050-200332

TOSHIBA

SERVICE MANUAL

COLOUR TELEVISION

29VH27E

AK52 Chassis

SM52-DRX_IF

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1.INTRODUCTION

11AK52 is a 100Hz flicker free colour television capable of driving 28”4:3/16:9, 32” 16:9, 33”4:3 and 29”4:3 real flat picture tubes.
The chassis is capable of operation in PAL, SECAM, NTSC (playback) colour standards and multiple transmission standards as B/G, D/K, I/I’, and L/L´.
Sound system output is supplying 2x10W (10%THD) for left and right outputs of 8ohm speakers.
TV supports the level 1.5 teletext standard. It is possible to decode transmissions including high graphical data.
The chassis is equipped with two full EuroScarts, one SCART for AV input/output, one front-AV input, one back-AV input, one headphone output, one SVHS input (via SCART and SVHS connector), two external speaker outputs (left and right).

2.TUNER

The hardware and software of the TV is suitable for tuners, supplied by different companies, which are selected from the Service Menu. These tuners can be combined VHF, UHF tuners suitable for CCIR systems B/G, H, L, L´, I/I´, and D/K. The tuning is available through the digitally controlled I^2C bus (PLL). Below you will find info on one of the Tuners in use.

General description of UV1316:
The UV1316 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L’, I and I’. The low IF output impedance has been designed for direct drive of a wide variety of SAW filters with sufficient suppression of triple transient.

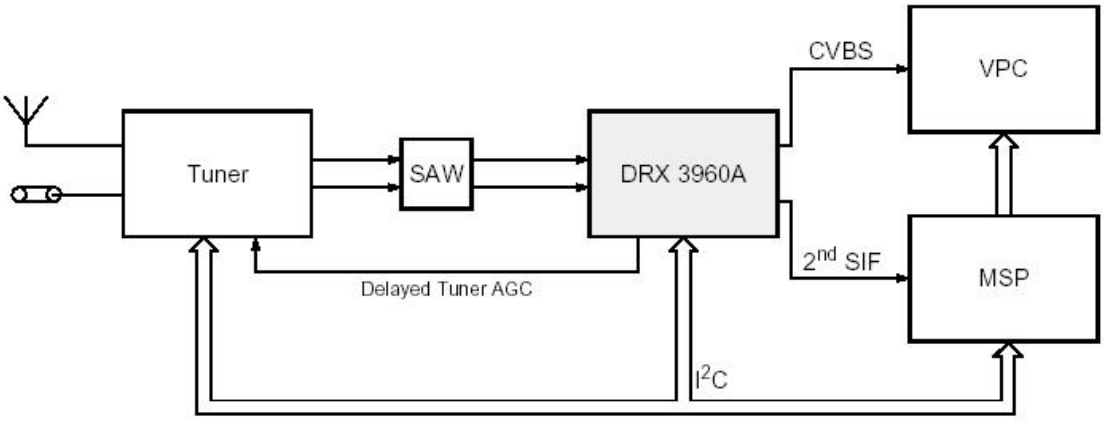
Features of UV1316:
1. Member of the UV1300 family small sized UHF/VHF tuners
2. Systems CCIR: B/G, H, L, L’, I and I’; OIRT: D/K
3. Digitally controlled (PLL) tuning via I^2C-bus
4. Off-air channels, S-cable channels and Hyperband
5. World standardized mechanical dimensions and world standard pinning
6. Compact size
7. Complies to “CENELEC EN55020” and “EN55013”

Pinning:

1.	Gain control voltage (AGC)	:	4.0V, Max: 4.5V
2.	Tuning voltage		
3.	I^2C-bus address select	:	Max: 5.5V
4.	I^2C-bus serial clock	:	Min:-0.3V, Max: 5.5V
5.	I^2C-bus serial data	:	Min:-0.3V, Max: 5.5V
6.	Not connected		
7.	PLL supply voltage	:	5.0V, Min: 4.75V, Max: 5.5V
8.	ADC input		
9.	Tuner supply voltage	:	33V, Min: 30V, Max: 35V
10.	Symmetrical IF output 1		
11.	Symmetrical IF output 2		

3.IF PART (DRX 3960A)

Tuner output IF signal is pre-filtered with only one 8-MHz channel SAW filter. The entire multistandard processing is performed. The Digital Receiver Front-end DRX 3960A performs the entire multi-standard Quasi Split Sound (QSS) TV IF processing, AGC, video demodulation, and generation of the second sound IF (SIF). Video and tuner AGC is controlled and adjusted by take over voltage. The alignment-free DRX 3960A needs no special external components. All control functions and status registers are accessible via I^2C bus interface.



4.VIDEO SWITCH TEA6415

In case of three or more external sources are used, the video switch IC TEA6415 is used. The main function of this device is to switch 8 video-input sources on the 6 outputs.
Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of sync. top for CVBS or black level for RGB signals).
Each nominal gain between any input and output is 6.5dB.For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, 5VDC on the input. Each input can be used as a normal input or as a MAC or Chroma input (with external Resistor Bridge). All the switching possibilities are changed through the BUS. Driving 75ohm load needs an external resistor. It is possible to have the same input connected to several outputs.

5.MULTI STANDARD SOUND PROCESSOR

The MSP34x1G family of single-chip Multi-standard Sound Processors covers the sound processing of all analog TV-Standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip. Signal conforming to the standard by the Broadcast Television Systems Committee (BTSC).
The DBX noise reduction, or alternatively, MICRONAS Noise Reduction (MNR) is performed alignment free. Other processed standards are the Japanese FM-FM multiplex standard (EIA-J) and the FM Stereo Radio standard.

6.SOUND OUTPUT STAGE WITH TDA7480L

The TDA7480L is an audio class-D amplifier assembled in Power DIP package specially designed for high efficiency applications mainly for TV and Home Stereo sets.
Mute stand-by function of the audio amplifier can be described as the following; the pin 12 (MUTE/STAND-BY) controls the amplifier status by two different thresholds, referred to ground. When Vpin 12 voltage is lower than 0.7V the amplifier is in Stand-by mode and the final stage generators are off. When Vpin 12 is higher than 4V, the amplifier is in play mode.
The TDA7480L is a 10W+10W stereo sound amplifier with mute/stand-by facility. MUTE control signal coming from microcontroller (when it is at high level) activates the mute function. IC is muted when mute pin is at low level (pin12). MUTE pin can also be activated via an external pop-noise circuitry in order to eliminate pop noise when TV is turned off. Just after the TV is turned off, this circuit switches the IC to stand-by mode by pulling the mute pin voltage to ground.

7.VERTICAL OUTPUT STAGE WITH TDA8177F

The IC TDA8177F is the vertical deflection booster circuit. Two supply voltages, +12V and -12V are needed to scan the inputs VERT+ and VERT-, respectively. And a third supply voltage, +60V for the flyback limiting are needed. The vertical deflection coil is connected in series between the output and feedback to the input.

8.VIDEO OUTPUT AMPLIFIER TDA6109

The TDA6109 includes three video output amplifiers in order to drive the three cathodes of a colour picture tube directly. To obtain maximum performance, the amplifier is used with black-current control.

9.POWER SUPPLY (SMPS)

The DC voltages required at various parts of the chassis are provided by an SMPS transformer controlled by the IC MC44608, which is designed for driving, controlling and protecting switching transistor of SMPS. The transformer generates 135V for FBT input, +/-14V for audio amplifier, 8V stand by voltage and 8V, 12V and 5V supplies for other different parts of the chassis.

An optocoupler is used to control the regulation of line voltage and stand-by power consumption. There is a regulation circuit in secondary side. This circuit produces a control voltage according to the changes in 135V DC voltage, via an optocoupler (TCET 1102G) to pin3 of the IC.

During the switch on period of the transistor, energy is stored in the transformer. During the switch off period energy is fed to the load via secondary winding. By varying switch-on time of the power transistor, it controls each portion of energy transferred to the second side such that the output voltage remains nearly independent of load variations.

10.MICROCONTROLLER SDA5550

10.1.General Features

• Feature selection via special function register
• Simultaneous reception of TTX, VPS, PDC, and WSS (line 23)
• Supply Voltage 2.5 and 3.3 V
• ROM version is used.

10.2.External Crystal and Programmable Clock Speed

• Single external 6MHz crystal, all necessary clocks are generated internally
• CPU clock speed selectable via special function registers.
• Normal Mode 33.33 MHz CPU clock, Power Save mode 8.33 MHz

10.3.Microcontroller Features

• 8bit 8051 instruction set compatible CPU.
• 33.33-MHz internal clock (max.)
• 0.360 ms (min.) instruction cycle
• Two 16-bit timers
• Watchdog timer
• Capture compare timer for infrared remote control decoding
• Pulse width modulation unit (2 channels 14 bit, 6 channels 8 bit)
• ADC (4 channels, 8 bit)
• UART (rxd, txd)

10.4.Memory

• Up to 128 Kilobyte on Chip Program ROM
• Eight 16-bit data pointer registers (DPTR)
• 256-bytes on-chip Processor Internal RAM (IRAM)
• 128bytes extended stack memory.
• Display RAM and TXT/VPS/PDC/WSS-Acquisition-Buffer directly accessible via MOVX
• UP to 16KByte on Chip Extended RAM (XRAM) consisting of;
- 1 Kilobyte on-chip ACQ-buffer-RAM (access via MOVX)
- 1 Kilobyte on-chip extended-RAM (XRAM, access via MOVX) for user software
- 3 Kilobyte Display Memory

10.5.Display Features

• ROM Character set supports all East and West European Languages in single device
• Mosaic Graphic Character Set
• Parallel Display Attributes
• Single/Double Width/Height of Characters
• Variable Flash Rate
• Programmable Screen Size (25 Rows x 33...64 Columns)
• Flexible Character Matrixes (HxV) 12 x 9...16
• Up to 256 Dynamical Redefinable Characters in standard mode; 1024 Dynamical Redefinable Characters in Enhanced Mode
• CLUT with up to 4096 colour combinations
• Up to 16 Colours per DRCS Character
• One out of 8 Colours for Foreground and Background Colours for 1-bit DRCS and ROM Characters

10.6.ROM Characters

• Shadowing
• Contrast Reduction
• Pixel by Pixel Shiftable Cursor With up to 4 Different Colours
• Support of Progressive Scan and 100 Hz.

• 3 X 4Bits RGB-DACs On-Chip
• Free Programmable Pixel Clock from 10 MHz to 32MHz
• Pixel Clock Independent from CPU Clock
• Multinorm H/V-Display Synchronization in Master or Slave Mode

10.7.Acquisition Features

• Multi-standard Digital Data Slicer
• Parallel Multi-norm Slicing (TTX, VPS, WSS, CC, G+)
• Four Different Framing Codes Available
• Data Caption only limited by available Memory
• Programmable VBI-buffer
• Full Channel Data Slicing Supported
• Fully Digital Signal Processing
• Noise Measurement and Controlled Noise Compensation
• Attenuation Measurement and Compensation
• Group Delay Measurement and Compensation
• Exact Decoding of Echo Disturbed Signals

10.8.Ports

• One 8-bit I/O-port with open drain output and optional I^2C Bus emulation support (Port0)
• Two 8-bit multifunction I/O-ports (Port1, Port3)
• One 4-bit port working as digital or analogue inputs for the ADC (Port2)
• One 2-bit I/O port with secondary function (P4.2, 4.3, 4.7)
• One 4-bit I/O-port with secondary function (P4.0, 4.1, 4.4) (Not available in P-SDIP 52)

11.SERIAL ACCESS 32K EEPROM

24LC32 is the 32Kbit electrically erasable programmable memory. The memory is compatible with the I^2C standard, two wire serial interface, which uses a bi-directional data bus and serial clock.

12.CLASS AB STEREO HEADPHONE DRIVER TDA1308

The TDA1308 is an integrated class AB stereo headphone driver contained in a DIP8 plastic package. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications.

13.SAW FILTERS

X6966M is an 8-MHz SAW Filter which is used for pre-filtering the IF input signal of DRX 3960A. The entire multistandard processing is performed within this filter which limits the signal bandwidth to 8 MHz and suppresses major parts of the adjacent channels.

14.IC DESCRIPTIONS

TDA6109
27W401
24LC32
SDA5275
DRAM 4MX4
SDA9400
LM317T
DDP3310
SDA5550
TEA6415
VPC3230D
TDA1308T
MSP3411G
TL431
DRX3960A
LM7808
BDX53BFI
TDA8177F
LM1086
MC44608
TCET1102G
TDA7480L
SAA3010T

14.1.TDA6109

14.1.1.General Description

The TDA6109JF includes three video output amplifiers in one plastic DIL-bent-SIL 9-pin medium power (DBS9MPF) package (SOT111-1), using high-voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

14.1.2.Features

· Typical bandwidth of 9.0 MHz for an output signal of 60 V (p-p)
· High slew rate of 1850 V/ms
· No external components required
· Very simple application
· Single supply voltage of 200 V
· Internal reference voltage of 2.5 V
· Fixed gain of 51
· Black-Current Stabilization (BCS) circuit
· Thermal protection.

14.1.3.Pinning

SYMBOL	PIN	DESCRIPTION
$V_{i(1)}$	1	inverting input 1
$V_{i(2)}$	2	inverting input 2
$V_{i(3)}$	3	inverting input 3
GND	4	ground (fin)
I_{om}	5	black current measurement output
V_{DD}	6	supply voltage
$V_{oc(3)}$	7	cathode output 3
$V_{oc(2)}$	8	cathode output 2
$V_{oc(1)}$	9	cathode output 1

14.2.27W401

14.2.1.Description

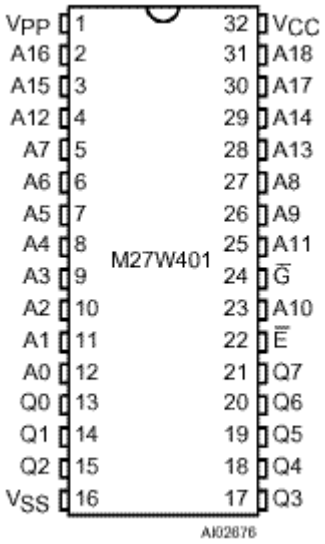
The M27W401 is a low voltage 4 Mbit EPROM offered in the two ranges UV (ultra violet erase) and OTP (one time programmable). It is ideally suited for microprocessor systems requiring large data or program storage and is organized as 524,288 by 8 bits. The M27W401 operates in the read mode with a supply voltage as low as 2.7V at –40 to 8??C temperature range. The decrease in operating power allows either a reduction of the size of the battery or an increase in the time between battery re-charges.
The FDIP32W (window ceramic frit-seal package) has a transparent lid, which allows the user to ex-pose the chip to ultraviolet light to erase the bit pat-tern. A new pattern can then be written to the device by following the programming procedure. For application where the content is programmed only one time and erasure is not required, the M27W401 is offered in PDIP32, PLCC32 and TSOP32 (8 x 20 mm) packages.

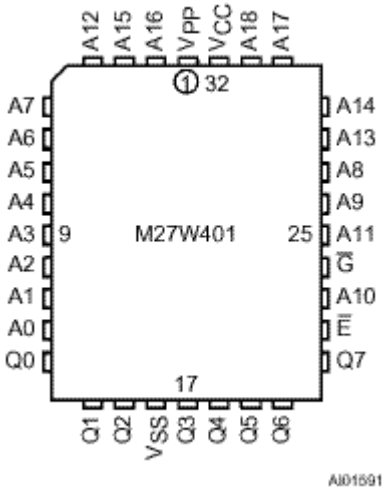
14.2.2.Features

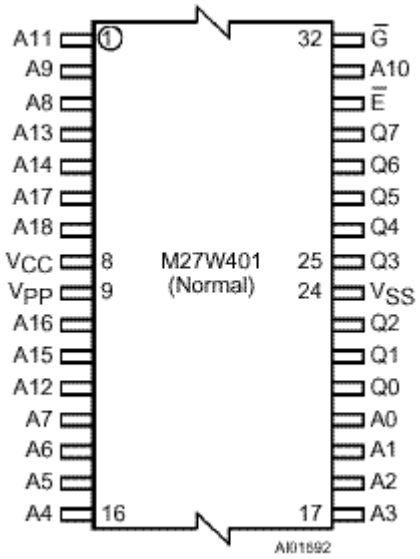
2.7V to 3.6v Low voltage in Read Operation
Access time:
–70ns at V_{CC} = 3.0V to 3.6V
–80ns at V_{CC} = 2.7V to 3.6V
Pin Compatible with M27C4001
Low Power Consumption:
–1?mA max Standby Current
– 15mA max Active Current at 5MHz
Programming Time 10?ns/byte
High Reliability CMOS Technology
– 2,000V ESD Protection
– 200mA Latchup Protection Immunity

Electronic Signature
– Manufacturer Code: 20h
– Device Code: 41h

14.2.3.Connections







DIP connections LCC Connections TSOP Connections

Signal Names

A0-A18	Address Inputs
Q0-Q7	Data Outputs
E	Chip Enable
G	Output Enable
V_{pp}	Program Supply
V_{cc}	Supply Voltage
V_{ss}	Ground

14.3.24LC32A

14.3.1.Description

The Microchip Technology Inc. 24LC32A is a 4K x 8 (32K bit) Serial Electrically Erasable PROM capable of operation across a broad voltage range (2.5V to 6.0V). It has been developed for advanced, low power applications such as personal communications or data acquisition. The 24LC32A also has a page-write capability of up to 32 bytes of data. The 24LC32A is capable of both random and sequential reads up to the 32K boundary. Functional address lines allow up to eight 24LC32A devices on the same bus, for up to 256K bits address space. Advanced CMOS technology and broad voltage range make this device ideal for low-power/ low-voltage, nonvolatile code and data applications. The 24LC32A is available in the standard 8-pin plastic DIP and both 150 mil and 200 mil SOIC packaging.

14.3.2.Features

• Single supply with operation down to 2.5V
• Maximum write current 3 mA at 6.0V
• Standby current 1 mA max at 2.5V
• 2-wire serial interface bus, I 2 CÔ compatible
• 100 kHz (2.5V) and 400 kHz (5V) compatibility
• Self-timed ERASE and WRITE cycles
• Power on/off data protection circuitry
• Hardware write protect
• 1,000,000 Erase/Write cycles guaranteed
• 32 byte page or byte write modes available

• Schmitt trigger filtered inputs for noise suppression
• Output slope control to eliminate ground bounce
• 2 ms typical write cycle time, byte or page
• Up to eight devices may be connected to the same bus for up to 256K bits total memory
• Electrostatic discharge protection > 4000V
• Data retention > 200 years
• 8-pin PDIP and SOIC packages
• Temperature ranges
• Commercial (C): 0°C to +75°C
• Industrial (I): -40°C to +85°C

14.3.3.Pin Descriptions

A0, A1, A2 Chip Address Inputs
The A0..A2 inputs are used by the 24LC32A for multiple device operation and conform to the 2-wire bus standard. The levels applied to these pins define the address block occupied by the device in the address map. A particular device is selected by transmitting the corresponding bits (A2, A1, A0) in the control byte.

SDA Serial Address/Data Input/Output
This is a Bi-directional pin used to transfer addresses and data into and data out of the device. It is an open drain terminal, therefore the SDA bus requires a pull up resistor to VCC (typical 10 kO for 100 kHz, 2 kO for 400 kHz) For normal data transfer SDA is allowed to change only during SCL low. Changes during SCL HIGH are reserved for indicating the START and STOP conditions.

SCL Serial Clock
This input is used to synchronize the data transfer from and to the device.
WP
This pin must be connected to either VSS or VCC. If tied to VSS, normal memory operation is enabled (read/write the entire memory 000-FFF). If tied to VCC, WRITE operations are inhibited. The entire memory will be write-protected. Read operations are not affected.
WCC
+2.5V to 6V Power Supply
WSS
Ground

14.4.SDA5275

14.4.1.Features

• Single chip teletext IC
• Analog CVBS-input with onchip clamping circuitry
• Slicer
• Supports level 1, 2.5 and 3.5 ETSI teletext standard
• Stores up to 14 teletext pages on chip
• Stores up to 2048 teletext pages with external 16 M memory
• SDA 5275: full level 2.5 processing
• Analog RGB-output
• 41 Latin script languages
• 12 ´ 10 character size
• Parallel display attributes
• 64 from 4096 colors selectable
• Enhanced flash modes
• Dynamically redefinable character set (DRCS, PCS)
• Pixel graphics
• Full screen display (64 ´ 32 or 80 ´ 24 character positions)
• Horizontal and vertical scrolling
• Graphic cursors
• 4:3 and 16:9 display
• Multinorm display (50/60/100/120 Hz)
• RISC-processor
• Firmware downloadable
• I^2C / 3 wire UART-interface (1 Mbit/s)
• Independent clocks for acquisition and display

• Tools for greatly simplified software development
• 24-Kbyte on-chip reconfigurable DRAM
• 44160-bit character ROM
• One external crystal for all standards

14.4.2.Pin Definition and functions

Pin No. P-LCC-68-1	Symbol	Function
1	INTQ	Interrupt request output to ext. controller
2	CLK-IO	System clock input/output
3	TCSQ/FLD	Composite sync output/ field output
4	VS/VCS	Vertical sync input/output
5	HS	Horizontal sync input/output
6	XOUT	20.5-MHz crystal oscillator output
7	XIN	20.5-MHz crystal oscillator input
8	GPO	General purpose output
9	TM	Test pin, leave open or connect VSS
10	CVBS	CVBS-video signal input
11	VDD1	+ 5 V digital supply
12	VDDA	+ 5 V analog supply
13	VSSA1	Analog ground
14	N.C.	Not connected
15	N.C.	Not connected
16	VDD2	+ 5 V digital supply
17	RES	Chip reset
18	N.C.	Not connected
19	N.C.	Not connected
20	N.C.	Not connected
21	VDD3	+ 5 V digital supply
22	N.C.	Not connected
23	VREF	+ 3 V reference voltage input
24	N.C.	Not connected
25	VDD4	+ 5 V digital supply
26	A8	External DRAM-address
27	A7	External DRAM-address
28	A6	External DRAM-address
29	A5	External DRAM-address
30	A4	External DRAM-address
31	A3	External DRAM-address
32	A2	External DRAM-address
33	A1	External DRAM-address
34	A0	External DRAM-address
35	A9	External DRAM-address
36	A10	External DRAM-address
37	A11	External DRAM-address
38	RASQ	Row address strobe (DRAM)
39	WEQ	Write enable (DRAM)
40	D1	External DRAM-data
41	D0	External DRAM-data
42	D2	External DRAM-data
43	D3	External DRAM-data
44	VSS4	0 V digital supply
45	CASQ	Column address strobe
46	N.C.	Not connected
47	N.C.	Not connected
48	N.C.	Not connected
49	VSS3	0 V digital supply
50	N.C.	Not connected
51	N.C.	Not connected
52	N.C.	Not connected
53	N.C.	Not connected
54	N.C.	Not connected
55	VSS2	0 V digital supply
56	VBB	Substrate bias voltage N.C.* (depends on version)
57	N.C.	Not connected

58	VSSA2	Analog ground
59	RGB-GND	RGB-ground
60	VSS1	0 V digital supply
61	R	Analog red display output
62	G	Analog green display output
63	B	Analog blue display output
64	BLAN	Blanking signal open drain output
65	CORQ	Contrast reduction open drain output
66	SCL	Bi-directional I^2C Bus clock port
67	SDA	Bi-directional I^2C Bus data port
68	I^2CEN	I^2C Bus enable

14.5.DRAM 4MX4

14.5.1.General Description

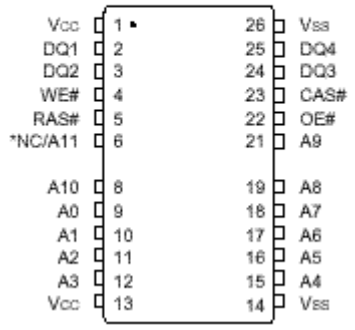
The 4 Meg x 4 DRAM is a randomly accessed, solid-state memory containing 16,777,216 bits organized in a x4 con-figuration. RAS# is used to latch the row address (first 11 bits for 2K and first 12 bits for 4K). Once the page has been opened by RAS#, CAS# is used to latch the column address (the latter 11 bits for 2K and the latter 10 bits for 4K, address pins A10 and A11 are “don’t care”). READ and WRITE cycles are selected with the WE# input. A logic HIGH on WE# dictates READ mode, while a logic LOW on WE# dictates WRITE mode. During a WRITE cycle, data-in (D) is latched by the falling edge of WE# or CAS#, whichever occurs last. An EARLY WRITE occurs when WE# is taken LOW prior to CAS# falling. A LATE WRITE or READ-MODIFY-WRITE occurs when WE# falls after CAS# is taken LOW. During EARLY WRITE cycles, the data outputs (Q) will remain High-Z regardless of the state of OE#. During LATE WRITE or READ-MODIFY-WRITE cycles, OE# must be taken HIGH to disable the data outputs prior to applying input data. If a LATE WRITE or READ-MODIFY-WRITE is attempted while keeping OE# LOW, no write will occur, and the data outputs will drive read data from the accessed location. The four data inputs and the four data outputs are routed through four pins using common I/O, and pin direction is controlled by WE# and OE#.

14.5.2.Features

- Industry-standard x4 pin out, timing, functions and packages
- State-of-the-art, high-performance, low-power CMOS silicon-gate process
- Single power supply (+3.3V ±0.3V or +5V ±10%)
- All inputs, outputs and clocks are TTL-compatible
- Refresh modes: RAS#-ONLY, HIDDEN and CAS#-BEFORE - RAS# (CBR)
- Optional Self Refresh (S) for low-power data retention
- 11 row, 11 column addresses (2K refresh) or 12 row, 10 column addresses (4K refresh)
- Extended Data-Out (EDO) PAGE MODE access cycle
- 5V-tolerant inputs and I/Os on 3.3V devices

14.5.3.Pin Assignment

24/26-Pin SOJ
(DA-2)



Top View

*NC on 2K refresh and A11 on 4K refresh options. **Note:** The “#” symbol indicates signal is active LOW.

14.6.SDA9400

14.6.1.General Description

The SDA9400 is a new component of the Micronas MEGAVISION ® IC set in a 0.35µm embedded DRAM technology (frame memory embedded). The SDA9400 is pin compatible to the SDA9401 (field memory embedded). The SDA9400 comprises all main functionalities of a digital feature box in one monolithic IC. The scan rate conversion to 100/120 Hz interlaced (50/60 Hz progressive) is based on a motion adaptive algorithm. The scan rate converted picture can be vertically expanded. The SDA9400 has a free running mode, therefore features like scan rate conversion to e.g. 70, 75 Hz with joint lines or multiple picture display (e.g. tuner scan) are possible. Due to the frame based signal processing, the noise reduction has been greatly improved. Furthermore separate motion detectors for luminance and chrominance have been implemented. For automatic controlling of the noise reduction parameters a noise measurement algorithm is included, which measures the noise level in the picture or in the blanking period. In addition a spatial noise reduction is implemented, which reduces the noise even in the case of motion. The input signal can be compressed horizontally and vertically with a certain number of factors. Therefore split screen is supported. Beside these additional functions like coloured background, windowing and flashing are implemented.

14.6.2.Features

• Two input data formats
- 4:2:2 luminance and chrominance parallel (2 x 8 wires)
- ITU-R 656 data format (8 wires)

• Two different representations of input chrominance data
- 2's complement code
- Positive dual code

• Flexible input sync controller

• Flexible compression of the input signal
- Digital vertical compression of the input signal (1.0, 1.25, 1.5, 1.75, 2.0, 3.0, 4.0)
- Digital horizontal compression of the input signal (1.0, 2.0, 4.0)

• Noise reduction
- Motion adaptive spatial and temporal noise reduction (3D-NR)
- Temporal noise reduction for luminance frame based or field based
- Temporal noise reduction for chrominance field based
- Separate motion detectors for luminance and chrominance
- Flexible programming of the temporal noise reduction parameters
- Automatic measurement of the noise level (5-bit value, readable by I²C bus)

• 3-D motion detection
- High performance motion detector for scan rate conversion
- Global motion detection flag (readable by I²C bus)
- Movie mode and phase detector (readable by I²C bus)

• TV mode detection by counting line numbers (PAL, NTSC, readable by I²C bus)

• Embedded memory
- 5 Mbit embedded DRAM core for field memories
- 192 kbit embedded DRAM core for line memories

• Flexible clock and synchronization concept
- Decoupling of the input and output clock system possible

• Scan rate conversion
- Motion adaptive 100/120 Hz interlaced scan conversion
- Motion adaptive 50/60 Hz progressive scan conversion
- Simple static interlaced and progressive conversion modes for 100/120 Hz interlaced or 50/60 Hz progressive scan conversion: e.g. ABAB, AABB, AA*B*B, AAAA, BBBB, AB, AA*
- Simple progressive scan conversion with joint lines:
50 Hz -> 60, 70, 75 Hz progressive
60 Hz -> 70, 75 Hz progressive
- Large area and line flicker reduction

• Flexible digital vertical expansion of the output signal (1.0, ... [1/32] ..., 2.0)

• Flexible output sync controller
- Flexible positioning of the output signal
- Flexible programming of the output sync raster
- External synchronization by backend IC possible
(e.g. split screen for one TV channel with joint lines and one PC VGA channel)

• **Signal manipulations**
- Insertion of coloured background
- Vertical and/or horizontal windowing with four different speed factors
- Flash generation (for supervising applications, motion flag readable by I²C bus)
- Still frame or field
- Support of split screen applications
- Multiple picture display - Tuner scan (4 and 16 times for 4:3, 12 times for 16:9 tubes)
- Support of multi picture display with PIP or front-end processor with integrated scaler
(e.g. 9 times display of PIP pictures, picture tracking, random pictures, still-in-moving picture, moving-in-still picture)
• I²C-bus control (400 kHz)
• P-MQFP-64 package
• 3.3 V ± 5% supply voltage

14.6.3.Pin Definition

Pin No.	Name	Type	Description
2,8,24,42,55	VSS1	S	Supply voltage (*V* SS = 0 V)
9,25,41,56	VDD1	S	Supply voltage (*V* DD = 3.3 V)
36,52,58	VSS2	S	Supply voltage (*V* SS = 0 V)
35,51,53,57,59	VDD2	S	Supply voltage (*V* DD = 3.3 V)
43,..,50	YIN0...7	I/TTL	Data input Y (see input data format)
31,..,34;37,...,40	UVIN0...7	I/TTL PD	Data input UV (for 4:2:2 parallel, see input data format) (for CCIR 656, see input data format)
30	RESET	I/TTL	System reset. The RESET input is low active. In order to ensure correct operation a "Power On Reset" must be performed. The RESET pulse must have a minimum duration of two clock periods of the system clock CLK1.
23	HIN	I/TTL PD	H-Sync input (only for full CCIR 656)
22	VIN	I/TTL PD	V-Sync input (only for full CCIR 656)
29	SYNCEN	I/TTL	Synchronization enable input
21	SDA	I/O	I²C-Bus data line (5V ability)
20	SCL I	I	I²C-Bus clock line (5V ability)
54	CLK1	I/TTL	System clock 1
17,..,10	UVOUT0...7	O/TTL	Data output UV (see output data format)
7,..,3;1;64;63	YOUT0...7	O/TTL	Data output Y (see output data format)
62	HREF	O/TTL	Horizontal active video output
61	VOUT/ VEXT	I/O/ TTL	EXSYN=0 (I²C-bus parameter): V-Sync output EXSYN=1: External V-Sync input for output part
60	HOUT/ HEXT	I/O/ TTL	EXSYN=0 (I²C-bus parameter): H-Sync output EXSYN=1: External H-Sync input for output part
18	INTERLACED	O/TTL	Interlace signal for AC coupled vertical deflection
28	X1 / CLK2	I/TTL	Crystal connection / System clock 2
27	X2	O/AN	Crystal connection
26	CLKOUT	O/TTL	Clock output (depends on I²C parameters CLK11EN, CLK21EN, FREQR)
19	TEST	I/TTL	Test input, connect to *V* SS for normal operation

14.7.LM317T

14.7.1.Description

The LM317T is an adjustable 3 terminal positive voltage regulator capable of supplying in excess of 1.5 amps over an output range of 1.25 to 37 volts. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage. Further, it employs internal current limiting, thermal shutdown and safe area compensation, making it essentially blow–out proof. The LM317 serves a wide variety of applications including local, on card regulation. This device can also be used to make a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, the LM317 can be used as a precision current regulator.

14.7.2.Features

• Output Current in Excess of 1.5 A

• Output Adjustable between 1.2 V and 37 V
• Internal Thermal Overload Protection
• Internal Short Circuit Current Limiting Constant with Temperature
• Output Transistor Safe–Area Compensation
• Floating Operation for High Voltage Applications
• Available in Surface Mount D^2PAK, and Standard 3–Lead Transistor Package
• Eliminates Stocking many Fixed Voltages

14.8.DDP3310

14.8.1.Description

The DDP 3310B is a single-chip digital Display and Deflection Processor designed for high-quality back-end applications in 100/120-Hz TV sets with 4:3 or 16:9 picture tubes. The IC can be combined with members of the DIGIT 3000 IC family (VPC 32xx, TPU 3040), or it can be used with third-party products. The IC contains the entire digital video component and deflection processing and all analog interface components.

14.8.2.Features

Video processing

– linear horizontal scaling (0.25 … 4)
– non-linear horizontal scaling “panorama-vision”
– dynamic peaking
– soft limiter (gamma correction)
– color transient improvement
– programmable RGB matrix
– picture frame generator
– two analog RGB/Fast-Blank inputs. The DDP 3310B is a single-chip digital Display and Deflection Processor designed for high-quality back-

Deflection processing

– scan velocity modulation output
– high-performance H/V deflection
– EHT compensation for vertical / East/West
– soft start/stop of H-Drive
– vertical angle and bow
– differential vertical output
– vertical zoom via deflection
– horizontal and vertical protection circuit
– adjustable horizontal frequency for VGA/SVGA display

Miscellaneous

– selectable 4:1:1/ 4:2:2 YC $_r$ C $_b$ input
– selectable 27/ 32-MHz line-locked clock input
– crystal oscillator for horizontal protection
– automatic picture tube adjustment (cutoff, white-drive)
– single 5-V power supply
– hardware for simple 50/60-Hz to 100/ 120-Hz conversion (display frequency doubling)
– two I^2C-controlled PWM outputs
– beam current limiter

14.8.3.Pin connection and short descriptions

NC = not connected
X = obligatory; connect as described in circuit diagram
OUT = Output
LV = if not used, leave vacant
IN = Input
SUPPLY = Supply Pin

Pin no PLCCK 68 pin	Pin name	Type	Connection (if not used)	Short description
1	VSUPP	SUPPLY	X	Supply voltage, Output pin driver
2	GNDP	SUPPLY	X	Ground, Output pin driver
3	VS2	IN	GNDD	Additional VSYNC input
4	FIFORRD	OUT	LV	FIFO Read counter reset

5	FIFORD	OUT	LV	FIFO Read Enable
6	FIFOWR	OUT	LV	FIFO Write Enable
7	FIFORWR	OUT	LV	FIFO Write counter reset
8	HOUT	OUT	X	Horizontal Drive Output
9	HFLB	IN	Hout	Horizontal Flyback Input
10	SAFETY	IN	GNDO	Safety Input
11	VPROT	IN	GNDO	Vertical protection Input
12	FREQSEL	IN	X	Selection of H-Drive Frequency Range
13	CM1	IN	X	Clock select 40.5 or 27/32 MHz
14	CMO	IN	X	Clock select 27/32 MHz
15	RSW2	OUT	LV	Range Switch2, Measurement ADC
16	RSW1	IN/OUT	LV	Range Switch1, Measurement ADC
17	SENSE	IN	GNDO	Sense ADC Input
18	GNDM	SUPPLY	X	Ground, MADC Input
19	VERT+	OUT	GNDO	Differantial Vertical Sawtooth Output
20	VERT-	OUT	GNDO	Differantial Vertical Sawtooth Output
21	EW	OUT	GNDO	Vertical Parabola Output
22	XREF	IN	X	Reference Input for RGB DACs
23	SVM	OUT	VSUPO	Scan Velocity Modulation
24	ROUT	OUT	VSUPO	Analog Output Red
25	GOUT	OUT	VSUPO	Analog Output Green
26	BOUT	OUT	VSUPO	Analog Output Blue
27	GNDO	SUPPLY	X	Ground, Analog Back-end
28	VSUPO	SUPPLY	X	Supply Voltage, Analog Back-end
29	VRD/BCS	IN	X	DAC Reference, Beam Current Safety
30	FBLIN1	IN	GNDO	Fast-Blank1 Input
31	RIN1	IN	GNDO	Analog Red1 Input
32	GIN1	IN	GNDO	Analog Green1 Input
33	BIN1	IN	GNDO	Analog Blue1 Input
34	FBLIN2	IN	GNDO	Fast-Blank2 Input
35	RIN2	IN	GNDO	Analog Red2 Input
36	GIN2	IN	GNDO	Analog Green2 Input
37	BIN2	IN	GNDO	Analog Blue2 Input
38	TEST	IN	GNDD	Test Pin
39	RESQ	IN	X	Reset Input, active low
40	PWM1	OUT	LV	I^2C-controlled DAC
41	PWM2	OUT	LV	I^2C-controlled DAC
42	HCS	IN	GNDD	Half-contrast
43	C0	IN	GNDD	Picture Bas Chroma (LSB)
44	C1	IN	GNDD	Picture Bas Chroma
45	C2	IN	GNDD	Picture Bas Chroma
46	C3	IN	GNDD	Picture Bas Chroma
47	C4	IN	GNDD	Picture Bas Chroma
48	C5	IN	GNDD	Picture Bas Chroma
49	C6	IN	GNDD	Picture Bas Chroma
50	C7	IN	GNDD	Picture Bas Chroma (MSB)
51	VSUPD	SUPPLY	X	Supply Voltage, Digital Circuitry
52	GNDD	SUPPLY	X	Ground, Digital Circuitry
53	LLC2	IN	X	System Clock Input (27/32/40.5 MHz)
54	Y0	IN	GNDD	Picture Bas Luma (LSB)
55	Y1	IN	GNDD	Picture Bas Luma
56	Y2	IN	GNDD	Picture Bas Luma
57	Y3	IN	GNDD	Picture Bas Luma
58	Y4	IN	GNDD	Picture Bas Luma
59	Y5	IN	GNDD	Picture Bas Luma
60	Y6	IN	GNDD	Picture Bas Luma
61	Y7	IN	GNDD	Picture Bas Luma (MSB)
62	LLC1	IN	VSUPD	Single Line-Locked Clock Input (13.5/16 MHz)
63	HS	IN	X	Horizontal Sync Input
64	VS	IN	GNDD	Vertical Sync Input
65	XTALK2	OUT	X	Analog Crystal Output (5-MHz Security Clock)
66	XTALK1	IN	X	Analog Crystal Input (5-MHz Security Clock)
67	SDA	IN/OUT	X	I^2C-Bus Data
68	SCL	IN/OUT	X	I^2C-Bus Clock

14.9.SDA5550

14.9.1.General definition

The SDA5550M is a single chip teletext decoder for decoding World System Teletext data as well as Video Programming System (VPS), Program Delivery Control (PDC), and Wide Screen Signalling (WSS) data used for PAL plus transmissions (Line 23). The device provides an integrated general-purpose, fully 8051-compatible Microcontroller with television specific hardware features. Microcontroller has been enhanced to provide powerful features such as memory banking, data pointers, and additional interrupts etc. The on-chip display unit for displaying Level 1.5 teletext data can also be used for customer defined on screen displays. Internal XRAM consists of up to 17 Kbytes. This device can support external memory up to 1Mbyte ROM and RAM.TVTEXT Controller contains a data slicer for VPS, WSS, PDC and TXT, an acceleration acquisition hardware module, a display generator for Level 1.5 TXT and powerful On screen Display capabilities based on parallel attributes, and pixel oriented characters (DRCS). The 8 bit Microcontroller operates at 360nsec cycle time (min). Controller with dedicated hardware does most of the internal TXT acquisition processing, transfer data to/from external memory interface and receives/transmits data via I^2C-firmware user interface. SDA5550M is realized in 0.25 micron technology with 2.5V supply voltage and 3.3V I/O compatible. The IC produces the following input or output control signals; AGC_CON, MODE_SW, L / L', PIP_MODS, PIP_SEL, ON/OFF (stand-by), SC1..3_IN_AV (pin 8 information from 3 SCARTs), AFC, MUTE (to mute audio output IC), I^2CEN.

14.9.2.Features

General

- Feature selection via special function register
- Simultaneous reception of TTX, VPS, PDC, and WSS (line 23)
- Supply Voltage 2.5 and 3.3 V

External Crystal and Programmable clock speed

Single external 6MHz crystal, all necessary clocks are generated internally
CPU clock speed selectable via special function registers.
Normal Mode 33.33 MHz CPU clock, Power Save mode 8.33 MHz

Microcontroller Features

- 8bit 8051 instruction set compatible CPU.
- 33.33-MHz internal clock (max.)
- 0.360ms (min.) instruction cycle
- Two 16-bit timers
- Watchdog timer
- Capture compare timer for infrared remote control decoding
- Pulse width modulation unit (2 channels 14 bit, 6 channels 8 bit)
- ADC (4 channels, 8 bit)
- UART

Memory

- Non-multiplexed 8-bit data and 16 … 20-bit address bus (ROMless Version)
- Memory banking up to 1Mbyte (Romless version)
- Up to 128 Kilobyte on Chip Program ROM
- Eight 16-bit data pointer registers (DPTR)
- 256-bytes on-chip Processor Internal RAM (IRAM)
- 128bytes extended stack memory.
- Display RAM and TXT/VPS/PDC/WSS-Acquisition-Buffer directly accessible via MOVX
- UP to 16KByte on Chip Extended RAM (XRAM) consisting of;
- 1 Kilobyte on-chip ACQ-buffer-RAM (access via MOVX)
- 1 Kilobyte on-chip extended-RAM (XRAM, access via MOVX) for user software
- 3 Kilobyte Display Memory

Display Features

- ROM Character Set Supports all East and West European Languages in single device
- Mosaic Graphic Character Set
- Parallel Display Attributes
- Single/Double Width/Height of Characters

• Variable Flash Rate
• Programmable Screen Size (25 Rows x 33...64 Columns)
• Flexible Character Matrixes (HxV) 12 x 9...16
• Up to 256 Dynamical Redefinable Characters in standard mode; 1024 Dynamical Redefinable Characters in Enhanced Mode
• CLUT with up to 4096 color combinations
• Up to 16 Colors per DRCS Character
• One out of Eight Colors for Foreground and Background Colors for 1-bit DRCS and ROM Characters
• Shadowing
• Contrast Reduction
• Pixel by Pixel Shiftable Cursor With up to 4 Different Colors
• Support of Progressive Scan and 100 Hz.
• 3 X 4Bits RGB-DACs On-Chip
• Free Programmable Pixel Clock from 10 MHz to 32MHz
• Pixel Clock Independent from CPU Clock
• Multinorm H/V-Display Synchronization in Master or Slave Mode

Acquisition Features
• Multistandard Digital Data Slicer
• Parallel Multi-norm Slicing (TTX, VPS, WSS, CC, G+)
• Four Different Framing Codes Available
• Data Caption only Limited by available Memory
• Programmable VBI-buffer
• Full Channel Data Slicing Supported
• Fully Digital Signal Processing
• Noise Measurement and Controlled Noise Compensation
• Attenuation Measurement and Compensation
• Group Delay Measurement and Compensation
• Exact Decoding of Echo Disturbed Signals

Ports
• One 8-bit I/O-port with open drain output and optional I^2C Bus emulation support (Port 0)
• Two 8-bit multifunction I/O-ports (Port 1, Port 3)
• One 4-bit port working as digital or analog inputs for the ADC (Port 2)
• One 2-bit I/O port with secondary functions (P4.2, 4.3, 4.7)
• One 4-bit I/O-port with secondary function (P4.0, 4.1, 4.4) (Not available in P-SDIP 52)

14.10.TEA6415C

14.10.1.General Description

The main function of the IC is to switch 8 video input sources on 6 outputs. Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of synch. top for CVBS or black level for RGB signals). Each nominal gain between any input and output is 6.5dB. For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, 5 V_{DC} on the input. Each input can be used as a normal input or as a MAC or Chroma input (with external resistor bridge). All the switching possibilities are changed through the BUS. Driving 75? load needs an external transistor. It is possible to have the same input connected to several outputs. The starting configuration upon power on (power supply: 0 to 10V) is undetermined. In this case, 6 words of 16 bits are necessary to determine one configuration. In other case, 1 word of 16 bits is necessary to determine one configuration.

14.10.2.Features

• 20MHz Bandwidth
• Cascadable with another TEA6415C (Internal address can be changed by pin 7 voltage)
• 8 Inputs (CVBS, RGB, MAC, CHROMA,...)
• 6 Outputs
• Possibility of MAC or chroma signal for each input by switching-off the clamp with an external resistor bridge
• Bus controlled
• 6.5dB gain between any input and output
• 55dB crosstalk at 5mHz

• Fully ESD protected

14.10.3.Pinning

1. Input : Max : 2Vpp, Input Current: 1mA, Max: 3mA
2. Data : Low level : -0.3V Max: 1.5V,
   High level : 3.0V Max : Vcc+0.5V
3. Input : Max : 2Vpp, Input Current: 1mA, Max : 3mA
4. Clock : Low level : -0.3V Max: 1.5V,
   High level : 3.0V Max : Vcc+0.5V
5. Input : Max : 2Vpp, Input Current: 1mA, Max: 3mA
6. Input : Max : 2Vpp, Input Current: 1mA, Max: 3mA
7. Prog
8. Input : Max : 2Vpp, Input Current: 1mA, Max: 3mA
9. Vcc : 12V
10. Input : Max : 2Vpp, Input Current: 1mA, Max: 3mA
11. Input : Max : 2Vpp, Input Current: 1mA, Max: 3mA
12. Ground
13. Output : 5.5Vpp, Min : 4.5Vpp
14. Output : 5.5Vpp, Min : 4.5Vpp
15. Output : 5.5Vpp, Min : 4.5Vpp
16. Output : 5.5Vpp, Min : 4.5Vpp
17. Output : 5.5Vpp, Min : 4.5Vpp
18. Output : 5.5Vpp, Min : 4.5Vpp
19. Ground
20. Input : Max : 2Vpp, Input Current: 1mA, Max : 3mA

14.11.VPC3230D

14.11.1.General Description

The VPC 323xD is a high-quality, single-chip video front-end, which is targeted for 4:3 and 16:9, 50/60-Hz and 100/120 Hz TV sets. It can be combined with other members of the DIGIT3000 IC family (such as DDP 331x) and/or it can be used with 3rd-party products. The main features of the VPC 323xD are;
– high-performance adaptive 4H comb filter Y/C separator with adjustable vertical peaking
– multi-standard color decoder PAL/NTSC/SECAM including all substandards
– four CVBS, one S-VHS input, one CVBS output
– two RGB/YC $_r$C $_b$ component inputs, one Fast Blank (FB) input
– integrated high-quality A/D converters and associated clamp and AGC circuits
– multi-standard sync processing
– linear horizontal scaling (0.25 ... 4), as well as non-linear horizontal scaling ‘Panorama-vision’
– PAL+ preprocessing
– line-locked clock, data and sync, or 656-output interface
– peaking, contrast, brightness, color saturation and tint for RGB/ YC $_r$C $_b$ and CVBS/ S-VHS
– high-quality soft mixer controlled by Fast Blank
– PIP processing for four picture sizes (1/4, 1/9, 1/16 or 1/36 of normal size) with 8-bit resolution
– 15 predefined PIP display configurations and expert mode (fully programmable)
– control interface for external field memory
– I^2C-bus interface
– one 20.25-MHz crystal, few external components
– 80-pin PQFP package

14.11.2.Pin Connections and Short Descriptions

NC = not connected
LV = if not used, leave vacant
X = obligatory; connect as described in circuit diagram
SUPPLYA = 4.75...5.25 V, SUPPLYD = 3.15...3.45 V

Pin No. PQFP 80-pin	Pin Name	Type	Connection (if not used)	Short Description
1	B1/CB1IN	IN	VREF	Blue1/Cb1 Analog Component Input
2	G1/Y1IN	IN	VREF	Green1/Y1 Analog Component Input

3	R1/CR1IN	IN	VREF	Read1/Cr1 Analog Component Input
4	B2/CB2IN	IN	VREF	Blue2/Cb2 Analog Component Input
5	G2/Y2IN	IN	VREF	Green2/Y2 Analog Component Input
6	R2/CR2IN	IN	VREF	Read2/Cr2 Analog Component Input
7	ASGF		X	Analog Shield GND_F
8	FFRSTWIN	IN	LV or GND_D	FIFO Reset Write Input
9	V_{SUPCAP}	OUT	X	Digital Decoupling Circuitry Supply Voltage
10	V_{SUPD}	SUPPLYD	X	Supply Voltage, Digital Circuitry
11	GND_D	SUPPLYD	X	Ground, Digital Circuitry
12	GND_{CAP}	OUT	X	Digital Decoupling Circuitry GND
13	SCL	IN/OUT	X	I^2C Bus Clock
14	SDA	IN/OUT	X	I^2C Bus Data
15	RESQ	IN	X	Reset Input, Active Low
16	TEST	IN	GND_D	Test Pin, connect to GND_D
17	VGAV	IN	GND_D	VGAV Input
18	YCOEQ	IN	GND_D	Y/C Output Enable Input, Active Low
19	FFIE	OUT	LV	FIFO Input Enable
20	FFWE	OUT	LV	FIFO Write Enable
21	FFRSTW	OUT	LV	FIFO Reset Write/Read
22	FFRE	OUT	LV	FIFO Read Enable
23	FFOE	OUT	LV	FIFO Output Enable
24	CLK20	IN/OUT	LV	Main Clock output 20.25 MHz
25	GND_{PA}	OUT	X	Pad Decoupling Circuitry GND
26	V_{SUPPA}	OUT	X	Pad Decoupling Circuitry Supply Voltage
27	LLC2	OUT	LV	Double Clock Output
28	LLC1	IN/OUT	LV	Clock Output
29	V_{SUPLLC}	SUPPLYD	X	Supply Voltage, LLC Circuitry
30	GND_{LLC}	SUPPLYD	X	Ground, LLC Circuitry
31	Y7	OUT	GND_Y	Picture Bus Luma (MSB)
32	Y6	OUT	GND_Y	Picture Bus Luma
33	Y5	OUT	GND_Y	Picture Bus Luma
34	Y4	OUT	GND_Y	Picture Bus Luma
35	GND_Y	SUPPLYD	X	Ground, Luma Output Circuitry
36	V_{SUPY}	SUPPLYD	X	Supply Voltage, Luma Output Circuitry
37	Y3	OUT	GND_Y	Picture Bus Luma
38	Y2	OUT	GND_Y	Picture Bus Luma
39	Y1	OUT	GND_Y	Picture Bus Luma
40	Y0	OUT	GND_Y	Picture Bus Luma (LSB)
41	C7	OUT	GND_C	Picture Bus Chroma (MSB)
42	C6	OUT	GND_C	Picture Bus Chroma
43	C5	OUT	GND_C	Picture Bus Chroma
44	C4	OUT	GND_C	Picture Bus Chroma
45	V_{SUPC}	SUPPLYD	X	Supply Voltage, Chroma Output Circuitry
46	GND_C	SUPPLYD	X	Ground, Chroma Output Circuitry
47	C3	OUT	GND_C	Picture Bus Chroma
48	C2	OUT	GND_C	Picture Bus Chroma
49	C1	OUT	GND_C	Picture Bus Chroma
50	C0	OUT	GND_C	Picture Bus Chroma (LSB)
51	GND_{SY}	SUPPLYD	X	Ground Sync Pad Circuitry
52	V_{SUPSY}	SUPPLYD	X	Supply Voltage, Sync Pad Circuitry
53	INTLC	OUT	LV	Interlace Output
54	AVO	OUT	LV	Active Video Output
55	FSY/HC/HSYA	OUT	LV	Front Sync/ Horizontal Clamp Pulse/Front-End Horizontal Sync Output
56	MSY/HS	IN/OUT	LV	Main Sync/Horizontal Sync Pulse
57	VS	OUT	LV	Vertical Sync Pulse
58	FPDAT/VSYA	IN/OUT	LV	Front End/Back-End Data/Front-End Vertical Sync Output
59	V_{STBYY}	SUPPLYA	X	Standby Supply Voltage
60	CLK5	OUT	LV	CCU 5 MHz Clock Output
61	NC	-	LV or GND_D	Not Connected
62	XTAL1	IN	X	Analog Crystal Input
63	XTAL2	OUT	X	Analog Crystal Output
64	ASGF		X	Analog Shield GND_F
65	GND_F	SUPPLYA	X	Ground, Analog Front-End
66	VRT	OUTPUT	X	Reference Voltage Top, Analog

67	I2CSEL	IN	X	I^2C Bus Address Select
68	ISGND	SUPPLYA	X	Signal Ground for Analog Input, connect to GND_F
69	V_{SUPF}	SUPPLYA	X	Supply Voltage, Analog Front-End
70	VOUT	OUT	LV	Analog Video Output
71	CIN	IN	LV	Chroma/Analog Video 5 Input
72	VIN1	IN	VRT	Video 1 Analog Input
73	VIN2	IN	VRT	Video 2 Analog Input
74	VIN3	IN	VRT	Video 3 Analog Input
75	VIN4	IN	VRT	Video 4 Analog Input
76	V_{SUPAI}	SUPPLYA	X	Supply Voltage, Analog Component Inputs Front-End
77	GND_{AI}	SUPPLYA	X	Ground, Analog Component Inputs Front-End
78	VREF	OUTPUT	X	Reference Voltage Top, Analog Component Inputs Front-End
79	FB1IN	IN	VREF	Fast Blank Input
80	AISGND	SUPPLYA	X	Signal Ground for Analog Component Inputs, connect to GND_{AI}

14.12.TDA1308T

14.12.1.General Description

The TDA1308 is an integrated class AB stereo headphone driver contained in an SO8 or a DIP8 plastic package. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications. It gets its input from two analog audio outputs (DACA_L and DACA_R) of MSP3411G. The gain of the output is adjustable by the feedback resistor between the inputs and outputs.

14.12.2.Features

- Wide temperature range
- No switch ON/OFF clicks
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
- high signal-to-noise ratio
- High slew rate
- Low distortion
- Large output voltage swing.

14.12.3.Pinning

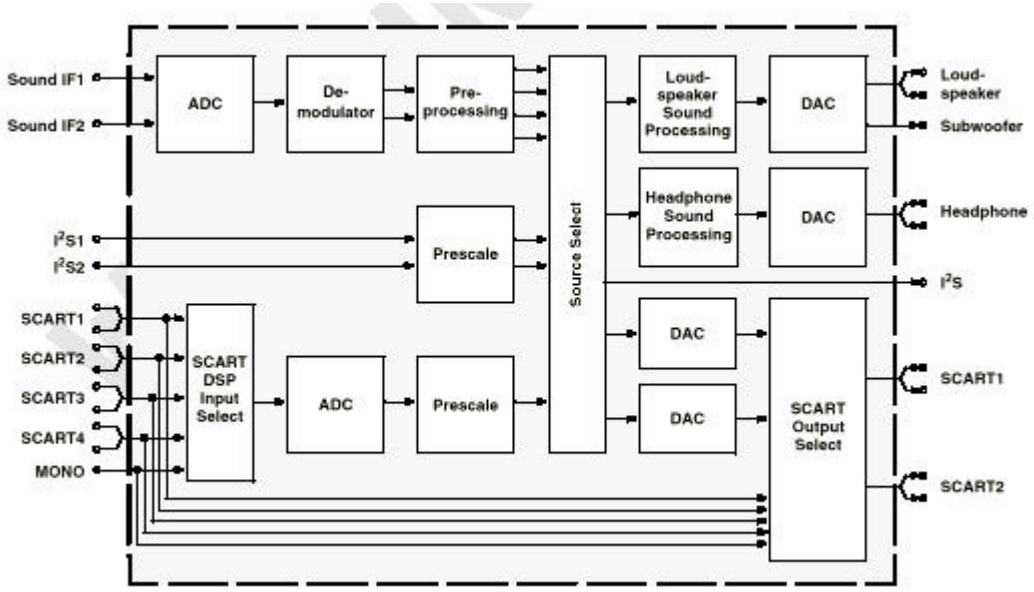
SYMBOL	PIN	DESCRIPTION
OUTA	1	Output A
INA(neg)	2	Inverting input A
INA(pos)	3	Non-inverting input A
V_{SS}	4	Negative supply
INB(pos)	5	Non-inverting input B
INB(neg)	6	Inverting input B
OUTB	7	Output B
V_{DD}	8	Positive supply

14.13.MSP34X1G (MSP3411G)

14.13.1.Description

The MSP 34x1G family of single-chip Mullet-standard Sound Processors covers the sound processing of all analog TV-Standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip. Figure shows a simplified functional block diagram of the MSP34x1G. The MSP34x1G has all functions of the MSP34x0G with the addition of a virtual surround sound feature. Surround sound can be reproduced to a certain extent with two loudspeakers. The MSP34x1G includes our virtualizer algorithm “3D-PANORAMA” which has been approved by the Dolby 1) Laboratories for compliance with the "Virtual Dolby Surround" technology. In addition, the MSP34x1G includes the

“PANORAMA” algorithm. These TV sound processing ICs include versions for processing the multi-channel television sound (MTS) signal conforming to the standard recommended by the Broadcast Television Systems Committee (BTSC). The DBX noise reduction, or alternatively, Micronas Noise Reduction (MNR) is performed alignment free. Other processed standards are the Japanese FM-FM multiplex standard (EIA-J) and the FM Stereo Radio standard. Current ICs have to perform adjustment procedures in order to achieve good stereo separation for BTSC and EIA-J. The MSP34x1G has optimum stereo performance without any adjustments. All MSP 34xxG versions are pin and software downward compatible to the MSP 34xxD. MSP34x1G further simplifies controlling software. Standard selection requires a single I^2C transmission only. The MSP34x1G has built-in automatic functions: The IC is able to detect the actual sound standard automatically (Automatic Standard Detection). Furthermore, pilot levels and identification signals can be evaluated internally with subsequent switching between mono/stereo/bilingual; no I^2C interaction is necessary (Automatic Sound Selection).



14.13.2.Features

3D-PANORAMA virtualizer (approved by Dolby Laboratories) with noise generator
PANORAMA virtualizer algorithm
Standard Selection with single I^2C transmission
Automatic Standard Detection of terrestrial TV standards/Automatic Carrier Mute function
Automatic Sound Selection (mono/stereo/bilingual), new registers MODUS, STATUS
Two selectable sound IF (SIF) inputs
Interrupt output programmable (indicating status change)
Loudspeaker / Headphone channel with volume, balance, bass, treble, loudness
Loudspeaker channel with MDB (Micronas Dynamic Bass)
AVC: Automatic Volume Correction
Subwoofer output with programmable low-pass and complementary high-pass filter
5-band graphic equalizer for loudspeaker channel
Spatial effect for loudspeaker channel; processing of all deemphasis filtering
Four Stereo SCART (line) inputs, one Mono input; two Stereo SCART outputs
Complete SCART in/out switching matrix
Two I^2S inputs; one I^2S output
All analog FM-Stereo A2 and satellite standards
All analog Mono sound carriers including AM-SECAM L
Simultaneous demodulation of (very) high-deviation FM-Mono and NICAM
Adaptive deemphasis for satellite (Wegener-Panda, acc. to ASTRA specification)
ASTRA Digital Radio (ADR) together with DRP 3510A
All NICAM standards
Korean FM-Stereo A2 standard

14.13.3.Pin connections

NC = not connected; leave vacant
LV = if not used, leave vacant
X = obligatory; connect as described in circuit diagram
DVSS: if not used, connect to DVSS
AHVSS: connect to AHVSS

Pin No.					Pin Name	Type	Connection (if not used)	Short Description
PLCC 68-pin	PSDIP 64-pin	PSDIP 52-pin	PQFP 80-pin	PLQFP 64-pin				
1	16	14	9	8	ADR_WS	OUT	LV	ADR word strobe
2	-	-	-	-	NC		LV	Not connected
3	15	13	8	7	ADR_DA	OUT	LV	ADR Data Output
4	14	12	7	6	I2S_DA_IN1	IN	LV	I²S1 data input
5	13	11	6	5	I2S_DA_OUT	OUT	LV	I²S data output
6	12	10	5	4	I2S_WS	IN/OUT	LV	I²S word strobe
7	11	9	4	3	I2S_CL	IN/OUT	LV	I²S clock
8	10	8	3	2	I2C_DA	IN/OUT	X	I²C data
9	9	7	2	1	I2C_CL	IN/OUT	X	I²C data
10	8	-	1	64	NC		LV	Not connected
11	7	6	80	63	STANDBYQ	IN	X	Stand-by (low-active)
12	6	5	79	62	ADR_SEL	IN	X	I²C bus address select
13	5	4	78	61	D_CTR_I/O_0	IN/OUT	LV	D_CTR_I/O_0
14	4	3	77	60	D_CTR_I/O_1	IN/OUT	LV	D_CTR_I/O_1
15	3	-	76	59	NC		LV	Not connected
16	2	-	75	58	NC		LV	Not connected
17	-	-	-	-	NC		LV	Not connected
18	1	2	74	57	AUD_CL_OUT	OUT	LV	Audio clock output (18.432 MHz)
19	64	1	73	56	TP		LV	Test pin
20	63	52	72	55	XTAL_OUT	OUT	X	Crystal oscillator
21	62	51	71	54	XTAL_IN	IN	X	Crystal oscillator
22	61	50	70	53	TESTEN	IN	X	Test pin
23	60	49	69	52	ANA_IN2+	IN	AVSS via 56 pF/LV	IF Input 2 (can be left vacant, only if IF input 1 is also not in use)
24	59	48	68	51	ANA_IN-	IN	AVSS via 56 pF/LV	IF common (can be left vacant, only if IF input 1 is also not in use)
25	58	47	67	50	ANA_IN1+	IN	LV	IF input 2
26	57	46	66	49	AVSUP		X	Analog power supply 5v
-	-	-	65	-	AVSUP		X	Analog power supply 5v
-	-	-	64	-	NC		LV	Not connected
-	-	-	63	48	NC		LV	Not connected
27	56	45	62	48	AVSS		X	Analog ground
-	-	-	61	-	AVSS		X	Analog ground
28	55	44	60	47	MONO_IN	IN	LV	Mono input
-	-	-	59	-	NC		LV	Not connected
29	54	43	58	46	VREFTOP		X	Reference voltage IF A/D converter
30	53	42	57	45	SC1_IN_R	IN	LV	SCART 1 input, right
31	52	41	56	44	SC1_IN_L	IN	LV	SCART 1 input, left
32	51	-	55	43	ASG		AHVSS	Analog Shield Ground
33	50	40	54	42	SC2_IN_R	IN	LV	SCART 2 input, right
34	49	39	53	41	SC2_IN_L	IN	LV	SCART 2 input, left
35	48	-	52	40	ASG		AHVSS	Analog Shield Ground
36	47	38	51	39	SC3_IN_R	IN	LV	SCART 3 input, right
37	46	37	50	38	SC3_IN_L	IN	LV	SCART 3 input, left
38	45	-	49	37	ASG		AHVSS	Analog Shield Ground
39	44	-	48	36	SC4_IN_R	IN	LV	SCART 4 input, right
40	43	-	47	35	SC4_IN_L	IN	LV	SCART 4 input, left
41	-	-	46	-	NC		LV or AHVSS	Not connected
42	42	36	45	34	AGNDC		X	Analog reference voltage
43	41	35	44	33	AHVSS		X	Analog ground
-	-	-	43	-	AHVSS		X	Analog ground
-	-	-	42	-	NC		LV	Not connected
-	-	-	41	-	NC		LV	Not connected
44	40	34	40	32	CAPL_M		X	Volume capacitor MAIN
45	39	33	39	31	AHVSUP		X	Analog power supply 8V

46	38	32	38	30	CAPL_A		X	Volume capacitor AUX
47	37	31	37	29	SC1_OUT_L	OUT	LV	SCART output 1, left
48	36	30	36	28	SC1_OUT_R	OUT	LV	SCART output 1, right
49	35	29	35	27	VREF		X	Reference ground 1
50	34	28	34	26	SC2_OUT_L	OUT	LV	SCART output 2, left
51	33	27	33	25	SC2_OUT_R	OUT	LV	SCART output 2, right
52	-	-	32	-	NC		LV	Not connected
53	32	-	31	24	NC		LV	Not connected
54	31	26	30	23	DACM_SUB	OUT	LV	Subwoofer output
55	30	-	29	22	NC		LV	Not connected
56	29	25	28	21	DACM_L	OUT	LV	Loudspeaker out, left
57	28	24	27	20	DACM_R	OUT	LV	Loudspeaker out, right
58	27	23	26	19	VREF2		X	Reference ground 2
59	26	22	25	18	DACA_L	OUT	LV	Headphone out, left
60	25	21	24	17	DACA_R	OUT	LV	Headphone out, right
-	-	-	23	-	NC		LV	Not connected
-	-	-	22	-	NC		LV	Not connected
61	24	20	21	16	RESETQ	IN	X	Power-on-reset
62	23	-	20	15	NC		LV	Not connected
63	22	-	19	14	NC		LV	Not connected
64	21	19	18	13	NC		LV	Not connected
65	20	18	17	12	I2S_DA_IN2	IN	LV	I²S2-data input
66	19	17	16	11	DVSS		X	Digital ground
-	-	-	15	-	DVSS		X	Digital ground
-	-	-	14	-	DVSS		X	Digital ground
67	18	16	13	10	DVSUP		X	Digital power supply 5V
-	-	-	12	-	DVSUP		X	Digital power supply 5V
-	-	-	11	-	DVSUP		X	Digital power supply 5V
68	17	15	10	9	ADR_CL	OUT	LV	ADR clock

14.14.TL431

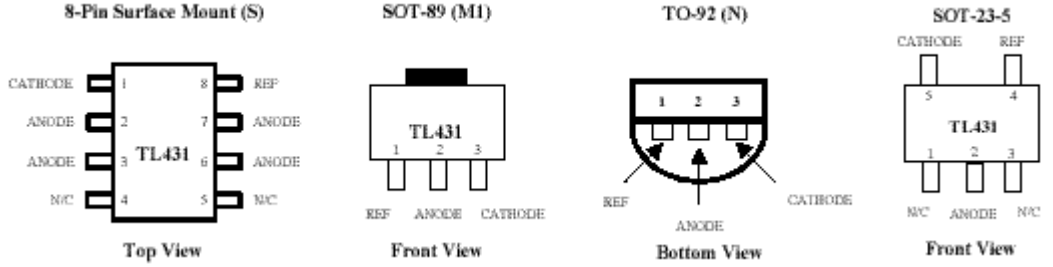
14.14.1.Description

The TL431 is a 3-terminal adjustable shunt voltage regulator providing a highly accurate 1 % band gap reference. TL431 acts as an open-loop error amplifier with a 2.5V temperature compensation reference. The TL431 thermal stability, wide operating current (150mA) and temperature range (0.to 105.makes it suitable for all variety of application that are looking for a low cost solution with high performance. The output voltage may be adjusted to any value between VREF and 36 volts with two external resistors. The TL431 is operating in full industrial temperature range of 0°C to 105°C. The TL431 is available in TO-92, SO-8, SOT-89 and SOT23-5 packages.

14.14.2.Features

- Trimmed Band gap to 1%
- Wide Operating Current 1mA to 150mA
- Extended Temperature Range 0. °C to 105.°C
- Low Temperature Coefficient 30 ppm /°C
- Offered in TO-92, SOIC, SOT-89, SOT-23-5
- Improved Replacement in Performance for TL431
- Low Cost Solution

14.14.3.Pin Configurations



14.15.DRX3960A

14.15.1.Introduction

The Digital Receiver Front-end DRX 3960A performs the entire multi-standard Quasi Split Sound (QSS) TV IF processing, AGC, video demodulation, and generation of the second sound IF (SIF) with only one SAW filter. The IC is designed for applications in TV sets, VCRs, PC cards, and TV tuners. The alignment-free DRX 3960A needs no special external components. All control functions and status registers are accessible via I²C bus interface. Therefore, it simplifies the design of high-quality, highly standardized IF stages. Due to its mixed signal structure and the digital demodulation, the IC offers unique features and is prepared for digital TV.

14.15.2.Features

– Multi-standard QSS IF processing with a single SAW
– Highly reduced amount of external components (no tank circuit, no potentiometers, no SAW switching)
– Programmable IF frequency (38.9 MHz, 45.75 MHz, 32.9 MHz, 36.125 MHz etc.)
– Digital IF processing for the following standards: B/G, D/K, I, L/L', and M/N
– Standard specific digital post filtering
– Standard specific digital video/audio splitting
– Standard specific digital picture carrier recovery:
– alignment-free
– Quartz-stable and accurate
– Stable frequency lock at 100% modulation and over modulation up to 115%
– Quartz-accurate AFC information
– Programmable standard specific digital group delay equalizing
– Automatically frequency-adjusted Nyquist slope, therefore optimal picture and sound performance over complete lock in frequency range
– Standard specific digital AGC and delayed tuner AGC with programmable tuner Take Over Point
– Fast AGC due to linear structure
– Adaptive back porch control, therefore fast positive modulation AGC
– No sound traps needed at video output
– Second SIF output with standard dependent pre-filtering and amplitude controlled output level
– Optimal sound SNR due to carrier recovery without quadrature distortions
– FM radio capability without external components and with standard TV tuner
– Prepared for digital TV (DVB-C, DVB-T, ATSC)
– I^2C bus interface

14.15.3.Pin connection and short descriptions

NC = not connected, leave vacant
DVSS = if not used, connect to DVSS
X = obligatory; connect as described in circuit diagram
LV = if not used, leave vacant
AHVSS = connect to AHVSS

Pin no PLCCK 68 pin	Pin name	Type	Supply Voltage	Connection (if not used)	Short description
1	AVSS_ADC			X	Analog Ground for ADC
2	AVDD_ADC			X	Analog Supply for ADC (+5V)
3	ANASTX	I/O	AVDD_FE8	GND	Test pin
4	ANASTY	I/O	AVDD_FE8	GND	Test pin
5	AVDD_FE8			X	2nd analog supply for the front-end
6	AVSS_FE8			X	2nd analog ground for the front-end
7	AVSS_FE40				1st analog ground for the front-end
8	IFINX	IN	AVDD_FE40	X	IF Input
9	AVDD_FE40			X	1st analog supply for the front-end
10	IFINY	IN	AVDD_FE40	X	IF Input
11	AVSS_FE40			X	1st analog ground for the front-end
12	AVDD_SYN			X	Analog supply for synthesizer (+5V)
13	AVSS_SYN			X	Analog ground for synthesizer
14	SHIELD	IN		X	Shield GND
15	TEST0	IN	AVDD_DAC	GND	Test pin
16	TEST1	IN	AVDD_DAC	GND	Test pin
17	TEST2	IN	AVDD_DAC	GND	Test pin

18	CVBS	OUT	AVDD_DAC	X	CVBS Output
19	REF_SW	IN	AVDD_DAC	X	Reference frequency switch
20	SIF	OUT	AVDD_DAC	X	2nd SIF output
21	AVDD_DAC			X	DAC supply (+5V)
22	AVSS_DAC			X	DAC ground
23	TEST_EN	IN	DVDD	GND	Test enable
24	RESETQ	IN	DVDD	X	Reset
25	I2C_SDC	I/O	DVDD	X	I2C data
26	I2C_SCL	I/O	DVDD	X	I2C clock
27	DVDD_CAP			X	Digital supply capacitor
28	DVDD			X	Digital supply (+3.3V)
29	DVSS			X	Digital ground
30	DVSS_CAP			X	Digital capacitor ground
31	PORT0	OUT	DVDD	LV	Digital output port
32	PORT1	OUT	DVDD	LV	Digital output port
33	TUNER_AGC	OUT	DVDD	X	Tuner AGC current output
34	PORT2	OUT	DVDD	LV	Digital output port
35	PORT3	OUT	DVDD	LV	Digital output port
36	PORT4	OUT	DVDD	LV	Digital output port
37	ADR_SEL	IN	DVDD	X	Address select
38	PORT5	OUT	DVDD	LV	Digital output port
39	DVDD_ADC			X	Digital supply for ADC (+3.3V)
40	DVSS_ADC			X	Digital ground for ADC
41	XTAL_IN	IN	AVDD_ADC	X	Crystal oscillator
42	XTAL_OUT	I/O	AVDD_ADC	X	Crystal oscillator/external reference frequency
43	VREF		AVDD_ADC	X	ADC Reference voltage
44	SGND		AVDD_ADC	X	ADC Reference ground

14.16.LM7808

14.16.1.Description

The L7800 series of three-terminal positive regulators is available in TO-220 TO-220FP TO-3 and D 2 PAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shutdown and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

14.16. 2.Features

Output Current Up To 1.5 A
Output Voltages of 5; 5.2; 6; 8; 8.5; 9; 12; 15; 18; 24V
Thermal Over load protection
Short Circuit Protection
Output Transition SOA Protection

14.17.BDX53BFI

14.17.1.Description

The BDX53BFI is silicon epitaxial-base NPN power transistor in monolithic Darlington configuration and are mounted in ISOWATT220 plastic package. It is intended for use in hammer drivers, audio amplifiers and other medium power linear and switching applications. The complementary PNP type is the BDX54BFI.

14.17.2.Applications

General purpose switching and amplifier
Linear and switching industrial equipment

14.18.TDA8177F

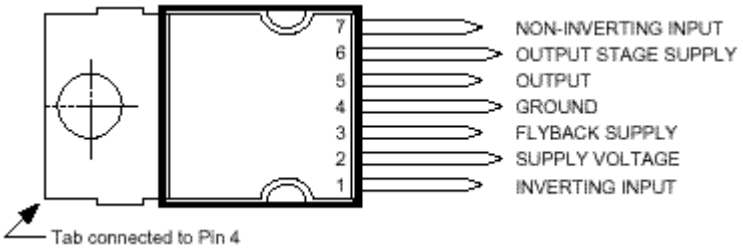
14.18.1.Description

Designed for monitors and high performance TVs, the TDA8177F vertical deflection booster can handle flyback voltage up to 70V. More than this it is possible to have a flyback voltage, which is more than the double of the supply (Pin 2). This allows to decrease the power consumption or to decrease the flyback time for a given supply voltage. The TDA8177F operates with supplies up to 35V and provides up to 3APP output current to drive the yoke.

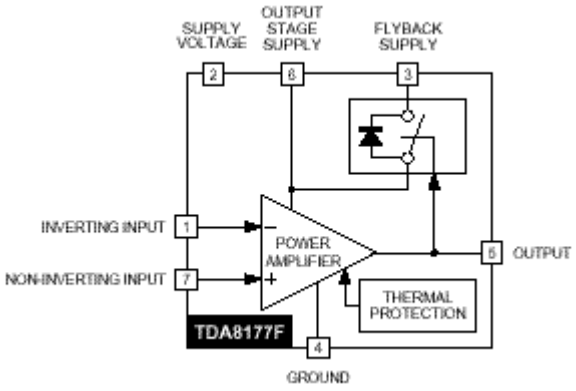
14.18.2.Features

Power Amplifier
Thermal Protection
Output Current Up To 3.0APP
Flyback Voltage Up To 70V (on Pin 5)
Suitable For Dc Coupling Application
External Flyback Supply

14.18.3.Pin connections



14.18.4.Block Diagram



14.19.LM1086

14.19.1.Description

The LM1086 is a series of low dropout positive voltage regulators with a maximum dropout of 1.5V at 1.5A of load current. It has the same pin-out as National Semiconductor's industry standard LM317. The LM1086 is available in an adjustable version, which can set the output voltage with only two external resistors. It is also available in five fixed voltages: 2.5V, 2.85V, 3.3V, 3.45V and 5.0V. The fixed versions integrate the adjust resistors. The LM1086 circuit includes a zener trimmed band-gap reference, current limiting and thermal shutdown.

14.19.2.Features

Available in 2.5V, 2.85V, 3.3V, 3.45V, 5V and Adjustable Versions
Current Limiting and Thermal Protection

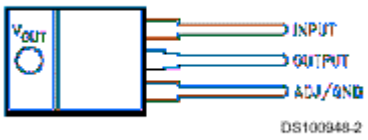
Output Current 1.5A
Line Regulation 0.015% (typical)
Load Regulation 0.1% (typical)

14.19.3.Applications

SCSI-2 Active Terminator
High Efficiency Linear Regulators
Battery Charger
Post Regulation for Switching Supplies
Constant Current Regulator
Microprocessor Supply

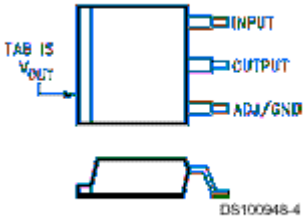
14.19.4.Connection Diagrams

TO-220



Top View

TO-263



Top View

14.20.MC44608

14.20.1.Description

The MC44608 is a high performance voltage mode controller designed for off–line converters. This high voltage circuit that integrates the start–up current source and the oscillator capacitor, requires few external components while offering a high flexibility and reliability. The device also features a very high efficiency stand–by management consisting of an effective Pulsed Mode operation. This technique enables the reduction of the stand–by power consumption to approximately 1W while delivering 300mW in a 150W SMPS.

• Integrated Start–Up Current Source
• Lossless Off–Line Start–Up
• Direct Off–Line Operation
• Fast Start–Up

14.20.2.General Features

• Flexibility
• Duty Cycle Control
• Under voltage Lockout with Hysteresis
• On Chip Oscillator Switching Frequency 40, or 75kHz
• Secondary Control with Few External Components

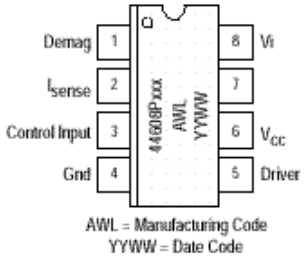
Protections

• Maximum Duty Cycle Limitation
• Cycle by Cycle Current Limitation
• Demagnetization (Zero Current Detection) Protection
• “Over V_{CC} Protection” Against Open Loop
• Programmable Low Inertia Over Voltage Protection Against Open Loop
• Internal Thermal Protection

GreenLine™ Controller

• Pulsed Mode Techniques for a Very High Efficiency Low Power Mode
• Lossless Startup
• Low dV/dT for Low EMI Radiations

14.20.3.Pin Connections



14.20.4.Pin Function description

Pin	Name	Description
1	Demag	The Demag pin offers 3 different functions: Zero voltage crossing detection (50mV), 24mA current detection and 120mA current detection. The 24mA level is used to detect the secondary reconfiguration status and the 120mA level to detect an Over Voltage status called Quick OVP.
2	ISENSE	The Current Sense pin senses the voltage developed on the series resistor inserted in the source of the power MOSFET. When I sense reaches 1V, the Driver output (pin 5) is disabled. This is known as the Over Current Protection function. A 200mA current source is flowing out of the pin 3 during the start–up phase and during the switching phase in case of the Pulsed Mode of operation. A resistor can be inserted between the sense resistor and the pin 3; thus a programmable peak current detection can be performed during the SMPS stand–by mode.
3	Control Input	A feedback current from the secondary side of the SMPS via the opto–coupler is injected into this pin. A resistor can be connected between this pin and GND to allow the programming of the Burst duty cycle during the Stand–by mode.
4	Ground	This pin is the ground of the primary side of the SMPS.
5	Driver	The current and slew rate capability of this pin are suited to drive Power MOSFETs.
6	VCC	This pin is the positive supply of the IC. The driver output gets disabled when the voltage becomes higher than 15V and the operating range is between 6.6V and 13V. An intermediate voltage level of 10V creates a disabling condition called Latched Off phase.
7		This pin is to provide isolation between the Vi pin 8 and the VCC pin 6.
8	Vi	This pin can be directly connected to a 500V voltage source for start–up function of the IC. During the Start–up phase a 9 mA current source is internally delivered to the VCC pin 6 allowing a rapid charge of the VCC capacitor. As soon as the IC starts–up, this current source is disabled.

14.21.TCET1102G

14.21.1.Description

The TCET110/ TCET2100/ TCET4100 consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4-lead up to 16-lead plastic dual inline package. The elements are mounted on one lead frame using a **coplanar technique**, providing a fixed distance between input and output for highest safety requirements.

14.21.2.Applications

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):
For appl. class I – IV at mains voltage =300 V
For appl. class I – III at mains voltage =600 V
According to VDE 0884, table 2, suitable for: **Switch-mode power supplies, line receiver, computer peripheral interface, microprocessor system interface.**

14.21.3.Features

VDE 0884 related features:
Rated impulse voltage (transient overvoltage) V_{IOTM} = 8 kV peak
Isolation test voltage (partial discharge test voltage) V_{pd} = 1.6 kV
Rated isolation voltage (RMS includes DC) V_{IOWM} = 600 V_{RMS} (848 V peak)
Rated recurring peak voltage (repetitive) V_{IORM} = 600 V_{RMS}

General features:
CTR offered in 9 groups
Isolation materials according to UL94-VO
Pollution degree 2 (DIN/VDE 0110 / resp. IEC 664)
Climatic classification 55/100/21 (IEC 68 part 1)
Special construction: Therefore, extra low coupling capacity of typical 0.2pF, high **C**ommon **M**ode **R**ejection
Low temperature coefficient of CTR
G = Leadform 10.16 mm; provides creepage distance > 8 mm, for TCET2100/ TCET4100 optional; suffix letter 'G' is not marked on the optocoupler
Coupling System U

14.22.TDA7480L

14.22.1.Description

The TDA7480L is an audio class-D amplifier assembled in Power DIP package specially de-signed for high efficiency applications mainly for TV and Home Stereo sets.

14.22.2.Features

10W Output Power: R_L = 8Ω/4Ω; THD = 10%
High Frequency
No Heatsink
Split Supply
Overvoltage Protection
St-By And Mute Features
Short Circuit Protection
Thermal Overload Protection

14.22.3.Pin Functions

Number	Name	Function
1	$-V_{CC}$	NEGATIVE SUPPLY.
2	$-V_{CC}$	NEGATIVE SUPPLY.
3	$-V_{CC}$	NEGATIVE SUPPLY.
4	OUT	PWM OUTPUT
5	BOOTDIODE	BOOTSTRAP DIODE ANODE
6	BOOT	BOOTSTRAP CAPACITOR
7	NC	NOT CONNECTED
8	FEEDCAP	FEEDBACK INTEGRATING CAPACITANCE
9	FREQUENCY	SETTING FREQUENCY RESISTOR
10	SGN-GND	SIGNAL GROUND
11	IN	INPUT
12	ST-BY-MUTE	ST-BY/ MUTE CONTROL PIN
13	NC	NOT CONNECTED
14	$+V_{CC}$ SIGN	POSITIVE SIGNAL SUPPLY
15	V_{REG}	10V INTERNAL REGULATOR
16	$+V_{CC}$ POW	POSITIVE POWER SUPPLY
17	$-V_{CC}$	NEGATIVE SUPPLY (TO BE CONNECTED TO PIN 16 VIA C5)
18	$-V_{CC}$	NEGATIVE SUPPLY
19	$-V_{CC}$	NEGATIVE SUPPLY
20	$-V_{CC}$	NEGATIVE SUPPLY

14.23.SAA3010T

14.23.1.Description

The SAA3010 is intended as a general purpose (RC-5) infrared remote control system for use where a low voltage supply and a large debounce time are expected. The device can generate 2048 different commands and utilizes a keyboard with a single pole switch for each key. The commands are arranged so that 32 systems can be addressed, each system containing 64 different commands. The circuit response to legal (one key pressed at a time) and illegal (more than one key pressed at a time) keyboard operation is specified in the section "Keyboard operation".

14.23.2.Features

Low voltage requirement
Biphase transmission technique
Single pin oscillator
Test mode facility

14.23.3.Pinning

Pin	Mnemonic	Function
1	X7 (IPU)	sense input from key matrix
2	SSM (I)	sense mode selection input
3	Z0-Z3 (IPU)	sense inputs from key matrix
7	MDATA (OP3)	generated output data modulated with 1/12 the oscillator frequency at a 25% duty factor
8	DATA (OP3)	generated output information
9-13	DR7-DR3 (ODN)	Scan drivers
14	VSS	Ground (0V)
15-17	DR-2-DR0 (ODN)	Scan drivers
18	OSC (I)	Oscillator input
19	TP2 (I)	test point 2
20	TP1 (I)	Test point 1
21-27	X0-X6 (IPU)	Sense inputs from key matrix
28	VDD(I)	Voltage supply

Note:
(I): Input,
(IPU): input with p-channel pull-up transistor,
(ODN): output with open drain n-channel transistor
(OD3): output 3-state

15.AK52 CHASSIS MANUAL ADJUSTMENTS PROCEDURE

15.1.PRELIMINARY

Before starting with the alignment procedure, make sure that all the potentiometers on the chassis and also screen and focus pots are in the medium position.

15.2.SYSTEM VOLTAGE ADJUSTMENTS

Inputs AC power (220V 50Hz)
PAL B/G test pattern via RF
(PAL I test pattern for PAL I TV's, SECAM D/K pattern, SECAM L/L'/K' TVs.)
Outputs Digital voltmeter to anode of D110.
Display System voltage
Action Apply power. Check that the stand-by Led lights.
Select TV mode and tune to the applied test pattern via local test keyboard.
Chassis should start normally.
Adjust all analog controls (volume, bass, treble, brightness, contrast, colour) to minimum settings.
Adjust VR127 according to the following different type of CRTs.

SYSTEM VOLTAGE	TYPE OF CRT
135V±0.5V	PHILIPS A66EAK552X54
135V±0.5V	PHILIPS A66EAK071X54
135V±0.5V	VIDEOCOLOR A66ECY13X12
135V±0.5V	PHILIPS W66ESF002X44

15.3.AFC ADJUSTMENTS

Inputs AC power
38.9 Mhz test pattern for PAL B/G, PAL-SECAM B/G or 39.5 MHz test pattern for PAL I model (90dBmV) to Z403 SAW filter input terminals 1 and 2.
Outputs Digital voltmeter to AFC point (pin22 of IC401)
Display AFC Voltage.
Action Adjust VL401 for 2.5±0.1 Volts. TV should automatically tune to a station when search tuning is activated.

15.4.FOCUS ADJUSTMENTS

Inputs AC power
PAL B/G test pattern via RF input.
Outputs Picture tube drive.
Display Picture
Action Select TV mode and tune to the signal.
Adjust focus potantiometer (the upper pot on the rear side of the FBT transformer) for optimum focusing drive.

15.5.SCREEN ADJUSTMENTS

Inputs AC power
PAL B/G Colour Bar test pattern via RF
Outputs 1/100 Oscilloscope probe to RGB cathodes on CRT baseboard.
NOTE: Ground pin of probe will be connected to 1st pin (GND) of the CRT socket.
Display RGB ratio
Action Select PAL B/G Colour bar pattern using the local test keyboard and the user remote control unit.
Adjust all control functions (brightness, colour and contrast) to minimum settings.
Measure the most sensitive cathode
Adjust the screen potentiometer (lower pot on the rear side of FBT transformer) until cathode voltage becomes 150V.

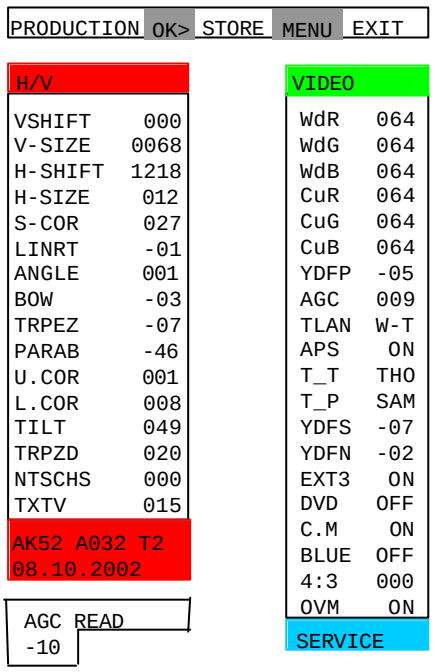
15.6.IF ADJUSTMENT FOR L' MODE

Inputs AC power
38.9 MHz test pattern for PAL B/G, PAL-SECAM B/G or 39.5 MHz test pattern for PAL I model. (90dBmV) to Z403 SAW filter input terminals 1 and 2.
Outputs Digital Voltmeter to AFC point. (pin22 of IC401)
Digital Voltmeter to AFC_L point. (pin14 of IC401
Display AFC Voltage.
Action Firstly adjust VL401 for 2.5±0.1 Volts. TV should automatically tune to a station when search tuning is activated.
Adjust VR401 for 2.5±0.1 Volts at the AFC_L point.

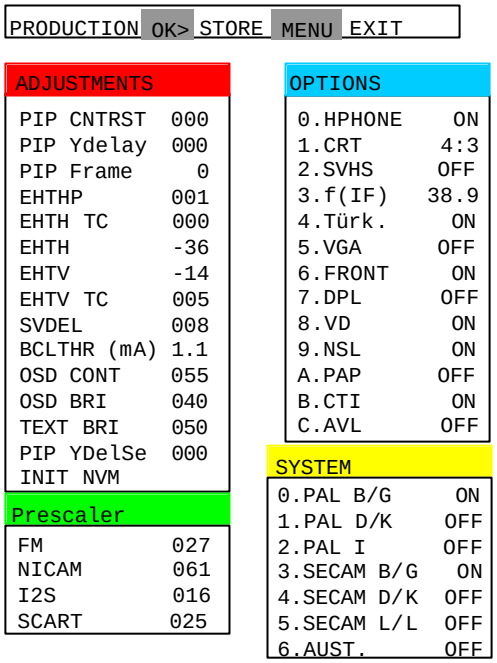
16.AK52 CHASSIS PRODUCTION SERVICE MODE ADJUSTMENTS

16.1.PRELIMINARY

All system, geometry and white balance alignments are performed in production service mode. Before starting the production mode alignments, make sure that all manual adjustments are done correctly. To start production mode alignments enter the MAIN MENU and then press the digits 1, 6, 7 and 5 respectively. The following first menu appears on the screen. Production mode values will appear on the screen.



First page



Second Page

SERVICE MENU

Production mode groups will be displayed with different colours of headlines, so in order to access a production alignment group press the colour button of the related group on the remote control transmitter.

- RED BUTTON is pressed to access H/V menu.
- GREEN BUTTON is pressed to access VIDEO adjust menu.
- BLUE BUTTON is pressed to go to the next page of the service menu.
- YELLOW BUTTON is used to adjust system parameters on the second page of the service menu.

After selecting one of the production service mode groups, you can access its items by pressing ? /? buttons. Selected parameter will be highlighted. Inorder to change the selected parameter, use ? / ? buttons. Inorder to switch between other group of items press the colour key of this groups headline.
To store the settings press OK button. To exit the service menu press MENU button.
Entire service menu parameters of AK52 CHASSIS are listed below.

16.2.H/V (HORIZONTAL AND VERTICAL GEOMETRY ALIGNMENTS)

Switch the program to crosshatch test pattern. Press RED button to access this group of item. Select the parameter by pressing up/down buttons. Adjust the parameter by pressing left/right buttons. Store the settings by pressing OK button. Switch the another parameter group by pressing the colour button of the related coloured headline of that group. Exit production mode by pressing the MENU button on the remote control.

V-SHIFT

Change Vertical Shift by pressing Left/Right buttons till the test pattern is vertically centered. Horizontal line at the center of the test pattern is in equal distance both to upper and lower side of the picture tube.

Check and readjust V-SHIFT item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	000

V-SIZE

Change Vertical Size by pressing Left/Right buttons till horizontal black lines on both the upper and lower part of the test pattern become very close to the upper and lower horizontal sides of picture tube and nearly about to disappear. Check and readjust V-SIZE item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	068

H-SHIFT

Change Horizontal Shift by pressing Left/Right buttons till the the test pattern is horizontally in equal distance both to right and left sides of the picture tube. Check and readjust H-SHIFT item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	0000
Max. Value:	1295
Recommended Value:	1218

H-SIZE

Change Horizontal Size by pressing Left/Right buttons till no under-scan condition will happen, i.e. no white bars on the left and right side of the test pattern will be visible nor picture will be so wide. Check and readjust H-SIZE item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	012

S-COR

Change S-Correction by pressing Left/Right buttons till the size of squares on both the upper and lower part of test pattern become equal to the squares laying on the vertical center of the test pattern. Check and readjust S-COR item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	027

LINRT

Change Linearity by pressing Left/Right buttons till all the size of squares of the test pattern become in equal size from the top of the screen to its bottom of the whole screen. Check and readjust LINRT item if the adjustment becomes improper after some other geometric adjustments are done. (especially after than S-COR adjustment)

Min. Value:	-128
Max. Value:	127
Recommended Value:	-01

ANGLE

Change Angle by pressing Left/Right buttons till the vertical lines of the crosshatch pattern become completely perpendicular to horizontal lines without any angle of vertical deviation. Check and readjust ANGLE item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	001

BOW

Change Bow by pressing Left/Right buttons till the vertical lines especially ones close to the left and right sides will of equal and symmetrical bending, i.e. they together will neither be towards left side nor right side. Check and readjust BOW item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	-03

TRPEZ

Change Trapezium by pressing Left/Right buttons till vertical lines, especially lines at the sides of the picture frame became parallel to the both sides of picture tube as close as possible. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	-07

PARAB

Change Parabol by pressing Left/Right buttons till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen. Check and readjust PARAB item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	-46

U.COR

Change Upper Correction by pressing Left/Right buttons till vertical lines at the upper corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. Check and readjust U.COR item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	001

L.COR

Change Lower Correction by pressing Left/Right buttons till vertical lines at the lower corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. Check and readjust L.COR item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	-128
Max. Value:	127
Recommended Value:	008

TILT

This adjustment only works when the TV has rotation option. Change TILT by pressing Left/Right buttons to rotate the complete raster clock-wise and counter clock-wise depending on the CRT. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	000
Max. Value:	063
Recommended Value:	049

TRPZD

Not used for this model.

NTSCHS

Change NTSC horizontal size by pressing Left/Right buttons to adjust till no under-scan condition will happen, i.e. no white bars on the left and right side of the NTSC test pattern will be visible nor picture will be so wide. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	000
Max. Value:	010

Recommended Value: 000

TXTV
Change TXTV by pressing Left/Right buttons to adjust the proper vertical size of Teletext screen. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: 000
Max. Value: 040
Recommended Value: 015

16.3.VIDEO ALIGNMENTS
Switch the program to colour bar test pattern. Press GREEN button to access this group of item. Select the parameter by pressing up/down buttons. Adjust the parameter by pressing left/right buttons. Store the settings by pressing OK button.

WdR, WdG, WdB: WHITE BALANCE ADJUSTMENT
Apply WHITE test pattern via RF. Adjust all analog functions to medium level and set WdR to 86, WdG to 84, WdB to 80, if needed. Use colour analyser and monitor the colour temperature (X,Y) on colour analyser. Select WdR and WdB by pressing up/down buttons and change the values by Left/Right buttons till the following values are read:
X=285±10
Y=293±10 on the colour analyser.

CuR, CuG, CuB
Set the values of these items as 64 (constant).

YDFP
Enter a PAL B/G colour and black-white bar test pattern via RF. Adjust Y-Delay for PAL till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.

Min. Value: -07
Max. Value: 001
Recommended Value: -05

AGC
Apply PAL BG signal, VHF-3 Channel-12 and 60dBmV signal level. Adjust AGC (Automatic Gain Control) item by pressing Left/Right buttons till the voltage at AGC point (pin1 of the tuner) becomes 3.0 volts.

Min. Value: 000
Max. Value: 015
Recommended Value: 009

TLAN
Text language is set. Options are W-T, W-E, W, E. W-T will be selected.

APS
The option of APS (Automatic Program Searching) item are ON and OFF. In order to active APS installation procedure when TV is turned for the very first time, select ON. Inorder to start TV without APS installation procedure, select OFF.

T_T
This item is used for the Tuner selection. The options are SAM for SAMSUNG, THO for THOMSON, SIE for SIEMENS, MK2 and MK3 for PHILIPS MP2/MP3, ALP for ALPS and TEC for Tecnisat. Select THO.

T_P
This item is also used for the Tuner selection. The options are MK2, SAM, THO, TEM. MK2 for PHILIPS, SAM for SAMSUNG, THO for THOMSON and TEM for TEMIC. Select SAM.

YDFS
Enter a SECAM B/G colour and black-white bar test pattern via RF. Adjust Y-Delay SECAM till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.

Min. Value:	-07
Max. Value:	001
Recommended Value:	-07

YDFN
Enter an NTSC colour and black-white bar test pattern via RF. Adjust Y-Delay NTSC till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.

Min. Value:	-07
Max. Value:	001
Recommended Value:	-02

EXT3
Select ON.

DVD
Select OFF.

C.M
Select ON.

BLUE
Select OFF.

4:3
Set to 0.

OVM
Select ON.

16.4.SERVICE ALIGNMENTS

IMPORTANT: There will no adjustments in this service mode during production mode alignments.
Press BLUE colour button on the remote control when Production mode is active. Press the colour button of the related item group headline colour. Press up/down buttons to select the item of group. Press Left/Right button to alter the value of the item. Press OK button to store the selected value and MENU button to exit the service alignments mode.

ADJUSTMENTS GROUP
Press RED button in order to access this group of items.

PIP CNTRST	: Level of the PIP picture
PIP Ydelay	: Luma delay of the PIP picture
PIP Frame	: Colour selection of the PIP frame (edges of the PIP)
EHTHP	: EHT compensation coefficient for horizontal phase
EHTH TC	: EHT time constant for horizontal phase compensation
EHTH	: EHT compensation coefficient for horizontal amplitude
EHTV	: EHT compensation coefficient for vertical amplitude
EHTV TC	: EHT time constant for control of vertical and horizontal amplitude EHT compensation
SVDEL	: Delay adjustment for scan velocity modulation
BCLTHR (mA)	: Beam current applied to the CRT
OSD CONT	: Contrast level of OSD
OSD BRI	: Brightness level of OSD
TEXT BRI	: Brightness level of text
PIP YDelSe	: Y-Delay adjustment for pin-in-picture option
INIT NVM	: Press to initiate the NVM

PRESCALER GROUP

Press GREEN button in order to access this group of items.

FM : This adjustment is to determine the pre-amplifier gain of MSP for German stereo
Set to 27.

NICAM : This adjustment is to determine the pre-amplifier gain of MSP for Nicam
Set to 61.

I2S : Not used.

SCART : This adjustment is to determine the pre-amplifier gain of MSP for Scart audio inputs
Set to 25.

OPTIONS GROUP

Press BLUE button in order to access this group of items.

0.HPHONE : ON/OFF
1.CRT : 4:3 / 16:9
2.SVHS : ON/OFF
3.f(IF) : always set to 38.9
4.Türk. : Turkish menu ON/OFF
5.VGA : ON/OFF
6.FRONT : Front AV ON/OFF
7.DPL : ON/OFF
8.VD : ON/OFF
9.NSL : ON/OFF
A.PAP : ON/OFF
B.CTI : ON/OFF
C.AVL : ON/OFF

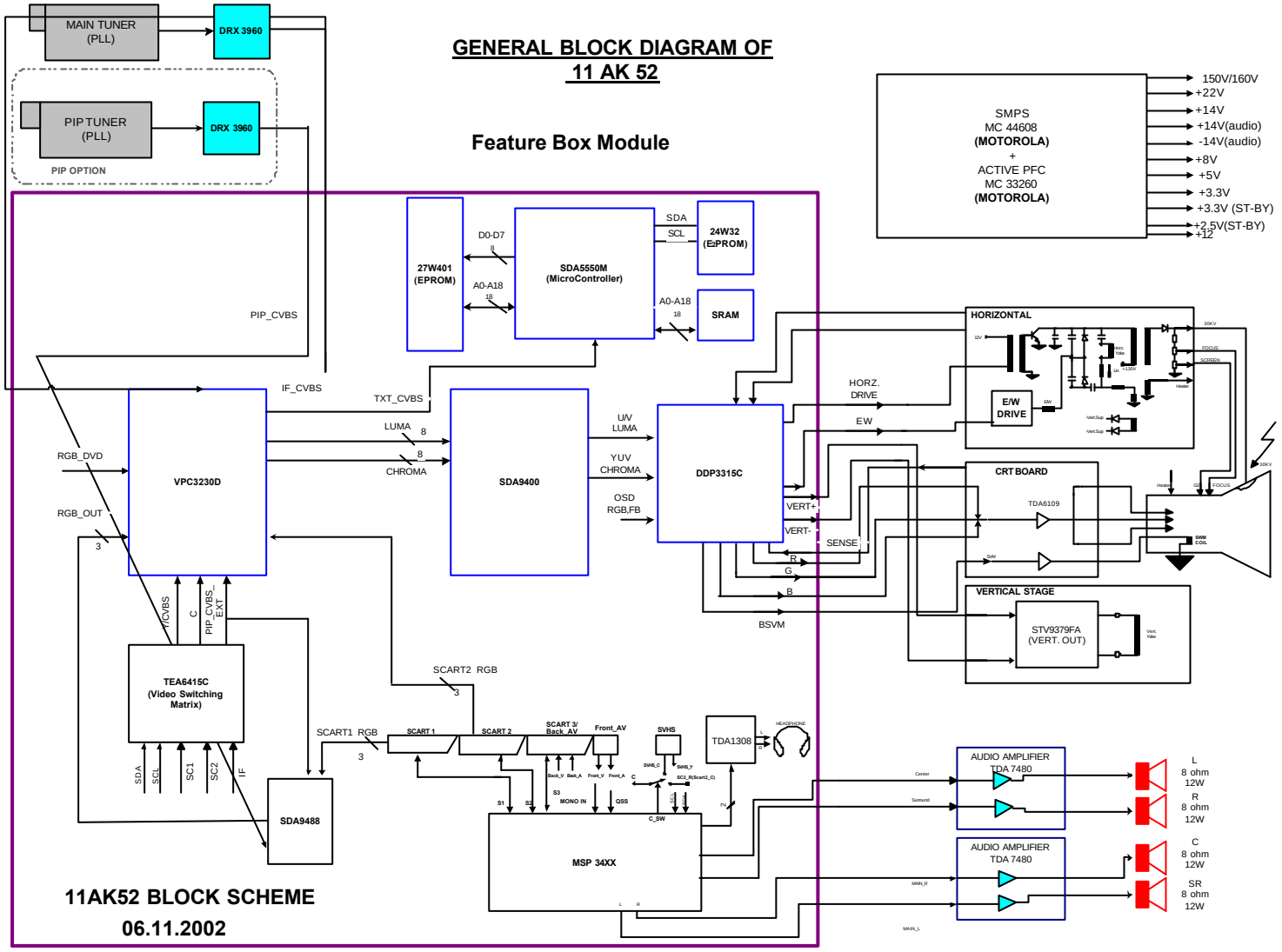
SYSTEM GROUP

Press YELLOW button in order to access this group of items.

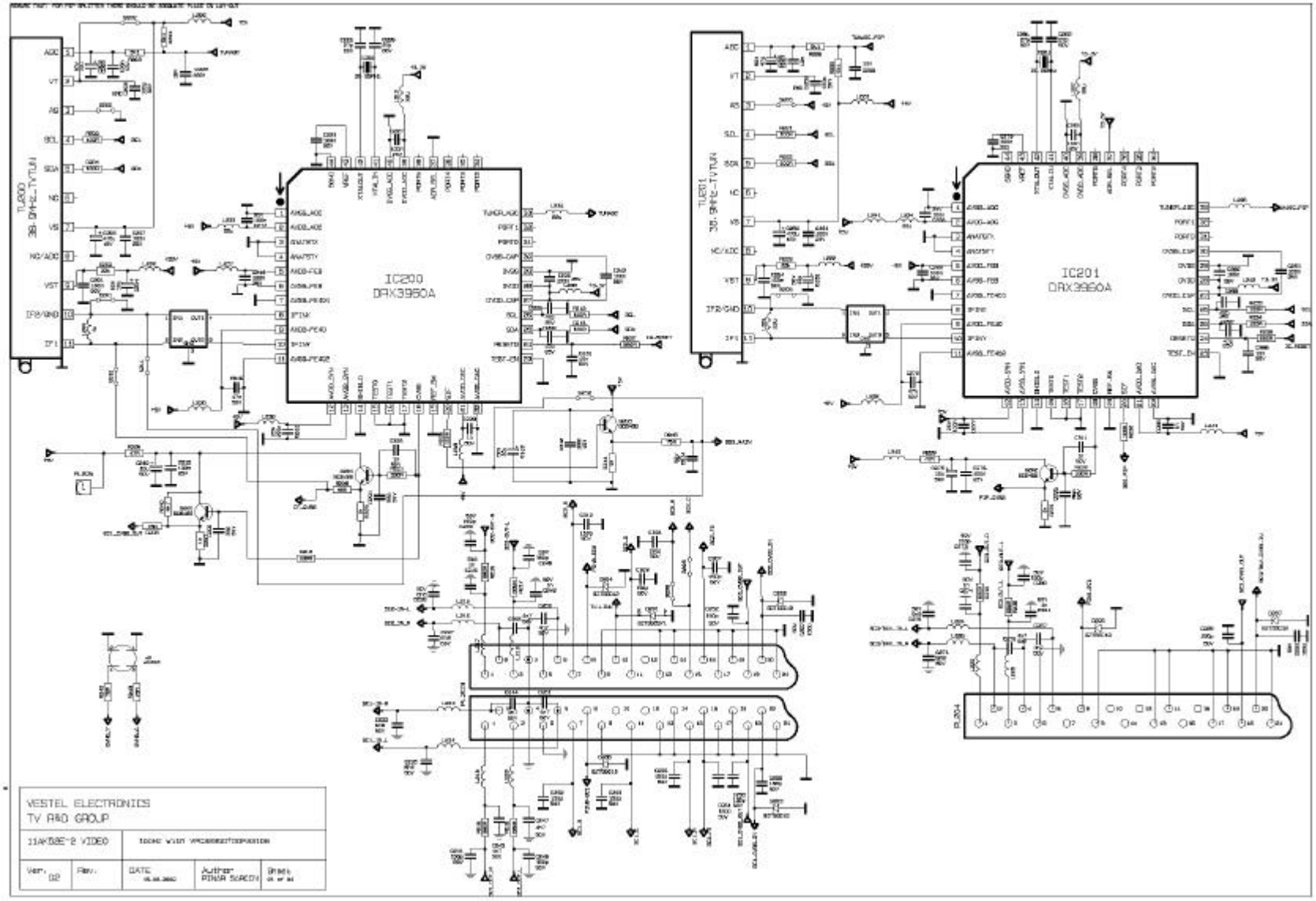
0.PAL B/G : ON/OFF
1.PAL D/K : ON/OFF
2.PAL I : ON/OFF
3.SECAM B/G : ON/OFF
4.SECAM D/K : ON/OFF
5.SECAM L/L' : ON/OFF
6.AUST. : ON/OFF

NOTE: Settings values in Service menu are given for 28" 4:3 THOMSON (A66EHJ13X12) tube in this manual.

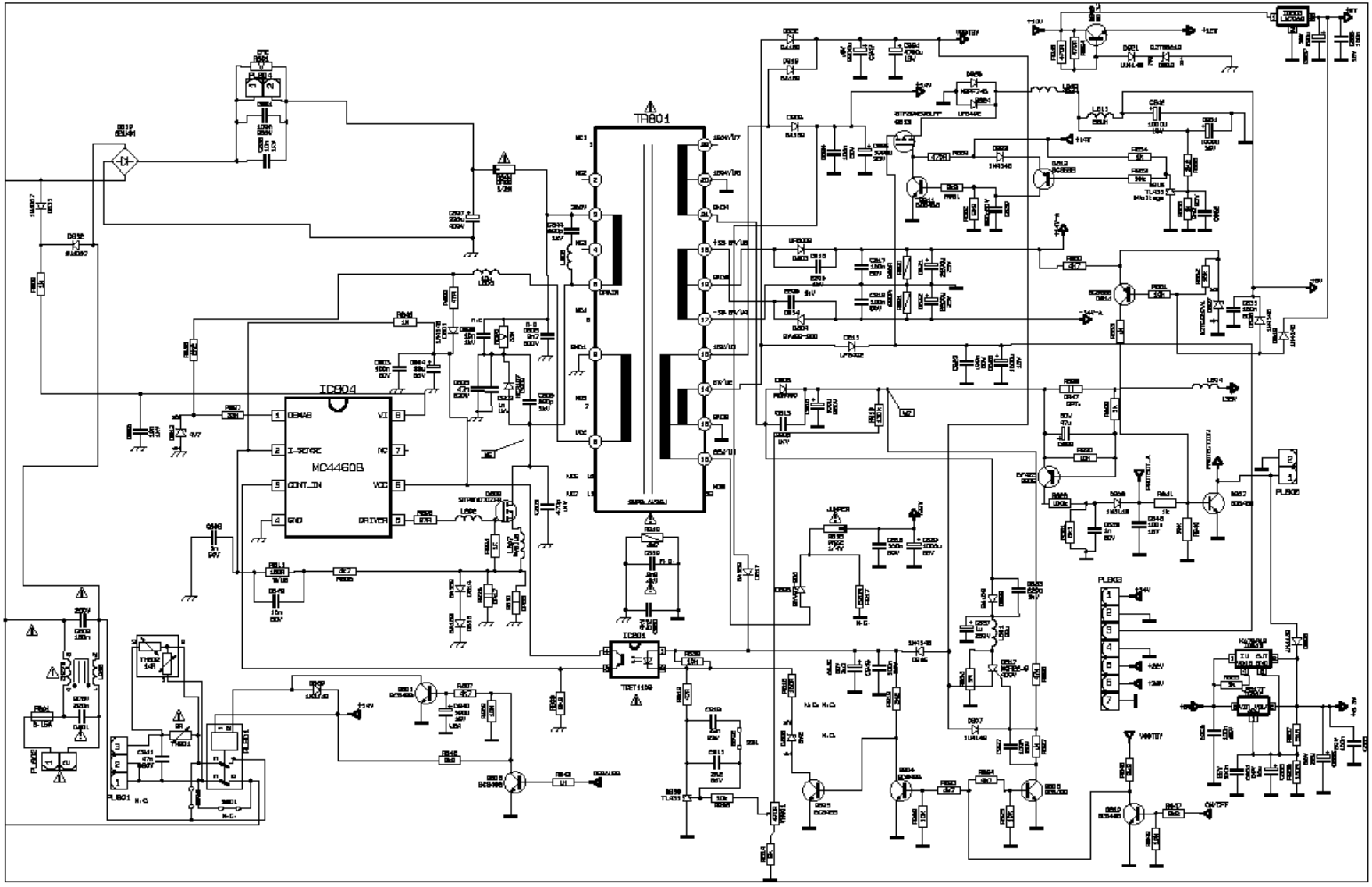
17.BLOCK DIAGRAM



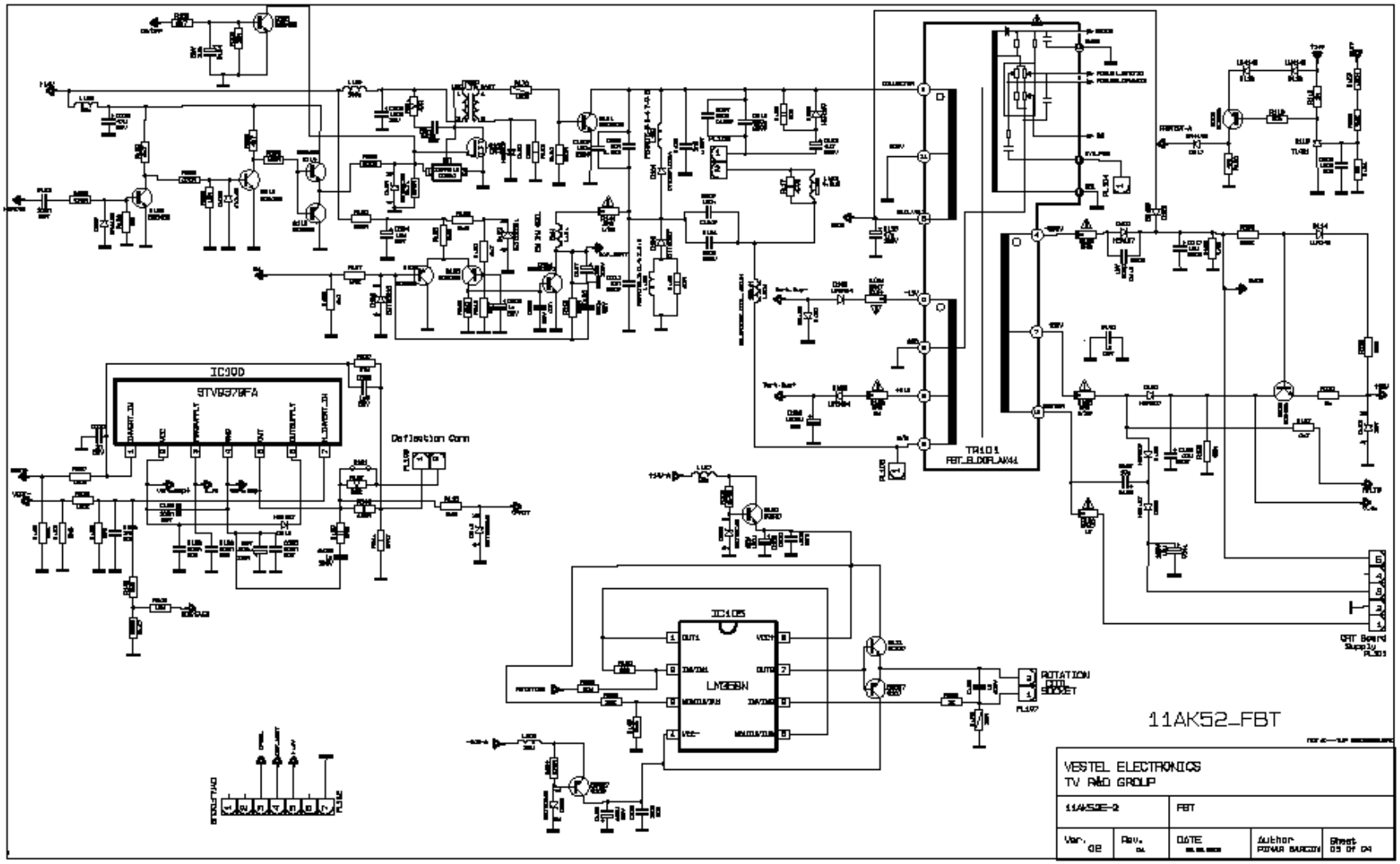
18.CIRCUIT DIAGRAMS



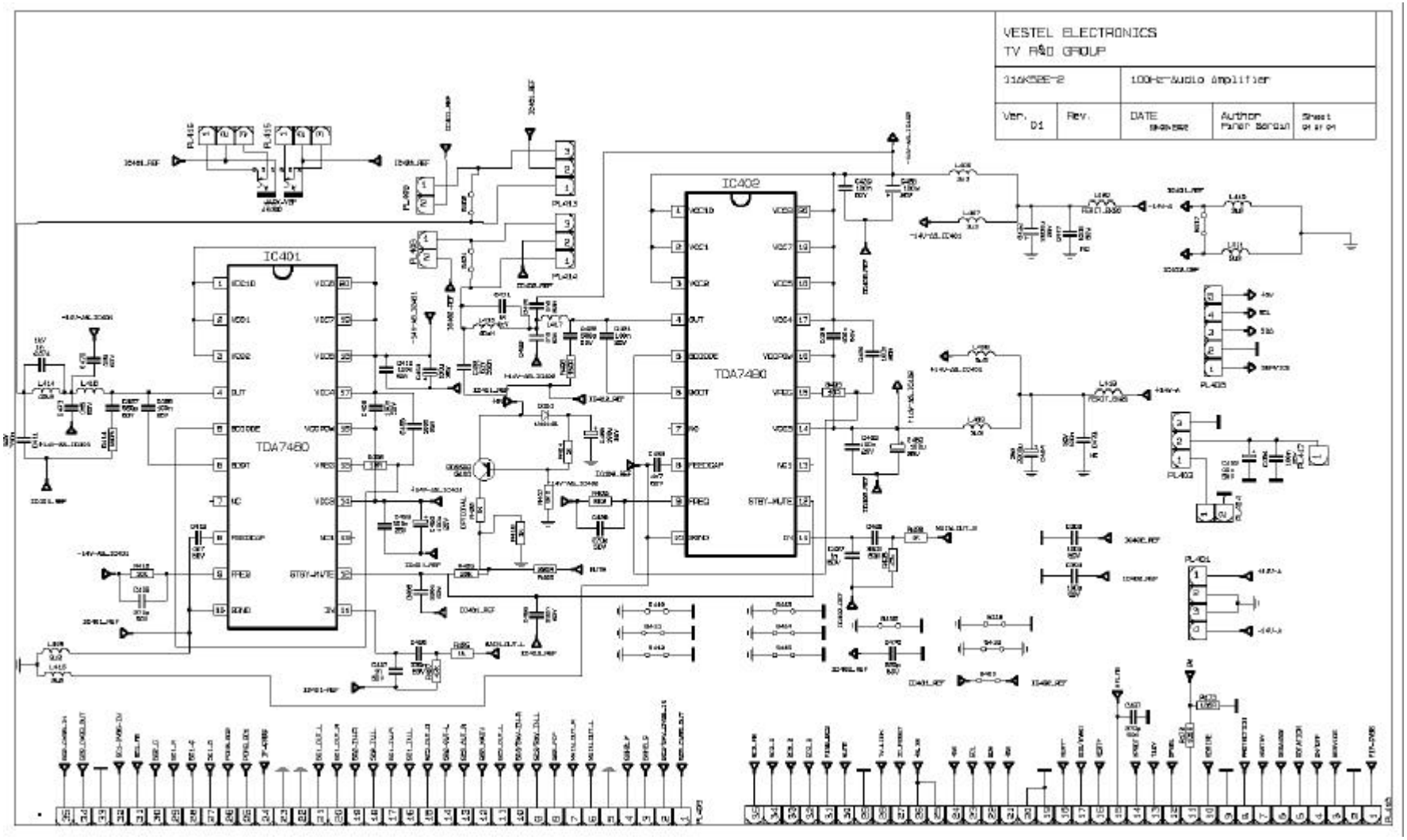
11ak52e3-VIDEO


TR801
IC804
MC44608
DEMAG
I-SENSE
CONT_IN
GND
VCC
DRIVER
IC801
TL431

11ak52e3-2


IC100
STV8978FA
Deflection Conn
TR101
FBT_BLOCPLAN44
IC105
LM2889N
ROTATION
COIL
SOCKET
11AK52_FBT
VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-2
FBT
Ver.
02
Rev.
01
DATE
Author
POYRAZ BARCIN
Sheet
03 OF 04

11ak52e3-3


VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-2
100Hz Audio Amplifier
Ver.
D1
Rev.
DATE
Author
Faner Serdun
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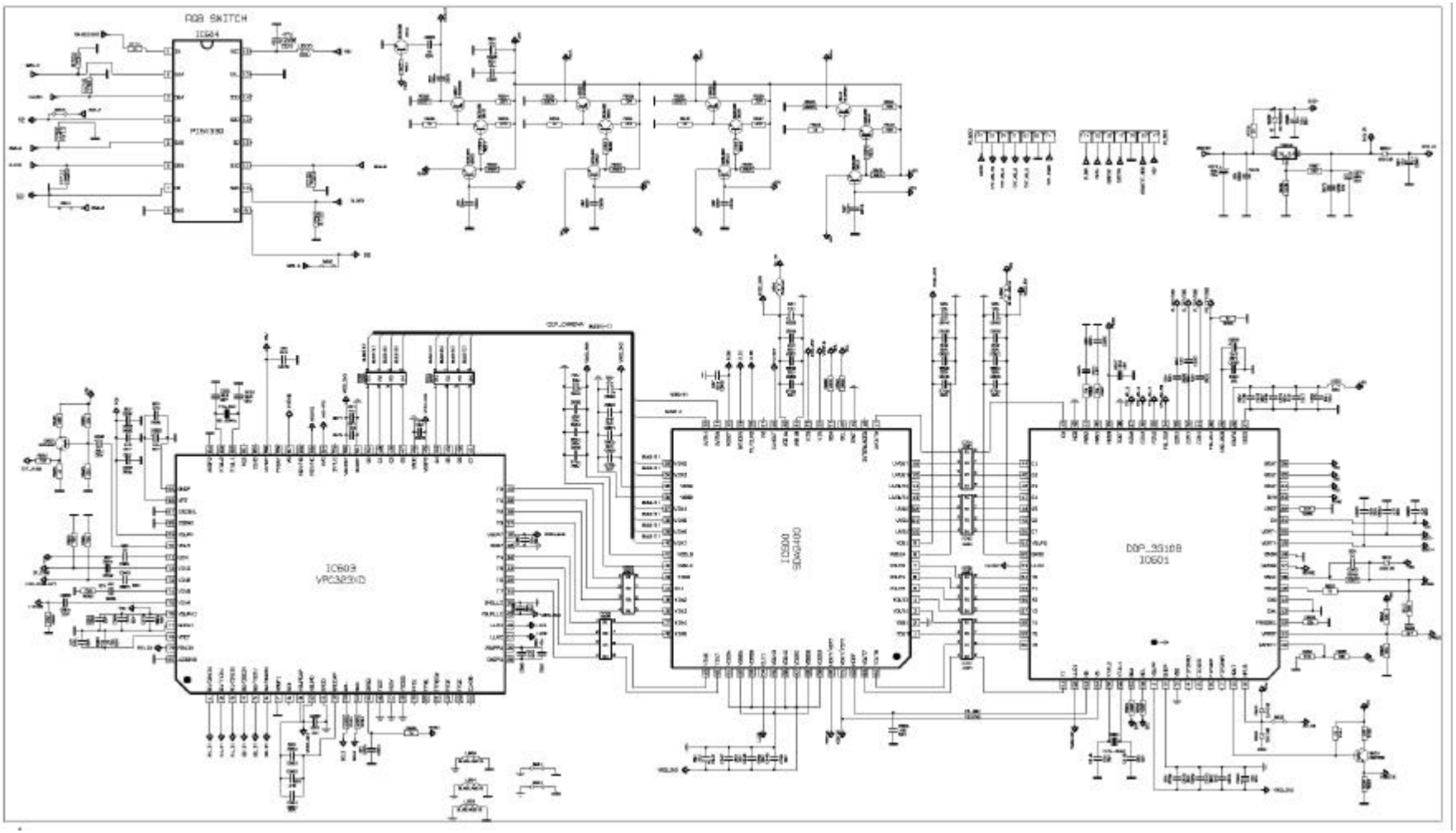
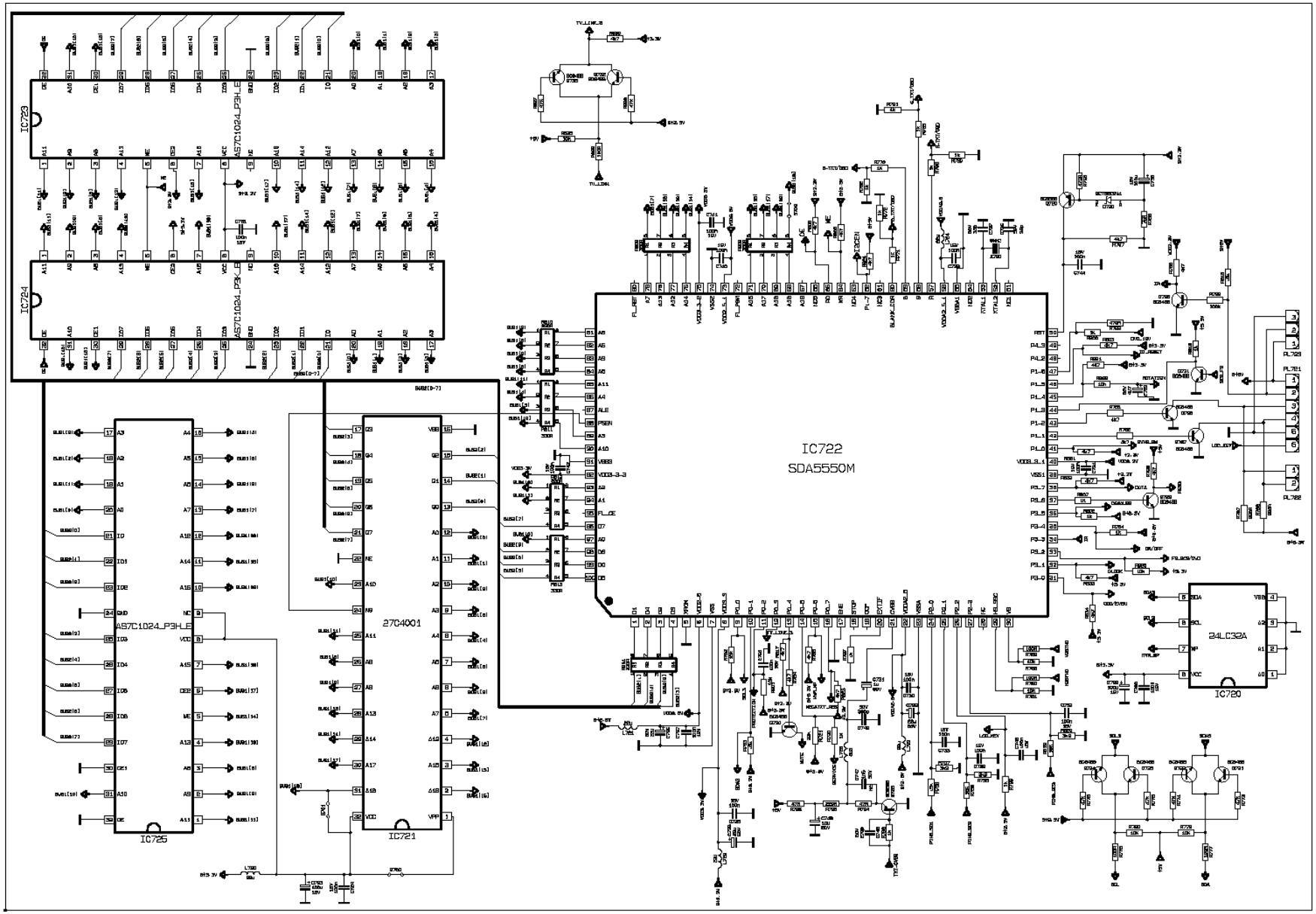
IC401
TDA7480
IC402
TDA7480

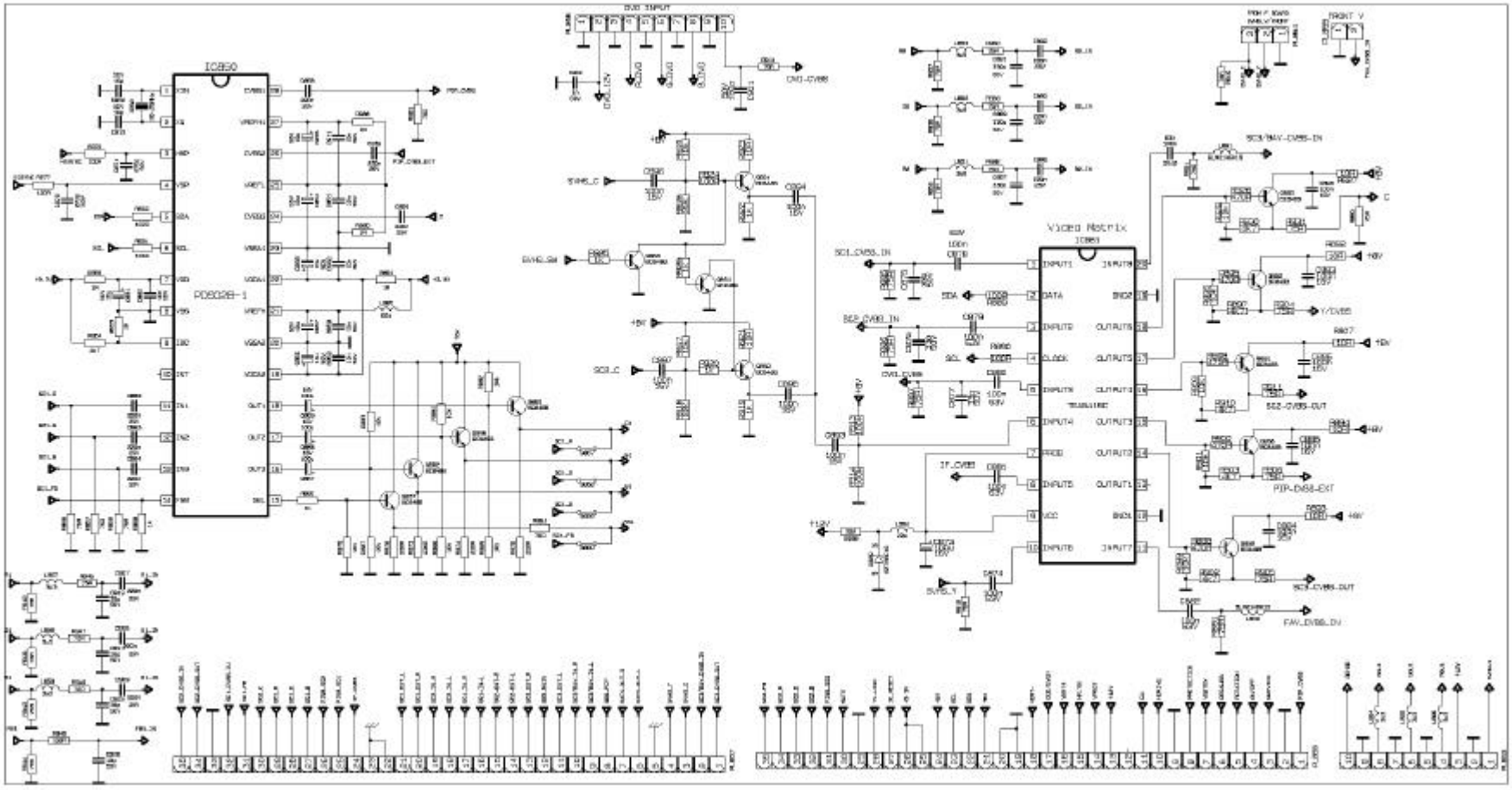
11ak52e3-4


RGB SWITCH
IC604
IC603
VPC3230D
IC500
SDA9403
DDP_3310B
IC601

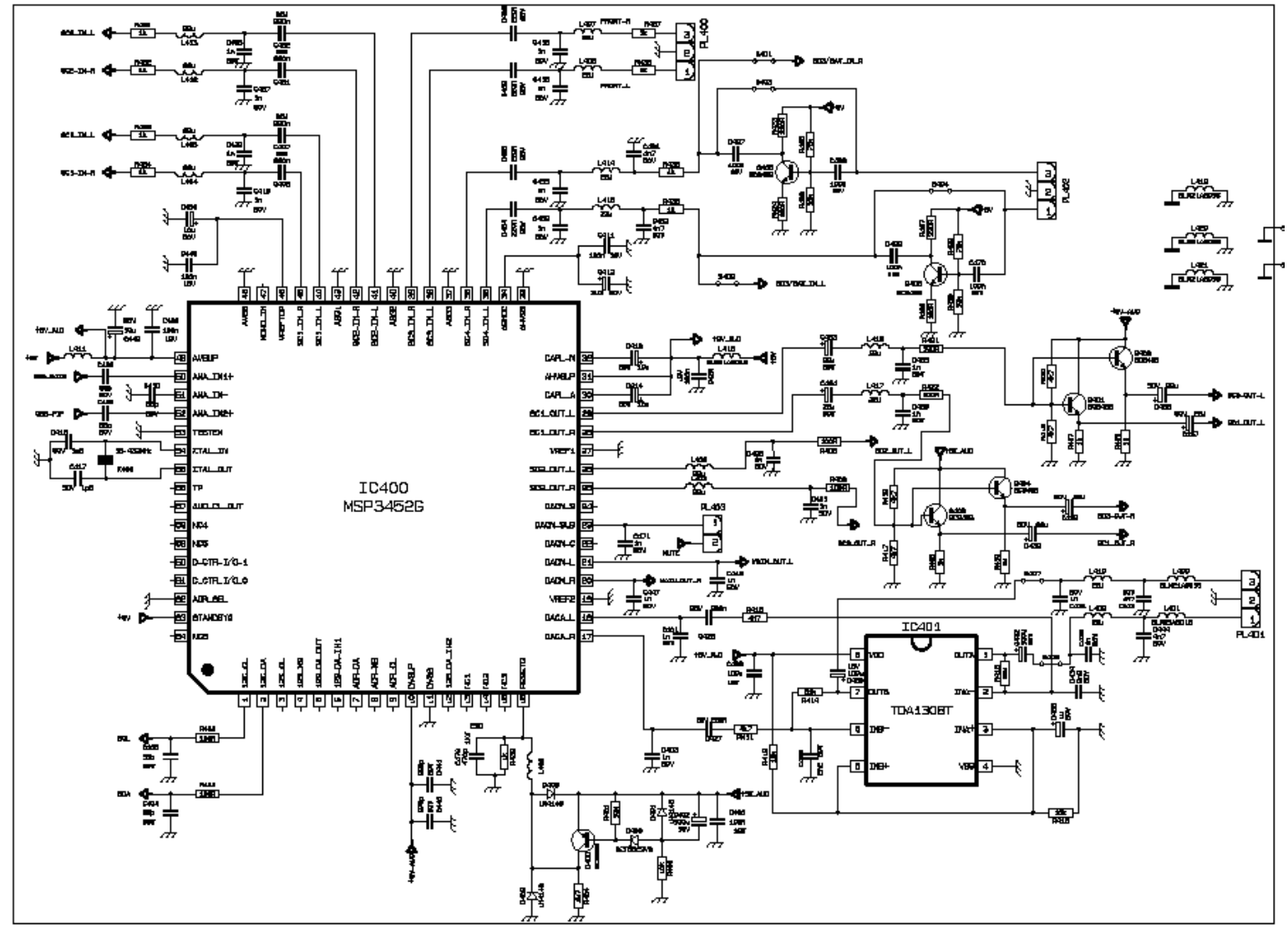
11fb2a1—1


IC722
SDA5550M
IC723
IC724
IC725
IC721
IC720
AS7C1024_P3H_LE
27C4001
24LC32A

11fb2a1—2


DVD INPUT
IC850
PD8028-1
Video Matrix
IC853
SCL_CVBS_IN
SDA
SCL
SCART_CVBS_IN
Y/CVBS
SCART-CVBS-OUT
PIP-CVBS-EXT
SCART_CVBS_OUT
FAV_CVBS_OV
FRONT V

11fb2a1—3



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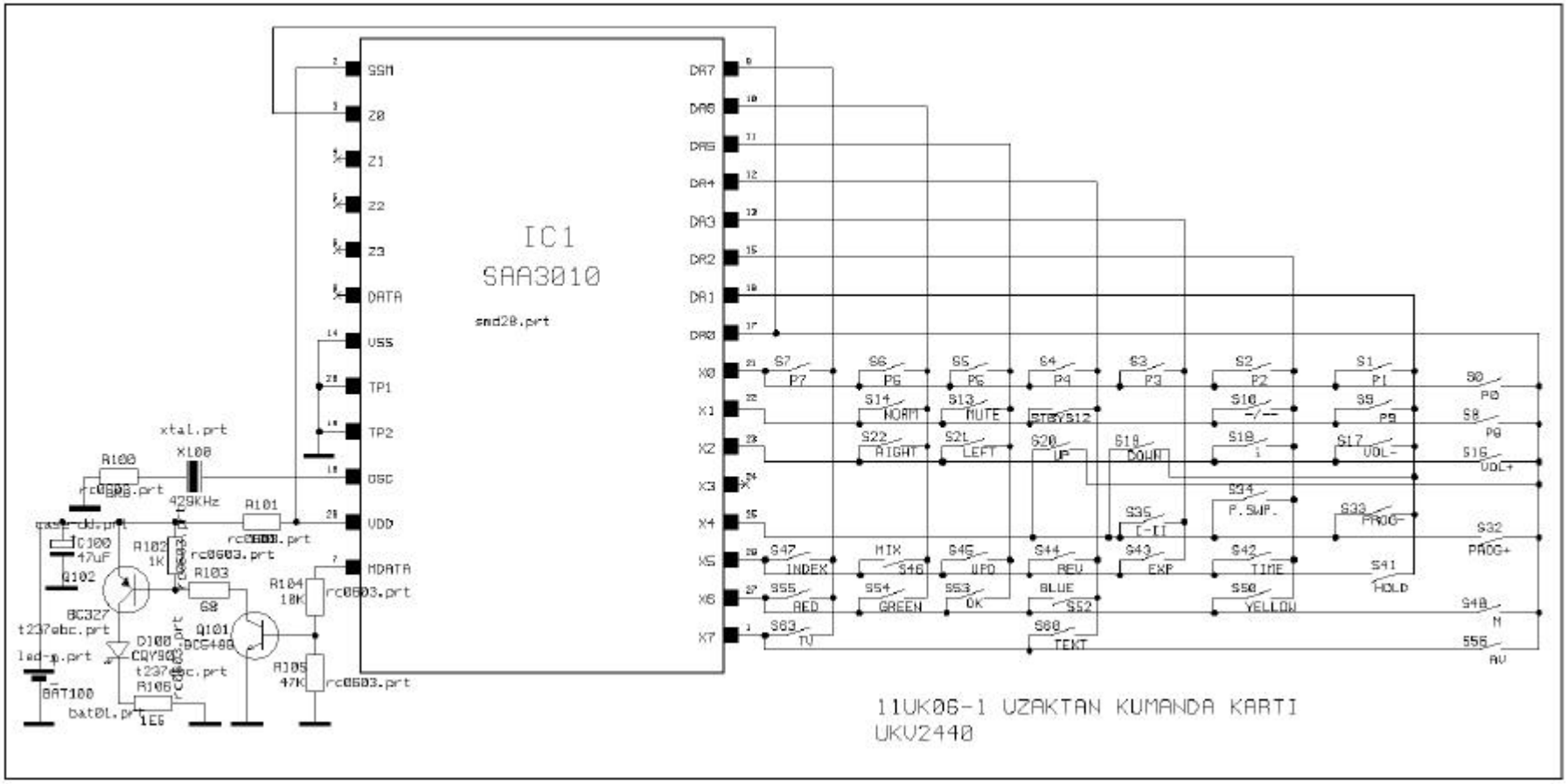
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Z1
Z2
Z3
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MDATA
DR7
DR6
DR5
DR4
DR3
DR2
DR1
DR0
X0
X1
X2
X3
X4
X5
X6
X7
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R101
R102
1K
R103
R104
18K
R105
47K
R106
1E6
C100
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BC548
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CQY90
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BAT100
bat0L.prt
S7
P7
S6
P6
S5
P5
S4
P4
S3
P3
S2
P2
S1
P1
S0
P0
S14
NORM
S13
MUTE
S12
S10
-/--
S9
P9
S8
P8
S22
RIGHT
S21
LEFT
S20
UP
S19
DOWN
S18
S17
VOL-
S16
VOL+
S34
P.SWP.
S33
PROG-
S32
PROG+
S47
INDEX
S46
MIX
S45
UPD
S44
REV
S43
EXP
S42
TIME
S41
HOLD
S55
RED
S54
GREEN
S53
OK
S52
BLUE
S50
YELLOW
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AV
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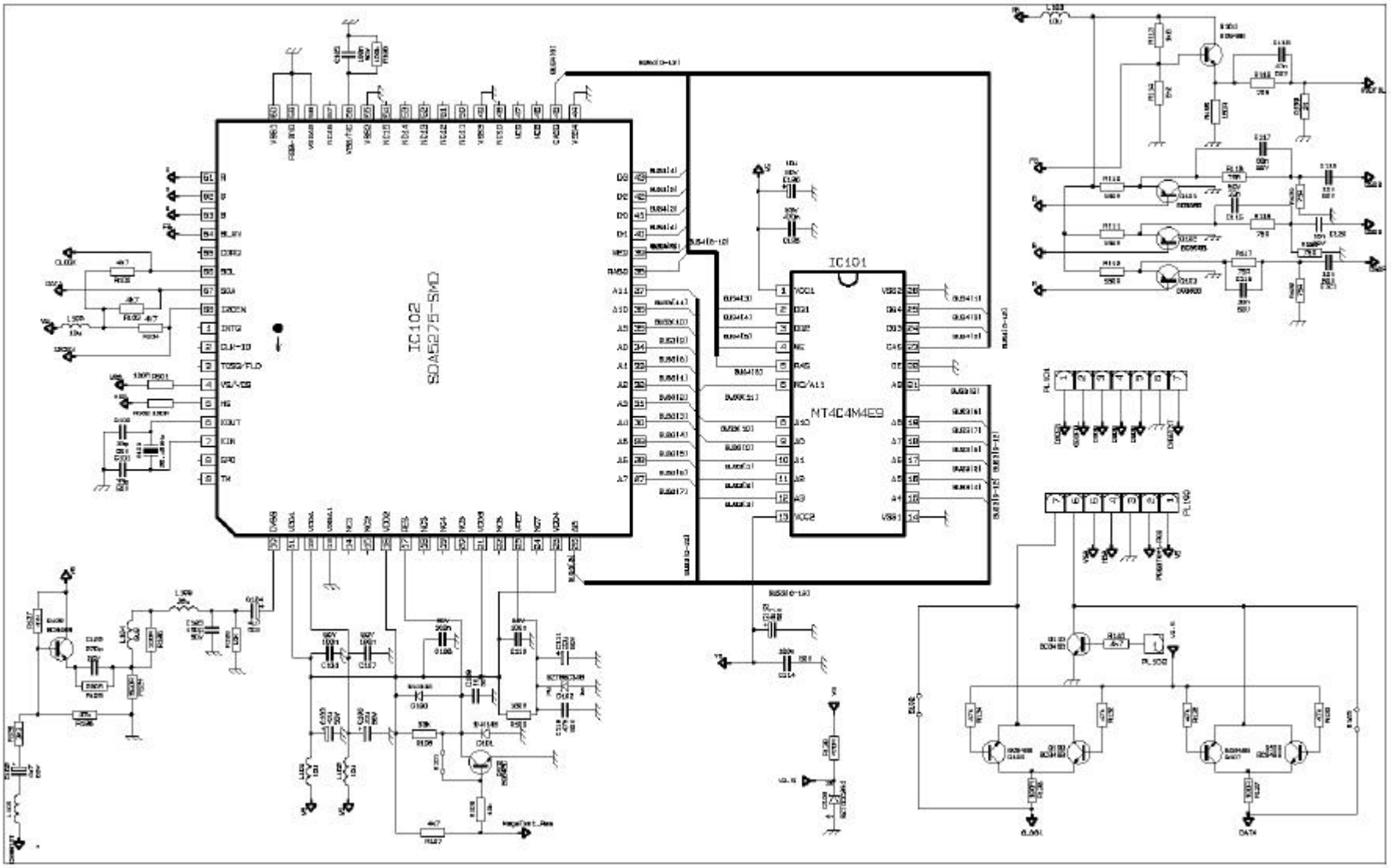
UKU2440

11uk06-1



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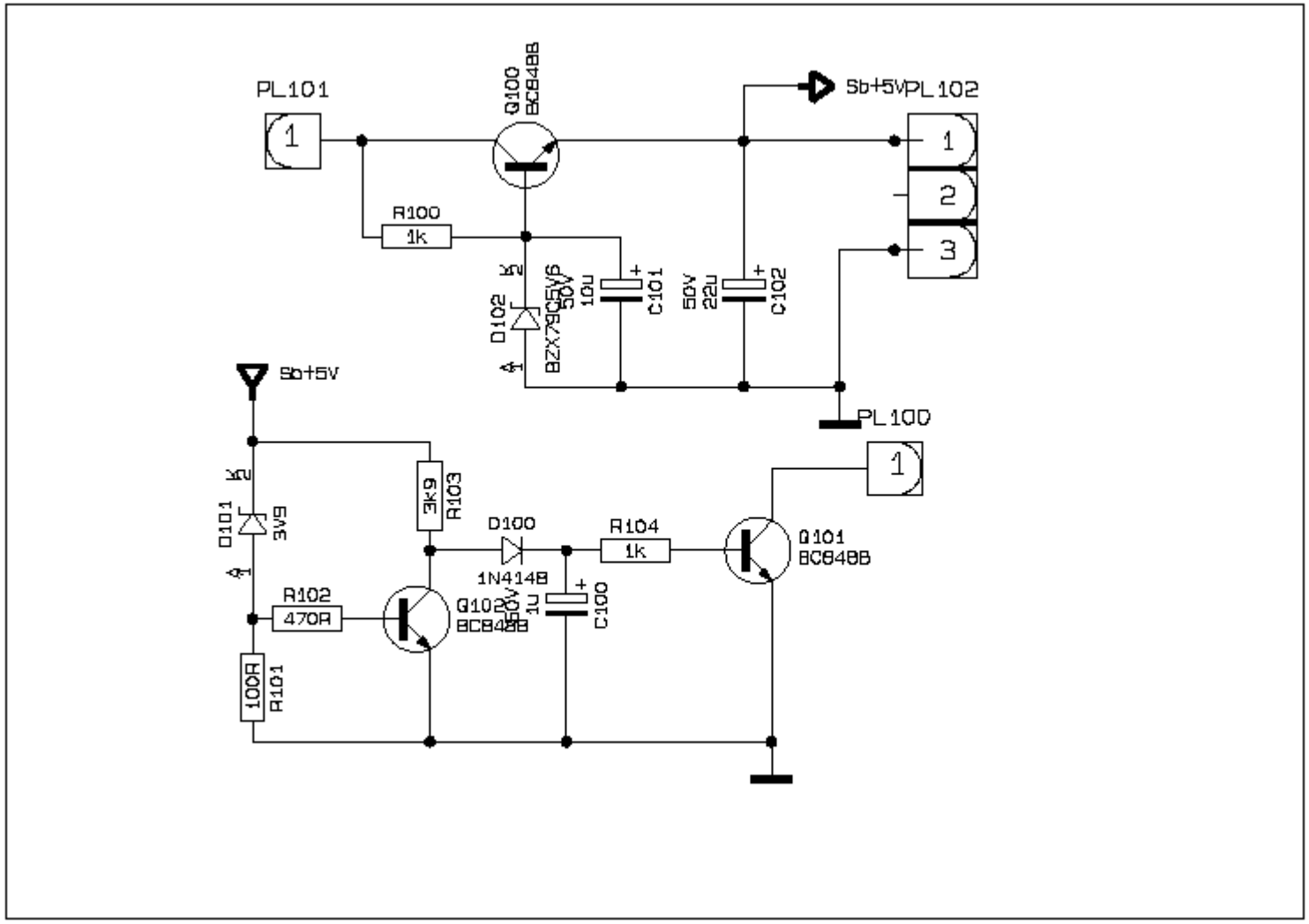
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1
Q100
BC848B
Sb+5V
PL102
1
2
3
R100
1k
D102
BZX79C5V6
50V
10u
C101
50V
22u
C102
Sb+5V
PL100
1
D101
3V9
3k9
R103
D100
1N414B
R104
1k
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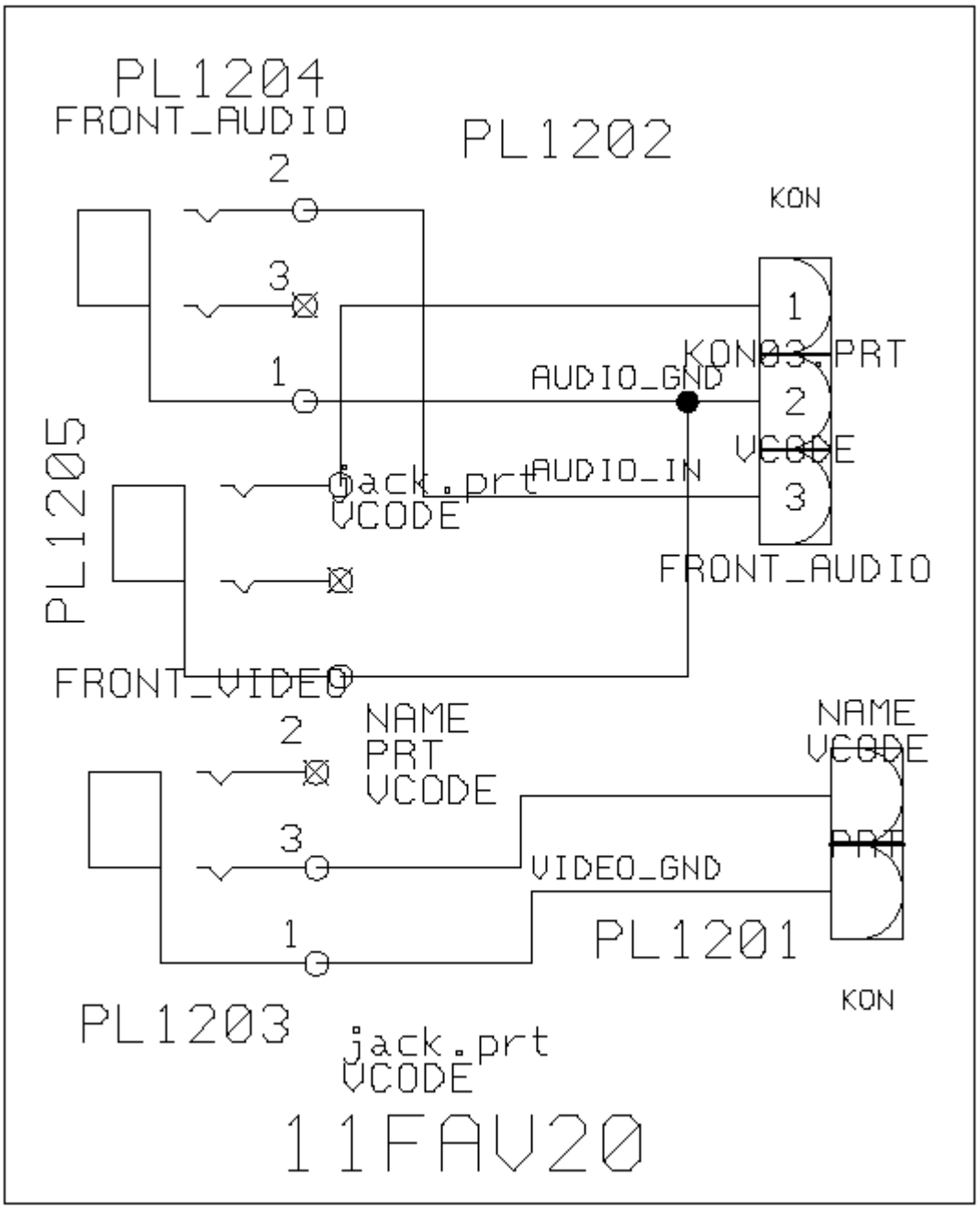
C100
100R
R101

11rs52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PL1202
KON
2
3
1
1
KON03.PRT
AUDIO_GND
2
VCODE
AUDIO_IN
3
jack.prt
VCODE
PL1205
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FRONT_VIDEO
2
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PRT
VCODE
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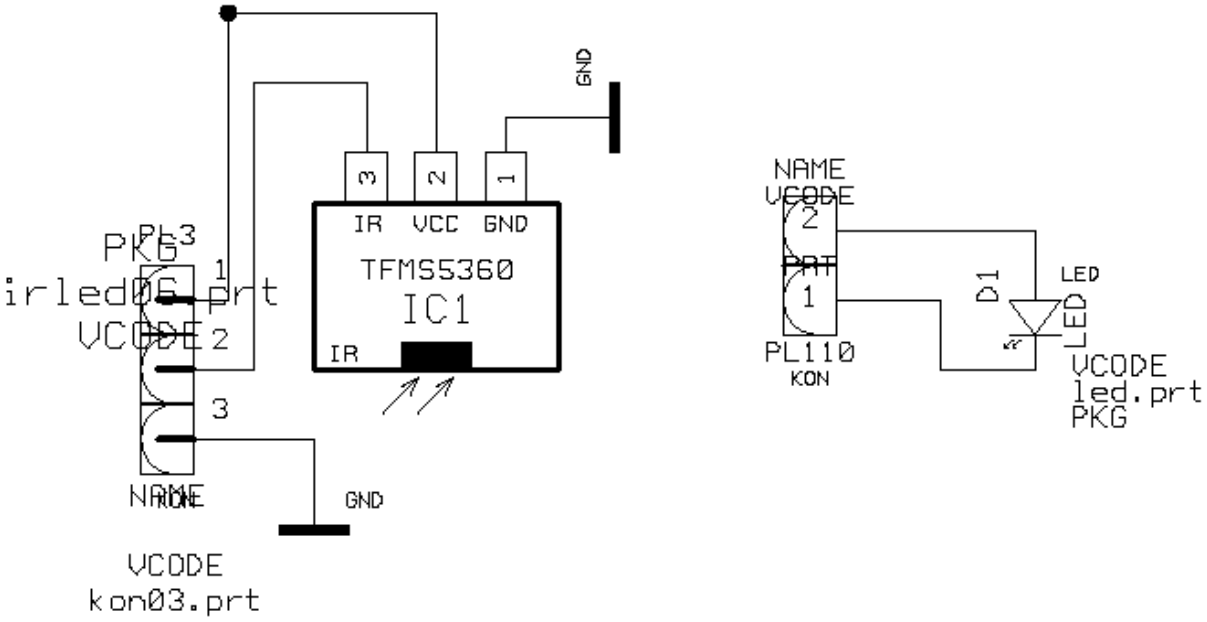
11fav19a4



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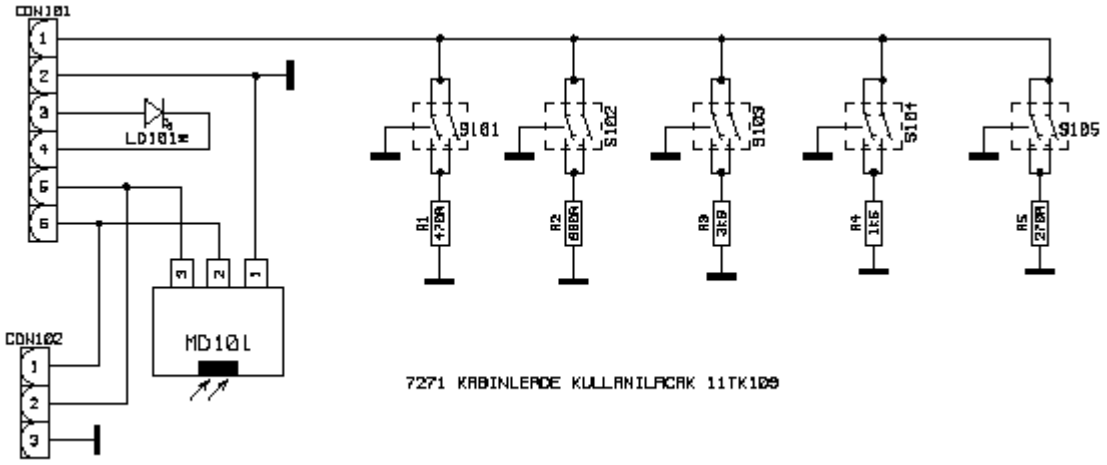

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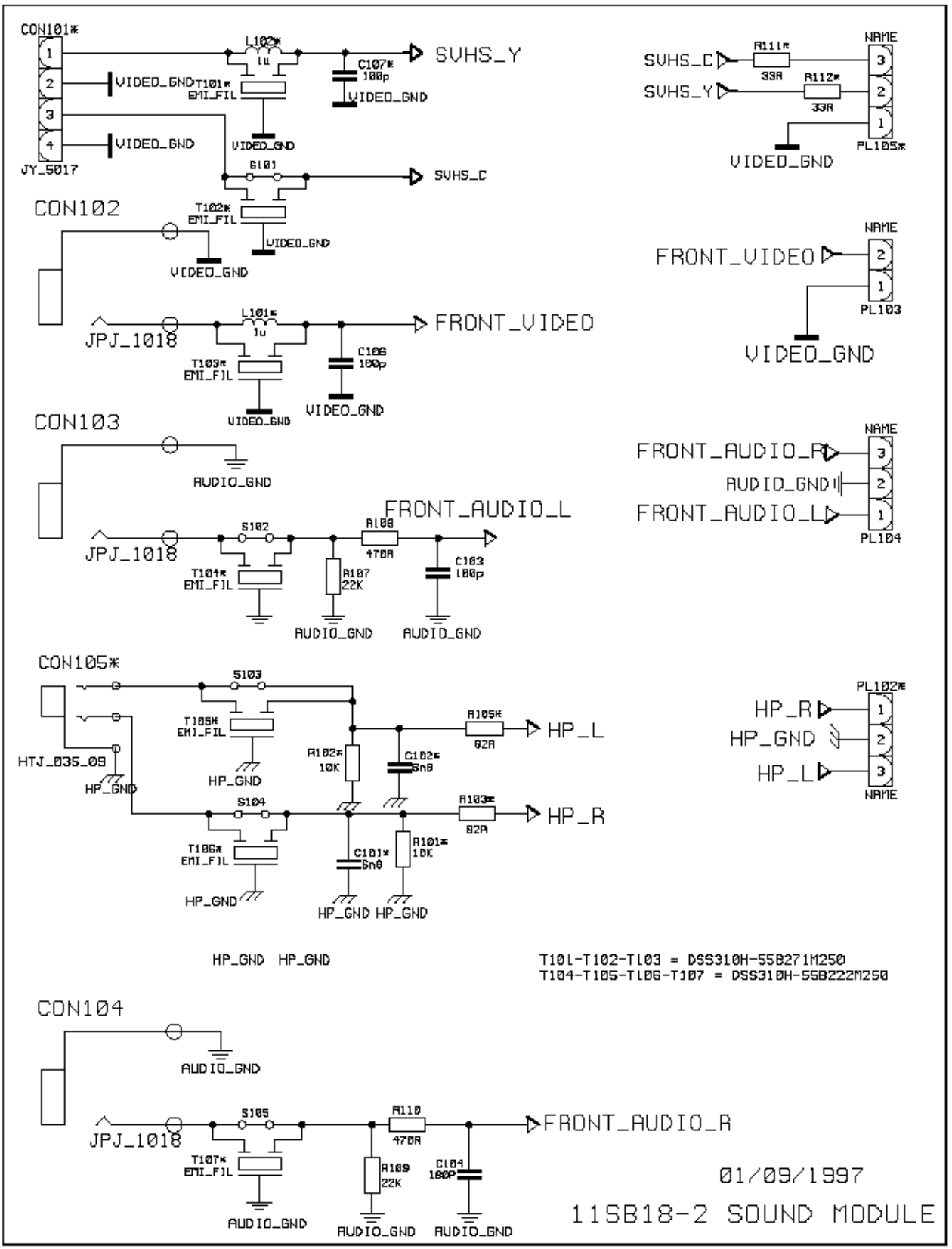
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JY_5017
L102*
1u
C107*
100p
SVHS_Y
VIDEO_GND
T101*
EMI_FIL
VIDEO_GND
VIDEO_GND
G101
SVHS_C
CON102
T102*
EMI_FIL
VIDEO_GND
VIDEO_GND
JPJ_1018
L101*
1u
FRONT_VIDEO
T103*
EMI_FIL
C106
100p
VIDEO_GND
VIDEO_GND
CON103
AUDIO_GND
FRONT_AUDIO_L
JPJ_1018
S102
R108
470R
T104*
EMI_FIL
R107
22K
C103
100p
AUDIO_GND
AUDIO_GND
CON105*
S103
T105*
EMI_FIL
R105*
82R
HP_L
HTJ_035_09
HP_GND
R102*
10K
C102*
5n6
S104
R103*
82R
HP_R
T106*
EMI_FIL
C101*
5n6
R101*
10K
HP_GND
HP_GND
HP_GND
HP_GND HP_GND
T101-T102-T103 = DSS310H-55B271M250
T104-T105-T106-T107 = DSS310H-55B222M250
CON104
AUDIO_GND
JPJ_1018
S105
R110
470R
FRONT_AUDIO_R
T107*
EMI_FIL
R109
22K
C104
100P
AUDIO_GND
AUDIO_GND
AUDIO_GND
01/09/1997
11SB18-2 SOUND MODULE
SVHS_C
SVHS_Y
R111*
33R
R112*
33R
NAME
PL105*
VIDEO_GND
FRONT_VIDEO
NAME
PL103
VIDEO_GND
FRONT_AUDIO_R
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FRONT_AUDIO_L
NAME
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PL102*
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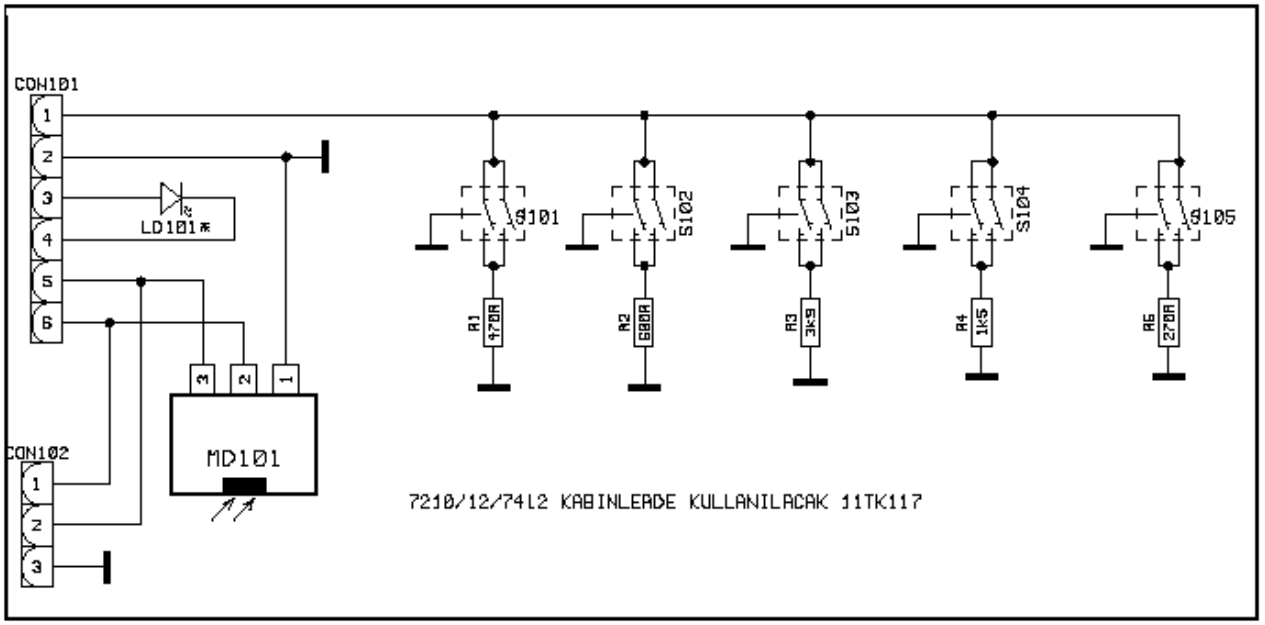
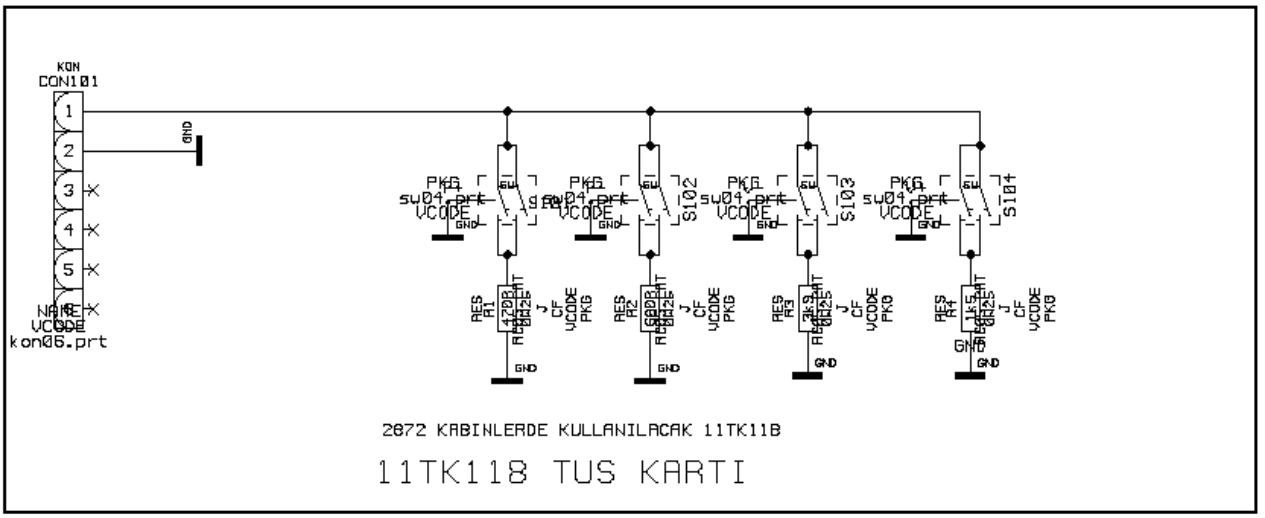
HP_L
NAME

11sb18-3



11tk117



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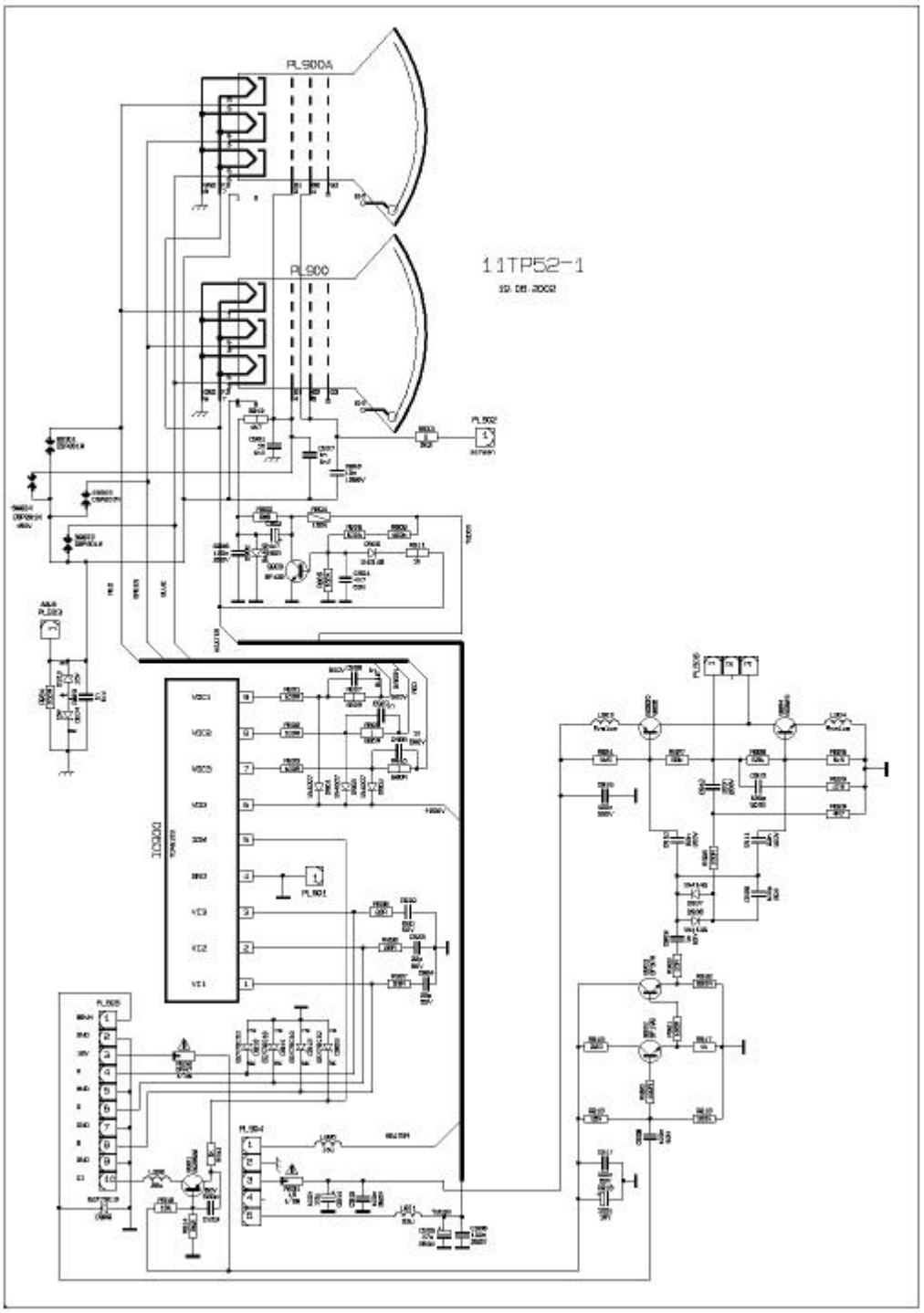
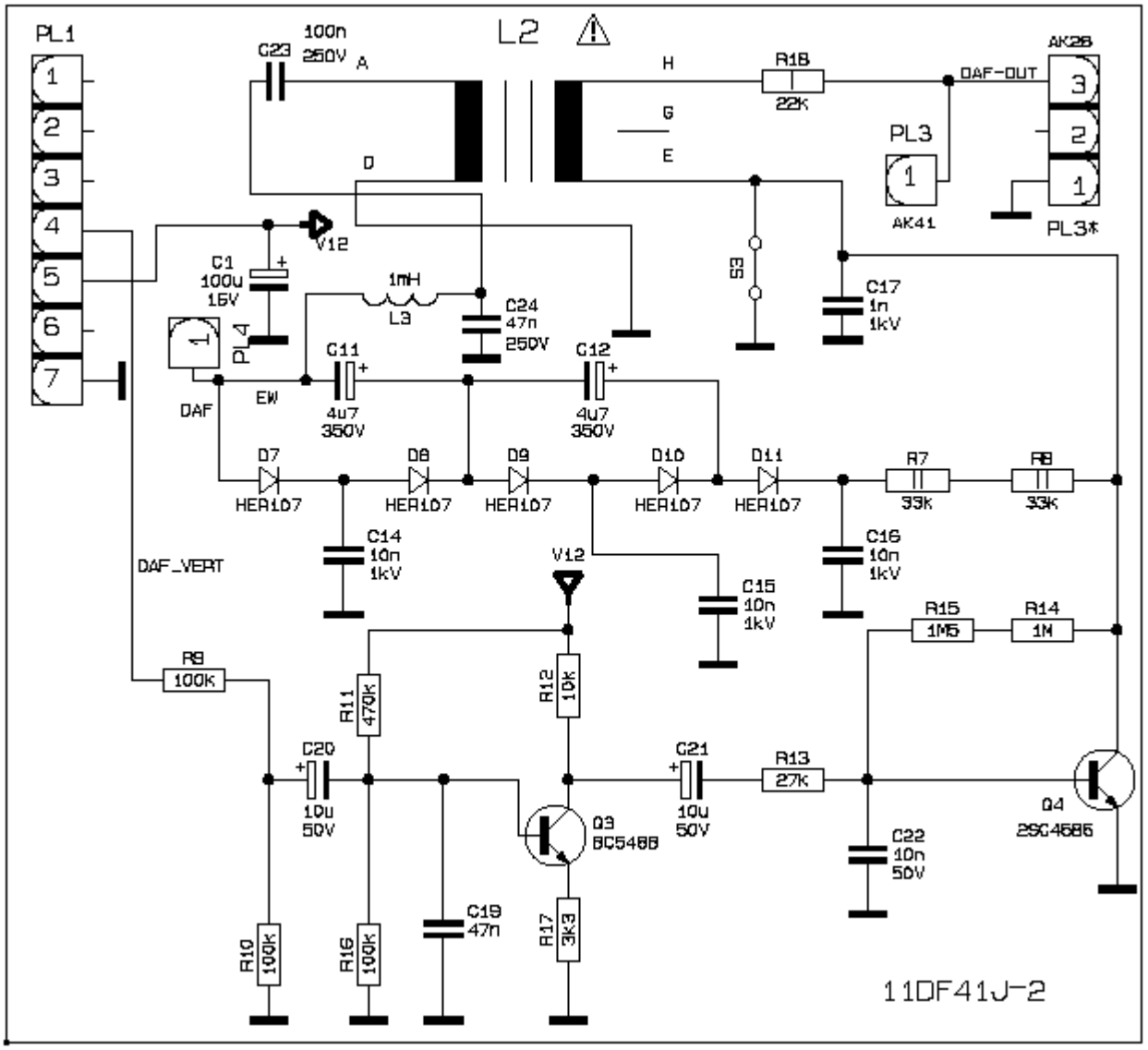


11tp52-1


PL1
C23 100n 250V
L2
A
H
R18 22K
DAF-OUT
AK26
PL3
AK41
PL3*
G
E
D
V12
C1 100u 16V
1mH
L3
C24 47n 250V
PL4
C11 4u7 350V
C12 4u7 350V
S3
C17 1n 1kV
DAF
EW
D7 HER107
D8 HER107
D9 HER107
D10 HER107
D11 HER107
R7 33k
R8 33k
C14 10n 1kV
C16 10n 1kV
C15 10n 1kV
DAF_VERT
R15 1M5
R14 1M
R9 100k
R11 470k
R12 10k
C20 10u 50V
C21 10u 50V
R13 27k
Q3 BC548B
Q4 2SC4686
C22 10n 50V
C19 47n
R17 3k3
R10 100k
R16 100k
11DF41J-2

11df41j-2

SM52-PHILIPS_IF

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1.INTRODUCTION

11AK52 is a 100Hz flicker free colour television capable of driving 28”4:3/16:9, 32” 16:9, 33”4:3 and 29”4:3 real flat picture tubes.
The chassis is capable of operation in PAL, SECAM, NTSC (playback) colour standards and multiple transmission standards as B/G, D/K, I/I’, and L/L´.
Sound system output is supplying 2x10W (10%THD) for left and right outputs of 8ohm speakers.
TV supports the level 1.5 teletext standard. It is possible to decode transmissions including high graphical data.
The chassis is equipped with two full EuroScarts, one SCART for AV input/output, one front-AV input, one back-AV input, one headphone output, one SVHS input (via SCART and SVHS connector), two external speaker outputs (left and right).

2.TUNER

The hardware and software of the TV is suitable for tuners, supplied by different companies, which are selected from the Service Menu. These tuners can be combined VHF, UHF tuners suitable for CCIR systems B/G, H, L, L´, I/I´, and D/K. The tuning is available through the digitally controlled I²C bus (PLL). Below you will find info on one of the Tuners in use.

General description of UV1316:

The UV1316 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L’, I and I’. The low IF output impedance has been designed for direct drive of a wide variety of SAW filters with sufficient suppression of triple transient.

Features of UV1316:

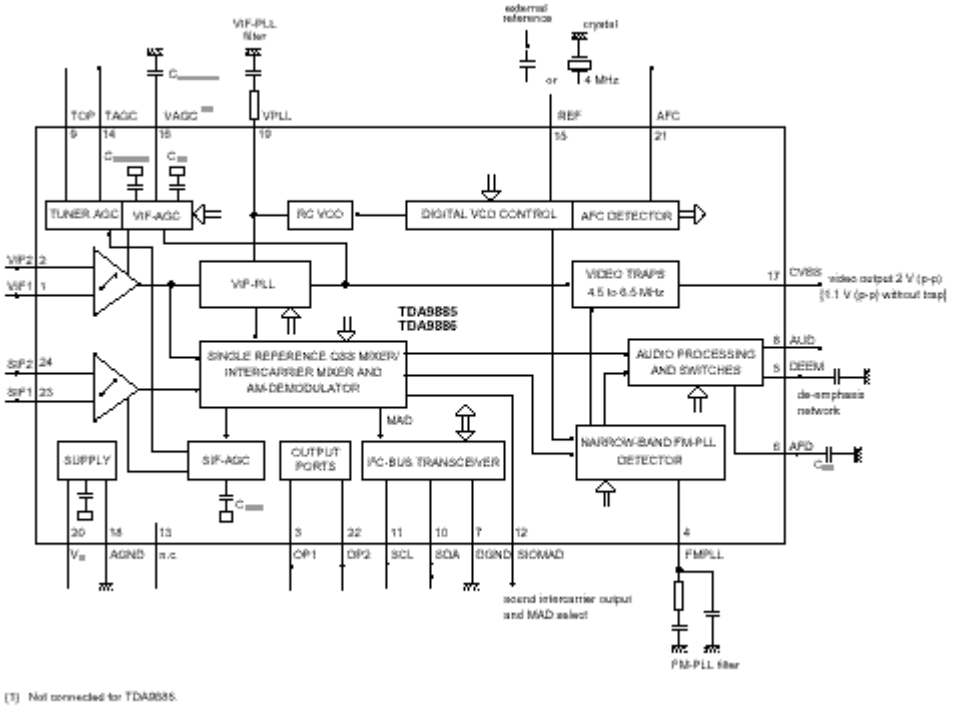
1. Member of the UV1300 family small sized UHF/VHF tuners
2. Systems CCIR: B/G, H, L, L’, I and I’; OIRT: D/K
3. Digitally controlled (PLL) tuning via I²C-bus
4. Off-air channels, S-cable channels and Hyperband
5. World standardized mechanical dimensions and world standard pinning
6. Compact size
7. Complies to “CENELEC EN55020” and “EN55013”

Pinning:

1.	Gain control voltage (AGC)	:	4.0V, Max: 4.5V
2.	Tuning voltage		
3.	I²C-bus address select	:	Max: 5.5V
4.	I²C-bus serial clock	:	Min:-0.3V, Max: 5.5V
5.	I²C-bus serial data	:	Min:-0.3V, Max: 5.5V
6.	Not connected		
7.	PLL supply voltage	:	5.0V, Min: 4.75V, Max: 5.5V
8.	ADC input		
9.	Tuner supply voltage	:	33V, Min: 30V, Max: 35V
10.	Symmetrical IF output 1		
11.	Symmetrical IF output 2		

3.IF PART (TDA9885/86)

The TDA9885 is an alignment-free single standard (without positive modulation, only PAL) vision and sound IF signal PLL.
The TDA9886 is an alignment-free multistandard (PAL, SECAM and NTSC) vision and sound IF signal PLL Both devices can be used for TV, VTR, PC and set-top box applications.
The following figure shows the simplified block diagram of the integrated circuit.
The integrated circuit comprises the following functional blocks:
VIF amplifier, Tuner and VIF-AGC, VIF-AGC detector, Frequency Phase-Locked Loop (FPLL) detector, VCO and divider, Digital acquisition help and AFC, Video demodulator and amplifier, Sound carrier trap, SIF amplifier, SIF-AGC detector, Single reference QSS mixer, AM demodulator, FM demodulator and acquisition help, Audio amplifier and mute time constant, I²C-bus transceivers and MAD (module address), Internal voltage stabilizer.



4.VIDEO SWITCH TEA6415

In case of three or more external sources are used, the video switch IC TEA6415 is used. The main function of this device is to switch 8 video-input sources on the 6 outputs.

Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of sync. top for CVBS or black level for RGB signals).

Each nominal gain between any input and output is 6.5dB.For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, 5VDC on the input. Each input can be used as a normal input or as a MAC or Chroma input (with external Resistor Bridge). All the switching possibilities are changed through the BUS. Driving 75ohm load needs an external resistor. It is possible to have the same input connected to several outputs.

5.MULTI STANDARD SOUND PROCESSOR

The MSP34x1G family of single-chip Multi-standard Sound Processors covers the sound processing of all analog TV-Standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip. Signal conforming to the standard by the Broadcast Television Systems Committee (BTSC).

The DBX noise reduction, or alternatively, MICRONAS Noise Reduction (MNR) is performed alignment free. Other processed standards are the Japanese FM-FM multiplex standard (EIA-J) and the FM Stereo Radio standard.

6.SOUND OUTPUT STAGE WITH TDA7480L

The TDA7480L is an audio class-D amplifier assembled in Power DIP package specially designed for high efficiency applications mainly for TV and Home Stereo sets.

Mute stand-by function of the audio amplifier can be described as the following; the pin 12 (MUTE/STAND-BY) controls the amplifier status by two different thresholds, referred to ground. When Vpin 12 voltage is lower than 0.7V the amplifier is in Stand-by mode and the final stage generators are off. When Vpin 12 is higher than 4V, the amplifier is in play mode.

The TDA7480L is a 10W+10W stereo sound amplifier with mute/stand-by facility. MUTE control signal coming from microcontroller (when it is at high level) activates the mute function. IC is muted when mute pin is at low level (pin12). MUTE pin can also be activated via an external pop-noise circuitry in order to eliminate pop noise when TV is turned off. Just after the TV is turned off, this circuit switches the IC to stand-by mode by pulling the mute pin voltage to ground.

7.VERTICAL OUTPUT STAGE WITH TDA8177F

The IC TDA8177F is the vertical deflection booster circuit. Two supply voltages, +12V and -12V are needed to scan the inputs VERT+ and VERT-, respectively. And a third supply voltage, +60V for the flyback limiting are needed. The vertical deflection coil is connected in series between the output and feedback to the input.

8.VIDEO OUTPUT AMPLIFIER TDA6109

The TDA6109 includes three video output amplifiers in order to drive the three cathodes of a colour picture tube directly. To obtain maximum performance, the amplifier is used with black-current control.

9.POWER SUPPLY (SMPS)

The DC voltages required at various parts of the chassis are provided by an SMPS transformer controlled by the IC MC44608, which is designed for driving, controlling and protecting switching transistor of SMPS. The transformer generates 135V for FBT input, +/-14V for audio amplifier, 8V stand by voltage and 8V, 12V and 5V supplies for other different parts of the chassis.

An optocoupler is used to control the regulation of line voltage and stand-by power consumption. There is a regulation circuit in secondary side. This circuit produces a control voltage according to the changes in 135V DC voltage, via an optocoupler (TCET 1102G) to pin3 of the IC.

During the switch on period of the transistor, energy is stored in the transformer. During the switch off period energy is fed to the load via secondary winding. By varying switch-on time of the power transistor, it controls each portion of energy transferred to the second side such that the output voltage remains nearly independent of load variations.

10.MICROCONTROLLER SDA5550

10.1.General Features

• Feature selection via special function register
• Simultaneous reception of TTX, VPS, PDC, and WSS (line 23)
• Supply Voltage 2.5 and 3.3 V
• ROM version is used.

10.2.External Crystal and Programmable Clock Speed

• Single external 6MHz crystal, all necessary clocks are generated internally
• CPU clock speed selectable via special function registers.
• Normal Mode 33.33 MHz CPU clock, Power Save mode 8.33 MHz

10.3.Microcontroller Features

• 8bit 8051 instruction set compatible CPU.
• 33.33-MHz internal clock (max.)
• 0.360 ms (min.) instruction cycle
• Two 16-bit timers
• Watchdog timer
• Capture compare timer for infrared remote control decoding
• Pulse width modulation unit (2 channels 14 bit, 6 channels 8 bit)
• ADC (4 channels, 8 bit)
• UART (rxd, txd)

10.4.Memory

• Up to 128 Kilobyte on Chip Program ROM
• Eight 16-bit data pointer registers (DPTR)
• 256-bytes on-chip Processor Internal RAM (IRAM)
• 128bytes extended stack memory.
• Display RAM and TXT/VPS/PDC/WSS-Acquisition-Buffer directly accessible via MOVX
• UP to 16KByte on Chip Extended RAM (XRAM) consisting of;
- 1 Kilobyte on-chip ACQ-buffer-RAM (access via MOVX)
- 1 Kilobyte on-chip extended-RAM (XRAM, access via MOVX) for user software
- 3 Kilobyte Display Memory

10.5.Display Features

• ROM Character set supports all East and West European Languages in single device
• Mosaic Graphic Character Set
• Parallel Display Attributes
• Single/Double Width/Height of Characters
• Variable Flash Rate
• Programmable Screen Size (25 Rows x 33...64 Columns)
• Flexible Character Matrixes (HxV) 12 x 9...16
• Up to 256 Dynamical Redefinable Characters in standard mode; 1024 Dynamical Redefinable Characters in Enhanced Mode
• CLUT with up to 4096 colour combinations
• Up to 16 Colours per DRCS Character
• One out of 8 Colours for Foreground and Background Colours for 1-bit DRCS and ROM Characters

10.6.ROM Characters
• Shadowing
• Contrast Reduction
• Pixel by Pixel Shiftable Cursor With up to 4 Different Colours
• Support of Progressive Scan and 100 Hz.
• 3 X 4Bits RGB-DACs On-Chip
• Free Programmable Pixel Clock from 10 MHz to 32MHz
• Pixel Clock Independent from CPU Clock
• Multinorm H/V-Display Synchronization in Master or Slave Mode

10.7.Acquisition Features
• Multi-standard Digital Data Slicer
• Parallel Multi-norm Slicing (TTX, VPS, WSS, CC, G+)
• Four Different Framing Codes Available
• Data Caption only limited by available Memory
• Programmable VBI-buffer
• Full Channel Data Slicing Supported
• Fully Digital Signal Processing
• Noise Measurement and Controlled Noise Compensation
• Attenuation Measurement and Compensation
• Group Delay Measurement and Compensation
• Exact Decoding of Echo Disturbed Signals

10.8.Ports
• One 8-bit I/O-port with open drain output and optional I^2C Bus emulation support (Port0)
• Two 8-bit multifunction I/O-ports (Port1, Port3)
• One 4-bit port working as digital or analogue inputs for the ADC (Port2)
• One 2-bit I/O port with secondary function (P4.2, 4.3, 4.7)
• One 4-bit I/O-port with secondary function (P4.0, 4.1, 4.4) (Not available in P-SDIP 52)

11.SERIAL ACCESS 32K EEPROM

24LC32 is the 32Kbit electrically erasable programmable memory. The memory is compatible with the I^2C standard, two wire serial interface, which uses a bi-directional data bus and serial clock.

12.CLASS AB STEREO HEADPHONE DRIVER TDA1308

The TDA1308 is an integrated class AB stereo headphone driver contained in a DIP8 plastic package. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications.

13.SAW FILTERS

K3953M:
Standard
B/G, D/K, I, L/L'
Features
TV IF video filter with Nyquist slopes at 33,90 MHz and 38,90 MHz
Constant group delay
Suitable for CENELEC EN 55020
Terminals
Tinned CuFe alloy
Pin configuration
1 Input
2 Input - ground
3 Chip carrier - ground
4 Output
5 Output

K3958M:
Standard
B/G, D/K, I, L/L'
Features
TV IF video filter with Nyquist slopes at 33.90 MHz and 38.90 MHz
Constant group delay
Terminal and Pin configuration are the same with K3953M

K9356M:
Standard
B/G, D/K, I, L
Features
TV IF audio filter with pass band for sound carriers at 32,40 MHz (D/K, L), 32,90 MHz (I) and 33,40 MHz (B/G)
Terminal and Pin configuration are the same with K3953M

K9656M:
Standard
B/G, D/K, I, L/L'
Features
TV IF audio filter with two channels
Channel 1 (L') with one pass band for sound carriers at 40,40 MHz (L') and 39,75 MHz (L'- NICAM)
Channel 2 (B/G, D/K, L, I) with one pass band for sound carriers between 32,35 MHz and 33,40 MHz
Terminal and Pin configuration are the same with K3953M

14.IC DESCRIPTIONS

TDA6109	27W401
24LC32	SDA5275
DRAM 4MX4	SDA9400
LM317T	DDP3310
SDA5550	TEA6415
VPC3230D	TDA1308T
MSP3411G	TL431
TDA9885/86	LM7808
TDA8177F	LM1086
MC44608	TCET1102G
TDA7480L	SAA3010T

14.1.TDA6109

14.1.1.General Description

The TDA6109JF includes three video output amplifiers in one plastic DIL-bent-SIL 9-pin medium power (DBS9MPF) package (SOT111-1), using high-voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

14.1.2.Features

· Typical bandwidth of 9.0 MHz for an output signal of 60 V (p-p)
· High slew rate of 1850 V/ms
· No external components required
· Very simple application
· Single supply voltage of 200 V
· Internal reference voltage of 2.5 V
· Fixed gain of 51
· Black-Current Stabilization (BCS) circuit
· Thermal protection

14.1.3.Pinning

SYMBOL	PIN	DESCRIPTION
$V_{i(1)}$	1	inverting input 1
$V_{i(2)}$	2	inverting input 2
$V_{i(3)}$	3	inverting input 3
GND	4	ground (fin)
I_{om}	5	black current measurement output
V_{DD}	6	supply voltage
$V_{oc(3)}$	7	cathode output 3
$V_{oc(2)}$	8	cathode output 2
$V_{oc(1)}$	9	cathode output 1

14.2.27W401

14.2.1.Description

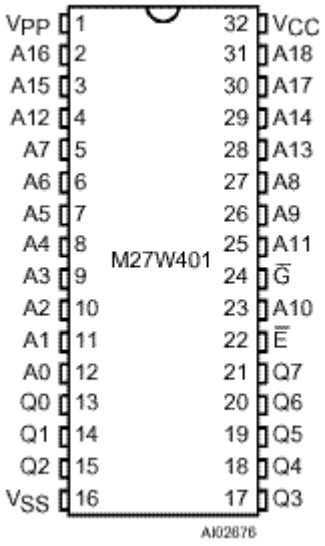
The M27W401 is a low voltage 4 Mbit EPROM offered in the two ranges UV (ultra violet erase) and OTP (one time programmable). It is ideally suited for microprocessor systems requiring large data or program storage and is organized as 524,288 by 8 bits. The M27W401 operates in the read mode with a supply voltage as low as 2.7V at –40 to 8??C temperature range. The decrease in operating power allows either a reduction of the size of the battery or an increase in the time between battery re-charges.

The FDIP32W (window ceramic frit-seal package) has a transparent lid, which allows the user to ex-pose the chip to ultraviolet light to erase the bit pat-tern. A new pattern can then be written to the device by following the programming procedure. For application where the content is programmed only one time and erasure is not required, the M27W401 is offered in PDIP32, PLCC32 and TSOP32 (8x20 mm) packages.

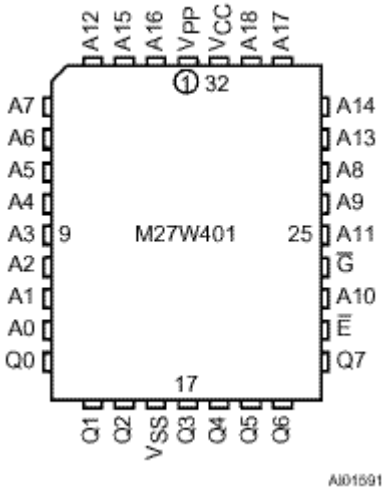
14.2.2.Features

2.7V to 3.6v Low voltage in Read Operation
Access time:
–70ns at V_{CC} = 3.0V to 3.6V
–80ns at V_{CC} = 2.7V to 3.6V
Pin Compatible with M27C4001
Low Power Consumption:
–1?mA max Standby Current
– 15mA max Active Current at 5MHz
Programming Time 10?ns/byte
High Reliability CMOS Technology
– 2,000V ESD Protection
– 200mA Latchup Protection Immunity
Electronic Signature
– Manufacturer Code: 20h
– Device Code: 41h

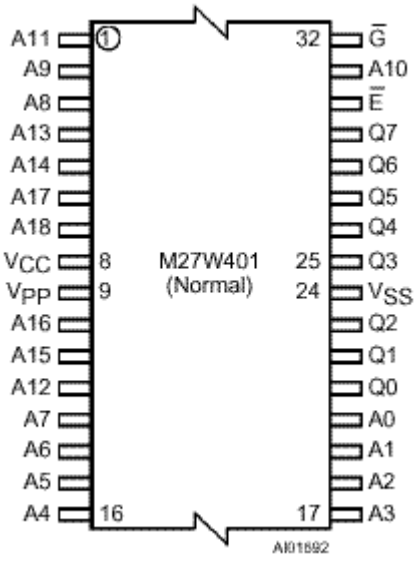
14.2.3.Connections



DIP connections



LCC Connections



TSOP Connections

Signal Names

A0-A18	Address Inputs
Q0-Q7	Data Outputs
E	Chip Enable
G	Output Enable
V_{pp}	Program Supply
V_{cc}	Supply Voltage
V_{ss}	Ground

14.3.24LC32A

14.3.1.Description

The Microchip Technology Inc. 24LC32A is a 4K x 8 (32K bit) Serial Electrically Erasable PROM capable of operation across a broad voltage range (2.5V to 6.0V). It has been developed for advanced, low power applications such as personal communications or data acquisition. The 24LC32A also has a page-write capability of up to 32 bytes of data. The 24LC32A is capable of both random and sequential reads up to the 32K boundary. Functional address lines allow up to eight 24LC32A devices on the same bus, for up to 256K bits address space. Advanced CMOS technology and broad voltage range make this device ideal for low-power/ low-voltage, nonvolatile code and data applications. The 24LC32A is available in the standard 8-pin plastic DIP and both 150 mil and 200 mil SOIC packaging.

14.3.2.Features

• Single supply with operation down to 2.5V
• Maximum write current 3 mA at 6.0V
• Standby current 1 mA max at 2.5V
• 2-wire serial interface bus, I 2 CÔ compatible
• 100 kHz (2.5V) and 400 kHz (5V) compatibility
• Self-timed ERASE and WRITE cycles
• Power on/off data protection circuitry
• Hardware write protect
• 1,000,000 Erase/Write cycles guaranteed
• 32 byte page or byte write modes available
• Schmitt trigger filtered inputs for noise suppression
• Output slope control to eliminate ground bounce
• 2 ms typical write cycle time, byte or page
• Up to eight devices may be connected to the same bus for up to 256K bits total memory
• Electrostatic discharge protection > 4000V
• Data retention > 200 years
• 8-pin PDIP and SOIC packages
• Temperature ranges
• Commercial (C): 0°C to +75°C
• Industrial (I): -40°C to +85°C

14.3.3.Pin Descriptions

A0, A1, A2 Chip Address Inputs

The A0..A2 inputs are used by the 24LC32A for multiple device operation and conform to the 2-wire bus standard. The levels applied to these pins define the address block occupied by the device in the address map. A particular device is selected by transmitting the corresponding bits (A2, A1, A0) in the control byte.

SDA Serial Address/Data Input/Output

This is a Bi-directional pin used to transfer addresses and data into and data out of the device. It is an open drain terminal, therefore the SDA bus requires a pull up resistor to VCC (typical 10 kO for 100 kHz, 2 kO for 400 kHz) For normal data transfer SDA is allowed to change only during SCL low. Changes during SCL HIGH are reserved for indicating the START and STOP conditions.

SCL Serial Clock

This input is used to synchronize the data transfer from and to the device.

WP
This pin must be connected to either VSS or VCC. If tied to VSS, normal memory operation is enabled (read/write the entire memory 000-FFF). If tied to VCC, WRITE operations are inhibited. The entire memory will be write-protected. Read operations are not affected.
WCC
+2.5V to 6V Power Supply
WSS
Ground

14.4.SDA5275

14.4.1.Features

• Single chip teletext IC
• Analog CVBS-input with onchip clamping circuitry
• Slicer
• Supports level 1, 2.5 and 3.5 ETSI teletext standard
• Stores up to 14 teletext pages on chip
• Stores up to 2048 teletext pages with external 16 M memory
• SDA 5275: full level 2.5 processing
• Analog RGB-output
• 41 Latin script languages
• 12 ´ 10 character size
• Parallel display attributes
• 64 from 4096 colors selectable
• Enhanced flash modes
• Dynamically redefinable character set (DRCS, PCS)
• Pixel graphics
• Full screen display (64 ´ 32 or 80 ´ 24 character positions)
• Horizontal and vertical scrolling
• Graphic cursors
• 4:3 and 16:9 display
• Multinorm display (50/60/100/120 Hz)
• RISC-processor
• Firmware downloadable
• I^2C / 3 wire UART-interface (1 Mbit/s)
• Independent clocks for acquisition and display
• Tools for greatly simplified software development
• 24-Kbyte on-chip reconfigurable DRAM
• 44160-bit character ROM
• One external crystal for all standards

14.4.2.Pin Definition and functions

Pin No. P-LCC-68-1	Symbol	Function
1	INTQ	Interrupt request output to ext. controller
2	CLK-IO	System clock input/output
3	TCSQ/FLD	Composite sync output/ field output
4	VS/VCS	Vertical sync input/output
5	HS	Horizontal sync input/output
6	XOUT	20.5-MHz crystal oscillator output
7	XIN	20.5-MHz crystal oscillator input
8	GPO	General purpose output
9	TM	Test pin, leave open or connect VSS
10	CVBS	CVBS-video signal input
11	VDD1	+ 5 V digital supply
12	VDDA	+ 5 V analog supply
13	VSSA1	Analog ground
14	N.C.	Not connected
15	N.C.	Not connected
16	VDD2	+ 5 V digital supply
17	RES	Chip reset
18	N.C.	Not connected

19	N.C.	Not connected
20	N.C.	Not connected
21	VDD3	+ 5 V digital supply
22	N.C.	Not connected
23	VREF	+ 3 V reference voltage input
24	N.C.	Not connected
25	VDD4	+ 5 V digital supply
26	A8	External DRAM-address
27	A7	External DRAM-address
28	A6	External DRAM-address
29	A5	External DRAM-address
30	A4	External DRAM-address
31	A3	External DRAM-address
32	A2	External DRAM-address
33	A1	External DRAM-address
34	A0	External DRAM-address
35	A9	External DRAM-address
36	A10	External DRAM-address
37	A11	External DRAM-address
38	RASQ	Row address strobe (DRAM)
39	WEQ	Write enable (DRAM)
40	D1	External DRAM-data
41	D0	External DRAM-data
42	D2	External DRAM-data
43	D3	External DRAM-data
44	VSS4	0 V digital supply
45	CASQ	Column address strobe
46	N.C.	Not connected
47	N.C.	Not connected
48	N.C.	Not connected
49	VSS3	0 V digital supply
50	N.C.	Not connected
51	N.C.	Not connected
52	N.C.	Not connected
53	N.C.	Not connected
54	N.C.	Not connected
55	VSS2	0 V digital supply
56	VBB	Substrate bias voltage N.C.* (depends on version)
57	N.C.	Not connected
58	VSSA2	Analog ground
59	RGB-GND	RGB-ground
60	VSS1	0 V digital supply
61	R	Analog red display output
62	G	Analog green display output
63	B	Analog blue display output
64	BLAN	Blanking signal open drain output
65	CORQ	Contrast reduction open drain output
66	SCL	Bi-directional I^2C Bus clock port
67	SDA	Bi-directional I^2C Bus data port
68	I^2CEN	I^2C Bus enable

14.5.DRAM 4MX4

14.5.1.General Description

The 4 Meg x 4 DRAM is a randomly accessed, solid-state memory containing 16,777,216 bits organized in a x4 con-figuration. RAS# is used to latch the row address (first 11 bits for 2K and first 12 bits for 4K). Once the page has been opened by RAS#, CAS# is used to latch the column address (the latter 11 bits for 2K and the latter 10 bits for 4K, address pins A10 and A11 are “don’t care”). READ and WRITE cycles are selected with the WE# input. A logic HIGH on WE# dictates READ mode, while a logic LOW on WE# dictates WRITE mode. During a WRITE cycle, data-in (D) is latched by the falling edge of WE# or CAS#, whichever occurs last. An EARLY WRITE occurs when WE# is taken LOW prior to CAS# falling. A LATE WRITE or READ-MODIFY-WRITE occurs when WE# falls after CAS# is taken LOW. During EARLY WRITE cycles, the data outputs (Q) will remain High-Z regardless of the state of OE#. During LATE WRITE or READ-MODIFY-WRITE cycles, OE# must be taken HIGH to disable the

data outputs prior to applying input data. If a LATE WRITE or READ-MODIFY-WRITE is attempted while keeping OE# LOW, no write will occur, and the data outputs will drive read data from the accessed location. The four data inputs and the four data outputs are routed through four pins using common I/O, and pin direction is controlled by WE# and OE#.

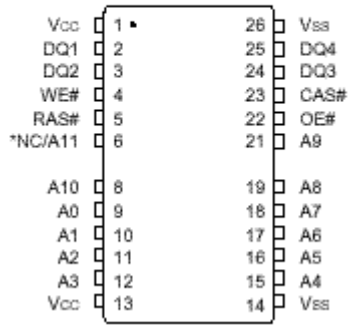
14.5.2.Features

- Industry-standard x4 pin out, timing, functions and packages
- State-of-the-art, high-performance, low-power CMOS silicon-gate process
- Single power supply (+3.3V ±0.3V or +5V ±10%)
- All inputs, outputs and clocks are TTL-compatible
- Refresh modes: RAS#-ONLY, HIDDEN and CAS#-BEFORE - RAS# (CBR)
- Optional Self Refresh (S) for low-power data retention
- 11 row, 11 column addresses (2K refresh) or 12 row, 10 column addresses (4K refresh)
- Extended Data-Out (EDO) PAGE MODE access cycle
- 5V-tolerant inputs and I/Os on 3.3V devices

14.5.3.Pin Assignment

Top View

24/26-Pin SOJ
(DA-2)



*NC on 2K refresh and A11 on 4K refresh options. **Note:** The "#" symbol indicates signal is active LOW.

14.6.SDA9400

14.6.1.General Description

The SDA9400 is a new component of the Micronas MEGAVISION ® IC set in a 0.35µm embedded DRAM technology (frame memory embedded). The SDA9400 is pin compatible to the SDA9401 (field memory embedded). The SDA9400 comprises all main functionalities of a digital feature box in one monolithic IC. The scan rate conversion to 100/120 Hz interlaced (50/60 Hz progressive) is based on a motion adaptive algorithm. The scan rate converted picture can be vertically expanded. The SDA9400 has a free running mode, therefore features like scan rate conversion to e.g. 70, 75 Hz with joint lines or multiple picture display (e.g. tuner scan) are possible. Due to the frame based signal processing, the noise reduction has been greatly improved. Furthermore separate motion detectors for luminance and chrominance have been implemented. For automatic controlling of the noise reduction parameters a noise measurement algorithm is included, which measures the noise level in the picture or in the blanking period. In addition a spatial noise reduction is implemented, which reduces the noise even in the case of motion. The input signal can be compressed horizontally and vertically with a certain number of factors. Therefore split screen is supported. Beside these additional functions like coloured background, windowing and flashing are implemented.

14.6.2.Features

- **Two input data formats**
- 4:2:2 luminance and chrominance parallel (2 x 8 wires)
- ITU-R 656 data format (8 wires)

• Two different representations of input chrominance data
- 2‘s complement code
- Positive dual code
• Flexible input sync controller
• Flexible compression of the input signal
- Digital vertical compression of the input signal (1.0, 1.25, 1.5, 1.75, 2.0, 3.0, 4.0)
- Digital horizontal compression of the input signal (1.0, 2.0, 4.0)
• Noise reduction
- Motion adaptive spatial and temporal noise reduction (3D-NR)
- Temporal noise reduction for luminance frame based or field based
- Temporal noise reduction for chrominance field based
- Separate motion detectors for luminance and chrominance
- Flexible programming of the temporal noise reduction parameters
- Automatic measurement of the noise level (5-bit value, readable by I²C bus)
• 3-D motion detection
- High performance motion detector for scan rate conversion
- Global motion detection flag (readable by I²C bus)
- Movie mode and phase detector (readable by I²C bus)
• TV mode detection by counting line numbers (PAL, NTSC, readable by I²C bus)
• Embedded memory
- 5 Mbit embedded DRAM core for field memories
- 192 kbit embedded DRAM core for line memories
• Flexible clock and synchronization concept
- Decoupling of the input and output clock system possible
• Scan rate conversion
- Motion adaptive 100/120 Hz interlaced scan conversion
- Motion adaptive 50/60 Hz progressive scan conversion
- Simple static interlaced and progressive conversion modes for 100/120 Hz interlaced or 50/60 Hz progressive scan conversion: e.g. ABAB, AABB, AA*B*B, AAAA, BBBB, AB, AA*
- Simple progressive scan conversion with joint lines:
50 Hz -> 60, 70, 75 Hz progressive
60 Hz -> 70, 75 Hz progressive
- Large area and line flicker reduction
• Flexible digital vertical expansion of the output signal (1.0, ... [1/32] ..., 2.0)
• Flexible output sync controller
- Flexible positioning of the output signal
- Flexible programming of the output sync raster
- External synchronization by backend IC possible
(e.g. split screen for one TV channel with joint lines and one PC VGA channel)
• Signal manipulations
- Insertion of coloured background
- Vertical and/or horizontal windowing with four different speed factors
- Flash generation (for supervising applications, motion flag readable by I²C bus)
- Still frame or field
- Support of split screen applications
- Multiple picture display - Tuner scan (4 and 16 times for 4:3, 12 times for 16:9 tubes)
- Support of multi picture display with PIP or front-end processor with integrated scaler
(e.g. 9 times display of PIP pictures, picture tracking, random pictures, still-in-moving picture, moving-in-still picture)
• I²C-bus control (400 kHz)
• P-MQFP-64 package
• 3.3 V ± 5% supply voltage

14.6.3.Pin Definition

Pin No.	Name	Type	Description
2,8,24,42,55	VSS1	S	Supply voltage (V SS = 0 V)
9,25,41,56	VDD1	S	Supply voltage (V DD = 3.3 V)
36,52,58	VSS2	S	Supply voltage (V SS = 0 V)
35,51,53,57,59	VDD2	S	Supply voltage (V DD = 3.3 V)
43,..,50	YIN0...7	I/TTL	Data input Y (see input data format)
31,..,34;37,...,40	UVIN0...7	I/TTL	Data input UV (for 4:2:2 parallel, see input data format)

		PD	(for CCIR 656, see input data format)
30	RESET	I/TTL	System reset. The RESET input is low active. In order to ensure correct operation a "Power On Reset" must be performed. The RESET pulse must have a minimum duration of two clock periods of the system clock CLK1.
23	HIN	I/TTL PD	H-Sync input (only for full CCIR 656)
22	VIN	I/TTL PD	V-Sync input (only for full CCIR 656)
29	SYNCEN	I/TTL	Synchronization enable input
21	SDA	I/O	I^2C-Bus data line (5V ability)
20	SCL I	I	I^2C-Bus clock line (5V ability)
54	CLK1	I/TTL	System clock 1
17,..,10	UVOUT0...7	O/TTL	Data output UV (see output data format)
7,..,3;1;64;63	YOUT0...7	O/TTL	Data output Y (see output data format)
62	HREF	O/TTL	Horizontal active video output
61	VOUT/ VEXT	I/O/ TTL	EXSYN=0 (I^2C-bus parameter): V-Sync output EXSYN=1: External V-Sync input for output part
60	HOUT/ HEXT	I/O/ TTL	EXSYN=0 (I^2C-bus parameter): H-Sync output EXSYN=1: External H-Sync input for output part
18	INTERLACED	O/TTL	Interlace signal for AC coupled vertical deflection
28	X1 / CLK2	I/TTL	Crystal connection / System clock 2
27	X2	O/AN	Crystal connection
26	CLKOUT	O/TTL	Clock output (depends on I^2C parameters CLK11EN, CLK21EN, FREQR)
19	TEST	I/TTL	Test input, connect to *V* SS for normal operation

14.7.LM317T

14.7.1.Description

The LM317T is an adjustable 3 terminal positive voltage regulator capable of supplying in excess of 1.5 amps over an output range of 1.25 to 37 volts. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage. Further, it employs internal current limiting, thermal shutdown and safe area compensation, making it essentially blow–out proof. The LM317 serves a wide variety of applications including local, on card regulation. This device can also be used to make a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, the LM317 can be used as a precision current regulator.

14.7.2.Features

- Output Current in Excess of 1.5 A
- Output Adjustable between 1.2 V and 37 V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting Constant with Temperature
- Output Transistor Safe–Area Compensation
- Floating Operation for High Voltage Applications
- Available in Surface Mount D^2PAK, and Standard 3–Lead Transistor Package
- Eliminates Stocking many Fixed Voltages

14.8.DDP3310

14.8.1.Description

The DDP 3310B is a single-chip digital Display and Deflection Processor designed for high-quality back-end applications in 100/120-Hz TV sets with 4:3 or 16:9 picture tubes. The IC can be combined with members of the DIGIT 3000 IC family (VPC 32xx, TPU 3040), or it can be used with third-party products. The IC contains the entire digital video component and deflection processing and all analog interface components.

14.8.2.Features

Video processing

– linear horizontal scaling (0.25 … 4)
– non-linear horizontal scaling “panorama-vision”
– dynamic peaking

– soft limiter (gamma correction)
– color transient improvement
– programmable RGB matrix
– picture frame generator
– two analog RGB/Fast-Blank inputs. The DDP 3310B is a single-chip digital Display and Deflection Processor designed for high-quality back-

Deflection processing
– scan velocity modulation output
– high-performance H/V deflection
– EHT compensation for vertical / East/West
– soft start/stop of H-Drive
– vertical angle and bow
– differential vertical output
– vertical zoom via deflection
– horizontal and vertical protection circuit
– adjustable horizontal frequency for VGA/SVGA display

Miscellaneous
– selectable 4:1:1/ 4:2:2 YC $_r$ C $_b$ input
– selectable 27/ 32-MHz line-locked clock input
– crystal oscillator for horizontal protection
– automatic picture tube adjustment (cutoff, white-drive)
– single 5-V power supply
– hardware for simple 50/60-Hz to 100/ 120-Hz conversion (display frequency doubling)
– two I^2C-controlled PWM outputs
– beam current limiter

14.8.3.Pin connection and short descriptions

NC = not connected
X = obligatory; connect as described in circuit diagram
OUT = Output
LV = if not used, leave vacant
IN = Input
SUPPLY = Supply Pin

Pin no PLCCK 68 pin	Pin name	Type	Connection (if not used)	Short description
1	VSUPP	SUPPLY	X	Supply voltage, Output pin driver
2	GNDP	SUPPLY	X	Ground, Output pin driver
3	VS2	IN	GNDD	Additional VSYNC input
4	FIFORRD	OUT	LV	FIFO Read counter reset
5	FIFORD	OUT	LV	FIFO Read Enable
6	FIFOWR	OUT	LV	FIFO Write Enable
7	FIFORWR	OUT	LV	FIFO Write counter reset
8	HOUT	OUT	X	Horizontal Drive Output
9	HFLB	IN	Hout	Horizontal Flyback Input
10	SAFETY	IN	GNDO	Safety Input
11	VPROT	IN	GNDO	Vertical protection Input
12	FREQSEL	IN	X	Selection of H-Drive Frequency Range
13	CM1	IN	X	Clock select 40.5 or 27/32 MHz
14	CMO	IN	X	Clock select 27/32 MHz
15	RSW2	OUT	LV	Range Switch2, Measurement ADC
16	RSW1	IN/OUT	LV	Range Switch1, Measurement ADC
17	SENSE	IN	GNDO	Sense ADC Input
18	GNDM	SUPPLY	X	Ground, MADC Input
19	VERT+	OUT	GNDO	Differantial Vertical Sawtooth Output
20	VERT-	OUT	GNDO	Differantial Vertical Sawtooth Output
21	EW	OUT	GNDO	Vertical Parabola Output
22	XREF	IN	X	Reference Input for RGB DACs
23	SVM	OUT	VSUPO	Scan Velocity Modulation
24	ROUT	OUT	VSUPO	Analog Output Red
25	GOUT	OUT	VSUPO	Analog Output Green
26	BOUT	OUT	VSUPO	Analog Output Blue
27	GNDO	SUPPLY	X	Ground, Analog Back-end
28	VSUPO	SUPPLY	X	Supply Voltage, Analog Back-end

29	VRD/BCS	IN	X	DAC Reference, Beam Current Safety
30	FBLIN1	IN	GNDO	Fast-Blank1 Input
31	RIN1	IN	GNDO	Analog Red1 Input
32	GIN1	IN	GNDO	Analog Green1 Input
33	BIN1	IN	GNDO	Analog Blue1 Input
34	FBLIN2	IN	GNDO	Fast-Blank2 Input
35	RIN2	IN	GNDO	Analog Red2 Input
36	GIN2	IN	GNDO	Analog Green2 Input
37	BIN2	IN	GNDO	Analog Blue2 Input
38	TEST	IN	GNDD	Test Pin
39	RESQ	IN	X	Reset Input, active low
40	PWM1	OUT	LV	I^2C-controlled DAC
41	PWM2	OUT	LV	I^2C-controlled DAC
42	HCS	IN	GNDD	Half-contrast
43	C0	IN	GNDD	Picture Bas Chroma (LSB)
44	C1	IN	GNDD	Picture Bas Chroma
45	C2	IN	GNDD	Picture Bas Chroma
46	C3	IN	GNDD	Picture Bas Chroma
47	C4	IN	GNDD	Picture Bas Chroma
48	C5	IN	GNDD	Picture Bas Chroma
49	C6	IN	GNDD	Picture Bas Chroma
50	C7	IN	GNDD	Picture Bas Chroma (MSB)
51	VSUPD	SUPPLY	X	Supply Voltage, Digital Circuitry
52	GNDD	SUPPLY	X	Ground, Digital Circuitry
53	LLC2	IN	X	System Clock Input (27/32/40.5 MHz)
54	Y0	IN	GNDD	Picture Bas Luma (LSB)
55	Y1	IN	GNDD	Picture Bas Luma
56	Y2	IN	GNDD	Picture Bas Luma
57	Y3	IN	GNDD	Picture Bas Luma
58	Y4	IN	GNDD	Picture Bas Luma
59	Y5	IN	GNDD	Picture Bas Luma
60	Y6	IN	GNDD	Picture Bas Luma
61	Y7	IN	GNDD	Picture Bas Luma (MSB)
62	LLC1	IN	VSUPD	Single Line-Locked Clock Input (13.5/16 MHz)
63	HS	IN	X	Horizontal Sync Input
64	VS	IN	GNDD	Vertical Sync Input
65	XTALK2	OUT	X	Analog Crystal Output (5-MHz Security Clock)
66	XTALK1	IN	X	Analog Crystal Input (5-MHz Security Clock)
67	SDA	IN/OUT	X	I^2C-Bus Data
68	SCL	IN/OUT	X	I^2C-Bus Clock

14.9.SDA5550

14.9.1.General definition

The SDA5550M is a single chip teletext decoder for decoding World System Teletext data as well as Video Programming System (VPS), Program Delivery Control (PDC), and Wide Screen Signalling (WSS) data used for PAL plus transmissions (Line 23). The device provides an integrated general-purpose, fully 8051-compatible Microcontroller with television specific hardware features. Microcontroller has been enhanced to provide powerful features such as memory banking, data pointers, and additional interrupts etc. The on-chip display unit for displaying Level 1.5 teletext data can also be used for customer defined on screen displays. Internal XRAM consists of up to 17 Kbytes. This device can support external memory up to 1Mbyte ROM and RAM.TVTEXT Controller contains a data slicer for VPS, WSS, PDC and TXT, an acceleration acquisition hardware module, a display generator for Level 1.5 TXT and powerful On screen Display capabilities based on parallel attributes, and pixel oriented characters (DRCS). The 8 bit Microcontroller operates at 360nsec cycle time (min). Controller with dedicated hardware does most of the internal TXT acquisition processing, transfer data to/from external memory interface and receives/transmits data via I^2C-firmware user interface. SDA5550M is realized in 0.25 micron technology with 2.5V supply voltage and 3.3V I/O compatible. The IC produces the following input or output control signals; AGC_CON, MODE_SW, L / L', PIP_MODS, PIP_SEL, ON/OFF (stand-by), SC1..3_IN_AV (pin 8 information from 3 SCARTs), AFC, MUTE (to mute audio output IC), I^2CEN.

14.9.2.Features

General

• Feature selection via special function register
• Simultaneous reception of TTX, VPS, PDC, and WSS (line 23)
• Supply Voltage 2.5 and 3.3 V

External Crystal and Programmable clock speed

Single external 6MHz crystal, all necessary clocks are generated internally
CPU clock speed selectable via special function registers.
Normal Mode 33.33 MHz CPU clock, Power Save mode 8.33 MHz

Microcontroller Features

• 8bit 8051 instruction set compatible CPU.
• 33.33-MHz internal clock (max.)
• 0.360ms (min.) instruction cycle
• Two 16-bit timers
• Watchdog timer
• Capture compare timer for infrared remote control decoding
• Pulse width modulation unit (2 channels 14 bit, 6 channels 8 bit)
• ADC (4 channels, 8 bit)
• UART

Memory

• Non-multiplexed 8-bit data and 16 … 20-bit address bus (ROMless Version)
• Memory banking up to 1Mbyte (Romless version)
• Up to 128 Kilobyte on Chip Program ROM
• Eight 16-bit data pointer registers (DPTR)
• 256-bytes on-chip Processor Internal RAM (IRAM)
• 128bytes extended stack memory.
• Display RAM and TXT/VPS/PDC/WSS-Acquisition-Buffer directly accessible via MOVX
• UP to 16KByte on Chip Extended RAM (XRAM) consisting of;
- 1 Kilobyte on-chip ACQ-buffer-RAM (access via MOVX)
- 1 Kilobyte on-chip extended-RAM (XRAM, access via MOVX) for user software
- 3 Kilobyte Display Memory

Display Features

• ROM Character Set Supports all East and West European Languages in single device
• Mosaic Graphic Character Set
• Parallel Display Attributes
• Single/Double Width/Height of Characters
• Variable Flash Rate
• Programmable Screen Size (25 Rows x 33...64 Columns)
• Flexible Character Matrixes (HxV) 12 x 9...16
• Up to 256 Dynamical Redefinable Characters in standard mode; 1024 Dynamical Redefinable Characters in Enhanced Mode
• CLUT with up to 4096 color combinations
• Up to 16 Colors per DRCS Character
• One out of Eight Colors for Foreground and Background Colors for 1-bit DRCS and ROM Characters
• Shadowing
• Contrast Reduction
• Pixel by Pixel Shiftable Cursor With up to 4 Different Colors
• Support of Progressive Scan and 100 Hz.
• 3 X 4Bits RGB-DACs On-Chip
• Free Programmable Pixel Clock from 10 MHz to 32MHz
• Pixel Clock Independent from CPU Clock
• Multinorm H/V-Display Synchronization in Master or Slave Mode

Acquisition Features

- Multistandard Digital Data Slicer
- Parallel Multi-norm Slicing (TTX, VPS, WSS, CC, G+)
- Four Different Framing Codes Available
- Data Caption only Limited by available Memory
- Programmable VBI-buffer
- Full Channel Data Slicing Supported
- Fully Digital Signal Processing
- Noise Measurement and Controlled Noise Compensation
- Attenuation Measurement and Compensation
- Group Delay Measurement and Compensation
- Exact Decoding of Echo Disturbed Signals

Ports

- One 8-bit I/O-port with open drain output and optional I^2C Bus emulation support (Port 0)
- Two 8-bit multifunction I/O-ports (Port 1, Port 3)
- One 4-bit port working as digital or analog inputs for the ADC (Port 2)
- One 2-bit I/O port with secondary functions (P4.2, 4.3, 4.7)
- One 4-bit I/O-port with secondary function (P4.0, 4.1, 4.4) (Not available in P-SDIP 52)

14.10.TEA6415C

14.10.1.General Description

The main function of the IC is to switch 8 video input sources on 6 outputs. Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of synch. top for CVBS or black level for RGB signals). Each nominal gain between any input and output is 6.5dB. For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, 5 V_{DC} on the input. Each input can be used as a normal input or as a MAC or Chroma input (with external resistor bridge). All the switching possibilities are changed through the BUS. Driving 75? load needs an external transistor. It is possible to have the same input connected to several outputs. The starting configuration upon power on (power supply: 0 to 10V) is undetermined. In this case, 6 words of 16 bits are necessary to determine one configuration. In other case, 1 word of 16 bits is necessary to determine one configuration.

14.10.2.Features

- 20MHz Bandwidth
- Cascadable with another TEA6415C (Internal address can be changed by pin 7 voltage)
- 8 Inputs (CVBS, RGB, MAC, CHROMA,...)
- 6 Outputs
- Possibility of MAC or chroma signal for each input by switching-off the clamp with an external resistor bridge
- Bus controlled
- 6.5dB gain between any input and output
- 55dB crosstalk at 5mHz
- Fully ESD protected

14.10.3.Pinning

1.	Input	:	Max : 2Vpp, Input Current: 1mA, Max : 3mA
2.	Data	:	Low level : -0.3V Max: 1.5V, High level : 3.0V Max : Vcc+0.5V
3.	Input	:	Max : 2Vpp, Input Current: 1mA, Max : 3mA
4.	Clock	:	Low level : -0.3V Max: 1.5V, High level : 3.0V Max : Vcc+0.5V
5.	Input	:	Max : 2Vpp, Input Current: 1mA, Max : 3mA
6.	Input	:	Max : 2Vpp, Input Current: 1mA, Max : 3mA
7.	Prog		
8.	Input	:	Max : 2Vpp, Input Current: 1mA, Max: 3mA
9.	Vcc	:	12V
10.	Input	:	Max : 2Vpp, Input Current: 1mA, Max : 3mA
11.	Input	:	Max : 2Vpp, Input Current: 1mA, Max : 3mA

12. Ground
13. Output : 5.5Vpp, Min : 4.5Vpp
14. Output : 5.5Vpp, Min : 4.5Vpp
15. Output : 5.5Vpp, Min : 4.5Vpp
16. Output : 5.5Vpp, Min : 4.5Vpp
17. Output : 5.5Vpp, Min : 4.5Vpp
18. Output : 5.5Vpp, Min : 4.5Vpp
19. Ground
20. Input : Max : 2Vpp, Input Current : 1mA, Max : 3mA

14.11.VPC3230D

14.11.1.General Description

The VPC 323xD is a high-quality, single-chip video front-end, which is targeted for 4:3 and 16:9, 50/60-Hz and 100/120 Hz TV sets. It can be combined with other members of the DIGIT3000 IC family (such as DDP 331x) and/or it can be used with 3rd-party products. The main features of the VPC 323xD are;
– high-performance adaptive 4H comb filter Y/C separator with adjustable vertical peaking
– multi-standard color decoder PAL/NTSC/SECAM including all substandards
– four CVBS, one S-VHS input, one CVBS output
– two RGB/YC $_r$ C $_b$ component inputs, one Fast Blank (FB) input
– integrated high-quality A/D converters and associated clamp and AGC circuits
– multi-standard sync processing
– linear horizontal scaling (0.25 ... 4), as well as non-linear horizontal scaling 'Panorama-vision'
– PAL+ preprocessing
– line-locked clock, data and sync, or 656-output interface
– peaking, contrast, brightness, color saturation and tint for RGB/ YC $_r$ C $_b$ and CVBS/ S-VHS
– high-quality soft mixer controlled by Fast Blank
– PIP processing for four picture sizes (1/4, 1/9, 1/16 or 1/36 of normal size) with 8-bit resolution
– 15 predefined PIP display configurations and expert mode (fully programmable)
– control interface for external field memory
– I^2C-bus interface
– one 20.25-MHz crystal, few external components
– 80-pin PQFP package

14.11.2.Pin Connections and Short Descriptions

NC = not connected
LV = if not used, leave vacant
X = obligatory; connect as described in circuit diagram
SUPPLYA = 4.75...5.25 V, SUPPLYD = 3.15...3.45 V

Pin No. PQFP 80-pin	Pin Name	Type	Connection (if not used)	Short Description
1	B1/CB1IN	IN	VREF	Blue1/Cb1 Analog Component Input
2	G1/Y1IN	IN	VREF	Green1/Y1 Analog Component Input
3	R1/CR1IN	IN	VREF	Read1/Cr1 Analog Component Input
4	B2/CB2IN	IN	VREF	Blue2/Cb2 Analog Component Input
5	G2/Y2IN	IN	VREF	Green2/Y2 Analog Component Input
6	R2/CR2IN	IN	VREF	Read2/Cr2 Analog Component Input
7	ASGF		X	Analog Shield GND_F
8	FFRSTWIN	IN	LV or GND_D	FIFO Reset Write Input
9	V_{SUPCAP}	OUT	X	Digital Decoupling Circuitry Supply Voltage
10	V_{SUPD}	SUPPLYD	X	Supply Voltage, Digital Circuitry
11	GND_D	SUPPLYD	X	Ground, Digital Circuitry
12	GND_{CAP}	OUT	X	Digital Decoupling Circuitry GND
13	SCL	IN/OUT	X	I^2C Bus Clock
14	SDA	IN/OUT	X	I^2C Bus Data
15	RESQ	IN	X	Reset Input, Active Low
16	TEST	IN	GND_D	Test Pin, connect to GND_D
17	VGAV	IN	GND_D	VGAV Input
18	YCOEQ	IN	GND_D	Y/C Output Enable Input, Active Low
19	FFIE	OUT	LV	FIFO Input Enable

20	FFWE	OUT	LV	FIFO Write Enable
21	FFRSTW	OUT	LV	FIFO Reset Write/Read
22	FFRE	OUT	LV	FIFO Read Enable
23	FFOE	OUT	LV	FIFO Output Enable
24	CLK20	IN/OUT	LV	Main Clock output 20.25 MHz
25	GND_{PA}	OUT	X	Pad Decoupling Circuitry GND
26	V_{SUPPA}	OUT	X	Pad Decoupling Circuitry Supply Voltage
27	LLC2	OUT	LV	Double Clock Output
28	LLC1	IN/OUT	LV	Clock Output
29	V_{SUPLLC}	SUPPLYD	X	Supply Voltage, LLC Circuitry
30	GND_{LLC}	SUPPLYD	X	Ground, LLC Circuitry
31	Y7	OUT	GND_Y	Picture Bus Luma (MSB)
32	Y6	OUT	GND_Y	Picture Bus Luma
33	Y5	OUT	GND_Y	Picture Bus Luma
34	Y4	OUT	GND_Y	Picture Bus Luma
35	GND_Y	SUPPLYD	X	Ground, Luma Output Circuitry
36	V_{SUPY}	SUPPLYD	X	Supply Voltage, Luma Output Circuitry
37	Y3	OUT	GND_Y	Picture Bus Luma
38	Y2	OUT	GND_Y	Picture Bus Luma
39	Y1	OUT	GND_Y	Picture Bus Luma
40	Y0	OUT	GND_Y	Picture Bus Luma (LSB)
41	C7	OUT	GND_C	Picture Bus Chroma (MSB)
42	C6	OUT	GND_C	Picture Bus Chroma
43	C5	OUT	GND_C	Picture Bus Chroma
44	C4	OUT	GND_C	Picture Bus Chroma
45	V_{SUPC}	SUPPLYD	X	Supply Voltage, Chroma Output Circuitry
46	GND_C	SUPPLYD	X	Ground, Chroma Output Circuitry
47	C3	OUT	GND_C	Picture Bus Chroma
48	C2	OUT	GND_C	Picture Bus Chroma
49	C1	OUT	GND_C	Picture Bus Chroma
50	C0	OUT	GND_C	Picture Bus Chroma (LSB)
51	GND_{SY}	SUPPLYD	X	Ground Sync Pad Circuitry
52	V_{SUPSY}	SUPPLYD	X	Supply Voltage, Sync Pad Circuitry
53	INTLC	OUT	LV	Interlace Output
54	AVO	OUT	LV	Active Video Output
55	FSY/HC/HSYA	OUT	LV	Front Sync/ Horizontal Clamp Pulse/Front-End Horizontal Sync Output
56	MSY/HS	IN/OUT	LV	Main Sync/Horizontal Sync Pulse
57	VS	OUT	LV	Vertical Sync Pulse
58	FPDAT/VSYA	IN/OUT	LV	Front End/Back-End Data/Front-End Vertical Sync Output
59	V_{STBYY}	SUPPLYA	X	Standby Supply Voltage
60	CLK5	OUT	LV	CCU 5 MHz Clock Output
61	NC	-	LV or GND_D	Not Connected
62	XTAL1	IN	X	Analog Crystal Input
63	XTAL2	OUT	X	Analog Crystal Output
64	ASGF		X	Analog Shield GND_F
65	GND_F	SUPPLYA	X	Ground, Analog Front-End
66	VRT	OUTPUT	X	Reference Voltage Top, Analog
67	I2CSEL	IN	X	I^2C Bus Address Select
68	ISGND	SUPPLYA	X	Signal Ground for Analog Input, connect to GND_F
69	V_{SUPF}	SUPPLYA	X	Supply Voltage, Analog Front-End
70	VOUT	OUT	LV	Analog Video Output
71	CIN	IN	LV	Chroma/Analog Video 5 Input
72	VIN1	IN	VRT	Video 1 Analog Input
73	VIN2	IN	VRT	Video 2 Analog Input
74	VIN3	IN	VRT	Video 3 Analog Input
75	VIN4	IN	VRT	Video 4 Analog Input
76	V_{SUPAI}	SUPPLYA	X	Supply Voltage, Analog Component Inputs Front-End
77	GND_{AI}	SUPPLYA	X	Ground, Analog Component Inputs Front-End
78	VREF	OUTPUT	X	Reference Voltage Top, Analog Component Inputs Front-End
79	FB1IN	IN	VREF	Fast Blank Input
80	AISGND	SUPPLYA	X	Signal Ground for Analog Component Inputs, connect to GND_{AI}

14.12.TDA1308T

14.12.1.General Description

The TDA1308 is an integrated class AB stereo headphone driver contained in an SO8 or a DIP8 plastic package. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications. It gets its input from two analog audio outputs (DACA_L and DACA_R) of MSP3411G. The gain of the output is adjustable by the feedback resistor between the inputs and outputs.

14.12.2.Features

- Wide temperature range
- No switch ON/OFF clicks
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
- high signal-to-noise ratio
- High slew rate
- Low distortion
- Large output voltage swing.

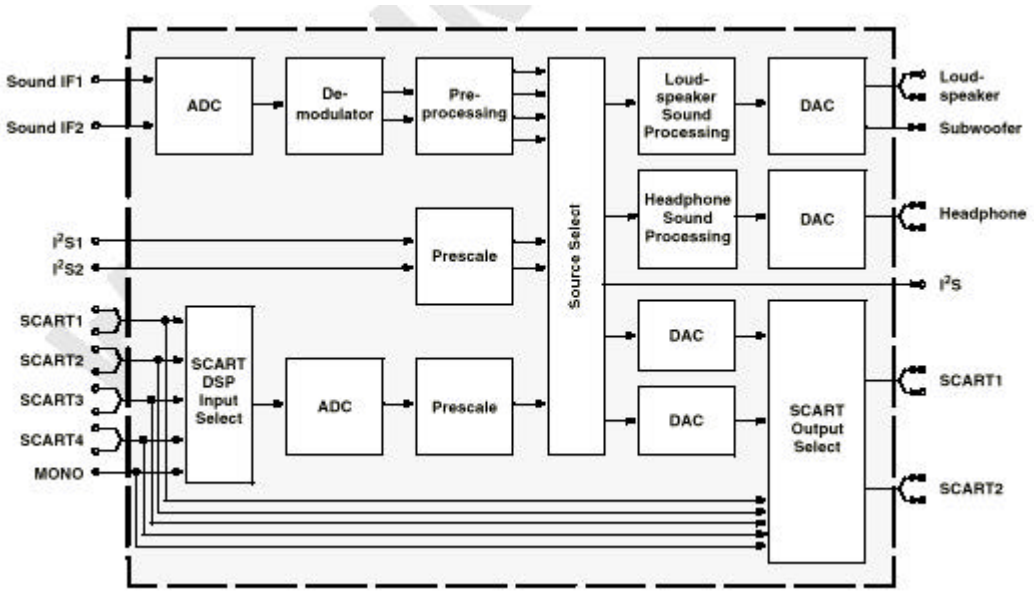
14.12.3.Pinning

SYMBOL	PIN	DESCRIPTION
OUTA	1	Output A
INA(neg)	2	Inverting input A
INA(pos)	3	Non-inverting input A
V_{SS}	4	Negative supply
INB(pos)	5	Non-inverting input B
INB(neg)	6	Inverting input B
OUTB	7	Output B
V_{DD}	8	Positive supply

14.13.MSP34X1G (MSP3411G)

14.13.1.Description

The MSP 34x1G family of single-chip Mullet-standard Sound Processors covers the sound processing of all analog TV-Standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip. Figure shows a simplified functional block diagram of the MSP34x1G. The MSP34x1G has all functions of the MSP34x0G with the addition of a virtual surround sound feature. Surround sound can be reproduced to a certain extent with two loudspeakers. The MSP34x1G includes our virtualizer algorithm “3D-PANORAMA” which has been approved by the Dolby 1) Laboratories for compliance with the "Virtual Dolby Surround" technology. In addition, the MSP34x1G includes the “PANORAMA” algorithm. These TV sound processing ICs include versions for processing the multi-channel television sound (MTS) signal conforming to the standard recommended by the Broadcast Television Systems Committee (BTSC). The DBX noise reduction, or alternatively, Micronas Noise Reduction (MNR) is performed alignment free. Other processed standards are the Japanese FM-FM multiplex standard (EIA-J) and the FM Stereo Radio standard. Current ICs have to perform adjustment procedures in order to achieve good stereo separation for BTSC and EIA-J. The MSP34x1G has optimum stereo performance without any adjustments. All MSP 34xxG versions are pin and software downward compatible to the MSP 34xxD. MSP34x1G further simplifies controlling software. Standard selection requires a single I^2C transmission only. The MSP34x1G has built-in automatic functions: The IC is able to detect the actual sound standard automatically (Automatic Standard Detection). Furthermore, pilot levels and identification signals can be evaluated internally with subsequent switching between mono/stereo/bilingual; no I^2C interaction is necessary (Automatic Sound Selection).



14.13.2.Features

3D-PANORAMA virtualizer (approved by Dolby Laboratories) with noise generator
PANORAMA virtualizer algorithm
Standard Selection with single I²C transmission
Automatic Standard Detection of terrestrial TV standards/Automatic Carrier Mute function
Automatic Sound Selection (mono/stereo/bilingual), new registers MODUS, STATUS
Two selectable sound IF (SIF) inputs
Interrupt output programmable (indicating status change)
Loudspeaker / Headphone channel with volume, balance, bass, treble, loudness
Loudspeaker channel with MDB (Micronas Dynamic Bass)
AVC: Automatic Volume Correction
Subwoofer output with programmable low-pass and complementary high-pass filter
5-band graphic equalizer for loudspeaker channel
Spatial effect for loudspeaker channel; processing of all deemphasis filtering
Four Stereo SCART (line) inputs, one Mono input; two Stereo SCART outputs
Complete SCART in/out switching matrix
Two I²S inputs; one I²S output
All analog FM-Stereo A2 and satellite standards
All analog Mono sound carriers including AM-SECAM L
Simultaneous demodulation of (very) high-deviation FM-Mono and NICAM
Adaptive deemphasis for satellite (Wegener-Panda, acc. to ASTRA specification)
ASTRA Digital Radio (ADR) together with DRP 3510A
All NICAM standards
Korean FM-Stereo A2 standard

14.13.3.Pin connections

NC = not connected; leave vacant
LV = if not used, leave vacant
X = obligatory; connect as described in circuit diagram
DVSS: if not used, connect to DVSS
AHVSS: connect to AHVSS

Pin No.					Pin Name	Type	Connection (if not used)	Short Description
PLCC 68-pin	PSDIP 64-pin	PSDIP 52-pin	PQFP 80-pin	PLQFP 64-pin				
1	16	14	9	8	ADR_WS	OUT	LV	ADR word strobe
2	-	-	-	-	NC		LV	Not connected
3	15	13	8	7	ADR_DA	OUT	LV	ADR Data Output
4	14	12	7	6	I2S_DA_IN1	IN	LV	I²S1 data input
5	13	11	6	5	I2S_DA_OUT	OUT	LV	I²S data output

6	12	10	5	4	I2S_WS	IN/OUT	LV	I²S word strobe
7	11	9	4	3	I2S_CL	IN/OUT	LV	I²S clock
8	10	8	3	2	I2C_DA	IN/OUT	X	I²C data
9	9	7	2	1	I2C_CL	IN/OUT	X	I²C data
10	8	-	1	64	NC		LV	Not connected
11	7	6	80	63	STANDBYQ	IN	X	Stand-by (low-active)
12	6	5	79	62	ADR_SEL	IN	X	I²C bus address select
13	5	4	78	61	D_CTR_I/O_0	IN/OUT	LV	D_CTR_I/O_0
14	4	3	77	60	D_CTR_I/O_1	IN/OUT	LV	D_CTR_I/O_1
15	3	-	76	59	NC		LV	Not connected
16	2	-	75	58	NC		LV	Not connected
17	-	-	-	-	NC		LV	Not connected
18	1	2	74	57	AUD_CL_OUT	OUT	LV	Audio clock output (18.432 MHz)
19	64	1	73	56	TP		LV	Test pin
20	63	52	72	55	XTAL_OUT	OUT	X	Crystal oscillator
21	62	51	71	54	XTAL_IN	IN	X	Crystal oscillator
22	61	50	70	53	TESTEN	IN	X	Test pin
23	60	49	69	52	ANA_IN2+	IN	AVSS via 56 pF/LV	IF Input 2 (can be left vacant, only if IF input 1 is also not in use)
24	59	48	68	51	ANA_IN-	IN	AVSS via 56 pF/LV	IF common (can be left vacant, only if IF input 1 is also not in use)
25	58	47	67	50	ANA_IN1+	IN	LV	IF input 2
26	57	46	66	49	AVSUP		X	Analog power supply 5v
-	-	-	65	-	AVSUP		X	Analog power supply 5v
-	-	-	64	-	NC		LV	Not connected
-	-	-	63	48	NC		LV	Not connected
27	56	45	62	48	AVSS		X	Analog ground
-	-	-	61	-	AVSS		X	Analog ground
28	55	44	60	47	MONO_IN	IN	LV	Mono input
-	-	-	59	-	NC		LV	Not connected
29	54	43	58	46	VREFTOP		X	Reference voltage IF A/D converter
30	53	42	57	45	SC1_IN_R	IN	LV	SCART 1 input, right
31	52	41	56	44	SC1_IN_L	IN	LV	SCART 1 input, left
32	51	-	55	43	ASG		AHVSS	Analog Shield Ground
33	50	40	54	42	SC2_IN_R	IN	LV	SCART 2 input, right
34	49	39	53	41	SC2_IN_L	IN	LV	SCART 2 input, left
35	48	-	52	40	ASG		AHVSS	Analog Shield Ground
36	47	38	51	39	SC3_IN_R	IN	LV	SCART 3 input, right
37	46	37	50	38	SC3_IN_L	IN	LV	SCART 3 input, left
38	45	-	49	37	ASG		AHVSS	Analog Shield Ground
39	44	-	48	36	SC4_IN_R	IN	LV	SCART 4 input, right
40	43	-	47	35	SC4_IN_L	IN	LV	SCART 4 input, left
41	-	-	46	-	NC		LV or AHVSS	Not connected
42	42	36	45	34	AGNDC		X	Analog reference voltage
43	41	35	44	33	AHVSS		X	Analog ground
-	-	-	43	-	AHVSS		X	Analog ground
-	-	-	42	-	NC		LV	Not connected
-	-	-	41	-	NC		LV	Not connected
44	40	34	40	32	CAPL_M		X	Volume capacitor MAIN
45	39	33	39	31	AHVSUP		X	Analog power supply 8V
46	38	32	38	30	CAPL_A		X	Volume capacitor AUX
47	37	31	37	29	SC1_OUT_L	OUT	LV	SCART output 1, left
48	36	30	36	28	SC1_OUT_R	OUT	LV	SCART output 1, right
49	35	29	35	27	VREF		X	Reference ground 1
50	34	28	34	26	SC2_OUT_L	OUT	LV	SCART output 2, left
51	33	27	33	25	SC2_OUT_R	OUT	LV	SCART output 2, right
52	-	-	32	-	NC		LV	Not connected
53	32	-	31	24	NC		LV	Not connected
54	31	26	30	23	DACM_SUB	OUT	LV	Subwoofer output
55	30	-	29	22	NC		LV	Not connected
56	29	25	28	21	DACM_L	OUT	LV	Loudspeaker out, left
57	28	24	27	20	DACM_R	OUT	LV	Loudspeaker out, right
58	27	23	26	19	VREF2		X	Reference ground 2
59	26	22	25	18	DACA_L	OUT	LV	Headphone out, left
60	25	21	24	17	DACA_R	OUT	LV	Headphone out, right
-	-	-	23	-	NC		LV	Not connected
-	-	-	22	-	NC		LV	Not connected
61	24	20	21	16	RESETQ	IN	X	Power-on-reset
62	23	-	20	15	NC		LV	Not connected

63	22	-	19	14	NC		LV	Not connected
64	21	19	18	13	NC		LV	Not connected
65	20	18	17	12	I2S_DA_IN2	IN	LV	I²S2-data input
66	19	17	16	11	DVSS		X	Digital ground
-	-	-	15	-	DVSS		X	Digital ground
-	-	-	14	-	DVSS		X	Digital ground
67	18	16	13	10	DVSUP		X	Digital power supply 5V
-	-	-	12	-	DVSUP		X	Digital power supply 5V
-	-	-	11	-	DVSUP		X	Digital power supply 5V
68	17	15	10	9	ADR_CL	OUT	LV	ADR clock

14.14.TL431

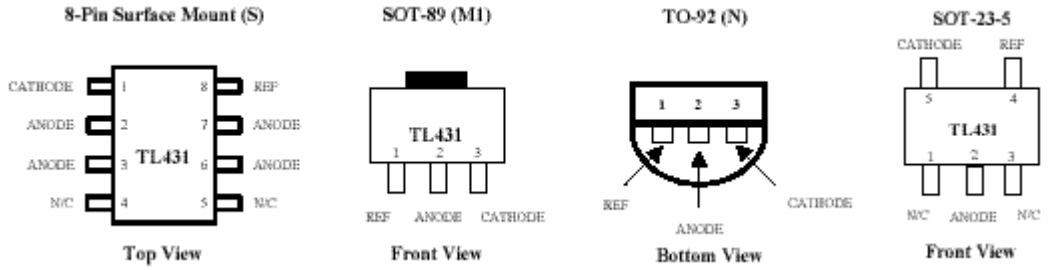
14.14.1.Description

The TL431 is a 3-terminal adjustable shunt voltage regulator providing a highly accurate 1 % band gap reference. TL431 acts as an open-loop error amplifier with a 2.5V temperature compensation reference. The TL431 thermal stability, wide operating current (150mA) and temperature range (0.to 105.makes it suitable for all variety of application that are looking for a low cost solution with high performance. The output voltage may be adjusted to any value between VREF and 36 volts with two external resistors. The TL431 is operating in full industrial temperature range of 0°C to 105°C. The TL431 is available in TO-92, SO-8, SOT-89 and SOT23-5 packages.

14.14.2.Features

- Trimmed Band gap to 1%
- Wide Operating Current 1mA to 150mA
- Extended Temperature Range 0. °C to 105.°C
- Low Temperature Coefficient 30 ppm /°C
- Offered in TO-92, SOIC, SOT-89, SOT-23-5
- Improved Replacement in Performance for TL431
- Low Cost Solution

14.14.3.Pin Configurations



14.15.TDA9885/86

14.15.1.Introduction

The TDA9885 is an alignment-free single standard (without positive modulation) vision and sound IF signal PLL. The TDA9886 is an alignment-free multi standard (PAL, SECAM and NTSC) vision and sound IF signal PLL. Both devices can be used for TV, VTR, PC and set-top box applications.

14.15.2.Features

- 5 V supply voltage
- Gain controlled wide-band Vision Intermediate Frequency (VIF) amplifier (AC-coupled)
- Multistandard true synchronous demodulation with active carrier regeneration (very linear demodulation, good intermodulation figures, reduced harmonics, excellent pulse response)
- Gated phase detector for L/L accent standard
- Fully integrated VIF Voltage Controlled Oscillator (VCO), alignment-free; frequencies switchable for all negative and positive modulated standards via I²C-bus
- Digital acquisition help, VIF frequencies of 33.4, 33.9, 38.0, 38.9, 45.75 and 58.75 MHz

• 4 MHz reference frequency input [signal from Phase-Locked Loop (PLL) tuning system] or operating as crystal oscillator
• VIF Automatic Gain Control (AGC) detector for gain control, operating as peak sync detector for negative modulated signals and as a peak white detector for positive modulated signals
• Precise fully digital Automatic Frequency Control (AFC) detector with 4-bit digital-to-analog converter; AFC bits via I²C-bus readable
• Take Over Point (TOP) adjustable via I²C-bus or alternatively with potentiometer
• Fully integrated sound carrier trap for 4.5, 5.5, 6.0 and 6.5 MHz, controlled by FM-PLL oscillator
• Sound IF (SIF) input for single reference Quasi Split Sound (QSS) mode (PLL controlled)
• SIF AGC for gain controlled SIF amplifier; single reference QSS mixer able to operate in high performance single reference QSS mode and in intercarrier mode, switchable via I²C-bus
• AM demodulator without extra reference circuit
• Alignment-free selective FM-PLL demodulator with high linearity and low noise
• I²C-bus control for all functions
• I²C-bus transceiver with pin programmable Module Address (MAD).

14.15.3.Pin Configurations

Symbol	Pin	Description
VIF1	1	VIF differential input 1
VIF2	2	VIF differential input 2
OP1	3	output 1 (open-collector)
FMPLL	4	FM-PLL for loop filter
DEEM	5	de-emphasis output for capacitor
AFD	6	AF decoupling input for capacitor
DGND	7	digital ground
AUD	8	audio output
TOP	9	tuner AGC TakeOver Point (TOP)
SDA	10	I²C-bus data input/output
SCL	11	I²C-bus clock input
SIOMAD	12	sound intercarrier output and MAD select
n.c	13	not connected
TAGC	14	tuner AGC output
REF	15	4 MHz crystal or reference input
VAGC	16	VIF-AGC for capacitor (Not connected for TDA9885.)
CVBS	17	video output
AGND	18	analog ground
VPLL	19	VIF-PLL for loop filter
V_P	20	supply voltage (+5 V)
AFC	21	output
OP2	22	output 2 (open-collector)
SIF1	23	differential input 1
SIF2	24	differential input 2

14.16.LM7808

14.16.1.Description

The L7800 series of three-terminal positive regulators is available in TO-220 TO-220FP TO-3 and D 2 PAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shutdown and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

14.16.2.Features

Output Current Up To 1.5 A
Output Voltages of 5; 5.2; 6; 8; 8.5; 9; 12; 15; 18; 24V
Thermal Over load protection
Short Circuit Protection
Output Transition SOA Protection

14.17.TDA8177F

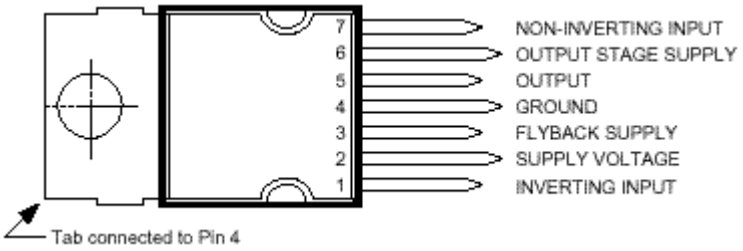
14.17.1.Description

Designed for monitors and high performance TVs, the TDA8177F vertical deflection booster can handle flyback voltage up to 70V. More than this it is possible to have a flyback voltage, which is more than the double of the supply (Pin 2). This allows to decrease the power consumption or to decrease the flyback time for a given supply voltage. The TDA8177F operates with supplies up to 35V and provides up to 3APP output current to drive the yoke.

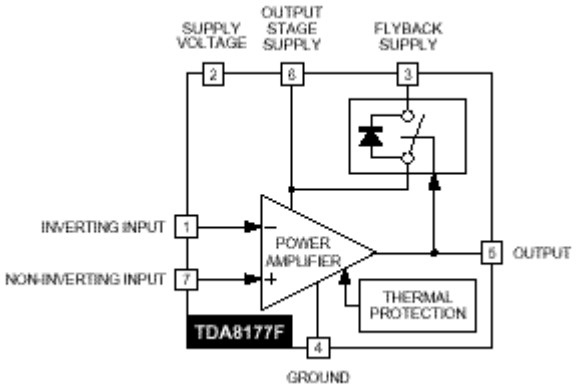
14.17.2.Features

Power Amplifier
Thermal Protection
Output Current Up To 3.0APP
Flyback Voltage Up To 70V (on Pin 5)
Suitable For Dc Coupling Application
External Flyback Supply

14.17.3.Pin connections



14.17.4.Block Diagram



14.18.LM1086

14.18.1.Description

The LM1086 is a series of low dropout positive voltage regulators with a maximum dropout of 1.5V at 1.5A of load current. It has the same pin-out as National Semiconductor's industry standard LM317. The LM1086 is available in an adjustable version, which can set the output voltage with only two external resistors. It is also available in five fixed voltages: 2.5V, 2.85V, 3.3V, 3.45V and 5.0V. The fixed versions integrate the adjust resistors. The LM1086 circuit includes a zener trimmed band-gap reference, current limiting and thermal shutdown.

14.18.2.Features

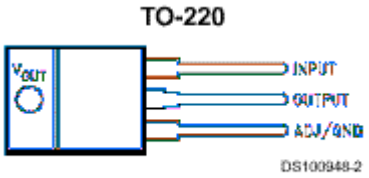
Available in 2.5V, 2.85V, 3.3V, 3.45V, 5V and Adjustable Versions
Current Limiting and Thermal Protection
Output Current 1.5A

Line Regulation 0.015% (typical)
Load Regulation 0.1% (typical)

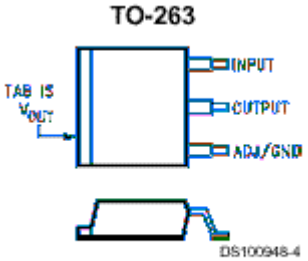
14.18.3.Applications

SCSI-2 Active Terminator
High Efficiency Linear Regulators
Battery Charger
Post Regulation for Switching Supplies
Constant Current Regulator
Microprocessor Supply

14.18.4.Connection Diagrams



Top View



Top View

14.19.MC44608

14.19.1.Description

The MC44608 is a high performance voltage mode controller designed for off–line converters. This high voltage circuit that integrates the start–up current source and the oscillator capacitor, requires few external components while offering a high flexibility and reliability. The device also features a very high efficiency stand–by management consisting of an effective Pulsed Mode operation. This technique enables the reduction of the stand–by power consumption to approximately 1W while delivering 300mW in a 150W SMPS.

• Integrated Start–Up Current Source
• Lossless Off–Line Start–Up
• Direct Off–Line Operation
• Fast Start–Up

14.19.2.General Features

• Flexibility
• Duty Cycle Control
• Under voltage Lockout with Hysteresis
• On Chip Oscillator Switching Frequency 40, or 75kHz
• Secondary Control with Few External Components

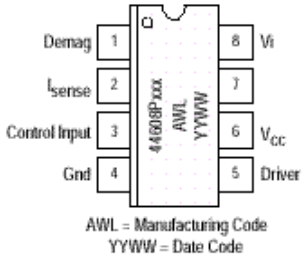
Protections

• Maximum Duty Cycle Limitation
• Cycle by Cycle Current Limitation
• Demagnetization (Zero Current Detection) Protection
• “Over VCC Protection” Against Open Loop
• Programmable Low Inertia Over Voltage Protection Against Open Loop
• Internal Thermal Protection

GreenLine™ Controller

• Pulsed Mode Techniques for a Very High Efficiency Low Power Mode
• Lossless Startup
• Low dV/dT for Low EMI Radiations

14.19.3.Pin Connections



14.19.4.Pin Function description

Pin	Name	Description
1	Demag	The Demag pin offers 3 different functions: Zero voltage crossing detection (50mV), 24mA current detection and 120mA current detection. The 24mA level is used to detect the secondary reconfiguration status and the 120mA level to detect an Over Voltage status called Quick OVP.
2	ISENSE	The Current Sense pin senses the voltage developed on the series resistor inserted in the source of the power MOSFET. When I sense reaches 1V, the Driver output (pin 5) is disabled. This is known as the Over Current Protection function. A 200mA current source is flowing out of the pin 3 during the start–up phase and during the switching phase in case of the Pulsed Mode of operation. A resistor can be inserted between the sense resistor and the pin 3; thus a programmable peak current detection can be performed during the SMPS stand–by mode.
3	Control Input	A feedback current from the secondary side of the SMPS via the opto–coupler is injected into this pin. A resistor can be connected between this pin and GND to allow the programming of the Burst duty cycle during the Stand–by mode.
4	Ground	This pin is the ground of the primary side of the SMPS.
5	Driver	The current and slew rate capability of this pin are suited to drive Power MOSFETs.
6	VCC	This pin is the positive supply of the IC. The driver output gets disabled when the voltage becomes higher than 15V and the operating range is between 6.6V and 13V. An intermediate voltage level of 10V creates a disabling condition called Latched Off phase.
7		This pin is to provide isolation between the Vi pin 8 and the VCC pin 6.
8	Vi	This pin can be directly connected to a 500V voltage source for start–up function of the IC. During the Start–up phase a 9 mA current source is internally delivered to the VCC pin 6 allowing a rapid charge of the VCC capacitor. As soon as the IC starts–up, this current source is disabled.

14.20.TCET1102G

14.20.1.Description

The TCET110/ TCET2100/ TCET4100 consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4-lead up to 16-lead plastic dual inline package. The elements are mounted on one lead frame using a **coplanar techniqu**e, providing a fixed distance between input and output for highest safety requirements.

14.20.2.Applications

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):
For appl. class I – IV at mains voltage =300 V
For appl. class I – III at mains voltage =600 V
According to VDE 0884, table 2, suitable for: **Switch-mode power supplies, line receiver, computer peripheral interface, microprocessor system interface.**

14.20.3.Features

VDE 0884 related features:
Rated impulse voltage (transient overvoltage) V_{IOTM} = 8 kV peak
Isolation test voltage (partial discharge test voltage) V_{pd} = 1.6 kV
Rated isolation voltage (RMS includes DC) V_{IOWM} = 600 V $_{RMS}$ (848 V peak)
Rated recurring peak voltage (repetitive) V_{IORM} = 600 V $_{RMS}$

General features:
CTR offered in 9 groups
Isolation materials according to UL94-VO
Pollution degree 2 (DIN/VDE 0110 / resp. IEC 664)
Climatic classification 55/100/21 (IEC 68 part 1)
Special construction: Therefore, extra low coupling capacity of typical 0.2pF, high **C**ommon **M**ode **R**ejection
Low temperature coefficient of CTR
G = Leadform 10.16 mm; provides creepage distance > 8 mm, for TCET2100/ TCET4100 optional; suffix letter 'G' is not marked on the optocoupler
Coupling System U

14.21.TDA7480L

14.21.1.Description

The TDA7480L is an audio class-D amplifier assembled in Power DIP package specially de-signed for high efficiency applications mainly for TV and Home Stereo sets.

14.21.2.Features

10W Output Power: R_L = 8Ω/4Ω; THD = 10%
High Frequency
No Heatsink
Split Supply
Overvoltage Protection
St-By And Mute Features
Short Circuit Protection
Thermal Overload Protection

14.21.3.Pin Functions

Number	Name	Function
1	$-V_{CC}$	NEGATIVE SUPPLY.
2	$-V_{CC}$	NEGATIVE SUPPLY.
3	$-V_{CC}$	NEGATIVE SUPPLY.
4	OUT	PWM OUTPUT
5	BOOTDIODE	BOOTSTRAP DIODE ANODE
6	BOOT	BOOTSTRAP CAPACITOR
7	NC	NOT CONNECTED
8	FEEDCAP	FEEDBACK INTEGRATING CAPACITANCE
9	FREQUENCY	SETTING FREQUENCY RESISTOR
10	SGN-GND	SIGNAL GROUND
11	IN	INPUT
12	ST-BY-MUTE	ST-BY/ MUTE CONTROL PIN
13	NC	NOT CONNECTED
14	$+V_{CC}$ SIGN	POSITIVE SIGNAL SUPPLY
15	V_{REG}	10V INTERNAL REGULATOR
16	$+V_{CC}$ POW	POSITIVE POWER SUPPLY
17	$-V_{CC}$	NEGATIVE SUPPLY (TO BE CONNECTED TO PIN 16 VIA C5)
18	$-V_{CC}$	NEGATIVE SUPPLY
19	$-V_{CC}$	NEGATIVE SUPPLY
20	$-V_{CC}$	NEGATIVE SUPPLY

14.22.SAA3010T

14.22.1.Description

The SAA3010 is intended as a general purpose (RC-5) infrared remote control system for use where a low voltage supply and a large debounce time are expected. The device can generate 2048 different commands and utilizes a keyboard with a single pole switch for each key. The commands are arranged so that 32 systems can be addressed, each system containing 64 different commands. The circuit response to legal (one key pressed at a time) and illegal (more than one key pressed at a time) keyboard operation is specified in the section "Keyboard operation".

14.22.2.Features

Low voltage requirement
Biphase transmission technique
Single pin oscillator
Test mode facility

14.22.3.Pinning

Pin	Mnemonic	Function
1	X7 (IPU)	sense input from key matrix
2	SSM (I)	sense mode selection input
3	Z0-Z3 (IPU)	sense inputs from key matrix
7	MDATA (OP3)	generated output data modulated with 1/12 the oscillator frequency at a 25% duty factor
8	DATA (OP3)	generated output information
9-13	DR7-DR3 (ODN)	Scan drivers
14	VSS	Ground (0V)
15-17	DR-2-DR0 (ODN)	Scan drivers
18	OSC (I)	Oscillator input
19	TP2 (I)	test point 2
20	TP1 (I)	Test point 1
21-27	X0-X6 (IPU)	Sense inputs from key matrix
28	VDD(I)	Voltage supply

Note:
(I): Input,
(IPU): input with p-channel pull-up transistor,
(ODN): output with open drain n-channel transistor
(OD3): output 3-state

15.AK52 CHASSIS MANUAL ADJUSTMENTS PROCEDURE

15.1.PRELIMINARY

Before starting with the alignment procedure, make sure that all the potentiometers on the chassis and also screen and focus pots are in the medium position.

15.2.SYSTEM VOLTAGE ADJUSTMENTS

Inputs AC power (220V 50Hz)
PAL B/G test pattern via RF
(PAL I test pattern for PAL I TV's, SECAM D/K pattern, SECAM L/L'/K' TVs.)
Outputs Digital voltmeter to anode of D110.
Display System voltage
Action Apply power. Check that the stand-by Led lights.
Select TV mode and tune to the applied test pattern via local test keyboard.
Chassis should start normally.
Adjust all analog controls (volume, bass, treble, brightness, contrast, colour) to minimum settings.
Adjust VR127 according to the following different type of CRTs.

SYSTEM VOLTAGE	TYPE OF CRT
135V±0.5V	PHILIPS A66EAK552X54
135V±0.5V	PHILIPS A66EAK071X54
135V±0.5V	VIDEOCOLOR A66ECY13X12
135V±0.5V	PHILIPS W66ESF002X44

15.3.AFC ADJUSTMENTS

AFC is automatically adjusted from software , when f (IF) is selected 38.9MHz for negative modulation and 33.9MHz for positive modulation from the service menu.

15.4.FOCUS ADJUSTMENTS

Inputs AC power
PAL B/G test pattern via RF input.
Outputs Picture tube drive.
Display Picture
Action Select TV mode and tune to the signal.
Adjust focus potantiometer (the upper pot on the rear side of the FBT transformer) for optimum focusing drive.

15.5.SCREEN ADJUSTMENTS

Inputs AC power
PAL B/G Colour Bar test pattern via RF
Outputs 1/100 Oscilloscope probe to RGB cathodes on CRT baseboard.
NOTE: Ground pin of probe will be connected to 1st pin (GND) of the CRT socket.
Display RGB ratio
Action Select PAL B/G Colour bar pattern using the local test keyboard and the user remote control unit.
Adjust all control functions (brightness, colour and contrast) to minimum settings.
Measure the most sensitive cathode
Adjust the screen potentiometer (lower pot on the rear side of FBT transformer) until cathode voltage becomes 150V.

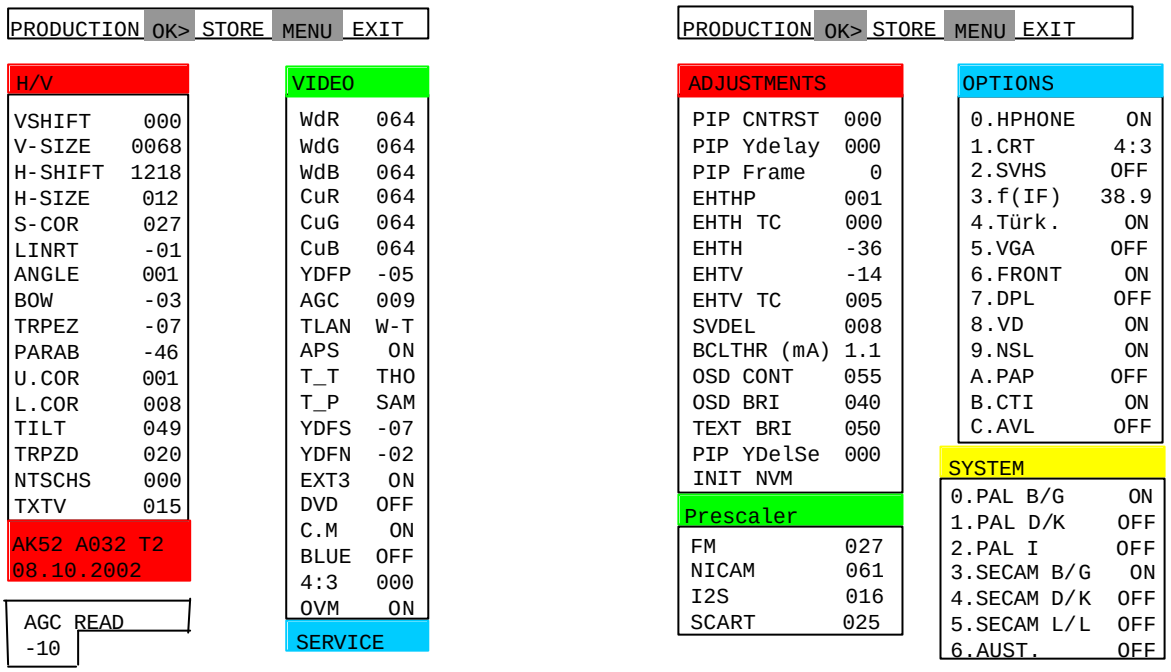
15.6.IF ADJUSTMENT FOR L' MODE

AFC is automatically adjusted from software , when f (IF) is selected 33.9MHz for positive modulation (SECAM L') from the service menu.

16.AK52 CHASSIS PRODUCTION SERVICE MODE ADJUSTMENTS

16.1.PRELIMINARY

All system, geometry and white balance alignments are performed in production service mode. Before starting the production mode alignments, make sure that all manual adjustments are done correctly. To start production mode alignments enter the MAIN MENU and then press the digits 1, 6, 7 and 5 respectively. The following first menu appears on the screen. Production mode values will appear on the screen.



First page

Second Page

SERVICE MENU

Production mode groups will be displayed with different colours of headlines, so in order to access a production alignment group press the colour button of the related group on the remote control transmitter.

- RED BUTTON is pressed to access H/V menu.
- GREEN BUTTON is pressed to access VIDEO adjust menu.
- BLUE BUTTON is pressed to go to the next page of the service menu.
- YELLOW BUTTON is used to adjust system parameters on the second page of the service menu.

After selecting one of the production service mode groups, you can access its items by pressing ? /? buttons. Selected parameter will be highlighted. Inorder to change the selected parameter, use ? / ? buttons. Inorder to switch between other group of items press the colour key of this groups headline.
To store the settings press OK button. To exit the service menu press MENU button.
Entire service menu parameters of AK52 CHASSIS are listed below.

16.2.H/V (HORIZONTAL AND VERTICAL GEOMETRY ALIGNMENTS)

Switch the program to crosshatch test pattern. Press RED button to access this group of item. Select the parameter by pressing up/down buttons. Adjust the parameter by pressing left/right buttons. Store the settings by pressing OK button. Switch the another parameter group by pressing the colour button of the related coloured headline of that group. Exit production mode by pressing the MENU button on the remote control.

V-SHIFT

Change Vertical Shift by pressing Left/Right buttons till the test pattern is vertically centered. Horizontal line at the center of the test pattern is in equal distance both to upper and lower side of the picture tube. Check and readjust V-SHIFT item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: -128
Max. Value: 127

Recommended Value: 000

V-SIZE

Change Vertical Size by pressing Left/Right buttons till horizontal black lines on both the upper and lower part of the test pattern become very close to the upper and lower horizontal sides of picture tube and nearly about to disappear. Check and readjust V-SIZE item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: -128
Max. Value: 127
Recommended Value: 068

H-SHIFT

Change Horizontal Shift by pressing Left/Right buttons till the the test pattern is horizontally in equal distance both to right and left sides of the picture tube. Check and readjust H-SHIFT item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: 0000
Max. Value: 1295
Recommended Value: 1218

H-SIZE

Change Horizontal Size by pressing Left/Right buttons till no under-scan condition will happen, i.e. no white bars on the left and right side of the test pattern will be visible nor picture will be so wide. Check and readjust H-SIZE item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: -128
Max. Value: 127
Recommended Value: 012

S-COR

Change S-Correction by pressing Left/Right buttons till the size of squares on both the upper and lower part of test pattern become equal to the squares laying on the vertical center of the test pattern. Check and readjust S-COR item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: -128
Max. Value: 127
Recommended Value: 027

LINRT

Change Linearity by pressing Left/Right buttons till all the size of squares of the test pattern become in equal size from the top of the screen to its bottom of the whole screen. Check and readjust LINRT item if the adjustment becomes improper after some other geometric adjustments are done. (especially after than S-COR adjustment)

Min. Value: -128
Max. Value: 127
Recommended Value: -01

ANGLE

Change Angle by pressing Left/Right buttons till the vertical lines of the crosshatch pattern become completely perpendicular to horizontal lines without any angle of vertical deviation. Check and readjust ANGLE item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: -128
Max. Value: 127
Recommended Value: 001

BOW

Change Bow by pressing Left/Right buttons till the vertical lines especially ones close to the left and right sides will of equal and symmetrical bending, i.e. they together will neither be towards left side nor right side. Check and readjust BOW item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value: -128

Max. Value: 127
Recommended Value: -03

TRPEZ
Change Trapezium by pressing Left/Right buttons till vertical lines, especially lines at the sides of the picture frame became parallel to the both sides of picture tube as close as possible. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.
Min. Value: -128
Max. Value: 127
Recommended Value: -07

PARAB
Change Parabol by pressing Left/Right buttons till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen. Check and readjust PARAB item if the adjustment becomes improper after some other geometric adjustments are done.
Min. Value: -128
Max. Value: 127
Recommended Value: -46

U.COR
Change Upper Correction by pressing Left/Right buttons till vertical lines at the upper corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. Check and readjust U.COR item if the adjustment becomes improper after some other geometric adjustments are done.
Min. Value: -128
Max. Value: 127
Recommended Value: 001

L.COR
Change Lower Correction by pressing Left/Right buttons till vertical lines at the lower corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. Check and readjust L.COR item if the adjustment becomes improper after some other geometric adjustments are done.
Min. Value: -128
Max. Value: 127
Recommended Value: 008

TILT
This adjustment only works when the TV has rotation option. Change TILT by pressing Left/Right buttons to rotate the complete raster clock-wise and counter clock-wise depending on the CRT. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.
Min. Value: 000
Max. Value: 063
Recommended Value: 049

TRPZD
Not used for this model.

NTSCHS
Change NTSC horizontal size by pressing Left/Right buttons to adjust till no under-scan condition will happen, i.e. no white bars on the left and right side of the NTSC test pattern will be visible nor picture will be so wide. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.
Min. Value: 000
Max. Value: 010
Recommended Value: 000

TXTV
Change TXTV by pressing Left/Right buttons to adjust the proper vertical size of Teletext screen. Check and readjust TRPEZ item if the adjustment becomes improper after some other geometric adjustments are done.

Min. Value:	000
Max. Value:	040
Recommended Value:	015

16.3.VIDEO ALIGNMENTS

Switch the program to colour bar test pattern. Press GREEN button to access this group of item. Select the parameter by pressing up/down buttons. Adjust the parameter by pressing left/right buttons. Store the settings by pressing OK button.

WdR, WdG, WdB: WHITE BALANCE ADJUSTMENT

Apply WHITE test pattern via RF. Adjust all analog functions to medium level and set WdR to 86, WdG to 84, WdB to 80, if needed. Use colour analyser and monitor the colour temperature (X,Y) on colour analyser. Select WdR and WdB by pressing up/down buttons and change the values by Left/Right buttons till the following values are read:
X=285±10
Y=293±10 on the colour analyser.

CuR, CuG, CuB

Set the values of these items as 64 (constant).

YDFP

Enter a PAL B/G colour and black-white bar test pattern via RF. Adjust Y-Delay for PAL till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.

Min. Value:	-07
Max. Value:	001
Recommended Value:	-05

AGC

Apply PAL BG signal, VHF-3 Channel-12 and 60dBuV signal level. Adjust AGC (Automatic Gain Control) item by pressing Left/Right buttons till the voltage at AGC point (pin1 of the tuner) becomes 3.0 volts.

Min. Value:	000
Max. Value:	031
Recommended Value:	016

TLAN

Text language is set. Options are W-T, W-E, W, E. W-T will be selected.

APS

The option of APS (Automatic Program Searching) item are ON and OFF. In order to active APS installation procedure when TV is turned for the very first time, select ON. Inorder to start TV without APS installation procedure, select OFF.

T_T

This item is used for the Tuner selection. The options are SAM for SAMSUNG, THO for THOMSON, SIE for SIEMENS, MK2 and MK3 for PHILIPS MP2/MP3, ALP for ALPS and TEC for Tecnisat. Select THO.

T_P

This item is also used for the Tuner selection. The options are MK2, SAM, THO, TEM. MK2 for PHILIPS, SAM for SAMSUNG, THO for THOMSON and TEM for TEMIC. Select SAM.

YDFS

Enter a SECAM B/G colour and black-white bar test pattern via RF. Adjust Y-Delay SECAM till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.

Min. Value:	-07
Max. Value:	001
Recommended Value:	-07

YDFN
Enter an NTSC colour and black-white bar test pattern via RF. Adjust Y-Delay NTSC till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.

Min. Value:	-07
Max. Value:	001
Recommended Value:	-02

EXT3
Select ON.

DVD
Select OFF.

C.M
Select ON.

BLUE
Select OFF.

4:3
Set to 0.

OVM
Select ON.

16.4.SERVICE ALIGNMENTS

IMPORTANT: There will no adjustments in this service mode during production mode alignments.
Press BLUE colour button on the remote control when Production mode is active. Press the colour button of the related item group headline colour. Press up/down buttons to select the item of group. Press Left/Right button to alter the value of the item. Press OK button to store the selected value and MENU button to exit the service alignments mode.

ADJUSTMENTS GROUP
Press RED button in order to access this group of items.

PIP CNTRST	: Level of the PIP picture
PIP Ydelay	: Luma delay of the PIP picture
PIP Frame	: Colour selection of the PIP frame (edges of the PIP)
EHTHP	: EHT compensation coefficient for horizontal phase
EHTH TC	: EHT time constant for horizontal phase compensation
EHTH	: EHT compensation coefficient for horizontal amplitude
EHTV	: EHT compensation coefficient for vertical amplitude
EHTV TC	: EHT time constant for control of vertical and horizontal amplitude EHT compensation
SVDEL	: Delay adjustment for scan velocity modulation
BCLTHR (mA)	: Beam current applied to the CRT
OSD CONT	: Contrast level of OSD
OSD BRI	: Brightness level of OSD
TEXT BRI	: Brightness level of text
PIP YDelSe	: Y-Delay adjustment for pin-in-picture option
INIT NVM	: Press to initiate the NVM

PRESCALER GROUP
Press GREEN button in order to access this group of items.

FM	: This adjustment is to determine the pre-amplifier gain of MSP for German stereo Set to 27.
NICAM	: This adjustment is to determine the pre-amplifier gain of MSP for Nicam Set to 61.
I2S	: Not used.
SCART	: This adjustment is to determine the pre-amplifier gain of MSP for Scart audio inputs Set to 25.

OPTIONS GROUP

Press BLUE button in order to access this group of items.

0.HPHONE : ON/OFF
1.CRT : 4:3 / 16:9
2.SVHS : ON/OFF
3.f(IF) : always set to 38.9
4.Türk. : Turkish menu ON/OFF
5.VGA : ON/OFF
6.FRONT : Front AV ON/OFF
7.DPL : ON/OFF
8.VD : ON/OFF
9.NSL : ON/OFF
A.PAP : ON/OFF
B.CTI : ON/OFF
C.AVL : ON/OFF

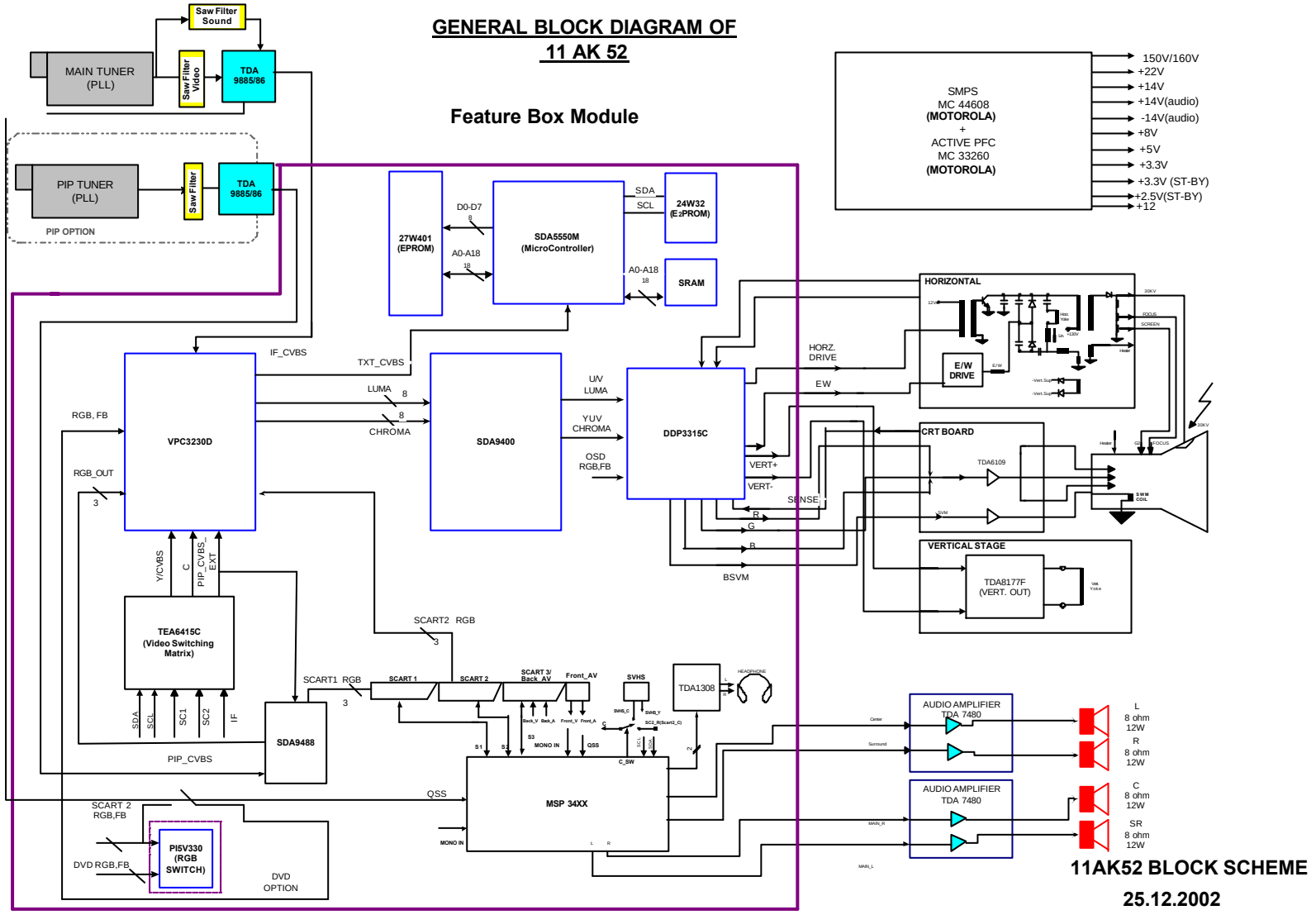
SYSTEM GROUP

Press YELLOW button in order to access this group of items.

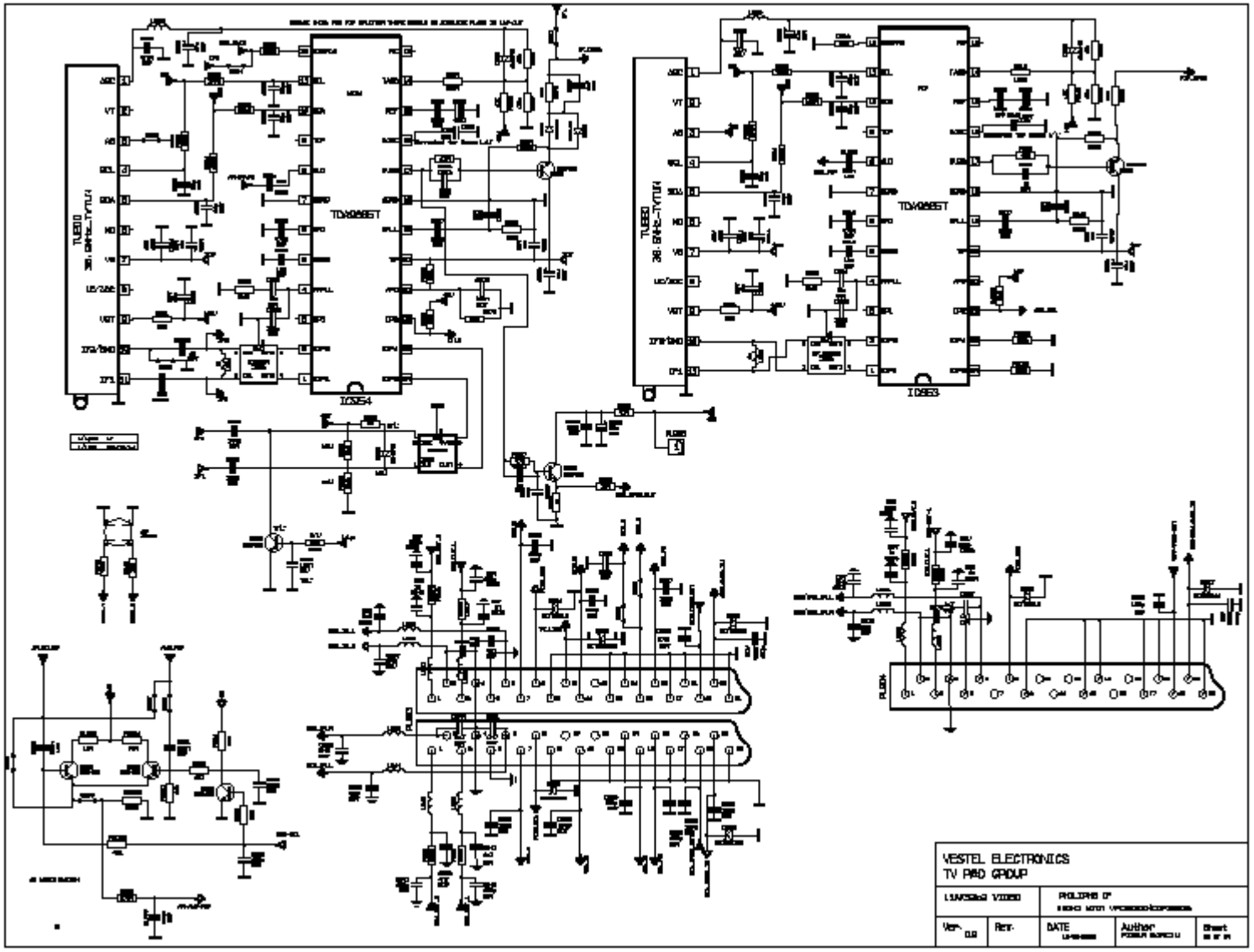
0.PAL B/G : ON/OFF
1.PAL D/K : ON/OFF
2.PAL I : ON/OFF
3.SECAM B/G : ON/OFF
4.SECAM D/K : ON/OFF
5.SECAM L/L' : ON/OFF
6.AUST. : ON/OFF

NOTE: Settings values in Service menu are given for 28" 4:3 THOMSON (A66EHJ13X12) tube in this manual.

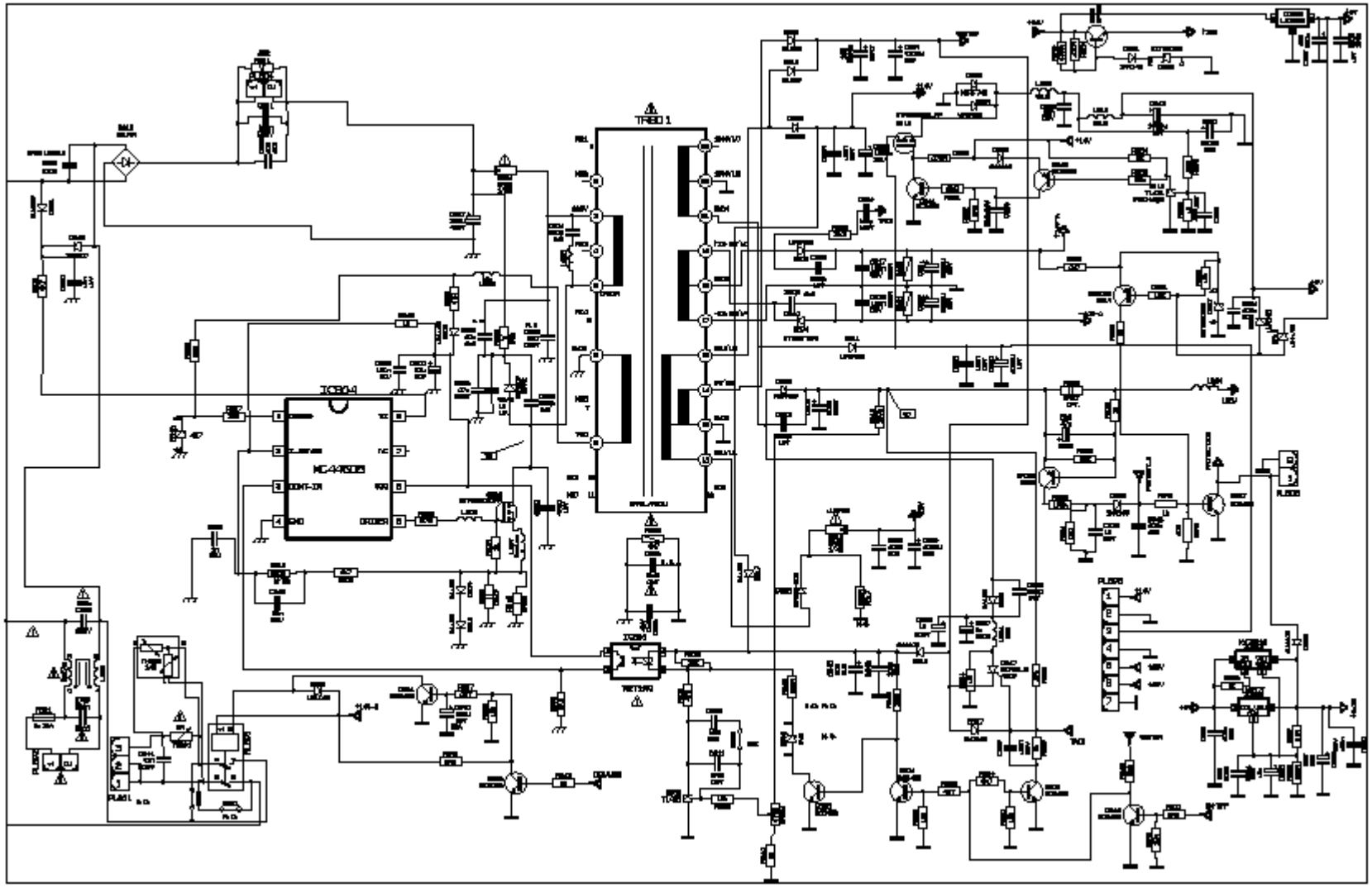
17.BLOCK DIAGRAM



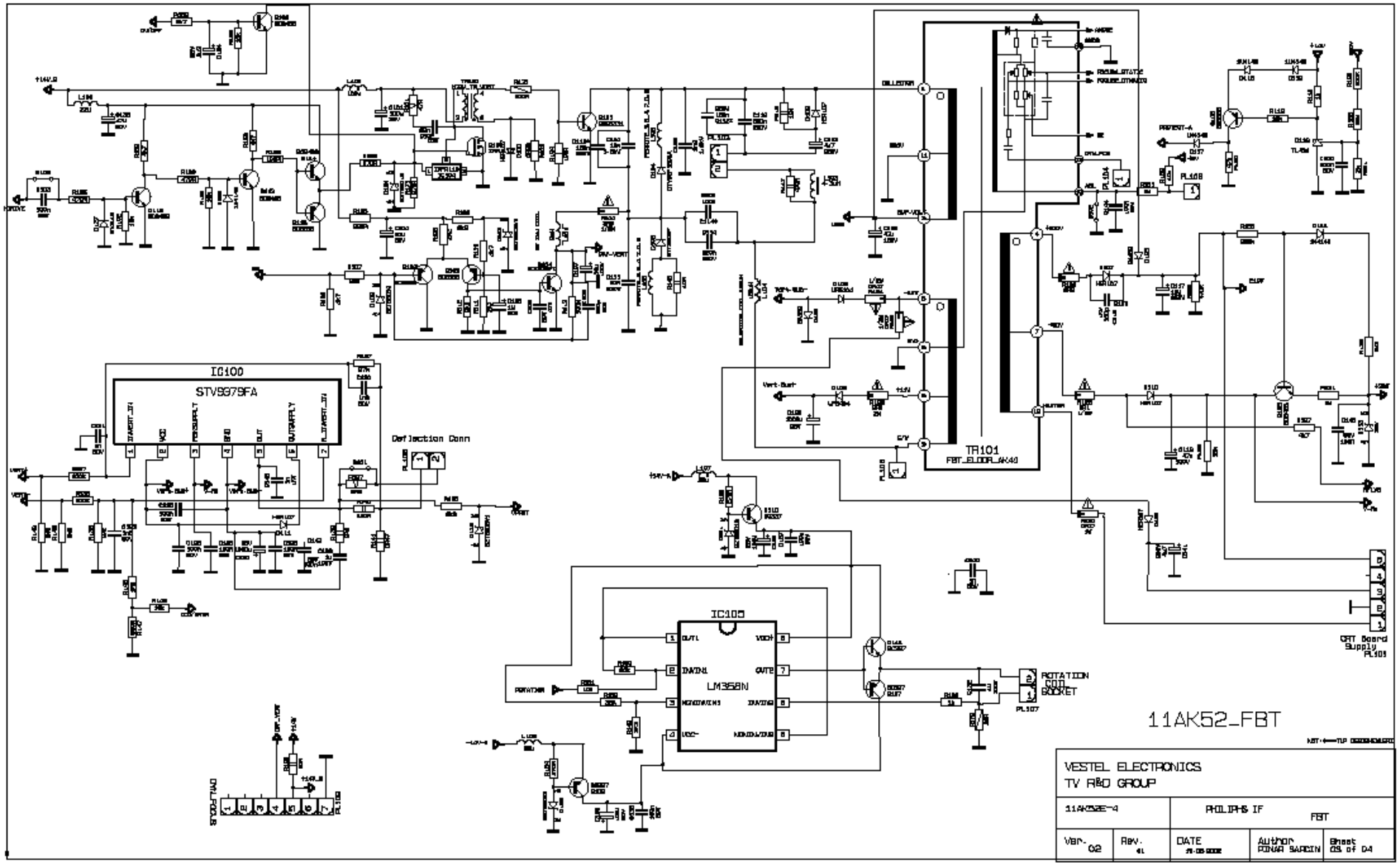
18.CIRCUIT DIAGRAMS



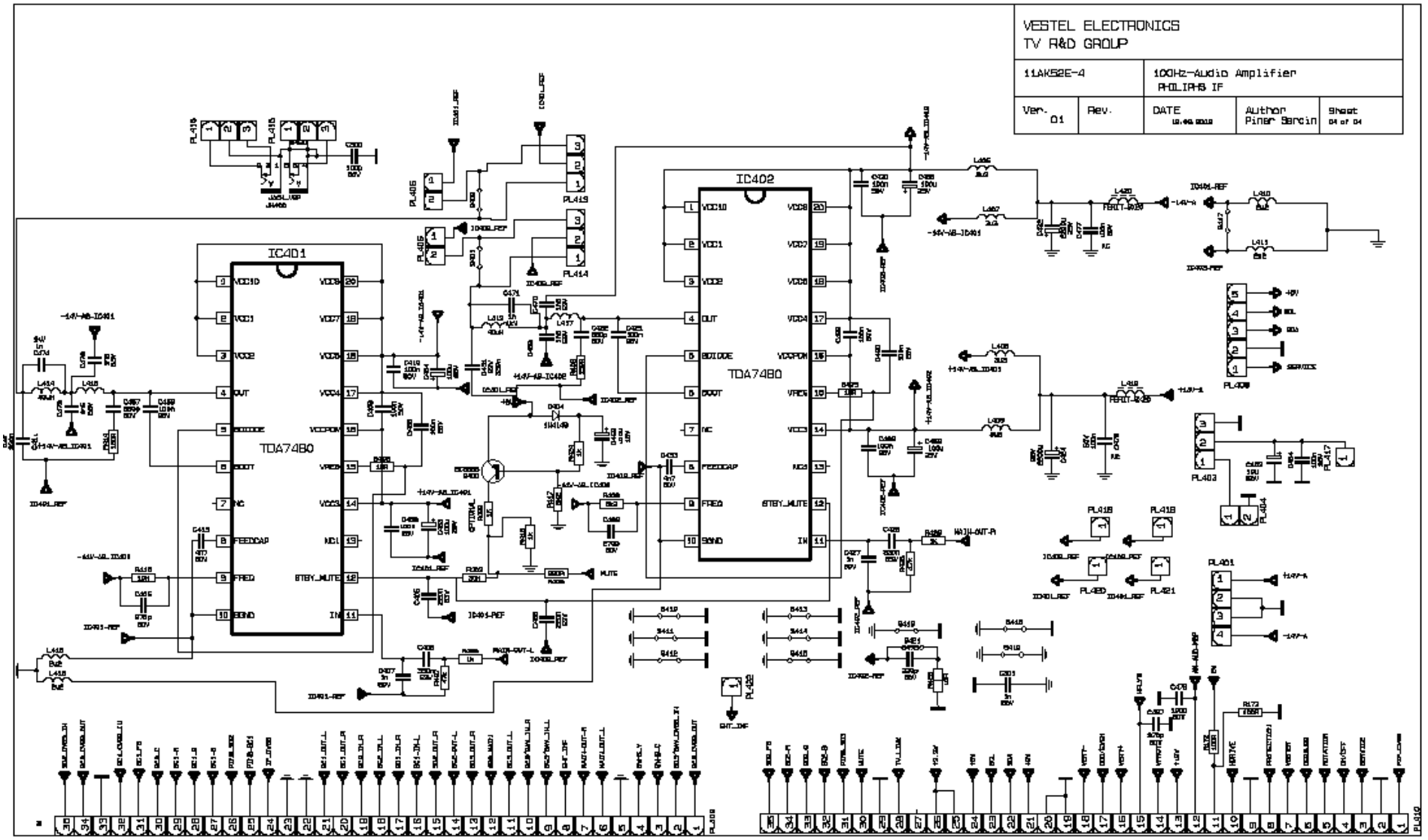
11ak52b4-VIDEO



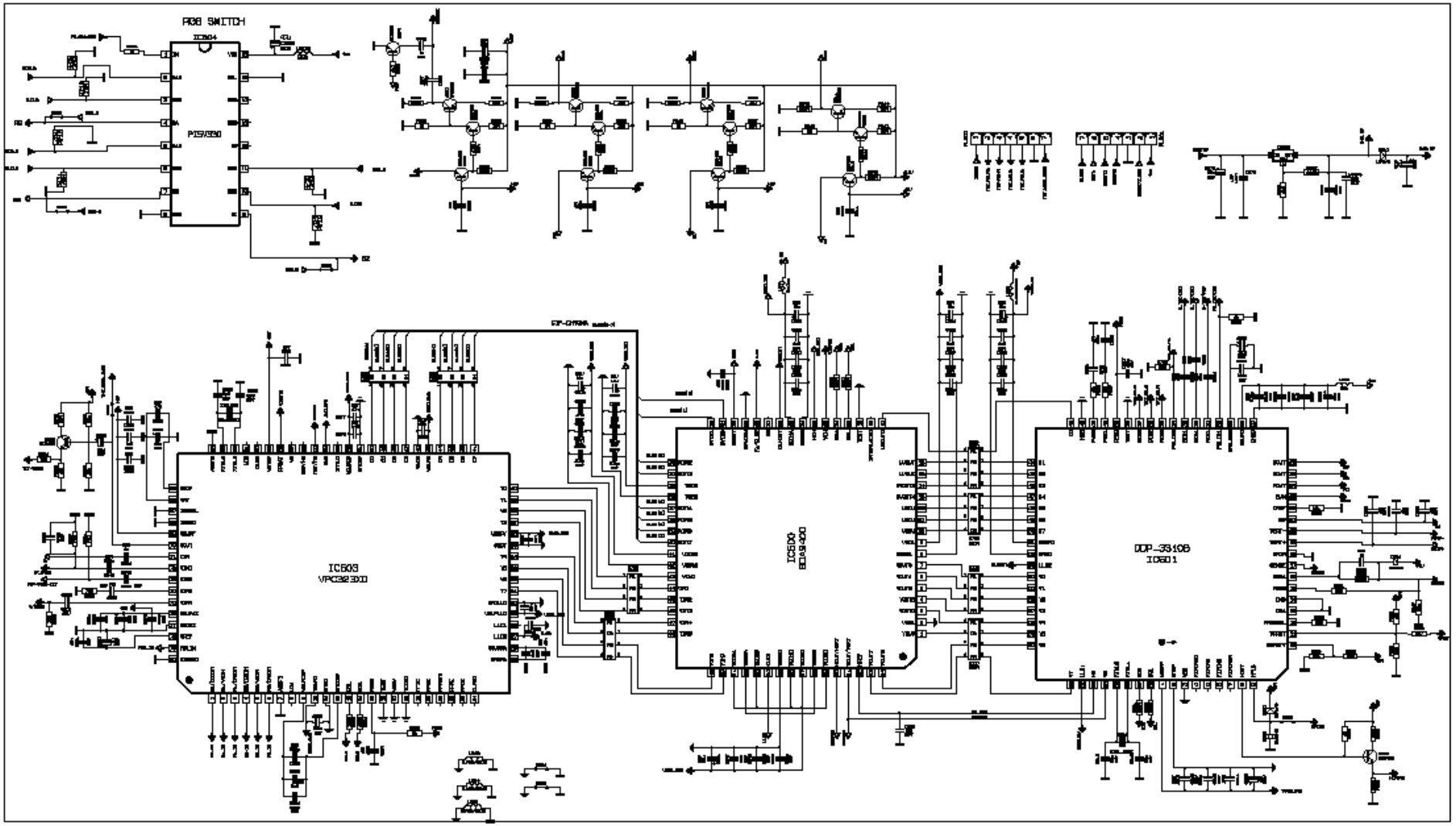
11ak52b4-2


IC100
STV9379FA
Deflection Conn
TR101
FBT_ELDOR_AK40
IC103
LM358N
ROTATION COIL SOCKET
CRT Board Supply
11AK52_FBT
VESTEL ELECTRONICS
TV R&D GROUP
PHILIPS IF
FBT

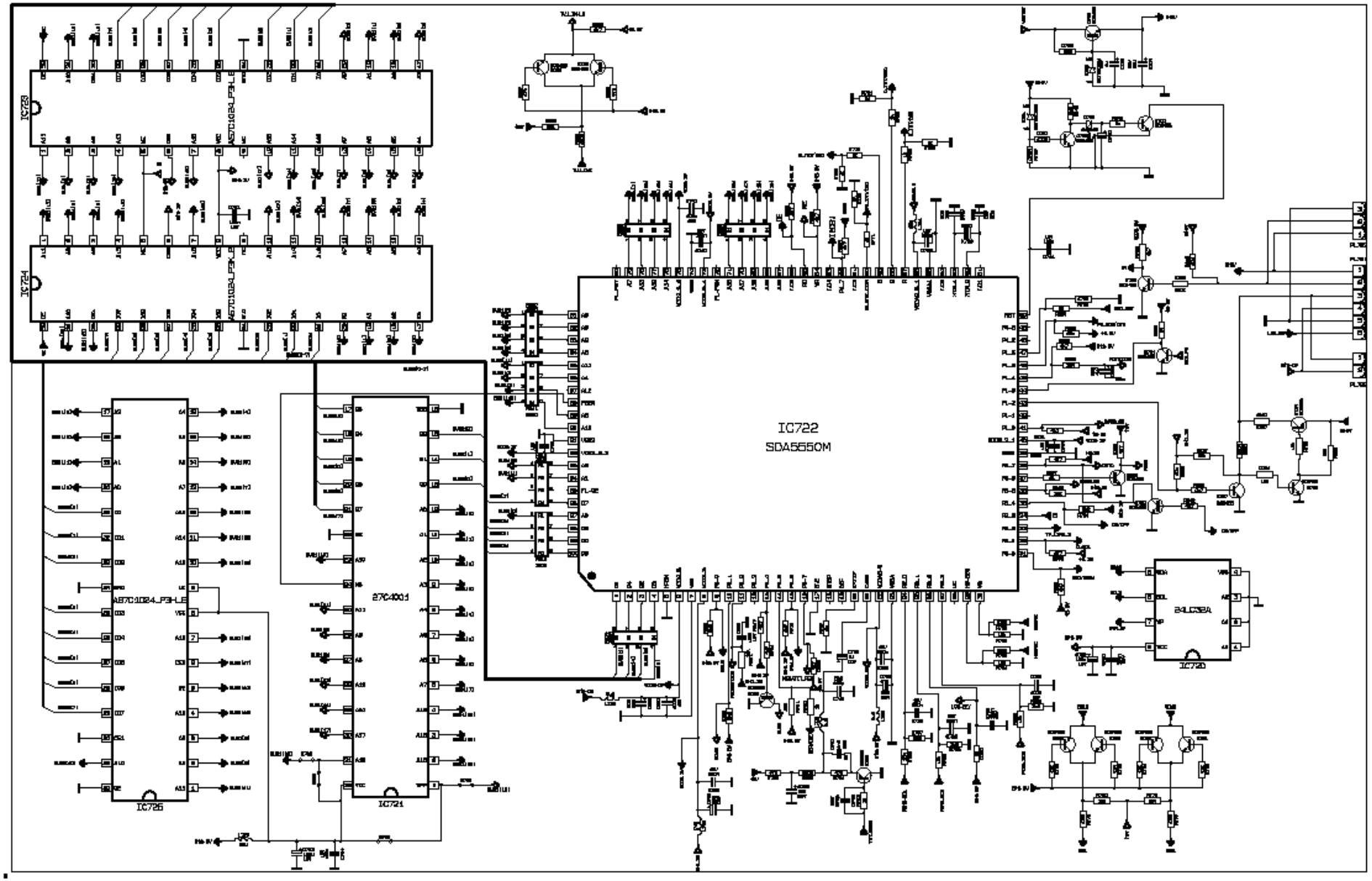
11ak52b4-3

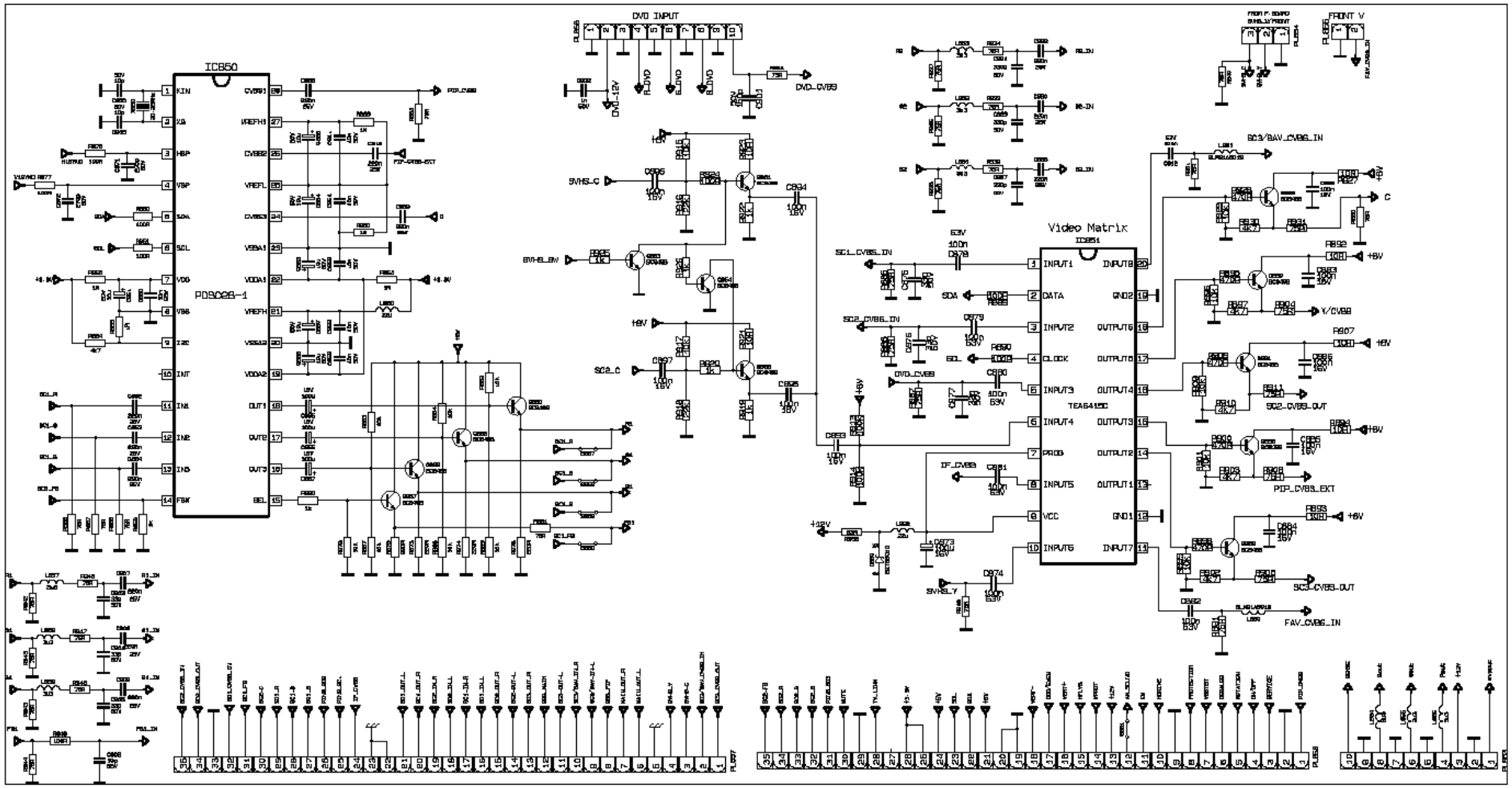

VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-4
100Hz-Audio Amplifier
PHILIPHS IF
Ver. 01
Rev.
DATE
Author
Piner Sercin
Sheet
04 of 04
IC401
TDA7480
IC402
TDA7480

11ak52b4-4

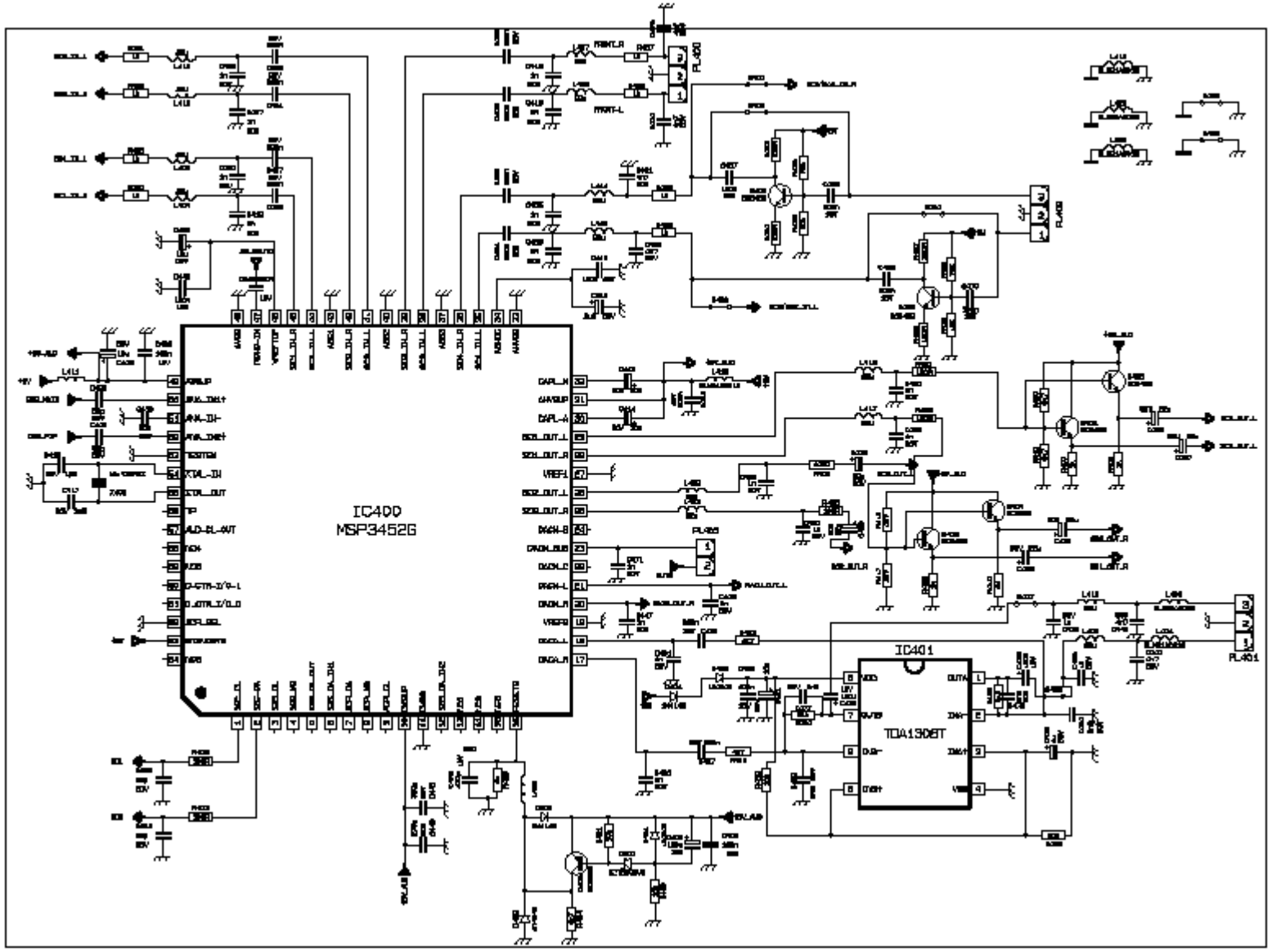


11fb2a3—1

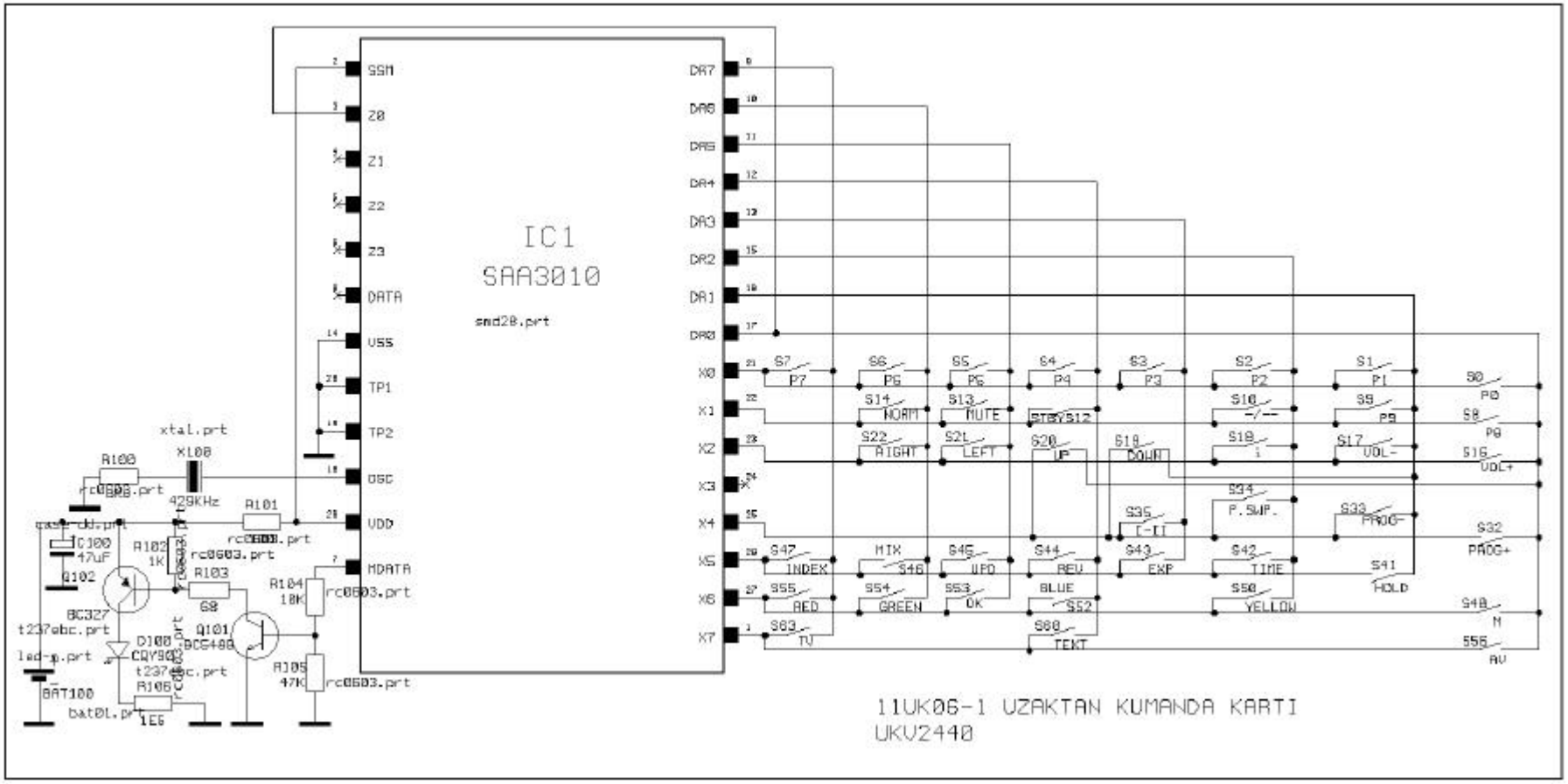

IC722
SDA5550M
IC723
IC724
IC725
IC721
IC720
A57D1024_F3H_LE
27C4001
24LC32A


DVD INPUT
ICB50
PDB0028-1
Video Matrix
TEA6415C
INPUT1
INPUT2
INPUT3
INPUT4
INPUT5
INPUT6
INPUT7
INPUT8
OUTPUT1
OUTPUT2
OUTPUT3
OUTPUT4
OUTPUT5
OUTPUT6
DATA
CLOCK
SDA
SCL
SC1_CVBS_IN
SC2_CVBS_IN
DVD_CVBS
SVHS-C
SVHS-LUM
SC2_C
SC2_CVBS_OUT
SC3_CVBS_OUT
PIP_CVBS_EXT
FAV_CVBS_IN
Y/CVBS
C
+8V
+12V

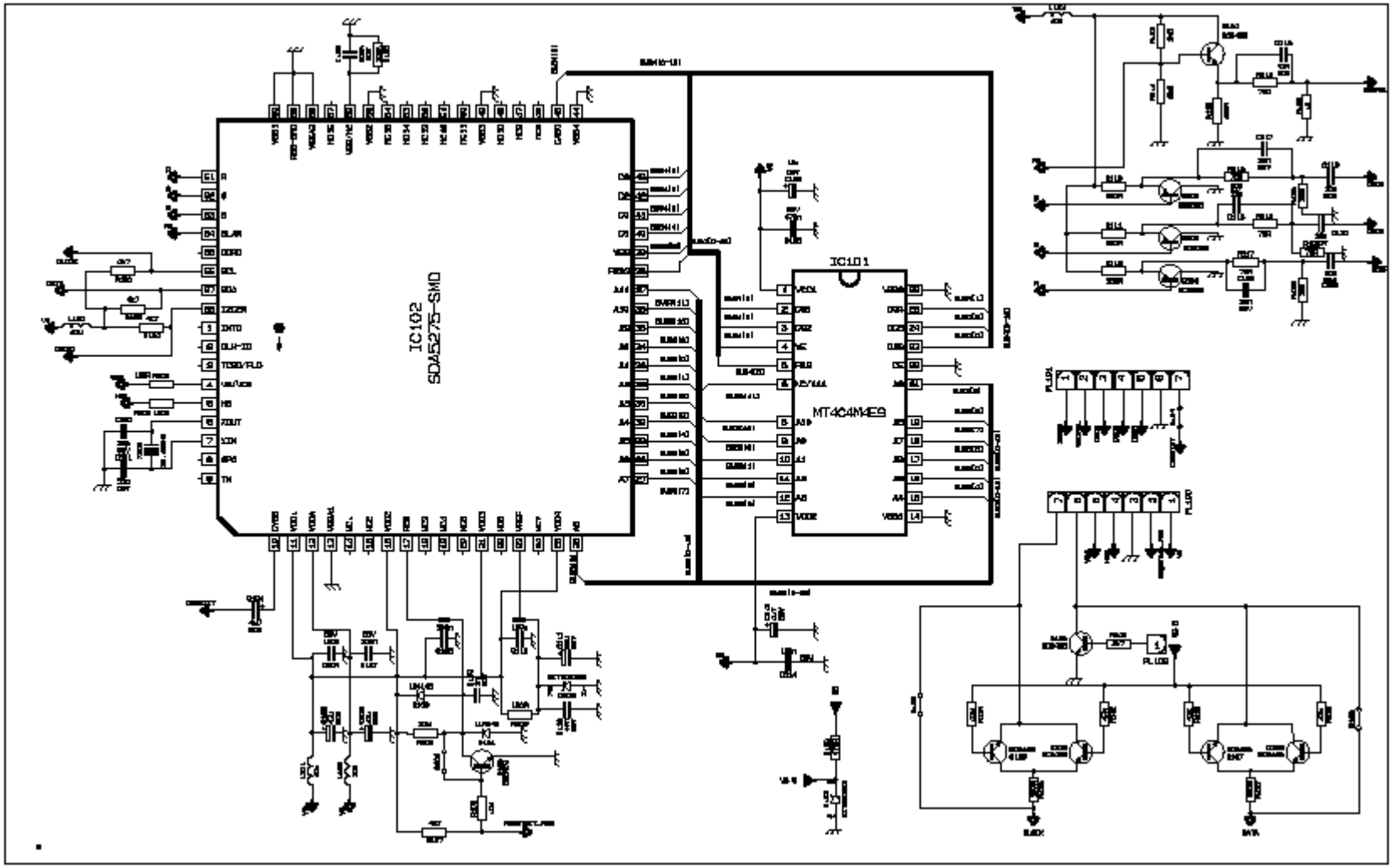
11fb2a3—3



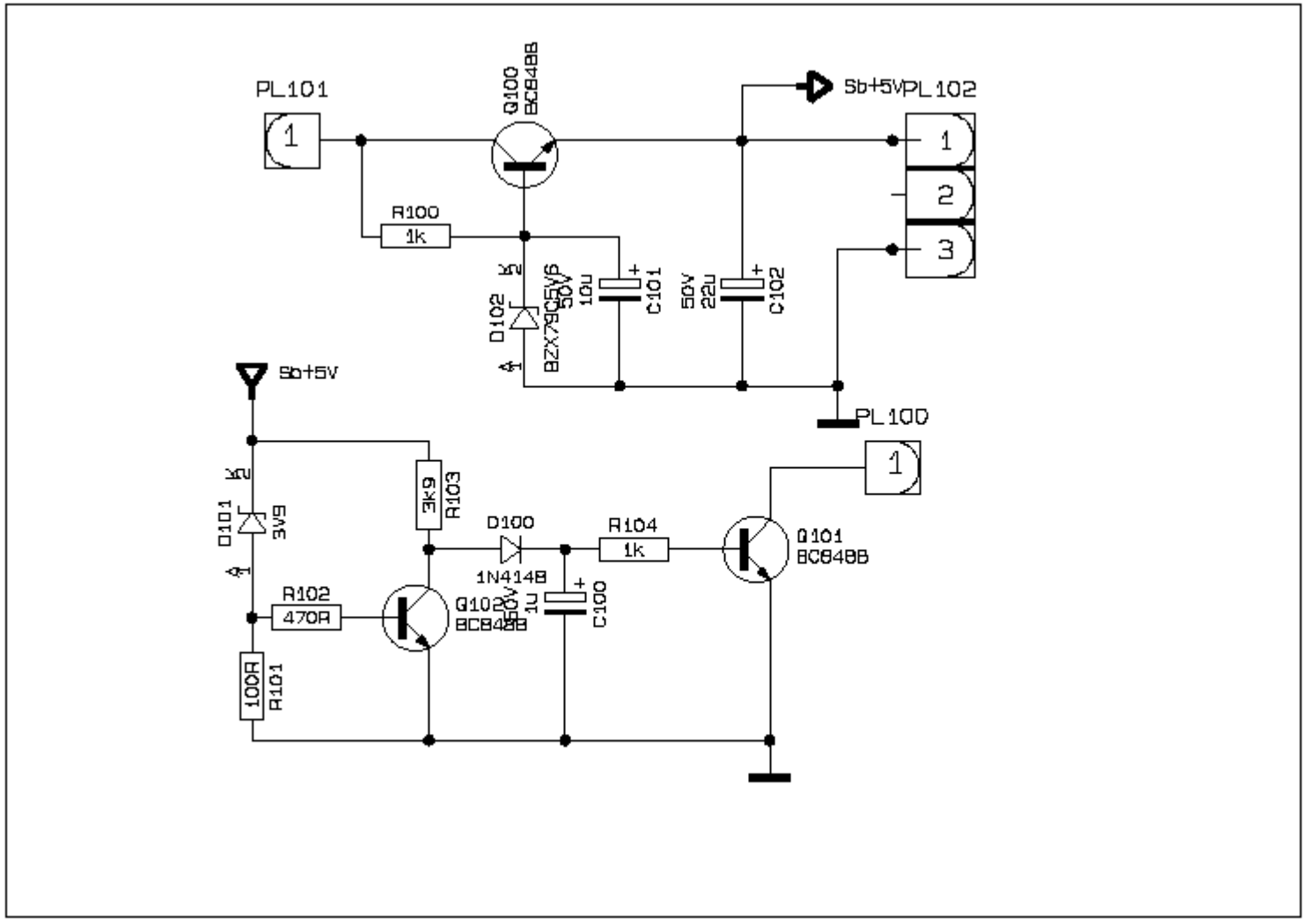
11fb2a3—4


IC1
SAA3010
smd28.prt
SSM
Z0
Z1
Z2
Z3
DATA
VSS
TP1
TP2
OSC
VDD
MDATA
DR7
DR6
DR5
DR4
DR3
DR2
DR1
DR0
X0
X1
X2
X3
X4
X5
X6
X7
xtal.prt
X100
429KHz
R100
R101
R102
1K
R103
68
R104
18K
R105
47K
R106
1E6
C100
47uF
Q102
BC327
Q101
BC548
D100
CQY90
BAT100
bat0l.prt
led-g.prt
rc0603.prt
S7 P7
S6 P6
S5 P5
S4 P4
S3 P3
S2 P2
S1 P1
S0 P0
S14 NORM
S13 MUTE
S12
S10 -/--
S9 P9
S8 P8
S22 RIGHT
S21 LEFT
S20 UP
S19 DOWN
S18 i
S17 VOL-
S16 VOL+
S34 P.SWP.
S35 [-II
S33 PROG-
S32 PROG+
S47 INDEX
S46 MIX
S45 UPD
S44 REV
S43 EXP
S42 TIME
S41 HOLD
S55 RED
S54 GREEN
S53 OK
BLUE
S52
S50 YELLOW
S49 M
S48
S83 TV
S80 TEXT
555 AV
11UK06-1 UZAKTAN KUMANDA KARTI
UKU2440

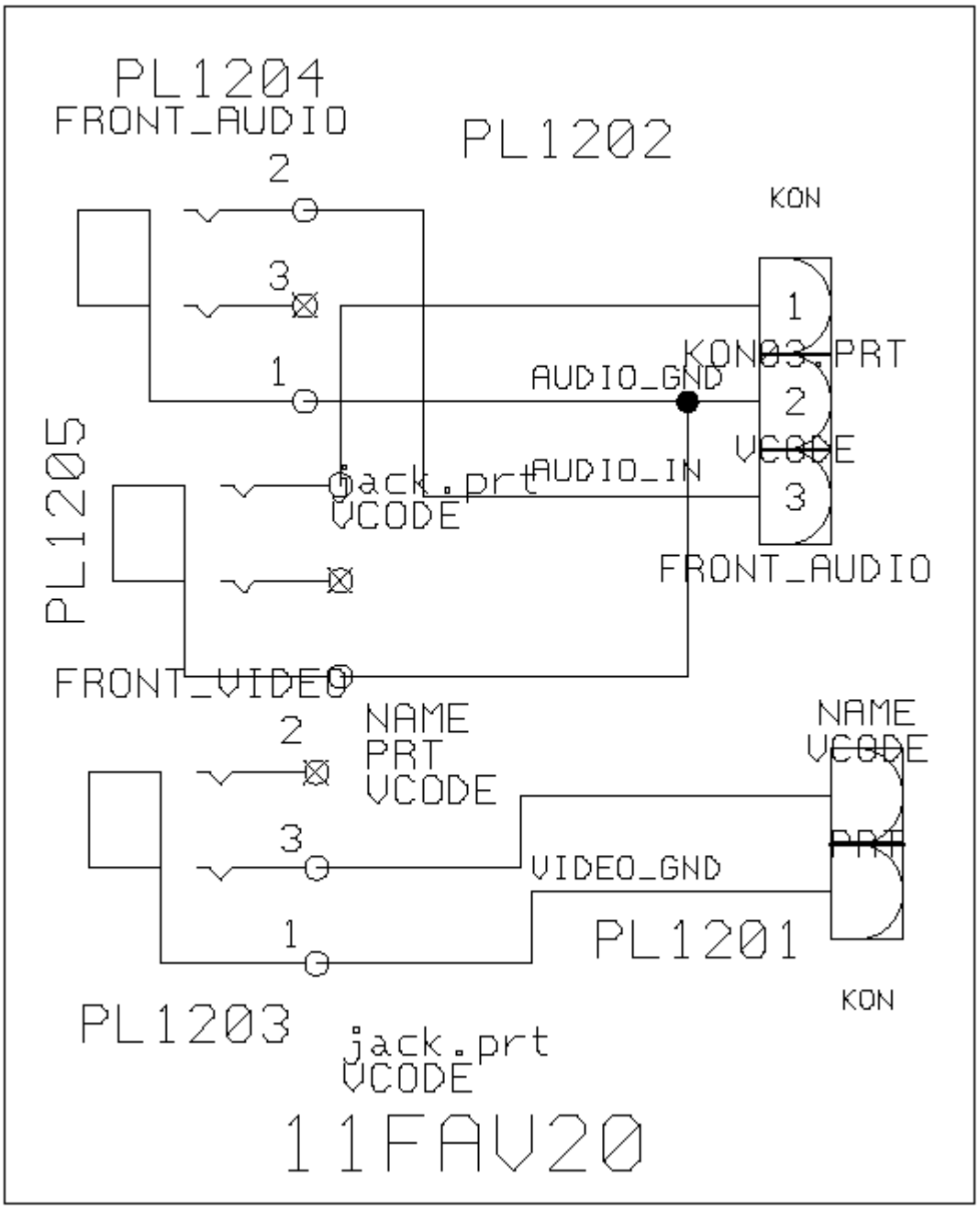
11uk06-1



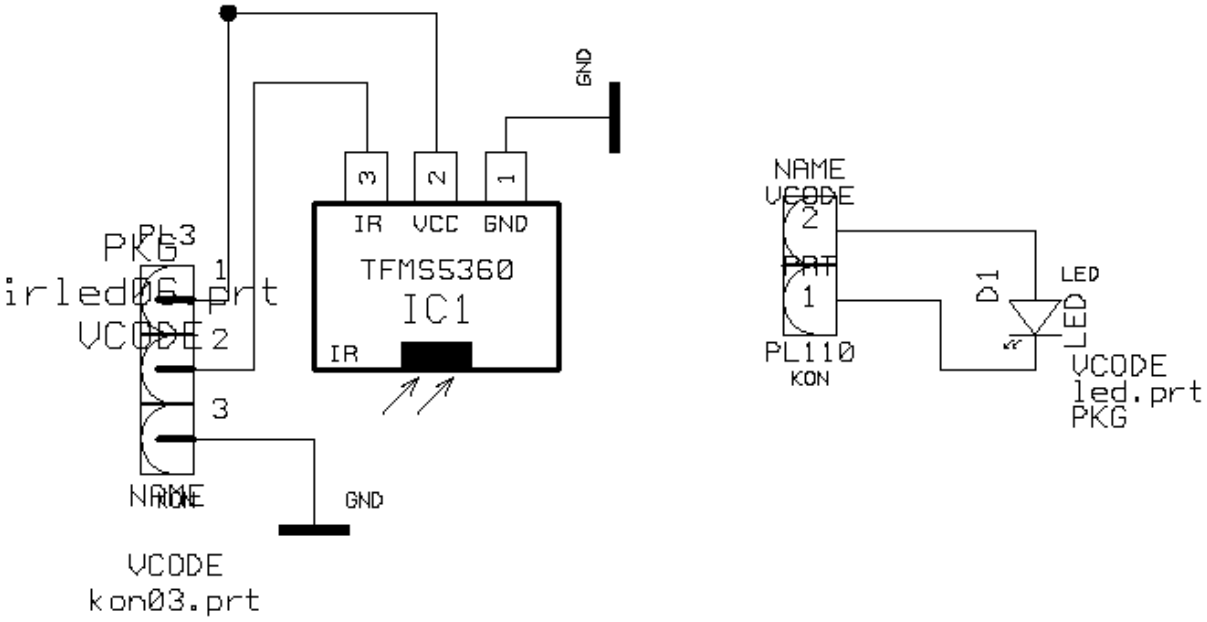
11txt52-4


PL101
1
Q100
BC848B
Sb+5V
PL102
1
2
3
R100
1k
D102
BZX79C5V6
50V
10u
C101
50V
22u
C102
PL100
Sb+5V
D101
3V9
3k9
R103
D100
1N4148
R104
1k
1
Q101
BC848B
R102
470R
Q102
BC848B
50V
1u
C100
100R
R101

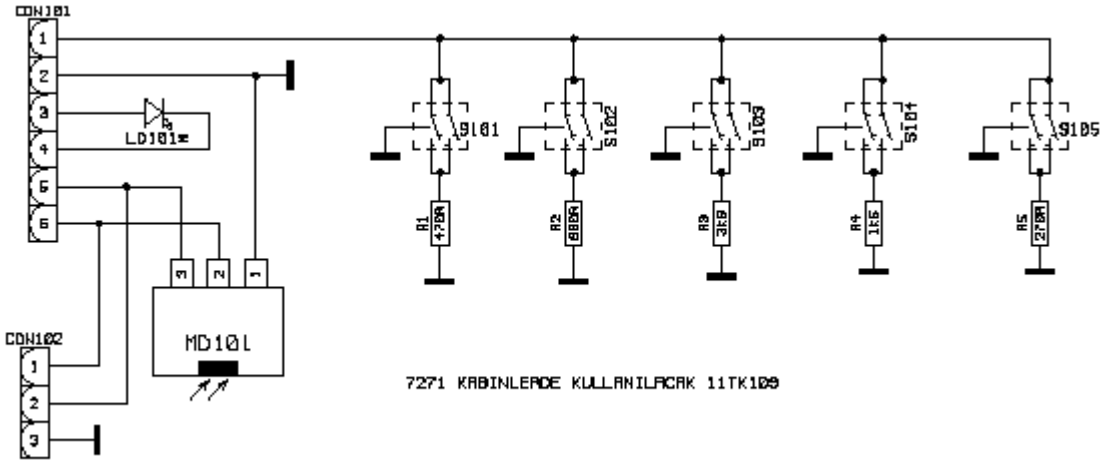
11rs52


PL1204
FRONT_AUDIO
PL1202
KON
2
3
1
1
KON03.PRT
AUDIO_GND
2
VCODE
AUDIO_IN
3
jack.prt
VCODE
PL1205
FRONT_AUDIO
FRONT_VIDEO
2
NAME
PRT
VCODE
NAME
VCODE
3
VIDEO_GND
PRT
1
PL1201
KON
PL1203
jack.prt
VCODE
11FAV20

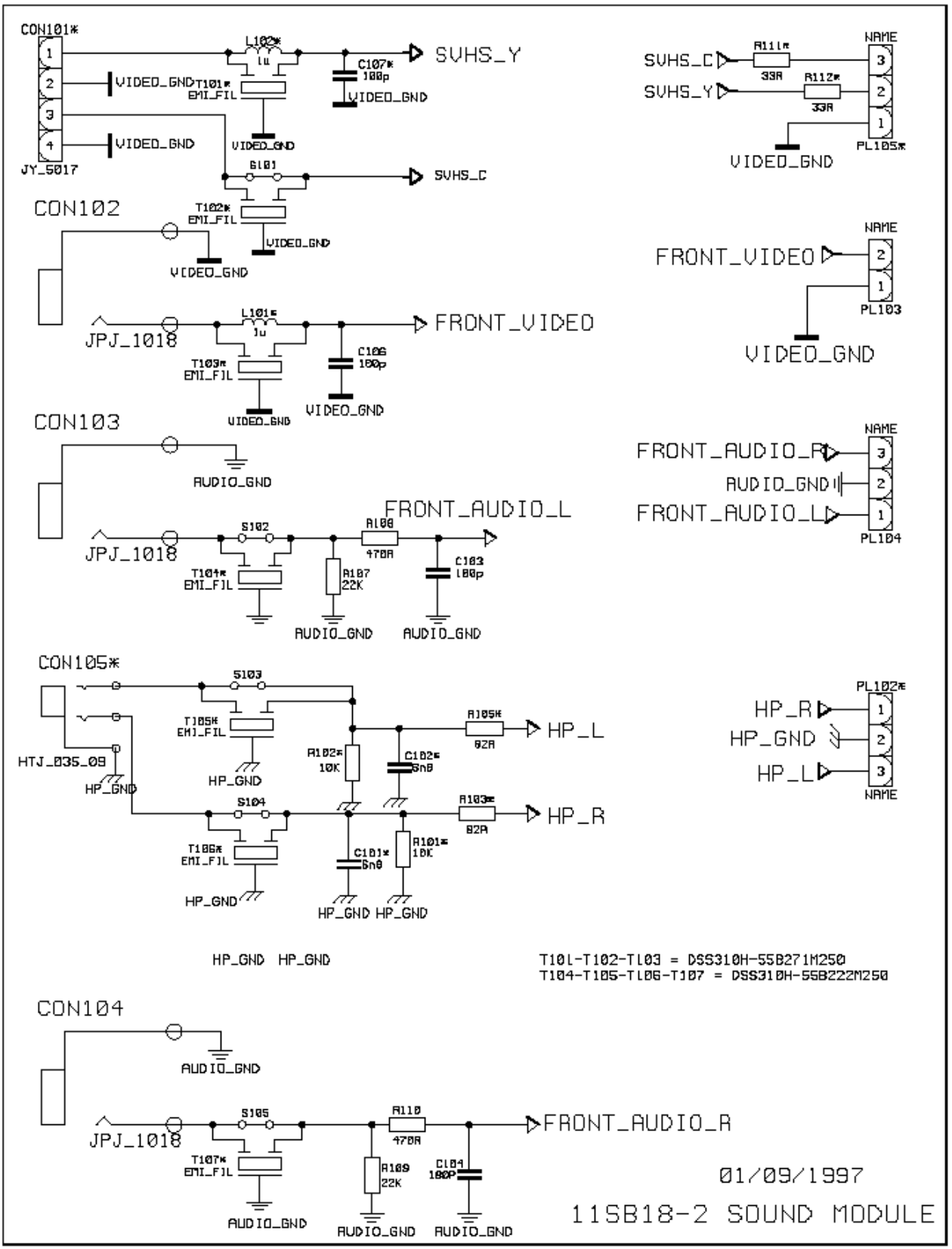
11fav19a4



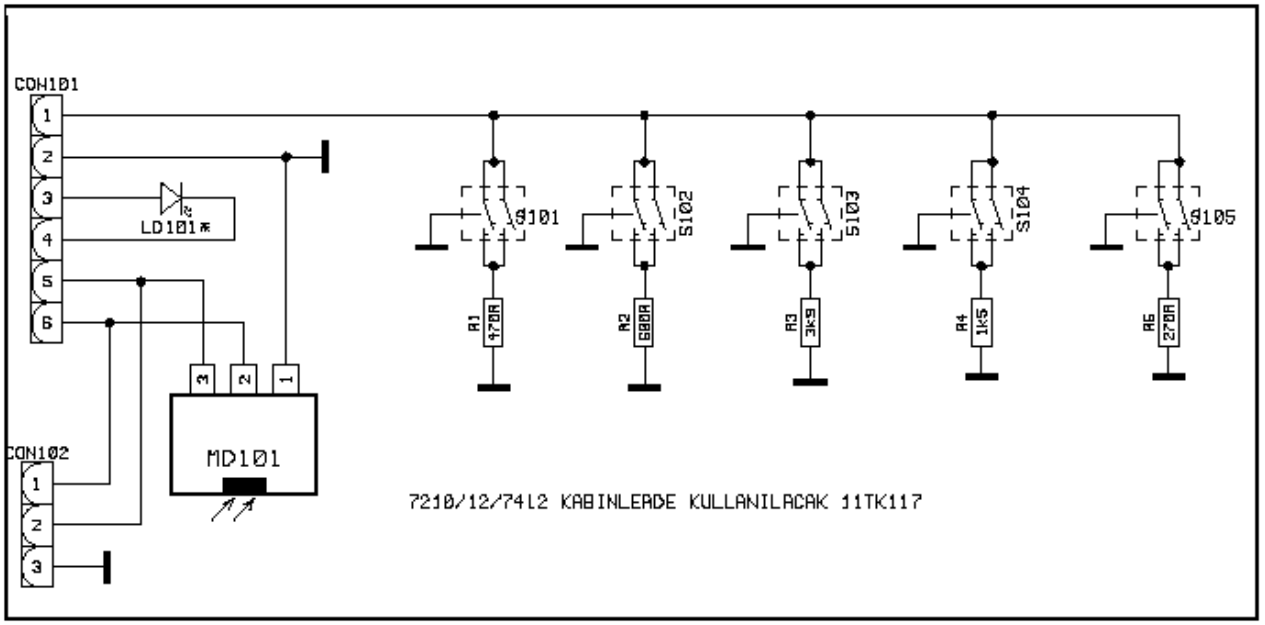
11ir2872



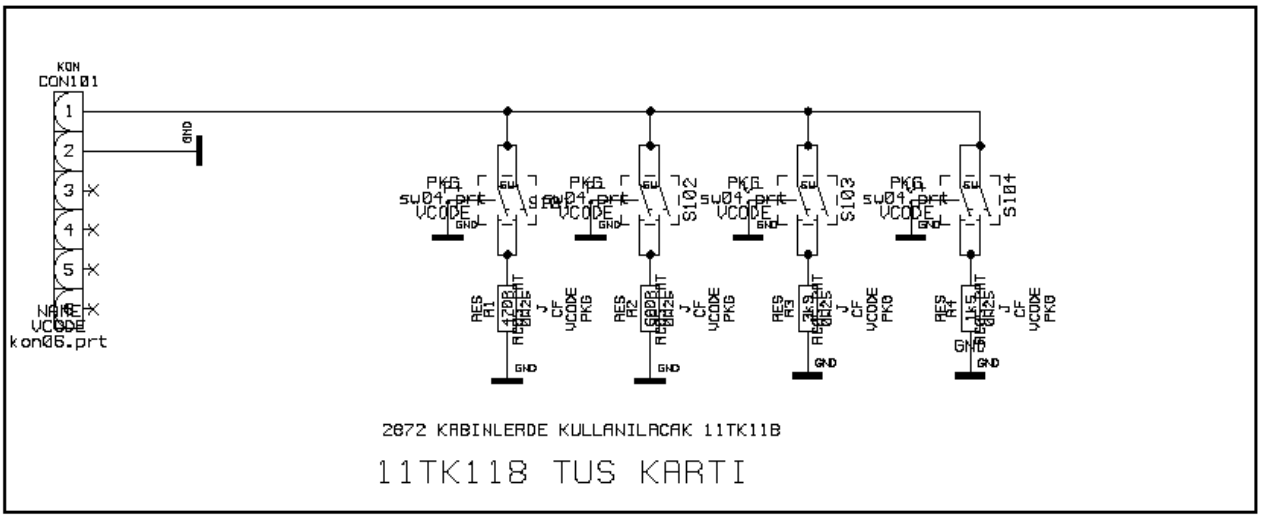
11tk109


CON101*
JY_5017
L102*
1u
C107*
100p
SVHS_Y
VIDEO_GND
T101*
EMI_FIL
VIDEO_GND
VIDEO_GND
G101
SVHS_C
CON102
T102*
EMI_FIL
VIDEO_GND
VIDEO_GND
JPJ_1018
L101*
1u
FRONT_VIDEO
T103*
EMI_FIL
C106
100p
VIDEO_GND
VIDEO_GND
CON103
AUDIO_GND
FRONT_AUDIO_L
JPJ_1018
S102
R108
470R
T104*
EMI_FIL
R107
22K
C103
100p
AUDIO_GND
AUDIO_GND
CON105*
S103
T105*
EMI_FIL
R105*
82R
HP_L
HTJ_035_09
HP_GND
R102*
10K
C102*
5n6
S104
R103*
82R
HP_R
T106*
EMI_FIL
C101*
5n6
R101*
10K
HP_GND
HP_GND
HP_GND
HP_GND HP_GND
T101-T102-T103 = DSS310H-55B271M250
T104-T105-T106-T107 = DSS310H-55B222M250
CON104
AUDIO_GND
JPJ_1018
S105
R110
470R
FRONT_AUDIO_R
T107*
EMI_FIL
R109
22K
C104
100P
AUDIO_GND
AUDIO_GND
AUDIO_GND
01/09/1997
11SB18-2 SOUND MODULE
SVHS_C
SVHS_Y
R111*
33R
R112*
33R
NAME
PL105*
VIDEO_GND
FRONT_VIDEO
NAME
PL103
VIDEO_GND
FRONT_AUDIO_R
AUDIO_GND
FRONT_AUDIO_L
NAME
PL104
PL102*
HP_R
HP_GND
HP_L
NAME

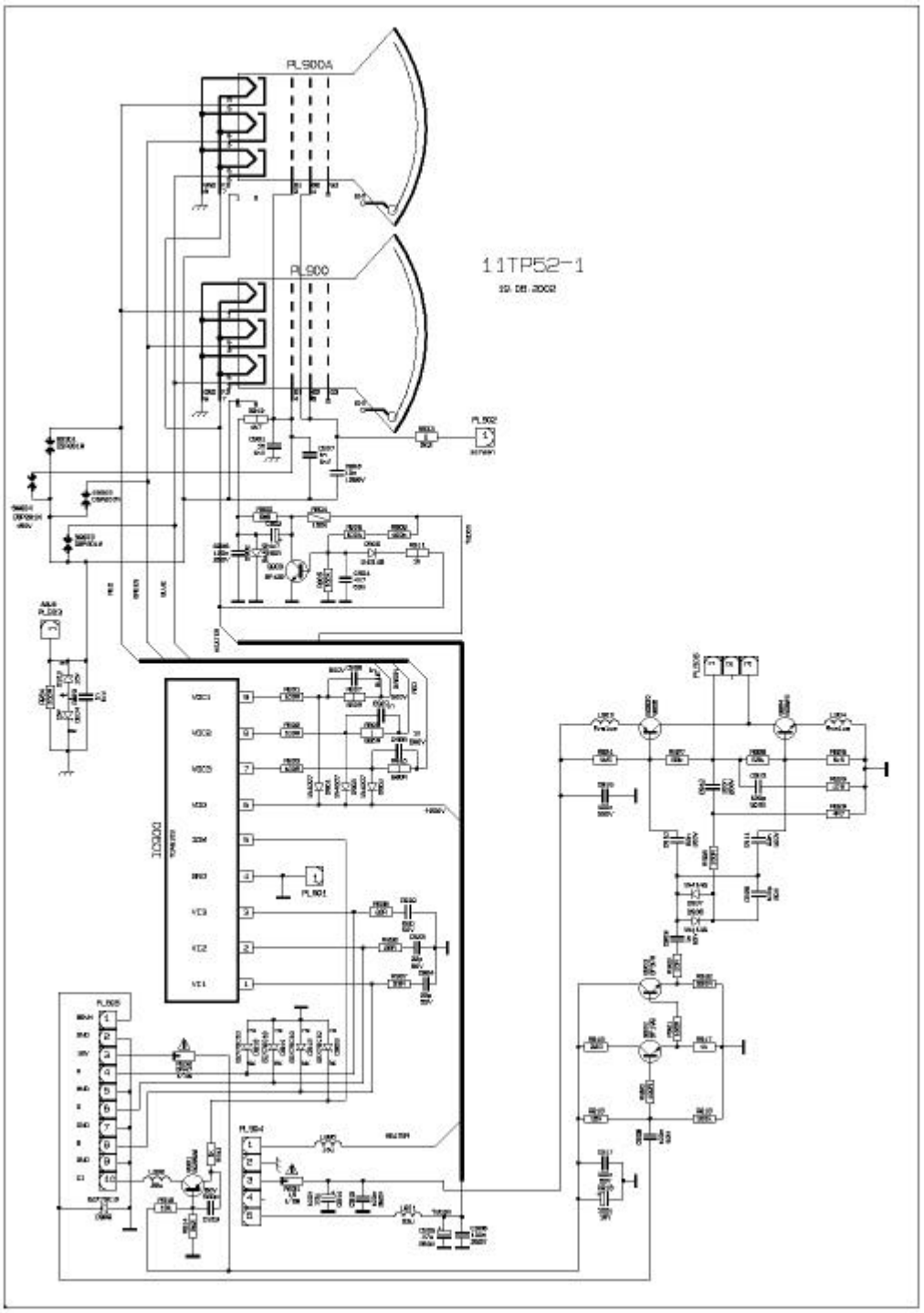
11sb18-3



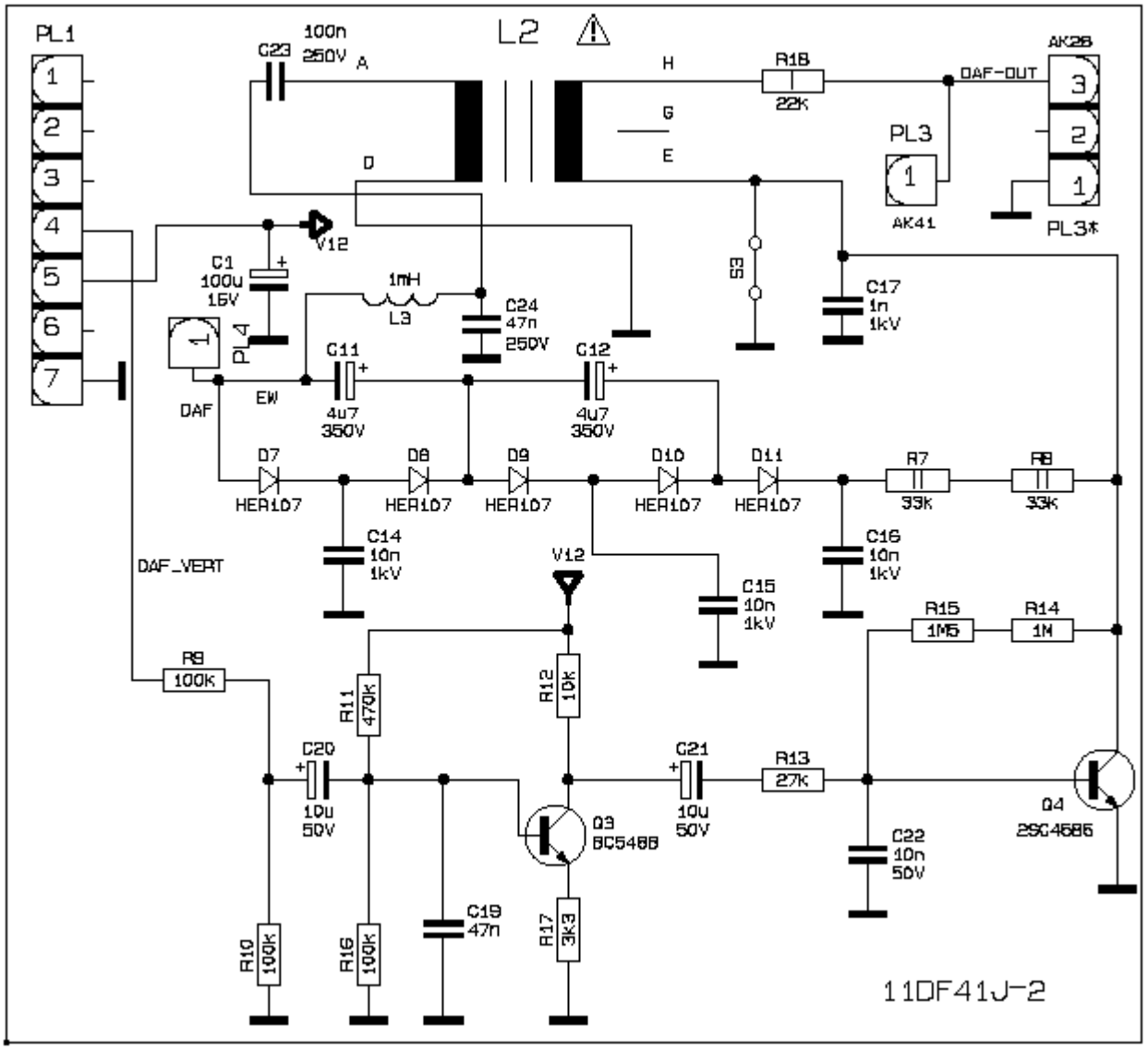
11tk117



11tk118



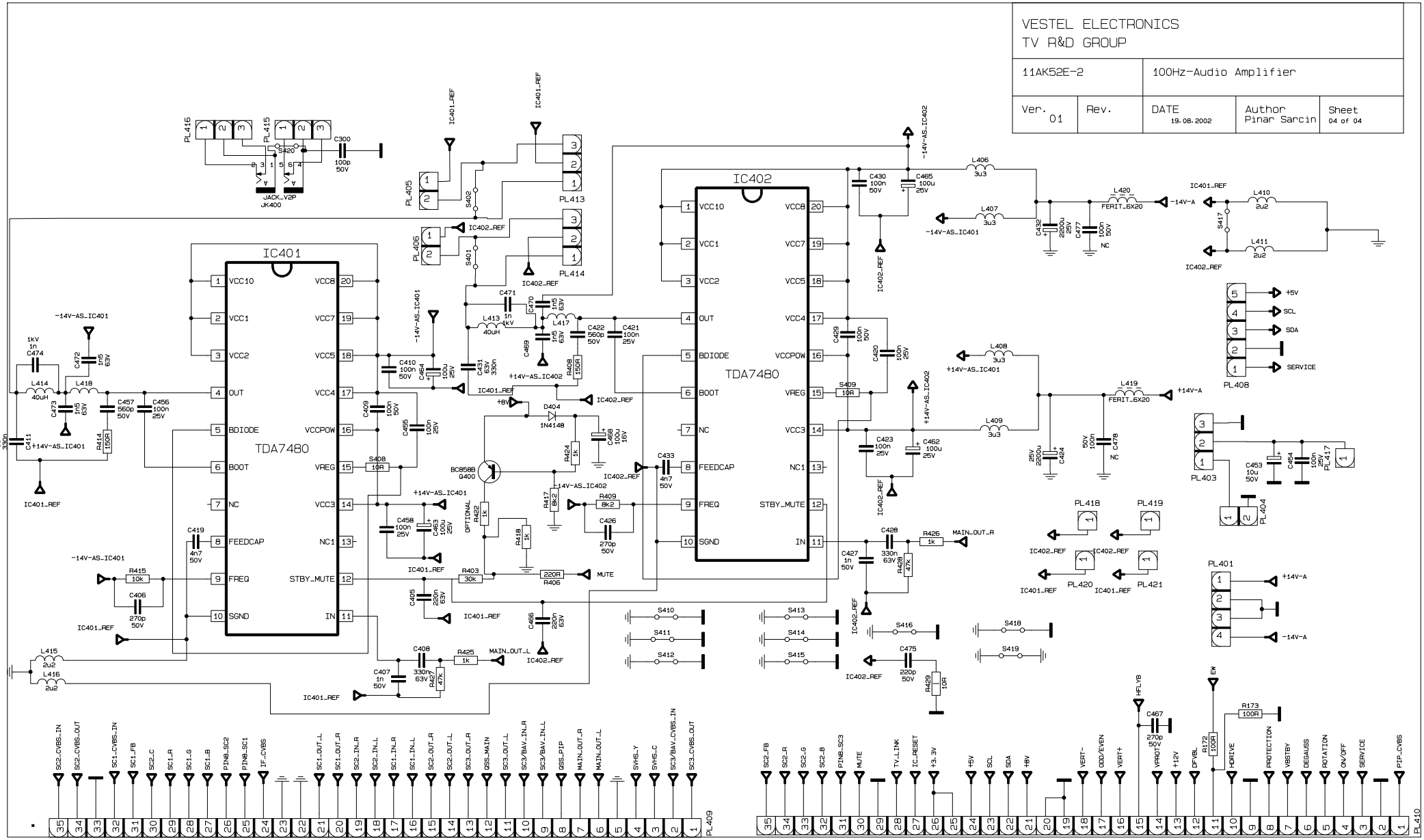
11tp52-1

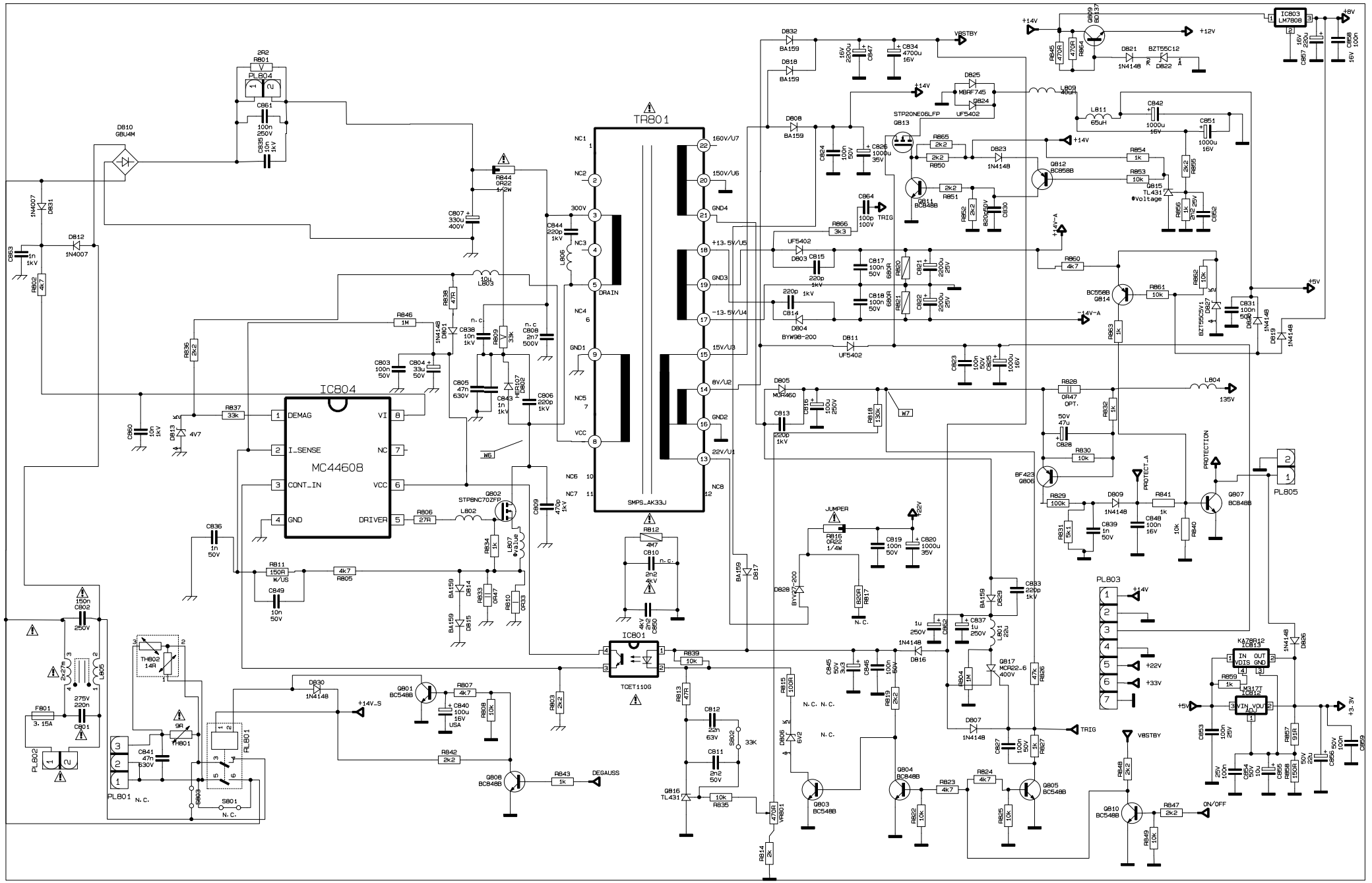

PL1
C23 100n 250V
L2
A
H
R18 22K
DAF-OUT
AK26
PL3
AK41
PL3*
G
E
D
V12
C1 100u 16V
1mH
L3
C24 47n 250V
PL4
C11 4u7 350V
C12 4u7 350V
S3
C17 1n 1kV
DAF
EW
D7 HER107
D8 HER107
D9 HER107
D10 HER107
D11 HER107
R7 33k
R8 33k
C14 10n 1kV
C16 10n 1kV
C15 10n 1kV
DAF_VERT
R15 1M5
R14 1M
R9 100k
R11 470k
R12 10k
C20 10u 50V
C21 10u 50V
R13 27k
Q3 BC548B
Q4 2SC4686
C22 10n 50V
C19 47n
R17 3k3
R10 100k
R16 100k
11DF41J-2

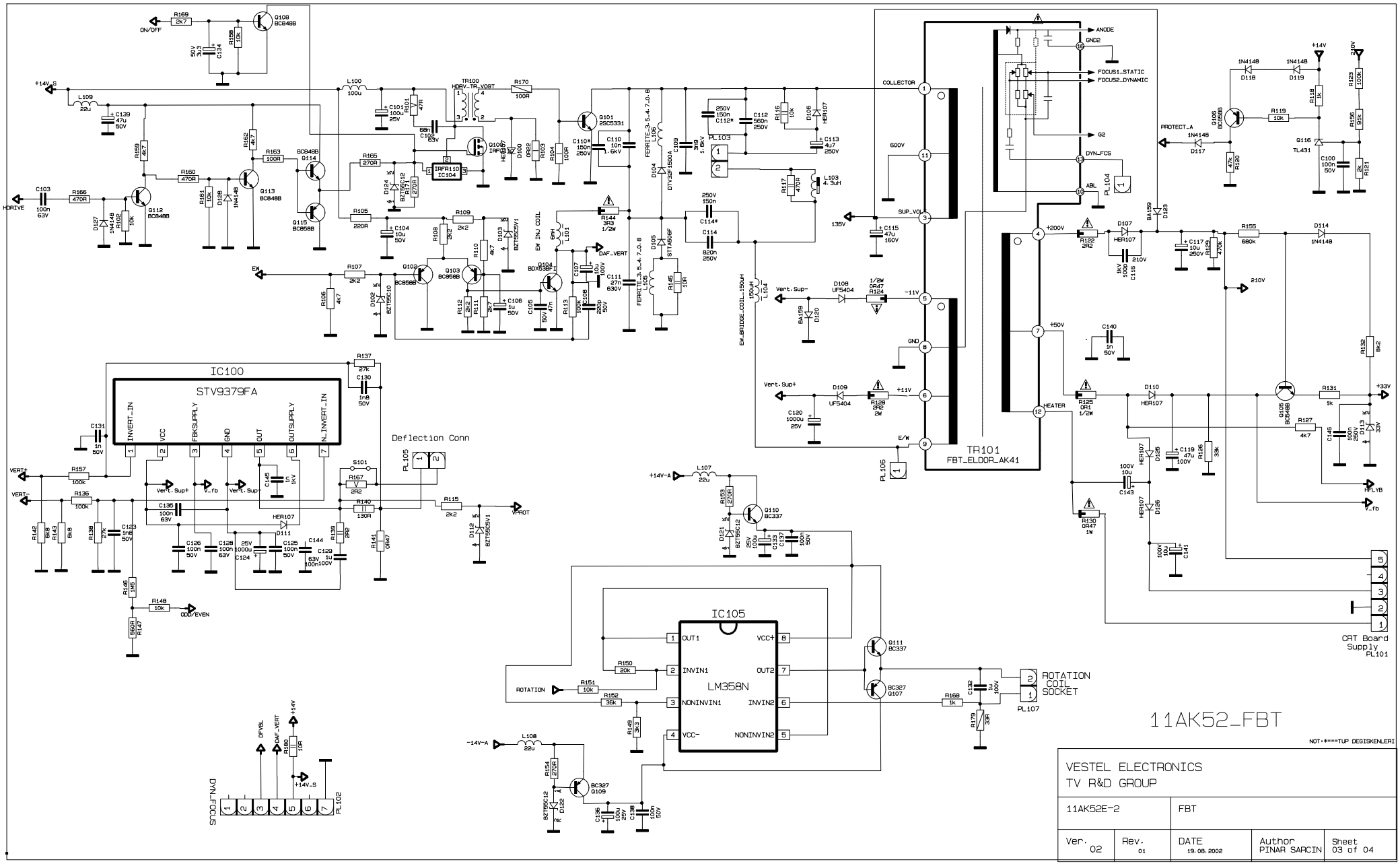
11df41j-2

Schematics

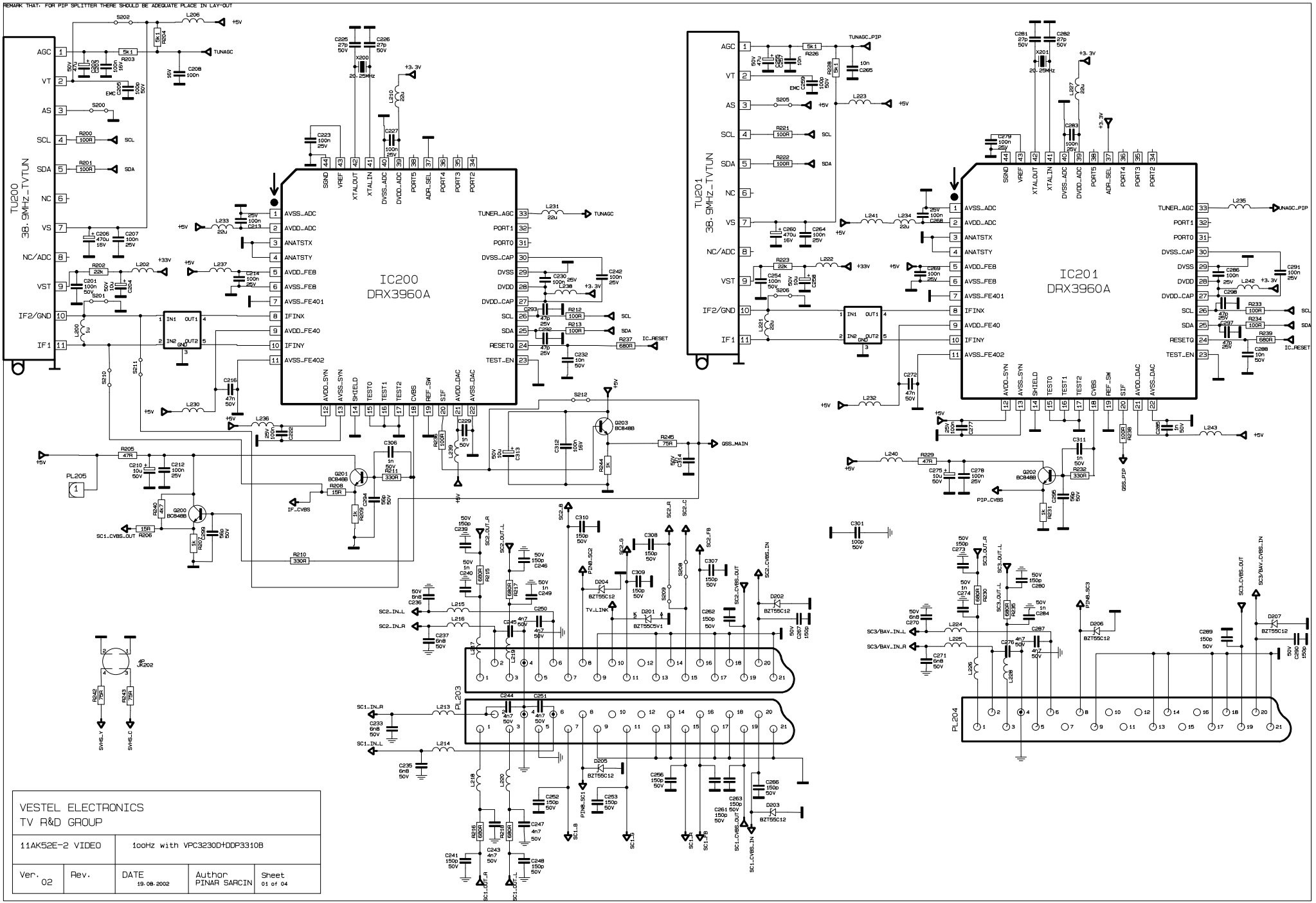
AK52-1


VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-2
100Hz-Audio Amplifier
Ver. 01
Rev.
DATE 19.08.2002
Author Pinar Sarcin
Sheet 04 of 04
IC401
IC402
TDA7480
PL401
PL403
PL404
PL405
PL406
PL408
PL410
PL413
PL414
PL415
PL416
PL417
PL418
PL419
PL420
PL421
JK400
S401
S402
S408
S409
S410
S411
S412
S413
S414
S415
S416
S417
S418
S419
S420
D404
1N4148
Q400
BC858B
SERVICE
SDA
SCL
+5V
MUTE
MAIN_OUT_L
MAIN_OUT_R
-14V-AS_IC401
+14V-AS_IC401
-14V-AS_IC402
+14V-AS_IC402
IC401_REF
IC402_REF
+8V
+14V-A
-14V-A


IC804
MC44608
DEMAG
I_SENSE
CONT_IN
GND
VI
NC
VCC
DRIVER
TR801
SMPS_4K33J
DRAIN
160V/U7
150V/U6
GND4
+13.5V/U5
GND3
-13.5V/U4
15V/U3
8V/U2
GND2
22V/U1
NC8
300V
IC801
TCET110G
Q802
STP8NC70ZFP
Q813
STP20NE06LFP
IC803
LM7808
K47812
IC813
M317T
IC814
VDU ADJ
TL431
Voltage
PL801
PL803
PL804
PL805
PROTECTION
PROTECT_A
JUMPER
TRIG
VBSTBY
ON/OFF
DEGAUSS
+14V
+12V
+8V
+5V
+3.3V
+22V
+33V
135V
-14V-A
+14V-A
+14V-S
N.C.

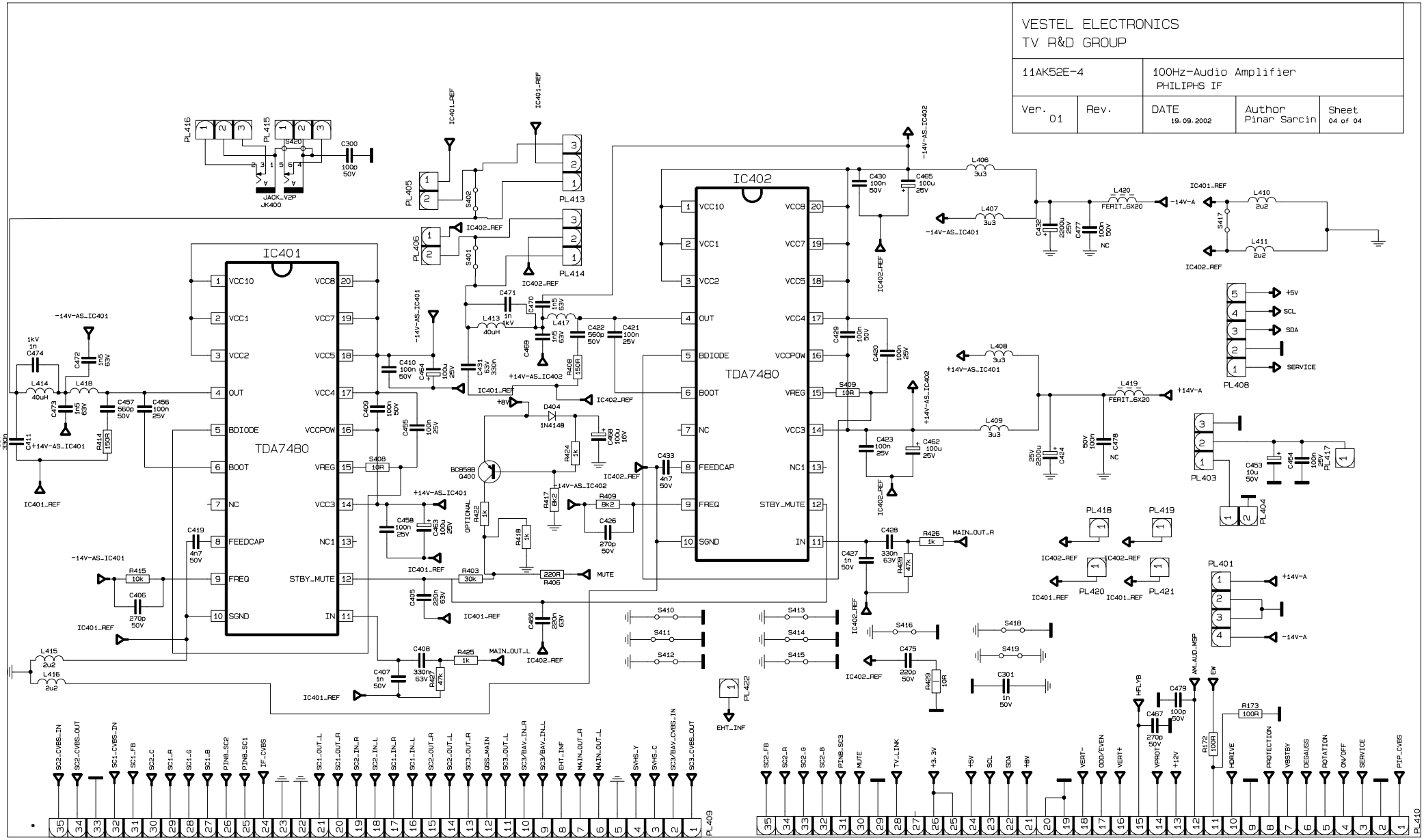

IC100
STV9379FA
INVERT_IN
VCC
FBKSUPPLY
GND
OUT
OUTSUPPLY
N_INVERT_IN
Deflection Conn
PL105
IC105
LM358N
OUT1
INVIN1
NONINVIN1
VCC-
VCC+
OUT2
INVIN2
NONINVIN2
TR100
HORV_TR_VOGT
TR101
FBT_ELDOR_AK41
ANODE
GND2
FOCUS1_STATIC
FOCUS2_DYNAMIC
G2
DYN_FCS
ABL
COLLECTOR
600V
SUP_VOL
135V
+200V
HEATER
+50V
+11V
-11V
GND
E/W
Vert.Sup+
Vert.Sup-
+33V
210V
+14V
+14V_S
+14V-A
-14V-A
PROTECT_A
HFLYB
V_fb
ON/OFF
HDRIVE
EW
DAF_VERT
VERT+
VERT-
VFROT
ROTATION
ODD/EVEN
DYN_FOCUS
ROTATION COIL SOCKET
PL107
CRT Board Supply PL101
11AK52_FBT
NOT:*===TUP DEGISKENLERI
VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-2
FBT
Ver. 02
Rev. 01
DATE 19.08.2002
Author PINAR SARCIN
Sheet 03 of 04

REMARK THAT, FOR PIP SPLITTER THERE SHOULD BE ADEQUATE PLACE IN LAY-OUT



VESTEL ELECTRONICS TV R&D GROUP				
11AK52E-2 VIDEO		100Hz with VPC3230D+DDP3310B		
Ver. 02	Rev.	DATE 19.08.2002	Author PINAR SARCIN	Sheet 01 of 04

AK52-B2


VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-4
100Hz-Audio Amplifier
PHILIPHS IF
Ver. 01
Rev.
DATE 19.09.2002
Author Pinar Sarcin
Sheet 04 of 04
IC401
IC402
TDA7480
PL409
PL410
PL408
PL403
PL404
PL401
PL405
PL406
PL413
PL414
PL415
PL416
PL417
PL418
PL419
PL420
PL421
PL422
JACK_V2P
JK400
EHT_INF
MUTE
MAIN_OUT_L
MAIN_OUT_R
SC2_CVBS_IN
SC2_CVBS_OUT
SC1_CVBS_IN
SC1_FB
SC2_C
SC1_R
SC1_G
SC1_B
PIN8_SC2
PIN8_SC1
IF_CVBS
SC1_OUT_L
SC1_OUT_R
SC2_IN_R
SC2_IN_L
SC1_IN_R
SC1_IN_L
SC2_OUT_R
SC2_OUT_L
SC3_OUT_R
OSS_MAIN
SC3_OUT_L
SC3/BAV_IN_R
SC3/BAV_IN_L
EHT_INF
MAIN_OUT_R
MAIN_OUT_L
SVHS_Y
SVHS_C
SC3/BAV_CVBS_IN
SC3_CVBS_OUT
SC2_FB
SC2_R
SC2_G
SC2_B
PIN8_SC3
MUTE
TV_LINK
+3.3V
+5V
SCL
SDA
+8V
VERT-
ODD/EVEN
VERT+
VPROT
+12V
AM_AUD_MSP
EW
HFLYB
HDRIVE
PROTECTION
VBSTBY
DEGAUSS
ROTATION
ON/OFF
SERVICE
PIP_CVBS
SERVICE
SDA
SCL
+5V
-14V-A
+14V-A
+14V-AS_IC401
-14V-AS_IC401
+14V-AS_IC402
-14V-AS_IC402
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IC402_REF
OPTIONAL
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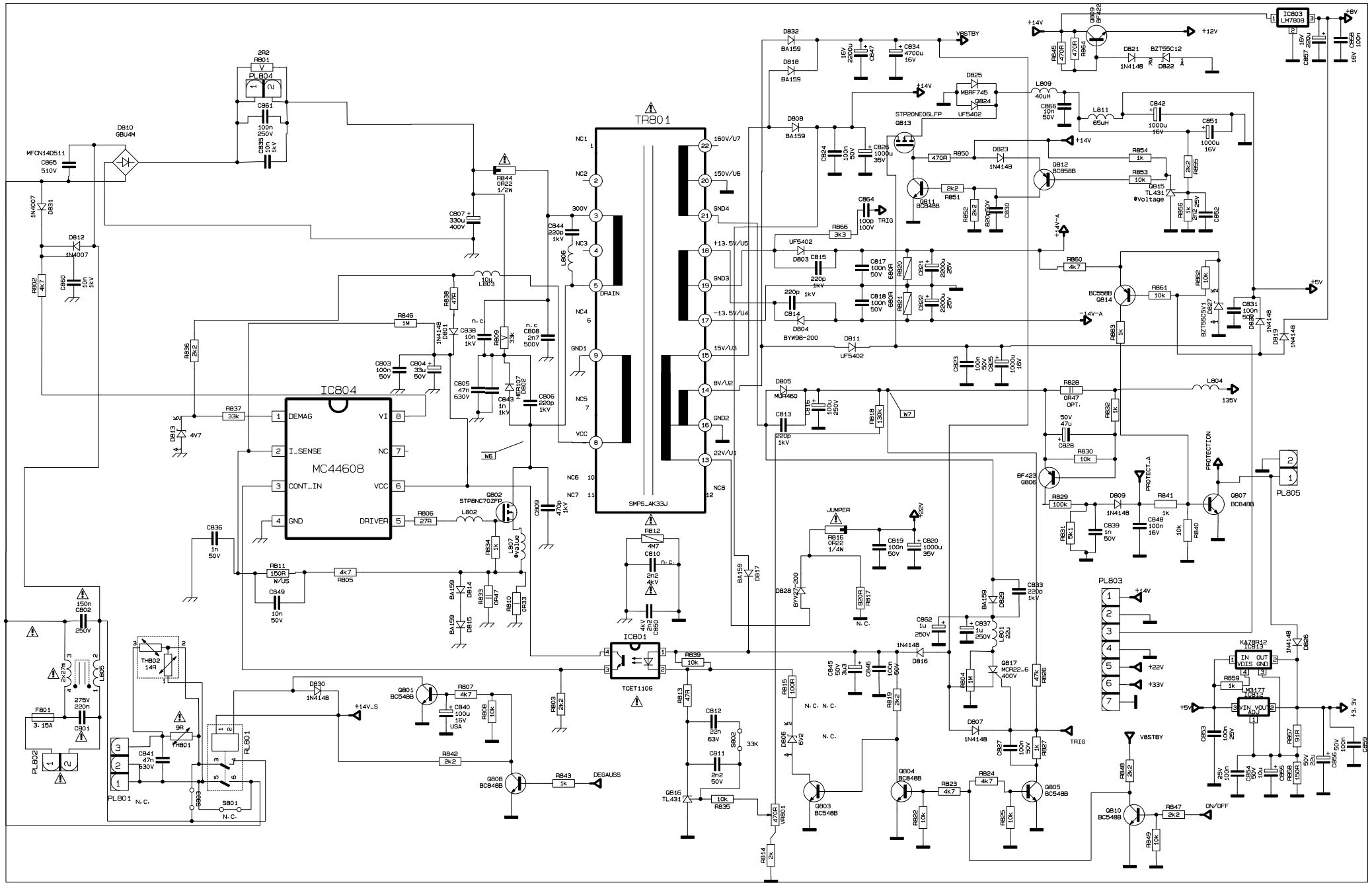
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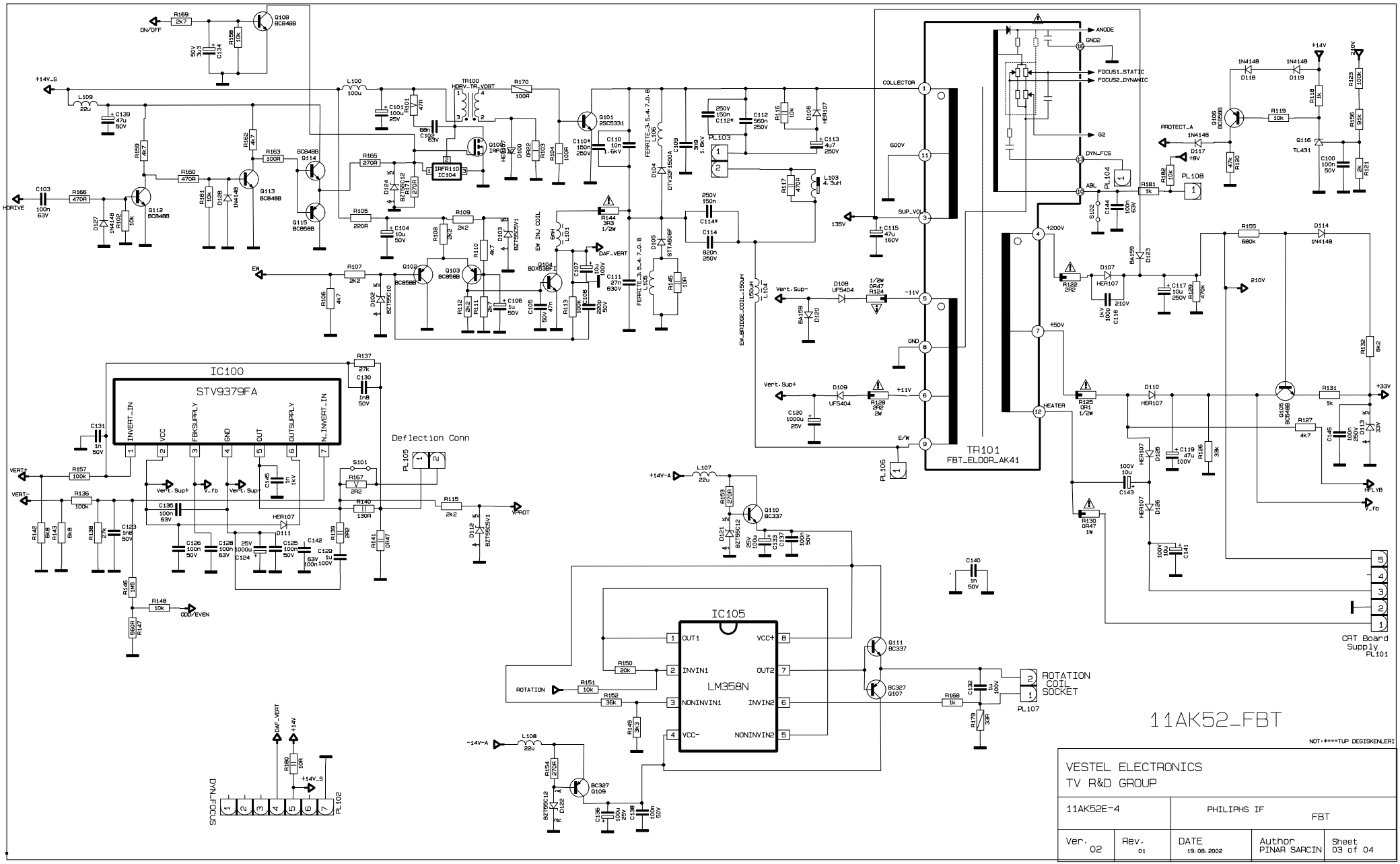
DEMAG
I_SENSE
CONT_IN
GND
VI
NC
VCC
DRIVER
TR801
SMPS_4K33J
DRAIN
160V/U7
150V/U6
+13.5V/U5
-13.5V/U4
15V/U3
8V/U2
22V/U1
IC801
TCET110G
PL801
PL802
PL803
PL804
PL805
IC803
LM7808
IC813
K78R12
IC814
M317T
Q802
STP8NC70ZFP
Q813
STP20NE06LFP
Q812
BC558B
Q814
BC558B
Q815
TL431
Q816
TL431
Q801
BC548B
Q803
BC548B
Q804
BC548B
Q805
BC548B
Q807
BC848B
Q808
BC848B
Q809
BF422
Q806
BF423
Q810
BC548B
Q817
MCR22-6
TH801
TH802
14R
VR801
S801
N.C.
DEGAUSS
ON/OFF
TRIG
VBSTBY
+14V
+12V
+8V
+5V
+3.3V
+22V
+33V
-14V-A
+14V_S
135V
PROTECTION
PROTECT_A
JUMPER
W5
W6
W7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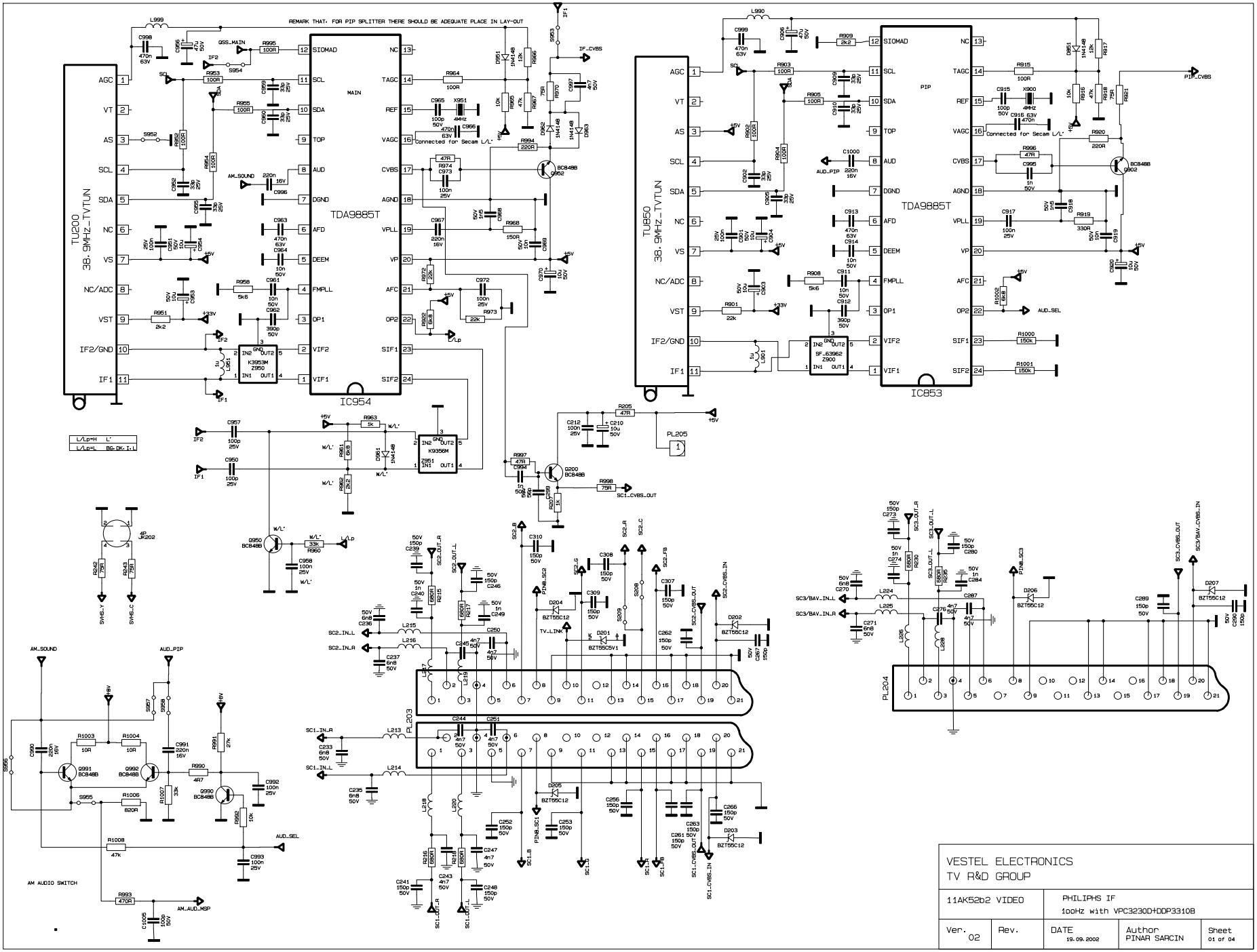
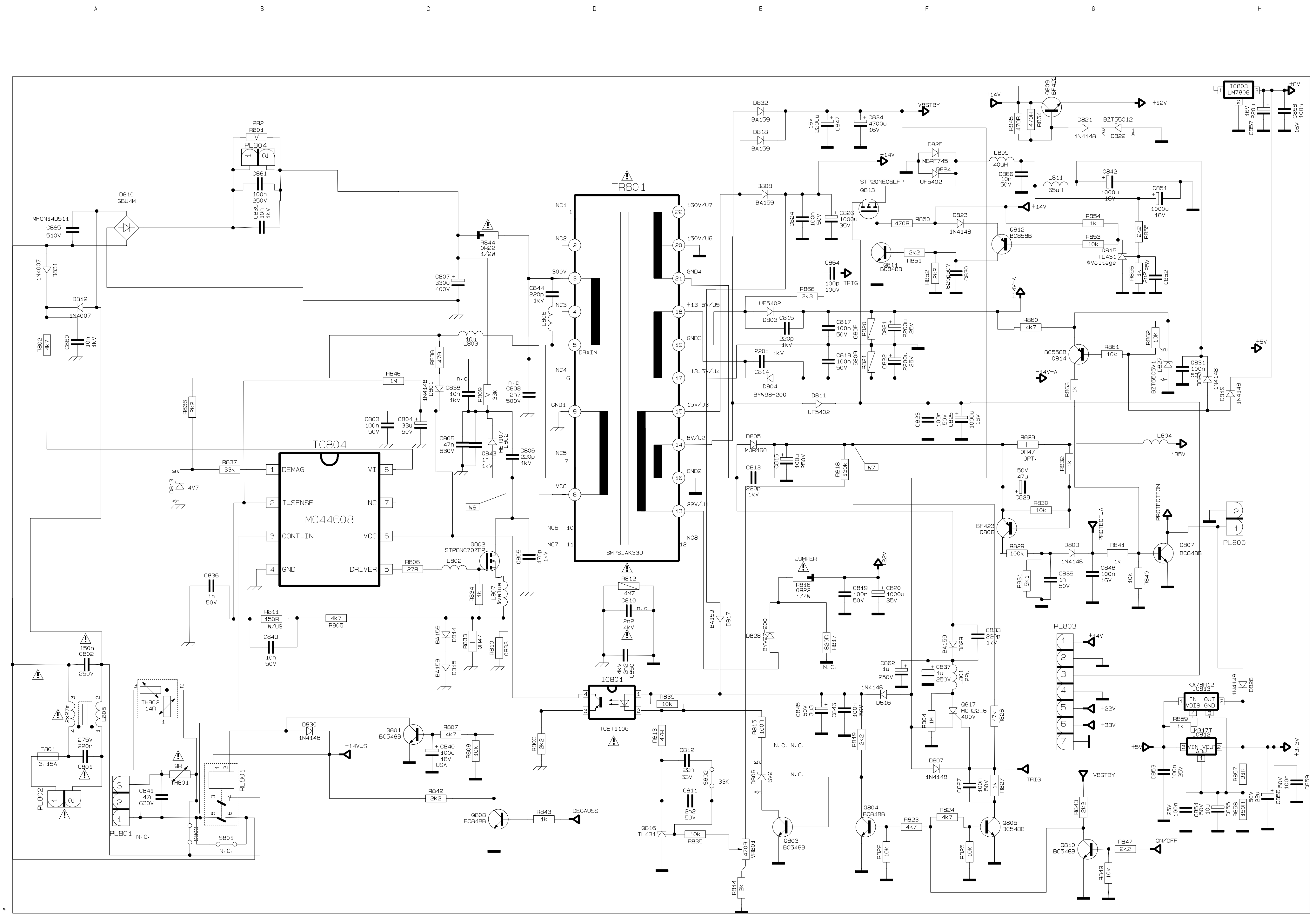
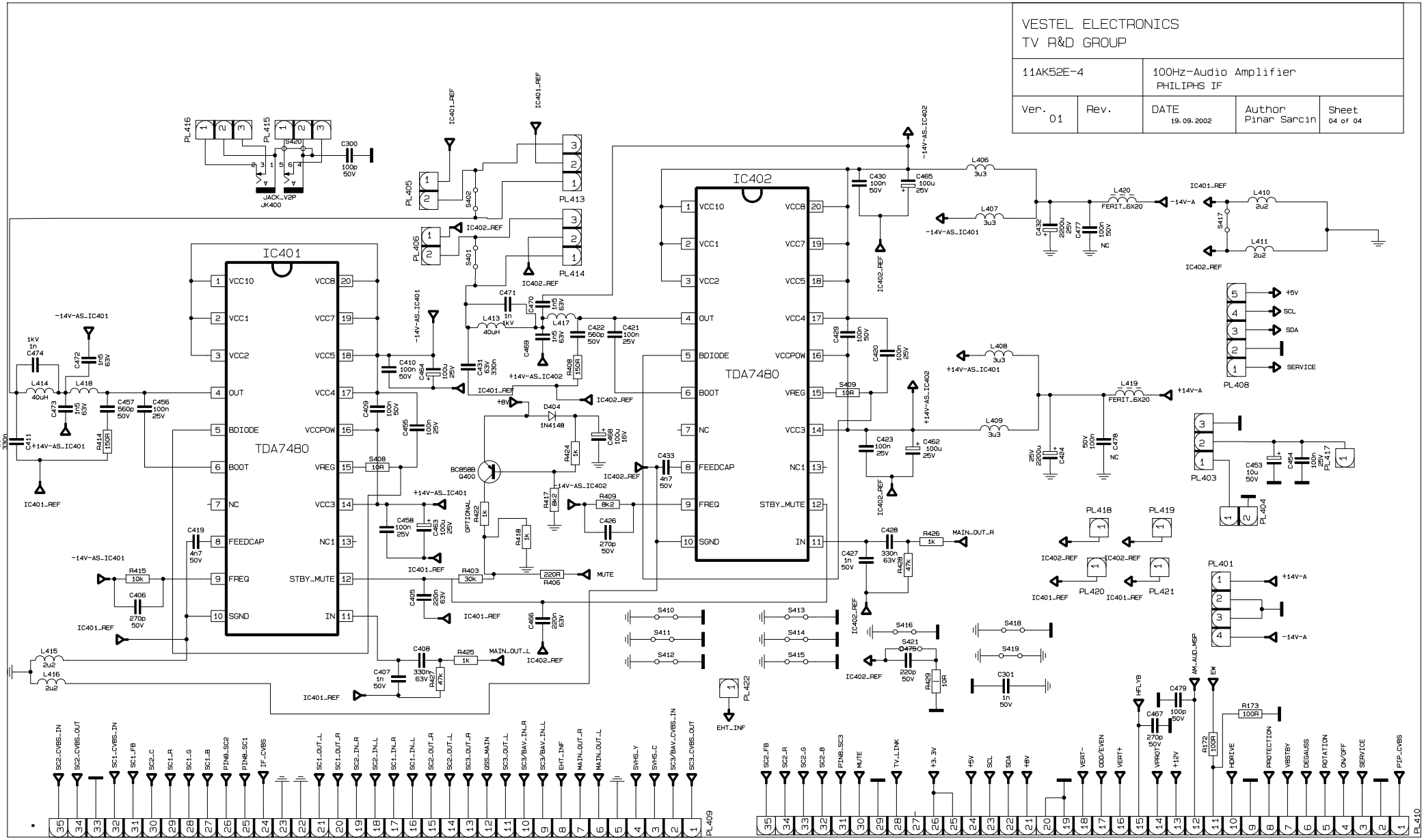
INVERT_IN
VCC
FBKSUPPLY
GND
OUT
OUTSUPPLY
N_INVERT_IN
Deflection Conn
IC105
LM358N
OUT1
INVIN1
NONINVIN1
VCC-
VCC+
OUT2
INVIN2
NONINVIN2
TR101
FBT_ELDOR_AK41
COLLECTOR
600V
135V
SUP_VOL
+200V
+50V
HEATER
-11V
GND
E/W
Vert.Sup+
Vert.Sup-
ANODE
GND2
FOCUS1_STATIC
FOCUS2_DYNAMIC
G2
DYN_FCS
ABL
PROTECT_A
+14V
210V
+33V
HFLYB
V_fb
ROTATION
ROTATION COIL SOCKET
PL107
CRT Board Supply PL101
DYN_FOCUS
PL102
ON/OFF
+14V_S
-14V-A
HDRIVE
EW
DAF_VERT
VERT+
VERT-
VFROT
ODD/EVEN
11AK52_FBT
NOT:*===TUP DEGISKENLERI
VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-4
PHILIPHS IF
FBT
Ver. 02
Rev. 01
DATE 19.08.2002
Author PINAR SARCIN
Sheet 03 of 04

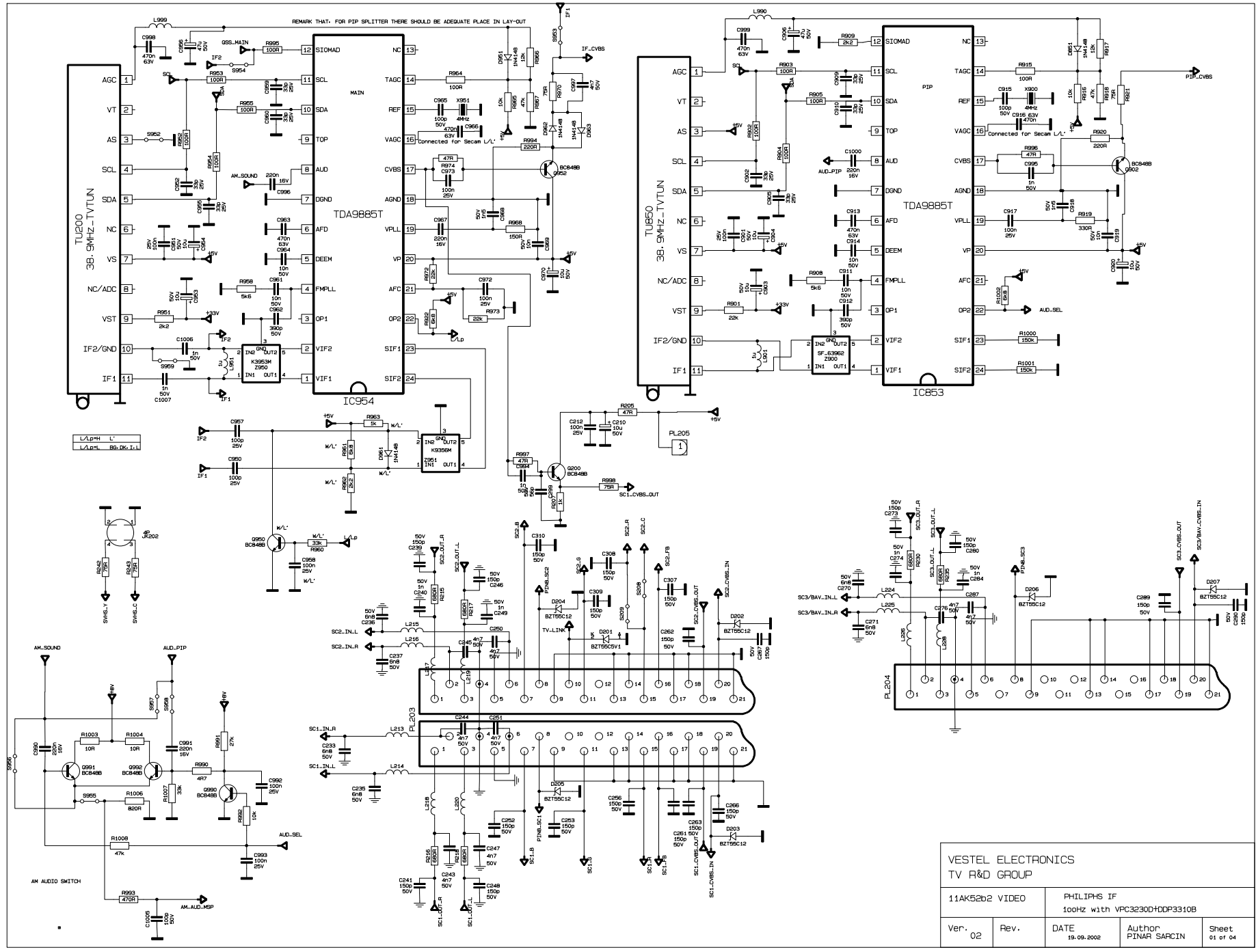

REMARK THAT: FOR PIP SPLITTER THERE SHOULD BE ADEQUATE PLACE IN LAY-OUT
TU200 38.9MHZ_TVTUN
TDA9885T
IC954
TU850 38.9MHZ_TVTUN
TDA9885T
IC853
MAIN
PIP
K3953M 2950
K9356M 7951
SF_63962 2900
IF_CVBS
PIP_CVBS
AUD_SEL
AUD_PIP
AM_SOUND
AM_AUD_MSP
AM AUDIO SWITCH
SC1_CVBS_OUT
SC2_IN_L
SC2_IN_R
SC1_IN_L
SC1_IN_R
SC3/BAV_IN_L
SC3/BAV_IN_R
SC3_CVBS_OUT
SC3/BAV_CVBS_IN
PL203
PL204
PL205
L/Lp=H L'
L/Lp=L BG.DK.I.L
VESTEL ELECTRONICS
TV R&D GROUP
11AK52b2 VIDEO
PHILIPHS IF
100Hz with VPC3230D+DDP3310B
Ver. 02
Rev.
DATE 19.09.2002
Author PINAR SARCIN
Sheet 01 of 04

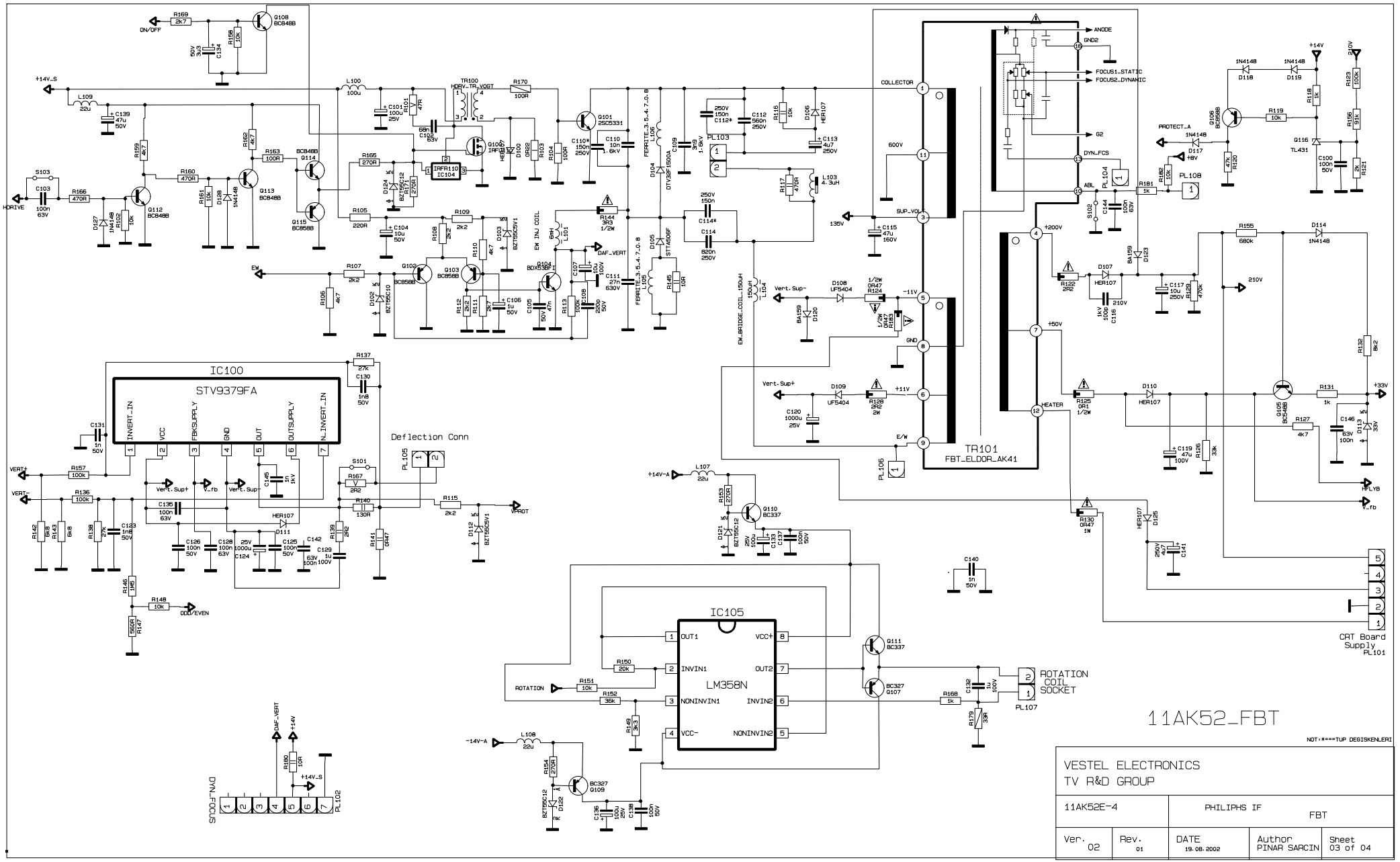
AK52-B4



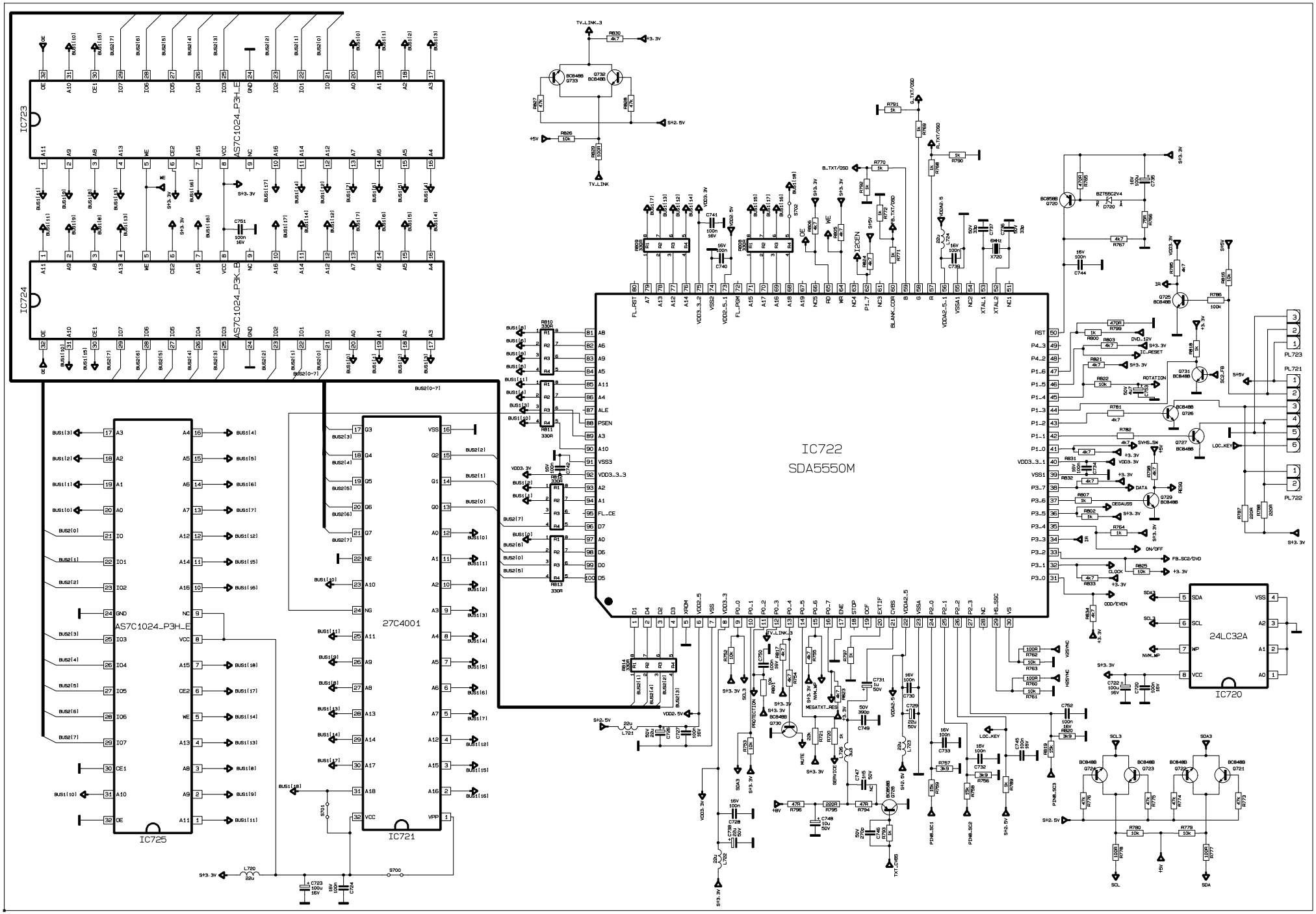
A
B
C
D
E
F
G
H
1
2
3
4
5
TR801
SMPS_AK33J
IC804
MC44608
DEMAG
I_SENSE
CONT_IN
GND
VI
NC
VCC
DRIVER
IC801
TCET110G
IC803
LM7808
IC813
KA78R12
IC812
LM317T
D810
GBU4M
MFCN14D511
C865
510V
PL804
R801
2R2
C861
100n
250V
C835
10n
1kV
D831
1N4007
D812
1N4007
R802
4k7
C860
10n
1kV
C807
330u
400V
R844
0R22
1/2W
C844
220p
1kV
L806
L803
10u
R838
47R
R846
1M
D801
1N4148
C838
10n
1kV
R809
33k
C808
2n7
500V
n.c.
C803
100n
50V
C804
33u
50V
C805
47n
630V
C843
1n
1kV
D802
HER107
C806
220p
1kV
R836
2k2
R837
33k
D813
4V7
W6
Q802
STP8NC70ZFP
R806
27R
L802
C809
470p
1kV
R834
1k
L807
@value
C836
1n
50V
R811
150R
W/US
R805
4k7
C849
10n
50V
D814
BA159
D815
R833
0R47
R810
0R33
R812
4M7
C810
2n2
4kV
C850
NC1
NC2
NC3
NC4
NC5
NC6
NC7
NC8
300V
DRAIN
GND1
VCC
160V/U7
150V/U6
GND4
+13.5V/U5
GND3
-13.5V/U4
15V/U3
8V/U2
GND2
22V/U1
D832
BA159
D818
D808
VBSTBY
C847
2200u
16V
C834
4700u
16V
+14V
D825
MBRF745
D824
UF5402
STP20NE06LFP
Q813
L809
40uH
C866
10n
50V
L811
65uH
C842
1000u
16V
C851
1000u
16V
C824
100n
50V
C826
1000u
35V
R850
470R
D823
1N4148
Q812
BC858B
R854
1k
R853
10k
R855
2k2
Q815
TL431
@Voltage
Q811
BC848B
R851
2k2
R852
2k2
820p50V
C830
R856
1k
C852
2n2 25V
C864
100p
100V
TRIG
R866
3k3
UF5402
D803
C815
220p
1kV
C817
100n
50V
R820
680R
C821
2200u
25V
C818
100n
50V
R821
680R
C822
2200u
25V
C814
D804
BYW98-200
+14V-A
-14V-A
D811
UF5402
C823
100n
50V
C825
1000u
16V
R860
4k7
Q814
BC558B
R861
10k
R862
10k
D827
BZT55C5V1
C831
100n
50V
D819
1N4148
+5V
R863
1k
Q809
BF422
R845
470R
R864
470R
D821
1N4148
BZT55C12
D822
+12V
+8V
C857
220u
16V
C858
100n
16V
D805
MUR460
C816
100u
250V
R818
130k
W7
C813
220p
1kV
R828
0R47
OPT.
L804
135V
R832
1k
C828
47u
50V
R830
10k
Q806
BF423
R829
100k
D809
1N4148
PROTECT_A
R841
1k
PROTECTION
Q807
BC848B
PL805
R831
5k1
C839
1n
50V
C848
100n
16V
R840
10k
JUMPER
R816
0R22
1/4W
+22V
C819
100n
50V
C820
1000u
35V
D828
BYV27-200
R817
820R
N.C.
D817
BA159
PL803
+33V
D829
BA159
C833
220p
1kV
C862
1u
250V
C837
1u
250V
L801
22u
D816
1N4148
C845
3u3
50V
C846
100n
50V
R839
10k
Q817
MCR22_6
400V
R804
1M
R826
47k
D807
1N4148
C827
100n
50V
R827
1k
R815
100R
R819
2k2
D806
6V2
Q803
BC548B
Q804
BC848B
R823
4k7
R824
4k7
Q805
BC548B
R822
10k
R825
10k
R813
47R
C812
22n
63V
C811
2n2
50V
S802
33K
Q816
TL431
R835
10k
VR801
470R
R814
2k
R803
2k2
C802
150n
250V
L805
2x27m
C801
275V
220n
F801
3.15A
PL802
TH802
14R
TH801
9R
RL801
C841
47n
630V
PL801
S803
S801
N.C.
D830
1N4148
+14V_S
Q801
BC548B
R807
4k7
C840
100u
16V
USA
R808
10k
R842
2k2
Q808
BC848B
R843
1k
DEGAUSS
R859
1k
C853
100n
25V
C854
100n
25V
C855
10u
50V
R857
91R
R858
150R
C856
22u
50V
C859
100n
50V
+3.3V
D826
1N4148
Q810
BC548B
R848
2k2
R847
2k2
R849
10k
ON/OFF


VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-4
100Hz-Audio Amplifier
PHILIPHS IF
Ver. 01
Rev.
DATE 19.09.2002
Author Pinar Sarcin
Sheet 04 of 04
IC401
IC402
TDA7480
VCC10
VCC1
VCC2
OUT
BDIODE
BOOT
NC
FEEDCAP
FREQ
SGND
VCC8
VCC7
VCC5
VCC4
VCCPOW
VREG
VCC3
NC1
STBY_MUTE
IN
-14V-AS_IC401
-14V-AS_IC402
+14V-AS_IC401
+14V-AS_IC402
IC401_REF
IC402_REF
+8V
+14V-A
MAIN_OUT_R
MAIN_OUT_L
MUTE
OPTIONAL
BC858B
Q400
D404
1N4148
PL408
PL403
PL404
PL401
PL409
PL410
PL422
EHT_INF
+5V
SCL
SDA
SERVICE
SC2_CVBS_IN
SC2_CVBS_OUT
SC1_CVBS_IN
SC1_FB
SC2_C
SC1_R
SC1_G
SC1_B
PIN8_SC2
PIN8_SC1
IF_CVBS
SC1_OUT_L
SC1_OUT_R
SC2_IN_R
SC2_IN_L
SC1_IN_R
SC1_IN_L
SC2_OUT_R
SC2_OUT_L
SC3_OUT_R
OSS_MAIN
SC3_OUT_L
SC3/BAV_IN_R
SC3/BAV_IN_L
EHT_INF
MAIN_OUT_R
MAIN_OUT_L
SVHS_Y
SVHS_C
SC3/BAV_CVBS_IN
SC3_CVBS_OUT
SC2_FB
SC2_R
SC2_G
SC2_B
PIN8_SC3
MUTE
TV_LINK
+3.3V
+5V
SCL
SDA
+8V
VERT-
ODD/EVEN
VERT+
VPROT
+12V
AM_AUD_MSP
EW
HFLYB
HDRIVE
PROTECTION
VBSTBY
DEGAUSS
ROTATION
ON/OFF
SERVICE
PIP_CVBS


REMARK THAT, FOR PIP SPLITTER THERE SHOULD BE ADEQUATE PLACE IN LAY-OUT
TU200
38.9MHz_TVTUN
TDA9885T
MAIN
IC954
TU850
38.9MHz_TVTUN
TDA9885T
PIP
IC853
AGC
VT
AS
SCL
SDA
NC
VS
NC/ADC
VST
IF2/GND
IF1
SIOMAD
TOP
AUD
DGND
AFD
DEEM
FMPLL
OP1
OP2
VIF2
VIF1
NC
REF
VAGC
CVBS
AGND
VPLL
VP
AFC
SIF1
SIF2
TAGC
IF_CVBS
PIP_CVBS
AUD_PIP
AUD_SEL
AM_SOUND
AUD_PIP
AM AUDIO SWITCH
AM_AUD_MSP
SC1_CVBS_OUT
SC2_CVBS_OUT
SC3/BAV_CVBS_IN
SC1_IN_L
SC1_IN_R
SC2_IN_L
SC2_IN_R
SC3/BAV_IN_L
SC3/BAV_IN_R
PL203
PL204
PL205
VESTEL ELECTRONICS
TV R&D GROUP
11AK52b2 VIDEO
PHILIPHS IF
100Hz with VPC3230D+DDP3310B
Ver. 02
Rev.
DATE 19.09.2002
Author PINAR SARCIN
Sheet 01 of 04


IC100
STV9379FA
INVERT_IN
VCC
FBKSUPPLY
GND
OUT
OUTSUPPLY
N_INVERT_IN
Deflection Conn
IC105
LM358N
OUT1
INVIN1
NONINVIN1
VCC-
VCC+
OUT2
INVIN2
NONINVIN2
TR101
FBT_ELDOR_AK41
COLLECTOR
600V
135V
SUP_VOL
+200V
+50V
HEATER
-11V
GND
E/W
ANODE
GND2
FOCUS1_STATIC
FOCUS2_DYNAMIC
G2
DYN_FCS
ABL
+14V_S
ON/OFF
HDRIVE
EW
DAF_VERT
VERT+
VERT-
VERROT
HFLYB
V_fb
ROTATION
ROTATION COIL SOCKET
PL107
CRT Board Supply PL101
DYN_FOCUS
PROTECT_A
11AK52_FBT
VESTEL ELECTRONICS
TV R&D GROUP
11AK52E-4
PHILIPHS IF
FBT
Ver. 02
Rev. 01
DATE 19.08.2002
Author PINAR SARCIN
Sheet 03 of 04

FB52-A1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SDA5550M
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IC724
IC725
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IC720
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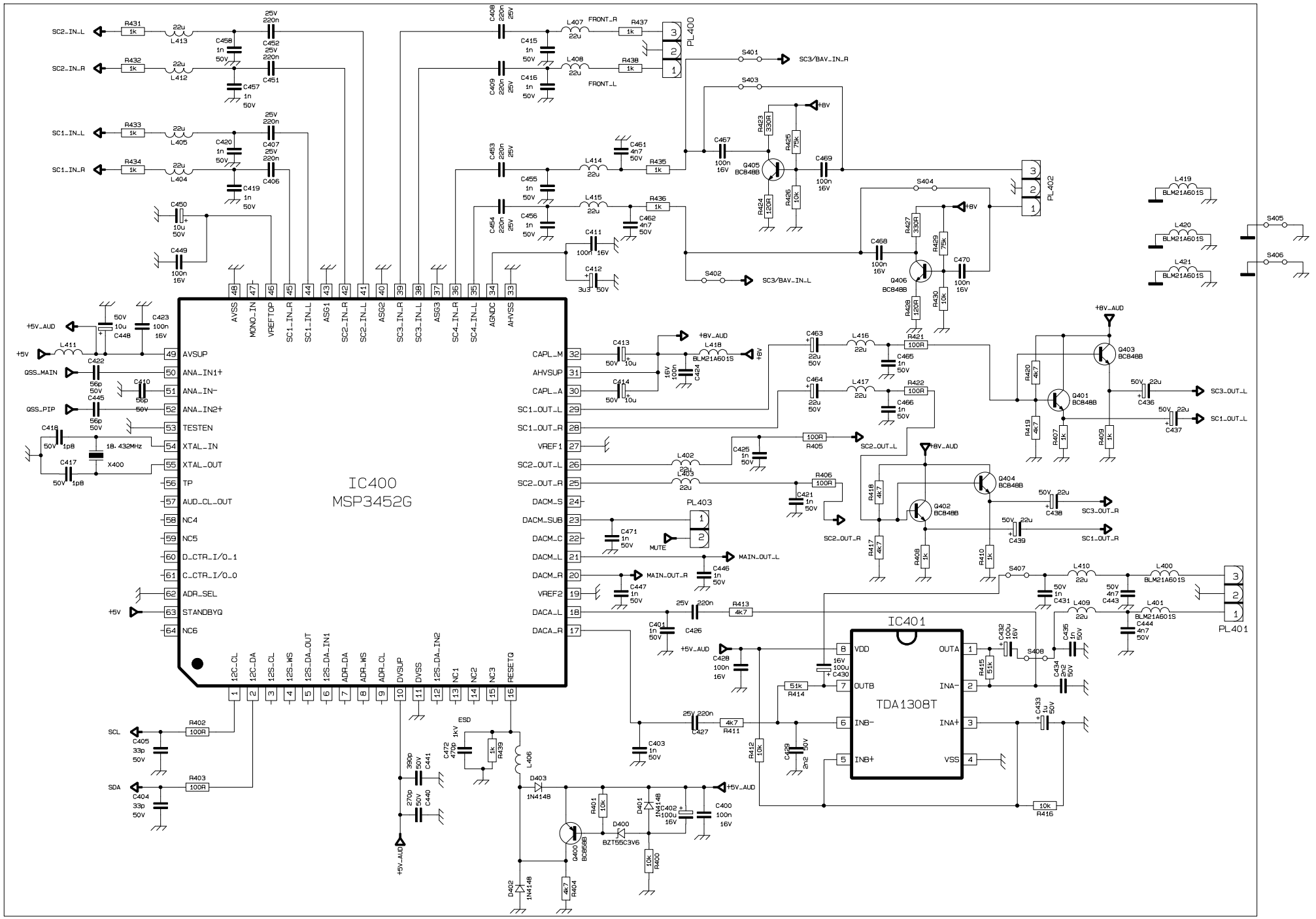
AS7C1024_P3K_E
27C4001
24LC32A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MSP3452G
IC401
TDA1308T
PL400
PL401
PL402
PL403
SC2_IN_L
SC2_IN_R
SC1_IN_L
SC1_IN_R
FRONT_R
FRONT_L
S401
S402
S403
S404
S405
S406
SC3/BAV_IN_R
SC3/BAV_IN_L
+8V
+8V_AUD
+5V_AUD
+5V
QSS_MAIN
QSS_PIP
18.432MHz
X400
MUTE
MAIN_OUT_L
MAIN_OUT_R
SC2_OUT_L
SC2_OUT_R
SC3_OUT_L
SC1_OUT_L
SC3_OUT_R
SC1_OUT_R
SCL
SDA
ESD
AVSS
MONO_IN
VREFTOP
SC1_IN_LR
SC1_IN_LL
ASG1
SC2_IN_R
SC2_IN_L
ASG2
SC3_IN_R
SC3_IN_L
ASG3
SC4_IN_R
SC4_IN_L
AGNDC
AHVSS
AVSUP
ANA_IN1+
ANA_IN-
ANA_IN2+
TESTEN
XTAL_IN
XTAL_OUT
TP
AUD_CL_OUT
NC4
NC5
D_CTR_I/O_1
C_CTR_I/O_0
ADR_SEL
STANDBYQ
NC6
CAPL_M
AHVSUP
CAPL_A
SC1_OUT_L
SC1_OUT_R
VREF1
SC2_OUT_L
SC2_OUT_R
DACM_S
DACM_SUB
DACM_C
DACM_L
DACM_R
VREF2
DACA_L
DACA_R
I2C_CL
I2C_DA
I2S_CL
I2S_WS
I2S_DA_OUT
I2S_DA_IN1
ADR_DA
ADR_WS
ADR_CL
DVSUP
DVSS
I2S_DA_IN2
NC1
NC2
NC3
RESETQ
VDD
OUTA
OUTB
INA-
INB-
INA+
INB+
VSS
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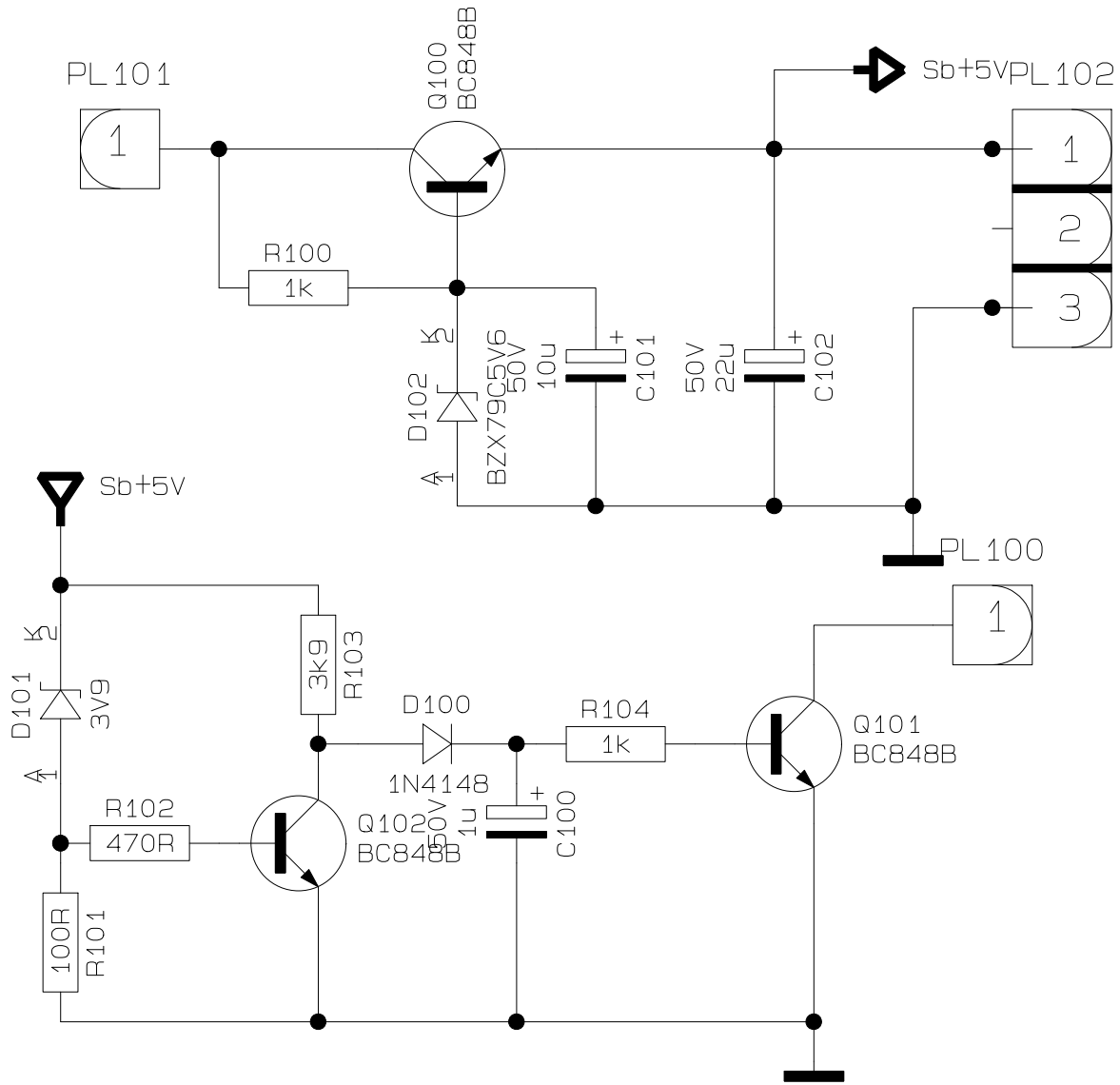
BZT55C3V6
1N4148
BLM21A601S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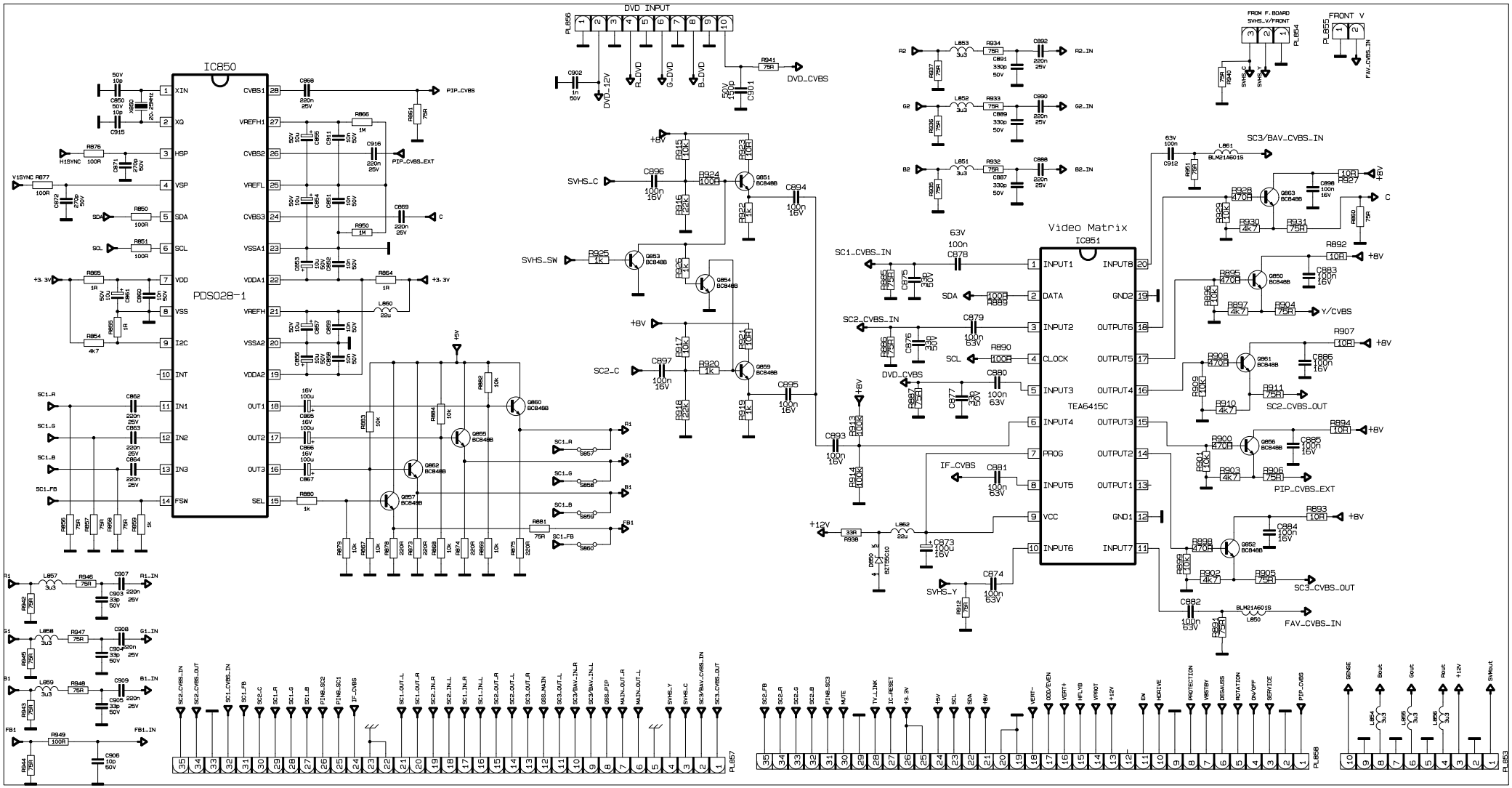
Q100
BC848B
Sb+5V
PL102
1
2
3
R100
1k
K
2
D102
BZX79C5V6
A
1
50V
10u
C101
50V
22u
C102
Sb+5V
PL100
1
K
2
D101
3V9
A
1
3k9
R103
D100
1N4148
R104
1k
Q101
BC848B
R102
470R
Q102
BC848B
50V
1u
C100
100R
R101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PDS028-1
DVD INPUT
PL856
DVD_CVBS
PIP_CVBS
PIP_CVBS_EXT
SVHS_C
SVHS_SW
SC2_C
IC851
Video Matrix
TEA6415C
SC1_CVBS_IN
SC2_CVBS_IN
DVD_CVBS
IF_CVBS
SVHS_Y
SDA
SCL
INPUT1
INPUT2
INPUT3
INPUT4
INPUT5
INPUT6
INPUT7
INPUT8
CLOCK
DATA
PROG
VCC
GND1
GND2
OUTPUT1
OUTPUT2
OUTPUT3
OUTPUT4
OUTPUT5
OUTPUT6
FROM F. BOARD
SVHS_V/FRONT
PL854
FRONT V
PL855
FAV_CVBS_IN
SC3/BAV_CVBS_IN
Y/CVBS
SC2_CVBS_OUT
PIP_CVBS_EXT
SC3_CVBS_OUT
FAV_CVBS_IN
R2_IN
G2_IN
B2_IN
R1_IN
G1_IN
B1_IN
FB1_IN
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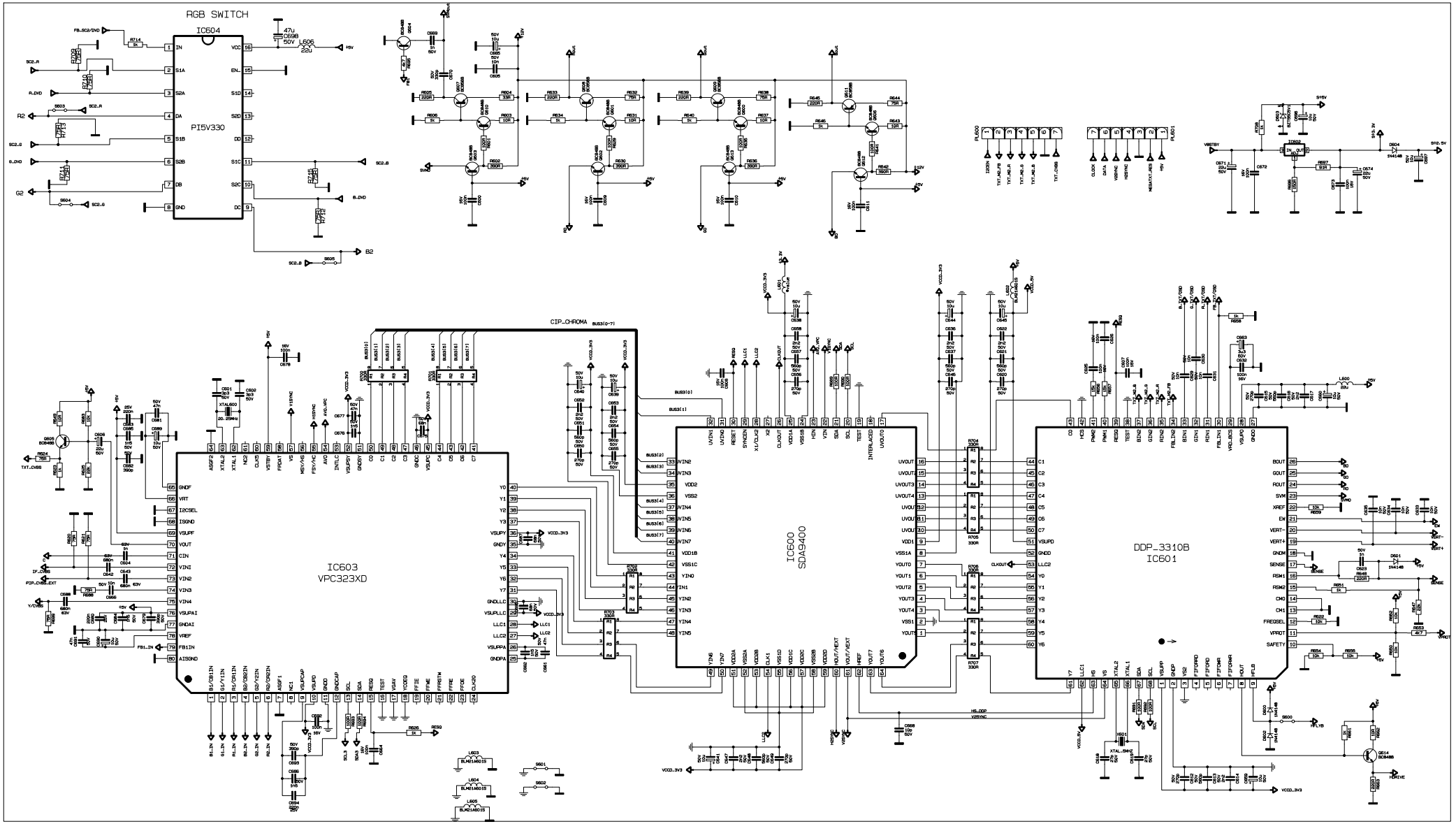
PL858
PL853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PI5V330
IC603
VPC323XD
IC600
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DDP_3310B
IC601
CIP_CHROMA
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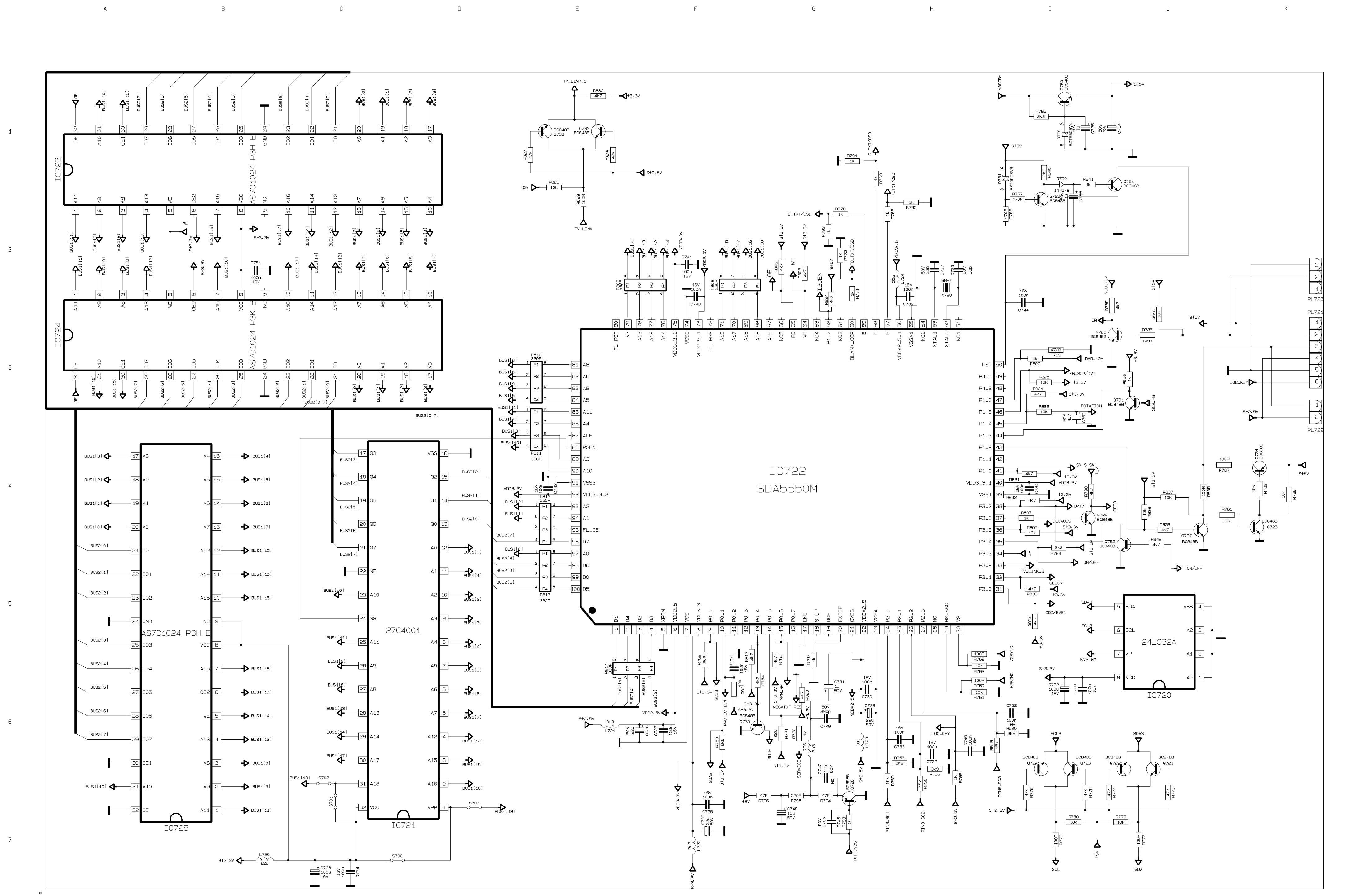
HS_DDP
VSYNC

FB52-A3



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AS7C1024_P3H_E
IC724
AS7C1024_P3K_E
IC722
SDA5550M
IC725
IC721
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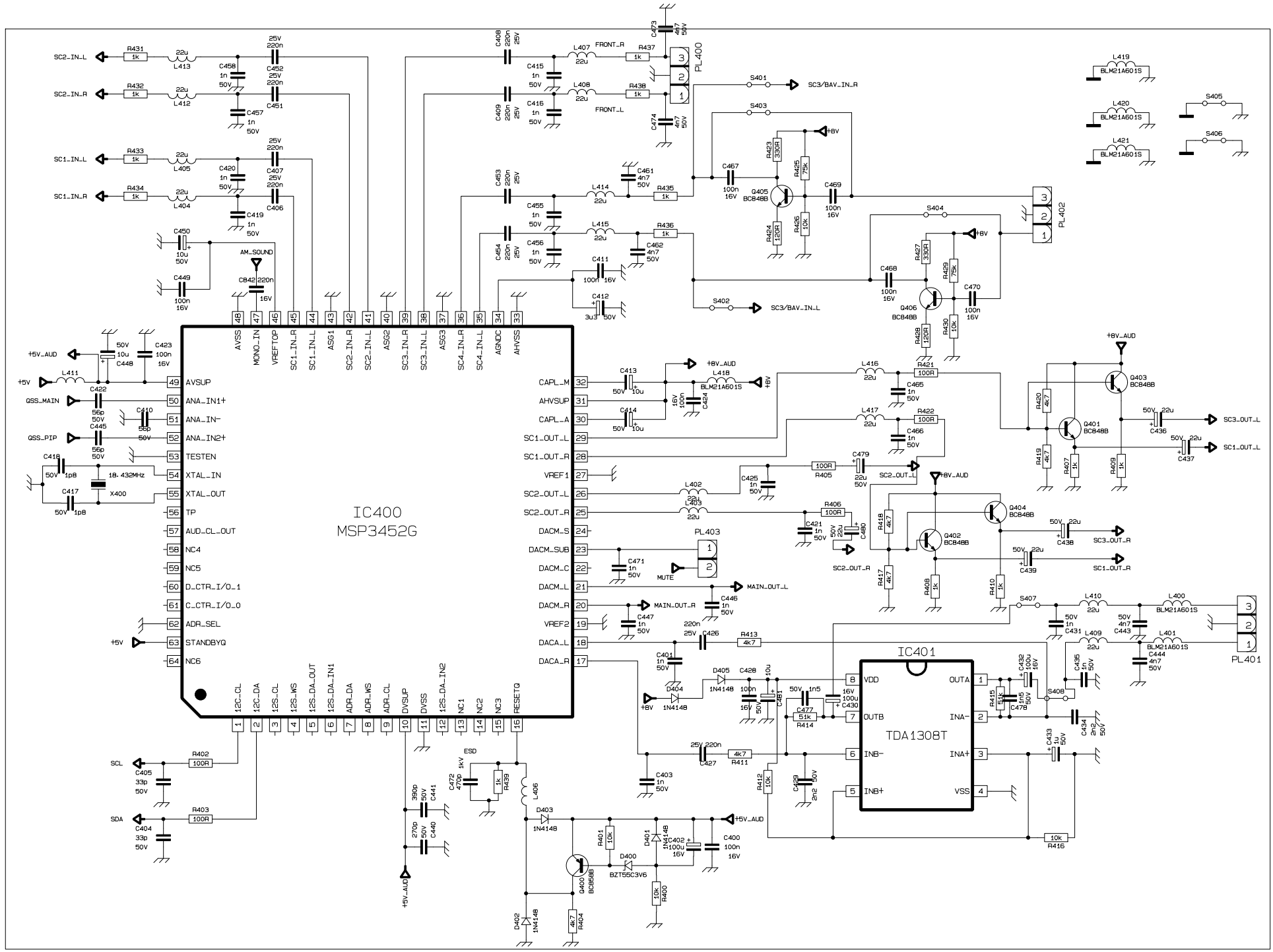
24LC32A
IC720
PL723
PL721
PL722


IC400
MSP3452G
IC401
TDA1308T
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PL401
PL402
PL403
SC2_IN_L
SC2_IN_R
SC1_IN_L
SC1_IN_R
AM_SOUND
FRONT_R
FRONT_L
SC3/BAV_IN_R
SC3/BAV_IN_L
+8V
+8V_AUD
+5V_AUD
+5V
QSS_MAIN
QSS_PIP
18.432MHz
X400
MUTE
MAIN_OUT_L
MAIN_OUT_R
SC2_OUT_L
SC2_OUT_R
SC3_OUT_L
SC1_OUT_L
SC3_OUT_R
SC1_OUT_R
SCL
SDA
ESD
BZT55C3V6
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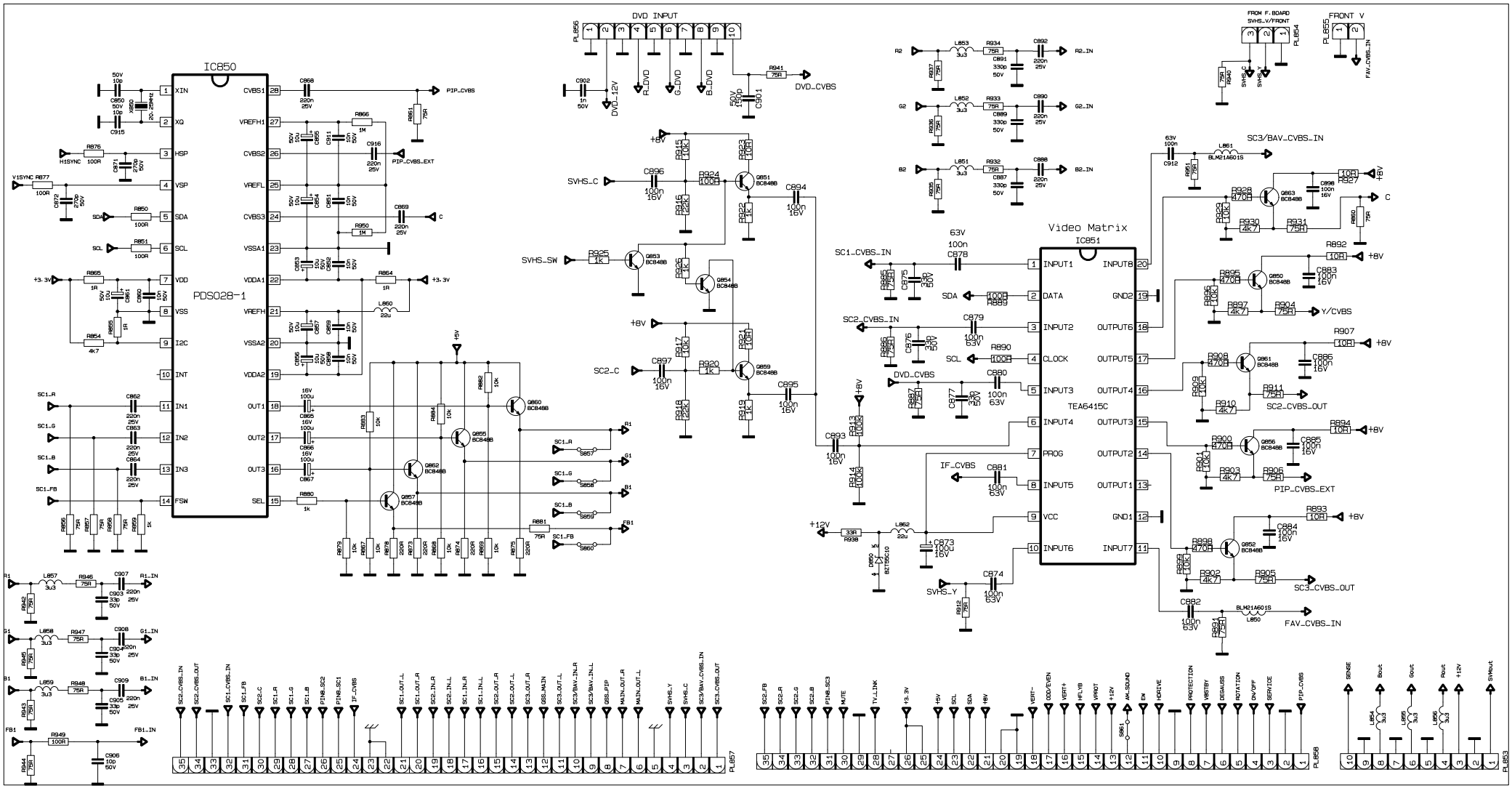
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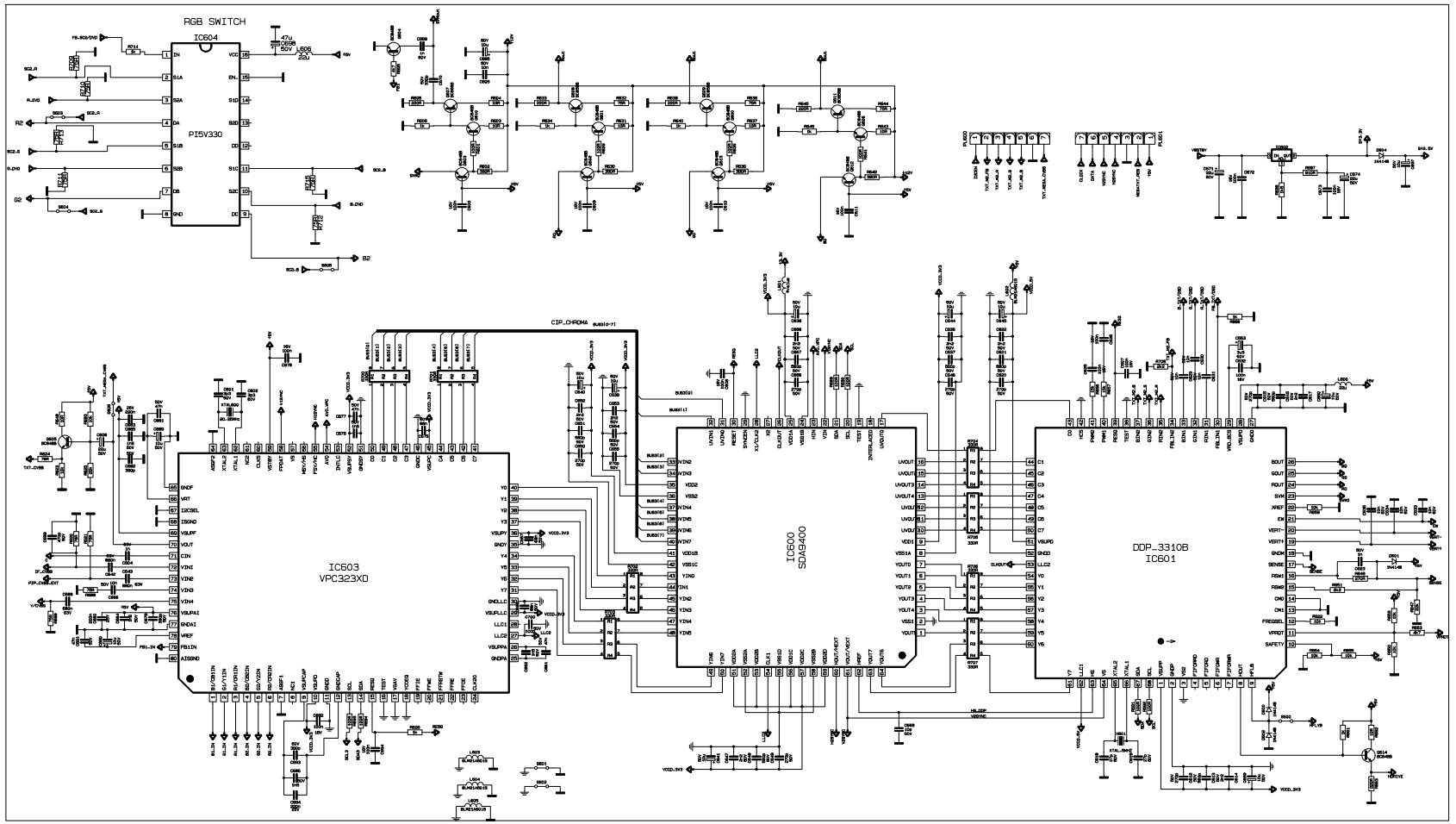
DVD INPUT
DVD_CVBS
PIP_CVBS
PIP_CVBS_EXT
SVHS_C
SVHS_SW
SC2_C
Video Matrix
IC851
TEA6415C
SC1_CVBS_IN
SC2_CVBS_IN
DVD_CVBS
IF_CVBS
SVHS_Y
SC3/BAV_CVBS_IN
Y/CVBS
SC2_CVBS_OUT
PIP_CVBS_EXT
SC3_CVBS_OUT
FAV_CVBS_IN
FRONT V
FROM F.BOARD
SVHS_V/FRONT
R2_IN
G2_IN
B2_IN
R1_IN
G1_IN
B1_IN
FB1_IN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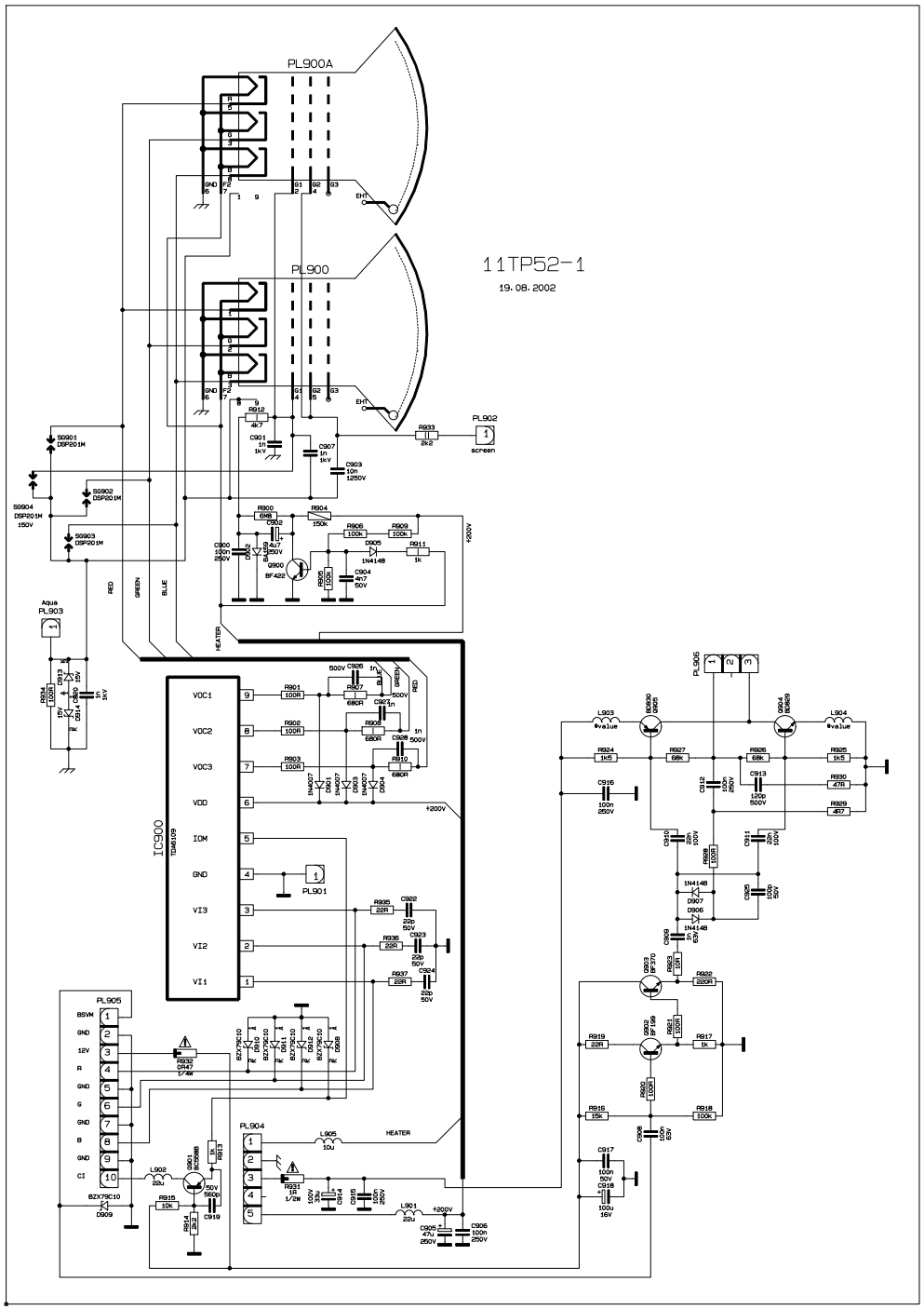
IC603
VPC323XD
IC600
SDA9400
DDP-3310B
IC601

TP52-1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PL900A
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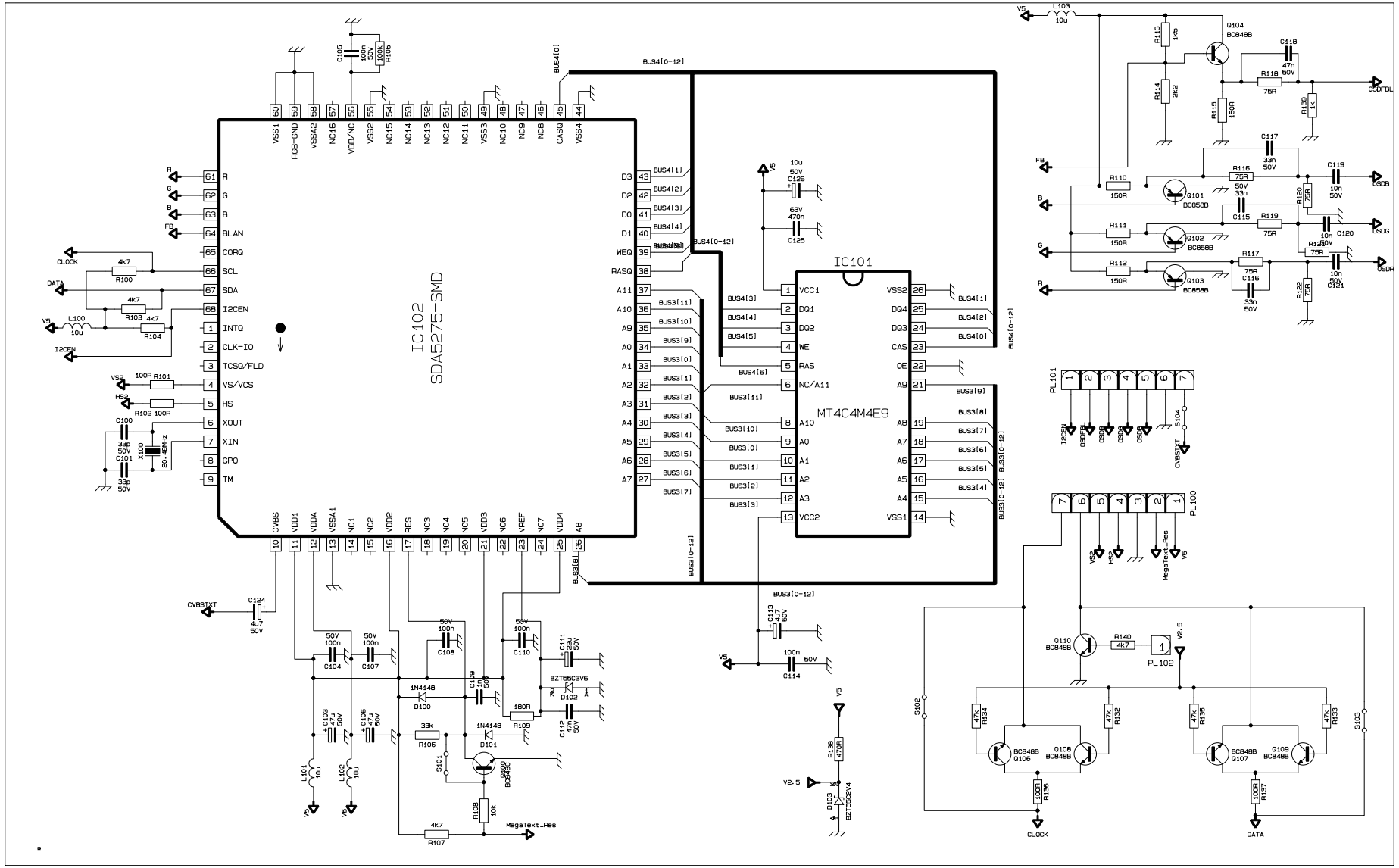
PL902
screen
PL903
Aqua
PL901
PL904
HEATER
PL905
IC900
TDA6109
VOC1
VOC2
VOC3
VDD
IOM
GND
VI3
VI2
VI1
RED
GREEN
BLUE
+200V
BSVM
12V
R
G
B
C1
EHT

TXT52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IC101
MT4C4M4E9
R
G
B
BLAN
CORQ
SCL
SDA
I2CEN
INTQ
CLK-IO
TCSQ/FLD
VS/VCS
HS
XOUT
XIN
GPO
TM
CLOCK
DATA
I2CEN
CVBS
CVBSTXT
MegaText_Res
BUS4[0-12]
BUS3[0-12]
BUS4[0]
BUS3[8]
VS1
RGB-GND
VSSA2
NC16
VBB/NC
VSS2
NC15
NC14
NC13
NC12
NC11
VSS3
NC10
NC9
NCB
CASQ
VSS4
D3
D2
D0
D1
WEQ
RASQ
A11
A10
A9
A0
A1
A2
A3
A4
A5
A6
A7
VCC1
DQ1
DQ2
WE
RAS
NC/A11
A10
A0
A1
A2
A3
VCC2
VSS2
DQ4
DQ3
CAS
OE
A9
A8
A7
A6
A5
A4
VSS1
CVBS
VDD1
VDDA
VSSA1
NC1
NC2
VDD2
RES
NC3
NC4
NC5
VDD3
NC6
VREF
NC7
VDD4
A8
V5
V2.5
VS2
HS2
OSDFBL
OSDB
OSDG
OSDR
S104
PL101
PL100
PL102
S102
S103
L103
10u
Q104
BC848B
Q101
BC858B
Q102
BC858B
Q103
BC858B
Q110
BC848B
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BC848B
Q108
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Q107
BC848B
Q109
BC848B
Q100
BC848B
D100
1N4148
D101
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D102
BZT55C3V6
D103
BZT55C2V4
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R102
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R105
R106
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R108
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R110
R111
R112
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R134
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R136
R137
R138
R139
R140
C100
C101
C102
C103
C104
C105
C106
C107
C108
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C110
C111
C112
C113
C114
C115
C116
C117
C118
C119
C120
C121
C122
C123
C124
C125
C126
L100
L101
L102

Parts List

BILL OF MATERIAL LIST

10020236 2919 TOSHIBA TOSHIBA 29VH27E(AK52)SILVER

NO	COMPONENT	MATERIAL	UNIT	QTY	POSITION NUMBER
1	20048248	SNOW BOX ASSY.2980/81/85/86	PC	1,000	. . . . .
2	20043519	SNOW BOX 2980-81 TOP	PC	1,000	. . . . .
3	60000011	EPS	KG	0,584	. . . . .
4	20043520	SNOW BOX 2980-81 BOTTOM	PC	1,000	. . . . .
5	60000011	EPS	KG	0,584	. . . . .
6	20085283	EXPEND KIT AK28 (2980/81) V.0	PC	1,000	. . . . .
7	20004520	CABLE HOLDER DX15 (I)	PC	1,000	. . . . .
8	60000991	KIRMA - HDPE	KG	0,003	. . . . .
9	20084045	STRAP TIE (L:118)	PC	1,000	. . . . .
10	60000018	COPOLYMER POLYPROPYLENE	KG	0,001	. . . . .
11	20085269	CABLE HOLDER CRT (I) UL94V-0	PC	1,000	. . . . .
12	60000855	KIRMA FR-ABS BLUE CRT	KG	0,002	. . . . .
13	70000331	ADHESIVE TAPE 75MM/660M (4125)	M	2,246	. . . . .
14	20097687	ON/OFF SW ASSY.FTZ(TOSHIBA)28"16:9-32-33	PC	1,000	. . . . .
15	30002174	SWITCH ON/OFF 4A/64A	PC	1,000	. . . . .
16	30002368	CNAS 2P/650 AC MAINS W/C	PC	1,000	. . . . .
17	30016513	POWER CORD 2.2MT JVC (W/FILTER)	PC	1,000	. . . . .
18	40000127	SWITCH INSULATION DOOR LK101	PC	1,000	. . . . .
19	40001898	MACARON (12cm.lsý ile daralan)	PC	1,000	. . . . .
20	20108637	CN.ASY.52A-TRFPFC 1,7 A E54 + CONN 2/35	PC	1,000	. . . . .
21	30018087	CNAS 2P/350 TRFPFC DIS W/C UL1672AWG22	PC	1,000	. . . . .
22	30018270	TRF PFC 1,7A 43MH 170W	PC	1,000	. . . . .
23	35000217	SCREW S C SYF YFMB 3.5*9.5	PC	1,000	. . . . .
24	20110212	SPK.AS.2985/86 W/TWT (AK37)	PC	1,000	. . . . .
25	20110213	SPK.ASSY.2985/86 W/TWT (AK37)(R)	PC	1,000	. . . . .
26	20082948	BRACKET SPEAKER - 128X77 (2985/86) (I)	PC	1,000	. . . . .
27	60000018	COPOLYMER POLYPROPYLENE	KG	0,041	. . . . .
28	60000022	MASTERBATCH (BLACK)	G	0,410	. . . . .
29	30000426	CAP EL 6.8UF 50V M (BPL)	PC	1,000	. . . . .
30	30001947	TWEETER 8R 15W CLOSED	PC	1,000	. . . . .
31	30001950	SPEAKER 8R15W (77*128)	PC	1,000	. . . . .
32	30002238	CABL 2P/200 SPK DIS UL1672AWG24	PC	1,000	. . . . .
33	30013905	CNAS 2P/900 DIS W/BLKC+FER UL2547 AWG24	PC	1,000	. . . . .

34	35000224	SCREW C SK ZN YFMB 2.9*9.5	PC	6,000	.	.	.	.	.
35	40009351	SPONGE -bracketspeaker 128X77 (55-Kg/m3)	PC	1,000	.	.	.	.	.
36	50011720	LABEL HIGH END	PC	1,000	.	.	.	.	.
37	20110214	SPK.ASSY.2985/86 W/TWT (AK37)(L)	PC	1,000	.	.	.	.	.
38	20082948	BRACKET SPEAKER - 128X77 (2985/86) (I)	PC	1,000	.	.	.	.	.
39	60000018	COPOLYMER POLYPROPYLENE	KG	0,041	.	.	.	.	.
40	60000022	MASTERBATCH (BLACK)	G	0,410	.	.	.	.	.
41	30000426	CAP EL 6.8UF 50V M (BPL)	PC	1,000	.	.	.	.	.
42	30001947	TWEETER 8R 15W CLOSED	PC	1,000	.	.	.	.	.
43	30001950	SPEAKER 8R15W (77*128)	PC	1,000	.	.	.	.	.
44	30002238	CABL 2P/200 SPK DIS UL1672AWG24	PC	1,000	.	.	.	.	.
45	30013903	CNAS 2P/900 DIS W/C+FER UL2547 AWG24	PC	1,000	.	.	.	.	.
46	35000224	SCREW C SK ZN YFMB 2.9*9.5	PC	6,000	.	.	.	.	.
47	40009351	SPONGE -bracketspeaker 128X77 (55-Kg/m3)	PC	1,000	.	.	.	.	.
48	50011720	LABEL HIGH END	PC	1,000	.	.	.	.	.
49	20111998	CRT KIT (29") AK52 WO/UL	PC	1,000	.	.	.	.	.
50	30012971	29 DEG COIL&EARTH CB. FLAT W/UL	PC	1,000	.	.	.	.	.
51	30016483	CNAS 2P/600 HRZ DIS W/C UL1672AWG24	PC	1,000	.	.	.	.	.
52	30019083	CNAS 2P/600 SIS W/C+FER UL1007AWG24	PC	1,000	.	.	.	.	.
53	20115572	BUTTON ASSY 2919 (SILVER/P)	PC	1,000	.	.	.	.	.
54	20004339	LENS PRE-AMP (8*14.5)	PC	1,000	.	.	.	.	.
55	60000927	CRYSTAL PS (NATURAL)	G	2,125	.	.	.	.	.
56	20082371	BUTTON FUNCTION 2985/86 5T (SILVER/P)	PC	1,000	.	.	.	.	.
57	20081205	BUTTON FUNCTION 2985/86 5T EKO.GRAY(I)	PC	1,000	.	.	.	.	.
58	60000001	ABS (NATURAL)	KG	0,007	.	.	.	.	.
59	60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,035	.	.	.	.	.
60	60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,002	.	.	.	.	.
61	20111549	LENS LED 2919RF (I) MILKY	PC	1,000	.	.	.	.	.
62	60000008	HIPS (NATURAL)	G	0,004	.	.	.	.	.
63	60000927	CRYSTAL PS (NATURAL)	G	2,000	.	.	.	.	.
64	20111550	LENS 2919RF (I)	PC	1,000	.	.	.	.	.
65	60000015	POLYCARBONATE (PC) (BLACK)	KG	0,008	.	.	.	.	.
66	20118280	BUTTON ON/OFF 2919RF (SILVER/P)	PC	1,000	.	.	.	.	.
67	20111548	BUTTON ON/OFF 2919RF EKO.GRAY(I)	PC	1,000	.	.	.	.	.
68	60000001	ABS (NATURAL)	KG	0,009	.	.	.	.	.
69	60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,045	.	.	.	.	.

70	60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,002	.	.	.	.	.
71	35000013	SPRING ON/OFF SWITCH	PC	1,000	.	.	.	.	.
72	20118276	CONT.PNL.D.2919RF SILVER/P	PC	1,000	.	.	.	.	.
73	20111546	CONTROL PANEL DOOR 2919RF EKO.GRAY (I)	PC	1,000	.	.	.	.	.
74	60000008	HIPS (NATURAL)	KG	0,027	.	.	.	.	.
75	60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,270	.	.	.	.	.
76	60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,002	.	.	.	.	.
77	20119802	MD.ASY.TK133+LD09-2919 5SW AK52	PC	1,000	.	.	.	.	.
78	20119796	MD.ASY.LD09-LED BOARD 2919 AK52	PC	1,000	.	.	.	.	.
80	30001279	LED RED/GREEN LTL293SJ	PC	1,000	D100	.	.	.	.
81	30001454	TR BC548B	PC	1,000	Q101	.	.	.	.
82	30001670	PREAMPLIFIER TFMS5360	PC	1,000	MD101	.	.	.	.
87	30000471	RES CF 1/4W 10K J	PC	1,000	R102	.	.	.	.
88	30000582	RES CF 1/2W 220R J	PC	1,000	R103	.	.	.	.
89	30000723	RES CF 1/4W 47K J	PC	1,000	R101	.	.	.	.
90	30000775	RES CF 1/4W 6.8K J	PC	1,000	R104	.	.	.	.
91	30019935	PCB 11LD09-1	PC	1,000	.	.	.	.	.
92	30000295	CAP CER 100NF 50V Z F	PC	1,000	C101	.	.	.	.
94	30002181	SWITCH TACT	PC	5,000	SW1	SW2	SW3	SW4	SW5
95	30020806	CNAS 2P/600+3P/600+6P/450 FLT W/3C+FER	PC	1,000	PL1-PL101	.	.	.	.
99	30000526	RES CF 1/4W 1.5K J	PC	1,000	R2	.	.	.	.
100	30000622	RES CF 1/4W 270R J	PC	1,000	R5	.	.	.	.
101	30000689	RES CF 1/4W 3.9K J	PC	1,000	R1	.	.	.	.
102	30000712	RES CF 1/4W 470R J	PC	1,000	R4	.	.	.	.
103	30000770	RES CF 1/4W 680R J	PC	1,000	R3	.	.	.	.
104	30019936	PCB 11TK133	PC	1,000	.	.	.	.	.
105	20120112	SCR.AS.2919 W/SB (AK45/52)(V.0)EKOGRAY	PC	1,000	.	.	.	.	.
106	20003605	PIN (CONTROL PANEL DOOR) (I)	PC	1,000	.	.	.	.	.
107	60000001	ABS (NATURAL)	KG	0,001	.	.	.	.	.
108	60000022	MASTERBATCH (BLACK)	G	0,010	.	.	.	.	.
109	20081285	WASHER - bracket speaker - 128x77 (I)	PC	4,000	.	.	.	.	.
110	60000008	HIPS (NATURAL)	KG	0,001	.	.	.	.	.
111	20123717	BACK DOOR AK45/52 EKO.GRAY (I) V.0	PC	1,000	.	.	.	.	.
112	60000009	FR-HIPS NATR.V-0	KG	0,058	.	.	.	.	.
113	60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,580	.	.	.	.	.
114	35000211	SCREW S C ZNSY YSMB 2.9*9.5	PC	4,000	.	.	.	.	.

115	35000212	SCREW S C ZNSY YSMB 2.9*13	PC	3,000	.	.	.	.	.
116	35000224	SCREW C SK ZN YFMB 2.9*9.5	PC	8,000	.	.	.	.	.
117	35000235	SCREW P C ZN AKBR 7*32	PC	4,000	.	.	.	.	.
118	35004572	SCREW P C AgSYF YSB 4x20	PC	12,000	.	.	.	.	.
119	40000026	EJECTOR CLIP-CLAP	PC	1,000	.	.	.	.	.
120	40000082	FOOT RUBBER 8410/11	PC	2,000	.	.	.	.	.
121	20121330	CRT B.ASSY.TP52E-SING.FOC.W/BSVM (AK52)	PC	1,000	.	.	.	.	.
124	30000075	CAP MKT 100NF 250V K (DC)	PC	3,000	C900	C906	C931	.	.
125	30000350	CAP EL 10UF 250V M	PC	1,000	C905	.	.	.	.
126	30000415	CAP EL 4.7UF 250V M	PC	1,000	C902	.	.	.	.
128	30006709	CONN HEADER 5P 2.5MM TOP WHT SD	PC	1,000	PL904	.	.	.	.
129	30006841	CAP MKP 1.2NF 1.6KV J	PC	1,000	C903	.	.	.	.
130	30012894	CONN HEADER 10P 2.54MM TOP WHT	PC	1,000	PL905	.	.	.	.
131	30019071	CABL 1P/550 DIS UL1672AWG22	PC	1,000	PL901	.	.	.	.
132	35000135	TEST PIN 1.1MM	PC	1,000	PL902	.	.	.	.
134	20056767	HE.ASY.28-BSVM BD139 (33/52/45/38)	PC	1,000	Q904	.	.	.	.
135	30003768	TR BD139	PC	1,000	.	.	.	.	.
136	35000142	HEATSINK 15AK14/15 15/TP ORTAK	PC	1,000	.	.	.	.	.
137	35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
138	35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.
139	35000182	SCREW C ZN YSMB M3*10	PC	1,000	.	.	.	.	.
140	20056768	HE.ASY.28-BSVM BD140 (36MOB/33/52/45/38)	PC	1,000	Q905	.	.	.	.
141	30013531	TR BD140	PC	1,000	.	.	.	.	.
142	35000142	HEATSINK 15AK14/15 15/TP ORTAK	PC	1,000	.	.	.	.	.
143	35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
144	35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.
145	35000182	SCREW C ZN YSMB M3*10	PC	1,000	.	.	.	.	.
146	30000075	CAP MKT 100NF 250V K (DC)	PC	2,000	C912	C915	.	.	.
147	30000388	CAP EL 33UF 160V M	PC	1,000	C914	.	.	.	.
148	30001194	RES MO 2W 680R J	PC	1,000	R931	.	.	.	.
149	30018976	CONN HEADER 3P 2.5MM TOP BSVM	PC	1,000	PL906	.	.	.	.
151	20103005	HE.ASY.52-CRT BOARD (AK52)	PC	1,000	IC900	.	.	.	.
152	30018768	IC TDA6109	PC	1,000	IC900	.	.	.	.
153	35000131	HEATSINK 11TP18 RGB	PC	1,000	.	.	.	.	.
154	35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
155	35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.

156	35000180	SCREW C ZN YSMB M3*6	PC	1,000	.	.	.	.	.
157	30001855	SOCKET CRT NARROWNECK W/GND	PC	1,000	PL900A	.	.	.	.
164	30000452	RES CF 1/4W 10R J	PC	2,000	R923	R929	.	.	.
165	30000459	RES CF 1/4W 100R J	PC	3,000	R920	R921	R928	.	.
166	30000466	RES CF 1/4W 1K J	PC	3,000	R917	R924	R925	.	.
167	30000477	RES CF 1/4W 100K J	PC	1,000	R918	.	.	.	.
168	30000531	RES CF 1/4W 15K J	PC	1,000	R916	.	.	.	.
169	30000580	RES CF 1/4W 22R J	PC	1,000	R919	.	.	.	.
170	30000584	RES CF 1/4W 220R G	PC	1,000	R922	.	.	.	.
171	30000707	RES CF 1/4W 47R G	PC	1,000	R930	.	.	.	.
172	30000779	RES CF 1/4W 68K J	PC	2,000	R926	R927	.	.	.
173	30001284	DIODE 1N4148 0.15A/100V 0.5A	PC	2,000	D906	D907	.	.	.
174	30000071	CAP MKT 10NF 63V J	PC	1,000	C909	.	.	.	.
175	30000074	CAP MKT 100NF 63V J	PC	1,000	C908	.	.	.	.
176	30000090	CAP MKT 22NF 100V J	PC	2,000	C910	C911	.	.	.
177	30000191	CAP CER 100PF 50V J SL	PC	1,000	C925	.	.	.	.
178	30000198	CAP CER 120PF 500V J SL	PC	1,000	C913	.	.	.	.
179	30000769	RES CF 1/2W 680R J	PC	1,000	R938	.	.	.	.
180	30017862	TR BF370	PC	1,000	Q903	.	.	.	.
181	30017863	TR BF199	PC	1,000	Q902	.	.	.	.
186	20124924	CRT B.ASSY.TP52E-PER COMMON AK52(32"SF)	PC	1,000	.	.	.	.	.
187	35000176	EYELET BR 2*3MM	PC	2,000	PL902	PL903	.	.	.
189	30000428	SPARK GAP 300V	PC	4,000	SG901	SG902	SG904	SG903	.
190	30000459	RES CF 1/4W 100R J	PC	2,000	R934	R912	.	.	.
191	30000466	RES CF 1/4W 1K J	PC	1,000	R911	.	.	.	.
192	30000477	RES CF 1/4W 100K J	PC	3,000	R905	R906	R909	.	.
193	30000492	RES CF 1/4W 120R J	PC	1,000	R913	.	.	.	.
194	30000535	RES CF 1/2W 150K J	PC	1,000	R904	.	.	.	.
195	30000583	RES CF 1/4W 220R J	PC	3,000	R901	R902	R903	.	.
196	30000612	RES CF 1/4W 2.4K J	PC	1,000	R914	.	.	.	.
197	30000788	RES CF 1/4W 6.8M J	PC	1,000	R900	.	.	.	.
198	30000973	RES MF 1/4W 3.9K F	PC	1,000	R915	.	.	.	.
199	30001245	RES FUSE 1/4W 0.47R J	PC	1,000	R932	.	.	.	.
200	30001284	DIODE 1N4148 0.15A/100V 0.5A	PC	2,000	D905	L902-Y	.	.	.
201	30001318	DIODE BA159 1A/800V 20A	PC	4,000	D902	D901	D903	D904	.
203	30020603	RES CC 1W 1K K	PC	3,000	R907	R908	R910	.	.

204	30021483	RES CC 1W 2.2K K	PC	1,000	R933	.	.	.	.
205	30021532	SPARK GAP 1500V	PC	1,000	SG905	.	.	.	.
206	30021902	PCB 11TP52E	PC	1,000	.	.	.	.	.
207	30000205	CAP CER 150PF 50V J SL	PC	1,000	C919	.	.	.	.
208	30000295	CAP CER 100NF 50V Z F	PC	1,000	C917	.	.	.	.
209	30000330	CAP CER 4.7NF 50V K B	PC	1,000	C904	.	.	.	.
210	30000352	CAP EL 100UF 16V M	PC	1,000	C918	.	.	.	.
211	30001427	TR BF422	PC	1,000	Q900	.	.	.	.
212	30001455	TR BC558B	PC	1,000	Q901	.	.	.	.
213	20121338	DOOR FIXED 2919RF SILVER (P)	PC	1,000	.	.	.	.	.
214	20121337	DOOR FIXED 2919RF EKO.GRAY (I)	PC	1,000	.	.	.	.	.
215	60000008	HIPS (NATURAL)	KG	0,033	.	.	.	.	.
216	60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,330	.	.	.	.	.
217	60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,002	.	.	.	.	.
218	20121351	BACK C.2980/81-85/86 SILV(P)UL)WO/EX.SP#	PC	1,000	.	.	.	.	.
219	20121352	BACK C.2980/81-85/86EKO.GRAY(I)WO/EX.S #	PC	1,000	.	.	.	.	.
220	60000009	FR-HIPS NATR.V-0	KG	3,491	.	.	.	.	.
221	60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	18,000	.	.	.	.	.
222	60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,080	.	.	.	.	.
223	20125753	CHS.ASSY.52B-43923141121213E	PC	1,000	.	.	.	.	.
227	30013163	FILTER SAW K9356	PC	1,000	Z951	.	.	.	.
228	30014261	FILTER SAW K3958M	PC	1,000	Z950	.	.	.	.
230	30001270	PTC 9 OHM	PC	1,000	TH801	.	.	.	.
231	30002183	RELAY MON15 KI-S-212M	PC	1,000	RL801	.	.	.	.
233	30001665	IC LM358N	PC	1,000	IC105	.	.	.	.
234	30001829	CONN HEADER 2P 2.5MM TOP WHT SD	PC	1,000	PL107	.	.	.	.
236	30009366	DIODE UF5402 3A/200V 150A	PC	1,000	D811	.	.	.	.
238	30009637	TUNER WSP (PLL) 38.9 MK2 - BATCH	PC	1,000	TU200	.	.	.	.
240	30015053	SOCKET SCART NEW TYPE	PC	1,000	PL204	.	.	.	.
242	20000848	FUSE ASSY.TK79-A (2.5A)	PC	1,000	F801	.	.	.	.
243	30001731	FUSE 2.5A 250V 5*20MM	PC	1,000	.	.	.	.	.
244	35000136	FUSE HOLDER TK79-A (GRAY)	PC	1,000	.	.	.	.	.
246	20070614	HE.ASY.37-SMPS 170-270V	PC	1,000	Q802	.	.	.	.
247	30001386	TR MTP6N60E (PLASTIC)	PC	1,000	.	.	.	.	.
248	35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
249	35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.

250	35000181	SCREW C ZN YSMB M3*8	PC	1,000	.	.	.	.	.
251	35006413	HEATSINK SMPS AK45	PC	1,000	.	.	.	.	.
252	70000074	SILICON (GRES)	KG	0,010	.	.	.	.	.
253	20085393	HE.ASY.33-DIODE UF5407 (33/52)	PC	1,000	D805	.	.	.	.
254	30001964	FERRITE BAR 5*8	PC	1,000	.	.	.	.	.
255	30007681	DIODE UF5407 3A/800V 150A	PC	1,000	.	.	.	.	.
256	35004134	HEATSINK DIODE (2)	PC	1,000	.	.	.	.	.
257	20102765	HE.ASY.52A-SMPS REG2	PC	1,000	.	.	.	.	.
258	30001500	IC LM7808	PC	1,000	IC803	.	.	.	.
259	35000142	HEATSINK 15AK14/15 15/TP ORTAK	PC	1,000	.	.	.	.	.
260	35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
261	35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.
262	35000180	SCREW C ZN YSMB M3*6	PC	1,000	.	.	.	.	.
263	20102766	HE.ASY.52A-VERTICAL	PC	1,000	.	.	.	.	.
264	30007799	TR BDX53BFI	PC	1,000	Q104	.	.	.	.
265	30013687	IC TDA8177F	PC	1,000	IC100	.	.	.	.
266	35000158	NUT C ZN BOTTOM M3	PC	2,000	.	.	.	.	.
267	35000166	KNURL WASHER C NI 3.2*6.5*0.6	PC	2,000	.	.	.	.	.
268	35000181	SCREW C ZN YSMB M3*8	PC	2,000	.	.	.	.	.
269	35005353	HEATSINK VERTICAL AK52	PC	1,000	.	.	.	.	.
270	70000074	SILICON (GRES)	G	0,010	.	.	.	.	.
271	20102767	HE.ASY.52A-HORIZANTAL	PC	1,000	.	.	.	.	.
272	30007678	DIODE GUC DTV32F1500A 6A/1500V 100A	PC	1,000	D104	.	.	.	.
273	30007768	DIODE STTA506F 5A/600V 55A	PC	1,000	D105	.	.	.	.
274	30016686	TR 2SC5302	PC	1,000	Q101	.	.	.	.
275	35000158	NUT C ZN BOTTOM M3	PC	3,000	.	.	.	.	.
276	35000166	KNURL WASHER C NI 3.2*6.5*0.6	PC	3,000	.	.	.	.	.
277	35000181	SCREW C ZN YSMB M3*8	PC	2,000	.	.	.	.	.
278	35000182	SCREW C ZN YSMB M3*10	PC	1,000	.	.	.	.	.
279	35005354	HEATSINK HORIZONTAL AK52	PC	1,000	.	.	.	.	.
280	20106073	HE.ASY.17PW02-STEPDOWN	PC	1,000	Q813	.	.	.	.
281	30007802	TR STP20N06LFP	PC	1,000	.	.	.	.	.
282	35000142	HEATSINK 15AK14/15 15/TP ORTAK	PC	1,000	.	.	.	.	.
283	35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
284	35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.
285	35000183	SCREW C ZN YSMB M3*12	PC	1,000	.	.	.	.	.

286	20108354	DIODE BRIDGE GBU4M 4A/1000V 150A(FORMLU)	PC	1,000	D810	.	.	.	.
287	30007758	DIODE BRIDGE GBU4M 4A/1000V 150A	PC	1,000	.	.	.	.	.
288	20108636	HE.ASY.52A-LM1086 3.3 1.5A 15AK14/15 ORT	PC	1,000	.	.	.	.	.
289	30019617	IC LDO LM1086 3.3V/1.5A TO220	PC	1,000	IC812	.	.	.	.
290	35000142	HEATSINK 15AK14/15 15/TP ORTAK	PC	1,000	.	.	.	.	.
291	35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
292	35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.
293	35000183	SCREW C ZN YSMB M3*12	PC	1,000	.	.	.	.	.
294	30000094	CAP MKT 220NF 275V M AC	PC	1,000	C801	.	.	.	.
295	30000161	CAP MKP 47NF 630V J	PC	1,000	C805	.	.	.	.
296	30000350	CAP EL 10UF 250V M	PC	1,000	C117	.	.	.	.
297	30000360	CAP EL 1000UF 25V M	PC	6,000	C120	C124	C826	C825	C851
.	.	.	.	.	C842	.	.	.	.
298	30000383	CAP EL 2200UF 25V M	PC	4,000	C821	C822	C424	C432	.
299	30000402	CAP EL 47UF 100V M	PC	1,000	C119	.	.	.	.
300	30000411	CAP EL 4700UF 16V M	PC	1,000	C834	.	.	.	.
301	30000415	CAP EL 4.7UF 250V M	PC	1,000	C113	.	.	.	.
302	30000421	CAP EL 220UF 400V M (FOR 28")	PC	1,000	C807	.	.	.	.
303	30000440	CAP CER 2.2NF 4KV M	PC	2,000	C810	C850	.	.	.
305	30001077	RES MO 2W 10R J	PC	2,000	R145	R180	.	.	.
306	30001079	RES MO 1W 100R J	PC	1,000	R104	.	.	.	.
307	30001086	RES MO 2W 10K J	PC	1,000	R116	.	.	.	.
308	30001168	RES MO 2W 470RJ	PC	1,000	R117	.	.	.	.
309	30001174	RES MO 2W 0.47R J	PC	2,000	R833	R828	.	.	.
310	30001224	RES FUSE 1/2W 0.22R J	PC	1,000	R844	.	.	.	.
311	30001288	DIODE BYV27-200 2A/200V 50A	PC	1,000	D808	.	.	.	.
312	30001299	DIODE UF5404 3A/400V 150A	PC	2,000	D108	D109	.	.	.
313	30001762	CONN HEADER 2P 2.5MM(9.7MM) TOP	PC	1,000	PL405	.	.	.	.
314	30001764	CONN HEADER 2P 2.5MM(9.7MM) TOP BLACK	PC	1,000	PL406	.	.	.	.
315	30001783	CONN HEADER 5P 2.5MM TOP BD	PC	1,000	PL408	.	.	.	.
316	30001792	CONN HEADER 2P 7.5MM TOP WHT	PC	2,000	PL103	PL802	.	.	.
317	30001795	CONN HEADER 3P 5/7.5MM TOP WHT	PC	1,000	PL801	.	.	.	.
318	30001829	CONN HEADER 2P 2.5MM TOP WHT SD	PC	1,000	PL105	.	.	.	.
319	30001960	FERIT BAR 6*20MM AK16	PC	2,000	L419	L420	.	.	.
320	30002851	XTAL 4MHZ L.C=30PF	PC	1,000	X951	.	.	.	.
321	30006709	CONN HEADER 5P 2.5MM TOP WHT SD	PC	1,000	PL101	.	.	.	.

322	30006743	TRF. HORIZONTAL DRIVER 15AK17-17"	PC	1,000	TR100	.	.	.	.
323	30006909	CAP EL 100UF M 250V	PC	2,000	C816	C115	.	.	.
324	30007757	COIL INJECTION EW 6MH AK28	PC	1,000	L101	.	.	.	.
325	30007771	FIXED COIL 100UH	PC	1,000	L100	.	.	.	.
326	30009366	DIODE UF5402 3A/200V 150A	PC	3,000	D803	D804	D824	.	.
327	30009833	CABL 1P/100 SIS	PC	1,000	KX22	.	.	.	.
328	30009846	CABL 1P/40 SIS	PC	2,000	PL418-PL4	PL420-PL4	.	.	.
330	30010921	DOUBLE-DECK SCART SOCKET	PC	1,000	PL203	.	.	.	.
332	30011968	IC SMPS MC44608 DIP8	PC	1,000	IC804	.	.	.	.
333	30015087	IC OPTOCOUPLER TCET1102G	PC	1,000	IC801	.	.	.	.
334	30017799	CNAS 5P/500 TUB SIS W/DC UL1007AWG24	PC	1,000	PL101	.	.	.	.
335	30018078	LINE FILTER 2X22MH (AK37)	PC	1,000	L805	.	.	.	.
336	30018412	CONN HOUSING 35P 3.0MM TOP DR	PC	2,000	PL409	PL410	.	.	.
337	30018422	IC AAMP TDA7480L 10W PDIP20	PC	2,000	IC401	IC402	.	.	.
339	30018627	TR NMOS IRFU110 4.3A/100V TO251	PC	1,000	Q100	.	.	.	.
340	30019205	TRF SMPS AK52 (170-270V) 170W	PC	1,000	TR801	.	.	.	.
342	30020772	CNAS 10P/320 AK52 SHL W/DC UL1533AWG24	PC	1,000	PL853	.	.	.	.
343	30020805	CABL 1P/150 SIS W/FER	PC	1,000	KXX1	.	.	.	.
344	40011350	SPACER SUPPORT SCC-3C-NZW	PC	1,000	.	.	.	.	.
345	40011922	EDGE SADDLE (CT-16)	PC	2,000	.	.	.	.	.
346	70000029	SOLDER (INGOT) 63/37	KG	0,020	.	.	.	.	.
347	70000661	SILICON V0 (UL 1410)(Firma Catg.No3748	G	5,000	.	.	.	.	.
349	30000075	CAP MKT 100NF 250V K (DC)	PC	1,000	C861	.	.	.	.
350	30001792	CONN HEADER 2P 7.5MM TOP WHT	PC	1,000	PL804	.	.	.	.
351	30018085	CAP VAR 510V K MFCN14D511	PC	1,000	R870	.	.	.	.
357	30000466	RES CF 1/4W 1K J	PC	1,000	R843	.	.	.	.
358	30000352	CAP EL 100UF 16V M	PC	1,000	C840	.	.	.	.
359	30001454	TR BC548B	PC	1,000	Q801	.	.	.	.
360	30001285	DIODE 1N4148 SMD	PC	1,000	D830	.	.	.	.
361	30001457	TR BC848B SMD	PC	1,000	Q808	.	.	.	.
362	30012641	RES SMD 1/16W 10K J (0603)	PC	2,000	R808	R842	.	.	.
363	30012692	RES SMD 1/16W 4.7K J (0603)	PC	1,000	R807	.	.	.	.
368	30000649	RES CF 1/2W 33R J	PC	1,000	R179	.	.	.	.
369	30000660	RES CF 1/4W 3.3K J	PC	1,000	R149	.	.	.	.
370	30001996	FIXED COIL 22UH Q40 K	PC	2,000	L107	L108	.	.	.
371	30000078	CAP MKT 1UF 100V M	PC	1,000	C132	.	.	.	.

372	30000353	CAP EL 100UF 25V M	PC	2,000	C133	C136	.	.	.
373	30001452	TR BC327	PC	2,000	Q107	Q109	.	.	.
374	30001453	TR BC337	PC	2,000	Q110	Q111	.	.	.
375	30000294	CAP SMD 100NF 50V K (0805)	PC	2,000	C137	C138	.	.	.
376	30009699	DIODE ZENER SMD BZT55C12	PC	2,000	D121	D122	.	.	.
377	30012641	RES SMD 1/16W 10K J (0603)	PC	1,000	R151	.	.	.	.
378	30012657	RES SMD 1/16W 1K J (0603)	PC	1,000	R168	.	.	.	.
379	30012665	RES SMD 1/16W 20K J (0603)	PC	1,000	R150	.	.	.	.
380	30012673	RES SMD 1/16W 270R J (0603)	PC	2,000	R153	R154	.	.	.
381	30012689	RES SMD 1/16W 39K J (0603)	PC	1,000	R152	.	.	.	.
383	30009699	DIODE ZENER SMD BZT55C12	PC	1,000	D207	.	.	.	.
384	30012581	CAP SMD 1NF 50V K R (0603)	PC	2,000	C274	C284	.	.	.
385	30012589	CAP SMD 4.7NF 50V K (0603)	PC	2,000	C276	C287	.	.	.
386	30012592	CAP SMD 6.8NF 50V K (0603)	PC	2,000	C270	C271	.	.	.
387	30012607	CAP SMD 150PF 50V J (0603)	PC	4,000	C273	C280	C289	C290	.
388	30012707	RES SMD 1/16W 680R J (0603)	PC	2,000	R230	R235	.	.	.
389	30013413	FERRITE BEAD ACB2012H-300	PC	4,000	L224	L225	L226	L228	.
390	30018735	DIODE ZENER BZT55C15 15V SMD	PC	1,000	D206	.	.	.	.
397	30006712	FERRITE BEAD 3.5X4.7X0.8	PC	1,000	J195	.	.	.	.
398	30012560	CAP SMD 100PF 50V J (0603)	PC	1,000	C957	.	.	.	.
399	30021082	IC TDA9885T/V3-SO24	PC	1,000	IC954	.	.	.	.
407	30000918	RES MF 1/4W 2.1K F	PC	1,000	R121	.	.	.	.
408	30001036	RES MF 1/4W 95K F	PC	1,000	R123	.	.	.	.
409	30001131	RES MO 1W 0.22R J	PC	1,000	R103	.	.	.	.
410	30001244	RES FUSE 1/2W 0.47R J	PC	2,000	R124	R183	.	.	.
411	30001291	DIODE HER107 1A/800V 30A	PC	1,000	D100	.	.	.	.
412	30001291	DIODE HER107 1A/800V 30A	PC	1,000	D125	.	.	.	.
413	30000092	CAP MKT 220NF 63V J	PC	1,000	C129	.	.	.	.
414	30000319	CAP CER 2.7NF 500V K B	PC	1,000	C808	.	.	.	.
415	30010517	CAP MKT 33NF 100V K	PC	1,000	C102	.	.	.	.
416	30012581	CAP SMD 1NF 50V K R (0603)	PC	1,000	C108	.	.	.	.
417	30012648	RES SMD 1/16W 150K J (0603)	PC	1,000	R113	.	.	.	.
426	30000452	RES CF 1/4W 10R J	PC	1,000	R806	.	.	.	.
427	30000459	RES CF 1/4W 100R J	PC	3,000	R952	R954	R995	.	.
428	30000466	RES CF 1/4W 1K J	PC	2,000	R118	R832	.	.	.
429	30000477	RES CF 1/4W 100K J	PC	3,000	R829	R136	R157	.	.

430	30000481	RES CF 1/4W 1M J	PC	1,000	R804	.	.	.	.
431	30000515	RES CF 1/4W 15R J	PC	1,000	R429	.	.	.	.
432	30000531	RES CF 1/4W 15K J	PC	1,000	R186	.	.	.	.
433	30000541	RES CF 1/4W 1.5M J	PC	1,000	R146	.	.	.	.
434	30000564	RES CF 1/4W 18K J	PC	1,000	R126	.	.	.	.
435	30000583	RES CF 1/4W 220R J	PC	1,000	R105	.	.	.	.
436	30000622	RES CF 1/4W 270R J	PC	1,000	R165	.	.	.	.
437	30000628	RES CF 1/4W 2.7K J	PC	1,000	R169	.	.	.	.
438	30000660	RES CF 1/4W 3.3K J	PC	1,000	R866	.	.	.	.
439	30000718	RES CF 1/4W 4.7K J	PC	6,000	R110	R127	R823	R824	R860
.	.	.	.	.	R802	.	.	.	.
440	30000729	RES CF 1/4W 470K J	PC	1,000	R129	.	.	.	.
441	30000744	RES CF 1/4W 560R J	PC	1,000	R147	.	.	.	.
442	30000769	RES CF 1/2W 680R J	PC	2,000	R820	R821	.	.	.
443	30000784	RES CF 1/4W 680K J	PC	1,000	R155	.	.	.	.
444	30000792	RES CF 1/4W 75R J	PC	1,000	R998	.	.	.	.
445	30000918	RES MF 1/4W 2.1K F	PC	1,000	R856	.	.	.	.
446	30000925	RES MF 1/4W 2.2K F	PC	1,000	R855	.	.	.	.
447	30000983	RES MF 1/4W 4.7K F	PC	1,000	R805	.	.	.	.
448	30001011	RES MF 1/4W 6.8K F	PC	2,000	R142	R143	.	.	.
449	30001036	RES MF 1/4W 95K F	PC	1,000	R156	.	.	.	.
450	30001159	RES MO 1W 0.33R J	PC	1,000	R810	.	.	.	.
451	30001257	RES MG 1/2W 4.7M J	PC	1,000	R812	.	.	.	.
452	30001284	DIODE 1N4148 0.15A/100V 0.5A	PC	2,000	D826	D404	.	.	.
453	30001288	DIODE BYV27-200 2A/200V 50A	PC	1,000	D111	.	.	.	.
454	30001291	DIODE HER107 1A/800V 30A	PC	3,000	D106	D107	D110	.	.
455	30001318	DIODE BA159 1A/800V 20A	PC	7,000	D120	D801	D814	D815	D829
.	.	.	.	.	D818	D123	.	.	.
456	30001323	DIODE BY299 2A/800V 70A	PC	1,000	D802	.	.	.	.
457	30001329	DIODE 1N4007 1A/1000V 30A	PC	2,000	D812	D831	.	.	.
458	30001344	DIODE ZENER 6.2V 1/2W	PC	1,000	D806	.	.	.	.
459	30001377	DIODE ZENER 33V UZT 33B	PC	1,000	D113	.	.	.	.
460	30001979	FIXED COIL 1UH Q45 M-A	PC	1,000	L951	.	.	.	.
461	30001992	FIXED COIL 10UH Q65 K-A	PC	1,000	L803	.	.	.	.
462	30001996	FIXED COIL 22UH Q40 K	PC	1,000	L109	.	.	.	.
463	30006691	DIODE ZENER 3.3V	PC	1,000	D813	.	.	.	.

464	30006712	FERRITE BEAD 3.5X4.7X0.8	PC	5,000	L105	L106	L417	L418	J130
465	30009036	RES FUSE 1/2W 0.1R J	PC	1,000	R125	.	.	.	.
466	30025350	PCB 11AK52B6	PC	1,000	.	.	.	.	.
467	30000069	CAP MKT 1NF 100V J	PC	4,000	C469	C470	C472	C473	.
468	30000071	CAP MKT 10NF 63V J	PC	2,000	C405	C466	.	.	.
469	30000074	CAP MKT 100NF 63V J	PC	1,000	C142	.	.	.	.
470	30000099	CAP MKT 33NF 63V J	PC	1,000	C812	.	.	.	.
471	30000100	CAP MKT 330NF 63V J	PC	4,000	C408	C428	C411	C431	.
472	30000109	CAP MKT 470NF 63V J	PC	2,000	C963	C966	.	.	.
473	30000190	CAP CER 100PF 50V J CH	PC	1,000	C864	.	.	.	.
474	30000283	CAP CER 1NF 50V K B	PC	1,000	C131	.	.	.	.
475	30000286	CAP CER 1NF 500V K B	PC	1,000	C145	.	.	.	.
476	30000295	CAP CER 100NF 50V Z F	PC	6,000	C831	C430	C824	C410	C409
.	.	.	.	.	C429	.	.	.	.
477	30000296	CAP CER 100NF 100V Z F	PC	3,000	C146	C128	C148	.	.
478	30000302	CAP CER 1.8NF 50V KB	PC	2,000	C123	C130	.	.	.
479	30000345	CAP EL 10UF 50V M	PC	5,000	C104	C210	C953	C954	C970
480	30000346	CAP EL 10UF 100V M	PC	1,000	C107	.	.	.	.
481	30000352	CAP EL 100UF 16V M	PC	2,000	C856	C468	.	.	.
482	30000353	CAP EL 100UF 25V M	PC	5,000	C101	C462	C463	C464	C465
483	30000362	CAP EL 1UF 50V M	PC	1,000	C106	.	.	.	.
484	30000367	CAP EL 1UF 250V M	PC	2,000	C837	C862	.	.	.
485	30000375	CAP EL 220UF 16V M	PC	1,000	C857	.	.	.	.
486	30000387	CAP EL 33UF 50V M	PC	1,000	C804	.	.	.	.
487	30000393	CAP EL 3.3UF 50V M	PC	2,000	C845	C134	.	.	.
488	30000400	CAP EL 47UF 50V M	PC	3,000	C139	C828	C956	.	.
489	30000431	CAP CER 100PF 1KV M	PC	1,000	C116	.	.	.	.
490	30000433	CAP CER 1NF 1KV M B	PC	3,000	C843	C471	C474	.	.
491	30001384	TR MCR22-6	PC	1,000	Q817	.	.	.	.
492	30001428	TR BF423	PC	1,000	Q806	.	.	.	.
493	30001454	TR BC548B	PC	4,000	Q105	Q803	Q805	Q810	.
494	30001455	TR BC558B	PC	1,000	Q814	.	.	.	.
495	30007308	CAP CER 220PF 1KV K (PULSE)	PC	4,000	C806	C813	C814	C815	.
496	30009208	CAP CER 470PF 1KV K (PULSE)	PC	1,000	C809	.	.	.	.
497	30019641	CAP MKT 100NF 100V J NO-HIT	PC	1,000	C135	.	.	.	.
498	30023137	IC TL431 %1 TOL (TO-92)	PC	3,000	Q116	Q815	Q816	.	.

499	30000284	CAP SMD 1NF 50V K R (0805)	PC	1,000	C301	.	.	.	.
500	30000294	CAP SMD 100NF 50V K (0805)	PC	10,000	C100	C125	C126	C803	C823
.	.	.	.	.	C827	C846	C859	C817	C818
501	30000309	CAP SMD 2.2NF 50V K R 0805	PC	1,000	C811	.	.	.	.
502	30000469	RES SMD 1/10W 1K J 0805	PC	3,000	R827	R834	R850	.	.
503	30000475	RES SMD 1/10W 10K J 0805	PC	4,000	R148	R161	R830	R835	.
504	30000503	RES SMD 1/10W 12K J (0805)	PC	1,000	R837	.	.	.	.
505	30000517	RES SMD 1/10W 15R J 0805	PC	1,000	R838	.	.	.	.
506	30000529	RES SMD 1/10W 1.5K J	PC	2,000	R102	R166	.	.	.
507	30000593	RES SMD 1/10W 2.2K J (0805)	PC	3,000	R803	R836	R108	.	.
508	30000614	RES SMD 1/10W 2.4K J (0805)	PC	1,000	R814	.	.	.	.
509	30000626	RES SMD 1/10W 270R J	PC	1,000	R171	.	.	.	.
510	30000631	RES SMD 1/10W 2.7K J 0805	PC	1,000	R131	.	.	.	.
511	30000636	RES SMD 1/10W 27K J 0805	PC	1,000	R138	.	.	.	.
512	30000710	RES SMD 1/10W 47R J (0805)	PC	1,000	R813	.	.	.	.
513	30000721	RES SMD 1/10W 4.7K J	PC	3,000	R159	R162	R160	.	.
514	30000782	RES SMD 1/10W 68K J	PC	2,000	R818	R868	.	.	.
515	30001285	DIODE 1N4148 SMD	PC	15,000	D114	D117	D118	D119	D807
.	.	.	.	.	D809	D820	D821	D819	D823
.	.	.	.	.	D127	D128	D951	D962	D963
516	30001457	TR BC848B SMD	PC	9,000	Q112	Q113	Q114	Q200	Q804
.	.	.	.	.	Q807	Q108	Q811	Q952	.
517	30001458	TR BC858B SMD	PC	7,000	Q102	Q103	Q106	Q115	Q812
.	.	.	.	.	Q400	Q117	.	.	.
520	30001971	FERRITE BEAT (805) BLM21A601S	PC	1,000	L802	.	.	.	.
521	30007026	RES SMD 1/10W 5.1K J(0805)	PC	1,000	R831	.	.	.	.
522	30007760	DIODE ZENER SMD BZT55C10	PC	1,000	D102	.	.	.	.
523	30007763	DIODE ZENER SMD BZT55C5V1	PC	4,000	D103	D112	D201	D827	.
524	30007789	RES SMD 1/10W 27K F (0805)	PC	1,000	R137	.	.	.	.
525	30009699	DIODE ZENER SMD BZT55C12	PC	4,000	D822	D202	D203	D124	.
526	30010560	CAP SMD 220NF 25V K R (0805)	PC	1,000	R163	.	.	.	.
527	30010643	RES SMD 1/10W 39R J (0805)	PC	1,000	R970	.	.	.	.
528	30012506	RES SMD 1/16W 1.5K J (0603)	PC	1,000	R187	.	.	.	.
529	30012508	RES SMD 1/16W 1.8K J (0603)	PC	1,000	R406	.	.	.	.
530	30012510	RES SMD 1/16W 100R J (0603)	PC	4,000	R815	R953	R955	R964	.
531	30012560	CAP SMD 100PF 50V J (0603)	PC	2,000	C467	C950	.	.	.

532	30012566	CAP SMD 22PF 50V J (0603)	PC	1,000	C965	.	.	.	.
533	30012567	CAP SMD 220PF 50V J (0603)	PC	1,000	C852	.	.	.	.
534	30012568	CAP SMD 270PF 50V J (0603)	PC	2,000	C406	C426	.	.	.
535	30012569	CAP SMD 33PF 50V J (0603)	PC	4,000	C952	C955	C959	C960	.
536	30012572	CAP SMD 390PF 50V J (0603)	PC	1,000	C962	.	.	.	.
537	30012574	CAP SMD 470PF 50V J (0603)	PC	1,000	C867	.	.	.	.
538	30012581	CAP SMD 1NF 50V K R (0603)	PC	7,000	C240	C249	C839	C140	C994
.	.	.	.	.	C1006	C1007	.	.	.
539	30012582	CAP SMD 10NF 50V K R (0603)	PC	2,000	C961	C969	.	.	.
540	30012583	CAP SMD 1.5NF 50V K (0603)	PC	1,000	C968	.	.	.	.
541	30012585	CAP SMD 2.2NF 50V K R (0603)	PC	2,000	C407	C427	.	.	.
542	30012589	CAP SMD 4.7NF 50V K (0603)	PC	8,000	C243	C244	C245	C247	C250
.	.	.	.	.	C251	C419	C433	.	.
543	30012590	CAP SMD 47NF 50V K (0603)	PC	1,000	C105	.	.	.	.
544	30012592	CAP SMD 6.8NF 50V K (0603)	PC	1,000	C237	.	.	.	.
545	30012592	CAP SMD 6.8NF 50V K (0603)	PC	3,000	C233	C235	C236	.	.
546	30012603	CAP SMD 100NF 25V K R (0603)	PC	9,000	C420	C458	C423	C455	C456
.	.	.	.	.	C421	C853	C951	C972	.
547	30012607	CAP SMD 150PF 50V J (0603)	PC	16,000	C239	C241	C246	C248	C252
.	.	.	.	.	C253	C256	C261	C262	C263
.	.	.	.	.	C266	C267	C307	C308	C309
.	.	.	.	.	C310	.	.	.	.
548	30012610	CAP SMD 10NF 50V J (0603)	PC	1,000	C964	.	.	.	.
549	30012641	RES SMD 1/16W 10K J (0603)	PC	11,000	R119	R822	R825	R839	R840
.	.	.	.	.	R849	R158	R853	R861	R862
.	.	.	.	.	R819	.	.	.	.
550	30012644	RES SMD 1/16W 12K J (0603)	PC	1,000	R966	.	.	.	.
551	30012657	RES SMD 1/16W 1K J (0603)	PC	7,000	R207	R841	R859	R854	R424
.	.	.	.	.	R863	S802	.	.	.
552	30012659	RES SMD 1/16W 2.2K J (0603)	PC	9,000	R107	R109	R112	R115	R847
.	.	.	.	.	R848	R851	R852	R951	.
553	30012662	RES SMD 1/16W 2.7K J (0603)	PC	1,000	R111	.	.	.	.
554	30012668	RES SMD 1/16W 220R J (0603)	PC	1,000	R994	.	.	.	.
555	30012669	RES SMD 1/16W 22K J (0603)	PC	2,000	R972	R973	.	.	.
556	30012677	RES SMD 1/16W 3.3K J (0603)	PC	1,000	R422	.	.	.	.
557	30012682	RES SMD 1/16W 30K J (0603)	PC	1,000	R403	.	.	.	.

558	30012684	RES SMD 1/16W 330R J (0603)	PC	1,000	R968	.	.	.	.
559	30012689	RES SMD 1/16W 39K J (0603)	PC	1,000	R867	.	.	.	.
560	30012692	RES SMD 1/16W 4.7K J (0603)	PC	2,000	R106	R185	.	.	.
561	30012695	RES SMD 1/16W 470R J (0603)	PC	3,000	R845	R864	R993	.	.
562	30012696	RES SMD 1/16W 47K J (0603)	PC	2,000	R120	R967	.	.	.
563	30012698	RES SMD 1/16W 5.6K J (0603)	PC	1,000	R418	.	.	.	.
564	30012698	RES SMD 1/16W 5.6K J (0603)	PC	1,000	R958	.	.	.	.
565	30012705	RES SMD 1/16W 6.8K J (0603)	PC	2,000	R922	R965	.	.	.
566	30012707	RES SMD 1/16W 680R J (0603)	PC	4,000	R215	R216	R217	R218	.
567	30012712	RES SMD 1/16W 8.2K J (0603)	PC	3,000	R132	R409	R417	.	.
568	30012714	RES SMD 1/16W 820R J (0603)	PC	1,000	R1006	.	.	.	.
569	30012982	RES SMD 1/16W 10R J 0603	PC	2,000	S408	S409	.	.	.
571	30013413	FERRITE BEAD ACB2012H-300	PC	8,000	L213	L214	L215	L216	L217
.	.	.	.	.	L218	L219	L220	.	.
572	30013413	FERRITE BEAD ACB2012H-300	PC	1,000	L999	.	.	.	.
573	30014022	RES SMD 1/16W 47R J (0603)	PC	2,000	R205	R997	.	.	.
574	30014420	RES SMD 1/16W 10K F (0603)	PC	1,000	R415	.	.	.	.
575	30016126	CAP SMD 220NF 16V K R (0603)	PC	1,000	C967	.	.	.	.
576	30016654	CAP SMD 100NF 16V K R (0603)	PC	3,000	C848	C212	C858	.	.
577	30018735	DIODE ZENER BZT55C15 15V SMD	PC	2,000	D204	D205	.	.	.
578	20125554	MD.ASY.FB52A-341112143321211	PC	1,000	.	.	.	.	.
580	20101701	MD.SMD.FB52A-FAV IN	PC	1,000	.	.	.	.	.
582	30000074	CAP MKT 100NF 63V J	PC	1,000	C882	.	.	.	.
583	30000315	CAP SMD 220NF 25V Z (0805)	PC	2,000	C408	C409	.	.	.
584	30001971	FERRITE BEAT (805) BLM21A601S	PC	1,000	L850	.	.	.	.
585	30012581	CAP SMD 1NF 50V K R (0603)	PC	2,000	C415	C416	.	.	.
586	30012589	CAP SMD 4.7NF 50V K (0603)	PC	2,000	C473	C474	.	.	.
587	30012657	RES SMD 1/16W 1K J (0603)	PC	2,000	R437	R438	.	.	.
588	30012713	RES SMD 1/16W 75R J (0603)	PC	1,000	R891	.	.	.	.
589	30017143	COIL SMD 22UH (2520)	PC	2,000	L407	L408	.	.	.
590	20101763	MD.SMD.FB52A-HEADPHONE	PC	1,000	.	.	.	.	.
592	30000345	CAP EL 10UF 50V M	PC	1,000	C481	.	.	.	.
593	30000352	CAP EL 100UF 16V M	PC	2,000	C430	C432	.	.	.
594	30000362	CAP EL 1UF 50V M	PC	1,000	C433	.	.	.	.
595	30000315	CAP SMD 220NF 25V Z (0805)	PC	2,000	C426	C427	.	.	.
596	30001285	DIODE 1N4148 SMD	PC	2,000	D404	D405	.	.	.

597	30001971	FERRITE BEAT (805) BLM21A601S	PC	2,000	L400	L401	.	.	.
598	30010024	IC TDA1308T SOIC 8P	PC	1,000	IC401	.	.	.	.
599	30012567	CAP SMD 220PF 50V J (0603)	PC	2,000	C477	C478	.	.	.
600	30012581	CAP SMD 1NF 50V K R (0603)	PC	2,000	C431	C435	.	.	.
601	30012589	CAP SMD 4.7NF 50V K (0603)	PC	4,000	C443	C444	C429	C434	.
602	30012592	CAP SMD 6.8NF 50V K (0603)	PC	2,000	C401	C403	.	.	.
603	30012641	RES SMD 1/16W 10K J (0603)	PC	2,000	R412	R416	.	.	.
604	30012692	RES SMD 1/16W 4.7K J (0603)	PC	2,000	R411	R413	.	.	.
605	30012700	RES SMD 1/16W 51K J (0603)	PC	2,000	R414	R415	.	.	.
607	30016654	CAP SMD 100NF 16V K R (0603)	PC	1,000	C428	.	.	.	.
608	30017143	COIL SMD 22UH (2520)	PC	2,000	L409	L410	.	.	.
609	20101768	MD.SMD.FB52A-WO/PIP	PC	1,000	.	.	.	.	.
611	20101771	MD.SMD.FB52A-VIRTUAL DOLBY&3D PANORAMA	PC	1,000	.	.	.	.	.
612	30018653	IC MSP3411G PLQFP64	PC	1,000	IC400	.	.	.	.
613	20105455	MD.SMD.FB52A-WO/DVD	PC	1,000	.	.	.	.	.
615	20126358	MD.SMD.FB52A3-COMMON(TOSHIBA)	PC	1,000	.	.	.	.	.
618	30023510	PCB 11FB52A4	PC	1,000	.	.	.	.	.
619	30000068	CAP MKT 1NF 63V K	PC	1,000	C604	.	.	.	.
620	30000074	CAP MKT 100NF 63V J	PC	4,000	C878	C879	C881	C912	.
621	30000109	CAP MKT 470NF 63V J	PC	3,000	C642	C643	C688	.	.
622	30000345	CAP EL 10UF 50V M	PC	17,000	C638	C639	C640	C641	C644
.	.	.	.	.	C645	C659	C660	C665	C689
.	.	.	.	.	C690	C748	C413	C414	C448
.	.	.	.	.	C450	C697	.	.	.
623	30000352	CAP EL 100UF 16V M	PC	4,000	C722	C723	C873	C402	.
624	30000362	CAP EL 1UF 50V M	PC	1,000	C731	.	.	.	.
625	30000362	CAP EL 1UF 50V M	PC	2,000	C735	C755	.	.	.
626	30000371	CAP EL 22UF 50V M	PC	11,000	C671	C674	C726	C729	C738
.	.	.	.	.	C437	C439	C436	C438	C479
.	.	.	.	.	C480	.	.	.	.
627	30000393	CAP EL 3.3UF 50V M	PC	2,000	C663	C412	.	.	.
628	30000396	CAP EL 47UF 16V M	PC	1,000	C754	.	.	.	.
629	30000413	CAP EL 4.7UF 50V M	PC	1,000	C753	.	.	.	.
630	30000444	CAP CER 470PF 1KV KB	PC	1,000	C472	.	.	.	.
631	30000315	CAP SMD 220NF 25V Z (0805)	PC	15,000	C406	C407	C451	C452	C680
.	.	.	.	.	C683	C694	C907	C908	C909

.	.	.	.	.	C453	C454	C888	C890	C892
632	30001285	DIODE 1N4148 SMD	PC	8,000	D401	D402	D403	D600	D601
.	.	.	.	.	D602	D604	D750	.	.
633	30001457	TR BC848B SMD	PC	36,000	Q401	Q402	Q600	Q601	Q602
.	.	.	.	.	Q603	Q605	Q606	Q610	Q612
.	.	.	.	.	Q613	Q614	Q721	Q722	Q723
.	.	.	.	.	Q724	Q725	Q726	Q727	Q729
.	.	.	.	.	Q730	Q850	Q856	Q859	Q861
.	.	.	.	.	Q863	Q731	Q732	Q733	Q403
.	.	.	.	.	Q404	Q852	Q720	Q750	Q751
.	.	.	.	.	Q752	.	.	.	.
634	30001458	TR BC858B SMD	PC	7,000	Q400	Q607	Q608	Q609	Q611
.	.	.	.	.	Q728	Q734	.	.	.
635	30001971	FERRITE BEAT (805) BLM21A601S	PC	5,000	L406	L411	L418	L602	L861
636	30003720	DIODE ZENER BZT55C5V6 5.6V SMD	PC	1,000	D720	.	.	.	.
637	30007668	IC SDA9400	PC	1,000	IC600	.	.	.	.
638	30007739	IC LM317T D2PAK	PC	1,000	IC602	.	.	.	.
639	30007760	DIODE ZENER SMD BZT55C10	PC	1,000	D850	.	.	.	.
640	30007761	DIODE ZENER SMD BZT55C3V6	PC	1,000	D400	.	.	.	.
641	30010349	IC DDP3310	PC	1,000	IC601	.	.	.	.
642	30012506	RES SMD 1/16W 1.5K J (0603)	PC	1,000	R696	.	.	.	.
643	30012509	RES SMD 1/16W 100K J (0603)	PC	3,000	R913	R914	R786	.	.
644	30012510	RES SMD 1/16W 100R J (0603)	PC	26,000	R402	R403	R405	R406	R421
.	.	.	.	.	R422	R601	R629	R635	R641
.	.	.	.	.	R689	R690	R691	R692	R693
.	.	.	.	.	R694	R760	R762	R777	R778
.	.	.	.	.	R889	R890	R949	R829	R787
.	.	.	.	.	R835	.	.	.	.
645	30012559	CAP SMD 10PF 50V D COG (0603)	PC	2,000	C668	C906	.	.	.
646	30012565	CAP SMD 1.8PF 50V J CH (0603)	PC	2,000	C417	C418	.	.	.
647	30012568	CAP SMD 270PF 50V J (0603)	PC	9,000	C440	C612	C615	C620	C646
.	.	.	.	.	C650	C655	C656	C746	.
648	30012569	CAP SMD 33PF 50V J (0603)	PC	6,000	C736	C737	C875	C876	C405
.	.	.	.	.	C404	.	.	.	.
649	30012570	CAP SMD 330PF 50V J (0603)	PC	7,000	C670	C903	C904	C905	C887
.	.	.	.	.	C889	C891	.	.	.

650	30012572	CAP SMD 390PF 50V J (0603)	PC	4,000	C679	C682	C693	C441	.
651	30012573	CAP SMD 47PF 50V J (0603)	PC	1,000	C700	.	.	.	.
652	30012574	CAP SMD 470PF 50V J (0603)	PC	1,000	C699	.	.	.	.
653	30012576	CAP SMD 56PF 50V J CH (0603)	PC	2,000	C410	C422	.	.	.
654	30012577	CAP SMD 560PF 50V J (0603)	PC	8,000	C613	C616	C621	C637	C648
.	.	.	.	.	C651	C654	C657	.	.
655	30012581	CAP SMD 1NF 50V K R (0603)	PC	14,000	C419	C420	C421	C425	C446
.	.	.	.	.	C447	C457	C458	C465	C466
.	.	.	.	.	C471	C623	C455	C456	.
656	30012582	CAP SMD 10NF 50V K R (0603)	PC	8,000	C605	C629	C630	C631	C633
.	.	.	.	.	C634	C635	C666	.	.
657	30012583	CAP SMD 1.5NF 50V K (0603)	PC	5,000	C662	C676	C684	C685	C686
658	30012585	CAP SMD 2.2NF 50V K R (0603)	PC	8,000	C614	C617	C622	C636	C647
.	.	.	.	.	C652	C653	C658	.	.
659	30012589	CAP SMD 4.7NF 50V K (0603)	PC	2,000	C461	C462	.	.	.
660	30012590	CAP SMD 47NF 50V K (0603)	PC	4,000	C661	C677	C681	C691	.
661	30012608	CAP SMD 27PF 50V J CH (0603)	PC	2,000	C618	C619	.	.	.
662	30012609	CAP SMD 68NF 50V K (0603)	PC	3,000	C675	C687	C695	.	.
663	30012613	CAP SMD 3.3PF 50V C CH(0603)	PC	2,000	C601	C602	.	.	.
664	30012641	RES SMD 1/16W 10K J (0603)	PC	31,000	R400	R401	R622	R652	R654
.	.	.	.	.	R655	R659	R761	R763	R779
.	.	.	.	.	R780	R801	R896	R901	R909
.	.	.	.	.	R929	R683	R917	R816	R822
.	.	.	.	.	R825	R826	R899	R623	R781
.	.	.	.	.	R782	R788	R802	R836	R837
.	.	.	.	.	R830	.	.	.	.
665	30012650	RES SMD 1/16W 15K J (0603)	PC	5,000	R656	R657	R758	R759	R819
666	30012657	RES SMD 1/16W 1K J (0603)	PC	31,000	R407	R408	R431	R432	R433
.	.	.	.	.	R434	R439	R606	R634	R640
.	.	.	.	.	R646	R661	R720	R771	R772
.	.	.	.	.	R789	R790	R791	R792	R793
.	.	.	.	.	R797	R807	R919	R920	R626
.	.	.	.	.	R658	R818	R409	R410	R435
.	.	.	.	.	R436	.	.	.	.
667	30012659	RES SMD 1/16W 2.2K J (0603)	PC	4,000	R651	R764	R765	R840	.
668	30012661	RES SMD 1/16W 2.4K J (0603)	PC	1,000	R650	.	.	.	.

669	30012668	RES SMD 1/16W 220R J (0603)	PC	5,000	R605	R633	R639	R645	R795
670	30012669	RES SMD 1/16W 22K J (0603)	PC	4,000	R625	R721	R918	R647	.
671	30012673	RES SMD 1/16W 270R J (0603)	PC	1,000	R648	.	.	.	.
672	30012675	RES SMD 1/16W 2K J (0603)	PC	1,000	R708	.	.	.	.
673	30012677	RES SMD 1/16W 3.3K J (0603)	PC	2,000	R752	R753	.	.	.
674	30012679	RES SMD 1/16W 3.9K J (0603)	PC	3,000	R756	R757	R820	.	.
675	30012688	RES SMD 1/16W 390R J (0603)	PC	4,000	R602	R630	R636	R642	.
676	30012692	RES SMD 1/16W 4.7K J (0603)	PC	26,000	R404	R417	R418	R419	R420
.	.	.	.	.	R754	R755	R785	R798	R897
.	.	.	.	.	R903	R910	R930	R653	R817
.	.	.	.	.	R821	R831	R832	R833	R834
.	.	.	.	.	R902	R663	R823	R824	R838
.	.	.	.	.	R842	.	.	.	.
677	30012695	RES SMD 1/16W 470R J (0603)	PC	7,000	R895	R900	R908	R928	R898
.	.	.	.	.	R766	R767	.	.	.
678	30012696	RES SMD 1/16W 47K J (0603)	PC	6,000	R773	R774	R775	R776	R827
.	.	.	.	.	R828	.	.	.	.
679	30012713	RES SMD 1/16W 75R J (0603)	PC	30,000	R620	R621	R624	R632	R638
.	.	.	.	.	R644	R688	R699	R860	R885
.	.	.	.	.	R886	R904	R906	R911	R931
.	.	.	.	.	R942	R943	R944	R945	R946
.	.	.	.	.	R947	R948	R932	R933	R934
.	.	.	.	.	R935	R936	R937	R905	R951
680	30012719	RES SMD 1/16W 910R J (0603)	PC	1,000	R697	.	.	.	.
681	30012982	RES SMD 1/16W 10R J 0603	PC	12,000	R603	R631	R637	R643	R662
.	.	.	.	.	R892	R907	R921	R927	R894
.	.	.	.	.	R649	R893	.	.	.
683	30013001	RES SMD 1/16W 1K F (0603)	PC	1,000	R841	.	.	.	.
684	30013571	IC SDA5550	PC	1,000	IC722	.	.	.	.
685	30013686	IC VIDEO SWITCH TEA6415CDT SMD	PC	1,000	IC851	.	.	.	.
686	30014022	RES SMD 1/16W 47R J (0603)	PC	2,000	R794	R796	.	.	.
687	30014128	RES SMD 1/16W 33R J (0603)	PC	2,000	R604	R938	.	.	.
688	30015059	IC VPC3230D	PC	1,000	IC603	.	.	.	.
689	30016126	CAP SMD 220NF 16V K R (0603)	PC	1,000	C842	.	.	.	.
690	30016654	CAP SMD 100NF 16V K R (0603)	PC	43,000	C411	C423	C424	C449	C600
.	.	.	.	.	C607	C608	C609	C610	C611

.	.	.	.	.	C625	C626	C632	C664	C672	
.	.	.	.	.	C673	C678	C692	C720	C724	
.	.	.	.	.	C727	C728	C730	C732	C733	
.	.	.	.	.	C734	C739	C740	C741	C742	
.	.	.	.	.	C744	C745	C750	C883	C885	
.	.	.	.	.	C886	C893	C895	C897	C898	
.	.	.	.	.	C752	C400	C884	.	.	
691	30017143	COIL SMD 22UH (2520)	PC	14,000	L402	L403	L404	L405	L412	
.	.	.	.	.	L413	L416	L417	L600	L720	
.	.	.	.	.	L724	L862	L414	L415	.	
692	30018093	COIL SMD 3.3uH (2520)	PC	13,000	L726	L857	L858	L859	L854	
.	.	.	.	.	L855	L856	L851	L852	L853	
.	.	.	.	.	L723	L721	L722	.	.	
693	30018409	RES SARRAY 1/16W 330R J (0603)	PC	15,000	R700	R701	R702	R703	R704	
.	.	.	.	.	R705	R706	R707	R808	R809	
.	.	.	.	.	R810	R811	R812	R813	R814	
694	30020535	DIODE ZENER SMD BZT55C3V9	PC	1,000	D751	.	.	.	.	
695	20128394	MD.SMD.FB52A3-FASTEXT	PC	1,000	.	.	.	.	.	
696	30012580	CAP SMD 820PF 50V J (0603)	PC	1,000	C749	.	.	.	.	
699	30001833	CONN HEADER 2P 2.5MM SIDE BLUE SD	PC	1,000	PL855	.	.	.	.	
700	30001844	CONN HEADER 3P 2.5MM SIDE GREEN SD	PC	1,000	PL400	.	.	.	.	
702	30001756	XTAL 18.432MHZ	PC	1,000	X400	.	.	.	.	
703	30001834	CONN HEADER 2P 2.5MM SIDE RED SD	PC	1,000	PL722	.	.	.	.	
704	30001853	SOCKET IC 32P	PC	1,000	IC721	.	.	.	.	
705	30006662	XTAL 6MHZ	PC	1,000	X720	.	.	.	.	
706	30006712	FERRITE BEAD 3.5X4.7X0.8	PC	1,000	L601	.	.	.	.	
707	30007745	CONN HEADER 10P 2.54MM SIDE WHT DR	PC	1,000	PL853	.	.	.	.	
708	30008778	XTAL 20.25MHZ	PC	1,000	X600	.	.	.	.	
709	30008782	XTAL 5MHZ	PC	1,000	X601	.	.	.	.	
710	30009784	SOCKET IC 8P (DIP)	PC	1,000	IC720	.	.	.	.	
711	30018115	CONN HEADER 3P 2.5MM SIDE BD SR	PC	1,000	PL723	.	.	.	.	
712	30018117	CONN HEADER 6P 2.5MM SIDE BD	PC	1,000	PL721	.	.	.	.	
713	30018410	CONN HEADER 35P 3.0MM SIDE DR	PC	2,000	PL857	PL858	.	.	.	
715	30001841	CONN HEADER 3P 2.5MM SIDE BLACK SD	PC	1,000	PL401	.	.	.	.	
717	20136915	PR.IC.52-AK52B-IC27W401 TOSHIBA T028	PC	1,000	.	.	.	.	.	
718	30016491	IC 27W401	PC	1,000	IC721	.	.	.	.	

719	30009846	CABL 1P/40 SIS	PC	1,000	KX20	.	.	.	.
720	20125754	IC 24C32 A065341112143221211	PC	1,000	.	.	.	.	.
721	30015382	IC 24C32 3V	PC	1,000	.	.	.	.	.
722	20130362	CRT DIFF.KIT AK52B-29"SAM(RF893)130V(TOS	PC	1,000	.	.	.	.	.
723	30000094	CAP MKT 220NF 275V M AC	PC	1,000	C802	.	.	.	.
724	30000143	CAP MKP 2.2NF 2KV %3.5	PC	1,000	C109	.	.	.	.
725	30000162	CAP MKP 470NF 250V J	PC	1,000	C112	.	.	.	.
726	30000180	CAP MKP 9.1NF 2000V %3.5	PC	1,000	C110	.	.	.	.
727	30000415	CAP EL 4.7UF 250V M	PC	1,000	C141	.	.	.	.
728	30001113	RES MO 4W 180R J	PC	1,000	R101	.	.	.	.
729	30001123	RES MO 2W 220R J	PC	1,000	R140	.	.	.	.
730	30001134	RES MO 2W 2.2R J	PC	1,000	R139	.	.	.	.
731	30001174	RES MO 2W 0.47R J	PC	1,000	R141	.	.	.	.
732	30001190	RES MO 2W 68R J	PC	1,000	R122	.	.	.	.
733	30001229	RES FUSE 1W 2.2R J	PC	1,000	R130	.	.	.	.
734	30003652	RES FUSE 2W 2.2R J	PC	1,000	R128	.	.	.	.
735	30007215	CAP MKP 1.2UF 250V J	PC	1,000	C114	.	.	.	.
736	30010149	TR BD243C	PC	1,000	Q818	.	.	.	.
737	30012003	CAP MKP 18NF 630V J	PC	1,000	C111	.	.	.	.
738	30017521	TRF FBT SINGLE COMMON FOCUS LAYER (AK41)	PC	1,000	TR101	.	.	.	.
739	30018304	LINEARTY COIL 7UH	PC	1,000	L103	.	.	.	.
740	30019483	COIL BRIDGE 300UH 32KHZ AK52	PC	1,000	L104	.	.	.	.
741	20126985	MD.ASY.SB18-W/FTZ FAV+HP+SVHS(83CM(AK52)	PC	1,000	.	.	.	.	.
743	30001830	CONN HEADER 2P 2.5MM TOP BLUE SD	PC	1,000	PL103	.	.	.	.
744	30001839	CONN HEADER 3P 2.5MM TOP GREEN SD	PC	1,000	PL104	.	.	.	.
745	30001891	RCA JACK 1P WHITE 28 FAV	PC	1,000	CON103	.	.	.	.
746	30001892	RCA JACK 1P RED 28 FAV	PC	1,000	CON104	.	.	.	.
747	30001893	RCA JACK 1P YELLOW 28 FAV	PC	1,000	CON102	.	.	.	.
749	30001838	CONN HEADER 3P 2.5MM TOP YELLOW SD	PC	1,000	PL105	.	.	.	.
750	30001895	JACK 4P DIN TYPE FOR SVHS	PC	1,000	CON101	.	.	.	.
751	30001962	FERRITE AK18 VIDEO	PC	2,000	T101	T102	.	.	.
756	30000594	RES CF 1/4W 22K J	PC	2,000	R107	R109	.	.	.
757	30000712	RES CF 1/4W 470R J	PC	2,000	R108	R110	.	.	.
758	30009574	PCB 11SB18-3	PC	1,000	.	.	.	.	.
759	30000190	CAP CER 100PF 50V J CH	PC	1,000	C106	.	.	.	.
760	30000213	CAP CER 180PF 50V J CH	PC	2,000	C103	C104	.	.	.

764	30000650	RES CF 1/4W 33R J	PC	2,000	R111	R112	.	.	.
765	30000190	CAP CER 100PF 50V J CH	PC	1,000	C107	.	.	.	.
771	30000115	CAP MKT 6.8NF 100V J	PC	2,000	C101	C102	.	.	.
773	30001962	FERRITE AK18 VIDEO	PC	1,000	T103	.	.	.	.
774	30001963	FERRITE AK18 AUDIO	PC	2,000	T104	T107	.	.	.
775	30014060	CNAS 830 FAV SVHS SHL W/DC+FER	PC	1,000	PL103-104	.	.	.	.
777	30001902	JACK HEADPHONE STEREO WO/SW	PC	1,000	CON105	.	.	.	.
778	30001963	FERRITE AK18 AUDIO	PC	2,000	T105	T106	.	.	.
779	30006712	FERRITE BEAD 3.5X4.7X0.8	PC	1,000	FXX1	.	.	.	.
780	30021625	CONN.ASSY.3/55 W/BLACK(NELTRON) W/FER	PC	1,000	PL102	.	.	.	.
781	20128266	LBL.CART.BOX TOSHIBA 29VH27E(ÇÝFT KATLI)	PC	1,000	.	.	.	.	.
782	50023532	LABEL LOT TOSHIBA ÇÝFT KATLI	PC	1,050	.	.	.	.	.
783	70000621	RIBBON 80MM*450MM	PC	1,050	.	.	.	.	.
784	20128267	LBL.BCK.CVR.TOSHIBA TOSHIBA 29VH27E "52"	PC	1,000	.	.	.	.	.
785	20013018	LBL.BCK.CVR.ASSY (TV) (WO/UL)	PC	1,000	.	.	.	.	.
786	50023173	LABEL LOT W/BARCODE (77X256)	PC	1,050	.	.	.	.	.
787	70000621	RIBBON 80MM*450MM	PC	1,030	.	.	.	.	.
788	20128268	ARTWORK TOSHIBA TOSHIBA 29VH27E (AK52)	PC	1,000	.	.	.	.	.
789	20100980	R/C 2143 TOSHIBA CT-841(SILVER/P)(GRAY/S	PC	1,000	.	.	.	.	.
790	20096229	R/C 2143 NOBRAND SILVER (F)	PC	1,000	.	.	.	.	.
791	20094768	R/C KIT 2143 TOSHIBA	PC	1,000	.	.	.	.	.
792	20094767	MD.ASY.UK05	PC	1,000	.	.	.	.	.
793	20094766	UKV.B.ASSY.UK05 (SMD)	PC	1,000	.	.	.	.	.
794	30000489	RES SMD 1/10W 1R J (0805)	PC	1,000	R102	.	.	.	.
795	30012509	RES SMD 1/16W 100K J (0603)	PC	1,000	R103	.	.	.	.
796	30012510	RES SMD 1/16W 100R J (0603)	PC	1,000	R100	.	.	.	.
797	30012578	CAP SMD 68PF 50V J (0603)	PC	2,000	C101	C102	.	.	.
798	30016654	CAP SMD 100NF 16V K R (0603)	PC	2,000	C103	C104	.	.	.
799	30018063	IC HT48RA0A OTP	PC	1,000	IC101	.	.	.	.
800	30018712	PCB 11UK05-2	PC	1,000	.	.	.	.	.
801	30000352	CAP EL 100UF 16V M	PC	1,000	C100	.	.	.	.
802	30001453	TR BC337	PC	1,000	Q100	.	.	.	.
803	30002733	LED INFRARED IR333	PC	1,000	D100	.	.	.	.
804	30002852	XTAL REZ 455KHZ	PC	1,000	X100	.	.	.	.
805	35002401	BATTERY CONT.SINGLE (-) RC2040	PC	1,000	.	.	.	.	.
806	35005008	BATTERY CONT.SINGLE (+) RC2040 TOSHIBA	PC	1,000	.	.	.	.	.

807	35000228	SCREW SK C ZNSY YSMB 2.9*9.5	PC	1,000	.	.	.	.	.
808	35005007	DOUBLE BATTERY CONTACT UKV-900 TOSHIBA	PC	1,000	.	.	.	.	.
809	40005467	LENS RC2040(I)	PC	1,000	.	.	.	.	.
810	40010082	RUBBER PAD TRP41 (RC 2143) TOSHIBA	PC	1,000	.	.	.	.	.
811	40012344	SPONGE (BATTERY DOOR) (15x31x5mm)	PC	1,000	.	.	.	.	.
812	40005299	BATTERY COVER RC2040 SILVER(P)	PC	1,000	.	.	.	.	.
813	40009346	BOTTOM CVR R/C 21/2240 SILVER(P)	PC	1,000	.	.	.	.	.
814	40010357	TOP CVR R/C 2143 NOBRAND (S) SILVER(P)	PC	1,000	.	.	.	.	.
815	30002391	BATTERY AAA UM4 1.5V GREEN	PC	2,000	.	.	.	.	.
816	50039215	I/B TOSH.29VH27E P/6P2143/ERHPRBG "52"	PC	1,000	.	.	.	.	.
817	30009836	29"REALFLAT 100HZ CPT TUBE	PC	1,000	.	.	.	.	.
818	30015231	ROTATION COIL AK33 29"	PC	1,000	.	.	.	.	.
819	40012621	LOGO TOSHIBA (W/P-SILVER BR/H.ST)(GRAY)	PC	1,000	.	.	.	.	.
820	50000007	PLASTIZOTE (1400*1000)	PC	2,000	.	.	.	.	.

Cabinet Exploded View

N/A

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