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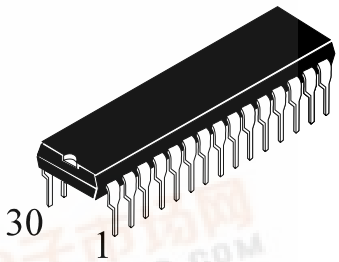
ILA1238NS

AM/FM MONO RECEIVER

ILA1238NS (analog of CXA1238S, SONY) - high-quality one-chip stereoreceiver designed for receipt of AM/FM signals of broadcasting stations. The receiver contains: high-frequency amplifiers and AM and FM mixers, AM and FM intermediate frequency amplifiers, AM and FM detectors, output decoder of stereosignal for coding system with pilot tone.

- Low consumption current (in FM mode Icc=12.5 mA, in AM mode Icc=9.5 mA at Ucc=6 V)
- LED indication of tuning
- LED indication of "STEREO" mode
- Switching-off noiseless FM tuning
- Small number of peripheral components

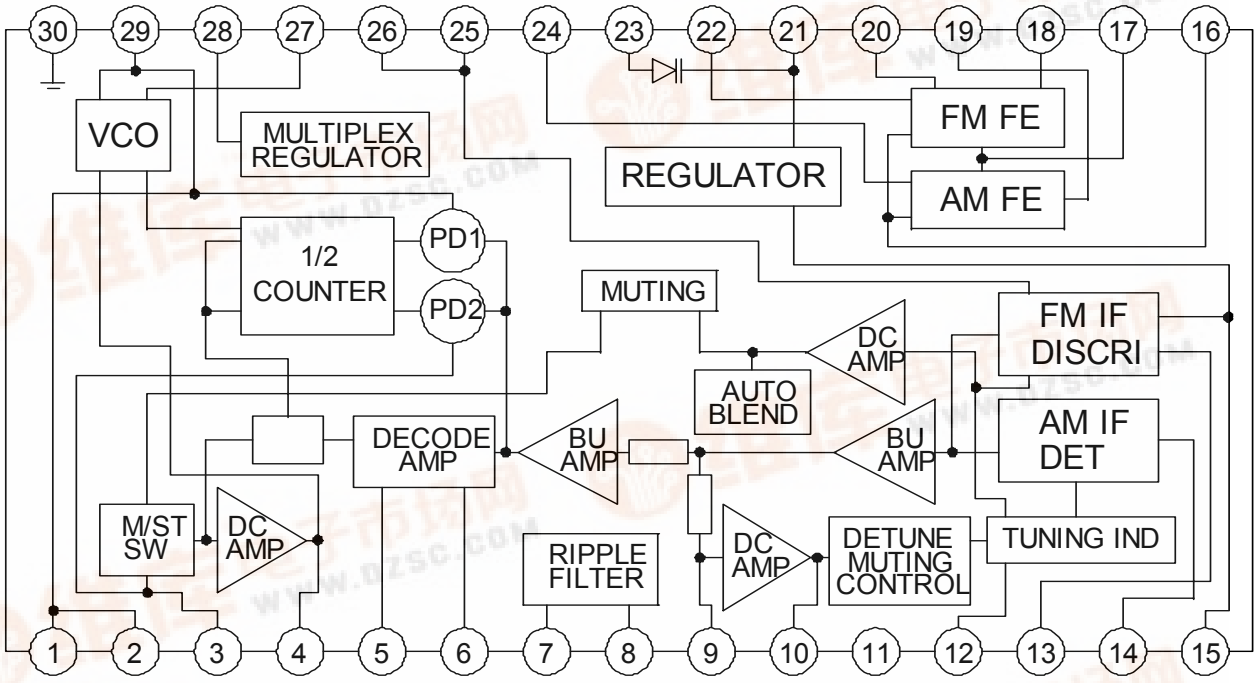


PACKAGE

30-pin mini-DIP

T_A = -10°...+70° C

BLOCK DIAGRAM



Note:
VCO - voltage controlled oscillator,
REGULATOR - reference voltage source,
MULTIPLEX REGULATOR - reference voltage source for stereodecoder,
FM FE - heterodyne oscillator, high frequency amplifier and FM path mixer,
AM FE - heterodyne oscillator, high frequency amplifier and AM path mixer,
FM IF DISCRI - intermediate frequency amplifier and FM path demodulator,
AM IF DET - intermediate frequency amplifier and AM path detector ,
TUNING IND - tuning indicator driver,
DETUNE MUTING CONTROL - muting control block,
DC AMP - DC amplifier,
BU AMP - buffer amplifier,
M/ST SW - "MONO"-"STEREO" switch,
DECODE AMP - decoder and LF signal amplifier,

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INTEGRAL

RIPPLE FILTER - internal stress source with ripple filter,
1/2 COUNTER - VCO frequency devider,
PD1,PD2 - phase detectors of VCO frequency tuning
AUTO BLEND - signal level block for VCO frequency tuning,
MUTING - “MONO” and “STEREO” modes control block.

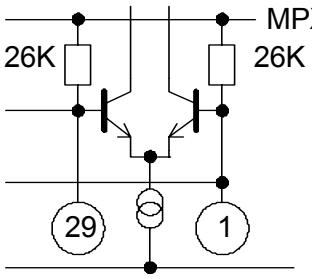
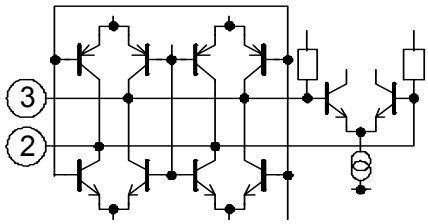
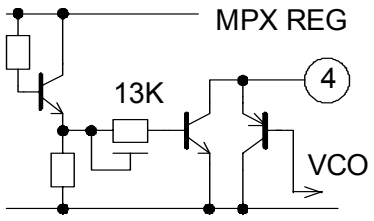
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
Ucc	Supply voltage	10	V
Topr	Operation temperature	-10 ... +70	°C
Tstg	Storage temperature	-55 ... +150	°C
Tjmax	Junction maximum temperature	125	°C
Pd	Allowable power dissipation	500	mW

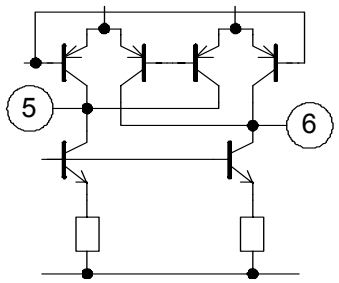
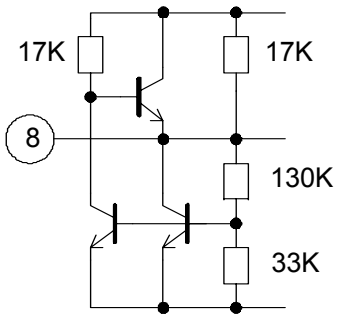
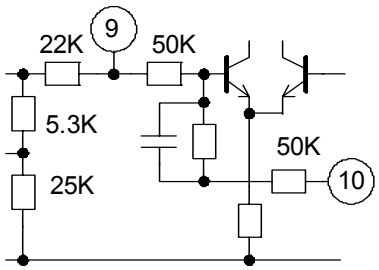
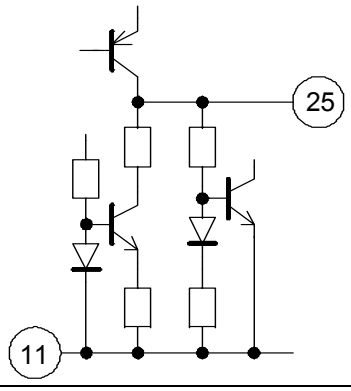
RECOMMENDED OPERATION CONDITIONS

Symbol	Parameter	Value	Unit
Ucc	Supply voltage	2.0 ... 9.0	V

PINS DESCRIPTION

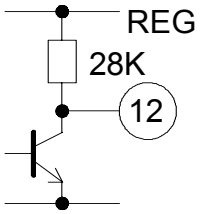
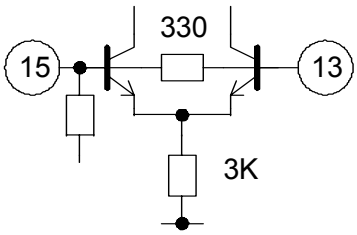
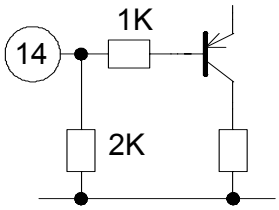
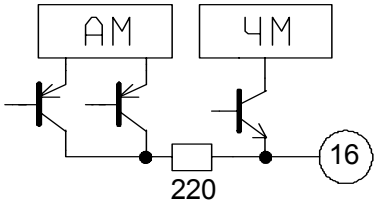
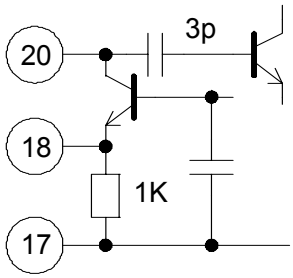
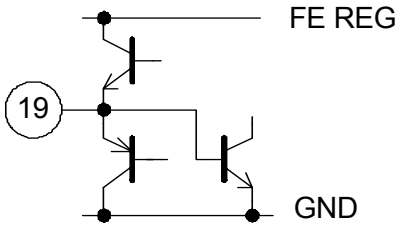
№	Symbol	Voltage, V				Equivalent electrical circuit	Description
		Ucc=3V		Ucc=6V			
		FM	AM	FM	AM		
1 29	PLL LPF1 PLL LPF2	0.86 0.86	0.86 0.86	0.86 0.86	0.86 0.86		Low frequency filter for VCO phase selftuning circuit
2 3	PILOT DET LPF1 □□□©□ PILOT DET LPF2	0.95 0.95	0.95 0.95	0.95 0.95	0.95 0.95		Pins for connecting capacitance of low frequency filter of pilot tone detector
4	ST IND VCO CHECK	1.6	1.6	4.5	4.5		Pin of indicator of "STEREO" mode and frequency control 76 kHz

PINS DESCRIPTION (CONTINUED)

№	Symbol	Voltage, V				Equivalent circuit	Description
		Ucc=3V		Ucc=6V			
		FM	AM	FM	AM		
5	Rch OUT	1.25	1.45	1.35	2.0		Right channel pin
6	Lch OUT	1.25	1.45	1.35	2.0		Left channel pin
7	Ucc	3.0	3.0	6.0	6.0		Supply
8	Ripple FILTER	2.5	2.5	4.0	4.0		Internal voltage source filter
9	AGC/AFC1	1.47	1.15	1.47	1.15		Pins of heterodyne AFC filter for FM path and AGC for AM path
10	AGC/AFC2	1.15	1.47	1.15	1.47		
11	GND	0	0	0	0		Common output of paths IF FM, IF AM and detectors
25	MUTE	0.05	0.1	0.05	0.1		Connection pin of muting time constant capacitance

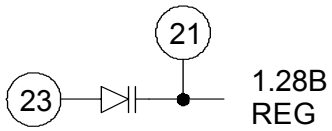
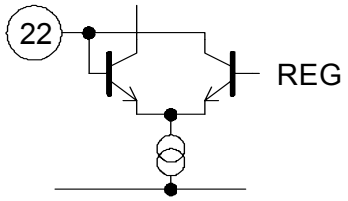
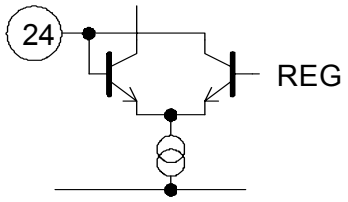
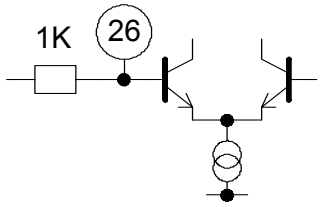
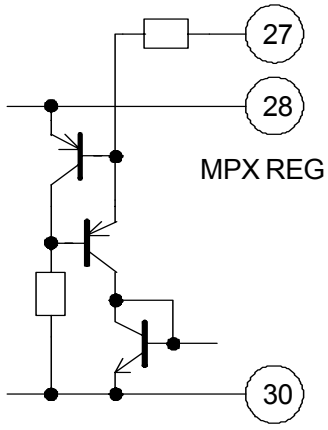
INTEGRAL

PINS DESCRIPTION (CONTINUED)

№	Symbol	Voltage, V				Equivalent circuit	Description
		Ucc=3V		Ucc=6V			
		FM	AM	FM	AM		
12	TUNE IND	1.6	1.6	4.5	4.5		Signal level indicator in FM and AM modes
13 15	FM IF IN BAND SELECT	1.28 1.28	0 0	1.28 1.28	0 0		FM IF input Bands switching output: for AM - to be connected to commom output, for FM - in free state
14	AM IF IN	0	0	0	0		input pin of AM IF
16	FM/AM FE OUT	0.4	0.35	0.8	0.35		Output pin of FM IF and AM IF mixers
17 18 20	FE GND FM RF IN FM RF	0 0.4 1.28	0 0 1.28	0 0.4 1.28	0 0 1.28		Common output of AM RF and FM RF Input of FM RF amplifier Output of FM RF amplifier
19	AM RF IN	1.28	1.28	1.28	1.28		Input of AM RF

INTEGRAL

PINS DESCRIPTION (CONTINUED)

№	Symbol	Voltage, V				Equivalent circuit	Description
		Ucc=3V		Ucc=6V			
		FM	AM	FM	AM		
21 23	REG AFC	1.28	1.28	1.28	1.28		Output of reference voltage source Output of AFC vericap
22	FM OSC	1.28	1.28	1.28	1.28		FM heterodyne output
24	AM OSC	1.28	1.28	1.28	1.28		AM heterodyne output
26	FM DISCRI	2.0	2.70	3.08	3.80		Discriminator connection output
27 28 30	VCO MPX REG GND	1.65 0	1.65 0	1.65 0	1.65 0		VCO control output for stereo-decoder Reference voltage output for stereo-decoder Common output for stereo-decoder

INTEGRAL

ELECTRICAL CHARACTERISTICS (Ta=25°C, Ucc=6 V)

№	Parameter, unit	Symbol	Value		Test conditions
			Min.	Max.	
1	Consumption current in AM mode, mA	I_{CC1}	5.0	12	Ucc=6.0 V
2	Consumption current in FM mode, mA	I_{CC2}	7.0	15	Ucc=6.0 V
3	FM RF block voltage gain, dB	A_{U1}	28	42	Ucc=6.0 V U_I=40 dBmkV f_I=100 MHz
4	FM IF sensitivity, dBmkV	S_1	-	31	Ucc=6.0 V U_I=*1 f_I=10.7 MHz Df=22.5 kHz fm=1 kHz
5	FM IF input signal level when switching over "MONO" - "STEREO", dBmkV	V_{I1}	38	48	U_I=*2 f_I=10.7 MHz fm=1 kHz
6	FM IF input signal level when switching over "STEREO" - "MONO", dBmkV	V_{I3}	35	46	U_I=*3 f_I=10.7 MHz fm=1 kHz
7	Automixing, dBmkV	V_{I2}	1	41	f_I=10.7 MHz fm=1 kHz
8	FM IF frequency deviation of standard (*4), kHz	D_{F1}	-50	50	U_I=90 dBmkV f_I=(10.7±0.05) MHz fm=1 kHz
9	Output current on tuning indicator output in FM mode, mA	I_{O2}	1.8	7.0	U_I=60 dBmkV f_I=10.7 MHz
10	Output current on "STEREO" mode indicator output, mA	I_{O1}	1.8	5.0	Ucc=6.0 V U_I=245 mV f_I=10.7 MHz fm=1 kHz
11	Output signal attenuation factor in MUTE mode, dB	A_1	16	30	U_I=245 mV MONO fm=1 kHz
12	Channel separation ratio, dB	Cd_{NC}	30	-	Ucc=6.0 V U_I=90 dBmkV f_I=10.7 MHz Df=22.5 kHz fm=1 kHz Modulation on R and L channels
13	Output voltage in FM "MONO" mode, mV	U_{O1}	35	138	Ucc=6.0 V U_I=90 dBmkV f_I=10.7 MHz Df=22.5 kHz fm=1 kHz
14	Output voltage in FM "STEREO" mode, mV	U_{O2}	20	138	Ucc=6.0 V U_I=90 dBmkV f_I=10.7 MHz Df=22.5 kHz fm=1 kHz

ELECTRICAL CHARACTERISTICS (Ta=25°C, Ucc=6 V) (continued)

№	Parameter, unit	Symbol	Value		Test conditions
			Min.	Max.	
15	Harmonic factor in FM "MONO" mode, %	Kh_1	-	2.0	Ucc=6.0 V U_I=90 dBmkV f_I=10.7 MHz Df=75 kHz fm=1 kHz
16	Harmonic factor in FM "STEREO" mode, %	Kh_2	-	2.0	Ucc=6.0 V U_I=90 dBmkV f_I=10.7 MHz Df=75 kHz fm=1 kHz
17	AM RF voltage gain, dB	A_{U2}	19	28	U_I=60 dBmkV f_I=1660 kHz
18	Sensitivity (*5) of AM IF, dBmkV	S_2	15	29	Ucc=6.0 V Uo=15.5 mV f_I=465 kHz fm=1 kHz 30% MOD
19	Output current on tuning indicator output in AM mode, mA	I_{O3}	1.3	7.0	U_I=85 dBmkV f_I=465 kHz
20	Output voltage in AM mode, mV	U_{O3}	35	138	Ucc=6.0 V U_I=85 dBmkV f_I=465 kHz fm=1 kHz 30% MOD
21	Harmonic factor in AM mode, %	Kh_3	-	2.0	Ucc=6.0 V U_I=95 dBmkV f=1660 kHz fm= 1kHz 30% MOD

Notes:

*1 - Input signal level must be within the limits, that the signal on output makes minus 3 dB of output signal at UI=31.6 мВ.

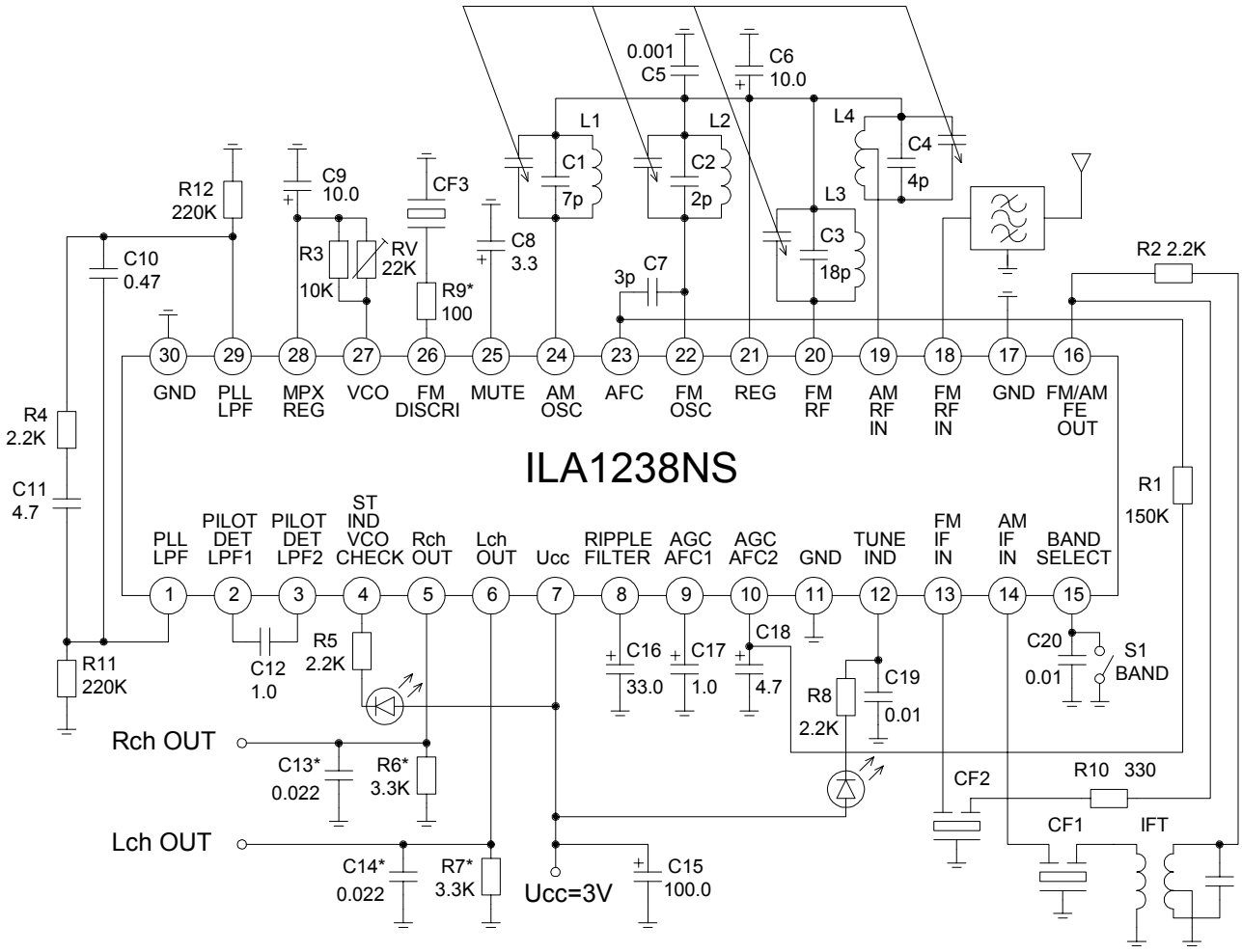
*2 - Input signal level is set equal to 0 mkV and then is raised up to the moment when "STEREO" mode indicator switches on.

*3 - Input signal level is set equal to 1 mV and then is reduced to the moment when "STEREO" mode indicator switches off.

*4 - Frequency deviation at which voltage constant on output 10 (AGC/AFC2) is equal to the voltage on output 21 (REG), of path central frequency (10.7 MHz).

*5 - Sensitivity means that signal level on AM IF input at which voltage on channel outputs is set equal to 15.5 mV (active value)

TYPICAL APPLICATION CIRCUIT



CF1 - filter 465 kHz, CF2 - filter 10.7 MHz,
CF3 - piezoelectric discriminator,
IFT - matching transformer for 465 kHz (parameters are given above).

Fig.10