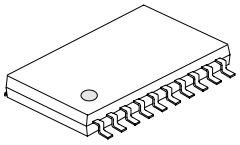
SINGLE STANDARD VIF-PLL DEMODULATOR AND FM-PLL DETECTOR

DESCRIPTION

The SA9801 is a monolithic integrated circuit for vision and sound IF signal processing in TV and VTR sets and multimedia front-ends.



SOP-20-375-1.27

FEATURES

* Suitable for negative vision modulation
* Applicable for IF frequencies of 38.9, 45.75 and 58.75 MHz
* Gain controlled wide-band Vision Intermediate Frequency (VIF) amplifier (AC-coupled)
* True synchronous demodulation with active carrier regeneration (ultra-linear demodulation, good intermodulation figures, reduced harmonics and excellent pulse response)
* Peak sync pulse AGC
* Video amplifier to match sound trap and sound filter
* AGC output voltage for tuner with fixed resistor for takeover point setting
* AFC detector without extra reference circuit
* Alignment-free FM-PLL detector with high linearity
* Stabilizer circuit for ripple rejection and to achieve constant output signals
* 5 to 9 V positive supply voltage range
* Low power consumption of 300 mW at 5 V supply voltage.

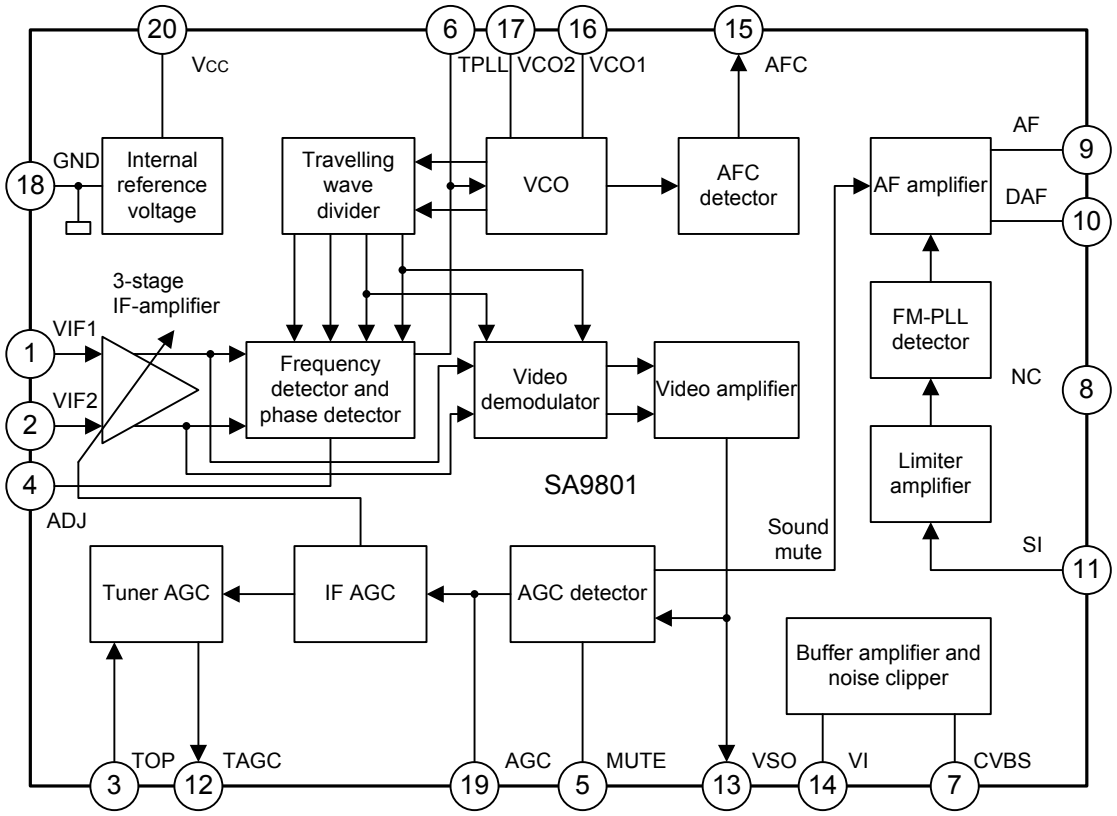
APPLICATIONS

* TV, VTR, PC and stb applications.

ORDERING INFORMATION

Part No.	Package	Marking
SA9801	SOP-20-375-1.27	SA9801

BLOCK DIAGRAM



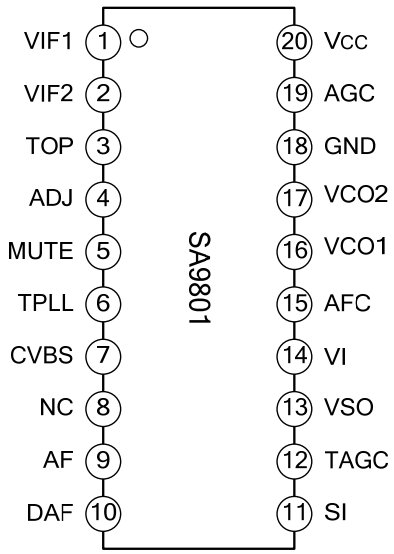
ABSOLUTE MAXIMUM RATING In accordance with the Absolute Maximum Rating System (IEC 134).

PARAMETER	SYMBOL	CONDITIONS	MIN.	MAX.	UNIT
Supply Voltage	V_{CC}	ICC= 70 mA; Tamb =70 °C; maximum chip temperature 125 °C for SA9801 128 °C for SA9801T	 0 0	 9.9 9.9	 V V
Voltage On Pins VIF1, VIF2, AFC And AGC Pin TAGC	V_n		0 −	V_{CC} 13.2	V V
Maximum Short-Circuit Time	$t_{sc(max)}$	to ground or VCC	−	10	s
Storage Temperature	T_{stg}		−25	+150	°C
Ambient Temperature	T_{amb}		−20	+70	°C

QUICK REFERENCE DATA

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}		4.5	5.0	9.9	V
Supply Current	I_{CC}	V_{CC} = 9 V	52	61	70	mA
Sensitivity Of VIF Input Signal (RMS Value)	$V_{i(sens)(VIF)(rms)}$	−1 dB video at output; f_{PC} = 38.9 or 45.75 MHz	−	50	90	μV
Maximum Input Voltage (RMS Value)	$V_{i(max)(rms)}$	+1 dB video at output; f_{PC} = 38.9 or 45.75 MHz	70	150	−	mV
IF Gain Control	GIF	f_{PC} = 38.9 or 45.75 MHz	64	70		dB
CVBS Output Voltage (Peak-To-Peak Value)	$V_{o(CVBS)(p-p)}$	V_{CC} = 5 V	1.7	2.0	2.3	V
−3 dB Video Bandwidth	Bv(−3dB)	CL < 20 pF; RL >1kΩ	6	8	−	MHz
Weighted Signal-To-Noise Ratio	S/NW	V_{CC} = 5 V	56	60	−	dB
Intermodulation Attenuation At F = 0.92 or 1.1 Mhz	$\alpha_{IM(0.92/1.1)}$	for BLUE	56	62	−	dB
Intermodulation Attenuation At F = 2.76 or 3.3 Mhz	$\alpha_{IM(2.76/3.3)}$	for BLUE	56	62	−	dB
Harmonics Suppression In Video Signal	$\alpha_{H(sup)}$		35	40	−	dB
Maximum Output AF Signal Handling Voltage (RMS Value)	$V_{o(AF)(max)(rms)}$	THD < 1.5%	0.8	−	−	V
Ambient Temperature	T_{amb}		−20	−	+70	°C

PIN CONFIGURATION



PIN DESCRIPTION

Pin No.	Pin Name	I/O	Function description
1	VIF1	I	VIF differential input 1
2	VIF2	I	VIF differential input 2
3	TOP	I	tuner AGC TakeOver Point (TOP) connection
4	ADJ	I	phase adjust connection
5	MUTE	I	sound mute switch connection
6	TPLL	I/O	PLL time constant connection
7	CVBS	O	CVBS (positive) video output
8	NC	-	not connected
9	AF	O	AF output
10	DAF	I/O	AF amplifier decoupling capacitor connection
11	SI	I	sound intercarrier input
12	TAGC	O	tuner AGC output
13	VSO	O	video and sound intercarrier output
14	VI	I	buffer amplifier video input
15	AFC	O	AFC output
16	VCO1	I/O	VCO1 reference circuit for 2fPC
17	VCO2	I/O	VCO2 reference circuit for 2fPC
18	GND	-	ground supply (0 V)
19	AGC	I/O	AGC detector capacitor connection
20	V_{CC}	-	supply voltage (+5 V)

FUNCTION DESCRIPTION

1. Video demodulator

Before the video demodulator, An VIF amplifier with AGC amplifies the VIF signal, and after demodulator and trap filter, pin CVBS provides a positive video signal of 2 V (p-p). Noise clipping is provided internally.

The true synchronous video demodulator is realized by a linear multiplier which is designed for low distortion and wide bandwidth. The vision IF input signal is multiplied with the 'in phase' component of the VCO output. The demodulator output signal is fed via an integrated low-pass filter (fg = 12 MHz) for suppression of the carrier harmonics to the video amplifier.

2. Sound demodulation

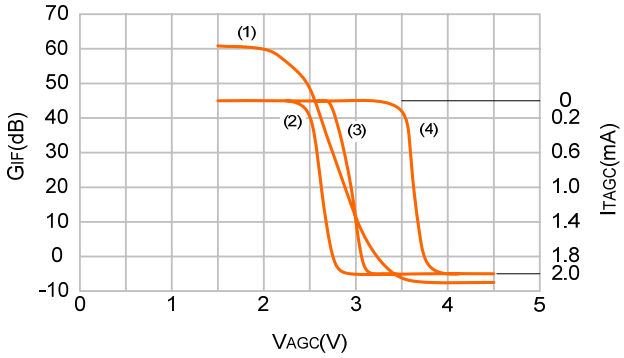
The FM sound intercarrier signal is fed to pin SI and through a limiter amplifier before it is demodulated.The result is high sensitivity and AM suppression.The limiter amplifier consists of 7 stages which are internally AC-coupled in order to minimizing the DC offset. An FM-PLL operates as an FM demodulator.

The audio frequency amplifier with internal feedback is designed for high gain and high common-mode rejection. The low-level AF signal output from the FM-PLL demodulator is amplified and buffered in a low-ohmic audio output stage. An external decoupling capacitor CDAF removes the DC voltage from the audio amplifier input.

By using the sound mute switch (pin MUTE) the AF amplifier is set in the mute state.

3. Tuner AGC

The voltage on capacitor CAGC of SA9801 is transferred to an internal IF control signal, and is fed to the tuner AGC to generate the tuner AGC output current on pin TAGC (open-collector output). The tuner AGC takeover point level is set by pin TOP. This allows the tuner to be matched to the SAW filter in order to achieve the optimum IF input level.



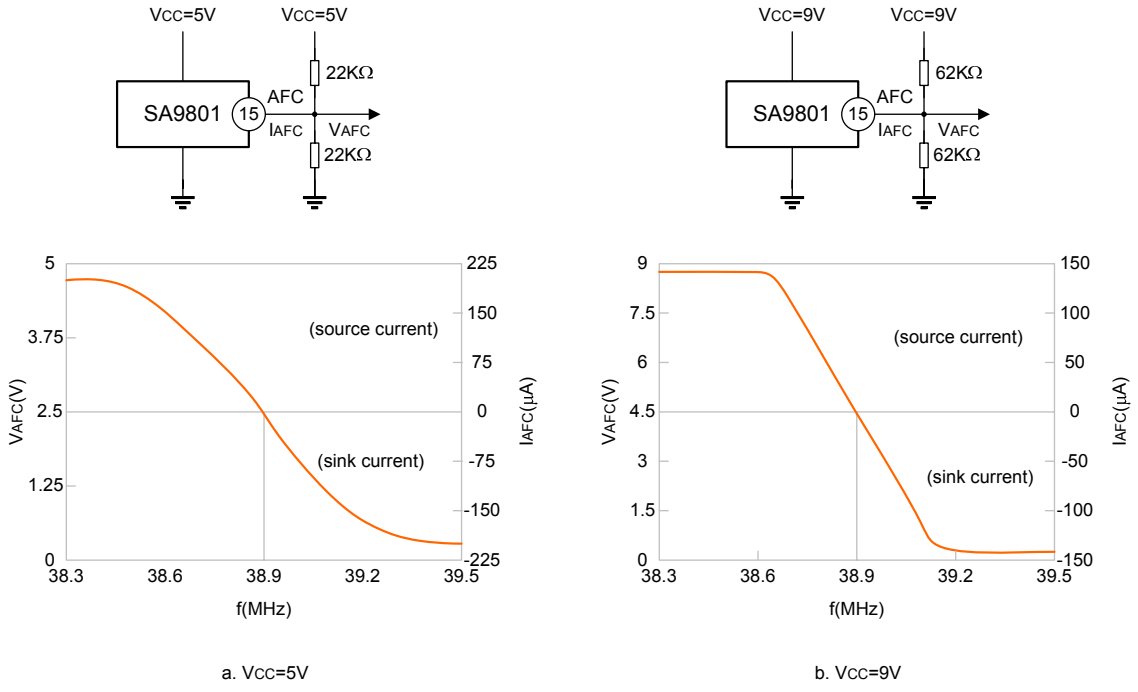
(1) GIF(IF gain control)
(2) RTOP=22KΩ
(3) RTOP=13KΩ
(4) RTOP=0Ω

IF AGC gain control and tuner AGC output current as a function of the tuner AGC detector voltage.

4. AFC Circuit

The VCO of SA9801 operates with a symmetrically connected reference LC circuit, operating at the double vision carrier frequency. Frequency control is performed by an internal variable capacitor diode.

The voltage to set the VCO frequency to the actual double vision carrier frequency is also amplified and converted for the AFC output current.



a. VCC=5V

b. VCC=9V

AFC measurement conditions and typical characteristics.

TYPICAL APPLICATION CIRCUIT

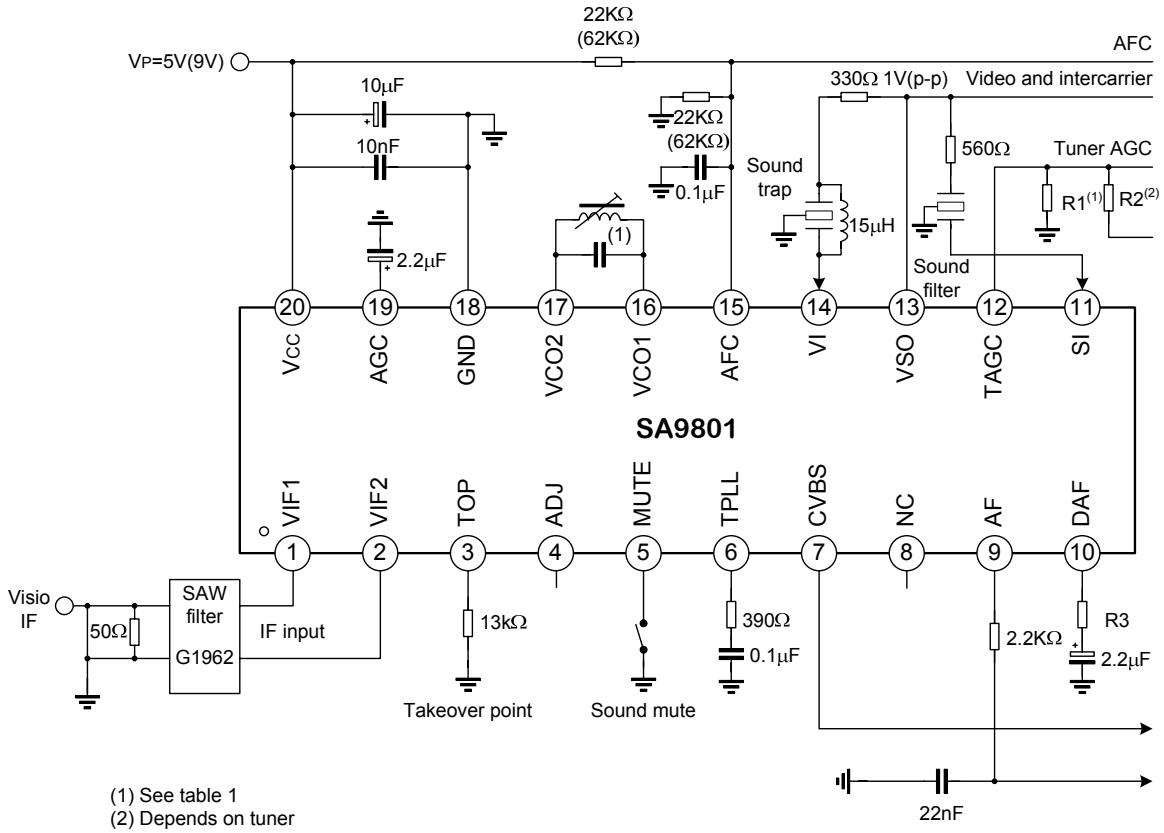
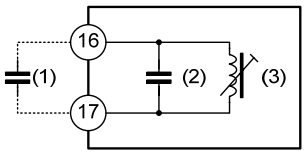
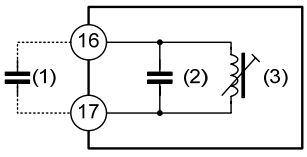
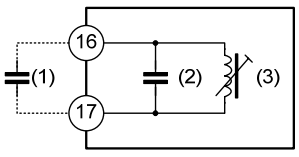
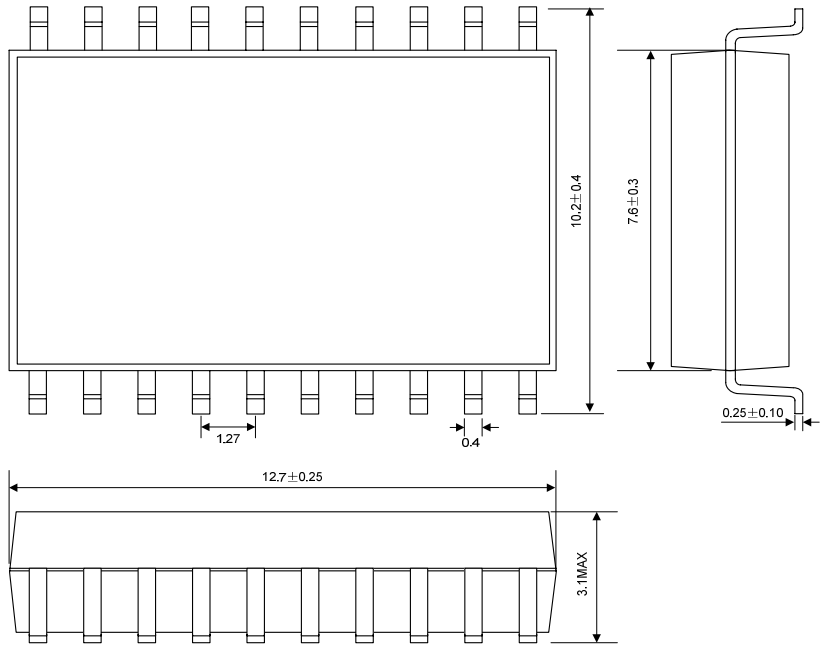


Table1 Oscillator circuit for different TV standards

PARAMETER	EUROPE	USA	JAPAN
IF frequency	38.9 MHz	45.75 MHz	58.75 MHz
VCO frequency	77.8 MHz	91.5 MHz	117.5 MHz
Oscillator circuit	 (1) CVCO=8.5pF (2) C=8.2±0.25pF (3) L=251nH	 (1) CVCO=8.5pF (2) C=10±0.25pF (3) L=163nH	 (1) CVCO=8.5pF (2) C=15±0.25pF (3) L=78nH

PACKAGE OUTLINE

SOP-20-375-1.27 UNIT: mm



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