



SANYO Semiconductors

DATA SHEET

LA77000V — Monolithic Linear IC

VHF Band RF Modulator (US3, 4ch Compatible)

Overview

The LA77000V is a VHF band RF module that supports US3, 4ch Compatible.

Functions

- RF VCO (AGC).
- RF Mixer.
- RF Buffer.
- Video clamp.
- White clipping.
- Audio FM.
- 4V regulator.
- Reference OSC.

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply rating	$V_{CC\text{ max}}$		7.0	V
Allowable power dissipation	$P_{d\text{ max}}$	$T_a \leq 75^\circ\text{C}$	350*	mW
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Mounted to the glass epoxy resin made board (114.3mm×76.1mm×1.6mm)

Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V_{CC}		5.0	V
Operating voltage range	$V_{CC\text{ op}}$		4.5 to 5.5	V

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LA77000V

Electrical Characteristics/Operating Characteristics at Ta = 25°C, V_{CC} = 5.0V, Measured with US3ch unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain 1	I _{CC1}	No signal, pin 6 high	28	41	53	mA
Current drain 2	I _{CC2}	No signal, pin 6 low	15	22	29	mA
Regulator voltage	V _{reg}	No signal	3.7	3.9	4.1	V
Antenna driver voltage	V _{ant}	Pin 6 high, 220Ω load	3.2	3.5	3.8	V
Negative Resistance (pin7)	-R	Cl≤100	1.2	2.2		kΩ
RF type						
Video carrier frequency accuracy	F _p	F _p (US3ch): 61.25MHz X'tal accuracy 30ppm	-25		25	kHz
Video carrier frequency stability	F _{pt}	X'tal accuracy 30ppm Ta = 4°C to 38°C	-25		25	kHz
Video carrier output US	P _{us}	No signal (Note 1)	85.5	87.5	89.5	dBμ
Audio carrier output ratio	P/S	S: f _p + 4.5MHz	14.5	16	17.5	dB
Audio 2 nd harmonic distortion	P/S2	S2: f _p + 2 × 4.5MHz	50	65		dB
Audio 3 rd harmonic distortion	P/S3	S3: f _p + 3 × 4.5MHz	45	55		dB
Chroma beat	P/CB	Vin = 3.58MHz, 0.6Vp-p CB: f _p + 920kHz	65	74		dB
Video harmonic distortion	P/V2	Vin = 1MHz, 1Vp-p V2: f _p + 2MHz	45	72		dB
Video type						
Video modulation	M _p	Vin = Stair step, 1Vp-p	75	80	85	%
White clip level	W _{CL}	Vin = Stair step, 1.5Vp-p	90	95	99	%
Differential gain	D _G	Vin = 10-Stair step, 1Vp-p (Note 2)	-5		5	%
Differential phase	D _P	Vin = 10-Stair step, 1Vp-p (Note 2)	-5		5	°C
Video signal frequency response	R _{fV}	Vin = CW, 1Vp-p 0.75 MHz to 3.75MHz	-1.1	-0.4	0.3	dB
Video S/N	V _{S/N}	Vin = 50% 4.2MHz LPF ON		50		dB
Audio type						
Audio carrier frequency accuracy	F _s	X'tal accuracy 30ppm	-5		5	kHz
Audio modulation	M _s	Ain = 1kHz, 1Vp-p (Note 3)	90	100	110	%
Maximum audio modulation	M _{smx}	THD < 3%	400			%
Audio distortion	THD	Ain = 1 kHz, 1Vp-p		0.4	2	%
Audio S/N	A _{S/N}	Ain = 1 kHz, 1Vp-p Vin = Color bar, 1Vp-p	45	50		dB

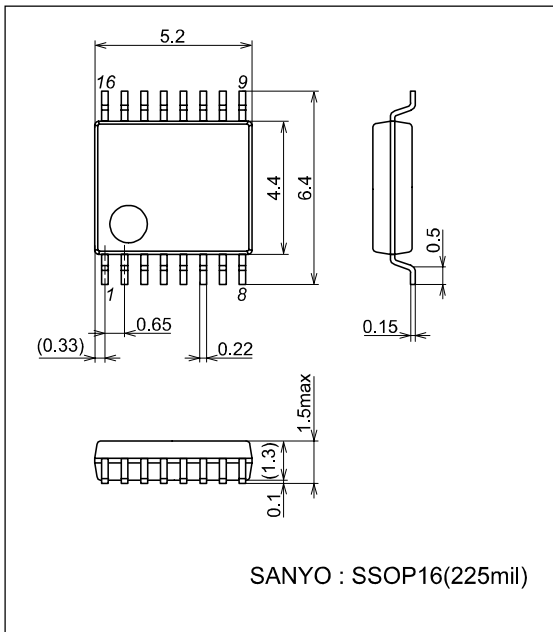
Note 1: 9.5dB added to the R_{FOUT} value measured with a spectrum analyzer of the input impedance of 50Ω.

Note 2: Difference between 1 stair step and 8 stair step of 10 stair step.

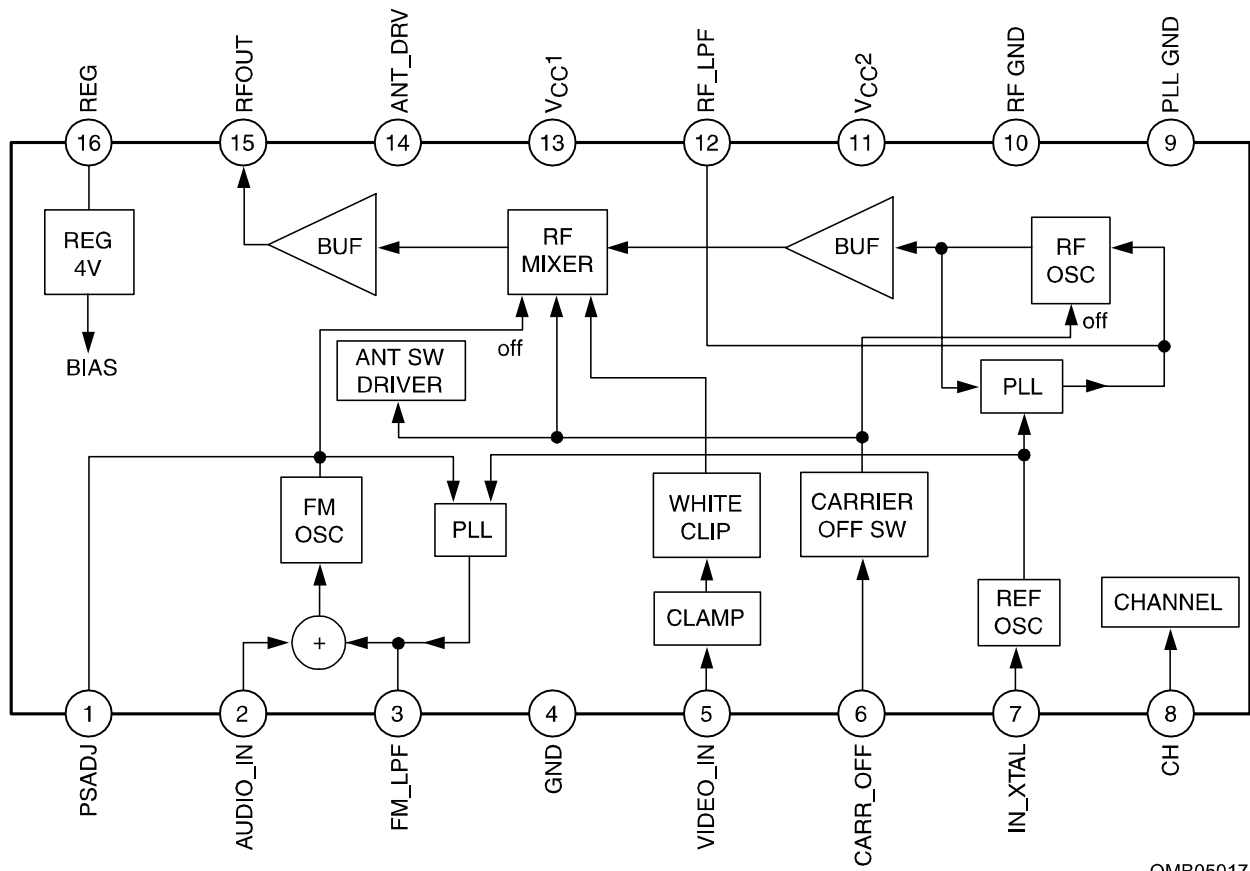
Note 3: 100% = ±25kHz modulation.

Package Dimensions

unit : mm
3178B



Block Diagram



OMB05017

Pin equivalent circuit

Pin No.	Symbol	Voltage	Circuit	Remarks
1	P/S ADJ	2.7		Capacitor and additionally a Resistor may inserted between the circuit and GND attenuate the audio inter-carrier level.
2	AUDIO IN	0		FM audio Input.
3	FM LPF	2.2		Control pin of output FM oscillator for the PLL phase detector charge pump.
4	GND	0		
5	VIDEO IN	2.6		Video Input Clamped with sink chip.
6	CARR OFF	-		Hi:14pin Hi RF Operating Lo:14pin Lo RF Stop

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LA77000V

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Pin No.	Symbol	Voltage	Circuit	Remarks
7	IN XTAL	3.5		4MHz oscillator inserted between the circuit and GND. External input of the 4MHz signal possible. Insertion of about 270kΩ resistor between the circuit and GND ensures compatibility with 3.58MHz of VTR chroma sub-carrier. Insertion of about 270kΩ resistor between the circuit and VCC ensures compatibility with 27MHz of D-STB reference.
8	CH	1.7		CH selector pin US3: 4.2V or more US4: 2.7V to 3.8V
9	PLL GND	0		PLL type GND
10	RF GND	0		RF type GND
11	V _{CC} ²	5.0		RF VCO type V _{CC}
12	RF LPF	2.6		Control pin of output RF oscillator for the PLL phase detector charge pump.

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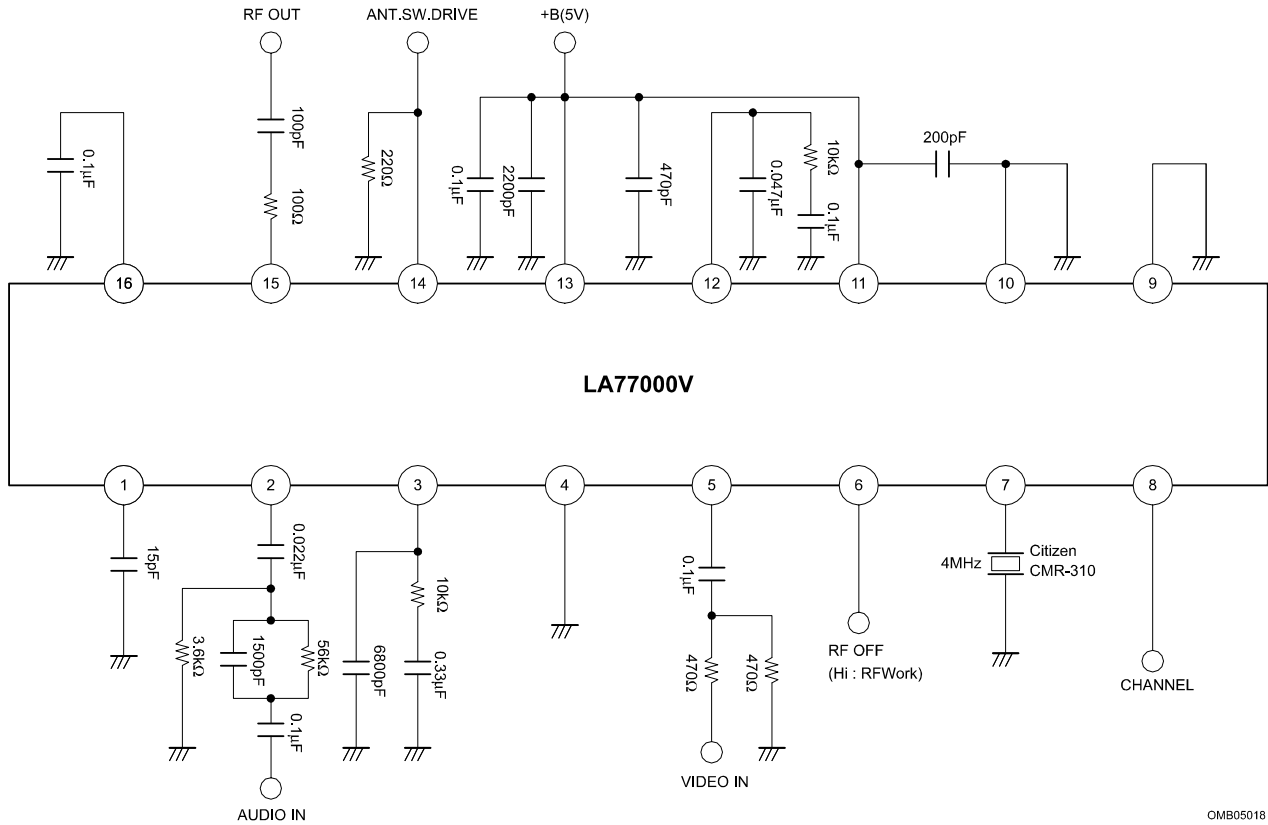
LA77000V

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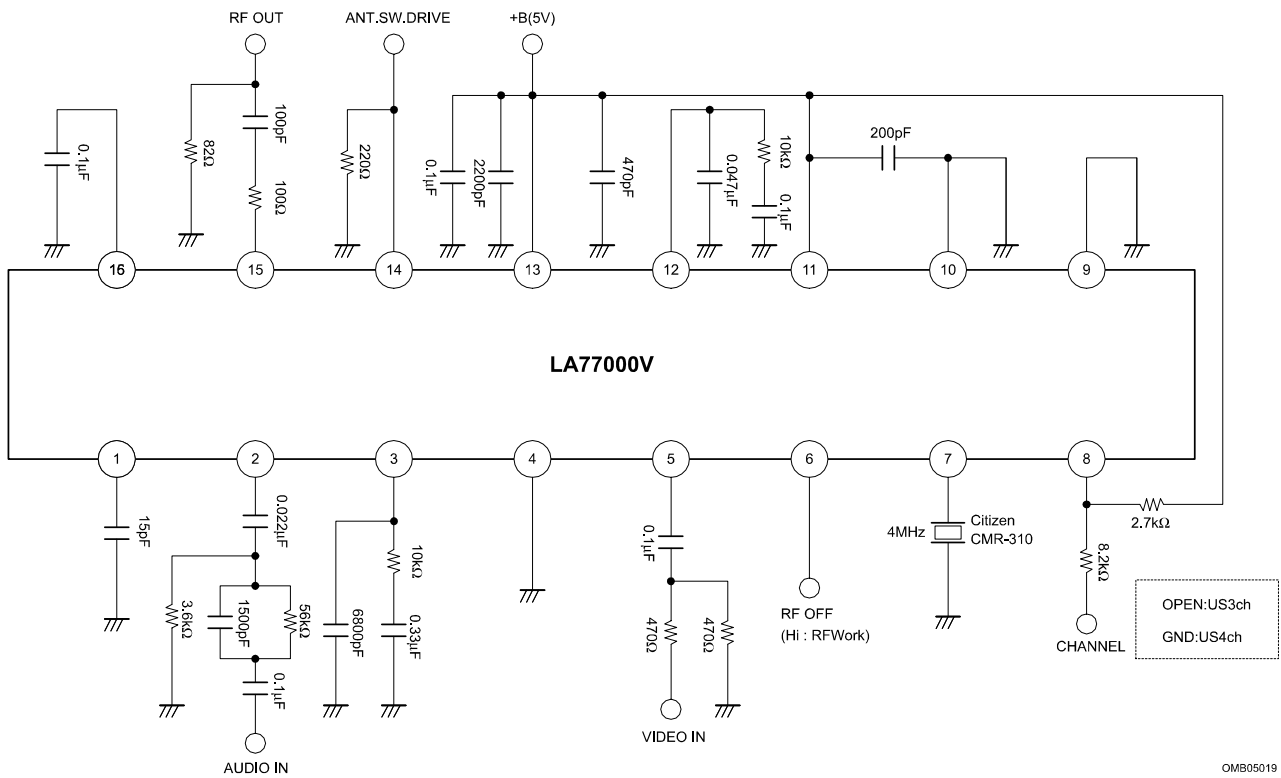
Pin No.	Symbol	Voltage	Circuit	Remarks
13	V _{CC} 1	5.0		V _{CC}
14	ANT DRV	3.5		Antenna SW driver pin. 15mA drive.
15	RF OUT	3.0		RF mixed signal output.
16	REG	3.9		Regulator output.

LA77000V

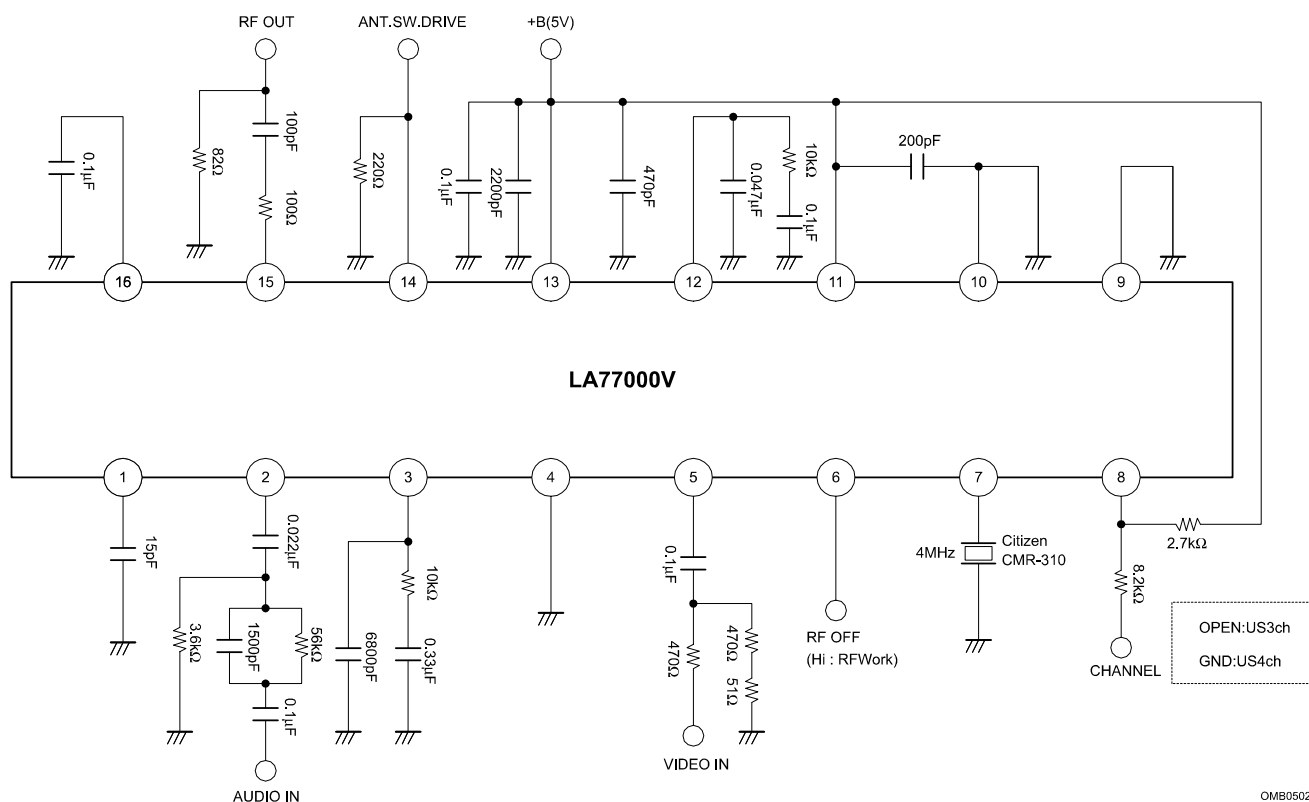
Test Circuit



Sample Application Circuit 1 (USch) for VCR



Sample Application Circuit 2 (USch) for STB



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