

Monolithic Linear IC

**LA7161V**



**VHF Band RF Modulator**

**Overview**

The LA7161V is an RF modulator which generates, from a baseband video and audio signal, PLL frequency synthesized RF TV channel signal in VHF band.

**Features**

- 5V operation.
- PLL synthesized RF VCO (US : 3ch, 4ch, JPN : 1ch, 2ch , TWN : 13ch only), channel selection accomplished using two pins.
- PLL synthesized (4.5MHz frequency) and tankless audio FM.
- The 4 or 3.58MHz (color subcarrier) reference frequency for PLL can either be generated internally or input from an external source.

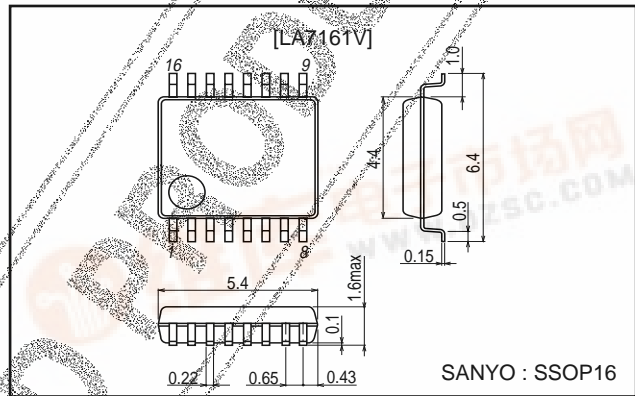
**Functions**

- RF VCO
- RF mixer
- RF buffer
- Video clamp
- White clip
- Audio FM
- 4V regulator
- Reference OSC

**Package Dimensions**

unit: mm

**3178-SSOP16**



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## LA7161V

### Specifications

#### Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max		7	V
Allowable power dissipation	P <sub>d</sub> max		* 350	mW
Operating temperature	T <sub>opr</sub>		-20 to +75	°C
Storage temperature	T <sub>stg</sub>		-55 to +150	°C

Note : When mounted on a glass epoxy resin circuit board (114.3mm × 76.1mm × 1.6mm)

#### Operating Conditions at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>		5	V
Operating voltage range	V <sub>CC</sub> op		4.5 to 5.5	V

#### Operating Characteristics at Ta=25°C, V<sub>CC</sub>=5V, US 3ch unless otherwise specified

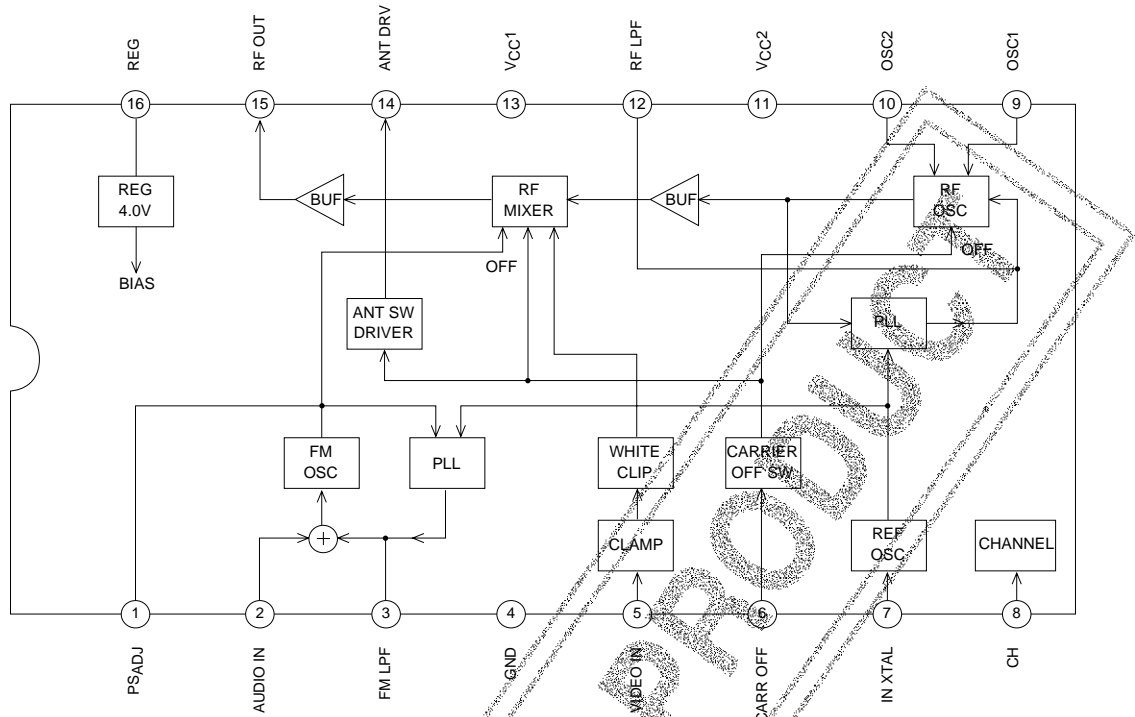
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current 1	I <sub>CC1</sub>	No signal, pin 6, high	26	37	48	mA
Supply current 2	I <sub>CC2</sub>	No signal, pin 6, low	17	25	23	mA
Regulator voltage	V <sub>reg</sub>	No signal	3.7	3.9	4.1	V
ANT SW driver	V <sub>ANT</sub>	Pin 6, high, 220Ω load	3.2	3.5	3.8	V
RF output US	P <sub>US</sub>	No signal	*2 84	87	90	dBμ
RF output JP	P <sub>JP</sub>	No signal, JPN 1ch	*2 83.5	86.5	89.5	dBμ
RF output TWN	P <sub>TW</sub>	No signal, TWN 13ch	*2 83	86	89	dBμ
P/S ratio	P/S	S : fp+4.5MHz	13.5	16	18.5	dB
4.5MHz 2nd harmonics	P/S2	S2 : fp+2×4.5MHz	50	65	-	dB
4.5MHz 3rd harmonics	P/S3	S3 : fp+3×4.5MHz	50	55	-	dB
920kHz beat	P/CB	V <sub>IN</sub> =3.58MHz, 0.6Vp-p CB : fp+920kHz	65	72	-	dB
Video harmonics	P/V2	V <sub>IN</sub> =1MHz, 1Vp-p V2 : fp+2MHz	45	65	-	dB
Video modulation	M <sub>p</sub>	V <sub>IN</sub> =Stair step, 1Vp-p	75	80	85	%
White clip level	WCL	V <sub>IN</sub> =Stair step, 1.5Vp-p	88	93	98	%
Differential gain	DG	V <sub>IN</sub> =Stair step, 1Vp-p	-5	-	+5	%
Differential phase	DP	V <sub>IN</sub> =Stair step, 1Vp-p	-5	-	+5	Deg
Audio modulation	M <sub>S</sub>	A <sub>IN</sub> =1kHz, 1Vp-p	*3 90	100	110	%
Maximum audio modulation	M <sub>S</sub> max	THD<3%	400	-	-	%
Audio THD	THD	A <sub>IN</sub> =1kHz, 1Vp-p	-	0.4	2	%
Audio S/N	S/N	A <sub>IN</sub> =1kHz, 1Vp-p V <sub>IN</sub> =Color bar, 1Vp-p	45	52	-	dB

Notes \*2 : Measure the pin RF OUT with a spectrum analyzer of 50Ω input impedance and add 9.5 dB to that value.

\*3 : 100% ±25kHz modulation.

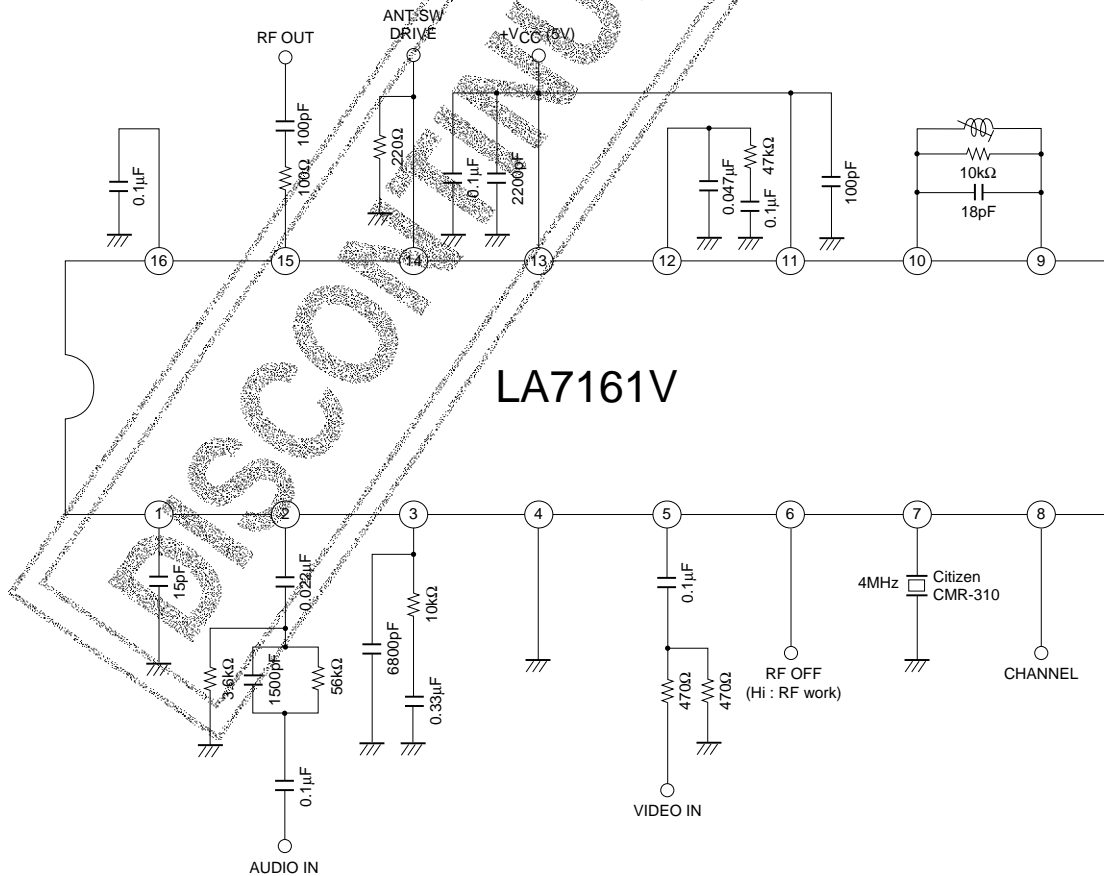
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## Equivalent Circuit Block Diagram



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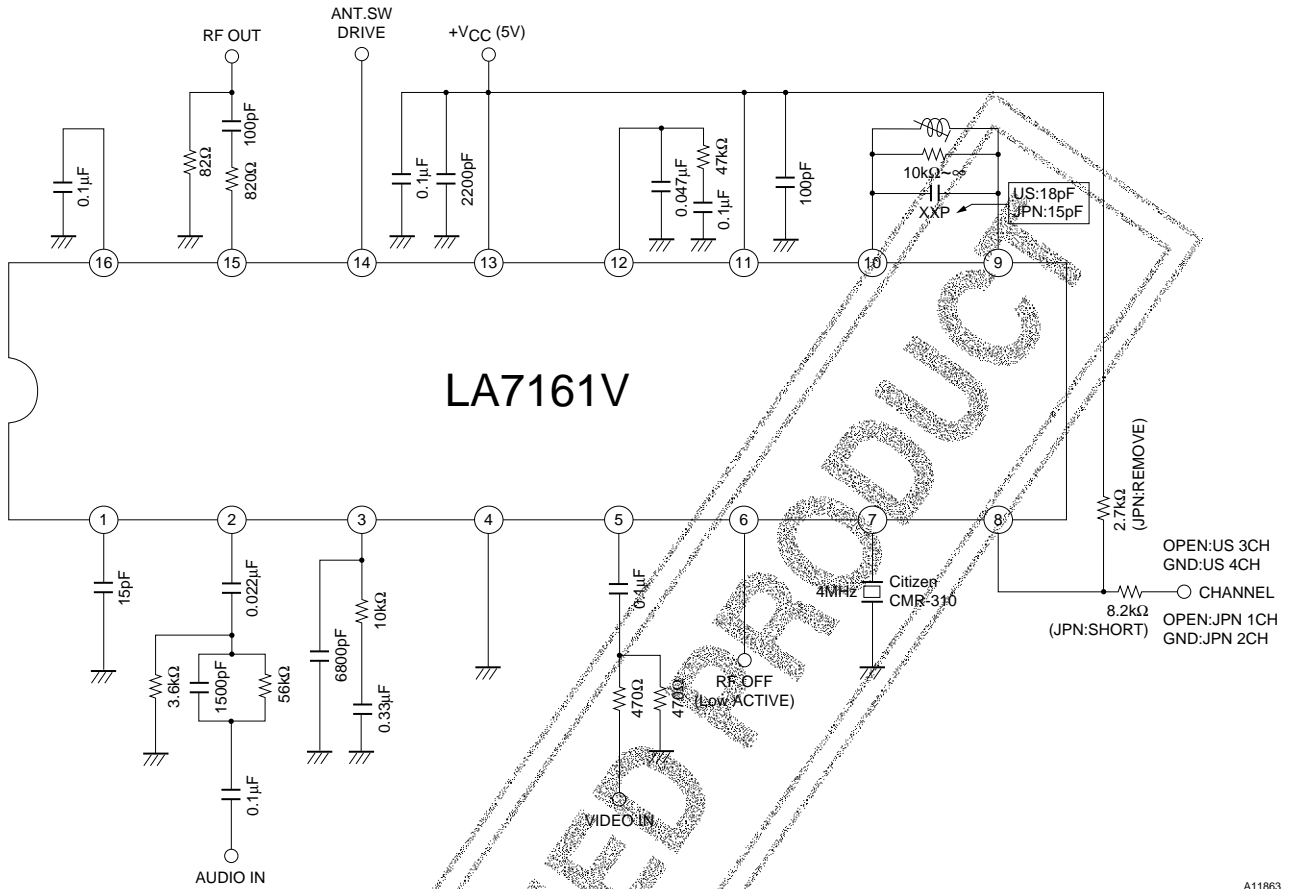
## Test Circuit (US CH)



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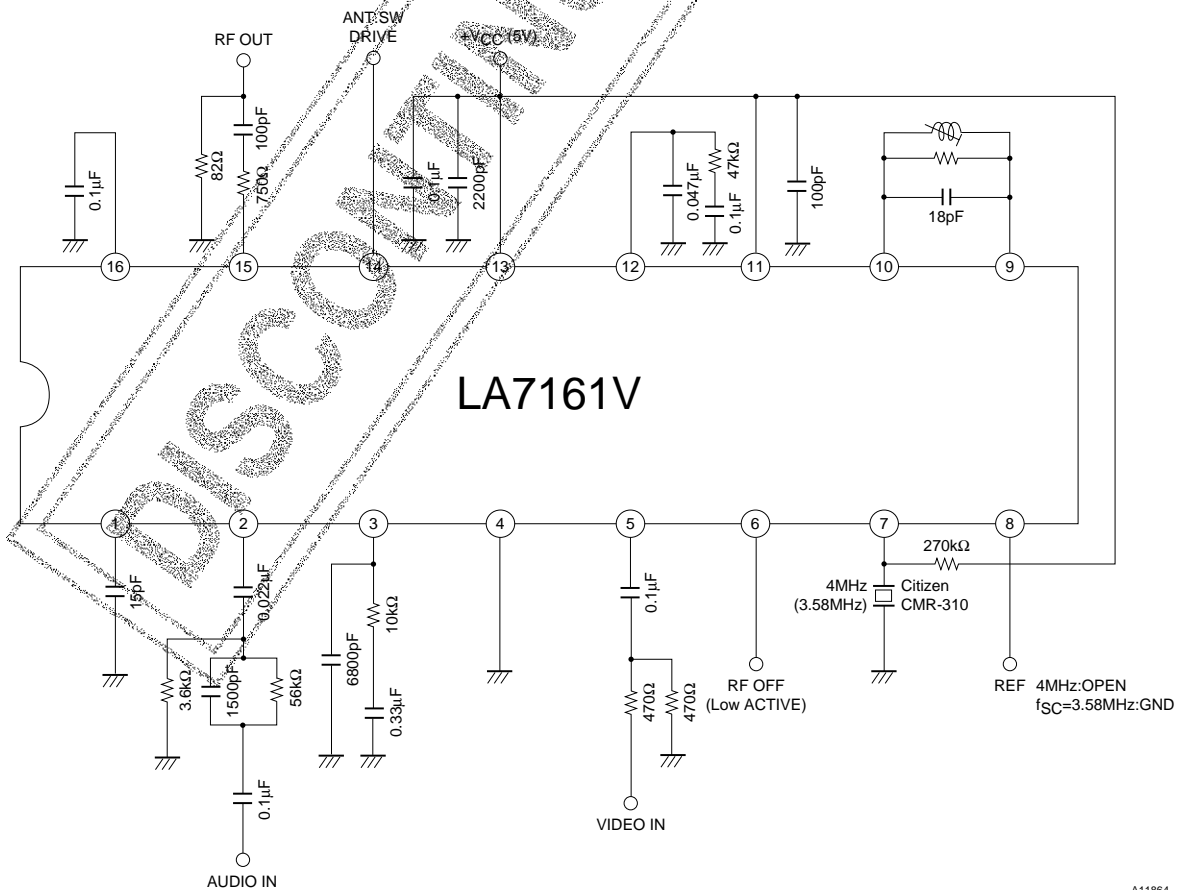
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## Sample Application Circuit (US, JPN CH)



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## Sample Application Circuit (TWN CH)



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### Application for Channel Selection

Channel	Reference Frequency (MHz)	Voltage of PIN8 (V)	A Resistor between PIN7 and GND (kΩ)	A Resistor between PIN8 and GND (kΩ)
US3	4.0	over 4.2	W/O	W/O
	3.58	same as above	W	W/O
US4	4.0	2.7 to 3.8	W/O	W/O
	3.58	same as above	W	W/O
JPN1	4.0	1.2 to 2.3	W/O	W/O
	3.58	same as above	W	W/O
JPN2	4.0	under 0.8	W/O	W/O
	3.58	same as above	W	W/O
TWN13	4.0	1.2 to 2.3	W/O	W
	3.58	under 0.8	W/O	W

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