

**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**

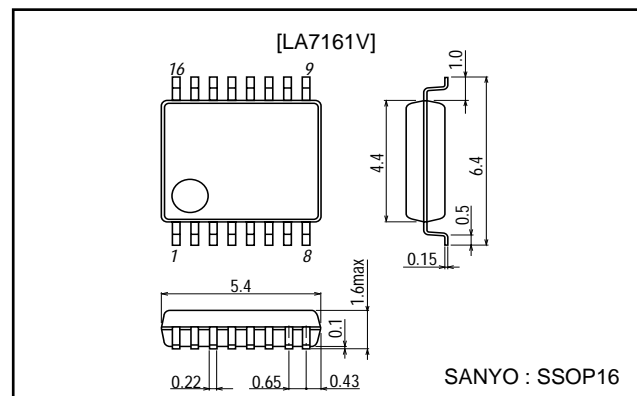
- 5V operation.
- PLL synthesized RF VCO (US : 3ch, 4ch, JPN : 1ch, 2ch , TWN : 13ch only), channel selection accomplished using two pins.
- PLL synthesized (4.5MHz frequency) and tankless audio FM.
- The 4 or 3.58MHz (color subcarrier) reference frequency for PLL can either be generated internally or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

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

# 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

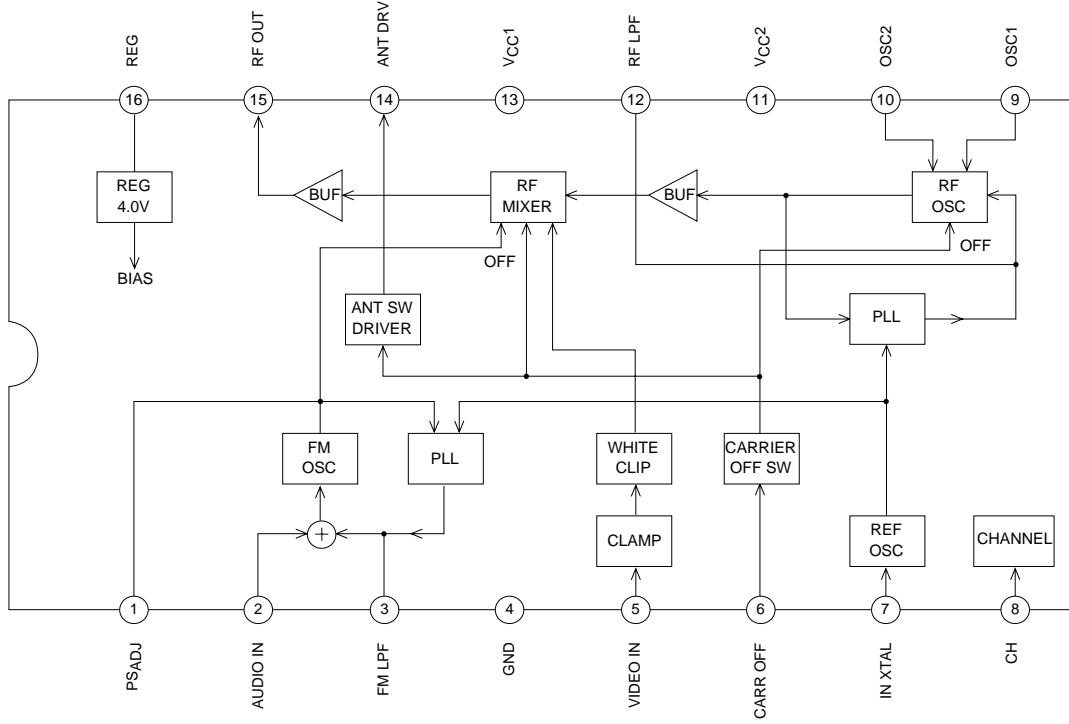
| Parameter                | Symbol             | Conditions  | Ratings |      |      | Unit |
|--------------------------|--------------------|---|---------|------|------|------|
|                          |                    |   | min     | typ  | max  |      |
| Supply current 1         | I <sub>CC1</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<br>CB : fp+920kHz               | 65      | 72   | -    | dB   |
| Video harmonics          | P/V2               | V <sub>IN</sub> =1MHz, 1Vp-p<br>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<br>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.

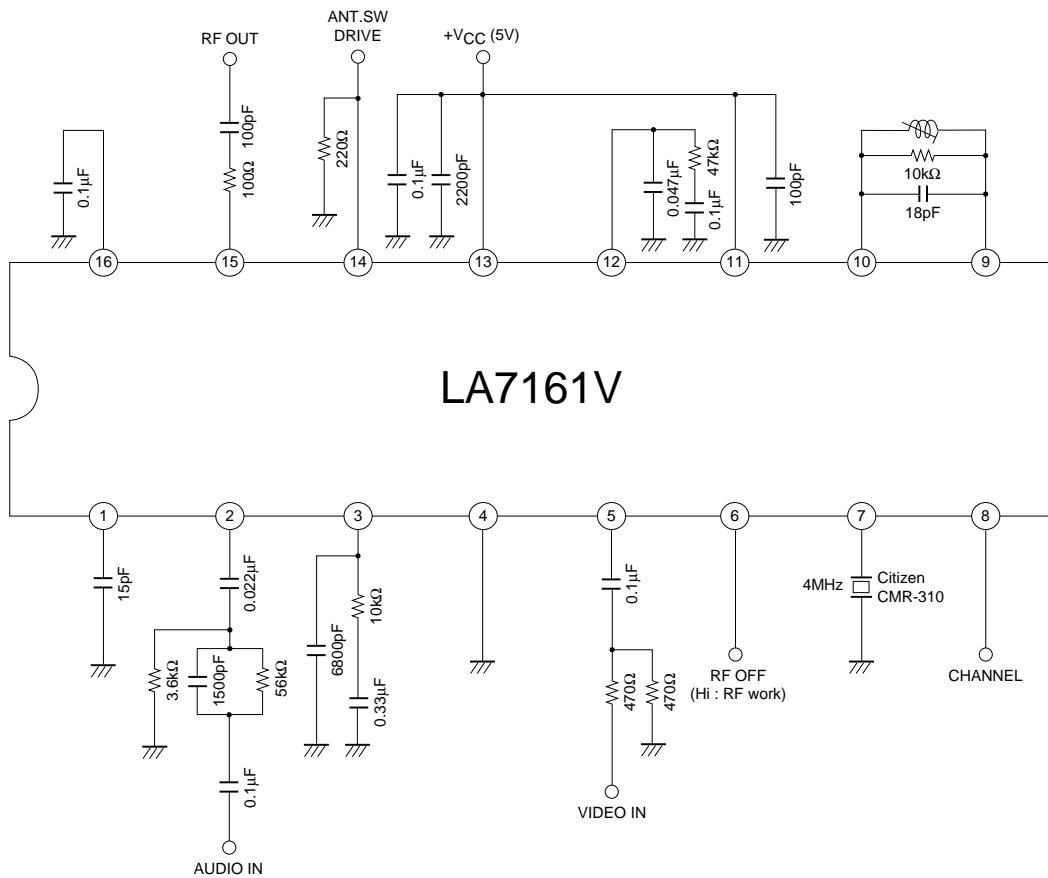
# LA7161V

## Equivalent Circuit Block Diagram



A11861

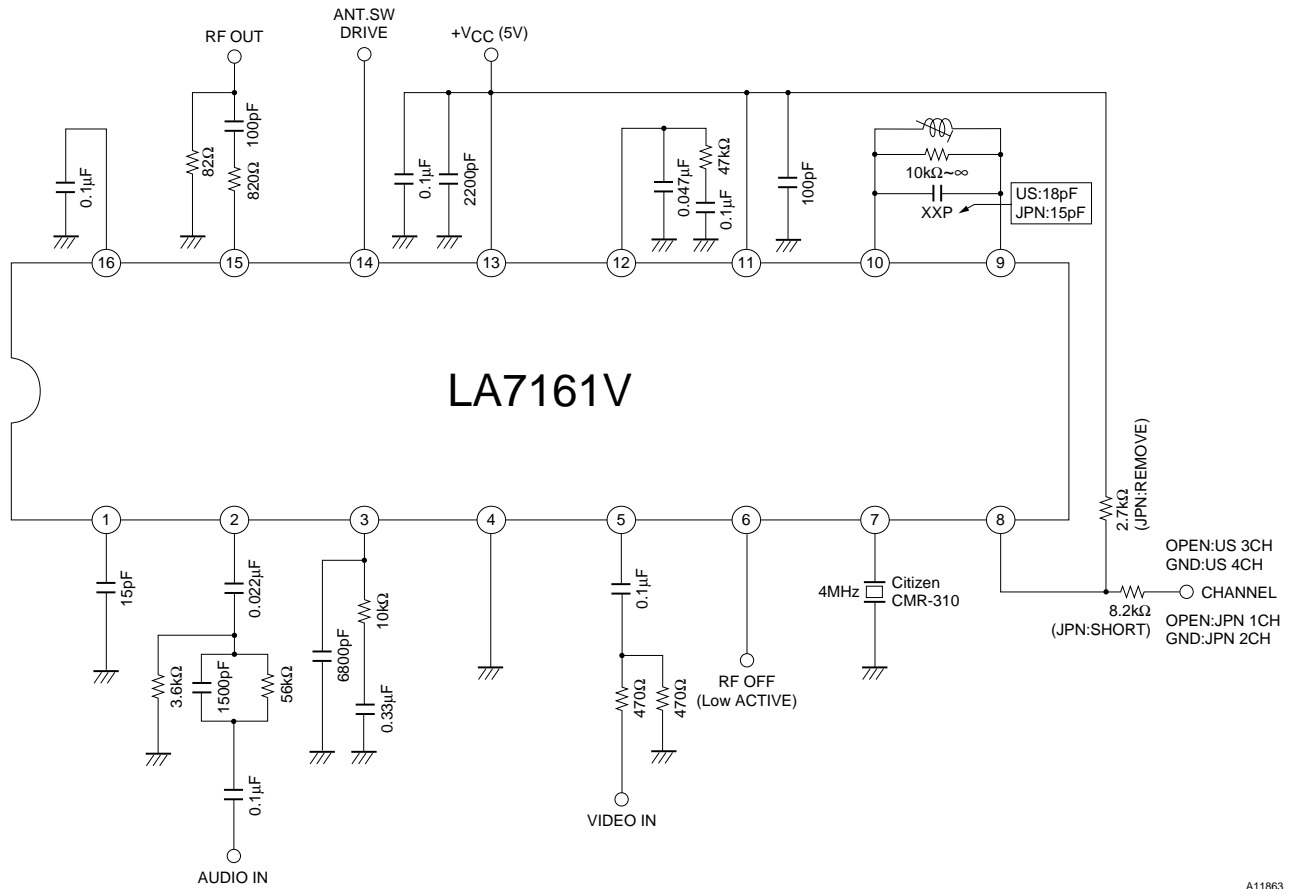
## Test Circuit (US CH)



A11862

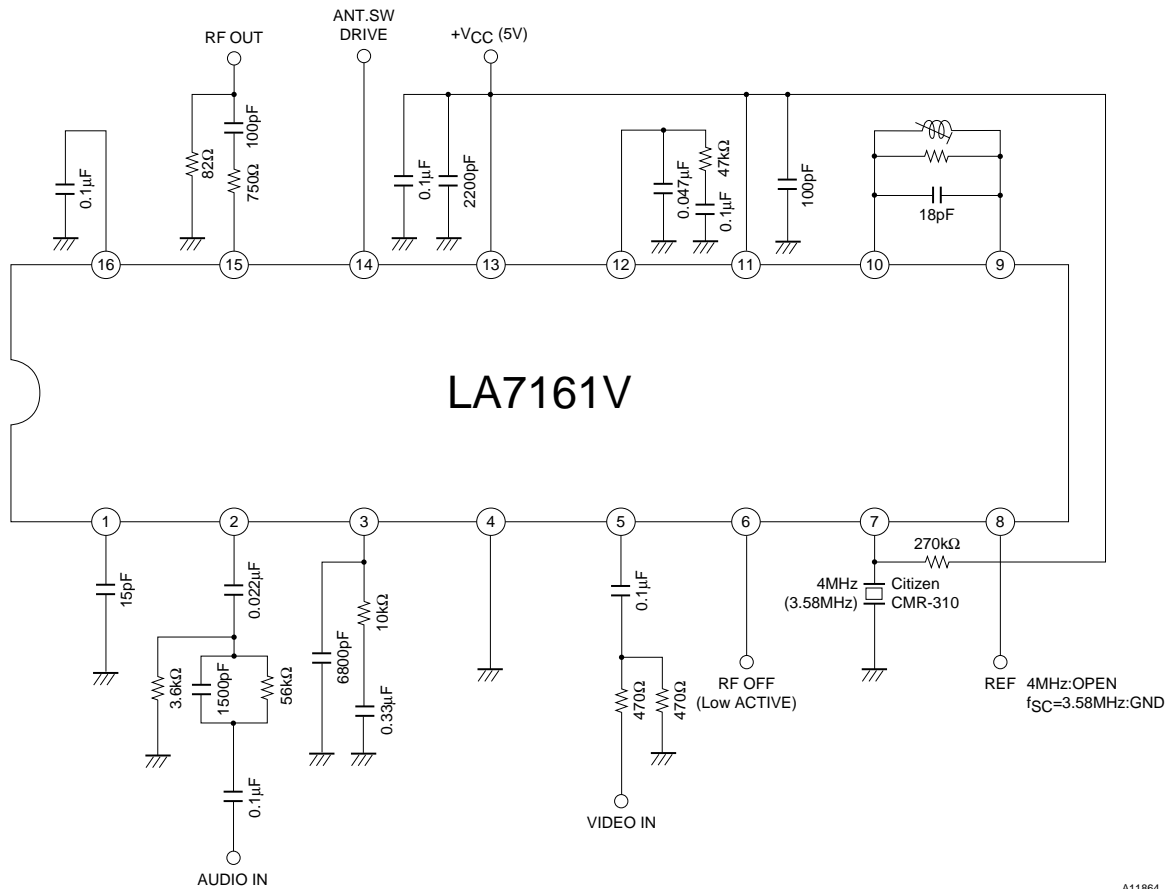
# LA7161V

## Sample Application Circuit (US, JPN CH)



A11863

## Sample Application Circuit (TWN CH)



A11864

## 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                                    |

- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of November, 1998. Specifications and information herein are subject to change without notice.