

# AN3117S, AN3117SA

## RF modulator IC for VCR and VDP

### ■ Overview

The AN3117S and AN3117SA are RF modulator ICs for VCR and VDP. They provide excellent high frequency characteristics by adopting the high performance RF oscillation circuit.

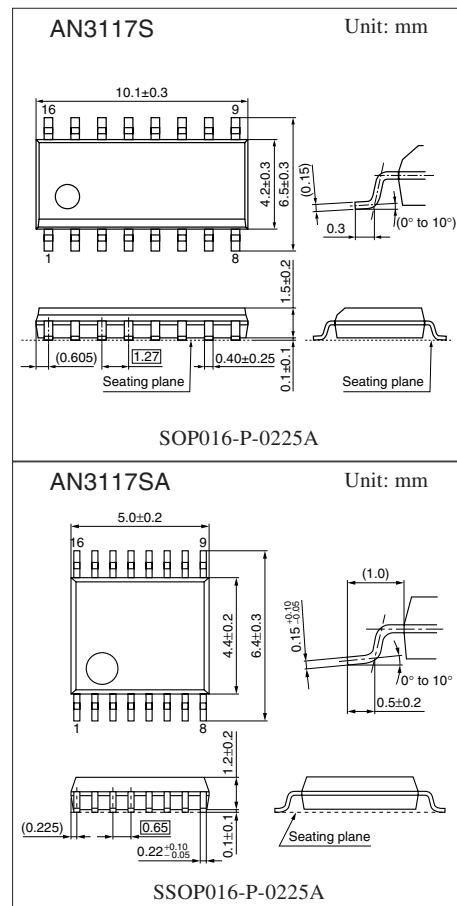
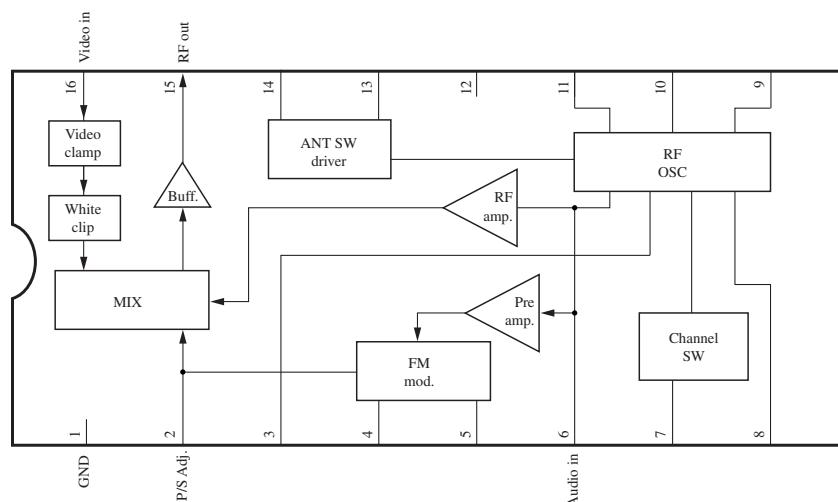
### ■ Features

- Excellent in higher harmonic characteristics of RF
- Excellent in higher harmonic characteristics of sound sub-carrier by the 1 MIX system
- Sharp white clip characteristics
- Suitable RF-MOD IC for the USA and Japan specifications
- Video AM modulator
- RF carrier oscillator
- White clip
- Channel changeover SW
- Sound FM modulator
- ANT SW driver
- Carrier off SW
- Available also the SSOP package (0.65 mm pitch)

### ■ Applications

- Video deck, video disk player, set top box for CATV, game machine

### ■ Block Diagram



Note) The packages (SOP16-P-0225A and SSOP016-P-0225A) of this product will be changed to lead-free type (SOP16-P-0225E and SSOP016-P-0225E). See the new package dimensions section later of this datasheet.

### ■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Ground pin	9	RF oscillator emitter pin 1
2	P/S adjustment pin	10	RF oscillator emitter pin 2
3	RF OSC control pin	11	RF oscillator base pin
4	SIF oscillation pin 1	12	Power supply pin
5	SIF oscillation pin 2	13	Antenna switch driver changeover pin
6	Sound input pin	14	Antenna switch driver pin
7	Channel changeover pin	15	RF output pin
8	SAW/LC oscillation changeover pin	16	Video input pin

### ■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	6	V
Supply current	I <sub>CC</sub>	60	mA
Power dissipation <sup>*2</sup>	P <sub>D</sub>	269	mW
Operating ambient temperature <sup>*1</sup>	T <sub>opr</sub>	-20 to +75	°C
Storage temperature <sup>*1</sup>	T <sub>stg</sub>	-55 to +150	°C

Note) \*1: Except for the operating ambient temperature and storage temperature, all ratings are for T<sub>a</sub> = 25°C.

\*2: The power dissipation shown is for the IC package in free air at T<sub>a</sub> = 75°C.

### ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V <sub>CC</sub>	4.5 to 5.5	V

### ■ Electrical Characteristics at V<sub>CC</sub> = 5 V, T<sub>a</sub> = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Current consumption	ITOT	V <sub>CC</sub> = 5 V, no video and sound input	18	22	26	mA
Video output level	VP	No video and sound input	83	85	87	dBm
Video modulation depth <sup>*1</sup>	mV	Video input = 0.625 V[p-p] 10-staircase wave	73	—	79	%
			77	80	83	
			81	—	87	

Note) 1. Measure in USA 3-ch. unless otherwise specified.

2. \*1: Video modulation coefficient ranks.

Video modulation coefficient	73% to 79%	77% to 83%	81% to 87%
Sound modulation coefficient	B	C	D

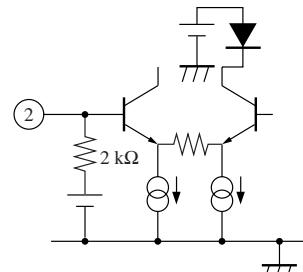
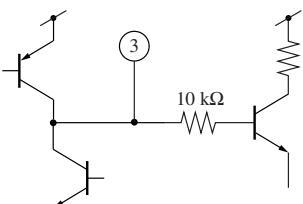
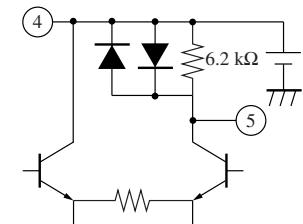
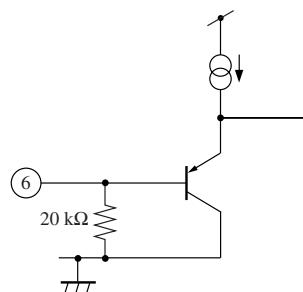
- Normal delivery for B to D ranks with embossed taping of 2 000 pcs per reel
- The rank can not be specified in your order.

■ Electrical Characteristics at  $V_{CC} = 5$  V,  $T_a = 25^\circ\text{C}$  (continued)

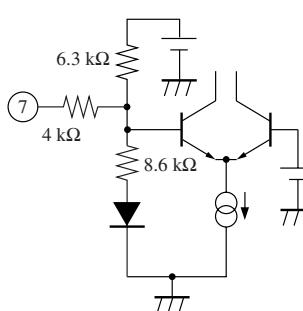
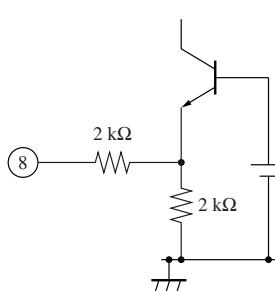
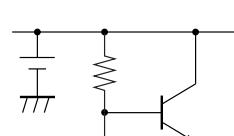
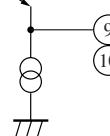
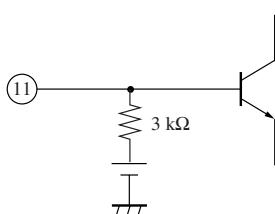
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Video output difference between channels	$\Delta V_P$	No video and sound input	-2	0	2	dB
Video modulation coefficient difference between channels	$\Delta m_V$	Video input = 0.625 V[p-p] 10-staircase wave	-2	0	2	%
Maximum video modulation coefficient	$m_{V_{\text{max}}}$	Video input = 1.0 V[p-p] 10-staircase wave	88	93.5	97	%
P/S ratio	$V_{PS}$	No video and sound input	9.5	12	14.5	dB
Sound modulation coefficient	$f_{\Delta F_{\text{FM}}}$	Sound input = 245 mV[rms] $f = 1$ kHz, sine wave	23	25	27	kHz
Maximum sound modulation coefficient	$f_{\Delta F_{\text{max}}}$	Sound input = 980 mV[rms] $f = 1$ kHz, ratio with $f_{\Delta F_{\text{FM}}}$	3.6	4	4.4	—
Sound S/N	$SN_S$	No video input	55	63	—	dB
Sync. distortion	Sync	$m = 80\%$ Full white signal	—	-2.5	—	%
Differential gain	DG	$m = 80\%$ Staircase wave	—	3	—	%
Differential phase	DP	$m = 80\%$ Staircase wave	—	2	—	deg
Sound modulation distortion	THD	$f_{\Delta F_{\text{FM}}} = \pm 25$ kHz	—	0.3	—	%
Sound oscillation frequency	$f_{SIF}$	$V_{CC} = 5$ V	—	4.50	—	MHz
Driver output voltage at ANT SW on	ASV	$V_{CC} = 5$ V, 13-pin open RF carrier off	—	0	—	V
At ANT SW off	ASRV	$V_{CC} = 5$ V, 13-pin 5 V	—	4.0	—	V
Driver output voltage		RF carrier on Load current 15 mA				
ANT SW RF carrier off voltage	COFF	$V_{CC} = 5$ V	—	0.25	—	V
ANT SW RF carrier on voltage	CON	$V_{CC} = 5$ V	—	1.25	—	V
Chroma beat	IM	P/S = 12 dB, P/C = 18 dB, $P = 66$ dB $\mu$ , 3.58 MHz, sine wave	—	65	—	dB
In-band beat	Beat		—	70	—	dB
Video input impedance	$R_V$		—	30	—	k $\Omega$
Sound input impedance	$R_A$		—	20	—	k $\Omega$
Video output level	$\Delta V_{PT}$	$T_a = 25^\circ\text{C}$ reference	—	—	$\pm 2$	dB
Temperature characteristics		$T_a = -10^\circ\text{C}$ to $+70^\circ\text{C}$				
Video modulation coefficient Temperature characteristics	$\Delta m_T$	$T_a = 25^\circ\text{C}$ reference $T_a = -10^\circ\text{C}$ to $+70^\circ\text{C}$	—	—	$\pm 3$	%
Maximum video modulation coefficient Temperature characteristics	$\Delta m_{\text{max}T}$	$T_a = 25^\circ\text{C}$ reference $T_a = -10^\circ\text{C}$ to $+70^\circ\text{C}$	87.5	—	—	%
Sound oscillation Frequency stability	$\Delta f_{ST}$	$T_a = 25^\circ\text{C}$ reference $T_a = -10^\circ\text{C}$ to $+70^\circ\text{C}$	—	—	$\pm 10$	kHz

Note) Measure in USA 3-ch. unless otherwise specified.

## ■ Terminal Equivalent Circuits

Pin No.	Pin name	Equivalent circuit	Description	Standard open voltage
1	GND		—	—
2	P/S Adjustment pin		P/S ratio becomes large when the capacitance connected between pin and GND increases.	2.7 V
3	RF OSC Control pin		Pin to control RF OSC. Oscillation of RF becomes unstable when capacitance connected between pin and GND is too small.	
4	SIF Oscillation pin 1		Reference bias source of oscillator. Sound buzz appears to decrease in sense of hearing when capacitance is connected between pin and GND to cut AC signal. Oscillation frequency is determined by the external tank circuit.	4.2 V
5	SIF Oscillation pin 2		Reference oscillator for 4.5 MHz sound modulator.	4.2 V
6	Sound input pin		Typical DC voltage is almost same as GND potential. If DC level of sound input signal is GND potential, an external coupling capacitor is not necessary. The circuit configuration which is designed to minimize the voltage variation at power supply on makes less pop noise.	0 V

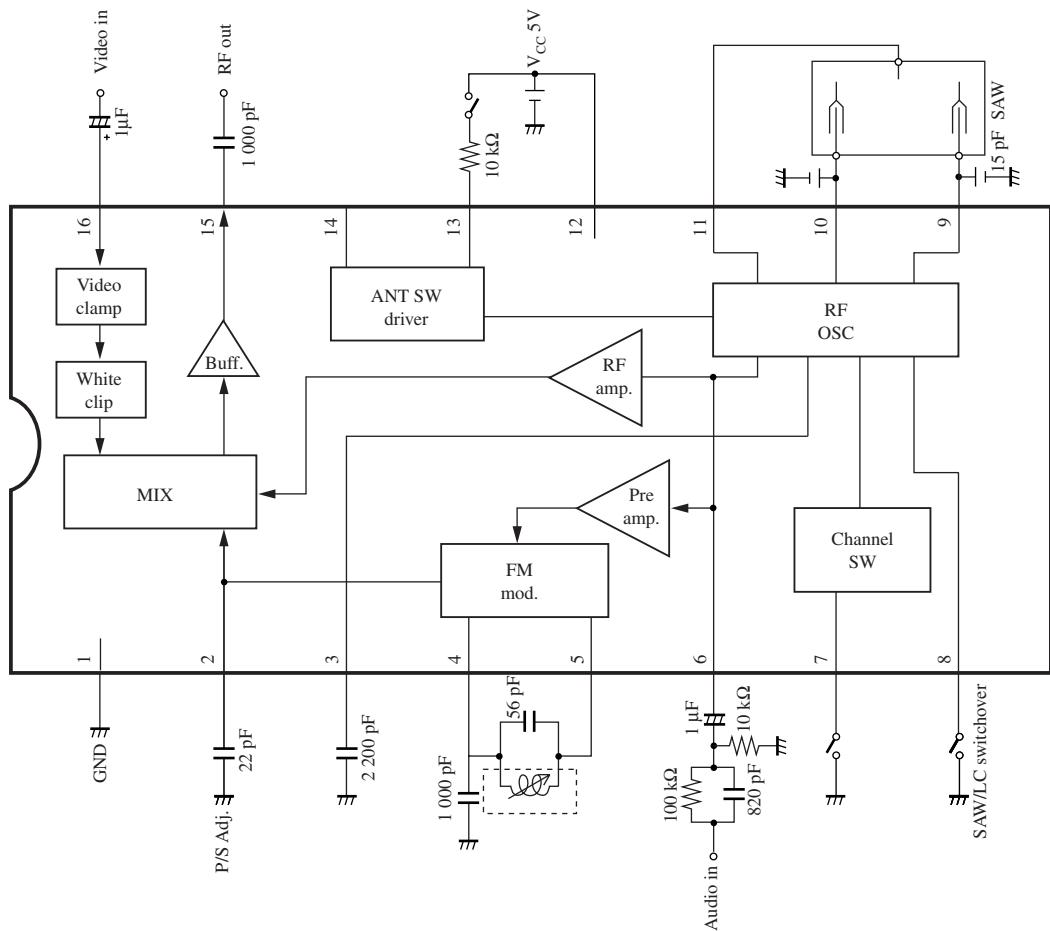
## ■ Terminal Equivalent Circuits (continued)

Pin No.	Pin name	Equivalent circuit	Description	Standard open voltage
7	Channel switchover pin		The oscillation output comes out from pin 9 when the channel switchover pin is open, and comes out from pin 10 when that pin is connected to GND.	1.9 V
8	SAW/LC Oscillation switch-over pin		Power output of RF oscillator increases if this pin is opened.	0.3 V
9	RF oscillator emitter pin 1		Pin 9 and pin 10 are oscillator output pins which configure emitter output of NPN transistor.	4.0 V
10	RF oscillator emitter pin 2			4.3 V
11	RF oscillator base pin		Pin 11 is input of oscillator and impedance is 3 kΩ.	3.7 V
12	Power supply pin		—	—

## ■ Terminal Equivalent Circuits (continued)

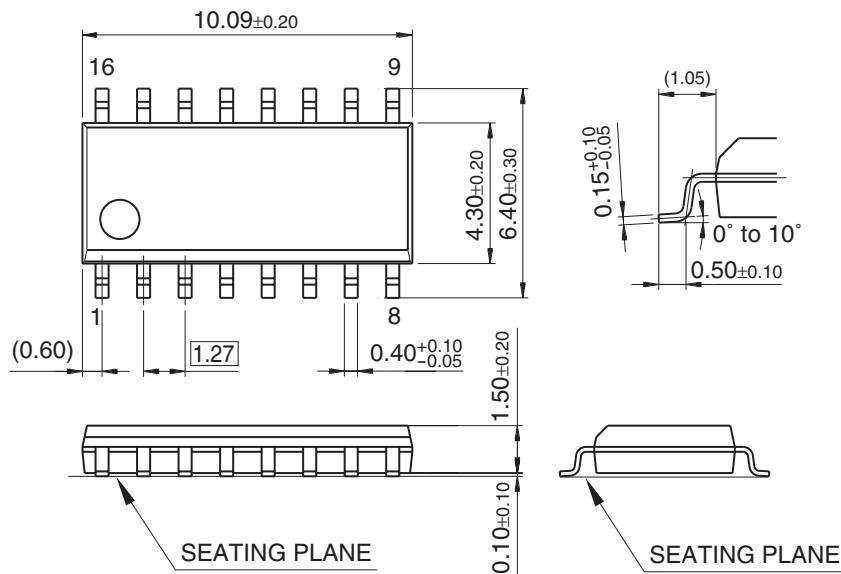
Pin No.	Pin name	Equivalent circuit	Description	Standard open voltage
13	Antenna switch		When pin 13 is connected to V <sub>CC</sub> , RF oscillator and driver changeover pin are operated and when this pin is open circuited, RF oscillator is stopped. In this state, no pop noise will not be made when antenna switch is turned on/off even if sound system is operating.	0.7 V
14	Antenna switch driver pin		When pin 13 is connected to V <sub>CC</sub> , this pin voltage becomes 4.0 V. (RF oscillator operates and load current is 15 mA) When pin 13 is open-circuited, this pin voltage is 0 V. (RF oscillator stops) Drive capability of driver pin is approx. 30 mA.	Pin 13: V <sub>CC</sub> 4.0 V (Load current in 15 mA)
15	RF output pin		Output pin of RF signal. It has low impedance output.	2.7 V
16	Video input pin		The sync. peak value clamp system is adopted for input clamp circuit. This pin has a high input impedance to minimize sync. distortion. Pay attention to the sync. sag which is likely to occur when an external capacitor attached is 0.47 μF or less.	2.0 V

## ■ Application Circuit Example

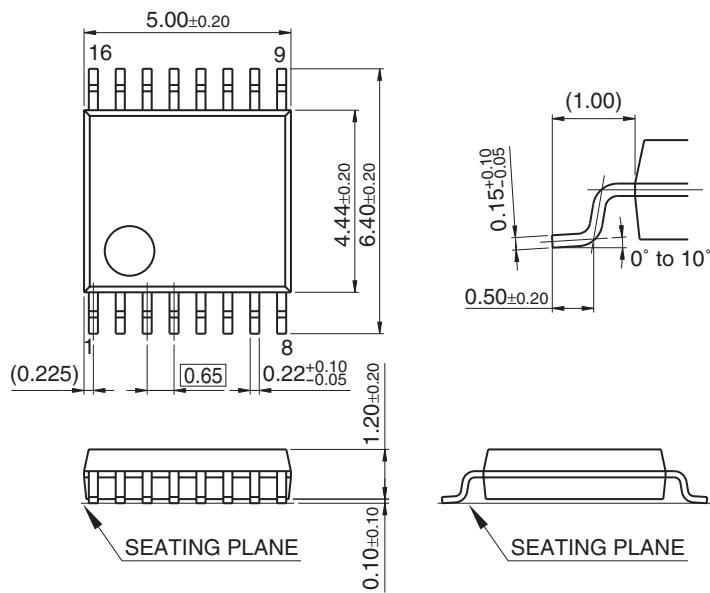


## ■ New Package Dimensions (Unit: mm)

- SOP016-P-0225E (Lead-free package)



- SSOP016-P-0225E (Lead-free package)



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