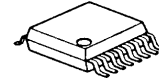


## RF Modulator for VHF Band

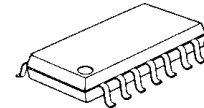
### DESCRIPTION

The NJM2536A is a RF modulator IC especially designed for VHF band RF modulator and consists of video clamp circuit, white clip circuit, video AM modulator and audio FM modulator, built into one chip.

### PACKAGE OUTLINE



NJM2536AV

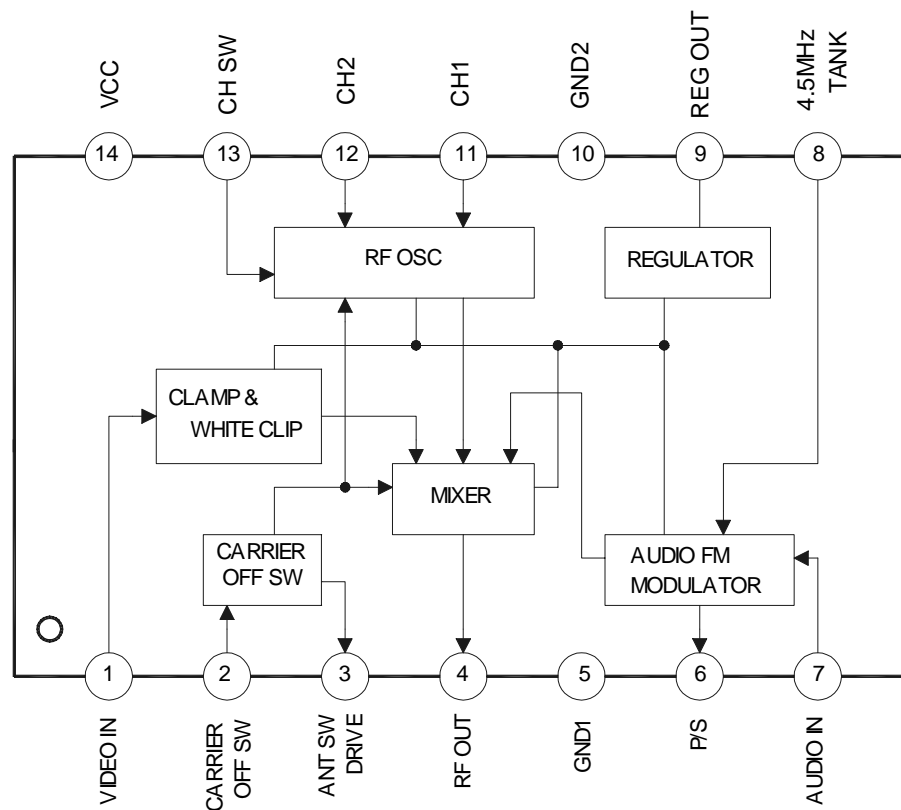


NJM2536AM

### FEATURES

- Operating Voltage 5V
- Picture-to-sound ratio is adjustable
- VHF Oscillator on chip
- Carrier-off switch function on chip
- Regulator on chip
- Bipolar Technology
- Package Outline:DMP/SSOP14

### BLOCK DIAGRAM



# NJM2536A

## ■ ABSOLUTE MAXIMUM RATINGS

( $T_A=25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Unit
Supply Voltage	$V_{CC}$	7	V
Power Dissipation	$P_D$	300	mW
Input Voltage	$V_I$	-0.3 to $V_{CC}$	V
Operating Temperature Range	$T_{opr}$	-20 to +75	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to +125	$^\circ\text{C}$

## ■ RECOMMENDED OPERATING VOLTAGE RANGE

( $T_A=25^\circ\text{C}$ )

Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
Operating Voltage		$V_{CC}$	4.5	5.0	5.5	V

## ■ ELECTRICAL CHARACTERISTICS

( $V_{CC}=5\text{V}, T_A=25^\circ\text{C}$ )

Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
Operating Current	No video/audio input signal, CARRIER OFF SW(Pin2)=5V	$I_{CC}$	13.5	16.0	22.5	mA
ANT SW DRIVE Output Voltage -1	CARRIER OFF SW(Pin2)=5V $I_D=26\text{mA}$	$V_{ANT1}$	3.7	4.0	4.3	V
ANT SW DRIVE Output Voltage -2	CARRIER OFF SW(Pin2)=Open $V_{CC}=2\text{V}$	$V_{ANT2}$	0	0.065	0.1	V
Video Output Level (Note 1)	Video input signal(Pin1)= $0.5V_{PP}$	$V_O$	(83)	86	(89)	dBu
Video Modulation Depth (Note 1)	Video input signal(Pin1)= $0.5V_{PP}$	mp	(70)	76	(82)	%
Video Limiter Modulation Depth (Note 1)	Video input signal(Pin1)= $1.0V_{PP}$	mpmax	(85)	94	(98)	%
Differential Gain	Video input signal(Pin1)= $0.5V_{PP}$ Staircase	DG	-	$\pm 3$	-	%
Differential Phase	Video input signal(Pin1)= $0.5V_{PP}$ Staircase	DP	-	$\pm 3$	-	deg
Picture-to-sound Ratio (Note 1)	Video input signal(Pin1)= $0.5V_{PP}$	PS	(11)	13	(15)	dB
Sound FM Modulation Sensitivity	Deviation of fs per 100mV	$\beta_b$	-	0.51	-	KHz/mV
Audio Distortion	Audio input signal(Pin7)= $0.05V_{PP}$ 1kHz sine wave	THD	-	0.3	-	%
Audio Signal-to-noise Ratio	Sound Modulation 60% 1kHz sine wave	ASN	-	60	-	dB
Maximum Sound FM Modulation	Audio input signal(Pin7)= $1.0V_{PP}$ 1kHz sine wave	msmax	-	700	-	%

(Note 1) Because AC characteristics largely depends on application circuit, these parameters are specified by the DC characteristics as shown in next page.

■ **DC ELECTRICAL CHARACTERISTICS** ( $V_{CC}=5V, Pin2=2.5V, T_A=25^{\circ}C$ , otherwise noted. All measurements performed in the DC test circuit are shown in next page)

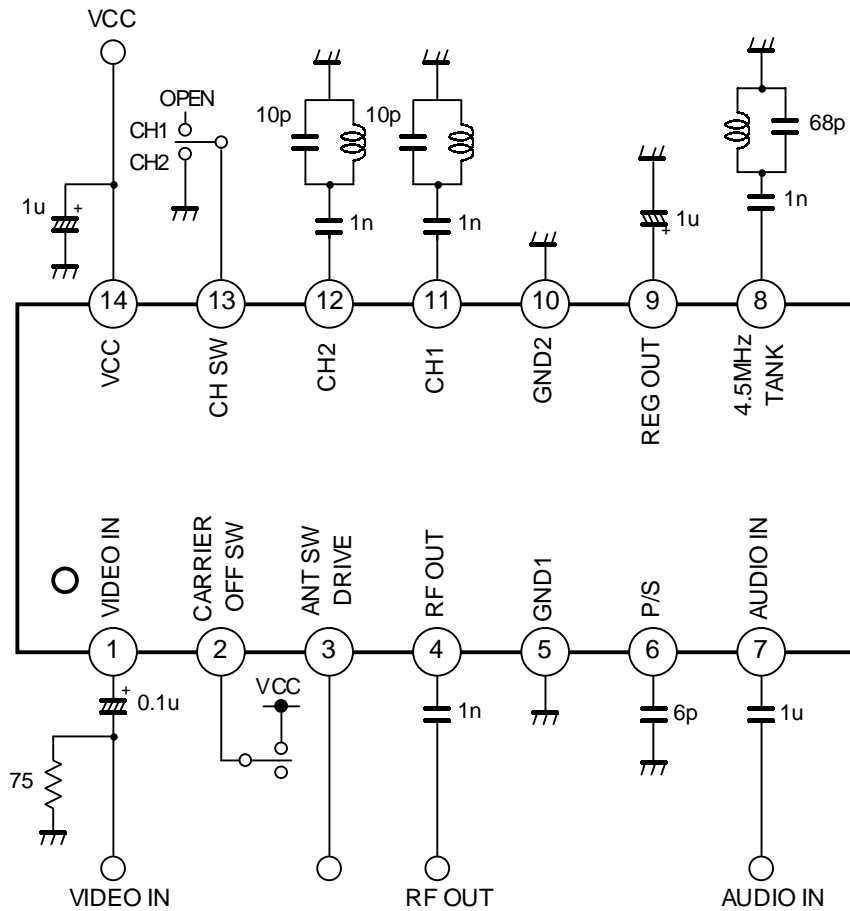
Parameter	Condition (Note 2)	Symbol	Min.	Typ.	Max.	Unit
Video Output Signal Amplitude 1	$Gw1=Gwh1-Gwl1$	Gw1	62.4	85	124.5	mV
Video Output Signal Amplitude 2	$Gw2=Gwh2-Gwl2$	Gw2	62.4	85	124.5	mV
Video Modulation Depth	$Mp=((Gw1-Mw)/Gw1) \times 100$ where $Mw=Mwh-Mwl$	Mp	70	76	82	%
Video Limiter Modulation Depth (Note 2)	$Mpmax=((Gw1-Wc)/Gw1) \times 100$ where $Wc=Wch-Wcl$	Mpmax	85	94	98	%
Picture-to-sound Ratio	$Ps=Psh-Psl$	Ps	-70	-45	-35.1	mV

(Note 2) Explanation of symbols

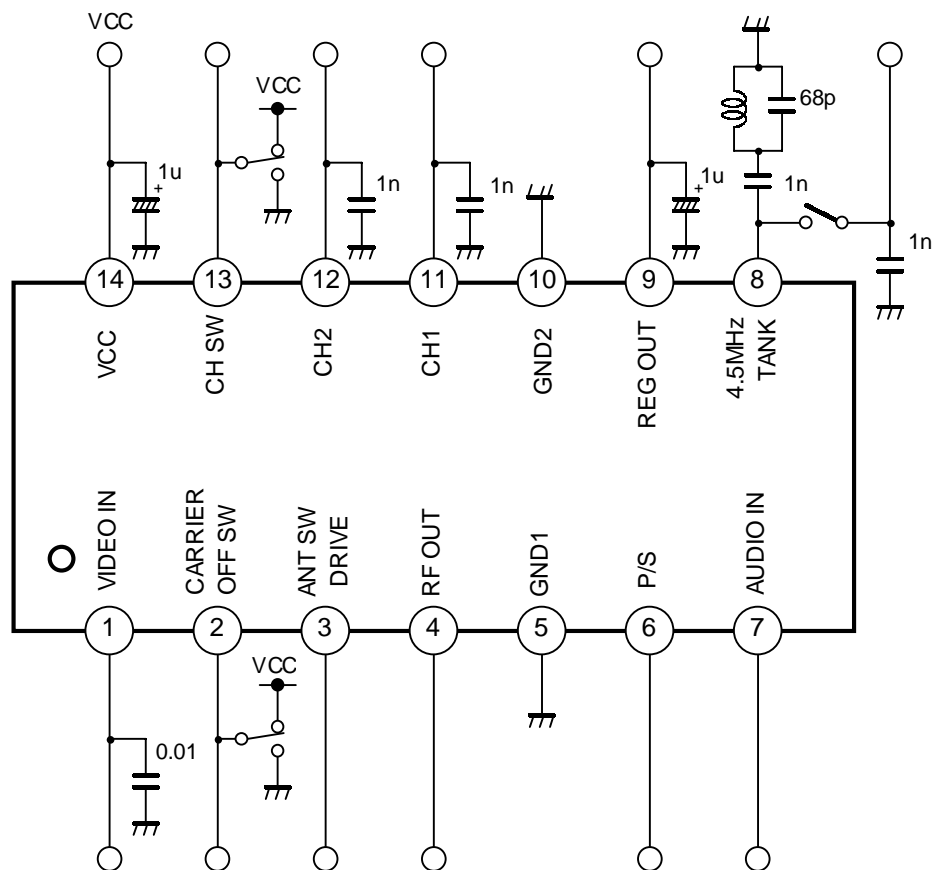
- $V_v$  : VIDEO IN output voltage at Pin1
- $V_{11h}$  : CH1 output voltage at Pin11  
CH SW (Pin13) input = 2.5V
- $V_{12h}$  : CH1 output voltage at pin12  
CH SW (Pin13) input = 0.5V
- $Gwh1$ : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v$ , CH1 (Pin11) =  $V_{11h} + 0.15V$ , CH SW (Pin13) input = 2.5V
- $Gwl1$  : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v$ , CH1 (Pin11) =  $V_{11h} - 0.15V$ , CH SW (Pin13) input = 2.5V
- $Gwh2$  : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v$ , CH2 (Pin12) =  $V_{12h} + 0.15V$ , CH SW (Pin13) input = 0.5V
- $Gwl2$  : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v$ , CH2 (Pin12) =  $V_{12h} - 0.15V$ , CH SW (Pin13) input = 0.5V
- $Mwh$  : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v + 0.43V$ , CH1 (Pin11) =  $V_{11h} + 0.15V$ , CH SW (Pin13) input = 2.5V
- $Mwl$  : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v + 0.43V$ , CH1 (Pin11) =  $V_{11h} - 0.15V$ , CH SW (Pin13) input = 2.5V
- $Wch$  : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v + 0.8V$ , CH1 (Pin11) =  $V_{11h} + 0.15V$ , CH SW (Pin13) input = 2.5V
- $Wcl$  : RF OUT output voltage at Pin4  
VIDEO IN (Pin 1) input =  $V_v + 0.8V$ , CH1 (Pin11) =  $V_{11h} - 0.15V$ , CH SW (Pin13) input = 2.5V
- $V_{Ps}$  : P/S output voltage at Pin6  
CARRIER OFF SW (Pin 2) input = 2.5V
- $Psh$  : RF OUT output voltage at Pin4  
P/S (Pin 6) input =  $V_{Ps} + 0.2V$ , CH1 (Pin11) = 2.4V, CH SW (Pin13) input = 2.5V
- $Psl$  : RF OUT output voltage at Pin4  
P/S (Pin 6) input =  $V_{Ps} - 0.2V$ , CH1 (Pin11) = 2.4V, CH SW (Pin13) input = 2.5V

# NJM2536A

## AC TEST CIRCUIT



## DC TEST CIRCUIT



## ■ TERMINAL CHARACTERISTICS

No.	Symbol	Typ. DC Voltage (V)	Equivalent Circuit	Function
1	VIDEO IN	1.9		Video Signal Input
2	CARRIER OFF SW	-		Picture Carrier-Off Switch
3	ANT SW DRIVE	4 (Pin2=High) 0 (Pin2=Low)		ANT Switch Drive Voltage Output
4	RF OUT	4		RF Signal Output
5	GND1	0		GND terminal except for oscillator circuit
6	P/S	2.8		Picture-to-sound Ratio Adjust

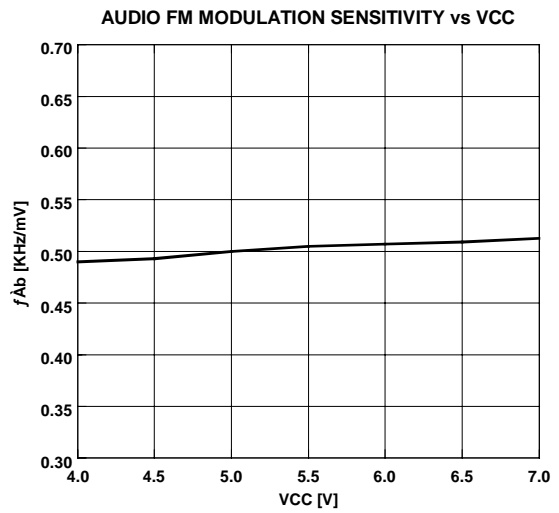
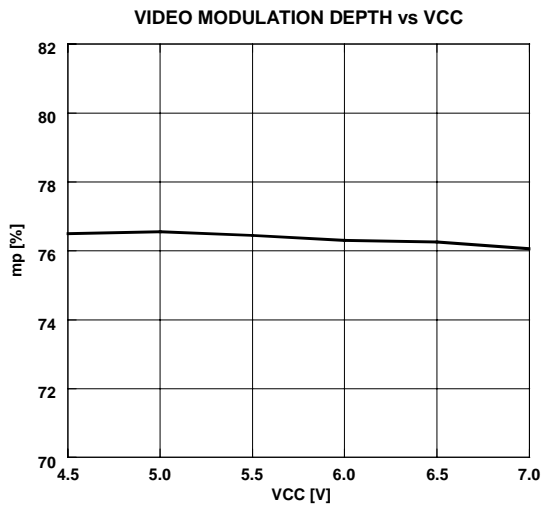
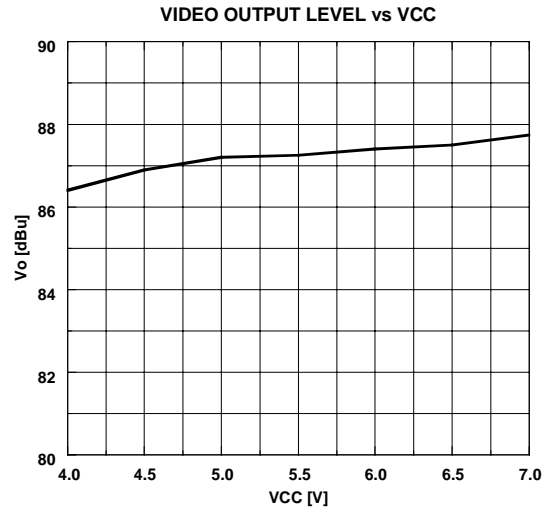
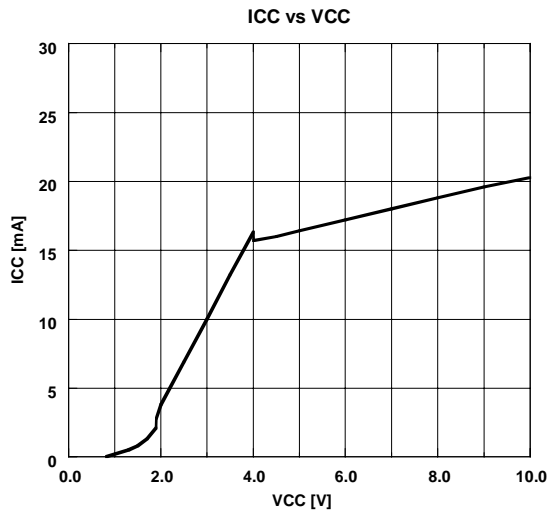
# NJM2536A

No.	Symbol	Typ. DC Voltage (V)	Equivalent Circuit	Function
7	AUDIO IN	0.035		Audio Signal Input
8	4.5MHz TANK	2.9		4.5MHz Tank Coil for Sound FM Modulation Circuit
9	REG OUT	4		Regulator Output
10	GND2	0		GND for Oscillator Circuit
11	CH1	2.24 (OSC:ON) 2.30 (OSC:OFF)		RF Oscillator Pin (Base)
12	CH2	2.24 (OSC:ON) 2.30 (OSC:OFF)		RF Oscillator Pin (Base)

No.	Symbol	Typ. DC Voltage (V)	Equivalent Circuit	Function
13	CH SW	2.38		Output channel Select Switch
14	VCC	5		Power Supply

## ■ TYPICAL CHARACTERISTICS

$T_A=25^\circ\text{C}$





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# MEMO

**[CAUTION]**

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