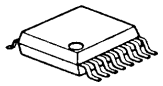
RF Modulator for VHF Band

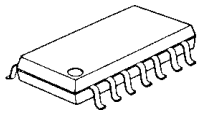
■ DESCRIPTION

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

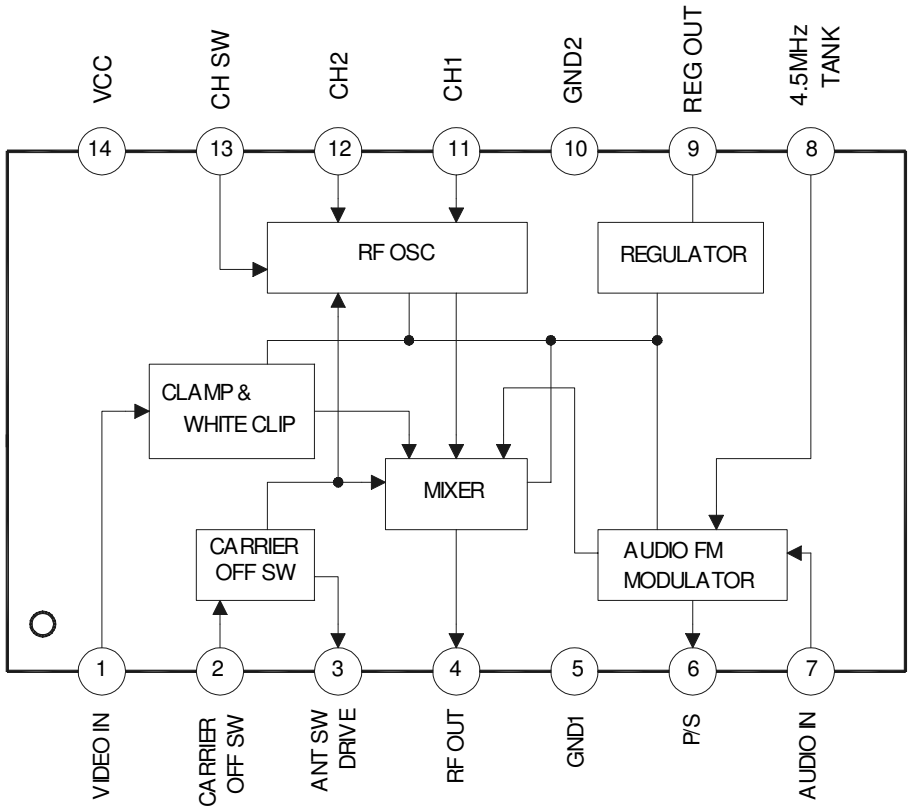


NJM2536AM

■ 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



■ **ABSOLUTE MAXIMUM RATINGS** (T_A=25℃)

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	℃
Storage Temperature Range	T_{stg}	-40 to +125	℃

■ **RECOMMENDED OPERATING VOLTAGE RANGE** (T_A=25℃)

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

■ **ELECTRICAL CHARACTERISTICS** (V_{CC}=5V,T_A=25℃)

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=26mA	V_{ANT1}	3.7	4.0	4.3	V
ANT SW DRIVE Output Voltage –2	CARRIER OFF SW(Pin2)=Open V_{CC}=2V	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	-	±3	-	%
Differential Phase	Video input signal(Pin1)=0.5V_{PP} Staircase	DP	-	±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	βb	-	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.

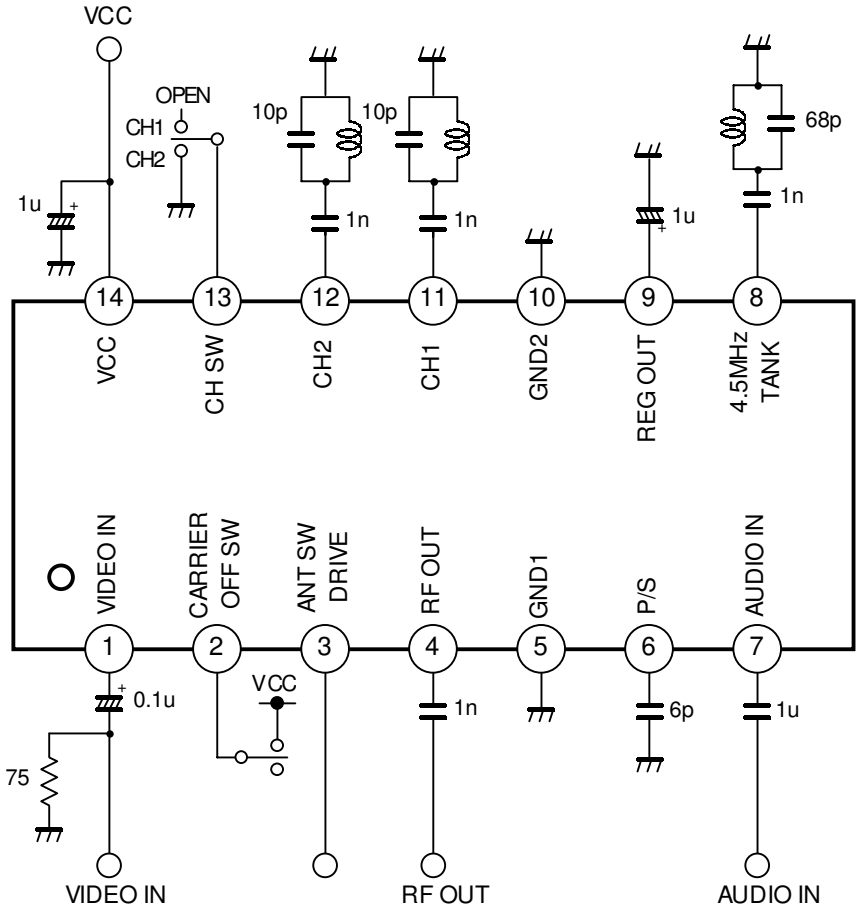
■ **DC ELECTRICAL CHARACTERISTICS** (V_{CC}=5V,Pin2=2.5V, T_A=25℃, otherwise noted. All measurements performed in the DC test circuit are shown in next page)

Parameter	Condition (Note 2)	Symbol	Min.	Typ.	Max.	Unit
Video Output Signal Amplitude 1	Gvv1=Gvvh1-Gvvl1	Gvv1	62.4	85	124.5	mV
Video Output Signal Amplitude 2	Gvv2=Gvvh2-Gvvl2	Gvv2	62.4	85	124.5	mV
Video Modulation Depth	Mp=((Gvv1-Mw)/Gvv1)x100 where Mw=Mwh-Mwl	Mp	70	76	82	%
Video Limiter Modulation Depth (Note 2)	Mpmax=((Gvv1-Wc)/Gvv1)x100 where Wc=Wch-Wcl	Mpmax	85	94	98	%
Picture-to-sound Ratio	Ps=Psh-Psl	Ps	-70	-45	-35.1	mV

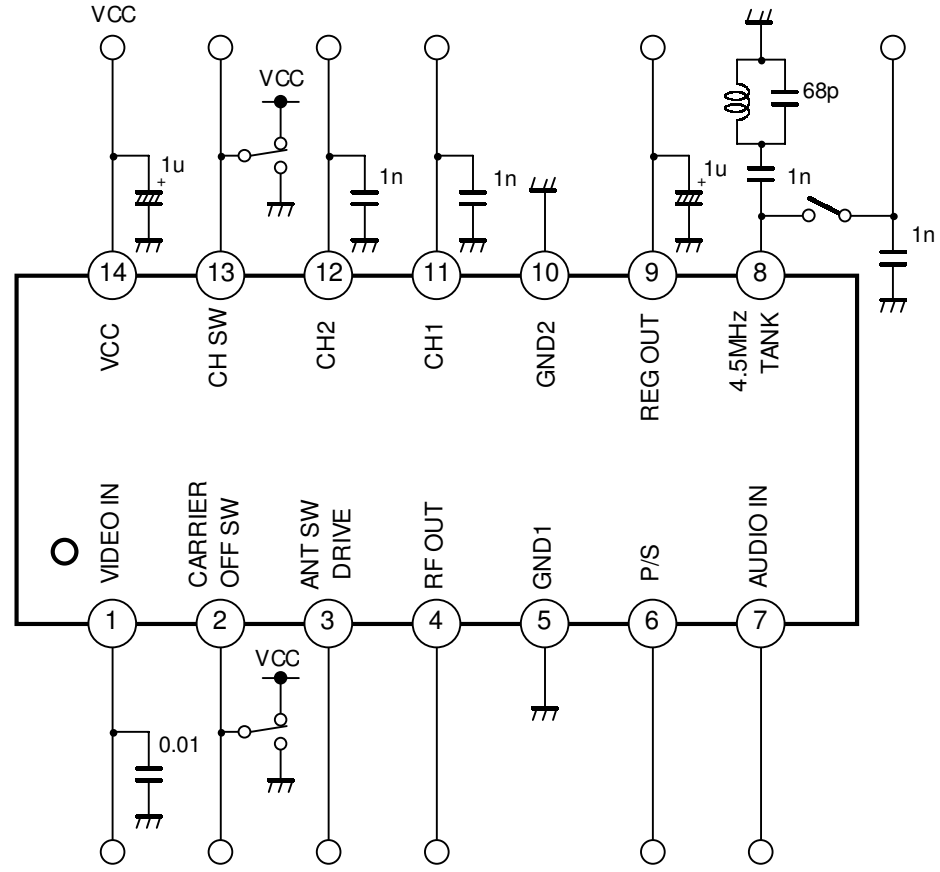
(Note 2) Explanation of symbols

- Vv : VIDEO IN output voltage at Pin1
- V11h : CH1 output voltage at Pin11
  CH SW (Pin13) input = 2.5V
- V12h : CH1 output voltage at pin12
  CH SW (Pin13) input = 0.5V
- Gvvh1: RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv, CH1 (Pin11) = V11h + 0.15V, CH SW (Pin13) input = 2.5V
- Gvvl1 : RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv, CH1 (Pin11) = V11h - 0.15V, CH SW (Pin13) input = 2.5V
- Gvvh2 : RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv, CH2 (Pin12) = V12h + 0.15V, CH SW (Pin13) input = 0.5V
- Gvvl2 : RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv, CH2 (Pin12) = V12h - 0.15V, CH SW (Pin13) input = 0.5V
- Mwh : RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv + 0.43V, CH1 (Pin11) = V11h + 0.15V, CH SW (Pin13) input = 2.5V
- Mwl : RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv + 0.43V, CH1 (Pin11) = V11h - 0.15V, CH SW (Pin13) input = 2.5V
- Wch : RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv + 0.8V, CH1 (Pin11) = V11h + 0.15V, CH SW (Pin13) input = 2.5V
- Wcl : RF OUT output voltage at Pin4
  VIDEO IN (Pin 1) input = Vv + 0.8V, CH1 (Pin11) = V11h - 0.15V, CH SW (Pin13) input = 2.5V
- VPs : 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 = VPs + 0.2V, CH1 (Pin11) = 2.4V, CH SW (Pin13) input = 2.5V
- Psl : RF OUT output voltage at Pin4
  P/S (Pin 6) input = VPs - 0.2V, CH1 (Pin11) = 2.4V, CH SW (Pin13) input = 2.5V

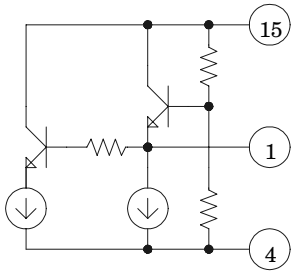
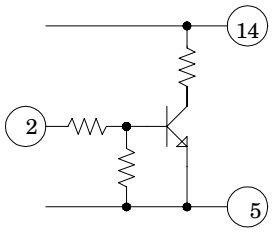
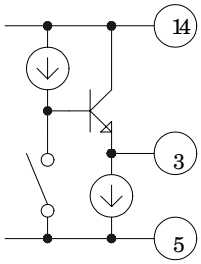
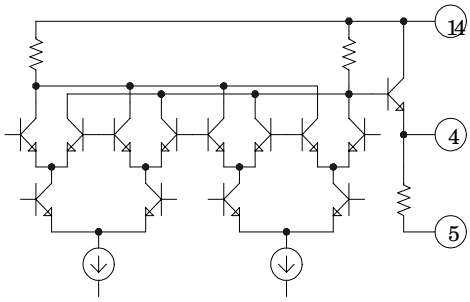
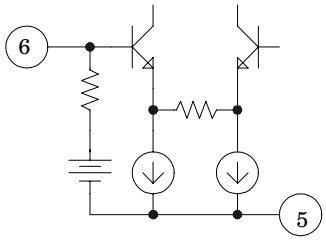
■ **AC TEST CIRCUIT**

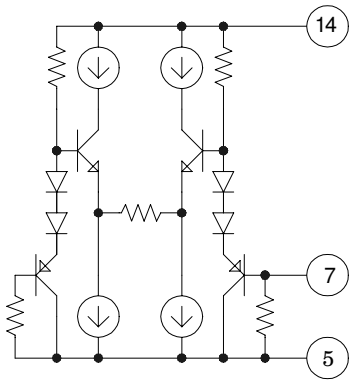
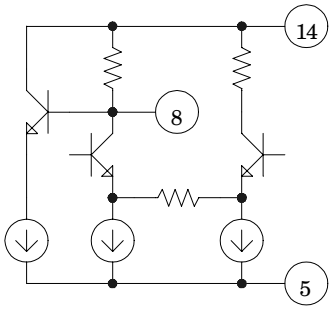
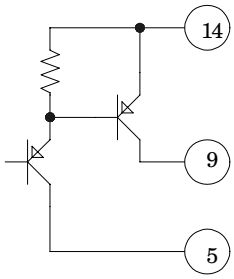
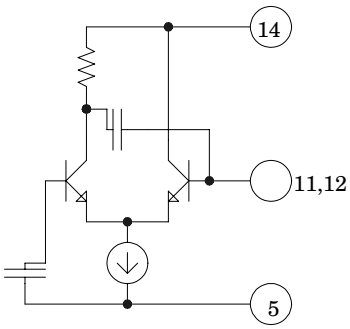


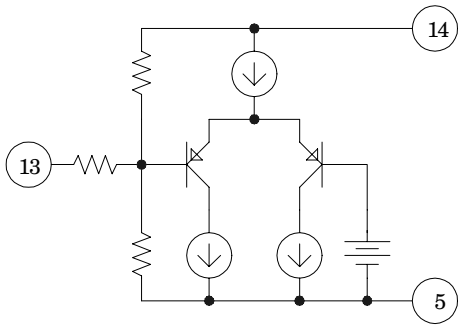
■ **DC TEST CIRCUIT**



■ **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

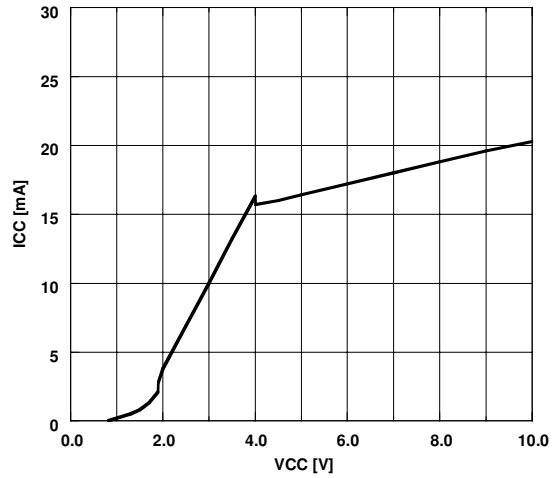
No.	Symbol	Typ. DC Voltage (V)	Equivalent Circuit	Function
7	AUDIO IN	0.035		Audio Signal Input
8	4.5MHz TANK	2.9		4.5MHz Tank Coil for Sound FM Modulation Circuit
9	REG OUT	4		Regulator Output
10	GND2	0		GND for Oscillator Circuit
11	CH1	2.24 (OSC:ON) 2.30 (OSC:OFF)		RF Oscillator Pin (Base)
12	CH2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

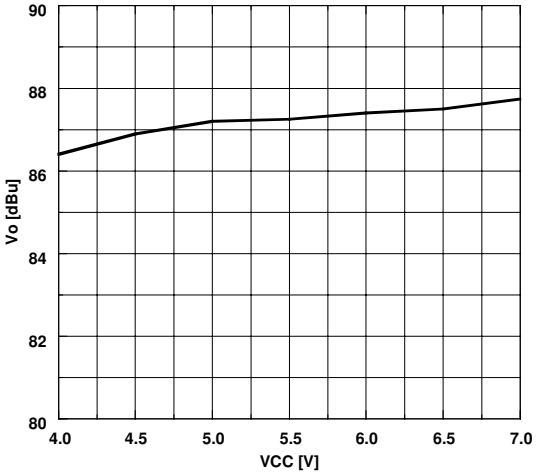
■ TYPICAL CHARACTERISTICS

T_A=25℃

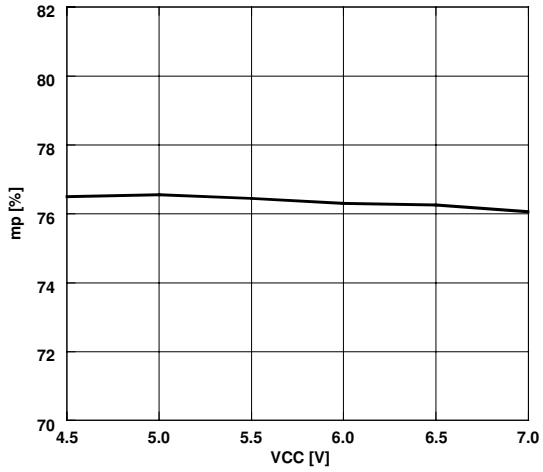
ICC vs VCC



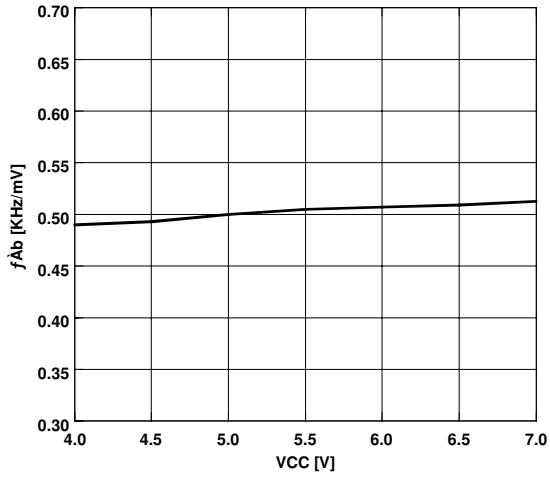
VIDEO OUTPUT LEVEL vs VCC



VIDEO MODULATION DEPTH vs VCC



AUDIO FM MODULATION SENSITIVITY vs VCC



MEMO

[CAUTION]
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