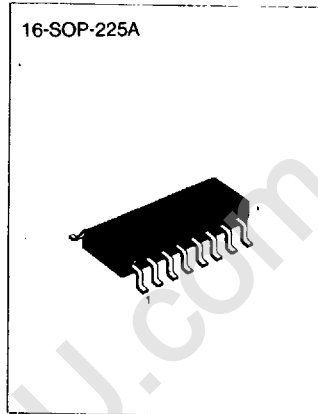


VHF BAND RF MODULATOR

The KA2990D is a monolithic integrated circuit of small out-line package designed for use in the VHF RF converter for VCRs, video game machines and so on.

FEATURES

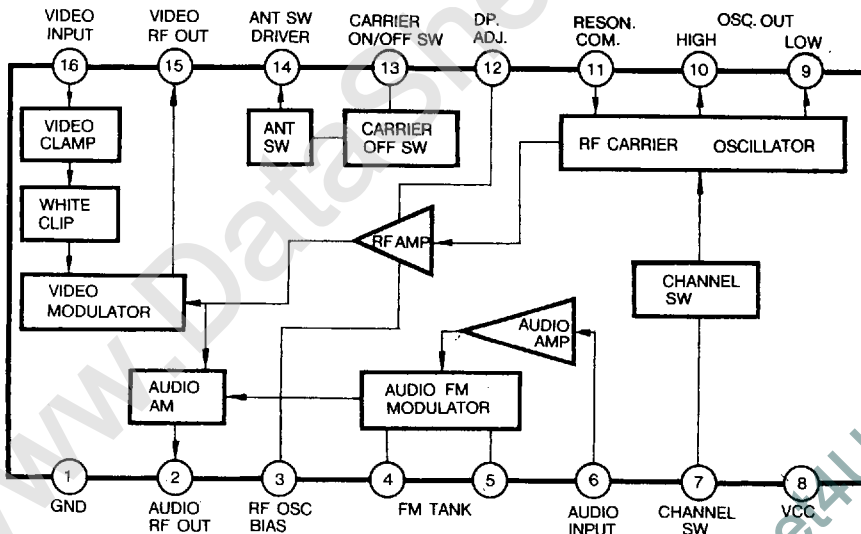
- Supply voltage 5V(4.5V~5.5V.)
- Symmetrical RF oscillator up to 100MHz
- Video input clamp/white clip
- Negative video AM
- FM audio modulation
- Audio/Video AM conversion
- Built-in antenna switch driver
- Channel switch/RF carrier switch



ORDERING INFORMATION

Device	Package	Operating Temperature
KA2990D	16-SOP-225A	-20°C~+70°C

BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Characteristic	Symbol	Value	Unit
Power supply	V _{CC}	6	V
Power Dissipation	P	600	mW
Operating Temperature	T _{opr}	-20~+70	°C
Storage Temperature	T _{stg}	-55~+125	°C

ELECTRICAL CHARACTERISTICS (V_{CC}=5V, Ta=25°C)

Characteristic	Symbol	Conditions	SPEC			Unit
			Min.	Typ.	Max.	
Supply Current	I _{CC}	No input signal	9	13	17	mA
RF Out Level	V _O	CH3(61.25MHz) CH4(67.25MHz)	83	87	90	dBuV
VIDEO PART						
Video MOD. Depth	M _V	0.635V _{p-p} , 100% White video signal	75	80	85	%
RF Out Level Channel Difference	ΔV _O	CH3(61.25MHz) CH4(67.25MHz)	-2	0	+2	dB
Video MOD. Depth Channel Difference	ΔM _V		-2	0	+2	%
MAX. Video MOD. Depth	M _{max}	1V _{p-p} , 100% White video signal	89	92.5	96	%
Differential Phase	DP	0.635V _{p-p} , Stair-step measured	-	2	5	deg
Differential Gain	DG	APL 50% (Chroma=20IRE)	-	2	5	%
Video (S/N) Ratio	V _{snv}	100% White(M _V =50%)	40	45	-	dB
Video Input Impedance	Z _{vin}		10	30	-	Kohm

Characteristic	Symbol	Conditions	SPEC			Unit
			Min.	Tpy.	Max.	
AUDIO PART						
Audio MOD. Depth	M_{st}	0.14V _{p-p} , 1 KHz Sine	19.4	21.4	23.4	KHz/ Dev.
		Audio input signal	22.4	24.4	26.4	
Audio (S/N) Ratio	V_{sna}	1 KHz Sine($M_v=60\%$)	40	50	—	dB
Audio Input Impedance	Z_{in}		75	100	145	Kohm
OUTPUT PART						
P/S Carrier Ratio	R_{ps}	No input signal	7.2	8.7	10.2	dB
Antenna Switch(ON) Pin Voltage	V_{swon}	$I_{load} = 10mA$	3.1	3.4	3.7	V
Antenna Switch(OFF) Pin Voltage	V_{swoff}		—	—	0.1	V
RF Carrier SW(ON) Pin Voltage	V_{con}		2.5	—	5	V
RF Carrier SW(OFF) Pin Voltage	V_{coff}		—	—	0.5	V

Guarantee Item.

1. In Band Spurious: Minmum Data -60dB
2. 920KHz Chroma Beat: Minmum Data -60dB.

PIN DESCRIPTION

Pin	Function	Description	Equivalent	Reference voltage
1	GND			0V
2	Audio RF OUT	AM Conversion Wave		3.25V
3	RF Bias	RF Oscillator bias		3.2V
4	Audio Tank (4.5MHz)	Audio FM Modulator Tank		4.1V
5	Audio Tank (4.5MHz)	Audio FM Modulator Tank (FM carrier out)		4.1V

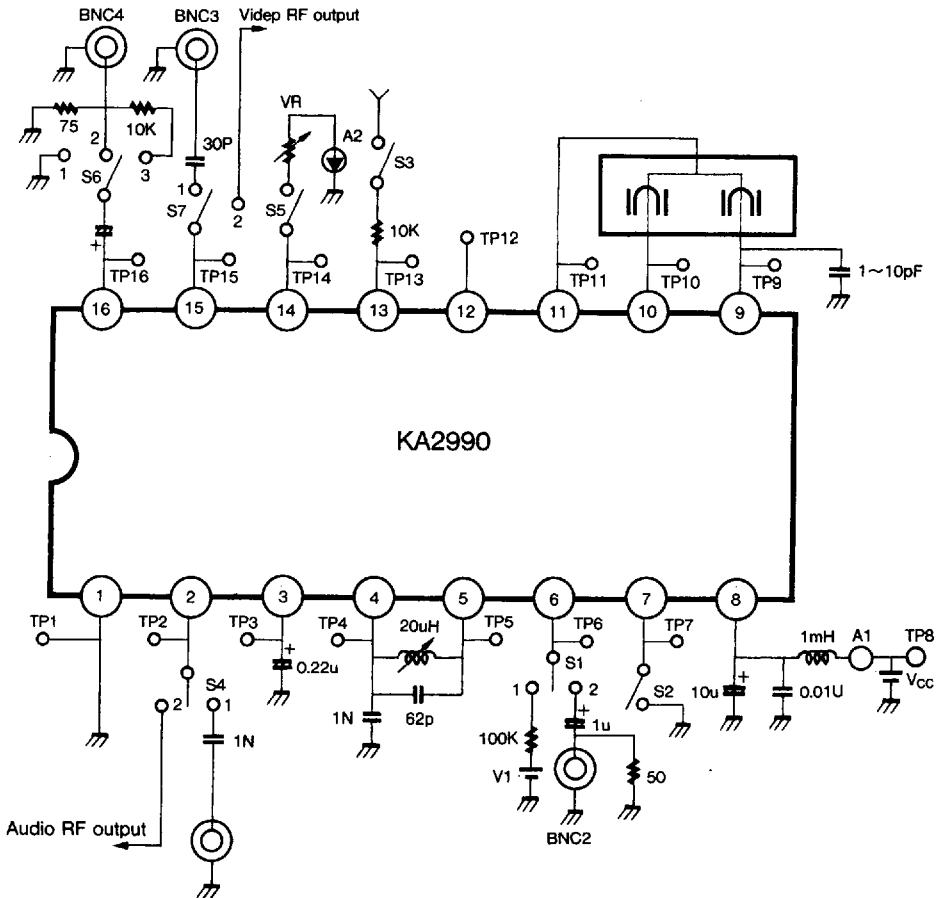
Pin	Function	Description	Equivalent	Reference voltage						
6	Audio IN	Audio input signal		0V						
7	Channel switch	RF Oscillator CH. selector <table border="1" style="margin-left: 20px;"> <tr> <td>OPEN</td> <td>LOW</td> <td>Pin9</td> </tr> <tr> <td>GND</td> <td>HIGH</td> <td>Pin10</td> </tr> </table>	OPEN	LOW	Pin9	GND	HIGH	Pin10		$\frac{2.75V}{0V}$
OPEN	LOW	Pin9								
GND	HIGH	Pin10								
8	Vcc			5V						
9	SAW resonator Low out	SAW resonator Low channel out		$\frac{3.7V}{4.2V}$						
10	SAW resonator High out	SAW resonator High channel out		$\frac{3.7V}{4.2V}$						

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Pin	Function	Description	Equivalent	Reference voltage				
11	SAW resonator Common	Common of Pin9 & Pin10		3.2V				
12	DP Adjust	Adjustment of RF Differential Phase. Connect a cap. for DP control		3.2V				
13	RF carrier switch	RF carrier & ANT. switch <table border="1" style="margin: 5px auto;"> <tr> <td>OPEN</td> <td>RF OSC.OFF</td> </tr> <tr> <td>5V</td> <td>RF OSC. ON</td> </tr> </table>	OPEN	RF OSC.OFF	5V	RF OSC. ON		
OPEN	RF OSC.OFF							
5V	RF OSC. ON							
14	Antenna switch Driver	Drive the antenna switch		$\frac{3.4V}{0V}$				

Pin	Function	Description	Equivalent	Reference voltage
15	Video RF out	AM conversion wave		3.1V
16	Video IN	Video signal input		1.6V

TEST CIRCUIT



APPLICATION INFORMATION

1. FUNCTION DESCRIPTION

1) RECOMMENDATION OF SAW

Company	Frequency	Mark	Region	Remark
Kyocera	91.24+/-0.08MHz	KAR 91CS	JAPAN	Japan; CH1: 91.25MHz CH1: 97.25MHz Korea, USA; CH3: 61.25MHz CH4: 67.25MHz
	97.24+/-0.08MHz			
	61.24+/-0.06MHz	KAR61CT	Korea USA	
	67.24+/-0.06MHz			
Murata	91.24+/-0.1MHz	SAR91MB40X	JAPAN	
	97.24+/-0.1MHz			
	61.24+/-0.1MHz	SAR61MB40X	Korea USA	
	67.24+/-0.06MHz			

2) TANK COIL

Company	Mark	Remark
Tokko	291ACS-4060Z	Internal type (62pF CAP)
	36PSN-1458Z	External type (62pF CAP)

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2. PACKAGE DIMENSION. (Dimension in millimeter)

16-SOP-225A 16 9 # 1 8 650.030 10.000. 020 1.27 (0.56) 040.010 450.020 572 050.0200.15 +0.01 -0.05 155.020 1.95MAX 0 0MIN
0.1MAX 0~8°

APPLICATION CIRCUIT

