

**VIDEO AND SOUND IF AMPLIFIER FOR MONOCHROME TV RECEIVERS**

The KA2913A, KA2917 are silicon monolithic integrated circuits designed for the VIF and SIF stage in B/W television receivers.

KA2913A: for Forward AGC type

KA2917: for Reverse AGC type

**FUNCTION**

**VIF stage**

- Three controlled IF amplifier stages
- Video demodulator controlled by the picture carrier
- Black noise and white noise inverter
- DC amplifier for RF AGC output
- Peak AGC

**SIF stage**

- Three controlled IF amplifier stages
- Quadrature detector

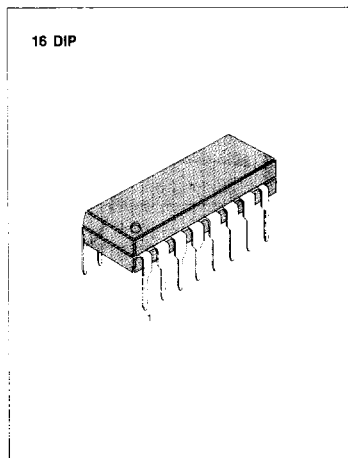
**FEATURE**

**VIF stage**

- High gain, wide band IF amplifier: 50dB (Typ.) at 45MHz
- Gain reduction with excellent stability: 55dB (Typ.) at 45MHz
- Excellent DG/DP characteristics: DG 7% (Typ.), DP 3.5 deg. (Typ.)
- Excellent S/N characteristics due to delayed 3-stage AGC action.
- Fast AGC action due to noise inverter and peak AGC.
- Switch off the video part with VTR switch.
- Dual differential AFT output

**SIF stage**

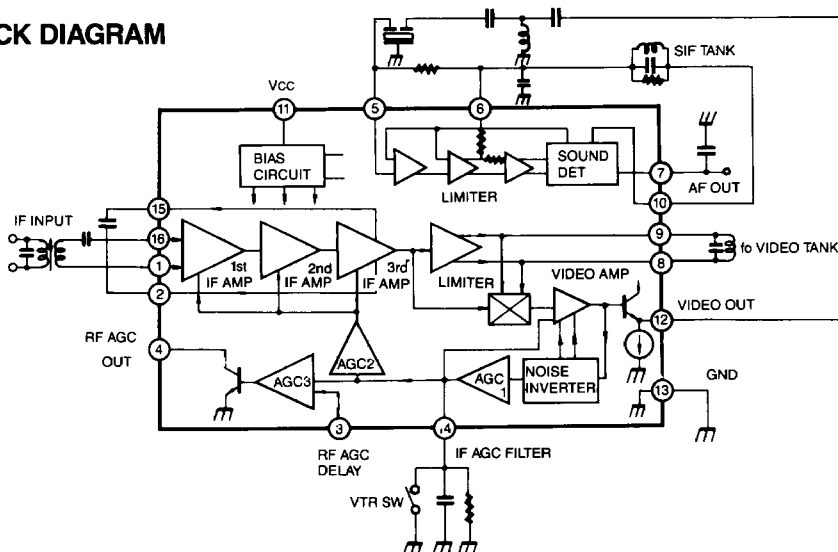
- Excellent limiter characteristics.
- Excellent AM rejection.
- Large undistorted audio output voltage with quadrature detector.



**ORDERING INFORMATION**

Device	Package	Operating Temperature
KA2913A	16 DIP	- 20 ~ + 65°C
KA2917		

**BLOCK DIAGRAM**



ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

Characteristic	Symbol	Value	Unit
Supply Voltage (Pin 11)	$V_{CC}$	15	V
Open Loop Voltage (Pin 4)	$V_4$	15	V
Video DC Output Current (Pin 12)	$I_{12}$	6	mA
Power Dissipation (Note)	$P_D$	1.4	W
Ambient Temperature	$T_a$	-20 ~ 65	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 ~ 150	$^\circ\text{C}$

Note: Derated above  $T_a = 25^\circ\text{C}$  in the proportion of 11.2 mW/ $^\circ\text{C}$ .

## ELECTRICAL CHARACTERISTICS

VIF Stage ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12\text{V}$ ,  $V_{CC} = 12\text{V}$ ,  $f_p = 45.75\text{MHz}$ ,  $f_s = 41.25\text{MHz}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	Test Fig
Recommended Supply Voltage	$V_{CC} (V_{11})$	—	10.8	12.0	13.2	V	—
Supply Current	$I_{CC} (I_{11})$	$S_1$ : On, $S_3$ : 2, $S_5$ : 2, $S_4$ : 1	35	50	65	mA	1
Video DC Output Voltage	$V_{12}$	$S_1$ : Off, $S_3$ : 2, $S_5$ : 2, $S_4$ : 1	5.2	5.5	5.8	V	1
Terminal Voltage 5	$V_5$	$S_1$ : On, $S_3$ : 2, $S_5$ : 2, $S_4$ : 1	3.5	4.4	5.3	V	1
Terminal Voltage 7	$V_7$	$S_1$ : On, $S_3$ : 2, $S_5$ : 2, $S_4$ : 1	4.6	6.0	7.2	V	1
RF AGC Residual Output Voltage	$V_4 \text{ Sat}$	$S_1$ : Off, $S_3$ : 2, $S_5$ : 2, $S_4$ : 1	—	—	0.5	V	1
RF AGC Leak Current	$I_4 \text{ Leak}$	$S_1$ : Off, $S_3$ : 1, $S_5$ : 1, $S_4$ : 2	—	—	1	$\mu\text{A}$	1
Video Sensitivity	$v_1$ Pin-16	(Note 1)	60	150	250	$\mu\text{V}_{rms}$	2
AGC Range	$\Delta A$ (IF)	(Note 2)	60	64	—	dB	2
SYNC TIP Level Voltage	$V_{SYNC}$ ( $V_{12}$ )	(Note 3)	2.3	2.5	2.7	V	2
Maximum IF Input Voltage	$V_{IN \text{ Max}}$ PIF	(Note 4)	100	120	—	$\text{mV}_{rms}$	2
White Noise Threshold	$V_W \text{ TH}$ ( $V_{12}$ )	(Note 5)	5.8	6.2	6.6	V	2
White Noise Clamp Level	$V_{WCL}$ ( $V_{12}$ )	(Note 5)	3.7	4.1	4.5	V	2
Black Noise Threshold	$V_B \text{ TH}$ ( $V_{12}$ )	(Note 5)	1.4	1.6	1.8	V	2

**ELECTRICAL CHARACTERISTICS**VIF Stage ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12\text{V}$ ,  $f_p = 45.75\text{MHz}$ ,  $f_s = 41.25\text{MHz}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	Test Fig	
Black Noise Clamp Level	$V_B$ CL ( $V_{12}$ )	(Note 5)	2.9	3.3	3.7	V	2	
Video Frequency Response	$f_{\text{BW}}$	(Note 6)	4.5	5.5	—	MHz	3	
Suppression of Carrier	CL	(Note 7)	40	50	—	dB	4	
Suppression of 2nd Carrier	$I_{2\text{nd}}$	(Note 8)	40	50	—	dB	4	
Suppression of Sound Carrier/ Color Subcarrier	$I_{920}$	(Note 9)	33	38	—	dB	4	
Differential Phase	DP	(Note 10)	—	3.5	5	deg	5	
Differential Gain	DG	(Note 10)	—	7	10	%	5	
VIF Input Impedance	$R_{\text{IN}}$ (VIF)	(Note 11)	1.5	3.0	6.0	$\text{K}\Omega$	6	
	$C_{\text{IN}}$ (VIF)		—	3.0	10.0	pF		
Max. Available Current	$I_{\text{A MAX}}$	(Note 12)	KA2917	0.3	—	—	mA	1
			KA2913A	7	—	—	mA	
RF AGC Delay Point Range	$V_{\text{IN}}$ Delay	(Note 13)	5.0	7.0	9.0	V	2	
Video Output Level	$V_{\text{OUT}}$	(Note 14)	2.25	2.5	2.75	V	2	

**ELECTRICAL CHARACTERISTICS**SIF Stage ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12\text{V}$ ,  $f_p = 45.75\text{MHz}$ ,  $f_s = 41.25\text{MHz}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	Test Fig
SIF Output Voltage	$S_{\text{OUT}}$	(Note 15)	200	400	600	$\text{mV}_{\text{rms}}$	3
Input Limiting Voltage	$V_{\text{IN}}$ (Lim)	(Note 16)	—	200	400	$\mu\text{V}_{\text{rms}}$	8
AM Rejection Ratio	AMR	(Note 17) $R_L = \infty$ $R_D = \infty$	40	45	—	dB	8
Recovered Output Voltage	$V_{\text{OD}}$	(Note 18) $R_L = \infty$ $R_D = \infty$	0.5	0.75	—	$V_{\text{rms}}$	8
Total Harmonic Distortion	THD	(Note 18) $R_L = \infty$ $R_D = \infty$	—	1.0	2.0	%	8
Max. Audio Output Voltage	$V_{\text{OM}}$	(Note 19)	4.0	—	—	$V_{\text{P.P}}$	8
SIF Input Impedance	$R_{\text{IN}}$ (SIF)		10	20	30	$\text{K}\Omega$	7
	$C_{\text{IN}}$ (SIF)		—	3	10	pF	
Audio Output Impedance	$R_{\text{O(AF)}}$	(Note 20)	10	15	20	$\text{K}\Omega$	9

Note 1)  $V_{AGC}$  (TP14 EXT. Applying voltage)=11.5V  
 VIF in:  $f=45.75\text{MHz}$ , 1kHz 30% AM modulation  
 Adjust VIF input level  $U_i$  so that the detected output of TP12C with high impedance probe will be  $0.8V_{p-p}$  and measure the input level.

Note 2)  $V_{AGC} = 4V$   
 Measure VIF input level  $U_i'$  same as note 1

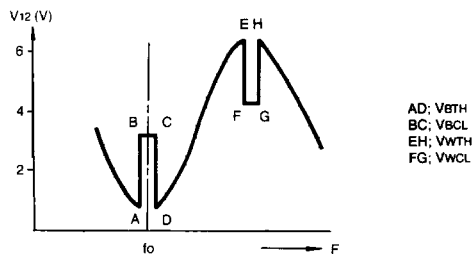
$$\Delta A = 20 \log \frac{U_i'}{U_i} (\text{dB})$$

Note 3) VIF in:  $f=45.75\text{MHz}$  CW 15mVrms  
 Measure the DC level of TP12A.

Note 4) VIF in:  $f=45.75\text{MHz}$  APL100%, 87.5% AM modulation.  
 TP14: open

(1) Adjust VIF input level  $50\text{mV}_{p-p}$  and measure the detected output level  $U_{op-p}$   
 (2) Then increase the input level so that the detected output level will be  $1.1 \times U_{op-p}$  and measure the input level.

Note 5)  $V_{AGC} = 8V$   
 VIF in:  $f=45.75\text{MHz} \pm 10\text{MHz}$  variable or sweep 15mVrms measure DC level of TP12A



Note 6)  $V_{AGC} = 8V$   
 SG<sub>1</sub>: 45.75MHz CW  
 SG<sub>2</sub>: 45.65-27MHz variable  
 (1) Setting output of SG<sub>1</sub> so that the DC level of TP12A will  
 (2) Setting output of SG<sub>2</sub> (45.65MHz) so that the AC level of TP12A will be  $0.5V_{p-p}$   
 (3) Decreasing frequency of SG<sub>2</sub> until the AC level of TP12A will be  $0.35V_{p-p}$  ( $-3\text{dB}$  of  $0.5V_{p-p}$ ) then read  
 $f_{SG2} = F f_{BW} = 45.75 - F \text{ MHz}$

Note 7) SG<sub>1</sub>: 45.75MHz, 1kHz 80% AM modulation 100mVrms  
 SG<sub>2</sub>, SG<sub>3</sub>: off  
 Setting  $V_{AGC}$  so that the output AC level of TP12A will be  $2.7V_{p-p}$   
 Measure CL of TP12A after setting to 0% AM of SG<sub>1</sub>

Note 8) Measure 2nd of TP12A same as Note 9

Note 9)  $V_{AGC} = 8V$   
 SG<sub>1</sub>: 45.75MHz (P: picture) 100mVrms  
 SG<sub>2</sub>: 41.25MHz (S: sound) 32mVrms ( $-10\text{dB}$  of SG<sub>1</sub>)  
 SG<sub>3</sub>: 42.17MHz (C: chroma) 32mVrms ( $-10\text{dB}$  of SG<sub>1</sub>)  
 (1) Setting  $V_{AGC}$  so that the output tip level (lower) of TP12A will be 3.0V DC  
 (2) Measure the level difference (dB) between the C-level and 920KHz level

Note 10)  $V_{AGC} = 8V$   
 VIF in:  $f=45.75\text{MHz}$  video signal (RAMP) 87.5% AM 100mV<sub>p-p</sub>  
 Setting ATT so that the SYNC TIP level of TP12A will be 2.5V DC measure DP and DG.

- Note 11)  $V_{AGC} = 5V$   $f = 45.75MHz$   
Measure  $R_{IN}$ ,  $C_{IN}$
- Note 12)  $S_1$ : On,  $S_3$ : 2,  $S_5$ : 1  $S_4$ : 1 for 2917  
2 for 2913A
- Note 13) TP14: Open  
VIF in: 45.75MHz CW 20mVrms  
(1) Adjust the voltage of Terminal 3 so that the voltage of Terminal 4 will be 6.0V DC  
(2) Measure the Terminal voltage 3
- Note 14) TP14: Open  
VIP in: 45.75MHz 100% APL 87.5% AM modulation signal amplitude 50mV<sub>p-p</sub>, measure the detected output voltage (white peak to SYNC TIP)
- Note 15) TP14: Open  
SG<sub>1</sub>: 45.75MHz CW 100mVrms  
SG<sub>2</sub>: 41.25MHz CW 25mVrms  
Measure SIF (4.5MHz) output voltage at TP12A
- Note 16) SIF IN:  $f = 4.5MHz$  FM  $f_{MOD} = 400Hz$   $\Delta f = \pm 25kHz$   
(1) Adjust SIF input level 100mV<sub>p-p</sub> and measure the detected output level  $V_{OS}$   
(2) Then decrease the input level so that the detected output level will be 3dB down of  $V_{OS}$  and measure the input level.
- Note 17) SIF IN:  $f = 4.5MHz$  FM  $f_{MOD} = 400Hz$   $\Delta f = \pm 25kHz$   
AM 30%  
Input level  $V_{INS} = 100dB\mu$
- Note 18) SIF IN:  $f = 4.5MHz$  FM  $f_{MOD} = 400Hz$   $\Delta f = \pm 25kHz$   
Input level  $V_{INS} = 80dB\mu$
- Note 19) SIF in:  $f = 4.4-4.6MHz$  variable or sweep measure the output DC voltage change
- Note 20) SIF IN:  $f = 4.5MHz$  FM  $f_{MOD} = 400Hz$   $\Delta f = \pm 25kHz$   
Input level  $V_{INS} = 80dB\mu$   
(1) Measure the detected output voltage  $V_{OA}$  with  $R_X = \infty$   
(1) Then, adjust  $R_X$  so that the detected output voltage will be  $\frac{V_{OA}}{2}$  and measure  $R_X$ .



3. VIDEO FREQUENCY RESPONSE & SIF OUTPUT VOLTAGE TEST CIRCUIT

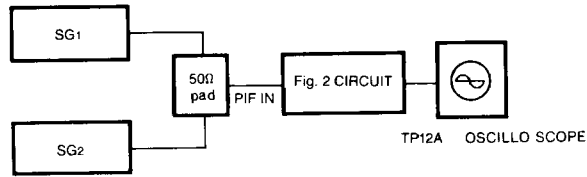


Fig. 3

4. INTER MODULATION TEST CIRCUIT

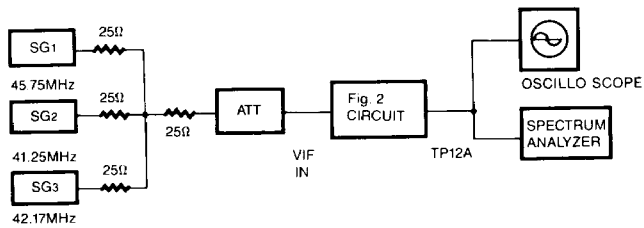
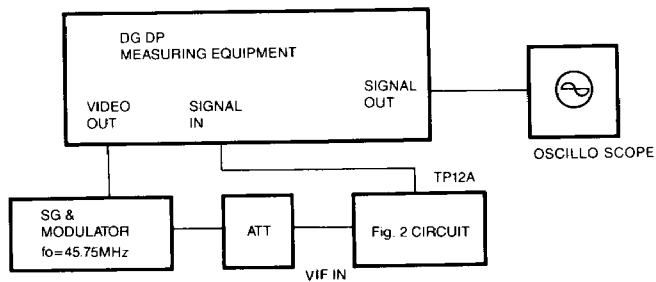


Fig. 4

5. DG, DP TEST CIRCUIT



APL: 50%  
ATT: ADJUST SYNC TIP LEVEL TO DC2.5V

Fig. 5

6. INPUT IMPEDANCE TEST CIRCUIT

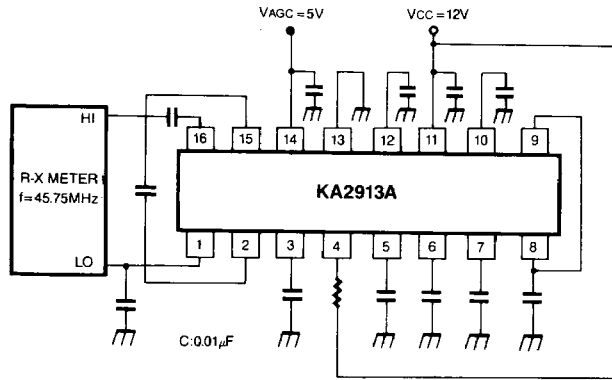


Fig. 6

7. SIF INPUT IMPEDANCE TEST CIRCUIT

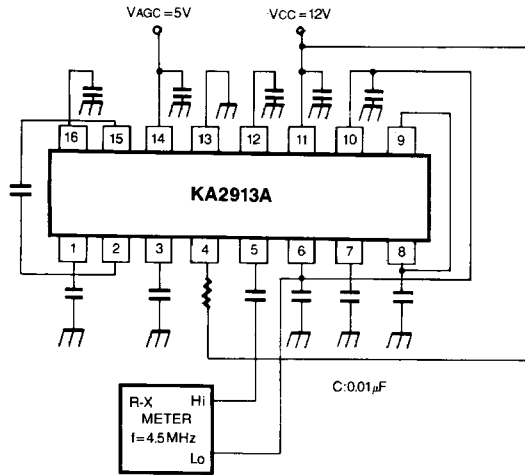


Fig. 7

8.  $V_{IN}$  (LIM), AMR,  $V_{OD}$ , THD,  $V_{OM}$  TEST CIRCUIT

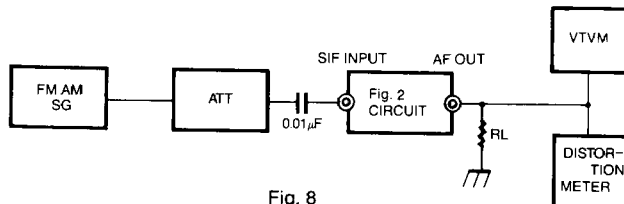


Fig. 8



9. AUDIO OUTPUT IMPEDANCE TEST CIRCUIT

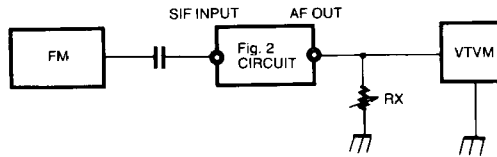


Fig. 9

TYPICAL APPLICATION CIRCUIT

