

**VIDEO IF+SIF SYSTEM**

The KA2914A, KA2918 are silicon monolithic integrated circuits designed for the VIF and SIF stage in color and B/W television receivers.

KA2914A: for Reverse AGC type

KA2918: for Forward AGC type

**FUNCTIONS**

**VIF**

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

**SIF**

- Three differential IF amplifier stages • Phase detector
- DC controlled attenuator
- Audio amplifier stage with NFB terminal

**FEATURES**

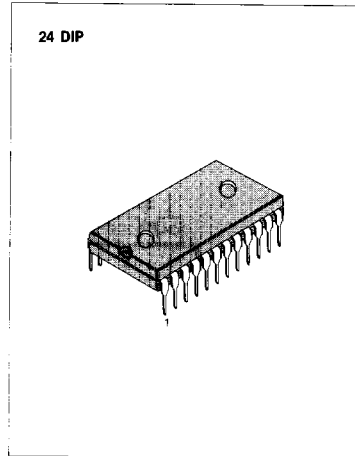
- PIF, SIF, ATT audio driver
- 2 chip color TV system is possible with the KA2153 or KA2154

**VIF**

- High gain, wide band IF amplifier
- AGC characteristics with excellent stability
- Excellent DG/DP characteristics
- Excellent S/N characteristics due to delayed 3-stage AGC action
- Negative video output signal
- Switch off the video part with VTR SW

**SIF**

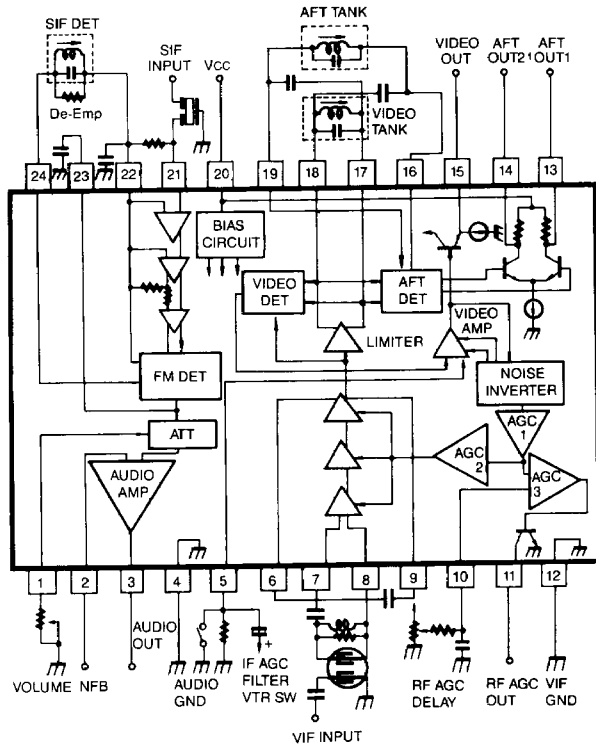
- Excellent limiter characteristics
- Excellent attenuator characteristics



**ORDERING INFORMATION**

Device	Package	Operating Temperature
KA2914A	24 DIP	- 20 ~ + 65°C
KA2918		

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V <sub>cc</sub>	15	V
Terminal 11 Open Voltage	V <sub>11</sub>	15	V
Video DC Output Current	I <sub>15</sub>	6	mA
Audio DC Output Current	I <sub>3</sub>	3	mA
Terminal 2 Voltage	V <sub>2</sub>	15	V
Power Dissipation (Note)	P <sub>d</sub>	1.6	W
Operating Temperature	T <sub>opr</sub>	- 20 ~ 65	°C
Storage Temperature	T <sub>stg</sub>	- 55 ~ 150	°C

Note: Derated above T<sub>a</sub> = 25°C in the proportion of 12.8 mW/°C.

## ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	Test Fig
Recommended Supply Voltage	$V_{CC}$	—	10.8	12.0	13.2	V	—
Supply Current	$I_{CC}$	—	50	72	95	mA	1
Video DC Output Voltage	$V_{15}$	SW <sub>1</sub> : 1 (KA2914A) SW <sub>2</sub> : 2 (KA2918)	5.2	5.5	5.8	V	1
AFT DC Output Voltage	$V_{13}$	SW <sub>1</sub> : 1 (KA2914A) SW <sub>2</sub> : 2 (KA2918)	5.3	6.8	8.3	V	1
	$V_{14}$	SW <sub>1</sub> : 1 (KA2914A) SW <sub>2</sub> : 2 (KA2918)	5.3	6.8	8.3	V	1
AFT DC Offset Voltage	$\Delta V_{13-14}$	SW: 1 (KA2914A) SW: 2 (KA2918)	-1.5	0	1.5	V	1
RF AGC Residual Output Voltage	$V_{11 \text{ Sat}}$	SW <sub>1</sub> : 1 (KA2914A) SW <sub>2</sub> : 2 (KA2918)	—	—	0.5	V	1
RF AGC Leak Current	$I_{11 \text{ LEAK}}$	SW <sub>1</sub> : 1 (KA2918) SW <sub>2</sub> : 1 (KA2914A)	—	—	1	$\mu\text{A}$	1
Video Sensitivity	$v_i$ Pin 7-8	(Note 1)	60	150	250	$\mu\text{V}_{\text{rms}}$	2
AGC Range	$\Delta A_{\text{VIF}}$	(Note 2)	60	64	—	dB	2
SYNC TIP Level Voltage	$V_{\text{SYNC}}$ ( $V_{15}$ )	(Note 3)	2.3	2.5	2.7	V	2
Max. IF Input Voltage	$v_{\text{IN Max}}$ PIF	(Note 4)	100	120	—	$\text{mV}_{\text{rms}}$	2
White Noise Threshold Level	$V_{\text{WTH}}$ ( $V_{15}$ )	(Note 5)	5.8	6.2	6.6	V	2
White Noise Clamp Level	$V_{\text{WCL}}$ ( $V_{15}$ )	(Note 5)	3.7	4.1	4.5	V	2

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Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	Test Fig
Black Noise Threshold Level	$V_{\text{BTH}}$ ( $V_{15}$ )	(Note 5)	1.4	1.6	1.8	V	2
Black Noise Clamp Level	$V_{\text{BCL}}$ ( $V_{15}$ )	(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
920KHz Beat Level	$I_{920}$	(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	
AFT Sensitivity	$\Delta F/V_{13-14}$	(Note 12)	—	16	—	kHz/V	2
AFT Output Voltage	Upper $V_{13\text{U}}$ $V_{14\text{U}}$	(Note 13)	11.7	11.9	12.0	V	2
	Lower $V_{13\text{L}}$ $V_{14\text{L}}$	(Note 13)	1.8	2.3	2.8	V	2
RF AGC Max Available Current	$I_{\text{A Max}}$	$\text{SW}_1: 1$ (KA2914A) $\text{SW}_2: 1$	0.3	—	—	mA	1
		$\text{SW}_1: 2$ $\text{SW}_2: 1$ (KA2918)	7.0	—	—		
RF AGC Delay Setting Range	$V_{\text{IN}}$ Delay	(Note 14)	5	7	9	V	
AFT Band width	$\Delta F_{\text{W}}$	(Note 13)	1.4	—	—	MHz	2
Video Output Voltage	$V_{\text{OUT}}$	(Note 15)	2.25	2.50	2.75	V	2

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Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	Test Fig	
SIF Output Voltage	$V_{OUT}$	(Note 16)	200	400	600	$\text{mV}_{\text{rms}}$	3	
Input Limiting Voltage	$V_{IN(LIM)}$	(Note 17) $R_D = \infty$	—	200	400	$\mu\text{V}_{\text{rms}}$	8	
AM Rejection Ratio	AMR	SIF IN: $f = 4.5\text{MHz}$ $f_m = 400\text{Hz}$ , $\Delta f = \pm 25\text{kHz}$ AM 30%, $V_{IN} = 100\text{dBu}$	40	45	—	dB	8	
Recovered Output Voltage	$V_{OD}$	SIF IN: $f = 4.5\text{MHz}$ $f_m = 400\text{Hz}$ , $\Delta f = \pm 25\text{kHz}$ $V_{IN} = 80\text{dBu}$ , $R_D = 12\text{k}\Omega$	0.5	0.75	—	$\text{V}_{\text{rms}}$	8	
Total Harmonic Distortion	$\text{THD}_{\text{DET}}$	SIF IN: $f = 4.5\text{MHz}$ $f_m = 400\text{Hz}$ , $\Delta f = \pm 25\text{kHz}$ $V_{IN} = 80\text{dBu}$	—	1.0	—	%	8	
Max. Audio Output Voltage	$V_{OM}$	SIF IN: $f = 4.4 \sim 4.6\text{MHz}$	4.0	—	—	$\text{V}_{\text{p-p}}$	8	
SIF Input Impedance	$R_{IN(SIF)}$	$f = 4.5\text{MHz}$	10.0	20.0	30.0	$\text{K}\Omega$	7	
	$C_{IN(SIF)}$		—	3.0	—	pF		
DET Output Impedance	$R_O(\text{DET})$	(Note 18)	10.0	15.0	20.0	$\text{K}\Omega$	9	
DC Voltage	Terminal 21	$\text{SW}_1: 1$ (KA2914A) $\text{SW}_2: 2$ (KA2918)	3.5	4.4	5.3	V	1	
	Terminal 23		4.8	6.0	7.2	V		
	Terminal 1		$V_1$	6.0	6.7	7.4		V
Max. Attenuation	ATT Max	(Note 19)	60	—	—	dB	10	
DC Volume Gain	$G_{\text{ATT Min}}$	$R_A = 0$ $G_{\text{ATT Min}} = 20 \log \frac{V_2}{V_{23}}$	-5.5	-3.5	-1.5	dB	10	
ATT Characteristics	1	$V_1(1)$	*	3.4	3.8	4.2	V	10
	2	$V_1(2)$	**	4.5	4.9	5.3	V	10
Signal Leakage	$V_{PT}$	(Note 20)	—	1.0	3.0	$\text{mV}_{\text{rms}}$	11	
AF AMP. Gain	$G_V \text{ AF}$	(Note 21)	—	20	—	dB	13	
AF AMP. Distortion	$\text{THD AF}$	$P_{23A} = 1\text{V}_{\text{pp}}$ , 400Hz $\text{SW}_3: \text{On}$ ATT: -26dB Setting	—	1.5	—	%	12	
AF AMP. Max. Output Voltage	$V_{\text{OAF Max}}$	(Note 21) $\text{THD}_{\text{AF}} 5\%$	1.5	2.0	—	$\text{V}_{\text{rms}}$	13	
AF Output DC Voltage	$V_3$	$\text{SW}_1: 1$ (KA2914A) $\text{SW}_2: 2$ (KA2918) $\text{SW}_3: 2$	6.7	7.7	8.8	V	1	

\* Read the 400Hz component of  $V_{A1}$  at  $P_2$  with  $R_A = 0$ , set  $R_A$  so that  $V_{A1} = 1/2 V_{A1} (-6\text{dB})$ , then read DC voltage of terminal 1 ( $V_1$ ).

\*\* Read the 400Hz component of  $V_{A1}$  at  $P_2$  with  $R_A = 0$ . Set  $R_A$  so that  $V_{A1} = 3.16 \times 10^{-3} V_{A1} (-50\text{dB})$  then read DC voltage of terminal 1 ( $V_1$ ).

TEST CIRCUIT

1. DC Characteristic

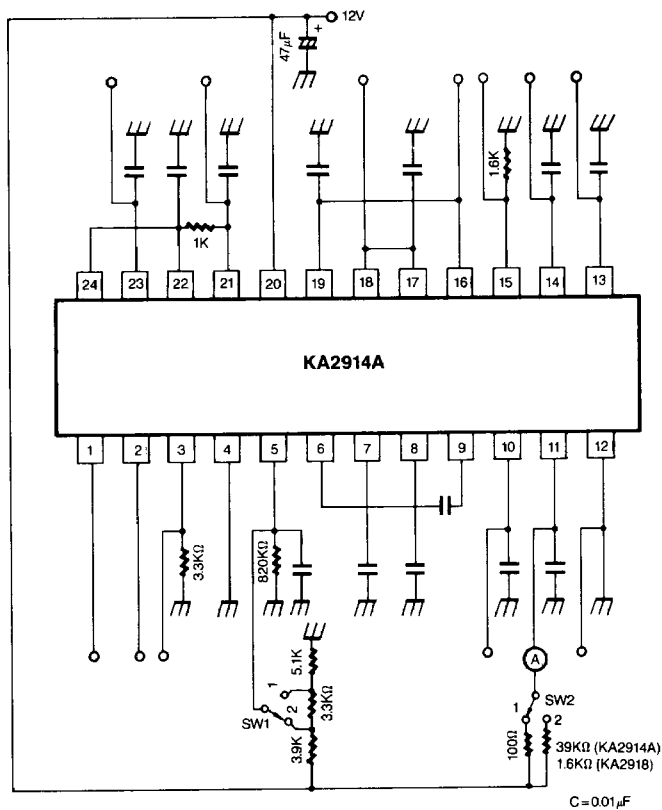


Fig. 1

2. AC Characteristic

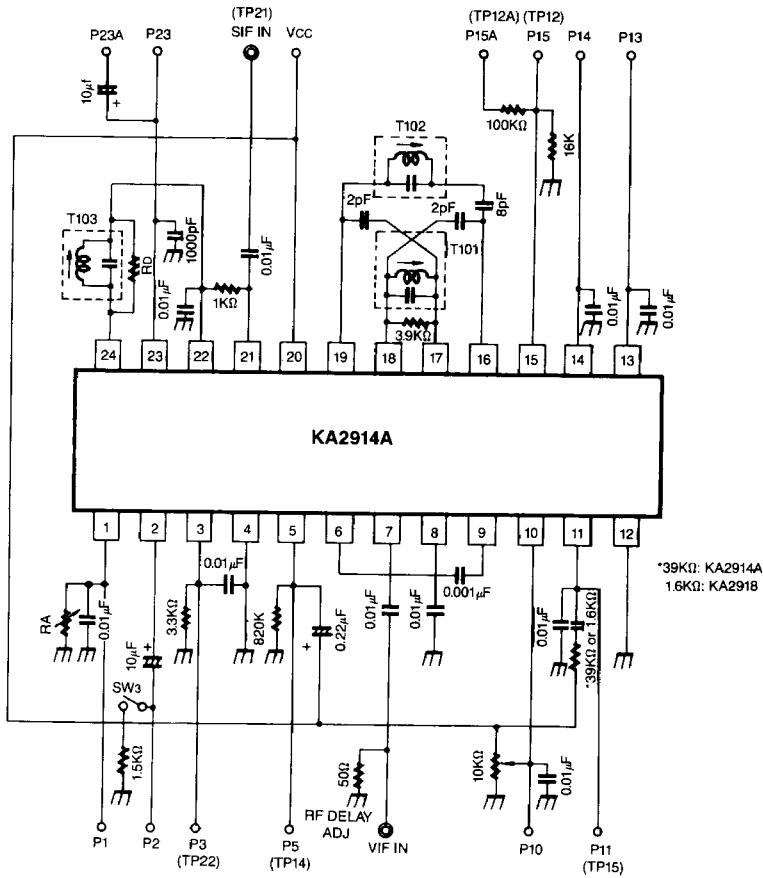


Fig. 2

3

**3. Video Frequency Response and SIF Output Voltage**

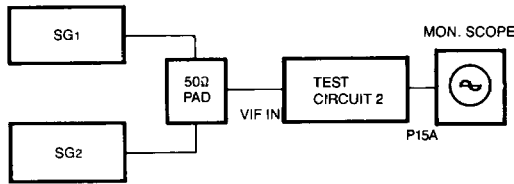


Fig. 3

**4. Inter Modulation**

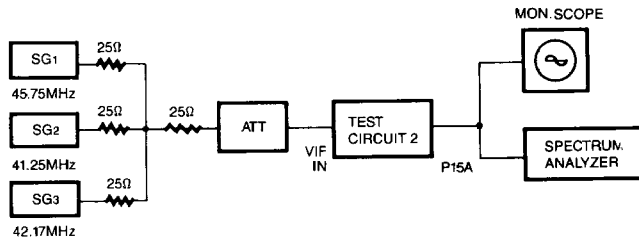
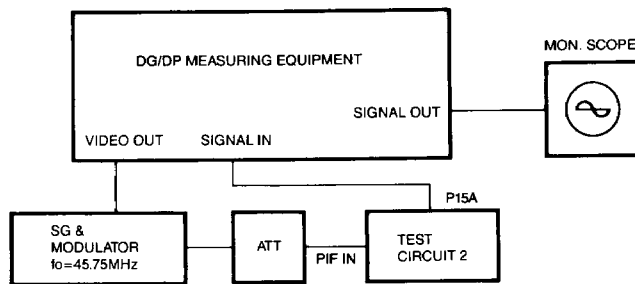


Fig. 4

**5. DG, DP**



APL=50%  
ATT: ADJUST SYNC TIP LEVEL TO DC 2.5V

Fig. 5





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

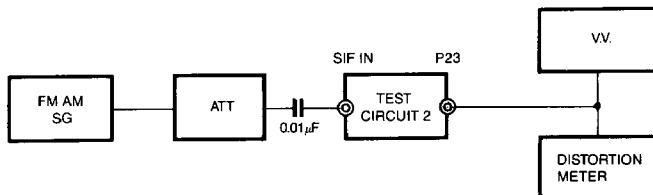


Fig. 8

9. Audio Output Impedance

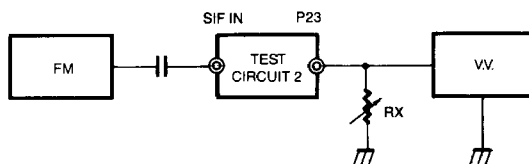


Fig. 9

10.  $ATT_{MAX.}$ ,  $G_{ATT MIN.}$ ,  $V_1(1)$ ,  $V_1(2)$

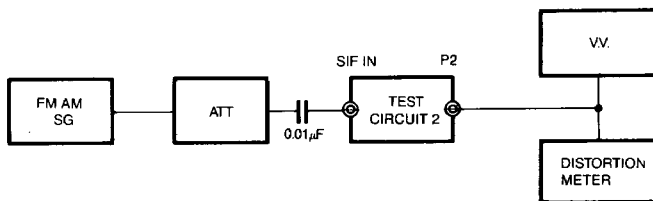


Fig. 10

11.  $v_{PT}$

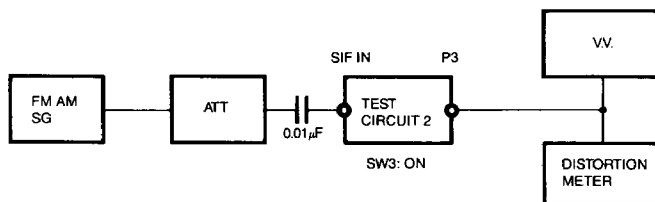


Fig. 11

12. THD<sub>AF</sub>

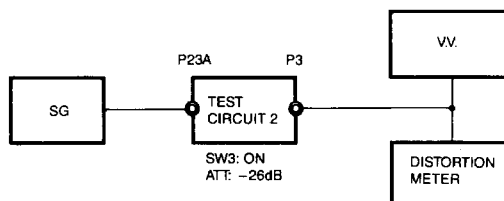


Fig. 12

13.  $G_v$  AF,  $v_{OAF\ MAX}$

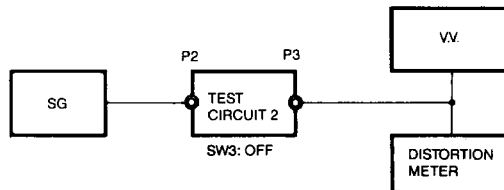


Fig. 13

## TEST CONDITIONS

Note 1)  $V_{AGC}$  (P5 EXT. Applying voltage)=11.5V

VIF in:  $f=45.75\text{MHz}$  1kHz 30% AM modulation

Adjust the VIF input level  $v$  so that the detected output of P15A with high impedance probe will be  $0.8V_{p-p}$  and measure the input level.

Note 2)  $V_{AGC}=4\text{V}$

Measure VIF input level  $v$  same as note 1

$$\Delta A = 20 \log \frac{v}{V} \text{ (dB)}$$

Note 3) VIF IN:  $f=45.75\text{MHz}$  CW 15mVrms

Measure the DC level of P15

Note 4) VIF IN:  $f=45.75\text{MHz}$  APL 100%, 87.5% AM modulation.

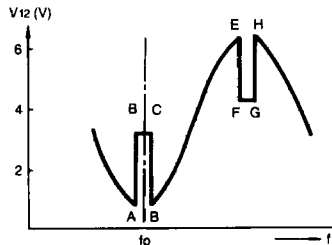
P5: open

(1) Adjust the VIF input level  $50\text{mV}_{p-p}$  and measure the detected output level  $v_{01p-p}$

(2) Then increase the input level so that the detected output level will be  $1.1 \times v_{01p-p}$  and measure the input level.

Note 5)  $V_{AGC}=8\text{V}$

VIF in:  $f=45.75\text{MHz} \pm 10\text{MHz}$  variable or sweep 15mVrms measure the DC level of P15.



Note 6)  $V_{AGC}=8\text{V}$  ( $GR \approx 30\text{dB}$ )

$SG_1$ : 45.75MHz CW

$SG_2$ : 45.75 – 40MHz variable

(1) Setting output of  $SG_1$ , so that the DC level of P15 will be 4.0V

(2) Setting output off  $SG_2$  (45.75MHz) so that the AC level of P15 will be  $0.5V_{p-p}$

(3) Decreasing frequency of  $SG_2$  until the AC level of P15 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<sub>AGC</sub> so that the output AC level of P15 will be 2.7V<sub>p-p</sub>  
 Measure CL of P15 after setting to 0% AM of SG<sub>1</sub>

$$CL = 20 \log \frac{2.7}{V_{CR} (V_{P-P})} \text{ (dB)}$$

- Note 8) Measure I<sub>2nd</sub> of P15 the same as note 7

- Note 9) V<sub>AGC</sub>=8V

SG<sub>1</sub>: 45.75MHz (P: picture) 100mVrms  
 SG<sub>2</sub>: 41.25MHz (S: sound) 32mVrms (-10dB of SG<sub>1</sub>)  
 SG<sub>3</sub>: 42.17MHz (C: chroma) 32mVrms (-10dB of SG<sub>1</sub>)

- (1) Setting V<sub>AGC</sub> so that the output tip level (lower) of P15 will be 3.0V DC  
 (2) Measure the level difference (dB) between the C-level and 920kHz level

- Note 10) V<sub>AGC</sub>=8V

VIF IN: f=45.75MHz video signal (RAMP) 87.5% AM 100mV<sub>p-p</sub>  
 Setting ATT so that the SYNC TIP level of P15 will be 2.5V DC.  
 Measure DP and DG

- Note 11) V<sub>AGC</sub>=5V f=45.75MHz

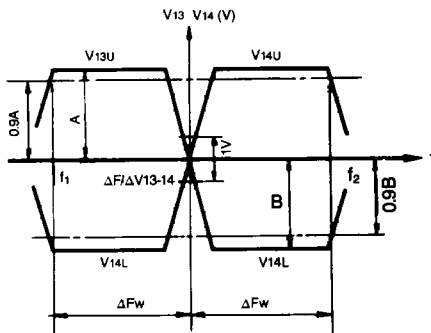
Measure R<sub>IN</sub>, C<sub>IN</sub>

- Note 12) AFT sensitivity  $\Delta F/\Delta (V_{13}-V_{14})$

- (1) INT, AGC (P5 open)  
 (2) VIF input: 45.75MHz  $\pm$  1.0MHz, CW 15mVrms  
 (3) Read the frequency (f<sub>1</sub>) of VIF when V<sub>13</sub>-V<sub>14</sub> = -1V  
 (4) Read the frequency (f<sub>2</sub>) of VIF when V<sub>13</sub>-V<sub>14</sub> = 1V then calculate  
 $\Delta F/\Delta (V_{13}-V_{14}) = |f_1 - f_2|$

- Note 13)  $\Delta F_W$ , V<sub>13U</sub>, V<sub>14U</sub>, V<sub>13L</sub>, V<sub>14L</sub>

- (1) INT AGC (P5 open)  
 (2) VIF IN: 45.75MHz  $\pm$  10MHz CW 15mVrms  
 (3) 8pF at Pin 16 should be shorted  
 (4) Read the frequency (f<sub>1</sub> or f<sub>2</sub>) when the V<sub>5</sub> or V<sub>6</sub> is reduced to 90% of the level of A or B with varying the frequency. Then the band width is the difference from center frequency (f<sub>0</sub>).



## Note 14) P5: 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 voltage of Terminal 3

## Note 15) P5: Open

VIF 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 16) P5: Open

SG<sub>1</sub>: 45.75MHz CW 100mVrmsSG<sub>2</sub>: 41.25MHz CW 25mVrms

Measure SIF (4.5MHz) output voltage at P15

Note 17) SIF IN: f=4.5MHz FM f<sub>MOD</sub>=400Hz Δf=±25kHz,(1) Adjust the SIF input level 100mV<sub>p-p</sub> and measure the detected output level v<sub>OS</sub>(2) Then decrease the input level so that the detected output level will be 3dB down of V<sub>OS</sub> and measure the input level

## Note 18) Output impedance

(1) SIF IN: f=4.5MHz f<sub>MOD</sub>=400Hz, Δf=±25kHz, 80dB<sub>μ</sub>(2) At P23 read the V<sub>O1</sub> at R<sub>X</sub>= , then read the R<sub>X</sub> when the recovered output becomes V<sub>O1/2</sub> by varying the R<sub>X</sub>. The R<sub>X</sub> is the output impedance.

## Note 19) ATT MAX

(1) SIF in: f=4.5MHz, f<sub>MOD</sub>=400Hz, f=±25kHz, 80dB<sub>μ</sub>(2) Read the 400Hz component of V<sub>A1</sub> at P2 with R<sub>A</sub>=0, then read V<sub>A1'</sub> with R<sub>A</sub>=∞

$$ATT \text{ MAX} = 20 \log \frac{V_{A1}}{V_{A1'}}$$

Note 20) U<sub>PT</sub>(1) SIF IN: f=4.5MHz, f<sub>MOD</sub>=400Hz, Δf=±25kHz, 80dB<sub>μ</sub>

(2) Read the 400Hz component at P3

Note 21) G<sub>V</sub> AF

(1) Apply 400Hz 0.1Vrms signal to P2

(2) Read the output voltage at P3

TYPICAL APPLICATION CIRCUIT

