

**SANYO Semiconductors**  
**DATA SHEET****LA75675M** — Monolithic Linear IC  
**For Use in TV/VTR Applications**  
**IF Signal Processing (VIF+SIF)****Overview**

This LA75675M is IF signal processing (VIF+SIF) for use in TV/VTR applications.

**Functions**

- VIF Block: VIF Amplifier, Buzz Cancellor, PLL Detector, IF AGC, RF AGC, AFT, Equalizer Amplifier
- SIF Block: Limiter Amplifier, PLL FM Detector

**Specifications****Maximum Ratings** at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\ max}$		6	V
Circuit voltage	V13, V17		$V_{CC}$	V
Circuit current	$I_6$		-3	mA
	$I_{10}$		-10	mA
	$I_{24}$		-2	mA
Allowable power dissipation	$P_d\ max$	$T_a \leq 50^\circ\text{C}$ , Independent IC	420	mW
		* Mounted on a board	720	mW
Operating temperature	$T_{opr}$		-20 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

\* When mounted on a  $65 \times 72 \times 1.6\text{mm}^3$  paper phenol board.

**Operating Conditions** at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		5	V
Operating supply voltage	$V_{CC\ op}$		4.5 to 5.5	V

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**Electrical Characteristics** at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $f_p = 45.75\text{MHz}$

### VIF Block

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	$I_5$		32	40	48	mA
Maximum RF AGC voltage	$V_{14H}$		$V_{CC}-0.5$	$V_{CC}$		V
Minimum RF AGC voltage	$V_{14L}$			0	0.5	V
Input sensitivity	$V_i$	$S1 = \text{OFF}$	32	38	44	$\text{dB}\mu\text{V}$
AGC range	GR		58	63		dB
Maximum allowable input	$V_i \text{ max}$		95	100		$\text{dB}\mu\text{V}$
No-signal video output voltage	$V_6$		3.5	3.8	4.1	V
Sync. signal tip voltage	$V_{6\text{tip}}$		0.9	1.2	1.5	V
Video output level	$V_o$		1.7	2	2.3	$V_{p-p}$
Black noise threshold voltage	$V_{\text{BTH}}$		0.5	0.8	1.1	V
Black noise clamp voltage	$V_{\text{BCL}}$		1.6	1.9	2.2	V
Video S/N	S/N		48	52		dB
C-S best	IC-S		38	43		dB
Frequency characteristics	$f_c$	6MHz	-3	-1.5		dB
Differential gain	DG			3	6.5	%
Differential phase	DP			3	5	$^\circ\text{C}$
No-signal AFT voltage	$V_{13}$		2.0	2.5	3.0	V
Maximum AFT voltage	$V_{13H}$		4.0	4.4	5.0	V
Minimum AFT voltage	$V_{13L}$		0	0.18	1.0	V
AFT detection sensitivity	$S_f$		28	40	52	$\text{mV}/\text{kHz}$
VIF input resistance	$R_i$	45.75MHz		1.5		$\text{k}\Omega$
VIF input capacitance	$C_i$	45.75MHz		3		pF
APC pull-in range (U)	$f_{pu}$		1.3	2.0		MHz
APC pull-in range (L)	$f_{pl}$			-2.0	-1.4	MHz
AFT tolerance frequency 1	$df_{a1}$		-150	0	+150	kHz
VCO1 maximum variable range (U)	$df_u$		1.5	2.0		MHz
VCO1 maximum variable range (L)	$df_l$			-2.0	-1.5	MHz
VCO control sensitivity	$\beta$		1.3	2.7	5.4	$\text{kHz}/\text{mV}$

### SIF Block

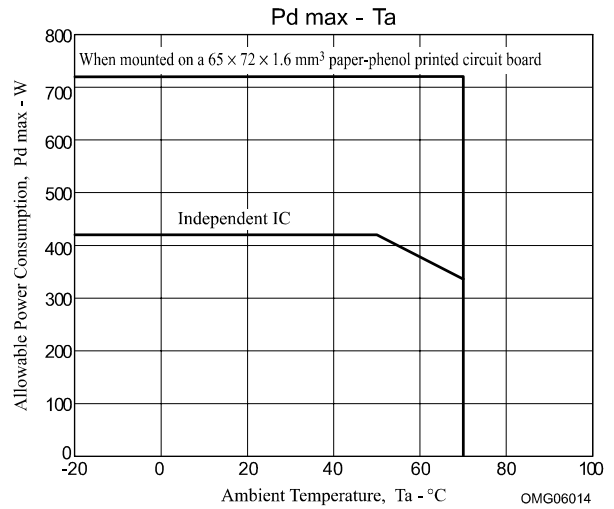
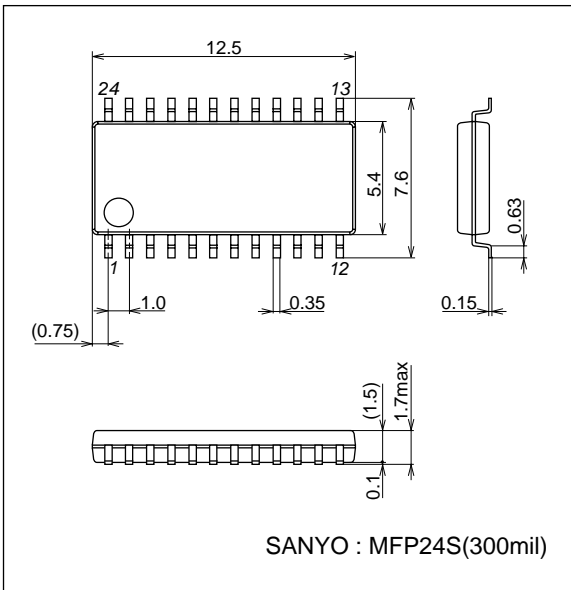
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Limiting sensitivity	$V_i (\text{lim})$		39	45	51	$\text{dB}\mu\text{V}$
FM detector output voltage	$V_o (\text{FM})$	$4.5\text{MHz} \pm 25\text{kHz}$	400	520	660	$\text{mV}_{\text{rms}}$
AM rejection ratio	AMR		50	60		dB
Distortion	THD			0.3	0.8	%
SIF S/N	S/N (FM)		59	64		dB
4.5MHz output level	$V_{\text{sout}}$	SIF IN, $80\text{dB}\mu\text{V}$	82	89	96	$\text{dB}\mu\text{V}$

\* IF the dynamic range of the FM detection output needs to be widened, connect a resistor and a capacitor in series between pin 23 and GND for level adjustment.

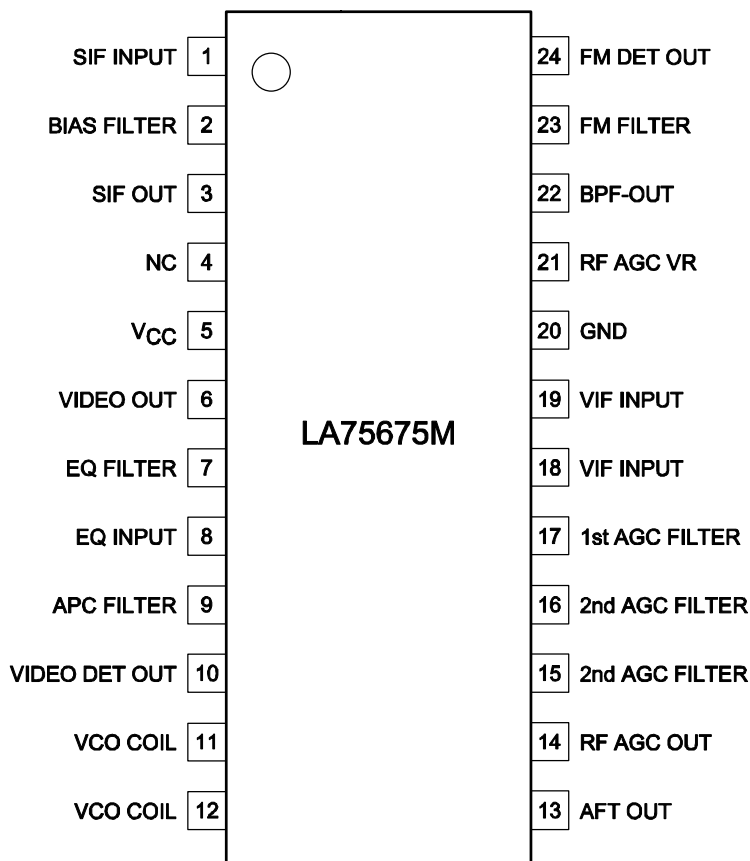
**Package Dimensions**

unit : mm

3112B



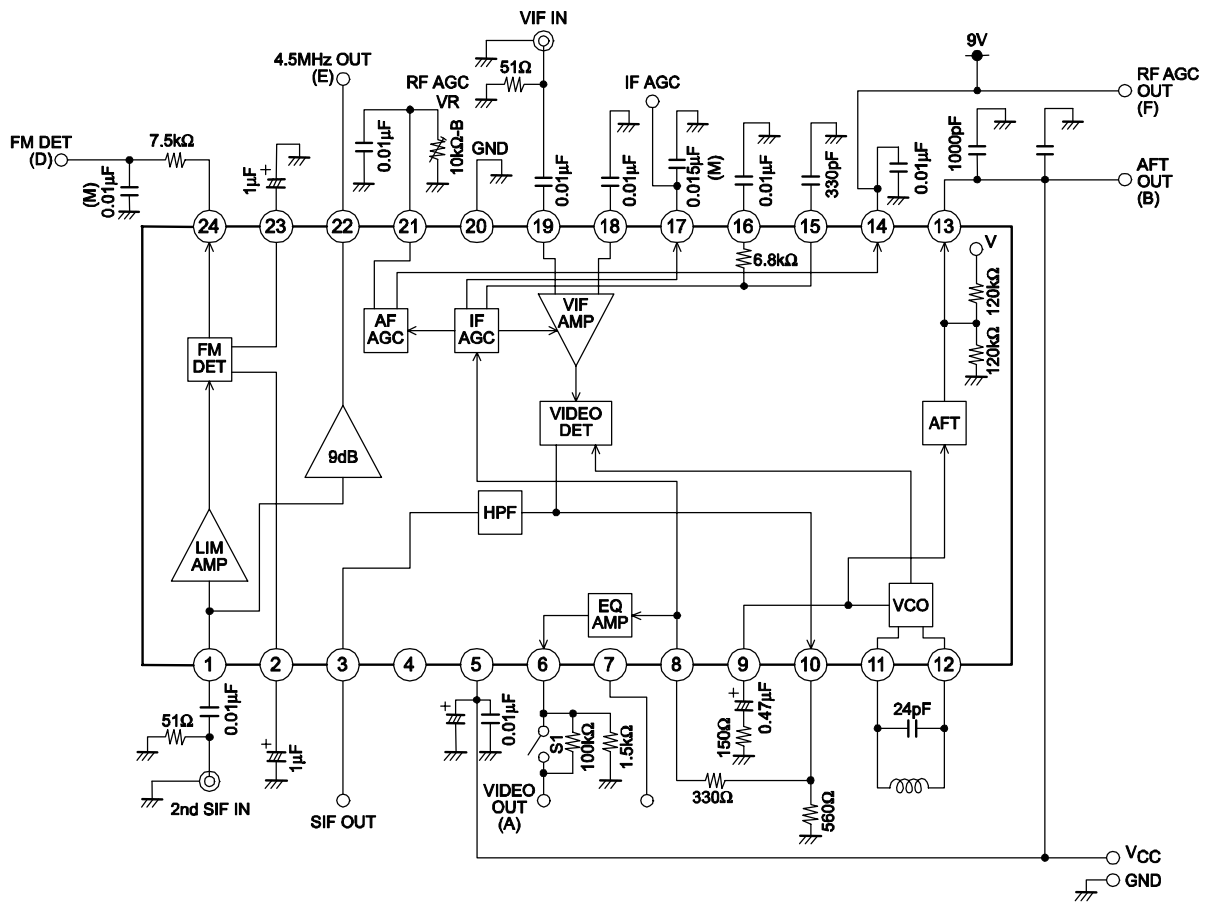
**Pin Assignment**



Top view

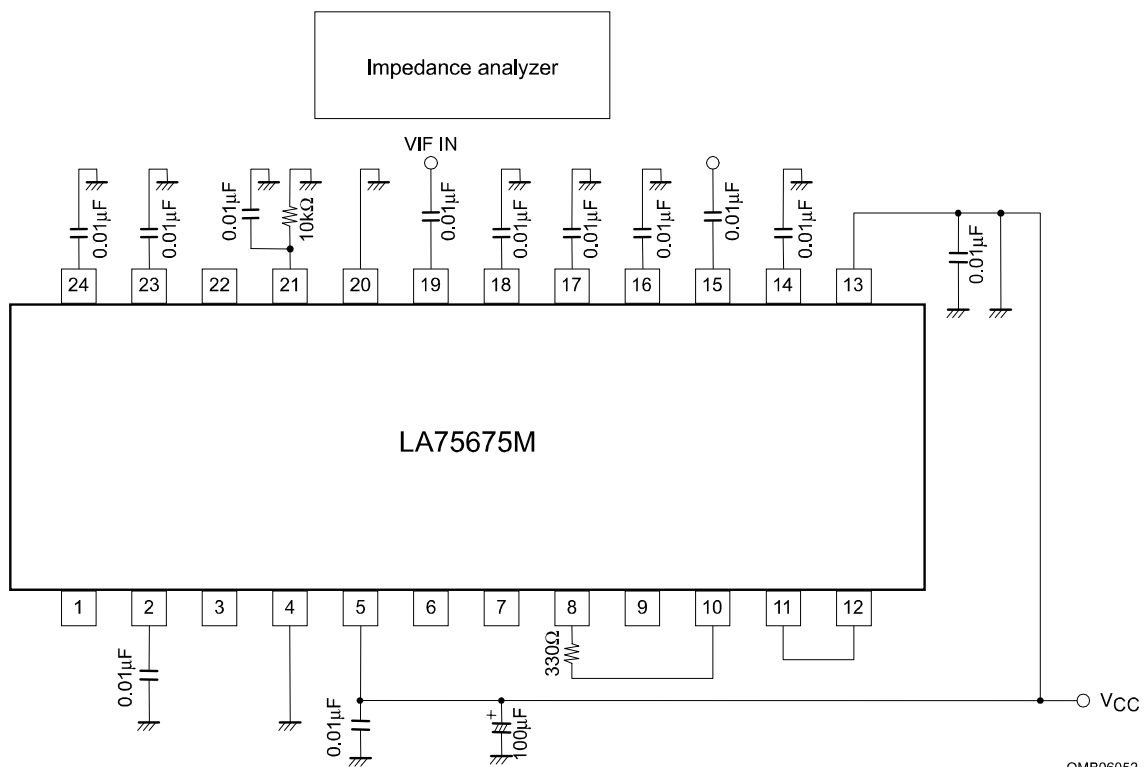
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**Block Diagram and AC Characteristics Test Circuit**



OMB06051

**Test Circuit**



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## Test Conditions

### V1. Circuit current [I<sub>5</sub>]

- (1) Internal AGC
- (2) Input a 45.75MHz, 10mVrms, continuous wave to the VIF input pin.
- (2) RF AGC V<sub>r</sub> MAX
- (3) Connect an ammeter to the V<sub>CC</sub> and measure the incoming current.

### V2. V3. Maximum RF AGC voltage, Minimum RF AGC voltage [V<sub>14H</sub>, V<sub>14L</sub>]

- (1) Internal AGC
- (2) Input a 45.75MHz, 10mVrms, continuous wave to the VIF input pin.
- (3) Adjust the RF AGC V<sub>r</sub> (resistance max.) and measure the maximum RF AGC voltage. .... V<sub>14H</sub>
- (4) Adjust the RF AGC V<sub>r</sub> (resistance min.) and measure the minimum RF AGC voltage. .... V<sub>14L</sub>

### V4. Input sensitivity [V<sub>i</sub>]

- (1) Internal AGC
- (2) f<sub>p</sub> = 45.75MHz 400Hz 40% AM (VIF input)
- (3) Turn off the S1 and put 100kΩ through.
- (4) Measure the VIF input level at which the 400Hz detection output level at test point A becomes 0.64Vp-p.

### V5. AGC range [GR]

- (1) Apply the V<sub>CC</sub> voltage to the external AGC, IF AGC (pin 17).
- (2) In the same manner under the same conditions as for V4 (input sensitivity), measure the VIF input level at which the detection output level becomes 0.64Vp-p. .... V<sub>il</sub>

(3)  $GR = 20 \log \frac{V_{il}}{V_i}$  dB

### V6. Maximum allowable input [V<sub>i</sub> max]

- (1) Internal AGC
- (2) f<sub>p</sub> = 45.75MHz 15kHz 78% AM (VIF input)
- (3) VIF input level at which the detection output level at test point A becomes video output (V<sub>o</sub>) ±1dB.

### V7. No-signal video output voltage [V<sub>6</sub>]

- (1) Apply the V<sub>CC</sub> voltage to the external AGC, IF AGC (pin 17).
- (2) Measure the DC voltage at the VIDEO output (A).

### V8. Sync. signal tip voltage [V<sub>6tip</sub>]

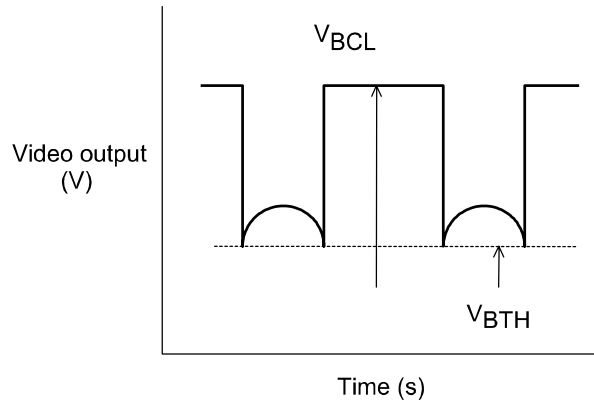
- (1) Internal AGC
- (2) Input a 45.75MHz, 10mVrms, continuous wave to the VIF input pin.
- (3) Measure the DC voltage at the VIDEO output (A).

### V9. Video output level [V<sub>o</sub>]

- (1) Internal AGC
- (2) f<sub>p</sub> = 45.75MHz 15kHz 78% AM V<sub>i</sub> = 10mVrms (VIF input)
- (3) Measure the peak value of the detection output level at test point A. (V<sub>p-p</sub>)

V10. V11. Black noise threshold level and clamp voltage [ $V_{BTH}$ ,  $V_{BCL}$ ]

- (1) Apply DC voltage to the external AGC, IF AGC (pin 17) and vary it.
- (2)  $f_p = 45.75\text{MHz}$  400Hz 40% AM 10mVrms (VIF input)
- (3) Adjust the IF AGC (pin 17) voltage to operate the noise canceller.  
Measure the  $V_{BTH}$ ,  $V_{BCL}$  at test point A.



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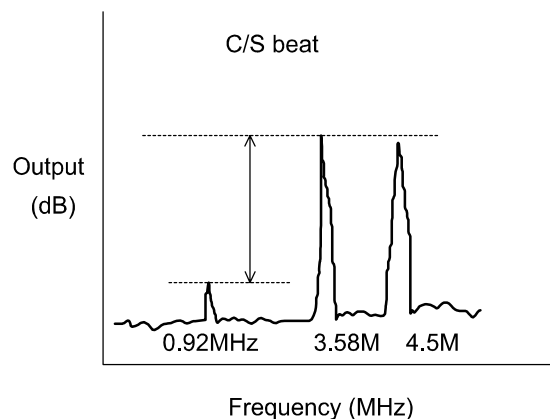
## V12. Video S/N [S/N]

- (1) Internal AGC
- (2)  $f_p = 45.75\text{MHz}$  CW = 10mVrms (VIF input)
- (3) Measure the noise voltage at test point A in RMS volts through a 10kHz to 4MHz band-pass filter.  
..... Noise voltage (N)

$$(4) S/N = 20 \log \frac{\text{Video position (V}_{p-p})}{\text{Noise voltage (V}_{rms})} = 20 \log \frac{1.12V_{p-p}}{\text{Noise voltage}} \text{ (dB)}$$

## V13. C/S beat [IC-S]

- (1) Apply DC voltage to the external AGC IF AGC (pin 17) and vary it.
- (2)  $f_p = 45.75\text{MHz}$  CW; 10mVrms  
 $f_c = 42.17\text{MHz}$  CW; 10mVrms – 10dB  
 $f_s = 41.25\text{MHz}$  CW; 10mVrms – 10dB
- (3) Adjust the IF AGC (pin 17) voltage so that the output level at test point A becomes 1.3Vp-p.
- (4) Measure the difference between the levels for 3.58MHz and 0.92MHz components at test point A.



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## V14. Frequency characteristics [fc]

- (1) Apply DC voltage to the external AGC IF AGC (pin 17) and vary it.
- (2) SG1 : 45.75MHz continuous wave 10mVrms  
SG2 : 45.65MHz to 39.75MHz continuous wave 2mVrms  
Add the SG1 and SG2 signals using a T pat and adjust each SG signal level so that the above-mentioned levels are reached and input the added signals to the VIF IN.
- (3) First set the SG2 frequency to 45.65MHz, and then adjust the IF AGC voltage (V17) so that the output level at test point A becomes 0.5Vp-p. .... V1
- (4) Set the SG2 frequency to 39.75MHz and measure the output level. .... V2
- (5) Calculate as follows :

$$fc = 20 \log \frac{V2}{V1} \text{ dB}$$

## V15. V16. Differential gain, differential phase [DG, DP]

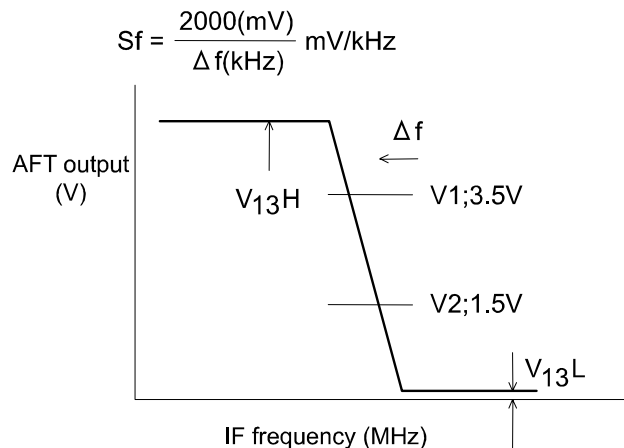
- (1) Internal AGC
- (2) fp = 45.75MHz APL50% 87.5% Modulation video signal Vi = 10mVrms
- (3) Measure the DG and DP at test point A.

## V17. No-signal AFT voltage [V13]

- (1) Internal AGC
- (2) Measure the DC voltage at the AFT output (B).

## V18. V19. V20. Maximum, minimum AFT output voltage, AFT detection sensitivity [V13H, V13L, Sf]

- (1) Internal AGC
- (2) fp = 45.75MHz  $\pm$ 1.5MHz, Sweep = 10mVrms (VIF input)
- (3) Maximum voltage : V13H, minimum voltage : V13L.
- (4) Measure the frequency deviation at which the voltage at test point B changes from V1 to V2. ....  $\Delta f$



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## V21. V22. VIF input resistance, Input capacitance [Ri, Ci]

- (1) Referring to the Input Impedance Test Circuit, measure Ri and Ci with an impedance analyzer.

## V23. V24. APC pull-in range [fpu, fpl]

- (1) Internal AGC
- (2)  $f_p = 39\text{MHz}$  to  $51\text{MHz}$  CW;  $10\text{mVrms}$
- (3) Adjust the SG signal frequency to be higher than  $f_p = 45.75\text{MHz}$  to bring the PLL to unlocked state.  
Note : The PLL is assumed to be in unlocked state when a beat signal appears at test point A.
- (4) When the SG signal frequency is lowered, the PLL is brought to locked state again. ....  $f_1$
- (5) Lower the SG signal frequency to bring the PLL to unlock state.
- (6) When the SG signal frequency is raised, the PLL is brought to locked state again. ....  $f_2$
- (7) Calculate as follows :  

$$f_{pu} = f_1 - 45.75\text{MHz}$$

$$f_{pl} = f_2 - 45.75\text{MHz}$$

V25. AFT tolerance frequency 1 [ $\Delta F_{a1}$ ]

- (1) Internal AGC
- (2) SG1 :  $43.75\text{MHz}$  to  $47.75\text{MHz}$  variable CW  $10\text{mVrms}$
- (3) Adjust the SG1 signal frequency so that the AFT output DC voltage (test point B) becomes  $2.5\text{V}$ ; that SG1 signal frequency is  $f_1$ .
- (4) External AGC (Adjust the V17.)
- (5) Apply  $9\text{V}$  to the IFAGC (pin 17) and then pick up the VCO oscillation frequency from the GND, etc.; that frequency is  $f_2$ .
- (6) Calculate as follows :  
AFT tolerance frequency :  $\Delta F_{a1} = f_2 - f_1$  (kHz)

## V26. V27. VCO maximum variable range (U, L) [dfu, dfll]

- (1) Apply the  $V_{CC}$  voltage to the external AGC, IF AGC (pin 17).
- (2) Pick up the VCO oscillation frequency from the VIDEO output (A), GND, etc.  
and adjust the VCO coil so that the frequency becomes  $45.75\text{MHz}$ .
- (3)  $f_l$  is taken as the frequency when  $1\text{V}$  is applied to the APC pin (pin 9).  
In the same manner,  $f_u$  is taken as the frequency when  $5\text{V}$  is applied to the APC pin (pin 9).  

$$d_{pu} = f_u - 45.75\text{MHz}$$

$$d_{fl} = f_l - 45.75\text{MHz}$$

V28. VCO control sensitivity [ $\beta$ ]

- (1) Apply the  $V_{CC}$  voltage to the external AGC, IF AGC (pin 17).
- (2) Pick up the VCO oscillation frequency from the VIDEO output (A), GND, etc.  
and adjust the VCO coil so that the frequency becomes  $45.75\text{MHz}$ .
- (3)  $f_1$  is taken as the frequency when  $3.0\text{V}$  is applied to the APC pin (pin 9).  
In the same manner,  $f_2$  is taken as the frequency when  $3.4\text{V}$  is applied to the APC pin (pin 9).

$$\beta = \frac{f_2 - f_1}{400} \text{ (kHz/mV)}$$

S1. SIF Limiting sensitivity [ $V_i$  (lim)]

- (1) Apply the  $V_{CC}$  voltage to the external AGC, IF AGC (pin 17).
- (2)  $f_s = 4.5\text{MHz}$   $f_m = 400\text{Hz}$   $\Delta F = \pm 25\text{kHz}$  (SIF input)
- (3) Set the SIF input level to  $100\text{mVrms}$  and then measure the level at test point D. ....  $V_1$
- (4) Lower the SIF input level until  $V_1 - 3\text{dB}$  occurs. Measure the input level at that moment.

S2. S4. FM detection output voltage, distortion [ $V_o$  (FM), THD]

- (1) Apply the  $V_{CC}$  voltage to the external AGC, IF AGC (pin 17).
- (2)  $f_s = 4.5\text{MHz}$   $f_m = 400\text{Hz}$   $\Delta F = \pm 25\text{kHz}$  (SIF input  $V_i = 100\text{mVrms}$ )
- (3) Assign the level at test point D to the FM detection output voltage and measure the distortion factor.

**S3. AM rejection ratio [AMR]**

- (1) Apply the VCC voltage to the external AGC, IF AGC (pin 17).
- (2)  $f_s = 4.5\text{MHz}$   $f_m = 400\text{Hz}$   $\text{AM} = 30\%$  (SIF input  $V_i = 100\text{mVrms}$ )
- (3) Measure the output level at test point D. .... VAM

$$(4) \text{AMR} = 20\log \frac{V_o(\text{FM})}{V_{\text{AM}}} \text{ dB}$$

**S5. SIF S/N [S/N(FM)]**

- (1) External AGC ( $V_{17} = V_{\text{CC}}$ )
- (2)  $f_s = 4.5\text{MHz}$  NO MOD  $V_i = 100\text{mVrms}$
- (3) Measure the output level at test point D. ....  $V_n$

$$(4) \text{S/N} = 20\log \frac{V_o(\text{FM})}{V_n} \text{ dB}$$

**S6. 4.5MHz output level [Vsout]**

- (1) External AGC ( $V_{17} = V_{\text{CC}}$ )
- (2)  $f_s = 4.5\text{MHz}$  NO MOD  $V_i = 10\text{mVrms}$
- (3) Measure the output level at test point E. .... Vsout

Note 1) Unless otherwise specified for VIF test, apply the VCC voltage to the IF AGC and adjust the VCO coil so that oscillation occurs at 45.7MHz.

2) Unless otherwise specified, leave the SW1 turned ON.

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