

# M51348AVP

## VIF/SIF for Low Supply Voltage

REJ03F0062-0100Z

Rev.1.0

Sep.19.2003

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### Description

The M51348 is a low supply voltage, low power semiconductor IC for compact TV sets which includes Video Intermediate Frequency (VIF), Sound Intermediate Frequency (SIF), and Synchronous Separation (Sync. Sep.) functions.

An IF amplifier, Video detector (with simultaneous sound detector), IF AGC, RF AGC (forward type), AFT, SIF limiter amplifier, FM detector electronic volume, and synchronous separation function are provided.

The package is of the 24-pin mini-flat type.

The M513848AFP has better DG and DP but less VIF input sensitivity than the M51348FP.

### Features

- This IC can be used with very low supply voltage and low power and it comes in a mini-flat package to suit the compact TV or compact TV tuner.

Minimum operating power voltage	3V
Consuming current	16mA (when used with 4.5V supply voltage)
- Current automatically decreases to ensure power saving when a strong signal is received, when the electronic volume control is at its lowest.
- There are separate GND pins for the VIF/Sync. Sep. circuit and for the SIF circuit so that cross-interference is reduced.
- It is possible to adjust the video detector output amplitude by controlling the 24-pin voltage externally.
- The AGC works fast because of the 2-stage AGC filter.  
AGC has high stability against outside noise due to the AGC noise canceller.
- Emitter input circuit is used in Sync. Sep. Output is taken from the Sync. Positive polarity.

### Application

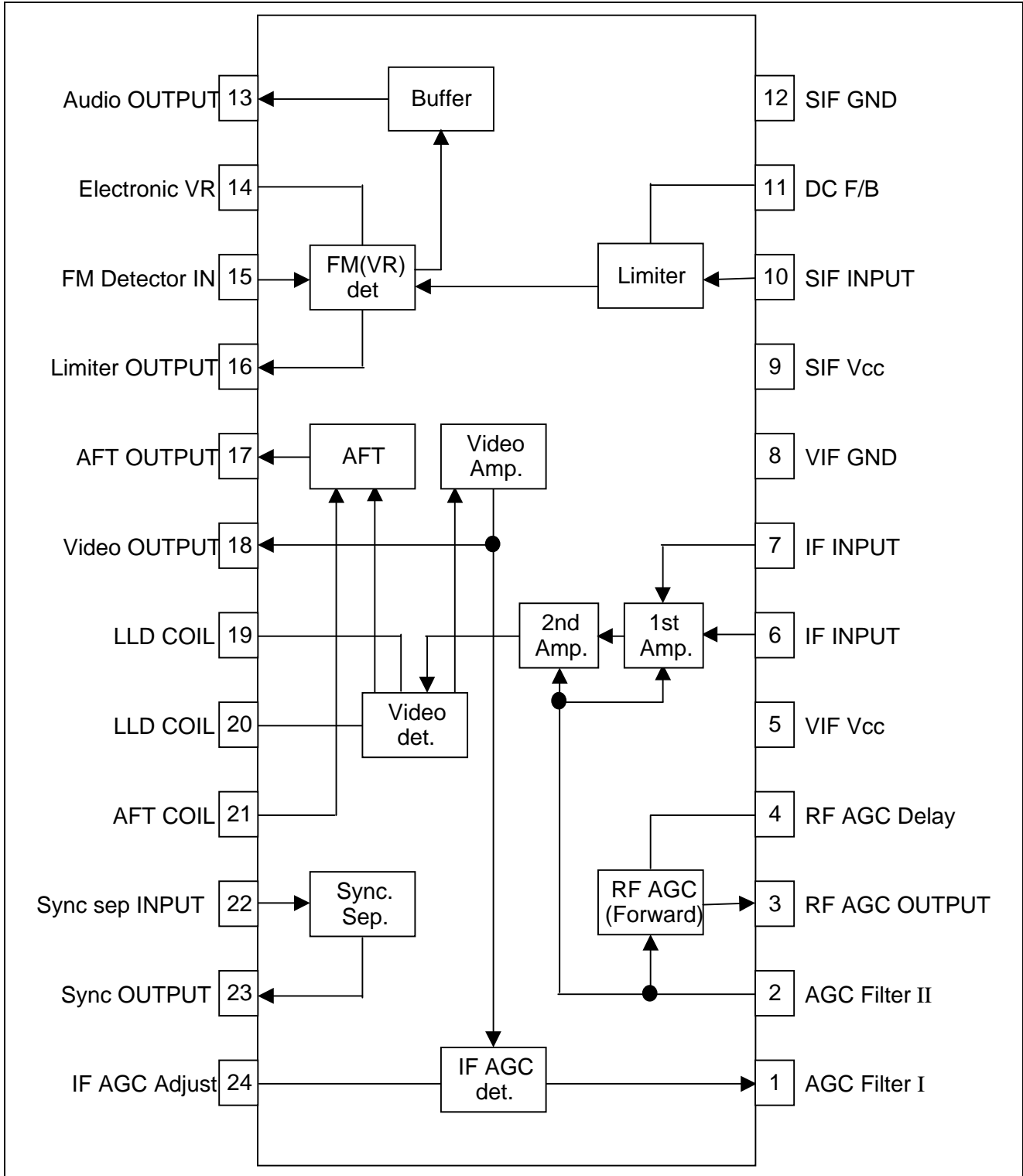
Portable B/W, color TV

### Recommend Operating Condition

Supply voltage range      3.0V to 6.0V

Rated supply voltage      4.5V

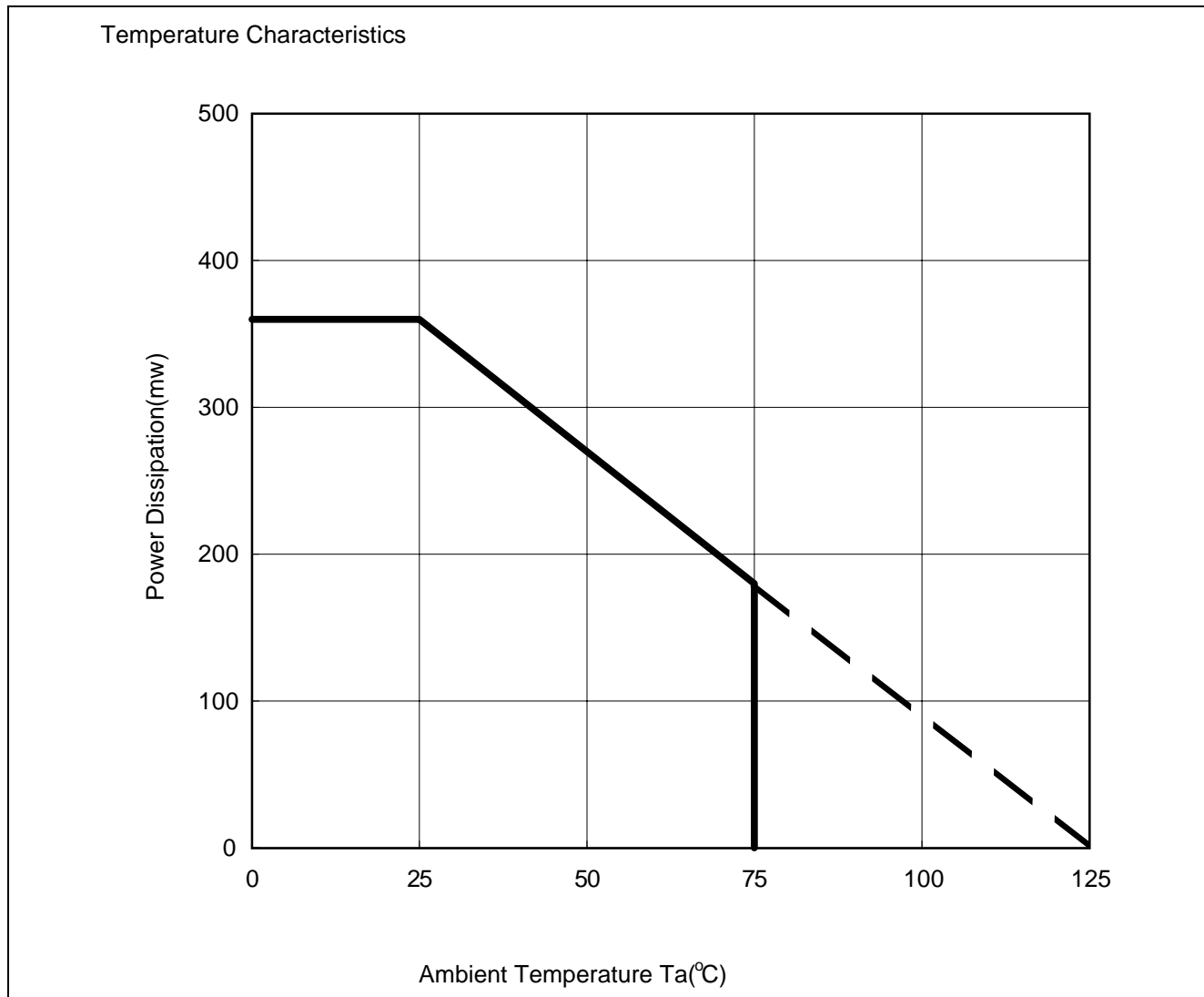
Block diagram & Pin configuration



## Absolute maximum ratings

(Ta=25°C, unless otherwise noted.)

Parameter	Symbol	Ratings	Unit	Note
Supply Voltage(1)	Vcc(5)	7.5	V	
Supply Voltage(2)	Vcc(9)	7.5	V	
Power Dissipation	Pd	360	mW	
Operating Temperature	Topr	- 20 to +75	°C	
Storage Temperature	Tstg	- 40 to +125	°C	



## Electrical Characteristics

## AC Characteristic (VIF)

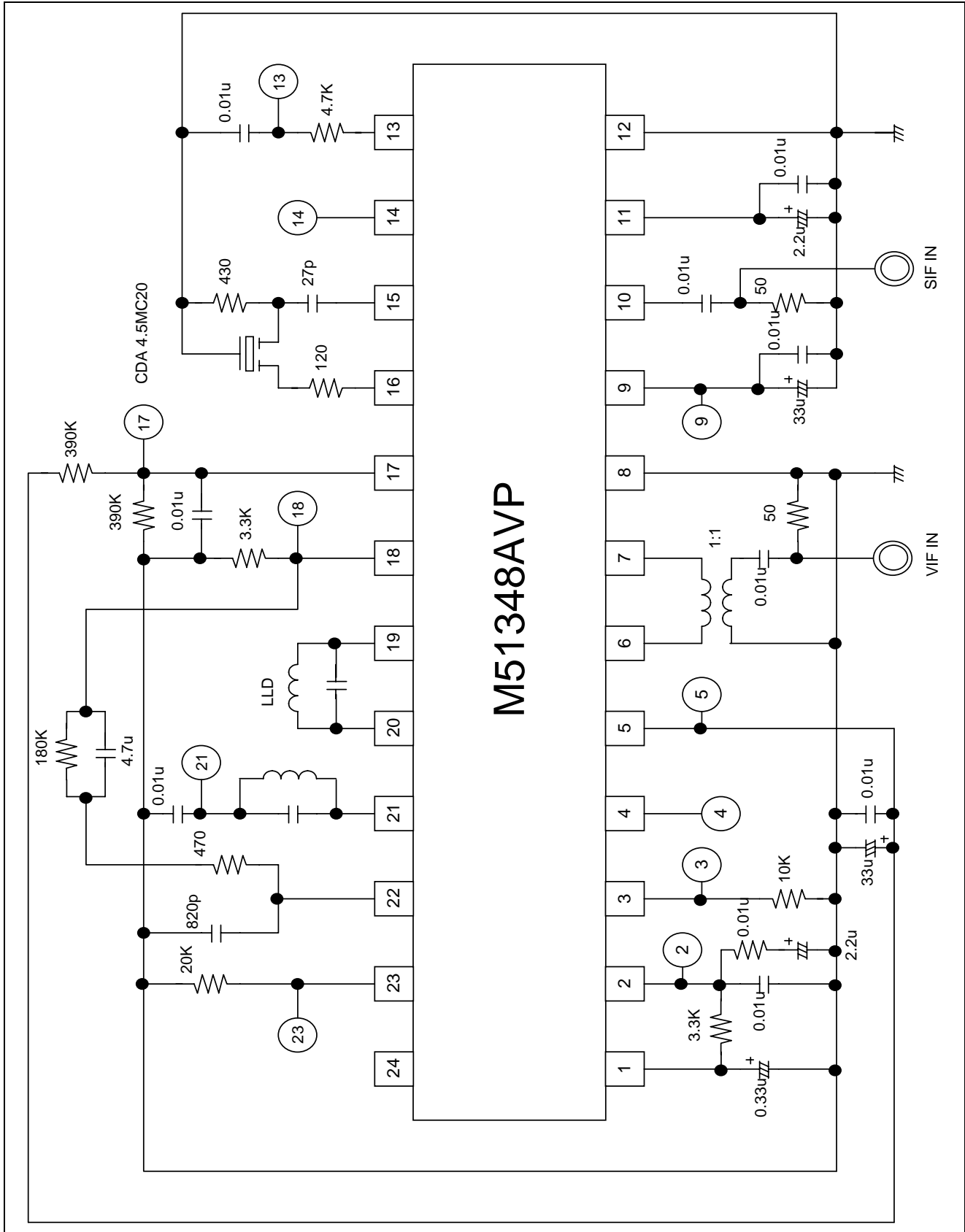
(Ta = 25°C, unless otherwise noted.)

No	Parameter	symbol	Test point	Input	Test conditions	Limits			Unit
						min	Typ.	max	
1	Circuit current	$I_{VIF}$	⑤	—	Input current with 4.5V in⑤	10	15	20	mA
2	Video detector output	Vodet	⑱	SG1 90dB $\mu$	Output amplitude.	0.7	0.9	1.1	Vp-p
3	Input sensitivity	Vinmin	⑱	SG1 Variable	Input level when output amplitude reaches 3dB less than Vo det.	—	45	55	dB $\mu$
4	Maximum allowable input	Vinmax	⑱	SG1 Variable	Input level when output amplitude reaches 3dB more than Vo det.	100	111	—	dB $\mu$
5	Video frequency characteristic	BW	⑱	SG2	BW is defined as f1- f2 when output amplitude reaches - 3dB less than when f1- f2=1MHz.	6	7	—	MHz
6	RF AGC maximum voltage	$V_{3H}$	③	SG4 90dB $\mu$	Output DC voltage with 4.5V in④	3.2	3.7	—	Vo-p
7	RF AGC minimum voltage	$V_{3L}$	③	SG4 90dB $\mu$	Output DC voltage with 2V in④	—	0	0.2	Vo-p
8	AFT detector sensitivity	$\mu$	⑰	SG5 90dB $\mu$	Refer to note1	30	50	—	mV /KHz
9	DC voltage at AFT mute ON	$V_{M17}$	⑰	SG5 90dB $\mu$	Output DC voltage with 0V in⑳	2	2.25	2.5	V
10	AFT center voltage	$V_{AC}$	⑰	—	Output DC voltage with 0V in㉑	0.5	1.4	2.5	V
11	Sync.Sep.output voltage	Vsync	㉓	SG1 90dB $\mu$	Output amplitude.	3.5	3.8	4.1	Vp-p
12	Operating voltage	$V_{VIF}$	⑤	SG1 90dB $\mu$	Must be operated.	3	—	6	V
13	Video detector output at high or low voltage	VoHdet	⑱	SG1 90dB $\mu$	Output amplitude with 6.0V or 3.0V in⑤	0.95	1.25	1.55	Vp-p

## AC Characteristic (SIF)

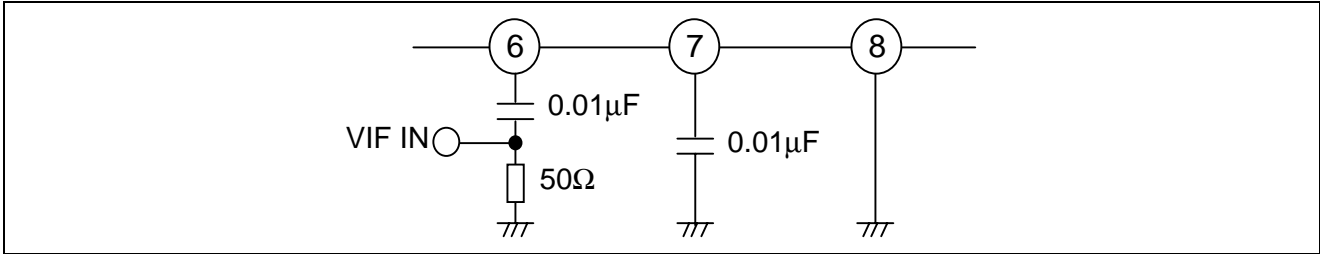
No	Parameter	symbol	Test point	Input	Test conditions	Limits			Unit
						min	Typ.	max	
1	Circuit current	$I_{SIF}$	⑨	—	Input current with 4.5V in⑨	2.2	3.2	4.2	mA
2	Detector output voltage	$V_{O_{AF}}$	⑬	SG6 90dB $\mu$	Output amplitude.	200	240	280	mVrms
3	Input limiting sensitivity	$V_{imin}$	⑬	SG6 Variable	Input level when input amplitude reaches -3dB below $V_{O_{AF}}$ .	—	32	49	dB $\mu$
4	AM rejection ratio	AMR	⑬	SG7 90dB $\mu$	Where $V_{AM}$ denotes output amplitude, $AMR=20\log\frac{V_{O_{AF}}(mVrms)}{V_{AM}(mVrms)}$	40	53	—	dB
5	Bandwidth	BW(s)	⑬	SG8 90dB $\mu$	Refer to note2.	100	130	—	kHz
6	Electronic volume control characteristic	$VR1$ $VR2$	⑬	SG6 90dB $\mu$	Ratio of output amplitude and $V_{O_{AF}}$ when ⑭ is changed from 4.0V to 1.0v.	3.0 —	3.9 -53	4.8 -45	dB
7	Distortion	THD	⑬	SG9 90dB $\mu$	Measured by distortion meter.	—	0.4	1.0	%
8	Operating voltage	$V_{SIF}$	⑨	SG6 90dB $\mu$	Must be operated.	3	—	6	V
9	Detector output voltage at high or low voltage	$V_{O_{H_{AF}}}$ $V_{O_{L_{AF}}}$	⑬	SG6 90dB $\mu$	Output amplitude with 6.0V or 3.0V in⑨	380 53	430 64	480 75	mVrms

Test Circuit



**Precaution concerning electrical characteristics**

- 1) Voltage Supplied (pins 5 and 9) is 4.5V unless otherwise noted in the conditions column.
- 2) VIF input amplitude ( $V_{in}$ ) is the amplitude of VFI IN in the circuit below. Feed SG1 90dB $\mu$  signal into the circuit below, and measure the DC voltage  $V_2$  at ②. Set the circuit for AC voltage measurement and adjust the input amplitude, monitoring DC voltage at ②, until it reaches the level of  $V_2$ . 90dB $\mu$  is defined as the input amplitude at that time.

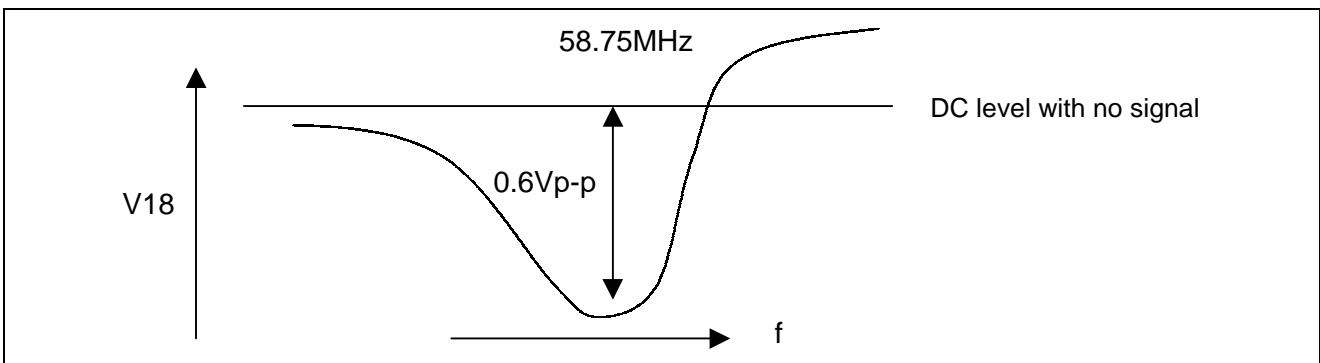


3) Input signals are shown below.

SG1	$f_0=58.75\text{MHz}$	$f_m=20\text{KHz}$	77.8% AM
SG2	$f_1=58.75\text{MHz}$	$V_i=90\text{dB}\mu$	CW
	$f_2=53 \pm 5\text{MHz}$	$V_i=70\text{dB}\mu$	CW
SG3	$f_0=58.75\text{MHz}$	Linearity 10step signal (87.5% Video modulation)	
SG4	$f_0=58.75\text{MHz}$		CW
SG5	$f_0=58.75 \pm 5\text{MHz}$		CW(SWEEP)
SG6	$f_0=4.5\text{MHz}$	FM 25KHz dev	$f_m=400\text{Hz}$
SG7	$f_0=4.5\text{MHz}$	AM 30%	$f_m=400\text{Hz}$
SG8	$f_0=4.5\text{MHz} \bullet \pm 200\text{KH} \bullet$	FM 7.5KHz dev	$f_m=400\text{Hz}$
SG9	$f_0=4.5\text{MHz} \bullet$	FM 7.5KHz dev	$f_m=400\text{Hz}$

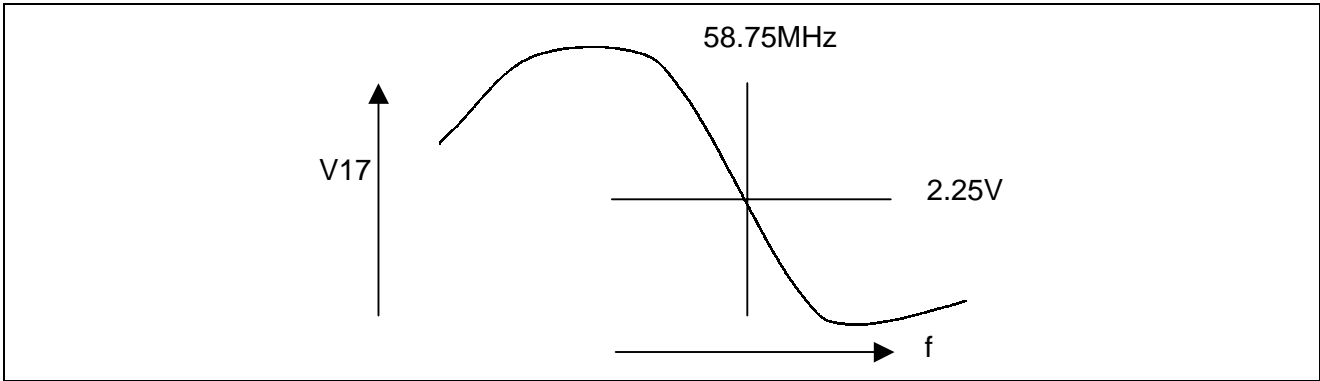
4) Adjustment of LLD coil

1. Feed SG5  $V_i=90\text{dB}\mu$  into VIF IN.
2. AFT coil must be shifted to detuned condition.
3. Feed outside voltage to ② and check tank response at ⑧ as shown in the figure below.
4. Adjust LLD coil so that peak comes at 58.75MHz.

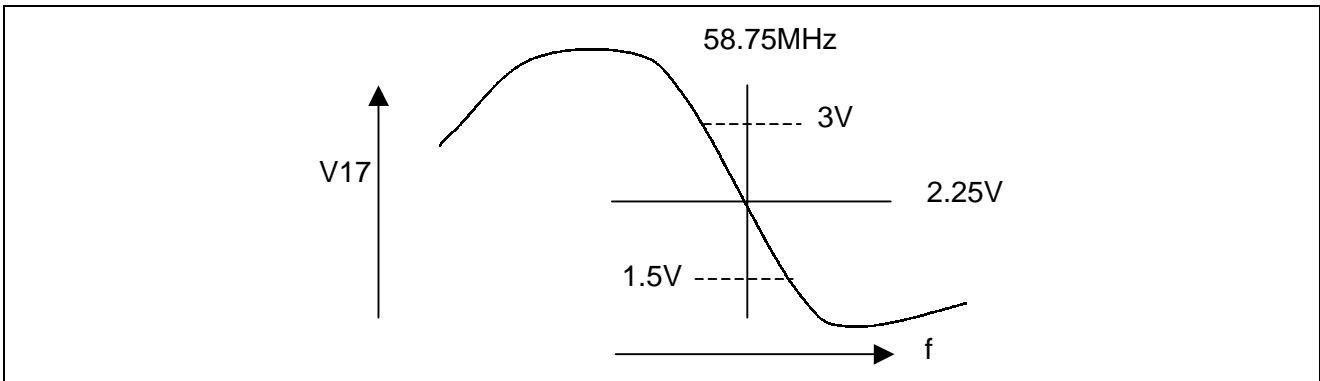


5) Adjustment of AFT coil

1. Feed SG5  $V_i=90\text{dB}\mu$  in VIF IN.
2. Measure the voltage at pin ⑰ and adjust AFT coil as shown in the figure below.



Note1 AFT detector sensitivity " $\mu$ "



Where  $f_A$  denotes a frequency at A and  $f_B$  at B.

$$\mu = \frac{1500\text{mV}}{f_B(\text{kHz}) - f_A(\text{kHz})}$$

Note2 Bandwidth "BW(s)"

First, define  $V_o(\text{DET})\text{FM}$  as the output amplitude when the signal  $f_o=4.5\text{MHz}$ ,  $f_m=400\text{Hz}$  and  $f_{\text{dev}}=\pm 7.5\text{kHz}$  is given to SIF IN.

Decrease and increase the frequency to until the output amplitude reaches -3dB than  $V_o(\text{DET})\text{FM}$ . These are defined as  $f_oL$  and  $f_oH$  respectively. Bandwidth is defined as

$$\text{BW(s)} = f_oH - f_oL$$



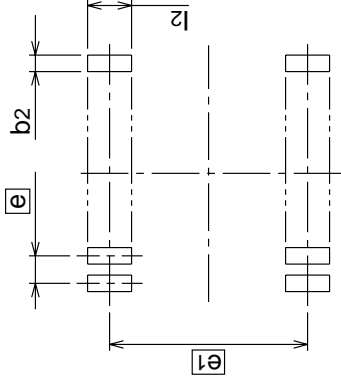
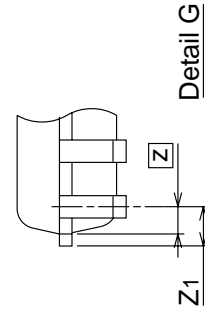
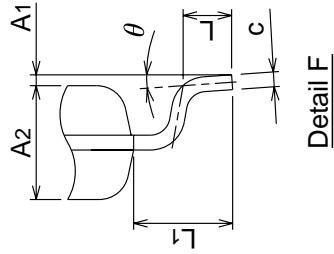
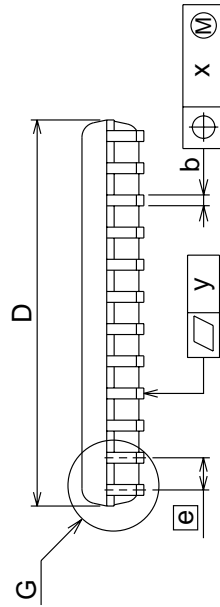
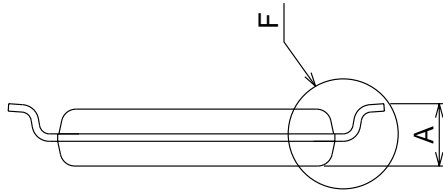
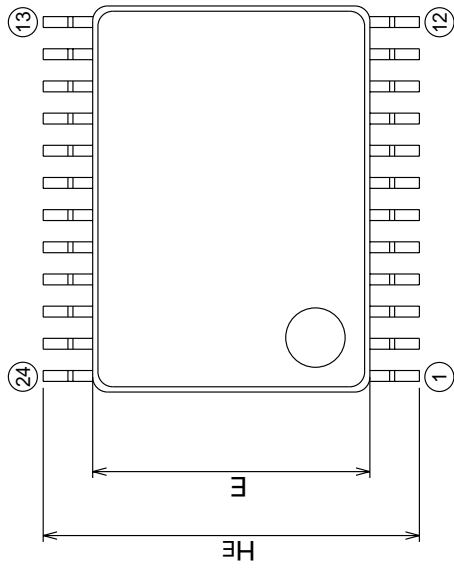
Package Dimensions

**24P2E-A**

(MMP)

**Plastic 24pin 275mil SSOP**

EIAJ Package Code SSOP24-P-275-0.65	JEDEC Code -	Weight(g) 0.12	Lead Material Alloy 42
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Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	-	-	1.45
A1	0	0.1	0.2
A2	-	1.15	-
b	0.17	0.22	0.32
c	0.13	0.15	0.2
D	7.7	7.8	7.9
E	5.5	5.6	5.7
e	-	0.65	-
HE	7.4	7.6	7.8
L	0.3	0.5	0.7
L1	-	1.0	-
L2	-	0.325	-
Z1	-	-	0.475
x	-	-	0.13
y	-	-	0.1
theta	0°	-	10°
b2	-	0.35	-
e1	-	7.0	-
l2	1.0	-	-

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