M51348AVP

VIF/SIF for Low Supply Voltage

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Rev.1.0
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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

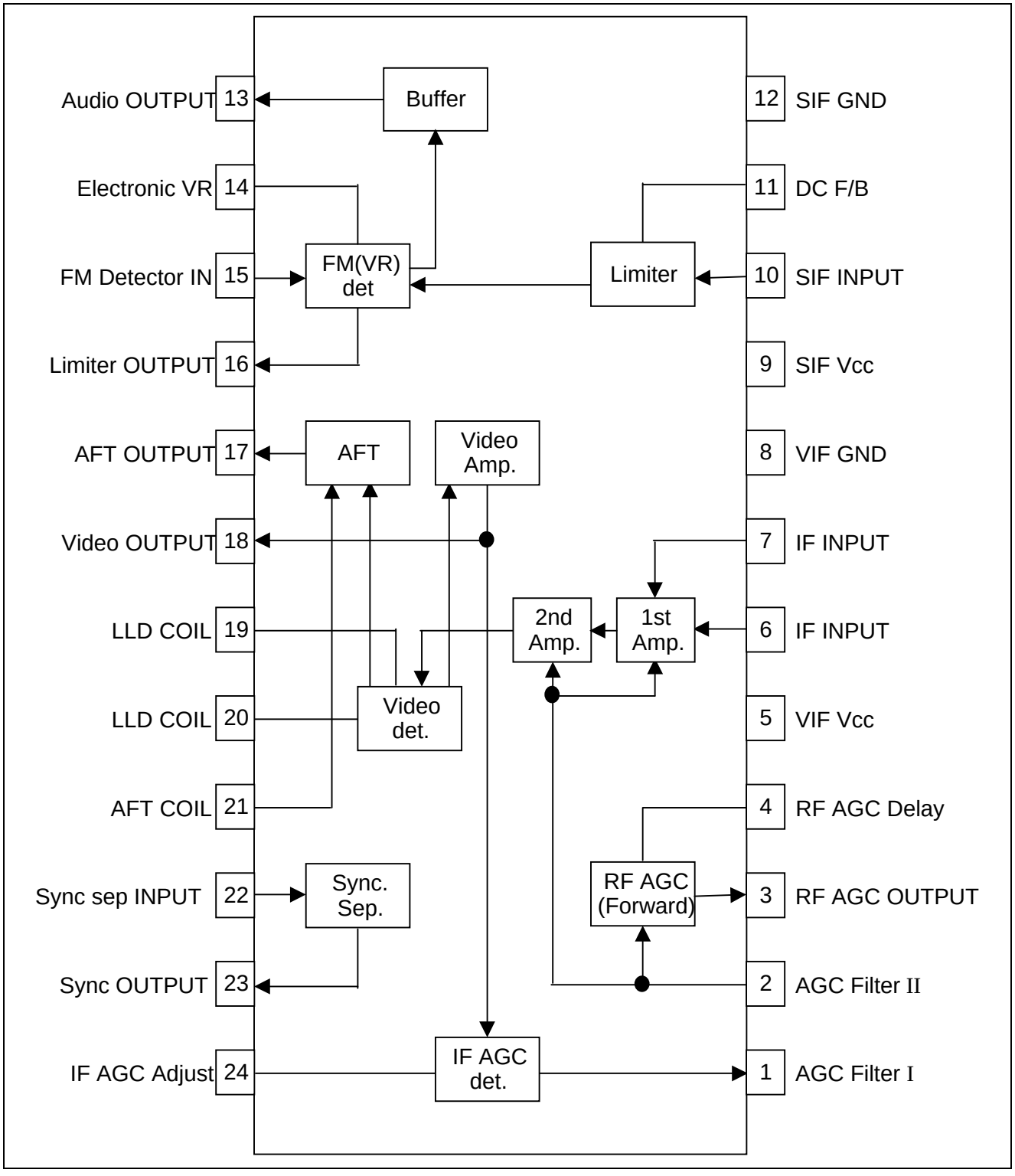
Portable B/W, color TV

Recommend Operating Condition

Supply voltage range 3.0V to 6.0V

Rated supply voltage 4.5V

Block diagram &Pin configuration



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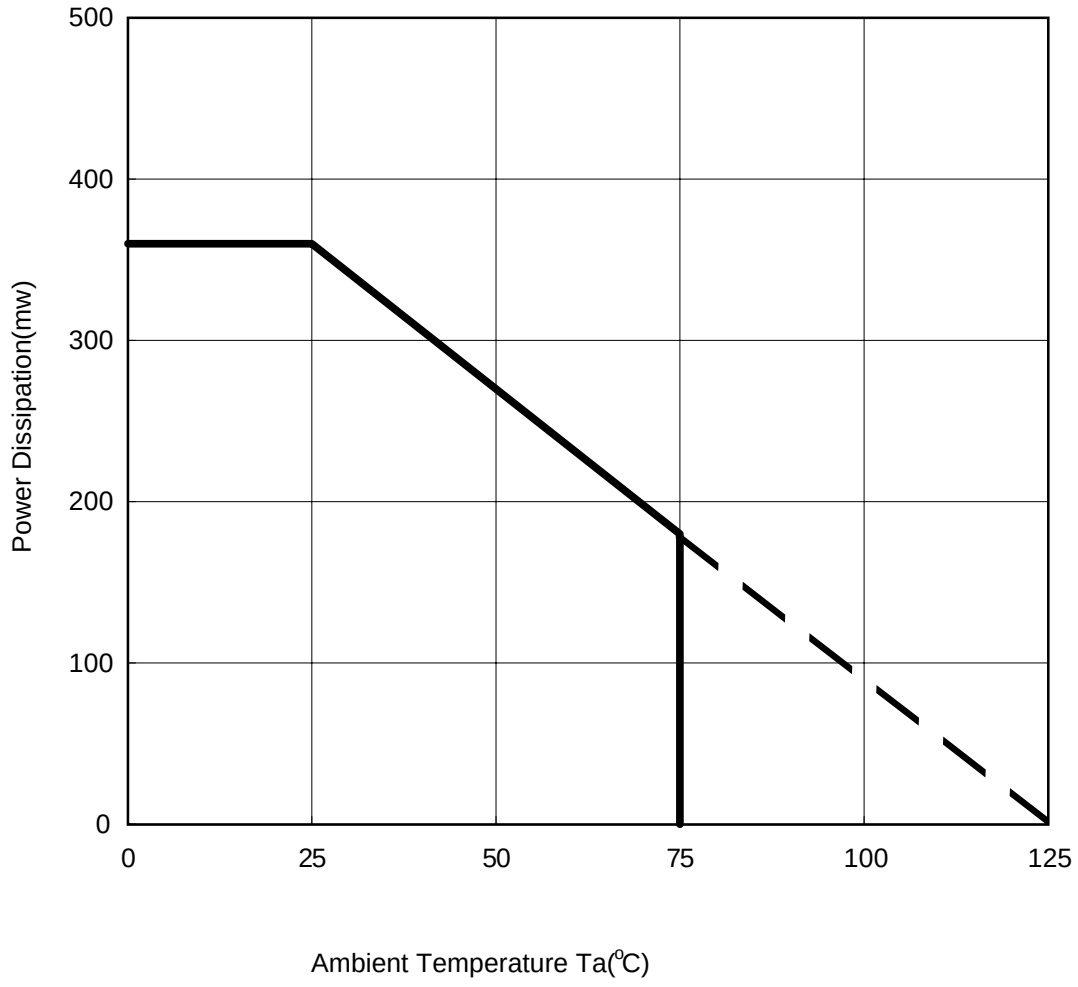
Absolute maximum ratings

(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	

Temperature Characteristics



Electrical Characteristics

AC Characteristic (VIF)

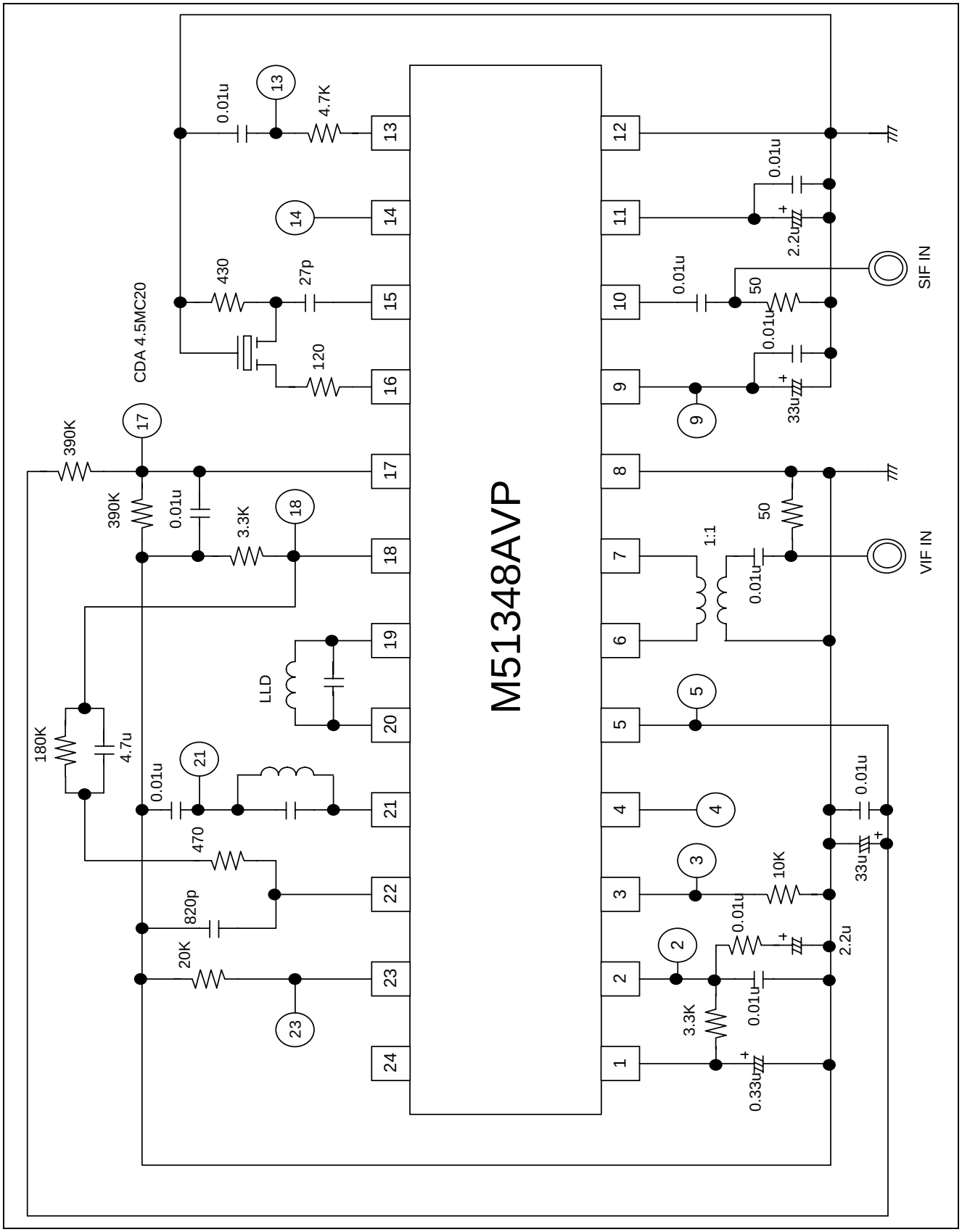
(Ta = 25°C, unless otherwise noted.)

No	Parameter	symbol	Test point	Input	Test conditions	Limits min	Limits Typ.	Limits max	Unit
1	Circuit current	I_{VIF}	⑤	—	Input current with 4.5V in ⑤	10	15	20	mA
2	Video detector output	Vodet	⑱	SG1 90dBμ	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	dBμ
4	Maximum allowable input	Vinmax	⑱	SG1 Variable	Input level when output amplitude reaches 3dB more than Vo det.	100	111	—	dBμ
5	Video frequency characteristic	BW	⑱	SG2	BW is defined as f1- f2 whenoutput amplitude reaches - 3dB less than when f1- f2=1MHz.	6	7	—	MHz
6	RF AGC maximum voltage	V_{3H}	③	SG4 90dBμ	Output DC voltage with 4.5V in ④	3.2	3.7	—	Vo- p
7	RF AGC minimum voltage	V_{3L}	③	SG4 90dBμ	Output DC voltage with 2V in ④	—	0	0.2	Vo- p
8	AFT detector sensitivity	μ	⑰	SG5 90dBμ	Refer to note1	30	50	—	mV /KHz
9	DC voltage at AFT mute ON	V_{M17}	⑰	SG5 90dBμ	Output DC voltage with 0V in ㉑.	2	2.25	2.5	V
10	AFT center voltage	V_{AC}	⑰	—	Output DC voltage with 0V in ②	0.5	1.4	2.5	V
11	Sync.Sep.output voltage	Vsync	㉓	SG1 90dBμ	Output amplitude.	3.5	3.8	4.1	Vp-p
12	Operating voltage	V_{VIF}	⑤	SG1 90dBμ	Must be operated.	3	—	6	V
13	Video detector output at high or low voltage	VoHdet	⑱	SG1 90dBμ	Output amplitude with 6.0V or 3.0V in ⑤	0.95	1.25	1.55	Vp-p

AC Characteristic (SIF)

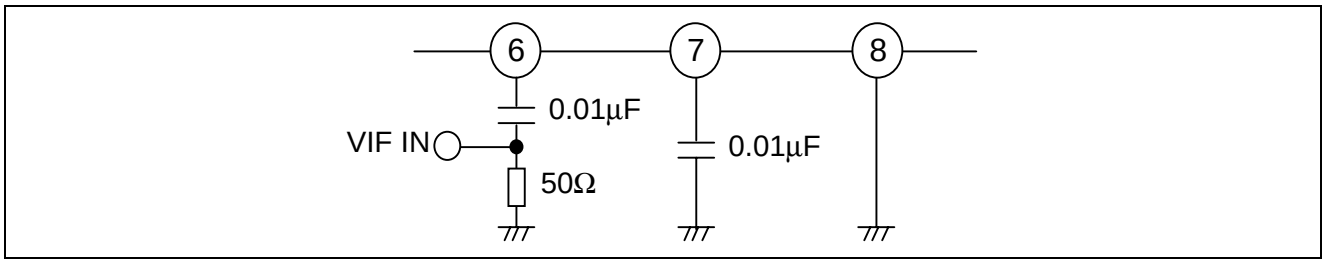
No	Parameter	symbol	Test point	Input	Test conditions	Limits min	Limits Typ.	Limits max	Unit
1	Circuit current	I_{SIF}	⑨	—	Input current with 4.5V in ⑨	2.2	3.2	4.2	mA
2	Detector output• voltage	Vo_{AF}	⑬	SG6 90dBμ	Output amplitude.	200	240	280	mVrms
3	Input limiting sensitivity	Vimin	⑬	SG6 Variable	Input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

Test Circuit



Precaution concerning electical charactristics

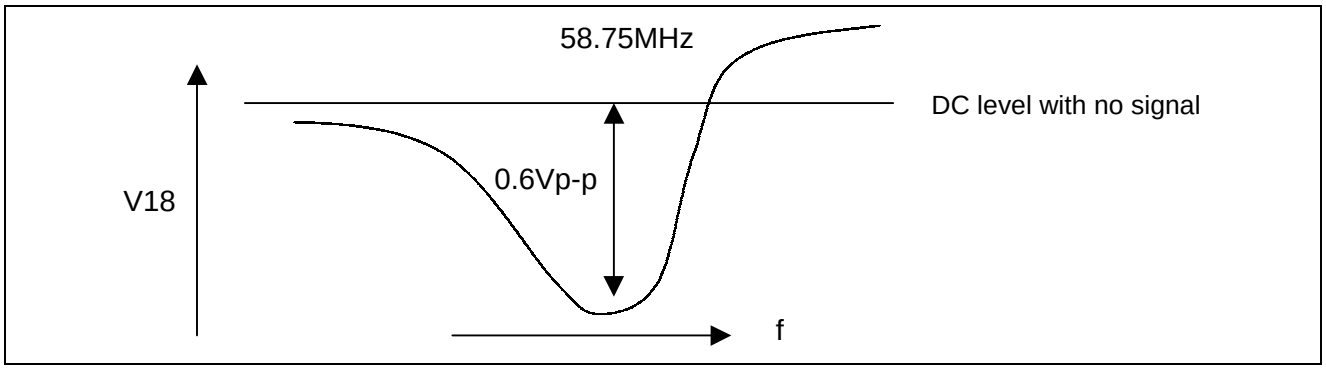
1) Voltage Supplied (pins 5 and 9)is 4.5V unless otherwise noted in the conditions column.
2) VIF input amplitude (Vin)is the amplitude of VFI IN in the circuit below.Feed SG1 90dBμ signal into the circuit below,and measure the DC voltage V2 at②.Set the circuit for AC voltage measurement and adjust the input amplitude,monitoring DC voltage at②,until it reaches the level of V2.90dBμ is defined as the input amplitude at that time.



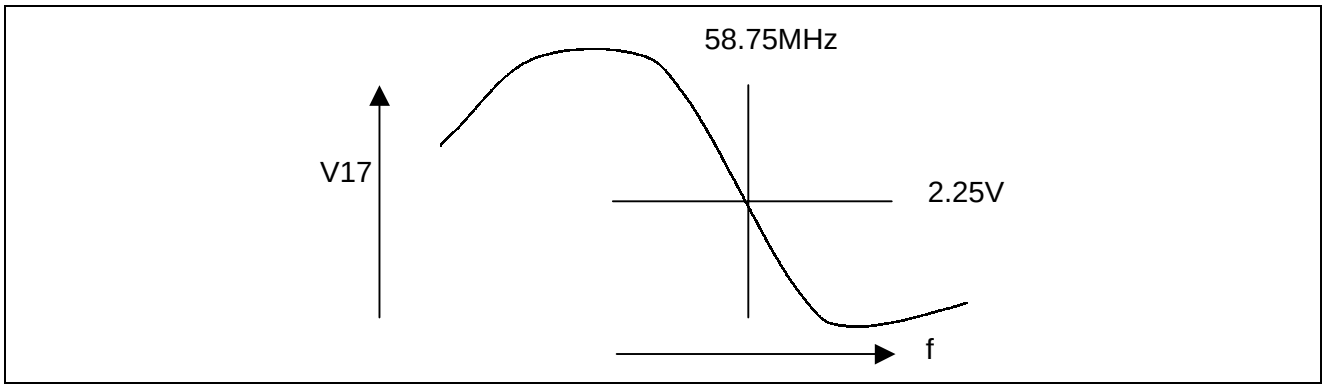
3) lnput signals are shown below.

SG1	fo=58.75MHz	fm=20KHz	77.8%AM
SG2	f1=58.75MHz	Vi=90dBμ	CW
	f2=53 ±5MHz	Vi=70dBμ	CW
SG3	fo=58.75MHz	Linearity 10step signal (87.5%Video modulation)	
SG4	fo=58.75MHz		CW
SG5	fo=58.75 ±5MHz		CW(SWEEP)
SG6	fo=4.5MHz	FM 25KHz dev	fm=400Hz
SG7	fo=4.5MHz	AM 30%	fm=400Hz
SG8	fo=4.5MH• ±200KH•	FM 7.5KHz dev	fm=400Hz
SG9	fo=4.5MH•	FM 7.5KHz dev	fm=400Hz

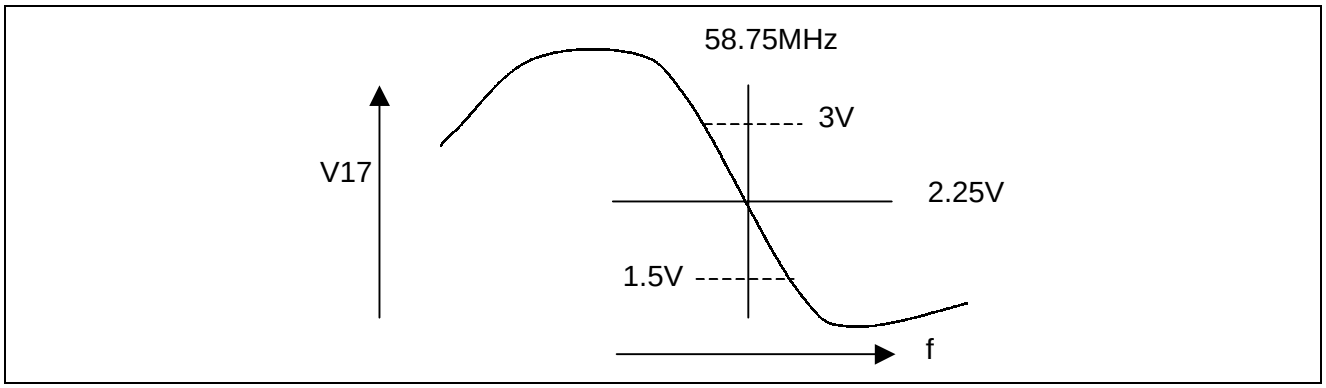
4) Adjustment of LLD coil
   1. Feed SG5 Vi=90dBμ into VIF IN.
   2. AFT coil must be shifted to detuned condition.
   3. Feed outside voltage to②and check tank response at ⑱ as shown in the figure below.
   4. Adjust LLD coil so that peak comes at 58.75MHz.



5) Adjustment of AFT coil
   1. Feed SG5 Vi=90dBμ in VIF IN.
   2. Measure the voltage at pin ⑰ and adjust AFT coil as shown in the figure below.



Note1 AFT detector sensitivity "μ"



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

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

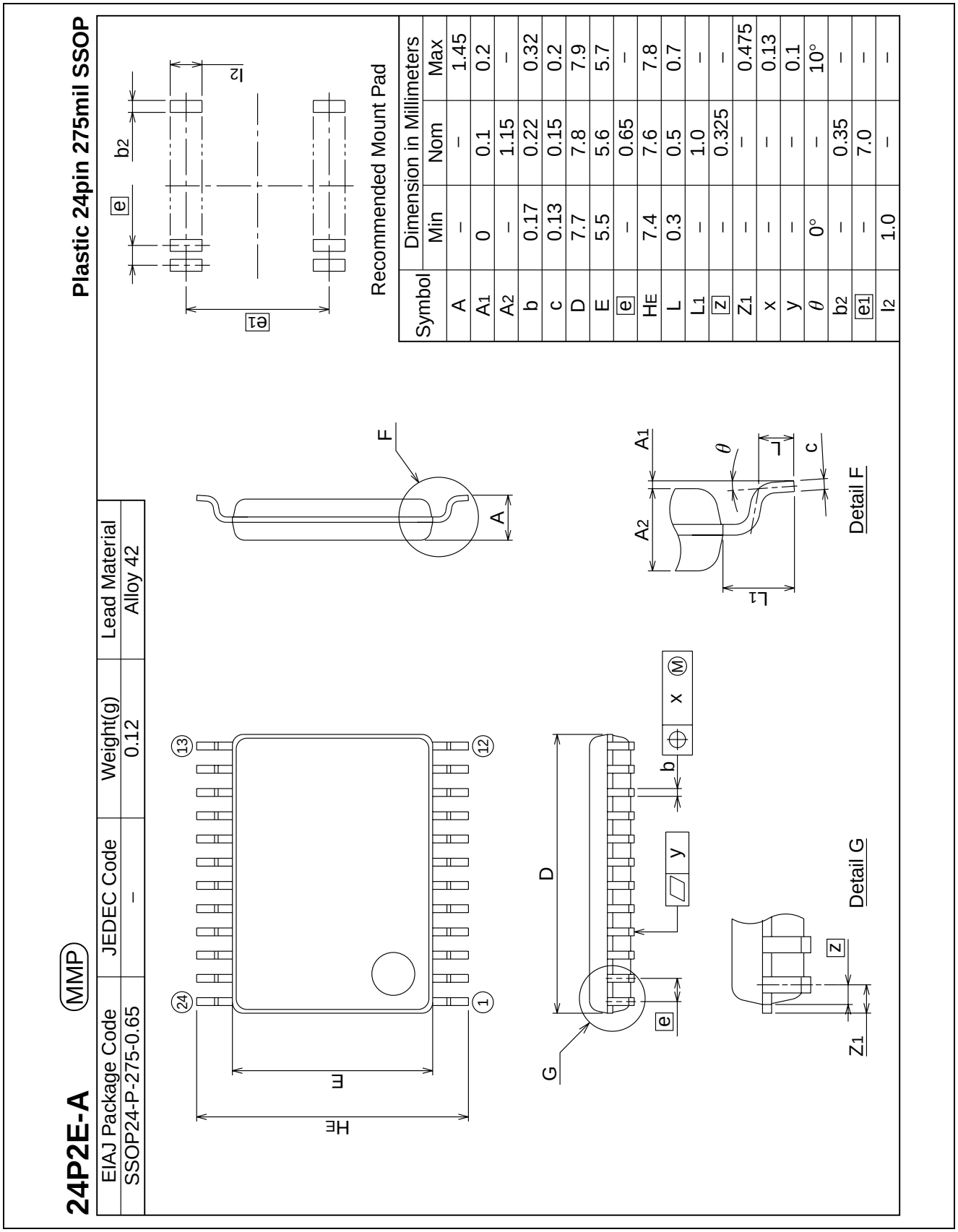
Note2 Bandwidth "BW(s)"

First,define Vo(DET)FM as the output amplitude when the signal fo=4.5MHz,fm=400Hz and fdev=±7.5KHz is given to SIF IN.

Decrease and increase the frequency to until the output amplitude reaches - 3dB than Vo(DET)FM.These are defined as fo L and fo H respectively.Bandwidth is defined as

BW(s) = foH- foL

Package Dimensions



Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	–	–	1.45
A_1	0	0.1	0.2
A_2	–	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	–
H_E	7.4	7.6	7.8
L	0.3	0.5	0.7
L_1	–	1.0	–
Z	–	0.325	–
Z_1	–	–	0.475
x	–	–	0.13
y	–	–	0.1
θ	0°	–	10°
b_2	–	0.35	–
e1	–	7.0	–
l_2	1.0	–	–

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