

M51348AVP

VIF/SIF for Low Supply Voltage

REJ03F0062-0100Z

Rev.1.0

Sep.19.2003

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

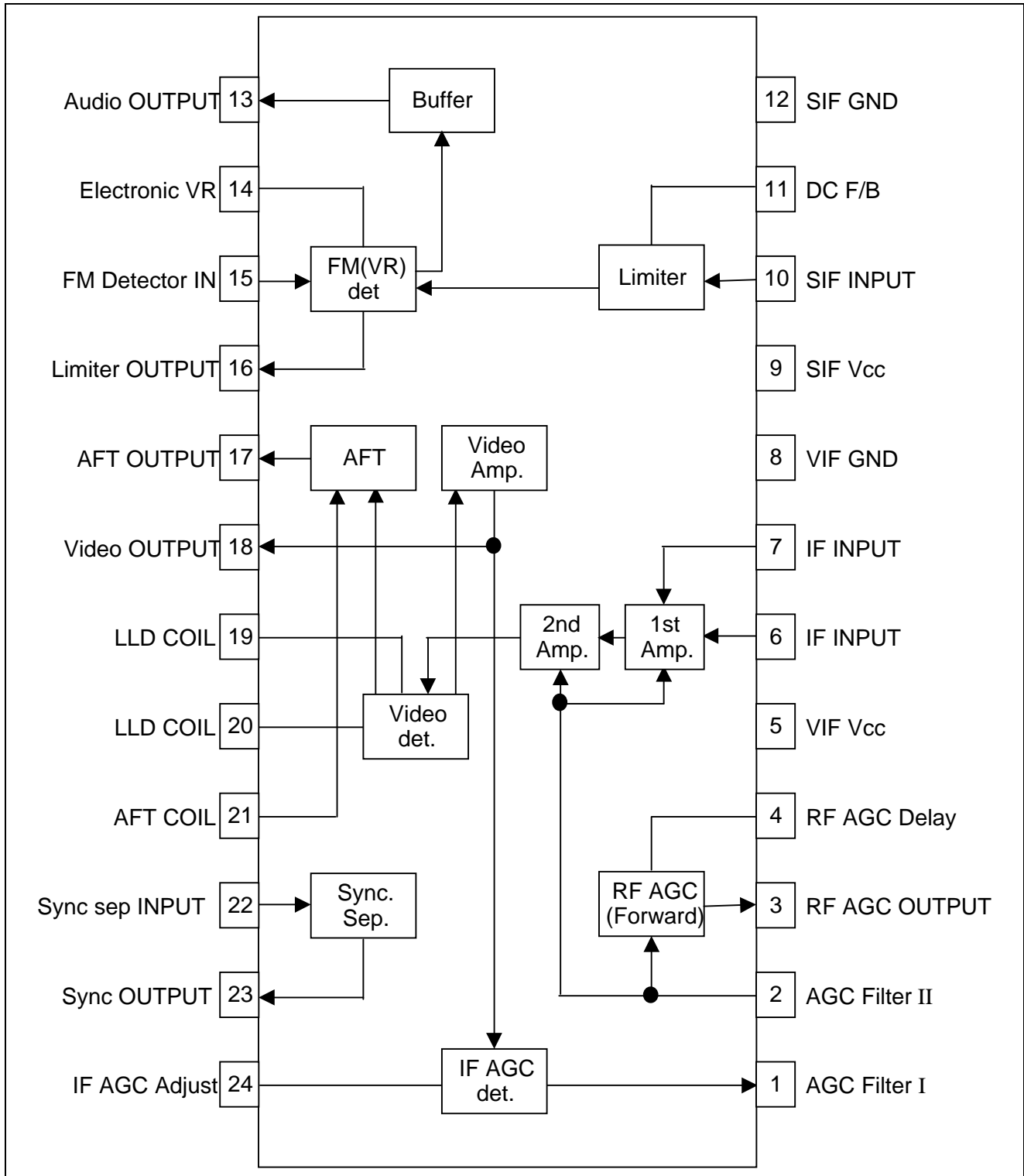
Portable B/W, color TV

Recommend Operating Condition

Supply voltage range 3.0V to 6.0V

Rated supply voltage 4.5V

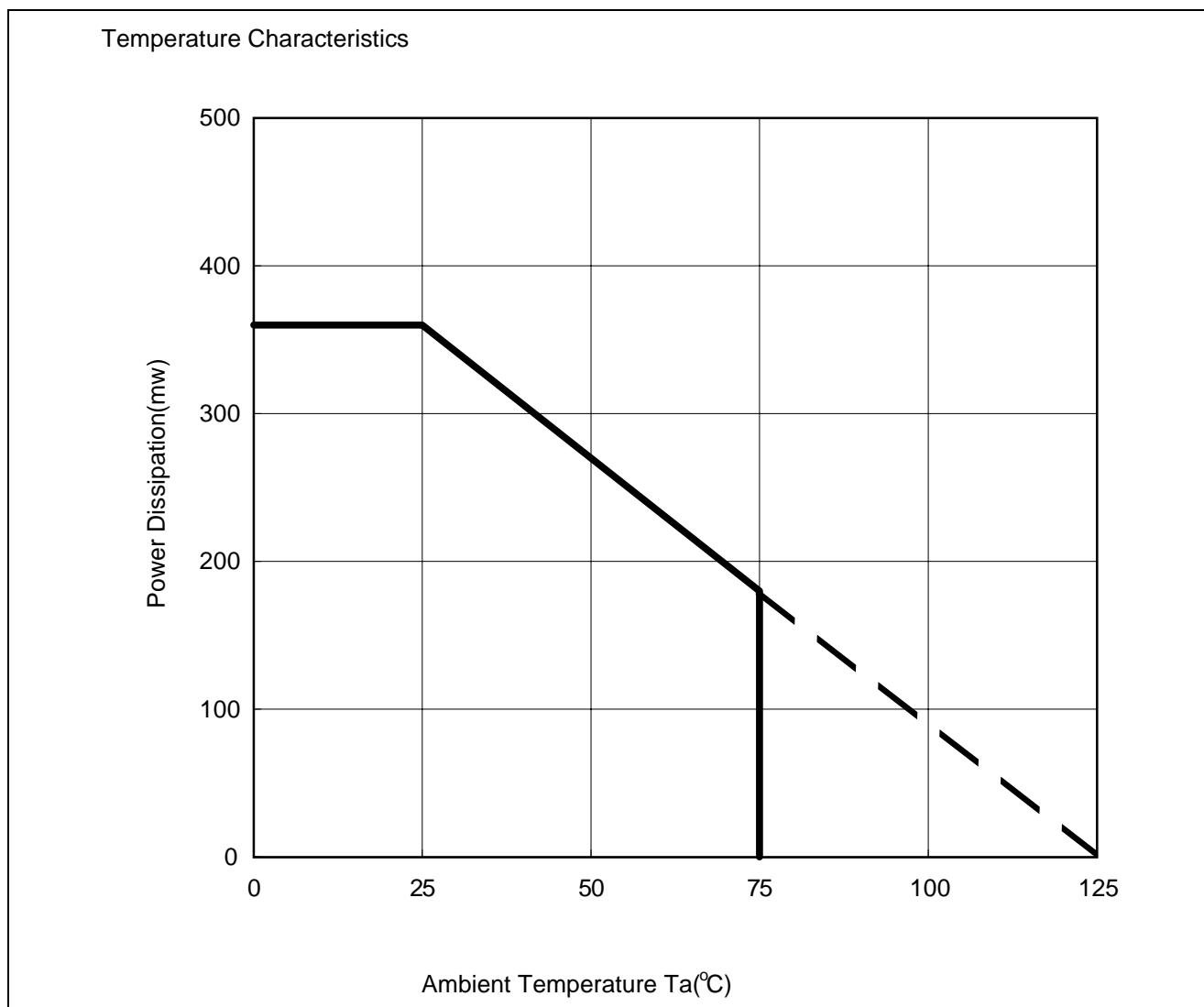
Block diagram & Pin configuration



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.)

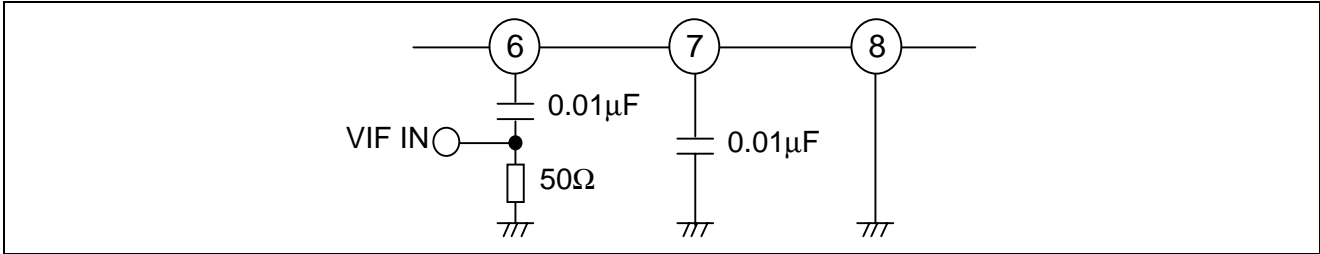
No	Parameter	symbol	Test point	Input	Test conditions	Limits			Unit
						min	Typ.	max	
1	Circuit current	I_{VIF}	⑤	—	Input current with 4.5V in⑤	10	15	20	mA
2	Video detector output	Vodet	⑱	SG1 90dB μ	Output amplitude.	0.7	0.9	1.1	Vp-p
3	Input sensitivity	Vinmin	⑱	SG1 Variable	Input level when output amplitude reaches 3dB less than Vo det.	—	45	55	dB μ
4	Maximum allowable input	Vinmax	⑱	SG1 Variable	Input level when output amplitude reaches 3dB more than Vo det.	100	111	—	dB μ
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 μ	Output DC voltage with 4.5V in④	3.2	3.7	—	Vo-p
7	RF AGC minimum voltage	V_{3L}	③	SG4 90dB μ	Output DC voltage with 2V in④	—	0	0.2	Vo-p
8	AFT detector sensitivity	μ	⑰	SG5 90dB μ	Refer to note1	30	50	—	mV /KHz
9	DC voltage at AFT mute ON	V_{M17}	⑰	SG5 90dB μ	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 μ	Output amplitude.	3.5	3.8	4.1	Vp-p
12	Operating voltage	V_{VIF}	⑤	SG1 90dB μ	Must be operated.	3	—	6	V
13	Video detector output at high or low voltage	VoHdet	⑱	SG1 90dB μ	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 μ	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 μ
4	AM rejection ratio	AMR	⑬	SG7 90dB μ	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 μ	Refer to note2.	100	130	—	kHz
6	Electronic volume control characteristic	$VR1$ $VR2$	⑬	SG6 90dB μ	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 μ	Measured by distortion meter.	—	0.4	1.0	%
8	Operating voltage	V_{SIF}	⑨	SG6 90dB μ	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 μ	Output amplitude with 6.0V or 3.0V in⑨	380 53	430 64	480 75	mVrms

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 μ 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 μ is defined as the input amplitude at that time.

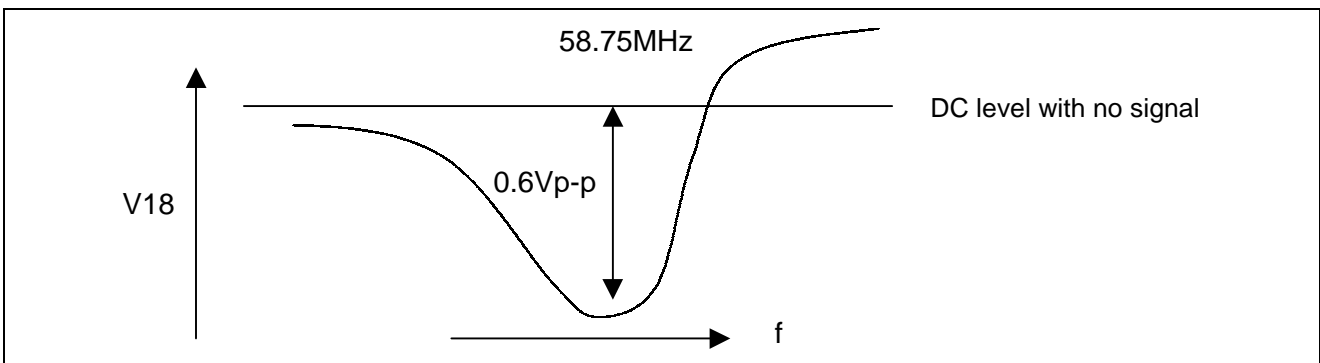


3) Input signals are shown below.

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	$f_m=400\text{Hz}$

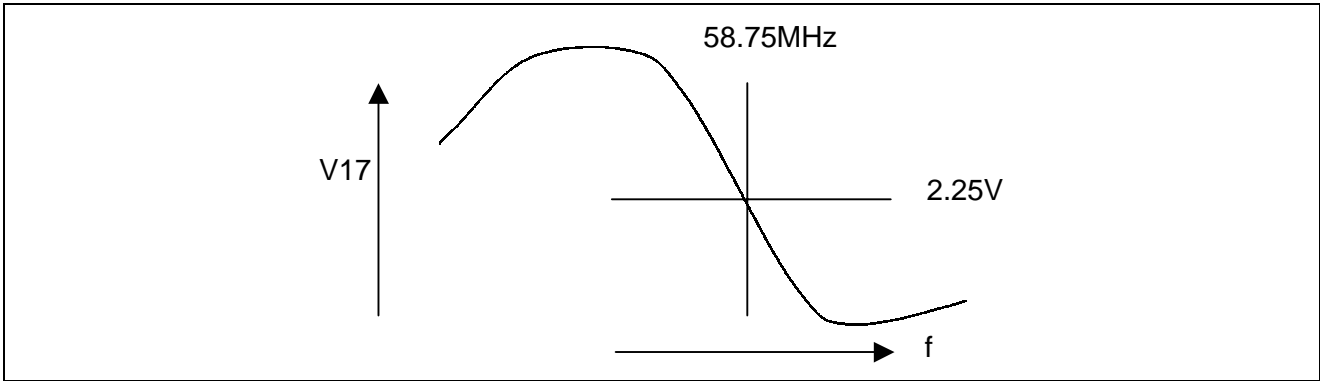
4) Adjustment of LLD coil

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.

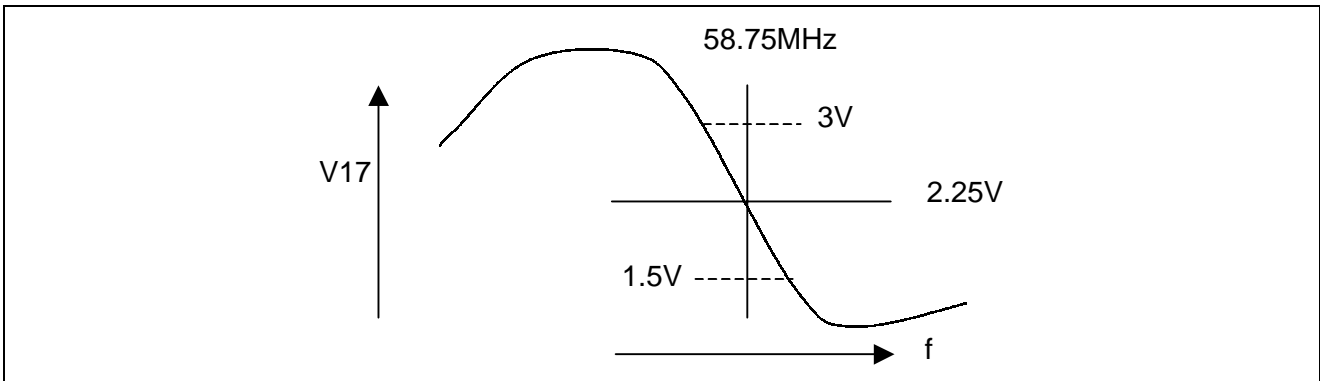


5) Adjustment of AFT coil

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 " μ "



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

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

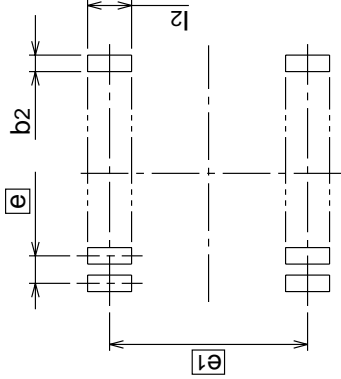
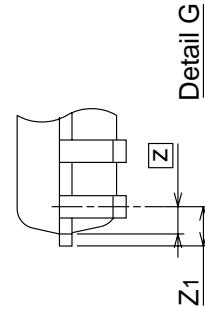
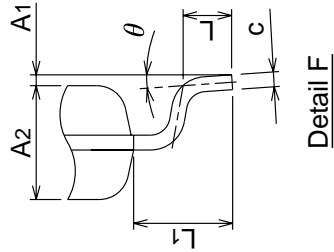
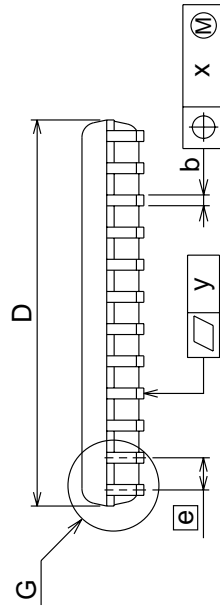
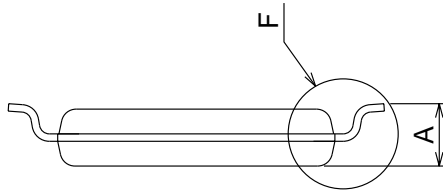
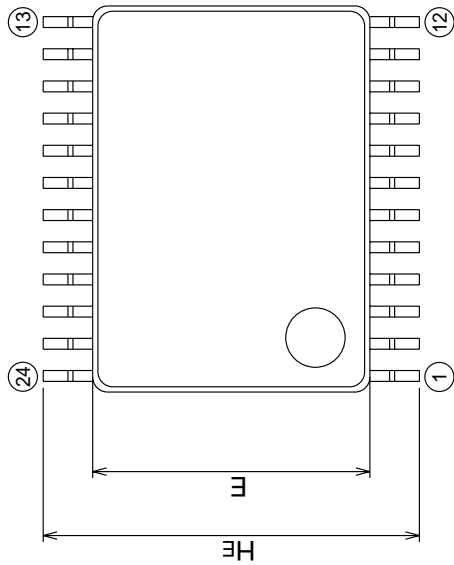
Package Dimensions

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
--	-----------------	-------------------	---------------------------



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	-
Z	-	0.325	-
Z1	-	-	0.475
x	-	-	0.13
y	-	-	0.1
theta	0°	-	10°
b2	-	0.35	-
e1	-	7.0	-
l2	1.0	-	-

RENESAS Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
 2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
 3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.
The information described here may contain technical inaccuracies or typographical errors.
Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (<http://www.renesas.com>).
 4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
 5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
 6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
 7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
 8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.
-



RENESAS SALES OFFICES

<http://www.renesas.com>

Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500 Fax: <1> (408) 382-7501

Renesas Technology Europe Limited.
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH
Dornacher Str. 3, D-85622 Feldkirchen, Germany
Tel: <49> (89) 380 70 0, Fax: <49> (89) 929 30 11

Renesas Technology Hong Kong Ltd.
7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2375-6836

Renesas Technology Taiwan Co., Ltd.
FL 10, #99, Fu-Hsing N. Rd., Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.
26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001