To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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The semiconductor operations of Hitachi and Mitsubishi Electric were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Mitsubishi Electric, Mitsubishi Electric Corporation, Mitsubishi Semiconductors, and other Mitsubishi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

M52768FP

PLL-INTER VIF/SIF

DESCRIPTION

M52768FP is a semiconductor integrated circuit consisting of VIF/SIF signal processing for CTVs and VCRs. M52768FP provide low cost and high performance system with the coil-less AFT.

FEATURES

■Inter carrier /NTSC only(4.5MHz)
■Coil-less AFT.
■PLL FM demodulation for Audio. No external parts and adjustment.
■Video output is 2.0Vp-p through EQ AMP.
■Easy to add Buzz canceler.
■Hi speed IF AGC.
■Improve over modulation characteristics.

RECOMMENDED OPERATING CONDITIONS

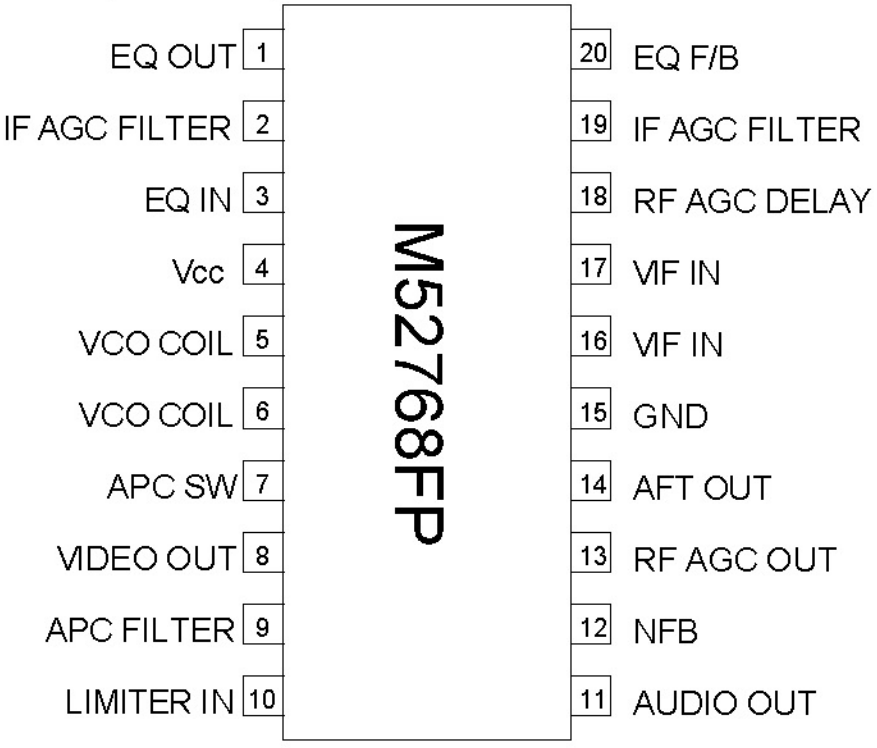
Supply Voltage Range (Vcc) • • • • • • • 4.5 to 5.5 V

Rated Supply Voltage (Vcc) • • • • • • • 5.0 V

APPLICATION

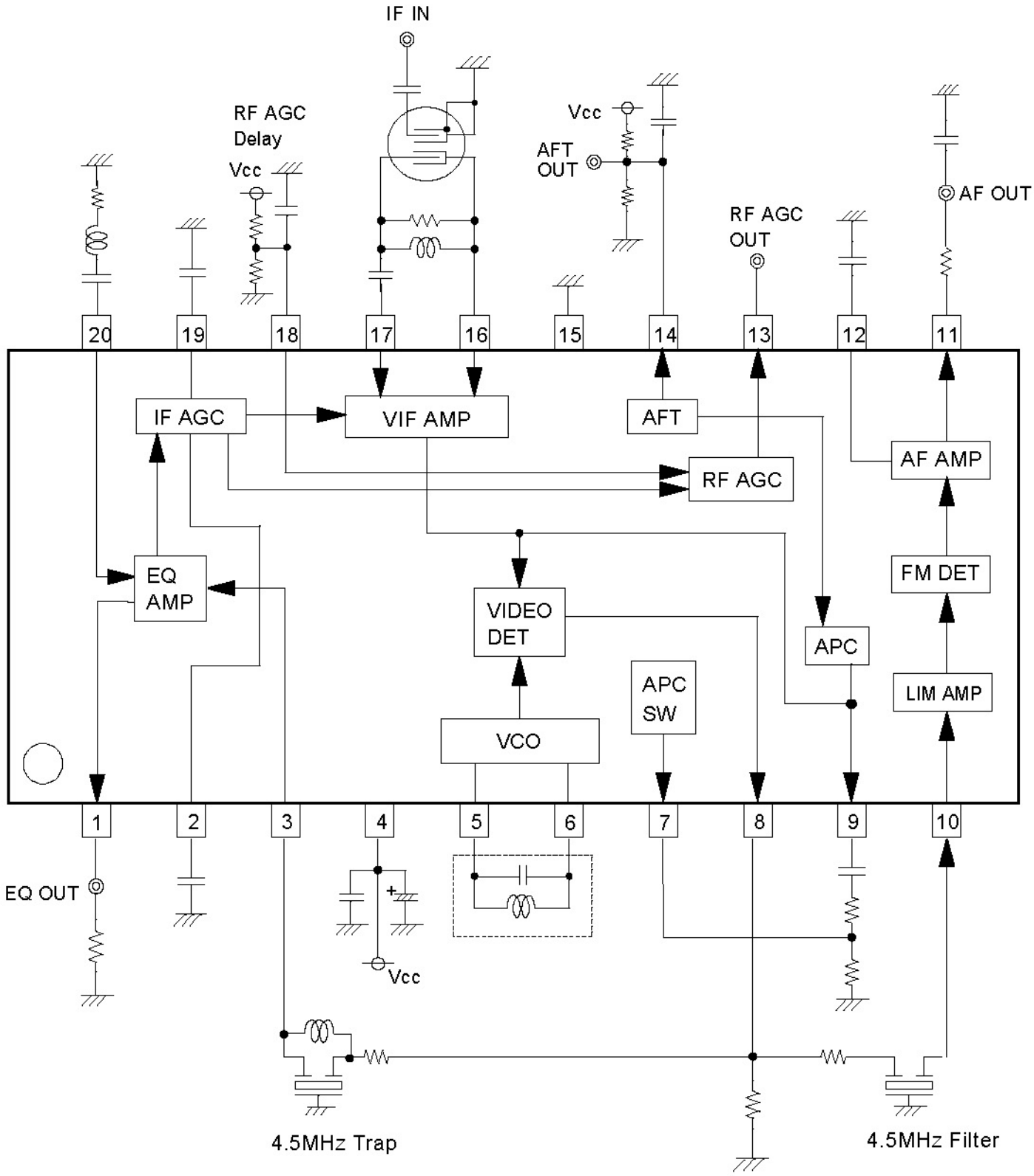
TV,VTR

PIN CONFIGURATION (TOP VIEW)



20pin SSOP

BLOCK DIAGRAM and PERIPHERAL CIRCUIT

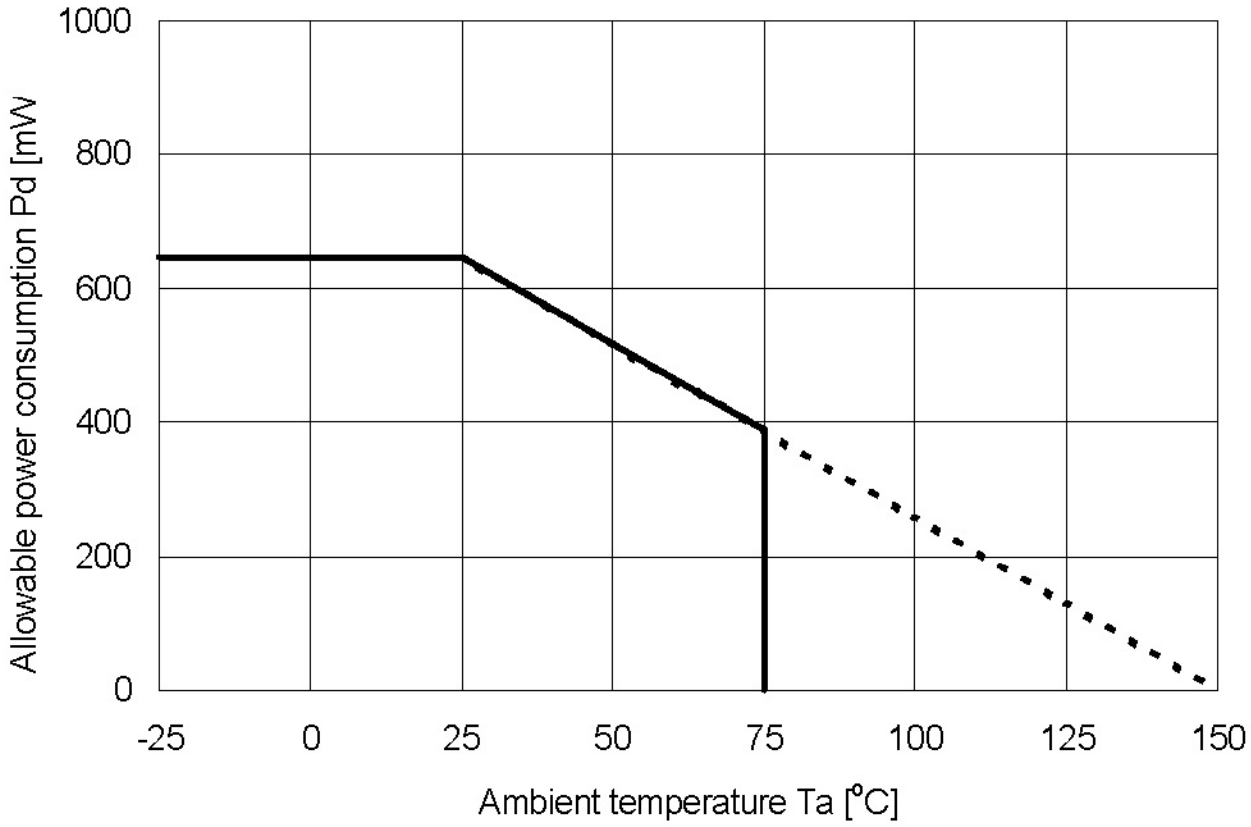


ABSOLUTE MAXIMUM RATINGS

(Ta = 25ºC, unless otherwise noted)

Parameter	Symbol	Ratings	Unit	Note
Supply Voltage 1	Vcc	6.0	V	
Power Consumption	Pd	624	mW	
Operating Temperature	Topr	-20 to +75	ºC	
Storage Temperature	Tstg	-40 to +150	ºC	

Temperature characteristics (maximum ratings)



ELECTRICAL CHARACTERISTICS

VIF Section (Vcc=5V, Ta=25ºC unless otherwise noted)

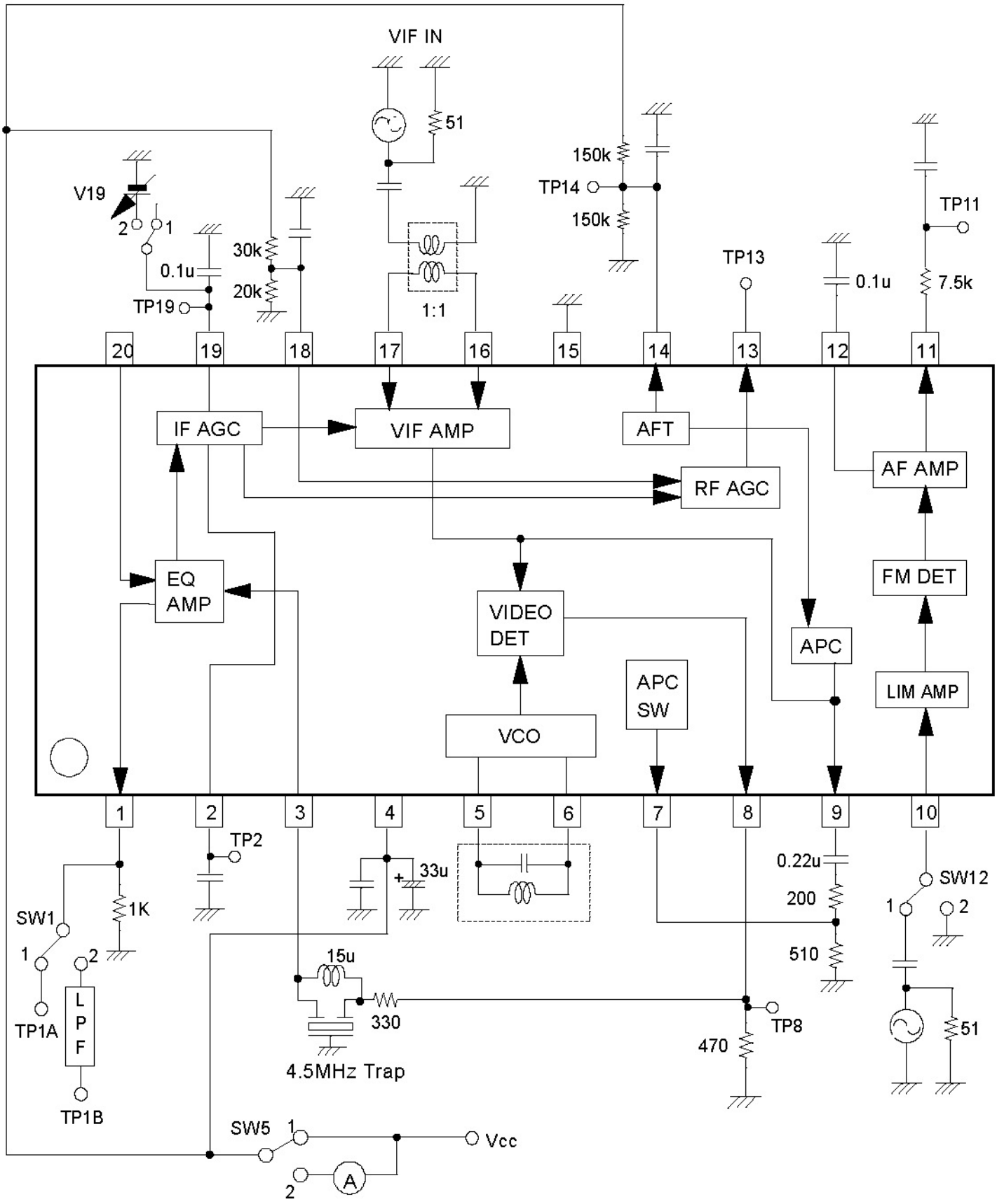
No.	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input SG	Measurement switches set to position 1 unless otherwise noted	Limits MIN	Limits TYP	Limits MAX	Unit	Note
1	Circuit Current	Icc	1	A	-	-	SW4=2		33		mA	
2	Video Output Voltage 8	Vo det8	1	TP8	VIF IN	SG1			1.1		Vp-p	
3	Video Output Voltage 1	Vo det	1	TP1A	VIF IN	SG1			2.0		Vp-p	
4	Video S/N	Video S/N	1	TP1B	VIF IN	SG2	SW1=2		56		dB	1
5	Video Band Width	BW	1	TP1A	VIF IN	SG3	SW19=2 V19=Variable		6.0		MHz	2
6	Input Sensitiv ity	VIN MIN	1	TP1A	VIF IN	SG4			48		dBµ	3
7	Maximum Allowable Input	VIN MAX	1	TP1A	VIF IN	SG5			110		dBµ	4
8	AGC Control Range Input	GR	-	-	-	-			62		dB	5
9	IF AGC Voltage 1	V19	1	TP19	VIF IN	SG6			3.1		V	
10	IF AGC Voltage 2	V2	1	TP2	VIF IN	SG6			3.1		V	
11	Maximum RF AGC Voltage	V13H	1	TP13	VIF IN	SG6			4.75		V	
12	Minimum RF AGC Voltage	V13L	1	TP13	VIF IN	SG7			0.1		V	
13	RF AGC Delay Point	V13	1	TP13	VIF IN	SG8			93		dBµ	6
14	Capture Range U	CL-U	1	TP1A	VIF IN	SG9			1.5		MHz	7
15	Capture Range L	CL-L	1	TP1A	VIF IN	SG9			1.8		MHz	8
16	Capture Range T	CL-T	1	-	-	-			3.3		MHz	9

No.	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input SG	Measurement switches set to position 1 unless otherwise noted	Limits MIN	Limits TYP	Limits MAX	Unit	Note
17	AFT Sensitivity	μ	1	TP14	VIF IN	SG10			30		mV/kHz	10
18	AFT Maximum Voltage	V14H	1	TP14	VIF IN	SG10			4.8		V	10
19	AFT Minimum Voltage	V14L	1	TP14	VIF IN	SG10			0.1		V	10
20	AFT defeat	AFT def 1	1	TP14	VIF IN	-			2.5		V	
21	Inter Modulation	IM	1	TP1A	VIF IN	SG11	SW19=2 V19=Variable		40		dB	11
22	Differential Gain	DG	1	TP1A	VIF IN	SG12			2		%	
23	Differential Phase	DP	1	TP1A	VIF IN	SG12			2		deg	
24	Sync. tip level	V1 SYNC	1	TP1A	VIF IN	SG2			0.8		V	

SIF Section (Vcc=5V,Ta=25ºC unless otherwise noted)

No.	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input SG	Measurement switches set to position 1 unless otherwise noted	Limits MIN	Limits TYP	Limits MAX	Unit	Note
25	AF Output	VoAF 1	1	TP11	SIF IN	SG16			700		mVrms	
26	AFOutput Distortion	THD AF 1	1	TP11	SIF IN	SG16			0.8		%	
27	Limiting Sensitivity	LIM 1	1	TP11	SIF IN	SG17			42		dBµ	12
28	AM Rejection	AMR 1	1	TP11	SIF IN	SG18			55		dB	13
29	AF S/N	AF S/N 1	1	TP11	SIF IN	SG19			62		dB	14

Measuring Circuit Diagram



Note) All the capacitors are 0.01μF, unless otherwise noted.
The Measuring Circuit 1 is Mitsubishi standard evaluation fixture.

INPUT SIGNAL

SG	50Ω Termination
1	f0 = 45.75 MHz AM 20 KHz 77.8 % 90 dBμ
2	f0 = 45.75 MHz 90 dBμ Cw
3	f1 = 45.75 MHz 90 dBμ Cw f2 = Frequency Variable 70 dBμ Cw } Mixed Signal
4	f0 = 45.75 MHz AM 20 KHz 77.8% Level Variable
5	f0 = 45.75 MHz AM 20 KHz 14.0% Level Variable
6	f0= 45.75 MHz 80 dBμ Cw
7	f0 = 45.75 MHz 110 dBμ Cw
8	f0 = 45.75 MHz Cw Level Variable
9	f0 = Frequency Variable AM 20 KHz 77.8 % 90 dBμ
10	f0 = Frequency Variable 90 dBμ Cw
11	f1 = 45.75 MHz 90 dBμ Cw f2 = 42.17 MHz 80 dBμ Cw f3 = 41.25 MHz 80 dBμ Cw } Mixed Signal
12	f0 = 45.75 MHz 87.5 % TV modulation Ten-step waveform Sync Tip Level 90 dBμ
13	f1 = 41.25 MHz 95 dBμ Cw
14	f1 = 41.25 MHz 75 dBμ Cw
15	f1 = 45.75 MHz 90 dBμ Cw f2 = 41.25 MHz 70 dBμ Cw } Mixed Signal
16	f0 = 4.5 MHz 90 dBμ FM 400 Hz ±25 KHzdev
17	f0 = 4.5 MHz Level Variable FM 400Hz ±25KHzdev
18	f0 = 4.5 MHz 90 dBμ AM 400 Hz 30 %
19	f0 = 4.5 MHz 90 dBμ Cw
20	f0 = 4.5 MHz Level Variable Cw

Notes

1. Video S/N

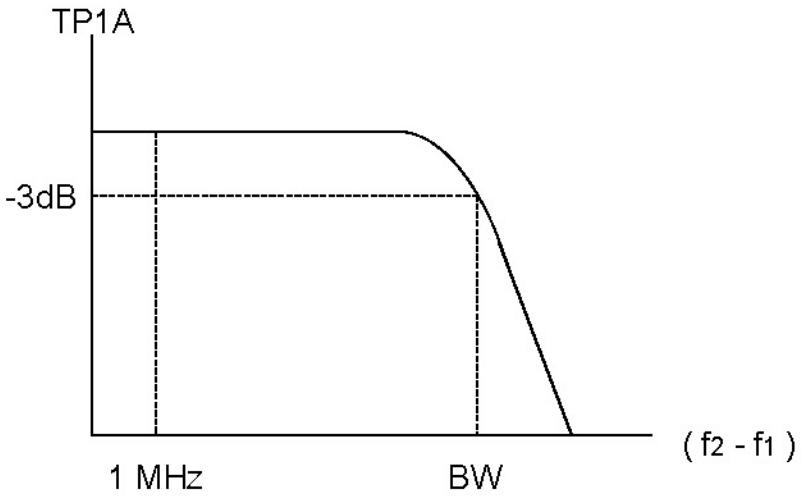
Input SG2 to VIF IN and measure the video out(Pin 1) noise in r.m.s at TP1B through a 5MHz (-3dB) L.P.F.

$$S/N=20\log\left(\frac{0.7\times Vo\ det}{NOISE}\right)\quad [dB]$$

2. Video Band Width: BW

1. Measure the 1MHz component level of Video output TP1A with a spectrum analyzer when SG3(f_2=44.75MHz) is input to VIF IN. At that time, measure the voltage at TP19 with SW19, set to position 2, and then fix V19 at that voltage.

2. Reduce f_2 and measure the value of (f_2-f_1) when the (f_2-f_1) component level reaches -3dB from the 1MHz component level as shown below.



3. Input Sensitivity: VIN MIN

Input SG4 (Vi=90dBμ) to VIF IN , and then gradually reduce Vi and measure the input level when the 20KHz component of Video output TP1A reaches -3dB from Vo det level.

4. Maximum Allowable Input: VIN MAX

1. Input SG5 (Vi=90dBμ) to VIF IN , and measure the level of the 20KHz component of Video output.

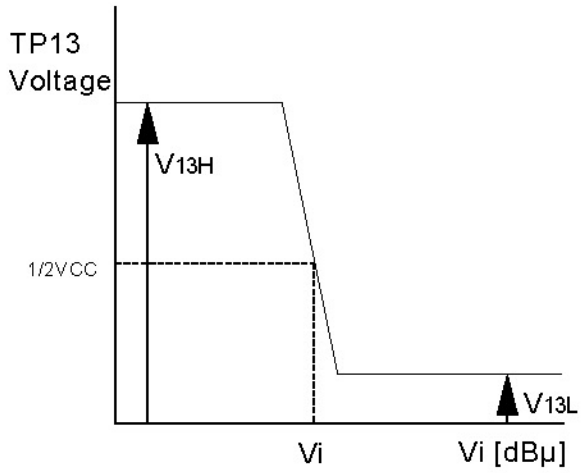
2. Gradually increase the Vi of SG and measure the input level when the output reaches -3dB.

5. AGC Control Range: GR

GR = VIN MAX - VIN MIN [dB]

6. RF AGC Operating Voltage: V13

Input SG8 to VIF IN and gradually reduce Vi and then measure the input level when RF AGC output TP17 reaches 1/2 VCC, as shown below.



7. Capture range: CL - U

1. Increase the frequency of SG9 until the VCO is out of locked-oscillation.
2. And decrease the frequency of SG9 and measure the frequency fU when the VCO is locked.

CL - U = fU - 45.75 [MHz]

8. Capture range: CL - L

1. Decrease the frequency of SG9 until the VCO is out of locked-oscillation.
2. And increase the frequency of SG9 and measure the frequency fL when the VCO is locked.

CL - L = 45.75 - fL [MHz]

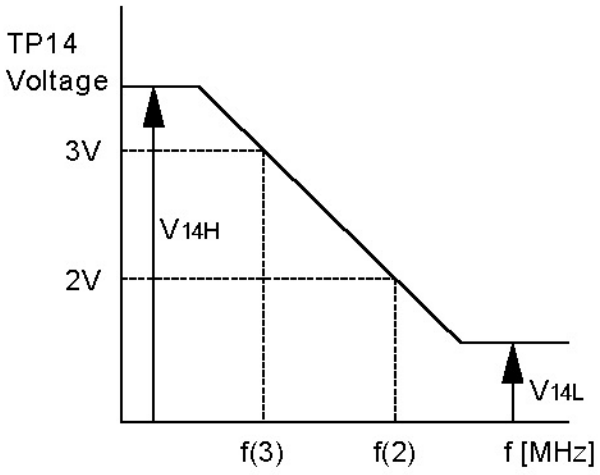
9. Capture range: CL - T

CL - T = CL - U + CL - L [MHz]

10. AFT sensitivity μ, Maximum AFT voltage V_{14H} , Minimum AFT voltage V_{14L}

1. Input SG10 to VIF IN , and set the frequency of SG10 so that the voltage of AFT output TP14 is 3[V] . This frequency is named f(3).
2. Set the frequency of SG10 so that the AFT output voltage is 2[V]. This frequency is named f(2)
3. IN the graph, maximum and minimum DC voltage are V_{14H} and V_{14L}, respectively.

$$\mu = \frac{1000 \quad [mV]}{f(2) - f(3) \quad [kHz]} \quad [mV/kHz]$$

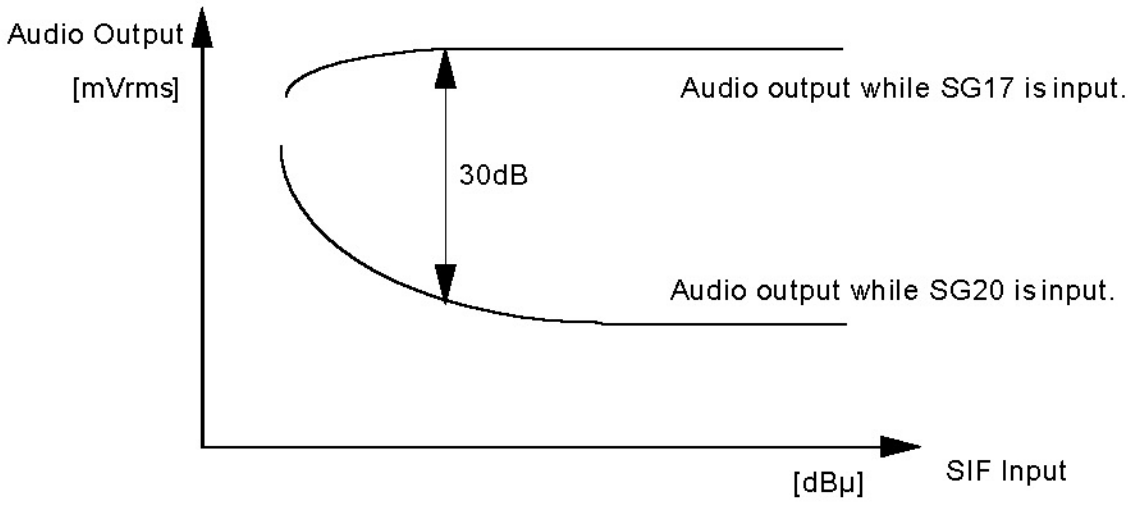


11. Inter modulation: IM

1. Input SG11 to VIF IN, and measure video output TP9 with an oscilloscope.
2. Adjust AGC filter voltage V19 so that the minimum DC level of the output waveform is Sync. tip level1.5V.
3. At this time, measure TP9 with a spectrum analyzer . The inter modulation is defined as a difference between 0.92MHz and 3.58 MHz frequency components.

12. Limiting Sensitivity: LIM

1. Input SG17 to SIF IN, and measure the 400Hz component level of AF output TP11.
2. Input SG20 to SIF IN, and measure the 400Hz component level of AF output TP11.
3. The input limiting sensitivity is defined as the input level when a difference between each 400Hz components of audio output (TP11) is 30dB, as shown below.



13. AM Rejection: AMR

1. Input SG18 to SIF IN ,and measure the output level of Audio output (TP11). This level is named VAM.
2. AMR is;

$$AMR = 20\log\left(\frac{VoAF\ (mVr.m.s)}{VAM\ (mVr.m.s)}\right) \quad [dB]$$

14. AF S/N: AF S/N

1. Input SG19 to SIF IN ,and measure the output noise level of Audio output (TP11). This level is named VN.
2. S/N is;

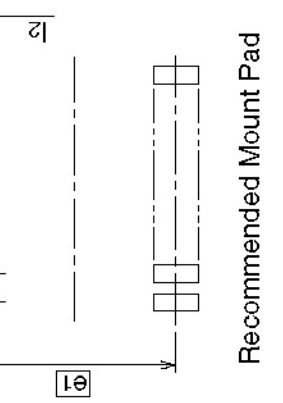
$$S/N = 20\log\left(\frac{VoAF\ (mVr.m.s)}{VN\ (mVr.m.s)}\right) \quad [dB]$$

DETAILED DIAGRAM OF PACKAGE OUTLINE

Plastic 20pin 225mil SSOP

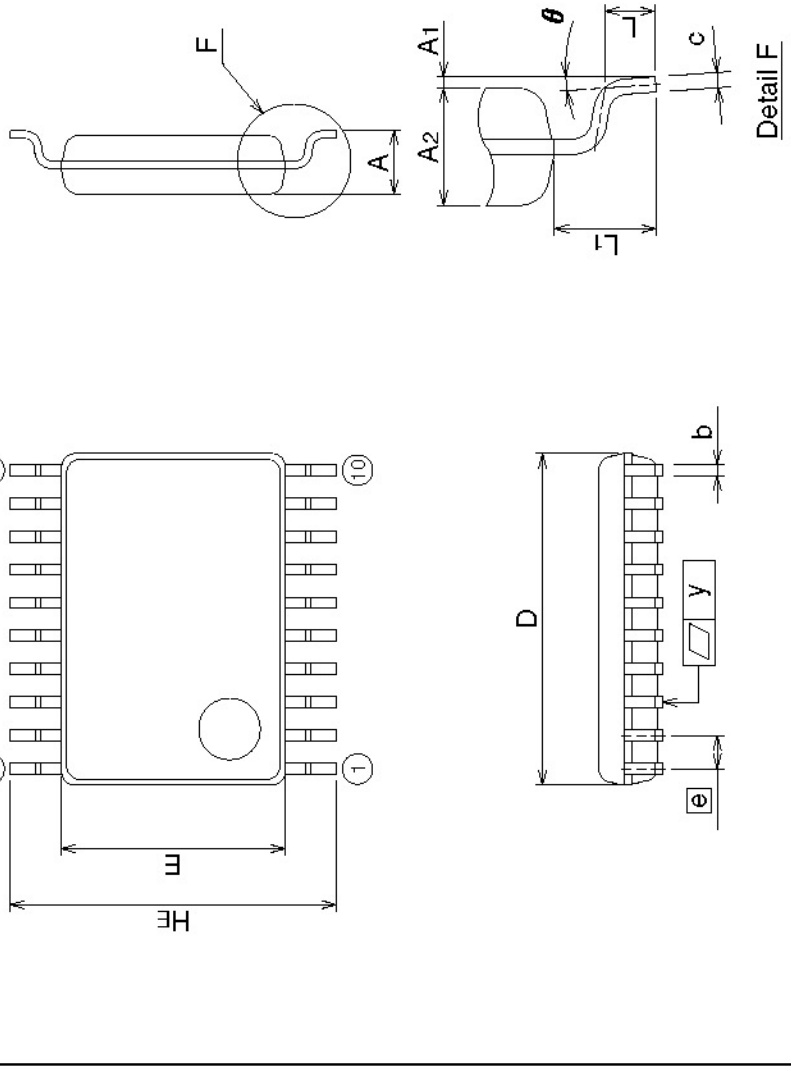
20P2E-A

EIAJ Package Code	JEDEC Code	Weight(g)	Lead Material
SSOP20-P-225-0.65	–	0.08	Alloy 42



Recommended Mount Pad

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	6.4	6.5	6.6
E	4.3	4.4	4.5
e	–	0.65	–
H_E	6.2	6.4	6.6
L	0.3	0.5	0.7
L_1	–	1.0	–
y	–	–	0.1
θ	0°	–	10°
b_2	–	0.35	–
e1	–	5.8	–
l_2	1.0	–	–



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