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)

Send any inquiries to http://www.renesas.com/inquiry.

EOL Product

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

For Product

M61112FP

Coil-less VIF/SIF

REJ03F0022-0100Z
Rev.1.0
Sep.16.2003

EOL Product

Description

M61112FP is a semiconductor integrated circuit consisting of IF signal processing for NTSC system. The circuit includes VIF amplifier, Video detector, Coil-less VCO, APC detector, IF/RF AGC, SIF limiter and FM detector functions, which permits a smaller tuner system.

Feature

- Inter and split system for NTSC
- Built-in coil-less VCO
- Non alignment AFT
- 3.58MHz/4.0MHz Reference frequency
- Built-in mute function VIF and SIF
- Built-in SIF buffer
- Receive FM radio

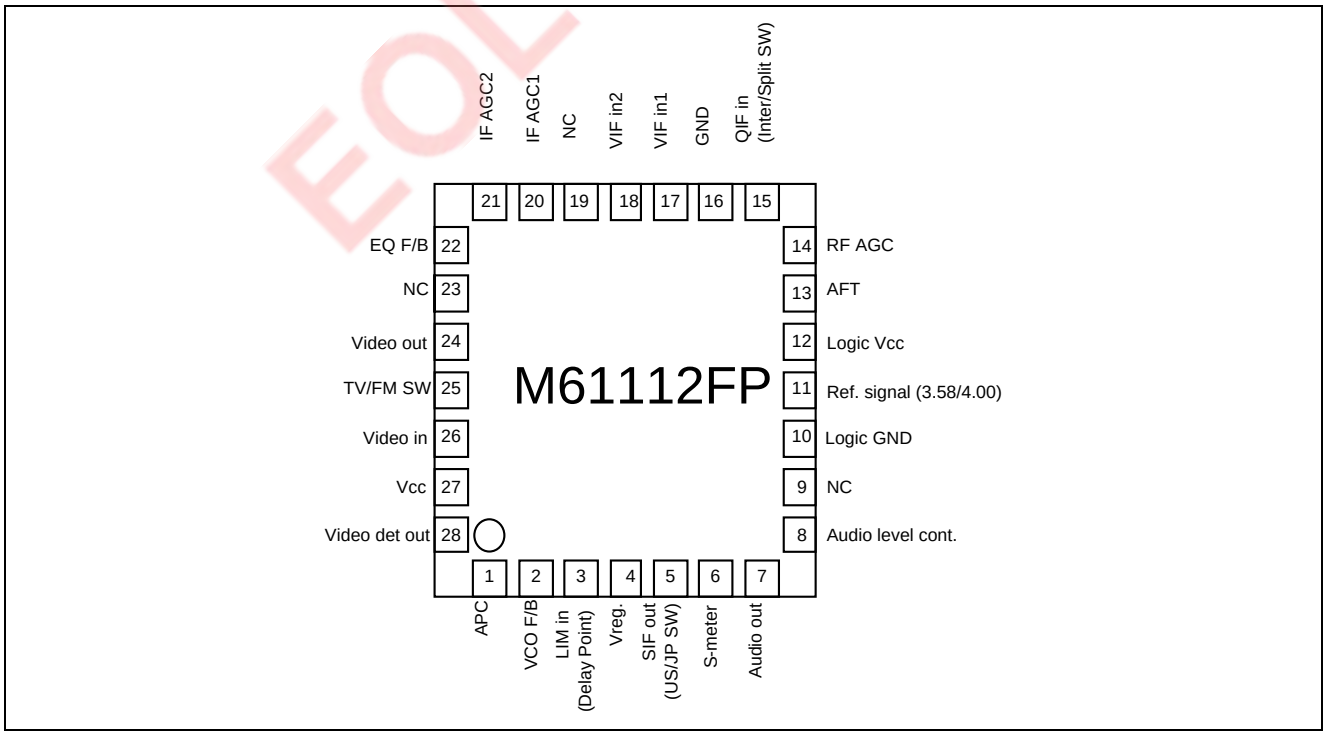
Application

TV set, VCR tuners.

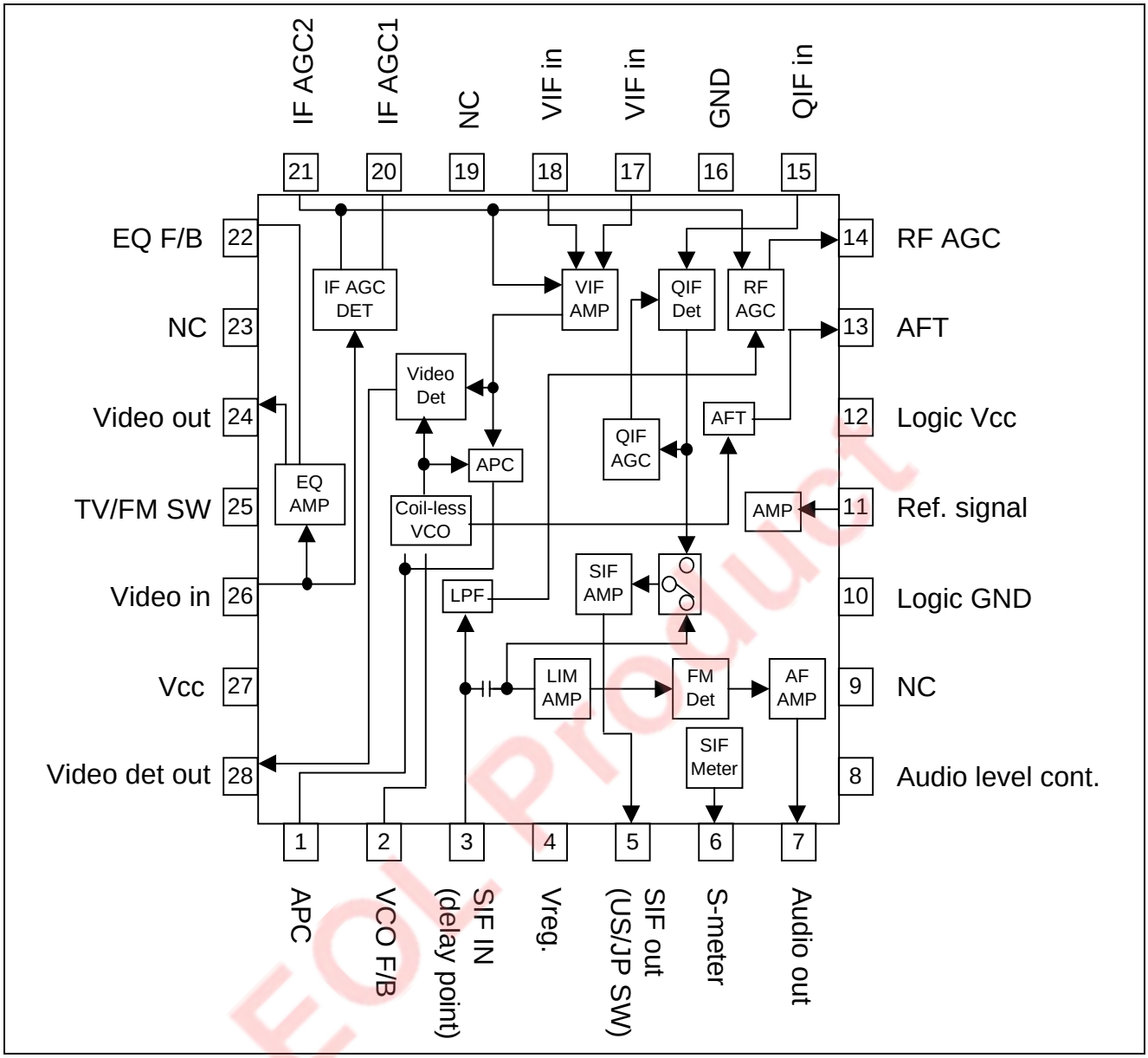
Recommended Operating Condition

Operating power supply voltage 5+/–0.25V

Pin Configulation

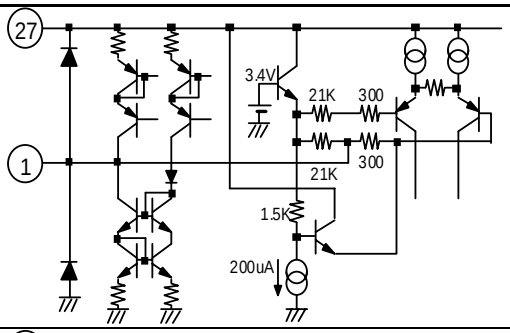
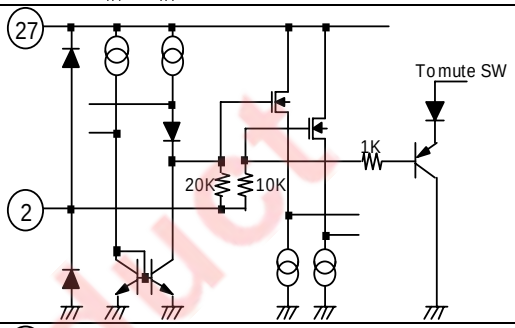
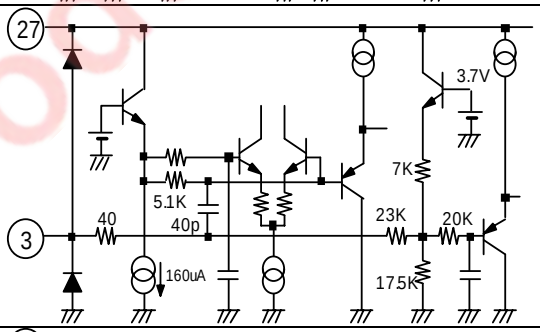
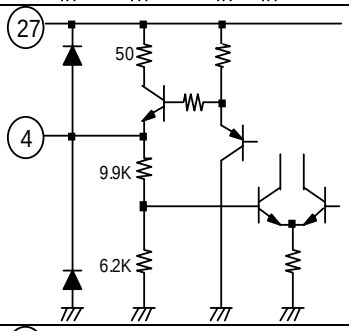
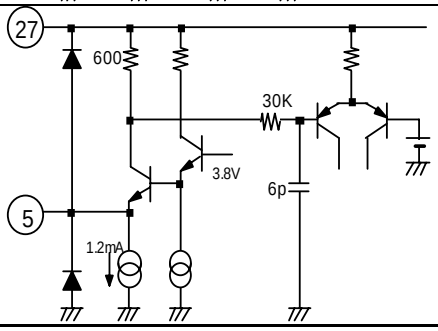


Block Diagram

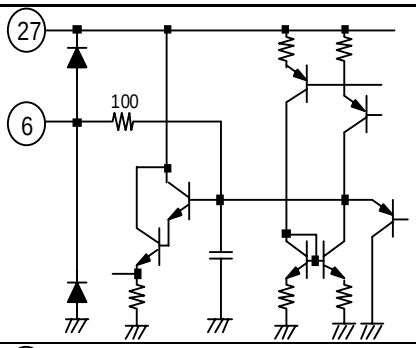
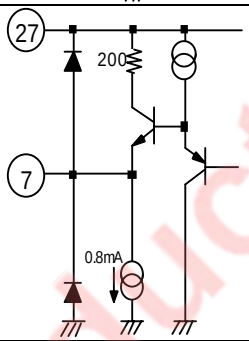
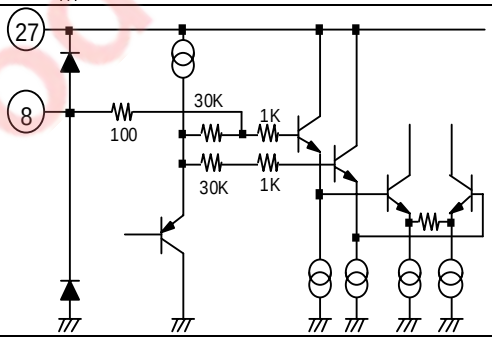
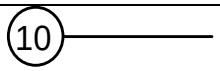
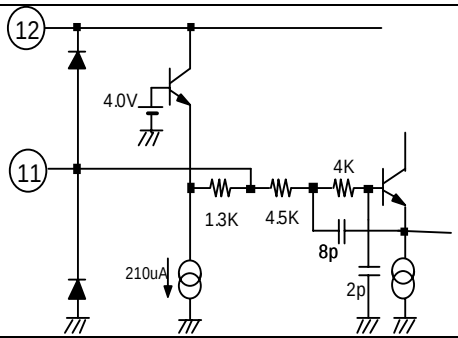
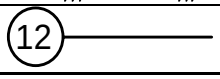


EOL Product

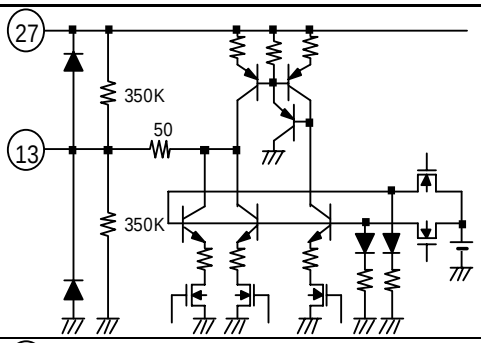
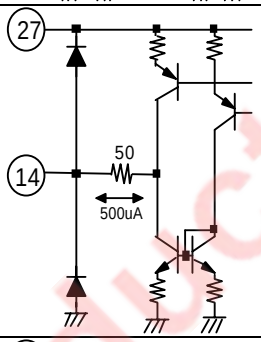
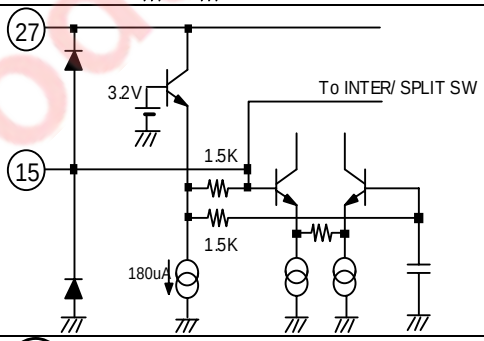
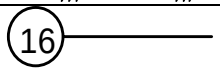
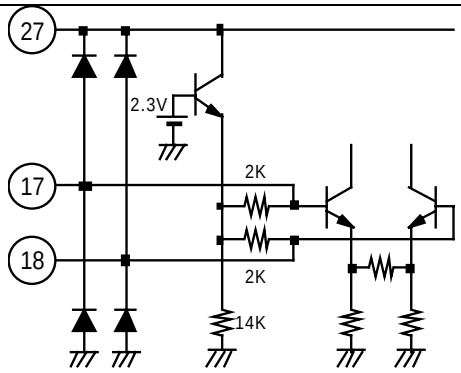
Pin Description

Pin No.	Pin Name	Function	Terminal Voltage	Equivalent Circuit
1	APC	APC filter terminal.	2.6V (no input)	
2	VCO F/B	VCO Feedback terminal. The feedback control is to keep the internal VCO of the uniform free-running frequency. This terminal has dual function, connecting to gnd select mode with VIF/SIF defeat.	3.0V	
3	SIF in (Delay Point)	RF AGC Delay terminal.4.5MHz SIF signal "LIM IN" is input at this pin which has dual function. The RF AGC Delay Point is set up of DC component of this signal. AC component is FM signal.	2.1V	
4	Vreg	Regulated voltage output terminal. The voltage is approximately 3 V.	3.0V	
5	SIF out (US/JP SW)	SIF output terminal. FM signal which is converted to 4.5MHz is output. This pin has dual function of being VIF VCO type selection terminal. Connect to GND with 1.5kΩ ;JPN"58.75MHz" No connect;USA"45.75MHz"	2.2V	

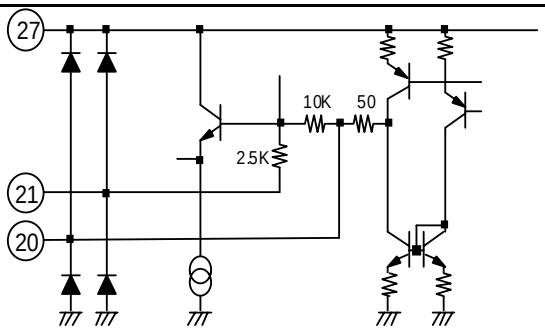
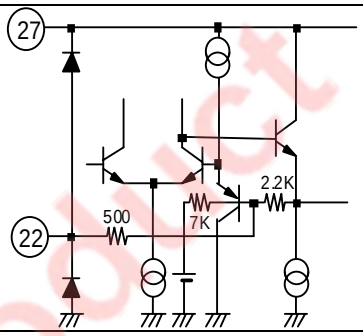
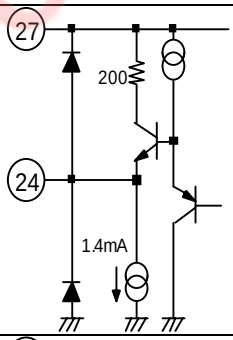
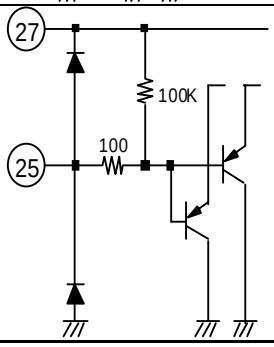
EOL Product

Pin No.	Pin Name	Function	Terminal Voltage	Equivalent Circuit
6	S-meter	S-meter terminal. This Pin changes DC Voltage to keep regular the output amplitude of Pin5.It Does the AGC function. However, The output of this Pin is about 0V when it become out of AGC range for small input.	2.2V | 0V	
7	Audio out	Sound output terminal. De-emphasis is achieved by external components.	2.3V	
8	Audio Level Cont.	AF Bypass terminal. It is connected to one of the input of a differential amplifier,external capacitor provides AC filtering. When resistor is connected in series with capacitor, it is possible to lower the amplitude of the audio output. When audio output terminal is not use,please connect this terminal to GND.	2.8V	
9	NC	—	—	—
10	Logic GND	Ground terminal for Logic and Ref amp.	GND	
11	Ref Signal (3.58/ 4.00)	Reference signal input terminal. It is input external signal with sinewave. In case of 4MHz mode,connect to GND with 4.7 kΩ.	3.2V	
12	Logic Vcc	Power supply terminal for Logic and Ref amp.	5V	

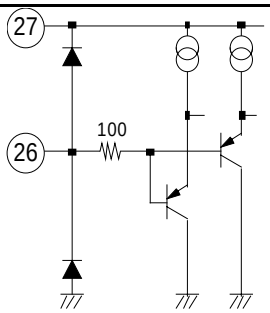
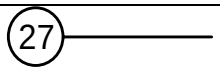
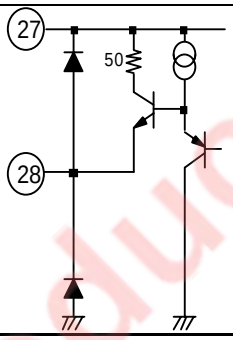
EOL Product

Pin No.	Pin Name	Function	Terminal Voltage	Equivalent Circuit
13	AFT (FM Carrier det)	AFT output terminal. Because of pulse-like signal output, Smoothing capacitor is connected externally with TV mode. Under FM mode,this pin is carrier detector. Active ; High Non-active ; Low	5V | 0V	
14	RF AGC	RF AGC output terminal. It is current drive type.	5V | 0V	
15	QIF in (Inter/ Split SW)	QIF Input terminal with SPLIT. This pin has dual function, The other is INTER/SPLIT SW. INTER : GND SPLIT : DC Open	2.4V	
16	GND	Ground terminal for VIF and SIF.	GND	
17	VIF in1	IF signal after SAW filter is input. It is a balance-type input.	1.5V	
18	VIF in2		1.5V	
19	NC	—	—	—

EOL Product

Pin No.	Pin Name	Function	Terminal Voltage	Equivalent Circuit
20	IF AGC 1	IF AGC filter terminal 1. External capacitor effects AGC speed. When this terminal is grounded,the effect of VIF amp, becomes minimum gain.	4.9V | 2.2V (TV)	
21	IF AGC 2	IF AGC filter terminal 2.	4.0V | 2.0V (FM)	
22	EQ AMP F/B	Equalizer feedback terminal. It is possible to change the AC response of the video signal by attaching L,C,R to this terminal.	2.3V	
23	NC	—	—	—
24	Video out	Video out terminal.	2.3V (no input)	
25	TV/FM SW	TV/FM SW terminal. Open : TV Mode GND : FM Mode Connecting to GND with 100kΩ or adding to 1/2 Vcc at this terminal select to search mode.	5V (TV)	

EOL Product

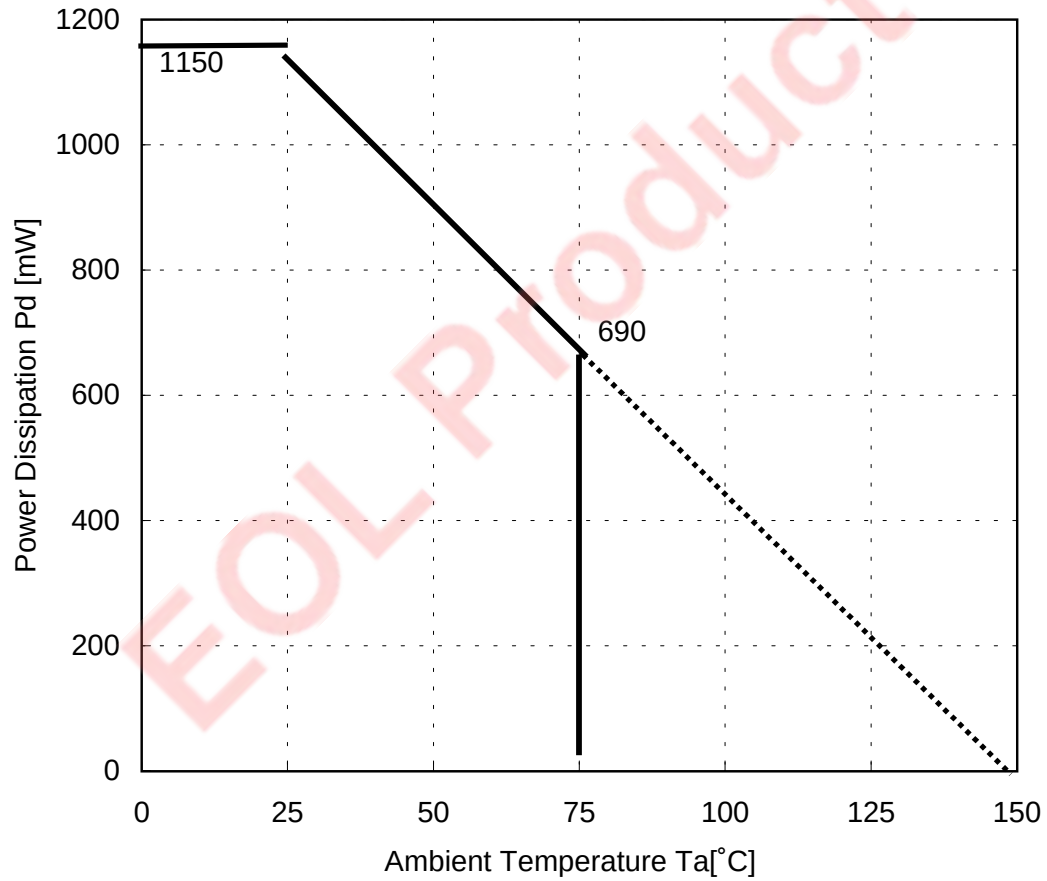
Pin No.	Pin Name	Function	Terminal Voltage	Equivalent Circuit
26	Video in	This terminal is input the video signal from Pin5"Video det out" by SIF trap. Input this terminal to DC of Video det signal is necessary for IF AGC function.	=PIN28	
27	Vcc	Power supply terminal for VIF and SIF.	5V	
28	Video det out	Video detector output terminal. SIF trap and SIF BPF are connected to this terminal. It is necessary connecting external resistor for drive, because open emitter configuration.	2.3V (Load of 240Ω/ no signal)	

EOL Product

Absolute maximum ratings (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Ratings	Unit	Note
Supply Voltage	Vcc	6.0	V	—
Total Power Dissipation	Pd	1150	mW	Conditions of this ratings. (1) 70x70mm^2 1.6mmt (1 layer board) (2) Board material = Glass epoxy (FR-4) (3) Cupper share of board = 50% (4) Wind velocity = 0m/sec It changes with the material of mounting board, the Cupper share, etc.
Operating Temperature	Topr	–20 to 75	°C	—
Storage Temperature	Tstg	–40 to 150	°C	—

Temperature Characteristics (maximum ratings)



EOL Product

Recommended Operating Condition (Ta=25°C, unless otherwise noted)

Parameter	Terminal #	Ratings	Unit
Supply Voltage	12, 27	5.0	V
Function Supply Voltage Range	12, 27	4.75 to 5.25	V
Reference Frequency	11	3.579545 or 4.00	MHz
GND	10, 16	—	—

Electrical Characteristics

General

(Unless Otherwise Specified :
: Ta = 25°C, Vcc = 5.0V, Ref Signal = 3.579545MHz, Vi = 100mVpp, SW Condition = 1)

No	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input Signal	SW Condition	Limits Min	Typ	Max	Unit	Note#
1	VIF/SIF Vcc Current	Icc1	1	Pin27	—	—		44	63	82	mA	
2	Logic Vcc Current	Icc2	1	Pin12	—	—		3.2	4.7	6.1	mA	
3	VIF/SIF Vcc Current @Defeat	Icc3	1	Pin12 Pin27	—	—	SW2=2	6.3	9.0	12.0	mA	
4	Video out Voltage @FM Mode	Vofm	1	TP24	—	—	SW25=2	-	0	0.5	V	
5	Ref. Signal Input Level	Fref	1	Pin11	Pin11	—		50	100	600	mVpp	

VIF Section 1

No	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input Signal	SW Condition	Limits Min	Typ	Max	Unit	Note#
6	Video out	Vodet	1	TP24	Pin17,18	SG1		0.95	1.20	1.45	Vpp	
7	Sync Tip level	Vsync	1	TP24	Pin17,18	SG2		1.20	1.45	1.70	V	
8	Video S/N	VoS/N	1	TP24 A	Pin17,18	SG2	SW8=2 SW24=2	48	50	—	dB	1
9	Video out Freq. Response	BW	1	TP24	Pin17,18	SG3		6	7	—	MHz	2
10	Input sensitivity	VinMIN	1	TP24	Pin17,18	SG4		—	45	52	dBμV	3
11	Max.IF Input	VinMAX	1	TP24	Pin17,18	SG5		101	105	—	dBμV	4
12	IF AGC Range	GR	1	—	—	—		49	60	—	dB	5
13	IF AGC voltage @80dBμV	IFAGC	1	TP21	Pin17,18	SG6		2.7	3.0	3.3	V	
14	Capture range U	CR-U	1	TP24	Pin17,18	SG7		0.80	1.00	—	MHz	6
15	Capture range L	CR-L	1	TP24	Pin17,18	SG7		1.38	1.75	—	MHz	7
16	Inter modulation	IM	1	TP24	Pin17,18	SG8		32	38	—	dB	8
17	D/G	DG	1	TP28	Pin17,18	SG9		—	3	5	%	
18	D/P	DP	1	TP28	Pin17,18	SG9		—	3	5	deg	
21	RF AGC High voltage	RFagcH	1	TP14	Pin17,18	SG10		4.4	4.7	5.0	V	
22	RF AGC Low voltage	RFagcL	1	TP14	Pin17,18	SG11		0	0.3	0.6	V	
23	RF AGC delay point @TV mode	RFDP1	1	TP14	Pin17,18	SG12		82	85	88	dBμV	9

EOL Product

VIF Section 2

No	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input Signal	SW Condition	Limits Min	Typ	Max	Unit	Note#
24	AFT Sensitivity	μ	1	TP13	Pin17,18	SG15		10	26	40	mV /kHz	10
25	AFT High voltage	AFTH	1	TP13	Pin17,18	SG16		4.3	4.7	5	V	10
26	AFT Low voltage	AFTL	1	TP13	Pin17,18	SG17		0	0.3	0.7	V	10
27	AFT Mute voltage	AFTM	1	TP13	Pin17,18	SG18		2.4	2.5	2.6	V	
28	AFT Center voltage @US mode	VaftUS	1	TP13	Pin17,18	SG2		2.40	2.65	2.90	V	
29	AFT Center voltage @JP mode	VaftJP	1	TP13	Pin17,18	SG19	SW5=2	2.60	2.87	3.15	V	

SIF Section

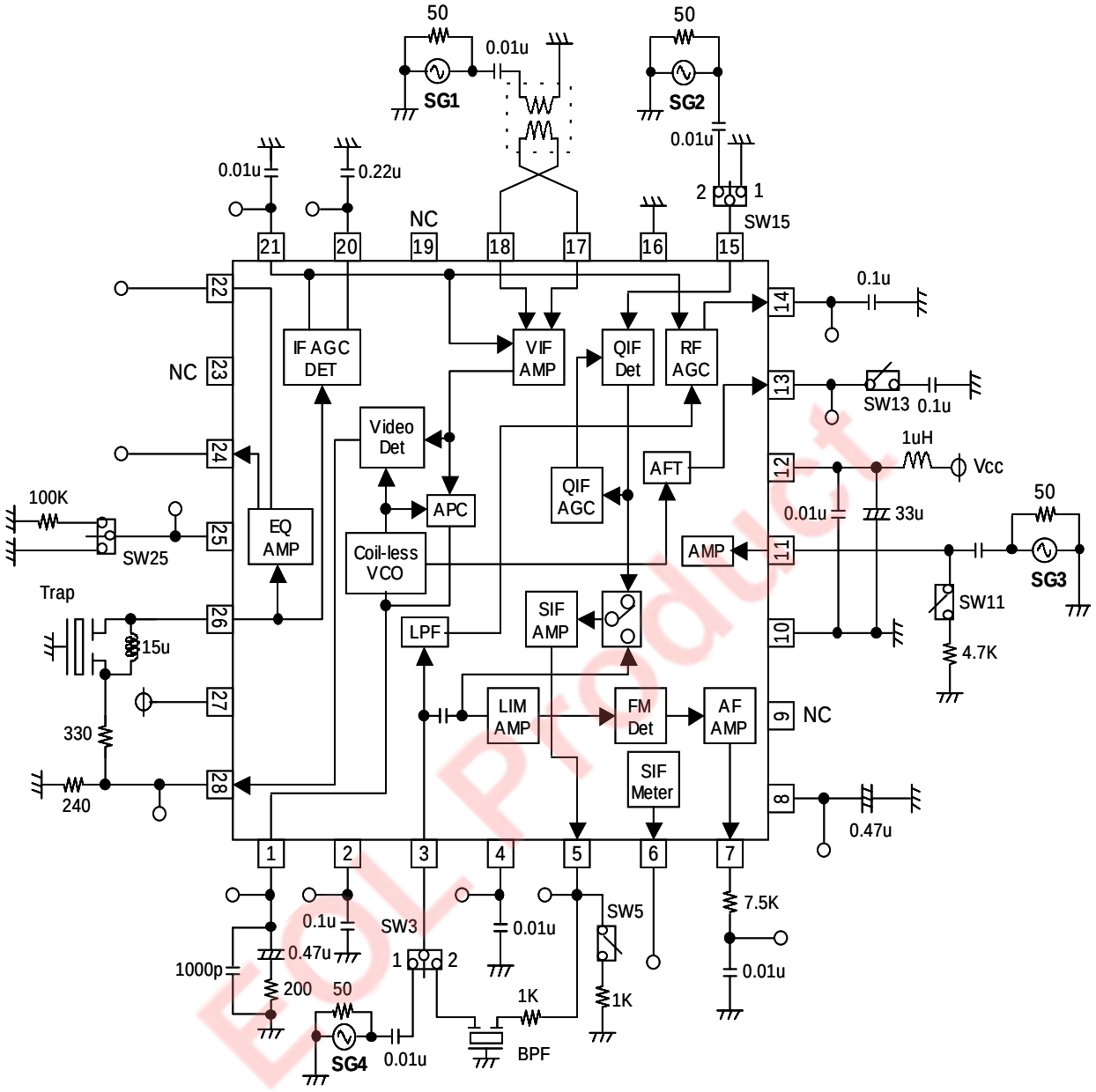
No	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input Signal	SW Condition	Limits Min	Typ	Max	Unit	Note#
30	AF output level @TV mode	VoAF1	1	TP7	Pin3	SG20	SW21=2	400	700	1000	mVrms	
31	AF output THD @TV mode	THDAF1	1	TP7	Pin3	SG20	SW21=2	—	0.4	0.9	%	
32	Audio S/N @TV mode	AF S/N1	1	TP7	Pin3	SG21	SW21=2	50	55	—	dB	11
33	Limiting sensitivity	LIM	1	TP7	Pin3	SG22 SG23	SW21=2	—	50	55	dBμV	12
34	QIF Output 1	QIF1	1	TP5	Pin17,18 Pin15	SG11 SG13		94	100	106	dBμV	
35	QIF Output 2	QIF2	1	TP5	Pin17,18 Pin15	SG11 SG14		94	100	106	dBμV	

VCO Section

No	Parameter	Symbol	Test Circuit	Test Point	Input Point	Input Signal	SW Condition	Limits Min	Typ	Max	Unit	Note#
36	VIF VCO freerun @US mode	FvcofUS	1	TP13	—	—	SW8=2 SW13&21=2 SW25=3	–500	0	+500	kHz	13
37	VIF VCO freerun @JP mode	FvcofJP	1	TP13	—	—	SW5&8=2 SW13&21=2 SW25=3	–500	0	+500	kHz	13

EOL Product

Test Circuit



#This test circuit is based on Renesas Technology board for evaluation.

EOL Product

Input Signal

SG	50 Ω Termination				
1	f0=45.75MHz	Vi=90dBμV	fm=20kHz		AM=77.8%
2	f0=45.75MHz	Vi=90dBμV	CW		
3	f1=45.75MHz f2=Freq. Variable	Vi=90dBμV Vi=70dBμV	CW CW	}	Mixed signal
4	f0=45.75MHz	Vi=Variable	fm=20kHz		AM=77.8%
5	f0=45.75MHz	Vi=Variable	fm=20kHz		AM=16.0%
6	f0=45.75MHz	Vi=80dBμV	CW		
7	f0=Freq. Variable	Vi=90dBμV	fm=20kHz		AM=77.8%
8	f1=45.75MHz f2=42.17MHz f3=41.25MHz	Vi=90dBμV Vi=80dBμV Vi=80dBμV	CW CW CW	}	Mixed signal
9	f0=45.75MHz 87.5% TV modulation 10 step waveform	Sync Tip Level = 90dBμV			
10	f0=45.75MHz	Vi=70dBμV	CW		
11	f0=45.75MHz	Vi=100dBμV	CW		
12	f0=45.75MHz	Vi=Variable	CW		
13	f0=41.25MHz	Vi=100dBμV	CW		
14	f0=41.25MHz	Vi=70dBμV	CW		
15	f0=Freq. Variable	Vi=90dBμV	CW		
16	f0=45.75-0.5MHz	Vi=90dBμV	CW		
17	f0=45.75+0.5MHz	Vi=90dBμV	CW		
18	f0=45.75+/-5MHz	Vi=90dBμV	CW		
19	f0=58.75MHz	Vi=90dBμV	CW		
20	f0=4.5MHz	Vi=90dBμV	fm=1kHz +/–25kHz dev		
21	f0=4.5MHz	Vi=90dBμV	CW		
22	f0=4.5MHz	Vi=Variable	fm=1kHz +/–25kHz dev		
23	f0=4.5MHz	Vi=Variable	CW		

EOL Product

Mode Select

Recommended Condition : Ta = 25°C, Vcc = 5.0V

Inter / Split select	15pin condition	Recommendation
Split	QIF IN	QIF IN
Inter	within 0.5V	GND

TV / FM select	25pin condition	Recommendation
TV	DC Open	DC Open
Search(#1)	2.2V to 2.8V	1/2 Vcc
FM	within 1.0V	GND

#1 : Search mode use for shipping test only.

IF mute select	2pin condition	Recommendation
active	DC open	DC open
mute	within 0.5V	GND

US / JP select	5pin condition	Recommendation
US	no resistance	no resistance
JP	pull down 1.0kΩ +/–10%	1kΩ to GND

Ref Signal select	11pin condition	Recommendation
3.58M	no resistance	no resistance
4.00M	pull down 4.7kΩ +/–10%	4.7kΩ to GND

SIF mute select	8pin condition	Recommendation
active	DC open	DC open
mute	within 0.3V	GND

FM Mode IF Frequency (INTER)

INTER	Ref Signal	IF Frequency
US	3.58MHz	42.341MHz
	4.00MHz	42.500MHz
JP	3.58MHz	55.330MHz
	4.00MHz	55.357MHz

FM Mode IF Frequency (SPLIT)

SPLIT	Ref Signal	IF Frequency
US	3.58MHz	41.250MHz
	4.00MHz	41.250MHz
JP	3.58MHz	54.250MHz
	4.00MHz	54.250MHz

EOL Product

NOTE

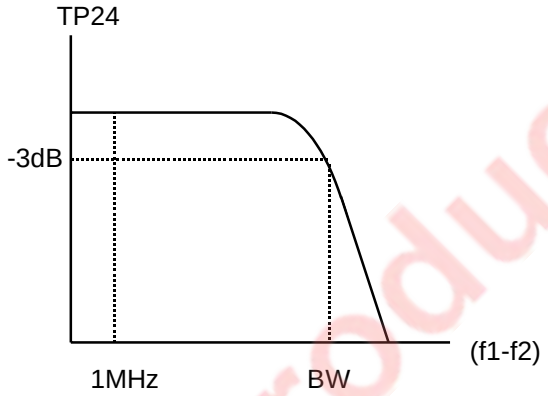
Note1 Video S/N : VoS/N

Input SG2 to VIF IN (Pin17, 18) and measure the video out (TP24A) noise in r.m.s. through a 5MHz (–3dB) L.P.F.

$$S/N = 20\log\left(\frac{0.7 \times Vodet \quad (Vpp)}{NOISE \quad (rms)}\right) \quad (dB)$$

Note2 Video Band Width : BW

1. Measure the 1MHz component level of Video output (TP24) with a spectrum analyzer when SG3 (f2 = 44.75MHz) is input to VIF IN (Pin17, 18).
   At that time, measure the voltage at TP21, and then fix TP21 at that voltage.
2. Reduce f2 and measure the value of (f1-f2) when the (f1-f2) component level reaches -3dB from the 1MHz component level as shown below.



Note3 Input Sensitivity : VinMIN

Input SG4 (Vi = 90dBμ) to VIF IN(Pin17, 18), and then gradually reduce Vi and measure the input level when the 20kHz component of Video output (TP24) reaches -3dB from Vo det level.

Note4 Maximum Allowable Input : VinMAX

1. Input SG5 (Vi = 90dBμ) to VIF IN (Pin17, 18) , and measure the level of the 20kHz component of Video output (TP24).
2. Gradually increase the Vi of SG5 and measure the input level when the output reaches –3dB.

Note5 AGC Control Range : GR

GR = VinMAX - VinMIN (dB)

Note6 Capture range : CR-U

1. Increase the frequency of SG7 until the VCO is out of locked-oscillation.
2. And decrease the frequency of SG7 and measure the frequency fU when the VCO is locked.

CR-U = fU –45.75 (MHz)

Note7 Capture range : CR-L

1. Decrease the frequency of SG7 until the VCO is out of locked-oscillation.
2. And increase the frequency of SG7 and measure the frequency fL when the VCO is locked.

CR-L = 45.75 - fL (MHz)

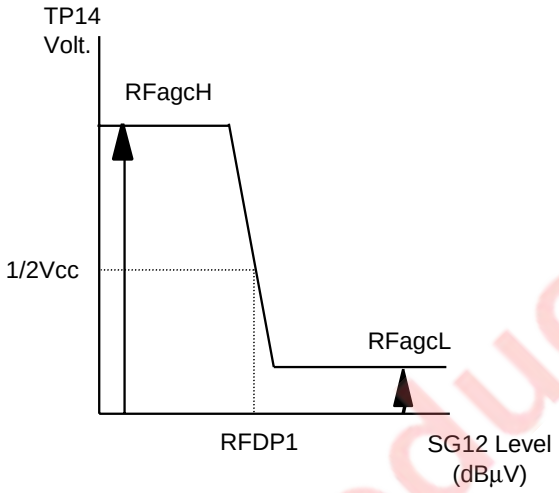
EOL Product

Note8 Inter modulation : IM

1. Input SG8 to VIF IN(Pin17,18), and measure video output (TP24) with an oscilloscope.
2. Adjust AGC filter voltage TP21 so that the minimum DC level of the output waveform is Vsync.
3. At that time, measure TP24 with a spectrum analyzer. The inter modulation is defined as a difference between 0.92MHz and 3.58 MHz frequency components.

Note9 RF AGC Delay Point (TV Mode) : RFDP1

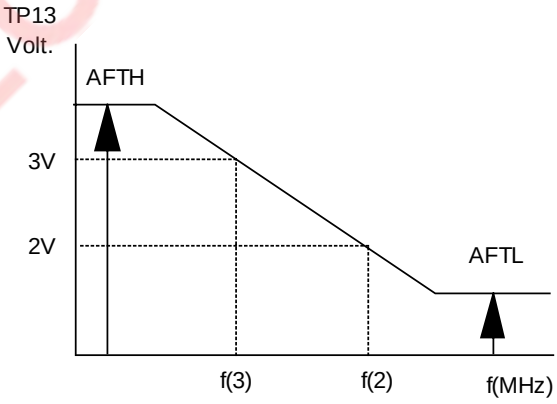
1. Input SG12 to VIF IN (Pin17, 18) and gradually reduce level and then measure the input level when RF AGC output (TP14) reaches 1/2Vcc, as shown below.
2. At that time, the state of Pin3 is DC open.



Note10 AFT sensitivity: μ , Maximum AFT voltage:AFTH, Minimum AFT voltage:AFTL

1. Input SG15 to VIF IN (Pin17,18), and set the frequency of SG15 so that the voltage of AFT output (TP13) is 3 volt. This frequency is named f(3).
2. Set the frequency of SG15 so that the AFT output voltage is 2 volt.
   This frequency is named f(2).
3. IN the graph shown below, maximum and minimum DC voltage are AFTH and AFTL, respectively.

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



Note11 Audio S/N(TV Mode) : AF S/N1

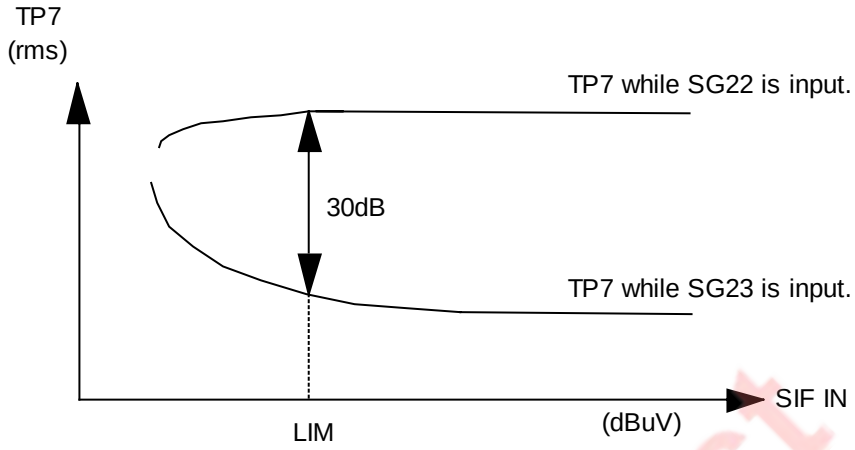
Input SG21 to SIF IN (Pin3), and measure the output noise level of Audio output (TP7) with FLAT-r.m.s. This level is named AFN1.

$$\text{AF S/N1} = 20\log\left(\frac{\text{VoAF1} \quad (mVrms)}{\text{AFN1} \quad (mVrms)}\right) \quad (dB)$$

EOL Product

Note12 Limiting Sensitivity : LIM

1. Input SG22 to LIM IN (Pin3), and measure the 1kHz component level of AF output (TP7) with FLAT-r.m.s.
2. Input SG23 to LIM IN (Pin3), and measure the noise level of AF output (TP7) with FLAT-r.m.s .
3. The input limiting sensitivity is defined as the input level when the difference between each 1kHz components of audio output (TP7) is 30dB, as shown below.



Note13 VIF VCO Freerun frequency : FvcofUS / FvcofJP

Input 3.579545MHz to Ref IN (Pin11), and set up SW as shown following.

	US Mode		JP Mode		
SW No.	**Setting**	**Condition**	**Setting**	**Condition**	
5	1	No-Connecting R	2	Connecting 1kΩ	*VCO SW : US/JP
8	2	GND	2	GND	
11	1	No-Connecting R	1	No-Connecting R	
13	2	No-Connecting C	2	No-Connecting C	
21	2	GND	2	GND	
25	3	Add to 2.5 Volt.	3	Add to 2.5 Volt.	

1. Measure the frequency of output signal at AFT out (TP13) each when be selected US or JP by SW5.
2. Measured frequency's are defined FaftUS (US Mode), FaftJP(JP Mode).
   The VCO freerun frequency is calculated by following.

<Fref = 3.579545MHz>

US Mode

FvcofUS = 52.915(MHz) - 2×FaftUS(MHz) - 45.75(MHz) [MHz]

JP Mode

FvcofJP = 65.925(MHz) - 2×FaftJP(MHz) - 58.75(MHz) [MHz]

Case of Fref frequency is 4.00MHz, SW11 should be set up 2
(Pin11 is connected 4.7kΩ to GND).
Others condition's are same as case of 3.58MHz mode,and the VCO freerun frequency is calculated by following.

<Fref = 4.00MHz>

US Mode

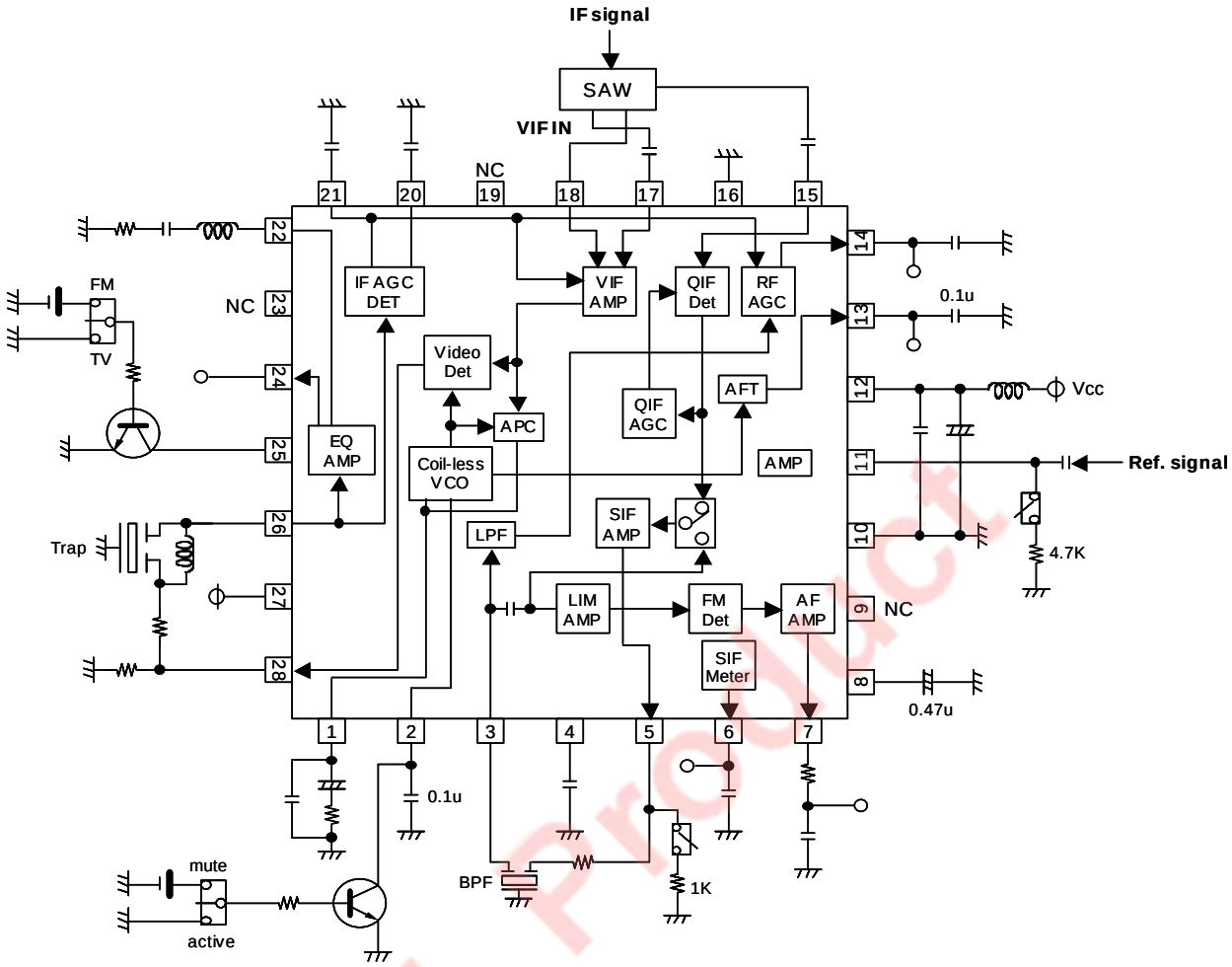
FvcofUS = 52.952(MHz) - 9×FaftUS(MHz) - 45.75(MHz) [MHz]

JP Mode

FvcofJP = 65.951(MHz) - 9×FaftJP(MHz) - 58.75(MHz) [MHz]

EOL Product

Application



Recommendation

* By pass capacitance for Logic Vcc (Pin12) should be mounted close hard by Logic GND (Pin10)
* In order to mitigate the surroundings lump by the VIF input, the balanced connection from a SAW filter to the VIF input pin of 17,18 recommends a putter which serves as a 1t coil by Tip C or the jumper.

Special components

SAW : SAF45MA210Z

TRP : TPSRA4M50B00

BPF : SFSH4.5MEB2

EOL Product

Package Dimensions

28PJW

Note: Please contact Renesas Technology Corporation for further details.

EOL Product

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

© 2003. Renesas Technology Corp., All rights reserved. Printed in Japan.
Colophon 1.0