

Wideband FM IF

The MC13155 is a complete wideband FM detector designed for satellite TV and other wideband data and analog FM applications. This device may be cascaded for higher IF gain and extended Receive Signal Strength Indicator (RSSI) range.

- 12 MHz Video/Baseband Demodulator
- Ideal for Wideband Data and Analog FM Systems
- Limiter Output for Cascade Operation
- Low Drain Current: 7.0 mA
- Low Supply Voltage: 3.0 to 6.0 V
- Operates to 300 MHz

WIDEBAND FM IF

MC13155

SEMICONDUCTOR **TECHNICAL DATA**



D SUFFIX PLASTIC PACKAGE CASE 751B (SO-16)

PIN CONNECTIONS

MAXIMUM RATINGS Rating Pin Symbol Value Unit Power Supply Voltage 11, 14 VEE (max) 6.5 Vdc Input Voltage 1, 16 1.0 Vrms Vin ТJ +150 °C Junction Temperature °C Storage Temperature Range - 65 to +150 Tsta NOTE: Devices should not be operated at or outside these values. The "Recommended

Operating Conditions" provide for actual device operation.





ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC13155D	$T_A = -40$ to $+85^{\circ}C$	SO-16

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RECOMMENDED OPERATING CONDITIONS

Rating	Pin	Symbol	Value	Unit
Power Supply Voltage (T _A = 25°C) - 40°C \leq T _A \leq 85°C	11, 14 3, 6	V _{EE} V _{CC}	– 3.0 to – 6.0 Grounded	Vdc
Maximum Input Frequency	1, 16	f _{in}	300	MHz
Ambient Temperature Range	_	TJ	- 40 to + 85	°C

DC ELECTRICAL CHARACTERISTICS (T_A = 25°C, no input signal.)

Characteristic	Pin	Symbol	Min	Тур	Max	Unit
Drain Current (VFF = - 5.0 Vdc)	11 14	I ₁₁ I ₁₄	2.0 3.0	2.8 4.3	4.0 6.0	mA
$(V_{EE} = -5.0 \text{ Vdc})$	14	I ₁₄	3.0	4.3	6.0	
Drain Current Total (see Figure 3) $(V_{EE} = -5.0 \text{ Vdc})$ $(V_{EE} = -6.0 \text{ Vdc})$ $(V_{EE} = -3.0 \text{ Vdc})$	11, 14	I _{Total}	5.0 5.0 5.0 4.7	7.1 7.5 7.5 6.6	10 10.5 10.5 9.5	mA

AC ELECTRICAL CHARACTERISTICS (T_A = 25°C, f_{IF} = 70 MHz, V_{EE} = -5.0 Vdc Figure 2, unless otherwise noted.)

Characteristic	Pin	Min	Тур	Max	Unit
Input for – 3 dB Limiting Sensitivity	1, 16	-	1.0	2.0	mVrms
$ \begin{array}{l} \mbox{Differential Detector Output Voltage (V_{in} = 10 \mbox{ mVrms}) \\ (f_{dev} = \pm 3.0 \mbox{ MHz}) & (V_{EE} = - 6.0 \mbox{ Vdc}) \\ & (V_{EE} = - 5.0 \mbox{ Vdc}) \\ & (V_{EE} = - 3.0 \mbox{ Vdc}) \end{array} $	4, 5	470 450 380	590 570 500	700 680 620	mV _{p-p}
Detector DC Offset Voltage	4, 5	- 250	-	250	mVdc
RSSI Slope	13	1.4	2.1	2.8	μA/dB
RSSI Dynamic Range	13	31	35	39	dB
RSSI Output $(V_{in} = 100 \ \mu Vrms)$ $(V_{in} = 1.0 \ m Vrms)$ $(V_{in} = 10 \ m Vrms)$ $(V_{in} = 100 \ m Vrms)$ $(V_{in} = 500 \ m Vrms)$	12	- - 16 -	2.1 2.4 24 65 75	- - 36 - -	μA
RSSI Buffer Maximum Output Current (Vin = 10 mVrms)	13	-	2.3	-	mAdc
Differential Limiter Output (V _{in} = 1.0 mVrms) (V _{in} = 10 mVrms)	7, 10	100 -	140 180		mVrms
Demodulator Video 3.0 dB Bandwidth	4, 5	-	12	-	MHz
Input Impedance (Figure 14) @ 70 MHz Rp ($V_{EE} = -5.0 \text{ Vdc}$) Cp ($C_2=C_{15} = 100 \text{ p}$)	1, 16		450 4.8	-	Ω pF
Differential IF Power Gain	1, 7, 10, 16	-	46	-	dB

NOTE: Positive currents are out of the pins of the device.

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CIRCUIT DESCRIPTION

查记 MC 3 25 50 人 新 a wideband three-stage limiting amplifier, a wideband guadrature detector which may be operated up to 200 MHz, and a received signal strength

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indicator (RSSI) circuit which provides a current output linearly proportional to the IF input signal level for approximately 35 dB range of input level.



Figures 17 and 18). Additionally, the peripheral area

surrounding the RF core provides pads to add supporting

and interface circuitry as a particular application dictates.

This evaluation board will be discussed and referenced in

Differential input and output ports interfacing the three

stage limiting amplifier provide a differential power gain of

typically 46 dB and useable frequency range of 300 MHz. The IF gain flatness may be controlled by decoupling of the

internal feedback network at Pins 2 and 15.

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Limiting Amplifier

Figure 2. Test Circuit

1.0n 27 -16 IN1 IN2 16 1 10n 2 DEC1 DEC2 15 14 3 VCC1 VEE1 $\supset V_{EE}$ 100n 1.0n 10µ RSSI 4 DETO1 13 Buffe 1.0k 5 12 DETO2 RSSI \bigcirc V_{EE} ∠ 1.0n 6 Vcc2 VFF2 11 VEE ∠ 1.0n 100n 10u C Limiter 2 7 LIMO1 LIMO2 10 Output 1.0n ≶ 330 QUAD2 8 QUAD1 9 $\setminus \wedge \wedge$ 499 升 20p L1 - Coilcraft part number 146-09J08S L1 111 260n

APPLICATIONS INFORMATION

Scattering parameter (S-parameter) characterization of the IF as a two port linear amplifier is useful to implement maximum stable power gain, input matching, and stability over a desired bandpass response and to ensure stable operation outside the bandpass as well. The MC13155 is unconditionally stable over most of its useful operating frequency range; however, it can be made unconditionally stable over its entire operating range with the proper decoupling of Pins 2 and 15. Relatively small decoupling capacitors of about 100 pF have a significant effect on the wideband response and stability. This is shown in the scattering parameter tables where S-parameters are shown for various values of C2 and C15 and at VEE of - 3.0 and - 5.0 Vdc.

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TYPICAL PERFORMANCE AT TEMPERATURE (See Figure 2. Test Circuit)





Figure 4. RSSI Output versus Frequency and

Figure 5. Total Drain Current versus Ambient Temperature and Supply Voltage



Figure 6. Detector Drain Current and Limiter Drain Current versus Ambient Temperature







Figure 8. RSSI Output versus Input Signal Voltage (V_{in} at Temperature)



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ARCHIVE INFORMATION

In the S-parameters measurements, the IF is treated as a measured with a single-ended input and output configuration in which the Pins 16 and 7 are terminated in the series combination of a 47 Ω resistor and a 10 nF capacitor to V_{CC} ground (see Figure 14. S-Parameter Test Circuit).

The S-parameters are in polar form as the magnitude (MAG) and angle (ANG). Also listed in the tables are the calculated values for the stability factor (K) and the Maximum

Available Gain (MAG). These terms are related in the following equations:

 $K = (1 - |S_{11}|^2 - |S_{22}|^2 + |\Delta|^2) / (2|S_{12}S_{21}|)$ where: $|\Delta| = |S_{11}S_{22} - S_{12}S_{21}|$.

 $MAG = 10 \log |S_{21}| / |S_{12}| + 10 \log |K - (K^2 - 1)^{1/2}|$

where: K > 1. The necessary and sufficient conditions for unconditional stability are given as K > 1:

 $\mathsf{B1} = \mathsf{1} + \mathsf{I} \, \mathsf{S_{11}} \, \mathsf{I^2} - \mathsf{I} \, \mathsf{S_{22}} \, \mathsf{I^2} - \mathsf{I} \, \vartriangle \, \mathsf{I^2} > \mathsf{0}$



Figure 14. S–Parameter Test Circuit

S–Parameters ($V_{FF} = -5.0$ Vdc, $T_A = 25^{\circ}C$, C_2 and $C_{15} = 0$ pF)

查询UMCA	3 <mark>135"供应</mark>	t ð 1	Forward S21		Rev	S12	Outpu	ut S22	к	MAG
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB
1.0	0.94	-13	8.2	143	0.001	7.0	0.87	- 22	2.2	32
2.0	0.78	- 23	23.5	109	0.001	- 40	0.64	- 31	4.2	33.5
5.0	0.48	1.0	39.2	51	0.001	- 97	0.34	-17	8.7	33.7
7.0	0.59	15	40.3	34	0.001	- 41	0.33	-13	10.6	34.6
10	0.75	17	40.9	19	0.001	- 82	0.41	-1.0	5.7	36.7
20	0.95	7.0	42.9	- 6.0	0.001	- 42	0.45	0	1.05	46.4
50	0.98	-10	42.2	- 48	0.001	- 9.0	0.52	- 3.0	0.29	-
70	0.95	-16	39.8	- 68	0.001	112	0.54	-16	1.05	46.4
100	0.93	- 23	44.2	- 93	0.001	80	0.53	- 22	0.76	-
150	0.91	- 34	39.5	-139	0.001	106	0.50	- 34	0.94	-
200	0.87	- 47	34.9	-179	0.002	77	0.42	- 44	0.97	-
500	0.89	-103	11.1	- 58	0.022	57	0.40	-117	0.75	-
700	0.61	-156	3.5	-164	0.03	0	0.52	179	2.6	13.7
900	0.56	162	1.2	92	0.048	- 44	0.47	112	4.7	4.5
1000	0.54	131	0.8	42	0.072	- 48	0.44	76	5.1	0.4

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Frequency	Inpu	t S11	Forward S21		Rev	S12	Outpu	ut S22	к	MAG
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB
1.0	0.98	-15	11.7	174	0.001	-14	0.84	- 27	1.2	37.4
2.0	0.50	- 2.0	39.2	85.5	0.001	-108	0.62	- 35	6.0	35.5
5.0	0.87	8.0	39.9	19	0.001	100	0.47	- 9.0	4.2	39.2
7.0	0.90	5.0	40.4	9.0	0.001	- 40	0.45	- 8.0	3.1	40.3
10	0.92	3.0	41	1.0	0.001	- 40	0.44	- 5.0	2.4	41.8
20	0.92	- 2.0	42.4	-14	0.001	- 87	0.49	- 6.0	2.4	41.9
50	0.91	- 8.0	41.2	- 45	0.001	85	0.50	- 5.0	2.3	42
70	0.91	-11	39.1	- 63	0.001	76	0.52	- 4.0	2.2	41.6
100	0.91	-15	43.4	- 84	0.001	85	0.50	-11	1.3	43.6
150	0.90	- 22	38.2	-126	0.001	96	0.43	- 22	1.4	41.8
200	0.86	- 33	35.5	-160	0.002	78	0.43	- 21	1.3	39.4
500	0.80	- 66	8.3	- 9.0	0.012	75	0.57	- 63	1.7	23.5
700	0.62	- 96	2.9	- 95	0.013	50	0.49	-111	6.3	12.5
900	0.56	-120	1.0	-171	0.020	53	0.44	-150	13.3	2.8
1000	0.54	-136	0.69	154	0.034	65	0.44	-179	12.5	- 0.8

S–Parameters ($V_{EE} = -5.0$ Vdc, $T_A = 25^{\circ}C$, C_2 and $C_{15} = 680$ pF)

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MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB
1.0	0.74	4.0	53.6	110	0.001	101	0.97	- 35	0.58	-
2.0	0.90	3.0	70.8	55	0.001	60	0.68	- 34	1.4	45.6
5.0	0.91	0	87.1	21	0.001	-121	0.33	- 60	1.1	49
7.0	0.91	0	90.3	11	0.001	-18	0.25	- 67	1.2	48.4
10	0.91	- 2.0	92.4	2.0	0.001	33	0.14	- 67	1.5	47.5
20	0.91	- 4.0	95.5	-16	0.001	63	0.12	-15	1.3	48.2
50	0.90	- 8.0	89.7	- 50	0.001	- 43	0.24	26	1.8	46.5
70	0.90	-10	82.6	-70	0.001	92	0.33	21	1.4	47.4
100	0.91	-14	77.12	-93	0.001	23	0.42	-1.0	1.05	49
150	0.94	- 20	62.0	-122	0.001	96	0.42	- 22	0.54	-
200	0.95	- 33	56.9	-148	0.003	146	0.33	- 62	0.75	-
500	0.82	- 63	12.3	-12	0.007	79	0.44	- 67	1.8	26.9
700	0.66	- 98	3.8	-107	0.014	84	0.40	-115	4.8	14.6
900	0.56	-122	1.3	177	0.028	78	0.39	-166	8.0	4.7
1000	0.54	-139	0.87	141	0.048	76	0.41	165	7.4	0.96

S–Parameters ($V_{EE} = -3.0$ Vdc, $T_A = 25^{\circ}C$, C_2 and $C_{15} = 0$ pF)

Frequency	Inpu	t S11	Forward S21		Rev	S12	Outpu	ut S22	к	MAG
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB
1.0	0.89	-14	9.3	136	0.001	2.0	0.84	- 27	3.2	30.7
2.0	0.76	- 22	24.2	105	0.001	- 90	0.67	- 37	3.5	34.3
5.0	0.52	5.0	35.7	46	0.001	- 32	0.40	-13	10.6	33.3
7.0	0.59	12	38.1	34	0.001	- 41	0.40	-10	9.1	34.6
10	0.78	15	37.2	16	0.001	- 92	0.40	-1.0	5.7	36.3
20	0.95	5.0	38.2	- 9.0	0.001	47	0.51	- 4.0	0.94	-
50	0.96	-11	39.1	- 50	0.001	-103	0.48	- 6.0	1.4	43.7
70	0.93	-17	36.8	- 71	0.001	- 76	0.52	-13	2.2	41.4
100	0.91	- 25	34.7	- 99	0.001	-152	0.51	-19	3.0	39.0
150	0.86	- 37	33.8	-143	0.001	53	0.49	- 34	1.7	39.1
200	0.81	- 49	27.8	86	0.003	76	0.55	- 56	2.4	35.1
500	0.70	- 93	6.2	- 41	0.015	93	0.40	-110	2.4	19.5
700	0.62	-144	1.9	-133	0.049	56	0.40	-150	3.0	8.25
900	0.39	-176	0.72	125	0.11	-18	0.25	163	5.1	-1.9
1000	0.44	166	0.49	80	0.10	- 52	0.33	127	7.5	- 4.8

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S–Parameters (V_{EE} = -3.0 Vdc, T_A = 25°C, C₂ and C₁₅ = 100 pF)

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MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB
1.0	0.97	-15	11.7	171	0.001	- 4.0	0.84	- 27	1.4	36.8
2.0	0.53	2.0	37.1	80	0.001	- 91	0.57	- 31	6.0	34.8
5.0	0.88	7.0	37.7	18	0.001	- 9.0	0.48	- 7.0	3.4	39.7
7.0	0.90	5.0	37.7	8.0	0.001	-11	0.49	- 7.0	2.3	41
10	0.92	2.0	38.3	1.0	0.001	- 59	0.51	- 9.0	2.0	41.8
20	0.92	- 2.0	39.6	-15	0.001	29	0.48	- 3.0	1.9	42.5
50	0.91	- 8.0	38.5	- 46	0.001	- 21	0.51	- 7.0	2.3	41.4
70	0.91	-11	36.1	- 64	0.001	49	0.50	- 8.0	2.3	40.8
100	0.91	-15	39.6	- 85	0.001	114	0.52	-13	1.7	37.8
150	0.89	- 22	34.4	-128	0.001	120	0.48	- 23	1.6	40.1
200	0.86	- 33	32	-163	0.002	86	0.40	- 26	1.7	37.8
500	0.78	- 64	7.6	-12	0.013	94	0.46	- 71	1.9	22.1
700	0.64	- 98	2.3	-102	0.027	58	0.42	-109	4.1	10.1
900	0.54	-122	0.78	179	0.040	38.6	0.35	-147	10.0	- 0.14
1000	0.53	-136	0.47	144	0.043	23	0.38	-171	15.4	- 4.52

S–Parameters ($V_{EE} = -3$	3.0 Vdc, T _A = 25°C,	C_2 and $C_{15} = 680 \text{ pF}$)
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Frequency	Inpu	t S11	Forward S21		Rev S12		Outpu	ut S22	ĸ	MAG
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB
1.0	0.81	3.0	37	101	0.001	-19	0.90	- 32	1.1	43.5
2.0	0.90	2.0	47.8	52.7	0.001	- 82	0.66	- 39	0.72	-
5.0	0.91	0	58.9	20	0.001	104	0.37	- 56	2.3	44
7.0	0.90	-1	60.3	11	0.001	- 76	0.26	- 55	2.04	44
10	0.91	- 2.0	61.8	3.0	0.001	105	0.18	- 52	2.2	43.9
20	0.91	- 4.0	63.8	– 15	0.001	59	0.11	-13	2.0	44.1
50	0.90	- 8.0	60.0	- 48	0.001	96	0.22	33	2.3	43.7
70	0.90	-11	56.5	- 67	0.001	113	0.29	15	2.3	43.2
100	0.91	-14	52.7	- 91	0.001	177	0.36	5.0	2.0	43
150	0.93	- 21	44.5	-126	0.001	155	0.35	-17	1.8	42.7
200	0.90	- 43	41.2	-162	0.003	144	0.17	- 31	1.6	34.1
500	0.79	- 65	7.3	-13	0.008	80	0.44	- 75	3.0	22
700	0.65	- 97	2.3	-107	0.016	86	0.38	-124	7.1	10.2
900	0.56	-122	0.80	174	0.031	73	0.38	-174	12	0.37
1000	0.55	-139	0.52	137	0.50	71	0.41	157	11.3	- 3.4

DC Biasing Considerations

Ter DC bigging 绘饰画 utilizes two VCC connections (Pins 3 and 6) and two V_{FF} connections (Pins 14 and 11). VFF1 (Pin 14) is connected internally to the IF and RSSI circuits' negative supply bus while VFF2 (Pin 11) is connected internally to the quadrature detector's negative bus. Under positive ground operation, this unique configuration offers the ability to bias the RSSI and IF separately from the quadrature detector. When two ICs are cascaded as shown in the 70 MHz application circuit and provided by the PCB (see Figures 17 and 18), the first MC13155 is used without biasing its quadrature detector, thereby saving approximately 3.0 mA. A total current of 7.0 mA is used to fully bias each IC, thus the total current in the application circuit is approximately 11 mA. Both VCC pins are biased by the same supply. V_{CC}1 (Pin 3) is connected internally to the positive bus of the first half of the IF limiting amplifier, while V_{CC}2 is internally connected to the positive bus of the RSSI, the quadrature detector circuit, and the second half of the IF limiting amplifier (see Figure 15). This distribution of the V_{CC} enhances the stability of the IC.

RSSI Circuitry

The RSSI circuitry provides typically 35 dB of linear dynamic range and its output voltage swing is adjusted by

selection of the resistor from Pin 12 to V_{EE}. The RSSI slope is typically 2.1 μ A/dB; thus, for a dynamic range of 35 dB, the current output is approximately 74 μ A. A 47 k resistor will yield an RSSI output voltage swing of 3.5 Vdc. The RSSI buffer output at Pin 13 is an emitter–follower and needs an external emitter resistor of 10 k to V_{EE}.

In a cascaded configuration (see circuit application in Figure 16), only one of the RSSI Buffer outputs (Pin 13) is used; the RSSI outputs (Pin 12 of each IC) are tied together and the one closest to the VEE supply trace is decoupled to V_{CC} ground. The two pins are connected to V_{EE} through a 47 k resistor. This resistor sources a RSSI current which is proportional to the signal level at the IF input; typically, 1.0 mVrms (- 47 dBm) is required to place the MC13155 into limiting. The measured RSSI output voltage response of the application circuit is shown in Figure 12. Since the RSSI current output is dependent upon the input signal level at the IF input, a careful accounting of filter losses, matching and other losses and gains must be made in the entire receiver system. In the block diagram of the application circuit shown below, an accounting of the signal levels at points throughout the system shows how the RSSI response in Figure 12 is justified.

Block Diagram of 70 MHz Video Receiver Application Circuit



Cascading Stages

The limiting IF output is pinned-out differentially, cascading is easily achieved by AC coupling stage to stage. In the evaluation PCB, AC coupling is shown, however, interstage filtering may be desirable in some applications. In which case, the S-parameters provide a means to implement a low loss interstage match and better receiver sensitivity.

Where a linear response of the RSSI output is desired when cascading the ICs, it is necessary to provide at least 10 dB of interstage loss. Figure 12 shows the RSSI response with and without interstage loss. A 15 dB resistive attenuator is an inexpensive way to linearize the RSSI response. This has its drawbacks since it is a wideband noise source that is dependent upon the source and load impedance and the amount of attenuation that it provides. A better, although more costly, solution would be a bandpass filter designed to the desired center frequency and bandpass response while carefully selecting the insertion loss. A network topology shown below may be used to provide a bandpass response with the desired insertion loss.



Quadrature Detector

THE MOCHAUSS CALLED Finst Coupled to the IF with internal 2.0 pF capacitors between Pins 7 and 8 and Pins 9 and 10. For wideband data applications, such as FM video and satellite receivers, the drive to the detector can be increased with additional external capacitors between these pins, thus, the recovered video signal level output is increased for a given bandwidth (see Figure 11A and Figure 11B).

The wideband performance of the detector is controlled by the loaded Q of the LC tank circuit. The following equation defines the components which set the detector circuit's bandwidth:

$$Q = R_T / X_L$$
(1)

where: R_T is the equivalent shunt resistance across the LC Tank and X_L is the reactance of the quadrature inductor at the IF frequency ($X_L = 2\pi fL$).

The inductor and capacitor are chosen to form a resonant LC Tank with the PCB and parasitic device capacitance at the desired IF center frequency as predicted by:

$$fc = (2\pi \sqrt{(LC_D)})^{-1}$$
 (2)

where: L is the parallel tank inductor and C_p is the equivalent parallel capacitance of the parallel resonant tank circuit.

The following is a design example for a wideband detector at 70 MHz and a loaded Q of 5. The loaded Q of the quadrature detector is chosen somewhat less than the Q of the IF bandpass. For an IF frequency of 70 MHz and an IF bandpass of 10.9 MHz, the IF bandpass Q is approximately 6.4.

Example:

Let the external Cext = 20 pF. (The minimum value here should be greater than 15 pF making it greater than the internal device and PCB parasitic capacitance, Cint \approx 3.0 pF).

$$C_p = Cint + Cext = 23 pF$$

Rewrite Equation 2 and solve for L:

 $L = (0.159)^2 / (C_p fc^2)$

L = 198 nH, thus, a standard value is chosen.

 $L = 0.22 \mu H$ (tunable shielded inductor).

The value of the total damping resistor to obtain the required loaded Q of 5 can be calculated by rearranging Equation 1:

$$R_T = Q(2\pi fL)$$

 $R_T = 5 (2\pi)(70)(0.22) = 483.8 Ω.$

The internal resistance, Rint between the quadrature tank Pins 8 and 9 is approximately 3200 Ω and is considered in determining the external resistance, Rext which is calculated from:

Rext = $((R_T)(Rint))/(Rint - R_T)$

Rext = 570, thus, choose the standard value.

Rext = 560 Ω .

SAW Filter

In wideband video data applications, the IF occupied bandwidth may be several MHz wide. A good rule of thumb is to choose the IF frequency about 10 or more times greater than the IF occupied bandwidth. The IF bandpass filter is a SAW filter in video data applications where a very selective response is needed (i.e., very sharp bandpass response). The evaluation PCB is laid out to accommodate two SAW filter package types: 1) A five–leaded plastic SIP package. Recommended part numbers are Siemens X6950M which operates at 70 MHz; 10.4 MHz 3 dB passband, X6951M (X252.8) which operates at 70 MHz; 9.2 MHz 3 dB passband; and X6958M which operates at 70 MHz; 6.3 MHz 3 dB passband, and 2) A four–leaded TO–39 metal can package. Typical insertion loss in a wide bandpass SAW filter is 25 dB.

The above SAW filters require source and load impedances of 50 Ω to assure stable operation. On the PC board layout, space is provided to add a matching network, such as a 1:4 surface mount transformer between the SAW filter output and the input to the MC13155. A 1:4 transformer, made by Coilcraft and Mini Circuits, provides a suitable interface (see Figures 16, 17 and 18). In the circuit and layout, the SAW filter and the MC13155 are differentially configured with interconnect traces which are equal in length and symmetrical. This balanced feed enhances RF stability, phase linearity, and noise performance.

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Figure 15. Simplified Internal Circuit Schematic

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Figure 16. 70 MHz Video Receiver Application Circuit



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Figure 17. Component Placement (Circuit Side)



Figure 18. Component Placement (Ground Side)



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Figure 20. Ground Side View



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