MT1110 75Ω Broadband Amplifier
Advance Data Sheet

CATV Distribution Applications

1 APPLICATIONS

- Set-top box
- Home gateways
- CATV Broadband distribution
- Cable splitters
- Laser drivers
- Optical receivers

2 FEATURES

- Cascadable 75Ω gain block
- 15 dB Gain
- 3 dB Noise figure
- Unconditionally stable
- 20 dB Input return loss
- 1 MHz to 2000 MHz 3 dB bandwidth
- +0.5 dB Gain tilt from 50 MHz to 850 MHz
- Typical OIP3 at 70 mA is 80 dBmV at 850 MHz
- Single +5V supply
- 70 mA Current consumption
- SOT-89 Package
- Industry standard pin-out for drop in compatibility

3 OVERVIEW

The Microtune 1110 (MT1110) broadband amplifier is a 75Ω internally matched amplifier designed for broadband CATV distribution and infrastructure applications. The MT1110 is built using high performance silicon-germanium (SiGe) technology and offers 15 dB gain with an industry best noise figure of 3.0 dB. It achieves a third order intercept point of 80 dBmV while drawing the industry's lowest current, 70 mA, from a single 5V supply.

Specifically designed for cable, data, and video applications, the MT1110 features a unique integrated equalization circuit that adds 0.5 dB of positive tilt to the gain slope to compensate for a commonly occurring frequency dependent attenuation found in broadband applications.

The MT1110's Darlington circuit topology produces high linearity with very low noise while maintaining matched input and output impedances. Two AC coupling capacitors, a bias resistor, and an optional inductor are the only external components required.

The MT1110 is available in a SOT-89 package for the extended industrial temperature range of -40°C to +85°C.

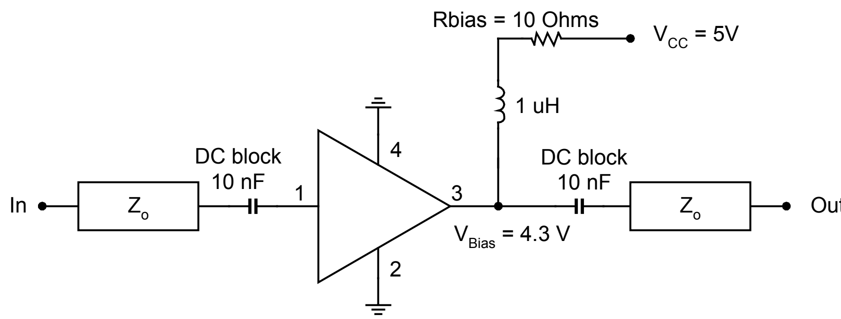

Figure 1 Typical Application

4 ABSOLUTE MAXIMUM RATINGS

Stresses greater than those listed in Table 1 may cause permanent damage to the device. These are stress ratings only; functional operation of the device under conditions other than those listed in the operational sections of this document is not recommended or implied. Exposure to any of the absolute maximum rating conditions for extended periods of time may affect reliability.

Table 1 Absolute Maximum Stress Ratings

PARAMETER	MIN	MAX	UNIT
Device voltage	-0.7	5	V
Device current		100	mA
RF Input power		60	dBmV
Junction temperature		+125	°C
Storage temperature range	-55	+150	°C
Lead temperature (soldering, 10 seconds)		+245	°C

5 DC ELECTRICAL CHARACTERISTICS

Table 2 Recommended Bias Resistor Values

SUPPLY VOLTAGE	5V	6V	9V	12V	UNIT
R_{Bias} at 70 mA	10	24	67	110	Ω

6 AC ELECTRICAL CHARACTERISTICS

The AC electrical characteristics listed in Table 3 are valid for the following conditions unless otherwise noted. Typical parameters are at T_A = +25°C.

- Device current = 70 mA
- V_{Bias} = 4.3 V
- Zo = 75Ω
- T_A = -40°C to +85°C

Table 3 AC Electrical Characteristics

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Power gain	S21	45 MHz to 870 MHz		15		dB
3 dB Gain bandwidth		Lower frequency determined by external components	1		2000	MHz
Noise figure	NF	45 MHz to 870 MHz		3	3.5	dB
Composite triple beat	CTB	79 Channels, output = 25 dBmV per tone		-72		dBc
		112 Channels, output = 25 dBmV per tone		-71		dBc
		132 Channels, output = 25 dBmV per tone		-70		dBc
Composite second order (sum)	CSO	79 Channels, output = 25 dBmV per tone		-61		dBc
		112 Channels, output = 25 dBmV per tone		-58		dBc
		132 Channels, output = 25 dBmV per tone		-53		dBc
Composite second order (difference)	CSO	79 Channels, output = 25 dBmV per tone		-54		dBc
		112 Channels, output = 25 dBmV per tone		-53		dBc
		132 Channels, output = 25 dBmV per tone		-52		dBc
Cross modulation	Xmod	79 Channels, output = 25 dBmV per tone		-68		dBc
		112 Channels, output = 25 dBmV per tone		-65		dBc
		132 Channels, output = 25 dBmV per tone		-63		dBc
Third order intercept point	OIP3	F1 = 54.25 MHz, F2 = 60.25 MHz, Output = 55 dBmV per tone		83		dBmV
		F1 = 403.25 MHz, F2 = 409.25 MHz, Output = 55 dBmV per tone		82		dBmV
		F1 = 853.25 MHz, F2 = 859.25 MHz, Output = 55 dBmV per tone		80		dBmV
Second order intercept point	OIP2	F = 403.25 MHz F= 409.25 MHz		105		dBmV
Output power 1 dB compression point	P1dB	F = 859.25 MHz		66		dBmV
Slope straight line	SL	45 MHz to 870 MHz		0.5		dB
Flatness straight line	FL	45 MHz to 870 MHz	-0.5		0.5	dB
Flatness narrow band	FLnb	In each 6 MHz segment			±0.2	dB
Reverse isolation	S12	50 MHz to 850 MHz		18		dB
Input Return Loss	S11		18	20		dB
Output Return Loss	S22		10	16		dB

7 TYPICAL PERFORMANCE

The following data is representative of a part measured in a typical application circuit.

- Device Current = 70 mA
- V_{Bias} = 4.3 V
- Zo=75Ω
- T_A = 25°C

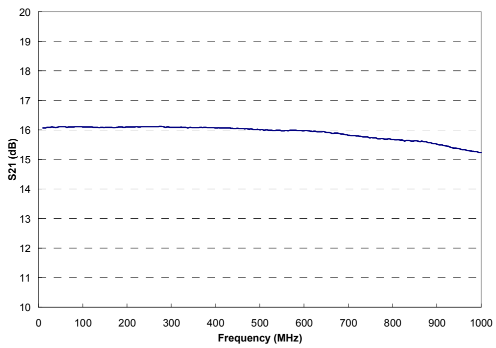

Figure 2 Power Gain vs Frequency

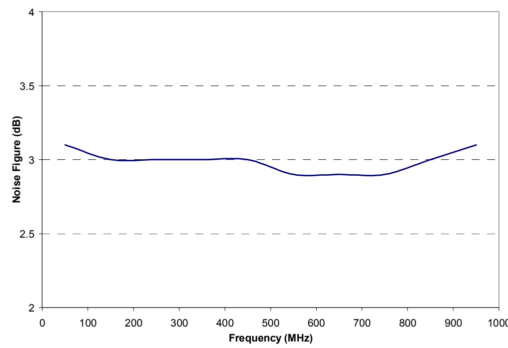

Figure 3 Noise Figure vs Frequency

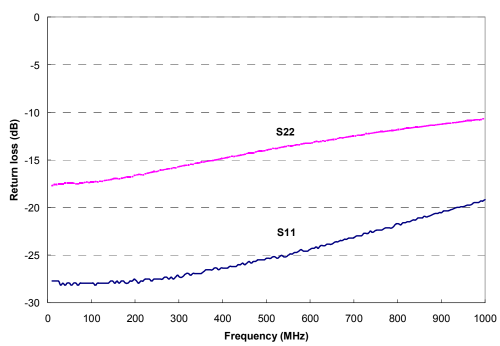

Figure 4 Return Loss vs Frequency

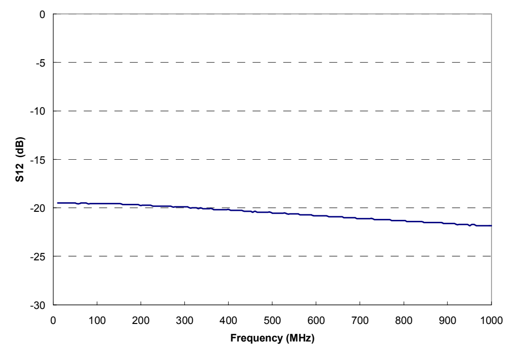

Figure 5 Reverse Isolation vs Frequency

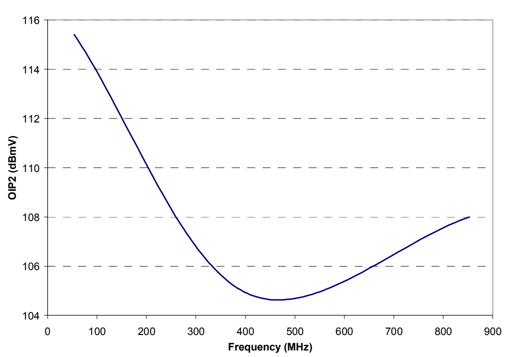

Figure 6 OIP2 vs Frequency

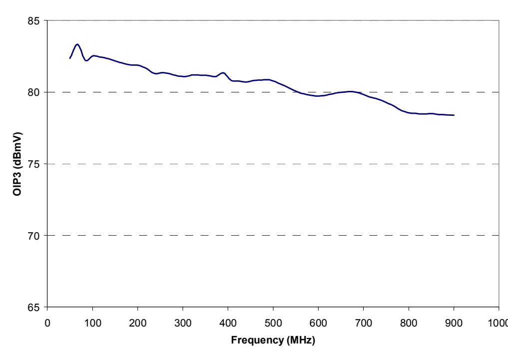

Figure 7 OIP3 vs Frequency

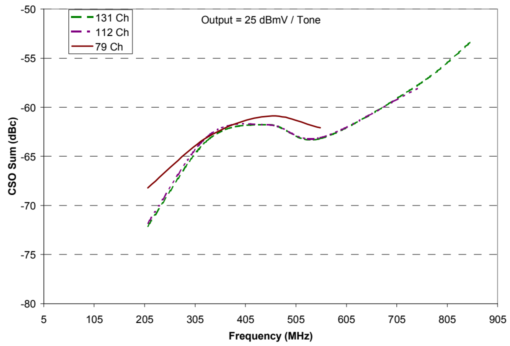

Figure 8 CSO Sum vs Frequency

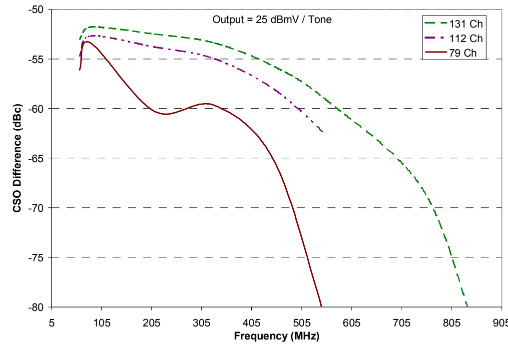

Figure 9 CSO Difference vs Frequency

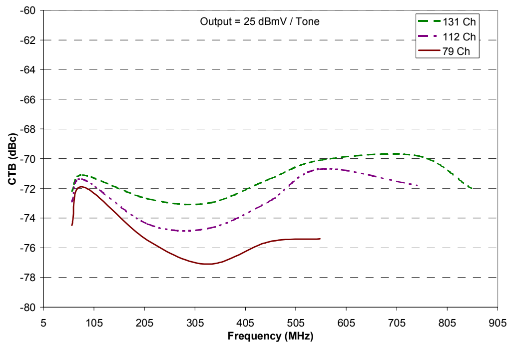

Figure 10 CTB vs Frequency

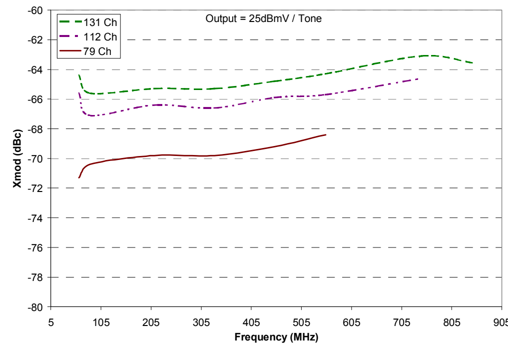

Figure 11 Xmod vs Frequency

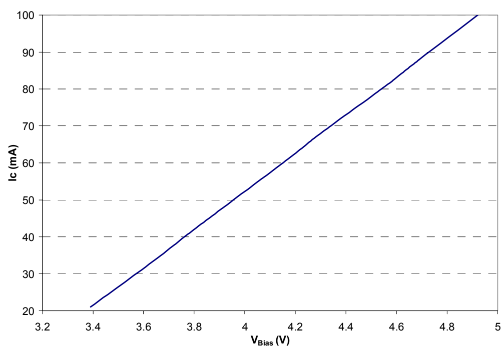

Figure 12 Collector Current vs V_{Bias}

Preliminary

8 TYPICAL S-PARAMETERS

Table 4 Typical S-Parameters (V_{Bias} = 4.3V, Icc = 70 mA)

FREQ. MHZ	|S11|	S11 ANG	|S21|	S21 ANG	|S12|	S12 ANG	|S22|	S22 ANG
5	0.043	-2.627	6.353	179.805	0.105	0.135	0.128	1.843
50	0.04	-2.287	6.394	177.154	0.106	-1.797	0.134	-10.244
150	0.041	-7.052	6.376	171.895	0.105	-5.018	0.142	-31.946
250	0.043	-11.811	6.39	166.387	0.102	-7.894	0.154	-50.422
350	0.045	-16.955	6.365	160.812	0.099	-10.261	0.172	-64.061
450	0.05	-20.835	6.344	155.12	0.096	-12.163	0.19	-75.581
550	0.056	-28.219	6.285	149.584	0.093	-13.826	0.211	-84.236
650	0.065	-33.505	6.249	143.488	0.09	-14.899	0.228	-91.909
750	0.076	-40.624	6.117	137.725	0.087	-15.802	0.249	-97.833
850	0.087	-45.991	6.044	132.207	0.084	-16.532	0.265	-102.994
1000	0.11	-57.035	5.777	123.596	0.081	-16.693	0.293	-109.497
1250	0.15	-69.338	5.373	110.022	0.077	-16.663	0.332	-117.654
1500	0.193	-79.722	4.981	97.893	0.074	-17.099	0.363	-123.275
1750	0.34	-103.07	5.104	87.096	0.066	-8.827	0.35	-124.261
2000	0.483	-122.339	5.14	76.932	0.057	0.078	0.338	-125.368

9 TERMINAL CONNECTIONS

Terminal connections for the MT1110 are described in Table 5. The package drawing on page 7 shows the pin configuration.

Table 5 Terminal Connections

PIN	FUNCTION / SYMBOL	DESCRIPTION
1	IN	Input
2	GND	Ground connection
3	OUT	Output/bias
4	GND	Ground connection

10 PACKAGE DRAWING

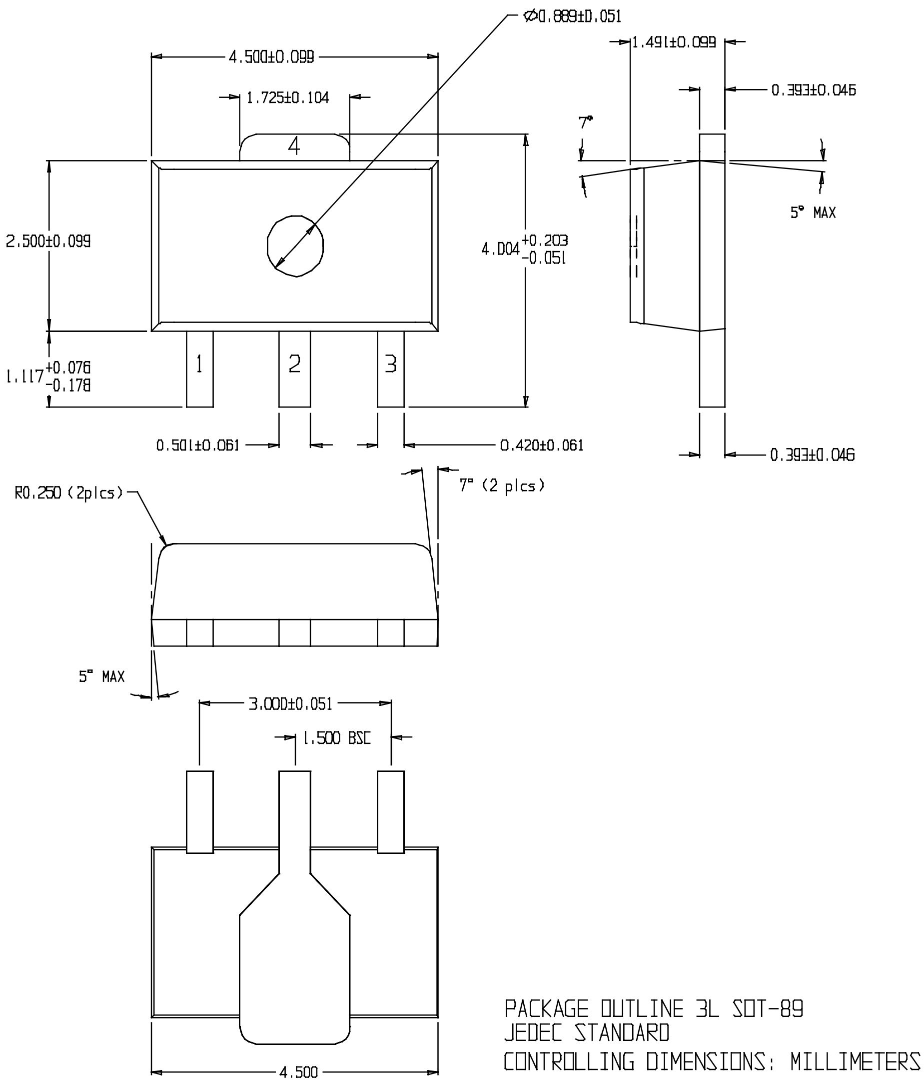

Figure 13   MT1110 Package Drawing

11 ORDERING INFORMATION

This part is available in the configuration shown below. Contact one of the offices listed on the following page or your local Microtune representative to place an order.

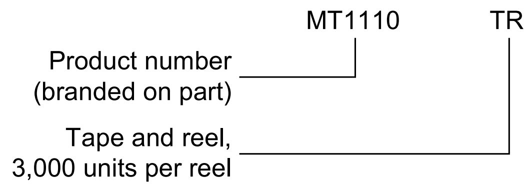

Figure 14 Ordering Information Scheme

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