

The RF Line Gallium Arsenide CATV Integrated Amplifier Module

Features

- Specified for 79-, 112- and 132-Channel Loading
- Excellent Distortion Performance
- Higher Output Capability
- Built-in Input Diode Protection
- GaAs FET Transistor Technology
- Unconditionally Stable Under All Load Conditions
- In Tape and Reel. R2 Suffix = 1,500 Units per 16 mm, 13 inch Reel.

Applications

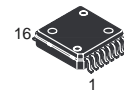
- CATV Systems Operating in the 40 to 870 MHz Frequency Range
- Output Stage Amplifier in Optical Nodes, Line Extenders and Trunk Distribution Amplifiers for CATV Systems
- Driver Amplifier in Linear General Purpose Applications

Description

- 24 Vdc Supply, 40 to 870 MHz, CATV Integrated Forward Power Doubler Amplifier Module

MMG2001R2

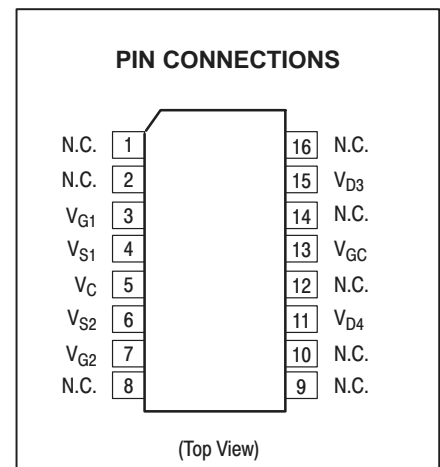
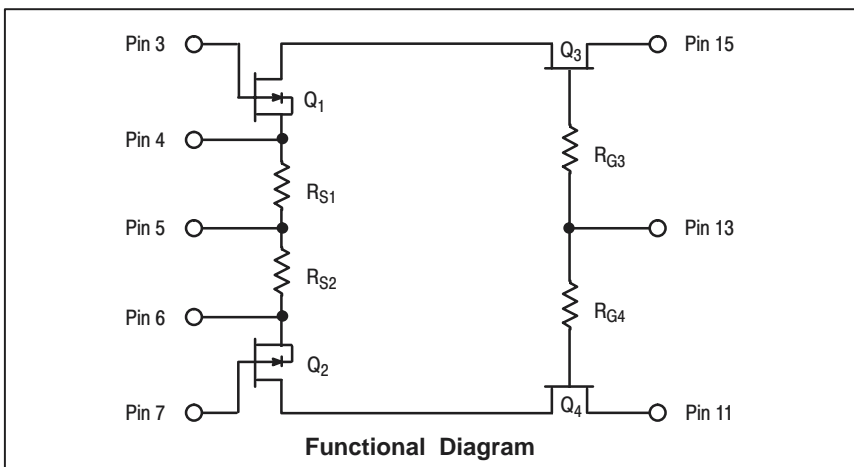
**870 MHz
19.5 dB GAIN
132-CHANNEL
CATV INTEGRATED AMPLIFIER
MODULE**



**CASE 978-03
PFP-16**

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
RF Voltage Input (Single Tone)	V_{in}	+70	dBmV
DC Supply Voltage	V_{CC}	+26	Vdc
Operating Case Temperature Range	T_C	-20 to +100	°C
Storage Temperature Range	T_{stg}	-40 to +100	°C



NOTE: MMG2001R2 Moisture Sensitivity Level (MSL) = 3.

ESD PROTECTION CHARACTERISTICS

Test Conditions	Class
Human Body Model	1 (minimum)
Machine Model	M1 (minimum)
Charge Device Model	C5 (minimum)

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.7	°C/W

ELECTRICAL CHARACTERISTICS ($V_{CC} = 24$ Vdc, $T_C = +45^\circ\text{C}$, 75 Ω system unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Frequency Range	BW	40	—	870	MHz
Power Gain	G_p	—	—	—	dB
40 MHz		—	19	—	
870 MHz		—	21	—	
Slope	S	—	0.8	—	dB
Gain Flatness (40–870 MHz, Peak to Valley)	G_F	—	0.5	—	dB
Input Return Loss ($Z_0 = 75$ Ohms)	IRL	—	—	—	dB
f = 40–160 MHz		—	21	—	
f = 161–450 MHz		—	19	—	
f = 451–870 MHz		—	22	—	
Output Return Loss ($Z_0 = 75$ Ohms)	ORL	—	—	—	dB
f = 40–400 MHz		—	22	—	
f = 401–870 MHz		—	17	—	
Composite Second Order					dBc
($V_{out} = +48$ dBmV/ch., Worst Case) 132–Channel FLAT	CSO_{132}	—	–68	–60	
($V_{out} = +48$ dBmV/ch., Worst Case) 112–Channel FLAT	CSO_{112}	—	–70	–62	
($V_{out} = +48$ dBmV/ch., Worst Case) 79–Channel FLAT	CSO_{79}	—	–74	–66	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 12 dB Tilt	CSO_{112}	—	–63	—	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 13.5 dB Tilt	CSO_{112}	—	–62	—	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 17 dB Tilt	CSO_{112}	—	–61	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 12 dB Tilt	CSO_{79}	—	–67	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 13.5 dB Tilt	CSO_{79}	—	–72	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 17 dB Tilt	CSO_{79}	—	–71	—	
Cross Modulation Distortion @ Ch 2					dBc
($V_{out} = +48$ dBmV/ch., FM = 55 MHz) 132–Channel FLAT	XMD_{132}	—	–55	–53	
($V_{out} = +48$ dBmV/ch., FM = 55 MHz) 112–Channel FLAT	XMD_{112}	—	–57	–55	
($V_{out} = +48$ dBmV/ch., FM = 55 MHz) 79–Channel FLAT	XMD_{79}	—	–60	–58	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 12 dB Tilt	XMD_{112}	—	–51	—	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 13.5 dB Tilt	XMD_{112}	—	–53	—	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 17 dB Tilt	XMD_{112}	—	–56	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 12 dB Tilt	XMD_{79}	—	–58	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 13.5 dB Tilt	XMD_{79}	—	–60	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 17 dB Tilt	XMD_{79}	—	–65	—	
Composite Triple Beat					dBc
($V_{out} = +48$ dBmV/ch., Worst Case) 132–Channel FLAT	CTB_{132}	—	–56	–54	
($V_{out} = +48$ dBmV/ch., Worst Case) 112–Channel FLAT	CTB_{112}	—	–60	–58	
($V_{out} = +48$ dBmV/ch., Worst Case) 79–Channel FLAT	CTB_{79}	—	–66	–64	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 12 dB Tilt	CTB_{112}	—	–58	—	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 13.5 dB Tilt	CTB_{112}	—	–59	—	
($V_{out} = +56$ dBmV @ 870 MHz Equiv) 112–Channel, 17 dB Tilt	CTB_{112}	—	–62	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 12 dB Tilt	CTB_{79}	—	–64	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 13.5 dB Tilt	CTB_{79}	—	–69	—	
($V_{out} = +58$ dBmV @ 870 MHz Equiv) 79–Channel, 17 dB Tilt	CTB_{79}	—	–72	—	
Noise Figure	NF	—	—	—	dB
50 MHz		—	4.0	4.5	
550 MHz		—	4.0	4.5	
750 MHz		—	4.0	4.5	
870 MHz		—	4.0	4.5	
DC Current ($V_{DC} = 24$ V, $T_C = 45^\circ\text{C}$)	I_{DC}	410	425	440	mA

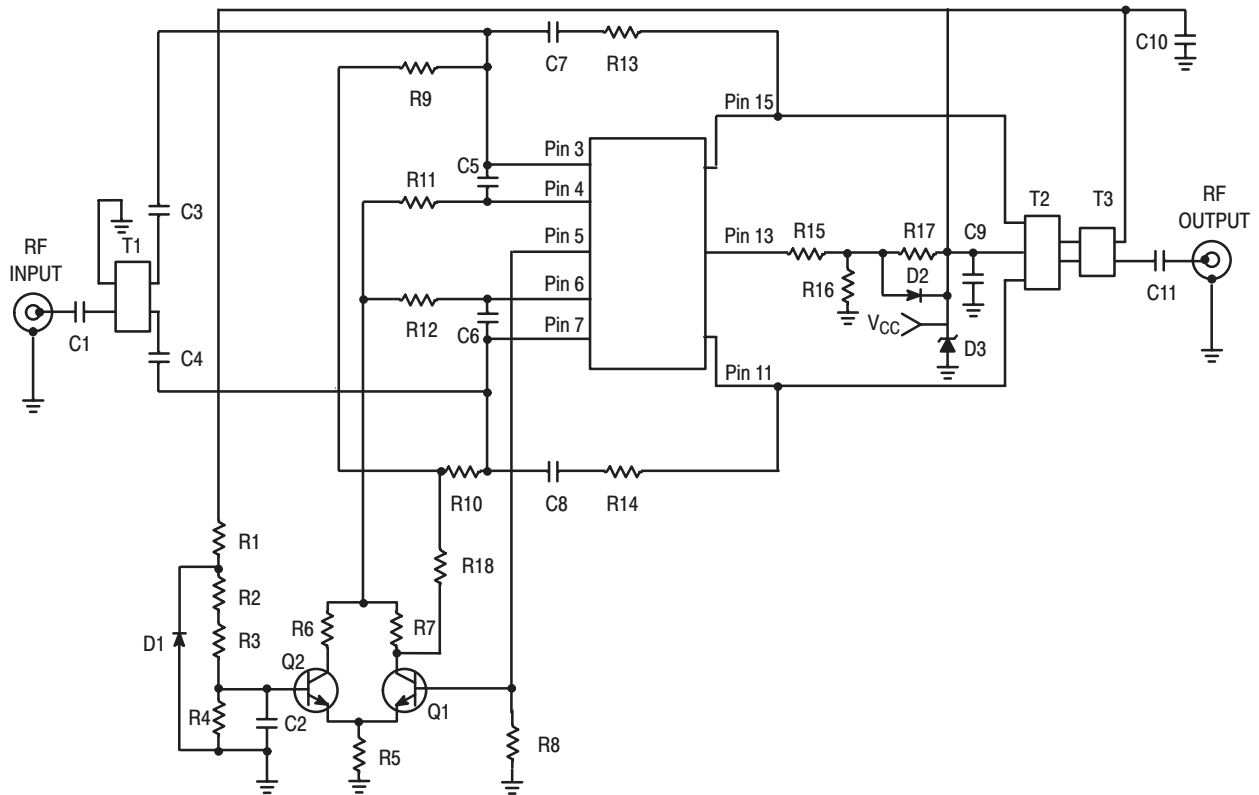


Figure 1. MMG2001R2 50–870 MHz Test Circuit Schematic

Table 1. MMG2001R2 50–870 MHz Test Circuit Component Designations and Values

Designation	Description
C1, C7, C8, C11	220 pF Chip Capacitors (0603)
C2, C3, C4, C9, C10	0.01 μ F Chip Capacitors (0603)
C5, C6	1.8 pF Chip Capacitors (0603)
D1	5.1 V Zener Diode, On/MM3Z5V1T1
D2	27 V Zener Diode, On/MM3Z27V1T1
D3	Transient Voltage Suppressor, On/1.5k27A/1.5SMC27AT3
Q1, Q2	Dual Transistors Package, On/MBT3904DW1T1
R1	2.2 k Ω , 1/4 W Chip Resistor (1206)
R2	680 Ω Chip Resistor (0603)
R3	180 Ω Chip Resistor (0603)
R4	1600 Ω Chip Resistor (0603)
R5	820 Ω Chip Resistor (0603)
R6	120 Ω Chip Resistor (0603)
R7	1.5 k Ω Chip Resistor (0603)
R8	8 Ω , 1 W Chip Resistor (2512)
R9, R10, R15	470 Ω Chip Resistors (0603)
R11, R12	18 Ω Chip Resistors (0603)
R13, R14	680 Ω Chip Resistors (0603)
R16	2.4 k Ω Chip Resistor (0603)
R17	6.2 k Ω Chip Resistor (0603)
R18	0 Ω Chip Resistor (0603)
T1	Input Transformer, Mot/77PC016E080
T2	Output Transformer, Mot/77PC016E071
T3	Output Transformer, Mot/77PC016E072
PCB	FR4, 62 mil, $\epsilon_r = 4.81$

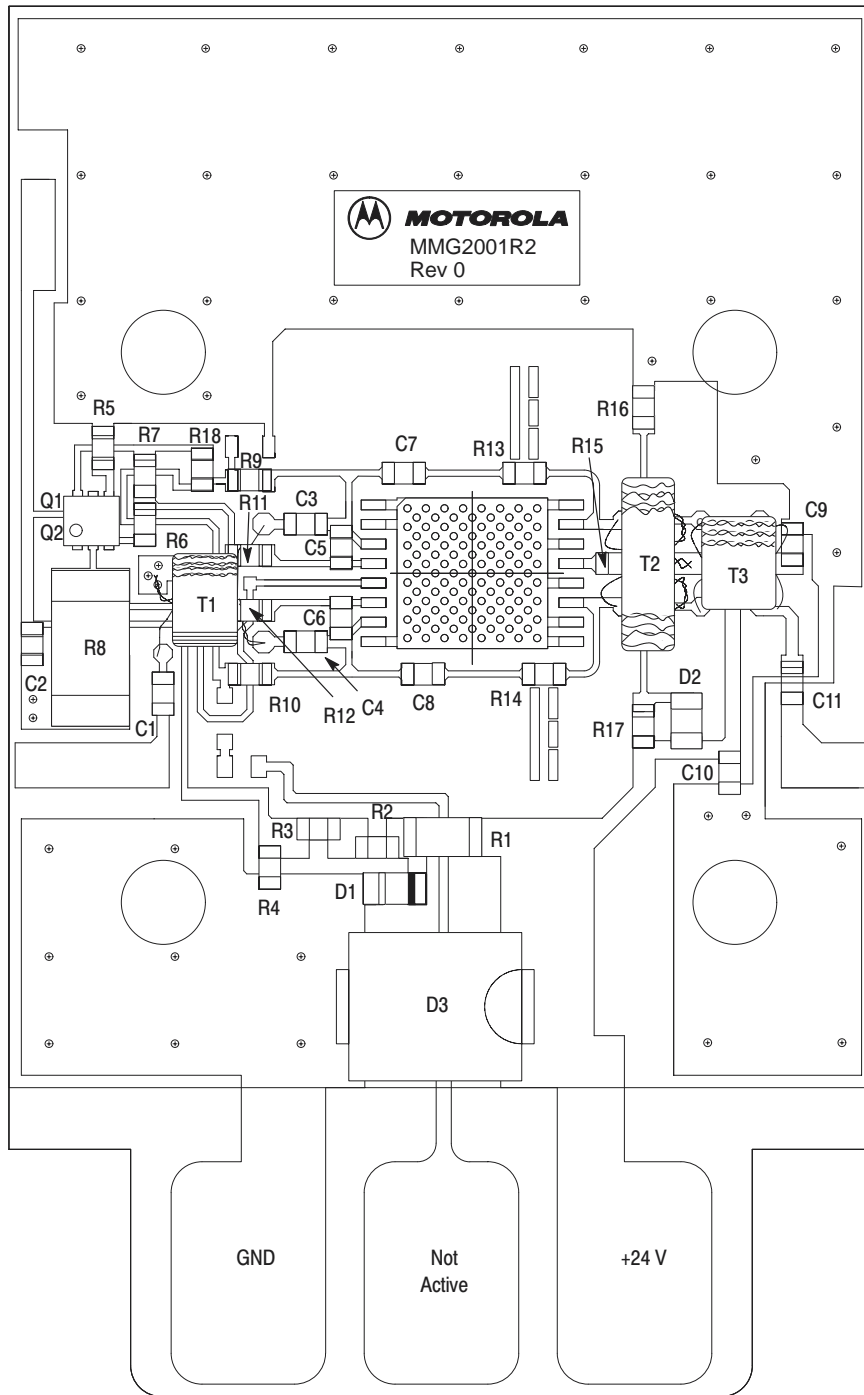


Figure 2. MMG2001R2 50–870 MHz Test Circuit Component Layout

TYPICAL CHARACTERISTICS

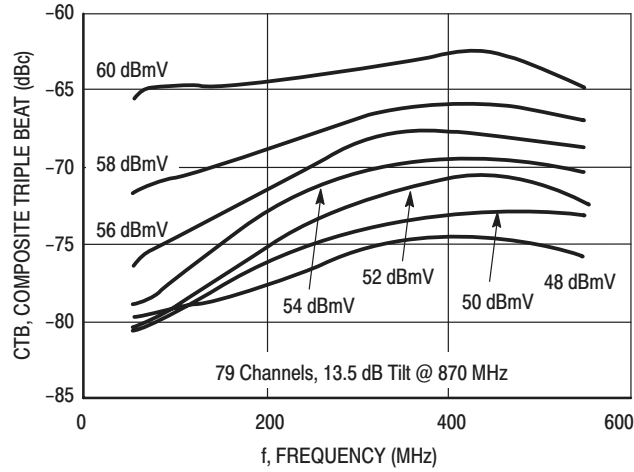


Figure 3. Composite Triple Beat versus Frequency

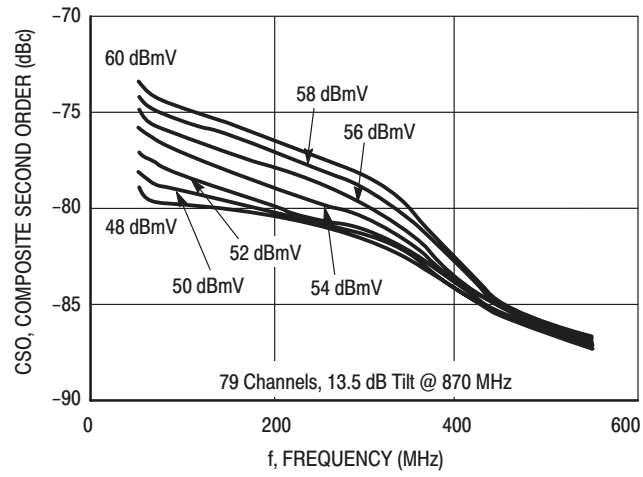


Figure 4. Composite Second Order versus Frequency

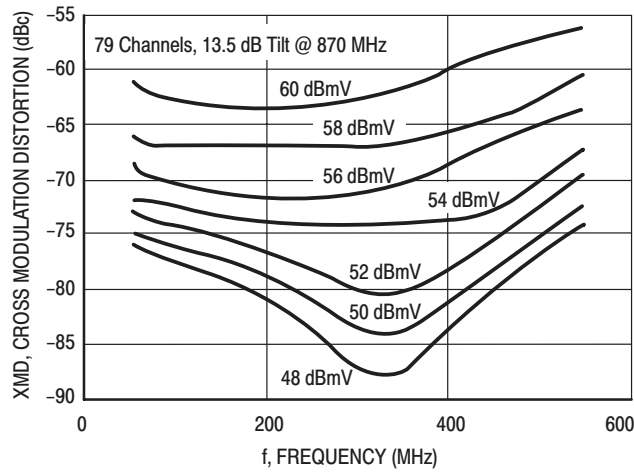
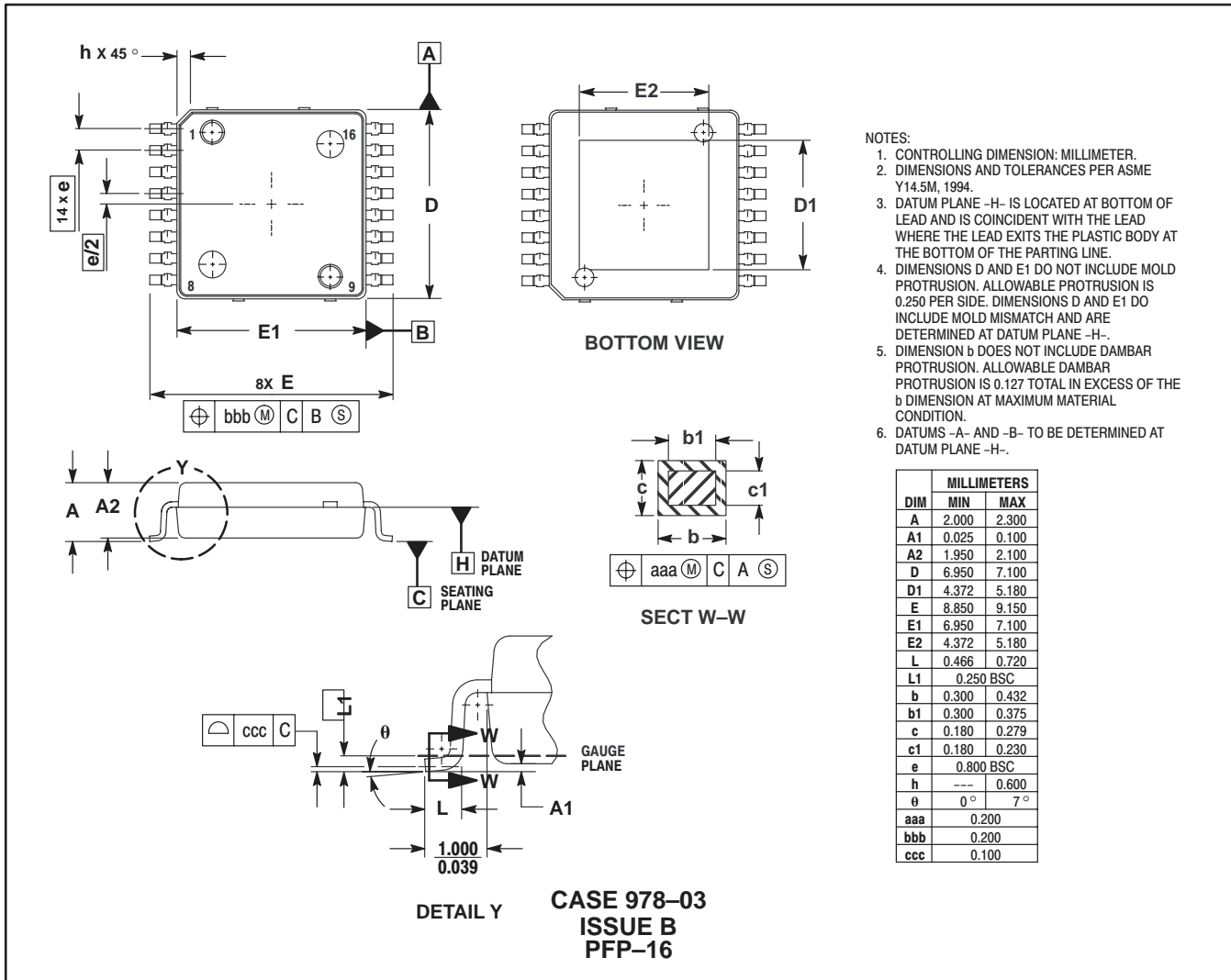


Figure 5. Cross Modulation Distortion versus Frequency

NOTES

NOTES

PACKAGE DIMENSIONS



Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and the Stylized M Logo are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Motorola and the Stylized M Logo are registered in the US Patent & Trademark Office. All other product or service names are the property of their respective owners.

© Motorola, Inc. 2003.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution; P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center, 3-20-1, Minami-Azabu, Minato-ku, Tokyo 106-8573 Japan. 81-3-3440-3569

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre, 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T. Hong Kong. 852-26668334

Technical Information Center: 1-800-521-6274

HOME PAGE: <http://www.motorola.com/semiconductors>

