The RF Line

Gallium Arsenide CATV Integrated Amplifier Module

MMG1001R2

870 MHz
18.5 dB GAIN
132–CHANNEL
CATV INTEGRATED AMPLIFIER
MODULE

Features

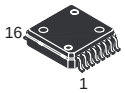
- Specified for 79–, 112– and 132–Channel Loading
- Excellent Distortion Performance
- Built–in Input Diode Protection
- GaAs FET Transistor Technology
- Unconditionally Stable Under All Load Conditions
- In Tape and Reel. R2 Suffix = 1,500 Units per 16 mm, 13 inch Reel.

Applications

- CATV Systems Operating in the 40 to 870 MHz Frequency Range
- Input Stage Amplifier in Optical Nodes, Line Extenders and Trunk Distribution Amplifiers for CATV Systems
- Output Stage Amplifier on Applications Requiring Low Power Dissipation and High Output Performance
- Driver Amplifier in Linear General Purpose Applications

Description

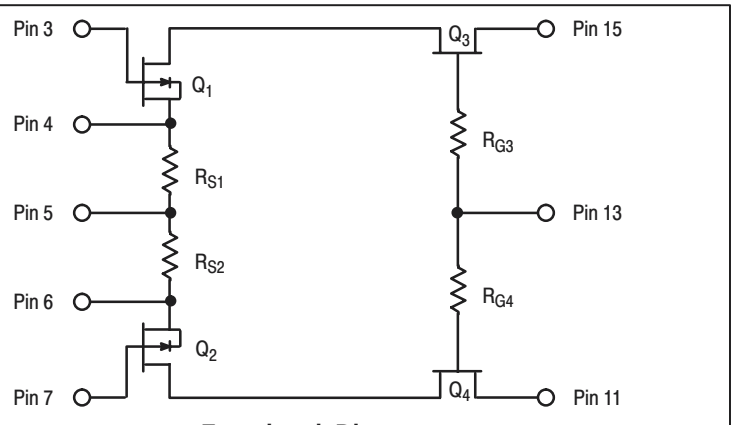
- 24 Vdc Supply, 40 to 870 MHz, CATV Integrated Forward Amplifier Module



CASE 978–03
PFP–16

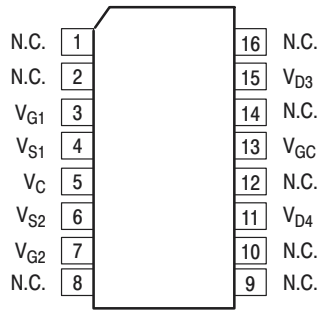
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
RF Voltage Input (Single Tone)	V_{in}	+65	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



Functional Diagram

PIN CONNECTIONS



(Top View)

NOTE: MMG1001R2 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	$R_{\theta JC}$	6.6	°C/W

ELECTRICAL CHARACTERISTICS (V_{CC} = 24 Vdc, T_C = +30°C, 75 Ω system unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Frequency Range		BW	40	—	870	MHz
Power Gain	50 MHz 870 MHz	G_p	— —	18 19	— —	dB
Slope	40–870 MHz	S	—	0.6	—	dB
Gain Flatness (40–870 MHz, Peak to Valley)		G_F	—	0.5	—	dB
Input Return Loss (Z_o = 75 Ohms) f = 40–160 MHz f = 161–450 MHz f = 451–870 MHz		IRL	 — — 	 21 19 22	 — — —	dB
Output Return Loss (Z_o = 75 Ohms) f = 40–400 MHz f = 401–870 MHz		ORL	 — —	 22 17	 — —	dB
Composite Second Order (V_{out} = +44 dBmV/ch., Worst Case) (V_{out} = +46 dBmV/ch., Worst Case) (V_{out} = +48 dBmV/ch., Worst Case)	 132–Channel FLAT 112–Channel FLAT 79–Channel FLAT	 CSO_{132} CSO_{112} CSO_{79}	 — — —	 –65 –65 –71	 –58 –59 –62	dBc
Cross Modulation Distortion @ Ch 2 (V_{out} = +44 dBmV/ch., FM = 55 MHz) (V_{out} = +46 dBmV/ch., FM = 55 MHz) (V_{out} = +48 dBmV/ch., FM = 55 MHz)	 132–Channel FLAT 112–Channel FLAT 79–Channel FLAT	 XMD_{132} XMD_{112} XMD_{79}	 — — —	 –64 –63 –62	 –52 –52 –52	dBc
Composite Triple Beat (V_{out} = +44 dBmV/ch., Worst Case) (V_{out} = +46 dBmV/ch., Worst Case) (V_{out} = +48 dBmV/ch., Worst Case)	 132–Channel FLAT 112–Channel FLAT 79–Channel FLAT	 CTB_{132} CTB_{112} CTB_{79}	 — — —	 –63 –64 –65	 –56 –56 –58	dBc
Noise Figure	50 MHz 870 MHz	NF	— —	4 4	5.0 5.0	dB
DC Current (V_{DC} = 24 V, T_C = –20° to +100°C)		I_{DC}	230	250	265	mA

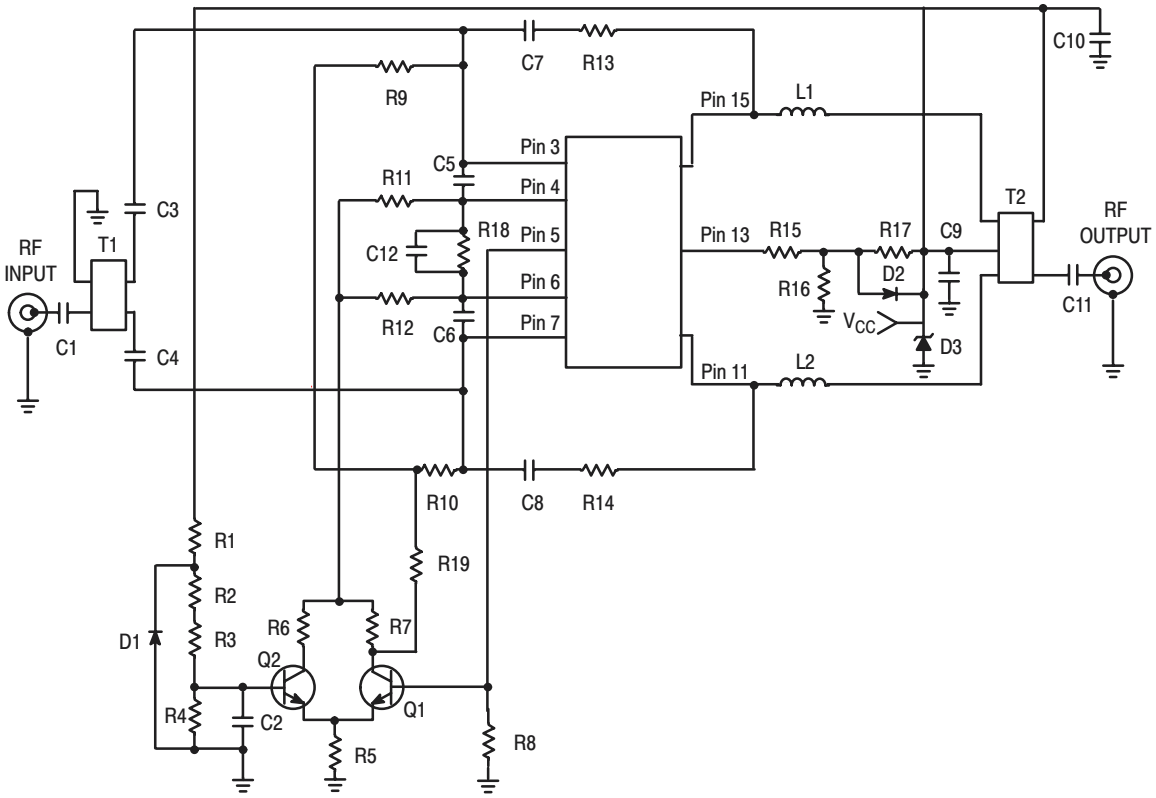


Figure 1. MMG1001R2 50–870 MHz Test Circuit Schematic

Table 1. MMG1001R2 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 μF Chip Capacitors (0603)
C5, C6	1.8 pF Chip Capacitors (0603)
C12	5.6 pF Chip Capacitor (0603)
D1	5.1 V Zener Diode, On/MM3Z5V1T1
D2	27 V Zener Diode, On/MM3Z27VT1
D3	Transient Voltage Suppressor, On/1.5k27A/1.5SMC27AT3
L1, L2	22 nH Chip Inductors (0603)
Q1, Q2	Dual Transistors Package, On/MBT3904DW1T1
R1	2.2 kΩ, 1/4 W Chip Resistor (1206)
R2	560 Ω Chip Resistor (0603)
R3	82 Ω Chip Resistor (0603)
R4, R5	820 Ω Chip Resistors (0603)
R6	120 Ω Chip Resistor (0603)
R7	1.5 kΩ Chip Resistor (0603)
R8	12 Ω, 1 W Chip Resistor (2512)
R9, R10, R15	470 Ω Chip Resistors (0603)
R11, R12	18 Ω Chip Resistors (0603)
R13, R14	910 Ω Chip Resistors (0603)
R16	2 kΩ Chip Resistor (0603)
R17	6.2 kΩ Chip Resistor (0603)
R18	5.6 Ω Chip Resistor (0603)
R19	0 Ω Chip Resistor (0603)
T1	Input Transformer, Mot/77PC016E068
T2	Output Transformer, Mot/77PC016E061
PCB	FR4, 62 mil, ε_r = 4.81

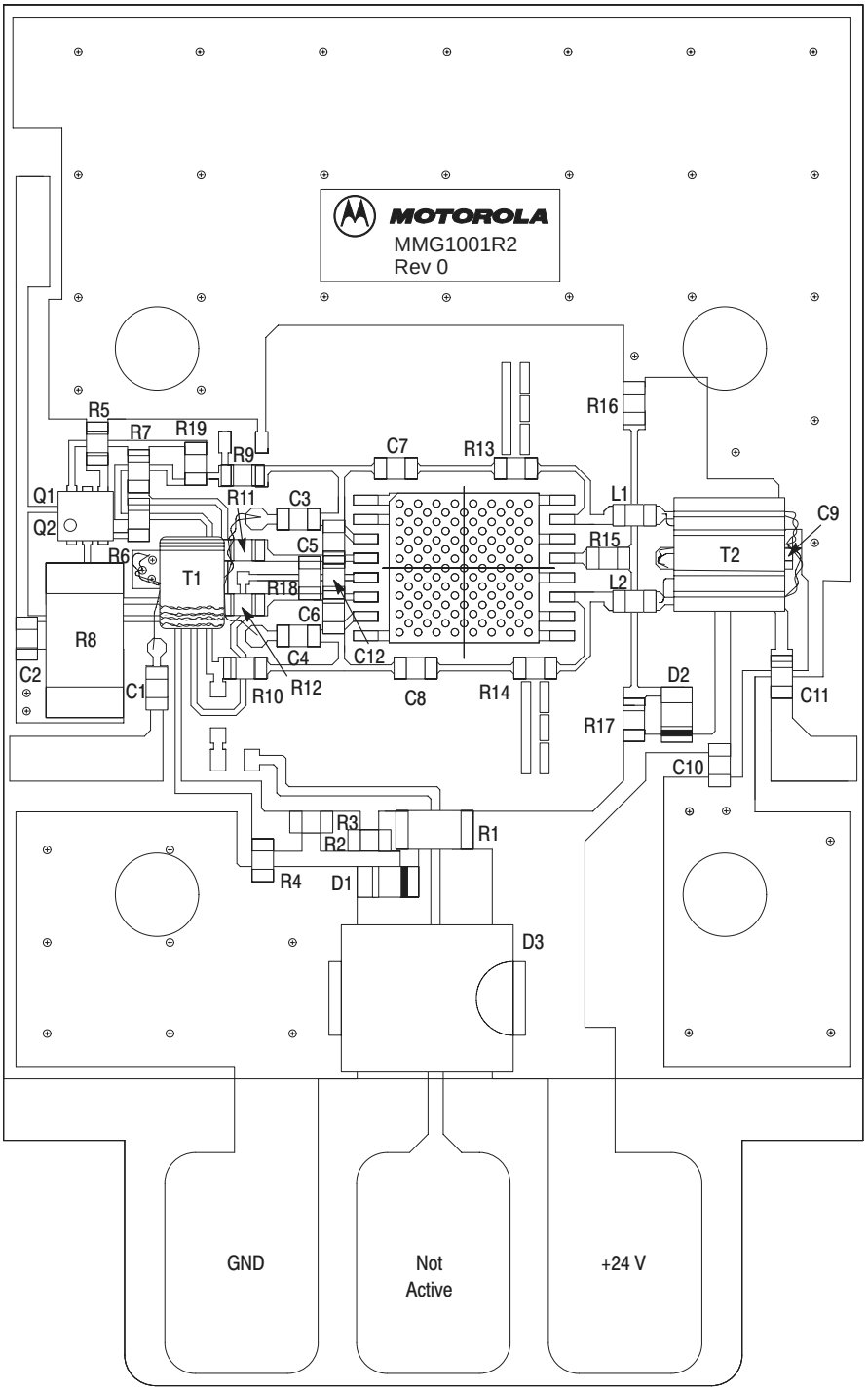


Figure 2. MMG1001R2 50–870 MHz Test Circuit Component Layout

TYPICAL CHARACTERISTICS

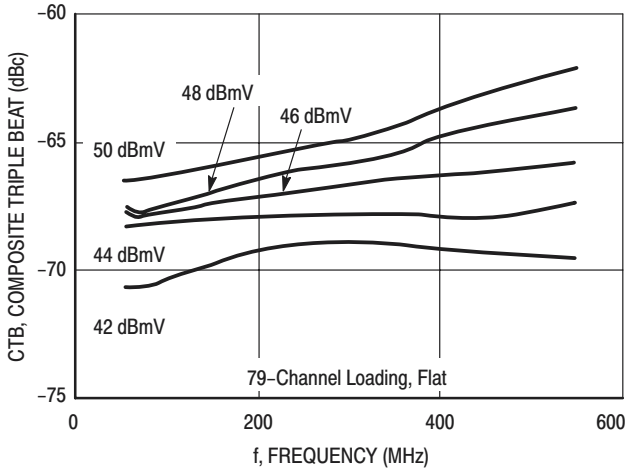


Figure 3. Composite Triple Beat versus Frequency

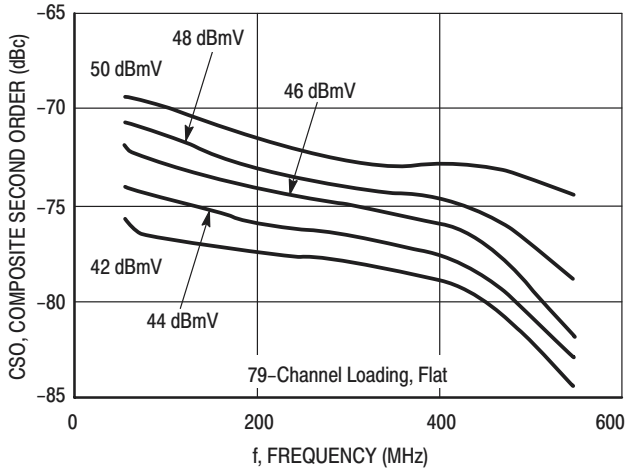


Figure 4. Composite Second Order versus Frequency

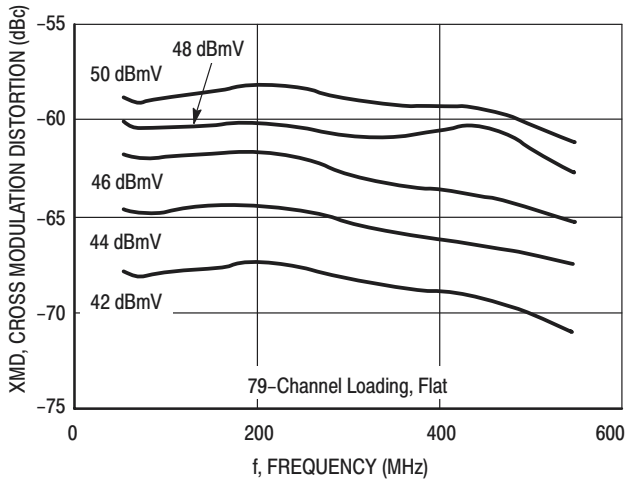
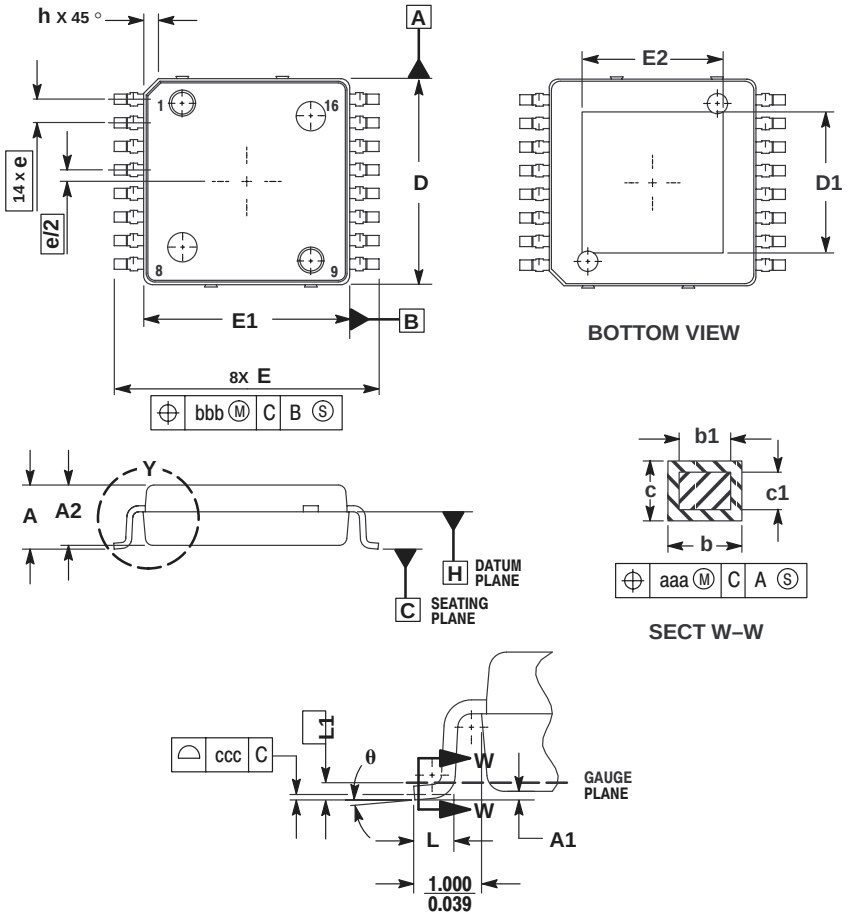


Figure 5. Cross Modulation Distortion versus Frequency

NOTES

NOTES

PACKAGE DIMENSIONS



CASE 978–03
ISSUE B
PFP–16

NOTES:
1. CONTROLLING DIMENSION: MILLIMETER.
2. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DATUM PLANE –H– IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.250 PER SIDE. DIMENSIONS D AND E1 DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE –H–.
5. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION IS 0.127 TOTAL IN EXCESS OF THE b DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. DATUMS –A– AND –B– TO BE DETERMINED AT DATUM PLANE –H–.

	MILLIMETERS	
DIM	MIN	MAX
A	2.000	2.300
A1	0.025	0.100
A2	1.950	2.100
D	6.950	7.100
D1	4.372	5.180
E	8.850	9.150
E1	6.950	7.100
E2	4.372	5.180
L	0.466	0.720
L1	0.250 BSC	
b	0.300	0.432
b1	0.300	0.375
c	0.180	0.279
c1	0.180	0.230
e	0.800 BSC	
h	---	0.600
θ	0 °	7 °
aaa	0.200	
bbb	0.200	
ccc	0.100	

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