

## NEC's 1 GHz GaAs CATV 18 dB PUSH-PULL AMPLIFIER

### FEATURES

- SPECIFIED FOR INCREASED BANDWIDTH TO 1 GHz
- GaAs ACTIVE DEVICES
- LOW DISTORTION
- HIGH LINEAR GAIN:  
MC-7831-HA - GL = 18 dB MIN at  $f = 870$  MHz
- LOW RETURN LOSS
- LOW GAIN CHANGE OVER TEMPERATURE
- SPECIFIED FOR 79, 110, and 132 CHANNELS PERFORMANCE
- HIGH RELIABILITY AND RUGGEDNESS:  
Withstands environmental extremes as well as Silicon devices (Surge, ESD, Etc.)

### DESCRIPTION

NEC's MC-7831-HA is a GaAs Multi-Chip Module designed for use as input stages in CATV applications up to 1 GHz. Because this unit is a GaAs device, it has low distortion, low noise figure, and low return loss across the entire frequency band.

Like the previous generation of products, these devices survive such hazards as surge and ESD as well as their silicon competitors, but deliver superior performance with low DC current required.

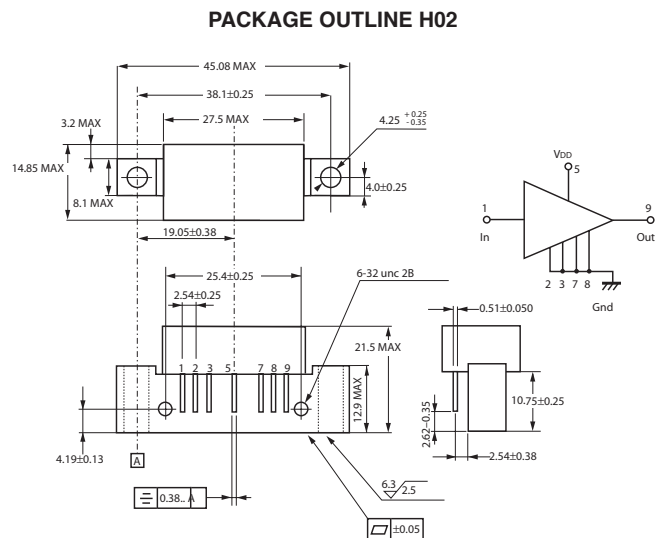
All devices are assembled and tested using fully automated equipment to maximize consistency in part to part performance, and reliability is assured by NEC's stringent quality and process control procedures. These parts come in industry compatible hybrid packages.

### ELECTRICAL CHARACTERISTICS ( $T_A = 30 \pm 5$ °C, $V_{DD} = 24$ V, $Z_S = Z_L = 75$ $\Omega$ )

PART NUMBER			MC-7831-HA			TEST CONDITIONS
SYMBOLS	CHARACTERISTICS	UNITS	MIN	TYP	MAX	
BW	Frequency Range	MHz	50	-	1000	f = 870 MHz
GL	Linear Gain	dB	18.0	-	21.0	
S	Gain Slope	dB	0.2	-	1.0	f = 40 to 870 MHz
Gf <sub>1</sub>	Gain Flatness 1	dB	-0.35	-	+0.35	40 to 870 MHz
Gf <sub>2</sub>	Gain Flatness 2	dB	-0.35	-	+0.85	40 to 1000 MHz
NF	Noise Figure 1	dB	-	-	6.5	f = 50 MHz
	Noise Figure 2		-	-	7.0	f = 870 MHz
RL <sub>in</sub>	Input Return Loss	dB	20.0	-	-	40 to 160MHz
			19.0	-	-	160 to 320 MHz
			17.5	-	-	320 to 640 MHz
			16.0	-	-	640 to 870 MHz
			10.0	-	-	870 to 1000 MHz
RL <sub>out</sub>	Output Return Loss	dB	20.0	-	-	40 to 160MHz
			19.0	-	-	160 to 320 MHz
			17.5	-	-	320 to 640 MHz
			16.0	-	-	640 to 870 MHz
			12.0	-	-	870 to 1000 MHz

(Continued on next page)

### OUTLINE DIMENSIONS (Units in mm)



### APPLICATIONS

- CATV HEADEND SYSTEMS
- CATV OPTICAL NODES
- CATV DISTRIBUTION AMPS

**ELECTRICAL CHARACTERISTICS** ( $T_A = 30 \pm 5 \text{ }^\circ\text{C}$ ,  $V_{DD} = 24 \text{ V}$ ,  $Z_S = Z_L = 75 \text{ } \Omega$ )

IDD	Operating Current	mA	180	–	240	RF OFF
CTB	Composite Triple Beat	dBc	–	–	-57	f = 40 to 870 MHz; 110 Channels, V <sub>OUT</sub> = 44 dBmV, Flat
XMod	Cross Modulation	dBc	–	–	-50	
CSO	Composite Second Order	dBc	–	–	-57	

**ABSOLUTE  
MAXIMUM RATINGS<sup>1</sup>** ( $T_{CASE} = 30 \text{ }^\circ\text{C}$ )

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>DD</sub>	Supply Voltage	V	30
V <sub>I</sub>	Input Voltage <sup>2</sup>	dBmV	65
T <sub>c</sub>	Operating Case Temperature	°C	-30 to +100
T <sub>STG</sub>	Storage Temperature	°C	-40 to +100

Note:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. Maximum single channel power applied to the input for 1 minute with no measurable degradation in performance.

**RECOMMENDED  
OPERATING CONDITIONS** ( $Z_S = Z_L = 75 \text{ } \Omega$ )

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V <sub>DD</sub>	Supply Voltage MC-7831-HA	V	23.5	24.0	24.5
V <sub>I</sub>	Input Voltage <sup>1</sup> MC-7831-HA	dBmV	–	21.0	27.5
T <sub>c</sub>	Operating Case Temperature MC-7831-HA	°C	-30	+25	+85

Note:

1. Test Conditions: 110 Channels, Flat

**ORDERING INFORMATION**

PART NUMBER	PACKAGE	QUANTITY
MC-7831-HA-AZ	7-pin special with heatsink	50pcs max/ Tray

**NOTES ON CORRECT USE**

1. The space between PC board and root of the lead should be kept more than 1 mm to prevent undesired stress on the lead and also should be kept less than 4 mm to prevent undesired parasitic inductance.

Recommended space is 2.0 to 3.0 mm typical.

2. Recommended torque strength of the screw is 59 to 78 Ncm.

3. Form the ground pattern as wide as possible to minimize ground impedance. (to prevent undesired oscillation)

All the ground pins must be connected together with wide ground pattern to decrease impedance difference.

**RECOMMENDED SOLDERING CONDITIONS**

This product should be soldered in the following recommended conditions. Other soldering methods and conditions than the recommended conditions are to be consulted with our sales representatives.

Soldering Method	Soldering Conditions	Condition Symbol
Pin Part Heating	Pin area temperature: less than 260°C <sup>1</sup> Hour: Within 2 sec./pin	–

Note:

1. The point of pin part heating must be kept at a distance of more than 1.2 mm from the root of lead.

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

**CEL** California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.

4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 919-2500 • FAX (408) 988-0279 • [www.cel.com](http://www.cel.com)

DATA SUBJECT TO CHANGE WITHOUT NOTICE

10/03/2005

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

Important Information and Disclaimer: Information provided by CEL on its website or in other communications concerning the substance content of its products represents knowledge and belief as of the date that it is provided. CEL bases its knowledge and belief on information provided by third parties and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. CEL has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. CEL and CEL suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall CEL’s liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

See CEL Terms and Conditions for additional clarification of warranties and liability.