

# The RF Line

## Gallium Arsenide

### CATV 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

#### Applications

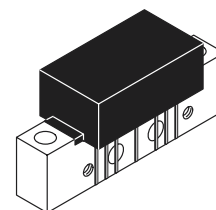
- CATV Systems Operating in the 40 to 870 MHz Frequency Range
- Input Stage Amplifier in Optical Nodes, Line Extenders and Trunk Distribution Amplifiers for CATV Systems
- Output Stage Amplifier on Applications Requiring Low Power Dissipation and High Output Performance
- Driver Amplifier in Linear General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

#### Description

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

**MHW9146**

**870 MHz**  
**14.3 dB GAIN**  
**132-CHANNEL**  
**GaAs CATV AMPLIFIER MODULE**



**CASE 1302-01, STYLE 1**

#### 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   |

#### ESD MAXIMUM RATINGS

| Rating                              | Input Value | Output Value | Unit |
|-------------------------------------|-------------|--------------|------|
| Surge Voltage per IEC 1000-4-5      | 200         | 200          | V    |
| Human Body Model per Mil. Std. 1686 | 2           | 2            | kV   |

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

| Characteristic                             | Symbol | Min      | Typ    | Max    | Unit |
|--------------------------------------------|--------|----------|--------|--------|------|
| Frequency Range                            | BW     | 40       | —      | 870    | MHz  |
| Power Gain 870 MHz                         | $G_p$  | 13.8     | 14.3   | 14.8   | dB   |
| Slope 40-870 MHz                           | S      | 0        | 0.4    | 1.0    | dB   |
| Gain Flatness (40-870 MHz, Peak-to-Valley) | $G_F$  | —        | —      | 0.5    | dB   |
| Return Loss — Input<br>( $Z_o = 75$ Ohms)  | IRL    | 20<br>18 | —<br>— | —<br>— | dB   |
| Return Loss — Output<br>( $Z_o = 75$ Ohms) | ORL    | 20<br>18 | —<br>— | —<br>— | dB   |

# Freescale Semiconductor, Inc.

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

| Characteristic                                                                                                                                                                   |                  | Symbol      | Min | Typ | Max | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-----|-----|-----|------|
| Composite Second Order<br>( $V_{out} = +48$ dBmV/ch., Worst Case)<br>( $V_{out} = +46$ dBmV/ch., Worst Case)<br>( $V_{out} = +44$ dBmV/ch., Worst Case)                          | 79–Channel FLAT  | $CSO_{79}$  | —   | –68 | –64 | dBc  |
|                                                                                                                                                                                  | 112–Channel FLAT | $CSO_{112}$ | —   | –63 | –60 |      |
|                                                                                                                                                                                  | 132–Channel FLAT | $CSO_{132}$ | —   | –63 | –60 |      |
|                                                                                                                                                                                  |                  |             |     |     |     |      |
| Cross Modulation Distortion @ Ch 2<br>( $V_{out} = +48$ dBmV/ch., FM = 55.25 MHz )<br>( $V_{out} = +46$ dBmV/ch., FM = 55.25 MHz)<br>( $V_{out} = +44$ dBmV/ch., FM = 55.25 MHz) | 79–Channel FLAT  | $XMD_{79}$  | —   | –60 | –55 | dBc  |
|                                                                                                                                                                                  | 112–Channel FLAT | $XMD_{112}$ | —   | –60 | –55 |      |
|                                                                                                                                                                                  | 132–Channel FLAT | $XMD_{132}$ | —   | –60 | –55 |      |
|                                                                                                                                                                                  |                  |             |     |     |     |      |
| Composite Triple Beat<br>( $V_{out} = +48$ dBmV/ch., Worst Case)<br>( $V_{out} = +46$ dBmV/ch., Worst Case)<br>( $V_{out} = +44$ dBmV/ch., Worst Case)                           | 79–Channel FLAT  | $CTB_{79}$  | —   | –64 | –60 | dBc  |
|                                                                                                                                                                                  | 112–Channel FLAT | $CTB_{112}$ | —   | –64 | –60 |      |
|                                                                                                                                                                                  | 132–Channel FLAT | $CTB_{132}$ | —   | –64 | –60 |      |
|                                                                                                                                                                                  |                  |             |     |     |     |      |
| Noise Figure                                                                                                                                                                     | 50 MHz           | NF          | —   | 4.4 | 5.5 | dB   |
|                                                                                                                                                                                  | 550 MHz          |             | —   | 3.8 | —   |      |
|                                                                                                                                                                                  | 750 MHz          |             | —   | 4.0 | —   |      |
|                                                                                                                                                                                  | 870 MHz          |             | —   | 4.3 | 5.5 |      |
| DC Current ( $V_{DC} = 24$ V, $T_C = 45^\circ\text{C}$ )                                                                                                                         |                  | $I_{DC}$    | 230 | 245 | 260 | mA   |

NOTE: This device requires an external 0.01  $\mu\text{F}$  DC blocking capacitor connected to the output pin (Pin 9) as indicated in Figure 1.

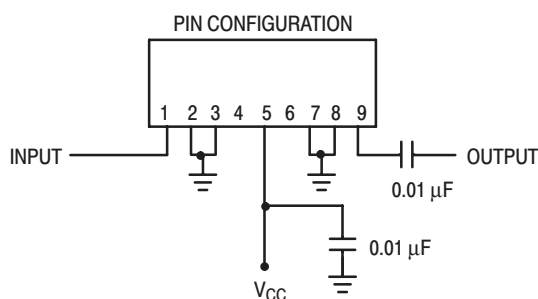
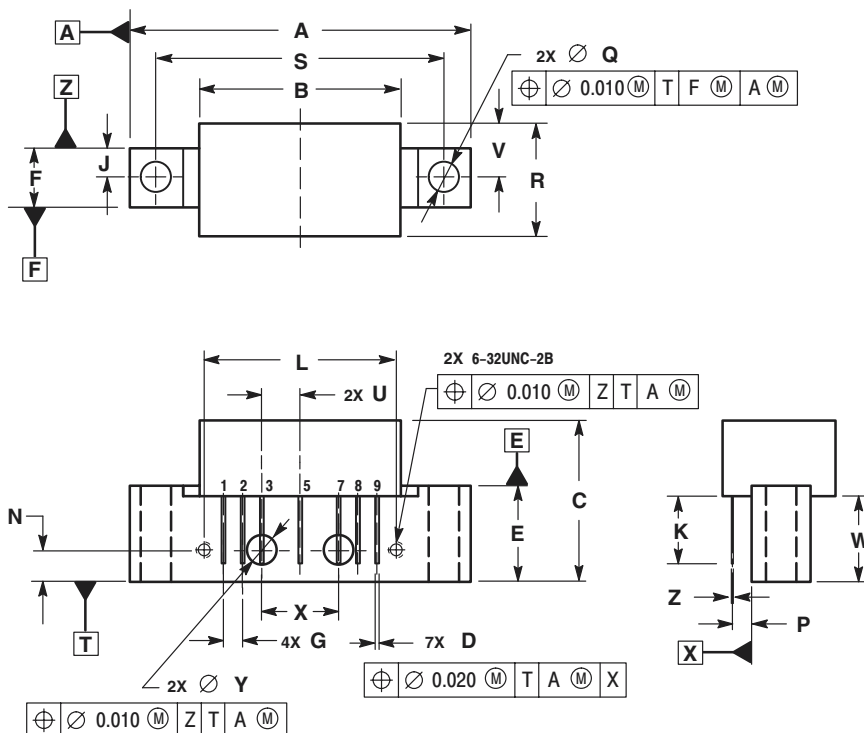


Figure 1. External Connections

# NOTES

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## PACKAGE DIMENSIONS



- NOTES:  
 1. DIMENSIONS ARE IN INCHES.  
 2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.

| DIM | INCHES    |       | MILLIMETERS |        |
|-----|-----------|-------|-------------|--------|
|     | MIN       | MAX   | MIN         | MAX    |
| A   | ---       | 1.775 | ---         | 45.085 |
| B   | ---       | 1.085 | ---         | 27.559 |
| C   | ---       | 0.840 | ---         | 21.336 |
| D   | 0.015     | 0.021 | 0.381       | 0.533  |
| E   | 0.465     | 0.510 | 11.811      | 12.954 |
| F   | 0.300     | 0.325 | 7.62        | 8.255  |
| G   | 0.100 BSC |       | 2.540 BSC   |        |
| J   | 0.156 BSC |       | 3.962 BSC   |        |
| K   | 0.315     | 0.355 | 8.001       | 9.017  |
| L   | 1.000 BSC |       | 25.400 BSC  |        |
| N   | 0.165 BSC |       | 4.191 BSC   |        |
| P   | 0.100 BSC |       | 2.540 BSC   |        |
| Q   | 0.148     | 0.168 | 3.759       | 4.267  |
| R   | ---       | 0.600 | ---         | 15.24  |
| S   | 1.500 BSC |       | 38.100 BSC  |        |
| U   | 0.200 BSC |       | 5.080 BSC   |        |
| V   | ---       | 0.250 | ---         | 6.350  |
| W   | 0.435     | ---   | 11.049      | ---    |
| X   | 0.400 BSC |       | 10.160 BSC  |        |
| Y   | 0.152     | 0.163 | 3.861       | 4.140  |
| Z   | 0.009     | 0.011 | 0.229       | 0.279  |

- STYLE 1:  
 PIN 1: RF INPUT  
 2: GROUND  
 3: GROUND  
 4: DELETED  
 5: VDC  
 6: DELETED  
 7: GROUND  
 8: GROUND  
 9: RF OUTPUT

### CASE 1302-01 ISSUE B

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