



Mini-Circuits

COAXIAL

# RF Instrument Amplifier HPA-20M2G7025+

50Ω 20 to 2700 MHz Broadband 25 W N-Type Female

## THE BIG DEAL

- Broadband, 20 to 2700 MHz
- High Gain, 50 dB typ.
- High P1dB, +40 dBm typ.
- High OIP3, +49 dBm typ.
- Built-in 110/220V AC power supply

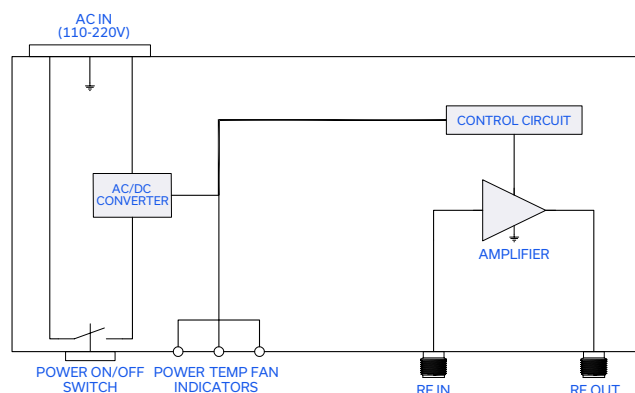


Generic photo used for illustration purposes only

## APPLICATIONS

- Communication Systems
- R&D, Production, and OTA Test Systems
- General Laboratory Applications
- Test & Measurement Equipment

## FUNCTIONAL DIAGRAM



## PRODUCT OVERVIEW

Mini-Circuits' HPA-20M2G7025+ is an instrument amplifier providing 25 W of output power with a typical small signal gain of 50 dB over the 20 to 2700 MHz frequency band. The amplifier uses state-of-the-art semiconductor technology and can be used in a wide range of applications. The amplifier runs on a built-in 110/220V power supply, making it easy to use in most lab environments. It features thermal self-protection, preventing damage to the amplifier and providing added reliability. It is housed in a lightweight aluminum alloy case (15.35 x 8.27 x 3.25") with N-type connectors, ideal for bench-top use.

## KEY FEATURES

| Features                                                  | Advantages                                                                                                                                                                                       |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Extremely Broadband, 20 to 2700 MHz, and High Power, 25 W | One single amplifier that covers the entire frequency band delivering rated power.                                                                                                               |
| High Gain, 50 dB Typ.                                     | High gain allows low drive levels to achieve rated output power which can be obtained from many standard lab generators.                                                                         |
| High OIP3, +49 dBm Typ.                                   | High OIP3 makes the amplifier suitable for applications requiring high linearity such as digitally modulated signals.                                                                            |
| Built-in 110V/220V power supply                           | Operating from a standard AC line power supply, the HPA-20M2G7025+ can be powered from 110 to 220V, making the amplifier versatile for use in most lab environments.                             |
| Thermally-self-protected                                  | A built-in sensing feature signals the unit to power off when the amplifier reaches its maximum rated operating temperature, preventing damage to the equipment and providing added reliability. |
| CE marked                                                 | Meets conformity standards for sale within the European Economic Area (EEA).                                                                                                                     |

Mini-Circuits



Mini-Circuits

COAXIAL

## RF Instrument Amplifier

HPA-20M2G7025+

50Ω 20 to 2700 MHz Broadband 25 W N-Type Female

ELECTRICAL SPECIFICATIONS AT  $T_{\text{AMBIENT}} = +25^{\circ}\text{C}$ 

| Parameter                          | Symbol               | Condition                                   | Min. | Typ.      | Max.      | Units |
|------------------------------------|----------------------|---------------------------------------------|------|-----------|-----------|-------|
| Frequency Range                    | f                    |                                             | 20   |           | 2700      | MHz   |
| Small Signal Gain                  | $G_{\text{SS}}$      | $P_{\text{OUT}} = -25 \text{ dBm}$          | 45   | 50        | 55        | dB    |
| Small Signal Gain Flatness         | $G_{\text{SS-FLAT}}$ | $P_{\text{OUT}} = -25 \text{ dBm}$          |      | $\pm 0.8$ | $\pm 2.0$ | dB    |
| Output Power at 1dB compression    | $P_{1\text{dB}}$     | $P_{\text{OUT-REF}} = +35 \text{ dBm}$      | +36  | +40       |           | dBm   |
| Output Power at 3dB compression    | $P_{3\text{dB}}$     | $P_{\text{OUT-REF}} = +35 \text{ dBm}$      | +40  | +44       |           | dBm   |
| Output Power at Saturation         | $P_{\text{SAT}}$     | $P_{\text{OUT-REF}} = +35 \text{ dBm}$      | +42  | +45       |           | dBm   |
| Noise Figure                       | NF                   |                                             |      | 10        |           | dB    |
| Output Third Order Intercept Point | OIP3                 | $P_{\text{OUT}} = +30 \text{ dBm/tone}$     | +40  | +49       |           | dBm   |
| Input Return VSWR                  | I-VSWR               | $P_{\text{OUT}} = -25 \text{ dBm}$          |      | 1.2:1     | 2.5:1     | dB    |
| Output Return VSWR                 | O-VSWR               | $P_{\text{OUT}} = -25 \text{ dBm}$          |      | 1:9:1     | 5:1       | dB    |
| AC Supply Voltage                  | $V_{\text{AC}}$      |                                             | 85   | 110/220   | 264       | V     |
| Power Consumption                  |                      | AC = 220 V, $P_{\text{OUT}} = 25 \text{ W}$ |      | 200       | 300       | W     |





COAXIAL

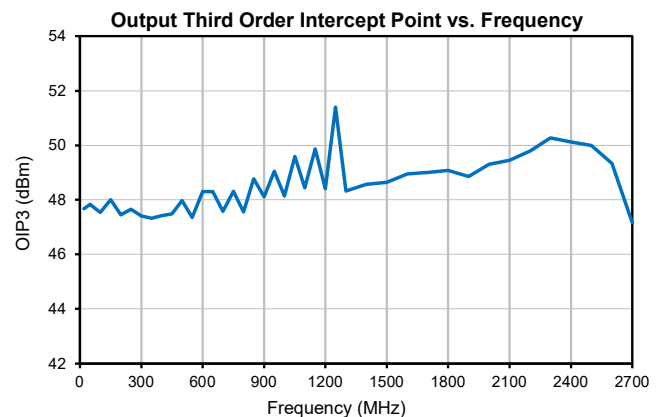
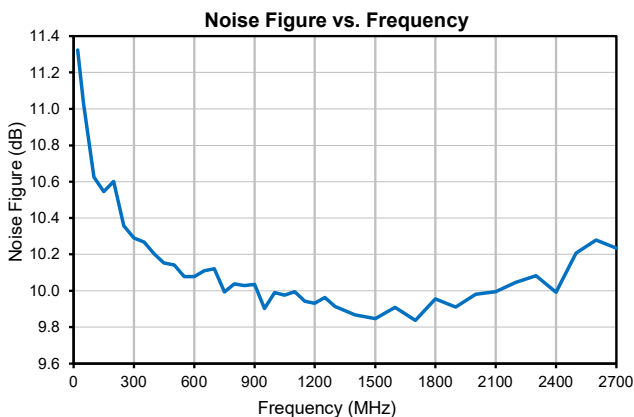
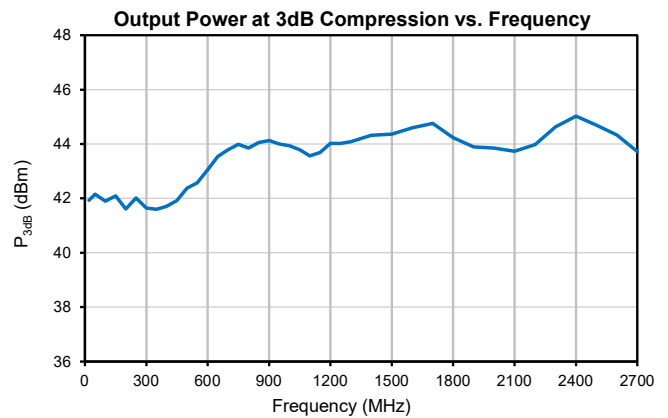
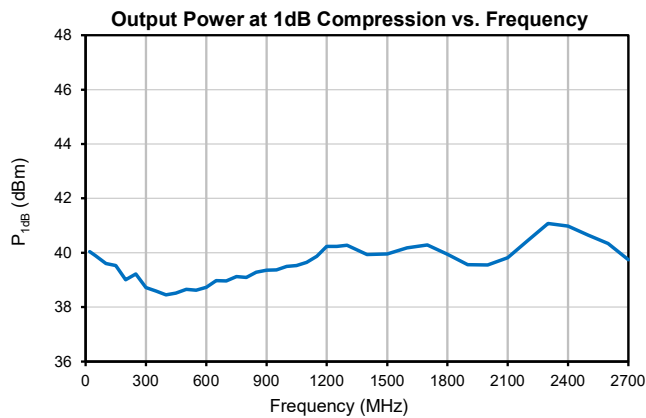
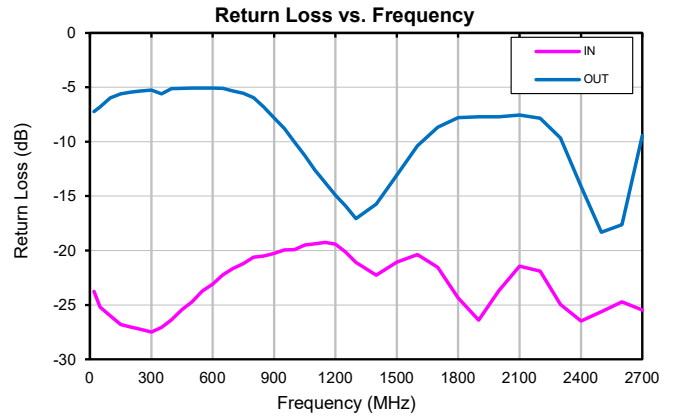
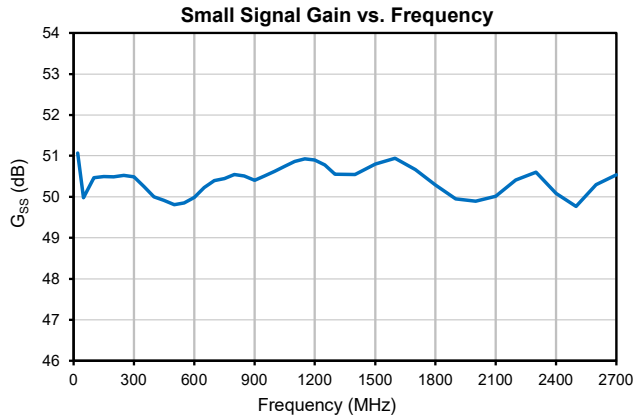
# RF Instrument Amplifier

HPA-20M2G7025+

Mini-Circuits

50  $\Omega$  20 to 2700 MHz Broadband 25 W N-Type Female

TYPICAL PERFORMANCE CHARTS AT  $T_{\text{AMBIENT}} = +25^{\circ}\text{C}$ , 50 OHM





Mini-Circuits

COAXIAL

# RF Instrument Amplifier **HPA-20M2G7025+**

50Ω 20 to 2700 MHz Broadband 25 W N-Type Female

## ABSOLUTE MAXIMUM RATINGS

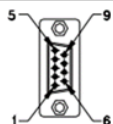
| Parameter                                                                             | Ratings                               |
|---------------------------------------------------------------------------------------|---------------------------------------|
| Operating Temperature                                                                 | $T_{\text{AMBIENT}}$ : 0 °C to +50 °C |
| Storage Temperature                                                                   | -20 °C to +70 °C                      |
| No damage with an open or short output load under +42 dBm CW output power (2 minutes) |                                       |
| RF Input Power (no damage)                                                            | +5 dBm                                |

Permanent damage may occur if any of these limits are exceeded.

## LED INDICATORS ON THE FRONT PANEL

| Parameter                | LED Color                                                                    |
|--------------------------|------------------------------------------------------------------------------|
| Power                    | Green at Normal Operation                                                    |
| HPA Temperature Shutdown | Red at Temperature Shutdown (85 °C internal heatsink temperature $\pm$ 5 °C) |
| Fan #1 and Fan #2        | Red at Fan Failure                                                           |

## FRONT PANEL D-SUB PIN-OUTS FOR ALARMS

| Pin# | Status                                                | D-Sub Pin-Out                                                                        |
|------|-------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1    | TTL High (3.3V) in case of High-Temperature Shut down |  |
| 2    | TTL High (3.3V) in case of Fan Failure                |                                                                                      |
| 3    | Ground                                                |                                                                                      |





COAXIAL

# RF Instrument Amplifier

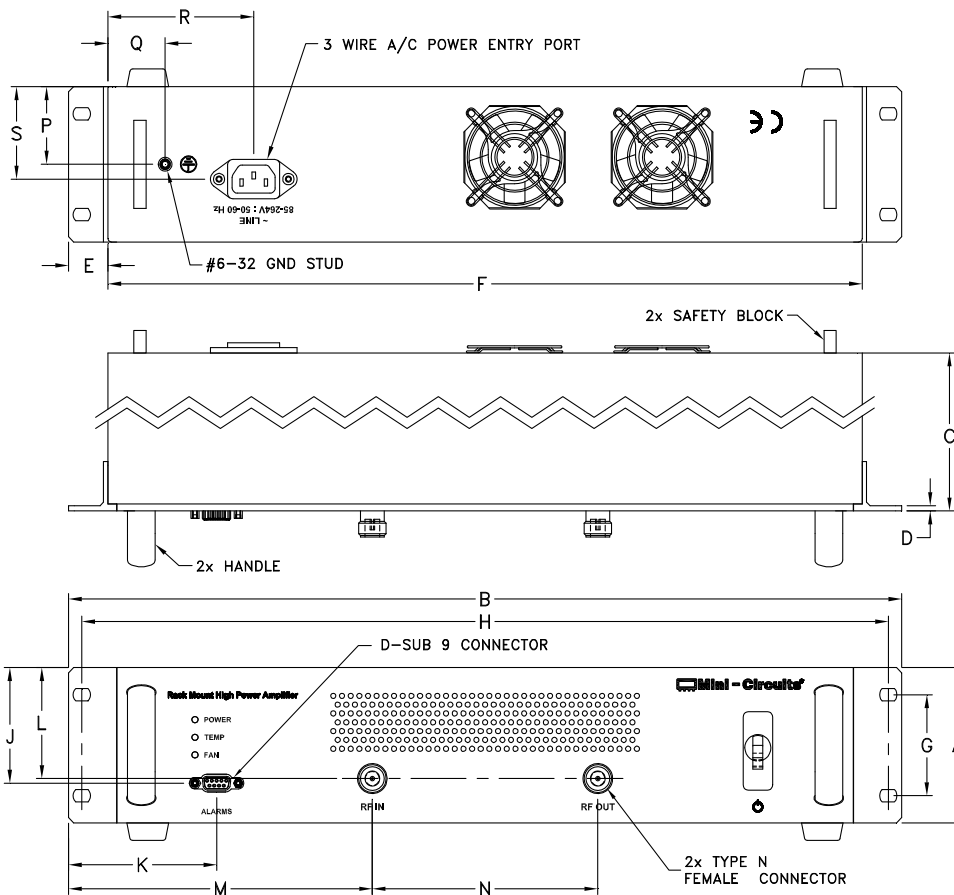
**HPA-20M2G7025+**

50Ω 20 to 2700 MHz Broadband 25 W N-Type Female

## COAXIAL CONNECTIONS

|              |          |
|--------------|----------|
| IN (RF IN)   | N-Female |
| OUT (RF OUT) | N-Female |

## CASE STYLE DRAWING



| CASE #   | A              | B                | C               | D            | E             | F                | G              | H                | J              | K              | L              |
|----------|----------------|------------------|-----------------|--------------|---------------|------------------|----------------|------------------|----------------|----------------|----------------|
| NG1942-1 | 3.46<br>(88.0) | 18.91<br>(480.4) | 20.2<br>(513.0) | .12<br>(3.0) | .89<br>(22.7) | 17.13<br>(435.0) | 2.25<br>(57.2) | 18.31<br>(465.0) | 2.58<br>(65.5) | 3.36<br>(85.4) | 2.48<br>(62.9) |

| CASE #   | M               | N               | P              | Q              | R              | S              | T  | WT, GRAMS |
|----------|-----------------|-----------------|----------------|----------------|----------------|----------------|----|-----------|
| NG1942-1 | 6.90<br>(175.2) | 5.12<br>(130.0) | 1.73<br>(44.0) | 1.30<br>(33.0) | 3.31<br>(84.1) | 2.06<br>(52.4) | -- | 13910     |

Dimensions are in inches (mm). Tolerances: 2Pl. ±.03; 3Pl. ±.015 inch





Mini-Circuits

COAXIAL

# RF Instrument Amplifier **HPA-20M2G7025+**

50Ω 20 to 2700 MHz Broadband 25 W N-Type Female

## ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD

|                           |                                              |
|---------------------------|----------------------------------------------|
| Performance Data & Graphs | Data                                         |
|                           | Graphs                                       |
|                           | S-Parameter (S2P Files) Data Set (.zip file) |
| RoHS Status               | Compliant                                    |
| Environmental Ratings     | ENV76                                        |

## ORDERING INFORMATION

|                 |                                |
|-----------------|--------------------------------|
| Model No. Links | <a href="#">HPA-20M2G7025+</a> |
| Case Style      | NG1942-1                       |
| Connector       | IN (N-Female) / OUT (N-Female) |

### NOTES

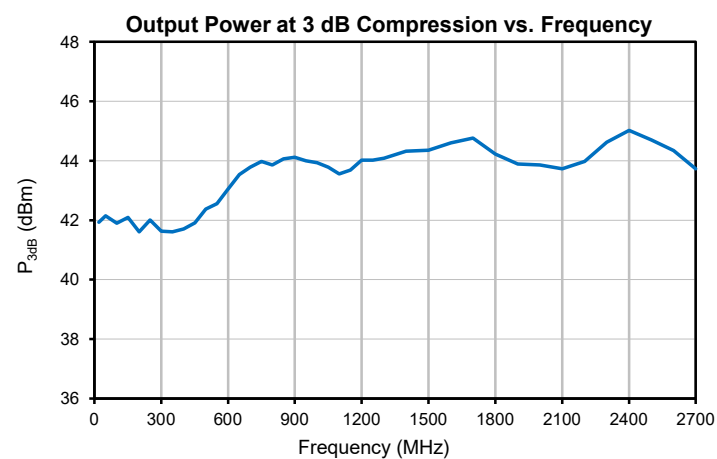
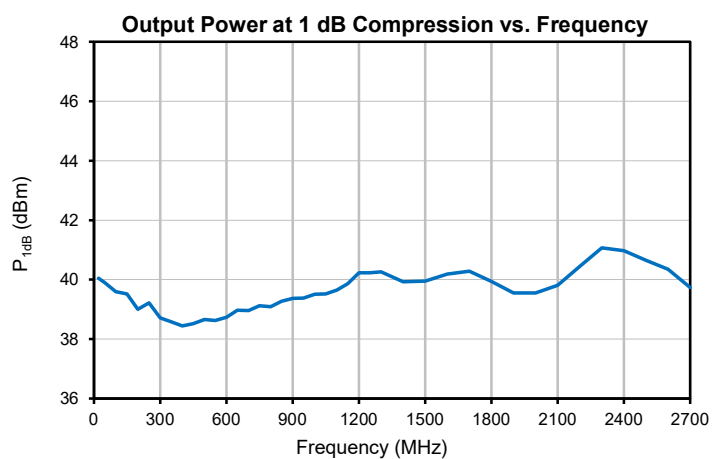
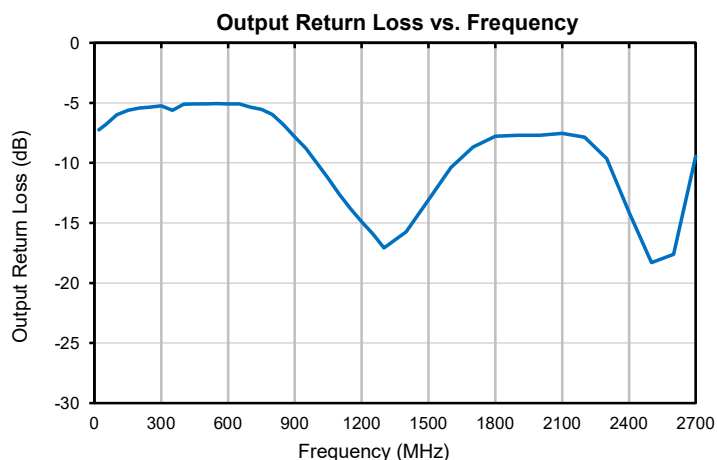
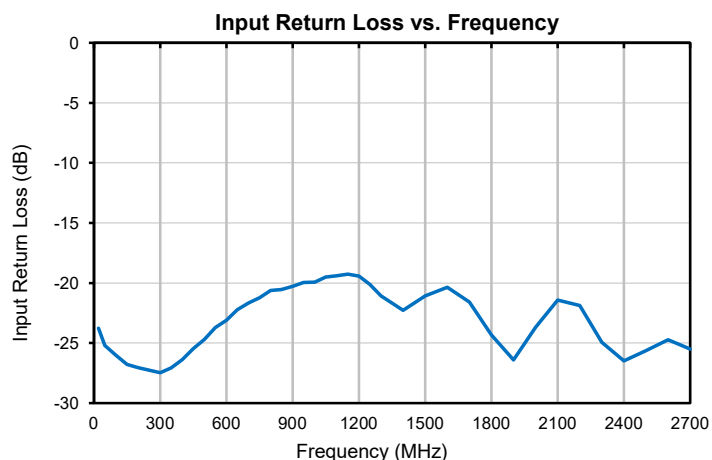
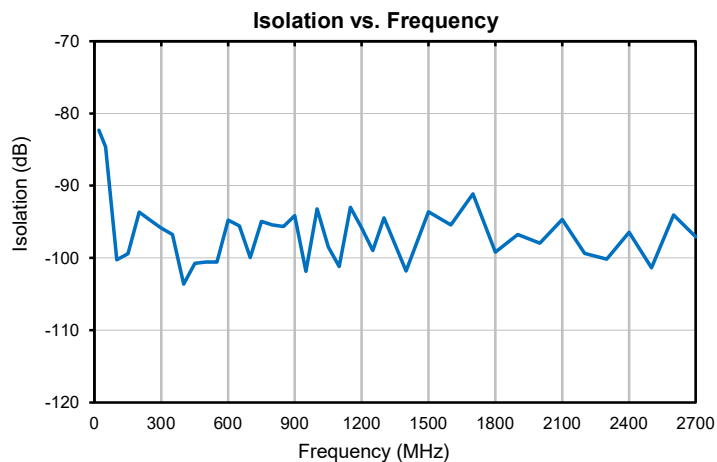
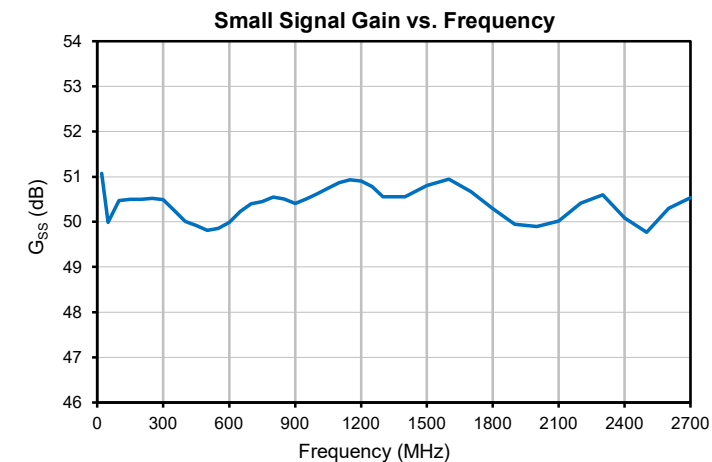
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



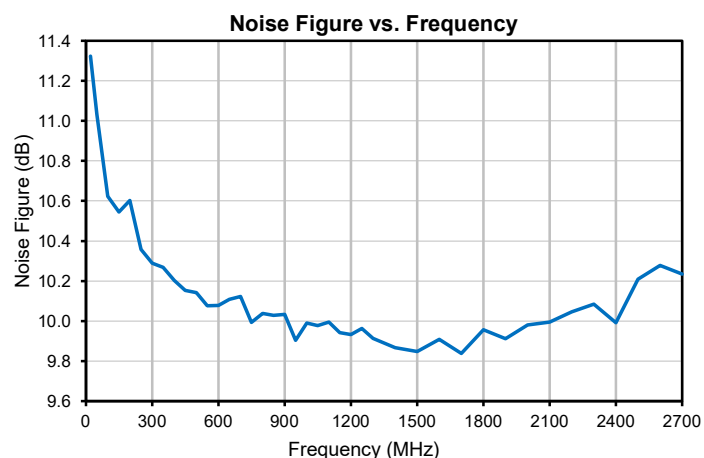
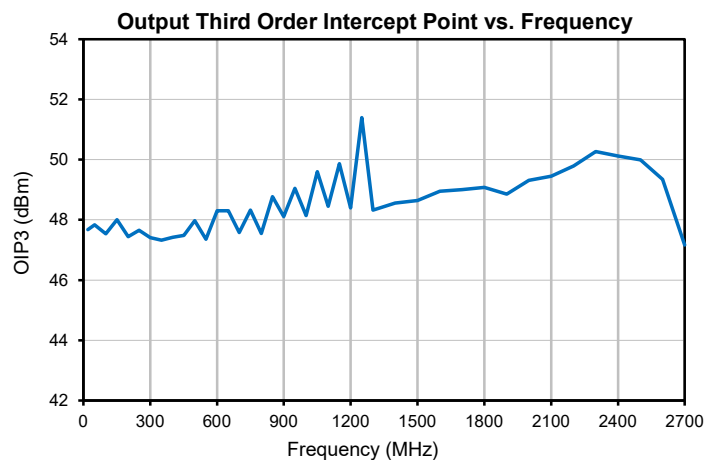
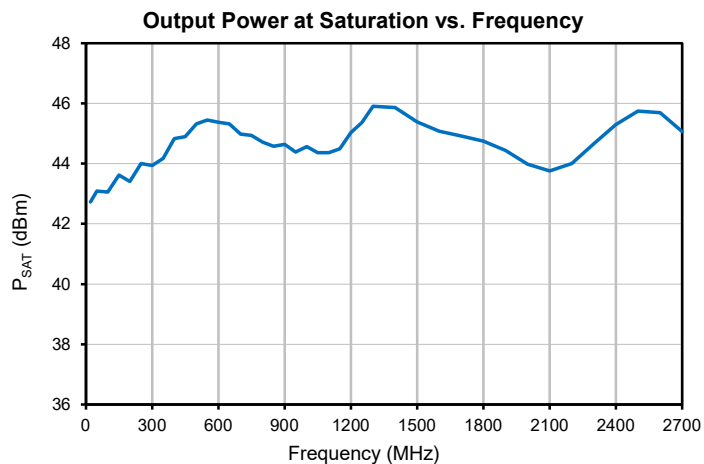
## Typical Performance Data

| Frequency<br>(MHz) | Gain  | Isolation | Return Loss (dB) |       | P <sub>OUT</sub> @ 1dB<br>Compression | P <sub>OUT</sub> @ 3dB<br>Compression | P <sub>OUT</sub> @<br>Saturation | OIP3  | Noise<br>Figure |
|--------------------|-------|-----------|------------------|-------|---------------------------------------|---------------------------------------|----------------------------------|-------|-----------------|
|                    | (dB)  | (dB)      |                  |       | (dBm)                                 | (dBm)                                 | (dBm)                            | (dBm) | (dB)            |
|                    | 28V   | 28V       | 28V              | 28V   | 28V                                   | 28V                                   | 28V                              | 28V   | 28V             |
| 20                 | 51.07 | 82.32     | 23.77            | 7.23  | 40.05                                 | 41.93                                 | 42.73                            | 47.67 | 11.32           |
| 50                 | 49.98 | 84.62     | 25.21            | 6.81  | 39.90                                 | 42.15                                 | 43.08                            | 47.83 | 11.03           |
| 100                | 50.47 | 100.27    | 26.00            | 5.98  | 39.60                                 | 41.90                                 | 43.05                            | 47.53 | 10.62           |
| 150                | 50.49 | 99.39     | 26.80            | 5.61  | 39.53                                 | 42.09                                 | 43.62                            | 48.00 | 10.54           |
| 200                | 50.49 | 93.67     | 27.04            | 5.44  | 39.00                                 | 41.61                                 | 43.40                            | 47.44 | 10.60           |
| 250                | 50.52 | 94.76     | 27.26            | 5.35  | 39.23                                 | 42.01                                 | 44.00                            | 47.65 | 10.36           |
| 300                | 50.49 | 95.87     | 27.48            | 5.24  | 38.72                                 | 41.64                                 | 43.93                            | 47.41 | 10.29           |
| 350                | 50.24 | 96.75     | 27.06            | 5.60  | 38.58                                 | 41.61                                 | 44.17                            | 47.33 | 10.27           |
| 400                | 50.00 | 103.63    | 26.37            | 5.11  | 38.45                                 | 41.70                                 | 44.83                            | 47.42 | 10.20           |
| 450                | 49.91 | 100.74    | 25.46            | 5.10  | 38.52                                 | 41.92                                 | 44.89                            | 47.48 | 10.15           |
| 500                | 49.81 | 100.60    | 24.70            | 5.08  | 38.66                                 | 42.37                                 | 45.31                            | 47.97 | 10.14           |
| 550                | 49.85 | 100.57    | 23.73            | 5.06  | 38.63                                 | 42.56                                 | 45.45                            | 47.35 | 10.08           |
| 600                | 49.99 | 94.78     | 23.09            | 5.07  | 38.73                                 | 43.05                                 | 45.38                            | 48.30 | 10.08           |
| 650                | 50.23 | 95.59     | 22.23            | 5.10  | 38.98                                 | 43.54                                 | 45.32                            | 48.30 | 10.11           |
| 700                | 50.40 | 99.92     | 21.66            | 5.35  | 38.97                                 | 43.79                                 | 44.98                            | 47.58 | 10.12           |
| 750                | 50.45 | 94.95     | 21.22            | 5.54  | 39.12                                 | 43.98                                 | 44.94                            | 48.32 | 9.99            |
| 800                | 50.55 | 95.47     | 20.62            | 5.97  | 39.10                                 | 43.85                                 | 44.71                            | 47.55 | 10.04           |
| 850                | 50.51 | 95.67     | 20.53            | 6.80  | 39.28                                 | 44.06                                 | 44.57                            | 48.78 | 10.03           |
| 900                | 50.40 | 94.15     | 20.26            | 7.82  | 39.37                                 | 44.12                                 | 44.64                            | 48.11 | 10.03           |
| 950                | 50.51 | 101.83    | 19.94            | 8.80  | 39.38                                 | 44.00                                 | 44.39                            | 49.05 | 9.90            |
| 1000               | 50.62 | 93.21     | 19.92            | 10.04 | 39.51                                 | 43.93                                 | 44.56                            | 48.14 | 9.99            |
| 1050               | 50.75 | 98.49     | 19.50            | 11.28 | 39.53                                 | 43.79                                 | 44.37                            | 49.59 | 9.98            |
| 1100               | 50.87 | 101.17    | 19.38            | 12.58 | 39.65                                 | 43.56                                 | 44.36                            | 48.45 | 10.00           |
| 1150               | 50.93 | 93.00     | 19.25            | 13.78 | 39.87                                 | 43.68                                 | 44.49                            | 49.87 | 9.94            |
| 1200               | 50.90 | 95.83     | 19.42            | 14.91 | 40.24                                 | 44.02                                 | 45.03                            | 48.40 | 9.93            |
| 1250               | 50.78 | 98.95     | 20.11            | 15.90 | 40.23                                 | 44.02                                 | 45.37                            | 51.39 | 9.96            |
| 1300               | 50.55 | 94.47     | 21.09            | 17.07 | 40.27                                 | 44.08                                 | 45.91                            | 48.32 | 9.91            |
| 1400               | 50.55 | 101.82    | 22.29            | 15.73 | 39.94                                 | 44.32                                 | 45.86                            | 48.56 | 9.87            |
| 1500               | 50.80 | 93.63     | 21.07            | 13.09 | 39.96                                 | 44.36                                 | 45.38                            | 48.64 | 9.85            |
| 1600               | 50.95 | 95.44     | 20.37            | 10.39 | 40.19                                 | 44.59                                 | 45.08                            | 48.95 | 9.91            |
| 1700               | 50.67 | 91.13     | 21.56            | 8.67  | 40.29                                 | 44.76                                 | 44.91                            | 48.99 | 9.84            |
| 1800               | 50.29 | 99.18     | 24.33            | 7.79  | 39.94                                 | 44.23                                 | 44.75                            | 49.08 | 9.96            |
| 1900               | 49.95 | 96.74     | 26.40            | 7.69  | 39.56                                 | 43.89                                 | 44.43                            | 48.85 | 9.91            |
| 2000               | 49.89 | 97.93     | 23.68            | 7.69  | 39.55                                 | 43.86                                 | 43.98                            | 49.31 | 9.98            |
| 2100               | 50.02 | 94.67     | 21.42            | 7.54  | 39.82                                 | 43.74                                 | 43.76                            | 49.45 | 10.00           |
| 2200               | 50.41 | 99.35     | 21.90            | 7.85  | 40.44                                 | 43.97                                 | 44.01                            | 49.79 | 10.05           |
| 2300               | 50.60 | 100.18    | 24.96            | 9.66  | 41.07                                 | 44.63                                 | 44.66                            | 50.27 | 10.08           |
| 2400               | 50.09 | 96.43     | 26.47            | 14.11 | 40.97                                 | 45.02                                 | 45.29                            | 50.12 | 9.99            |
| 2500               | 49.77 | 101.35    | 25.64            | 18.31 | 40.66                                 | 44.69                                 | 45.74                            | 50.00 | 10.21           |
| 2600               | 50.30 | 94.08     | 24.74            | 17.62 | 40.35                                 | 44.33                                 | 45.70                            | 49.33 | 10.28           |
| 2700               | 50.53 | 97.07     | 25.48            | 9.44  | 39.74                                 | 43.72                                 | 45.06                            | 47.17 | 10.23           |

## Typical Performance Curves

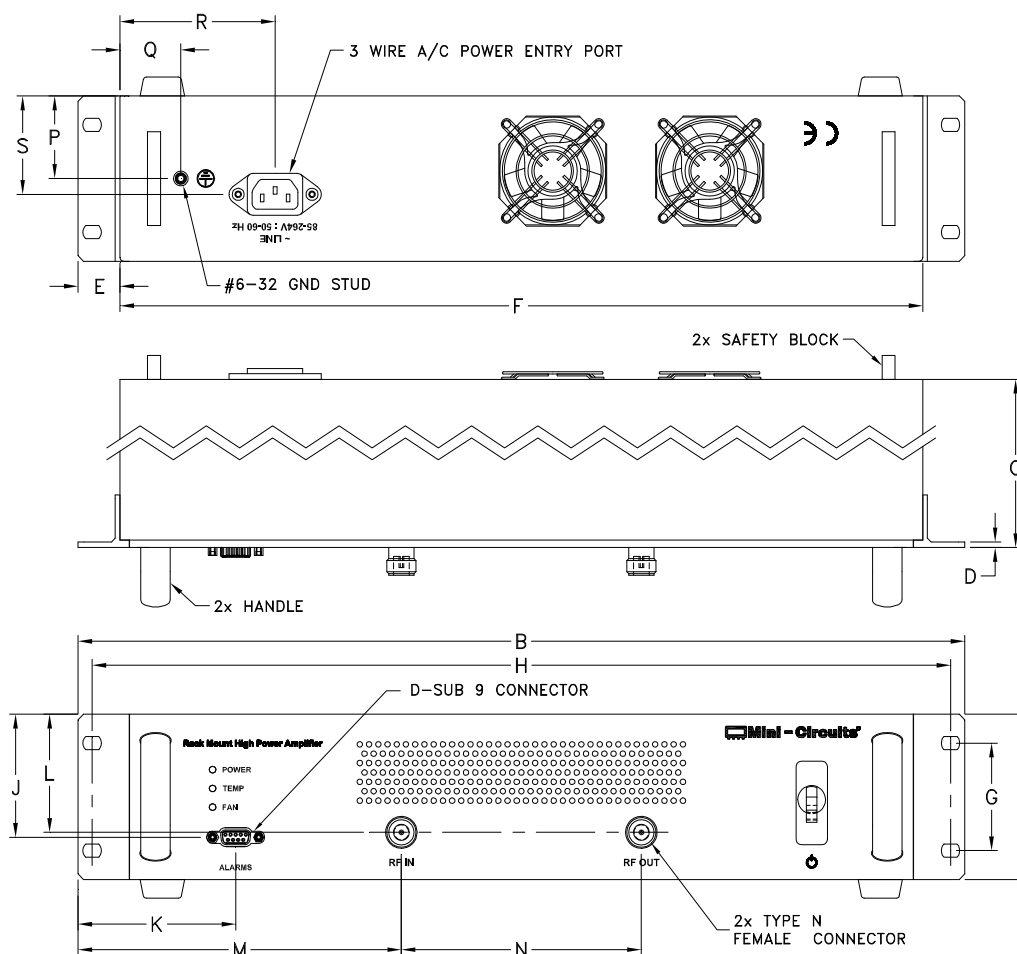


## Typical Performance Curves



## Outline Dimensions

NG1942-1



| CASE #   | A              | B                | C               | D            | E             | F                | G              | H                | J              | K              | L              |
|----------|----------------|------------------|-----------------|--------------|---------------|------------------|----------------|------------------|----------------|----------------|----------------|
| NG1942-1 | 3.46<br>(88.0) | 18.91<br>(480.4) | 20.2<br>(513.0) | .12<br>(3.0) | .89<br>(22.7) | 17.13<br>(435.0) | 2.25<br>(57.2) | 18.31<br>(465.0) | 2.58<br>(65.5) | 3.36<br>(85.4) | 2.48<br>(62.9) |

| CASE #   | M               | N               | P              | Q              | R              | S              | T        | WT, GRAMS |
|----------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------|-----------|
| NG1942-1 | 6.90<br>(175.2) | 5.12<br>(130.0) | 1.73<br>(44.0) | 1.30<br>(33.0) | 3.31<br>(84.1) | 2.06<br>(52.4) | --<br>-- | 13910     |

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .03$ ; 3Pl.  $\pm .015$

### Note:

- Case material: Aluminum alloy.
- Finish: Powder coating, Color: White.



INTERNET <http://www.minicircuits.com>  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661  
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010  
Mini-Circuits ISO 9001 & ISO 14001 Certified



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification         | Test/Inspection Condition           | Reference/Spec              |
|-----------------------|-------------------------------------|-----------------------------|
| Operating Temperature | -0° to 50° C<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature   | -20° to 70° C (non condensing)      | Individual Model Data Sheet |