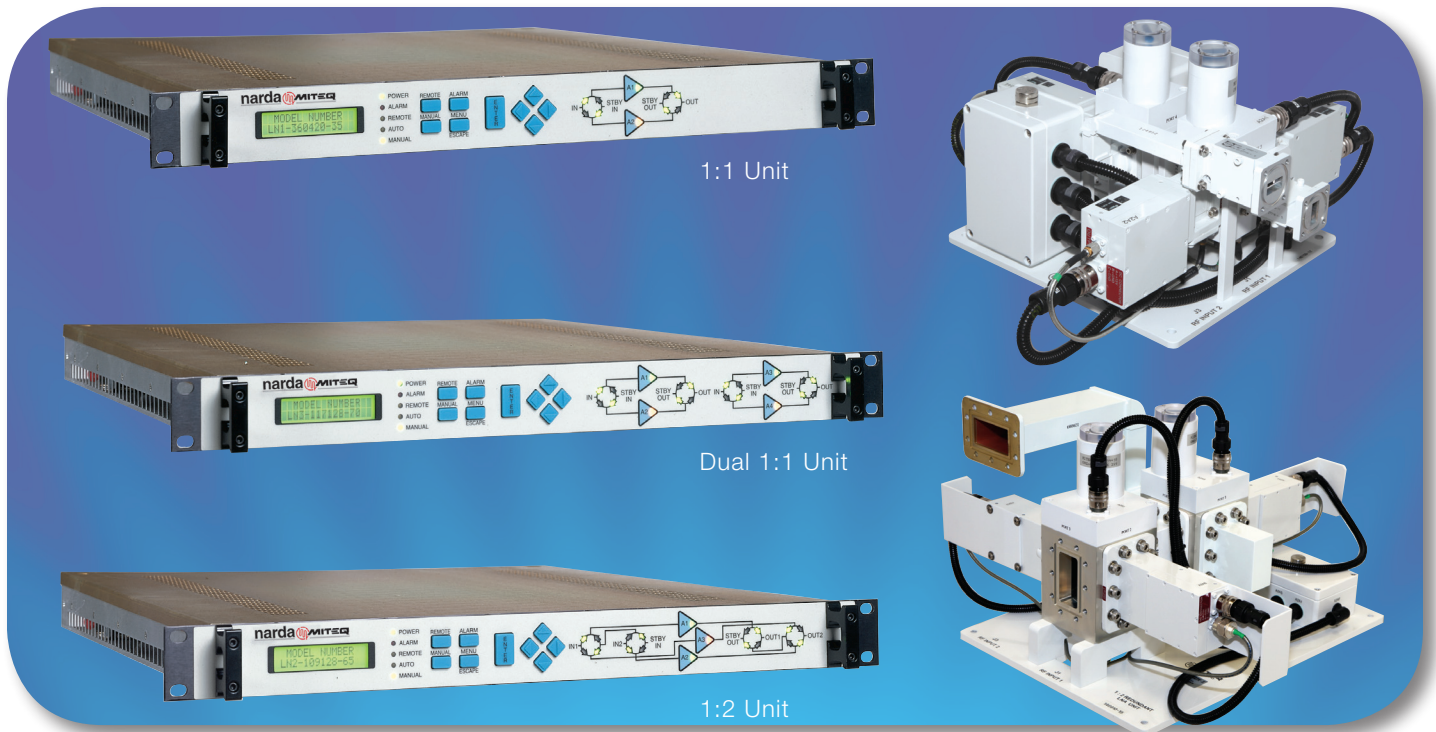


# REDUNDANT LOW-NOISE AMPLIFIER



## 1:1; DUAL 1:1 AND 1:2 SYSTEMS



### FEATURES

- Low amplifier noise temperature
- Fault tolerant design
- Fully redundant, hot-swappable power supplies
- Remote control via RS-485 or RS-422 user selectable
- Automatic/manual control from both local and remote mode
- Remote status
- Off-line input/output access
- Amplifier current fault detection
- Weather resistant amplifier/switch plate assembly
- Time-stamped alarm history
- Front panel LNA bias display

### OPTIONS

- Remote RS-232, Ethernet or contact closure
- Transmit reject filter
- Internal noise source
- Input/output signal monitors
- Higher gain
- Increased output power
- Remote control unit

The 1:1, dual 1:1 and 1:2 redundant low-noise amplifier (LNA) systems are designed to ensure continuous operation without disruption of signal transmission.

A fault condition in the on-line LNA, or an operator generated command, will switch the standby LNA to the on-line position and remove the on-line LNA from the signal path.

The redundant LNA system consists of an outdoor amplifier/switch assembly which mounts at the antenna hub, rack-mounted indoor local control unit and interconnection control cable.

# REDUNDANT LOW-NOISE AMPLIFIER

## SPECIFICATIONS

| FREQUENCY (GHz) | BAND ABBREVIATION | AVAILABLE NOISE TEMPERATURE At +25 °C (Maximum) | INTERFACE INPUT/OUTPUT |
|-----------------|-------------------|---|------------------------|
| 1.5 to 1.6      | 150160            | 33, 40, 60                                      | SMA/SMA                |
| 2.0 to 2.4      | 200240            | 33, 40, 60                                      | SMA/SMA                |
| 2.2 to 2.3      | 220230            | 33, 40, 60                                      | SMA/SMA                |
| 3.4 to 4.2      | 340420            | 30, 35, 40, 50, 60                              | CPR-229G/N             |
| 3.4 to 4.8      | 340480            | 30*, 35*, 40, 50, 60                            | CPR-229G/N             |
| 3.62 to 4.205   | 362420            | 30, 35, 40, 50, 60                              | CPR-229G/N             |
| 3.6 to 4.8      | 360480            | 30*, 35*, 40, 50, 60                            | CPR-229G/N             |
| 4.5 to 4.8      | 450480            | 30, 35, 40, 50, 60                              | CPR-229G/N             |
| 7.1 to 8.4      | 710840            | 50*, 55, 60, 65                                 | CPR-112G/SMA           |
| 7.25 to 7.75    | 725775            | 45, 50, 55, 60, 65                              | CPR-112G/SMA           |
| 8.0 to 8.4      | 800840            | 50*, 55, 60, 65                                 | CPR-112G/SMA           |
| 10.7 to 12.75   | 107128            | 70, 80, 90, 100                                 | WR-75/SMA              |
| 10.95 to 12.75  | 109128            | 65, 70, 80, 90, 100                             | WR-75/SMA              |
| 10.95 to 11.70  | 109117            | 65, 70, 80, 90, 100                             | WR-75/SMA              |
| 11.70 to 12.75  | 117128            | 65, 70, 80, 90, 100                             | WR-75/SMA              |
| 17.7 to 21.2    | 177212            | 120*, 140, 160                                  | WR-42/SMA              |
| 17.7 to 22.0    | 177220            | 130*, 140, 160                                  | WR-42/SMA              |
| 18.7 to 20.3    | 187203            | 120*, 140, 160                                  | WR-42/SMA              |
| 20.2 to 21.2    | 202212            | 120*, 140, 160                                  | WR-42/SMA              |

\* References 14 dB minimum input return loss specification.

## NOMENCLATURE FOR MODEL NUMBERS

Low-noise amplifier system model numbers:

Model number: LN (controller)-(frequency band abbreviation)-(amplifier noise temperature)

Controller code:

- 1 = 1:1 Controller
- 2 = 1:2 Controller
- 3 = Dual 1:1 Controller

Please note that each low-noise amplifier system is supplied with:

- 1 Redundant amplifier/switch assembly
- 1 Local control and monitoring unit
- 1 100 foot interconnection control cable (other lengths optional)

Example: 1:1 system, 10.95 GHz to 12.75 GHz with 65 °K amplifier noise temperature:

LN1-109128-65

Example: 1:2 system, 3.4 GHz to 4.2 GHz with 30 °K amplifier noise temperature:

LN2-340420-30

Assembly enclosure option: To substitute a weather resistant enclosure for the standard weather resistant plate assembly add -W to end of part number. The weather resistant enclosure is recommended for mounting in a nonsheltered environment with direct rainfall.

Example: 1:2 system, 3.4 GHz to 4.2 GHz with 30 °K amplifier noise temperature in a weather resistant enclosure:

LN2-340420-30-W

## SPECIFICATIONS (CONTINUED)

### RF SPECIFICATIONS

|                                       |   |
|---------------------------------------|---|
| Gain .....                            | 50 dB minimum, 52 dB typical (higher gain optional)   |
| Gain flatness.....                    | 0.4 dB/40 MHz,<br>1.0 dB peak-to-peak/RF bands up to 500 MHz,<br>1.5 dB peak-to-peak/RF bands up to 800 MHz,<br>2.0 dB peak-to-peak/RF bands greater than 800 MHz |
| Gain slope.....                       | 0.2 dB/10 MHz maximum   |
| Gain stability.....                   | ±0.2 dB/24 hours (constant temperature),<br>5 dB maximum/-40 °C to +60 °C (higher stability optional)   |
| Power output (1 dB compression) ..... | +10 dBm minimum (higher output power optional)  |
| AM/PM conversion .....                | 0.5°/dB maximum to 0 dBm output   |
| Group delay (±18 MHz)                 |   |
| Linear .....                          | 0.02 ns/MHz maximum   |
| Parabolic .....                       | 0.001 ns/MHz <sup>2</sup> maximum   |
| Ripple .....                          | 0.1 ns peak-to-peak maximum   |
| Spurious outputs .....                | Below thermal noise   |
| Isolation .....                       | 50 dB minimum   |
| Input return loss .....               | 19 dB minimum,<br>*14 dB minimum (refer to table on previous page)  |
| Output return loss.....               | 20 dB minimum   |
| Input/output impedance .....          | 50 ohms   |
| Switchover time .....                 | 100 ms maximum  |
| Nondamage input power .....           | +10 dBm maximum   |
| Transmit desensitivity threshold      |   |
| C-Band .....                          | -20 dBm maximum (-30 dBm with Option 11)  |
| C-Band (3.4 GHz to 4.8 GHz).....      | -45 dBm maximum (-55 dBm with Option 11)  |
| X-Band .....                          | -50 dBm maximum (-60 dBm with Option 11)  |
| Ku-Band .....                         | -20 dBm maximum (-30 dBm with Option 11)  |
| Ka-Band .....                         | -50 dBm maximum (-60 dBm with Option 11)  |

### LOCAL CONTROL UNIT PRIMARY POWER REQUIREMENTS

|                        |   |
|------------------------|---|
| Voltage.....           | 90 VAC to 250 VAC                         |
| Frequency.....         | 47 Hz to 63 Hz                            |
| Power consumption..... | 20 W typical, 50 W peak during switchover |

### SUMMARY ALARM

Contact closure/open for DC voltage and/or amplifier alarm.  
Status alarm readout on remote control bus.

### PHYSICAL

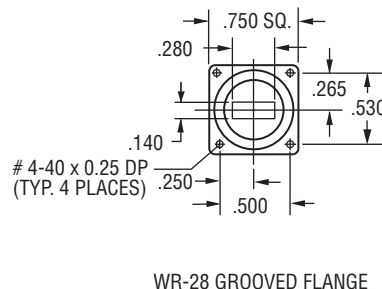
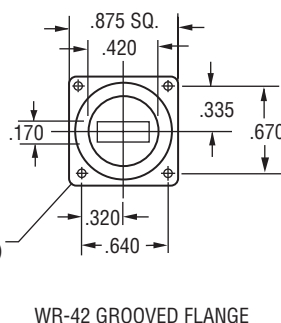
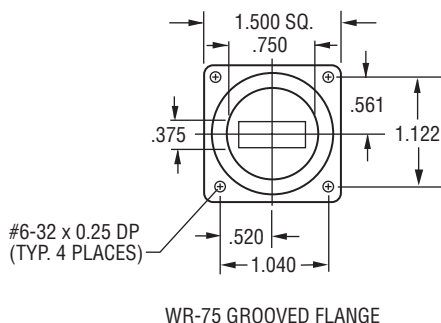
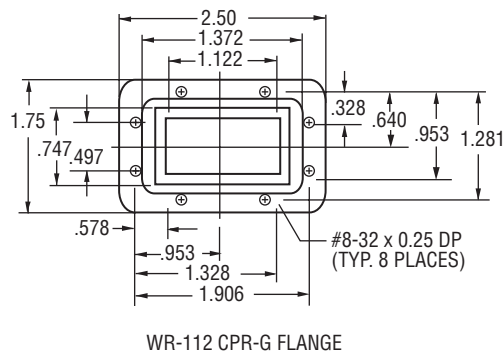
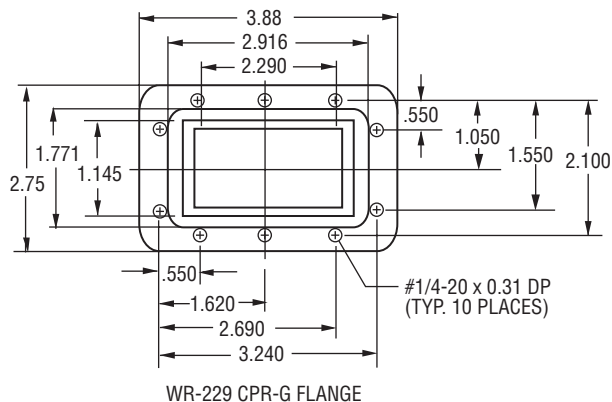
|  |   |
|--|---|
| AC input connectors.....   | IEC-320   |
| Summary alarm interface mating connector.....                                | DEM-9P  |
| Remote interface connector .....   | DEM-9S for RS-485 and RS-422,<br>DB-25P for RS-232,<br>DB-37S for contact closure |
| Switch/amplifier weight (does not apply to weather resistant housing option) |   |
| 1:1 units.....   | Below 10 GHz 15 lb. above 10 GHz 10 lb. nominal                                   |
| 1:2 units.....   | Below 10 GHz 25 lb. above 10 GHz 20 lb. nominal                                   |

### ENVIRONMENTAL

|  |  |
|--|--|
| Operating                                      |  |
| Ambient temperature (Controller).....          | 0 °C to 50 °C  |
| Ambient temperature (Amplifier assembly) ..... | -40 °C to +60 °C (other ranges available, consult factory) |
| Atmospheric pressure .....                     | Up to 10,000 feet  |
| Nonoperating                                   |  |
| Temperature .....                              | -50 °C to 70 °C  |
| Atmospheric pressure .....                     | Up to 40,000 feet  |
| Shock and vibration .....                      | Normal handling by commercial carriers                     |

# REDUNDANT LOW-NOISE AMPLIFIER

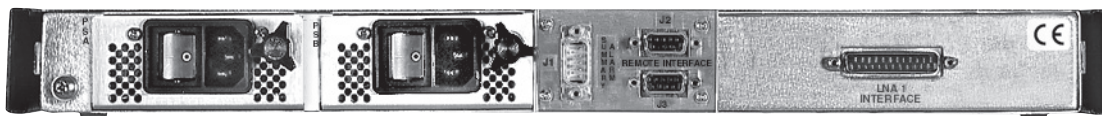
## STANDARD WAVEGUIDE FLANGES



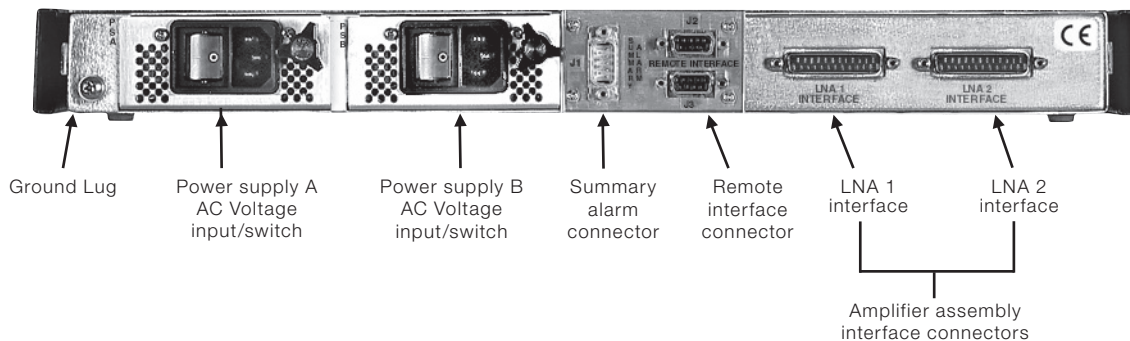
NOTE: FLANGES NOT DRAWN TO SIZE.

## CONTROLLER REAR-PANEL VIEW

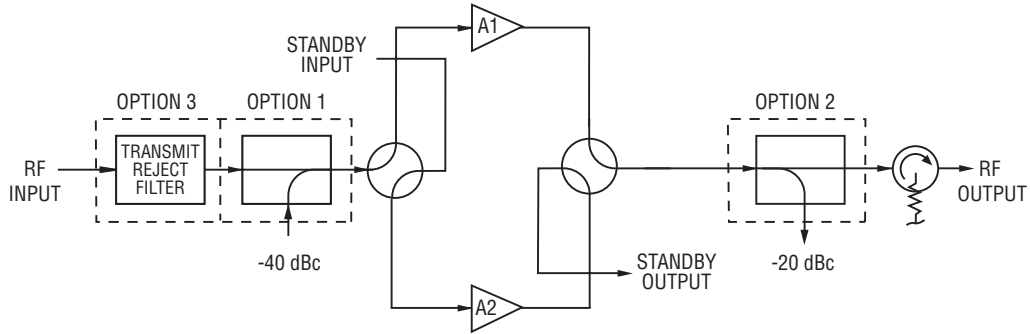
### 1:1 AND 1:2 CONTROLLER



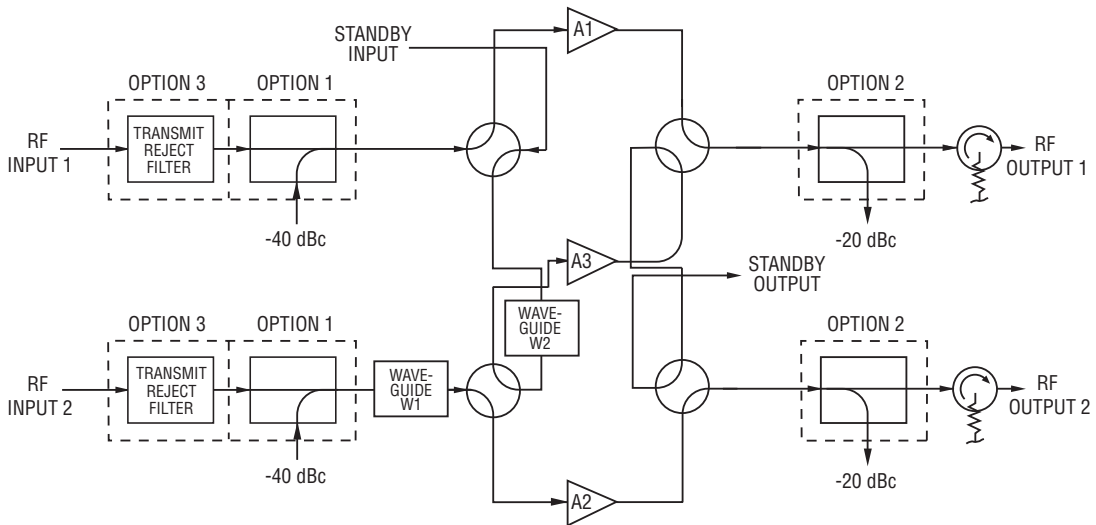
### DUAL 1:1 CONTROLLER



### 1:1 REDUNDANT LNA SYSTEM BLOCK DIAGRAM



### 1:2 REDUNDANT LNA SYSTEM BLOCK DIAGRAM



Typical system noise temperature calculation:

1:1 Redundant System:

$$T_{\text{system}} = T_{\text{LNA}} + T_{\text{SWITCH}} + T_{\text{OPTION 3}} + T_{\text{OPTION 1}}$$

1:2 Redundant LNA System:

RF input 1: LNA 1 on-line signal path

$$T_{\text{system}} = T_{\text{LNA}} + T_{\text{SWITCH}} + T_{\text{OPTION 3}} + T_{\text{OPTION 1}}$$

RF input 1: LNA 3 on-line signal path (LNA 1 standby)

$$T_{\text{system}} = T_{\text{LNA}} + 2 * T_{\text{SWITCH}} + T_{\text{W2}} + T_{\text{OPTION 3}} + T_{\text{OPTION 1}}$$

RF input 2: LNA 2 on-line signal path

$$T_{\text{system}} = T_{\text{LNA}} + T_{\text{W1}} + T_{\text{SWITCH}} + T_{\text{OPTION 3}} + T_{\text{OPTION 1}}$$

RF input 1: LNA 3 on-line signal path (LNA 2 standby)

$$T_{\text{system}} = T_{\text{LNA}} + 2 * T_{\text{SWITCH}} + T_{\text{W1}} + T_{\text{W2}} + T_{\text{OPTION 3}} + T_{\text{OPTION 1}}$$

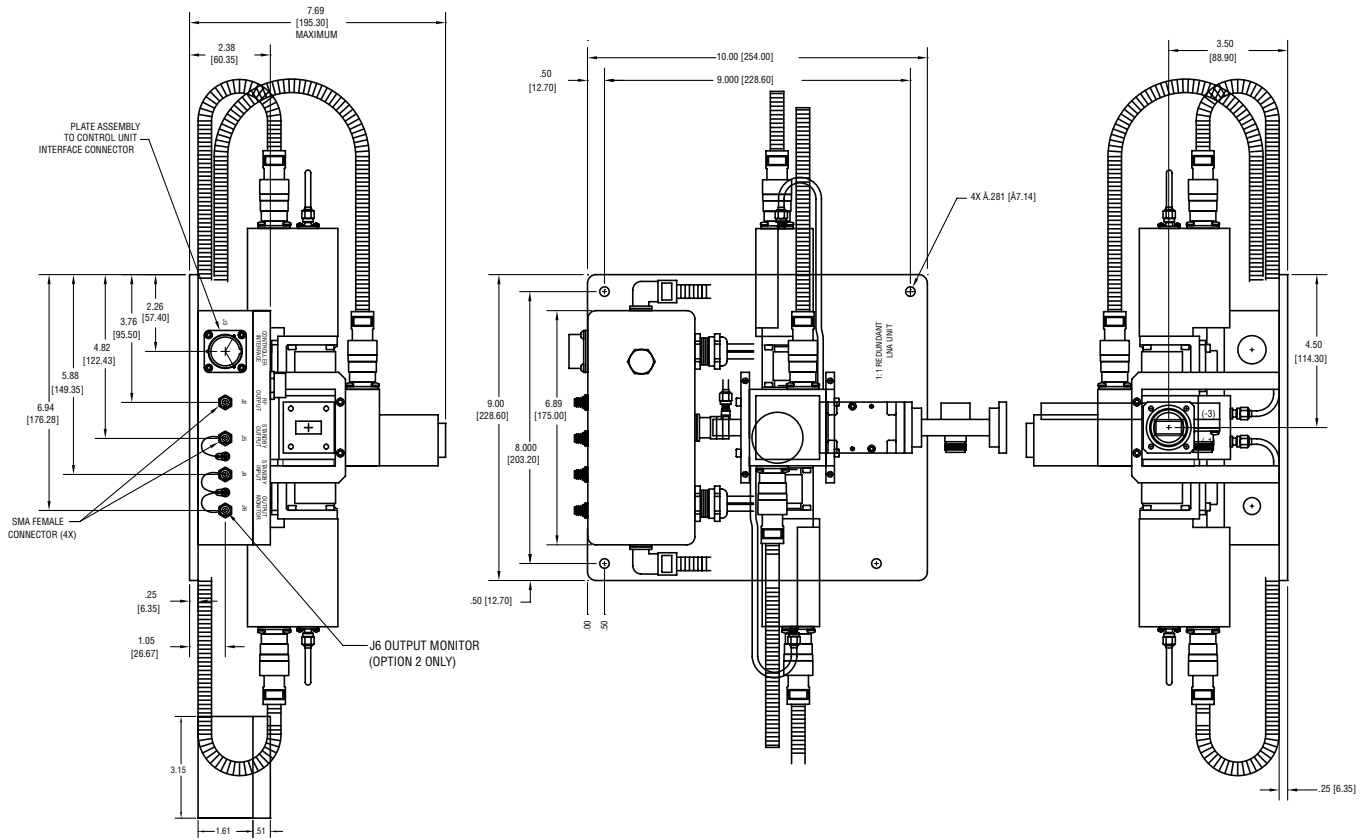
### Typical Noise Temperature in Kelvin (°K) at 23 °C

| Band (GHz)            | 0 to 0.95 | 0.95 to 2 | 3.62 to 4.205 | 3.4 to 4.2 & 4.5 to 4.8 | 7.2 to 7.8 | 10.7 to 12.75 | 17.7 to 22.0 | 27.5 to 33 |
|-----------------------|-----------|-----------|---------------|-------------------------|------------|---------------|--------------|------------|
|                       | (coaxial) | WR-229    | WR-229        |                         | WR-112     | WR-75         | WR-42        | WR-28      |
| $T_{\text{SWITCH}}$   | 7.0 °     | 13.5 °    | 1.5 °         | 1.5 °                   | 3 °        | 5 °           | 12 °         | 20 °       |
| $T_{\text{W1}}$       | N/A       | N/A       | 1.5 °         | 1.5 °                   | 4 °        | 4 °           | 7 °          | 10 °       |
| $T_{\text{W2}}$       | 14 °      | 14 °      | 1.5 °         | 1.5 °                   | 9 °        | 9 °           | 11 °         | 15 °       |
| $T_{\text{OPTION 1}}$ | 25 °      | 25 °      | 0.5 °         | 0.5 °                   | 2 °        | 2 °           | 3 °          | 4 °        |
| $T_{\text{OPTION 3}}$ | N/A       | N/A       | 3.0 °         | 7.5 °                   | 28 °       | 15 °          | N/A          | N/A        |

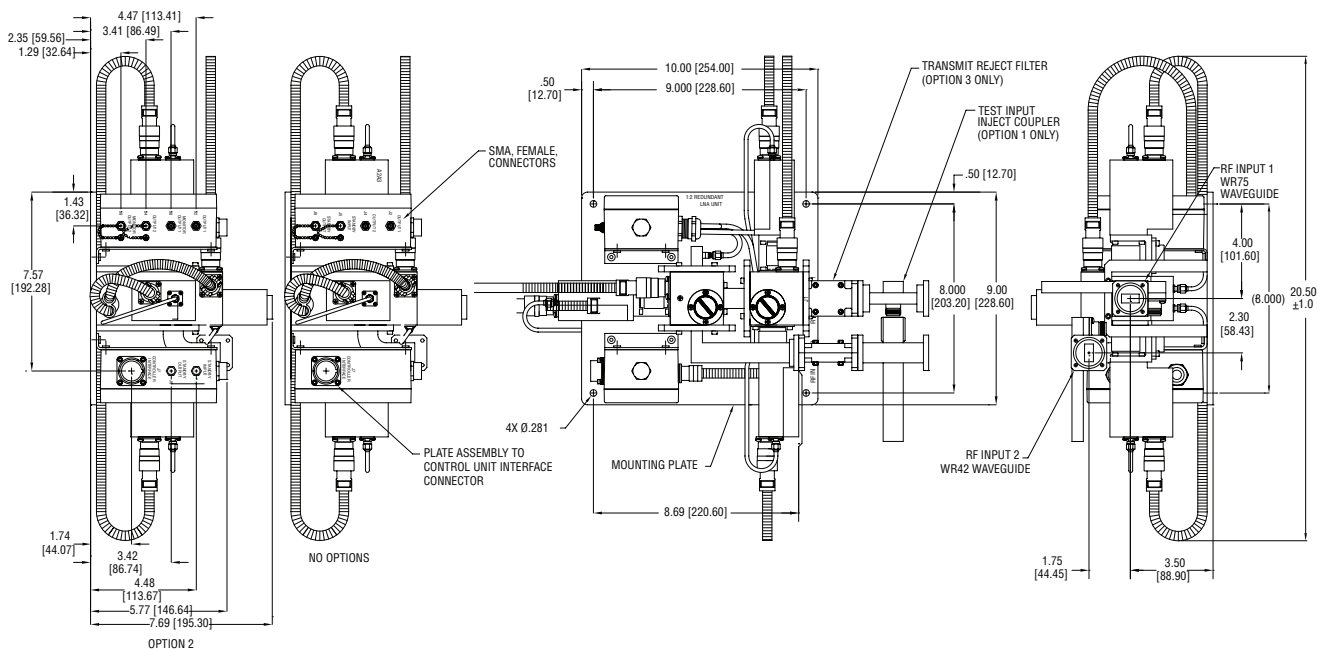
# REDUNDANT LOW-NOISE AMPLIFIER

## OUTLINE DRAWINGS

### 1:1 Ku-BAND AMPLIFIER



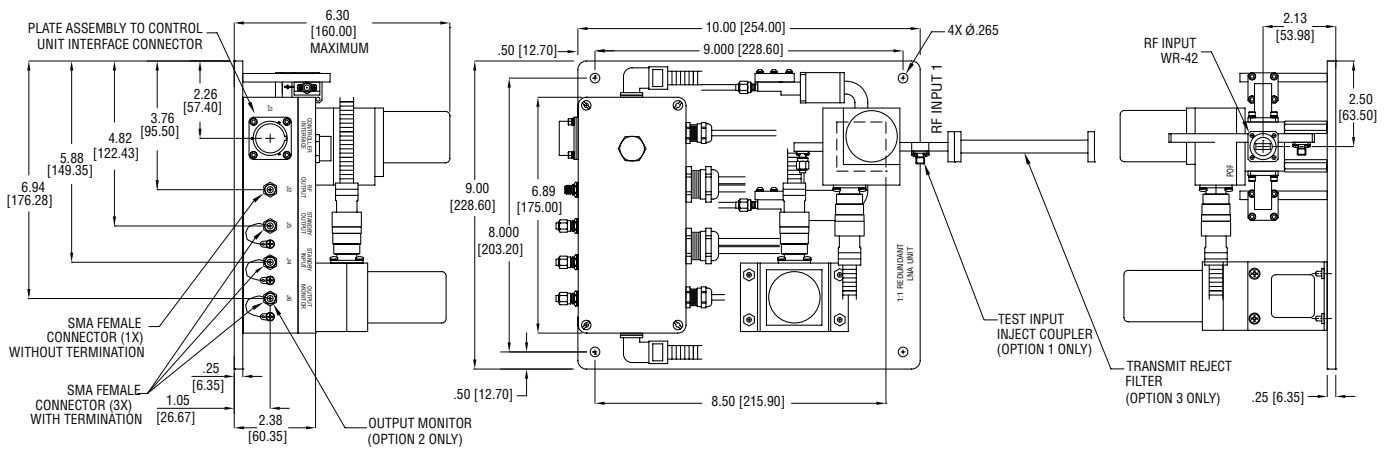
### 1:2 Ku-BAND AMPLIFIER ASSEMBLY



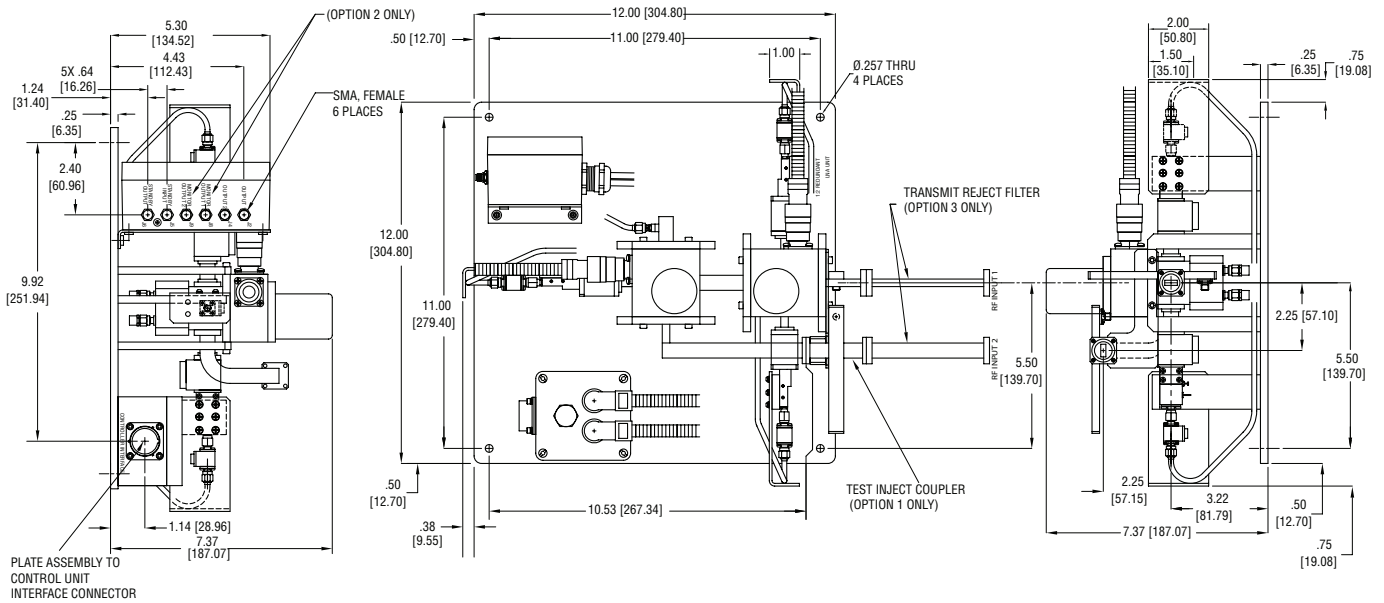
Note: Dimensions shown are in inches and those shown in brackets [ ] are in millimeters.

## OUTLINE DRAWINGS (CONTINUED)

### Ka-BAND AMPLIFIER ASSEMBLY OUTLINE DRAWING



### 1:2 Ka-BAND AMPLIFIER ASSEMBLY



Note: Dimensions shown are in inches and those shown in brackets [ ] are in millimeters.

# REDUNDANT LOW-NOISE AMPLIFIER

## OPTIONS

Missing option numbers are not applicable for this product.

**Note:** System noise temperature will increase and return loss will degrade for any additional component located before the amplifier. This applies to Options 1 and 3.

1. Test input inject couplers  
Below 3.4 GHz, coaxial coupler 40 dB nominal coupling level.  
Above 3.4 GHz, crossguide coupler 40 dB nominal coupling level.
2. Output test coupler  
20 dB nominal coupling level
3. Transmit reject filter

| RECEIVE BAND FREQUENCY (GHz) | RECEIVE BAND INSERTION LOSS | TRANSMIT BAND FREQUENCY (GHz) | TRANSMIT BAND REJECTION |
|------------------------------|-----------------------------|-------------------------------|-------------------------|
| 3.4 to 4.2                   | 0.04 dB                     | 5.825 to 6.725                | 60 dB                   |
| 3.62 to 4.205                | 0.04 dB                     | 5.825 to 6.425                | 55 dB                   |
| 3.6 to 4.8                   | 0.10 dB                     | 5.85 to 7.05                  | 60 dB                   |
| 4.5 to 4.8                   | 0.15 dB                     | 6.70 to 7.05                  | 55 dB                   |
| 7.25 to 7.75                 | 0.5 dB                      | 7.9 to 8.4                    | 64 dB                   |
| 10.7 to 12.75                | 0.15 dB                     | 13.75 to 14.5 (17.3 to 18.4*) | 60 dB                   |
| 10.95 to 12.75               | 0.1 dB                      | 14.0 to 14.5 (17.3 to 18.4*)  | 70 dB                   |
| 17.7 to 21.2                 | 0.25 dB                     | 27.0 to 31.0                  | 70 dB                   |

\* For 17.3 GHz to 18.4 GHz band, Option 3 becomes Option 3-DBS.

4. Noise source  
15 dB ENR nominal. Local and remote control provided.
- 6-(x). Local control unit to amplifier/switch assembly cable length, where (x) is the length of the cable in feet.  
Available from 10 feet to 400 feet in 10 foot increments. 100 foot cable supplied as standard.
11. Increased gain  
60 dB minimum gain
12. Increased output power  
+20 dBm output power at 1 dB compression
13. Increased gain stability  
3 dB peak-to-peak maximum/-40 °C to +60 °C
17. Remote control
  - B. RS-422/RS-485 (supplied as standard)
  - C. RS-232
  - D. Contact closure
  - H. Ethernet
22. Dedicated remote control panel  
Provides remote control over a dedicated RS-422/RS-485 bus.  
Option 17B (RS-422/RS-485 remote bus) must be ordered.

**Note:** For literature describing local control and remote control (bus protocols), refer to Narda-MITEQ Technical Note 25T042.

The material presented in this datasheet was current at the time of publication. Narda-MITEQ's continuing product improvement program makes it necessary to reserve the right to change our mechanical and electrical specifications without notice. If either of these parameters is critical, please contact the factory to verify that the information is current.

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