



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.

# 1:1, DUAL 1:1 AND 1:2 REDUNDANT LOW-NOISE AMPLIFIER SYSTEMS



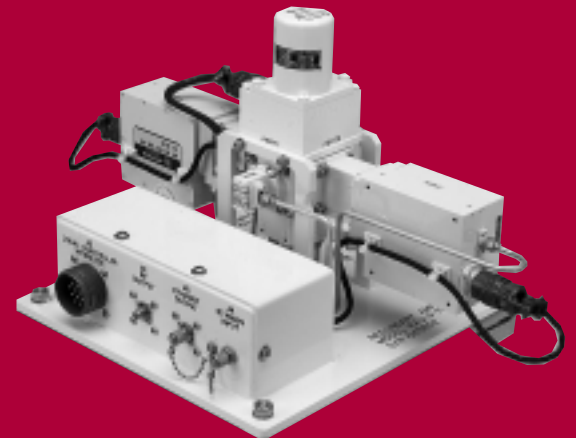
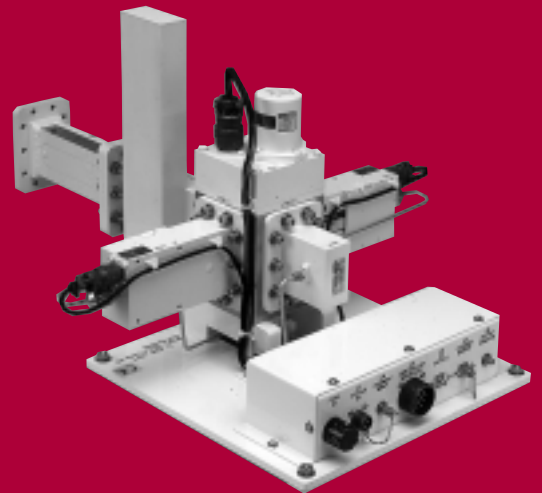
1:1  
CONTROLLER



1:2  
CONTROLLER



DUAL 1:1  
CONTROLLER



## FEATURES

- Low amplifier noise temperature
- Fault tolerant design
- Fully redundant, hot swappable power supplies
- Remote control via RS485 or RS422 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 RS232 or contact closure
- Transmit reject filter
- Internal noise source
- Input/output signal monitors
- Higher gain
- Increased output power
- Remote control unit

## SPECIFICATIONS

Frequency (GHz)	Band Abbreviation	Available Noise Temperature At +25°C (Maximum)	Interface Input/Output
1.5 – 1.6	150160	33, 40, 60	SMA/SMA
2.2 – 2.3	220230	33, 40, 60	SMA/SMA
3.4 – 4.2	340420	30, 35, 40, 50, 60	CPR-229G/N
3.4 – 4.8	340480	30, 35, 40, 50, 60	CPR-229G/N
3.62 – 4.205	362420	30, 35, 40, 50, 60	CPR-229G/N
4.5 – 4.8	450480	30, 35, 40, 50, 60	CPR-229G/N
7.1 – 8.4	710840	50*, 55, 60, 65	CPR-112G/SMA
7.25 – 7.75	725775	45, 50, 55, 60, 65	CPR-112G/SMA
8.0 – 8.4	800840	50*, 55, 60, 65	CPR-112G/SMA
10.7 – 12.75	107128	70, 80, 90, 100	WR-75/SMA
10.95 – 12.75	109128	65, 70, 80, 90, 100	WR-75/SMA
10.95 – 11.70	109117	65, 70, 80, 90, 100	WR-75/SMA
11.70 – 12.75	117128	65, 70, 80, 90, 100	WR-75/SMA
17.7 – 21.2	177212	120*, 140, 160, 200	WR-42/SMA
17.7 – 22.0	177220	130*, 140, 160, 200	WR-42/SMA
18.7 – 20.3	187203	120*, 140, 160, 200	WR-42/SMA
20.2 – 21.2	202212	120*, 140, 160, 200	WR-42/SMA

\* References 14 dB minimum input return loss specification.

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, 10.95–12.75 GHz with 65°K amplifier noise temperature:  
LN1-109128-65

Example: 1:2 system, 3.4–4.2 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, 3.4–4.2 GHz with 30°K amplifier noise temperature in a weather resistant enclosure:  
LN2-340420-30-W

### RF SPECIFICATIONS

Gain .....	50 dB minimum, 52 dB typical (higher gain optional)
Gain flatness .....	0.4 dB/40 MHz,
	1.0 dB peak-to-peak/RF bands up to 500 MHz,
	1.5 dB peak-to-peak/RF bands up to 800 MHz,
	2.0 dB peak-to-peak/RF bands greater than 800 MHz
Gain slope .....	0.2 dB/10 MHz maximum

## SPECIFICATIONS (CONT.)

Gain stability .....	±0.2 dB/24 hours (constant temperature), 5 dB maximum/-40 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, *14 dB minimum (refer to table)
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)
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 .....	90–250 VAC
Frequency.....	47–63 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

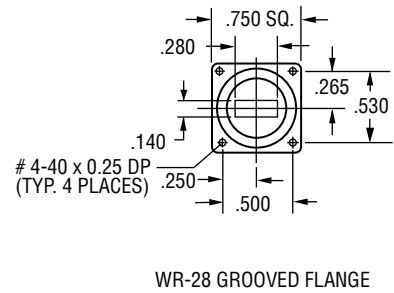
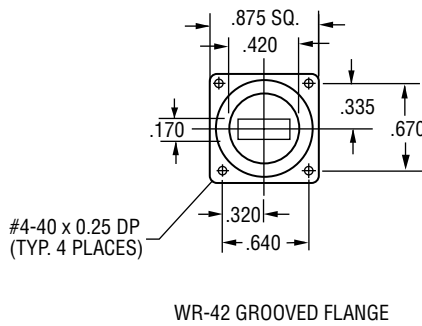
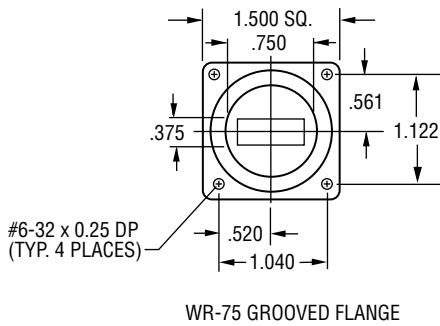
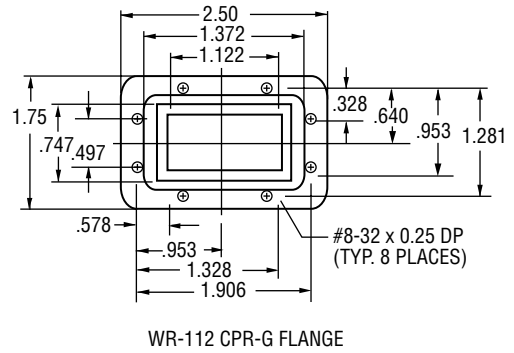
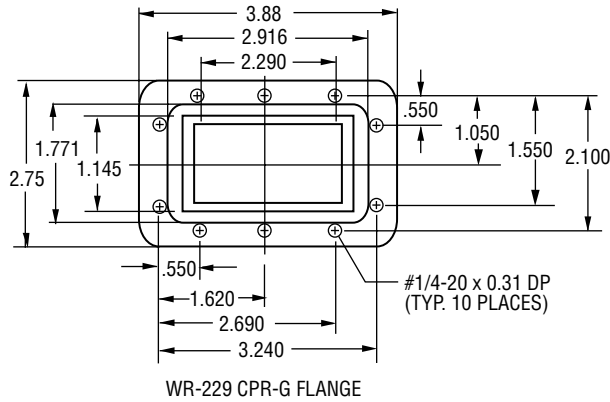
### PHYSICAL

AC input connectors .....	IEC-320
Summary alarm interface mating connector.....	DEM-9P
Remote interface connector .....	DEM-9S for RS485 and RS422, DB-25P for RS232, DB-37S for contact closure
Switch/amplifier weight (does not apply to weather resistant housing option)	
1:1 units .....	Below 10 GHz 15 lbs, above 10 GHz 10 lbs nominal
1:2 units .....	Below 10 GHz 25 lbs, above 10 GHz 20 lbs nominal

### ENVIRONMENTAL

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

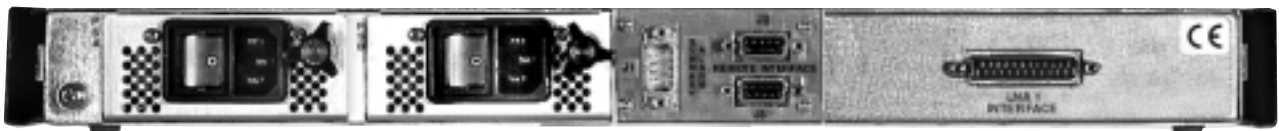
## STANDARD WAVEGUIDE FLANGES



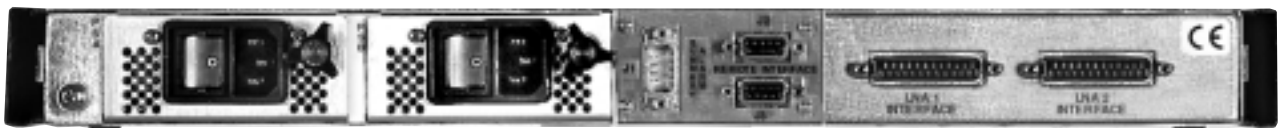
NOTE:  
FLANGES NOT DRAWN TO SIZE

## CONTROLLER REAR PANEL VIEW

### 1:1 AND 1:2 CONTROLLER

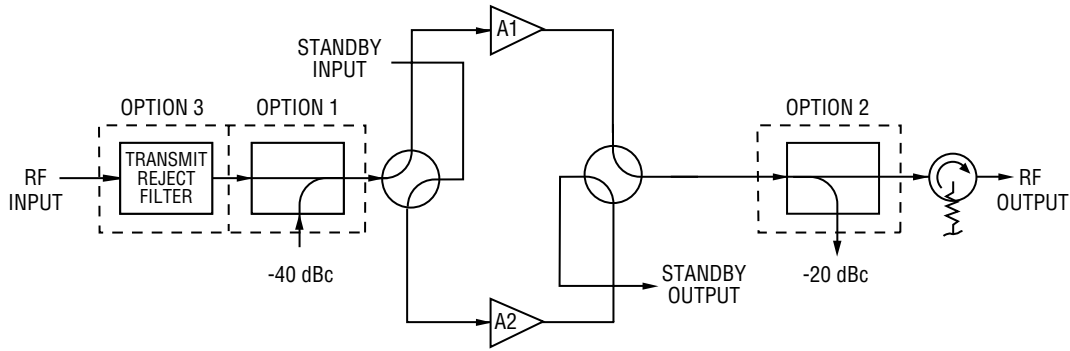


### DUAL 1:1 CONTROLLER

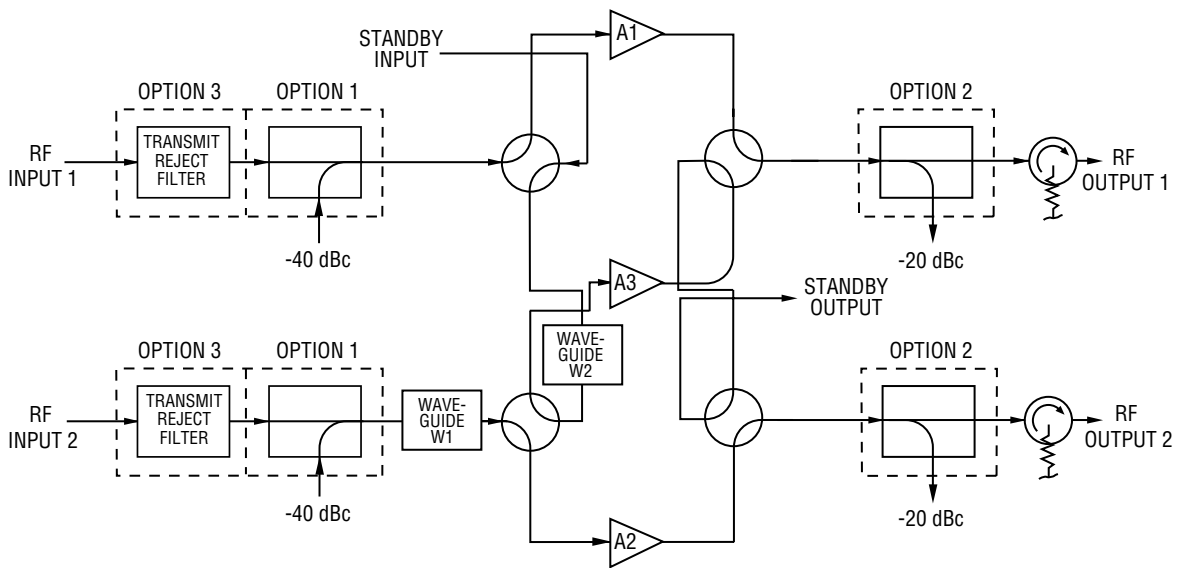


- ↑  
Ground lug
  - ↑  
Power supply A  
AC voltage  
input/switch
  - ↑  
Power supply B  
AC voltage  
input/switch
  - ↑  
Summary  
alarm  
connector
  - ↑  
Remote  
interface  
connectors
  - ↑  
LNA 1  
interface
  - ↑  
LNA 2  
interface
- └──────────────────┘  
Amplifier assembly  
interface  
connectors

## 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)

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

RF input 2: LNA 2 on-line signal path

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

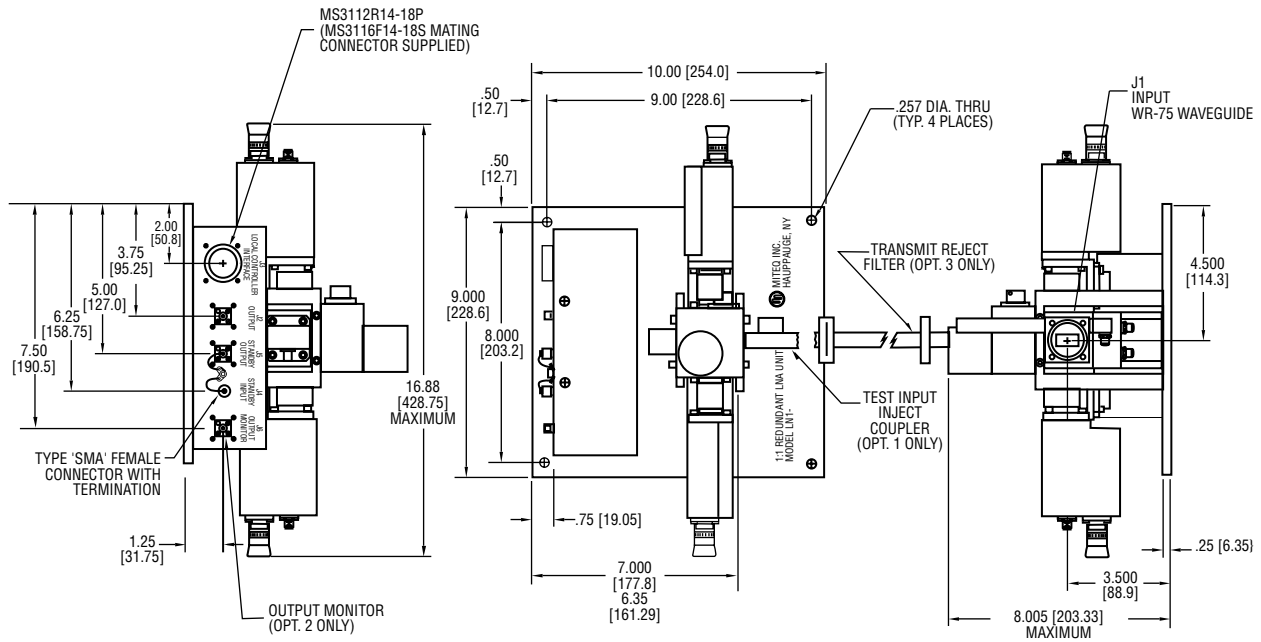
RF input 1: LNA 3 on-line signal path (LNA 2 standby)

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

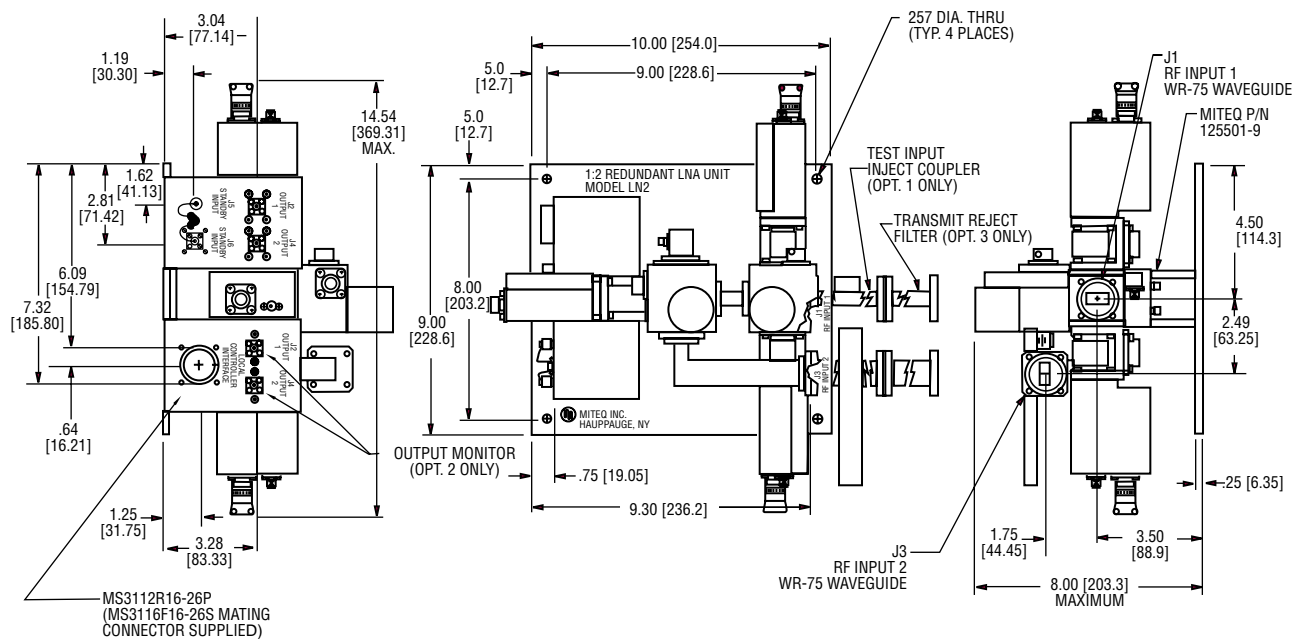
### Typical Noise Temperature in Kelvin at 23°C

Band (GHz)	0-0.95		3.62-4.205		10.7-12.75		17.7-22.0	27.5-33
	0-0.95	0.95-2	3.62-4.205	4.5-4.8	7.2-7.8	10.7-12.75		
	(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

# 1:1 Ku-BAND AMPLIFIER ASSEMBLY OUTLINE DRAWING

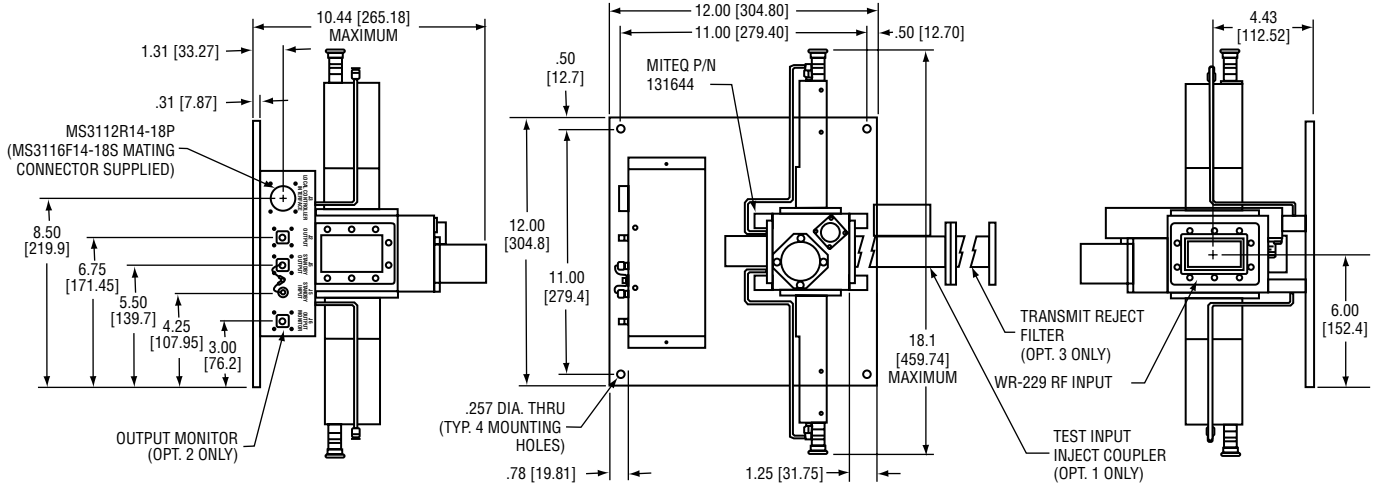


# 1:2 Ku-Band Amplifier Assembly Outline Drawing

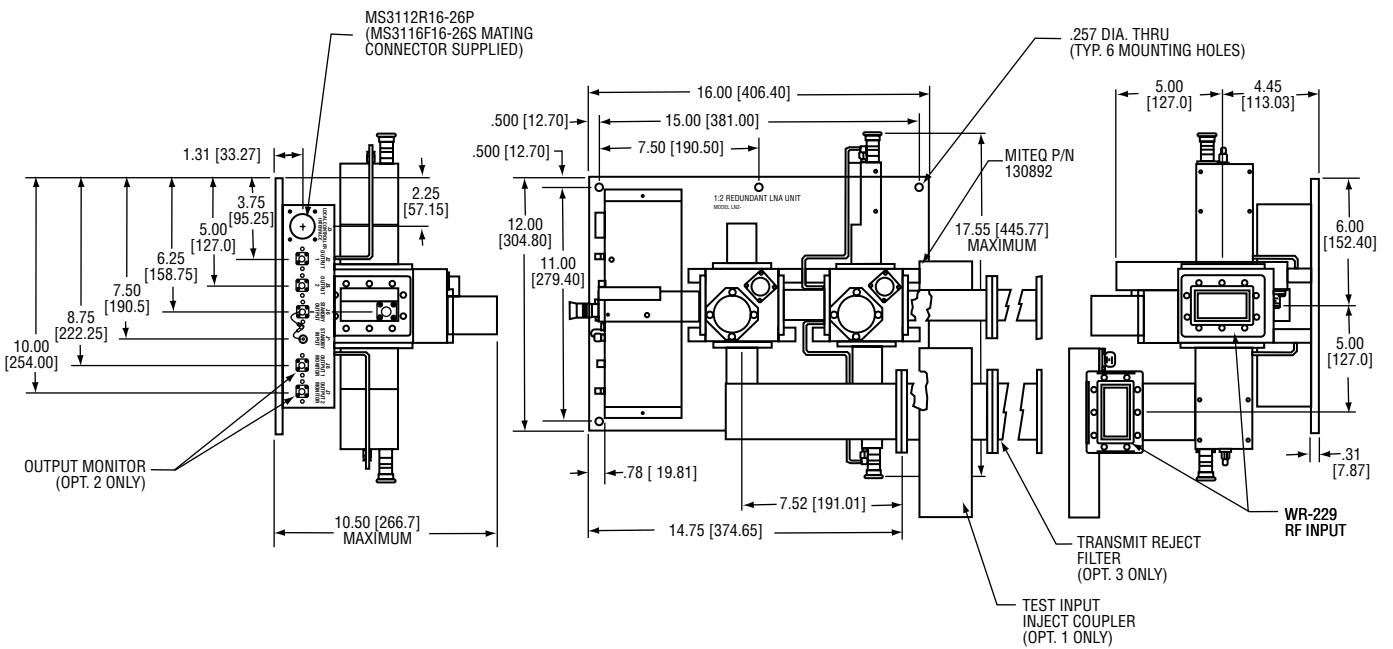


NOTE:  
DIMENSIONS IN BRACKETS [ ] ARE IN MILLIMETERS

# 1:1 C-BAND AMPLIFIER ASSEMBLY OUTLINE DRAWING



# 1:2 C-BAND AMPLIFIER ASSEMBLY OUTLINE DRAWING



NOTE:  
DIMENSIONS IN BRACKETS [ ] ARE IN MILLIMETERS

# 1:1, DUAL 1:1 AND 1:2 REDUNDANT LOW-NOISE AMPLIFIER SYSTEMS

## OPTIONS

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 – 4.2	.04 dB	5.825 – 6.725	60 dB
3.62 – 4.205	0.04 dB	5.825 – 6.425	55 dB
4.5 – 4.8	.15 dB	6.70 – 7.05	55 dB
7.25 – 7.75	0.5 dB	7.9 – 8.4	64 dB
10.7 – 12.75	.15 dB	13.75 – 14.5	60 dB
10.95 – 12.75	0.1 dB	14.0 – 14.5	70 dB
17.7 – 21.2	0.25 dB	27.0 – 31.0	70 dB

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 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 to +60°C.
17. Remote control.  
**B.** RS422/485 (supplied as standard).  
**C.** RS232.  
**D.** Contact closure.
22. Dedicated remote control panel.  
Provides remote control over a dedicated RS422/485 bus.  
Option 17B (RS422/485 remote bus) must be ordered.

Notes: Missing option numbers are not applicable to this product.  
For literature describing local control and remote control (bus protocols), refer to MITEQ's Technical Note 25T042.



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