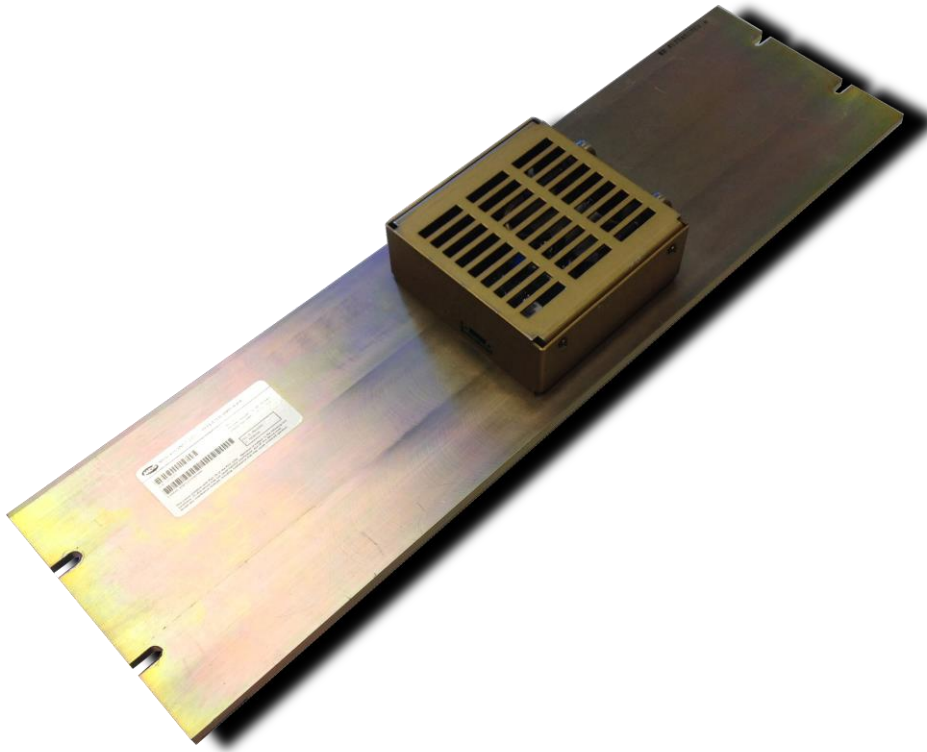




MDS

**GE MDS eNETL2T/U/V Manual  
P/N 05-4186A01 Rev H**



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# 1 Important Information

## 1.1 RF Exposure



Professional installation required. The radio equipment described in this guide emits radio frequency energy. Although the power level is low, the concentrated energy from a directional antenna may pose a health hazard. Do not allow people to come closer than 2.07 meters (6.79 feet) to the antenna when the transmitter is operating in indoor or outdoor environments. More information on RF exposure can be found on the Internet at: [www.fcc.gov/oet/info/documents/bulletins](http://www.fcc.gov/oet/info/documents/bulletins).

## 1.2 FCC Approval Notice

This device is offered as a licensed transmitter per FCC Parts 80, 90 and 95. It is approved for use under the following conditions: Changes or modifications not expressly approved by GE MDS, LLC will void the user's authority to operate the equipment.

## 1.3 FCC Part 80 Information

For FCC Part 80, valid frequencies are 216-218 MHz pursuant to Part 80.385 at up to 40 watts input to the antenna terminals (as per this product's grant) pursuant to Part 80.215(h)(5).

## 1.4 FCC Part 90 Information

For FCC Part 90, valid frequencies are 217-220 MHz at up to 2 Watts input to the antenna terminal pursuant to Part 90.259 or 220-222 MHz at up to 500 Watts Effective Radiated Power (ERP) pursuant to Part 90.729 and applicable antenna height restrictions.

## 1.5 FCC Part 95 Information

For FCC Part 95, valid frequencies are 218-219 MHz. The Effective Radiated Power (ERP) must be less than or equal to 4 Watts for mobile use and 20 Watts for fixed use pursuant to Part 95.855. This can be accomplished by adjusting the output power of the amplifier and selecting an antenna with appropriate gain. Consult the following table for assistance in setting the output power and selecting an antenna to maintain compliance. The table provides examples, however other combinations can be used.

Amplifier Power Setting	ERP	Maximum Antenna Gain
2 W	4 W	3 dBd (5.2 dBi)
4 W	4 W	0 dBd (2.2 dBi)
2 W	20 W	10dBd (12.2 dBi)
10 W	20 W	3 dBd (5.2 dBi)
20 W	20 W	0 dBd (2.2 dBi)

## 2 Introduction

The eNETL2T/U/V is an RF power amplifier designed for use in the 210–270 MHz frequency range at up to 40 Watts. It is intended to serve as a 100% duty cycle amplifier for MDS entraNET 220 and TD220 radios operating in point-to-multipoint repeater or base applications.

### 2.1 Product Description

The eNETL2T/U/V power amplifier consists of an RF amplifier and PCB mounted to a heat sink, with a DC Power interface, power control interface, and input/output RF connections on the sidewalls of the chassis. DC power is supplied to the amplifier from a regulated and filtered DC source capable of supplying 10-16 VDC at a maximum current of 6 Amperes. The DC power source should be current limited or have a protective fuse or circuit breaker.

### 2.2 Power Control Loop Modes

The amplifier can operate in two modes; External or Internal Control Loop. In External mode, a cable feeds the output power level back to the transceiver (typically an entraNET 220) which adjusts its drive to attain the power setpoint. In Internal mode, a feedback circuit within the amplifier performs this function. In both cases, the setpoint is set by potentiometer R112, located within the amplifier. Further, the PA performs TX/RX switching to provide a low loss receive path when not transmitting. The TX/RX control is performed via the control cable attached at J101 and by RF detection within the PA.

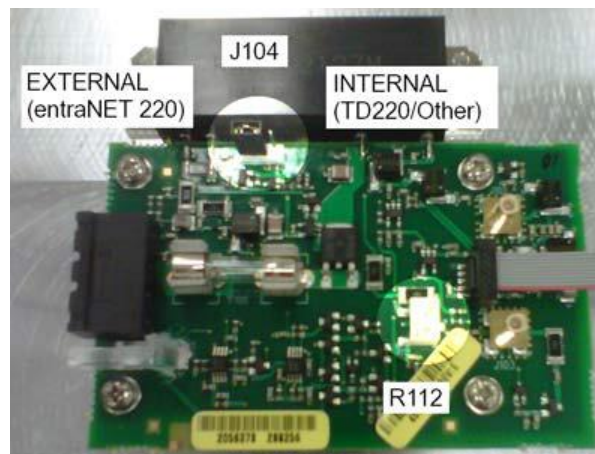
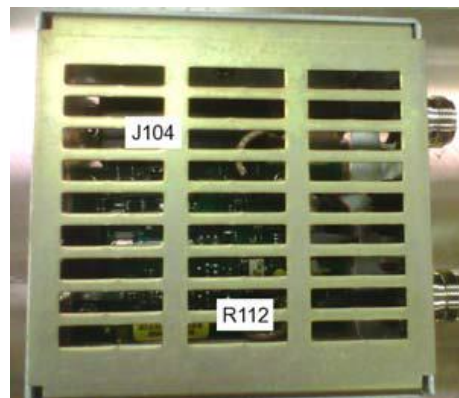


Figure 1 – J104 and R112 Locations

## 3 Interfaces

### 3.1 J101 Control Interface

The J101 Control Interface is intended to connect to the transceiver's control interface and provides keying and power control signals. The mating connector is a Molex 43025-0800 housing with Molex 43030-0007 female crimp terminals. An MDS P/N 03-4224A01 cable employs these and will plug into the socket on the PA. An MDS P/N 03-4152A01 cable will adapt the end of the 03-4224A01 cable to fit into the header on the 03-6139A01 TD/RCL DB25 to RJ adapter board (03-4758A03 kit).

**Table 1 – J101 Control Cable Pin Functions**

Pin	Function
Pin 1	EXT_KEY, 3 VDC enable TX, low=off
Pin 2	EXT_DET, 0.7 VDC (varies to set RF power)
Pin 3	Not used
Pin 4	Ground
Pin 5	Not used
Pin 6	Not used
Pin 7	Not used
Pin 8	Not used

### 3.2 J102 RF Output

J102 is a 50 Ohm Female Type N connector.

### 3.3 J103 RF Input

J103 is a 50 Ohm Female Type N connector.

### 3.4 J104 External/Internal Keying Jumper

J104 is a jumper block with 3 pins. Shorting pins 1 and 2 (EXT) enables an external transceiver to key the amplifier via J101. Shorting pins 2 and 3 (INT) enables the amplifier's internal power detector to key the amplifier. Access to this jumper block is via a hole in the top cover.

### 3.5 R112 Power Control Adjustment

R112 is used to adjust the RF power output of the amplifier in both internal and external keying modes. Turn the potentiometer clockwise for higher power and counterclockwise for lower power.

## 4 Installation

### 4.1 Mounting the Unit

The eNETL2T and eNETL2V are designed for mounting in a standard 19-inch rack cabinet using the 3U panel provided. Four screws (not provided) are required to attach the panel to the rack sides. This panel also serves as a heat sink for the PA module, and is normally mounted with the cooling fins facing outward.

### 4.2 Connecting the Unit

Place the amplifier module in service by making the following cable connections.

1. Using low loss 50-ohm coaxial cable, connect the RF Input connector (J103) to the RF output connector of the MDS 220 MHz radio.
2. Using low loss 50-ohm coaxial cable, connect the RF Output connector (J102) to the station duplexer or antenna.
3. For use with TD220 or other 220 MHz radios without a control interface, follow these sub-steps:
  - a. Move Jumper J104 to the Internal Keying position as shown in Figure 2 and leave J101 open. Access to J104 is available through a top cover vent slot.
4. For use with entraNET 220, follow these sub-steps:
  - a. Move Jumper J104 to the External Keying position as shown in Figure 2. Access to J104 is available through a top cover vent slot.
  - b. Connect the Power Control interface (J101) to the MDS 220 MHz radio in accordance with the pin connections listed in below. J101 is an 8-pin Molex polarized connector.
5. Connect 10-16 VDC power supply to the Power connector (J100). The left pin is positive (+); the right is negative (-).

This completes the installation procedure. The remainder of this guide provides steps for power output check/adjustment, lists specification data, and agency approval information.

#### Adjusting RF Power Output

To check/set the amplifier's RF power output, proceed as follows.

1. Connect a wattmeter (rated for use at 220 MHz, and at least 40 watts) to the amplifier's RF output connector (J102).
2. Terminate the wattmeter into a 50-ohm, non-inductive load.
3. Apply RF drive from 220 MHz radio and note the RF power indication at J102.
4. If necessary, adjust R112 (see Figure 2) with an insulated flat blade tool to achieve the desired output level. Access to this control is available through a top cover vent slot.

## 5 Unit Specifications

Table 2 – Unit Specifications

Parameter	Specification
Operating Voltage	13.8 VDC nominal
Maximum Current Draw	6 Amperes @ 12.5V, 40W RF Out
RF Drive Power	100 mW typical, 2W maximum
RF Out eNETL2T LEV: A (or blank)	Min: 42 to 44 dBm (16 to 25 W), Max: 44 to 47 dBm (25 to 50 W)
RF Out eNETL2T LEV: B	Min: <=40dBm(10W), Max: 44 to 46dBm (25 to 40 W)
Temperature Range	See Duty Cycle below
Humidity	95% at 40C (104F) non-condensing
Duty Cycle (T, V models)	100% up to full output power, -40 to +70 degC
Duty Cycle (U model)	100% at 2 Watts, 30% above 2 Watts, -40 to +70 degC
Operating Frequency	210–270 MHz*
Mounting	standard 19-inch rack cabinet
Approximate Weight	5.15 lbs.
Dimensions (T, V models)	5.25" H x 19" W x 2.88" D (13.34 H x 48.26 W x 7.31 D cm)
Dimensions (U-model)	5.25" H x 7" W x 2.88" D (13.34 H x 17.78 W x 7.31 D cm)
FCC Identifier	E5MDS-ENETL2TU
Name of Grantee	GE MDS LLC

\* For eNETL2T/U, specifications may vary outside 217–222 MHz. For eNETL2V, specifications may vary outside 256–261 MHz.

## 6 Technical Assistance

For assistance, contact us using one of the following methods:

Telephone: +1 585 241 5510

FAX: +1 585 242 8369

E-mail: [gemds.techsupport@ge.com](mailto:gemds.techsupport@ge.com)

Web: [www.gemds.com](http://www.gemds.com)

## 7 Change Log

Version	Date	Author	Changes
A	N/A	T. Mayo	Initial release
B	N/A	T. Mayo	Updates
C	2015-01-30	T. Mayo	Converted to new format. Updated FCC information.
D	2015-02-17	T. Mayo	Updated Part 80 maximum transmit power to match grant.
E	2015-02-27	T. Mayo	Added power control cable information.
F	2015-07-31	T. Mayo	Added details to the RF Out specification to clarify differences between models.
G	2016-07-12	T. Hodge	Update output power limits for Level B
H	2016-12-19	T. Mayo	Added temperature and humidity specifications