



GE MDS GPA-1 Manual
P/N draft
Rev A.

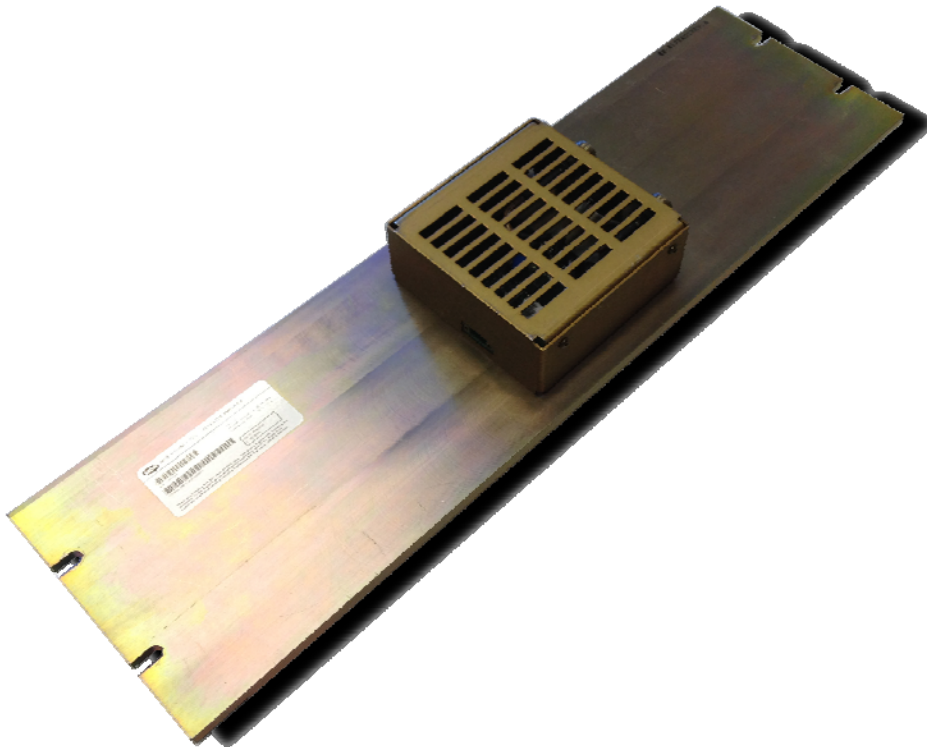


Table of Contents

1	Important Information	3
1.1	RF Exposure	3
1.2	FCC Approval Notice	3
1.3	FCC Part 90 Information	3
1.4	Product Description	4
1.5	Power Control Loop	4
2	Interfaces	5
2.1	J101 Control Interface	5
2.2	J102 RF Output	5
2.3	J103 RF Input	5
2.4	J104 External/Internal Jumper	5
2.5	R112 Power Control Adjustment	6
3	Installation	6
3.1	Mounting the Unit	6
3.2	Connecting the Unit	6
3.3	Alignment (Setting power output)	6
	GPA-1B smaller heat-sink option	7
	GPA-1 standard heat-sink option	7
	Unit Specifications	8
4	Technical Assistance	8
5	Change Log	8

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 1.8 meters, (5.9 feet) to the antenna when the transmitter is operating with a unity gain antenna.

This is an RF amplifier, the maximum ERP for this FCC band is 500 watts, this equates to an RF safety distance of 5.7 meters. For Canada, the maximum ERP is 125 Watts, this equates to a distance of 3.6 meters.

Please consult the FCC website below for RF safety distances, using different antenna gain configurations which affect the ERP.

More information on RF exposure can be found on the Internet at:
www.fcc.gov/oet/info/documents/bulletins.

Installation professionnelle requise. L'équipement radio décrite dans ce guide émet de l'énergie de fréquence radio. Bien que le niveau de puissance est faible, l'énergie concentrée depuis une antenne directionnelle peut-être poser un danger pour la santé.

Ne laissez pas les gens à se rapprocher de 1,8 mètres, (5,9 pieds) à l'antenne lorsque l'émetteur fonctionne avec une antenne à gain unité.

Il s'agit d'un amplificateur RF, la P.A.R. maximale pour cette bande de FCC est de 500 watts, cela équivaut à une distance de sécurité RF de 5,7 mètres. Pour le Canada, la P.A.R. maximale est de 125 Watts, cela équivaut à une distance de 3,6 mètres.

Veillez consulter le site de FCC ci-dessous pour les distances de sécurité RF, à l'aide de configurations de gain antenne différentes qui affectent l'ERP.

Plus d'informations sur l'exposition aux radiofréquences se trouvent à l'adresse Internet :
www.fcc.gov/oet/info/documents/bulletins.

1.2 FCC Approval Notice

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

1.3 FCC Part 90 Information

For FCC Part 90, valid frequencies are 150-174 MHz at up to 500 Watts ERP

Part 90 Signal Boosters	THIS IS A 90.219 CLASS A DEVICE
<p>WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.</p>	

Caution; only use authorized antennas that meet the FCC license requirements. Use of unauthorized antennas, cables, and/or coupling devices not conforming with ERP/EIRP for outdoor/indoor will void the licensee's license to operate.

Introduction

The GPA-1 is an RF power amplifier designed for use in the 150-174 MHz frequency range at up to 40 Watts. It is intended to serve as a 100% duty cycle amplifier for MDS SD1 operating in point-to-multipoint repeater or base applications.

1.4 Product Description

The GPA-1 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 8 Amperes. The DC power source should be current limited or have a protective fuse or circuit breaker.

1.5 Power Control Loop

The GPA-1 amplifier operates in INT mode. In Internal mode, a feedback circuit within the amplifier controls the output power. The set point 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 by RF detection within the PA.

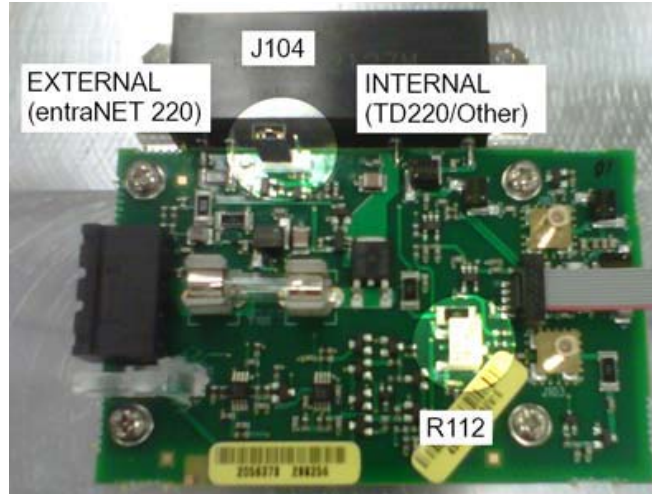


Figure 1 – J104 and R112 Locations

2 Interfaces

2.1 J101 Control Interface

The J101 Control Interface is intended to connect to the transceiver’s control interface and provides keying and power control signals.

Table 1 – J101 Control Cable Pin Functions

Pin	Function
Pin 1	3 Vdc enable TX, low=off
Pin 2	0.7 Vdc (varies to set RF power)
Pin 3	Not used
Pin 4	Ground

2.2 J102 RF Output

J102 is a 50 Ohm Female Type N connector.

2.3 J103 RF Input

J103 is a 50 Ohm Male Type N, REVERSE Polarity connector. This RF amp is provided with a Reverse Polarity N connector, to meet the FCC RF signal Booster/Amplifier rules. The connector is provided so that only one RF signal can be input to the RF Amp.

This amplifier is designed to be only used with the GEMDS SD1 Data Transceiver.

At no time shall this amplifier be used with no more than the intended single RF input, any other combination of signal shall void the FCC type approval of this amplifier

2.4 J104 External/Internal Jumper

J104 is a jumper block with 3 pins. Shorting pins 1 and 2 (EXT) is not used for the GPA-1. Shorting pins 2 and 3 (INT) enables the amplifier’s internal power detector to control the amplifier power output. Access to this jumper block is via a hole in the top cover.

2.5 R112 Power Control Adjustment

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

3 Installation

3.1 Mounting the Unit

The GPA-1 is 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.

3.2 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 SD1 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 SD1 transceiver follow these sub-steps, PWR set between 23-27 dBm (input power). Do not use above 27dBm for GPA-1 input. Move Jumper J104 to the Internal Keying position as shown in Figure 1. Access to J104 is available through a top cover vent slot.
4. Connect 10-16 Vdc power supply to the Power connector (J100). The left pin is positive (+); the right is negative(-).

3.3 Alignment (Setting power output)

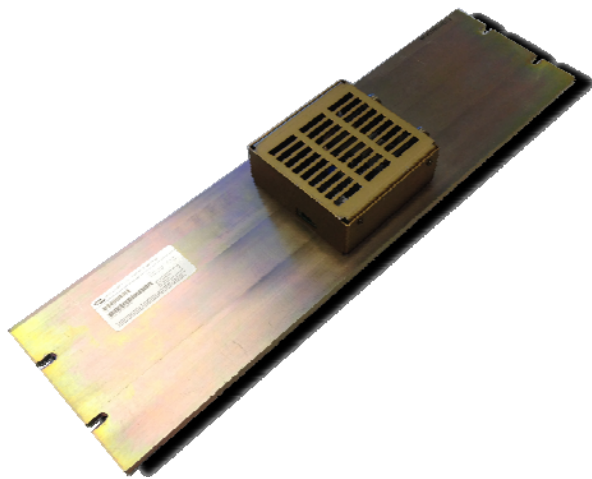
Adjusting RF Power Output

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

1. Connect a wattmeter (rated for use at 150 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. Set SD1 PWR=23dBm
4. Apply RF drive from 150 MHz radio and note the RF power indication at J102.
5. 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.



GPA-1B smaller heat-sink option



GPA-1 standard heat-sink option

Unit Specifications

Table 2 – Unit Specifications

Parameter	Specification
Operating Voltage	10-16 Vdc
Maximum Current Draw	8 Amperes @ 12.5V, 40W RF Out.
RF Drive Power	SD1 PWR=23dBm
RF Out	+40 to +46 dBm (10-40 watts), adjustable
Duty Cycle (GPA-1 model)	100% up to full output power
Duty Cycle (GPA-1B model)	100% at 2 Watts, 30% above 2 Watts
Operating Frequency	150–174 MHz*
Mounting	standard 19-inch rack cabinet
Approximate Weight	5.15 lbs.
Dimensions (GPA-1 model)	5.25" H x 19" W x 2.88" D (13.34 H x 48.26 W x 7.31 D cm)
Dimensions (GPA-1B-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-GPA-1
Name of Grantee	GE MDS LLC

4 Technical Assistance

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

Telephone: 585.241.5510

FAX: 585.242.8369

E-mail: gemds.techsupport@ge.com

Web: www.gemds.com

5 Change Log

Version	Date	Author	Changes
A		D.McCarthy	Initial release