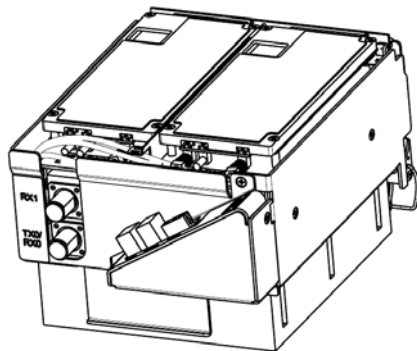
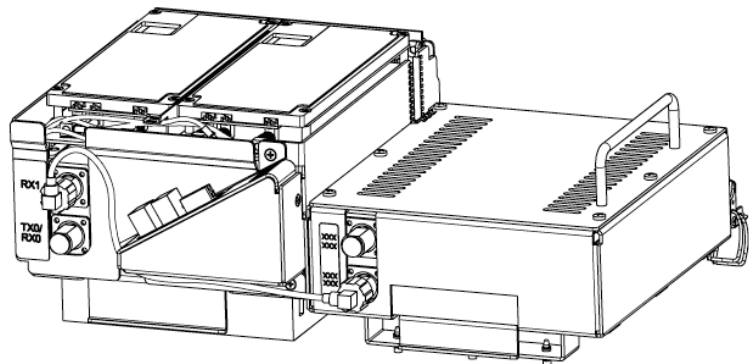


# FlexWave Prism<sup>®</sup> RF Modules for Prism Remote Units Installation Guide

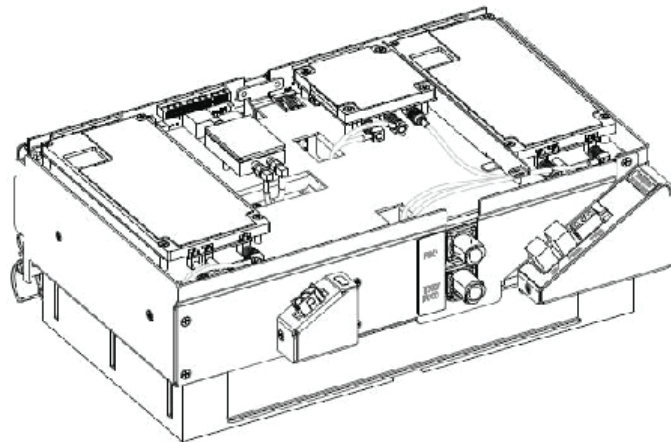
TECP-77-141 • Issue 5 • November 2013



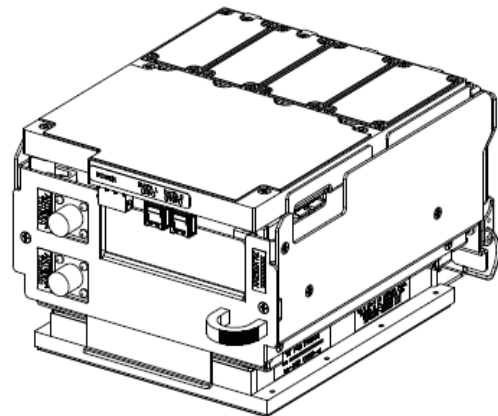
Single-Slot RF Module



Dual-Band Dual-Slot RF Module



Dual-Slot 40W RF Module



HDM RF Module

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## PREFACE

This manual provides the information you need to install TE Connectivity FlexWave Prism® RF Modules into a Prism Remote Unit (PRU). Installation instructions are provided for the following Prism Remote Unit RF Modules:

- Single-Slot RF Modules, which includes the HDM RF Modules
- Dual-Slot RF Modules
  - Dual-Card RF Modules
  - 40W RF Modules.

**NOTE:** This installation guide documents the RF Modules that are compatible with the FlexWave Prism Remote Unit, which is designed for outdoor use. For information on the RF Modules designed for use with the FlexWave Prism Indoor Remote Units (IRUs), see the *FlexWave Prism Indoor Remote Unit Installation Guide* (TECP-77-197).

## Revision History

Table 1. *Revision History*

Issue	Document Date	Technical Updates
1	April 2012	Original
2	February 2013	Changed Prism remote Unit model names from Single-/Dual-/Tri-/Quad-Band to Single-/Dual-/Tri-/Quad-Bay; updated <a href="#">Table 4 on page 10</a> to add new RF Modules; removed the <i>Specifications</i> section, which included the <i>RF and Optical Specifications</i> and the <i>Frequency and Composite Output Power at Antenna Port (dBm) for Prism Remote Units</i> tables; to access these performance specifications, refer to the <i>FlexWave Prism Performance Specifications</i> (TECP-77-201); updated “ <a href="#">Contacting TE Connectivity</a> ” on <a href="#">page 46</a> .
3	May 2013	Updated “ <a href="#">Accessing User Documentation on the TE Customer Portal</a> ” on <a href="#">page 4</a> ; added “ <a href="#">Understanding the RF Module Cables</a> ” on <a href="#">page 15</a> ; updated “ <a href="#">Connect the RF Module Cables</a> ” on <a href="#">page 37</a> .
4	October 2013	Added support for the following HDM RF Modules, in conjunction with Prism EMS Software Release 8.1.1: HDM AWS Band 4 MIMO 20W; HDM AWS Band 4 SISO 40W; HDM PCS Band 25 SISO 40W (see <a href="#">Table 4 on page 10</a> ); updated <a href="#">Table 2 on page 3</a> .
5	November 2013	Adds support for the

## FlexWave Prism User Documentation

FlexWave Prism user documentation is intended for system administrators, engineers and installers responsible for planning, administering, configuring, and maintaining FlexWave Prism systems. [Table 2](#) lists the manuals that correspond to the features of the FlexWave Prism EMS described in this guide.

**Table 2.** FlexWave Prism User Documentation

Title	Catalog Number
<i>FlexWave Prism Software Release 8.1 System Setup and Provisioning Guide</i> <sup>(1)</sup>	TECP-77-214
<i>FlexWave Prism Software Release 8.1.1 Performance Specifications</i> <sup>(2)</sup>	TECP-77-229
<i>Host Unit II Installation Guide</i>	TECP-77-206
<i>Host Unit Expansion Unit Installation Guide</i>	TECP-77-202
<i>Host Unit II and Host Unit Expansion Unit Module Replacement Guide</i>	TECP-77-207
<i>Prism Remote Unit Installation Guide</i>	TECP-77-142
<i>RF Modules for Prism Remote Units Installation Guide</i> <sup>(3)</sup>	TECP-77-141
<i>Indoor Remote Unit Installation Guide</i>	TECP-77-197
<i>OADM Splice Box Installation Guide</i>	TECP-77-208
<i>Coarse Wavelength Division Multiplexer User Guide</i>	TECP-77-209
<p>1 Release 8.1 is the <i>earliest</i> release of the FlexWave Prism EMS that supports the hardware features described in this installation guide.</p> <p>2 Release 8.1.1 is the <i>earliest</i> release of the FlexWave Prism EMS that supports the RF Modules added to this installation guide; see “<a href="#">Revision History</a>” on page 2.</p> <p>3 The Prism Remote RF Modules and Remote Mounting Kit are designed for use only in the Prism Remote Unit (PRU). The IRU RF Modules and mounting options are described in the <i>FlexWave Prism Indoor Remote Unit Installation Guide</i> (TECP-77-197).</p>	

## Document Cautions and Notes

Two types of messages, identified below, appear in the text:

**CAUTION!** Cautions indicate operations or steps that could cause personal injury, induce a safety problem in a managed device, destroy or corrupt information, or interrupt or stop services.

**NOTE:** Notes contain information about special circumstances.

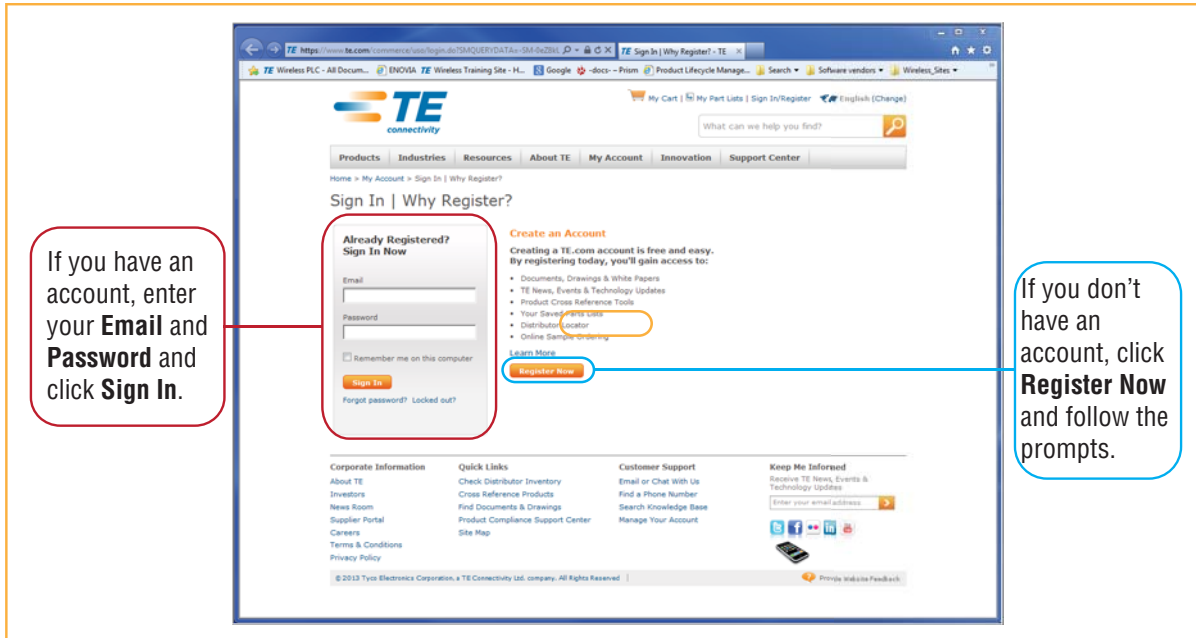
## Accessing User Documentation on the TE Customer Portal

- 1 Click on the following URL link:

**`https://www.te.com/portal/wireless/`**

(Alternatively, enter the preceding URL into your web browser, and then press **ENTER** on your keyboard.)

- 2 Access to the Customer Portal requires a user account and password. On the **Sign In** page, do one of the following:



- 3 On the **Wireless Customer Portal** home page in the **Knowledge Center** panel, click the **Manuals and Data Sheets** link.
- 4 On the **Manuals and Data Sheets** page, do the following:
  - a In the **Document Repository** panel, scroll to the section for the product line of the document that you want to access.
  - b Click on the title of the manual that you wish to open.
  - c (Optional) Save the PDF to your PC or laptop.

## Standards Certification

**FCC:** This equipment complies with the applicable sections of Title 47 CFR Part 15 (Host Unit), Part 22 (800 MHz Cellular), Part 24 (1900 MHz - PCS), Part 90 (800/900 - SMR), and Part 27 (2100 MHz - AWS) & (700 MHz -LTE).

**IC:** This equipment complies with the applicable sections of RSS-131. The term “IC:” before the radio certification number only signifies that Industry Canada Technical Specifications were met.

The Manufacturer's rated output power of this equipment is for single carrier operation. For situations when multiple carrier signals are present, the rating would have to be reduced by 3.5 dB, especially where the output signal is re-radiated and can cause interference to adjacent band users. This power reduction is to be by means of input power or gain reduction and not by an attenuator at the output of the device.

**Note:** To comply with Maximum Permissible Exposure (MPE) requirements, the maximum composite output from the antenna cannot exceed 1000 Watts ERP (LTE, Cellular and SMR), the antenna cannot exceed 1640 Watts EIRP (PCS and AWS), and the antenna must be permanently installed in a fixed location that provides at least 6 meters (20 feet) of separation from all persons.

**UL/CUL:** This will be installed in a restricted access location. This equipment complies with Type 4, per UL and CUL 50, Standard for Enclosures for Electrical Equipment. This equipment provides the degree of protection specified by IP66 as defined in IEC Publication 529.

**FDA/CDRH:** This equipment uses a Class 1 LASER according to FDA/CDRH Rules. This product conforms to all applicable standards of 21 CFR Part 1040.

**Caution:** Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**EU Harmonized Standards:** Meets essential requirements of R&TTE 1999/5/EC.

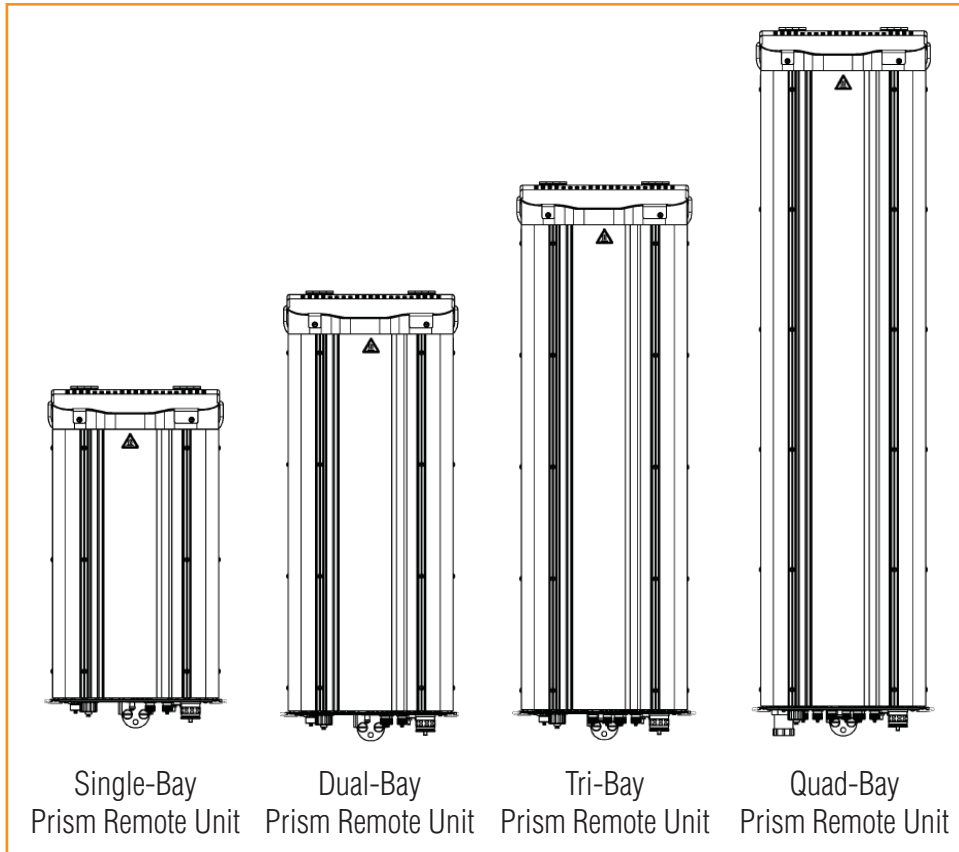
- Article 3.1a—The protection of the health and the safety of the user and any other person, including the objectives with respect to safety requirements contained in Directive 2006/95/EC, but with no voltage limit applying.
- Article 3.1b—The protection requirements with respect to electromagnetic compatibility contained in Directive 2004/108/EC.
- Article 3.2—In addition, radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communication and orbital resources so as to avoid harmful interference.

**EMC Standards:** EN 55022 and EN55024 (CE marked)

**Safety Standards:** This equipment complies with IEC 60950-1, 2ND Edition + Amendment 1 (CE marked) and with UL 60950-1, 2ND Edition + Amendment 1 (File number E174166) (USA and Canada)

## OVERVIEW OF RF MODULES FOR PRUs

Figure 1 illustrates the Prism Remote Unit (PRU), which controls RF emissions, interfaces with the FlexWave Host.



**Figure 1.** Prism Remote Units

The PRU has from one to four RF Module slots, depending on the PRU model. That is, the Single-Bay PRU has one RF Module slot, and the Quad-Bay PRU has four RF Module slots. A PRU can support up to four RF Modules.

The function of the PRU RF Modules on the Forward Path is to:

- convert the digitized RF transported from the Host to Analog RF
- amplify the Analog RF signal
- provide signal filtering.

The function of the PRU RF Modules on the Reverse Path is to:

- convert the Analog RF from the handset to Digital RF for transport to the Host
- provide signal filtering.



---

Each RF Module can support any of the following DART combinations:

- one Classic DART or one Single SuperDART
- two Classic DARTs
- two Single SuperDARTs
- one Dual SuperDART
- one or two sets of Tx or Rx Boards (HDM)
  - HDM-850 has one set
  - HDM-700 has two sets.

Each RF Module will have up to two 6-timeslot DARTs or one 12-timeslot DARTs per RF Module. The RF Modules are field replaceable, but cannot be serviced in the field.

## PRU RF Module Types

The PRU RF Modules are available in the following formats, and as described in the following sections:

- “Prism Remote Unit Single- and Dual-Card RF Modules” on page 8
- “Prism Remote Unit HDM RF Modules” on page 9
- “Prism Remote Unit Dual-Slot 40W RF Modules” on page 10.

## Prism Remote Unit Single- and Dual-Card RF Modules

Figure 2 shows examples of PRU Single- and Dual-Slot RF Modules, both of which have two DARTs. A PRU Single- and Dual-Card RF Module comprise:

- one DART
- one Duplexer with one or two internal Low Noise Amplifiers (LNAs)
- one Linear Power Amplifier (LPA)
- one Remote DART Interface (RDI) board.

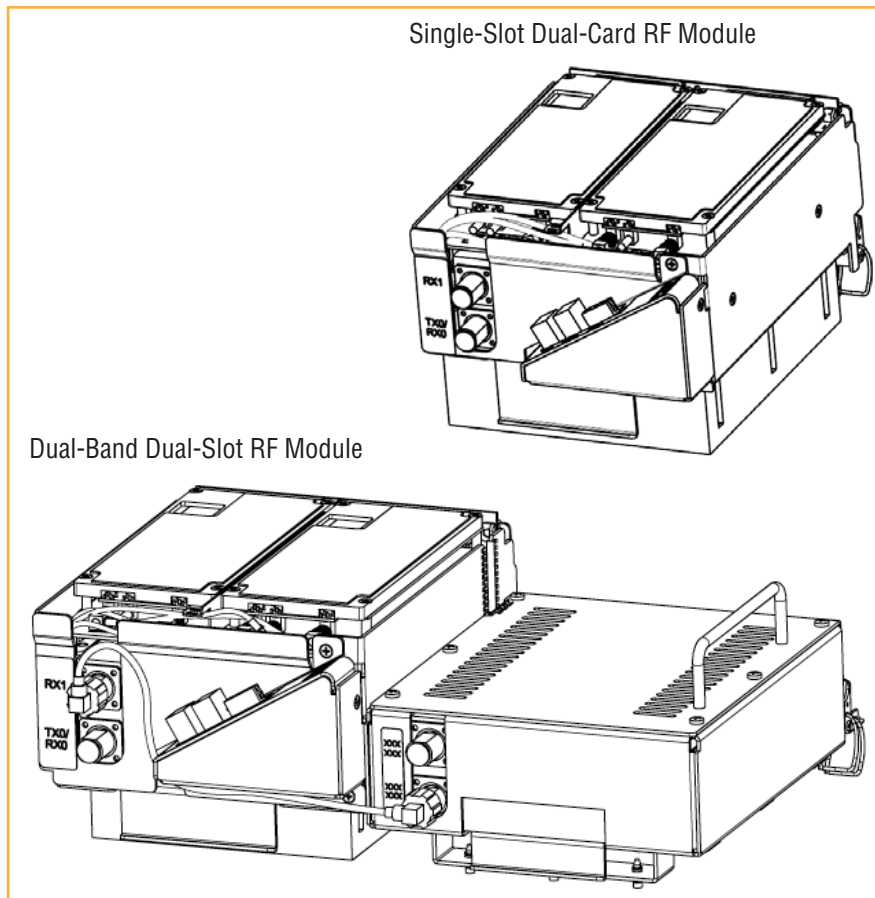


Figure 2. Single- and Dual-Slot RF Modules

## Prism Remote Unit HDM RF Modules

PRU HDM RF Modules (Figure 3) are designed for 850 Cell frequencies. The initial release of the HDM RF Module is a Single Input Single Output (SISO) Configuration that

- interfaces one Host DART—either Classic or SuperDART
- supports two non-contiguous RF slices up to 25 MHz total bandwidth—SuperDART only
- supports up to 40W RF output power.

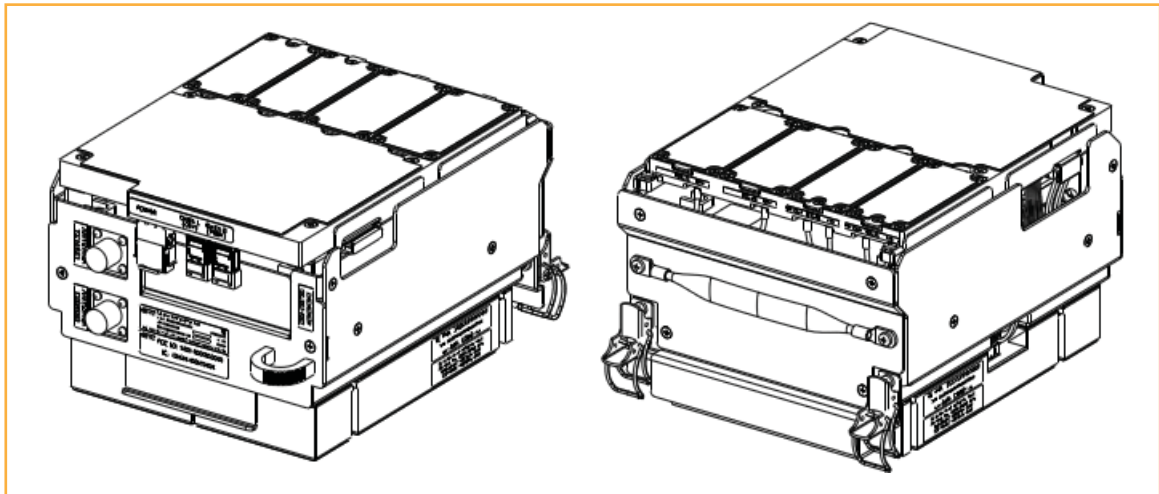


Figure 3. HDM RF Module

The components of a PRU HDM RF Module are dependent on the module type, as listed in Table 3.

Table 3. Components of PRU HDM RF Modules

RF Module Type	DPM	LPA	Duplexer	Rx Card	Tx Card
SISO <sup>(1)</sup>	1	1	1	1	1
MIMO/Dual Band Module <sup>(2)</sup>	1	2	2	2	2
(1) 850 20W and 40W only.					
(2) 700 MIMO 20W and 850/1900 20W only.					

## Prism Remote Unit Dual-Slot 40W RF Modules

The FlexWave PRU Dual-Slot 40W RF Module (Figure 5) is designed for AWS and PCS frequencies. The Prism Remote 40W RF Module comprises:

- one DART
- two Power Amplifiers (PAs)
- one Remote DART Interface (RDI) board.

**NOTE:** This manual describes how to install the PCS 1900 and AWS 2100 Non-Diversity RF Modules.

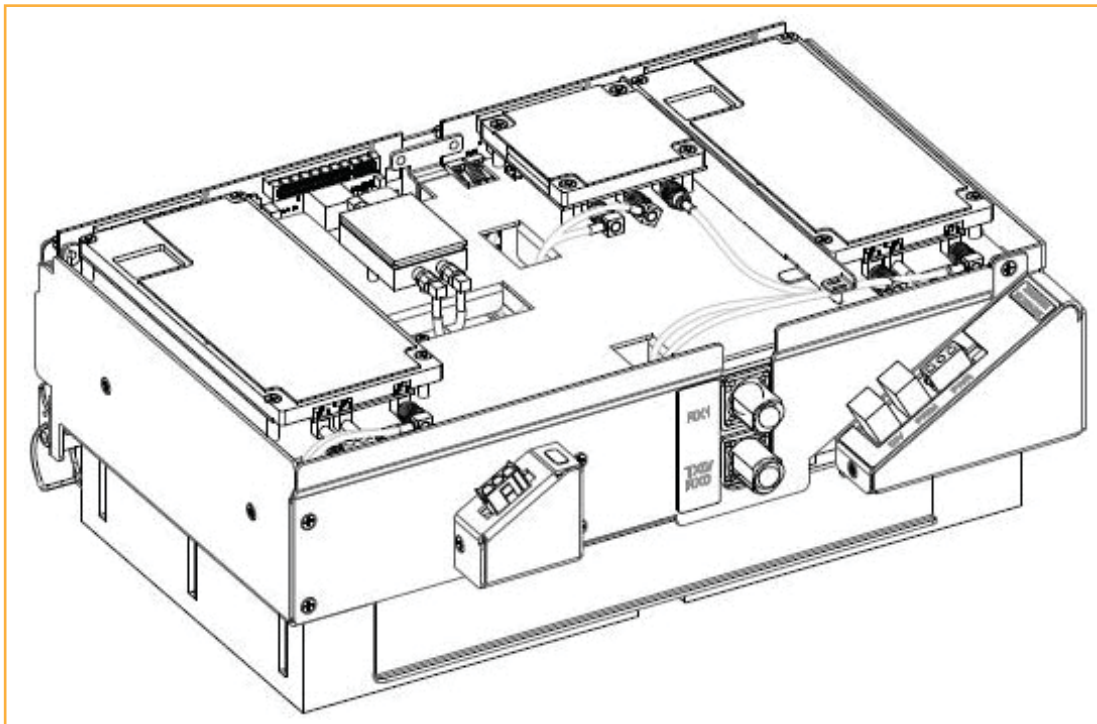


Figure 4. Dual-Slot 40W RF Module

## Supported RF Modules

Table 4. FlexWave Prism RF Modules for PRUs Supported in this Installation Guide

Catalog Number	Description
FWP-4210000MOD	6.5W 800 SMR MODULE, NON-DIVERSITY, CLASSIC
FWP-6216000MOD	10W, EGSM 900, NON-DIVERSITY, SGL SD
FWP-6226000MOD	10W, EGSM 900, DIVERSITY, SGL SD
FWP-7416000MOD	20W, GSM 1800, NON-DIVERSITY, SGL SD
FWP-741S000MOD	20W, GSM 1800, NON-DIVERSITY, DL SD
FWP-7426000MOD	20W, GSM 1800, DIVERSITY, SGL SD

**Table 4.** *FlexWave Prism RF Modules for PRUs Supported in this Installation Guide (Cont.)*

<b>Catalog Number</b>	<b>Description</b>
FWP-8410000MOD	20W RF Module, PCS 1900 Non-Diversity Enclosure
FWP-8416000MOD	20W PCS MODULE, NON-DIVERSITY, SGL SD
FWP-841S000MOD	20W RF Module, PCS 1900 12S Enclosure
FWP-8420000MOD	20W RF Module, PCS 1900 Diversity Enclosure
FWP-8426000MOD	20W PCS MODULE, DIVERSITY, SGL SD
FWP-84MT000MOD	20W RF MOD, PCS1900, MIMO
FWP-8810000MOD	40W PCS MODULE, NON-DIVERSITY, CLASSIC (DUAL-SLOT)
FWP-881T000MOD	HDM PCS Band 25 SISO 40W
FWP-9416000MOD	20W, UMTS 2100, NON-DIVERSITY, SGL SD
FWP-9416D00MOD	20W 2100 UMTS MODULE, DIV Ready, SGL SD
FWP-941S000MOD	20W, UMTS 2100, NON-DIVERSITY, DL SD
FWP-9426000MOD	20W, UMTS 2100, DIVERSITY, SGL SD
FWP-A410000MOD	20W RF Module, AWS 2100 Non-Diversity Enclosure
FWP-A416000MOD	20W AWS MODULE, NON-DIVERSITY, SGL SD
FWP-A41S000MOD	20W RF Module, AWS 2100 12S Enclosure
FWP-A420000MOD	20W RF Module, AWS 2100 Diversity Enclosure
FWP-A426000MOD	20W AWS MODULE, DIVERSITY, SGL SD
FWP-A4MT000MOD	HDM AWS Band 4 MIMO 20W
FWP-A810000MOD	40W AWS MODULE, NON-DIVERSITY, CLASSIC
FWP-A81T000MOD	HDM AWS Band 4 SISO 40W
FWP-B410000MOD	20W WIDEBAND CELL MODULE, NON-DIVERSITY, Classic
FWP-B420000MOD	20W WIDEBAND CELL MODULE, DIVERSITY, CLASSIC
FWP-B810100MOD	40W WIDEBAND CELL MODULE, NON-DIVERSITY, (SGL-SLOT)
FWP-C4MT000MOD	DUAL 20W 850/1900 RF MODULE, (SGL BAY)
FWP-D210000MOD	6.5W 800/900 ESMR MODULE, NON-DIVERSITY, CLASSIC
FWP-F216000MOD	10W APAC EGSM (885-915) MODULE, SGL SD
FWP-I210000MOD	6.5W APAC iDEN Module, Non-Diversity, Classic (Extended 1 MHz)
FWP-K216000MOD	10W 900 P-GSM Module, Non-Diversity, SGL SD
FWP-K226000MOD	10W 900 P-GSM Module, Diversity, SGL SD
FWP-L416000MOD	20W 700 Lower ABC MODULE, NON-DIVERSITY, SGL SD
FWP-L4MT000MOD	DUAL 20W 700 LOWER ABC MODULE, MIMO
FWP-L4MTU4MMOD	20W RF MOD, 700ABC/700UC
FWP-U416000MOD	700 LTE, UPPER C, 20W MODULE, SISO, SGL SD
FWP-U4MT000MOD	DUAL 20W 700 UPPER C MODULE, MIMO
FWP-U816100MOD	40W 700 Upper C MODULE, NON-DIVERSITY, SGL SD (SGL-SLOT)

## RF MODULE COMPONENTS

Figure 5 shows typical RF Module components, using the Single-Slot RF Module as an example.

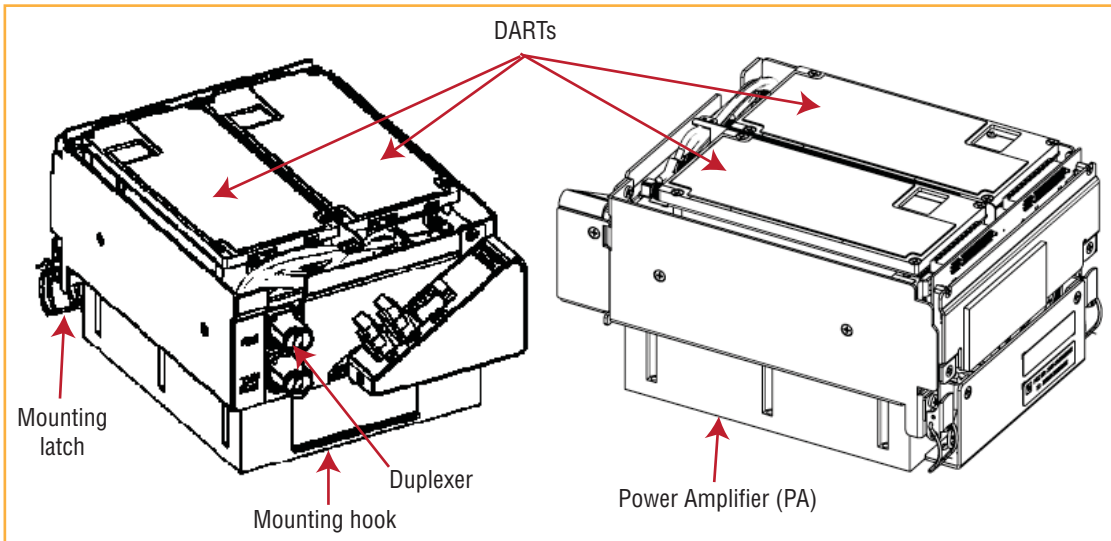


Figure 5. PRU Single-Slot RF Module Components

Figure 6 shows the components of an HDM RF Module.

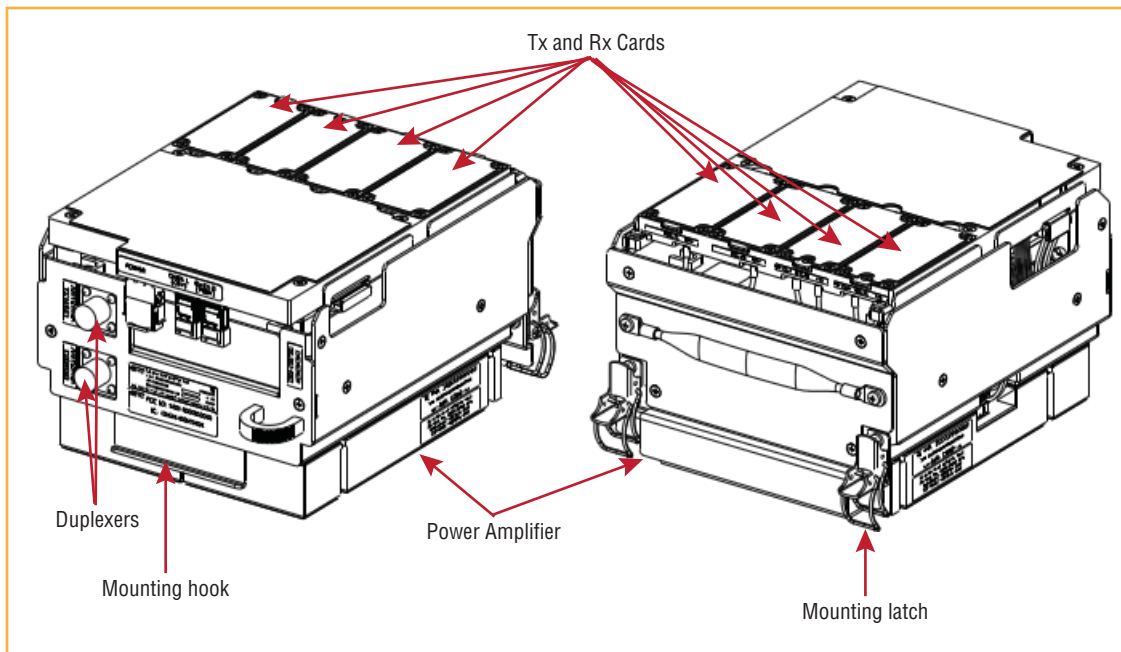


Figure 6. HDM RF Module Components

## Duplexer and Low Noise Amplifier

The RF Module provides the PRU with an internal Duplexer that is optimized to provide the desired RF band-pass filtering and in-band equipment isolation between FWD and REV paths. The Duplexer provides the filtering necessary to the transmit and receive paths to and from the connected antenna.

The Duplexer for the Prism Remote Unit Single- and Dual-Card RF Modules and the Dual-Slot 40W RF Modules contains up to two REV path Low Noise Amplifiers (LNA for PRI and/or SEC reverse paths). Each LNA provides the Prism reverse path with nominal 30 dB REV gain and system NF of 5 dB per RX path.

The Duplexer for an HDM RF Module does not have a Low Noise Amplifier.

Duplexers are not field serviceable.

## Linear Power Amplifiers

The Linear Power Amplifier (LPA) is a high quality broadband RF amplifier used for achieving Prism product-rated power for the PRU Tx forward path spectrum RF. The PAs are pass-band specific, with the maximum composite Tx power levels, and >10 dB instantaneous peak power rating listed in:

- [Table 5](#) for Single-Card, Dual-Card, and HDM RF Modules
- [Table 6 on page 14](#) for Dual-Slot 40W RF Modules.

The LPA is housed within the RF Module, and is not field serviceable.

**Table 5.** LPA Maximum Composite Tx Power Levels for Single-Card, Dual-Card, and HDM RF Modules

Passband	Maximum dBm	Watts	Instantaneous Bandwidth (MHz)
AWS 2100	+43	20	45
Cellular 850	+43	20	25
	+46	40	25
EGSM 900	+40	10	35
DCS 1800	+42	15.8	75
LTE 700 Lower ABC	+43	20	18
	+46	40	18
LTE 700 Upper C	+43	20	10
	+46	40	10
PCS 1900	+43	20	70
PGSM 900	+40	10	25
SMR 800	+38	6.5	18
SMR 900	+38	6.5	5
UMTS 2100	+42	15.8	60

**Table 6.** LPA Maximum Composite Tx Power Levels for Dual-Slot 40W RF Modules

Passband	Maximum dBm	Watts	Instantaneous Bandwidth (MHz)
PCS 1900	+46	40	70
AWS 2100	+46	40	45

**NOTE:** Industry Canada 20 dB Pass Band Model Number FWP-C4MT000MOD Cellular 850 MHz = 26.3 MHz and the PCS 1900 = 66.8 MHz.

## Digital Processing Module

The Digital Processing Module (DPM) is found only in the HDM RF Modules. The DPM provides the primary processing and logic functions for the HDM RF Module. It also provides the primary power interface for the HDM RF Module, and conversion of the native 28 Vdc voltage to lower voltages as necessary for functionality.

The DPM has a Transmit (Tx) Board and a Receive (Rx) Board:

- Tx Board—provides band specific filtering for the intended Transmit path.
- Rx Board—provides band specific filtering for the intended Receive path.



---

## UNDERSTANDING THE RF MODULE CABLES

Before you install the RF Module cables, familiarize yourself with the rules that pertain to these cables, as defined in the following sections.

Always provided at each RF Module shelf are five cables:

- two High-Speed Data Cables, which in this document are referred to as LVDS (Low-Voltage Differential Signaling) cables
- two RF Cables (TX0/RX0) and (TX1/RX1)
- one Power (PWR) Cable.

### Power Cable Connection

Maintain adequate strain relief distances from the connection points to the module.

### LVDS Cable Connections

- LVDS cables labeled PRIM and DIV should always either be connected to a RF Module or strain relieved to adjacent cables, as this protects the cable against damage through misplacement.
- Align and fully insert the LVDS cable connectors into their respective connector cages. Full insertion is identified by an audible click.
- Ensure the two LVDS cables are fully seated and latched into their respective receptacles on the RF Module by lightly pulling outward on the connectors. If fully seated and locked into position, the cable connectors will not slide back out.
- Maintain adequate strain-relief distances from the connection points to the RF Module.

### RF Cable Connections

The RF Module cables that are pre-installed in the PRU connect to the corresponding connectors on the RF Module. The RF Module cables correlate to the antenna connectors on the bottom of the PRU chassis.

## RF Cable Rules

- When installing a Diversity, MIMO or Dual-Band RF Module, both RF cables labeled MOD N TX0/RX0 and MOD N TX1/RX1 shall be connected to the N-Style connections of the RF Module.
- When installing a Non-Diversity or SISO RF Module:
  - The MOD N TX0/RX0 cable shall be connected to the single available N-Style RF Connection of the RF Module.
  - The MOD N TX1/RX1 cable shall be constrained to the existing cables using a tie wrap or similarly accepted fastener so it cannot be pinched or prevent the PRU door from closing. Do not cut or attempt to otherwise remove this RF Cable.
- RF cables are hand-formable; however, cables must adhere to a minimum bend radius of 1-inch from the outlet of the integrated cable guide to the respective N-Style RF connection on the RF Module.

## RF Module Cables for Single-Card, Dual-Card, and HDM RF Modules

The RF cable and connector labels also correspond to the RF Module slots in the PRU chassis, where **MOD A** is the bottom slot and **MOD D** is the top slot. In the installation steps, the RF cables and connectors are referred to as **MOD N TX0/RX0** and as **MOD N TRX1** where **N** equals **A, B, C, or D**.

The cables and connectors have corresponding labels as shown in [Table 7](#) for Single-Card, Dual-Card, and HDM RF Modules.

**Table 7.** RF Antenna Labels for Single-Card, Dual-Card, and HDM RF Modules—From Top of Chassis Down

RF Module Cable, RF Module Connector, and Remote Antenna Connector Label	Function	Single-Slot Remote Unit RF Module Slot Designations	Dual-Slot Remote Unit RF Module Slot Designations		
			Dual-Bay	Tri-Bay	Quad-Bay
Mod D TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module D	MOD D	N/A	N/A	MOD C
Mod D TX1/RX1	Diversity receive for RF power from the antenna for RF Module D				
Mod C TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module C	MOD C	N/A	MOD B	MOD B
Mod C TX1/RX1	Diversity receive for RF power from the antenna for RF Module C				
Mod B TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module B	MOD B	MOD A		
Mod B TX1/RX1	Diversity receive for RF power from the antenna for RF Module B				
Mod A TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module A	MOD A		MOD A	MOD A
Mod A TX1/RX1	Diversity receive for RF power from the antenna for RF Module A				

## RF Module Cables for Dual-Slot Installations

For Dual-Slot installations, the RF cables and connectors are labeled as **MOD N TX0/RX0** and **MOD N TX1/RX1**, where **N** refers to the bottom slot of the double-slot installation. For example, for a Dual-Slot installation in a Quad-Bay chassis, the RF cables and connectors are labeled as **MOD C TX0/RX0** and **MOD C TX1/RX1**.

The cables and connectors have corresponding labels as shown in [Table 8 on page 17](#) for Dual-Slot 40W RF Modules.

**Table 8.** RF Antenna Labels for Dual-Slot 40W RF Modules (Top of Chassis Down)

RF Module Cable, RF Module Connector, and Remote Antenna Connector Labels	Function	Slots for 40W RF Modules <sup>(a) (b)</sup>		
		Dual-Bay	Tri-Bay	Quad-Bay
Mod D TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module D	N/A	N/A	Slots C and D
Mod D RX1	Diversity receive for RF power from the antenna for RF Module D			
Mod C TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module C	N/A	N/A	
Mod C RX1	Diversity receive for RF power from the antenna for RF Module C			
Mod B TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module B	Slots A and B	Slots A and B	Slots A and B
Mod B RX1	Diversity receive for RF power from the antenna for RF Module B			
Mod A TX0/RX0	Transmit RF power and primary receive to/from the antenna for RF Module A			
Mod A RX1	Diversity receive for RF power from the antenna for RF Module A			
<sup>(a)</sup> N/A indicates that the slot cannot be used for a Dual-Slot 40W RF Module <sup>(b)</sup> Install the Dual-Slot 40W RF Module in the lower-most slot in the chassis. If, however, if two Dual-Slot 40W RF Modules are present, install the 2100 Module in the lower-most slot and the 1900 Module in the upper-most slot.				

## RF Group Assignments for PRUs

A PRU comprises from one to four RF Module slots. **Figure 7** illustrates the numbering of RF Module slots and DARTs.

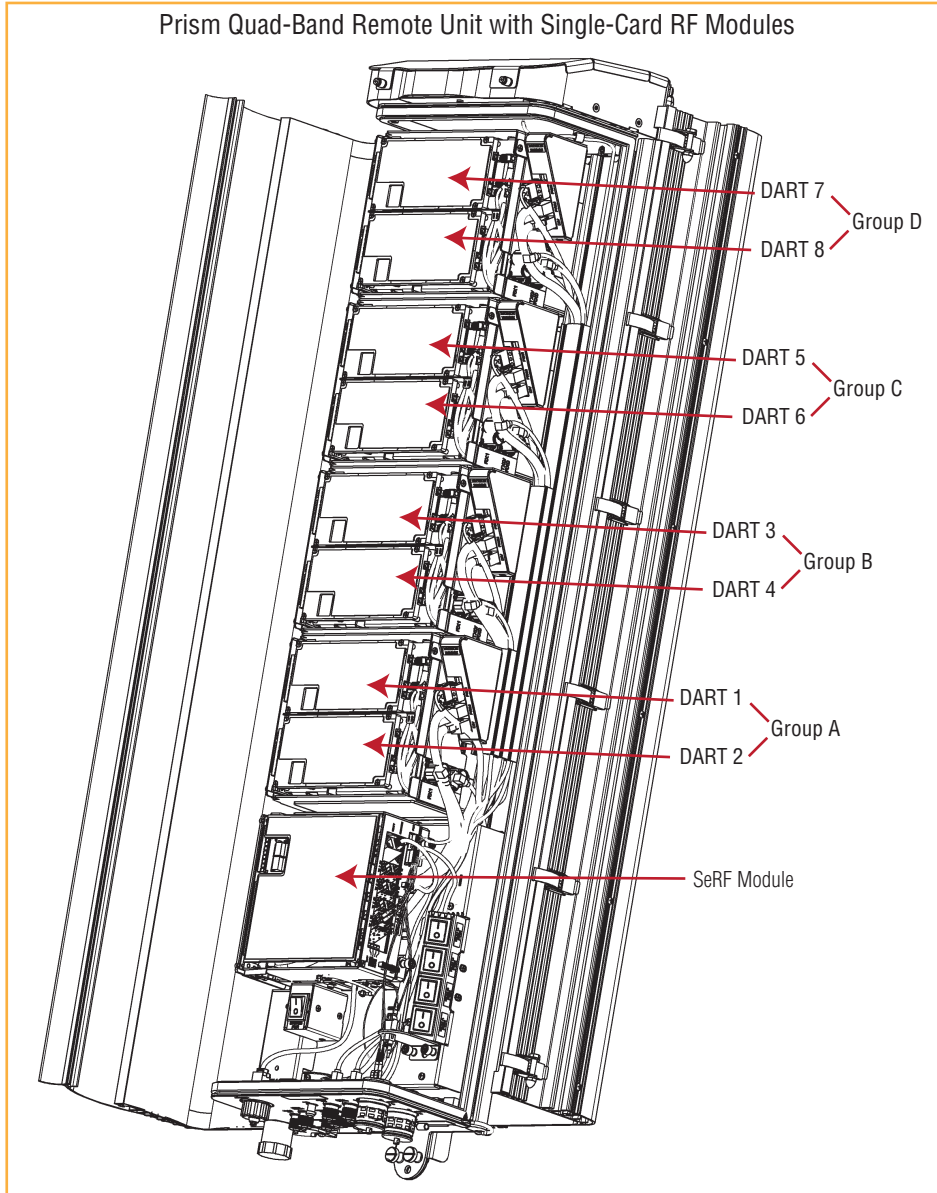


Figure 7. DART RF Groups in a Prism Remote Unit (PRU)

Table 9 lists how the FlexWave Prism EMS references the RF group assignments and corresponding components of each RF Module.

Table 9. Remote Unit RF Group Assignments (from Top/Down)

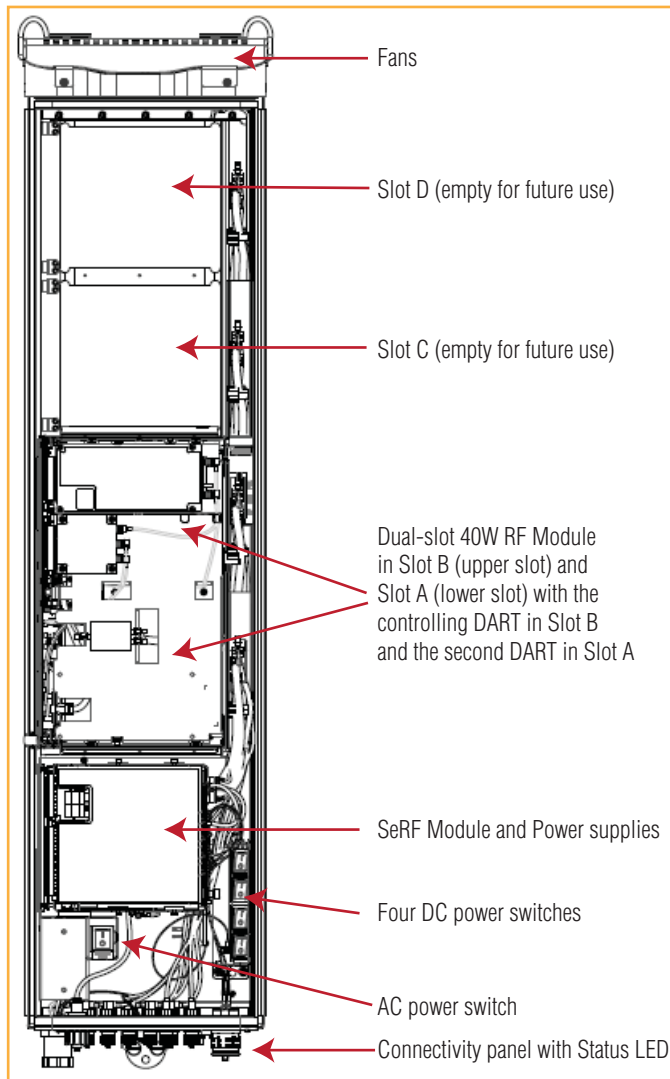
Physical RF Slot	RF Group	DART Number	LNA Number		LPA Number for Single LPA	LPA Number for Dual LPAs	Power Detector Number for Single PD	Power Detector Number for Dual PDs
			Primary	Diversity				
D	D	8		8	7	8	7	8
		7	7	7		7		
C	C	6		6	5	6	5	6
		5	5	5		5		
B	B	4		4	3	4	3	4
		3	3	3		3		
A	A	2		2	1	2	1	2
		1	1	1		1		
SeRF Board								

**NOTE:** In a dual-LPA system, the Configure Remote Forward Gain page shows two values for the LPA status, one for each LPA. Changing the LPA Mode or resetting the LPA applies to both LPAs at the same time.

**CAUTION!** Should your system experience an LPA problem, refer to Table 9 to ensure that you apply new settings or troubleshoot the correct RF Module.

**CAUTION!** If you use a customized SNMP polling for system status, you must change your LPA indexing scheme.

The Dual-Slot 40W RF Module occupies two slots in a Prism Remote. **Figure 8** shows the main components in a Prism enclosure, with a 40W RF Module occupying Slots A and B. The controlling DART will always be in the upper slot (B or D), and the second LPA is always in the lower slot (A or C).



**Figure 8.** Dual-Slot 40W RF Module in a Quad-Bay Prism Remote

**NOTE:** If a Dual-Slot 40W RF Module AWS 2100 and a Dual-Slot 40W RF Module PCS 1900 are both installed in a Quad-Bay Remote, it is recommended that the PCS 1900 be installed in upper-most slot, and the AWS 2100 be installed in the lower-most slot.

**NOTE:** To accommodate two-slot modules, you need to remove a module slot shelf as described in “Dual-Slot Modules Only—Remove the Module Slot Shelf” on page 25.

## INSTALL THE RF MODULE(S)

The following sections guide you through the installation of an RF Module into a PRU chassis. The process to install the four different types of RF Modules is basically the same; however, differences are noted and should be followed.

**NOTE:** In the following steps, the RF cables and connectors are referred to as MOD N TX0/RX0 and as MOD N TRX1 where N equals A, B, C, or D.

### Safety Precautions

- CAUTION!** This is restricted access equipment and only qualified service personnel should service and operate this equipment using appropriate tools.
- CAUTION!** Wet conditions increase the potential for receiving an electrical shock when installing or using electrically-powered equipment. To prevent electrical shock, never install or use electrical equipment in a wet location or during a lightning storm.
- CAUTION!** Always allow sufficient fiber length to permit routing of patch cords and pigtails without severe bends. Fiber optic patch cords or pigtails may be permanently damaged if bent or curved to a radius of less than 2 inches (5.1 cm).
- CAUTION!** Exterior surfaces of the Prism Remote Unit may be hot. Use caution during servicing.
- CAUTION!** Service personnel must confirm that the perimeter gasket and door-to-door gaskets are in place when closing the Prism doors after servicing.
- CAUTION!** This equipment uses a Class 1 Laser according to FDA/CDRH rules. Laser radiation can seriously damage the retina of the eye. Do not look into the ends of any optical fiber. Do not look directly into the optical transceiver of any digital unit or exposure to laser radiation may result. An optical power meter should be used to verify active fibers. A protective cap or hood **MUST** be immediately placed over any radiating transceiver or optical fiber connector to avoid the potential of dangerous amounts of radiation exposure. This practice also prevents dirt particles from entering the adapter or connector.
- CAUTION!** This system is an RF Transmitter and continuously emits RF energy. Maintain 3 foot (91.4 cm) minimum clearance from the antenna while the system is operating. Wherever possible, shut down the RAN before servicing the antenna.

## Guard against Damage from Electro-Static Discharge

**CAUTION!** Electro-Static Discharge (ESD) can damage electronic components. To prevent ESD damage, always wear an ESD wrist strap when working with the IRU or when handling any of its components. Connect the ground wire on the ESD wrist strap to an earth ground source before touching the IRU or any of its components. Wear the wrist strap the entire time that you work with the IRU and its components.

**CAUTION!** Place the Prism RF Modules in anti-static packing material when transporting or storing them.

## Unpack and Inspect the RF Module

- 1 Inspect the exterior of the shipping container(s) for evidence of rough handling that may have damaged the components in the container.
- 2 Unpack each container while carefully checking the contents for damage and verify with the packing slip.
- 3 If damage is found or parts are missing, file a claim with the commercial carrier and notify TE Customer Service (see [“Contacting TE Connectivity” on page 46](#)). Save the damaged cartons for inspection by the carrier.
- 4 Save all shipping containers for use if the equipment requires shipment at a future date.

**CAUTION!** Handle the RF Module with care during installation. Be especially careful to not damage the thermal-interface material (TIM), which is attached to the LPA. If the TIM is damaged, the LPA can overheat. Before installing the RF Module, check to see if the heatsink material is gouged or cracked. If the TIM is damaged, do not install the RF Module and contact TE Connectivity for assistance (see [“Contacting TE Connectivity” on page 46](#) for contact information).

**CAUTION!** If the thermal-interface material is damaged, the installation and use of the RF Module may void the warranty of the RF Module.



## Remove Release Liners from the RF Module

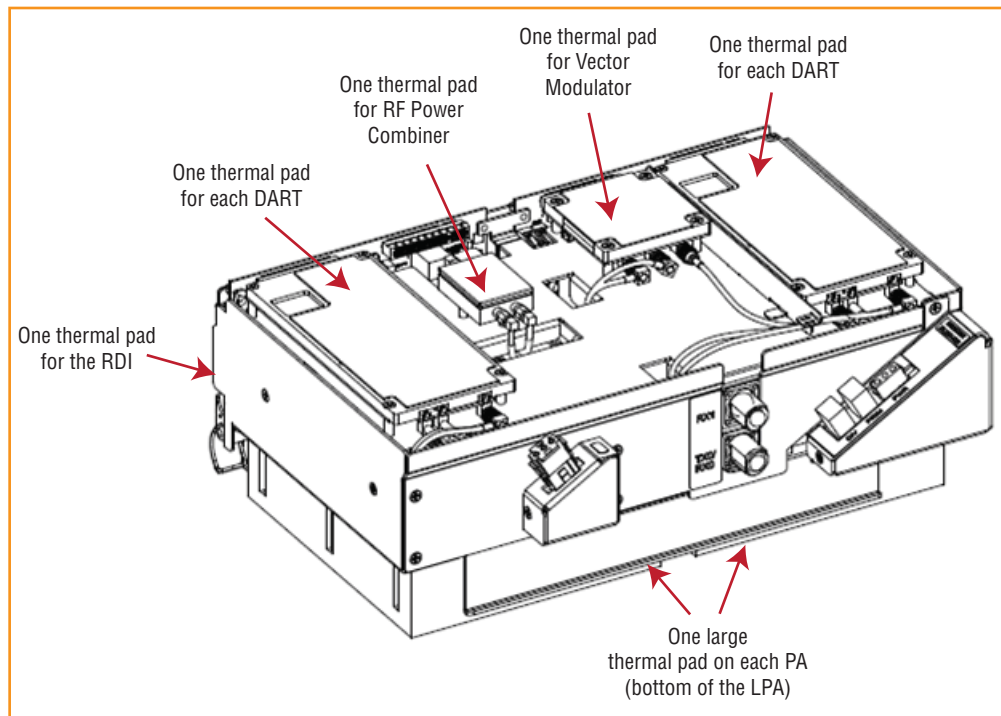
**NOTE:** Release Liners are present on front and back of new modules.

- 1 Open the PRU enclosure.
- 2 Remove release liners, if present, from the thermal pads on the RF Module prior to installing the module into the PRU chassis.

**CAUTION!** The thermal pads are very sensitive to mishandling—do not nick, scratch, or ding them.

For most RF Modules, the thermal pads are located as listed below and as shown in [Figure 9](#), which shows a Dual-Slot 40W RF Module.

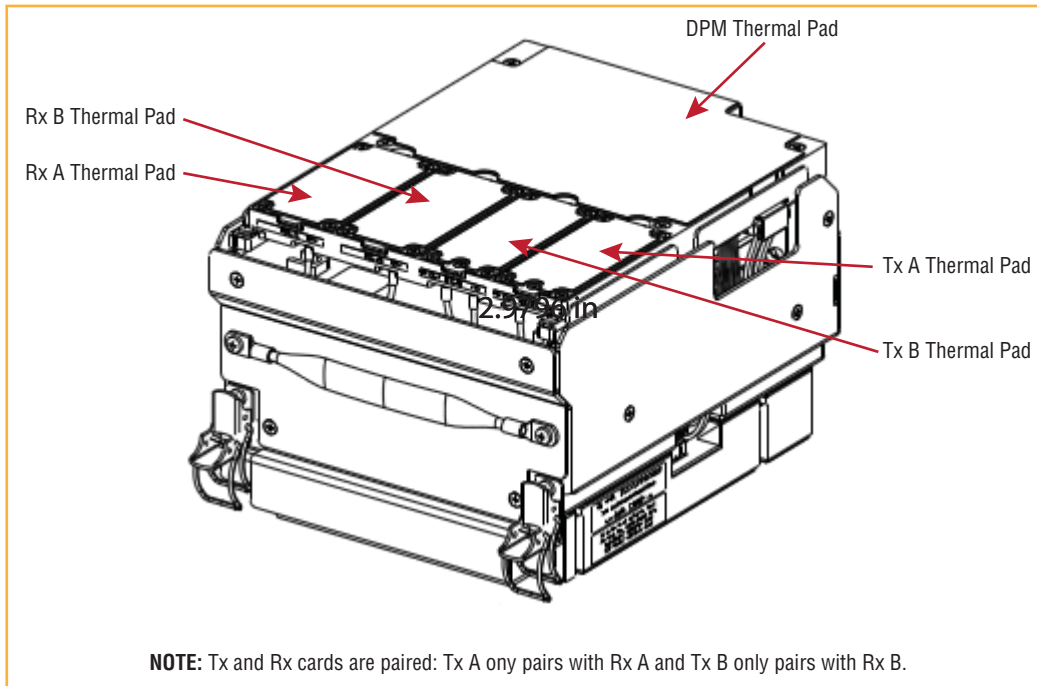
- one large pad on the back surface of each Linear Power Amplifier (LPA)
- up to two on the front surface (DARTs)
- one on the left side for the (RDI)
- one on the vector modulator board
- one on the RF power combiner.



**Figure 9.** Thermal Pads on a Dual-Slot 40W RF Module

For HDM RF Modules, the thermal pads are located as listed below and as shown in [Figure 10](#).

- one pad for each Rx and Tx board
- one large pad over the DPM
- one for each Power Amplifier (PA), which is on the bottom of the HDM RF Module.



**Figure 10.** Thermal Pads on an HDM RF Module

## Dual-Slot Modules Only—Remove the Module Slot Shelf

### 1 For Dual-Slot RF Modules only.

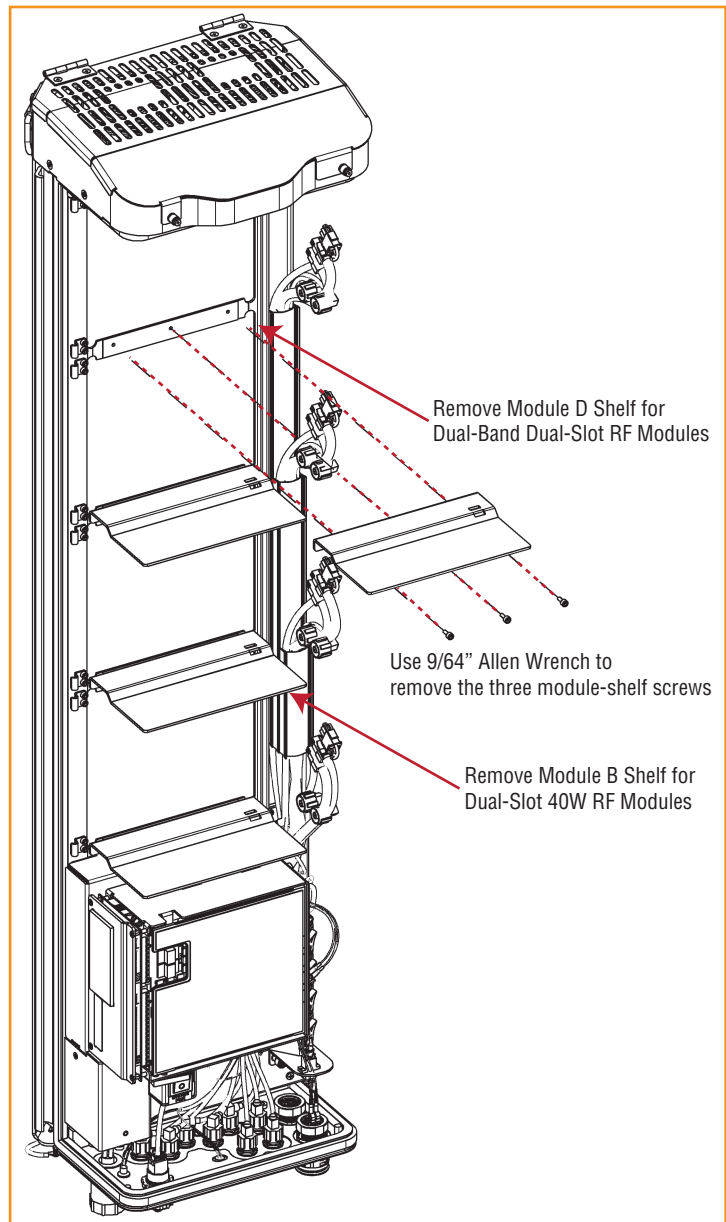
If you are installing a Dual-Slot RF Module, you must remove a module slot shelf from the PRU chassis to accommodate the module's size. (For further information, see [Table 7 on page 16.](#))

Remove the shelf as appropriate for the RF Module:

- For a Dual-Slot 40W RF Module, remove the Module B Shelf.
- For a Dual-Bay Dual-Slot RF Module, remove Module D Shelf.

To remove the module shelf:

- Use a 9/64" Allen™ wrench to remove the three screws that attach the module shelf to the PRU chassis, as shown in the following graphic.
- Discard or store the module shelf and fasteners.



## Install the RF Module into the Prism Remote Chassis

**Recommendation:** Install Dual-Bay Dual-Slot modules in the two upper-most slots of the PRU.

**Recommendation:** Install Dual-Slot 40W modules in the bottom-most slots of the PRU.

**Recommendation:** If both a Dual-Slot AWS2100 40W RF Module and a Dual-Slot PCS1900 40W RF Module are installed in a Quad-Bay PRU, install the AWS2100 Module in the lower-most slot of the PRU.

- 1 Hold the RF Module so that the DART card(s) face away from the PRU and the Mounting Hook is toward the Receiving flange on the PRU chassis.

**NOTE:** Always install RF Modules from the bottom up. Do not skip a slot.

- 2 Holding the RF Module at a 45° angle in respect to the rear heatsink, rest the bottom surface of the module on the RF Module shelf, as shown in one of the following graphics, and as applicable to the RF Module.

- Single-Slot RF Module: [Figure 11 on page 27](#)
- HDM RF Module: [Figure 12 on page 28](#)
- Dual-Bay Dual-Slot RF Module: [Figure 13 on Page 29](#)
- Dual-Slot 40W RF Module: [Figure 14 on Page 30.](#)

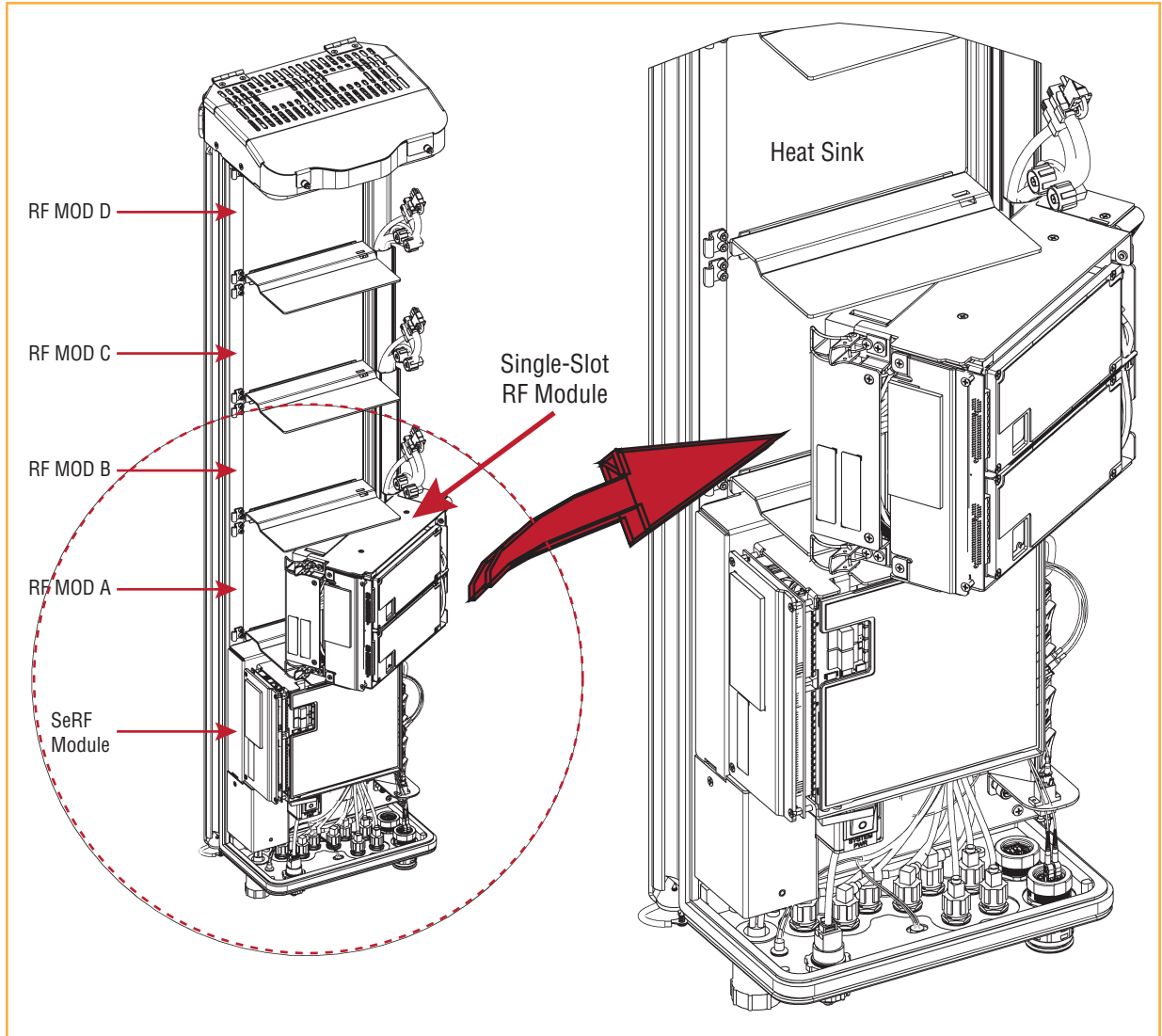
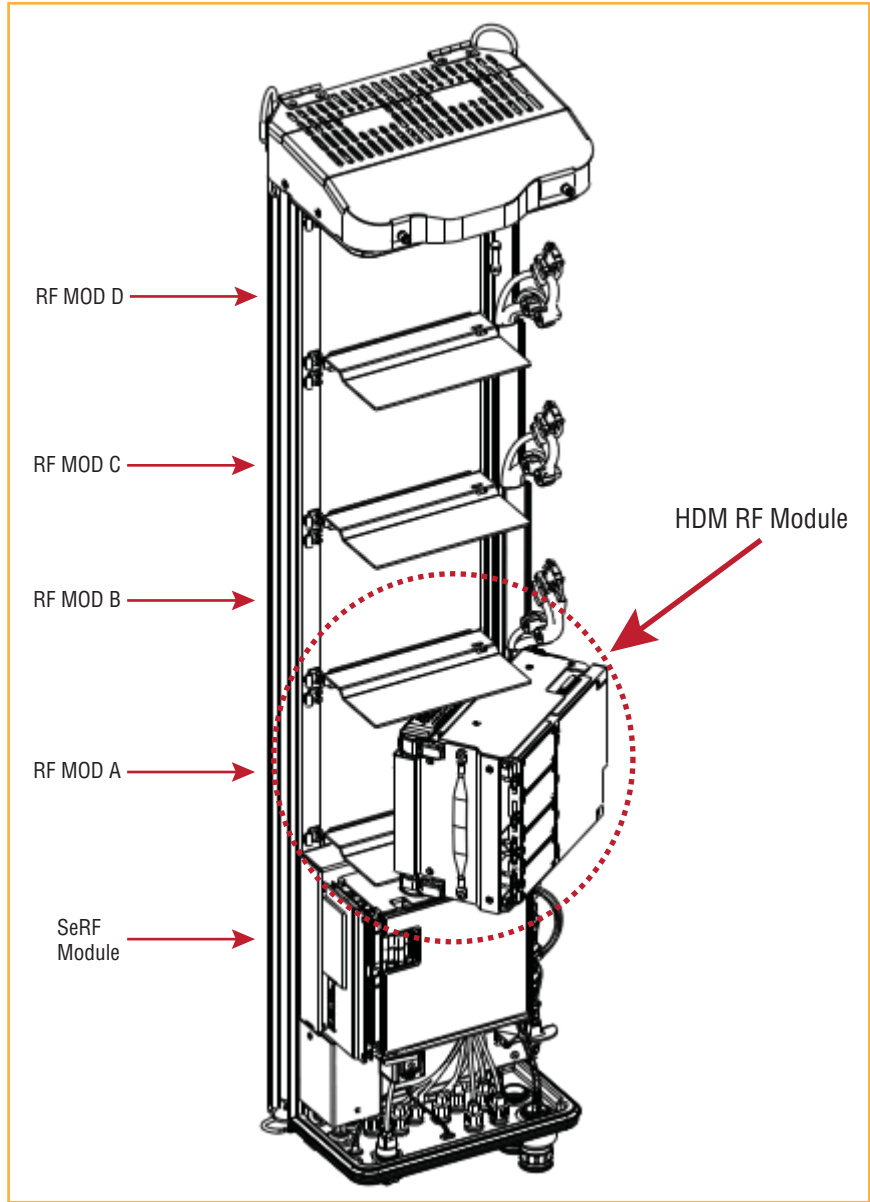
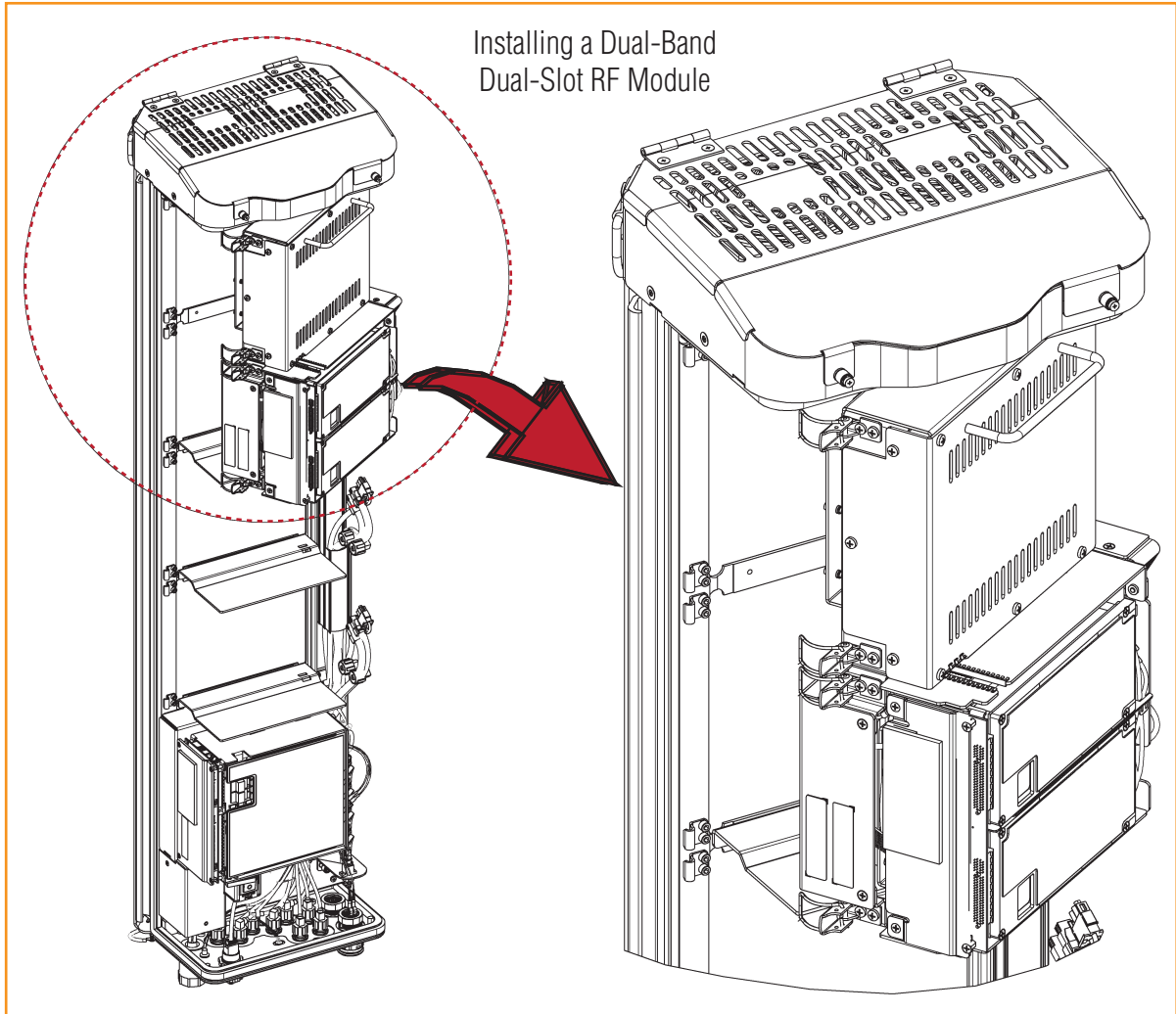


Figure 11. Installing a Single-Slot RF Module



**Figure 12.** Installing an HDM RF Module



**Figure 13.** Installing a Dual-Bay Dual-Slot RF Module

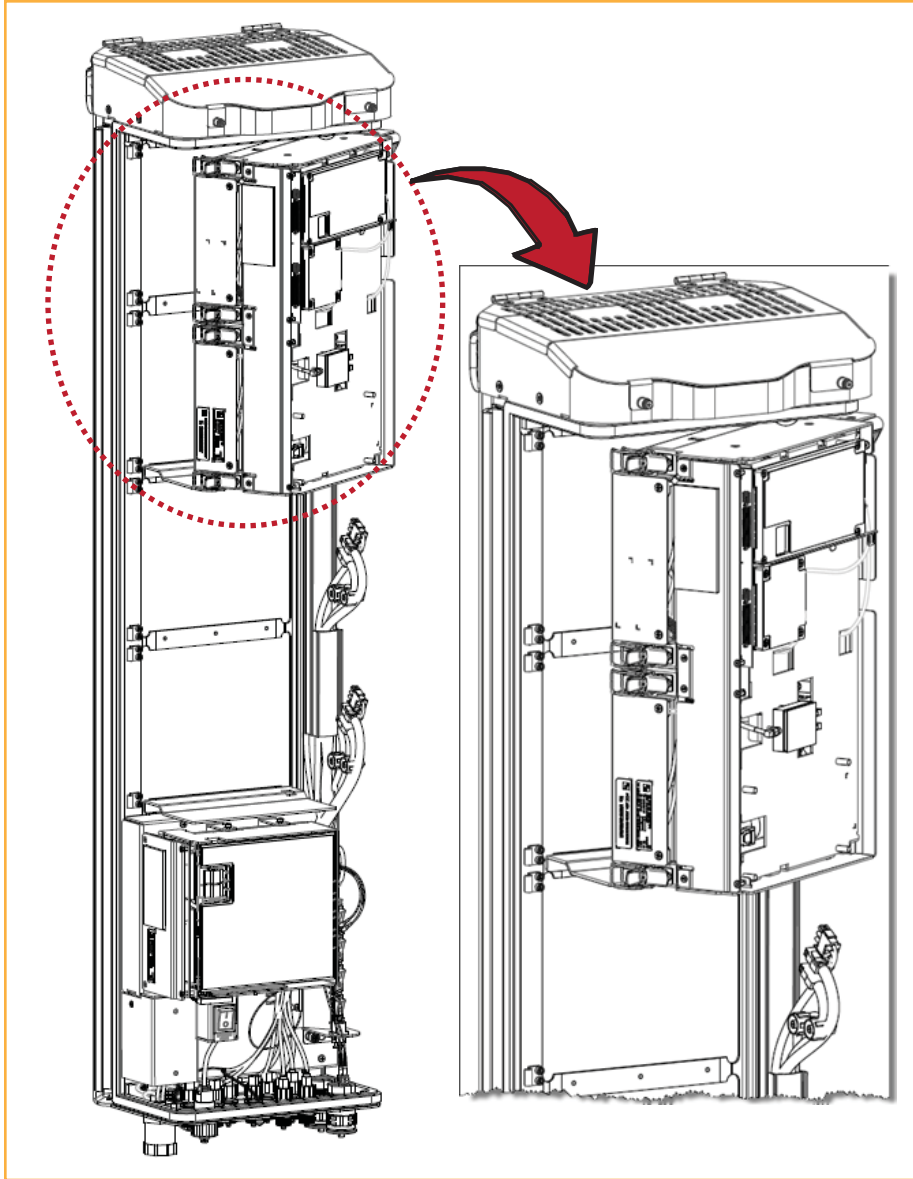
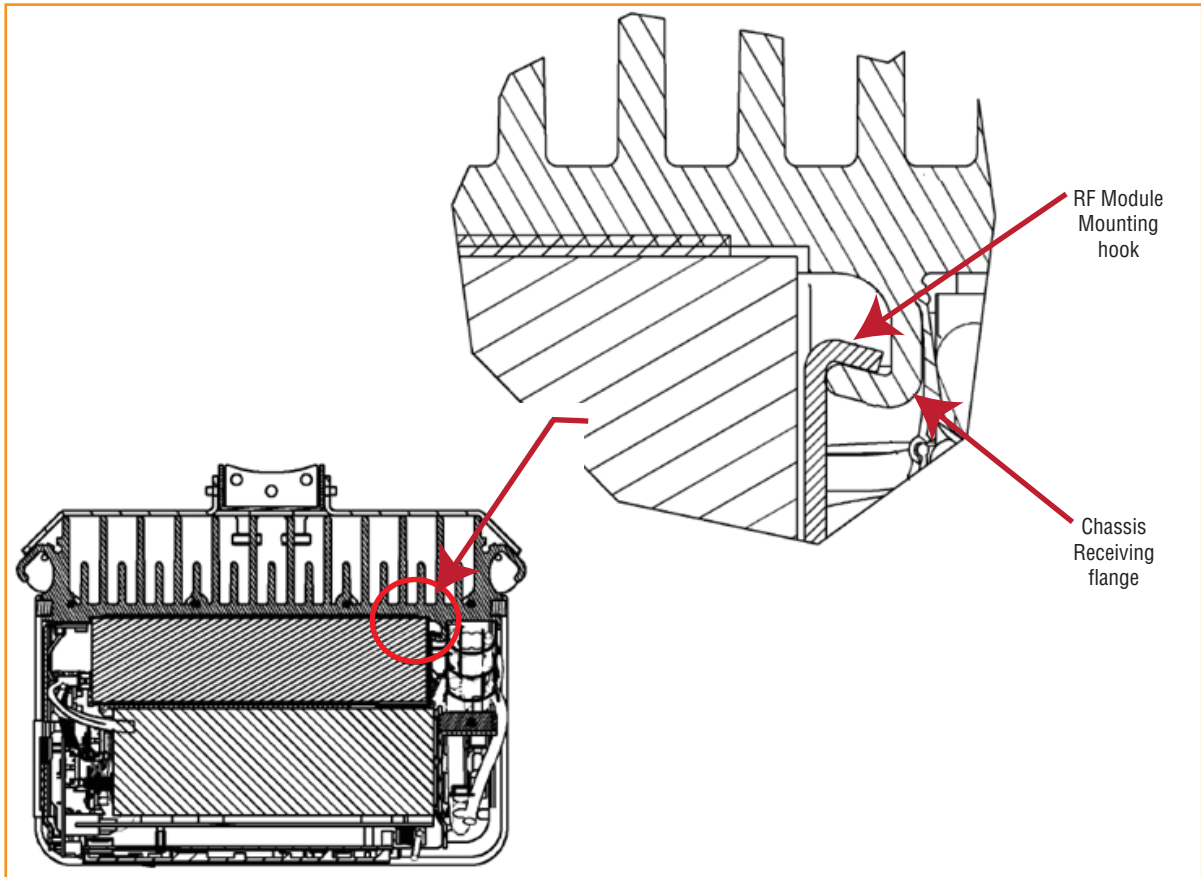


Figure 14. Installing a Dual-Slot 40W RF Module



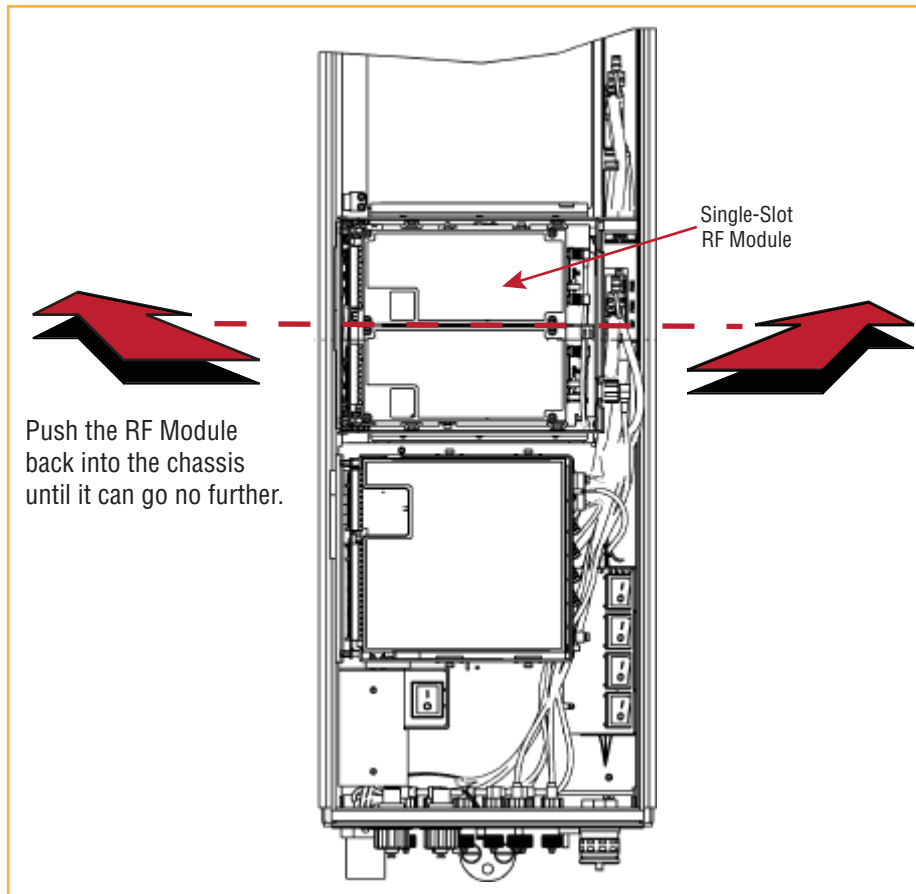
- 3 Align the Mounting Hook on the module with the receiving flange on the PRU heat sink, and then slide the RF Module in toward the flange until it can go no further.



- 4 Push the left edge of the RF Module back and into the PRU chassis until it can go no further, as shown in the following graphics:
  - For Single-Slot RF modules, see [Figure 15 on page 32](#).
  - For HDM RF modules, see [Figure 16 on page 33](#).
  - For Dual-Slot RF modules, see [Figure 17 on page 34](#), which uses the Dual-Slot 40W RF Module as an example.

**CAUTION!** Make sure the RF Module is seated correctly in the Module shelf. Incorrect alignment of the RF Module can cause the RF Module to fail due to overheating.

- The front edge of the RF Module should be parallel with the shelf above it.
- The Mounting Hook on the RF Module should be fully engaged with the Receiving flange on the PRU chassis.
- If you later cannot shut the PRU door, verify that the RF Module is installed correctly.



**Figure 15.** Seating a Single-Slot RF Module

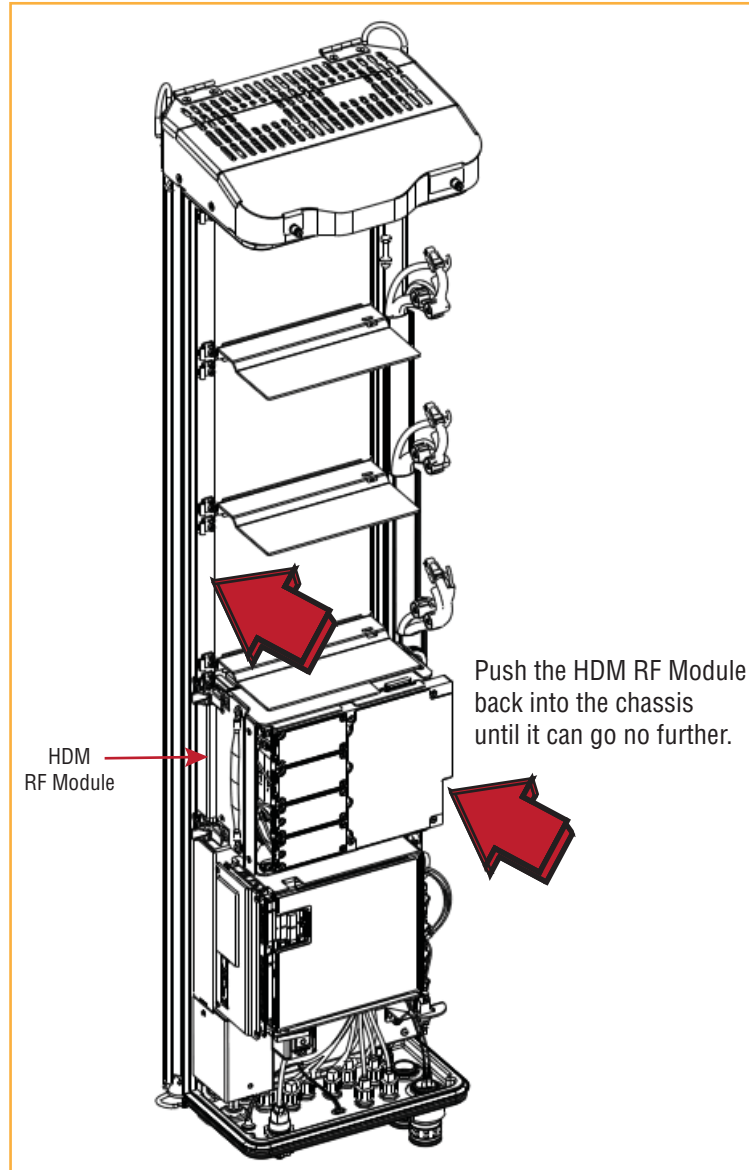


Figure 16. Seating an HDM RF Module

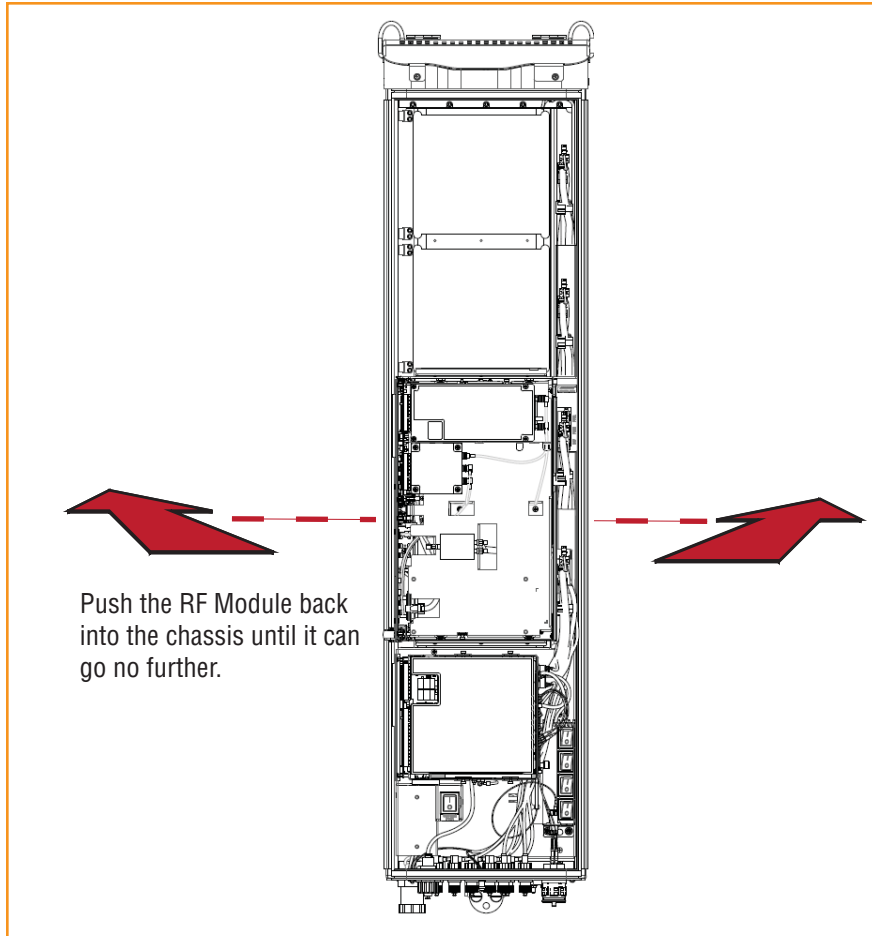


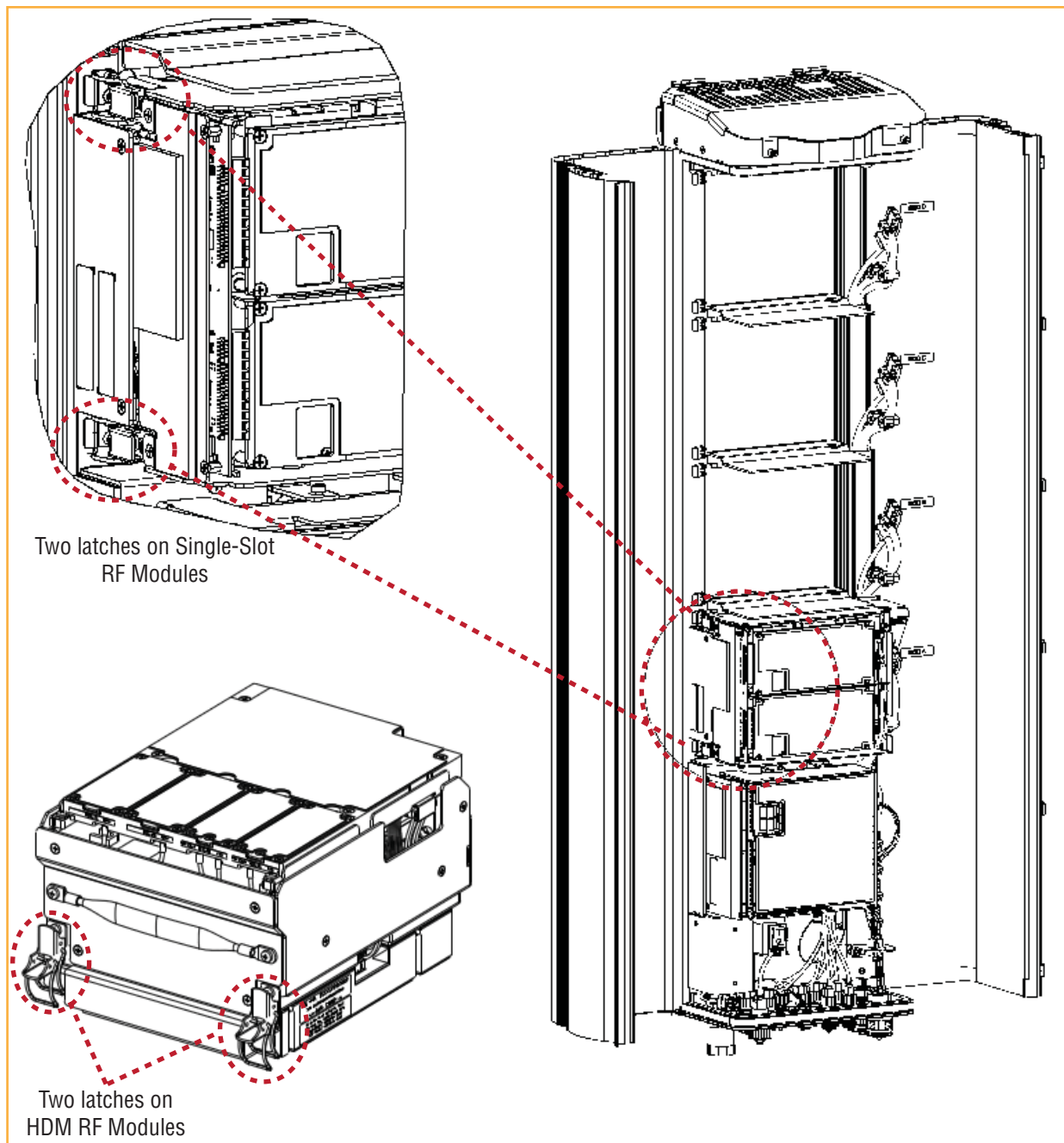
Figure 17. Seating a Dual-Slot RF Module

### Secure RF Module Latches

- 1 To secure the module latches on the left side of the RF Module, do one of the following, as appropriate for the RF Module being installed:
  - “Connect Latches on Single-Slot and HDM RF Modules” on page 35
  - “Connect Latches on Dual-Bay Dual-Slot RF Modules” on page 36.

## Connect Latches on Single-Slot and HDM RF Modules

For Single-Slot and HDM RF Modules, secure two latches, as shown in [Figure 18](#).



**Figure 18.** Latches on Single-Slot and HDM RF Modules

### Connect Latches on Dual-Bay Dual-Slot RF Modules

For Dual-Bay Dual-Slot RF Modules, secure four latches, as shown in Figure 19.

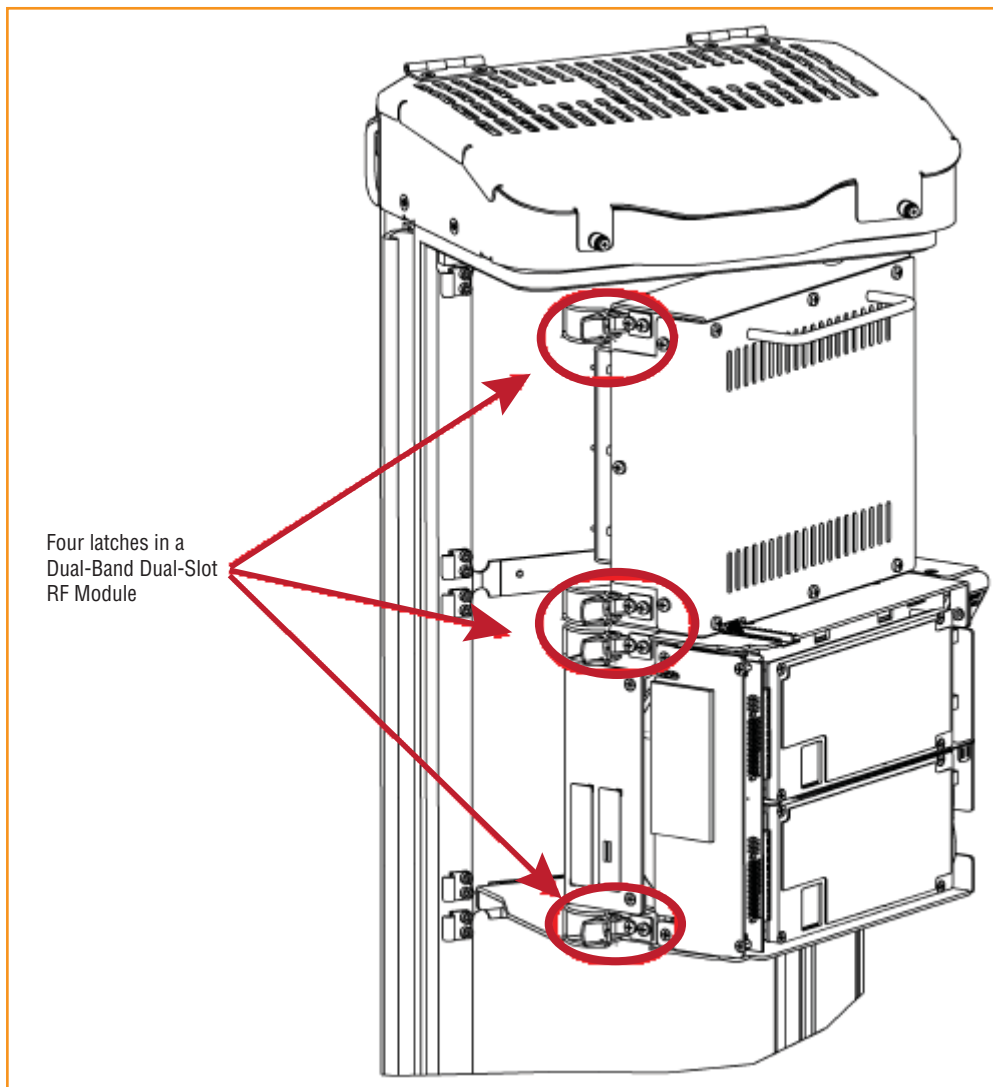
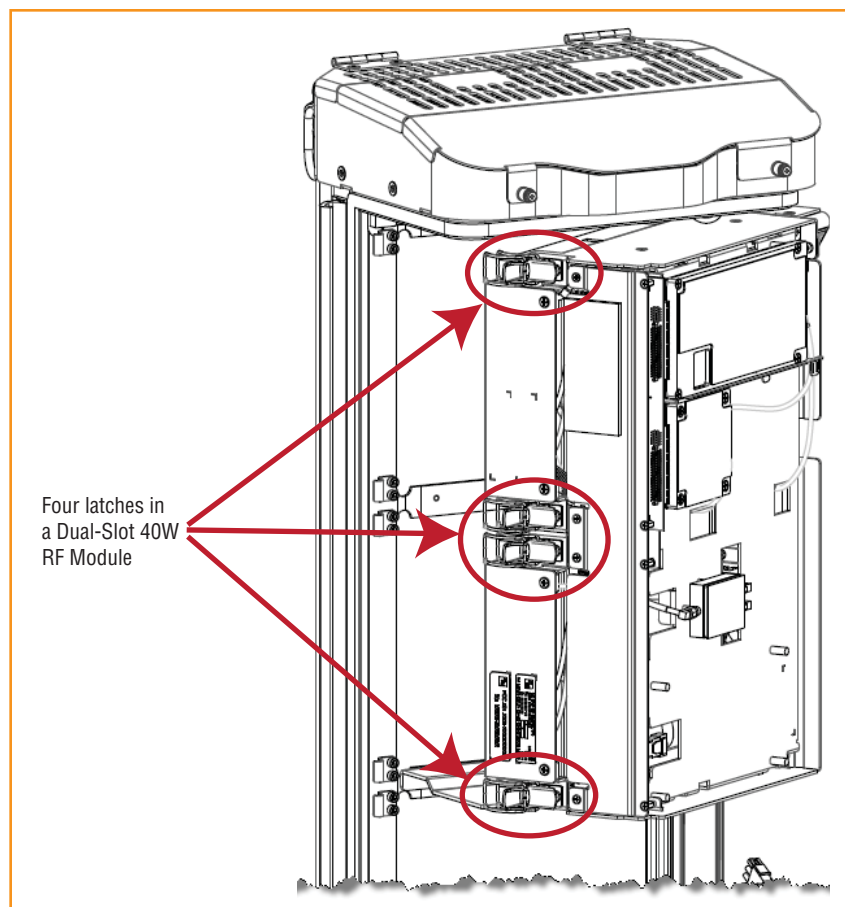


Figure 19. Dual-Bay Dual-Slot RF Module Latches

## Latches on Dual-Slot 40W RF Modules

For Dual-Slot 40W RF Modules, secure four latches, as shown in [Figure 20](#).



**Figure 20.** Dual-Slot 40W RF Module Latches

### Verify that the RF Module Mounting Hook is Engaged

- 1 Verify that the RF Module Mounting Hook is engaged correctly by pulling the module away from the heat sink. The RF Module should not move. If the RF Module moves during this check, repeat all the steps starting at [“Install the RF Module into the Prism Remote Chassis”](#) on [page 26](#) through this step.

### Connect the RF Module Cables

The steps to connect the RF Module cables have been separated into two different procedures; follow the steps that correspond to the RF Module being installed.

- [“Connecting Cables in a Single-Slot RF Module Installation”](#) on [page 38](#)
- [“Connecting Cables in a Dual-Slot RF Module Installation”](#) on [page 40](#).

## Connecting Cables in a Single-Slot RF Module Installation

- 1 Position the cables so that they are under the right edge of the RF Module, pointing up.
- 2 Follow the rules listed in “Understanding the RF Module Cables” on page 15.
- 3 Working from the bottom connector up, connect the RF Module cables, as follows:
  - a Connect the MOD N TX1/RX1 cable to the RF Module.
    - i If a TX1/RX1 RF Module connection is available, insert the N-Style Plug of the MOD N TX1/RX1 cable into the TX1/RX1 N-Style Jack of the RF Module. If RF Module connection is not available, constrain the MOD N TX1/RX1 cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.
    - ii Turn the coupling nut of the plug clockwise to thread onto the jack and finger-tighten.
    - iii Torque coupling nut to 8 +/- 1 in-lbs to ensure full connection.

**NOTE:** Insufficient torque applied to RF Module connections can result in elevated insertion/return loss and higher than normal VSWR reported by the system.

- b Connect the MOD N TX0/RX0 cable to the RF Module.
  - i Insert the N-Style Plug of the MOD N TX0/RX0 cable into the TX0/RX0 N-Style Jack of the RF Module.
  - ii Turn the coupling nut of the plug clockwise to thread onto the jack and finger-tighten.
  - iii Torque coupling nut to 8 +/- 1 in-lbs to ensure full connection.

**NOTE:** Insufficient torque applied to RF Module connections can result in elevated insertion/return loss and higher than normal VSWR reported by the system.

- c Connect the LVDS Cables to the RF Module.
  - i Connect the MOD N DIV LVDS Cable to the DIV receptacle of the RF Module by inserting and sliding in until fully seated.

**NOTE:** Always connect the Diversity LVDS Cable with the RF Module.

- ii Connect the MOD N PRIM LVDS Cable to the PRIM connector, following the same steps as above.

**NOTE:** Full insertion can be recognized by an audible click as the LVDS Cable Connector locks into the RF Module Receptacle. This can be verified by lightly pulling back on the LVDS connector while making sure not to depress the release trigger. When fully inserted, the cable should not be able to be removed from the receptacle.

- d Connect the Power Cable Connector to the PWR receptacle of the RF Module by inserting and sliding in until fully seated.

**NOTE:** Full insertion can be recognized by an audible click as the Power Cable Connector locks into the RF Module Receptacle. This can be verified by lightly pulling back on the Power Cable Connector while making sure not to depress the release triggers on the ends of the connector. When fully inserted, the cable should not be able to be removed from the receptacle.



Refer to the graphic that corresponds to the RF Module being installed into a single slot (bay) of the PRU:

- Single-Slot RF Module: [Figure 21 on Page 39](#)
- HDM RF Module: [Figure 22 on page 40](#)

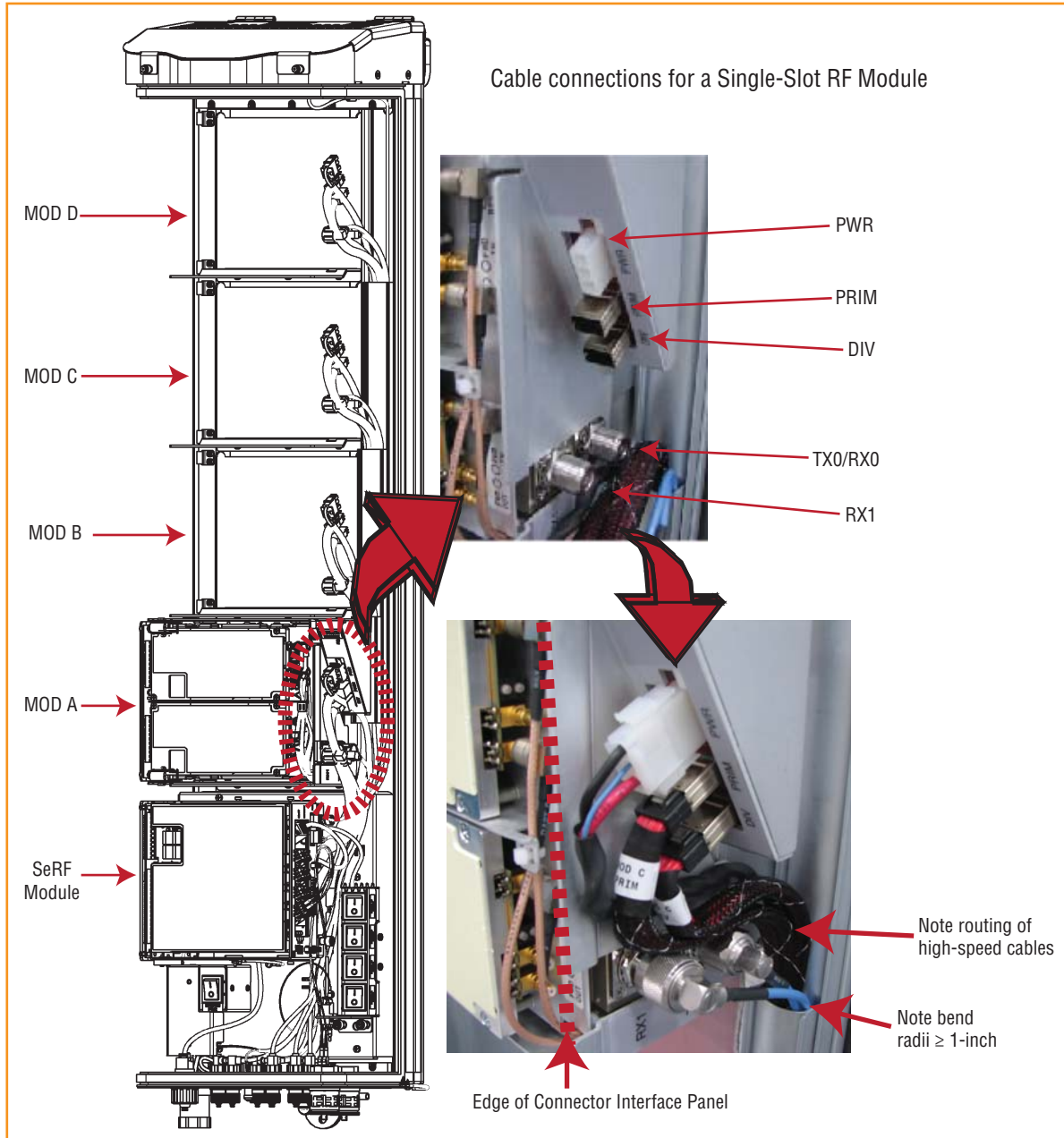
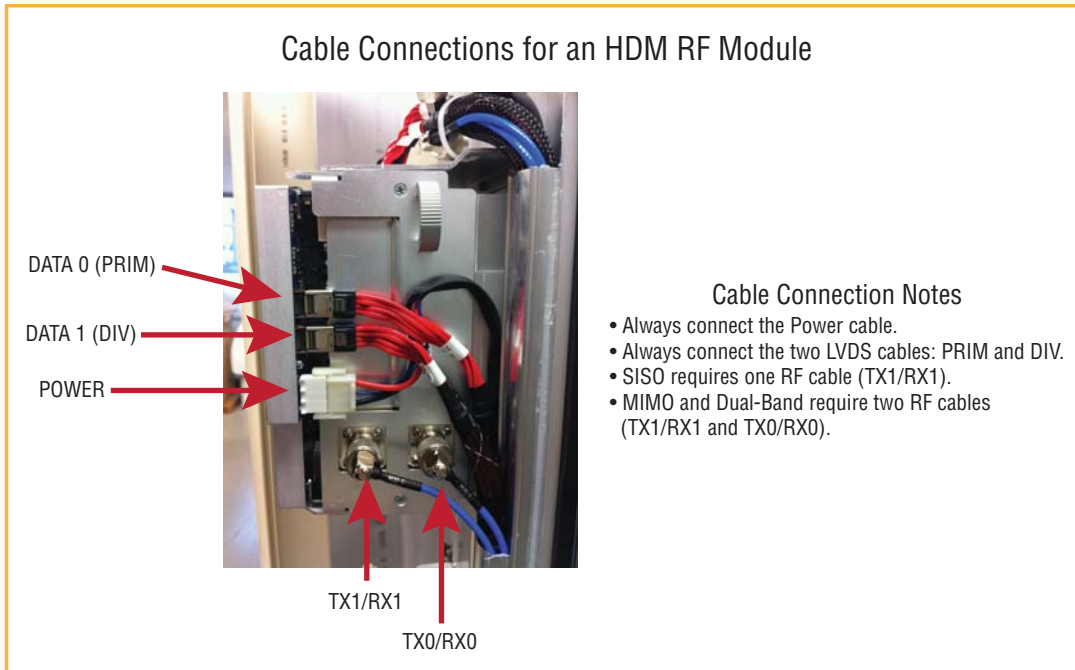


Figure 21. Cable Connections for Single-Slot RF Modules

**CAUTION!** Ensure that all cable bends are below the top edge of the Connector Interface Panel as indicated by the dashed line in the preceding figure. Failure to correctly position the cables could inhibit closing the PRU door, which can result in damage to the cables.



**Figure 22.** Cable Connections for HDM RF Modules

### Connecting Cables in a Dual-Slot RF Module Installation

- 1 Position the cables so that they are under the right edge of the RF Module, pointing up.
- 2 Follow the rules listed in [“Understanding the RF Module Cables”](#) on page 15.
- 3 Follow the rules listed below that pertain only to Dual-Slot RF Modules.
  - The upper RF Module shelf will either not be present (factory installed module) or will be removed prior to installation (field installed module).
  - The MOD N TX0/RX0 cable for the lower RF Module slot will need to be connected to the MOD N TX0/RX0 N-Style RF connection of the Dual-Slot RF Module.
  - Constrain the MOD N TX1/RX1 cable to the existing cables using a tie wrap such so it cannot be pinched or prevent the PRU door from closing. Do not cut or attempt to otherwise remove this RF cable.
  - The Power (PWR) cable and two LVDS cables of the upper RF Module slot are not used when installing a Dual-Slot RF Module.

- 4 Working from the bottom connector up, connect the RF Module cables, as follows:
  - a Connect the MOD N TX1/RX1 cable to the RF Module.

**NOTE:** Do not remove any factory connected RF Cables.

- i Constrain the MOD N TX1/RX1 cable of the lower RF Module slot to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.
- ii Connect the MOD N TX1/RX1 cable to the TX1/RX1 or N/C, N-Style Jack of the upper RF Module slot.
- iii Turn the coupling nut of the plug clockwise to thread onto the jack and finger-tighten.
- iv Torque coupling nut to 8 +/- 1 in-lbs to ensure full connection.

**NOTE:** Insufficient torque applied to RF Module connections can result in elevated insertion/return loss and higher than normal VSWR reported by the system.

- b Connect the MOD N TX0/RX0 cable to the RF Module.

**NOTE:** Do not remove any factory connected RF Cables.

- i If TX0/RX0 RF Module connection is available, insert the N-Style Plug of the MOD N TX0/RX0 cable into the TX0/RX0 N-Style Jack of the lower RF Module slot. If RF Module connection is not available, constrain the MOD N TX0/RX0 cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.
- ii Turn the coupling nut of the plug clockwise to thread onto the jack and finger-tighten.
- iii Torque coupling nut to 8 +/- 1 in-lbs to ensure full connection.
- iv If TX0/RX0 RF Module connection is available, insert the N-Style Plug of the MOD N TX0/RX0 cable into the TX0/RX0 N-Style Jack of the upper RF Module slot. If RF Module connection is not available, constrain the MOD N TX0/RX0 cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.
- v Turn the coupling nut of the plug clockwise to thread onto the jack and finger-tighten.
- vi Torque coupling nut to 8 +/- 1 in-lbs to ensure full connection.

**NOTE:** Insufficient torque applied to RF Module connections can result in elevated insertion/return loss and higher than normal VSWR reported by the system.

- c Connect the LVDS Cables to the RF Module.
  - i If available, connect the MOD N DIV LVDS Cable to the DIV receptacle of the lower RF Module by inserting and sliding in until fully seated. If DIV receptacle is not available, constrain the MOD N DIV LVDS Cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.
  - ii If available, connect the MOD N PRIM LVDS Cable to the PRIM receptacle of the lower RF Module by inserting and sliding in until fully seated. If DIV receptacle is not available, constrain the N PRIM LVDS Cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.
  - iii If available, connect the MOD N DIV LVDS Cable to the DIV receptacle of the upper RF Module by inserting and sliding in until fully seated. If DIV receptacle is not available, constrain the MOD N DIV LVDS Cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.
  - iv If available, connect the MOD N PRIM LVDS Cable to the PRIM receptacle of the upper RF Module by inserting and sliding in until fully seated. If DIV receptacle is not available, constrain the N PRIM LVDS Cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.

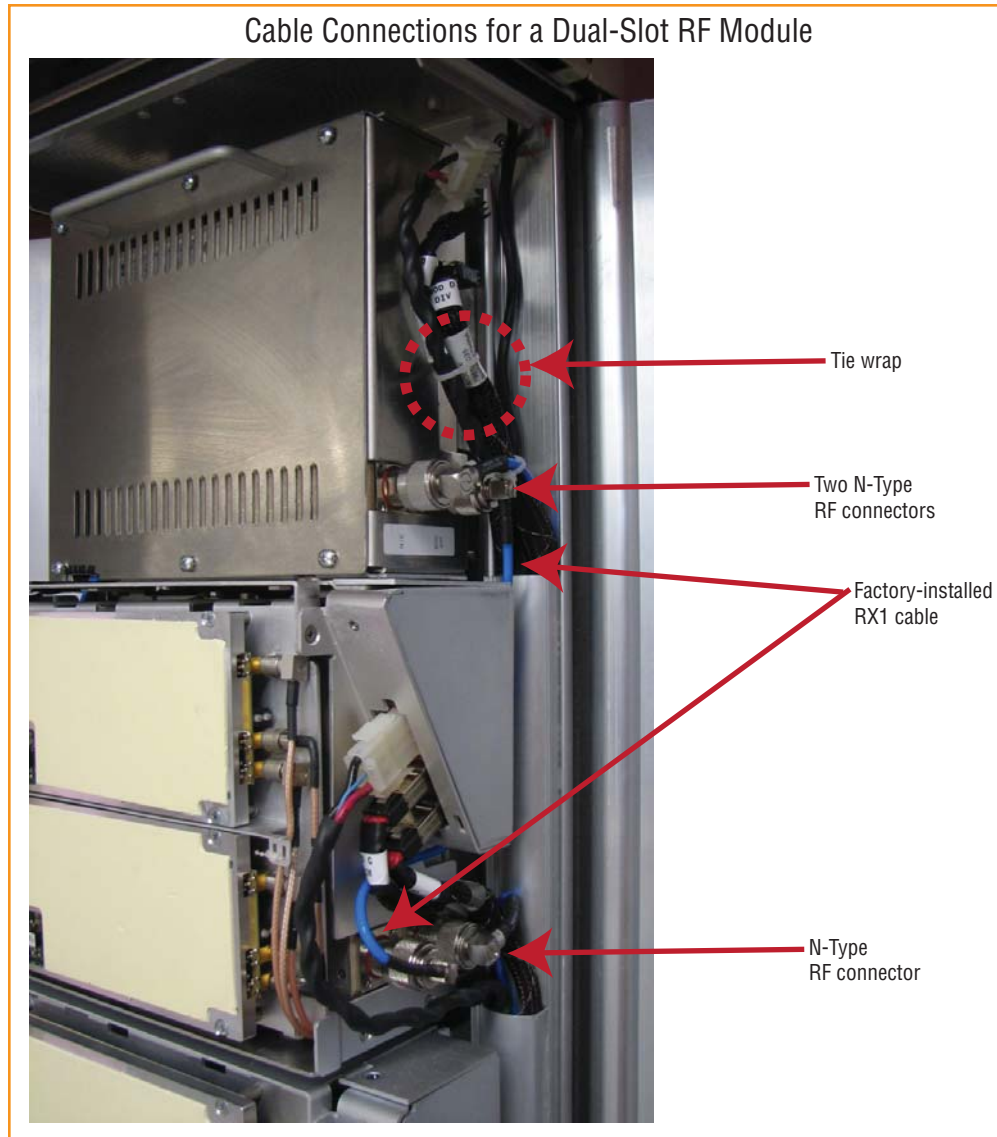
**NOTE:** Full insertion can be recognized by an audible click as the LVDS Cable Connector locks into the RF Module Receptacle. This can be verified by lightly pulling back on the LVDS connector while making sure not to depress the release trigger. When fully inserted, the cable should not be able to be removed from the receptacle.

- d Connect the Power cable to the RF Module.
  - i Connect the Power Cable Connector to the PWR receptacle of the lower RF Module by inserting and sliding in until fully seated.
  - ii If available, connect the Power Cable Connector to the PWR receptacle of the upper RF Module by inserting and sliding in until fully seated. If PWR receptacle is not available, constrain the Power Cable to accompanying cables using a tie wrap so it cannot be pinched or prevent the PRU door from closing.

**NOTE:** Full insertion can be recognized by an audible click as the Power Cable Connector locks into the RF Module Receptacle. This can be verified by lightly pulling back on the Power Cable Connector while making sure not to depress the release triggers on the ends of the connector. When fully inserted, the cable should not be able to be removed from the receptacle.

Refer to the graphic that corresponds to the RF Module being installed in a dual-slot:

- Dual-Bay Dual-Slot RF Module: [Figure 23 on Page 43](#)
- Dual-Slot 40W RF Module: [Figure 24 on Page 44](#).



**Figure 23.** Cable Connections for Dual-Bay Dual-Slot RF Modules

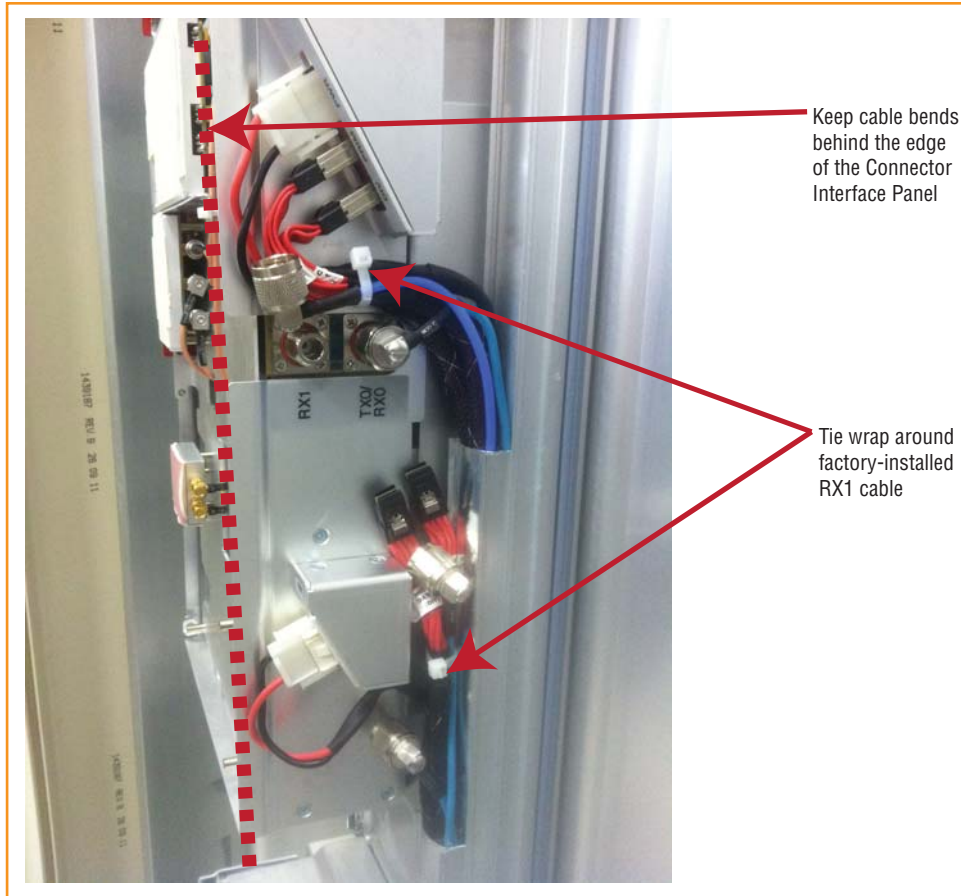
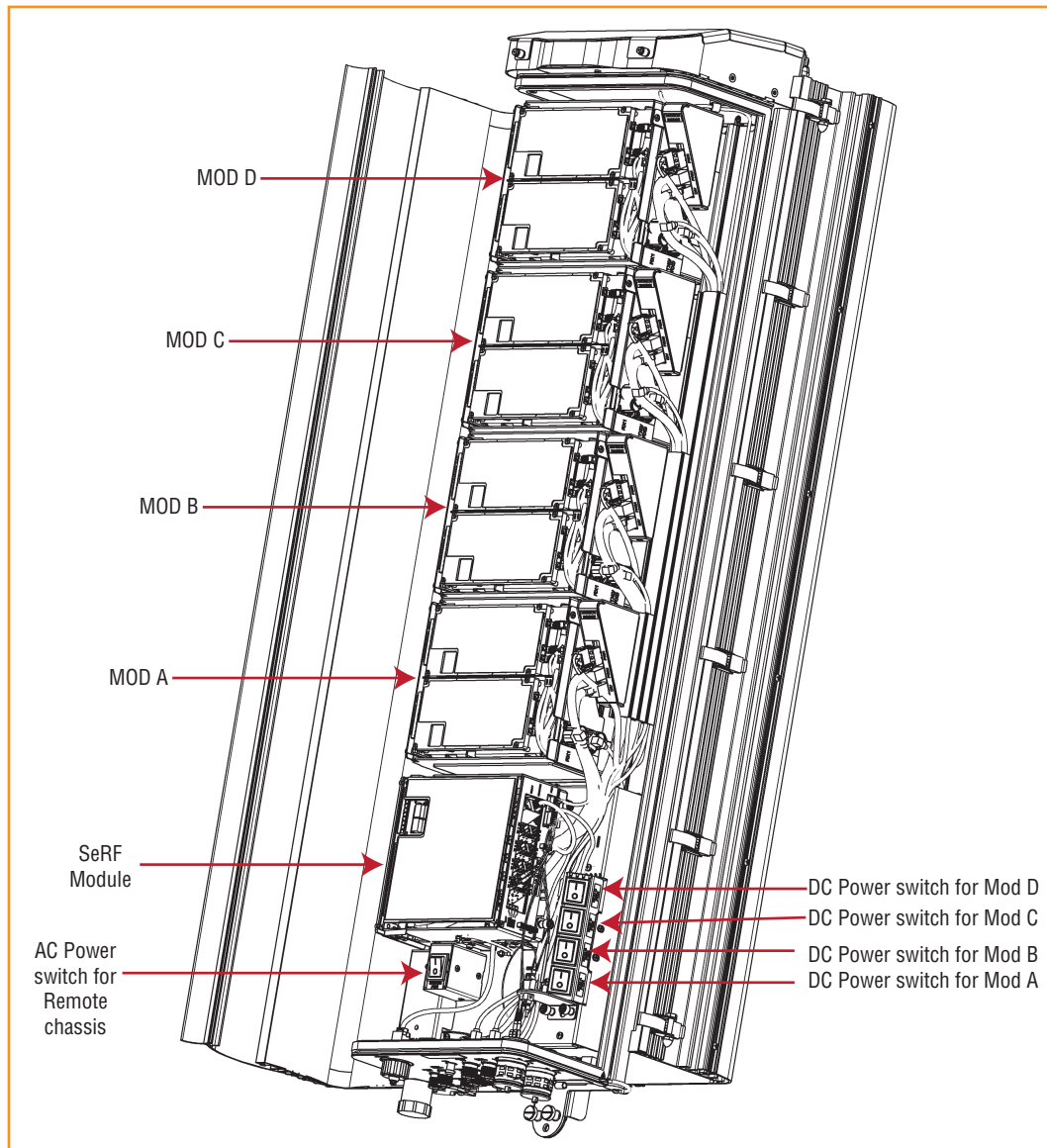


Figure 24. Cable Connections for Dual-Slot 40W RF Modules

**CAUTION!** Ensure that all cable bends are below the top edge of the Connector Interface Panel as indicated by the dashed line in the preceding figure. Failure to correctly position the cables could inhibit closing the PRU door, which can result in damage to the cables.

## Power on the RF Module

- 1 Follow the rules listed below to toggle the Power switch that corresponds to the RF Module to its ON position.
  - For Dual-Slot RF Modules, use the Power switch for the lower module. For example, to power up a Dual-Slot RF Module in combined slots C+D in a Quad-Bay chassis, turn ON DC Power switch for Mod C; leave the DC Power switch for Mod D OFF.
  - A Dual-Slot 40W RF Module uses the Power Supplies in both slots. If the Dual-Slot 40W RF Module is installed in slots C+D, turn ON the Power switch for Mod C and Mod D.



- 2 Repeat all the steps in “Install the RF Module(s)” on page 21 to install other RF Modules.

## CONTACTING TE CONNECTIVITY

### Contacting TE Connectivity by Telephone

#### Sales

Asia Pacific	+65-6294-9948
France	0800 914032
Germany	0180 2232923
Italy	0800 782374
Spain	900 983291
United Kingdom	0800 960236
USA or Canada	1-800-366-3891
Extension	73000
Connectivity Extension	73475
Wireless Extension	73476



#### Technical Support

USA or Canada	1-800-530-9960
Elsewhere	+1-952-917-0761

### Contacting TE Connectivity Online

Click on one of the following URLs, or past the URL into your web browser.

#### Customer Portal

<https://www.te.com/portal/wireless/>

#### Technical Support for Wireless Products

<http://www.te.com/WirelessSupport>







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