

## DOCUMENT OVERVIEW

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-Bay RF Modules, which includes the HDM RF Modules
- Dual-Bay RF Modules
  - Dual-Band RF Modules
  - Legacy 40W RF Modules.

Table 1 lists the RF Modules that this installation guide supports. The RF Modules are compatible only with the Remote Units listed in Table 2 on page 3.

**Table 1.** FlexWave Prism RF Modules Supported in this Installation Guide

Catalog Number	Description
<b>High-Density Module (HDM); Single Bay</b>	
FWP-441T841MOD	DUAL 20W SMR800 / PCS1900
FWP-8416000MOD	20W PCS Module, Non-Diversity, HDM, Single Bay
FWP-84MT000MOD	Dual 20W 1900 PCS, RF Module, MIMO, Single-Bay
FWP-881T000MOD	HDM PCS Band 2 & 25 40W SISO, Single-Bay
FWP-A416000MOD	20W AWS Module, Non-Diversity, HDM, Single Bay
FWP-A4MT000MOD	HDM AWS Band 4 MIMO 20W, Single-Bay
FWP-A81T000MOD	HDM AWS Band 4 SISO 40W RF Module, Single-Bay
FWP-B410000MOD	20W WIDEBAND Cell Module, Non-Diversity, Classic
FWP-B810100MOD	40W WIDEBAND Cell Module, Non-Diversity, Single-Bay
FWP-C4MT000MOD	DUAL 20W 850 Cell/1900 PCS, Module, Single-Bay
FWP-L4MT000MOD	20W 700 IABC Module, MIMO HDM, Single-Bay
FWP-L4MTU4MMOD	Dual 20W 700 IABC/700uC, RF Module, Single-Bay
FWP-U4MT000MOD	20W 700 uC Module, MIMO HDM, Single-Bay
<b>Single SuperDART; Single Bay</b>	
FWP-6216000MOD	10W, EGSM 900, Non-Diversity, Single SuperDART
FWP-7416000MOD	20W, GSM 1800, Non-Diversity, Single SuperDART
FWP-9416000MOD	20W, UMTS 2100, Non-Diversity, Single SuperDART
FWP-9416D00MOD	20W 2100 UMTS Module, DIV Ready, Single SuperDART
FWP-F216000MOD	10W APAC EGSM (885-915) Module, Single SuperDART
FWP-I210000MOD	6.5W APAC iDEN Module, Non-Diversity, Classic (Extended 1 MHz)
FWP-K216000MOD	10W 900 P-GSM Module, Non-Diversity, Single SuperDART
FWP-L416000MOD	20W 700 Lower ABC Module, Non-Diversity, Single SuperDART
FWP-U416000MOD	700 LTE, UPPER C, 20W Module, SISO, Single SuperDART
FWP-U816100MOD	40W 700 Upper C Module, Non-Diversity, Single SuperDART, Single-Bay
<b>Dual SuperDART; Single Bay</b>	
FWP-741S000MOD	20W, GSM 1800, Non-Diversity, DL SuperDART
FWP-841S000MOD	20W RF Module, PCS 1900 12S
FWP-941S000MOD	20W, UMTS 2100, Non-Diversity, DL SuperDART
FWP-A41S000MOD	20W RF Module, AWS 2100 12S
<b>Two Single SuperDARTs; Single Bay</b>	
FWP-6226000MOD	10W, EGSM 900, Diversity, Single SuperDART
FWP-7426000MOD	20W, GSM 1800, Diversity, Single SuperDART
FWP-8426000MOD	20W PCS Module, Diversity, Single SuperDART
FWP-9426000MOD	20W, UMTS 2100, Diversity, Single SuperDART
FWP-A426000MOD	20W AWS Module, Diversity, Single SuperDART
FWP-K226000MOD	10W 900 P-GSM Module, Diversity, Single SuperDART

**Table 1.** *FlexWave Prism RF Modules Supported in this Installation Guide (Cont.)*

Catalog Number	Description
<b>Classic DART; Single Bay</b>	
FWP-4210000MOD	6.5W 800 SMR Module, Non-Diversity, Classic
FWP-8410000MOD	20W RF Module, PCS 1900 Non-Diversity
FWP-A410000MOD	20W RF Module, AWS 2100 Non-Diversity
FWP-B420000MOD	20W WIDEBAND Cell Module, Diversity, Classic
FWP-8420000MOD	20W RF Module, PCS 1900 Diversity
FWP-A420000MOD	20W RF Module, AWS 2100 Diversity
<b>Classic DART; Two-Bay</b>	
FWP-8810000MOD	40W PCS Module, Non-Diversity, Classic (Dual-Bay)
FWP-A810000MOD	40W AWS Module, Non-Diversity, Classic, Dual-Bay
<b>Dual Classic DART; Two-Bay</b>	
FWP-D210000MOD	6.5W 800/900 ESMR Module, Non-Diversity, Classic

**Table 2.** *Supported FlexWave Prism Remote Unit Chassis*

Catalog Number	Description
FP1-XXXXXXXXXXRU	Single-Bay Prism Remote
FP2-XXXXXXXXXXRU	Dual-Bay Prism Remote
FP3-XXXXXXXXXXRU	Tri-Bay Prism Remote
FP4-XXXXXXXXXXRU	Quad-Bay Prism Remote

## Revision History

This release of the FlexWave Prism Remote Unit RF Module Installation Guide, TECP-77-141 Issue 6, adds support for the DUAL 20W SMR800 / PCS1900 RF Module (FWP-441T841MOD).

## 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.

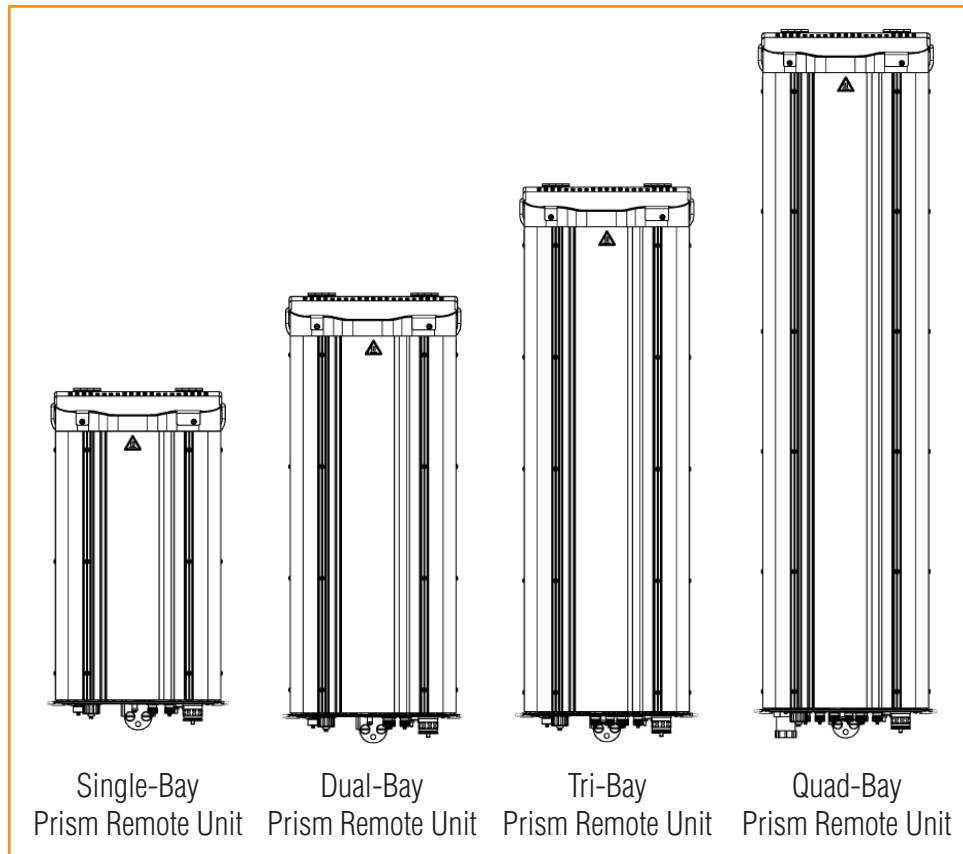
**NOTE:** Notes contain information about special circumstances.

## Abbreviations Used in this Guide

CDRH	Center for Diseases and Radiological Health	LVDS	Low-Voltage Differential Signaling
cm	Centimeter	MHz	Megahertz
DART	Digital Analog RF Transport	MIMO	Multiple-Input Multiple-Output
dB	Decibel	MOD	Module
dBm	Decibel-milliwatts	PA	Power Amplifier
DCS	Distributed Call Signaling	PRIM	Primary
DD	Digital Dividend	PRU	Prism Remote Unit
DIV	Diversity	PWR	Power
DPM	Digital Processing Module	REV	Reverse
EMC	Electromagnetic Compatibility	RF	Radio Frequency
ESD	Electro-Static Discharge	Rx	Receive
EU	European Union	SDART	Super Digital Analog RF Transport
FCC	Federal Communications Commission	SeRF	Serialized RF
FDA	Food and Drug Administration	SFP	Small Form-Factor Pluggable
FRU	Fullband Remote Unit	TIM	Thermal-Interface Material
FWD	Forward	Tx	Transmit
HDM	High Density Module	UL	Underwriters' Laboratories, Inc.
HMFOC	Hardened Multi-Fiber Optic Connector	UMTS	Universal Mobile Telecommunications System
IC	Industry Canada	W	Watt
LED	Light-Emitting Diode		

## OVERVIEW OF RF MODULES FOR PRISM REMOTE UNITS

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



**Figure 1.** Prism Remote Units (PRUs)

The PRU has from one to four RF Module bays, depending on the PRU model. That is, the Single-Bay PRU has one RF Module bay, and the Quad-Bay PRU has four RF Module bays. 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.

**NOTE:**     **The RF Modules are field replaceable, but cannot be serviced in the field.**

## RF Module DARTs

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

- one Classic DART or one Single SuperDART
- two Classic DARTs (i.e., the 6.5W 800/900 ESMR Module, Non-Diversity, Classic)
- two Classic DARTs—Diversity
- two Single SuperDARTs—Diversity
- one Dual SuperDART
- one or two sets of Tx or Rx Boards (HDM).

Each RF Module will have up to two 6-timeslot DARTs or one 12-timeslot DART per RF Module.

The DART type determines the maximum number of links, where there can be up to eight Classic DARTs or Single SuperDARTs that support 39 MHz each, or up to 4 Dual SuperDARTs that support up to 75MHz each.

Prism supports the DART Module types listed below.

- Classic DARTs are 6-timeslot DARTs that support up to 35 MHz contiguous bandwidth (see [Table 3 on page 6](#)).
- Single SuperDARTs are 6-timeslot DARTs that support two non-contiguous bands in the entire frequency range of the DART, but cannot exceed 39 MHz total RF bandwidth (see [Table 4 on page 6](#)).
- Dual SuperDARTs are 12-timeslot DARTs that support up to 60-75 MHz (see [Table 5 on page 7](#))

**NOTE:** Industry Canada PCS 20 dB nominal bandwidth is less than 61.5 MHz.

**NOTE:** Industry Canada AWS 20 dB nominal bandwidth is less than 47.2 MHz

**Table 3.** Single-Bay Classic DARTs

DART Module Type	Maximum Bandwidth (MHz)	Number of Fiber Slots
800 APAC iDEN Classic	19	3
800 SMR Classic	18	3
850 Cell Classic	25	4
900 SMR Classic	5	1

**Table 4.** Single-Bay SuperDARTs <sup>(1)</sup>

DART Name	Used in...		Maximum Frequency Span (MHz)	Maximum Bandwidth (MHz)	Maximum Fiber Slots
	Host Units	HEUs			
1800 GSM SGL SuperDART	Yes	No	75	39	6
1900 PCS SGL SuperDART	Yes	Yes	70	39	6
2100 AWS SGL SuperDART	Yes	Yes	45	39	6
2100 UMTS SGL SuperDART	Yes	No	60	39	6
700 IABC SGL SuperDART	Yes	Yes		18	3
700 uC SGL SuperDART	Yes	Yes		10	2
900 EGSM SGL SuperDART	Yes	No		35	6

(1) When using a Host Unit with both the SeRF II and System Board II modules, the bandwidths and fiber slots shown are only available in Host Unit DART Slots 1 and 3 for Single-Bay SuperDARTs.

**Table 5. Dual-Bay SuperDARTs**

DART Module Type	Maximum Bandwidth (MHz)	Number of Fiber Slots
1800 GSM DL SuperDART	75	12
1900 PCS DL SuperDART	70	12
2100 AWS DL SuperDART	45	8
2100 UMTS DL SuperDART	60	12

## RF Module Types

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

- “Single- and Dual-Bay RF Modules with Classic or SuperDARTs” on page 7
- “HDM RF Modules” on page 8
- “Legacy Dual-Bay 40W RF Modules” on page 9.

### Single- and Dual-Bay RF Modules with Classic or SuperDARTs

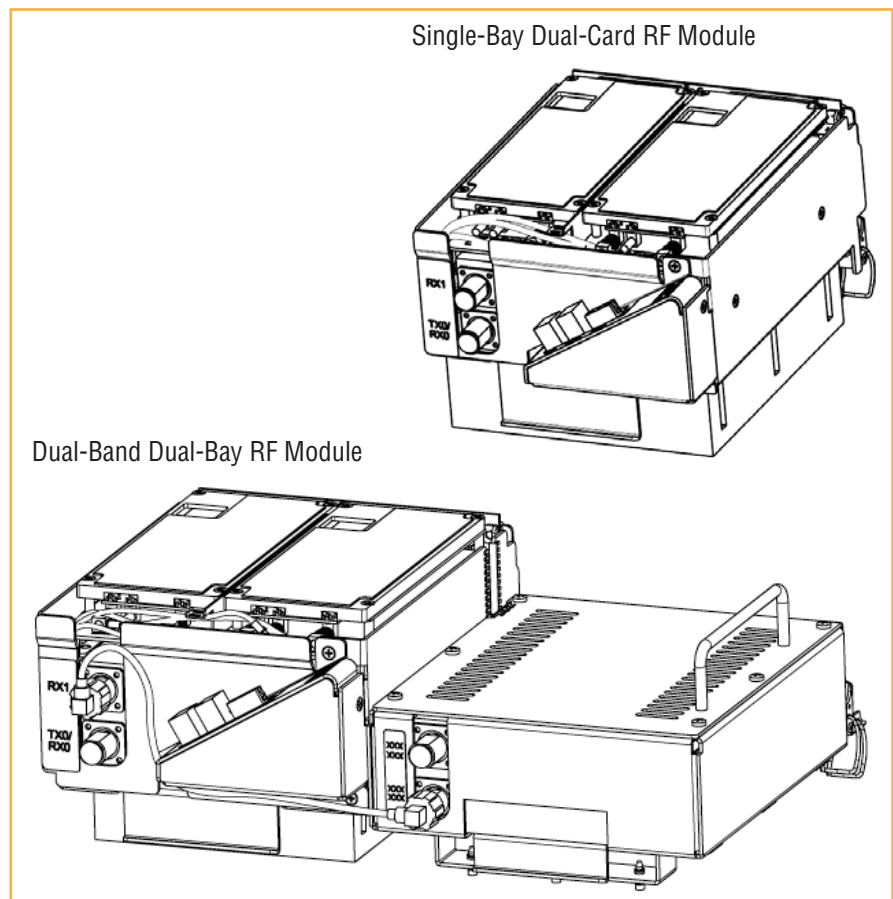
Figure 2 shows examples of Single- and Dual-Bay RF Modules, both of which have two DARTs.

Single-Bay RF Modules have the following elements:

- one or two DARTs
- one Duplexer
- one Linear Power Amplifier (LPA)
- one Remote DART Interface (RDI) board.

Dual-Band Dual-Bay RF Modules have the following elements:

- two DARTs
- two Duplexers
- one Linear Power Amplifier (LPA)
- one Remote DART Interface (RDI) board.



**Figure 2. Single- and Dual-Bay RF Modules**

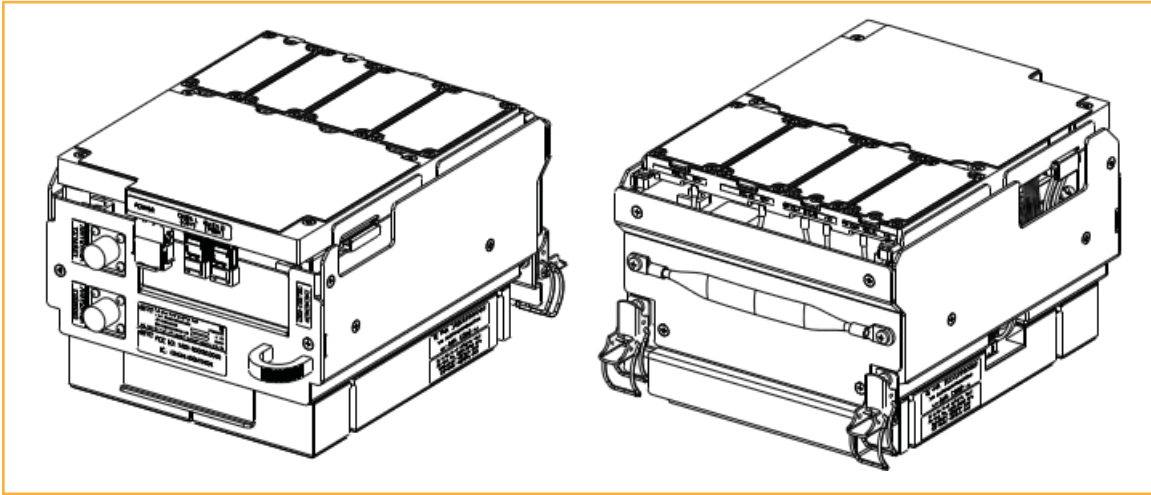
## HDM RF Modules

HDM RF Modules ([Figure 3](#)) are designed to provide the ability to deploy either a 20W Dual /Multiple Input multiple Output (MIMO) RF Module (where dual equals two bands) or a 40W Single Input Single Output (SISO) RF Module within a single-bay of a PRU. An HDM RF Module does the following:

- interfaces one Host DART-either Classic or SuperDART
- supports two non-contiguous RF slices up to 35 MHz total bandwidth in a Dual or MIMO configuration
- supports full bandwidth in a SISO configuration, up to 75 MHz
- supports 20W per band/Path in a Dual/MIMO RF Module
- supports up to 40W RF output power in a SISO RF Module.

An HDM RF Module has the following components:

- one DPM
- one or two sets of TX/RX boards
- one or two Duplexers
- one or two Power Amplifiers (PAs).



**Figure 3.** HDM RF Modules

The components of a PRU HDM RF Module are dependent on the module type, as listed in [Table 6](#).

**Table 6.** Components of PRU HDM RF Modules

RF Module Type	DPM	LPA	Duplexer	Rx Card	Tx Card
SISO	1	1	1	1	1
MIMO/Dual Band Module	1	2	2	2	2

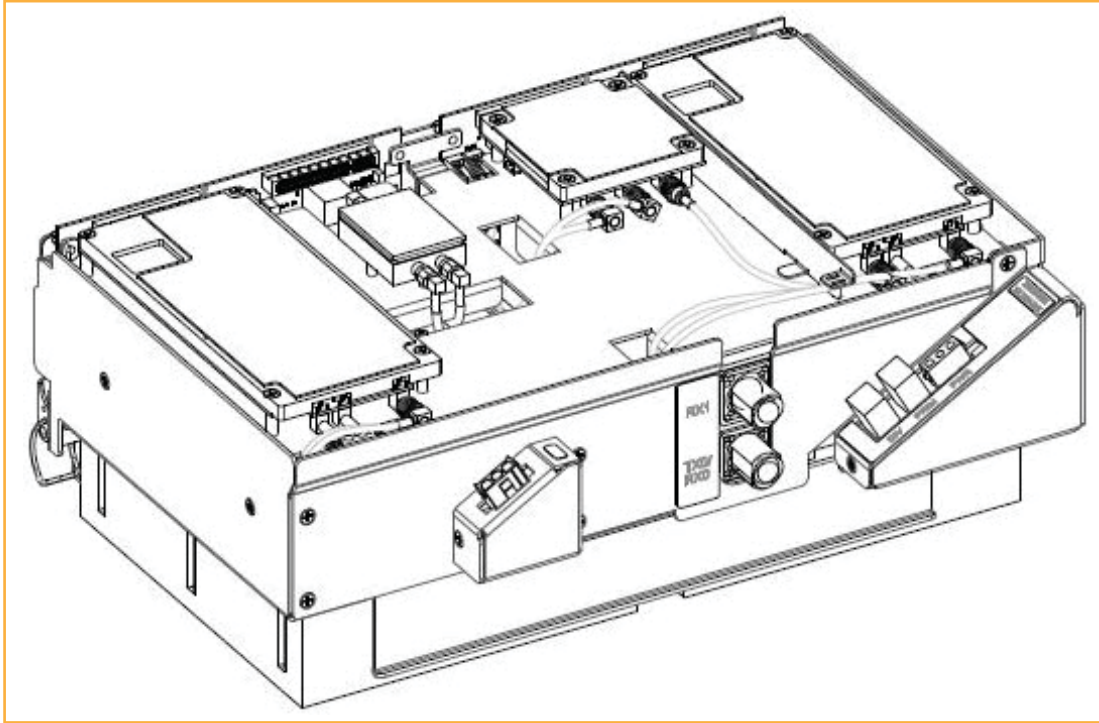


## Legacy Dual-Bay 40W RF Modules

The Legacy Dual-Bay 40W RF Module ([Figure 5](#)) is designed for AWS and PCS frequencies and is supported only by Classic DARTs. The Legacy Dual-Bay 40W RF Module comprises:

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

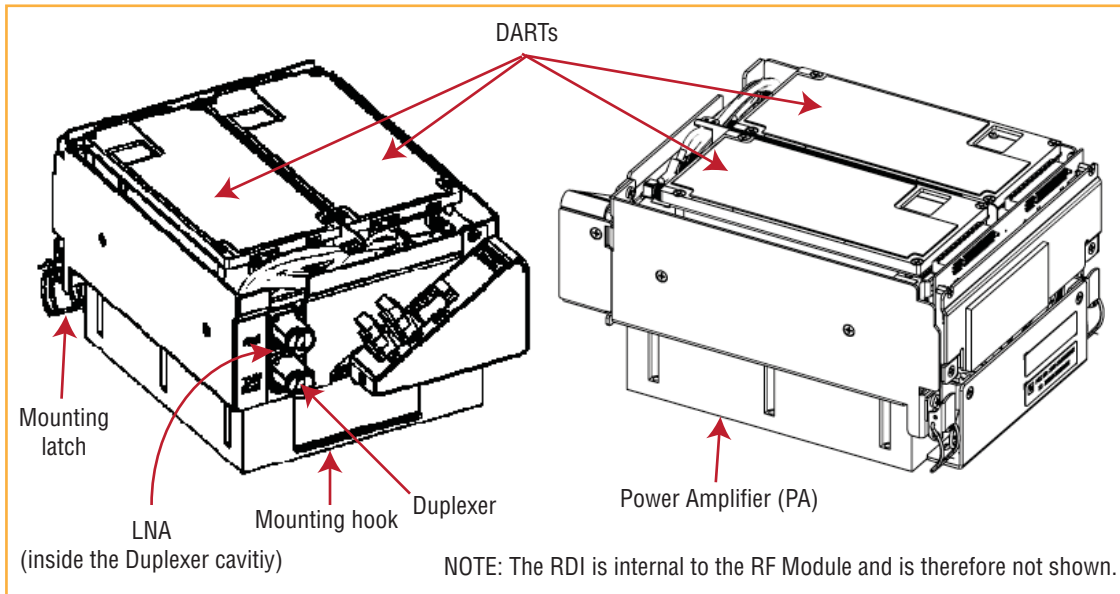
**NOTE:** This manual describes how to install the PCS 1900 and AWS 2100 Non-Diversity RF Modules.



**Figure 4.** Legacy Dual-Bay 40W RF Module

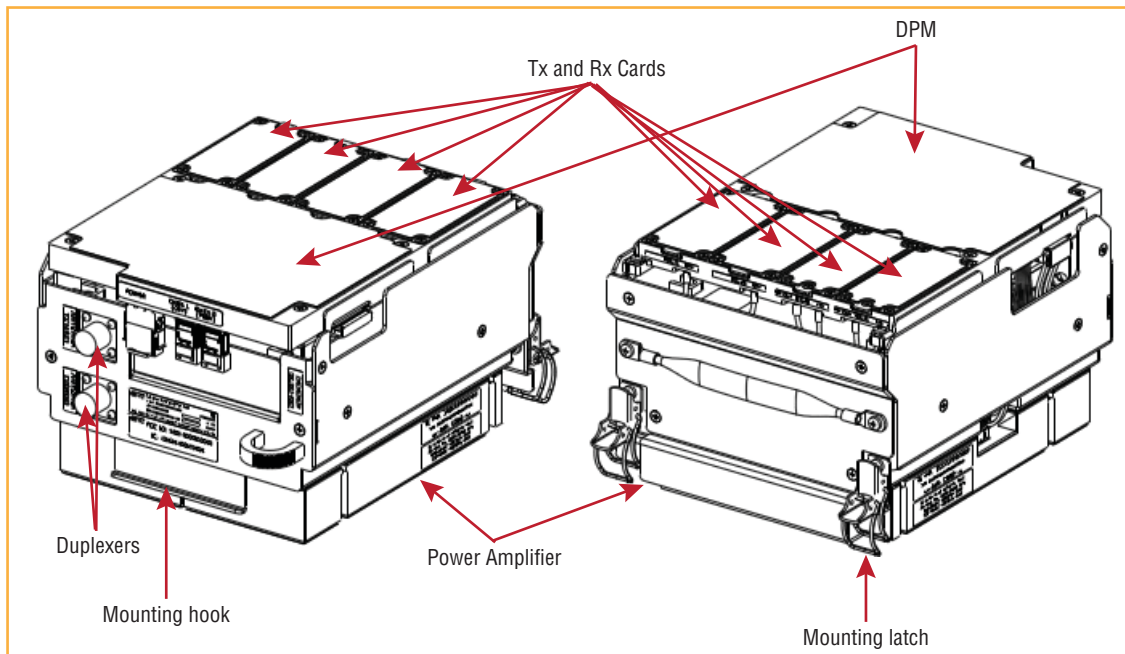
# RF MODULE COMPONENTS

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



**Figure 5. Single-Bay 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 Single- and Dual-Bay RF Modules and the Legacy Dual-Bay 40W RF Modules contains up to two REV path Low Noise Amplifiers (LNA for PRI and/or SEC reverse paths).

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 RF. The PAs are pass-band specific, with the maximum composite Tx power levels listed in [Table 7](#) for Single-Card, Dual-Card, and HDM RF Modules and [Table 8 on page 11](#) for Legacy Dual-Bay 40W RF Modules.

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

**Table 7.** LPA Maximum Composite Tx Power Levels for Single-Card, Dual-Card, and HDM RF Modules

Passband	Maximum dBm	Watts	Bandwidth (MHz) supported across entire spectrum				
			HDM		Single Super DART	Classic DART	Dual SuperDART
			Dual/MIMO	SISO			
AWS 2100	43	20	39	45	39	NA	45
Cellular 850	43	20	25	25	NA	25	NA
	46	40	25	25	NA	25	NA
EGSM 900	40	10	35	35	35	NA	NA
DCS 1800	42	15.8	39	75	39	NA	75
LTE 700 Lower ABC	43	20	18	18	18	NA	NA
	46	40	18	18	18	NA	NA
LTE 700 Upper C	43	20	10	10	10	NA	NA
	46	40	10	10	10	NA	NA
PCS 1900	43	20	39	70	39	NA	70
PGSM 900	40	10	25	25	25	NA	NA
SMR 800	38	6.5	18	18	NA	18	NA
SMR 900	38	6.5	5	5	NA	5	NA
UMTS 2100	42	15.8	39	60	39	NA	60

**Table 8.** LPA Maximum Composite Tx Power Levels for Legacy Dual-Bay 40W RF Modules

Passband	Maximum dBm	Watts	Bandwidth (MHz) supported across entire spectrum Classic DART
PCS 1900	+46	40	35
AWS 2100	+46	40	35

**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”

**NOTE:** Older labeling schemes used “PRI” and “DIV”. To match old labeling schemes to current labeling:

- TX0/RX0 = PRI
- TX1/RX1 = DIV
- When installing a Non-Diversity or SISO RF Module, or an SMR 800/900 Dual-Band Dual-Bay 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 bays in the PRU chassis, where **MOD A** is the bottom bay and **MOD D** is the top bay. In the installation steps, the RF cables and connectors are referred to as **MOD N TX0/RX0** and as **MOD N TX1/RX1** where **N** equals **A, B, C, or D**.

The cables and connectors have corresponding labels as shown in [Table 9](#) for Single-Card, Dual-Card, and HDM RF Modules.

**Table 9.** RF Antenna Labels for Single-Card, Dual-Card, and HDM RF Modules (From Top of PRU Chassis Down)

	RF Module Cable, RF Module Connector, and Remote Antenna Connector Label	Function	Single-Bay Remote Unit RF Module Bay Designations	Dual-Band Dual-Bay Remote Unit RF Module Bay Designations		
				Dual-Bay	Tri-Bay	Quad-Bay
Bay D	Mod D TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module D	MOD D	N/A	N/A	MOD C
	Mod D TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module D				
Bay C	Mod C TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module C	MOD C	N/A	MOD C	
	Mod C TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module C				
Bay B	Mod B TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module B	MOD B	MOD A	MOD A	
	Mod B TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module B				
Bay A	Mod A TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module A	MOD A			
	Mod A TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module A				

## RF Module Cables for Dual-Bay Installations

For Dual-Bay installations, the RF cables and connectors are labeled as **MOD N TX0/RX0** and **MOD N TX1/RX1**, where **N** refers to the top bay of the double-bay installation. For example, for a Dual-Bay 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 10 on page 14](#) for Legacy Dual-Bay 40W RF Modules.

**Table 10.** RF Antenna Labels for Legacy Dual-Bay 40W RF Modules (From Top of PRU Chassis Down)

	RF Module Cable, RF Module Connector, and Remote Antenna Connector Label	Function	40W Dual-Bay Remote Unit RF Module Bay Designations				
			Dual-Bay	Tri-Bay	Tri-Bay	Quad-Bay	
Bay D	Mod D TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module D	N/A	N/A	N/A	MOD D	MOD C
	Mod D TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module D					
Bay C	Mod C TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module C	N/A	MOD C	MOD C	MOD C	MOD C
	Mod C TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module C					
Bay B	Mod B TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module B	MOD B	MOD B	MOD C	MOD B	MOD B
	Mod B TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module B					
Bay A	Mod A TX0/RX0	Transmit RF power and primary/Path 1 receive to/from the antenna for RF Module A	MOD B	MOD B	MOD A	MOD B	MOD A
	Mod A TX1/RX1	Diversity receive/Path 2 for RF power from the antenna for RF Module A					

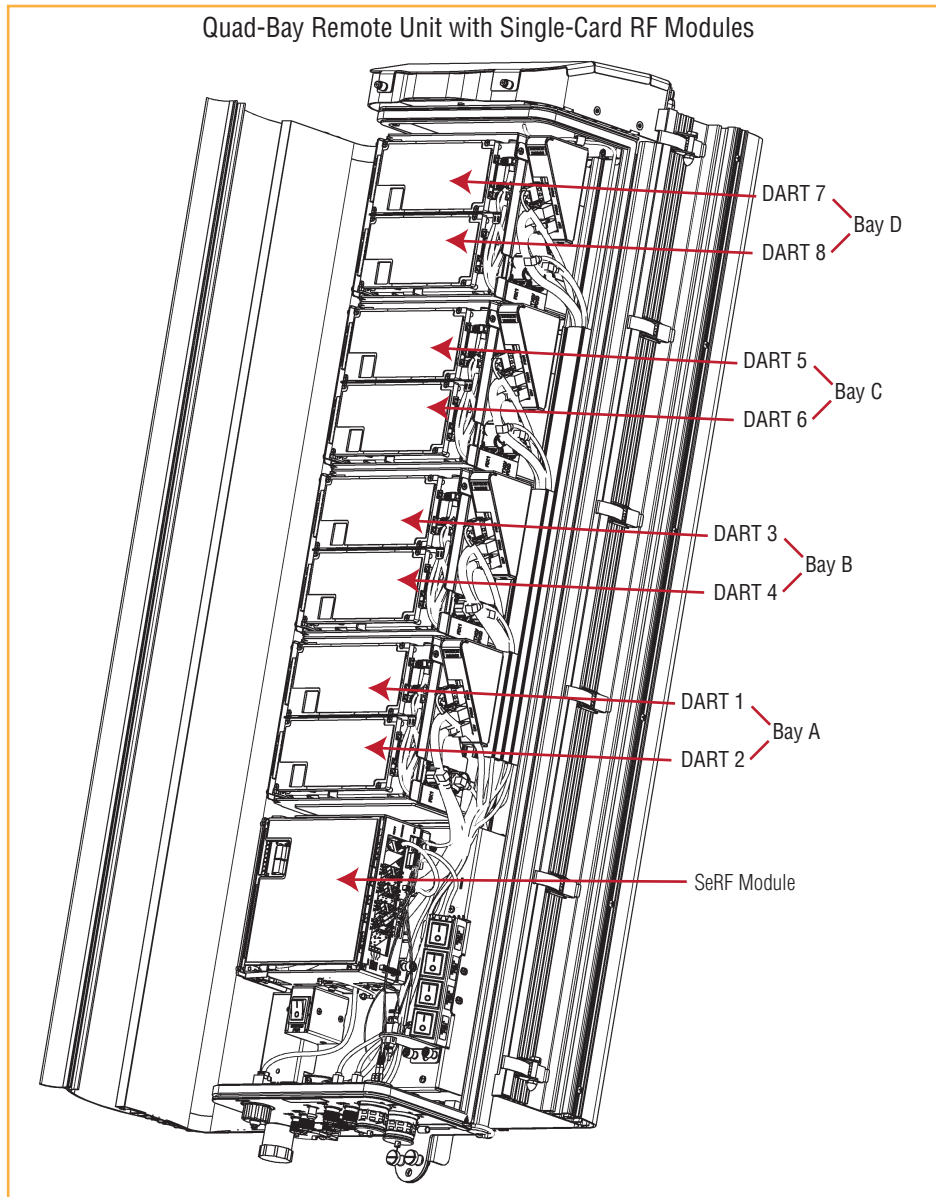
Note: For Dual Module installations the center module shelf needs to be removed; see [“Dual-Bay Modules Only—Remove the Module Bay Shelf” on page 21](#).

Note: Install the Legacy Dual-Bay 40W RF Module in the lower-most bay in the chassis. If, however, if two Legacy Dual-Bay 40W RF Modules are present, install the 2100 Module in the lower-most Bay and the 1900 Module in the upper-most Bay.



## RF Group Assignments for PRUs

A PRU comprises from one to four RF Module bays. [Figure 7](#) illustrates the numbering of RF Module bays and DARTs.



**Figure 7.** RF Modules Bays in a PRU

Table 11 lists how the FlexWave Prism EMS references the RF group assignments and corresponding components of each RF Module.

**Table 11.** Remote Unit RF Group Assignments (from Top/Down)

Physical RF Bay	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	8		8	7	8	7	8
	7	7			7		7
C	6		6	5	6	5	6
	5	5			5		5
B	4		4	3	4	3	4
	3	3			3		3
A	2		2	1	2	1	2
	1	1			1		1

NOTE: For software releases prior to 7.3, the LPAs were labeled as 1, 2, 3, and 4.

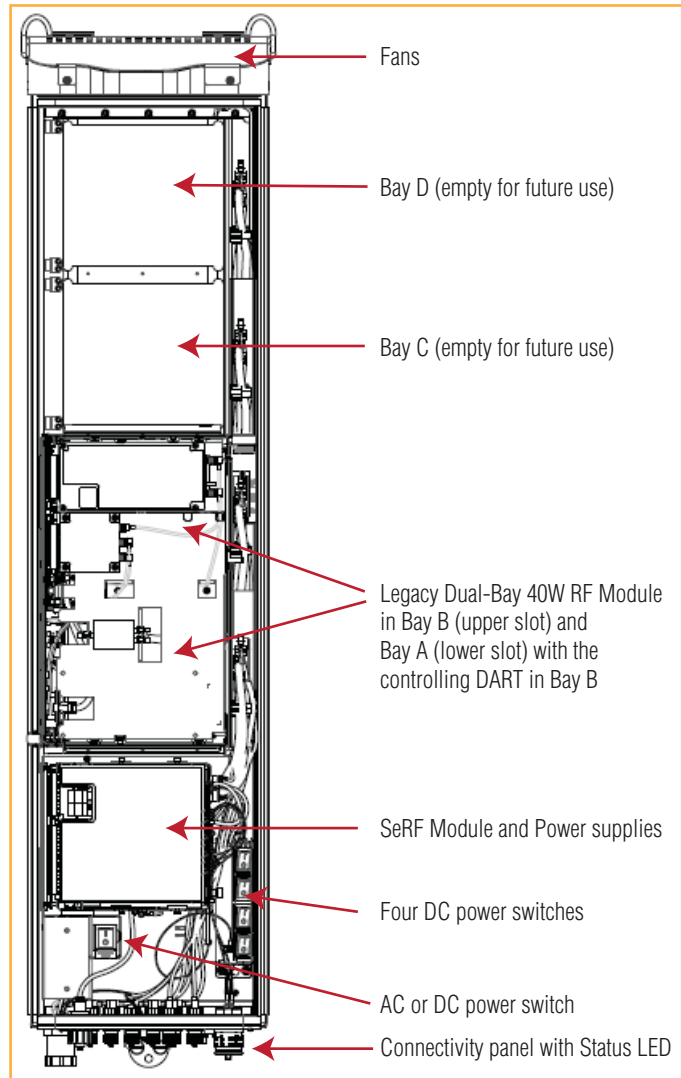
**NOTE:** In a dual LPA system, the Configure Remote Forward Gain page shows two values for the LPA status, one for each LPA. Changing the LPA Mode or resetting the LPA applies to both LPAs at the same time.

**CAUTION!** Should your system experience an LPA problem, refer to Table 11 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 Legacy Dual-Bay 40W RF Module occupies two bays in a PRU. [Figure 8](#) shows the main components in a PRU enclosure, with a Legacy 40W RF Module occupying Bays A and B. The controlling DART will always be in the upper bay (B or D), and the second LPA is always in the lower bay (A or C).



**Figure 8.** Legacy Dual-Bay 40W RF Module in a Quad-Bay PRU

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

**NOTE:** To accommodate two-bay modules, you need to remove a module bay shelf as described in [“Dual-Bay Modules Only—Remove the Module Bay Shelf”](#) on page 21.

## 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 TX1/RX1 where N equals A, B, C, or D.

**NOTE:** When installing RF Modules, populate the RF Modules from highest frequency band to lowest within the PRU. Likewise for power output, populate from the bottom bay to the top; higher output to lower output. That is, for a deployment with 2100 40W, 1900 40W, 850 20W and 700 20W MIMO, install the RF Modules as follows:

- 2100 40W RF Module in Bay A
- 1900 40W RF Module in Bay B
- 850 20W RF Module in Bay C
- 700 20W MIMO RF Module in Bay 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 pigtailed without severe bends. Fiber optic patch cords or pigtailed 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 PRU or when handling any of its components—including the RF Modules. Connect the ground wire on the ESD wrist strap to an earth ground source before touching the PRU or any of its components. Wear the wrist strap the entire time that you work with the PRU and its components.

**CAUTION!** Place 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 47](#)). 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 47](#) 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

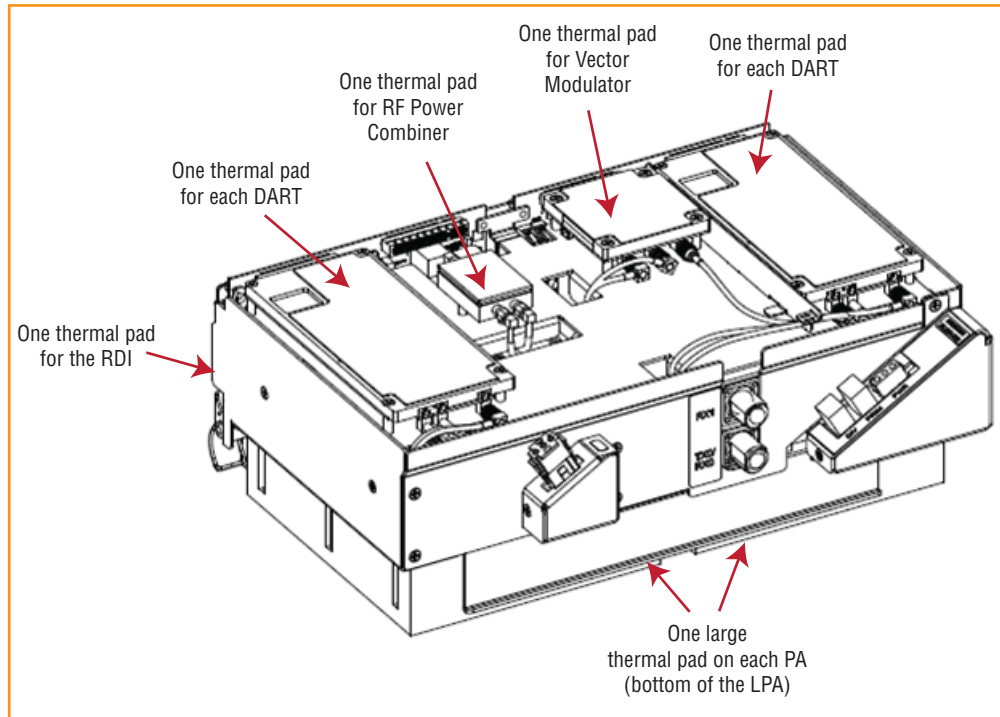
**NOTE:** Release Liners are present on front and back of new modules.

- 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 Single- and Dual-Bay RF Modules, the thermal pads are located as listed below and as shown in [Figure 9 on page 20](#), which shows a Legacy Dual-Bay 40W RF Module.

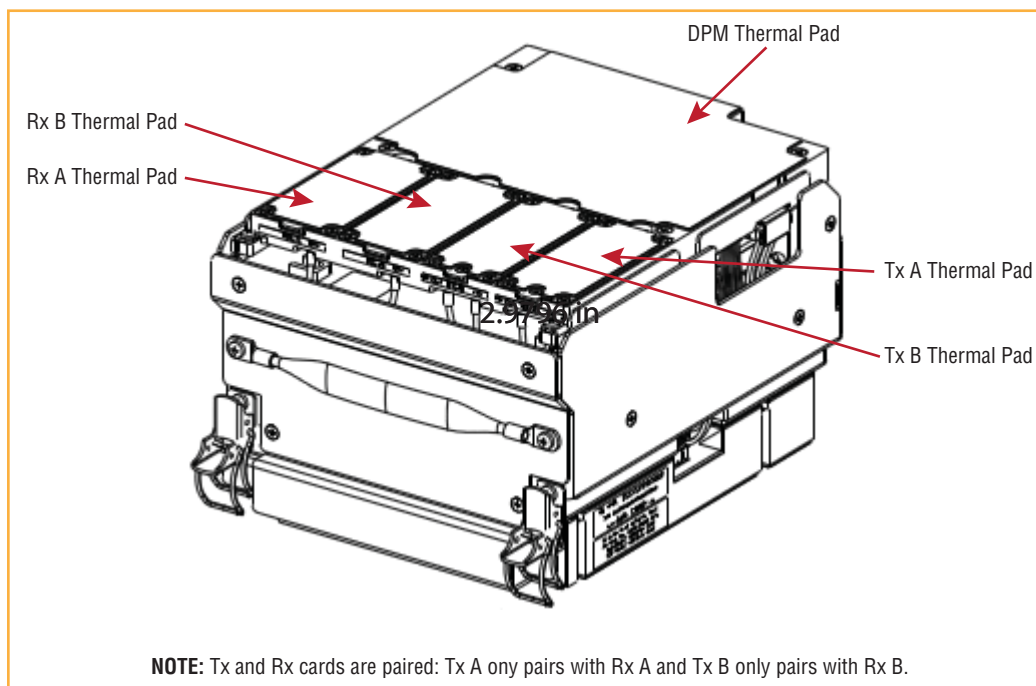
- one large pad on the back surface of each Linear Power Amplifier (LPA)
- up to two on the front surface (DARTs)
- one on the left side for the (RDI)
- one on the vector modulator board
- one on the RF power combiner.



**Figure 9.** Thermal Pads on a Legacy Dual-Bay 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-Bay Modules Only—Remove the Module Bay Shelf

### 1 FOR DUAL-BAY RF MODULES ONLY.

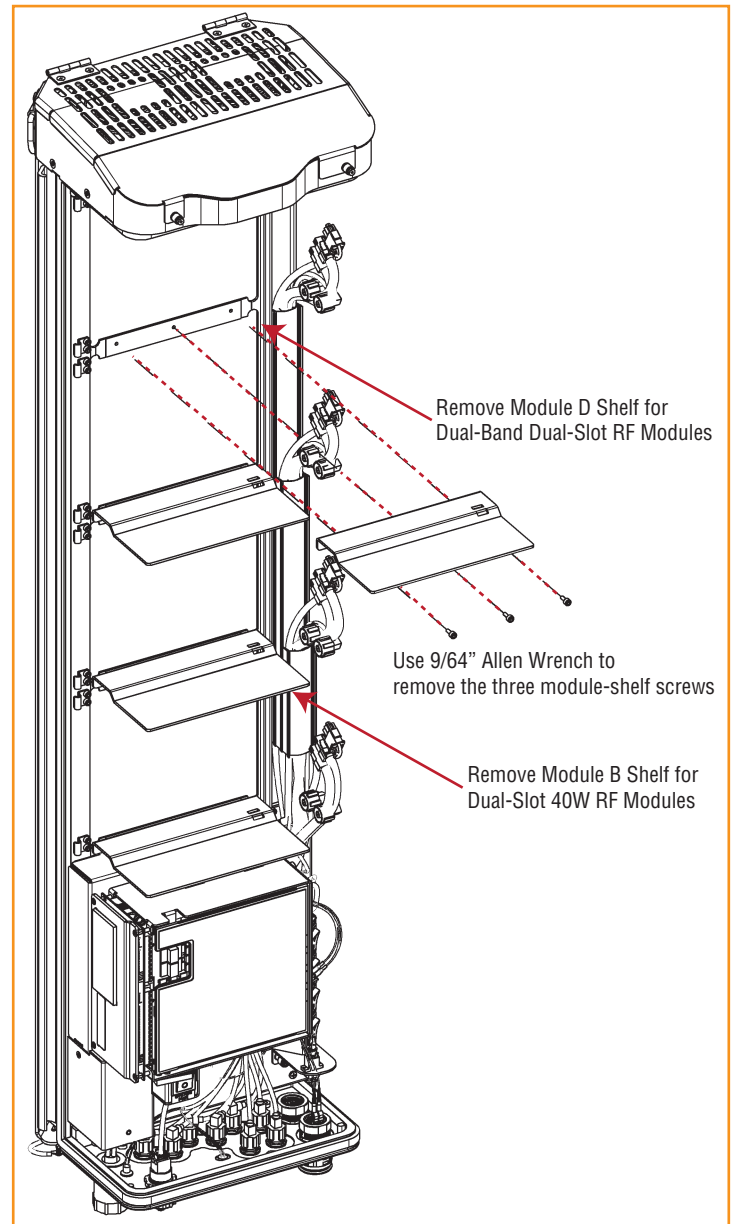
If you are installing a Dual-Bay RF Module, you must remove a module bay shelf from the PRU chassis to accommodate the module's size. (For further information, see [Table 9 on page 13](#).)

Remove the shelf as appropriate for the RF Module:

- For a Legacy Dual-Bay 40W RF Module, when installing in the A and B Bays, remove the Module B Bay Shelf.
- For a Dual-Bay RF Module, when installing in the C and D Bays, remove Module D Bay Shelf.

To remove a Module Bay Shelf:

- a 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.
- b Discard or store the module shelf and fasteners.

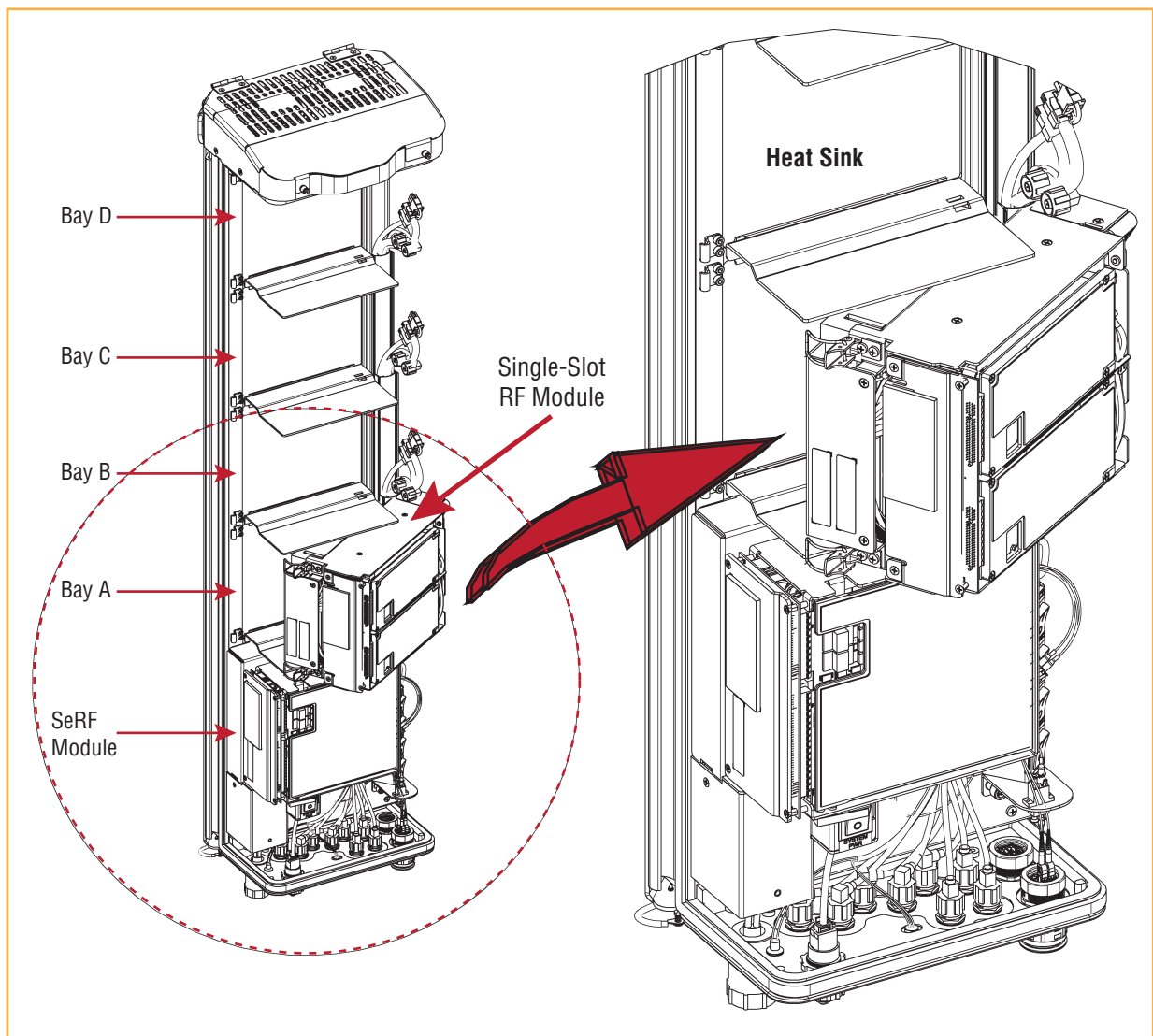


## Install the RF Module into the Prism Remote Chassis

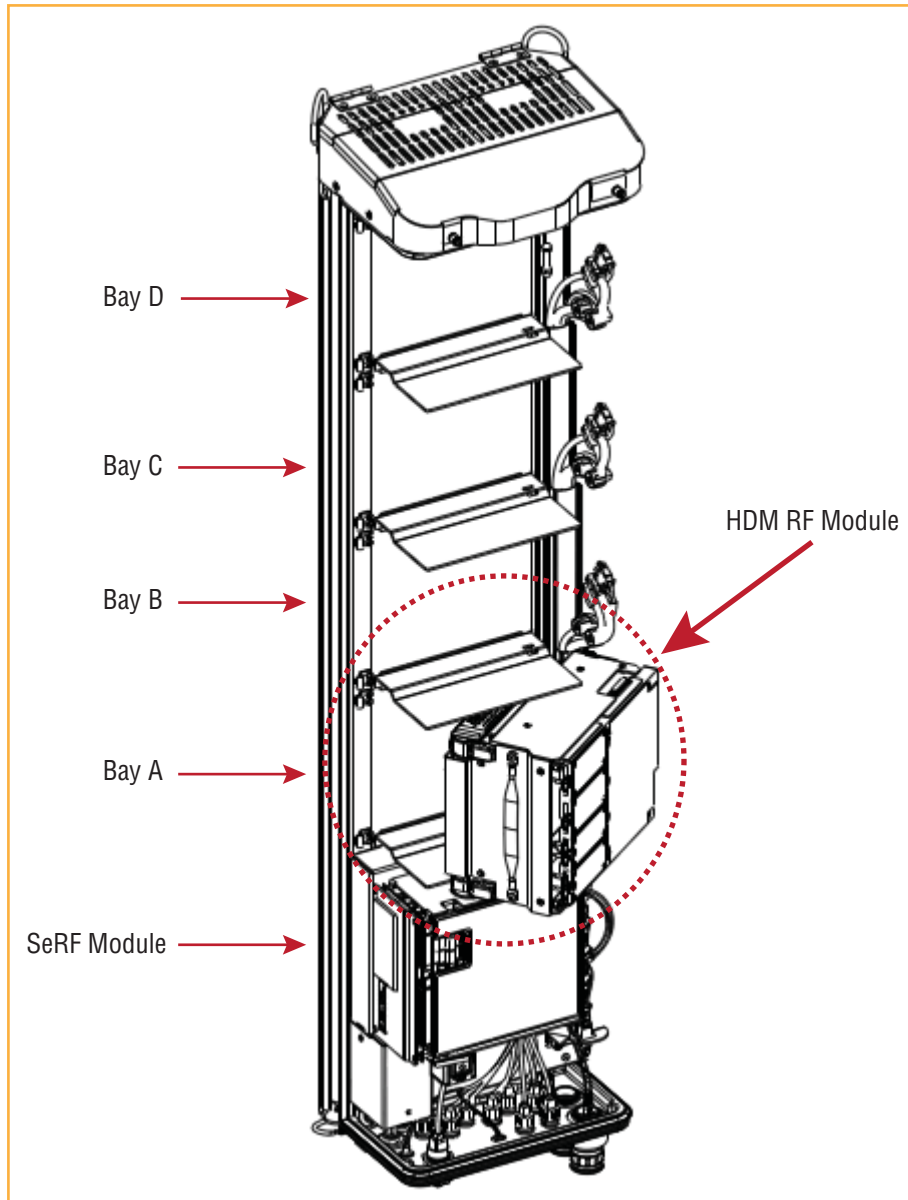
- 1 Hold the RF Module so that the DART card(s) face away from the PRU and the Mounting Hook is toward the Receiving flange on the PRU chassis.

**NOTE:** Always install RF Modules from the bottom up. Do not skip a bay, as this provides more efficient heat dissipation.

- 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-Bay RF Module: [Figure 11 on page 22](#)
  - HDM RF Module: [Figure 12 on page 23](#)
  - Dual-Bay RF Module: [Figure 13 on Page 24](#)
  - Legacy Dual-Bay 40W RF Module: [Figure 14 on Page 25.](#)

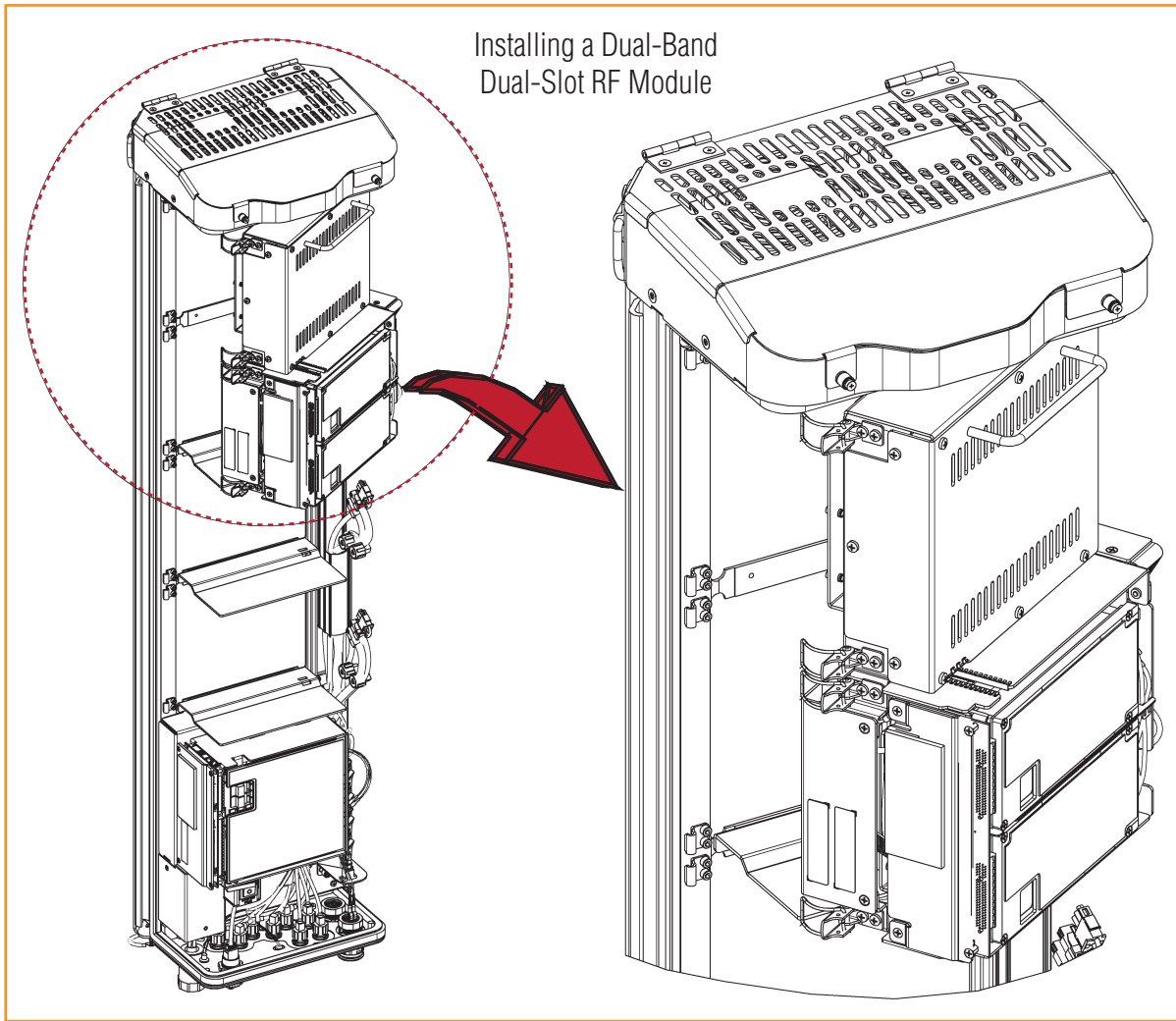


**Figure 11.** Installing a Single-Bay RF Module



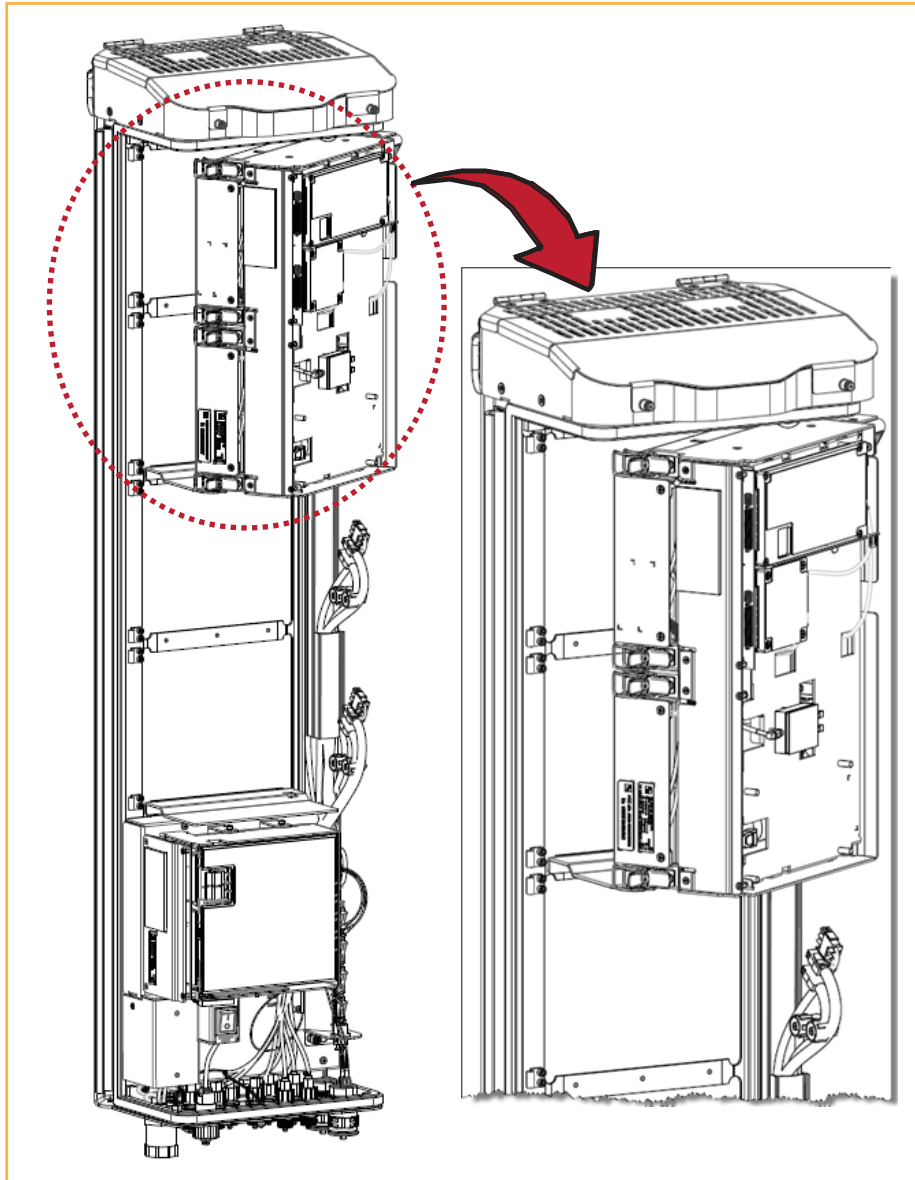
**Figure 12.** Installing an HDM RF Module





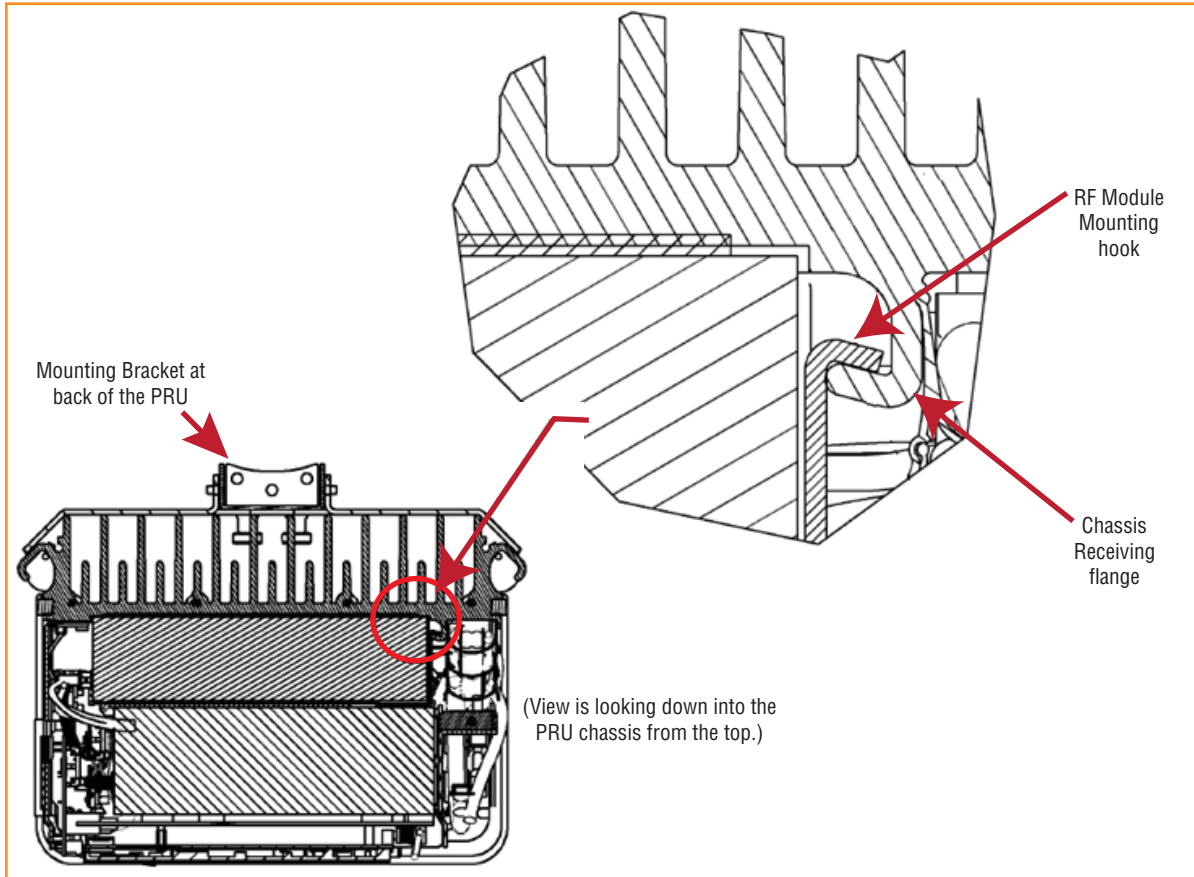
**Figure 13.** Installing a Dual-Bay RF Module





**Figure 14.** Installing a Legacy Dual-Bay 40W RF Module

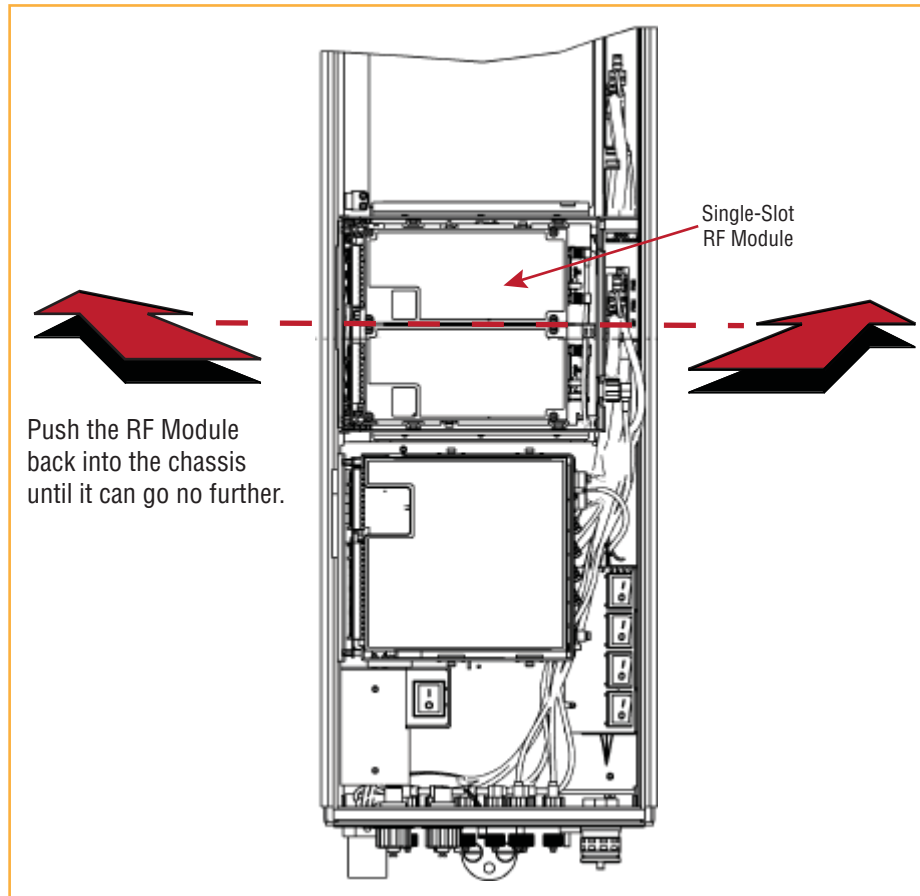
- 3 Align the Mounting Hook on the module with the receiving flange on the PRU heat sink, and then slide the RF Module in toward the flange until it can go no further.



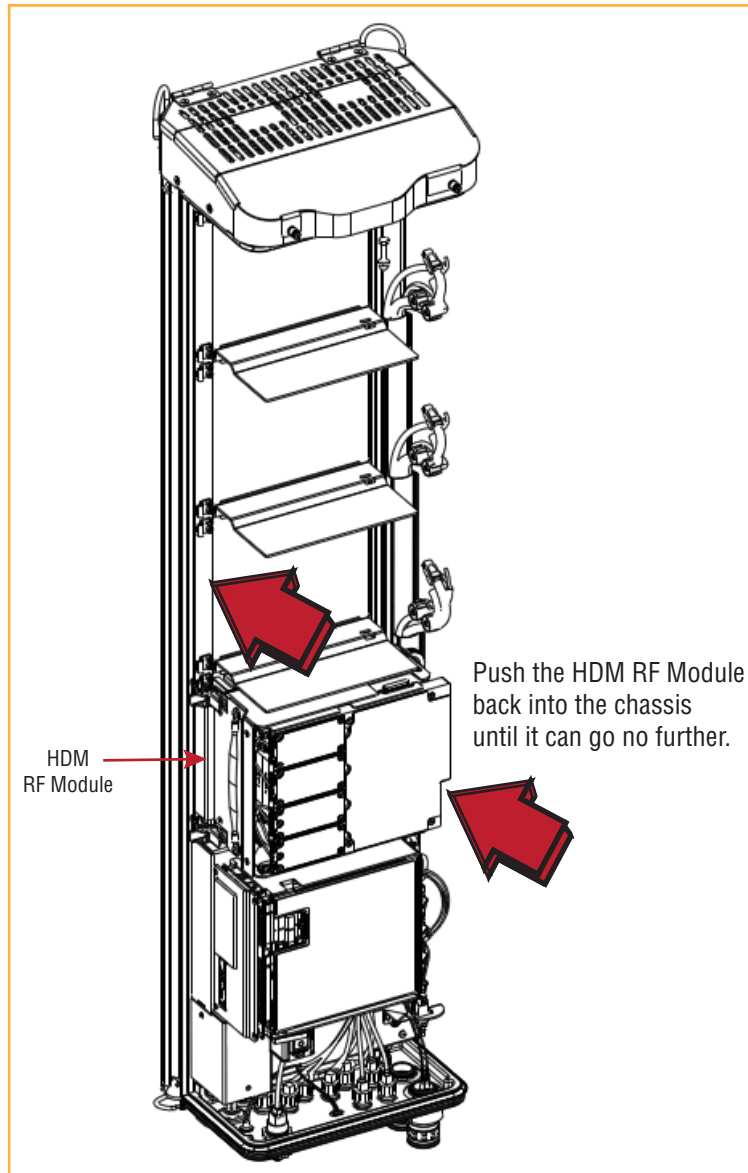
- 4 Push the left edge of the RF Module back and into the PRU chassis until it can go no further, as shown in the following graphics:
- For Single-Bay RF Modules, see [Figure 15 on page 27](#).
  - For HDM RF Modules, see [Figure 16 on page 28](#).
  - For Dual-Bay RF Modules, see [Figure 17 on page 29](#), which uses the Legacy Dual-Bay 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.

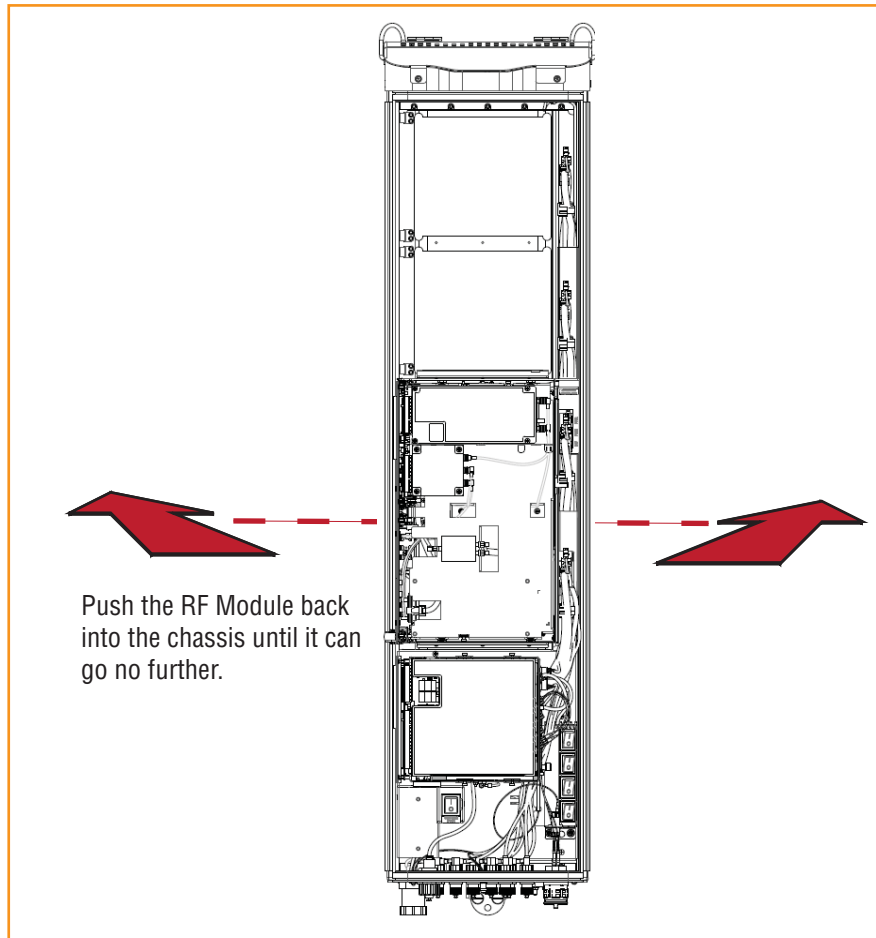
- The front edge of the RF Module should be parallel with the shelf above it.
- The Mounting Hook on the RF Module should be fully engaged with the Receiving flange on the PRU chassis.
- If you later cannot shut the PRU door, verify that the RF Module is installed correctly.



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



**Figure 16.** Seating an HDM RF Module



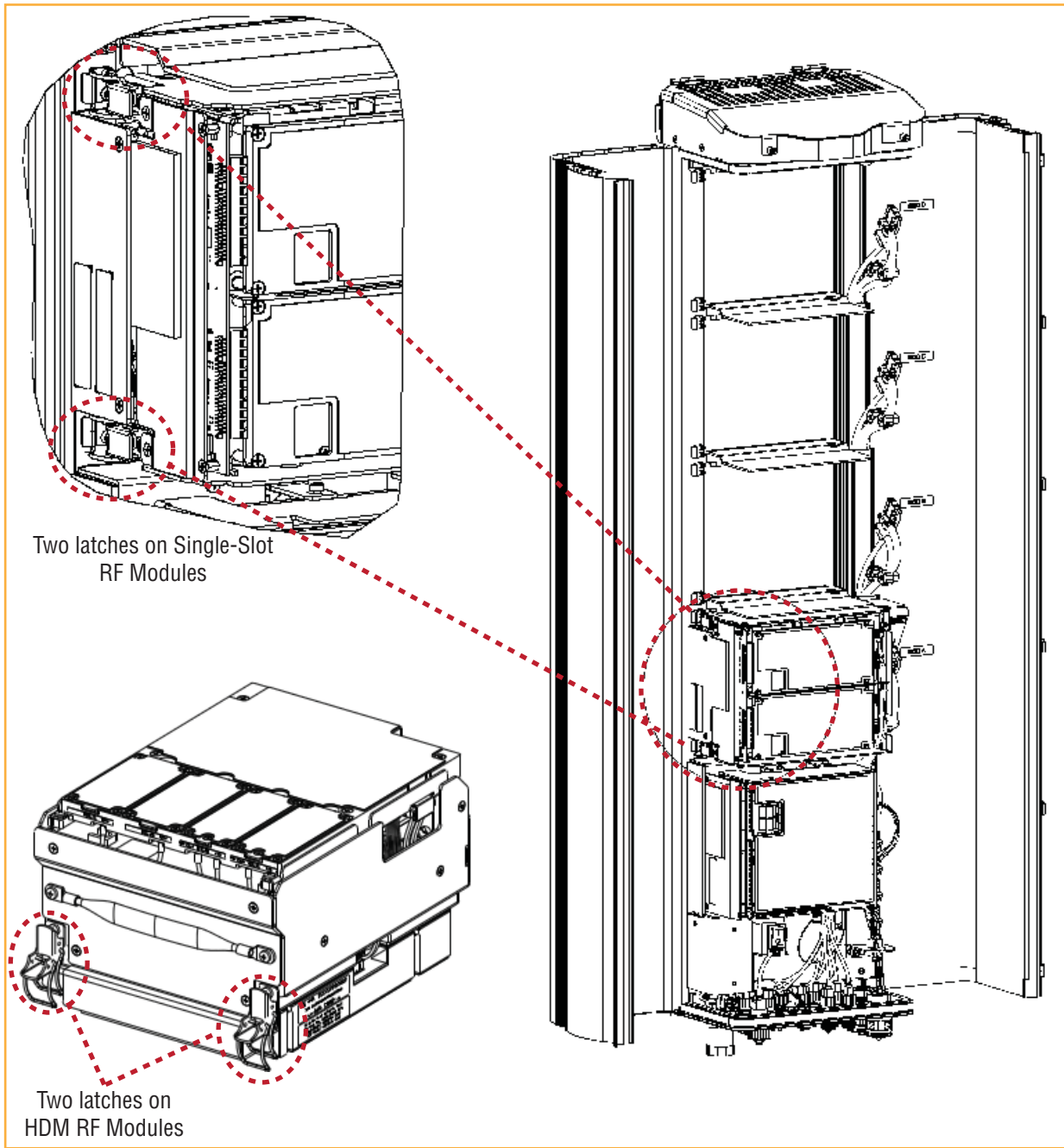
**Figure 17.** Seating a Dual-Bay RF Module

## 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-Bay and HDM RF Modules” on page 29](#)
  - [“Connect Latches on Dual-Bay RF Modules” on page 31.](#)

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

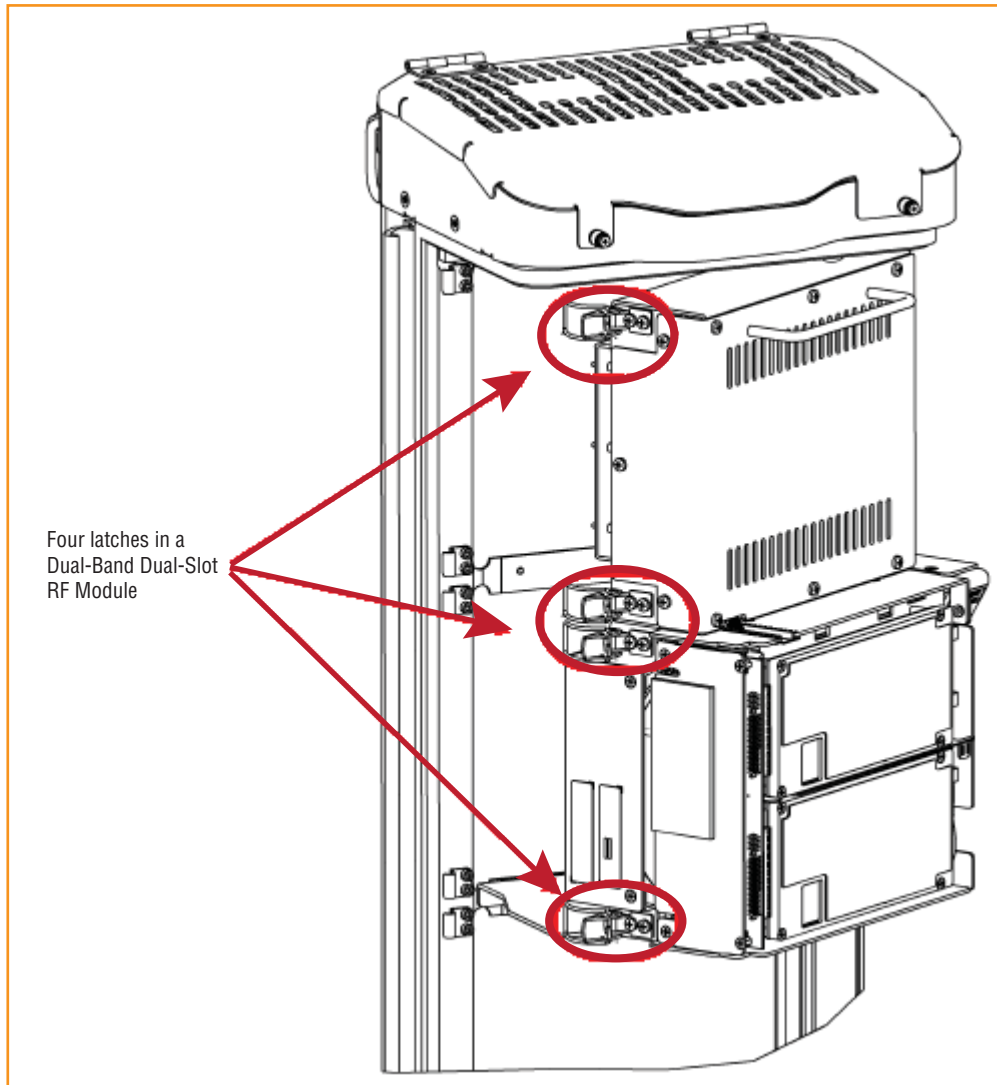
For Single-Bay and HDM RF Modules, secure two latches, as shown in [Figure 18](#).



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

## Connect Latches on Dual-Bay RF Modules

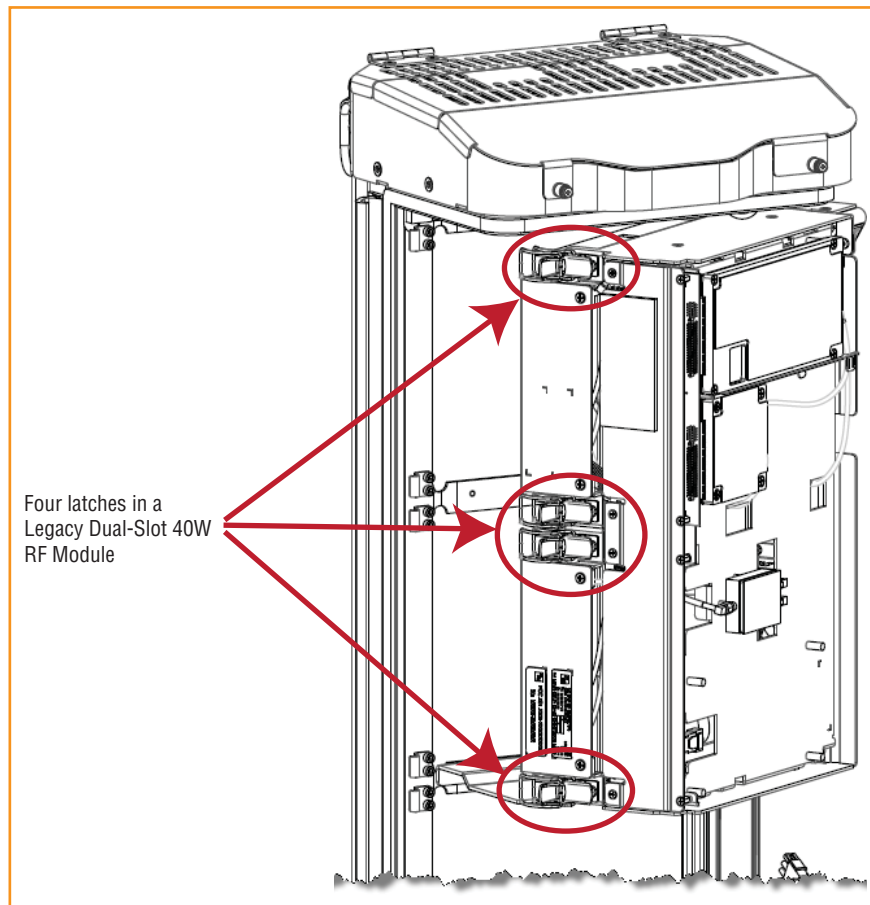
For Dual-Bay RF Modules, secure four latches, as shown in [Figure 19](#).



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

## Latches on Legacy Dual-Bay 40W RF Modules

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



**Figure 20.** Legacy Dual-Bay 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 22](#) 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-Bay RF Module Installation” on page 33](#)
- [“Connecting Cables in a Dual-Bay RF Module Installation” on page 35.](#)



## Connecting Cables in a Single-Bay 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 12.](#)
- 3 Connect the RF Module cables, in the following order:
  - a 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  $8 \pm 1$  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 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  $8 \pm 1$  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 bay of the PRU:

- Single-Bay RF Module: [Figure 21 on Page 34](#)
- HDM RF Module: [Figure 22 on page 35](#)

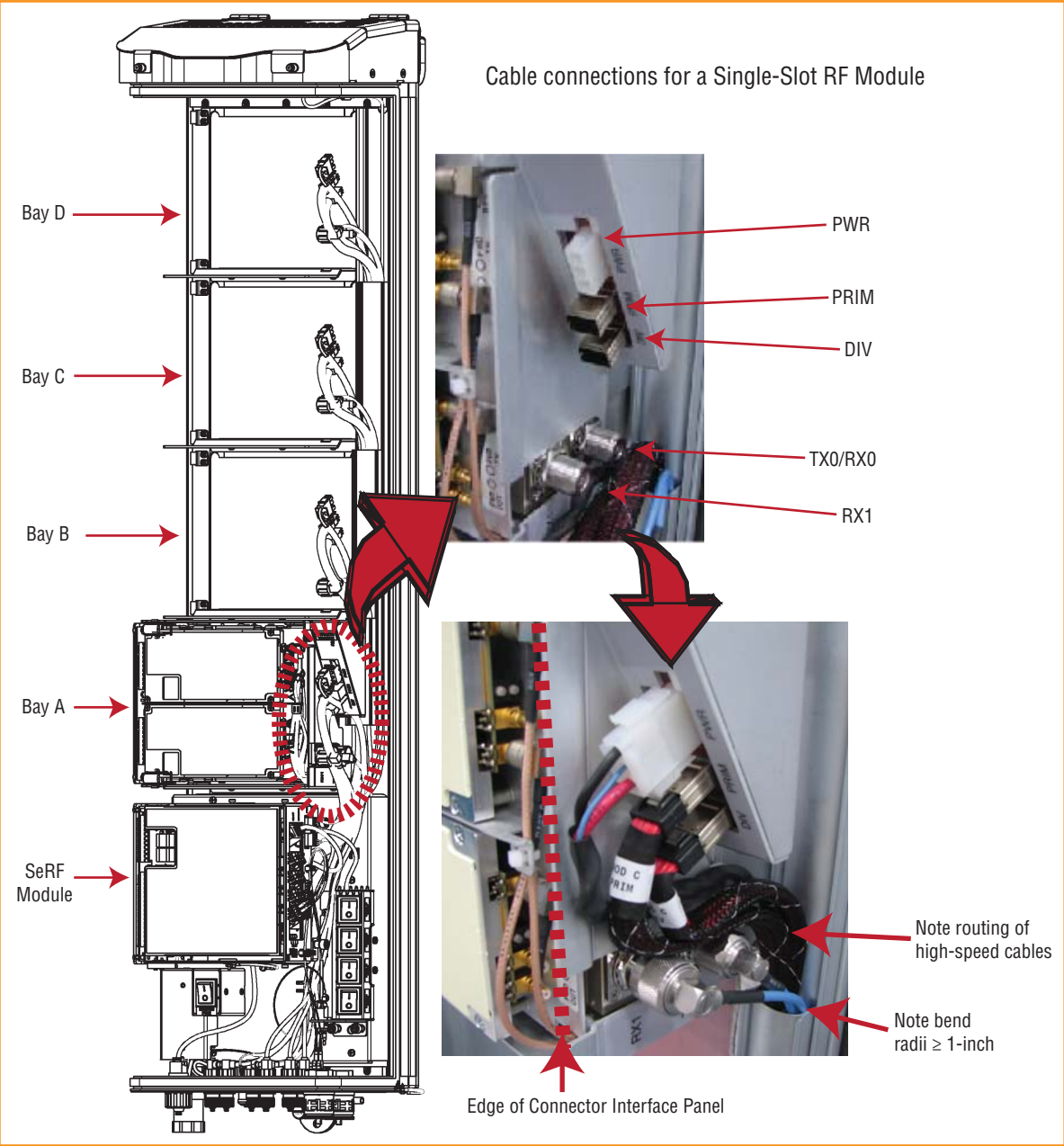
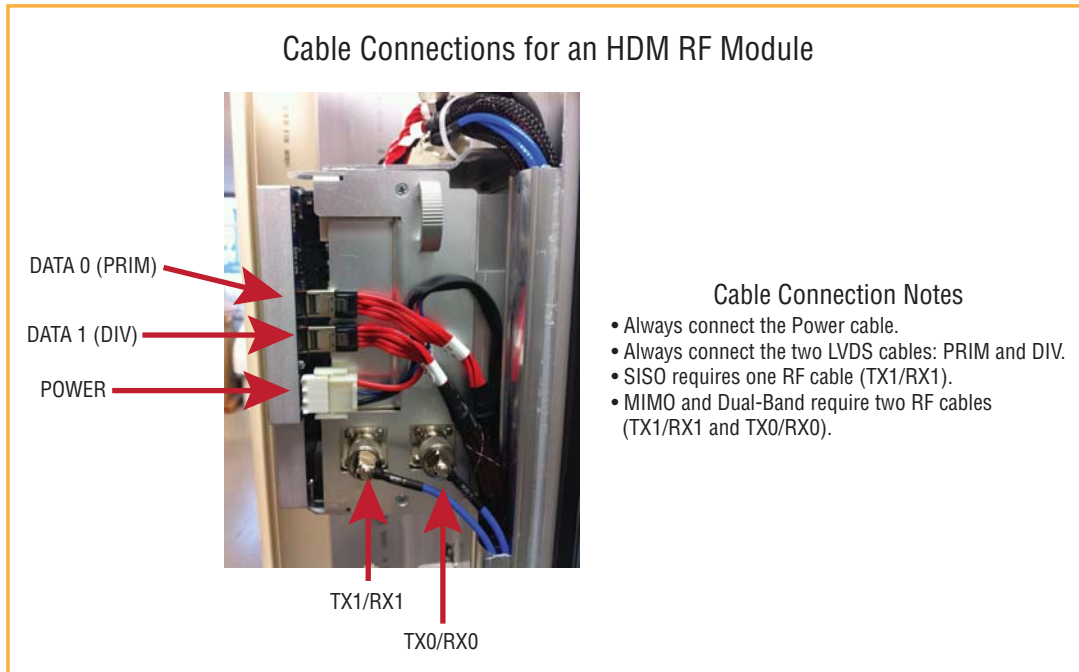


Figure 21. Cable Connections for Single-Bay RF Modules

**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.

## Cable Connections for an HDM RF Module



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

### Connecting Cables in a Dual-Bay 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 12.](#)
- 3 Follow the rules listed below that pertain only to Dual-Bay 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 bay will need to be connected to the MOD N TX0/RX0 N-Style RF connection of the Dual-Bay 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 RF cables and two LVDS cables of the lower RF Module bay are not used when installing a Dual-Bay RF Module.
  - [Table 12](#) lists how to correctly connect HDM RF Modules to the Antenna ports on the bottom of the PRU.

**Table 12.** HDM Antenna Port Mapping

RF Module Catalog #	Description	TX0/RX0	TX1/RX1
FWP-C4MT000MOD	HDM DUAL 20W 850/1900 RF MODULE	1900	850
FWP-L4MTU4MMOD	HDM DUAL 20W, 700ABC/700UC, RF MODULE	700 IABC	700 uC
FWP-L4MT000MOD	HDM MIMO 20W 700 LOWER ABC RF MODULE	Path 1	Path 2
FWP-U4MT000MOD	HDM MIMO 20W 700 UPPER C MODULE	Path 1	Path 2
FWP-A4MT000MOD	HDM MIMO 20W 2100 AWS RF MODULE	Path 1	Path 2
FWP-84MT000MOD	HDM MIMO 20W 1900 PCS RF MODULE	Path 1	Path 2

- 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.
    - i Constrain the MOD N TX1/RX1 cable of the lower RF Module bay 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 bay.
    - iii Turn the coupling nut of the plug clockwise to thread onto the jack and finger-tighten.
    - iv Torque coupling nut to  $8 \pm 1$  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 lower RF Module bay. 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  $8 \pm 1$  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 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.
  - iii 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.

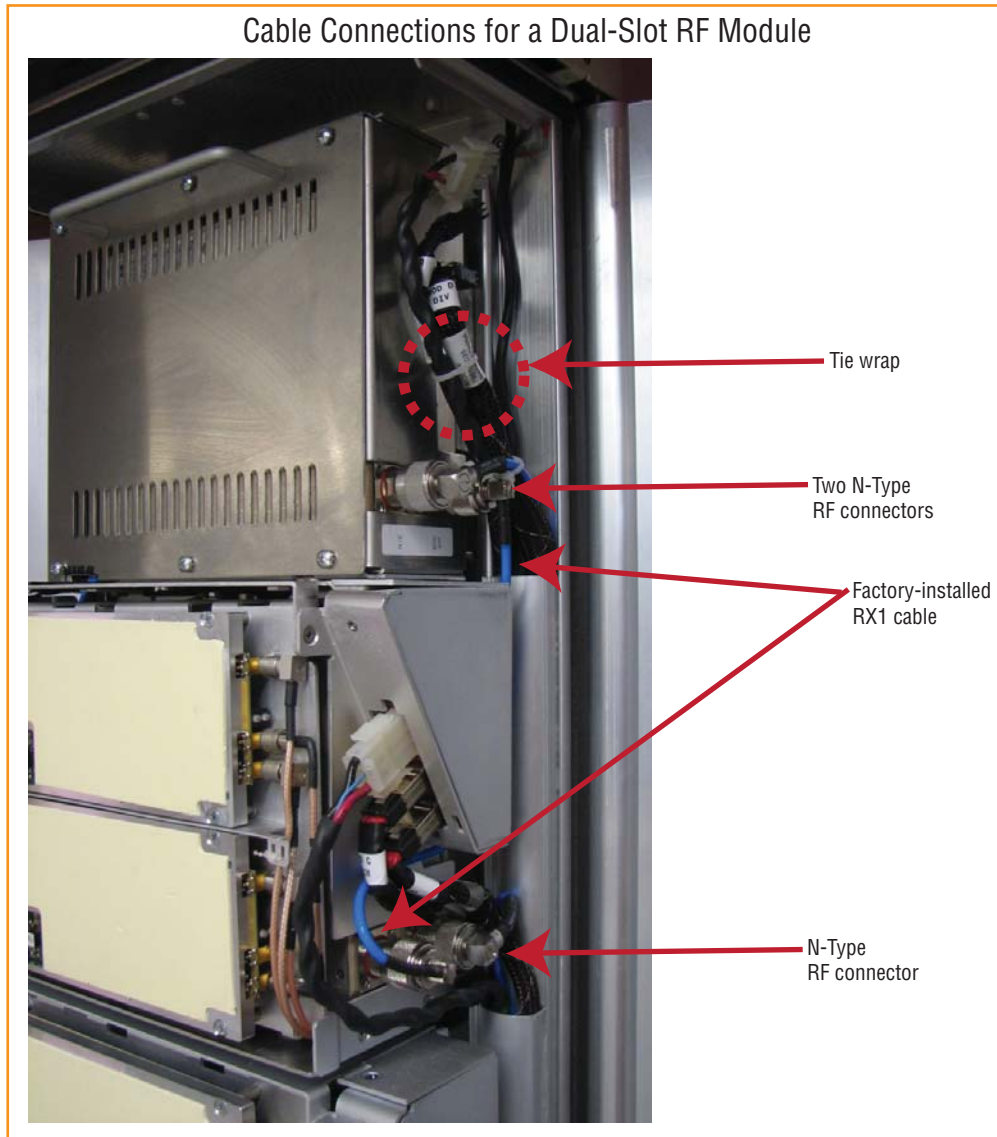
**NOTE:** **Full insertion can be recognized by an audible click as the LVDS Cable Connector locks into the RF Module Receptacle. This can be verified by lightly pulling back on the LVDS connector while making sure not to depress the release trigger. When fully inserted, the cable should not be able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

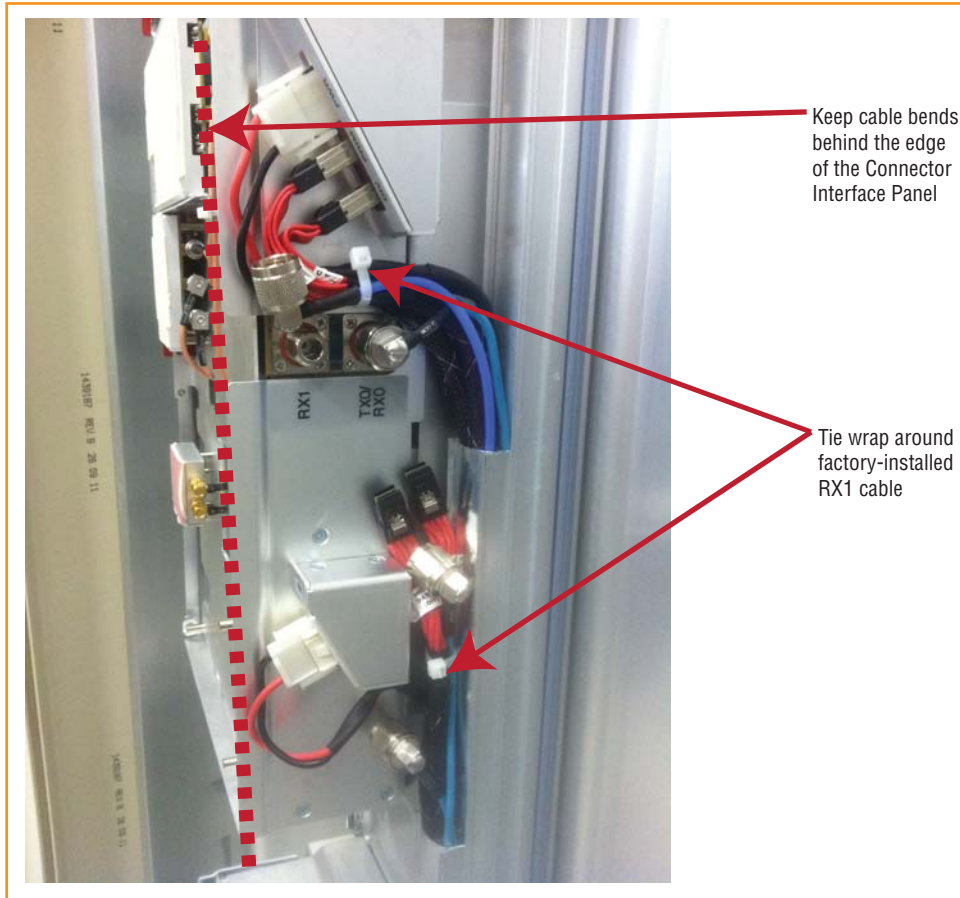
**NOTE:** **Full insertion can be recognized by an audible click as the Power Cable Connector locks into the RF Module Receptacle. This can be verified by lightly pulling back on the Power Cable Connector while making sure not to depress the release triggers on the ends of the connector. When fully inserted,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

- Dual-Bay RF Module: [Figure 23 on Page 37](#)
- Legacy Dual-Bay 40W RF Module: [Figure 24 on Page 38](#).



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



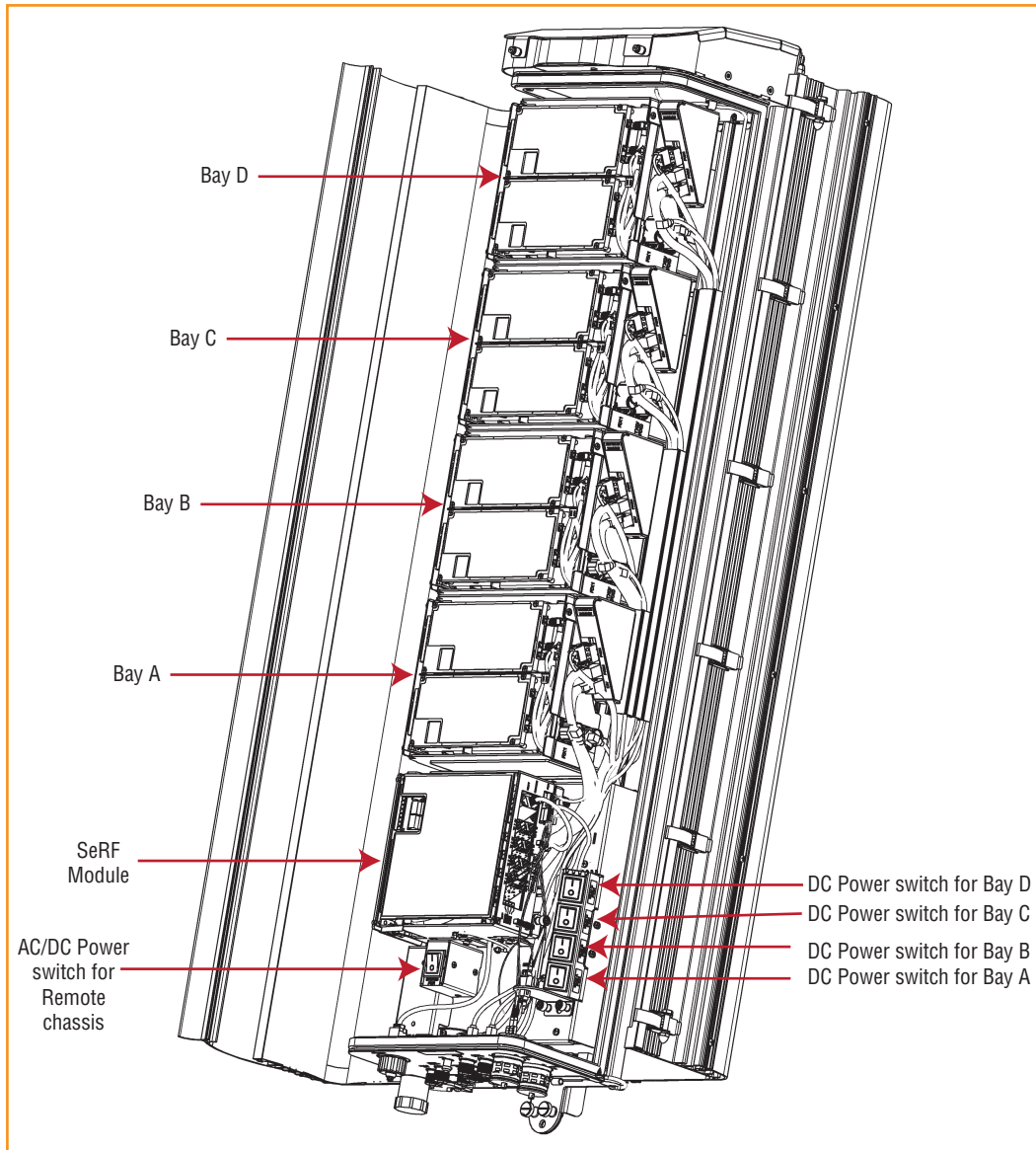
**Figure 24.** Cable Connections for Legacy Dual-Bay 40W RF Modules

**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-Band Dual-Bay RF Modules, use the Power switch for the lower module. For example, to power up a Dual-Bay RF Module in combined bays 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 Legacy Dual-Bay 40W RF Module uses the Power Supplies in both bays. If the Legacy Dual-Bay 40W RF Module is installed in bays 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 18 to install other RF Modules.

# 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- Zone Enhancers for the Land Mobile Service. 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)



## ACCESSING USER DOCUMENTATION ON THE TE CUSTOMER PORTAL

You can access additional user documentation on the TE Customer Portal, as described below.

- 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:
  - If you have an account, in the **Already Registered? Sign In Now** panel, enter your **Email** and **Password**, and then click **Sign In**.
  - If you don't have an account, under **Create an Account**, click **Register Now** and follow the prompts.
- 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 computer.

# CONTACTING TE CONNECTIVITY

## Telephone Numbers

### 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

## Online Access

### Customer Portal

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

### Technical Support for Wireless Products

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

[www.te.com/wireless](http://www.te.com/wireless)

