



## NanoRF OPTICAL HYBRID MODULES

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MODULES ALLOW FOR SIGNIFICANT INCREASE IN DENSITY AND SPEED IN A SMALL FORM FACTOR



Modules allow for significant increase in density and speed in a small form factor



## Description

Next Generation VPX module market trends are calling for increased density and bandwidth within an embedded computing slot (more speed and functionality), TE Connectivity (TE) NanoRF hybrid modules leverage a floating Insert in the backplane with guide features that pre-align contacts before engaging reducing potential for damage. These modules offer high density RF and optical connections within a common connector module for VPX-based embedded computing systems.

### COMMON GUIDE FEATURES FOR BOTH RF AND OPTICS

- Floating Insert on backplane side contains NanoRF contacts and optical mounts
- Alignment features provide reliable, stub-free mating

### COMMON MATING INTERFACE

- Supports CableMT and Edge Mount transceivers allowing additional modularity and options for customers
- Multiple slot profiles and connector modules added to VITA 65.0 and 65.1 allows intermateability, interoperability among VPX hardware suppliers for a robust supply chain

### APPLICATIONS

- Radar
- Electronic Warfare
- Missile Guidance
- Tactical Communication

### MARKETS

- Ground Defense
- Missile Defense
- C5ISR

## ELECTRICAL

- **Rated Max Frequency:** 85 GHz
- **Isolation, Cable-to-Cable:**
  - ≥ 90 dB from 27 to 40 GHz
  - ≥ 100 dB from 3 to 27 GHz
  - ≥ 120 dB from 30 to 3 GHz
  - ≥ 140 dB from 3 to 30 MHz
- Cable-to- Edge Launch in test, including effects of board termination
- Testing per EIA 364-90 Method B
- **Impedance:** 50 Ohm
- **Surface VSWR, Cable-to-Cable:**
  - 1.4:1 max to 40 GHz (both .047 and .086)
  - 1.5:1 max from 40 to 50 GHz (.086 cable)
  - 1.5:1 max from 40 to 67 GHz (.047 cable)
  - 1.6:1 max from 67 to 85 GHz (.047 cable)
- **Cable-to-PCB Edge Launch:**
  - 1.4:1 max to 40 GHz
  - 1.5:1 max from 40 to 67 GHz (.047 cable)

## MECHANICAL

- **Mating Cycles:** 500
- **Temperature Range:** -55°C to +125°C
- **Cable Diameter:**
  - .047 for plug-in card, .047 and .086 options for backplane

## MATERIALS






- Available in Basecard and Mezzanine Edge Mount or Cable options

## SUPPORTING DOCUMENTATION

- **NanoRF Product Specification:** 108-163006
- **NanoRF Qualification Test Report:** 501-134076
- **NanoRF Instruction Sheet:** 408-163016
- **Dual MT Half Module Product Specification:** 108-163007
- **Dual MT Half Module Test Report:** 501-163003
- **Dual MT Half Module Application Specification:** 114-163005

# RF and Optical Connector Modules

## Half Module VITA 65 Aperture J Backplane per VITA 67.3D

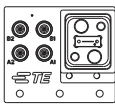



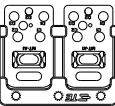
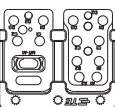
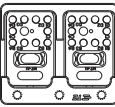
VITA 65 Module Designation	Backplane Module Layout			Connector Module Part Number	RF Contact Part Number (.086" Cable)	RF Contact Part Number (.047" Cable)	MT Ferrule Kit Part Number	Optical Plug-In Card Interface
6.4.5.7.1		VITA 66.4 (1 MT)	Plug-In Module	2226881-1	—	—	2102866-2 (Std Grade) 2313212-2 (Low Loss)	Cabled MT
			Backplane	2828736-1	—	—	2102866-1 (Std Grade) 2313212-1 (Low Loss)	—
6.4.5.7.2		9 Pos NanoRF	Plug-In Module	2357976-1	—	2302339-1 (9 ea)	—	—
			Backplane	2357971-1	2332772-1 (8 ea)	2302345-1 (1 ea)	—	—
6.4.5.7.3		Style C 66.5 Insert with 5 NanoRF	Plug-In Module	2359407-1	—	2302339-1 (5 ea)	12-Fiber: 2355002-1 24-Fiber: 2355002-2	Cabled MT
				2358435-1	—	2302339-1 (5 ea)	—	Transceiver
			Backplane	2358431-1	2332772-1 (4 ea)	2302345-1 (1 ea)	12-Fiber: 2332756-1 24-Fiber: 2332756-2	—
6.4.5.7.4		Style C 66.5 Insert with 10 NanoRF	Plug-In Module	2359410-1	—	2302339-1 (10 ea)	12-Fiber: 2355002-1 24-Fiber: 2355002-2	Cabled MT
				2313388-1	—	2302339-1 (10 ea)	—	Transceiver
			Backplane	2313391-1	—	2302345-1 (10 ea)	12-Fiber: 2332756-1 24-Fiber: 2332756-2	—
6.4.5.7.6		Style D 66.5 Insert (3 MT)	Plug-In Module	2388442-1	—	—	12-Fiber: 2375154-1 24-Fiber: 2375154-2	3 Cabled MT
				2388440-1	—	—	12-Fiber: 2375154-1 24-Fiber: 2375154-2	2 Cabled MT & 1 Transceiver
			Backplane	2388438-1	—	—	12-Fiber: 2375153-1 24-Fiber: 2375153-2	—

### VITA 66.5 TRANSCEIVER KITS

Transceiver Kit TE Part Number	Channel Count	Tx/Rx	Rx Sens (dBm)	Max Data Rate G	Application	Plug Kit Part Number: Included in Transceiver Kit Part Number	Backplane Connector Part Number Half Width	Backplane Connector Part Number Full Width	66.5 Style
2394052-4	12	Rx	-7.5	28	1 MT + 5 nanoRF	2358435-1	2358431-1	2358791-1	C Hybrid
2393875-1	4	TxRx	-7.5	28	3 MT	2388440-1	2388438-1	—	D
2393875-3	12	Tx	—	28	3 MT	2388440-1	2388438-1	—	D
2393875-4	12	Rx	-7.5	28	3 MT	2388440-1	2388438-1	—	D
2394053-1	4	TxRx	-12	10	1 MT + 10 nanoRF	2313388-1	2313391-1	2363793-1	C Hybrid
2394053-2	4	TxRx	-9	10	1 MT + 10 nanoRF	2313388-1	2313391-1	2363793-1	C Hybrid
2394053-3	12	Tx	—	10	1 MT + 10 nanoRF	2313388-1	2313391-1	2363793-1	C Hybrid
2394053-4	12	Rx	-12	10	1 MT + 10 nanoRF	2313388-1	2313391-1	2363793-1	C Hybrid
2394054-1	4	TxRx	-12	10	1 MT + 5 nanoRF	2358435-1	2358431-1	2358791-1	C Hybrid
2394054-2	4	TxRx	-9	10	1 MT + 5 nanoRF	2358435-1	2358431-1	2358791-1	C Hybrid
2394054-3	12	Tx	—	10	1 MT + 5 nanoRF	2358435-1	2358431-1	2358791-1	C Hybrid
2394054-4	12	Rx	-12	10	1 MT + 5 nanoRF	2358435-1	2358431-1	2358791-1	C Hybrid
2394055-1	4	TxRx	-12	10	3 MT	2388440-1	2388438-1	—	D
2394055-2	4	TxRx	-9	10	3 MT	2388440-1	2388438-1	—	D
2394055-3	12	Tx	—	10	3 MT	2388440-1	2388438-1	—	D
2394055-4	12	Rx	-12	10	3 MT	2388440-1	2388438-1	—	D

# RF and Optical Connector Modules

## Full Module VITA 65 Aperture H Backplane per VITA 67.3C

VITA 65 Module Designation	Backplane Module Layout		Connector Module Part Number	RF Contact Part Number (.086" Cable)	RF Contact Part Number (.047" Cable)	MT Ferrule Kit Part Number	Optical Plug-In Card Interface	
6.4.5.6.1 (Legacy SOSA profiles)		VITA 67.1 and VITA 66.4 Hybrid	Plug-In Module	2157339-4 (P2A) 2226881-1 (P2B)	1996390-1	1996771-1	2102866-2 (Std Grade) 2313212-2 (Low Loss)	Cabled MT
			Backplane	2828423-1 (SMPM Rear Cable Attach) 2828775-1 (OSMM Rear Cable Attach)	—	—	2102866-1 (Std Grade) 2313212-1 (Low Loss)	—
6.4.5.6.2		9 Pos SMPM	Plug-In Module	2332834-3	2101012-1	2157248-1	—	—
			Backplane (Snap-In Contacts)	2365211-1	2332676-1	2332676-2	—	—
			Backplane (Front Washer Contacts)	2332832-2	1996390-1	1996771-1	—	—
6.4.5.6.3		10 Pos SMPM	Plug-In Module	2323863-3	2101012-1	2157248-1	—	—
			Backplane (Snap-In Contacts)	2332706-1	2332676-1	2332676-2	—	—
			Backplane (Front Washer Contacts)	2323763-2	1996390-1	1996771-1	—	—
6.4.5.6.4		14 Pos SMPM	Plug-In Module	—	2101012-1	2157248-1	—	—
			Backplane (Snap-In Contacts)	2361107-1	2332676-1	2332676-2	—	—
			Backplane (Front Washer Contacts)	2332827-2	1996390-1	1996771-1	—	—
6.4.5.6.8		2 Style C 66.5 inserts with 10 NanoRF	Plug-In Module	2359407-1 (2 ea) 2358435-1 (2 ea)	—	2302339-1 (10 ea)	12-Fiber: 2355002-1 24-Fiber: 2355002-2	Cabled MT
			Backplane	2358791-1	2332772-1 (8 ea)	2302345-1 (2 ea)	12-Fiber: 2332756-1 24-Fiber: 2332756-2	—
			Plug-In Module	2359407-1 + 2357976-1 2358435-1 +	—	2302339-1 (14 ea)	12-Fiber: 2355002-1 24-Fiber: 2355002-2	Cabled MT
6.4.5.6.9		1 Style C 66.5 insert with 14 NanoRF	Backplane	2378047-1	2332772-1 (12 ea)	2302345-1 (2 ea)	12-Fiber: 2332756-1 24-Fiber: 2332756-2	—
			Plug-In Module	2359410-1 (2 ea) 2313388-1 (2 ea)	—	2302339-1 (20 ea)	12-Fiber: 2355002-1 24-Fiber: 2355002-2	Cabled MT
			Backplane	2378048-1	—	2302345-1 (20 ea)	12-Fiber: 2332756-1 24-Fiber: 2332756-2	—
6.4.5.6.10		2 Style C 66.5 inserts with 20 NanoRF	Plug-In Module	2388442-1 (2 ea) 2388440-1 (2 ea)	—	—	12-Fiber: 2375154-1 24-Fiber: 2375154-2	2 Cabled MT per Insert
			Backplane	2388444-1	—	—	12-Fiber: 2375154-1 24-Fiber: 2375154-2	1 Cabled MT & 1 Transceiver per Insert
			Backplane	2388444-1	—	—	12-Fiber: 2375153-1 24-Fiber: 2375153-2	—

# NanoRF Optical Hybrid Modules

## 3U SLOT PROFILES

Slot Profile Ending	Interface	P0/J0	P1/J1	P2/J2	RF / Optical Connector Module Description	RF Contacts	Optical Ferrule Kits
14.2.16 14.2.17 14.4.14 14.4.15	Plug-In Card	2102772-1	2102771-1	2102771-1	N/A	N/A	N/A
		2332816-1	2302785-1	2302785-1			
	Backplane	2102735-1	2102736-1	2102737-1			
		2332817-1	2302789-1	2302790-1			
14.6.13-0 14.8.7-0	Plug-In Card	2286250-1	2102771-1	Empty	N/A	Empty	Empty
		2313237-1	2302785-1				
	Backplane	2102736-1	2102737-1	Empty			
		2313238-1	2302790-1				
14.8.7-1	Plug-In Card	2286250-1	2102771-1	2226881-1	VITA 66.4 in 67.3D - 6.4.5.7.1	—	2101866-2 (std grade) 2313212-2 (low loss)
		2313237-1	2302785-1				
	Backplane	2102736-1	2102737-1	2226880-1			
		2313238-1	2302790-1				
14.8.7-2 14.8.7-3 14.6.13-6 14.6.13-7	Plug-In Card	2286250-1	2102771-1	2371597-1 (cbl) 2371598-1 (xcvr)	1 Style B 66.5 Insert - 6.4.5.7.5 (2 MT)	—	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2313237-1	2302785-1				
	Backplane	2102736-1	2102737-1	2371602-1			
		2313238-1	2302790-1				
14.8.7-4 14.8.7-5	Plug-In Card	2286250-1	2102771-1	2371599-1 (cbl) 2362125-1 (xcvr)	1 Style D 66.5 Insert - 6.4.5.7.6 (3 MT)	—	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2313237-1	2302785-1				
	Backplane	2102736-1	2102737-1	2362124-1			
		2313238-1	2302790-1				
14.6.13-1	Plug-In Card	2286250-1	2102771-1	2357976-1	9 NanoRF Contacts - 6.4.5.7.2	2302339-1	—
		2313237-1	2302785-1				
	Backplane	2102736-1	2102737-1	2357971-1			
		2313238-1	2302790-1				
14.6.13-2 14.6.13-3	Plug-In Card	2286250-1	2102771-1	2359407-1 (cbl) 2358435-1 (xcvr)	1 Style C Insert and 5 NanoRF Contacts 6.4.5.7.2	2302339-1	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2313237-1	2302785-1				
	Backplane	2102736-1	2102737-1	2358431-1			
		2313238-1	2302790-1				
14.6.13-4 14.6.13-5	Plug-In Card	2286250-1	2102771-1	2359410-1 (cbl) 2313388-1 (xcvr)	1 Style C Insert and 10 NanoRF Contacts 6.4.5.7.4	2302339-1	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2313237-1	2302785-1				
	Backplane	2102736-1	2102737-1	2313391-1			
		2313238-1	2302790-1				
14.9.2-0 14.6.11-0	Plug-In Card	2102772-1	2102771-1	Empty	N/A	Empty	Empty
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	Empty			
		2332817-1	2302790-1				
14.6.11-1	Plug-In Card	2102772-1	2102771-1	2157339-4 (P2A) 2000974-1 (P2B)	Hybrid 66.4+67.1 - 6.4.5.6.1	1996771-1 (.047" cbl) 1996390-1 (.086" cbl)	2101866-2 (std grade) 2313212-2 (low loss)
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2828423-1 (SMPM Rear Termination) 2828775-1 (OSMM Rear Termination)			
		2332817-1	2302790-1				
14.6.11-2 14.9.2-1	Plug-In Card	2102772-1	2102771-1	2323863-3	10 SMPM Contacts - 6.4.5.6.3	2157248-1 (.047" cbl) 2101012-1 (.086" cbl)	—
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2323763-2			
		2332817-1	2302790-1				

■ VITA 46 (MULTIGIG RT 2-R)

■ VITA 46.30 (MULTIGIG RT 3)

# NanoRF Optical Hybrid Modules

## 3U SLOT PROFILES

Slot Profile Ending	Interface	P0/J0	P1/J1	P2/J2	RF / Optical Connector Module Description	RF Contacts	Optical Ferrule Kits
14.6.11-3	Plug-In Card	2102772-1	2102771-1	2332834-3	9 SMPM Contacts - 6.4.5.6.2	2157248-1 (.047" cbl) 2101012-1 (.086" cbl)	—
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2332832-2		1996771-1 (.047" cbl) 1996390-1 (.086" cbl)	—
		2332817-1	2302790-1				
14.6.11-4 14.9.2-2	Plug-In Card	2102772-1	2102771-1	—	14 SMPM 67.3 Contacts – 6.4.5.6.4	2157248-1 (.047" cbl) 2101012-1 (.086" cbl)	—
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2332827-2		1996771-1 (.047" cbl) 1996390-1 (.086" cbl)	—
		2332817-1	2302790-1				
14.6.11-5 14.9.2-3	Plug-In Card	2102772-1	2102771-1	Not Available from TE	19 SMPS 67.3 Contacts-6.4.5.6.6	N/A	N/A
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	Not Available from TE			
		2332817-1	2302790-1				
14.6.11-8 14.6.11-9	Plug-In Card	2102772-1	2102771-1	Need Two: 2371597-1 (cbl) 2371598-1 (xcvr bottom MT)	2 Style B 66.5 Inserts-6.4.5.6.5	—	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2371603-1		—	12-Fiber: 2332756-1 24-Fiber: 2332756-2
		2332817-1	2302790-1				
14.6.11-10 14.6.11-11	Plug-In Card	2102772-1	2102771-1	2359407-1 (cbl) or 2358435-1 (xcvr) plus 2357976-1 (RF only)	1 Style C Insert and 14 NanoRF Contacts – 6.4.5.6.8	2302339-1	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2378047-1		2332772-1 (.086" cbl) 2302345-1 (.047" cbl)	12-Fiber: 2332756-1 24-Fiber: 2332756-2
		2332817-1	2302790-1				
14.6.11-12 14.6.11-13	Plug-In Card	2102772-1	2102771-1	Need Two: 2359410-1 (cbl) 2313388-1 (xcvr bottom MT)	2 Style C Insert and 20 NanoRF Contacts – 6.4.5.6.9	2302339-1	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2378048-1		2302345-1	12-Fiber: 2332756-1 24-Fiber: 2332756-2
		2332817-1	2302790-1				
14.6.11-14	Plug-In Card	2102772-1	2102771-1	Need Two: 2371599-1 (cbl) 2362125-1 (xcvr bottom MT)	2 Style D 66.5 Inserts – 6.4.5.6.11	—	12-Fiber: 2355002-1 24-Fiber: 2355002-2
		2332816-1	2302785-1				
	Backplane	2102735-1	2102736-1	2378055-1		—	12-Fiber: 2332756-1 24-Fiber: 2332756-2
		2332817-1	2302790-1				
14.6.14-0	Plug-In Card	2286250-1	2313237-1	Empty	N/A	Empty	Empty
	Backplane	2102737-1	2302790-1	Empty		Empty	Empty
14.6.14-1 14.6.14-2 14.6.14-3 14.6.14-4	Plug-In Card	2286250-1	2313237-1	TBD	1 Style B 66.5 Insert and 14 SMPM Contacts – 6.4.5.8.2	N/A	N/A
	Backplane	2102737-1	2302790-1	TBD			
14.6.14-5	Plug-In Card	2286250-1	2313237-1	TBD	1 Style C 66.5 Insert and 14 SMPM Contacts – 6.4.5.8.3	N/A	N/A
	Backplane	2102737-1	2302790-1	TBD			
14.6.14-6	Plug-In Card	2286250-1	2313237-1	Not Available from TE	31 SMPS 67.3 Contacts-6.4.5.8.4	N/A	N/A
	Backplane	2102737-1	2302790-1	Not Available from TE			
14.6.14-7 14.6.14-8	Plug-In Card	2286250-1	2313237-1	Not Available from TE	1 Style B 66.5 Insert and 19 SMPS 67.3 Contacts – 6.4.5.8.5	N/A	N/A
	Backplane	2102737-1	2302790-1	Not Available from TE			
14.6.14-9 14.6.14-10	Plug-In Card	2286250-1	2313237-1	TBD	3 Style B 66.5 Inserts 6.4.5.8.6	N/A	N/A
	Backplane	2102737-1	2302790-1	TBD			



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### NanoRF OPTICAL HYBRID MODULES

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