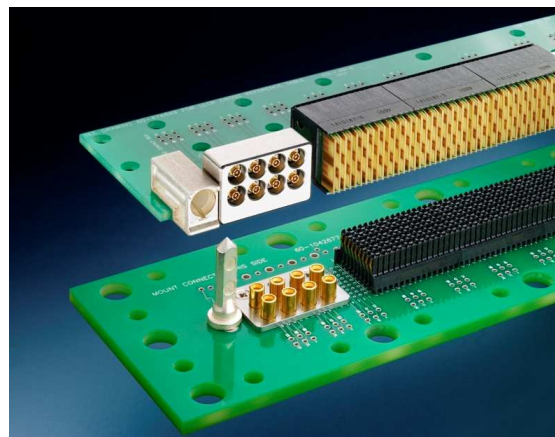


# RF Modules & Contacts

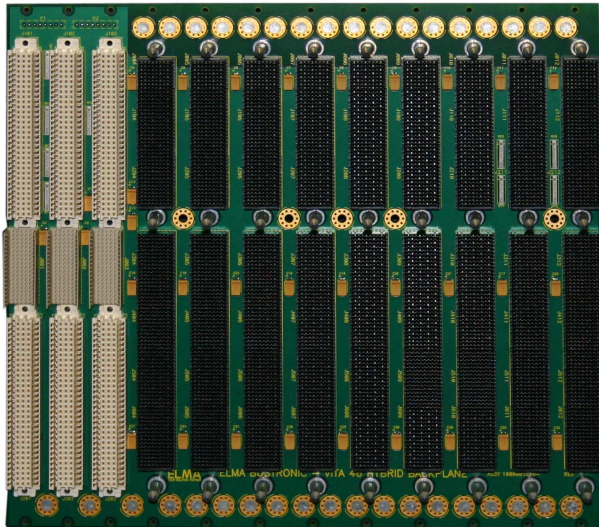
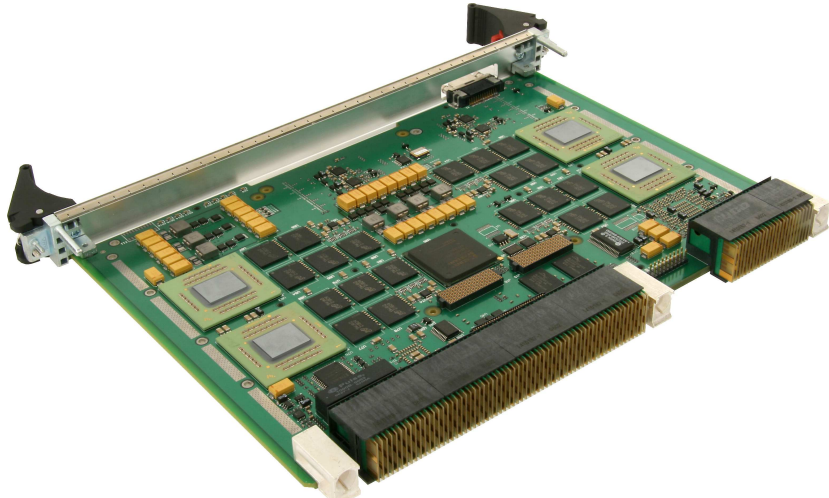
## VITA 67

Oct 2011



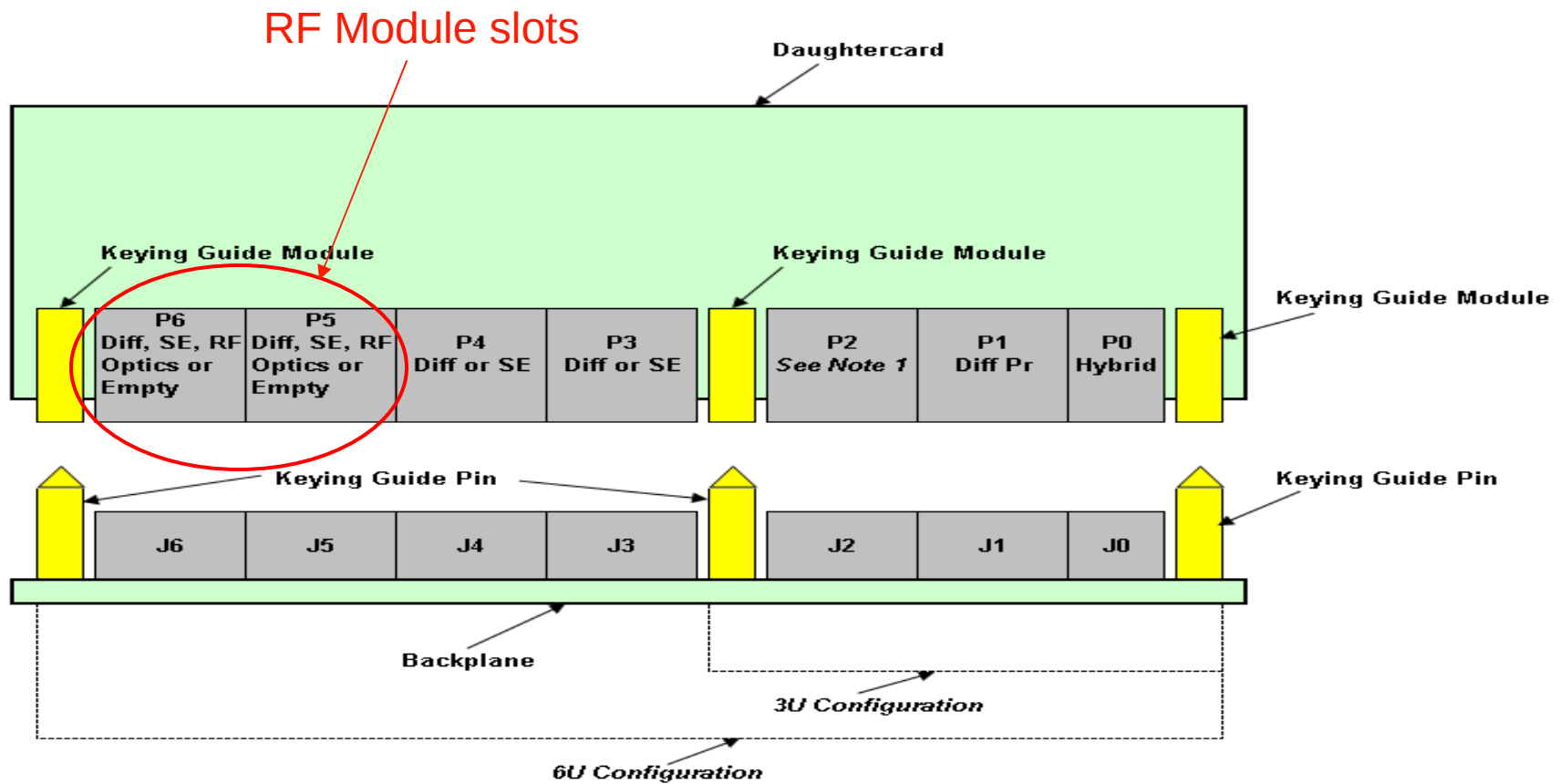
# **VPX Applications for VITA 67 RF Modules and Contacts**

# Typical VPX (VITA 46) Constructions



Source: Curtiss Wright Controls

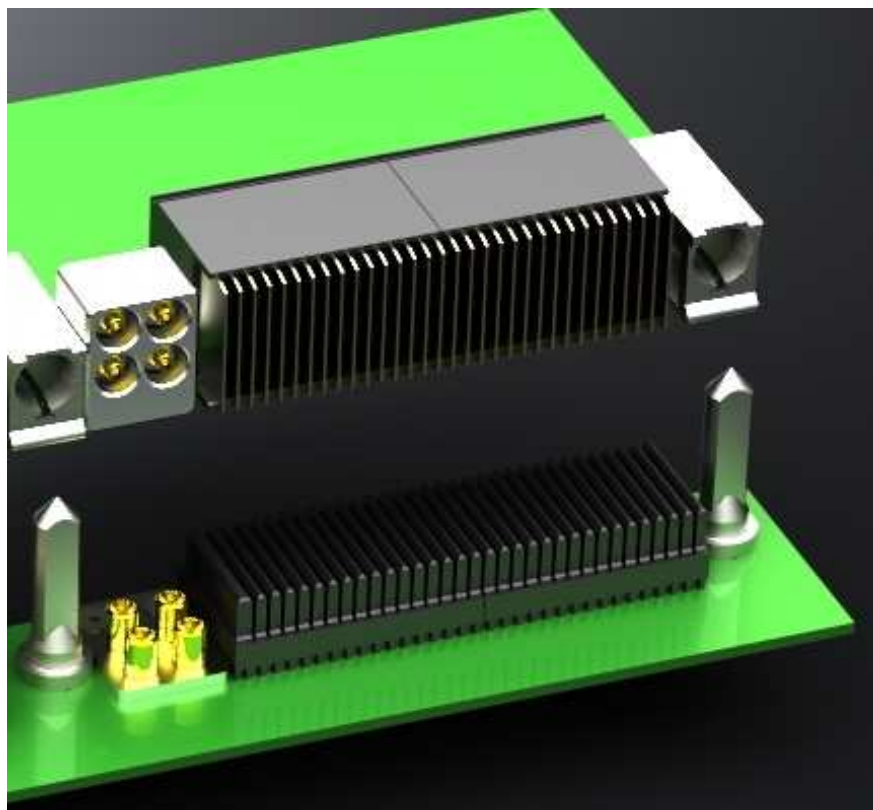
# Vita 46 Board – Typical Module Layout



Note 1: 6U: Diff or SE / 3U: Diff, SE, RF, Optics or Empty

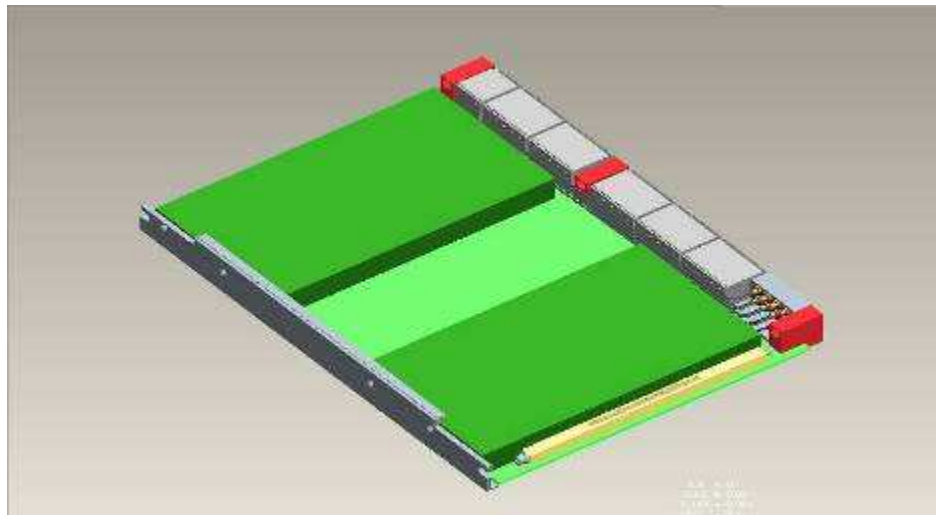
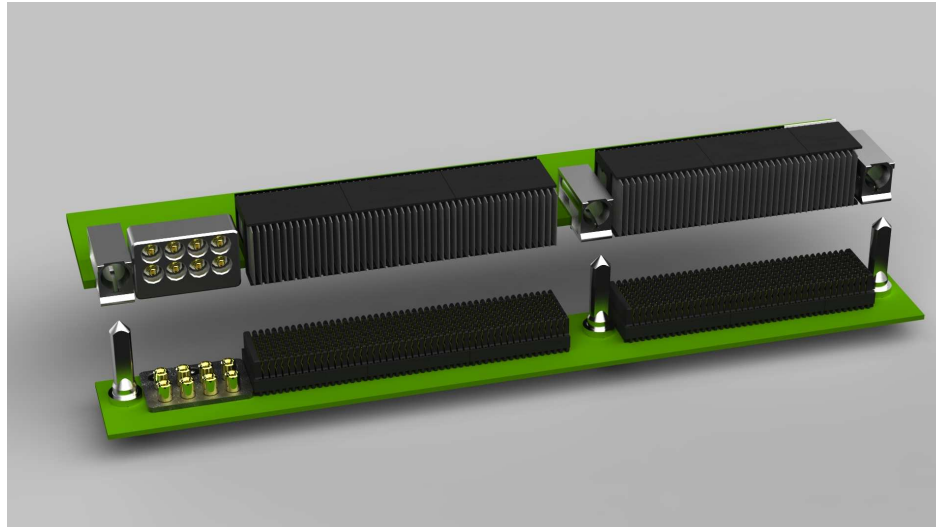
# VITA 67 – 3U Configuration

Uses VITA 67.1  
4-position module



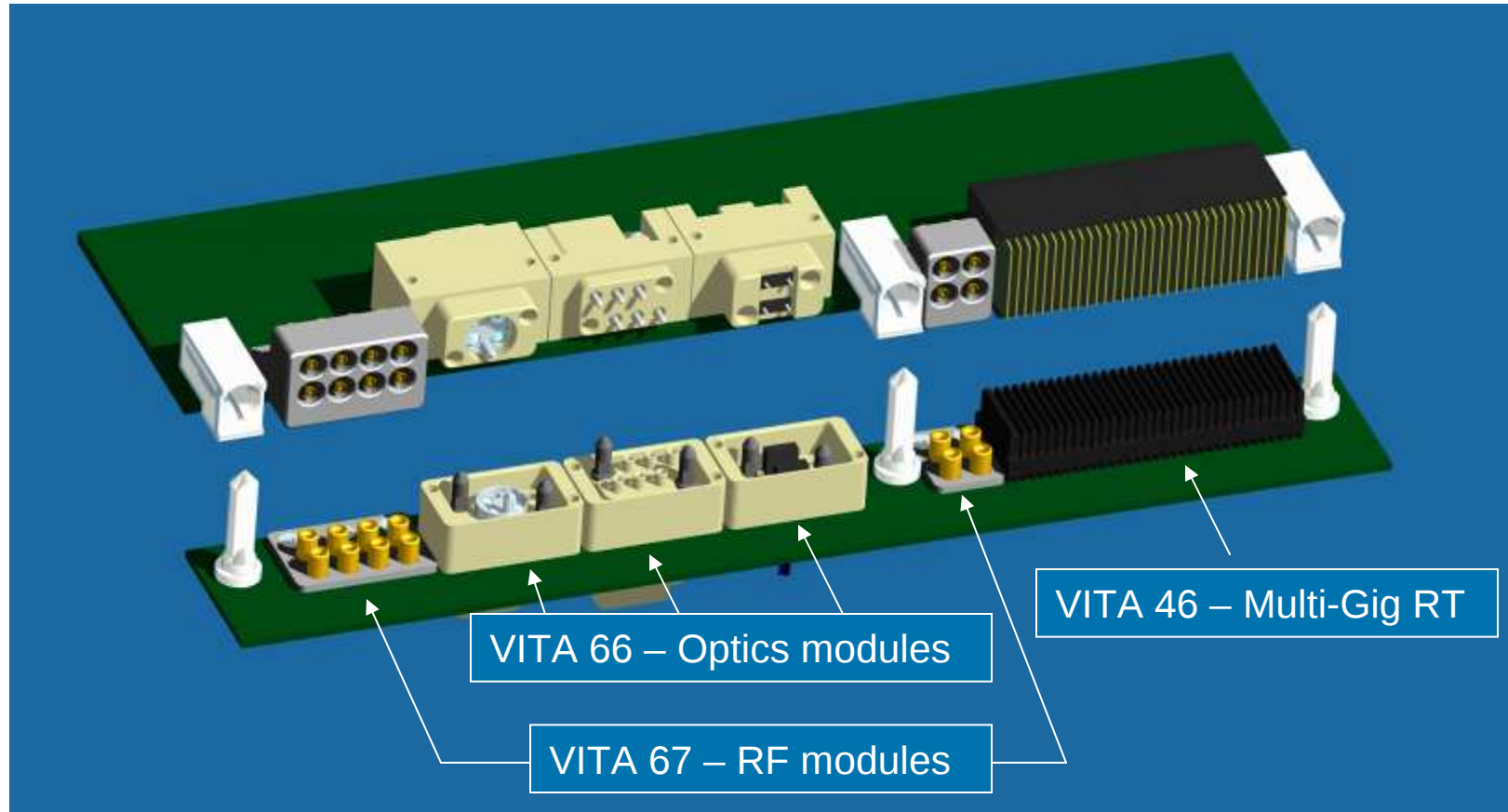
# VITA 67 – 6U Configuration

Uses VITA 67.2  
8-position module



# VPX

## User Configurable Connector System



### Mixed Signal Configuration

# **Features & Specifications**

## **VITA 67 RF Modules**

# VITA 67 - RF Modules

## Features

- Modular design permits application specific configuration
- RF Modules available in Stainless steel and Aluminum
- Float mounted jack maintains positive RF connection
- Excellent channel-to-channel isolation
- Will support .8" (20mm) card pitch
- .240 center-to-center contact spacing
- RF (SMPM) contact performance to 40.0 GHz
- RF contacts are available for a variety of cables

# VITA 67 - RF Modules

## Electrical Requirements

- Freq Range: DC to 26.5 GHz
- Flatness: +/- 1 dB DC- 26.5 GHz (transmission loss)
- Insertion Loss: <0.12 dB
- VSWR: 1.15:1 Max. up to 10 GHz  
1.25:1 Max. 10-26.5 GHz  
1.35:1 Max. 26.5-40 GHz
- DWV: 325 Vrms
- Temperature Range: -65° to +105°C
- Isolation: (Channel – Channel)
  - SHF (3-30 GHz) > 100 dB
  - VHF/UHF (30 MHz–3 GHz) > 120 dB
  - HF (3-30 MHz) > 140 dB
- RF Power: (C.W. Ave.)
  - VHF/UHF/SHF (30 MHz–30 GHz) > 20 dBm
  - HF (3-30 MHz) > 30 dBm

# VITA 67 - RF Modules

## Mating and Misalignment

- Axial float: = .079" (2.0mm) Min.
- Radial misalignment: .010" (.020" total)
- Force to Engage: 3.5 lbs (typical @ .052 axial spring deflection)
- Force to Disengage: 1.35 lbs (typical)
- Float Mount Preload: 2.3 lbs (typical)
- Float Mount force at full axial deflection: 4.25 lbs (typical)

Note: All values are typical for a single RF contact in a smooth bore receptacle.

# VITA 67 - RF Modules

## Environmental

- Durability: EIA-364-9, 500 mating cycles, smooth bore
- Vibration: EIA-364-28, Test Condition III 10 nanosecond discontinuity
- Mechanical shock: EIA-364-27, Method G
- Operating Temperature: -65 to +165 C
- Humidity/Temperature cycling: EIA-364-31, Method III
- Corrosion resistance: 48 hours salt fog exposure IAW ASTM G85, Annex A4

# VITA 67 - RF Modules

## Standards & Specifications

- Materials and plating meet the requirements of MIL-PRF-39012
- Designed to meet the vibration and corrosion resistance requirements of ANSI/VITA 47
- SMPM RF contact interfaces compatible with MIL-STD-348

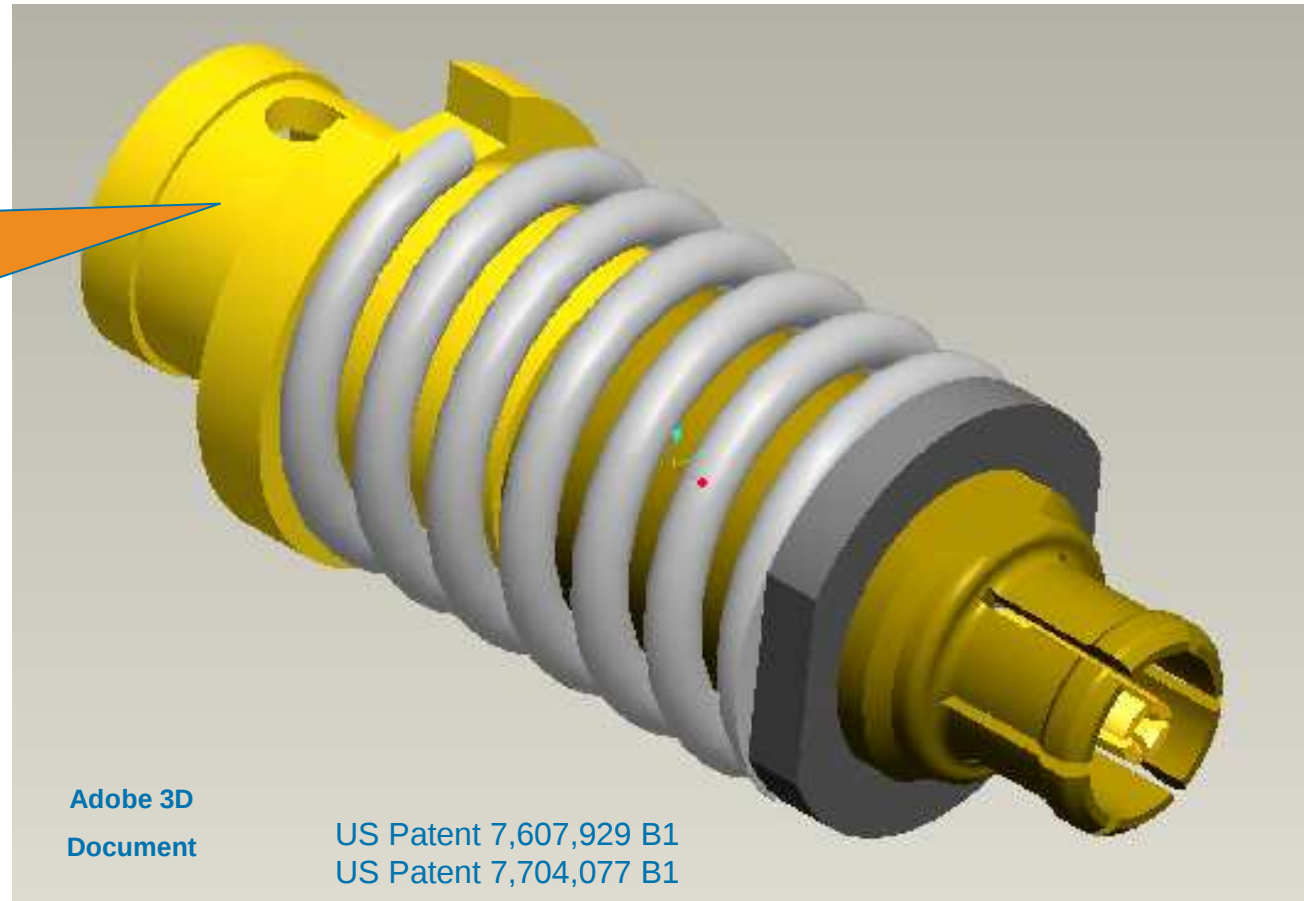
# **VITA 67**

## **Float Mount SMPM Connector**

# VITA 67, Daughter Card RF Contact

**SMPM  
FLOAT MOUNT  
RECEPTACLE  
(.086 Cable)**

Spring and  
retaining ring  
supplied  
unassembled



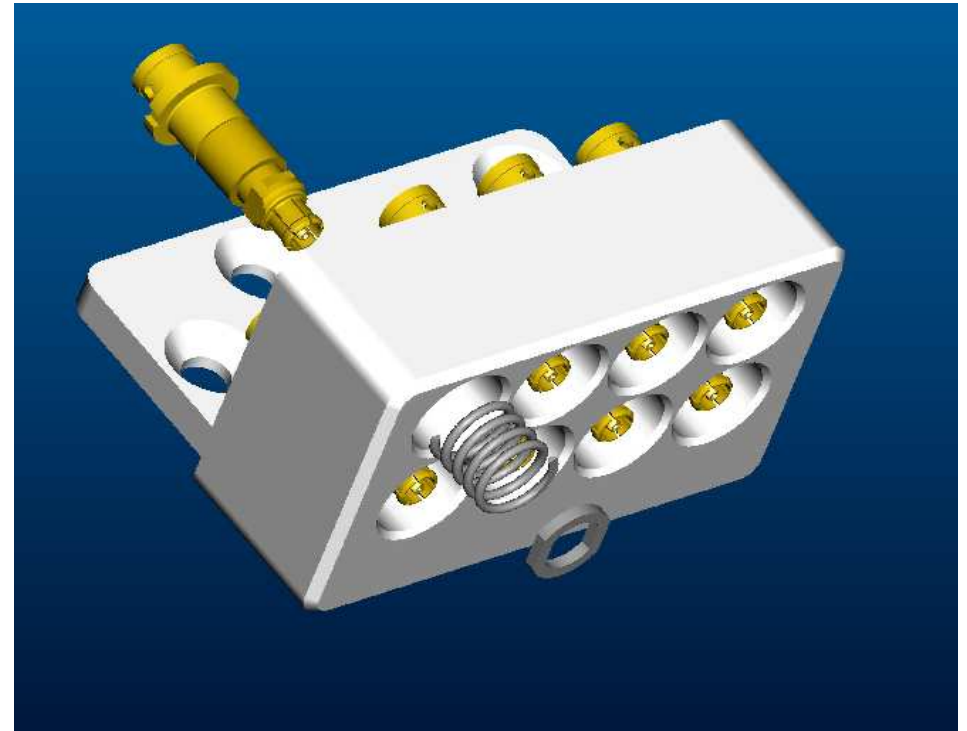
Adobe 3D  
Document

US Patent 7,607,929 B1  
US Patent 7,704,077 B1

# VITA 67, Daughter Card RF Contact

Cabled contact is inserted into the module, insertion tool is used to rotate and lock the retaining ring, holding the contact and spring in place.

Spring compression assures that the contact interface is bottomed when modules are mated, optimizing RF performance



# VITA 67 Daughtercard Modules, Cable applied

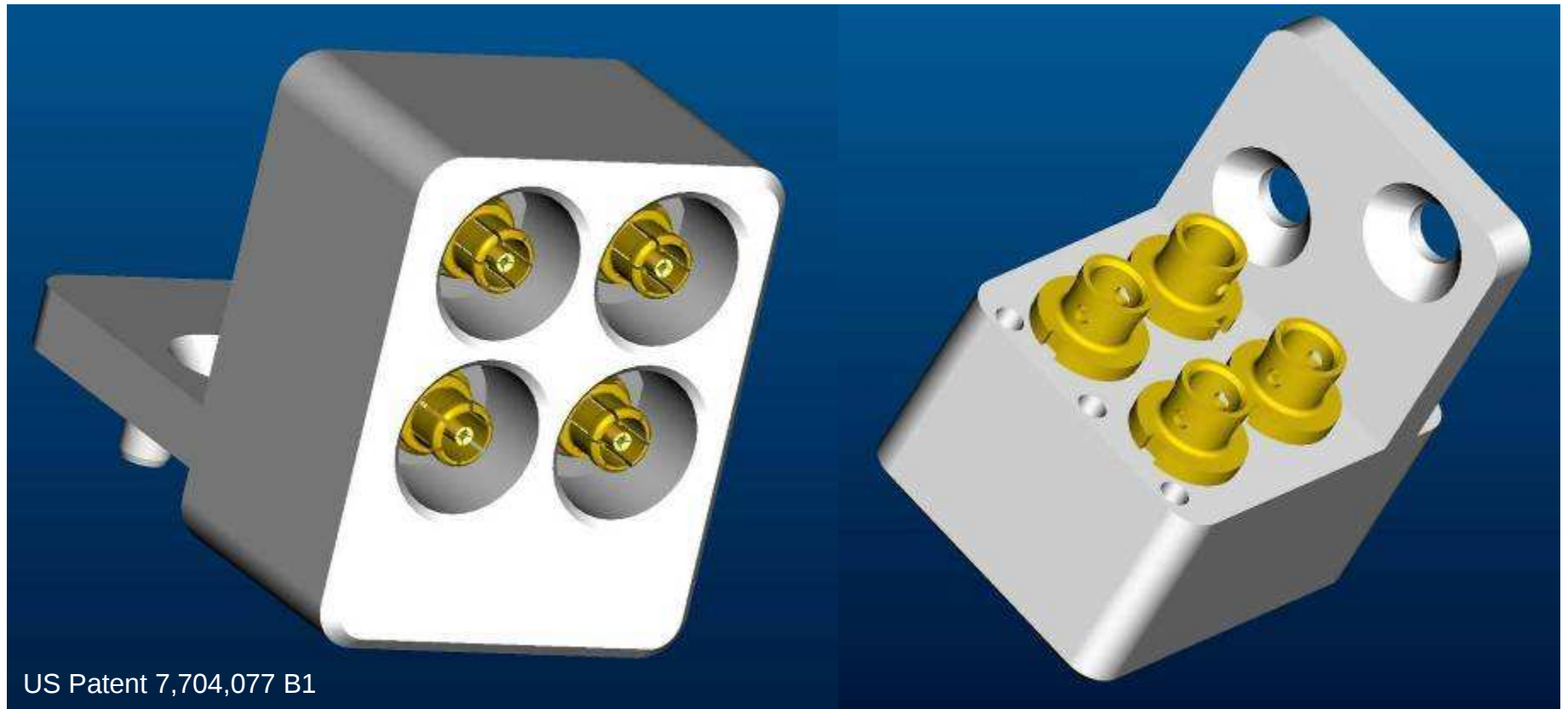


**VITA 67.1     4 Position RF Module**

**VITA 67.2     8 Position RF Module**

# VITA 67.1

## 4 Position Daughter Card RF Module



US Patent 7,704,077 B1

Stainless Steel  
Aluminum

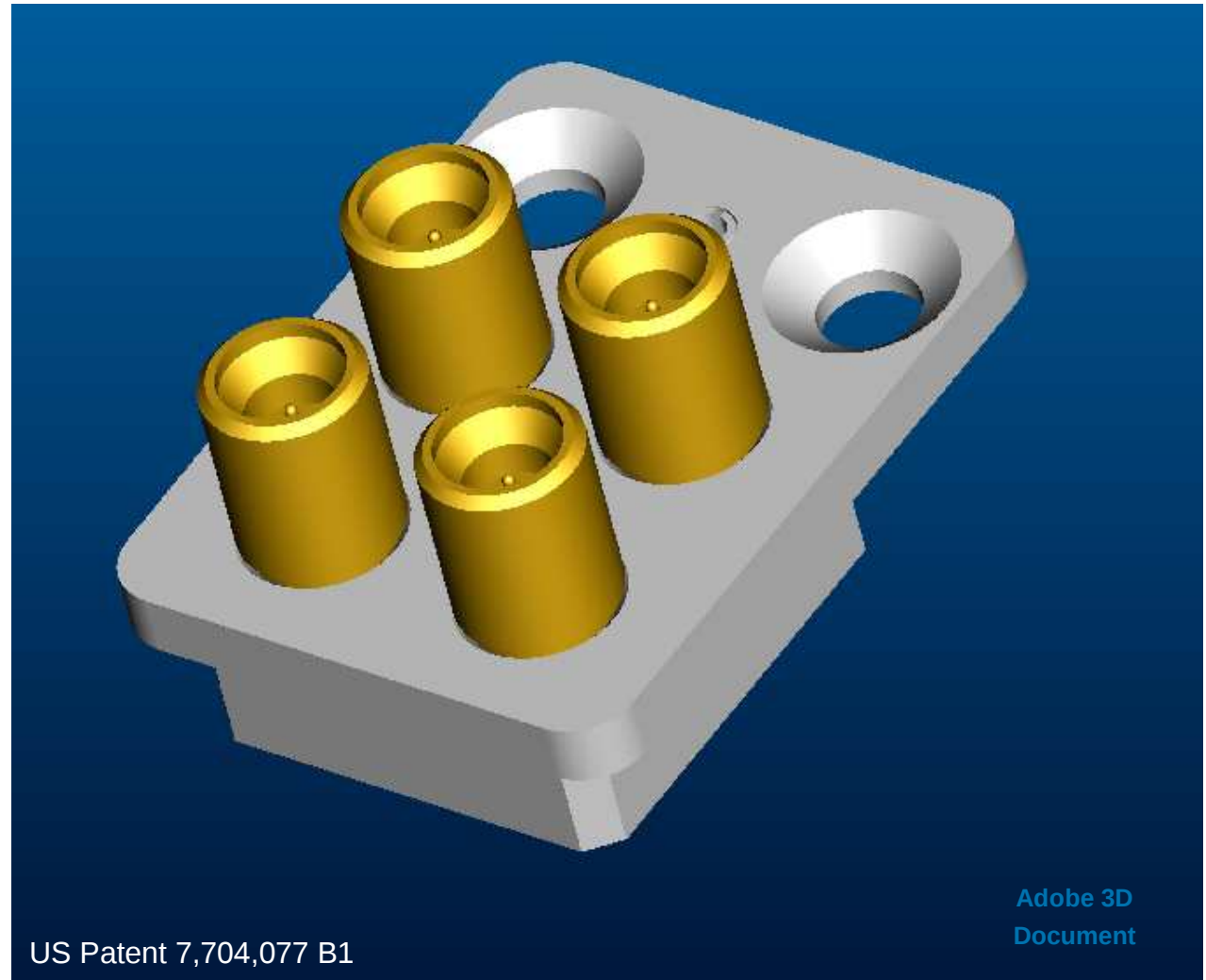
1996883-4  
2157338-3

Contacts purchased separately

# VITA 67.1

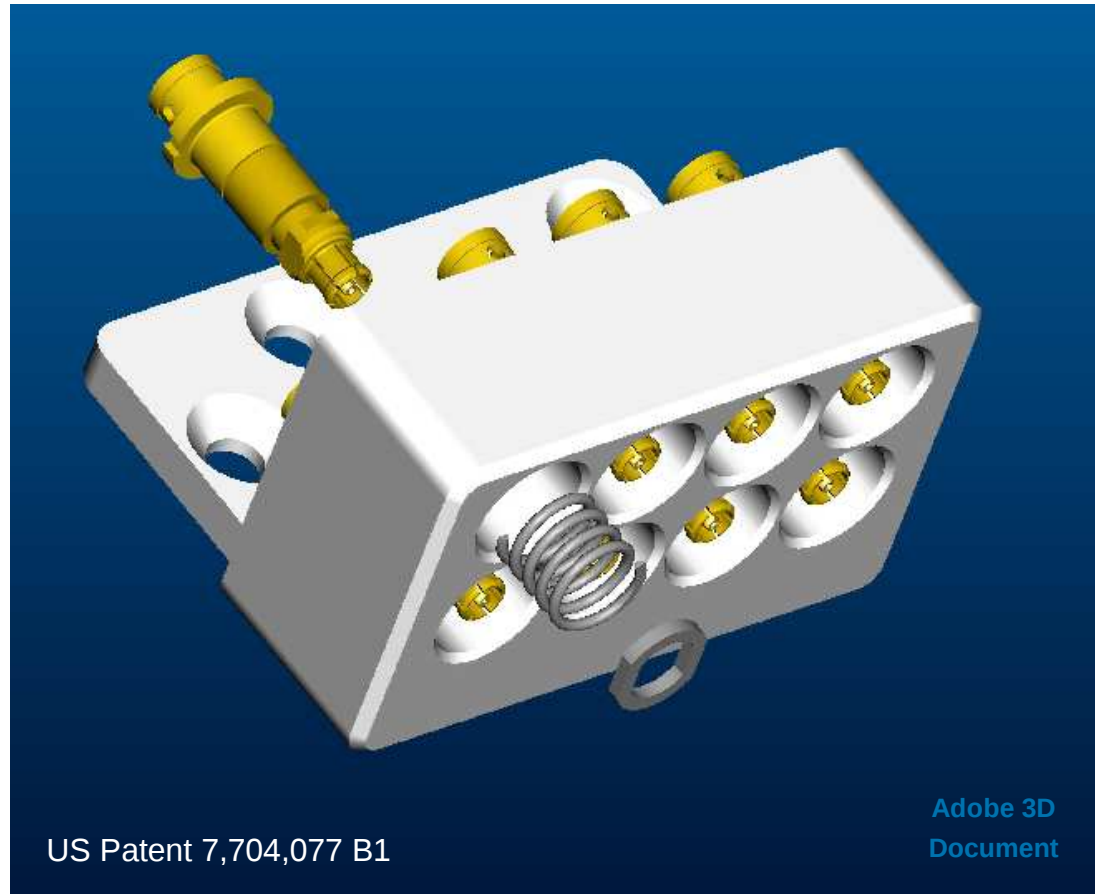
## 4 Position Backplane RF Module – 1996884-1

Designed for use on  
3U VITA 46  
Configuration



# VITA 67.2

## 8 Position Daughter Card RF Module



Stainless Steel  
Aluminum

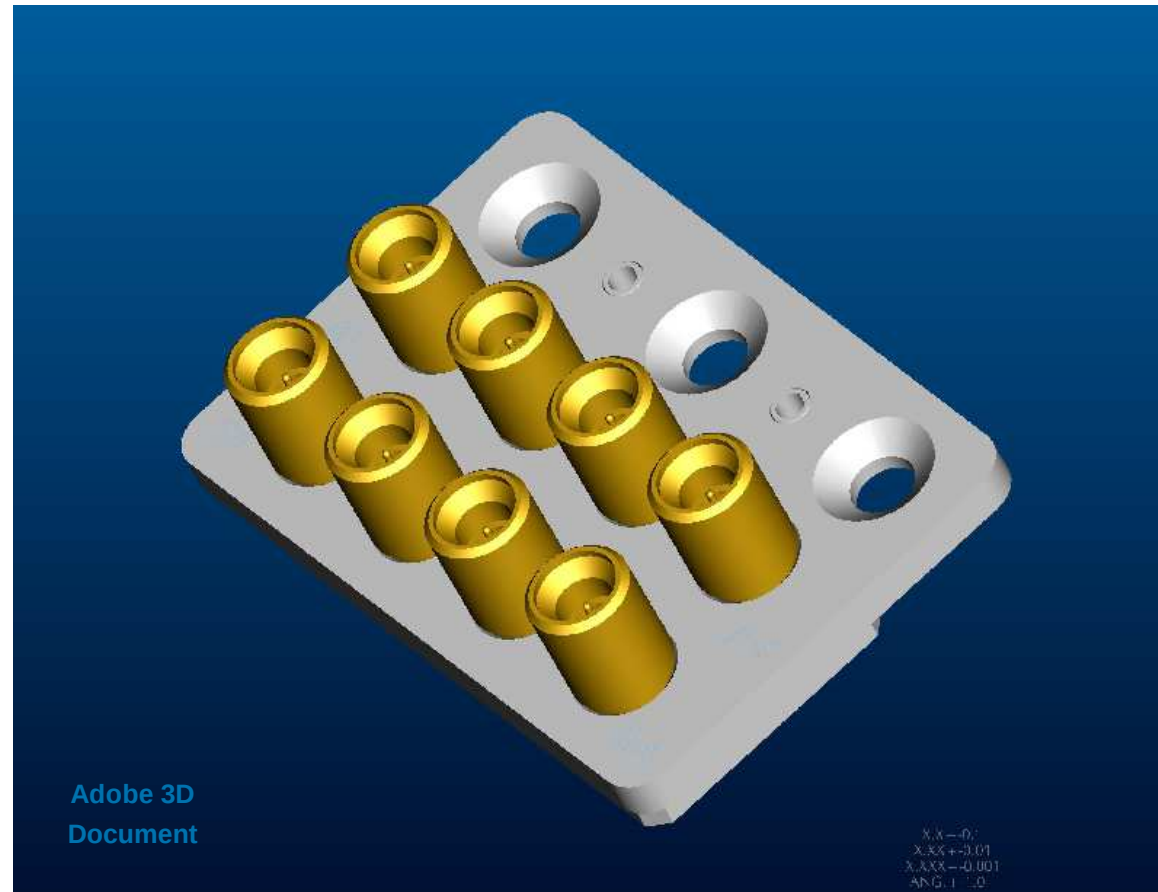
1996705-4  
2157350-3

Contacts purchased separately

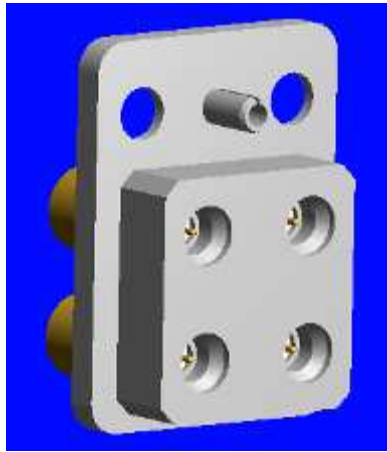
# VITA 67.2

## 8 Position Backplane RF Module – 1996706-1

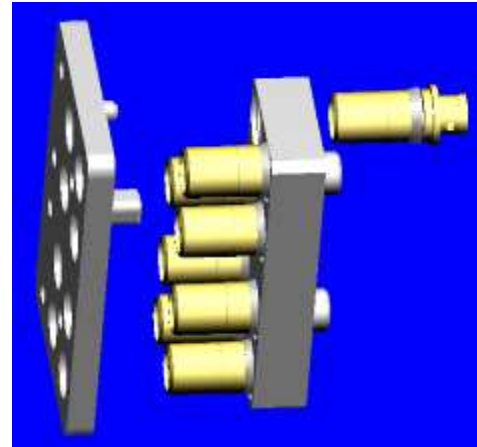
Designed for use on  
6U VITA 46  
Configuration



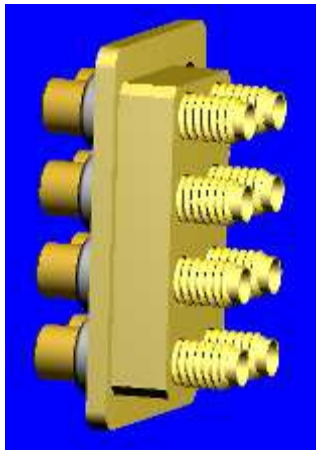
# Backplane Connection Side Options



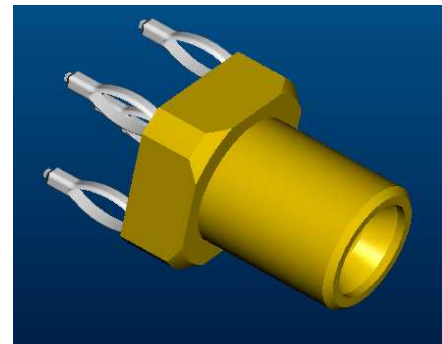
SMPM plug interface



Direct cable attach



OSMM jack interface



Press-fit PCB termination

# Direct Cable Attach

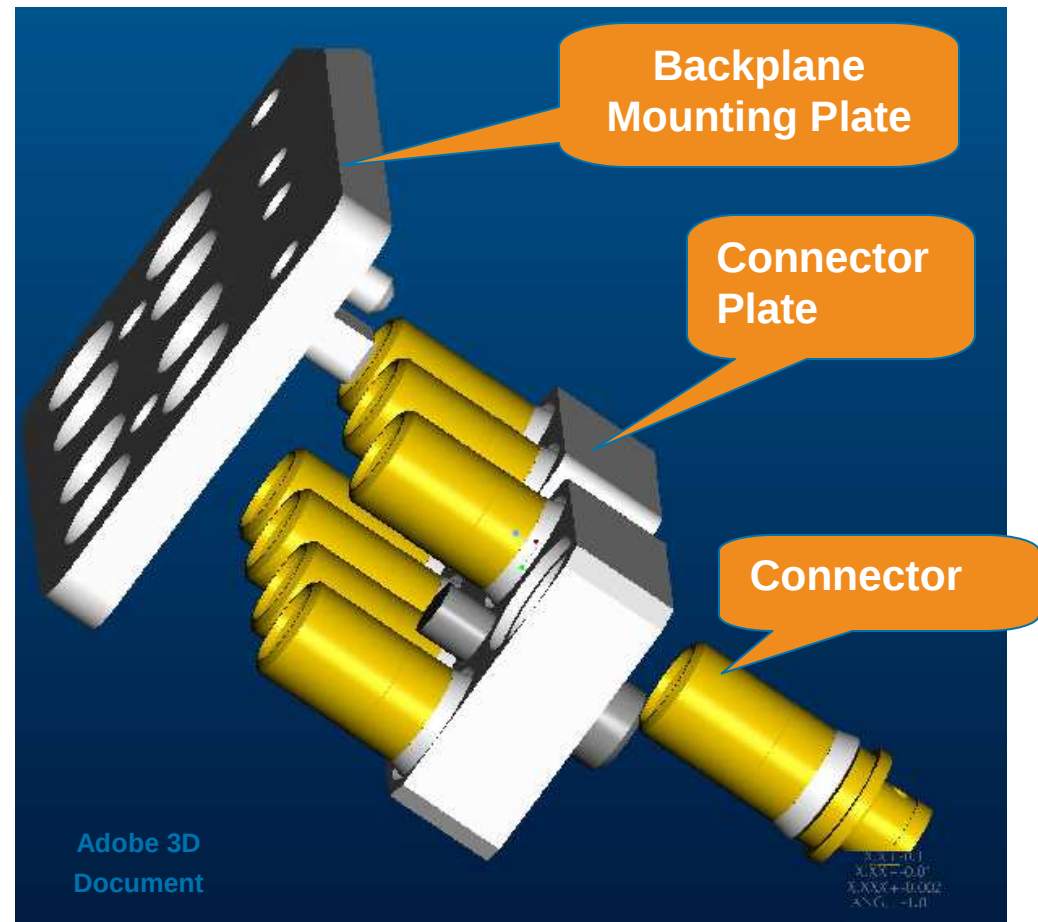
Module kit is supplied with  
backplane mounting plate and  
connector plate

Contact snaps into connector plate

Eliminates a secondary interface  
at the backplane connection

## Advantages:

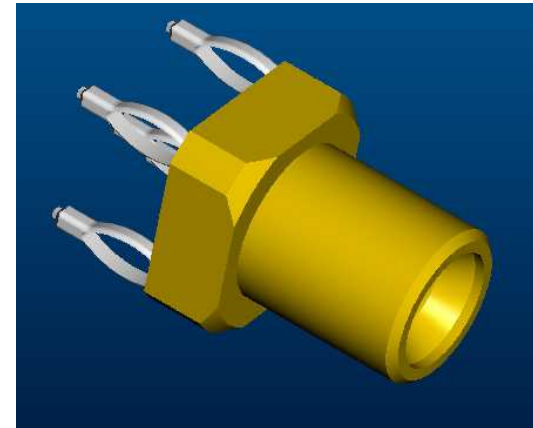
- Better RF performance
- Lower Cost
- Lighter Weight
- Replaceable contacts



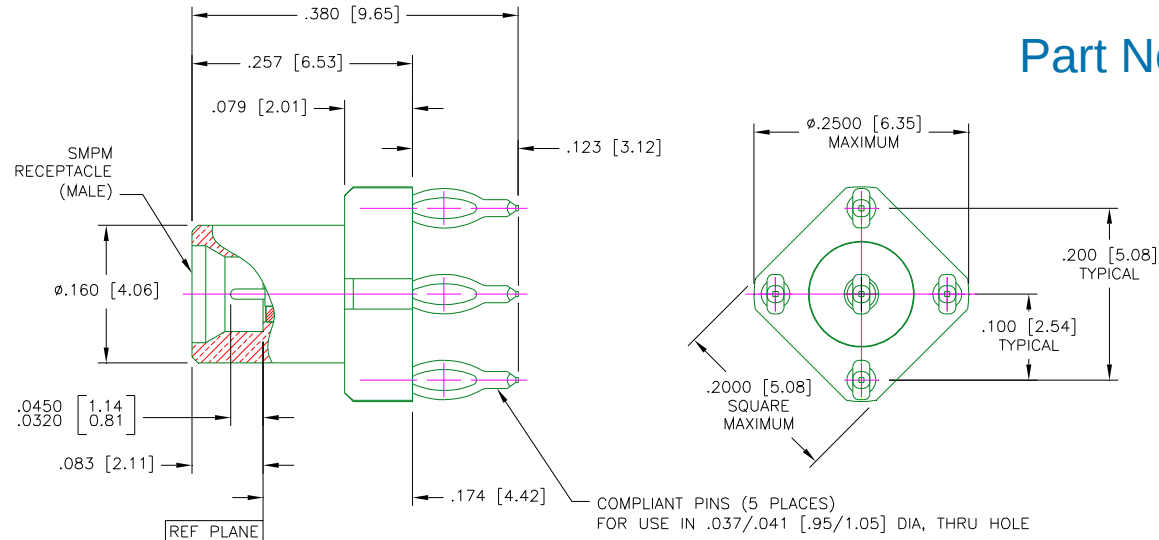
# VITA 67

## Compliant Pin, Backplane Connector

No backplane module plate required, PCB layout sets contacts in the position required for mating daughtercard module.

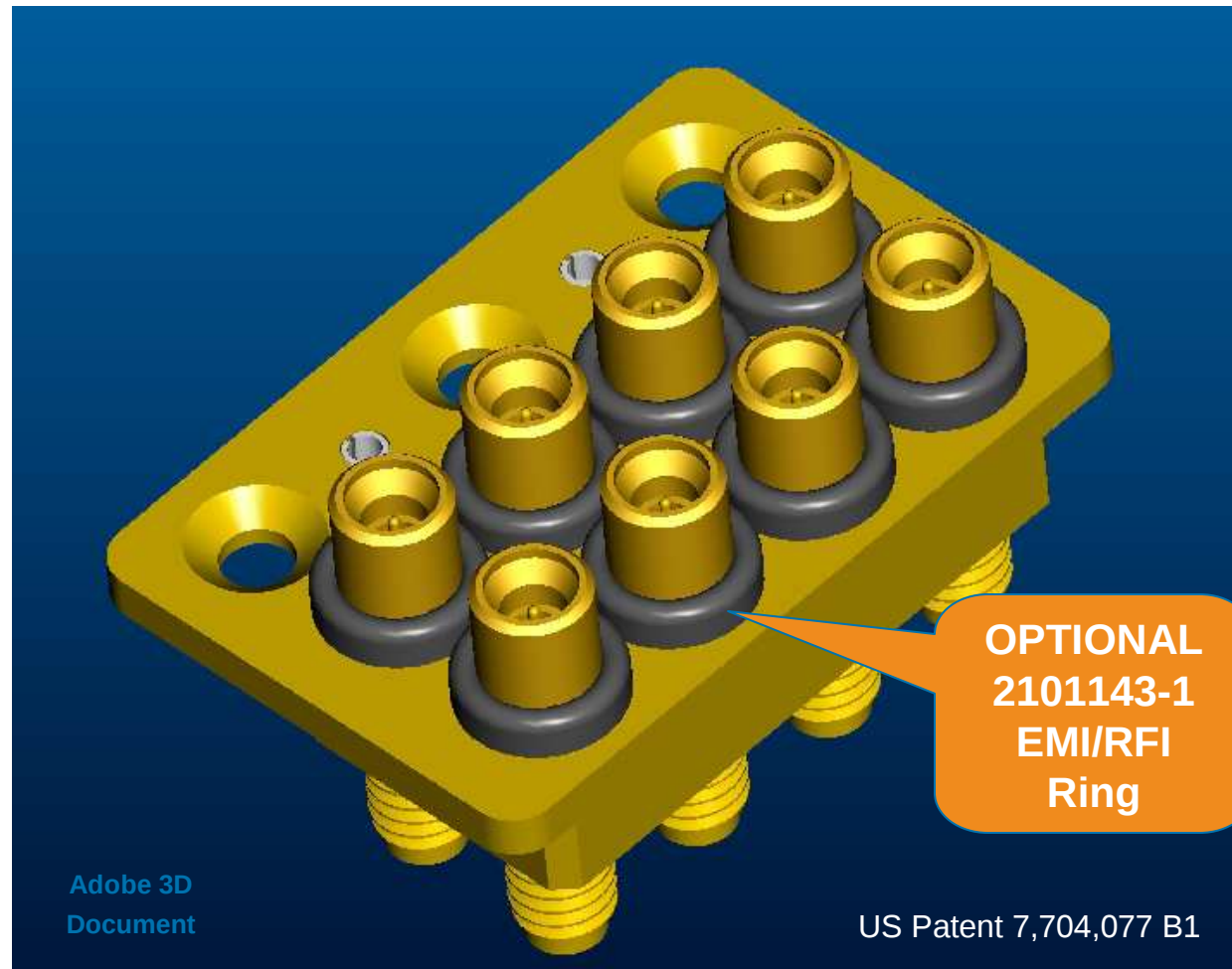


Part No. 1996318-1

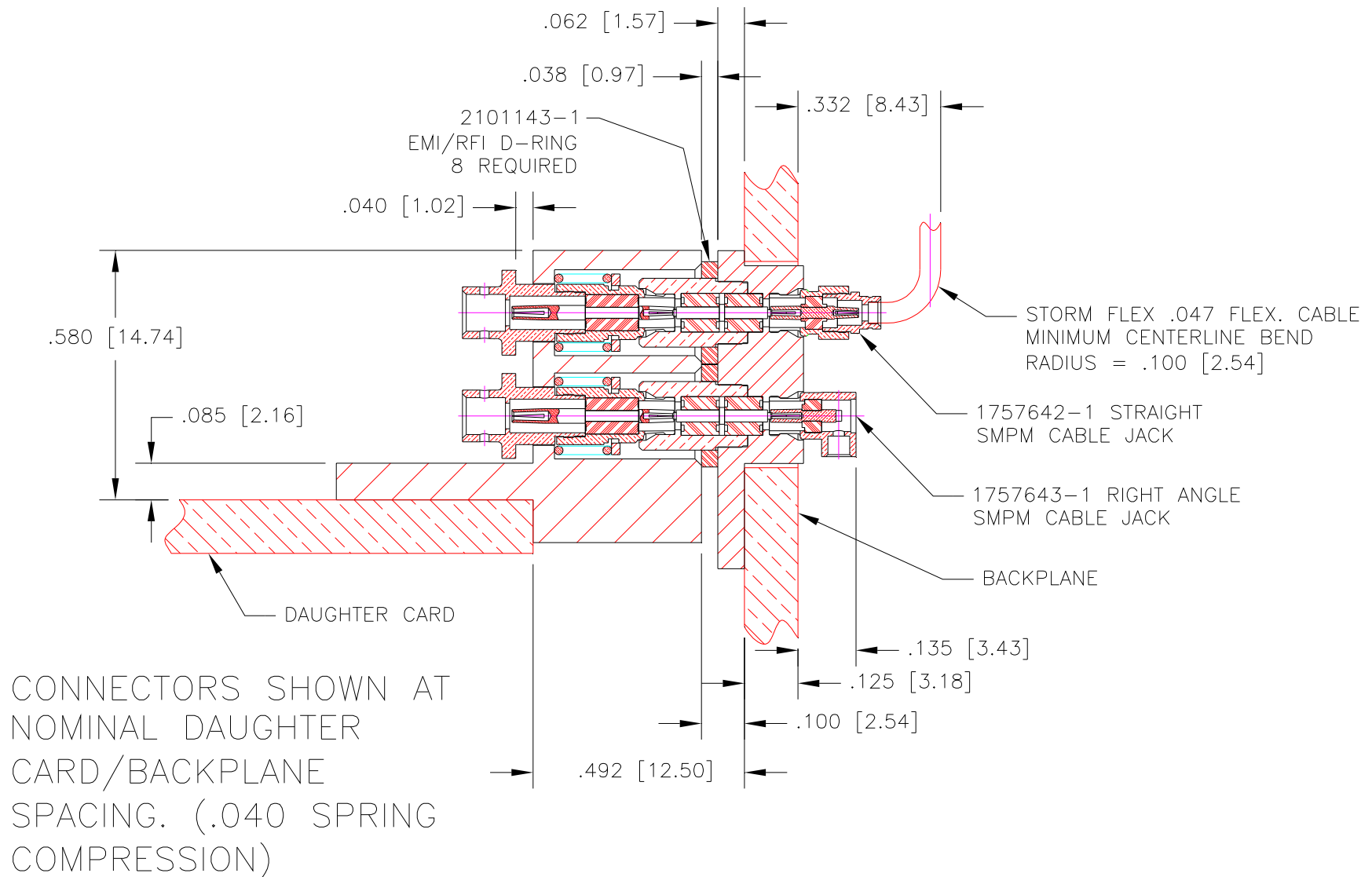


# VITA 67 Type RF Backplane Module (OSMM)

EMI/RFI Ring  
Improves Shielding  
Effectiveness



# VITA 67, Typical Module Cross Section



# **SMPM Series Connector**

# SMPM Series Connectors

Sub-miniature, push-on, RF interconnect system similar to SMP, except 30% smaller, with the following features:

- Center-to-center spacing of .135" for higher packaging density than SMP
- RF performance to 40 GHz
- Can accommodate both axial and radial misalignment similar to SMP
- Standard interface design per MIL-STD-348A, Notice 5
- 2 different detent styles for varied insertion force requirements (full detent, smooth bore)



# SMPPM

## Product Performance/Specifications

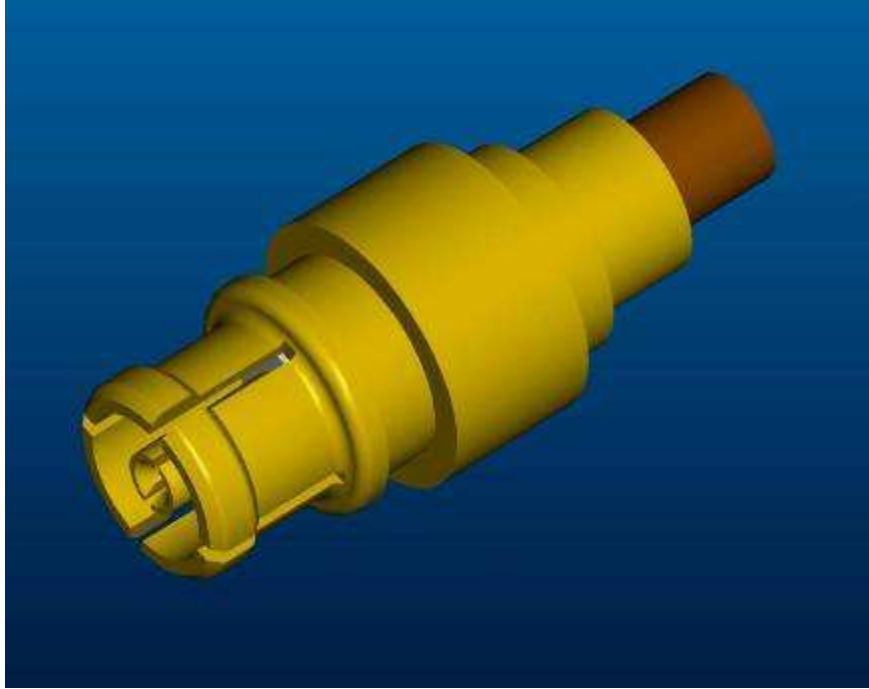
- Impedance: 50 ohms
- Frequency Range: DC to 40 GHz
- VSWR: 1.15 max to 26.5 GHz, 1.50 max to 40 GHz (typical values)
- Engagement force: 8.0 lbs max (full detent), 2.5 lbs max (smooth bore)
- Disengagement force: 5 lbs min (full detent), 0.5 lbs min (smooth bore)
- Radial misalignment: .010" min
- Axial misalignment: .000-.010"
- DWV: 200 VRMS min (@ sea level)

# SMPPM

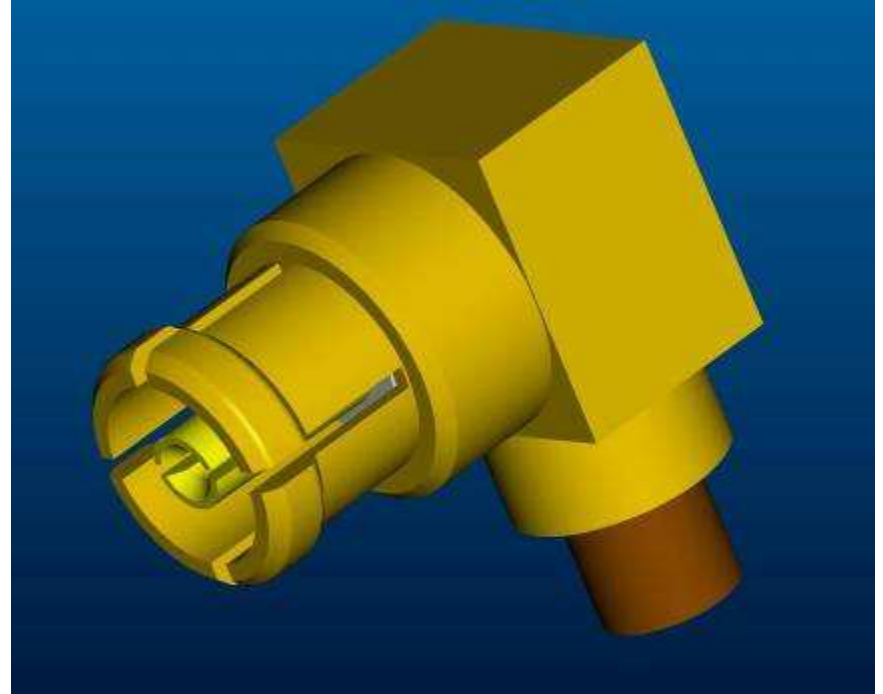
## Product Performance/Specifications (cont.)

- Operating Temperature: -65°C to +165°C
- Durability: 100 cycles (full detent) - 500 cycles (smooth bore)
- Insulation resistance: 5,000 megohms min
- Corona level: 125 VRMS @ 70,000 feet
- Humidity-temperature cycling: EIA-364-31, Method III
- Temperature life: EIA-364-17, Method A, Test condition V
- Corrosion: EIA-364-26, Condition B
- Mechanical shock: EIA-364-27, Method G
- Thermal shock: EIA-364-32
- Vibration, sinusoidal: EIA-364-28, Test condition III

# SMPPM Connectors, for use with RF Backplane (*pass-thru*) modules

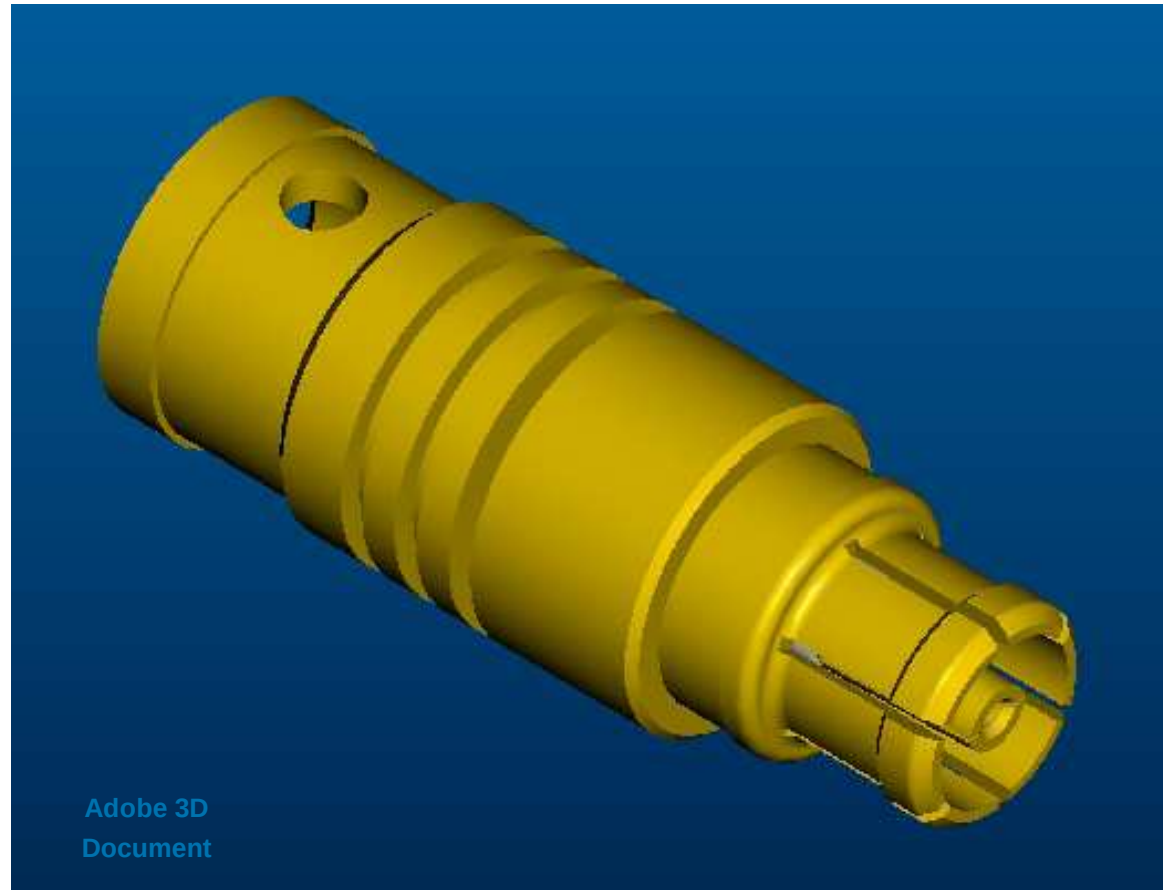


SMPPM Straight (F) Plug  
.047 Cable 1757642-1



SMPPM Right Angle (F) Plug  
.047 Cable 1757643-1

# SMPPM Connectors, for use with RF Backplane (*pass-thru*) modules

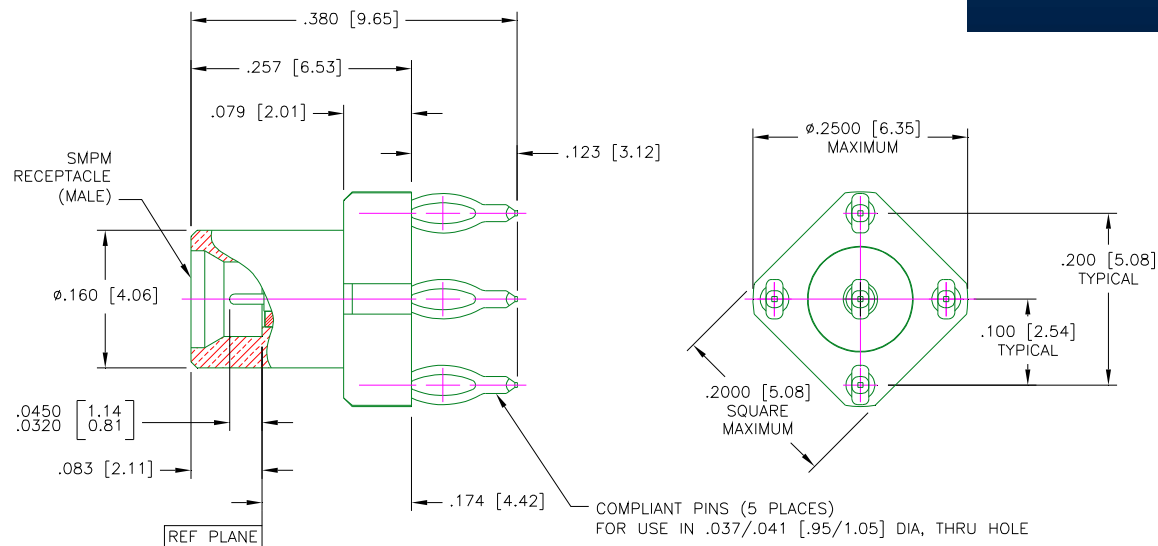
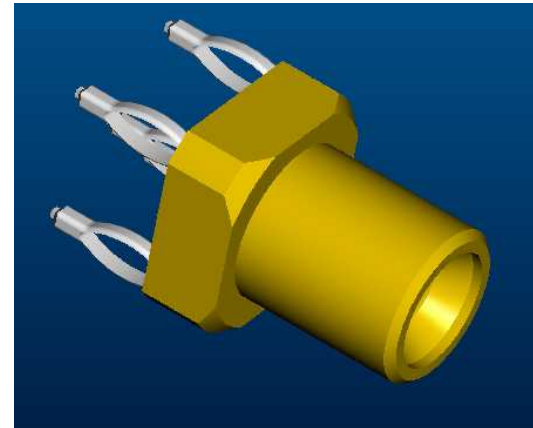


SMPPM Straight (F) Plug,  
.086 Cable, 1996328-1

# VITA 67

## Compliant Pin, Backplane Connector

Part No. 1996318-1



# RF Module Part Numbers

# VITA 67 Part Number Matrix

## RF Modules and RF Connectors

| Application                 |                                          | Motherboard (Backplane) |                                                                   | Daughter Card   |           |                      |             |
|-----------------------------|------------------------------------------|-------------------------|-------------------------------------------------------------------|-----------------|-----------|----------------------|-------------|
|                             |                                          | RF Module               | RF Connector SMPM                                                 | RF Module       |           | SMPM Cable Connector |             |
| # positions                 | Backplane Connection Side                |                         |                                                                   | Stainless Steel | Aluminum  | .047 Cables          | .086 Cables |
| 8                           | SMPM cables attach to module             | 1996706-1               | Integrated into RF module                                         | 1996705-4       | 2157350-3 | 1996771-1            | 1996390-1   |
| 8                           | Direct PCB termination                   | N/A                     | 1996318-1                                                         | 1996705-4       | 2157350-3 | 1996771-1            | 1996390-1   |
| 8                           | OSMM plug attach                         | 1996777-2               | Integrated into RF module                                         | 1996705-4       | 2157350-3 | 1996771-1            | 1996390-1   |
| 8                           | SMPM cables insert into backplane module | 2157553-1               | 2101012-1 (.086 cable)<br>2157248-1 (.047 cable)                  | 1996705-4       | 2157350-3 | 1996771-1            | 1996390-1   |
| 4                           | SMPM cables attach to module             | 1996884-1               | Integrated into RF module                                         | 1996883-4       | 2157338-3 | 1996771-1            | 1996390-1   |
| 4                           | OSMM plug attach                         | 2101510-2               | Integrated into RF module                                         | 1996883-4       | 2157338-3 | 1996771-1            | 1996390-1   |
| Installation & Removal Tool |                                          | 2101595-1               | For use on 1996771-1 and 1996390-1, for Twist Lock Retaining Ring |                 |           |                      |             |

**Notes:**

RF contacts may be used with .047/.086 dia semi-rigid, conformable, and flexible cables  
Other configurations available and custom solutions are possible.

# VITA 67 Backplane Mating Connectors

| Backplane Mating Connectors | Connect to 1996706-1 and 1996884-1 (SMPM),<br>and 1996777-1/-2 and 2101510-1/-2 (OSMM)<br>Backplane Module ( <i>pass thru</i> ) |           |           |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|
|                             | RF Connector                                                                                                                    |           |           |
|                             | .047 S.R.                                                                                                                       | .086 S.R. | RG 196/U  |
| SMPM Straight Cable Plug    | 1757642-1                                                                                                                       | 1996328-1 | N/A       |
| SMPM Right Angle Cable Plug | 1757643-1<br>1757638-1 ( <i>Low Profile</i> )                                                                                   | 2101777-1 | N/A       |
| OSMM Straight Cable Plug    | 1058955-1                                                                                                                       | 1996942-1 | 1059057-1 |
| OSMM Right Angle Cable Plug | 1058993-1                                                                                                                       | TBD       | 1059063-1 |

# TE Connectivity

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