Keysight Technologies

M9155/6/7C PXI Hybrid Switch Modules

DC to 26.5 GHz

Data Sheet



KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

Overview

Product description

Keysight Technologies, Inc. has been a leading designer and manufacturer of RF and microwave switches in the global marketplace for more than 60 years. RF and microwave switches are used extensively in microwave test systems for signal routing between instruments and devices under test (DUT).

Keysight designs and manufacturers a comprehensive range of RF and microwave switches to meet your switching requirements. Other than connectorized switches, Keysight also offers switch modules that operate across a broad frequency range and come in a variety of configurations. With Keysight's proven track record in switches (high performance, quality and reliability), these modules will provide a similar set of standards of high accuracy and repeatability for automated test and measurement, signal monitoring and routing applications.

The M9155/6/7C Keysight PXI hybrid switch module series operates from a frequency range of DC to 26.5 GHz. It is being used in applications such as Automatic Test Equipment (ATE), RF communications measurement and RF parametric measurements where a rugged switching module is needed in switching systems.

The PXI hybrid switch module comes in a selection of 3 models; the integration of Keysight dual SPDT switches, dual transfer switches, and a single SP6T configurations. These PXI modules provide an exceptional 0.03 dB insertion loss repeatability, high isolation and low SWR with a long operating life up to 10 million cycles.

Applications

- Automatic test equipment
- RF communications measurement
- RF parametric measurements

Features

- A readily scaled integrated switching solution to satisfy your unique platform needs
- 0.03 dB insertion loss repeatability throughout the operating life
- Unmatched isolation of 60 dB at 26.5 GHz
- Soft Front Panel is available for each switch module

Customer values

- Peace of mind in switch technology from Keysight who has a proven track record of providing versatile, quality RF and microwave switches
- Reduce downtime for recalibration, improve testing efficiency and hence maximize throughput
- Maximize measurement accuracy and system flexibility
- The embedded graphical user interface ease the trouble shooting of your PXI systems

Features

- A readily scaled integrated switching solution to satisfy your unique platform needs
- 0.03 dB insertion loss repeatability throughout the operating life
- Typical operating life up to 10 million cycles
- Unmatched isolation of 60 dB at 26.5 GHz
- Soft front panel is available for each switch module

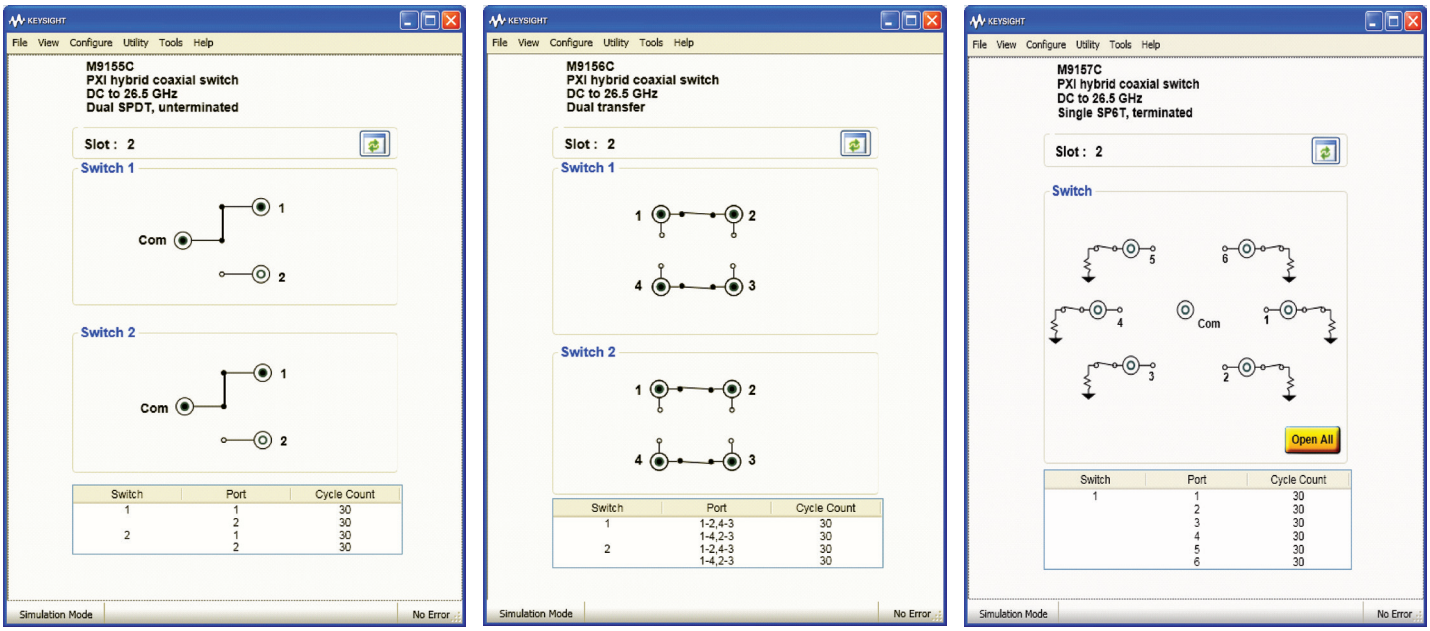
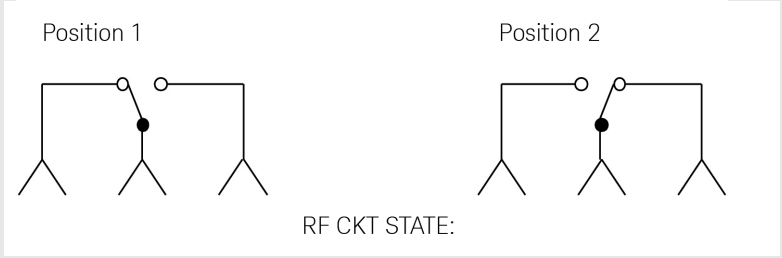
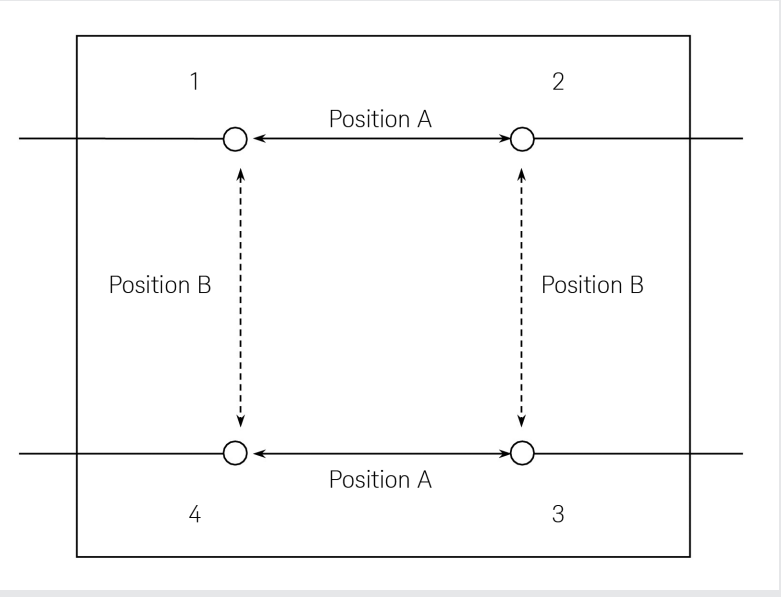


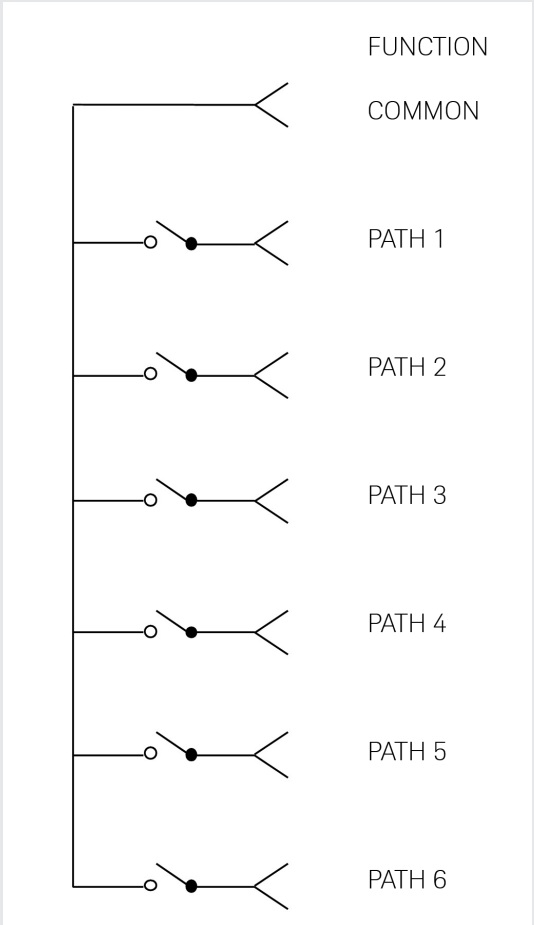
Figure 1. Soft front panel for M9155C, M9156C and M9157C



M9155C is an integration of 2 units of Keysight 8765C with Option 024 (24 V, 3 inch ribbon)



M9156C is an integration of 2 units of Keysight L7222C with Option 161 (24 V, 10-pin DIP)



M9157C is an integration of 1 unit of Keysight L7106C with Option 161 (24 V, 16-pin DIP)

Connections are made via front panel mounted high quality RF coaxial connectors, 3.5 mm (f) or SMA (f) for 50 Ω.

The M9155/6/7C switch modules give you the most reliable and repeatable RF & microwave switching available in the market. Their applications are mainly in automated test equipment for example, RF communication, engineering verification and RF parametric measurement where low insertion loss and ultra high isolation are critical.

These modules provide individual cycle count trackings for each of the switch paths. Cycle count is incremented per each complete Open-Close sequence. The individual cycle count is user-retrievable, either via scripting or the Soft Front Panel. Engineers can use this feature for scheduled maintenance to reduce unexpected system downtime.

Easy Setup ... Test ... and Maintenance

Hardware platform

Compliance

The M9155/6/7C is PXI compliant, using either a PXI-H, PXI-1 or cPCI slot. Designed to benefit from fast data interfaces, the products can be integrated with other test and automation modules in PXI, CompactPCI, and Hybrid chassis. The PXI format offers high performance in a small, rugged package. It is an ideal deployment platform for many automated test systems. A wide array of complementary PXI products is currently available. Products include multimeters, waveform generators, local oscillators, digitizers, and switch multiplexers.

Software platform

Drivers

Keysight's switches come complete with software drivers for Windows XP, Windows Vista, Windows 7, and LabVIEW. Also included are application code examples for LabVIEW, LabWindows/CVI, Visual Studio, C, C++, MATLAB.

Soft front panel

The M9155/6/7C's graphical user interface guides developers through the module setup process. Users can quickly configure the module parameters. The interfaces are implemented using the IVI standard supporting both IVI-COM and IVI-C.

Easy software integration

Keysight's M9155/6/7C comes complete with software drivers for Windows XP, Windows Vista, Windows 7, and LabVIEW. Also included are application code examples for LabVIEW, LabWindows/CVI, Visual Studio, C, C++, C#, Visual Basic, and MATLAB, which provide M9155/6/7C set up and basic switching functionality. The application code examples are easily modified to quickly integrate the module into your measurement system.

Calibration intervals

The M9155/6/7C is factory calibrated and shipped with an ISO-9001, NIST-traceable calibration certificate.

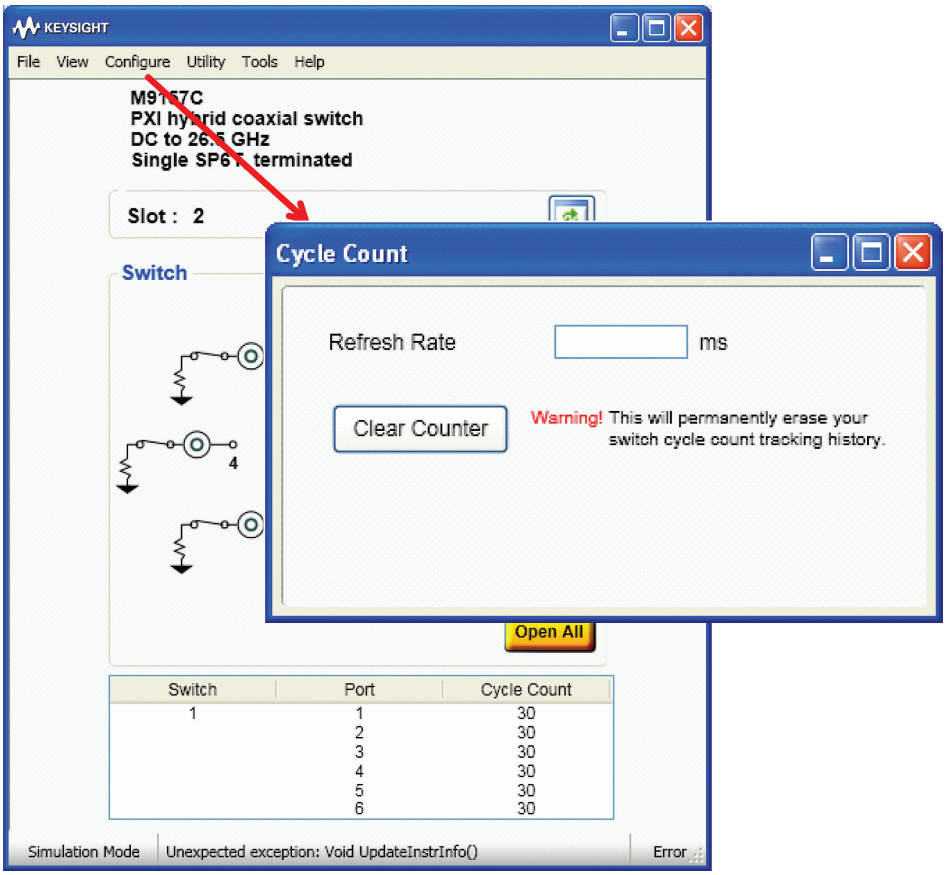


Figure 2. Onboard switch cycle count tracking eases maintenance and reduces unexpected system downtime.

Technical Specifications

RF input specifications			
Input characteristics		M9155C, M9156C, M9157C	
Frequency range		DC to 26.5 GHz	
Characteristics impedance		50 Ω	
Maximum RF carry power (50 Ω)		150 W at 100 MHz at 75 %C	
Maximum voltage (cold-switching only)		86.6 Vrms	
Maximum carry current (per channel)		1.73 Arms	
Initial on path resistance		100 MΩ	
Off path resistance > 1		0 MΩ	
RF specifications			
Model	M9155C	M9156C	M9157C
Switch type	Dual SPDT EM switch	Dual transfer EM switch	Single SP6T EM switch
	Keysight 8765C, two each	Keysight L7222C, two each	Keysight L7106C, one
Dimension	1 slot	2 slots	3 slots
Frequency range	DC to 26.5 GHz	DC to 26.5 GHz	DC to 26.5 GHz
Insertion loss f is frequency in GHz	0.25 + 0.027f DC: 0.25 dB 8 GHz: 0.47 dB 12.4 GHz: 0.58 dB 18 GHz: 0.74 dB 26.5 GHz: 0.96	0.2 + 0.025f DC: 0.20 dB 8 GHz: 0.40 dB 12.4 GHz: 0.51 dB 18 GHz: 0.65 dB 26.5 GHz: 0.86 dB	0.3 + 0.015f DC: 0.30 dB 8 GHz: 0.42 dB 12.4 GHz: 0.49 dB 18 GHz: 0.57 dB 26.5 GHz: 0.70 dB
Isolation	110 - 2.25f DC: 110 dB 8 GHz: 92 dB 12.4 GHz: 82 dB 18 GHz: 70 dB 26.5 GHz: 50 dB	110 - 2f DC: 110 dB 8 GHz: 94 dB 12.4 GHz: 85 dB 18 GHz: 74 dB 26.5 GHz: 57 dB	DC - 12 GHz: 90 dB 12 - 15 GHz: 70 dB 15 - 20 GHz: 65 dB 20 - 26.5 GHz: 60 dB
VSWR	DC - 4 GHz: 1.25 4 - 18 GHz: 1.45 18 - 26.5 GHz: 1.70	DC - 2 GHz: 1.10 2 - 4 GHz: 1.15 4 - 12.4 GHz: 1.25 12.4 - 20 GHz: 1.40 20 - 26.5 GHz: 1.65	DC - 4 GHz: 1.20 4 - 12.4 GHz: 1.35 12.4 - 20 GHz: 1.45 20 - 26.5 GHz: 1.70
Operating life	5 million cycles	2 million cycles	2 million cycles
Typical operating life	10 million cycles	5 million cycles	5 million cycles
Insertion loss repeatability	0.03 dB	0.03 dB	0.03 dB
Impedance	50 Ω	50 Ω	50 Ω
RF connectors	3.5 mm (f)	SMA (f)	SMA (f)

Power requirements				
Power consumption from the backplane supply is as follows:				
Voltage	+3.3 V	+5 V	–12 V	+12 V
Current	0.5 A (typ. 0.2 A)	20 mA (typ. 10 mA)	0	0.4 A (typ. 0.2 A)

General operating data	
Maximum power rating	M9155C which contains two each of 8765C
Hot switching	2 W average for switching with power applied
Cold switching	150 W CW at 3 GHz, 25 °C, 120 W CW at 4.2 GHz, 25 °C

Technical Specifications (continued)

General operating data (continued)	
M9156C which contains two each of L7222C	
Hot switching	1 W CW, 50 W peak, 10 us max pulse width, not to exceed 1 W average
Cold switching	150 W CW at 3 GHz, 25 °C, 120 W CW at 4.2 GHz, 25 °C
M9157C which contains one L7106C	
Into internal termination	
Hot switching	1 W CW, 50 W peak, 10 µs max pulse width, not to exceed 1 W average
Into thru path	
Hot switching	2 W CW, 100 W peak, 10 µs max pulse width, not to exceed 2 W average
Environmental and physical specifications	
Temperature	
Operating	0 to 55% C
Non-operating	–40 to 70% C
Relative humidity	
Operating	95% RF at 40% C, 24 hours cycling, repeated 5 times
Non-operating	50% RH at –10% C to 25% C, 24 hour cycle
Vibration	
Operating random	5 - 500 Hz, 0.3 g RMS
Vibration	
Survival random vibration	5 - 500 Hz, 3.41 g RMS
Shock	
End use handling shock	Half-sine wave form, 120 in/s, duration < 3 ms
Transportation shock	Trapezoidal, 50 g
Altitude test	
Operating/non-operation	15,000 ft (4600 m)
ESD Immunity	
Air discharge	15 kV per IEC61000-4-2
Direct discharge[1]	8 kV per IEC61000-4-2
Safety	This product has input power below the requirements as specified in the Low Voltage Directive (2006/95/EC)
EMC	EMC Standard: IEC 61326-1:2005/EN 61326-1:2006 Emissions: CISPR 11:2003/EN55011:2007 Immunity: IEC 61000-4-3:2002 / EN 61000-4-3:2002 Electrostatic Discharge: IEC 61000-4-2:2001/EN 61000-4-2:1995+A1:1998+A2:2001 EMC/EMI: CE, C-Tick
CE compliance	EMC Compatibility Directive (EMC): 2004/108/EC
Warm-up time	Refer to PXI chassis warm up time
Dimensions	3U PXI/CompactPCI standard Front panel complies with IEEE 1101.10 certification and compliance
M9155C	174.8 x 128.7 x 20 mm
M9156C	174.8 x 128.7 x 40.3 mm
M9157C	174.8 x 128.7 x 60.7 mm
Weight	
M9155C	0.395 kg
M9156C	0.255 kg
M9157C	0.340 kg
Connectors	PXI bus via 32 bit P1/J1 backplane connector. Signals via front panel mounted coaxial 3.5 mm (f) or SMA(f) connectors.
Contact Material	Beryllium copper, gold plated
Connector compatibility	PXI-h, PXI-1, cPCI

1. To outer conductor

Configuration

Hardware

Recommended configuration

Model	Description
M9018A	PXIe chassis, 18-slots, 3U, 8 Gb/s
M9155C	PXI hybrid coaxial switch, DC to 26.5 GHz, dual SPDT, unterminated
M9156C	PXI hybrid coaxial switch, DC to 26.5 GHz, dual transfer
M9157C	PXI hybrid coaxial switch, DC to 26.5 GHz, single SP6T, terminated
M9021A	PXIe system interface

Accessories

SMA male-male cable (semi-rigid)

Module and chassis compatibility

PXI chassis compatibility
Compatible with all chassis conforming to the 3U PXI and 3U cPCI specifications
Compatible with Keysight M9018A PXIe chassis, 18-slots, 3U, 8 Gb/s

Related products

Model	Description
M9155CH40	PXI hybrid coaxial switch, DC to 40 GHz, dual SPDT, unterminated
M9156CH40	PXI hybrid coaxial switch, DC to 40 GHz, dual transfer
M9157CH40	PXI hybrid coaxial switch, DC to 40 GHz, single SP6T, terminated
M9392A	PXI vector signal analyzer
M9302A	PXI local oscillator
M9351A	PXI downconverter (50 MHz–2.9 GHz)
M9360A	PXI attenuator/preselector
M9361A	PXI downconverter (2.75 GHz–26.5 GHz)

Ordering

Model	Description
M9155C	PXI hybrid coaxial switch, DC to 26.5 GHz, dual SPDT, unterminated
M9156C	PXI hybrid coaxial switch, DC to 26.5 GHz, dual transfer
M9157C	PXI hybrid coaxial switch, DC to 26.5 GHz, single SP6T, terminated

Mechanical Dimensions

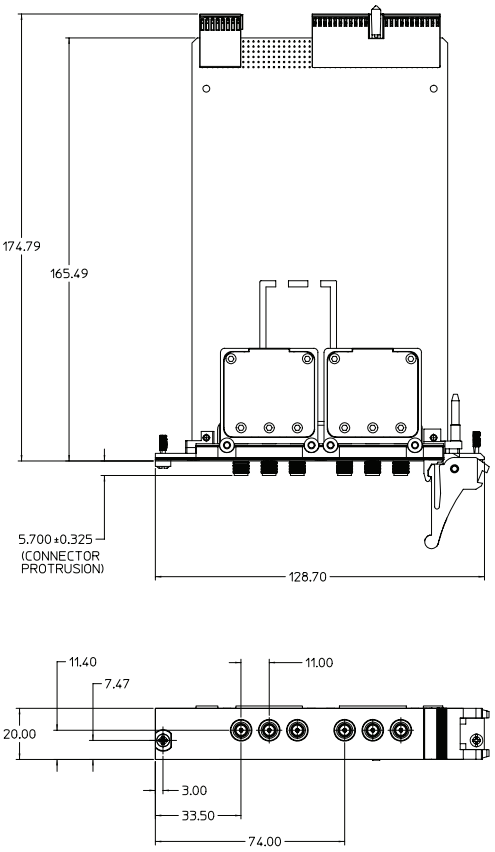


Figure 3. M9155C

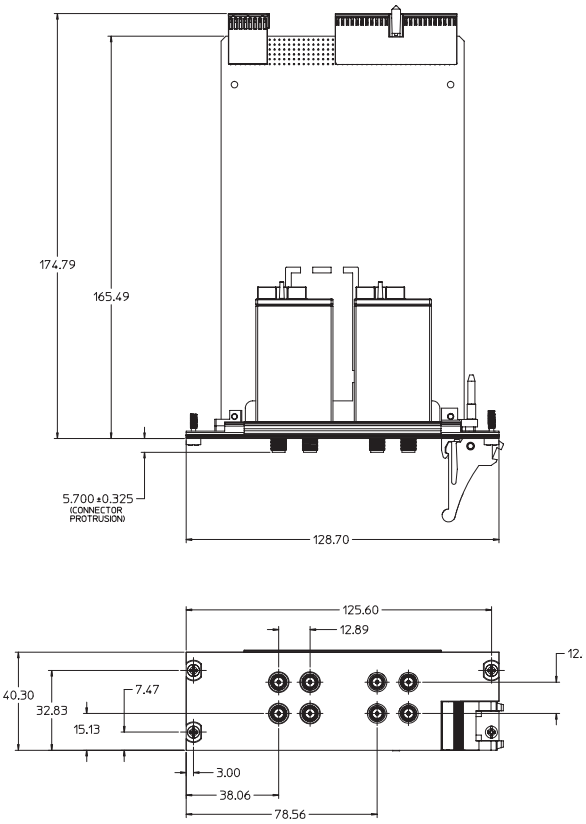


Figure 4. M9156C

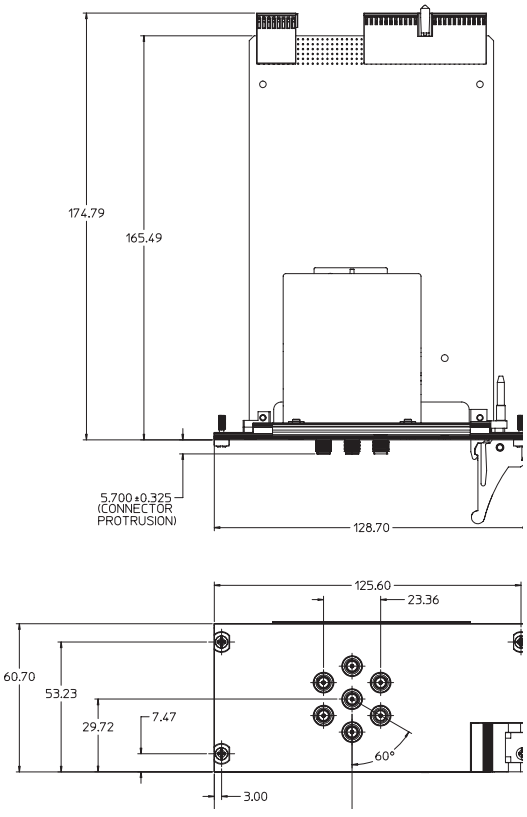


Figure 5. M9157C

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