DATA SHEET

S9100A
5G Multi-Band Vector Transceiver
380 MHz to 6 GHz and 24.25 to 43.5 GHz

KEYSIGHT TECHNOLOGIES

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System Performance

Conditions

Information and data contained in this data sheet is subject to change without notice.

In addition to the following conditions, the S9100A system performance, documented in this data sheet, is valid for an ambient temperature of 25 °C unless otherwise noted.

- The system is within its calibration cycle.
- The system has been stored at an ambient temperature within the allowed operating range for at least two hours before being powered on.
- The system has been powered on continuously for at least two hours warm-up time, with the IQ Analyzer or X-Series application (e.g. 5G NR) running, and the M1740A mmWave Transceiver powered on (verify that LEDs are on). If the system met these warm-up requirements and there is a brief power shutdown, such as a system reboot, allow 45 minutes of warm-up time after the system is powered back on.
- The “Align Now All” alignments have been run, in the M9410A PXIe VXT module, after the warm-up period:
    - within the previous 8 hours
    - if the temperature has changed more than 5°C from the previous “Align Now All” alignments
- Amplitude accuracy characteristics apply after system calibration has been performed in the current environment and humidity has not changed by more than ± 10%.

Characteristics

Notes

- The characteristics provided in this data sheet for operation at or below 6 GHz are a subset of the specifications for the Keysight M9410A PXIe VXT Vector Transceiver module. For the most recent and more detailed performance information, refer to the M9410A Data Sheet (literature no. 5992-3331EN). Note that the performance characteristics in that data sheet apply at the input/output connectors of the M9410A module, but in the S9100A system, there is approximately 0.25 to 0.5 dB of insertion loss between the S9100A front panel connectors and the M9410A due to the M9155C switch module and cabling.

  The S9100A Option 020 and S9100A Option 022 systems include both a Primary Transceiver (M9410A PXIe VXT) that generates a “Wanted” signal and a Secondary Transceiver (M9410A PXIe VXT) that generates a “Blocker” signal (interfering signal) for testing the performance of a base station receiver. These signals are combined in a hybrid before being routed to the S9100A front panel. In these systems, there is approximately 3 dB of insertion loss between the Primary Transceiver (M9410A PXIe VXT) and the S9100A front panel RF Out connector, and there is approximately 18 dB of loss between the Secondary Transceiver (M9410A PXIe VXT) and the S9100A front panel RF Out connector.

  The Sub 6 GHz amplitude characteristics in this data sheet include the effects of the added system insertion loss.

- The M9410A-001 in this S9100A 5G Multi-Band Vector Transceiver is configured with:
  Option F06 (Frequency Range, 380 MHz to 6 GHz),
  Option B12 (1.2 GHz BW),
  Option M05 (512 MSa memory),
  Option 1EA (High Output Power).

Definitions

typical (typ)
Describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 95% of the units exhibit with a 95% confidence level at room temperature (approximately 25 °C). Typical performance does not include measurement uncertainty. Typical performance is not warranted.
measured (meas)
Describes an attribute measured during the design phase for purposes of communicating expected performance, such as amplitude drift vs. time. This data is measured at room temperature (approximately 25 °C). Measured performance is not warranted.
nominal (nom)
Describes the expected mean or average performance, or an attribute whose performance is by design, such as the 50 Ω connector. This data is measured at room temperature (approximately 25 °C). Nominal performance is not warranted.

Recommended Best Practices

- Set chassis fan to high at environmental temperatures above 45°C.

S9100A Standard Configurations

This data sheet contains system performance for the S9100A base system that is available in four standard configurations with multiple output and input connectors that have different system performance:

- Keysight S9100A Option RH1 5G Multi-Band Vector Transceiver
- Keysight S9100A Option 007 mmWave Transceiver with High IF
- Keysight S9100A Option 020 mmWave Transceiver with Blocker
- Keysight S9100A Option 022 mmWave Transceiver with High IF and Blocker

S9100A Connectors (Ports 1 to 8)

Each S9100A standard configuration has a different set of output and input connectors (ports):

- **All** S9100A standard configurations have mmWave ports on the **M1740A mmWave Transceiver** that are RF Tx/Rx 1 ① and RF Tx/Rx 2 ②

- **All** S9100A standard configurations have RF ports that are either RF Out ③ and RF In ④ or RF Out ⑤ and RF In ⑥

  - **S9100A Option RH1 and 007** have **RF Transceiver** ports RF Out ③ and RF In ④

    and

  - **S9100A Option 020 and 022** have **RF Transceiver** ports RF Out ⑤ and RF In ⑥

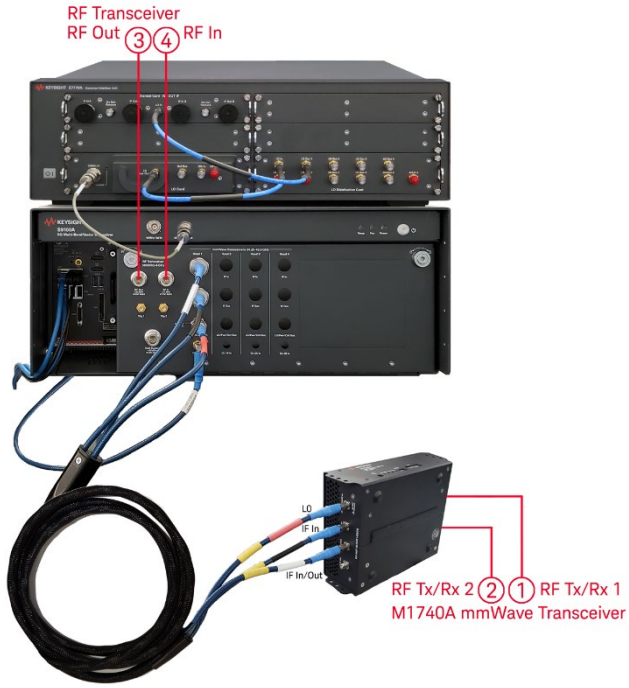
    Although output and input ports RF Out ⑤ and RF In ⑥ with a Blocker have the same name on the external labeling as standard configurations labeled as output and input ports RF Out ③ and RF In ④ without a Blocker, they have different system performance because the Transmit (Tx) RF Out signal path for these ports is routed through a bridge signal hybrid combiner with additional cabling and switching that combines the RF Out of a Primary Transceiver (M9410A PXIe VXT), "Wanted" signal, with the RF Out of a Secondary Transceiver (M9410A PXIe VXT), "Blocker" signal.

- **Some** S9100A standard configurations have High IF ports RF Out ⑦ and RF In ⑧

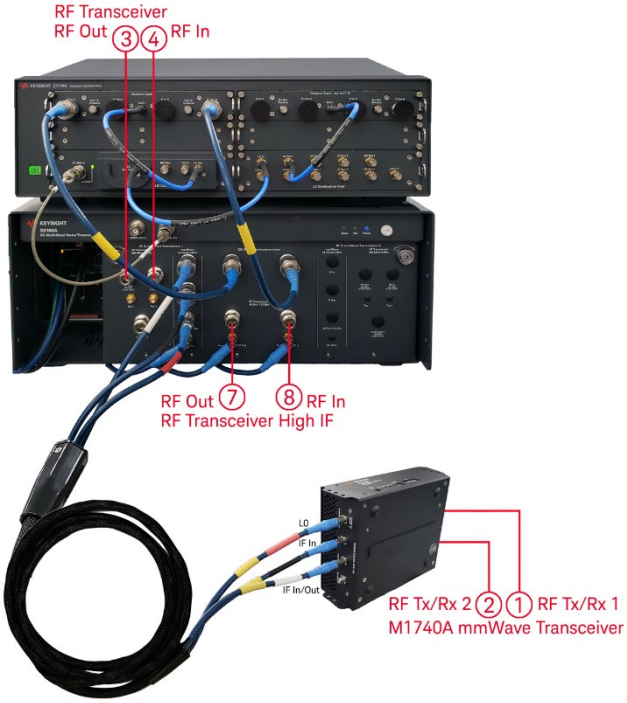
  S9100A Option 007 and 022 have **RF Transceiver High IF** ports RF Out ⑦ and RF In ⑧ that route signal paths through up and down converters, located in the Keysight E7770A Common Interface Unit (CIU), along with additional cabling and switching which results in signals ranging from 6 to 12 GHz.

Output / Input Ports		
RF Tx/Rx 1 ①	RF Tx/Rx 2 ②	All S9100A Standard Configurations **M1740A mmWave Transceiver Connectors** (RF Tx/Rx 1 & RF Tx/Rx 2)
RF Out ③	RF In ④	S9100A Option RH1 or 007 **RF Transceiver Connectors** (RF Out & RF In)
RF Out ⑤	RF In ⑥	S9100A Option 020 or 022 with Blocker **RF Transceiver Connectors** (RF Out & RF In)
RF Out ⑦	RF In ⑧	S9100A Option 007 or 022 with High IF RF Transceiver High IF Connectors (RF Out & RF In)

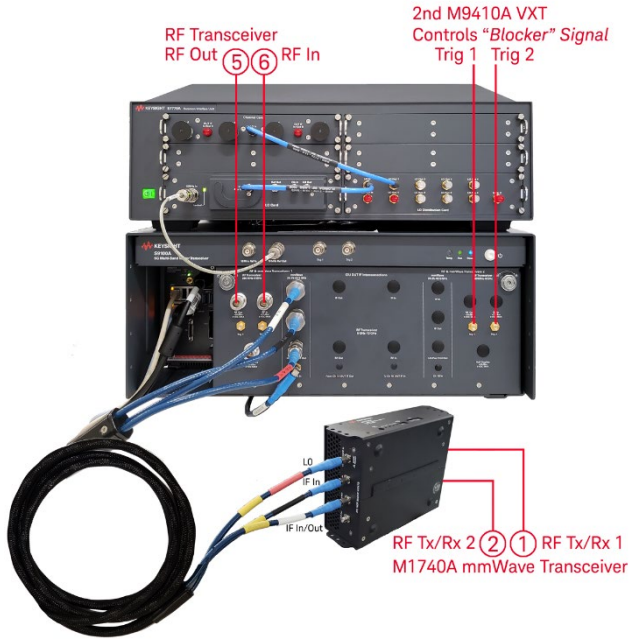
S9100A Option RH1
5G Multi-Band Vector Transceiver



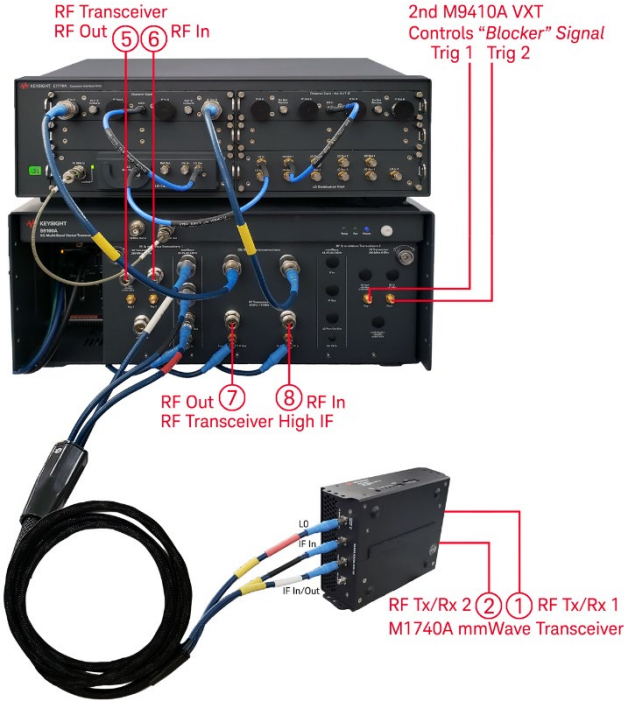
S9100A Option 007
mmWave Transceiver w/ High IF



S9100A Option 020
mmWave Transceiver w/ Blocker



S9100A Option 022
mmWave Transceiver w/ High IF and Blocker



Vector Signal Analyzer (Rx) Performance

Performance		
Capture Depth	512 MSa	
Frequency		
	Frequency Range	
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	22.7 to 43.5 GHz, settable	
All S9100A Standard Configurations RF Transceiver Connectors RF In ④ or RF In ⑥	380 to 6000 MHz	
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF In ⑧	6 to 12 GHz	
	Frequency Reference	
Accuracy, aging rate, stability	Refer to M9300A specifications	
Signal Analysis Bandwidth		
	Center Frequency	**Maximum Bandwidth**, nominal
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 30.5 GHz 30.5 to 43.5 GHz	800 MHz 1.2 GHz
All S9100A Standard Configurations RF Transceiver Connectors RF In ④ or RF In ⑥	380 to 550 MHz 550 to 1310 MHz 1310 to 2000 MHz 2000 to 5480 MHz 5480 to 6000 MHz	100 MHz 200 MHz 600 MHz 1200 MHz (6080 MHz – **Center Frequency**) × 2 MHz
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF In ⑧	6 to 12 GHz	800 MHz

Amplitude Range		
	Frequency Range	**Settable Input Level Ranges**
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	22.7 to 43.5 GHz	–70 dBm to +5 dBm
All S9100A Standard Configurations RF Transceiver Connectors RF In ④ or RF In ⑥	380 to 6000 MHz	–150 dBm to +27 dBm
Half Duplex Connector (Option HDX)	380 to 6000 MHz	–150 dBm to +27 dBm
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF In ⑧	6 to 12 GHz	–70 dBm to +10 dBm

Absolute Amplitude Accuracy (CW mode)			
	Frequency Range	**Level**	**Accuracy,** typical
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 33 GHz 33 to 37 GHz 37 to 43.5 GHz	–70 dBm to 0 dBm –70 dBm to 0 dBm –70 dBm to 0 dBm	± 1.75 dB ± 2.50 dB ± 1.75 dB
All S9100A Standard Configurations RF Transceiver Connectors RF In ④ or RF In ⑥	380 to 680 MHz	–70 to +27 dBm	≤ ± 0.45 dB
	680 to 910 MHz	–70 to –8 dBm –8 to +27 dBm	≤ ± 0.45 dB ≤ ± 0.50 dB
	910 to 1310 MHz	–70 to –8 dBm –8 to +27 dBm	≤ ± 0.55 dB ≤ ± 0.60 dB
	1310 to 2000 MHz	–70 to –30 dBm –30 to +27 dBm	≤ ± 0.60 dB ≤ ± 0.65 dB
	2000 to 3500 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 0.70 dB ≤ ± 0.80 dB ≤ ± 0.60 dB
	3500 to 4500 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 0.65 dB ≤ ± 0.70 dB ≤ ± 0.75 dB
	4500 to 5400 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 0.90 dB ≤ ± 0.95 dB ≤ ± 0.85 dB
	5400 to 6000 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 1.20 dB ≤ ± 1.15 dB ≤ ± 1.05 dB

	Frequency Range	Level	Accuracy, typical
Half Duplex Connector (Option HDX)	380 to 910 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 0.50 dB ≤ ± 0.35 dB ≤ ± 0.45 dB
	910 to 1310 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 0.60 dB ≤ ± 0.45 dB ≤ ± 0.55 dB
	1310 to 3500 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 0.75 dB ≤ ± 0.70 dB ≤ ± 0.65 dB
	3500 to 4500 MHz	–70 to –30 dBm –30 to +27 dBm	≤ ± 0.95 dB ≤ ± 0.80 dB
	4500 to 5400 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 1.15 dB ≤ ± 0.95 dB ≤ ± 1.00 dB
	5400 to 6000 MHz	–70 to –30 dBm –30 to –8 dBm –8 to +27 dBm	≤ ± 1.35 dB ≤ ± 1.10 dB ≤ ± 1.05 dB
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF In ⑧	6 to 12 GHz	–70 dBm to +10 dBm	± 1.5 dB, typical

Linearity (CW mode)

	Frequency Range	Input Level	Linearity, typical
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 33.3 GHz	–50 to –45 dBm –45 to –30 dBm –30 to –20 dBm –20 to 0 dBm	≤ ± 0.60 dB ≤ ± 0.50 dB ≤ ± 0.30 dB ≤ ± 0.20 dB
	33.3 to 37.0 GHz	–50 to –30 dBm –30 to –25 dBm –25 to –17 dBm –17 to –10 dBm –10 to 0 dBm	≤ ± 0.90 dB ≤ ± 0.70 dB ≤ ± 0.50 dB ≤ ± 0.40 dB ≤ ± 0.30 dB
	37.0 to 43.5 GHz	–50 to –30 dBm –30 to –27 dBm –27 to –10 dBm –10 to 0 dBm	≤ ± 0.70 dB ≤ ± 0.50 dB ≤ ± 0.40 dB ≤ ± 0.30 dB

Scale Fidelity (CW mode)

	Frequency Range	Input Level	Scale Fidelity, typical
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 33.3 GHz	–50 to –40 dBm –40 to 0 dBm	≤ ± 0.20 dB ≤ ± 0.10 dB
	33.3 to 37.0 GHz	–50 to –48 dBm –48 to –40 dBm –40 to 0 dBm	≤ ± 0.23 dB ≤ ± 0.20 dB ≤ ± 0.10 dB
	37.0 to 43.5 GHz	–50 to –48 dBm –48 to –40 dBm –40 to 0 dBm	≤ ± 0.22 dB ≤ ± 0.20 dB ≤ ± 0.10 dB

IF Flatness			
	Frequency Range	**Bandwidth**	**Flatness**
M1740A mmWave Connectors[1] RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 29.5 GHz 37 to 43.5 GHz	800 MHz 1200 MHz	± 1.75 dB, typical ± 2.20 dB, typical
All S9100A Standard Configurations RF Transceiver Connectors RF In ④ or RF In ⑥	380 to 6000 MHz	100 MHz 200 MHz 400 MHz 800 MHz 1200 MHz	± 1.10 dB, typical ± 1.35 dB, typical ± 1.25 dB, typical ± 1.45 dB, typical ± 1.80 dB, typical
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF In ⑧	6 to 12 GHz	800 MHz	± 2.0 dB, typical

Error Vector Magnitude (EVM)		
Test signal for FR1: 5G NR, 30 kHz subcarrier spacing, 256QAM		
Test signal for FR2: 5G NR, 120 kHz subcarrier spacing, 256QAM		
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	**24.25 to 29.5 GHz**	**EVM**, typical
	100 MHz BW signal	≤ –39 dB, –40 to –4 dBm input power ≤ –38 dB, –4 to 0 dBm input power
	400 MHz BW signal	≤ –36 dB, –40 to 0 dBm input power
	37 to 40 GHz	
	100 MHz BW	≤ –39 dB, –40 to –13 dBm input power ≤ –37 dB, –13 to –8 dBm input power ≤ –39 dB, –8 to –3 dBm input power ≤ –36 dB, –3 to 0 dBm input power
	400 MHz BW	≤ –35 dB, –40 to –2 dBm input power ≤ –34.5 dB, –2 to 0 dBm input power
All S9100A Standard Configurations RF Transceiver Connectors RF In ④ or RF In ⑥	**FR1 (Sub 6 GHz)**	**EVM**, nominal
	100 MHz BW signal at 5000 MHz	< 0.3% at –10 dBm input power
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF In ⑧	**6 to 12 GHz**	**EVM**, typical
	100 MHz BW	≤ –37 dB, –40 to –30 dBm input power ≤ –38 dB, –30 to 0 dBm input power
	400 MHz BW	≤ –31 dB, –40 to –32 dBm input power ≤ –33 dB, –32 to –4 dBm input power ≤ –32 dB, –4 to 0 dBm input power

[1] Performance can be improved at a specific frequency by performing an IF Flatness Calibration using the Keysight S910xA System Calibration software application.

Adjacent Channel Leakage Ratio (ACLR)		
Test signal for FR1: 5G NR, 30 kHz subcarrier spacing, 256QAM, noise correction ON		
Test signal for FR2: 5G NR, 120 kHz subcarrier spacing, 256QAM, noise correction ON		
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	**24.25 to 29.5 GHz**	**ACLR**, typical
	100 MHz BW	≤ –44 dBc, –40 to 0 dBm input power
	400 MHz BW	≤ –39 dBc, –40 to 0 dBm input power
	37 to 40 GHz	
	100 MHz BW	≤ –44 dBc, –40 to –14 dBm input power ≤ –42 dBc, –14 to –2 dBm input power ≤ –41 dBc, –2 to 0 dBm input power
	400 MHz BW	≤ –38 dBc, –40 to –12 dBm input power ≤ –37 dBc, –12 to 0 dBm input power
All S9100A Standard Configurations RF Transceiver Connectors RF In ④ or RF In ⑥	**FR1 (Sub 6 GHz)**	**ACLR adjacent channel**, nominal
	100 MHz BW signal at 5 GHz	< –63 dBc at 0 dBm input power
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF In ⑧	**6 to 12 GHz**	**ACLR**, typical
	100 MHz BW	≤ –40 dBc, –40 to –34 dBm input power ≤ –45 dBc, –34 to –30 dBm input power ≤ –47 dBc, –30 to 0 dBm input power
	400 MHz BW	≤ –34 dBc, –40 to –32 dBm input power ≤ –40 dBc, –32 to –24 dBm input power ≤ –43 dBc, –24 to 0 dBm input power

Vector Signal Generator (Tx) Performance

Performance		
ARB Depth	512 MSa	
Frequency		
	Frequency Range	
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	22.7 to 43.5 GHz, settable	
All S9100A Standard Configurations RF Transceiver Connectors RF Out ③ or RF Out ⑤	380 MHz to 6000 MHz	
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF Out ⑦	6 to 12 GHz	
	Frequency Reference	
Accuracy, aging rate, stability	Refer to M9300A specifications	
Signal Generation Bandwidth		
	Center Frequency	**Maximum Bandwidth**, nominal
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 30.5 GHz 30.5 to 43.5 GHz	800 MHz 1.2 GHz
All S9100A Standard Configurations RF Transceiver Connectors RF Out ③ or RF Out ⑤	380 to 550 MHz 550 to 1310 MHz 1310 to 2000 MHz 2000 to 5480 MHz 5480 to 6000 MHz	100 MHz 200 MHz 600 MHz 1200 MHz (6080 MHz – **Center Frequency**) × 2 MHz
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF Out ⑦	6.0 to 8.6 GHz 8.6 to 9.3 GHz 9.3 to 12.0 GHz	800 MHz 400 to 600 MHz 800 MHz

Amplitude Range		
	Frequency Range	**Settable Output Level Range**
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	22.7 to 43.5 GHz	**CW:** –70 dBm to +10 dBm **Modulated:** –40 dBm to +5 dBm
S9100A Option RH1 or 007 RF Transceiver Connectors RF Out ③	380 to 6000 MHz	**CW:** –120 dBm to +20 dBm **Modulated:** Depends on the Crest Factor
S9100A Option 020 or 022 w/ Blocker RF Transceiver Connectors RF Out ⑤	380 to 6000 MHz	**CW:** Primary Transceiver (M9410A PXIe VXT) “Wanted” signal: –120 dBm to +17 dBm Secondary Transceiver (M9410A PXIe VXT) “Blocker” signal: –120 dBm to +2 dBm **Modulated:** Depends on the Crest Factor
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF Out ⑦	6 to 12 GHz	**CW:** –50 dBm to +10 dBm **Modulated:** Depends on the Crest Factor

Absolute Amplitude Accuracy (CW mode)			
	Frequency Range	**Level**	**Accuracy**, typical
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 33.3 GHz 33.3 to 37.0 GHz 37.0 to 43.5 GHz	–70 to +10 dBm	± 2.0 dB
S9100A Option RH1 or 007 RF Transceiver Connectors RF Out ③	380 to 550 MHz	≤ +20 to –80 dBm ≤ –80 to –120 dBm	< ± 0.55 dB < ± 0.80 dB
	550 to 2000 MHz	≤ +20 to –15 dBm ≤ –15 to –80 dBm ≤ –80 to –110 dBm	< ± 0.70 dB < ± 0.55 dB < ± 0.85 dB
	2000 to 3900 MHz	≤ +20 to –15 dBm ≤ –15 to –80 dBm ≤ –80 to –110 dBm	< ± 0.60 dB < ± 0.70 dB < ± 1.30 dB
	3900 to 5700 MHz	≤ +20 to –15 dBm ≤ –15 to –80 dBm ≤ –80 to –100 dBm	< ± 0.80 dB < ± 1.10 dB < ± 1.20 dB
	5700 to 6000 MHz	≤ +20 to –15 dBm ≤ –15 to –80 dBm ≤ –80 to –90 dBm	< ± 0.80 dB < ± 1.10 dB < ± 1.20 dB
S9100A Option 020 or 022 w/ Blocker RF Transceiver Connectors RF Out ⑤ Primary Transceiver, “Wanted” signal	380 to 550 MHz	≤ +17 to –83 dBm ≤ –83 to –120 dBm	≤ ± 0.55 dB ≤ ± 0.80 dB
	550 to 2000 MHz	≤ +17 to –18 dBm ≤ –18 to –83 dBm ≤ –83 to –113 dBm	≤ ± 0.70 dB ≤ ± 0.55 dB ≤ ± 0.85 dB
	2000 to 3900 MHz	≤ +17 to –18 dBm ≤ –18 to –83 dBm ≤ –83 to –113 dBm	≤ ± 0.60 dB ≤ ± 0.70 dB ≤ ± 1.30 dB
	3900 to 5700 MHz	≤ +17 to –18 dBm ≤ –18 to –83 dBm ≤ –83 to –103 dBm	≤ ± 0.80 dB ≤ ± 1.10 dB ≤ ± 1.20 dB
	5700 to 6000 MHz	≤ +17 to –18 dBm ≤ –18 to –83 dBm ≤ –83 to –93 dBm	≤ ± 0.80 dB ≤ ± 1.10 dB ≤ ± 1.20 dB
S9100A Option 020 or 022 w/ Blocker RF Transceiver Connectors RF Out ⑤ Secondary Transceiver, “Blocker” signal	380 to 550 MHz	≤ +2 to –98 dBm ≤ –98 to –120 dBm	≤ ± 0.55 dB ≤ ± 0.80 dB
	550 to 2000 MHz	≤ +2 to –33 dBm ≤ –33 to –98 dBm ≤ –98 to –120 dBm	≤ ± 0.70 dB ≤ ± 0.55 dB ≤ ± 0.85 dB
	2000 to 3900 MHz	≤ +2 to –33 dBm ≤ –33 to –98 dBm ≤ –98 to –120 dBm	≤ ± 0.60 dB ≤ ± 0.70 dB ≤ ± 1.30 dB
	3900 to 5700 MHz	≤ +2 to –33 dBm ≤ –33 to –98 dBm ≤ –98 to –118 dBm	≤ ± 0.80 dB ≤ ± 1.10 dB ≤ ± 1.20 dB
	5700 to 6000 MHz	≤ +2 to –33 dBm ≤ –33 to –98 dBm ≤ –98 to –108 dBm	≤ ± 0.80 dB ≤ ± 1.10 dB ≤ ± 1.20 dB

	Frequency Range	Level	Accuracy, typical
Half Duplex Connector (Option HDX)	380 to 550 MHz	≤ +5 to –80 dBm ≤ –80 to –90 dBm	≤ ± 0.50 dB ≤ ± 0.65 dB
	550 to 2000 MHz	≤ +5 to –15 dBm ≤ –15 to –80 dBm ≤ –80 to –90 dBm	≤ ± 0.55 dB ≤ ± 0.60 dB ≤ ± 0.75 dB
	2000 to 3900 MHz	≤ +5 to –15 dBm ≤ –15 to –80 dBm ≤ –80 to –90 dBm	≤ ± 0.50 dB ≤ ± 0.80 dB ≤ ± 1.10 dB
	3900 to 6000 MHz	≤ +5 to –15 dBm ≤ –15 to –80 dBm	≤ ± 0.90 dB ≤ ± 1.25 dB
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF Out ⑦	6 to 12 GHz	–50 to +10 dBm	± 1.5 dB, typical

Linearity (CW mode)			
	Frequency Range	Level	Linearity, typical
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 33.3 GHz	–50 to –40 dBm –40 to –18 dBm –18 to –12 dBm –12 to +5 dBm	≤ ± 0.45 dB ≤ ± 0.40 dB ≤ ± 0.30 dB ≤ ± 0.15 dB
	33.3 to 37.0 GHz	–50 to –40 dBm –40 to –30 dBm –30 to –3 dBm –3 to +5 dBm	≤ ± 0.40 dB ≤ ± 0.30 dB ≤ ± 0.25 dB ≤ ± 0.40 dB
	37.0 to 43.5 GHz	–50 to –30 dBm –30 to –20 dBm –20 to +5 dBm	≤ ± 0.50 dB ≤ ± 0.40 dB ≤ ± 0.30 dB

IF Flatness			
	Frequency Range	**Bandwidth**	**Flatness,** typical
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.25 to 29.5 GHz 37 to 40 GHz	800 MHz 1.2 GHz	± 2 dB
All S9100A Standard Configurations RF Transceiver Connectors RF Out ③ or RF Out ⑤	380 to 6000 MHz	100 MHz 200 MHz 400 MHz 800 MHz 1200 MHz	± 0.5 dB ± 0.8 dB ± 1.0 dB ± 1.0 dB ± 1.5 dB
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF Out ⑦	6 to 8.6 GHz 8.6 to 9.3 GHz 9.3 to 12.0 GHz	800 MHz 400 to 600 MHz 800 MHz	± 3 dB

Error Vector Magnitude (EVM)		
Test signal for FR1: 5G NR, 30 kHz subcarrier spacing, 256QAM		
Test signal for FR2: 5G NR, 120 kHz subcarrier spacing, 256QAM		
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	**24.25 to 29.5 GHz**	**EVM**, typical
	100 MHz BW	–42 dB, –20 to 5 dBm output power
	400 MHz BW	–36 dB, –20 to 5 dBm output power
	37 to 40 GHz	
	100 MHz BW	–39 dB, –20 to –15 dBm output power –40 dB, –15 to 5 dBm output power
	400 MHz BW	–34 dB, –20 to 5 dBm output power
All S9100A Standard Configurations RF Transceiver Connectors RF Out ③ or RF Out ⑤[1]	**FR1 (Sub 6 GHz)**	**EVM**, nominal
	100 MHz BW signal at 4 GHz	< 0.4% at –10 dBm output power
	100 MHz BW signal at 5 GHz	< 0.6% at –10 dBm output power
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF Out ⑦	**6 to 12 GHz**	**EVM**, typical
	100 MHz BW	–45 dB, –20 to –15 dBm output power –47 dB, –15 to –4 dBm output power –45 dB, –4 to –2 dBm output power –43 dB, –2 to 0 dBm output power
	400 MHz BW	–39 dB, –20 to –18 dBm output power –40 dB, –18 to –14 dBm output power –42 dB, –14 to –2 dBm output power –40 dB, –2 to 0 dBm output power

[1]The S9100A Option 020 and S9100A Option 022 systems include both a Primary Transceiver (M9410A PXIe VXT) that generates a “Wanted” signal and a Secondary Transceiver (M9410A PXIe VXT) that generates a “Blocker” signal. EVM characteristics apply to the RF Output of the Primary Transceiver.

Adjacent Channel Leakage Ratio (ACLR)		
Test signal for FR1: 5G NR, 30 kHz subcarrier spacing, 256QAM, noise correction ON		
Test signal for FR2: 5G NR, 120 kHz subcarrier spacing, 256QAM, noise correction ON		
M1740A mmWave Connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	**24.25 to 29.5 GHz**	**ACLR**, typical
	100 MHz BW signal at 28 GHz	–44 dBc, –20 to –12 dBm output power –45 dBc, –12 to 5 dBm output power
	400 MHz BW signal at 28 GHz	–38 dBc, –20 to 5 dBm output power
	37 to 40 GHz	
	100 MHz BW	–45 dBc, –20 to –16 dBm output power –46 dBc, –16 to 0 dBm output power –45 dBc, 0 to 5 dBm output power
	400 MHz BW	–38 dBc, –20 to –18 dBm output power –39 dBc, –18 to 5 dBm output power
All S9100A Standard Configurations RF Transceiver Connectors RF Out ③ or RF Out ⑤[1]	**FR1 (Sub 6 GHz)**	**ACLR**, nominal
	100 MHz BW signal at 4 GHz	< –57 dBc at 0 dBm output power
	100 MHz BW signal at 5 GHz	< –55 dBc at 0 dBm output power
S9100A Option 007 or 022 w/ High IF RF Transceiver High IF Connectors RF Out ⑦	**6 to 12 GHz**	
	100 MHz BW	–47 dBc, –20 to –16 dBm output power –50 dBc, –16 to –4 dBm output power –43 dBc, –4 to 0 dBm output power
	400 MHz BW	–40 dBc, –20 to –12 dBm output power –45 dBc, –12 to –2 dBm output power –42 dBc, –2 to 0 dBm output power

[1] The S9100A Option 020 and S9100A Option 022 systems include both a Primary Transceiver (M9410A PXIe VXT) that generates a “Wanted” signal and a Secondary Transceiver (M9410A PXIe VXT) that generates a “Blocker” signal. ACLR characteristics apply to the RF Output of the Primary Transceiver.

General Performance

Environmental Characteristics		
S9100A[1]	• For indoor use only • Altitude up to 6,561.68 ft (2,000 m) • Operating Temperature 10 to 40° C, 5% to 85% (non-condensing) relative humidity.	
Power Requirements		
	Voltage & frequency	**Power consumption**
S9100A Base System[2]	100/120 V, 50/60 Hz 220/240 V, 50/60 Hz	1200 W Max (Lower range) 1300 W Max (Upper range)
M1740A	36 VDC	34 W
E7770A	100/120 V, 50/60 Hz 220/240 V, 50/60 Hz	480 W maximum
Size and Weights		
Dimensions		
S9100A Base System	Height: 192.4 mm (7.6 in); with feet removed Height: 197.8 mm (7.8 in); with feet installed Width: 449.5 mm (17.7 in); with rugged panel Depth: 568.9 mm (22.4 in); with rugged panel	
M1740A	Height: 66 mm (2.60 in) Width: 139 mm (5.47 in) Depth: 183 mm (7.20 in)	
E7770A	Height: 145.6 mm (5.7 in); with feet installed Width: 449 mm (17.7 in); across handles Depth: 424 mm (16.7 in); across front connectors and rear feet	
S9100A Rack Space	2 X 2U x 1 rack width	
Weight		
S9100A Base System	20.4 kg (45.0 lbs)	
M1740A	2.2 kg (4.85 lbs)	
E7770A E7770A Channel Card (IF In A & IF Out B)	18.1 kg (40 lbs) 19.0 kg (42 lbs) used w/ S9100A Option 007 or 022 configurations	
Remote programming		
Interface	LAN RJ-45	
Warranty		
Standard 1-year warranty		
Calibration Cycle		
The recommended calibration cycle is one year; calibration services are available through Keysight service centers.		

[1] Keysight S9100A 5G Multi-Band Vector Transceiver

[2] Keysight S9100A Base System is a PXIe chassis with modules, rugged panel, and cables

S9100A Base System[1] Front Panel (with Rugged Panel)

LAN, Display Port, and USB Connectors, M9037A PXIe Embedded Controller

LAN 1 and LAN 2 (TCP/IP Interface)	
Connectors	Two, 10/100/1000BASE-T (RJ-45) Gigabit Ethernet ports
Video/Dual Display Ports	
Connector	Two, Dual Mode DisplayPort++ connectors can support either a DisplayPort or DVI-D monitor
USB 2.0 ports	
Connectors	Four, USB 2.0 (Type A)
Connectors	Two, USB 3.0
Trig (PXI Trigger In/Out)	
Connector	SMB (m) snap-on, bi-directional trigger connector for routing an external trigger signal to/from PXI backplane
GPIB	
Connector	GPIB (Micro-D 25-pin)
PCIe	
Connector	x8 Gen 3 PCIe IPASS connector for controlling a second PXIe or AXIe chassis or RAID storage

Frequency Reference, 10 MHz Ref In/Out Connectors above the Rugged Front Panel

10 MHz Ref Out, Frequency Reference (Connects behind rugged panel from M9300A PXIe Reference 10 MHz Out.)	
Accuracy, aging rate, stability	Refer to M9300A PXIe reference specifications.
Recommended Calibration Cycle	1 year
Connector	BNC (f)
Amplitude	9.5 dBm, *nominal*
10 MHz Ref In (Connects behind rugged panel to M9300A PXIe Reference Ref In and locks to another reference with a value from 1 to 110 MHz.)	
Connector	BNC (f)
Frequency	1 MHz to 110 MHz, sine wave
Lock range	± 1 ppm, nominal
Input Amplitude	0 to 10 dBm, *nominal*
Impedance	50 Ω, nominal

[1] Keysight S9100A Base System is a PXIe chassis with modules, rugged panel, and cables

Transceiver Connectors, RF 380 MHz to 6 GHz on the Rugged Front Panel

RF Out	
Connector	Type-N (f), 50 Ω, nominal
Frequency Range	380 MHz to 6 GHz
Amplitude	0 VDC, +30 dBm Maximum Applied Reverse Input Power
RF In	
Connector	Type-N (f), 50 Ω, nominal
Frequency Range	380 MHz to 6 GHz
Amplitude	0 VDC, +27 dBm Maximum Safe Input Power
Trig 1 and Trig 2 (Input or Output, Selectable)	
Connector	SMA (f)
Input Impedance Input Level Range	1 k Ω or 50 Ω, nominal –3.3 V to +3.3 V
Output Impedance Output Level Range	50 Ω, nominal 3.3 V LVTTL
Half Duplex, Option HDX	
Connector	Type-N (f)
Frequency Range	380 MHz to 6 GHz
Amplitude	0 VDC, +30 dBm Maximum Safe Input Power

Transceiver Connectors, Head mmWave 24.25 to 43.5 GHz on the Rugged Front Panel

IF In	
Connector	Type-N (f), 50 Ω, nominal
Frequency Range	380 MHz to 6 GHz
Amplitude	± 10 VDC, +33 dBm Maximum
IF Out	
Connector	Type-N (f), 50 Ω, nominal
Frequency Range	380 MHz to 6 GHz
Amplitude	± 10 VDC, +33 dBm Maximum
LO/Pwr/Ctrl Out	
Connector	TNC (f)
Ch 1A In	
Connector	SMA (f)

Note

- IF In, IF Out, and LO/Pwr/Ctrl Out connect to the M1740A.
- Head 1 Ch 1A In connects to the LO/Ctrl/Pwr Output connector behind the rugged front panel.

M1740A mmWave Transceiver

RF Tx/Rx 1 and RF Tx/Rx 2	
Connector	2.4 mm (f), 50 Ω, nominal These ports can be configured either to supply a mmWave signal to a Device Under Test (DUT) or to receive a mmWave signal from a DUT.
Amplitude	15 VDC, +20 dBm Maximum Input

Note

Although the M1740A mmWave Transceiver is operational from 22.7 to 43.5 GHz, the performance information for the S9100A is only provided for the frequency bands called out in this Data Sheet.

LO/IF Out (In the S9100A configuration, this port is not used.)	
Connector	SMA (f), 50 Ω, nominal This port provides the IF output of the downconverter in the M1740A. This port also accepts an LO input to be used by the downconverter.
IF In/Out (In the S9100A configuration, this port is used as the IF output from the M1740A.)	
Connector	SMA (f), 50 Ω, nominal This port can be used either to accept an IF input to the upconverter in the M1740A or to provide the IF output of the downconverter in the M1740A.
IF frequency range	2.5 to 4 GHz
IF input power range	–20 to –30 dBm minimum, CW
IF output power range	–24 to –8 dBm, CW
IF In (In the S9100A configuration, this port is used as the IF input to the M1740A.)	
Connector	SMA (f), 50 Ω, nominal This port accepts an IF input to the upconverter in the M1740A.
IF frequency range IF input power range	2.5 to 4 GHz –20 to –30 dBm minimum, CW
LO/Pwr/Ctrl/IF In (In the S9100A configuration, this port is used as the power, control, and LO input to the M1740A.)	
Connector	SMA (f), 50 Ω, nominal This port accepts the following combined inputs: • An LO input to be used by the upconverter and/or downconverter in the M1740A. • A +36 VDC voltage input to power the M1740A. • A control signal to operate the M1740A. • This port can also accept an IF input to the upconverter in the M1740A, but this function is not used in the S9100A configuration.
LO frequency range LO power level	6 to 12 GHz –20 dBm, minimum
DC power	+36 VDC, 1A

Caution

Do not connect or disconnect the LO/Pwr/Ctrl cable, at either end, while the M1740A mmWave Transceiver is powered on.

E7770A Common Interface Unit (CIU) Front Panel and Rear Panel

Local Oscillator Card (LO Card), Connectors	
10 MHz In	BNC (f), 50 Ω, nominal
LO Aux Out	SMA (f), 50 Ω, nominal
Ref Out and CLK In	SMA (f), 50 Ω, nominal (Intended for future use.)
LO Out	SMA (f), 50 Ω, nominal
LO Distribution Card, Connectors	
LO In, LO In 2,	SMA (f), 50 Ω, nominal
LO Out 1, 2, 3, 4	SMA (f), 50 Ω, nominal
LO Aux 1, 2, 4, 4	SMA (f), 50 Ω, nominal
Channel Card - No DUT IF, Connectors	
LO In	SMA (f), 50 Ω, nominal
IF In A, IF Out A, IF In B, IF Out B	These connectors are not used in some S9100A configurations.
Channel Card - No DUT IF, Rear Panel Connectors	
LO/CTRL/PWR	TNC (f), 50 Ω, nominal: 6 to 12 GHz, 10 dBm minimum, +36 VDC, 1A
DUT IF IN and DUT IF OUT	These connectors are not used in some S9100A configurations.
Channel Card - S9100A Option 007 and Option 022 with High IF, Front Panel Connectors	
IF In A and IF Out B IF Out A and IF In B	Type-N (f), 50 Ω, nominal These two connectors are not used in S9100A Option 007 and 022 configurations.
Channel Card - S9100A Option 007 and Option 022 with High IF, Rear Panel Connectors	
LO/CTRL/PWR	TNC (f), 50 Ω, nominal: 6 to 12 GHz, 10 dBm minimum, +36 VDC, 1A
CHANNEL 1B, DUT IF IN and CHANNEL 1A, DUT IF OUT	Type-N (f) connectors are used in S9100A Option 007 and 022 configurations.

Related Literature

For more detailed product and specification information refer to the following literature and web pages:

- Keysight S9100A 5G Multi-Band Vector Transceiver, Startup Guide (literature no. S9100-90001)
- Keysight S9100A 5G Multi-Band Vector Transceiver, Configuration Guide (literature no. 5992-3562EN)
- Keysight M9019A PXIe 18 slot Chassis, Data Sheet (literature no. 5992-1481EN)
- Keysight M9037A PXIe High Performance Embedded Controller, Data Sheet (literature no. 5991-3661EN)
- Keysight M9410A and M9411A PXIe VXT Vector Transceivers, Data Sheet (literature no. 5992-3331EN)
- Keysight X-Series Measurement Applications, Brochure (literature no. 5989-8019EN)
- Keysight Signal Studio Software, Brochure (literature no. 5989-6448EN)

Web

Product page:

http://www.keysight.com/find/S9100A

Learn more at: www.keysight.com

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