

S9130A Performance 5G Multi-Band Vector Transceiver

380 MHz to 8 or 12 GHz and 24.25 to 43.5 GHz



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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 S9130A 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 45 minutes warm-up time, with the IQ Analyzer or X-Series application (e.g. 5G NR) running, and the M1741A 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 20 minutes of warm-up time after the system is powered back on.
- The alignments have been run in order of “Align Now All”, “Align IF Cable” and “Align RRH Amplitude” for the first use, after the warm-up period.
- The “Align Now All” alignments have been run after the warm-up period:
 - Within the previous 7 days
 - If the PXIe subsystem internal temperature has changed more than 5°C from the previous “Align Now All” alignments
- The alignments have been run in order of “Align Now All”, “Align IF Cable” and “Align RRH Amplitude”, after the warm-up period:
 - If more than 30 days have elapsed since the previous “Align IF Cable” or “Align RRH Amplitude” alignments
 - If the PXIe subsystem internal temperature has changed more than 5°C from the previous “Align IF Cable” or “Align RRH Amplitude” alignments
 - If IF cables have been disconnected, reconnected, moved or replaced

Characteristics

Notes

- The characteristics provided in this data sheet for operation at or below 8 or 12 GHz are a subset of the specifications for the Keysight M9415A PXIe VXT Vector Transceiver module. For the most recent detailed performance information, refer to the M9415A Data Sheet (literature no. 3120-1518.EN). Note that the performance characteristics in that data sheet apply at the input/output connectors of the M9415A module, but in the S9130A system, there is approximately 0.25 to 0.5 dB of insertion loss between the S9130A front panel connectors and the M9415A due to the M9155C switch module and cabling.
- The M9415A-001 in this S9130A 5G Multi-Band Vector Transceiver is configured with:
 - Option F08 (frequency range, 380 MHz to 8 GHz), or Option F12 (frequency range, 380 MHz to 12 GHz)
 - Option B12 (1.2 GHz bandwidth)
 - 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.
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.
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.

Recommended Best Practices

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

S9130A Standard Configurations

This data sheet contains system performance for the S9130A that is available in one standard configuration with multiple input and output connectors:

- Keysight S9130A-TR1 Performance 5G Multi-Band Vector Transceiver

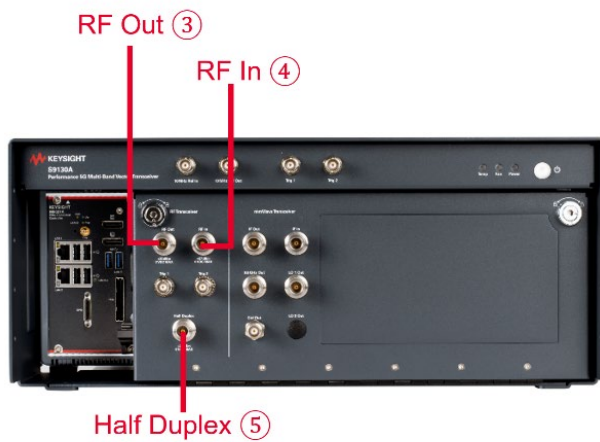
S9130A Connectors (Ports 1 to 5)

All S9130A-TR1 standard configurations have mmWave ports and RF ports:

- **M1741A mmWave Transceiver** has ports **RF Tx/Rx 1** ① and **RF Tx/Rx 2** ②
- **RF Transceiver** has ports **RF Out** ③, **RF In** ④ and **Half Duplex** ⑤

Output / Input ports	Requirements
RF Tx/Rx 1 ① RF Tx/Rx 2 ②	M1741A mmWave transceiver connector (RF Tx/Rx 1 & RF Tx/Rx 2)
RF Out ③ RF In ④	RF transceiver connectors (RF Out and RF In)
Half Duplex ⑤	RF transceiver connector (Half Duplex)

S9130A-TR1 Performance 5G Multi-Band Vector Transceiver



Vector Signal Analyzer (Rx) Performance

Performance		
Capture depth	512 MSa	
Frequency range		
M1741A mmWave connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.0 to 44.0 GHz, settable	
RF transceiver RF connector - RF In ④ - RF In ④ (Option FE1)	380 MHz to 8 GHz 380 MHz to 12 GHz	
Half Duplex connector - Half Duplex ⑤ (Option HD1) - Half Duplex ⑤ (Option HD1 and FE1)	380 MHz to 8 GHz 380 MHz to 12 GHz	
Frequency reference		
Accuracy, aging rate, stability	Refer to Timebase specifications	
Signal analysis bandwidth		
	Center frequency	Maximum bandwidth, nominal
M1741A mmWave connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.4 to 24.6 GHz 24.6 to 43.6 GHz	800 MHz 1.2 GHz
RF transceiver RF connector RF In ④	380 to 550 MHz	100 MHz
Half duplex connector Half duplex ⑤ (Option HD1)	550 MHz to 1.31 GHz	200 MHz
	1.31 to 2 GHz	600 MHz
RF transceiver RF connector RF In ④ (Option FE1)	2 to 8 GHz	1.2 GHz
	380 to 550 MHz	100 MHz
Half Duplex connector Half Duplex ⑤ (Option HD1 and FE1)	550 MHz to 1.31 GHz	200 MHz
	1.31 to 2 GHz	600 MHz
	2 to 12 GHz	1.2 GHz
Amplitude range		
	Frequency range	Settable input levelranges
M1741A mmWave connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.0 to 44.0 GHz	–70 dBm to +5 dBm
RF transceiver RF connector RF In ④	380 MHz to 8 GHz	–150 dBm to +27 dBm
RF transceiver RF connector RF In ④ (Option FE1)	380 MHz to 12 GHz	–150 dBm to +27 dBm
Half Duplex connector Half Duplex ⑤ (Option HD1)	380 MHz to 8 GHz	–150 dBm to +27 dBm
Half Duplex connector Half Duplex ⑤ (Option HD1 and FE1)	380 MHz to 12 GHz	–150 dBm to +27 dBm

Absolute amplitude accuracy (CW mode)

M1741A mmWave connectors

RF Tx/Rx 1 ①

RF Tx/Rx 2 ②

Frequency range	Level	Accuracy
24.0 to 44.0 GHz	−55 to −10 dBm	± 0.75 dB <i>typical</i>
	−10 to 0 dBm	± 0.85 dB, ± 0.35 dB <i>typical</i>

RF transceiver connector

RF In ④

RF In ④ (Option FE1)

Frequency range	−70 dBm ≤ Input level < +10 dBm	+10 dBm ≤ Input level ≤ +20 dBm	+20 dBm < Input level ≤ +27 dBm
380 MHz to 1.31 GHz	< ± 0.20 dB <i>typical</i>	< ± 0.30 dB <i>typical</i>	< ± 0.70 dB <i>typical</i>
1.31 to 4.3 GHz	< ± 0.25 dB <i>typical</i>	< ± 0.30 dB <i>typical</i>	< ± 0.65 dB <i>typical</i>
4.3 to 8.4 GHz	< ± 0.25 dB <i>typical</i>	< ± 0.25 dB <i>typical</i>	< ± 0.40 dB <i>typical</i>
8.4 to 11.4 GHz	< ± 0.30 dB <i>typical</i>	< ± 0.40 dB <i>typical</i>	< ± 0.50 dB <i>typical</i>
11.4 to 12 GHz	< ± 0.35 dB <i>typical</i>	< ± 0.45 dB <i>typical</i>	< ± 0.70 dB <i>typical</i>

Half Duplex connector

Half Duplex ⑤ (Option HD1)

Frequency range	−70 dBm ≤ Input level < +10 dBm	+10 dBm ≤ Input level ≤ +20 dBm	+20 dBm < Input level ≤ +27 dBm
380 MHz to 1.31 GHz	< ± 0.25 dB <i>typical</i>	< ± 0.30 dB <i>typical</i>	< ± 0.85 dB <i>typical</i>
1.31 to 4.3 GHz	< ± 0.25 dB <i>typical</i>	< ± 0.30 dB <i>typical</i>	< ± 0.80 dB <i>typical</i>
4.3 to 8.4 GHz	< ± 0.30 dB <i>typical</i>	< ± 0.30 dB <i>typical</i>	< ± 0.50 dB <i>typical</i>
8.4 to 11.4 GHz	< ± 0.40 dB <i>typical</i>	< ± 0.35 dB <i>typical</i>	< ± 0.55 dB <i>typical</i>
11.4 to 12 GHz	< ± 0.40 dB <i>typical</i>	< ± 0.45 dB <i>typical</i>	< ± 0.65 dB <i>typical</i>

IF Flatness

M1741A mmWave connectors ¹

- RF Tx/Rx 1 ① RF Tx/Rx 2 ②

Center frequency	200 MHz BW	400 MHz BW	800 MHz BW	1.2 GHz BW
24.6 to 43.6 GHz	± 0.80 dB typical	± 1.10 dB typical	± 1.25 dB typical	± 1.75 dB typical

RF transceiver connector

- -25 dBm $\leq$ Input level $\leq$ $+10$ dBm
 - RF In ④
 - RF In ④ (Option FE1)

Center frequency	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	± 0.50 dB typical	N/A	N/A	N/A	N/A	N/A
550 MHz to 1.31 GHz	± 0.35 dB typical	± 0.40 dB typical	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	± 0.35 dB typical	± 0.40 dB typical	± 0.70 dB typical	± 0.95 dB typical	N/A	N/A
1.62 to 2 GHz	± 0.35 dB typical	± 0.40 dB typical	± 0.30 dB typical	± 0.30 dB typical	N/A	N/A
2 to 3.5 GHz	± 0.15 dB typical	± 0.25 dB typical	± 0.30 dB typical	± 0.30 dB typical	± 0.25 dB typical	± 0.35 dB typical
3.5 to 4.3 GHz	± 0.20 dB typical	± 0.25 dB typical	± 0.40 dB typical	± 0.40 dB typical	± 0.40 dB typical	± 0.45 dB typical
4.3 to 12 GHz	± 0.50 dB typical	± 0.50 dB typical	± 0.65 dB typical	± 0.70 dB typical	± 0.70 dB typical	± 0.80 dB typical

Half Duplex connector

- -25 dBm $\leq$ Input level $\leq$ $+10$ dBm
 - Half Duplex ⑤ (Option HD1)

Center frequency	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	± 0.55 dB typical	N/A	N/A	N/A	N/A	N/A
550 MHz to 1.31 GHz	± 0.35 dB typical	± 0.40 dB typical	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	± 0.35 dB typical	± 0.40 dB typical	± 0.70 dB typical	± 0.95 dB typical	N/A	N/A
1.62 to 2 GHz	± 0.35 dB typical	± 0.40 dB typical	± 0.30 dB typical	± 0.30 dB typical	N/A	N/A
2 to 3.5 GHz	± 0.15 dB typical	± 0.25 dB typical	± 0.25 dB typical	± 0.25 dB typical	± 0.30 dB typical	± 0.35 dB typical
3.5 to 4.3 GHz	± 0.20 dB typical	± 0.20 dB typical	± 0.40 dB typical	± 0.40 dB typical	± 0.55 dB typical	± 0.80 dB typical
4.3 to 12 GHz	± 0.40 dB typical	± 0.50 dB typical	± 0.60 dB typical	± 0.70 dB typical	± 0.75 dB typical	± 0.80 dB typical

1. Performance can be improved at a specific frequency by performing an IF Flatness Calibration using the Keysight S9130A System Calibration software application.

Error Vector Magnitude (EVM)		
M1741A mmWave connectors		
• RF Tx/Rx 1 ① RF Tx/Rx 2 ②		
Test signal for FR1: 5G NR, 30 kHz subcarrier spacing, 256QAM		
Test signal for FR2: 5G NR, 120 kHz subcarrier spacing, 256QAM		
Measured in loopback, power level referred to source power, nominal		
24.5 to 43.5 GHz	100 MHz BW	≤ -42 dB, -35 to 5 dBm input power ≤ -37 dB, -40 to -35 dBm input power
	400 MHz BW	≤ -40 dB, -30 to 5 dBm input power ≤ -30 dB, -40 to -30 dBm input power
	8 x 100 MHz BW	≤ -37 dB, -30 to 5 dBm input power ≤ -27 dB, -40 to -30 dBm input power
RF transceiver RF connector		
• RF In ④		
• RF In ④ (Option FE1)		
Measured in loopback, at -5 dBm input power, nominal		
30 kHz SCS, 4 GHz, 100 MHz (256QAM)		0.23%
30 kHz SCS, 5 GHz, 100 MHz (256QAM)		0.27%
30 kHz SCS, 7 GHz, 100 MHz (256QAM)		0.28%
30 kHz SCS, 11 GHz, 100 MHz (256QAM)		0.35%
120 kHz SCS, 4 GHz, 200 MHz (256QAM)		0.28%
120 kHz SCS, 5 GHz, 200 MHz (256QAM)		0.36%
120 kHz SCS, 7 GHz, 200 MHz (256QAM)		0.35%
120 kHz SCS, 11 GHz, 200 MHz (256QAM)		0.41%
Measured in loopback, at -10 dBm input power, nominal		
120 kHz SCS, 4 GHz, 400 MHz (256QAM)		0.42%
120 kHz SCS, 5 GHz, 400 MHz (256QAM)		0.50%
120 kHz SCS, 7 GHz, 400 MHz (256QAM)		0.43%
120 kHz SCS, 11 GHz, 400 MHz (256QAM)		0.50%
120 kHz SCS, 7 GHz, 100 MHz 8CC (256QAM)		0.65%
120 kHz SCS, 11 GHz, 100 MHz 8CC (256QAM)		0.74%
Adjacent Channel Leakage Ration (ACLR)		
M1741A mmWave connectors		
• RF Tx/Rx 1 ① RF Tx/Rx 2 ②		
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		
Measured in loopback, power level referred to source power, nominal		
24.5 to 43.5 GHz	100 MHz BW	≤ -48 dBc, 2 to 5 dBm input power ≤ -51 dBc, -30 to 2 dBm input power ≤ -43 dBc, -40 to -30 dBm input power
	400 MHz BW	≤ -43 dBc, 2 to 5 dBm input power ≤ -45 dBc, -25 to 2 dBm input power ≤ -43 dBc, -35 to -25 dBm input power ≤ -38 dBc, -40 to -35 dBm input power
	8 x 100 MHz BW	≤ -42 dBc, -30 to 5 dBm input power ≤ -35 dBc, -40 to -30 dBm input power
RF transceiver RF connector		
• RF In ④		
• RF In ④ (Option FE1)		
RF input port, at -5 dBm input power, LNA off, noise correction ON, nominal		
30 kHz SCS, 4 GHz, 100 MHz (256QAM)		-67.0 dBc
30 kHz SCS, 5 GHz, 100 MHz (256QAM)		-66.0 dBc

Vector Signal Generator (Tx) Performance

Performance		
ARB Depth	512 MSa	
Frequency range		
M1741A mmWave connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.0 to 44.0 GHz, settable	
RF transceiver RF connector - RF Out ③ - RF Out ③ (Option FE1)	380 MHz to 8 GHz 380 MHz to 12 GHz	
Frequency reference		
Accuracy, aging rate, stability	Refer to Timebase specifications	
Signal generation bandwidth		
	Center frequency	Maximum bandwidth, nominal
M1741A mmWave connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.4 to 24.6 GHz 24.6 to 43.6 GHz	800 MHz 1.2 GHz
RF transceiver RF connector RF Out ③	380 to 550 MHz 550 MHz to 1.31 GHz	100 MHz 200 MHz
Half Duplex connector Half Duplex ⑤ (Option HD1)	1.31 to 2 GHz 2 to 8 GHz	600 MHz 1.2 GHz
RF transceiver RF connector RF Out ③ (Option FE1)	380 to 550 MHz 550 MHz to 1.31 GHz	100 MHz 200 MHz
Half Duplex connector Half Duplex ⑤ (Option HD1 and FE1)	1.31 to 2 GHz 2 to 12 GHz	600 MHz 1.2 GHz
Amplitude range		
	Frequency range	Settable output level range
M1741A mmWave connectors RF Tx/Rx 1 ① RF Tx/Rx 2 ②	24.0 to 44.0 GHz	CW: –70 dBm to +10 dBm Modulated: - Depends on the Crest Factor
RF transceiver RF connector - RF Out ③ - RF Out ③ (Option FE1)	380 MHz to 8 GHz 380 MHz to 12 GHz	CW: –120 dBm to +20 dBm Modulated: - Depends on the Crest Factor
Half Duplex connector - Half Duplex ⑤ (Option HD1) - Half Duplex ⑤ (Option HD1 and FE1) (configured to output mode)	380 MHz to 8 GHz 380 MHz to 12 GHz	CW: –120 dBm to +5 dBm

Absolute amplitude accuracy (CW mode)

M1741A mmWave connectors

- **RF Tx/Rx 1** ① **RF Tx/Rx 2** ②

Frequency range		Level		Accuracy		
24.0 to 44.0 GHz		−55 to −20 dBm −20 to +5 dBm		± 1.1 dB typical ± 1.1 dB, ± 0.5 dB typical		
RF transceiver RF connector						
• RF Out ③ • RF Out ③ (Option FE1)						
Frequency range	380 to 550 MHz	550 MHz to 4.3 GHz	4.3 to 6 GHz	6 to 7.8 GHz	7.8 to 10.2 GHz	10.2 to 12 GHz
+10 dBm < Level ≤ +20 dBm	< ± 0.25 dB typical	< ± 0.35 dB typical	< ± 0.45 dB typical	< ± 0.45 dB typical	< ± 0.45 dB typical	< ± 0.45 dB typical
+0 dBm < Level ≤ +10 dBm	< ± 0.25 dB typical	< ± 0.30 dB typical	< ± 0.40 dB typical	< ± 0.45 dB typical	< ± 0.35 dB typical	< ± 0.30 dB typical
−60 dBm ≤ Level ≤ +0 dBm	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.20 dB typical	< ± 0.25 dB typical	< ± 0.20 dB typical
−90 dBm ≤ Level < −60 dBm	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.35 dB typical	< ± 0.50 dB typical	< ± 0.35 dB typical	< ± 0.50 dB typical
−100 dBm ≤ Level < −90 dBm	< ± 0.35 dB typical	< ± 0.40 dB typical	< ± 0.30 dB typical	< ± 0.50 dB typical	< ± 0.35 dB typical	< ± 0.50 dB typical
−110 dBm ≤ Level < −100 dBm	< ± 0.45 dB typical	< ± 0.55 dB typical	< ± 0.50 dB typical	< ± 0.55 dB typical	< ± 0.45 dB typical	< ± 0.60 dB typical
Half Duplex connector						
• Half Duplex ⑤ (Option HD1)						
Frequency range	380 to 550 MHz	550 MHz to 4.3 GHz	4.3 to 6 GHz	6 to 7.8 GHz	7.8 to 10.2 GHz	10.2 to 12 GHz
+0 dBm < Level ≤ +10 dBm	< ± 0.20 dB typical	< ± 0.20 dB typical	< ± 0.30 dB typical	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.40 dB typical
−60 dBm ≤ Level ≤ +0 dBm	< ± 0.20 dB typical	< ± 0.25 dB typical	< ± 0.30 dB typical	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.30 dB typical
−90 dBm ≤ Level < −60 dBm	< ± 0.20 dB typical	< ± 0.25 dB typical	< ± 0.30 dB typical	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.25 dB typical
−100 dBm ≤ Level < −90 dBm	< ± 0.35 dB typical	< ± 0.35 dB typical	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.25 dB typical	< ± 0.30 dB typical
−110 dBm ≤ Level < −100 dBm	< ± 0.40 dB typical	< ± 0.55 dB typical	< ± 0.40 dB typical	< ± 0.40 dB typical	< ± 0.40 dB typical	< ± 0.50 dB typical

IF flatness, typical

M1741A mmWave connectors

- RF Tx/Rx 1 ① RF Tx/Rx 2 ②

Center frequency	200 MHz BW	400 MHz BW	800 MHz BW	1.2 GHz BW
24.6 to 43.6 GHz	$\pm 1.0 \text{ dB}$	$\pm 1.0 \text{ dB}$	$\pm 1.5 \text{ dB}$	$\pm 1.5 \text{ dB}$

RF transceiver RF connector

- $-30 \text{ dBm} \leq \text{Input level} \leq +20 \text{ dBm}$
 - RF Out ③
 - RF Out ③ (Option FE1)

Center frequency	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	$\pm 0.40 \text{ dB}$	N/A	N/A	N/A	N/A	N/A
550 to 680 MHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	N/A	N/A	N/A	N/A
680 to 730 MHz	$\pm 0.55 \text{ dB}$	$\pm 1.05 \text{ dB}$	N/A	N/A	N/A	N/A
730 MHz to 1.31 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	$\pm 0.55 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.70 \text{ dB}$	N/A	N/A
1.62 to 2 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.50 \text{ dB}$	N/A	N/A
2 to 3.5 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.40 \text{ dB}$	$\pm 0.60 \text{ dB}$
3.5 to 4.3 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	$\pm 0.85 \text{ dB}$	$\pm 1.00 \text{ dB}$	$\pm 1.00 \text{ dB}$	$\pm 1.00 \text{ dB}$
4.3 to 6 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.75 \text{ dB}$
6 to 9 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.55 \text{ dB}$
9 to 10.2 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	$\pm 0.55 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.80 \text{ dB}$	$\pm 1.10 \text{ dB}$
10.2 to 12 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.65 \text{ dB}$	$\pm 0.65 \text{ dB}$	$\pm 0.65 \text{ dB}$

Half Duplex connector

- $-20 \text{ dBm} \leq \text{Input level} \leq +10 \text{ dBm}$
 - Half Duplex ⑤ (Option HD1)

Center frequency	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	$\pm 0.40 \text{ dB}$	N/A	N/A	N/A	N/A	N/A
550 to 680 MHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	N/A	N/A	N/A	N/A
680 to 730 MHz	$\pm 0.55 \text{ dB}$	$\pm 1.00 \text{ dB}$	N/A	N/A	N/A	N/A
730 MHz to 1.31 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.70 \text{ dB}$	N/A	N/A
1.62 to 2 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	N/A	N/A
2 to 3.5 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.40 \text{ dB}$	$\pm 0.45 \text{ dB}$
3.5 to 4.3 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.65 \text{ dB}$	$\pm 0.70 \text{ dB}$	$\pm 0.70 \text{ dB}$
4.3 to 6 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.75 \text{ dB}$
6 to 9 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$
9 to 10.2 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.65 \text{ dB}$	$\pm 0.90 \text{ dB}$
10.2 to 12 GHz	$\pm 0.40 \text{ dB}$	$\pm 0.50 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.60 \text{ dB}$	$\pm 0.65 \text{ dB}$	$\pm 0.65 \text{ dB}$

Error Vector Magnitude (EVM)		
M1741A mmWave connectors		
RF Tx/Rx 1 ① RF Tx/Rx 2 ②		
Test signal for FR1: 5G NR, 30 kHz subcarrier spacing, 256QAM		
Test signal for FR2: 5G NR, 120 kHz subcarrier spacing, 256QAM		
Measured in loopback, power level referred to source power, <i>nominal</i>		
24.5 to 43.5 GHz	100 MHz BW	≤ -42 dB, -35 to 5 dBm input power ≤ -37 dB, -40 to -35 dBm input power
	400 MHz BW	≤ -40 dB, -30 to 5 dBm input power ≤ -30 dB, -40 to -30 dBm input power
	8 x 100 MHz BW	≤ -37 dB, -30 to 5 dBm input power ≤ -27 dB, -40 to -30 dBm input power
RF transceiver RF connector		
- RF Out ③ - RF Out ③ (Option FE1)		
Measured in loopback, at -5 dBm input power, <i>nominal</i>		
30 kHz SCS, 4 GHz, 100 MHz (256QAM)		0.23%
30 kHz SCS, 5 GHz, 100 MHz (256QAM)		0.27%
30 kHz SCS, 7 GHz, 100 MHz (256QAM)		0.28%
30 kHz SCS, 11 GHz, 100 MHz (256QAM)		0.35%
120 kHz SCS, 4 GHz, 200 MHz (256QAM)		0.28%
120 kHz SCS, 5 GHz, 200 MHz (256QAM)		0.36%
120 kHz SCS, 7 GHz, 200 MHz (256QAM)		0.35%
120 kHz SCS, 11 GHz, 200 MHz (256QAM)		0.41%
Measured in loopback, at -10 dBm input power, <i>nominal</i>		
120 kHz SCS, 4 GHz, 400 MHz (256QAM)		0.42%
120 kHz SCS, 5 GHz, 400 MHz (256QAM)		0.50%
120 kHz SCS, 7 GHz, 400 MHz (256QAM)		0.43%
120 kHz SCS, 11 GHz, 400 MHz (256QAM)		0.50%
120 kHz SCS, 7 GHz, 100 MHz 8CC (256QAM)		0.65%
120 kHz SCS, 11 GHz, 100 MHz 8CC (256QAM)		0.74%

Adjacent Channel Leakage Ratio (ACLR)		
M1741A mmWave connectors		
RF Tx/Rx 1 ① RF Tx/Rx 2 ②		
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		
Measured in loopback, power level referred to source power, <i>nominal</i>		
24.5 to 43.5 GHz	100 MHz BW	≤ -48 dBc, 2 to 5 dBm input power ≤ -51 dBc, -30 to 2 dBm input power ≤ -43 dBc, -40 to -30 dBm input power
	400 MHz BW	≤ -43 dBc, 2 to 5 dBm input power ≤ -45 dBc, -25 to 2 dBm input power ≤ -43 dBc, -35 to -25 dBm input power ≤ -38 dBc, -40 to -35 dBm input power
	8 x 100 MHz BW	≤ -42 dBc, -30 to 5 dBm input power ≤ -35 dBc, -40 to -30 dBm input power
RF transceiver RF connector		
- RF Out ③ - RF Out ③ (Option FE1)		
RF output port, at -10 dBm output power, <i>nominal</i>		
30 kHz SCS, 4 GHz, 100 MHz (256QAM)		-60.5 dBc
30 kHz SCS, 5 GHz, 100 MHz (256QAM)		-57.5 dBc
30 kHz SCS, 7 GHz, 100 MHz (256QAM)		-58.0 dBc
30 kHz SCS, 11 GHz, 100 MHz (256QAM)		-56.0 dBc
120 kHz SCS, 4 GHz, 200 MHz (256QAM)		-58.0 dBc
120 kHz SCS, 5 GHz, 200 MHz (256QAM)		-54.0 dBc
120 kHz SCS, 7 GHz, 200 MHz (256QAM)		-56.5 dBc
120 kHz SCS, 11 GHz, 200 MHz (256QAM)		-54.5 dBc
120 kHz SCS, 4 GHz, 400 MHz (256QAM)		-54.0 dBc
120 kHz SCS, 5 GHz, 400 MHz (256QAM)		-51.0 dBc
120 kHz SCS, 7 GHz, 400 MHz (256QAM)		-52.0 dBc
120 kHz SCS, 11 GHz, 400 MHz (256QAM)		-52.0 dBc
120 kHz SCS, 7 GHz, 100 MHz 8CC (256QAM)		-50.5 dBc
120 kHz SCS, 11 GHz, 100 MHz 8CC (256QAM)		-49.0 dBc

Timebase Performance

Frequency reference		
Accuracy		$\pm$ [(time since last adjustment $\times$ aging rate) + temperature stability + calibration accuracy]
Aging rate	Daily	$< \pm 0.5$ ppb/day, after 72-hour warm-up
	Yearly	$< \pm 0.1$ ppm/year, after 72-hour warm-up
	Total 2 years	$< \pm 0.15$ ppm/2 years, after 72-hour warm-up
Temperature effects	20 to 30 °C	$< \pm 10$ ppb
Initial achievable calibration accuracy		$\pm 5 \times 10^{-8}$

General Performance

Environmental characteristics		
S9130A ¹	For indoor use only	
	Altitude up to 6,561.68 ft (2,000 m)	
	Operating temperature 20 to 30 °C	
	Maximum relative humidity (non-condensing): 85% RH	
Power requirements		
	Voltage and frequency	Power consumption
S9130A PXIe subsystem ²	100/120 V, 50/60 Hz	485 W typical, 1200 W max (Lower range)
	220/240 V, 50/60 Hz	465 W typical, 1300 W Max (Upper range)
M1741A	19 VDC	95 W typical
M1741A via 0950-6166 AC/DC adapter	100/120 V, 50/60 Hz	100 W typical
	220/240 V, 50/60 Hz	105 W typical
Size and weights		
Dimensions		
S9130A base system	Height: 197.8 mm (7.79 in); with feet installed	
	Width: 449.5 mm (17.70 in); with rugged panel	
	Depth: 568.9 mm (22.40 in); with rugged panel (from back bumper to front BNC)	
M1741A	Height: 70 mm (2.76 in)	
	Width: 175 mm (6.89 in)	
	Depth: 345 mm (13.58 in)	
S9130A rack space	2 X 2U x 1 rack width	
Weight		
S9130A base system	22.68 kg (50.0 lbs)	
M1741A	3.5 kg (7.7 lbs)	
Remote programming		
Interface	LAN RJ-45	
Calibration cycle		
The recommended calibration cycle is one year		

1. Keysight S9130A Performance 5G Multi-Band Vector Transceiver.

2. Keysight S9130A PXIe subsystem is a PXIe chassis with modules, rugged panel, and cables.

Connectors, M9037A PXIe Embedded Controller

LAN 1 and LAN 2	
Two, 10/100/1000BASE-T (RJ-45) Gigabit Ethernet ports	
Video/Dual display ports	
Two, Dual Mode DisplayPort++ connectors can support either a DisplayPort or DVI-D monitor	
USB 2.0 and 3.0	
Four, USB 2.0 (Type A)	
Two, USB 3.0 (Type A)	
Trig (PXI trigger In/Out)	
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

S9130A PXIe Subsystem ¹ Front Panel (with Rugged Panel)

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

10 MHz Ref Out (Connects behind rugged panel from M9480A reference 10 MHz Out)	
Accuracy, aging rate, stability	Refer to Timebase specifications
Recommended Calibration Cycle	1 year
Connector	BNC (f)
Amplitude	13 dBm, <i>typical</i>
10 MHz Ref In (Connects behind rugged panel to M9480A reference Ref In)	
Connector	BNC (f)
Frequency	10 MHz or 100 MHz
Lock range	± 0.6 ppm, <i>nominal</i>
Input amplitude	–3 to 20 dBm, <i>nominal</i>
Impedance	50 Ω , <i>nominal</i>

Trig 1 and Trig 2 Connectors above the Rugged Front Panel

Trig 1 and Trig 2 (Connects behind rugged panel to M9019A PXIe chassis Trig 1 and Trig 2)	
Connector	BNC (f)
Direction control	Input or output (configurable)
Output level	3.3 V CMOS (TTL compatible, 5 V tolerant)
Output impedance	50 Ω <i>typical</i>
Output trigger source	PXI_Trig0 - PXI_Trig7 (Segment 2 or 3)
Input level	3.3 V CMOS (TTL compatible, 5 V tolerant)
Input impedance	3 k Ω <i>typical</i>
Input trigger destination	PXI_Trig0 - PXI_Trig7 (Segment 2 or 3)
Input threshold	1.65 V <i>typical</i>
Minimum swing	250 mV <i>typical</i>
Minimum pulse width	100 ns <i>typical</i>

Note: These two front panel trigger connectors (Trig 1 and Trig 2) above the rugged front panel connect to the PXI [0:7] backplane trigger bus in the M9019A chassis and can be configured as Input or Output. To learn more about these connectors, see the [Keysight PXIe Chassis Family, User Guide \(M9019-90003\)](#).

1. Keysight S9130A PXIe Subsystem is a PXIe chassis with modules, rugged panel, and cables.

Connectors, RF Transceiver on the Rugged Front Panel

RF In	
Connector	Type-N (f), 50 Ω , <i>nominal</i>
Frequency range	380 MHz to 8 GHz
	380 MHz to 12 GHz (Option FE1)
Amplitude	0 VDC, +27 dBm maximum safe input power
RF Out	
Connector	Type-N (f), 50 Ω , <i>nominal</i>
Frequency range	380 MHz to 8 GHz
	380 MHz to 12 GHz (Option FE1)
Amplitude	0 VDC, +30 dBm maximum applied reverse input power
Half Duplex, Option HD1	
Connector	Type-N (f)
Frequency range	380 MHz to 8 GHz
	380 MHz to 12 GHz (Option FE1)
Amplitude	0 VDC, +30 dBm maximum safe input power

Connectors, mmWave Transceiver on the Rugged Front Panel

IF In	
Connector	Type-N (f), 50 Ω , <i>nominal</i>
Frequency range	2.3 GHz to 4.1 GHz
Amplitude	0 VDC, +20 dBm maximum
IF Out	
Connector	Type-N (f), 50 Ω , <i>nominal</i>
Frequency range	2.3 GHz to 4.1 GHz
Amplitude	0 VDC, -10 dBm <i>typical</i> , +7 dBm maximum
Ctrl Out	
Connector	TNC (f)
Frequency range	300 MHz to 1 GHz
Amplitude	+36 VDC, -10 dBm maximum
LO 1 Out	
Connector	Type-N (f), 50 Ω , <i>nominal</i>
Frequency range	2 GHz to 12 GHz
Amplitude	-3 dBm <i>typical</i> , +15 dBm maximum
9.6 GHz Out	
Connector	Type-N (f), 50 Ω , <i>nominal</i>
Frequency	9.6 GHz
Amplitude	+12 dBm <i>typical</i>

Note: IF In, IF Out, and LO/9.6 GHz/Ctrl Out connect to the M1741A IF Side.

M1741A mmWave Transceiver

RF Tx/Rx 1 and RF Tx/Rx 2	
Connector	2.4 mm (f), 50 Ω , <i>nominal</i> 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	0 VDC, +20 dBm maximum input
Cal	
Connector	2.4 mm (f), 50 Ω , <i>nominal</i> This port provides a switched output from RF level detectors within the M1741A. It is used during the calibration process.
LO In	
Connector	3.5 mm (f), 50 Ω , <i>nominal</i> This port accepts a variable-frequency input from the LO Out connector on the front panel.
Frequency range	2 GHz to 12 GHz
Input amplitude	–1 dBm <i>typical</i> , 10 dBm maximum
Rx IF Out	
Connector	SMA (f), 50 Ω , <i>nominal</i> This port provides an IF output from the receiver downconverter. The input is furnished to the Rx IF In connector on the front panel.
Frequency range	2.3 GHz to 4.1 GHz
Output amplitude	0 dBm <i>typical</i> , CW
Tx IF In	
Connector	SMA (f), 50 Ω , <i>nominal</i> This port accepts an IF input to the transmitter upconverter. The input is received from the Tx/IF Out connector on the front panel.
Frequency range	2.3 GHz to 4.1 GHz
Input amplitude	–13 dBm <i>typical</i> , CW
9.6 GHz In	
Connector	3.5 mm (f), 50 Ω , <i>nominal</i> This port accepts a fixed-frequency input from the 9.6 GHz Out connector on the front panel.
Frequency	9.6 GHz
Input amplitude	+8 dBm <i>typical</i> , +18 dBm maximum
9.6 GHz Out	
Connector	3.5 mm (f), 50 Ω , <i>nominal</i> This port provides an output of the same signal which is received at the 9.6 GHz In port. It can be used in synchronizing other equipment.
Frequency	9.6 GHz
Output amplitude	+15 dBm <i>typical</i>
Power	
Connector	This 4-pin connector accepts a 19-volt DC power input from the AC/DC converter accessory.
Voltage	19 VDC <i>nominal</i>
Current	6 Amps maximum

Related Literature

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

- Keysight S9130A Performance 5G Multi-Band Vector Transceiver, Getting Started Guide
(literature no. [S9130-90001](#))
- Keysight S9130A Performance 5G Multi-Band Vector Transceiver, Configuration Guide
(literature no. [3120-1470EN](#))
- Keysight M9019A PXle 18 slot Chassis, Data Sheet
(literature no. [5992-1481EN](#))
- Keysight M9037A PXle High Performance Embedded Controller, Data Sheet
(literature no. [5991-3661EN](#))
- Keysight M9415A Performance PXle VXT Vector Transceivers, Data Sheet
(literature no. [3120-1518EN](#))
- 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/S9130A>

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

