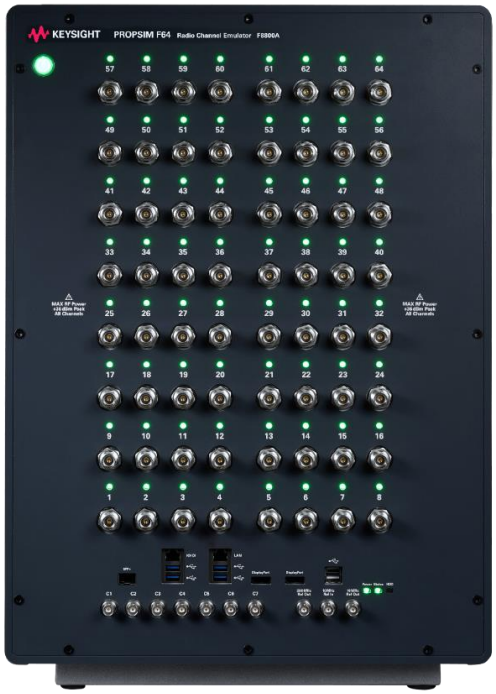
DATA SHEET

PROPSIM F64

Radio Channel Emulator F8800A



Industry-leading mobile device, modem and network equipment manufacturers use Keysight's PROPSIM F64 radio channel emulator to

- Integrate new 5G NR and 4G LTE product features
- Verify new hardware and software releases in a 24/7 automated test environment

Tier-1 mobile operators use PROPSIM F64 to validate 5G NR and LTE-A devices and base stations.

Unique capabilities in PROPSIM F64 enable users to validate a wide range of RF and mmWave applications in the aerospace, avionics, satellite and defense industries.

End-to-End Real-World Performance Testing in the Lab

PROPSIM F64 is a versatile multi-channel radio channel emulation solution that enables users to emulate field test conditions in a laboratory environment for software and hardware testing of radio network systems, mobile devices, WLAN, MESH/MANET type of radios, satellites and RF sensor systems.

It is used to perform wireless industry benchmarking of devices and base stations across the entire product creation workflow – from research, development, to acceptance and field performance optimization.

KEYSIGHT TECHNOLOGIES

The PROPSIM F64 emulates dynamic radio channels between transmitters and receivers and is thus independent of system technology or signal modulations. Its capabilities are designed for end-to-end realistic and repeatable real-world performance testing of 5G multi-mode devices and base stations in the laboratory to accelerate successful 5G rollouts.

Key capabilities and features (standard and optional)

Capability/Feature	
RF ports in single F8800A	With F8800ARF1 channel units: Up to 64 TRX ports N-female connectors. Shipping 8, 16, 24, 32, 40, 48, 56, 64 TRX port configurations. Bidirectional and unidirectional fading supported
	With F8800ARF2 channel units: Up to 64(T)RX+64TX SMA-female connectors. Flexible configurations with software up to • 64 bidirectional TRX ports or • 64 unidirectional TX & RX ports Shipping 8, 16, 24, 32, 40, 48, 56, 64 (T)RX+RX port configurations
MIMO fading channels	Up to 1024 digital channels in single F8800A unit
	Up to 4096 digital channels in four (4) F8800A unit setup
MIMO and massive MIMO emulation	Single unit:
	• MIMO multiple 2x2bi, 4x2bi, 4x4bi, 8x2bi, 8x4bi, 8x8bi
	• **Full Antenna Array Sampling** Massive MIMO testing 16x8bi 16x16bi, 32x16bi for complete base station MU- MIMO TM9 UE feedback and uplink SRS based massive MIMO scheduler/beamformer testing
	• **Simplified Antenna Array Sampling** Massive MIMO testing with external antenna interface unit or RF phase shifter matrix. Multi-User, Multi-RAT and Handover mobility focused UE and base station testing. Antenna Array column/row combination and Virtual Probe/Key-hole-channel emulation configurations are supported.
	Multiple unit:
	• **Full Antenna Array Sampling** 64x4bi, 64x8bi, 64x16bi, 128x4bi, 128x8bi, 128x16bi
MESH and MANET emulation	Up to 64 radios
Frequency range	F8800ARF1: 450 MHz to 6 GHz
	F8800ARF2: 3 MHz to 6 GHz
	With E7770A: 6 GHz to 12 GHz
	With M1740A: 24.25 GHz to 29.5 GHz, 37 GHz to 43.5 GHz
Connectivity Options	RF cabled connectivity
	Over the Air (OTA) connectivity chambers

Instantaneous signal BW	40/100/160 MHz. With F8800ACE1 40/125MHz
	EXT-BW 300 MHz. With F8800ACE1 250MHz
	EXT-BW 450 MHz. With F8800ACE1 375MHz
	EXT-BW 600 MHz. With F8800ACE1 500MHz
EXT-BW operation is not specified below 450MHz	EXT-BW 900 MHz. With F8800ACE1 750MHz
	EXT-BW 1200 MHz. With F8800ACE1 1000MHz
LTE/5G NR Carrier Aggregation support	Contiguous up to 1200 MHz (TDD or FDD)
	Non-contiguous up to 32 CA bands
Independent RF local oscillators in single F8800A	Up to 32
Frequency conversion e.g. from band A to band B	Yes. Requires minimum two RFLOs
Internal RF band combination into single RF TRX port above 450 MHz	Up to 8 RF bands. Removes need to use external RF plumbing in typical lab setups
Fading paths per fading channel	Up to 48
Minimum delay	2.5 µs
Maximum delay	1000 ms [1)]
Doppler emulation	Up to ± 1.5 MHz [1)]
Test setup calibration	Integrated test setup amplitude and phase calibration
	No need for external VNA instrument
Programmable and synchronous Interference sources	CW and AWGN
	LTE[1)] and NR[1)] waveforms
IQ data recording	Simultaneous uplink and downlink IQ data capturing [1)]
Automatic input level setting	Continuous and RF burst- triggering input power measurements
Uplink and downlink separation	Integrated uplink and downlink separation
User definable input/ output ports	User-defined active connector settings
Remote control	ATE SCPI commands. PROPSIM plugin for The Keysight Test Automation on PathWave (TAP)
	Ethernet
Other interfaces	10 MHz reference IN and OUT
	HW trigger port for emulation start/stop
	Synchronization ports for multiple PROPSIM hardware units

PROPSIM software and channel models	PROPSIM Standard Tools software includes
	• 3GPP 5G NR TDL channel models for FR1 and FR2 testing
	• LTE, WCDMA, GSM and Static Butler
	PROPSIM GCM 5G Tool software
	• 3GPP TR38.901, TR36.873, WINNER and SCME
	• Ray-tracing data import
	• 3D Antenna pattern inclusion in to channel model
	• Custom test topology creation for massive MIMO, Device-to-Device (D2D), Vehicle-to-everything (V2X)
	• MIMO OTA channel models (CTIA/3GPP/CCSA). RTS MIMO OTA
	PROPSIM WLAN Tool software includes 802.11n/ac/ax channel models
	VDT Toolset for 5G NR, LTE, WCDMA, GSM and WLAN
	High-Speed Train channel model pack (mobile network operator test plan)
	Massive MIMO BTS channel model pack (mobile network operator test plan)
	Aerospace Modeling Tool
Fast fading profiles	**PROPSIM Standard Tools software:** Constant, Rayleigh, Rice, Nakagami, Lognormal, Suzuki, Pure Doppler, flat, rounded, Gaussian, Jakes, Butterworth, user-defined, and CIR data from 3rd party simulation tools
	Each digital channel can be set for independent fading profile (delay, doppler, amplitude, correlation)
Pathloss/Shadowing	PROPSIM Standard Tools software with Shadowing option
	• Each TRX channel independently, 100 dB dynamic range
	• Each digital fading channel independently, 60 dB dynamic range
Delay profiles	**PROPSIM Standard Tools software:** Constant, sliding delay, 3GPP birth-death, 3GPP sliding delay group, user- defined, delay profiles from 3rd party simulation tools, ray-tracing applications
	Each digital fading channel has independent delay setting

1) Planned capability in future software release, may require additional option/license for operation.

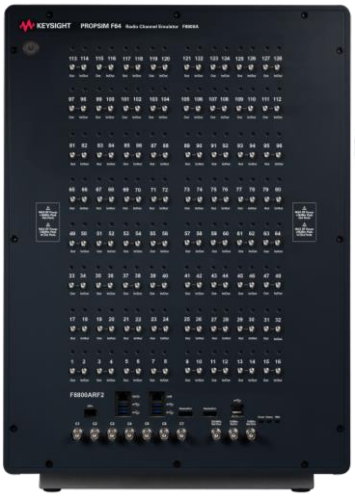
RF Characteristics

F8800ARF1: RF levels and linearity across 450 MHz to 6 GHz with 160 MHz BW signal. Typical values.	
RF input level	+35 dBm, peak
RF output level	+5 dBm, peak
RF input/output resolution	0.1 dB
RF output gain setting range	+5…-100 dB
RF output level accuracy	< ±0.5 dB
Output noise floor (output level ≤ –40 dBm)	< -168 dBm/Hz
EVM	< -45 dB RMS, 5G NR 100 MHz, 256 QAM, 3.5 GHz
	< -45 dB RMS, 802.11ax 160 MHz, 1024 QAM, 5.9 GHz
Crosstalk between TRX ports	< -100 dB
VSWR all RF ports	450 MHz to 700 MHz < 1.5
	700 MHz to 2 GHz < 1.3
	2 GHz to 6 GHz < 1.5

F8800ARF2: RF levels and linearity across 3 MHz to 6 GHz with 160 MHz BW signal. Typical values.	
RF input level	+35 dBm, peak +15 dBm, peak below 100 MHz
RF output level	TRX port +5 dBm, peak TX port +15 dBm, peak
RF input/output resolution	0.1 dB
RF output gain setting range	TRX port +5…-100 dB TX port +15…-100 dB
RF output level accuracy	< ± 0.5 dB, at center frequency
Output noise floor (output level ≤ –40 dBm)	< -168 dBm/Hz < -155 dBm/Hz below 30 MHz
EVM	< -50 dB RMS, 5G NR 100 MHz, 256 QAM, 3.5 GHz
	< -50 dB RMS, 802.11ax 160 MHz, 1024 QAM, 5.9 GHz
	< -43 dB RMS, 20 MHz 64 QAM, 100 MHz
Crosstalk between TRX/TX ports	< -100 dB
VSWR all RF ports	3 MHz to 700 MHz < 1.8
	700 MHz to 2 GHz < 1.3
	2 GHz to 6 GHz < 1.5

RF Channel Unit options for F8800A

F880ARF1 RF channel units



F8800ARF2 RF channel units

Ordering Information

Product	Description
F8800A-xxx, F8800ARFx	PROPSIM F64 Hardware configurations and options
F8800Axxx	PROPSIM Standard Tools Software applications and options
F8800ACE1	Aerospace emulation option
F9860Axxx	Geometric Channel Modeling Tool and options
F9870Axxx	WLAN 802.11ax/ac software tool and options
F9340Axxx	Virtual Drive Testing Toolset (field-to-lab) and options.
F9809A	MIMO OTA Test Model pack
F9510A	Massive MIMO Antenna Interfacing Unit

For detailed product configuration items and product support services please contact your sales representative for options and pricing.

Keysight 5G Solutions

Keysight's industry-first 5G end-to-end design and test solutions enable the mobile industry to accelerate 5G product design development from the physical layer to the application layer and across the entire workflow from simulation, design, and verification to manufacturing, deployment, and optimization.

Keysight offers common software and hardware platforms compliant to the latest 3GPP standards, enabling the ecosystem to quickly and accurately validate 5G chipsets, devices, base stations and networks, as well as emulate subscriber behavior scenarios. Additional information about Keysight's 5G solutions is available at www.keysight.com/find/5G.

- For more information about Keysight's PathWave, visit www.keysight.com/find/pathwave.
- For more information on the M1740A mmWave transceiver, visit www.keysight.com/find/m1740a.
- For more information on the E7770A CIU, visit www.keysight.com/find/e7770a.

Keysight's 5G Network Emulation Solutions leverage the E7515B UXM 5G Wireless Test Platform (www.keysight.com/find/e7515b) and include:

- 5G Protocol R&D Toolset: www.keysight.com/find/5g-protocol
- 5G Protocol Conformance Toolset: www.keysight.com/find/5g-protocol-conformance
- 5G RF/RRM Conformance Toolset: www.keysight.com/find/5g-rf-conformance

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

KEYSIGHT TECHNOLOGIES