# Keysight Technologies
## Propsim F8 Channel Emulator

Data Sheet



Versatile Channel Emulator for
Advanced Performance Testing

*The industry standard MIMO channel emulator for WLAN 802.11ac chipset research and design verification, supporting up to 160 MHz signal bandwidth with MU-MIMO and 3D beamforming.*

## Manufacturers of wireless devices, chipsets and systems use Propsim F8 to:

– Verify WLAN 802.11 chipset and device performance
– Quickly test multi-link airborne, aerospace and satellite radio performance
– Evaluate wireless research and technology programs (e.g. LTE-A and 5G)
– Perform LTE-A base station testing with real devices
– Enhance LTE-A multi-mode device and chipset development with real base station functionality
– Improve over-the-air (OTA) testing of wireless devices

## Propsim F8 offers unrivalled RF channel emulation capabilities and accuracy:

– Enables the most accurate signal fading processing in terms of time, phase and amplitude
– Exceeds the linearity requirements for 256/1024 QAM and 160 MHz signals in MIMO topology
– Supports up to 8x8 full MIMO/mesh topology (64 internal channels)
– Supports a wide range of LTE-Advanced scenarios including CA schemes, CoMP, HetNet, Hi-order MIMO, 3D beamforming and more
– Performs ultra-wideband signal (>1 GHz instantaneous signals) testing using Keysight patented RF channel combination technology
– Supports 5G radio channel models defined in 3GPP TR38.900 and 5G METIS research program, enabling research labs to start early experimental testing of 5G physical layer technologies at mmW bands (requires external mmW band UC/DC hardware)

## Easy operation across a vast range of functions via GUI or Automation API:

– Includes wizard with guided steps for simple test scenario creation and editing
– Offers built-in input power measurement
– Provides fully automated phase and amplitude calibration without a vector network analyzer
– Automated 24/7 testing and ATE remote control interface for GPIB and LAN enable unattended, cost-effective and quick test case execution
– Compatible with other Propsim products test automation interface enabling smooth and convenient transfer or share of test automation scripts

## Industry leading intuitive channel modeling tools:

– Propsim WLAN tool for design and verification of MIMO performance and interoperability of WLAN products
– Propsim Geometric Channel Modeling tool (GCM) enables easy multi-link test scenario definition based on SCME, WINNER models to test MU-MIMO, beamforming, smart antennas, CoMP, carrier aggregation, HetNet and multi-RAT performance and interoperability testing of real devices and real base stations
– Propsim MIMO OTA modeling tools compatible with CTIA/3GPP/CCSA test plans (and beyond) enable easy benchmarking of off-the-shelf devices in anechoic chamber installations
– Propsim Aerospace Modeling tool for testing airborne, aerospace and satellite radio communication devices and systems

# Specifications

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| RF interface channel configurations | 2, 4, 6 or 8 |
| MIMO emulation | 2x2, 4x2, 4x4, 8x2, 8x4 up to 8x8 |
| MANET emulation | up to eight radios in full mesh topology |
| Multi emulator synchronization | up to 6 units |
| RF interface channel frequency range | 220 to 6000 MHz |
| RF interface channel signal bandwidth | up to 160 MHz |
| Number of fading paths per RF interface channel (in terrestrial channel emulation mode) | up to 48 |
| Number of fading channels. All independently controllable via GUI for fading, Doppler, path amplitude and path phase offset | up to 64 |
| Internal interference generators | AWGN, CW |
| Satellite or any flying object maximum Doppler shift in aerospace channel emulation mode (for each path independently) | up to 1.5 MHz |
| Excess delay range for terrestrial channel emulation | up to 3000 µs |
| Excess delay range for aerospace channel emulation mode | up to 1.3 s |
| Bi-directional emulation | Flexible and reliable duplex separation provided with interfacing unit |
| Number of integrated RF local oscillators | up to 4 internal and 4 external carrier frequencies (in total up to 8) |
| Input power measurement | Automatic input level setting |
| Input power meter modes | Continuous and RF burst-triggering |
| ATE control interface for easy test case automation | |
| Integrated phase and amplitude calibration | |
| Fully automatic phase and amplitude calibration with Keysight ACU external hardware unit (no need for VNA) | |
| User defined active RF connector setting simplifies switching between test cases in automated tests | |

# RF Performance

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| RF input range @ 20 MHz BW | – 55 - 0 dBm (CF 6 dB, SNR >35 dB) – 30 - 0 dB (CF 6 dB, SNR >60 dB, full range) |
| RF output level range | – 116 to –16 dBm (RMS, CF 6 dB) |
| Peak output level | max. 0 dBm |
| RF output level setting resolution | 0.1 dB |
| Digital fading channel dynamics | 60 dB |
| Noise floor | – 171 dBm/Hz (output RMS level < –40 dBm) |
| EVM performance typical, RMS | WCDMA 3.84 MHz BW < –48 dB OFDMA 20 MHz BW < –45 dB OFDMA 160 MHz BW < -40 dB |

# Channel Modeling

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| Standard channel models | 3GPP LTE, WCDMA, GSM, 3GPP2 (IS-54, IS 95), TETRA, ITU 3G, WLAN, DVB-T/H |
| Optional channel models | LTE Advanced evaluation models, IMT-Advanced models, SCM, SCME models, WINNER, WINNER+, TD-LTE, IEE802.11 WLAN models |
| Fading profiles | Constant, Rayleigh, Rice, Nakagami, Lognormal, Suzuki, Pure Doppler, flat, rounded, Gaussian, Jakes, Butterworth, user-defined profiles, models from 3rd party simulation tools and ray-tracing applications |
| Delay profiles | Constant, sinusoidal sliding delay, linear sliding delay, 3GPP birth-death, 3GPP sliding delay group, user-defined, delay profiles from 3rd party simulation tools and ray-tracing applications |
| Channel configuration topologies | Single or multiple independent or fully synchronized MIMO, MISO, SIMO, SISO, MANET/ mesh carrier aggregation, CoMP and relaying transmission schemes |
| Run-time fading engine | Amplitude, delay, Doppler and environment separately controlled for each fading channel |

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| Channel modeling tool for user-defined channel models |
| Impulse response file format for importing user-defined channel models |
| Flexible control of pre-defined shadowing profiles or user-defined path loss profiles. Control of up to 64 channels independently |
| Emulation of 2D and 3D beamforming channels, single and multi-user scenarios |
| Emulation of high speed train scenarios, measured with channel sounder or defined with channel modeling tools |
| Field to lab virtual drive testing modeling tool for C2K/GSM/WCDMA/ LTE field data captured with scanners, test terminals or receivers; seamless operation with Keysight Nemo drive test tools |
| MIMO OTA modeling tool for CTIA/3GPP/CCSA MIMO OTA testing supports the latest CTIA and 3GPP compliant test scenarios and channel model validations; optional tools for LTE-CA inter- and intraband MIMO (DL), Uplink-MIMO, Bi-directional and 3D MIMO OTA testing |
| Geometric channel modeling tool for user-defined Multi-link MIMO, beamforming and smart antenna testing; includes dynamic spatial, defined antenna patterns, 3D modeling and IMTA, WINNER and SCME models |
| Aerospace modeling tool for satellite and airborne communication link testing |
| Custom channel modeling tool kit for external PC |
| Maximize your investment: hardware platform extensions and additional features can be purchased and installed at any time after the initial delivery of an emulator platform |