Keysight Technologies
Propsim F32 Channel Emulator 2.7 GHz

Data Sheet

Advanced End-to-End Performance Testing with Unrivaled Multi-Link Emulation Capacity
Perform advanced testing of chipsets, devices and base stations with Propsim F32

- LTE-A multi-mode chipset and device testing with real base stations
- CTIA/3GPP/CCSA MIMO OTA device testing in anechoic chamber
- LTE-A base station testing with real devices
- Multi-RAT virtual drive testing
- Device and base station testing integrated into the mobile operator test plan
- Applications end-to-end performance testing with live network: VoLTE and data throughput; fall back scenarios to legacy technology voice and data; cell selection/re-selection scenarios and more
- Special VHF to UHF and mobile ad-hoc network radio testing

Unique capabilities for LTE-Advanced Performance Testing

- Unique multi-link emulation capability and integrated programmable LTE interference sources
- 32 bi- and uni-directional RF interface channels and 128 internal channels for flexible multi-link scenario testing
- MU-MIMO testing e.g. 10x UE and 2x eNB/4x UE and 4 x eNB
- LTE small cells and dual connectivity testing. LTE-Hi, LTE-LAA and WiFi offloading
- Multi-RAT live network and device testing e.g. multi-cell LTE, HSPA, GSM
- Single F32 supports LTE Carrier Aggregation testing up to 8CC bands, each 40MHz wide
- Uplink MIMO, LTE 3D beamform testing e.g. 16x8-Bi or up to 64x4-Bi
- Efficient device MIMO OTA testing with Propsim FAST-OTA capability

Easy access to main functionality

- Setup Wizard with guided steps for test scenario creation and editing
- Bi- and uni-directional operation of RF ports
- Built-in input power measurement
- Integrated synchronous LTE Network interference generation
- Fully automated phase and amplitude calibration without external VNA
- Automated 24/7 testing
- ATE remote control interface for GPIB and LAN
- Compatible with other Propsim products test automation interface enabling smooth and convenient transfer or share of test automation scripts

Improve testing accuracy and coverage

- Propsim Geometric Channel Modeling tool (GCM) tool 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 live base stations
- Propsim Virtual Drive Testing modeling tool enables advanced troubleshooting of field issues, benchmarking, interoperability and regression testing by importing field measurement data from a live network captured by drive test tools such as Nemo Outdoor and Nemo Handy
- Propsim MIMO OTA modeling tools compatible with CTIA/3GPP/CCSA test plans (and beyond) enable easy benchmarking of off-the-self devices in anechoic chamber installations

Ready test scenario packs include:

- Operator performance test plans, minimizing time spent on test preparation
- High-speed train, CoMP, MU-MIMO & beamforming testing adopted in test plan by major mobile network operator in Asia
- CTIA MIMO OTA test scenarios
- Propsim FAST-OTA capability enables up to 12x faster device MIMO OTA testing compared to conventional test methods
- LTE carrier aggregation testing, MIMO OTA and RF conductive
- Mobile Adhoc Network and MESH network radio testing
## Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td><strong>RF interface channel configurations</strong></td>
<td>8, 16, 24 or 32</td>
</tr>
<tr>
<td><strong>MIMO emulation</strong></td>
<td>2x2, 4x2, 4x4, 8x2, 8x4, 8x8, 10x10, 16x8 up to 64x8^1</td>
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<tr>
<td><strong>MANET emulation</strong></td>
<td>up to 32 radios in chain, and 11 radios in full mesh network topology</td>
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<tr>
<td><strong>RF interface channel frequency range</strong></td>
<td>30 to 2700 MHz</td>
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<tr>
<td><strong>RF interface channel signal bandwidth</strong></td>
<td>40 MHz/32 RF channels, optionally 80 MHz /16 RF channels</td>
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<tr>
<td><strong>Number of fading paths per channel</strong></td>
<td>up to 48</td>
</tr>
<tr>
<td><strong>Number of fading channels</strong></td>
<td>up to 128 all independently controllable via GUI for fading, Doppler, path amplitude and path phase offset</td>
</tr>
<tr>
<td><strong>Internal interference generators</strong></td>
<td>LTE fully configurable and synchronous, AWGN and CW</td>
</tr>
<tr>
<td><strong>Excess delay range for terrestrial channel emulation</strong></td>
<td>up to 3000 μs</td>
</tr>
<tr>
<td><strong>Number of integrated RF local oscillators</strong></td>
<td>up to 8 internal and 8 external carrier frequencies. In total up to 16</td>
</tr>
<tr>
<td><strong>Multi-emulator synchronization</strong></td>
<td>up to 6 units</td>
</tr>
<tr>
<td><strong>Input power measurement</strong></td>
<td>Automatic input level setting</td>
</tr>
<tr>
<td><strong>Input power meter modes</strong></td>
<td>Continuous and RF burst-triggering</td>
</tr>
<tr>
<td><strong>Integrated duplex components for uplink and downlink separation</strong></td>
<td></td>
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<tr>
<td><strong>User-defined active connector settings</strong></td>
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<tr>
<td><strong>ATE control interface for effortless test case automation</strong></td>
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<tr>
<td><strong>Integrated phase and amplitude calibration (no need for VNA)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Fully automatic phase and amplitude calibration with Keysight Technologies ACU external hardware unit (no need for VNA)</strong></td>
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1. multi-F32 unit configuration

## RF Performance

<table>
<thead>
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<tbody>
<tr>
<td><strong>RF input range @ 20 MHz BW</strong></td>
<td>-50 to +20 dBm (CF 10 dB, SNR &gt;35 dB)</td>
</tr>
<tr>
<td></td>
<td>-30 to +20 dBm (CF 10 dB, SNR &gt;60 dB, full range)</td>
</tr>
<tr>
<td><strong>RF output level range</strong></td>
<td>-120 to 0 dBm (RMS, CF 10 dB)</td>
</tr>
<tr>
<td><strong>Peak output level</strong></td>
<td>max. 0 dBm</td>
</tr>
<tr>
<td><strong>RF output level setting resolution</strong></td>
<td>0.1 dB</td>
</tr>
<tr>
<td><strong>Digital fading channel dynamics</strong></td>
<td>60 dB</td>
</tr>
<tr>
<td><strong>Noise floor</strong></td>
<td>-165 dBm/Hz typical</td>
</tr>
<tr>
<td><strong>EVM</strong></td>
<td>OFDMA 20 MHz BW &lt; -45 dB typical</td>
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Channel Modeling

<table>
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<tr>
<th>Standard channel models</th>
<th>3GPP LTE, WCDMA, GSM, 3GPP2 (IS-54, IS 95), TETRA, ITU 3G, WLAN, DVB-T/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional channel models</td>
<td>LTE Advanced evaluation models, IMT-Advanced models, SCM and SCME models, WINNER, WINNER+, operator test plan specific channel model packs on TD-LTE</td>
</tr>
<tr>
<td>Fading profiles</td>
<td>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</td>
</tr>
<tr>
<td>Delay profiles</td>
<td>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</td>
</tr>
<tr>
<td>Channel configuration topologies</td>
<td>Very flexible, single or multiple independent or fully synchronized MIMO, MISO, SIMO, SISO, MANET/mesh carrier aggregation, CoMP and relaying transmission schemes</td>
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<tr>
<td>Run-time fading engine</td>
<td>Amplitude, delay, Doppler and environment separately controlled for each fading channel</td>
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<tr>
<td>Channel modeling tool for user-defined channel models</td>
<td></td>
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<td>Emulation of dynamic impulse response data</td>
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<tr>
<td>Flexible control of pre-defined shadowing profiles or user-defined path loss profiles; control of up to 128 channels independently</td>
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<tr>
<td>Emulation of 2D and 3D beamforming channels, single and multi-user scenarios, measured</td>
<td></td>
</tr>
<tr>
<td>Emulation of high-speed train scenarios; measured with channel sounder or defined with channel modeling tools</td>
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<tr>
<td>Field to lab virtual drive testing modeling tool for C2K/GSM/WCDMA/ LTE device and base station testing in the lab; use measured radio channel data captured with scanners, test terminals or receivers from the field; seamless operation with Keysight Nemo drive test tools</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Geometric channel modeling tool for user-defined Multi-link MIMO, beamforming and smart antenna scenarios testing; includes dynamic spatial models, user-defined antenna patterns, 3D modeling and IMTA, WINNER and SCME models</td>
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<tr>
<td>Custom channel modeling tool kit for external PC</td>
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<tr>
<td>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</td>
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Evolving

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