Keysight Technologies
Propsim F32 Channel Emulator 6 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, device and base station testing
- CTIA/3GPP/CCSA MIMO OTA device testing in anechoic chamber
- Multi-RAT Virtual Drive Testing
- Device and base station testing part of mobile operator test plan
- Applications end-to-end performance testing with live network: VoLTE, Data Throughput. Fall back scenarios to legacy technology Voice and Data. Cell selection/re-selection scenarios etc.
- LTE 3D MIMO technology testing
- WLAN, V2X and device to device 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) 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
- Propsim WLAN modeling tool for design and verification of MIMO performance and interoperability of WLAN products

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 scenarios 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
- Automotive 802.11p V2X radio testing
## Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>RF interface channel configurations</td>
<td>8, 16, 24 or 32</td>
</tr>
<tr>
<td>MIMO emulation</td>
<td>2x2, 4x2, 4x4, 8x2, 8x4, 8x8, 10x10, 16x8 up to 64x8*</td>
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<tr>
<td>MANET, V2X, Device to Device link emulation</td>
<td>up to 32 radios in chain, and 11 radios in full mesh network topology</td>
</tr>
<tr>
<td>RF interface channel frequency range</td>
<td>up to 350 - 6000 MHz</td>
</tr>
<tr>
<td>RF interface channel signal bandwidth</td>
<td>40 MHz/32 RF channels, optionally 80 MHz /16 RF channels</td>
</tr>
<tr>
<td>Number of fading paths per channel</td>
<td>up to 48</td>
</tr>
<tr>
<td>Number of fading channels</td>
<td>up to 128 all independently controllable via GUI for fading, Doppler, path amplitude and path phase offset</td>
</tr>
<tr>
<td>Internal interference generators</td>
<td>LTE fully configurable and synchronous. AWGN and CW</td>
</tr>
<tr>
<td>Excess delay range for terrestrial channel emulation</td>
<td>up to 3000 μs</td>
</tr>
<tr>
<td>Number of integrated RF local oscillators</td>
<td>up to 8 internal and 8 external carrier frequencies. In total up to 16</td>
</tr>
<tr>
<td>Multi-emulator synchronization</td>
<td>up to 6 units</td>
</tr>
<tr>
<td>Input power measurement</td>
<td>Automatic input level setting</td>
</tr>
<tr>
<td>Input power meter modes</td>
<td>Continuous and RF burst-triggering</td>
</tr>
<tr>
<td>Integrated duplex components for uplink and downlink separation</td>
<td></td>
</tr>
<tr>
<td>User-defined active connector settings</td>
<td></td>
</tr>
<tr>
<td>ATE control interface for effortless test case automation</td>
<td></td>
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<tr>
<td>Integrated phase and amplitude calibration (no need for VNA)</td>
<td></td>
</tr>
<tr>
<td>Fully automatic phase and amplitude calibration with Keysight Technologies ACU external hardware unit (no need for VNA)</td>
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## RF Performance

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>RF input level range</td>
<td>350...4200MHz -50dBm...+25dBm RMS</td>
</tr>
<tr>
<td></td>
<td>4200...6000MHz -40dBm...+25dBm RMS</td>
</tr>
<tr>
<td>RF output level range</td>
<td>350...4200MHz -4dBm...-120dBm RMS</td>
</tr>
<tr>
<td></td>
<td>4200...6000MHz -14dBm...-120dBm RMS</td>
</tr>
<tr>
<td>Peak output level</td>
<td>max. +16dBm 350...4200MHz</td>
</tr>
<tr>
<td></td>
<td>max. +6dBm 4200...6000MHz</td>
</tr>
<tr>
<td>RF output level setting resolution</td>
<td>0.1 dB</td>
</tr>
<tr>
<td>Digital fading channel dynamics</td>
<td>60 dB</td>
</tr>
<tr>
<td>Noise floor</td>
<td>– 165 dBm/Hz typical (output RMS level &lt; -40 dBm)</td>
</tr>
<tr>
<td>EVM</td>
<td>OFDMA 20 MHz BW &lt; -45 dB typical</td>
</tr>
</tbody>
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1. multi-F32 unit configuration
## Channel Modeling

<table>
<thead>
<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>
</tr>
<tr>
<td>Run-time fading engine</td>
<td>Amplitude, delay, Doppler and environment separately controlled for each fading channel</td>
</tr>
</tbody>
</table>

Channel modeling tool for user-defined channel models

Emulation of dynamic impulse response data

Flexible control of pre-defined shadowing profiles or user-defined path loss profiles; control of up to 128 channels independently

Emulation of 2D and 3D beamforming channels, single and multi-user scenarios, measured

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 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

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 scenarios testing; includes dynamic spatial models, user-defined antenna patterns, 3D modeling and IMTA, WINNER and SCME models

WLAN Tool for design and verification of MIMO performance and interoperability of WLAN products

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
Evolving

Our unique combination of hardware, software, support, and people can help you reach your next breakthrough. We are unlocking the future of technology.

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