TDEMI® G

TDEMI® G
Boosting your overall test & measurements.

GAUSS

Special Features

Receiver	Spectrum Analyzer	Real-time Spectrum Analyzer	Preselection Low Noise Amplifier System	Pre- & Full-Compliance Measurements	Intuitive and easy to operate

Content

At a Glance

TDEMI® G

- **Full Compliance EMI Receiver according to standards CISPR 16-1-1, ANSI C63.2, MIL-461, and DO-160**
- **Spectrum Analyzer**
- **Integrated Low Noise Amplifier (LNA)**
- **Integrated Preselection**
- **Traditional and FFT-based Mode**
- **Automatic Stepped Attenuator**
- **Ultra Low Noise Floor**
- **Excellent Spurious Performance**
- **Real-time Spectrum Analyzer optional**
- **Vast IQ-Bandwidth**

In 2007 GAUSS INSTRUMENTS® showed the first fully digital EMI Receiver TDEMI® 1G which, for the first time, was able to reduce the scan time for quasi-peak from hours down to 64 seconds. The benefit of fast testing, the novel real-time spectrogram with 162.5 MHz and the, back in 2007 totally new and outstanding, touchscreen interface has become very fast a well aproved and a hugh added-value contributing solution for its users, allowing them to speed up their EMC testing tremendously and easily debug and analyze the EMI of their products. In 2010 the new CISPR 16-1-1, CISPR 16-3, CISPR 16-2-X officially included the FFT-based measuring instrument based on the TDEMI® technology by explicitly describing the additional requirements, e.g. as fully gapless data processing.

With that knowledge of the first EMI Receivers, which entirely fulfil the CISPR 16-1-1 and having a real-time bandwidth of 162.5 MHz, other novel products like the TDEMI® eXtreme and the TDEMI® ULTRA series have been developed with up to 685 MHz real-time bandwidth and the unique MultiGHz real-time scanning feature. Always based on the leading-edge technologies, like high-speed ADCs and FPGAs, these systems have improved the performance and measurement speed of testing worldwide in EMC and radio communication labs.

Keeping the heritage of the TDEMI® G series in mind, and having in mind that these receivers are doing their daily work for a lot of customers worldwide since 2007, we now introduce a brand new generation of the TDEMI® G series. The new TDEMI® G series uses again the latest technologies of high resolution and high-speed ADCs as well as new FPGAs to achieve an excellent spurious free dynamic range. It also improves the scanning speed for the quasi-peak measurements in Band A and B once more down to 1.5 s and in Band C/D up to 1 GHz down to 8 s.

The new TDEMI® G series provides a fully CISPR complaint real-time bandwidth up to 225 MHz (Option RTEMI225-UG) which allows again fully gapless measurements. In addition for communication testing the new TDEMI® G Series is equipped with a spectrum analyzer and can optionally be equipped also with a real-time analyzer (Option RTSPA*-UG) and an IQ-measurement mode (Option IQ*-UG). Upcoming standards are supported with resolution bandwidths up to 510 MHz. A preselector with fixed filters allows excellent performance to measure EMC signals and communication signals. Marker tables and a report generator allow quickly to check if an EUT is fulfilling the limit and within two clicks a report can be generated directly. The embedded 4 channel Click Analyzer with high dynamic range can be installed (Option CLICK-UG). While the original TDEMI® G Series was the very first EMI receiver on the market with a touchscreen of 8.4", we kept the original rack mountable form factor but now providing a seamless front panel with a high-end PCAP screen of 10.1".

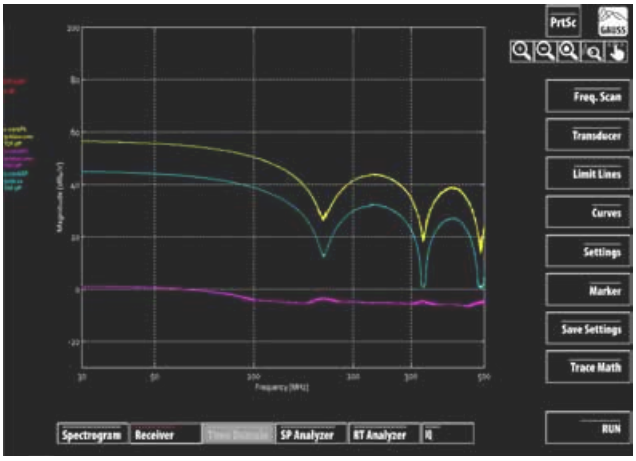

Fig. 1 – **Measurement of an impulse with excellent dynamic range (Peak, Quasi-Peak, Average).**

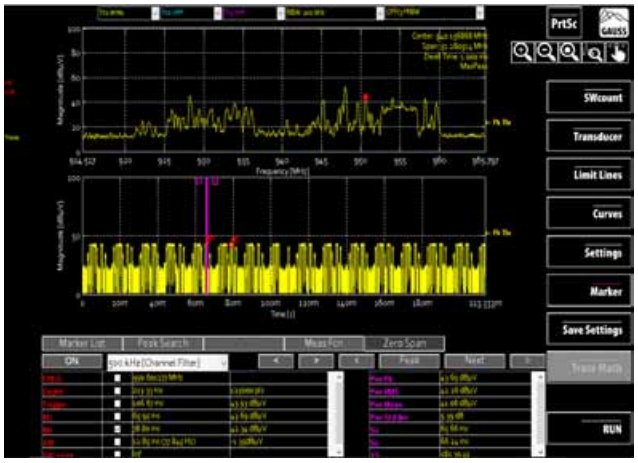

Fig. 2 – **Measurement of communication signals (Spectrum, zero span and measurment functions).**

EMI Receiver

The new TDEMI® G provides a traditional superheterodyne mode beside the FFT-based mode, which is implemented fully digital in the frequency range up to 1 GHz. Above 1 GHz there is an ultra broadband down-conversion to the digital IF level, with an FFT-bandwidth of 112 MHz or 225 MHz (Option RTEMI*-UG) respectively. The instruments can be configured with an AM/FM demodulator with an output to the headphones (Option DM-UG).

The fully CISPR 16-1-1 compliant Shortterm-FFT (STFFT) implementation of the new TDEMI® G series speeds up your EMC measurements by a factor of up to 16000. Thus, scan times - and along with that also your overall testing time - can be achieved now, which are much shorter and setting new standards in your product certification process. For example a full scan with quasi-peak detector in the range from 30 MHz to 1 GHz is carried out in less than 10 seconds. So it is possible to measure and characterize fluctuating disturbances and equipment under test changing between different operation modes very easily and much even more precise as well. An excellent noise floor makes the TDEMI® G perfect suited for radiated, conducted emission testings as well as measurements using an absorbing clamp, CDN, and also automotive testing.

Spectrum Analyzer

Already in its standard configuration the TDEMI® G is equipped with a Spectrum Analyzer which comes with a traditional superhet mode. It is implemented fully digital and provides 145 resolution bandwidths (RBW) starting at 1 Hz RBW going up to 60 MHz in 1, 2, 3, 5 steps as well as smaller sized steps in between. By the innovative multichannel technology the measurement speed is increased by a factor up to 32000. It corresponds to a Shortterm-FFT based set of 32000 full digital superhet receivers. In conjunction with the video filters and detectors all measurements according to a vast variety of standards are speed up by the factor 32000. By this tremendous advantage in speed and performance, the user is enabled to analyse non-stationary phenomenons much more precisely and reliable than ever before.

The full compliance to CISPR 16-1-1 and ANSI C63.2 standards is given by fulfilling all its requirements, such as the 6 dB RBWs (EMI RBWs 1 Hz - 10 MHz), and in particular the very essential requirement for the dynamic range for pulses. Thus, the spectrum analyzer of the TDEMI® G can be applied also for pre- and final measurements with peak and average detector. Furthermore it is in full conformance with ANSI C63.4, MIL-461 and DO-160 standards and can be used in a vast range of applications such as the analysis of communication signals.

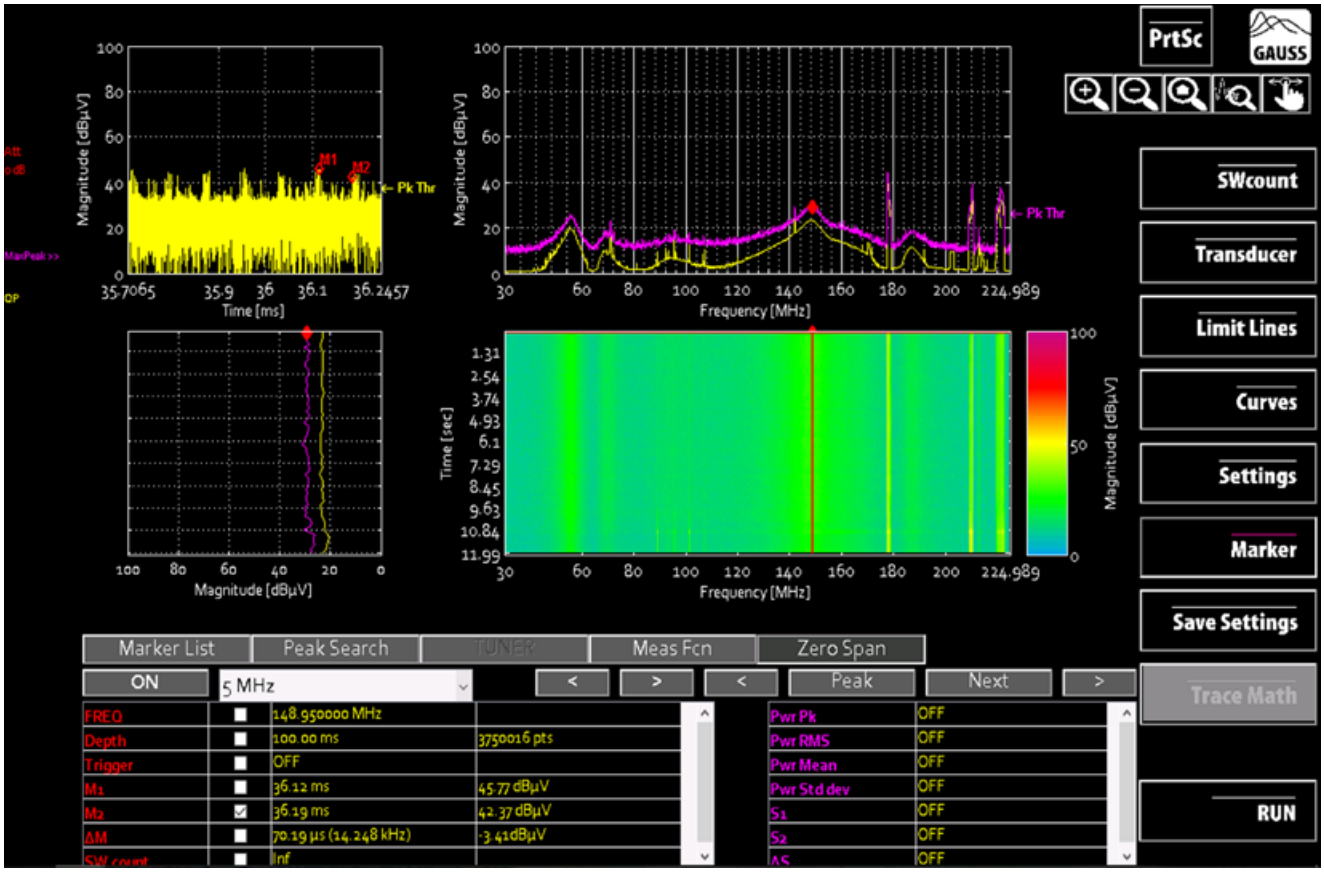

Fig. 3 – **Fully compliant spectrogram (QP & Maxpeak) including zero span and high resolution zero span to investigate emission of a power supply.**

CISPR 16-1-1 Real-time Spectrogram

Measurements of radiated emissions in the frequency range up to 1 GHz can be very time consuming since the CISPR and FCC standards require that the measurements have to be performed at several antenna heights and all angular positions of the device under test.

Using the TDEMI® G receiver series of GAUSS INSTRUMENTS® with the real-time spectrogram (Option RTEMI*-UG) bandwidth of 112 MHz or 225 MHz respectively and fully gapless evaluation and visualization, the final maximization can be performed at all frequencies simultaneously and in full real-time over all positions. This outstanding and worldwide unique feature of the fully gapless real-time spectrogram mode combines all advantages of a single frequency mode of a traditional receiver with the possibility to carry out the measurements at all frequencies simultaneously. Two detectors are applied simultaneously, thus CISPR-Average and quasi-peak detectors can be measured simultaneously in real-time as well as stored and visualized in real-time. In parallel, investigation of signals with additional RBW and zero span can be performed.

The fully gapless processing and evaluation of all frequencies is inherent, which is an absolutely mandatory requirement of the standard CISPR 16-1-1 Ed. 3.1 or later for the use of an FFT-based instrument for final certification measurements.

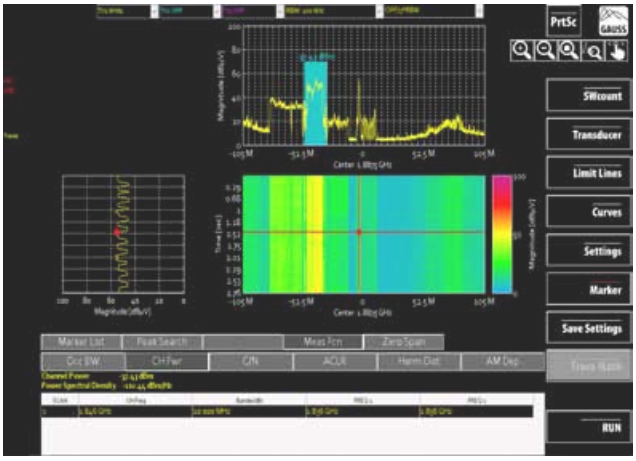

Fig. 4 – **Measurement of a channel power of a wideband communication signal.**

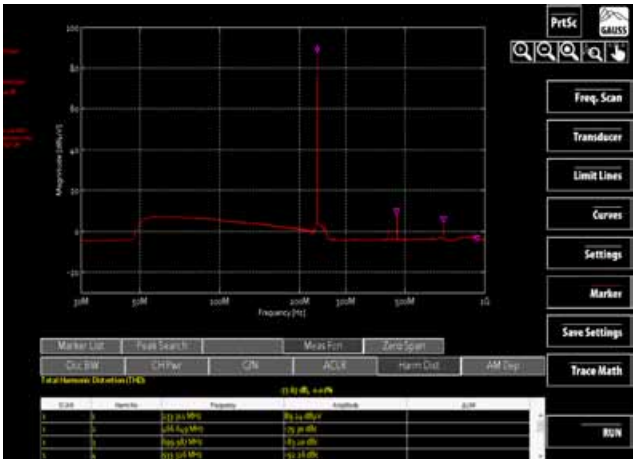

Fig. 5 – **Measurement of harmonics of a 233 MHz signal.**

Real-time Spectrum Analyzer

The real-time spectrum analyzer mode (Option RTSPA*-UG) comes along with a real-time bandwidth of 112 MHz or 225 MHz respectively. The real-time spectrum analyzer mode provides all resolution bandwidths and settings already known from the spectrum analyzer mode and also provides the full dynamic for pulses required by CISPR 16-1-1. Included are the 6 dB EMI resolution bandwidths as well as the 3 dB bandwidth starting at 1 Hz going up to 60 MHz. Powerful measurement functions and features are available for EMC and radio communication testing.

The real-time SPA operation mode of the TDEMI® G series combines all advantages of a conventional superhet analyzer with the advanced evaluation capabilities and vast advantages of the real-time capabilities based on the leading-edge technology provided by GAUSS INSTRUMENTS®. The unrivaled real-time bandwidth of 225 MHz (Option RTSPA225-UG) opens up absolutely new possibilities regarding the analysis, characterization and observation possibilities for all kinds of signals.

Preselection and High Resolution ADCs

The new TDEMI® G Series uses several high resolution and high-speed ADCs to achieve an excellent spurious free dynamic range, as well as an excellent dynamic range for impulses. By the internal hardware preselector system with embedded low noise amplifiers the spurious free dynamic range and the noise floor are further improved compared to other reciever series.

This newly updated leading-edge technology improves the noisefloor in comparison to the first TDEMI® 1G system by about 10 dB and improves the dynamic range by more than 20 dB. Thus the TDEMI® G series with 225 MHz Real-time bandwidth (Option RTSPA225-UG) is the perfect tool to measure complex EMI signals which require high sensitivity and high dynamic range all at the same time. It combines the advantage of a hardware preselector, high resolution ADCs and floating point high-speed ADCs to achieve an excellent dynamic range and linearity performance for all type of signals.

In addition, the TDEMI® G of GAUSS INSTRUMENTS® can be equipped also with an additional ultra low noise preamplifier (Option ULNA-UG) for all the frequency ranges up to 44 GHz to further enhance its sensitivity.

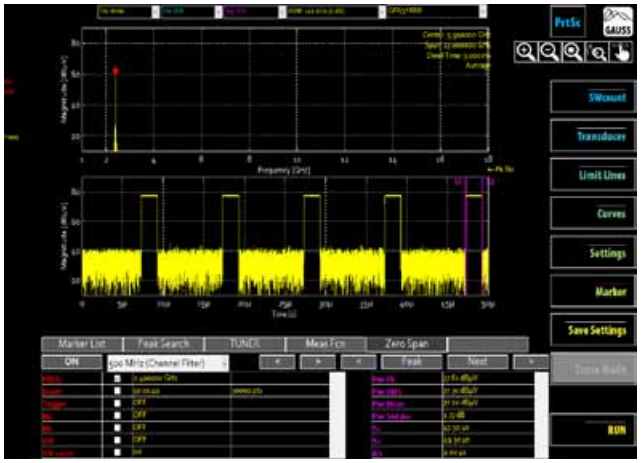

Fig. 6 – **Pulse Measurement with 510 MHz Measurement Bandwidth.**

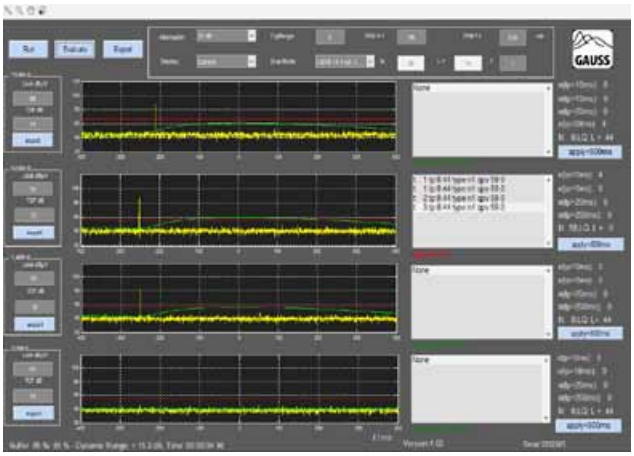

Fig. 7 – **Measurement with Click Rate Analyzer according to CISPR 14.**

Up to 510 MHz IQ-Analysis Bandwidth

The IQ mode is available as additional option for the TDEMI® G and can be ordered in several selections either with 50 MHz, 112MHz, 225 MHz, or 510 MHz maximum analysis bandwidth. The TDEMI® G is equipped with a large memory of 2x250 Megasamples first level memory and 8 GByte second level memory to store and process the I/Q data. Based on the acquired I/Q data it is possible to perform analogue demodulations like AM and FM as well as digital demodulations, burst power measurements, and channel power measurements according to ETSI as well as other radio telecommunication standards. The maximum expansion stage of 510 MHz IQ bandwidth of the IQ mode makes your TDEMI® G receiver ready prepared for the measurement of 5G applications already today. For even more advanced signal analysis applications, e.g. of radar signals or correlation measurements, the large I/Q data can be postprocessed also by additional signal processing algorithms. The largest IQ bandwidth of up to 510 MHz is available up to 44 GHz with activated preselection. In contrast to traditional receivers that are based on spectrum analyzers, thus with the TDEMI® G always full image rejection is guaranteed and high dynamic range provided without any need to turn off the preselection during wide IF bandwidth operation.

Click Rate Analyzer

The optional available click rate analyzer expands your TDEMI® G Measurement System to a fully integrated click rate analyzer. So the combination of a TDEMI® receiver, according to CISPR 16-1-1, a click rate analyzer and advanced evaluation methods, as the spectrogram mode, is available in a single box solution. The click rate measurement is performed at all four frequencies in parallel. Hereby, the total testing time is reduced significantly compared to sequential measurements performed by a conventional heterodyne receiver. By using the same digital data base of the TDEMI® G system as in its receiver mode the calibration of the click rate analyzer is covered automatically by the standard calibration of the TDEMI® system. The click rate analysis is operated by an own graphical user interface. The software measures and displays the current signal at all four frequencies in parallel as peak and quasi-peak value each. Both detector values are fully stored and evaluated. After finishing testing every single disturbance can be selected from a list and the response of the IF signal and the quasi-peak value can be displayed and a test report can be automatically created, so there is no need anymore to repeat a measurement for a certain click or a certain time.

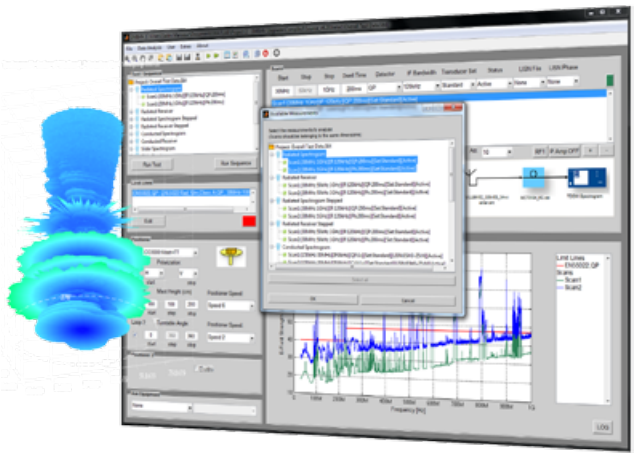

Fig. 8 – **Screenshot EMI 64k Software Suite.**

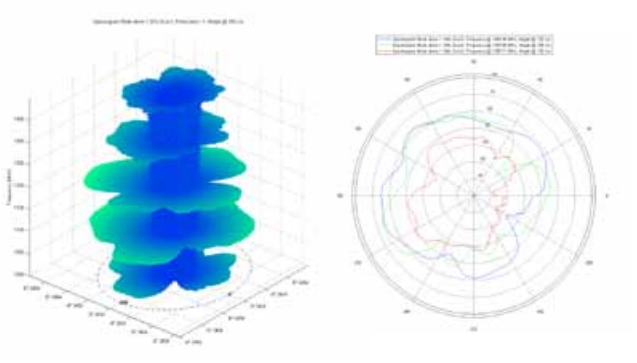

Fig. 9 – **Screenshot EMI 64k Software Suite - radiation pattern in 2D and 3D.**

EMI 64k Automation Software Suite

The EMI 64k automation software suite of GAUSS INSTRUMENTS®, allows you to embed your TDEMI® G receiver in a fully automated test environment. A full automation of EMI testing according to all commercial and military standards is available with this software suite. Using the capabilities of the TDEMI® G with a fully gapless processing and full quasi-peak detection the EMI 64k is the only software that provides a full automation even under conditions of sporadic interferences or drifting emissions. This unique technology avoids manual searching of peaks and improves the overall test quality. In addition the complete radiation pattern is measured at all frequencies with quasi-peak detector.

The EMI 64k provides traditional measurement procedures like pre-scanning and final maximization at individual frequencies as well as full automated EMI testing using the full benefits of a huge real-time bandwidth of 225 MHz with quasi-peak and average detector to get the spectrum at all angular positions and heights. The methods of data reduction and fully automated maximization using the real-time spectrogram mode can be combined for extremely fast and accurate testing.

The EMI 64k software supports conducted emissions, measurement of disturbance power, radiated emission measurements in a full anechoic room or at an open area test site as well as in a semi anechoic chamber. For all these typical test setups the EMI testing is fully automated. Also measurements with your GTEM cell, which is a very effective approach to test small devices, are possible with the EMI 64k software to speed up the measurement using the quasi-peak detector achieving a scan time between 3s (TDEMI® X) and 10 s (New TDEMI® G). The measurement is carried out at all 3 axis and then the calculation of an OATS equivalent result is performed by the EMI64k software.

The EMI 64k automation software is available for all TDEMI® product families and can be hosted on your TDEMI® System or on a separate workstation such as an external lab PC or laptop.

The EMI 64k is a bundle of packages that can be configured according to the customer requirements. The great advantage is the following: You only pay for the features that you need and you can upgrade anytime later with additional features that you need for future tests.

Specification TDEMI® G

Frequency Range

TDEMI® 30M	9 kHz - 30 MHz
TDEMI® 1G	9 kHz - 1 GHz
TDEMI® 3G	9 kHz - 3 GHz
TDEMI® 6G	9 kHz - 6 GHz
TDEMI® 9G	9 kHz - 9 GHz
TDEMI® 18G	9 kHz - 18 GHz
TDEMI® 26G	9 kHz - 26.5 GHz
TDEMI® 30G	9 kHz - 30 GHz
TDEMI® 40G	9 kHz - 40 GHz
TDEMI® 44G	9 kHz - 44 GHz
extendable	› down to 1 Hz - 9 kHz (Option 1Hz-UG)

Reference Oscillator (Option OCXO-UG)	› Aging < +/- 3.5 ppm / 15 years › Temperature drift (0 – 60° C) < +/- 1 x 10e-8 SSB phase noise (1 Hz BW): 1 Hz -90 dBc/Hz 10 Hz -120 dBc/Hz 100 Hz -135 dBc/Hz 1 kHz -145 dBc/Hz › Long-term frequency stability < 0.5 x 10^{-8} / year › Temperature drift < 0.5 x 10^{-8} (0–50 °C) › Initial calibration accuracy < 1 x 10^{-8}
External Ref. input (Option REF-UG)	› External Ref. input 10 MHz
Spectral purity	› SSB phase noise frequency = 1 GHz, carrier offset › 100 Hz < –100 dBc (1 Hz) › 1 kHz < –126 dBc (1 Hz) › 10 kHz < –133 dBc (1 Hz) › 100 kHz < –135 dBc (1 Hz) › 1 MHz < –146 dBc (1 Hz) › 10 MHz < –150 dBc (1 Hz) (nom.) › Residual FM frequency = 1 GHz, RBW = 1 kHz, Sweep time = 100 ms < 5 Hz (nom.)
Operating modes	› EMI receiver (superheterodyne) › EMI receiver (FFT-based measuring instrument) › Spectrum analyzer › Real-time EMI receiver (Spectrogram) (Option RTEMI*-UG) › Real-time spectrum analyzer (HyperOverlapping) (Option RTSPA*-UG) › Wideband IQ receiver (Signal Analyzer) (Option IQ*-UG)

EMI Receiver
(CISPR 16-1-1, ANSI C63.2, MIL-461, DO-160)
Traditional stepped scan

Frequency readout (Analyzer mode)	› Marker resolution 0.005 Hz › Uncertainty ±(marker frequency × reference accuracy + 10 % × resolution bandwidth + ½ (span/(sweep points – 1)) + 0.5 Hz) › Spectrum analyzer 1 to 8 000 000 (64 bit operation system) › EMI measurement 1 to 8 000 000 (64 bit operation system) › Marker tuning frequency step size marker step size = sweep points span/(sweep points – 1) › Marker step size = standard span/(default sweep points – 1) › Frequency counter resolution 0.001 Hz › Count accuracy ±(frequency × reference accuracy + ½ (last digit)) › Display range for frequency axis 0 Hz, 10 Hz to max. frequency › Resolution 0.01 Hz › Max. span deviation ±0.1 %
Receiver scan	› Scan scan with max. 100 subranges with different settings › Scan modes normal scan, FFT-based measuring instrument according to CISPR 16-1-1 › Measurement time superhet scan, per frequency 1 µs to >100 s › Measurement time FFT-based measuring instrument, per frequency 1 µs to >100 s › Frequency step size normal scan min. 1 Hz › Frequency step size FFT-based measuring instrument min. 1 Hz

EMI Receiver FFT-based Measuring Instrument

(CISPR 16-1-1, ANSI C63.2, MIL-461, DO-160)
HyperOverlapping Technology

Frequency segment processed in parallel	› RBW = 10 Hz 0.06 MHz (Option 1Hz-UG) › RBW = 100 Hz 0.6 MHz (Option 1Hz-UG) › RBW = 200 Hz 1.1 MHz › RBW = 1 kHz 5.7 MHz (Option 1Hz-UG) › RBW = 9 kHz 57 MHz › RBW = 10 kHz 57 MHz (Option 1Hz-UG) › RBW = 120 kHz 225 MHz › RBW = 100 kHz 225 MHz (Option 1Hz-UG) › RBW = 1 MHz 225 MHz (Option 1Hz-UG) › RBW = 8 MHz 225 MHz (Option 1Hz-UG) › RBW = 10 MHz 225 MHz (Option 1Hz-UG)
Scanning Speed (Receiver Mode typ.)	› Band A (9 kHz - 150 kHz), Quasi-Peak, dwell time 1 s : 1.5 s › Band B (150 kHz - 30 MHz) 9 kHz peak detector, dwell time 100 ms: 0.1 s › Band B (150 kHz - 30 MHz), Quasi-Peak, dwell time 1 s: 1.5 s › Band C/D (30 MHz - 1 GHz) 120 kHz, peak detector, dwell time 10 ms: < 0.5 s › Band C/D (30 MHz - 1 GHz) 9 kHz, peak detector, dwell time 10 ms: < 0.5 s › Band C/D (30 MHz - 1 GHz), Quasi-Peak, dwell time 1 s: 5 s › Band E (1 GHz – 6 GHz), dwell time 1 ms: 3 s
Measurement Speed	› Measurement and Update Rate Receiver Mode & Storage 40960 Frequency Points 1ms (40960000 Points / s) (meas.)
FFT-Overlapping Factor	› according to CISPR 16-1-1 and CISPR 16-3 › Overlapping factor typ > 95% [1] › HyperOverlapping > 99.9% [1]

1 FFT-based measuring instrument according to CISPR 16-1-1, MIL461 and other EMC standards.
An improved version of time-domain scan.

Real-time EMI Receiver (Spectrogram) (Option RTEMI112-UG, RTEMI225-UG)

(CISPR 16-1-1, ANSI C63.2, MIL-461, DO-160)

	› Real-time bandwidth 112 MHz (Option RTEMI112-UG) › Real-time bandwidth 225 MHz (Option RTEMI225-UG) › Peak, Quasi-Peak, Average, CISPR-Average, and RMS detector › Time-domain fully gapless › Frequency Step: Half of Bandwidth › Minimum resolution 5 ms (depending on number of points) › Zoom & Pan to Select Frequency band of interest › POI 300ps › HyperOverlapping Technology
Display and Analysis Functions	› Spectrogram (2D & 3D), 16.78 m. colors › Time-domain, Frequency Domain (Marker selectable) › Delta-Marker in Time- and Frequency Domain › Save and Load Measurements, Visualization, Post-processing and Evaluation

Preselection and Preamplifier

Structure	› Multiple paths with fixed filters › Multiple paths for different amplitude ranges
Digital Preselection	› 0 MHz – 225 MHz › 225 MHz – 450 MHz › 450 MHz – 675 MHz › 675 MHz – 900 MHz › 900 MHz – 1 GHz › Above 1 GHz in 225 MHz steps

Specification TDEMI® G

Spectrum Analyzer
(CISPR 16-1-1, ANSI C63.2, MIL-461, DO-160)

Spectrum Analyzer	› Sweep time range span = 0 Hz, 1 µs to 16000 s › Span ≥ 10 Hz, swept 1 us to 16000 s › Span ≥ 10 Hz, FFT based measuring instrument 1 µs to 16000 s › Sweep time accuracy span = 0 Hz ±0.1 % (nom.) › Span ≥ 10 Hz, swept ±1 % (nom.)
IF Bandwidths	› 3dB bandwidth: 1 Hz – 60 MHz › 1, 2, 3, 5 steps › Small step size (150 steps) for channel measurements › EMI Filters: 6dB bandwidths CISPR: 200 Hz, 9 kHz, 120 kHz, 1 MHz 6dB bandwidths: 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz, 8 MHz, 10 MHz › 3dB bandwidths: 3 MHz, 5 MHz, 10 MHz, 20 MHz, 40 MHz, 50 MHz (Option IQ50-UG) [1], 80 MHz (Option IQ112-UG) [1], 100 MHz (Option IQ112-UG) [1], 160 MHz (Option IQ225-UG) [1] › Channel Filter: 30 kHz, 60 kHz, 100 kHz, 250 kHz, 500 kHz, 1 MHz, 2 MHz, 4 MHz, 8 MHz, 15 MHz, 30MHz, 60 MHz (Option IQ112-UG) [1], 125 MHz (Option IQ112-UG) [1], 250 MHz (Option IQ225-UG) [1], 510 MHz (Option IQ510-UG) [1]
Video filter	› 0.1 Hz - 10 MHz + 3*RBW/OFF › 1, 2, 3, 5 steps › Detectors: MaxPeak, MinPeak, Sample
Detectors (Video filter off)	› Maxpeak, Average, RMS › Dynamic requirements according to CISPR 16-1-1 (Peak, AVG)

Real-time Spectrum Analyzer (Option RTSPA*-UG)
(CISPR 16-1-1, ANSI C63.2, MIL-461, DO-160)

Analysis Settings	› Automatic selection of the settings › STFFT Resolution: > 32,000 › Real-time analysis bandwidth 225 MHz (Option RTSPA225-UG) › Time-domain fully gapless › Frequency step: Half of bandwidth › Zoom & Pan to select frequency band of interest › Analysis of history › Detectable signal duration (SNR>60 dB) 300 ps › Signal duration for 100% POI 300 ps › HyperOverlapping Technology
Display and Analysis Functions	› Spectrogram (2D & 3D), 16.78 m. colors › Time-domain, Frequency Domain (Marker selectable) › Delta-Marker in Time- and Frequency Domain › Save and Load measurements › Real-time Spectrum › Persistence Spectrum › Real-time Spectrogram › Power vs. time › Power vs. waterfall
IF Bandwidths	› 3dB bandwidth: 1 Hz – 60 MHz › 1, 2, 3, 5 steps › Small step size (150 steps) for channel measurements › EMI Filters: 6dB bandwidths CISPR: 200 Hz, 9 kHz, 120 kHz, 1 MHz 6dB bandwidths: 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz, 8 MHz, 10 MHz › 3dB bandwidths: 3 MHz, 5 MHz, 10 MHz, 20 MHz, 40 MHz, 50 MHz (Option IQ50-UG) [1], 80 MHz (Option IQ112-UG) [1], 100 MHz (Option IQ112-UG) [1], 160 MHz (Option IQ225-UG) [1] › Channel Filter: 30 kHz, 60 kHz, 100 kHz, 250 kHz, 500 kHz, 1 MHz, 2 MHz, 4 MHz, 8 MHz, 15 MHz, 30MHz, 60 MHz (Option IQ112-UG) [1], 125 MHz (Option IQ112-UG) [1], 250 MHz (Option IQ225-UG) [1], 510 MHz (Option IQ510-UG) [1]
Video filter	› 0.1 Hz - 10 MHz + 3*RBW/OFF › 1, 2, 3, 5 steps › Detectors: MaxPeak, MinPeak, Sample
Detectors (Video filter off)	› Maxpeak, Average, RMS › Dynamic requirements according to CISPR 16-1-1 (Peak, AVG)
Measurement Speed	› Measurement and Update Rate Analyzer Mode & Storage 32000 Frequency Points 1ms (32000 000 Points / s) (meas.)

Noise Floor (Analyzer Mode) without Option ULNA-UG	
	› Preselection (in front of preamp) active, Average Detector, typ.
	› 1 Hz – 10 Hz < - 80 dBm/Hz
	› 10 Hz – 100 Hz < -117 dBm/Hz
	› 100 Hz – 1 kHz < -127 dBm/Hz
	› 1 kHz – 9 kHz < -137 dBm/Hz
	› 9 kHz – 150 kHz < -150 dBm/Hz
	› 1 MHz – 30 MHz < -162 dBm/Hz
	› 30 MHz – 1 GHz < -166 dBm/Hz
	› 1 GHz – 1.1 GHz < -163 dBm/Hz
	› 1.1 GHz – 6 GHz < -165 dBm/Hz
	› 6 GHz – 9 GHz < -157 dBm/Hz
	› 9 GHz – 13 GHz < -157 dBm/Hz
	› 13 GHz – 18 GHz < -152 dBm/Hz
	› 18 GHz – 26.5 GHz < -147 dBm/Hz
	› 26.5 GHz – 33 GHz < -149 dBm/Hz
	› 33 GHz – 40 GHz < -147 dBm/Hz
	› 40 GHz – 44 GHz < -130 dBm/Hz

Noise Floor (Analyzer Mode) with Option ULNA-UG	
	› ULNA-UG on, Preselection on/off, Average Detector, typ.
	› 1 kHz – 9 kHz < -137 dBm/Hz
	› 9 kHz – 150 kHz < -150 dBm/Hz
	› 1 MHz – 30 MHz < -162 dBm/Hz
	› 30 MHz – 1 GHz < -166 dBm/Hz
	› 1 GHz – 1.1 GHz < -163 dBm/Hz
	› 1.1 GHz – 6 GHz < -165 dBm/Hz
	› 6 GHz – 9 GHz < -165 dBm/Hz
	› 9 GHz – 13 GHz < -165 dBm/Hz
	› 13 GHz – 18 GHz < -160 dBm/Hz
	› 18 GHz – 26.5 GHz < -160 dBm/Hz
	› 26.5 GHz – 33 GHz < -160 dBm/Hz
	› 33 GHz – 40 GHz < -160 dBm/Hz
	› 40 GHz – 44 GHz < -140 dBm/Hz

1 Signal analysis available without option IQ*-UG_E only up to 30 GHz

Preselection	
TDEMI® 30M	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz
TDEMI® 1G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz
TDEMI® 3G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz
TDEMI® 6G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz
TDEMI® 9G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz 6 GHz – 9 GHz
TDEMI® 18G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz 6 GHz – 9 GHz 9 GHz – 13 GHz 13 GHz – 15 GHz 15 GHz – 18 GHz
TDEMI® 26G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz 6 GHz – 9 GHz 9 GHz – 13 GHz 13 GHz – 15 GHz 15 GHz – 18 GHz 18 GHz – 22 GHz 22 GHz – 26.5 GHz
TDEMI® 30G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz 6 GHz – 9 GHz 9 GHz – 13 GHz 13 GHz – 15 GHz 15 GHz – 18 GHz 18 GHz – 22 GHz 22 GHz – 26.5 GHz 26.5 GHz – 29.2 GHz 29.2 GHz – 30 GHz
TDEMI® 40G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz 6 GHz – 9 GHz 9 GHz – 13 GHz 13 GHz – 15 GHz 15 GHz – 18 GHz 18 GHz – 22 GHz 22 GHz – 26.5 GHz 26.5 GHz – 29.2 GHz 29.2 GHz – 33 GHz 33 GHz – 40 GHz

Specification TDEMI® G

TDEMI® 44G	1 Hz – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 225 MHz 225 MHz – 450 MHz 450 MHz – 675 MHz 675 MHz – 900 MHz 900 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz 6 GHz – 9 GHz 9 GHz – 13 GHz 13 GHz – 15 GHz 15 GHz – 18 GHz 18 GHz – 22 GHz 22 GHz – 26.5 GHz 26.5 GHz – 29.2 GHz 29.2 GHz – 33 GHz 33 GHz – 40 GHz 40 GHz – 44 GHz

Low Noise Preamplifier (Option ULNA-UG)

TDEMI® 30M	› 1 kHz – 30 MHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 1G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 3G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 3 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 6G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 6 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 9G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 6 GHz (Gain 20 dB, NF typ. 2.0 dB) › 6 GHz – 9 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 18G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 6 GHz (Gain 20 dB, NF typ. 2.0 dB) › 6 GHz – 9 GHz (Gain 20 dB, NF typ. 2.0 dB) › 9 GHz – 13 GHz (Gain 20 dB, NF typ. 2.0 dB) › 13 GHz – 18 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 26G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 6 GHz (Gain 20 dB, NF typ. 2.0 dB) › 6 GHz – 9 GHz (Gain 20 dB, NF typ. 2.0 dB) › 9 GHz – 13 GHz (Gain 20 dB, NF typ. 2.0 dB) › 13 GHz – 18 GHz (Gain 20 dB, NF typ. 2.0 dB) › 18 GHz – 26.5 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 30G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 6 GHz (Gain 20 dB, NF typ. 2.0 dB) › 6 GHz – 9 GHz (Gain 20 dB, NF typ. 2.0 dB) › 9 GHz – 13 GHz (Gain 20 dB, NF typ. 2.0 dB) › 13 GHz – 18 GHz (Gain 20 dB, NF typ. 2.0 dB) › 18 GHz – 26.5 GHz (Gain 20 dB, NF typ. 2.0 dB) › 26.5 GHz – 30 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 40G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 6 GHz (Gain 20 dB, NF typ. 2.0 dB) › 6 GHz – 9 GHz (Gain 20 dB, NF typ. 2.0 dB) › 9 GHz – 13 GHz (Gain 20 dB, NF typ. 2.0 dB) › 13 GHz – 18 GHz (Gain 20 dB, NF typ. 2.0 dB) › 18 GHz – 26.5 GHz (Gain 20 dB, NF typ. 2.0 dB) › 26.5 GHz – 33 GHz (Gain 20 dB, NF typ. 2.0 dB) › 33 GHz – 40 GHz (Gain 20 dB, NF typ. 2.0 dB)
TDEMI® 44G	› switchable on/off (> 30 MHz) › 1 kHz – 1 GHz (Gain 20 dB, NF typ. 2.0 dB) › 1 GHz – 6 GHz (Gain 20 dB, NF typ. 2.0 dB) › 6 GHz – 9 GHz (Gain 20 dB, NF typ. 2.0 dB) › 9 GHz – 13 GHz (Gain 20 dB, NF typ. 2.0 dB) › 13 GHz – 18 GHz (Gain 20 dB, NF typ. 2.0 dB) › 18 GHz – 26.5 GHz (Gain 20 dB, NF typ. 2.0 dB) › 26.5 GHz – 33 GHz (Gain 20 dB, NF typ. 2.0 dB) › 33 GHz – 40 GHz (Gain 20 dB, NF typ. 2.0 dB) › 40 GHz – 44 GHz (Gain 20 dB, NF typ. 2.0 dB)

Noise Floor (Receiver Mode)
Preselection (in front of preamp) active, Average Detector, typical

TDEMI® 30M	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV
TDEMI® 1G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV
TDEMI® 3G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 3 GHz (1 MHz IF): < 2 dBuV
TDEMI® 6G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 6 GHz (1 MHz IF): < 2 dBuV
TDEMI® 9G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 6 GHz (1 MHz IF): < 2 dBuV › 6 GHz – 9 GHz (1 MHz IF): < 10 dBuV
TDEMI® 18G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 6 GHz (1 MHz IF): < 2 dBuV › 6 GHz – 9 GHz (1 MHz IF): < 10 dBuV › 9 GHz – 13 GHz (1 MHz IF): < 10 dBuV › 13 GHz – 18 GHz (1 MHz IF): < 10 dBuV
TDEMI® 26G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 6 GHz (1 MHz IF): < 2 dBuV › 6 GHz – 9 GHz (1 MHz IF): < 10 dBuV › 9 GHz – 13 GHz (1 MHz IF): < 10 dBuV › 13 GHz – 18 GHz (1 MHz IF): < 10 dBuV › 18 GHz – 26.5 GHz (1 MHz IF): < 10 dBuV
TDEMI® 30G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 6 GHz (1 MHz IF): < 2 dBuV › 6 GHz – 9 GHz (1 MHz IF): < 10 dBuV › 9 GHz – 13 GHz (1 MHz IF): < 10 dBuV › 13 GHz – 18 GHz (1 MHz IF): < 10 dBuV › 18 GHz – 26.5 GHz (1 MHz IF): < 10 dBuV › 26.5 GHz – 30 GHz (1 MHz IF): < 18 dBuV
TDEMI® 40G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 6 GHz (1 MHz IF): < 2 dBuV › 6 GHz – 9 GHz (1 MHz IF): < 10 dBuV › 9 GHz – 13 GHz (1 MHz IF): < 10 dBuV › 13 GHz – 18 GHz (1 MHz IF): < 10 dBuV › 18 GHz – 26.5 GHz (1 MHz IF): < 10 dBuV › 26.5 GHz – 33 GHz (1 MHz IF): < 18 dBuV › 33 GHz – 40 GHz (1 MHz IF): < 20 dBuV
TDEMI® 44G	› 1 kHz – 9 kHz (10 Hz IF): < -15 dBuV › 9 kHz – 150 kHz (200 Hz IF): < -20 dBµV › 1 MHz – 30 MHz (9kHz IF): < -16 dBµV › 30 MHz – 1 GHz (120 kHz IF): < -8 dBµV › 1 GHz – 6 GHz (1 MHz IF): < 2 dBuV › 6 GHz – 9 GHz (1 MHz IF): < 10 dBuV › 9 GHz – 13 GHz (1 MHz IF): < 10 dBuV › 13 GHz – 18 GHz (1 MHz IF): < 10 dBuV › 18 GHz – 26.5 GHz (1 MHz IF): < 10 dBuV › 26.5 GHz – 33 GHz (1 MHz IF): < 18 dBuV › 33 GHz – 40 GHz (1 MHz IF): < 20 dBuV › 40 GHz – 44 GHz (1 MHz IF): < 35 dBuV

Specification TDEMI® G

Noise Floor (Receiver Mode) with Option ULNA-UG on
Preselection (in front of preamp) active, Average Detector, typical

TDEMI® 30M	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
TDEMI® 1G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
TDEMI® 3G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 3 GHz (1 MHz IF):	< 0 dBuV
TDEMI® 6G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 6 GHz (1 MHz IF):	< 0 dBuV
TDEMI® 9G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 6 GHz (1 MHz IF):	< 0 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV
TDEMI® 18G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 6 GHz (1 MHz IF):	< 0 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV
TDEMI® 26G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 6 GHz (1 MHz IF):	< 0 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV
	› 18 GHz – 26.5 GHz (1 MHz IF):	< 7 dBuV
TDEMI® 30G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 6 GHz (1 MHz IF):	< 0 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV
	› 18 GHz – 26.5 GHz (1 MHz IF):	< 7 dBuV
	› 26.5 GHz – 30 GHz (1 MHz IF):	< 7 dBuV
TDEMI® 40G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 6 GHz (1 MHz IF):	< 0 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV
	› 18 GHz – 26.5 GHz (1 MHz IF):	< 7 dBuV
	› 26.5 GHz – 33 GHz (1 MHz IF):	< 7 dBuV
	› 33 GHz – 40 GHz (1 MHz IF):	< 7 dBuV
TDEMI® 44G	› 1 kHz – 9 kHz (10 Hz IF):	< -15 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -16 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -15 dBµV
	› 1 GHz – 6 GHz (1 MHz IF):	< 0 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV
	› 18 GHz – 26.5 GHz (1 MHz IF):	< 7 dBuV
	› 26.5 GHz – 33 GHz (1 MHz IF):	< 7 dBuV
	› 33 GHz – 40 GHz (1 MHz IF):	< 7 dBuV
	› 40 GHz – 44 GHz (1 MHz IF):	< 29 dBuV

Level	› Display range displayed noise floor up to +30 dBm › Maximum DC input level, pulse 6 V (0dB Att) › RF-CW signal 120 dBµV
Display Accuracy	› Measurement Uncertainty: < 0.5 dB (100 MHz) typ. 0.15 dB › Resolution: 0.01 dB › f < 1 GHz: +/- 1 dB › 1 GHz < f < 18 GHz: +/- 1.5 dB 18 GHz < f < 40 GHz: +/- 2 dB › Pulse Indication according to CISPR 16-1-1

Level Measurement Uncertainty

CISPR Indication Range	› 6 dB margin to noise floor over complete amplitude range according to CISPR 16-1-1 Ed. 3.1 and later › Quasi-peak indication according to CISPR 16-1-1 › Peak, Average, CISPR-AVG indication according to CISPR 16-1-1 in all modes › CISPR-RMS indication according to CISPR 16-1-1 › Maximum deviation for sinusoidal signals according to CISPR 16-1-1: 1dB (9 kHz – 1 GHz) 2dB (1 GHz – 40 GHz)[1]
Absolute level uncertainty	› Signal level : 40 – 60 dBuV (15 MHz) < 0.3 dB (σ = 0.1) › Attenuator switching uncertainty (15 MHz) < 0.2 dB (σ = 0.15)
Frequency response	› Attenuation: all states including 0dB Preamplifier: On/Off, PRLNA: Off 1 Hz – 1 GHz < 0.5 dB (σ = 0.15dB) 1 GHz – 18 GHz < 1.5 dB (σ = 0.50dB) 8 GHz – 40 GHz < 2 dB (σ = 0.67dB) › Attenuation: all states including 0dB Pre amplifier: On/Off, PRLNA: On 1 Hz – 30 MHz < 0.5 dB (σ = 0.15dB) 30 MHz – 1 GHz < 1.2 dB (σ = 0.40dB) 1 GHz – 18 GHz < 1.5 dB (σ = 0.50dB) 18 GHz – 40 GHz < 2 dB (σ = 0.67dB)
Additional uncertainties	› Uncertainty of reference level setting: 0 dB › Uncertainty between Superheterodyne Mode and FFT-based Mode: 0 dB › Bandwidth Switching Uncertainty Typ: < 0.1dB
Nonlinearity of displayed level	› Logarithmic level display S/N > 16 dB, 0 dB ≤ level ≤ –70 dB < 0.1 dB (σ = 0.04 dB) S/N > 16 dB, –70 dB < level ≤ –90 dB < 0.2 dB (σ = 0.08 dB)

1 Fulfills requirement of Draft CISPR-16-1-1 up to 40GHz.

Total Measurement Uncertainty S/N > 20dB (95 % confidence level)	› Preamplifier: On/Off, PRLNA: Off 1 Hz – 1 GHz < 0.3 dB 1 GHz – 18 GHz < 0.7 dB 18 GHz – 40 GHz < 1.5 dB › Attenuation: all states including 0dB Preamplifier: On/Off, PRLNA: On 1 Hz – 30 MHz < 0.3 dB 30 MHz – 1 MHz < 0.6 dB 1 GHz – 18 GHz < 0.7 dB 18 GHz – 40 GHz < 1.5 dB
Spurious Response	› Residual spurious response RF attenuation = 0 dB, Preamp on › f ≤ 1 MHz < –107 dBm › f ≤ 1 MHz < –117 dBm › f > 1 MHz < –112 dBm › f > 1 GHz < –120 dBm (multisampling) › Image frequency < -80 dBc (nom.) › Suppression of 2x2 Mixing Product (< -70 dBc, multisampling)
Measurement time	› 1 µs – 60 s (Average, RMS) › 1 µs – infinite (Peak, Quasi-Peak, CISPR-Average, CISPR-RMS-Average)
Attenuator	› Mechanical: 0 – 70 dB, 10 dB Steps or 0 – 75 dB, 5 dB Steps › Autorange Function › Protection during Start-up: 10 dB › Protection in Off-State: Set to the max. Att.
Input Port RF1	› N-typ connector (1Hz - 6 GHz) › above 6 GHz Field replaceable › 6 GHz – 18 GHz (N Precision) › 6 GHz – 40 GHz (2.92 mm) › 0 dB attenuator: VSWR < 2.0 (1 Hz - 1 GHz), typ. 1.50 › 10 dB attenuator: VSWR < 3.0 (1 GHz - 40 GHz)
Input Port RF2	› N-type connector (1Hz - 6 GHz) › 0 dB attenuator: VSWR < 2.0 (1 Hz - 1 GHz), typ 1.50 › 10 dB attenuator: VSWR < 3.0 (1 GHz - 6 GHz)
Maximum input level (RF1)	› 0 dB Attenuator 122 dBµV 6V Pulses › 10 dB Attenuator 132 dBµV 18V Pulses
Maximum input level (RF2)	› 0 dB Attenuator 132 dBµV 18V Pulses

Specification TDEMI® G

Marker and Evaluation (Receiver Mode)
- Marker Functions : Marker, Delta, Peak Left, Peak Right, Left, Right, Marker
- to Trace, …
- Save and Load Measurements
- Report Generator (Option RG-UG) for automated Evaluation against Limit Lines, incl. Subranges

Intermodulation
- 1dB Compression Point of Mixer
  f ≤ 1 GHz 15 dBm (Digital IQ mixer)
  f > 1 GHz 10 dBm (First mixer)
- Third order Intercept Point (TOI)
  10 Hz – 1 GHz Typ. > 25 dBm
  1 GHz – 40 GHz Typ. > 20 dBm
- Second Harmonic Intercept Point (SHI)
  10 Hz – 40 GHz Typ. > 15 dBm (Preamp ON)

Dynamic, Nonlinearities
- Preamp active, Preselection active/inactive, Attenuator: 0 dB
- Image Frequency Rejection: typ. 70 dBc (100dBc Multisampling)
- IF Rejection: 80 dBc, (100dBc Multisampling)
- Display Level Range: Noise floor – 120 dBµV (13dBm)
- Suppression of harmonic components (Option PRLNA-UG)
  20 MHz - 22 GHz
  Mixer Level - 10 dBm: < - 80 dBc
- Suppression of non-harmonic components
  f > 1 MHz: < - 80 dBc

Trigger function
- Real-time spectrum analyzer mode: Frequency mask trigger, post & pretrigger
- Real-time EMI receiver mode: Frequency mask trigger, post & pretrigger

Demodulation (Receiver Mode) (Option DM-UG)
- Amplitude Modulation (AM)
- Frequency Modulation (FM)
- "Tune to Marker" Function

Tracking generator (Option MG-UG)
- MG-UG30M: 9 kHz – 30 MHz
- MG-UG1G: 9 kHz – 1 GHz
- MG-UG3G: 9 kHz – 3 GHz
- MG-UG6G: 9 kHz – 6 GHz
- MG-UG9G: 9 kHz – 9 GHz
- MG-UG18G: 9 kHz – 18 GHz
- MG-UG26G: 9 kHz – 26,5 GHz
- MG-UG30G: 9 kHz – 30 GHz
- MG-UG40G: 9 kHz – 40 GHz
- MG-UG XE: Control of external signal generator
- Synchronous stepped scanning
- Normalization for transducer factor (export function)

I-Q Memory Storage (Option IQ-UG)
- IQ50-UG: Extended Analysis Bandwidth to 50 MHz [1]
- IQ112-UG: Extended Analysis Bandwidth to 112 MHz [1]
- IQ225-UG: Extended Analysis Bandwidth to 225 MHz [1]
- IQ510-UG: Extended Analysis Bandwidth to 510 MHz [1]
- Resolution: 16 Bit I and Q Channel
- Memory Depth (First Level): 250 000 000 Points I and Q Channel
- Memory Depth (Second Level): 4 000 000 000 Points I and Q Channel
- Maximum Sampling Rate: 600 MHz I and Q Channel
- Variable Sampling Rate Digital Downconversion and Filter with N x 2

Remote Control
- Remote control command set according to SCPI standard

Interfaces
- 2x Ethernet/LAN, 4x USB, GPIB (Option GPIB-UG), HDMI (Display port), Audio

Display, User Interface
- Resolution 1280 x 800 Pixel, 10,1", TrueColor (16.78 Mio. colors), Multi Touchscreen, Projective Capacitive Touch (PCAP)

PC
- Multicore processor, 16 GByte RAM, >128 GByte Solid State Disc
- Operation system: Windows® 11, 64Bit

Power Supply
- 230 V +/-20 % 50 Hz or 110 V +/- 10% 60 Hz
- Typ. power consumption 60 - 140 W

Temperature range / EMC
- 15° - 40° C (min.)
- Emissions according to DIN EN 55011
- Immunity according to DIN EN 61000-6-2 (10V/m)
- Inputs matched
- Mains harmonics according to EN61000-3-2

Mechanical stress
- sinusoidal vibration: 5 Hz to 150 Hz, max. 1.8 g, 0.5 g from 55 Hz to 150 Hz, in line with EN 60068-2-6
- random vibration: 10 Hz to 100 Hz, acceleration 1g (RMS)
- shock: 40 g shock spectrum, in line with MIL-PRF-28800F, class 3

Weight
- approx. 13 kg

1 up to 30 GHz; with option IQ*UG_E up to 44 GHz (Dual-use export controlled)

TDEMI® G Options

Main Options

1Hz-UG	› Start frequency 1 Hz, decade bandwidths: 1Hz (SPA/RTSPA), 10 Hz, 100 Hz, 1kHz, 10 kHz, 100 kHz, 1 MHz, 8 MHz, 10 MHz	F, Z
ATT1dB-UG	› 1dB Step Attenuator	F, Z
REF-UG	› External Ref. input 10 MHz	F, Z
OCXO-UG	› Highly stable oven controlled reference oscillator	F, Z
ULNA-UG	› Ultra Low Noise Amplifier, additionally integrated for ultra low noise floor	F, Z
DM-UG	› AM/FM demodulator	F, Z
RTEMI112-UG	› Real-time EMI Receiver (112 MHz Real-time Bandwidth)	F, Z
RTEMI225-UG	› Real-time EMI Receiver (225 MHz Real-time Bandwidth)	F, Z
RTSPA112-UG	› Real-time Spectrum Analyzer (112 MHz Real-time Bandwidth)	F, Z
RTSPA225-UG	› Real-time Spectrum Analyzer (225 MHz Real-time Bandwidth)	F, Z
IQ50-UG	› IQ data analysis (50 MHz Real-time Bandwidth) up to 26,5 GHz	F, Z
IQ50-UG_E	› IQ data analysis (50 MHz Real-time Bandwidth) up to 44 GHz (Dual-use export controlled)	F, Z
IQ112-UG	› IQ data analysis (112 MHz Real-time Bandwidth) up to 26,5 GHz	F, Z
IQ112-UG_E	› IQ data analysis (112 MHz Real-time Bandwidth) up to 44 GHz (Dual-use export controlled)	F, Z
IQ225-UG	› IQ data analysis (225 MHz Real-time Bandwidth) up to 26,5 GHz	F, Z
IQ225-UG_E	› IQ data analysis (225 MHz Real-time Bandwidth) up to 44 GHz (Dual-use export controlled)	F, Z
IQ510-UG	› IQ data analysis (510 MHz Real-time Bandwidth) up to 26,5 GHz	F, Z
IQ510-UG_E	› IQ data analysis (510 MHz Real-time Bandwidth) up to 44 GHz (Dual-use export controlled)	F, Z
CRMS-UG	› CISPR-RMS-AVG detector	S
LISN-UG	› Controller for measuring accessories, TTL signals (+5V), e.g. for automated control of LISN	F, Z
LISNCable-UG	› Customized cable for auxiliary measurement equipment, e.g. LISN or triple loop antenna	H
RG-UG	› Report generator including analysis of subranges	S
MG-UG	› Tracking generator	F, Z
MX-UG	› External Mixer Hardware Interface (Requirement: Option MG-UG)	F, Z
KB-UG	› Compact keyboard incl. touchpad	H
TT-UG	› Transport and storage case for TDEMI® G	H
SEC-UG	› Security Option (Removable flash drive, Data Sanitization)	F, Z
APD-UG	› APD measuring function according to CISPR 16-1-1, processing of frequencies in parallel in real-time	F, Z
EMI64k	› Automation software suite	S
CLICK-UG	› Click rate analyzer, measurement of 4 frequencies in parallel	S
CAL-UG	› Calibration by the manufacturer according to ISO17025, incl. certificate and documentation of values	24 Months
CALD-UG	› Accredited Calibration according to DAkkS (ILAC) / ISO 17025, incl. certificate and documentation of values	24 Months

F: Upgradeable, integration at manufacturer site necessary; Z: Additional costs for exchange; H: Delivery of hardware; S: Software installation

Recommended Calibration interval: 24 Months

FULL & PRE COMPLIANCE

GAUSS INSTRUMENTS®
TDEMI® TECHNOLOGY

FULL COMPLIANCE
TDEMI® EMI Receiver

Ultimate & ULTRA Series

12V Power Supply & Battery Pack

SPECIAL FEATURES
- › Multi GHz Real-time Spectrum Analyzer
- › Ultrafast Spectrum Analyzer Scanning
- › Ultrafast Receiver Scanning
- › Ultrafast Superhet Mode

INFO
[ULTRA]

Multi GHz — Real-Time Scanning [Ultimate & ULTRA]

1000 MHz — Real-Time Bandwidth [Ultimate]

685/342.5 MHz — Real-Time Bandwidth [Ultimate &ULTRA]

DC - 6/18/26.5/40 GHz — Frequency Ranges [Ultimate & ULTRA Series]

up to 44 GHz — Frequency Ranges [Ultimate Series]

FULL COMPLIANCE
TDEMI® EMI Receiver

X & G Series

SPECIAL FEATURES
- › Real-time Spectrum Analyzer
- › Oscilloscope
- › Signal Analyzer

INFO
[X] eXtreme

INFO
[G] Standard

Multi GHz — Real-Time Scanning [X Series]

645 MHz — Real-Time Bandwidth [X Series]

325 / 162.5 GHz — Real-Time Bandwidth [X Series]

225 / 112 MHz — Real-Time Bandwidth [G Series]

DC - 1/3/6/18/26.5/40 GHz — Frequency Ranges [X Series]

1 Hz -1/3/6/9/18/26.5/30/40/44 GHz — Frequency Ranges [G Series]

PRE COMPLIANCE
TDEMI® EMI Receiver

M & M+ Series

Upgradeable to Full Compliance

SPECIAL FEATURES
- › Real-time Spectrum Analyzer
- › 12V Power Supply & Battery Pack

INFO
[M] Mobile
[M+] Mobile Plus

225 / 112 MHz — Real-Time Bandwidth [M & M+ Series]

10 Hz - 1/3/6/7 GHz — Frequency Ranges [M & M+ Series]

ABOUT

GAUSS INSTRUMENTS®
TDEMI® TECHNOLOGY

Established in the year 2007, the company GAUSS INSTRUMENTS is manufacturer of highest performance EMC test equipment and provides advanced EMI test solutions pushing your product development and testing capabilities ahead, and speeding up your time to market cycles. With GAUSS putting the turbo in EMC since 2007, product certifications as well as pre-certification tasks have become as simple as they had never been before. Across all over the world we provide our unrivaled products, advanced test solutions, and services – together with a local service partner of our worldwide network of highly qualified and dedicated team and partners.

GAUSS INSTRUMENTS traces its technical roots to basic research on short time Fourier analysis and synthesis begun in the 70's. In the early 2000's the founders of GAUSS INSTRUMENTS invented a measurement technology combining time-domain and FFT based techniques and superheterodyne technology in a massively parallel topology - the so called TDEMI® Technology which has become the new state-of-the-art in the world of EMI testing in the meanwhile. TDEMI® Technology is a registered brand and patented technology of GAUSS INSTRUMENTS. It is provided to you only by GAUSS or its' official certified local partners. Joint research projects were performed in the field of time-domain measurements of electromagnetic interferences (EMI) together with well-respected research institutes and universities. Official metrology labs, testing and certification institutes, as well as leading automotive OEMs and many other blue chip companies selected GAUSS as innovative cooperation partner and reliable solution provider for their demanding test requirements during market certification as well as product development but also research investigations. Over the past two decades about 100 publications, transaction papers, white papers and journal articles were published on selected topics of time-domain EMI measurements and EMC testing as well as intelligent methods for automated testing. As inventor of the TDEMI® Measurement Systems which use ultra high-speed analog-to-digital converters and pretty much advanced real-time digital signal processing methods we enable ultra fast tests and measurements for electromagnetic compliance that fulfill the increasing demands for measurements of today's ever increasing density and complexity of electronic equipment and systems.

And our innovation continues - combining our deep knowledge of real-time digital signal processing, millimeter, and microwave technologies to develop receiver and analyzer solutions combining and blurring the lines between previously discrete test instruments while delivering speeds and analysis capabilities several orders of magnitude greater than any other measurement equipment available. Combining both the advantages of the 'old' analog and the 'new' digital world we keep your testing up-to-date and beyond - pushing it to the next level and ready prepared for the future coming.

Today GAUSS offers a wide range of solutions from DC to 40 GHz for all kind of test requirements in the world of emission testing - full compliance solutions as well as pre-certification solution or even customized solution perfectly fitting to your specific requirements pushing your testing capabilities ahead. We provide customized signal processing solutions based on our well-proven hardware and DSP platforms, as well as unique software solutions. With a strong knowledge in real-time and digital technology, millimeterwave and microwave technology we develop systems that are absolutely outstanding in the field of test and measurement. E. g. the fastest real-time FFT based measuring instruments on the planet with a full compliance real-time analysis bandwidth of 685 MHz as well as classical superheterodyne technology to name a few only of our outstanding and outperforming features for full compliance testing and signal analysis.

It is our true passion to develop and to produce highest quality and highest performance instruments made in Germany. With leading-edge technology we're fulfilling all the today's requirements of complex measurement tasks and beyond. Our dedicated goal and ultimate passion is to provide our customers with all the additional benefits and full competitive advantages of accelerated testing, the optimum measurement procedures, unrivaled measurement speed and accuracy - all together at the same time. Empowered by our leading test solutions and patented TDEMI® Technology, we're boosting the capabilities of today's product development and significantly speeding up the time to market of your products. Thus, your product certification as well as pre-certification challenges become just a walk-over now!

Feel the experience and make your life easy!

Driven by our ultimate mission: **Smarter testing for a smarter world.**

Imprint

Specifications subject to be changed without notice.
Technically conditioned color divergences are possible.

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