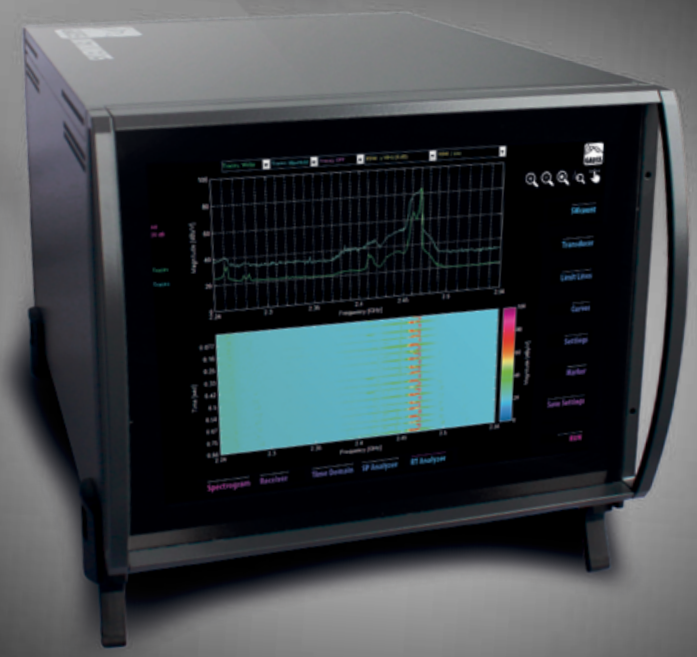
TDEMI® ULTRA



TDEMI® ULTRA
BEST RF PERFORMANCE AND LOWEST NOISE FLOOR.

GAUSS

Special Features

Up to 685 MHz Real-time Bandwidth	Up to 40 GHz Real-time Scanning	Ultrafast Receiver Scanning	Ultrafast Stepped Scanning	12 V Supply & Battery Pack	Intuitive and easy to operate

Content

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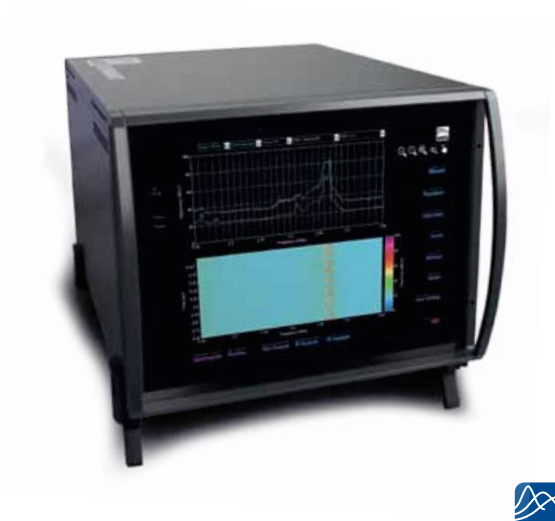

- **Testing acc. to CISPR, ANSI, MIL, DO, VG, ETSI, … Standards**
- **Ultrafast testing 64 000x faster than conventional EMI receivers**
- **Ultrafast superheterodyne mode**
- **Ultrahigh performance preselection in all operating modes**
- **+12 V supply and battery pack operation for mobile and on-board testing**
- **Up to 685 MHz fully gapless real-time analysis bandwidth**
- **Up to 40 GHz real-time scanning**
- **Real-time spectrum analyzer**

The novel TDEMI® ULTRA measurement systems are setting the new benchmark for full compliance testing according to all commercial, military, and OEM standards. The system is the first instrument that combines an ultrahigh performance superheterodyne stepped scan mode with ultrahigh performance technology. The result is an instrument, that allows to speed up the conventional stepped scan mode in combination with an ultrahigh performance preselection. Of course the instrument provides a huge real-time bandwidth of 685 MHz with two parallel CISPR detectors to speed up measurements tremendously. To reduce the measurement time also above 1 GHz even further, a 40 GHz Real-time Scanning module allows now measuring in real-time with a very high resolution of a frequency range of several GHz, e.g. a time resolution better than 100 ms over a range of 6 GHz. Easy operation is provided by a very user friendly graphical user interface and a 10.4" touch screen. The system's standard configuration comes with 16 GByte of RAM and it runs in a 64 bit architecture to store, process, and visualize huge amounts of data.

The instruments of the TDEMI® ULTRA receiver series are available for the frequency ranges up to 6 GHz, 18 GHz, 26.5 GHz and 40 GHz. Additionally these blazing fast measurements can be carried out even starting from DC optionally (Option DC-UG). The TDEMI® ULTRA receivers have been optimized for low power consumption and ultrahigh performance at the same time. With only 90 - 130 Watts of power consumption these receiver series provides a fully gapless real-time bandwidth of 685 MHz and 40 GHz real-time scanning. The TDEMI® ULTRA can be supplied either by 12 Volts or 110 - 240 Volts or by a battery pack respectively. This flexibility enables to perform on-board testings in vehicles, boats or aircrafts.

The TDEMI® ULTRA series has been designed for the usage of pre-certifications as well as final certifications. The instruments fulfill the CISPR 16-1-1 Ed 3.1 as well as all later editions. The traditional ultrahigh performance superheterodyne mode is available to perform measurements according to all standards that do not reference to modern short term FFT (STFFT) based instruments. In comparison to other solutions there is no additional uncertainty between the superheterodyne mode and the STFFT based mode. This unique feature greatly allows to reduce the overall uncertainty of EMC testing and minimizes the costs and effort in your lab.

The vast variety of functionalities includes a real-time spectrum analyzer with 342.5 MHz real-time analysis bandwidth as well as an oscilloscope. Special hardware based on the patented TDEMI® technology of GAUSS INSTRUMENTS allows to process real-time bands of even up to 685 MHz fully gapless, as required by CISPR 16-1-1. This tough require-

ment of a probability of intercept of about 300 ps makes the TDEMI® ULTRA also a perfect analysis tool to detect, measure and investigate very short, intermittent signals or single events.

For EMI measurements the TDEMI® ULTRA brings you an extremely fast scanning speed. Pre- and full compliance measurements can be carried out by a factor of 64 000 times faster than with other solutions. For measurements using the quasi-peak detector the duration of a scan in the range from 30 MHz – 1 GHz is reduced from hours down to a few seconds, making the TDEMI® ULTRA the absolutely fastest receiver for pre-certifications as well as for full compliance testing and product certification. Blazing speed is not the only absolutely unparalleled feature making the TDEMI® ULTRA unrivaled. Some more of the outstanding features are e. g. the possibility to run 100 scans, to load an unlimited number of limit lines and transducers, and to create tables with an unlimited number of markers. These features greatly help to make your testing much more efficient and the final test report can be generated automatically and you get the final test result within just seconds.

For the measurement of communication equipment the TDEMI® ULTRA can be equipped with the option PRLNA-UG. This option integrates an additional preselection low noise amplifier system into your TDEMI® ULTRA. During the measurement of harmonics of such devices with high dynamic range there is no need of any additional notch filters anymore. For the measurement of communication signals for power line communication or WiFi, the ultrahigh performance preselection in combination with an ultrahigh linear input stage allow to measure harmonics down to a level of 90 dBc.

For the measurement of communication devices the TDEMI® ULTRA is equipped also with a spectrum analyzer mode with a set of fine step of resolution bandwidths from 1 Hz – 15 MHz. In addition, with the option LRBW-UG further resolution bandwidths up to 200 MHz are available. For the analysis and demodulation of communication devices the TDEMI® ULTRA can be upgraded with the option IQ-Data which allows to store and process communication signals with a bandwidth of several hundred MHz. A powerful programmable Digital Down Converter Unit allows to configure the bandwidth and sampling rate dynamically between several kHz up to several hundred MHz. An AM/FM audio-demodulator is very useful as well e. g. at an open area test site (OATS) for analyzing the ambient noise.

The measurement of frequency hopping signals can be carried out in the real-time spectrum analyzer mode as required by ETSI standards. The real-time spectrum analyzer of the TDEMI® ULTRA provides in addition to a conventional real-time spectrum analyzer some advantages. In this mode the TDEMI® ULTRA works like a parallel set of a huge number of spectrum analyzers in zero spans tuned to specific frequencies. This technology provides an excellent POI of about 300ps as well as all features that are provided by a conventional spectrum analyzer, like RMS detector and video filters.

With the TDEMI® ULTRA series your EMC testing according to CISPR, MIL461, DO160, ANSI, FCC and ETSI standards or any related standards is accelerated tremendously. At the same time highly reliable and reproducible test results with reduced measurement uncertainty ensure a very good correlation with your or any other external certification lab. By not missing any disturbance or emission, e. g. intermittent or even single events you can be sure to pass the certification. This saves the additional costs and efforts of repeating certification tests and makes the TDEMI® ULTRA a highly valueable and cost effective solution for your product development and pre-certification process.

The TDEMI® ULTRA is an excellent investment for today and for the future with an even great return on investment. The system can be extended in the frequency range or upgraded with additional features any time later. The recommended calibration interval of 24 months makes the instrument a very cost effective solution during the operation. Software updates, e.g. for the support of new standards, are provided over the entire lifetime of the instrument.

With the EMI64k automation software suite conducted emission measurements, measurements with the CDNE and disturbance power measurements can be carried out fully automated. For automated radiated EMI testing in a fully anechoic room (FAR), on open area test sites (OATS) or in a semi anechoic chamber (SAC) automation routines and drivers for turntable and antenna masts are available as well. The EMI testing with the GTEM cell can also be fully automated including the generation of the final report.

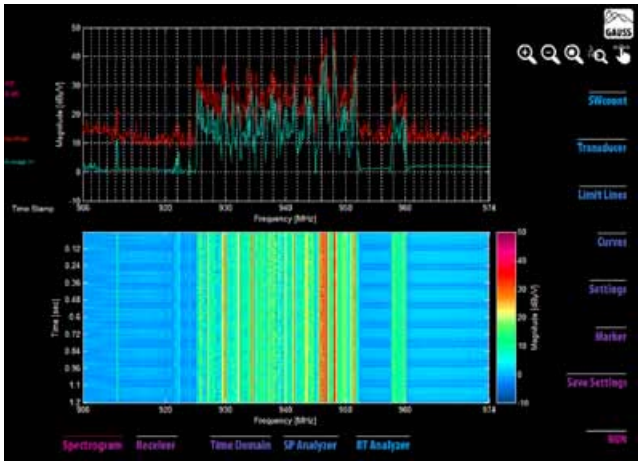

Fig. 1 – **Ultra fast Receiver Scanning in spectrogram. Real-time spectrogram of a GSM signal is shown.**

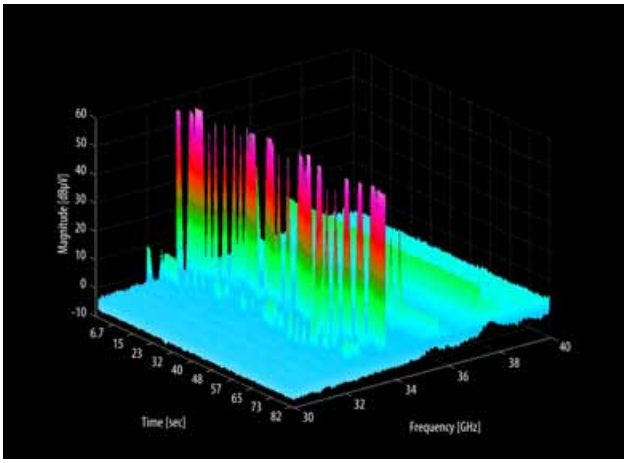

Fig. 2 – **Real-time measurement of a GHz frequency hopping signal.**

Ultra fast Receiver Scanning

The ultrafast Receiver Scanning technology enables to speed up EMI testing for traditional stepped scan mode as well as for measurements according to the definition of the "FFT-based Measuring Instrument" of CISPR 16-1-1 and MIL 461G, also known as TDEMI® Technology. Real-time autoattenuation and real-time notching ensure a huge dynamic range over the entire frequency range.
In the stepped scan mode the measurement speed is improved dramatically in comparison to prior art technology. For example in stepped scan mode a measurement from 1 GHz – 6 GHz takes about 1.5s with two parallel CISPR detectors. Activating the "FFT-based" Multichannel Measuring Mode the entire scan takes less than 100ms. Of course both modes show the same level accuracy and fulfill the current CISPR 16-1-1 as well as previous versions.
The individual scans can be stored in a spectrogram. The system uses real-time streaming, a full 64 bit architecture that enables to process several Gigabyte to visualize it in real-time. Typical applications of this mode are measurements of passing trains, E-Mobility as well as measurements according any to EMC or ETSI Standards. Long-term spectrum monitoring as well as the analysis of non-stationary signals with a resolution in the microsecond range is also available.

Multi GHz Real-time Scanning

Recently, GAUSS INSTRUMENTS introduced the novel Multi-GHz real-time scanning feature for the TDEMI® ULTRA receiver series providing a several Gigahertz real-time bandwidth.

By the newly designed very powerful hardware, measurements across several Gigahertz can be performed in the real-time spectrum analyzer mode. E.g. in the frequency range from 1 GHz to 40 GHz, all frequency points can be directly measured with a very high resolution in time and the result can be maximized instantaneously.

Over the entire frequency range the measurement results are displayed in real-time. Thus the final maximization can be performed at all frequencies in just one step. The detectors peak, average, and RMS are available in this mode. Further the video bandwidths, which are required according to the standards, can be applied.

Of course all the measurements are according to CISPR, ANSI C63.4, FCC Part 15, MIL 461, DO 160 and many other national and international standards are fully covered.

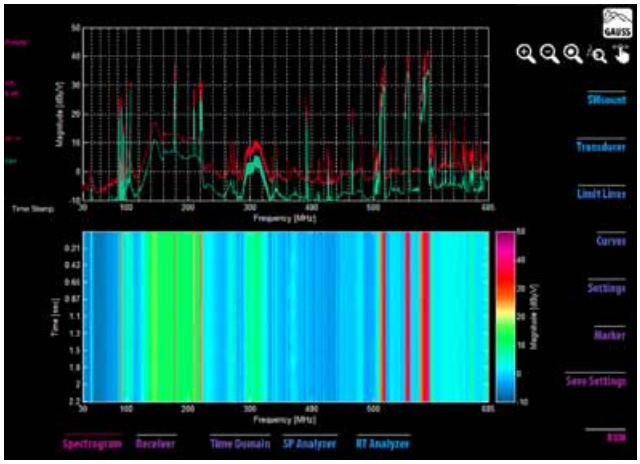

Fig. 3 – **Screenshot 685 MHz Real-time Measurement (Quasi-peak and CISPR-Average in parallel).**

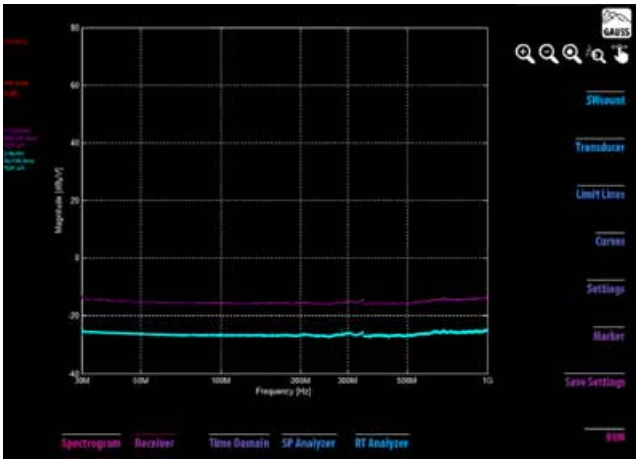

Fig. 4 – **Noise floor 30 MHz - 1 GHz.**

685 MHz Real-time Bandwidth

Measurements of radiated emissions in the frequency range up to 1 GHz are very time consuming as according to CISPR and FCC Standards the measurements have to be performed at several antenna heights and all angular positions of the device under test.

Using the TDEMI® ULTRA of GAUSS INSTRUMENTS with a real-time analysis bandwidth of 685 MHz and fully gapless evaluation and visualizing (Option 685M-UG) the final maximization can be performed at all frequencies simultaneously, and in full real-time over all positions.

This worldwide unique feature of the fully gapless real-time spectrogram mode combines all advantages of the single frequency mode of a traditional receiver with the possibility to carry out the measurement 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. Fully gapless processing and evaluation of all frequencies is given, which is a mandatory requirement of CISPR 16-1-1 Ed. 3.1 or later.

Ultra-low noise floor

The world's fastest EMI receiver – the TDEMI® ULTRA of GAUSS INSTRUMENTS providing unique features as 685 MHz fully CISPR compliant real-time bandwidth, Multi-GHz Real-time Scanning and the lowest displayed average noise level at 40 GHz can be equipped also with additional ultra low noise pre-amplifiers (ULNA-UG) for the frequency ranges 30 MHz – 6 GHz, 18 GHz, 26.5 GHz, and 40 GHz.

These novel pre-amps provide a very low noise figure and a very high dynamic range - both at the same time - thus providing an RF performance outstanding in the test and measurement market.

High linearity and lowest displayed inherent noise is achieved by a patented technology combining pre-amps with very low noise figure, pre-selectors and a special circuit monitoring the linearity reserve of the pre-amp.

Since the noise floor of the TDEMI® ULTRA does not contain any inherent spurs, the TDEMI® ULTRA equipped with the option ULNA-UG is the perfect tool for automotive EMC measurements according CISPR 25 as well as all other OEM standards.

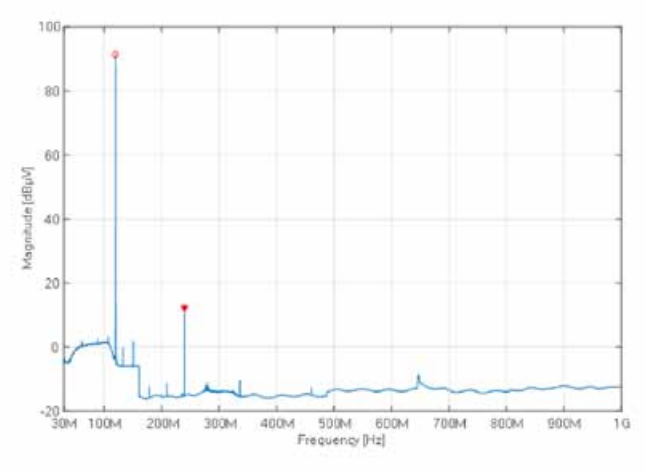

Fig. 5 – **Measurement of Harmonics 120 MHz.**

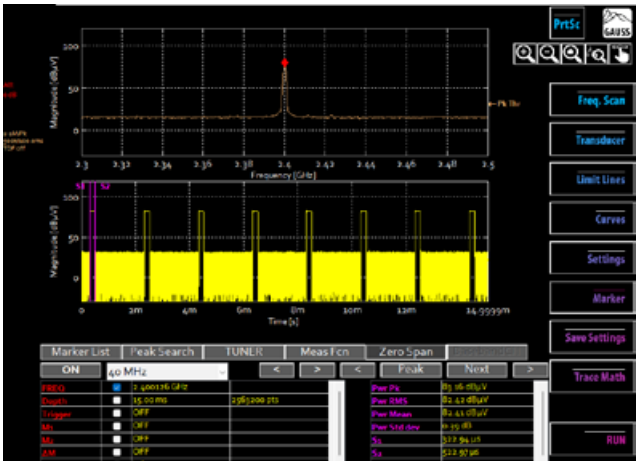

Fig. 6 – **Measurement of Pulse Train of Signal at 2.4 GHz with 40 MHz Resolution Bandwidth.**

Preselection Low Noise Amplifier System

The TDEMI® ULTRA contains a combination of a preselection, ultrahighly linear input stage, and high resolution ADCs to achieve a maximum performance that supersedes prior art technology, e.g. for pulses and pulse modulated carriers.

By this technology, during all operating modes optimum image rejection, and full CISPR 16-1-1 compliance is ensured, of course.

For the measurement of transmitting devices, e.g. below 1 GHz, it is often necessary to measure harmonics of these devices with a performance up to 90 dBc. The optional Preselection Low Noise Amplifier System (PRLNA-UG) allows suppressing the fundamentals while the harmonics are measured. The option can be activated during measurements in receiver mode. While the preselection is active an instantaneous real-time bandwidth of 171.25 MHz is available.

Thus, additional auxiliary equipment, such as external notch filters are not needed anymore during the measurement of such devices.

200 MHz IQ Analysis

The IQ mode is available as additional option for the TDEMI® ULTRA and can be ordered in several selections either up to 40 MHz or with Option LRBW-UG up to 200 MHz.

The TDEMI® ULTRA is equipped with a large memory of 2x8 Megasamples first level memory and 8 GByte second level memory to store and process the I/Q data for vector signal analysis. Typical applications are the pulse power train measurements for WIFI and Bluetooth. The Option LRBW-UG offers the large Resolution Bandwidth which are needed for measurement of UWB Signals. 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 200 MHz is available up to 40 GHz with activated preselection. In contrast to traditional receivers that are based on spectrum analyzers, thus with the TDEMI® ULTRA always full image rejection is guaranteed and high dynamic range provided without any need to turn off the preselection during wide IF bandwidth operation.

Specification TDEMI® ULTRA

Frequency Range

TDEMI® ULTRA 6	9 kHz - 6 GHz
TDEMI® ULTRA 18	9 kHz - 18 GHz
TDEMI® ULTRA 26	9 kHz - 26.5 GHz
TDEMI® ULTRA 40	9 kHz - 40 GHz
extendable	› down to DC - 9 kHz, Option DC-UG

Reference Oscillator (OCXO)	› 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
Spectral purity	› SSB phase noise frequency = 500 MHz, carrier offset › 100 Hz < –100 dBc (1 Hz) › 1 kHz < –107 dBc (1 Hz) › 10 kHz < –101 dBc (1 Hz) › 100 kHz < –126 dBc (1 Hz) › 1 MHz < –146 dBc (1 Hz) › 10 MHz < –150 dBc (1 Hz) (nom.) › Residual FM frequency = 500 MHz, RBW = 1 kHz, Sweep time = 100 ms < 3 Hz (nom.)
Operating modes	› EMI receiver (superheterodyne) › EMI receiver (FFT-based measuring instrument) › Real-time EMI receiver (spectrogram) › Spectrum analyzer › Real-time spectrum analyzer › Oscilloscope

EMI Receiver
(CISPR 16-1-1, ANSI C63.2, MIL461, DO-160)

Frequency readout (Analyzer mode)	› Marker resolution 0.5 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 0.1 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 › Number of trace points up to 8 000 000 › 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, MIL461, DO160)

Frequency segment processed in parallel	› RBW = 10 Hz 0.09 MHz (Option DC-UG) › RBW = 100 Hz 0.9 MHz (Option DC-UG) › RBW = 200 Hz 1.7 MHz (Option DC-UG) › RBW = 1 kHz 8.5 MHz (Option DC-UG) › RBW = 9 kHz 85 MHz › RBW = 10 kHz 85 MHz (Option DC-UG) › RBW = 120 kHz 342.5 MHz RTBW › RBW = 100 kHz 342.5 MHz RTBW › RBW = 1 MHz 342.5 MHz RTBW
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: < 100 ms › Band C/D (30 MHz - 1 GHz) 9 kHz, peak detector, dwell time 10 ms: < 100 ms › Band C/D (30 MHz - 1 GHz), Quasi-Peak, dwell time 1 s: 4 s (+ 5s processing time) › Band E (1 GHz – 6 GHz), dwell time 1 ms: 100 ms
Measurement Speed	› Measurement and Update Rate Receiver Mode & Storage 40960 Frequency Points 1ms (40960000 Points / s) (meas.)
FFT-Overlaping Factor	› according to CISPR 16-1-1 and CISPR 16-3 › Overlapping factor typ > 95% [1]

Real-time EMI Receiver (Spectrogram)
(CISPR 16-1-1, ANSI C63.2, MIL461, DO-160)

	› Real-time bandwidth 342.5 MHz, 685 MHz (Option 685M-UG) › Peak, Quasi-Peak, Average, CISPR-Average, and RMS detector › Time-domain fully gapless › Frequency Step: Half of Bandwidth › Minimum resolution in time 5 ms (depending on number of points) › Zoom & Pan to Select Frequency band of interest › POI 300ps
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

1 FFT-based measuring instrument according to CISPR 16-1-1, MIL461 and other EMC standards. Sometimes called time-domain scan.

Specification TDEMI® ULTRA

Preselection and Preamplifier

Structure	› Multiple paths with fixed filters › Multiple paths for different amplitude ranges
Digital Preselection	› 0 MHz – 171.25 MHz › 171.25 MHz – 342.5 MHz › 342.5 MHz - 513.75 MHz › 513.75 MHz - 685 MHz › 685 MHz - 856.25 MHz › 856.25 MHz – 1 GHz

Preselection without Option PRLNA-UG

TDEMI® ULTRA 6	High-pass Filter 150 kHz 150 kHz – 30 MHz 30 MHz – 300 MHz 30 MHz – 1.15 GHz 1.15 GHz – 3 GHz 3 GHz – 6 GHz
TDEMI® ULTRA 18	High-pass Filter 150 kHz 150 kHz – 30 MHz 30 MHz – 300 MHz 30 MHz – 1.15 GHz 1.15 GHz – 3 GHz 3 GHz – 6 GHz 6 GHz – 9 GHz 9 GHz – 13 GHz 13 GHz – 15 GHz 15 GHz – 18 GHz
TDEMI® ULTRA 26	High-pass Filter 150 kHz 150 kHz – 30 MHz 30 MHz – 300 MHz 30 MHz – 1.15 GHz 1.15 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® ULTRA 40	High-pass Filter 150 kHz 150 kHz – 30 MHz 30 MHz – 300 MHz 30 MHz – 1.15 GHz 1.15 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

Preselection with Option PRLNA-UG

TDEMI® ULTRA 6	DC – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 171.255 MHz 171.25 MHz – 342.5 MHz 342.5 MHz – 513.75 MHz 513.75 MHz – 685 MHz 685 MHz – 856.25 MHz 856.25 MHz – 1 GHz 1 GHz – 3 GHz 3 GHz – 6 GHz
TDEMI® ULTRA 18	DC – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 171.255 MHz 171.25 MHz – 342.5 MHz 342.5 MHz – 513.75 MHz 513.75 MHz – 685 MHz 685 MHz – 856.25 MHz 856.25 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® ULTRA 26	DC – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 171.255 MHz 171.25 MHz – 342.5 MHz 342.5 MHz – 513.75 MHz 513.75 MHz – 685 MHz 685 MHz – 856.25 MHz 856.25 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® ULTRA 40	DC – 9 kHz 9 kHz – 150 kHz 150 kHz – 30 MHz 30 MHz – 171.255 MHz 171.25 MHz – 342.5 MHz 342.5 MHz – 513.75 MHz 513.75 MHz – 685 MHz 685 MHz – 856.25 MHz 856.25 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

Low Noise Preamplifier without Option PRLNA-UG

TDEMI® ULTRA 6	› Fixed between Preselection and Mixer, ADC respectively	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.5 dB)
	› 1.15 GHz – 6 GHz	(Gain 20 dB, NF typ. 2.0 dB)
TDEMI® ULTRA 18	› Fixed between Preselection and Mixer, ADC respectively	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.5 dB)
	› 1.15 GHz – 6 GHz	(Gain 20 dB, NF typ. 2.0 dB)
	› 6 GHz – 9 GHz	(Gain 17 dB, NF typ. 1.6 dB)
	› 9 GHz – 13 GHz	(Gain 21 dB, NF typ. 1.8 dB)
	› 13 GHz – 18 GHz	(Gain 19 dB, NF typ. 2.2 dB)
TDEMI® ULTRA 26	› Fixed between Preselection and Mixer, ADC respectively	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.5 dB)
	› 1.15 GHz – 6 GHz	(Gain 20 dB, NF typ. 2.0 dB)
	› 6 GHz – 9 GHz	(Gain 17 dB, NF typ. 1.6 dB)
	› 9 GHz – 13 GHz	(Gain 21 dB, NF typ. 1.8 dB)
	› 13 GHz – 18 GHz	(Gain 19 dB, NF typ. 2.2 dB)
	› 18 GHz – 26.5 GHz	(Gain 22 dB, NF typ. 2.0 dB)
TDEMI® ULTRA 40	› Fixed between Preselection and Mixer, ADC respectively	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.5 dB)
	› 1.15 GHz – 6 GHz	(Gain 20 dB, NF typ. 2.0 dB)
	› 6 GHz – 9 GHz	(Gain 17 dB, NF typ. 1.6 dB)
	› 9 GHz – 13 GHz	(Gain 21 dB, NF typ. 1.8 dB)
	› 13 GHz – 18 GHz	(Gain 19 dB, NF typ. 2.2 dB)
	› 18 GHz – 26.5 GHz	(Gain 22 dB, NF typ. 2.0 dB)
	› 26.5 GHz – 33 GHz	(Gain 22 dB, NF typ. 2.0 dB)
	› 33 GHz – 40 GHz	(Gain 17 dB, NF typ. 2.1 dB)

Low Noise Preamplifier with Option PRLNA-UG

TDEMI® ULTRA 6	› switchable on/off	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.0 dB)
	› 1.15 GHz – 6 GHz	(Gain 20 dB, NF typ. 2.0 dB)
TDEMI® ULTRA 18	› switchable on/off	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.0 dB)
	› 1.15 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® ULTRA 26	› switchable on/off	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.0 dB)
	› 1.15 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® ULTRA 40	› switchable on/off	
	› 150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.0 dB)
	› 1.15 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)

Specification TDEMI® ULTRA

Noise Floor (Receiver Mode) without Option PRLNA-UG
Preselection (in front of preamp) active, Average Detector, typical

TDEMI® ULTRA 6	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV
	› 1.1 GHz – 6 GHz (1 MHz IF):	< 2 dBuV
TDEMI® ULTRA 18	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV
	› 1.1 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):	< 15 dBuV
TDEMI® ULTRA 26	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV
	› 1.1 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):	< 15 dBuV
	› 18 GHz – 26.5 GHz (1 MHz IF):	< 10 dBuV
TDEMI® ULTRA 40	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV
	› 1.1 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):	< 15 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

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

	Option ULNA-UG	off	on
TDEMI® ULTRA 6	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV	< -15 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV	< - 4 dBuV
	› 1.1 GHz – 6 GHz (1 MHz IF):	< 2 dBuV	< - 4 dBuV
TDEMI® ULTRA 18	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV	< -15 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV	< - 4 dBuV
	› 1.1 GHz – 6 GHz (1 MHz IF):	< 2 dBuV	< - 4 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
TDEMI® ULTRA 26	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV	< -15 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV	< - 4 dBuV
	› 1.1 GHz – 6 GHz (1 MHz IF):	< 2 dBuV	< - 4 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 18 GHz – 26.5 GHz (1 MHz IF):	< 5 dBuV	< 3 dBuV
TDEMI® ULTRA 40	› 10 Hz – 100 Hz (10 Hz IF):	< 0 dBuV	< 0 dBuV
	› 100 Hz – 1 kHz (10 Hz IF):	< -10 dBuV	< -10 dBuV
	› 1 kHz – 9 kHz (10 Hz IF):	< -20 dBuV	< -20 dBuV
	› 9 kHz – 150 kHz (200 Hz IF):	< -20 dBµV	< -20 dBµV
	› 1 MHz – 30 MHz (9kHz IF):	< -15 dBµV	< -15 dBµV
	› 30 MHz – 1 GHz (120 kHz IF):	< -8 dBµV	< -15 dBµV
	› 1 GHz – 1.1 GHz (1 MHz IF):	< 1 dBuV	< - 4 dBuV
	› 1.1 GHz – 6 GHz (1 MHz IF):	< 2 dBuV	< - 4 dBuV
	› 6 GHz – 9 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV	< - 4 dBuV
	› 18 GHz – 26.5 GHz (1 MHz IF):	< 5 dBuV	< 3 dBuV
	› 26.5 GHz – 33 GHz (1 MHz IF):	< 5 dBuV	< 5 dBuV
	› 33 GHz – 40 GHz (1 MHz IF):	< 5 dBuV	< 5 dBuV

Spectrum Analyzer

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 – 15 MHz › 1, 2, 3, 5 steps › Small step size (145 steps) for channel measurements › 6dB bandwidths CISPR: 200 Hz, 9 kHz, 120 kHz, 1 MHz › 6dB bandwidths MIL/DO: 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz › 3dB bandwidths: 20 MHz, 40 MHz (Option IQ-UG), 50 MHz, 80 MHz, 100 MHz, 160 MHz (Option IQ-UG + LRBW-UG) [1] › Channel Filter: 60 kHz, 100 kHz, 200 kHz, 500 kHz, 1 MHz, 2 MHz, 4 MHz, 8 MHz, 15 MHz, 30 MHz (Option IQ-UG), 50 MHz, 100 MHz, 200 MHz (Option IQ-UG+LRBW-UG) [1]
Video filter	› Relative IF bandwidth: › 1, 1/2, 1/5, 1/10, 1/20, 1/50, 1/100 , 1/1000, 1/10000, 1/ 100000 › Detectors: MaxPeak, MinPeak, Sample
Detectors (Video filter 0)	› Maxpeak, Average, RMS › Dynamic requirements according to CISPR 16-1-1 (Peak, AVG)

Real-time Spectrum Analyzer

Analysis Settings	› Automatic selection of the settings › STFFT Resolution: 64000 Points › Real-time analysis bandwidth 342.5 MHz › Time-domain fully gapless › Frequency step: Half of bandwidth › Minimum resolution in time 5 ms (depending on number of points) › Zoom & Pan to select frequency band of interest › Analysis of history › POI 300 ps
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
IF Bandwidth	› 3dB bandwidth: 1 Hz – 15 MHz › 1, 2, 3, 5 steps › Small Step Size (145 Steps) for channel measurements › 6dB Bandwidths CISPR: 200 Hz, 9kHz, 120 kHz, 1 MHz › 6dB bandwidths MIL/DO: 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100kHz, 1 MHz
Video filter	› Relative IF bandwidth: 1, 1/2, 1/5, 1/10, 1/20, 1/50, 1/100 , 1/1000, 1/10000, 1/ 100000 › Detectors: MaxPeak, MinPeak, Sample

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

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 64000 Frequency Points 1ms (64000 000 Points / s) (meas.)

Noise Floor (Analyzer Mode) without Option PRLNA-UG	› Preselection (in front of preamp) active, Average Detector, typ.	
	› 1 Hz – 10 Hz	< -107 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

Noise Floor (Analyzer Mode) with Option PRLNA-UG	› ULNA-UG on, Preselection on/off, Average Detector, typ.	
	› 1 Hz – 10 Hz	< -107 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	< -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

Noise Floor (Analyzer Mode) with Option PRLNA-UG with Signal Processing	› ULNA-UG on, Preselection on/off, Average Detector, typ.	
	› 1 Hz – 10 Hz	< -115 dBm/Hz
	› 10 Hz – 100 Hz	< -125 dBm/Hz
	› 100 Hz – 1 kHz	< -135 dBm/Hz
	› 1 kHz – 9 kHz	< -145 dBm/Hz
	› 9 kHz – 150 kHz	< -153 dBm/Hz
	› 1 MHz – 30 MHz	< -160 dBm/Hz
	› 30 MHz – 1 GHz	< -174 dBm/Hz
	› 1 GHz – 1.1 GHz	< -171 dBm/Hz
	› 1.1 GHz – 6 GHz	< -173 dBm/Hz
	› 6 GHz – 9 GHz	< -173 dBm/Hz
	› 9 GHz – 13 GHz	< -173 dBm/Hz
	› 13 GHz – 18 GHz	< -168 dBm/Hz
	› 18 GHz – 26.5 GHz	< -168 dBm/Hz
	› 26.5 GHz – 33 GHz	< -168 dBm/Hz
	› 33 GHz – 40 GHz	< -168 dBm/Hz

Specification TDEMI® ULTRA

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
› 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)

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
Preamplifer: On/Off, PRLNA: Off
DC – 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
Preamplifer: On/Off, PRLNA: On
DC – 30 MHz < 0.5 dB (σ = 0.15dB)
30 MHz – 1 MHz < 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)

Total Measurement Uncertainty S/N > 20dB (95 % confidence level)

› Preamplifer: On/Off, PRLNA: Off
DC – 1 GHz < 0.3 dB
1 GHz – 18 GHz < 0.7 dB
18 GHz – 40 GHz < 1.5 dB

› Attenuation: all states including 0dB
Preamplifer: On/Off, PRLNA: On
DC – 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 MHz < –120 dBm (multisampling)
› Image frequency < -100 dBc (multisampling)
› Spurious IF response < -100 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 – 55 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 (DC - 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 (DC - 1 GHz), typ. 1.50
› 10 dB attenuator: VSWR < 3.0 (1 GHz - 40 GHz)

Input Port RF2

› N-type connector (DC - 6 GHz)
› 0 dB attenuator: VSWR < 2.0 (DC - 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 (10dB Att)

Maximum input level (RF2)

› 0 dB Attenuator
132 dBµV
18V Pulses

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 – 40 GHz Typ. > 20dBm › Second Harmonic Intercept Point (SHI) 10 Hz – 40 GHz Typ. > 55dBm
Dynamic, Nonlinearities	› Preamp active, Preselection active/inactive, Attenuator: 0 dB › Image Frequency Rejection: typ. 70 dBc (100dBc Multisampling) › IF Rejection: 70 dBc, (100dBc Multisampling) › Display Level Range: Noise floor – 120 dBµV (13dBm)
Trigger function	› Real-time spectrum analyzer mode: Frequency mask trigger, post & pretrigger › Real-time EMI receiver mode: Frequency mask trigger, post & pretrigger
Time-domain Analysis (RF) - Oscilloscope	› Bandwidth 1 GHz › Sampling rate 2.6 GS/s › 16 Bit resolution › 32000 Samples › Trigger, Post- and Pre- Trigger function, Amplitude Trigger
Demodulation (Receiver Mode) (Option DM-UG)	› Amplitude Modulation (AM) › Frequency Modulation (FM) › "Tune to Marker" Function
Tracking generator (Option MG-UG)	› MG-UG6G: 9 kHz – 6 GHz › MG-UG20G: 9 kHz – 20 GHz › MG-UG40G: 9 kHz – 40 GHz › MG-UG XE: Control of external signal generator › Synchronous and fast sweeped › Normalization for transducer factor (export function)
I-Q Memory Storage (Option IQ-UG)	› Resolution: 16 Bit I and Q Channel › Memory Depth (First Level): 8 000 000 Points I and Q Channel › Memory Depth (Second Level): 8 000 000 000 Points I and Q Channel › Maximum Sampling Rate: 342.5 MHz I and Q Channel › Variable Sampling Rate Digital Downconversion and Filter with N x 2 › Bandwidth > 200 MHz (Option LRBW-UG) [1]

1 up to 30 GHz; with option LRBW-UG_E up to 40 GHz (Dual-use export controlled)

Remote Control	› Remote control command set according to SCPI standard
Interfaces	› Ethernet/LAN, USB, GPIB (Option GPIB-UG), HDMI (Display Port), Audio
Display, User Interface	› Resolution 1024 x 768 Pixel, 10,4", TrueColor (16.78 Mio. colors), Multi Touchscreen
PC	› Multicore processor, 16 GByte RAM, >128 GByte Solid State Disc › Operation system: Windows® 11, 64Bit
Power Supply	› +11 V .. +14 V DC, 230 V +/-20 % 50 Hz or 110 V +/- 10% 60 Hz › Typ. power consumption 90 - 130 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 › Electric Safety EN 61010-1
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. 10 - 12 kg

Specification TDEMI® ULTRA

Main Options

DC-UG	› Start frequency DC, decade bandwidths: 10 Hz, 100 Hz, 1kHz, 10 kHz, 100 kHz, 1 MHz	F, Z
685M-UG	› Real-time Bandwidth 685 MHz, Quasi-Peak and CISPR-AVG parallel in real-time spectrogram mode More increase of measurement speed	F, Z
ULNA-UG	› Ultra Low Noise Amplifier, additionally integrated for ultra low noise floor	F, Z
PRLNA-UG	› Preselection Low Noise Amplifier System	F, Z
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
KB-UG	› Compact keyboard incl. touchpad	H
TC-UG	› Transport and storage case for TDEMI	H
DM-UG	› AM/FM demodulator	S
IQ-UG	› IQ data analysis	F, Z
LRBW-UG	› Further Resolution Bandwidths up to 200 MHz (requires IQ-UG) up to 30 GHz	F, Z
LRBW-UG_E	› Further Resolution Bandwidths up to 200 MHz (requires IQ-UG) up to 40 GHz (Dual-use export controlled)	F, Z
RG-UG	› Report generator including analysis of subranges	S
CRMS-UG	› CISPR-RMS-AVG detector	S
MG-UG	› Tracking generator	F, Z
MX-UG	› External Mixer Hardware Interface (Requirement: Option MG-UG)	F, Z
SEC-UG	› Security Option (Removable flash drive, Data Sanitization)	F, Z
BAT-UG	› Battery pack, rechargeable, approx. 3 hours runtime	H
APD-UG	› APD measuring function according to CISPR 16-1-1, processing of frequencies in parallel in real-time	F, Z
CLICK-UG	› Click rate analyzer, measurement of discontinuous disturbance according to CISPR 16-1-1 and CISPR 14-1, 6 Hours	S
EMI64k	› Automation software suite	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

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

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QP REAL-TIME BANDWIDTH

162.5 MHz

SINCE 2007

QP REAL-TIME BANDWIDTH

325 MHz

SINCE 2013

QP REAL-TIME BANDWIDTH

645 MHz

SINCE 2016

ULTRA-FAST RECEIVER SCANNING

40 GHz

SINCE 2018

QP REAL-TIME BANDWIDTH

1000 MHz

SINCE 2023

@ TDEMI Ultimate

REAL-TIME MEASUREMENTS

44 GHz

SINCE 2023

@ TDEMI Ultimate

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