

TDEMI® X



**TDEMI® X – 64 000 TIMES FASTER THAN
CONVENTIONAL EMI RECEIVERS**



MAIN FEATURES

Receiver

APD Function
and Histogram

Real-time
Spectrogram

Spectrum
Analyzer

Real-time
Spectrum Analyzer

Oscilloscope

Content

NEW! The TDEMI® eXtreme.	4
Technical Specifications	8
Products Overview	14
About	15
Imprint	17

At a Glance

TDEMI® X

- › 64 000 times faster than conventional instruments
- › 100 dB
- › multifunctional and upgradeable
- › conventional and FFT-based leading-edge technology



The novel product line TDEMI® eXtreme (short form: TDEMI® X) is the latest and most advanced level of full digital measurement equipment for emission testing on the fast lane. It is based on the unrivaled and well approved technology of GAUSS INSTRUMENTS.

By the use of the leading-edge analog-to-digital converters with the best ratio of signal to noise power density available on the market, most modern high-speed FPGAs with a calculation power of about 250 state-of-the-art PCs and in-house designed high performance microwave circuits highest measurement accuracy and highest measurement speed is achieved over the entire frequency range starting from 10 Hz up to 40 GHz.

The new TDEMI® eXtreme is easily upgradeable in its frequency range by different extensions which can be integrated into the instrument subsequently.

The frequency ranges are 1 GHz, 3 GHz, 6 GHz, 18 GHz, 26.5 GHz or 40 GHz respectively. The frequency ranges of the instruments start at 9 kHz by standard configuration and can be extended down to 10 Hz by the option Option MIL/DO-UG. A large variety of configurable options make the TDEMI® X to the customized solution perfect fitting to your application according to all civil standards

(e. g. CISPR, EN, FCC, or ANSI), military (MIL-461) as well as avionic standards (DO-160). The TDEMI® X measurement system offers in its standard configuration a fully integrated spectrum analyzer mode and also a real-time spectrum analyzer mode. An overview of the available options is given on the page following to the detailed technical specification. Furthermore we offer a customized adaptation to your specific application and needs upon request.

The option OSC-UG provides a two-channel oscilloscope, extending the frequency range even down to DC. The new and highest performance product line TDEMI® X can be used in a vast range of applications due to its spectrum analyzer mode and real-time spectrum analyzer and can be used also for measurements according to telecommunication standards such as ETSI standards e.g. or for general analysis of signals - and all this can be done fully in real-time with an absolutely unique instantaneous bandwidth of 325 MHz and an unrivaled measurement speed and dynamic range of 100 dB (without attenuator) or even up to 170 dB with attenuator.

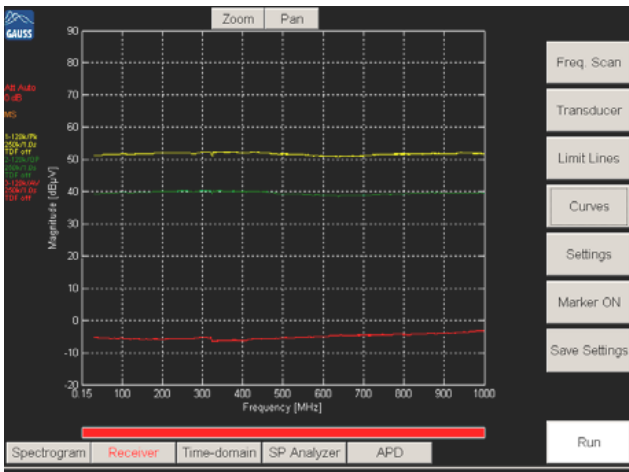


Fig. 1 – Measurement of picosecond Pulses.

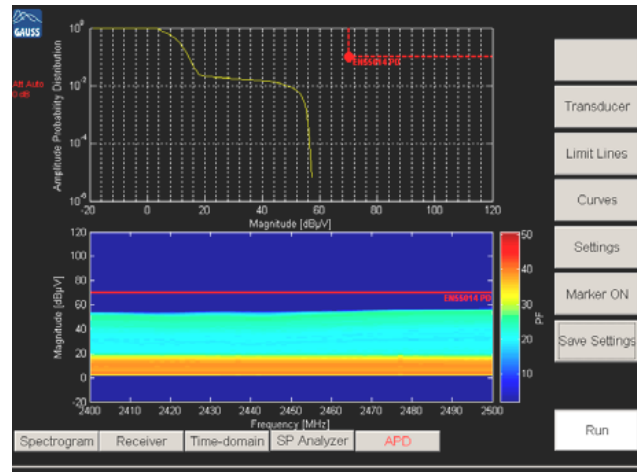


Fig. 2 – Measurement of APD and histogram and fully automated evaluation against limit lines.

Receiver Mode

The TDEMI® eXtreme provides a traditional superheret mode for sure, 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 a real-time bandwidth of 325 MHz. The instruments can be configured with an AM/FM demodulator and output to headphones (Option DM-UG).

Moreover the receiver mode of the TDEMI® X provides a full compliant Shortterm-FFT (STFFT) implementation, which speeds up your EMC measurements by a factor up to 16000. Thus scan times - and with it overall testing times - can be realized now which are much shorter and setting new standards in product certification. 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 more precise and reliable. An excellent noise floor makes the TDEMI® X perfect suited for radiated, conducted as well as measurements with absorbing clamp or CDN.

APD Function and Histogram

The measurement systems of the TDEMI® eXtreme series can be equipped with a measuring mode for the amplitude probability distribution (APD) and with a colored histogram display by the option APD-UG. The APD measuring function for example is used for testing of ISM (industrial, scientific, medical) equipment. Especially for such measurements like APD function the vast advantages of the most modern technology of the TDEMI® X become aware, when a highly parallel measurement and calculation is saving a huge amount in time and money.

Moreover the histogram function, by its color depth of 16.78 million, enables the user to analyse and distinguish intermittent narrow- and broadband disturbances as well as to detect masked signals very easily.

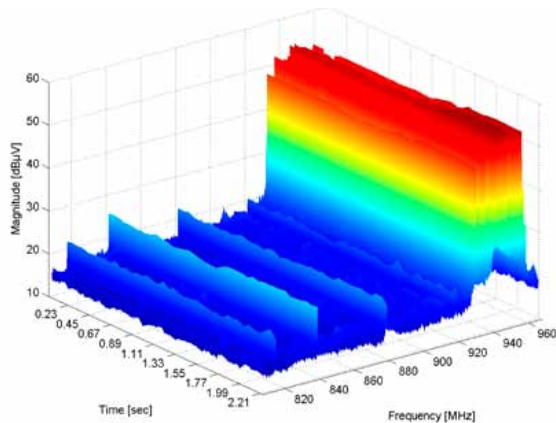


Fig. 3 – Evaluation of multi-channel signal sources in 3D diagram.

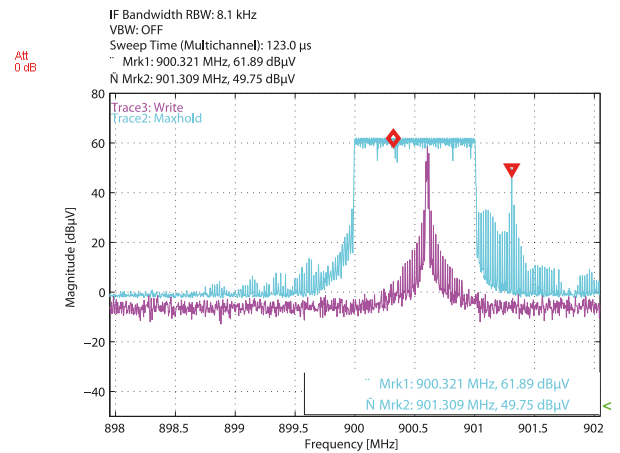


Fig. 4 – Analysis of an intermittent interference outside of an occupied frequency band.

Real-time Spectrogram Mode

The real-time spectrogram mode of the TDEMI® eXtreme is absolutely unique in its performance and unique particularly because of the full conformance with the standards CISPR 16-1-1, ANSI C63.2, MIL-461, and DO-160 respectively. The real-time spectrogram offers the perfect combination of full compliance and analysis capabilities in fully gapless real-time, observing what is going on there in your circuitry, component, device or equipment under test.

The remote control feature via commands according to SCPI standard enables the use in fully automated lab and certification environment. Evaluation capabilities, e. g. several markers, display in 2D or 3D allow to analyse disturbances and evaluate them regarding to conformity. The measurement is carried out over a frequency range of 162.5 MHz in real-time. Up to 16000 frequency points are measured in parallel.

Spectrum Analyzer

Also in spectrum analyzer mode the TDEMI® X is equipped with a traditional superhet mode. It is implemented digital and provides 145 IF bandwidths beginning from 1 Hz going up to 30 MHz in 1, 2, 3, 5 steps as well as small sized steps in between.

By the innovative multi-channel technology the measurement speed is increased by a factor up to 64000. It corresponds to a Shortterm-FFT based set of 64000 full digital superheterodyne receivers. In conjunction with the parallel implementation of video filters and detectors all measurements according to standards are sped up by the factor 64000 and the user is enabled to analyse non-stationary phenomena much more precisely and reliable.

Due to the available 6 dB bandwidths and the full compliance to CISPR 16-1-1, in particular e.g. the very essential requirement regarding the dynamic range for pulses, the TDEMI® X can be applied for pre- and final measurements with peak and average detector. Also it is in full conformance with ANSI C63.2, MIL-461 and DO-160. A large number of additional functionalities allow the use in a wide range of applications for the analysis of analog and digital communication signals.

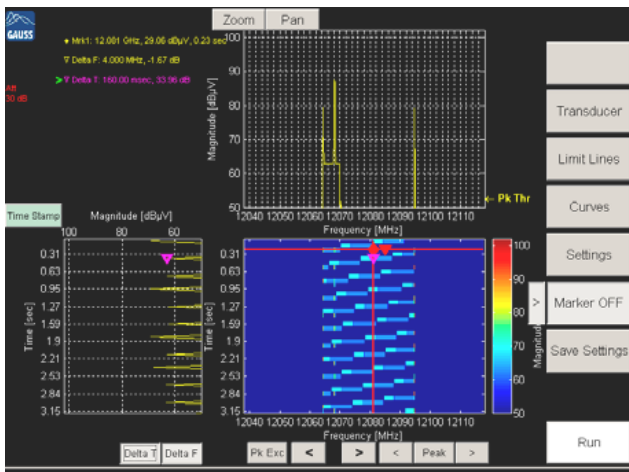


Fig. 5 – Analysis of a swept and stepped signal. Evaluation and recording in time- and frequency domain.

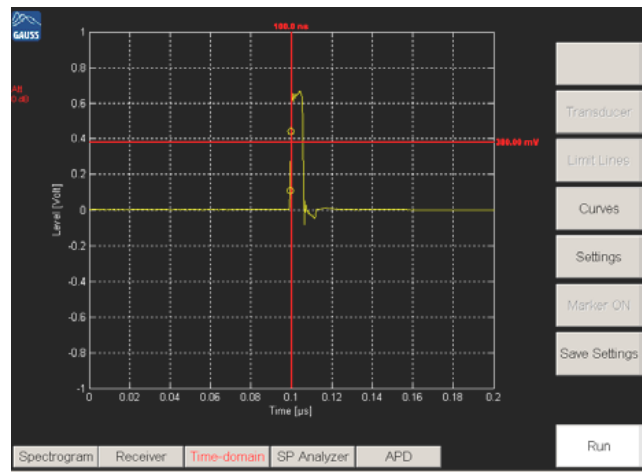


Fig. 6 – Time-domain measurement of a pulse with a resolution of 16 bit. Red lines show the trigger levels in time and amplitude respectively.

Real-time Spectrum Analyzer

The real-time spectrum analyzer mode comes along with a real-time bandwidth of 162.5 MHz in the standard configuration of the TDEMI® X instruments and can be extended even to 325 MHz real-time bandwidth by the option QCDS-UG which is absolutely unique in the test and instrumentation market.

The real-time spectrum analyzer mode provides all bandwidths and settings already known from spectrum analyzer mode and also provides the full dynamic for pulses required by CISPR 16-1-1.

This operation mode of the TDEMI® X series combines all advantages of conventional superhet analyzers 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 325 MHz opens up absolutely new possibilities regarding the analysis, characterization and observation of all kinds of signals.

Time-domain Mode

The time-domain mode of the TDEMI® eXtreme provides a real-time bandwidth of 1 GHz and enables a broadband acquisition of signals with highest resolution in its class at the same time. Digitally implemented hardware triggering combined with an extremely high dynamic range allow triggering on CISPR 16-1-1 pulses and display with a unique precision of 16 bit.

By the easy and intuitive user interface and control via touchscreen, the operator can set and vary trigger levels for example directly with a touch on the screen of the instrument.

TDEMI® X Specifications

Frequency Range

TDEMI® X1	› 9 kHz - 1 GHz
TDEMI® X3	› 9 kHz - 3 GHz
TDEMI® X6	› 9 kHz - 6 GHz
TDEMI® X18	› 9 kHz - 18 GHz
TDEMI® X26	› 9 kHz - 26.5 GHz
TDEMI® X40	› 9 kHz - 40 GHz
extendable	down to 10 Hz - 9 kHz, with Option MIL/DO-UG
extendable	down to DC, 2-Channel, with Option OSC-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 -95 dBc/Hz
	12.8 MHz 10 Hz -120 dBc/Hz
	100 Hz -140 dBc/Hz
	1 kHz -145 dBc/Hz

Receiver Mode	› Analog and Digital Superheterodyne Receiver
	› STFFT-based Receiver Mode (Multichannel Mode)
	› Trace Point > 8.000.000

Receiver Mode (CISPR 16-1-1, ANSI C63.2)

IF Bandwidth 200 Hz	› IF Filter: Gaussian Shaped Filter, Specification according to CISPR 16-1-1, Bandwidth Deviation < 10%
	› Peak, Average, CISPR-Average, Quasi-Peak, RMS, CISPR-RMS-AVG Detector (Option CRMS-UG)
	› Measurement at > 1400 Frequencies in parallel, >2400 Frequencies in parallel (with Option QCDS-UG)
	› Frequency Step < 100 Hz

IF Bandwidth 9 kHz	› IF Filter: Gaussian Shaped Filter, Specification according to CISPR 16-1-1, Bandwidth Deviation < 10%
	› Peak, Average, CISPR-Average, Quasi-Peak, RMS, CISPR-RMS-AVG Detector (Option CRMS-UG)
	› Measurement at 8192 Frequencies in parallel, 16384 Frequencies in parallel (with Option QCDS-UG)
	› Frequency Step < 400 Hz

IF Bandwidth 120 kHz	› IF Filter: Gaussian Shaped Filter, Specification according to CISPR 16-1-1, Bandwidth Deviation < 10%
	› Peak, Average, CISPR-Average, Quasi-Peak, RMS, CISPR-RMS-AVG Detector (Option CRMS-UG)
	› Measurement at 2048 Frequencies in parallel, 4096 Frequencies in parallel (with Option QCDS-UG)
	› Frequency Step < 400 Hz

IF Bandwidth 1 MHz	› IF Filter: Gaussian Shaped Filter, Specification according to CISPR 16-1-1, Bandwidth Deviation < 10%
	› Peak, Average, CISPR-Average, RMS, CISPR-RMS-AVG Detector (Option CRMS-UG)
	› Measurement at 256 Frequencies in parallel, 512 Frequencies in parallel (with Option QCDS-UG)
	› Frequency Step < 800 Hz

Noise Floor (Receiver Mode) without Option PRLNA-UG

Preselection (in front of preamp) active, Average Detector, typical

TDEMI® X1	› 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

TDEMI® X3	› 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 – 3 GHz (1 MHz IF):	< 2 dBuV

TDEMI® X6	› 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® X18	› 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® X26	› 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® X40	› 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

TDEMI® X1	› 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

TDEMI® X3	› 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 – 3 GHz (1 MHz IF):	< 2 dBuV

TDEMI® X6	› 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® X18	› 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):	< 3 dBuV
	› 9 GHz – 13 GHz (1 MHz IF):	< 3 dBuV
	› 13 GHz – 18 GHz (1 MHz IF):	< 3 dBuV

TDEMI® X26	› 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):	< 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):	< 5 dBuV

TDEMI® X40	› 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):	< 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):	< 5 dBuV
	› 26.5 GHz – 33 GHz (1 MHz IF):	< 5 dBuV
	› 33 GHz – 40 GHz (1 MHz IF):	< 5 dBuV

Receiver Mode (MIL-461, DO-160, ANSI C63.2) with Option MIL/DO-UG

IF Bandwidth 1 Hz	› IF Filter: Gaussian Shaped
	› Bandwidth Deviation < 10%
	› Peak, Average, RMS Detector

IF Bandwidth 10 Hz	› IF Filter: Gaussian Shaped
	› Bandwidth Deviation < 10%
	› Peak, Average, RMS Detector

IF Bandwidth 100 Hz	› IF Filter: Gaussian Shaped
	› Bandwidth Deviation < 10%
	› Peak, Average, RMS Detector

IF Bandwidth 1 kHz	› IF Filter: Gaussian Shaped
	› Bandwidth Deviation < 10%
	› Peak, Average, RMS Detector

IF Bandwidth 10 kHz	› IF Filter: Gaussian Shaped
	› Bandwidth Deviation < 10%
	› Peak, Average, RMS Detector

IF Bandwidth 100 kHz	› IF Filter: Gaussian Shaped
	› Bandwidth Deviation < 10%
	› Peak, Average, RMS Detector

IF Bandwidth 1 MHz	› IF Filter: Gaussian Shaped
	› Bandwidth Deviation < 10%
	› Peak, Average, RMS Detector

Attenuator	› Mechanical: 0 – 70 dB, 10 dB Steps; or 0 – 75 dB, 5 dB Steps
	› Electrical: 5 dB Steps
	› Autorange Function
	› Protection during Start-up: 10 dB
	› Protection in Off-State: Set to the max. Att.

Phase Noise

1 GHz (typ.)	› SSB Phase Noise:	
	1 kHz	-100 dBc/Hz
	10 kHz	-95 dBc/Hz
	100 kHz	-100 dBc/Hz
	1 MHz	-135 dBc/Hz

6 GHz (typ.)	› SSB Phase Noise:	
	1 kHz	-65 dBc/Hz
	10 kHz	-90 dBc/Hz
	100 kHz	-123 dBc/Hz
	1 MHz	-145 dBc/Hz

TDEMI® X Specifications

Preselection without Option PRLNA-UG

TDEMI® X1 High-pass Filter 150 kHz
150 kHz – 30 MHz
30 MHz – 300 MHz
30 MHz – 1 GHz

TDEMI® X3 High-pass Filter 150 kHz
150 kHz – 30 MHz
30 MHz – 300 MHz
30 MHz – 1.15 GHz
1.15 GHz – 3 GHz

TDEMI® X6 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® X18 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® X26 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® X40 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® X1 DC – 9 kHz
9 kHz – 150 kHz
150 kHz – 30 MHz
30 MHz – 162.5 MHz
162.5 MHz – 325 MHz
325 MHz – 487.50 MHz
487.50 MHz – 650 MHz
650 MHz – 812.50 MHz
812.50 MHz – 975 MHz
975 MHz – 1 GHz

TDEMI® X3 DC – 9 kHz
9 kHz – 150 kHz
150 kHz – 30 MHz
30 MHz – 162.5 MHz
162.5 MHz – 325 MHz
325 MHz – 487.50 MHz
487.50 MHz – 650 MHz
650 MHz – 812.50 MHz
812.50 MHz – 975 MHz
975 MHz – 1 GHz
1 GHz – 3 GHz

TDEMI® X6 DC – 9 kHz
9 kHz – 150 kHz
150 kHz – 30 MHz
30 MHz – 162.5 MHz
162.5 MHz – 325 MHz
325 MHz – 487.50 MHz
487.50 MHz – 650 MHz
650 MHz – 812.50 MHz
812.50 MHz – 975 MHz
975 MHz – 1 GHz
1 GHz – 3 GHz
3 GHz – 6 GHz

TDEMI® X18 DC – 9 kHz
9 kHz – 150 kHz
150 kHz – 30 MHz
30 MHz – 162.5 MHz
162.5 MHz – 325 MHz
325 MHz – 487.50 MHz
487.50 MHz – 650 MHz
650 MHz – 812.50 MHz
812.50 MHz – 975 MHz
975 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® X Specifications

Low Noise Preamplifier with Option PRLNA-UG

TDEMI® X1 › switchable on/off
› 150 kHz – 1.15 GHz (Gain 20 dB, NF typ. 2.0 dB)

TDEMI® X3 › switchable on/off
› 150 kHz – 1.15 GHz (Gain 20 dB, NF typ. 2.0 dB)
› 1.15 GHz – 3 GHz (Gain 20 dB, NF typ. 2.0 dB)

TDEMI® X6 › 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® X18 › 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® X26 › 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® X40 › 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)

RF Input

› N Standard Connector 50 Ohm
› 0 dB Attenuator:
VSWR: < 1.8 (f < 1 GHz), typ. 1.2
VSWR: < 2.5 (f > 1 GHz), typ. 2.0
› 10 dB Attenuator:
VSWR: < 1.2 (f < 1 GHz), typ. 1.1
VSWR: < 2.0 (f > 1 GHz), typ. 1.8

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)
› split into 2 Measurement Ranges
› Automatical Switching between Measurement Ranges
1) Noise floor – 90 dBμV
2) 90 dBμV – 120 dBμV (f < 1 GHz)
› P1dB@1 GHz: > 120 dBμV, P1dB Mixer 5 dBm
› IP3: > 142 dBμV (typ. 155 dBμV)

Display Accuracy

› Measurement Uncertainty: < 0.5 dB (100 MHz) typ. 0.15 dB
› Resolution: 0.01 dB
› f < 1 GHz: +/- 1 dB
› 30 GHz > f > 1 GHz: +/- 1.5 dB
40 GHz > f > 30 GHz: +/- 2 dB
› Pulse Indication according to CISPR 16-1-1

Measurement time

› 1 μs – 60 s (Average, RMS)
› 1 μs – infinite (Peak, Quasi-Peak, CISPR-Average, CISPR-RMS-Average)

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

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

Demodulation (Receiver Mode) (Option DM-UG)

› Amplitude Modulation (AM)
› Frequency Modulation (FM)
› "Tune to Marker" Function

Analog-Digital-Converter System	<ul style="list-style-type: none"> › Number of bit per A/D Converter: 12 › Sampling rate: 2.6 GS/s › Number of Analog-Digital-Converter (multiresolution): 2 › Full number of bit (real-time bandwidth 162.5 MHz): 22 › P1dB (ADC1) typ.: 13 dBm (without preamp) › P1dB (ADC2) typ.: 40 dBm Peak (pulses)
--	--

EMI Receiver FFT-based Measuring Instrument¹	<ul style="list-style-type: none"> › Frequency segment processed in parallel 162.5 MHz
--	---

Scanning Speed (Receiver Mode typ.)	<ul style="list-style-type: none"> › Band A, Quasi-Peak, dwell time 1 s : 3 s › Band A, Quasi-Peak, dwell time 1 s : 1.5 s (QCDS-UG) › Band B (150 kHz - 30 MHz) 9 kHz peak detector, dwell time 100 ms: 0.1 s › Band B, Quasi-Peak, dwell time 1 s : 3 s › Band B, Quasi-Peak, dwell time 1 s : 1.5 s (QCDS-UG) › Band C/D (30 MHz - 1 GHz) 120 kHz, peak detector, dwell time 10 ms: < 1 s › Band C/D (30 MHz - 1 GHz) 9 kHz, peak detector, dwell time 10 ms: < 2 s › Band C/D Quasi-Peak, dwell time 1 s : 20 s › Band C/D Quasi-Peak, dwell time 1 s : 10 s (QCDS-UG) › Band E (1 GHz - 6 GHz), dwell time 100 ms: 4 s › Band E (1 GHz - 6 GHz), dwell time 100 ms: 2 s (QCDS-UG)
--	---

Weighted real-time Spectrogram (Receiver Mode)

Acc. to CISPR 16-1-1, ANSI C63.2, MIL-461, DO-160	<ul style="list-style-type: none"> › Real-time bandwidth 162.5 MHz › 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
---	---

Display and Analysis Functions	<ul style="list-style-type: none"> › 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
--------------------------------	--

Time-domain Analysis (RF) - Oscilloscope	<ul style="list-style-type: none"> › Bandwidth 1 GHz › Sampling rate 2.6 GS/s › 16 Bit resolution › 32000 Samples › Trigger, Post- and Pre- Trigger function, Amplitude Trigger
---	--

Tracking generator (Option MG-UG)	<ul style="list-style-type: none"> › MG-UG1G: 9 kHz - 1 GHz › MG-UG3G: 9 kHz - 3 GHz › 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 swept › Normalization via Transducer Factor
--	---

Remote control / Interfaces	<ul style="list-style-type: none"> › Ethernet/LAN (1 GBit and 100 MBit) › Remote Control Command Set according to SCPI Standard › USB 2.0, RS232, PS/2, Audio out for AM/FM Demodulation, VGA, HDMI › GPIB (with Option GPIB-UG)
------------------------------------	--

Display / User Interface	<ul style="list-style-type: none"> › Resolution 800 x 600 Pixel, 8.4", True Color (16,78 m. colors) › Touchscreen
---------------------------------	---

Power Supply	<ul style="list-style-type: none"> › 230 V +/-20% 50 Hz, 110 V +/-10% 60 Hz › Power consumption (typ.): 120 W to 150 W
---------------------	--

Temperature range / EMC	<ul style="list-style-type: none"> › 15° - 40° C › 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	<ul style="list-style-type: none"> › 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 (ca.)	<ul style="list-style-type: none"> › TDEMI® X1: 15 kg › TDEMI® X3: 18 kg › TDEMI® X6: 18 kg › TDEMI® X18: 20 kg › TDEMI® X26: 20 kg › TDEMI® X40: 25 kg
---------------------	---

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

TDEMI® X Specifications

Spectrum Analyzer

IF Bandwidths

- › 3 dB Bandwidth: 1 Hz – 30 MHz
- › 1, 2, 3, 5 Steps
- › Small Step Size (145 Steps) for Channel Measurements
- › 6 dB Bandwidths CISPR, ANSI: 200 Hz, 9 kHz, 120 kHz, 1 MHz
- › 6 dB Bandwidths MIL/DO, ANSI: 10 Hz, 100 Hz, 1 kHz, 100 kHz, 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

Detector (Video Filter off)

- › Maxpeak, Average, RMS
- › Dynamic Requirements according to CISPR 16-1-1 (Peak, AVG)

Sweep time

- › Traditional Mode: 10 μs – 1000 s
- › Multi-Channel Mode: 10 μs – 1000 s
- › Definition via dwell time: 10 μs – 150 s
- › Autoset Function

Typical sweep time for Scanning

› 30 MHz – 1 GHz:	40 ms (dwell time 2 ms) (120 kHz)
› 1 GHz – 6 GHz:	1s (dwell time 0.5ms) (1 MHz)
› 30 GHz – 40 GHz:	1s (dwell time 0.1ms) (1 MHz)
› 30 GHz – 40 GHz:	3s (dwell time 0.1ms) (120 kHz)

Multi-Channel Mode

- › Speeding up the Measurement by:
 - Factor 32768
 - Factor 65536 (Option QC DSP-UG)
- › Number of Points measured in parallel:
 - 32768
 - 65536 (Option QC DSP-UG)
- › Reduction of Dead time:
 - Factor 32768
 - Factor 65536 (Option QC DSP-UG)
- › Real-time Analysis and Evaluation Bandwidth:
 - 162.5 MHz
 - 325 MHz (Option QC DSP-UG)

Display and analysis Functions

- › Measurements against Masks and Limit Lines
- › Parameters as carrier to noise ratio, occupied bandwidth, spurious emission, APD, CCDF
- › Export of Data
- › Analysis of IQ Data (Option IQ-UG)
- › Trace Points 8.000.000

Real-time Spectrum Analyzer

Analysis Settings

- › Automatic Selection of the Settings
- › STFFT Resolution: 32768 Points
- › STFFT Resolution: 65536 Points (Option QC DSP-UG)
- › Real-time Analysis Bandwidth 162.5 MHz
- › Real-time Analysis Bandwidth 325 MHz (Option QC DSP-UG)
- › 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

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 Bandwidths

- › 3 dB Bandwidth: 1 Hz – 30 MHz
- › 1, 2, 3, 5 Steps
- › Small Step Size (145 Steps) for Channel Measurements
- › 6 dB Bandwidths CISPR, ANSI: 200 Hz, 9kHz, 120 kHz, 1 MHz
- › 6 dB Bandwidths MIL/DO, ANSI: 10 Hz, 100 Hz, 1 kHz, 100 kHz, 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

Detector (Video Filter off)

- › Maxpeak, Average, RMS
- › Dynamic Requirements according to CISPR 16-1-1 (Peak, AVG)

Noise Floor (Analyzer Mode) without Option PRLNA-UG

› Preselection (in front of preamp) active, Average Detector	
› 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

› LNA on, Preselection on/off, Average Detector	
› 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

TDEMI® X Options

TDEMI® X Options

OSC-UG	› 2-Channel oscilloscope, DC -1 GHz	F, Z
MIL/DO-UG	› Start frequency 10 Hz, decade bandwidths: 10 Hz, 100 Hz, 1kHz, 10 kHz, 100 kHz, 1 MHz	F, Z
QCDS-UG	› Enhanced DSP Unit, boosting system calculation power, Increase of measurement speed for receiver and spectrum analyzer, Extension of real-time analysis bandwidth to 325 MHz.	F, Z
645M-UG	› Realtime Bandwidth 645 MHz, Quasi-Peak and CISPR-AVG parallel in real-time spektrogram mode More increase of measurement speed (Requirement: Option QCDS-UG)	F, Z
UFSPA-UG	› Multi GHz Real-Time Scanning Modul for Real-Time Spectrum Analyzer Hardware and Software for ultra fast scanning in Spectrum Analyzer Mode	F, Z
UFRS-UG	› Ultra fast Receiver Scanning	F, Z
ULNA-UG	› Ultra Low Noise Amplifier, additionally integrated for ultra low noise floor	F, Z
PRLNA-UG	› Preselection Low Noise Amplifier System	
MG-UG	› Tracking generator	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
TT-UG	› Transport trolley for TDEMI	H
DM-UG	› AM/FM demodulator	S
ZF-UG	› IF analysis	S
IQ-UG	› IQ data analysis	S
RG-UG	› Report generator including analysis of subranges	S
CRMS-UG	› CISPR-RMS-AVG detector	S
APD-UG	› APD measuring function according to CISPR 16-1-1, report generator, limit lines	S
CLICK-UG	› Click rate analyzer, measurement of 4 frequencies in parallel	S
CAL-UG	› Calibration by the manufacturer according to ISO17025, incl. certificate	24 Months
CALD-UG	› DAkkS Calibration by accredited lab according to DAkkS, incl. certificate	24 Months
EMI64k	› Remote control software	S

additional customized options are possible upon request

M

F: Upgradeable, integration at manufacturer site necessary

Z: Additional costs for exchange

H: Delivery of hardware

S: Software installation

M: e-mail request to info@tdemi.com

Calibration interval: 24 Months (given only due to the request of customer)

FULL & PRE COMPLIANCE

GAUSS INSTRUMENTS®
TDEMI® TECHNOLOGY



FULL COMPLIANCE
TDEMI® EMI Receiver

X&G Series

SPECIAL FEATURES

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

Multi^{GHz}

645^{MHz}

Real-Time Scanning

[X Series]

Real-Time Bandwidth

[X Series]

325^{MHz}

Real-time Bandwidth

[X Series]

162.5^{MHz}

Real-Time Bandwidth

[X&G Series]

INFO

- [X] Extreme
- [G] Standard

DC - 1/3/6/18/26.5/40^{GHz}

Frequency Ranges

PRE COMPLIANCE
TDEMI® EMI Receiver

M&M+ Series

Upgradeable to Full Compliance

SPECIAL FEATURES

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

162.5^{MHz}

Real-Time Bandwidth

[M&M+ Series]

INFO

- [M] Mobile
- [M+] Mobile Plus

10^{Hz} - 1/3/6^{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 645 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.**

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

Copyright GAUSS INSTRUMENTS® 06/2017

GAUSS INSTRUMENTS Vertriebs GmbH
Messerschmittstrasse 4
80992 Munich

info@TDEMI.com
www.gauss-instruments.com
tel +49 89 - 54 04 699 0



CONTACT

GAUSS INSTRUMENTS®
Messerschmittstrasse 4 / 80992 Munich / Germany
www.tdemi.com

fon +49(0)89 54 04 699 0
fax +49(0)89 54 04 699 29
info@tdemi.com
