TDEMI X

GAUSS INSTRUMENTS

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 civil standards (e. g. CISPR, EN), military (MIL461) as well as avionic standards (DO160). The TDEMI X measurement system offers in its standard configura-

tion 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 adaption to your specific application and needs on 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 ETSI standards 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 150 dB with attenuator.
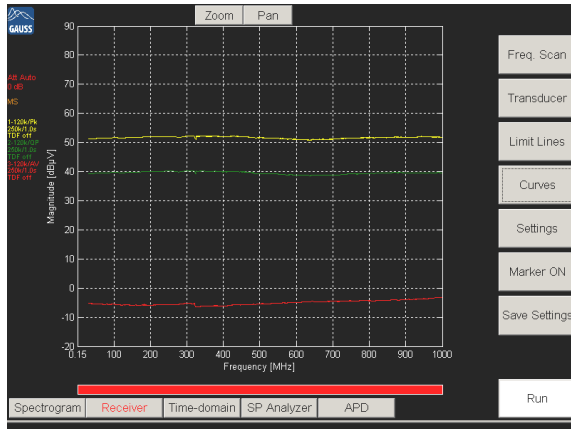
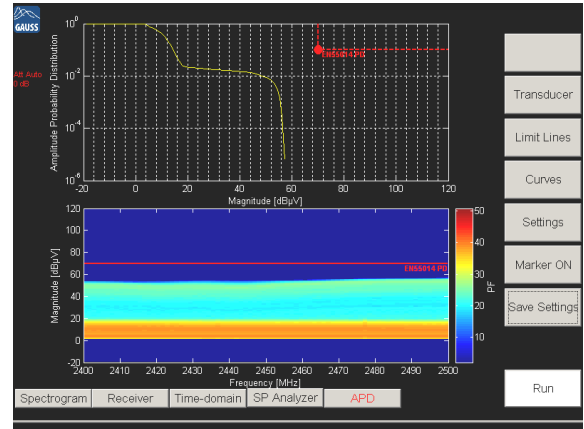Fig. 1 – **Measurement of picosecond Pulses.**

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

Receiver Mode

The TDEMI eXtreme provides a traditional superhet 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 equipement 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 propability 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) equipement. 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.
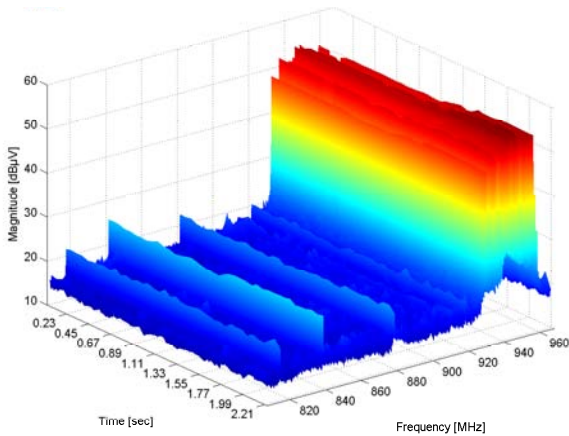
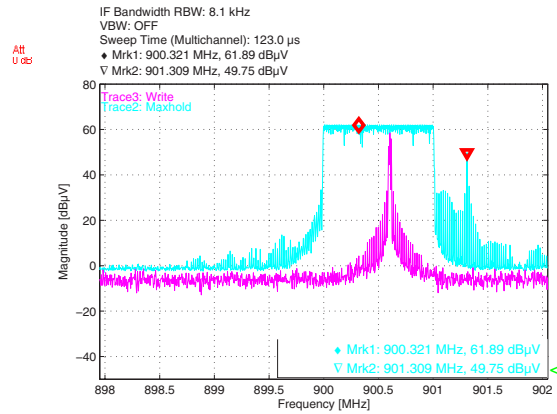Fig. 3 – **Evaluation of multi-channel signal sources in 3D diagram.**

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

Real-time Spectro-gram Mode

The real-time spectrogram mode of the TDEMI eXtreme is very unique in its performance and unique especially because of the full compliance with the standards CISPR 16-1-1, MIL461 and DO160 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 measurment 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 phenomens much more precisely and reliable.

Due to the available 6 dB bandwidths and the full compliance to CISPR 16-1-1, MIL461 and DO160 regarding the dynamic of pulses, the TDEMI X can be applied for pre- and final measurements with peak and average detector. A large number of functionalities allow the use in a wide range of applications for the analysis of analog and digital communication signals.
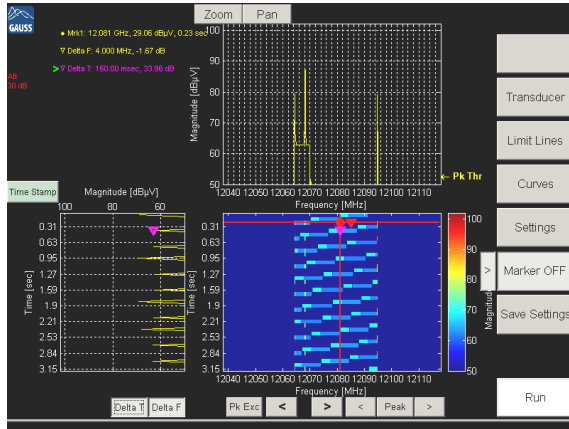
The image at top shows the GAUSS INSTRUMENTS logo and header

TDEMI eXtreme

Fig. 5 – **Analysis of a sweeped and stepped signal.** Evalution and re-cording in time- and frequency domain.
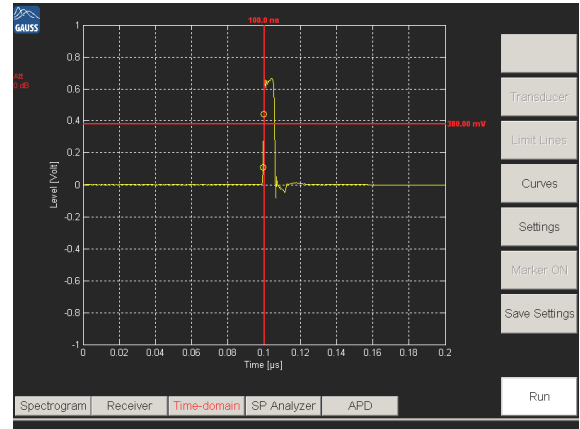

Fig. 6 – **Time-domain measurement of a pulse with a resolution of 16 bit.** Red lines show the trigger levels in time and amplitude respectively.

Real-time Spectrum-analyzer

The real-time spectrum analyzer mode comes along with a real-time bandwith of 162.5 MHz in the standard confi-guration of the TDEMI X instruments and can be exten-ded even to 325 MHz real-time bandwidth by the option QCDSP-UG which is absolutely unique in the test and ins-trumentation market.

The realt-time spectrum analyzer mode provides all band-widths and settings already known from spectrum analy-zer mode and also provides the full dynamic for pulses re-quired by CISPR 16-1-1. This operation mode of the TDEMI X series combines all advantages of conventional super-het analyzers with the advanced evaluation capabilities and vast advantages of the real-time capabilities based on the leading-edge technology provided by GAUSS IN-STRUMENTS. 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 trig-gering 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 operater can set and vary trigger levels for example directly with a touch on the screen of the instrument.

FREQUENCY RANGE	
TDEMI X1	9 kHz – 1GHz
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 – 9kHz, 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
	1kHz	-145 dBc/Hz

RECEIVER MODE
Analog and Digital Superheterodyne Receiver
STFFT-based Receiver Mode (Multichannel Mode)

RECEIVER MODE (CISPR 16-1-1)

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 QCDSP-UG)

Frequency Step < 100 Hz

IF Bandwidth 9kHz

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 QCDSP-UG)

Frequency Step < 400 Hz

IF Bandwidth 120kHz

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 QCDSP-UG)

Frequency Step < 400 Hz

IF Bandwidth 1MHz

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 QCDSP-UG)

Frequency Step < 800 Hz

NOISE FLOOR (Receiver Mode) 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

TDEMI X Specifications

RECEIVER MODE (Option MIL/DO-UG)

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

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

IF Bandwidth 100kHz
  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 – 50 dB in 10 dB Steps
Elektronical: 5 dB Steps
Autorange Function
Protection during Start-up: 10 dB
Protection in Off-State: 50 dB

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	-145dBc/Hz

PRESELECTION

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

LOW NOISE PREAMPLIFIER

TDEMI X1
Fixed between Preselection and ADC

150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.5 dB)

TDEMI X3
Fixed between Preselection and Mixer, ADC respectively

150 kHz – 1.15 GHz	(Gain 20 dB, NF typ. 2.5 dB)
1.15 GHz – 3 GHz	(Gain 20 dB, NF typ. 2.0 dB)

TDEMI X6
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 X18
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 X26
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 X40
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)

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
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
Mesasurement 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

TDEMI X Specifications

ANALOG-DIGITAL-CONVERTER SYSTEM
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)

SCANNING SPEED (Receiver Mode) typ.:
Band A, Quasi-Peak, dwell time 1 s : 3 s
Band A, Quasi-Peak, dwell time 1 s : 1.5 (QCDSP-UG)
Band B, Quasi-Peak, dwell time 1 s: 3 s
Band B, Quasi-Peak, dwell time 1 s: 1.5 (QCDSP-UG)
Band C/D Quasi-Peak, dwell time 1 s: 20 s
Band C/D Quasi-Peak, dwell time 1 s: 10 s (QCDSP-UG)
Band E (1 GHz – 6 GHz), dwell time 100 ms: 4 s
Band E (1 GHz – 6 GHz), dwell time100 ms: 2 s (QCDSP-UG)

WEIGHTED REAL-TIME SPECTROGRAM (Receiver Mode)
Acc. to CISPR 16-1-1, MIL461, DO160
　　　　Real-time bandwidth 162.5 MHz
　　　　Peak, 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
　　　　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
Bandwidth 1 GHz
Sampling rate 2.6 GS/s
16 Bit resolution
32000 Samples
Trigger, Post- and Pre- Trigger function, Amplitude Trigger

TRACKING GENERATOR (Opiton MG-UG)
MG-UG X1:　　　　　　9 kHz – 1 GHz
MG-UG X6:　　　　　　9 kHz – 3 GHz
MG-UG X10:　　　　　9 kHz – 10 GHz
MG-UG X20:　　　　　9 kHz – 20 GHz
MG-UG XE: Control of external signal generator
Synchronous and fast sweeped
Normalization via Transducer Factor

REMOTE CONTROL/INTERFACES
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
Resolution 800 x 600 Pixel, 8.4", True Color (16,78 m. colors)
Touchscreen

POWER SUPPLY
230 V +/-20% 50 Hz, 110 V+/-10% 60 Hz
Power consumption (typ.): 120 W to 150 W

TEMPERATURE RANGE/EMC
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

WEIGHT (ca.)
TDEMI X1:　　　　　15 kg
TDEMI X3:　　　　　18 kg
TDEMI X6:　　　　　18 kg
TDEMI X18:　　　　20 kg
TDEMI X26:　　　　20 kg
TDEMI X40:　　　　25 kg

SPECTRUM ANALYZER

IF BANDWIDTHS
3dB Bandwidth: 1 Hz – 30 MHz
1, 2, 3, 5 Steps
Small Step Size (145 Steps) for Channel Measurments
6dB Bandwidths CISPR: 200 Hz, 9 kHz, 120 kHz, 1 MHz
6dB Bandwidths MIL/DO: 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

DETECTORS (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 QCDSP-UG)
Number of Points measured in parallel:
    32768
    65536 (Option QCDSP-UG)
Reduction of Dead time:
    Factor 32768
    Factor 65536 (Option QCDSP-UG)
Real-time Analysis and Evaluation Bandwidth:
    162.5 MHz
    325 MHz (Option QCDSP-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)

REAL-TIME SPECTRUMANALYZER

ANALYSIS SETTINGS
Automatic Selection of the Settings
STFFT Resolution: 32768 Points
STFFT Resolution: 65536 Points (Option QCDSP-UG)
Real-time Analysis Bandwidth 162.5 MHz
Real-time Analysis Bandwidth 325 MHz (Option QCDSP-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
3dB Bandwidth: 1 Hz – 30 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, 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

DETECTORS (Video Filter Off)
Maxpeak, Average, RMS
Dynamic Requirements according to CISPR 16-1-1 (Peak, AVG)

NOISE FLOOR (Analyzer Mode)
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

TDEMI X Options

Abbreviation	Short Description	Note
OSC-UG	2-Channel oscilloscope, DC -1 GHz	F
MIL/DO-UG	(Start frequency 10 Hz, decade bandwidths: 10 Hz, 100 Hz, 1kHz, 10 kHz, 100 kHz, 1 MHz)	F
QCDSP-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
LISN-UG	Controller for measuring accessories, TTL signals (+5V), e.g. for automated control of LISN	F
LISNCable-UG	Customized cable for auxiliary measurement equipment, e.g. LISN or triple loop antenna	H
KB-UG	Compact keyboard incl. touchpad	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
SLIDE-UG	Software for disturbance power measurements, manual or remote control of the slideway, automated maximization and report generation, analysis of subranges	S
CAL-UG	Calibration by the manufacturer according to ISO17025, incl. certificate	24 Months
CALD-UG	DAkkS Calibration by accredited lab according to ISO17025, incl. certificate	24 Months
	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

Notes

Imprint

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