

# Spectrum Analyzer

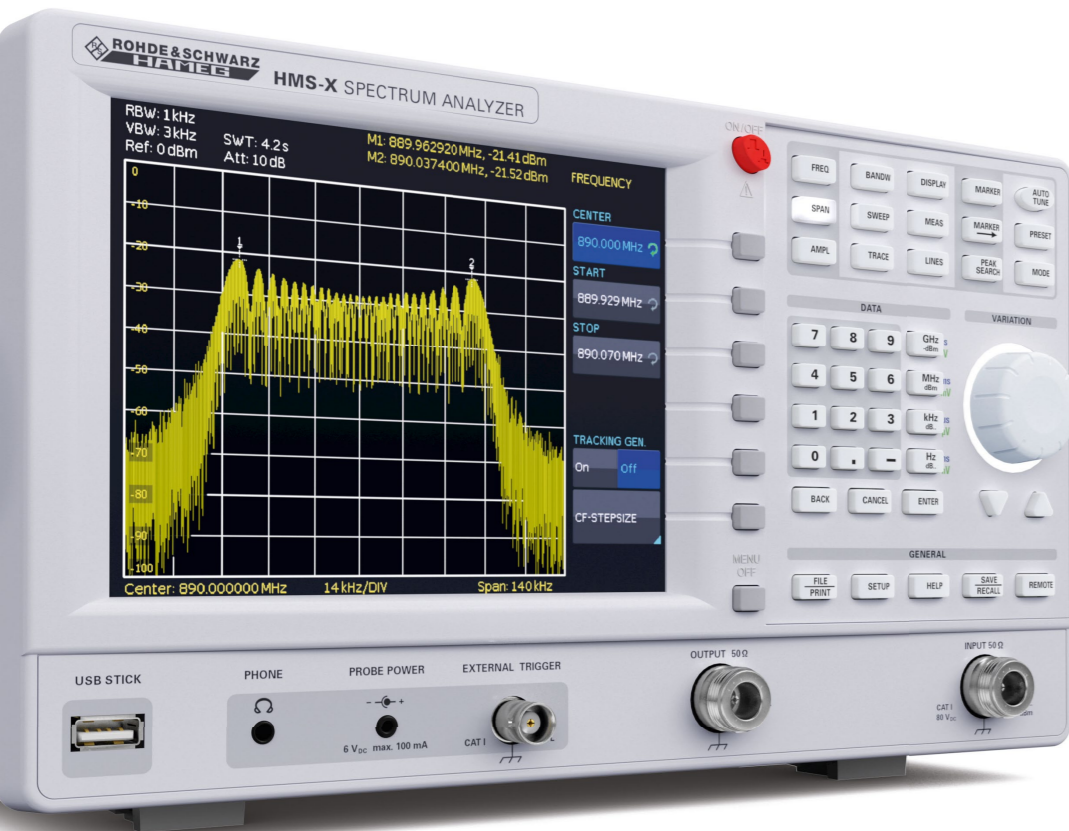
## 1.6 GHz | 3 GHz

### HMS-X

**HAMEG**<sup>®</sup>  
Instruments  
A Rohde & Schwarz Company



# 1 Basic Unit + 3 Options



### Key facts

- Frequency range: 100 kHz to 1.6 GHz/3 GHz\*<sup>1</sup>
- Spectral purity greater than -100 dBc/Hz (at 100 kHz)
- SWEEP from 20 ms to 1000 s
- Detectors: auto-, min-/max.-peak, sample, RMS, average, quasi-peak\*<sup>2</sup>
- Miscellaneous marker/ $\Delta$ marker and peak functions
- Tracking generator\*<sup>3</sup>
  - Frequency range: 5 MHz to 1.6 GHz/3 GHz\*<sup>1</sup>
  - Output level: -20 dBm to 0 dBm
- Directly export data to USB flash drive, RS-232/USB dual interface for remote control
- Fanless design and fast boot time

\*<sup>1</sup> with HMS-3G (HV212) option  
 \*<sup>2</sup> with HMS-EMC (HV213) option  
 \*<sup>3</sup> with HMS-TG (HV211) option



Model overview:	HMS-X with EMC option	HMS-X basic unit
Amplitude measurement range	-114 dBm to +20 dBm	-104 dBm to +20 dBm
DANL	typ. -135 dBm	typ. -104 dBm
Resolution bandwidth	100 Hz to 1 MHz, 200 kHz (-3 dB), 200 Hz, 9 kHz, 120 kHz, 1 MHz (-6 dB)	10 kHz to 1 MHz, 200 kHz (-3 dB)
Video bandwidth	10 Hz to 1 MHz	1 kHz to 1 MHz

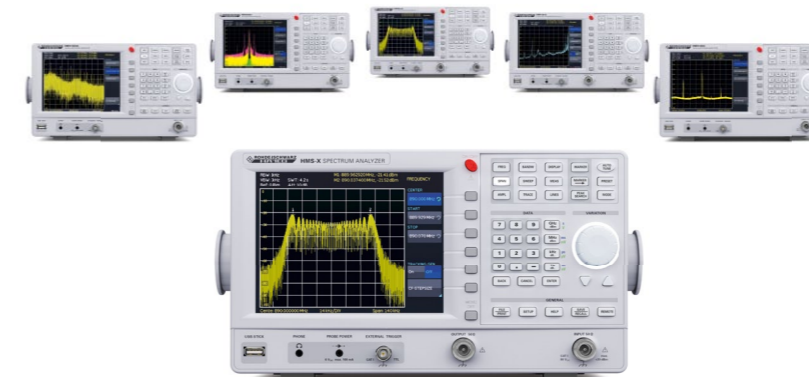


# Your HMS-X Spectrum Analyzer

You can create your HMS spectrum analyzer by combining a basic unit with any of three available options. In case of growing requirements, upgrade vouchers allow you to upgrade your instruments with all options at any point in time.



- This option activates all the functions that are required for EMC precompliance measurements. The preamplifier option has been integrated into the new HMS-EMC option.
- The frequency range is increased from 1.6 GHz to 3 GHz with this option.
- This option activates the tracking generator in the instrument.



We have used the first-class hardware from our largest HMS spectrum analyzer and developed a new and flexible instrument concept. It can be individually configured, combined and upgraded for your applications.

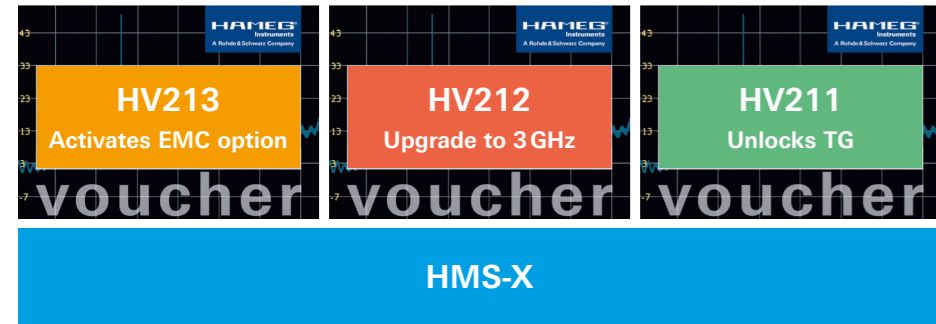
HMS previous models	HMS-X
HMS1000E	HMS-X
HMS1000	HMS-X + EMC*
HMS1010	HMS-X + EMC* + TG
HMS3000	HMS-X + EMC* + 3G
HMS3010	HMS-X + EMC* + 3G + TG

\* The preamplifier function is an integral part of the HMS-EMC option

# Upgrade at any time

You can easily upgrade all three available options at any later point in time with option upgrade vouchers available at your dealer.

The voucher number and the serial number of your HMS-X instrument enable you to generate the respective licence key directly on our web page <http://voucher.hameg.com>.



HMS-X options	Option code <sup>*1</sup>	Voucher code <sup>*2</sup>
EMC option incl. preamplifier	HMS-EMC	HV213
Bandwidth upgrade to 3 GHz	HMS-3G	HV212
Unlock built-in tracking generator	HMS-TG	HV211

\*1 available only with purchase of HMS-X basic unit

\*2 activate HMS-X options at any time after purchase of HMS-X basic unit

# EMC Precompliance

Not only do unexpected results in test labs during EMC compliance measurements translate into extra costs, quite often they also cause a substantial delay for your project. HAMEG offers effective and cost-efficient tools for EMC precompliance measurements which allow you to successfully prevent possible surprises before the actual onset of a problem.

Our HME Explorer software for your EMC measurements is included with every HMS-X spectrum analyzer with activated EMC option.

## EMC precompliance sets

HAMEG offers product sets for your EMC precompliance measurements, which include all necessary instruments to analyse typical EMC problems. Depending on your requirements, you can choose between a 1 GHz and a 3 GHz combination.

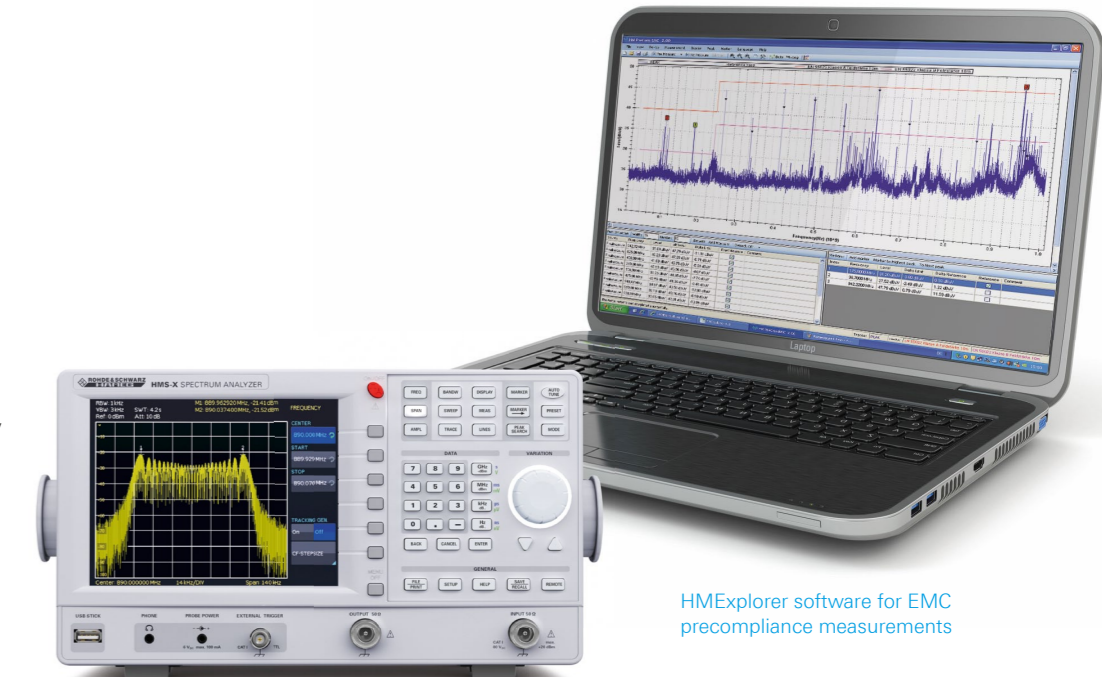
### 1 GHz EMC-SET1

- ▮ Spectrum analyzer HMS-X incl. HMS-EMC option
- ▮ Probe set HZ530
- ▮ Line impedance stabilization network (LISN) HM6050-2
- ▮ HME Explorer software



### 3 GHz EMC-SET2

- Differences to SET1:
- ▮ HMS-3G option additional
  - ▮ 3 GHz probe set HZ540 instead of HZ530



Spectrum analyzer HMS-X

HME Explorer software for EMC precompliance measurements



Line impedance stabilization network for line conducted measurements LISN HM6050-2



1 GHz probe set HZ530



3 GHz probe set HZ540 (fig. similar)

# Recommended Accessories

## 3 GHz VSWR bridge HZ547

This unit is used to measure the voltage standing wave ratio (VSWR) and reflection coefficient of a device under test with an impedance of 50 Ω. Typical test devices include attenuators, terminations, frequency switches, amplifiers, cables and mixers.



3 GHz VSWR bridge for HMS-X, option HMS-TG required, option HMS-3G recommended

## Near-field probe set 3 GHz HZ540 | HZ550

Near field probe set for comparative measurements with built-in preamplifier covering frequency ranges from 1 MHz to 3GHz, designed for the 50 Ω N-connectors of the HMS-X:

- E-field probe
- H-field probe
- High impedance probe
- μH-field probe (HZ550)
- Radiation probe (HZ550)

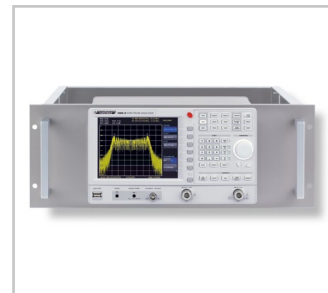


## Alternative version HZ540L | HZ550L

Same specification as HZ540 | HZ550, but with low capacitance probe instead of high impedance probe

## HZ46

4 RU 19" rackmount kit



## HZ99

Carrying case for protection and transport



## HO730

Ethernet/USB dual interface card



## HO740

Interface IEEE-488 (GPIB), galvanically isolated



## HZ530

Near-field probe set 1 GHz



## Spectrum analyzer HMS-X Firmware: ≥ 2.022

Frequency	
Frequency range:	100 kHz to 1.6 GHz 100 kHz to 3 GHz <sup>1</sup>
Temperature stability:	±2 ppm (0 to 30 °C)
Aging:	±1 ppm/year
Frequency counter <sup>2</sup> :	
Resolution	1 Hz
Accuracy	±(Frequency x tolerance of reference)
Span setting range:	0 Hz (zero span) and 100 Hz to 1.6 GHz
Basic unit	0 Hz (zero span) and 100 Hz to 3 GHz <sup>1</sup>
Spectral purity, SSB phase noise:	
30 kHz from carrier (500 MHz, +20 to 30 °C)	<-85 dBc/Hz <sup>2</sup>
100 kHz from carrier (500 MHz, +20 to 30 °C)	<-100 dBc/Hz
1 MHz from carrier (500 MHz, +20 to 30 °C)	<-120 dBc/Hz
Sweep time:	
Span = 0 Hz	2 ms to 100 s
Span > 0 Hz	20 ms to 1000 s, min. 20 ms/600 MHz
Resolution bandwidths (-3 dB):	
	10 kHz to 1 MHz in 1–3 steps, 200 kHz
	100 Hz to 1 MHz in 1–3 steps, 200 kHz <sup>2</sup>
Tolerance	
≤300 kHz	±5% typ.
1 MHz	±10% typ.
Resolution bandwidths (-6 dB):	
	200 Hz, 9 kHz, 120 kHz, 1 MHz <sup>2</sup>
Video bandwidths:	
	1 kHz to 1 MHz in 1–3 steps
	10 Hz to 1 MHz in 1–3 steps <sup>2</sup>

Amplitude	
Display range:	Average noise level displayed up to +20 dBm
Amplitude measurement range:	Typ. -104 to +20 dBm Typ. -114 to +20 dBm <sup>2</sup>
Max. permissible DC at HF input:	80 V
Max. power at HF input:	20 dBm, 30 dBm for max. 3 min.
Intermodulation free range:	
TOI products, 2 x -20 dBm (-10 dBm ref. level)	66 dB typ. (typ. +13 dBm third-order intercept)
(at distance between signals ≤2 MHz)	60 dB typ. (+10 dBm TOI)
(at distance between signals >2 MHz)	66 dB typ. (typ. +13 dBm TOI)

DANL (Displayed average noise level):	
(RBW 10 kHz, VBW 1 kHz, ref. level ≤-30 dBm 10 MHz to 1.6 GHz/3 GHz <sup>1</sup> )	-95 dBm, typ. -104 dBm
(RBW 100 Hz, VBW 10 Hz, Ref. Level ≤-30 dBm 10 MHz to 1.6 GHz/3 GHz <sup>1</sup> )	-115 dBm <sup>2</sup> , typ. -135 dBm <sup>2</sup>
Preamp. deactivated	typ. -124 dBm <sup>2</sup>
Inherent spurious:	
(ref. level ≤-20 dBm, f >30 MHz, RBW ≤100 kHz)	<-80 dBm
Input related spurious:	
(Mixer level ≤-40 dBm, carrier offset >1 MHz) (2 to 3 GHz)	-70 dBc typ. -55 dBc <sup>1</sup>
2nd harmonic receive frequency:	
(mixer level -40 dBm)	-60 dBc typ.
Level display:	
Reference level	-80 to +20 dBm in 1 dB steps
Display range	100 dB, 50 dB, 20 dB, 10 dB
	linear <sup>2</sup>
Logarithmic display scaling	dBm, dBμV, dBmV
Linear display scaling	Percentage of reference level <sup>2</sup>
Measured curves:	1 curve and 1 memory curve
Trace mathematics:	A-B (curve-stored curve), B-A
Detectors:	Auto-, Min-, Max-Peak, Sample, RMS, Average Quasi-Peak <sup>2</sup>
Failure of level display:	<1.5 dB, typ. 0.5 dB (ref. level -50 dBm, 20 to 30 °C)

Marker/Deltamarker	
Number of marker:	8
Marker functions:	Peak, next peak, minimum, center = marker, frequency, reference level = marker level, all marker on peak
Marker displays:	Normal (level, log.), delta marker, noise marker Normal (lin.), (frequency) counter <sup>2</sup>

Inputs/Outputs	
HF Input:	N socket
Input impedance	50 Ω
VSWR (10 MHz to 1.6 GHz/3 GHz <sup>1</sup> )	<1.5 typ.
Output tracking generator <sup>3</sup> :	N socket
Output impedance	50 Ω
Frequency range	5 MHz to 1.6 GHz/3 GHz <sup>1</sup>
Output level	-20 to 0 dBm, in 1 dB steps

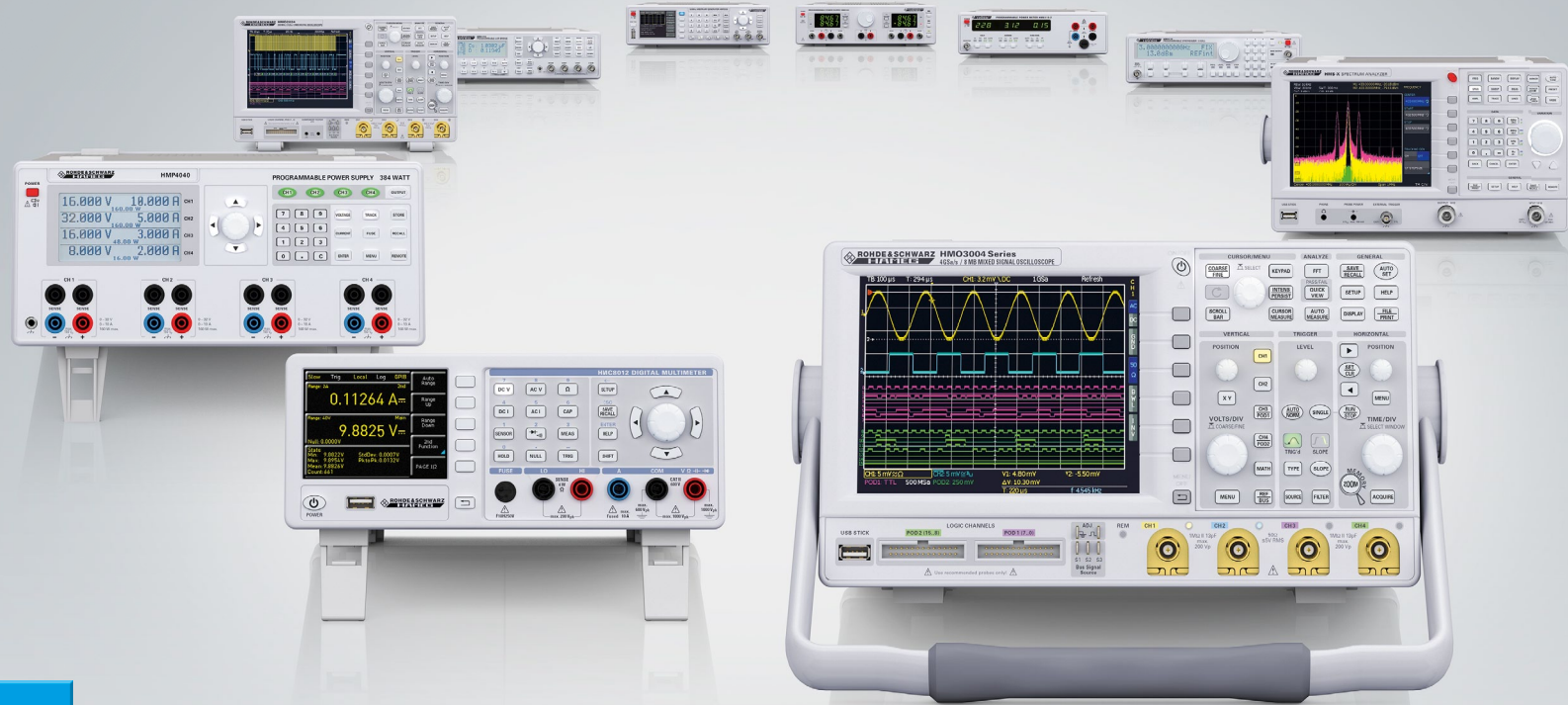
Trigger input:	BNC female
Trigger voltage	TTL
Ext. reference input/output:	BNC females
Reference frequency	10 MHz
Essential level (50 Ω)	10 dBm
Supply output for field probes:	6 Vdc, max. 100 mA (2.5 mm DIN jack)
Audio output (Phone):	3.5 mm DIN jack
Demodulation	AM and FM (internal speaker)

Miscellaneous	
Display:	16.5 cm (6.5") TFT Color VGA Display
Save/Recall memory	10 complete device settings
Trigger	Free run, Single Trigger, external Trigger Video Trigger <sup>2</sup>
Interfaces:	
	Dual-Interface USB/RS-232 (HO720), USB-Stick (frontside), USB-Printer (rear side), DVI-D for ext. monitor
Power supply:	105/253 V, 50 to 60 Hz, CAT II
Power consumption:	Max. 40 W at 230 V, 50 Hz
Protection class:	Safety class I (EN61010-1)
Operating temperature:	+5 to +40 °C
Storage temperature:	-20 to +70 °C
Rel. humidity:	5 to 80% (non condensing)
Dimensions (W x H x D):	285 x 175 x 220 mm
Weight:	3.6 kg

<sup>1</sup> with activated HMS-3G option  
<sup>2</sup> with activated HMS-EMC option  
<sup>3</sup> with activated HMS-TG option

**Accessories included:**  
Line cord, printed operating manual, CD, software

Recommended accessories:	
HO730	Dual-interface ethernet/USB
HO740	Interface IEEE-488 (GPIB), galvanically isolated
HZ530	Near-field probe set 1 GHz for EMI diagnostics
HZ540/550	Near-field probe set 3 GHz for EMI diagnostics
HZ540L/550L	Near-field probe set 3 GHz for EMI diagnostics
HZ547	3 GHz VSWR bridge for HMS-X incl. HMS-TG option
HZ13	Interface cable (USB) 1.8 m
HZ14	Interface cable (serial) 1:1
HZ21	Adapter N (plug) - BNC (socket)
HZ46	4RU 19" rackmount kit
HZ72	GPIB-cable 2 m
HZ99	Carrying case for protection and transport
HZ520	Plug-in antenna with BNC connection
HZ525	50 Ω-termination, N plug
HZ560	Transient limiter
HZ575	75/50 Ω converter



value-instruments.com

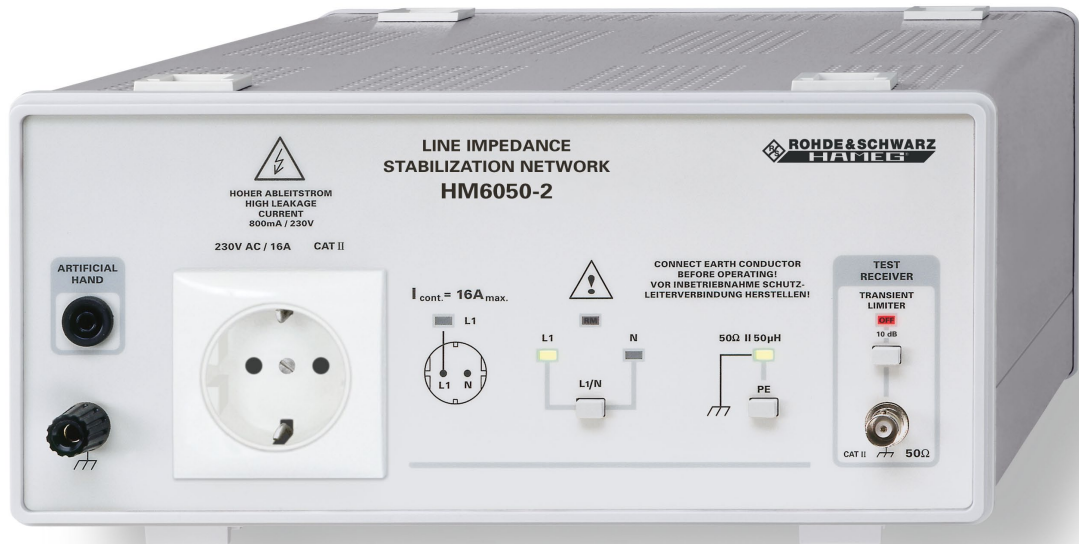
[www.hameg.com](http://www.hameg.com)

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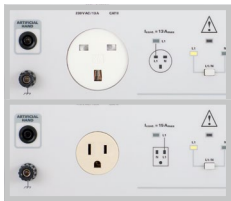
# Line Impedance Stabilization Network HM6050-2

HM6050-2

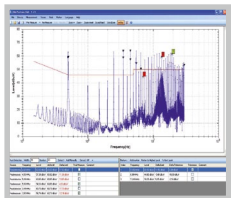


- Measurement of Line-conducted Interferences within the Range from 9kHz...30MHz (CISPR 16)
- Selectable Transient Limiter
- Artificial Hand Connector

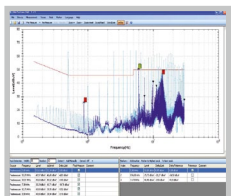
HM6050-2K  
(UK Version, 230V)  
HM6050-2S  
(US Version, 115V)



Measurement of Line-conducted Interference: Fail



Measurement of Line-conducted Interference: Pass



## Technical Specifications at 23°C ±2°C

Frequency Range:	9kHz...30MHz
Impedance Characteristics:	Z = 50Ω    (50μH + 5Ω), Error <20% under terms of VDE 876T1
Max. Current:	16A
Line Voltage/Frequency:	230V/50...60Hz, CAT II
Artificial Hand:	220pF + 511Ω
PE (selectable):	50μH    50Ω

## Transient Limiter

Frequency Range:	150kHz...30MHz
Transmission Loss:	10dB (+1.5/-0.5dB)

## Connectors

Measurement Output:	50Ω BNC
Power Supply Socket for DUT:	Standard German (UK, US) wall outlets
Artificial Hand:	4mm banana socket
Line Cord:	fixed

## Miscellaneous

Operating Temperature:	10...40°C
Power Supply:	HM6050-2D (DE Version) 230V ±10%, 50...60Hz HM6050-2K (UK Version) 230V ±10%, 50...60Hz HM6050-2S (US Version) 115V ±10%, 50...60Hz
Safety Class:	Safety class I (IEC1010-1/VDE 0411)
Dimensions and Weight:	285 x 125 x 380mm (W x H x D), approx. 6kg

**HZ540/HZ550 EMV Near-Field Probe Set up to 3GHz**

HZ550



Picture  
HZ550L

**HZ540 and HZ550 EMI-Near Field Probe Sets**

The HZ540/550 are the ideal toolkits for the investigation of RF electromagnetic fields. They are indispensable for EMI pre-compliance testing during product development, prior to third party testing. The sets include 3 or 5 hand-held probes with built-in pre-amplifier covering the frequency range from <1MHz to approx. 3000MHz.

The probes of the basic set HZ540 include one magnetic field probe, one electric field probe, and a high impedance probe. In addition to the HZ550 features an optional  $\mu$ -magnetic field probe and an antenna. All probe outputs are matched to the 50 $\Omega$  inputs of spectrum analyzers or RF-receivers.

**Probe Set HZ540 (Basic Set)**

<b>HZ551</b>	Electrical Field Probe
Frequency range:	<1MHz to approx. 3GHz
Directional sensitivity:	omnidirectional Sensitive to electrical fields
Output impedance:	50 $\Omega$ ; SMA-connector
Power supply:	6V <sub>dc</sub> /80mA (directly from HAMEG Spectrum Analyzer)

<b>HZ552</b>	Magnetic Field Probe
Frequency range:	<30MHz to approx. 3GHz
Directional sensitivity:	similar to a frame antenna Sensitive to changing magnetic fields
Output impedance:	50 $\Omega$ ; SMA-connector
Power supply:	6V <sub>dc</sub> /50mA (directly from HAMEG Spectrum Analyzer)

<b>HZ553</b>	High Impedance Probe
Frequency range:	<1MHz to approx. 3GHz
Input capacity:	<2pF // approx. 250k $\Omega$
Attenuation:	between 10:1 and 30:1
Max. input voltage:	10V <sub>pp</sub> (without significant distortion)
Max. voltage of a non-insulated conductor:	30V
Output impedance:	50 $\Omega$ ; SMA-connector
Power supply:	6V <sub>dc</sub> /80mA (directly from HAMEG Spectrum Analyzer)

<b>Physical dimensions:</b>	13 x 27 x 70mm (W x H x D) (+ antenna at HZ551)
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<b>HZ540 consists of:</b>	HZ551 Electrical Field Probe HZ552 Magnetic Field Probe HZ553 High Impedance Probe 1 SMA to N-Cable 1.2m Case Manual
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**Probe Set HZ550**

<b>HZ554</b>	Magnetic Field Probe (small sensor)
Frequency range:	<50MHz to approx. 3GHz
Directional sensitivity:	Sensitive to changing magnetic fields High spatial resolution due to very small sensor area
Max. voltage of a non-insulated conductor:	30V
Output impedance:	50 $\Omega$ ; SMA-connector
Power supply:	6V <sub>dc</sub> /50mA

<b>HZ556</b>	Active antenna
Frequency range:	<30MHz to approx. 3GHz
Directional pattern:	like a frame antenna Radiation of changing magnetic fields
Max. input power:	0.5W (short term)
Output impedance:	50 $\Omega$ ; SMA-connector
Power supply:	not required; passive probe

<b>Physical dimensions:</b>	13 x 27 x 70mm (W x H x D) (+ antenna at HZ551)
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<b>HZ550 consists of:</b>	1 HZ540 Basic Set 1 HZ554 Magnetic Field Probe 1 HZ556 Active antenna 1 SMA to N-Cable 1.2m
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**Probe Set HZ540L and HZ550L**

HZ540L = HZ540 (without HZ553) + HZ555 Low Capacitance Probe  
HZ550L = HZ550 (without HZ553) + HZ555 Low Capacitance Probe

<b>HZ555</b>	Low Capacitance Probe
Frequency range:	approx. 400kHz...3GHz
Input impedance:	<0.2pF // 250k $\Omega$
Attenuation:	10:1
Max. input voltage:	5V <sub>pp</sub>
Max. voltage of a non-insulated conductor:	30V
Output impedance:	50 $\Omega$ ; SMA-connector
Power supply:	6V <sub>dc</sub> /80mA