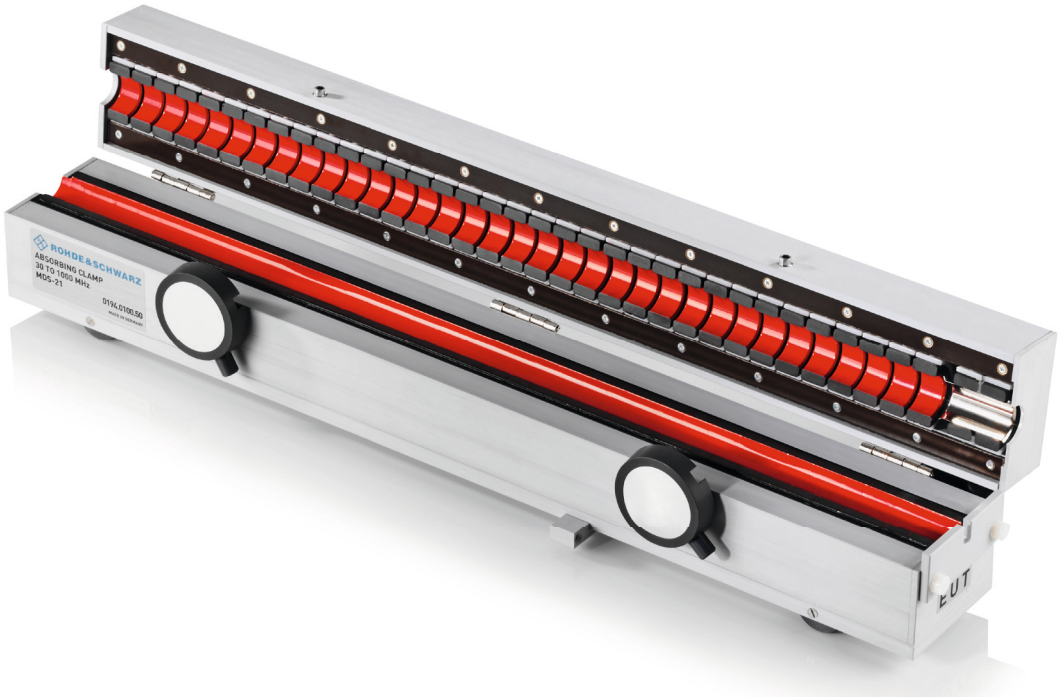
R&S®MDS-21
Absorbing Clamp
Measurement of disturbance power and screening effectiveness on cables



ROHDE&SCHWARZ

Test & Measurement

Product Brochure | 01.01

R&S®MDS-21 Absorbing Clamp At a glance

The R&S®MDS-21 absorbing clamp meets the requirements of CISPR 16-1-3/EN 55016-1-3 for disturbance power measurements in the frequency range of 30 MHz to 1000 MHz and is applicable for screening effectiveness measurements.

The disturbance emitted by electrical appliances, machines and systems must comply with the limits specified in national and international standards. MDS absorbing clamps (Meyer de Stadelhofen) in conjunction with EMI measuring receivers are used to measure the disturbance power on cables in line with CISPR 13/EN 55013, CISPR 14-1/EN 55014-1 and EN 50083-2. They can also be used in conjunction with two-port measuring devices to measure the screening effectiveness of cables in line with IEC 62153-4 and EN 50083-2.

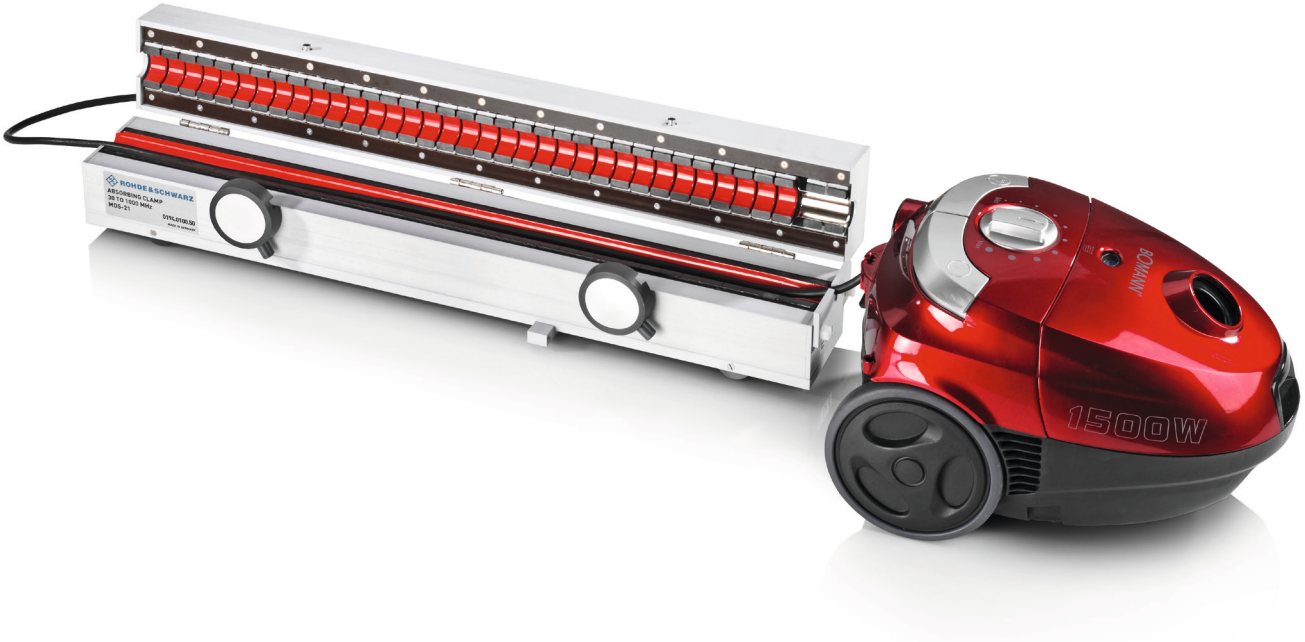
MDS absorbing clamps are also used to test the efficiency of disturbance suppression devices for high-voltage ignition systems in line with CISPR 12/EN 55012.

In the frequency range below 30 MHz, the interference stipulated in many standards is defined by measuring the disturbance voltage produced by the EUT at the terminals of a line-impedance stabilization network. This is important because disturbance in this frequency range is mainly propagated via cables.

Above 30 MHz, where radiated disturbance is predominant, the interference is defined by the disturbance field strength at a certain distance. Small EUTs mainly emit disturbance via connected cables, e.g. power cables. For this reason, and also to reduce extensive field strength measurements to a minimum, many standards stipulate the MDS absorbing clamp to measure the disturbance power.

Key facts

- Frequency range from 30 MHz to 1000 MHz
- Maximum cable diameter: 20 mm
- Clamp opens for easy insertion of the test cable
- Ball bearing rollers for continuous use in automatic measurements
- Requirements and calibration in line with CISPR 16-1-3



R&S®MDS-21 Absorbing Clamp

Benefits and key features

Design

The R&S®MDS21 absorbing clamp consists of a number of ferrite ring cores arranged in a row that surround the EUT's cable. Some of these ring cores are part of the current transformer. The output voltage of this current transformer is fed to the measuring receiver via an internal ferrite-loaded RF cable. With power cables, the measurement result is not affected by the magnitude of the current since the currents of the forward and return leads cancel each other out. MDS absorbing clamps consist of a two-part plastic case that can be opened. Each part includes a set of ferrite ring core halves. In the upper part, the halves are arranged in spring-loaded holding devices to form a channel that surrounds the EUT's cable. Closing the upper part of the plastic case completes the magnetic loop around the cable. Practical eccentric catches provide the necessary contact pressure. The clamp has ball bearing rollers rated for the continuous use that is typical of automatic measurements. This allows it to move until it finds the location of maximum disturbance.

Compact measurement system for semi-automatic disturbance power measurements, with R&S®ESR EMI test receiver and R&S®MDS-21 absorbing clamp.

Disturbance power measurement

A ferrite absorber in the R&S®MDS21 absorbing clamp surrounds the power cable and acts as resistance for the high-frequency RFI power. The incoming current is measured at the absorber input using a current transformer and an EMI measuring receiver. Since there is no matching between the disturbance source, the cable, and the absorber in this setup, the MDS absorbing clamp is slid along the cable to find the maximum current. By selecting suitable absorber material and correctly dimensioning the current transformer, the dBµV readout of an EMI measuring receiver is almost identical to a dBpW readout. A calibration certificate is also supplied.

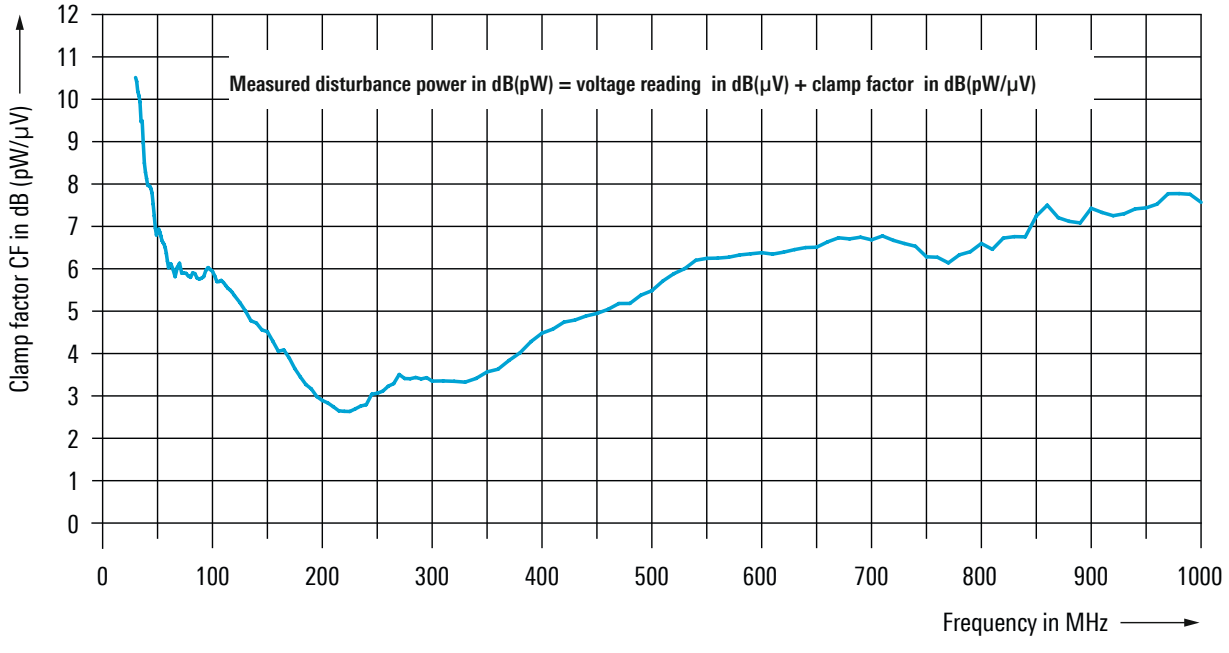
Screening effectiveness measurement

The screening effectiveness of a cable is defined as the ratio of the disturbance power of the surface acoustic wave of an unshielded cable measured with the MDS absorbing clamp to the disturbance power of the surface acoustic wave on the cable screen. The shielded cable is terminated into its nominal impedance. Disturbing effects caused by standing waves are reduced by the ferrite absorber of the MDS absorbing clamp and by an additional ferrite absorber.

Further applications

In addition to measuring the disturbance emitted from small appliances and measuring the screening effectiveness of cable screens, the R&S®MDS-21 absorbing clamp can also be used to measure the efficiency of disturbance suppression devices for high-voltage ignition systems in accordance with CISPR 12/EN 55012. Since high-energy pulses can occur and are coupled to the measuring receiver, the measuring receiver inputs must be thoroughly protected. The R&S®MDS-21 absorbing clamps are also suitable for use as coupling clamps in order to test the immunity of electronic devices.

Typical clamp factor of the R&S®MDS-21 with 6-dB attenuator and 5 m connecting cable



Specifications

Specifications		
Frequency range		30 MHz to 1000 MHz
Insertion loss	in line with CISPR 16-1-3	17 dB ±4 dB (nom.)
Decoupling factor DF	in line with CISPR 16-1-3	> 21 dB
Decoupling factor DR	in line with CISPR 16-1-3	> 30 dB
Receiver input impedance		50 Ω
Maximum permissible DC current or peak value of AC current		30 A
Maximum permissible RF input power	immunity measurements	5 W
Maximum cable diameter		20 mm
Maximum cable diameter	with spacer	6 mm
Connectors		
RF output/input	disturbance power/immunity measurements	N female, 50 Ω
General data		
Operating temperature range		+5 °C to +45 °C
Storage temperature range		–40 °C to +70 °C
Dimensions, overall	W × H × D	625 mm × 106 mm × 106 mm (24.6 in × 4.2 in × 4.2 in)
Weight		6.9 kg (15.2 lb)

Ordering information

Designation	Type	Order No.
Base unit		
Absorbing Clamp	R&S®MDS-21	0194.0100.50
Accessories supplied		
User manual; corresponding calibration certificate; coaxial connecting cable (for connecting the R&S®MDS-21 to the EMI measuring receiver) length: 5 m, with 2 × N male connector; 6 dB attenuator and elbow adapter N/N		

Service that adds value

- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

About Rohde&Schwarz

The Rohde&Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

Rohde&Schwarz GmbH&Co. KG
www.rohde-schwarz.com

Rohde&Schwarz training
www.training.rohde-schwarz.com

Regional contact

- Europe, Africa, Middle East | +49 89 4129 12345
  customersupport@rohde-schwarz.com
- North America | 1 888 TEST RSA (1 888 837 87 72)
  customer.support@rsa.rohde-schwarz.com
- Latin America | +1 410 910 79 88
  customersupport.la@rohde-schwarz.com
- Asia Pacific | +65 65 13 04 88
  customersupport.asia@rohde-schwarz.com
- China | +86 800 810 82 28 | +86 400 650 58 96
  customersupport.china@rohde-schwarz.com

R&S® is a registered trademark of Rohde&Schwarz GmbH&Co. KG
Trade names are trademarks of the owners

PD 3607.5319.12 | Version 01.01 | November 2016 (as)
R&S®MDS-21 Absorbing Clamp

Data without tolerance limits is not binding | Subject to change
© 2016 Rohde&Schwarz GmbH&Co. KG | 81671 Munich, Germany

3607531912

3607.5319.12 01.01 PDP 1 en