R&S®ENY81 COUPLING NETWORK

For measurement of asymmetrical (common-mode) disturbance voltage

Product Brochure Version 06.00



Make ideas real



AT A GLANCE

The R&S[®]ENY81 coupling network has been designed to measure the asymmetrical (common-mode) disturbance voltage of unshielded, symmetrical telecommunications ports of EUTs.

The radio disturbance measurements can be performed in the frequency range from 150 kHz to 30 MHz. The coupling network complies with the following product standards:

- CISPR 22: 2008 and EN 55022:2010 (figure D.3)
- CISPR32 and EN55032 (figure G.3)

The R&S[®]ENY81 is tested and calibrated in line with CISPR 16-1-2. The calibration data supplied refers to a symmetrical impedance of 100 Ω .

Key facts

- ► Eight-wire network
- Radio disturbance measurements in line with CISPR 22: 2008 and EN 55022: 2010 or CISPR 32 and EN 55032 (150 kHz to 30 MHz)
- ► Compliance with CISPR16-1-2
- Adapter sets to meet standardized LCL requirements (55 dB and 65 dB) and to accommodate various telecommunications interfaces
- High transmission bandwidth for wanted signal (100 MHz)

Test method

The R&S[®]ENY81 terminates the EUT's interface with 150 Ω (asymmetrical or common-mode impedance) and couples the EUT's asymmetrical disturbance signal to the test receiver with a voltage division factor of typ. 10 dB. The wanted symmetrical (differential-mode) signal passes through the network almost without attenuation up to a bandwidth of 100 MHz (valid for a symmetrical impedance of 100 Ω). At the same time, the coupling network decouples the test circuit from disturbance effects (disturbance voltage, impedance) at the associated equipment (AE) port.

In line with CISPR22 and EN55022 or CISPR32 and EN55032, an eight-wire ISN (R&S°ENY81 or R&S°ENY81-CA6) is used for disturbance voltage measurements on four unshielded symmetrical wire pairs. Thanks to the design, the R&S°ENY81 can also be used for measurements on two or four wire pairs.

CISPR 22 and EN 55022 as well as CISPR 32 and EN 55032 specify the following conformance test method: The measurement of the EUT should be performed with a suppression of the wanted symmetrical signal corresponding to the category of the connected cable (requirements for CAT 3, CAT 5 and CAT 6 cable categories are defined in the standard).



Compact test set consisting of the R&S[®]ESR EMI test receiver and the R&S[®]ENY81 coupling network for semiautomatic measurement of the asymmetrical disturbance voltage In order to implement these test methods, the R&S[®]ENY81 consists of a high-symmetry basic network and a number of adapter sets for implementing the required longitudinal conversion losses (LCL). Each adapter set contains adapters for LCL values of 55 dB (for CAT3 cable category) and 65 dB (for CAT5 cable category). Due to the high longitudinal conversion loss, the CAT6 cable category requires the use of a separate coupling network (R&S[®]ENY81-CA6).

Nomenclature

In the CISPR 22: 2008 and EN 55022: 2010 product standards, this type of coupling network is referred to as an impedance stabilization network (ISN).

In the CISPR32 and EN 55032 product standards and the CISPR16 basic standard, these networks are called asymmetrical artificial networks (AAN) and Y-networks. In the IEC 61000-4-6 basic standard, they are referred to as coupling/decoupling networks (CDN).

Adapters

The R&S[®]ENY81 eight-wire ISN comes with two adapter sets with RJ-45 connector and with connectors for user-selectable wiring (1 mm banana jack).

Functional testing

The R&S[®]ENY-FTS option in connection with a network analyzer allows the functional testing of the ISN. This functional testing includes the verification of the asymmetrical impedance and phase, voltage division factor, longitudinal conversion loss and decoupling attenuation.

Mechanical design

The R&S[®]ENY81 coupling network features bare threaded sockets for connecting them to a reference ground plane that is arranged either horizontally or vertically.

Overview of the adapter sets

Application	Pin assignment (in line with EIA/TIA T568B)				
	Connector	pair 1/pins 4, 5	pair 2/pins 1, 2	pair 3/pins 3, 6	pair 4/pins 7, 8
Ethernet (100BASE-T4, 1000BASE-T)	RJ-45	•	•	•	•
User-selectable pin assignment	RJ-11, RJ-45 and 1 mm				



R&S®ENY81 with basic adapter sets

Insertion loss/voltage division factor



The typical insertion loss of the symmetrical circuit – measured with a line impedance of 100 Ω – determines the transmission bandwidth of the coupling network for the wanted signal; the typical voltage division factor (lower curve) is to be added to the measured voltage for the frequency range from 150 kHz to 30 MHz for comparison with the disturbance limit.

Longitudinal conversion loss (LCL)



Typical longitudinal conversion losses (LCL) as required by CISPR 22: 2008 and EN 55022: 2010 or CISPR 32 and EN 55032 for the CAT 3 and CAT 5 cable categories; all curves are valid for the frequency range from 150 kHz to 30 MHz but also have significance for immunity tests up to 80 MHz.

Decoupling attenuation



Typical decoupling attenuation between AE port and receiver port with EUT port short; the curves are valid for the frequency range from 150 kHz to 30 MHz but also have significance for immunity tests up to 80 MHz.

SPECIFICATIONS IN BRIEF

Frequery range 50 kHz to 30 MHz Radio disturbance measurements 150 kHz to 30 MHz Phase angle 0.15 MHz to 30 MHz 0° ± 20° Vaga division factor in asymmetrical circu 150 kHz to 30 MHz 0° ± 20° Vaga division factor in asymmetrical circu 150 kHz to 30 MHz 0° ± 20° Vaga division factor in asymmetrical circu 150 kHz to 30 MHz 0° ± 20° Vaga division factor in asymmetrical circu 150 kHz to 30 MHz 100 MHz (for 100 Source and load) Teamsinsion bandwith 30 dh Zto 30 MHz 100 MHz (for 100 Source and load) Teamsinsion bandwith 20 dh Zto 30 MHz 100 MHz (for 100 Source and load) Editation conversion set (LL) 100 kHz (for 100 Source and load) 100 MHz (for 100 Source and load) Editation conversion set (LL) 100 kHz (for 100 Source and load) 100 MHz (for 100 Source and load) Editation conversion set (LL) (dB) 50 dB = 100g(11 + (frS) ²) dB 100 kHz (for 100 Source and load) Editation conversion set (LL) (dB) 50 dB = 100 g(11 + (frS) ²) dB 100 kHz (for 100 MHz 100 kHz (for 100 MHz Editation conversion set (LL) (dB) 100 kHz (for 100 MHz 100 kHz (for 100 MHz 100 kHz (for 100 MHz Rocosplic geneticity 100 kHz (f	Specifications in brief		
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		case with basic adapter set	1640 g (3.62 lb)

ORDERING INFORMATION

Designation	Туре	Order No.
Base unit		
Eight-wire ISN in line with CISPR 22: 2008 and CISPR 32	R&S®ENY81	1309.8503.03
Options		
Functional test set	R&S [®] ENY-FTS	1309.8703.13
Accessories supplied		
Plastic carrying case with foam material, calibration data ¹⁾		

¹⁾ The calibration data includes asymmetrical impedance and phase, voltage division factor, decoupling attenuation, longitudinal conversion loss (LCL), transmission bandwidth and crosstalk.

Service that adds value

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

Rohde & Schwarz

The Rohde&Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. 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.

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Sustainable product design

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



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