

TS-9975

Fully Automatic Emissions Test System up to 40 GHz

- Full compliant EMC measurements according to all military and commercial standards like FCC, CISPR, EN, ETS, TELCO (BELLCORE), VDE, ANSI, VCCI, MIL-STD, VG, DEF-STAN, and many others.
- Measurements up to 40 GHz without changing antennas.
- Easily extendable down to 20 Hz.
- Frequency range 1 GHz to 18/26 and 40 GHz.
- Exceptional system sensitivity.
- Turn-key solution.

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Fully Automatic Emissions Test System up to 40 GHz

Relevant Standards

No matter whether you're performing commercial,^a military,^b automotive or medical testing the TS-9975 has been developed to meet the most demanding measurement standards.

Applications

The TS-9975 EMI 40 GHz test system offers emission measurements from 1 GHz (20 Hz) to 40 GHz. This complete turnkey system performs automated measurements that match your specific application. While designed to meet current domestic and international standards, the TS-9975 system design allows for maximum flexibility for customized testing and future needs.

System Types

The basic version of the TS-9975 comes in two different types depending on the frequency range and antenna(s) necessary.

ESI26 : Up to 26.5 GHz

ESI40 : Up to 40 GHz

The ROHDE&SCHWARZ TS-9975 is more than a collection of antennas, test equipment, cables and software. It is a fully functional integrated tool that provides accurate, dependable solutions for your most rigorous EMI problems.

System Integration

A high-performance EMI measuring system requires extensive design and development. The selection of the equipment, components and quality of products and workmanship ensure the system will work to meet the industry's demanding standards.

The instruments and components have to be mechanically and electrically assembled. Prior to shipment each piece is inspected and checked in accordance with its specification. The racks are then assembled and tested at the ROHDE&SCHWARZ Systems Facility.

Emissions Measurements

The previous mentioned standards stipulate a wide variety of measurements^c in a wide frequency range, all of which can be covered with TS-9975.



System Benefits

- Optimized for throughput due to no antenna change from 1 to 40 GHz
- Emissions software and test receiver can also be used for full compliant measurements below 1 GHz
- Setup and practical training performed by experienced system engineers
- Domestic and worldwide system support centers
- Turnkey ~ no headaches

^a FCC, EN and CISPR based standards and TELCO (Bellcore 1089)

^b MIL-STD 461/462 and DO-160

^c Radiated EMI measurements from 1 to 40 GHz, Optional radiated EMI measurements from 10 KHz to 1 GHz and optional conducted EMI measurements starting at 20 Hz

TS-9975

● Denotes standard equipment
● Denotes selectable configuration

System Components & Design

← Control Room Anechoic Chamber →

① Software

The TS-9975 test system control software is the ES-K1. This windows based program automates commercial and military measurement standards and the ES-K2 Script Development Kit allows customized measurement procedures. The ES-K1 supports drivers for ROHDE&SCHWARZ EMI test receivers and a large number of accessories such as mast and turntables from various manufacturers and ROHDE&SCHWARZ LISN's. The test receiver drivers are specifically designed to utilize the unique and powerful built-in features of the ESI. The software and hardware work together to perform measurements both properly and accurately.

② System Controller TS-CON1

ES-K1 EMI System Software
ESI Driver ES-K16

③ Mast & Turntable Controller

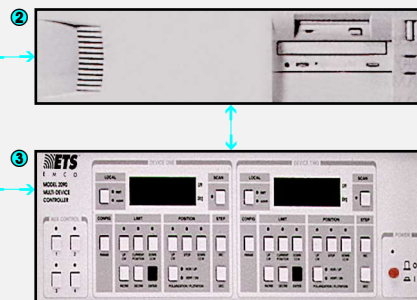
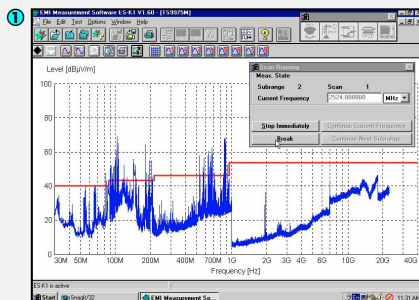
Fully remote-controlled using ES-K1 via IEEE-488.2. The software has drivers for EMCO models 1050, 1060, 2090, Sunol and Deisel controllers.

④ EMI Test Receiver

ESI26 : 20 Hz to 26.5 GHz

ESI40 : 20 Hz to 40 GHz

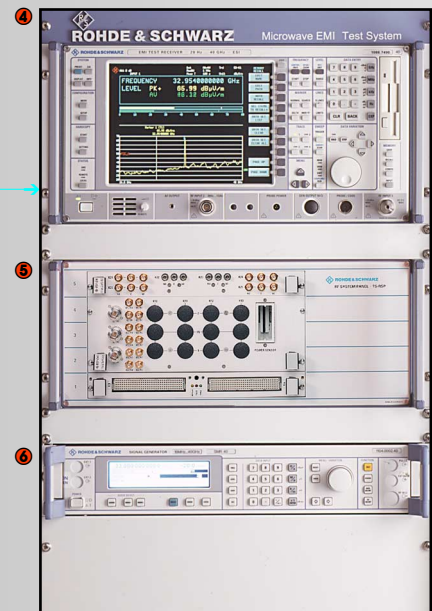
The ESI test receiver which makes up the heart of the test system is fully CISPR 16-1 compliant. The ESI combines the receiver's high overload capability, accuracy and sensitivity with the speed and flexibility of a spectrum analyzer. This is because the ESI can run as an EMI test receiver or a spectrum analyzer with built in preselector and preamplifier. Whether you are performing a MIL STD 461C RE02 or measuring to a next generation mobile phone standard, the ESI can handle it.



Antenna Mast and Turntable

The following main features characterize ES-K1:

- Operates under Windows 95, 98, NT 4.0 and 2000
- Fully automatic and interactive measurements
- EMI measurements to commercial and military standards
- Broadband / narrowband discrimination
- Conducted and radiated measurements
- Convenient and flexible result display and report generation



⑤ TS-RSP : Relay Switch Unit

- Built-in NRVS RF Power Meter
- 4 Relay paths up to 18 GHz
- 2 Relay paths up to 40 GHz

⑥ Microwave Signal Generator

SMR27 : 1 to 27 GHz

SMR40 : 1 to 40 GHz

● Preamplifier Systems & Antennas

To customize your particular application, the TS-9975 comes in several antenna preamplifier configurations. Either individual antenna preamplifier systems or combined antenna array systems are available.



TS-ANA Combined Antenna Array System

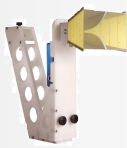
To allow the user to measure the entire frequency range from 1 to 40 GHz, or from 1 to 26.5 GHz without manual antenna and / or polarization change ROHDE&SCHWARZ has developed an antenna array system TS-ANA.

TS-ANA2 : 1 to 26.5 GHz

This system includes two horn antennas, preamplifier and a remote controlled RF relay mounted on a single mast adapter.

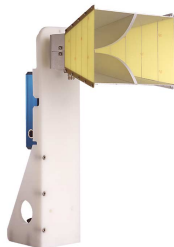
TS-ANA4 : 1 to 40 GHz

All three horn antennas are mounted on a single mast adapter together with the preamplifiers and the remote controlled RF relay.



TS-PR Individual Preamplifier - Antenna System

The horn antenna and preamplifier system comes with a tripod adapter, which allows an easy manual polarization change. The TS-PR series is also mast-mountable.



TS-PR18 : 1-18 GHz

This antenna-pre-amplifier combination is available to users who need to measure interference from 1 to 18 GHz. This system contains a double ridged horn antenna, low noise preamplifier and a flexible, ruggedized, low-loss cable.



TS-PR26 & TS-PR40 : 18 to 26.5 or 40 GHz

To cover the frequency ranges from 18 to 26.5 GHz or from 26.5 to 40 GHz the preamplifier antenna combination TS-PR26 and TS-PR40 are available. These combinations are similar to the TS-PR18 design.

TS-9975

Standards

Commercial Standards : see Graph 1

Cables & Preamplifiers

1 GHz – 18 GHz	18 GHz – 26.5 GHz	26.5 GHz – 40 GHz
8 m ↑ Total Cable Length	4 m	4 m
TS-PR18, TS-ANA2, TS-ANA4 ↑ Preamplifier	TS-PR26, TS-ANA2, TS-ANA4	TS-PR40, TS-ANA2, TS-ANA4
Double Ridged Guide Horn Antenna ↑ Antenna Type	Standard Gain Horn Antenna	Standard Gain Horn Antenna

EMI Test Receiver

1 GHz – 7 GHz	7 GHz – 40 GHz
Average ↑ Detector	Average
1 MHz ↑ 6 dB Resolution Bandwidth	1 MHz
ON ↑ Internal Preamplifier	NA



Military / Aerospace Standards : see Graph 2

Cables & Preamplifiers

1 GHz – 18 GHz	18 GHz – 26.5 GHz	26.5 GHz – 40 GHz
8 m ↑ Total Cable Length	4 m	4 m
TS-PR18, TS-ANA2, TS-ANA4 ↑ Preamplifier	TS-PR26, TS-ANA2, TS-ANA4	TS-PR40, TS-ANA2, TS-ANA4
Double Ridged Guide Horn Antenna ↑ Antenna Type	Standard Gain Horn Antenna	Standard Gain Horn Antenna

EMI Test Receiver

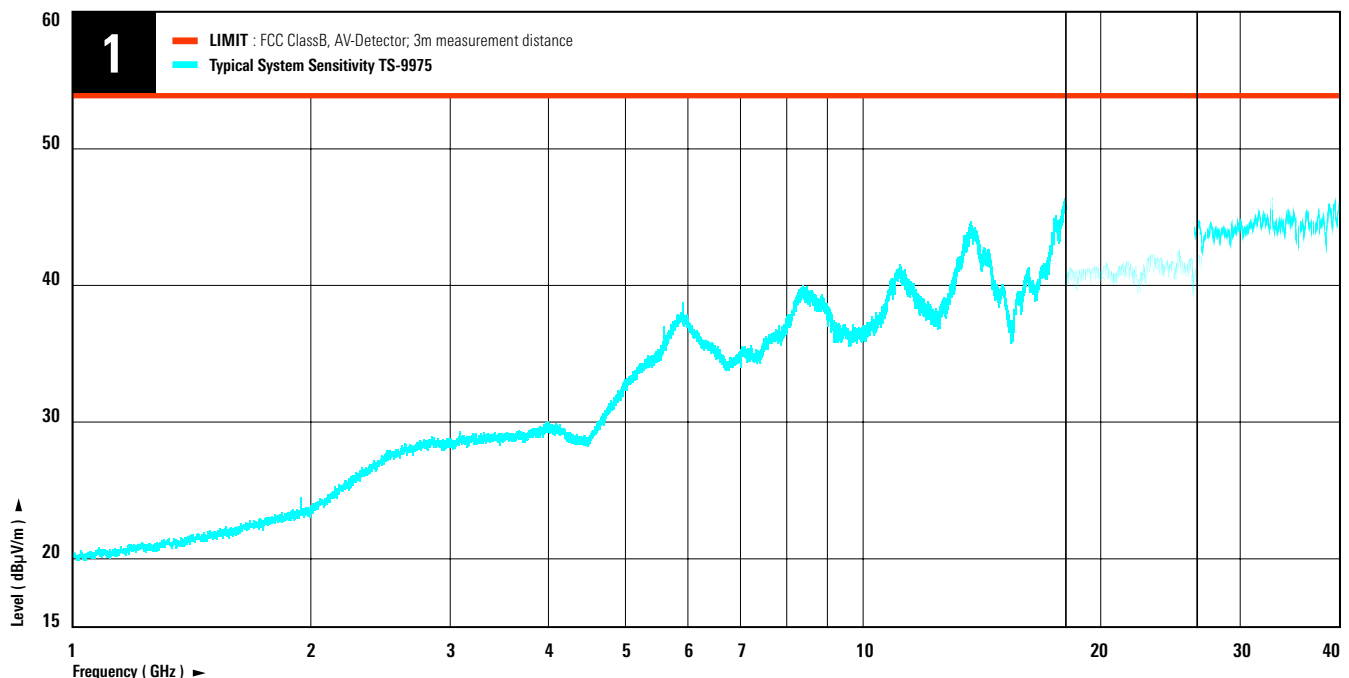
1 GHz – 7 GHz	7 GHz – 40 GHz
Peak ↑ Detector	Peak
1 MHz ↑ 6 dB Resolution Bandwidth	1 MHz
ON ↑ Internal Preamplifier	NA

TS-9975

Typical Specifications

Preamplifier System

TS-PR18	TS-PR26	TS-PR40
0.1 – 18 GHz (0.03 – 18 GHz) ↑ Frequency Range	18 – 26.5 GHz	26.5 – 40 GHz
> 29 dB (32 dB) ↑ Gain	> 27 dB (30 dB)	> 50 dB
1.8 dB ↑ Gain Variation	1.0 dB	2.5 dB
2.8 dB ↑ Noise Figure	2.6 dB	2.9 dB
+5 dBm ↑ 1 -dB Compression Point	+5 dBm	+5 dBm
2.5 : 1 ↑ Input VSWR	2 : 1	2 : 1
2.5 : 1 ↑ Output VSWR	2 : 1	2 : 1
RPC - 2.9 mm, 50 Ω ↑ RF-Input Connector	RPC - 2.92 mm, 50 Ω	RPC - 2.92 mm, 50 Ω
N Precision-Female DIN Connector ↑ RF-Output Connector	RPC - 2.92 mm, 50 Ω	RPC - 2.92 mm, 50 Ω
5 Pin Female DIN Connector ↑ Power Supply Connector	5 Pin Female DIN Connector	5 Pin Female DIN Connector
+15 V / 200 mA ↑ Power Supply	+15 V / 200 mA	+15 V / 200 mA
0.25 in x 20 Thread Mount ↑ Tripod Mounting	0.25 in x 20 Thread Mount	0.25 in x 20 Thread Mount
Manual ↑ Polarization Change	Manual	Manual
EMCO / SUNOL / DEISEL ↑ Mast Mounting	EMCO / SUNOL / DEISEL	EMCO / SUNOL / DEISEL
Via Mast ↑ Polarization Change	Via Mast	Via Mast



TS-ANA2

0.1 – 26.5 GHz (0.03 – 26.5 GHz)

↑ **Frequency Range**

> 29 dB (32 dB) / > 27 dB (30 dB) / NA

↑ **Gain** : 1 - 18 GHz / 18 - 26.5 GHz / 26.5 GHz - 40 GHz

1.8 dB / 1.0 dB / NA

↑ **Gain Variation** : 1 - 18 GHz / 18 - 26.5 GHz / 26.5 GHz - 40 GHz

2.8 dB / 2.6 dB / NA

↑ **Noise Figure** : 1 - 18 GHz / 18 - 26.5 GHz / 26.5 GHz - 40 GHz

+5 dB / +5 dB / NA

↑ **1 -dB Compression Point** : 1 - 18 GHz / 18 - 26.5 GHz / 26.5 GHz - 40 GHz

2.5 : 1 / 2 : 1 / NA

↑ **Input VSWR** : 1 - 18 GHz / 18 - 26.5 GHz / 26.5 GHz - 40 GHz

2.5 : 1 / 2 : 1 / NA

↑ **Output VSWR** : 1 - 18 GHz / 18 - 26.5 GHz / 26.5 GHz - 40 GHz

RPC 2.9 mm, 50 Ω

↑ **RF-Input Connector**

RPC 2.9 mm, 50 Ω

↑ **RF-Output Connector**

5 Pin Female DIN Connector

↑ **Power Supply Connector**

+5 V / 10 A

+15 V / 4 A

-15 V / 4 A

+24 V / 5 A

↑ **Power Supply**

DC - 40 GHz, 3 Inputs, 1 Output

↑ **RF-Relay**

EMCO / SUNOL / DEISEL

↑ **Mast Mounting**

Via Mast

↑ **Polarization Change**

TS-ANA4

0.1 – 40 GHz (0.03 – 40 GHz)

> 29 dB (32 dB) / > 27 dB (30 dB) / 50 dB (> 52 dB)

1.8 dB / 1.0 dB / 2.5 dB

2.8 dB / 2.6 dB / 2.9 dB

+5 dB / +5 dB / +5 dB

2.5 : 1 / 2 : 1 / 2 : 1

2.5 : 1 / 2 : 1 / 2 : 1

RPC 2.92 mm, 50 Ω

RPC 2.92 mm, 50 Ω

5 Pin Female DIN Connector

+5 V / 10 A

+15 V / 4 A

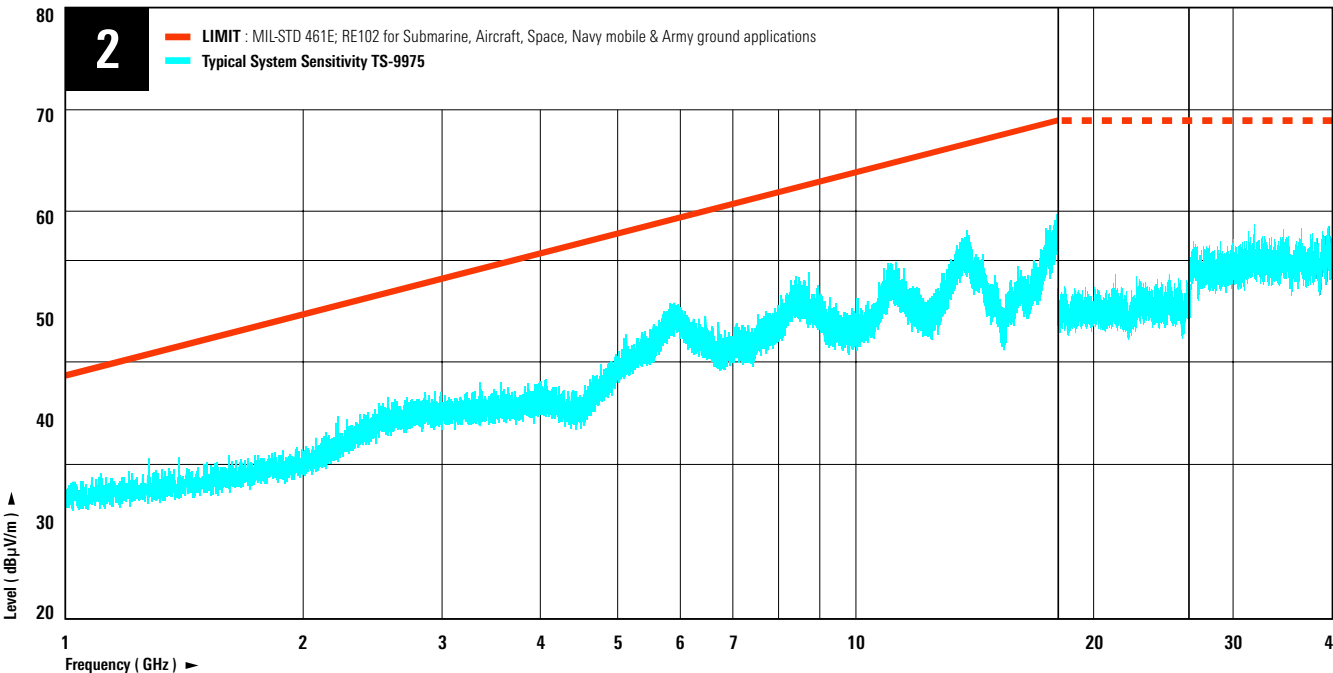
-15 V / 4 A

+24 V / 5 A

DC - 40 GHz, 3 Inputs, 1 Output

EMCO / SUNOL / DEISEL

Via Mast



Option Information

EMI Test Receiver Options

Vector Signal Analyzer
Tracking Generator 7 GHz
Tracking Generator 7 GHz with I/Q Modulator
Switchable Attenuator for Tracking Generator
External Mixer Output for ESI26 and ESI40
Second IEEE-Bus Card

FSE-B7
FSE-B10
FSE-B11
FSE-B12
FSE-B21
FSE-B17

Signal Generator & Options

Signal Generator 1 GHz to 27 GHz
Signal Generator 1 GHz to 40 GHz
Frequency Extension 0.01 GHz to 1 GHz
AM / FM / SCAN Modulator
RF Attenuator 20 GHz (SMR 20/27)
RF Attenuator 40 GHz (SMR 30/40)

SMR27
SMR40
SMR-B11
SMR-B5
SMR-B15
SMR-B17

Recommended Options

RFI Voltage Measurements

V-Network 4 Lines, 200 A
V-Network 4 Lines, 25 A
V-Network 2 Lines, 16 A
V-Network 1 Line, 0.1 to 200 MHz
Attenuator for ESH2-Z3
Coupling Network 2x2 ISN
Coupling Network 4 Wire ISN
Antenna Impedance Converter
Pulse Limiter, 0 to 30 MHz
Attenuator, 0 to 1.5 GHz

ENV4200
ESH2-Z5
ESH3-Z5
ESH3-Z6
ESH2-Z31
ENY22
ENY41
EZ-12
ESH3-Z2
ESH2Z11

Field Strength Measurements

E and H Near Field Probe Set, 100 kHz to 2 GHz
E and H Near Field Probe Set, 9 kHz to 1 GHz
Inductive Probe, 9 kHz to 30 MHz
Rod Antenna, 9 kHz to 30 MHz, active
Loop Antenna, 9 kHz to 30 MHz, active
Rod Antenna (MIL), 9 kHz to 30 MHz, active
Power Supply for Active Antennas
Shielded, Calibrated Pickup Coil (MIL), 5 Hz to 10 MHz
Active H Field Measurement Antenna, 0.1 KHz to 30 MHz
Broadband Dipole, 20 to 80 MHz
Conical Log Spiral Antenna, 0.2 to 1 GHz
Biconical Antenna, 20 to 300 MHz
Log Periodic Antenna, 0.2 to 1.3 GHz
Log Periodic Antenna, 0.4 to 3 GHz
Active Antenna System, 0.1 kHz to 1 GHz
Active Receiving Dipole, 0.2 to 1 GHz
Active Receiving Dipole, 20 to 500 MHz
Precision Halfwave Dipole Set, 30 to 300 MHz
Precision Halfwave Dipole Set, 0.3 to 1 GHz

HZ-11
HZ-14
HFH2-Z4
HFH2-Z1
HFH2-Z2
HFH2-Z6
HZ-9
HZ-10
HM525
HUF-Z1
HUF-Z4
HK116
HL223
HL040
AM524
HE202
HE302
HZ-12
HZ-13

Tripods & Positioning Facilities

Wooden Tripod for HFH2-Z6, HK116, etc.
Tripod and Mast for HFH2-Z2, HUF-Z, etc.

HZ-1
HUF-Z

Common RF Components

Preamplifier, 9 kHz to 300 MHz
Preamplifier, 9 kHz to 1000 MHz
Preamplifier, 30 MHz to 3 GHz
Preamplifier, 30 MHz to 7 GHz
DC Block, 10 kHz to 18 GHz

TS-PR03
TS-PR1
TS-PR3
TS-PR7
FSE-Z3



Ordering Information

Basic system consists of ESI test receiver, 19" rack and cables.

Test System Types

TS-9975 : Test system from 1 to 26 GHz	3545.7072.26
TS-9975 : Test system from 1 to 40 GHz	3545.7089.40

Preamplifier & Antenna Systems

TS-PR18 : 1 to 18 GHz	3545.7008.03
TS-PR26 : 18 to 26 GHz	3545.7014.03
TS-PR40 : 26 to 40 GHz	3545.7020.03
TS-ANA4 : 1 to 40 GHz	3545.7037.03
TS-ANA2 : 1 to 26.5 GHz	3545.7043.03

System Options

TS-CON1 : System Controller	3545.7108.03
ES-K1 : EMI Test Software	1026.6790.02
ES-K2 : Script Development	1026.6890.02
ES-K16 : ESI Driver	1108.0288.02
ES-K40 : Mast & Turntable Controller for EMCO 2090, Sunol	1140.4591.02
ES-K32 : Mast & Turntable Controller for EMCO 1050/1060	1062.3697.02

Microwave Signal Generators

SMR27 : 1 to 27 GHz	1104.0002.27
SMR40 : 1 to 40 GHz	1104.0002.40
TS-RSP : Relay Switch Unit	0331.1601.15

