R&S®ETC
Compact TV Analyzer
Economical
TV transmitter testing

GREENTEST® TECHNOLOGIES

Product Brochure | Version 05.00

R&S®ETC Compact TV Analyzer

At a glance

The R&S®ETC compact TV analyzer offers a comprehensive set of measurement functions for DVB-T2, DVB-T/DVB-H and ISDB-T digital TV transmitter testing. It is also useful for service and maintenance of TV transmitters as well as for testing modulators in R&D or quality assurance environments. The design of the analyzer is ideal for coverage measurements in broadcast network planning.

The R&S®ETC is specialized in TV analysis and also performs spectrum and scalar network analysis as well as power measurements. For tests that require higher sensitivity and selectivity, users can activate an integrated preselector followed by a preamplifier.

The core component of the R&S®ETC is an FPGA-based realtime digital TV demodulator that optimizes realtime BER measurements and provides a demodulated MPEG-2 transport stream at the ASI output. The instrument also offers a comprehensive set of transmitter measurement functions including amplitude, phase and group delay measurements for DVB-T2, DVB-T and ISDB-T. Further advantages of the compact TV analyzer are its high measurement speed and fast booting and mode switching times, which significantly reduces the time needed for test procedures.

To facilitate data exchange and monitoring, the R&S®ETCView Windows-based PC software, which comes with the instrument, allows users to document measurement results. The data can be transferred via a USB or LAN interface.

Key facts

- Support of DVB-T2, DVB-T/DVB-H and ISDB-T digital TV standards [1)]
- Wide frequency range up to 3.6 GHz or 8 GHz
- Precision MER measurement in realtime (typ. 44 dB at 500 MHz)
- Wide input level range from –76 dBm to +10 dBm for quasi error-free transport stream decoding
- Spectrum analyzer DANL of typ. –165 dBm (1 Hz)
- Support of MPEG decoding and analysis

R&S®ETC Compact TV Analyzer

Benefits and key features

Comprehensive analysis of digital signal transmission

- Measurement of DVB-T2, DVB-T/DVB-H and ISDB-T digital signal parameters
- Full support of DVB-T2 single and multi-PLP transmission mode
- Display of constellation diagram, channel impulse response (echo pattern), shoulder distance of OFDM spectrum and MER(k)
- High-precision power measurements with Rohde&Schwarz power sensors

▷ page 4

Precise measurement with realtime demodulation

- FPGA-based realtime digital TV demodulator for maximum measurement accuracy
- Support of TV signal analysis with and without FEC lock
- Reliable detection of short-time interference thanks to high measurement speed
- BER measurement and ASI transport stream output
- Integrated preselection and preamplifier enabling wide input level range

▷ page 5

Easy operation, network coverage analysis and automatic test measurement

- Fast selection of functions via keypad and rotary knob
- Easy compliance testing based on limit tables
- Reproducible measurements using user-specific measurement profiles, channel tables, transducers and cable models
- Efficient coverage analysis for broadcast terrestrial networks with R&S®BCDRIVE
- Automatic transmitter measurements and documentation

▷ page 6

Video/audio decoding and data logging

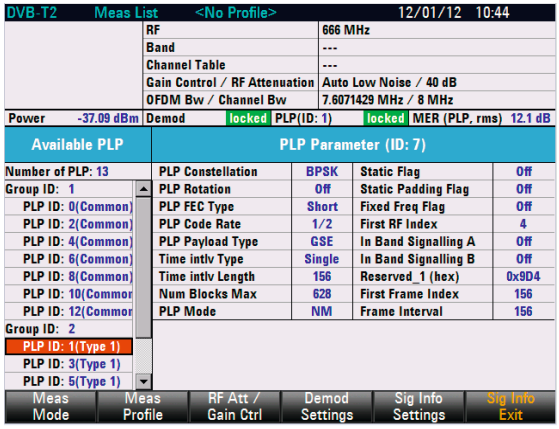
- MPEG decoding and analysis
- Data logging for analysis
- The data logging feature allow users to monitor the transmitter performance over an observation period. The data is recorded for comparison or analysis purposes.
- Editing and customizing of channel tables, measurement profiles, and transducer and limit tables
- Transfer of measurement results for documentation on PC
- Full remote control using SCPI commands

▷ page 7

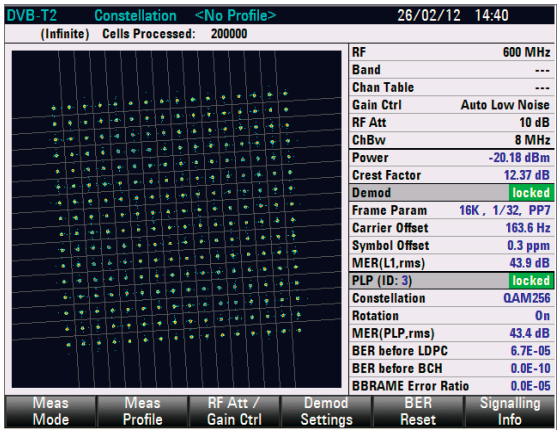
R&S®ETC model overview	
Frequency range	
Up to 3.6 GHz	model .04
Up to 8 GHz	model .08

Comprehensive analysis of digital signal transmission

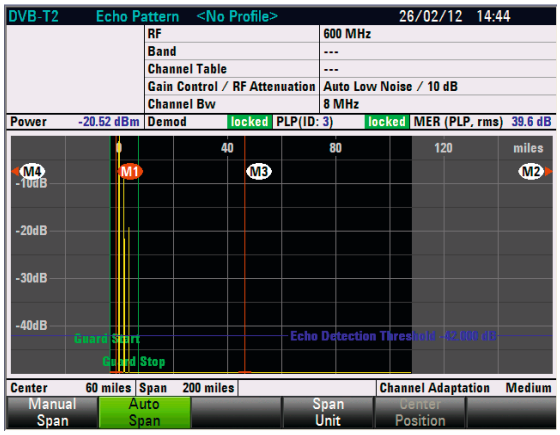
Multi-PLP menu.



Rotated constellation.



Channel impulse response.



Measurement of DVB-T2, DVB-T/DVB-H and ISDB-T digital signal parameters

The R&S®ETC compact TV analyzer measures key parameters and displays them on its color LCD, allowing users to visually judge the quality of the received signal at a glance. The TV analyzer function of the R&S®ETC reads the configuration of the actual TV signal from its signaling information and sets the receiver parameters accordingly.

Full support of DVB-T2 single and multi-PLP transmission mode

For DVB-T2, the R&S®ETC supports measurement of both single and multi-PLP signal transmission. In multi-PLP mode, the user can view the number of available PLPs and demodulate one particular PLP by selecting manual mode.

Display of constellation diagram, channel impulse response (echo pattern), shoulder distance of OFDM spectrum and MER(k)

The R&S®ETC provides a straightforward display of measured parameters. For DVB-T2, the R&S®ETC also displays rotated constellation diagrams together with other important signal parameters.

The channel impulse response measurement is essential for analyzing receive signal problems. This measurement produces a graph showing echoes caused by multipath propagation as well as the different signal delays of the transmitters in a single-frequency network (SFN). The R&S®ETC also displays the spectrum of the received TV signal and measures the shoulder distance, channel power, amplitude, phase and group delay.

The analyzer measures the modulation error ratio (MER) of all OFDM carriers. In addition, it provides a graphical display of the MER values versus the OFDM carriers, i.e. MER(k). This function is useful for detecting narrowband interference effects, which would not be visible in the overall RMS value of the MER.

High-precision power measurements with Rohde&Schwarz power sensors

Broadband power measurements can be performed by combining Rohde&Schwarz power sensors with the R&S®ETC, making it a high-precision RF power meter. For supported powers sensors, please see page 11"External accessories".

Precise measurement with realtime demodulation

The R&S®ETC internal power meter allows users to measure power levels with a power sensor.

R&S®ETC is used for DUT analysis and result data is transferred using R&S®ETCView.

FPGA-based realtime digital TV demodulator for maximum measurement accuracy

The core component of the R&S®ETC is an FPGA-based measurement demodulator that demodulates and decodes the received signal in realtime. The FPGA implementation helps to ensure minimum tolerances and therefore high accuracy and reproducibility. The R&S®ETC achieves a MER value of typ. 44 dB at 500 MHz, which is excellent in its class.

Support of TV signal analysis with and without FEC lock

The R&S®ETC allows users to demodulate the RF signal with and without FEC lock. Measurement without FEC lock is beneficial when analyzing echo in the critical environment where the signal's carrier-to-noise ratio is relatively weak.

Reliable detection of short-time interference thanks to high measurement speed

A key task in examining receive problems is the detection of irregularly occurring short-time interference. The R&S®ETC is ideal for this task due to its realtime signal processing unit and its high speed of typically eight measurements per second. Impulsive interference can be reliably detected.

BER measurement and ASI transport stream output

Realtime demodulation allows continuous measurement of the bit error ratio (BER) of the received signal. The R&S®ETC indicates the BER before and after forward error correction processing, as well as the packet error ratio of the decoded transport stream. For ISDB-T, the R&S®ETC simultaneously displays the BER for layers A, B and C. It then makes the decoded transport stream available at the ASI output for further processing.

Integrated preselection and preamplifier enabling wide input level range

The R&S®ETC has an internal RF preselection that suppresses unwanted received signals and thereby increases the dynamic range. A low-noise amplifier that is connected after the preselection filter increases the sensitivity of the R&S®ETC. As a result, the R&S®ETC achieves a level range from –76 dBm to +10 dBm for quasi error-free transport stream decoding.

Easy operation, network coverage analysis and automatic test measurement

Fast selection of functions via keypad and rotary knob

The R&S®ETC can be operated conveniently using the keypad and the rotary knob with built-in Enter key. Basic functions are assigned to fixed function keys, while navigation in the menus of the different measurement screens is performed via softkeys.

Easy compliance testing based on limit tables

To check a TV transmitter against its specifications, a large number of parameters must be confirmed and compared with the permissible limit values. The R&S®ETC considerably simplifies this task by allowing the user to define limit values in tables. Any violation of these limit values is immediately highlighted in color so that the user can see at a glance whether the measurement is within the permissible limits.

Reproducible measurements using user-specific measurement profiles, channel tables, transducers and cable models

The R&S®ETC makes it easy to save the frequency response of filters, amplifiers or antennas as transducer data. The measurement results will then be compensated automatically using the transducer data. Moreover, all required settings for a specific measurement task can be saved as a user-specific measurement profile and called up when necessary.

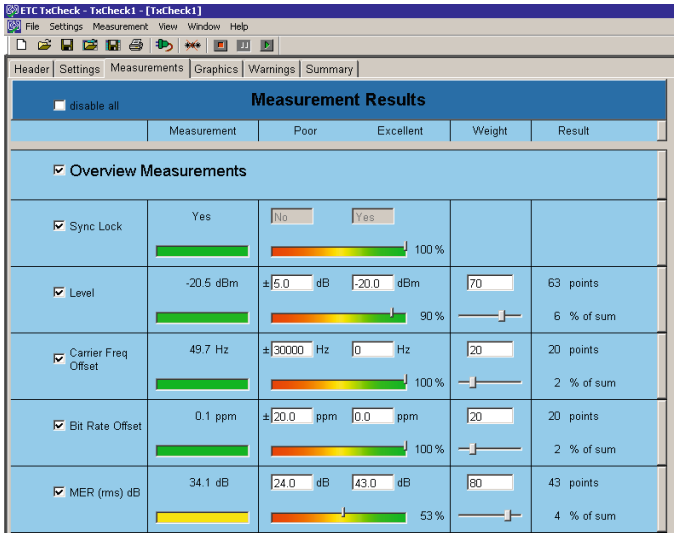
Efficient coverage analysis for broadcast terrestrial networks with R&S®BCDRIVE

The R&S®BCDRIVE broadcast drive test software runs on an external PC and allows users to quickly and reliably perform measurements to acquire the geographical distribution of the signal quality during drive tests. The system delivers accurate results with a single drive test – for multiple frequencies and for a large number of terrestrial broadcast standards. The intelligent functionality for displaying vast amounts of measured data in Google Earth makes it possible to recognize critical reception areas with pinpoint accuracy.

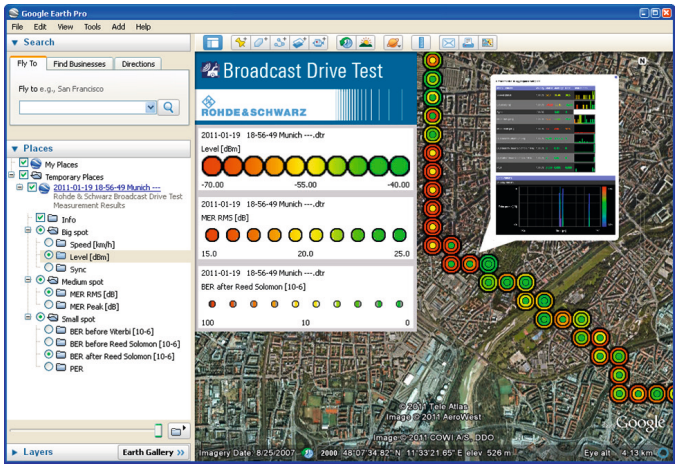
Automatic transmitter measurements and documentation

When the R&S®TxCheck software is used with the R&S®ETC, users can perform automatic transmitter measurements by just pressing the start button. This software runs on an external PC and allows the user to monitor and measure from remote locations. Measurement results are presented in a graphical and color bar display. A measurement summary provides an overall result. A report containing measurement parameters, analysis results and graphs is also generated.

R&S®TxCheck measurement software.



R&S®BCDRIVE broadcast drive test software.



Video/audio decoding and data logging

MPEG decoding and analysis

The R&S®ETC-B280 MPEG decoder option enables users to visually check the received program. It decodes MPEG-2 and H.264 video content and displays the MPEG service information (SI).

Data logging for analysis

The data logging feature allow users to monitor the transmitter performance over an observation period. The data is recorded for comparison or analysis purposes.

Storage of measurement data in internal or external memory

The measurement data and the current device settings can be saved quickly and easily in the internal memory of the R&S®ETC or on a USB memory stick. Another feature is the hardcopy function to save the current screen contents as a graphical file in the R&S®ETC by just pressing a key.

Editing and customizing of channel tables, measurement profiles, and transducer and limit tables

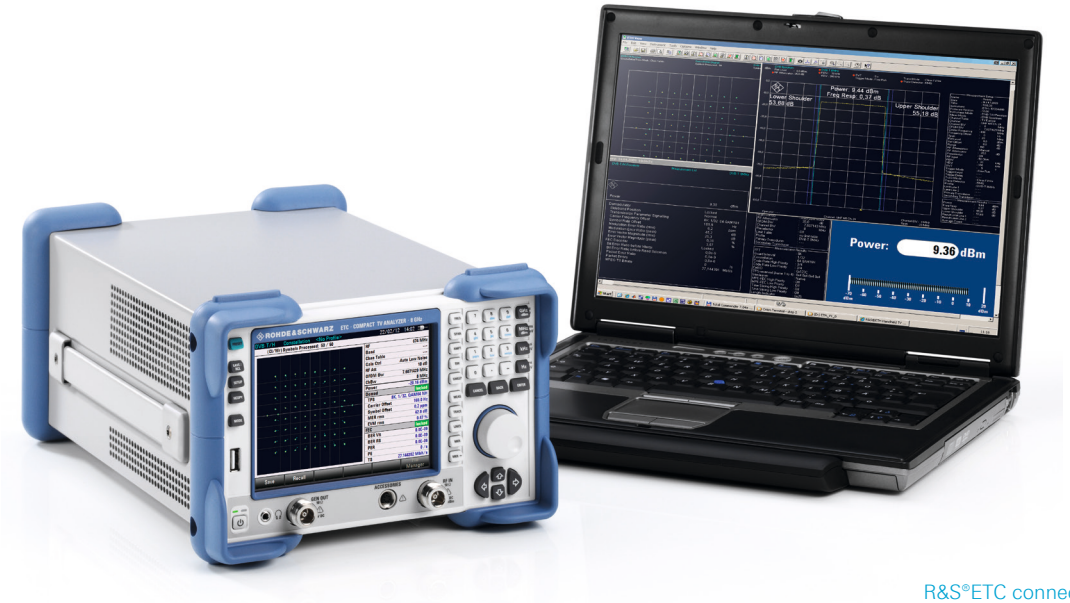
The R&S®ETCView PC software, which comes with the R&S®ETC, allows users to perform convenient bidirectional data transfer between the R&S®ETC and PC via USB or LAN interface. It includes editors to generate measurement profiles and limit value, transducer, cable model and channel tables, and transfers them to and from the R&S®ETC.

Transfer of measurement results for documentation on PC

The R&S®ETCView PC software ensures the transmission of saved measurement results and hardcopy files from the R&S®ETC to the PC for documentation. The analyzer also permits remote monitoring of signals, e.g. at unattended transmitter sites. In this case, the R&S®ETC is remote-controlled via LAN; the software is used for transferring the current measurement values – also via LAN – to the PC and for displaying them.

Full remote control using SCPI commands

The R&S®ETC can be remote controlled via the LAN or USB interface, which allows integration into automatic test systems. This function is especially useful in applications in R&D and quality assurance of modulators. The remote control commands are in line with the SCPI protocol.



R&S®ETC connected to PC with R&S®ETCView GUI.

Application examples

Complete on-site transmitter measurements including out-of-band emissions

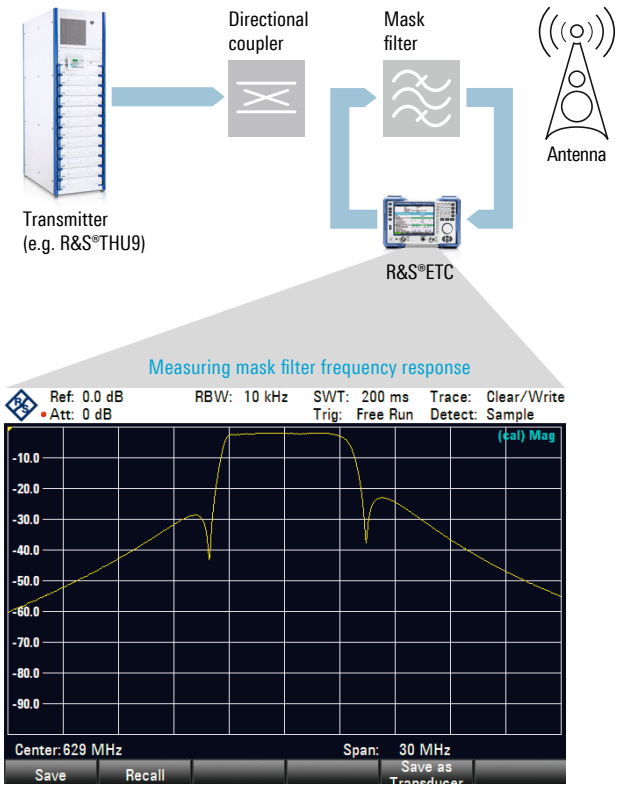
The relevant test specifications for digital TV transmitters usually require the following measurements:

- Output power
- MER of the OFDM signal and the individual carriers
- Bit error ratio
- Out-of-band emissions

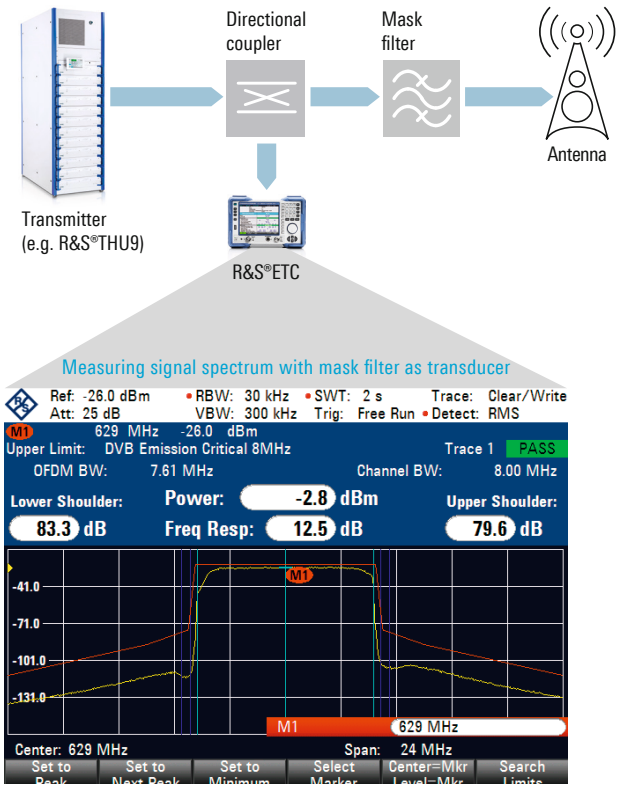
Out-of-band emissions is one of the measurements required during commissioning, service and maintenance of TV transmitters. It checks whether there are unwanted signal components in a transmitter's adjacent channels. The R&S®ETC provides an easy way to test a TV transmitter's out-of-band emissions without an external bandstop filter. The automatic generation and use of transducer factors make this function possible on this compact TV analyzer. Since low-power transmitters are often located in remote, difficult-to-access areas where space is typically limited, the small size of the compact R&S®ETC is advantageous.

The transducer measurement function of the R&S®ETC compact TV analyzer facilitates the measurement of out-of-band emissions with user-predefined limit lines for the spectrum masks.

Measurement with the R&S®ETC (part 1)



Measurement with the R&S®ETC (part 2)

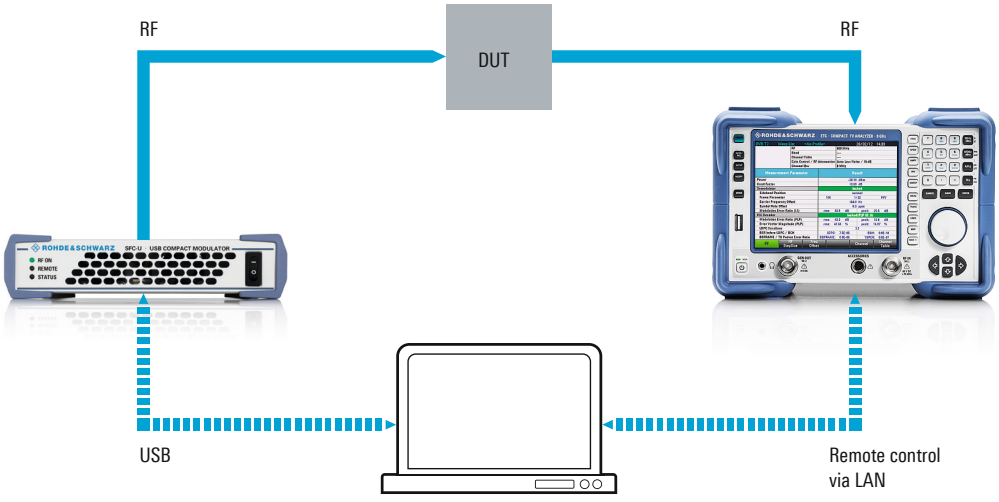


Testing transposers using the R&S®ETC in combination with the R&S®SFC-U

The measurement of transposers is essential to ensuring good quality of retransmitted signals. The signal quality can be measured at the input and output of transposers as well as the mask filter. The signal fed into a transposer is always an RF signal received over the air by an antenna. A weak output signal from the transposer could be caused either by the transposer itself or by weak signal reception. The measurements required for the transposer are the same as those for the TV transmitter but with an additional test to ensure the transposer works properly with noisy input signals.

For transposer testing, a signal source is needed to generate the RF input signal with defined quality. The R&S®SFC-U is an ideal instrument for providing a good signal source; the R&S®ETC is excellent for analyzing the output of the transposer. Both instruments are connected to a PC that controls the measurements via USB and LAN. This setup provides a cost-effective solution for testing transposers. The measurement is simple to set up, using the R&S®SFC-U to reproduce the signal and feed it into the transposer for testing the output signal quality using the R&S®ETC. Both instruments can be easily controlled from a PC.

Testing transposers with the R&S®ETC and R&S®SFC-U



Specifications in brief

Specifications in brief		
DVB-T2 analysis (R&S®ETC-K240), DVB-T/DVB-H analysis (R&S®ETC-K140) and ISDB-T analysis (R&S®ETC-K160)		
Quasi error-free input level range	RF = 500 MHz, RF preselection on, 64QAM, CR 1/2	typ. –76 dBm to +10 dBm
Inherent modulation error ratio (MER)	0 dB RF attenuation, 64QAM non-hierarchical modulation, 8K FFT, 1/32 guard interval, slow channel adaptation	
	level = –30 dBm, RF preselection off	
	RF = 50 MHz to 862 MHz	> 40 dB
	RF = 500 MHz	typ. 44 dB
	level = –45 dBm, RF preselection on	
	RF = 50 MHz to 862 MHz	> 38 dB
	RF = 500 MHz	typ. 43 dB
Phase noise	RF = 500 MHz	
	Δf = 30 kHz	< 98 dBc (1 Hz)
	Δf = 100 kHz	< 100 dBc (1 Hz)
	Δf = 1 MHz	< 125 dBc (1 Hz)
Noise figure	RF = 500 MHz	
	RF preselection off	< 22 dB, typ. 18 dB
	RF preselection on	< 14 dB, typ. 11 dB
Third-order intermodulation (TOI)	0 dB RF attenuation	
	RF preselection off	typ. +7 dBm
	RF preselection on	typ. –6 dBm
Second-harmonic intercept point (SHI)	50 MHz < RF < 1.5 GHz, 0 dB RF attenuation	
	RF preselection off	typ. +30 dBm
	RF preselection on	typ. +60 dBm
Signal level uncertainty	RF < 3.6 GHz	< 1.0 dB, typ. < 0.5 dB
Frequency uncertainty	internal reference	2×10^{-6}
	with the R&S®HA-Z240 GPS receiver	2.5×10^{-8}
Spectrum analysis		10 MHz < RF < 2 GHz, 0 dB RF attenuation
Displayed average noise level (DANL)	RF preselection off	typ. –156 dBm (1 Hz)
	RF preselection on	typ. –165 dBm (1 Hz)
Resolution bandwidths (RBW)		100 Hz to 3 MHz in 1/sequence
Video bandwidths		10 Hz to 3 MHz in 1/sequence
Trace detectors		auto peak, max. peak, min. peak, sample, RMS
Scalar network analysis (R&S®ETC-K10 option)		
Tracking generator output level		–40 dBm to 0 dBm in 1 dB steps
Data points		631
Dynamic range for transmission measurements		> 70 dB, typ. 90 dB
Reflection measurements	R&S®FSH-Z2	10 MHz to 3 GHz
	R&S®FSH-Z3	10 MHz to 6 GHz
Power meter		
Terminating power sensors	R&S®FSH-Z1	10 MHz to 8 GHz
	R&S®FSH-Z18	10 MHz to 18 GHz
Directional power sensors	R&S®FSH-Z14	25 MHz to 1 GHz
	R&S®FSH-Z44	200 MHz to 4 GHz
General data		
Operating temperature range		5 °C to +45 °C
Display		14.5 cm (5.7 in) color LCD TFT
Dimensions	W × H × D	233 mm × 158 mm × 350 mm (9.2 in × 6.2 in × 13.8 in)
Weight		4.8 kg (10.6 lb)

For data sheet, see 3606.6970.22 and www.rohde-schwarz.com

Ordering information

Designation	Type	Order No.
Base unit		
Compact TV Analyzer, up to 3.6 GHz	R&S®ETC	2116.5000.04
Compact TV Analyzer, up to 8 GHz	R&S®ETC	2116.5000.08
Accessories supplied		
USB cable, quick start guide and CD-ROM with R&S®ETCView PC software and documentation		
Hardware option		
FPGA Extension Board	R&S®ETC-B300	2116.5230.02
MPEG Decoder Board	R&S®ETC-B280	2116.5252.02
Software options		
RF Preselection, up to 3.6 GHz	R&S®ETC-K1	2116.5098.02
RF Preselection, up to 8 GHz	R&S®ETC-K1	2116.5181.02
Tracking Generator with Scalar Network Analysis, up to 3.6 GHz	R&S®ETC-K10	2116.5169.02
Tracking Generator with Scalar Network Analysis, up to 8 GHz	R&S®ETC-K10	2116.5175.02
Phase, Group Delay Measurement	R&S®ETC-K180	2116.5130.02
DVB-T/DVB-H Analysis	R&S®ETC-K140	2116.5100.02
ISDB-T Analysis	R&S®ETC-K160	2116.5117.02
DVB-T2 Analysis (requires R&S®ETC-B300)	R&S®ETC-K240	2116.5123.02
Software application tools for DVB-T2, DVB-T/H and ISDB-T		
Broadcast Drive Test Software Access	R&S®ETC-K930	2116.5146.02
Automatic Transmitter Measurement, TXCHECK	R&S®ETC-K940	2116.5152.02
External accessories		
GPS Receiver	R&S®HA-Z240	1309.6700.03
Directional Power Sensor, 25 MHz to 1 GHz	R&S®FSH-Z14	1120.6001.02
Directional Power Sensor, 200 MHz to 4 GHz	R&S®FSH-Z44	1165.2305.02
Wideband Power Sensor, 50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
Soft Carrying Bag	R&S®RTM-Z3	1305.0289.02
R&S®ETC Hard Case	R&S®ETC-Z1	2116.5300.00

Warranty		
Base unit		3 years
All other items [1]		1 year
Options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde&Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Accredited Calibration Coverage, one year	R&S®AW1	
Extended Warranty with Accredited Calibration Coverage, two years	R&S®AW2	

[1] For options that are installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

Service that adds value

- Worldwide
- Local and 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.

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

微信视频号　绿测科技订阅号　绿测工场服务号

GREENTEST® TECHNOLOGIES

绿测科技有限公司

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