Specifications

Realtime measurement functions to test specifications for DVB systems (ETR290)

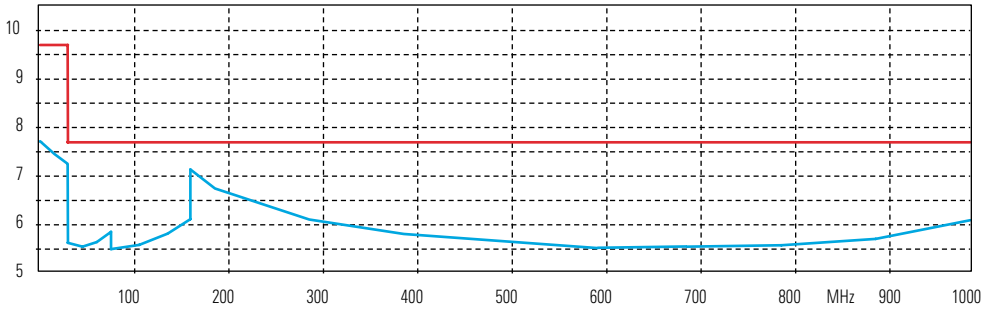
Model-specific characteristics

	DVB-T standard test receiver (model 40)	DVB-T high-end test receiver (model 43) with option EFA-B3	DVB-T high-end demodulator (model 43)
RF input	selective	selective	non-selective
Connector	50 Ω or 75 Ω, BNC or N female, front or rear panel (see configuration sheet)	50 Ω, N female, rear panel and 75 Ω, BNC female, rear panel	50 Ω, N female, rear panel
Return loss	≥14 dB in channel with 50 Ω connector and input attenuation ≥10 dB ≥12 dB in channel with 75 Ω connector and input attenuation ≥10 dB	≥17 dB (>20 dB typ.) in channel with 50 Ω connector ≥14 dB (>17 dB typ.) in channel with 75 Ω connector	≥30 dB
Frequency range	48 MHz to 862 MHz	4.5 MHz to 1000 MHz [1]	45 MHz to 1000 MHz
Level range (lower values: QPSK only[1][2]))	–72 dBm to +20 dBm (with LOW NOISE, preamplifier = OFF) –82 dBm to –47 dBm (with LOW NOISE, preamplifier = ON) –88 dBm to –47 dBm (with LOW NOISE, preamplifier = ON and HIGH ADJ CHAN POWER = ON)	–85 dBm to +14 dBm (low noise) –80 dBm to +20 dBm (normal) –80 dBm to +20 dBm (low distortion) –90 dBm to –10 dBm (low noise and HIGH ADJ CHAN POWER = ON)	–50 dBm to +20 dBm
Noise figure (50 Ω input, RF ≥47.15 MHz)	12 dB typ. (low noise) 7 dB typ. (preamplifier and low noise)	7 dB typ. (low noise) 9 dB typ. (normal) 11 dB typ. (low distortion)	
Image frequency rejection	≥70 dB (VHF) and ≥50 dB (UHF)	100 dB	
IF rejection		100 dB	
Local oscillator			
Resolution	1 Hz	1 Hz	1 Hz
Frequency error	≤2 x 10^{-6}	≤2 x 10^{-6}	≤2 x 10^{-6}
OFDM demodulator characteristics			
Inherent MER[2])	≥38 dB	≥40 dB	≥40 dB
Inherent SNR[2])	≥39 dB	≥41 dB	≥41 dB

[1]) At low input frequencies such as 4.57 MHz: additional tilt (0.7 dB pp typ.), minimum input level: –30 dBm, SAW filter ON.

[2]) Valid for instruments delivered as of January 2001.

RF Preselection for demodulator – option EFA-B3



Noise figure (low noise mode)

Common characteristics

IF input	50 Ω, BNC female, rear panel, 36 MHz
Return loss in channel	≥30 dB
Level range	–30 dBm to –5 dBm
IF output	50 Ω, BNC female, rear panel, 36 MHz
Return loss in channel	≥20 dB
Level, regulated	–17 dBm

OFDM characteristics	
Bandwidth operation	6 MHz, 7 MHz and 8 MHz switchable
SAW filters	6 MHz, 7 MHz, 8 MHz or OFF
Bit rate clock inaccuracy	<10 ppm (< 3 ppm typ.)
FFT mode	2K or 8K carriers
Constellation	QPSK, 16QAM, 64QAM
Guard interval	1/4, 1/8, 1/16, 1/32
Code rate	1/2, 2/3, 3/4, 5/6, 7/8
Hierarchical modulation	OFF, α=1, α=2, α=4
Equivalent noise degradation (END) at 64QAM; R 2/3	≤1.5 dB
Channel correction	self-adapting
I/Q inversion	automatic, with indication
BER processing	before Viterbi decoder, before and after Reed-Solomon decoder
Measurements level, frequency offset, bit rate offset / BER (bit error ratio) before Viterbi decoder, before and after Reed-Solomon decoder / MER (modulation error ratio) in dB and % / SNR (signal-to-noise ratio), carrier suppression (2K and 8K) / quadrature error, amplitude imbalance phase jitter / shoulder attenuation (upper/lower) to ETR290 /crest factor	
Graphic displays constellation diagram, start/stop frequencies and number of symbols selectable / MER(f) in dB: RMS and max. values, start/stop frequencies selectable / MER(f) in %: RMS and min. values, start/stop frequencies selectable / Interference(f) in dB: RMS and max. values, start/stop frequencies selectable / I/Q(f), start/stop frequencies and number of symbols selectable / frequency spectrum, start/stop frequencies selectable / amplitude(f), start/stop frequencies selectable / phase(f), start/stop frequencies selectable / group delay(f), start/stop frequencies selectable / polar plot, start/stop frequencies selectable / amplitude distribution(RF) / CCDF(RF) / impulse response(t) with zoom (max. zoom = 20) / history for level (all level units available), MER (dB and %), BER before Viterbi, BER before Reed-Solomon decoder, all measurements: MAX and MIN and AVERAGE and MAXMIN detectors running in parallel	
Protection ratio for DVB-T interfered with by analog TV in the lower adjacent channel (n-1), 64QAM, R 2/3, 8 MHz, QEF, LOW DISTORTION and HIGH ADJ CHAN POWER = ON (valid for instruments delivered as of January 2001)	44 dB typ.
Protection ratio for DVB-T interfered with by analog TV in the upper adjacent channel (n+1), 64QAM, R 2/3, 8 MHz, QEF, LOW DISTORTION and HIGH ADJ CHAN POWER = ON (valid for instruments delivered as of January 2001)	42 dB typ.
MPEG2 TS parallel output	synchronous LVDS (188 byte, 204 byte, TS-SPI), 100 Ω
MPEG2 TS ASI output	asynchronous serial MPEG2 transport stream (TS-ASI); 75 Ω
SER DATA output	serial data stream ahead of Viterbi decoder; 75 Ω
SER CLOCK output	clock output for SER DATA; 75 Ω
Alarm messages	level, synchronization, BER before Viterbi, BER before and after Reed-Solomon, data transmission error
Storage	with date and time, up to 1000 lines
Memory for instrument setup storage	0 to 4

Test parameters	**Range**	**Resolution**
Level	depending on model, see above	0.1 dB
MER (modulation error ratio) in dB	depending on mode of QAM	0.1 dB
MER (modulation error ratio) in %	depending on mode of QAM	0.1%
SNR (signal-to-noise ratio)	depending on mode of QAM	0.1 dB
Carrier suppression (2K and 8K)	–5 dB to +30 dB	0.1 dB
I/Q amplitude imbalance	±5%	0.01%
I/Q quadrature error	±5°	0.01°
Frequency offset	±300 kHz	1 Hz
Bit rate offset	±40 ppm	0.1 ppm
BER before Viterbi	1.0×10^{-2} to 0.1×10^{-15}	$0.1 \times 10^{-\text{exponent}}$
BER before Reed-Solomon	1.0×10^{-3} to 0.1×10^{-15}	$0.1 \times 10^{-\text{exponent}}$
BER after Reed-Solomon	1.0×10^{-4} to 0.1×10^{-14}	$0.1 \times 10^{-\text{exponent}}$
Crest factor	0.0 dB to 15.0 dB	0.1 dB
Echo values (max. = 5 echoes)	0.0 dB to –40.0 dB, –62.2 µs to +236.4 µs (8K FFT, 8 MHz channel bandwidth)	0.1 dB, 10 ns

MPEG2 decoder – option EFA-B4

Realtime measurement functions: simultaneous monitoring of all signals in transport stream
Realtime measurement functions according to test specifications for DVB systems (ETR290): priorities 1, 2 and 3

Signal format	
Transport stream	to ISO/IEC 1-13818
Data rate of transport stream	up to 54 Mbit/s
Length of data packets	188/204 bytes, automatic switchover
Signal input	
Internal: from DVB demodulator External: asynchronous serial MPEG2 transport stream, 270 Mbit/s (TS ASI)	BNC connector on rear panel, 200 mV pp to 1 V pp, 75 Ω
Video signal output	
CCVS (PAL, SECAM, NTSC)	BNC connector on rear panel, 1 V pp ±1%, 75 Ω
Video serial digital (ITU-R 601), 270 Mbit/s	BNC connector on rear panel, 800 mV pp, 75 Ω
Audio	
Connectors	Lemo Triax female, paired; on front panel: unbalanced, on rear panel: balanced, floating
Impedance	<25 Ω
Signals	mono, left/right, sound 1/ sound 2
Level (full scale)	+6 dBm ±0.2 dB into 600 Ω
Frequency response (40 Hz to 15 kHz)	±0.5 dB relative to 1 kHz
S/N ratio	>70 dB, unweighted
THD	>70 dB

Video distributor – option EFA-B6

Video output	2 x BNC female on front panel; 2 x BNC female on rear panel
Impedance	75 Ω
Return loss (0 Hz to 6 MHz)	≥26 dB
Level inaccuracy	≤2%
DC offset of video signal, MPEG2 decoder mode, black level	0 V
Decoupling of outputs (level variation at terminated output when switching the other outputs between short circuit and open circuit)	≤1%

6 MHz SAW filter – option EFA-B11

Ripple in band	0.4 dB pp
Rejection of adjacent channels	>50 dB (>±3.8 MHz) >85 dB (>±5.3 MHz) with high adj. channel power ON

7 MHz SAW filter – option EFA-B12

Ripple in band	0.7 dB pp
Rejection of adjacent channels	>55 dB (>±4.0 MHz) >90 dB (>±5.3 MHz) with high adj. channel power ON

8 MHz SAW filter – option EFA-B13

Ripple in band	0.8 dB pp
Rejection of adjacent channels	>55 dB (>±4.4 MHz) >90 dB (>±5.3 MHz) with high adj. channel power ON

General data

Display	monochrome LCD (320 x 240), backlit
Interfaces	IEC625-2/IEEE488 bus, RS-232-C, printer (Centronics)
Temperature range	to IEC68-2-1/-2
Rated temperature range	+5°C to +45°C
Operating temperature range	0°C to +50°C
Power supply	100 V to 120 V/220 V to 240 V +10%/-15% (autoranging), 50 Hz to 60 Hz
Power consumption	EFA 40: 70 W EFA 43: 75 W EFA 43 + EFA-B3: 90 W
Dimensions (W x H x D)	435 mm x 147 mm x 460 mm
Weight	approx. 12 kg, depending on options

Ordering information

DVB-T Test Receiver *) Selective, constellation diagram, output MPEG2 data stream	EFA 40	2067.3004.40
DVB-T Test Demodulator *) Broadband, constellation diagram, output MPEG2 data stream	EFA 43	2067.3004.43

Options

RF Preselection for demodulator	EFA-B3	2067.3627.02
MPEG2 Decoder	EFA-B4	2067.3633.02
Video Distributor	EFA-B6	2067.3656.02
OFDM Demodulator (for analog units)	EFA-B10	2067.3740.02
6 MHz SAW Filter	EFA-B11	2067.3691.00
7 MHz SAW Filter	EFA-B12	2067.3591.00
8 MHz SAW Filter	EFA-B13	2067.3579.02

Recommended extras

EFA Calibration Values	EFA-DCV	2082.0490.09
19" Adapter	ZZA-93	0396.4892.00
Lemo Triax connector (mono) with connecting cable (open)		2067.7451.00
Service manual		2068.0950.24
Transportation Bag for 3 HU high units	ZZT-314	1001.0523.00

*) Note: please fill in configuration sheet (available from your local representative or from Rohde&Schwarz WEB site, EFA section) so that your test receiver/demodulator can be tailored to your requirements.

Further EFA family members ...

... see EFA main data sheet (PD 0757.2421), including:
EFA models 20/23 (DVB-C), EFA models 12/33 (analog standard B/G), EFA models 78/89 (analog standard D/K or I), EFA models 72/83 (analog standard M/N)

Certified Quality System ISO 9001 DQS REG. NO 1954

Certified Environmental System ISO 14001 REG. NO 1954