# Specifications

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| **Frequency range** | 9 kHz to 2750 MHz |
| Frequency setting | |
| with tuning knob | in 10 Hz, 100 Hz, 100 kHz steps or user-defined step size(switch-selected) |
| numerical | by keyboard entry |
| in steps | any size selectable |
| automatic scanning | for RF spectrum analysis |
| Display | 8 digit LCD with backlighting |
| Resolution up to 1000 MHz | 10 Hz |
| from 1000 MHz | 100 Hz |
| Frequency accuracy | |
| after 30 min warmup | $<1 \times 10^{-6}$ |
| with optional OCXO Reference Oscillator ESCS-B6 | $<5 \times 10^{-7}$ |

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| **RF input** | 50 Ω, N female |
| VSWR | |
| f <1000 MHz | <1.2 with ≥10 dB RF attenuation<br><2.0 with 0 dB RF attenuation |
| f >1000 MHz | typ. 1.5 with ≥10 dB RF attenuation<br>typ. 2.0 with 0 dB RF attenuation |
| RF attenuator | 0 to 60 dB, 5 dB steps |

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| **Preamplifier** | can be connected between preselector and 1st mixer |
| Gain | 10 dB nominal |

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| **Maximum input level** | |
| RF attenuation 0 dB | |
| DC voltage | 50 V |
| Sinewave AC voltage | 130 dBµV |
| Pulse spectral density | 97 dBµV/MHz (100 V x 0.5 ns) |
| RF attenuation ≥10 dB | |
| DC voltage | 50 V |
| Sinewave AC voltage | 137 dBµV (1 W) |
| Max. pulse voltage (10 µs) | 150 V |
| Max. pulse energy (20 µs) | 10 mWs |

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| **Oscillator reradiation at RF input** | |
| (0 dB RF attenuation) | |
| 9 kHz to 1000 MHz | <20 dBµV |

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| **Interference rejection, nonlinearities** | |
| Image frequency 1st and 2nd IF | |
| 9 kHz to 30 MHz | >90 dB |
| 30 to 1000 MHz | >80 dB |
| IF rejection | |
| 9 kHz to 30 MHz | >90 dB |
| 30 MHz to 1000 MHz | >70 dB |
| 1000 MHz to 2750 MHz | >80 dB |
| Intercept point d3, (\|f1-f2\| > 2 MHz), preamplifier off | >5 dBm, typ. 10 dBm |
| Intercept point k2 | |
| 9 kHz to 1960 MHz | >30 dBm |
| Preselector | |
| Filter ranges: | |
| 9 kHz to 150 kHz | fixed |
| 150 kHz to 2 MHz | fixed |
| 2 MHz to 8 MHz | tracking |
| 8 MHz to 25 MHz | tracking |
| 25 MHz to 80 MHz | tracking |
| 80 MHz to 200 MHz | tracking |
| 200 MHz to 500 MHz | tracking |
| 500 MHz to 1000 MHz | fixed |
| 1000 MHz to 1900 MHz | fixed |
| 1900 MHz to 2750 MHz | fixed |

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| **RF shielding** | |
| Voltage indication at a field strength of 10 V/m with 0 dB RF attenuation ($f \neq f_e$) | <0 dBµV |
| Additional error in quasi-peak indication range (10 V/m) | <1 dB |

**Intermediate frequencies**

| | 9 kHz to 30 MHz | 30 to 1000 MHz | 1000 to 2750 MHz |
|---|---|---|---|
| 1st IF | 74.7 MHz | 1354.7 MHz | 394.7 MHz |
| 2nd IF | 10.7 MHz | 74.7 MHz | 74.7 MHz |
| 3rd IF | — | 10.7 MHz | 10.7 MHz |

**IF bandwidths**

| Nominal bandwidth | –3 dB | –6 dB | Shape factor $BW_{6\,dB}/BW_{60\,dB}$ |
|---|---|---|---|
| 200 Hz[1]) | 180 Hz | 200 Hz | 1:8 |
| 9 kHz[1]) | 7 kHz | 9 kHz | 1:4 |
| 120 kHz[1]) | 90 kHz | 120 kHz | 1:5 |
| 1 MHz | 700 kHz | 1 MHz | 1:5 |

[1]) Complies with tolerance to CISPR 16.

**Displayed noise level** (average)

| Range | | Preamplifier off | Preamplifier on |
|---|---|---|---|
| 9 kHz to 30 MHz | BW = 200 Hz | <–25 dBµV<br>typ. –28 dBµV | <–34 dBµV<br>typ. –38 dBµV |
| 50 kHz to 30 MHz | BW = 9 kHz | <–12 dBµV | <–18 dBµV |
| 30 to 1000 MHz | BW = 120 kHz | <+1 dBµV<br>typ. –1 dBµV | <–4 dBµV<br>typ. –7 dBµV |
| 1000 to 2750 MHz | BW = 120 kHz | <+5 dBµV | <0 dBµV |

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| **Inherent spurious responses** | |
| (equivalent input voltage) | |
| 9 kHz to 30 MHz | <–10 dBµV |
| 30 to 2750 MHz | <0 dBµV |

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| **Level display** | |
| Digital in dBµV, dBµA, dBm, dBµV/m, dBµA/m, dBpW, dBpT | 3½-digit LCD, resolution 0.1 dB |
| Analog | on analog meter in operating range of IF detector with digital display of lower range limit |
| Bargraph display | horizontal bar on the screen |
| Resolution | 0.1 dB |
| Operating range | 60 dB |
| Overload indication | by level detectors in the RF and IF signal path |
| Detectors | average (AV), peak (PK), quasi-peak (QP), RMS (option ESCS-B9), 3 detectors can be switched on simultaneously |
| Measuring times | 1 ms to 100 s (1/2/5 steps) |
| Measuring times in overview mode | 50 µs to 1 s (1/2/5 steps) |

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| **Measurement accuracy** | |
| Average indication for S/N > 16 dB | |
| 9 kHz to 1000 MHz | <1 dB |
| 1000 to 2750 MHz | <1.5 dB |
| Quasi-peak indication | to CISPR 16-1 |
| Level calibration | harmonics generator, calibrates the receiver for all settings, correction values saved in nonvolatile memory, duration approx. 1 min |

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| **Screen** | 6.5" TFT colour LCD |
| Resolution | 640 x 480 pixels (VGA) |
| Viewing angle | 90° vertical, 90° horizontal |
| Contrast ratio | 100:1 |

**RF spectrum analysis**

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|---|---|
| Display range | |
| X axis (frequency) | user-selectable, linear or logarithmic |
| Y axis (level) | 10 dB to 200 dB, adjustable in 10 dB steps |
| Traces | max. 2 |
| Display modes | Clr/Write, Max Hold, View |
| Frequency scan modes | |
| Spectrum Overview | scan with fixed attenuation and step size with maximum speed |
| Scan | scan with automatic attenuation setting and selectable step size |
| Channel | scan on up to 400 preset frequencies |

**Marker**

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| | 2 markers with digital display of frequency and level |
| Marker functions | Normal Marker, Delta Marker, Marker to Peak, Next Peak Right, Next Peak Left, Marker Track, Receiver to Marker, Marker Zoom; display of a user-selectable section of the trace; zoom depth down to single value display from max. 30,000 scan values |

**Time domain analysis**

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| Display range (sweep time) | 5 ms to 10,000 s |
| Minimum resolution (x axis) | 100 µs |
| Level display range (y axis) | 10 to 200 dB, adjustable in 10 dB steps, autoscale function |
| Triggering | |
| Internal | RF-level-controlled, threshold adjustable via display line, digital on-screen display of threshold |
| External | TTL levels, positive or negative edge |
| Manual | manual trigger of sweep |
| Sweep | one-shot or free-running |
| Number of traces | max. 2 |
| Display modes | Clr/Write, Max Hold, View |
| Markers | 2 markers with digital display of time and level |
| Marker functions | Normal Marker, Delta Marker, Marker to Peak, Next Peak Right, Next Peak Left, Marker Zoom; display of a user-selectable section of the trace; zoom depth down to single value display from max. 30,000 values measured in time domain |

**IF spectrum analysis (option ESCS-B4)**

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| Display range | 10 kHz to 10 MHz, 1/2/5 steps |
| IF input attenuation | 0/20 dB (selectable) |
| Resolution | 1/3/10 kHz |
| Sweep time | 50 ms to 10 s, 1/2/5 steps |
| Level display range | 80 dB |
| Number of traces | max. 2 |
| Display modes | Clr/Write, Max Hold, Min Hold, Average, View |
| Markers | 2 markers with digital display of frequency and level |
| Marker functions | Normal Marker, Delta Marker, Marker to Peak, Tune to Marker |

**Demodulation modes**

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| | AM, FM, A0 (zero beat) |
| Loudspeaker | built-in loudspeaker, headphones connection |
| Volume | adjustable with knob |
| Squelch | digitally adjustable, displayed on screen, coupled to threshold level for triggering measurements |

**Date, time of day**

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| | built-in clock module, continuously active, fed from internal battery |

**Internal memory**

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| Transducer | 22 transducer factors with up to 50 values, nonvolatile, combinable |
| Limit lines | 22 limit lines with up to 50 values, nonvolatile |
| Instrument settings | 9 complete setups, nonvolatile |
| Automatic scan | |
| Frequency scan | can be defined with start and stop frequency and step size, max. 5 ranges with individual settings |
| Frequency lists | automatic measurement on max. 400 frequencies |
| RFI voltage measurement | automatic control of LISNs, peak value determination in up to 400 subranges, limit check |
| RFI power measurement | interactive scan with absorbing clamp, peak value determination in up to 400 subranges, limit check |
| RFI field-strength measurement | interactive scan with automatic antenna switching, peak value determination in up to 400 subranges, limit check |

**Documentation**

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|---|---|
| Plotter (IEC/IEEE bus) or printer (Centronics) | graphs with limit lines, settings and comments, complete test reports, lists with frequency and level |
| Scaling of graphs | lin or log frequency axis |

## Connectors and interfaces

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|---|---|
| **Remote control** | interface to IEC625.2 (IEEE488.2) |
| Remote-control connector | 24-pin Amphenol |
| Plotter | via IEC/IEEE-bus interface |
| Printer connector | parallel interface (25-pin Centronics) |
| Suitable printers | 24-pin impact, inkjet (monochrome and colour), laser printer |
| **Floppy disk drive** | $3^1/_2$", 1.44 Mbyte (formatted) for saving instrument settings, measurement results, transducer factors and limit lines |
| Formatting | MS-DOS-compatible |
| Data format | binary or HP-GL |
| **Front-panel outputs** | |
| Supply and coding connector for antennas, etc. | 12-pin Tuchel |
| AF output | stereo jack 3.5 mm, adjustable level |
| **Tracking generator (option ESCS-B5)** | |
| Generator output | 50 Ω, N female |
| Frequency range | 9 kHz to 2750 MHz |
| Output level | 90 dBµV, can be electronically reduced by max. 10 dB |
| Frequency response | <2 dB |
| **Rear-panel outputs** | |
| IF 10.7 MHz | 50 Ω, BNC female |
| EMF in range of analog level display for unmodulated sinewave signal | 1 mV to 1 V |
| Bandwidth = IF bandwidth | |
| Reference input/output | BNC female |
| Frequency | 10 MHz |
| Output level | 7 dBm |
| Frequency drift | see frequency accuracy |
| Input level (if switched as reference input) | >–7 dBm (0.1 V) |
| User port | 25-pin Cannon connector for control of LISNs (phase switching) and antennas |
| Keyboard connector | 5-pin DIN for connection of MF2 keyboard |
| VGA connector | 15-pin Cannon for connection of colour monitor |
| **Rear-panel inputs** | |
| Reference input/output | BNC female |
| External battery | 3-pin male |
| Required voltage | 11 to 33 V (switch-on voltage >12 V) |

## General data

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|---|---|
| Rated temperature range | 0 to +50°C |
| Storage temperature range | –20 to +60°C |
| Mechanical resistance | shock-tested to MIL-STD-810 D (shock spectrum 40 g), vibration-tested to MIL-T-28800 D, class 5; complies with IEC Publ. 68-2-6 |
| EMC | to EEA-EMC directive (89/336/EEC), German EMC legislation and CISPR 16-1, A-1 |
| Calibration interval | 1 year |
| Selftest | on keystroke, fault detection down to module level |
| **Power supply** | |
| AC supply | 100/120/230/240 V ± 10%, 47 to 420 Hz (60 VA), safety class I to VDE 0411 (IEC348) |
| Battery, external internal (options[1]) | 11 to 33 V/2.5 A at 24 V, 4.7 A at 12 V 13.2 V, Ni-MH |
| Operating time with Battery Controller ESCS-B1 and 3 Battery Packs ESCS-B2 | 3 h (basic unit only) |
| Indication of operating time | in hours and minutes with automatic warning if remaining operating time is less than 20 min |
| Dimensions (W x H x D) | 435 mm x 236 mm x 350 mm |
| Weight | 18.4 kg |
| with option ESCS-B1 and 3 Battery Packs ESCS-B2 | 22.9 kg |

[1]) ESCS-B1 and ESCS-B2

Certified Quality System
ISO 9001
DQS REG. NO 1954-04