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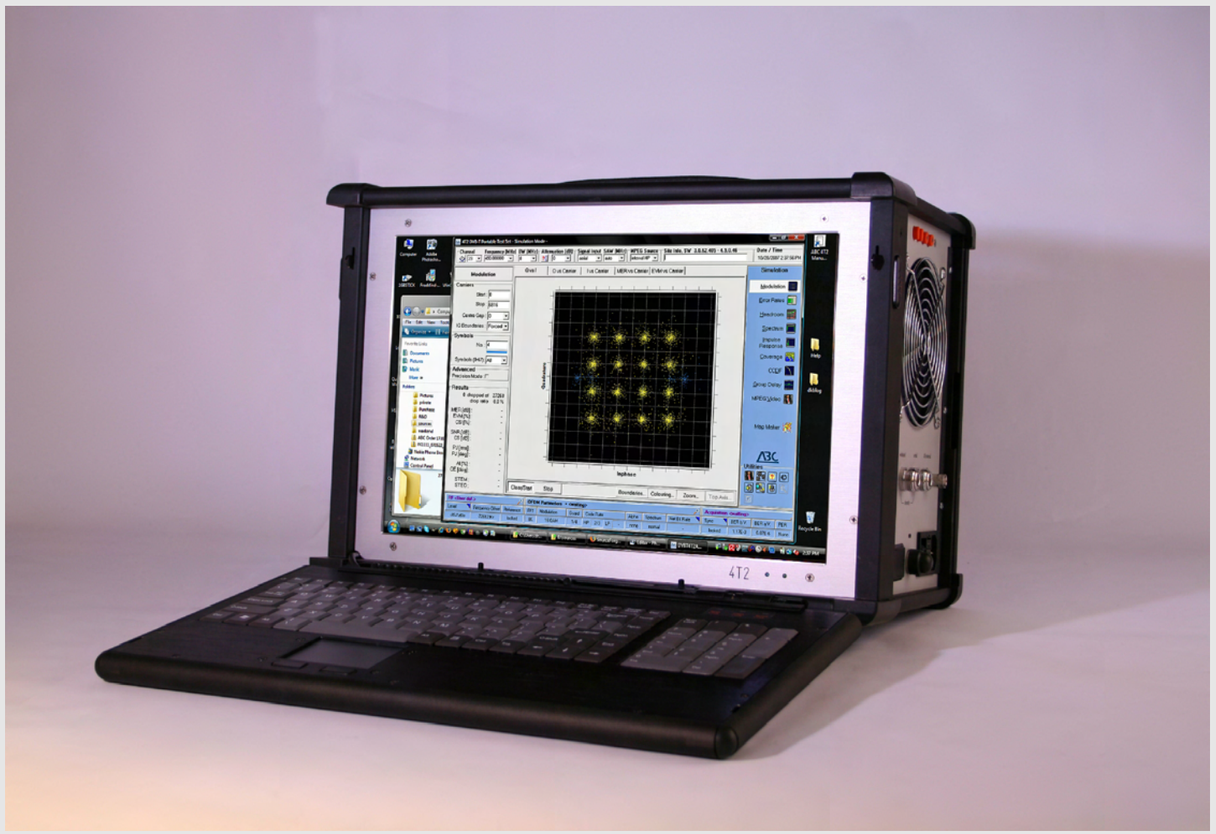
# 4T2-Portable test set
# DVB terrestrial analyser system

4T2-Portable

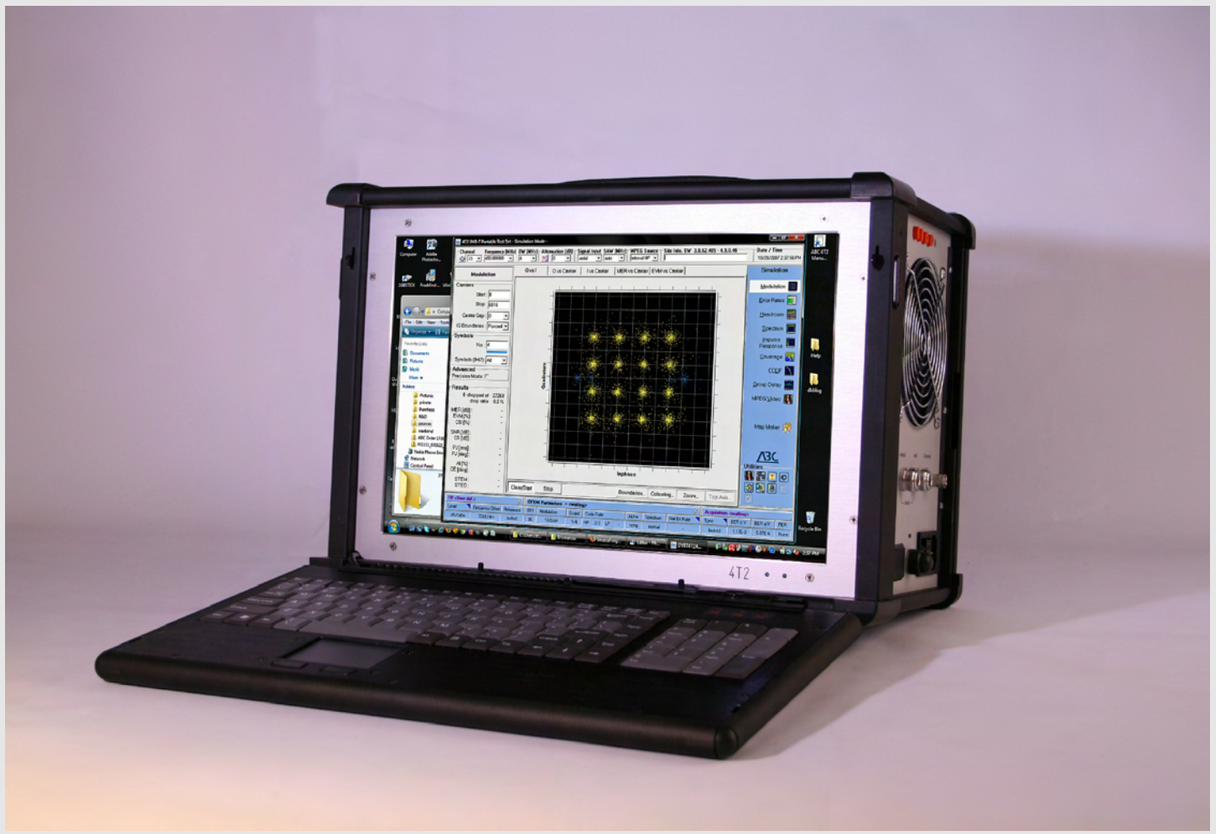
- COFDM analyser with MER performance >42 dB in real-time
- 4k capable diversity receiver
- Spectrum, impulse response, group delay, and CCDF
- Automated multi-channel coverage measurements with antenna correction factors
- IP-content streaming, analysis, and decoding



# 4T2-Portable test set
# DVB terrestrial analyser system



- 40 x 30 x 20 cm compact design
- 11.8 kg weight (<20 kg in flightcase trolley)
- full metal body with rubber bumper corners
- Diversity receiver, and RF signal generator (optional) fitting in the same chassis
- Latest core-duo platform with MPEG-4, H.264 high definition decoder



# 4T2-Portable 2010 model
# right hand side features / connectors




- Aerial input
- Wideband input

  (both inputs together form the diversity inputs)
- ASI external (I/O)
- Conditional Access common interface
- Fan speed control (behind black screw)
- Spare fuse compartment
- Mounting screw
- Mains switch

# 4T2-Portable 2010 model
# left hand side features / connectors

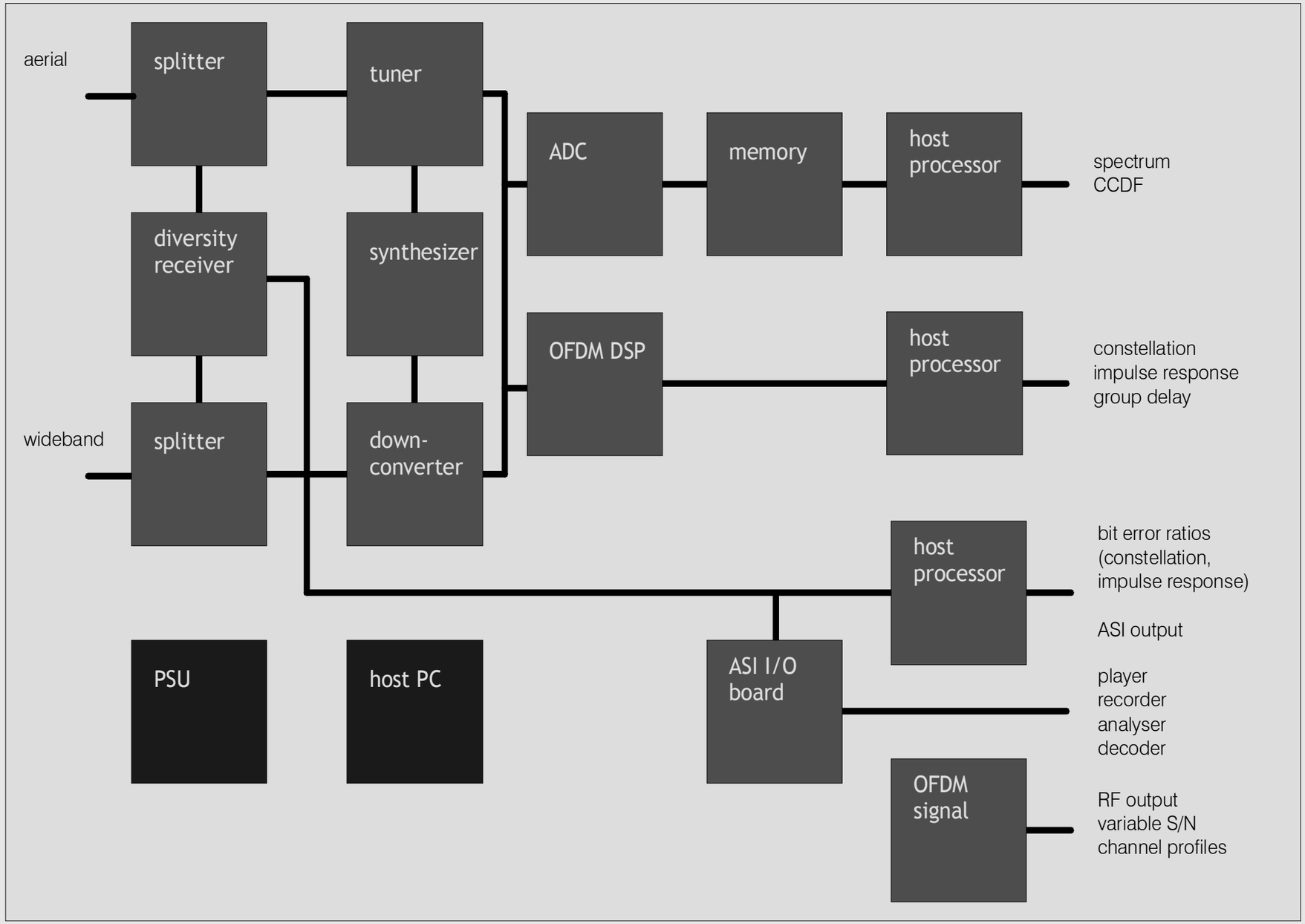


- ASI I/O
- 2x Gbit LAN
- 10 MHz external reference
- Power switch
- USB 2.0


- Screen adjustment
- Mounting screw

# Block diagram





# Key features



- All measurements required for acceptance tests performed by a single instrument in second-to-none accuracy
- Coverage measurements of up to three channels simultaneously (dual-diversity)
- Open system based on Windows, supporting any standard application software
- Unlimited storage of measurement reports on either HDD, or USB memory stick
- Ethernet interface for remote control or sharing of the 4T2 equipment in LAN or WAN environments

# 4T2 quality features



- MER better than 42 dB in real time (variation-free)
- Internal clock better than 2E-8 stability
- Frequency resolution 1 Hz
- Bitrate accuracy better than 1 bit/s
- Input level accurracy better than 0.5 dB
- Spectrum analysis measures 85 dB dynamics
- Impulse Response analysis outside guard interval

# measurement parameters (standard)



- Modulation Analysis, including Constellation Diagram, MER & EVM versus carriers
- RF Parameters with frequency offset
- OFDM Parameters, including Bit Rates
- Bit Error Rates with long term data logging
- CCDF linearity analysis
- Group Delay
- MPEG decoding

# measurement parameters (optional)



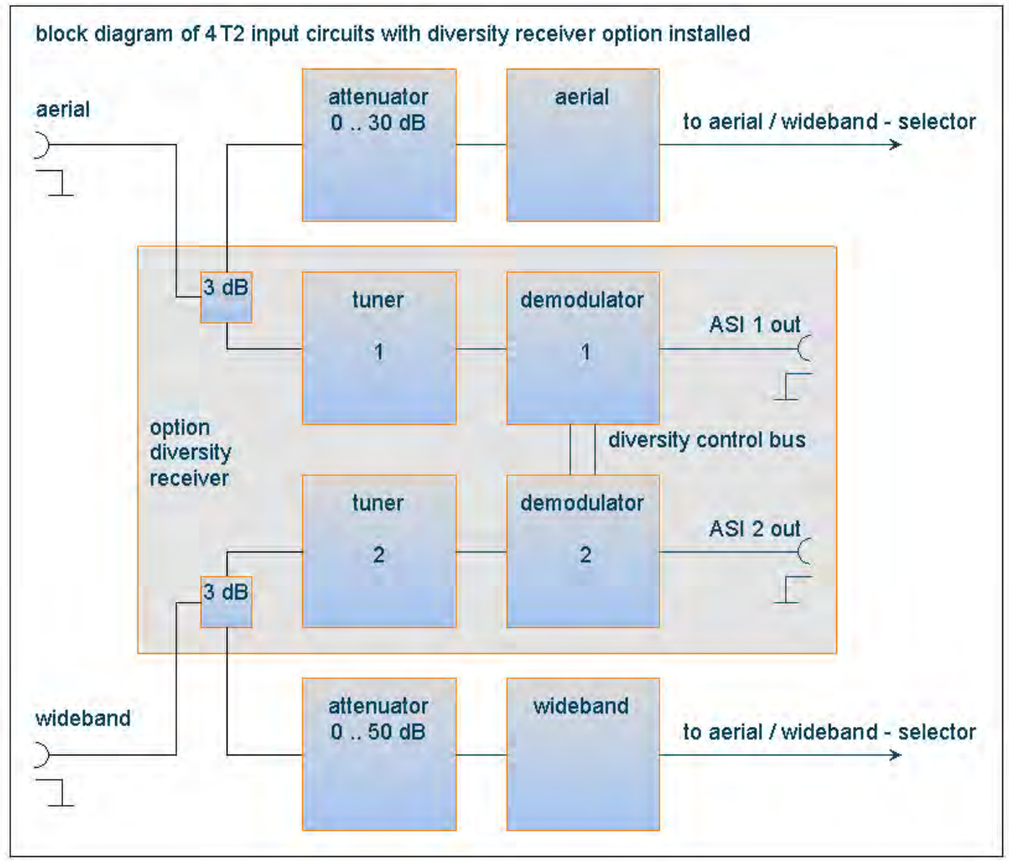
- MPEG playback, recording, and analysis
- MPEG / IP DVB-H and DVB-T analysis
- Signal Generator with impairments
- Spectrum analysis
- Impulse Response analysis

# Diversity receiver



## Improve mobile reception to make measurement results less prone to pick-up velocity

- Dual antenna input
- Dual ASI output
- VHF / UHF 2, 4, 8 k modes
- Fully integrated in coverage option

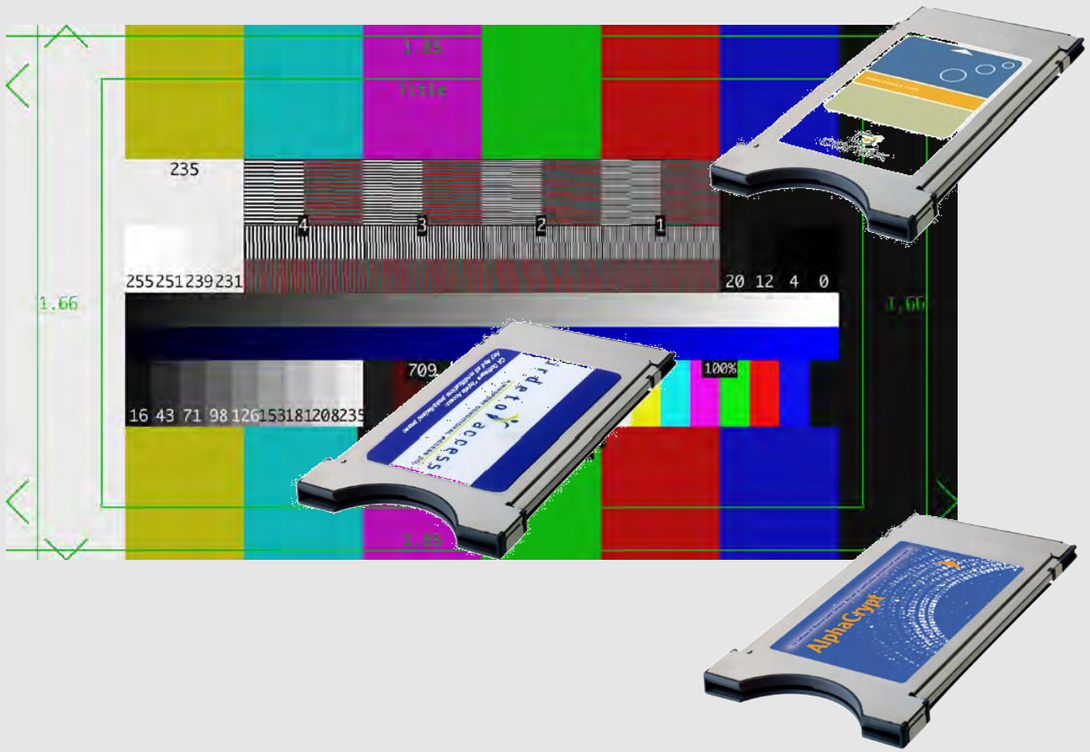


# MPEG-2 SD HW decoder and CI (optional, portable only)



**Provide a standard definition 4:2:0 MPEG-2 decoder with support for conditional access modules following the common interface standard**

- CVBS decoder output
- CI control software in analyser application
- CI accessible from the outside, or secured inside



# Technical data



| Selective RF Input (aerial) | | | |
|---|---|---|---|
| | Input Connector | BNC female | |
| | Input Range | - 90 to - 10 dBm (QPSK, CR=2/3 QEF) | |
| | | - 84 to - 10 dBm (QAM 16, CR=2/3 QEF) | |
| | | - 77 to - 20 dBm (QAM 64, CR=2/3 QEF) | |
| | Frequency Range | 46.5 to 870 MHz (Ch E2 to Ch 70) | |
| | Tuning Resolution | 1 Hz | |
| | Frequency Accuracy | ± 2 E-8 (0 to 50 °C), ± 1 E-7 (aging/a) | |
| | | < ± 1 E-11 with external reference (10 MHz) | |
| | Channel Bandwidth | 6, 7, 8 MHz, (6 MHz using 7 MHz SAW filter) | |
| | Input Impedance | 50 Ohm | |
| | LO Phase Noise (typical) | - 75 dBc / Hz @ 1 kHz from carrier | |
| | | - 85 dBc / Hz @ 10 kHz from carrier | |
| | Image Rejection (typical) | 70 dB (Band I) | |
| | | 65 dB (Band II) | |
| | | 60 dB (Band IV/V) | |
| | AGC Range | 60 dB + 29 dB (manual attenuation) | |
| | VSWR | < 1.5 | |
| | Noise Figure | < 5 dB | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Input level | 0.1 dBm | ± 0.9 dB @ - 79 to - 20 dBm |
| | | 0.1 dBµV | ± 1.5 dB @ - 90 to - 80 dBm |

| Wideband RF Input (wideband) | | | |
|---|---|---|---|
| | Input Connector | N female | |
| | Input Range | - 35 to + 15 dBm (all modulations CR=7/8 QEF) | |
| | Frequency Range | 30 to 894 MHz | |
| | Tuning Resolution | 1 Hz | |
| | Frequency Accuracy | ± 2 E-8 (0 to 50 °C), ± 1 E-7 (aging/a) | |
| | | < ± 1 E-11 with external reference (10 MHz) | |
| | Channel Bandwidth | 6, 7, 8 MHz | |
| | Input Impedance | 50 Ohm | |
| | LO Phase Noise | - 80 dBc / Hz @ 10 Hz from carrier | |
| | | - 90 dBc / Hz @ 100 Hz from carrier | |
| | | - 95 dBc / Hz @ 1 kHz from carrier | |
| | | - 100 dBc / Hz @ 10 kHz from carrier | |
| | VSWR | < 1.2 | |
| | Noise Figure | < 3.5 dB | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Input level | 0.1 dBm | ± 0.7 dB @ - 20 to + 10 dBm |
| | | 0.1 dBµV | |

| COFDM Demodulation | | | |
|---|---|---|---|
| | Modulation | QPSK, 16QAM, 64QAM | |
| | | (hierarchical, non-hierarchical) | |
| | FFT length | 2k / 8k | |
| | Code rates | 1/2, 2/3, 3/4, 5/6, 7/8 | |
| | Guard interval factor | 1/4, 1/8, 1/16, 1/32 | |
| | Reed Solomon | 188, 204 byte packets | |
| | Mode detection | Automatic | |
| | Synchronisation time | < 250 ms | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Frequency Offset | 1 Hz | ± 1 Hz |
| | Bandwidth | 0.1 Hz | look-up table |
| | Bandwidth Offset | 0.1 Hz | ± 0.2 Hz |
| | Net Bit Rate | 1 bit / s | look-up table |
| | Bitrate Offset | 0.1 bit / s | ± 0.2 bit / s |
| | Cell Identifier | - / - | - / - |

| COFDM Modulation Analysis | | | |
|---|---|---|---|
| | Constellation Diagram | selectable carrier span | |
| | I and Q versus Carrier | variable symbol count | |
| | MER and EVM versus Carrier | | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| MER | Modulation Error Ratio | 0.1 dB | ± 0.50 dB up to 42 dB MER |
| EVM | Error Vector Magnitude | 0.1 % | ± 0.20 % down to 0.75 % EVM |
| CSI | Channel State Information | 0.1 % | ± 0.20 % down to 1 % CSI |
| SNR | Signal to Noise Ratio | 0.1 dB | ± 0.50 dB up to 50 dB SNR |
| CS | Carrier Suppression | 0.1 dB | ± 0.50 dB |
| PJ | Phase Jitter | 0.001° RMS | ± 0.002° |
| | | 0.01° DEG | ± 0.02° |
| AI | Amplitude Imbalance | 0.01% | ± 0.02% |
| QE | Quadrature Error | 0.01° | ± 0.02% |
| STEM | System Target Error Mean | 0.001 | ± 0.002 |
| STED | STE Deviation | 0.001 | ± 0.002 |

| Error Rates and Headroom Analysis | | | |
|---|---|---|---|
| | Bit Error Rates | Error Rates per Seconds, Minutes, Hours | |
| | | Input Level, MER Results | |
| | | Logfile as comma separated values ASCII | |
| | Receiver Headroom | Error Rates with decreased C/N | |
| **Measurement Results** | | **Range** | **Accuracy** |
| BER .V. | Bit Error Rate before Viterbi | 0.1 to 1E-10 | 4 ppm |
| BER a.V. | Bit Error Rate after Viterbi | 0.1 to 1E-10 | 2 ppm |
| PER | MPEG Packet Errors | 1, 0 | 1 |
| | Receiver Headroom dynamic | 1 to 29 dB | ± 1.5 dB |

# Technical data (contd)



| Spectrum Analysis | | | |
|---|---|---|---|
| | Displays / Functions | DVB-T Channel Spectrum | |
| | Variable Zoom | | |
| | 5 Independent Markers | | |
| | Spectrum Masks | | |
| | Resolution Bandwidths | 3 / 10 / 30 / 100 kHz | |
| | Video Bandwidths | 300 Hz / 1 / 3 / 10 / 30 / 100 kHz | |
| | Screen Memory | | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Dynamic | 85 dB | ± 0.7 dB |
| | Frequency | 177 Hz | ± 2 E-8 |
| | Level | 0.1 dB | ± 0.7 dB |

| MPEG TS Analysis | | | |
|---|---|---|---|
| | Displays / Functions | 1st, 2nd and 3rd priority ERR according TR.101.290 | |
| | | Logging of Errors to file | |
| | | Services Counter | |
| | | Stream Hierarchy tree view | |
| | | TS, PID sorted views, PCR jitter display | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Log-file | 1 | - / - |
| | Services bit-rates | 1 bit / s | ± 5 µs |

| Impulse Response Analysis | | | |
|---|---|---|---|
| | Displays / Functions | ACF on raw Samples | |
| | | CF on Pilot carriers | |
| | Variable Zoom | | |
| | 5 Independent Markers | | |
| | Video Bandwidths | 300 Hz / 1 / 3 / 10 / 30 / 100 kHz | |
| | Screen Memory | | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Amplitude | 1 dB | ± 1.5 dB |
| | Time | 0.1 µs | ± 0.5 µs |

| Coverage Analysis | | | |
|---|---|---|---|
| | Displays / Functions | Recording of measurement values and position data from GPS receiver | |
| | | On-line graphical display in user defined maps | |
| | | documented ASCII file format for automated conversion | |
| | GPS receiver protocol | NMEA, WGS 84 | |
| | Number of satellites | 2 – 12 | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Log file update rate | 1s | RTC |
| | Field-strength, Level, Error Rates | | |

| CCDF Analysis | | | |
|---|---|---|---|
| | Displays / Functions | Cumulative Complementary Distribution Function | |
| | | Peak to Average Power Probability (PAR) | |
| | Variable Zoom | | |
| | 5 Independent Markers | | |
| | Screen Memory | | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Crest Factor | 0.1 dB | ± 0.5 dB |
| | Marker Readouts | 0.1 dB | ± 0.5 dB |

| Group Delay | | | |
|---|---|---|---|
| | Displays / Functions | Phase and Group Delay response | |
| | Variable Zoom | | |
| | 5 Independent Markers | | |
| | Screen Memory | | |
| **Measurement Results** | | **Resolution** | **Accuracy** |
| | Marker Readouts | 0.1 ns | ± 0.5 ns |

| Standards / Qualifications | | |
|---|---|---|
| | DVB-T compliance | EN 300 744 |
| | Measurement Guidelines | TR 101 290 |
| | MPEG Compliance | ISO/IEC 13818-1; ITU-T H.222.0 |
| | EMC | DIN EN 55022: 2001-09<br>DIN EN 55024: 2002-11<br>DIN EN 55013: 2003-10<br>DIN EN 61000-3-2: 2001-12 |
| | Safety | EN 60950-1 |
| | Environmental Protection | EN 60 529; DIN VDE 470; IP20 |
| | Temperature Range | ETS 300 019-1-7 Class 7.1 |
| | Vibration | ETS 300 019-1-7 Class 7.1 |
| | Humidity | ETS 300 019-1-7 Class 7.1 |
| | Transportation | ETS 300 019-2-2 Class 2.3 |
| | Storage | ETS 300 019-1-1 Class 1.2 |

# Further information

Please find further information under

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