REFEREE II

Complete DTV signal Analysis, from RF down to video

DVB T/T2 DVB C/C2

RF TS T2-MI

REFEREE II IS A HIGH PERFORMANCE, COMPACT AND PORTABLE MEASUREMENT RECEIVER FOR TERRESTRIAL AND CABLE TV, CUMULATING SINGLE AND MULTI-PLP LIVE RECEPTION WITH REAL-TIME MPEG-2 TS ANALYSIS AND RECORDING.

The ReFeree II provides monitoring of DVB-T2 parameters (RF, T2 frame, L1 pre/post signaling, PLP parameters), including **DVB-T2 version 1.3.1** and **T2 Lite**, whatever the transmission mode (Single & Multi-PLP, SFN/MFN, MISO/SISO...). ReFeree II also provides monitoring of **DVB-T** (RF, TPS, MIP), **DVB-C** and **DVB-C2** parameters (RF, C2 frame, L1, BB frame, data slice).

As a forerunner on DVB-T2 technology, TestTree proposes a real-time analysis application, **DiviSuite**, running on **MS Windows**, connected to the **ReFeree II** via **USB connectivity**. DiviSuite application ensures simultaneous analysis of both RF signal and MPEG-2 TS content. Monitoring screens can be customized.
In its basic version, the DiviSuite Base with ReFeree II features live capabilities for **baseband stream** (T2-MI, MPEG-2 TS) **recording** and **playback** (over ASI/IP output). The application also integrates a video decoder enabling **real-time decoding** of all unencrypted services (**H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...**).

The **RF Scope** software option for DiviSuite includes a specific screen gathering the main **RF parameters measured in real-time**: signal level, SNR, MER, BER, modulation parameters, constellation, Channel Impulse Response and SFN synchronization.

The **T2-MI Analyzer** software option for DiviSuite gives access to the most complete T2-MI Single & Multi-PLP analysis: L1 specific screen (pre/post signaling), PLP allocation (BB frame, TS, padding/overflow), BB frame header, ISSY field, T2 timestamp, PLP extraction.

The **TS Analyzer** software option for DiviSuite enables the **MPEG-2 TS** analysis of the stream included in the RF signal (Single & Multi-PLP support). **PSI/SI** tables are parsed and displayed (including **Private tables** parsing). The 3 priority levels of **ETSI TR 101 290** are implemented. Bitrate can be analyzed globally, by service, by PID. Alarm thresholds are customizable.

Finally, the **Test Coverage** software option for DiviSuite activates the **internal GNSS receiver** enabling **GPS/GLONASS** localization information to be added to the RF measurement test reports (Google Earth and Google Fusion Tables compatible). The software option is delivered with a magnet mount GNSS L1 Antenna.

CHARACTERISTICS

1x RF input for DVB-T/DVB-T2 (T2 Lite supported) & DVB-C/DVB-C2
ITU-J83 Annexes A, C (roll-off 0.15) supported
1x ASI input and 1x ASI output
1x IP Data input/output
1x 1PPS & 1x 10MHz inputs for SFN delay measurement
1x GPS/GLONASS connector for coverage tests
USB self-powered, 660 g

H.264 MPEG-4 AVC H.265 HEVC

DIVISUITE SOFTWARE

RF measurements: signal level, SNR, MER, BER, graphical constellation
SFN Drift, Network Delay, Channel Impulse Response display
Single and multi-PLP support
T2-MI analysis: L1 pre & post signaling, T2 frame statistics, BB frame header, ISSY field, T2 timestamp
DVB-C2 specific analysis: L1, C2 frame, BB frame, Data Slice...
PSI/SI and PIDs parsing, PCR graphs
ETSI TS 101 290 validation (priority 1, 2, 3)
Services decoding: H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...
MPEG-2 TS record and playback
MPEG-2 TS over IP forward (PC's Ethernet interface selection)
Compatible MS Windows XP/Vista/7/8/10

APPLICATIONS

- R&D Test & Measurement
- Baseband Signal Generation
- RF Reception Quality Measurement
- Terrestrial & Cable Network Troubleshoot
- Head-End/TX site/off-air measurements
- Installation & Maintenance Test Tool
- Coverage & Drive Tests for DVB-T & DVB-T2

KEY BENEFITS

- **Easy to use** and configure
- **Compact** (660 g), USB self-powered
- Complete product: **RF + baseband (ASI, IP, File)** analysis, baseband record & playback
- All modulation schemes supported (from QPSK to 256QAM, Normal & Rotated for Terrestrial, from 16QAM to 4096 QAM for Cable)

TECHNICAL CHARACTERISTICS

RF	
Connector In	1x F-type female - 75 Ω
DVB-T/T2	
Sensitivity	-80 to -5 dBm / 28 to 104 dBµV
Frequency range	40 to 1000 Mhz
Channel bandwidth	1.7, 5, 6, 7 & 8 MHz
Modulation	QPSK, 16QAM, 64QAM, 256QAM
FFT mode	1k, 2k, 4k, 8k, 8k extended,16k, 16k extended, 32k, 32k extended
DVB-C/C2	
Sensitivity	-80 to -5 dBm / 28 to 104 dBµV
Frequency range	40 to 1000 Mhz (125 kHz resolution)
Channel bandwidth	6 & 8 MHz
Modulation	16QAM, 64QAM, 128QAM, 256QAM, 1024QAM, 4096QAM
Symbol rate	1.8 to 7.2 Msymbols/s
DVB-ASI	
Connector In	1x BNC female - 75 Ω
Connector Out	1x BNC female - 75 Ω
Max bitrate	140 Mbps
IP data	1x Gigabit Ethernet
1PPS connector	1x BNC female - 50 Ω
10MHz connector	1x BNC female - 50 Ω
GNSS Connector	1x MCX - 50 Ω
USB	
Data connector	1x USB2 Mini-B
USB Auxiliary power connector	1x USB2 Mini-B

RF MEASUREMENTS

All measurements are made in real-time

Graphical display	Constellation, Channel Impulse Response (DVB-T/T2)
Signal level	-90 to -5 dBm / 18 to 104 dBµV (0.1 dBm resolution)
SNR	0 to 40 dB (0.1dB resolution)
MER	0 to 40 dB
BER (DVB-T/T2)	Pre-Viterbi, Post-Viterbi, LDPC, BCH
BER (DVB-C/C2)	Pre-RS, Post-Viterbi, LDPC, BCH

T2/C2 SPECIFIC ANALYSIS

Single & Multi-PLP, PLP extraction
DVB-C2: C2 frame, L1, BB frame, data slice, notch parameter
DVB-T2/T2-MI:
- T2 L1 pre/post signaling: frame, cells, OFDM symbols, # FEC, interleaving, TI block size
- PLP allocation: BB frame padding, TS padding, TS overflow
- BB frame, ISSY field, T2 timestamp

BASEBAND TRANSPORT MONITORING

MPEG-2 TS features analyzed in real-time from either source:
- RF, DVB-ASI or IP through USB from the ReFeree
- IP from the PC's Ethernet interface

Or analyzed offline from TS file source

ETSI TR 101 290: priorities 1, 2, 3
Service information
- PSI/SI table display for MPEG, DVB, BTS; including private tables
- Service components type and structure
- PID summary

Bitrate monitoring
- Overall, by Service (Program), by PID

PCR Accuracy graphs

BASEBAND TRANSPORT PROCESSING

Audio/video decoding (unencrypted programs): stream display
- H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...

Recording of the entire multiplex (MPTS/SPTS) into a TS file
Real-time forward of the entire multiplex to **ASI** or **IP** (unicast or multicast over UDP streaming)
TS files playback:
- Loop/segment play modes
- Stream playlist handling, bitrate auto-detection with PCRs
- Null packet removal

ENVIRONMENT & PHYSICAL

Dimensions	210 x 35 x 153 mm / 8.3 x 1.3 x 6 in
Weight	660 g
Operating temperature	-20 to +55 °C / -4 to 131 °F
Storage temperature	-20 to +70 °C / -4 to 158 °F
Humidity	0 to 95%, non condensing
Power supply	USB self-powered

ORDERING CODES

ReFeree II	**DVB-T/T2/T2 Lite & DVB-C/C2 Measurement Receiver** hipped bundled with DiviSuite Base software for MS Windows XP/Vista/7/8/10

Software options

RF Scope	RF Analysis	RF + TS Bundle
TS Analyzer	MPEG-2 TS Analysis	
T2-MI Analyzer	T2-MI Analysis	
Test Coverage	GPS/GLONASS localization information	

48HMAX SHIPMENT | All Options Bundle (RF + TS + T2-MI + Test Coverage)

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