Technical Information

# MPEG2/ATM TEST SET

R&S DVATM
MPEG2 over ATM

The R&S DVATM is a multifunctional MPEG2 and ATM test set. It is intended for all test applications involving the transmission of MPEG2 signals via telecommunication interfaces. The R&S DVATM's universal measurement concept is optimized for these applications and allows analyses from the application layer (MPEG2) through to the physical transport layer.

- Integrated MPEG2 and ATM test set

- Compact design

- Flexible telecommunication interfaces

- Portable

- Wide range of test functions

- Straightforward operating concept

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Multifunctional test set

The R&S DVATM is a multifunctional MPEG2 and ATM test set. It is intended for all measurement applications in which MPEG2 signals are transported over ATM telecommunication interfaces. For all these applications it offers the necessary tools from the MPEG2 and telecommunication world, providing the required interfaces for all layers involved as well as test signals and analysis functions.

The R&S DVATM is the first unit worldwide that is able to process both MPEG2 and ATM signals. The user interface is designed in the style commonly found in sound and TV broadcasting. It gives the user a clear overview of the complex relations and operations at all times.
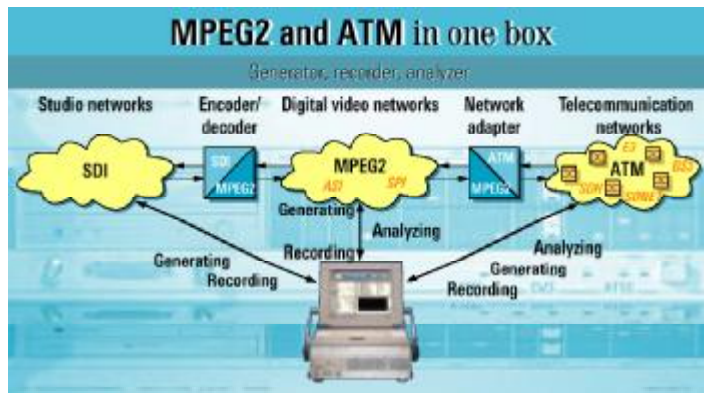
Measurement at any point of transmission route with R&S DVATM

No layer left out

The Test Set R&S DVATM is a multistandard instrument that, thanks to a variety of integrated interfaces, allows the user to measure signals at any point of the transmission route, analyze them and feed in test signals (see block diagram).
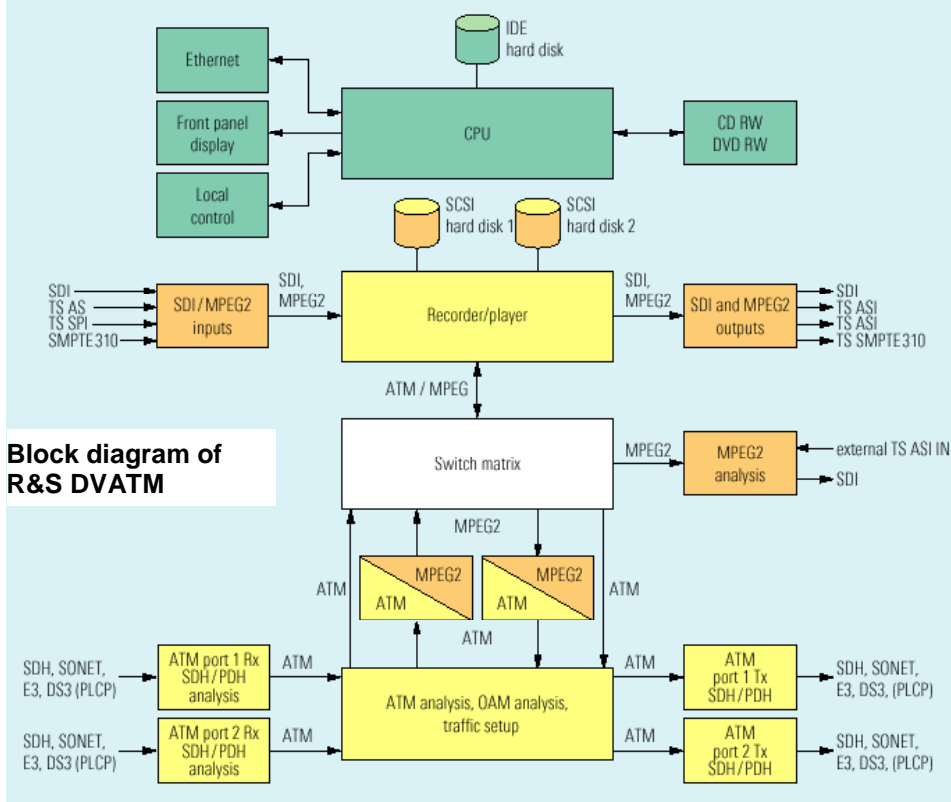
The test set supports fast and target-oriented identification of defective network elements. It analyzes and clearly displays the impact on the transmitted broadcast signal. Its universal concept allows analysis from the application layer (MPEG2) through ATM to the physical transport layer with SDH and PDH. It provides the user with all layers required for this task and specifically analyzes a connection of a defined transmission channel (VPI/VCI).

For this purpose, two ATM ports that can be used independently of each other are provided at the network end. The two interfaces can be software-configured to provide up to six different standards.

The analysis function of the ATM ports recognizes alarms and defects in all standards – SDH, SONET, E3-(PLCP), DS3-(PLCP) – and displays them as events, error lists or graphically.

Block diagram of R&S DVATM

The network statistics report of the test set is a scan function for the ATM ports to identify and list active ATM connections and their specific parameters. This gives the user a fast and clear overview of assignments and activities within the network, enabling him to select connections simply and surely for analysis.

An ATM statistics function that analyzes the entire ATM port with all active connections provides information on the status of arriving cells. Other important connection parameters are delay (CIAT, CTD) and jitter (one-point and two-point measurements – CDV) of the transmitted ATM cells. The user can additionally monitor compliance with contractual parameters by a policing function.

The OAM fault management function on the F4 and F5 OAM layer allows monitoring of OAM activities and detection of end-to-end and segment alarms. This function can optionally be expanded to OAM performance management.

Extensive measurements on the different ATM adaptation layers (AAL1, AAL1 with FEC and AAL5) enable you to draw conclusions about the working of this level. This is of special interest for the transmission of MPEG2 transport streams. The MPEG2 transport stream packed in ATM cells can also be applied to an internal MPEG2 decoder/analyzer.

MPEG2 analysis is based on the recommendations of the ETSI standard ETR 101 290. Here the transport stream is examined and evaluated for first, second and third order priority errors. A new variant of the Stream Explorer software produces the display, fitted with new functionality to measure the overall jitter of MPEG2 transport streams.

The R&S DVATM integrates versatile recorder and player tools. An SDI, MPEG2 or ATM signal can be recorded and archived as a data stream during a network element test, and subsequently played back. Plus, a signal from the MPEG2 signal set already stored in the R&S DVATM can be selected for playback.

Applications for MPEG2/ATM Test Set R&S DVATM

One application is the installation and startup of transmission routes, network elements, MPEG2/ATM adapters and SDI encoders. The R&S DVATM allows bench testing of the entire equipment plus transmission simulation prior to installation. All required settings can be made in advance. This cuts installation and commissioning costs and saves unnecessary field trials on equipment already in place. Testing transmission routes prior to use allows early identification of possible connection problems. This ensures subsequent errorfree transmission, in which the test set can also be used to monitor quality.
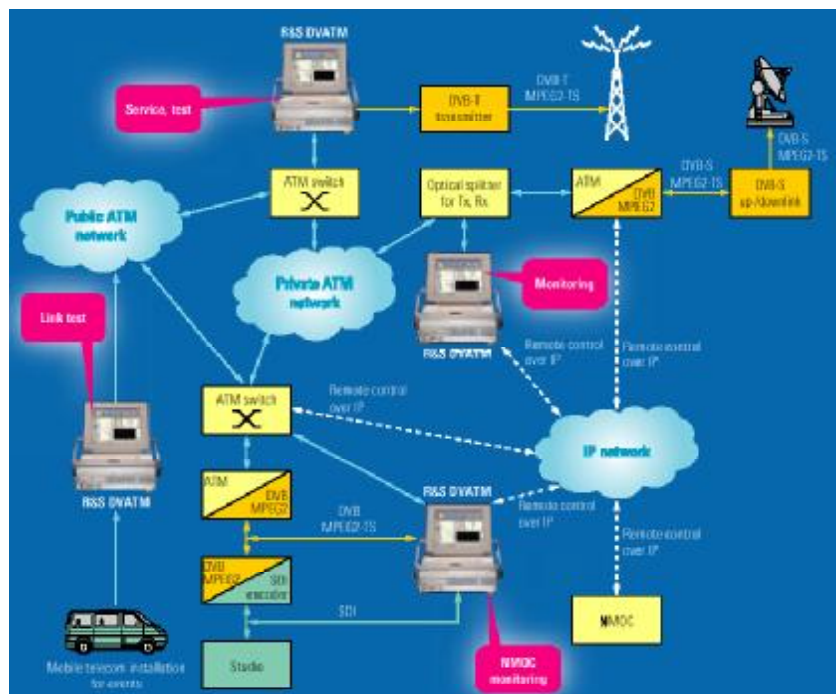
In monitoring mode, the R&S DVATM can log and record data streams of the layers. Used in a network management operation center, the test set can monitor connections under remote control. The user interface of the test set can be exported to any PC over IP networks. In the event of problems, specific path sections can thus be tested and analyzed from a remote location.

Self-explanatory operation

Based on the Windows^{TM} Embedded NT operating system, the test set presents the user with a PC-like screen. The self-explanatory and clearly structured user interface simplifies handling of this complex all-rounder. The window is divided in two. At the top you always see a superordinate navigation window showing all important information about the configuration and measurement states. Below is the currently active software. In this way the user has complete control of all settings of the test set at all times.

A switch matrix is available for intuitive, sure and fast configuration of the internal test setup and measurement functions. In a block diagram, it gives an overview of the inputs and outputs used and of the interconnection of test set modules.
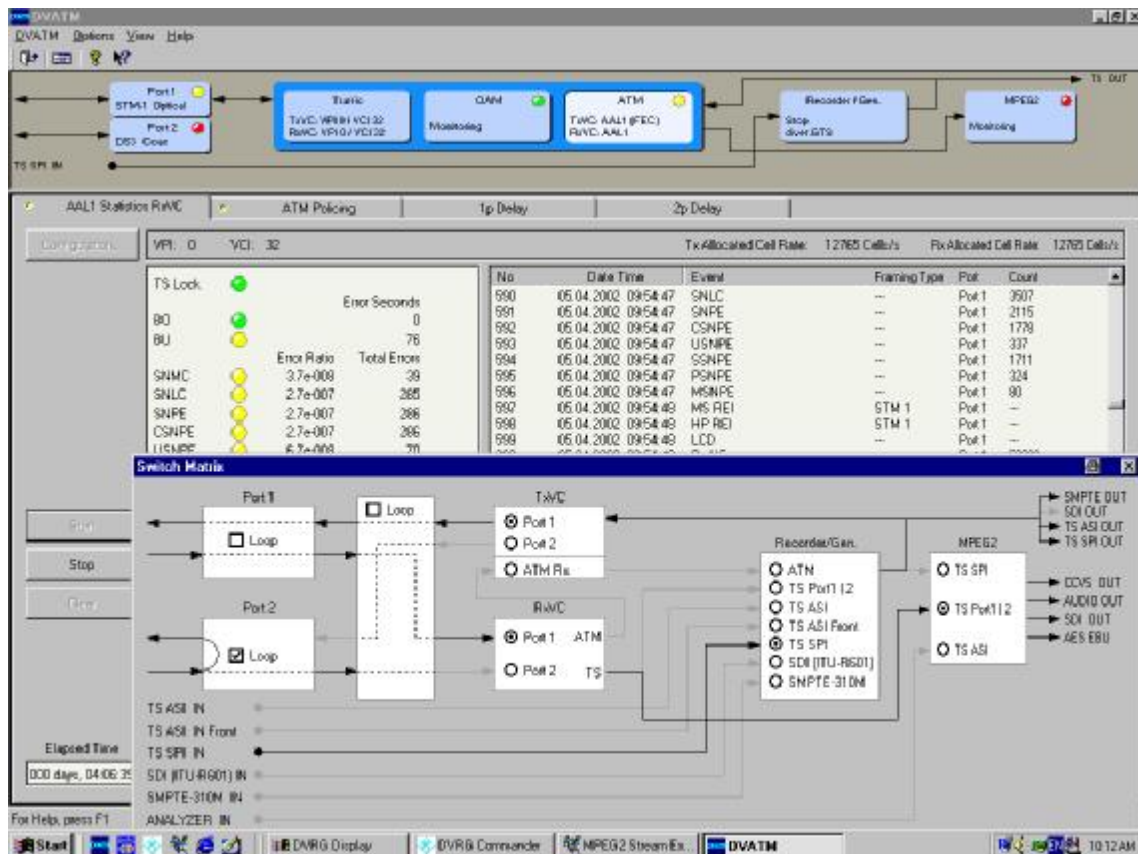
User interface of R&S DVATM with navigation window, measurement window with AAL1 (FEC) and switch matrix for device configuration (front)

Specifications

Basic unit   **R&S DVATM**

ATM Measurement Board Characteristics

Virtual channels

Number	1 virtual channel (VPI: 1 to 255 / VCI: 1 to 65535) unidirectional, bidirectional, symmetrical/non-symmetrical
Service category	CBR
ATM payload	0 Mbit/s to 149.760 Mbit/s
MPEG2 payload	0 Mbit/s to 132.8 Mbit/s
MPEG2 TS packet type	Tx, Rx: 188 bytes
AAL types	AAL0 (transparent mode), AAL1, AAL1 with FEC, AAL5
Reassembly buffer (CDVT)	depending on TS rate, selectable

Reference clock	internal, can be switched to external clock input
External	1544 kHz or 2048 kHz, squarewave, TTL

ATM interfaces	min. 1, max. 2 ATM interfaces (see options**)**
Tx clock	local, looped Rx, central, external
Scrambling function	switch-selected (ATM scrambling/descrambling)
Loop function	transparent port-loop, transparent port-to-port
SDH/SONET	STM-1, STS-3c
PDH	E3, DS3, E3-PLCP, DS3-PLCP

Port statistics	depending on options

STM 1 base statistics	port 1 and port 2
LOS, OOF, AU-LOP	errored seconds
MS-REI, HP-REI	total errors

STM 1 advanced statistics	port 1 or port 2
LOS, LOF, OOF,	errored seconds
AU-LOP, AU-AIS, AU-NDF, AU-PJE-, AU-PJE+,	total number
MS-AIS, MS-RDI, HP-RDI, HP-UNEQ,	
MS-REI, HP-REI, HP-PLM, B1, B2, B3	

E3/E3-PLCP statistics	
LOS, OOF, AIS, RAI, PAY	errored seconds
LCV, FE, BIP-8, FEBE	total number

E3-PLCP statistics	
OOF, LOF, YELLOW	errored seconds
FE, BIP, FEBE	total number

DS3/DS3-PLCP statistics	
LOS, OOF, RED, AIS, RAI, IS	errored seconds
LCV, FE, PCV, CCV, FEBE, EXZ	total number

DS3-PLCP statistics	
OOF, LOF, YELLOW	errored seconds
FE, BIP, FEBE	total number

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ATM analysis

ATM port analysis — port 1 and port 2
    LCD — errored seconds
    RxHE, RxCHE, RxUHE — total number
    TxC, RxC, RxIC, RxDC, RxOAM, RxF4-SEG, RxF4-E2E, RxF5-SEG, Rx-F5-E2E — cells/s, total number, graph

ATM policing
    Tx bandwidth violation — errored seconds
    Rx non-conforming cells — errored seconds
    PTI 000 to 111 — cells/s, total number, graph
    RxC — cells/s, total number, graph
    Conforming cells — cells/s, total number, graph
    CLP1 cells — cells/s, total number, graph

1p delay measurement
    CIAT min., mean, max. — meas. value in ns/µs (min. 20 ns), graph (min. 640 ns)
    1p CDV min., mean, abs. mean, max. — meas. value in ns/µs (min. 20 ns), graph (min. 640 ns)

OAM analysis

OAM modes
    OAM monitoring mode — analysis of received OAM alarms/defects
    OAM performance monitoring — generation/analysis of FPM OAM cells, 2p delay measurement, OAM monitoring mode

F4 OAM analysis
    End to end
        LOC, VP-AIS, VP-RDI — errored seconds
        Activation — active seconds
    Segment
        LOC, VP-AIS, VP-RDI — errored seconds
        Activation — active seconds

F5 OAM analysis
    End to end
        LOC, VC-AIS, VC-RDI — errored seconds
        Activation — active seconds
    Segment
        LOC, VC-AIS, VC-RDI — errored seconds
        Activation — active seconds

F5 performance monitoring
    CER, CMR, CLR0, CLR0+1, CLR1 — error ratio, errored seconds
    CE, MIC, LC0, LC0+1, LC1 — cells/s, total number
    SECB — blocks/s, total number
    SECBR — block ratio, errored seconds

2p delay measurement
    CTD min., mean, max. — meas. value in ns/µs (min. 20 ns), graph (min. 640 ns)
    2p CDV peak-to-peak., mean, abs. mean, max. — meas. value in ns/µs (min. 20 ns), graph (min. 640 ns)

AAL analysis

AAL1 and AAL1 FEC — CBR
    SNMC, SNLC, SNPE, CSNPE, USNPE, SSNPE, PSNPE, MSNPE — error ratio, total number
    RxC, SNPV, PC, CSN — cells/s, total number, graph
    FECUB, FECCB — block ratio, total number of blocks (AAL1 FEC only)
    FECVB — blocks/s, total number of blocks, graph (AAL1 FEC only)

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AAL5   CBR
  PDU size   number of bytes
  TS size   number of bytes
  RxC   cells/s, total number, graph
  RxPDUs   PDU/s, total number, graph
  PDUCRCE, PDULE   error ratio, total number of errors

PC platform
  Operating system   Windows NT 4.0 embedded
  Software   only special software for R&S DVATM released by
                                    Rohde & Schwarz

  Operation
    Local control   see option R&S DVATM-B20
    Remote control   on request
    Remote interface   RS232, Ethernet 10/100BT
  CD drive   DVD (read), CD (read/write)
  Graphics card   Savage/MX, 8 MB
    VGA   max. 1600 x 1200, 82 Hz, true colour
  Connectors   rear panel
    VGA   15-pin D-sub for VGA-Monitor
    TFT   DVI-C (only for option R&S DVATM-B20)
    PS/2   PS/2, combined mouse and touchpad connector
  Serial interface   9-pin D-sub, RS232, 9.6 kbaud to 115 kbaud,
                                    for remote control or connecting other devices
  Parallel interface   25-pin D-sub, printer output
  Network   RJ 45, Ethernet 100baseT, TCP/IP,
                                    for remote control and system integration

Front panel signalling   LEDs
  Port 1 and port 2   activity and test
  Physical layer   LOS, LCD
  ATM   F4 OAM (VP-AIS, VP-RDI)
                                    F5 OAM (VC-AIS, VC-RDI, LOC)
  ATM/MPEG2   buffer overflow (BO), buffer underflow (BU),
                                    player/recorder status indication
  MPEG2 TS   TS sync loss, TS sync OK, SYNC, PAT, CONT, PMT,
                                    PID, TRANS, CRC, OTHERS
  Ethernet network   status indication
  HD1 and SCSI HD2 systems   status indication
  Power supply   ON, STANDBY

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Options

Local Control   **Option R&S DVATM-B20**
  Characteristics   control unit including keyboard, touch pad and display
  Display   15" TFT, can be folded out
    Resolution   1024 x 768, 256k colours
  Keyboard   flat-panel keyboard with touch pad
  Dimensions   see "General data", height 1 HU

ATM Interface SO15 (SDH/SONET)   **Option R&S DVATM-B3**
  Characteristics   optical monomode interface
  Standard   STM-1/STS-3c (OC-3c) framing
  ATM mapping   VC-4
  Bit rate   155.520 Mbit/s ±20 ppm
  ATM cell rate   353 207 cells/s
  Optical fiber   9/125 µm 1310 nm monomode
  Center wavelength   1260 nm min., 1360 nm max.
  LED output power   -15 dBm min., -8.0 dBm max.
  Input sensitivity   -28 dBm min.
  Input saturation level   -8 dBm min.
  Connector   duplex SC
  Transmission range   <15 km (typ.)

ATM Interface SO2 (SDH/SONET)   **Option R&S DVATM-B2**
  Characteristics   optical multimode interface
  Standard   STM-1/STS-3c (OC-3c) framing
  ATM mapping   VC-4
  Bit rate   155.520 Mbit/s ±20 ppm
  ATM cell rate   353 207 cells/s
  Optical fiber   62.5/125 µm multimode
  Center wavelength   1260 nm min., 1380 nm max.
  LED output power   -19 dBm min., -14.0 dBm max.
  Input sensitivity   -31 dBm min.
  Input saturation level   -14 dBm min.
  Connector   duplex SC
  Transmission range   <2 km (typ.)

ATM Interface TP155 (SDH/SONET)   **Option R&S DVATM-B5**
  Characteristics   electrical interface
  Standard   STM-1/STS-3c framing
  ATM mapping   VC-4
  Bit rate   155.520 Mbit/s ±20 ppm
  ATM cell rate   353 207 cells/s
  Connector/cable   RJ45/twisted pair

ATM Interface E3/DS3 (PDH)   **Option R&S DVATM-B11**

Characteristics	electrical interface	
Standard	E3 framing	DS3 framing
	ITU-T G.804/G.832	ITU-T G.804/G.704
	(standard can be software-selected)	
Bit rate	34.368 Mbit/s ±50 ppm	44.736 Mbit/s ±50 ppm
ATM cell rate without PLCP	80 000 cells/s	104 268 cells/s
ATM cell rate with PLCP	72 000 cells/s	96 000 cells/s
Connector/cable	2 x BNC/75 Ω	2 x BNC/75 Ω

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MPEG2 Generator/Recorder

	Option R&S DVATM-B31
Characteristics	recording and playback of MPEG2 transport streams
Standard	ATSC- and DVB-compatible
Operating modes	RAM or hard disk mode
Signal repertoire	test patterns with audio test signals, moving picture sequences and user-recorded sequences DVATM-B31 functionality can be extended by means of options DVMD-B1, DVG-1, DV-HDTV and DV-TCM

Signal characteristics
Transport stream	to ISO/IEC 1-13818
Packet length	selectable
ATSC	188/208 byte
DVB	188/204 byte
Sequence length	
Generator signal	endless MPEG2 signal (vision and sound loop)
Recorded signal	depending on hard disk capacity
Typical	for data rate of 5 Mbit/s
36 GB hard disk	16 h
with option R&S DVRG-B2 (+36 GB)	32 h

Signal inputs/outputs	MPEG2 TS, SDI, optionally SMPTE310
SPI	MPEG2 TS, synchronous parallel
Characteristics	to EN50083-9, LVDS, 410 mV$_{pp}$, 1.25 V DC
Input	rear panel, 25-contact female, shielded
Output	front panel, 25-contact female, shielded
ASI	MPEG2 TS, asynchronous serial, 270 Mbit/s
Characteristics	to EN50083-9, 800 mV$_{pp}$, BNC, 75 Ω
Input	front and rear panel
Output	front and rear panel
Loopthrough output	rear panel, active, looped through from the input
SDI	see option R&S DVRG-B4
SMPTE310	see option R&S DVRG-B6

SMPTE 310M Interface

	Option R&S DVRG-B6
Characteristics	to SMPTE-310M BNC, 75 Ω (extension for option R&S DVATM-B31)
Input	rear panel, 400 mV$_{pp}$ to 880 mV$_{pp}$
Output	rear panel, 800 mV$_{pp}$
Data rate	19.392658 Mbit/s

SDI Interface

	Option R&S DVRG-B4
Characteristics	recording and playback of non-compressed SDI video signals (requires option R&S DVRG-B2) to ITU-R B.T.601/656, SMPTE 259M (extension for option R&S DVATM-B31)
Input	rear panel 800 mV$_{pp}$, BNC, 75 Ω
Output	rear panel 800 mV$_{pp}$, BNC, 75 Ω

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ATM Record/Play   **Option R&S DVATM-B40**
  Characteristics   recording and playback of ATM data signals
                                                        (requires options R&S DVATM-B31 and R&S
                                                        DVRG-B2)
                                                        (extension for option R&S DVATM-B31)

  Recording, playback   1 VCI
  Range   VPI: 1 to 255 / VCI: 1 to 65535
  Capacity   approx. 72 GB
    Recording time   max. 58 min
    Recording mode   transparent (= AAL0 = 53 byte,
                                                        all AAL types, all bit rates)
  ATM payload   0 Mbit/s to 149.760 Mbit/s

SCSI Hard Disk   **Option R&S DVRG-B2**
  Characteristics   memory extension for archiving MPEG2 transport
                                                        streams, required for recording and playback of non-
                                                        compressed SDI video signals and ATM data signals
                                                        (extension for option R&S DVATM-B31)

  Hard disk capacity   min. 36 GB

Test Card M Sequences[1] (software)   **Option R&S DV-TCM**
  (extension for option R&S DVATM-B31)
  Test Card M Streams   DVB and ATSC;Sound: MPEG, AC-3

HDTV Sequences[1] (software)   **Option R&S DV-HDTV**
  (extension for option R&S DVATM-B31)
  HDTV-Sequences   DVB and ATSC;Sound: MPEG, AC-3

Stream Combiner® [1] (software)   **Option R&S DVG-B1**
  (extension for option R&S DVATM-B31)
  Characteristics   Stream Combiner for generation of individual TS

MPEG2 Analyzer   **Option R&S DVATM-B30**
incl. Stream Explorer® [1] R&S DVMD-B1 (software)
Characteristics   analysis and monitoring of transport streams to
                                                        DVB/ATSC standard
Standard   ATSC- and DVB-compatible

Signal characteristics
  Transport stream   to ISO/IEC 1-13818
    Data rate   up to 54 Mbit/s
    Packet length   188/204 byte with DVB
                                                        188/208 byte with ATSC
  Video decoding   main profile and main level (SDTV)
  Audio decoding   MPEG1 layers 1 and 2
                                                        MPEG2 layers 1 and 2, low sampling rate

Transport stream analysis   to ETR 102 290
  Number of different PMT PIDs   max. 20 with ATSC,
                                                        max. 25 with DVB
  Number of programs   max. 64
  PCR jitter   overall, accuracy
    Profile   0.01 Hz, 0.1 Hz, 1 Hz
  PSI table interpreter
  Trigger on error
  Integrated running log
  Data rate measurement

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Signal outputs
  CCVS
    Standards   PAL, SECAM, NTSC
    Output   rear panel,

	$1~V_{pp} \pm 1~\%$, $75~\Omega$, BNC
Return loss (0 MHz to 6 MHz)	30 dB
Frequency response	typical values:
0 MHz to 3 MHz	+1 %/-2 %
<4 MHz	+1 %/-5 %
<5 MHz	+1 %/-15 %
SDI (CCIR 601)	serial digital
Characteristics	to ITU-R B.T.601/656, SMPTE259
Output	rear panel,
	$800~mV_{pp}$, $75~\Omega$, BNC
ASI	MPEG2, asynchronous serial, 270 Mbit/s
Characteristics	to EN50083-9,
Input	rear panel,
	$800~mV_{pp}$, BNC, $75~\Omega$
Audio, analog	
Characteristics	analog left, right
Outputs	rear panel,
	2 x LEMO triax male, $<50~\Omega$, unbalanced
Level (full scale)	6/9/12/15 dBu ±0.5 dB
Frequency response (40 Hz to 15 kHz)	±0.5 dB relative to 1 kHz
S/N ratio	>70 dB, unweighted
Total harmonic distortion (THD)	>70 dB
Audio, digital	
Characteristics	serial AES/EBU
Output	rear panel,
	LEMO triax male, $4~V_{pp}$, $110~\Omega$

General data

Temperature ranges
    Nominal temperature range   +5 °C to +40 °
    Operating temperature range   +5 °C to +40 °C
    Storage temperature range   -40 °C to +70 °C

Mechanical resistance
    Vibration, sinusoidal   5 Hz to 150 Hz, max. 2 g at 55 Hz,
                                             0.5 g from 55 Hz to 150 Hz,
                                             meets IEC 68-2-6 and MIL-T-28800 D Class 5
    Vibration, random   10 Hz to 300 Hz, 1.2 g (rms)
    Shock   40 g shock spectrum, meets MIL-STD-810 D
                                             and MIL-T-28800 D Classes 3 and 5

Climatic resistance   95 % relative humidity, cyclic test at +25 °C/+40 °C,
                                             meets IEC 68-2-30
    Atmospheric pressure   transport: 566 hPa corresp. to 4500 m
                                             operation: 795 hPa corresp. to 2000 m

Electromagnetic compatibility   meets EN 50081-1 and EN 50082-2
                                             (EMC Directive of EU)

Electrical safety   meets EN 61010-1

Power supply   90 V to 264 V, 47 Hz to 63 Hz, 180 VA

Dimensions (W x H x D)
    R&S DVATM   465.1 mm x 150.45 mm x 517 mm, 3 HU
    R&S DVATM with R&S DVATM-B20
        Carrying handle swung out
        (transport position)   513.5 mm x 150.5 mm x 596 mm, approx. 4 HU
        Carrying handle swung in   513.5 mm x 180.8 mm x 474 mm

Weight
    R&S DVATM   15 kg
    R&S DVATM with R&S DVATM-B20   20.5 kg

Ordering information

Order designation
    MPEG2/ATM TEST SET   R&S DVATM   2084.7004.02
    (only in combination with R&S DVATM-B31
    and ATM INTERFACE)

Options

ATM INTERFACE SO2	R&S DVATM-B2	2084.7479.02
ATM INTERFACE SO15	R&S DVATM-B3	2084.7485.02
ATM INTERFACE TP155	R&S DVATM-B5	2084.7504.02
ATM INTERFACE E3/DS3	R&S DVATM-B11	2084.7562.02
LOCAL CONTROL	R&S DVATM-B20	2084.7440.02
MPEG2 ANALYZER	R&S DVATM-B30	2084.7591.02
MPEG2 GENERATOR/RECORDER	R&S DVATM-B31	2084.7604.02
ATM RECORD/PLAY	R&S DVATM-B40	2084.7533.02
SCSI HARD DISK 36 GB	R&S DVRG-B2	2083.1919.02
SDI (ITU-R B.T. 601/656; RECORD/PLAY)	R&S DVRG-B4	2083.1931.02
SMPTE 310M INTERFACE	R&S DVRG-B6	2083.1954.02
SOFTWARE TEST CARD M SEQUENCES [1]	R&S DV-TCM	2085.7708.02
SOFTWARE HDTV SEQUENCES [1]	R&S DV-HDTV	2085.7650.02
SOFTWARE STREAM EXPLORER® [1]	R&S DVMD-B1	2068.9406.02
(enthalten in DVATM-B30)		
SOFTWARE STREAM COMBINER® [1]	R&S DVG-B1	2068.9835.02

^{1)} see data sheet

Abbreviations:

1p, 2p	one point, two point		LOS	Loss Of Signal
AAL	ATM Adaptation Layer		MIS	MisInserted Cells
AIS	Alarm Indication Signal		MPEG	Motion Picture Expert Group
AMI	Alternated Mark Inversion		MS-	Multiplexer Section
ATM	Asynchronous Transfer Mode		MSNPE	SNP Multibit Error
AU	Administrative Unit		MTBO	Mean Time Between Outages
AU-LOP	AU: Loss Of Pointer		NDF	New Data Flag
B1,B2,B3	BIP parity word		OAM	Operation And Maintenance
BIP	Bit Interleaved Parity error		OOF	Out Of Frame
BIP-n	Bit Interleaved Parity error n-bit		PAY	Payload Type label mismatch
BO	Buffer Overflow		PC	Provided Cells
BU	Buffer Underflow		PCR	Peak Cell Rate
BW	Bandwidth		PCV	Path Coding Violation
CBR	Constant Bit Rate		PDU	Protocol Data Unit
CC	Continuity Check		PDUCRCE	PDU CRC Error
CCV	C-bit Coding Violation		PDULE	PDU Length Error
CDV	Cell Delay Variation		PJE	Pointer Justification Event
CDVT	Cell Delay Variation Tolerance		PLCP	Physical Layer Convergence Protocol
CDVTV	Cell Delay Variation Tolerance Violation		PLM	Payload Label Mismatch
CE	Cell Errors		PSNPE	SNP Parity bit Error
CER	Cell Error Ratio		PTI	Payload Type Identifier
CHE	Corrected Header Errors		PVC	Permanent Virtual Circuit
CIAT	Cell Interarrival Time		RAI	Remote Alarm Indication
CLP	Cell Loss Priority		RDI	Remote Defect Indication
CLP1-BW	CLP bit 1 BandWidth		RED	Red Alarm
CLR	Cell Loss Ratio		REI	Remote Error Indication
CMR	Cell Misinsertion Rate		Rx	Received, receiver
CSN	Correct SN		SDH	Synchronous Digital Hierarchy
CSNPE	SNP Corrected Errors		SEG	Segment
CTD	Cell Transfer Delay		SECB	Severely Errored Cell Blocks
DC	Discarded Cells		SECBR	Severely Errored Cell Block Ratio
DS3	Digital Signal, Level 3		SNLC	Sequence Number Lost Cells
E2E	End to End		SNMC	Sequence Number Misinserted Cells
E3	CEPT3, 34.368 Mbps		SNP	Sequence Number Protection
EXZ	Excessive Zeros		SNPE	SNP Errors
F4	VP OAM cells		SNPV	SNP Valid Cells
F5	VC OAM cells		Sonet	Synchronous Optical Network
FE	Framing Error		SSNPE	SNP Single bit Error
FEBE	Far End Block Error		STM	Synchronous Transport Module
FEC	Forward Error Correction		STS	Synchronous Transfer Signal
FECCB	FEC Corrected Blocks		SVC	Switched Virtual Circuit
FECUB	FEC Uncorrected Blocks		TS	Transport Stream (MPEG2)
FECUB	FEC Uncorrected Blocks		Tx	Transmitted, transmitter
FECVB	FEC Valid Blocks		UHE	Uncorrected Header Errors
FPM	Forward Performance Monitoring		UNEQ	UNEQuipped
HE	Header Errors		USNPE	SNP Uncorrected Errors
HP	Higher Order Path		VBR	Variable Bit Rate
IC	Idle Cells		VC	Virtual Channel
IS	Idle Signal		VC-4	Virtual Container 4 for SDH use
LC	Lost Cells		VCI	Virtual Channel Identifier
LCD	Loss of Cell Delineation		VP	Virtual Path
LCV	Line Code Violation		VPI	Virtual Path Identifier
LOC	Loss of Cell Synchronization		Yellow	Yellow Alarm
LOF	Loss Of Frame			
LOP	Loss of Pointer			

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