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MPEG RF Signal Generator

RTX130B Data Sheet



RTX130B MPEG RF Signal Generator

Features & Benefits

- Provides a Complete Solution for QAM ITU-T J.83 Standards, Annex A (DVB-C), B, C, and VSB Signal Generation by Integrating a QAM and VSB Modulator, Up-converter, and MPEG Generator in a Portable Form Factor
- **New**: Integrated IPTV and Video over IP Stress Test Generation for Hybrid STB Test, or Migration from RF to IP Interface Technology
- **New**: Suite of Test Streams Provided as Standard and Optional Multiplexer Software Provides Complete Stream Creation and Generation Tool Set
- Real-time Updating of Time Stamps and Time Tables for Error-free Looping From Disk
- USB and GbE Interface for Loading of Transport Streams for Optimum Flexibility in Storing and Managing Transport Stream Libraries
- Integration with Automated Systems Enabled by Ethernet Remote Control using SCPI (Standard Command for Programmable Instruments) Command Set
- Quick and Easy Interpretation of Complex Structures by Utilizing a Large Color Hierarchical Display of Transport Stream Components
- Optional Tools for Transport Stream Creation and Analysis to Support Compliance and Stress Testing of Video Products Using MPEG-2 Technology
- Integrates with Tektronix Monitoring Tools for Powerful and Cost-effective Transport Stream Monitoring, and Error Recording

Applications

- QAM, VSB, and IPTV Consumer Receiver Design and Manufacturing Test
- Evaluation of Professional QAM, VSB, and IP Video Broadcast Equipment
- Performance Verification of QAM, VSB, and IP Video Broadcast Systems
- Simulation of Digital Terrestrial, Cable, and IPTV Broadcasting Transmission
- Scheduling of Stream Playout and Recording for Broadcast and Production Line Applications

QAM and VSB MPEG RF Signal Generator

Set-top Box manufacturers, broadcasters, and cable operators are providing new, advanced services to customers. These services require new consumer devices that have embedded DVRs, HD tuners, advanced video decoders, data broadcast capability, and telephony/internet connection to support advanced service offerings. The tasks of software engineering and the time scale for design verification and conformance testing are increasing significantly with this advanced functionality.

RTX130B is designed to meets these needs for:

- MPEG digital TV Set-top Box, Integrated Digital TV, and MPEG consumer device software development
- Equipment manufacturers and broadcast operators who need a solution for design evaluation and testing in their MPEG transmission environment

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RTX130B Product Information

In the digital terrestrial broadcasting and cable environment, powerful RF-modulated signal generation functionality is required in a portable form factor for design, test, and maintenance.

The RTX130B QAM and VSB RF Signal Generator offers a flexible, affordable solution for design evaluation and conformance testing of digital video products conforming to the DVB-C / ITU-T J.83 standards, Annex A, B, C, and ATSC (8 VSB) standards for digital terrestrial and cable TV systems.

Integrated ASI and IP generation capability negates the need to purchase a separate ASI or IP Player and provides a consistent user experience regardless of which physical interface is used to generate streams:

- Supports ITU-T J.83 standards, Annex A (DVB-C), B, C, and ATSC VSB, for modulation of streams played from disk
- QAM modulation mode*1 of 16, 64, 256, and 8 VSB
- Frequency: 50 to 860 MHz in 12.5 kHz steps
- 36/44 MHz IF output
- RF Output Level, 45-58 dBmV in 1 dB steps
- DVB-ASI/SMPTE310M and SPI transport stream input/output for recording and playout from hard disk
- IP generation capability for developing and testing hybrid STB solutions, developing multiple CPE designs, or migrating from RF to IP STB interfaces
- Protects investment through inclusion of IP generation with support for IPv6 and TTS standards
- With the RTX130B you can select the combination of RF modulation options required when ordering, and can add further modulation options when needed, protecting your original investment

*1 Not all constellations are available in all QAM modes.

The RTX130B is the optimum tool for design and evaluation of consumer QAM , VSB, and IPTV equipment, such as set-top boxes and integrated televisions, devices requiring a directly modulated RF or IP input. The RTX130B can also be used as a signal source for end-to-end broadcast system evaluation and maintenance.

As an integrated solution, RTX130B removes the need to purchase a separate transport stream generator, QAM and VSB modulator/up-converter, and IPTV signal generator. DVB-SPI and ASI/SMPTE310M interfaces are also provided as standard, allowing recording and playout of MPEG-2 Transport Streams.

The RTX130B offers continuous, error-free transport stream looping for long duration playout, and PCR Jitter insertion for stressing MPEG product designs. Users can continuously loop test streams, including updating of all time stamps, continuity counters, and time tables to perform long-term simulation of off-air signals.

Support for IP Stress test playout with capabilities for error insertion (IP Packet Drops, Checksum Errors, Sequence Errors and Packet Jitter), burst mode (both timing and packet number based), and manual error generation capabilities provide a complete solution for validating IPTV equipment designs. Advanced Mode provides protocol header customization capabilities for source and destination ports and addresses, setting MAC address, transport checksum, network checksums, and user editing of any packet header field parameters. Session replication functionality is provided to simultaneously encapsulate and play a TS over many IP sessions to simulate an IPTV environment.

Ethernet network control functionality enables remote control of functions like Play, Record, Clock Rate, and PCR Jitter Insertion using the SCPI (Standard Control for Programmable Instruments) command set, allowing easy integration into ATE and automated broadcast environments.

An optional scheduler application enables the RTX130B to be used as a simple MPEG stream server for prerecorded broadcast and manufacturing test signal transmission.

Offline Stream Multiplexing and Analysis Options

The addition of the MTS400 offline MPEG toolset to the RTX130B platform provides the broadest, deepest stream creation and analysis tool set on a highly portable platform. Ideally suited to commissioning and debug of complex MPEG transmission systems the analysis options offered with the RTX130B provide offline transport stream multiplexing and analysis capability with additional options for data broadcast analysis and generation. A separate data sheet is available covering the MTS400 Series Stream Multiplexing and Analysis options in greater detail.

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Characteristics

System Characteristics

Characteristic	Description
MPEG Stream Source	Supports MPEG-2, DVB, and ATSC Transport Stream protocols. Records and plays out MPEG Transport Streams in multiple formats. Error-free looping. PCR Jitter insertion
Packet Length	188, 204, or 208 bytes and Non-TS
ASI Maximum Data Rate	
Memory	200 Mb/s
Disk	120 Mb/s
ASI Minimum Data Rate	256 Kb/s
Number of Input/Output Interfaces	One DVB SPI I/O, One ASI/SMPTE310M In, One ASI/SMPTE310M Out, One IF Out, One RF Out, and One IP
DVB Synchronous Parallel Interface	Connector: 25 pin D-sub Maximum data rate: 200 Mb/s
Asynchronous Serial Interface	Connector: BNC Maximum data rate: 200 Mb/s User-selectable burst and nonburst transmission format
SMPTE310M	Connector: BNC Data rate: 19.392658 Mb/s
IP Generation	Supports IPv4, IPv6,RTP. UDP. Unicast, IGMP Multicast and broadcast modes, TTS
IP Maximum Data Rate	
Single session	160 Mb/s
Session replication	300 Mb/s
IP Interface	10/100/1000BaseT RJ45 Network Interface
Internal Storage Capacity	194 GB usable
Internal Reference Clock	27 MHz ±1 ppm when manufactured
Stability	±1 ppm over temperature range
Long-term drift	±0.5 ppm per year
External Reference Input	10/27 MHz ±1 ppm (recommended)

RF Signal Characteristics

Characteristic	Description
Broadcasting System	DVB-C / ITU-T J.83 Annex A, ITU-T J.83 Annex B, ITU-T J.83 Annex C, ATSC
Internal Reference Clock	27 MHz ±1 ppm when manufactured
Stability	±1 ppm over temperature range
Long-term drift	±0.5 ppm per year
Output Connector	BNC, 75 Ω
RF Frequency Range	50 MHz to 860 MHz, 12.5 kHz step
RF Output Amplitude	45 dBmV to 58 dBmV, 1 dB step
IF Frequency Range	36/44 MHz
IF Output Amplitude	35 ±3 dBmV
Modulation	
Mode	DVB-C / ITU-T J.83 Annex A (Option M1)
Symbol rate	5 to 6.9565 MS/s (IF), 5 to 6.9565 MS/s (RF)
Carrier modulation	16/64/256 QAM
Outer coding	RS (204,188)
Roll off	0.15
Mode	ITU-T J.83 Annex B (Option M2)
Symbol rate	5.056941/5.360537 MS/s
Carrier modulation	64/256 QAM
Outer coding	RS (128, 122)
Roll off	0.18/0.12
Mode	ITU-T J.83 Annex C (Option M3)
Symbol rate	5.274 MS/s, 1 to 5.3097 MS/s (IF), 5 to 5.3097 MS/s (RF), 5.274 MS/s (JCTEA)
Carrier modulation	64 QAM
Outer coding	RS (204, 188)
Roll off	0.13
Mode	ATSC (Option M4)
Symbol rate	10.762237 MS/s
Carrier modulation	8 VSB
Outer coding	RS (207, 187)
Roll off	0.1152
8 VSB adjacent channel spectral emissions comply with FCC emission mask for low-power DTV transmitters* [2] within 4 MHz of either side of the band-edge.	

*[2] FCC's emission regulations for low-power DTV transmitters are given in 47CFR part 74.794(a).

Platform Characteristics

Characteristic	Description
Operating System	Windows XP
Disk Space	System: 19.5 GB MPEG storage: 182 GB
RAM	1024 MB
Display	1024×768, color LCD
Character Input	Keypad
Keyboard and Mouse	Standard
Interfaces	VGA output, printer port, serial port, USB 2.0, 1000Base-T Ethernet, IEEE1394b

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Environmental Characteristics

Characteristic	Description
Temperature	
Operating	+5 °C to +40 °C
Nonoperating	-20 °C to +60 °C
Humidity	
Operating	20% to 80% (noncondensing)
Nonoperating	5% to 90% (noncondensing)
Altitude	
Operating	Up to 3 km
Nonoperating	Up to 12 km

EMC/Safety

Characteristic	Description
EMC	EN61326-1
Safety	UL61010-1, CAN/CSA C22.2 No.6 1010-1-04, EN61010-1
Australia Declaration of Conformity	AS/NZS 2064

Power Requirements

Characteristic	Description
Mains Voltage Range	100 to 240 VAC
Mains Frequency	50/60 Hz
Power Requirements	80 VA max

Physical Characteristics

Dimension	mm	in.
Height	132	5.2
Width	214	8.4
Depth	435	17
Weight	**kg**	**lb.**
Net	6.2	13.7

PC System Requirement for Scheduler Software

The following PC configuration is required for installation:

- Intel or 100% compatible motherboard chipset
- Windows 2000 Operating System or Windows XP Operating System
- 256 MB of RAM
- 2 - 3 MB of available hard disk space for the applications and documentation
- VGA (640 × 480) resolution video adapter and monitor (XGA (1024 × 768) or higher resolution recommended)
- CD-ROM or DVD drive
- Keyboard and Microsoft Mouse or compatible pointing device

Important Note: Apart from those specifically authorized by Tektronix, there should be no other application installed on the PC. If other applications are installed, it is possible they may interfere with the operation of the software supplied. Software operation under these circumstances cannot be guaranteed.

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Ordering Information

RTX130B

RF Signal Generator.

Includes: Stream capture and playout with error-free looping and PCR Jitter insertion, QAM and VSB signal output, IP signal output, 512 MB RAM, 182 GB MPEG stream storage, sample streams, USB keyboard and mouse, front cover, and user manual.

Please specify power plug when ordering.

Note: At least one modulation option must be ordered with a RTX130B, a maximum of four modulation options can be supported in total per RTX130B. Only one RF output is provided. MTX100A units can not be upgraded to RTX130B standard and do not support RTX130B RF options.

RTX130B Options

General

Option	Description
Opt. M1	DVB-C / ITU-T J.83 Annex A Modulation Mode
Opt. M2	ITU-T J.83 Annex B Modulation Mode
Opt. M3	ITU-T J.83 Annex C Modulation Mode
Opt. M4	ATSC Modulation Mode
Opt. SC	Scheduler
Opt. TSCA	Add Deferred-time Transport Stream Compliance Analyzer
Opt. CG	Add Carousel Generator
Opt. DB	Add Carousel Analyzer
Opt. DBCG	Add Carousel Analyzer And Carousel Generator
Opt. ES	Add ES Analyzer
Opt. MX	Add Deferred-time Multiplexer
Opt. PA	Add PES Analyzer
Opt. BA	Add Buffer Analyzer

Service

Option	Description
Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. R3	Repair Service 3 Years
Opt. R5	Repair Service 5 Years

International Power Plugs

Option	Description
Opt. A0	US Plug, 115 V, 60 Hz
Opt. A1	Euro Plug, 220 V, 50 Hz
Opt. A2	UK Plug, 240 V, 50 Hz
Opt. A3	Australian Plug, 240 V, 50 Hz
Opt. A4	N. American Plug, 240 V, 50 Hz
Opt. A5	Swiss Plug, 220 V, 50 Hz
Opt. A6	Japanese Plug, 100 V, 110/120 V, 60 Hz
Opt. A10	China Plug, 50 Hz
Opt. A99	No power cord

Language

Option	Description
Opt. L0	English printed manual
Opt. L5	Japanese printed manual
Opt. L99	Electronic manuals only (No printed manual)

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Upgrade Kit

Option	Description
RTX13UP	Field upgrade kit for RTX130B. Any options shall be transferred to OptionDongle. This option includes a USB memory stick and upgrade instructions
Opt. M1	Add DVB-C / ITU-T J.83 Annex A Modulation Mode
Opt. M2	Add ITU-T J.83 Annex B Modulation Mode
Opt. M3	Add ITU-T J.83 Annex C Modulation Mode
Opt. M4	Add ATSC Modulation Mode
Opt. SC	Add Scheduler
Opt. UPG	Upgrade RTX130B to the latest software version
Opt. PPD	A parallel port dongle
Opt. L0	Upgrade to add English Manual
Opt. L5	Upgrade to add Japanese Manual
Opt. L99	Electronic manuals only (No printed manual)
RTXPAUP	Software upgrade kit for RTX100B or RTX130B. Any options shall be transferred to OptionDongle. This option includes a USB memory stick and upgrade instructions
Opt. PPD	A parallel port dongle
Opt. L0	Upgrade to add English MTS4 Manual
Opt. L5	Upgrade to add Japanese MTS4 Manual
Opt. L99	Upgrade with Electronic manuals only (No printed MTS400 Series manual)
Opt. TSCA	Upgrade to add Deferred-time Transport Stream Compliance Analyzer to RTX100B or RTX130B
Opt. CG	Upgrade to add Carousel Generator to RTX100B or RTX130B
Opt. DB	Upgrade to add Carousel Analyzer to RTX100B or RTX130B
Opt. DBCG	Upgrade to add Carousel Analyzer and Carousel Generator to RTX100B or RTX130B
Opt. ES	Upgrade to add ES Analyzer to RTX100B or RTX130B
Opt. MX	Upgrade to add Deferred-time Multiplexer to RTX100B or RTX130B
Opt. PA	Upgrade to add PES Analyzer to RTX100B or RTX130B
Opt. BA	Upgrade to add Buffer Analyzer to RTX100B or RTX130B
Opt. IF	One-time install of all selected options for one product

Optional Accessories

Accessory	Description
WFM7F05 Opt. NN	Rackmount Kit
1700F06	Blank Panel

CE

ISO 9001

Product(s) are manufactured in ISO registered facilities.

GPIB IEEE-488

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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