ISDB-T and ISDB-TB RF Signal Generator

RTX100B Data Sheet

ISDB-T and ISDB-TB RF Signal Generator

Features & Benefits

- Provides a Complete Solution for ISDB-T Signal Generation by Integrating Modulator, Up Converter, and MPEG Generator in a Portable Form Factor
- **New**: Also Supports Brazilian Digital DTV System (ISDB-TB) Standard
- Rapid Setup using Automatic Detection of Parameters from the Broadcast Stream, to Modulate the RF Accordingly
- The RTX100B can be used as a Simple ISDB-T Modulator as it can Modulate the Stream from ASI Directly Without the Need to Store the Stream
- Real-time Updating of Time Stamps, Time Tables, and ISDB-T Reed Solomon FEC for Error-free Looping
- Integrated IPTV and Video Over IP Stress Test Generation with Support for IPv6 and TTS for Hybrid STB Test, or Migration from RF to IP Interface Technology
- Suite of Test Streams Provided as Standard and Optional Multiplexer Software Provides Complete Stream Creation and Generation Tool Set
- IEEE1394b, USB 2.0, and GbE Interface Download 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 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
- Integrated with Tektronix Monitoring Tools for Powerful and Cost-effective Transport Stream Monitoring, and Error Recording

Applications

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

Tektronix®

ISDB-T and ISDB-TB RF Signal Generator

The RTX100B ISDB-T and ISDB-TB RF Signal Generator offers a flexible, affordable solution for design evaluation and conformance testing of digital video products conforming to the Integrated Service Digital Broadcasting-Terrestrial (ISDB-T) standards for digital terrestrial TV systems. The RTX100B provides the capability to record and play out MPEG-2 transport streams, and modulate the up-converted RF signal.

In the digital terrestrial broadcasting environment, with applications from fixed to mobile and portable reception, powerful signal generation functionality is required in a portable form factor for design, test, and maintenance.

The RTX100B includes the modulator and up-converter as standard, and can directly output the RF modulated signal. This removes the need to have a separate transport stream generator, modulator, and up-converter to generate the RF test signal. The RTX100B can output test signals from Transport Streams to modulated RF in a half-rack 3u portable unit. DVB-SPI and ASI interfaces are provided as standard, allowing recording and playout of MPEG-2 Transport Streams.

The RTX100B takes the Transport Stream transmission parameters and uses these to modulate and up-convert to RF. The RTX100B can modulate either directly from a real-time ASI input, or from a Transport Stream stored on disk.

The RTX100B is the best tool for design and evaluation of consumer ISDB-T and ISDB-TB equipment, such as set-top box, televisions, car navigation systems, and cellular phones, as these devices require a direct modulated RF input. It is possible to use the RTX100B as a signal source for end-to-end broadcast system evaluation and maintenance.

The RTX100B offers continuous, error-free transport stream looping for long-duration playout, and PCR jitter insertion for stressing designs. Users can continuously loop all sample streams, including updating of all time stamps, continuity counters, time tables, and ISDB-T Reed Solomon FEC, without fear of buffer under- or overflow.

Integrated ASI and IP video 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. IP playout functionality protects investment through inclusion of IP generation with support for IPv6 and TTS standards. 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 remote-control functionality enables control of functions such as Play, Record, Clock Rate, and 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 RTX100B to be used as a simple content scenario server for broadcast and manufacturing test signal transmission. The extendable storage allows users to tailor the amount of storage they require.

The Solution for ISDB-T Streams

MTXS01: ISDB-T Remultiplex Software

MTXS01 is a complete software multiplexer tool for ISDB-T standard streams. It provides offline multiplexing of existing transport streams and ISDB-T information in order to produce ISDB-T transport streams. It can also be used to multiplex existing ISDB-T transport streams, and modify ISDB-T information.

Offline Stream Multiplexing and Analysis Options

The addition of the MTS400 offline MPEG toolset to the RTX100B 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 RTX100B 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.

Performance You Can Count On

Depend on Tektronix to provide you with performance you can count on. In addition to industry-leading service and support, this product comes backed by a one-year warranty as standard.

Characteristics

System Characteristics

Characteristic	Description
MPEG Stream Source	Supports MPEG-2, DVB, ATSC, and ISDB 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 In, One ASI 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
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 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	27 MHz ±1 ppm (recommended)

RF Signal Characteristics

Characteristic	Description
Broadcasting System	Digital Broadcasting TV (Japan ARIB STD-B31 and Brazil SBTVD N01)
Packet Length	204 bytes
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, 50 Ω
Frequency Range	UHF 473 to 803 MHz ISDB-T Channel 13 to 62 ISDB-TB Channel 14 to 69
Frequency Offset	1/7 MHz
Output Level	Fixed, -21 dBm to -29 dBm (Mode1), -18 dBm to -26 dBm (Mode2), -15 dBm to -23 dBm (Mode3)
Mode	Mode1, Mode2, Mode3
Guard Interval	1/4, 1/8, 1/16, 1/32
Carrier Modulation	QPSK, 16QAM, 64QAM
Coding Rate	1/2, 2/3, 3/4, 5/6, 7/8
Time Interval Length	0 to 32 (depends on mode)

Platform Characteristics

Characteristic	Description
Operating System	Microsoft Windows XP
Disk Space	System: 19.5 GB MPEG storage: 192 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

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

Regulatory

Characteristic	Description
EMC	EN61326-1
Safety	UL61010-1, CAN/CSA C22.2 No. 61010-1-04, 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	180 VA Max

Physical Characteristics

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

PC System Requirements 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 RAM.
- 2-3 MB of available hard disk space for applications and documentation.
- VGA (640 × 480) resolution video adapter and monitor. (XVGA (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, no other applications should be installed on the PC. If other applications are installed, they may interfere with the operation of the software supplied. Software operation under these circumstances cannot be guaranteed.

Ordering Information

RTX100B ISDB-T and ISDB-TB Signal Generator

Includes: Stream capture and playout with error-free looping and PCR jitter insertion, RF signal output, IP signal output, 512 MB RAM, 160 GB MPEG stream storage, sample streams, USB keyboard and mouse, front cover, user manual, and one-year warranty.

Note: Please specify power plug when ordering.

RTX100B Options

Product Options

Option	Description
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 Options

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

Power Plug Options

Option	Description
Opt. A0	North America
Opt. A1	Universal EURO
Opt. A2	United Kingdom
Opt. A3	Australia
Opt. A4	240 V, North America
Opt. A5	Switzerland
Opt. A6	Japan
Opt. A10	China
Opt. A99	No power cord

Language Options

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

Upgrade Kit

Option	Description
RTX10UP	Field upgrade kit for RTX100B. Any options shall be transferred to OptionDongle. This option includes a USB memory stick and upgrade instructions
Opt. SC	Add Scheduler
Opt. UPG	Upgrade RTX130B to the latest software version
Opt. PPD	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	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
MTXS01	ISDB-T Remultiplex Software
071-1757-xx	Service Manual
WFM7F05 Opt. NN	Rackmount Kit
1700F06	Blank Panel

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Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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