ISDB-T and ISDB-TB RF Signal Generator

RTX100B

Product Information

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 3 u 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 timestamps, continuity counters, time tables and ISDB-T Reed Solomon FEC, without fear of buffer under- or overflow.

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 timestamps, 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, USB2.0 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

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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 Re-multiplex Software

MTXS01 is a complete software multiplexer tool for ISDB-T standard streams. It provides off-line 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.

Characteristics

System Characteristics

MPEG Stream Source Characteristics	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 Mbps
Disk	120 Mbps
ASI Minimum Data Rate	256 Kbps
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 Mbps
Asynchronous Serial Interface	Connector: BNC, Maximum data rate: 200 Mbps, User selectable burst and non-burst transmission format
IP Generation Characteristics	Supports IPv4, IPv6, RTP. UDP. Unicast, IGMP Multicast and broadcast modes, TTS
IP Maximum Data Rate	
Single Session	160 Mbps
Session replication	300 Mbps
IP Interface	10/100/1000BaseT RJ45 Network Interface
Internal Reference Clock	27 MHz ±1 ppm
External Reference Input	27 MHz ±1 ppm (recommended)

RF Signal Characteristics

Broadcasting System	Digital Broadcasting TV (Japan ARIB STD-B31 and Brazil SBTVD N01)
Packet Length	204 bytes
Internal Reference Clock	27 MHz ±1 ppm
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

Operating System	Microsoft Windows XP
Disk Space	System: 19.5 GB, MPEG storage: 192 GB
RAM	1024 MB
Display	1024x768, Color LCD
Character Input	Keypad
Keyboard and Mouse	Standard
Interfaces	VGA output, Printer port, Serial port, USB2.0, 1000BASE-T Ethernet, IEEE1394b

Environmental Characteristics

Temperature	
Operating	+5 ºC to +40 ºC
Nonoperating	–20 ºC to +60 ºC
Humidity	
Operating	20% to 80% (noncondensing)
Nonoperating	5% to 90% (noncondensing)
Altitude	
Operating	Up to 3 km
Nonoperating	Up to 12 km

Regulatory

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

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**	**lbs.**
	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 to 3 MB of available hard disk space for applications and documentation

– VGA (640 x 480) resolution video adapter and monitor. (XVGA (1024 x 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 and User Manual.

Please specify power plug when ordering.

RTX100B Options

Product Options

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

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

Power Plug Options

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

Language Options

Opt. L0	English Printed Manual
Opt. L5	Japanese Printed Manual
Opt. L99	Electronic Manuals Only (No Printed Manual)

Upgrade Kit

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	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 Analyser 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

MTXS01	ISDB-T Re-multiplex Software
071-1757-xx	Service Manual
WFM7F05 opt NN	Rackmount Kit
1700F06	Blank Panel

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Contact Tektronix:

ASEAN / Australasia (65) 6356 3900
Austria +41 52 675 3777
Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777
Belgium 07 81 60166
Brazil & South America (11) 40669400
Canada 1 (800) 661-5625
Central East Europe, Ukraine and the Baltics +41 52 675 3777
Central Europe & Greece +41 52 675 3777
Denmark +45 80 88 1401
Finland +41 52 675 3777
France +33 (0) 1 69 86 81 81
Germany +49 (221) 94 77 400
Hong Kong (852) 2585-6688
India (91) 80-22275577
Italy +39 (02) 25086 1
Japan 81 (3) 6714-3010
Luxembourg +44 (0) 1344 392400
Mexico, Central America & Caribbean 52 (55) 5424700
Middle East, Asia and North Africa +41 52 675 3777
The Netherlands 090 02 021797
Norway 800 16098
People's Republic of China 86 (10) 6235 1230
Poland +41 52 675 3777
Portugal 80 08 12370
Republic of Korea 82 (2) 6917-5000
Russia & CIS +7 (495) 7484900
South Africa +27 11 206 8360
Spain (+34) 901 988 054
Sweden 020 08 80371
Switzerland +41 52 675 3777
Taiwan 886 (2) 2722-9622
United Kingdom & Eire +44 (0) 1344 392400
USA 1 (800) 426-2200
For other areas contact Tektronix, Inc. at: 1 (503) 627-7111

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For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

Product(s) are manufactured in ISO registered facilities.

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

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