

# MTX100B Portable MPEG Test System

## MTS400 Series MPEG Analysis Tools Data Sheet



- **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
- Analyzes Stored Transport Streams at up to 400 Mb/s to Greatly Reduce Analysis Time. Real-time Transport Stream Analysis Available from 500 Kb/s to 214 Mb/s
- Playout and Record at Speeds up to 120 Mb/s from Local Disk and 200 Mb/s from RAM
- Innovative *Program Centric* User Interface Brings Expert Power to the Novice User
- Customizable Scripting Supports the Broadest Range of Ratified and Evolving Worldwide DTV Standards (ATSC, DVB, and ISDB) and Includes Local Language Service Information

## Features & Benefits

- The MTS400 Series MPEG Analysis Tools are Now Available on the MTX100B Portable Platform
- Separate Options are Available for Real Time\*1 and Deferred Time Transport Stream Compliance Analysis, Real-time Video over IP Transport Stream Compliance Analysis, Transport Stream Multiplexing, Elementary Stream Analysis, PES and Buffer Analysis, Data Broadcast Carousel Analysis, and Data Broadcast Carousel Generation
- Both Transport Stream Compliance Analyzer Packages Offer the CaptureVu™ Feature and PCR Measurement and Graphing Capabilities. CaptureVu™ Feature Captures and Analyzes System Events in Real Time and Deferred Time to Debug the Intermittent and Complex Problems that Traditional Analyzers Miss
- Real-time Video over IP Generation, Analysis, and Recording

## Applications

### Intended Applications

- The addition of the MTS400 MPEG analysis toolset to the MTX100B platform provides a complete solution for stream creation, editing, generation, and analysis on a highly portable platform. Ideally suited for in-field installation, commissioning, and debug of complex MPEG transmission systems, the analysis options offered with the MTX100B provide both real-time and offline Transport Stream analysis capability with ASI, SMPTE310M, and IP interface options. Additional options provide offline multiplexing, PES and buffer analysis, elementary stream analysis, and data broadcast analysis.

\*1 Interfaces available include ASI, SPI (DVB Parallel), and SMPTE310M.

## Introduction/Overview

Tektronix' industry leadership offers the broadest (across multiple standards and video layers) and deepest (in depth of generation and analysis) solution for compressed video test. The MTS400 Series MPEG tools can be applied anywhere at any level, to diagnose and solve the most subtle, complex, and intermittent DTV problems in the minimum time.

The MTS400 Series MPEG tools provide a comprehensive suite of analysis tools including Transport Stream (TS) compliance, buffer, PES, compressed video and audio elementary stream analyzers, together with TS editor, multiplexer, and data broadcast applications for stream creation, analysis, and error injection.

Standards compliance is ensured through built-in customizable scripting supporting the broadest ranges of ratified and evolving DTV standards, including ATSC, DVB-C, DVB-H, DVB-S, DVB-T, ISDB-S, ISDB-T, and MPEG. To keep analysis up to date, flexibility is the key. New standards and proprietary tables can easily be catered for by loading Tektronix-supplied updates or creating your own custom scripts.

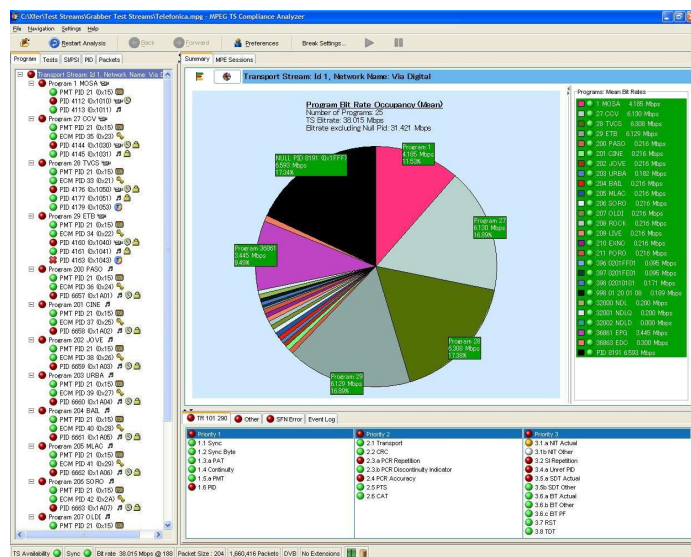
## Player and Recorder

The MTX100B MPEG-2 Recorder and Player offers a flexible, affordable solution for design evaluation and conformance testing of digital video products using MPEG-2 technology. The MTX100B records and plays out MPEG-2 Transport Streams compliant with ATSC, DVB, and ISDB standards at the high data rates needed to verify and troubleshoot designs for high-performance video products and systems. The large internal storage, USB 2.0, and Ethernet download capability help you build and maintain a large library of test streams.

The MTX100B offers continuous, error-free Transport Stream looping for long duration payout, and PCR Jitter insertion for stressing designs. Users can continuously loop all sample streams, including updating of all time stamps, continuity counters, time tables (TDT, TOT, and STT), Normal Play-time Reference, and ISDB-T Reed Solomon FEC, without fear of buffer under- or overflow.

An 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.

The MTX100B can play any Transport Stream files, including custom Transport Streams created with offline multiplexers in the Tektronix MPEG Analysis Tools. In addition, the MTX100B can play data files in other formats, including elementary streams and files in DSS format.



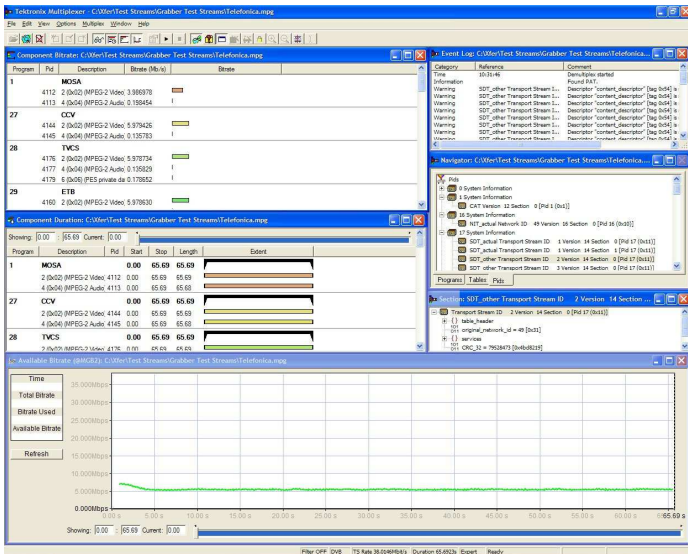
## Summary of Analyzer Options

### Transport Stream Compliance Analyzer (TSCA, TSCX)

The MPEG Transport Stream Compliance Analyzer (TSCA) is a new class of software-based analysis tool, the world's first Compressed Digital Video Debugger/Analyzer that introduces the CaptureVu™ feature, a new-to-market capability that captures and analyzes system events to debug the intermittent and complex problems that traditional software-based analyzers miss.

The TSCA offers significant enhancements over traditional software-based deferred-time (stored streams) MPEG analyzers. The combination of an innovative high-speed analysis engine and built-in intelligence, allows ultrafast pinpointing and debugging of intermittent faults in MPEG Transport Streams.

The TSCX is a real-time version of the TSCA analyzer operating on all of the connected stream interfaces as well as IP through the Ethernet port. The real-time analysis also includes Cross Layer time-correlated IP and TS measurements, alarms, and error logging together with stream recording. Users can configure the TSCA software to display stream information in user-selected fonts. This feature enables you to view stream information in your local language or to use custom fonts.



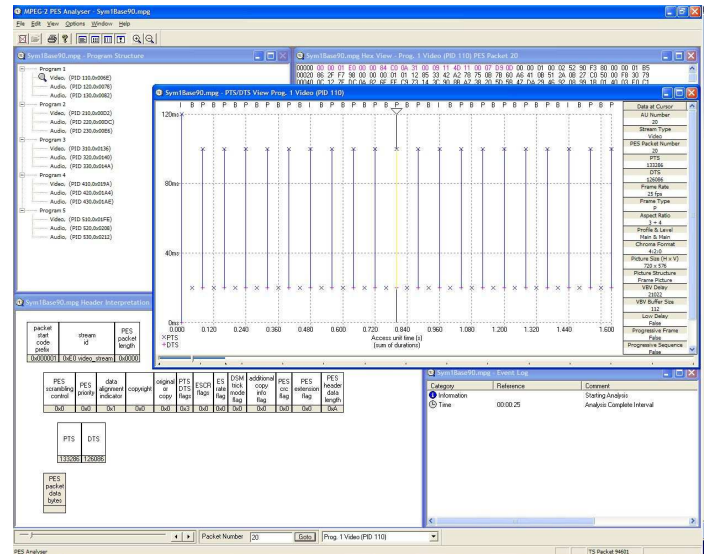
Multiplexer and SI Table Editor

## Multiplexer and SI Table Editor

When testing network elements or set-top boxes, a Transport Stream of the representative type needed is often not available. Even if there is a similar one, vital components within it may be missing or suffer from a lack of SI (system information) or other tables, or are multiplexed to the incorrect Transport Stream rate for the application.

Use the Multiplexer/Remultiplexer/Demultiplexer application to create multiprogram Transport Streams with custom SI/PSI/PSIP information for DVB, ATSC, ISDB, and MPEG compliant Transport Streams. A new ISDB-T Single Segment mode is added in version 3.1.

H.264 Elementary Streams may also be multiplexed into a Transport Stream. H.264 streams, both with and without SEI timing messages, are supported. The PTS and DTS generated for non-SEI streams are based upon the POC (Picture Order Count) information. PTS/DTS generation may be suppressed for SEI streams. Bit rate and frame rate auto-detection features aid the import process. These may be overridden for non-SEI streams.

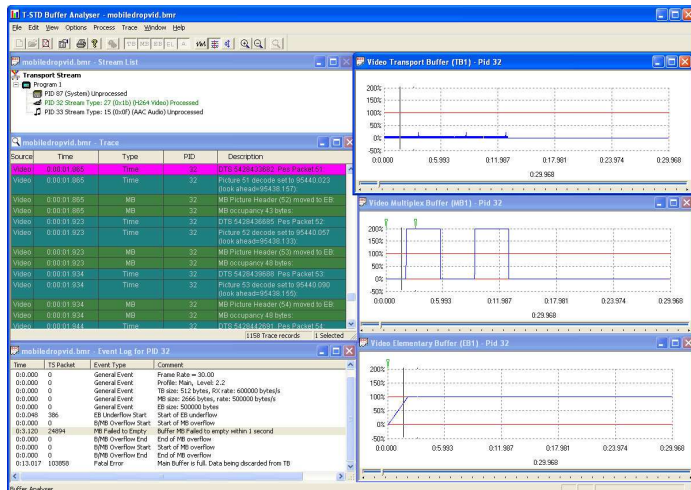


Packetized Elementary Stream (PES) Analyzer

This enables the user to create their own test streams that they can use to validate and debug their designs more quickly, and also to create errored streams to perform parametric stress testing and ensure robustness and quality of their MPEG-2 or H.264 implementation.

## Packetized Elementary Stream (PES) Analyzer

When developing professional and consumer equipment, particularly encoders and set-top boxes, the characteristics of the test streams being either generated or used as stimulus need to be ascertained. The header associated with each PES packet is of particular interest, as it contains the decode and presentation time stamps (DTS and PTS) for the contained Elementary Stream. Errors in these time stamps may cause resets or picture freeze problems at the receiver in extreme cases. They are more typically the cause of lip sync problems where the time stamps of associated video and audio streams are not synchronized. The PES Analyzer is designed to help address these problems as well as verify conformance of the PES header contents to the MPEG, DVB, and ATSC standards.



Buffer Analyzer

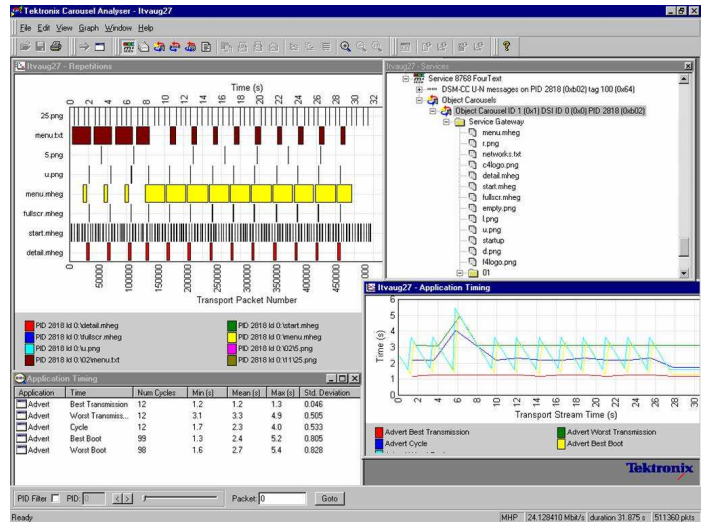
## Buffer Analyzer

When developing professional and consumer equipment, particularly encoders and set-top boxes, the characteristics of the test streams being either generated or used as stimulus need to be ascertained. Of critical importance amongst these characteristics is adherence to the buffer model. That is, when the stream is processed by a receiver, will any of the internal buffers be caused to either under- or overflow. Consequences of these conditions will be freeze frames and receiver resets.

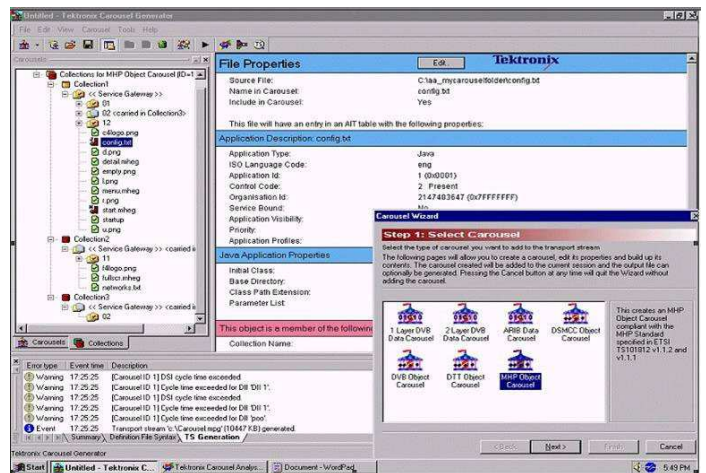
There are two types of buffer model; the one to use by the receiver is signaled within the Elementary Stream itself. The T-STD method is based upon the DTS values within the PES header and can be used for any contained CODEC type. Additionally, certain video CODECs such as MPEG-2 and H.264/AVC may contain buffer parameters within the ES itself. The Buffer Analyzer verifies conformance of a stream to the T-STD model. Verification of the H.264/AVC HRD method is covered by the MTS4EA product.

## Carousel Analyzer

When developing either data or object carousels for interactive applications, designers not only need to verify the content of carousels, but also whether they are compliant with the relevant standards, and to optimize the settings between transmission bandwidth and responsiveness of the user experience. These settings are mainly concerned with the repetition rates of the various carousel groups. The Carousel Analyzer is designed to address all of these needs for a Transport Stream file containing carousel components.



Carousel Analyzer



Carousel Generator

## Carousel Generator

The Carousel Generator product is used for creating object carousel contents within an output Transport Stream. This is particularly useful in test situations where the effects of varying parameters, such as individual repetition intervals, may be quickly ascertained. The generator will create object carousels conforming to the MPEG-2, DVB, DTT (MHPEG-5), or MHP standards.



## Characteristics

### System Characteristics

Characteristic	Description
MPEG Stream Source	Supports MPEG-2, DVB, ATSC, ISDB, and IPTV protocols. Records and plays out MPEG 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
Maximum Individual File Size	100 GB
ASI Minimum Data Rate	500 Kb/s
Number of Input/Output Interfaces	One DVB SPI I/O standard, with a second I/O available. One IP output standard
IP Generation	Supports IPv4, IPv6, RTP, UDP, Unicast, IGMP Multicast and Broadcast modes, TTS
Available Optional Interfaces	Asynchronous Serial Interface (ASI) required for Real-time Transport Stream analysis (Opt. TSCX). IP Interface option required for Real-time Transport Stream analysis (Opt. IPE)
Internal Reference Clock	27 MHz $\pm$ 1 ppm
External Reference Input	27 MHz $\pm$ 1 ppm (recommended)

### Transport Stream Interfaces

Characteristic	Description
DVB Synchronous Parallel Interface (Standard)	Connector: 25-pin D-sub Maximum data rate: 200 Mb/s
SMPTE310M / ASI / SPI Interface (Option 07)	
SMPTE310M Connector	BNC, Data rate: 19.39 Mb/s
ASI Connector	BNC, Maximum data rate: 200 Mb/s
SPI In Connector	25-pin D-sub, Maximum data rate: 200 Mb/s
IP Playout Interface (Standard)	10/100/1000BaseT RJ45 network interface
IP Maximum Data Rate	
Single Session	160 Mb/s
Session Replication	300 Mb/s
IP Interface	10/100/1000BaseT RJ45 network interface

### Platform Characteristics

Characteristic	Description
Operating System	Microsoft 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

### Environmental

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

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

## Ordering Information

MTS400 software options for the MTX100B platform.

### MTX100B Options

Option	Description
Opt. 07	Add SMPTE310M / ASI / SPI Interface Module Option 07 is required to run Opt. TSCX and Opt. MTX10UP
Opt. IPE	Security Dongle key to add 10/100Base-T Video-over-IP electrical interface to MTX100B
Opt. TSCX	Security Dongle key to add Real Time Transport Stream Compliance Analyzer to MTX100B
Opt. TSCA	Security Dongle key to add Deferred Time Transport Stream Compliance Analyzer to MTX100B
Opt. MX	Security Dongle key to add Deferred Time Multiplexer to MTX100B
Opt. ES	Security Dongle key to add ES Analyzer to MTX100B
Opt. PA	Security Dongle key to add PES Analyzer to MTX100B
Opt. BA	Security Dongle key to add Buffer Analyzer to MTX100B
Opt. DB	Security Dongle key to add Carousel Analyzer to MTX100B
Opt. CG	Security Dongle key to add Carousel Generator to MTX100B
Opt. DBCG	Security Dongle key to add Carousel Analyzer and Carousel Generator to MTX100B
Opt. L0	English printed manual
Opt. L5	Japanese printed manual
Opt. L99	Electronic manuals only (no printed manual)

**Note:** Upgrade to add Standard Options after initial purchase of MTX100B platform

### MTXPAUP Options

Option	Description
Opt. IPE	Upgrade to add Security Dongle key for 10/100Base-T Video-over-IP electrical interface to MTX100B
Opt. MX	Upgrade to add Security Dongle key for Deferred Time Multiplexer to MTX100B
Opt. ES	Upgrade to add Security Dongle key for ES Analyzer to MTX100B
Opt. PA	Upgrade to add Security Dongle key for PES Analyzer to MTX100B
Opt. BA	Upgrade to add Security Dongle key for Buffer Analyzer to MTX100B
Opt. DB	Upgrade to add Security Dongle key for Carousel Analyzer to MTX100B
Opt. CG	Upgrade to add Security Dongle key for Carousel Generator to MTX100B
Opt. DBCG	Upgrade to add Security Dongle key for Carousel Analyzer and Carousel Generator to MTX100B
Opt. TSCA	Upgrade to add Security Dongle key for Transport Stream Compliance Analyzer to MTX100B
Opt. TSCX	Upgrade to add Security Dongle key for Real Time Transport Stream Compliance Analyzer to MTX100B
Opt. UPG	Upgrade to add latest version of MTS4 Series analyzer application software
Opt. L0	English Documentation for Portable Analyzer, printed (MTS400)
Opt. L5	Japanese Documentation for Portable Analyzer, printed (MTS400)
Opt. L99	Electronic manuals only (no printed manual) for Portable Analyzer (MTS400)
Opt. IF	One-time install of all selected options for one product

### 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

### Power Plug Options

Option	Description
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

### Optional Accessories

Accessory	Description
071-1754-xx	Service Manual
WFM7F05 Opt. NN	Rackmount Kit
1700F06	Blank Panel



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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**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](http://www.tektronix.com)



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