MTS4000 MPEG Test Systems Specifications and Performance Verification

Technical Reference





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Technical Reference



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- Worldwide, visit www.tektronix.com to find contacts in your area.

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Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, additional information is provided at the end of this section. (See page vi, *Service safety summary*.)

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

To avoid fire or personal injury

Use proper power cord. Use only the power cord specified for this product and certified for the country of use. Do not use the provided power cord for other products.

Ground the product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, make sure that the product is properly grounded. Do not disable the power cord grounding connection.

Power disconnect. The power switch disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to disconnect the power switch; it must remain accessible to the user at all times to allow for quick disconnection if needed.

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

The measuring terminals on this product are not rated for connection to mains or Category II, III, or IV circuits.

Do not operate without covers. Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

Use proper fuse. Use only the fuse type and rating specified for this product.

Wear eye protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

Do not operate in wet/damp conditions. Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry. Remove the input signals before you clean the product.

Provide proper ventilation. Refer to the installation instructions in the manual for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment. Always place the product in a location convenient for viewing the display and indicators.

Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use care when lifting and carrying the product. This product is provided with handles for lifting and carrying.

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock. Do not touch exposed connections.

Do not service alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power. To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

Verify safety after repair. Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in this manual

These terms may appear in this manual:



WARNING. Warning statements identify conditions or practices that could result in injury or loss of life.



CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

Symbols and terms on the product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.



When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product:











U Standby

CAUTION Refer to Manual

ION Protective Ground Manual (Earth) Terminal

Mains Disconnected OFF (Power)

Preface

This manual lists the electrical, mechanical, and environmental specifications, and the certification and compliance statements for the Tektronix MTS4000 MPEG Test System. Also provided are procedures for verifying the performance of the test system.

NOTE. Text in this manual about the MPEG Player refers to the MPEG player application installed in the MTS4000 system.

Product documentation

The following table lists the documentation available for your MTS4000 or MTS4SAV3 product:

Document (Tektronix part number)	Purpose	Location
MTS4000 and MTS4SAV3 Quick Start User Manual (071-2970-xx English, 077-0665-xx Simplified Chinese, 077-0666-xx Japanese, 077-0657-xx Russian)	Describes how to install and get started using the test systems.	+ + two training of the second
MTS4000 and MTS4SAV3 Analyzer Applications User Manual (077-0622-xx)	Describes the operation of the following analyzer applications: TSCA, PES Analyzer, T-STD Buffer Analyzer, and ES Analyzer.	www.Tektronix.com
MTS4000 and MTS4SAV3 Generator Applications User Manual (077-0623-xx)	Describes the operation of the following generator applications: Multiplexer, MPEG Player, TS Editor, ISDB-T Remux, Make Seamless Wizard, Transport Stream Cutter, and Script Pad.	Image: Second
MTS4000 and MTS4SAV3 Carousel Applications User Manual (077-0624-xx)	Optional manual supporting module-level servicing of the instrument.	www.Tektronix.com
MTS4000 and MTS4SAV3 Release Notes (077-0627-xx)	Describes known issues with the test systems.	Textaneous Resultance de la conserve de la conserv
MTS4EAV7 HEVC / AVC Video and Compressed Audio Analyzer User Manual (071-3228-xx)	Describes the operation of the MTS4EAV7 application software.	+ +
MTS4CC Elementary Stream Compliance Checker User Manual (071-2075-xx)	Describes the operation of the MTS4CC application software.	+ +
PQA600B and PQASW Picture Quality Analyzer User Manual (071-3280-xx)	Describes the operation of the PQA application software.	+ +
VQS1000 Video Quality Software Quick Start User Manual (077-0489-xx)	Describes the operation of the VQS1000 application software.	www.Tektronix.com

Specifications

This chapter contains specifications for the MTS4000 MPEG Test Systems.

All specifications are guaranteed unless labeled "typical." Typical specifications are provided for your convenience but are not guaranteed.

To meet specifications, the following conditions must be met:

- The system must be kept within the environmental limits specified in this document.
- The system must be powered from a source maintaining voltage and frequency within the limits described in this document.
- The system must have been operating continuously for at least 20 minutes within the specified operating temperature range.

Any conditions that are unique to a particular characteristic are expressly stated as part of that characteristic.

Characteristic	Description
Operating system	Microsoft Windows 7 Ultimate, 64 bit
Processor	Intel i7 860 Quad core
Disk space	
Operating system and software applications	500 GB SATA hard drive
File storage	500 GB SATA hard drive
RAM	4 GB
CD-ROM drive	CD-R/W, DVD-R/RW, DVD+R/RW
Display	LCD, 1280 X 1024, 17 inch
Ethernet	
10/100/1000 (GigE)	Two 10/100/1000Base-T; RJ45 connector
	Supported protocol: Ethernet/IP/UDP/ MPEG-TS and VLAN
	When used in MPEG-TS analysis and record, the minimum and maximum link bit rates are typically 250 kbps and 100 Mbps respectively
	IP playout bit rate is typically up to 190 Mbps
Keyboard/mouse	Integrated keyboard/mouse
External audio ports	External audio jacks for microphone input and line output
External VGA Output	
USB ports	Six USB 2.0 device connectors, two on front, four on side

Table 1: Platform specifications

Characteristic	Description
ASI card	Quad ASI adapter for PCI Express bus, x4 Gen 1.
Connector type	BNC 75 Ω (4x). Each port can be independently configured as input or output.
Tx or Rx Bit Rate, typical	Up to 214 Mbps max
Physical layer	DVB-ASI (coax) EN50083-9
Return Loss, typical	> 15 dB, typical
ASI Output (Demodulated RF Output)	
Signal amplitude	1.0 V_{p-p} max, 600 m V_{p-p} min, into a 75 Ω load.
Return loss	10 dB min at 270 MHz

Table 2: ASI card electrical characteristics

Table 3: DVB-S2 card characteristics

Characteristic	Description
Input frequency range	950 MHz to 2150 MHz with 1 MHz step size
Input signal amplitude range, typical	–60 dBm to –30 dBm for a CBER of <1 ^{e-6}
	Use high quality shielded cables and higher input level to prevent ingress of interfering signals. This is particularly important at the tuned frequency where the input circuitry is by design most sensitive.
Modulation format	QPSK in accordance with DVB-S (ETSI EN 300 421)
	QPSK, 8PSK, 16APSK and 32APSK in accordance with DVB-S2 (ETSI EN 302 307) including Constant, Adaptive and Variable Coding and Modulation (CCM, ACM and VCM)
Modulation baud rate	1 MBaud min, 60 MBaud max
	Maximum symbol rate: 60 MBaud in QPSK, 45 MBaud in 8PSK, 39 MBaud in 16APSK, and 32 MBaud in 32APSK.
Code rate	DVB-S: 1/2, 2/3, 3/4, 5/6, 6/7, 7/8
	DVB-S2: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
FEC modes	Viterbi and Reed-solomon in accordance with DVB-S
	LDPC and BCH in accordance with DVB-S2
	Short and Normal FEC blocks in accordance with DVB-S2
Roll off	0.2, 0.25, 0.35
Connector type	F type
Input termination impedance	75 Ω nominal
Input return loss, typical	>6 dB, 950 MHz to 2150 MHz
LNB supply voltage	selectable; 13.0 V \pm 1.5 V or 18.0 V \pm 1.5 V, with 100 Ω , 5 watt resistor load
LNB supply maximum current	200 mA
LNB 22 kHz signalling frequency	22 kHz ±20%
LNB 22 kHz signalling amplitude	800 mV _{p-p} with 100 Ω load
LNB mode	DiSEqC 2

Table 4: DVB-S2 measurements

Measurement	Description
RF lock	RF lock is indicated by LED and Status
Input level (signal strength), typical	Range: –60 dBm to –30 dBm
	Resolution: 1 dB
	Accuracy: ±5 dB
EVM (Error Vector Magnitude), typical	Display Range: ≤4.0% to ≥30.0% RMS
	Resolution: 0.1%
	Accuracy: ±20% or reading
MER (Modulation Error Ratio) with	Display Range: 10 dB to 30 dB with equalizer
equalizer, typical	Resolution: 1 dB
	Accuracy: ±2 dB for range from 10 to 28 dB
C/N (Carrier to Noise ratio), typical	Display Range: 10 dB to 30 dB
	Resolution: 1 dB
	Accuracy: ±2 dB for range from 10 to 28 dB
Phase noise, typical	Display Range: 5 to 45 Degrees RMS
	Resolution: 1 Degree
Pre-Viterbi BER	Pre-Viterbi BER is displayed
Pre-Reed Solomon (RS) BER	Pre-RS BER is displayed
Pre-LDPC BER	Pre-LDPC BER is displayed
Pre-BCH BER	Pre-BCH BER is displayed
Post RS BER and TEF (Transport Error Flag)	Post Reed Solomon BER (TEF ratio), TEF rate, and number of Transport Error Flags (TEF count) is displayed
Transmission parameter	All coding and modulation parameters are indicated to the user
Constellation	The RF constellation is displayed

Table 5: 8VSB card characteristics

Characteristic	Description
Input frequency range	54 MHz to 860 MHz, VHF/UHF channels 2 to 69 (to include low VHF frequencies)
Input signal level	-72 dBm to -6 dBm (-23 dBmV to +43 dBmV)
	Use high quality shielded cables and higher input level to prevent ingress of interfering signals. This is particularly important at the tuned frequency where the input circuitry is by design most sensitive.
Modulation format	8VSB in accordance with ATSC A/53B
Receiver bandwidth	6 MHz
Input termination impedance	75 Ω nominal
Connector type	F-type
Input return loss, typical	5 dB minimum

Table 6: 8VSB measurements

Measurements	Description
RF Lock	RF lock is indicated by LED and Status
Input level (signal strength), typical	Display Range: –72 dBm to –2 dBm relative to 75 Ω (–23 dBmV to +47 dBmV)
	Resolution: 1 dB
	Accuracy: ±3 dB
EVM (Error Vector Magnitude), typical	Display Range: ≤3.0% to ≥12.5% rms
	Resolution: 0.1%
	Accuracy: ±20% of reading
Equivalent MER (Modulation Error	Display Range: 17 dB to 31 dB with Equalizer
Ratio) with Equalizer, typical	Resolution: 0.1 dB
	Accuracy: ±1 dB for MER >25 dB; ±3 dB for MER 25 dB to 31 dB
	(Measured at –30 dBm input. For best MER accuracy, maintain the input signal level between –50 dBm and –15 dBm.)
SNR (Signal to Noise Ratio), typical	Display Range: 15 dB to 35 dB
	Resolution: 1 dB
	Accuracy: ±1 dB for SNR < 25 dB; ±3 dB for SNR 25 dB to 35 dB
BER	Pre-RS BER, SER 1 second and 10 seconds windows values are displayed
TEF (Transport Error Flag)	Transport Error Flags (uncorrectable error count) in a 1 second window and 10 second window are displayed
Constellation diagram	The 8VSB constellation diagram is a display of I-data history with histograms (the IQ constellation is not available). This is displayed as Symbol Distribution in the user interface
Echo profile, typical	Equalizer filter tap information is displayed.
	Display Echo Level range: Normalized real tap values over the range of –1 to 1
	Display Delay range: –6.7 μs to 45.5 μs

Table 7: QAM Annex B card characteristics

Characteristic	Description
Input frequency range	88 MHz to 858 MHz
Input signal level, typical	–64 dBm to –19 dBm (45 dBuV to 90 dBuV relative to 75 Ω)
	With either a 64 or 256 QAM input, there are five or fewer Transport Error Flags in 11 seconds, which corresponds to a post FEC rate of 1e ⁻⁸
	\ge –30 dBm when operated in an electromagnetic field of 3 V/m or more
Modulation format	64QAM, 256QAM (compliant with ITU J-83 Annex B)
Interleaving mode	Level 1 and Level 2 interleaving support compliant with all ITU J-83 Annex B, excluding I, J = (128,7) and (128,8), and in 256 QAM excluding (8, 16) and (16, 8)
Modulation baud rate	64 QAM: 5.056941 Mbaud/s
	256 QAM: 5.360537 Mbaud/s
Spectrum polarity	Demodulates both Normal and Inverted IF Spectrum
Receiver bandwidth, QAM B	6 MHz nominal
Connector type	F type

Table 7: QAM Annex B card characteristics (cont.)

Characteristic	Description
Input termination impedance	75 Ω nominal
Input return loss, typical	5 dB minimum
Ultimate Modulation Error Ratio with equalizer, typical	≥37 dB with an equalizer

Table 8: QAM Annex B measurements

Measurement	Description
RF lock	RF lock is indicated by LED and Status
Input level (signal strength), typical	
Range	–64 dBm to –19 dBm (45 dBuV to 90 dBuV relative to 75 Ω)
Resolution	1 dB
Accuracy	±3 dB
EVM (Error Vector Magnitude), typical	
Display Range	
64 QAM	≤1% to ≥5% rms
256 QAM	≤1% to ≥2.5% rms
Resolution	0.1%
Accuracy	±1%
MER (Modulation Error Ratio) with Equalizer, typical	
Display Range	
64 QAM	22 dB to 37 dB
256 QAM	28 dB to 37 dB
Resolution	0.1 dB
Accuracy	±1 dB for MER < 25 dB; ±3 db for MER 25 dB to 34 dB (measured at –30 dBm input)
SNR (Signal to Noise Ratio), typical	
Display Range	
64 QAM	22 dB to 37 dB
256 QAM	28 dB to 37 dB
Resolution	Resolution: 1 dB
Accuracy	Accuracy: ±1 dB for SNR < 25 dB; ±3 db for SNR 25 dB to 34 dB
BER (Bit Error Ratio)	Pre-RS BER is displayed
TEF (Transport Error Flag)	Transport Error Flags (uncorrectable error count) in a 1 second window and 10 second window are displayed
Constellation	The RF constellation is displayed

Characteristic	Description
General description	
Ethernet ports	The interface supports full duplex operation only. Half duplex is not supported.
ASI input	One ASI input for loop-through of ASI input
ASI output	One ASI output for video over IP to ASI output or for ASI/SMPTE310M loop-through of input signal selectable via SW control.
Transport stream rate over IP	250 Kbps to 155 Mbps max
ASI output (TS from video over IP)	
Connector	BNC
Impedance	75 Ω nominal, transformer coupled.
Transport stream rate, typical	250 Kbps min and up to 155 Mbps max.
Signal amplitude	600 mV _{p-p} min, 1.0 V _{p-p} max into a 75 Ω load.
Return loss	10 dB min at 270 MHz
Ethernet optical port – General charac	cteristics
Optical operating mode	Single mode or Multimode
Connector type	Duplex data link MSA compliant SFP connector
Standard	1000 BASE-X
Data format	NRZ
Ethernet optical transmitter – Single n	node 1550 nm using Tektronix supplied SFP module
Output power, typical	–2 dBm to +4 dBm
Center wavelength - 1550 nm, typical	1530 nm Min, 1550 nm typical, 1570 nm max
Total jitter (peak-to-peak)	<170 ps
Extinction ratio	≥9.0 dBm
Ethernet optical receiver – Single mod	le 1550 nm using Tektronix supplied SFP module
Optical input power, typical	-26 dBm to -3 dBm, BER ≤ 1 X 10 ⁻¹²
Input wavelength	1270 nm ≤ λ ≤ 1610 nm
Jitter tolerance	IEEE 802.3z and ANSI X3T11
Ethernet optical transmitter – Single n	node 1310 nm using Tektronix supplied SFP module
Output power, typical	–11 dBm to –3 dBm
Center wavelength - 1310 nm, typical	1270 nm min, 1310 nm typical, 1355 nm max

Table 9: Video over IP card

Table 9: Video over IP card (cont.)

Ethernet optical transmitter - Single mode 1310 nm using Tektronix supplied SFP module

Total jitter (peak-to-peak)	<170 ps			
Extinction ratio	≥9.0 dBm			
Ethernet optical receiver – Single mod	e 1310 nm using Tektronix supplied SFP module			
Optical input power, typical	-19 dBm to -3 dBm, BER ≤ 1 X 10 ⁻¹²			
Input wavelength	1270 nm ≤ λ ≤ 1610 nm			
Jitter tolerance	IEEE 802.3z and ANSI X3T11			
Ethernet optical transmitter – Multimod	de 850 nm using Tektronix supplied SFP module			
Output power, typical	–9.5 dBm to –2 dBm			
Center wavelength - 850 nm, typical	830 nm min, 850 nm typical, 860 nm max			
Total jitter (peak-to-peak)	<170 ps			
Extinction ratio	≥9.0 dBm			
Ethernet optical receiver – Multimode	850 nm using Tektronix supplied SFP module			
Optical input power, typical	$-17 \text{ dBm to } 0 \text{ dBm}, \text{BER} \le 1 \text{ X } 10^{-12}$			
Input wavelength	770 nm ≤ λ ≤ 860 nm			
Jitter tolerance	IEEE 802.3z and ANSI X3T11			
Ethernet Electrical Port				
Standard	10/100/1000BASE-T IEEE 802.3			
Connector type	RJ-45			
Data format 10/100 Base T	NRZ			
Data format 1000 Base T	Trellis encoded, PAM5 symbols full-duplex on 4-pair Cat-5 UTP per IEEE 802.3ab			

Table 10: 10G Ethernet card

Characteristic	Description	
General description		
Ethernet ports	Dual 10 Gigabit SFP+ Ethernet connections supporting 10GBASE-SR	
Transport stream rate over IP, typical	700 Mbps throughput	
Ethernet optical port		
Optical operating mode	Multi mode SR	
Connector type	SFP+	
Standard	IEEE 802.3	
Physical layer interface	10GBASE-SR (E10G41BFSR, E10G42BFSR)	

Table 11: AC power source electrical characteristics

Characteristic	Description
Source voltage	100 to 240 VAC. Fluctuations must not exceed 10% of the nominal rated voltage.
Frequency range	50/60 Hz

Table 11: AC power source electrical characteristics (cont.)

Characteristic	Description
Power consumption	220 W maximum, 100 - 240 V, 50/60 Hz.
Mains fuse	Not operator replaceable.

Table 12: Mechanical characteristics

Characteristic	Description
Classification	Bench top instrument.
Cooling airflow	Intake is from the side of the instrument, and exhaust is to the rear of the instrument.
	For proper cooling, at least two inches (51 mm) of clearance is needed on the sides and rear of the instrument cabinet
Overall dimensions	Height: 346.0 mm (13.62 in)
	Width: 434.5 mm (17.01 in)
	Depth: 243.0 mm (9.57 in)
Weight	17.0 kg (37.48 lb)
Shipping weight	20.2 kg (44.53 lb)

Table 13: Environmental characteristics

Characteristic	Description		
Atmospherics			
Temperature			
Operating	+5 °C to +40 °C, 30 °C per hour maximum gradient; temperature of the intake air at the front and sides of the instrument		
Non-operating	–20 °C to +60 °C, 30 °C per hour maximum gradient		
Humidity	Max wet bulb temperature: +29 °C (derates relative humidity to ~22% at 50 °C).		
Operating	20% to 80% relative humidity, non-condensing.		
Non-operating	10% to 80% relative humidity, non-condensing.		
Altitude			
Operating	0 to 3000 m (9800 ft).		
Non-operating	0 to 12,000 m (40,000 ft).		
Dynamics			
Random vibration			
Operating	0.27 g _{ms} total from 5 to 500 Hz.		
Non-operating	2.28 g _{ms} total from 5 to 500 Hz.		
Sine vibration, operating	0.013 inch peak-to-peak displacement from 5 Hz to 55 Hz		
Functional shock, non-operating	30 g, 11 ms half-sine		

Performance verification

The procedures in this section allow you to verify the performance of the following MTS4000 MPEG Test System components:

- ASI Interface
- 10 G Interface
- MTS4000 Platform and System Software

Preparation Before you begin the Performance Verification procedures, review the following information:

- Ensure that the procedures are performed only by qualified service personnel who have read the General Safety Summary at the front of this manual.
- Ensure that the service personnel are familiar with system operation (refer to the MTS4000 MPEG Test System Quick Start User Manual).

Required equipment You will need the following equipment to perform the verification procedures:

- ^{II} 75 Ω BNC-to-BNC cable (quantity of one) Tektronix part number 174-4954-00.
- RJ45 network cable.
- 850 nm fiber cable.
- A copy of the "sym1.mpg" transport stream file.

NOTE. The "sym1.mpg" transport stream file is supplied with every instrument in the following directory: C:\Test Streams.

You can also obtain this file from the MTS4000 Documentation Browser CD or from the Tclips MPEG Test Stream Software DVD.

Prepare the instrument Perform the following steps to prepare the instrument to be tested:

- 1. Make sure the dongle is securely installed on a USB port.
- 2. Make the following cable connections on the instrument.
 - = Connect the 75 Ω BNC-to-BNC cable between the ASI 3 and ASI 4 ports on the ASI card.
 - Connect the RJ45 network cable between the two network connectors on the instrument side panel.
 - Connect the 850 nm fiber cable between the ports on the 10G card (if installed).





Standard 1G network loopback connection

ASI loopback connection and 10G optical loopback connection

- 3. Connect the power cord to the side-panel power input connector.
- Power on the MTS4000 system. 4.

MPEG Player initial setup. The verification procedures use the MPEG player to play out a test stream file. Prepare the MPEG Player using the following steps.

1. Start the MPEG Player by double-clicking the icon on the desktop.

NOTE. If the Recommended Settings dialog box displays, dismiss the box by selecting OK.

- 2. Open the sym1.mpg transport stream file.
 - **a.** Click File > Open and locate the file sym1.mpg (C:\TestStreams).
 - **b.** Select the file and click Open.
- **3.** In the Play menu, set the following:

NOTE. In the MPEG Player menus, a check mark appears next to the selected setting for some menu parameters.

- a. Packet Size: 188.
- **b.** Clock: Select Default in the dialog box to display the Default Clock dialog box. Select OK in the Default Clock dialog box.

Clock	Default Clock	×
Clock Source Internal ExtRef 10.0 (MHz) Ext P Clk Ext S Clk	Default Data Rate 41471 x 27.0 = 27000 x 27.0 =	41.471000 (Mbps)
© Data Rate 41471 x 27.0 = 41.471000 (Mbps) 27000	Packet Size	38 🔻
 IP Data Rate 43.172697 (Mbps) 		Cancel
Default Rate		

c. Update: On.

d. PCR Initial Value: Set Base Value and Extension Value to 0 in the dialog box.

PCR Initial Value	-X -
PCR Initial Value	
Base Value [33]	0
Extension Value [9]	0
	OK Cancel

- e. Source: Disk.
- f. Loop: On.
- g. Other: Set the Standard to DVB. The select Update.

Select the Continuity Counter check box.

Select the PCR/PTS/DTS check box.

Select the TDS/TOT/STT check box.

Clear the NPT check box.

Others 💽	Select Update Item
Standard DVB TDT/TOT	Update Item Continuity Counter PCR/PTS/DTS
Numeric Hex -	V TDT/TOT/STT
Update	OK Cancel
OK Cancel	

Do not close the MPEG Player application.

Verification procedures

Perform the following steps to verify that the MTS4000 system is operating properly. The steps are written with the assumption that you are performing all of the steps in order. If you start the procedures in the middle, you will have to review previous steps for instrument setup.

- ASI loopback test
- In the MPEG Player, set the following:
 a. Select Play > Interface > ASI.

💷 Sym1 - Tektronix MPEG Player					
File View Play ASI Utility					
📂 🖬 定	Interface	•		IP	
🖃 📕 TS "S	Packet Size	►	\checkmark	ASI	
±	Clock		2		
	Update	►			
	PCR Initial Value		ι.		

b. Select ASI > ASI Out > ASI-3.

💷 Sym1 - Tektronix MPEG Player				
File View Play ASI Utility				
📂 🗓 📄 🔚 🛛 🗛 ASI Out 🔶		ASI-1		
		ASI-2		
■ ■ ■ PAT PID:0x0, TbID:0x0, TSID:0x1	\checkmark	ASI-3		
NIT PID:0x10, TbID:0x40		ASI-4		
SDT PID:0x11, TbIID:0x42				

- **c.** In the MPEG Player toolbar, click the green Play arrow to start playing the transport stream file.
- 2. Start the TS Compliance Analyser by double-clicking the icon on the desktop.



3. Set the Real-time Interface to ASI-4.

Select Real-time Interface	—
Standard	
Base Standard DVB, Region No Extensions Using default scripts. Scripted validations are not enabled.	Change
Interfaces	
Select from the available interfaces IP	
Interface Settings ASI-3	
Presets Selected Presets	

4. Click OK to accept the changes and close the Select Real-time Interface dialog box.

After a few seconds, the TSCA window opens with the analysis results of the ASI transport stream. Some EIT errors are acceptable.



1G Ethernet loopback test 10G loopback test

The steps in this procedure can be used to perform a loopback test on the standard 1G Ethernet ports and the optional 10G optical interface card ports.

The example screen shots display the names and connections for the 1G Ethernet ports. The 10G optical ports have identical screens, but different adapter names.

NOTE. Do not attempt to perform the two loopback test simultaneously. First test the 1G Ethernet ports, then if installed, test the 10G optical ports.

- 1. Verify that the ports are active.
 - **a.** 1G Standard Ethernet ports: With a loopback cable connected, verify that the LEDs on the Ethernet ports are on or blinking. Check the RJ45 cable connections if the LEDs are off.
 - **b.** 10G Optical Interface ports: With a loopback cable connected, verify that the LEDs on the optical ports are on or blinking. Check the fiber cable connections if the LEDs are off.

NOTE. For ease of identifying the ports, if you need to verify both the 1G Standard Ethernet ports and the 10G Optical ports, do not have both loopback cables connected at the same time.

2. Open the Network and Sharing Center in the Windows Control Panel.

You should see two local area connections displayed.



- **4.** Configure the two ports as static IP addresses 192.168.1.100 and 192.168.1.200 on the MTS4000.
 - **a.** Select the first Local Area Connection and then click Properties in the dialog screen. Configure it to 192.168.1.100 IP address. (This will be used for the MPEG Player.)

🔋 Local Area Connection Status	
General	
Connection	
IPv4 Connectivity:	No Internet access
IPv6 Connectivity:	No Internet access
Media State:	Enabled
Duration:	00:04:50
Speed:	1.0 Gbps
Details	
Activity	
Sent —	Received
Packets: 155	0
Properties Pisable	Diagnose
	Close

b. Highlight Internet Protocol Version 4 (TCP/IPv4) and select Properties.

📮 Local Area Connection Properties
Networking Sharing
Connect using:
Intel(R) 82578DM Gigabit Network Connection
Configure
This connection uses the following items:
 Client for Microsoft Networks QoS Packet Scheduler File and Printer Sharing for Microsoft Networks Internet Protocol Version 6 (TCP/IPv6) Internet Protocol Version 4 (TCP/IPv4)
Install Uninstall Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
OK Cancel

c. Select Use the following IP address: and enter the value 192.168.1.100.

Internet Protocol Version 4 (TCP/IPv4)	Properties 💦 💽
General	
You can get IP settings assigned autor this capability. Otherwise, you need to for the appropriate IP settings.	natically if your network supports ask your network administrator
Obtain an IP address automatical	ly
• Use the following IP address:	
IP address:	192.168.1.100
S <u>u</u> bnet mask:	255 . 255 . 255 . 0
Default gateway:	· · ·
Obtain DNS server address auton	natically
 O Use the following DNS server add 	Iresses:
Preferred DNS server:	
<u>A</u> lternate DNS server:	· · ·
🔲 Vaļidate settings upon exit	Ad <u>v</u> anced
	OK Cancel

- **d.** Select the second Local Area Connection and set the IP address to 192.168.1.200. Use the same method as described for setting the first Local Area Connection. (This will be used for TSCA input.)
- 5. Start the MPEG player and open the Sym1.mpg file.

6. In the MPEG player toolbar, select Play > Interface > IP.

If the following pop-up displays, select OK. Do not use Auto Configure.

gPlayer - Recommended Settings	×
The recommended settings for the MpegPlayer in IP mode are:	
To configure all the settings automatically use the "Auto Configure" button.Configure the following settings on your bo	
1. For the Intel Pro/1000 MT Drivers, please set the following options: These are accessed via Control Panel> Network and Internet Connections> Network Connections> Intel Pro/1000 Device> Properties> Configure> Advanced The following settings are recommended: Adaptive Inter-Frame Spacing> Disabled Flow Control> Off Interrupt Moderation Rate> Off Interrupt Moderation Rate> Off Jumbo Frames> <max available=""> Link Speed & Duplex> Auto-negotiate 1000Mbps (For 1Gig or higher Network only) Receive Descriptors> 2048 All other settings are at defaults. NDTE: Auto Configure will set the "Link Speed and Duplex" to "AutoDetect". This setting can be changed manually, if required.</max>	
2. The following Windows services needs to be configured. Windows Firewall/Internet Connection Sharing (ICS)> Disabled & Stopped Automatic Updates> Disabled & Stopped IIS Admin> Disabled & Stopped	
3. Java automatic Update must be turned off. These are accessed via Control Panel> Java> Update	
۰ (ا	
Do not show again Auto Configure OK	

7. In the MPEG player toolbar, select IP > Configure.

IP Playout Configuration				×
Configuration name		•		
Protocols				
IP Version	IPv4 💌		Protocol RTP	•
Device Name	Network adapter Intel(R)	82578DM Gigabit Netw	vork Connection' a	on loca 🔻
Source IP Address	192.168.1.100	•	Source Port	16384
Transmission Mode	Multicast 👻		Destination Port	16384
Destination IP Address	239.1.1.1]		
Enable VLAN VI	D 1	Advanced Settings.	Stream Re	plication
Packet Size				
📃 Allow TS Fragmenta	tion 📃 Allow IP Fra	gmentation		
🔘 IP Packet Size	1370	Bytes		
Number of TS packet	ets 7	IP Packet Size = 137	'O bytes	
Store Settings Dele	ete Settings Reset To D	efault Settings	ОК	Cancel

- 8. Configure the IP interface.
 - **a.** Use the Device Name pull-down list and select the adapter that you set the IP address to 192.168.1.100. This is to be used for playout.
 - **b.** Click Stream Replication and enter 0 (no stream replication).
- **9.** In the MPEG Player toolbar, click the green Play arrow to start playing the transport stream file.
- 10. Start the TS Compliance Analyzer and choose IP interface.

If this is the first time the IP interface has been selected, double click the red area in preset or click the "+" button once

Select Real-time Interface	X
Standard Base Standard DVB, Region Using default scripts. Scripted	No Extensions validations are not enabled. Change
Interfaces Select from the available inte	rfaces IP 👻
Interface Settings Presets Double-click to add a preset	Selected Preset These are the settings for the currently selected preset. To browse the network for a stream, select the <i>Browse…</i> button. Field Value ⑦
•	Browse
	OK Apply Cancel

11. Browse to the stream coming to 192.168.1.200 port. In this example, it is the Intel(R) 82583V Gigabit Network Connection.

	(192, 168, 1, 200) I	intel(R) 82583V Giga	bit Network Co	nnection					
	Device WPF_{1BE	04F7F-D97D-4D3E-E	3D1-9B408A16	D5A2}					
(P Address Settir	ngs (managed by o	perating system)							
Passive mode	e (no outbound tra	(ffic)							
Active mode	(issues and respon	nds to ARP and othe	r traffic)						
IP Address:	192.168.1.200 (n	managed by operati	ng system)						
Subnet Mask	c: (managed by ope	erating system)							
Default Gate	way: (managed by	operating system)							Change
Current Group:	239.1.1.1							Change	Leave
Current Group: 5 UDP flows dete	239.1.1.1 ected (total rate 42	2. 103 Mbps)						Change	Leave
Current Group: 5 UDP flows dete Dest. MAC	239.1.1.1 ected (total rate 42 Source IP	2.103 Mbps)	Transport	Has TS	Source Port	Dest. Port	Bit rate (Kbps)	Change Bit rate Graph	Leave
Current Group: 5 UDP flows dete Dest. MAC 01:00:5E:01:0. 01:00:5E:7E:E	239.1.1.1 ected (total rate 42 Source IP 	2.103 Mbps) Dest. IP 239.1.1.1 239.255.255.2	Transport RTP (IDP	Has TS	Source Port 16384 64744	Dest. Port 16384 3702	Bit rate (Kbps) 42101.247 0.000	Change Bit rate Graph	Multicast
Current Group: 5 UDP flows dete Dest. MAC 01:00:5E:01:0. 01:00:5E:7F:F. 01:00:5E:7F:F.	239.1.1.1 ected (total rate 42 Source IP 192.168.1.100 192.168.1.200	2.103 Mbps) Dest. IP 239.1.1.1 239.255.255.2 239.255.255.2.	Transport RTP UDP UDP	Has TS	Source Port 16384 64744 64743	Dest. Port 16384 3702 3702	Bit rate (Kbps) 42101.247 0.000 0.000	Change Bit rate Graph	Multicast
Current Group: 5 UDP flows dete Dest. MAC 01:00:5E:01:0. 01:00:5E:7F:F. 01:00:5E:7F:F. 33:33:00:01:0.	239.1.1.1 ected (total rate 42 Source IP 192.168.1.100 	2.103 Mbps) Dest. IP 239.1.1.1 239.255.255.2 FF02::1:2	Transport RTP UDP UDP UDP	Has TS V X X X	Source Port 16384 64744 64743 546	Dest. Port 16384 3702 3702 547	Bit rate (Kbps) 42101.247 0.000 0.000 0.864	Change Bit rate Graph	Multicast

- **12.** Click on the "green" stream on the list for analysis where source IP is 192.168.1.100 (this is from MPEG Player) and select OK.
- 13. Close all remaining configuration screens, and the analysis will start.
- 14. Some EIT errors are acceptable, see below:



Shut down the instrument

The Performance Verification procedure is complete.

Power off the instrument and disconnect the signal cables.