

# IP Video Monitor

## IPM400A Datasheet



### IPM400A

The IPM400A simultaneously verifies IP and TS integrity on all IP Video flows (sessions) on a GbE link. It is ideal for monitoring networks which carry both Multi-program Transport Streams (MPTS) or Single-program Transport Streams (SPTS), at either Constant Bit Rate (CBR) or Variable Bit Rate (VBR).

### Key features

- In-depth, real-time MPEG analysis option allows diagnostics to be performed on live payload without always having to use labor-intensive deferred-time analysis of captured streams
- No additional analysis software is required – all confidence and diagnostic analysis can be carried out with the IPM400A
- When used in conjunction with the VQS1000 Video Quality Software application, provides reliable and sophisticated analysis algorithms applied to decoded MPEG-2 or H.264 video to identify stuck, black, macro-blocking, and compression artifacts

### Applications

- Diagnostic Monitoring of IP Video Contribution and Primary Distribution
  - Cable Headend Monitoring
  - Terrestrial Distribution
  - DTH or Network Operator Satellite Uplink Monitoring
- IPTV Ingest and Headend Monitoring

### Introduction

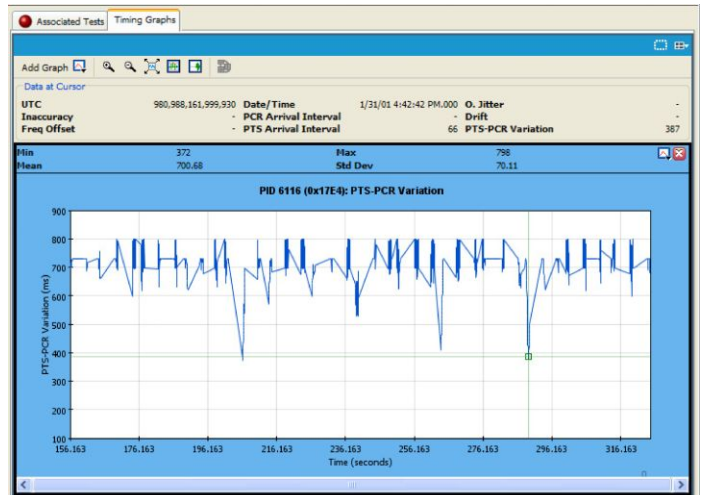
As the worldwide DTV market continues to evolve, a shift of consumer viewing behavior, combined with increasing competitive pressure, is driving the explosion of growth in broadcast channels and overall capex investment. A key operational challenge for video network operators is how to efficiently deliver superior Quality of Service (QoS) levels to maintain differentiation in this competitive market. The IPM400A provides an intuitive and simplified presentation of video quality and diagnostic information. This benefit enables the delivery of superior QoS levels in an increasingly complex broadcast environment.

### Product information

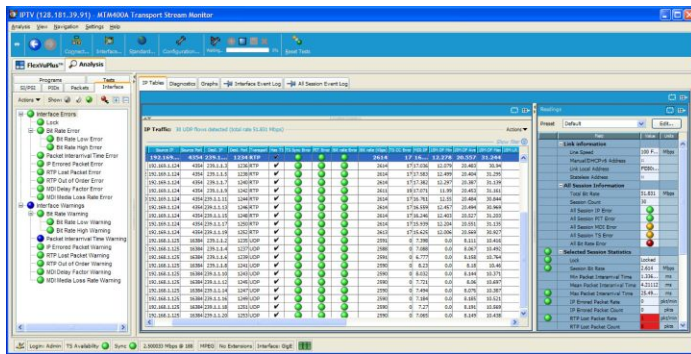
- Monitor up to 500 IP flows (sessions) including all essential parameters (continuity count, sync byte, packet interarrival time (PIT))
  - Ensure IP and TS integrity for all services up to fully loaded GbE link
- Video/Audio backhaul
  - Allows actual content to be fed back to the central monitoring point to see and hear the content being broadcast (encrypted content sent to a STB for hardware decode)
- "Green Stream" learning mode
  - Allows monitoring-by-exception and elimination of false alarms
- Multiplex view
  - Allows an at-a-glance view of program utilization over an extended period allowing the user to see if bandwidth spikes occurred, which leads to overwhelmed routers resulting in dropped packets
- Unique 2-level Alarms
  - Uniquely provides advanced warning of impending problems to avoid customer complaints. Single-level alarming means the alert can only be generated. With 2-level alarms, separate warning and failure alarms are not possible
- FlexVuPlus™
  - Uniquely presents simplified presentation of video quality and diagnostic information

# Datasheet

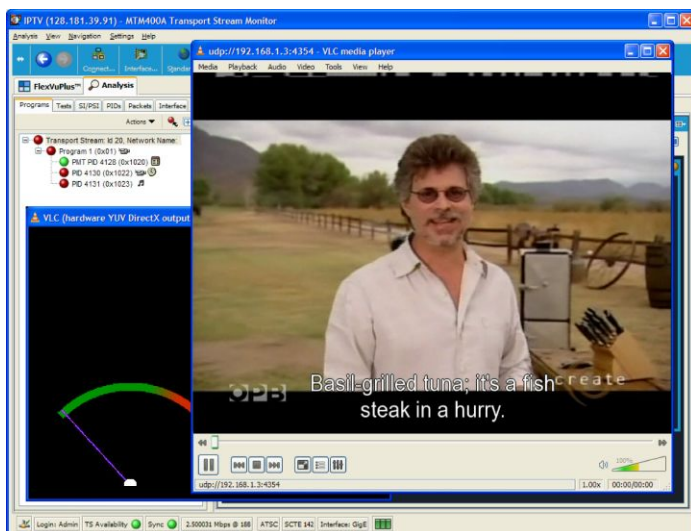
- Filtered logs
  - Allows diagnostics to be performed at the TS, Program or PID levels to "zoom in" on problems quickly
- Diagnostic option to add root-cause analysis
  - Advanced Timing Analysis including PTS-PCR and DTS-PCR for real-time buffer measurements to give indication of encoding and multiplexing errors
  - Triggered recording with pretrigger buffers enables capture of intermittent issues for offline analysis
  - Service logging, bit rate testing, and template testing functionality provides verification of bandwidth allocation and service plans
  - Polling allows cost-effective monitoring of low revenue-earning channels
- Simultaneous connection of multiple remote users and Multi-sink SNMP traps for Network Management Systems (NMS)
  - Provides early visibility of problems to key individuals throughout the organization, supporting quicker notification and corrective action
  - Allow multiple users and/or NMS to access the IPM400A simultaneously



Advanced Timing Analysis including PTS-PCR for real-time buffer measurements to give indication of encoding and multiplexing errors



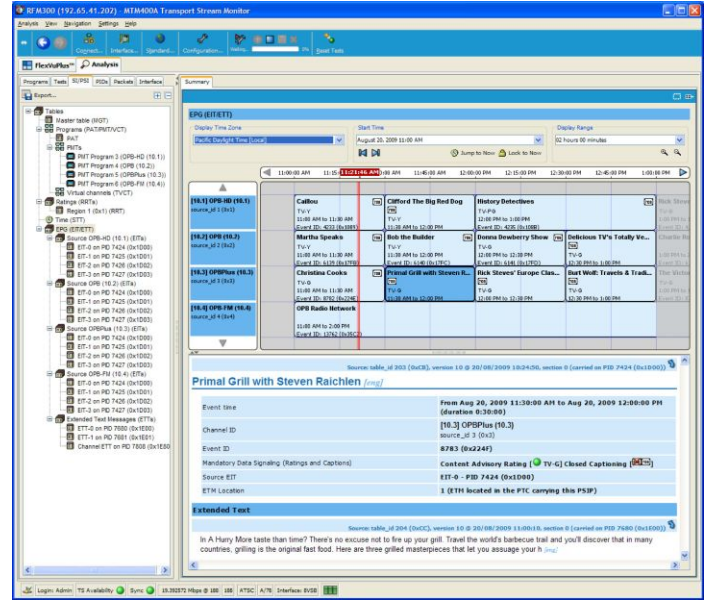
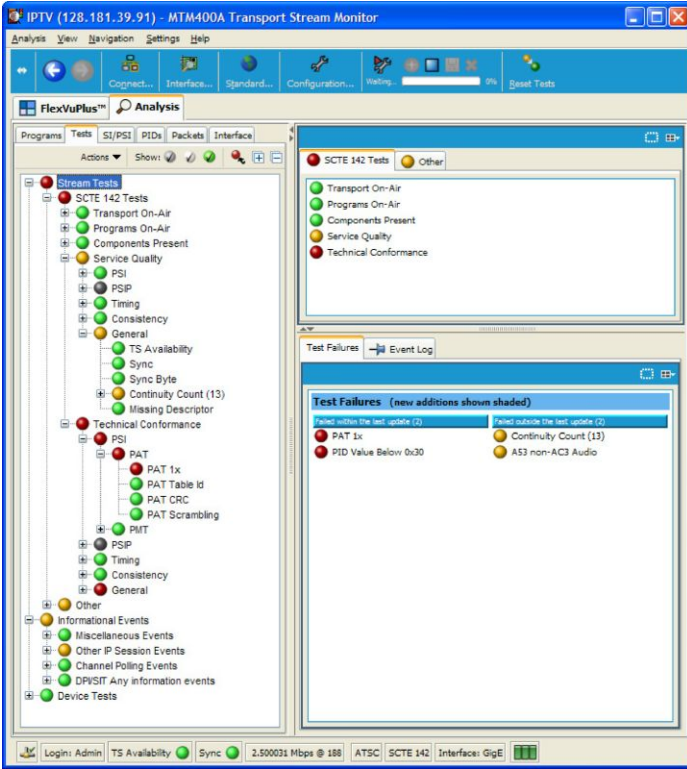
Simultaneous QoS monitoring of all IP Video flows.



Video and audio content monitoring to ensure QoE is maintained.

## Technical overview

- SCTE-142 and A/78 monitoring modes classify five distinct levels of importance
  - Transport Stream Off-air (TOA), Program Off-air (POA), Component Missing (CM), Quality of Service (QoS), Technically Nonconformant (TNC)
  - Enables filtering and display only of errors that require immediate attention
- Comprehensive TR 101 290 Priority 1, 2, and 3 MPEG measurement mode
  - Provides in-depth analysis of Transport Stream, syntax, timing, and content to support root-cause analysis of system interoperability issues
- Superior PCR measurements (PCR\_OJ, DR and FO)
  - PCR\_OJ enable deterministic measurements on Transport Stream and network-induced jitter allowing Transport Stream and network errors to be isolated
  - DR and FO measurements allow diagnosis of longer-term system degradation
- PSI/SI/PSIP/DC-II conformance and consistency checking
  - Checks compliance with ATSC A/65, DVB, and ARIB standards
  - Closed Caption (EIA608/708 and SCTE20/21) and Regional Ratings Descriptor (RRT) checking ensures conformance to FCC regulations. Status is indicated in both thumbnail and EPG views
  - PSI/PSI/PSIP testing ensures set-top box performance (channel change etc.) can be verified
- SCTE 35 DPI monitoring
  - Allows analysis and diagnostics of "splice" advertising and other local content



EPG View

SCTE-142 and A/78 modes classify five distinct levels of importance.

# Specifications

## Power requirements

<b>Power consumption (nominal)</b>	40 VA
<b>Voltage</b>	100 to 240 V
<b>Frequency</b>	50/60 Hz

## GbE IP video monitoring interface specifications

<b>Interconnect port options</b>	<p>10/100/1000BASE-T RJ45 electrical port standard.</p> <p>Optional optical SFP modules which plug into IPM400A to provide optical connectivity:</p> <p>1000BASE-SX Short Wavelength Optical port with LC connector for MTM400A Gigabit Ethernet Interface (Multi Mode 850 nm) Opt. SX</p> <p>1000BASE-LX Long Wavelength Optical port with LC connector for MTM400A Gigabit Ethernet Interface (Single Mode 1310 nm) Opt. LX</p> <p>1000BASE-ZX Optical port with LC connector for MTM400A Gigabit Ethernet Interface (Single Mode 1550 nm) Opt. ZX</p>
<b>Maximum data rate</b>	Line rate
<b>ASI output</b>	ASI compliant with specification EN 50083-9 ASI smoothing can be activated to compensate for bursty IP traffic
<b>Protocol stack support</b>	<p>IPv4 support</p> <p>IPv6 support</p> <p>UDP/IP/Ethernet</p> <p>UDP/IP/VLAN/Ethernet</p> <p>RTP/UDP/IP/Ethernet</p> <p>RTP/UDP/IP/VLAN/Ethernet</p>
<b>Multicast and control support</b>	<p>IGMP v2 support</p> <p>IGMP v3 support</p> <p>MLD v2 support</p> <p>ARP</p> <p>ICMP (Inbound and Outbound ping)</p>
<b>IP packet support</b>	7 Transport Stream packets per IP packet (188 byte packets) FEC (FEC is parsed but is not processed)
<b>Multi session monitoring parameters</b>	<p>Discovery of up to 500 IP sessions, simultaneous monitoring of key parameters including:</p> <p>Continuity Count</p> <p>Sync Byte</p> <p>Packet Interarrival Time (PIT) for all sessions</p> <p>Session Bit Rate</p> <p>Out-of-Order and Dropped Packet errors (RTP only)</p>

## GbE IP video monitoring interface specifications

### Statistics

Static IP header contents  
 Total bit rate for all Ethernet traffic  
 Instantaneous TS bit rate for selected IP session  
 Errored packets rate per minute and absolute count  
 Dropped packets rate per minute and absolute count  
 Out-of-Order packets rate per minute and absolute count  
 TS Continuity Count

---

### Graphs

IP session TS bit rate  
 Traffic graph for all IP sessions with per session error indication  
 IP packet interarrival time of the selected IP session Min, Max, and Average  
 IP session lock status trend graph (up to seven days)  
 IP Dropped Packet Rate trend graph (up to seven days)  
 IP Out-of-Order Packet Rate trend graph (up to seven days)  
 IP Corrupted Packet Rate trend graph (up to seven days)  
 Packet Interarrival Time histogram view, Average and Peak trend graph (up to seven days)

---

### Alarms

User-definable thresholds for alarms on all sessions including:  
 Errored packets rate  
 Dropped packets rate  
 Packet interarrival time maximum  
 Out-of-Order packet rate  
 Event alarms on all sessions including:  
 TS Continuity Count Errors  
 TS Sync Byte  
 TS Sync Loss  
 Dropped Session

---

### Control

Line select (optical, electrical rate)  
 Filters for MAC, IP, Port  
 Protocol control for ARP, RTP, IGMP and VLAN  
 IGMP (single or multiple subscription)

---

## Environmental

### Temperature

<b>Operating</b>	+5 °C to +40 °C
<b>Nonoperating</b>	-10 °C to +60 °C

---

### Humidity

<b>Operating</b>	Maximum relative humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C
<b>Nonoperating</b>	10% to 95% relative humidity, noncondensing

---

### Altitude

<b>Operating</b>	0 m to 3000 m (9800 ft.)
<b>Nonoperating</b>	0 m to 12000 m (40000 ft.)

---

### Random vibration

<b>Operating</b>	5 to 500 Hz, GRMS = 2.28
<b>Nonoperating</b>	.5 to 500 Hz, GRMS = 0.27

---

### Functional shock

Operating 30 G, half sine, 11 ms duration

---

### Electromagnetic compatibility

<b>EC Declaration of Conformity</b>	Meets EN55103. Electromagnetic Environment E4
<b>Australia / New Zealand Declaration of Conformity</b>	Meets AS/NZS 2064
<b>FCC</b>	Emissions are within FCC CFR 47, Part 15, Subpart B, Class A limits

---

### Safety

Meets 73/23/EEC, EN61010-1, UL3111-1 and CAN/CSA 22.2 No. 1010.1-92, IEC61010-1

---

## Physical

### Dimensions

<b>Height</b>	44 mm/ 1.73 in.
<b>Width</b>	430 mm/ 17.13 in.
<b>Depth</b>	600 mm/ 23.62 in.

---

### Weight

<b>Net</b>	6.0 kg/ 13.3 lb.
<b>Shipping</b>	9.0 kg/ 19.7 lb.

---

### Clearance

<b>Top</b>	0 mm/ 0 in.
<b>Bottom</b>	0 mm/ 0 in.
<b>Left Side</b>	Standard 19 in. rackmount
<b>Right Side</b>	Standard 19 in. rackmount
<b>Front</b>	Clearance for handles required
<b>Rear</b>	Clearance for connectors required

---

## Ordering information

### IPM400A

IP Video Monitoring Probe for QoS of up to 500 MPTS or SPTS IP Video Flows.

Includes: 1RU chassis fitted with GbE interface and Transport Stream processor cards, manual, rack slides, power cord, and license key certificate.

### Options

Opt. DIAG	Deep-dive diagnostic analysis for a single IP Video flow
Opt. SX	1000BASE-SX Short Wavelength Optical port with LC connector (Multi Mode 850 nm)
Opt. LX	1000BASE-LX Long Wavelength Optical port with LC connector (Single Mode 1310 nm)
Opt. ZX	1000BASE-ZX Optical port with LC connector (Single Mode 1550 nm)

### Language options

Opt. L0	English manual
Opt. L5	Japanese manual

### Service options

R3	Repair Service 3 Years (including warranty)
R5	Repair Service 5 Years (including warranty)

### Power cords

Opt. A0	North America power plug
Opt. A1	Universal EURO power plug
Opt. A2	United Kingdom power plug
Opt. A3	Australia power plug
Opt. A4	240 V North America power plug
Opt. A5	Switzerland power plug
Opt. A6	Japan power plug
Opt. A10	China power plug
Opt. A99	No power cord or AC adapter



## Complementary products

<b>MTS4SA Opt. TSCL</b>	Stand-alone Deferred-time Software package. DVB/ATSC/ARIB TS Compliance Analyzer Software (TS file size limited to 192 MB). For full details see separate data sheet
<b>VQS1000</b>	Video Quality Software application for single-ended QoE analysis of video and audio content

## Field upgrade kits

<b>Opt. DIAG</b>	Add deep-dive diagnostic analysis for a single IP Video flow
<b>Opt. SX</b>	1000BASE-SX Short Wavelength Optical port with LC connector (Multi Mode 850 nm)
<b>Opt. LX</b>	1000BASE-LX Long Wavelength Optical port with LC connector (Single Mode 1310 nm)
<b>Opt. ZX</b>	1000BASE-ZX Optical port with LC connector (Single Mode 1550 nm)

Other

<b>Opt. IFC</b>	One-time install of all selected options and calibration for one product
-----------------	--



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

**ASEAN / Australasia** (65) 6356 3900  
**Belgium** 00800 2255 4835\*  
**Central East Europe and the Baltics** +41 52 675 3777  
**Finland** +41 52 675 3777  
**Hong Kong** 400 820 5835  
**Japan** 81 (3) 6714 3010  
**Middle East, Asia, and North Africa** +41 52 675 3777  
**People's Republic of China** 400 820 5835  
**Republic of Korea** 001 800 8255 2835  
**Spain** 00800 2255 4835\*  
**Taiwan** 886 (2) 2722 9622

**Austria** 00800 2255 4835\*  
**Brazil** +55 (11) 3759 7627  
**Central Europe & Greece** +41 52 675 3777  
**France** 00800 2255 4835\*  
**India** 000 800 650 1835  
**Luxembourg** +41 52 675 3777  
**The Netherlands** 00800 2255 4835\*  
**Poland** +41 52 675 3777  
**Russia & CIS** +7 (495) 6647564  
**Sweden** 00800 2255 4835\*  
**United Kingdom & Ireland** 00800 2255 4835\*

**Balkans, Israel, South Africa and other ISE Countries** +41 52 675 3777  
**Canada** 1 800 833 9200  
**Denmark** +45 80 88 1401  
**Germany** 00800 2255 4835\*  
**Italy** 00800 2255 4835\*  
**Mexico, Central/South America & Caribbean** 52 (55) 56 04 50 90  
**Norway** 800 16098  
**Portugal** 80 08 12370  
**South Africa** +41 52 675 3777  
**Switzerland** 00800 2255 4835\*  
**USA** 1 800 833 9200

\* European toll-free number. If not accessible, call: +41 52 675 3777

Updated 10 April 2013

**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).

Copyright © Tektronix, Inc. All rights reserved. Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. TEKTRONIX and TEK are registered trademarks of Tektronix, Inc. All other trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.



14 Jan 2014

2AW-24494-5

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

**Tektronix**<sup>®</sup>

