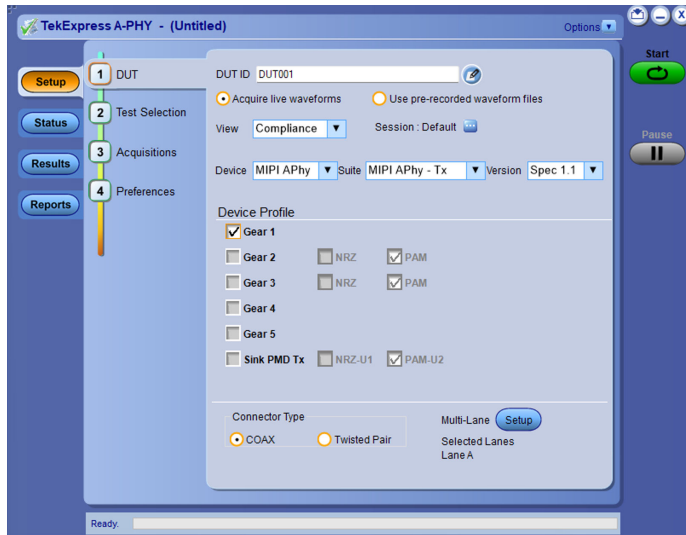


TekExpress MIPI A-PHY Compliance Application Datasheet



MIPI® A-PHY is a standardized long-reach SerDes physical layer interface developed by the MIPI Alliance for automotive and advanced sensor connectivity applications. It is designed to support high-bandwidth, low-latency communication between cameras, displays, sensors, and centralized compute platforms. A-PHY enables reliable data transmission over up to 15 meters of coaxial cable or shielded twisted pair (STP) in electrically noisy automotive environments.

The interface supports asymmetric data rates ranging from several gigabits per second up to 16 Gbps, incorporates advanced error resilience mechanisms, and is optimized to meet stringent automotive EMI/EMC and functional safety requirements.

As software-defined vehicles (SDVs), ADAS, autonomous driving systems, and next-generation infotainment architectures continue to increase sensor bandwidth demands, MIPI A-PHY has emerged as a key industry standard for high-speed in-vehicle connectivity. Compliance testing of A-PHY transmitters requires comprehensive characterization of signal integrity, timing, jitter, PAM4 eye quality, channel performance, and interoperability, as defined by the MIPI A-PHY Compliance Test Specification (CTS).

The Tektronix TekExpress® A-PHY compliance application provides a complete physical layer test solution for automated transmitter compliance testing and characterization of MIPI A-PHY devices. The solution streamlines the execution of compliance measurements, accelerates root-cause analysis, and enables engineers to validate signal quality and performance with confidence across multiple A-PHY operating modes and data rates.

Key Features

- Supports multi-gear A-PHY operation (NRZ, PAM4) up to 16 Gbps
- PAM4 eye diagram analysis using long random patterns for improved BER confidence
- BER-based eye mask testing with extrapolation (10^{-6} to 10^{-12})
- Channel templates (Short/Medium/Long) for realistic cable emulation
- Adaptive equalization and link training validation
- Jitter decomposition (RJ, DJ) and total jitter measurements
- Asymmetric link validation (high-speed downlink, low-speed uplink)
- Common-mode voltage and EMI noise tolerance measurements
- Voltage, timing, skew, and latency analysis
- Compliance mode and user-defined debug options
- Automated reports with pass/fail results and detailed metrics

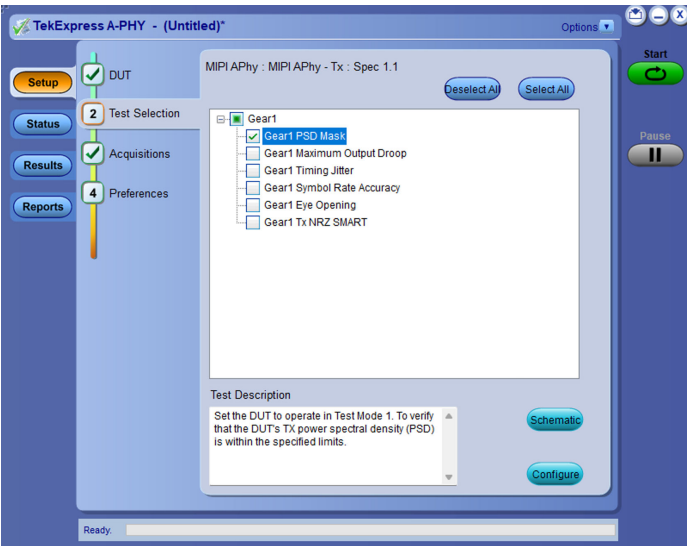
A-PHY Automated Compliance Testing

The Tektronix TekExpress® A-PHY application runs on 7 Series DPO, 6 Series MSO, and 6 Series B MSO oscilloscopes. The close integration of the oscilloscope and test software provides an automated, simple, and efficient way to test A-PHY transmitter interfaces and devices in accordance with the requirements of the A-PHY Conformance Test Specification, version 1.x.

Measurement setup and test execution are simplified with the A-PHY software. The intuitive graphical user interface (GUI) is designed to represent the workflow from setup through testing, allowing users to focus on design and debugging rather than measurement configuration.

The TekExpress A-PHY compliance application supports both live and offline analysis through real-time waveform acquisition as well as pre-recorded waveform processing for debug and compliance workflows. It enables flexible test setup configurations, including direct DUT connection using coax-to-SMA and STP-to-SMA fixtures, along with link partner-based validation setups.

The application also supports DUT control via vendor-provided CLI interfaces (as defined in the A-PHY CTS appendix) or through link partner-driven forced test mode operation.



Test selection tab

Reporting

The Report tab provides a view of the complete test results, including pass/fail status, test margins, and images supporting the test results for each lane of the DUT.

Tektronix® TekExpress A-PHY MIPI APhy – Tx Test Report							
Setup Information							
DUT ID	GEAR5_TP			Scope Model	MS0648		
Date/Time	6/17/2026 11:49:01 AM			Scope F/W Versio	CF-01-1CT FV-2.26.8-release.34		
Device Type	MIPI APhy			Scope Serial Number	B027144		
TekExpress Framework Version	v5.12.0.2.2			CH1: (Source, Probe Model-Serial)	CH1, 1X-N/A		
TekExpress A-PHY Version	v1.0.0.120			CH2: (Source, Probe Model-Serial)	CH2, 1X-N/A		
CTS Version	1.1			CH3: (Source, Probe Model-Serial)	CH3, 1X-N/A		
Compliance Mode	Yes			CH4: (Source, Probe Model-Serial)	CH4, 1X-N/A		
Execution Mode	Live						
Overall Test Result	Pass						
Overall Execution Time	00:00:23						
DUT COMMENT:	General comment						
Test Name Summary Table							
Gear5 Maximum Output Droop				Pass			
Gear5 Maximum Output Droop							
Measurement Details	Measured Value	Test Result	Margin	Low Limit	High Limit	Units	Additional Info
Positive Gear5 Maximum Output Droop	11.792	Pass	Low: NA, High: 28.208	NA	40	%	
Negative Gear5 Maximum Output Droop	12.586	Pass	Low: NA, High: 27.414	NA	40	%	
COMMENTS							

Back to Summary Table

Test report

Specifications

Measurements

Transmitter (Tx) Physical Layer Measurements

Measurement	Test Mode	Description / Intent
Transmit Power Spectral Density (PSD)	TM1	Verifies spectral mask compliance across frequency (per gear)
Transmitter Output Droop	TM2	Measures amplitude decay over time during transmission
Transmitter Timing Jitter (TJ)	TM3	Total jitter measurement including timing variation
NRZ Eye Opening	TM4	Eye height and width for NRZ signaling modes
PAM-X Eye/Signal Integrity	TM4	Eye opening via multi-level constellation behaviour (implicit)
Transmitter Linearity (PAM-X)	TM4	Measures distortion across PAM levels
Symbol Rate Accuracy	—	Verifies Tx frequency/symbol timing accuracy
Inter-Pair Skew (Dual Lane)	TM4	Lane-to-lane timing alignment for Q-port

Ordering Information

Hardware Requirements

Item	Description
Oscilloscope models	7 Series DPO (8 GHz and higher) 6 Series B MSO (3 GHz and above with 6-WIN)

Software Requirements

Application	Scope Model	Option	License Type
TekExpress MIPI A-PHY Compliance Solution	7 Series DPO (≥ 8 GHz)	7-CMAPHY	New Instrument License
		7-CMAPHY-FL	New Instrument License
	MSO 6 B series (≥ 3 GHz)	6-CMAPHY	New Instrument License
		SUP6-CMAPHY	New Instrument License
		SUP6-CMAPHY-FL	New Instrument License

A-PHY Gear based Oscilloscope Selection Guide

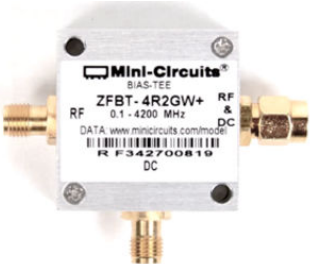
Normative Downlink / Reverse Downlink Gears

Gear	Data Rate	Modulation	Symbol Rate (GBaud)	Max Net App Data Rate (Gbps)	Recommended Oscilloscope
G1	2 Gbps	NRZ-8B/10B	2	1.5	MSO6B / 7 Series DPO
G2	4 Gbps	NRZ-8B/10B	4	3	MSO6B / 7 Series DPO
G3	8 Gbps	PAM4	4	7.2	MSO6B / 7 Series DPO
G4	12 Gbps	PAM8	4	10.8	MSO6B / 7 Series DPO
G5	16 Gbps	PAM16	4	14.4	MSO6B / 7 Series DPO

Normative Uplink Gears

Gear	Data Rate	Modulation	Symbol Rate (MBaud)	Max Net App Data Rate (Mbps)	Recommended Oscilloscope
U1	100 Gbps	NRZ-8B/10B	100	54	MSO6B
U2	200 Gbps	PAM4-8B/10B	100	125	MSO6B

Recommended Test Fixtures

Company	Category	Part number	Description	Reference
Rosenberger	Adapter (Female)	02K1AM-KA0S3	RPC-2.92 to HFM calibration adaptor	
	Adapter (Male)	02S1AM-SA0S3	HFM male adaptor	
Mini circuit	Splitter	ZFRSC-42-S+	2-way resistive splitter, DC–4.2 GHz	
	Bias Tee	FBT-4R2GW+	Bias tee, ~100 kHz–4.2 GHz	

Certification

Tektronix is registered to ISO 9001:2015 and ISO 14001:2015.

Contact Information:

Australia 1 800 709 465
Austria* 00800 2255 4835
Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777
Belgium* 00800 2255 4835
Brazil +55 (11) 3530-8901
Canada 1 800 833 9200
Central East Europe / Baltics +41 52 675 3777
Central Europe / Greece +41 52 675 3777
Denmark +45 80 88 1401
Finland +41 52 675 3777
France* 00800 2255 4835
Germany* 00800 2255 4835
Hong Kong 400 820 5835
India 000 800 650 1835
Indonesia 007 803 601 5249
Italy 00800 2255 4835
Japan 81(3) 6714 3086
Luxembourg +41 52 675 3777
Malaysia 1 800 22 55835
Mexico, Central/South America and Caribbean 52 (55) 88 69 35 25
Middle East, Asia, and North Africa +41 52 675 3777
The Netherlands* 00800 2255 4835
New Zealand 0800 800 238
Norway 800 16098
People's Republic of China 400 820 5835
Philippines 1 800 1601 0077
Poland +41 52 675 3777
Portugal 80 08 12370
Republic of Korea +82 2 565 1455
Russia / CIS +7 (495) 6647564
Singapore 800 6011 473
South Africa +41 52 675 3777
Spain* 00800 2255 4835
Sweden* 00800 2255 4835
Switzerland* 00800 2255 4835
Taiwan 886 (2) 2656 6688
Thailand 1 800 011 931
United Kingdom / Ireland* 00800 2255 4835
USA 1 800 833 9200
Vietnam 12060128
*** European toll-free number. If not accessible, call:** +41 52 675 3777

Find more valuable resources at [TEK.COM](https://www.tek.com)

Tektronix®

Copyright © Tektronix. 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.

61W-74277-0 14 July 2026