

# **QSPI** Electrical Validation & Protocol Decode Software







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Electrical validation results

Protocol Decode results

QSPI Electrical Validation and Protocol Decode Software offers electrical measurements compliance testing and protocol decoding as specified in QSPI specification. PGY-QSPI Electrical validation and Protocol decode software runs in Tektronix Oscilloscope and provides electrical measurements and protocol decode at the click of a button. This allows engineers quickly check for QSPI compliance and flexibility to debug the failure. In addition to this engineer can decode the command and response of QSPI to debug the communication. PGY-QSPI takes advantage of digital channels of MSO and provides the decoding of QSPI data lines.

#### **Key Features**

- Single and Dual Transfer rate (STR/DTR).
- Supports electrical measurements and compliance testing for Extended SPI, Dual SPI, and Quad SPI.
- Supports Triggering on command index and on S# falling edge.
- Supports Analog and Digital Channels of Tektronix MSO.
- Automated electrical measurements with a customizable reference level of QSPI electrical signal.
- Customizable measurement limit setup for pass/fail validation of electrical signal to enable measurements.
- Links the protocol content to the electrical signal in the oscilloscope for easy understanding of the electrical characteristics of the protocol.
- ♦ Color codes protocol content for easy analysis.
- Ability to store the QSPI protocol data and electrical data in CSV and txt format.
- Utility features like zoom, undo and fit to screen for easy debugging while correlating the protocol data to the waveform.
- Report Generation.
- Supports offline analysis.



#### **Configuration panel**

Configure panel helps in selecting the Signal Source, such as Channels, wfm Files, and CSV Files (Digital). Live Analog or Digital Channels of the oscilloscope can be used for analyzing the signal. The required QSPI mode can also be selected and the reference levels of each signal can also be customized. The offline analysis is made using the stored .wfm files (Analog channels data) or from CSV files (Digital Channel data).

Construction - PGY-QSPI Electrical Validation and Protocol Decode Software Save Recall Recall Default About											
	Signal Source	Initial Settings Mode		Run							
Select	O Channels	O Extended SPI		Signal Type					Single		
	O Wfm Files	O Dual SPI		Analog S	ignal 🔵 Digital Sigr	al			No Acq		
Configure	O CSV Files (Digital)	O Quad SPI		Channels	Unit	Ref Level		Hysteresis	Run		
	O H5 Files	Transfer Rate	C:	CH1 V	Percentage ~	50	%	5 %	Run Options		
Limit Setup	Input Latch Edge	DTR 🗸	S# :	CH2 V	Percentage 🗸 🗸	50	%	5 %			
Chine Setup	input cuton cugo	Address Mode	DQ0:	CH3 🗸	Percentage $\lor$	50	%	5 %	Result		
CMD Definitions	Rising Edge 🗸	3-byte ~	DQ 1:	CH4 🗸	Percentage ~	50	%	5	Export		
	Output Latch Edge	XIP Mode:	🖸 DQ2 🗸 🕻	CH5 🗸	Percentage 🗸 🗸	50	%	5 %	Export		
Trigger	Rising Edge 🗸	Fast Read V	🛛 DQ3 🗸 🛛	сн6 🗸	Percentage 🗸 🗸	50	%	5 %	Report		
Version :0.9.6.1 Oscilloscope: ch1,ch2,ch3,ch4											

#### Limit setup panel

The Limit Setup tab helps to set up the limits and reference levels of each selected measurement. In order to characterize and validate QSPI signals, PGY-QSPI software provides a graphical measurement reference level setup to set the measurement reference level of QSPI signals. All the limits can be varied as per the requirement. The limits set here will decide the pass/fail criteria for calculating the electrical measurements.

						Measure	ment Limi	ts								Dup
		Low	High			Low	High	-			Low	High				Run
Select	fC:	NA	108	MHz 、	tSHQZ	NA	8	nS	~	tW:	NA	8	mS	~	Deference	Single
	fR:	NA	54	MHz	tCLQV	NA	7	nS	~	tWNVCR:	NA	3	s	~	Setup	No Ac
Configure	tCH:	4	NA	nS 🔻	tCLQV	NA	5	nS	~	tCFSR:	NA	NA	nS	~		Dur
conngure	tCL:	4	NA	nS 🕚	tCLQX	1	NA	nS	~	tWVCR:	NA	NA	nS	~	Recall	Run
	tCLCH:	0.1	NA	nS 🕚	tCHQX	1	NA	nS	~	tWRVECR:	NA	NA	nS	~	1	Run Opti
imit Setup	tCHCL:	0.1	NA	nS 🚿	tHLCH	4	NA	nS	~	tPP:	NA	5	mS	~	Update	Result
AD Definitions	tSLCH:	4	NA	nS 🕚	tWHSL	20	NA	nS	~	tPP:	NA	5	mS	~	Limits	
	tCHSL:	4	NA	nS	tCHHH	4	NA	nS	~	tPP:	NA	5	mS	~		Export
Trigger	tDVCH:	2	NA	nS 🕚	tHHCH	4	NA	nS	~	tPP:	NA	NA	mS	~		Report

#### **Trigger setup panel**

PGY-QSPI can trigger on Command index or Chip select falling edge. It can trigger on a specific command or any set trigger pattern. NOTE: The oscilloscope must have Serial pattern Triggering to be able to utilize this feature.

🔯 Prodigy Tech	novations - PGY-C	SPI Ele	ctrical Validation and	d Protocol De	ode Software	Save	Recall	Recall Default	About	?
	Trigger Ty	pe				Trigger Setup				Run
Select	CMD Trigger	~	Clock Source:	CH1	-	Data Level:	1.0	v		Single
			Trigger Source:	CH2	~	Clock Level:	1.0	v		No Acq
Configure			Trigger On			Data Rate:	108	Mbps		Run Run Options
Limit Setup			RESET ENABLE					~		Dente
Linne Setup			Trigger Pattern	:						Result
CMD Definitions			01100110XXXXXXX		*****	*****	000000000	x		Export
Trigger									Set Trigger	Report
Version :0.9.6.1		Osc	illoscope   C: Ref Le	evel 50, Hys 5	S#: Ref Level	50, Hys 5   DQ 0: Ref L	evel 50, H	ys 5   DQ 1: Ref Le	vel 50, Hys 5   DQ 2:	

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#### **Electrical Measurement**

PGY-QSPI software provides an extensive list of electrical measurements, which can be selected using the Select Panel in the software GUI.

Select			Measurements	_	-	Run
	C IC	T tSLCH	tsHsL1(READ CMD)	<b>СННН</b>	✓ tSHWL	No Aco
	FR(For READ CMD)	TZ ICHSL	tsHSL2(Non READ CMD)	T the the	VPPHSL	no neg
Configure	CH	TINCH	T tSHQZ	T tCHHL	TSCK	Run
	📝 tCL	17 Invent	T tCLQX(CLK Low)	THHQX	TDSCKHCNVH	Run Optio
imit Setup	CLCH	TCHDX		THLQZ	THSDO	Result
	TCHCL	TCHSH	Charler with	TZ WHSL	T tDELAY	
AD Definitions	TCLOV 10pF V	T tSHCH	UHLCH			Export
Trimer				Clear A	Select All	

#### List of electrical measurements we support for QSPI

Symbol	Measurement	
fC	Clock frequency for all commands other than reading	~
fR	Clock frequency for read commands	<ul> <li>✓</li> </ul>
tCH	Clock High time	<ul> <li>✓</li> </ul>
tCL	Clock Low time	<ul> <li>✓</li> </ul>
tCLCH	Clock Rise time	<b>v</b>
tCHCL	Clock Fall time	<b>v</b>
tCLQV	CLK low to output valid under 10pF/30pF	<b>v</b>
tSLCH	S# active setup time (relative to the clock)	<b>v</b>
tCHSL	S# not active hold time (relative to the clock)	<b>v</b>
tDVCH	Data in setup time	<b>v</b>
tCHDX	Data in hold time	<b>v</b>
tCHSH	S# active hold time (relative to the clock)	<b>v</b>
tSHCH	S# not active setup time (relative to the clock)	<b>v</b>
tSHSL1	S# deselect time after a READ command	<b>v</b>
tSHSL2	S# deselect time after a non READ command	<b>v</b>
tSHQZ	Output disable time	<b>v</b>
tCLQX (CLK Low)	Output Hold time (clock low)	<b>v</b>
tCHQX (CLK High)	Output Hold time (clock high)	<b>v</b>
tHLCH	HOLD command setup time (relative to the clock)	<ul> <li>✓</li> </ul>
tCHHH	HOLD command hold time (relative to the clock)	<b>v</b>
tHHCH	HOLD command setup time (relative to the clock)	<b>v</b>
tCHHL	HOLD command hold time (relative to the clock)	<b>v</b>
thhqx	HOLD command to output Low-Z	<b>v</b>
thlqz	HOLD command to output High-Z	<b>v</b>
tWHSL	Write protect setup time	<b>v</b>
tSHWL	Write protect hold time	<b>v</b>
tVPPHSL	Enhanced VPPH HIGH to S# LOW for extended and dual I/O page program	<b>v</b>
tSCK	Clock period	~
tDSCKHCNVH	Clock Delay time to CS	<b>v</b>
tHSDO	DQ0 data valid delay from clock	~
tDELAY	Clock to data delay	<ul> <li>✓</li> </ul>



#### **Electrical Validation and Protocol Decode**

PGY-QSPI will automatically calculate all the electrical measurements and generate results as per the limits set.



PGY-QSPI will also display the protocol-decoded information in a listing manner with all relevant information.





PGY-QSPI has a feature called detail view, which is essentially a very powerful debugging tool. In detail view, each protocol-decoded data is linked to its respective position in the waveform for easy debugging of protocol-related problems.



#### **Tektronix Oscilloscopes Supported:**

- DPO/MSO5000 series
- DPO7000 series
- DPO/MSO/DSA 70000 series
- MSO5 series, MSO6 series

### **About Prodigy Technovations Pvt Ltd**

Prodigy Technovations Pvt Ltd (www.prodigytechno.com) is a leading global technology provider of Protocol Decode, and Physical layer testing solutions on test and measurement equipment. The company's ongoing efforts include successful implementation of innovative and comprehensive protocol decode and physical layer testing solutions that span the serial data, telecommunications, automotive, and defense electronics sectors worldwide.



## Get in touch



+91-80-42126100



www.prodigytechno.com

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Prodigy Technovations Pvt. Ltd. 294, 3rd Floor, 7th Cross, 7th Main BTM II Stage, Bangalore 560076. Karnataka, India.





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