

NEXUS ANALYZER

User Guide Rev 1.5

Benefits and Applications:

- System and host port characterization: I2C and low-speed signals.
- 800G capable SI traces
- Ecosystem interoperability testing: I2C sniffer between host and module
- Validates CMIS implementation on module in seconds.
- Voltage noise measurements
- Platform for active modules with module state machine, data path state machine tests and MBM validation tools



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Key Features

The same key features below apply for every available form factor of Nexus.



connection to use GUI or API features

Adapter

800G Adapter Key Features:

- SI traces and connector support 112G rates
- Support up to 30W modules
- Current and temperature sensor
- Module power ripples and inrush current measurement
- Detection of power spikes during module state transitions
- Probing interface for Vcc and GND pins
- External I2C
- Dip switch to choose low-speed signal source: internal/external Available in all SFF/CMIS form factors

Analyzer

800G Analyzer Key Features:

- Voltage sensor
- ePPS signal validation
- 1 MHz I2C
- Probing interface for low-speed signals
- External control for any low-speed signal:
 - INT/RST
 - LPW/PRS
 - SDA 0
 - o SCL
- LEDs for control/alarm signal status
- USB port for PC connection to use **GUI or API features**

Available in all SFF/CMIS form factors



Measured Insertion Loss data of 800G OSFP Adapter



Measured Insertion Loss data of 800G **QSFP-DD** Adapter:



Nexus Hardware

Nexus includes an adapter with 800G traces, which supports 30W modules. Through a set of lowspeed pin headers, the adapter mates with the analyzer which gives the user access to the Nexus Software.

The hardware also includes a dip switch, and a front probing interface for low-speed signals access and control:



A: Signals from host side at plug

B: Signals to connector inside Nexus, going to module

Low speed	Dip switch		Front Pin	Headers
signals	ON	OFF	DIP SWITCH ON	DIP SWITCH OFF
SCL	Plug connected to connector	Front pin headers to connector, plug side disconnected	Probing interface	External driver
SDA	Plug connected to connector	Front pin headers to connector, plug side disconnected	Probing interface	External driver
INT/RSTn	Plug connected to connector	Front pin headers to connector, plug side disconnected	Probing interface	External driver
LPWn/PRSn	Plug connected to connector	Front pin headers to connector, plug side disconnected	Probing interface	External driver



LEDs to indicate device power up status:

To be set in a state, LED1 or LED2 (items 1&2) or all LEDs (item 3), will blink 3 times in 3 seconds.

Each state will indicate the health of the device as stated below for each form factor.

OSFP:

	Description:USB disconnectionCable attached missing
BB BB BB BB BB BB BB BB BB BB BB BB BB	 Description: USB disconnection Enumeration in PC port fault
	Description:USB connection validated

QSFP-DD:

	Description:USB disconnectionCable attached missing
NO THE OFFICE OF A STATE OF A STA	 Description: USB disconnection Enumeration in PC port fault
NOT USB NOT	Description:USB connection validated

QSFP:

NO THE STATE OF TH	Description: USB disconnection Cable attached missing
NOOTHERS NOOTHE	 Description: USB disconnection Enumeration in PC port fault
WO THE MODE P WODELLP WODELLS WODE P WODE P WODELLP WODELLS WODELS WODELLS WODEL	Description:USB connection validated



Each low-speed signal can be controlled independently from the next. To switch each of the low-speed signals sources, it suffices to slide its' switch to the top or bottom side

Nexus GUI Installation

GUI installation is only accessible to users with ML4066-NX-Pro. This does not apply and is inaccessible to users with ML4066-NX-HW.

The GUI installation license is available per each single ML4066-NX-Pro unit.

Step 1: USB Driver

- Download USB Driver
- https://multilaneinc.com/wpcontent/uploads/2023/06/ML4066_ANA_V2_USB_Driver_Signed_V0.1.zip
- Power up Nexus by plugging it into host
- Connect Nexus to the PC through USB cable
- Download the USB driver file
- Go to "Device Manager"
- Find the target device that need to install the driver
- Right-click on the device and select Update Driver Software
- Select Browse my computer for driver software
- Browse you PC and select the driver file
- Click Next and wait until the driver is installed

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Step 2: Download Software

The below button redirects you to the software download which supports every available form factor

DOWNLOAD

Step 3: Connection & Initialization

Once the software was downloaded, you can access it and the below screen should appear:

Connect	-	×
NEXUS ANALYZER		
Device: OSFP V Connect		
Device detected Simulation		
Firmware revision: 0.4 Device PN: ML4066-OSFP-ANA-V2		

Choose the device form factor accordingly and press "Connect".

Press "Simulation" for a GUI test run without hardware: Simulation mode is also accessed through a simulation license provided by MultiLane.

Nexus GUI

Upon connection and initialization, below is how the Nexus GUI appears on screen

Nexus Analyzer	multiLane	- 0 ×
Settings Help		Configuration
Monitor Module Controls FEC CDB Control Signal R/W Functions M	SA Table MSA Validation Module Emulation VCC Current I2C Scope Stat	e Machine Analysis INITIATOR Mode Disconnect OSFP Analyzer Simulation
Pause Monitor Monitor Refresh Rate 500 ms Legend		
DM VDM	ning 🔣 High Warning 🚺 Low Alarm 🗛 High Alaram 105; Loss of Signal 10	Loss of Lock State Changed
Module Sensors		
Temperature 7 W VCC Supply 3.7 W AUX1 113	117 AUX2 255.246 AUX3 168.378 State Changed	Module State ModuleReady
TX Monitor	RX Monitor	
CH 1 Power 6.5535 mW ∨ Bias 130.562 mA	LOS LOL Fault CH 1 Power 3.276	
CH 2 Power 3 3019 mW × Bias 65 836 mA	IOSION Fault CH 2 Power 3.281	
CH 3 Power 3.3022 mw Bias 65.796 mA	LOS LOL State CH 3 Power 3.287	
CH 4 Power 3.3018 mW V Bias 65.816 mA	LOS LOL Fault CH 4 Power 3.297	
CH 5 Power 3.2868 mW V Bias 65.556 mA	LOS LOL Fault CH 5 Power 6.541	
CH 6 Power 6.548 mW > Bias 130.6 mA	LOS LOL Fault CH 6 Power 3.292	s mw v Los LoL
CH 7 Power 3.3008 mW > Bias 65.696 mA	LOS LOL Fault CH 7 Power 3.294	∎ mw v Los LoL
CH 8 Power 3.2768 mw V Bias 65.996 mA	LOS LOL Fault CH 8 Power 6.528	5 mw v 📄 LOS LOL
Network path state machine test stopped.	Device restarted due to failed communication.	Adapter Temperature: 31 °C Analyzer Temperature: 6 °C

For more information about the Nexus unit, the firmware and software revisions implemented and used, refer to **"Settings"** and **"Help"** on the top left corner of the GUI:

Under "Settings" you will find:



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- SW Parameters: This is available to check storage information, log size of files to be exported from Nexus throughout the application and their respective location.
- SW Parameters also allows user to increase the log size of all data to be measured and saved throughout the application, in the following tabs: I2C, VCC, Current and Scope Mode.

Module Controls FEC CDB Control	Signal R/W Functions
me Monitor Monitor Refresh Rate Vo Pline enter to Set Viller	Itage Reference 3.3 V
Log size (s) 60 (Estimated file size: 0.96 GB)	
C:\Users\saawar Log file location \Nexus Analyzer	Change location
Maximum disk 10 GB Set	
Remaining free space: 8.504206336GB	
Simulation file location (Nexus Analyzer)	MultiLane SAL
Change location	
🗸 Clean History	
Disk Information	
184GB Used space 746GB Free space	
• 184GB Used space 746GB Free space	

• Device Check: press on "Check Device" for a device power up health check. The LEDs on the right side of the window will either turn green, indicating a healthy device, or red, indicating an issue in the power up of Nexus.

	Device Health Check	
Analyzer diagnostics	Temperature Sense Fault	
	Voltage Sense Fault	0
	Slave MCU Communication Faul	t O AUX1 65343
MCU diagnostics	I2C Setup Fault	0
Monitor	ADC Setup Fault	0
	PLL Setup Fault	2 mA O
		Check Device



 Device Info: check Nexus Part Number and Firmware Revision, as well as device Serial Number.



 License: this is useful to users with ML4066-NX-HW who want to upgrade to ML4066-NX-Pro which will require a license. Users with ML4066-NX-Pro will not need a license.

Add License Key	-	×
Enter Provided License Key		
License		
Check License Apply License Generate Info		

Press **"Help"**, and then **"About us"** for more information on the Software revision being used and accessing software revision history:

MEXUS ANALYZER	⊗ multiL <u>ane</u>
Change Logs: # Release Note ## v0.7.2.1 - [24-05-21] ### Fixed - Control signal status bar disp	ay. [QSFPDD]
## v0.7.2.0 - [24-05-15] ### Fixed - FEC bug behavior. [ALL] ## v0.7.1.0 - [24-05-09] ### Fixed - Message sentence on Module	: control. [ALL]
For Technical Support : dctssupport@multilaneinc.com	Application version: v0.7.2.1 User Guide
www.multilaneinc.com	

Nexus GUI Features	Description			
Monitor	Diagnostic and Versatile Diagnostic Monitoring			
Module Controls	Access to TX and RX controls			
FEC	Monitor FEC status on their module.			
Common Data Block (CDB)	Update their module firmware.			
Control Signals	Access to low-speed signals in three different			
	modes			
R/W Functions	I2C read/write operations			
MSA Table	Gives the user access to their module memory.			
MSA Validation	Full CMIS/SFF register sweep.			
Module Emulation	Emulation Module Memory to validate the host.			
VCC	Continuous VCC Supply measurements.			
Current	Continuous and in-rush current measurements.			
130	I2C packets capturing and packet details			
120	analysis.			
Scope Mode	SCL, SDA, VCC and Current measurements.			
State Machine Analysis Tab	State Machine, Data Path State Machine, and			
State Machine Analysis Idb	Module State Behavior tests available.			

Nexus operates in three modes:

- Target mode: the analyzer acts as a module for a host DUT. Nexus will emulate module memory and behavior, while the user tests host capabilities, including R/W capabilities.
- Initiator mode: the analyzer acts as a host for a module DUT. Nexus will emulate host behavior and access everything on the module inserted including memory, low-speed signals, all parameters advertised, effectively testing module functionality and CMIS implementation.
- Bypass mode: the analyzer monitors exchange between host and module, accessing and testing communication between the two.





multiLane Configuration INITIATOR Mode Dis CDB Control Signal R/W Functions MSA Table MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis FEC Le State Changed Loss of Lock ors 🖯 VCC Supply 3.5 ture 50 TX Mo Power 6.5535 mw 🗸 🗌 В O CH 2 Analyzer СН 3 ver 3.3022 mW CH 4 3.3018 \square CH 5 mw 🗸 🦳 Module CH6 Po er 6.548 B I2C Tra Bias 65.996 mA LOS | LOL Fault State CH 8 Power 6.5285 mw ~ _ _ LOS | LOL CH 8 3.2768 mW 🗸 🗌 ork path state m

To change the mode of Nexus on the GUI, follow the steps below:

- A: Press on this button to access all three modes
- $\circ~$ B: This window will appear after pressing the button from A
- C: Press any desired mode

Setting I2C Speed;

User can set an I2C speed to work through their application by following the steps below:

Nexus Analyzer	multiLane	– @ ×
Settings Help		Configuration
Monitor Module Controls FEC CDB Control Signal R/W Functions MSA Ta	able MSA Validation Module Emulation VCC Current I2C Scope State Machine Analy	vis OSEP Analyzer Simulation
Pause Monitor Monitor Refresh Rate 500 ms		
(Press enter to Set Value) Legend	High Warning LA Low Alarm HA High Alaram LOS Loss of Signal LOI . Loss of Lock	State Changed
Module Sensors 🖶 💦 Temperature 50 💭 VCC Supply 3.5	Initiator mode enabled. acts as a host and has control over the module.	itate MaduloRoad
TX Monitor	typass Initiator I2C Speed III Monte To set values 112 Monte Transformer Host	
CH 1 Power 6.5535 mW V Bi 6 130.562 mA		
CH 2 Power 3.3019 mW B B 65.836 mA	LOS LOL Fault CH 2 Power 3.858 mw y (
CH 3 Power 5.3022 mW - Bi s 65.796 mA	Analyzer	
CH 4 Power 3.3018 mW C Bits 65.316 mA	GH4 Power 8 273	
CH 5 Power 3.2868 mW V Bi 65.556 mA		
CH 6 Power 6.548 mw V Bits 130.6 mA		
CH 7 Power 3.3008 mW V Bi 12C Transaction		
CH 8 Power 3.2768 mw C Bias 03.970 mA	LUS LOL State	
Network path state machine test stopped.	Device restarted due to failed communication.	Adapter Temperature: 14 °C Analyzer Temperature: 41 °C



Set Control Signals Defaults:

Nexus Analyzer	multiLane	- @ ×
Settings Help		Configuration
Monitor Module Controls FEC CDB Control Signal R/W Functions MSA Table	e MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis ePPS	INITIATOR Mode Disconnect
		Standard C-CMIS V OSFP Analyzer
Pause Monitor Monitor Refresh Rate 500 ms		
DM VDM	💥 High Warning 🔼 Low Alarm 👫 High Alaram 105 : Loss of Signal 101 ; Loss of Lock 🛑 State Changee	
Module Sensors	Initiator mode enabled.	
The Ar	nalyzer acts as a host and has control over the module.	Ny .
Target Byp	as: LeMode Reset Reset ModSel	
TX Monitor	Low State Low State Host	
CH 1 Power 6.5535 mw - Bia 190562 mA	● High State ● High State ● High State	
CH 2 Prower 3 3019 mW V Bin 5 835 mi	Release State O Release State O Release State	
CH 3 Power 3.3022 mw v Bias 65.796 mA	O IntL ModPrsL Analyzer S LO	
CH 4 Power 3.3018 mW V Bins 65.816 mA	o Cow State	
	High State High State	
CH 5 Power 3.2868 mw V Bi	O Release State O Release State Module	
CH 6 Power 6.548 mW ✓ Bias 130.5 mA		
CH 7 Power 3.3008 mW Bi L2C Transaction	.05 LOL Fault CH 7 Power 32.948 mix v LOS LO	ļ
CH 8 Power 3.2768 mW v Bias 65.996 mA L	OS LOL Fault CH 8 Power 65.285 mw v LOS LOS	
Analyzer mode changed to INITIATOR.	🗘 🛕 Data is purely simulated and may not be reflective of real-time performance. Adapter Temp	erature: 0 °C Analyzer Temperature: 1 °C

After choosing a mode to enable and work with, user can access low-speed signals on plug/host side to override them. These low-speed signals are accessible at any point in the GUI.

User can also keep the control signals as they are set by default, shown in the tables below:

OSFP:

Mode							
	B	sypass	Ini	tiator	Target		
Signal	Direction	Default Value	Direction	Default Value	Direction	Default Value	
H_INTn_P Module side	in	x	in	х	in	х	
H_RSTn_P Module side	in	x	out	1	in	х	
H_PRSn_P Module side	in	х	in	х	in	х	
H_LPWn_P Module side	in	х	out	0	in	х	
M_INTn_CON Host side	in	х	out	0	out	0	
M_RSTn_CON Host side	in	х	in	х	in	х	
M_LPWn_CON Host side	in	x	in	х	in	х	
Present signal (Hardware Signal)	N/A	N/A	pulled down	0	pulled down	0	



QSFP-DD:

Mode							
		Bypass	In	nitiator	Target		
Signal	Direction	Default Value	Direction	Default Value	Direction	Default Value	
MODSEL_L_P Host side	in	x	in	x	in *	х	
INT_L_P Host side	in	х	OUT	1	OUT	1	
RESET_L_P Host side	in	Х	in	Х	in *	х	
MODPRS_L_P Host side	in	х	OUT	0	OUT	0	
LPMODE_P Host side	in	х	in	х	in	х	
MODSEL_L_CON Module side	in	х	OUT	0	in	х	
INT_L_CON Module side	in	х	in *	x	in	х	
RESET_L_CON Module side	in	х	OUT	1	in	х	
MODPRS_L_CON Module side	in	х	in *	x	in	x	
LPMODE_CON Module side	in	X	OUT	1	in	х	

*pulled up from MCU

QSFP:

Mode							
		Bypass	Ir	itiator	Target		
Signal	Direction	Default Value	Direction Default Value		Direction	Default Value	
MODSEL_L_P Host side	in	Х	in	х	in *	х	
INT_L_P Host side	in	х	OUT	1	OUT	1	
RESET_L_P Host side	in	Х	in	Х	in *	х	
MODPRS_L_P Host side	in	Х	OUT	0	OUT	0	
LPMODE_P Host side	in	Х	in	х	in *	Х	
MODSEL_L_CON Module side	in	х	OUT	0	in	х	
INT_L_CON Module side	in	х	in *	х	in	х	
RESET_L_CON Module side	in	х	OUT	1	in	х	
MODPRS_L_CON Module side	in	x	in *	x	in	х	
LPMODE_CON Module side	in	x	OUT	1	in	х	

*pulled up by the hardware of the analyzer



multiLane Nexus Analyze Configuration Disconnect INITIATOR Mode Monitor Module Controls FEC CDB Control Signal R/W Functions MSA Table MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis TX Controls **RX** Controls Output Disable Polarity Flip Squelch Disable Force Squelch Output Disable Polarity Flip Squelch Disable 🔲 Tx 3 🔤 Rx 3 🔲 Rx 3 🔲 Rx 3 🔤 Rx 5 🔲 Tx 6 🔳 Rx 6 🔲 Tx 7 🔲 Rx 7 🗌 Tx 8 🗖 Tx 8 🔲 Tx 8 🔲 Tx 8 🔳 Rx 8 🔳 Rx 8 🔳 Rx 8 Output Amplitude Output Pre-Cursor Output P Input E 12 0 dB ¹² 0 dB ¹² 0 dB Tx 1 Rx 1 🖁 Rx 1 🍈 12 0 dB 12 0 dB 12 0 dB Tx 2 🧯 Rx 2 🧯 Rx 2 🧯 12 0 dB 12 0 dB 12 0 dB тх з 🍐 Rx 3 🧯 Rx 3 🧯 Rx 3 12 0 dB 12 0 12 0 dB Rx 4 🌡 Tx 4 🧯 Rx 4 🍐 dB Rx 4 12 0 dB 12 0 dB ¹² 0 dB Rx 5 🧯 Rx 5 🧴 Tx 5 💧 **Tx 6 0 12 0 de** 334320,152] Connected successfully to OSFP. 34329.160] Analyzer mode changed to INITIATOR. 3:43:32.606] VCC enabled on Ch1. 12 0 dB 12 0 dB Rx 6 🌡 Rx 6 🧯 12 0 ¹² 0 dB Rx 7 💧 Rx 7 🇯 12 0 dB 12 0 Rx 7 Rx 8 💧 Rx 8 🌷 Starting continuous capture. Resolution set to 8 Bit. Rx 8 d set to 1 MSPS. 🗘 🛕 Data is purely simulated and may not be reflective of real-time perform Adapter Ter ature: 35 °C Ai ure: 35 °C

On the bottom left of the UI, there is a status bar for Nexus, and it will be updated throughout user application, effectively resetting when the user disconnects from the GUI, see example below

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Firmware Upgrade on Nexus:

The latest firmware revision on Nexus is v0.5.1.5.

It is possible to update the FW revision directly from user side, following the steps below:

- On the top right of the UI, press on Settings -> Device Info -> Update Firmware
- You will be redirected to FW packages already downloaded with the full Nexus UI setup:
 - o OSFP/QDD FW packages will be available
 - Select the corresponding form factor, and select "QDD_FirmwarePackage.hex" or "OSFP_FirmwarePackage.hex"
 - o Select the latest firmware package as per the date stated
- Update device
- Please reach out to dctssupport@multilaneinc.com for a FW upgrade guide.

The FW Upgrade procedure might require the disabling of anti-virus of the laptop in use. Please refer to your IT department.

In the case that this is not possible, try using a laptop that is not limited to your company firewall restrictions



Additionally, please be in touch with our team as we can ship the unit to the nearest location and upgrade the FW from our side



Nexus GUI Features

Monitor

Digital Monitoring											
News Analyzer multiLane _ d' >											
Monitor Module Controls FEC CDB Control Signal R/W Functions MSA Table MSA Validation Module Emulation VCC Current 12C Scope State Machine Analysis State Control Signal Control Signal R/W Functions MSA Table MSA Validation Module Emulation VCC Current 12C Scope State Machine Analysis State Control Signal Control Signal R/W Functions MSA Table MSA Validation Module Emulation VCC Current 12C Scope State Machine Analysis											
Pause Monitor Monitor Refresh Rate 500 ms Legend Module Sensors Module Sensors											
Temperature 31 VCC Supply 2.8 M AUX1 100	AUX2 100 AUX3 1.04 State Changed	Module State ModuleReady Low Memory, Register 3, Bits 1-3									
TX Monitor	RX Monitor										
CH 1 Power 6.5535 m/ V Bias 130.562 mA	LOS LOL Fault CH 1 Power 32.768										
CH 2 Power 3.3019 m/// Bias 65.836 mA	LOS LOL Fault CH 2 Power 32.818										
CH 3 Power 3.3022 m/ v Bias 65.796 mA	LOS LOL Fault CH 3 Power 32.878										
CH 4 Power 3.3018 m/W V Bias 65.816 mA	LOS LOL Fault CH 4 Power 32.978										
CH 5 Power 3.2968 mW V Bias 65.556 mA	LOS LOL Fault CH 5 Power 65.41										
CH 6 Power 6.548 m/w V Blas 130.6 mA	LOS LOL Fault CH 6 Power 32.928										
CH 7 Power 3.3008 m/W V Bias 65.696 mA	LOS LOL Sate CH 7 Power 32.948										
CH 8 Power 3.2768 m/W V Bias 65.926 mA	LOS LOL Fault CH 8 Power 65.285										
O Module asserted to reset		Adapter Temperature: 19 °C. Analyzer Temperature: 15 °C.									

- Operates in initiator mode
- Module monitoring interface: monitors module parameters like temperature, voltage, current with respective alarms and warnings. Monitors TX and RX. Allows access to squelch mode control, flag masks, and ability to set alarm thresholds and limits.
- Color coded high alarms/ high warnings.
- Color coded low alarms/ low warnings.
- Press on "Generate PDF Report" to generate a report on all the parameters present under Digital Monitoring in a certain time interval

Module Sensors can be docked to the top of the GUI by pressing on the docking icon, right side of "Module Sensors"



Versatile Diagnostic Monitoring

Analyzer multiLarrand - 0 ×												
errings Help Meeinning Adapter Temperature 26 Analyzer Temperature 49 NITHATOR Mode Disconnect												
Monitor FEC CDB Control Signals R/W Functions MSA Table MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis ePPS												
Pause Monitor Monitor Refres 500 ms Legend												
DM VDM	DM WOLM											
Group 1 Group 2												
Descriptor/Samples Mask Flag And Threshold												
Sample 1 6425 Descriptor	Sample 17 13364 Descriptor	Sample 33 8224 Descriptor O Sample 49	0 Descriptor									
Sample 2 29298 Descriptor	Sample 18 8224 Descriptor	Sample 34 8224 Descriptor Sample 50	Descriptor									
Sample 3 29555 Descriptor	Sample 19 13364 Descriptor	Sample 35 #224 Descriptor Sample 51	Descriptor									
Sample 4 24929 Descriptor	Sample 20 22616 Descriptor	Sample 36 8224 Descriptor @ Sample 52	Descriptor									
Sample 5 20046 Descriptor	Sample 21 21588 Descriptor	Sample 37 32896 Descriptor Sample 53	Descriptor									
Sample 6 29812 Descriptor	Sample 22 22886 Descriptor	Sample 38 Descriptor Sample 54	Descriptor									
Sample 7 28527 Descriptor	Sample 23 12599 Descriptor	Sample 39 Descriptor Sample 55	Descriptor									
Sample 8 27499 Descriptor	Sample 24 22536 Descriptor	Sample 40 Descriptor Sample 56	Descriptor									
Sample 9 8224 Descriptor 0	Sample 25 34135 Descriptor	Sample 41 Descriptor O Sample 57	Descriptor									
Sample 10 7196 Descriptor	Sample 26 8224 Descriptor	Sample 42 61680 Descriptor 0 Sample 58	Descriptor									
Sample 11 20303 Descriptor	Sample 27 8224 Descriptor	Sample 43 3542 Descriptor 0 Sample 59	Descriptor									
Sample 12 17990 Descriptor	Sample 28 12850 Descriptor 0	Sample 44 Descriptor Sample 60	Descriptor									
Sample 13 13365 Descriptor	Sample 29 122336 Descriptor	Sample 45	Descriptor									
Sample 14 12336 Descriptor	Sample 30 12591 Descriptor	Sample 46 Descriptor O Sample 62	Descriptor									
Sample 15 18247 Descriptor	Sample 31 B224 Descriptor	Sample 47 Descriptor Sample 63	59624 Descriptor									
Sample 16 17476 Descriptor 0	Sample 32 5224 Descriptor	Sample 48 22336 Descriptor 0 Sample 64	2370 Descriptor									

- Operates in initiator mode
- Access to enabled/disabled groups in the module
- Indexing available for module interrupts

Module Controls										
Nexus Analyzer					multiLan	em-			- 0 ×	
Settings Help									Configuration	
Monitor Module Cor	trois FEC CDB	Control Signal R/V	Functions MSA Te	able MSA Validation	Module Emula	tion VCC Current I2C So	ope State N	Machine Analysis	INITIATOR Mode Disconnect	
TX Controls				RX Controls					Standard Comm	
Output Disable	Polarity Flip	Squelch Disable	Force Squeich	Output Disable	Polarity Flip	Squeich Disable				
⊟ Tx 1	🚍 Tx 1	= Te 1	⊟ Tx1	🔲 Rx 1	≡ Rx 1	🚍 Rx 1				
🔲 Tx 2	🔲 Tx 2	🚍 Tx 2	🗮 Tx 2	🚍 Rx 2	🚍 Rx 2	🚍 Rx 2				
🚍 Tx 3	🚍 Tx 3	🚍 Tx 3	🚍 Tx 3	🚍 Rx 3	🚍 Rx 3	E Rx 3				
≡ Tx 4	🚍 Tx 4	⊒ Tx 4	🚍 Tx 4	🚍 Rx 4	🗏 Rx 4	🚍 Rx 4				
🚍 Tx 5	🚍 Tx 5	🚍 Tx 5	🚍 Tx S	🚍 Rx 5	🚍 Rx 5	🚍 Rx 5				
🚍 Tx 6	🔤 Tx 6	= Tx 6	🚍 Tx 6	🚍 Rx 6	E Rx 6	🚍 Rx 6				
🔤 Tx 7	🔲 Tx 7	🔤 Tx 7	🔲 Tx 7	🚍 Rx 7	🗏 Rx 7	Rx 7				
🔤 Tx 8	🔲 Tx 8	🔲 Tx 8	🗮 Tx 8	🚍 Rx 8	E Rx 8	Rx 8				
Input Equalization				Output Amplitud		Output Pre-Cursor		Output Post-Cursor		
Tx 1 🖁	¹² 0 da			Rx 1 100-400	✓ mV	Rx1 * • * (8 48	Rx1 6 12 0 d8		
Tx 2	" 0 "			Rx 2 400 - 800	₩V	Rx2 • • · · · ·	4 *	Rx 2 6 12 0 d8		
Tx3				Rx 3 100-400	✓ mV	Rx3 • · · ·	9 *	Rx3 0 ds		
Tx 5	2 O M	Tx 5 8		Rx 4 100-400	₩V	Rx5 8				
Tx 6	17 O 48			Rx 5 100-400	₩V	Rx6 🔓 🦉 🚺		Rx 6 0 d8		
Tx 7 🔓	³² 0 dm			Rx 6 300-600	✓ mV	Rx 7 6 12	0 48	Rx 7 6 12 0 48		
Tx 8 🦫	12 O 48			Rx 7 300-600	·	Rx 8 🌢 🛛 💆 🗋	•	Rx 8 6 48		
C Module asserted to	reset							Adapter Temperature: 37	*C. Analyzer Temperature: 35 *C	



- Initiator Mode
- Gives user access to TX and RX controls
 - Output disable
 - o Polarity flip
 - o Squelch disable
 - Force squelch
- Control and monitoring over TX equalization techniques.
- Ability to dock parameters

FEC

The FEC Tab includes FEC Advertisement, FEC Configuration and BER/FEC Monitor.

As soon as user hovers their mouse on the FEC tab in either window, a tooltip will appear to indicate each register read from for each corresponding parameter.

In FEC Advertisement, Nexus will read register 130 from page 13h to determine whether the module used supports Host and Media side FEC. In case of no FEC support, this tab will cease to function. Otherwise, Nexus will proceed to read the set of registers 128, 131, 132, 133, 134, 135, 136, 137, 138, 139, 141, 142, from page 13h. From the data read, Nexus will monitor the correct parameters in Host and Media side FEC.

FEC Advertisement										
Nexus Analyzer		mul	tiL <u>ane</u>		- 0 ³ ×					
Settings Help Monitor Module Controls FEC	CDB Control Signal R/W Functions	MSA Table MSA Validation Modu	le Emulation VCC Current I2C S	cope State Machine Analysis	Configuration INITIATOR Mode Disconnect					
FEC Advertisment FEC Configura FEC is not supported.	ation BER/FEC Monitor				CVIISS2 V COSHP Analyzer					
Media Side FEC		Host Side FEC								
PRBS Generator Pre FEC	Checker Data Invert	PRBS Generator Pre FEC	Checker Data Invert							
Not Supported										
PRBS Generator Post FEC	Checker Per Lane	PRBS Generator Post FEC	Checker Per Lane							
Not Supported										
PRBS Checker Pre FEC	Generator Per Lane	PRBS Checker Pre FEC	Generator Per Lane Enable							
Not Supported										
PRBS Checker Post FEC	Simultaneous Loopbacks	PRBS Checker Post FEC	Simultaneous Loopbacks							
Not Supported										
Generator Data Swap	Output Loopback	Generator Data Swap	output Loopback							
Not Supported										
Generator Data Invert	Per Lane Loopback	Generator Data Invert	Per Lane Loopbacks							
Not Supported										
Checker Data Swap	Input Loopback	Checker Data Swap	Input Loopback							
Not Supported										
Generator Per Lane Pattern	Checker Per Lane Pattern	Generator Per Lane Pattern	Checker Per Lane Pattern							
Lane 1 pattern is used for all lanes										
Checker Supported Patterns	Generator Supported Patterns	Checker Supported Patterns	Generator Supported Patterns							
C Analyzer mode changed to INITIAT	OR.			Adapter Temperat	ure: 35 *C Analyzer Temperature: 26 *C					

- Operates in initiator mode
- FEC advertisement for transceiver characteristics
- Access to post FEC
- FEC Monitoring interface for BER, error count, and SNR



Reads FEC diagnostics from module, implements MSA formatting and presents final BER data

FEC Configuration

FEC Configuration feature allows the user to correctly configure module parameters before monitoring BER/FEC. Parameters include Host and Media PRBS generator and checker clocks, as well as host and media side parameters for each of the channels as shown below.

Nexus Analyzee	multiLane	- 0 ×
Settings Help Monitor Module Controls FEC CDB Control Signal R/W Function	c	orfiguration INITIATOR Mode Disconnect
FEC Advertisment FEC Configuration BER/FEC Monitor Data may not to synchronized. Please make save to notech. Configuration Hars PDRE Converted Clark and an adverted by Mars PDRE Converted Clark and adverted by Mars PDRE Converted by PDRE Converted by Mars PDRE Converted by PDRE Converted b	Start Stop (John)	Anis 5.2 🔍 OSPP Analyzer Simulation
Media PRBS Generator Clock Internal Clock V Media PRBS	Checker Clock Recovered Clocks v Weasurement Time Size v Start Sup Clockan Update period Select	
Refresh All Refresh Channel 4 Channels Channel 4 Hoots Side Apply to All Generator Enable Channel 1 Enable Enable Channel 2 PreFC Enable Dots Invert Channel 3 Channel 4 Channel 7 Channel 4 Output Enable PostFC Enable Channel 3 Channel 4 Channel 5 Channel 4 Output Enable Disgnostics Mask Pattern Check Sating Complete Pattern Check Sating Complete	Channel 4 Media Side Generator Enable Data Invert Byte Swap PreFEC Enable Pattern PRESSQ V	
Channel 7	Pattern Checker Loss of Lock	
C Analyzer mode changed to INITIATOR.	Data is purely simulated and may not be reflective of real-time performance. Adapter Temperature: 50 °C / Table accuracy which	Analyzer Temperature: 50 °C

- Allows user to configure module
- Operates in Initiator mode
- Allows user to set PRBS generator clock on host and media side

Allows user to configure each channel by itself including generator and checker, loopback, and diagnostics mask on host and media side



FEC Monitor

_					_	_					_			
Nesas A	nalyzer						multi	Lane						- 0° ×
Settings 1	ыр												Configuration	
Monitor	Module Controls	FEC CDB	Control Signal	R/W Functions	MSA Table	MSA Valida	tion Module	Emulation VCC	Current I2C Sco	pe State Machi	ne Analys	is	INITIATOR Mode	Disconnect
FEC Adv	ertisment FEC C	onfiguration	BER/FEC Mon	itor									CMIS 5.2 V 0 05	FP Analyzor Simulation
Merlin	Side					Hout S								
THIC CAL	800	Fores Count	Total Bits Co	und CLIP		THOSE SH	050	Ferror Count	Total Rite Count	CND				
	0.000-0	o count	0.000-0				0.000-0	citur count	o non-a	ann				
Lane 1			0.0000	0.00		Lane 1		<u> </u>	0.00000					
	BER	Error Count	Total Bits Co	ount SNR			BER	Error Count	Total Bits Count	SNR				
Lane 2	0.000e0	•	0.000e0	0.00		Lane 2	0.000e0		0.000e0	0.00				
	BER	Error Count	Total Bits Co	ount SNR			BER	Error Count	Total Bits Count	SNR				
Lane 3	0.000+0	0	0.000e0	0.00		Lane 3	0.000e0	0.000e0	0.000e0	0.00				
	BER	Error Count	Total Bits Co	ount SNR			BER	Error Count	Total Bits Count	SNR				
Lane 4	0.000+0	•	0.000e0	0.00		Lane 4	0.000e0		0.000#0	0.00				
come i		Error Count	Tatal Bits Co					Error Count	Total Rite Count	CND				
	0.000-0	o count	0.000-0	0.00			0.000-0	chur count	o oon-o	0.00				
Lane 5	0.00080		0.00060	0.00		Lane 5	0.00040	•	0.000e0					
	BER	Error Count	Total Bits Co	ount SNR			BER	Error Count	Total Bits Count	SNR				
Lane 6	0.000e0	0	0.000e0	0.00		Lane 6	0.000e0		0.000 c 0	0.00				
	BER	Error Count	Total Bits Co	unt SNR			BER	Error Count	Total Bits Count	SNR				
Lane 7	0.000e0	•	0.000e0	0.00		Lane 7	0.000e0			0.00				
	BER	Error Count	Total Bits Co	unt SNR			BER	Error Count	Total Bits Count	SNR				
lane 8	0.000e0	0	0.000e0	0.00		lane 8	0.000e0		0.000e0	0.00				
the o						Number of								
🗘 FF rea	d from register 130	in page 13h.				0 🔺	ata is purely simu	lated and may not b	e reflective of real-time pe	eformance.		Adapter Temperature: 3	*C Analyzer Temperatu	e 7 °C

- Operates in initiator mode
- FEC Monitoring interface for BER, error count, and SNR

Reads FEC diagnostics from module, implements MSA formatting and presents final BER data

Media Side:

- BER: Page 14h, registers 208 through 223. The values read are then calculated through F16 equation as per CMIS5.2, section 3.4.
- Error count: page 14h
 - Lanes 1 and 5: registers 192 through 199
 - Lanes 2 and 6: registers 208 through 215
 - Lanes 3 and 7: registers 224 through 231
 - Lanes 4 and 8: registers 240 through 247
- Total Bits Count: page 14h
 - Lanes 1 and 5: registers 200 through 207
 - Lanes 2 and 6: registers 216 through 223
 - Lanes 3 and 7: registers 232 through 239
 - Lanes 4 and 8: registers 248 through 255
- SNR: page 14h, registers 240 through 256. The values read are then divided by 256 as per CMIS5.2, section 8.13.3

multiLane

Host side:

- BER: Page 14h, registers 192 through 207. The values read are then calculated through F16 equation as per CMIS5.2, section 3.4.
- Error count: page 14h
 - Lanes 1 and 5: registers 192 through 199
 - Lanes 2 and 6: registers 208 through 215
 - Lanes 3 and 7: registers 224 through 231
 - Lanes 4 and 8: registers 240 through 247
- Total Bits Count: page 14h
 - Lanes 1 and 5: registers 200 through 207
 - Lanes 2 and 6: registers 216 through 223
 - Lanes 3 and 7: registers 232 through 239
 - Lanes 4 and 8: registers 248 through 255
- SNR: page 14h, registers 208 through 223. The values read are then divided by 256 as per CMIS5.2, section 8.13.3

Common Data Management (CDB)

CDB operates in initiator mode

Analyzer		multiLane				- 0)
Settings Help Monitoring Adapter Temperature 21 Analyzer Ter Monitor FEC CDB Control Signals R/V Features Performance/Data Monitoring	^{mperature} 27 V Functions MSA Table MSA Validation Commands FW Download Command	Module Emulation VCC Current I2C Scope State	: Machine Analysis	Configuratic OSFP Analy INITIATOP	n zer O Mode	Disconnect	
CDB Performance/Data Monitoring PM Controls PM objects we V Link Mode No Operation Clear All PM Feature Information Read PM Additional Features Data Monitoring and Recording Controls Refresh Clear DM and Recording Advertisement DM Advertisement Temperature Histogram V Save Current histogram Clear Temperature histogram Temperature Histogram	Max Duration for completion (ms)	Get PM Media Side LPL/EPL Media Side Lane SNR Beytes Record T Media Side RAM4 LTP Tx Laser Blas Tx Power Rx Power Rx Power Per-Lane Laser Temperature Get Data Path PM LPL/EPL Frame Error Count Media Side Pre-Side Ber Bayes Data Path Lane 1-8 Data Path Lane 9-16 Data Path Lane 25-32 Clear and Read LPL Clear and Read EPL	ypc Lane 1-8 Refresh LPL Lane 9-16 Geer/Read LPL Lane 17-2 Geer/Read EPL Lane 25-3 Refresh EPL Get PM Host Side LPL/EPL V Host Side LPL/EPL V Host Side PARA LTP Host Side PARA LTP Host Side PARA LTP V Record Type Styles V Record Type Styles V Lane 1-8 Type Refresh and Read LPL Clear and Read EPL Clear and Read EPL	Name Name CDB status CDB tause CDB status Firmane download password Copy/Abort/fail Image Readb. Stat: command payload are Erased Byte Base Write PL/ ER. Run Image A or 8 hitless suppr CMD Stat: 0101h max time m Command Progress Success	Page co 9F 9F 9F 9F 9F 9F 9F 9F 9F 9F	Address D 37 4 8 4 136 137 2 140 2 141 142 143 144	

multiLane

Performance and Data Monitoring

- CMD 0200h PM Controls: Extract Performance Monitoring data records such as minimum/average/maximum values. "No Operation" reads the most recent values, while "Clear All" clears the extracted values for all lanes in the interconnect.
- CMD 0201h PM Feature Information: Reads the PM's additional features.
- CMD 0280h Data Monitoring and Recording Controls: "Refresh" loads the most recent attributes. "Clear All" clears all values for all parameters for all lanes at the same time.
- CMD 0281h Data monitoring and recording advertisement
- CMD 0290h Temperature Histogram: Displays the temperature intervals of the interconnect and how long it stayed at each temperature interval.
- CMD 0210h, 0211h Get Module PM LPL/EPL: Choose parameters of the module's performance monitoring records, and replace the current values of the minimum, average, and maximum values. "Refresh" replaces the old values, while "Clear and Read" reads and resets the old values.
- CMD 0212h, 0213h Get PM Host Side LPL/EPL: Choose parameters of the host's performance monitoring records, and replace the current values of the minimum, average, and maximum values. "Refresh" replaces the old values, while "Clear and Read" reads and resets the old values.
- CMD 0214h, 0214h Get PM Media Side LPL/EPL: Choose parameters the performance monitoring records of specific lanes, and replace the current values of the minimum, average, and maximum values. "Refresh" replaces the old values, while "Clear and Read" reads and resets the old values.
- CMD 0216h, 0217h Get Data Path PM LPL/EPL: Choose the data path for specific lanes and replace the current values of the minimum, average, and maximum values. "Refresh" replaces the old values, while "Clear and Read" reads and resets the old values.

Analyzer		multiLane				-	Ð
Settings Help Monitoring Adapter Temperature 21 Analyzer Te Monitor FEC CDB Control Signals R/V Features Performance/Data Monitoring	mperature 27	Module Emulation VCC Current 12C Scope State	e Machine Analysis	Configurat OSFP Ana INITIATO	on yzer O R Mode	Disconnect	
CDB Performance/Data Monitoring PM Controls PM ediets are Link Mode No Operation Clear All PM Feature Information Read PM Additional Features Data Monitoring and Recording Controls Refresh Clear DM Advertisement DM Advertisement DM Advertisement Temperature Histogram Clear Temperature histogram Clear Temperature Histogram	Mux Duration for completion (m) Get Module PM LPL/EPL © Ptess © Record Type © Module Temperature © VCC © Aux1 = AUX2 = AUX2 = AUX3 Refresh and Read LPL Clear and Read LPL Clear and Read EPL Clear and Read EPL	Get PM Media Side LP/EPL Media Side Lane SNR Baytes Record T Media Side PAM4 LP Tx Laser Bias Rever Rx Power Per-Lane Laser Temperature Get Data Path PM LPL/EPL Frame Error Count Media Side Pre-Side Ber Baytes Per-Side Ber Baytes Per-Side Ber Data Path Lane 1-8 Data Path Lane 17-24 Clear and Read LPL Clear and Read EPL	ype Lane 1-8 Refresh LPL Lane 9-16 Cear/Read LPL Lane 17-2 Clear/Read EPL Lane 25-3 Refresh EPL Get PM Host Side LPL/EPL ♥ Host Side PM4 LTP Host Side PM4 LTP Host Side PM4 LTP ♥ Lane 1-8 ♥ Lane 1-8 ♥ Lane 1-8 ♥ Lane 1-8 ♥ Lane 1-8 ♥ Lane 25-32 Refresh and Read LPL Clear and Read EPL Clear and Read EPL	Name CDB status CDB status CDB complete flag Firmware development Start command payload size Eraced Byte base Write UPL / EPL Read UPL / EPL Read UPL / EPL Read and an 8 hitless supp CMD Start 0101h max time m 4 Command Progress Success	Page 00 00 00 9F 9F	Address 37 8 136 137 139 140 141 142 143 144	



CDB Commands

- CMD 0000h Query Status
- CMD 0001h Enter Password
- CMD 0002h Change Password
- CMD 0003h Enable/Disable Password Protection
- CMD 0004h General Abort
- CMD 0380h Loopbacks

Analyzer													multiL <u>ane</u>					– @ ×
Settings Help Monitoring Adapter Temperature Monitor FEC CDB Co Features Performance	21 ontrol S :/Data	Analyze Signals Monito	er Tem R/W ring	perati Funct	ure 27 tions M mands	MSA T FW	fable ' Dow	MS	A Vali d Con	datio	n N d	lodule	Emulation VCC Current I2C Scope State N	Aachine Analysis			Con OS IN	figuration FP Analyzer Disconnect Disconnect
CDB Feature and capal	bilities	Suppor	+										Firmware Update Features Implemented	Name				
Madula Features	n	orforma	neo N	Ionit	ning	Do	et An	d Die		i.e				CDB status	00	37	01	Command completed successfully
woule reatures		enorma	ince i	vioniti	oning		TL AN		agnos	uc			Read FW Features	CDB complete flag	00	125	00	CDB complete flag assertion
Command Support	•		4			1			B					Copy/Abort/Full Image Readb	9F	130		Bit0: Abort Support, Bit1: Copy Support. B
CMDs 0000h-000Fh	• •	00			00						0			Start command payload size		138	16	Start command payload size in bytes
CMDs 0010h-001Fh	0 0	0 0			0 0						0	0 0		Erased Byte	9F	139	255	The default erased byte value
CMDs 0020h-002Fh	0 0	0 0	c		0 0	' C					0	0 0		bsize	9F	140	255	Block size = {bsize + 1} * 8, E.g.bsize= 0.Blo
CMDs 0030h-003Fh														Write LPL / EPL		141		Firmware upgrade supported mechanism
CMDs 0040h-004Fh	• •	• 0									0			Read LPL / EPL		142		Firmware read / readback support mechar
CMDs 0050h-005Fh														Run Image A or B hitless supp	9F	143	0	0 : CMD Run A or B causes a reset. Traffic i
CMDs 0060h-006Fh														 CMD Start 0101n max time ma 	51	144		This is the maximum execution time for a
CMDs 0070h-007Fh																		
CMDs 0080h-008Fh																Exp	ort	
CMDs 0090h-009Fh			l c		0 0						0				Comman	nd Progress		
CMDs 00A0h-00AFh			l c		0 0						0					_	_	
CMDs 00B0h-00BFh	0 0	0 0	lc		0 0	lc					0	0 0						
CMDs 00C0b-00CFb	00	00			00				$\frac{1}{2}$		0	 0 0			Success			
CMD: 00D0b-00DEb		0 0			0 0						0	0 0						
CMD- 0050L 0055L		0 0			0 0						0							
CMD- 00F0L 00FFL					00						0							
CMDs 00F0h-00FFh		0.0			0.0						Ο_							



CDB Features

- CMD 0040h Module Features: Identifies which commands are supported, from CMD 0 to CMD 00FF along with the maximum CDB command execution time.
- CMD 0042h Performance Monitoring: Identifies which commands are supported from 0200h to 02FFh.
- CMD 0043h Bert and diagnostics: Identifies CMD 0300h to 03FFh.
- CMD 0041h Read FW Features: Identifies many parameters supported the firmware features including firmware download transfer type, if copy/abort/full image readback commands are supported, start command payload size, erased byte, the firmware update features, if read/write firmware is supported, the firmware can be upgraded, etc. Use this feature to determine whether a device supports LPL or EPL firmware.

Analyzer		multiLane	-		_		- 5 ×
Settings Help Monitoring Adapter Temperature 21 Analyzer Temperature 2 Monitor FEC CDB Control Signals R/W Functions Features Performance/Data Monitoring Commands	MSA Table MSA Validation Module Emulat	tion VCC Current 120	C Scope Stat	e Machine Ar	nalysis		Configuration OSTP Analyzer INITIATOR Mode Disconnect
CDB Firmware Download Commandr	C I C						
Load Corresponding Binary file	Get Firmware Into	CDB status				Command ID unknown	
	Get FW Version	CDB complete flag				CDB complete flag assertion	
Download new Firmware Image Program IPL Program EPL Abort Firmware download Abort Firmware	Fernivare Vision 02.03 Refresh						
Run Downloaded Firmware Image						Export	
Delay MSB (Hex) Delay MSB (Hex) Bernet							
0 0 •					mmand	Progress	
Run Image Traffic affecting reset to in Attempt hitless reset to in Switch to the new firmware image Traffic affecting reset to run Attempt hitless reset to run Commit Image Traffic affecting reset to run	active image active image aning image aning image			Su	uccess		
Copy firmware image							
Copy Image A to B Copy Image B to A							

• The green buttons indicate which commands are supported.

CDB FW Download Commands

- CMD 0101h, 0103h, 0107h Program LPL: Loads the firmware binary file for Local Payload (LPL). Allows for updating interconnect firmware.
- CMD 0101h, 0104h, 0107h Program EPL: Loads the firmware binary file for Extended Payload (EPL). EPL support varies depending on the interconnect. Allows for updating interconnect firmware.
- CMD 0101h, 0105h, 0107h Read Image LPL: Read the latest upgraded firmware image using LPL
- CMD 0101h, 0106h, 0107h Read Image EPL: Read the latest upgraded firmware image using EPL.
- Export Image: Exports an image of the firmware after the read is completed as a .bin file, which in turn can be loaded into and read by other interconnects.
- CMD 0102h Abort FW download: Stops the firmware from being installed onto the interconnect.



- CMD 0109h Run image: After the new LPL or EPL Firmware is loaded, this command switches to the latest firmware image. Does not replace the existing firmware image on the interconnect.
- CMD 010Ah Commit image: Replaces the firmware image on the interconnect with the new loaded firmware image. Prior to this command being executed, the old firmware will still be executed on startup. Always ensure the new image is running perfectly (by running it on the interconnect using the previous commands) before using this command.
- CMD 0108h Copy image A to B/B to A: In the event of two images being present on the same interconnect and both images are written to flash, this command makes ensures that both images are identical, with the copied image being specified in the commands as either image A to image B, or image B to image A.
- CMD 0100h Get FW Info: Loads the information about the latest firmware on the interconnect, for both image A and image B.

Control Signals

The control signals tab showcases the low-speed signals specific to each form factor, with the ability to drive them high or low. This tab operates in three modes, Initiator, Bypass and Target, effectively testing host and module side to validate each in regard to low-speed signals.

In Initiator mode, user can drive the low-speed signals of the module, validating that the module responds to host commands. In Bypass mode, user would be testing I2C between host and module. In Target mode, user can drive the low-speed signals on the host side, validating that the host responds to low-speed signals changes.

This tab allows users to validate I2C on both their host and module, and overall CMIS Compliance. For instance, user can change a control signal on their host, and validate its' change by placing Nexus in Target mode and reading the low-speed input and output signals.



- Output/Input Signals:
- Read/ drive control signals
- Analog sampling of signals in real time

- Graph features vertical and horizontal markers.
- Pull up resistors: display SDA and SCL resistors values, where I2C should be in idle state to detect accurate values.
- Ability to export/import data
- Ability to dock Output Signals to the top of the GUI and control them throughout the application

Access to **OSFP** low-speed signals in three modes

Signals Modes	LWPn	RSTn	INTn	PRSn
Initiator	Output signal	Output signal	Input signal	Input signal
Bypass*	No control	No control	No control	No control
Target	Input signal	Input signal	Output signal	Output signal

Access to **QSFP-DD** low-speed signals in three modes:

Signals Modes	LPMode	ResetL	IntL	ModPrsL
Initiator	Output signal	Output signal	Input signal	Input signal
Bypass*	No control	No control	No control	No control
Target	Input signal	Input signal	Output signal	Output Signal

Access to **QSFP** low-speed signals in three modes:

Signals Modes	LPMode	ResetL	IntL	ModPrsL
Initiator	Output signal	Output signal	Input signal	Input signal
Bypass*	No control	No control	No control	No control
Target	Input signal	Input signal	Output signal	Output Signal

*In bypass mode, Nexus only samples the signal between host and module.



I2C Read/Write Operations

Analyzer	mu	ultiLane	- a x
About Help Maritaring Adapter lemperature 14 Analyze Manitor FEC CDB Control Signals	ree Temperature 20 R/W Functions MSA Table MSA Validation VCC Current I2C	Scope State Machine Analysis	Configuration OSTP Analyzer IN TIATOR Mode Disconnect
Read/Write Byte		Advanced Read/Write	
Page(hex)	Bank(hex)	Page(hex) • Bank(hex) •	Slave address(hex) A0
Single Address(dec) • Data(bec) Data(Ascii) Read Write	Multiple Start Address(dec) Find Address(dec) Read Address Data (Nex) Data (Dec) Data (Assi)	Single Address(ifec) Data(hex) Data(bcc) Data(bcc) Data(bcc) Read Write	Madrigile Virite Save 404() Data (Dec) Data (Aeci)

Operates in initiator mode

- Single byte read/write operations
- Multiple byte read operations
- Advanced R/W used to read from or write to multiple registers simultaneously

MSA Table

The MSA Table tab works in Initiator mode, giving the user access to their Module Memory. Nexus will display the module memory, with address and description of each register. With a "Read Data" button, user can read the contents of every register in the module memory. In addition to reading, user can write or change the value of each register, by double clicking on the box of either the "Data (Hex)" or "Data (Dec)" columns of the desired register. To cement the changes, press on "Write Data to Hardware".





The module memory can be read for all pages at once, or user can also filter the pages and read only a few at once. (link this to table that shows how to filter)

izer					multiLane			- (
Help itoring pter Temperature or FEC CDB C	32 Analy Control Signals	er Temperature R/W Functio	e 38 ons MSA Table I	MSA Validation	Module Emulation VCC Current 12C Scope State Machine Analysis			Configuration OSFP Analyzer NITIATOR Mode Disconnect
nory Map								
Pages ^ 🔻	Transfer Filter			Data (Ascii)	Description	Read Only		
Pages : LowMe								Read Data
LowMem	search		~		Identifier	~		Lond Data from file
LowMem	🗹 🔳 (Selec	t All)		(Revision Compliance	~		Load Data from file
LowMem	⊽ LowM	em			Characteristics	~		6 D I I I
LowMem	▼ Page	00			Module State			Save Data to file
Lowiviem	= Page I	11			Bank O flag summary	×		
LowMem		/' \ว			Bank 1 flag summary	×		Write Data to Hardware
Lowiviem		2			Bank 2 hag summary	×		
lowMem	- Page				Date Date /Madula Ermunes fault and Madula State shanged flag			Revert Read Only
LowMem	Page 1	14		•	Latabad VCC2 2 /Tamp Alarm and Warning		- 1	he affected pages are the ones selected in the tab
lowMem	= Page	10			Latched VLC5.5/ Temp Alarm and Warning			choose the desired page(s) use the filter button
LowMem	= Page	11			Latched AUX1/2 Alarm and Warning			
LowMam	= Page	12			Personal			
owMem	= Page				Custom			
owMem	= Page	4			Internally measured Temperature 1 MSB	7		
lowMem					Internally measured Temperature 1 ISB	7		
lowMem		ОК	Cancel		Internally measured Supply 3.3v MSB	7		
LowMem	17	45	69	E	Internally measured Supply 3.3v LSB	7		
LowMem	18	00	0		Internally measured AUX1 MSB	7		
LowMem	19	00	0		Internally measured AUX1 LSB	₹		
LowMem	20	00	0		Internally measured AUX2 MSB	7		
LowMem	21	00	0		Internally measured AUX2 LSB	₹		

- Operates in initiator mode
- Select page(s) to read
- Read data from device for selected page(s)
- Save data to file
- Load data from file
- Write data to hardware to have the data required in respective addresses
- Read only column: checked boxes refer to read only registers, while unchecked boxes refer to read/write registers, as per MSA. Use these to make R/W registers RO, and RO registers R/W, affecting MSA compliance why?
- Revert read only: revert back to the original type access of all registers as per MSA



MSA Validation

MSA Validation tab objective is to validate the CMIS implementation on the module, or the host.

On the Module side, MSA Validation works in initiator mode. User can select a standard:

- CMIS standard: user can validate module memory against the CMIS specifications.
- Custom standard: user can edit the CMIS specifications displayed by Nexus, or user can load their own custom standard. Further details explained below.

The user can validate their module memory in two different levels:

- Register level validation: Nexus will validate each register against the CMIS standard. If in that register one bit is writable, Nexus will consider the whole register to be writable and validate as such.
- Bit level validation: Nexus will validate the access type of each bit in every register, giving the user the respective details.

The levels are available for both CMIS and custom standards.

Module	side
--------	------

Nexus Analyzer	multiLane	- @ ×
Settings Help Monitor Module Controls FEC CDB Control Signal R/W Functions MSA Table	MSA Validation Module Emulation VCC Current 12C Scope State Machine Analysis	Configuration INITIATOR Mode Disconnect
Module Host		Standard CCMIS V OSFP Analyzer
Select a standard: CMIS Y Read and Validate Data Save	e Data Generate PDF report	
Validation Table		
Page ∧ ▼ Address Data (Hex) Register Access ▼ Re Type Validation ▼ Conter	egister T Notes	-
A Page : LowMem - 128 Items		
A Page : Page 00 - 128 Items		
A Page : Page 01 - 128 Items		
A Page : Page 02 - 128 Items		
A Page : Page 03 - 128 Items		
A Page : Page 04 - 128 Items		
Page : Page 10 - 128 Items		
A Page : Page 11 - 128 Items		
A Page : Page 12 - 128 Items		
A Page : Page 13 - 128 Items		
A Page : Page 14 - 128 Items		
A Page : Page 15 - 128 Items		
A Page : Page 16 - 128 Items		
▲ Page : Page 17 - 128 Items		
▲ Page : Page 20 - 128 Items		
A Page : Page 21 - 128 Items		
A Page : Page 22 - 128 Items		
A Page : Page 23 - 128 Items		
▲ Page : Page 24 - 128 Items		
▲ Page : Page 25 - 128 Items		
A Dage + Dage 26 - 129 Itoms		· · · · · · · · · · · · · · · · · · ·
🗘 Module asserted to reset	🗘 🛕 Data is purely simulated and may not be reflective of real-time performance.	ter Temperature: 24 °C Analyzer Temperature: 11 °C

- Operates in initiator mode
- Select page(s) to read
- Read data from device for selected page(s)
- Select validation type: Register Access Type Validation or Register Content Validation, or both
- Validation on bit level available
- Validate data against selected standards:
 - CMIS: Nexus validates module memory map against CMIS specifications and standards. Bit level Validation available.
 - Custom: Nexus validates module memory map against user custom standards. Customization on bit level available.



- Save data to file
- Load data from file
- Generate PDF report for the selected page(s)

CMIS VALIDATION

After validating the chosen page(s), a set of pass/fail registers appear as shown with the respective description of success or failure

Analyzer					multiLane	- 🗆 ×
Settings Help Monitoring Adapter Temperature	a BZ Ani	alyzer Temperature	. 34		Con Os	iguration P Analyzer O TIATOR Mode Disconnect
Monitor FEC CD8	Control Signa	als R/W Functio	ns MSA Table MS/	Validation Module E	mulation VCC Current I2C Scope State Machine Analysis ata Save Data Load Data From File Generate PDF report	
Validation Table						
Page \land 🝸	Address	Data (Hex)	Register Access Type Validation	Register Content Validation	Notes	
* Page : Page 01	- 128 Items					
Page 01	128	01			Address 128 of Page Page 01, Register Access type Passed. Register Content Passed.	
Page 01	129	00			Address 129 of Page Page 01, Register Access type Passed. Register Content Passed.	
Page 01	130	02			Address 130 of Page Page 01, Register Access type Passed. Register Content Passed.	
Page 01	131	01			Address 131 of Page Page 01, Register Access type Passed. Register Content Passed.	
Page 01	132	00			Address 132 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	133	00			Address 133 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	134	00			Address 134 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	135	00			Address 135 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	136	00			Address 136 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	137	00			Address 137 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	138	00			Address 138 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	139	00			Address 139 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	140	00			Address 140 of Page Page 01, Register Access type Passed. Register Content Passed.	
Page 01	141	00			Address 141 of Page Page 01, Register Access type Passed. Register Content Passed.	
Page 01	142	00			Address 142 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	143	00			Address 143 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	144	00			Address 144 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	145	00			Address 145 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	146	00			Address 146 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.
Page 01	147	00			Address 147 of Page Page 01, Read Only Register. Access type Failed: Register is writable. Register Co	ntent Passed.

One example reads:

Page 01, Address 136-

Register Access Type Validation: Failed

Register Content Validation: Passed

Notes: address 136 of Page 01, Read Only Register. Access type Failed: Register is writable. Register Content Passed.

According to the CMIS specifications, address 136 of page 01 should be Read Only in a compliant module. Nexus tries writing to the register and succeeds, resulting in a Fail on Register Access Type.



Bit Level Validation

Nexus A	nalyzer						multiLane	- a >
Settings I	lelp							Configuration
Monitor	Module C	ontrols FE	C CDB Co	ntrol Signal	R/W Functions	A Table MCA Validation	Module Emulation VCC Current I2C Scope State Machine Analysis	INITIATOR Mode Disconnect
				incroir original		MSA Validation		Standard C-CMIS V OSEP Analyzer
Module	Host							
Select a :	tandard:	сміз		Read a	and Validate Data	Save Data G	ienerate PDF report	
Validat	on Table							
	Page \land	T Add	ress Dat	a (Hex)	Register Access Type Validation	Register Content Validation	Notes	
⊤ Pa	ge : LowMe							
	LowMem	(Access type failed. Content validation passed. Expand for more details.	
	LowMem			50			Read Only register. Access type failed: register is writable. Register Content Passed.	
	LowMem			00	Failed		Access type failed. Content validation passed. Expand for more details.	
	0 - 1 RESERVED 0 - 0 Undefined Undefined Reserved, access				d Undefined	Reserved, acce	ss type and content validation are undefined.	
	2 - 3 RO 0 - 1 Failed Passed Access type validat					Access type va	lidation Failed :Writable, content validation passed.	
	4 - 5 RO 0 - 0 Failed Undefined Reserved read only. A					Reserved read	only. Access type validation Failed : Writable. Content validation is undefined.	
		6 - 7 RO 0 - 3 Failed Passed Access ty				Access type va	lidation Failed :Writable, content validation passed.	
	LowMem			02			Access type failed. Content validation passed. Expand for more details.	
	LowMem			00			Access type failed. Content validation passed. Expand for more details.	
	LowMem			00			Access type failed. Content validation passed. Expand for more details.	
	LowMem			00			Access type failed. Content validation passed. Expand for more details.	
	LowMem			00			Access type failed. Content validation passed. Expand for more details.	
	LowMem			00			Access type failed. Content validation passed. Expand for more details.	
	LowMem						Read Only register.Register Access type Passed. Register Content Passed.	
	LowMem	1	0	00			Read Only register.Register Access type Passed. Register Content Passed.	
	LowMem	1	1	00			Read Only register Register Access type Passed. Register Content Passed.	
	LowMem	1	2	00			Reserved/Custom register. Access type undefined. Register Content undefined	
	LowMem		3	00	undenned		Reserved/custom register. Access type underned. Register Content underlined	

One example reads:

LowMem, Address 2-

Register Access Type Validation: Failed

Register Content Validation: Passed

Expand for more details:

Bits	Туре	Range	Type Validation	Content Validation	Notes
0-1	RESERVED	0-0	Undefined	Undefined	Reserved, access type and content validation undefined
2-3	RO	0-1	Failed	Passed	Access type validation Failed: Writable, content validation passed.
4-5	RO	0-0	Failed	Undefined	Reserved read only. Access type validation Failed: Writable. Content validation is undefined.
6-7	RO	0-3	Failed	Passed	Access type validation Failed: Writable, content validation passed.


When a register or a bit within that register are undefined as per CMIS, Nexus validates them as such.

Otherwise, each bit or pair of bits are validated against their Type, and Content specifications as per CMIS.

Custom Validation

The CMIS memory map includes registers and bits that are open to customization. In addition, a user may want to customize a few registers to their liking, effectively not fully complying to the CMIS standards.

In this case, Nexus allows users to upload their own standards as .CSV files, or allows them to edit the CMIS memory map directly on the software, as shown in the example above and to follow.

Custom Validation is available on register and bit level, the below example follows the bit level custom validation of address 2, LowMem.

Nexus Analyzer		multiLane		
Settings Help				Configuration
Monitor Module Controls FEC CDB	Control Signal R/W Eurotions MSA Table	L .: Nodula Emulation VCC Current 12C Scone	State Machine Analysis	INITIATOR Mode Disconnect
	Control Signal New Pancaons Inisk Table MSA Vali	dation module characterity vec current rice scope	State machine Analysis	Standard C-CMIS 🗸 🕒 OSFP Analyzer
Module Host				
Select a standard: Custom				
Validation Table	Set For Validation Import from	n csv Export to csv	Restore checked Registers to CMIS default	×
Page ^ 🔻 Address	Reserved Table			
A Page : LowMem - 128 Items	Check All Page A Y Address			Î
 Page : Page 00 - 128 Items 	A Page : LowMem - 128 Items			
	A Page : Page 00 - 128 Items			
	A Page : Page 01 - 128 Items			
	A Page : Page 02 - 128 Items			
	Page : Page 03 - 128 Items			
	A Page : Page 04 - 128 Items			
	Page : Page 10 - 128 Items			
	A Page : Page 11 - 128 Items			
	Page : Page 12 - 128 Items			
	A Page : Page 13 - 128 Items			
	A Page : Page 14 - 128 Items			
	A Page : Page 15 - 128 Items			
	Page : Page 16 - 128 Items			
	A Page : Page 17 - 128 Items			
	A Page : Page 20 - 128 Items			
	Page : Page 21 - 128 Items			Y
🗘 Validation Done.	÷ 🔺	Data is purely simulated and may not be reflective of real-time perform	Adapter Temperature: 20 *	C Analyzer Temperature: 30 °C



Follow the example below:

Select LowMem as shown below, to start with:

Nexus Analyzer		multiLane	-		– @ ×
Settings Help					Configuration
Monitor Module Controls FEC CDB Control Signal R/W Functions	MSA Table Area Validada	- Module Emulation	C Current I2C Scope State Machine Analysis		INITIATOR Mode Disconnect
	MSA Validatio				Standard C-CMIS 🗸 OSFP Analyzer
Module Host					
Select a standard: Custom					
Validation Set For Validation	Import from cry	Even	t to cau Pastore checked Re	vistors to CMIS default	×
Validation lable	import nom esv		Restore checked key	isters to CMIS delaut	
Page A T Address					
A Page : LowMem - 128 Items Check All Page					î
A Page : Page 00 - 128 Items	Access				
LowMen	0	RO/ENUM		Edit	
Bits					
0-7	RO				
0-7	RO	128 - 255			
+ CowMern		RO/VALUE	Revision Compliance	Edit	
LowMem		RO/VALUE	Characteristics	Edit	
	RESERVED				
2-3	RO	0-1			
6-7	RO				
+ LowMem		RO/VALUE	Module State	Edit	
+ CowMem		RO/VALUE	Bank 0 flag summary	Edit	
LowMern		RO/VALUE	Bank 1 flag summary	Edit	
🗘 Validation Done.	🗘 🛕 Data i	s purely simulated and may not I	be reflective of real-time performance.	Adapter Temperature: 20 *C	C Analyzer Temperature: 35 *C

Selecting LowMem, address 2 to edit and customize as shown below:

Nexus Analyzer	multiLane	– 🗅 ×
Settings Help		Configuration
Monitor Module Controls FEC CDB Control Signal R/W Functions MS	A Table MSA Validation Module Emulation VCC Current 12C Scope State Machine Analys	INITIATOR Mode Disconnect
Module Host	Bit Selection	Standard CCMIS V OSFP Analyzer
Select a standard: Custom Read and Validate Dat	0 1 2 3 4 5 6 7 C	
Validation Table Set For Validation	Restore checked F	egisters to CMIS default
Page A T Address On Reserved Table	Set Group	
A Page : LowMem - 128 Items A Page : Page 00 - 128 Items	Group Value Range Mirc O Add Range	
Page : LowMem - 128 Iten	0 85 170 255 Max 255 Edit Range	Edit
Bits 7	RO Bits? A B'Type Ranges	
0-7	Bits : 0,1 - 1 Items	
+ LowMem	0,1 RO/VALUE RESERVED 0-0 🗹 🗶 mpliance	Edit
LowMem	Bits 92,3 U1 Items Characteristics	Edit
Bits	2,3 RO 0-1 🗹 🗙	
0-1	RESERVED Bits : 4,5 - 1 Items	
2-3	RO 0-0 E X	
4-5	Bits : 6, / - 1 items	
6.7		
- LowMem	3 RO/VALUE Module State	Edit
- LowMem	Set Register Remove All Cancel	Edit
LowMem	5 RO/VALUE Bank 1 flag summary	Edit
🗘 Validation Done.	💲 🛕 Data is purely simulated and may not be reflective of real-time performance.	Adapter Temperature: 31 °C Analyzer Temperature: 54 °C

Upon selecting the register to customize, the window shown in the photo above will appear, showcasing the following:

- Accessible Bits 0-7: select which or all bits to customize
- Editable Value Range of register: customize value range of selected bits
- Editable Access type and ranges of each of the bits



Select bits to customize

Nexus Analyzer	multiLa	neme		- @ ×
Settings Help			Configuration	
Monitor Module Controls FEC CDB Control Signal R/W Functions MSA	Table MSA Validation Module Emu	lation VCC Current I2C Scope State Machine Analy	lysis INITIATOR Mode Discor	nnect
Module Host			Standard CCMIS V OSF	P Analyzer
Select a standard: Custom				
Validation Table Set For Validation	Import from csv	Export to csv Restore checked	d Registers to CMIS default	
Page ^ T Address in Reserved Table Page:LowMen - 128 Items Dredu Ad Page A Page - N	0 1 2 3	Selection (4) (5) (6) (7) C Refer hits Select a group of unused hits	e b	
Page : LowMem - 128 Iten LowMem	Set Group	Identifier	Edit	
		Ge Min: 0 Add Range		
	** 	70 255 Max: 255 Edit Range		
LowMern		Revision Compliance	Edit	
- LowMern		Characteristics	Edit	
Bits				
2-8				
	Set Register Remove All	Cancel		
	RO 0-3			
t LowMem	3 RO/VALUE	Module State	Edit	
+ LowMem	4 RO/VALUE	Bank 0 flag summary	Edit	
LowMem	5 RO/VALUE	Bank 1 flag summary	Edit	
Validation Done.	🗘 🛕 Data is purely simulated	and may not be reflective of real-time performance.	Adapter Temperature: 16 °C Analyzer Temperature: 3 °C	

Select range of values for selected bits

Nexus Analyzer		multiLane	w~_		- @ ×
Settings Help Monitor Module Controls FEC CDB	Control Signal R/W Functions MSA	Table MSA Validation Module Emulation	on VCC Current I2C Scope State Machine	Analysis	Configuration INITIATOR Mode Disconnect Standard c-cmus V OSFP Analyzer
Module Host					
Select a standard: Custom					
Validation Table	Set For Validation		Expert to csv Restore d	necked Registers to CMIS default	
Page $\land \overline{\mathbf{T}}$ Address	Reserved Table	()			
Page : LowMem - 128 Items			Refresh Bits		
A Page : Page 00 - 128 Items	Page : LowMem - 128 Iten	Set Group			
	- LowMem	Group 1 ^{0//} Value Rang 5	Mire 1 Identifier	Edit	
		[3-5] —	Add Kange		
	0 - 7		6 Max: 5 Edit Range		
	+ LowMem			Edit	
	LowMem			Edit	
		Bits : 3,4,5 - 1 Items	ny 16 12 ¥		
	0-1	RESERVED			
	2-3				
		Set Register Remove All	Cancel		
	LowMem	3 RO/VALUE	Module State	Edit	
	LowMem	4 RO/VALUE	Bank 0 flag summary	Edit	
	- LowMem	5 RO/VALUE	Bank 1 flag summary	Edit	
🗘 Validation Done.		🗘 🛕 Data is purely simulated and r	nay not be reflective of real-time performance.	Adapter Temperature: 25 *C	Analyzer Temperature: 16 °C



Edit access type and range through the table



In the photo shown above, user can change the access type of each standalone bit, or group of bits.

Nexus Analyzer		multiLane		- ס ×
Settings Help				Configuration
Monitor Module Controls FEC CDB Co	ontrol Signal R/W Functions MSA	Table MSA Validation Module Emulation	CC Current I2C Scope State Machine Analysis	INITIATOR Mode Disconnect
				OSFP Analyzer
Module Host				
Select a standard: Custom				
Validation Table	Set For Validation		hecked Registers t	o CMIS default
Page A T Address	Reserved Table			
ruge i nutiess		0 (1) (2) (3) (4)	5 6 7 Refresh Bits	
Page : LowMem - 128 Items	Check All Page A			с П
= rage : rage 00 - 120 items	* Page : LowMem - 128 Iten	Set Group		
	LowMem			Edit
		[3-5]	Add Kange	
		0 2 4 6	Max S Edit Range	
	LowMem		instance Completence	Edit
	Low/Mem	Bits ^ Le Type	Ranges	Edit
		Bits : 3,4,5 - 1 Items		
			1.5 🗹 🗙	
			Edit this range	
		Set Register Remove All	Cancel	
	6-7			
	LowMem	3 RO/VALUE	Module State	Edit
	LowMem	4 RO/VALUE	Bank 0 flag summary	Edit
	Lowwiem	5 RO/VALUE	Bank Thag summary	
Analyzer mode abarred to INITIATOR		A Data is nurely simulated and may no	t be reflective of real-time performance	Tomogratures 46.% Analyzer Tomogratures 50.%
Analyzer mode changed to INITIATOR.		and the sparse sine and the not	ADapit	e remperature: 40 C Analyzer remperature: 50 C

In the photo shown above, user can edit the range of values from the table

Upon reading and validating the data, user will get a set of pass/fail registers against their customized standards

MSA Validation

Host Side

Noxus Analyzer								
tings Help								Configuration
								TANGET Mode
Monitor Module Co	entrols FEC COB	Control Signal	R/W Functions M	SA Table MSA Validation	Module Emulation	VCC Current I2C Scope State Machine Analys	als ePPS	O OSEP Analyzer
Module Host								
Stop Analysis								
Shee Address	Denner	Address	Occuration					
Jane House Car		- Hardiness	C particular	MSA Access Type	Status			
AO	Page 11h	140	Read	RO				
	Page 11h		Read					
	Page 11h	142	Read					
	Page 11h	143	Read	80				
AO	Page 11h	144	Read	RO				
AO	Page 11h	145	Read	RO				
AO	Page 11h	146	Read	RO				
A0	Page 11h	147	Read	RO				
AO	Page 11h	148	Read	RO				
	Page 11h	149	Read					
	Page 11h		Read					
	Page 11h		Read	RO				
	Page 11h		Read	RO				
	Page 11h		Read					
	Page 11h		Read					
	Page 11h		Read					
	Page 11h	156	Read					
	Page 11h		Read					
	Page 11h		Read					
	Page 11h		Read					
	Low Memory		Read					
	Low Memory		Read					
	Low Memory		Write					
	Low Memory		Write					
	Low Memory		Read	80				
	Low Memory		Read					
	Low Memory		Write					
	Low Memory		Read					
	Low Memory		Read					
10	Low Memory	10	Write	RO				

On the host side, this tab operates in Target mode. From the host side, the user can send out R/W operations to the module, and Nexus will validate these operations and registers involved as shown above.

Press on "Start Analysis", go to host UI, and send out commands. Nexus will show you the page and register, the type of operation, and will show you as per CMIS standards the access type of each of those registers, with a pass/fail according to CMIS.

Press on "Stop Analysis" once testing is done.

Module Emulation

Module emulation works in target mode, where Nexus emulates a module memory as per CMIS. It allows you to validate the host register access, by confirming that the host is adopting the proper access types (RO/RW) for CMIS specific addresses.

Module Emulation also allows user to emulate Module monitored parameters including temperature and signal loss, validating that your host is monitoring correctly.



Memory Map

Nexus Analyzer	multiLane	- 0 ×
Settings Help Monitor Module Centrols FEC CDB Centrol Signal R/W Functions MSA Tak	ole MSA Validation Module Emulation VCC Current E2C Scope State Machine Analysis	Configuration TARGET Mode Disconnect
Memory Map Monitor Control		A
Read Data Load Data from file Save Data to	file Write Data to Hardware Clock Stretching 0 (w) I2C Faults Disable clock stretching	Page Selection
Memory Map		Custom Map Custom V Set
Pages A Y Address Data (Hex) Data (Dec) Data (Asc	ii) Description v2.8	Page 02
Pages : Page 00 - 128 Items		Page 03
A Pages : Page 01 - 128 Items		Page 04
		Page 10
		Page 11
		Page 12
		Page 13
		Page 14
		Page 20
		Page 21
		Page 22
		Page 23
		Page 24
C Done Reading.	🗘 🛕 Data is parely simulated and may not be reflective of real time performance. Adapter Temp	erature: 11 °C Analyzer Temperature: 25 °C

Emulate Module Memory:

- LowMem, Page00 and Page01 are emulated by default in "Memory Map"
- Under "Page Selection", user can add a maximum of three extra pages to emulate by dragging and dropping under "Memory Map", or simply clicking on the page.
 - Once user adds a page to the emulated module memory, edit or write to the registers directly in the "Memory Map" table by double clicking on the "Data(Hex)" column and typing a value:

Me	Memory Map							
	Pages \land 🍸	Address	Data (Hex)	Data (Dec)	Data (Ascii)	Description v2.8		
•	Pages : LowMen	n - 128 Items						
	LowMem	0	[]	25		Identifier		
	LowMem	1	28	40	(Revision Compliance		
	LowMem	2	04	4		Characteristics		

- Commit the value by pressing "Write Data to Hardware"
- Write to memory directly on the table and commit by pressing "Write Data to Hardware"
- \circ Validate the host R/W capabilities by reading the changed register from the host side



 Nexus FW will continue emulating the pages added until or unless the page/pages are removed. If the pages are not removed, expect the same pages to reappear after Nexus GUI disconnection. To remove the pages added, press on the "X" icon next to the added pages under "Page Selection":

Page Selection		
Custom Map Custom	_	Set
Page 02		
Page 03		×
Page 04		
Page 10		×
Page 11		
Page 12		

- Option to emulate a MultiLane custom memory by choosing one of the following under "Page Selection => Custom Map":
- Active Electrical Cable (AEC)
- Active Loopback (ALB)
- Passive Electrical Loopback (ELB)

Page Selection						
Custom Map	Custom 🗸	Set				
Page 02	Custom ALB					
Page 03	AEC ELB	×				
Page 04						
Page 10		×				

Validate Host

- Access the host to validate it is reading/ writing correctly to emulated module memory
- Carry out R/W operations from the host side on the registers changed from Nexus side

Module Emulation Tab Also Allows User to:

- Change Clock Stretching
- Choose and add an I2C Fault Trigger (Choose "Reset I2C" to remove fault):
 - Expect communication to be interrupted by I2C fault triggers from Host side, for example choosing a "Single Read" I2C Fault will interrupt the Host from reading a single register





Module Control

Emulate module parameters as below, and validate your host monitoring capabilities:

In addition to emulating output power, temperature and VCC supply, you can also trigger alarms and warnings.



Press "Refresh Page Content" to refresh the content of the page.

Enable "MSA Register Custom" to reset the alarms and warnings and making them abide by CMIS standards of warnings/alarms type. Some of these are standardized as "Clear On Read", so enabling MSA Register Custom will clear these warnings and alarms being monitored or read from your host. Disabling "MSA Register Custom" is customizing their type as "Read Only", giving user access to emulate alarms and warnings as desired. After disabling "MSA Register Custom", press "Refresh Page Content



Graphs and Measurements

Data Configuration

Nexus allows for the measurement of real-time VCC supply, In-rush and continuous current, I2C communication, and real time probing of voltage, current, SDA and SCL signals. All graphs and measurements are configured in the same steps, listed below:

The below example was done on the VCC tab, and applies to the Current tab, I2C Tab, and Scope Mode tab.

The Log Size of the data is set by default to 60 seconds, and can be increased by accessing "Settings => SW parameters" on the top left of the GUI.

	 Set your 	r required san	npling speed	
Monito	or FEC CDB Contr	ol Signals R/W Fund	ctions MSA Table MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis	
	▶ Continuous ▼	Sampling Speed and Resolution	1 MSPS × 8 Bit × Channel Configuration AutoScale	
4			4.166 MSPS 3.125 MSPS 2.5 MSPS	
3.5			2 MSPS 1.5625 MSPS	
з			1.25 MSPS 1.111 MSPS 1 MSPS	

Set your required sampling resolution

Monito	or FEC CDB Contr	ol Signals R/W Fund	tions MSA	Table	MSA	Validation Module Emulation	VCC Current	t I2C Scope	State Machine Analysis
	► Continuous	Sampling Speed and Resolution	1 MSPS V	8 Bit	•)	Channel Configuration	AutoScale		
				6 Bit 8 Bit					
35-				10 Bit 12 Bit					

Set your channel configuration

Monitor FEC CDB Cont	rol Signals R/W Fund	tions MSA Table MS	SA Validation	Module Emulation VC	C Current I2C	Scope State Machine Analysis
► Continuous -	Sampling Speed and Resolution	1 MSPS V 8 Bit V	Channel	Configuration A	utoScale	
				Channel 1	Channel 2	
3.5				VCC On	VCC • of	
				_		_



• Once the measurement is done, expand the Details window as below:

Analyze		multiLane			- 01 ×
Settings H Monito Adapte	elp ng Temperature 82 Analyzer Temperature 41			Configuration OSFP Analyzer BYPASS Mode	Disconnect
Monitor	FEC CDB Control Signals R/W Functions MSA Table MS Continuous Sampling Speed and Resolution	A Validation Module Emulation VCC Current I2C Sco Channel Configuration AutoScale	ope State Machine Analysis		
35 334			Cetaih	Clear Graph	Export Data
				Markers time = 0.280673 and voltage time = 0.428395 and voltage = 3.	Export ImportHistc 9439154624939
Voltage (V)				Differences $\Delta V = 0$	
				Lat = 0.147722 Curve Visibility ✓ VCC	
	85		12		
		Time (s)			

- Add Marker: go back to the graph and press on any point directly onto it to add your marker.
- "Markers" box indicates the time and voltage marker values
- Differences" box indicates the difference by voltage and time between markers
- Clear graph:
 - Data: clear all markers
 - Graph: clear all captured data
- Export data:
 - Import: import a single file to visualize data on graph. A single file is the portion of data visible on the screen.
 - Export: export data and save file. Export file previously imported.
 - Import History: import all the data measured from the start of the session.



Graph Timeline

After capturing data in continuous mode for a large interval of time, you can use the graph timeline as shown below, to focus the data on a specific interval of time.

Hovering over the timeline you will see the data is categorized into cached data, and session data.

Cached data offers real time reading of data, while session data is saved into files which we have to access to read



Analyzer	multiLane	– @ ×
Setting: Help Monitoring Adapter Temperature 81 Monitor FEC CDB Control Signals R/W Functions MSA Table MSA Validation Sampling Speed	Module Emulation VCC Current I2C Scope State Machine Analysis	Configuration OSFP Analyzer D BYPASS Mode Disconnect
and Resolution Links a survey comments		Details >>
2.5 (S) 56°° 1.5		
a3 •	21 22 22 22 22 22 22 22 22 22 22 22 22 2	A 225
		>



VCC Measurements

VCC Measurements can be done in initiator, bypass or target modes.

Analyzer	multiLane	
Settings Help Monitoring Adapter Temperature	27 Analyzer Temperature 28	Configuration OSEP Analyzer BYPASS Mode Disconnect
Monitor FEC CDB	Control Signals R/W Functions MSA Table MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis Sampling Speed I MSPS v 8 Bit v Channel Configuration AutoScale	
3		Details >>
() softener 15		
°	9 9.5 10 10.5 11 Time (s)	11.5
		>

Measure VCC in continuous mode, or measure VCC spikes, by configuring the sampling speed and resolution, as well as the channels:

		Analyzer	multiL	_ane
		Settings Help Monitoring Adapter Temperature 32 Analyzer Tempera	iture 41	
Monitor FEC CDB Control Signals R/W Fund	tions MSA Table MSA Validation Module Emulation VCC Curren			
Continuous Sampling Speed and Resolution	1 MSP5 V 8 Bit V Channel Configuration AutoScale 4.166 MSP5 3.125 MSP5	Monitor FEC CDB Control Signals R/W Fur Continuous Sampling Speed and Resolution	ctions MSA Table MSA Validation Module Emulation VCC 1 MSPS v 8 Bit Channel Configuration Auto 6 Bit	Current I2C Scope State Machine Analysis oScale
35	2.5 MSPS		3 Bit 10 Bit	
	1.5625 MSPS Analyzer		nultiLane	
3	L2 Moro Settings Help Monitoring Adapter Temperature #2 Analyzer Temperature	41		
	Monitor FEC CDB Control Signals R/W Function	s MSA Table MSA Validation Module Emulati	on VCC Current I2C Scope State Machine Analysis	
	Continuous Sampling Speed and Resolution	USPS V 8 Bit V Channel Configu	AutoScale	
	4 15	Current	Stannel 1 Channel 2 Current On	

Once your configuration is done, press "Continuous" to get the data.



Current Measurements

Current Measurements can be done in initiator, bypass or target modes



Choose your required current measurement:

- Continuous current measurements
- In-rush current measurements

Set your sampling speed and resolution, and configure the channels:

			Analyzer	n	nultiLane
			Settings Help Monitoring		
			Adapter Temperature 32 Analyzer Temperatu	ire 41	
Monitor FEC CDB Control Signals R/W Fund	tions MSA Table MSA	alidation Module Emulation VCC Current I			
Sampling Speed	1 MSPS V 8 Bit V	Channel Configuration AutoScale	Monitor FEC CDB Control Signals R/W Funct	ions MSA Table MSA Validation Module Emulatic	on VCC Current I2C Scope State Machine Analysis
and Resolution	4.166 MSPS		Continuous V Sampling Speed and Resolution	1 MSPS V 8 Bit V Channel Configuration	AutoScale
1	3.125 MSPS			6 Bit 8 Bit	
3.5	2 MSPS			10 Bit	
	1.5625 MSPS 1.25 MSPS	Analyzer		multiLane	
3	1.111 MSPS 1 MSPS	Settings Help			
		Monitoring Adapter Temperature 32 Analyzer Temp	erature 41		
		Monitor FEC CDB Control Signals R/W F	unctions MSA Table MSA Validation Module E	mulation VCC Current I2C Scope State Mach	ine Analysis
		Continuous Sampling Speed	d 1 MSPS × 8 Bit × Channel Confic +		
		and Resolution			
				Channel 1 Channel 2	
		35			



In-rush current measurements

- Nexus should be in Initiator mode
- DUT should be unplugged from Nexus
- To capture in-rush current upon module power-up, start capturing while DUT is unplugged, and plug in DUT once you start capturing data. (shown below)





I2C Packet Analysis

- I2C Captures can be done in initiator, bypass or target modes
- Single and continuous captures
- I2C trigger and tracking events
- Different sampling speeds available
- Represent SCL, SDA, ACK/NACK, and I2C edges graphically

🔂 Analyzer		multi	ane	- d) ×
Settings Help Monitoring				Configuration
Adapter Temperature 12 And	alyzer Temperature			OSEP Analyzer O INITIATOR Mode Disconnect
Monitor FEC CDB Control Sign	als R/W Functions MSA Table	MSA Validation Module Emulation VCC	Current I2C Scope State Machine Analysis	
Continuous	ling Speed Resolution	8 Bit	Auto Scale 🔻	
4 Single				4
25 Tracking				4
(L) deg				
8 13				
			1 1.2 Time (s)	
<				2
☆ Packet Details				



Configure the sampling speed, resolution and choose channels:

Analyzer	multiLane		- 0 ×
Settings Help Monitoring Adapter Temperature 40 Monitor FEC CDB Control Signals R/W Functions MSA Table MSA Validation Mo Continuous Setting Speed 1 MSPS × 8 Bit × Cham	odule Emulation VCC Current IZC Scope State	Machine Analysis	Configuration OSFP Analyzer INITIATOR Mode Disconnect
10 10 9 9 8 8 7 7 7 6 6 5 8 5 8 5 8 5 8 5 4 4 4 3 3 2 2 2	Channel 1 SDA On SCL ON SCL SCL SCL SCL SCL SCL SCL SCL SCL SCL SCL	Channel 2	Cedik ₂
1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	os 1 Time (s)	12 14 14	u 2

Continuous Capture



I2C continuous capture shows SDA and SCL data.





I2C Single, trigger and tracking captures show SDA, SCL, Start, Stop and Edges on the graphs.

I2C Trigger Capture	
Get Default	Trigger I2C with: Control Signals:
Channel 1 Channel 2 SDA On SDA Off	 Module Interrupt
scl. I On On	o Module Present
	o Reset
I2C Trigger ✓ Enabled I2C Tracker I Disabled I2C Trigger Events NONE I2C Tracker Events NONE	o Low Power
Trigger Delay: CONTROLSIGNAL	 State Machine
(Value betw STATEMACHINE 12CSIGNAL	I2C Signal:
	o Start

o Stop





Choose the trigger required and measure the data:

I2C Tracking Capture

Indicate which address you want to capture, and if you'd like this data tracked.







Single/Trigger/Tracker Capture: press on Packet Details to expand and look into the data captured

Continuous Capture: draw a precise portion of data on the graph, click Draw Edges, and expand Packet Details.

Press on one packet for more details on the data. This will also position you to the chosen packet on the graph:





Press on one byte from chosen packet to also position yourself accordingly on the graph:



Scope Mode

R Neus Analyzer multiLane	- Ø ×
Settings Holp Monitoring Adapter Temperature 20 Analyzer Temperature 20	Configuration OSEP Analyzer BYPASS Mode Disconnect
Monitor FEC CDB Control Signals R/W Functions MSA Table MSA Validation Module Emulation VCC Current 12C Scope State Machine Analysis	
Continuous	
	Detail
200 E	
-1000 0 0.2 6.4 6.4 0.3 1 1.2 1.4 1.6 	ч,

- Scope Mode data can be measured in initiator, bypass and target modes.
- Measure data in continuous mode.



Configure your sampling speed and resolution, and move on to the channel configuration:

Monitor FEC CDB Control Signals R/W Fun	tions MSA Table MSA Validation Module I	Emulation VCC Current	I2C Scope State Machine	Analysis
Continuous Sampling Speed and Resolution	1 MSPS v 8 Bit v Channel Confi			
		Channel 1	Channel 2	
		SDA 👥 On	sda 💿 off	
		sal 💿 off	SCL 💽 On	
		Current 💿 Off	Current 🕘 Off	
		vcc 💿 off	vcc 💿 он	
S S		_		

Choose to measure two signals from two different channels at once, choosing between:

- SDA
- SCL
- Current
- VCC

Measure the continuous data





State Machine Test

All tests below are equipped with detailed logging on time and state transitions, which can be generated into a PDF report. All the tests and state transitions are manually driven: take the module from one state to another by manually pressing on the desired state transition (the below tests are not automatic)

For the below state machine tests, it is possible for the user to override state transitions CMIS time limitations. Press "Set Duration", and check "Override CMIS limits". Control the slider to the time range required.

Module Host		
Module State Machine Data Path State Machine	🖉 🔿 Miedule Behavloral Midel 💿 💿 Nëtwerk Path State Machine	
Stop Test Generate PDF report Save Log	MgmtInit (ms) ⁰ ²⁰⁰⁰ ²⁰⁰⁰ ²⁰⁰⁰ ²⁰⁰⁰ ²⁰⁰⁰ ²⁰⁰⁰ ²⁰⁰⁰	
Applied Durations : Set Duration	ModulePwrUp (ms) 0 20000 20000 Override CMIS limits	SI
	ModulePwrDown (ms) 100 500 Override CMIS limits	
– LowPwrS – ResetS Legend:	Resetting (ms) 0 20000 20000 V Override CMIS limits	
Steady State Transient State	Apply Revert CMIS Values	
	Modulecow/w/	

The state machine tests include:

- Module State Machine test
- Data Path State Machine test
- Module Behavioral Model
- Network Path State Machine test

The tests are all **manually driven** and are available on module side in initiator mode, and host side in target mode.

On the module side, Nexus would be validating module state transitions, testing that a module receives and acts on a host state transition command accordingly.

On the host side, Nexus would be validating the host commands. User can initiate these commands from the host side, and validate them from the logs that come with the test on Nexus side.

We recommend to check the modules power up sequence as tests will fail according to the power up sequence advertised in the module.



Module Side

The below tests are all done in initiator mode. The below tests are manually driven and are not automatic.

The tests are each initialized by clicking on the desired test, and pressing on "Initialize Test":



For the below state machine tests, it is possible for the user to override state transitions CMIS time limitations. Press "**Set Duration**", and check "**Override CMIS limits**". Control the slider to the time range required.

Module Host		
Module State Machine Data Path State Machine	Module Behavioral Model	
Stop Test Generate PDF report Save Log	Mgmtlnit (ms) 0 2000 2000 Override CMIS limits	
Applied Durations :	ModulePwrUp (ms) 0 20000 20000 20000 Vorride CMIS limits	St
	ModulePwrDown (ms) 100 500 Override CMIS limits	
LowPwrS ResetS	Resetting (ms) 0 < T < 20000 20000 ✓ Override CMIS limits	
Legend:	Apply Revert CMIS Values	
steady state iransient state	ModuleLowPwr	

To manually drive the tests, user can press on the rectangles in the block diagram:



The example above is taken from a Module State Machine test, and user can drive the module from and to any state including Reset, ModuleLowPwr and ModuleReady. If the state transition is





successful, the designated rectangle or block of the new state turns green. If the state transition has failed, the test will go to a "Fault", with details of the fault in the logs, as shown below:

Stop the test by pressing **"Stop Test".** All test logs can be saved to a text file by pressing **"Save Log"**, and can be generated into a PDF report by pressing **"Generate PDF report"**:

Module State Machine	Data Path State Machine	Module Behavioral Model
Stop Test Generate	PDF report Save Log	

Module state machine test

setters in help incontour FEC CDB Control Signals RVW Functions MSA Table MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis Monitor FEC CDB Control Signals RVW Functions MSA Table MSA Validation Module Emulation VCC Current I2C Scope State Machine Analysis Module State Machine Data Path State Machine Module Environment Stop Test Generate PDF report Seve Log PD7 10 5 2711112 509; Initializing Module. PD2 3 05 2411112 539; Phowering up Module. PD2 3 05 2411112 539; Phow	Analyzer	multiLane	– 0 ×
Monitor FEC CDB Control Signals RW functions MSA Table MSA buildation Module Emulation VCC Current I2C Scope State Machine Analysis Module State Machine Data Path State Machine Module State Machine Data Path State Machine Stop Test Generate PDF report Stop Test Generate PDF report Image: State Machine Analysis Stop Test Image: State Machine Analysis Image: State Machine Analysis Image: State Machine Image: State Machine Image: State Machine Analysis Image: State Machine Analysis Image: State Machine Image: State Machine Image: State Machine Analysis Image: State Machine Analysis Image: State Machine Image: State Mach	Settings Help Monitoring Adapter Temperature 34 Analyzer Temperature 39		Configuration OSFP Analyzer BYPASS Mode Disconnect
F0021405-2411112-402 Module was successfully set in Reset inside Elapsed time: 101ms [2023-05-2411112-502; ResetL HW pin is set to high. ResetS state: [2023-05-2411112-502; Initializing Module. [2023-05-2411112-502; Module was successfully set in Los Power [2023-05-2411112-502; Module was successfully set in Los Power [2023-05-2411112-502; Powering up Module. [2023-05-2411112-532; Powering up Module. [2023-05-2411112-533; Powering up Module. [2023-05-241112-533; Powering up Module.	Monitor FEC CDB Control Signals R/W Functions MSA Table MSA Validation Image: Module State Machine Image: Module	Module Emulation VCC Current I2C Scope State Machine Analysis	
	P2023.05-24111122.40; Module was successfully set in Reset mode Elapsed time: 101ms P2023.05-24111122:50; ResetL HW pin is set to high. ResetS state: False P2023.05-24111122:50; Initializing Module. P2023.05-24111122:50; Module was successfully set in Low Power resets Elapsed time: 8ms P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-24111122:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-2411112:53; LPMode HW pin is set to low. LowPwrS state: False P2023.05-2411112:53; LPMode HW pin is set soccessfully set in High Fawer P203.05-2411112:53; LPMode HW pin is soccessfully set in High Fawer P203.05-2411112:53; LPMode HW pin is soccessfully set in High Fawer P203.05-241112:53; LPMode HW pin is soccessfully set in High Fawer P203.05-241112:53; LPMode HW pin is soccessfully set in High Fawer P203.05-2411112:53; LPMode HW pin is soccessfully set in High Fawer P203.05-2411112:53; LPMode HW pin is soccessfully set in High Fawer P203.05-2411112:53; LPMode HW pin is soccessfully set in High Fawer P203.05-241112:53; LPMode HW pin is soccessfully	Resetting Resetting Resetting Resetting Midduktowflwr Midduktowflwr Midduktowflwr Midduktowflwr Midduktowflwr Midduktowflwr Midduktowflwr Midduktowflwr	Fault Max Transition Time: (ms) 5000 Set CowPwrS CheverS Legend: Steady State Transient State



Data path state machine test



Module Behavioral Model

Access the Appsel codes supported on your DUT through the Module behavioral model. The supported Appsel Codes are highlighted as shown below for Application 1 and Application 2, the highlighted rectangles are clickable. Select the desired Appsel Code to implement on the module by simply clicking on a supported Apsel code. Validate your host routine with Nexus in implementing selected Apsel code on module. Once the selected code is set on the module, Nexus will indicate a success with logs. Otherwise, Nexus will indicate a fault related to the Apsel code on the module

Analyzer	multiLane		– @ ×
Settings Help Monitoring Adapter Temperature 34 Analyzer Temperature 39			Configuration OSFP Analyzer BYPASS Mode Disconnect
Monitor FEC CDB Control Signals K/W Functions MSA lable MSA Validation Module E Module State Machine Data Path State Machine Module Behavioral Model Stop Test Generate PDF report Save Log	mulation VCC Current I2C Scope State Machine Analysis		
	Application 1 : 400GAUI-8 C2M		
			AppSelCode: 0001
			Ļ
	Application 5		
	Application 6	ApplyImmidate	ApplyDPInit
	Application 7		
			Ļ
			ConfigStatus



Network Path State Machine Test



Host Side

The below tests are all done in target mode. The tests are each initialized by clicking on the desired test, and then pressing "Begin Analysis":

Module Host			
Module State Machine	Data Path State Machine	Module Behavioral Model	Network Path State Machine
Begin Analysis	Get Log	g and Stop	

To drive the state machine tests on the host side and validate the host capabilities in implementing state changes on the module, follow the CMIS specifications which the guide refers you to for each test below:



<section-header> Contraction </tabl

Press on "Begin Analysis", and manually trigger state transitions from your host which will be reflected here, validating host to module communication.

Data Path State Machine



For DPSM host side testing, press on "Begin Analysis", and then please refer to CMIS 5.2 specifications, section 6.3.3, for more information on how to trigger state transitions from the host side, and check which registers are involved.



DPDeactivated:

- Read: page 11h addresses 128-131
- Set module to high power:
 - Write: page 10h (16) address 128 -> 00
 - Write: page 10h (16) address 143 -> FF

DPInitialized:

- Read: page 11h addresses 128-131
- Write: page 10h address 132 -> 00
- Write: page 10h address 130 -> 00

DPActivated:

Read: page 11h addresses 128-131 -> 44

Module Behavioral Model

Nexus Analyzer			50	I 🖓 🖸 🐺 👹 199+ 🥑 <	- 8 ×
Settings Help					Configuration
Monitor Module Controls FEC	CDB Control Signal R/W Function	s MSA Table MSA Validation M	odule Emulation VCC Current I	C Scope State Marbles Associate ePPS	TARGET Mode Disconnect
Module Hotel				the particular second second second and second	OSIP Analyzer
Module State Machine	Data Path State Machine	O Module Behavioral Model	Network Path State Machine		
Begin Analysis	Get Log	and Stop			
-	Application 1 : 400GAUI-4 S C2M				
-	Application 2 : 800G S C2M				
	Application 3 : 100GAUI-1-5 C2M				
				State: AppSelCode 1 set on lane 1 Time : 472943 ms	
				State: DataPath lane ID invalid on lane 3. AppSelCode 1	
	Application 6			Time : 472943 ms State: AppSelCode 1 set on lane 4	
				Time : 472943 ms State: AppSelCode 1 set on Iane 5 Time : 472943 ms	
				State: AppSelCode 1 set on lane 6 Time : 472943 ms	
				State: AppSelCode 1 set on lane 7 Time : 472943 ms	
				State: AppSelCode 1 set on lane 8 Time : 472943 ms	
C Analyzer mode changed to TARG	er.				Adapter Temperature: 40 °C Analyzer Temperature: 43 °C

Press on "Begin Analysis", and change/implement specific apsel codes by writing to the correct registers from the host side. Validate with Nexus.

400G:

- write: page 10h (16) address 145 -> 10h (Appsel 0001, lane 1)
- write: page 10h (16) address 146 -> 10h (Appsel 0001, lane 1)
- write: page 10h (16) address 147 -> 10h (Appsel 0001, lane 1)
- write: page 10h (16) address 148 -> 10h (Appsel 0001, lane 1)
- write: page 10h (16) address 149 -> 18h (Appsel 0001, lane 5)
- write: page 10h (16) address 150 -> 18h (Appsel 0001, lane 5)
- write: page 10h (16) address 151 -> 18h (Appsel 0001, lane 5)
- write: page 10h (16) address 152 -> 18h (Appsel 0001, lane 5)
- write: page 10h (16) address 143 -> FF



800G:

- write: page 10h (16) address 145 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 146 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 147 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 148 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 149 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 150 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 151 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 152 -> 20h (Appsel 0010, lane 1)
- write: page 10h (16) address 143 -> FF

100G:

- write: page 10h (16) address 145 -> 30h (Appsel 0011, lane 1)
- write: page 10h (16) address 146 -> 32h (Appsel 0011, lane 2)
- write: page 10h (16) address 147 -> 34h (Appsel 0011, lane 3)
- write: page 10h (16) address 148 -> 36h (Appsel 0011, lane 4)
- write: page 10h (16) address 149 -> 38h (Appsel 0011, lane 5)
- write: page 10h (16) address 150 -> 3Ah (Appsel 0011, lane 6)
- write: page 10h (16) address 151 -> 3Ch (Appsel 0011, lane 7)
- write: page 10h (16) address 152 -> 3Eh (Appsel 0011, lane 8)
- write: page 10h (16) address 143 -> FF

Network Path State Machine



Press on "Begin Analysis", and then please refer to CMIS 5.2 specifications, section 7.6.7, for more information on how to trigger state transitions from the host side, and check which registers are involved



NPDeactivated:

- Read: page 16h addresses 200-203
- Set module to high power
 - Write: page 16h address 128 -> 01
 - Write: page 16h address 160 -> 00
 - Write: page 16h address 176 -> FF

NPInitialized:

- Read: page 16h addresses 200-203
- Write: page 10h address 132 -> 00
- Write: page 10h address 130 -> 00

NPActivated:

Read: page 16h addresses 200-203 -> 44

multiLane

C-CMIS

Nexus version V0.7.3 includes C-CMIS1.3 support for coherent pluggables.

To access C-CMIS support, refer to "**Configuration**" on the top right side of the GUI, where user has the choice between CMIS5.2 or C-CMIS1.3 specifications support. Select "**C-CMIS1.3**"

Configuration		
BYPASS Mo	de	Disconnect
C-CMIS 1.3 🗸	OSFF	Analyzer Simulation
CMIS 5.2		
C-CMIS 1.3		

C-CMIS extensions are valid for the following tabs:

- Monitor
- Module Controls
- O MSA Table
- O MSA Validation

Monitor

The C-CMIS Monitor operates in initiator mode and includes Media Lane and Host Lane monitoring.

Media Lane:

Under Media Lane, user has access to "FEC Performance Monitoring" and "Link Performance Monitoring"

With **FEC Performance Monitoring**, user has access to all 8 lanes. To monitor module parameters, user should check the lanes user wishes to monitor, by checking the box next to each of the lanes in the table.

Monitor Module Controls FEC CDB Control Signal R/W Functions MSA Table MSA Validation Module Emulation VCC Current 12C Scope State Machine Analysis Pause Monitor Monitor Refresh Rate 500 ms Uegend Tel: Low Warning Tel: High Warn									
Name	= Lane 1	= Lane 2	Eane 3	= Lane 4	[—] Lane 5	= Lane 6	E Lane 7	= Lane 8	
Number of bits									
Number of bits during sub-interval									
Number of corrected bits									
Minimum number of corrected bits during sub-interval									
Maximum number of corrected bits during sub-interval									
Number of frames									
Number of frames during sub-interval									
Number of frames with uncorrectable errors									
Minimum number of frames with uncorrectable errors during sub-interval									
Maximum number of frames with uncorrectable errors during sub-interval									



With "Link Performance Monitoring", user can monitor all link parameters respective to each lane, by checking the box next to each of the lanes.

M	onitor Module Controls FEC CDB Control	Signal R/W Functions	MSA Table MSA Va	lidation Module Emu	lation VCC Curren	t I2C Scope State	Machine Analysis		INITIATOR Mode	Disconnect	
Des	Come Manifest and a set of a s										
Pat	Pause Monitor Monitor Refresh Rate 500 ms Legend										
Ж	VDM C-CMIS	Low Wa	rning 🔣 High Warni	ing 🚺 Low Alarm 🚺	High Alaram LOS	: Loss of Signal LOL :	Loss of Lock 📕 Stat	e Changed			
Me	dia Lane Host Lane										
FEC	C performance monitoring Link performance	e monitoring									
	Name	Т Туре	E Lane 1	E Lane 2	E Lane 3	E Lane 4	Elane 5	E Lane 6	Elane 7	Eane 8	
	Name : Carrier Frequency Offset - 3 Items										
	Carrier Frequency Offset	Average									
	Carrier Frequency Offset	Minimum									
	Carrier Frequency Offset	Maximum									
	Name : Clock Recovery Loop Monitor - 3 Item	IS									
	Clock Recovery Loop Monitor	Average	0	0	0	0	0	0	0	0	
	Clock Recovery Loop Monitor	Minimum		0		0	0			0	
	Clock Recovery Loop Monitor	Maximum		0			0				
	Name : Differential Group Delay - 3 Items										
	Name : DSP Compensated Chromatic Dispersi	ion - 3 Items									
	Name : Error Vector Magnitude of the Moder	n - 3 Items									
	Name : ESNR - 3 Items										
	Name : High Granularity SOPMD - 3 Items										
	Name : Low Granularity SOPMD - 3 Items										
	Name : Modulation Error Ratio - 3 Items										
	A Name : OSNR Estimate - 3 Items										
	A Name : Polarization Dependent Loss - 3 Items										
	A Name : Q Factor - 3 Items										
	Name : Q Margin - 3 Items										
	Name : Rx Input Optical Power - 3 Items										
	Analyzer mode changed to INITIATOR.		C 🖌	Device restarted due to fa	iled communication.		Ad	apter Temperature: 54 °C	Analyzer Temperature: 39		

Host Lane

With Host Lane, user can monitor host side parameters of each of the lanes on the module by checking the box next to each of the lanes.

Monitor Module Controls FEC CDB Co	ontrol Signal R/W Fu	nctions MSA Table	MSA Validation Mod	ule Emulation VCC	Current I2C Scope	State Machine Analys	sis	INITIATOR Mode	Disconnect SFP Analyzer Simulation	
Pause Monitor Monitor Refresh Rate (Demo enter to Set Male DM VDM (Colling) DM VDM (Colling) Media Lane Host Lane										
Name	⁼ Lane 1	= Lane 2	= Lane 3	⁼ Lane 4	⁼ Lane 5	[—] Lane 6	= Lane 7	⁼ Lane 8		
Number of bits										
Number of bits during sub-interval										
Number of corrected bits										
Minimum number of corrected bits during sub-interval										
Maximum number of corrected bits during sub-interval										
Number of frames										
Number of frames during sub-interval										
Number of frames with uncorrectable errors										
Minimum number of frames with uncorrectable errors during sub-interval										
Maximum number of frames with uncorrectable errors during sub-interval										
Analyzer mode changed to INITIATOR.			🗘 🛕 Device restartes	due to failed communicati	ion.		Adapter Temperature:	50 °C Analyzer Temperatur	e: 41 °C	



Module Controls

In Module Controls, user has access to Media and Host lanes.

Media Lanes

Monitor Module	e Controls FEC CDB Control Signal R/W Fu	unctions MSA Table MSA Vali	idation Module Emulation VCC Current 12	C Scope State Machine Analysis	INITIATOR Mode Disconnect
CMIS Controls	C-CMIS Controls				Cost P Analyzer Simulation
Media Lanes	Host Lanas				
Data may not be sync	chronized. Please make sure to refresh.				
Refresh All	Refresh Channel 1				
Channels	Channel 1 Rx Power		Channel 1 Media Lanes		
Apply to All	Rx Power Monitor		Tx filter type Root-Raised-Cosine		
Channels	Rx Signal Power Monitor		Scaled Roll of Factor	0	
(Channel 1)	Rx Total Power High Alarm Threshold	-40 8.16 O dBm	Rx Insertion of LF on The Detection of L	D	
Channel 2	Rx Total Power Low Alarm Threshold	-40 8.16 0 dBm	Tx Transmit Shape Control		
	Rx Total Power High Warning Threshold	-40 8.16 0 dBm	Channel 1 Flags Masks		
Channel 3	Rx Total Power Low Warning Threshold	-40 8.16 0 dBm	Tx Loss of Alignment Alarm Tx Out of Alignment Alarm	Rx Loss of Alignment Alarm Rx Out of Alignment Alarm	
Channel 4	Rx Signal Power High Alarm Threshold	-40 8.16 0 dBm	Tx CMU Loss of Lock Alarm	Rx Deskew Loss of Lock	
	Rx Signal Power Low Alarm Threshold	-40	Tx Reference Clock Loss of Lock Alarm Tx Deskew Loss of Lock Alarm	Rx FIFO Error FEC Excessive Degrade Over PM	
Channel 5	Rx Signal Power High Warning Threshold	-40 8.16 0 dBm	Tx FIFO Error	Interval Alarm	
Channel 6	Rx Signal Power Low Warning Threshold	-40 8.16 0 dBm	Rx Loss of Frame Rx Loss of Multi-Frame	FEC Detected Degrade Over PM Interval Alarm	
	Channel 1 Rx FEC		🔲 Rx Demodulator Loss of Lock	Remote Degrage Alarm	
Channel 7	Rx FEC Detected Degrade		Rx Chromatic Dispersion Compensation	Local Degrage Alarm	
	Rx FEC Excessive Degrade		- Loss of Lock		
Channel 8	Rx FEC Detected Degrade Raise Threshold	65535 O			
	Rx FEC Detected Degrade Clear Threshold	0 <u>65535</u> 0			
	Rx FEC Excessive Degrade Raise Threshold	65535 0			
	Rx FEC Excessive Degrade Clear Threshold	0 <u>65535</u> 0			
🗘 Analyzer mode	e changed to INITIATOR.	\$ 🔺	Data is purely simulated and may not be reflective of real	-time performance. Ac	apter Temperature: 35 °C Analyzer Temperature: 37 °C

With Media Lanes, user has access to configure:

- o Channel Rx Power
- o Channel Rx FEC
- o Channel Media Lanes
- o Channel Flags Masks

User has the option to configure each channel separately, or to apply the same configuration of one channel to all 8 channels, by selecting channels on the left side of the screen, or by selecting "**Apply to All Channels**".

To set the configuration, if done separately on each channel, press "**Refresh** Channel x".

To set configuration, if applied to all channels, press "Refresh All Channels"





Host Lanes

Monitor Module	e Controls FEC CDB Control Signal R/W Functions I	MSA Table MSA Validation Module Emulation VCC Current 12C Scope State Machin	e Analysis
CMIS Controls Media Lanes Data nay are the spre Refresh All Channels Channel 1 Channel 2 Channel 3 Channel 4 Channel 6 Channel 8	Controls TPE Cost Control signal (XVI Functions) CCCNIS Controls Cost Lanes Investor Researches une to infent. Refresh Channel 5 Channel 5 Host Lanes Provisioning and Flag Masks FEC Excessive Degrade Over PM Interval Alarm Remote Degrade Alarm Cosal Degrade Alarm Cosal Degrade Alarm Flexe Content PHY Fault Alarm Flexe GID Mismatch Alarm Flexe Gid Mismatch Alarm Flexe Instance Map Mismatch Alarm Flexe Loss of Fame Alarm Flexe Cost Deside Fult Remote Fault Flexe Loss of Alignment Flexe Loss of Alignment Remote Fault Remote Fault Receive Losal Fault	Channel 5 Host Lanes Configuration Insertion of LF on Detection of LD FFEC Detected Degrade FEC Detected Degrade Raise Threshold FEC Detected Degrade Raise Threshold FEC Excessive Degrade Clear Threshold FEC Excessive Degrade Clear Threshold FEC Excessive Degrade Clear Threshold COSS 0 FEC Excessive Degrade Clear Threshold COSS 0 FEC Excessive Degrade Clear Threshold COSS 0 COSS 0	COMS 1.1 V OSFP Analyzer Simulation
🗘 Analyzer mode	changed to INITIATOR.	Data is purely simulated and may not be reflective of real-time performance.	Adapter Temperature: 18 °C Analyzer Temperature: 12 °C

Under Host Lanes, user has access to configure:

- o Channel Host Lanes Provisioning and Flag Masks
- o Channel Host Lanes Configuration

Channel configuration in Media Lanes also applies here.



MSA Table

Nonitor Module Controls FEC	CDB Control Sig	gnal R/W Fund	tions MSA Table	MSA Validation Module E	Emulation VCC Current I2C S	cope State Machine Analysis		CCMIS 1.3 V OSFP Analyzer Simulation
CMIS Map C-CMIS Map								
C-CMIS Memory Map								
Pages Address Pages : Page 30 - 128 Item Pages : Page 31 - 128 Item Pages : Page 31 - 128 Item	Data (Hex) ns ns	Data (Dec)	Data (Ascii)		Description		Read Only	Bank Selection 0 V
 Pages : Page 32 - 128 Item Pages : Page 33 - 128 Iten Pages : Page 34 - 128 Iten 	ns							Read Data
 Pages : Page 35 - 128 Item Pages : Page 38 - 128 Item Pages : Page 3A - 128 Item 	is ns ms							Save Data to file
 Pages : Page 3B - 128 Item Pages : Page 40 - 128 Item Pages : Page 41 - 128 Iten 	is ns							Write Data to Hardware
 Pages : Page 42 - 128 Item Pages : Page 43 - 128 Iten Pages : Page 44 - 128 Iten 	is ns							The affected pages are the ones selected in the table. To choose the desired page(s) use the filter button
Module asserted to reset				↑ A Data is purely simula	ated and may not be reflective of real-time :	performance.	Adanter Temperat	ture: 31 °C. Analozer Temperature: 31 °C

The MSA Table tab works in Initiator mode, giving the user access to their Module Memory. Nexus will display the module memory, with address and description of each register. First, user should configure "**Bank Selection**" on the right side of the screen.

With a "**Read Data**" button, user can read the contents of every register in the module memory. In addition to reading, user can write or change the value of each register, by double clicking on the box of either the "**Data (Hex)**" or "**Data (Dec)**" columns of the desired register. To cement the changes, press on "**Write Data to Hardware**".

Pages \land 🍸	Address	Data (Hex)	Data (Dec)	Data (Ascii)	Description	Read Only	
Pages : LowMem	- 128 Items						
LowMem			0		Identifier	₹	

The module memory can be read for all pages at once, or user can also filter the pages and read only a few at once.

Monitor	Module Co	ontrols	FEC	CDB	Control S	Signal	R/W Fun	ctions	MSA	Table	MSA Validation
CMIS Map C-CMIS Map											
C-CM	IS Memory	Мар									
	Pages 🗸 🍸	Add	dress	Da	ta (Hex)	Dat	a (Dec)	Data	(Ascii)		
	ages : Pag	Clear									
A P	ages : Pag										
▲ P.	ages : Pag	Sear	ch				<u> </u>				
A P	ages : Pag		(Selec	t All)							
▲ P.	ages : Pag		Page i	30							
▲ P.	ages : Pag	7	Page	31							
A P	ages : Pag		Dago	22							
A P	ages : Pag		nage.								
▲ P.	ages : Pag		Page .								
▲ P.	ages : Pag		Page	34							
A P	ages : Pag	₹	Page	35							
▲ P.	ages : Pag	₹	Page	38							
▲ P.	ages : Pag		Page :	3A							
▲ P.	ages : Pag	▼	Page :	3B							
			Page	40							
			Page	41							
				(Ж	C C	ancel				
								8			



- Operates in initiator mode
- Select bank
- Select page(s) to read
- Read data from device for selected page(s)
- Save data to file
- Load data from file
- Write data to hardware to have the data required in respective addresses
- Read only column: checked boxes refer to read only registers, while unchecked boxes refer to read/write registers, as per MSA. Use these to make R/W registers RO, and RO registers R/W, affecting MSA compliance why?
- Revert read only: revert back to the original type access of all registers as per MSA

MSA Validation

Start by selection the correct bank.

Monitor	Module Cor	trols FEC	CDB Cont	trol Signal	R/W Functi	ons MSA Ta	ble MSA Validation	n Module Emulati	on VCC Current I2C	Scope State Machine Analys	sis	INITIATOR Mode	Disconnect
Module	Host		_			_							P Analyzer Simulation
CMIS	C-CMIS												
	6												
Select a	standard:	CMIS		Bank Select	ion •	Read a	nd Validate Data	Save Data	Load Data From File	Generate PDF report			
C-CN	IIS Validation	Table			1								
	Page \land 🍸	Address	Data (H	x) Regist	ter A ² Valid	Regist Content Va	er lidation			Notes			
	Page : Page 30	- 128 Items			5								
	Page : Page 31	- 128 Items			6								
	Page : Page 32	- 128 Items											
A	Page : Page 33	- 128 Items											
A	Page : Page 34	- 128 Items											
A	Page : Page 35	- 128 Items											
	Page : Page 38	- 128 Items											
A 1	Page : Page 3/	128 Items											
A	Page : Page 3E	- 128 Items											
▲	Page : Page 40	- 128 Items											
▲ 1	Page : Page 41	- 128 Items											
A	Page : Page 42	- 128 Items											
A	Page : Page 43	- 128 Items											
	Page : Page 44	- 128 Items											
C Mod	ule asserted to	reset					🔿 🛕 Data is	s purely simulated and r	may not be reflective of real-tim	e performance.	Adapter Temperature: 21	*C Analyzer Temperature:	25 °C

MSA Validation for C-CMIS operates the same as for CMIS. Please refer to section x for guidance.
multiLane

Revision History

Revision Number	Date	Description	
1.0	6/12/2023	Preliminary	
1.1	8/2/2023	Added Module Emulation	
1.2	11/1/2023	Added QSFP-DD Support in control signals	
1.3	4/9/2024	Instructions for Update 2, v0.7 changes and features: nexus gui monitor tab (undocking feature) module controls Module Emulation updates MSA validation (host side) I2C packets (photos) state machine tests (host side) Control signals (docking/undocking)	
1.4		Formatting and Styling C-CMIS Support	
1.5	9/17/2024	Set override control signals Device health check	



Software and Firmware Revision History

SW Revision Number	Date	Description	Compatible FW Revision
V0.5.8	26/05/23	 Management Interface FEC CDB Control Signals R/W MSA Table MSA Validation VCC Current I2C Scope Mode State Machine Test 	V0.3.9 OSFP
V0.5.9.3	18/09/23	Added Module Emulation	V0.3.9 OSFP V0.4.3 QDD
V0.6	14/11/23	 Network Path State Machine Detection of power spikes Management interface host side State machine tests host side MSA Validation host side 	
V0.7		 Module Behavioral Model host side Updated Module Emulation Updated State Machine Tests Changes in UI 	V1.6.1 OSFP 1.7.1 QDD
V0.7.6		 C-CMIS Support GUI enhancements Additions to DM 	

Appendix

Accuracy of signals for ML4066-NX-Pro-OSFP REV1.0:

Signal	Notes	
VCC	+/- 5 mv accuracy (12 bit sampling resolution)	
Current	+/-40 mA accuracy (12 bit sampling resolution)	
Operating Temperature	Max 85C	
Sampling Resolution	6 bit, 8 bit, 10 bit, 12 bit	
Sampling Speed	Min 1 MSPS	
	Max 5 MSPS	



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