
Digital Diagnostic Monitoring Interface for XFP Optical Transceivers

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Overview

This Application Note defines Finisar implementation of the XFP 2-wire serial interface, which is used for serial ID, digital diagnostics, and certain control functions. The 2-wire serial interface is mandatory for all XFP modules and it is defined in the XFP MSA Specification Rev 4.5. It is modeled largely after the digital diagnostics monitoring interface proposed for the SFP and GBIC optical transceivers and defined in the SFF draft document SFF-8472 Rev 10.1, which in turn is an extension of the original serial ID systems defined for the GBIC and SFP transceivers. One major difference, however, is that the memory structure is changed to use a single 2-wire interface address.

IMPORTANT: The digital diagnostics functionality and memory maps described in this document apply to Beta-and Production-level units only. Please contact Finisar for information on Alpha-level units.

As with GBIC and SFP transceivers, the XFP serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C01A/02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL pin). The positive edge clocks data into those segments of the memory map that are not write-protected within the XFP transceiver. The negative edge clocks data from the XFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to 8 bit parameters, addressed from 0000h to the maximum address of the memory.

The structure of the memory map is shown in Figure 1. The normal 256-byte I2C address space is divided into lower and upper blocks of 128 Bytes. The lower block of 128 bytes is always directly available and is used for the diagnostics and control functions described in this document that must be accessed repeatedly. One exception to this is that the standard module identifier byte defined in the GBIC and SFP transceivers is located in Byte 0 of the memory map (in the diagnostics space) to allow software developed for multiple module types to have a common branching decision point. This byte is repeated in the serial ID section so that it also appears in the expected relationship to other serial ID bits.

Multiple blocks of memories are available in the upper 128 Bytes of the address space. These are individually addressed through a table select Byte which the user enters into a location in the lower address space. Thus, there is a total available address space of $128 * 256 = 32$ Kbytes in this upper memory space.

The upper address space tables are used for less frequently to access functions such as serial ID, user writable EEPROM, reserved EEPROM, diagnostics and control spaces. The upper address space, is for future standards definition, as well as ample space for vendor specification functions. These are allocated as follows:

Table 00h:	Reserved for future diagnostic and control functions
Table 01h:	Serial ID EEPROM
Table 02h:	User-writable EEPROM
Table 03h: - 7Fh	Finisar-specific internal functions (not accessible to the user)
Table 80h – FFh	Reserved

The details of each memory space are described in the XFP MSA document. All 2-Wire registers are read with bit 7 in the MSB first.

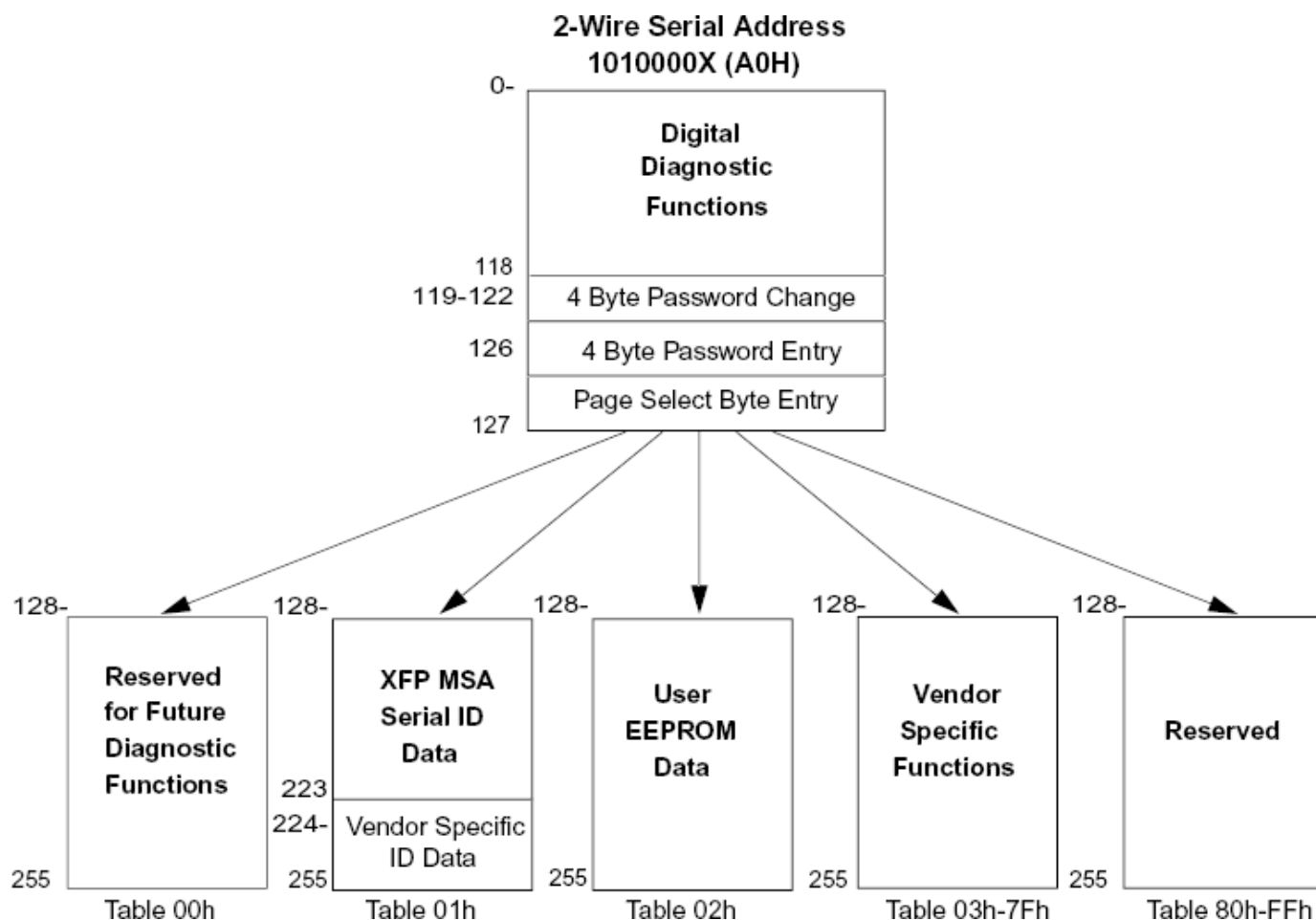


Figure 1: XFP 2-Wire Serial Interface Memory Map

The memory structure also provides for an optional password entry location in the lower memory space that may be used to protect user-writable memory (Table 02h). A password is not required to read any serial ID or diagnostics information in the lower memory address space or in Tables 00h – 02h. A password is not required to write any

controls defined in the digital diagnostic functions described in the MSA document either. A password (entered into bytes 123 – 126) is required to allow write access to the User EEPROM Table (02h). The default password is 00001011h per the XFP MSA, and it can be changed by the host manufacturer by writing the new password into bytes 119 – 122 when the correct old password has been written into bytes 123 – 126. The host password must be in the range of 00000000h to 7FFFFFFFh.

The 2-wire serial interface address of the XFP module is 1010000X (A0h). In order to allow access to multiple XFP modules on the same 2-wire serial bus, the XFP pin-out includes a MOD_DESEL or module deselect pin. This pin (which is pulled high or deselected in the module) must be held low by the host to select the module of interest and allow communication over the 2-wire serial interface. The module does not respond to or accept 2-wire serial bus instructions unless it is selected.

Table 1 below lists the various Finisar XFP part numbers available and the corresponding applications that they support.

Table 1 XFP Part Number Designations

Part Number	Application	Max Data Rate (Gb/s)	Transmitter / Receiver Type	Max Reach	ROHS Compliance
FTLX1411D3	10GBASE-LR/LW, 10GEthernet	10.5	1310 nm DFB uncooled / PIN receiver	10 km	Fully Compliant
FTRX1411D3	10GBASE-LR/LW, 10GEthernet, 1200-SM-LL-L 10GFC	10.5	1310 nm DFB uncooled / PIN receiver	10 km	5 of 6
FTLX1411M3	SONET OC192 SR1 SDH STMI-64.1, 10GBASE-LR LW 10GE, 1200-SM-LL-L 10G FC, G709 OUT-2, 10GBASE-LR/LW, 10GE, G709 OTU2 FEC	11.1	1310 nm DFB uncooled / PIN receiver	10 km	Fully Compliant
FTRX-1411M3	SONET OC192 SR1 SDH STMI-64.1, 10GBASE-LR LW 10GE, 1200-SM-LL-L 10G FC, G709 OUT-2, 10GBASE-LR/LW, 10GE, G709 OTU2 FEC	11.1	1310 nm DFB uncooled / PIN receiver	10 km	5 of 6
FTLX1412M3	SONET OC192 SR-1, SDH STMI-61.1, 10GBASE-LR/LW 10GE, 1200-SM-LL-L, 10GFC, 10GBASE-LR/LW +FEC, 1200-SM-LL-L, 10GFC +FEC	11.3	1310 nm DFB uncooled	10 km	Fully compliant
FTLX1412D3	10GBASE-LR/LW 10GE 1200-SM-LL-L 10GFC	10.5	1310 nm DFB uncooled	10 km	Fully Compliant

Part Number	Application	Max Data Rate (Gb/s)	Transmitter Type	Max Reach	ROHS Compliance
FTLX1611M3	SONET OC192 IR2, SDH STMS-64.2b, SONET OC192 IR3 SDH STMS-64.2b, ITU-T G709, 10GBASE-ER/EW, 10GBASE-ER/EW +FEC, 40km 10GFC	11.1	Temperature stabilized 1550 nm DFB	40 km	Fully Compliant
FTRX1611-3	SONET OC192 IR2, SDH STMS-64.2b, SONET OC192 IR3 SDH STMS-64.2b, ITU-T G709, 10GBASE-ER/EW, 40km 10GFC	10.7	Temperature stabilized 1550 nm DFB	40 km	5 of 6
FTLX1811M3	SONET OC-192/SDH STM-64 ITU-T G959.1 P1L1-2D2, SONET OC192/SDH STM64 with ITU-T G709. 10GBASE-ZR/ZW 80km 10GE. Extended 80km 10GFC, 80km 10GE+ITU.T G709 +FEC	11.1	Temperature stabilized 1550 nm DFB	80 km	Fully Compliant
FTRX-1811-3	SONET OC192/SDH STM-64 ITU-T G959.1 P1L1-2D2, 10GBASE-ZR-ZW, 80km 10GE, Extended 80km 10GFC	10.7	Temperature stabilized 1550 nm DFB	80 km	5 of 6
FTRX-1911-3	20dB link budget XFP links with low dispersion and high optical power loss	11.1	Temperature stabilized 1550 nm DFB	40 km	5 of 6
FTLX3611M3	DWDM Networks SDH STMS-64.2b, 10GBASE-ER/EW, 10GBASE-ER/EW +FEC, 40km 10GFC, OC192/STM-64 with FEC	11.1	Temperature stabilized DWDM rated EML transmitter	40 km	Fully Compliant
FTLX3811M3	DWDM 10Gb/s SONET/SDH ITU-T G698.1S-D100S1-2D, DWDM 10GB/s SONET/SDH ITU-T G.709 DWDM 80km 10GE, DWDM 80km, 10GFC + FEC	11.1	Temperature stabilized DWDM rated EML transmitter	80 km	Fully Compliant
FTLX3812M3	Amplified DWDM 10G SONET SDH, Amplified DWDM 10GE	11.1	Temperature stabilized DWDM EML transmitter	80 km	Fully Compliant
FTLX3812S3	Amplified DWDM 10G SONET/SDH	10.7	Temperature stabilized DWDM EML transmitter / APD receiver	80 km	Fully Compliant
FTLX3911M3	DWDM Low Dispersion, highly attenuated applications, unamplified DWDM 10GB/s SONET/SDH DWDM 10GE, DWDM 10GFC	11.1	Temperature stabilized DWDM EML transmitter	80 km	Fully Compliant

Part Number	Application	Max Data Rate (Gb/s)	Transmitter Type	Max Reach	ROHS Compliance
FTLX4213M3	Amplified DWDM 10Gb/s SONET/SDH Amplified DWDM 10GB/s Ethernet and 10GB/s Fibre Channel.	11.3	Temperature stabilized DWDM CML Transmitter	200 km	Fully Compliant
FTLX8511D3	10GBASE-SR/SW, 10GE, 1200-MX-SN-I 10G FC	10.5	850nm VCSEL	300 m	Fully Compliant

Please Note

All XFP modules that support a temperature stabilized laser, require at least 60 seconds for the laser to stabilize after power-on. Power-on condition includes a hard-reset or hot plug of the XFP module.

The host needs to wait this amount of time, before running any data traffic or checking for link status.

In addition to this, if any I2C transactions are carried out during this time, then the EEPROM contents read, do not display the actual status of the module, and instead are only the instantaneous readings.

The following pages in this Application Note display the EEPROM Memory Map contents of some of the standard Finisar XFP modules.

The part numbers described in detail in the following pages, are FTLX-1411M3, FTLX1412M3, FTLX-1611M3, FTLX-1811M3, FTLX-3811-3, FTLX3812-M3, FTLX3812-S3, FTLX4213, and FTLX8511D3.

Other XFP variants will follow the same EEPROM template, however there may be slightly different settings for some parameters in the XFP MSA Serial ID section.

This application note, covers existing XFP modules that have successfully completed full GR-468 qualification. The next revision of this application note, will include the next generation of XFP products once they become available.

Description of Finisar Memory Map Contents

Product: FTLX-1411M3

Type Codes:

NVE: Non-volatile EEPROM. Read only by customer

VH: Volatile Host Entry Field. Set to 00h on power up or reset unless noted.
Read/Write by Host

VHW: Volatile Host Write Field. Set to 00h on power up or reset unless noted. Write only by Host

VHR: Volatile Host Read Field. Set to 00h on power up or reset unless noted. Read only by Host.

R: Reserved. Ignore write, Return 00h on read.

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127

Byte Address	Bit Address	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		XXXXh	Ignored
	3	VH W	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0h	Not supported, ignore write, read back as 0h
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		Xh	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0h	Normal REFCLK, mode only supported. Ignore write, read back as 0b
Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968d	78° (Assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13°C (Assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	19200d	+75° (Assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10°C (Assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	35000d	70 mA
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	10111d	20 mA
22-23		NVE	2B	Bias High Warning	Threshold for warn	32500d	65 mA
24-25		NVE	2B	Bias Low Warning	Threshold for warn	12500d	25 mA

26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	14125d	+1.5 dBm (assumes 2 dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	1995d	-7.0 dBm (assumes 2 dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	12589d	+1.0 dBm (assumes 2 dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	2239d	-6.5 dBm (assumes 2 dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	17783d	+ 2.5 dBm (assumes 1.5 dB accuracy)
36-37		NVE	2B	RX Power Low Alarm	Threshold for alarm	100d	-20 dBm
38-39		NVE	2B	RX Power High Warning	Threshold for warn	15849d	+ 2.0 dBm (assumes 1.5 dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	158d	-18 dBm
42-43		NVE	2B	AUX1 High Alarm	Threshold for alarm	36300d	3.63 V
44-45		NVE	2B	AUX1 Low Alarm	Threshold for alarm	30000d	3.00V
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	35000d	3.50V (assumes 50mV accuracy)
48-49		NVE	2B	AUX1 Low Warning	Threshold for warn	31000d	3.10V (assumes 50 mV accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	55000d	5.50 V
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	45000d	4.50 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	53000d	5.30 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47000d	4.70V (assumes 50mV accuracy)
Optional VPS Control Registers							
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	0000b	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	All 000b	Ignore write, return 0000h on read
	0	VH	1b	Regulator Bypass Mode	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0h
60-69		R	10B	Reserved	Reserved	00h	Ignore write return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not supported. Ignore W, return 00h
71		VH	1B	Actual BER	For FEC systems	00h	Not supported. Ignore W, return 00h
72-73		VH	2B	Wavelength Set for tunable laser	Host wavelength set	0000h	Not supported. Ignore W, return 0000h
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not supported. Ignore W, return 00h
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not supported. Ignore W, return 00h

77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not supported. Ignore W, return 00h
78-79		R	2B	Reserved	Reserved	00h	Ignore write: return 00h on read
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset.
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in XFP MSA 4.0
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Report 0000h on read.
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
104-105		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	0000h	Report +3.3V Supply Voltage
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	0000h	Report +5V Supply voltage
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes. 0b = Tx ON; 1b = Tx OFF
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host. This bit is OR'ed with the Tx Dis hard pin. Writing "1" disables the laser. Default power up value "0"
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Reports state of MOD_NR hard pin, updated within 100ms of change on pin. 0b = module ready 1b = module not ready. Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes. Reports state of P-down hard pin, 0b = power on, normal operation 1b=power down
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b.
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes. Reports state of Interrupt hard pin, "0" indicates possible module operational fault or a status critical to the host system

	1	VHR	1b	Rx_LOS State	Reports LOS	xb	Ignore writes. Reports state of Rx_LOS hard pin. Updated within 100ms of change on pin. 0=Rx_LOS is in de-asserted mode 1=Rx_LOS is asserted
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes. Indicates transceiver has achieved power up and A/D data ready. The Data_Not_Ready bit is high during module power up and prior to the first valid A/D reading. Once the first valid A/D reading occurs, the bit is set low until the device is powered down. The bit must be set low within 1 s of power-up
111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Identifies Not ready condition as specific to the Tx path
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignores writes. Identifies Loss of Lock in Tx path CDR.
	4	VH	1b	RX_NR	Identifies RX_NR	xb	Ignores writes. Set if RX CDR loss of lock.
	3	VH	1b	RX_CDR not locked	Identifies RX_LOL	xb	Ignores writes. Identifies loss of lock in Rx path CDR
	2-0	R	3b	Reserved	Reserved	000b	Ignores writes, reports 000b.
112-117		R	6B	Reserved		00b	Ignore W, return 00h
118	7-1	R	7b	Reserved	Reserved	000000b	Not supported. Ignore W, return 0000000b
	0	VH	1b	Error Checking	Switches Packet Error Checking	0b	Host sets to 1b to enable packet error checking. Power up and reset to 0b
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Change host password value if current correct password entered in 123-126. Power-up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Host may enter password to Access Protected Area. Power up and reset to 00000000h
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Addr ess	Bit Addr ess	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
Extended Identifier						
129	6-7	2b	Ext. Identifier - Module Power Class	Defines Module Power Class	XXh = 01b	Defines module power class 01= power level 2 (2.5W max)
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Identifies need for REFCLK. 1=Synchronous Ref Clock input not required.
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	Indicates if CLEI code is present in Page 02h, 1b = CLEI code is present in page 02h
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000b	Reserved
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	1=support, 0=not support
	6	1b	10GBASE-LR		1b	1=support, 0=not support
	5	1b	10GBASE-ER		0b	1=support, 0=not support
	4	1b	10GBASE-LRM		0b	
	3	1b	10GBASE-SW		0b	
	2	1b	10GBASE-LW		1b	
	1	1b	10GBASE-EW		0b	
	0	1b	10GBASE - ZR		0b	1=support, 0=not support
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I		0b	
	6	1b	1200-SM-LL-L		1b	1=support, 0=not support
	5	1b	Extended reach 1550nm		0b	
	4	1b	Intermediate reach 1310nm FP		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved		0b	
	6	1b	Reserved		0b	
	5	1b	Reserved		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF		0b	

	6	1b	1000BASE-LX/1xFC SMF	0b	
	5	1b	2xFC MMF	0b	
	4	1b	2xFC SMF	0b	
	3	1b	OC-48-SR	0b	
	2	1b	OC-48-IR	0b	
	1	1b	OC-48-LR	0b	
	0	1b	Reserved	0b	
SONET/SDH Interconnect Link Compliance Codes					
135	7	1b	I-64.1r	1b	(OC-192 VSR4-2 support, -1dBm max power)
	6	1b	I-64.1 (P111-2D1)	1b	(OC-192 SR-1 support, -1 dBm max power)
	5	1b	I-64.2r	0b	
	4	1b	I-64.2	0b	
	3	1b	I-64.3	0b	
	2	1b	I-64.5	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
SONET/SDH Short Haul Link Compliance Codes					
136	7	1b	S-64.1	0b	
	6	1b	S-64.2a	0b	
	5	1b	S-64.2b	0b	
	4	1b	S-64.3a	0b	
	3	1b	S-64.3b	0b	
	2	1b	S-64.5a	0b	
	1	1b	S-64.5b	0b	
	0	1b	Reserved	0b	
SONET/SDH Long Haul Link Compliance Codes					
137	7	1b	L-64.1	0b	
	6	1b	L-64.2a	0b	
	5	1b	L-64.2b	0b	
	4	1b	L-64.2c	0b	
	3	1b	L-64.3	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
SONET/SDH Very Long Haul Link Compliance Codes					
138	7	1b	V-64.2a	0b	
	6	1b	V-64.2b	0b	
	5	1b	V-64.3	0b	
	4	1b	Reserved	0b	
	3	1b	Reserved	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
Encoding					
139	7	1b	64B/66B	1b	10GE/10GFC Coding
	6	1b	8B/10B	1b	Not used in standards but is supported
	5	1b	SONET Scrambled	1b	OC-192 Coding
	4	1b	NRZ	1b	NRZ only supported
	3	1b	RZ	0b	
	2-0	3b	Reserved	000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	Xxh = 63h 9900 Mbps

141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	XXh = 6Fh	11100 Mbps for FTLX versions 10700 Mbps for FTRX versions
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	0Ah	10 km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not Supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not Supported
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm fiber, units of 1 m	00h	Not Supported
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0100h	1310 nm DFB laser
	3	1b	Wavelength Control		0h	No wavelength control
	2	1b	Cooled Transmitter		0h	Transmitter is not cooled
	1	1b	Detector Type		0h	0=PIN Detector
	0	1b	Tunable Transmitter		0h	0=Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	Supported
	6	1b	CDR Support for 10.3 Gb/s		1b	Supported
	5	1b	CDR Support for 10.5 Gb/s		1b	Supported
	4	1b	CDR Support for 10.7 Gb/s		1b	Supported
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported for FTLX versions, not supported for FTRX (leaded) versions
	2	1b	Reserved		Xh = 0b	
	1	1b	Line-side Loopback Mode Supported		Xh = 0b	
	0	1b	XFI Loopback Supported		Xh = 1b	0=not supported 1=Supported
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	XXXXXXh = 009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	XXXXh = FTLX-1411M3	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	6658h	1310nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	OFA0hh	20.0nm * (200/nm). Corresponds to 1290-1340nm range.

190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
				EXTENDED ID FIELDS		
192-195		4B	Power Supply Fields			
192		1B	Maximum Power Dissipation (/20mW)		XXh = 7Dh	= 2500 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		XXh = 96h	= 1500mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0111h	= 350 mA (actual 320 mA)
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0011h	= 300 mA (actual 265 mA)
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		00000h	Not used
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000h	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	Eg A000000	Encoded serial number
Date Code (vendor manufacturing date)						
212-217		6B	Date code - year	Vendors manufacturing date code – year. (00 = 2000) ASCII	Eg “030106”	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	Vendor specific lot code, ASCII. May be blank
Diagnostic Monitoring / Variable Power Supply / Special Function Support						
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power.
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
Enhanced Options, Indicated which optional enhanced features are implemented						
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		0b	Not supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
AUX Monitoring						
222	4-7	4b	Aux A/D Input 1		0111h	+3.3V Supply Monitor on AUX A/D 1
	0-3	4b	Aux A/D Input 2		0110h	+5V Supply Monitor on AUX A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

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Customer Specific Fields

<i>Data Address</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224-255	32	TBD	TBD	All 00h at present	

Upper Memory Map: I2C Address: A0h, Table 02h

User-writable EEPROM. A password (entered into bytes 123-126) is required to allow write access to this table. The default password is 00001011h per the XFP MSA, and it can be changed by the user (i.e., host manufacturer) by writing the new password into bytes 110-122 when the correct old password has been written into bytes 123-126. The host password must be in the range of 00000000h to 7FFFFFFFh. This table is always readable (password not required).

Upper Memory Map: I2C Address: A0h, Table 03h – 7Fh

Used by Finisar for internal parameter storage. Not readable or writable without Finisar Password.

Product: FTLX-1412M3

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127

Byte Address	Bit Address	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
		Signal Conditioner Control					
1	4-7	VH	4b	Data Rate Control		XXXXh	Ignored
	3	VH W	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0h	Not supported, ignore write, read back as 0h
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		Xh	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0h	Normal REFCLK, mode only supported. Ignore write, read back as 0b
		Flag Thresholds					
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	21248d	83° (Assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13°C (Assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	20480d	+80° (Assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10°C (Assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	40000d	80 mA
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	7500d	15 mA
22-23		NVE	2B	Bias High Warning	Threshold for warn	37500d	75 mA
24-25		NVE	2B	Bias Low Warning	Threshold for warn	10000d	20 mA
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	14125d	+1.5 dBm (assumes 2 dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	1995d	-7.0 dBm (assumes 2 dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	12589d	+1.0 dBm (assumes 2 dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	2512d	-6 dBm (assumes 2 dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	17783d	+ 2.5 dBm (assumes 1.5 dB accuracy)
36-37		NVE	2B	RX Power Low Alarm	Threshold for alarm	100d	-20 dBm
38-39		NVE	2B	RX Power High Warning	Threshold for warn	15849d	+ 2.0 dBm (assumes 1.5 dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	158d	-18 dBm

42-43		NVE	2B	AUX1 High Alarm	Threshold for alarm	36300d	3.63 V
44-45		NVE	2B	AUX1 Low Alarm	Threshold for alarm	30000d	3.00V
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	35000d	3.50V (assumes 50mV accuracy)
48-49		NVE	2B	AUX1 Low Warning	Threshold for warn	31000d	3.10V (assumes 50 mV accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	0000b	00
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	0000b	00
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	0000b	00
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	0000b	00
Optional VPS Control Registers							
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	0000b	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	All 000b	Ignore write, return 0000h on read
	0	VH	1b	Regulator Bypass Mode	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0h
60-69		R	10B	Reserved	Reserved	00h	Ignore write return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not supported. Ignore W, return 00h
71		VH	1B	Actual BER	For FEC systems	00h	Not supported. Ignore W, return 00h
72-73		VH	2B	Wavelength Set for tunable laser	Host wavelength set	0000h	Not supported. Ignore W, return 0000h
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not supported. Ignore W, return 00h
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not supported. Ignore W, return 00h
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not supported. Ignore W, return 00h
78-79		R	2B	Reserved	Reserved	00h	Ignore write: return 00h on read
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset.
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in XFP MSA 4.0
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Report 0000h on read.
100-		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in

101							Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
104-105		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	0000h	Report +3.3V Supply Voltage
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	0000h	Report +5V Supply voltage
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes. 0b = Tx ON; 1b = Tx OFF
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host. This bit is OR'ed with the Tx Dis hard pin. Writing "1" disables the laser. Default power up value "0"
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Reports state of MOD_NR hard pin, updated within 100ms of change on pin. 0b = module ready 1b = module not ready. Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes. Reports state of P-down hard pin, 0b = power on, normal operation 1b=power down
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b.
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes. Reports state of Interrupt hard pin, "0" indicates possible module operational fault or a status critical to the host system
	1	VHR	1b	Rx_LOS State	Reports LOS	xb	Ignore writes. Reports state of Rx_LOS hard pin. Updated within 100ms of change on pin. 0=Rx_LOS is in de-asserted mode 1=Rx_LOS is asserted

	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes. Indicates transceiver has achieved, power up and A/D data ready. The Data _Not_ Ready bit is high during module power up and prior to the first valid A/D reading. Once the first valid A/D reading occurs, the bit is set low until the device is powered down. The bit must be set low within 1 s of power-up
111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Identifies Not ready condition as specific to the Tx path
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignores writes. Identifies Loss of Lock in Tx path CDR.
	4	VH	1b	RX_NR	Identifies RX_NR	xb	Ignores writes. Set if RX CDR loss of lock.
	3	VH	1b	RX_CDR not locked	Identifies RX_LOL	xb	Ignores writes. Identifies loss of lock in Rx path CDR
	2-0	R	3b	Reserved	Reserved	000b	Ignores writes, reports 000b.
112-117		R	6B	Reserved		00b	Ignore W, return 00h
118	7-1	R	7b	Reserved	Reserved	000000b	Not supported. Ignore W, return 0000000b
	0	VH	1b	Error Checking	Switches Packet Error Checking	0b	Host sets to 1b to enable packet error checking. Power up and reset to 0b
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Change host password value if current correct password entered in 123-126. Power-up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Host may enter password to Access Protected Area. Power up and reset to 00000000h
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

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1 **Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all**
2 **Nonvolatile**

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Byte Addr ess	Bit Addr ess	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
Extended Identifier						
129	6-7	2b	Ext. Identifier - Module Power Class	Defines Module Power Class	XXh = 01b	Defines module power class 01= power level 2 (2.5W max)
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Identifies need for REFCLK. 1=Synchronous Ref Clock input not required.
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	Indicates if CLEI code is present in Page 02h, 1b = CLEI code is present in page 02h
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000b	Reserved
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR	0b	1=support, 0=not support	
	6	1b	10GBASE-LR	1b	1=support, 0=not support	
	5	1b	10GBASE-ER	0b	1=support, 0=not support	
	4	1b	10GBASE-LRM	0b		
	3	1b	10GBASE-SW	0b		
	2	1b	10GBASE-LW	1b		
	1	1b	10GBASE-EW	0b		
	0	1b	10GBASE - ZR	0b	1=support, 0=not support	
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I	0b		
	6	1b	1200-SM-LL-L	1b	1=support, 0=not support	
	5	1b	Extended reach 1550nm	0b		
	4	1b	Intermediate reach 1310nm FP	0b		
	3	1b	Reserved	0b		
	2	1b	Reserved	0b		
	1	1b	Reserved	0b		
	0	1b	Reserved	0b		
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved	0b		
	6	1b	Reserved	0b		
	5	1b	Reserved	0b		
	4	1b	Reserved	0b		
	3	1b	Reserved	0b		
	2	1b	Reserved	0b		
	1	1b	Reserved	0b		
	0	1b	Reserved	0b		
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF	0b		
	6	1b	1000BASE-LX/1xFC SMF	0b		

	5	1b	2xFC MMF	0b	
	4	1b	2xFC SMF	0b	
	3	1b	OC-48-SR	0b	
	2	1b	OC-48-IR	0b	
	1	1b	OC-48-LR	0b	
	0	1b	Reserved	0b	
SONET/SDH Interconnect Link Compliance Codes					
135	7	1b	I-64.1r	1b	(OC-192 VSR4-2 support, -1dBm max power)
	6	1b	I-64.1 (P111-2D1)	1b	(OC-192 SR-1 support, -1 dBm max power)
	5	1b	I-64.2r	0b	
	4	1b	I-64.2	0b	
	3	1b	I-64.3	0b	
	2	1b	I-64.5	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
SONET/SDH Short Haul Link Compliance Codes					
136	7	1b	S-64.1	0b	
	6	1b	S-64.2a	0b	
	5	1b	S-64.2b	0b	
	4	1b	S-64.3a	0b	
	3	1b	S-64.3b	0b	
	2	1b	S-64.5a	0b	
	1	1b	S-64.5b	0b	
	0	1b	Reserved	0b	
SONET/SDH Long Haul Link Compliance Codes					
137	7	1b	L-64.1	0b	
	6	1b	L-64.2a	0b	
	5	1b	L-64.2b	0b	
	4	1b	L-64.2c	0b	
	3	1b	L-64.3	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
SONET/SDH Very Long Haul Link Compliance Codes					
138	7	1b	V-64.2a	0b	
	6	1b	V-64.2b	0b	
	5	1b	V-64.3	0b	
	4	1b	Reserved	0b	
	3	1b	Reserved	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
Encoding					
139	7	1b	64B/66B	1b	10GE/10GFC Coding
	6	1b	8B/10B	1b	Not used in standards but is supported
	5	1b	SONET Scrambled	1b	OC-192 Coding
	4	1b	NRZ	1b	NRZ only supported
	3	1b	RZ	0b	
	2-0	3b	Reserved	000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb) Xxh = 63h	9900 Mbps
141		1B	BR, maximum	Maximum Supported XXh = 71h	11300 Mbps for FTLX versions

				Bitrate (/100Mb)		
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	0Ah	10 km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not Supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not Supported
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm fiber, units of 1 m	00h	Not Supported
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0100h	1310 nm DFB laser
	3	1b	Wavelength Control		0h	No wavelength control
	2	1b	Cooled Transmitter		0h	Transmitter is not cooled
	1	1b	Detector Type		0h	0=PIN Detector
	0	1b	Tunable Transmitter		0h	0=Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	Supported
	6	1b	CDR Support for 10.3 Gb/s		1b	Supported
	5	1b	CDR Support for 10.5 Gb/s		1b	Supported
	4	1b	CDR Support for 10.7 Gb/s		1b	Supported
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported for FTLX versions, not supported for FTRX (leaded) versions
	2	1b	Reserved		Xh = 0b	
	1	1b	Line-side Loopback Mode Supported		Xh = 0b	
	0	1b	XFI Loopback Supported		Xh = 1b	0=not supported 1=Supported
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	XXXXXXh = 009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	XXXXh = FTLX-1411M3	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	6658h	1310nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	OFA0hh	20.0nm * (200/nm). Corresponds to 1290-1340nm range.

190		1B	Max Case Temp	Maximum Case Temperature	4Bh	75°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
			EXTENDED ID FIELDS			
192-195		4B	Power Supply Fields			
192		1B	Maximum Power Dissipation (/20mW)		XXh = 64h	8bit value *20mW= 2000mW
193		1B	Max. Power Diss. In Power-down (/10mW)		XXh = 96h	8bit value *10mW= 1200mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0000h	=0 mA (actual 320 mA)
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0110h	= 300 mA (actual 265 mA)
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		00000h	Not used
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000h	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	Eg A000000	Encoded serial number
Date Code (vendor manufacturing date)						
212-217		6B	Date code - year	Vendors manufacturing date code – year. (00 = 2000) ASCII	Eg “030106”	yyymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	Vendor specific lot code, ASCII. May be blank
Diagnostic Monitoring / Variable Power Supply / Special Function Support						
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power.
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
Enhanced Options, Indicated which optional enhanced features are implemented						
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		0b	Not supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
AUX Monitoring						
222	4-7	4b	Aux A/D Input 1		0111h	+3.3V Supply Monitor on AUX A/D 1
	0-3	4b	Aux A/D Input 2		00h	Not supported AUX A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

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Customer Specific Fields

<i>Data Addr ess</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224- 255	32	TBD	TBD	All 00h at present	

Upper Memory Map: I2C Address: A0h, Table 02h

User-writable EEPROM. A password (entered into bytes 123-126) is required to allow write access to this table. The default password is 00001011h per the XFP MSA, and it can be changed by the user (i.e., host manufacturer) by writing the new password into bytes 110-122 when the correct old password has been written into bytes 123-126. The host password must be in the range of 00000000h to 7FFFFFFFh. This table is always readable (password not required).

Upper Memory Map: I2C Address: A0h, Table 03h – 7Fh

Used by Finisar for internal parameter storage. Not readable or writable without Finisar Password.

Product: FTLX-1611-3

This document describes the data format and contents of the FTRX-1611-3 memory map. It also adds some details about the diagnostic section. This specification is current relative to the XFP MSA rev 4.5

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

Byte Addr ess	Bit Addr ess	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		0b	
	3	VHW	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0b	Not supported, ignore write, read back as 0b
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		xb	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0b	Normal REFCLK mode only supported. Ignore write, read back as 0b
Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968d	+78 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	19200d	+75 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	65500d	131mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	15000d	30 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	60500d	121mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	17500d	35 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	28184d	+4.5 dBm (assumes 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	5012d	-3.0 dBm (assumes 1.5dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	25119d	+4.0 dBm (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	5623d	-2.5 dBm (assumes 1.5dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	12589d	+1.0 dBm (assumes 1.5dB accuracy)
36-37		NVE	2B	RX Power Low Alarm	Threshold for alarm	50d	-23 dBm (assumes 1.5dB accuracy)
38-		NVE	2B	RX Power High	Threshold for warn	11220	+0.5 dBm

39				Warning		d	(assumes 1.5dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	63d	-22 dBm (assumes 1.5dB accuracy)
42-43		NVE	2B	AUX1 High Alarm	Threshold for alarm	11520d	45°C (assumes 0.5°C accuracy)
44-45		NVE	2B	AUX1Low Alarm	Threshold for alarm	5120d	20°C (assumes 0.5°C accuracy)
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	10240d	40°C (assumes 0.5°C accuracy)
48-49		NVE	2B	AUX1Low Warning	Threshold for warn	6144d	24°C (assumes 0.5°C accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	55000d	5.50 V
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	45000d	4.50 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	53000d	5.30 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47000d	4.70 V (assumes 50mV accuracy)
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	xxxxb	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000b	Ignore write, return 000b
	0	VH	1b	VPS Bypass Control	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0b
60-69		R	10B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
71		VH	1B	Actual BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
72-73		VH	2B	Wavelength Set	Host wavelength set	0000h	Not Supp. Ignore write, return 0000h.
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not Supp., return 0000h.
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not Supp. Ignore W, return 00h.
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not Supp. Ignore W, return 00h.
78-79		R	2B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in MSA
98-		VHR	2B	Reserved A/D Chan.	Reserved	xxxxh	Report 0000h on read.

99							
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
104-105		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	xxxxh	Report TEC temperature
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	xxxxh	Report +5V Supply voltage.
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host, power up and reset to 0b
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b, Do not reset
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes
	1	VHR	1b	LOS State	Reports LOS	xb	Ignore writes
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes
111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if TX CDR loss of lock.
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	4	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if RX CDR loss of lock.
	3	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	2-0	R	3b	Reserved	Reserved	000b	Ignore writes, report 000b.
112-117		R	6B	Reserved			Ignore writes, report 00h.
118	7-1	R	7b	Reserved	Reserved	0b	Ignore writes, report 0000000b.
	0	VH	1b	Error Checking	Switches Packet Error Checking	xb	Host sets to 1b to enable packet error checking. Power up and reset to 0b.
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Changes host password value if current correct password entered in 123-126. Power up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Allows Write Access to Customer EEPROM. Power up and reset to 00000000h.

127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.
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Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Addr ess	Bit Addr ess	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
129	6-7	2b	Ext. Identifier - Module Power Class	Defines Module Power Class	10b	Indicates Power Dissipation <3.5W under all specified operating conditions.
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Module does not need REFCLK
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	To be supported on a customer basis. Value is 1b if CLEI Code is present in Table 2
129	0-2	3b	Ext. Identifier - Reserved	Reserved	2h	Power Level 3 (< 3.5W)
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	
	6	1b	10GBASE-LR		0b	
	5	1b	10GBASE-ER		1b	
	4	1b	Reserved		0b	
	3	1b	10GBASE-SW		0b	
	2	1b	10GBASE-LW		0b	
	1	1b	10GBASE-EW		1b	
	0	1b	Reserved		0b	
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I		0b	
	6	1b	1200-SM-LL-L		0b	
	5	1b	Extended reach 1550nm		1b	
	4	1b	Intermediate reach 1310nm		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved		0b	
	6	1b	Reserved		0b	
	5	1b	Reserved		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	

	0	1b	Reserved	0b	
Lower Speed Link Compliance Codes					
134	7	1b	1000BASE-SX/1xFC MMF	0b	
	6	1b	1000BASE-LX/1xFC SMF	0b	
	5	1b	2xFC MMF	0b	
	4	1b	2xFC SMF	0b	
	3	1b	OC-48-SR	0b	
	2	1b	OC-48-IR	0b	
	1	1b	OC-48-LR	0b	
	0	1b	Reserved	0b	
SONET/SDH Interconnect Link Compliance Codes					
135	7	1b	I-64.1r	0b	
	6	1b	I-64.1	0b	
	5	1b	I-64.2r	0b	
	4	1b	I-64.2	0b	
	3	1b	I-64.3	0b	
	2	1b	I-64.5	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
SONET/SDH Short Haul Link Compliance Codes					
136	7	1b	S-64.1	0b	
	6	1b	S-64.2a	0b	
	5	1b	S-64.2b	1b	(OC-192 IR-2 support)
	4	1b	S-64.3a	0b	
	3	1b	S-64.3b	0b	
	2	1b	S-64.5a	0b	
SONET/SDH Short Haul Link Compliance Codes					
	1	1b	S-64.5b	0b	
	0	1b	Reserved	0b	
SONET/SDH Long Haul Link Compliance Codes					
137	7	1b	L-64.1	0b	
	6	1b	L-64.2a	0b	
	5	1b	L-64.2b	0b	
	4	1b	L-64.2c	0b	
	3	1b	L-64.3	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
SONET/SDH Very Long Haul Link Compliance Codes					
138	7	1b	V-64.2a	0b	
	6	1b	V-64.2b	0b	
	5	1b	V-64.3	0b	
	4	1b	Reserved	0b	
	3	1b	Reserved	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
Encoding					
139	7	1b	64B/66B	1b	10GE/10GFC Coding
	6	1b	8B/10B	1b	Not used in standards but is supported
	5	1b	SONET Scrambled	1b	OC-192 Coding
	4	1b	NRZ	1b	NRZ only supported
	3	1b	RZ	0b	
	2-0	3b	Reserved	000b	

140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	63h	9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	6Fh	11100 Mbps for FTLX version 10700 Mbps for FTRX version
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	28h	40km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not supported
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm fiber, units of 1 m	00h	Not supported
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0111b	1550nm EML laser
	3	1b	Wavelength Control		0b	No wavelength control
	2	1b	Cooled Transmitter		1b	Transmitter is cooled
	1	1b	Detector Type		0b	PIN Detector
	0	1b	Tunable Transmitter		0b	Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	
	6	1b	CDR Support for 10.3 Gb/s		1b	
	5	1b	CDR Support for 10.5 Gb/s		1b	
	4	1b	CDR Support for 10.7 Gb/s		1b	
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported for FTLX versions Not supported for FTRX versions
	2	1b	Reserved		0b	
	1	1b	Line-side Loopback Mode Supported		0b	
	0	1b	XFI Loopback Supported		1b	
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	“FTLX-1611-3 ”	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	7918h	1550nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	0DACH	17.5nm * (200/nm). Corresponds to 1530-1565nm range.

190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
				EXTENDED ID FIELDS		
192-195		4B	Power Supply Fields			
192		1B	Maximum Power Dissipation (/20mW)		AFh	= 3500 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		96h	= 1500 mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0111b	= 350 mA
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0100b	= 400 mA
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		1000b	= 800 mA (actual is 750mA)
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000b	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	e.g., “A000000”	Encoded serial number
212-217		6B	Date code	Vendor’s manufacturing date	e.g., “030106“	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	May be blank
			Diagnostic Monitoring / Variable Power Supply / Special Function Support			
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
			Enhanced Options			
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		0b	Not supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
222	4-7	4b	Aux A/D Input 1		0100b	TEC Temperature Monitor on Aux A/D 1
	0-3	4b	Aux A/D Input 2		0110b	+5V Supply Monitor on Aux A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

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Customer Specific Fields

<i>Data Addr ess</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224- 255	32	TBD	TBD	All 00h at present	

Upper Memory Map: I2C Addr: A0h, Table 2

Customer Writable EEPROM. Writable with correct host password entry. Always readable.

Upper Memory Map: I2C Addr: A0h, Table 3–

Used by Finisar for internal parameter storage. Not readable or Writable without Finisar Password.

Product: FTLX-1811-3

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

Byte Addr	Bit Addr	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		0b	
	3	VHW	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0b	Not supported, ignore write, read back as 0b
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		xb	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0b	Normal REFCLK mode only supported. Ignore write, read back as 0b
Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968d	+78 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	19200d	+75 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	65500d	131 mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	15000d	30 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	60500d	121 mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	17500d	35 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	44668d	+6.5 dBm (assumes 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	6310d	-2.0 dBm (assumes 1.5dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	39811d	+6.0 dBm (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	7079d	-1.5 dBm (assumes 1.5dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	3162d	-5.0 dBm (assumes 1.5dB accuracy)
36-37		NVE	2B	RX Power Low Alarm	Threshold for alarm	25d	-26 dBm (assumes 1.5dB accuracy)
38-39		NVE	2B	RX Power High Warning	Threshold for warn	2818d	-5.5 dBm (assumes 1.5dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	28d	-25.5 dBm (assumes 1.5dB accuracy)

42-43		NVE	2B	AUX1 High Alarm	Threshold for alarm	11520d	45°C (assumes 0.5°C accuracy)
44-45		NVE	2B	AUX1 Low Alarm	Threshold for alarm	5120d	25°C (assumes 0.5°C accuracy)
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	10240d	40°C (assumes 0.5°C accuracy)
48-49		NVE	2B	AUX1 Low Warning	Threshold for warn	6144d	30°C (assumes 0.5°C accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	55000d	5.50 V
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	45000d	4.50 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	53000d	5.30 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47000d	4.70 V (assumes 50mV accuracy)
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	xxxxb	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000b	Ignore write, return 000b
	0	VH	1b	VPS Bypass Control	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0b
60-69		R	10B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
71		VH	1B	Actual BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
72-73		VH	2B	Wavelength Set	Host wavelength set	0000h	Not Supp. Ignore write, return 0000h.
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not Supp., return 0000h.
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not Supp. Ignore W, return 00h.
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not Supp. Ignore W, return 00h.
78-79		R	2B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in MSA
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Report 0000h on read.
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value

104-105							in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	xxxxh	Report TEC temperature
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	xxxxh	Report +5V Supply voltage.
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host, power up and reset to 0b
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b, Do not reset
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes
	1	VHR	1b	LOS State	Reports LOS	xb	Ignore writes
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes
111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if TX CDR loss of lock.
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	4	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if RX CDR loss of lock.
	3	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	2-0	R	3b	Reserved	Reserved	000b	Ignore writes, report 000b.
112-117		R	6B	Reserved			Ignore writes, report 00h.
118	7-1	R	7b	Reserved	Reserved	0b	Ignore writes, report 0000000b.
	0	VH	1b	Error Checking	Switches Packet Error Checking	xb	Host sets to 1b to enable packet error checking. Power up and reset to 0b.
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Changes host password value if current correct password entered in 123-126. Power up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Allows Write Access to Customer EEPROM. Power up and reset to 00000000h.
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Address	Bit Address	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
129	6-7	2b	Ext. Identifier -	Defines Module	10b	Indicates Power Dissipation

			Module Power Class	Power Class		<3.5W under all specified operating conditions.
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Module does not need REFCLK
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	To be supported on a customer basis. Value is 1b if CLEI Code is present in Table 2
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000b	
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	
	6	1b	10GBASE-LR		0b	
	5	1b	10GBASE-ER		0b	
	4	1b	Reserved		0b	
	3	1b	10GBASE-SW		0b	
	2	1b	10GBASE-LW		0b	
	1	1b	10GBASE-EW		0b	
	0	1b	Reserved		0b	
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I		0b	
	6	1b	1200-SM-LL-L		0b	
	5	1b	Extended reach 1550nm		0b	
	4	1b	Intermediate reach 1310nm		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved		0b	
	6	1b	Reserved		0b	
	5	1b	Reserved		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF		0b	
	6	1b	1000BASE-LX/1xFC SMF		0b	
	5	1b	2xFC MMF		0b	
	4	1b	2xFC SMF		0b	
	3	1b	OC-48-SR		0b	
	2	1b	OC-48-IR		0b	
	1	1b	OC-48-LR		0b	
	0	1b	Reserved		0b	
		SONET/SDH Interconnect Link Compliance Codes				
135	7	1b	I-64.1r		0b	
	6	1b	I-64.1		0b	
	5	1b	I-64.2r		0b	
	4	1b	I-64.2		0b	

	3	1b	I-64.3		0b	
	2	1b	I-64.5		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Short Haul Link Compliance Codes				
136	7	1b	S-64.1		0b	
	6	1b	S-64.2a		0b	
	5	1b	S-64.2b		0b	(OC-192 IR-2 support)
	4	1b	S-64.3a		0b	
	3	1b	S-64.3b		0b	
	2	1b	S-64.5a		0b	
	1	1b	S-64.5b		0b	
	0	1b	Reserved		0b	
		SONET/SDH Long Haul Link Compliance Codes				
137	7	1b	L-64.1		0b	
	6	1b	L-64.2a		0b	
	5	1b	L-64.2b		0b	
	4	1b	L-64.2c		0b	
	3	1b	L-64.3		0b	
	2	1b	G959.1 P1L1-2D2		1b	New ITU-T 80km SDH Standard (2003)
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Very Long Haul Link Compliance Codes				
138	7	1b	V-64.2a		0b	
	6	1b	V-64.2b		0b	
	5	1b	V-64.3		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Encoding				
139	7	1b	64B/66B		1b	10GE/10GFC Coding
	6	1b	8B/10B		1b	Not used in standards but is supported
	5	1b	SONET Scrambled		1b	OC-192 Coding
	4	1b	NRZ		1b	NRZ only supported
	3	1b	RZ		0b	
	2-0	3b	Reserved		000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	63h	9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	6Fh	11100 Mbps for FTLX version 10700 Mbps for FTRX version
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	50h	80km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not supported
145		1B	Length (62.5m)	Link length supported	00h	Not supported

				for 62.5/125 mm fiber, units of 1 m		
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0111b	1550nm EML laser
	3	1b	Wavelength Control		0b	No wavelength control
	2	1b	Cooled Transmitter		1b	Transmitter is cooled
	1	1b	Detector Type		1b	APD Detector
	0	1b	Tunable Transmitter		0b	Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	
	6	1b	CDR Support for 10.3 Gb/s		1b	
	5	1b	CDR Support for 10.5 Gb/s		1b	
	4	1b	CDR Support for 10.7 Gb/s		1b	
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported for FTLX versions Not supported for FTRX versions
	2	1b	Reserved		0b	
	1	1b	Line-side Loopback Mode Supported		0b	
	0	1b	XFI Loopback Supported		1b	
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	“FTLX-1811-3 ”	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	7918h	1550nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	0DACH	17.5nm * (200/nm). Corresponds to 1530-1565nm range.
190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
EXTENDED ID FIELDS						
192-195		4B	Power Supply Fields			
192		1B	Maximum Power Dissipation (/20mW)		AFh	= 3500 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		96h	= 1500 mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0111b	= 350 mA
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0100b	= 400 mA
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		1000b	= 800 mA (actual is 750mA)
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000b	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	e.g., “A000000”	Encoded serial number
212-217		6B	Date code	Vendor’s manufacturing date	e.g., “030106”	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	May be blank

			Diagnostic Monitoring / Variable Power Supply / Special Function Support			
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
			Enhanced Options			
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		0b	Not supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
222	4-7	4b	Aux A/D Input 1		0100b	TEC Temperature Monitor on Aux A/D 1
	0-3	4b	Aux A/D Input 2		0110b	+5V Supply Monitor on Aux A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

Customer Specific Fields

Data Addr ess	Size (Bytes)	Field Name	Description of Field	Value	Value Meaning
224-255	32	TBD	TBD	All 00h at present	

Upper Memory Map: I2C Addr: A0h, Table 2

Customer Writable EEPROM. Writable with correct host password entry. Always readable.

Upper Memory Map: I2C Addr: A0h, Table 3–

Used by Finisar for internal parameter storage. Not readable or Writable without Finisar Password.

Product: FTLX-3811-3

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

Byte Addr ess	Bit Addr ess	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		xxxxb	Ignore for Intel or Gennum
	3	VHW	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0b	Not supported, ignore write, read back as 0b
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		xb	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0b	Normal REFCLK mode only supported. Ignore write, read back as 0b
Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968d	+78 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	19200d	+75 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	65500d	131 mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	15000d	30 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	60500d	121 mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	17500d	35 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	31623d	+ 5 dBm (assumes 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	5012d	-3.0 dBm (assumes 1.5dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	28184d	+ 4.5 dBm (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	5623d	-2.5 dBm (assumes 1.5dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	3162d	-5.0 dBm (assumes 1.5dB accuracy)
36-37		NVE	2B	Rx Power Low Alarm	Threshold for alarm	25d	-26dBm (assumes 1.5dB accuracy)
38-39		NVE	2B	RX Power High Warning	Threshold for warn	2818d	-5.5 dBm (assumes 1.5dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	28d	-25.5 dBm (assumes 1.5dB accuracy)
42-		NVE	2B	AUX1 High Alarm	Threshold for alarm	11520	45°C

43						d	(assumes 0.5°C accuracy)
44-45		NVE	2B	AUX1 Low Alarm	Threshold for alarm	5120d	25°C (assumes 0.5°C accuracy)
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	10240d	40°C (assumes 0.5°C accuracy)
48-49		NVE	2B	AUX1 Low Warning	Threshold for warn	6144d	30°C (assumes 0.5°C accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	55000d	5.50 V
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	45000d	4.50 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	53000d	5.30 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47000d	4.70 V (assumes 50mV accuracy)
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	xxxxb	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000b	Ignore write, return 000b
	0	VH	1b	VPS Bypass Control	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0b
60-69		R	10B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
71		VH	1B	Actual BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
72-73		VH	2B	Wavelength Set	Host wavelength set	0000h	Not Supp. Ignore write, return 0000h.
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not Supp., return 0000h.
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not Supp. Ignore W, return 00h.
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not Supp. Ignore W, return 00h.
78-79		R	2B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in MSA
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Report 0000h on read.
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
104-		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value

105							in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	xxxxh	Report TEC temperature
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	xxxxh	Report +5V Supply voltage.
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host, power up and reset to 0b
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b, Do not reset
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes
	1	VHR	1b	LOS State	Reports LOS	xb	Ignore writes
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes
111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if TX CDR loss of lock.
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	4	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if RX CDR loss of lock.
	3	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	2-0	R	3b	Reserved	Reserved	000b	Ignore writes, report 000b.
112-117		R	6B	Reserved			Ignore writes, report 00h.
118	7-1	R	7b	Reserved	Reserved	0b	Ignore writes, report 0000000b.
	0	VH	1b	Error Checking	Switches PEC	xb	Host sets to 1b to enable packet error checking. Power up and reset to 0b.
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Changes host password value if current correct password entered in 123-126. Power up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Allows Write Access to Customer EEPROM. Power up and reset to 00000000h.
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Address	Bit Address	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
129	6-7	2b	Ext. Identifier -	Defines Module	10b	Indicates Power Dissipation

			Module Power Class	Power Class		<3.5W under all specified operating conditions.
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Module does not need REFCLK
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	To be supported on a customer basis. Value is 1b if CLEI Code is present in Table 2
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000b	
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	
	6	1b	10GBASE-LR		0b	
	5	1b	10GBASE-ER		0b	
	4	1b	Reserved		0b	
	3	1b	10GBASE-SW		0b	
	2	1b	10GBASE-LW		0b	
	1	1b	10GBASE-EW		0b	
	0	1b	Reserved		0b	
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I		0b	
	6	1b	1200-SM-LL-L		0b	
	5	1b	Extended reach 1550nm		0b	
	4	1b	Intermediate reach 1310nm		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved		0b	
	6	1b	Reserved		0b	
	5	1b	Reserved		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF		0b	
	6	1b	1000BASE-LX/1xFC SMF		0b	
	5	1b	2xFC MMF		0b	
	4	1b	2xFC SMF		0b	
	3	1b	OC-48-SR		0b	
	2	1b	OC-48-IR		0b	
	1	1b	OC-48-LR		0b	
	0	1b	Reserved		0b	
		SONET/SDH Interconnect Link Compliance Codes				
135	7	1b	I-64.1r		0b	
	6	1b	I-64.1		0b	
	5	1b	I-64.2r		0b	
	4	1b	I-64.2		0b	

	3	1b	I-64.3		0b	
	2	1b	I-64.5		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Short Haul Link Compliance Codes				
136	7	1b	S-64.1		0b	
	6	1b	S-64.2a		0b	
	5	1b	S-64.2b		0b	
	4	1b	S-64.3a		0b	
	3	1b	S-64.3b		0b	
	2	1b	S-64.5a		0b	
	1	1b	S-64.5b		0b	
	0	1b	Reserved		0b	
		SONET/SDH Long Haul Link Compliance Codes				
137	7	1b	L-64.1		0b	
	6	1b	L-64.2a		0b	
	5	1b	L-64.2b		0b	
	4	1b	L-64.2c		0b	
	3	1b	L-64.3		0b	
	2	1b	G.959.1 P1L1-2D2		1b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Very Long Haul Link Compliance Codes				
138	7	1b	V-64.2a		0b	
	6	1b	V-64.2b		0b	
	5	1b	V-64.3		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Encoding				
139	7	1b	64B/66B		1b	10GE/10GFC Coding
	6	1b	8B/10B		1b	Not used in standards but is supported
	5	1b	SONET Scrambled		1b	OC-192 Coding
	4	1b	NRZ		1b	NRZ only supported
	3	1b	RZ		0b	
	2-0	3b	Reserved		000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	63h	9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	6Fh	11100 Mbps for FTLX versions 10700 Mbps for FTRX versions
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	50h	80km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not supported
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm	00h	Not supported

				fiber, units of 1 m		
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0111b	1550nm EML laser
	3	1b	Wavelength Control		0b	No wavelength control
	2	1b	Cooled Transmitter		1b	Transmitter is cooled
	1	1b	Detector Type		1b	APD Detector
	0	1b	Tunable Transmitter		0b	Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	
	6	1b	CDR Support for 10.3 Gb/s		1b	
	5	1b	CDR Support for 10.5 Gb/s		1b	
	4	1b	CDR Support for 10.7 Gb/s		1b	
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported for FTLX version Not supported for FTRX version
	2	1b	Reserved		0b	
	1	1b	Line-side Loopback Mode Supported		0b	
	0	1b	XFI Loopback Supported		1b	
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	“FTRX-3811-3xx ”	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	xxxxh	15xx.xx nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	14h	0.1nm * (200/nm).
190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
EXTENDED ID FIELDS						
192-195	4B	Power Supply Fields				
192		1B	Maximum Power Dissipation (/20mW)		AFh	= 3500 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		96h	= 1500 mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0111b	= 350 mA
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0100b	= 400 mA
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		1000b	= 800 mA (actual is 750mA)
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000b	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	e.g., “A000000”	Encoded serial number
212-217		6B	Date code	Vendor’s manufacturing date	e.g., “030106”	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	May be blank
Diagnostic Monitoring / Variable Power Supply / Special Function Support						

220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
			Enhanced Options			
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		0b	Not supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
222	4-7	4b	Aux A/D Input 1		0100b	TEC Temperature Monitor on Aux A/D 1
	0-3	4b	Aux A/D Input 2		0110b	+5V Supply Monitor on Aux A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

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Customer Specific Fields

<i>Data Addr ess</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224-255	32	TBD	TBD	All 00h at present	

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3

Upper Memory Map: I2C Addr: A0h, Table 2

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Customer Writable EEPROM. Writable with correct host password entry. Always readable.

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Upper Memory Map: I2C Addr: A0h, Table 3

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Product: FTLX-3812-M3

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

Byte Addr ess	Bit Addr ess	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		xxxxb	Ignore for Intel or Gennum
	3	VHW	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0b	Not supported, ignore write, read back as 0b
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		xb	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0b	Normal REFCLK mode only supported. Ignore write, read back as 0b
Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968d	+78 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	19200d	+75 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	65500d	131 mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	15000d	30 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	60500d	121 mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	17500d	35 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	35481d	+5.5 dBm (assumes a 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	3162d	-5.0 dBm (assumes 1.5dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	31623d	+ 5 dB (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	3548d	-4.5 dBm (assumes 1.5dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	3162d	-5.0 dBm (assumes 1.5dB accuracy)
36-37		NVE	2B	Rx Power Low Alarm	Threshold for alarm	25d	-26dBm (assumes 1.5dB accuracy)
38-39		NVE	2B	RX Power High Warning	Threshold for warn	2818d	-5.5 dBm (assumes 1.5dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	28d	-25.5 dBm (assumes 1.5dB accuracy)
42-		NVE	2B	AUX1 High Alarm	Threshold for alarm	11520	45°C

43						d	(assumes 0.5°C accuracy)
44-45		NVE	2B	AUX1 Low Alarm	Threshold for alarm	5120d	25°C (assumes 0.5°C accuracy)
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	10240d	40°C (assumes 0.5°C accuracy)
48-49		NVE	2B	AUX1 Low Warning	Threshold for warn	6144d	30°C (assumes 0.5°C accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	55000d	5.50 V
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	45000d	4.50 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	53000d	5.30 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47000d	4.70 V (assumes 50mV accuracy)
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	xxxxb	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000b	Ignore write, return 000b
	0	VH	1b	VPS Bypass Control	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0b
60-69		R	10B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
71		VH	1B	Actual BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
72-73		VH	2B	Wavelength Set	Host wavelength set	0000h	Not Supp. Ignore write, return 0000h.
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not Supp., return 0000h.
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not Supp. Ignore W, return 00h.
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not Supp. Ignore W, return 00h.
78-79		R	2B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in MSA
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Report 0000h on read.
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
104-		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value

105							in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	xxxxh	Report TEC temperature
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	xxxxh	Report +5V Supply voltage.
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host, power up and reset to 0b
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b, Do not reset
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes
	1	VHR	1b	LOS State	Reports LOS	xb	Ignore writes
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes
111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if TX CDR loss of lock.
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	4	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if RX CDR loss of lock.
	3	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	2-0	R	3b	Reserved	Reserved	000b	Ignore writes, report 000b.
112-117		R	6B	Reserved			Ignore writes, report 00h.
118	7-1	R	7b	Reserved	Reserved	0b	Ignore writes, report 0000000b.
	0	VH	1b	Error Checking	Switches PEC	xb	Host sets to 1b to enable packet error checking. Power up and reset to 0b.
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Changes host password value if current correct password entered in 123-126. Power up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Allows Write Access to Customer EEPROM. Power up and reset to 00000000h.
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Address	Bit Address	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
129	6-7	2b	Ext. Identifier -	Defines Module	10b	Indicates Power Dissipation

			Module Power Class	Power Class		<3.5W under all specified operating conditions.
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Module does not need REFCLK
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	To be supported on a customer basis. Value is 1b if CLEI Code is present in Table 2
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000b	
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	
	6	1b	10GBASE-LR		0b	
	5	1b	10GBASE-ER		0b	
	4	1b	Reserved		0b	
	3	1b	10GBASE-SW		0b	
	2	1b	10GBASE-LW		0b	
	1	1b	10GBASE-EW		0b	
	0	1b	Reserved		0b	
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I		0b	
	6	1b	1200-SM-LL-L		0b	
	5	1b	Extended reach 1550nm		0b	
	4	1b	Intermediate reach 1310nm		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved		0b	
	6	1b	Reserved		0b	
	5	1b	Reserved		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF		0b	
	6	1b	1000BASE-LX/1xFC SMF		0b	
	5	1b	2xFC MMF		0b	
	4	1b	2xFC SMF		0b	
	3	1b	OC-48-SR		0b	
	2	1b	OC-48-IR		0b	
	1	1b	OC-48-LR		0b	
	0	1b	Reserved		0b	
		SONET/SDH Interconnect Link Compliance Codes				
135	7	1b	I-64.1r		0b	
	6	1b	I-64.1		0b	
	5	1b	I-64.2r		0b	
	4	1b	I-64.2		0b	

	3	1b	I-64.3		0b	
	2	1b	I-64.5		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Short Haul Link Compliance Codes				
136	7	1b	S-64.1		0b	
	6	1b	S-64.2a		0b	
	5	1b	S-64.2b		0b	
	4	1b	S-64.3a		0b	
	3	1b	S-64.3b		0b	
	2	1b	S-64.5a		0b	
	1	1b	S-64.5b		0b	
	0	1b	Reserved		0b	
		SONET/SDH Long Haul Link Compliance Codes				
137	7	1b	L-64.1		0b	
	6	1b	L-64.2a		0b	
	5	1b	L-64.2b		0b	
	4	1b	L-64.2c		0b	
	3	1b	L-64.3		0b	
	2	1b	G.959.1 P1L1-2D2		1b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Very Long Haul Link Compliance Codes				
138	7	1b	V-64.2a		0b	
	6	1b	V-64.2b		0b	
	5	1b	V-64.3		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Encoding				
139	7	1b	64B/66B		1b	10GE/10GFC Coding
	6	1b	8B/10B		1b	Not used in standards but is supported
	5	1b	SONET Scrambled		1b	OC-192 Coding
	4	1b	NRZ		1b	NRZ only supported
	3	1b	RZ		0b	
	2-0	3b	Reserved		000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	63h	9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	6Fh	11100 Mbps for FTLX version. 10700 Mbps for FTRX version
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	50h	80km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not supported
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm	00h	Not supported

				fiber, units of 1 m		
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0111b	1550nm EML laser
	3	1b	Wavelength Control		0b	No wavelength control
	2	1b	Cooled Transmitter		1b	Transmitter is cooled
	1	1b	Detector Type		1b	APD Detector
	0	1b	Tunable Transmitter		0b	Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	
	6	1b	CDR Support for 10.3 Gb/s		1b	
	5	1b	CDR Support for 10.5 Gb/s		1b	
	4	1b	CDR Support for 10.7 Gb/s		1b	
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported for FTLX version. Not supported for FTRX version.
	2	1b	Reserved		0b	
	1	1b	Line-side Loopback Mode Supported		0b	
	0	1b	XFI Loopback Supported		1b	
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	“FTLX-3812-M3xx ”	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	xxxxh	15xx.xx nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	14h	0.1nm * (200/nm).
190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
EXTENDED ID FIELDS						
192-195	4B	Power Supply Fields				
192		1B	Maximum Power Dissipation (/20mW)		AFh	= 3500 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		96h	= 1500 mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0111b	= 350 mA
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0100b	= 400 mA
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		1000b	= 800 mA (actual is 750mA)
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000b	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	e.g., “A000000”	Encoded serial number
212-217		6B	Date code	Vendor’s manufacturing date	e.g., “030106”	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	May be blank
Diagnostic Monitoring / Variable Power Supply / Special Function Support						

220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
			Enhanced Options			
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		1b	Supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
222	4-7	4b	Aux A/D Input 1		0100b	Laser Temperature Monitor on Aux A/D 1
	0-3	4b	Aux A/D Input 2		0110b	+5V Supply Monitor on Aux A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

Customer Specific Fields

<i>Data Address</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224-255	32	Vendor Specific EEPROM	TBD	All 00h at present	

Upper Memory Map: I2C Addr: A0h, Table 2

Customer Writable EEPROM. Writable with correct host password entry. Always readable.

Upper Memory Map: I2C Addr: A0h, Table 3

Used by Finisar for internal parameter storage. Not readable or Writable without Finisar Password.

Product: FTLX-3812-S3

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

Byte Addr ess	Bit Addr ess	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		xxxxb	Ignore for Intel or Gennum
	3	VHW	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0b	Not supported, ignore write, read back as 0b
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		xb	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0b	Normal REFCLK mode only supported. Ignore write, read back as 0b
Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968d	+78 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	19200d	+75 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	65500d	131 mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	15000d	30 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	60500d	121 mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	17500d	35 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	31623d	+5 dBm (assumes 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	5012d	-3.0 dBm (assumes 1.5dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	28184d	+4.5 dBm (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	5623d	-2.5 dBm (assumes 1.5dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	3162d	-5.0 dBm (assumes 1.5dB accuracy)
36-37		NVE	2B	Rx Power Low Alarm	Threshold for alarm	25d	-26dBm (assumes 1.5dB accuracy)
38-39		NVE	2B	RX Power High Warning	Threshold for warn	2818d	-5.5 dBm (assumes 1.5dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	28d	-25.5 dBm (assumes 1.5dB accuracy)
42-		NVE	2B	AUX1 High Alarm	Threshold for alarm	11520	45°C

43						d	(assumes 0.5°C accuracy)
44-45		NVE	2B	AUX1 Low Alarm	Threshold for alarm	5120d	25°C (assumes 0.5°C accuracy)
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	10240d	40°C (assumes 0.5°C accuracy)
48-49		NVE	2B	AUX1 Low Warning	Threshold for warn	6144d	30°C (assumes 0.5°C accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	55000d	5.50 V
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	45000d	4.50 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	53000d	5.30 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47000d	4.70 V (assumes 50mV accuracy)
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	xxxxb	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000b	Ignore write, return 000b
	0	VH	1b	VPS Bypass Control	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0b
60-69		R	10B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
71		VH	1B	Actual BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
72-73		VH	2B	Wavelength Set	Host wavelength set	0000h	Not Supp. Ignore write, return 0000h.
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not Supp., return 0000h.
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not Supp. Ignore W, return 00h.
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not Supp. Ignore W, return 00h.
78-79		R	2B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in MSA
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Report 0000h on read.
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
104-		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value

105							in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	xxxxh	Report TEC temperature
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	xxxxh	Report +5V Supply voltage.
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host, power up and reset to 0b
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b, Do not reset
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes
	1	VHR	1b	LOS State	Reports LOS	xb	Ignore writes
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes
111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if TX CDR loss of lock.
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	4	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if RX CDR loss of lock.
	3	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	2-0	R	3b	Reserved	Reserved	000b	Ignore writes, report 000b.
112-117		R	6B	Reserved			Ignore writes, report 00h.
118	7-1	R	7b	Reserved	Reserved	0b	Ignore writes, report 0000000b.
	0	VH	1b	Error Checking	Switches PEC	xb	Host sets to 1b to enable packet error checking. Power up and reset to 0b.
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Changes host password value if current correct password entered in 123-126. Power up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Allows Write Access to Customer EEPROM. Power up and reset to 00000000h.
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Address	Bit Address	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
129	6-7	2b	Ext. Identifier -	Defines Module	10b	Indicates Power Dissipation

			Module Power Class	Power Class		<3.5W under all specified operating conditions.
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Module does not need REFCLK
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	To be supported on a customer basis. Value is 1b if CLEI Code is present in Table 2
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000b	
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	
	6	1b	10GBASE-LR		0b	
	5	1b	10GBASE-ER		0b	
	4	1b	Reserved		0b	
	3	1b	10GBASE-SW		0b	
	2	1b	10GBASE-LW		0b	
	1	1b	10GBASE-EW		0b	
	0	1b	Reserved		0b	
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I		0b	
	6	1b	1200-SM-LL-L		0b	
	5	1b	Extended reach 1550nm		0b	
	4	1b	Intermediate reach 1310nm		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved		0b	
	6	1b	Reserved		0b	
	5	1b	Reserved		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF		0b	
	6	1b	1000BASE-LX/1xFC SMF		0b	
	5	1b	2xFC MMF		0b	
	4	1b	2xFC SMF		0b	
	3	1b	OC-48-SR		0b	
	2	1b	OC-48-IR		0b	
	1	1b	OC-48-LR		0b	
	0	1b	Reserved		0b	
		SONET/SDH Interconnect Link Compliance Codes				
135	7	1b	I-64.1r		0b	
	6	1b	I-64.1		0b	
	5	1b	I-64.2r		0b	
	4	1b	I-64.2		0b	

	3	1b	I-64.3		0b	
	2	1b	I-64.5		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Short Haul Link Compliance Codes				
136	7	1b	S-64.1		0b	
	6	1b	S-64.2a		0b	
	5	1b	S-64.2b		0b	
	4	1b	S-64.3a		0b	
	3	1b	S-64.3b		0b	
	2	1b	S-64.5a		0b	
	1	1b	S-64.5b		0b	
	0	1b	Reserved		0b	
		SONET/SDH Long Haul Link Compliance Codes				
137	7	1b	L-64.1		0b	
	6	1b	L-64.2a		0b	
	5	1b	L-64.2b		0b	
	4	1b	L-64.2c		0b	
	3	1b	L-64.3		0b	
	2	1b	G.959.1 P1L1-2D2		1b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Very Long Haul Link Compliance Codes				
138	7	1b	V-64.2a		0b	
	6	1b	V-64.2b		0b	
	5	1b	V-64.3		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Encoding				
139	7	1b	64B/66B		1b	10GE/10GFC Coding
	6	1b	8B/10B		1b	Not used in standards but is supported
	5	1b	SONET Scrambled		1b	OC-192 Coding
	4	1b	NRZ		1b	NRZ only supported
	3	1b	RZ		0b	
	2-0	3b	Reserved		000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	63h	9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	6Fh	11100 Mbps for FTLX versions 10700 Mbps for FTRX versions
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	50h	80km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not supported
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm	00h	Not supported

				fiber, units of 1 m		
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0111b	1550nm EML laser
	3	1b	Wavelength Control		0b	No wavelength control
	2	1b	Cooled Transmitter		1b	Transmitter is cooled
	1	1b	Detector Type		1b	APD Detector
	0	1b	Tunable Transmitter		0b	Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	
	6	1b	CDR Support for 10.3 Gb/s		1b	
	5	1b	CDR Support for 10.5 Gb/s		1b	
	4	1b	CDR Support for 10.7 Gb/s		1b	
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported for FTLX versions. Not supported for FTRX versions
	2	1b	Reserved		0b	
	1	1b	Line-side Loopback Mode Supported		0b	
	0	1b	XFI Loopback Supported		1b	
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	“FTRX-3811-3xx ”	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	xxxxh	15xx.xx nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	14h	0.1nm * (200/nm).
190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
EXTENDED ID FIELDS						
192-195	4B	Power Supply Fields				
192		1B	Maximum Power Dissipation (/20mW)		AFh	= 3500 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		96h	= 1500 mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0111b	= 350 mA
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0100b	= 400 mA
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		1000b	= 800 mA (actual is 750mA)
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000b	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	e.g., “A000000”	Encoded serial number
212-217		6B	Date code	Vendor’s manufacturing date	e.g., “030106”	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	May be blank

			Diagnostic Monitoring / Variable Power Supply / Special Function Support			
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
			Enhanced Options			
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		0b	Not supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
222	4-7	4b	Aux A/D Input 1		0100b	TEC Temperature Monitor on Aux A/D 1
	0-3	4b	Aux A/D Input 2		0110b	+5V Supply Monitor on Aux A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

Customer Specific Fields

Data Address	Size (Bytes)	Field Name	Description of Field	Value	Value Meaning
224-255	32	TBD	TBD	All 00h at present	

Upper Memory Map: I2C Addr: A0h, Table 2

Customer Writable EEPROM. Writable with correct host password entry. Always readable.

Upper Memory Map: I2C Addr: A0h, Table 3

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

Byte Address	Bit Address	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		xxxxb	Ignore for Intel or Gennum
	3	VHW	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0b	Not supported, ignore write, read back as 0b
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		xb	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0b	Normal REFCLK mode only supported. Ignore write, read back as 0b

Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968d	+78 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62208d	-13 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	19200d	+75 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	62976d	-10 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	65500d	131 mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	15000d	30 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	60500d	121 mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	17500d	35 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	35481d	+15.5 dBm (assumes a 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	3162d	-5.0 dBm (assumes 1.5dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	31623d	+ 15 dB (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	3548d	-4.5 dBm (assumes 1.5dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	3162d	-5.0 dBm (assumes 1.5dB accuracy)
36-37		NVE	2B	Rx Power Low Alarm	Threshold for alarm	25d	-16dBm (assumes 1.5dB accuracy)
38-39		NVE	2B	RX Power High Warning	Threshold for warn	2818d	-5.5 dBm (assumes 1.5dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	28d	-15.5 dBm (assumes 1.5dB accuracy)
42-43		NVE	2B	AUX1 High Alarm	Threshold for alarm	11520d	45°C (assumes 0.5°C accuracy)
44-45		NVE	2B	AUX1Low Alarm	Threshold for alarm	5120d	25°C (assumes 0.5°C accuracy)
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	10240d	40°C (assumes 0.5°C accuracy)
48-49		NVE	2B	AUX1Low Warning	Threshold for warn	6144d	30°C (assumes 0.5°C accuracy)
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	55000d	5.50 V
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	45000d	4.50 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	53000d	5.30 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47000d	4.70 V (assumes 50mV accuracy)
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	xxxxb	Written and read by host. Ignore and return 0000b

59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000b	Ignore write, return 000b
	0	VH	1b	VPS Bypass Control	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0b
60-69		R	10B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
70		VH	1B	Acceptable BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
71		VH	1B	Actual BER	For FEC systems	00h	Not Supp. Ignore W, return 00h.
72-73		VH	2B	Wavelength Set	Host wavelength set	0000h	Not Supp. Ignore write, return 0000h.
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not Supp., return 0000h.
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not Supp. Ignore W, return 00h.
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not Supp. Ignore W, return 00h.
78-79		R	2B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xb	Latched on flag condition. Cleared on host read. (See MSA)
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0b	Set and readable by host. Cleared at power-up or reset
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in MSA
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Report 0000h on read.
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-103		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value in Units Defined in MSA
104-105		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	xxxxh	Report TEC temperature
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	xxxxh	Report +5V Supply voltage.
Signal Conditioner Control							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xb	Ignore writes
	6	VH	1b	Soft TX Disable	OR's with input pin	0b	Read and write by host, power up and reset to 0b
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xb	Ignore writes
	4	VHR	1b	P_Down State	Reports P_Down	xb	Ignore writes
	3	VH	1b	Soft P_Down	OR's with input pin	0b	Read and write by host, power up and reset to 0b, Do not reset
	2	VHR	1b	Interrupt State	Reports Interrupt	xb	Ignore writes
	1	VHR	1b	LOS State	Reports LOS	xb	Ignore writes
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xb	Ignore writes

111	7	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if TX CDR loss of lock.
	6	VH	1b	TX_Fault	Identifies TX_Fault	0b	Ignore writes. Conditions for set TBD. Set at 0b for now.
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	4	VH	1b	TX_NR	Identifies TX_NR	xb	Ignore writes. Set if RX CDR loss of lock.
	3	VH	1b	TX_CDR not locked	Identifies TX_LOL	xb	Ignore writes.
	2-0	R	3b	Reserved	Reserved	000b	Ignore writes, report 000b.
112-117		R	6B	Reserved			Ignore writes, report 00h.
118	7-1	R	7b	Reserved	Reserved	0b	Ignore writes, report 0000000b.
	0	VH	1b	Error Checking	Switches PEC	xb	Host sets to 1b to enable packet error checking. Power up and reset to 0b.
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Changes host password value if current correct password entered in 123-126. Power up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Allows Write Access to Customer EEPROM. Power up and reset to 00000000h.
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Addr ess	Bit Addr ess	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
129	6-7	2b	Ext. Identifier - Module Power Class	Defines Module Power Class	10b	Indicates Power Dissipation <3.5W under all specified operating conditions.
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Module does not need REFCLK
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	To be supported on a customer basis. Value is 1b if CLEI Code is present in Table 2
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000b	
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	
	6	1b	10GBASE-LR		0b	
	5	1b	10GBASE-ER		0b	

	4	1b	Reserved	0b	
	3	1b	10GBASE-SW	0b	
	2	1b	10GBASE-LW	0b	
	1	1b	10GBASE-EW	0b	
	0	1b	Reserved	0b	
10 Gigabit Fibre Channel Compliance Codes					
132	7	1b	1200-MX-SN-I	0b	
	6	1b	1200-SM-LL-L	0b	
	5	1b	Extended reach 1550nm	0b	
	4	1b	Intermediate reach 1310nm	0b	
	3	1b	Reserved	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
10 Gigabit Copper Link Compliance Codes					
133	7	1b	Reserved	0b	
	6	1b	Reserved	0b	
	5	1b	Reserved	0b	
	4	1b	Reserved	0b	
	3	1b	Reserved	0b	
	2	1b	Reserved	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
Lower Speed Link Compliance Codes					
134	7	1b	1000BASE-SX/1xFC MMF	0b	
	6	1b	1000BASE-LX/1xFC SMF	0b	
	5	1b	2xFC MMF	0b	
	4	1b	2xFC SMF	0b	
	3	1b	OC-48-SR	0b	
	2	1b	OC-48-IR	0b	
	1	1b	OC-48-LR	0b	
	0	1b	Reserved	0b	
SONET/SDH Interconnect Link Compliance Codes					
135	7	1b	I-64.1r	0b	
	6	1b	I-64.1	0b	
	5	1b	I-64.2r	0b	
	4	1b	I-64.2	0b	
	3	1b	I-64.3	0b	
	2	1b	I-64.5	0b	
	1	1b	Reserved	0b	
	0	1b	Reserved	0b	
SONET/SDH Short Haul Link Compliance Codes					
136	7	1b	S-64.1	0b	
	6	1b	S-64.2a	0b	
	5	1b	S-64.2b	0b	
	4	1b	S-64.3a	0b	
	3	1b	S-64.3b	0b	
	2	1b	S-64.5a	0b	
	1	1b	S-64.5b	0b	
	0	1b	Reserved	0b	
SONET/SDH Long Haul Link Compliance Codes					
137	7	1b	L-64.1	0b	
	6	1b	L-64.2a	0b	
	5	1b	L-64.2b	0b	
	4	1b	L-64.2c	0b	

	3	1b	L-64.3		0b	
	2	1b	G.959.1 P1L1-2D2		1b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		SONET/SDH Very Long Haul Link Compliance Codes				
138	7	1b	V-64.2a		0b	
	6	1b	V-64.2b		0b	
	5	1b	V-64.3		0b	
	4	1b	Reserved		0b	
	3	1b	Reserved		0b	
	2	1b	Reserved		0b	
	1	1b	Reserved		0b	
	0	1b	Reserved		0b	
		Encoding				
139	7	1b	64B/66B		1b	10GE/10GFC Coding
	6	1b	8B/10B		1b	Not used in standards but is supported
	5	1b	SONET Scrambled		1b	OC-192 Coding
	4	1b	NRZ		1b	NRZ only supported
	3	1b	RZ		0b	
	2-0	3b	Reserved		000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	63h	9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	6Fh	11100 Mbps
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	50h	80km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	00h	Not supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	00h	Not supported
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm fiber, units of 1 m	00h	Not supported
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
		Device Technology				
147	4-7	4b	Transmitter Technology		0111b	1550nm EML laser
	3	1b	Wavelength Control		0b	No wavelength control
	2	1b	Cooled Transmitter		1b	Transmitter is cooled
	1	1b	Detector Type		1b	APD Detector
	0	1b	Tunable Transmitter		0b	Transmitter not Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
		CDR Support				
164	7	1b	CDR Support for 9.95 Gb/s		1b	
	6	1b	CDR Support for 10.3 Gb/s		1b	
	5	1b	CDR Support for 10.5 Gb/s		1b	
	4	1b	CDR Support for 10.7 Gb/s		1b	
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported on FTLX version, not supported on FTRJ version

	2	1b	Reserved		0b	
	1	1b	Line-side Loopback Mode Supported		0b	
	0	1b	XFI Loopback Supported		1b	
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	“FTRX-3811-S3xx ”	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	xxxxh	15xx.xx nm * (20/nm)
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	14h	0.1nm * (200/nm).
190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
			EXTENDED ID FIELDS			
192-195		4B	Power Supply Fields			
192		1B	Maximum Power Dissipation (/20mW)		AFh	= 3500 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		96h	= 1500 mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		0111b	= 350 mA
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		0100b	= 400 mA
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		1000b	= 800 mA (actual is 750mA)
	0-3	4b	Max. Current on -5V Supply (-/100mA)		0000b	Not used
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	e.g., “A000000”	Encoded serial number
212-217		6B	Date code	Vendor’s manufacturing date	e.g., “030106”	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	May be blank
			Diagnostic Monitoring / Variable Power Supply / Special Function Support			
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
			Enhanced Options			
221	7	1b	Module supports VPS		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		1b	Supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
222	4-7	4b	Aux A/D Input 1		0100b	Laser Temperature Monitor on Aux A/D 1

	0-3	4b	Aux A/D Input 2		0110b	+5V Supply Monitor on Aux A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

Customer Specific Fields

<i>Data Address</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224-255	32	Vendor Specific EEPROM	TBD	All 00h at present	

Upper Memory Map: I2C Addr: A0h, Table 2

Customer Writable EEPROM. Writable with correct host password entry. Always readable.

Product: FTLX8511D3

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

Byte Addr ess	Bit Addr ess	Type Code	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
0		NVE	1B	Identifier	Type of serial transceiver	06h	XFP
Signal Conditioner Control							
1	4-7	VH	4b	Data Rate Control		0000h	
	3	VHW	1b	Reserved		0h	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0h	Follow MSA definition. Power up or reset to 0b = no optical loopback.
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		0h	Power up or reset to 0b = no optical loopback.
	0	VH	1b	Signal Conditioner Control		0h	The module should default to asynchronous reference clock.

Flag Thresholds							
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19968b	+78 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	63488b	-8 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	18688b	+73 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	64768b	-3 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved		Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	6000b	12 mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	2000b	4 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	5500b	11 mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	2500b	5 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	15849b	+ 2dBm (assumes 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	1995b	-7 dBm (assumes 2 dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	12589b	+1 dBm (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	2512b	-6 dBm (assumes 2 dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	17783b	+ 2.5 dBm
36-37		NVE	2B	RX Power Low Alarm	Threshold for alarm	275b	-15.6 dBm
38-39		NVE	2B	RX Power High Warning	Threshold for warn	15849b	+2 dBm
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	347b	-14.6 dBm
42-43		NVE	2B	AUX1 High Alarm	Threshold for alarm	36300b	3.63V

44-45		NVE	2B	AUX1Low Alarm	Threshold for alarm	30000h	3V
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	35000h	3.5V
48-49		NVE	2B	AUX1Low Warning	Threshold for warn	31000h	3.1V
50-51		NVE	2B	AUX2 High Alarm	Threshold for alarm	0000h	
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	0000h	
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	0000h	
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	0000h	
Optional VPS Control Registers							
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000h	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	0000h	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000h	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000h	Reserved
	0	VH	1b	Regulator Bypass Mode	Turns VPS Bypass on or off	0h	VPS not supported. Value shall be set to “0”, 0b=turns VPS Bypass off
60-69		R	10B	Reserved	Reserved	00h	Reserved
70		VH	1B	Acceptable BER	For FEC systems	00h	Not required
71		VH	1B	Actual BER	For FEC systems	00h	Not required
72-73		VH	2B	Wavelength Set for tunable laser	Host wavelength set	0000h	Not required
74-75		VH	2B	Wavelength Error	Returned wavelength error	0000h	Not required
76		VH	1B	FEC Amplitude Adj	Set Amp Slice	00h	Not required
77		VH	1B	FEC Phase Adj	Set Phase Slice	00h	Not required
78-79		R	2B	Reserved	Reserved	00h	Not required
80-87		VHR	8B	Latched Interrupt Flag Bits	Individual bits set per XFPMSA	xh	See XFP MSA 4.0 Table 39, the latched flags are cleared on the read of the corresponding byte, as described in XFP MSA.
88-95		VH	8B	Interrupt Masking Bits	Individual bits set per XFPMSA	0h	See XFP MSA 4.0 Table 40, mask bits shall be non-volatile and power-up in the unmasked state (i.e. bits set to 0).
96-97		VHR	2B	Temperature Readout	MSB in First Byte	xxxxh	Reported Temperature Value in Units Defined in XFP MSA 4.0
98-99		VHR	2B	Reserved A/D Chan.	Reserved	0000h	Reserved
100-101		VHR	2B	TX Bias A/D Chan	MSB in First Byte	xxxxh	Reported TX Bias Value in Units Defined in MSA
102-		VHR	2B	TX Power A/D Chan	MSB in First Byte	xxxxh	Reported TX Power Value

103							in Units Defined in MSA
104-105		VHR	2B	RX Power A/D Chan	MSB in First Byte	xxxxh	Reported RX Power Value in Units Defined in MSA
106-107		VHR	2B	AUX1 A/D Chan	MSB in First Byte	0000h	Report TEC temperature is not required
108-109		VHR	2B	AUX2 A/D Chan	MSB in First Byte	0000h	Report +5V Supply voltage, is not required.
General Control Status Bits							
110	7	VHR	1b	TX Disable State	Reports TXDIS	xh	Ignore writes. 0b = Tx ON; 1b = Tx OFF
	6	VH	1b	Soft TX Disable	OR's with input pin	0h	This bit is OR'ed with the Tx Dis hard pin. Writing "1" disables the laser. Default power up value "0"
	5	VHR	1b	MOD-NR State	Reports MOD_NR	xh	Reports state of MOD_NR hard pin, updated within 100ms of change on pin. 0b = module ready 1b = module not ready
	4	VHR	1b	P_Down State	Reports P_Down	xh	Reports state of P-down hard pin, 0b = power on, normal operation 1b=power down
	3	VH	1b	Soft P_Down	OR's with input pin	0h	"Not required", if module vendor implements the feature, the register state shall not affect the P_down state of the module with hard pin control
	2	VHR	1b	Interrupt State	Reports Interrupt	xh	Reports state of Interrupt hard pin, "0" indicates possible module operational fault or a status critical to the host system
	1	VHR	1b	Rx_LOS State	Reports LOS	xh	Reports state of Rx_LOS hard pin. Updated within 100ms of change on pin. 0=Rx_LOS is in de-asserted mode 1=Rx_LOS is asserted
	0	VHR	1b	Data Not Ready	Set low when A/D ready.	xh	Indicates transceiver has achieved, power up and A/D data ready. The Data_Not_Ready bit is high during module power up and prior to the first valid A/D reading. Once the first valid A/D reading occurs, the bit is set low until the device is powered down. The bit must be set low within 1 s of power-up
111	7	VH	1b	TX_NR	Identifies TX_NR	xh	Identifies Not ready condition as specific to the Tx path

	6	VH	1b	TX_Fault	Identifies TX_Fault	0h	Identifies laser fault condition, generated by laser safety system. 0=Tx normal 1=Tx Fault
	5	VH	1b	TX_CDR not locked	Identifies TX_LOL	xh	Identifies Loss of Lock in Tx path CDR.
	4	VH	1b	RX_Nr	Identifies RX_Nr	xh	Set if RX CDR loss of lock.
	3	VH	1b	RX_CDR not locked	Identifies RX_LOL	xh	Identifies loss of lock in Rx path CDR
	2-0	R	3b	Reserved	Reserved	000h	Reserved
112-117		R	6B	Reserved		00h	Reserved
118	7-1	R	7b	Reserved	Reserved	0000000h	Reserved
	0	VH	1b	Error Checking	Switches Packet Error Checking	0h	Value shall be set at 0b=disable packet error checking
119-122		VH	4B	New Password entry.	Host may enter to change Password	00h	Change host password value if current correct password entered in 123-126. Power-up and reset to 00000000h.
123-126		VH	4B	Password entry.	Host may enter Password to Access Protected Area	00h	Host may enter password to Access Protected Area.
127		VH	1B	Table Select	Host enters to select upper memory table	01h	Defines Table for subsequent upper memory map reads. Defaults to 01h on Power and reset.

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Address	Bit Address	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial transceiver	06h	XFP
Extended Identifier						
129	6-7	2b	Ext. Identifier - Module Power Class	Defines Module Power Class	XXh = 00	Defines module power class 00= power level 1 (1.5W max) 01= power level 2 (2.5W max) 10= power level 3 (3.5W max) 11 = power level 4 (4.5W max)
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0h	Module contains CDR function.
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1h	Identifies need for REFCLK. 0=Synchronous Ref Clock input required 1=Synchronous Ref Clock input not required.

129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0h	Indicate if CLEI code is present in Page 02h, 1b = CLEI code is present in page 02h
129	0-2	3b	Ext. Identifier - Reserved	Reserved	000h	Reserved
130		1B	Connector	Code for connector type	07h	LC
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR	1h	1=support, 0=not support	
	6	1b	10GBASE-LR	0h	1=support, 0=not support	
	5	1b	10GBASE-ER	0h	1=support, 0=not support	
	4	1b	10GBASE-LRM	0h		
	3	1b	10GBASE-SW	1h		
	2	1b	10GBASE-LW	0h		
	1	1b	10GBASE-EW	0h		
	0	1b	10GBASE - ZR	0h	1=support, 0=not support	
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I	1h		
	6	1b	1200-SM-LL-L	0h	1=support, 0=not support	
	5	1b	Extended reach 1550nm	0h		
	4	1b	Intermediate reach 1310nm FP	0h		
	3	1b	Reserved	0h		
	2	1b	Reserved	0h		
	1	1b	Reserved	0h		
	0	1b	Reserved	0h		
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved	0h		
	6	1b	Reserved	0h		
	5	1b	Reserved	0h		
	4	1b	Reserved	0h		
	3	1b	Reserved	0h		
	2	1b	Reserved	0h		
	1	1b	Reserved	0h		
	0	1b	Reserved	0h		
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF	0h		
	6	1b	1000BASE-LX/1xFC SMF	0h		
	5	1b	2xFC MMF	0h		
	4	1b	2xFC SMF	0h		
	3	1b	OC-48-SR	0h		
	2	1b	OC-48-IR	0h		
	1	1b	OC-48-LR	0h		
	0	1b	Reserved	0h		
		SONET/SDH Interconnect Link Compliance Codes				
135	7	1b	I-64.1r	0h		
	6	1b	I-64.1 (P111-2D1)	Xh	SR-1, 1=support, 0=no support	
	5	1b	I-64.2r	0h		
	4	1b	I-64.2	0h		
	3	1b	I-64.3	0h		
	2	1b	I-64.5	0h		
	1	1b	Reserved	0h		
	0	1b	Reserved	0h		
		SONET/SDH Short Haul Link Compliance Codes				
136	7	1b	S-64.1	0h		

	6	1b	S-64.2a	0h	
	5	1b	S-64.2b	0h	
	4	1b	S-64.3a	0h	
	3	1b	S-64.3b	0h	
	2	1b	S-64.5a	0h	
	1	1b	S-64.5b	0h	
	0	1b	Reserved	0h	
SONET/SDH Long Haul Link Compliance Codes					
137	7	1b	L-64.1	0h	
	6	1b	L-64.2a	0h	
	5	1b	L-64.2b	0h	
	4	1b	L-64.2c	0h	
	3	1b	L-64.3	0h	
	2	1b	Reserved	0h	
	1	1b	Reserved	0h	
	0	1b	Reserved	0h	
SONET/SDH Very Long Haul Link Compliance Codes					
138	7	1b	V-64.2a	0h	
	6	1b	V-64.2b	0h	
	5	1b	V-64.3	0h	
	4	1b	Reserved	0h	
	3	1b	Reserved	0h	
	2	1b	Reserved	0h	
	1	1b	Reserved	0h	
	0	1b	Reserved	0h	
Encoding					
139	7	1b	64B/66B	1h	10GE/10GFC Coding
	6	1b	8B/10B	1h	
	5	1b	SONET Scrambled	1h	OC-192 Coding
	4	1b	NRZ	1h	NRZ only supported
	3	1b	RZ	0h	
	2-0	3b	Reserved	000b	
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	Xxh = 63h 9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	XXh = 4Bh 10500 Mbps
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	XXh 0 km
143		1B	Length (E-50um)	Link length supported for extended bandwidth MMF, units of 2 m	XXh = 96h 300m
144		1B	Length (50m)	Link length supported for 50/125 mm fiber, units of 1 m	XXh = 52h Upto 300m with 2000 MHz/km
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm fiber, units of 1 m	XXh = 1Ah Upto 33m with 200 MHz/km
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h Not supported
Device Technology					
147	4-7	4b	Transmitter Technology	0000h	850 nm VCSEL
	3	1b	Wavelength Control	0h	No wavelength control
	2	1b	Cooled Transmitter	xh	Transmitter is not cooled

	1	1b	Detector Type		xh	0=PIN Detector 1=APD Detector
	0	1b	Tunable Transmitter		0h	0=Transmitter not Tunable 1=Transmitter is Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	"FINISAR CORP. "	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		Xh = 1h	Supported
	6	1b	CDR Support for 10.3 Gb/s		Xh = 0h	Not Supported
	5	1b	CDR Support for 10.5 Gb/s		Xh = 1h	Supported
	4	1b	CDR Support for 10.7 Gb/s		Xh = 0h	
	3	1b	CDR Support for 11.1 Gb/s		Xh = 0h	Not supported
	2	1b	Reserved		Xh = 0h	
	1	1b	Line-side Loopback Mode Supported		Xh = 0h	
	0	1b	XFI Loopback Supported		Xh = 1h	0=not supported 1=Supported
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	XXXXXXh = 009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	XXXXh = FTLX-8511D3-CS	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	XXXXh	
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	XXXXh = 4268h	850nm * (20/nm) = 17000
188-189		2B	Wavelength Tolerance	+/- Wavelength (1/200nm)	XXXXh	Guaranteed range of laser wavelength (+/-value) from Nominal Wavelength (wavelength tol = value/200 in nm) = 20nm
190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
EXTENDED ID FIELDS						
192-195		4B	Power Supply Fields			
192		1B	Maximum Power Dissipation (/20mW)		XXh = 4Bh	Max value is 8 bit value *20mW = 1500mW/20mW= 75
193		1B	Max. Power Diss. In Power-down (/10mW)		XXh = 96h	Max value is 8 bit value *10mW = 150mW
194	4-7	4b	Max. Current on +5V Supply (/50mA)		XXXXh = 0h	Not used - Max current is 4 bit value*50mA [500mA max]
	0-3	4b	Max. Current on +3.3V Supply (/100mA)		XXh = 4h	Max current is 4 bit value*100mA [500mA max] = 600 mA
195	4-7	4b	Max. Current on +1.8V Supply (/100mA)		XXh = 00000h	Not used – Max current is 4 bit value*100mA
	0-3	4b	Max. Current on -5V Supply (-/100mA)		XXh = 0000h	Not used - Max current is 4 bit value*50mA [500mA max]
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	XXh	Format LLLYYWWSSSS, see Section 0 for more details. The information shall be left justified starting at address 196, with the

						unused upper address locations filled by 0x20h (corresponding to the ASCII space characters)
Date Code (vendor manufacturing date)						
212-213		2B	Date code - year	Vendors manufacturing date code – year. (00 = 2000) ASCII		
214-215		2B	Date code - month	Vendors manufacturing date code month		
216-217		2B	Date code day	Vendor’s manufacturing day of month		yymmdd
218-219		2B	Lot Code	Vendor lot code		Vendor specific lot code, ASCII
Diagnostic Monitoring / Variable Power Supply / Special Function Support						
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power. Cisco requires the vendor to always report average power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
Enhanced Options, Indicated which optional enhanced features are implemented						
221	7	1b	Module supports VPS		0b	Not required
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		0b	Not supported.
	1	1b	Wavelength Tunability		0b	Not supported
	0	1b	Optional CMU Mode		0b	Not supported
AUX Monitoring						
222	4-7	4b	Aux A/D Input 1		000h	Not required
	0-3	4b	Aux A/D Input 2		000h	Not required
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

Vendor Specific ID Fields

<i>Data Address</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224	1	Reserved			
225	1	Reserved			
226	1	Vendor Specific			

227-242	16	Vendor Specific			
243-251	9	Reserved (9 bytes)			
252-255	4	4 byte CRC			This is standard Ethernet packet CRC function. Pass it in the entire 28 bytes of the field.

1
2

Table A2h

<i>Data Address</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
128-137	10	User EEPROM		0	CLEI code 10 characters, alphanumeric represented as ASCII. The CLEI will be provided by Cisco to approved vendors.
138-147	10	User EEPROM		0000000000	
148-151	4	User EEPROM		0000	
152	1	User EEPROM (Temp Range)		01h	Operating (case) temperature range of the device. 00h=unknown or unspecified 01h=COM, commercial -5C to 70C 02h= EXT, extended -5 to 85C 03h=IND, industrial -40 to 85 C
153-160	8	Reserved		00000000h	Reserved. These bytes must be set to 0x0h
161	1	CC_USER		(Variable)	Check code for the user EEPROM fields from address 128 to 160, inclusive.
162-167	6	User EEPROM Read/Write Access Required		000000h	Reserved. These bytes must be set to 0x0h
168-169	2	User EEPROM (LBC_SCALE_NEG40C)		(Variable)	If -40°C is supported, otherwise 0 if not. Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at -5°C. Byte 168 is MSB. Byte 169 is LSB.
170-171	2	User EEPROM (LBC_SCALE_NEG5C)		(Variable)	Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at -5°C. Byte 170 is MSB. Byte 171 is LSB.
172-	2	User		(Variable)	Unsigned fixed-point

173		EEPROM (LBC_SCA LE_20C)			temperature adjustment data for LBC & LBC[0] at 20°C. Byte 172 is MSB. Byte 173 is LSB
174- 175	2	User EEPROM (LBC_SCA LE_45C)		(Variable)	Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at 45°C. Byte 174 is MSB. Byte 175 is LSB
176- 177	2	User EEPROM (LBC_SCA LE_70C)		(Variable)	Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at 70°C. Byte 176 is MSB. Byte 177 is LSB
178- 179	2	User EEPROM (LBC_SCA LE_85C)		(Variable)	If 85°C is supported, otherwise 0 if not. Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at 85°C. Byte 178 is MSB. Byte 179 is LSB.
180- 181	2	User EEPROM (TEMP[0])		(Variable)	This is the value of the internal transceiver temperature measured at BOL (time of manufacturing) and under nominal conditions. Represented as 16 bit, signed two's complement value in increments of 1/256 degrees Celsius. Accuracy shall be within +/-3°C
182- 183	2	User EEPROM (LBC[0])		(Variable)	This is the value of LBC in uA measured at BOL (time of manufacturing) and under nominal conditions at transceiver temperature of TEMP[0]. Stored as a 16 bit unsigned integer with current defined as full 16 bit value (0- 65525), with LSB equal to 2uA.
184- 185	2	User EEPROM (OPT[0])		(Variable)	This is the value of the Tx output power measured at BOL (time of manufacturing) and under nominal conditions. Stored as full 16 bit value (0- 65535) with the LSB equal to 0.1uW. This yields a total measurement range of 0 to 6.5525mW (~-40 to +8.2 dBm). Accuracy shall be within +/-1dB.
186	1	User EEPROM Read/Write Access required		0	Reserved
187	1	User	Checksum		Check code for Extended ID

		EEPROM CC_Vendor				fields from addresses 162 to 186, inclusive
188-189	2	User EEPROM (OPR[0] Read/Write Access required)			0	Module vendor shall write 0x0h into these bytes at time of manufacturing.
190	1	User EEPROM Read/Write Access Required			00b	Reserved.
191	1	User EEPROM Read/Write access required			Check sum variable	Check code for Extended ID fields from addresses 188 to 190.
192-211	20	User EEPROM Read/write access required			0b	
212-222	11	User EEPROM Read/Write Access Required			0b	Reserved
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

Customer Specific Fields

<i>Data Address</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224-255	32	Vendor Specific EEPROM	TBD	All 00h at present	

Upper Memory Map: I2C Addr: A0h, Table 2

Customer Writable EEPROM. Writable with correct host password entry. Always readable.

Product: FTLX4213_4 channel

Lower Memory Map: I2C Addr: A0h, Bytes 0 – 127.

<i>Byte Address</i>	<i>Bit Address</i>	<i>Type Code</i>	<i>Size (Bytes) or (bits)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
0		NVE	1B	Identifier	Type of serial	06h	XFP

					transceiver		
		Signal Conditioner Control					
1	4-7	VH	4b	Data Rate Control		xxxxb	Ignore for Intel or Gennum
	3	VHW	1b	Reserved		N/A	Reserved
	2	VH	1b	Line-side Loopback Control. 1b actuates loopback of optical input to optical output.		0b	Not supported, ignore write, read back as 0b
	1	VH	1b	XFI Loopback Control. 1b actuates loopback of electrical input to electrical output		xb	Power up to 0b
	0	VH	1b	Signal Conditioner Control		0b	Normal REFCLK mode only supported. Ignore write, read back as 0b
		Flag Thresholds					
2-3		NVE	2B	Temp High Alarm	Threshold for alarm	19200d	+75 °C (assumes 3°C accuracy)
4-5		NVE	2B	Temp Low Alarm	Threshold for alarm	62976d	-10 °C (assumes 3°C accuracy)
6-7		NVE	2B	Temp High Warning	Threshold for warn	18688d	+73 °C (assumes 5°C accuracy)
8-9		NVE	2B	Temp Low Warning	Threshold for warn	63488d	-8 °C (assumes 5°C accuracy)
10-17		R	8B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
18-19		NVE	2B	Bias High Alarm	Threshold for alarm	62500d	125 mA (assumes 0.3mA accuracy)
20-21		NVE	2B	Bias Low Alarm	Threshold for alarm	10000d	20 mA (assumes 0.3mA accuracy)
22-23		NVE	2B	Bias High Warning	Threshold for warn	55000d	110 mA (assumes 0.3mA accuracy)
24-25		NVE	2B	Bias Low Warning	Threshold for warn	15000d	30 mA (assumes 0.3mA accuracy)
26-27		NVE	2B	TX Power High Alarm	Threshold for alarm	63096d	+7.95 dBm (assumes a 2dB accuracy)
28-29		NVE	2B	TX Power Low Alarm	Threshold for alarm	3981d	-4.0 dBm (assumes 1.5dB accuracy)
30-31		NVE	2B	TX Power High Warning	Threshold for warn	39811d	+ 6 dB (assumes 2dB accuracy)
32-33		NVE	2B	TX Power Low Warning	Threshold for warn	6310d	-2.0 dBm (assumes 1.5dB accuracy)
34-35		NVE	2B	RX Power High Alarm	Threshold for alarm	3981d	-4.0 dBm (assumes 1.5dB accuracy)
36-37		NVE	2B	Rx Power Low Alarm	Threshold for alarm	13d	-28.8dBm (assumes 1.5dB accuracy)
38-39		NVE	2B	RX Power High Warning	Threshold for warn	2512d	-6 dBm (assumes 1.5dB accuracy)
40-41		NVE	2B	RX Power Low Warning	Threshold for warn	20d	-27 dBm (assumes 1.5dB accuracy)
42-43		NVE	2B	AUX1 High Alarm	Threshold for alarm	35640d	3.564 V
44-45		NVE	2B	AUX1Low Alarm	Threshold for alarm	30360d	3.036 V
46-47		NVE	2B	AUX1 High Warning	Threshold for warn	34650d	3.465 V
48-49		NVE	2B	AUX1Low Warning	Threshold for warn	31350d	3.135 V
50-		NVE	2B	AUX2 High	Threshold for alarm	54000d	5.40 V

51				Alarm			
52-53		NVE	2B	AUX2 Low Alarm	Threshold for alarm	46000d	4.60 V
54-55		NVE	2B	AUX2 High Warning	Threshold for warn	52500d	5.25 V (assumes 50mV accuracy)
56-57		NVE	2B	AUX2 Low Warning	Threshold for warn	47500d	4.75 V (assumes 50mV accuracy)
58	7-4	NVE	4b	VCC2 min with Reg	Min. VCC2 with Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-0	VH	4b	VCC2 Host	VCC2 Supplied by Host	xxxxb	Written and read by host. Ignore and return 0000b
59	7-4	VH	4b	VCC2 min in Bypass	Min. VCC2 in Regulator	0000b	VPS not supported. Return 0000b=1.8V
	3-1	VH	3b	Reserved	Reserved	000b	Ignore write, return 000b
	0	VH	1b	VPS Bypass Control	Turns VPS Bypass on or off	0b	VPS not supported. Ignore write, return 0b
60		R	2B	LFL1	Laser First Frequency (THz)	All 00h	00h on read.
62		R	2B	LFL2	Laser First Frequency (GHz*10)	All 00h	00h on read.
64		R	2B	LFH1	Laser Last Frequency	All 00h	00h on read.
66		R	2B	LFH2	Laser Last Frequency (GHz*10)	All 00h	00h on read.
68		R	2B	LGrid	Laser maximum supported grid spacing (GHz*10)	All 00h	00h on read.
70		VH	1B	Acceptable BER	Acceptable BER reported by the FEC to the module	00h	00h.
71		VH	1B	Actual BER	Actual BER reported by the FEC to the module	00h	00h.
72-73		VH	2B	Wavelength Set MSB	User Input of wavelength set point (units of 0.05nm)	0000h	0000h.
74-75		VH	2B	Wavelength Error LSB	User Input of wavelength set point (units of 0.05nm)	0000h	0000h.
76		VH	1B	FEC Amplitude Adjustment	Relative amplitude of receive quantization threshold	00h	00h.
77		VH	1B	FEC Phase Adjustment	Phase of receive quantization	00h	00h.
78-79		R	2B	Reserved	Reserved	All 00h	Ignore write; return 00h on read.
80	7			L-Temp High Alarm	Latched Temperature High Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	6			L-Temp Low Alarm	Latched Temperature Low Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	5			L-Vcc High Alarm	Latched Vcc High Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	4			L-Vcc Low Alarm	Latched Vcc Low Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	3			L-Tx Bias High	Latched Tx Bias High	FALSE	Latched on flag condition.

				Alarm	Alarm		Cleared on host read. (See MSA)
	2			L-Tx Bias Low Alarm	Latched Tx Bias Low Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	1			L-Tx Power High Alarm	Latched Tx Power High Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	0			L-Tx Power Low Alarm	Latched Tx Power Low Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
81	7			L-Rx Power High Alarm	Latched – Rx Power High Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	6			L-Rx Power Low Alarm	Latched Rx Power Low Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	5			L-AUX1 High Alarm	Latched AUX 1 High Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	4			L-AUX1 Low Alarm	Latched AUX1 Low Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	3			L-AUX 2 High Alarm	Latched AUX2 High Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	2			L-AUX 2 Low Alarm	Latched AUX2 Low Alarm	FALSE	Latched on flag condition. Cleared on host read. (See MSA)
	1			RESERVED	RESERVED		
	0			RESERVED	RESERVED		
82	7			L-Temp High Warning	Latched High Temperature Warning	0h	FALSE
	6			L-Temp Low Warning	Latched Low Temperature Warning	0h	FALSE
	5			L-Vcc High Warning	Latched High Vcc Warning	0h	FALSE
	4			L-Vcc Low Warning	Latched Low Vcc Warning	0h	FALSE
	3			L-Tx Bias High Warning	Latched Tx Bias High Warning	0h	FALSE
	2			L-Tx Bias Low Warning	Latched Tx Bias Low Warning	0h	FALSE
	1			L-Tx Power High Warning	Latched Tx Power High Warning	0h	FALSE
	0			L-Tx Power Low Warning	Latched Tx Power Low Warning	0h	FALSE
83	7			L-Rx Power High	Latched Rx Power High Warning	0h	FALSE
	6			L-Rx Power Low	Latched Rx Power Low Warning	0h	FALSE
	5			L-AUX1 High Warning	Latched High AUX1 Monitor	0h	FALSE
	4			L-AUX 1 Low Warning	Latched Low AUX1 monitor	0h	FALSE
	3			L-AUX 2 High	Latched High AUX2	0h	FALSE

				Warning	monitor		
	2			L-AUX 3 Low Warning	Latched Low AUX2 monitor	0h	FALSE
	1			RESERVED	RESERVED	0h	FALSE
	0			RESERVED	RESERVED	0h	FALSE
84	7			L-TX_NR	Latched TX_NR Status	0h	FALSE
	6			L-Tx_Fault	Latched Laser Fault Condition. Generated by Laser Safety	0h	FALSE
	5			L-Tx CDR not locked	Latched TxCDR Loss Of Lock	0h	FALSE
	4			L-Rx_NR	Latched Rx_NR status	0h	FALSE
	3			L-LOS	Latched Mirror of LOS pin (Rx optical loss of signal)	0h	FALSE
	2			L-Rx CDR not Locked	Latched Rx CDR Loss of Lock	0h	FALSE
	1			L-MOD_NR	Latched Mirror of MOD_NR pin	0h	FALSE
	0			L-Reset Complete	Latched Reset Complete Flag	0h	FALSE
85	7			L-APD Supply Fault	Latched APD Supply Fault	0h	FALSE
	6			L-TEC Fault	Latched TEC Fault	0h	FALSE
	5			L-Wavelength	Latched Wavelength Unlocked	0h	FALSE
	4			L-Bad Channel	Latched BAD channel	0h	FALSE
	3			L- New Channel	Latched New Channel Acquired	0h	FALSE
	2			L-Unsupported Tx	Latched Unsupported Tx Dither	0h	FALSE
	1			RESERVED	RESERVED	0h	FALSE
	0			RESERVED	RESERVED	0h	FALSE
86				RESERVED	RESERVED		
87				RESERVED	RESERVED		
88	7			M-Temp High Alarm	Masking bit for high temperature alarm	0h	FALSE
	6			M-Temp Low Alarm	Masking bit for Low temperature Alarm	0h	FALSE
	5			M-Vcc High Alarm	Masking bit for High Vcc Alarm	0h	FALSE
	4			M-Vcc Low Alarm	Masking bit for Low Vcc Alarm	0h	FALSE
	3			M-Tx Bias High Alarm	Masking bit for High Tx bias	0h	FALSE
	2			M-Tx Bias Low Alarm	Masking bit for Low Tx bias	0h	FALSE
	1			M-Tx Power High Alarm	Masking bit for high Tx power	0h	FALSE
	0			M-Tx power Low Alarm	Masking bit for low Tx power	0h	FALSE
89	7			M-Rx Power High	Masking bit for High Rx power	0h	FALSE
	6			M-Rx Power Low	Masking bit for Low Rx power	0h	FALSE
	5			M-AUX 1 High	Masking bit for High	0h	FALSE

				Alarm	AUX 1		
	4			M-AUX 1 Low Alarm	Masking bit for Low AUX 1	0h	FALSE
	3			M-AUX 2 High Alarm	Masking bit for high AUX 2	0h	FALSE
	2			M-AUX 2 Low Alarm	Masking bit for low AUX 2	0h	FALSE
	1			RESERVED	RESERVED	0h	FALSE
	0			RESERVED	RESERVED	0h	FALSE
90	7			M-Temp High Warning	Masking bit for High Temperature Warning	0h	FALSE
	6			M-Temp Low Warning	Masking bit for Low Temperature	0h	FALSE
	5			M-Vcc High Warning	Masking bit for high Vcc	0h	FALSE
	4			M-Vcc Low Warning	Masking bit for Vcc Low warning	0h	FALSE
	3			M-Tx Bias high	Masking bit for Tx Bias high warning	0h	FALSE
	2			M-Tx Bias Low	Masking bit for Tx Bias Low Warning	0h	FALSE
	1			M-Tx Power High	Masking bit for high Tx power	0h	FALSE
	0			M-Tx power Low	Masking bit for low Tx power	0h	FALSE
91	7			M-Rx power High	Masking bit for Rx power High Warning	0h	FALSE
	6			M-Rx Power Low	Masking bit for Rx power Low Warning	0h	FALSE
	5			M-AUX 1 High	Masking bit for high AUX 1	0h	FALSE
	4			M-AUX 1 Low Warning	Masking bit for Low AUX 1	0h	FALSE
	3			M-AUX 2 High Warning	Masking bit for High AUX 2 Warning	0h	FALSE
	2			M-AUX 2 Low Warning	Masking bit for Low AUX 2	0h	FALSE
	1			RESERVED	RESERVED	0h	FALSE
	0			RESERVED	RESERVED	0h	FALSE
92	7			M-Tx_NR	Masking bit for Tx_NR Status	0h	FALSE
	6			M_Tx_Fault	Masking bit for Laser Fault condition. Generated by laser	0h	FALSE
	5			M-Tx CDR Not Locked	Masking bit for TX CDR Loss of Lock	0h	FALSE
	4			M-RX_NR	Masking bit for Rx_NR status	0h	FALSE
	3			M-LOS	Masking bit for mirror of LOS pin (Rx optical loss of signal)	0h	FALSE
	2			M-Rx CDR not locked	Masking bit for Rx CDR loss of lock	0h	FALSE
	1			M-MOD_NR	Masking bit for Mirror of MOD_NR	0h	FALSE
	0			M-Reset	Masking bit for Reset	0h	FALSE

				Complete	Complete		
93	7			M-APD Supply Fault	Masking bit for APD Supply	0h	FALSE
	6			M-TEC Fault	Masking bit for TEC Fault	0h	FALSE
	5			M-Wavelength Unlocked	Masking bit for Wavelength Unlocked Condition	0h	FALSE
	4			M-Bad Channel	Masking bit for bad channel	0h	FALSE
	3			M-New Channel	Masking bit for new channel	0h	FALSE
	2			M-Unsupported Tx	Masking bit for Unsupported Tx	0h	FALSE
	1			RESERVED	RESERVED	0h	FALSE
	0			RESERVED	RESERVED	0h	FALSE
94				RESERVED	RESERVED		
95				RESERVED	RESERVED		
96				Temperature MSB	Internally measured module temperature		
97				Temperature LSB	Internally measured module temperature		
98				Vcc MSB	Internally measured supply voltage in transceiver		
99				Vcc LSB	Internally measured supply voltage in transceiver		
100				Tx Bias MSB	Internally measured Tx Bias		
101				Tx Bias LSB	Internally measured Tx Bias		
102				Tx power MSB	Measured Tx output power		
103				Tx power LSB	Measured Tx Output Power		
104				Rx power MSB	Measured Rx output power		
105				Rx power LSB	Measured Rx output power		
106				AUX 1 MSB	Auxiliary measurement defined in Byte 222 page 01h		
107				AUX 1 LSB	Auxiliary measurement defined in byte 222 page 01h		
108				AUX 2 MSB	Auxiliary measurement 2 defined in Byte 222 Page 01h		
109				AUX 2 LSB	Auxiliary measurement 2 defined in Byte 222 page 01h		
110	7			Tx Disable State	Digital state of the Tx Disable Input Pin. Updated within 100ms of Change on Pin		

	6			Soft Tx Disable	Read/write bit that allows software disable of laser. Writing '1' disables laser. Turn on/off time is 100msec max from acknowledgement of serial byte transmission. This bit is "OR"d with the hard TX_DISABLE pin value. Note, per SFP MSA TX_DISABLE pin is default enabled unless pulled low by hardware. If Soft TX Disable is not implemented, the transceiver ignores the value of this bit. Default power up value is 0.		
	5			MOD_NR State	Digital state of the MOD_NR Pin. Updated within 100msec of change on pin		
	4			P_Down State	Digital state of the P_Down Pin. Updated within 100msec of change on pin		
	3			Soft P_Down	Read/write bit that allows the module to be placed in the power down mode. This is identical to the P_Down hardware pin function except that it does not initiate a system reset		
	2			Interrupt	Digital state of the Interrupt output pin		
	1			LOS	Indicates Optical Loss of Signal (per relevant optical link standard). Updated within 100msec of change on pin		
	0			Data_Not_Ready	Indicates transceiver has achieved power up and data is ready. Bit remains high until data is ready to be read at which time the device sets the bit low.		
111	7			Tx_NR State	Identifies Not Ready Condition as specific to the tx path		
	6			Tx Fault State	Identifies Not Ready condition as specific to the Tx path		
	5			Tx_CDR Not Locked	Identifies Loss of Lock in Tx		
	4			Rx_NR State	Identifies Not Ready Condition as specific to		

					the Tx path		
	3			Rx_CDR Not Locked	Identifies Loss Of Lock in Rx path CDR		
	2			Tx_Tune	Identifies Tx Not Ready due to tuning		
	1			Tx Dither	"1" Disables Dither, "0" Enables Dither		
	0			RESERVED	RESERVED		
112				Channel # Set	User Input of Channel #, which is an integer 1 to N (N= # of Chins.)		
113				Channel # Set	User Input of Channel #, which is an integer 1 to N (N= # of Chans.)		
114				Frequency Error	Frequency error reported in 16 bit signed integer with LSB= 0.1GHz		
115				Frequency Error	Frequency error reported in 16 bit signed integer with LSB = 0.1 GHz		
116				RESERVED	RESERVED		
117				RESERVED	RESERVED		
118	0			Error Checking	Error Checking	00h	Packet Error
	1-7			RESERVED	RESERVED		
119				New Password Entry	Location of Entry of New Optional Password	00h	0
120				New Password Entry	Location of Entry of New Optional Password	00h	0
121				New Password Entry	Location of Entry of New Optional Password	00h	0
123				Password Entry	Location for Entry of Optional Password	00h	0
124				Password Entry	Location for Entry of Optional Password	00h	0
125				Password Entry	Location for Entry of Optional Password	00h	0
126				Password Entry	Location for Entry of Optional Password	00h	0
127				Table Select	Entry Location for Table Select	01h	1

Upper Memory Map: I2C Addr: A0h, Table 1 – Serial ID Section – Read only by Host, all Nonvolatile

Byte Address	Bit Address	Size (Bytes) or (bits)	Field Name	Description of Field	Value	Value Meaning
128		1B	Identifier	Type of serial	06h	XFP

				transceiver		
129	7-6	2b	Ext. Identifier - Module Power Class	Defines Module Power Class	10b	Power Level 4 (> 3.5 W)
129	5	1b	Ext. Identifier - CDR	Identifies presence of a CDR	0b	With CDR
129	4	1b	Ext. Identifier - REFCLK	Identifies need for REFCLK	1b	Not Required
129	3	1b	CLEI Code Present	Indicates if CLEI Code is present in Table 2	0b	No CLEI code present in Table 02h
129	0-2	3b	RESERVED	Reserved	000b	
130		1B	Connector	Code for connector type	07h	
131-138		8 B	Transceiver Code for electronic compatibility or optical compatibility			
		10 Gigabit Ethernet Compliance Codes				
131	7	1b	10GBASE-SR		0b	False
	6	1b	10GBASE-LR		0b	False
	5	1b	10GBASE-ER		0b	False
	4	1b	10GBASE-LRM		0b	False
	3	1b	10GBASE-SW		0b	False
	2	1b	10GBASE-LW		0b	False
	1	1b	10GBASE-EW		0b	False
	0	1b	Reserved		0b	False
		10 Gigabit Fibre Channel Compliance Codes				
132	7	1b	1200-MX-SN-I		0b	False
	6	1b	1200-SM-LL-L		0b	False
	5	1b	Extended reach 1550nm		0b	False
	4	1b	Intermediate reach 1310nm		0b	False
	3	1b	Reserved		0b	RESERVED
	2	1b	Reserved		0b	RESERVED
	1	1b	Reserved		0b	RESERVED
	0	1b	Reserved		0b	RESERVED
		10 Gigabit Copper Link Compliance Codes				
133	7	1b	Reserved		0b	RESERVED
	6	1b	Reserved		0b	RESERVED
	5	1b	Reserved		0b	RESERVED
	4	1b	Reserved		0b	RESERVED
	3	1b	Reserved		0b	RESERVED
	2	1b	Reserved		0b	RESERVED
	1	1b	Reserved		0b	RESERVED
	0	1b	Reserved		0b	RESERVED
		Lower Speed Link Compliance Codes				
134	7	1b	1000BASE-SX/1xFC MMF		0b	False
	6	1b	1000BASE-LX/1xFC SMF		0b	False
	5	1b	2xFC MMF		0b	False
	4	1b	2xFC SMF		0b	False
	3	1b	OC-48-SR		0b	False
	2	1b	OC-48-IR		0b	False
	1	1b	OC-48-LR		0b	False
	0	1b	Reserved		0b	False
		SONET/SDH Interconnect Link Compliance Codes				
135	7	1b	I-64.1r		0b	False
	6	1b	I-64.1		0b	False
	5	1b	I-64.2r		0b	False

	4	1b	I-64.2	0b	False
	3	1b	I-64.3	0b	False
	2	1b	I-64.5	0b	False
	1	1b	Reserved	0b	False
	0	1b	Reserved	0b	False
SONET/SDH Short Haul Link Compliance Codes					
136	7	1b	S-64.1	0b	False
	6	1b	S-64.2a	0b	False
	5	1b	S-64.2b	0b	False
	4	1b	S-64.3a	0b	False
	3	1b	S-64.3b	0b	False
	2	1b	S-64.5a	0b	False
	1	1b	S-64.5b	0b	False
	0	1b	Reserved	0b	False
SONET/SDH Long Haul Link Compliance Codes					
137	7	1b	L-64.1	0b	False
	6	1b	L-64.2a	0b	False
	5	1b	L-64.2b	0b	False
	4	1b	L-64.2c	0b	False
	3	1b	L-64.3	0b	False
	2	1b	G.959.1 P1L1-2D2	1b	False
	1	1b	Reserved	0b	False
	0	1b	Reserved	0b	False
SONET/SDH Very Long Haul Link Compliance Codes					
138	7	1b	V-64.2a	0b	False
	6	1b	V-64.2b	0b	False
	5	1b	V-64.3	0b	False
	4	1b	Reserved	0b	False
	3	1b	Tunable DWDM (by Channel#, byte 112-113)	0b	True
	2	1b	Tunable DWDM (in 50 pm steps, byte 72-73)	0b	False
	1	1b	Reserved	0b	False
	0	1b	Reserved	0b	False
Encoding					
139	7	1b	64B/66B	1b	10GE/10GFC Coding is supported
	6	1b	8B/10B	1b	Supported
	5	1b	SONET Scrambled	1b	Supported
	4	1b	NRZ	1b	NRZ only supported
	3	1b	RZ	0b	Not supported
	2	1b	Tx Dither Supported	000b	Not Supported
	1-0	2b	RESERVED	0b	RESERVED
140		1B	BR, minimum	Minimum Supported Bitrate (/100Mb)	63h 9900 Mbps
141		1B	BR, maximum	Maximum Supported Bitrate (/100Mb)	71h 11300 Mbps for FTLX version.
142		1B	Length (SMF) – km	Link length supported for 9/125 um fiber, units of km	C8h 200km
143		1B	Length (E-50um)	Link length supported for extended bandwidth 50um	00h Not supported
144		1B	Length (50m)	Link length supported for 50/125 mm fiber,	00h Not supported

				units of 1 m		
145		1B	Length (62.5m)	Link length supported for 62.5/125 mm fiber, units of 1 m	00h	Not supported
146		1B	Length (Copper)	Link length supported for copper, units of 1m	00h	Not supported
Device Technology						
147	4-7	4b	Transmitter Technology		0111b	1550nm EML laser
	3	1b	Wavelength Control		0b	Wavelength control
	2	1b	Cooled Transmitter		1b	Transmitter is cooled
	1	1b	Detector Type		1b	APD Detector
	0	1b	Tunable Transmitter		1b	Transmitter is Tunable
148-163		16B	Vendor name	SFP vendor name (ASCII) blank padded	“FINISAR CORP. ”	
CDR Support						
164	7	1b	CDR Support for 9.95 Gb/s		1b	Supported
	6	1b	CDR Support for 10.3 Gb/s		1b	Supported
	5	1b	CDR Support for 10.5 Gb/s		1b	Supported
	4	1b	CDR Support for 10.7 Gb/s		1b	Supported
	3	1b	CDR Support for 11.1 Gb/s		1b	Supported
	2	1b	Reserved		0b	
	1	1b	Line-side Loopback Mode Supported		0b	False
	0	1b	XFI Loopback Supported		1b	True
165-167		3B	Vendor OUI	SFP vendor IEEE company ID	009065h	IEEE assigned
168-183		16B	Vendor PN	Part number provided by vendor (ASCII)	“FTLX4213M xxxx ”	Finisar part number
184-185		2B	Vendor rev	Revision level for part number provided by vendor (ASCII)	3030h	Hardware revision level field not used
186-187		2B	Wavelength	Nominal Laser Wavelength (1/20nm)	0000h	15xx.xx nm * (20/nm)
188-189		2B	Wavelength Tolerance	Guaranteed range of laser wavelength +/- value from nominal Wavelength	0008h	0.1nm * (200/nm) = 8
190		1B	Max Case Temp	Maximum Case Temperature	46h	70°C
191		1B	CC_BASE	Check code for Base ID Fields (addresses 128 to 190)	xxh	Calculated check code, low 8 bits of sum of first 64 bytes of Serial ID info.
EXTENDED ID FIELDS						
192-195		4B	Power Supply Fields			
192		1B	Maximum Power Dissipation (/20mW)		C8h	= 4000 mW
193		1B	Max. Power Diss. In Power-down (/10mW)		96h	= 1500 mW
194	4-7	4b	Maximum current required by +5V Supply. Max current is 4 bit value * 50 mA. [500 mA max]		0A	=500mA
	0-3	4b	Maximum current required by +3.3V Supply. Max current is 4 bit value * 100 mA.		0111b	= 700mA
195	4-7	4b	Maximum current required by +1.8V Supply. Max current is 4 bit value * 100 mA.		000b	= 00

	0-3	4b	Maximum current required by -5.2V Supply.Max current is 4 bit value * 50 mA. [500 mA max]		0000b	0
196-211		16B	Vendor SN	Serial number provided by vendor (ASCII) blank padded	e.g., “A000000”	Encoded serial number
212-217		6B	Date code	Vendor’s manufacturing date	e.g., “030106“	yymmdd
218-219		2B	Lot Code	Vendor lot code	2020h	May be blank
Diagnostic Monitoring / Variable Power Supply / Special Function Support						
220	7	1b	Reserved		0b	Reserved
	6	1b	Reserved		0b	Reserved
	5	1b	Reserved		0b	Reserved
	4	1b	FEC BER Support		0b	No BER Support
	3	1b	Received power measurement type		1b	Average Power
	2	1b	Reserved		0b	Reserved
	1-0	2b	Reserved		00b	Will be Reserved
Enhanced Options						
221	7	1b	Module supports Variable Power Supply		0b	Not supported
	6	1b	Soft TX_DISABLE		1b	Soft TX_DISABLE is supported
	5	1b	Soft PWR_DWN		1b	Soft PWR_DWN is supported
	4	1b	Supports VPS LV Regulator Mode		0b	We are not supporting VPS
	3	1b	Supports VPS Bypassed Regulator Mode		0b	We are not supporting VPS
	2	1b	Active FEC Control		1b	Supported.
	1	1b	Wavelength Tunability		1b	Supported
	0	1b	Optional CMU Mode		0b	Not supported
222	4-7	4b	Aux A/D Input 1		0111b	+3.3V Supply Monitor on AUX A/D 1
	0-3	4b	Aux A/D Input 2		0110b	+5V Supply Monitor on Aux A/D 2
223		1B	CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	xxh	Calculated check code. Low 8 bits of sum of Bytes 192-222

Customer Specific Fields

<i>Data Address</i>	<i>Size (Bytes)</i>	<i>Field Name</i>	<i>Description of Field</i>	<i>Value</i>	<i>Value Meaning</i>
224-255	32	Vendor Specific EEPROM	TBD	All 00h at present	

Upper Memory Map: I2C Addr: A0h, Table 2

Customer Writable EEPROM. Writable with correct host password entry. Always readable.

Upper Memory Map: I2C Addr: A0h, Table 3

Used by Finisar for internal parameter storage. Not readable or Writable without Finisar Password.

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