	Datasheet	No.	DS10-E004
		Initial Date	2012-07-29
OE	OE6S5418	Written Team	R&D Dept.
			GH Zheng

Ⅰ Preview

PN	OE6S5418
Description	SFP+, ZR 80KM

Ⅱ Contents

Ⅲ Revision History

No.	Date	Items	Change Recording	Ver.	Rev.	Customer
1	2012-07-29	All	Initial registration	000	000	Standard
2						
3						
4						
5						
6						

1. Features

- Hot pluggable
- 10Gb/s serial optical interface
- 1550nm cooled EML transmitter with TEC, High sensitivity APD Receiver
- Up to 80km on 9/125um SMF
- SFP+ MSA package with duplex LC connector
- 2-wire interface for management and diagnostic monitor
- SFI High Speed Electrical Interface
- Very low EMI and excellent ESD protection
- +3.3V single power supply
- Power consumption less than 1.5W
- Operating case temperature: 0~+70°C
- Compliant with SFF-8431 and SFF-8432
- Compliant with SFF-8472 Rev 10.2
- Compliant with IEEE 802.3ae 10GBASE-ZR and 10GBASE-ZW
- RoHS Compliant

2. Applications

- 10G Base-ZR/ZW
- 10G Fiber Channel (with/without FEC)
- 10G Storage system

3. Description

OE6S5418 is 1550nm cooled EML laser and InGaAs-APD photo-detector receiver based 10Gigabit SFP+ transceiver , which is designed to transmit and receive optical data over single mode optical fiber for link length up to 80km.

The SFP+ ZR module is small form factor pluggable module for duplex optical data communications such as 10GBASE-ZR/ZW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI.

The transmitter converts 10Gbit/s serial PECL or CML electrical data into serial optical data compliant with the 10GBASE-ZR standard. An open collector compatible Transmit Disable (Tx_Dis) is provided. A logic "1," or no connection on this pin will disable the laser from transmitting. A logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply

voltage and temperature variations. An open collector compatible Transmit Fault (Tx_Fault) is provided. TX_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host with a resistor in the range 4.7-10 kΩ. TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor.

The receiver converts 10Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx_LOS signal is intended as a preliminary indication to the system in which the SFP+ is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

A 2-wire interface (SCL, SDA) is used for serial ID, digital diagnostics and other control /monitor functions

4. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T_{ST}	-40	+85	℃
Supply Voltage	V_{CC3}	0	+3.6	V
Relative Humidity	RH	5	95	%

5. Operation Environment

Parameter	Symbol	Min	Typ	Max	Unit
Date Rate			10.3125		Gb/s
Supply Voltage	V_{CC}	+3.14	3.3	+3.47	V
Supply Current	I_{CC}		350	450	mA
Power Dissipation	PD			1.5	W
Operating Temperature	T_{OP}	0	25	+70	℃

6. Transmitter Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Side Mode Suppression Ratio	SMSR	30	-		dBm	
Average launch power of OFF transmitter	Poff	-30	-		dBm	
Extinction Ratio	ER	9	-	-	dB	
Transmitter Dispersion Penalty	TDP	-	-	3.0	dB	

Relative Intensity Noise		Rin	-	-	-128	dB/Hz	
Optical Return Loss Tolerance			21	-	-	dB	
Operating Data Rate		S		10.3125		Gbps	
Centre Wavelength		λC	1530	1550	1565	nm	
Average Optical Power		Pavg	0	-	4.0	dBm	
Common mode voltage tolerance			15	-	-	mV	
Tx Input Diff Voltage		VI	180		700	mV	
Transmit Disable Input	H	V_{IH}	2.0		Vcc+0.3	V	
	L	V_{IL}	0		0.8	V	
Transmit Enable Output	H	V_{OH}	2.4		Vcc+0.3	V	
	L	V_{OL}	0		0.4	V	
Data Dependent Input Jitter		DDJ			0.1	UI	
Data Input Total Jitter		TJ			0.28	UI	
Input Differential Impedance		Zin	80	100	120	Ω	

7. Receiver Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Center Wavelength	λr	1250		1600	nm	
Average receiver power	PIN			-24	dBm	
Receive overload in average power	PMAX	-7.0				
Los Assert	LosA	-35		-	dBm	
Los Dessert	LosD			-24	dBm	
Los Hysteresis	LosH	0.5		4	dB	
Stressed Eye Jitter		0.3			UIp-p	1
Receive electrical 3dB upper cutoff frequency				12.3	GHz	
Receiver Reflectance				-26	dB	
Single Ended Output Voltage Tolerance		-0.3		4	V	
Rx Output Diff Voltage	Vo	300		850	mV	
Rx Output Rise and Fall Time	Tr/Tf	30			ps	20% to 80%
Total Jitter	TJ			0.7	UI	
Deterministic Jitter	DJ			0.42	UI	

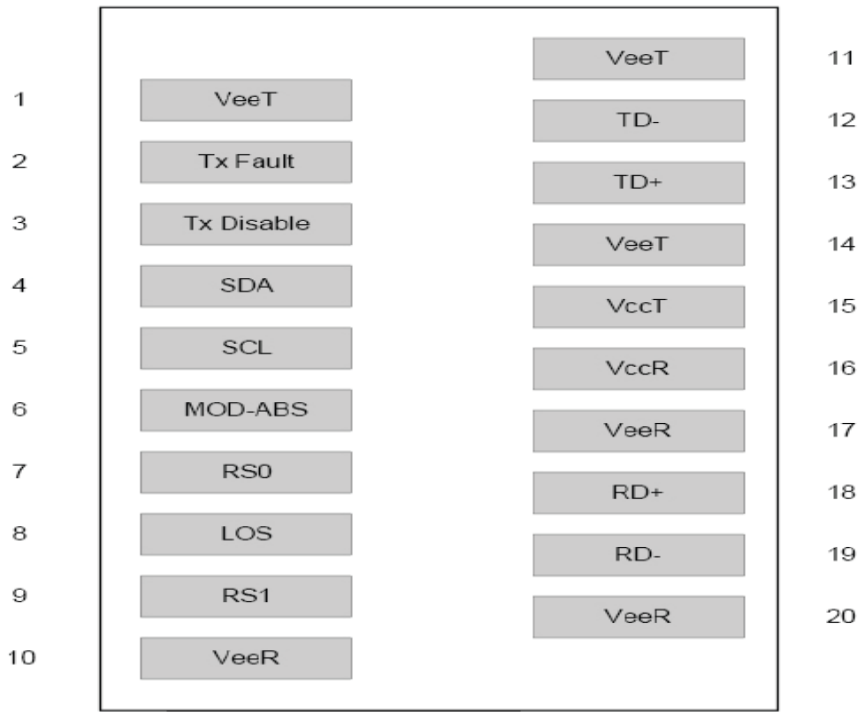
Notes:

[1] Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER =1x 10^{-12} .

8. Pin Information

Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



Pin Function Definitions

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	Note1
2	Tx Fault	Module transmitter fault	Note 2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	Note 3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	Note 2
7	RS0	Receiver Rate Select	
8	LOS	Receiver Loss of Signal Indication	Note4
9	RS1	Transmitter Rate Select (not used)	
10	VeeR	Module receiver ground	Note 1
11	VeeR	Module receiver ground	Note 1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	Note 1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	Note 1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	Note1

Note 1、 The module ground pins shall be isolated from the module case.

Note 2、 This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

Note 3、 This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.

Note 4、 This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

9. SFP+ Module A0、 A2 information and management

The SFP+ modules implement the 2-wire serial communication protocol as defined in the SFP -8472.

The serial ID information of the SFP+ modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information(A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers".

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

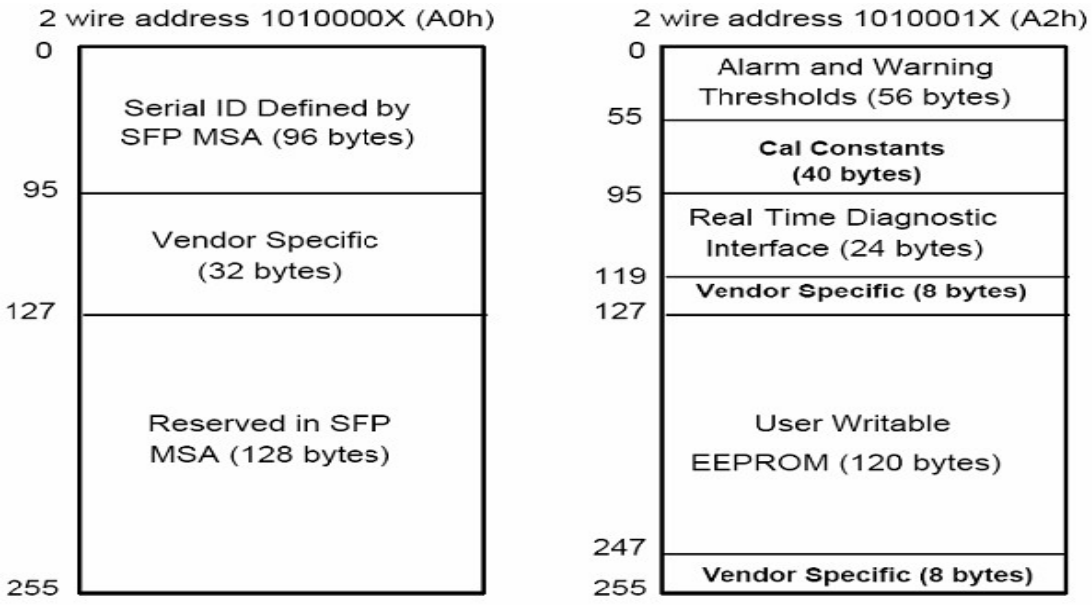


Table 2 - EEPROM Serial ID Memory Contents (**A0h**)

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	
11	1	Encoding	64B/66B (06h)

12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps （67h）
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: OCRECOM
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "OE6S5418" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	OCRE's Manufacturing date code
92	1	Diagnostic type	
93	1	Enhanced option	
94	1	SFF-8472	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	OCRECOM specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

10. Digital Diagnostic Monitor Characteristics

Parameter	Symbol	Min.	Max	Unit
Temperature monitor absolute error	DMI_Temp	-3	3	℃
Laser power monitor absolute error	DMI_TX	-3	3	dBm
RX power monitor absolute error	DMI_RX	-3	3	dBm
Supply voltage monitor absolute error	DMI_VCC	-0.08	0.08	V
Bias current monitor	DMI_Ibias	-10%	10%	mA

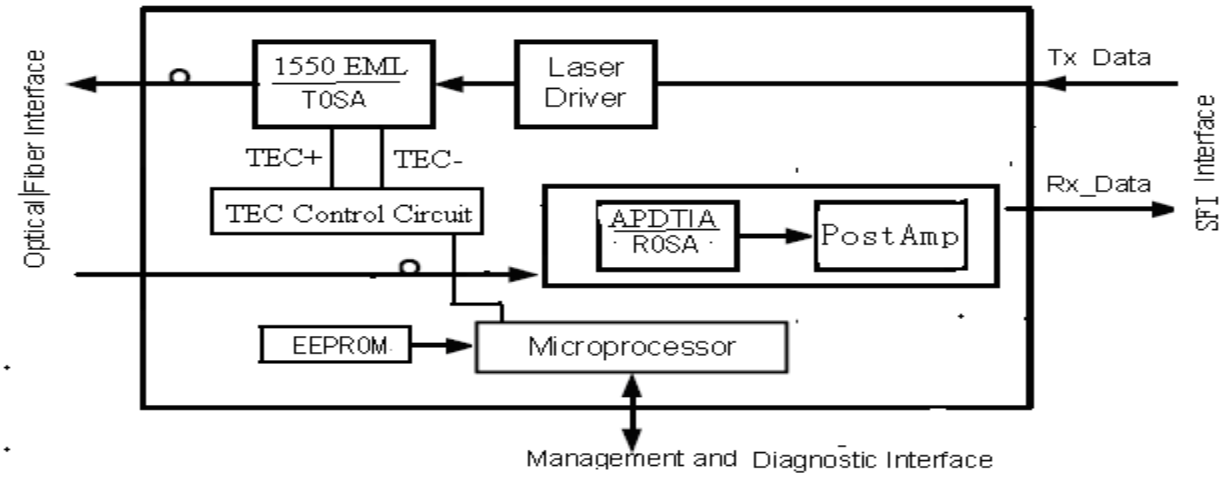
11. Regulatory Compliance

The OE6S5418 complies with international Electromagnetic Compatibility and international safety requirements and standards (see details in Table following).

Electrostatic Discharge	MIL-STD-883E	Class 1(>2000 V)

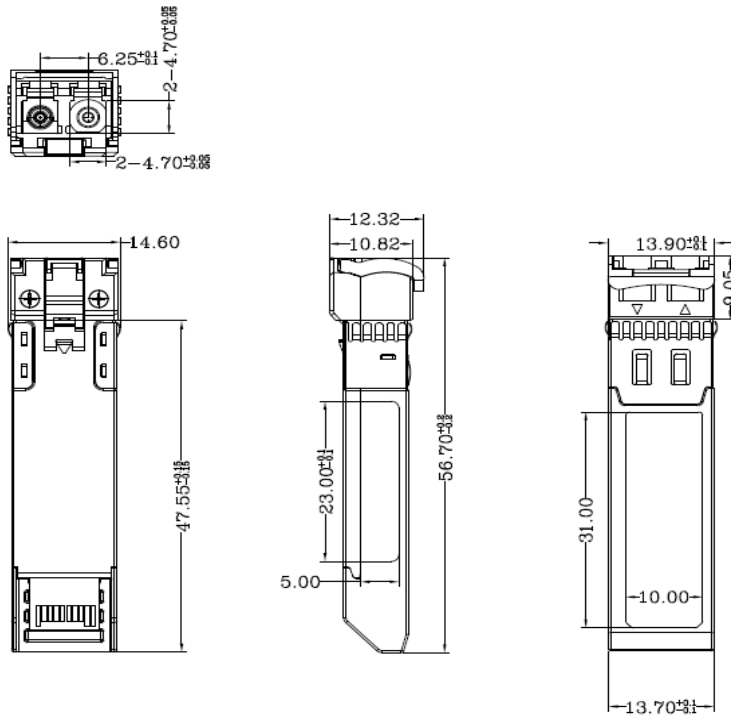
(ESD) to the Electrical Pins	Method 3015.4	
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

12. A block diagram of the OE6S5418 SFP+ optical transceiver is shown below



SFP+ ZR Transceiver

13. Mechanical Dimensions



14. Model Order information

PN	Description
OE6S5418	10G SFP+ ZR 80KM 0~70℃