



Product Name	GAOTek Quantum Wave SFP-CWDM transceivers
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CONTENT

1. Product Features	3
2. Applications	3
3. Description.....	4
4. Absolute Maximum Ratings	5
5. Recommended Operating Conditions	5
6. Optical and Electrical Characteristics	6
7. Timing and Electrical	8
8. Diagnostics.....	9
9. Digital Diagnostic Memory Map	9
10. Pin Descriptions.....	11
11. Recommended Interface Circuit	14
12. Mechanical Dimensions	15
13. Ordering information	16

GAOTek Quantum Wave SFP-CWDM transceivers

1. Product Features:

- Supports up to 14.025 Gbps bit rates.
- Hot-pluggable SFP+ footprint.
- CWDM Cooled EML laser and PIN photodiode, Up to 40 km for SMF transmission.
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle.
- Compatible with RoHS.
- Single +3.3 V power supply.
- Real Time Digital Diagnostic Monitoring
- Operating case temperature:
Standard: 0 to +70°C



2. Applications:

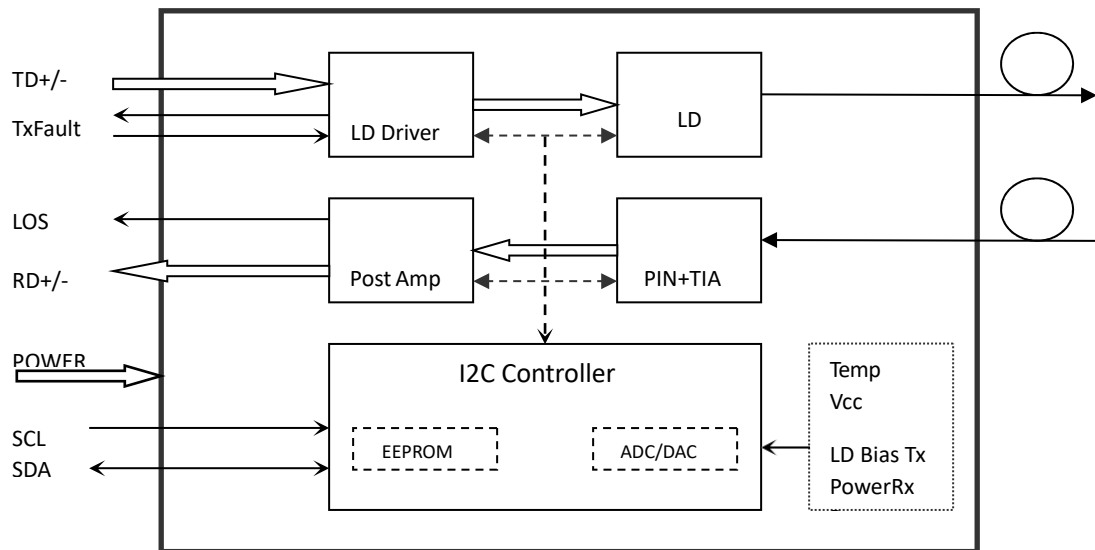
- 4.25/8.5/14.025G Fiber channel
- Other Optical links

3. Description:

The SFP+ transceivers are high-performance, cost-effective modules supporting data rate of 14.025Gbps and 40km transmission distance with SMF.

The transceiver consists of three sections: a Cooled EML laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.



Transceiver functional diagram



4. Absolute Maximum Ratings:

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

5. Recommended Operating Conditions:

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	Vcc	3.135	3.30	3.46 5	V
Power Supply Current	Icc			550	mA
Data Rate		4.25	14.025		Gbps



6. Optical and Electrical Characteristics:

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λ_c	$\lambda_c-6.5$	λ_c	$\lambda_c+6.5$	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30	-		dB	
Average Output Power	P _{out}	-1		+3	dBm	1
Extinction Ratio	ER	8.2			dB	
Data Input Swing Differential	V _{IN}	180		850	mV	2
Input Differential Impedance	Z _{IN}	90	100	110	Ω	
TX Disable	Disable	2.0		V _{cc}	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		V _{cc}	V	
	Normal	0		0.8	V	
Receiver						
Centre Wavelength	λ_c	1260		1620	nm	
Receiver Sensitivity				-13	dBm	3
Receiver Overload		0.5			dBm	3
LOS De-Assert	LOSD			-15	dBm	
LOS Assert	LOSA	-28			dBm	
LOS Hysteresis		0.5			dB	
Data Output Swing	V _{out}	300		900	mV	4

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Differential						
LOS	High	2.0		Vcc	V	
	Low			0.8	V	

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS $2^{31}-1$ test pattern @ 14025Mbps, BER $\leq 1 \times 10^{-12}$.
4. Internally AC-coupled.



7. Timing and Electrical:

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			2	ms
Tx Disable Assert Time	t_off			100	µs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	µs
Tx Disable To Reset	t_reset	10			µs
LOS Assert Time	t_loss_on			100	µs
LOS De-assert Time	t_loss_off			100	µs
Serial ID Clock Rate	f_serial_clock		100	400	KHz
MOD_DEF (0:2)-High	VH	2		V _c	V
MOD_DEF (0:2)-Low	VL			0.8	V



8. Diagnostics:

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	-1 to +3	dBm	±3dB	Internal
RX Power	-16 to -1	dBm	±3dB	Internal

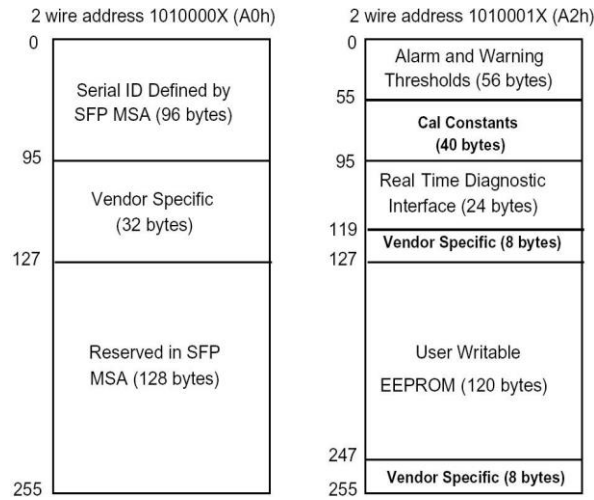
9. Digital Diagnostic Memory Map:

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

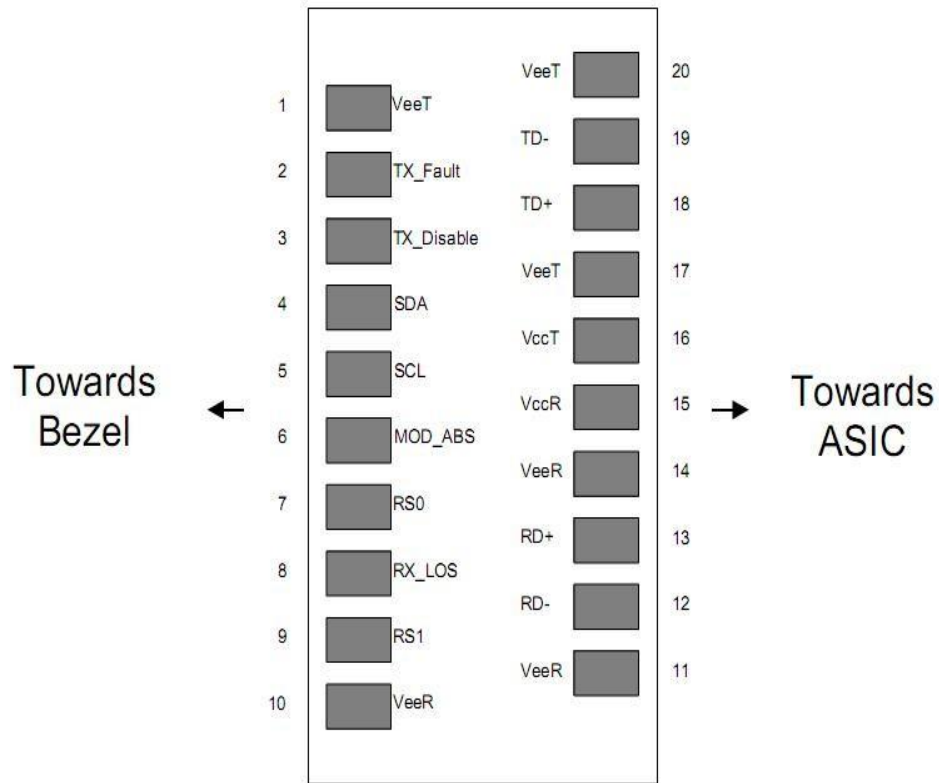
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.



The digital diagnostic memory map specific data field defines as following.



10. Pin Descriptions:





Pin	Signal Name	Description	Plug Seq.	Notes
1	VEET	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	VEER	Receiver ground	1	
11	VEER	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	VEER	Receiver ground	1	
15	VCCR	Receiver Power Supply	2	
16	VCCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	VEET	Transmitter Ground	1	

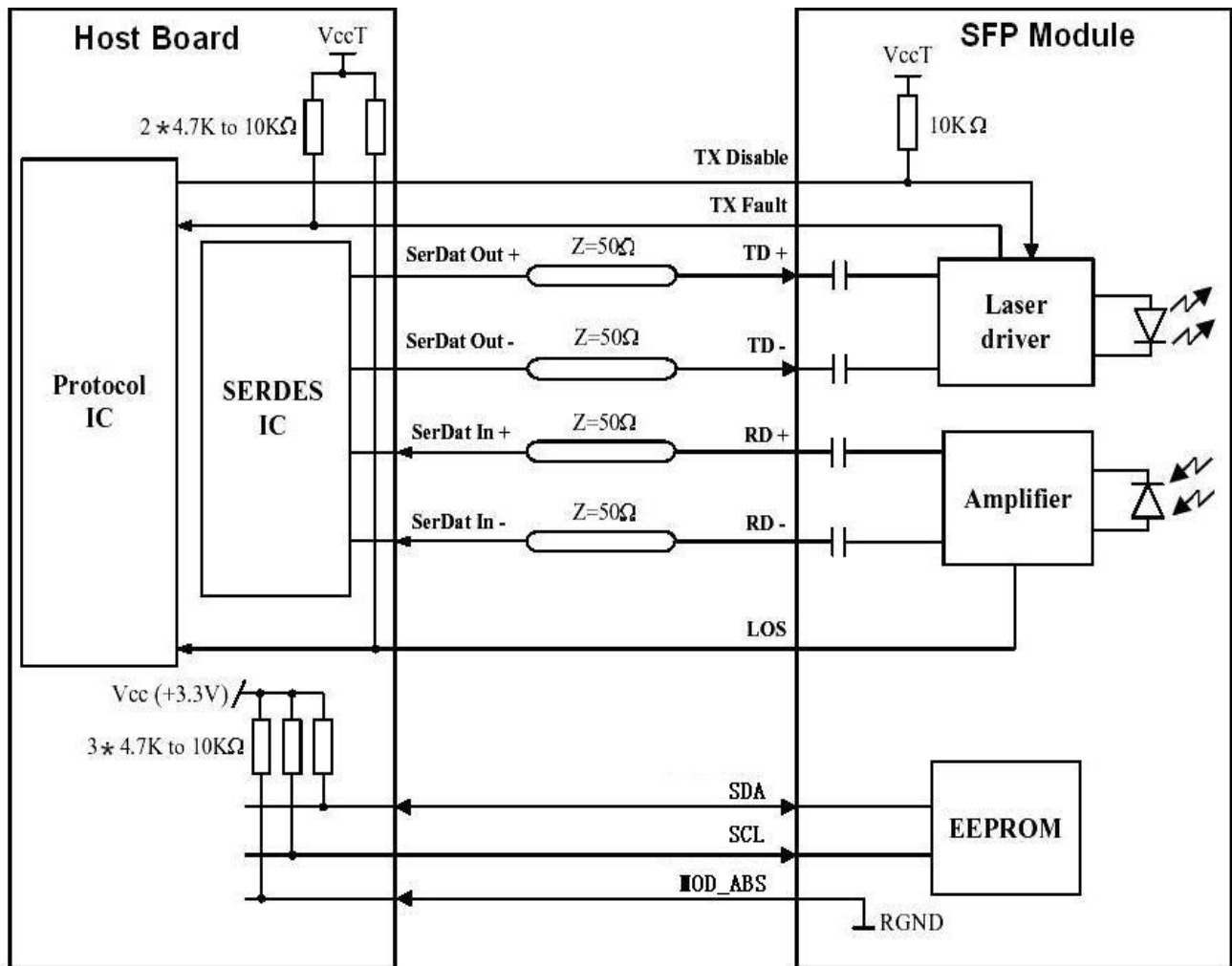


Notes:

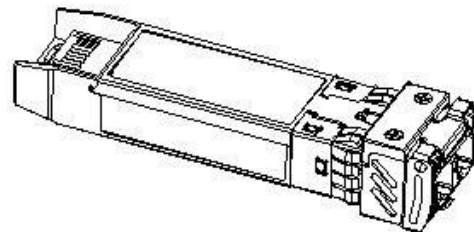
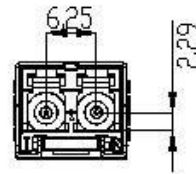
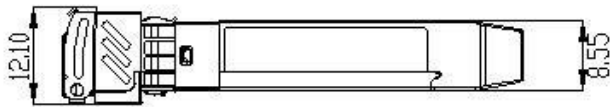
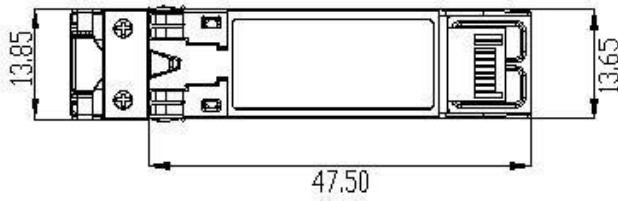
Plug Seq.: Pin engagement sequence during hot plugging

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10k Ω resistor on the host board to a voltage between 2.0V and $V_{cc}+0.3V$. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- 2) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- 3) LOS is open collector output. Should be pulled up with 4.7k~10k Ω on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
- 4) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100 Ω (differential) at the user SERDES.
- 5) TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100 Ω differential termination inside the module.

11.Recommended Interface Circuit:



12. Mechanical Dimensions:





13. Ordering information:

Part Number	Product Description
SFP-CWxxDF-40DC	1470~1610nm CWDM, 14.025Gbps, LC, 40km, 0°C~+70°C, with DDM

λC Wavelength Guide											
Code	λC	Unit	Code	λC	Unit	Code	λC	Unit	Code	λC	Unit
47	1470	nm	51	1510	nm	55	1550	nm	59	1590	nm
49	1490	nm	53	1530	nm	57	1570	nm	61	1610	nm

