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RAYCORE

Q3-S208 V3.2E

Specification of SFP Dual LC 1.25G CWDM Transceiver

Part Number: ATRG-63xx-xCSDD-00



The SFP transceivers are high performance, cost effective modules supporting data-rate of 1.25Gbps and transmission with SMF.

The transceiver consists of three sections: an un-cooled CWDM DFB 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 (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Features

- 18ch CWDM laser and PIN PD for link budget 18dB transmission (ATRG-63xx-DCSDD-00)
- 18ch CWDM laser and PIN PD for link budget 23dB transmission (ATRG-63xx-ZCSDD-00)
- Data-rate of 1.25Gbps operation
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature: Standard: 0 to +70°C

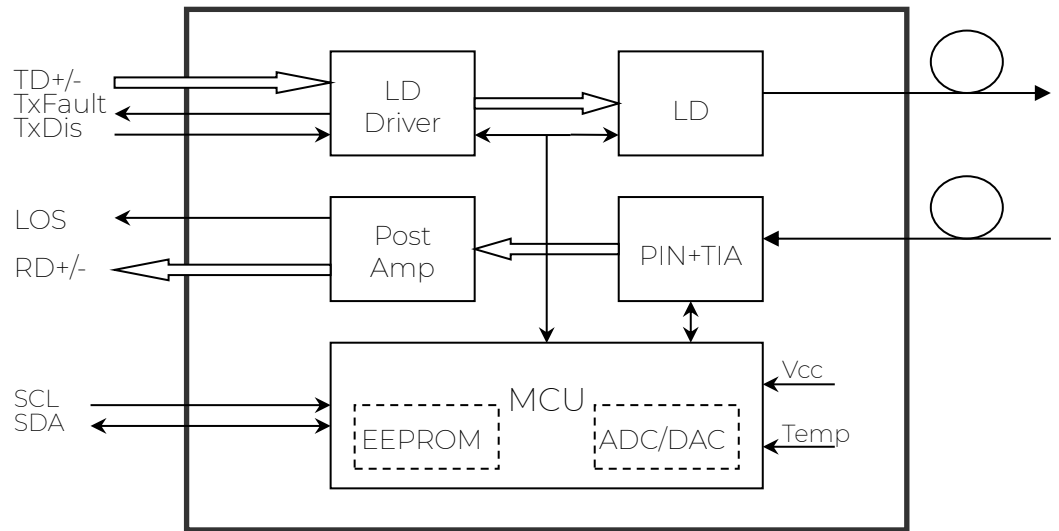
Applications

- Gigabit Ethernet (1.25Gbps)
- Fiber Channel 1xFC (1.0625Gbps)
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems



CWDM Wavelength - Latch Color

Wavelength Type	Bail Latch Color	Wavelength Type	Bail Latch Color	Wavelength Type	Bail Latch Color	Wavelength Type	Bail Latch Color
1270nm	Water Blue	1290nm	Dark Red	1310nm	Olive	1330nm	Yellow Green
1350nm	Sky Blue	1370nm	Pink	1390nm	White	1410nm	Black
1430nm	Beige	1450nm	Ocean Blue	1470nm	Gray	1490nm	Violet
1510nm	Blue	1530nm	Green	1550nm	Yellow	1570nm	Orange
1590nm	Red	1610nm	Brown				



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	%

Specifications

Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	0		+70	°C
Power Supply Voltage		Vcc	3.13	3.3	3.47	V
Power Supply Current		Icc			300	mA
Data Rate	Gigabit Ethernet			1.25		Gbps



Optical and Electrical Characteristics

ATRG-63xx-DCSDD-00: (CWDM DFB and PIN, Link Budget: 18dB, SMF Reach)

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}	-5		0	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time (20%~80%)	tr/tf			0.26	ns	
Data Input Swing Differential	V _{IN}	400		1800	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	1310	1620	nm	
Receiver Sensitivity				-23	dBm	3
Receiver Overload		-3			dBm	3
Loss of Signal De-Assert	LOS _D			-24	dBm	
Loss of Signal Assert	LOS _A	-35			dBm	
Loss of Signal Hysteresis		1		4	dB	
Data Output Swing Differential	V _{OUT}	370		1800	mV	4
Loss of Signal	High	2.0		V _{cc}	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 2⁷-1 test pattern @1250Mbps, BER $\leq 1 \times 10^{-12}$.
4. Internally AC-coupled.



ATRG-63xx-ZCSDD-00: (CWDM DFB and PIN, Link Budget: 23dB, SMF Reach)

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}	0		+5	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time (20%~80%)	tr/tf			0.26	ns	
Data Input Swing Differential	V _{IN}	400		1800	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	1310	1620	nm	
Receiver Sensitivity				-23	dBm	3
Receiver Overload		-3			dBm	3
Loss of Signal De-Assert	LOS _D			-24	dBm	
Loss of Signal Assert	LOS _A	-35			dBm	
Loss of Signal Hysteresis		1		4	dB	
Data Output Swing Differential	V _{OUT}	370		1800	mV	4
Loss of Signal	High	2.0		V _{cc}	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 2⁷-1 test pattern @1250Mbps, BER $\leq 1 \times 10^{-12}$.
4. Internally AC-coupled.



Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
TX Disable Negate Time	t_on			1	ms
TX Disable Assert Time	t_off			10	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
Loss of Signal Assert Time	t_loss_on			100	μs
Loss of Signal De-assert Time	t_loss_off			100	μs
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0:2)-High	V _H	2		V _{cc}	V
MOD_DEF (0:2)-Low	V _L			0.8	V

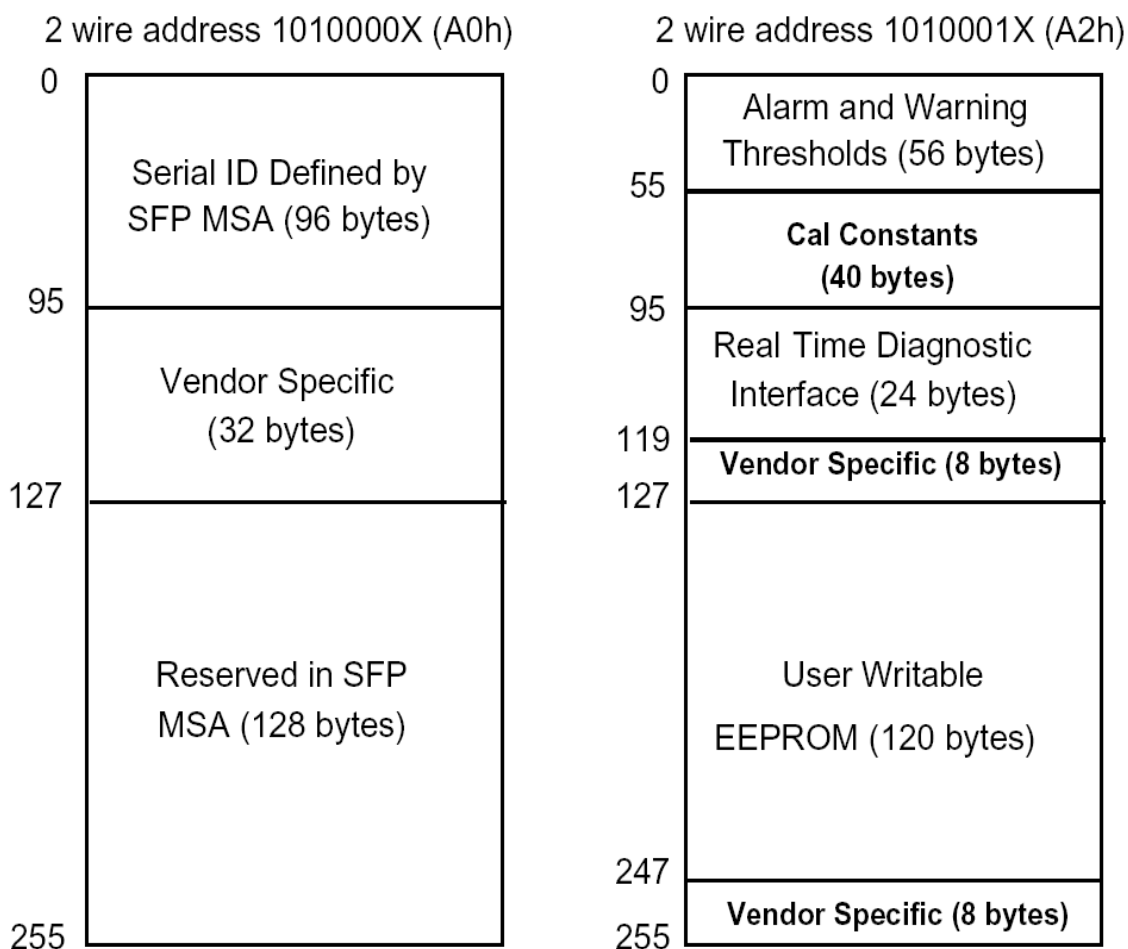
Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal/External
Voltage	3.0 to 3.6	V	±3%	Internal/External
Bias Current	0 to 100	mA	±10%	Internal/External
TX Power	refer the spec.	dBm	±3dB	Internal/External
RX Power	refer the spec.	dBm	±3dB	Internal/External



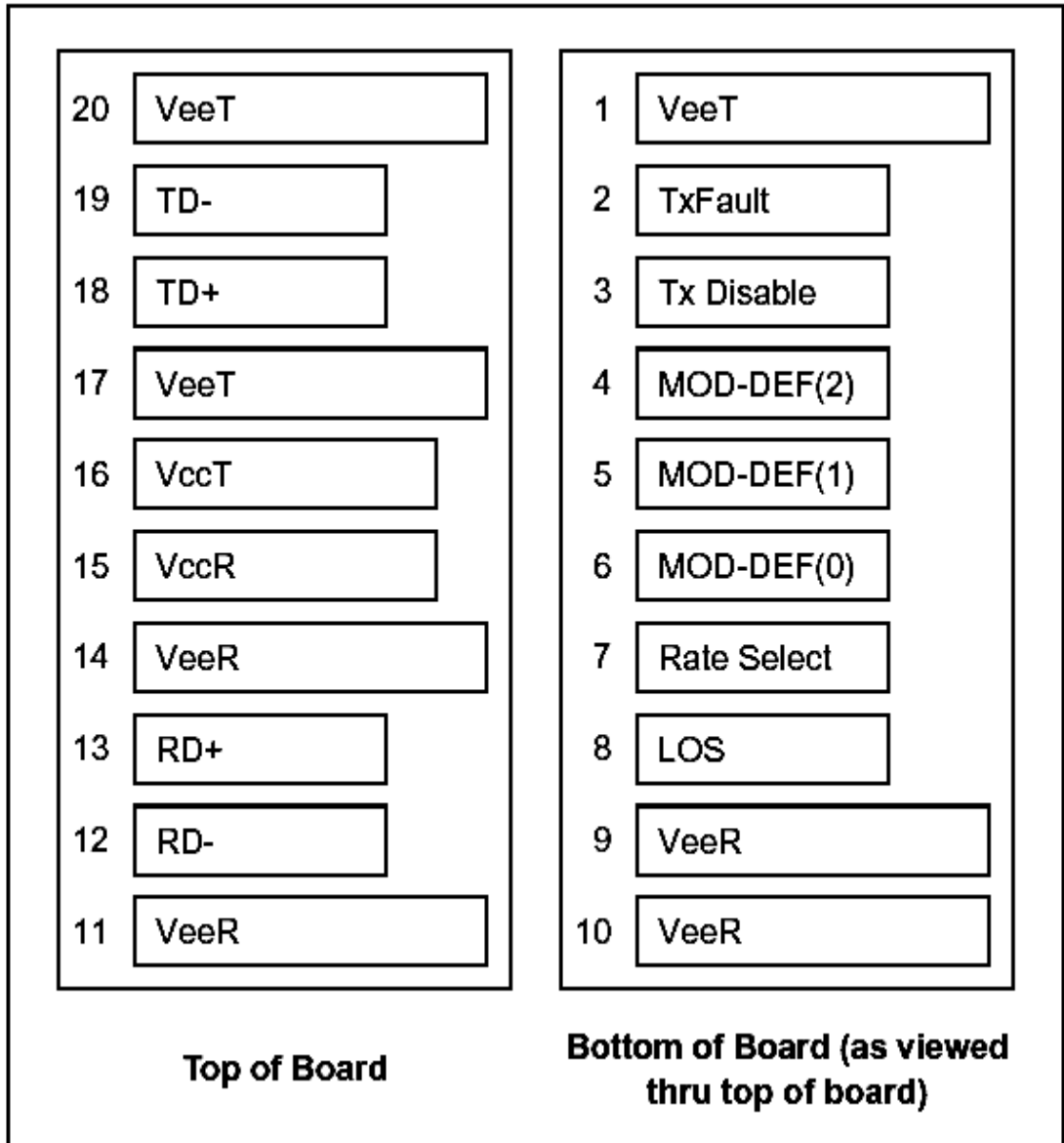
Digital Diagnostic Memory Map

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



Pin Definitions

Pin Diagram



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V _{EER}	Receiver ground	1	
10	V _{EER}	Receiver ground	1	
11	V _{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V _{EER}	Receiver ground	1	
15	V _{CCR}	Receiver Power Supply	2	
16	V _{CCT}	Transmitter Power Supply	2	
17	V _{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V _{EET}	Transmitter Ground	1	

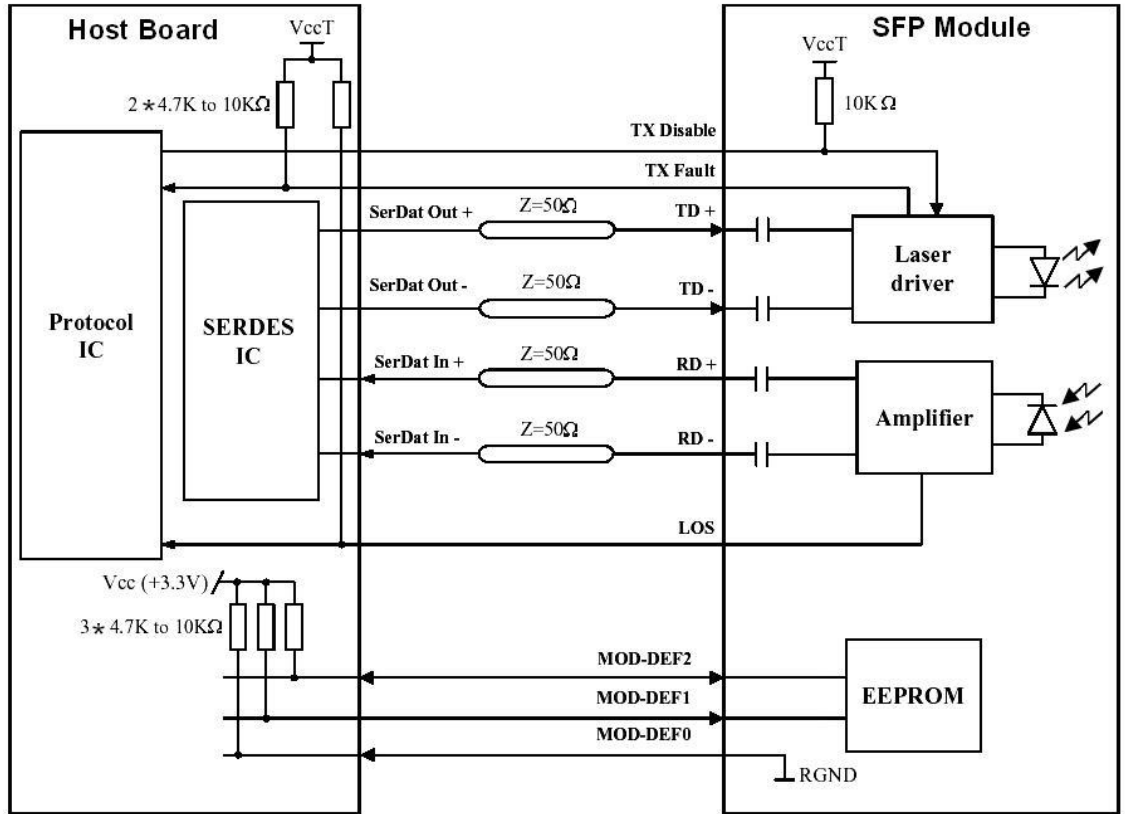
Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- TX Fault is an open collector output, which should be pulled up with a 4.7k~10kohms 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.
- TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kohms resistor. Its states are:
 Low (0 to 0.8V): Transmitter on
 (>0.8V, < 2.0V): Undefined
 High (2.0 to 3.465V): Transmitter Disabled
 Open: Transmitter Disabled
 Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7k~10kohms resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR}.
 Mod-Def 0 is grounded by the module to indicate that the module is present
 Mod-Def 1 is the clock line of two wire serial interface for serial ID
 Mod-Def 2 is the data line of two wire serial interface for serial ID
- LOS is an open collector output, which should be pulled up with a 4.7k~10kohms resistor. Pull up voltage between 2.0V and V_{cc}+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100ohms (differential) at the user SERDES.
- TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100ohms differential termination inside the module.



Recommended Interface Circuit



Ordering information

ATR-63xx-DCSDD-00: (CWDM DFB and PIN, Link Budget: 18dB, SMF Reach)

Form Factor	Date Rate	Media	Link Budget	Wavelength	TX Power (dBm)	RX Sensitivity (dBm)	DDM (Y/N)	Temperature (°C)	Part Number
SFP-Dual-LC	1.25G	SMF	18dB	1270nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CA-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1290nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CB-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1310nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CC-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1330nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CD-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1350nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CE-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1370nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CF-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1390nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CG-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1410nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CH-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1430nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CJ-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1450nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63CI-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1470nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C2-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1490nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C3-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1510nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C4-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1530nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C5-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1550nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C6-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1570nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C7-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1590nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C8-DCSDD-00
SFP-Dual-LC	1.25G	SMF	18dB	1610nm	0 ~ -5	≤ -23	Y	0 ~ +70	ATR-63C9-DCSDD-00



ATRG-63xx-ZCSDD-00: (CWDM DFB and PIN, Link Budget: 23dB, SMF Reach)

Form Factor	Date Rate	Media	Link Budget	Wavelength	TX Power (dBm)	RX Sensitivity (dBm)	DDM (Y/N)	Temperature (°C)	Part Number
SFP-Dual-LC	1.25G	SMF	23dB	1270nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CA-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1290nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CB-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1310nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CC-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1330nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CD-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1350nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CE-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1370nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CF-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1390nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CG-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1410nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CH-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1430nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CJ-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1450nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63CI-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1470nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C2-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1490nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C3-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1510nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C4-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1530nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C5-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1550nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C6-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1570nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C7-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1590nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C8-ZCSDD-00
SFP-Dual-LC	1.25G	SMF	23dB	1610nm	5 ~ 0	≤ -23	Y	0 ~ +70	ATRG-63C9-ZCSDD-00

