

1X9 Single Mode Fiber DUAL Transceiver

155Mbps 100km

RTR1-5D03-4***

Product Features

- 1550nm DFB Laser Transmitter
- InGaAs PIN-TIA Photodiode Receiver
- Reach 100km Transmission Distance on 9/125 μ m SMF
- DUAL Single Mode Transceiver 1x9 Footprint
- SC, FC or ST Optical Interface are Optional
- Single +3.3V/5V Power Supply
- LVPECL Differential Inputs and Outputs
- LVPECL/LVTTL Signal Detection Output
- Compliant With RoHS and Lead Free
- Metal Enclosure for Lower EMI
- Operating Case Temperature:
 - Standard: 0 to +70 $^{\circ}$ C
 - Extend: -20 to +75 $^{\circ}$ C
 - Industrial: -40 to +85 $^{\circ}$ C

Product Applications

- Fast Ethernet
- ATM/SONET/SDH
- Switch/Router
- Other Optical Transmission Systems

Performance Specifications

➤ Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	
Storage Temperature	T _{st}	-40	+85	°C	
Operating Temperature	T _o	RTR1-5D03-4C**	0	+70	°C
		RTR1-5D03-4E**	-20	+75	°C
		RTR1-5D03-4I**	-40	+85	°C
Input Voltage	-	GND	V _{CC}	V	
Power Supply Voltage	V _{CC} -V _{EE}	0	+6	V	

Note: Stress in excess of maximum absolute ratings can cause permanent damage to the module

➤ Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	
Storage Temperature	T _{st}	-40	-	+85	°C	
Operating Case Temperature	T _c	RTR1-5D03-4C**	0	-	+70	°C
		RTR1-5D03-4E**	-20	-	+75	°C
		RTR1-5D03-4I**	-40	-	+85	°C
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Voltage	V _{CC}	4.75	5.0	5.25	V	
Power Supply Current	I _{CC}	-	-	300	mA	
Data Rate	DR	-	155	-	Mbps	

➤ Optical Specification

Transmitter							
Parameter		Symbol	Min	Typ	Max	Unit	Note
Center Wavelength	1550 DFB	λ_c	1530	1550	1570	nm	-
Spectral Width	DFB	$\Delta\lambda$	-	-	1	nm	-
Side Mode Suppression Ratio		SMSR	30	-	-	dB	DFB Laser
Average Optical Output Power		P _o	-3	-	2	dBm	-
Extinction Ratio		ER	11	-	-	dB	-
Optical Rise/Fall Time(20%-80%)		Tr/Tf	-	-	2.8	ns	-
Output Eye Diagram	Compliant with ITU-T G.957						
Receiver							
Parameter		Symbol	Min	Typ	Max	Unit	Note
Operate Wavelength		-	1260	-	1620	nm	-
Receiver Sensitivity		R _{SENS}	-	-	-34	dBm	1
Receiver Saturation		P _{RS}	-3	-	-	dBm	1
SD Assert		-	-45	-	-	dBm	Alarm: High-level
SD De-Assert		-	-	-	-34	dBm	
SD Hysteresis		-	0.5	-	5	dBm	-

Note: 1. Minimum Sensitivity and saturation levels for a 2²³-1 PRBS test pattern @155Mbps.

Electrical Specification

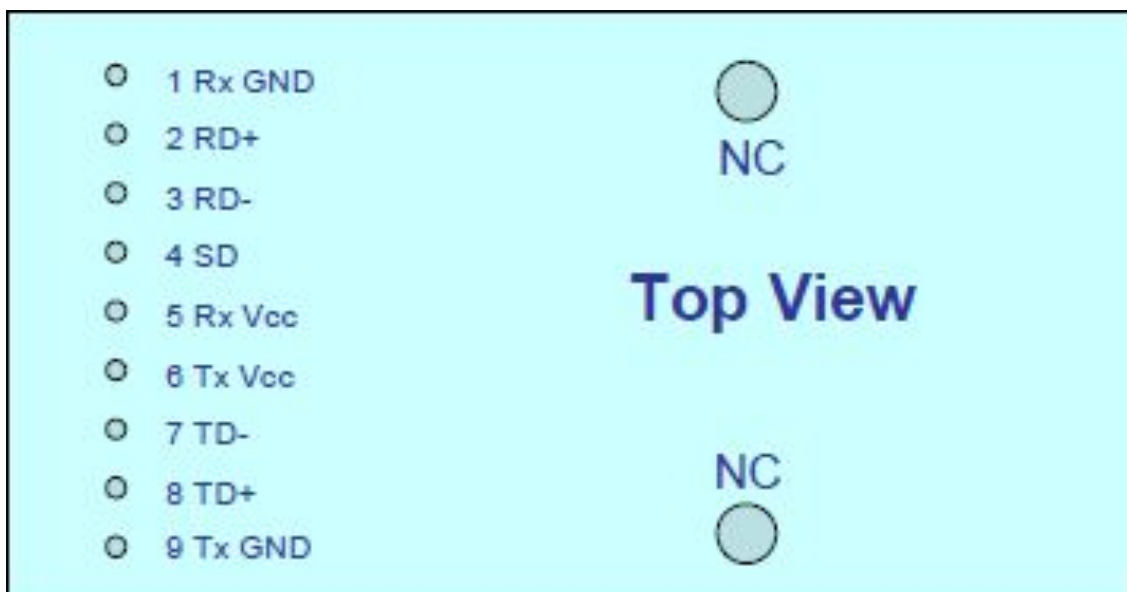
Transmitter						
Parameter	Symbol	Min	Typ	Max	Unit	Note
Power Supply Current	I_{CC}	-	70	180	mA	2
Input Differential Impedance	Z_{IN}	90	100	110	Ω	-
Single-terminal Input Voltage	$V_{IH} - V_{IL}$	300	-	1000	mV	-
Data Input Voltage-Low	$V_{IL} - V_{CC}$	-1.81		-1.48	V	-
Data Input Voltage-High	$V_{IH} - V_{CC}$	-1.16		-0.88	V	-
Receiver						
Parameter	Symbol	Min	Typ	Max	Unit	Note
Power Supply Current	I_{CC}	-	70	150	mA	2
Data Output Voltage-Low	$V_{OL} - V_{CC}$	-1.81	-	-1.62	V	3
Data Output Voltage-High	$V_{OH} - V_{CC}$	-1.025	-	-0.88	V	3
Signal Detect Output Voltage-Low	$V_{SDL} - V_{CC}$	-1.81	-	-1.62	V	PECL/LVPECL
Signal Detect Output Voltage-High	$V_{SDH} - V_{CC}$	-1.025	-	-0.88	V	
Signal Detect Output Voltage-Low	$V_{SDL} - V_{CC}$	-	-	0.8	V	TTL/LVTTL
Signal Detect Output Voltage-High	$V_{SDH} - V_{CC}$	2.0	-	-	V	

Note: 2. The current excludes the output load current.

3. Terminated with 500hm to $V_{CC} - 2V$.

Pin Definitions

PIN Diagram

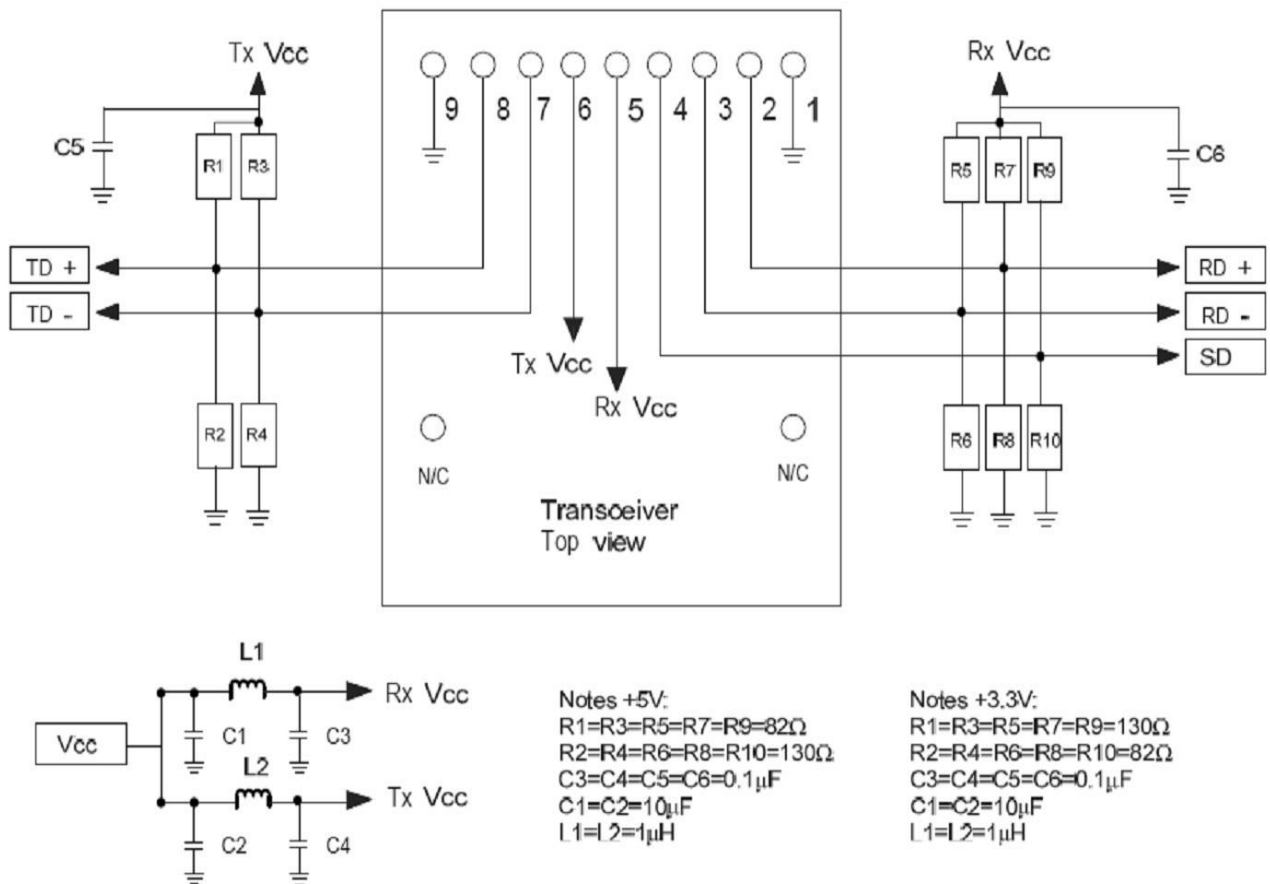


➤ **PIN Description**

PIN	Symbol	Note
1	GNDR	Directly connect this pin to receiver signal ground plane.
2	RD+	See recommended circuit schematic.
3	RD-	See recommended circuit schematic.
4	SD	Active high on this indicates a receiver optical signal.
5	V _{ccR}	+3.3V/+5.0V DC power for the receiver section.
6	V _{ccT}	+3.3V/+5.0V DC power for the transmitter section.
7	TD-	See recommended circuit schematic.
8	TD+	See recommended circuit schematic.
9	GNDT	Directly connect this pin to transmitter signal ground plane.

Recommended Circuit

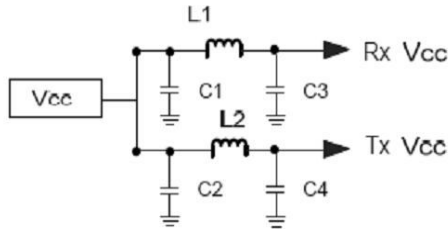
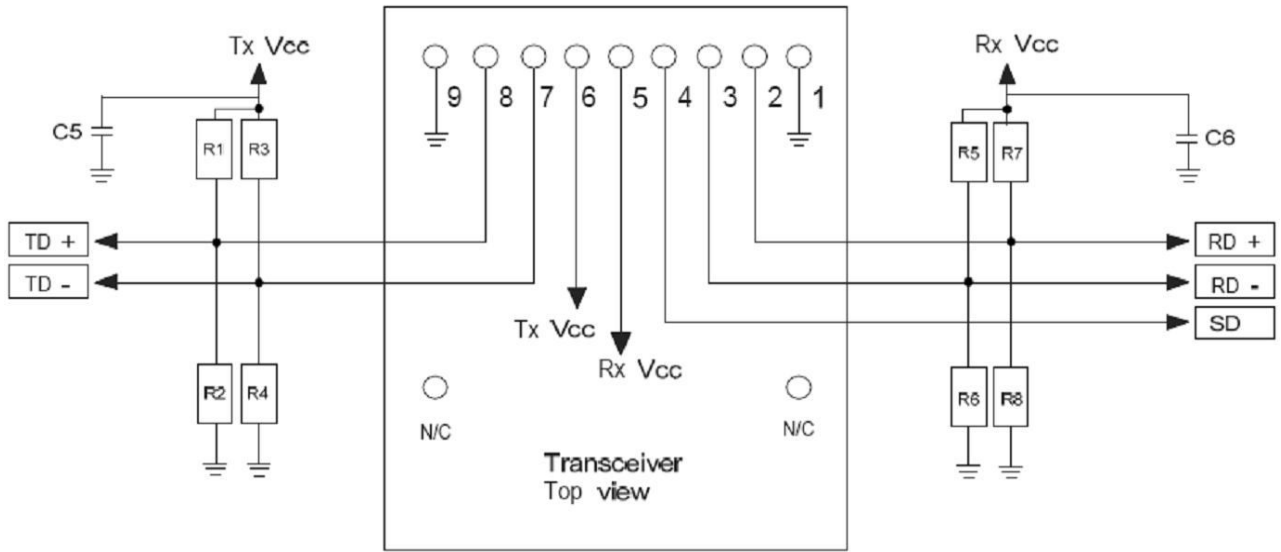
➤ **PECL Signal Detect**



Note: The split-loaded terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance.

Use short tracks from the inductors L1/L2 to the module Rx Vcc/Tx Vcc. A GND plane under the module is required for good EMI and sensitivity performance.

➤ TTL Signal Detect

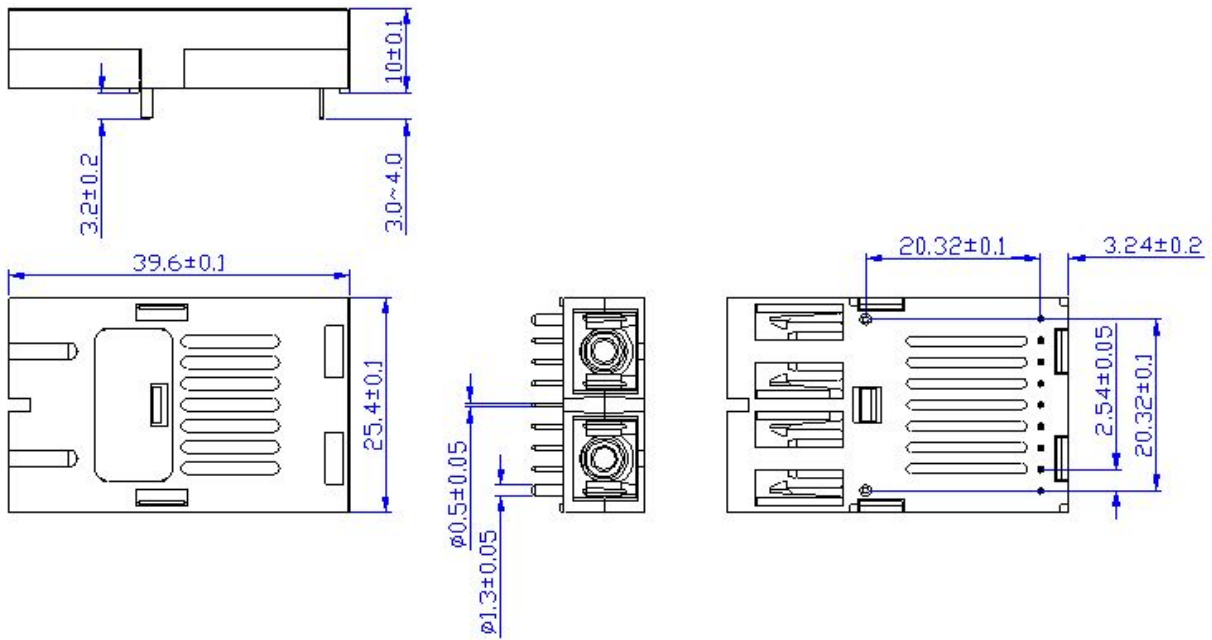


Notes +5V:
 R1=R3=R5=R7=82Ω
 R2=R4=R6=R8=130Ω
 C3=C4=C5=C6=0.1μF
 C1=C2=10μF
 L1=L2=1μH

Notes +3.3V:
 R1=R3=R5=R7=130Ω
 R2=R4=R6=R8=82Ω
 C3=C4=C5=C6=0.1μF
 C1=C2=10μF
 L1=L2=1μH

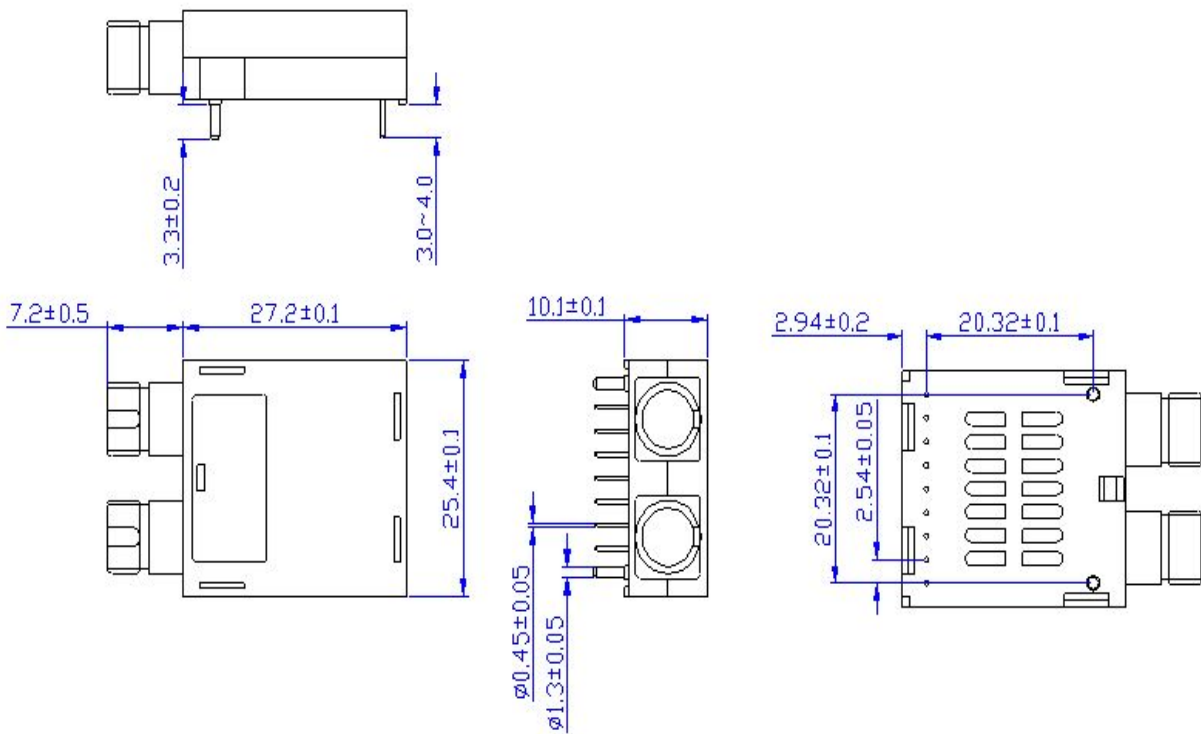
Package Diagram

➤ SC Interface



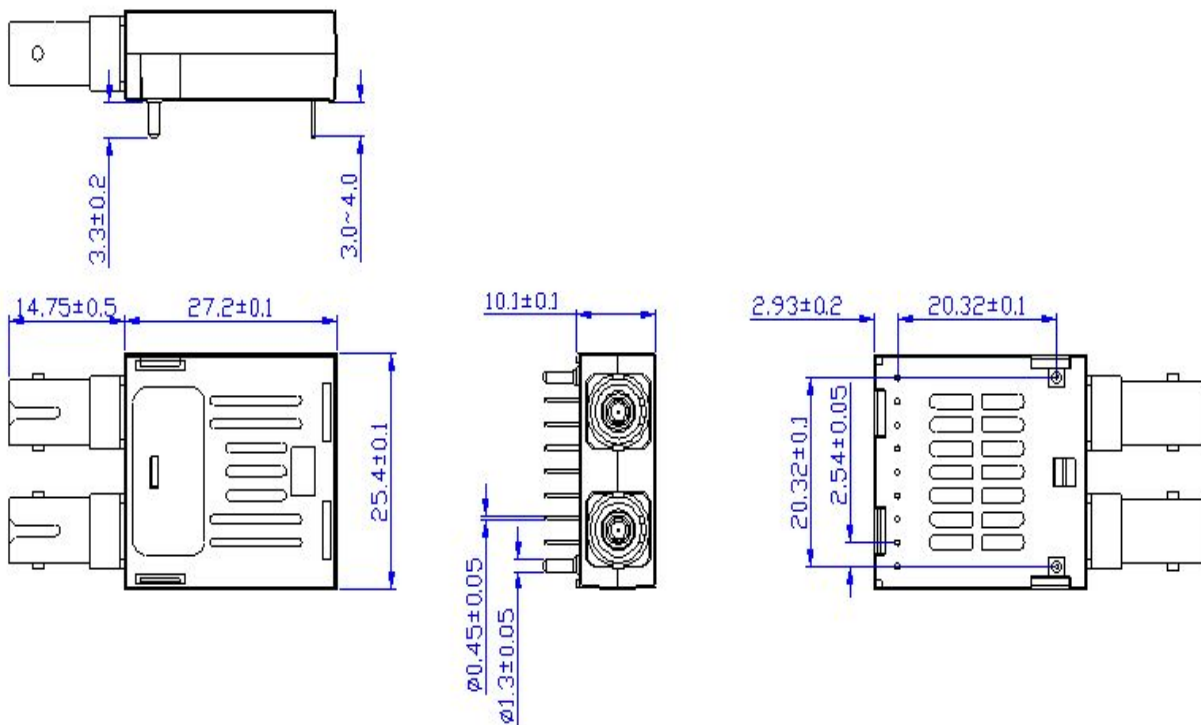
Unit: mm

▶ **FC Interface**



Unit: mm

▶ **ST Interface**



Unit: mm

Order Information

R	TR	1	-	5D	03	-	4	*	*	*	*	
REON	1X9	DUAL Fiber Inter- face	-	1550nm DFB	155 Mbps	-	-3~2 dBm	C E I	0~+70 °C -20~+75 °C -40~+85 °C	2=SC/PC 3=SC/APC 4=FC/PC 5=FC/APC 6=ST/PC 7=ST/APC	1=3.3V PECL signal/PECL alarm 2=3.3V PECL signal /TTL alarm 5=5V PECL signal/PECL alarm 6=5V PECL signal /TTL alarm	Customer Information

P/N	Package	Fiber Type	Data Rate (bps/Hz)	Reach	Tx(nm)	Rx	Temperature (°C)	Connector Type	Voltage
RTR1-5D03-4C21	1x9	SM	100~155M	100km	1550 DFB	PIN	0~+70	SC	3.3V
RTR1-5D03-4I21	1x9	SM	100~155M	100km	1550 DFB	PIN	-40~+85	SC	3.3V
RTR1-5D03-4C25	1x9	SM	100~155M	100km	1550 DFB	PIN	0~+70	SC	5V
RTR1-5D03-4I25	1x9	SM	100~155M	100km	1550 DFB	PIN	-40~+85	SC	5V
RTR1-5D03-4C41	1x9	SM	100~155M	100km	1550 DFB	PIN	0~+70	FC	3.3V
RTR1-5D03-4I41	1x9	SM	100~155M	100km	1550 DFB	PIN	-40~+85	FC	3.3V
RTR1-5D03-4C45	1x9	SM	100~155M	100km	1550 DFB	PIN	0~+70	FC	5V
RTR1-5D03-4I45	1x9	SM	100~155M	100km	1550 DFB	PIN	-40~+85	FC	5V
RTR1-5D03-4C61	1x9	SM	100~155M	100km	1550 DFB	PIN	0~+70	ST	3.3V
RTR1-5D03-4I61	1x9	SM	100~155M	100km	1550 DFB	PIN	-40~+85	ST	3.3V
RTR1-5D03-4C65	1x9	SM	100~155M	100km	1550 DFB	PIN	0~+70	ST	5V
RTR1-5D03-4I65	1x9	SM	100~155M	100km	1550 DFB	PIN	-40~+85	ST	5V

For more information:

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