

1X9 Single Mode Fiber DUAL Transceiver

155Mbps 120km

RTR1-5D03-5***

Product Features

- 1550nm DFB Laser Transmitter
- InGaAs PIN-TIA Photodiode Receiver
- Reach 120km 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 | Tst | -40 | +85 | °C | |
| Operating Temperature | To | RTR1-5D03-5C** | 0 | +70 | °C |
| | | RTR1-5D03-5E** | -20 | +75 | °C |
| | | RTR1-5D03-5I** | -40 | +85 | °C |
| Input Voltage | - | GND | Vcc | V | |
| Power Supply Voltage | Vcc-Vee | 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 | Tst | -40 | - | +85 | °C | |
| Operating Case Temperature | Tc | RTR1-5D03-5C** | 0 | - | +70 | °C |
| | | RTR1-5D03-5E** | -20 | - | +75 | °C |
| | | RTR1-5D03-5I** | -40 | - | +85 | °C |
| Power Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | |
| Power Supply Voltage | Vcc | 4.75 | 5.0 | 5.25 | V | |
| Power Supply Current | Icc | - | - | 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 | | Po | 0 | - | 5 | 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 | | RSENS | - | - | -34 | dBm | 1 |
| Receiver Saturation | | PRS | -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

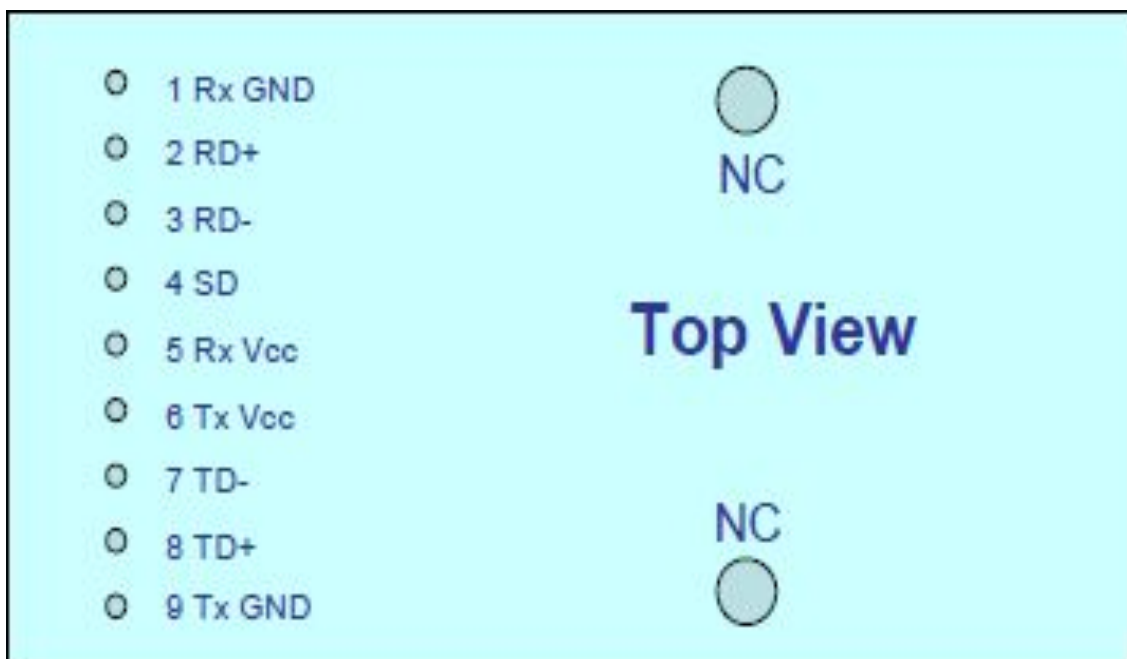
| Transmitter | | | | | | |
|-----------------------------------|-----------------------------------|--------|-----|-------|------|-------------|
| Parameter | Symbol | Min | Typ | Max | Unit | Note |
| Power Supply Current | I _{CC} | - | 70 | 180 | mA | 2 |
| Input Differential Impedance | Z _{IN} | 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 Vcc-2V.

Pin Definitions

PIN Diagram

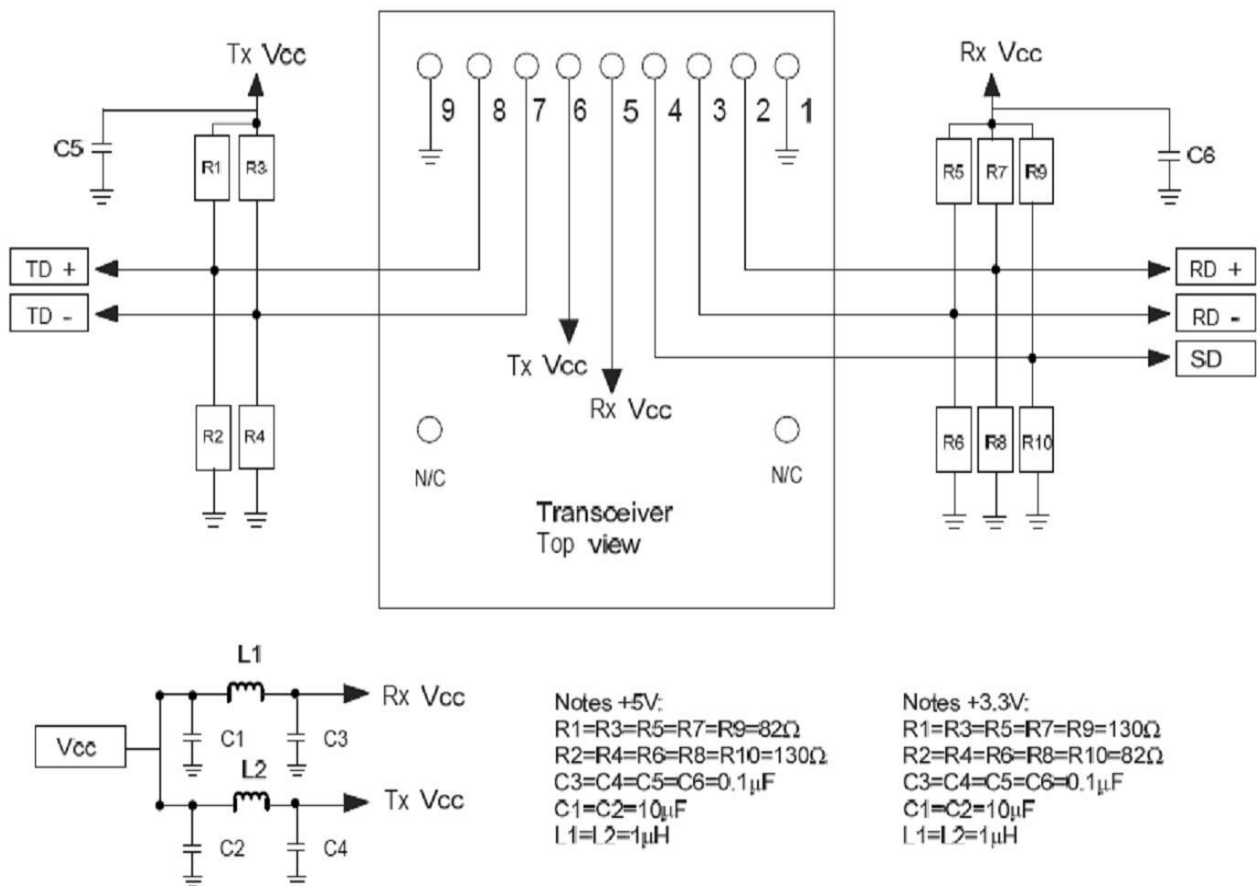


➤ PIN Description

| 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 | VccR | +3.3V/+5.0V DC power for the receiver section. |
| 6 | VccT | +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

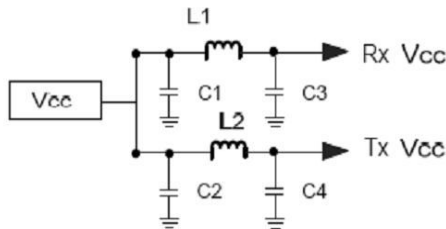
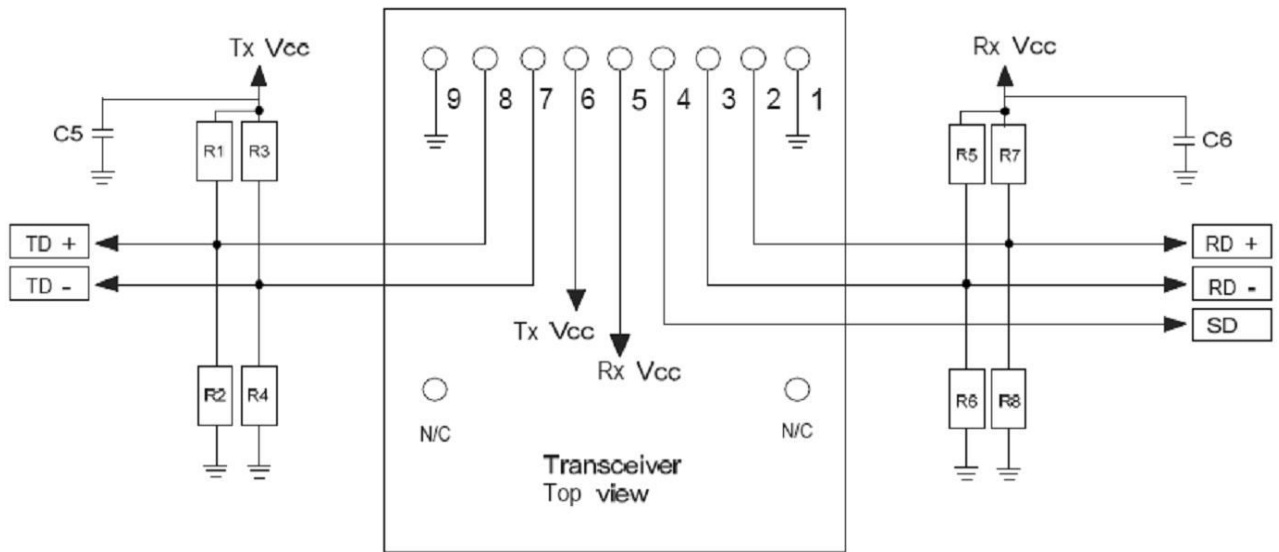
➤ PECL Signal Detect



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**

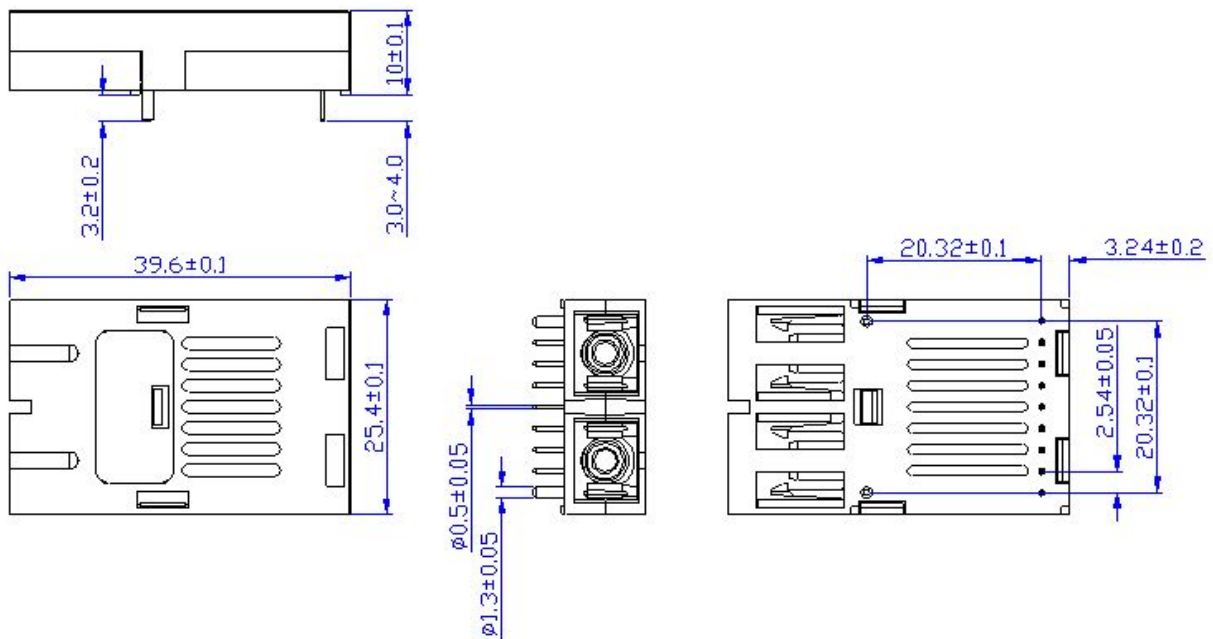


Notes +5V:
 R1=R3=R5=R7=82Ω
 R2=R4=R6=R8=130Ω
 C3=C4=C5=C6=0.1μF
 C1=C2=10μF
 L1=L2=1μH

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

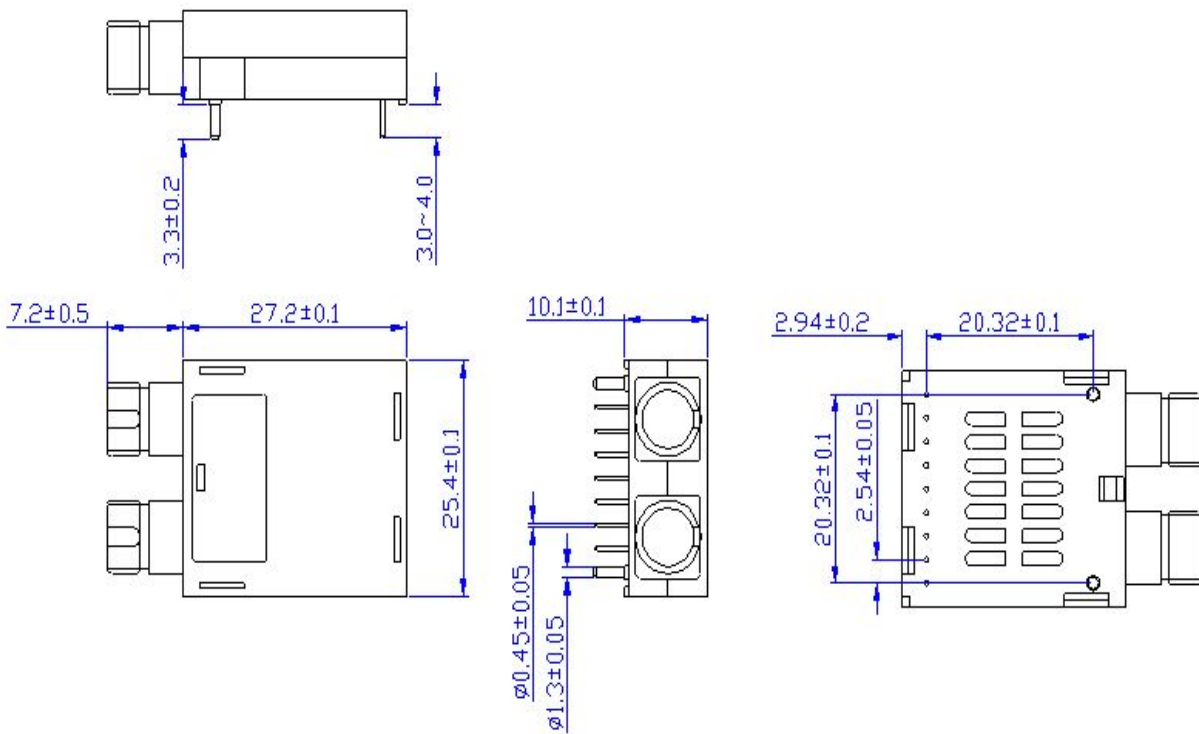
Package Diagram

➤ **SC Interface**



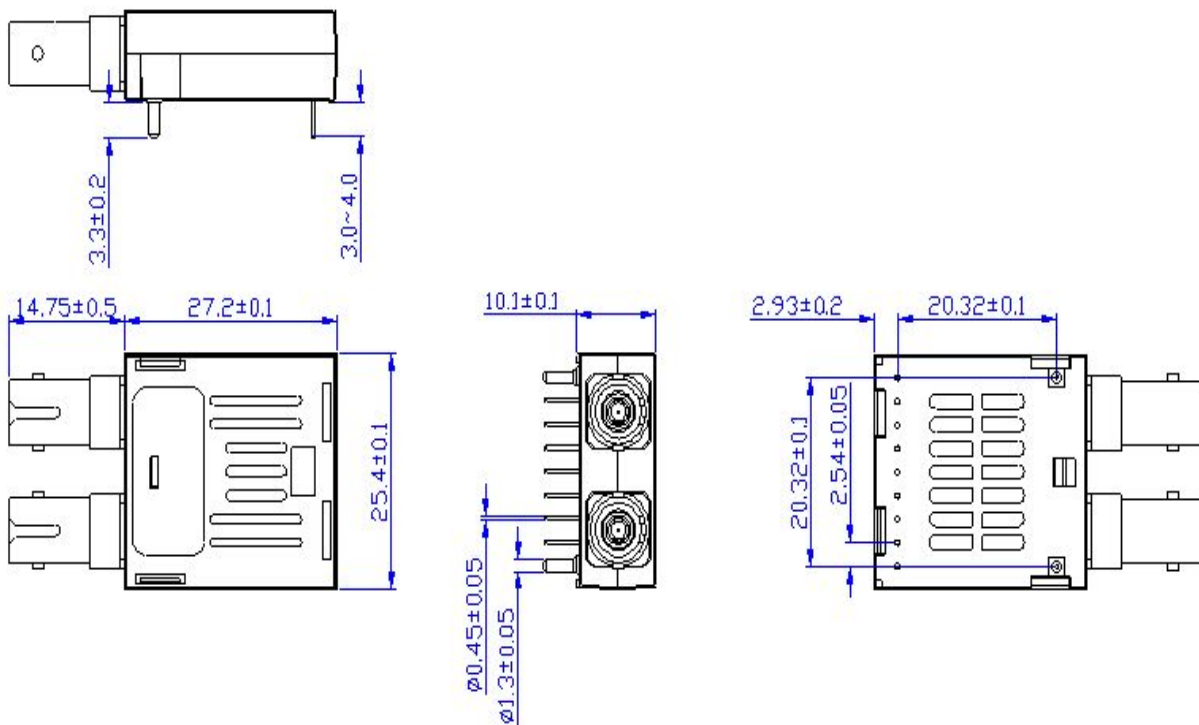
Unit: mm

▶ **FC Interface**



Unit: mm

▶ **ST Interface**



Unit: mm

Order Information

| R | TR | 1 | - | 5D | 03 | - | 5 | * | * | * | * |
|------|-----|---------------------------------|---|---------------|-------------|---|------------|--|--|---|-------------------------|
| REON | 1X9 | DUAL Fiber Inter- face | - | 1550nm DFB | 155 Mbps | - | 0~5 dBm | C 0~+70 °C E -20~+75 °C I -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 |
|----------------|---------|---------------|-----------------------|-------|----------|-----|---------------------|-------------------|---------|
| RTR1-5D03-5C21 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | 0~+70 | SC | 3.3V |
| RTR1-5D03-5I21 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | -40~+85 | SC | 3.3V |
| RTR1-5D03-5C25 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | 0~+70 | SC | 5V |
| RTR1-5D03-5I25 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | -40~+85 | SC | 5V |
| RTR1-5D03-5C41 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | 0~+70 | FC | 3.3V |
| RTR1-5D03-5I41 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | -40~+85 | FC | 3.3V |
| RTR1-5D03-5C45 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | 0~+70 | FC | 5V |
| RTR1-5D03-5I45 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | -40~+85 | FC | 5V |
| RTR1-5D03-5C61 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | 0~+70 | ST | 3.3V |
| RTR1-5D03-5I61 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | -40~+85 | ST | 3.3V |
| RTR1-5D03-5C65 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | 0~+70 | ST | 5V |
| RTR1-5D03-5I65 | 1x9 | SM | 100~155M | 120km | 1550 DFB | PIN | -40~+85 | ST | 5V |

For more information:

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