

## RSPD-16GD20-CXX

### 14.025Gbps SFP+ DWDM Transceiver, Single Mode, 20km Reach

#### Product Features

- ◆ Supports up to 14.025Gbps bit rates
- ◆ Hot-pluggable SFP+ footprint
- ◆ 100GHz ITU, C Band DWDM Cooled EML laser and PIN photodiode, Up to 20km for SMF transmission
- ◆ Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- ◆ Compatible with RoHS
- ◆ Single +3.3V power supply
- ◆ Real Time Digital Diagnostic Monitoring
- ◆ Operating case temperature:  
Standard: 0 to +70°C



#### Applications

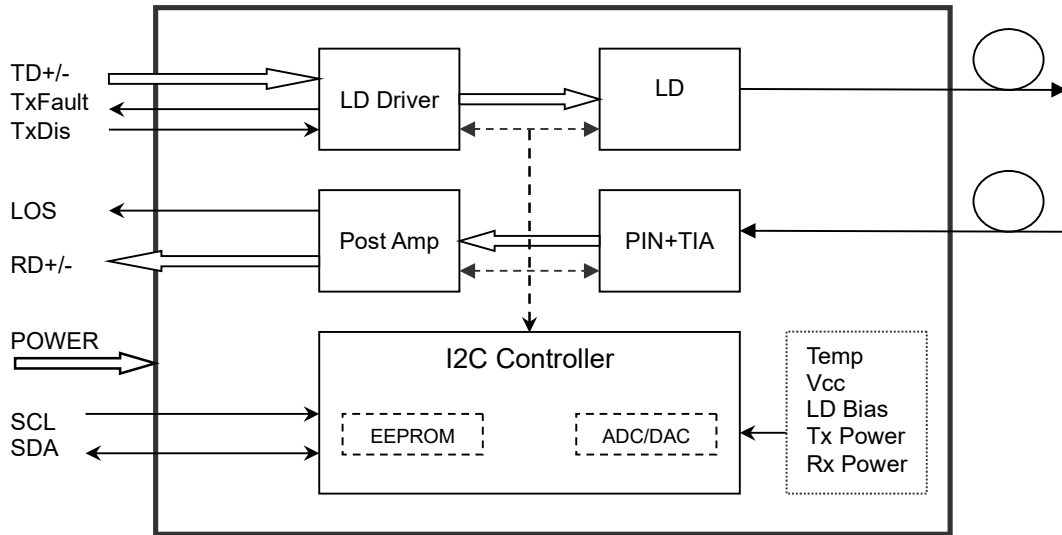
- ◆ 4.25/8.5/14.025G Fibre channel
- ◆ Other Optical links

#### Description

The SFP+ transceivers are high performance, cost effective modules supporting data rate of 14.025Gbps and 20km 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

### 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  | %    |

### Recommended Operating Conditions

| Parameter                  | Symbol | Min   | Typical | Max   | Unit |
|----------------------------|--------|-------|---------|-------|------|
| Operating Case Temperature | Tc     | 0     |         | +70   | °C   |
| Power Supply Voltage       | Vcc    | 3.135 | 3.30    | 3.465 | V    |
| Power Supply Current       | Icc    |       |         | 550   | mA   |
| Data Rate                  |        | 4.25  | 14.025  |       | Gbps |

## Optical and Electrical Characteristics

| Parameter                      | Symbol          | Min     | Typical | Max      | Unit     | Notes |
|--------------------------------|-----------------|---------|---------|----------|----------|-------|
| <b>Transmitter</b>             |                 |         |         |          |          |       |
| Centre Wavelength              | $\lambda_c$     | 1528.77 |         | 1563.86  | 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      | $\Omega$ |       |
| 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        |       |
| <b>Receiver</b>                |                 |         |         |          |          |       |
| Centre Wavelength              | $\lambda_c$     | 1260    |         | 1620     | nm       |       |
| Receiver Sensitivity           |                 |         |         | -14      | dBm      | 3     |
| Receiver Overload              |                 | 0.5     |         |          | dBm      | 3     |
| LOS De-Assert                  | $LOS_D$         |         |         | -15      | dBm      |       |
| LOS Assert                     | $LOS_A$         | -28     |         |          | dBm      |       |
| LOS Hysteresis                 |                 | 0.5     |         |          | dB       |       |
| Data Output Swing Differential | $V_{out}$       | 300     |         | 900      | mV       | 4     |
| LOS                            | 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  $2^{31}-1$  test pattern @14025Mbps, 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           |     |         | 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                              | V <sub>H</sub> | 2   |         | V <sub>cc</sub> | V    |
| MOD_DEF (0:2)-Low                               | V <sub>L</sub> |     |         | 0.8             | V    |

## Diagnostics

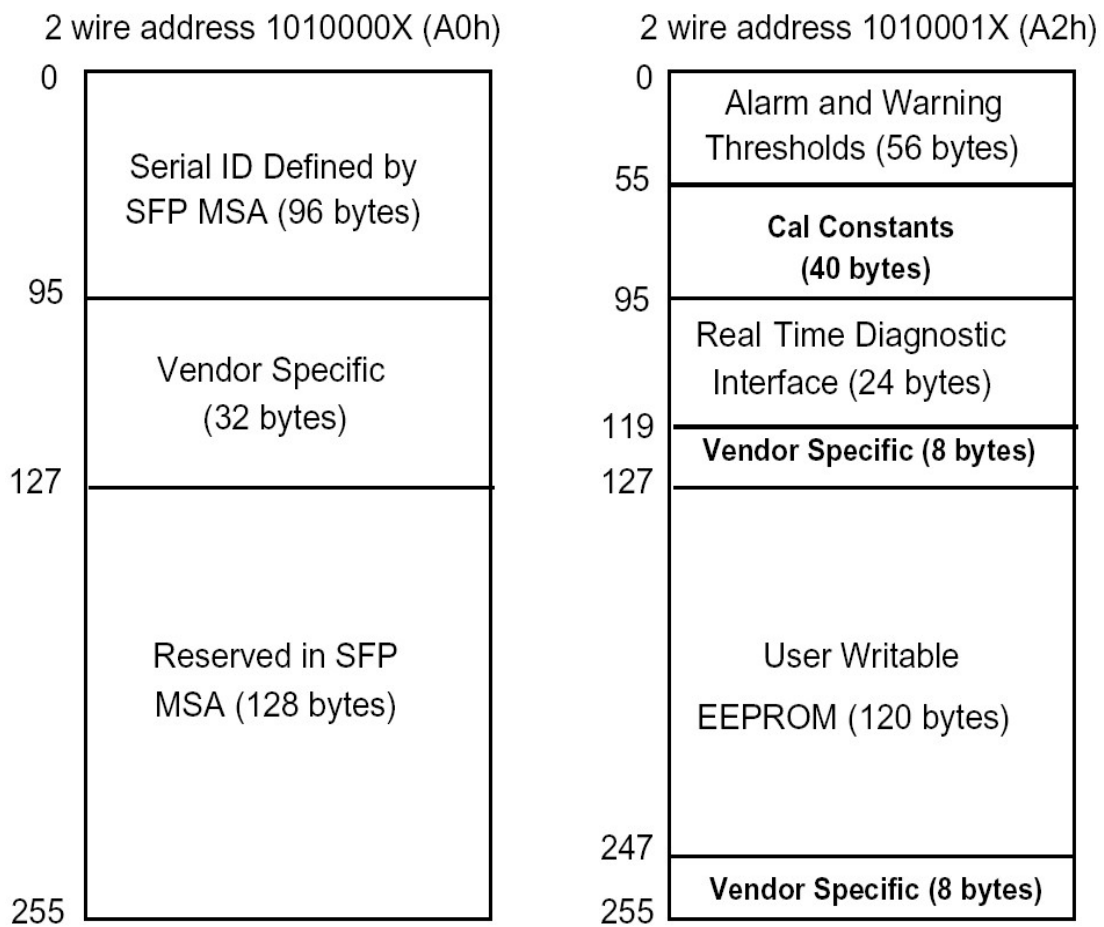
| Parameter    | Range      | Unit | Accuracy | Calibration |
|--------------|------------|------|----------|-------------|
| Temperature  | 0 to +70   | °C   | ±3°C     | Internal    |
| Voltage      | 3.0 to 3.6 | V    | ±3%      | Internal    |
| Bias Current | 0 to 100   | mA   | ±10%     | Internal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

### Digital Diagnostic Memory Map

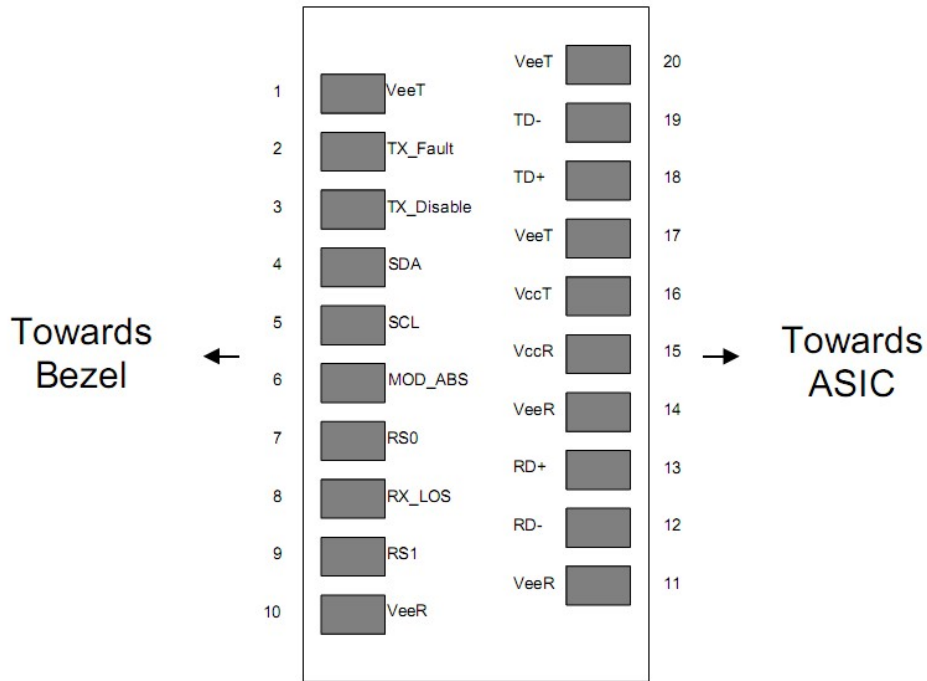
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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 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 |

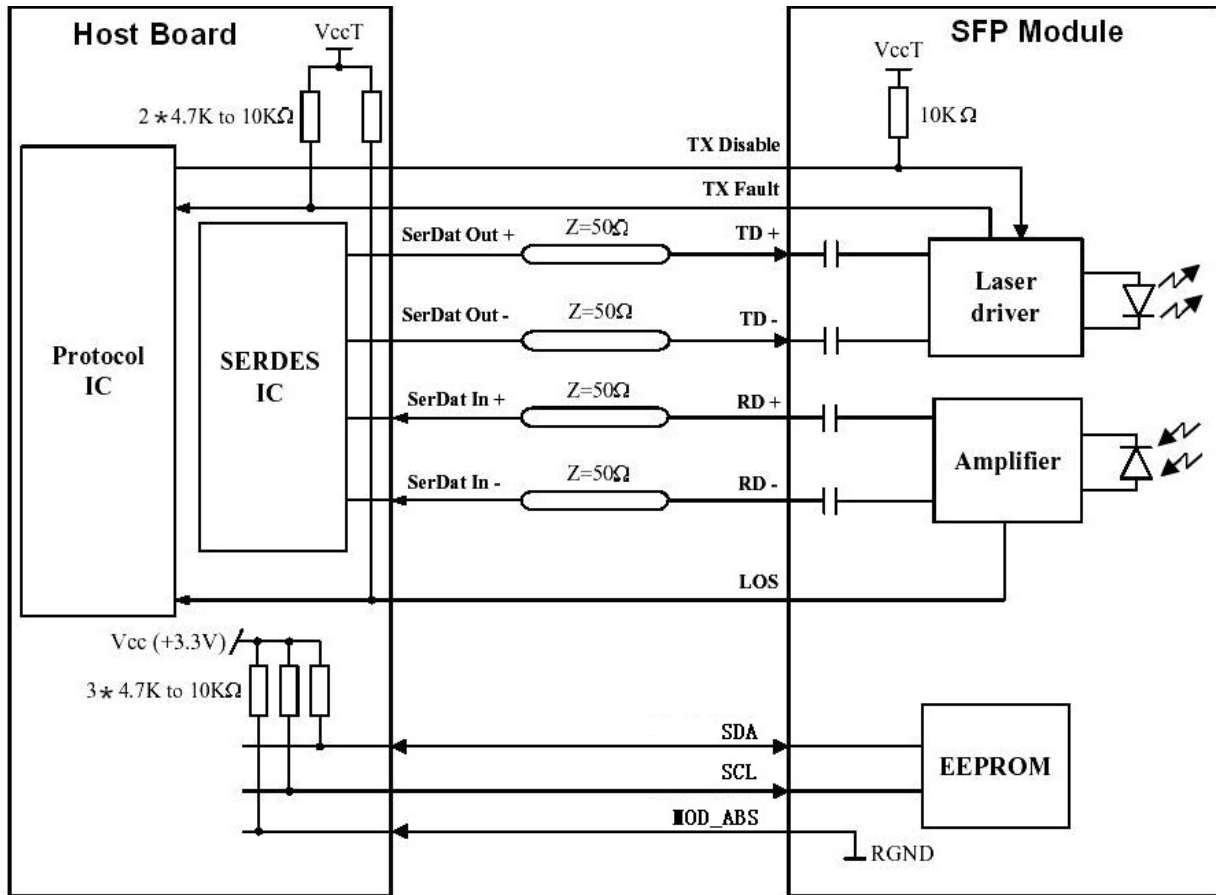
|    |      |                       |   |        |
|----|------|-----------------------|---|--------|
| 19 | TD-  | Inv. Transmit Data In | 3 | Note 5 |
| 20 | VEET | Transmitter Ground    | 1 |        |

Notes:

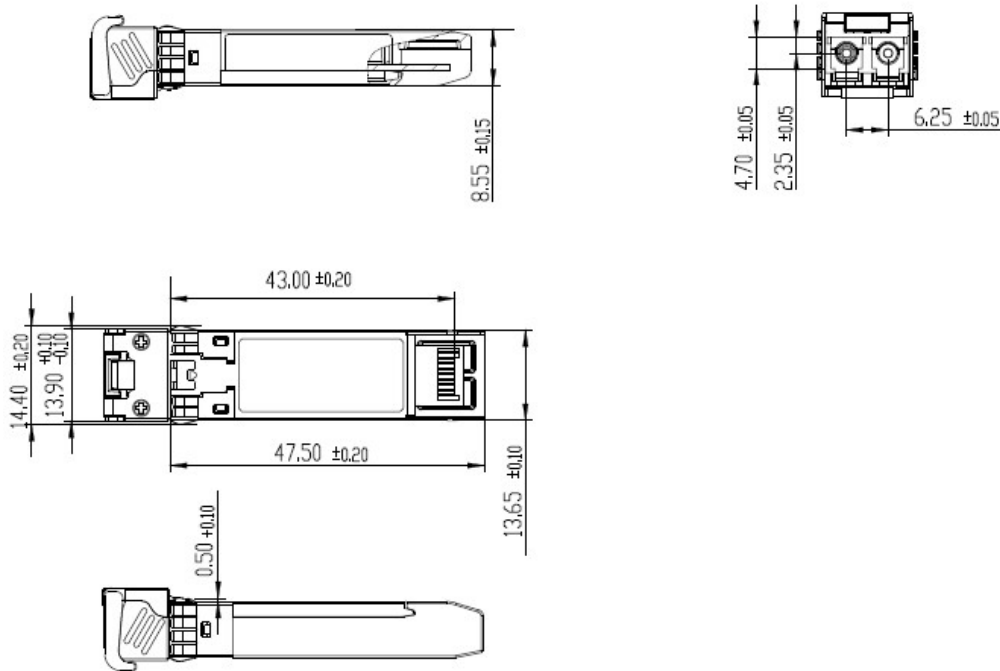
Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+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~10kΩ 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 100Ω (differential) at the user SERDES.
- 5) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



## Mechanical Dimensions



## Ordering information

| Part Number     | Product Description                                      |
|-----------------|--|
| RSPD-16GD20-C17 | SFP+ C17 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C18 | SFP+ C18 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C19 | SFP+ C19 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C20 | SFP+ C20 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C21 | SFP+ C21 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C22 | SFP+ C22 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C23 | SFP+ C23 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C24 | SFP+ C24 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C25 | SFP+ C25 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C26 | SFP+ C26 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C27 | SFP+ C27 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C28 | SFP+ C28 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C29 | SFP+ C29 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C30 | SFP+ C30 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |



|                 |  |
|-----------------|--|
| RSPD-16GD20-C31 | SFP+ C31 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C32 | SFP+ C32 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C33 | SFP+ C33 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C34 | SFP+ C34 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C35 | SFP+ C35 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C36 | SFP+ C36 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C37 | SFP+ C37 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C38 | SFP+ C38 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C39 | SFP+ C39 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C40 | SFP+ C40 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C41 | SFP+ C41 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C42 | SFP+ C42 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C43 | SFP+ C43 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C44 | SFP+ C44 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C45 | SFP+ C45 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C46 | SFP+ C46 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C47 | SFP+ C47 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C48 | SFP+ C48 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C49 | SFP+ C49 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C50 | SFP+ C50 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C51 | SFP+ C51 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C52 | SFP+ C52 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C53 | SFP+ C53 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C54 | SFP+ C54 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C55 | SFP+ C55 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C56 | SFP+ C56 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C57 | SFP+ C57 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C58 | SFP+ C58 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C59 | SFP+ C59 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C60 | SFP+ C60 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |
| RSPD-16GD20-C61 | SFP+ C61 DWDM, 14.025Gbps, LC, 20km, 0°C~+70°C, with DDM |