

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic



## ORDERING INFORMATION

### SP2T-20-9D - 3 - XXYY

|  |             |  |  |                                  |             |
|--|-------------|--|--|----------------------------------|-------------|
|  |             |  |  | <b>TRANSMITTER#2 WAVELENGTH*</b> |             |
|  |             |  |  | 27 = 1270nm                      | 45 = 1450nm |
|  |             |  |  | 29 = 1290nm                      | 47 = 1470nm |
|  |             |  |  | 31 = 1310nm                      | 49 = 1490nm |
|  |             |  |  | 33 = 1330nm                      | 51 = 1510nm |
|  |             |  |  | 35 = 1350nm                      | 53 = 1530nm |
|  |             |  |  | 37 = 1370nm                      | 55 = 1550nm |
|  |             |  |  | 39 = 1390nm                      | 57 = 1570nm |
|  |             |  |  | 41 = 1410nm                      | 59 = 1590nm |
|  |             |  |  | 43 = 1430nm                      | 61 = 1610nm |
|  |             |  |  | <b>TRANSMITTER#1 WAVELENGTH*</b> |             |
|  |             |  |  | 27 = 1270nm                      | 45 = 1450nm |
|  |             |  |  | 29 = 1290nm                      | 47 = 1470nm |
|  |             |  |  | 31 = 1310nm                      | 49 = 1490nm |
| 33 = 1330nm  | 51 = 1510nm |  |  |                                  |             |
| 35 = 1350nm  | 53 = 1530nm |  |  |                                  |             |
| 37 = 1370nm  | 55 = 1550nm |  |  |                                  |             |
| 39 = 1390nm  | 57 = 1570nm |  |  |                                  |             |
| 41 = 1410nm  | 59 = 1590nm |  |  |                                  |             |
| 43 = 1430nm  | 61 = 1610nm |  |  |                                  |             |
| <b>TRANSMITTERS TYPE</b>   |             |  |  |                                  |             |
| 3 = CWDM   |             |  |  |                                  |             |
| <b>COMMUNICATIONS PROTOCOL</b>   |             |  |  |                                  |             |
| 9D = Multi-Protocol Video with Digital Diagnostics, 143MBaud to 1.485GBaud |             |  |  |                                  |             |

\* TX #1 will always have lower of the two wavelengths

## MODULE SPECIFICATIONS - ABSOLUTE MAXIMUM RATINGS

| PARAMETER           | SYMBOL                               | MIN | MAX | UNITS           | NOTES                  |
|---------------------|--------------------------------------|-----|-----|-----------------|------------------------|
| Storage Temperature | Tstg                                 | -40 | +85 | °C              |                        |
| Supply Voltage      | V <sub>CC</sub> T, V <sub>CC</sub> R |     | 6.0 | V               | VCC - ground           |
| Data AC Voltage     | Tx+, Tx-                             |     | 2.6 | V <sub>pp</sub> | Differential           |
| Data DC Voltage     | Tx+, Tx-                             | -10 | 10  | V <sub>pk</sub> | V(Tx+ or Tx-) - ground |

## Features

- SMPTE 292M/297M/259M compatible
- Based on industry standard SFP
- Handles Pathological test pattern
- Internally calibrated Digital Diagnostic Monitoring Interface
- RoHS-6 compliant
- 100Ω differential AC coupled CML/LVPECL Level Inputs
- Die Cast Metal Housing
- Hot pluggable
- Single +3.3V Power Supply

## PRODUCT OVERVIEW

The SP2T-20-9D-3-XXYY Optical CWDM Video Small Form factor Pluggable (V\_SFP) dual transmitter modules are high performance integrated simplex data link for unidirectional communication over single mode optical fiber. The SP2T-20-9D-3-XXYY modules are designed to transmit a wide range of data rates from 143Mbps to 1.485Gbps. These simplex transmitter modules are compatible with the following standards:

- SMPTE 297M/292M (HDTV -- 1.485Gbps)
- SMPTE 297M/259M (SDTV -- 143/177/270/360Mbps)

The Stratos Lightwave dual transmitter V\_SFP module is hot pluggable which allows a suitably designed enclosure to be changed from one type of external interface to another simply by plugging in a V\_SFP having the alternative external interface. The SP2T-20-9D-3-XXYY operates using a single 3.3V supply.

This optoelectronic dual transmitter module is a Class 1 Laser product compliant with FDA Radiation Performance Standards, 21 CFR Subchapter J. This component is also Class 1 Laser compliant according to International Safety Standard IEC-825-1.

## LONG WAVELENGTH LASER

The SP2T-20-9D-3-XXYY are designed with CWDM lasers with angle polished fiber stub.

**STRATOS**

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# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

## MODULE SPECIFICATION - RECOMMENDED OPERATING CONDITIONS

| PARAMETER                | SYMBOL                              | MIN    | TYP  | MAX    | UNITS | NOTES                     |
|--------------------------|-------------------------------------|--------|------|--------|-------|---------------------------|
| Ambient Case Temperature | Tc                                  | 0      |      | +70    | °C    |                           |
| Supply Voltage           | V <sub>DDT</sub> , V <sub>DDR</sub> | +3.135 | +3.3 | +3.465 | VDC   |                           |
| Baud Rate                | BRate                               | 143    |      | 1485   | MBaud | 143/177/270/360/1485MBaud |

## PERFORMANCE SPECIFICATIONS - ELECTRICAL

0°C<Tc<+70°C; +3.135<Vcc<+3.465V

| PARAMETER                        | SYMBOL             | MIN | TYP | MAX  | UNITS | NOTES                                |
|----------------------------------|--------------------|-----|-----|------|-------|--------------------------------------|
| Supply Current                   | Icc                |     | 180 | 220  | mA    | Tc = 25°C, Vcc = +3.3 V              |
|                                  |                    |     |     | 350  | mA    | 0°C<Tc<+70°C, +3.135 V< Vcc <+3.465V |
| Surge Current                    | I <sub>surge</sub> |     |     | 30   | mA    | Surge above steady state value       |
| CML/LVPECL Inputs (Differential) |                    | 300 |     | 1860 | mVpp  | AC coupled inputs                    |
| Input Impedance (Differential)   | Z <sub>in</sub>    | 95  | 100 | 105  | ohms  | R <sub>in</sub> > 100 kohms @ DC     |
| Tx_DISABLE Input Voltage - High  | V <sub>iH</sub>    | 2   |     | 3.45 | V     |                                      |
| Tx_DISABLE Input Voltage - Low   | V <sub>iL</sub>    | 0   |     | 0.8  | V     |                                      |

## SP2T-20-9D-3-XXYY OPTICAL SPECIFICATIONS -- Dual CWDM Lasers

0°C<Tc<+70°C; +3.135<Vcc<+3.465V

| PARAMETER                                | SYMBOL           | MIN                           | TYP | MAX  | UNITS | NOTES  |
|--|------------------|-------------------------------|-----|------|-------|--|
| Link Distance                            |                  | See link distance table below |     |      |       |  |
| <b>TRANSMITTER</b>                       |                  |                               |     |      |       |  |
| Optical Center Wavelength @ Tc=+25°C     | λ                | X-2                           |     | X+2  | nm    | Center Wavelength = X = 1270,1290,1310, 1330,1350,1370,1390,1410,1430,1450,1470, 1490,1510,1530,1550,1570, 1590,1610nm |
| Optical Center Wavelength # 0°C<Tc<+70°C | λ                | X-5                           |     | X+7  | nm    |  |
| Side Mode Suppression Ratio              | SMSR             | 30                            | 40  |      | dB    |  |
| Optical Transmit Power                   | P <sub>opt</sub> | 0                             |     | +3   | dBm   | Average power coupled into SMF   |
| Extinction Ratio                         | ER               | 9                             |     |      | dBm   | P1/P0  |
| Relative Intensity Noise                 | RIN              |                               |     | -117 | dB/Hz |  |
| Total Jitter [ Pk - Pk ]                 | TJ               |                               | 120 | 135  | ps    | Measured with Color Bar Test Signal @1.485Gbps   |
|  |                  |                               |     | 740  | ps    | Measured with Color Bar Test Signal @143/177/270/360MBaud  |
| Output Rise Time                         | t <sub>r</sub>   |                               | 80  | 120  | ps    | 20%-80%; Measured unfiltered   |
| Output Fall Time                         | t <sub>f</sub>   |                               | 240 | 270  | ps    | @143/177/270/360/1485MBaud   |

## LINK DISTANCE:

| TRANSMITTER                     | RECEIVER                               | DATA RATE            | LINK DISTANCE (Min) | NOTES  |
|---------------------------------|--|----------------------|---------------------|--------|
| CWDM Lasers (SP2T-20-9D-3-XXYY) | PIN (SP1R-20-9D-2-B or SP2R-20-9D-2-B) | 1485MBaud            | 55km                | Note 1 |
|                                 |  | 143/177/270/360MBaud | 65km                |        |
|                                 | APD (SP1R-20-9D-3L-B)                  | 1485MBaud            | 75km                |        |
|                                 |  | 143/177/270/360MBaud | 100km               |        |

**Note 1:** The specified minimum link distances are based on IEEE link budget models. Assumes minimum transmitter output power and extinction ratio and worst case receiver sensitivity with color bar test signal at 140/177/270/360/1485Mbps. The minimum link distances will be reduced with SDI test matrix. Please contact factory to discuss specific applications.

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

## VIDEO SFP CONNECTOR PIN-OUT:

Video SFP transceiver, dual transmitter, dual receiver, simplex transmitter, and simplex receiver modules share identical signal pin-outs. This allows the host flexibility to design one PCB to accommodate all version of Video SFP offered by Stratos. Depending on particular Video SFP module, some signal pins are not internally connected (i.e.  $\pm$ RX\_1 and  $\pm$ RX\_2 are not internally connected in dual transmitter module). Refer to plug sequence table on following page for more information.

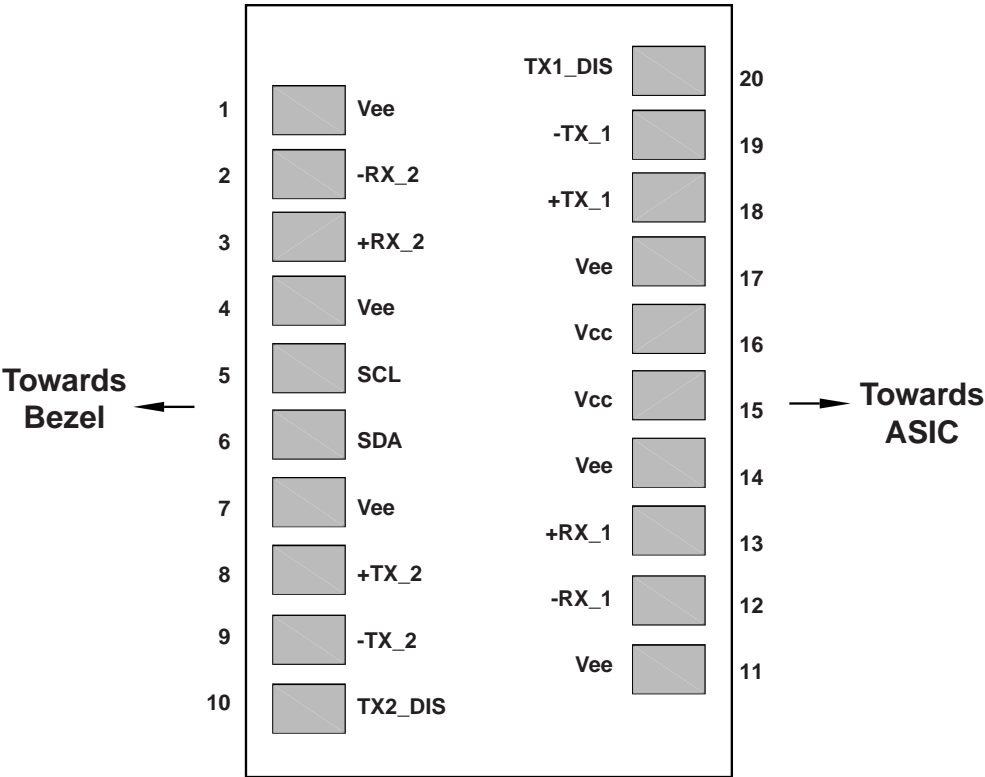


Figure 1. Diagram of Host Board Connector Block Pin Numbers and Names

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

| PIN NO. | NAME    | FUNCTION                           | PLUG SEQ. | NOTES                                   |
|---------|---------|------------------------------------|-----------|---|
| PIN 1   | Vee     | Signal Ground                      | 1         |   |
| PIN 2   | -RX_2   | Inverted Received Data out (2)     | 3         | Floating; Not Internally Connected      |
| PIN 3   | +RX_2   | Non-Inverted Received Data out (2) | 3         | Floating; Not Internally Connected      |
| PIN 4   | Vee     | Signal Ground                      | 1         |   |
| PIN 5   | SCL     | Serial Clock                       | 3         |   |
| PIN 6   | SDA     | Serial Data                        | 3         |   |
| PIN 7   | Vee     | Signal Ground                      | 1         |   |
| PIN 8   | +TX_2   | Non-inverted Data In (2)           | 3         | Note 2                                  |
| PIN 9   | -TX_2   | Inverted Data In (2)               | 3         | Note 2                                  |
| PIN 10  | TX2_DIS | Transmitter Disable (2)            | 3         | Note 3: Module Disables on high or open |
| PIN 11  | Vee     | Signal Ground                      | 1         |   |
| PIN 12  | -RX_1   | Inverted Received Data out         | 3         | Floating; Not Internally Connected      |
| PIN 13  | +RX_1   | Non-Inverted Received Data out     | 3         | Floating; Not Internally Connected      |
| PIN 14  | Vee     | Signal Ground                      | 1         |   |
| PIN 15  | Vcc     | Power Supply                       | 2         | +3.3V ±5%, Note 4: Internally connected |
| PIN 16  | Vcc     | Power Supply                       |           |   |
| PIN 17  | Vee     | Signal Ground                      | 1         |   |
| PIN 18  | +TX_1   | Non-inverted Data In               | 3         | Note 2                                  |
| PIN 19  | -TX_1   | Inverted Data In                   | 3         | Note 2                                  |
| PIN 20  | TX1_DIS | Transmitter Disable                | 3         | Note 3: Module Disables on high or open |

**Plug Sequence: Pin engagement sequence during hot plugging.**

## NOTES:

(2)  $\pm TX_1$  &  $\pm TX_2$  : are the differential transmitter inputs. They are AC coupled differential lines with 100ohm differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swing of 300 - 1860 mV differential (150-930mV single ended).

(3) **TX1\_DIS & TX2\_DIS**: are inputs that is used to shut down the transmitter optical output when laser fault condition (internally latched) occurs. . It is internally pulled up with a 4.7K - 10K ohm resistor. The states are:

|                      |                      |
|----------------------|----------------------|
| Low (0 - 0.8V):      | Transmitter ON       |
| (>0.8, <2.0V):       | Undefined            |
| High (2.0 - 3.465V): | Transmitter Disabled |
| Open:                | Transmitter Disabled |

(4) **Vcc**: is defined as 3.3V±5% at the V\_SFP connector pin. Maximum supply current is 350mA. Recommended host board power supply filtering is shown in figure 3. When the recommended supply filtering network is used, hot plugging of the V\_SFP module will result in an inrush current of no more than 30mA greater than the steady state value.

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## TERMINATION CIRCUITS

Inputs to the SP2T-20-9D-3-XXYY dual transmitter SFP are AC coupled and internally terminated with 100ohms differential. These modules can operate with CML/PECL logic levels. The input signal must have at least a 300mV peak-to-peak differential signal swing. Different termination strategies may be required depending on the particular chip being interfaced to. **The SP2T-20-9D-3-XXYY product family is designed with AC coupled data inputs to provide the following advantages:**

- Close positioning of Transmitter chip-set with respect to SP2T-20-9D-3-XXYY module allows for shorter line lengths and at gigabit speeds reduces EMI.
- Minimum number of external components.
- Internal termination reduces the potential for unterminated stubs which would otherwise increase jitter and reduce transmission margin.

Subsequently, this affords the customer the ability to optimally locate the chip-set being interfaced to as close to the SP2T-20-9D-3-XXYY as possible and save valuable real estate. At gigabit rates this can provide a significant advantage resulting in better transmission performance and accordingly better signal integrity.

Figure 2 illustrates the recommended transmit and receive data line terminations.

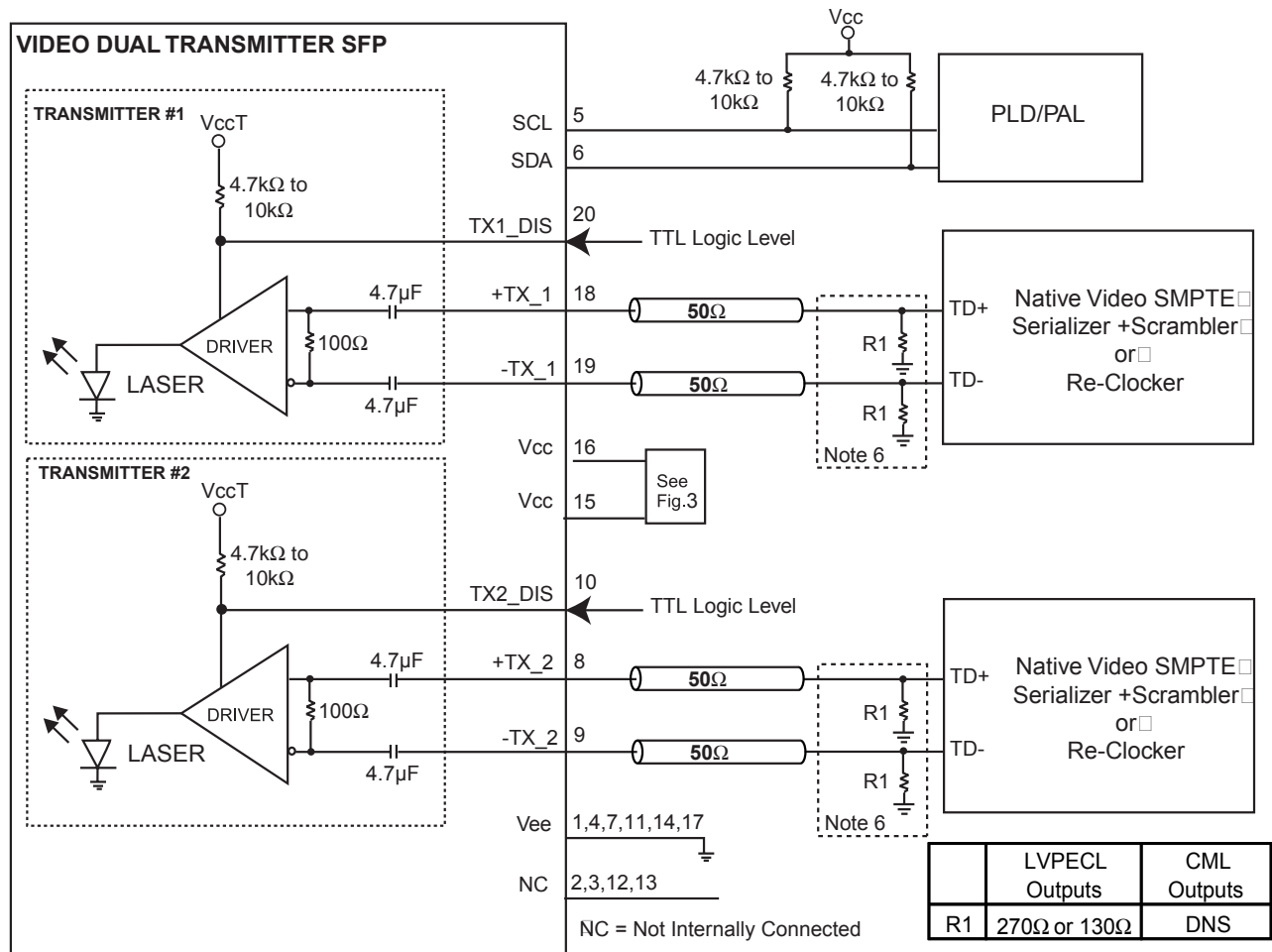


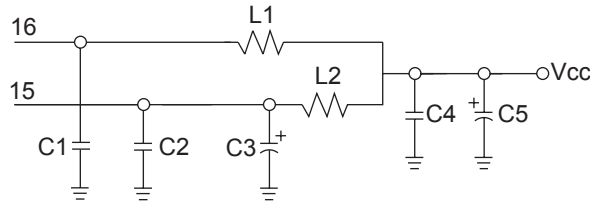
Figure 2. Recommended TRANSMIT Data Lines Terminations

Note 6. Consult the Chipset (LVPECL) manufacturer's applications information for biasing required for Tx outputs. Some chipset outputs are internally biased and may not need external bias resistors.

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## POWER COUPLING

A suggested layout for power and ground connections is given in figure 3 below. Connections are made via separate voltage and ground planes. The ferrite bead should provide an impedance of 220Ω at 100MHz. Bypass capacitors should be placed as close to the 20 pin connector as possible.



VALUES: □

C1, C2, C4 = 0.1μF □

C3, C5 = 10μF, Tantalum □

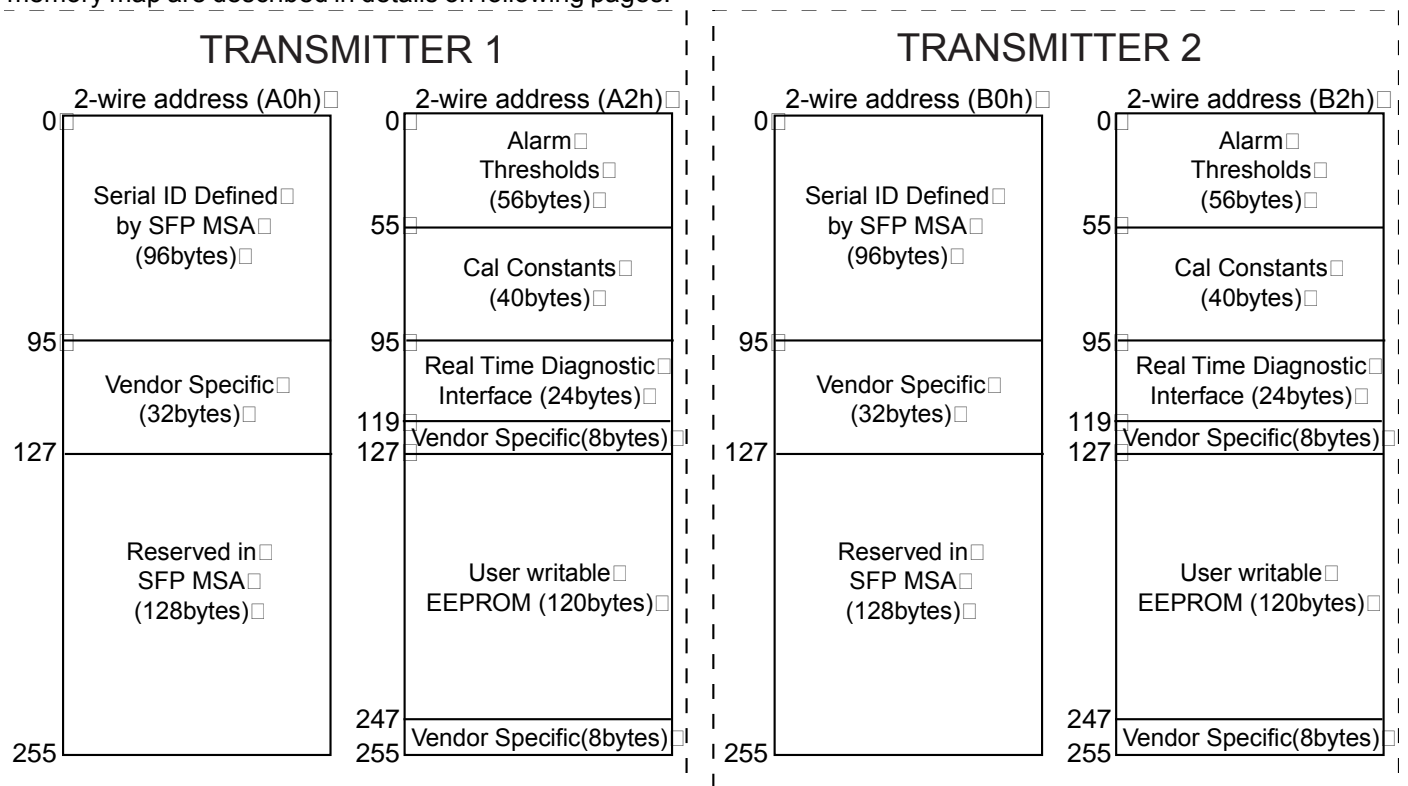
L1, L2 = Impedance of 220Ω at 100MHz

**Figure 3. Suggested Power Coupling**

## DIGITAL DIAGNOSTIC MONITORING INTERFACE

The SP2T-20-9D-3-XXYY dual transmitter modules are provided with internally calibrated digital diagnostic monitoring interface which allows real-time access to device operating parameters such as dual transmitter module temperature, laser bias current, transmitted optical power, and supply voltage over a 2-wire interface. It also defines a system of alarm flags, which provides users with summary information on whether any of the operating parameters are outside of a factory set normal range.

The SP2T-20-9D-3-XXYY dual transmitter SFP module is designed with two memory devices (one for each transmitter). The Digital Diagnostics Monitoring Interface (DDMI) memory map is shown in figure 4 below. The contents of the memory map are described in details on following pages.



**Figure 4. SP2T-20-9D-2-B (Dual Transmitter V\_SFP) Memory Map**

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

| Addr. (DEC) | Hex Value | ASCII | Description   | Addr. (DEC) | Hex value | ASCII | Description               | Addr. (DEC)  | Hex value | ASCII | Description                           |                |
|-------------|-----------|-------|---|-------------|-----------|-------|---------------------------|--|-----------|-------|---------------------------------------|----------------|
| 0           | 81        |       | Dual Transmitter Video SFP (V_SFP)                                    | 33          | 61        | a     | Vendor name (cont)        | 66   | 00        |       | Max. and Min. bit rate -- Unspecified |                |
| 1           | 04        |       | SFP function is defined by serial ID only                             | 34          | 76        | v     |                           | 67   | 00        |       |                                       |                |
| 2           | 07        |       | LC Connector  | 35          | 65        | e     |                           | 68   |           |       | Vendor serial number                  |                |
| 3           | 40        |       | SMPTE 292M/297/259M   | 36          | 00        |       | Reserved                  | 69   |           |       |                                       |                |
| 4           | 00        |       | Transceiver codes which are not applicable for SMPTE SFP transceivers | 37          | 00        |       | Vendor OUI -- Unspecified | 70   |           |       |                                       |                |
| 5           | 00        |       |   | 38          | 00        |       |                           | 71   |           |       |                                       |                |
| 6           | 00        |       |   | 39          | 00        |       |                           | 72   |           |       |                                       |                |
| 7           | 00        |       |   | 40          | 53        | S     | Vendor part number        | 73   |           |       |                                       |                |
| 8           | 00        |       |   | 41          | 50        | P     |                           | 74   |           |       |                                       |                |
| 9           | 00        |       |   | 42          | 32        | 2     |                           | 75   |           |       |                                       |                |
| 10          | 00        |       |   | 43          | 54        | T     |                           | 76   |           |       |                                       |                |
| 11          | 06        |       | SMPTE scrambled   | 44          | 32        | 2     |                           | 77   |           |       |                                       |                |
| 12          | 0F        |       | Nominal bit rate in units of 100Mb/s                                  | 45          | 30        | 0     | Vendor date code          | 78   |           |       |                                       |                |
| 13          | 00        |       | Reserved  | 46          | 2D        | -     |                           | 79   |           |       |                                       |                |
| 14          | 00        |       | Length (9μ)*km  | 47          | 39        | 9     |                           | 80   |           |       |                                       |                |
| 15          | 00        |       | Length (9μ)*100m  | 48          | 44        | D     |                           | 81   |           |       |                                       |                |
| 16          | 00        |       | Length (50μm)   | 49          | 2d        | -     |                           | 82   |           |       |                                       |                |
| 17          | 00        |       | Length (62.5μm)   | 50          | 33        | 3     |                           | 83   |           |       |                                       |                |
| 18          | 00        |       | Length (Copper)   | 51          | 2D        | -     |                           | 84   |           |       |                                       |                |
| 19          | 00        |       | Reserved  | 52          | XX        | X     | 85                        |  |           |       |                                       |                |
| 20          | 53        | S     | Vendor name   | 53          | XX        | X     | Vendor revision           | 86   |           |       |                                       |                |
| 21          | 74        | t     |   | 54          | XX        | Y     |                           | 87   |           |       |                                       |                |
| 22          | 72        | r     |   | 55          | XX        | Y     |                           | 88   |           |       |                                       |                |
| 23          | 61        | a     |   | 56          | 20        |       | Internally Calibrated     | 89   |           |       |                                       |                |
| 24          | 74        | t     |   | 57          | 20        |       |                           | Enhanced options: Alarm/warning flags, Soft Tx_Dis, Soft Tx_Fault, Unspecified | 90        |       |                                       |                |
| 25          | 6F        | o     |   | 58          | 20        |       |                           |  | 91        |       |                                       |                |
| 26          | 73        | s     |   | 59          | 20        |       |                           | 92   | 60        |       |                                       |                |
| 27          | 4C        | L     |   | Vendor name | 60        | XX    |                           | CWDM Wavelength = Varies with modules  | 93        | E0    |                                       | Unspecified    |
| 28          | 69        | l     |   |             | 61        | XX    |                           |  | 94        | 01    |                                       |                |
| 29          | 67        | g     |   |             | 62        | 00    |                           | Reserved   | 95        | XX    |                                       | CC_EXT (64-94) |
| 30          | 68        | h     | 63  |             | XX        |       | CC_BASE (0-62)            | 96-127   | 00        |       | Vendor specific                       |                |
| 31          | 74        | t     | 64  |             | 00        |       | Option values             | 128-255  | 00        |       | Reserved                              |                |
| 32          | 77        | w     | 65  | 18          |           |       |                           |  |           |       |                                       |                |

Table D.1: Serial ID Data Fields (2-wire Address A0h & B0h)

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

| Address (DEC) | # Bytes | Name                        | Description                              | Value  |     |
|---------------|---------|-----------------------------|--|--------|-----|
| 00-01         | 2       | Temp High Alarm             | MSB at low address                       | +90°C  |     |
| 02-03         | 2       | Temp Low Alarm              | MSB at low address                       | -20°C  |     |
| 04-05         | 2       | Temp High Warning           | MSB at low address                       | +85°C  |     |
| 06-07         | 2       | Temp Low Warning            | MSB at low address                       | -10°C  |     |
| 08-09         | 2       | Supply Voltage High Alarm   | MSB at low address                       | +3.6V  |     |
| 10-11         | 2       | Supply Voltage Low Alarm    | MSB at low address                       | +3.0V  |     |
| 12-13         | 2       | Supply Voltage High Warning | MSB at low address                       | +3.47V |     |
| 14-15         | 2       | Supply Voltage Low Warning  | MSB at low address                       | +3.14V |     |
| 16-17         | 2       | Bias High Alarm             | MSB at low address                       | Note A |     |
| 18-19         | 2       | Bias Low Alarm              | MSB at low address                       |        |     |
| 20-21         | 2       | Bias High Warning           | MSB at low address                       |        |     |
| 22-23         | 2       | Bias Low Warning            | MSB at low address                       |        |     |
| 24-25         | 2       | Tx Power High Alarm         | MSB at low address                       |        |     |
| 26-27         | 2       | Tx Power Low Alarm          | MSB at low address                       |        |     |
| 28-29         | 2       | Tx Power High Warning       | MSB at low address                       |        |     |
| 30-31         | 2       | Tx Power Low Warning        | MSB at low address                       |        |     |
| 32-33         | 2       | Rx Power High Alarm         | MSB at low address                       |        | N/A |
| 34-35         | 2       | Rx Power Low Alarm          | MSB at low address                       |        | N/A |
| 36-37         | 2       | Rx Power High Warning       | MSB at low address                       | N/A    |     |
| 38-39         | 2       | Rx Power Low Warning        | MSB at low address                       | N/A    |     |
| 40-55         | 16      | Reserved                    | Reserved for future monitored quantities |        |     |

Note A: Varies from module to module

**Table D.2: ALARM AND WARNING THRESHOLDS (2-wire address A2h & B2h)**

| Address (DEC) | # Bytes | Name            | Description   | Value |
|---------------|---------|-----------------|---|-------|
| 56-59         | 4       | Rx_PWR (4)      | Not application for dual transmitter video SFP module                                       |       |
| 60-63         | 4       | Rx_PWR (3)      |   |       |
| 64-67         | 4       | Rx_PWR (2)      |   |       |
| 68-71         | 4       | Rx_PWR (1)      |   |       |
| 72-75         | 4       | Rx_PWR (0)      |   |       |
| 76-77         | 2       | Tx_I (Slope)    | Fixed decimal (unsigned calibration data, laser bias current                                | 1     |
| 78-79         | 2       | Tx_I (Offset)   | Fixed decimal (signed two's complement) calibration data, laser bias current                | 0     |
| 80-81         | 2       | Tx_PWR (Slope)  | Fixed decimal (unsigned) calibration data, transmitter coupled output power                 | 1     |
| 82-83         | 2       | Tx_PWR (Offset) | Fixed decimal (signed two's complement) calibration data, transmitter coupled output power. | 0     |
| 84-85         | 2       | T (Slope)       | Fixed decimal (unsigned) calibration data, internal module temperature                      | 1     |
| 86-87         | 2       | T (Offset)      | Fixed decimal (signed two's complement) calibration data, internal module temperature.      | 0     |
| 88-89         | 2       | V (Slope)       | Fixed decimal (unsigned) calibration data, internal module supply voltage.                  | 1     |
| 90-91         | 2       | V (Offset)      | Fixed decimal (signed two's complement) calibration data, internal module supply voltage.   | 0     |
| 92-94         | 3       | Reserved        | Reserved  |       |
| 95            | 1       | Check Sum       | Byte 95 contains the low order 8 bits of the sum of bytes 0 – 94.                           |       |

**Table D.3: CALIBRATION CONSTANTS FOR INTERNALLY CALIBRATED V\_SFP (2-wire address A2h & B2h)**

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

| Address (DEC)                       | Bit | Name                  | Description   |
|-------------------------------------|-----|-----------------------|---|
| 96                                  | All | Temperature MSB       | Internally measured module temperature  |
| 97                                  | All | Temperature LSB       |   |
| 98                                  | All | Vcc MSB               | Internally measured supply voltage (Note B)                                     |
| 99                                  | All | Vcc LSB               |   |
| 100                                 | All | Tx Bias MSB           | Internally measured TX Bias Current (Note C)                                    |
| 101                                 | All | Tx Bias LSB           |   |
| 102                                 | All | Tx Power MSB          | Measured TX output power (Note D)   |
| 103                                 | All | Tx Power LSB          |   |
| 104                                 | All | Rx Power MSB          | Not applicable for dual transmitter video SFP module                            |
| 105                                 | All | Rx Power LSB          |   |
| 106                                 | All | Reserved MSB          | Reserved for 1st future definition of digitized analog input                    |
| 107                                 | All | Reserved LSB          | Reserved for 1st future definition of digitized analog input                    |
| 108                                 | All | Reserved MSB          | Reserved for 2nd future definition of digitized analog input                    |
| 109                                 | All | Reserved LSB          | Reserved for 2nd future definition of digitized analog input                    |
| <b>Optional Status/Control Bits</b> |     |                       |   |
| 110                                 | 7   | TX Disable state      | Digital state of the TX Disable input pin                                       |
| 110                                 | 6   | Soft TX Disable state | Read/write bit that allows software disable of laser. Writing 1 disables laser. |
| 110                                 | 5   | Reserved              |   |
| 110                                 | 4   | Rx Rate Select State  | Not implemented in dual transmitter video SFP (V_SFP)                           |
| 110                                 | 3   | Soft Rx Rate Select   | Not implemented in dual transmitter video SFP (V_SFP)                           |
| 110                                 | 2   | Tx Fault              | Digital state of TX_FAULT   |
| 110                                 | 1   | LOS                   | Not applicable for dual transmitter video SFP module                            |
| 110                                 | 0   | Data_ready_Bar        | Indicates V_SFP module has achieved power up and data is ready                  |
| 111                                 | All | Reserved              |   |

**Table D.4: A/D Values and Status Bits (2-wire address A2h)**

Note B: The Tx voltage VccT is monitored with accuracy of  $\pm 3\%$

Note C: The accuracy of bias current measurement is  $\pm 10\%$

Note D: The accuracy of Tx optical power measurement is  $\pm 3\text{dB}$

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

## ALARM FLAGS:

Data address 112-119 (Table D.5) contain an optional set of alarm bits. These alarm flags are not latched. It is recommended that the detection of an asserted flag bit should be verified by a second read of the flag at least 100msec later. For users who do not wish to set their own threshold values (address 0 to 55 at 2-wire address A0h & B0h) or read the values (address 0 - 55 at 2-wire address A2h & B2h), the flags alone can be monitored.

| Data Address | Bits | Name                  | Description  |
|--------------|------|-----------------------|--|
| 112          | 7    | Temp High Alarm       | Set when internal temperature exceed high alarm level        |
|              | 6    | Temp Low Alarm        | Set when internal temperature is below low alarm level       |
|              | 5    | Vcc High Alarm        | Set when internal supply voltage exceed high alarm level     |
|              | 4    | Vcc Low Alarm         | Set when internal supply voltage is below low alarm level    |
|              | 3    | TX Bias High Alarm    | Set when internal TX Bias current exceed high alarm level    |
|              | 2    | TX Bias Low Alarm     | Set when internal TX Bias current is below low alarm level   |
|              | 1    | TX Power High Alarm   | Set when internal TX output power exceed high alarm level    |
|              | 0    | TX Power Low Alarm    | Set when internal TX output power is below low alarm level   |
| 113          | 7    | RX Power High Alarm   | Not applicable for dual transmitter video SFP module         |
|              | 6    | RX Power Low Alarm    | Not applicable for dual transmitter video SFP module         |
|              | 5    | Reserved Alarm        |  |
|              | 4    | Reserved Alarm        |  |
|              | 3    | Reserved Alarm        |  |
|              | 2    | Reserved Alarm        |  |
|              | 1    | Reserved Alarm        |  |
|              | 0    | Reserved Alarm        |  |
| 114          | All  | Reserved              |  |
| 115          | All  | Reserved              |  |
| 116          | 7    | Temp High Warning     | Set when internal temperature exceed high Warning level      |
|              | 6    | Temp Low Warning      | Set when internal temperature is below low Warning level     |
|              | 5    | Vcc High Warning      | Set when internal supply voltage exceed high Warning level   |
|              | 4    | Vcc Low Warning       | Set when internal supply voltage is below low Warning level  |
|              | 3    | TX Bias High Warning  | Set when internal TX Bias current exceed high Warning level  |
|              | 2    | TX Bias Low Warning   | Set when internal TX Bias current is below low Warning level |
|              | 1    | TX Power High Warning | Set when internal TX output power exceed high Warning level  |
|              | 0    | TX Power Low Warning  | Set when internal TX output power is below low Warning level |
| 117          | 7    | RX Power High Warning | Not applicable for dual transmitter video SFP module         |
|              | 6    | RX Power Low Warning  | Not applicable for dual transmitter video SFP module         |
|              | 5    | Reserved Warning      |  |
|              | 4    | Reserved Warning      |  |
|              | 3    | Reserved Warning      |  |
|              | 2    | Reserved Warning      |  |
|              | 1    | Reserved Warning      |  |
|              | 0    | Reserved Warning      |  |
| 118          | All  | Reserved              |  |
| 119          | All  | Reserved              |  |

Table D.5: Alarm Flag Bits (2-wire Address A2h & B2h)

| Data Address | # Bytes | Name            | Description     |
|--------------|---------|-----------------|-----------------|
| 120-127      | All     | Vendor Specific | Vendor Specific |

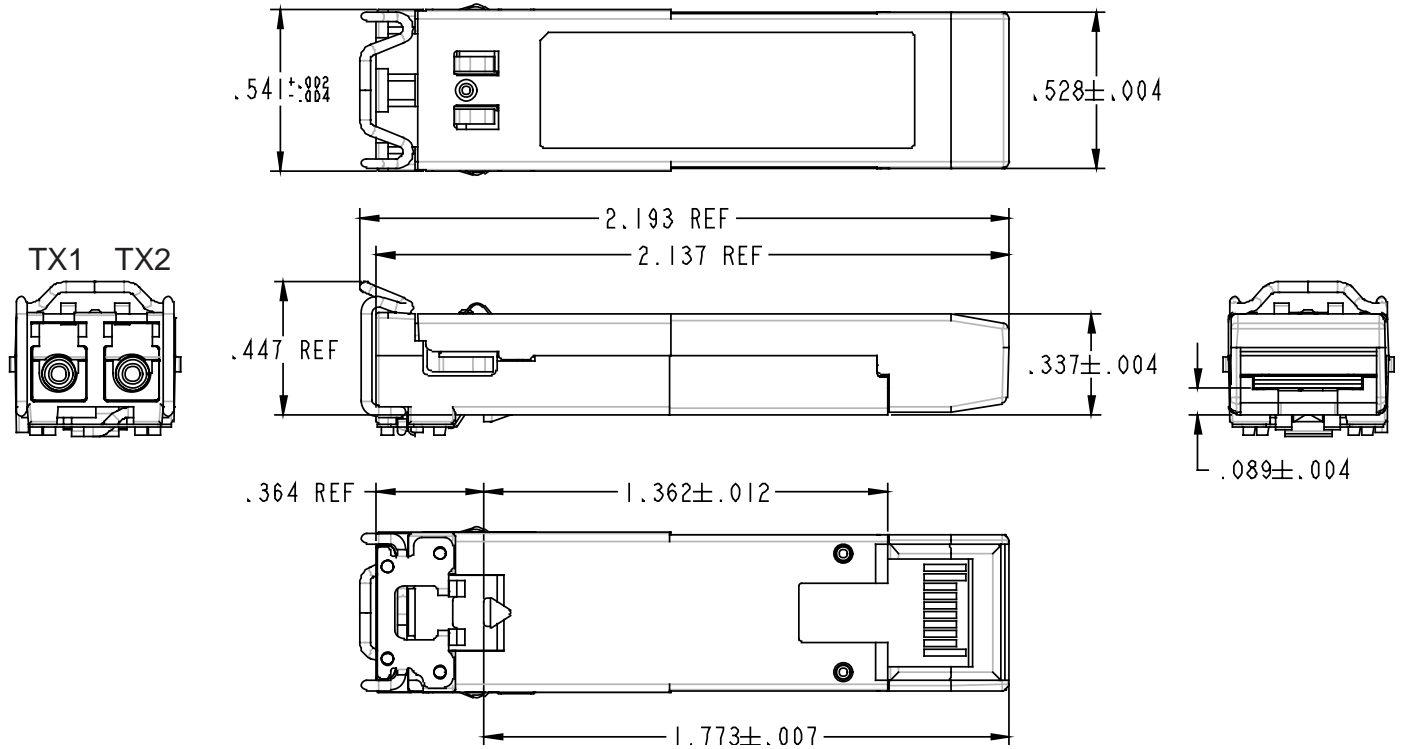
Table D.6: Vendor Specific Memory Addresses (2-wire Address A2h & B2h)

| Data Address | # Bytes | Name            | Description                       |
|--------------|---------|-----------------|-----------------------------------|
| 128-247      | 120     | User EEPROM     | User writable EEPROM              |
| 248-255      | 8       | Vendor Specific | Vendor specific control functions |

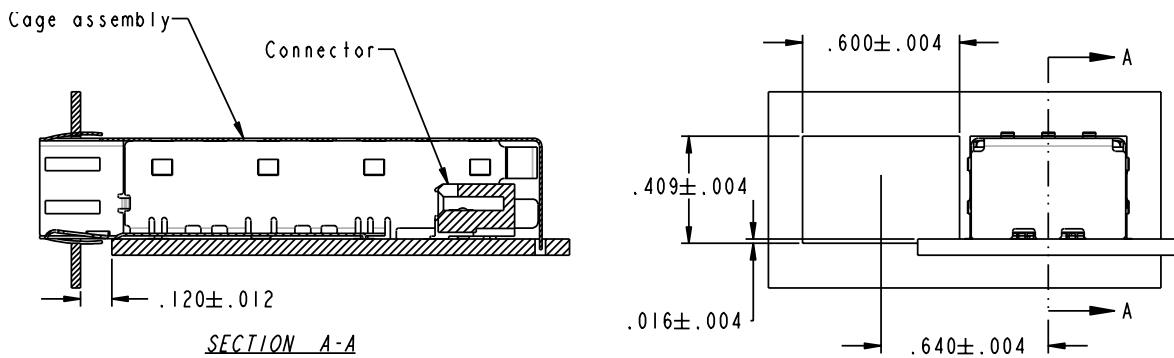
Table D.7: User Accessible EEPROM (2-wire Address A2h & B2h)

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

## V\_SFP MECHANICAL DIMENSIONS (inches) with BAIL ACTUATOR



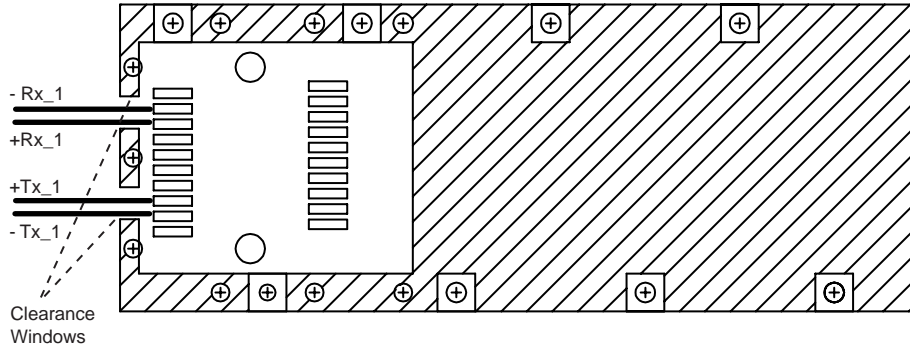
## V\_SFP PANEL CUTOUT



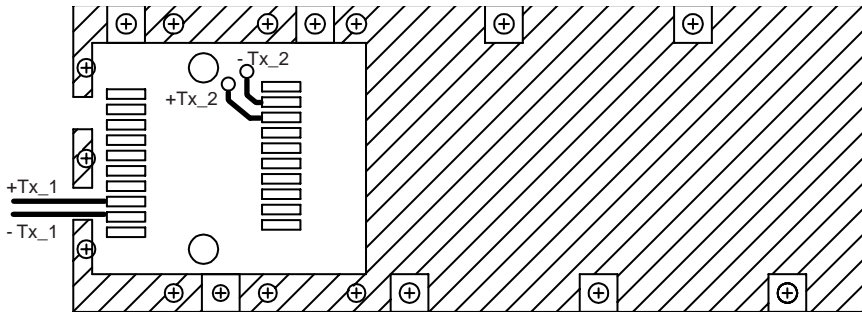
# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic

## VIDEO SFP RECOMMENDED HOST LAYOUT:

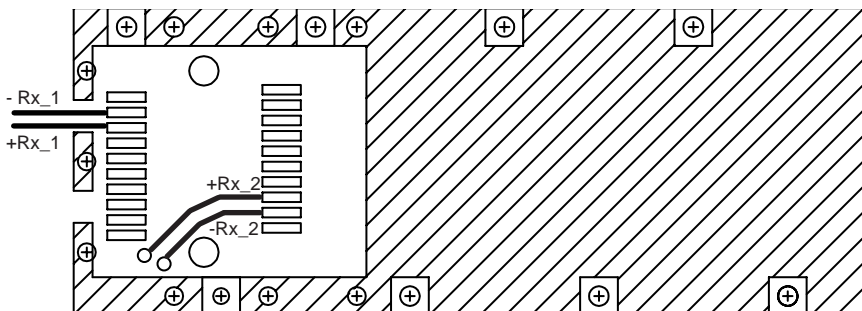
The video transceiver, dual transmitter, dual receiver, simplex transmitter, and simplex receiver modules share identical signal pin-outs. This provides the host flexibility to design one PCB to accommodate all three video SFPs. The video cage, however has only two signal trace clearance windows. Therefore, we recommend routing  $\pm TX_2$  and  $\pm RX_2$  signal traces to the bottom PCB layer before crossing through the video SFP cage outline.



**Video SFP Transceiver**  
SPLC-20-9D-X-X (TX/RX)  
**NOTE:  $\pm TX_2$  AND  $\pm RX_2$**   
are not internally con-  
nected in Video SFP  
transceiver



**Dual Transmitter Video SFP**  
SP2T-20-9D-X-X (TX/TX)  
**NOTE:  $\pm TX_2$**  are not  
internally connected in  
simplex transmitter Video  
SFP (SP1T-20-9D-X-B)



**Dual Receiver Video SFP**  
SP2R-20-9D-X-X (RX/RX)  
**NOTE:  $\pm RX_2$**  are not  
internally connected in  
simplex receiver Video  
SFP (SP1R-20-9D-X-X)

# SP2T-20-9D-3-XXYY Optical CWDM SMPTE 292M/297M/259M CWDM Dual Transmitters Video SFP w/Digital Diagnostic



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