

### **XFP-10G-DW-TUNE-40-C**

MSA and TAA 10GBase-DWDM 50GHz XFP Transceiver (SMF, 1530nm to 1565nm, 0km, LC, DOM)

#### **Features:**

- INF-8077i Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



#### **Applications:**

- 10x Gigabit Ethernet over DWDM
- 8x/10x Fibre Channel
- Access, Metro and Enterprise

#### **Product Description**

This MSA compliant XFP transceiver provides 10GBase-DWDM throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1530nm to 1565nm via an LC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

## Tunable XFP Channel Number and Wavelength

| Channel No. | Frequency (THz) | Center Wavelength | Channel No. | Frequency (THz) | Center Wavelength |
|-------------|-----------------|-------------------|-------------|-----------------|-------------------|
| 1           | 191.35          | 1566.723          | 49          | 193.75          | 1547.316          |
| 2           | 191.40          | 1566.314          | 50          | 193.80          | 1546.917          |
| 3           | 191.45          | 1565.905          | 51          | 193.85          | 1546.518          |
| 4           | 191.50          | 1565.496          | 52          | 193.90          | 1546.119          |
| 5           | 191.55          | 1565.087          | 53          | 193.95          | 1545.720          |
| 6           | 191.60          | 1564.679          | 54          | 194.00          | 1545.322          |
| 7           | 191.65          | 1564.271          | 55          | 194.05          | 1544.924          |
| 8           | 191.70          | 1563.863          | 56          | 194.10          | 1544.526          |
| 9           | 191.75          | 1563.455          | 57          | 194.15          | 1544.128          |
| 10          | 191.80          | 1563.047          | 58          | 194.20          | 1543.730          |
| 11          | 191.85          | 1562.640          | 59          | 194.25          | 1543.333          |
| 12          | 191.90          | 1562.233          | 60          | 194.30          | 1542.936          |
| 13          | 191.95          | 1561.826          | 61          | 194.35          | 1542.539          |
| 14          | 192.00          | 1561.419          | 62          | 194.40          | 1542.142          |
| 15          | 192.05          | 1561.013          | 63          | 194.45          | 1541.746          |
| 16          | 192.10          | 1560.606          | 64          | 194.50          | 1541.349          |
| 17          | 192.15          | 1560.200          | 65          | 194.55          | 1540.953          |
| 18          | 192.20          | 1559.794          | 66          | 194.60          | 1540.557          |
| 19          | 192.25          | 1559.389          | 67          | 194.65          | 1540.162          |
| 20          | 192.30          | 1558.983          | 68          | 194.70          | 1539.766          |
| 21          | 192.35          | 1558.578          | 69          | 194.75          | 1539.371          |
| 22          | 192.40          | 1558.173          | 70          | 194.80          | 1538.976          |
| 23          | 192.45          | 1557.768          | 71          | 194.85          | 1538.581          |
| 24          | 192.50          | 1557.363          | 72          | 194.90          | 1538.186          |
| 25          | 192.55          | 1556.959          | 73          | 194.95          | 1537.792          |
| 26          | 192.60          | 1556.555          | 74          | 195.00          | 1537.397          |
| 27          | 192.65          | 1556.151          | 75          | 195.05          | 1537.003          |

|           |        |          |           |        |          |
|-----------|--------|----------|-----------|--------|----------|
| <b>28</b> | 192.70 | 1555.747 | <b>76</b> | 195.10 | 1536.609 |
| <b>29</b> | 192.75 | 1555.343 | <b>77</b> | 195.15 | 1536.216 |
| <b>30</b> | 192.80 | 1554.940 | <b>78</b> | 195.20 | 1535.822 |
| <b>31</b> | 192.85 | 1554.537 | <b>79</b> | 195.25 | 1535.429 |
| <b>32</b> | 192.90 | 1554.134 | <b>80</b> | 195.30 | 1535.036 |
| <b>33</b> | 192.95 | 1553.731 | <b>81</b> | 195.35 | 1534.643 |
| <b>34</b> | 193.00 | 1553.329 | <b>82</b> | 195.40 | 1534.250 |
| <b>35</b> | 193.05 | 1552.926 | <b>83</b> | 195.45 | 1533.858 |
| <b>36</b> | 193.10 | 1552.524 | <b>84</b> | 195.50 | 1533.465 |
| <b>37</b> | 193.15 | 1552.122 | <b>85</b> | 195.55 | 1533.073 |
| <b>38</b> | 193.20 | 1551.721 | <b>86</b> | 195.60 | 1532.681 |
| <b>39</b> | 193.25 | 1551.319 | <b>87</b> | 195.65 | 1532.290 |
| <b>40</b> | 193.30 | 1550.918 | <b>88</b> | 195.70 | 1531.898 |
| <b>41</b> | 193.35 | 1550.517 | <b>89</b> | 195.75 | 1531.507 |
| <b>42</b> | 193.40 | 1550.116 | <b>90</b> | 195.80 | 1531.116 |
| <b>43</b> | 193.45 | 1549.715 | <b>91</b> | 195.85 | 1530.725 |
| <b>44</b> | 193.50 | 1549.315 | <b>92</b> | 195.90 | 1530.334 |
| <b>45</b> | 193.55 | 1548.915 | <b>93</b> | 195.95 | 1529.944 |
| <b>46</b> | 193.60 | 1548.515 | <b>94</b> | 196.00 | 1529.553 |
| <b>47</b> | 193.65 | 1548.115 | <b>95</b> | 196.05 | 1529.163 |
| <b>48</b> | 193.70 | 1547.715 | <b>96</b> | 196.10 | 1528.773 |

## Absolute Maximum Ratings

| Parameter                    | Symbol | Min. | Typ. | Max. | Unit | Notes               |
|------------------------------|--------|------|------|------|------|---------------------|
| Storage Temperature          | Tstg   | -40  |      | 85   | °C   |                     |
| Case Temperature             |        | -5   |      | 70   | °C   |                     |
| ESD                          |        | 500  |      |      | V    | High Speed i/o pins |
|                              |        | 2000 |      |      |      | All other pins      |
| Receiver optical input power |        |      |      | +12  | dBm  |                     |

## Electrical Characteristics

| Parameter               | Symbol | Min. | Typ. | Max. | Unit  | Notes                            |
|-------------------------|--------|------|------|------|-------|----------------------------------|
| 1.8V Supply             | Vcc2   | 1.71 | 1.8  | 1.89 | V     | VPS not supported                |
| 3.3V Supply             | Vcc3   | 3.15 | 3.3  | 3.45 | V     |                                  |
| 5.0V Supply             | Vcc5   | 4.75 | 5.0  | 5.25 | V     |                                  |
| Supply Current, 1.8V    |        |      | 160  | 200  | mA    |                                  |
| Supply Current, 3.3V    |        |      | 310  | 400  | mA    |                                  |
| Supply Current, 5.0V    |        |      | 100  | 200  | mA    |                                  |
| Inrush current limit    |        |      |      | 100  | mA/μs |                                  |
| Total power consumption |        |      |      | 2.5  | W     | Power Level 2 MSA classification |

## System Performance

| Parameter         | Min       | Max       | OSNR  | BER   | Conditions                                                |
|-------------------|-----------|-----------|-------|-------|-----------------------------------------------------------|
| Noise Loaded      | -400ps/nm | 1500ps/nm | 19dB  | 1E-04 | 10.709Gb/s, -10 to -20dBm, 0.25nm filter, optimised RxDTV |
| Unamplified Links | 0ps/nm    | 1600ps/nm | >35dB | 1E-12 | 10.709Gb/s, -22dBm, 0.25nm filter, optimised RxDTV        |

## Optical Characteristics

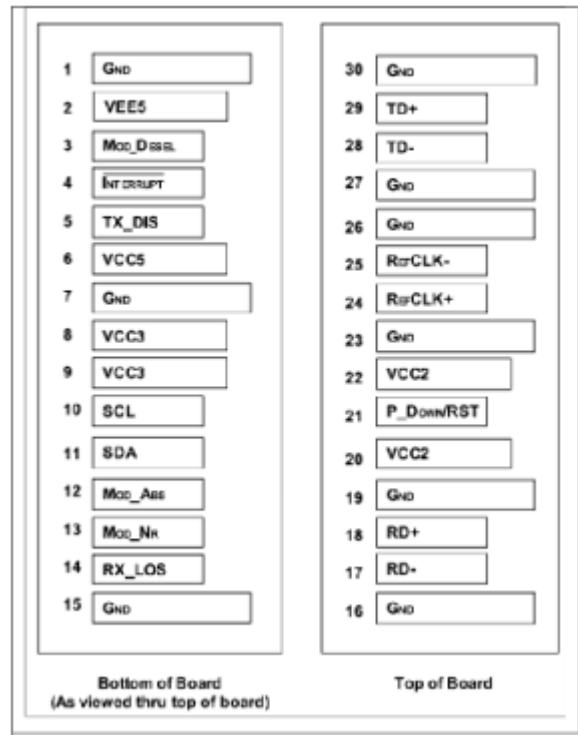
| Parameter                      | Symbol              | Min.   | Typ. | Max.   | Unit    | Conditions                                           |
|--------------------------------|---------------------|--------|------|--------|---------|------------------------------------------------------|
| Transmitter                    |                     |        |      |        |         |                                                      |
| Data Rate                      |                     | 9.95   |      | 11.35  | Gb/s    | NRZ                                                  |
| Frequency range                |                     | 191.35 |      | 196.10 | THz     | 50GHz grid, 96 channels                              |
| Frequency accuracy             |                     | -2.5   |      | +2.5   | GHz     | EOL                                                  |
| Optical transmit power         | Po                  |        | +0.5 |        | dBm     | SOL, 25°C                                            |
| Optical transmit power         | Po                  | -1     |      | +3.0   | dBm     | EOL                                                  |
| Shuttered output power         |                     |        | -45  | -40    | dBm     |                                                      |
| Optical power stability        | $\Delta P_{out}$    | -1.0   |      | +1.0   | dB      | All channels, SOL                                    |
| Side mode suppression          | SMSR                | 35     |      |        | dB      | $\pm 2.5$ nm, modulated                              |
| Spectral width                 | $\Delta\lambda$     |        | 0.3  | 0.5    | nm      | -20dB, modulated                                     |
| Extinction ratio               | ER                  | 9.5    |      |        | dB      | Filtered, 10.709Gb/s                                 |
| Eye diagram compliance         | GR-253, ITU-T G.691 |        |      |        |         |                                                      |
| Mask margin                    |                     | 10     |      |        | %       |                                                      |
| OSNR                           |                     | 50     | 55   |        | dB      | 0.1nm RBW                                            |
| SBS threshold                  |                     | 18     |      |        | dBm     | 50km SMF                                             |
| Tuning speed                   |                     |        |      | 50     | ms      |                                                      |
| Laser enable (turn on) time    |                     |        |      | 50     | ms      | To >90% power                                        |
| Laser disable (turn off) time  |                     |        |      | 10     | $\mu$ s | To <10% power                                        |
| Module initialization time     |                     |        |      | 20     | s       |                                                      |
| Receiver                       |                     |        |      |        |         |                                                      |
| Data rate                      |                     | 9.95   |      | 11.35  | Gb/s    | NRZ                                                  |
| Input operating wavelength     | $\lambda$           | 1525   |      | 1575   | nm      |                                                      |
| Receiver Sensitivity           |                     |        | -26  |        | dBm     | 10.709 Gb/s, IE-12,<br>OSNR>35dB, optimized<br>RxDTV |
| Maximum input power (overload) | Pin MAX             | -5     |      |        | dBm     |                                                      |
| LOS assert                     | PA                  | -33    |      | -28.5  | dBm     |                                                      |
| LOS de-assert                  | PD                  | -32.5  |      | -26.5  | dBm     |                                                      |
| LOS Hysteresis                 | PD - PA             | 0.5    |      | 4      | dB      |                                                      |
| LOS assert time                | TA                  |        |      | 100    | $\mu$ s |                                                      |
| LOS de-assert time             | TD                  |        |      | 100    | $\mu$ s |                                                      |

## Pin Descriptions

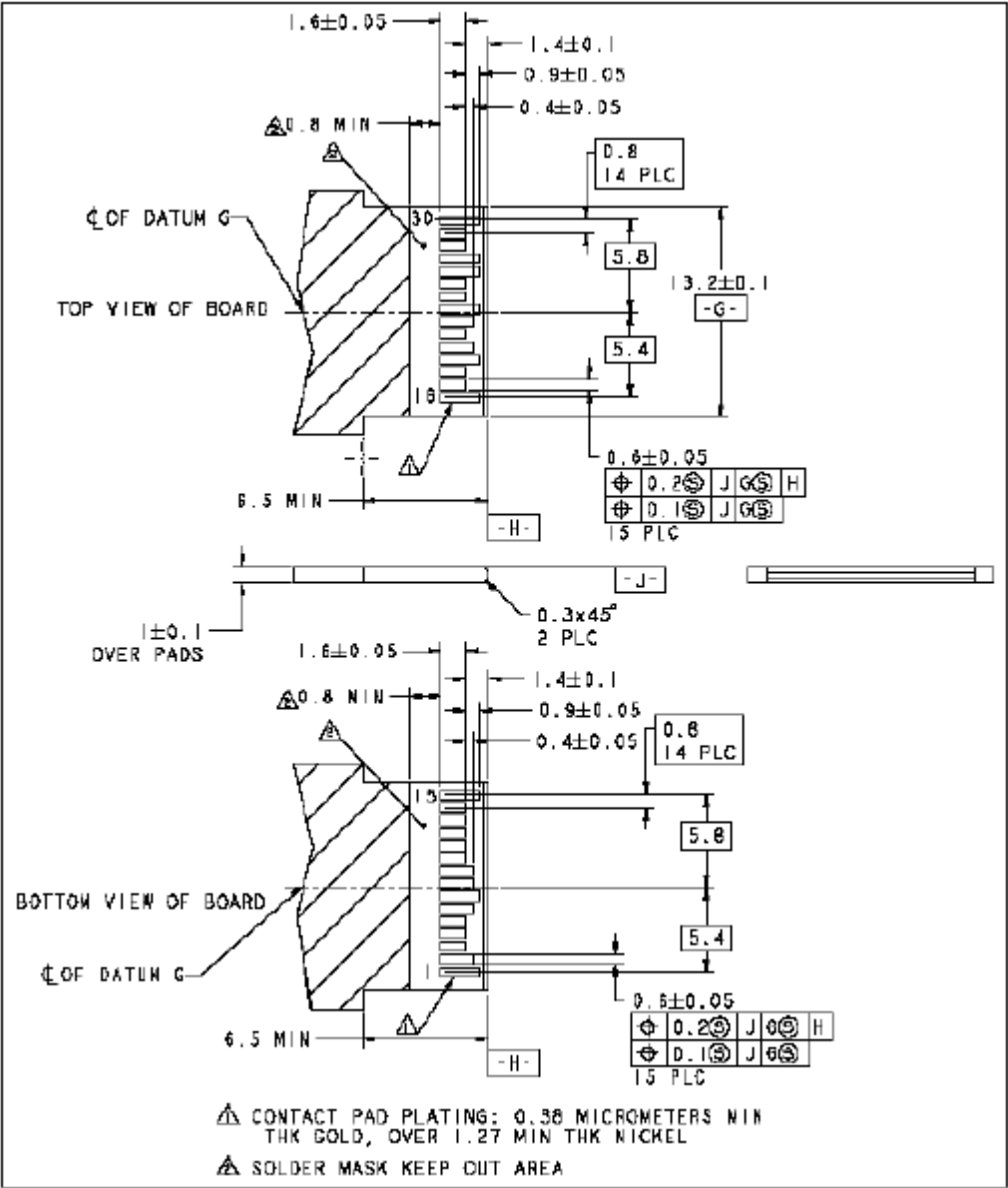
| Pin | Logic     | Symbol     | Name/Descriptions                                                                                                                                                                                                                                                                                | Notes |
|-----|-----------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1   |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 2   |           | VEE5       | Optional -5.2V Power Supply                                                                                                                                                                                                                                                                      |       |
| 3   | LVTTL-I   | Mod-Desel  | Module De-select, when held low allows the module to respond to 2-wire serial interface commands                                                                                                                                                                                                 |       |
| 4   | LVTTL-O   | Interrupt  | Interrupt; Indicates presence of an important condition which can be read over the serial 2-wire interface                                                                                                                                                                                       | 2     |
| 5   | LVTTL-I   | TX_DIS     | Transmitter Disable; Turns off transmitter laser output                                                                                                                                                                                                                                          |       |
| 6   |           | VCC5       | +5V Power Supply                                                                                                                                                                                                                                                                                 |       |
| 7   |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 8   |           | VCC3       | +3.3V Power Supply                                                                                                                                                                                                                                                                               |       |
| 9   |           | VCC3       | +3.3V Power Supply                                                                                                                                                                                                                                                                               |       |
| 10  | LVTTL-I/O | SCL        | 2-wire Serial interface clock                                                                                                                                                                                                                                                                    | 2     |
| 11  | LVTTL-I/O | SDA        | 2-wire Serial interface data line                                                                                                                                                                                                                                                                | 2     |
| 12  | LVTTL-O   | Mod_Abs    | Indicates Module is not present. Grounded in the Module                                                                                                                                                                                                                                          | 2     |
| 13  | LVTTL-O   | Mod_NR     | Module Not Ready; Indicating Module Operational Fault                                                                                                                                                                                                                                            | 2     |
| 14  | LVTTL-O   | RX_LOS     | Receiver Loss Of Signal Indicator                                                                                                                                                                                                                                                                | 2     |
| 15  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 16  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 17  | CML-O     | RD-        | Receiver Inverted Data Output                                                                                                                                                                                                                                                                    |       |
| 18  | CML-O     | RD+        | Receiver Non-Inverted Data Output                                                                                                                                                                                                                                                                |       |
| 19  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 20  |           | VCC2       | +1.8V Power Supply                                                                                                                                                                                                                                                                               | 3     |
| 21  | LVTTL-I   | P Down/RST | Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode.<br>Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle |       |
| 22  |           | VCC2       | +1.8V Power Supply                                                                                                                                                                                                                                                                               | 3     |
| 23  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 24  | PECL-I    | RefCLK+    | Not required                                                                                                                                                                                                                                                                                     |       |
| 25  | PECL-I    | RefCLK-    | Not required                                                                                                                                                                                                                                                                                     |       |
| 26  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 27  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |
| 28  | CML-I     | TD-        | Transmitter Inverted Data Input                                                                                                                                                                                                                                                                  |       |
| 29  | CML-I     | TD+        | Transmitter Non-Inverted Data Input                                                                                                                                                                                                                                                              |       |
| 30  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                    | 1     |

**Notes:**

1. Module ground pins (GND) are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7K-10kOhms to a voltage between 3.15V and 3.45V on the host board.
3. Variable Power Supply (VPS) function is not supported.



Recommended Pattern Layout





## Power Supply Noise Tolerance

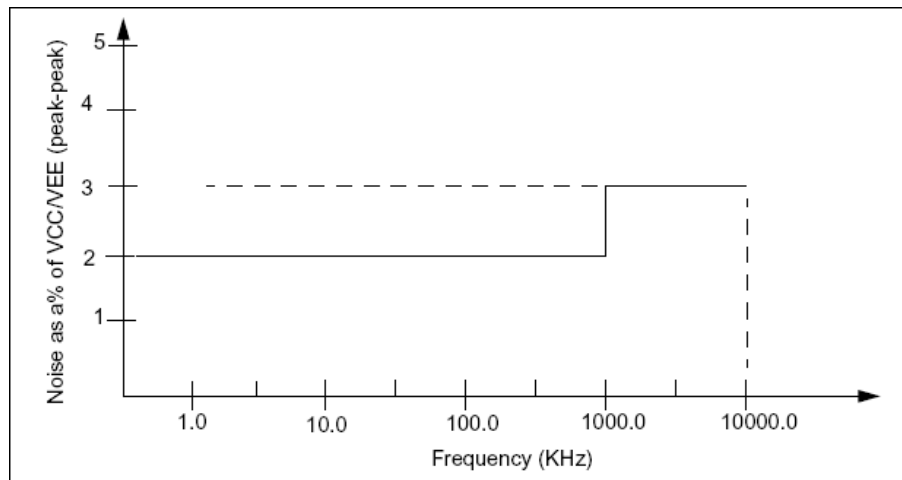
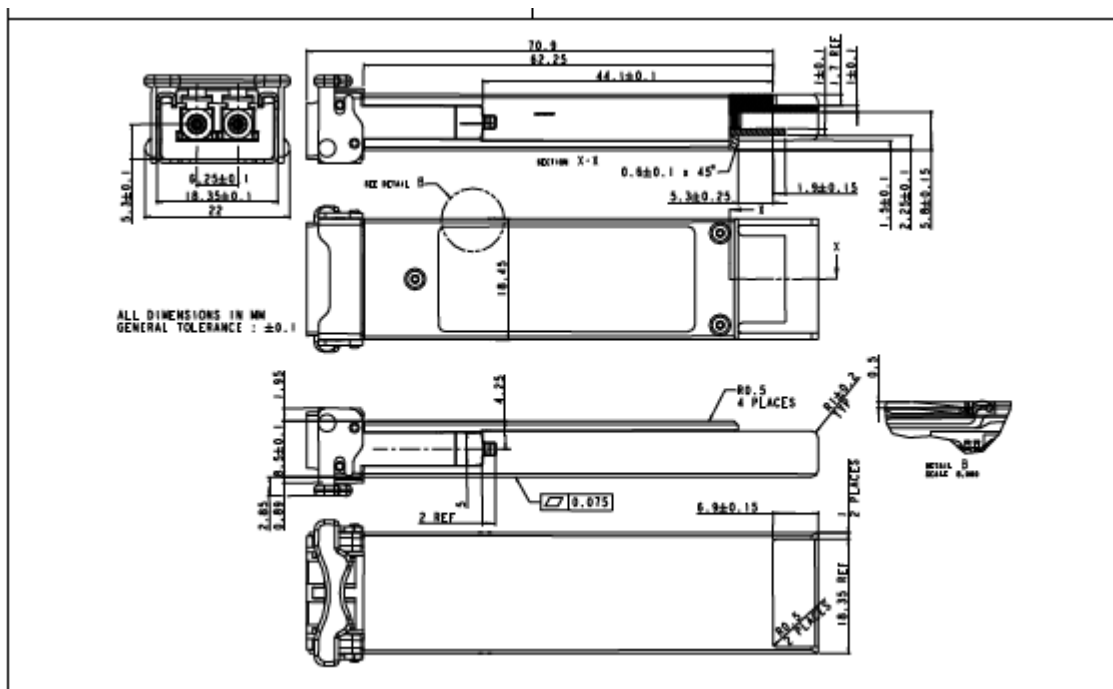


Figure 2 Power Noise Requirement

## Mechanical Specifications



## About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

## A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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