

### **SFP-2-5GB-DW25-160-C-C**

Cisco® Compatible TAA 2.5GBase-DWDM SFP Transceiver C-Band 100GHz (SMF, 1557.36nm, 160km, LC, DOM)

#### **Features:**

- Compliant with SFP MSA
- Duplex LC Connector
- Single-mode Fiber
- Single 3.3V Supply
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- Commercial Temperature 0 to 70 Celsius
- RoHS Compliant and Lead Free



#### **Applications:**

- Gigabit Ethernet over DWDM
- 1x Fibre Channel
- Access, Metro and Enterprise

#### **Product Description**

This Cisco® SFP transceiver provides 2.5GBase-DWDM throughput up to 160km over single-mode fiber (SMF) using a wavelength of 1557.36nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Cisco® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. 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."



### SFP+ Channel Number and Wavelength

| Channel | Frequency | Center Wavelength (nm) | Channel | Frequency (THz) | Center Wavelength (nm) |
|---------|-----------|------------------------|---------|-----------------|------------------------|
| 0       | 190.0     | 1577.86                | 50      | 195.0           | 1537.40                |
| 1       | 190.1     | 1577.03                | 51      | 195.1           | 1536.61                |
| 2       | 190.2     | 1576.20                | 52      | 195.2           | 1535.82                |
| 3       | 190.3     | 1575.37                | 53      | 195.3           | 1535.04                |
| 4       | 190.4     | 1574.54                | 54      | 195.4           | 1534.25                |
| 5       | 190.5     | 1573.71                | 55      | 195.5           | 1533.47                |
| 6       | 190.6     | 1572.89                | 56      | 195.6           | 1532.68                |
| 7       | 190.7     | 1572.06                | 57      | 195.7           | 1531.90                |
| 8       | 190.8     | 1571.24                | 58      | 195.8           | 1531.12                |
| 9       | 190.9     | 1570.42                | 59      | 195.9           | 1530.33                |
| 10      | 191.0     | 1569.59                | 60      | 196.0           | 1529.55                |
| 11      | 191.1     | 1568.77                | 61      | 196.1           | 1528.77                |
| 12      | 191.2     | 1567.95                | 62      | 186.2           | 1610.06                |
| 13      | 191.3     | 1567.13                | 63      | 186.3           | 1609.19                |
| 14      | 191.4     | 1566.31                | 64      | 186.4           | 1608.33                |
| 15      | 191.5     | 1565.50                | 65      | 186.5           | 1607.47                |
| 16      | 191.6     | 1564.68                | 66      | 186.6           | 1606.60                |
| 17      | 191.7     | 1563.86                | 67      | 186.7           | 1605.74                |
| 18      | 191.8     | 1563.05                | 68      | 186.8           | 1604.88                |
| 19      | 191.9     | 1562.23                | 69      | 186.9           | 1604.03                |
| 20      | 192.0     | 1561.42                | 70      | 187.0           | 1603.17                |
| 21      | 192.1     | 1560.61                | 71      | 187.1           | 1602.31                |
| 22      | 192.2     | 1559.79                | 72      | 187.2           | 1601.46                |
| 23      | 192.3     | 1558.98                | 73      | 187.3           | 1600.60                |
| 24      | 192.4     | 1558.17                | 74      | 187.4           | 1599.75                |
| 25      | 192.5     | 1557.36                | 75      | 187.5           | 1598.89                |
| 26      | 192.6     | 1556.55                | 76      | 187.6           | 1598.04                |
| 27      | 192.7     | 1555.75                | 77      | 187.7           | 1597.19                |
| 28      | 192.8     | 1554.94                | 78      | 187.8           | 1596.34                |
| 29      | 192.9     | 1554.13                | 79      | 187.9           | 1595.49                |
| 30      | 193.0     | 1553.33                | 80      | 188.0           | 1594.64                |
| 31      | 193.1     | 1552.52                | 81      | 188.1           | 1593.79                |
| 32      | 193.2     | 1551.72                | 82      | 188.2           | 1592.95                |
| 33      | 193.3     | 1550.92                | 83      | 188.3           | 1592.10                |
| 34      | 193.4     | 1550.12                | 84      | 188.4           | 1591.26                |
| 35      | 193.5     | 1549.32                | 85      | 188.5           | 1590.41                |
| 36      | 193.6     | 1548.51                | 86      | 188.6           | 1589.57                |
| 37      | 193.7     | 1547.72                | 87      | 188.7           | 1588.73                |
| 38      | 193.8     | 1546.92                | 88      | 188.8           | 1587.88                |
| 39      | 193.9     | 1546.12                | 89      | 188.9           | 1587.04                |
| 40      | 194.0     | 1545.32                | 90      | 189.0           | 1586.20                |

|    |       |         |    |       |         |
|----|-------|---------|----|-------|---------|
| 41 | 194.1 | 1544.53 | 91 | 189.1 | 1585.36 |
| 42 | 194.2 | 1543.73 | 92 | 189.2 | 1584.53 |
| 43 | 194.3 | 1542.94 | 93 | 189.3 | 1583.69 |
| 44 | 194.4 | 1542.14 | 94 | 189.4 | 1582.85 |
| 45 | 194.5 | 1541.35 | 95 | 189.5 | 1582.02 |
| 46 | 194.6 | 1540.56 | 96 | 189.6 | 1581.18 |
| 47 | 194.7 | 1539.77 | 97 | 189.7 | 1580.35 |
| 48 | 194.8 | 1538.98 | 98 | 189.8 | 1579.52 |
| 49 | 194.9 | 1538.19 | 99 | 189.9 | 1578.69 |

### Absolute Maximum Ratings

| Parameter                  |     | Symbol | Min. | Typ.  | Max. | Unit |
|----------------------------|-----|--------|------|-------|------|------|
| Maximum Supply Voltage     |     | Vcc    | -0.5 |       | 3.6  | V    |
| Storage Temperature        |     | Tstg   | -40  |       | 85   | °C   |
| Operating Case Temperature |     | Tc     | 0    |       | 70   | °C   |
| Operating Humidity         |     | RH     |      |       | 95   | %    |
| Data Rate                  | GBE |        |      | 1.25  |      | Gbps |
|                            | FC  |        |      | 1.063 |      |      |

### Electrical Characteristics

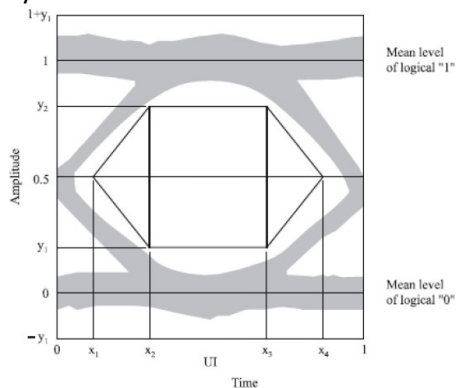
| Parameter                    |         | Symbol | Min. | Typ. | Max. | Unit  | Notes              |
|------------------------------|---------|--------|------|------|------|-------|--------------------|
| Power Supply Voltage         |         | Vcc    | 3.15 | 3.3  | 3.45 | V     |                    |
| Power Supply Current         |         | Icc    |      |      | 450  | mA    |                    |
| Transmitter                  |         |        |      |      |      |       |                    |
| CML Differential Inputs      |         | VIN    | 400  |      | 1600 | mVp-p | AC Coupled Inputs  |
| Input Differential Impedance |         | ZIN    | 85   | 100  | 115  | Ω     | RIN>100kΩ @ DC     |
| Tx_Disable                   | Disable |        | 2    |      | Vcc  | V     |                    |
|                              | Enable  |        | 0    |      | 0.8  |       |                    |
| Tx_Fault                     | Fault   |        | 2    |      | Vcc  | V     |                    |
|                              | Normal  |        | 0    |      | 0.8  |       |                    |
| Receiver                     |         |        |      |      |      |       |                    |
| CML Differential Outputs     |         | VOUT   | 400  | 800  | 1200 | mVp-p | AC Coupled Outputs |
| Output Impedance             |         | ZOUT   | 85   | 100  | 115  | Ω     |                    |
| Rx_LOS                       | LOS     |        | 2    |      | Vcc  | V     |                    |
|                              | Normal  |        | 0    |      | 0.8  | V     |                    |
| MOD-DEF (0:2)                |         | VOH    | 2.5  |      |      | V     |                    |
|                              |         | VOL    | 0    |      | 0.8  | V     |                    |

## Optical Characteristics

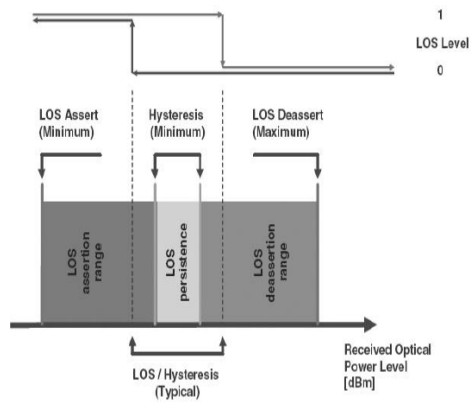
| Parameter                              | Symbol                     | Min. | Typ. | Max. | Unit  | Notes |
|----------------------------------------|----------------------------|------|------|------|-------|-------|
| Transmitter                            |                            |      |      |      |       |       |
| Optical Center Wavelength              | $\lambda_C$                | 1528 |      | 1610 | nm    |       |
| Spectral Width (-20dB)                 | $\Delta\lambda$            |      |      | 0.3  | nm    |       |
| Side-Mode Suppression Ratio            | SMSR                       | 30   |      |      | dB    |       |
| Channel Spacing                        | $\Delta f$                 |      | 100  |      | GHz   |       |
| Deviation From Central Frequency @ EOL |                            | -12  |      | 12   | GHz   |       |
| Average Output Power                   | POUT                       | 2    |      | 5    | dBm   | 1     |
| Average Launch Power (Tx Off)          | Poff                       |      |      | -45  | dBm   |       |
| Extinction Ratio                       | ER                         | 8.2  |      |      | dB    | 1     |
| Rise/Fall Time (20-80%)                | Tr/Tf                      |      |      | 150  | ps    |       |
| Tx_Disable Assert Time                 | Toff                       |      |      | 10   | us    |       |
| POUT @ Tx_Disable Asserted             | POUT                       |      |      | -45  | dBm   |       |
| Optical Signal Noise Ratio @ 0.1nm     | OSNR                       |      | 40   |      | dB    | 3     |
| Relative Intensity Noise               | RIN                        |      |      | -135 | dB/Hz |       |
| Dispersion Tolerance                   | DT                         |      | 2400 |      | Ps/nm |       |
| Output Optical Eye                     | Compatible with IEEE 802.3 |      |      |      |       | 1, 4  |
| Receiver                               |                            |      |      |      |       |       |
| Optical Input Wavelength               | $\lambda$                  | 1528 |      | 1620 | nm    |       |
| Receiver Sensitivity                   | Pmin                       |      |      | -31  | dBm   | 2     |
| Receiver Overload                      | Pmax                       | -9   |      |      | dBm   |       |
| LOS De-Assert                          | LOSD                       |      |      | -32  | dBm   |       |
| LOS Assert                             | LOSA                       | -45  |      |      | dBm   |       |
| LOS Hysteresis                         |                            |      | 0.5  |      | dB    | 5     |

### Notes:

1. Filtered. Measured with a PRBS  $2^{23}-1$  test pattern at 2.5Gbps.
2. Measured with a PRBS  $2^{23}-1$  test pattern at 2.5Gbps, G.652 SMF, and BER  $\leq 1 \times 10^{-12}$ .
3. OSNR at BER of  $10e^{-12}$ .
4. Eye Pattern Mask.



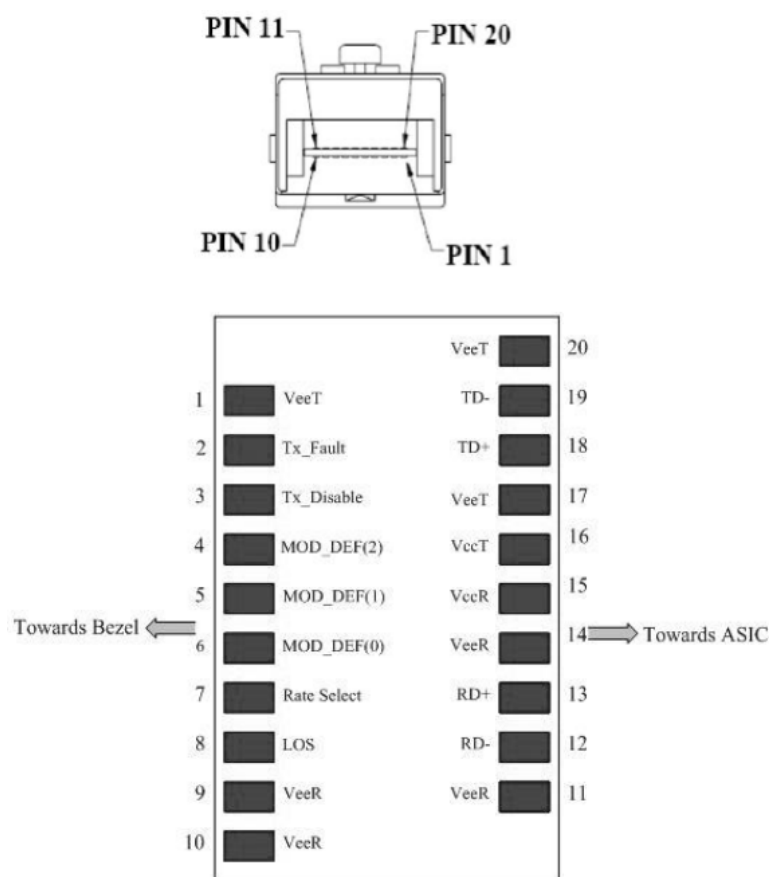
## 5. LOS Hysteresis.



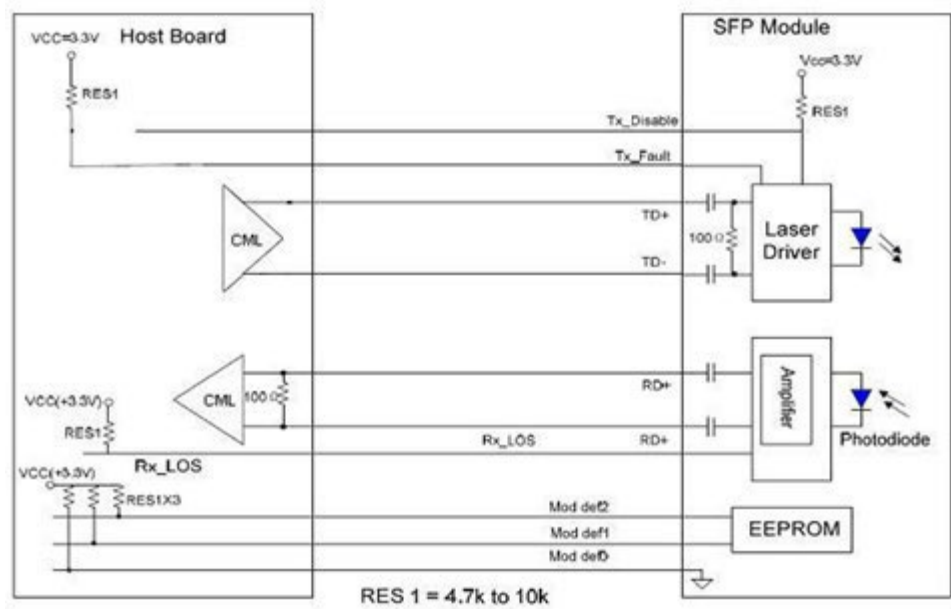
## Pin Descriptions

| Pin | Symbol      | Name/Description                                           | Note |
|-----|-------------|------------------------------------------------------------|------|
| 1   | VeeT        | Transmitter Ground.                                        |      |
| 2   | Tx_Fault    | Transmitter Fault Indication. Open Collector/Drain Output. |      |
| 3   | Tx_Disable  | Transmitter Disable.                                       |      |
| 4   | MOD-DEF2    | Module Definition 2. 2-Wire Serial Interface Data.         |      |
| 5   | MOD-DEF1    | Module Definition 1. 2-Wire Serial Interface Clock.        |      |
| 6   | MOD-DEF0    | Module Definition 0. Grounded within the module.           |      |
| 7   | Rate Select | Rate Select 0. Not Used.                                   |      |
| 8   | LOS         | Loss of Signal. Open Collector/Drain Output.               |      |
| 9   | VeeR        | Receiver Ground.                                           |      |
| 10  | VeeR        | Receiver Ground.                                           |      |
| 11  | VeeR        | Receiver Ground.                                           |      |
| 12  | RD-         | Inverted Receiver Data Out.                                |      |
| 13  | RD+         | Received Data Out.                                         |      |
| 14  | VeeR        | Receiver Ground.                                           |      |
| 15  | VccR        | Receiver Power. $3.3 \pm 5\%$ .                            |      |
| 16  | VccT        | Transmitter Power. $3.3 \pm 5\%$ .                         |      |
| 17  | VeeT        | Transmitter Ground.                                        |      |
| 18  | TD+         | Transmitter Data In.                                       |      |
| 19  | TD-         | Inverted Transmit Data In.                                 |      |
| 20  | VeeT        | Transmitter Ground.                                        |      |

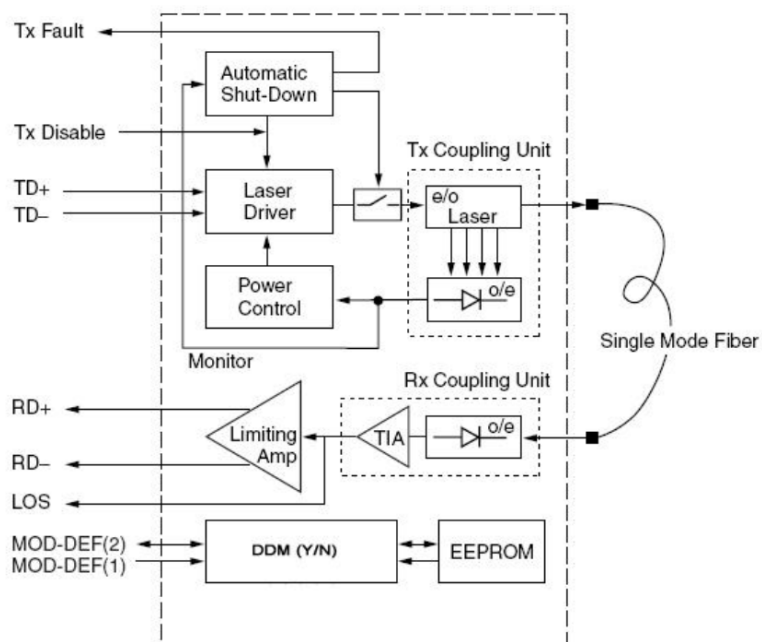
Electrical Pad Layout



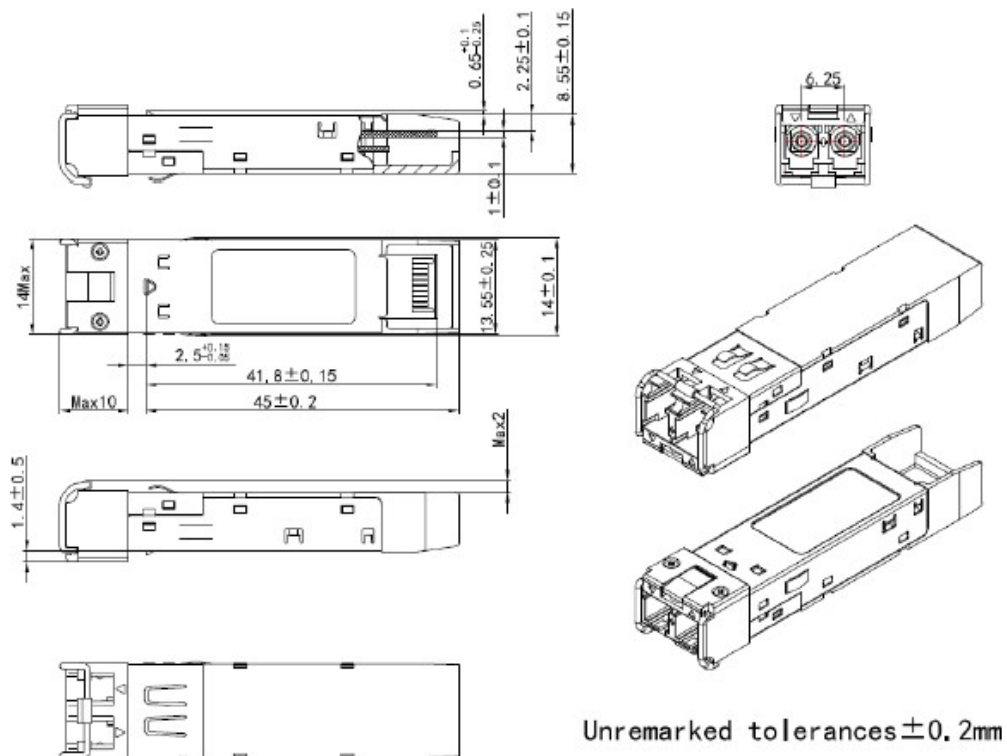
Recommended Circuit Schematic



## Functional Description of Transceiver

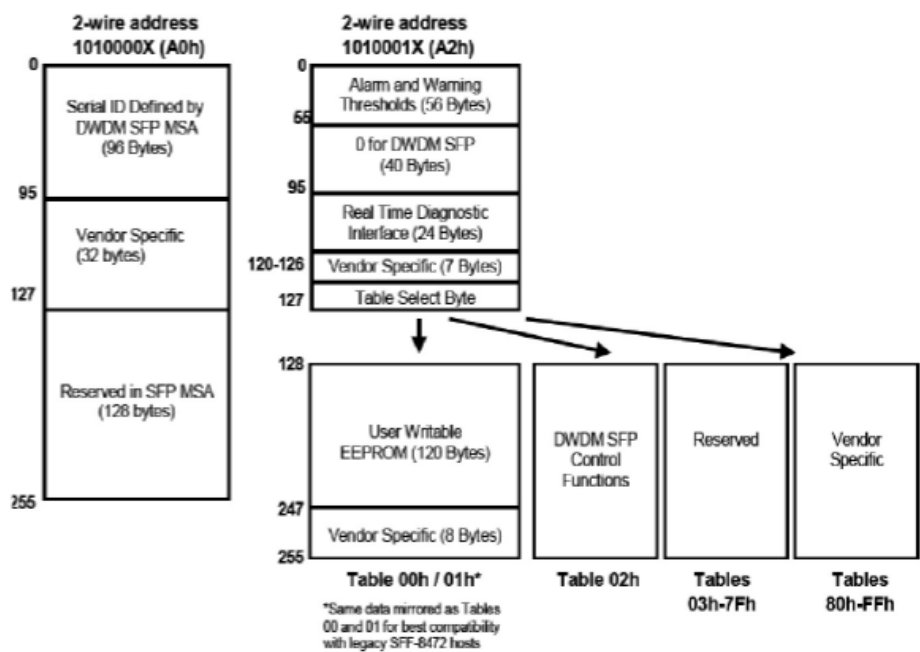


## Mechanical Specifications



EEPROM Information

EEPROM memory map-specific data field description is as below:





## About ProLabs

Our experience comes as standard; for over 15 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 over 90 optical switching and transport platforms.

## 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 400G 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.

## Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. 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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