

### Features

- 15mW output power
- Built in isolator ensures stable operation even with feedback from MOPA chain
- Ultrafast pulsing capability
- PM or SM Fiber
- Laser welded, epoxy free and hermetically sealed
- Built in TEC, thermistor and monitor detector
- Rugged to shock and vibration

### Applications

- Master oscillator for MOPA
- Seeder for fiber lasers
- Seeder for DPSS lasers

### General Description

The EM442, 1064nm distributed feedback laser (DFB) is a InGaAsP/InP multi-quantum well (MQW) laser diode. The module is ideal in applications where mode stability, low RIN and stable PM properties are needed. The module contains a cooler, thermistor, monitor detector and bias-T. The module is designed and built using EM4s high reliability platform for defense components.

### Ordering Information

EM442-XX-YY

|            |                                           |
|------------|-------------------------------------------|
| Bias-T     |                                           |
| NA         | : Not included                            |
| 00         | : Pin 12 used as high speed low ohm input |
| 25         | : 25Ω matching resistor                   |
| 50         | : 50Ω matching resistor                   |
| Fiber type |                                           |
| SM         | : SMF28                                   |
| PM         | : Polarization Maintaining                |

### Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and operation of the device at these or conditions beyond these are not implied. Exposure to absolute maximum ratings for extended periods of time may affect device reliability.

| Parameter                   | Sym              | Condition | Min | Max | Unit |
|-----------------------------|------------------|-----------|-----|-----|------|
| Storage Temperature         | T <sub>STG</sub> |           | -40 | 85  | °C   |
| Operating Case Temperature  | T <sub>OP</sub>  |           | -20 | 70  | °C   |
| Laser Forward Current       | I <sub>F</sub>   |           |     | 150 | mA   |
| Laser Reverse Voltage       | V <sub>R</sub>   |           |     | 2   | V    |
| Photo Diode Forward Current | I <sub>PD</sub>  |           |     | 10  | mA   |
| Photo diode Reverse Voltage | V <sub>PD</sub>  |           |     | 20  | V    |
| TEC Current                 | I <sub>TEC</sub> |           |     | 3.0 | A    |
| TEC Voltage                 | V <sub>TEC</sub> |           |     | 4.0 | V    |
| Thermistor Current          |                  |           |     | 2   | mA   |
| Thermistor Voltage          |                  |           |     | 5   | V    |
| Lead Soldering Time         |                  |           |     | 10  | s    |
| Lead Soldering temperature  |                  |           |     | 250 | °C   |
| ESD                         |                  | HBM       |     | 500 | V    |

## Optical And Electrical Characteristics

$T_{OP}=25^{\circ}\text{C}$ , continous wave and beginning of life unless otherwise specified.

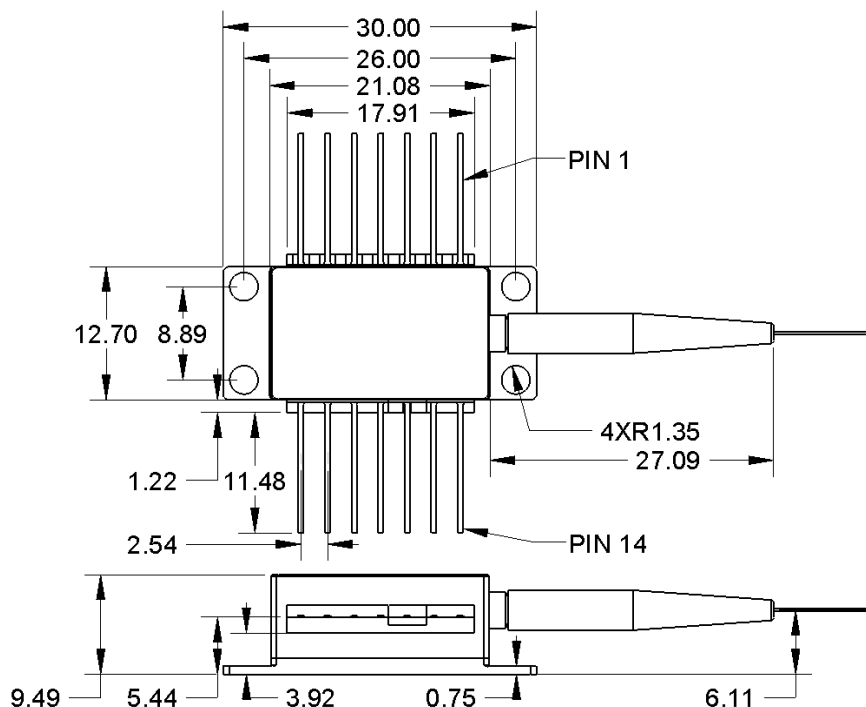
| Parameter                        | Sym.         | Condition                                                                | Min  | Typ.  | Max   | Unit               |
|----------------------------------|--------------|--------------------------------------------------------------------------|------|-------|-------|--------------------|
| Operating Chip Temperature       | $T_{CHIP}$   |                                                                          | 15   |       | 35    | $^{\circ}\text{C}$ |
| Threshold Current                | $I_{TH}$     |                                                                          |      | 17    | 20    | mA                 |
| Laser Drive Current              | $I_{OP}$     |                                                                          |      | 100   | 130   | mA                 |
| Laser Forward Voltage            | $V_F$        | $I=I_{MAX}$                                                              |      | 1.6   | 2     | V                  |
| Output Power                     | $P_{OP}$     | $I=I_{OP}$                                                               | 20   |       |       | mW                 |
| Center Wavelength                | $\lambda$    | $P=P_{OP}$                                                               |      | 1064  |       | nm                 |
| Linewidth                        | $\Delta \nu$ |                                                                          |      | 1     |       | MHz                |
| Relative Intensity Noise         | RIN          | $P=P_{OP}$ , 0.2GHz→3GHz                                                 |      | -150  |       | dB/Hz              |
| Side Mode Suppression            | SMSR         | $P=P_{OP}$                                                               | 30   |       |       | dB                 |
| Optical Isolation                | ISO          |                                                                          | 30   | 35    |       | dB                 |
| Polarization Extinction Ratio    | PER          | PM fiber option.                                                         | 17   | 21    |       | dB                 |
| Monitor Photo Diode Current      | $I_{PD}$     | $P=P_{OP}$                                                               | 50   |       |       | $\mu\text{A}$      |
| Monitor Photo Diode Dark Current | $I_D$        |                                                                          |      |       | 100   | nA                 |
| Tracking Error                   |              | $P=P_{OP}$                                                               | -0.5 |       | 0.5   | dB                 |
| Modulation Bandwidth             | F            | 50 $\Omega$ bias-T option                                                | 3    |       |       | GHz                |
| Electrical Back Reflection       | $S_{11}$     | 50 $\Omega$ bias-T option                                                |      |       | -10   | dB                 |
| Modulation Input Matching        | $Z_{IN}$     | Bias-T option 00                                                         |      | -     |       | $\Omega$           |
|                                  |              | Bias-T option 25                                                         |      | 25    |       |                    |
|                                  |              | Bias-T option 50                                                         |      | 50    |       |                    |
| TEC Current                      |              | $T_{OP}=70^{\circ}\text{C}$ , $P=P_{OP}$ , $T_{CHIP}=25^{\circ}\text{C}$ |      |       | 2.0   | A                  |
| TEC Voltage                      |              | $T_{OP}=70^{\circ}\text{C}$ , $P=P_{OP}$ , $T_{CHIP}=25^{\circ}\text{C}$ |      |       | 4     | V                  |
| Thermistor Resistance            | $R_{TH}$     | $T=25^{\circ}\text{C}$                                                   | 9500 | 10000 | 10500 | $\Omega$           |
| Thermistor $\beta$ coefficient   | $\beta$      | 0 / 50 $^{\circ}\text{C}$                                                |      | 3892  |       |                    |

## Fiber Specification

| Parameter                 | Typ.                        | Unit          |
|---------------------------|-----------------------------|---------------|
| Fiber Type                | PM / SM dependent on option | -             |
| Connector Type            | FC/APC                      | -             |
| Buffer Diameter PM Option | 250                         | $\mu\text{m}$ |
| Buffer Diameter SM Option | 900                         | $\mu\text{m}$ |
| Buffer Material PM Option | Acrylate                    | -             |
| Buffer Material SM Option | Hytre                       | -             |
| Minimum Pigtail Length    | 1                           | m             |
| Minimum Bend Radius       | 35                          | mm            |

## Mechanical Drawing

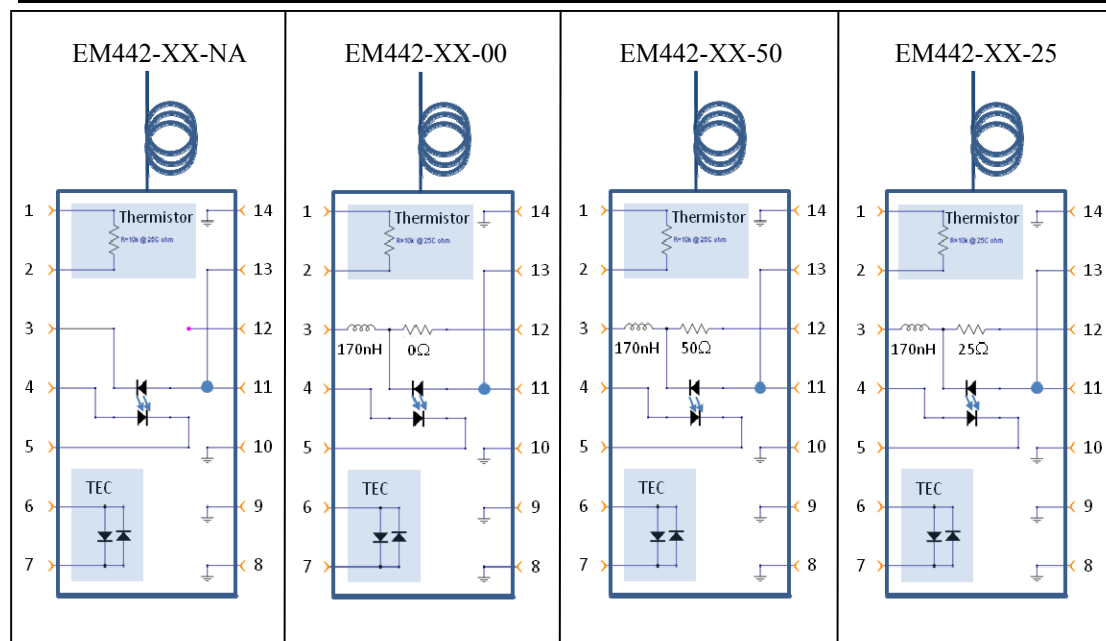
All units in mm



## Pinning

| Pin | Description              |
|-----|--------------------------|
| 1   | Thermistor               |
| 2   | Thermistor               |
| 3   | Laser Cathode (Bias)     |
| 4   | Monitor PD Anode         |
| 5   | Monitor PD Cathode       |
| 6   | TEC +                    |
| 7   | TEC -                    |
| 8   | Case GND                 |
| 9   | Case GND                 |
| 10  | Case GND                 |
| 11  | Laser Anode              |
| 12  | See ordering information |
| 13  | Laser Anode              |
| 14  | Case GND                 |

## Ordering Information (Continued)



The component complies with all applicable portions of 21 CFR 1040.10, 21 CFR 1010.2 and 21 CFR 1010.3. Since this is a component, it does not comply with all of the requirements contained in 21 CFR 1040.10 and 21 CFR 1040.11 for complete laser products.

For pricing and delivery information, please contact EM4 inc. direct at +1 781 275 75 01, [sales@em4inc.com](mailto:sales@em4inc.com) or any of the representatives listed at [www.em4inc.com](http://www.em4inc.com).

The information published in this datasheet is believed to be accurate and reliable. EM4, Inc. reserves the right to change without notice including but not limited to the design, specification, form, fit or function relating to the product herein. ©2008 EM4, Inc. All rights reserved.