

## Product Bulletin



The JDS Uniphase CT2 Series OC-3 (155 Mb/s) transceiver module integrates optics and electronics in a Small Form Factor Pluggable (SFP) package. It is Multisource Agreement (MSA) compatible and designed for operation at 1310 nm and 1550 nm.

The CT2 Series SFP transceiver provides a fully OC-3 SONET compliant interface between the SONET/SDH photonic layer and the electrical layer. Its microprocessor-based modular design implements all features specified in the SFP MSA compatible 2-wire Serial Digital Diagnostic Monitoring Interface for Optical Transceivers.

The major components in this module include a Fabry-Perot or uncooled distributed feedback (DFB) based optical transmitter, a PIN based optical receiver with integrated transimpedance amplifier (TIA), a microprocessor, a limiting post amplifier, and a laser driver. The modular transceiver design offers a "hot pluggable" interface, allowing the same basic architecture to be used for SR, IR-1, IR-2, LR-1, and LR-2 versions.

### OC-3 SFP Transceiver (1310 nm and 1550 nm) CT2 Series

#### Key Features

- SFP MSA compatible
- Fully OC-3 SONET compliant at all reaches: SR, IR-1, IR-2, LR-1, and LR-2
- Microprocessor-based design fully implements the Digital Diagnostic Monitoring Interface
- Automatic output power and extinction ratio control over temperature and lifetime to compensate for laser efficiency degradation
- Expandable options, such as a custom software user interface

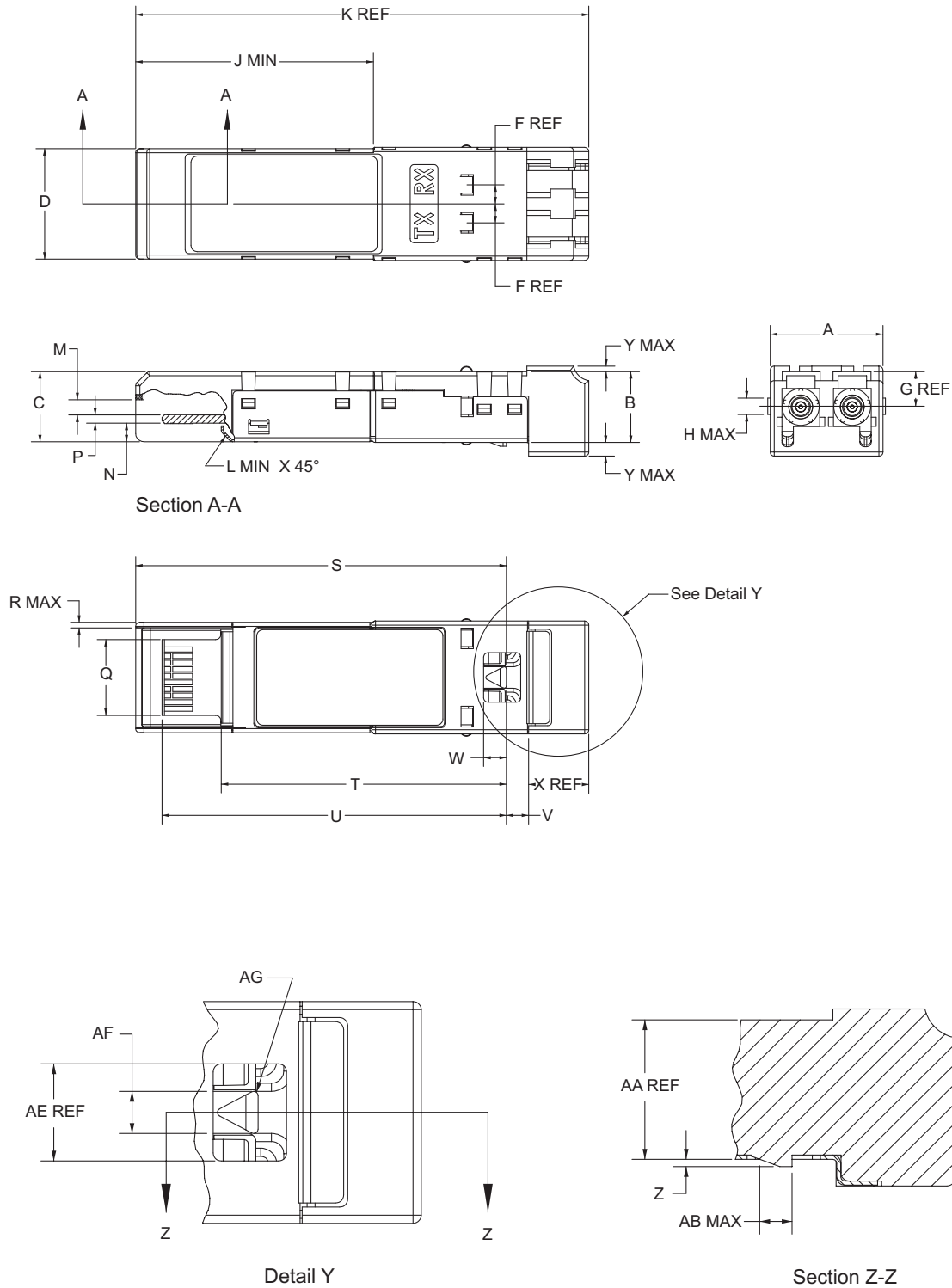
#### Applications

- Metro access
- Metro core
- Wide area networks

#### Compliance

- GR-253-CORE
- ITU-T G.957
- SFF-8472

Dimensions Diagram (Specifications in mm unless otherwise noted; see dimensions table on next page.)



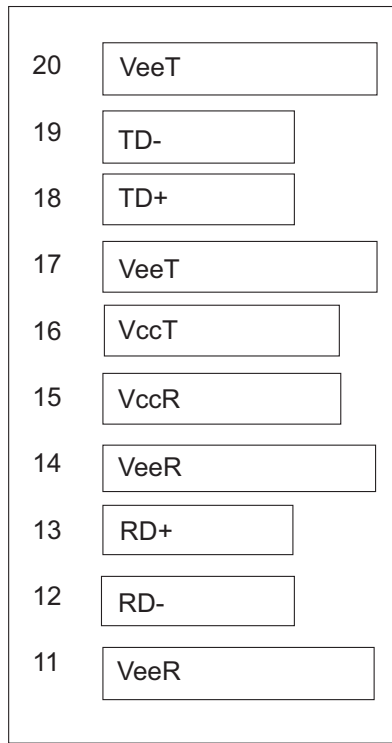
**Dimension Table for the CT2**

| Designator | Dimension (mm) | Tolerance (mm) | Comments  |
|------------|----------------|----------------|---|
| A          | 13.7 mm        | ±0.1 mm        | Transceiver width, nose piece or front that extends inside cage                                   |
| B          | 8.6 mm         | ±0.1 mm        | Transceiver height, front, that extends inside cage   |
| C          | 8.5 mm         | ±0.1 mm        | Transceiver height, rear  |
| D          | 13.4 mm        | ±0.1 mm        | Transceiver width, rear   |
| E          | 1.0 mm         | Maximum        | Extension of front sides outside of cage  |
| F          | 2.3 mm         | Reference      | Location of cage grounding springs from centerline, top   |
| G          | 4.2 mm         | Reference      | Location of side cage grounding springs from top  |
| H          | 2.0 mm         | Maximum        | Width of cage grounding springs   |
| J          | 28.5 mm        | Minimum        | Location of transition between nose piece and rear of transceiver                                 |
| K          | 55.0 mm        | Reference      | Transceiver overall length  |
| L          | 1.1 mm x 45°   | Minimum        | Chamfer on bottom of housing  |
| M          | 2.0 mm         | ±0.25 mm       | Height of rear shoulder from transceiver printed circuit board                                    |
| N          | 2.25 mm        | ±0.1 mm        | Location of printed circuit board to bottom of transceiver  |
| P          | 1.0 mm         | ±0.1 mm        | Thickness of printed circuit board  |
| Q          | 9.2 mm         | ±0.1 mm        | Width of printed circuit board  |
| R          | 0.7 mm         | Maximum        | Width of skirt in rear of transceiver   |
| S          | 45.0 mm        | ±0.2 mm        | Length from latch shoulder to rear of transceiver   |
| T          | 34.6 mm        | ±0.3 mm        | Length from latch shoulder to bottom opening of transceiver                                       |
| U          | 41.8 mm        | ±0.15 mm       | Length from latch shoulder to end of printed circuit board  |
| V          | 2.7 mm         | ±0.05 mm       | Length from latch shoulder to shoulder of transceiver outside of cage (location of positive stop) |
| W          | 2.7 mm         | ±0.1 mm        | Clearance for actuator tines  |
| X          | 7.3 mm         | Reference      | Transceiver length extending outside of cage  |
| Y          | 2.0 mm         | Maximum        | Maximum length of top and bottom transceiver extending outside of cage                            |
| Z          | 0.45 mm        | ±0.05 mm       | Height of latch boss  |
| AA         | 8.6 mm         | Reference      | Transceiver height, front, that extends inside the cage   |
| AB         | 2.6 mm         | Maximum        | Length of latch boss  |
| AE         | 6.0 mm         | Reference      | Width of cavity that contains the actuator  |

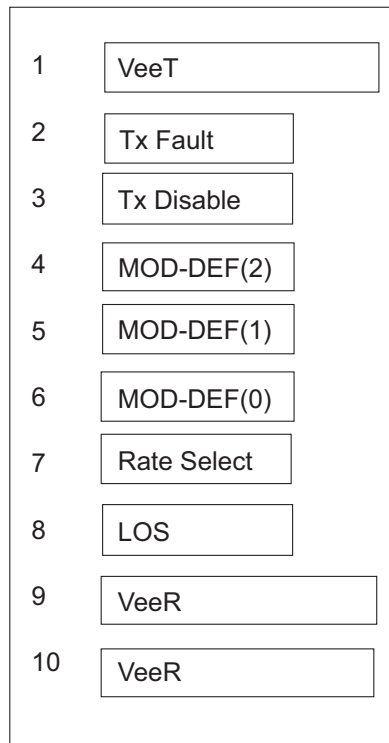
**Bail Latch Color Code Definition**

| Bail Latch Color | Wavelength | Typical Reach |
|------------------|------------|---------------|
| Gray             | 1310 nm    | SR (2 km)     |
| Yellow           | 1310 nm    | IR (15 km)    |
| Orange           | 1550 nm    | IR (40 km)    |
| Red              | 1310 nm    | LR (40 km)    |
| White            | 1550 nm    | LR (80 km)    |

CT2 Electrical Pad Layout



Top of Board



Bottom of Board (As Viewed through Top of Board)

Transceiver Pin Descriptions

| Pin             | Description   |
|-----------------|---|
| TD              | Un-clocked, multirate, Differential CML (or LVPECL) serial bit stream (OC-3) used to drive the optical transmitter. Internally AC coupled and terminated via internal 100 Ω differential impedance.   |
| TD <sub>b</sub> |   |
| RD              | Differential, CML (or LVPECL) received electrical signal capable of detecting OC-3 bit patterns.  |
| RD <sub>b</sub> | The differential pair is internally biased and AC coupled. This signal requires 100 Ω external differential termination.  |
| Rate_select     | Internally monitored and available for future use. Can be customized for specific applications.   |
| TxDIS           | Transmitter Disable Input. A logic HIGH on this input pin disables the transmitter's laser so that there is no optical output. If left open the transmitter will be disabled.   |
| LOS             | Loss of Signal (Open Collector). A logic HIGH on this output indicates an incoming signal level that is less than -30 dBm but no greater than -38 dBm for SR, IR1 and IR2 configurations and less than -36 dBm but no greater than -44 dBm for LR1 and LR2 configurations. LOS shall deassert (logic LOW) when a 4 dB (maximum), 0.5 dB (minimum) hysteresis is obtained. |
| Tx_fault        | Transmitter fault (Open collector). A logic HIGH indicates that the transmitter is in a fault condition.  |
| MOD_DEF(0)      | MOD_DEF(0) is internally grounded to indicate the presence of the module. Must be pulled-up on host board with a 10 KΩ resistor.  |
| MOD_DEF(1)      | MOD_DEF(1) is the clock of the 2 wire interface for module monitoring.  |
| MOD_DEF(2)      | MOD_DEF(2) is the data line of the 2 wire interface for module monitoring.  |
| VccR,VccT       | Receiver, Transmitter power supply, respectively  |
| VeeR, VeeT      | Receiver, Transmitter ground, respectively. The chassis ground is not isolated from circuit ground.   |

**Specifications**

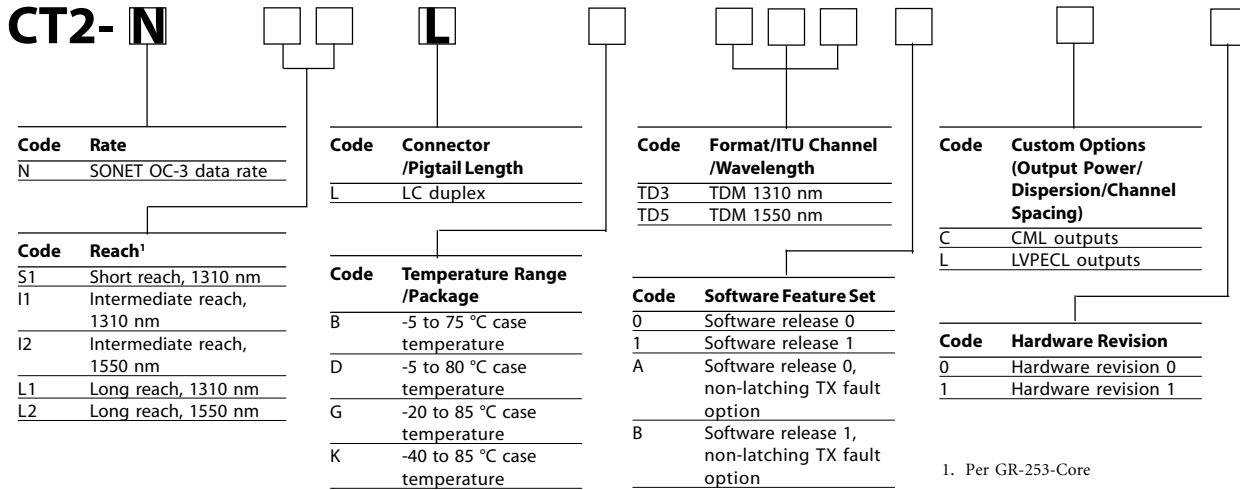
| Parameter   |                                       | SR                    | IR-1     | IR-2    | LR-1      | LR-2    |
|---|---------------------------------------|-----------------------|----------|---------|-----------|---------|
| Average output power <sup>1</sup>                                 | Minimum                               | -15 dBm               | -15 dBm  | -15 dBm | -5 dBm    | -5 dBm  |
|   | Typical                               | -11 dBm               | -11 dBm  | -11 dBm | -2 dBm    | -2 dBm  |
|   | Maximum                               | -8 dBm                | -8 dBm   | -8 dBm  | 0 dBm     | 0 dBm   |
| BOL power output <sup>1</sup>                                     | Minimum                               | -14 dBm               | -14 dBm  | -14 dBm | -4 dBm    | -4 dBm  |
|   | Typical                               | -11 dBm               | -11 dBm  | -11 dBm | -2 dBm    | -2 dBm  |
|   | Maximum                               | -9 dBm                | -9 dBm   | -9 dBm  | -1 dBm    | -1 dBm  |
| Operating wavelength  | Minimum                               | 1266 nm               | 1260 nm  | 1450 nm | 1280 nm   | 1460 nm |
|   | Typical                               | 1310 nm               | 1310 nm  | 1550 nm | 1310 nm   | 1550 nm |
|   | Maximum                               | 1360 nm               | 1360 nm  | 1615 nm | 1355 nm   | 1615 nm |
| Spectral width <sup>2</sup>                                       | Typical                               | -                     | -        | 0.3 nm  | -         | 0.3 nm  |
|   | Maximum                               | -                     | -        | 1 nm    | -         | 1 nm    |
| Side mode suppression ratio (DFB laser) <sup>3</sup>              | Minimum                               | -                     | -        | 30 dB   | -         | 30 dB   |
| Extinction ratio <sup>4</sup> (BOL)                               | Minimum                               | 9.0 dB                | 9.0 dB   | 9.0 dB  | 11.0 dB   | 11.0 dB |
|   | Typical                               | 10.0 dB               | 10.0 dB  | 10.0 dB | 12.0 dB   | 12.0 dB |
|   | Maximum                               | 12.0 dB               | 12.0 dB  | 10.5 dB | 13.0 dB   | 13.0 dB |
| Extinction ratio <sup>4</sup> (EOL)                               | Minimum                               | 8.2 dB                | 8.2 dB   | 8.2 dB  | 10.0 dB   | 10.0 dB |
|   | Maximum                               | 12.5 dB               | 12.5 dB  | 11.0 dB | 13.5 dB   | 13.5 dB |
| Optical rise and fall times (20 to 80%) <sup>5</sup>              | Maximum                               | 3200 ps               |          |         |           |         |
| Eye mask of optical output <sup>6,7</sup>                         | Compliant with GR-253 and ITU-T G.957 |                       |          |         |           |         |
| Eye mask margin (filtered)  | Minimum                               | 5%                    |          |         |           |         |
|   | Typical                               | 15%                   |          |         |           |         |
| Jitter generation (peak-to-peak) <sup>8</sup>                     | Maximum                               | 60 mUI <sub>P-P</sub> |          |         |           |         |
| Jitter generation (rms) <sup>8</sup>                              | Maximum                               | 6 mUI <sub>rms</sub>  |          |         |           |         |
| Power output with transmitter disabled                            | Typical                               | -50 dBm               | -50 dBm  | -50 dBm | -50 dBm   | -       |
|   | Maximum                               | -40 dBm               | -40 dBm  | -40 dBm | -40 dBm   | -40 dBm |
| Receiver sensitivity (BOL, BER=1 x 10 <sup>-12</sup> , ER=10 dB)  | Minimum                               | -24 dBm               | -29 dBm  | -29 dBm | -35 dBm   | -35 dBm |
|   | Typical                               | -25 dBm               | -30 dBm  | -30 dBm | -36 dBm   | -36 dBm |
| Receiver sensitivity (EOL, BER=1 x 10 <sup>-12</sup> , ER=8.2 dB) | Minimum                               | -22 dBm               | -27 dBm  | -27 dBm | -33 dBm   | -33 dBm |
| Maximum received optical power                                    | Minimum                               | -8 dBm                | -8 dBm   | -8 dBm  | -10 dBm   | -10 dBm |
| Link status response time   | Minimum                               | 3 μs                  |          |         |           |         |
|   | Typical                               | 50 μs                 |          |         |           |         |
|   | Maximum                               | 100 μs                |          |         |           |         |
| Optical path penalty  | Maximum                               | 1 dB                  |          |         |           |         |
| Dispersion  | Maximum                               | 18 ps/nm              | 96 ps/nm | -       | 246 ps/nm | -       |
| Receiver reflectance  | Maximum                               | -                     | -        | -       | -         | -25 dB  |
| Minimum optical return loss                                       | Minimum                               | -                     | -        | -       | -         | -24 dB  |
| BER floor   | Maximum                               | 10 <sup>-15</sup>     |          |         |           |         |
| Reflect into Tx for <1 dB degradation at the receiver             | Maximum                               | -                     | -        | -       | -         | -24 dB  |
| Standard case temperature   | -5 to 75 °C                           |                       |          |         |           |         |
| Extended case temperature   | -40 to 85 °C                          |                       |          |         |           |         |
| Supply voltage  | Minimum                               | 3.135 V               |          |         |           |         |
|   | Typical                               | 3.3 V                 |          |         |           |         |
|   | Maximum                               | 3.465 V               |          |         |           |         |
| Bit rate  | 155 Mb/s                              |                       |          |         |           |         |

1. Measured using an integrating sphere, connector repeatability is ±1 dB.
2. Full spectral width measured 20 dB down from the central wavelength peak under fully modulated conditions (for DFB lasers).
3. Ratio of the average output power in the dominant longitudinal mode to the power in the most significant side mode under fully modulated conditions.
4. Ratio of logic 1 output power to logic 0 output power under fully modulated conditions.
5. Using an unfiltered measurement.
6. GR-253-CORE.
7. ITU-T recommendation G.957.
8. Formatted OC-3 pattern with scrambled PRBS 15 payload using Agilent 86130A BERT as the data source.

**Ordering Information**

For more information on this or other products and their availability, please contact your local JDS Uniphase account manager or JDS Uniphase directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide or via e-mail at sales@jdsu.com.

**Sample: CT2-NS1LBTD30C0**



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