

## ONS-SC+-10GEP45.7-AO

Cisco® ONS ONS-SC+-10GEP45.7 Compatible TAA Compliant 10GBase-DWDM 50GHz SFP+ Transceiver (SMF, 1545.72nm, 80km, LC, DOM)

### Features

- SFF-8432 and SFF-8472 Compliance
- Temperature-stabilized EML transmitter and APD receiver
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications

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

### Product Description

This Cisco® ONS-SC+-10GEP45.7 compatible SFP+ transceiver provides 10GBase-DWDM throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1545.72nm 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.

AddOn's 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 3015.7.
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3.
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B.
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2.
- RoHs compliant with 2002/95/EC 4.1&4.2 2005/747/EC.

## Tunable SFP+ Channel Number and Wavelength

| ITU Channel | Frequency (THz) | Center Wavelength (nm) | ITU Channel | Frequency (THz) | Center Wavelength (nm) |
|-------------|-----------------|------------------------|-------------|-----------------|------------------------|
| 1           | 191.10          | 1568.77                | 52          | 193.65          | 1548.11                |
| 2           | 191.15          | 1568.36                | 53          | 193.70          | 1547.72                |
| 3           | 191.20          | 1567.95                | 54          | 193.75          | 1547.32                |
| 4           | 191.25          | 1567.54                | 55          | 193.80          | 1546.92                |
| 5           | 191.30          | 1567.13                | 56          | 193.85          | 1546.52                |
| 6           | 191.35          | 1566.72                | 57          | 193.90          | 1546.12                |
| 7           | 191.40          | 1566.31                | 58          | 193.95          | 1545.72                |
| 8           | 191.45          | 1565.90                | 59          | 194.00          | 1545.32                |
| 9           | 191.50          | 1565.50                | 60          | 194.05          | 1544.92                |
| 10          | 191.55          | 1565.09                | 61          | 194.10          | 1544.53                |
| 11          | 191.60          | 1564.68                | 62          | 194.15          | 1544.13                |
| 12          | 191.65          | 1564.27                | 63          | 194.20          | 1543.73                |
| 13          | 191.70          | 1563.86                | 64          | 194.25          | 1543.33                |
| 14          | 191.75          | 1563.45                | 65          | 194.30          | 1542.94                |
| 15          | 191.80          | 1563.05                | 66          | 194.35          | 1542.54                |
| 16          | 191.85          | 1562.64                | 67          | 194.40          | 1542.14                |
| 17          | 191.90          | 1562.23                | 68          | 194.45          | 1541.75                |
| 18          | 191.95          | 1561.83                | 69          | 194.50          | 1541.35                |
| 19          | 192.00          | 1561.42                | 70          | 194.55          | 1540.95                |
| 20          | 192.05          | 1561.01                | 71          | 194.60          | 1540.56                |
| 21          | 192.10          | 1560.61                | 72          | 194.65          | 1540.16                |
| 22          | 192.15          | 1560.20                | 73          | 194.70          | 1539.77                |
| 23          | 192.20          | 1559.79                | 74          | 194.75          | 1539.37                |
| 24          | 192.25          | 1559.39                | 75          | 194.80          | 1538.98                |
| 25          | 192.30          | 1558.98                | 76          | 194.85          | 1538.58                |
| 26          | 192.35          | 1558.58                | 77          | 194.90          | 1538.19                |
| 27          | 192.40          | 1558.17                | 78          | 194.95          | 1537.79                |
| 28          | 192.45          | 1557.77                | 79          | 195.00          | 1537.40                |
| 29          | 192.50          | 1557.36                | 80          | 195.05          | 1537.00                |
| 30          | 192.55          | 1556.96                | 81          | 195.10          | 1536.61                |
| 31          | 192.60          | 1556.55                | 82          | 195.15          | 1536.22                |
| 32          | 192.65          | 1556.15                | 83          | 195.20          | 1535.82                |
| 33          | 192.70          | 1555.75                | 84          | 195.25          | 1535.43                |
| 34          | 192.75          | 1555.34                | 85          | 195.30          | 1535.04                |
| 35          | 192.80          | 1554.94                | 86          | 195.35          | 1534.64                |
| 36          | 192.85          | 1554.54                | 87          | 195.40          | 1534.25                |

|    |        |         |     |        |         |
|----|--------|---------|-----|--------|---------|
| 37 | 192.90 | 1554.13 | 88  | 195.45 | 1533.86 |
| 38 | 192.95 | 1553.73 | 89  | 195.50 | 1533.47 |
| 39 | 193.00 | 1553.33 | 90  | 195.55 | 1533.07 |
| 40 | 193.05 | 1552.93 | 91  | 195.60 | 1532.68 |
| 41 | 193.10 | 1552.52 | 92  | 195.65 | 1532.29 |
| 42 | 193.15 | 1552.12 | 93  | 195.70 | 1531.90 |
| 43 | 193.20 | 1551.72 | 94  | 195.75 | 1531.51 |
| 44 | 193.25 | 1551.32 | 95  | 195.80 | 1531.12 |
| 45 | 193.30 | 1550.92 | 96  | 195.85 | 1530.72 |
| 46 | 193.35 | 1550.52 | 97  | 195.90 | 1530.33 |
| 47 | 193.40 | 1550.12 | 98  | 195.95 | 1529.94 |
| 48 | 193.45 | 1549.72 | 99  | 196.00 | 1529.55 |
| 49 | 193.50 | 1549.32 | 100 | 196.05 | 1529.16 |
| 50 | 193.55 | 1548.91 | 101 | 196.10 | 1528.77 |
| 51 | 193.60 | 1548.51 | 102 | 196.15 | 1528.38 |

## Pin Descriptions

| Pin | Symbol     | Name/Descriptions  | Ref. |
|-----|------------|--|------|
| 1   | VeeT       | Transmitter Ground (Common with Receiver Ground).                            | 1    |
| 2   | TX Fault   | Transmitter Fault.   | 2    |
| 3   | TX Disable | Transmitter Disable. Laser output disabled on high or open. LVTTI-I.         | 3    |
| 4   | SDA        | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTLI/O. |      |
| 5   | SCL        | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTLI-I. |      |
| 6   | MOD_ABS    | Module Absent, Connect to VeeT or VeeR in Module.                            | 4    |
| 7   | RS0        | Rate Select 0, optionally controls SFP+ module receiver LVTTI-I.             | 5    |
| 8   | LOS        | Loss of Signal indication. Logic 0 indicates normal operation. LVTTI-O.      | 2    |
| 9   | RS1        | Rate Select 1, optionally controls SFP+ module transmitter. LVTTI-I.         | 5    |
| 10  | VeeR       | Receiver Ground (Common with Transmitter Ground).                            | 1    |
| 11  | VeeR       | Receiver Ground (Common with Transmitter Ground).                            | 1    |
| 12  | RD-        | Receiver Inverted DATA out. AC Coupled. CML-O.                               |      |
| 13  | RD+        | Receiver Non-inverted DATA out. AC Coupled. CML-O.                           |      |
| 14  | VeeR       | Receiver Ground (Common with Transmitter Ground).                            | 1    |
| 15  | VccR       | Receiver Power Supply.   |      |
| 16  | VccT       | Transmitter Power Supply.  |      |
| 17  | VeeT       | Transmitter Ground (Common with Receiver Ground).                            | 1    |
| 18  | TD+        | Transmitter Non-Inverted DATA in. AC Coupled. CML-I.                         |      |
| 19  | TD-        | Transmitter Inverted DATA in. AC Coupled. CML-O.                             |      |
| 20  | VeeT       | Transmitter Ground (Common with Receiver Ground).                            | 1    |

**Notes:**

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Vcc\_Host with resistor in the range 4.7K $\Omega$  to 10K $\Omega$ . Pull ups can be connected to one or several power supplies, however the host board design shall ensure that no module contract has voltage exceeding module VccT/R +0.5.V.
3. Tx\_Disable is an input contact with a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccT inside module.
4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Vcc\_Host with a resistor in the range from 4.7K $\Omega$  to 10K $\Omega$ . Mod\_ABS is asserted "High" when the SFP+ module is physically absent from a host slot.
5. RS0 and RS1 are module inputs and are pulled low to VeeT with >30K resistors in the module. RS0 optionally selects the optical receive signaling rate coverage. RS1 optionally selects the optical transmit signaling rate coverage.
6. These contacts can also be used for RS0 and RS1 if implementing SFF8079. See SFF8079 for details. RS1 is commonly connected to VeeT or VeeR in the classic SFP modules. The host needs to ensure that it will not be damaged if this contact is connected to VeeT or VeeR in the module.
7. The SFP+ module provides two inputs RS0 and RS1 that can optionally be used for rate selection. RS0 controls the receive path signaling rate compatibility, and RS1 controls the transmit path signaling rate compatibility. The host and module may choose to use either, both, or none of these functions. Because contact 9 in the classic SFP INF-8074i is connected to VeeR, and SFP+ host utilizing RS1 must provide short circuit protection.
8. This rate select functionality can also be controlled by software as defined by SFF-8472. Optionally the rate selects methods of Part 2 SFF-8079 may be used instead of the method described here by setting the management declaration bit (A0h byte 93 bit 2) to 1, see SFF-8472.

| Parameter | State | Conditions                                      |
|-----------|-------|---|
| RS0       | Low   | Rx signally rate less than or equal to 4.25GBd. |
|           | High  | Rx signally rate great than 4.25GBd.            |
| RS1       | Low   | Tx signally rate less than or equal to 4.25GBd. |
|           | High  | Tx signally rate great than 4.25GBd.            |



Pin-out of connector Block on Host board

## Recommended Circuit Schematic



### Absolute Maximum Ratings

| Parameter   | Symbol | Min. | Max. | Unit |
|---|--------|------|------|------|
| Storage Temperature                               | TS     | -40  | 85   | °C   |
| Supply Voltage                                    | Vcc    | -0.3 | 4.0  | V    |
| Operating Humidity                                | RH     | 5    | 85   | %    |
| Receive input optical power<br>(damage threshold) | Pdth   |      | +4   | dBm  |

### Recommended Operating Conditions

| Parameter                                  | Symbol | Min. | Typ. | Max. | Unit |
|--|--------|------|------|------|------|
| Power Supply Voltage                       | Vcc    | 3.13 | 3.30 | 3.47 | V    |
| Case Operating Temperature –<br>Commercial | Tc     | -5   |      | 70   | °C   |
| 9/125 $\mu$ m SMF                          | Lmax   |      |      | 80   | km   |

### Electrical Characteristics

| Parameter                      | Symbol   | Min. | Typ. | Max.    | Unit     | Notes |
|--------------------------------|----------|------|------|---------|----------|-------|
| Transmitter                    |          |      |      |         |          |       |
| Differential data input swing  | Vin, pp  | 120  | 600  | 850     | mV       |       |
| Input differential impedance   | Rin      | 85   | 100  | 115     | $\Omega$ | 1     |
| TX Disable-High                |          | 2.0  |      | Vcc+0.3 | V        |       |
| TX Disable-Low                 |          | Vee  |      | Vee+0.8 | V        |       |
| TX Fault-High                  |          | 2.0  |      | Vcc+0.3 | V        |       |
| TX Fault-Low                   |          | Vee  |      | Vee+0.8 | V        |       |
| Receiver                       |          |      |      |         |          |       |
| Single ended data output swing | Vout, pp | 350  | 400  | 700     | mV       |       |
| LOS-High                       |          | 2.0  |      | Vcc+0.3 | V        |       |
| LOS-Low                        |          | Vee  |      | Vee+0.8 | V        |       |

#### Notes:

1. AC coupled.

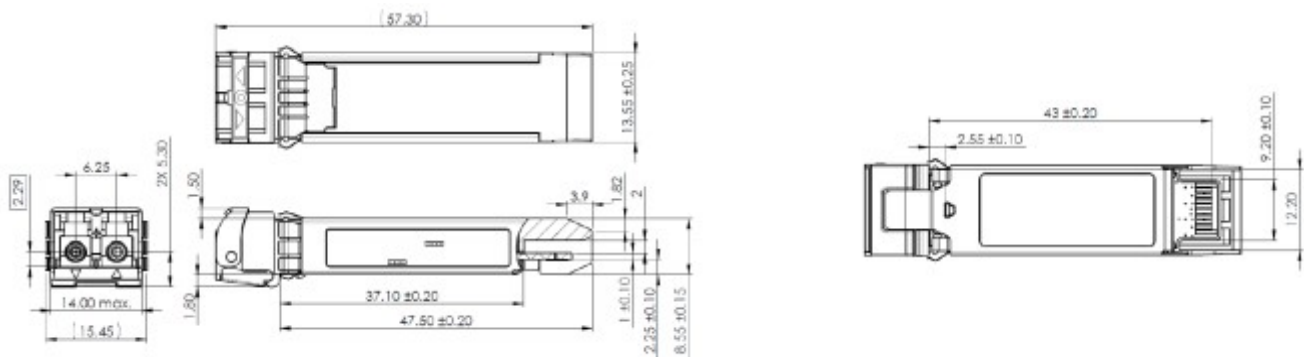
## Optical Characteristics

| Parameter                   |                | Symbol    | Min.        | Typ. | Max.        | Unit  | Notes |
|-----------------------------|----------------|-----------|-------------|------|-------------|-------|-------|
| Transmitter                 |                |           |             |      |             |       |       |
| Output Opt. Power           |                | PO        | 0           |      | 5           | dBm   |       |
| Optical Extinction Ratio    |                | ER        | 9           |      |             | dB    |       |
| Side Mode Suppression Ratio |                | SMSR      | 35          |      |             | dB    |       |
| Center Wavelength Spacing   |                |           |             | 50   |             | GHZ   |       |
| Optical Wavelength          |                | $\lambda$ | 1528.38     |      | 1568.77     | nm    |       |
| Frequency stability (BOL)   |                |           | $f_c - 1.5$ |      | $f_c + 1.5$ | GHz   |       |
| Frequency stability (EOL)   |                |           | $f_c - 2.5$ |      | $f_c + 2.5$ | GHz   |       |
| Channel tuning time         |                |           |             |      | 50          | ms    |       |
| Jitter Generation           | 4MHz to 80MHz  |           |             |      | 0.1         |       |       |
|                             | 20kHz to 80MHz |           |             |      | 0.3         |       |       |
| Spectral Width              |                |           |             |      | 200         | pm    |       |
| Relative Intensity Noise    |                | RIN       |             |      | -130        | dB/Hz |       |
| Return Loss                 |                |           | 24          |      |             | dB    |       |
| Receiver                    |                |           |             |      |             |       |       |
| Overload                    |                | PO        | -8          |      |             | dBm   |       |
| Receiver Reflectance        |                | Rrx       |             |      | -23         | dB    |       |
| LOS De-Assert               |                | LOSD      |             |      | -26         | dBm   |       |
| LOS Assert                  |                | LOSA      | -33.5       |      |             | dBm   |       |
| LOS Hysteresis              |                |           | 0.5         |      | 5           | dB    |       |

### Notes:

- Measured at 9.9532GBs, PRBS<sup>31</sup>-1, NRZ.
- Measured at 10.3125Gbs, Non-framed PRBS<sup>2</sup><sup>31</sup>-1, NRZ.
- Non-FEC rate refers 9.9/10.3/10.5 Gbs, and FEC rate refers 10.7/11.1/11.3 Gbs, BER of 1E-12 for non-FEC rate, and 1E-4 for FEC rate.

Mechanical Specifications



EEPROM Information

EEPROM memory map specific data field description is as below:





**Digital Diagnostic Monitoring Interface**

The digital diagnostic monitoring interface also defines another 256-byte memory map in EEPROM, which makes use of the 8-bit address 1010001X (A2h). The monitoring specification of this product is described in this table.

| Parameter    | Range           | Accuracy | Calibration |
|--------------|-----------------|----------|-------------|
| Temperature  | 0°C to 70°C (C) | ±3°C     | Internal    |
| Voltage      | 2.97V to 3.63V  | ±3%      | Internal    |
| Bias Current | 0mA to 100mA    | ±10%     | Internal    |
| TX Power     | 0dBm to 4dBm    | ±2dB     | Internal    |
| RX Power     | -24dBm to -8dBm | ±2dB     | Internal    |

**About AddOn Networks**

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is engrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.

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