

## 0Description

### General

The transceiver form SANOC is small form factor pluggable module for serial optical data communications such as IEEE 802.3ae 10GBASE-LR/LW. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I2C. This module is designed for single-mode-fiber (SMF) and operates at a nominal wavelength of 1310 nm.



|                                    |                          |
|------------------------------------|--------------------------|
| <b>SFP+ Duplex SMF Transceiver</b> |                          |
| <b>LC Type with DDM</b>            | <b>SY13A0-10ATQS(WT)</b> |

### Transmitter Section

The transmitter consists of a high-performance 1310 nm MQW DFB structure laser in the optical subassembly (OSA), which is housed within a metal package. In addition, this component is also class 1 laser compliant with according to International Safety Standard IEC-60825 and FDA 21 CFR 1040.10 and 1040.11.

### Receiver Section

The receiver contain of an InGaAs PIN photodiode coupled to a high sensitivity transimpedance amplifier (TIA) in an OSA. This OSA combination is mated to a post amplifier IC that provides the post amplification and SD (Signal Detection) or LOS (Loss of Signal) indication circuit, which provides logic high state output when an unusable input optical signal level is detected.

## Features

- Single +3.3V Power Supply
- Complaint with SFP+ MSA
- Compliant to IEEE 802.3ae 10GBASE-LR/LW
- SFF-8472 Digital Diagnostic Function
- AC/AC Coupling according to MSA
- Class 1 Laser International Safety Standard IEC 825 Compliant. Complies with EN60825-1 and FDA 21 CFR 1040.10 and 1040.11
- Commercial Operation Temp.: 0 °C to +70 °C
- Industrial Operation Temp.: -40 °C to +85 °C
- RoHS Compliant

## Applications

- High-speed Storage Area Networks
- Computer Cluster Cross-connect
- Custom High-speed Data Pipes

## Performance Specifications

| Absolute Maximum Ratings                   |            |                 |      |         |      |       |
|--|------------|-----------------|------|---------|------|-------|
| Parameter                                  |            | Symbol          | Min  | Typ     | Max  | Unit  |
| Supply Voltage                             |            | $V_{CC}$        | 0    | -       | 4    | V     |
| Storage Temperature                        |            | $T_S$           | -40  | -       | 85   | °C    |
| Operating Temperature                      | Commercial | $T_{OP-com}$    | 0    | -       | 70   | °C    |
|  | Industrial | $T_{OP-ind}$    | -40  | -       | 85   | °C    |
| General Specifications                     |            |                 |      |         |      |       |
| Parameter                                  |            | Symbol          | Min  | Typ     | Max  | Units |
| Data Rate                                  |            | B               | 9.95 | 10.3125 | 10.5 | Gbps  |
| Supported Link Length on 9/125 $\mu$ m SMF |            | L               | 10   | -       | -    | Km    |
| Supply Current                             |            | $I_{Tx}+I_{Rx}$ | -    | -       | 300  | mA    |
| Power Dissipation                          |            | $P_{Dis}$       | -    | -       | 1000 | mW    |

### Optical and Electrical Characteristics

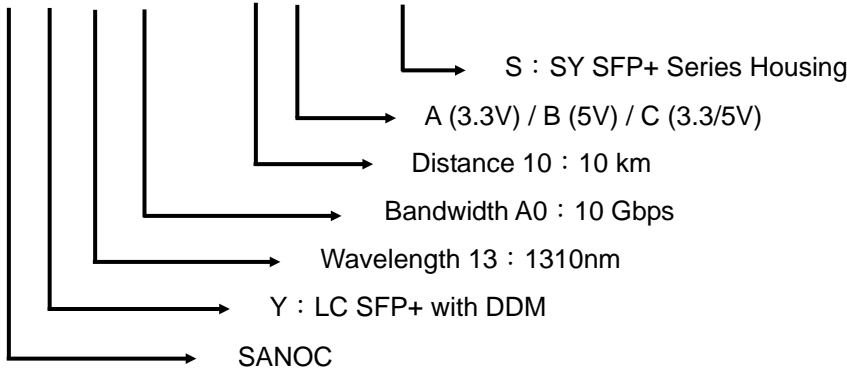
| Transmitter Electrical Characteristics |                 |      |      |          |       |
|--|-----------------|------|------|----------|-------|
| Parameter                              | Symbol          | Min  | Typ  | Max      | Unit  |
| Supply Voltage                         | $V_{CC}$        | 3.15 | 3.3  | 3.45     | V     |
| Data Differential Input Voltage        | $V_{in, pp}$    | 120  | -    | 1200     | mVpp  |
| Input High Voltage                     | $V_{IL}$        | 2.0  | -    | $V_{CC}$ | V     |
| Input Low Voltage                      | $V_{IH}$        | Gnd  | -    | 0.8      | V     |
| Transmitter Optical Characteristics    |                 |      |      |          |       |
| Parameter                              | Symbol          | Min  | Typ  | Max      | Unit  |
| Output Optical Power                   | $P_O$           | -8   | -    | +0.5     | dBm   |
| Optical Modulation Amplitude           | $P_{O,OMA}$     | -5.2 | -    | -        | dBm   |
| Center Wavelength                      | $\lambda_C$     | 1260 | 1310 | 1355     | nm    |
| Spectral Width (-20dB)                 | $\Delta\lambda$ | -    | -    | 1        | nm    |
| Side Mode Suppression Ratio            | SMSR            | 30   | -    | -        | dB    |
| Extinction Ratio                       | ER              | 3.5  | -    | -        | dB    |
| Relative Intensity Noise               | RIN             | -    | -    | -128     | dB/Hz |
| POut@TX Disable Asserted               | $P_{OFF}$       | -    | -    | -30      | dBm   |

| Receiver Electrical Characteristics |               |      |     |          |          |
|-------------------------------------|---------------|------|-----|----------|----------|
| Parameter                           | Symbol        | Min  | Typ | Max      | Unit     |
| Supply Voltage                      | $V_{CC}$      | 3.15 | 3.3 | 3.45     | V        |
| Data Differential Output Voltage    | $V_{out, pp}$ | 400  | 600 | 700      | mVpp     |
| Receiver LOS/SD Output Voltage-High | $V_{RH}$      | 2.0  | -   | $V_{CC}$ | V        |
| Receiver LOS/SD Output Voltage-Low  | $V_{RL}$      | 0    | -   | 0.8      | V        |
| Receiver Optical Characteristics    |               |      |     |          |          |
| Parameter                           | Symbol        | Min  | Typ | Max      | Unit     |
| Maximum Receiver Power              | $P_{in}$      | -1   | -   | -        | dBm      |
| Receiver Sensitivity                | $P_S$         | -    | -   | -14.4    | dBm      |
| Receiver Sensitivity in OMA*        | $P_{S,OMA}$   | -    | -   | -12.6    | dBm      |
| Stress Sensitivity in OMA           | $P_{SS,OMA}$  | -    | -   | -10.3    | dBm      |
| Operating Wavelength                | $\lambda_C$   | 1260 | -   | 1565     | nm       |
| Optical Return Loss                 | $P_R$         | -    | -   | 12       | dB       |
| Signal Detect-Asserted              | $P_A$         | -    | -   | -14.4    | dBm avg. |
| Signal Detect-Deasserted            | $P_D$         | -30  | -   | -        | dBm avg. |
| Signal Detect-Hysteresis            | $P_A - P_D$   | 1    | -   | -        | dB       |

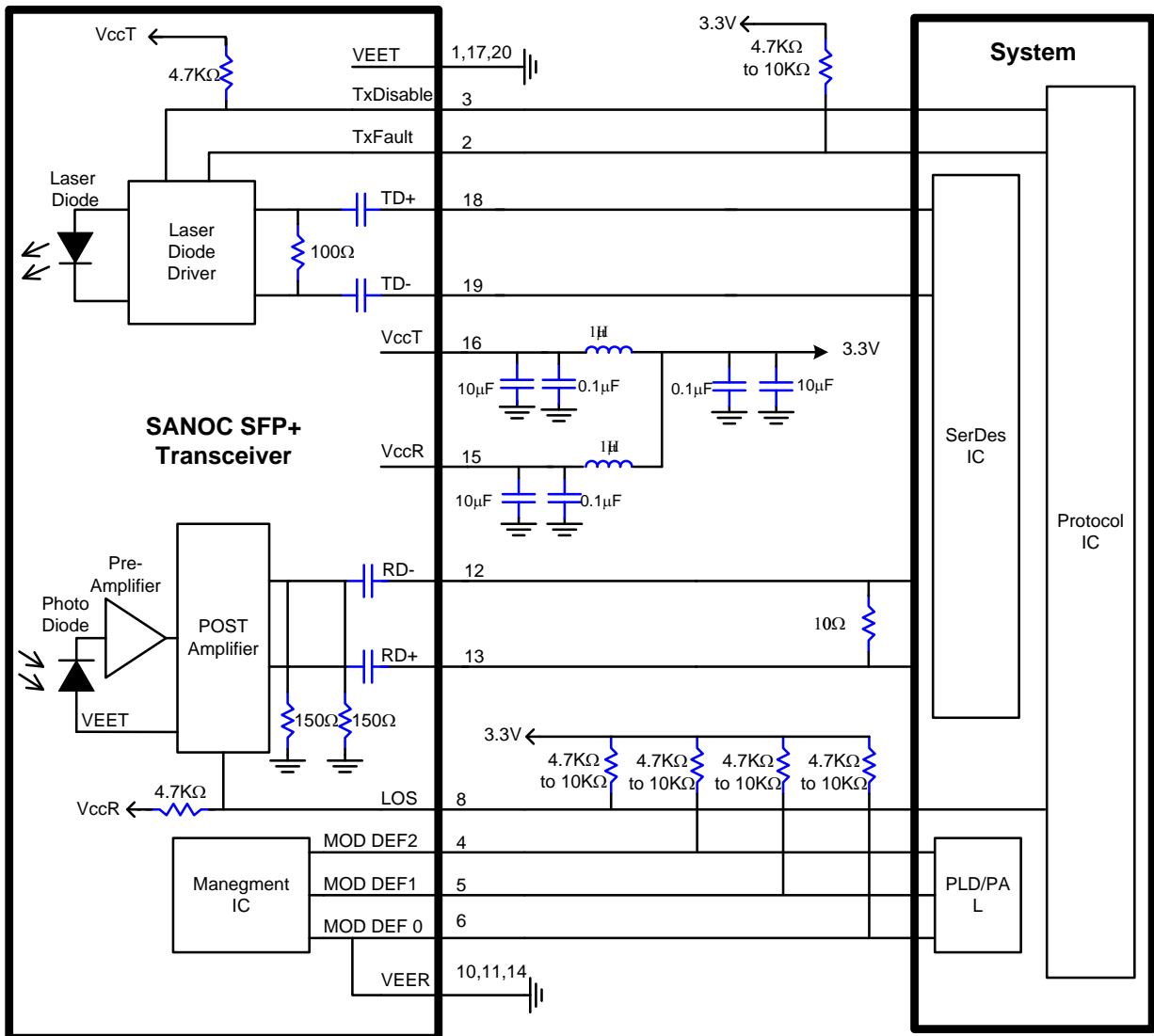
\*at BER= $10^{-12}$  and PRBS  $2^{31}-1$ .

**Ordering Information**

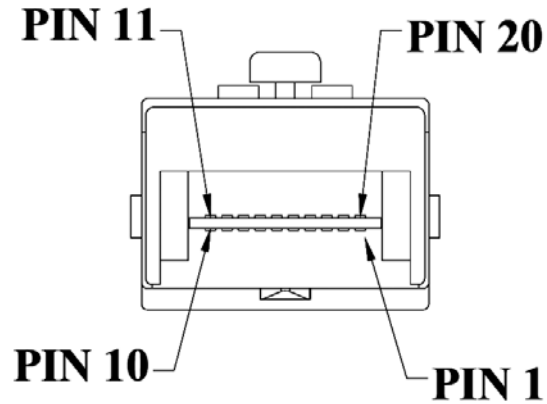
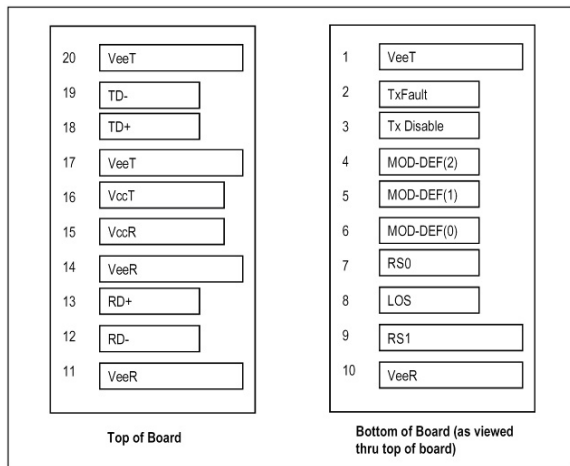
S Y 13 A 0 - 10 A T Q S (WT) → (WT) : Industrial Temp. / None : Commercial Temp.



**Recommended Circuit Schematic**



**SFP Transceiver Electrical Pad Layout**



**Pinout Table**

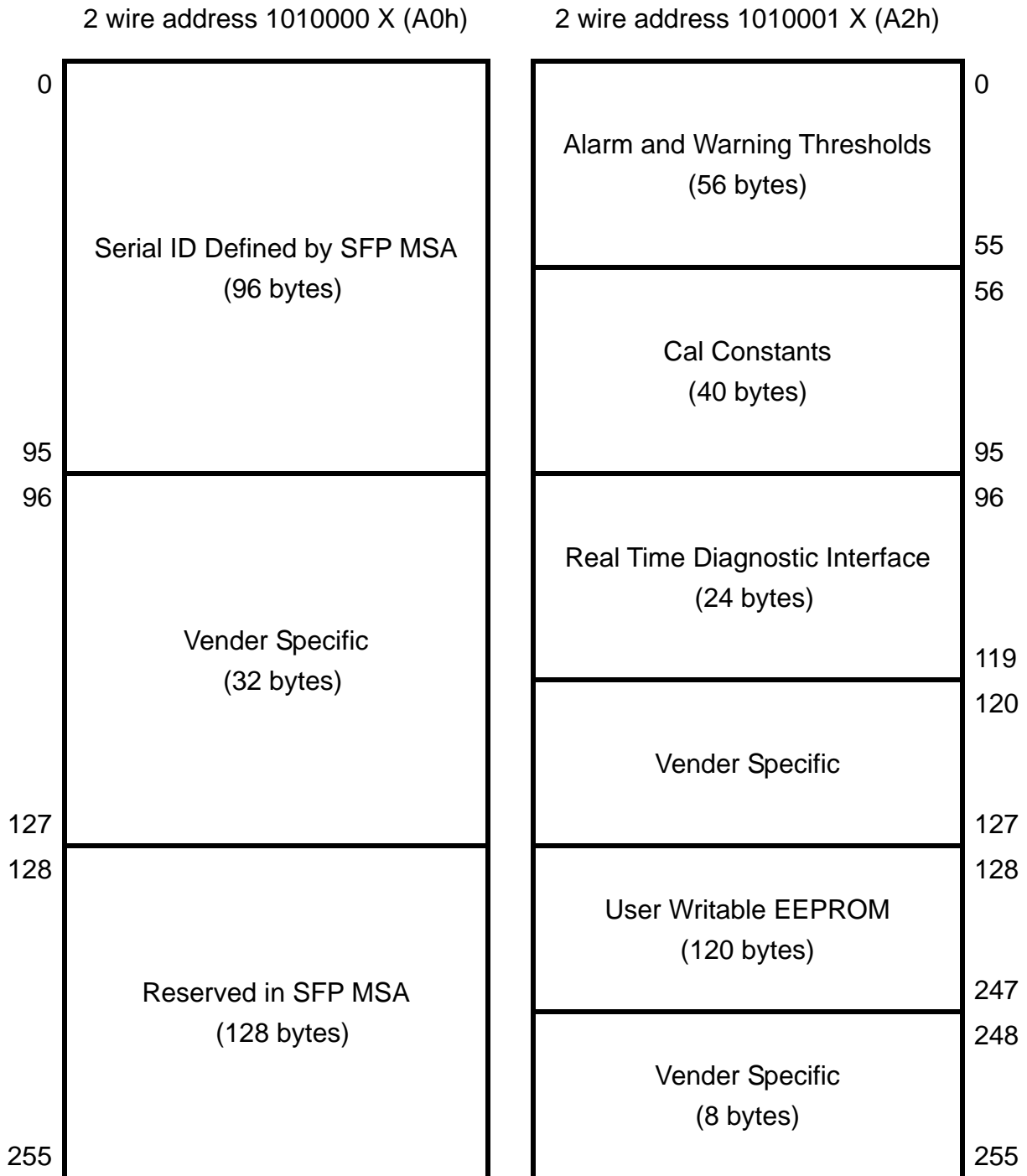
| Pin | Symbol             | Name/Description   | Ref. |
|-----|--------------------|--|------|
| 1   | V <sub>EET</sub>   | Transmitter Ground   |      |
| 2   | T <sub>FAULT</sub> | Transmitter Fault.   | 3    |
| 3   | T <sub>DIS</sub>   | Transmitter Disable. Laser output disabled on high or open.  | 1    |
| 4   | MOD_DEF (2)        | Module Definition 2. Data line (SDA) for Serial ID.  | 2    |
| 5   | MOD_DEF (1)        | Module Definition 1. Clock line (SCL) for Serial ID.   | 2    |
| 6   | MOD_DEF (0)        | Module Definition 0. Grounded within the module.   | 2    |
| 7   | RS0                | RX Rate Select (LVTTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance. |      |
| 8   | LOS                | Loss of Signal indication. Logic 0 indicates normal operation.   | 3    |
| 9   | RS1                | TX Rate Select (LVTTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance. |      |
| 10  | V <sub>EER</sub>   | Receiver Ground  |      |
| 11  | V <sub>EER</sub>   | Receiver Ground  |      |
| 12  | RD-                | Receiver Inverted DATA out. AC Coupled   |      |
| 13  | RD+                | Receiver Non-inverted DATA out. AC Coupled   |      |
| 14  | V <sub>EER</sub>   | Receiver Ground  |      |
| 15  | V <sub>CCR</sub>   | Receiver Power Supply  |      |
| 16  | V <sub>CCT</sub>   | Transmitter Power Supply   |      |
| 17  | V <sub>EET</sub>   | Transmitter Ground   |      |
| 18  | TD+                | Transmitter Non-Inverted DATA in. 100 ohm termination between TD+ and TD-, AC Coupled thereafter.                                  |      |
| 19  | TD-                | Transmitter Inverted DATA in. See TD+  |      |
| 20  | V <sub>EET</sub>   | Transmitter Ground   |      |

**Notes:**

1. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
2. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V. MOD\_DEF (0) pulls line low to indicate module is plugged in.
3. TX-Fault and LOS are open collector output. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 2.0V and 5.5V.

### Memory map

The memory map in the following describes an extension to the memory map defined in SFP MSA. The enhanced interface uses the two wire serial bus address 1010001X(A2h) to provide diagnostic information about the module's present operating conditions.



**2 Wire Address (A0h, interface ID: Data Fields)**

| Address                          | Bytes | Name                       | Description  |
|----------------------------------|-------|----------------------------|--|
| <b>BASE ID FIELDS</b>            |       |                            |  |
| 0                                | 1     | Identifier                 | Type of transceiver  |
| 1                                | 1     | Ext. Identifier            | Extended identifier of type of transceiver   |
| 2                                | 1     | Connector                  | Code for connector type  |
| 3-10                             | 8     | Transceiver                | Code for electronic or optical compatibility   |
| 11                               | 1     | Encoding                   | Code for high speed serial encoding algorithm  |
| 12                               | 1     | BR, Nominal                | Nominal signal rate, units of 100MBd.  |
| 13                               | 1     | Rate Identifier            | Type of rate select functionality  |
| 14                               | 1     | Length(SMF,km)             | Link length supported for single mode fiber, units of km                                 |
| 15                               | 1     | Length (SMF)               | Link length supported for single mode fiber, units of 100 m                              |
| 16                               | 1     | Length (50μm)              | Link length supported for 50 μm OM2 fiber, units of 10 m                                 |
| 17                               | 1     | Length (62.5μm)            | Link length supported for 62.5 μm OM1 fiber, units of 10 m                               |
| 18                               | 1     | Length (cable)             | Link length supported for copper or direct attach cable, units of m                      |
| 19                               | 1     | Length (OM3)               | Link length supported for 50 μm OM3 fiber, units of 10 m                                 |
| 20-35                            | 16    | Vendor name                | SFP vendor name (ASCII)  |
| 36                               | 1     | Transceiver                | Code for electronic or optical compatibility   |
| 37-39                            | 3     | Vendor OUI                 | SFP vendor IEEE company ID   |
| 40-55                            | 16    | Vendor PN                  | Part number provided by SFP vendor (ASCII)   |
| 56-59                            | 4     | Vendor rev                 | Revision level for part number provided by vendor (ASCII)                                |
| 60-61                            | 2     | Wavelength                 | Laser wavelength (Passive/Active Cable Specification Compliance)                         |
| 62                               | 1     | Unallocated                |  |
| 63                               | 1     | CC_BASE                    | Check code for Base ID Fields (addresses 0 to 62)  |
| <b>EXTENDED ID FIELDS</b>        |       |                            |  |
| 64-65                            | 2     | Options                    | Indicates which optional transceiver signals are implemented                             |
| 66                               | 1     | BR, max                    | Upper bit rate margin, units of %  |
| 67                               | 1     | BR, min                    | Lower bit rate margin, units of %  |
| 68-83                            | 16    | Vendor SN                  | Serial number provided by vendor (ASCII)   |
| 84-91                            | 8     | Date code                  | Vendor's manufacturing date code   |
| 92                               | 1     | Diagnostic Monitoring Type | Indicates which type of diagnostic monitoring is implemented (if any) in the transceiver |
| 93                               | 1     | Enhanced Options           | Indicates which optional enhanced features are implemented (if any) in the transceiver   |
| 94                               | 1     | SFF-8472 Compliance        | Indicates which revision of SFF-8472 the transceiver complies with.                      |
| 95                               | 1     | CC_EXT                     | Check code for the Extended ID Fields (addresses 64 to 94)                               |
| <b>VENDOR SPECIFIC ID FIELDS</b> |       |                            |  |
| 96-127                           | 32    | Vendor Specific            | Vendor Specific EEPROM   |
| 128-255                          | 128   | Reserved                   | Reserved for SFF-8079  |

**2 Wire Address (A2h, Digital Diagnostic Monitoring Interface)**

**Alarm and Warning Thresholds**

| Address | Bytes | Name                             |
|---------|-------|----------------------------------|
| 00-01   | 2     | Temp High Alarm Thresholds       |
| 02-03   | 2     | Temp Low Alarm Thresholds        |
| 04-05   | 2     | Temp High Warning Thresholds     |
| 06-07   | 2     | Temp Low Warning Thresholds      |
| 08-09   | 2     | Voltage High Alarm Thresholds    |
| 10-11   | 2     | Voltage Low Alarm Thresholds     |
| 12-13   | 2     | Voltage High Warning Thresholds  |
| 14-15   | 2     | Voltage Low Warning Thresholds   |
| 16-17   | 2     | Bias High Alarm Thresholds       |
| 18-19   | 2     | Bias Low Alarm Thresholds        |
| 20-21   | 2     | Bias High Warning Thresholds     |
| 22-23   | 2     | Bias Low Warning Thresholds      |
| 24-25   | 2     | TX Power High Alarm Thresholds   |
| 26-27   | 2     | TX Power Low Alarm Thresholds    |
| 28-29   | 2     | TX Power High Warning Thresholds |
| 30-31   | 2     | TX Power Low Warning Thresholds  |
| 32-33   | 2     | RX Power High Alarm Thresholds   |
| 34-35   | 2     | RX Power Low Alarm Thresholds    |
| 36-37   | 2     | RX Power High Warning Thresholds |
| 38-39   | 2     | RX Power Low Warning Thresholds  |
| 40-55   | 16    | Reserved                         |

**Calibration constants (2 Wire Address A2h)**

| Address | Bytes | Name           | Description  |
|---------|-------|----------------|--|
| 56-59   | 4     | Rx_PWR(4)      | Rx_PWR(4) is set to zero for "internally calibrated" devices.      |
| 60-63   | 4     | Rx_PWR(3)      | Rx_PWR(3) is set to zero for "internally calibrated" devices.      |
| 64-67   | 4     | Rx_PWR(2)      | Rx_PWR(2) is set to zero for "internally calibrated" devices.      |
| 68-71   | 4     | Rx_PWR(1)      | Rx_PWR(1) is set to 1 for "internally calibrated" devices.         |
| 72-75   | 4     | Rx_PWR(0)      | Rx_PWR(0) is set to zero for "internally calibrated" devices.      |
| 76-77   | 2     | Tx_I(Slope)    | Tx_I(Slope) is set to 1 for "internally calibrated" devices.       |
| 78-79   | 2     | Tx_I(Offset)   | Tx_I(Offset) is set to zero for "internally calibrated" devices.   |
| 80-81   | 2     | Tx_PWR(Slope)  | Tx_PWR(Slope) is set to 1 for "internally calibrated" devices.     |
| 82-83   | 2     | Tx_PWR(Offset) | Tx_PWR(Offset) is set to zero for "internally calibrated" devices. |
| 84-85   | 2     | T (Slope)      | T(Slope) is set to 1 for "internally calibrated" devices.          |
| 86-87   | 2     | T (Offset)     | T(Offset) is set to zero for "internally calibrated" devices.      |
| 88-89   | 2     | V (Slope)      | V(Slope) is set to 1 for "internally calibrated" devices.          |
| 90-91   | 2     | V (Offset)     | V(Offset) is set to zero for "internally calibrated" devices.      |
| 92-94   | 3     | Reserved       | Reserved   |
| 95      | 1     | Checksum       | Byte 95 contains the low order 8 bits of the sum of bytes 0 – 94.  |

**Digital Monitoring Values (2 Wire Address A2h)**

The digital value conversions are updated every 13ms (nominal) or 20ms (max) in rotation. After getting digital value, each measurement could be obtained by multiplying digital value by corresponding LSB value:

**Temperature (Signed twos complement value)**

| A2h Byte 96 (Temperature MSB) |                |                |                |                |                |                |                | A2h Byte 97 (Temperature LSB) |                 |                 |                 |                 |                 |                 |                 |
|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| S                             | 2 <sup>6</sup> | 2 <sup>5</sup> | 2 <sup>4</sup> | 2 <sup>3</sup> | 2 <sup>2</sup> | 2 <sup>1</sup> | 2 <sup>0</sup> | 2 <sup>-1</sup>               | 2 <sup>-2</sup> | 2 <sup>-3</sup> | 2 <sup>-4</sup> | 2 <sup>-5</sup> | 2 <sup>-6</sup> | 2 <sup>-7</sup> | 2 <sup>-8</sup> |

$$\text{Temperature} = \text{Temp (digital monitoring value)} \times \text{LSB}_{\text{Temp}} = \text{Temp (digital monitoring value)} \times \frac{1}{256}$$

**Vcc, TX Bias, TX Power, RX Power (Unsigned values)**

|                                   |                 |                 |                 |                 |                 |                |                |                                   |                |                |                |                |                |                |                |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|-----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| A2h Byte 98 (V <sub>cc</sub> MSB) |                 |                 |                 |                 |                 |                |                | A2h Byte 99 (V <sub>cc</sub> LSB) |                |                |                |                |                |                |                |
| A2h Byte 100 (TX Bias MSB)        |                 |                 |                 |                 |                 |                |                | A2h Byte 101 (TX Bias LSB)        |                |                |                |                |                |                |                |
| A2h Byte 102 (TX Power MSB)       |                 |                 |                 |                 |                 |                |                | A2h Byte 103 (TX Power LSB)       |                |                |                |                |                |                |                |
| A2h Byte 104 (RX Power MSB)       |                 |                 |                 |                 |                 |                |                | A2h Byte 105 (RX Power LSB)       |                |                |                |                |                |                |                |
| 2 <sup>15</sup>                   | 2 <sup>14</sup> | 2 <sup>13</sup> | 2 <sup>12</sup> | 2 <sup>11</sup> | 2 <sup>10</sup> | 2 <sup>9</sup> | 2 <sup>8</sup> | 2 <sup>7</sup>                    | 2 <sup>6</sup> | 2 <sup>5</sup> | 2 <sup>4</sup> | 2 <sup>3</sup> | 2 <sup>2</sup> | 2 <sup>1</sup> | 2 <sup>0</sup> |

$$V_{cc} = V_{cc}(\text{digital monitoring value}) \times \text{LSB}_{V_{cc}} = V_{cc}(\text{digital monitoring value}) \times 100\mu\text{V}$$

$$\text{TX Bias Current} = \text{TX Bias Current (Digital Value)} \times \text{LSB}_{\text{TX,Bias}} = \text{TX Bias Current (Digital Value)} \times 2\mu\text{A}$$

$$\text{TX Power} = \text{TX Power (Digital Value)} \times \text{LSB}_{\text{TXPower}} = \text{TX Power (Digital Value)} \times 0.1\mu\text{W}$$

$$\text{RX Power} = \text{RX Power (Digital Value)} \times \text{LSB}_{\text{RXPower}} = \text{RX Power (Digital Value)} \times 0.1\mu\text{W}$$

**Digital Diagnostic Monitor Accuracy**

| Parameter               | Typical Value | Note                                     |
|-------------------------|---------------|--|
| Transceiver Temperature | ± 3°C         | T <sub>OP-min</sub> ~T <sub>OP-max</sub> |
| Power Supply Voltage    | ± 3%          | V <sub>CC</sub>                          |
| TX Bias Current         | ± 10%         |  |
| TX Optical Power        | ± 3dB         | P <sub>O-min</sub> ~P <sub>O-max</sub>   |
| RX Optical Power        | ± 3dB         | P <sub>S</sub> ~P <sub>in</sub>          |



**Status Bits (2 Wire Address A2h)**

| Address | Bit | Name                 | Description                                |
|---------|-----|----------------------|--|
| 110     | 7   | TX Disable State     | Digital state of the TX Disable Input Pin. |
| 110     | 6   | Soft TX Disable      | Not implement.                             |
| 110     | 5   | Reserved             |  |
| 110     | 4   | RX Rate Select State | Not implement.                             |
| 110     | 3   | Soft RX Rate Select  | Not implement.                             |
| 110     | 2   | TX Fault             | Digital state of the TX Fault Output Pin.  |
| 110     | 1   | LOS                  | Digital state of the LOS Output Pin.       |
| 110     | 0   | Data_Ready_Bar       |  |

**Alarm and Warning Flag Bits (2 Wire Address A2h)**

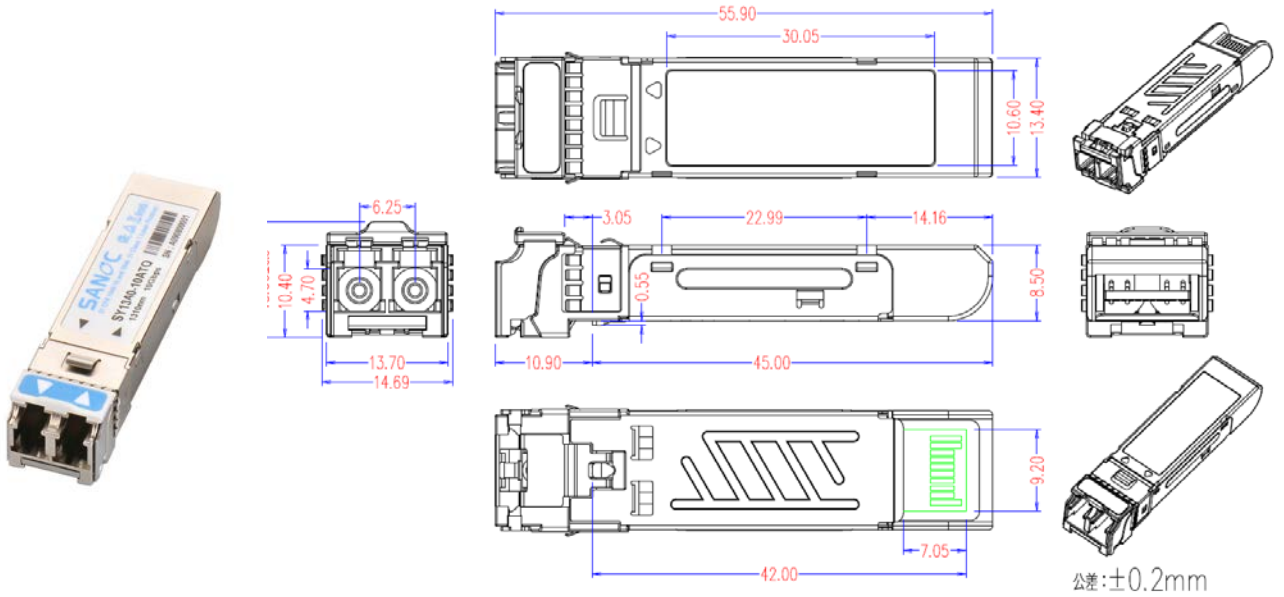
| Address | Bit | Name                  | Description  |
|---------|-----|-----------------------|--|
| 112     | 7   | Temp High Alarm       | Set when internal temperature exceeds high alarm level.      |
| 112     | 6   | Temp Low Alarm        | Set when internal temperature is below low alarm level.      |
| 112     | 5   | Vcc High Alarm        | Set when internal supply voltage exceeds high alarm level.   |
| 112     | 4   | Vcc Low Alarm         | Set when internal supply voltage is below low alarm level.   |
| 112     | 3   | TX Bias High Alarm    | Set when TX Bias current exceeds high alarm level.           |
| 112     | 2   | TX Bias Low Alarm     | Set when TX Bias current is below low alarm level.           |
| 112     | 1   | TX Power High Alarm   | Set when TX output power exceeds high alarm level.           |
| 112     | 0   | TX Power Low Alarm    | Set when TX output power is below low alarm level.           |
| 113     | 7   | RX Power High Alarm   | Set when Received Power exceeds high alarm level.            |
| 113     | 6   | RX Power Low Alarm    | Set when Received Power is below low alarm level.            |
| 113     | 5-0 | Reserved Alarm        |  |
| 114     | All | Reserved              |  |
| 115     | All | Reserved              |  |
| 116     | 7   | Temp High Warning     | Set when internal temperature exceeds high warning level.    |
| 116     | 6   | Temp Low Warning      | Set when internal temperature is below low warning level.    |
| 116     | 5   | Vcc High Warning      | Set when internal supply voltage exceeds high warning level. |
| 116     | 4   | Vcc Low Warning       | Set when internal supply voltage is below low warning level. |
| 116     | 3   | TX Bias High Warning  | Set when TX Bias current exceeds high warning level.         |
| 116     | 2   | TX Bias Low Warning   | Set when TX Bias current is below low warning level.         |
| 116     | 1   | TX Power High Warning | Set when TX output power exceeds high warning level.         |
| 116     | 0   | TX Power Low Warning  | Set when TX output power is below low warning level.         |
| 117     | 7   | RX Power High Warning | Set when Received Power exceeds high warning level.          |
| 117     | 6   | RX Power Low Warning  | Set when Received Power is below low warning level.          |
| 117     | 5-0 | Reserved Warning      |  |
| 118     | All | Reserved              |  |
| 119     | All | Reserved              |  |

**Package Outline Drawing**

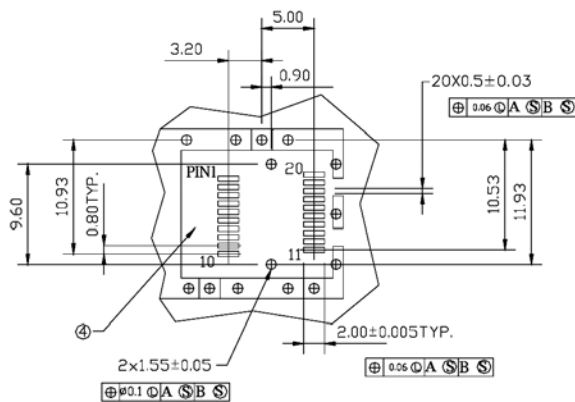
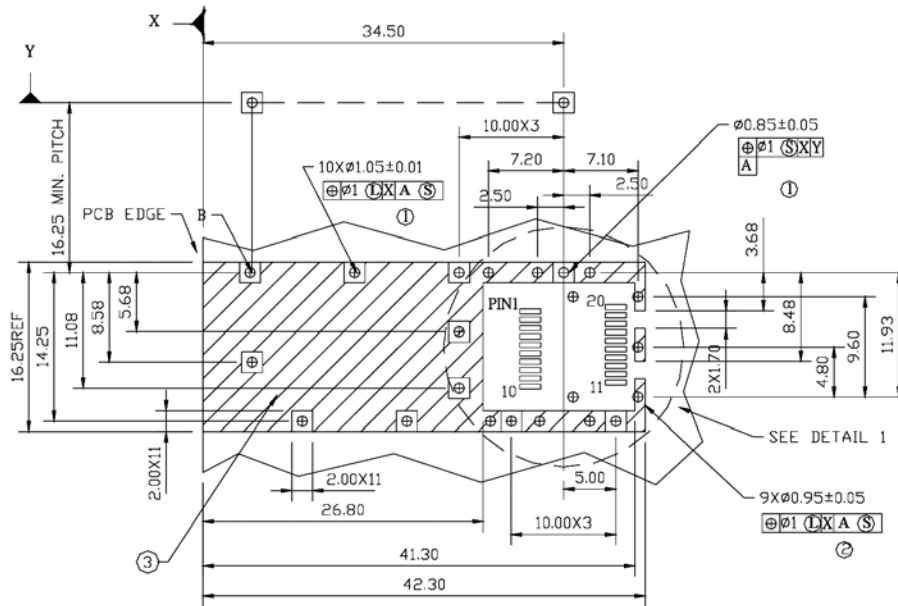
**(1)LC Type (SY Series)**

**DIMENSIONS ARE IN MILLIMETERS (unit:mm)**

**ALL DIMENSIONS ARE 0.2mm UNLESS OTHERWISE SPECIFIED**



**SFP host board mechanical layout**



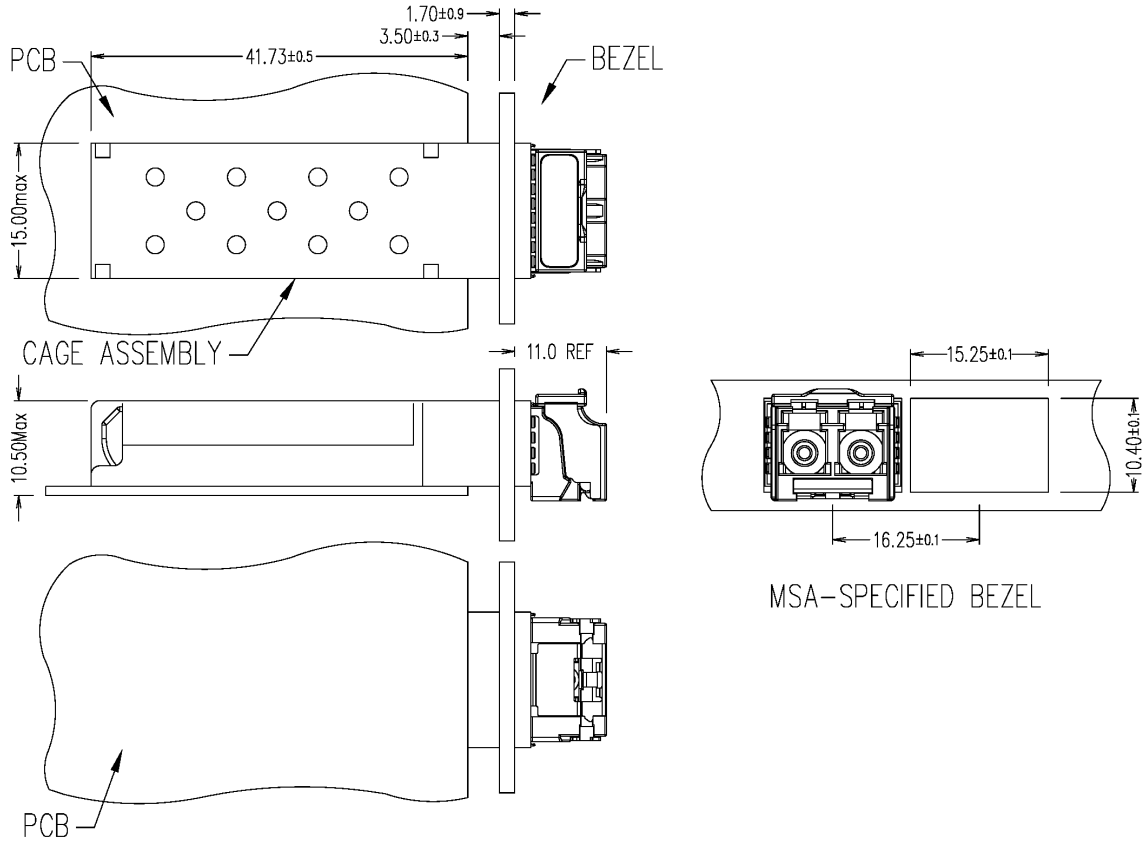
DETAIL 1

**LEGEND**

- 1.PADS AND VIAS ARE CHASSIS GROUND
- 2.THROUGH HOLES, PLATING OPTIONAL
- 3.HATCHED AREA DENOTES COMPONENT AND TRACE KEEPOUT(EXCEPT CHASSIS GROUND)
- 4.AREA DENOTES COMPONENT KEEPOUT (TRACES ALLOWED)

DIMENSIONS ARE IN MILLIMETERS

**Assembly drawing**



**Eye Safety**

The transceiver is a class 1 laser product. It complies with EN 60825-1 and FDA 21 CFR 1040.10 and 1040.11. In order to meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.

**Caution**

All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part is required. Tampering with and modifying the performance of the device will result in voided product warranty.

|      |               |         |        |               |     |
|------|---------------|---------|--------|---------------|-----|
| 文件名稱 | SY13A0-10ATQS |         | 文件編號   | 23-13A010122Q |     |
| 版本   | 發行日期          | 撰寫者/修改者 | 變更內容   |               |     |
| V3.0 | 2015/8/13     | 潘瑋君     | 重新發行   |               |     |
| V3.3 | 2015/10/27    | 潘瑋君     | 加入文件履歷 |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
|      |               |         |        |               |     |
| 核 准  | 廖育聖           | 制 定 人   | 潘瑋君    | 制訂單位          | 研發部 |
|      |               |         |        | 發行蓋章處         |     |
|      |               |         |        |               |     |