



WDP843-54C1

10GB/s 10Km SFP+ 1310nm Transceiver with DDM function

Features

- Compliant to SFP+ MSA
- Fully ROHS Compliant
- All metal housing for superior EMI performance
- Operating data rate from 8.5Gbps to 10Gbps
- Uncooled 1310nm DFB Laser
- High sensitivity PIN photodiode and TIA
- Up to 10km
- LC duplex connector
- Hot pluggable 20pin connector
- Low power consumption < 1.0W
- 0°C to 70°C operating wide temperature range
- Single +3.3V±5% power supply
- Digital Diagnostic Monitoring sff-8472 Rev 10.2 compliant
- Real time monitoring of :
Transmitted optical power
Received optical power
Laser bias current
Temperature
Supply voltage

Applications

- 10GBASE - LR/LW 10G Ethernet
- 10GFC
- 8GFC

Standard

- IEEE 802.3ae 10GBASE - LR/LW
- SFF-8431 Rev 3.0
- SFF-8472 Rev 10.2
- 10GFC Rev 4.0
- FC-PI-4 Rev 7.0

Ordering Information

| Specifications | | | | | | | | | | |
|----------------|---------|-------------|------------|---------------|-----|-------------------|--------|-------|-------|------------------------|
| Part No | package | Data rate | Tx | Optical Power | Rx | Sensitivity (OMA) | Top | Reach | other | Application |
| WDP843-54C1 | SFP+ | 8.5G~10.52G | 1310nm DFB | -8.2~+0.5dBm | PIN | <-12.6dBm | 0~70°C | 10km | DDM | 10GBASE-LR/LW 8G/10GFC |



Descriptions

The WDP843-54C1 1310nm DFB 10Gigabit Transceiver is designed to transmitter and receive serial optical data over single mode optical fiber with 10km.

They are compliant with SFF-8431, SFF-8472, 10GFC Rev4.0 , FC-PI-4 Rev7.0 and IEEE802.3ae 10GBASE-LR /LW .

The transmitter converts serial CML electrical data into serial optical data compliant with the IEEE802.3ae standard. An open collector compatible Transmit Disable (Tx_Dis) is provided .When Tx_Dis is asserted high, Transmitter is turned off .

The receiver converts serial optical data into serial CML electrical data .An open collector compatible loss of signal is provided .The RX_LOS signal indicates insufficient optical power for reliable signal reception at the receiver. Digital diagnostics functions are available via 2-wire serial interface ,as specified in sff-8472 .

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

Block Diagram

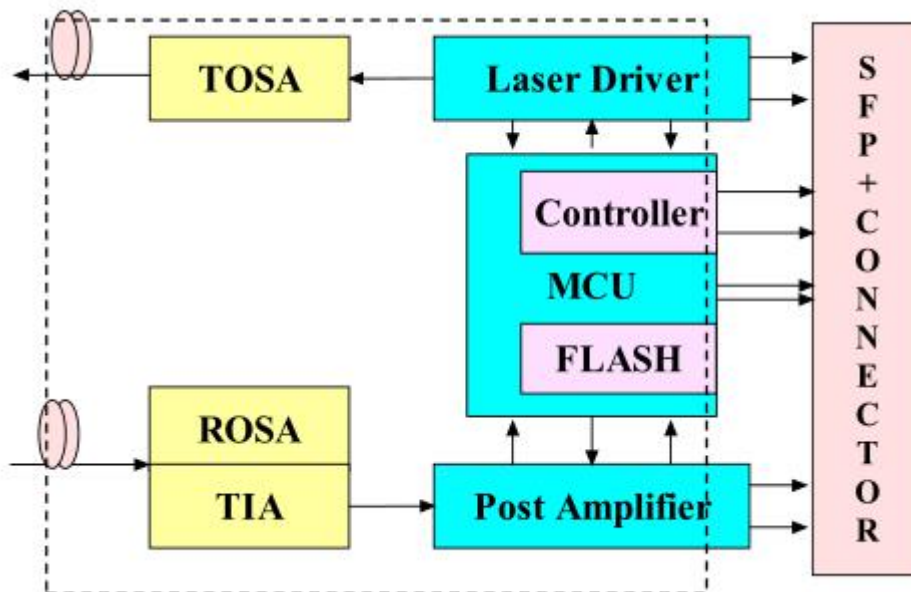


Figure 1. Transceiver functional diagram



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|--------------------------|--------|------|------|------|------|------|
| Storage Temperature | Ts | -40 | | 85 | °C | |
| Storage Ambient Humidity | HA | 5 | | 95 | % | |

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|----------------------------|--------|-------------------|----------|------|-------|----------------|
| Case Operating Temperature | Tcase | 0 | | 70 | °C | |
| Ambient Humidity | HA | 5 | | 70 | % | Non-condensing |
| Power Supply Voltage | VCC | 3.13 | 3.3 | 3.47 | V | |
| Bit Rate | BR | | 9.953 | | Gbs | 10GBASE- LW |
| | | | 10.3125 | | | 10GBASE- LR |
| | | | 8.5 | | | 800-SM-LC-L |
| | | | 10.51875 | | | 1200-SM-LL-L |
| Bit Error Ratio | BER | | | | 10-12 | |
| Max Supported link Length | | | 10KM | | | |
| Coupled Fiber | | Single mode fiber | | | | 9/125um SMF |

Electrical Characteristics (Tc = 0°C to 70 °C and Vcc = 3.14 to 3.46)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|----------------------------------|--------|------|------|---------|-------|---------|
| Supply Voltage | Vcc | 3.14 | 3.3 | 3.46 | V | |
| Supply Current | Icc | | | 300 | mA | |
| Transmitter | | | | | | |
| Input Differential Impedance | Rin | 80 | 100 | 120 | Ω | |
| Differential Data Input Swing | Vin | 100 | | 1000 | mVp-p | |
| Transmit Disable Voltage | Vdis | 2 | | | V | |
| Transmit Enable Voltage | Ven | Vee | | Vee+0.8 | V | |
| Transmit Fault Assert Voltage | Vfa | 2.2 | | | V | |
| Transmit Fault De-Assert Voltage | Vfda | Vee | | Vee+0.4 | V | |
| Receiver | | | | | | |
| Differential Data Output Swing | Vod | 300 | 600 | 840 | mVp-p | |
| Output Rise Time | Trise | | 25 | | ps | 20%~80% |
| Output Fall Time | Tfall | | 25 | | ps | 20%~80% |
| LOS Fault | Vlosft | 2 | | Vcc | V | |
| LOS Normal | Vlosnr | Vee | | Vee+0.8 | V | |

Optical Characteristics (Tc = 0°C to 70 °C and Vcc = 3.14V to 3.46V)



| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|-----------------------------------------|------------------|------|------|-------|-------|------|
| Transmitter | | | | | | |
| Nominal Wavelength | λ | 1260 | 1310 | 1350 | nm | |
| Spectral width | $\Delta \lambda$ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Optical Modulation Amplitude | Poma | -5.4 | | | dBm | |
| Optical Output Power | Pav | -8.2 | | 0.5 | dBm | |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 3.2 | dB | |
| Launch Power in OMA Minus TDP | | -6.2 | | | dBm | |
| Average Launch Power of OFF Transmitter | Poff | | | -35 | dBm | |
| Relative Intensity Noise | Rin | | | -128 | dB/HZ | |
| Optical Return Loss Tolerance | ORLT | | | 12 | dB | |
| Receiver | | | | | | |
| Center Wavelength | λ | 1260 | 1310 | 1610 | nm | |
| Average Receiver Power | Pavg | - | - | -14.4 | dBm | |
| Receiver Sensitivity (OMA) | Rsense1 | | | -12.6 | dBm | 1 |
| Stressed Sensitivity (OMA) | Rsense2 | | | -10.3 | dBm | 2 |
| Receiver Saturation | Rsat | 0 | | | dBm | |
| Receiver Reflectance | Rrefl | | | -12 | dB | |
| Los Assert LOS | LOSd | -30 | | | dBm | |
| Los De-Assert LOS | LOSa | | | -17 | dBm | |
| Los Hysteresis | | 0.5 | | | dB | |

Note1: Sensitivity for 10G PRBS 2*23-1 and BER better than or equal to 10E-12

Note2: The stressed sensitivity value in the table are for system level BER measurement which include the effects of CDR circuit.



Pin function definitions

Table 1: Transceiver pin descriptions

| Pin Number | Symbol | Name | Description |
|------------|------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 17, 20 | VeeT | Transmitter Signal Ground | These pins should be connected to signal ground on the host board. |
| 2 | TX Fault | Transmitter Fault Out (OC) | Logic “1” Output=Laser Fault(Laser off before t_fault) Logic “0” Output=Normal Operation This pin is open collector compatible, and should be pulled up to Host Vcc with a 10kΩ resistor |
| 3 | TX Disable | Transmitter Disable In (LVTTL) | Logic “1” Input(or no connection)=laser off Logic “0” Input = Laser on This pin is internally pulled up to VccT with a 10kΩ resistor |
| 4 | SDA | Module Definition Identifiers | Serial ID with SFF-8472 Diagnostics |
| 5 | SCL | | Module Definition pins should be pulled up to Host Vcc with 10 kΩ resistors. |
| 6 | MOD-ABS | | |
| 7 | RS0 | ReceiverRateSelect (LVTTL) | These pins have an internal 30 kΩ pull-down to ground. |
| 9 | RS1 | Transmitter Rate Select (LVTTL) | A Signal on either of these pins will not affect module performance. |
| 8 | LOS | Loss of signal Out(OC) | Sufficient optical signal for potential BER<1x10 ⁻¹² =Logic “0” Insufficient optical signal for potential BER<1x10 ⁻¹² =Logic “1” This pin is open collector compatible , and should be pulled up to Host Vcc with a 10 kΩ resistor |
| 10, 11, 14 | VeeR | Receiver Signal Ground | This pins should be connected to signal ground on the host board. |
| 12 | RD- | Receiver Negative Data Out (CML) | Light on = Logic “0” Output Receiver Data output is internally AC coupled and series terminated with a 50Ω resistor. |
| 13 | RD+ | Receiver Positive Data Out (CML) | Light on = Logic “1” Output Receiver Data output is internally AC coupled and series terminated with a 50Ω resistor. |
| 15 | VccR | Receiver Power Supply | This pin should be connected to a filtered +3.3V power supply on the host board . See Figure3. Recommended power supply filter |
| 16 | VccT | Transmitter Power Supply | This pin should be connected to a filtered +3.3V power supply on the host board . See Figure3. Recommended power supply filter |



| | | | |
|----|-----|------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 18 | TD+ | Transmitter Positive Data In (CML) | Logic "1" Input =light on Transmitter Data inputs are internally AC coupled and terminated with a differential 100Ω resistor |
| 19 | TD- | Transmitter Negative Data In(CML) | Logic "0" Input =light on Transmitter Data inputs are internally AC coupled and terminated with a differential 100Ω resistor |

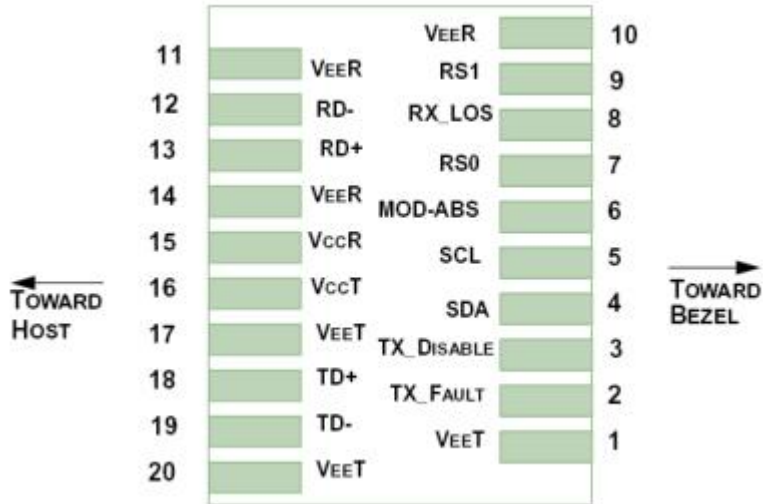


Figure 2. Pin function definitions

Typical application circuit

Recommended “Typical Application Schematics” are shown in Figure 3

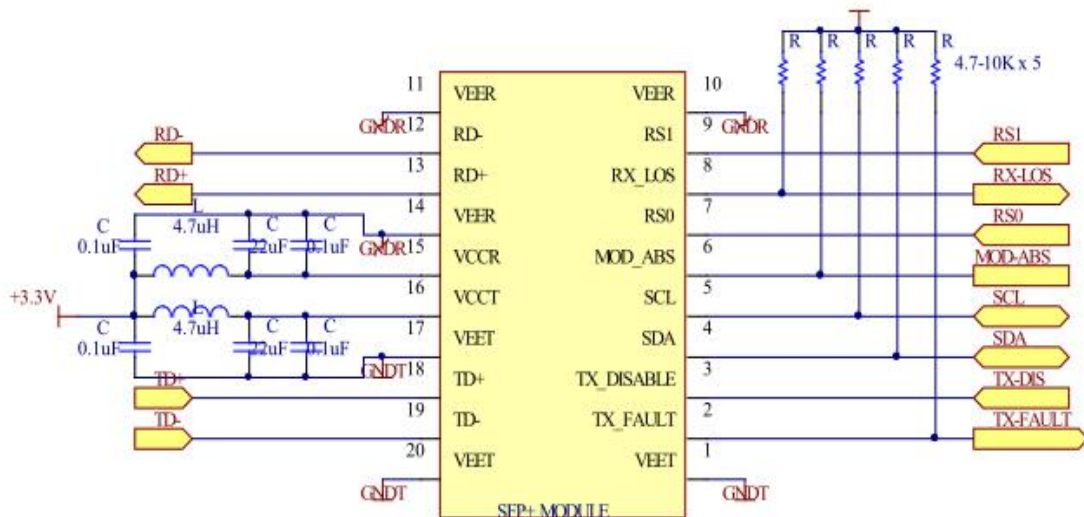


Figure 3. Typical application schematics



Electrostatic Discharge (ESD)

The WDP843-54C1 is compatible with ESD levels found in typical manufacturing and operating environments as described in Table 2. In the normal handling and operation of optical transceivers, ESD is of concern in two circumstances.

The first case is during handling of the transceiver prior to insertion into an SFP+ compliant cage. To protect the device, it's important to use normal ESD handling pre-cautions. These include use of grounded wrist straps, work-benches and floor wherever a transceiver is handled

The second case to consider is static discharges to the exterior of the host equipment chassis after installation. If the optical interface is exposed to the exterior of host equipment cabinet, the transceiver may be subject to system level ESD requirements

Electromagnetic Interference (EMI)

Equipment incorporating gigabit transceivers is typically subject to regulation by the FCC in the United States, CENELEC EN55022 (CISPR 22) in Europe and VCCI in Japan. The WDP843-54C1 compliance to these standards is detailed in Table 2. The metal housing and shielded design of the WDP843-54C1 minimizes the EMI challenge facing the equipment designer.

EMI Immunity (Susceptibility)

Due to its shielded design, the EMI immunity of the WDP843-54C1 exceeds typical industry standards.

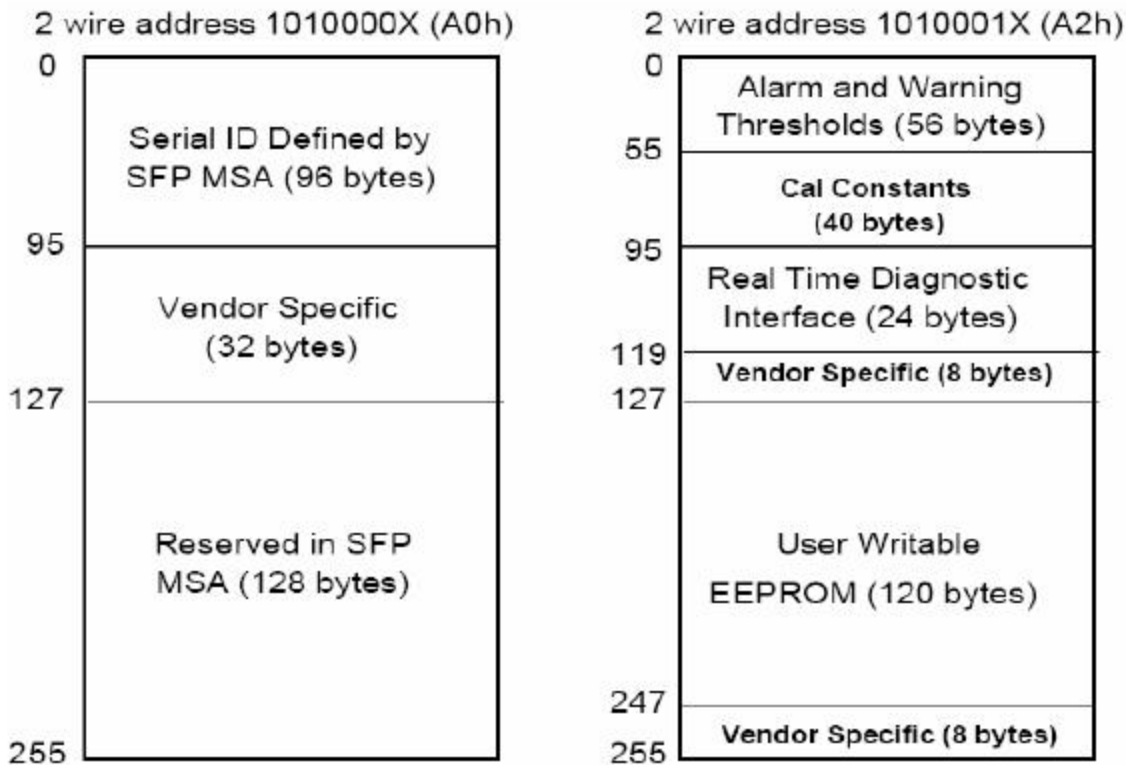
Table 2: Regulatory compliance

| Feature | Test Method | Performance |
|-----------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883C Method3015.7 | Class 1 (> 1500 Volts) |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | Variation of IEC 61000-4-2 | Typically ,no damage occurs with 15KV when the duplex LC connector receptacle is contacted by a Human Body Model probe |
| Electrostatic Interference (EMI) | CISPR22 ITE Class B EN55022 Class B FCC Class B | Compliant with standards |
| Immunity | IEC61000-4-3 Calss 2 EN55024 | Typically show no measurable effect from a 3V/m field swept from 80 to 1000MHZ applied to the transceiver without a chassis enclosure |
| ROHS Compliance | | Less than 1000ppm of cadmium , lead, mercury, hexavalent chromium, polybrominated biphenyls, and ploybrominated biphenyl ethers. |



Digital Diagnostic Interface Definition

The 2-wire serial interface addresses of the sfp+ module are 1010000x (A0h) and 1010001x (A2h)



Accessing Serial ID memory uses the 2 wire address 1010000x(A0). Memory Contents of serial ID are shown in Table 3.

Table 3 : Serial ID memory Contents

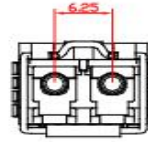
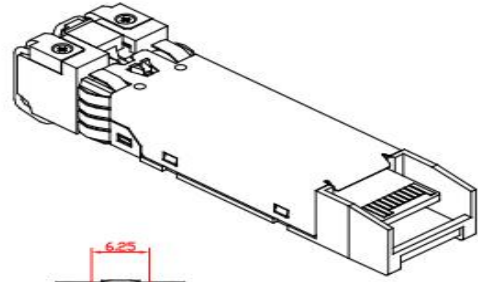
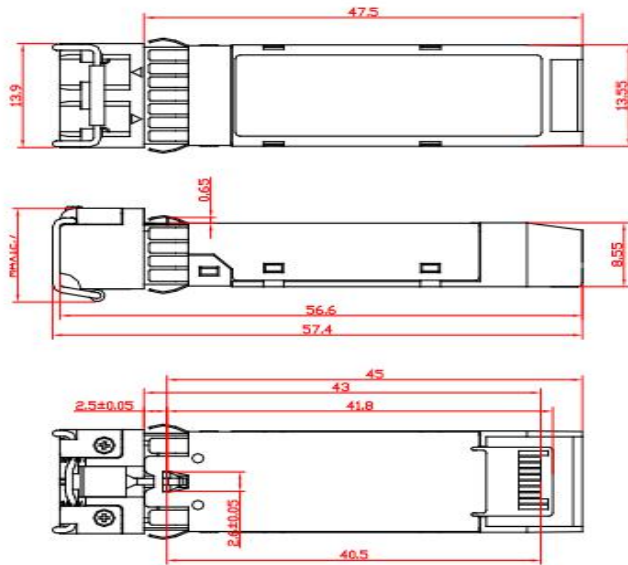
| Data Address | Size (Bytes) | Name of Field | Contents (Hex) | Description |
|-----------------------|--------------|------------------|----------------|-------------------------------------------|
| BASE ID FIELDS | | | | |
| 0 | 1 | Identifier | 03 | SFP |
| 1 | 1 | EXT. Identifier | 04 | SFP function is defined by Serial ID only |
| 2 | 1 | Connector | 07 | LC Connector |
| 3--10 | 8 | Transceiver | | Transceiver Code |
| 11 | 1 | Encoding | 03 | NRZ |
| 12 | 1 | BR, Norminal | 64 | 8.5~10.52Gbit/s |
| 13 | 1 | Reserved | 00 | |
| 14 | 1 | Length (9um, km) | 0A | Transceiver transmit Distance (10km) |
| 15 | 1 | Length (9um) | 64 | |
| 16 | 1 | Length (50um) | 00 | |
| 17 | 1 | Length (62.5um) | 00 | |



| | | | | |
|----------------------------------|-----|-------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18 | 1 | Length(Copper) | 00 | |
| 19 | 1 | Reserved | 00 | |
| 20--35 | 16 | Vendor name | | Net-Light(ASCII) |
| 36 | 1 | Reserved | 00 | |
| 37--39 | 3 | Vendor OUI | 00 00 00 | |
| 40--55 | 16 | Vendor PN | | WDP843-54C1(ASC11) |
| 56--59 | 4 | Vendor REV | 00 00 00 00 | |
| 60--61 | 2 | Wavelength | | Transceiver wavelength |
| 62 | 1 | Reserved | 00 | |
| 63 | 1 | CC_BASE | Check Sum | Check code for Base ID Fields |
| EXTENDED ID FIELDS | | | | |
| 64--65 | 2 | Options | 00 1A | TX_DISABLE TX_FAULT and Loss of Signal implemented |
| 66 | 1 | BR, max | 00 | |
| 67 | 1 | BR, min | 00 | |
| 68--83 | 16 | Vendor SN | 31 32 33 34 35 36 37 38 20 20 20 20 20 20 20 20 | Serial Number of transceiver (ASCII). For example :12345678 |
| 84--91 | 8 | Data code | 30 35 31 30 31 31 20 20 | Data code :051011 |
| 92 | 1 | Diagnostic Monitoring Type | 68 | Diagnostics (EXT.Cal) |
| 93 | 1 | Enhanced Options | F6 | Optional Alarm/Warning flags Implemented for all monitored quantities, optional soft tx_fault monitoring implemented , optional soft rx_loss monitoring implemented |
| 94 | 1 | SFF-8472 Compliance | 03 | SFF-8472 Rev10.2 |
| 95 | 1 | CC_EXT | Check Sum | Check sum for Extended ID Field |
| VENDOR SPECIFIC ID FIELDS | | | | |
| 96--127 | 32 | Vendor Specific | Read only | Depends on customer information |
| 128- 255 | 128 | Reserved | Read only | Filled by zero |



Package outline (unit:mm)



Unit: mm
Unspecified Tolerance: ±0.1mm