

## 1.25Gb/s Bi-Di SFP 1490nm/1550nm DFB-LD with LC Receptacle

### Features:

- ☞ Single Mode bi-directional Transmission
- ☞ SFP Multi-source Package with LC Receptacle
- ☞ Up to 1.25Gb/s Data Links
- ☞ Hot-Pluggable Capability
- ☞ Single +3.3V Power Supply
- ☞ Isolation > 30dB, Cross Talk < -45dB
- ☞ Compliant with Specifications for IEEE802.3Z
- ☞ Compliant with Bellcore TA-NWT-000983
- ☞ Eye Safety Designed to Meet Laser Class1, Compliant with IEC60825-1

### Applications:

- ☞ Gigabit Ethernet
- ☞ Fiber Channel
- ☞ WDM Application

### Specification:

#### ● Electrical and Optical Characteristics: (Condition: $T_a = T_{op}$ )

| Parameter                              | Symbol    | Min. | Typical | Max.            | Unit   |
|----------------------------------------|-----------|------|---------|-----------------|--------|
| Transmitter Differential Input Voltage | +/-TX_DAT | 200  |         | 2400            | mV p-p |
| Supply Current                         | $I_{CC}$  |      | 130     | 180             | mA     |
| Tx_Disable Input Voltage – Low         | $V_{IL}$  | 0    |         | 0.8             | V      |
| Tx_Disable Input Voltage – High        | $V_{IH}$  | 2.0  |         | V <sub>CC</sub> | V      |
| Tx_Fault Output Voltage – Low          | $V_{OL}$  | 0    |         | 0.8             | V      |
| Tx_Fault Output Voltage – High         | $V_{OH}$  | 2.0  |         | V <sub>CC</sub> | V      |
| Receiver Differential Output Voltage   | +/-RX_DAT | 600  |         | 1400            | mV p-p |
| Rx_LOS Output Voltage- Low             | $V_{OL}$  | 0    |         | 0.8             | V      |
| Rx_LOS Output Voltage- High            | $V_{OH}$  | 2.0  |         | V <sub>CC</sub> | V      |

#### Transmitter (TX1490nm):

| Parameter               | Symbol          | Min.                  | Typical | Max.                  | Unit |
|-------------------------|-----------------|-----------------------|---------|-----------------------|------|
| Data Rate               | B               | -                     | 1250    | -                     | Mb/s |
| Centre Wavelength       | $\lambda_c$     | 1480                  | 1490    | 1500                  | nm   |
| Output Spectral Width   | $\Delta\lambda$ | -                     | -       | 1                     | nm   |
| Average Output Power    | $P_o$           | 0                     | -       | -                     | dBm  |
| Extinction Ratio        | EXT             | 9                     | -       | -                     | dB   |
| Data Input Voltage-High | $V_{IHS}$       | V <sub>CC</sub> -1.16 | -       | V <sub>CC</sub> -0.89 | V    |

|                         |                           |               |    |               |    |
|-------------------------|---------------------------|---------------|----|---------------|----|
| Data Input Voltage -Low | $V_{ILS}$                 | $V_{CC}-1.82$ | -  | $V_{CC}-1.48$ | V  |
| Supply Current          | $I_{CC}$                  | -             | 90 | 150           | mA |
| Output Optical Eye      | Compliant with IEEE802.3Z |               |    |               |    |

**Receiver (RX1550nm):**

| Parameter                 | Symbol      | Min.          | Typical | Max.          | Unit |
|---------------------------|-------------|---------------|---------|---------------|------|
| Receive Sensitivity       | $P_{min}$   | -             | -       | -23           | dBm  |
| Maximum Input Power       | $P_{MAX}$   | -3            | -       | -             | dBm  |
| Signal Detection-Asserted | $SD_{HIGH}$ | -             | -       | -24           | dBm  |
| Signal Detection-Deserted | $SD_{LOW}$  | -34           | -       | -             | dBm  |
| Hysteresis                | -           | -             | 3.0     | -             | dBm  |
| Output High Voltage       | $V_{OH}$    | $V_{CC}-1.03$ | -       | $V_{CC}-0.89$ | V    |
| Output Low Voltage        | $V_{OL}$    | $V_{CC}-1.82$ | -       | $V_{CC}-1.63$ | V    |
| Operating Wavelength      | $\lambda_c$ | 1540          | 1550    | 1560          | nm   |
| Supply Current            | $I_{CC}$    | -             | 80      | 110           | mA   |

**Transmitter (TX1550nm):**

| Parameter               | Symbol                    | Min.          | Typical | Max.          | Unit |
|-------------------------|---------------------------|---------------|---------|---------------|------|
| Data Rate               | B                         | -             | 1250    | -             | Mb/s |
| Centre Wavelength       | $\lambda_c$               | 1540          | 1550    | 1560          | nm   |
| Output Spectral Width   | $\Delta\lambda$           | -             | -       | 1             | nm   |
| Average Output Power    | $P_o$                     | -2            | -       | -             | dBm  |
| Extinction Ratio        | EXT                       | 9             | -       | -             | dB   |
| Data Input Voltage-High | $V_{IHS}$                 | $V_{CC}-1.16$ | -       | $V_{CC}-0.89$ | V    |
| Data Input Voltage -Low | $V_{ILS}$                 | $V_{CC}-1.82$ | -       | $V_{CC}-1.48$ | V    |
| Supply Current          | $I_{CC}$                  | -             | 90      | 150           | mA   |
| Output Optical Eye      | Compliant with IEEE802.3Z |               |         |               |      |

**Receiver (RX1490nm):**

| Parameter                 | Symbol      | Min.          | Typical | Max.          | Unit |
|---------------------------|-------------|---------------|---------|---------------|------|
| Receive Sensitivity       | $P_{min}$   | -             | -       | -23           | dBm  |
| Maximum Input Power       | $P_{MAX}$   | -3            | -       | -             | dBm  |
| Signal Detection-Asserted | $SD_{HIGH}$ | -             | -       | -24           | dBm  |
| Signal Detection-Deserted | $SD_{LOW}$  | -34           | -       | -             | dBm  |
| Hysteresis                | -           | -             | 3.0     | -             | dBm  |
| Output High Voltage       | $V_{OH}$    | $V_{CC}-1.03$ | -       | $V_{CC}-0.89$ | V    |
| Output Low Voltage        | $V_{OL}$    | $V_{CC}-1.82$ | -       | $V_{CC}-1.63$ | V    |
| Operating Wavelength      | $\lambda_c$ | 1480          | 1490    | 1500          | nm   |
| Supply Current            | $I_{CC}$    | -             | 80      | 110           | mA   |

● **Absolute Maximum Ratings: (T<sub>C</sub>=25℃)**

| Parameter                       | Symbol          | Min. | Max. | Unit |
|---------------------------------|-----------------|------|------|------|
| Storage Temperature             | T <sub>ST</sub> | -40  | +85  | ℃    |
| Operating Temperature(Option 1) | T <sub>IP</sub> | 0    | 70   | ℃    |
| Operating Temperature(Option 2) | T <sub>IP</sub> | -40  | +85  | ℃    |
| Input Voltage                   | T <sub>CC</sub> | 0    | +5   | V    |

● **Recommended Operating Environment:**

| Parameter                       | Symbol          | Min. | Typical | Max. | Unit |
|---------------------------------|-----------------|------|---------|------|------|
| Supply Voltage                  | V <sub>CC</sub> | +3.0 | +3.3    | +3.6 | V    |
| Operating Temperature(Option 1) | T <sub>OP</sub> | 0    | -       | 70   | ℃    |
| Operating Temperature(Option 2) | T <sub>OP</sub> | -40  | -       | +85  | ℃    |

● **Timing Characteristics:**

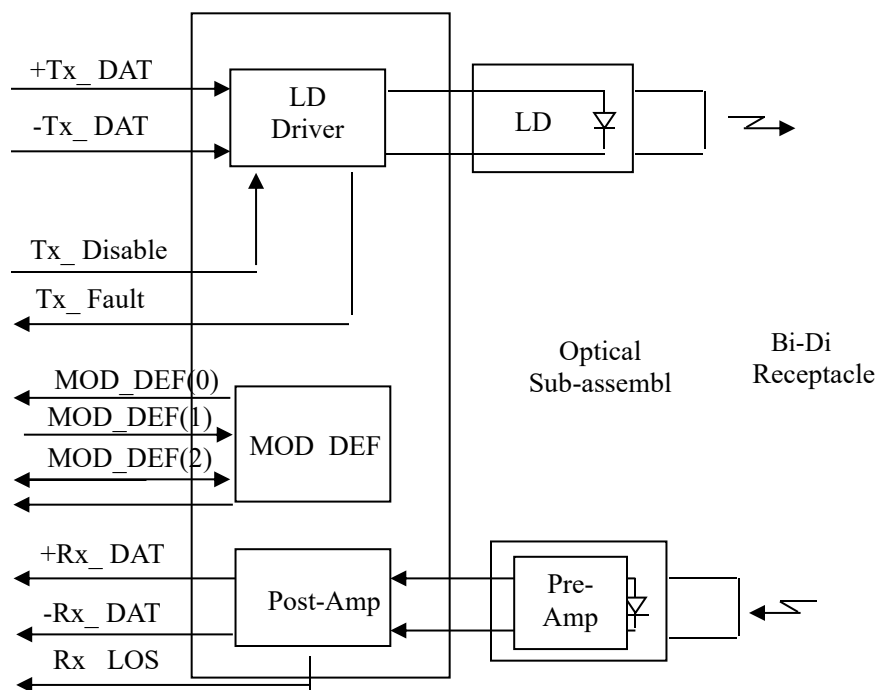
| Parameter                                       | Symbol                 | Min. | Typical | Max. | Unit |
|-------------------------------------------------|------------------------|------|---------|------|------|
| TX_DISABLE Assert Time                          | t <sub>off</sub>       |      | 3       | 10   | usec |
| TX_DISABLE Negate Time                          | t <sub>on</sub>        |      | 0.5     | 1    | msec |
| Time to Initialize Include Reset of TX_FAULT    | t <sub>int</sub>       |      | 30      | 300  | msec |
| TX_FAULT from Fault to Assertion                | t <sub>fault</sub>     |      | 20      | 100  | usec |
| TX_DISBEL Time to Start Reset                   | t <sub>reset</sub>     | 10   |         |      | usec |
| Receiver Loss of Signal Assert Time (Off to On) | T <sub>A</sub> ,RX_LOS |      |         | 100  | usec |
| Receiver Loss of Signal Assert Time (On to Off) | T <sub>d</sub> ,RX_LOS |      |         | 100  | usec |

● **Serial ID Memory Contents:**

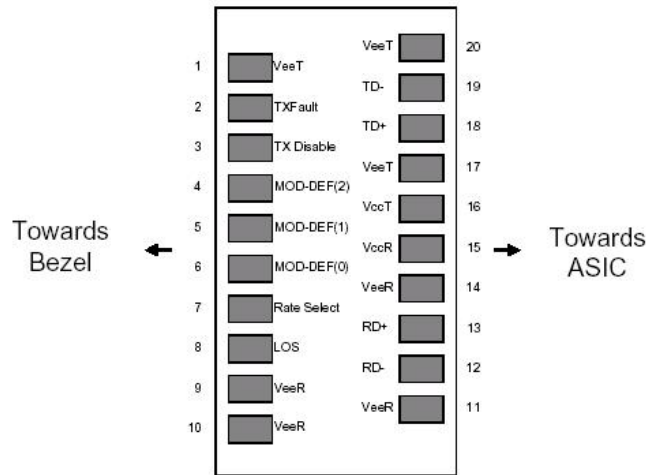
| Data Address   | Length (Byte) | Name of Length | Description and Contents                                 |
|----------------|---------------|----------------|----------------------------------------------------------|
| Base ID Fields |               |                |                                                          |
| 0              | 1             | Identifier     | Type of Serial transceiver (03h=SFP)                     |
| 1              | 1             | Reserved       | Extended identifier of type serial transceiver (04h)     |
| 2              | 1             | Connector      | Code of optical connector type (07=LC)                   |
| 3-10           | 8             | Transceiver    | Gigabit Ethernet 1000Base-SX & Fiber Channel             |
| 11             | 1             | Encoding       | 8B10B (01h)                                              |
| 12             | 1             | BR,Nominal     | Nominal baud rate, unit of 100Mbps                       |
| 13-14          | 2             | Reserved       | (0000h)                                                  |
| 15             | 1             | Length(9um)    | Link length supported for 9/125um fiber, units of 100m   |
| 16             | 1             | Length(50um)   | Link length supported for 50/125um fiber, units of 10m   |
| 17             | 1             | Length(62.5um) | Link length supported for 62.5/125um fiber, units of 10m |

|                           |    |                |                                                                                                       |
|---------------------------|----|----------------|-------------------------------------------------------------------------------------------------------|
| 18                        | 1  | Length(Copper) | Link length supported for copper, units of meters                                                     |
| 19                        | 1  | Reserved       |                                                                                                       |
| 20-35                     | 16 | Vendor Name    | SFP vendor name                                                                                       |
| 36                        | 1  | Reserved       |                                                                                                       |
| 37-39                     | 3  | Vendor OUI     | SFP transceiver vendor OUI ID                                                                         |
| 40-55                     | 16 | Vendor PN      | Part Number                                                                                           |
| 56-59                     | 4  | Vendor rev     | Revision level for part number                                                                        |
| 60-62                     | 3  | Reserved       |                                                                                                       |
| 63                        | 1  | CCID           | Least significant byte of sum of data in address 0-62                                                 |
| Extended ID Fields        |    |                |                                                                                                       |
| 64-65                     | 2  | Option         | Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported) |
| 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 (ASCII)                                                                                 |
| 84-91                     | 8  | Date code      | Manufacturing date code                                                                               |
| 92-94                     | 3  | Reserved       |                                                                                                       |
| 95                        | 1  | CCEX           | Check code for the extended ID Fields (addresses 64 to 94)                                            |
| Vendor Specific ID Fields |    |                |                                                                                                       |
| 96-127                    | 32 | Readable       | Specific date, read only                                                                              |

### Block Diagram of Transceiver:



## Pin Assignment:



Pin out of Connector Block on Host Board

## Pin Description:

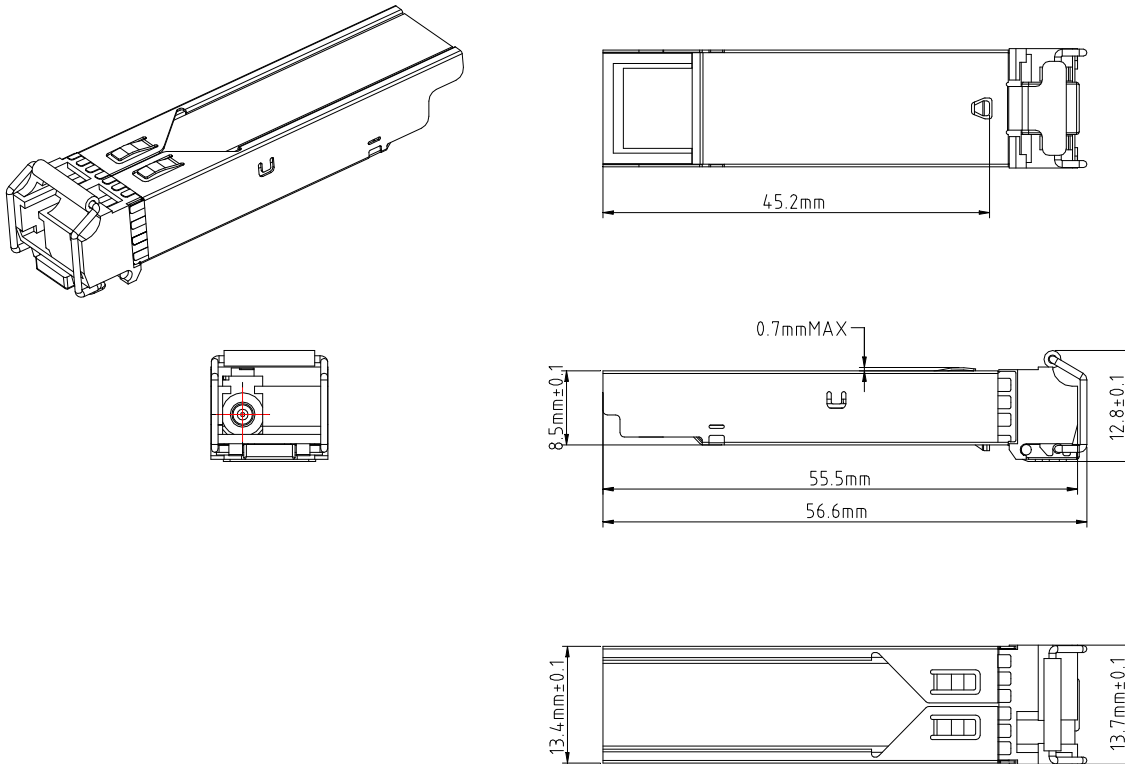
| Pin | Symbol             | Name/Description                                               | Ref. |
|-----|--------------------|----------------------------------------------------------------|------|
| 1   | V <sub>EET</sub>   | Transmitter Ground (Common with Receiver Ground)               | 1    |
| 2   | T <sub>FAULT</sub> | Transmitter Fault. Not supported.                              |      |
| 3   | T <sub>DIS</sub>   | Transmitter Disable. Laser output disabled on high or open.    | 2    |
| 4   | MOD DEF(2)         | Module Definition 2. Data line for Serial ID.                  | 3    |
| 5   | MOD DEF(1)         | Module Definition 1. Clock line for Serial ID.                 | 3    |
| 6   | MOD DEF(0)         | Module Definition 0. Grounded within the module.               | 3    |
| 7   | Rate Select        | No connection required                                         |      |
| 8   | LOS                | Loss of Signal indication. Logic 0 indicates normal operation. | 4    |
| 9   | V <sub>EER</sub>   | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 10  | V <sub>EER</sub>   | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 11  | V <sub>EER</sub>   | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 12  | RD-                | Receiver Inverted DATA out. AC Coupled                         |      |
| 13  | RD+                | Receiver Non-inverted DATA out. AC Coupled                     |      |
| 14  | V <sub>EER</sub>   | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 15  | V <sub>CCR</sub>   | Receiver Power Supply                                          |      |
| 16  | V <sub>CCT</sub>   | Transmitter Power Supply                                       |      |
| 17  | V <sub>EET</sub>   | Transmitter Ground (Common with Receiver Ground)               | 1    |
| 18  | TD+                | Transmitter Non-Inverted DATA in. AC Coupled.                  |      |
| 19  | TD-                | Transmitter Inverted DATA in. AC Coupled.                      |      |
| 20  | V <sub>EET</sub>   | Transmitter Ground (Common with Receiver Ground)               | 1    |

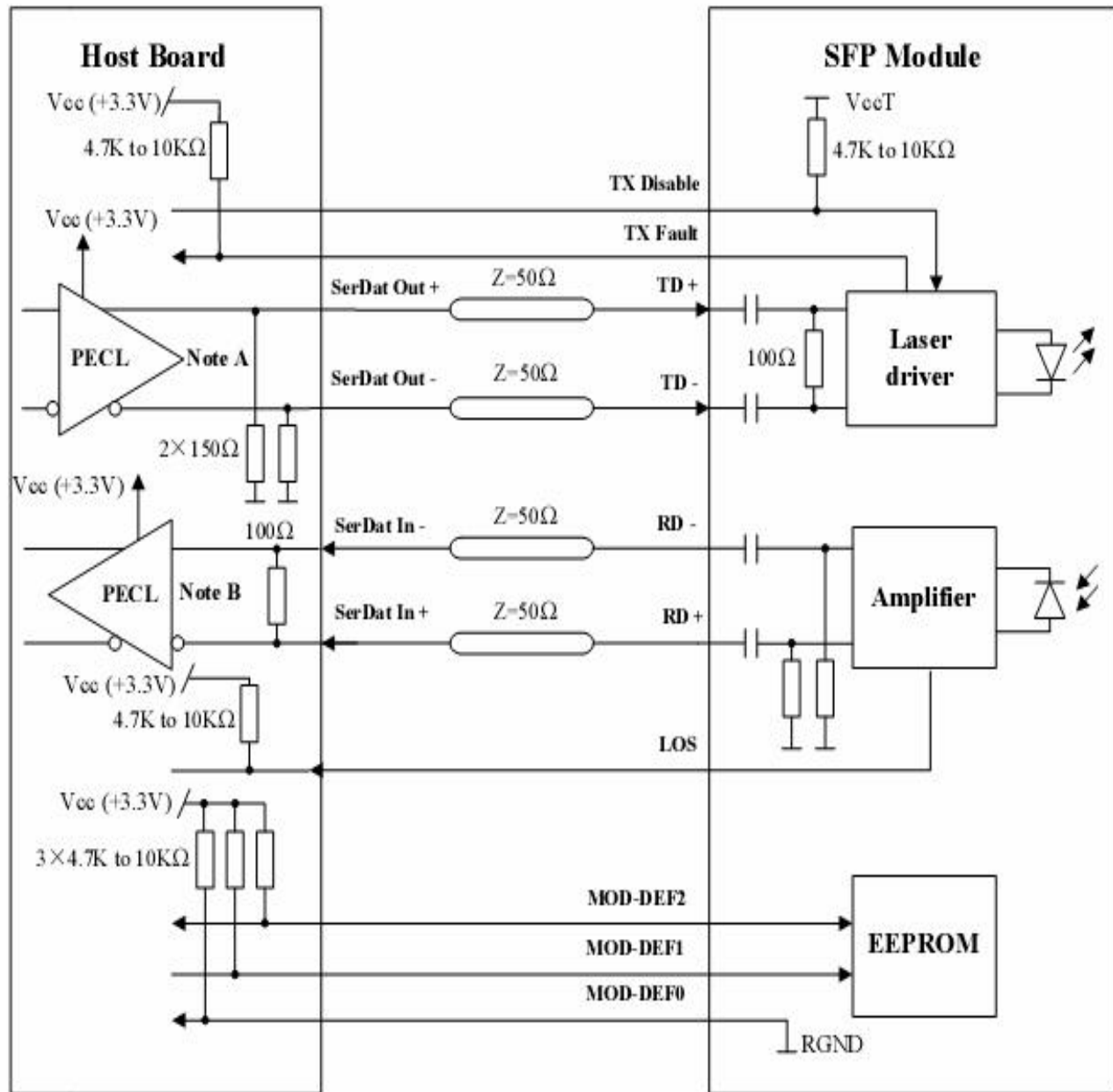
### Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.  
MOD\_DEF(0) pulls line low to indicate module is plugged in.

4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## Mechanical Dimensions:



**Recommended Circuit:**

**Note A:** Circuit assumes open emitter output

**Note B:** Circuit assumes high impedance internal bias @Vcc-1.3V