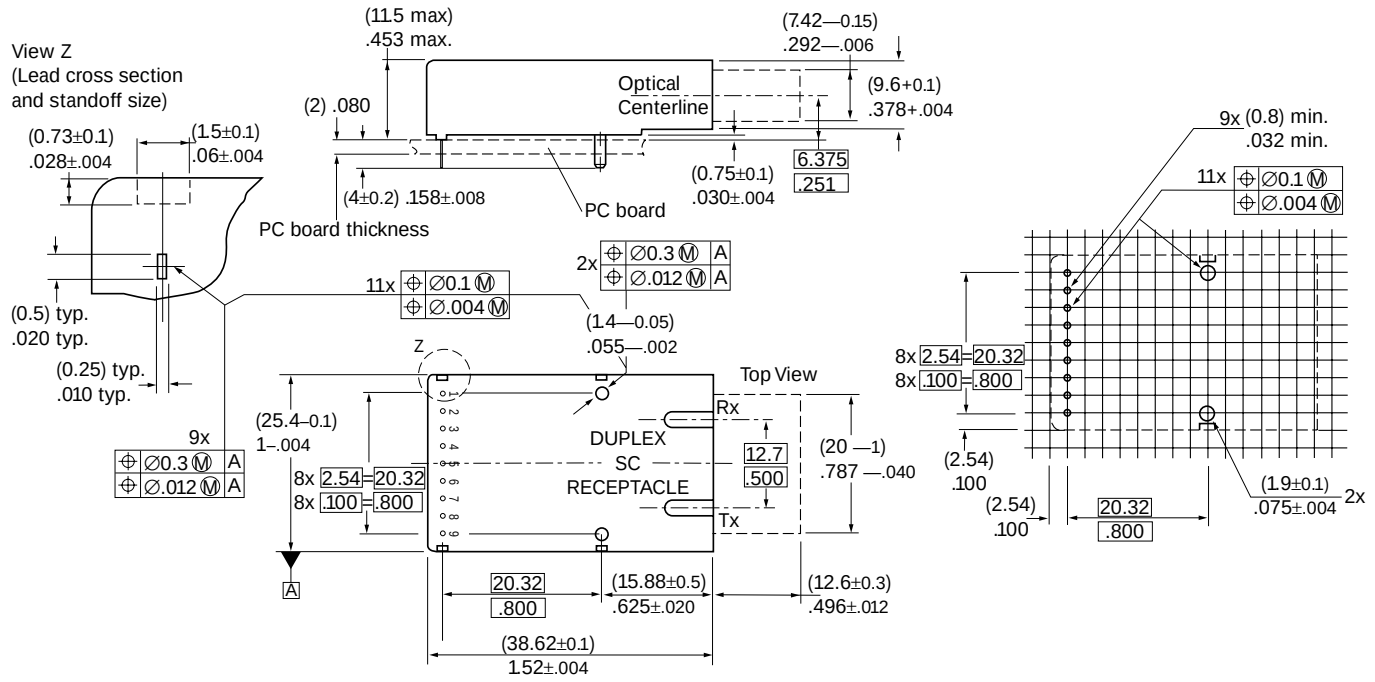
# V23809-E11-C10

## Single Mode 1300 nm ESCON® 1x9 Transceiver

Dimensions in (mm) inches




### FEATURES

- **Compliant with IBM ESCON® single mode standard**
- **Compact integrated transceiver unit with**
  - **MQW laser diode transmitter**
  - **InGaAs PIN photodiode receiver**
  - **Duplex SC receptacle**
- **FDA Class 1 laser safety compliant under normal operating conditions**
- **FDA Accession No. 9520890-7**
- **IEC Class 1 laser safety compliant**
- **Single power supply (5 V)**
- **Signal detect indicator**
- **PECL differential inputs and outputs**
- **Process plug included**
- **Wave solderable and washable with process plug inserted**
- **Industry standard multisource 1x9 footprint**

### Absolute Maximum Ratings

Exceeding any one of these values may destroy the device immediately.

| | |
|---|---|
| Package Power Dissipation(1) | 1.5 W |
| Supply Voltage ($V_{CC}$–$V_{EE}$) | 6 V |
| Data Input Levels | $V_{CC}$+0.5 V |
| Differential Data Input Voltage | 2.5 V |
| Operating Ambient Temperature | 0°C to 70°C |
| Storage Ambient Temperature | –40°C to 85°C |
| Soldering Conditions, Temp/Time (MIL-STD 883C, Method 2003) | 250°C/5.5s |

Note

1 For $V_{CC}$–$V_{EE}$ (min., max.). 50% duty cycle. The supply current does not include the load drive current of the receiver output. Add max. 45 mA for the three outputs. Load is 50 Ω to $V_{CC}$–2 V.

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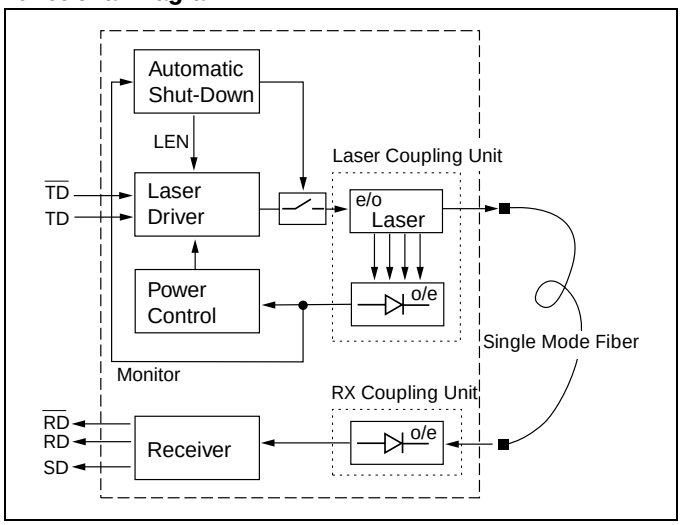
## DESCRIPTION

This data sheet describes the Infineon single mode ESCON transceiver.
The Infineon single mode ESCON transceiver is a single unit comprised of a transmitter, a receiver, and an SC duplex single mode receptacle. 1300 nm long wavelength technology is combined with the well-established 1x9 industry standard footprint. This design frees the customer from many alignment and PC board layout concerns.
The system is compatible with the IBM single mode ESCON standard and the upcoming SBCON standard of ANSI.
Based on laser technology and single mode fiber, the link can be extended up to 20 Km and beyond.
This transceiver operates at 200 Mbit/s from a single power supply (+5 Volt). The full differential data inputs and outputs are PECL compatible. It is designed to be encoded with 8B/10B signal layers.

## Functional Description

This transceiver is designed to transmit serial data via single mode cable.

### Functional Diagram




The receiver component converts the optical serial data into PECL compatible electrical data (RD and RDnot). The Signal Detect (SD, active high) shows whether optical data is present(1).

The transmitter converts PECL compatible electrical serial data (TD and TDnot) into optical serial data. It contains a laser driver circuit that drives the modulation and bias current of the laser diode. The currents are controlled by a power control circuit to guarantee a constant output power of the laser over temperature and aging.

The power control uses the output of the monitor PIN diode (mechanically built into the laser coupling unit) as a controlling signal, to prevent the laser power from exceeding the operating limits.

This module is a Class 1 laser product, due to an integrated automatic shutdown circuit that disables the laser when it detects transmitter failures.

The transceiver contains a supervisory circuit to monitor the power supply. This circuit makes an internal reset signal whenever the supply voltage drops below the reset threshold. It keeps the reset signal active for at least 140 milliseconds after the voltage has risen above the reset threshold. During this time the laser is inactive.

Note

1. We recommend to switch off the transmitter supply ($V_{CC}$-Tx) if no transmitter input data is applied.

## TECHNICAL DATA

The electro-optical characteristics described in the following tables are valid only for use under the recommended operating conditions.

### Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Ambient Temperature | $T_{AMB}$ | 0 | | 70 | °C |
| Power Supply Voltage | $V_{CC}$–$V_{EE}$ | 4.75 | 5.0 | 5.25 | V |
| Supply Current(1) | $I_{CC}$ | | 150 | 270 | mA |
| **Transmitter** | | | | | |
| Data Input High Voltage | $V_{IH}$–$V_{CC}$ | –1165 | | –880 | mV |
| Data Input Low Voltage | $V_{IL}$–$V_{CC}$ | –1810 | | –1475 | |
| Input Data Rise/Fall Time, 10%–90% | $t_R$, $t_F$ | 0.4 | | 1.3 | ns |
| **Receiver** | | | | | |
| Output Current | $I_O$ | | | 25 | mA |
| Input Center Wavelength | $\lambda_C$ | 1260 | | 1360 | nm |

Note

1. For $V_{CC}$–$V_{EE}$ (min., max.). 50% duty cycle. The supply current does not include the load drive current of the receiver output. Add max. 45 mA for the three outputs. Load is 50 Ω to $V_{CC}$–2 V.

### Transmitter Electro-Optical Characteristics

| Transmitter | Symbol | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Output Power (Average) | $P_O$ | –8 | –6 | –3 | dBm |
| Center Wavelength | $l_C$ | 1261 | | 1360 | nm |
| Spectral Width (FWHM) | $\Delta_l$ | | 2.4 | 7.6 | |
| Output Rise Time | $t_R$ | 0.6 | | 2.2 | ns |
| Output Fall Time | $t_F$ | | | | |
| Extinction Ratio (dynamic) | ER | 8.2 | | | dB |
| Eye Diagram(1) | | | | | |

Note

1. Transmitter meets ANSI T1E1.2, SONET OC-3, and ITU-T G.957 mask patterns.

### Receiver Electro-Optical Characteristics

| Receiver | Symbol | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Sensitivity (Average Power)(1) | $P_{IN}$ | | –38 | –35 | dBm |
| Saturation (Average Power) | $P_{SAT}$ | –3 | | | |
| Signal Detect Assert Level(2) | $P_{SDA}$ | | –40.5 | –38 | |
| Signal Detect Deassert Level(3) | $P_{SDD}$ | –45 | –42 | | |
| Signal Detect Hysteresis | $P_{SDA}$–$P_{SDD}$ | 1 | 1.5 | 3 | dB |
| Output Low Voltage(4) | $V_{OL}$–$V_{CC}$ | –1950 | | –1630 | mV |
| Output High Voltage(4) | $V_{OH}$–$V_{CC}$ | –1025 | | –735 | |
| Output Data Rise/Fall Time, 10%–90% | $t_R$, $t_F$ | | | 1.3 | ns |
| Output SD Rise/Fall Time(5) | | | | 40 | |

Notes

1. Minimum average optical power at which the BER is less than 1 x $10^{-10}$ or lower. Measured with a $2^{23}$–1 NRZ PRBS as recommended by ANSI T1E1.2, SONET OC-3, and ITU-T G.957.
2. An increase in optical power of data signal above the specified level will cause the SIGNAL DETECT to switch from a Low state to a High state.
3. A decrease in optical power of data signal below the specified level will cause the SIGNAL DETECT to switch from a High state to a Low state.
4. PECL compatible. Load is 50 Ω into $V_{CC}$–2 V. Measured under DC conditions at 25°C. For dynamic measurements a tolerance of 50 mV should be added. $V_{CC}$=5 V.
5. PECL compatible. A high level on this output shows that optical data is applied to the optical input.

### Pin Description

| Pin Name | | Level | Pin # | Description |
|---|---|---|---|---|
| $RxV_{EE}$ | Rx Ground | Power Supply | 1 | Negative power supply, normally ground |
| RD | Rx Output Data | PECL Output | 2 | Receiver output data |
| RDn | Rx Output Data | PECL Output | 3 | Inverted receiver output data |
| SD | Rx Signal Detect | PECL Output active high | 4 | A high level on this output shows that optical data is applied to the optical input. |
| $RxV_{CC}$ | Rx +5 V | Power Supply | 5 | Positive power supply, +5 V |
| $TxV_{CC}$ | Tx +5 V | Power Supply | 6 | Positive power supply, +5 V |
| TDn | Tx Input Data | PECL Input | 7 | Inverted transmitter input data |
| TD | Tx Input Data | PECL Input | 8 | Transmitter input data |
| $TxV_{EE}$ | Tx Ground | Power Supply | 9 | Negative power supply, normally ground |
| | Stud Pin | Mech. Support | S1/2 | Stud connected to $V_{EE}$ |

### Regulatory Compliance

| Feature | Standard | Comments |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD 883C Method 3015.4 | Class 1 (>1000 V) |
| Immunity: Electrostatic Discharge (ESD) to the Duplex SC Receptacle | EN 61000-4-2 IEC 61000-4-2 | Discharges of ±15kV with an air discharge probe on the receptacle cause no damage. |
| Immunity: Radio Frequency Electromagnetic Field | EN 61000-4-3 IEC 61000-4-3 | With a field strength of 10 V/m rms, noise frequency ranges from 10 MHz to 1 GHz. No effect on transceiver performance between the specification limits. |
| Emission: Electromagnetic Interference (EMI) | FCC Class B EN 55022 Class B CISPR 22 | Noise frequency range: 30 MHz to 1 GHz |

### EYE SAFETY

This laser based single mode transceiver is a Class 1 product. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11.

To meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.

### Caution

**All adjustments have been made at the factory prior to shipment of the devices. No maintenance or alteration to the device is required.**
**Tampering with or modifying the performance of the device will result in voided product warranty.**
**Do not view into the open optical port for more than 60 seconds.**

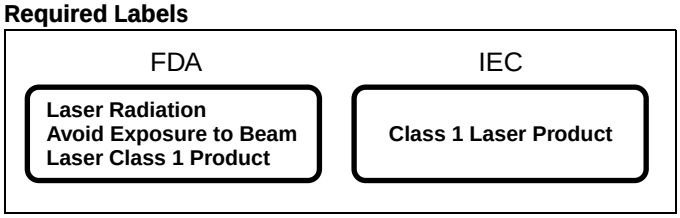
Note

Failure to adhere to the above restrictions could result in a modification that is considered an act of "manufacturing," and will require, under law, recertification of the modified product with the U.S. Food and Drug Administration (ref. 21 CFR 1040.10 (i)).

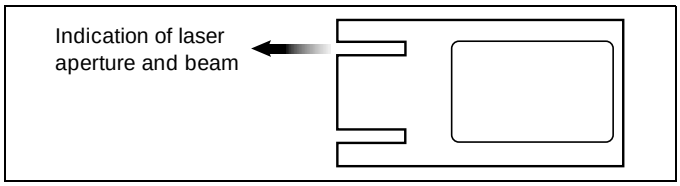
### Laser Data

| | |
|---|---|
| Wavelength | 1300 nm |
| Total output power (as defined by IEC: 50 mm aperture at 10 cm distance) | 5 mW |
| Total output power (as defined by FDA: 7 mm aperture at 20 cm distance) | 325 µW |
| Beam divergence | 4° |

### Required Labels

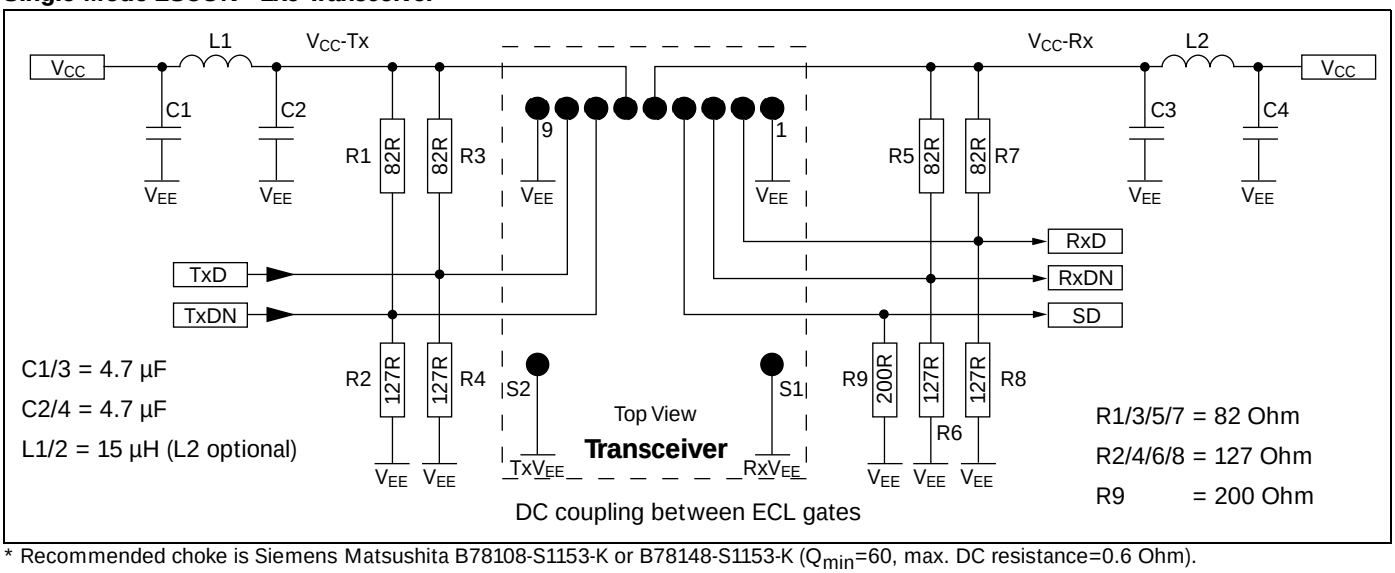



### Laser Emission



**APPLICATION NOTE**

**Single Mode ESCON® 1x9 Transceiver**




* Recommended choke is Siemens Matsushita B78108-S1153-K or B78148-S1153-K ($Q_{min}$=60, max. DC resistance=0.6 Ohm).

The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module $V_{CC}$–RX/$V_{CC}$–TX. A $V_{EE}$ plane under the module is required for good EMI and sensitivity performance. Studs should be connected to this $V_{EE}$ plane.

The transceiver contains an automatic shutdown circuit. Reset is only possible if the power is turned off, and then on again. $V_{CC}$TX switched below $V_{TH}$.

Further application notes for electrical interfacing are available upon request. Ask for Appnote 82.

Application board available on request.

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