

## ESCON/SBCON Multimode SFF MT-RJ Transceiver

### Product Facts

- Fully compliant with ANSI X3.296-1997 SBCON
- Complies with IBM Enterprise Systems Connection (ESCON) architecture
- Single +3.3V power supply
- Complies with Small Form Factor (SFF) Multi-Source Agreement (MSA)
- High-density MT-RJ connector interface
- High reliability 1300 nm optics
- PECL and LVPECL compatible data interface
- Wave Solder and Aqueous Wash compatible
- UL 60950 recognized



Tyco Electronics' ESCON/SBCON SFF MT-RJ Transceiver 1382345-1 is an LED based 1300 nm fiberoptic transceiver module intended for use in ESCON and SBCON applications. The transceiver sends and receives pre-encoded data over a pair of 62.5  $\mu\text{m}$  or 50  $\mu\text{m}$  core multimode optical fibers. The module, which operates from a single +3.3V power supply, contains separate transmitter and receiver sections with PECL and LVPECL compatible data interfaces.

Technological advancements in precision optical design and ASIC design have enabled Tyco Electronics to produce low cost SFF transceivers. Package style is the multi-sourced 2 x 5 DIP style with integral MT-RJ connector interface. This new small form factor is approximately half the width of a duplex SC 1 x 9 module,

providing an effective center line spacing of 0.55-inches from port to port, allowing the equipment designer to double the port density of a given product. The transceiver has a DC-coupled data interface that provides the highest degree of flexibility for use in a wide variety of circuit architectures. It has been extensively tested to comply with ANSI X3.296-1997 SBCON. Tyco Electronics also offers a wide variety of Small Form Factor (SFF) and Small Form-factor (SFP) transceivers in both singlemode and multimode.

The transceiver module meets Class 1 Eye Safety requirements, as defined by IEC 60825-1. The module has been designed with grounding and shielding features that minimize EMI susceptibility and radiated emissions. Units are supplied with process plugs.

**ESCON/SBCON Multimode SFF MT-RJ Transceiver (Continued)**

**ESCON/SBCON Multimode SFF MT-RJ Transceiver**

**Part Number  
1382345-1**

**Transmitter Performance Specifications:**

( $T_c=0$  to  $70^\circ\text{C}$ ,  $V_{CC}-V_{EE}=3.135$  to  $3.465\text{V DC}$ )

Parameter	Symbol	Notes	Min	Typ	Max	Units
Data Rate (NRZ)	B	—	8	—	200	Mb/s
Optical Output (avg.)	$P_{OUT}$	1,2	-19.5	—	-15	dBm
Extinction Ratio	—	3	8	—	—	dB
Optical Power at Logic Low "0" State	$P_{OUT}("0")$	—	—	—	-45	dBm
Center Wavelength	$\lambda_{OUT}$	4	1280	1320	1380	nm
Spectral Width (FWHM)	$\Delta\lambda$	4	—	130	175	nm
Total Jitter	$t_{TJ}$	5	—	—	.8	ns
Output Rise Time	$t_{TLH}$	4,6	—	1.2	1.7	ns
Output Fall Time	$t_{THL}$	4,6	—	1.2	1.7	ns
Data Input Voltage Levels	$V_{IL}$ $V_{IH}$	7,8 7,8	$V_{CC}-1.84$ $V_{CC}-1.17$	—	$V_{CC}-1.45$ $V_{CC}-0.880$	V V
Data Input Current Levels	$I_{IL}$ $I_{IH}$	— —	-350 -10	—	10 350	$\mu\text{A}$ $\mu\text{A}$
Power Supply Voltage	$V_{CC} - V_{EE}$	—	3.135	3.3	3.465	V
Supply Current	$I_{CC}$	—	—	—	120	mA
Operating Temperature	$T_c$	—	0	—	70	$^\circ\text{C}$

Note: All optical measurements made through a short patch cable, between 2 and 5 meters in length, using 62.5  $\mu\text{m}$  multimode fiber unless stated otherwise.

1. Meets Class I LED safety requirements of IEC 60825-1 when operated within the specified temperature and power supply ranges. Transmitter optical output power measured per TIA/EIA 455-95.
2. Specification applies to 0.275 NA 62.5/125  $\mu\text{m}$  multimode fiber.
3. Extinction ratio measured per TIA/EIA 526-4A with a repeating K28.7 data pattern.
4. The output rise and fall time and spectral performance conform to ANSI X3.296-1997 SBCON.
5. Driven with a differential signal.
6. Measured from 20% to 80% points on rising and falling edge of transmitted waveform.
7. When  $V_{BB}$  is used as the reference voltage.
8. Configured for LVPECL. Compatible with 10 K, 10 KH and 100 K ECL and PECL.

**ESCON/SBCON Multimode SFF MT-RJ Transceiver (Continued)**

**ESCON/SBCON Multimode SFF MT-RJ Transceiver**

**Part Number  
1382345-1**

**Receiver Performance Specifications:**

( $T_c=0$  to  $70^\circ\text{C}$ ,  $V_{cc}-V_{ee}=3.135$  to  $3.465\text{V DC}$ )

Parameter	Symbol	Notes	Min	Typ	Max	Units
Data Rate (NRZ)	B	—	8	—	200	Mb/s
Optical Input (avg.) Sensitivity	$P_{IN}$	1	—	—	-33	dBm
Saturation Level	—	—	—	—	-14	dBm
Optical Wavelength	$\lambda_{IN}$	—	1280	—	1380	nm
Systematic Jitter	$t_{SJ}$	—	—	—	2	ns
Random Jitter	$t_{RJ}$	—	—	—	0.6	ns
Output Rise Time	$t_{TLH}$	2	—	—	1.3	ns
Output Fall Time	$t_{THL}$	2	—	—	1.3	ns
Output Voltage Levels	$V_{OH}$ $V_{OL}$	3 3	$V_{cc}-1.1$ $V_{cc}-1.86$	—	$V_{cc}-0.86$ $V_{cc}-1.620$	V V
Signal Detect Output Voltage	SD					
Assert	$V_A$	3	$V_{cc}-1.1$	—	$V_{cc}-0.86$	V
Deassert	$V_D$	3	$V_{cc}-1.86$	—	$V_{cc}-1.620$	V
SD Power Levels (avg.)						
Assert	$P_A$	—	—	—	-36	dBm
Deassert	$P_D$	—	-45	—	—	dBm
Hysteresis	—	—	.5	—	4	dB
SD Delay Time						
Assert	—	—	0	—	100	$\mu\text{s}$
Deassert	—	—	0	—	350	$\mu\text{s}$
Power Supply Voltage	$V_{CC} - V_{EE}$	—	3.135	3.3	3.465	V
Supply Current	$I_{CC}$	—	—	—	110	mA
Operating Temperature	$T_c$	—	0	—	70	$^\circ\text{C}$

Note: All optical measurements made through a short patch cable, between 2 and 5 meters in length, using 62.5  $\mu\text{m}$  multimode fiber unless stated otherwise.

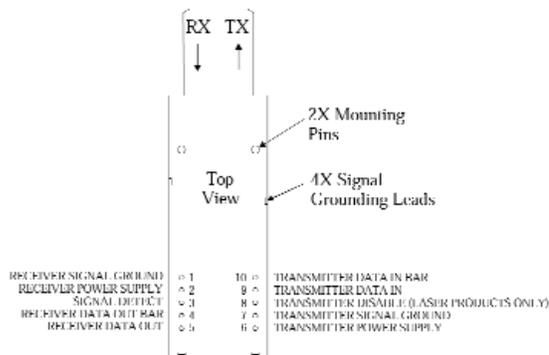
1. Receive Sensitivity measured at, or extrapolated to, 10E - 12 BER using a 200 MBd input signal with a 2<sup>7</sup>-1 code pattern.
2. Receiver electrical output rise and fall times measured from 20 to 80% points on rising and falling edge of waveform with 50 ohm load to  $V_{cc} - 2\text{V}$ .
3. Measured with a 50 ohm load to  $V_{cc} - 2\text{V}$ .

**Absolute Maximum Ratings:**

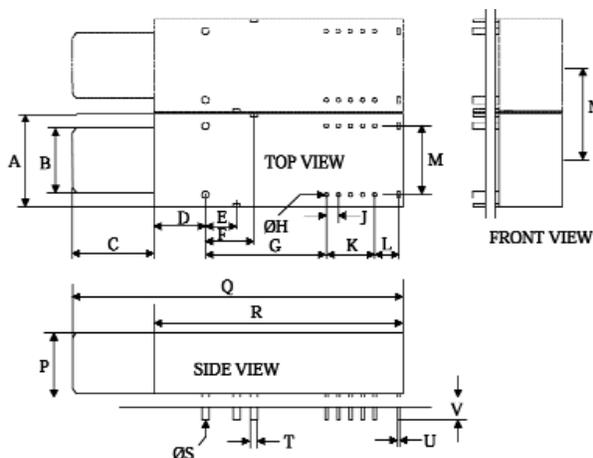
Parameter	Symbol	Units	Min	Max
Storage Temperature	$T_s$	$^\circ\text{C}$	-40	85
Lead Soldering Limits/Time	—	$^\circ\text{C/s}$	—	240/10
Data Input Voltage	$V_{INPUT}$	V	-0.5	$V_{cc}$
Differential Input Voltage	$V_{DIFF}$	V	—	2.0
Supply Voltage	$V_{CC}-V_{EE}$	V	-0.2	5.0

**ESCON/SBCON Multimode SFF MT-RJ Transceiver (Continued)**

**Transceiver Pin Descriptions**



**Package Outline Drawing**



**Notes:**

1. This figure describes the package outline, mounting studs, pins and their relationships to each other.
2. Toleranced to accommodate round or rectangular leads.
3. All 12 pins and posts are to be treated as a single pattern.
4. The MT-RJ optical connector has a 750 µm fiber spacing.
5. Refer to the MT-RJ Transceiver Pin Out Diagram for additional information.
6. This transceiver is supplied with an EMI gasket that fits onto the nose-piece and ensures an intimate fit between the nose-piece and the MSA defined customer front panel cut-out shown in Figure 4. Please refer to the Tyco Electronics' Customer Drawing number 1382345-1 for additional details on these gasket dimensions.

	Millimeters			Inches				Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.		Min.	Typ.	Max.	Min.	Typ.	Max.
A			13.59			0.535	L		3.56			0.140	
B		9.53			0.375		M		10.16			0.400	
C		12.40			0.488		N	13.97			0.550		
D		7.59			0.299		P		9.53			0.375	
E		4.57			0.180		Q		48.72			1.918	
F		7.11			0.280		R		36.42			1.434	
G		17.78			0.700		ØS	0.97		1.07	0.038		0.042
ØH	0.41		0.61	0.016		0.024	T		1.02			0.040	
J		1.78			0.070		U		0.25			0.010	
K		7.12			0.280		V		3.30			0.130	

**Important:** PLEASE SEE THE TYCO ELECTRONICS' CUSTOMER DRAWING 1382345-1 FOR TRANSCEIVER HOUSING DIMENSIONS AND TOLERANCES. DRAWINGS CAN BE OBTAINED ON OUR WEBSITE AT: <http://www.tycoelectronics.com> OR CALL TYCO ELECTRONICS' FAX SERVICE AT 1-800-522-6752.

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## ESCON/SBCON Multimode SFF MT-RJ Transceiver (Continued)

### Pin-Out Description:

Symbol	Pin No.	Function
Two Front Mounting Studs		Provided for mechanical attachment to the PCB and ensure mechanical strength. The holes on the PCB that they attach to must be connected to chassis ground.
Four Holes for Signal Grounding Leads		Connect to signal ground.
V <sub>EEr</sub>	1	Receiver Signal Ground. Connect to receiver signal ground plane.
V <sub>CCr</sub>	2	Receiver Power Supply.
SD	3	Signal detect. Normal Operation: Logic "1" Output. Fault Condition: Logic "0" Output.
RD-	4	Received Data Out Bar. No internal terminations are provided.
RD+	5	Received Data Out. No internal terminations are provided.
V <sub>CCt</sub>	6	Transmitter Power Supply.
V <sub>EEt</sub>	7	Transmitter Signal Ground.
V <sub>DIS</sub>	8	No internal connection is provided. Transmitter Disable Input. Optional feature for laser based products only.
TD+	9	Transmitter Data In and Data In Bar. No internal terminations are provided. See recommended circuit schematic.
TD-	10	Transmitter Data In Bar. No internal terminations are provided. See recommended circuit schematic.

#### Note:

1. V<sub>EEr</sub> and V<sub>EEt</sub> are connected together inside the transceiver module.

### Regulatory Compliance:

Agency	Test Method	Listing Document
TUV	EN60825-1:1994_A11:1996 EN60825-2:1994+A1 EN60950:1992+A1+A2+A3+A4+A11	TUV Product Services LED Class I Protection Class III TUV Certification Number: B020546940002
UL/  US	UL60950	E141081

### ESD Testing:

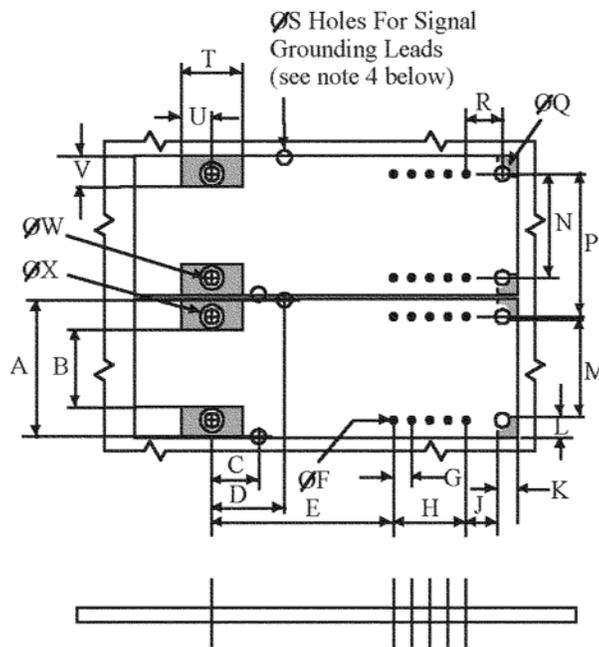
Test	Test Method	Procedure
ESD1	JEDEC/EIA JESD22-A114-A (C=100 pF, R=1500 ohm - Human body model)	Pulses applied to each pin and Ground at 1 KV
ESD2	25 KV maximum air discharge (simulates human body discharge into a DUT)	40 discharges are applied per DUT (10 at each of the top, nose, right, and left). Each module is tested with both power ON and OFF.

### Related Documents:

ESCON/SBCON Multimode SFF MT-RJ Transceiver Application Specification #114-13083

**ESCON/SBCON Multimode SFF MT-RJ Transceiver (Continued)**

**Figure 3: MSA Recommended Circuit Board Layout**



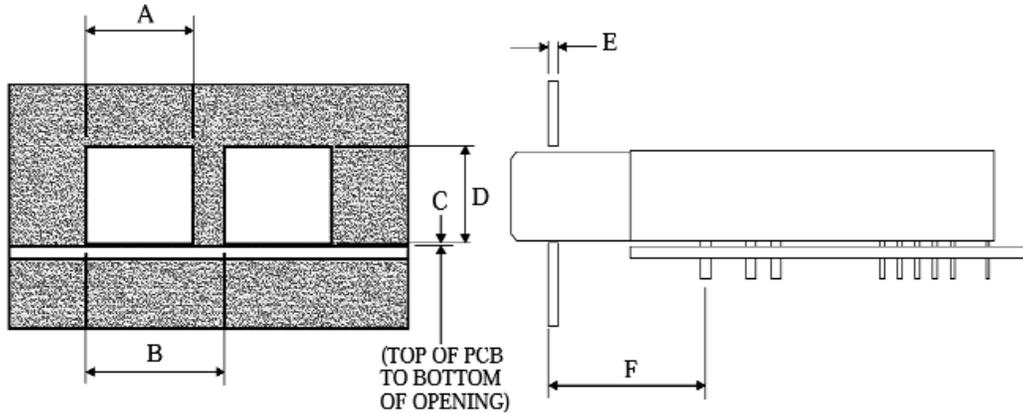
**Notes:**

1. This figure describes the recommended circuit board layout for the MT-RJ Transceiver placed at a 0.550 inch spacing.
2. The shaded areas are keep-out areas reserved for housing standoffs. No metal traces or Ground connection in keep-out areas.
3. The 10 pin module implementation requires only 16 PCB holes.
4. These four holes for signal grounding leads must be connected to signal ground on the PCB.
5. Solder Posts should be soldered to the PCB for mechanical strength and these PCB holes should be connected to chassis ground.

	Millimeters			Inches				Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.		Min.	Typ.	Max.	Min.	Typ.	Max.
A		13.34			0.525		M		9.59			0.378	
B		7.59			0.299		N		10.16			0.400	
C		4.57			0.180		P	13.97			0.550		
D		7.11			0.280		ØQ			2.29			0.090
E		17.78			0.700		R		3.56			0.140	
ØF	0.71	0.81	0.91	0.028	0.032	0.036	ØS	1.3	1.4	1.5	0.051	0.055	0.059
G		1.78			0.070		T		6.00			0.236	
H		7.12			0.280		U		3.00			0.118	
J		3.08			0.121		V		3.00			0.118	
K		2.00			0.079		ØW	1.3	1.4	1.5	0.051	0.055	0.059
L		2.00			0.079		ØX			2.29			0.090

**ESCON/SBCON Multimode SFF MT-RJ Transceiver (Continued)**

**Figure 4: MSA Recommended MT-RJ Front Panel Opening**



	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	10.70	10.80	10.90	0.421	0.425	0.429
B	13.97			0.550		
C		0.25			0.010	
D	9.70	9.80	9.90	0.382	0.386	0.390
E		1.00			0.039	
F	15.50		16.25	0.610		0.640