

## RCLED-Based 650 nm Fiber Optic Transceiver Solution in Lensed Side-Looker Encapsulation



### FEATURES

- Meets the IEEE 1394b S200 (250 Mbps) specification
- Resonant cavity LED
- Small emission aperture
- Narrow emission beam characteristics
- Integrated optical lens
- Narrow spectral width
- Low power consumption
- Emits at red 650 nm wavelength conforming to current plastic fiber standards
- Housed in Firecomms exclusive *Side-Looker* package with integrated optics to efficiently focus and direct light
- Provided in IDB 1394 form factor and suitable for SMI and IDB 1394 Automotive Connector form factors

### DESCRIPTION

Firecomms' RCLED-based 650 nm fiber optic transceiver (FOT) solution is designed for maximum speed in IEEE 1394b S200 POF (plastic optical fiber) applications. This FOT solution pairs Firecomms' RCLED (resonant cavity light emitting diode) technology with a 250 Mbps receiver in a new package design that complies with the emerging IDB 1394 standard. The integration of the FOT pair in a 50 meter POF link provides for a high-integrity link with an attenuation overhead in excess of 3 dB.

### APPLICATIONS

Application	Standard	Distance	Speed
Automotive	IDB 1394	18 meters	250 Mbps
Home/Office Network	IEEE 1394b S100/Ethernet	100 meters	125 Mbps
Home/Office Network	IEEE 1394b S200	50 meters	250 Mbps

FC300R/FC300D (Preliminary) Revision C

Firecomms assumes no responsibility for inaccuracies or omissions in the information contained in this document. Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein.

## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Minimum	Maximum	Unit	Test Condition
Storage Temperature	$T_{stg}$	-40	95	°C	
Operating Temperature	$T_{op}$	-40	85	°C	
Soldering Temperature <sup>[1]</sup>			260	°C	10 s. cycle time
RCLED Forward Current	$I_F$		100	mA	
RCLED Reverse Voltage	$V_R$		5	V	
RCLED Power Dissipation	$P_{TOT}$		200	mW	
ROSA Power Supply	$V_{CCMax}$		4.5	V	

## RCLED TOSA OPTICAL AND ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Minimum	Typical <sup>[2]</sup>	Maximum	Unit	Test Condition
Transmitted Optical Power, 1 mm POF, 25°C <sup>[3]</sup>	$P_o$	-4.5	-1.5	-0.5	dBm	$I_f = 20$ mA
Transmitted Optical Power, 1 mm POF, -40 to +70°C <sup>[3]</sup>	$P_o$	-8.0		1.5	dBm	$I_f = 20$ mA
Transmitted Optical Power, 1 mm POF, -40 to +85°C <sup>[3]</sup>	$P_o$	-10.0		1.5	dBm	$I_f = 20$ mA
Numerical Aperture	NA		0.35			$I_f = 20$ mA
Unpeaked Optical Rise Time (20 to 80%)	$\tau_R$			2.0	ns	$I_f = 20$ mA
Unpeaked Optical Fall Time (80 to 20%)	$\tau_F$			2.0	ns	$I_f = 20$ mA
Peak Wavelength	$\lambda$	640	650	660	nm	$I_f = 3$ mA
Spectral Width	$\Delta\lambda$		20		nm	Full width at half maximum
Forward Voltage	$V_f$	1.8	2.0	2.2	V	$I_f = 20$ mA
Data Rate	$f_{data}$		250		Mbps	$I_f = 30$ mA, NRZ
Diode Capacitance	$C_o$		5		pF	$V_f = 0$ V, $f = 1$ MHz

FC300R/FC300D (Preliminary) Revision C

Firecomms assumes no responsibility for inaccuracies or omissions in the information contained in this document. Specifications are subject to change without notice.

No patent rights are granted to any of the circuits described herein.

### RCLED TOSA THERMAL CHARACTERISTICS

Parameter	Symbol	Minimum	Typical <sup>[2]</sup>	Maximum	Unit	Test Condition
Temperature Coefficient-Wavelength	$d\lambda/dT$		-0.082		nm/°C	Drive current 20 mA
Variation in Transmitted Optical Power, 1 mm POF, -40 - +70°C	$\Delta P_o$		6		dBm	Drive current 20 mA
Forward Voltage Temperature Coefficient	$dV_f/dT$		-1.75		mV/°C	

### ROSA OPTICAL AND ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Minimum	Typical <sup>[2]</sup>	Maximum	Unit	Test Condition
Power Supply	$V_{CC}$	3.05	3.3	3.55	V	
Common Mode Output Voltage	$V_{CM}$	1.8		2.02	V	
Supply Current (no loads)	$I_{CC}$		30	42	mA	
Power Supply Rejection Ratio (<4 MHz)	$PSRR$	35			dBm	
Bandwidth	$BW$		200		MHz	
Pulse Width Distortion	$T_{PWD}$			6	%	
Differential Output Voltage	$V_D$		600		mV	
Output Impedance	$R_{OUT}$		50		$\Omega$	
Optical Sensitivity (BER=10 <sup>-12</sup> )	$S$	-24	-22	-20	dBm	
Rise/Fall Time (20-80%)	$t_r, t_f$			2	nS	

#### Notes:

- 1.6 mm below seating plane.
- Typical data measured at 25°C unless otherwise specified.
- Optical power measured at the end of 50 cm of 1 mm step index POF with an NA = 0.5.

#### FC300R/FC300D (Preliminary) Revision C

Firecomms assumes no responsibility for inaccuracies or omissions in the information contained in this document. Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein.

APPLICATION CIRCUITS

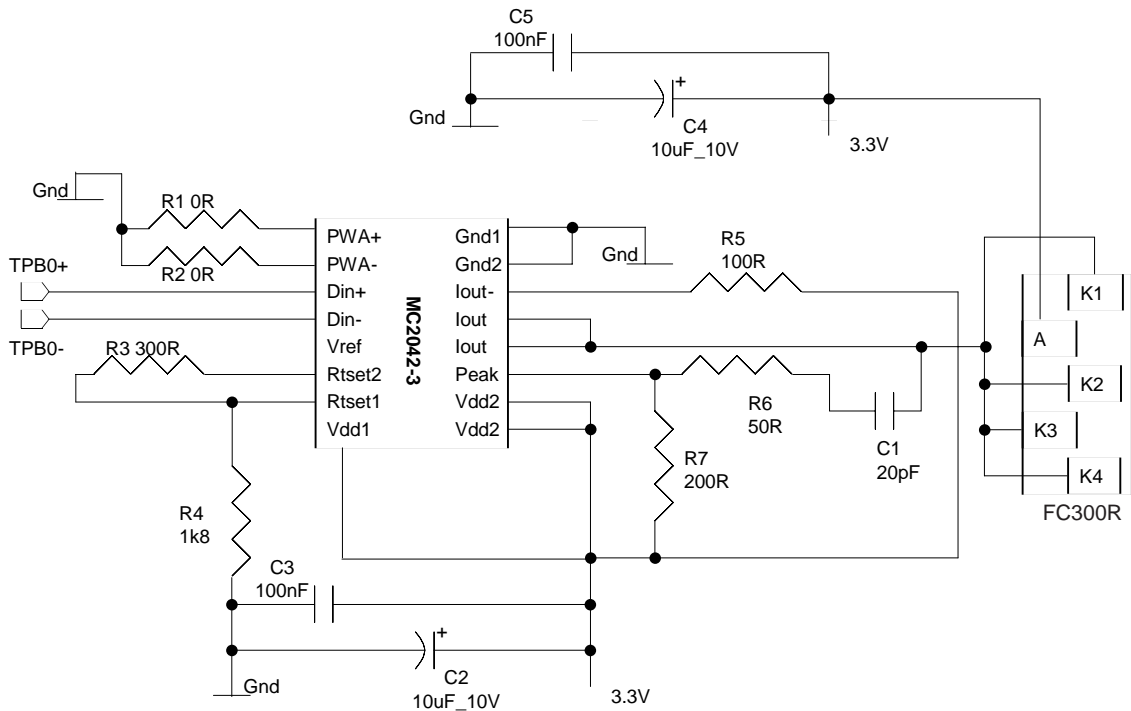


Figure 1. Transmit Circuit.

Ensure that the Phy Port is configured to be beta (Optical) only. Refer to Phy Chip applications notes. Refer also to Texas Instruments Application Report SGZA001A.

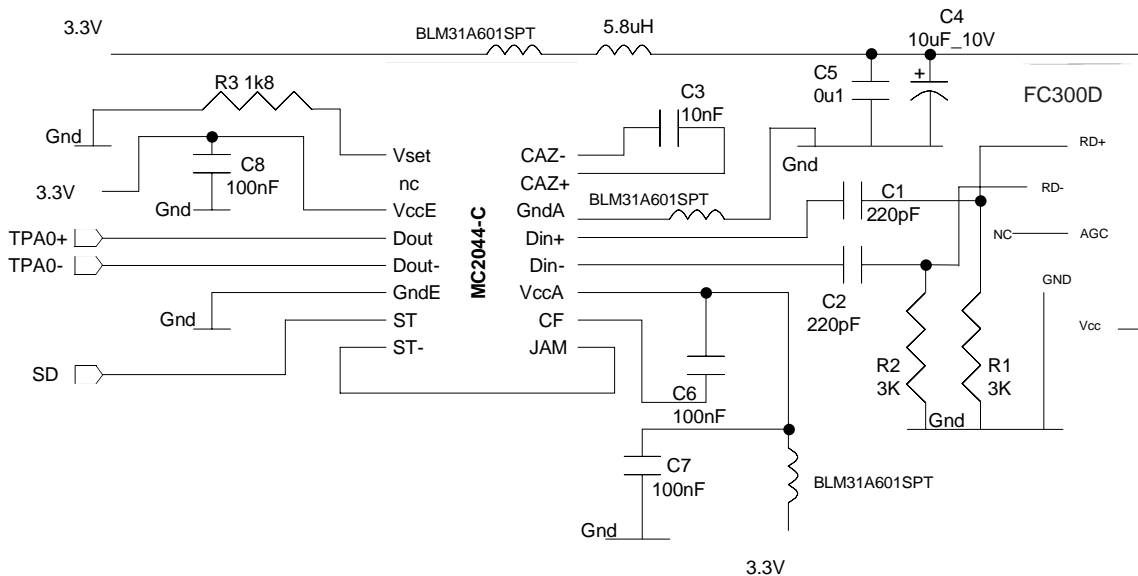


Figure 2. Receive Circuit.

Ensure that the Phy Port is configured to be beta (Optical) only. Refer to Phy Chip applications notes. Refer also to Texas Instruments Application Report SGZA001A.

FC300R/FC300D (Preliminary) Revision C

Firecomms assumes no responsibility for inaccuracies or omissions in the information contained in this document. Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein.

## DEVELOPMENT BOARDS

Firecomms offers development boards on which the transmit and receive application circuits have been implemented.

## MECHANICAL DATA

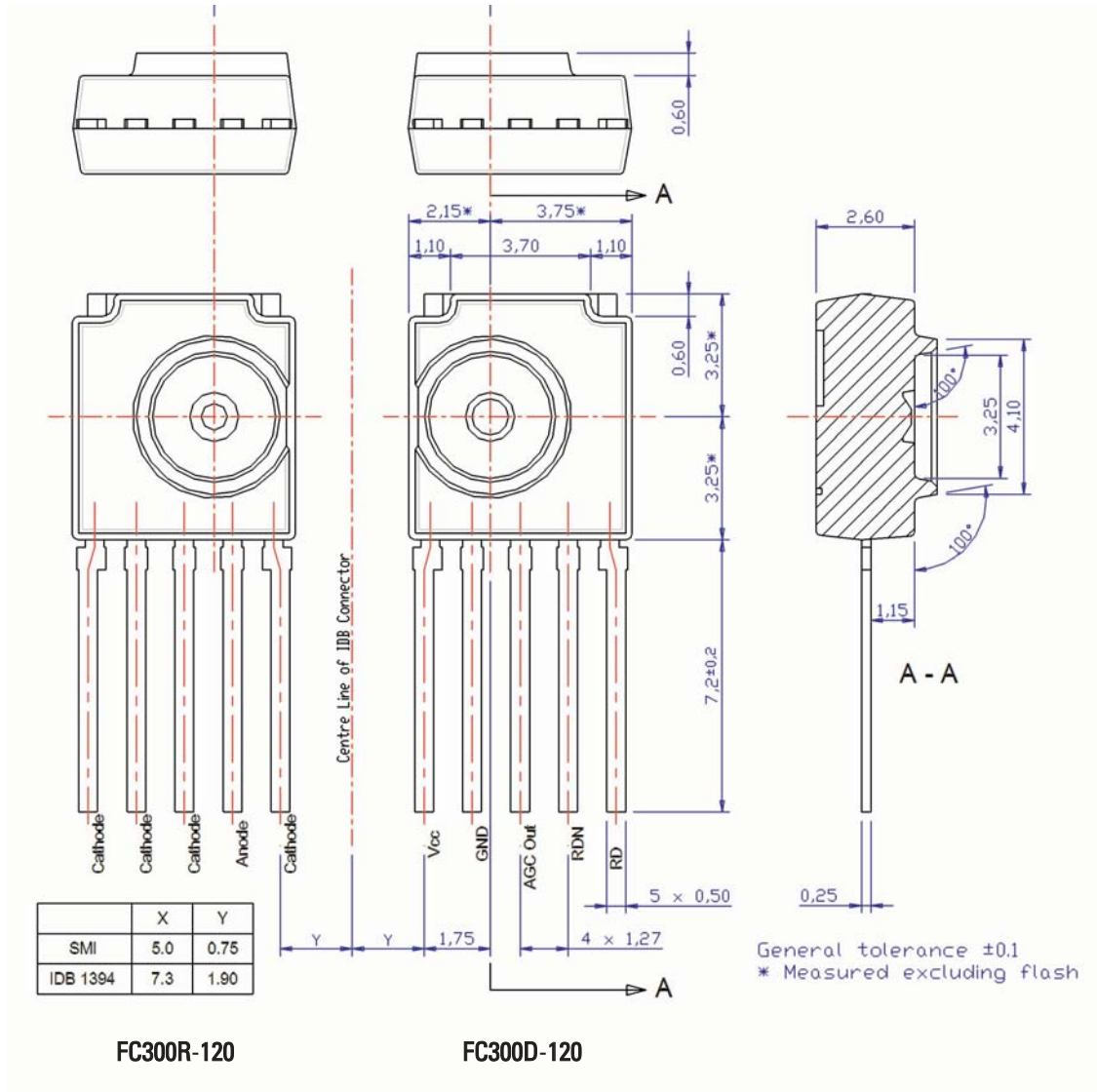
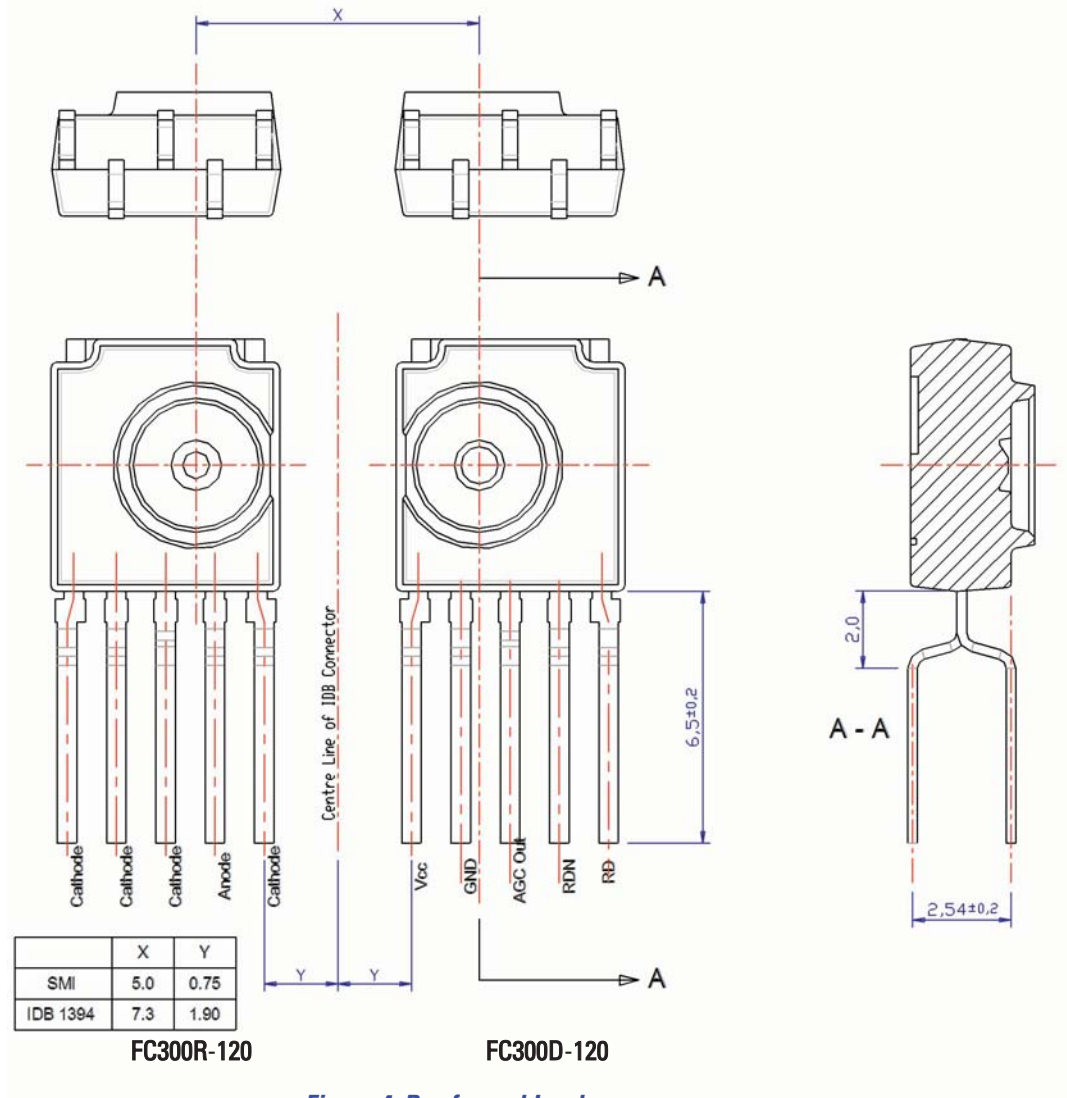


Figure 3. Straight Leads.

**Notes:**

- A. The metal projections at the top corners of the package are internally connected and should not come into electrical contact with any other circuit board.
- B. The alignment ring (diameter 3.25/4.10) is the primary reference for alignment of the fiber.

FC300R/FC300D (Preliminary) Revision C  
 Firecomms assumes no responsibility for inaccuracies or omissions in the information contained in this document. Specifications are subject to change without notice.  
 No patent rights are granted to any of the circuits described herein.



**Figure 4. Pre-formed Leads.**

**Notes:**

- A. The metal projections at the top corners of the package are internally connected and should not come into electrical contact with any other circuit board.
- B. The alignment ring (diameter 3.25/4.10) is the primary reference for alignment of the fiber.

## ORDERING INFORMATION

Part Number	Name	Description
FC300R-100	650 nm RCLED TOSA	Transmitter, straight leads (see Figure 3)
FC300R-120	650 nm RCLED TOSA	Transmitter, pre-formed leads (see Figure 4)
FC300D-100	ROSA	Receiver, straight leads (see Figure 3)
FC300D-120	ROSA	Receiver, pre-formed leads (see Figure 4)
FC300K-100	Kit, Straight Leads	Includes TOSA (FC300R-100) and ROSA (FC300D-100)
FC300K-120	Kit, Pre-Formed Leads	Includes TOSA (FC300R-120) and ROSA (FC300D-120)

Copyright (c) 2004, 2005 Firecomms Ltd.  
 FC300R/FC300D (Preliminary) Revision C  
 Firecomms assumes no responsibility for inaccuracies or omissions in the information contained in this document. Specifications are subject to change without notice.  
 No patent rights are granted to any of the circuits described herein.

  
 Photonic Communications Technology