



DC-5 MBd Fiber Optic Receiver with TTL interface and dual voltage rail operation

FEATURES

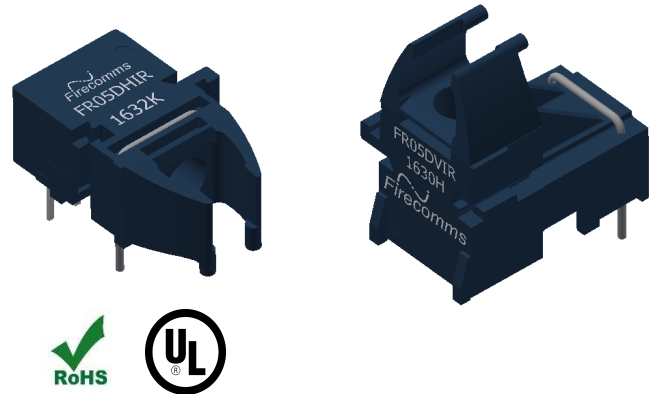
- Designed for use with plastic optical fiber (POF)
- Optimized for data transmission from DC to 5 MBd
- Industrial temperature range -40 °C to +85 °C
- RoHS and UL compliant
- Flame retardant (UL 94 V-0) connector housings
- TTL/CMOS compatible output for ease of design
- Dual Operating Voltage 3.3 V and 5 V.
- Low pulse width distortion
- Compatible with Versatile Link cables and connectors

APPLICATIONS

Table 1 APPLICATIONS	
Application	Motor Control, Voltage Isolation, Drives, Inverters, Industrial Control, Gaming, Medical Imaging.
Standard	Low-speed serial RS232, RS485, CAN Bus, Modbus,
Distance	50 meters Step Index (SI) POF in typical operating conditions 30 meters in worst case conditions ^[1]
Speed	DC to 5 MBd (NRZ)

Note:

1. Depending on the installation conditions.



DESCRIPTION

The Firecomms DC to 5 MBd RedLink receiver is based on a fully integrated photo-diode with TIA and limiting amplifier.

Housed in non-conducting plastic RedLink connector housings, the receiver is blue in colour. The housing is compatible with the Versatile Link style fiber plug, and is designed primarily for use with Plastic Optical Fiber (POF).

The receiver operates equally at both the standard 3.3 V and 5 V DC supply rail voltages. It operates over the industrial temperature range of -40 °C to +85 °C supporting many industrial applications where a reliable command and control response is required in electrically harsh environments.

The integrated receiver (photodiode, transimpedance amplifier (TIA) and limiting amplifier in a single IC) has enhanced immunity to EMI and EMC from the local environment making the unit ideal for use in electrically noisy applications. It has a single push/pull voltage data output compatible with TTL/CMOS electronics. The receiver is typically used over POF in industrial serial bus protocol links.

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SPECIFICATIONS

Table 2
DC-5 MBd OPEN COLLECTOR RECEIVER ABSOLUTE MAXIMUM RATINGS

These are the absolute maximum ratings at or beyond which the FOT can be expected to be damaged.

Notes:

- 260 °C for 10 sec, one time only, at least 2.2 mm away from lead root.*

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	T _{stg}	-40	+85	°C
Operating Temperature	T _{op}	-40	+85	°C
Soldering Temperature ^[1]	T _{slid}		+260 ^[1]	°C
Supply Voltage	V _{cc}	-0.5	5.5	V
RX Output Current	I _o		25	mA

Table 3
DC-5 MBd OPEN COLLECTOR RECEIVER REGULATORY COMPLIANCE

Parameter	Symbol	Standard	Level
Electrostatic Discharge, Human Body Model (contact ESD)	HBM	Mil-STD-883	Level 2 (4 kV)
UL Certification	UL	UL	Files No. (Pending)
Radiated Emissions Immunity	Vm ⁻¹	IEC 61000-4-3	15 Vm ⁻¹
Storage Compliance	MSL	J-STD-020D	2a (4-week floor life)
Restriction of Hazardous Substances Directive	RoHS	Directive 2011/95/EU	Certified compliant
Eye Safety		IEC 60825-1	LED Class 1

SPECIFICATIONS, Handling

Firecomms 5 MBd RedLink devices are color coded, receivers are blue. These devices are auto-insertable and are tested for handling in static controlled assembly processes (HBM). Cleaning, degreasing and post solder washing should be carried out using standard solutions compatible with both plastics and the environment. For example, recommended solutions for degreasing are alcohols (methyl, isopropyl and isobutyl). In the soldering process, non-halogenated water soluble fluxes are recommended. RedLink products are not suitable for use in reflow solder processes (infrared/vapor-phase reflow). The dust plug should be kept in place during soldering, washing and drying processes to avoid contamination of the active optical area of each connector.

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SPECIFICATIONS

Table 4
RECEIVER ELECTRICAL AND OPTICAL CHARACTERISTICS

Test Conditions:

1. Wake up Delay is the delay from $V_{CC} > 2.75\text{ V}$ to when the output will respond correctly to optical input. Output is held in tristate before this time.
2. Test data was validated over the full temperature range of $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$, and over both supply rail voltage options of 5 V and $3.3\text{ V} \pm 10\%$ and over the input optical received power as specified by P_{RH} and P_{RL} . Input power levels are for peak (not average) optical input levels. For 50% duty cycle data, peak optical power is twice the average optical power. Data referred to as typical are rated at $+25\text{ }^{\circ}\text{C}$.
3. Testing in the recommended receiver circuit ($R_I = 50\text{ k}\Omega$, $C_{I(\text{total})} = 15\text{ pF}$)
4. Optical signal from the recommended Transmitter circuit. Estimated value measured from junction to PC board solder joint for horizontal mount package.
5. PWD for Optical Input of 50 MBd, NRZ 2⁷-1 (PRBS7) data, resulting in a BER $\leq 10^{-9}$.
6. For an Optical Power High (OPH) range of -20 to $+2\text{ dBm}$ the Pulse Width Distortion (PWD) is $\pm 4\text{ ns}$
7. PWD for 1st to 3rd pulse is characterized with minimum Optical Input pulse width of 20 ns, with the 1st pulse being the worst case. For pulses $> 20\text{ ns}$ the PWD will be less. If data rate $< 1\text{ MBd}$, then the pulse width distortion = PWD 1st to 3rd pulse.
8. Pins 5 and 8 are used for mounting and retaining purposes. It is required that pins 5 and 8 be connected to ground.
9. Pin 4 is electrically isolated internally. Pin 4 may be externally connected to pin 1 for board layout compatibility with existing designs. Otherwise it is recommended pin 4 be grounded as in Figure 3.

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Supply Current	I_{CC}	10	11	15	mA	$P_R = -1$ to -22 dBm , [2,3,4]
Wake Up Delay (power up)	$t_{\text{power-on}}$		40		μs	[1]
High Level Output Voltage	V_{OH}	V_{CC} – 0.05		V_{CC}	V	$I_{OH\text{-max}} = 40\text{ }\mu\text{A}$, [2]
Low Level Output Voltage	V_{OL}	0		0.05	V	$I_{OL\text{-max}} = 1.6\text{ mA}$, [2]
Optical Power High	P_{RH}	-22		+2	dBm	[2,3]
Optical Power Low	P_{RL}			-40	dBm	[2,3]
Data Rate		DC		5	Mbd	Min UI = 200 ns, Max f = 2.5 MHz
Output Rise Time (10/90%)	t_r		5	10	ns	[2,3,4]
Output Fall Time (10/90%)	t_f		5	10	ns	[2,3,4]
Pulse Width Distortion	PWD	-10	5	+10	ns	[2,3,5,6]
Propagation Delay Low to High	$t_{\text{PropDly-LH}}$		18	50	ns	[2,3,5,7]
Propagation Delay High to Low	$t_{\text{PropDly-HL}}$		18	50	ns	

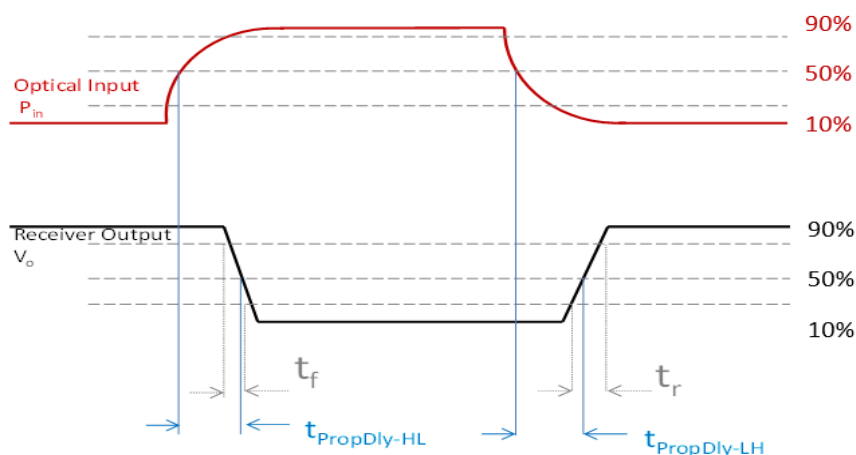


FIGURE 1
Definition of receiver Propagation Delay, rise and fall times (Inverting Receiver).

APPLICATION CIRCUIT

Table 5 RECEIVER PIN DESCRIPTION		
Pin	Name	Symbol
1	Receiver Output	V_o
2	Receiver Ground	GND
3	Receiver VCC	VCC
4	NO CONNECT	N/C
5	Retaining Pin	N/C
8	Retaining Pin	N/C

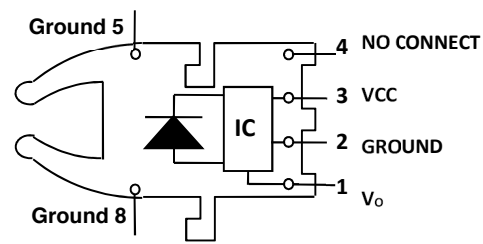


FIGURE 2
Receiver pin numbering

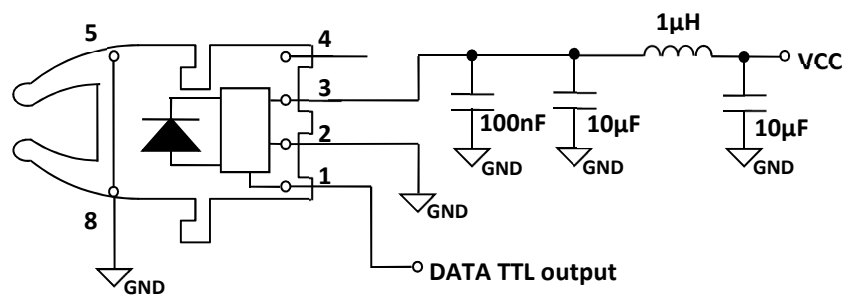


FIGURE 3
Recommended receiver interface circuit.

MECHANICAL DATA, Horizontal

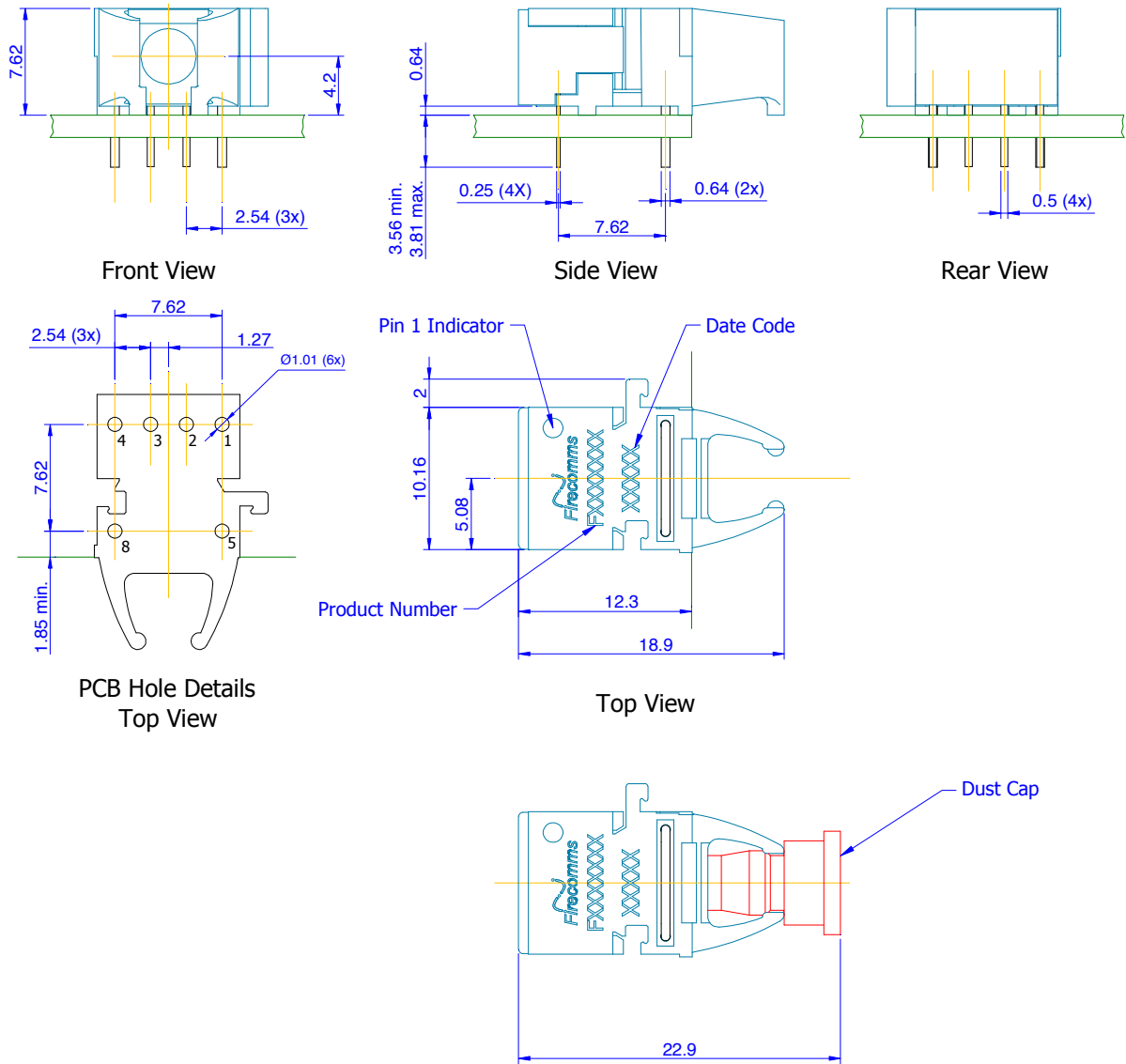


FIGURE 4
 Mechanical dimensions of the Horizontal 5 Mbd RedLink connector and PCB footprint, which is a top view.
 General dimensional tolerance is ± 0.2 mm.

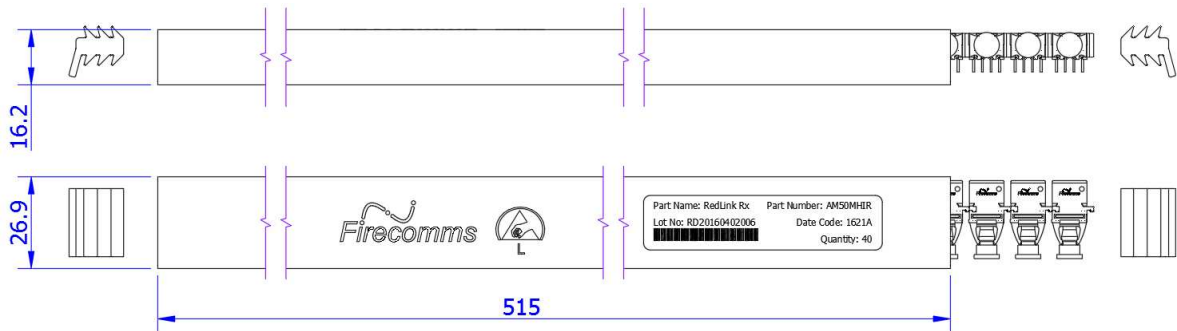


FIGURE 5
 Packing tube for Firecomms 5 Mbd Horizontal receiver

MECHANICAL DATA, Vertical

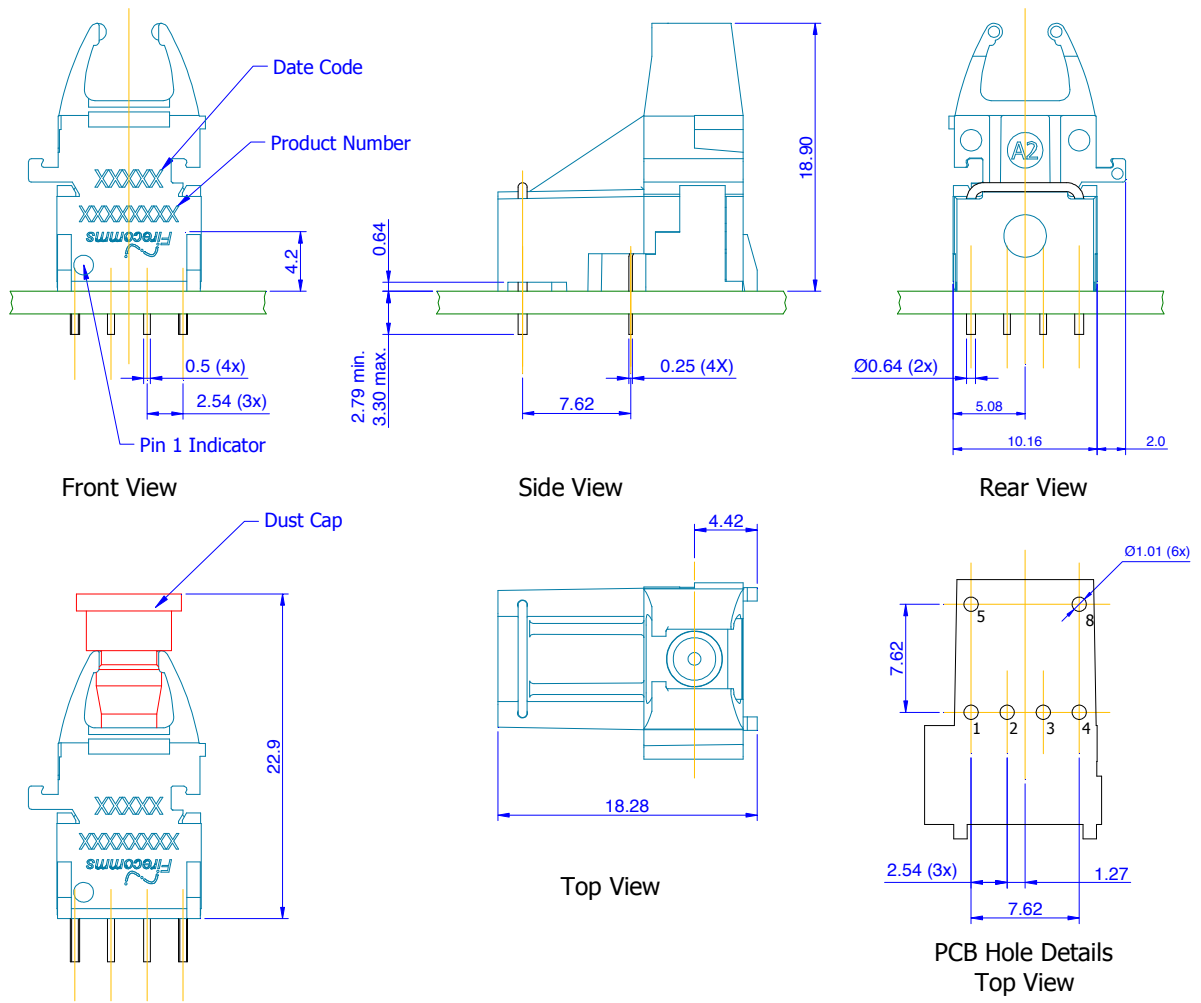


FIGURE 6
Mechanical dimensions of the Vertical 5 Mbd RedLink connector and PCB footprint, which is a top view. General dimensional tolerance is ± 0.2 mm.

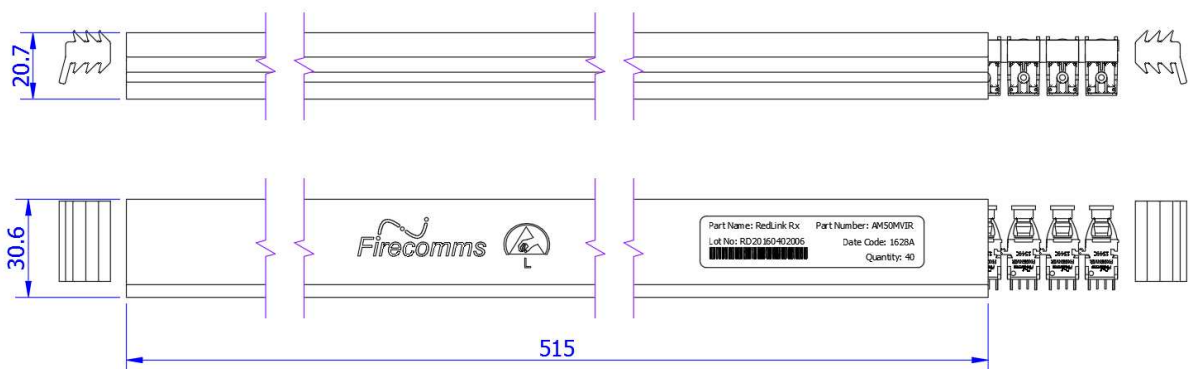


FIGURE 7
Packing tube for Firecomms 5 Mbd Horizontal receiver

PACKING INFORMATION

Components are packed in PVC anti-static tubes in moisture barrier bags. Bags should be opened only in static-controlled locations, and standard procedures should be followed for handling moisture sensitive components.

Table 6 PACKING INFORMATION		
	Horizontal	Vertical
Components per Tube	40	40
Tube Length	515 mm	515 mm
Tube Height	16.2 mm	21.0 mm
Tube Depth	26.9 mm	30.8 mm
Tubes per Bag	5	5
Bags per Inner Carton	1	1
Inner Carton Length	630 mm	630 mm
Inner Carton Height	70 mm	70 mm
Inner Carton Depth	105 mm	105 mm
Weight per Inner Carton, Complete	0.48 Kg	0.66 Kg
Components per Inner Carton	200	200
Inner Cartons per Outer Carton	10	10
Outer Carton Length	650 mm	650 mm
Outer Carton Height	235 mm	235 mm
Outer Carton Width	376 mm	376 mm
Weight per Outer Carton, Complete	5.28 Kg	6.98 Kg
Components per Outer Carton	2,000	2,000

ORDERING INFORMATION

Table 7 ORDERING INFORMATION		
Part Number	Name	Description
FR05DHIR	5 MBd RedLink Receiver, Horizontal package with Dual voltage operation	DC to 5 MBd Receiver, with dual supply voltage operation, Blue Casing in a horizontal package
FR05DVIR	5 MBd RedLink Receiver, Vertical package with Dual voltage operation.	DC to 5 MBd Receiver, with dual supply voltage operation, Blue Casing in a vertical package

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