FR10MxIR

DC-10 RedLink® Fiber Optic Receiver

Data Sheet

DESCRIPTION

The Firecomms DC-10 MBd RedLink® receiver is a fully integrated photodiode and receiver IC. The receiver is housed in a miniature package to interface to plug-terminated lengths of Plastic Optic Fiber (POF) or 200 µm Plastic Clad Silica (PCS) fiber. When paired with the appropriate transmitter, the receiver is capable of delivering 10 MBd digital signals over fiber and operate in the temperature range of -40 °C to +85 °C.

The connector is a robust optical to electrical receiver with integrated pulse width distortion minimization circuitry for reliable data transmission. It features a push-pull 5V TTL compatible CMOS output which is typically used at 10 MBd over POF in industrial automation serial bus protocols.

FEATURES

- Visible RCLED at red wavelength (650 nm)
- Optimized for data transmission from DC to 10 MBd
- Ideal for use with POF and PCS fiber
- Industrial temperature range -40 °C to +85 °C
- RoHS compliant and flame retardant (UL 94 V-0) connector housings
- Low pulse width distortion
- Compatible with Versatile Link cables and connectors
- Horizontal and Vertical options available
- 5 V Push Pull TTL Compatible CMOS output

AVAILABLE OPTIONS

Table 1
ORDERING INFORMATION / PART NUMBERS

Inverting RedLink® 10 MBd Receiver Horizontal	FR10MHIR
Inverting RedLink® 10 MBd Receiver Vertical	FR10MVIR
Inverting RedLink® 10 MBd Receiver Tilte	FR10DWIR

APPLICATIONS

Table 2
APPLICATIONS

Application	Automation and Industrial Control. Serial Communications. Voltage Isolation.
Standard	Serial RS232, RS485, CAN-Bus, MODBUS, Profibus
Distance	50 meters Step Index POF [1] 300 meters with 200 µm PCS fiber [1]
Speed	DC to 10 MBd

Note: 1. Depending on the installation conditions.

SPECIFICATIONS

Table 3
RECEIVER PIN DESCRIPTION

Pin	Name	Symbol
1	Receiver Output	V_0
2	Receiver Ground	Gnd
3	Receiver Vcc	Vcc
4	No Connect	N.C.
5	Retaining Pin	Gnd
8	Retaining Pin	Gnd

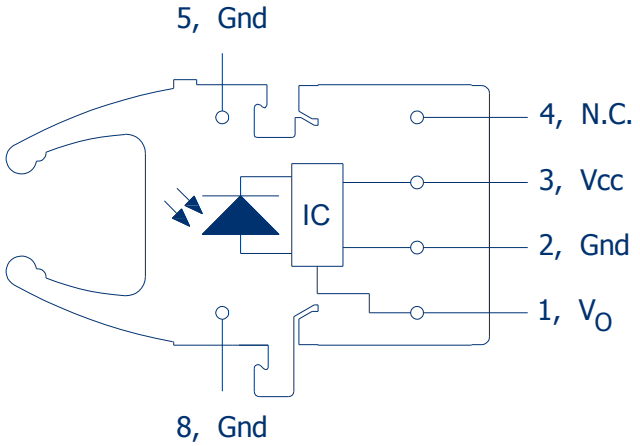

FIGURE 1.
Receiver pin-out, top view

Table 4
REGULATORY COMPLIANCE

Parameter	Symbol	Standard	Level
Electrostatic Discharge, Human Body Model (contact ESD)	HBM	Mil-STD-883	Level 2 (4 kV)
Radiated Emissions Immunity	Vm^{-1}	IEC 61000-4-3	15 Vm^{-1}
UL Certification	UL	94 V-0 Material	Files No. (Pending)
Storage Compliance	MSL	J-STD-020E	2a (4 week floor life)
Restriction of Hazardous Substances Directive	RoHS	Directive 2011/65/EU	Certified compliant

RECOMMENDED APPLICATION CIRCUIT

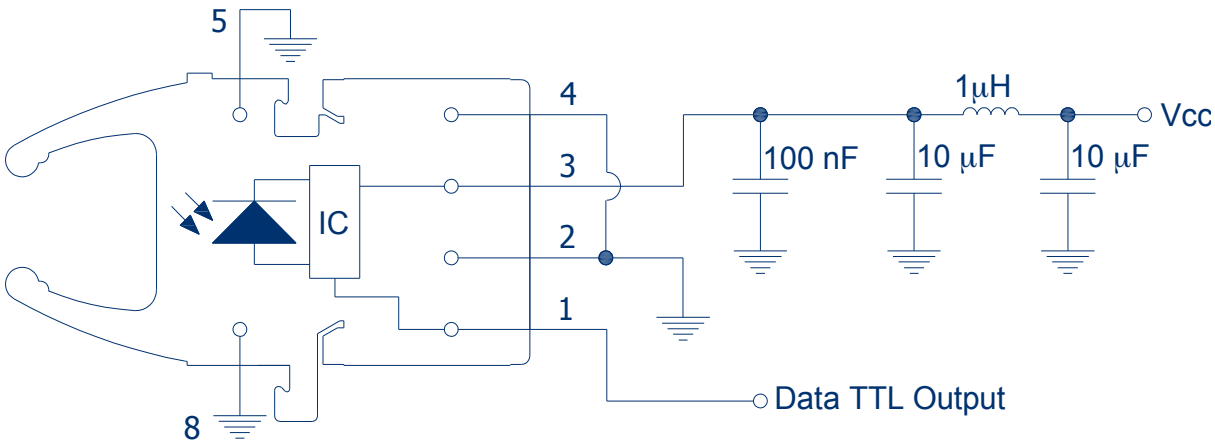

FIGURE 2.
RedLink® Receiver Application Circuit

SPECIFICATIONS

Table 5
ABSOLUTE MAXIMUM RATINGS

These are the absolute maximum ratings at or beyond which the FOT can be expected to be damaged
Notes:
1. 260 °C for 10 seconds, 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_{sld}		+260	°C
RX Supply Voltage	Vcc	-0.5	+5.5	V
RX Output Current	I_O	-16	+16	mA

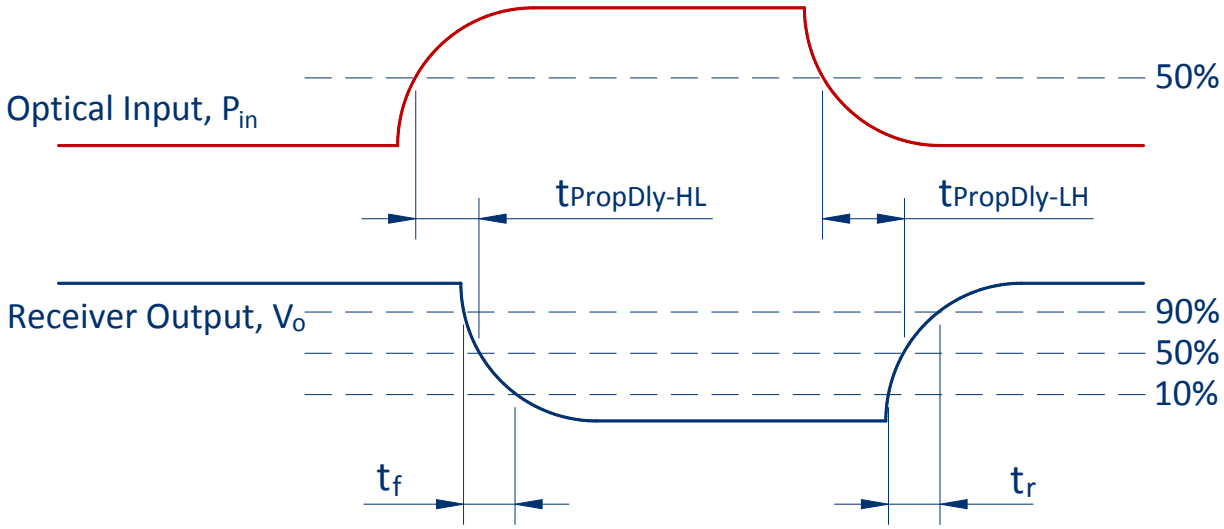

FIGURE 3.
Receiver Propagation Delay and rise/fall time definitions

This Receiver has an output stage that is a standard CMOS push-pull design. It is suitable for operation with standard 5V CMOS logic IC's. It is not an open collector stage. It is not compatible with voltages higher than 5.5 V.

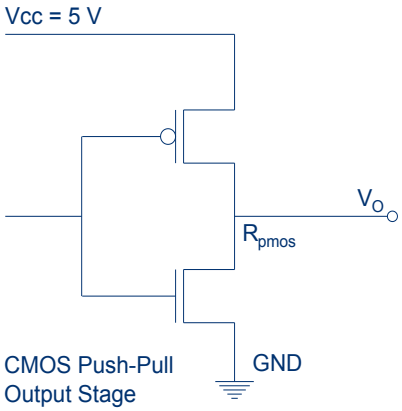

FIGURE 4.
Receiver CMOS Push-Pull output stage.

SPECIFICATIONS

Table 6
RECEIVER ELECTRICAL AND OPTICAL CHARACTERISTICS

Test Conditions:

1. *Test data was validated over the full temperature range of -40 °C to +85 °C, and over the full supply rail voltage of 4.5 V to 5.5 V. Data referred to as typical are rated at +25 °C and Vcc = 5.0 V.*
2. *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.*
3. *Receiver overdrive (PRL,max) is specified as the limit where |PWD| will not exceed 30 ns. The receiver will be in the correct state (logic "0") for optical powers above PRL,max. However, it may not meet a 30% symbol period PWD if the overdrive limit is exceeded.*
4. *Estimated value measured from junction to PC board solder joint for horizontal mount package.*
5. *Pins 5 and 8 are used for mounting and retaining purposes. It is required that pins 5 and 8 be connected to ground.*
6. *In recommended receiver circuit, with an optical signal from the recommended transmitter circuit.*
7. *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.*
8. *BER ≤ 10E-9*

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Peak POF Sensitivity: Minimum Input for Logic "0"	$P_{RL\ MIN}$	-22			dBm	1 mm POF, |PWD| < 30 ns
Peak POF Overdrive Limit: Maximum Input for Logic "0"	$P_{RL\ MAX}$			+2	dBm	1 mm POF, |PWD| < 30 ns
Peak POF Off State Limit: Maximum Input for Logic "1"	$P_{RH\ MAX}$			-40	dBm	1 mm POF
Peak HCS Sensitivity: Minimum Input for Logic "0"	$P_{RL\ MIN}$	-24			dBm +	200 µm PCS, |PWD| < 30 ns
Peak HCS Overdrive Limit: Maximum Input for Logic "0"	$P_{RL\ MAX}$			0	dBm	200 µm PCS, |PWD| < 30 ns
Peak HCS Off State Limit: Maximum Input for Logic "1"	$P_{RH\ MAX}$			-42	dBm	200 µm PCS
Supply Current	I_{CC}		13	16	mA	V_O = Open Circuit
High Level Output Voltage	V_{OH}	Vcc -0.5		Vcc	V	I_O = -40 µA
Low Level Output Voltage	V_{OL}		0.1	0.2	V	I_O = -1.6 mA
Output Rise Time (10% -- 90%)	t_{RISE}	4	8	12	ns	C_{LOAD} = 10 pF
Output Fall Time (10% -- 90%)	t_{FALL}	4	8.5	13	ns	C_{LOAD} = 10 pF
Power Supply Noise Immunity	PSNI	0.1	0.4		V_{PP}	Sine Wave DC – 10 MHz

MECHANICAL DATA, HORIZONTAL

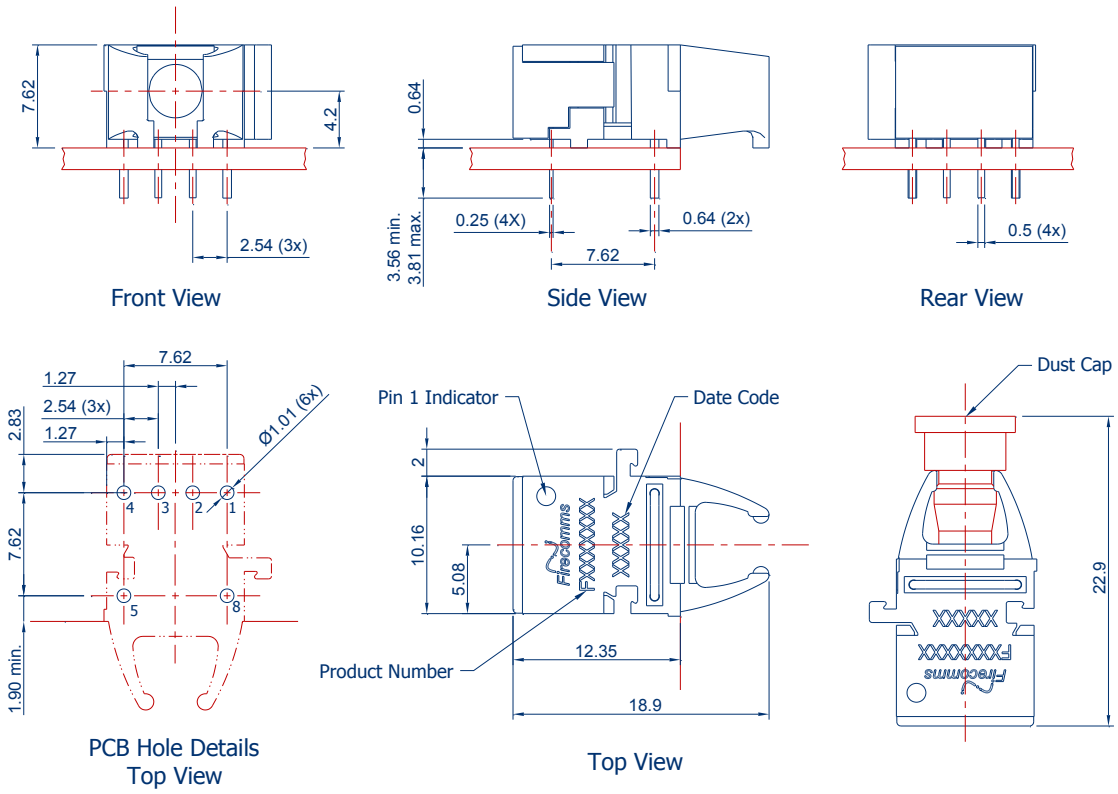

FIGURE 5.
Mechanical dimensions of the horizontal receivers and PCB footprint, which is a top view
General dimensional tolerance is ± 0.2 mm

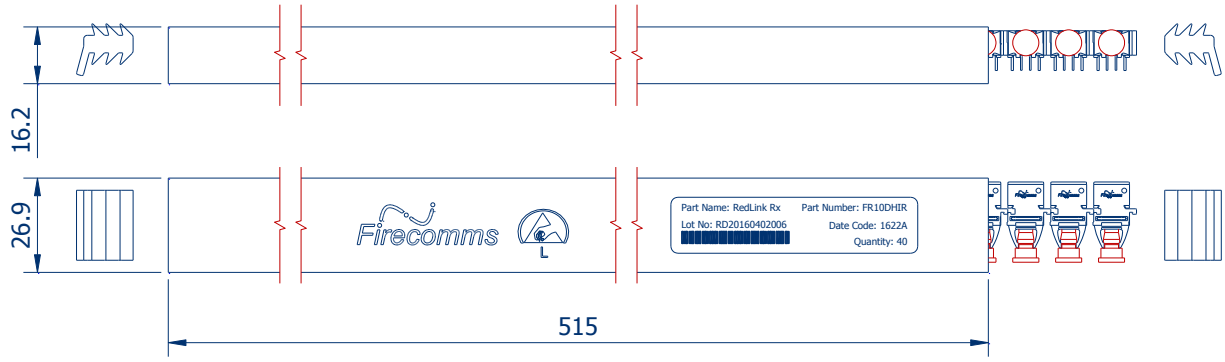

FIGURE 6.
Packing tube for Firecomms Horizontal RedLink® Receivers

MECHANICAL DATA, VERTICAL

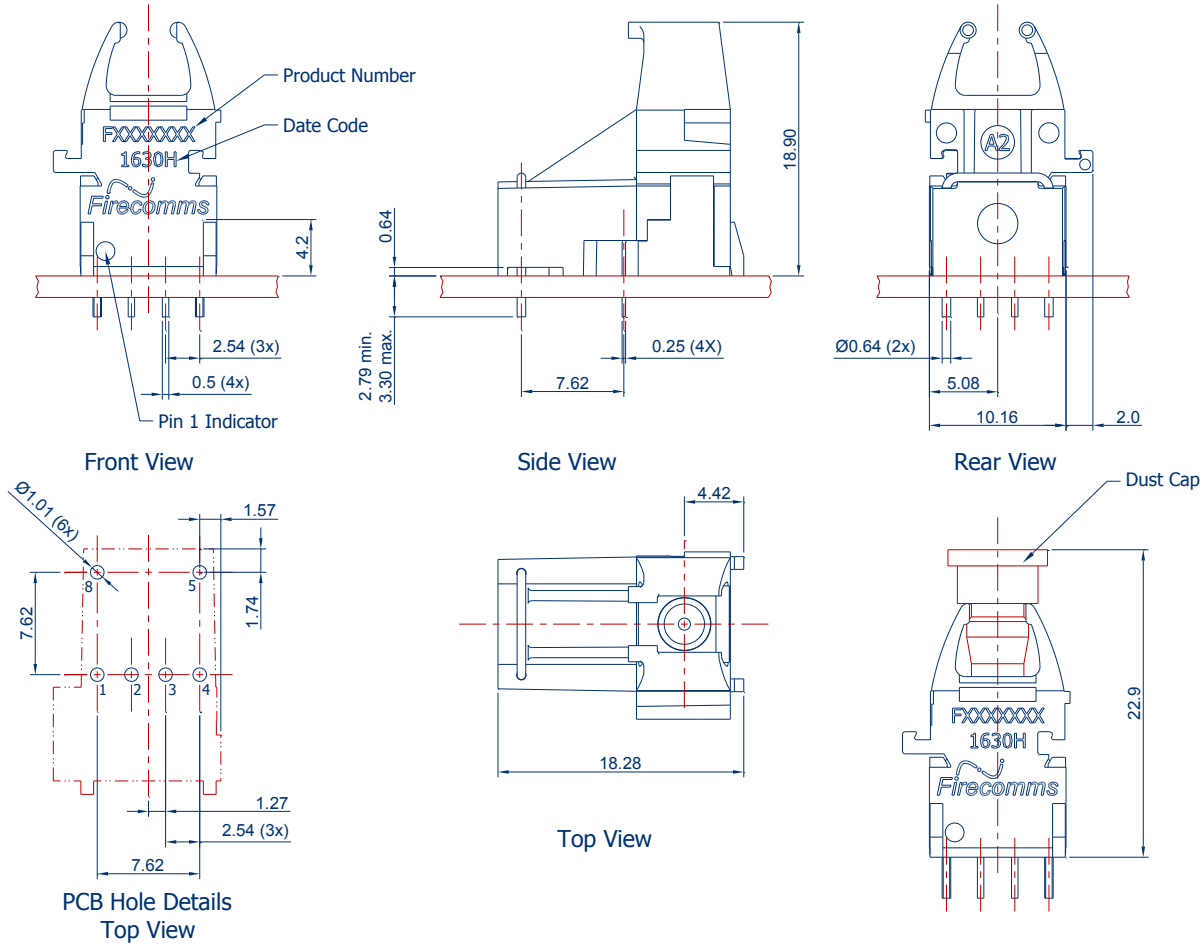

FIGURE 7.
Mechanical dimensions of the vertical receivers and PCB footprint, which is a top view
General dimensional tolerance is ± 0.2 mm

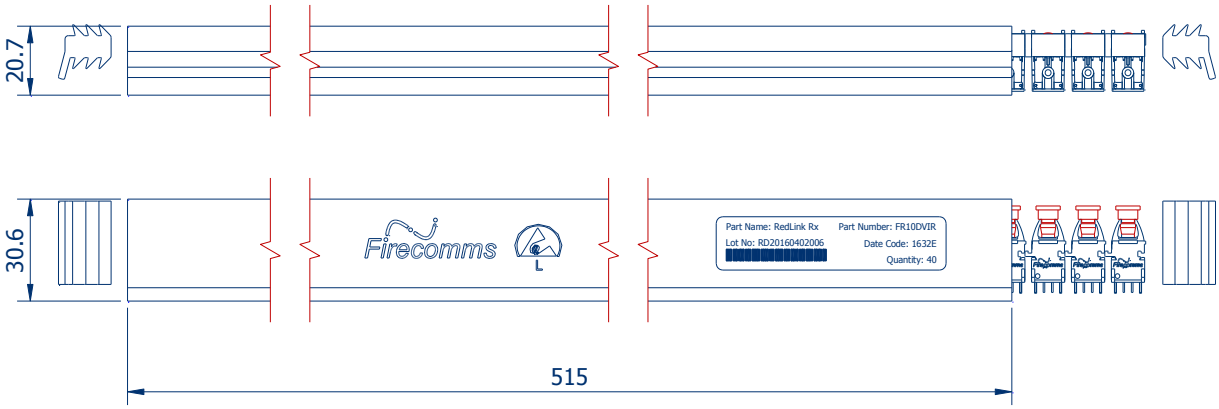

FIGURE 8.
Packing tube for Firecomms Vertical RedLink® Receivers

MECHANICAL DATA, 30° TILTED

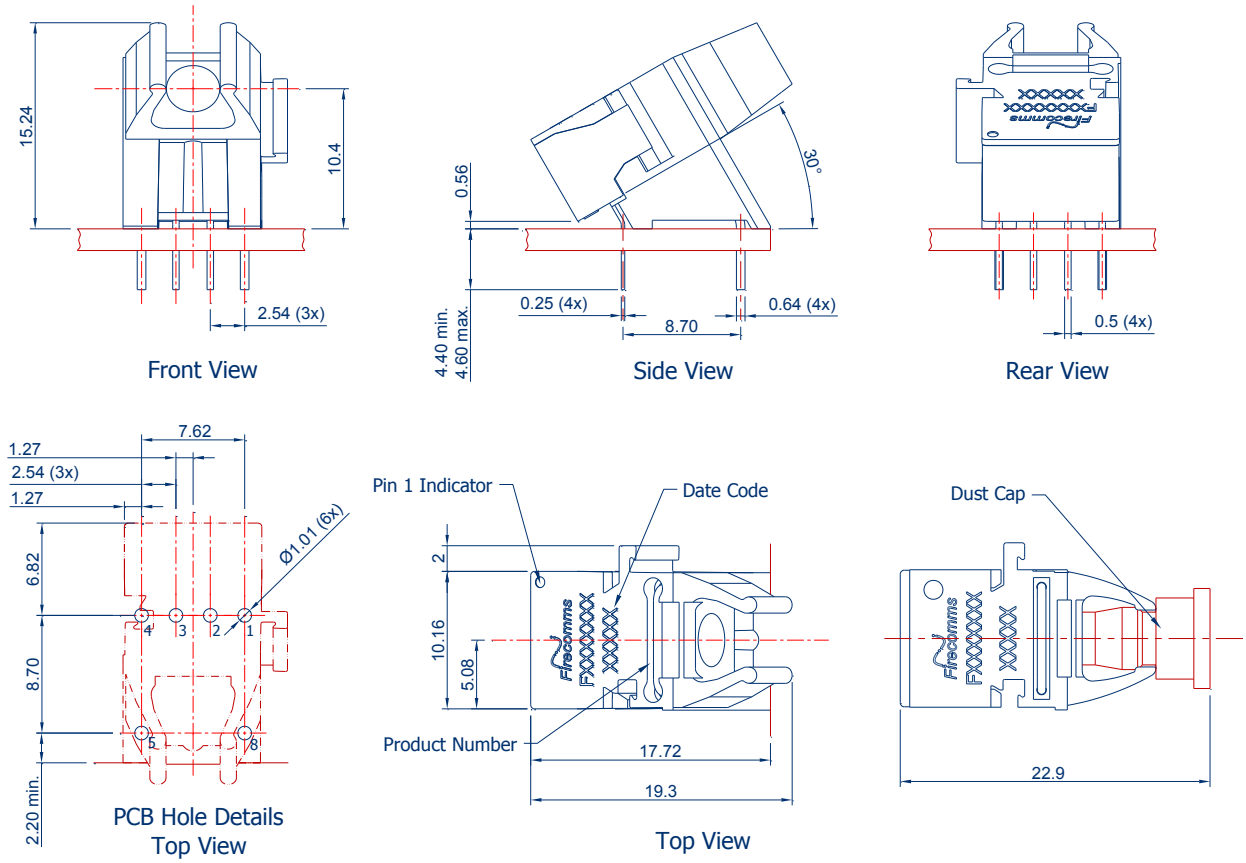

FIGURE 9.
Mechanical dimensions of the tilted receiver connectors and PCB footprint, which is a top view
General dimensional tolerance is ± 0.2 mm

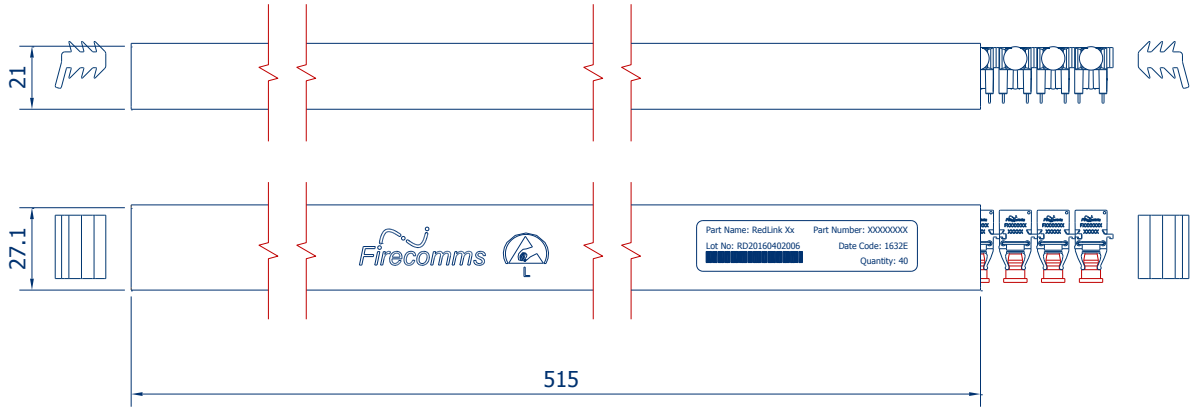

FIGURE 10.
Packing tube for Firecomms Tilted RedLink® Receivers

PART HANDLING

The Firecomms™ high voltage RedLink® receiver devices are color coded blue. They are auto-insertable. They 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). Acetone, ethyl acetate, phenol or similar solution based products are not permitted.

In the soldering process, non-halogenated water soluble fluxes are recommended. These parts are not suitable for use in reflow solder processes (infrared/vapor-phase reflow). The dust plug should remain in place during soldering, washing and drying processes to avoid contamination of the active optical area of each component.

The Moisture Sensitivity Level (MSL) classification of this device is 2a according to JEDEC J-STD-020E.
The shelf life of an unopened MBB (Moisture Barrier Bag) is 24 months at < 40 °C and < 90 % R.H.
Once the Moisture Barrier Bag is opened the devices can be either

a) Stored in normal factory conditions < 30 °C and < 60 % R.H. for a maximum of 672 hours (4 Weeks) prior to soldering.
b) Stored at < 10 % R.H. (Dry Cabinet).

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 7
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 Width	70 mm	70 mm
	Inner Carton Height	105 mm	105 mm
Weight per Inner Carton, Complete		0.77 kg	0.92 kg
Components per Inner Carton		200	200
Inner Cartons per Outer Carton		10	10
	Outer Carton Length	650 mm	650 mm
	Outer Carton Width	235 mm	235 mm
	Outer Carton Height	376 mm	376 mm
Weight per Outer Carton, Complete		8.14 kg	9.61 kg
Components per Outer Carton		2,000	2,000