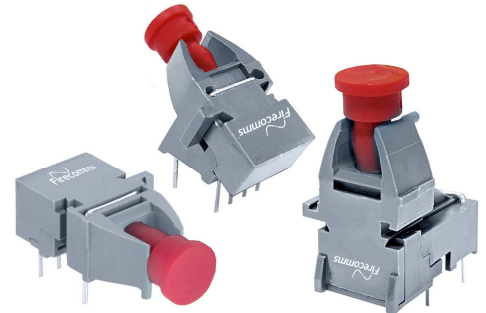


# FT10DxxR

## 650 nm DC-10 MBd Fully Integrated RedLink® Fiber Optic Transmitter

### Datasheet



### DESCRIPTION

Firecomms DC-10 MBd RedLink® transmitter consists of a highly reliable Resonant Cavity Light Emitting Diode (RCLED) with integrated driver IC as a visible optical transmitter. The device 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.

Capable of delivering 10 MBd digital signals over fiber and operating in the temperature range of -40 °C to +85 °C. The device can operate from a 5 V or 3.3 V DC power rail and can tolerate ± 10 % supply variation.

The transmitter contains a visible red wavelength RCLED with fully integrated precision driver IC. The use of intrinsically eye-safe, visible light simplifies link set-up and testing. It is available in inverting and non-inverting options.

### AVAILABLE OPTIONS

Table 1

#### ORDERING INFORMATION / PART NUMBERS

10 MBd Horizontal Package Non-Inverting, TTL	FT10DHNR
10 MBd Horizontal Package Inverting, TTL	FT10DHIR
10 MBd Vertical Package Non-Inverting, TTL	FT10DVNR
10 MBd Vertical Package Inverting, TTL	FT10DVIR
10 MBd Tilted Package Non- Inverting, TTL	FT10DWNR
10 MBd Tilted Package Inverting, TTL	FT10DWIR

### FEATURES

- Fully integrated driver IC with visible RCLED at red wavelength (650 nm)
- Optimised for data rates from DC to 10 MBd
- Industrial Temperature Range -40 °C to +85 °C
- Dual power supply operation (5 V, 3.3 V) with 10 % rail tolerance
- RoHS compliant and flame retardant (UL 94 V-0)
- Inverting and Non-Inverting options
- Horizontal, Vertical and 30° Tilted options
- Compatible with Versatile Link cables and connectors

### APPLICATIONS

Table 2  
APPLICATIONS

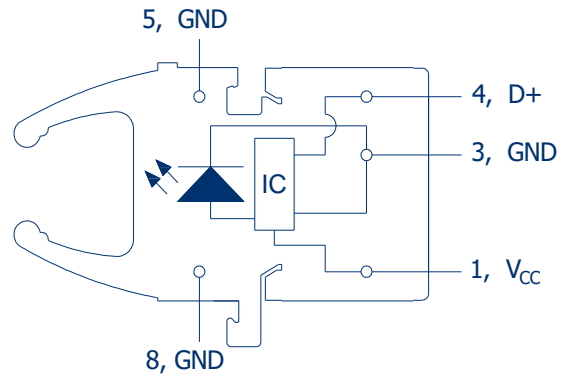
<b>Application</b>	Automation and Industrial Control. Serial Communications. Voltage Isolation.
<b>Standard</b>	Serial RS232, RS485, CAN-Bus, Modbus, PROFIBUS
<b>Distance</b>	50 meters Step Index POF <sup>[1]</sup> 100 meters with 200 µm PCS fiber <sup>[1]</sup>
<b>Speed</b>	DC to 10 MBd

**Note:** 1. Depending on the installation conditions

## SPECIFICATIONS

**Table 3**  
**TRANSMITTER PIN DESCRIPTION**

Pin	Name	Symbol
1	LINE VOLTAGE	V <sub>CC</sub>
2	NO PIN PRESENT	
3	GROUND	GND
4	DATA INPUT (TTL)	D+
5	RETAINING PIN	GND
8	RETAINING PIN	GND

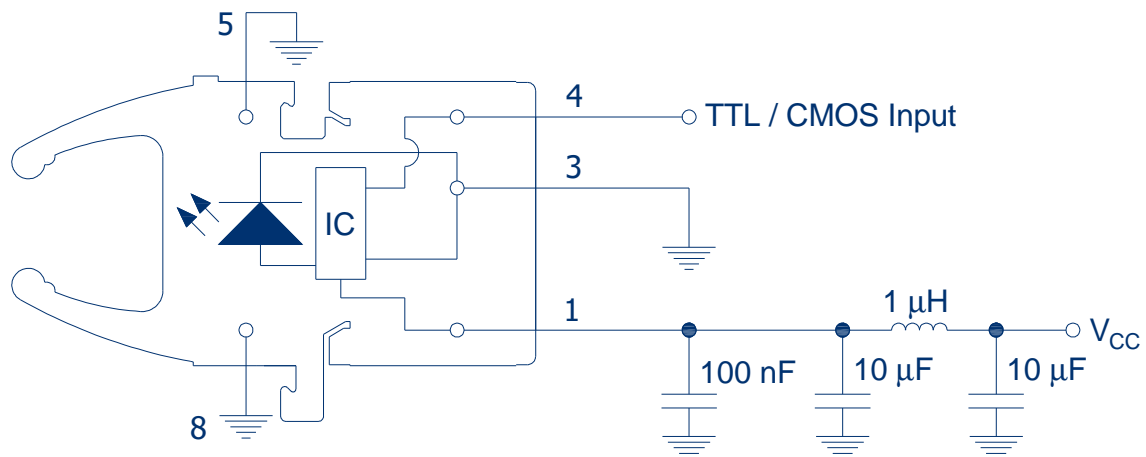


**FIGURE 1**  
**Transmitter pin-out, top view**

**Table 4**  
**REGULATORY COMPLIANCE**

Parameter	Symbol	Standard	Level
Electrostatic Discharge, Human Body Model (contact ESD)	HBM	Mil-STD-883	Level 2 (4 kV)
UL Certification	UL	60950-1	File No. E362227
Storage Compliance	MSL	J-STD-020	2a (4-week floor life)
Restriction of Hazardous Substances Directive	RoHS	Directive 2011/65/EU Incl. Amendment 2015/863	Certified compliant
Eye Safety		IEC 60825-1	LED Class 1

## RECOMMENDED APPLICATION CIRCUIT



**FIGURE 2**  
**Recommended transmitter application circuit. See note 7, Table 6**

## SPECIFICATIONS

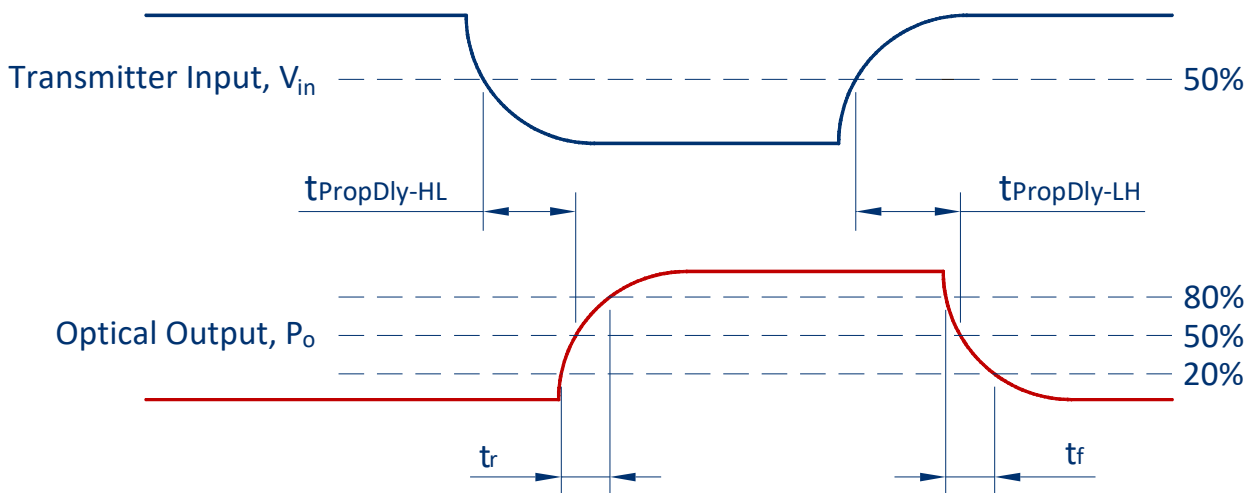
**Table 5**  
**ABSOLUTE MAXIMUM RATINGS**

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

**Notes:**

1. 260°C for 10 seconds, one time only, at least 2.2 mm away from lead root
2. Applying conditions above absolute maximum ratings is destructive to the device. Functional operation of the device at conditions between maximum operating conditions (5.5 V) and absolute maximum ratings is not implied. Extended exposure to stresses above recommended operating conditions will have an effect on device reliability

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	$T_{stg}$	-40	+85	°C
Operating Temperature	$T_{op}$	-40	+85	°C
Soldering Temperature <sup>[1]</sup>	$T_{sld}$		+260 <sup>[1]</sup>	°C
Supply Voltage <sup>[2]</sup>	$V_{CC}$	-0.5	+7	V
Tx Input Voltage (Data in) <sup>[2]</sup>	$V_{IN}$	-0.5	+7	V



**FIGURE 3**  
Illustration of propagation delay and rise/fall times for the inverting transmitter

## SPECIFICATIONS

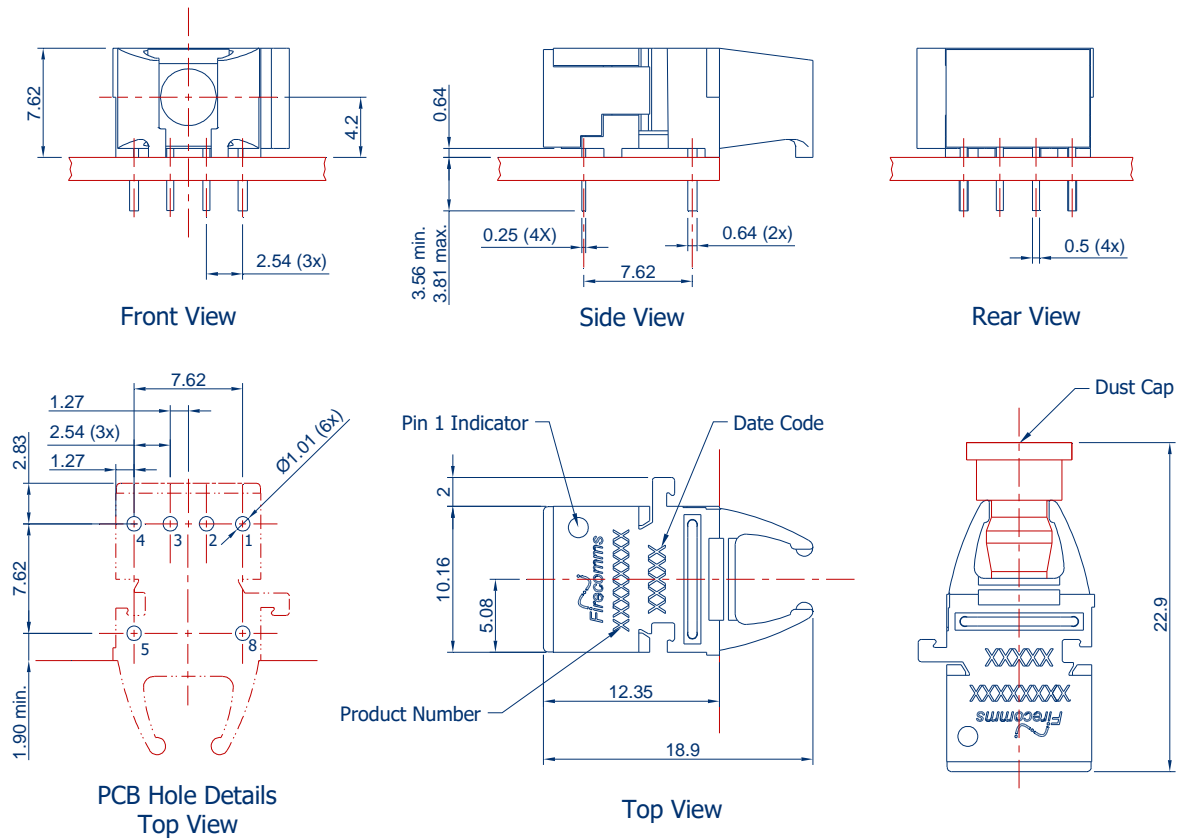
**Table 6**  
**TRANSMITTER ELECTRICAL AND OPTICAL CHARACTERISTICS**

**Test Conditions:**

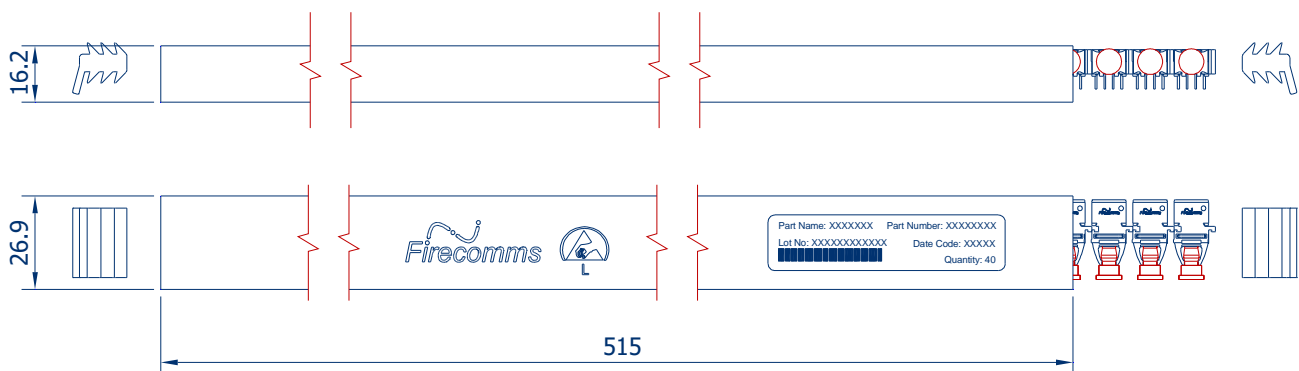
1. Test data was validated over the full temperature range of -40 °C to +85 °C, and over both power supply rail options of 5 V and 3.3 V  $\pm$  10%. Typical data out is at 25 °C, with 10 Mbps PRBS data and 3.3 V Supply
2. Output power levels are for peak (not average) optical output levels. For 50% duty cycle data, peak optical power is twice the average optical power. Optical power is measured when coupled into 0.5 m of a 1 mm diameter 0.5 NA POF and a large area detector.
3. Electrical input pulse width is determined at 1.5 V and  $dV/dt$  between 1 V and 2 V shall not be less than 1 V/ns
4. Emission Wavelength (centroid)  $\lambda_c = \sum_i P_i \lambda_i / \sum_i P_i$ . (Ref: EIA/TIA std. FOTP-127/6.1, 1991)
5. Spectral Width Root Mean Squared (RMS)  $\lambda_{RMS} = (\sum_i P_i (\lambda_c - \lambda_i)^2 / \sum_i P_i)^{1/2}$ . (Ref: EIA/TIA std. FOTP-127/6.3, 1991)
6. Wake Up Delay is the time from valid power up to valid data output, at 5 V or 3.3 V  $\pm$  10%, with input data at 50% duty cycle
7. Pins 5 and 8 are only used for mounting and retention purposes. Connect to ground.

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Supply Current	$I_{cc}$		12.5 @3V 13.5 @5V	25	mA	[1]
Input Voltage - Low	$V_{IL}$	-0.3		0.8	V	[1]
Input Voltage - High	$V_{IH}$	2.0		$V_{cc} + 0.25$	V	[1]
Data Input Capacitance	$C_{in}$			7	pF	
Data Input Resistance	$R_{in}$	10			M $\Omega$	
Output Power	$P_{High}$	-6		+2	dBm	[1], [2]
Emission Wavelength (centroid)	$\lambda_c$	640	650	680	nm	[4]
Spectral Width (RMS)	$\lambda_{RMS}$			30	nm	[5]
Optical Rise time (20%-80%)	$t_r$		1.6	5	ns	[1]
Optical Fall time (20%-80%)	$t_f$		1	2	ns	[1]
Propagation Delay Low-to-High	$t_{PropDly\_LH}$	13	22	30	ns	[1], Figure 3
Propagation Delay High-to Low	$t_{PropDly\_HL}$	13	22	30	ns	[1], Figure 3
Tx Pulse Width Distortion	PWD	-5.0		+5.0	ns	[1,4]
Wake Up Delay (power up)	$t_{power-on}$		20		$\mu$ s	[6]

## MECHANICAL DATA, HORIZONTAL

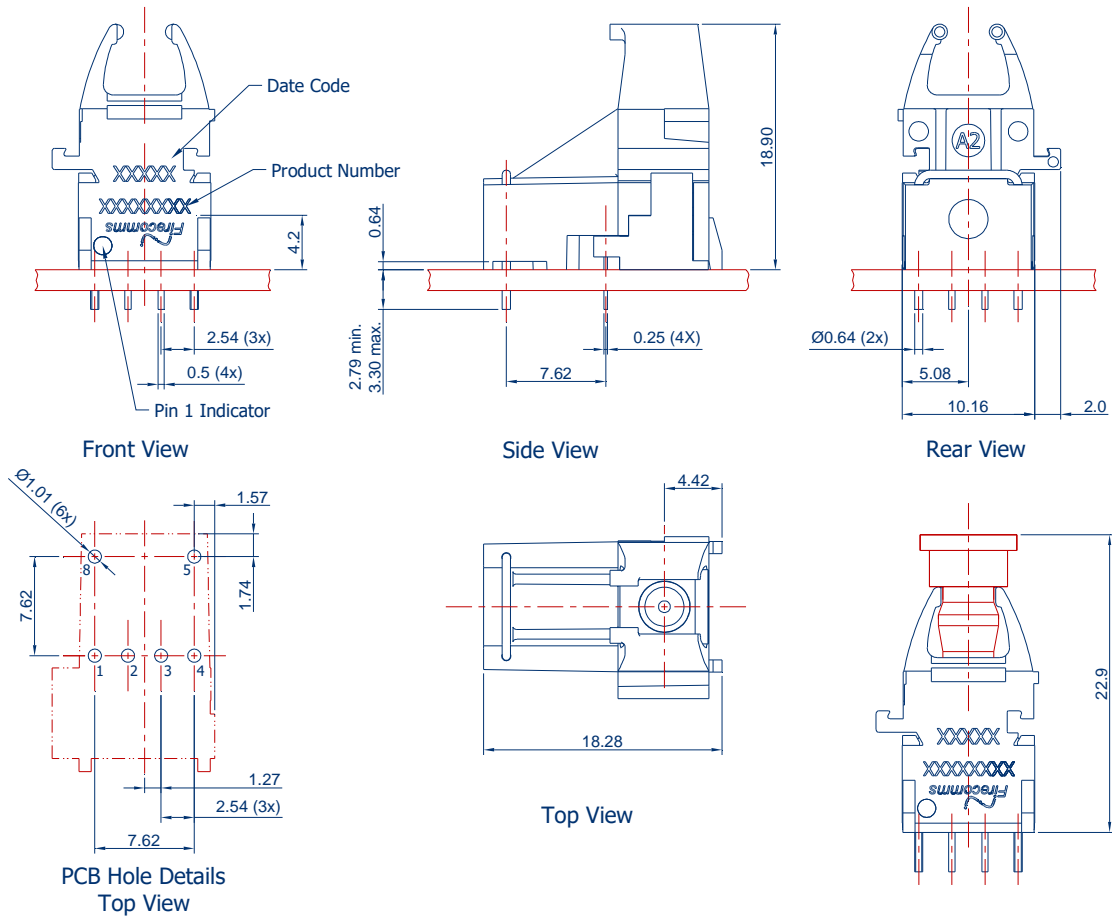


**FIGURE 4**  
**Mechanical dimensions of RedLink® horizontal connectors and PCB footprint, which is a top view**  
 General dimensional tolerance is  $\pm 0.2$  mm

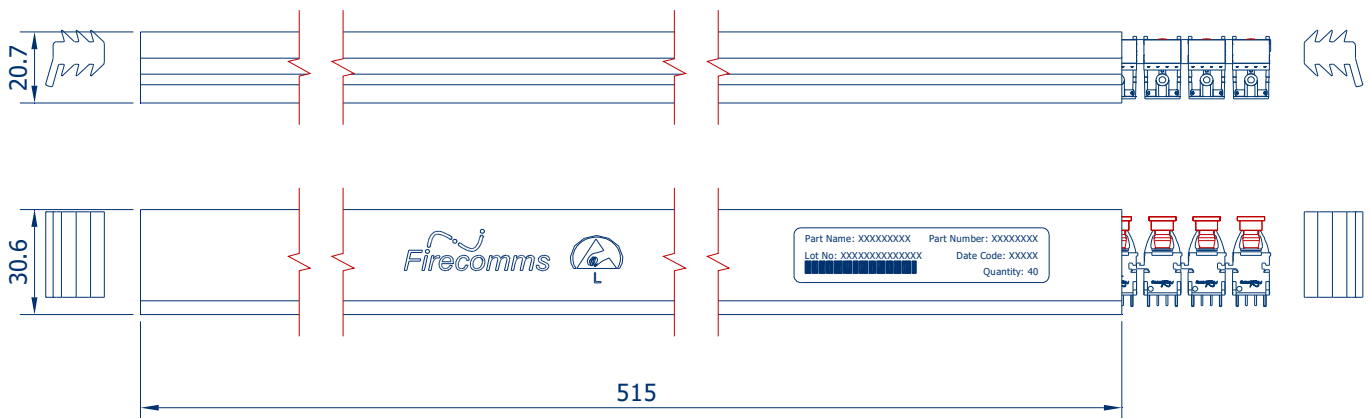


**FIGURE 5**  
**Packing tube for Firecomms RedLink® horizontal connector**

**MECHANICAL DATA, VERTICAL**

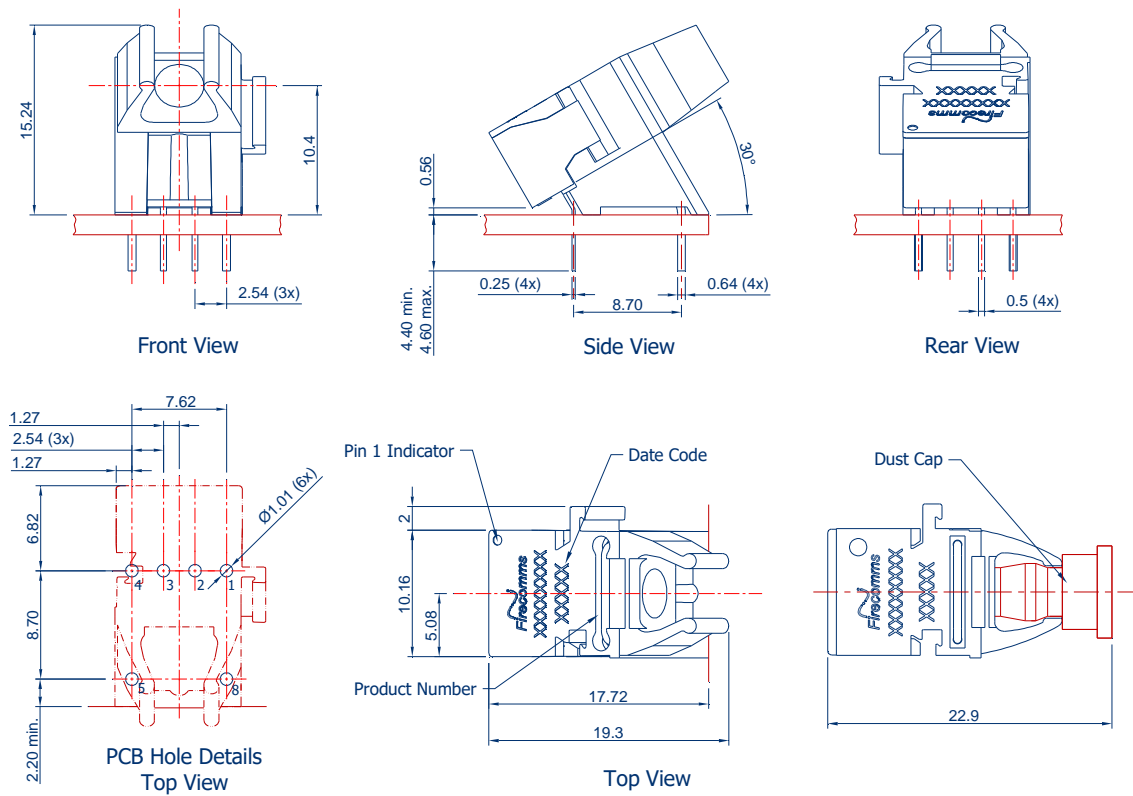


**FIGURE 6**  
 Mechanical dimensions of RedLink® vertical connectors and PCB footprint, which is a top view  
 General dimensional tolerance is  $\pm 0.2$  mm

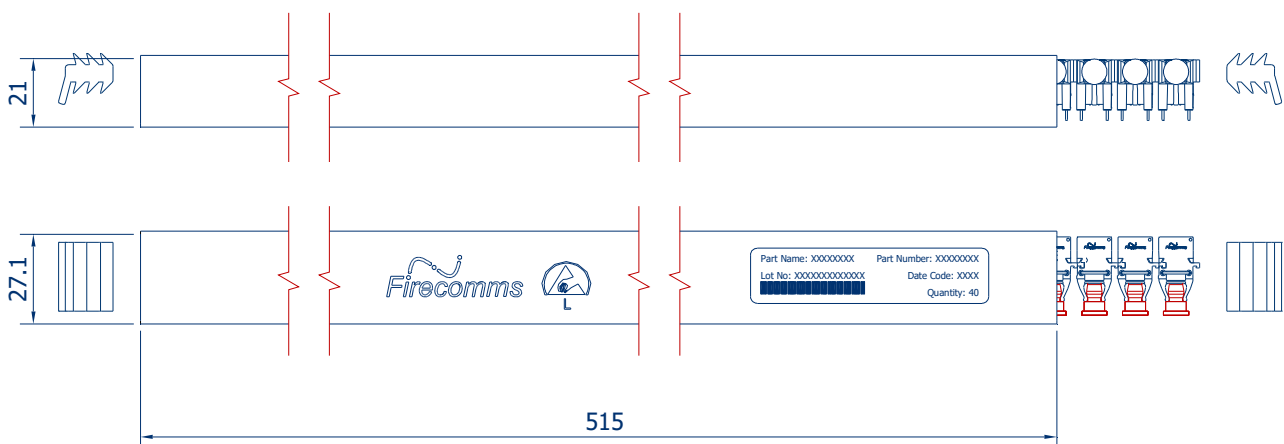


**FIGURE 7**  
 Packing tube for Firecomms RedLink® vertical connectors

## MECHANICAL DATA, 30° TILTED



**FIGURE 8**  
**Mechanical dimensions of RedLink® tilted connectors and PCB footprint, which is a top view**  
 General dimensional tolerance is  $\pm 0.2$  mm



**FIGURE 9**  
**Packing tube for Firecomms RedLink® tilted connectors**

## PART HANDLING

Firecomms RedLink<sup>®</sup> connectors are auto-insertable and tested for handling in static-controlled assembly processes (Human Body Model - 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. RedLink<sup>®</sup> connectors 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 part.

The Moisture Sensitivity Level (MSL) classification of this device is 2a according to JEDEC J-STD-020.

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 and 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	Tilted
Components per Tube	40	40	40
Tube Length	515 mm	515 mm	515 mm
Tube Height	16.2 mm	20.7 mm	21 mm
Tube Depth	26.9 mm	30.6 mm	27.1 mm
Tubes per Bag	5	5	5
Bags per Inner Carton	1	1	1
Inner Carton Length	630 mm	630 mm	630 mm
Inner Carton Width	70 mm	70 mm	70 mm
Inner Carton Height	105 mm	105 mm	105 mm
Weight per Inner Carton, Complete	0.77 kg	0.92 kg	0.92 kg
Components per Inner Carton	200	200	200
Inner Cartons per Outer Carton	10	10	10
Outer Carton Length	650 mm	650 mm	650 mm
Outer Carton Width	235 mm	235 mm	235 mm
Outer Carton Height	376 mm	376 mm	376 mm
Weight per Outer Carton, Complete	8.13 kg	9.60 kg	9.60 kg
Components per Outer Carton	2,000	2,000	2,000

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