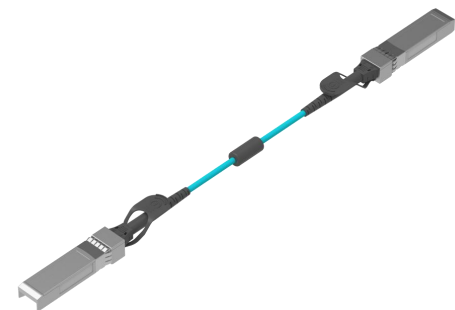


# 25Gbps 850nm Multimode SFP28 Active Optical Cable FYC-E25MxxxT

**Features**

- Hot-pluggable SFP28 form factor
- Supports 25Gbps data rate
- Maximum link length of 70m on OM3 MMF or 100m on OM4 MMF
- 850nm VCSEL laser and PIN photo-detector
- Internal CDR on both Transmitter and Receiver channel
- Single 3.3V power supply
- Power dissipation < 1W/end
- Digital diagnostics functions are available via the I2C interface
- Commercial case temperature range: -40°C to 85°C



**Applications**

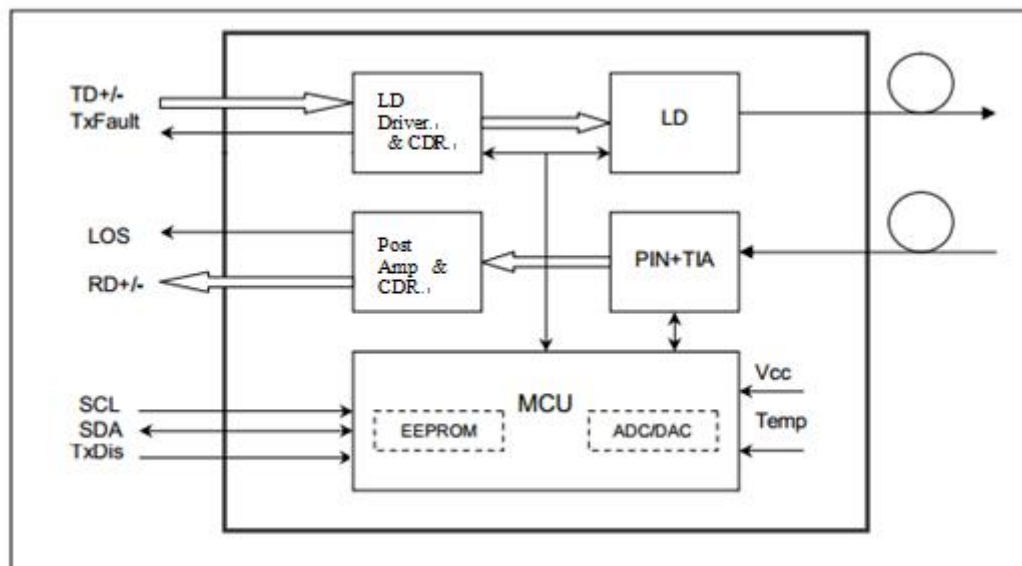
- 25GBASE-SR Ethernet
- CPRI Option8&10/ eCPRI 25.78G

**Description**

FIBERSTAMP SFP28 Active Optical Cables are direct-attach fiber assemblies with SFP28 connectors. They are suitable for very short distances and offer a cost-effective way to connect within racks and across adjacent racks.

The FIBERSTAMP Technologies FYC-E25MxxxT is a single-Channel, Pluggable, Fiber-Optic SFP28 for 25 Gigabit Ethernet and Infiniband EDR Applications. It is a high performance module for short-range data communication and interconnect applications which operate at 25.78125 Gbps up to 70m@OM3 or 100m@OM4 fiber. This module is designed to operate over multimode fiber systems using a nominal wavelength of 850nm. The electrical interface uses a 20 contact edge type connector.

**Block Diagram**



### Absolute Maximum Ratings

**Table 1 - Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	0	3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

### Recommended Operating Conditions

**Table 2 - Recommended Operating Conditions**

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Commercial	Tc	-40	+85	°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc			300	mA
Fiber Length on 50/125µm high-bandwidth (OM3) MMF				70	m
Fiber Length on 50/125µm high-bandwidth (OM4) MMF				100	m

### Optical and Electrical Characteristics

**Table 3 - Optical and Electrical Characteristics**

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Data rate	BR	10.13	25.78		Gbps	
Centre Wavelength	$\lambda_c$	840	850	860	nm	
Spectral Width (-20dB)	$\sigma$			0.6	nm	
Average Output Power	Pavg	-8.4		2.4	dBm	
Optical Power OMA	POMA	-6.4		3	dBm	
Extinction Ratio	ER	2			dB	
Differential data input swing	VIN,PP	40		1000	mV	
Input Differential Impedance	ZIN	90	100	110	$\Omega$	
TX Disable	Disable	2.0		Vcc	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		Vcc	V	
	Normal	0		0.8	V	
<b>Receiver</b>						
Data rate	BR	10.13	25.78		Gbps	
Centre Wavelength	$\lambda_c$	840	850	860	nm	
Receiver Sensitivity (OMA)	Psens	-	-	-10	dBm	
Stressed Sensitivity (OMA)		-	-	-5.2	dBm	
Receiver Power (OMA)				3	dBm	
LOS De-Assert	LOSD			-13	dBm	



Parameter	Symbol	Min	Typical	Max	Unit	Notes
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5			dB	
Differential data output swing	Vout,PP	300		850	mV	
LOS	High	2.0		Vcc	V	
	Low			0.8	V	

**Notes:**

Receive Sensitivity measured with a prbs31 pattern @25.78125Gb/s, BER 5E-5;

**Timing and Electrical**

**Table 4 - Timing and Electrical**

Parameter	Symbol	Min.	Max.	Unit	Conditions
Tx_Disable assert time	t_off		100	µs	Rising edge of Tx_Disable to fall of output signal below 10% of nominal
Tx_Disable negate time	t_on		2	ms	Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start up or fault recovery.
Time to initialize 2-wire interface	t_2w_start_up		300	ms	From power on or hot plug after the supply meeting Table 8.
Time to initialize	t_start_up		300	ms	From power supplies meeting Table 8 or hot plug or Tx disable negated during power up, or Tx_Fault recovery, until non-cooled power level I part (or non-cooled power level II part already enabled at power level II for Tx_Fault recovery) is fully operational.
Time to initialize cooled module and time to power up a cooled module to Power Level II	t_start_up_cooled		90	s	From power supplies meeting Table 8 or hot plug, or Tx disable negated during power up or Tx_Fault recovery, until cooled power level I part (or cooled power level II part during fault recovery) is fully operational. Also, from stop bit low-to-high SDA transition enabling Power Level II until cooled module is fully operational
Time to Power Up to Level II	t_power_level2		300	ms	From stop bit low-to-high SDA transition enabling power level II until non-cooled module is fully operational
Time to Power Down from Level II	t_power_down		300	ms	From stop bit low-to-high SDA transition disabling power level II until module is within power level I requirements
Tx_Fault assert	Tx_Fault_on		1	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault assert for cooled module	Tx_Fault_on_cooled		50	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault Reset	t_reset	10		µs	Time Tx_Disable must be held high to reset Tx_Fault
RS0, RS1 rate select timing for FC	t_RS0_FC, t_RS1_FC		500	µs	From assertion till stable output
RS0, RS1 rate select timing non FC	t_RS0, t_RS1		24	ms	From assertion till stable output
Rx_LOS assert delay	t_los_on		100	µs	From occurrence of loss of signal to assertion of Rx_LOS
Rx_LOS negate delay	t_los_off		100	µs	From occurrence of presence of signal to negation of Rx_LOS



Diagnostics

Table 5 – Diagnostics Specification

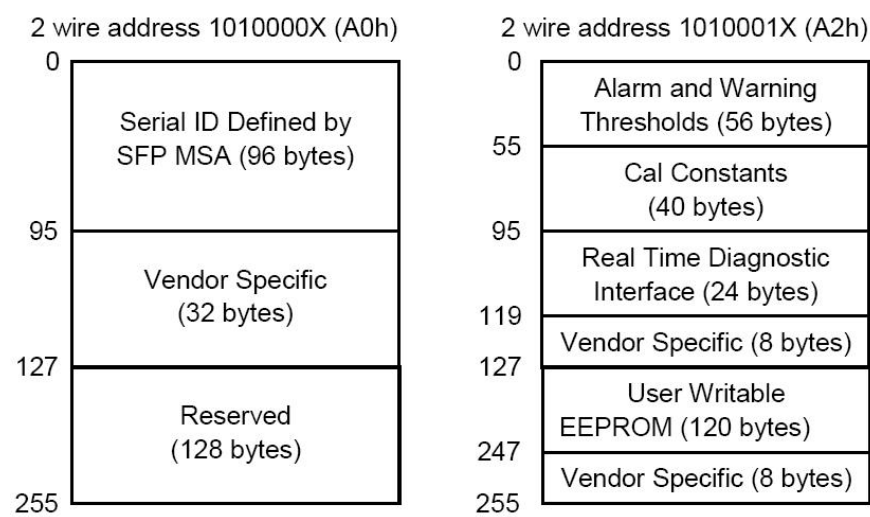
Parameter	Range	Unit	Accuracy	Calibration
Temperature	-40 to +85	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 20	mA	±10%	Internal / External
TX Power	-8 to 3	dBm	±3dB	Internal / External
RX Power	-14 to 0	dBm	±3dB	Internal / External

Digital Diagnostic Memory Map

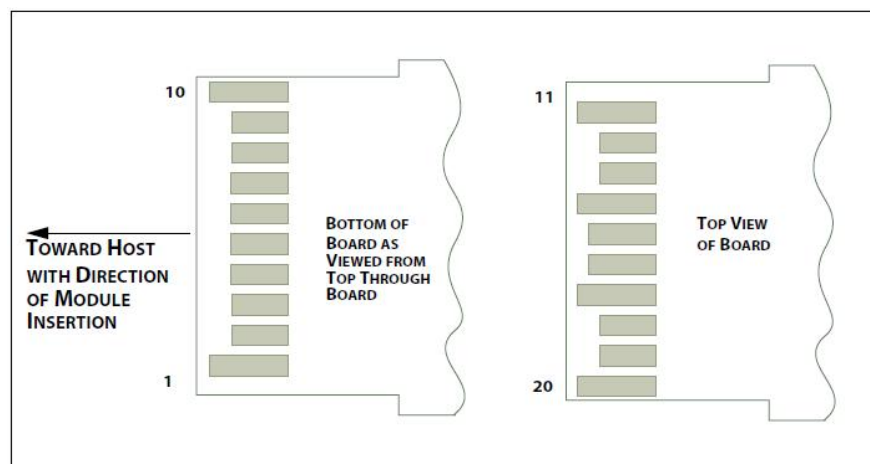
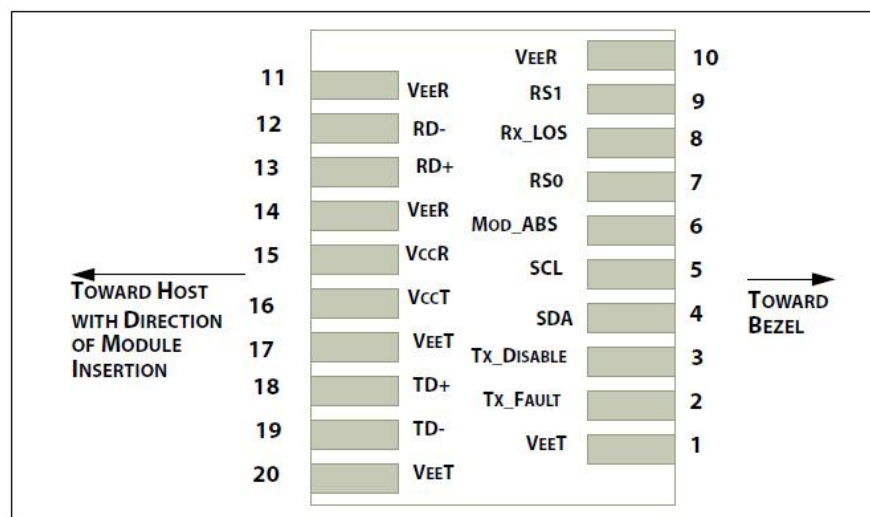
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



Pin Definitions



### Pin Descriptions

PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_ABS	Module Definition, Grounded in the module	
7	LVTTTL-I	RS0	Receiver Rate Select	
8	LVTTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTTL-I	RS1	Transmitter Rate Select (not used)	
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

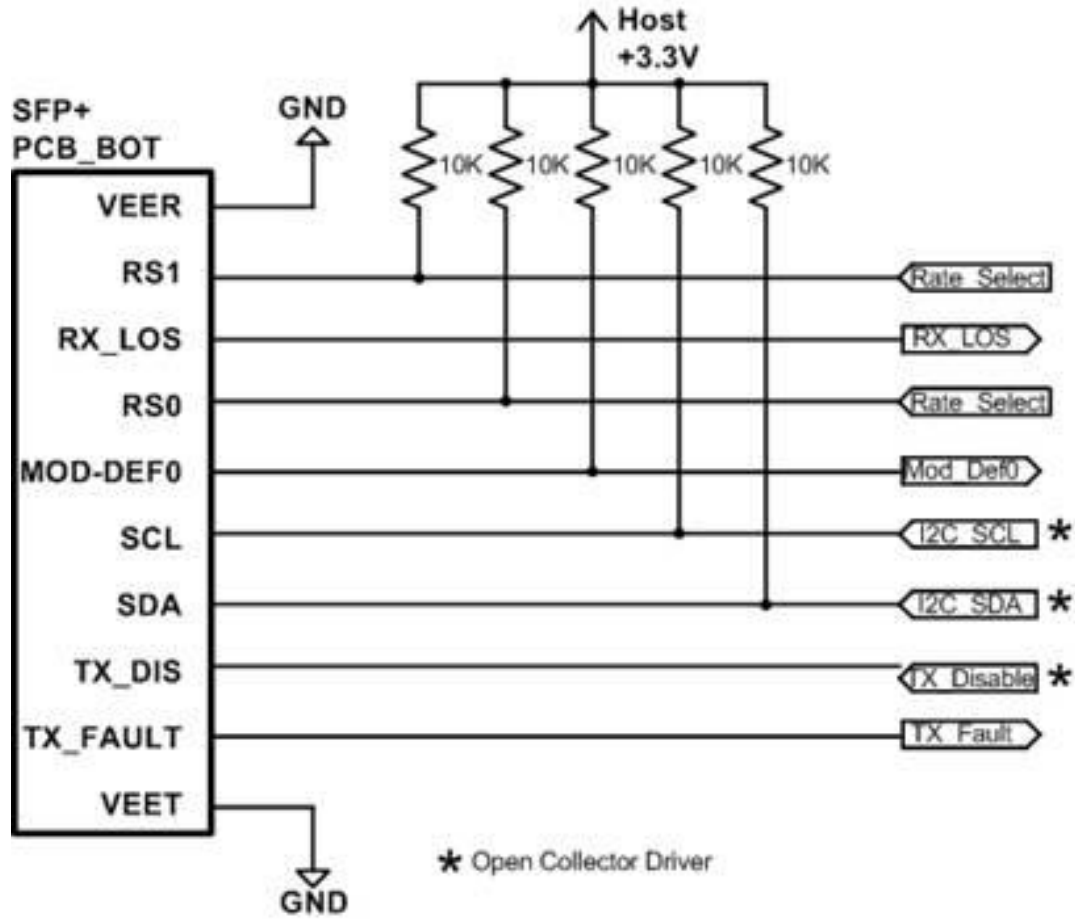
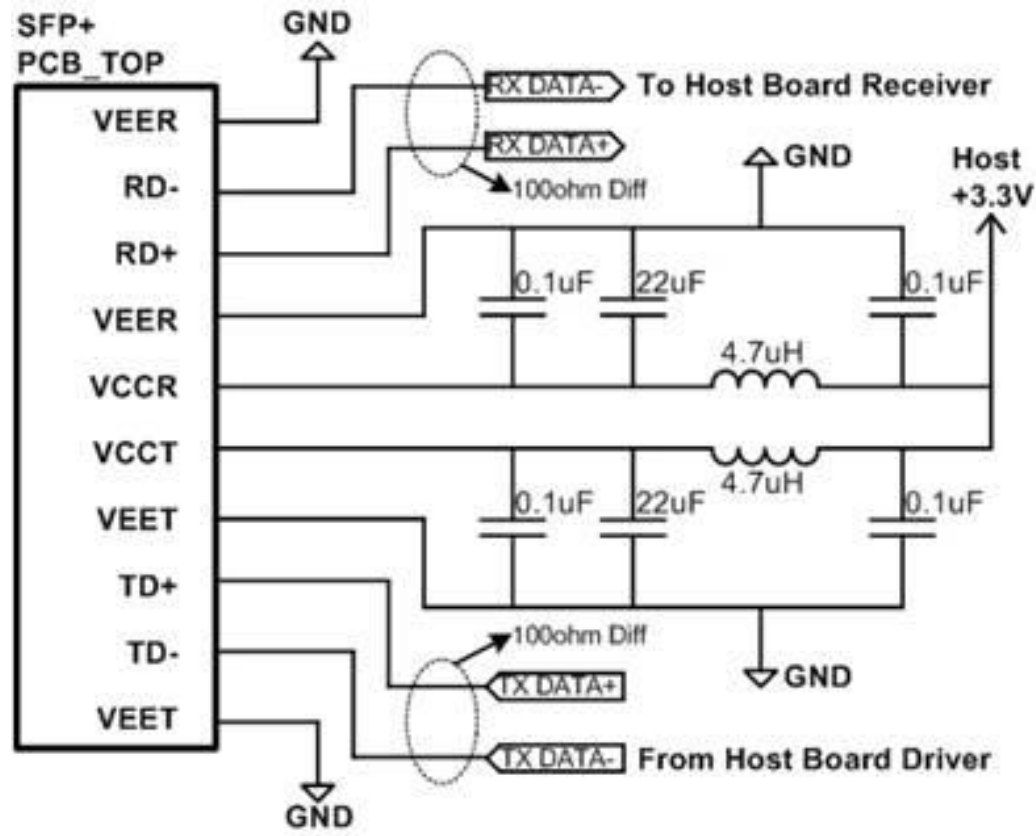
#### Notes:

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

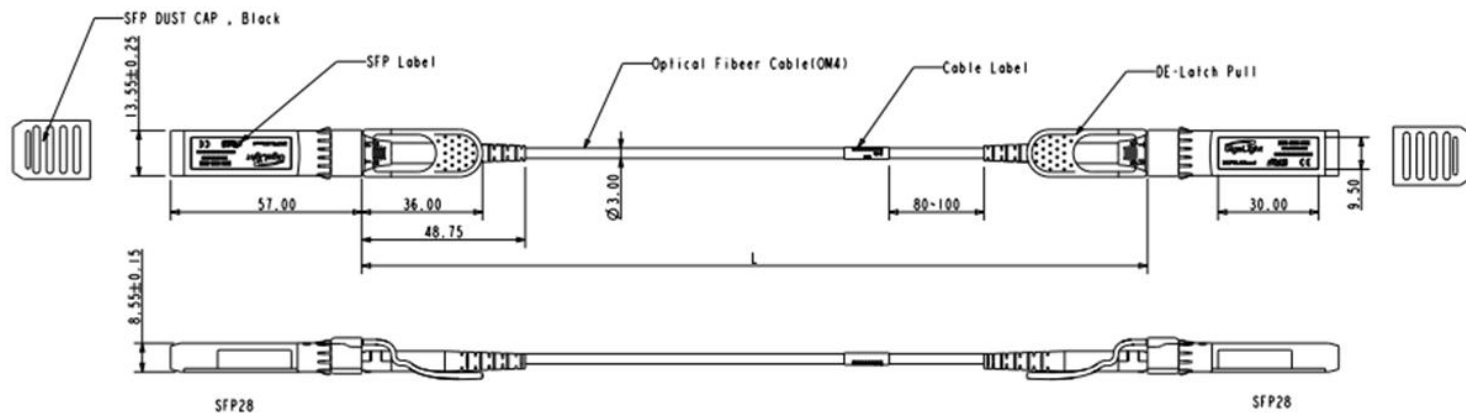




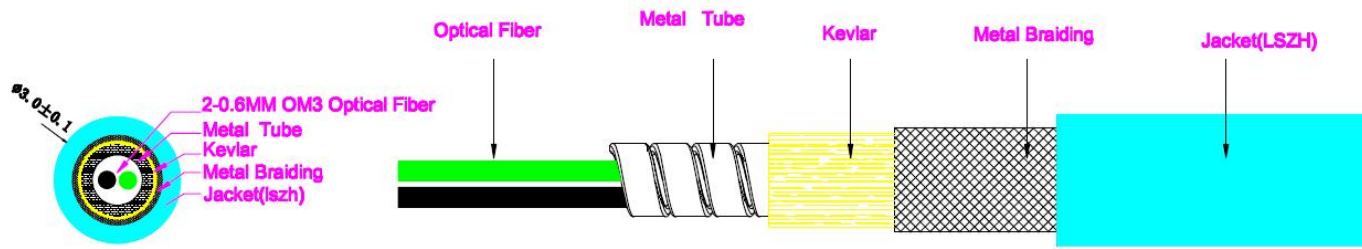
## Recommended Interface Circuit



## Mechanical Dimensions



Cable Specification (om3, 2cores, D3.0mm):



Main Cable Parameter

No. of Fibers	Size (mm)	Tensile (N)		Crush Resistance (N/100mm)		Bending Radius (mm)		Temperature (° C)	MM	
		Long Term	Short Term	Long Term	Short Term	Dynamic	Static		850nm	1300nm
2	3.0±0.1	600	800	2000	3000	200	100	-20~70	≤ 3.5	< 1.5

### Regulatory Compliance

FIBERSTAMP FYC-E25MxxxT SFP28 Active Optical Cable transceivers are Class 1 Laser Products. They are certified per the following standards:

Feature	Standard
Laser Safety	IEC 60825-1:2014 (Third Edition) EN 60825-2: 2004+A1+A2
Electrical Safety	EN 62368-1: 2014 IEC 62368-1: 2014 UL 62368-1: 2014
Environmental protection	2011/65/EU 2015/863/EU
CE EMC	EN55032: 2015 EN55035: 2017 EN61000-3-2: 2014 EN61000-3-3: 2013
FCC	FCC Part 15, Subpart B; ANSI C63.4-2014

### References

1. SFP MSA
2. 25GBASE-SR

### CAUTION:

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

### Ordering information

Part Number	Product Description
FYC-E25MxxxT	25Gbps, 850nm; SFP28 Active Optical Cable; -40°C ~ +85°C
XXX:001~70	1~70 Length in meters on OM3 MMF
XXX:001~100	1~100 Length in meters on OM4 MMF
Further details are available from any FIBERSTAMP sales representative.	



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