

# SFG-W02 (NC3112-20/ NC5512-20)

1.25Gbps / 1310nm/1550nm / Bi-directional SM SFP Transceiver

## Description

### General

The SFG-W02 are small form factor pluggable modules for bi-directional serial optical data communications such as Gigabit Ethernet IEEE802.3z and Fiber Channel. These modules are designed for single mode fiber with high performance by using 1310 / 1550 nm wavelength. It is with the SFP 20-pin connector to allow hot plug capability.



### Transmitter Section

The transmitter consists of a high-performance 1310 nm Fabry-Perot (FP) or 1550 nm MQW DFB structure lasers in the bi-directional optical subassembly (BOSA), which is housed within a metal package. In addition, this component is also class 1 laser compliant with according to International Safety Standard IEC-825.

### Receiver Section

The receiver contain of an integrated planar InGaAs PIN photodiode coupled to a high sensitivity trans-impedance amplifier (TIA) in an BOSA. This BOSA combination is mated to a post amplifier IC that provides the post amplification and SD (Signal Detect) indication circuit, which provides LVTTTL logic low state output when an unusable input optical signal level is detected.

## Features

- Small Form Factor Pluggable MSA Compliant
- Bi-directional Linking Distance Up to 20 km (14dB)
- Compliant with IEEE 802.3z Gigabit Ethernet
- Compliant with Fiber Channel
- TTL Signal Detect Indicator
- SC or LC Simplex Connector
- EEPROM with serial ID functionality
- Class 1 Laser Safety Standard IEC 825 Compliant
- Single + 3.3 V power Supply
- Temperature: 0 to 70°C or -40 to +85°C (Industrial)
- RoHS Compliant

## Applications

- Gigabit Ethernet / Fiber Channel

## General Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	V <sub>CC</sub>	0	-	3.6	V
Power Supply Current	I <sub>CC</sub>	-	-	300	mA
Operating Temperature (Standard)	T <sub>OP</sub>	0	-	+70	°C
Operating Temperature (Industrial)	T <sub>OPI</sub>	-40	-	+85	°C
Storage Temperature	T <sub>S</sub>	-40	-	+85	°C
Data Rate	B	-	1250	-	Mbps
Supported Link Length on 9/125µm SMF	L	-	20	-	Km

## Order Information

Models	P/No.	Bit Rate (Mbps)	Distance (km)	Wavelength (nm)	Package	Temp	TX Power (dBm)	RX Sens. (dBm)	DMI
SFG-W02/A	NC3112-20	1250	20	Tx-1310/ Rx-1550	SC SFP	0 to 70	-2 to -8	-22	No
SFG-W02/B	NC5512-20	1250	20	Tx-1550/ Rx-1310	SC SFP	0 to 70	-2 to -8	-22	No
SFG-W02/AL-D	NK3112-20-D	1250	20	Tx-1310/ Rx-1550	LC SFP	0 to 70	-2 to -8	-22	Yes
SFG-W02/BL-D	NK5512-20-D	1250	20	Tx-1550/ Rx-1310	LC SFP	0 to 70	-2 to -8	-22	Yes
SFG-W02/A-I	NC3112-20-I	1250	20	Tx-1310/ Rx-1550	SC SFP	-40 to 85	-2 to -8	-22	No
SFG-W02/B-I	NC5512-20-I	1250	20	Tx-1550/ Rx-1310	SC SFP	-40 to 85	-2 to -8	-22	No
SFG-W02/A-DI	NC3112-20-DI	1250	20	Tx-1310/ Rx-1550	SC SFP	-40 to 85	-2 to -8	-22	Yes
SFG-W02/B-DI	NC5512-20-DI	1250	20	Tx-1550/ Rx-1310	SC SFP	-40 to 85	-2 to -8	-22	Yes

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## Optical and Electrical Characteristics

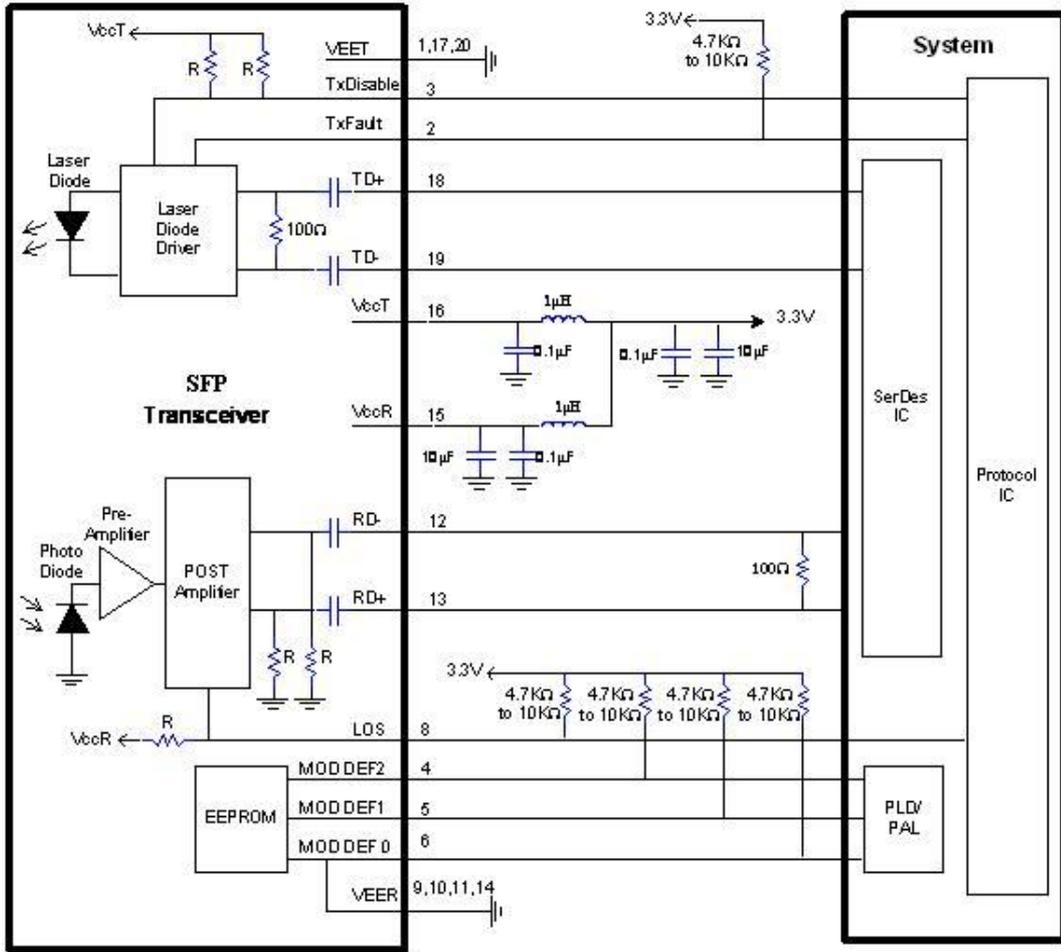
Transmitter Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$	3.15	3.3	3.45	V
Supply Current	$I_{CC}$	-	-	160	mA
Data Differential Input Voltage	$V_{in, pp}$	300	-	1600	mV
Disable Input Voltage	$V_{IL} - V_{CC}$	-1.81	-	-1.48	V
Enable Input Voltage	$V_{IH} - V_{CC}$	-1.16	-	-0.88	V
Transmitter Optical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Output Optical Power	$P_O$	-8	-	-2	dBm
Center Wavelength	NC3112-20 $\lambda_C$	1280	1310	1340	nm
Center Wavelength	NC5512-20 $\lambda_C$	1530	1550	1570	nm
Spectral Width (RMS)	NC3112-20 $\Delta\lambda$	-	2	-	nm
Spectral Width (RMS)	NC5512-20 $\Delta\lambda$	-	1	-	nm
Optical Rise Time (10%-90%)	$t_r$	-	-	0.26	ns
Optical Fall Time (10%-90%)	$t_f$	-	-	0.26	ns
Extinction Ratio	ER	8.2	-	-	dB

Receiver Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$	3.15	3.3	3.45	V
Supply Current	$I_{CC}$	-	-	100	mA
Data Differential Output Voltage	$V_{out, pp}$	300	-	1000	mV
Data Output Rise Time (10%-90%)	$t_r$	-	-	0.35	ns
Data Output Fall Time (10%-90%)	$t_f$	-	-	0.35	ns
Receiver Optical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Maximum Receiver Power	$P_{in}$	-3	-	-	dBm
Receiver Sensitivity	$P_S$	-	-22	-	dBm
Optical Center Wavelength	NC3112-20 $\lambda_C$	1480	-	1600	nm
Optical Center Wavelength	NC5512-20 $\lambda_C$	1250	-	1350	nm
Signal Detect-Asserted	$P_A$	-	-	-21	dBm avg.
Signal Detect-Deasserted	$P_D$	-36	-	-	dBm avg.
Signal Detect-Hysteresis	$P_A - P_D$	0.5	-	-	dB

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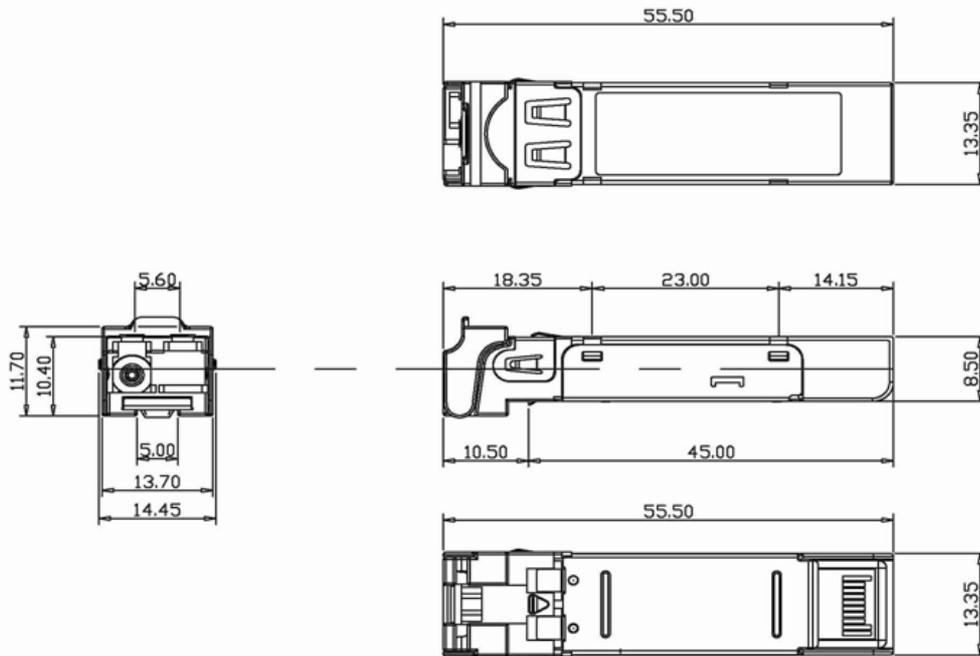
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## Recommended Circuit Schematic

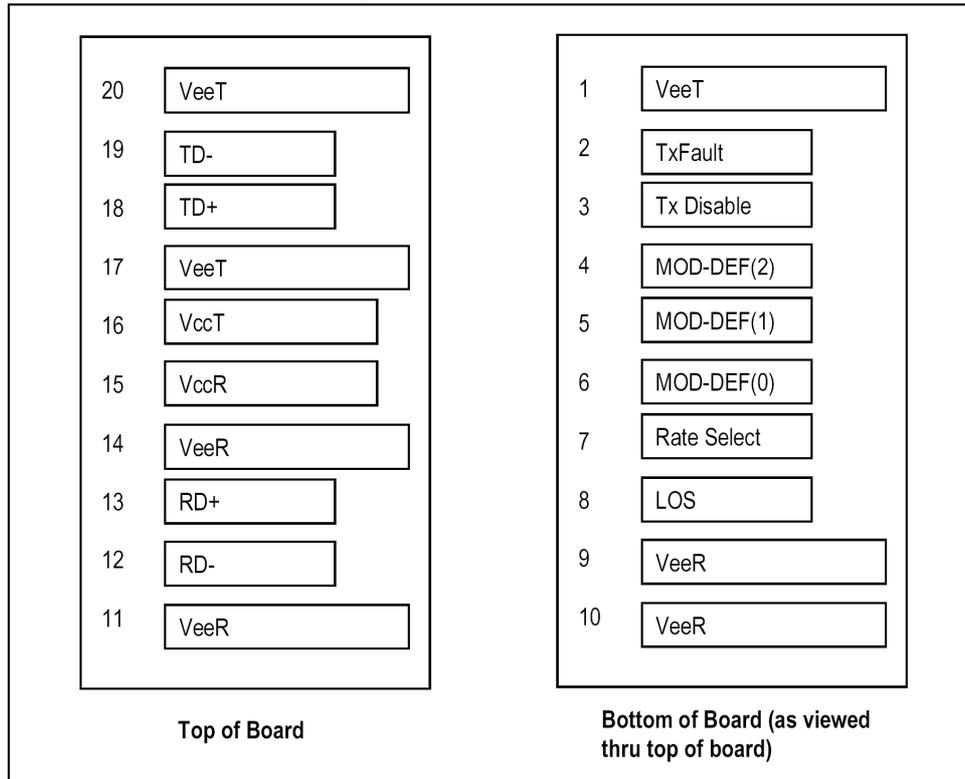


## Package Outline Drawing

Dimension (unit: mm)



### SFP Transceiver Electrical Pad Layout



### Pinout Table

Pin	Symbol	Name/Description	Ref.
1	V <sub>EET</sub>	Transmitter Ground	1
2	T <sub>FAULT</sub>	Transmitter Fault.	4
3	T <sub>DIS</sub>	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF (2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF (1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF (0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	
9	V <sub>EER</sub>	Receiver Ground	1
10	V <sub>EER</sub>	Receiver Ground	1
11	V <sub>EER</sub>	Receiver Ground	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V <sub>EER</sub>	Receiver Ground	1
15	V <sub>CCR</sub>	Receiver Power Supply	
16	V <sub>CCT</sub>	Transmitter Power Supply	
17	V <sub>EET</sub>	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted DATA in. 100 ohm termination between TD+ and TD-, AC Coupled thereafter.	
19	TD-	Transmitter Inverted DATA in. See TD+	
20	V <sub>EET</sub>	Transmitter Ground	1

#### Notes:

- Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V. MOD\_DEF (0) pulls line low to indicate module is plugged in.
- TX-Fault is open collector output. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 2.0V and 5.5V.
- LOS is open collector output. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 2.0V and 5.5V.