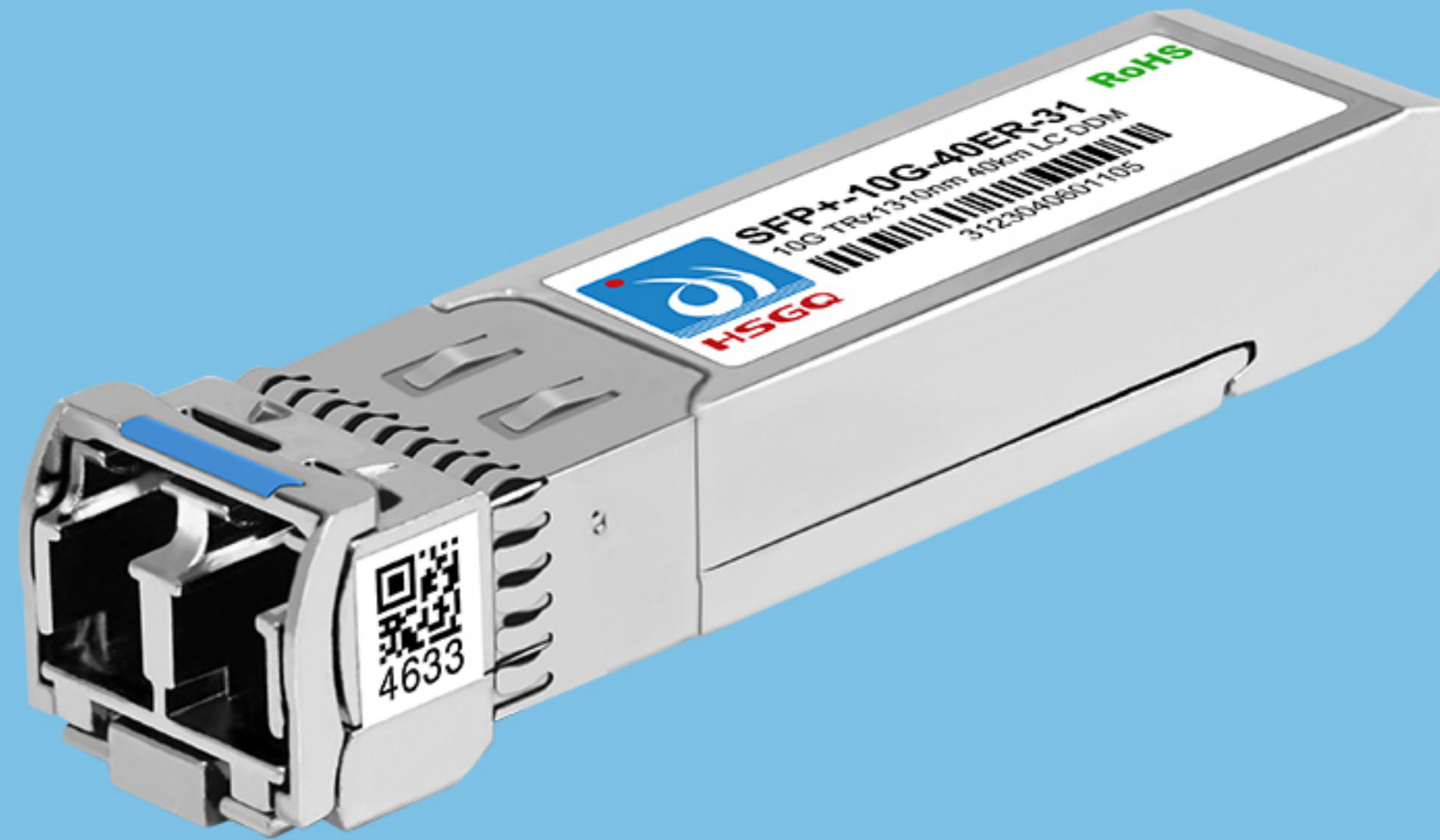


# HSGQ-SFP+ 10G Dual Modle



## Product Specification

Package	Model	Data Rate	Distance	Wavelength	Laser	Interface	Working Temperature	Receiving Sensitivity
SFP+	SFP-10G-10LR-31	10.3125Gbps	10KM	TRx1310	DFB/PIN	LC	0~70°C or -40~85°C	<=-30dBm
SFP+	SFP-10G-20LR-31	10.3125Gbps	20KM	TRx1310	DFB/PIN			<=-32dBm
SFP+	SFP-10G-40ER-31	10.3125Gbps	40KM	TRx1310	DFB/PIN			<=-32dBm
SFP+	SFP-10G-40ER-55	10.3125Gbps	40KM	TRx1550	EML/APD			<=-32dBm
SFP+	SFP-10G-60ER-31	10.3125Gbps	60KM	TRx1310	DFB/PIN			<=-32dBm
SFP+	SFP-10G-60ER-55	10.3125Gbps	60KM	TRx1550	EML/APD			<=-32dBm
SFP+	SFP-10G-80ZR-55	10.3125Gbps	80KM	TRx1550	EML/APD			<=-32dBm
SFP+	SFP-10G-100ZR-55	10.3125Gbps	100KM	TRx1550	EML/APD			<=-32dBm
SFP+	SFP-10G-110ZR-55	10.3125Gbps	110KM	TRx1550	EML/APD			<=-32dBm
SFP+	SFP-10G-120ZR-55	10.3125Gbps	120KM	TRx1550	EML/APD			<=-32dBm

## Product Features

- 2-wire interface for management specifications compliant with SFF-8472 digital diagnostic monitoring interface for optical transceivers
- Electrical interface compliant to SFF-8431 specifications for enhanced 8.5 and 10 Gigabit small form factor pluggable module "SFP+"
- 10Gb/s serial optical interface compliant to 802.3ae 10GBASE-LR
- Operating case temperature: 0 to 70 °C or-40 to 85°C
- All-metal housing for superior EMI performance
- Low power consumption
- Advanced firmware allow customer system encryption information to be stored in transceiver
- Cost effective SFP+ solution, enables higher port densities and greater bandwidth
- RoHS compliant

## General Description

- The SFP+ LR module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differentially to common mode conversion for quality signal termination and low EMI. SFI typically operates over 200 mm of improved FR4 material or up to about 150mm of standard FR4 with one connector.
- The transmitter converts 10Gbit/s serial CML electrical data into serial optical data compliant with the 10GBASE-LR standard. An open collector compatible Transmit Disable (Tx\_Dis) is provided. A logic "1," or no connection on this pin will disable the laser from transmitting. A logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop(APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault(TFault) is provided. TX\_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX\_Fault output contact is an open drain/collector and shall be pulled up to the Vcc\_Host in the host with a resistor in the range 4.7-10 kΩ. TX\_Disable is a module input contact, When TX\_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor.
- The receiver converts 10Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx\_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx\_LOS contact is an open drain/collector output and shall be pulled up to Vcc\_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx\_LOS signal is intended as a preliminary indication to the system in which the SFP+ is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

## Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:1993+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated(July 26,2001)

## Pin Definition

The SFP+ modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP+ host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8083, or stacked connector with equivalent electrical performance. Host PCB contact assignment is shown in Figure 2 and contact definitions are given in Table 2. SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 3 and the contact sequence order listed in Table 2.

SFP+ Module PIN Definition:

Pin	Logic	Symbol	Name/Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTL-I	TX_Dis	Transmitter Disable, Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_DEFO	Module Definition, Grounded in the module	
7	LVTTL-I	RSO	Receiver Rate Select	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal indication Active LOW	
9	LVTTL-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 (not used)	
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

- Note: 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.

## Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Unit	Notes	Parameter	Unit	Notes
Operating Reach	m	2-10K	Operating Reach	m	2-10K
Transmitter			Receiver		
Center wavelength (range)	nm	1260-1355	Center wavelength (range)	nm	1260-1355
Side Mode suppression Ratio (min)	dB	30	Receive overload (Max) in average power(note 1)	dBm	0.5
Launched power			Receive sensitivity (Min) in average power(note 1)	dBm	-14.4
-maximum (average)	dBm	0.5	Receiver sensitivity (Max) in OMA (note 2)	dBm	-12.6
-minimum (average)	dBm	-8.2	Receiver Reflectance (Max)	dB	-12
-OMA(Min)	dBm	-5.2	Stressed receiver sensitivity (Max) in OMA(note 2)	dBm	-10.3
-OMA-TDP (Min)	dBm	-6.2	Vertical eye closure penalty (Min)(note 3)	dB	2.2
Transmitter and dispersion penalty (Max)	dB	3.2	Los Assert(Min)	dBm	-30
Average launch power of OFF transmitter (Max)	dBm	-30	Los Dessert(Max)	dBm	-12
Extinction ratio (Min)	dB	3.5	Los Hysteresis(Min)	dB	0.5
RIN12 OMA(Max)	dB/Hz	-128	Stressed eye jitter (Min)(note 2)	UIp-p	0.3
Optical Return Loss Tolerance (Min)	dB	12	Receive electrical 3dB upper cutoff frequency (Max)	GHZ	12.3
			Receiver power (damage, Max)	dBm	1.5

- Notes:  
1. Average optical power shall be measured using the methods specified in TIA/EIA-455-95.  
2. Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER = 1× 10<sup>-12</sup>.  
3. Vertical eye closure penalty and stressed eye jitter are the test conditions for measuring stressed receiver sensitivity, They are not the required characteristic of the receiver.  
4. Power budget is defined as the difference between the Rx sensitivity and the Tx output power of the interface.  
5. Path penalty is defined as the power penalty of the interface between back-to-back and themaximum applied dispersion.

## Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified

Parameter	Symbol	Min	Typical	Max	Unit	Notes	Parameter	Symbol	Min	Typical	Max	Unit	Notes
Data Rate	/	/	10.3125	/	Gbps	/	Power Consumption	/	/	800	1000	mV	/
Transmitter							Receiver						
Single Ended Output Voltage Tolerance	/	-0.3	/	4	V	/	Single Ended Output Voltage Tolerance	/	-0.3	/	4	V	/
Common mode voltage tolerance	/	15	/	/	mV	/	Rx Output Rise and Fall Time	Tr/Tf	30	/	/	ps	20%to80%
Tx Input Diff Voltage	VI	180	/	800	mV	/	Rx Output Diff Voltage	Vo	300	/	850	mV	/
Tx Fault	VoL	-0.3	/	0.4	V	At 0.7mA	Total Jitter	TJ	/	/	0.7	UI	/
Data Dependent input Jitter	DDJ	/	/	0.1	UI	/	Deterministic Jitter	DJ	/	/	0.42	UI	/
Data Input Total Jitter	TJ	/	/	0.28	UI	/							

## Absolute Maximum Rating

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	Vcc	0	3.6	V
Power Supply Temperature	Tc	-40	85	°C
Operating Case Temperature	Tc	0	70	°C
	Ti	-40	85	°C
Relative Humidity	RH	5	95	%
RX Input Average Power	Pmax	-	0	dBm

## Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol	Min	Typical	Max	Unit
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Power Supply Current	Icc	/	/	300	mA
Operating Case Temperature	Tc	0	25	70	°C
	Ti	-40	25	85	°C

## Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	/
Supply voltage monitor absolute error	DMI_VCC	-0.08	0.08	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	-1dBm to -15dBm range
Bias current monitor	DMI_ibias	-10%	10%	mA	/

## ESD

This transceiver is specified as ESD threshold 2KV for all electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A(HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Figure 2: Module Interface to Host

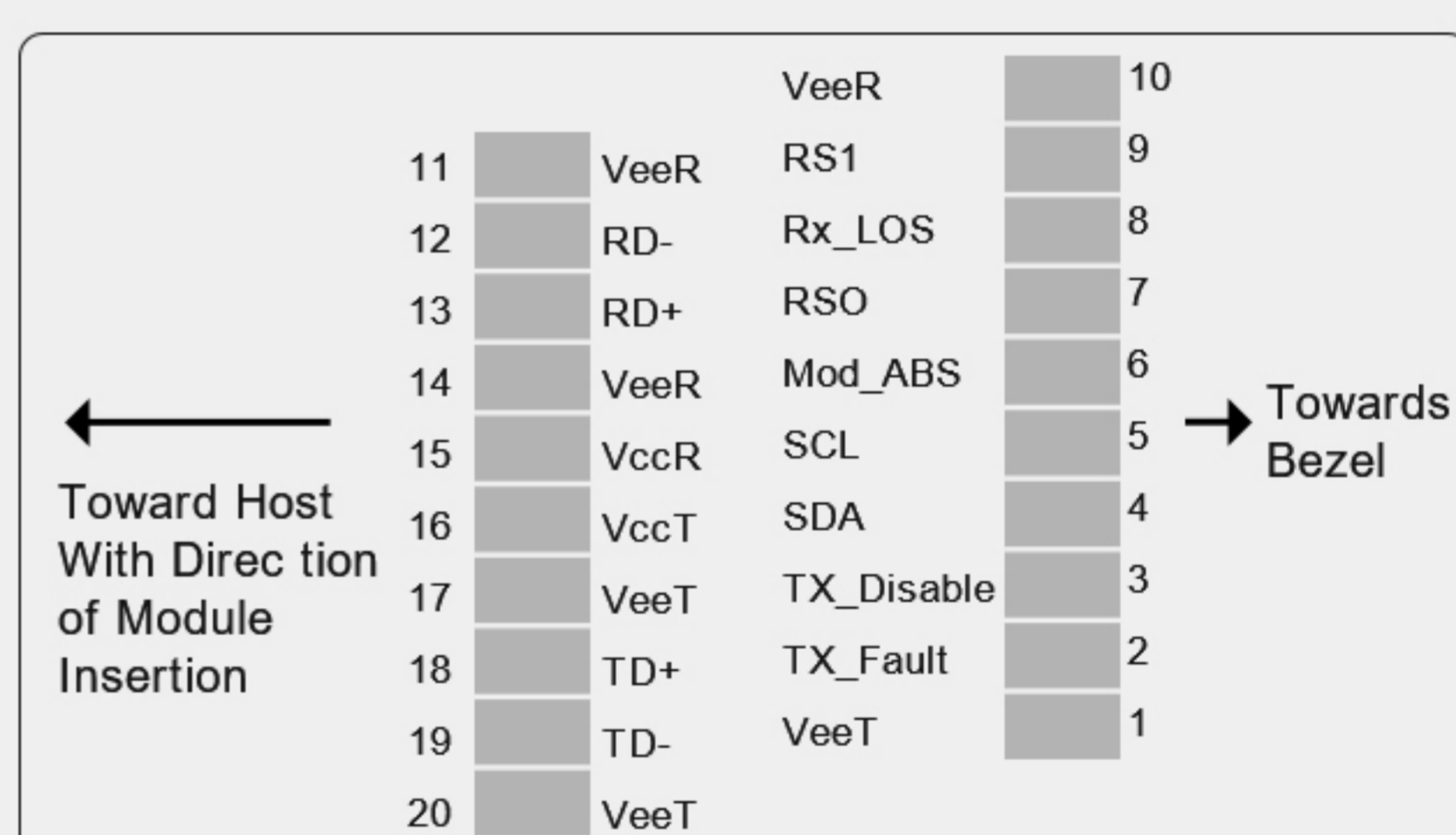
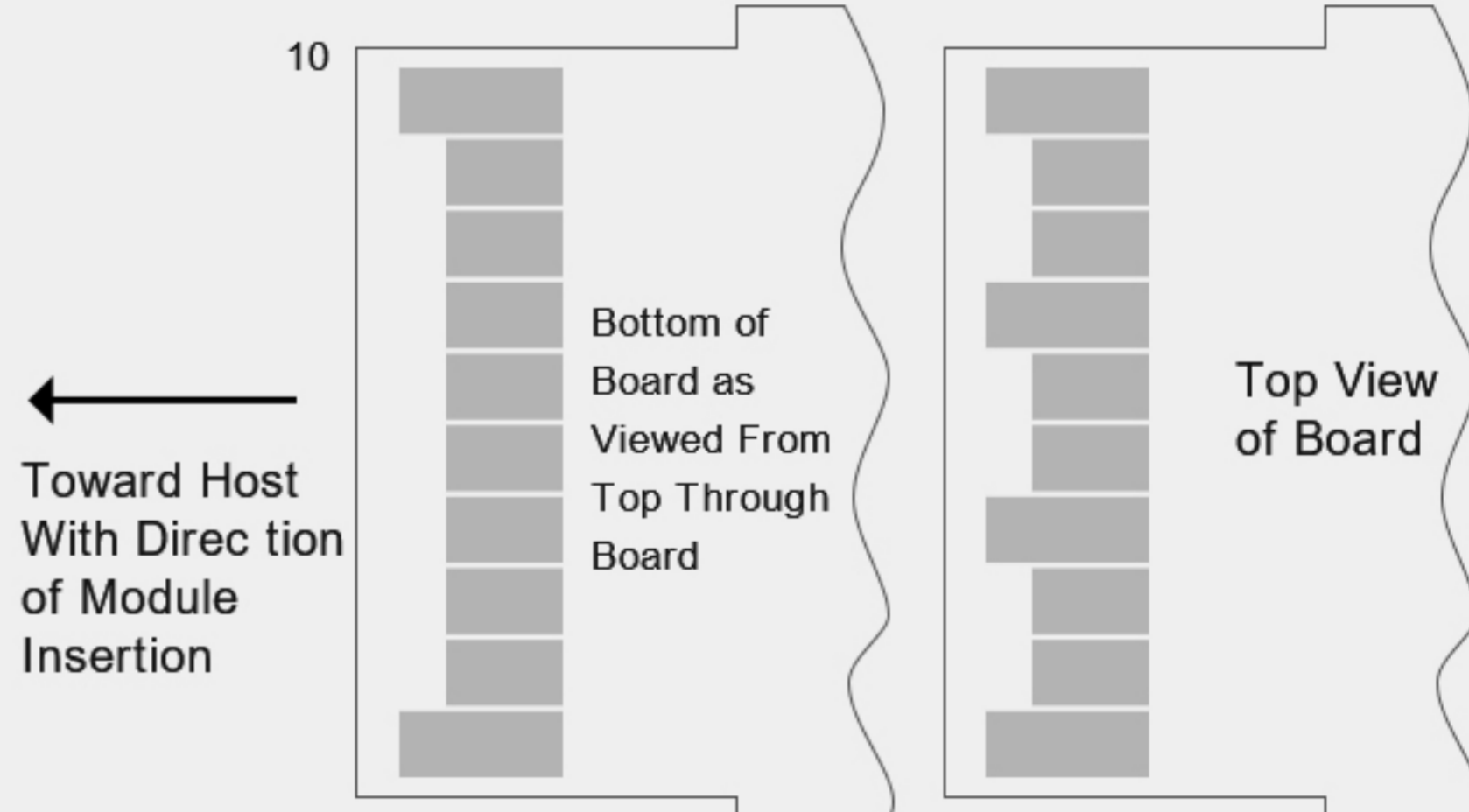


Figure 3: Module Contact Assignment



For more information, please visit: <http://www.hsgq.com>

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