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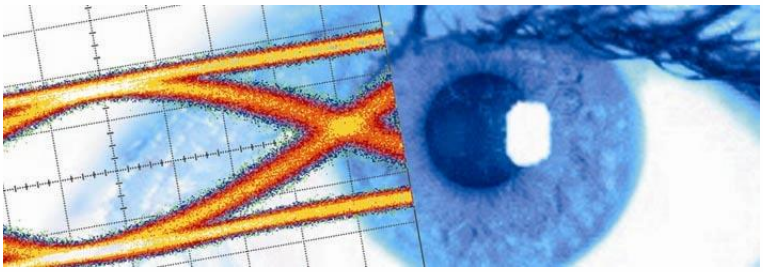
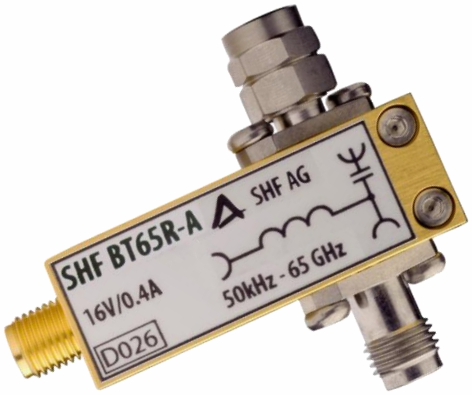


Datasheet

SHF BT65R

65 GHz Broadband Bias-Tee



Description

The SHF BT65R bias tee is the RoHS compliant successor of the SHF BT65. It outputs the superposition of the signals applied to the AC and to the DC port. Any existing DC content is blocked from its AC input while the DC input is practically only allowing transmission of pure DC[1].

Based on SHF's air line construction, it offers resonance-free transmission up to 65 GHz. In addition to the low insertion loss, all products have an extremely low group delay ripple.

Applications

- Optical Communications
- High-Speed Pulse Experiments
- Satellite Communications
- Research and Development
- Antenna Measurements
- Data Transmission

Configurations

- A - AC port: 1.85 mm male, AC+DC port: 1.85 mm female
- B - AC port: 1.85 mm female, AC+DC port: 1.85 mm male
- C - AC port: 1.85 mm male, AC+DC port: 1.85 mm male
- D - AC port: 1.85 mm female, AC+DC port: 1.85 mm female

One of above configurations has to be chosen. For more information, please be referred to the mechanical drawing on the last page of this data sheet. The DC-port is always SMA female.

Options

- HV100 - High Voltage (maximum DC voltage extended to 100 V)
- HC800 - High Current (maximum DC current extended to 800 mA)
- HVC100/800 - High Voltage & Current (maximum DC voltage extended to 100 V and maximum DC current extended to 800 mA)
- EM - Extended Measurement (inspection report up to 110 GHz)

[1] In case a low- and a high frequency signal should be combined a SHF Diplexer (essentially a bias tee with a certain bandwidth in the low frequency path) would be the right choice.

Specifications - SHF BT65R

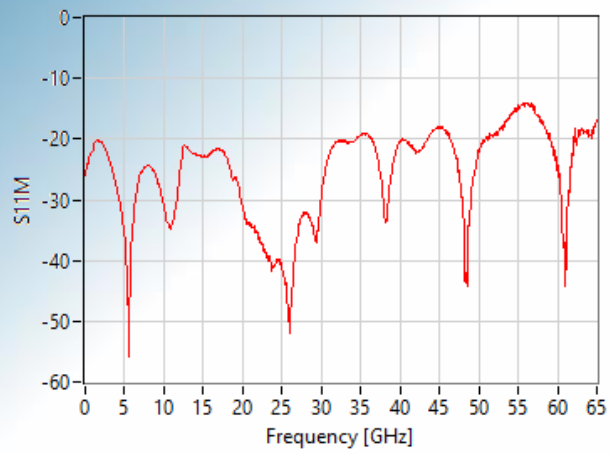
Parameter	Unit	Symbol	Min	Typ	Max	Conditions
Absolute Maximum Ratings for SHF BT65R without Option						
Maximum RF Input	dBm	$P_{in\ max}$			30	average power of a continuous [2] signal, 50 Ω load and f ≥ 2 x f_{Low}
Maximum DC Voltage	V		-16		16	difference between ports and between ports to ground
Maximum DC Current	mA		-400		400	
Case Temperature	T_{case}	°C	10	25	50	
Electrical Characteristics SHF BT65R without Option (At 25°C case temperature)						
High Frequency 3 dB Point	GHz	f_{HIGH}	65			
Low Frequency 3 dB Point	kHz	f_{LOW}		20 40	25 50	with 1 V_{DC} applied with 16 V_{DC} applied
Insertion loss	dB	S_{21}			1.5	< 65 GHz
Reflection	dB	S_{11} ; S_{22}			-17 -14 -9	>40 MHz <10 GHz <30 GHz <65 GHz
Group Delay Ripple	ps				±50	40 MHz … 50 GHz, 160 MHz aperture
Isolation		dB	30			1 MHz … 40 GHz
DC Resistance	Ω			3.5		DC to AC+DC port
Mechanical Characteristics						
Connector	Ω			50		1.85mm (V)
Dimensions	mm					please see page 8

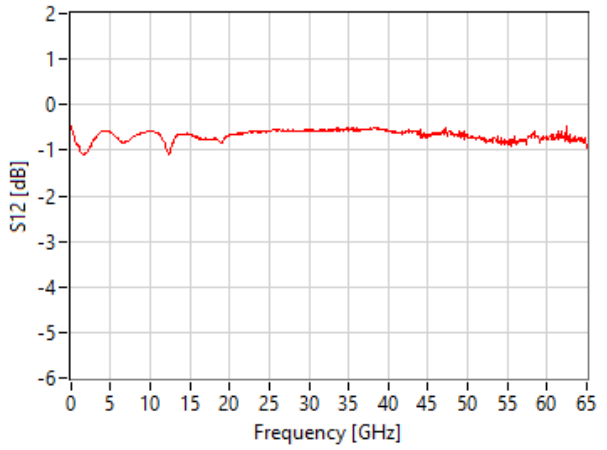
In case an option is chosen the following variations to above specifications apply:

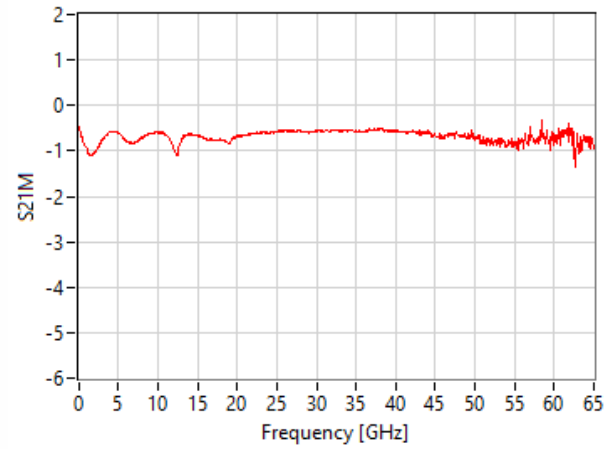
Parameter	Unit	No option	HV 100	HC 800	HVC 100/800
Maximum DC Voltage	V	-16…+16	-100…+100	-16…+16	-100…+100
Maximum DC Current	A	-0.4…+0.4	-0.4…+0.4	-0.8…+0.8	-0.8… +0.8
Max. Low Frequency 3 dB Point	MHz	0.05	3	0.1	3
Typical DC Resistance	Ω	3.5	3.5	1	1

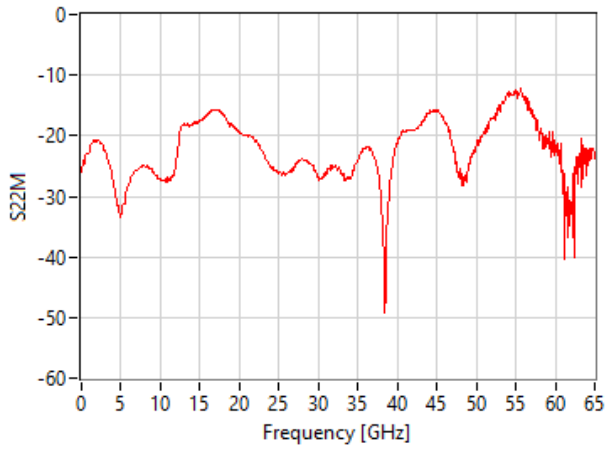
[2] 30 dBm (1 W) equals 20 V peak to peak for continuous sinusoidal signals.

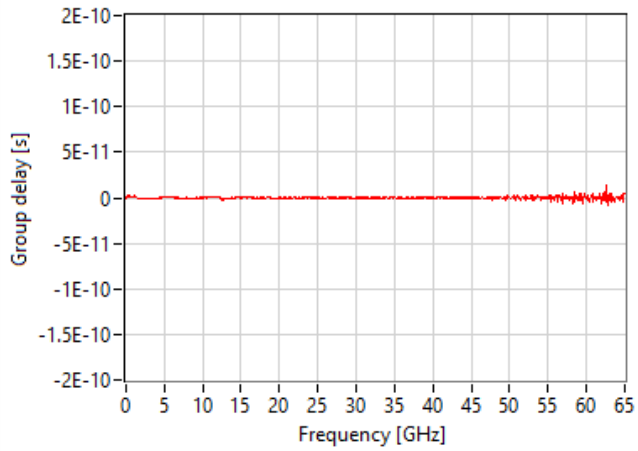
Typical S-Parameters for a BT65R without Option

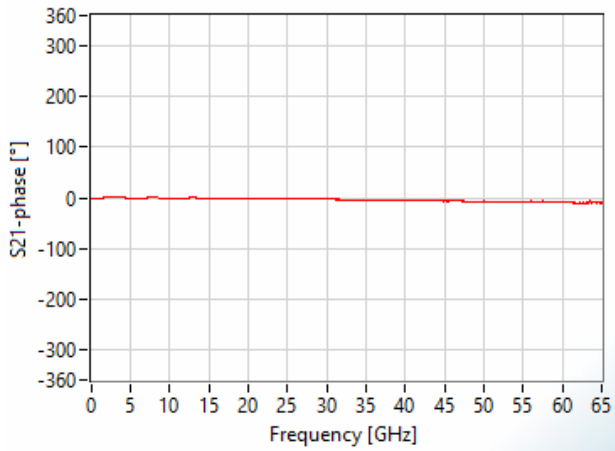










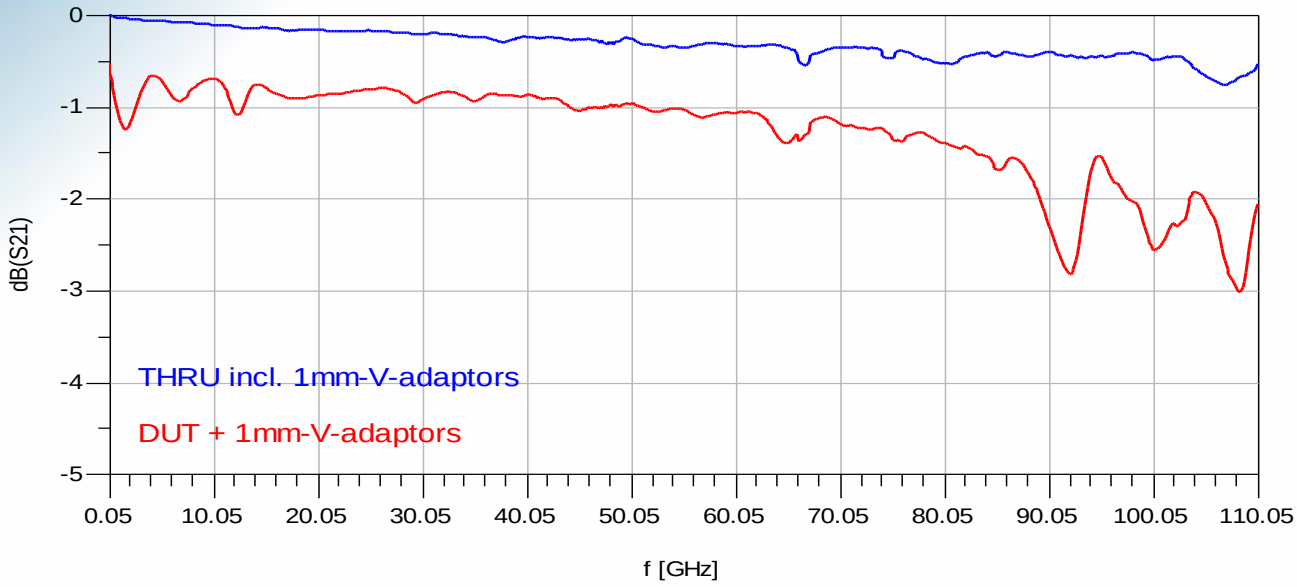


Aperture of group delay measurement: 160 MHz
S21 phase measurement has been compensated by propagation delay to visualize phase linearity.

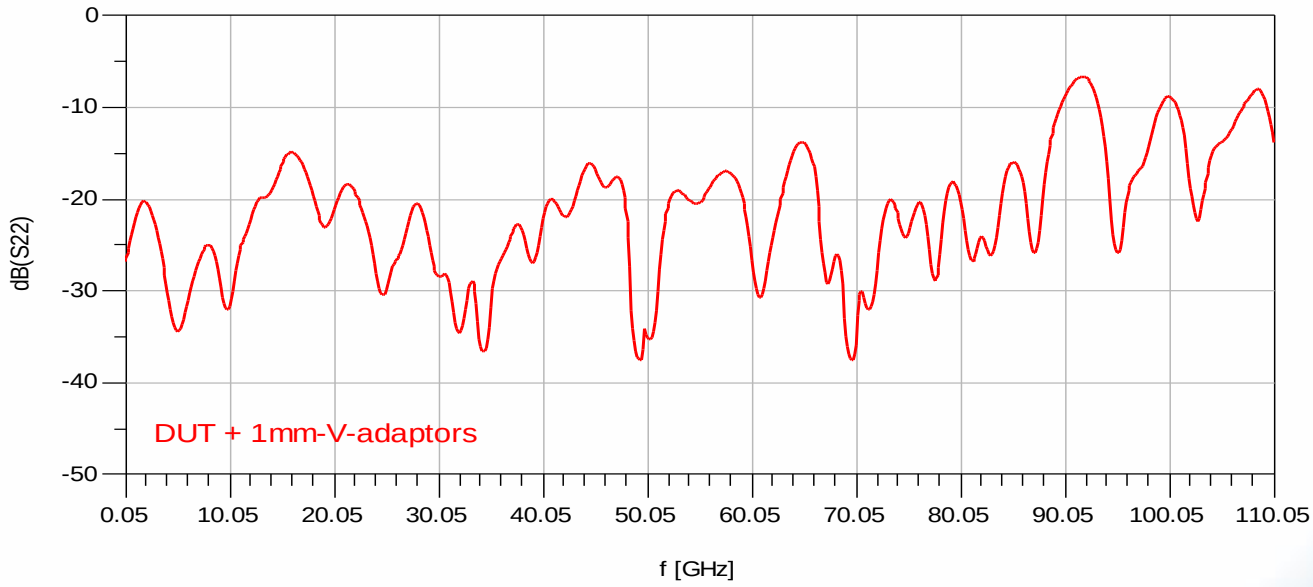
Typical S-Parameters for a BT65R with Option EM

When selecting the option EM the performance of the bias tee is measured up to 110GHz. The spikes at ~67 GHz and ~75 GHz are due to moding of the V connectors.

Insertion loss



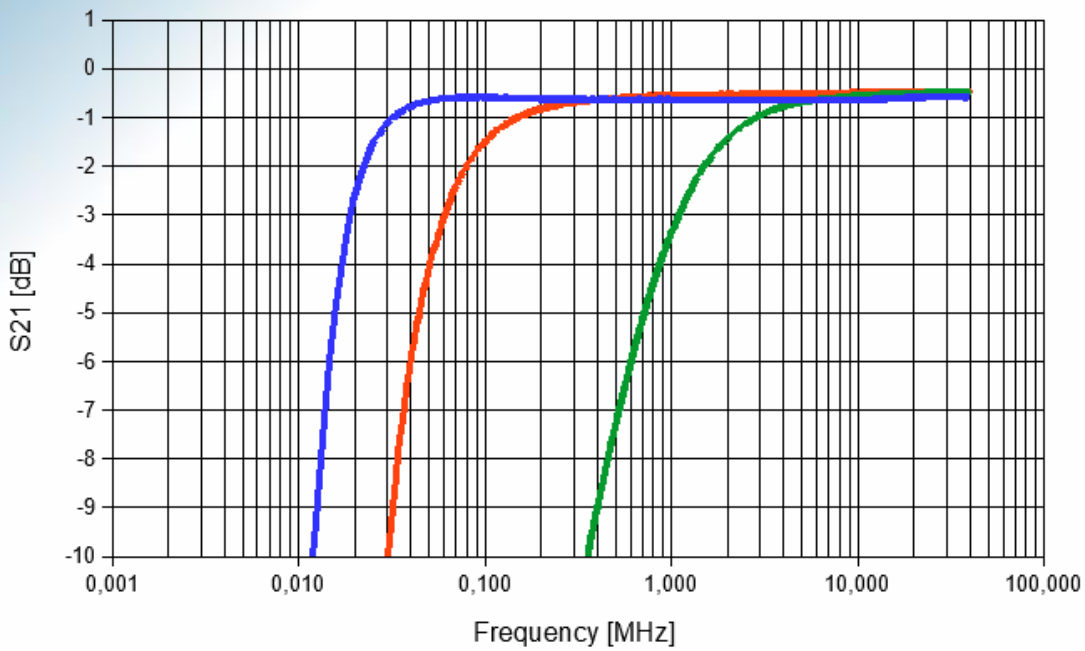
Return loss



Typical Low Frequency Response of AC Path

Measurement without applied DC voltage.

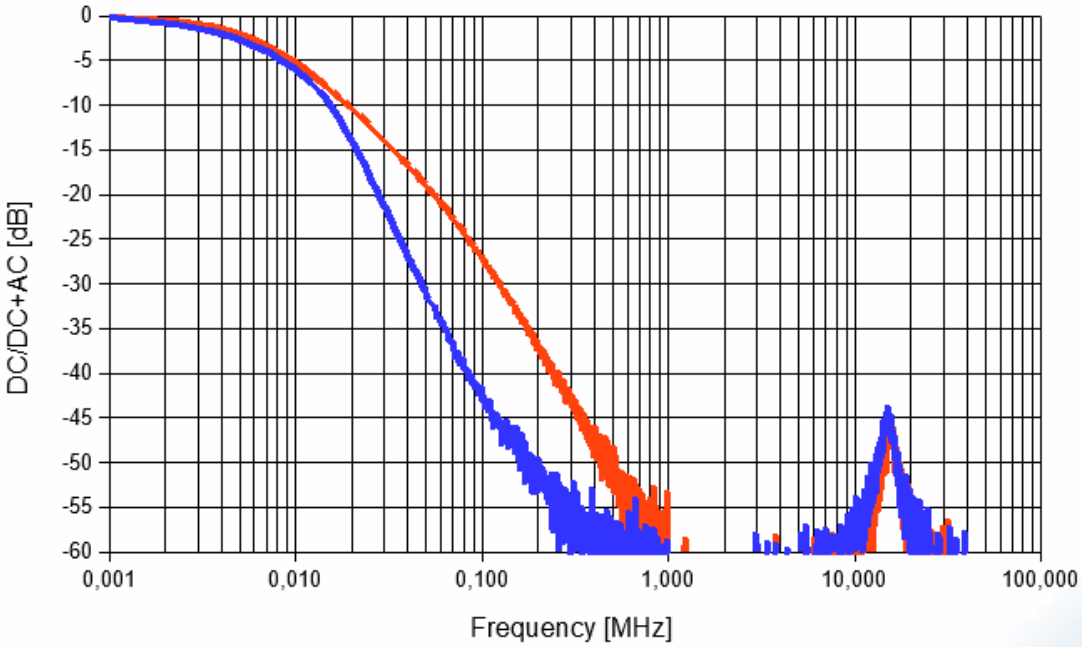
W/o option: blue ; ***Option HC800:*** red ; ***Option HV100 and HVC100/800:*** green



Typical Low Frequency Response of DC Path

Measurement without applied DC voltage.

W/o option and HV100: blue ; ***Option HC800 and HVC100/800:*** red



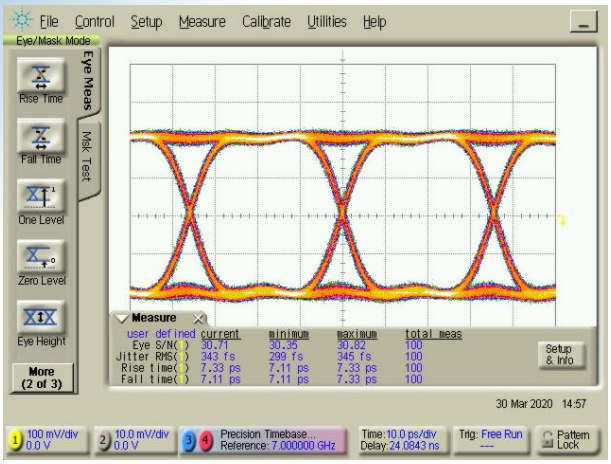
Note: The isolation DC/AC is better at low frequencys by the effect of the coupling capacitor in this path.

Typical Waveforms

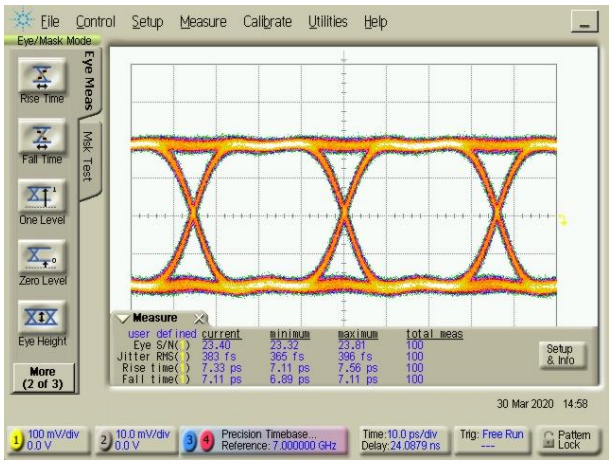
Input Eye Amplitude ~400 mV

Measurements had been performed using a SHF 613 A DAC and an Agilent 86100C DCA with Precision Time Base Module (86107A) and 70 GHz Sampling Head (86118A).

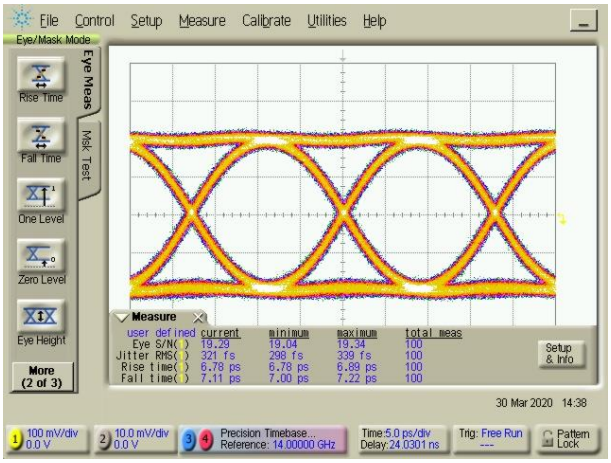
Rise and fall time are measured from 20 to 80 percent.



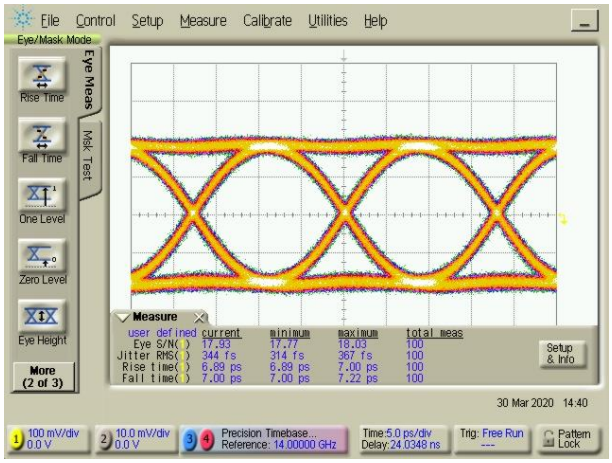
Input Signal @ 28 Gbps



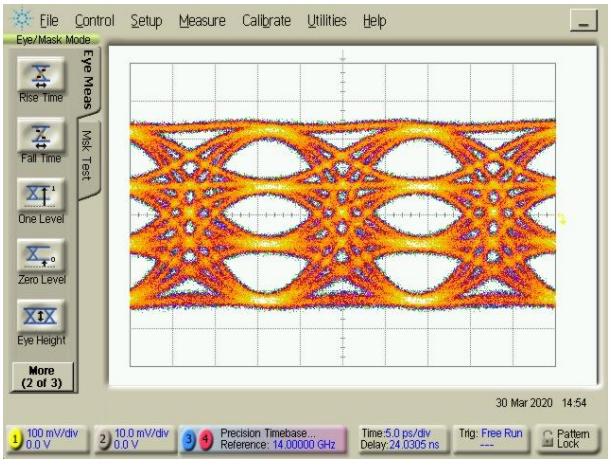
Output Signal @ 28 Gbps



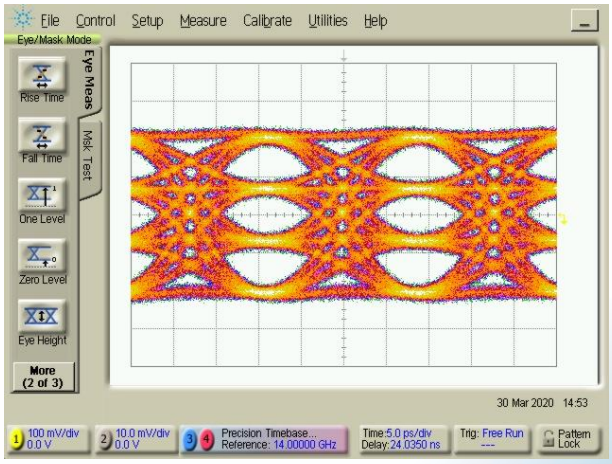
Input Signal @ 56 Gbps



Output Signal @ 56 Gbps

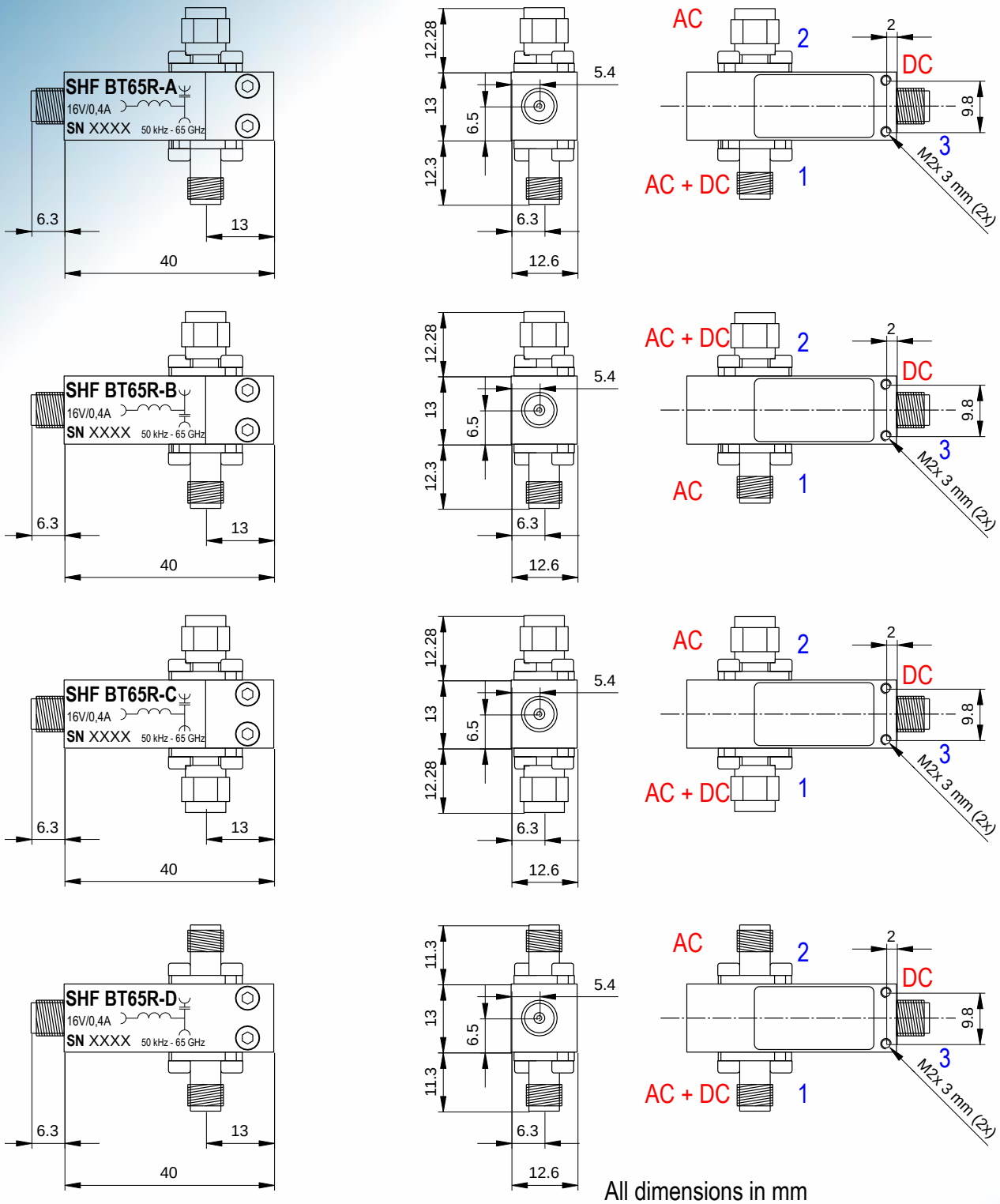


Input Signal @ 56 GBaud



Output Signal @ 56 GBaud

Mechanical Drawing



All dimensions in mm