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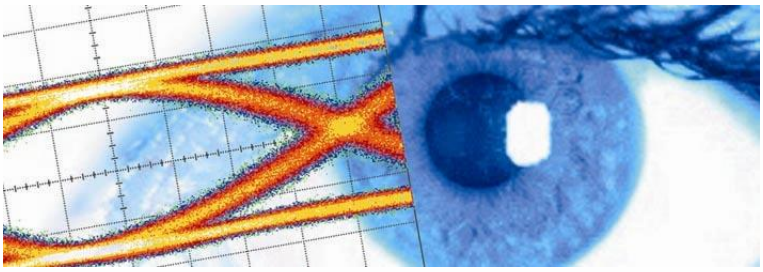
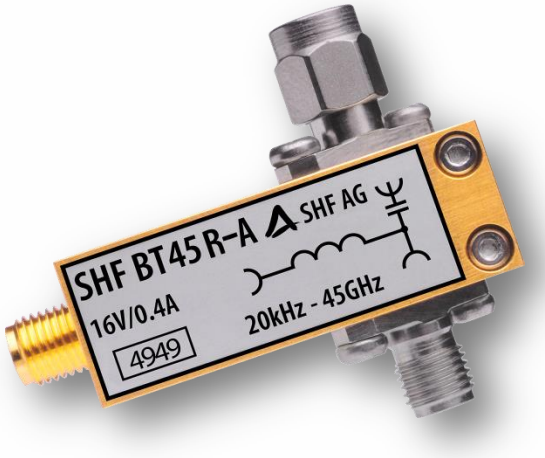


Datasheet

SHF BT45R

45 GHz Broadband Bias-Tee



Description

The SHF BT45R bias tee is the RoHS compliant successor of the SHF BT45. 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 45 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: 2.92 mm male, AC+DC port: 2.92 mm female
- B - AC port: 2.92 mm female, AC+DC port: 2.92 mm male
- C - AC port: 2.92 mm male, AC+DC port: 2.92 mm male
- D - AC port: 2.92 mm female, AC+DC port: 2.92 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)
- HV200 - High Voltage (maximum DC voltage extended to 200 V)
- HC1000 - High Current (maximum DC current extended to 1 A)
- HC2000 - High Current (maximum DC current extended to 2 A)
- HVC100/1000 - High Voltage & Current (maximum DC voltage extended to 100 V and maximum DC current extended to 1 A)

[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 BT45R

Parameter	Unit	Symbol	Min	Typ	Max	Conditions
Absolute Maximum Ratings for SHF BT45R 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 BT45R without Option (At 25°C case temperature)						
High Frequency 3 dB Point	GHz	f_{HIGH}	45			
Low Frequency 3 dB Point	kHz	f_{LOW}			20	with 16 V_{DC} applied
Insertion loss	dB	S_{21}			1.5	< 40 GHz
Input Reflection	dB	S_{11} ; S_{22}			-17 -14 -10	>40 MHz <15 GHz <20 GHz <45 GHz
Group Delay Ripple	ps				±50	1 GHz … 40 GHz, 160 MHz aperture
Isolation		dB	30			1 MHz … 30 GHz
DC Resistance	Ω			3.5		DC to AC+DC port
Mechanical Characteristics						
Connector	Ω			50		2.92mm (K)
Dimensions	mm					please see page 5
Weight	g			25		

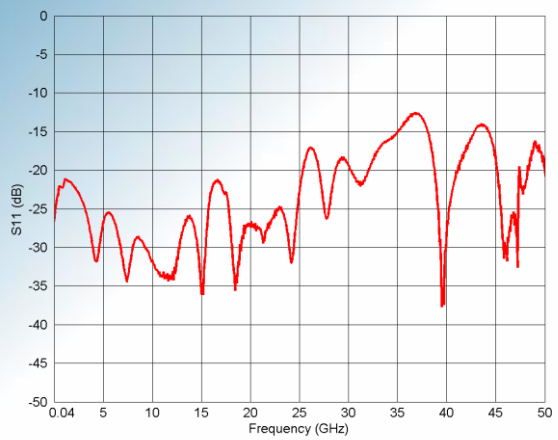
In case an option is chosen the following variations to above specifications apply:

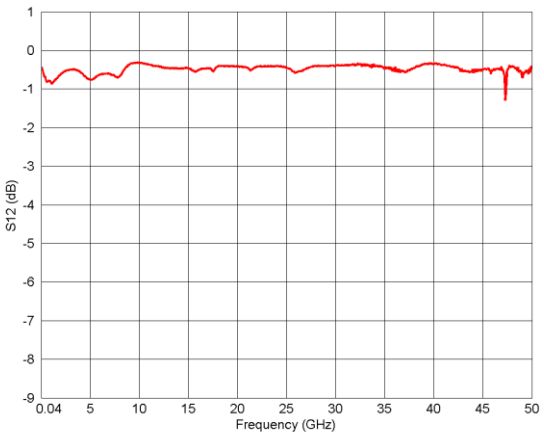
Parameter	Unit	No option	HV 100	HV 200	HC 1000	HC 2000	HVC 100/1000
Maximum DC Voltage	V	-16…+16	-100…+100	-200…+200	-16…+16	-16…+16	-100…+100
Maximum DC Current	A	-0.4…+0.4	-0.4…+0.4	-0.4…+0.4	-1… +1	-2… +2	-1… +1
Max. Low Frequency 3 dB Point [3]	MHz	0.02	0.8	4	0.1	0.5	0.8
Typical DC Resistance	Ω	3.5	3.5	3.5	1	0.3	1

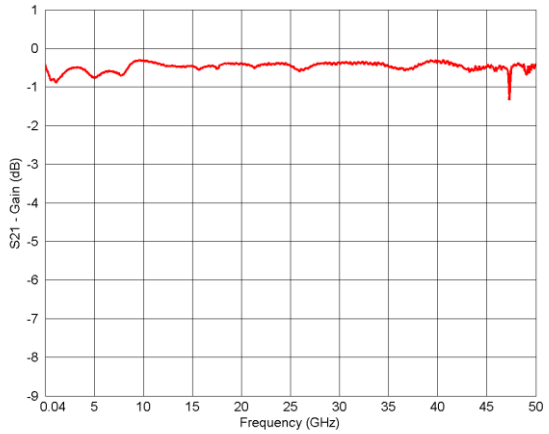
[2] 30 dBm (1 W) equals 20 V peak to peak for continuous sinusoidal signals. A pulsed excitation with an average of 1 W and thus having significantly higher peaks is possible. The maximum RF input power does not change in case a signal is applied to the DC port.

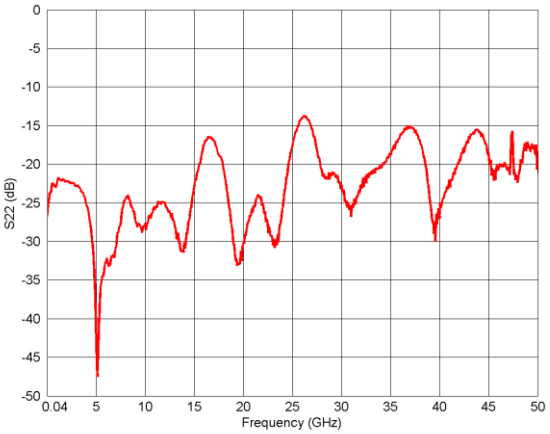
[3] measured with maximum DC voltage applied

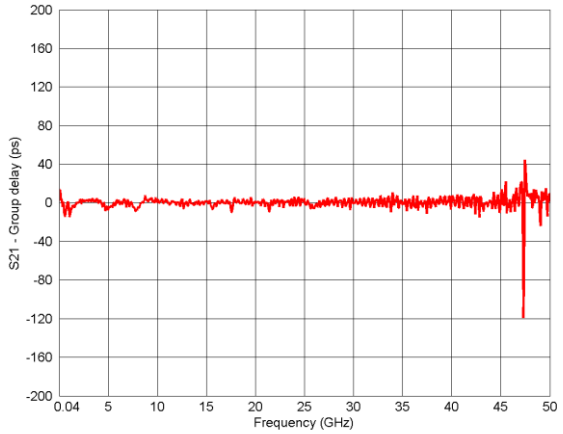
Typical S-Parameters for a BT45R without Option

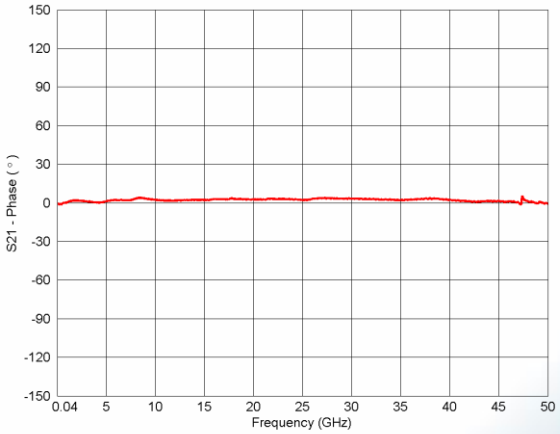












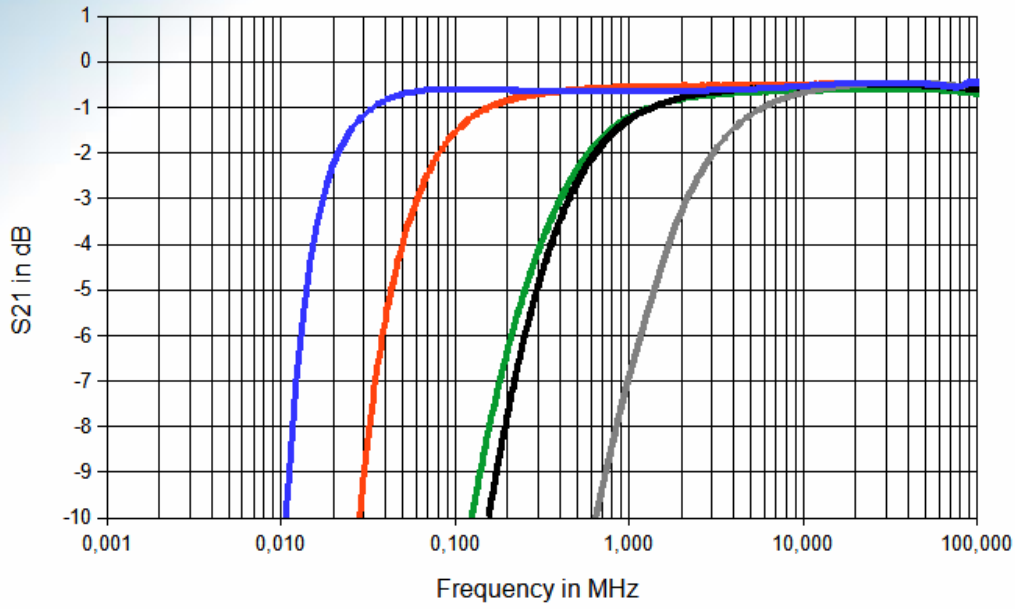
Aperture of group delay measurement: 160 MHz
S21 phase measurement has been compensated by propagation delay to visualize phase linearity.

Typical Low Frequency Response of AC Path

Measurement without applied DC voltage.

W/o option: blue ; ***Option HC1000:*** red ; ***Option HC2000:*** green

Option HV100 and HVC100/1000: black ; ***Option HV200:*** gray

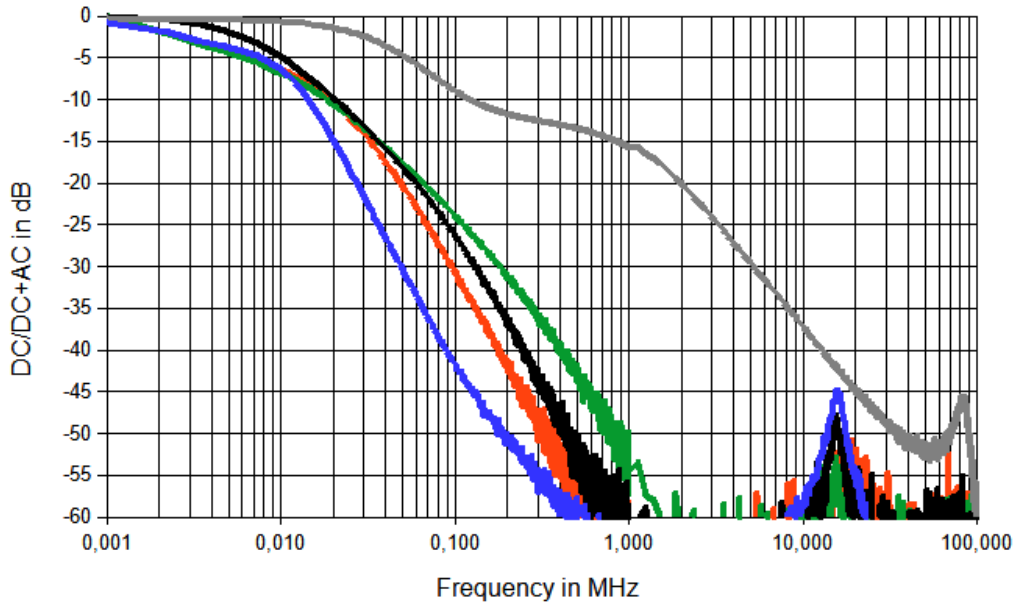


Typical Low Frequency Response of DC Path

Measurement without applied DC voltage.

W/o option: blue ; ***Option HC1000:*** red ; ***Option HC2000:*** green

Option HV100 and HVC100/1000: black ; ***Option HV200:*** gray



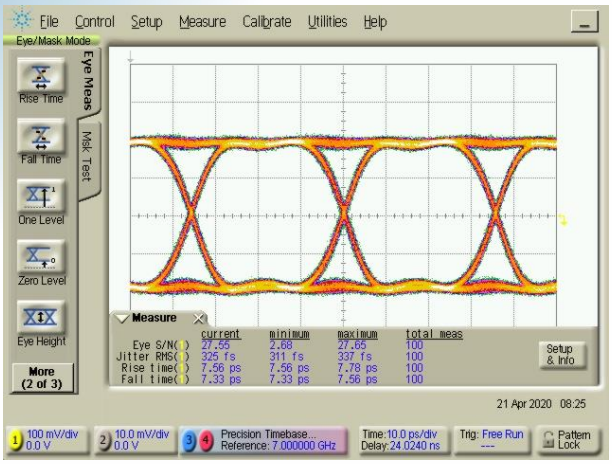
Note: The isolation DC/AC is better at low frequencys by the effect of the coupling capacitor in this path.

Typical Waveforms

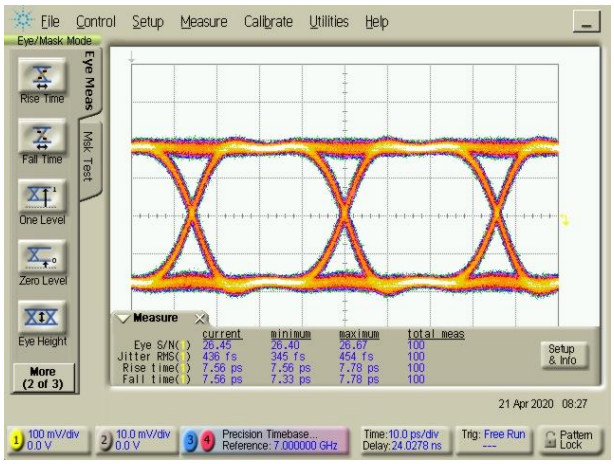
Input Eye Amplitude ~400 mV

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).

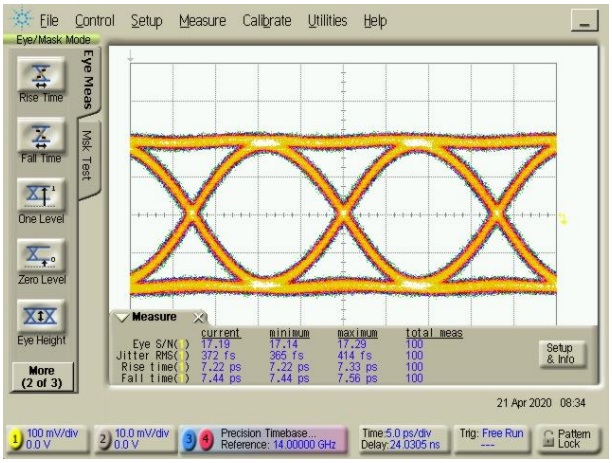
Rise and fall time are measured from 20 to 80 percent.



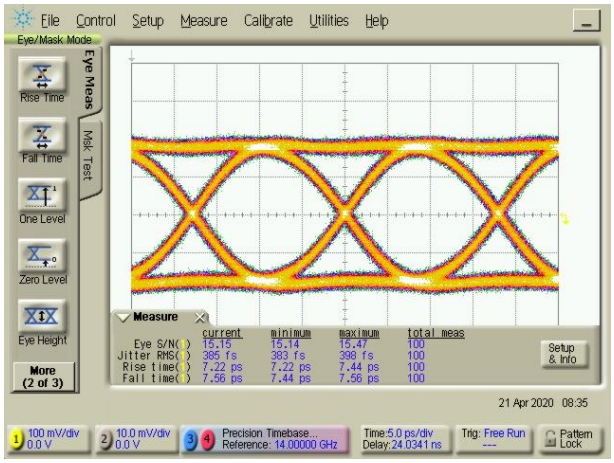
Input Signal @ 28 Gbps



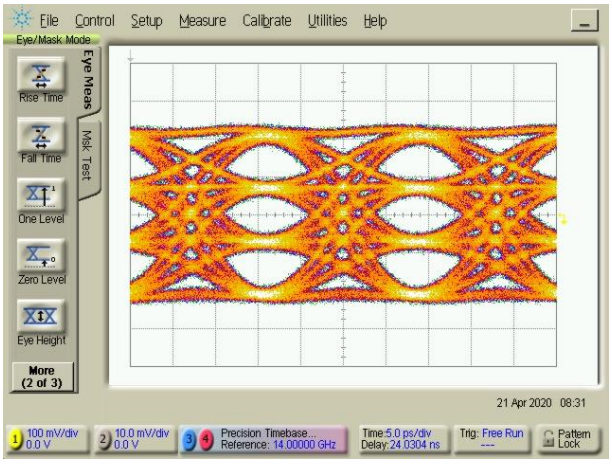
Output Signal @ 28 Gbps



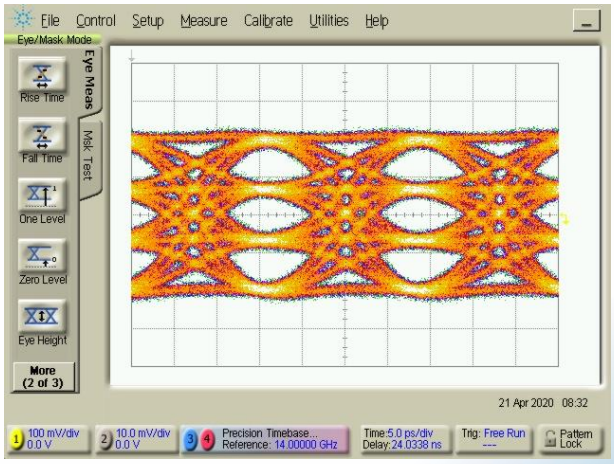
Input Signal @ 56 Gbps



Output Signal @ 56 Gbps

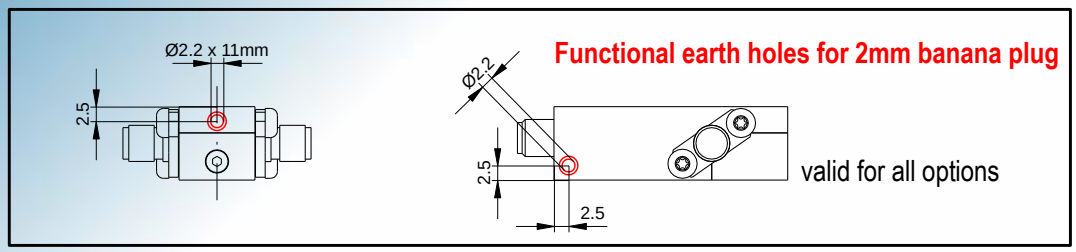


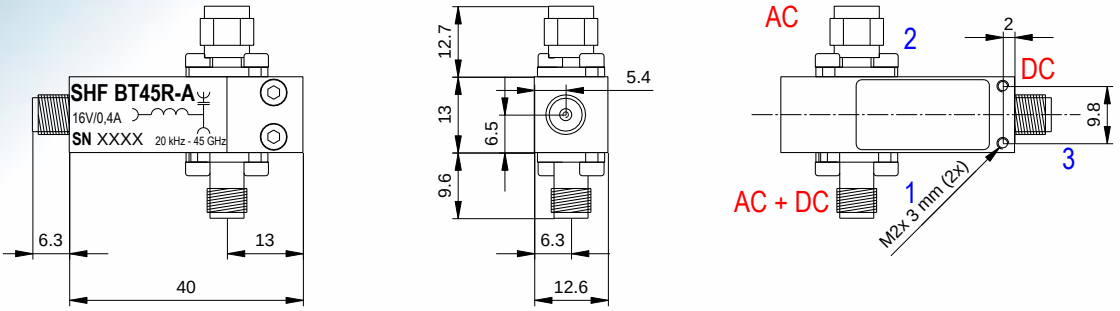
Input Signal @ 56 GBaud

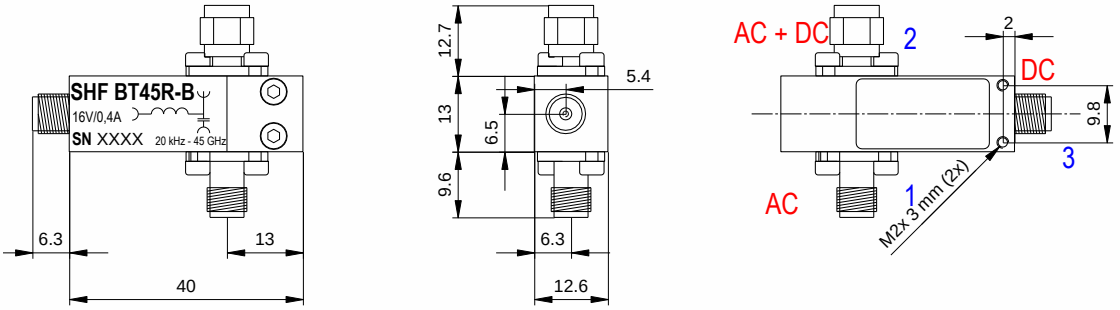


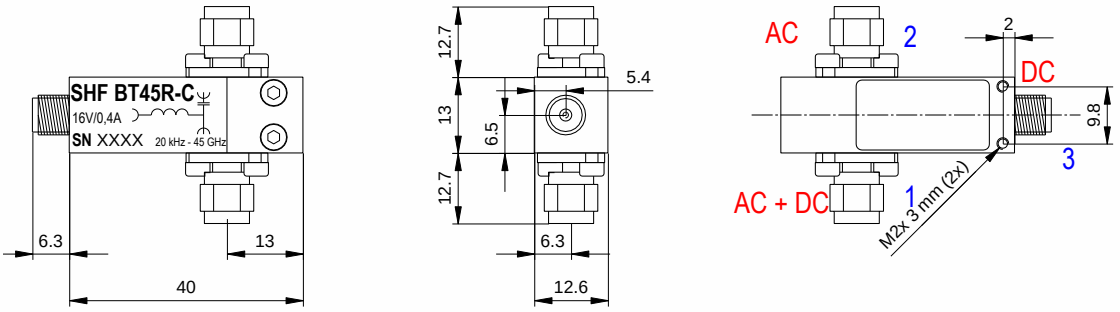
Output Signal @ 56 GBaud

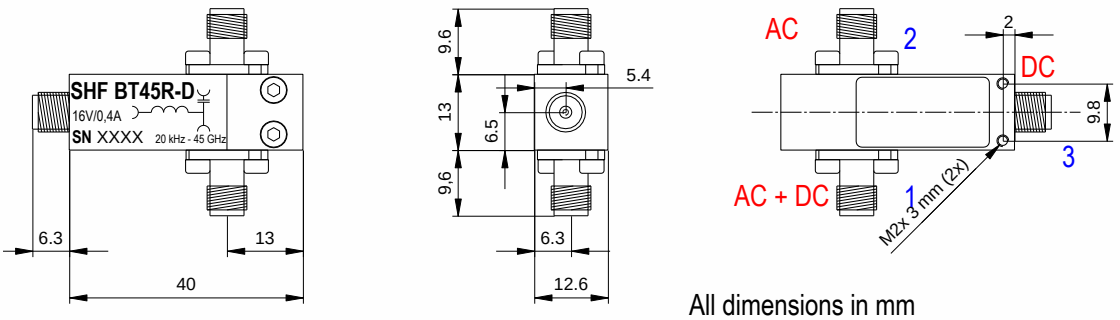
Mechanical Drawing











All dimensions in mm