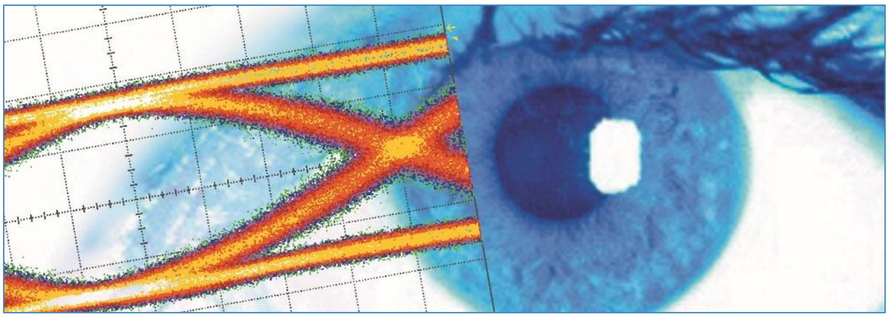
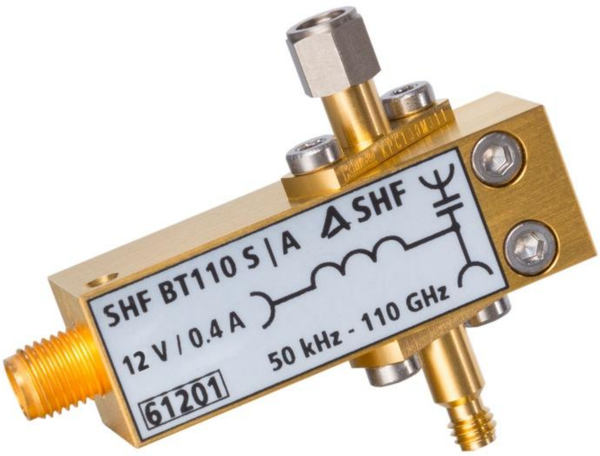


Data Sheet

SHF BT110 S



Broadband Bias-Tee

Description

The SHF BT110 S is a RoHS compliant bias tee offering resonance-free transmission up to 110 GHz at low insertion loss. 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. As the successor to the BT110R, the BT110 S offers reduced S_{12} and S_{21} ripple below 30 GHz.

Individual Inspection

Each bias tee will be furnished with an individual inspection report showing the compliance to the data sheet as well as the frequency domain performance. This data (including the touchstone® s2p-file) is accessible on-line. The specific link dedicated to each serial number will be provided with the delivery and is printed as a QR code.

Configurations

The SHF BT110 S is to be selected in one of the following configurations.

A: AC port: 1.0 mm Male, AC+DC port: 1.0 mm Female

B: AC port: 1.0 mm Female, AC+DC port: 1.0 mm Male

C: AC port: 1.0 mm Male, AC+DC port: 1.0 mm Male

D: AC port: 1.0 mm Female, AC+DC port: 1.0 mm Female

The DC-port is always SMA.

Options

HV35: High Voltage (maximum DC Voltage extended to 35 V)

MP: Phase Matching of two Bias Tees (Matched Pair)

Specifications

Absolute Maximum Ratings

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Maximum RF Input w/o option	dBm	$P_{in\ max}$			30	average power of a continuous[1] signal, 50 Ω load and f ≥ 300 kHz
Maximum RF Input with Opt. HV35	dBm	$P_{in\ max}$			30	average power of a continuous[1] signal, 50 Ω load and f ≥ 3 MHz
Maximum DC Voltage w/o option with Opt. HV35	V		 -12 -35		 12 35	difference between ports and between ports to ground
Maximum DC Current	mA		-400		400	
Case Temperature	T_{case}	°C	10	25	50	

Electrical Characteristics (At 25°C case temperature, unless otherwise specified)

Parameter	Unit	Symbol	Min	Typ	Max	Comment
High Frequency 3 dB Point	GHz	f_{HIGH}	110			
Low Frequency 3 dB Point w/o option	kHz	f_{LOW}			50 150	with 0 V_{DC} applied with 12 V_{DC} applied
Low Frequency 3 dB Point Opt. HV35	MHz	f_{LOW}			0.3 1.5	with 0 V_{DC} applied with 35 V_{DC} applied
Insertion loss	dB	IL			1.7 2.2	2 MHz < f ≤ 70 GHz 70 GHz < f ≤ 110 GHz
Return Loss	dB	RL	14 12 10			2 MHz < f ≤ 30 GHz 30 GHz < f ≤ 70 GHz 70 GHz < f ≤ 110 GHz
Phase Delay Difference[2]	deg	Δ PD			±4 ±8	1 GHz < f ≤ 60 GHz 60 GHz < f ≤ 110 GHz If option MP is chosen
Insertion Loss Difference[3]	db	Δ IL			±0.4	1 to 110 GHz If option MP is chosen
DC-Resistance	Ohm			2.5		DC Port to AC+DC Port

[1] 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.

[2] The phase delay difference is defined as the phase difference in degrees of the output signals of both bias tees. It is calculated as: *ΦBias-Tee1 – ΦBias-Tee2*, where *ΦBias-Tee1* and *ΦBias-Tee2* indicate the unwrapped phase of S21 *Bias-Tee*1 and S21 *Bias-Tee*2, respectively.

[3] The insertion loss difference is defined as the insertion loss difference in dB of the output signals of both bias tees. It is calculated as: *|S21 Bias-Tee1|dB - |S21 Bias-Tee2|dB*.

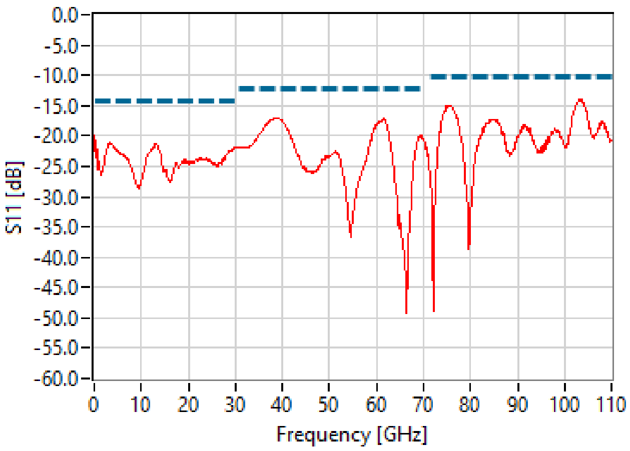
Mechanical Characteristics

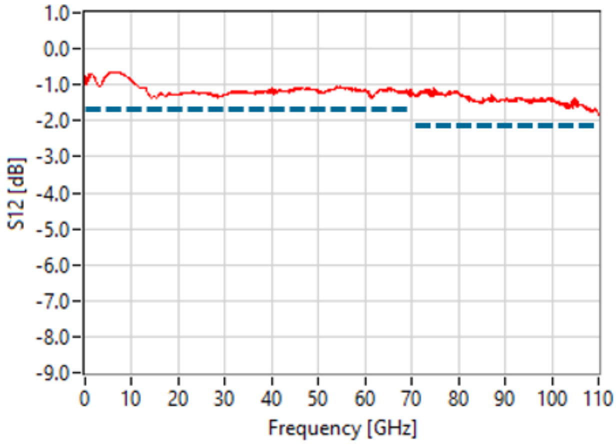
Parameter	Unit	Symbol	Min	Typ	Max	Conditions
Connector	Ω			50		1.0 mm[4]
Dimensions	mm					see outline drawing on page 8
Weight	g			24		

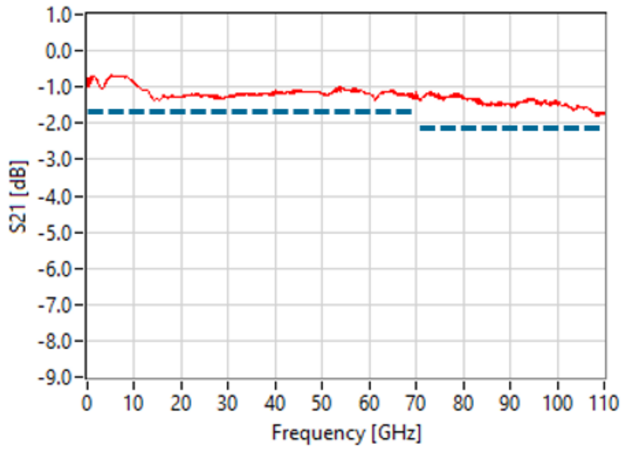
[4] Gender configurations according selected option

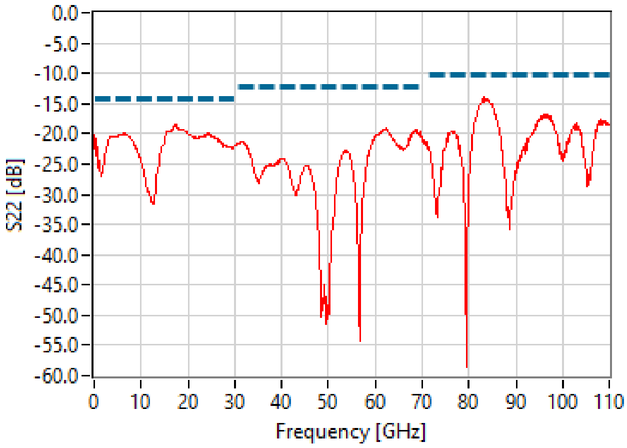
Typical S-Parameters

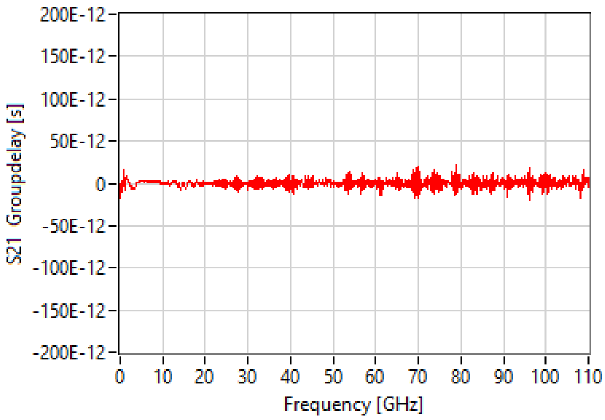
W/o option

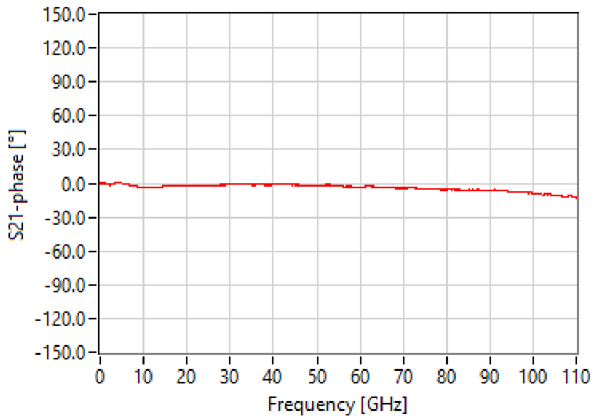










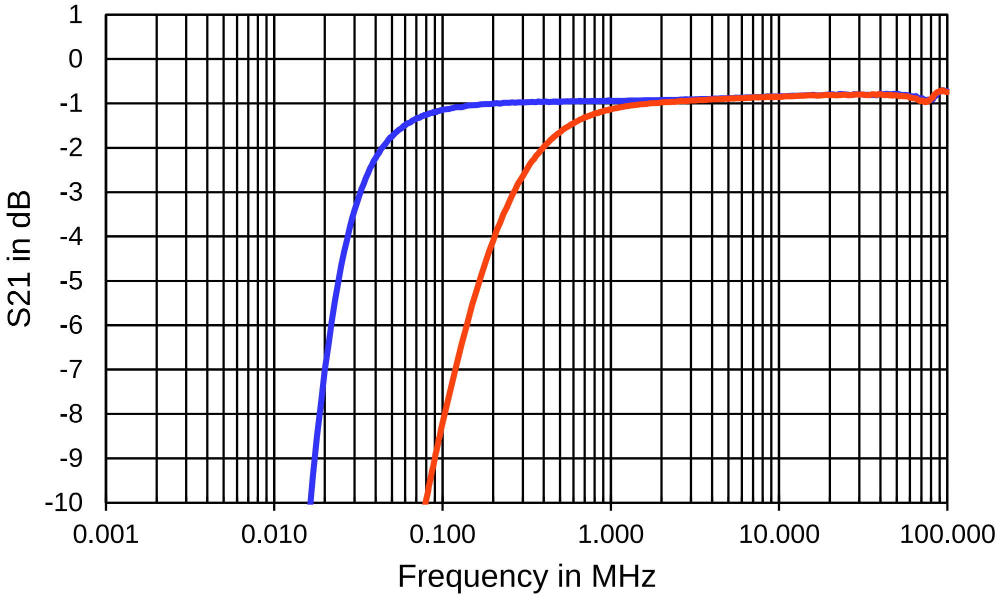


Blue dashed lines = Specifications

Typical Low Frequency Response of AC Path

Measurements without applied DC voltage, with 50 Ω Termination at DC Port.

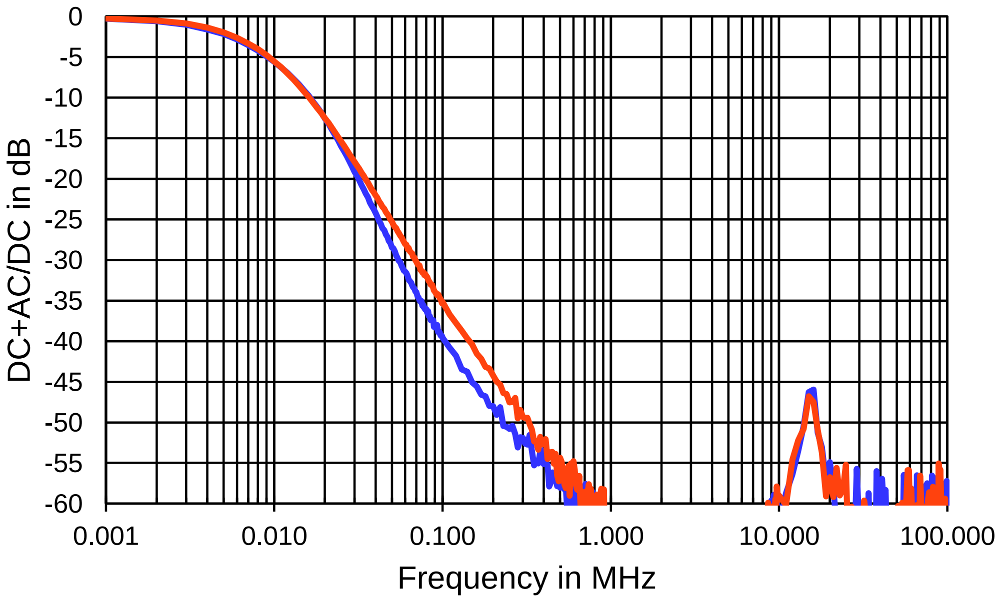
W/o option: *blue*; ***Option HV35:*** *red*



Typical Low Frequency Response of DC Path

Measurements without applied DC voltage, with 50 Ω Termination at AC Port.

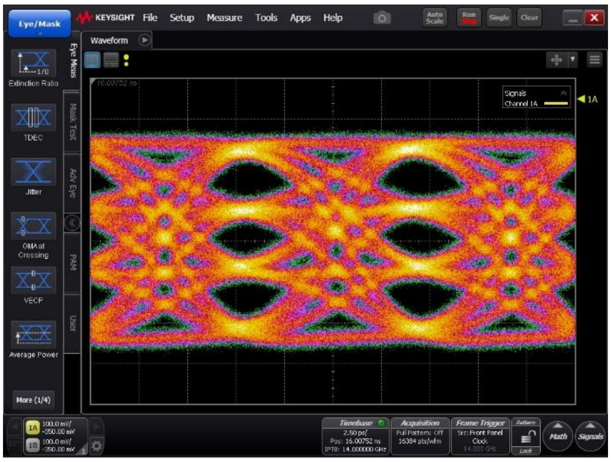
W/o option: *blue*; ***Option HV35:*** *red*



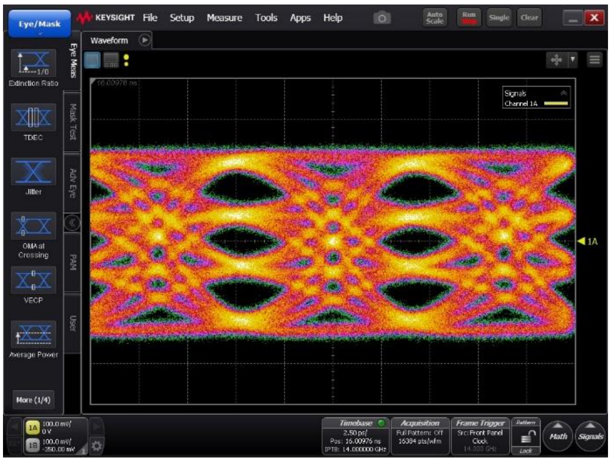
Note: The isolation AC/DC is better at low frequencies by the effect of the coupling capacitor in this path.

Typical Multilevel Waveforms

Measurements at 112 GBaud had been performed using a SHF 12105 A with SHF 616 C PAM-Mux and a Keysight DCA-X N1000A with a 100 GHz Sampling Module (N1046A).



112 GBaud (224 Gbps) Input Signal

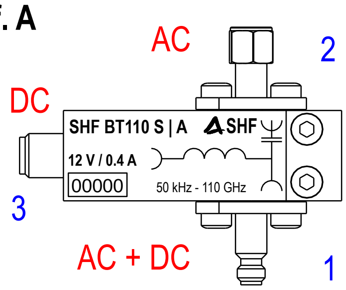


112 GBaud (224 Gbps) Output Signal

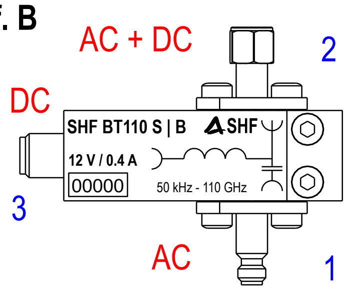
Mechanical Drawing

Configurations

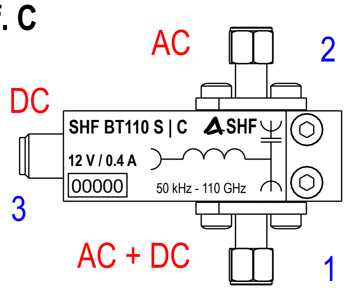
Conf. A



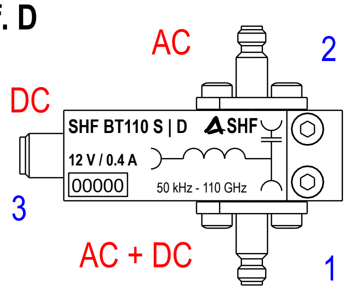
Conf. B



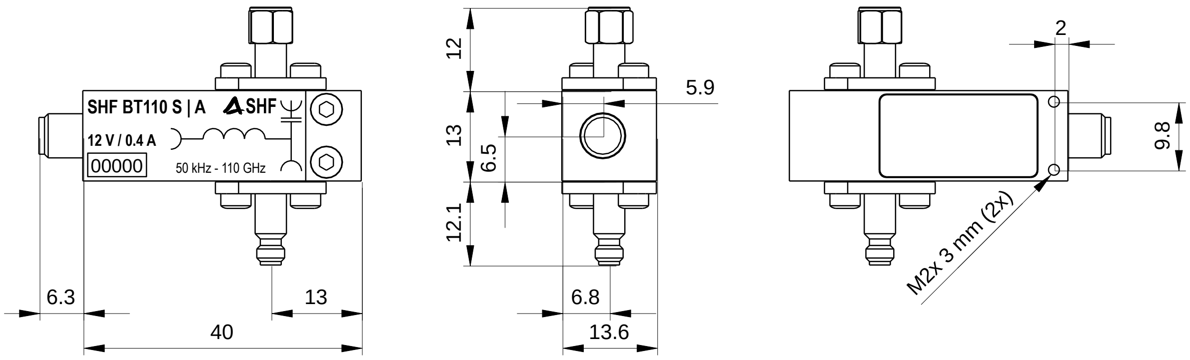
Conf. C



Conf. D



Dimensions



All dimensions in mm

Note: There are two holes for 2 mm banana plug. These could be used for a functional earth connection.

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