

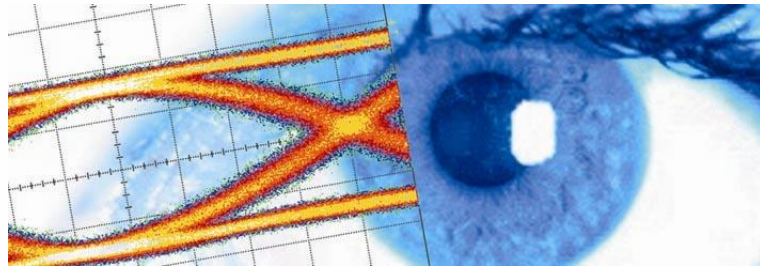


**SHF Communication Technologies AG**

Wilhelm-von-Siemens-Str. 23D • 12277 Berlin • Germany

Phone +49 30 772051-0 • Fax +49 30 7531078

E-Mail: [sales@shf-communication.com](mailto:sales@shf-communication.com) • Web: [www.shf-communication.com](http://www.shf-communication.com)

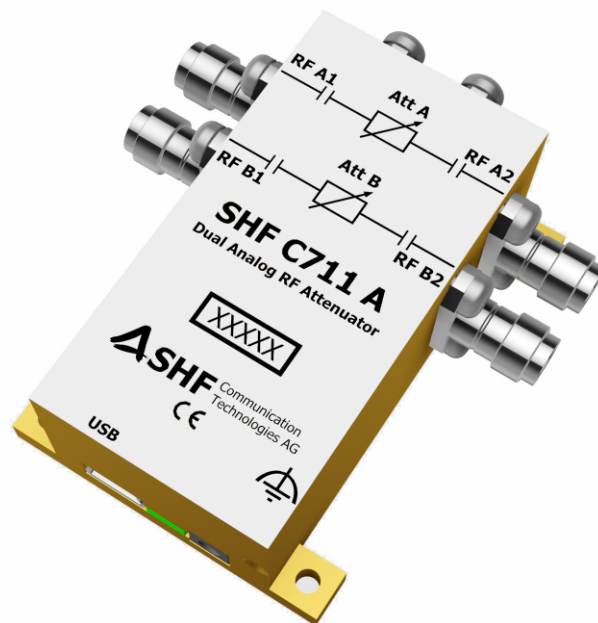


# Datasheet

## SHF C711 A

50 GHz / 64 Gbps

### 22 dB Variable Dual Analog RF Attenuator



SHF reserves the right to change specifications and design without notice – SHF C711 A - V002 – December 01, 2020 Page 1/10



## Description

The SHF C711 A is a dual analog broadband RF attenuator, operating from 40 kHz up to 50 GHz for clock signal, and up to 64 Gbps for NRZ Data signal. It offers high quality output signals together with a compact size and ease of operation.

The two attenuators are fully independent RF building blocks, so essentially two attenuators are operated by single software and housed in a single chassis as indicated by the block diagram below. It operates in both directions, i.e. the signal can be applied to or taken from the RF ports.

Attenuation values can be set with a calibrated resolution of  $\pm 0.1$  dB within a 22 dB dynamic range.

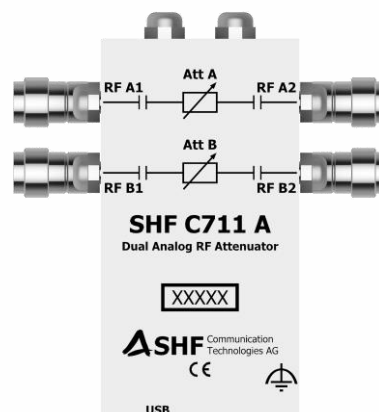
## Features

- Broadband operation up to 50 GHz
- Up to 64Gbps NRZ Data signal
- Calibrated attenuation settings
- High attenuation resolution
- Attenuation of differential signals
- Bi-directional
- Low power consumption
- Single-ended operation
- USB interface
- Simple, easy to use GUI
- Automated measurements by using different software environments easily possible<sup>1</sup>

## Applications

- Broadband test and measurement equipment

## Block Diagram



<sup>1</sup> To operate the switch, intuitive and well documented plain text commands are sent and received via USB. Thus the device can be operated either by the complementary software or automated by any programming language which can communicate with USB devices.



## Accessories

- Functional earth cable
- Mini-USB cable

## Absolute Maximum Ratings

Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
<b>Input Parameters</b>						
Input Power	dBm	$P_{in}$			30	
External DC Voltage on RF Ports	V	$V_{DCext}$	-6		+6	AC coupled ports

## Specifications – SHF C711 A

Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
<b>Performance</b>						
Minimum Input Frequency	kHz	$f_{min}$			40	Clock Signal
Maximum Input Frequency	GHz	$f_{max}$	50			Clock Signal
Data Rate	Gbps		64			Data Signal
Attenuation Range	dB			22		
Attenuation Resolution	dB				0.1	
Attenuation Accuracy					TBD	
Insertion Loss @ min att.	dB		4	6	7.5	whole frequency range
Insertion Loss @ max att.	dB		26	28	29	whole frequency range
Return Loss @ min att.	dB		6	10		< 50 GHz, RF A1
Return Loss @ min att.	dB		6	10		< 50 GHz, RF A2
Return Loss @ max att.	dB		7	10		< 50 GHz, RF B1
Return Loss @ max att.	dB		12	16		< 50 GHz, RF B2



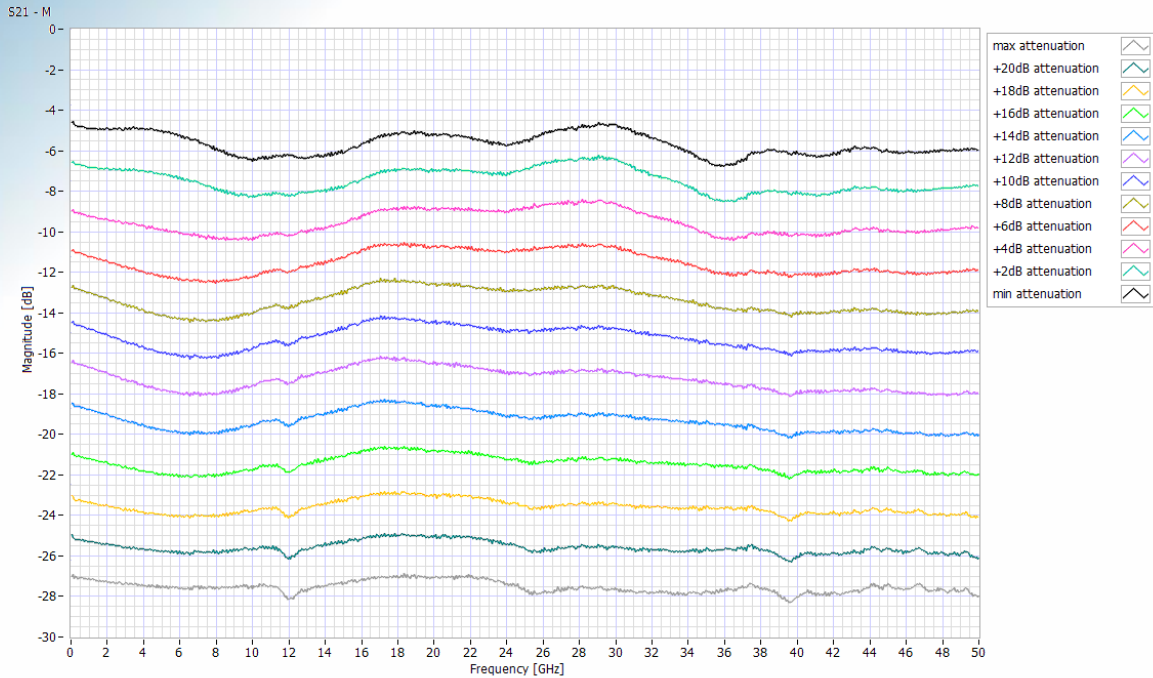
Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
<b>Output Parameters</b>						
Jitter RMS	fs	J <sub>RMS</sub>				See note <sup>2</sup>
Duty Cycle	%	DC				See note <sup>2</sup>
Inter-Channel Skew	ps				1	
<b>Power Requirement</b>						
Supply Voltage	V	V <sub>CC</sub>	+4.40	+5.00	+5.25	Mini USB
Supply Current	mA	I <sub>CC</sub>		20		
Power Dissipation	mW	P <sub>d</sub>		100		@ V <sub>CC</sub> = +5 V
<b>Mechanical Characteristics</b>						
Attenuator A RF A1	Ω			50		1.85 mm (V) female
Attenuator A RF A2	Ω			50		1.85 mm (V) female
Attenuator B RF B1	Ω			50		1.85 mm (V) female
Attenuator B RF B2	Ω			50		1.85 mm (V) female
Dimensions	mm					See Outline Drawing
Weight	g			90		
<b>Conditions</b>						
Operating Temperature	°C	T <sub>ambient</sub>	15		35	

<sup>2</sup> No degradation in jitter or duty cycle performance were observed for sine wave signals

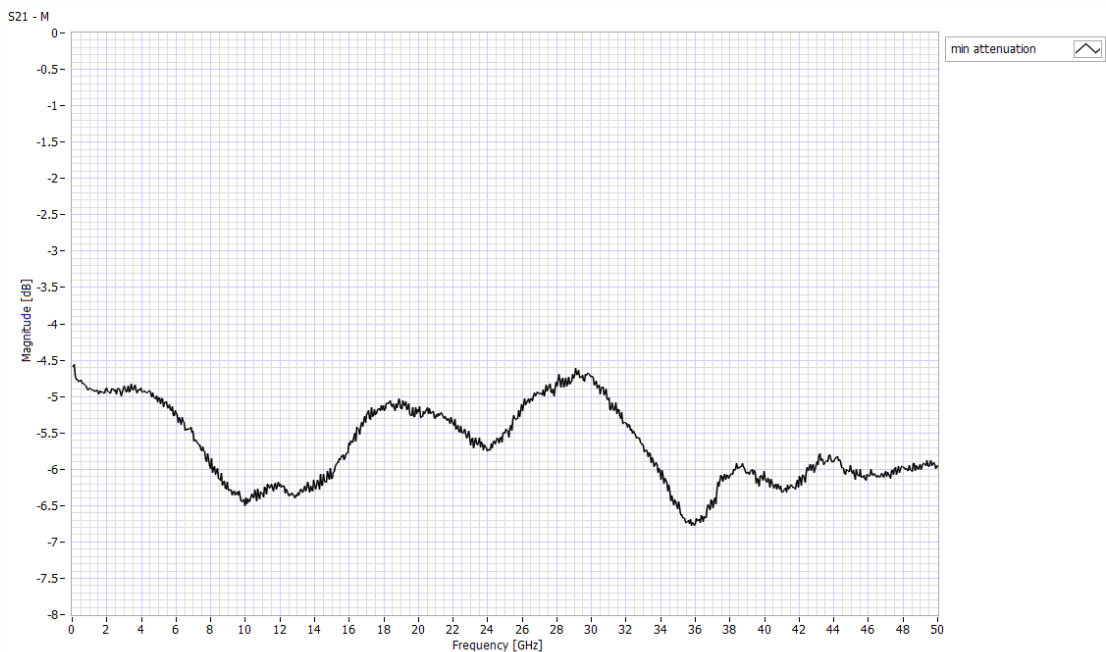


# Typical RF Performance @ +25°C

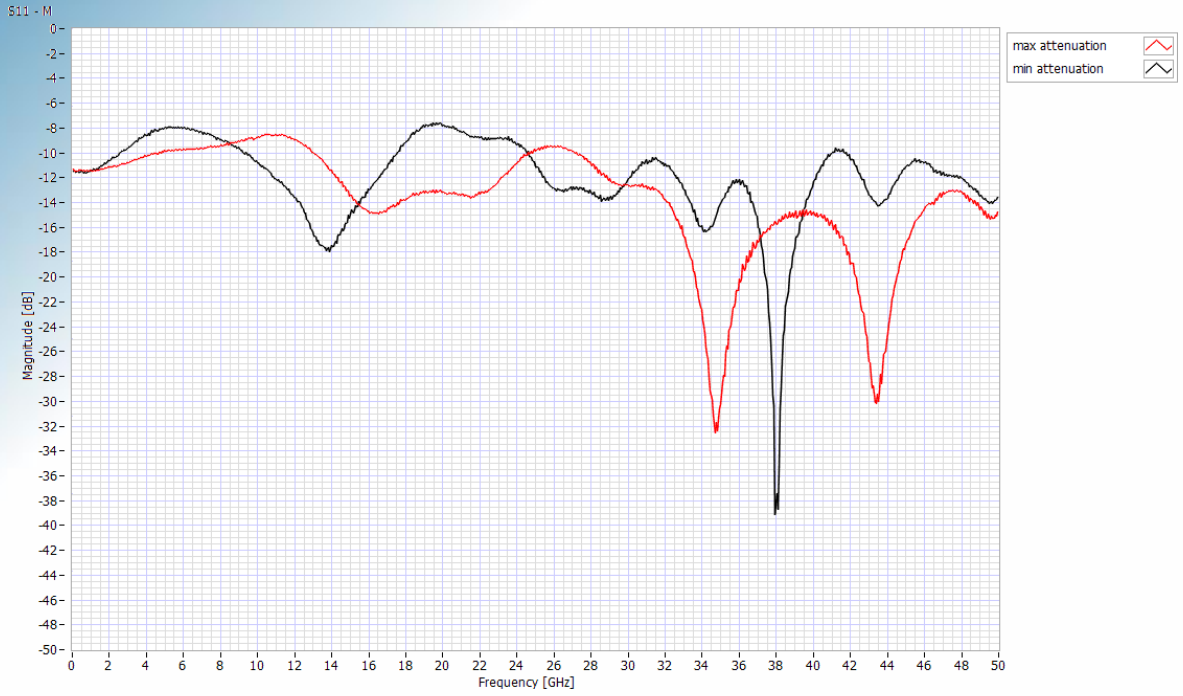
The measurements below had been performed using a VNA.



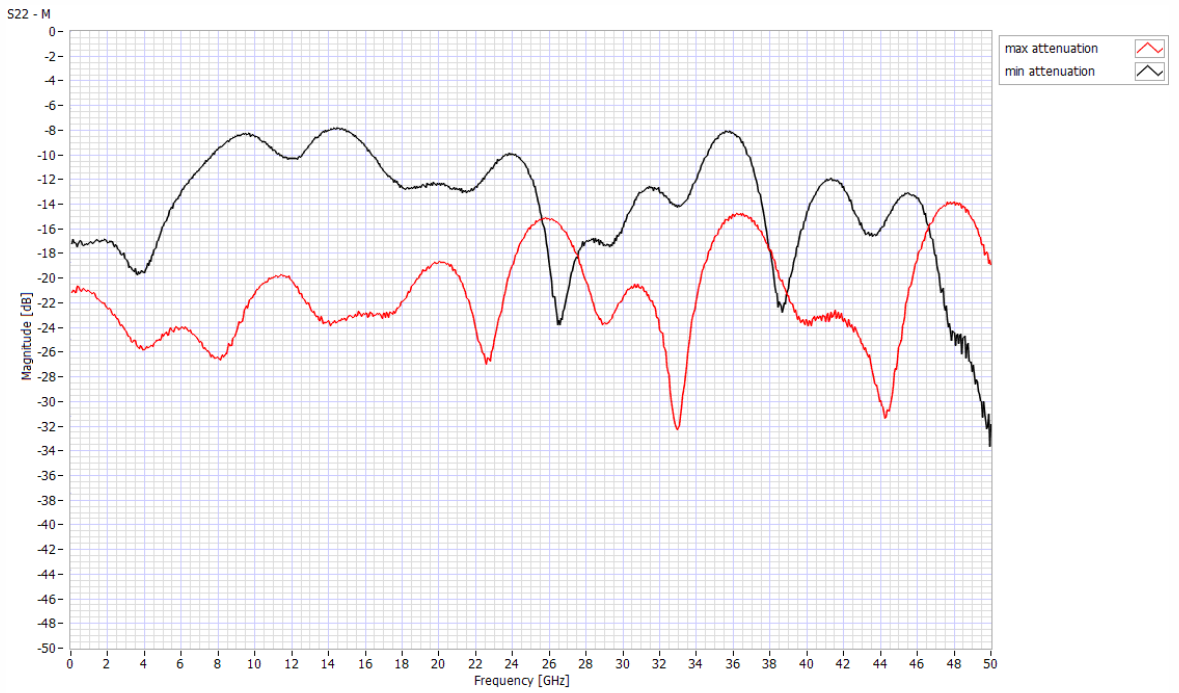
Insertion Loss vs. attenuation



Insertion Loss @ min attenuation



**Return Loss (RF A1/B1) @ min / max attenuation**



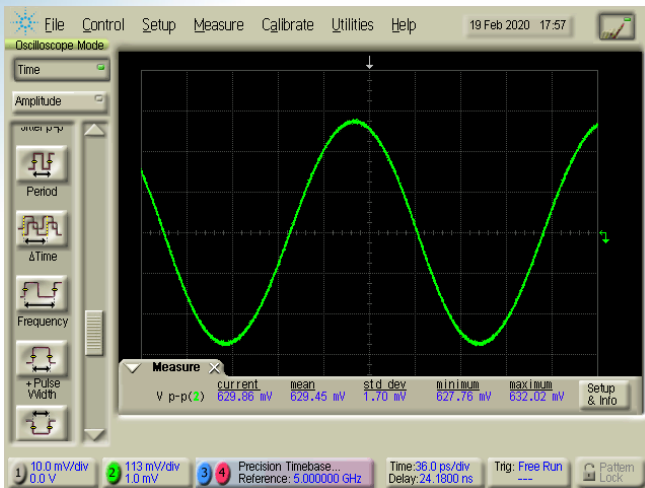
**Return Loss (RF A2/B2) @ min / max attenuation**



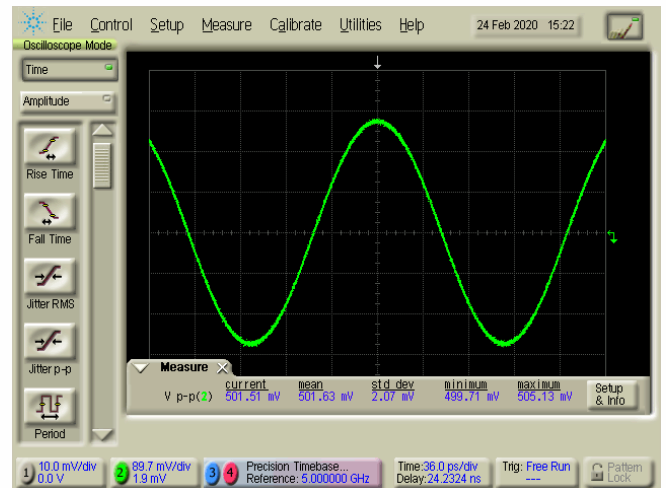
# Typical Output Waveforms

## Clock Output Signals

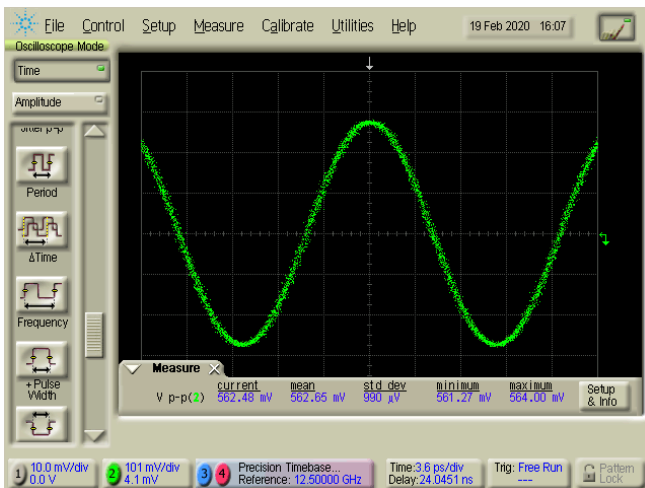
The measurements below had been performed using an Anritsu signal generator (3697C) and an Agilent Digital Communication Analyzer (DCA) with a Precision Timebase Module (86107A) and a 70 GHz Sampling Module (86118A). The outputs of the Switch module had been connected directly to the DCA input. Input power of the clock signal is 0 dBm (630 mV<sub>pp</sub>).



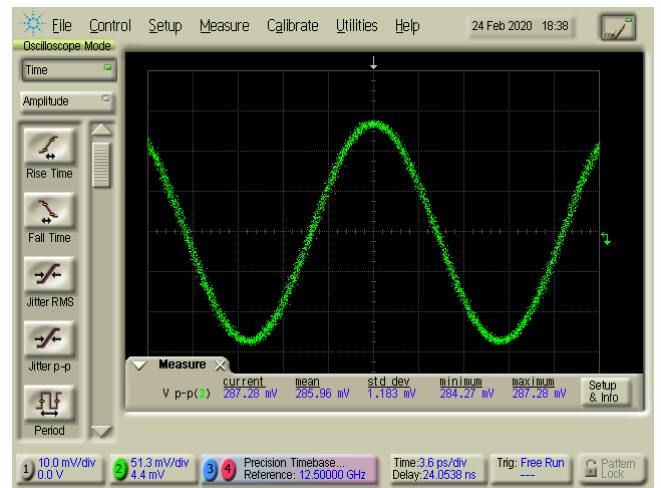
5 GHz input signal



5 GHz output signal @ min attenuation



50 GHz input signal



50 GHz output signal @ min attenuation

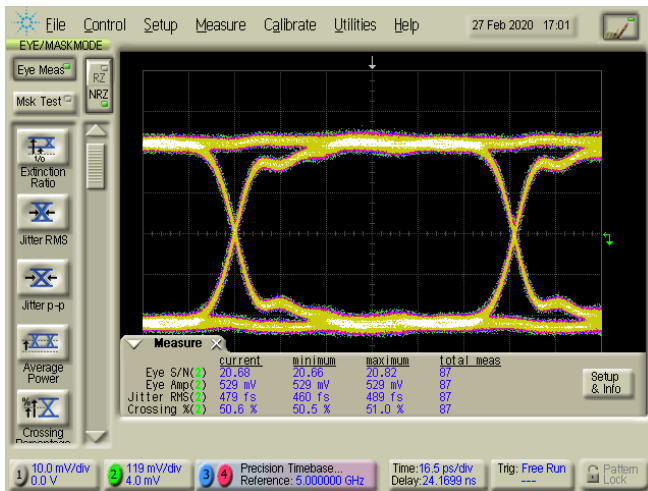


## Data Output Signals

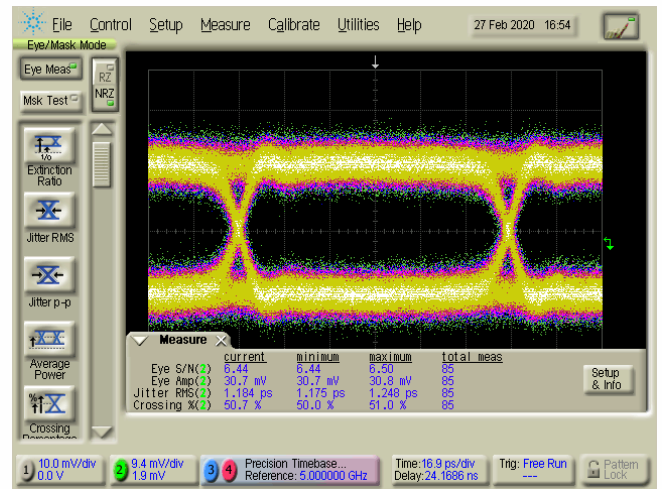
The measurements below had been performed using a SHF 12105 A Bit Pattern Generator (PRBS  $2^{31}-1$ ) and an Agilent Digital Communication Analyzer (DCA) with a Precision Timebase Module (86107A) and a 70 GHz Sampling Module (86118A). The outputs of the Switch module had been connected directly to the DCA input. Input Data amplitude is  $\sim 630$  mV<sub>pp</sub>, and it is a PRBS  $2^{31}-1$  signal.



10 Gbps input signal

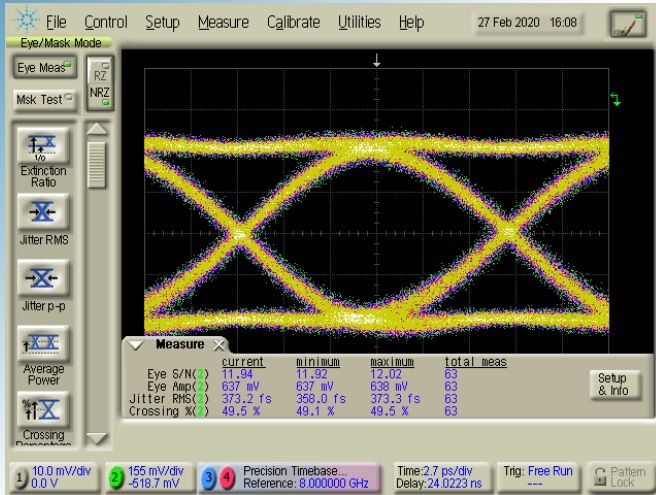


10 Gbps output signal @ min attenuation

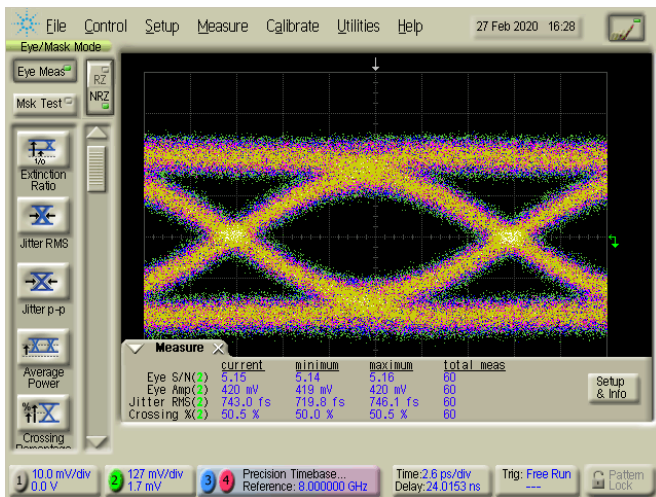


10 Gbps output signal @ max attenuation

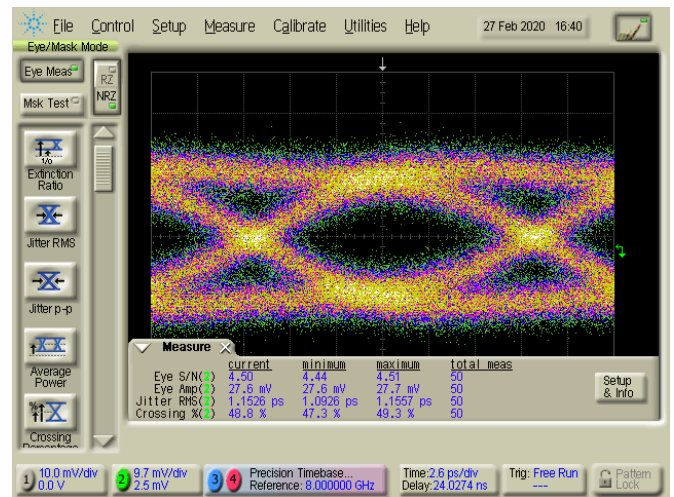




64 Gbps input signal



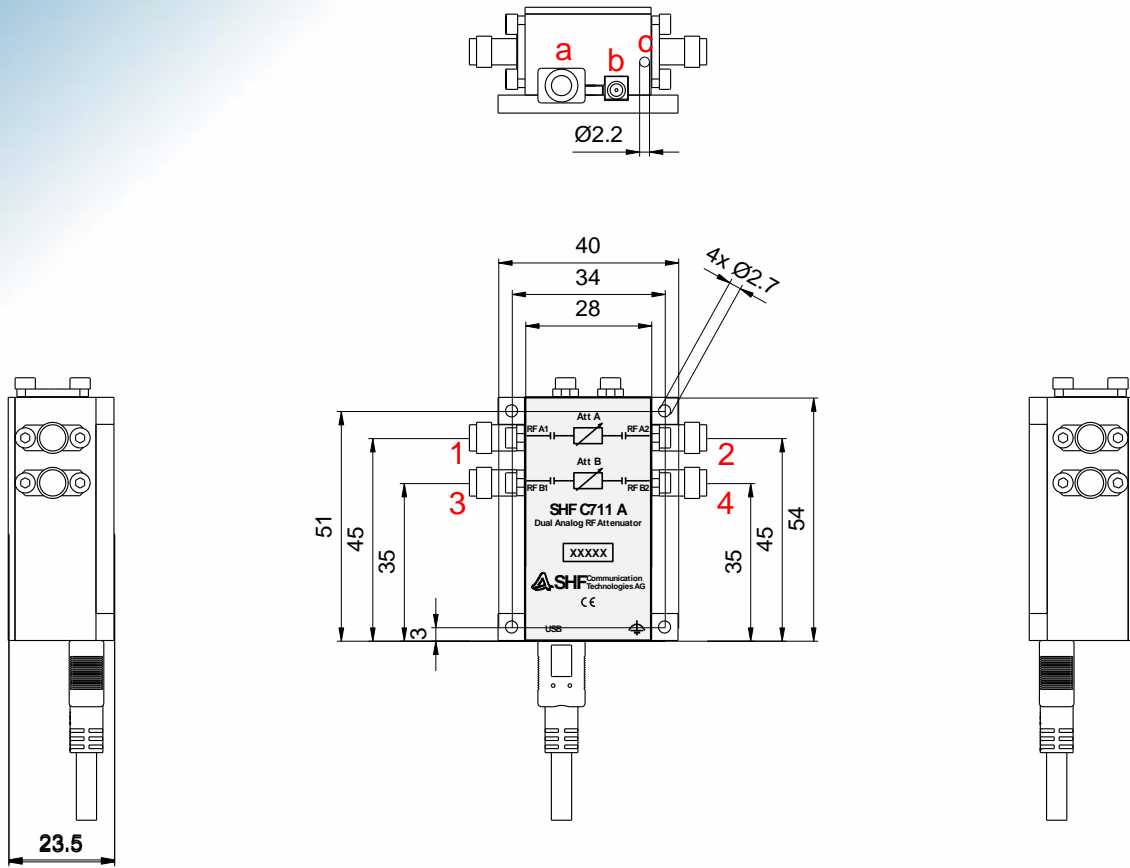
64 Gbps output signal @ min attenuation



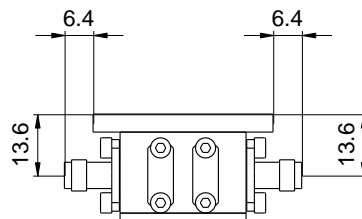
64 Gbps output signal @ max attenuation



# Outline Drawing – Module



Pos	Port	Connector
1	RF A1 Att A	1.85mm (V) female
2	RF A2 Att A	1.85mm (V) female
3	RF B1 Att B	1.85mm (V) female
4	RF B2 Att B	1.85mm (V) female



All dimensions are in mm

Port	Connector
a	Mini-USB
b	nc
c	Functional earth (FE)