

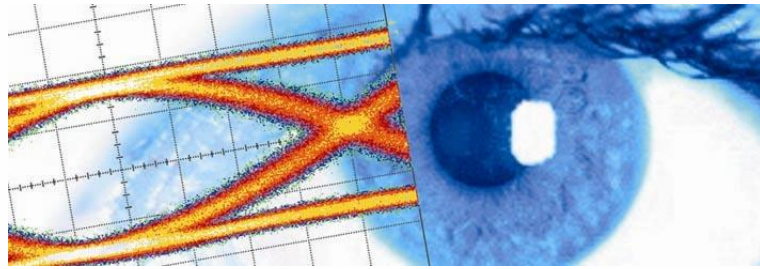


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Datasheet

SHF C711 A

50 GHz / 64 Gbps

Dual Analog RF Attenuator





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 ± 0.1 dB within a 22 dB dynamic range.

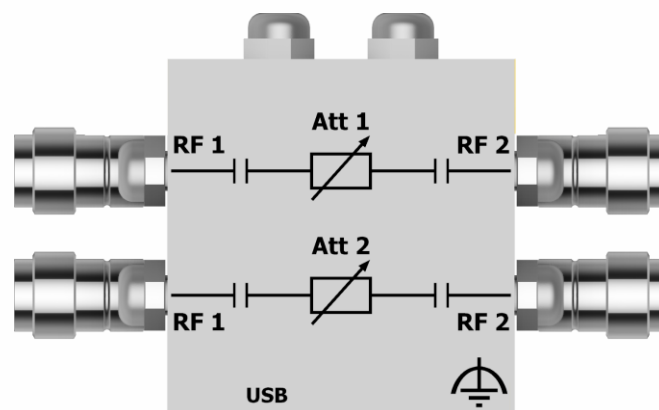
Features

- 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 possible¹

Applications

- Broadband test and measurement equipment

Block Diagram



¹ 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
Input Parameters						
Input Power	dBm	P_{in}			30	
External DC Voltage on RF Ports	V	V_{DCext}	-6		+6	AC coupled ports



Specifications – SHF C711 A

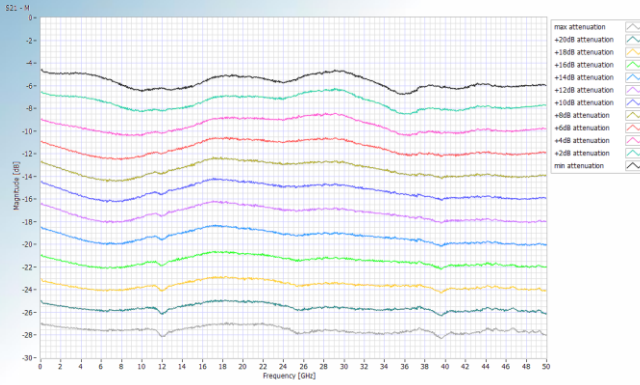
Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
Performance						
Minimum Input Frequency	kHz	f_{MIN}			40	Clock Signal
Maximum Input Frequency	GHz	f_{MAX}	50			Clock Signal
Data Rate	Gbps		64			Data Signal
Attenuation Range	dB			22		
Attenuation Resolution	dB				0.1	
Attenuation Accuracy					TBD	
Insertion 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 1
Return Loss @ min att.	dB		6	10		< 50 GHz, RF 2
Return Loss @ max att.	dB		7	10		< 50 GHz, RF 1
Return Loss @ max att.	dB		12	16		< 50 GHz, RF 2
Output Parameters						
Jitter RMS	fs	J_{RMS}				See note ²
Duty Cycle	%	DC				See note ²
Inter-Channel Skew	ps				1	
Power Requirement						
Supply Voltage	V	V_{CC}	+4.40	+5.00	+5.25	Mini USB
Supply Current	mA	I_{CC}		20		
Power Dissipation	mW	P_{d}		100		@ $V_{\text{CC}} = +5 \text{ V}$
General						
Operating Temperature	°C	T_{ambient}	15		35	
Weight	gr			90		
Dimensions	mm					See Outline Drawing

² No degradation in jitter or duty cycle performance were observed for sine wave signals

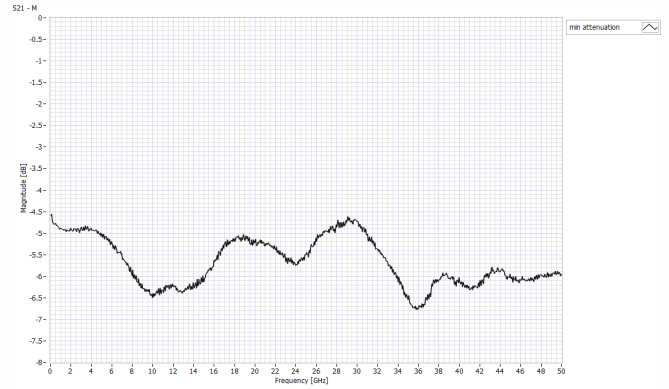


Typical RF Performance @ +25°C

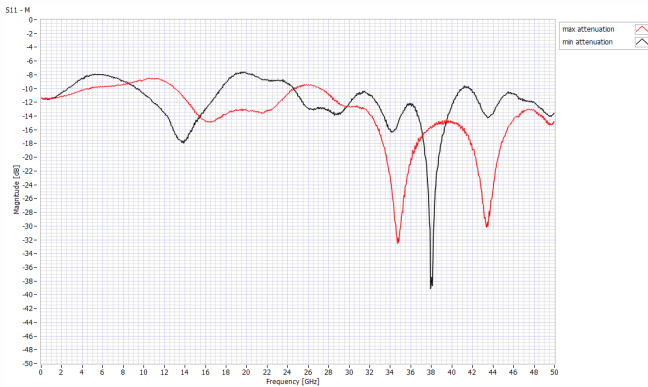
The measurements below had been performed using a VNA.



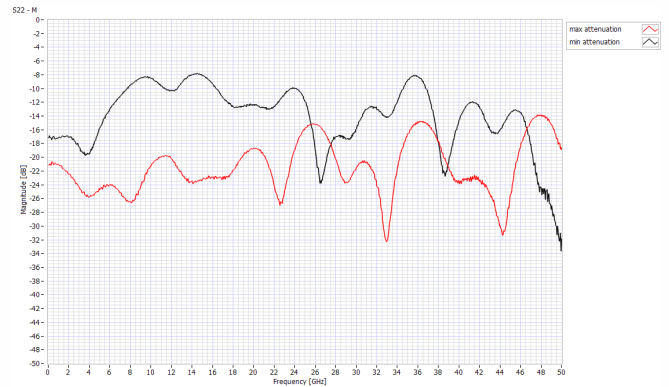
Insertion Loss vs. attenuation



Insertion Loss @ min attenuation



Return Loss (RF1) @ min / max attenuation



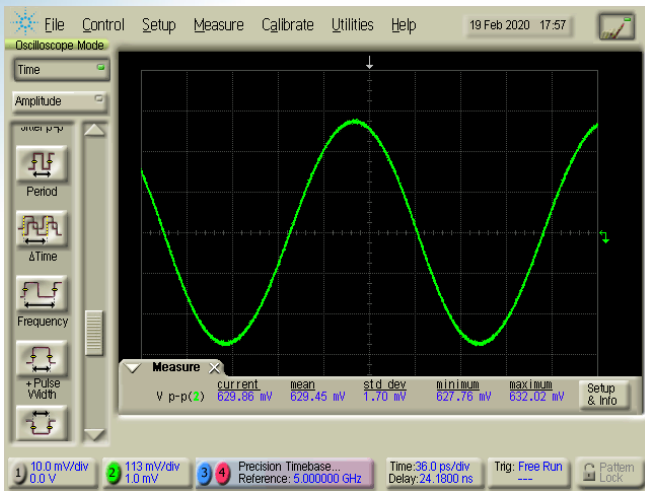
Return Loss (RF2) @ min / max attenuation



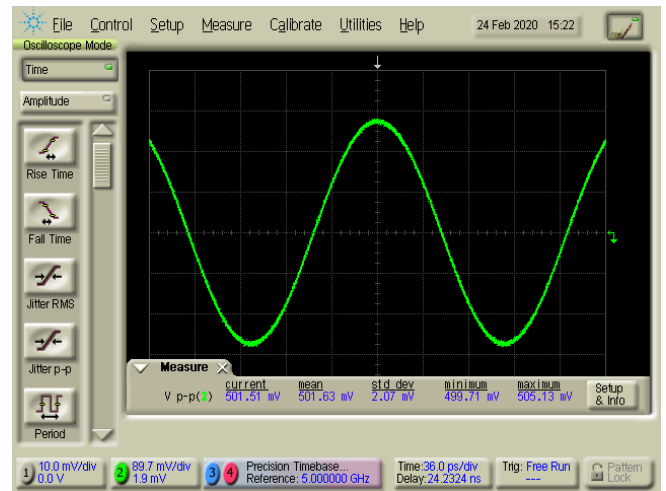
Typical Output Waveforms

Clock Output Signals

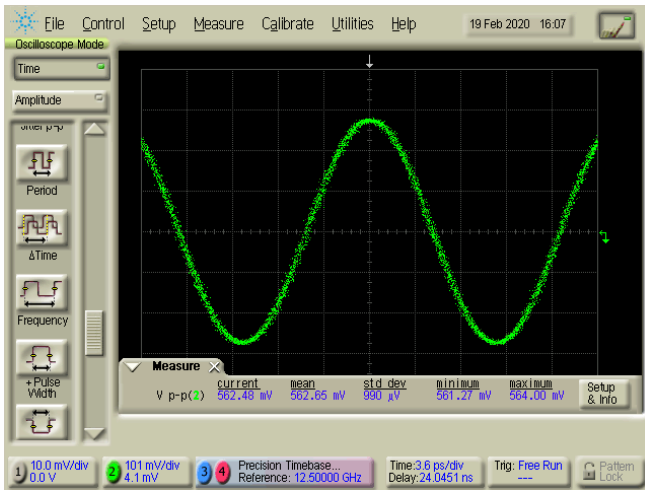
The measurements below had been performed using an Anritsu signal generator (3697C) and an Agilent Digital Communication Analyzer (DCA) with a Precision Timebase Module (86107A) and a 70 GHz Sampling Module (86118A). The outputs of the Switch module had been connected directly to the DCA input. Input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



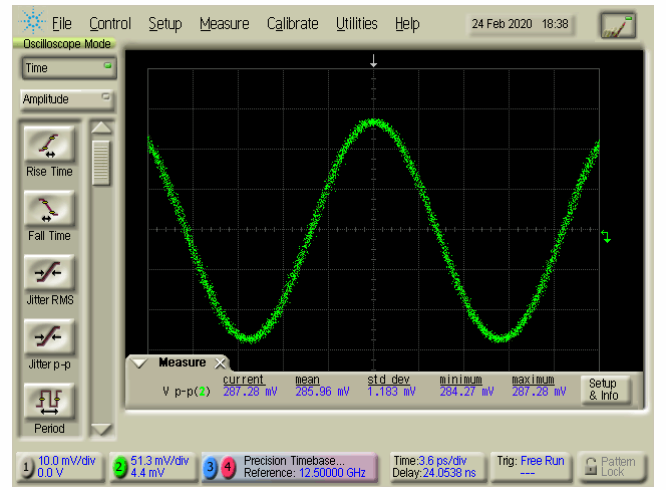
5 GHz input signal



5 GHz output signal @ min attenuation



50 GHz input signal

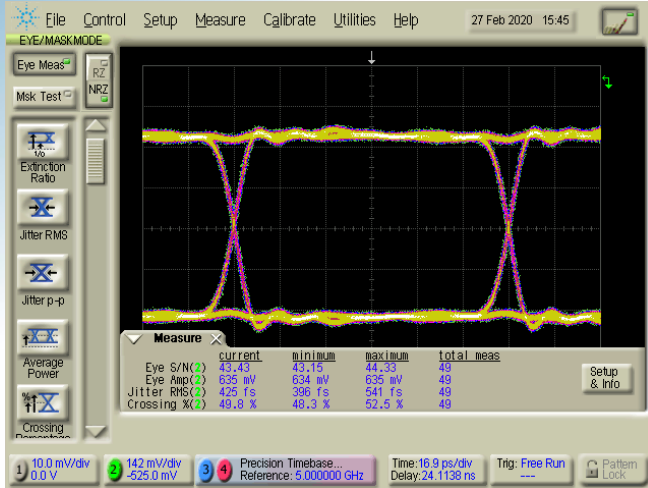


50 GHz output signal @ min attenuation

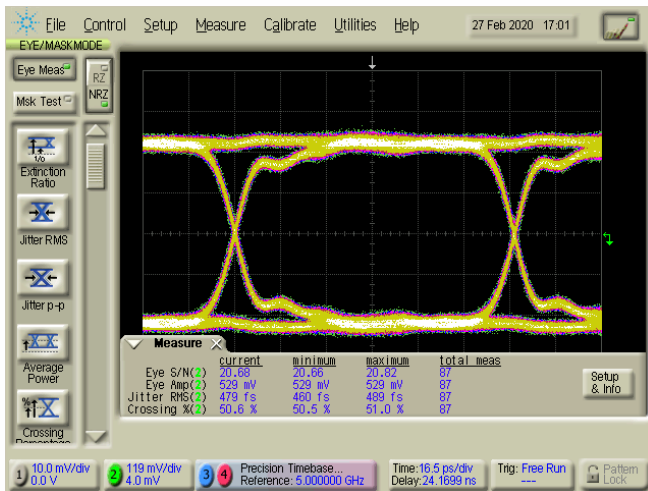


Data Output Signals

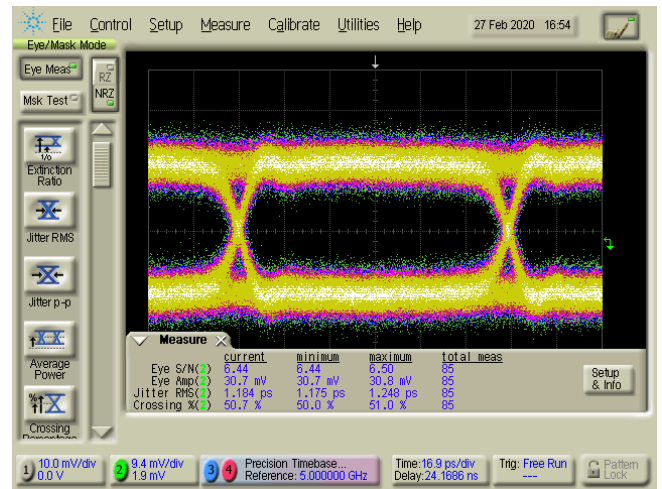
The measurements below had been performed using a SHF 12105 A Bit Pattern Generator (PRBS $2^{31}-1$) and an Agilent Digital Communication Analyzer (DCA) with a Precision Timebase Module (86107A) and a 70 GHz Sampling Module (86118A). The outputs of the Switch module had been connected directly to the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



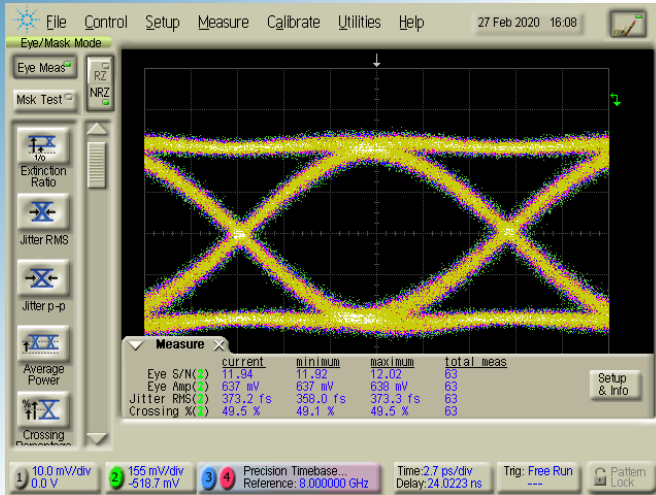
10 Gbps input signal



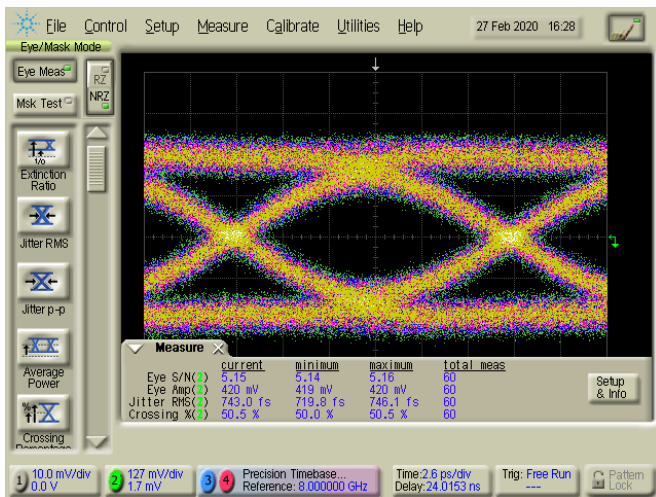
10 Gbps output signal @ min attenuation



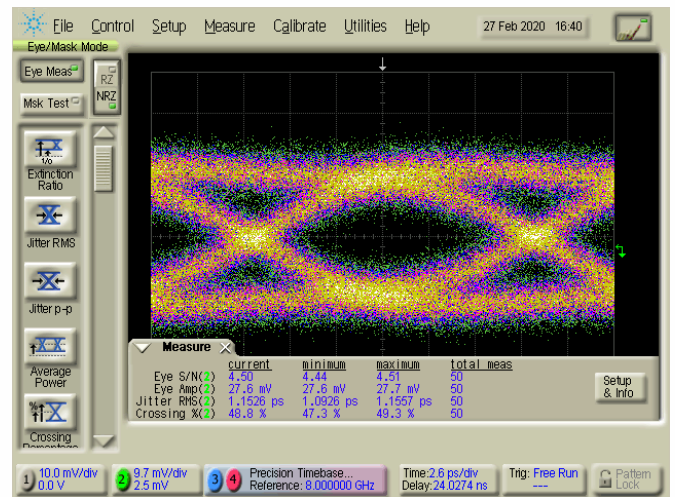
10 Gbps output signal @ max attenuation



64 Gbps input signal



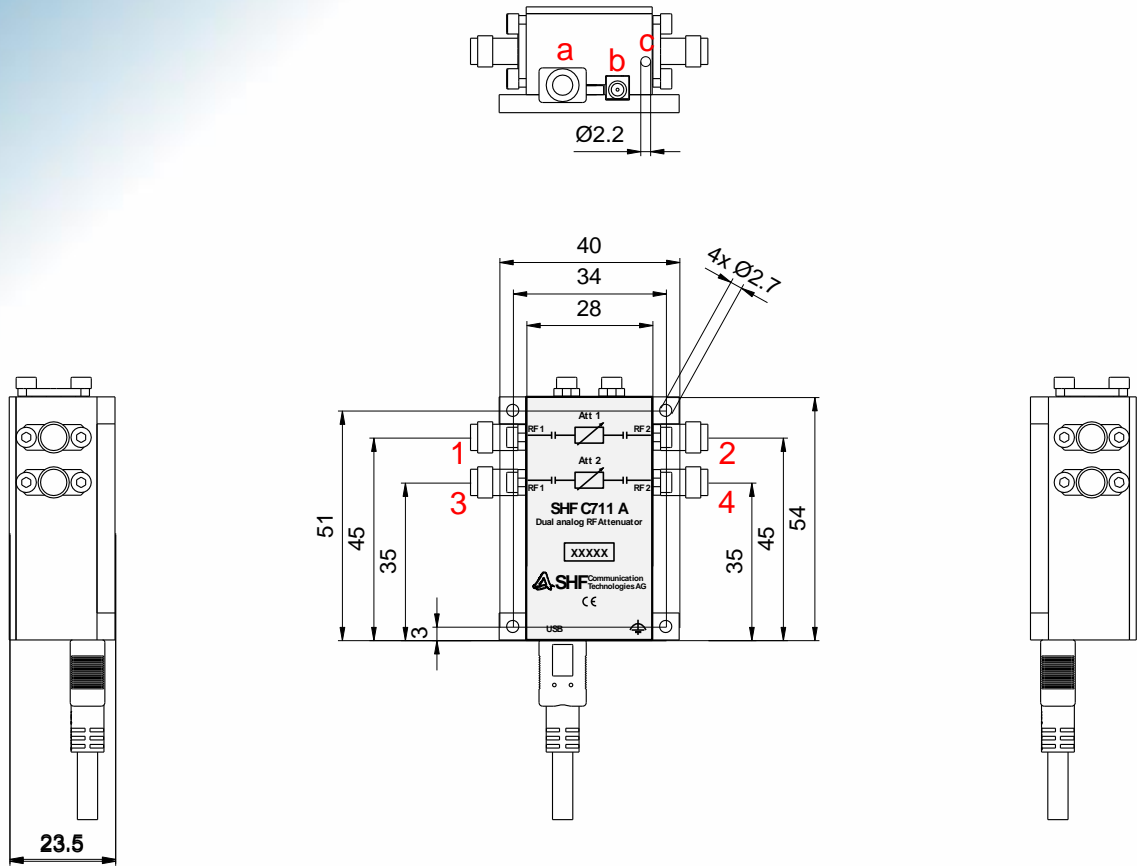
64 Gbps output signal @ min attenuation



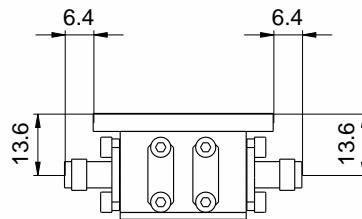
64 Gbps output signal @ max attenuation



Outline Drawing – Module



Pos	Port	Connector
1	RF 1 Att 1	1.85mm (V) female
2	RF 2 Att 1	1.85mm (V) female
3	RF 1 Att 2	1.85mm (V) female
4	RF 2 Att 2	1.85mm (V) female



All dimensions are in mm

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