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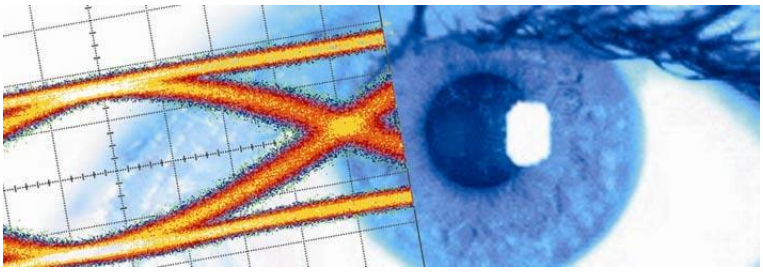


Datasheet

SHF C702 A

50 GHz / 64 Gbps

Dual 2:1 RF Switch

SHF Communication Technologies AG
the bandwidth company

Description

The SHF C702 A is a dual 2:1 broadband RF switch, operating form 100 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 switches are fully independent RF building blocks housed in a single chassis, as indicated by the block diagram below, and operated by a single software. It operates in both directions, i.e. the signal can be applied to or taken from the common (COM) port.

An option with low frequency compensation (LFC) is also available.

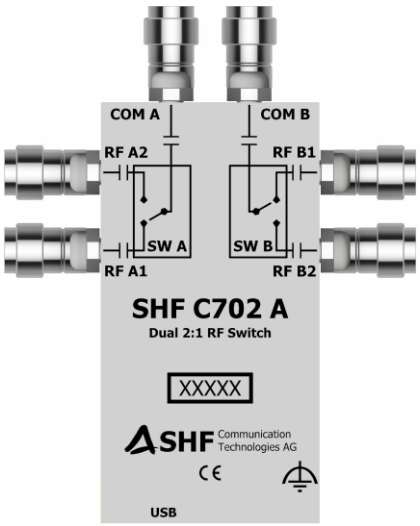
Features

- Broadband operation up to 50 GHz
- Up to 64 Gbps NRZ Data signal
- Bi-directional
- Low power consumption
- Two individual switches in one module
- Single-ended operation
- USB interface
- Simple, easy to use GUI
- Automated measurements by using different software environments easily possible[1]

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 serial devices.

Accessories

- Functional earth cable
- Mini-USB cable

Options

Option – Low Frequency Compensation (LFC)

The Low Frequency Compensation option is offered in order to reduce the frequency response roll-off. Due to a lower loss at the lower frequencies there is a typical role-off of 5 dB between 1 MHz and 50 GHz. The compensation reduces the roll-off to approximately 2 dB over the frequency range, but at the same time increases the insertion loss by roughly 3 dB at the lower frequency range.

Absolute Maximum Ratings

Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
Input Parameters						
Input Power	dBm	P_{in}			23	
External DC Voltage on RF Ports	V	V_{DCext}	-6		+6	AC coupled ports

Specifications – SHF C702 A

Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
Performance						
Minimum Input Frequency	kHz	f_{min}			100	Clock Signal
Maximum Input Frequency	GHz	f_{max}	50			Clock Signal
Bandwidth	GHz	f_{3dB} f_{6dB}		38 50		Clock Signal
Data Rate	Gbps		64			Data Signal
Insertion Loss	dB			2 3 4 6	2.5 4 5 7	< 25 GHz 25 - 30 GHz 30 - 40 GHz 40 - 50 GHz
Isolation	dB		27	40		
Return Loss	dB		6	10		< 50 GHz, RF 1/2
Return Loss	dB		5	10		< 50 GHz, Common
Settling Time	ms			1		
Switching Transient Overshoot[2]	mV				±300	
Output Parameters						
Jitter RMS	fs	J_{RMS}				See note[3]
Duty Cycle	%	DC				See note[33 above]

[2] Switching Transient Overshoot refers to a voltage overshoot measured on the module's ports while toggling the switch

[3] No degradation in jitter or duty cycle performance were observed for sine wave signals

Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
Power Requirement						
Supply Voltage	V	V_{cc}	+4.40	+5.00	+5.25	Mini USB
Supply Current	mA	I_{cc}		65		
Power Dissipation	mW	P_d		325		@ V_{CC} = +5 V
Mechanical Characteristics						
Switch A RF A1	Ω			50		1.85 mm (V) female
Switch A RF A2	Ω			50		1.85 mm (V) female
Switch A COM A	Ω			50		1.85 mm (V) female
Switch B RF B1	Ω			50		1.85 mm (V) female
Switch B RF B2	Ω			50		1.85 mm (V) female
Switch B COM B	Ω			50		1.85 mm (V) female
Dimensions	mm					See Outline Drawing
Weight	g			90		
Conditions						
Operating Temperature	°C	$T_{ambient}$	15		35	

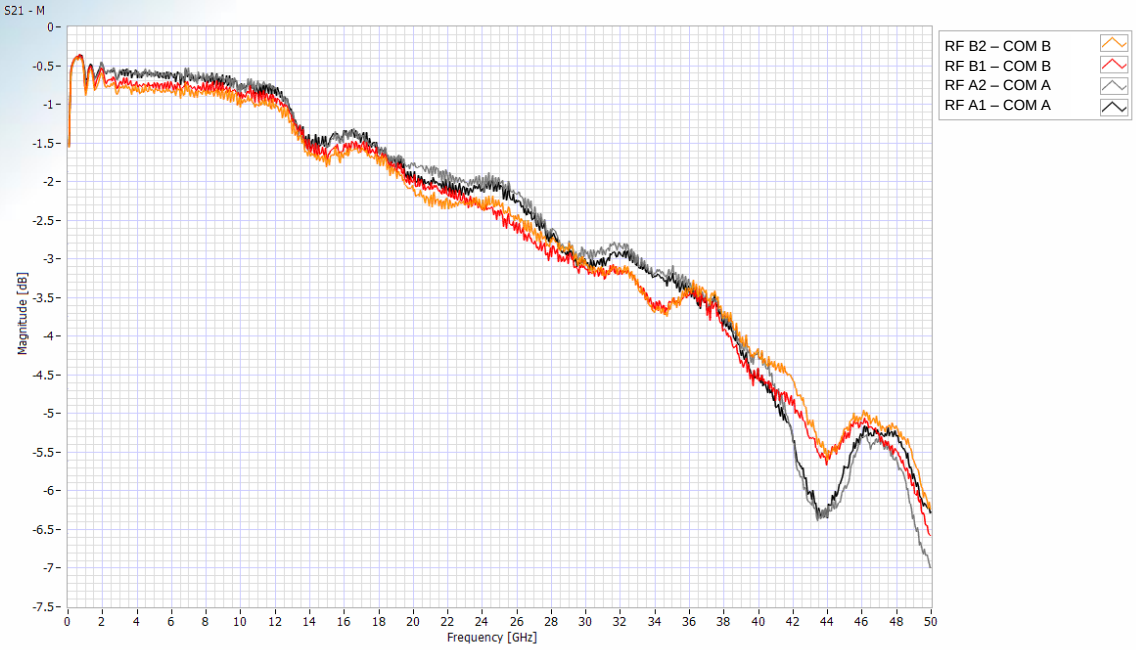
Specifications – SHF C702 A Option LFC

Parameter	Unit	Symbol	Min.	Typ.	Max.	Comment
Performance						
Bandwidth	GHz	f_{3dB}		> 50		Clock Signal
Insertion Loss	dB			4 6	5 7	< 38 GHz 38 - 50 GHz
Return Loss	dB		6	10		< 50 GHz, RF 1/2
Return Loss	dB		5	10		< 50 GHz, Common

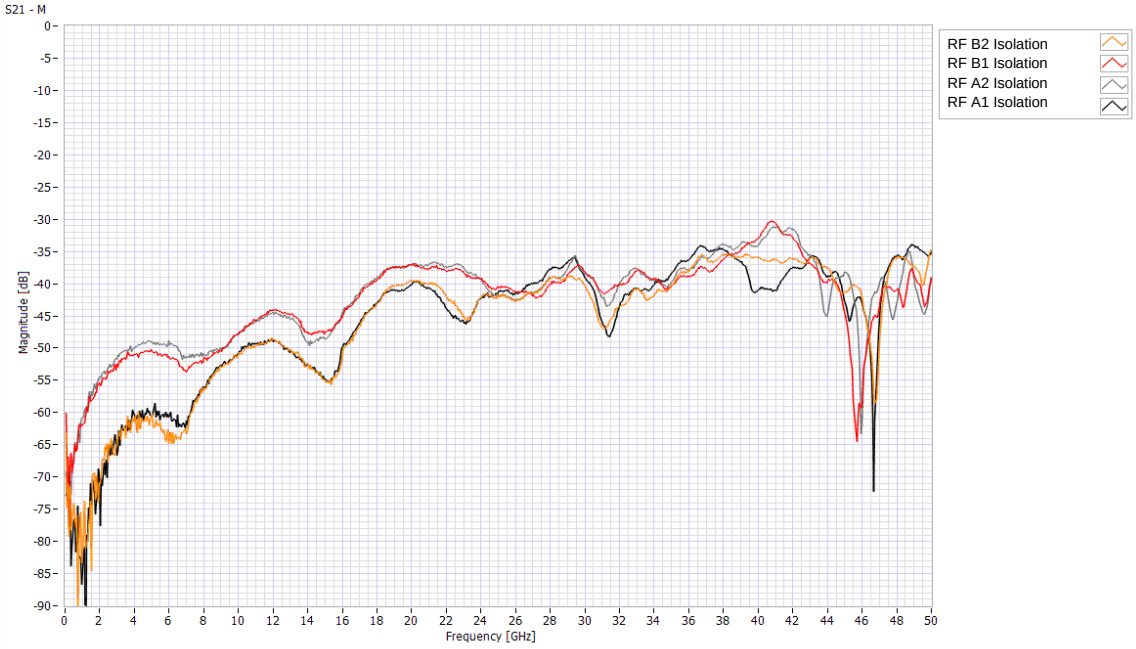
Typical RF Performance @ +25°C

C702 A (no option)

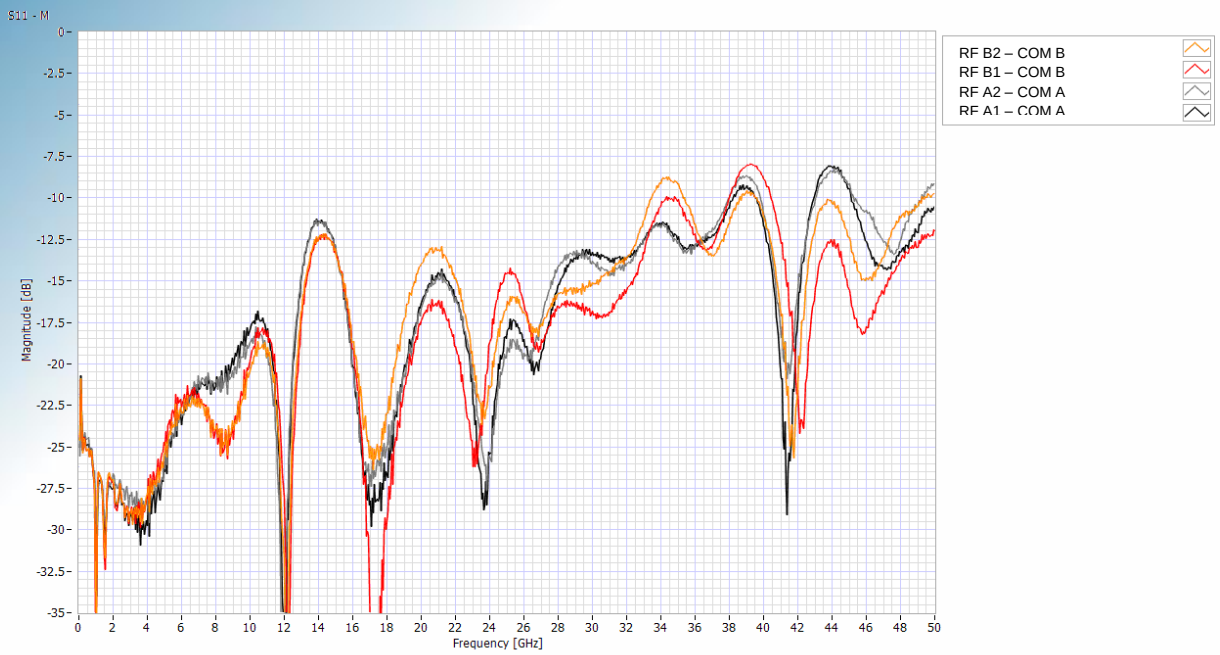
The measurements below had been performed using a VNA.



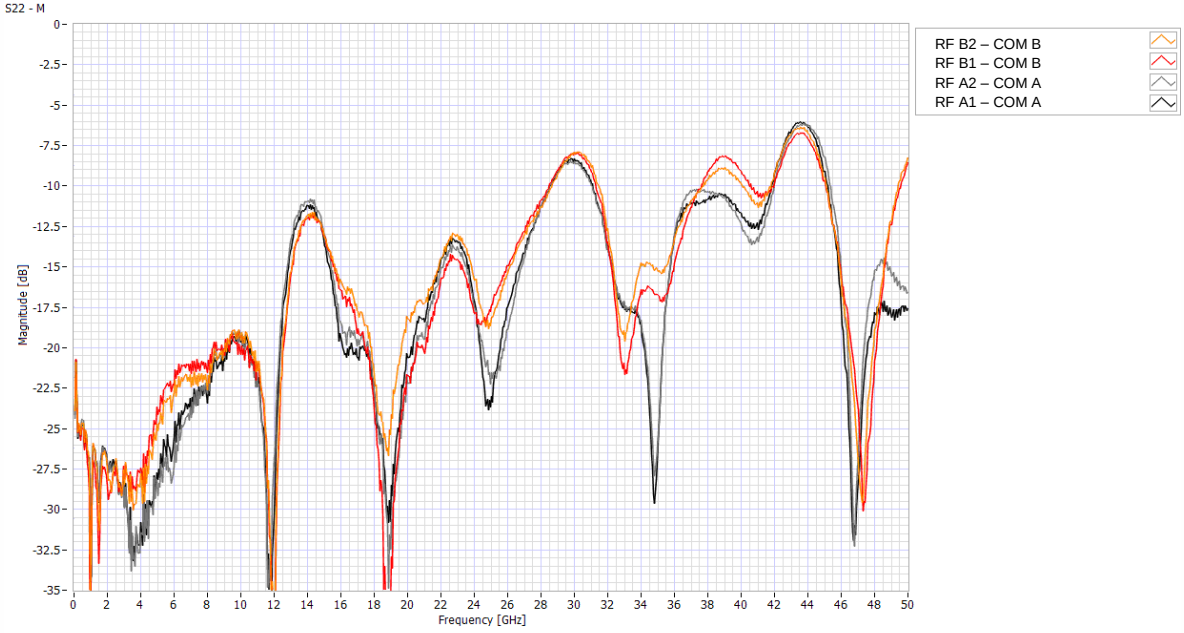
Insertion Loss



Isolation



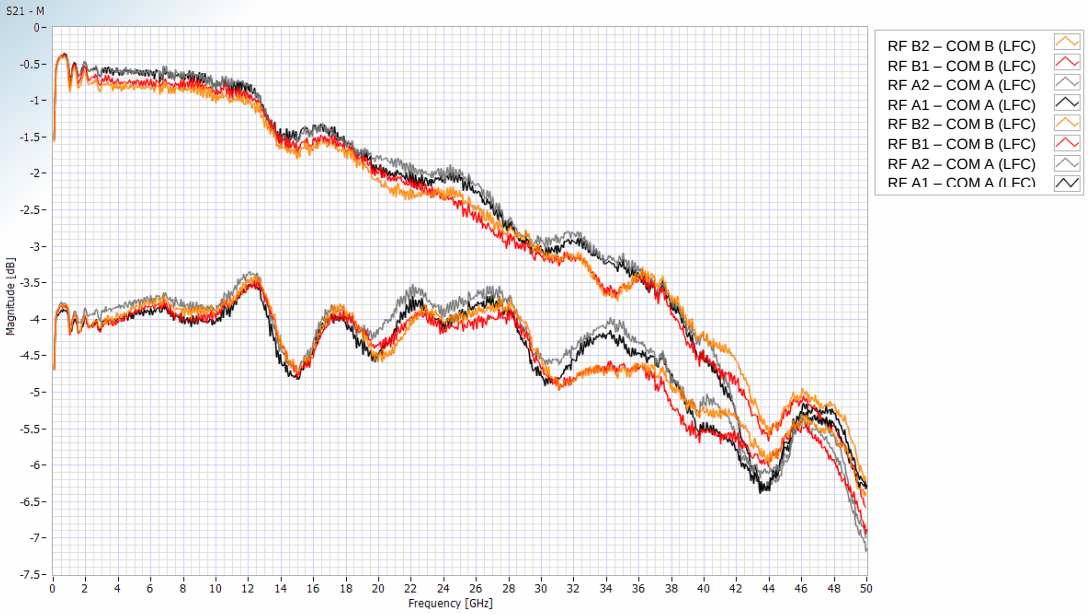
Return Loss (RF A1/2, RF B1/2)



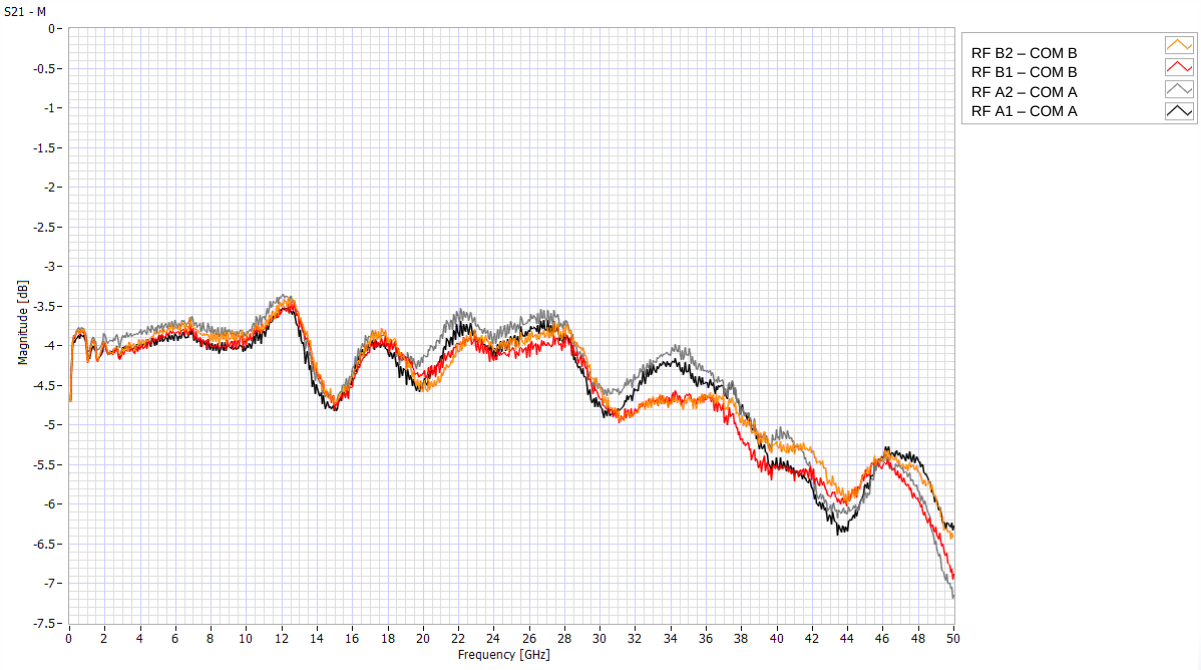
Return Loss (COM A/B)

C702 A (option LFC)

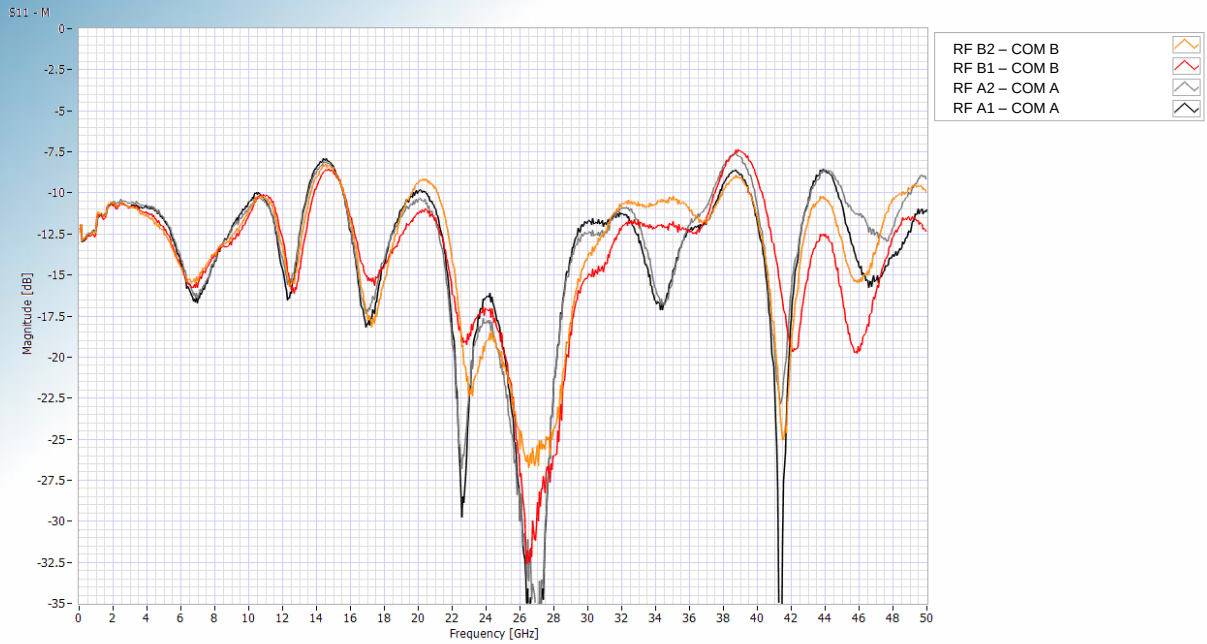
The measurements below had been performed using a VNA.



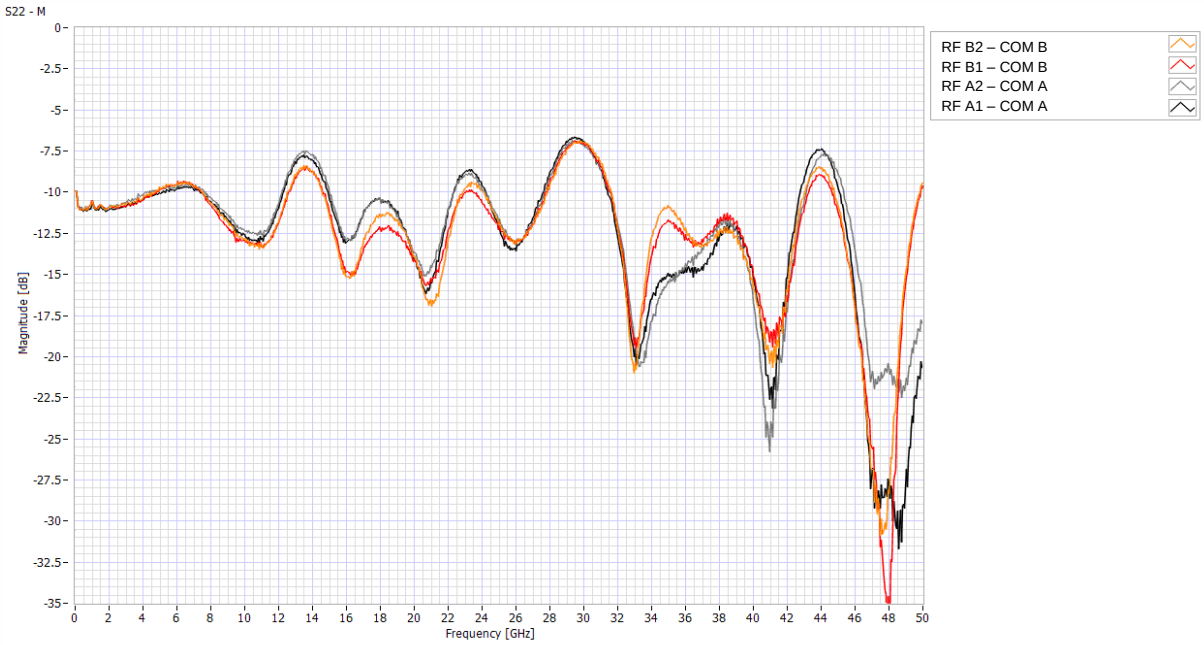
Insertion Loss – LFC compared to “no Option”



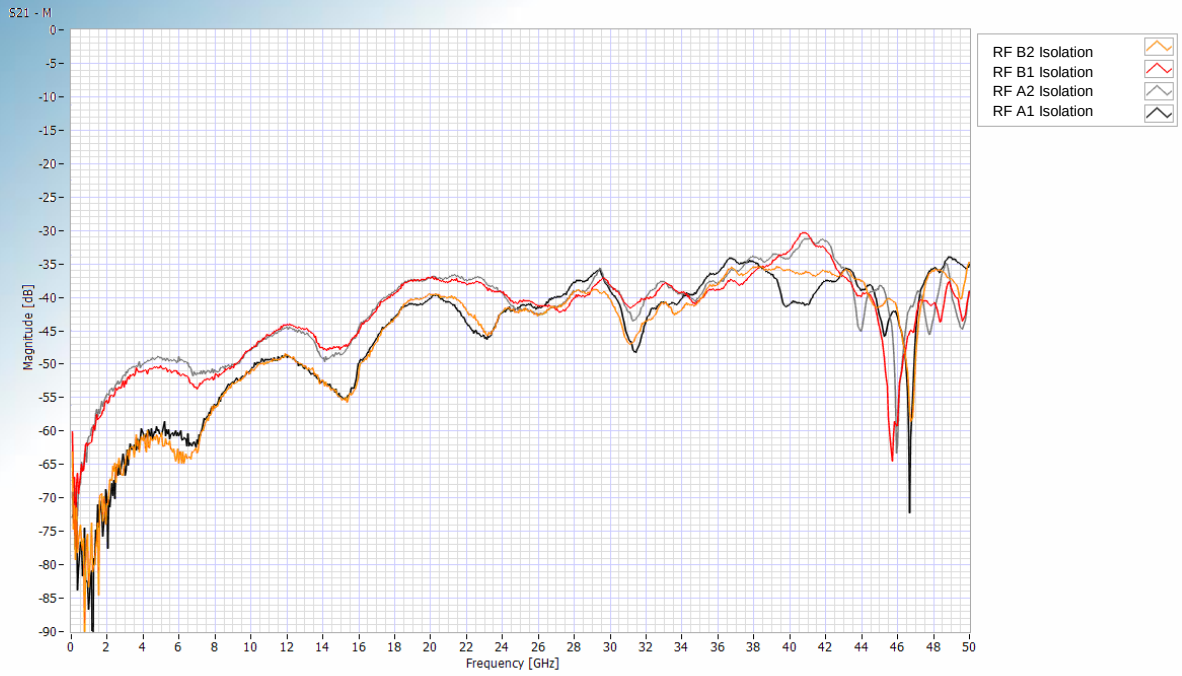
Insertion Loss



Return Loss (RF A1/2, RF B1/2)



Return Loss (COM A/B)

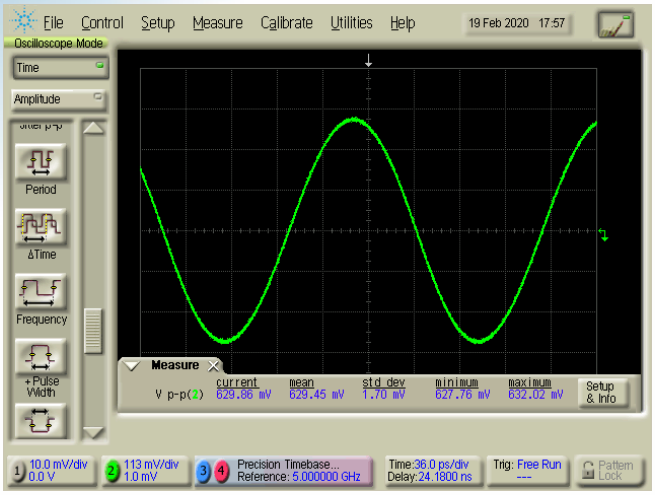

S21 - M
Magnitude [dB]
Frequency [GHz]
RF B2 Isolation
RF B1 Isolation
RF A2 Isolation
RF A1 Isolation

Isolation

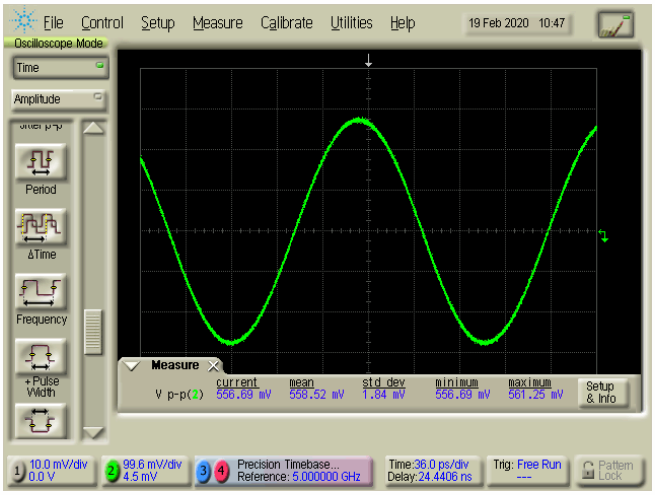
Typical Output Waveforms

Clock Output Signals

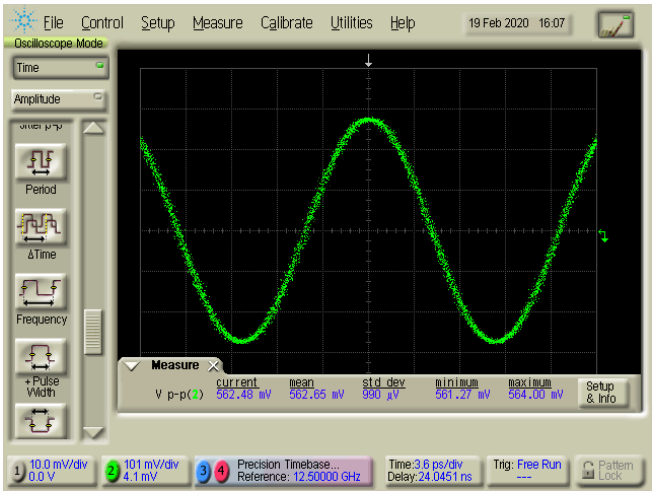
The measurements below had been performed using an Anritsu signal generator (3697C) and an Agilent Digital Communication Analyzer (DCA) with a Precision Timebase Module (86107A) and a 70 GHz Sampling Module (86118A). The outputs of the Switch module had been connected directly to the DCA input. Input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



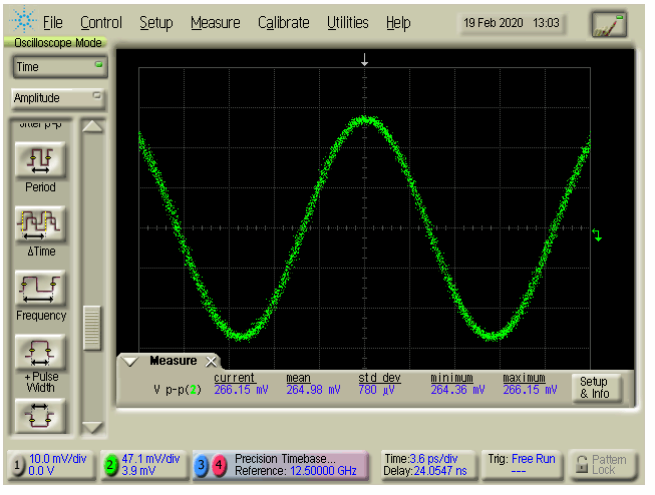
5 GHz input signal



5 GHz output signal



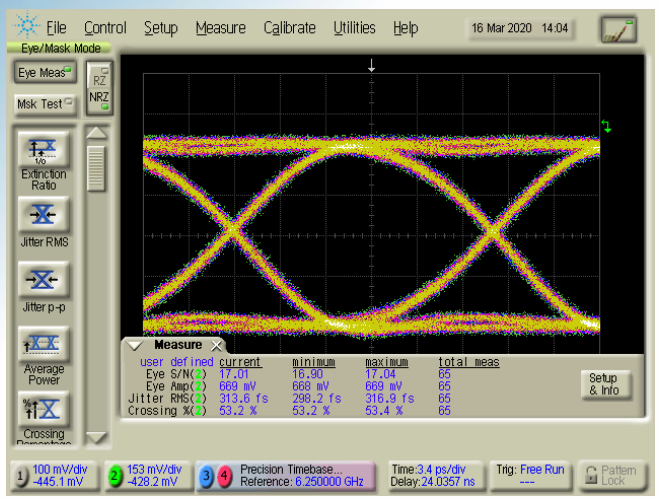
50 GHz input signal



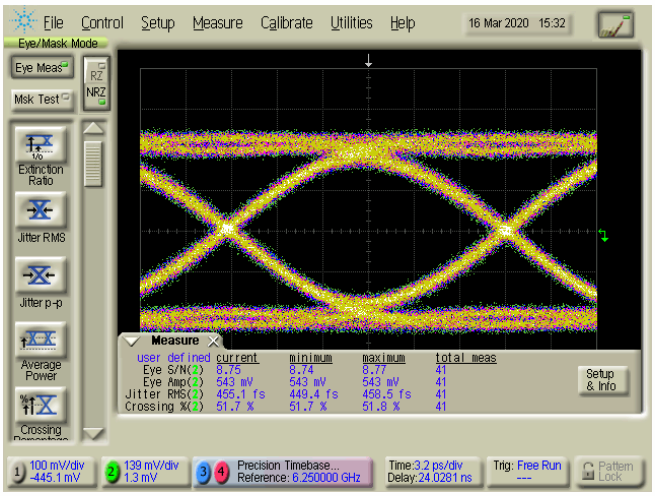
50 GHz output signal

Data Output Signals

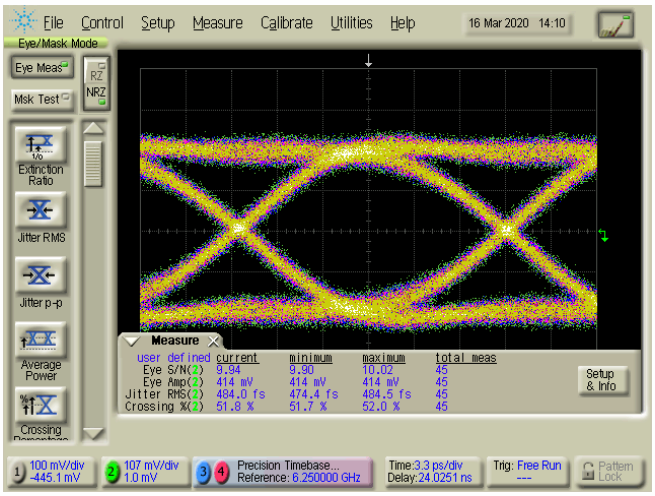
The measurements below had been performed using a SHF 12104 A Bit Pattern Generator and an Agilent Digital Communication Analyzer (DCA) with a Precision Timebase Module (86107A) and a 70 GHz Sampling Module (86118A). The outputs of the Switch module had been connected directly to the DCA input. Input Data amplitude is ~630 mV_{pp}, and it is a PRBS 2^{31}-1 signal.



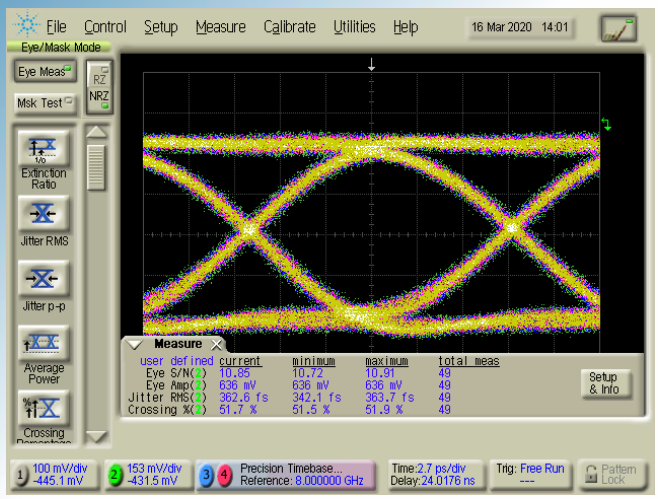
50 Gbps input signal



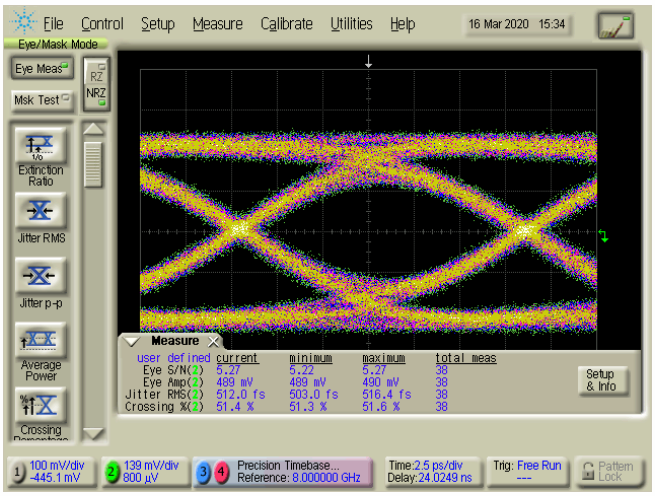
50 Gbps output signal



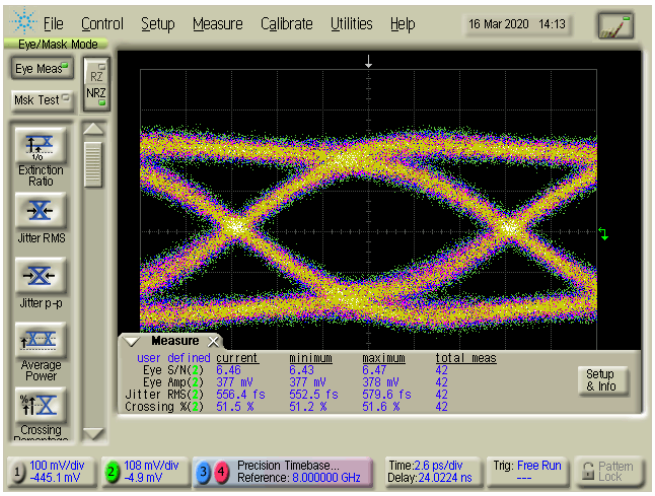
50 Gbps output signal – Option LFC



64 Gbps input signal

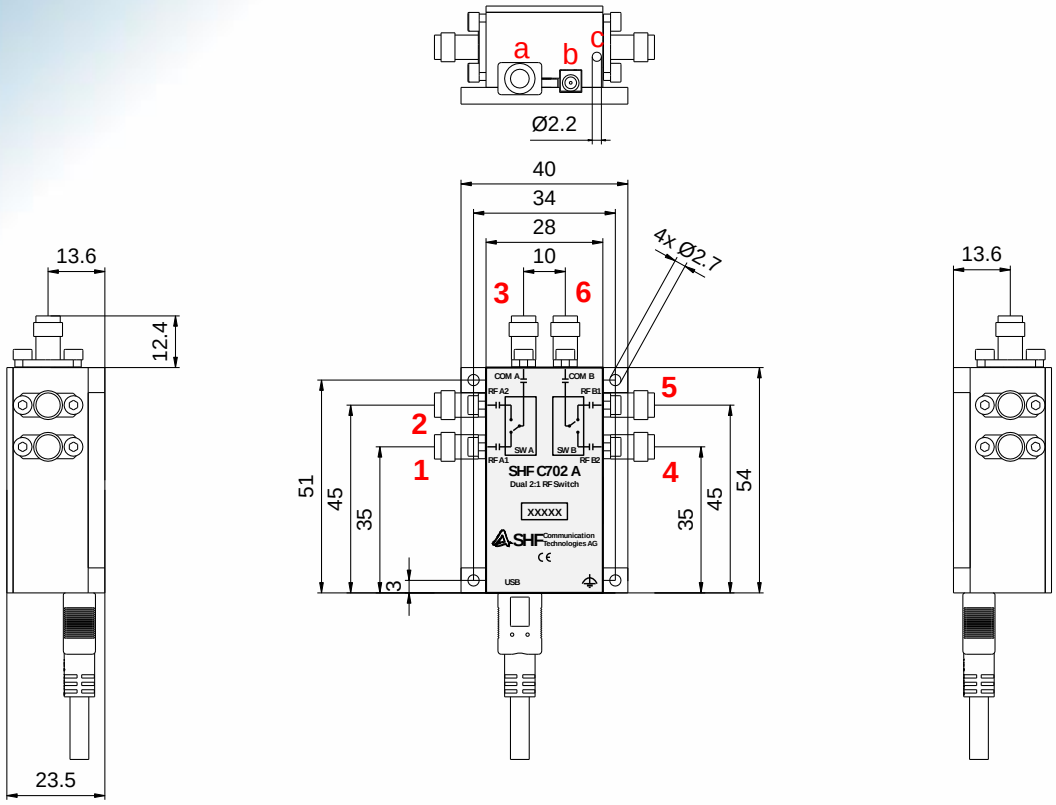


64 Gbps output signal

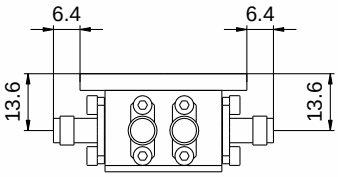


64 Gbps output signal – Option LFC

Outline Drawing – Module



Pos	Port	Connector
1	RF A1 SW A	1.85mm (V) female
2	RF A2 SW A	1.85mm (V) female
3	COM A SW A	1.85mm (V) female
4	RF B2 SW B	1.85mm (V) female
5	RF B1 SW B	1.85mm (V) female
6	COM B SWB	1.85mm (V) female



All dimensions are in mm

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

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