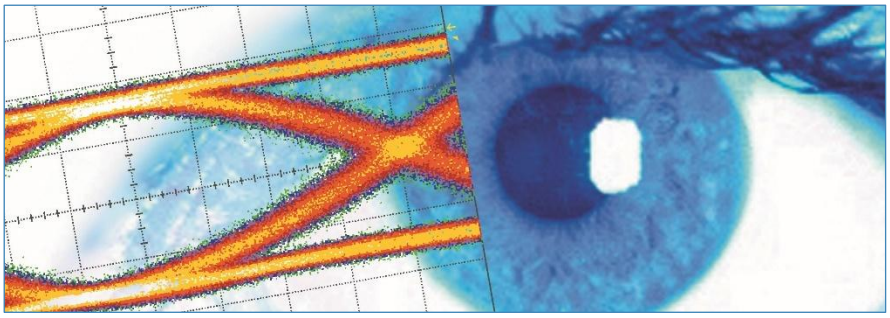


Data Sheet

SHF C603 B



128 Gbps
2:1 Multiplexer

Description

The SHF C603 B is a 2:1 Multiplexer operating at data rates up to 128 Gbps for use in broadband test setups and telecom transmission systems. Two single ended serial data streams of up to 64 Gbps are accepted by the multiplexer and converted into one differential data signal of up to 128 Gbps. A single ended clock signal with a frequency half of the output data rate drives the SHF C603 B. All RF in- and output ports are AC-coupled and internally terminated with 50 Ohm to GND. Unused in- or output ports should be terminated with 50 Ohm.

Features

- Broadband operation up to 128 Gbps
- Differential data output, 500 mV single ended output swing
- Single ended clock and data inputs
- Latched (re-timed and re-shaped) input ports
- Output amplitude, output speed & output duty cycle control (remote by software)
- USB interface

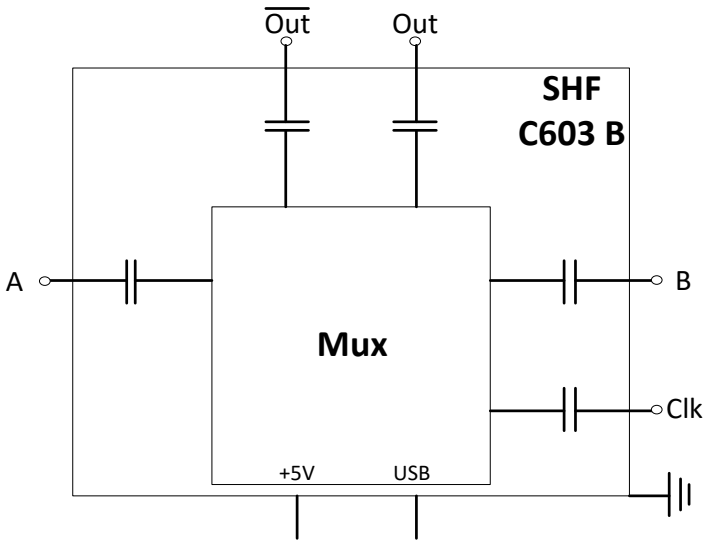
Configurations

The SHF C603 B is to be selected in one of the following configurations.

VFVF: 1.85 mm female connectors at data input and output ports

VFWF: 1.0 mm female connectors at the data output ports instead of 1.85 mm connectors

Block Diagram



Specifications

Absolute Maximum Ratings

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Data Input Voltage	mV	$V_{data\ in}$			900	Peak-to-Peak
Clock Input Voltage	mV	$V_{clk\ in}$			900	Peak-to-Peak
External DC Voltage on RF Input Ports	V	V_{DCin}	-6		+6	AC coupled input
External DC Voltage on RF Output Ports	V	V_{DCout}	-6		+6	AC coupled output
DC Supply Voltage	V	V_{cc}	0		+6	

Input Parameters

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Data Input Voltage	mV	$V_{data\ in}$	300		800	
Minimum Clock Input Frequency	GHz	$f_{in,\ min}$			1.5	
Maximum Clock Input Frequency	GHz	$f_{in,\ max}$	64			
Clock Input Voltage	mV_{pp}	$V_{clk\ in}$	300		800	

Output Parameters

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Minimum Output Data Rate	Gbps	$R_{out,min}$			3	@ 500 mV_{pp} clock input
Maximum Output Data Rate	Gbps	$R_{out,max}$	128			@ 500 mV_{pp} clock input
Maximum Output Voltage	mV	V_{out}	400 450	500 520	600 600	≤ 100 Gbps > 100 Gbps single ended, adjustable up to -6 dB
Rise / Fall time	ps	t_r/t_f		5.0 4.0	7.0 5.0	≤ 100 Gbps > 100 Gbps 20/80 %,@Trim=100 %, on scope display
Output Jitter, RMS value[1]	fs	J_{rms}		300 400	450 550	≤ 100 Gbps > 100 Gbps on scope display

[1] Test condition: Clock Input Signal $Jitter_{RMS}$ <150 fs

Power Requirements

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Supply Voltage	V	V_{cc}	+5.0	5.2	+5.5	2.5 x 0.7 mm DC Power Jack
Supply Current	mA	I_{cc}		790		
Power Dissipation	W	P_d		4.1		@ V_{CC} = +5 V

Mechanical Characteristics

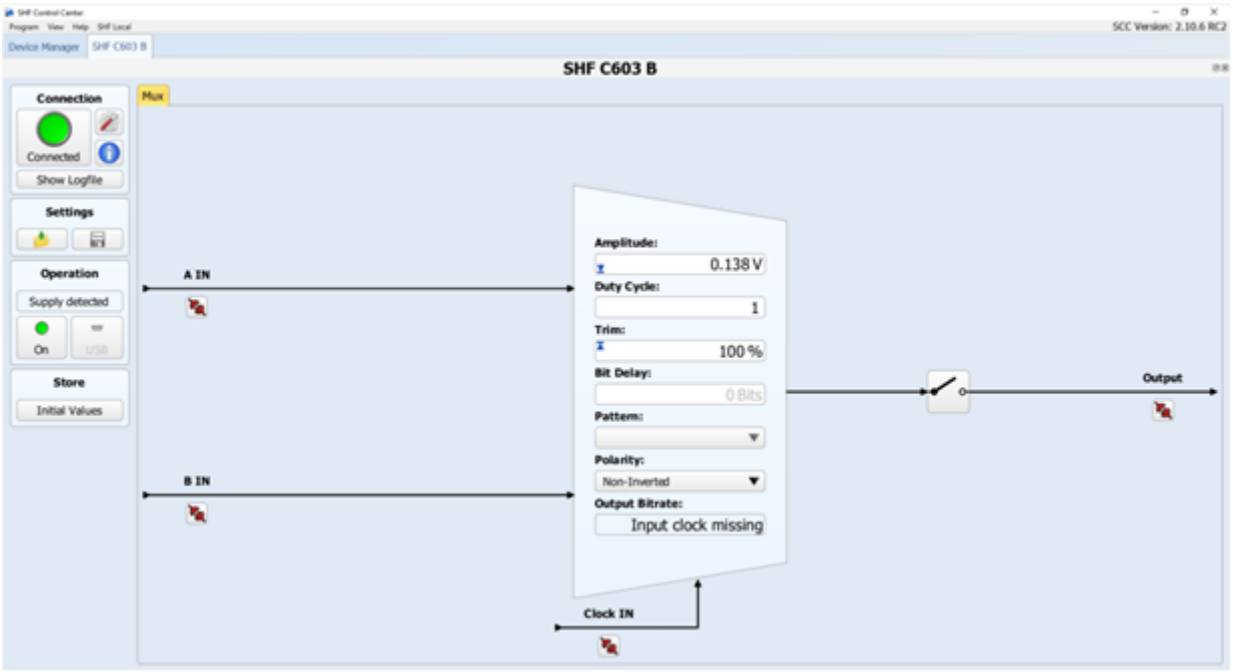
Parameter	Unit	Symbol	Min	Typ	Max	Comment
Input Connectors	Ω			50		1.85 mm (V) female
Output Connectors	Ω			50		1.85 mm (V) female
Dimensions	mm					see pages 9/10
Weight	g			90 430		without heat sink with heat sink

Conditions

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Operating Temperature	°C	$T_{ambient}$	15		45	

Remote Interface & Software

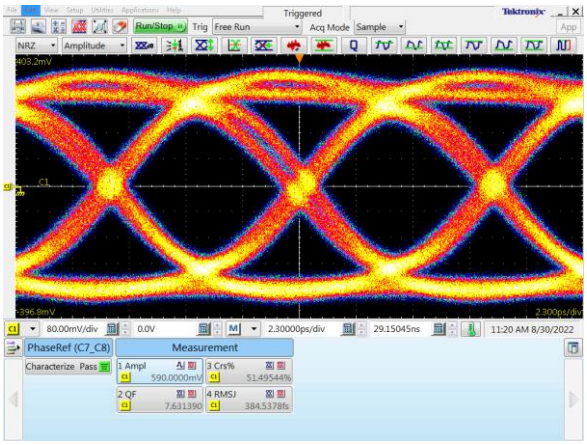
The MUX is controlled by the easy to use software package SHF Control Center (SCC). The amplitude, duty cycle, output signal speed (Trim) and the RF output state (on/off) can be set and are displayed in the graphical user interface (GUI).



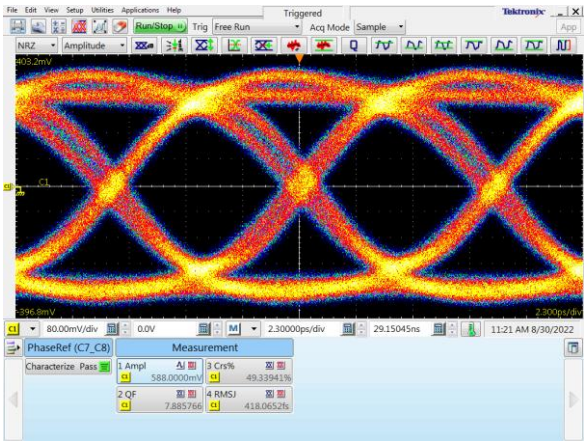
SHF Control Center (SCC)

Typical Output Eye Diagrams

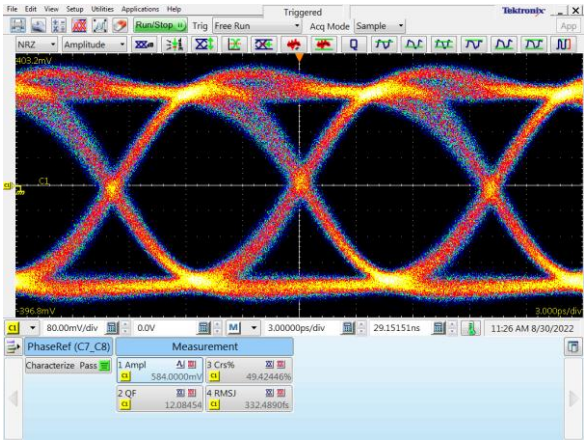
Measurements below had been performed using a SHF 12106 A Bit Pattern Generator (PRBS 231-1) and a Tektronix DSA 8300 Digital Serial Analyzer (DSA) with Phase Reference Module (82A04B-60G) and 70 GHz Sampling Module (80E11). The outputs of the MUX module had been connected directly to the DSA input.



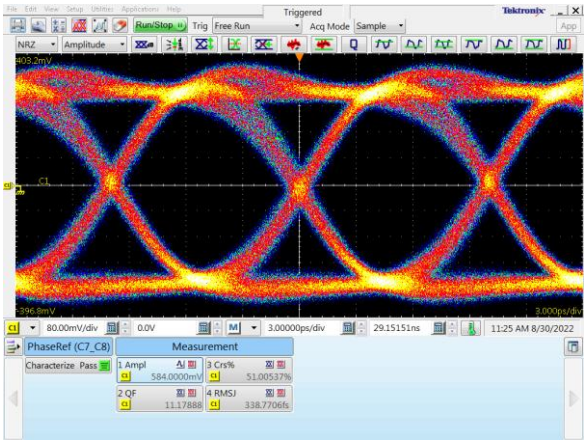
Out @ 128 Gbps



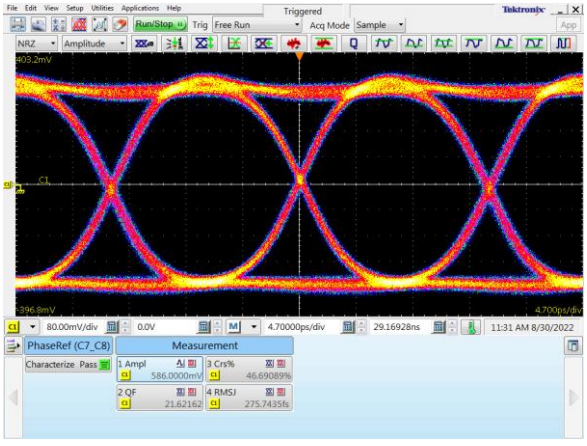
Out inv. @ 128 Gbps



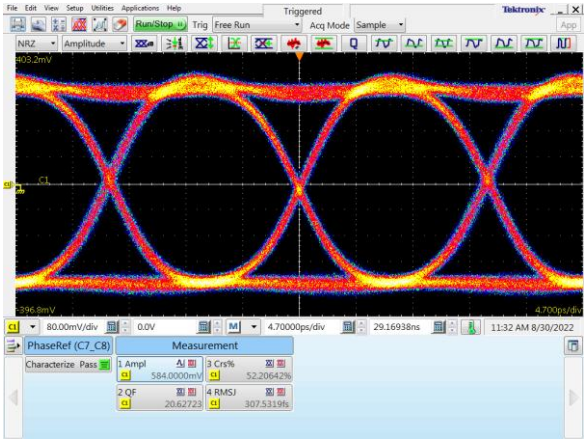
Out @ 100 Gbps



Out inv. @ 100 Gbps

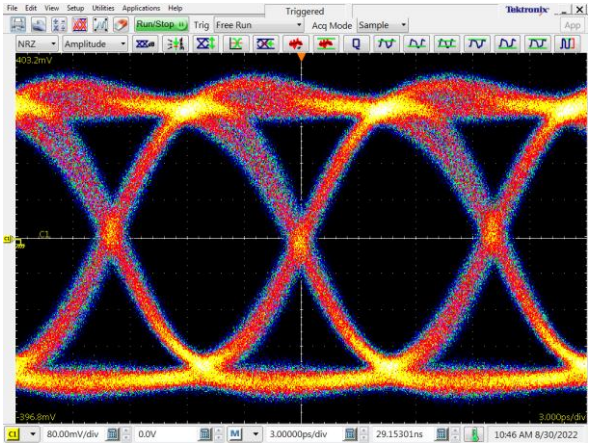


Out @ 64 Gbps

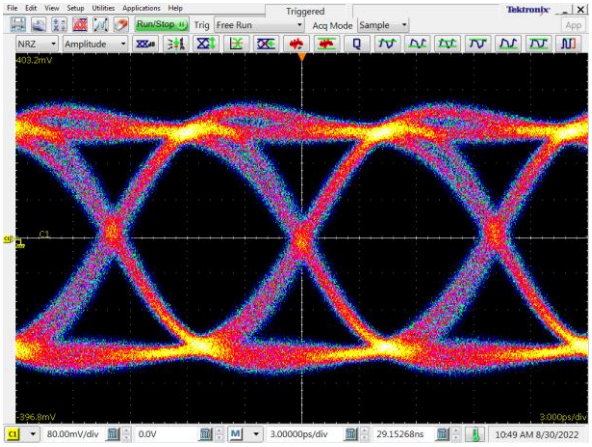


Out inv. @ 64 Gbps

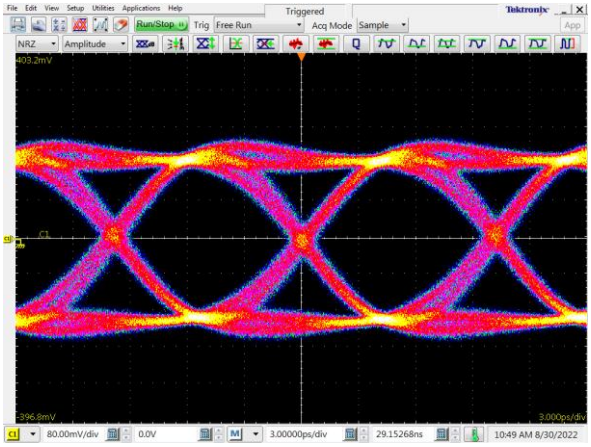
Output Amplitude Adjustment



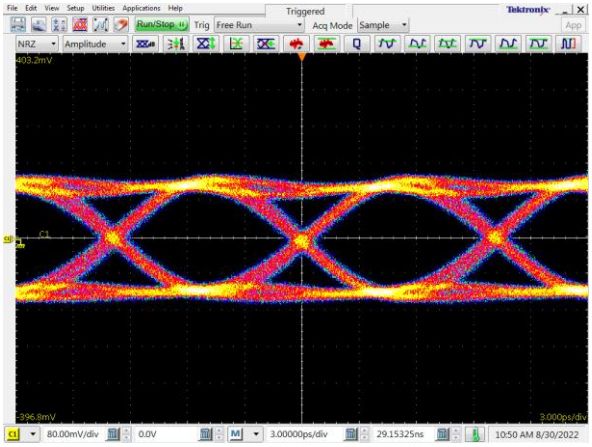
100 Gbps @ 500 mV



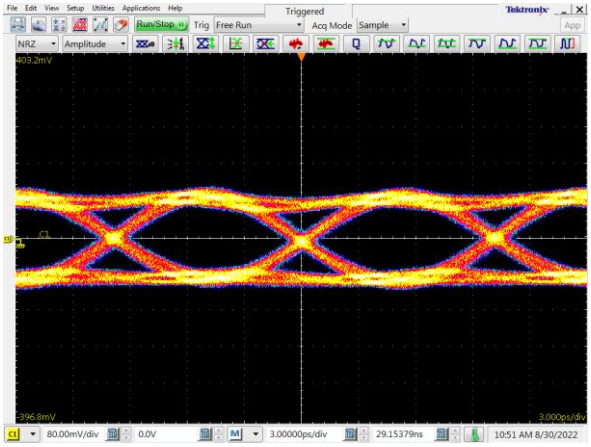
100 Gbps @ 400 mV



100 Gbps @ 300 mV

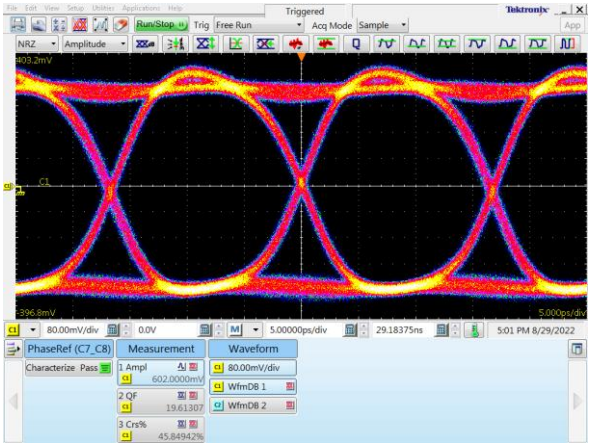


100 Gbps @ 200 mV

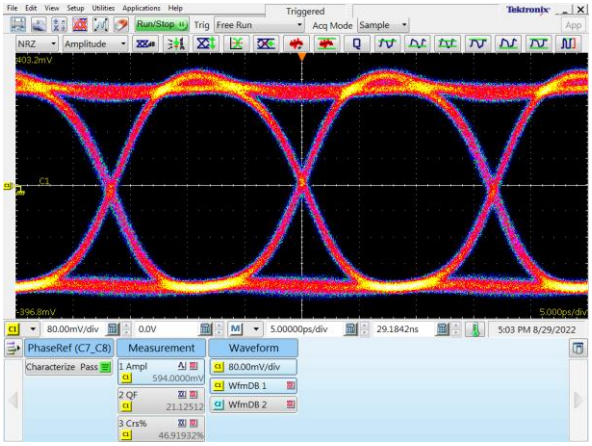


100 Gbps @ 150 mV

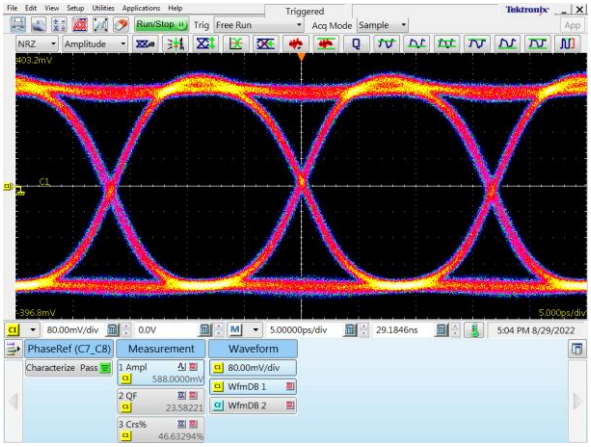
Output Signal Speed (TRIM) - Adjustment



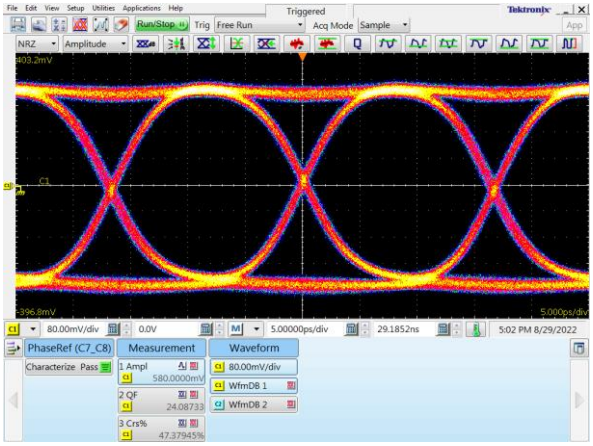
60 Gbps @ TRIM = 100 %



60 Gbps @ TRIM = 50 %



60 Gbps @ TRIM = 25 %

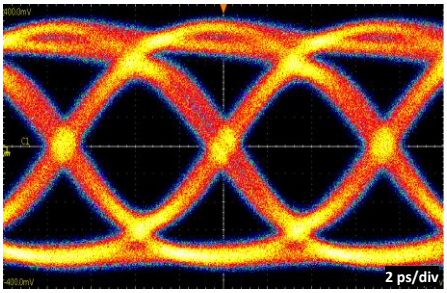


60 Gbps @ TRIM = 0 %

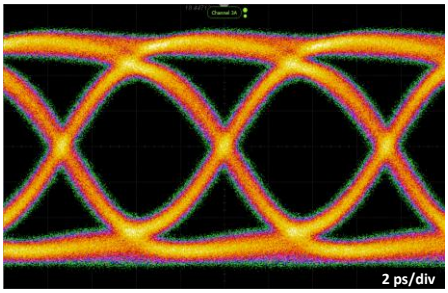
Oscilloscope comparison

Measurements below had been performed using a SHF 12106 A Bit Pattern Generator (PRBS 213-1), a Keysight DCA N1000A with Precision Timebase and 122 GHz Sampling Module (N1046A). The outputs of the MUX module had been connected directly to the amplifier input. The output of the amplifier had been connected with a 20 dB attenuator to the DCA input.

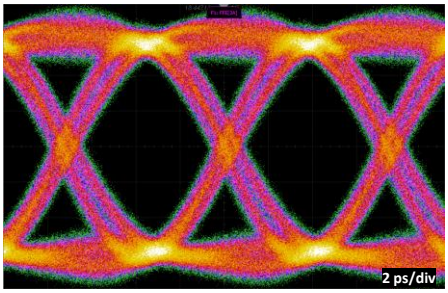
Tektronix DSA / BW = 70 GHz **Keysight DCA / BW = 122 GHz**



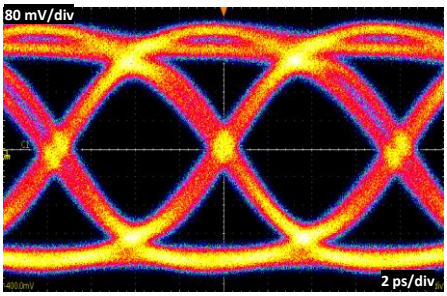
138 Gbps measurement



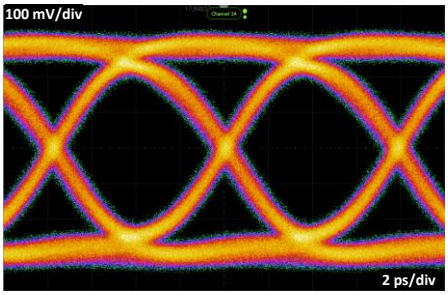
138 Gbps measurement



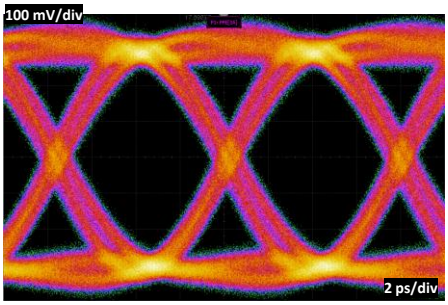
138 Gbps measurement
+ Linear FFE (7-Tap with 2 pre cursors)



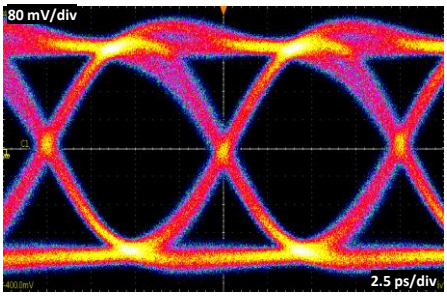
128 Gbps measurement



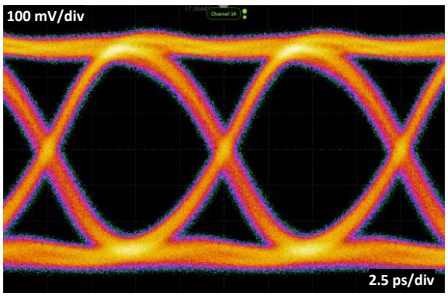
128 Gbps measurement



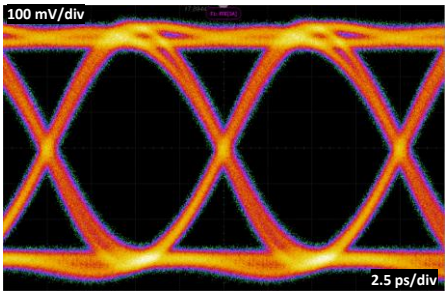
128 Gbps measurement
+ Linear FFE (7-Tap with 2 pre cursors)



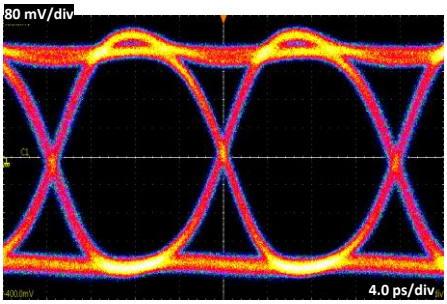
100 Gbps measurement



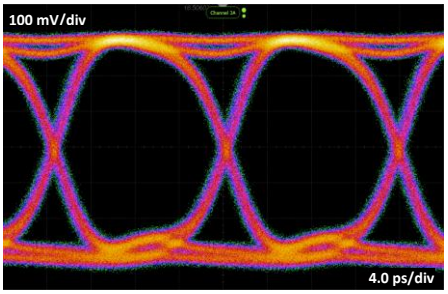
100 Gbps measurement



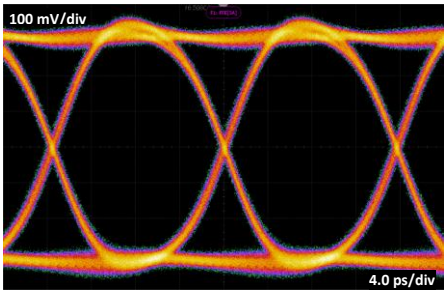
100 Gbps measurement
+ Linear FFE (7-Tap with 2 pre cursors)



64 Gbps measurement



64 Gbps measurement

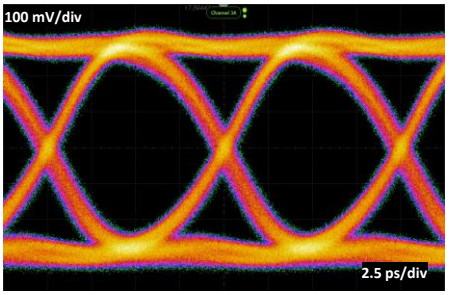


64 Gbps measurement
+ Linear FFE (7-Tap with 2 pre cursors)

Output signals with recommended output amplifier

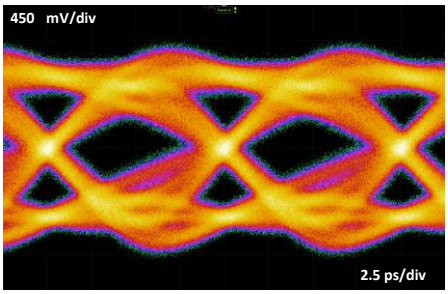
Measurements below had been performed using a SHF 12106 A Bit Pattern Generator (PRBS 2^{13}-1), a Keysight DCA N1000A with Precision Timebase and 122 GHz Sampling Module (N1046A). The outputs of the MUX module had been connected directly to the amplifier input. The output of the amplifier had been connected with a 20 dB attenuator to the DCA input.

Output SHF C603 B

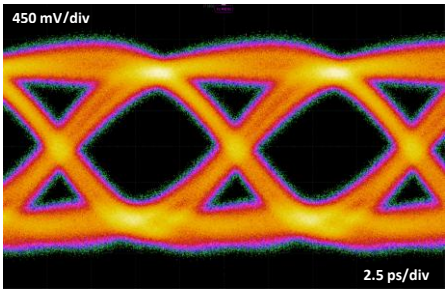


100 Gbps measurement
Eye Amplitude = 500 mV

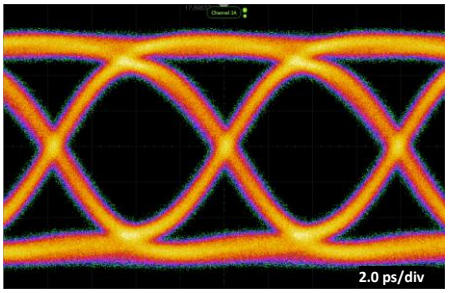
Output SHF M827 B –VMVF



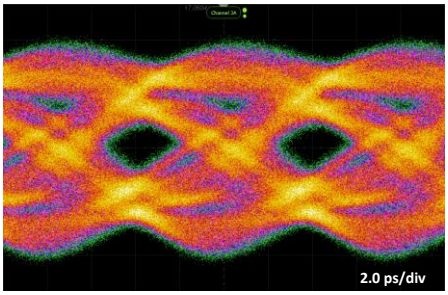
100 Gbps measurement
Eye Amplitude = 1700 mV



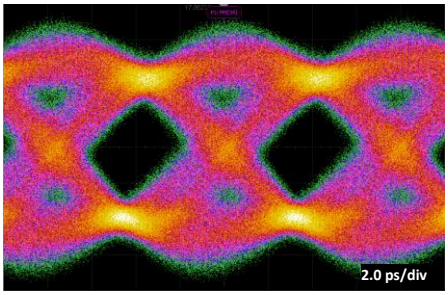
100 Gbps measurement
+ Linear FFE (8-Tap with 2 pre cursors)



128 Gbps measurement
Eye Amplitude = 500 mV



128 Gbps measurement
Eye Amplitude = 1500 mV

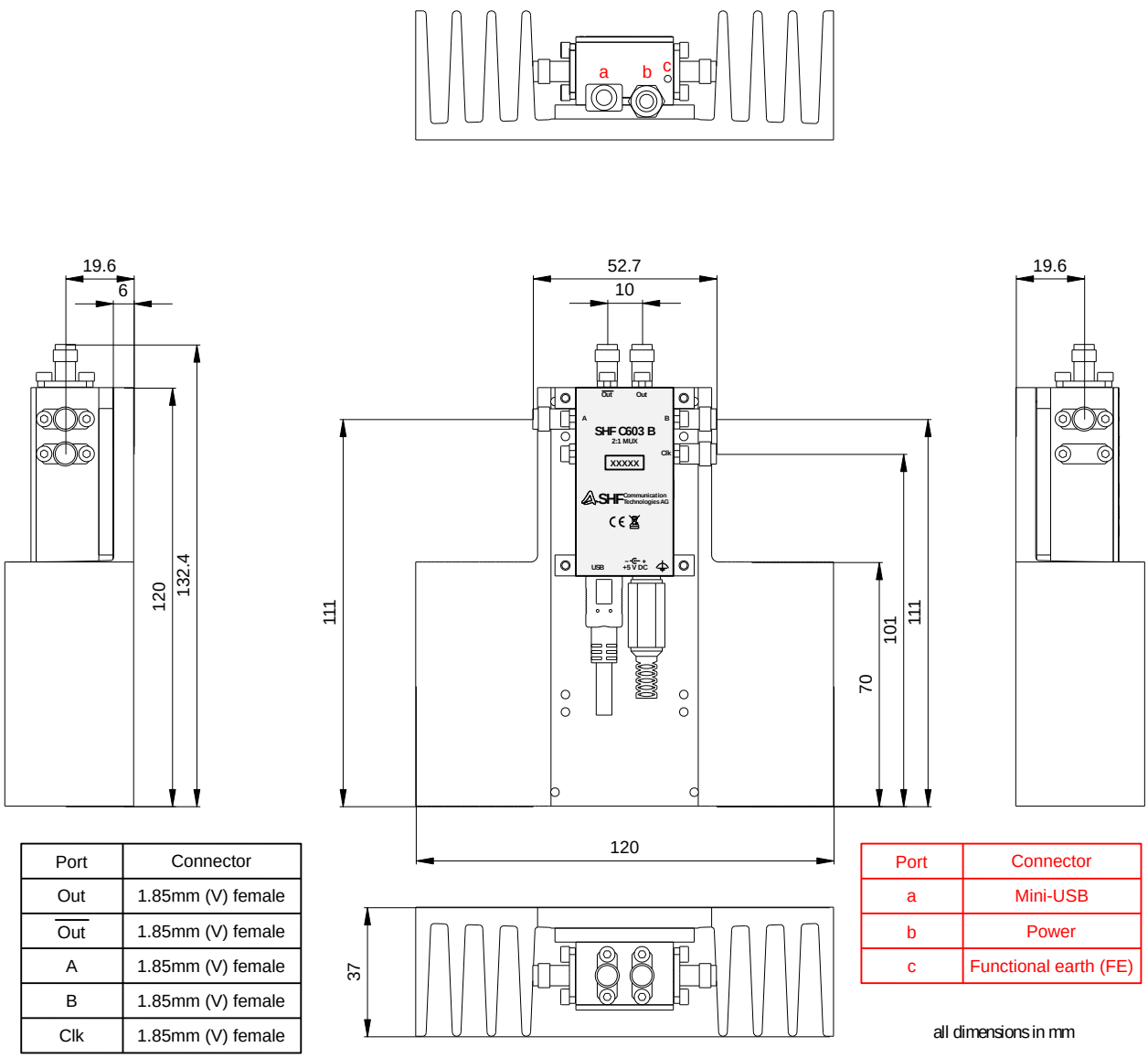


128 Gbps measurement
+ Linear FFE (8-Tap with 2 pre cursors)

For more information about SHFs amplifiers, please refer to:

https://www.shf-communication.com/products/rf-broadband-amplifiers/

Mechanical Drawing with Heat Sink – Configuration VFVF

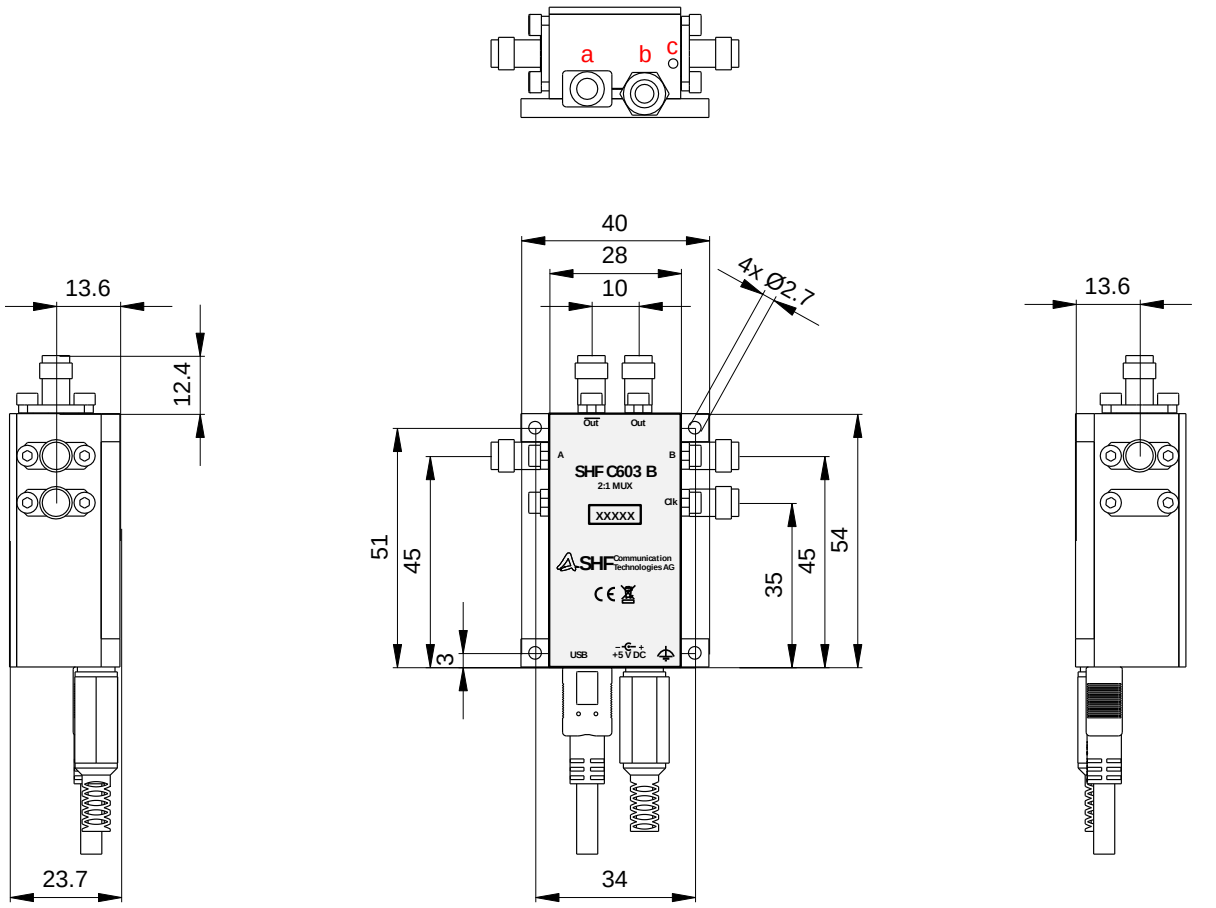


Port	Connector
Out	1.85mm (V) female
$\overline{\text{Out}}$	1.85mm (V) female
A	1.85mm (V) female
B	1.85mm (V) female
Clk	1.85mm (V) female

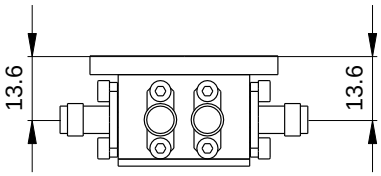
Port	Connector
a	Mini-USB
b	Power
c	Functional earth (FE)

all dimensions in mm

Mechanical Drawing without Heat Sink – Configuration VFVF



Port	Connector
Out	1.85mm (V) female
$\overline{\text{Out}}$	1.85mm (V) female
A	1.85mm (V) female
B	1.85mm (V) female
Clk	1.85mm (V) female

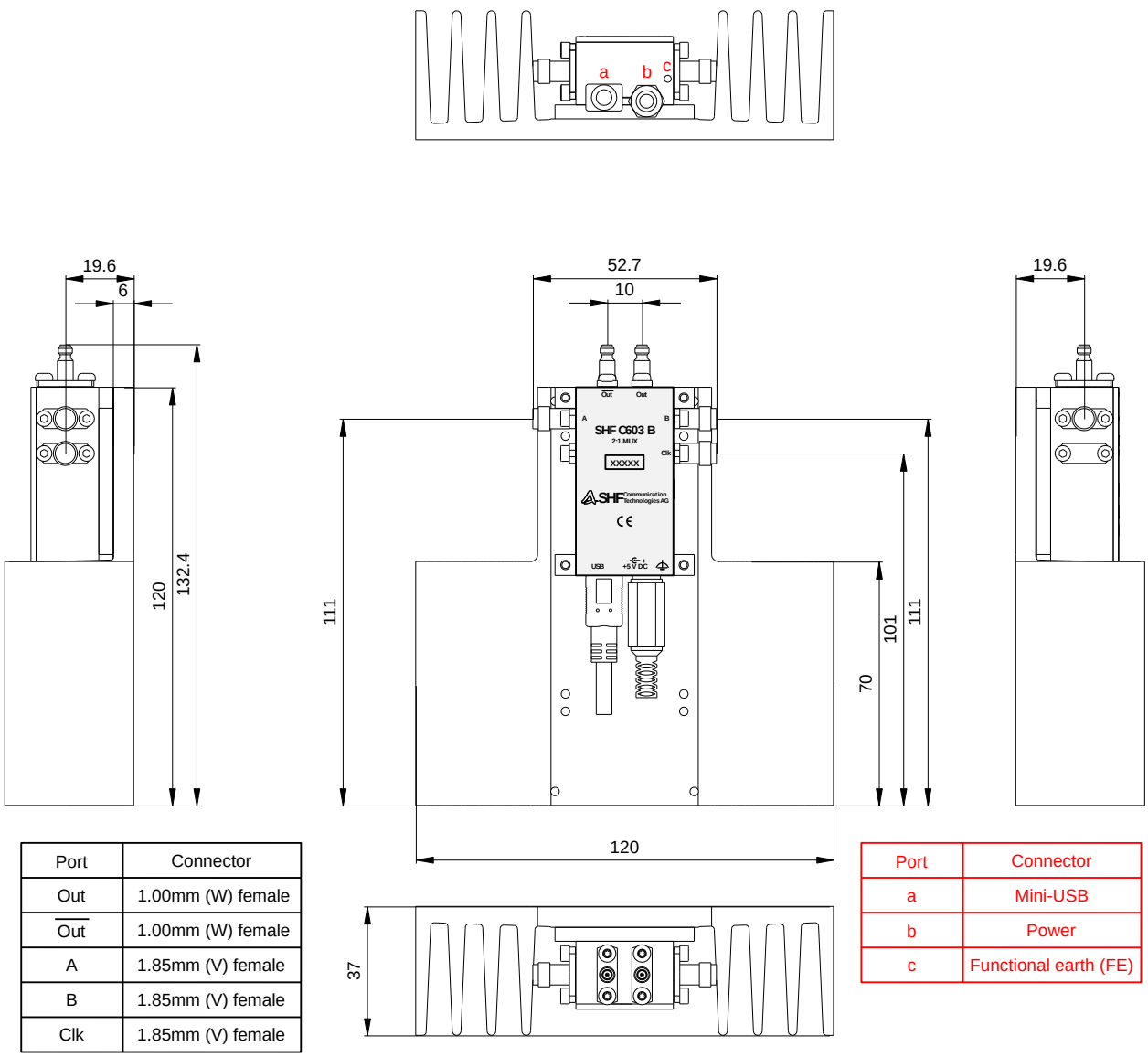


all dimensions in mm

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

Please ensure that adequate cooling of the module is guaranteed.

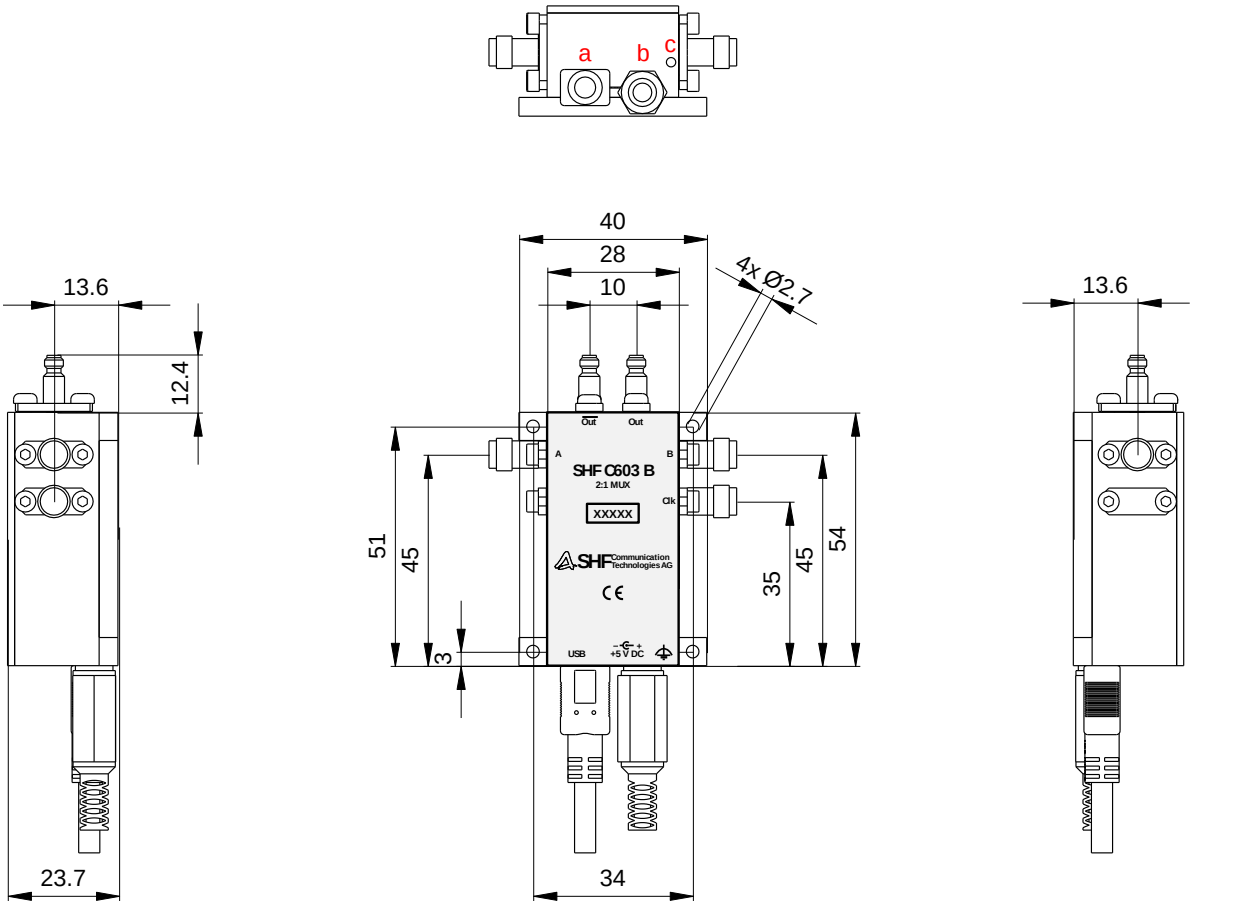
Mechanical Drawing with Heat Sink – Configuration VFWF



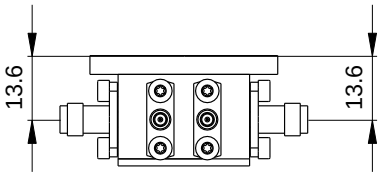
Port	Connector
Out	1.00mm (W) female
$\overline{\text{Out}}$	1.00mm (W) female
A	1.85mm (V) female
B	1.85mm (V) female
Clk	1.85mm (V) female

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

Mechanical Drawing without Heat Sink – Configuration VFWF



Port	Connector
Out	1.00mm (W) female
$\overline{\text{Out}}$	1.00mm (W) female
A	1.85mm (V) female
B	1.85mm (V) female
Clk	1.85mm (V) female



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

Please ensure that adequate cooling of the module is guaranteed.

SHF Communication Technologies AG

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

+49 30 772 051 0

sales@shf-communication.com

www.shf-communication.com