

Data Sheet

SHF C643 A



40-80 GHz T-Flip-Flop (TFF)

1:2 Frequency Divider



Description

The SHF C643 A is a T-Flip-Flop (TFF) module capable of broadband operation up to 80 GHz using a sinusoidal input signal. A frequency of half the input frequency is provided at the outputs. It offers high quality output signals together with a compact size and ease of operation.

Features

- Broadband operation from 40 to 80 GHz
- Two differential output ports with 90° phase shift between the outputs
- 800 mV_{pp} single ended output swing
- Single ended or differential operation (either In or In! or both can be used)

Applications

- Next generation Ethernet standards
- Telecom transmission
- Fibre Channel®
- Broadband test and measurement equipment
- Prescaler in high-speed clock distributions

Configurations

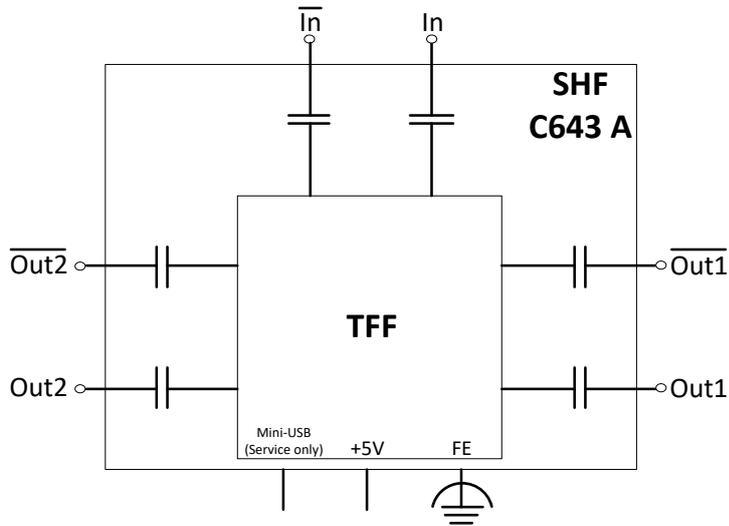
- WFFV: 1.0 mm inputs and 1.85 mm outputs
- Other configurations on request

Accessories

- +5 V Power Supply Desktop Adapter
- Functional earth cable → Connection to test setup ground has to be set up first before any other connection to prevent instrument damage!

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Block Diagram



Specifications¹

Absolute Maximum Ratings

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Input Voltage	mV	$V_{clk\ in}$			1000	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
Minimum Input Frequency	GHz	$f_{in,min}$			40	@ 400 mV input voltage
Maximum Input Frequency	GHz	$f_{in,max}$	80			@ 400 mV input voltage
Input Voltage	mV	V_{in}	400		950	Single ended, peak-to-peak, see page 7

¹ These specifications are valid for the WFVF configuration



Output Parameters

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Minimum Output Frequency	GHz	$f_{out,min}$			20	@ 400 mV input voltage
Maximum Output Frequency	GHz	$f_{out,max}$	40			@ 400 mV input voltage
Output Voltage	mV	V_{out}	500		950	Single ended, peak-to-peak, see page 7

Power Requirements

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Supply Voltage	V	V_{CC}	4.8	5.0	5.2	Supply Voltage
Supply Current	mA	I_{CC}			600	
Power Dissipation	W	P_d			3.0	@ $V_{CC} = +5 V$

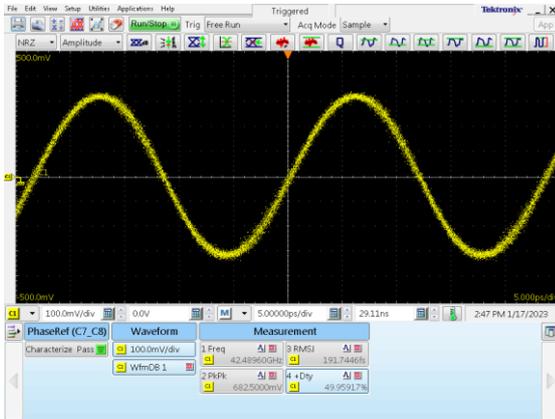
Mechanical Characteristics

Parameter	Unit	Symbol	Min	Typ	Max	Comment
Input Connectors	Ω			50		1.0 mm (W) female
Output Connectors	Ω			50		1.85 mm (V) female
Dimensions	mm					See pages 8-9
Weight	g			90		

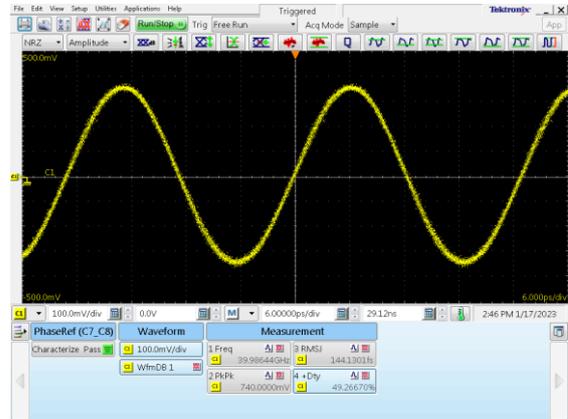


Typical Output Waveforms

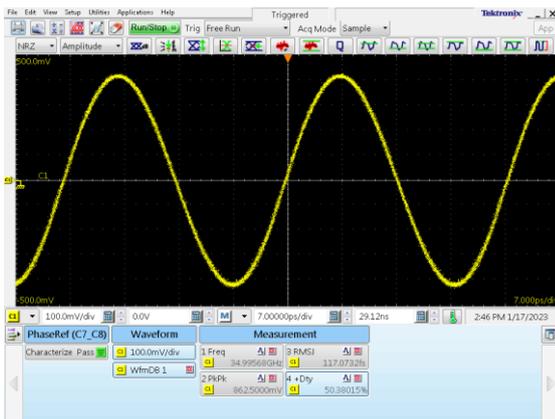
The measurements below had been performed using a Tektronix DSA 8300 Digital Serial Analyzer (DSA) with Phase Reference Module (82A04B-60G) and 70 GHz Sampling Module (80E11). The outputs of the TFF had been connected directly with a 10 dB attenuator the DSA input. The input voltage is 500 mV_{pp}.



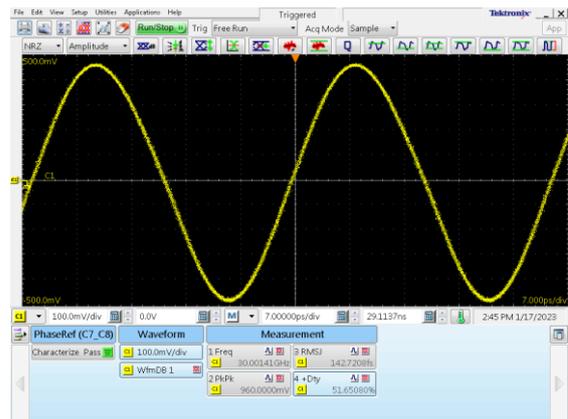
Output signal @ $f_{out} = 42.5$ GHz



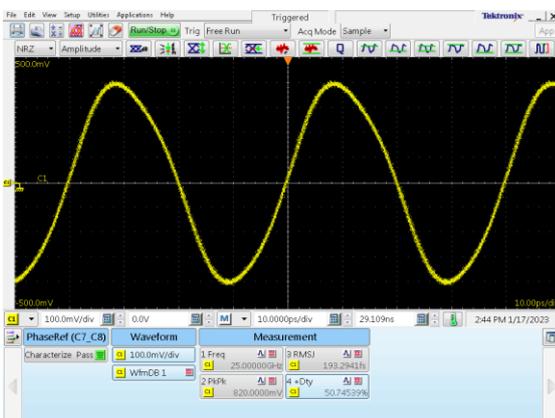
Output signal @ $f_{out} = 40$ GHz



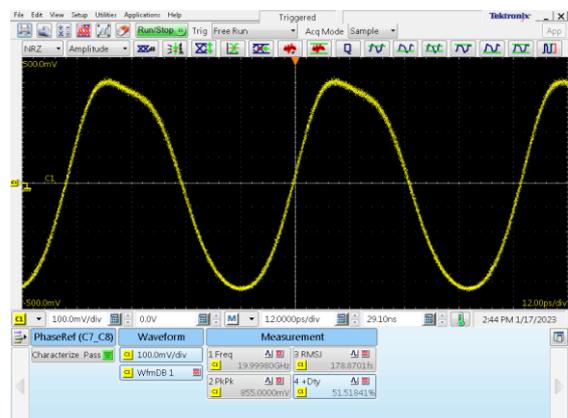
Output signal @ $f_{out} = 35$ GHz



Output signal @ $f_{out} = 30$ GHz



Output signal @ $f_{out} = 25$ GHz

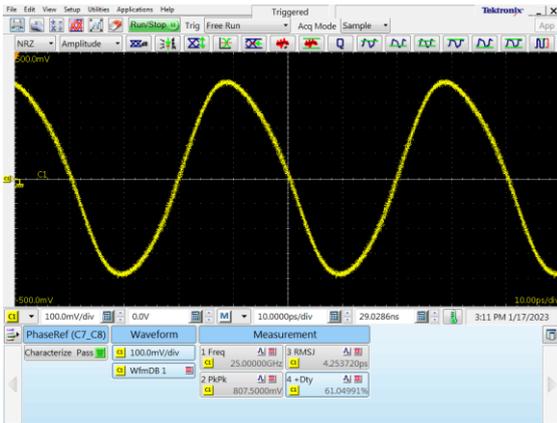


Output signal @ $f_{out} = 20$ GHz

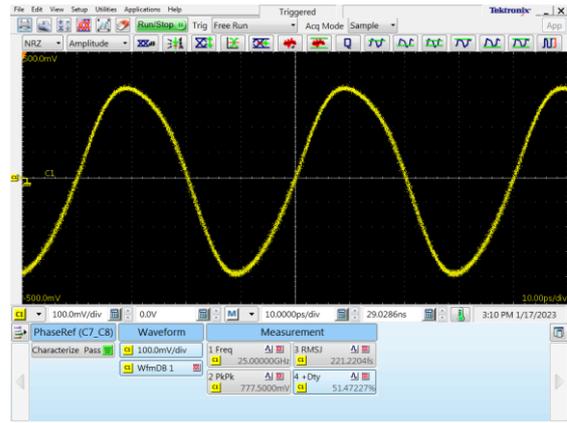


Output Signal Timing

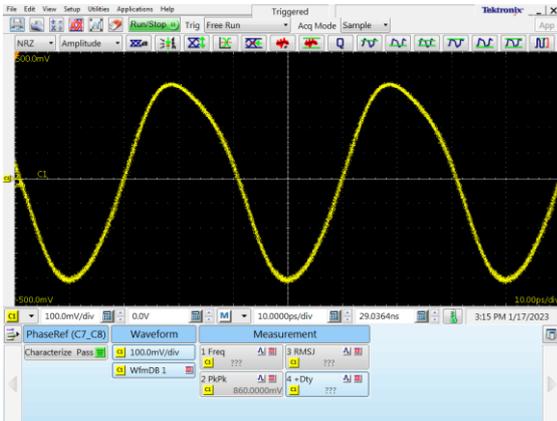
The measurements below had been performed using a Tektronix DSA 8300 Digital Serial Analyzer (DSA) with Phase Reference Module (82A04B-60G) and 70 GHz Sampling Module (80E11). The outputs of the TFF had been connected directly with a 10 dB attenuator the DSA input. The screenshots shown below describe the phase relation between the 2 differential output signals with its 90° phase shift between output port 1 and output port 2.



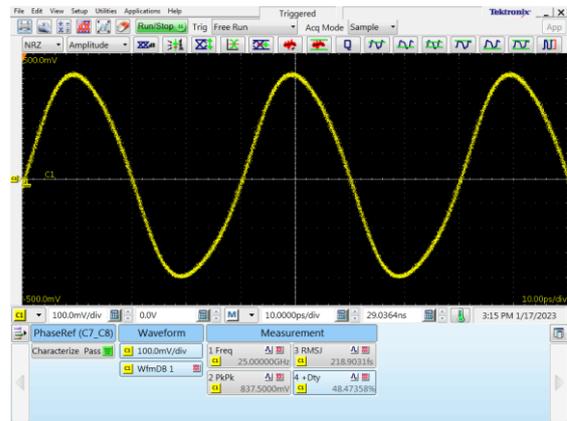
Out1 @ $f_{out} = 25$ GHz



Out1 inverted @ $f_{out} = 25$ GHz



Out2 @ $f_{out} = 25$ GHz



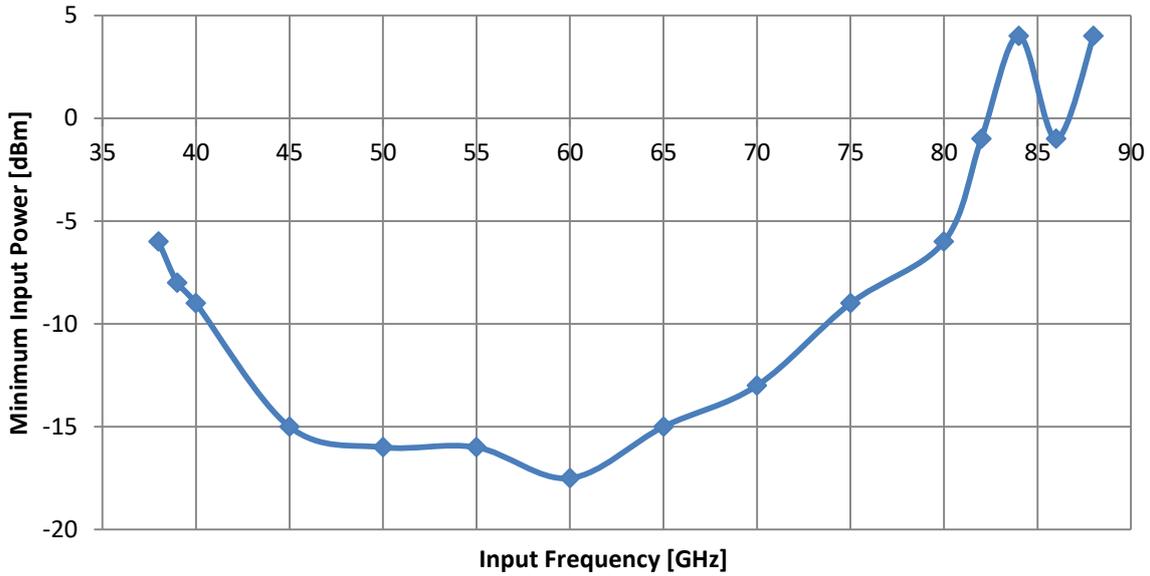
Out2 inverted @ $f_{out} = 25$ GHz



Typical Results

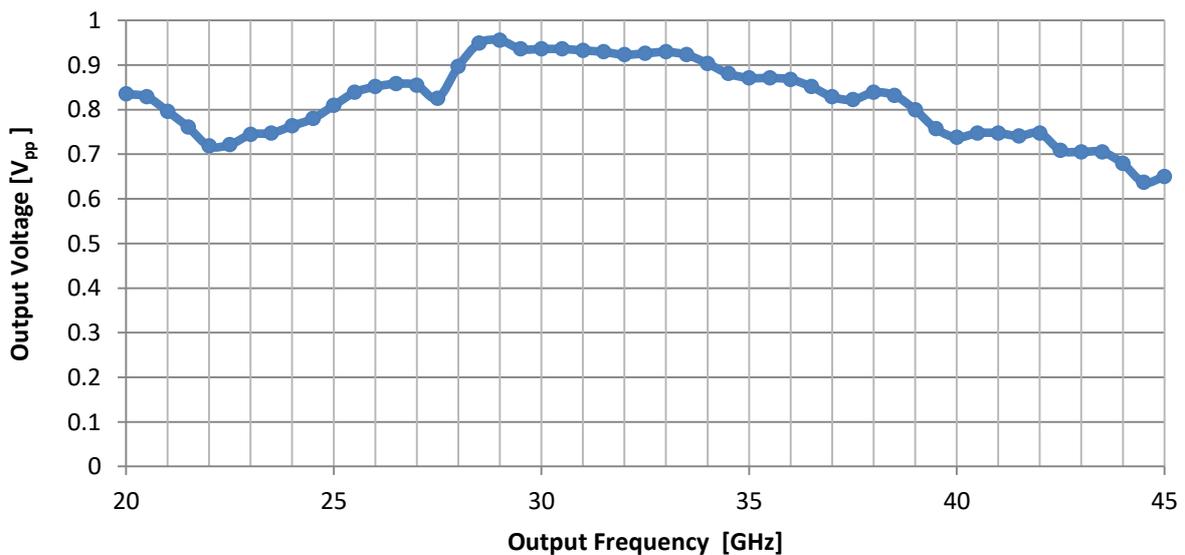
The RMS jitter of the output signal increases with a decreasing the input power. The minimum input power below is measured to reach a maximum output RMS jitter of ~ 200 fs.

Input Sensitivity



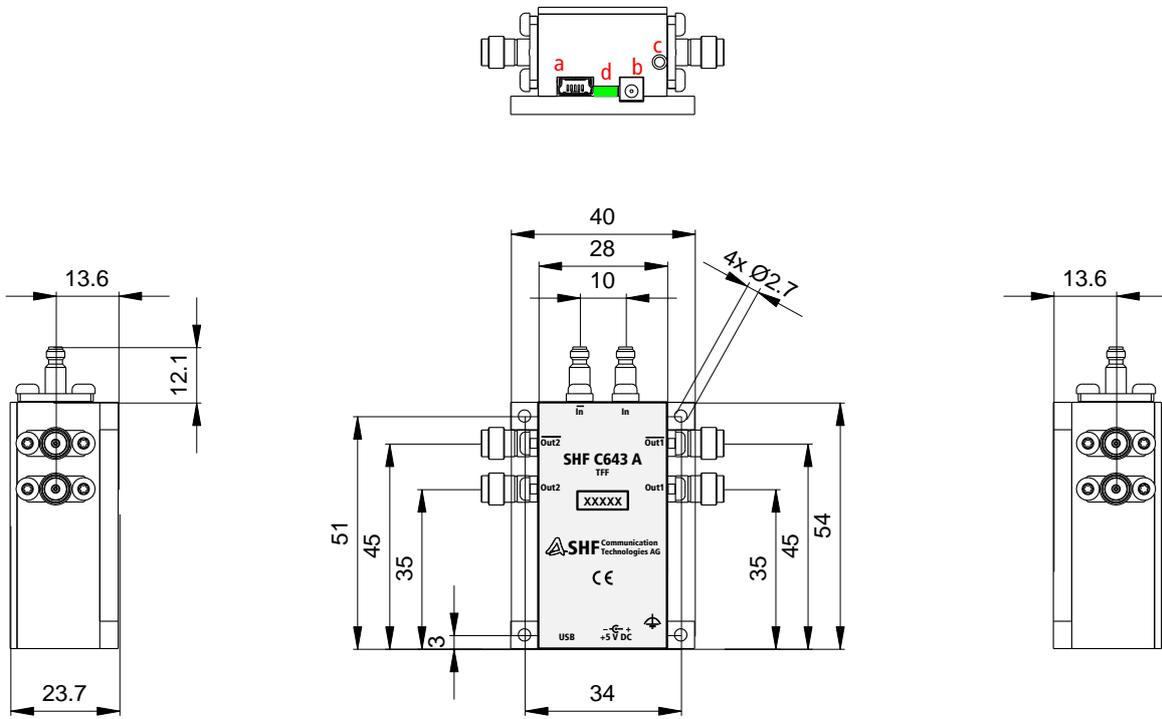
The frequency-dependent output voltages of all output ports are very similar. The diagram below shows a typical output voltage curve.

Output Voltage

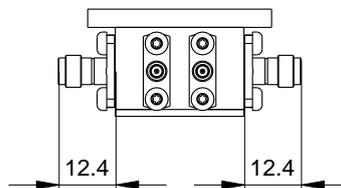




Mechanical Drawing - Configuration WFVF



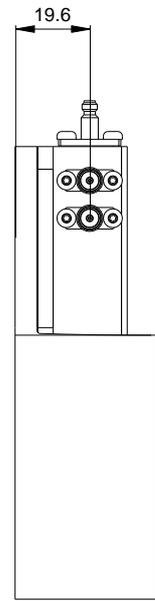
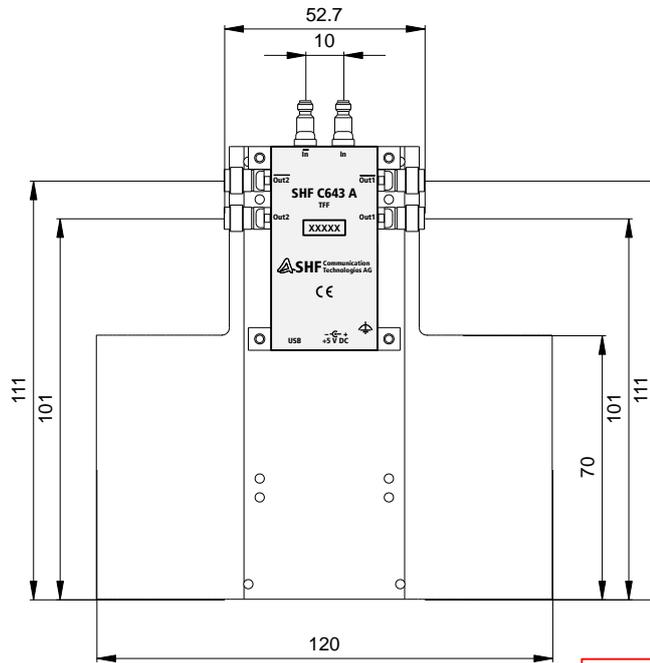
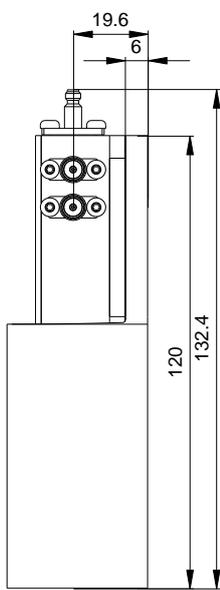
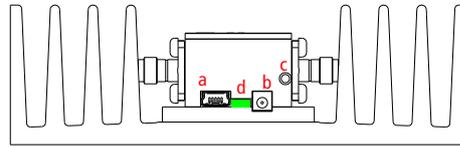
Port	Connector
In	1.0mm female
In	1.0mm female
Out1	1.85mm (V) female
Out1	1.85mm (V) female
Out2	1.85mm (V) female
Out2	1.85mm (V) female



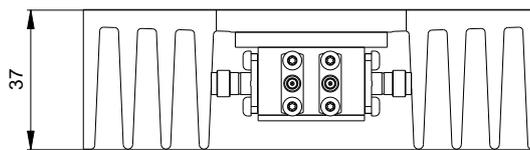
Port	Connector
a	Mini-USB
b	Power
c	Functional earth (FE)
d	Power-LED

all dimensions in mm

Mechanical Drawing with Heat Sink - Configuration WFVF



Port	Connector
In	1.0mm female
In	1.0mm female
Out1	1.85mm (V) female
Out1	1.85mm (V) female
Out2	1.85mm (V) female
Out2	1.85mm (V) female



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

all dimensions in mm



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