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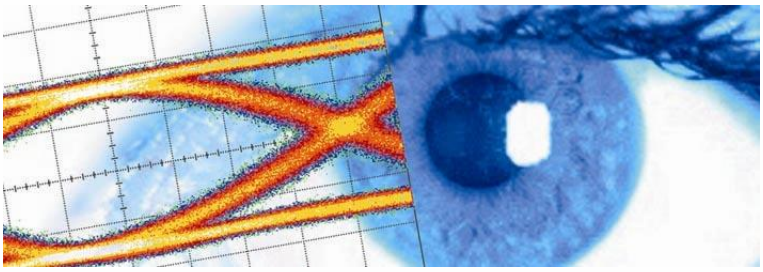


# Datasheet

## SHF C642 B

60 GHz T-Flip-Flop (TFF)

1:2 Frequency Divider

# Description

The SHF C642 B is a T-Flip-Flop (TFF) module capable of broadband operation up to 60 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.

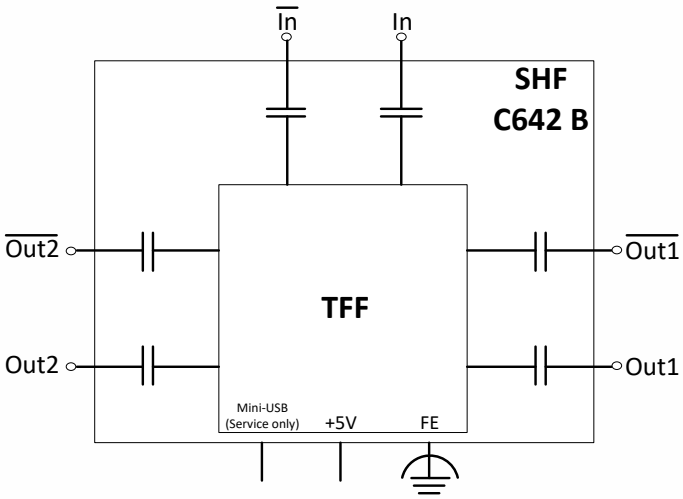
# Features

- Broadband operation up to 60 GHz
- Two differential output ports with 90° phase shift between the outputs
- 700 $mV_{pp}$ single ended output swing
- Single ended or differential operation (either In or In! or both can be used)

# Applications

- 100G Ethernet development and prototyping
- OC-768 / STM-256 applications
- Telecom transmission
- Fibre Channel®
- Broadband test and measurement equipment

# Block Diagram




# Accessories1

- +5V 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!

® Fibre Channel is a registered trademark of the Fibre Channel Industry Association

[1] Mini-USB port is only for service purposes, no USB cable will be provided

# Absolute Maximum Ratings

| Parameter | Unit | Symbol | Min. | Typ. | Max. | Comment |
|---|---|---|---|---|---|---|
| **Input Parameters** | | | | | | |
| 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 | |

# Specifications

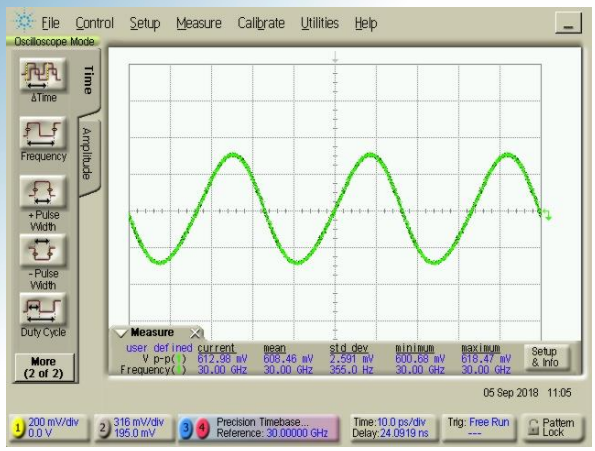
| Parameter | Unit | Symbol | Min. | Typ. | Max. | Comment |
|---|---|---|---|---|---|---|
| **Input Parameters** | | | | | | |
| Minimum Input Frequency[2] | GHz | $f_{in,min}$ | | 1 | 2 | @ 500mV input amplitude, see page 7 |
| Maximum Input Frequency | GHz | $f_{in,max}$ | 60 | 62 | | @ 500mV input amplitude, see page 7 |
| Input Voltage | mV | $V_{in}$ | 500<br>600 | | 900[3]<br>900[3] | ≤ 50GHz<br>> 50GHz<br>Single ended, peak-to-peak, see page 7 |
| **Output Parameters** | | | | | | |
| Output Voltage | mV | $V_{out}$ | 500 | | 900 | Single ended, peak-to-peak, see page 7 |
| **Power Requirements** | | | | | | |
| Supply Voltage | V | $V_{cc}$ | 4.8 | 5.0 | 5.2 | |
| Supply Current | mA | $I_{cc}$ | | 630 | 700 | |
| Power Dissipation | mW | $P_d$ | | 3150 | | @ $V_{CC}$ = +5V |
| **Conditions** | | | | | | |
| Operating Temperature | °C | $T_{ambient}$ | 15 | | 35 | |

[2] Theoretical limit is DC, practical limit depends on slew rate of input signal

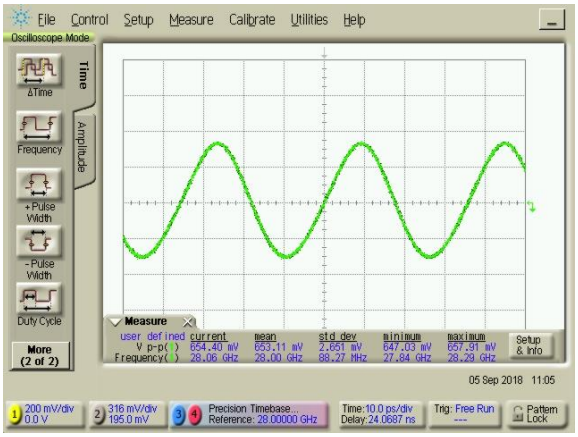
[3] corresponds to a maximum sinusoidal input signal of +3dBm

# Typical Output Waveforms

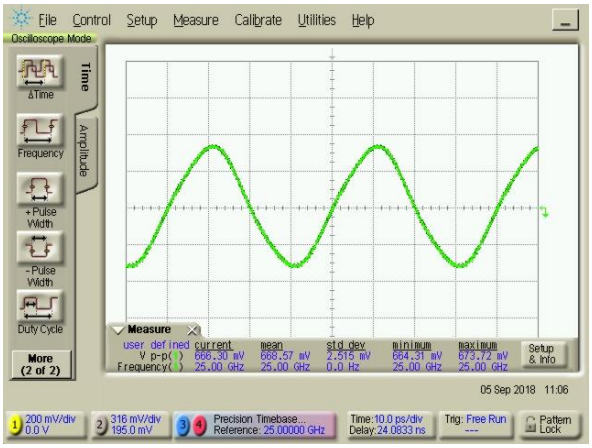
The measurements below had been performed using an Agilent 86100B DCA with Precision Time Base Module (86107A) and 70 GHz Sampling Head (86118A). The output of the TFF had been connected directly to the DCA input.



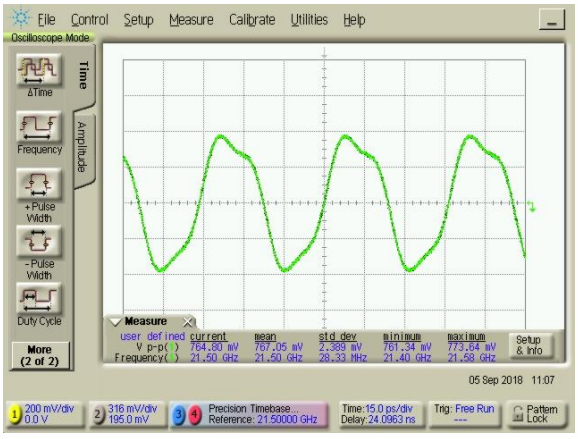

**Output signal @ $f_{out}$ = 30 GHz**



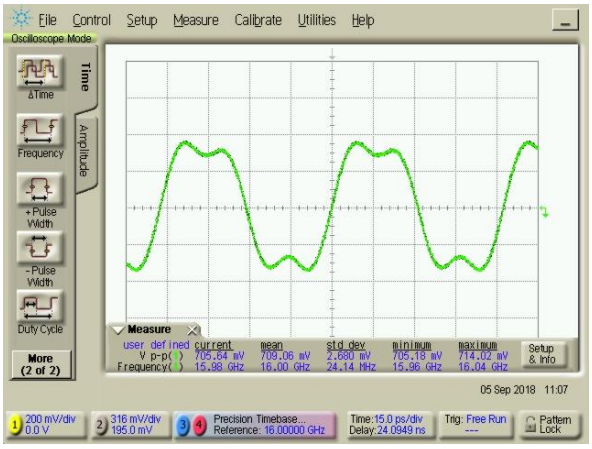

**Output signal @ $f_{out}$ = 28 GHz**



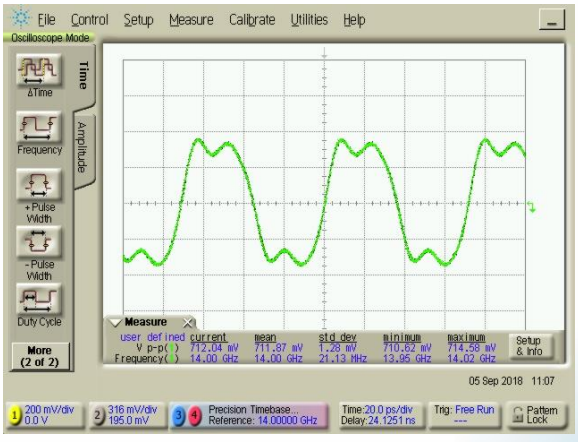

**Output signal @ $f_{out}$ = 25 GHz**



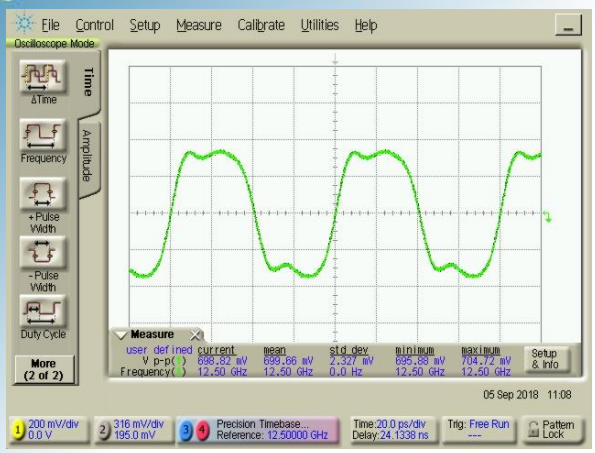

**Output signal @ $f_{out}$ = 21.5 GHz**



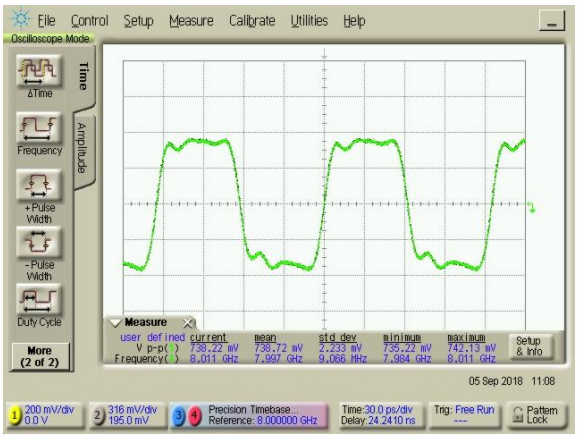

**Output signal @ $f_{out}$ = 16 GHz**



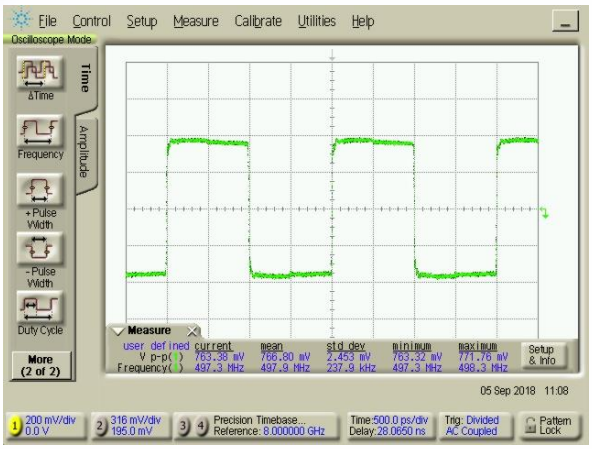

**Output signal @ $f_{out}$ = 14 GHz**




**Output signal @ $f_{out}$ = 12.5 GHz**



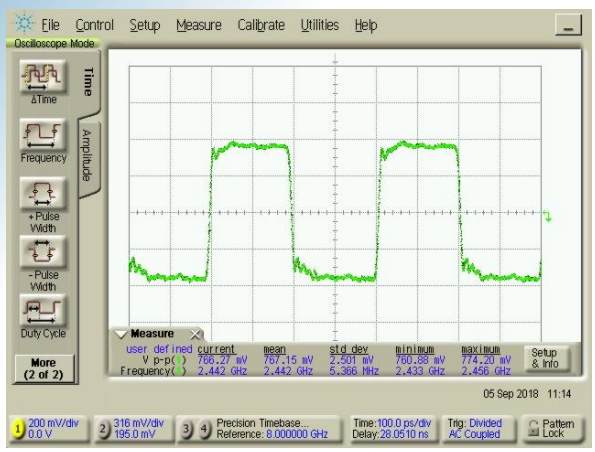

**Output signal @ $f_{out}$ = 8 GHz**



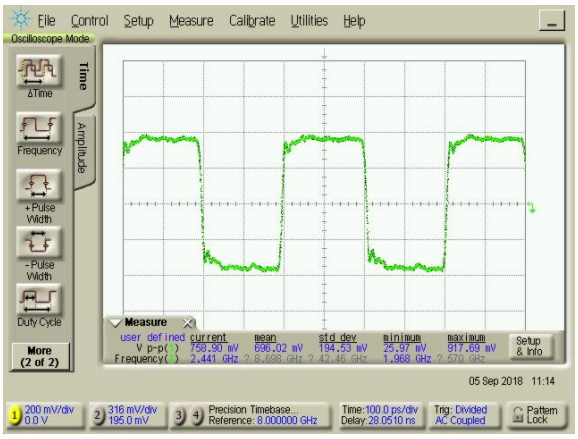

**Output signal @ $f_{out}$ = 0.5 GHz**

# Output Signal Timing

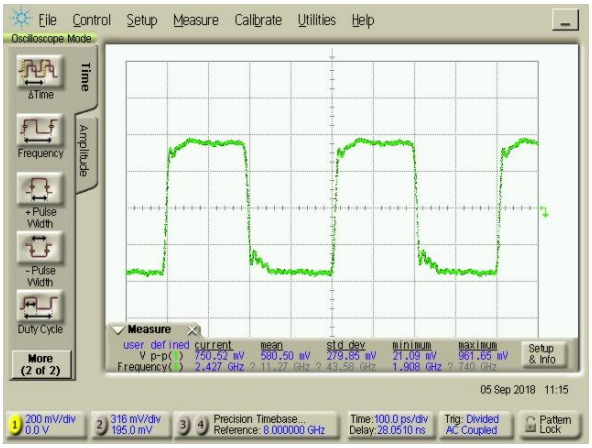
The measurements had been performed using an Agilent 86100B DCA with Precision Time Base Module (86107A) and 70 GHz Sampling Head (86118A). The output of the TFF had been connected directly to the DCA input. The screenshots shown below describe the phase relation between the 2 differential output signals with its 90° phase shift between output port 1 and output port 2.



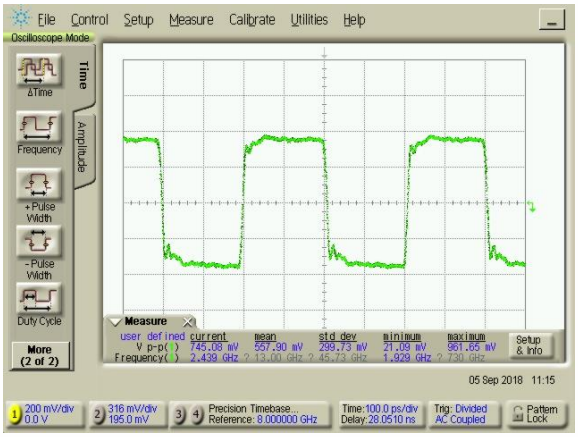

**Out1 @ $f_{out}$ = 5 GHz**




**Out1 inverted @ $f_{out}$ = 5 GHz**

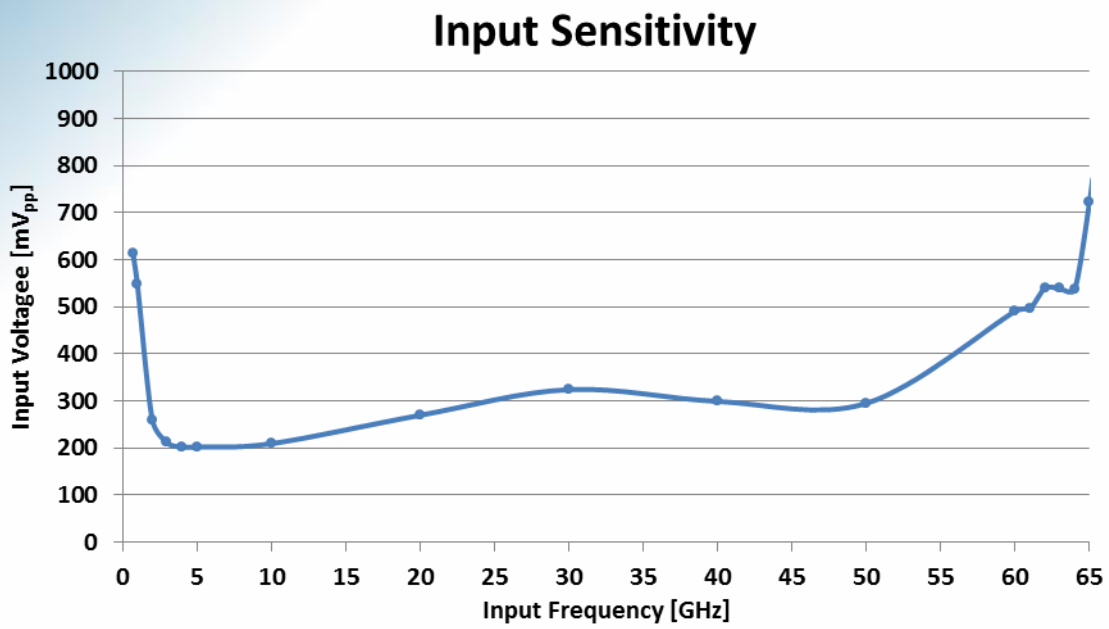


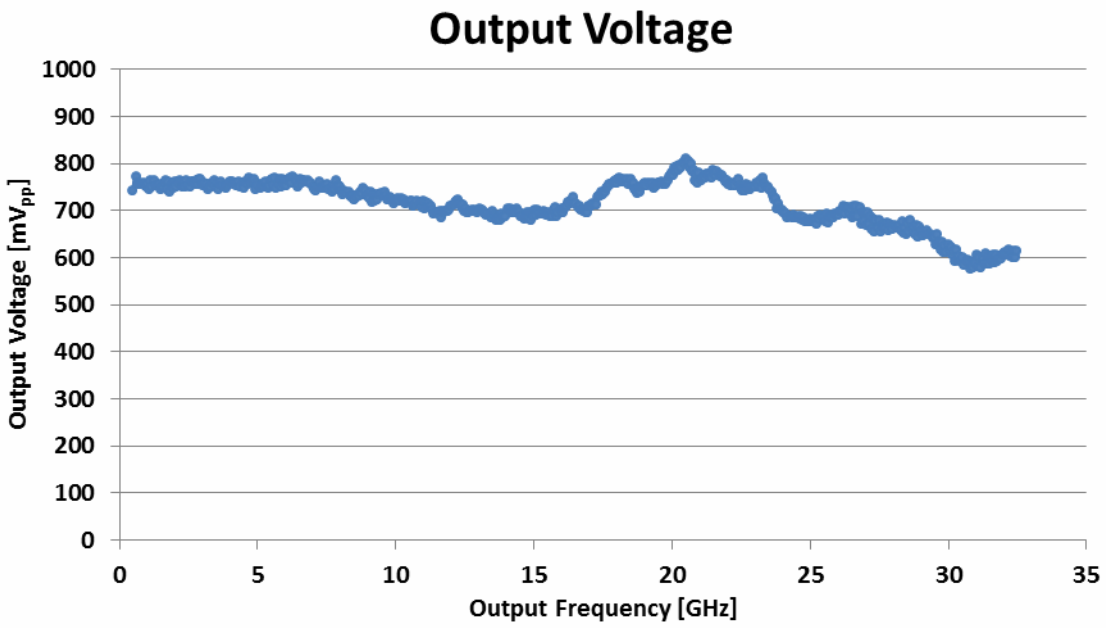

**Out2 @ $f_{out}$ = 5 GHz**



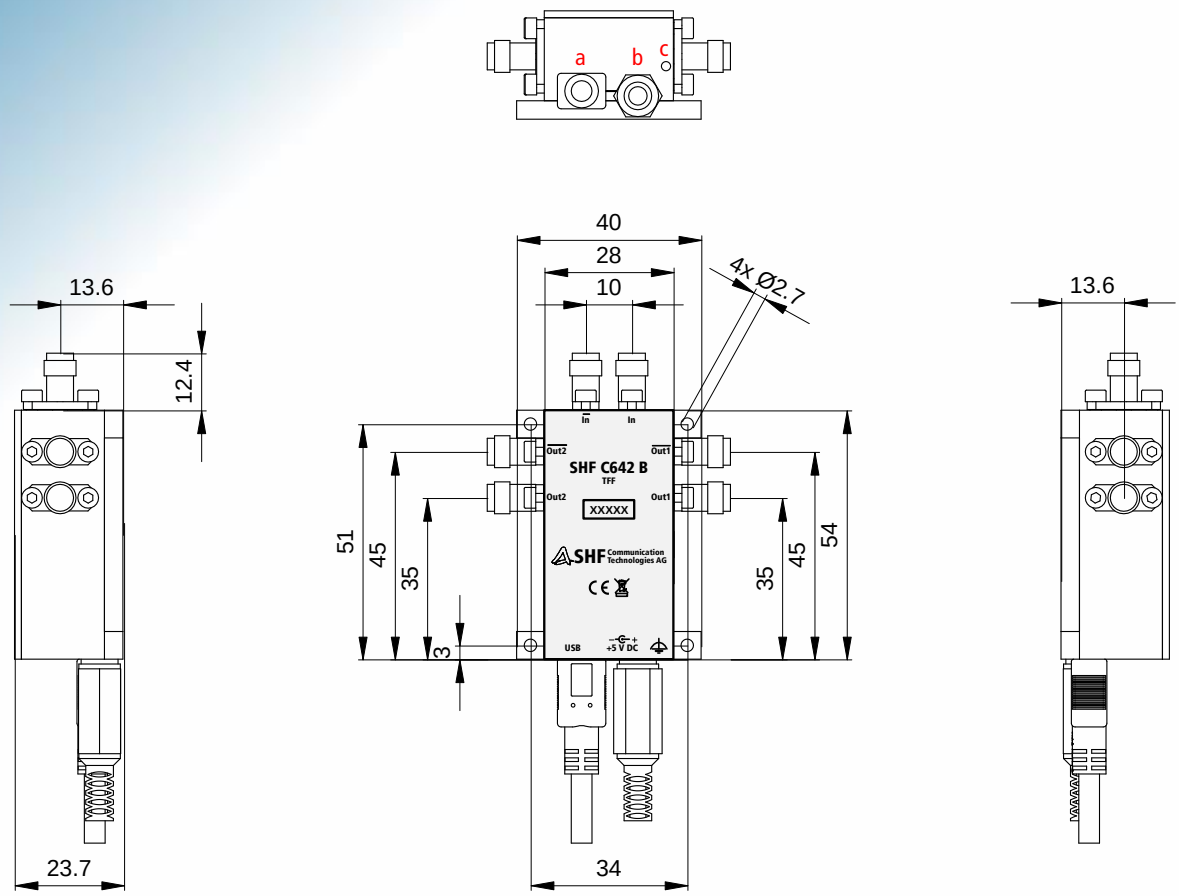

**Out2 inverted @ $f_{out}$ = 5 GHz**

# Typical Results

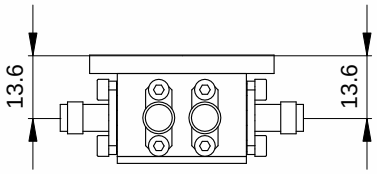


# Outline Drawing – Module



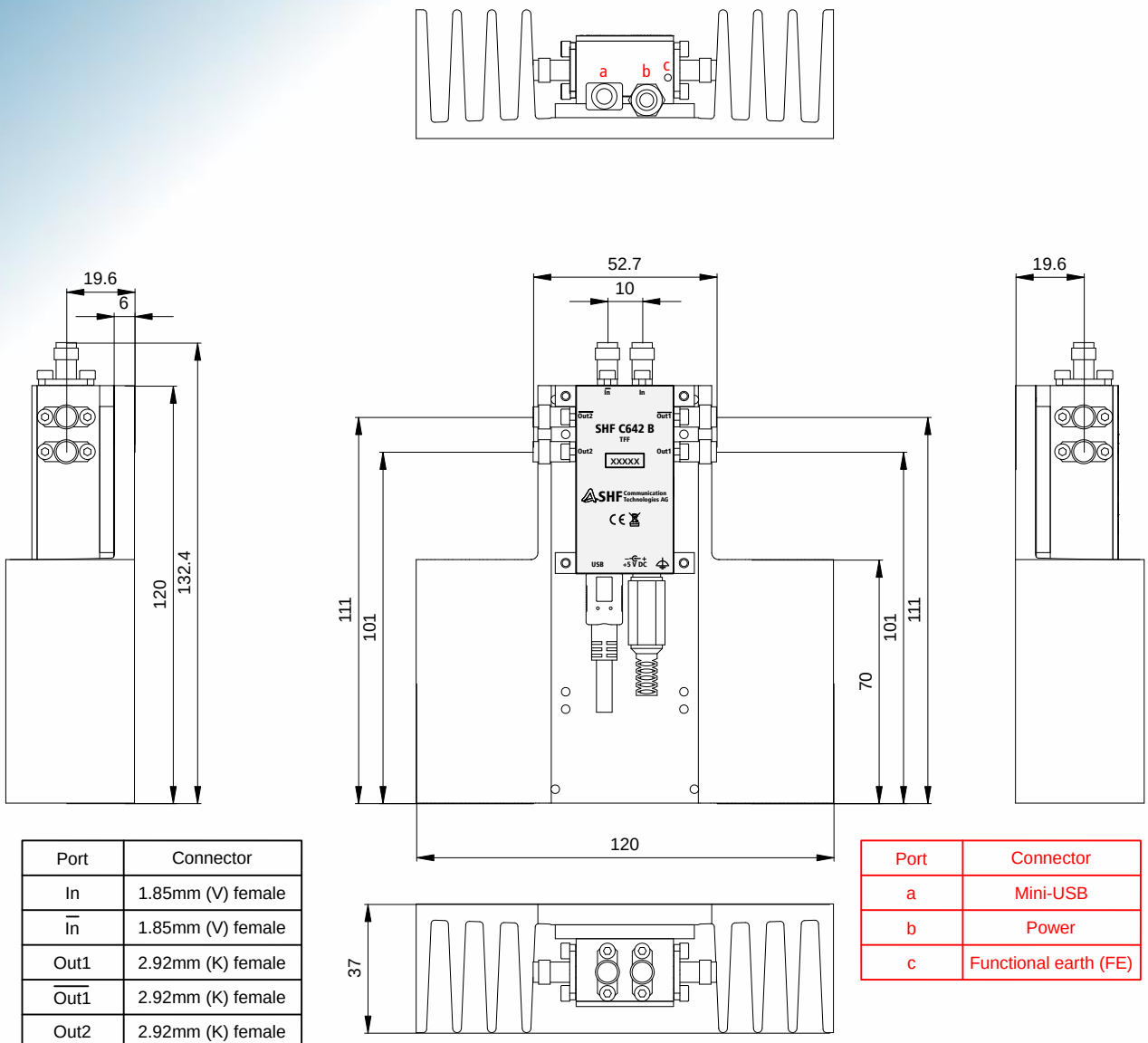

| Port | Connector |
|---|---|
| In | 1.85mm (V) female |
| $\overline{\text{In}}$ | 1.85mm (V) female |
| Out1 | 2.92mm (K) female |
| $\overline{\text{Out1}}$ | 2.92mm (K) female |
| Out2 | 2.92mm (K) female |
| $\overline{\text{Out2}}$ | 2.92mm (K) female |




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

All dimensions are in mm.

# Outline Drawing – Module with Heat Sink




| Port | Connector |
|---|---|
| In | 1.85mm (V) female |
| $\overline{\text{In}}$ | 1.85mm (V) female |
| Out1 | 2.92mm (K) female |
| $\overline{\text{Out1}}$ | 2.92mm (K) female |
| Out2 | 2.92mm (K) female |
| $\overline{\text{Out2}}$ | 2.92mm (K) female |

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

All dimensions are in mm.