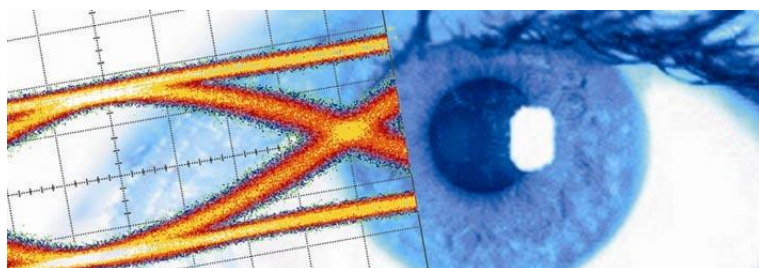# SHF Communication Technologies AG

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# Datasheet
# SHF C681 A
# Analog FIR Filter

**SHF Communication Technologies AG**
the bandwidth company

# Description

The SHF C681 A is a tunable analog 6-tap finite impulse response (FIR) filter. The differential input signal is amplified and filtered by a 6-stage FIR filter structure with fixed tap delays of ~7.5 ps. The frequency response can be arbitrarily modified by adjusting the filter coefficients i.e. the gain of the tap amplifiers in the GUI.

Equalizing operation has been verified for heavily degraded signals up to 60 GBaud PAM4 and 80 Gbps NRZ (please be referred to the signals below).

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

- Differential data input and output
- Complementary DSP software ("SHF FIR") to calculate the optimum settings from s2p files
- Compact module to be placed wherever adaptive equalization is required e.g. close to the DUT

# Applications

- Quality Improvement of a degraded signal e.g. for BER measurements
- Equalization of transmission channels
- Signal predistortion to simulate various transmission channels
- 100GbE, 200GbE, 400GbE and 1TbE system evaluation & development
- Telecom transmission
- Broadband test and measurement equipment
- Feed forward equalization (FFE)

# Block Diagram
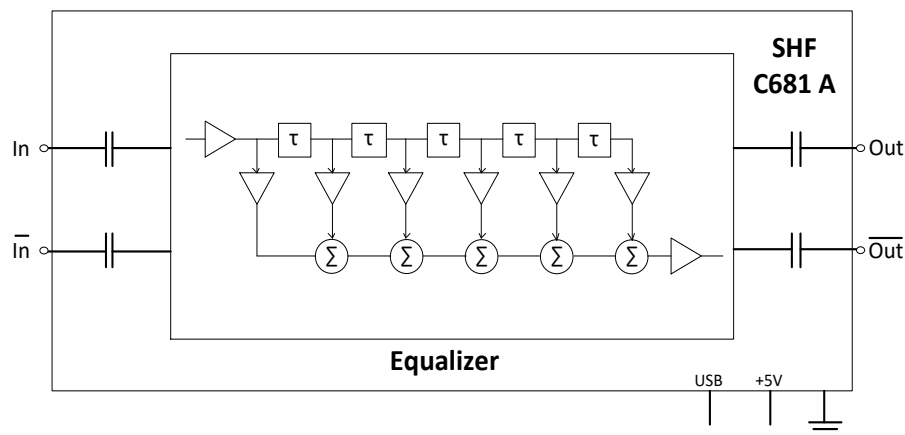


# Accessories

- +5V power supply desktop adapter
- Functional earth cable
- Mini-USB cable

# Absolute Maximum Ratings

| Parameter | Unit | Symbol | Min. | Typ. | Max. | Comment |
|---|---|---|---|---|---|---|
| **Input Parameters** | | | | | | |
| Data Input Voltage | mV | $V_{data\ in}$ | | | 900 | Peak-to-Peak |
| External DC Voltage on Data 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** | | | | | | |
| Maximum Analog Bandwidth | GHz | $f_{-3dB}$ | 55[1] | | | |
| Data Input Voltage | mV | $V_{data\ in}$ | | 200 | 800 | Eye Amplitude; Single-ended |
| 1 dB Compression | mV | $V_{1dB}$ | | 200 100 | | Eye Amplitude; Single ended drive; Differential drive |
| **Output Parameters** | | | | | | |
| Output Amplitude | mV | $V_{out}$ | | | 300 | Eye Amplitude; Single-ended; Depending on tap settings |
| **Power Requirements** | | | | | | |
| Supply Voltage | V | $V_{cc}$ | +5 | | +5.5 | 2.5 x 0.7 mm DC Power Jack |
| Supply Current | mA | $I_{ee}$ | | | 250 | |
| Power Dissipation | W | $P_d$ | 1.25 | | 1.38 | @ $V_{CC}$ = +5V |
| **Conditions** | | | | | | |
| Operating Temperature | °C | $T_{ambient}$ | 15 | | 35 | |

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1 Analog Bandwidth depends on the set filter characteristic

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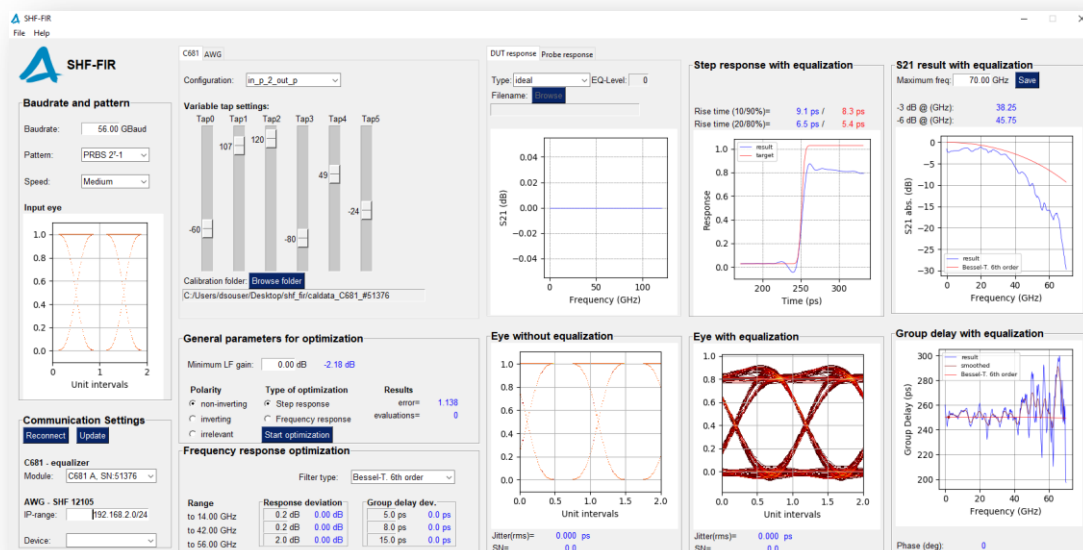
# Remote Interface & Software

The Filter is controlled by the easy to use software package SHF Control Center (SCC).
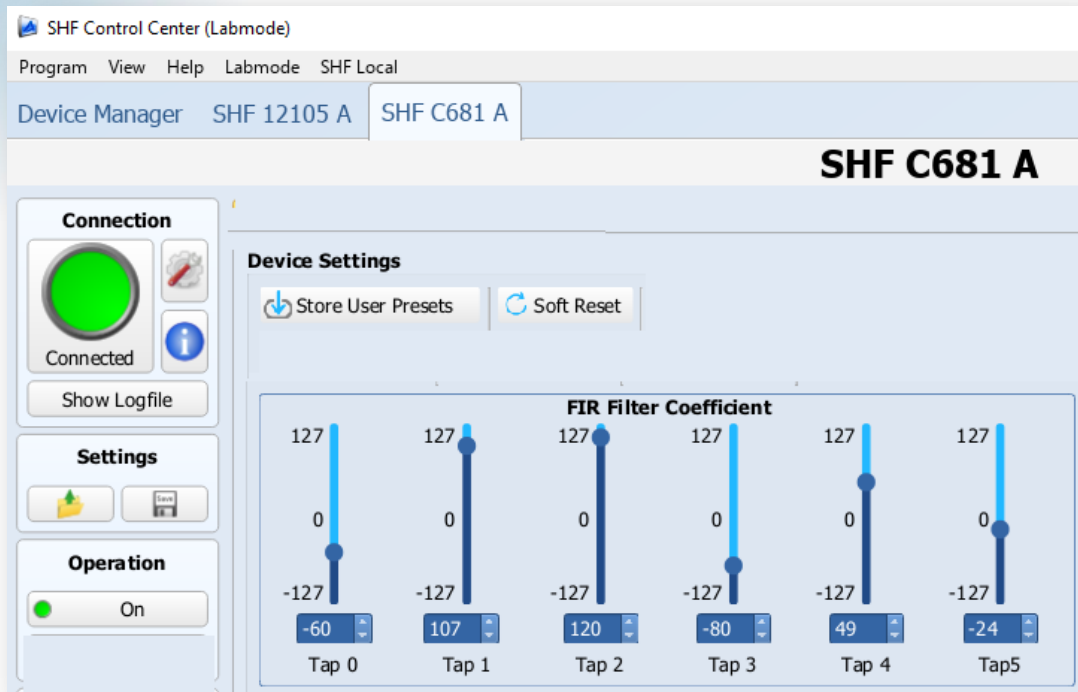
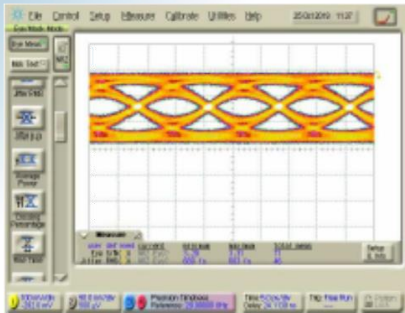

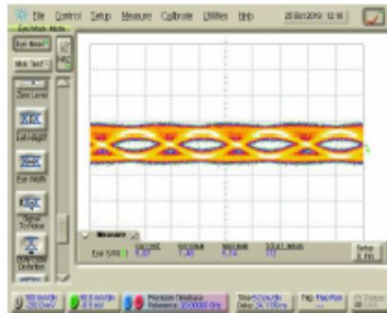The Filter settings can be derived and optimized by a dedicated DSP program package "SHF FIR".
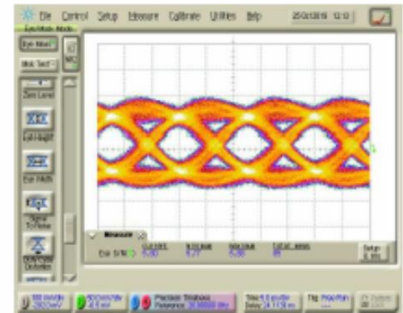
# Typical Applications

## Compensation of a 30 GHz Bessel Filter at 80 Gbit/s
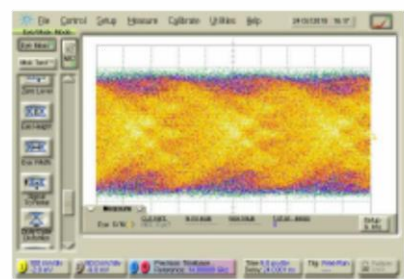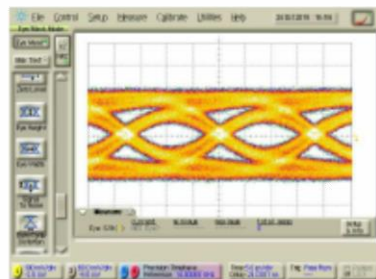


Before equalization
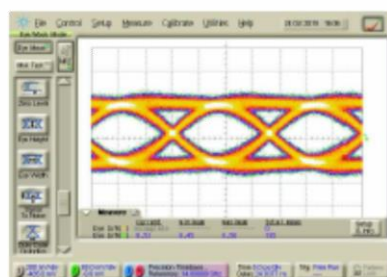S/N: 3.3

Optimized for 15 dB loss
S/N: 5.1

Optimized for 15 dB loss
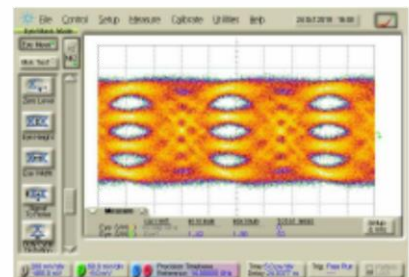S/N: 5.8

## Compensation of 2.8 m TCF280 cable at 56 GBaud
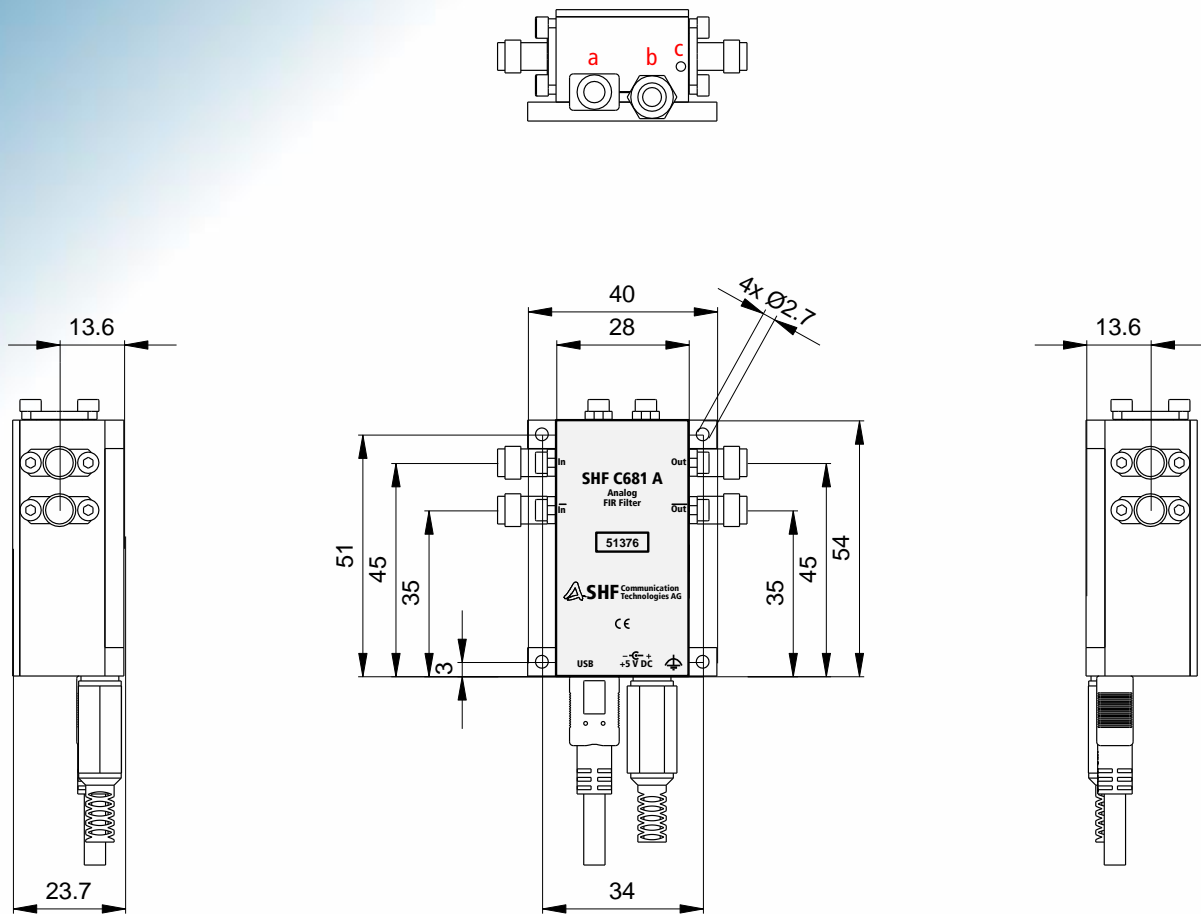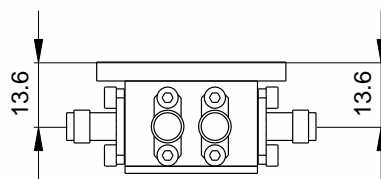
Before equalization



Optimized



NRZ

PAM4

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# Outline Drawing – Module



| Port | Connector |
|------|-----------|
| In | 1.85mm (V) female |
| $\overline{\text{In}}$ | 1.85mm (V) female |
| Out | 1.85mm (V) female |
| $\overline{\text{Out}}$ | 1.85mm (V) female |

All dimensions are in mm

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

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