SHF Communication Technologies AG

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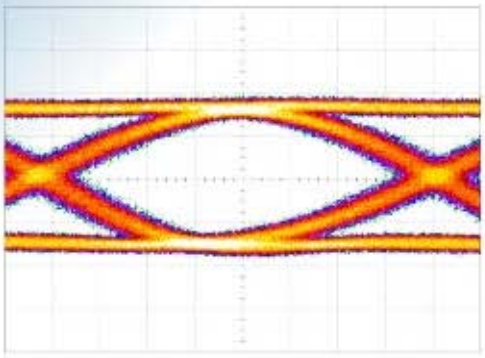
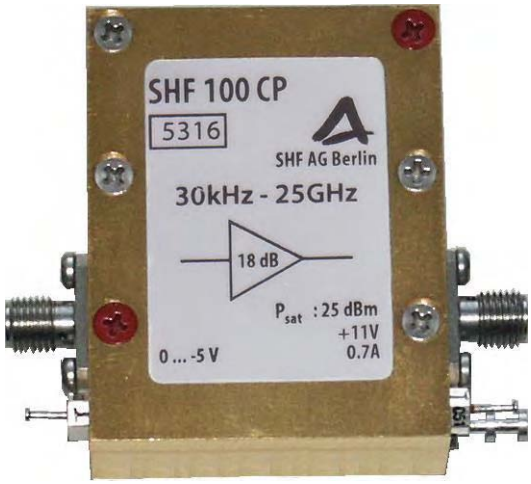


Datasheet

SHF 100 CP

Broadband Amplifier

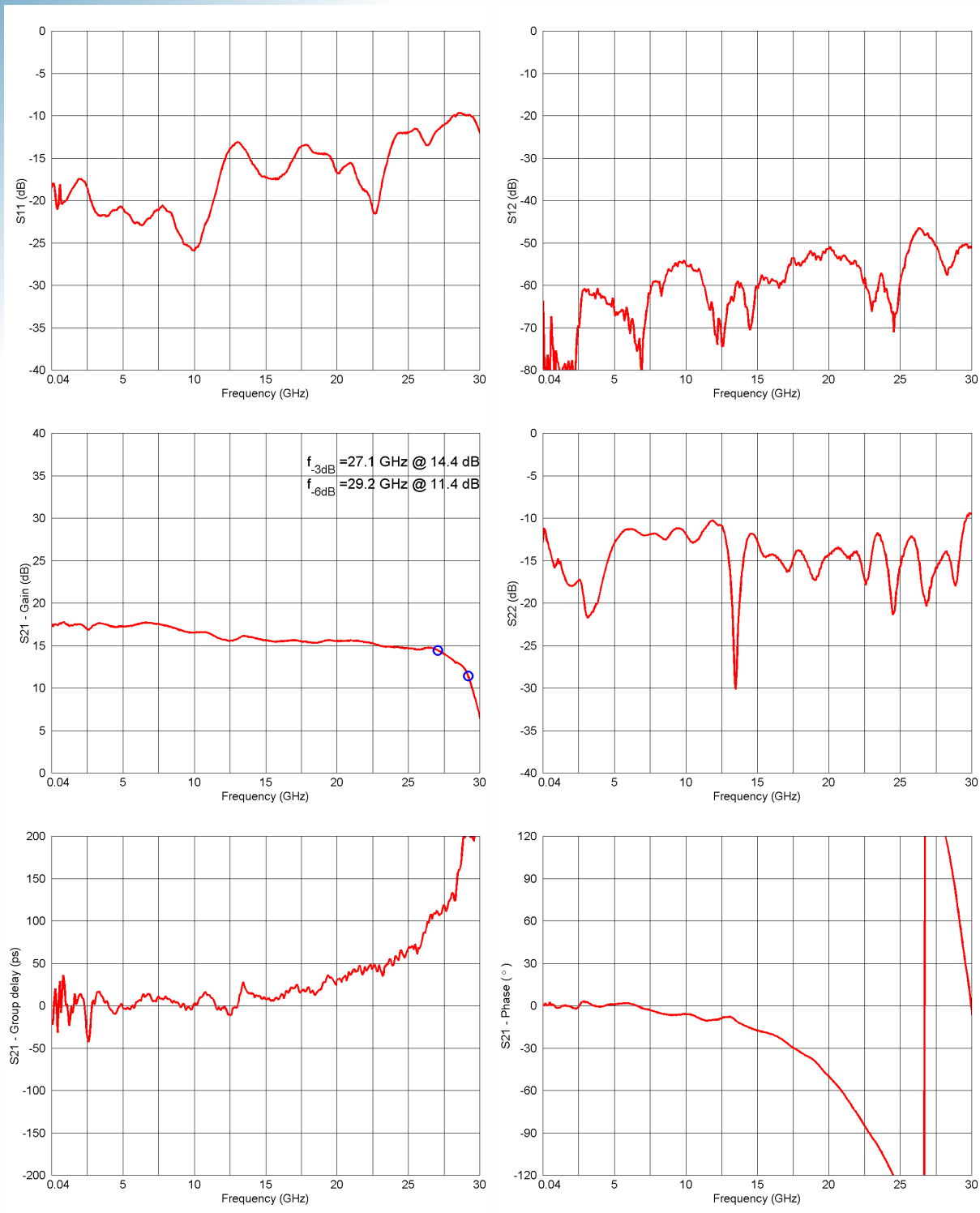


Specifications – SHF 100 CP

Parameter	Symbol	Unit	Min	Typ	Max	Conditions
High frequency 3 dB point	f_{HIGH}	GHz	25	29		
Low frequency 3 dB point	f_{LOW}	kHz		20	30	
Gain	G_p	dB	17	18	19	inverting
Output voltage adjust Voltage Current	 V_{gc} I_{gc}	 V mA	 0 0		 -5 -10	reduces gain by up to 3 dB / reduces output voltage by 2V
Temperature coefficient	T_c	dB/°C		-0.05		
Noise figure	N_F	dB		6		at 5 GHz
Group delay		ps		±50		>3GHz <20GHz, 100MHz aperture
Gain ripple		dB		±1	±1.5	
Output power at 1 dB compression	P_{01dB}	dBm (V)	25 (11.2) 23 (8.9)	26 (12.6) 24 (10.0)		<10 GHz <20 GHz
Output power at saturation	P_{sat}	dBm (V)	25.5 (12) 24 (10)	26.5 (13.3) 25 (11.2)		<10 GHz <20 GHz
Input return loss	S_{11}	dB			-15 -10	>40 MHz <10 GHz >10 GHz <18 GHz
Output return loss	S_{22}	dB			-10	>40 MHz <18 GHz
Maximum input power		dBm			10 10	in operation without power supply
Rise time/fall time	t_r/t_f	ps			19	20%...80%
Supply voltage		V	11		15	0.65 A, reverse voltage protected
Power consumption		W	7.15			using 11 V supply voltage
Input connector						SMA female
Output connector						SMA female
Dimensions		mm				51x40x16 excluding connectors

The SHF 100 CP is a three stage amplifier design using special monolithic microwave integrated circuits (MMICs) inside special carriers to achieve ultra wide bandwidth and low noise performance. The custom made MMIC carrier is optimized for good input return loss between its interior and the 50 Ohm outside hybrid technology. The computer optimized broadband circuit is specially tuned for minimum pass band ripple. A voltage regulator IC makes the amplifier insensitive to reverse voltage and line ripple.

S-Parameters, group delay and phase response at maximum gain



Aperture of group delay measurement: 100MHz

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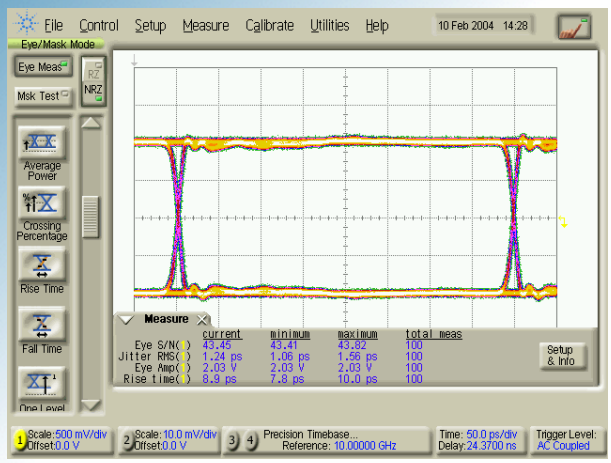
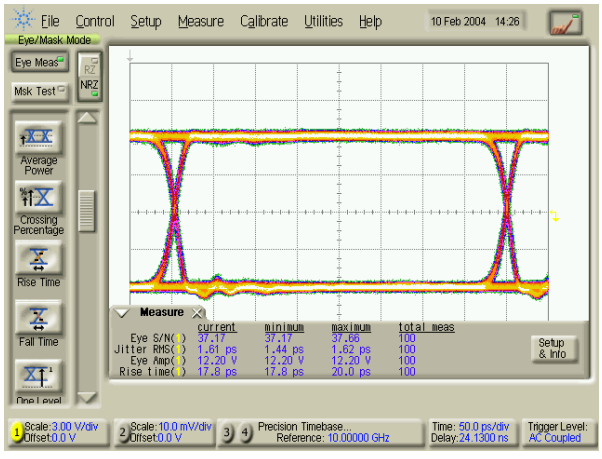
Eye Diagrams at 2.5 Gbps

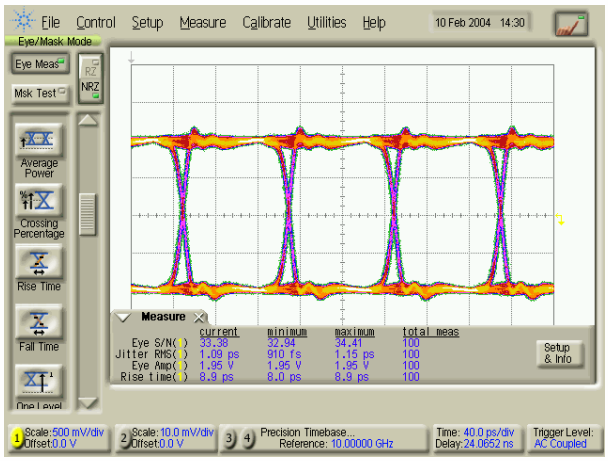


Input signal amplitude: 2.0 V

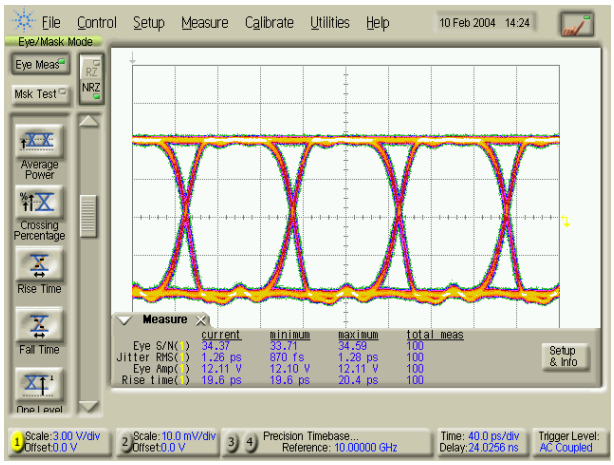


Output signal amplitude: 12.2 V

Eye Diagrams at 10 Gbps

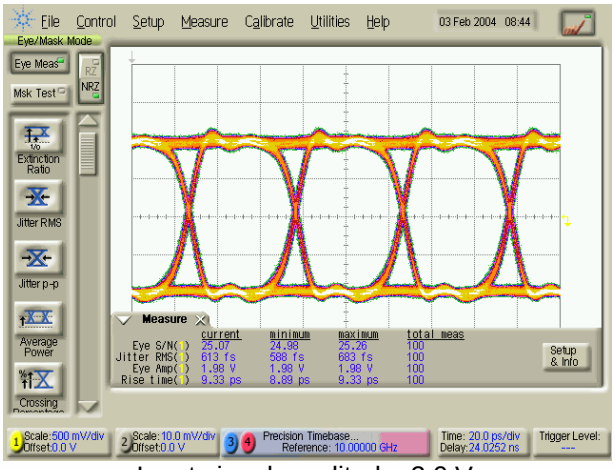


Input signal amplitude: 1.9 V

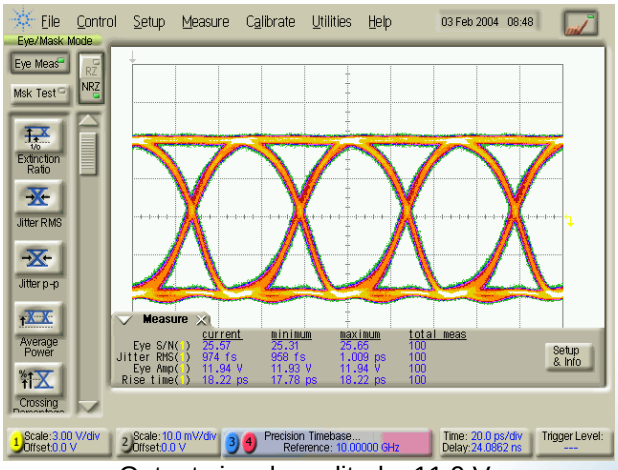


Output signal amplitude: 12.1 V

Eye diagrams at 20 Gbps



Input signal amplitude: 2.0 V



Output signal amplitude: 11.9 V

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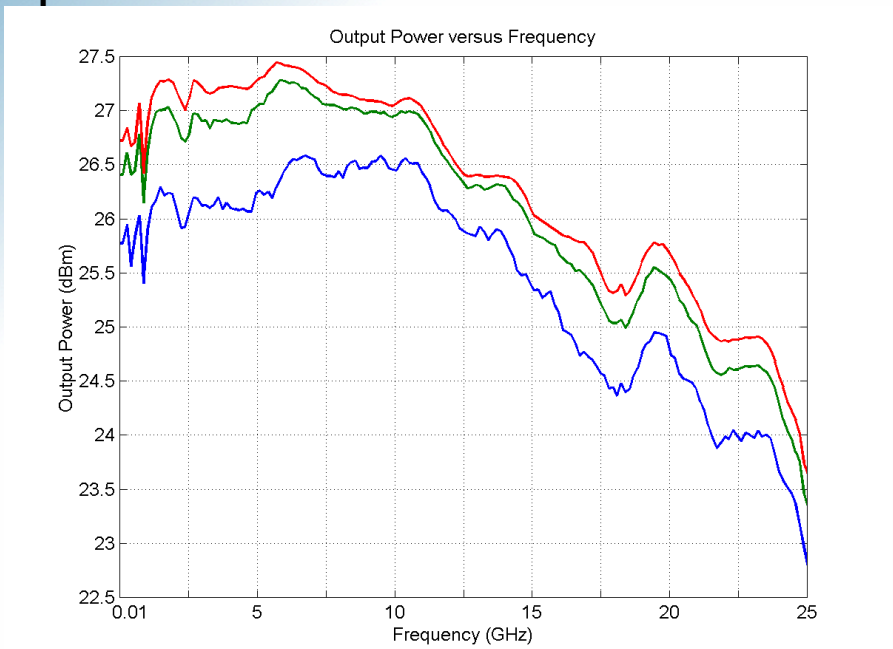
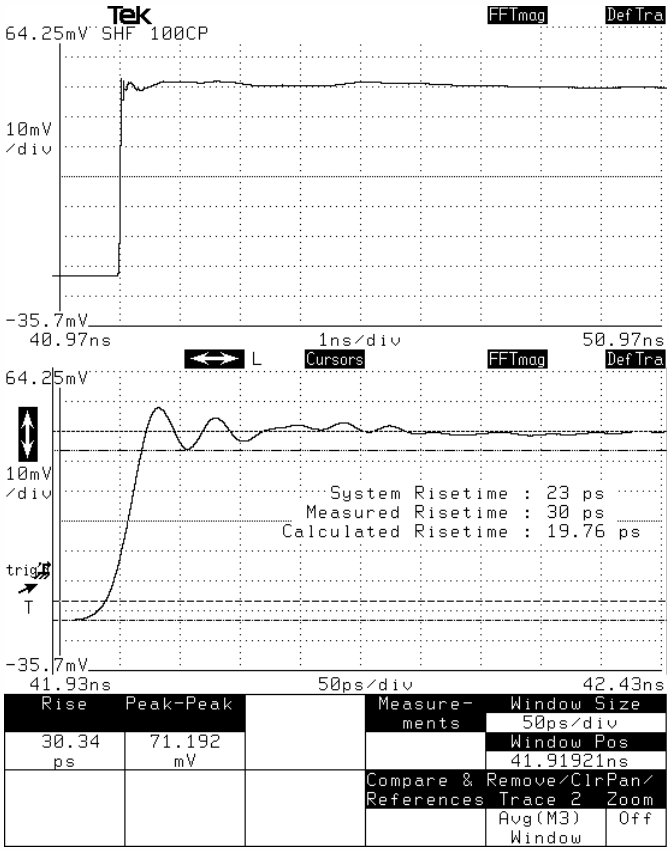
Saturation power



Top (red) : 3 dB compression; Middle (green) : 2 dB compression; Bottom (blue) : 1 dB compression

Step response



system rise time measured as 23 ps, giving a deconvoluted amplifier rise time of 19.8 ps.

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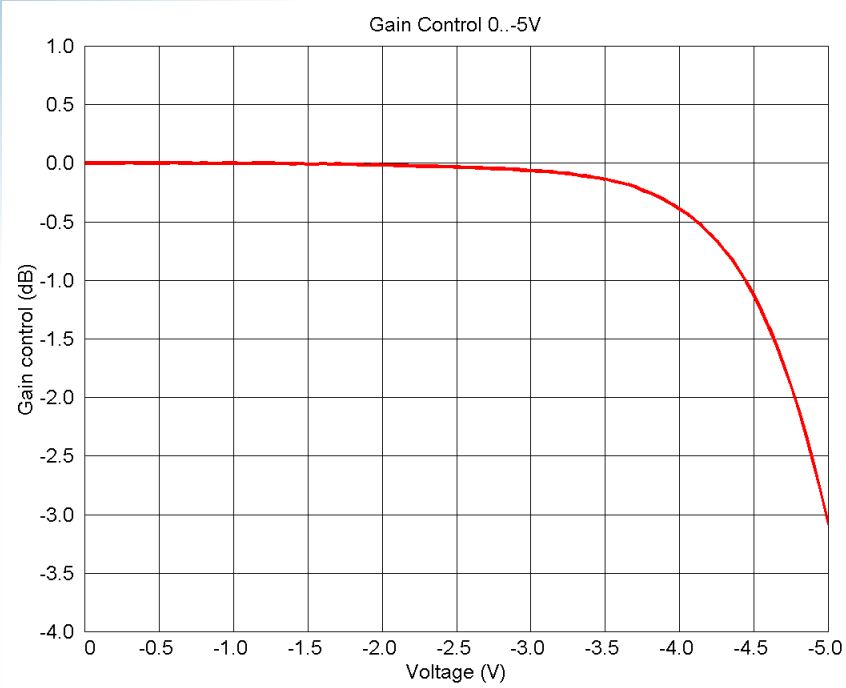
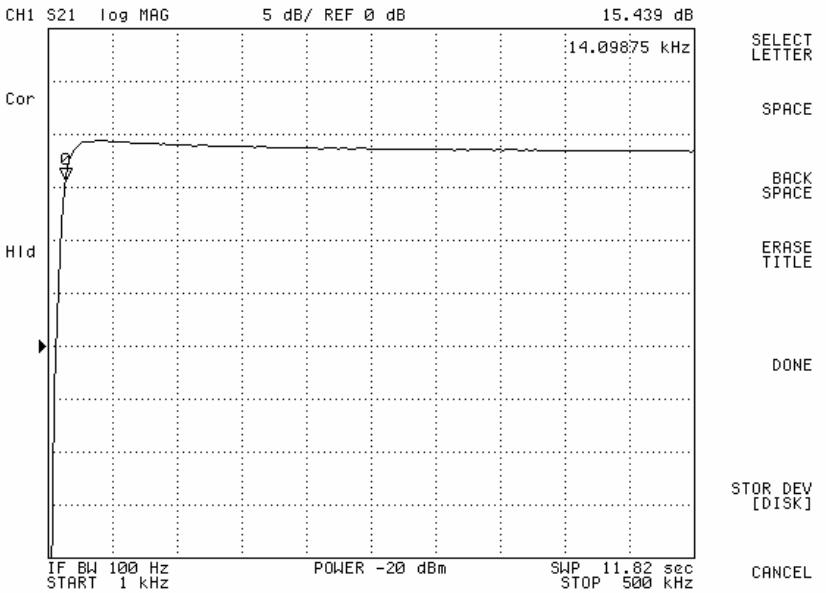
Gain reduction



All SHF amplifiers have a feature which allows the output gain to be reduced by up to approximately 3 dB by applying a negative voltage to the gain reduction pin.

Low frequency response (<500 kHz)



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Available Options

01: DC return on input (max. ±1.75 V, max. 35 mA)

02: Built-in bias tee on input (max. ±12 V, max. 220 mA)

03: DC return on output (max. ±1.75 V, max. 35 mA)

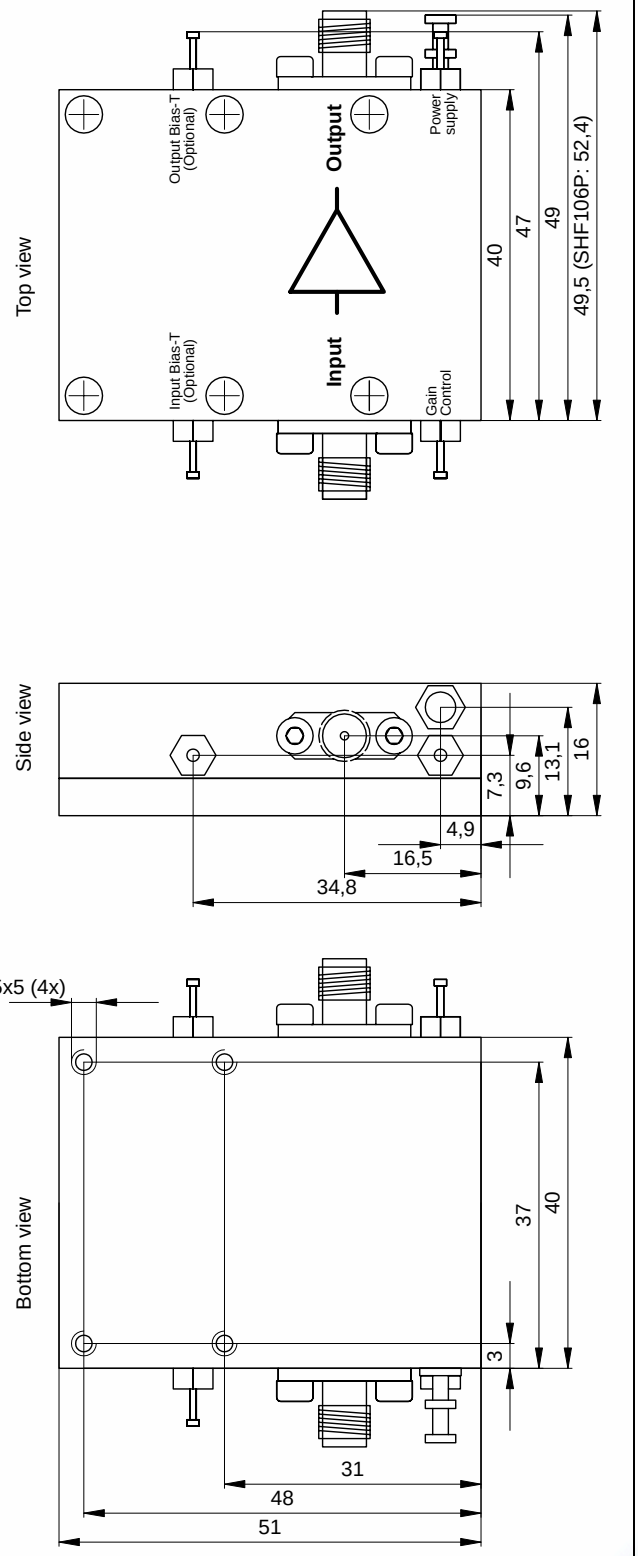
04: Built-in bias tee on output (max. ±12 V, max. 220 mA)

MT: Special tuning available to optimize performance with E/O modulators
Positive gain slope of up to +3 dB possible

MP: Matches the phase of two amplifiers

The following options cannot be combined:
01 and 02
03 and 04
02 and 04

For other configurations please contact us.



The amplifier is supplied with a heatsink (not shown) with a thermal resistance of 1.5K/W. For permanent mounting, the heatsink can be removed. Adequate cooling must be ensured.

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User Instructions

ATTENTION !

Electrostatic sensitive GaAs FET amplifier

1. To prevent damage through static charge build up, cables should be always discharged before connecting them to the amplifier!
2. Attach a 50 Ohm output load **before** supplying DC power to the amplifier!
3. The supply voltage can be taken from any regular 11…15 V, 1 A DC power supply and can be connected to the supply feed-through filter via an ON / OFF switch.
4. The minimum supply voltage is 11 V. A higher one increases the power dissipation of the internal voltage stabilizer.
5. Using a 3 dB or 6 dB input attenuator will result in a 6 dB or 12 dB increase of the input return loss.
6. An input signal of about 1.8 V_{pp} equivalent to 9 dBm will produce saturated output swing of 12.6V_{pp}.
7. Higher input voltages will drive the amplifier's output stage into saturation, leading to waveform peak clipping.
8. Saturated output voltages can only be used between 10 MHz and 40 GHz without damage while the amplifier is connected to a 50 Ohm precision load with a VSWR of less than 1.2 or better than 20 dB return loss up to 26 GHz.
9. While using a reflective load the output voltage has to be reduced to a safe operating level below 6.5 V_{pp} according to the magnitudes of the reflections.

   ATTENTION: At frequencies up to 20 GHz a capacitive load can be trans-formed to an inductive one through transmission lines! With an output stage driven into saturation this may lead to the immediate destruction of the amplifier (within a few ps)!
10. The input voltage should never be greater than 2 V_{pp} equivalent to 10 dBm input power.

    The input voltage without DC power supplied to the amplifier should never be greater than 2 V_{pp} equivalent to 10 dBm input power.
11. Hint: Pulse shape tuning of the amplifier has been performed after warm up at about 35°C case temperature. Slightly more over and undershoot will be present at low temperature!