

SHF Communication Technologies AG

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# Datasheet SHF 58214 A Multi-Channel Amplifier Plug-In







The SHF 58214 A is a two or four channel plug-in intended to amplify the output signal from the 33G outputs channels of a SHF 12104 A Bit Pattern Generator.

This plug-in module is part of the SHF modular measurement series and needs to be installed in a mainframe. In case the plug-in is fitted into a right hand mainframe slot on top of the BPG it can be connected by short jumper cables (part of the delivery) from the BPGs data ports to the input ports of the amplifier.

### Features

- All settings are computer controlled and adjustable via the BCC (BERT Control Center) software package
- Adjustable output voltage
- Adjustable crossing

## Configurations

- Option 2C: Two channels (amplifiers) in one plug-in
- Option 4C: Four channels (amplifiers) in one plug-in





### **Data Output Specification**

All specifications below are only applicable if the SHF 58214 A is driven by and delivered together with a SHF 12104 A in configuration Dual 33, Quad 33 or Oct 33. Existing SHF 12104 A Bit Pattern Generators might need to be sent back to SHF for recalibration in order to achieve the below stated minimum output level.

| Parameter            | Symbol                         | Unit | Min.       | Тур. | Max.       | Comment  |
|----------------------|--------------------------------|------|------------|------|------------|--|
| Minimum Bit Rate     |                                | Gbps |            | 2    | 3          |  |
| Maximum Bit Rate     |                                | Gbps | 33         | 34   |            |  |
| Maximum Output Level | V <sub>out max</sub>           | V    | 6.0<br>5.5 |      | 6.5        | Adjustable via BCC<br>@ 50% Crossing, Eye Amplitude<br>Eye Amplitude |
| Minimum Output Level | V <sub>out min</sub>           | V    | 2.5        |      | 3.0        | Adjustable via BCC<br>Eye Amplitude                                  |
| Jitter (RMS)         | J <sub>RMS</sub>               | fs   |            | 600  | 700<br>800 | on scope display <sup>1</sup><br>@ 50% Crossing                      |
| Rise/Fall Time       | t <sub>r</sub> /t <sub>f</sub> | ps   |            | 12   | 14         | 20%80%<br>on scope display <sup>1</sup>                              |
| Minimum Crossing     |                                | %    |            |      | 40<br>30   | Adjustable via BCC<br>< 3 V Eye Amplitude<br>≥ 3 V Eye Amplitude     |
| Maximum Crossing     |                                | %    | 60<br>75   |      |            | Adjustable via BCC<br>< 3 V Eye Amplitude<br>≥ 3 V Eye Amplitude     |
| Connector Type       |                                | Ω    |            | 50   |            | 2.92 mm (K) female   |

<sup>1</sup> Measured with Agilent 86100A with 70 GHz sampling head and precision time base triggered by Clk or Clk/2 output, using PRBS 2<sup>31</sup>-1

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## **General Plug-In Specifications**

| Parameter                           | Symbol              | Unit     | Min | Тур       | Max    | Conditions  |
|-------------------------------------|---------------------|----------|-----|-----------|--------|---|
| Max. RF Input Power                 | P <sub>in max</sub> | dBm<br>V |     |           | 4<br>1 | Peak to peak voltage                                  |
| High Frequency 3 dB Point           | f <sub>HIGH</sub>   | GHz      | 30  | 35        |        |   |
| Low Frequency 3 dB Point            | f <sub>LOW</sub>    | kHz      | 80  |           |        |   |
| Gain                                | S <sub>21</sub>     | dB       | 23  | 24        | 25     | Non-inverting<br>Measured at P <sub>in</sub> =-27 dBm |
| Output Power at 1 dB<br>Compression | P <sub>01dB</sub>   | dBm<br>V |     | 15<br>3.6 |        | 10 MHz15 GHz<br>Peak to peak voltage                  |
| Output Power at 2 dB<br>Compression | P <sub>02dB</sub>   | dBm<br>V |     | 18<br>5   |        | 10 MHz15 GHz<br>Peak to peak voltage                  |
| Output Power at 3 dB<br>Compression | P <sub>03dB</sub>   | dBm<br>V |     | 20<br>6.3 |        | 10 MHz15 GHz<br>Peak to peak voltage                  |
| Input Return Loss                   | S <sub>11</sub>     | dB       |     | -10       | - 9    | < 30 GHz  |
| Output Return Loss                  | S <sub>22</sub>     | dB       |     | -12       | -10    | < 30 GHz  |

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### 28 Gbps Data Output Signals

All measurements had been performed by using a SHF 12104 A Bit Pattern Generator in Config Quad 33, an Agilent 86100D DCA with Precision Time Base Module (86107A) and a 70 GHz Sampling Head (86118A) directly connected to the output of the SHF 58214 A.



Eye Amplitude: 6 V, Crossing: 30 %



Eye Amplitude: 4 V, Crossing: 30 %



Eye Amplitude: 3 V, Crossing: 30 %



Eye Amplitude: 6 V, Crossing: 50 %



Eye Amplitude: 4 V, Crossing: 50 %



Eye Amplitude: 3 V, Crossing: 50 %



Eye Amplitude: 6 V, Crossing: 75 %



Eye Amplitude: 4 V, Crossing: 75 %



Eye Amplitude: 3 V, Crossing: 75 %

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#### 32 Gbps Data Output Signals

All measurements had been performed by using a SHF 12104 A Bit Pattern Generator in Config Quad 33, an Agilent 86100D DCA with Precision Time Base Module (86107A) and a 70 GHz Sampling Head (86118A) directly connected to the output of the SHF 58214 A.



Eye Amplitude: 6 V, Crossing: 30 %



Eye Amplitude: 4 V, Crossing: 30 %



Eye Amplitude: 3 V, Crossing: 30 %



Eye Amplitude: 6 V, Crossing: 50 %



Eye Amplitude: 4 V, Crossing: 50 %



Eye Amplitude: 3 V, Crossing: 50 %



Eye Amplitude: 5.8 V, Crossing: 75 %



Eye Amplitude: 4 V, Crossing: 75 %



Eye Amplitude: 3 V, Crossing: 75 %

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### **Driving an EA Modulator**

Current electro-absorption modulators require a drive voltage of  $\leq$  3V with an adjustable crossing up to 75 %. For this application it is recommended to attach an external 6 dB coaxial attenuator to the output of the SHF 58214 A multi-channel amplifier plug-in. This will change the following specifications.

By selecting an attenuator in the control software, it will calibrate the voltage reading to the attenuator's output.

| Parameter            | Symbol               | Unit | Min.        | Тур. | Max.     | Comment  |
|----------------------|----------------------|------|-------------|------|----------|--|
| Maximum Output Level | V <sub>out max</sub> | V    | 3.0<br>2.75 |      | 3.25     | Adjustable via BCC<br>@ 50% Crossing, Eye Amplitude<br>Eye Amplitude |
| Minimum Output Level | V <sub>out min</sub> | V    | 1.25        |      | 1.5      | Adjustable via BCC<br>Eye Amplitude                                  |
| Minimum Crossing     |                      | %    |             |      | 40<br>30 | Adjustable via BCC<br>< 1.5 V Eye Amplitude<br>≥ 1.5 V Eye Amplitude |
| Maximum Crossing     |                      | %    | 60<br>75    |      |          | Adjustable via BCC<br>< 1.5 V Eye Amplitude<br>≥ 1.5 V Eye Amplitude |

#### 28 Gbps Data Output Signals with 6 dB attenuator

The following results had been measured by using a SHF 12104 A Bit Pattern Generator in Config Quad 33, an Agilent 86100D DCA with Precision Time Base Module (86107A) and a 70 GHz Sampling Head (86118A) connected to the output of the SHF 58214 A via an external 6 dB attenuator.



Eye Amplitude: 3 V, Crossing: 30 %





Eye Amplitude: 3 V, Crossing: 50 %





Eye Amplitude: 3 V, Crossing: 75 %



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Eye Amplitude: 2 V, Crossing: 50 %

