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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



SiT6098EBB Evaluation Board User Manual for 1 Hz - 32 kHz Oscillator and TCXO in CSP: SiT1532/4, SiT1552

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This evaluation board supports the following products.

SiT1532: 32.768 kHz oscillator in 1.5 x 0.8 mm CSP package

SiT1534: 1 Hz to 32.768 kHz oscillator in 1.5 x 0.8 mm CSP package

SiT1552: 32.768 kHz TCXO in 1.5 x 0.8 mm CSP package

1 SiT6098EBB Evaluation Board Introduction

The SiT6098EBB evaluation board provides the ability to evaluate the functionality of the 32 kHz oscillators on a simple board that makes it easy to power up the oscillator and observe the output buffered through an operational amplifier. The analog buffer isolates the device from the significant loading, which is important for performing best waveform and current measurements.

The SiT6098EBB supports the following package size: 1.5 x 0.8 mm CSP

2 Board Information

A PCB view of the SiT6098EBB board with component reference designator call out is shown in [Figure A2](#) (SiT6098EBB layout).

3 Connectors

Overview:

Designator	Purpose
J2	DUT Power
J3	Buffer Power
J1	Buffer output
J6	Direct output
J4	DUT Consumption Current measurement

Mating connectors:

Designator	Mating connectors (Digi-Key Part Numbers)
J2	WM2613-ND
J3	WM2626-ND
J4	WM2613-ND
Crimps for J2, J3, J4	WM6685CT-ND, 7pcs
J6	H2011-ND
Crimps for J6	H9999-ND, 2pcs
J1	A97594-ND

Pin-1 orientation of the chip is defined by a chamfer and dot in the silkscreen pattern.

3.1 DUT Power

Evaluation boards have input two-pin connector J2 for power supply. Pins polarities are identified on the silkscreen pattern near connector.

3.2 Buffered Clock Output

This EVB uses an operational amplifier to buffer the oscillator clock output to make it easy to connect to test and measurement equipment through SMA cables without loading the ultra-low power clock output driver. The ADA4817-1 FET operational amplifier is used in a unity gain buffer configuration. It is a unity-gain stable, ultra-high speed, voltage feedback amplifier with FET inputs.

The three-pin connector J3 is intended for supplying the VDD power to the on-board operational amplifier. Pin polarities are identified on the silkscreen pattern near connector J3. The operational amplifier requires a dual power supply and should be -3V for negative power rail (V-) and +8V for the positive supply (V+).

Buffer supply voltage:

Power rail name	Voltage
V+	+8V (max)
V-	-3V (min)

3.3 Clock Output (Direct)

The oscillator output is best observed through the buffered output path, using a test probe placed on the test point TP2 or through the SMA connector J1. The buffer can be bypassed and the output can be directly observed thru J6 2mm pitch pin header connector or using test point TP1 (see Figures A2-A3 of Appendix A for test points arrangement on the board). Section 4.1 shows recommended measurement configurations. When probing the oscillator output directly, the probe loading can affect the output waveform and power consumption of the device. SiTime recommends active probes with 10 M Ω and 1pF impedance.

3.4 DUT Current Consumption Measurement

Two-pin connector J4 enables measuring the current consumption. To measure the current properly, remove zero-ohm resistor R3, and connect the DMM or other current measuring device across this connector.

4 Application Notes

4.1 Configurations

SiT6098EBB supports multiple configurations for evaluating AC and DC coupled output modes of SiTime oscillator. In addition, this EVB provides the ability to add additional load capacitance and to bypass the output buffer. Figure A1 (see Appendix A) shows the schematic of SiT6098EBB. Components labeled “DNP” are not assembled. Components which are common to all listed below configurations have nominal values assigned to them.

4.2 General Configuration

Figure 1 shows general shipment configuration.

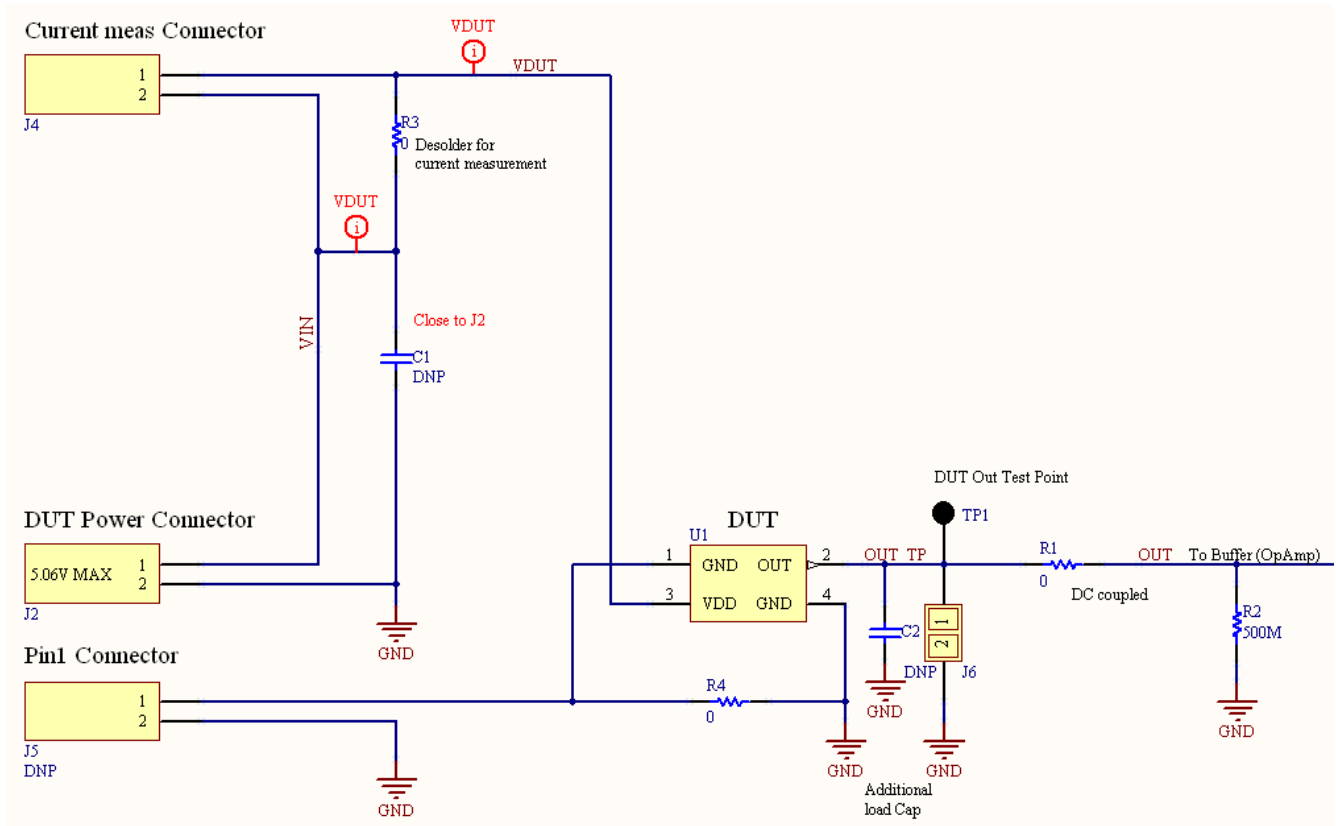


Figure 1: General EVB configuration

4.2.1 Configuration 1: DC-Coupled Output

This configuration is intended for observing a DC coupled output through an oscilloscope through the buffered output at SMA (J1) connector or test point (TP2) (see Figures A1-A2 of Appendix A for test point locations on the board). Figure 2 shows the circuit for this configuration.

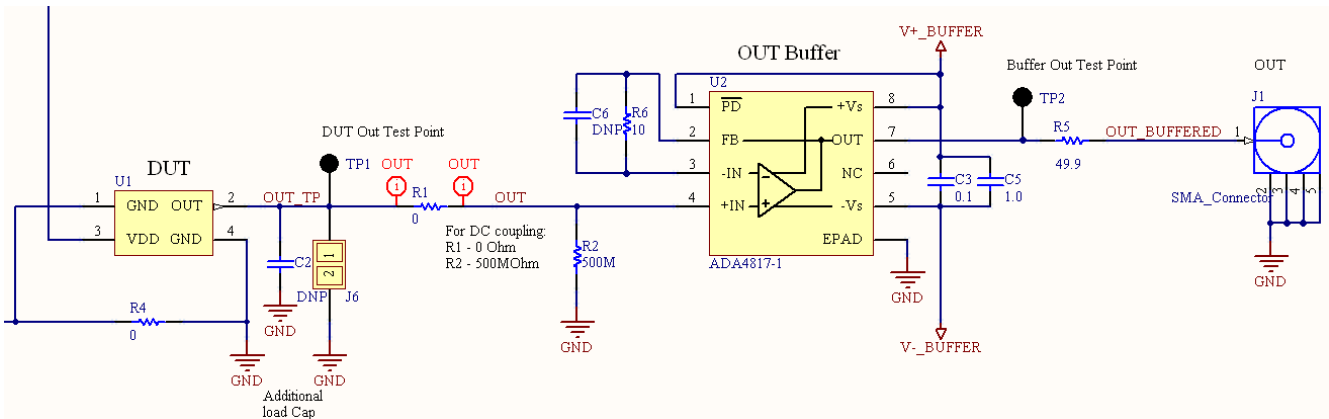


Figure 2: DC-coupled output configuration

4.2.2 Configuration 2: AC-Coupled Output

This configuration is intended for observing an AC-coupled output through an oscilloscope through the buffered output at SMA (J1) connector or Buffer output test point (TP2) (see Figures A1-A2 of Appendix A for test point locations on the board). A 0.1 μF capacitor is placed in the clock output signal path. Figure 3 shows the circuit for this configuration.

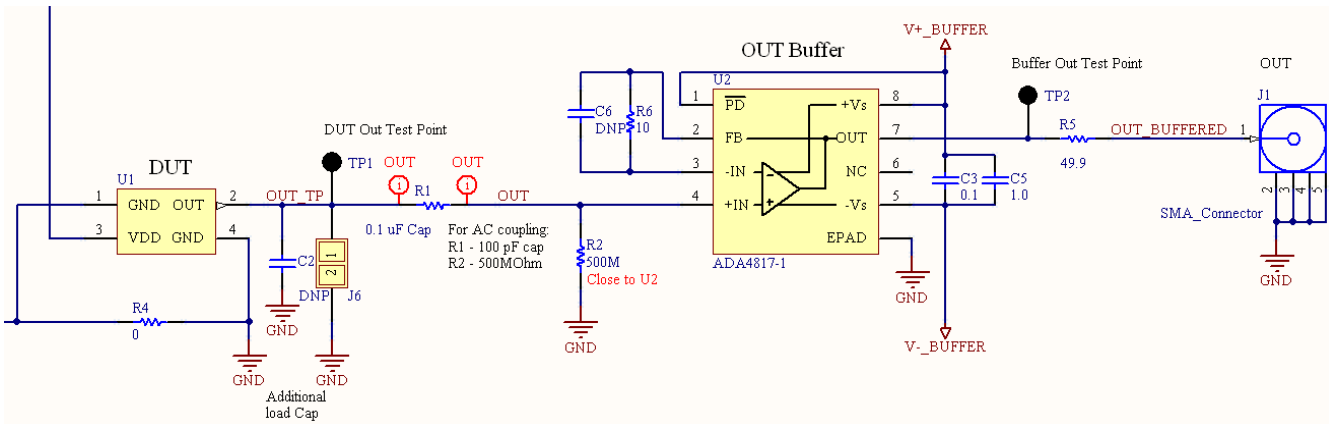


Figure 3: AC-coupled output configuration

4.2.3 Configuration 4: Direct Output with Additional Load Capacitor

This configuration is intended for observing direct oscillator output with a passive high input impedance (> 1 MΩ || < 1 pf) scope probe at test point TP1 (see Figures A1-A2 of Appendix A for test points on the board) or to connect the oscillator output to end user system using 2 mm pitch header connector J6 with an optional user defined load capacitor C2. Figure 4 shows the circuit for this configuration.

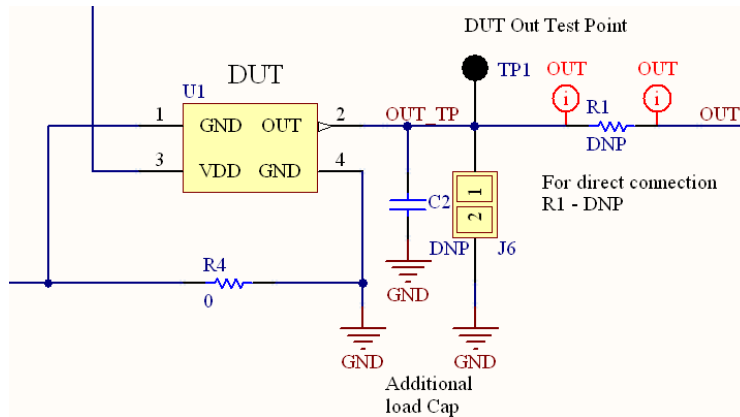


Figure 4: Circuit for observing direct oscillator output

4.2.4 Configuration 5: DUT Power Supply Filter

This configuration is intended for providing power-supply bypass filtering for the oscillator by soldering user-defined capacitor C1. Figure 5 shows circuit for this configuration. The DUT power-supply bypass filtering is not required in common cases. It should be used only if power supply noise is significant or to cancel parasitic inductance effect of long wires from the power supply to EVB.

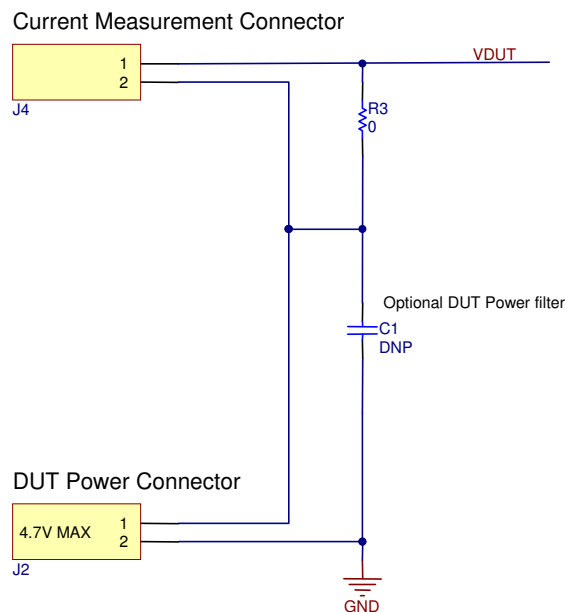


Figure 5: Circuit for providing DUT power filter

4.2.5 Measuring Current Consumption

When measuring supply current, simply remove jumper resistor R3 across 2-pin connector J4. Figure 6 shows circuit for this configuration and connect a precision DMM e.g. Agilent U1242A to connector J4. Figure 7 shows the setup for measuring supply current.

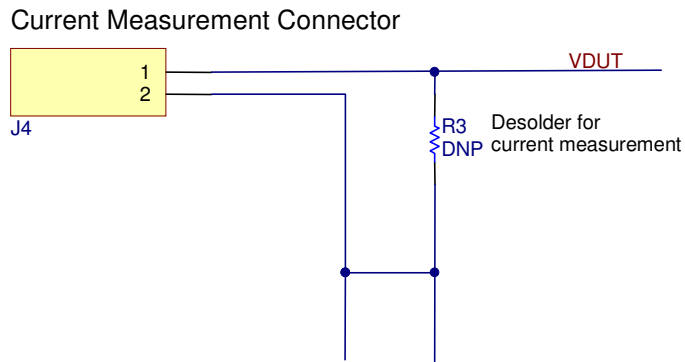


Figure 6: DUT supply current measurement

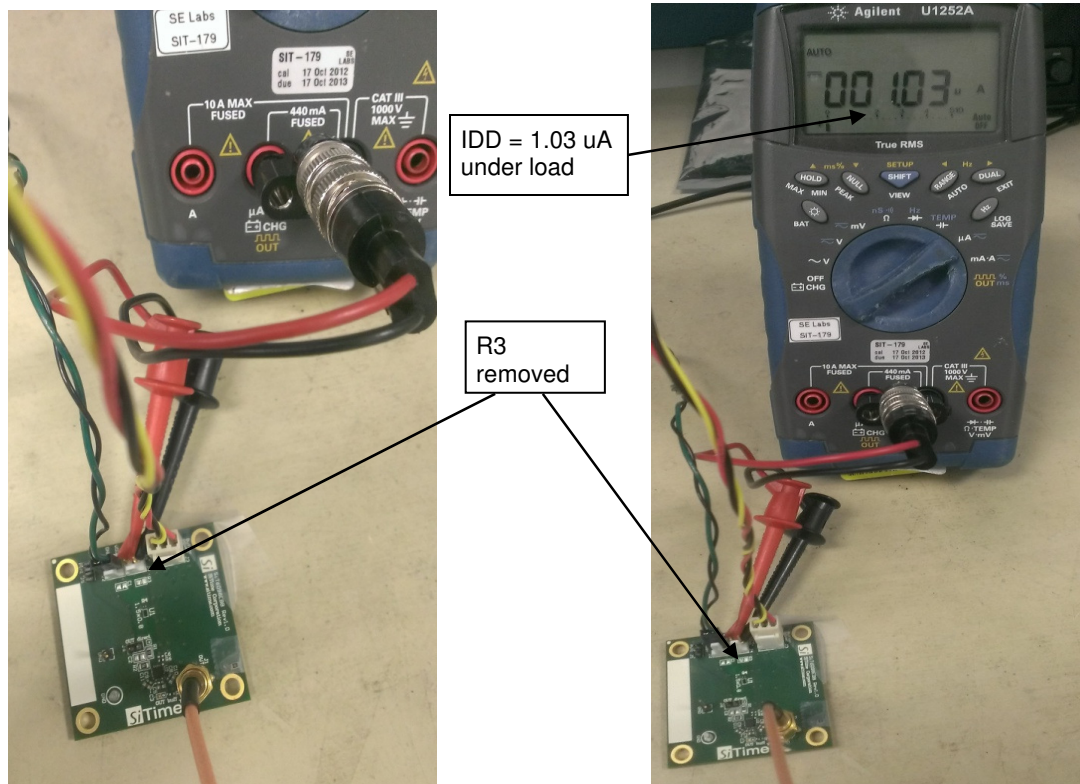


Figure 7: Setup for measuring IDD

Appendix A

A1: Board Schematic

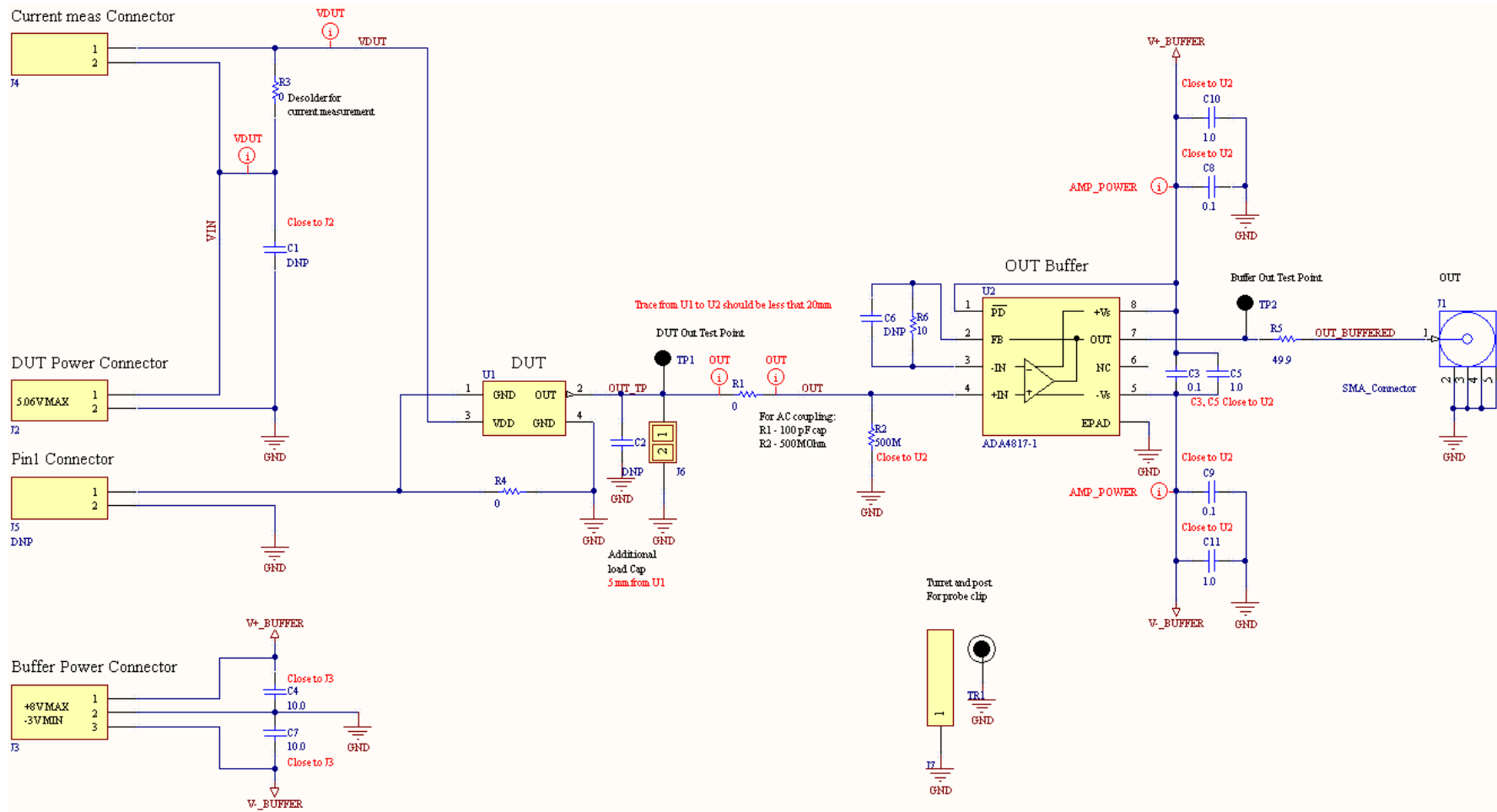


Figure A1: SiT6098EBB schematic

A2: Board Layout

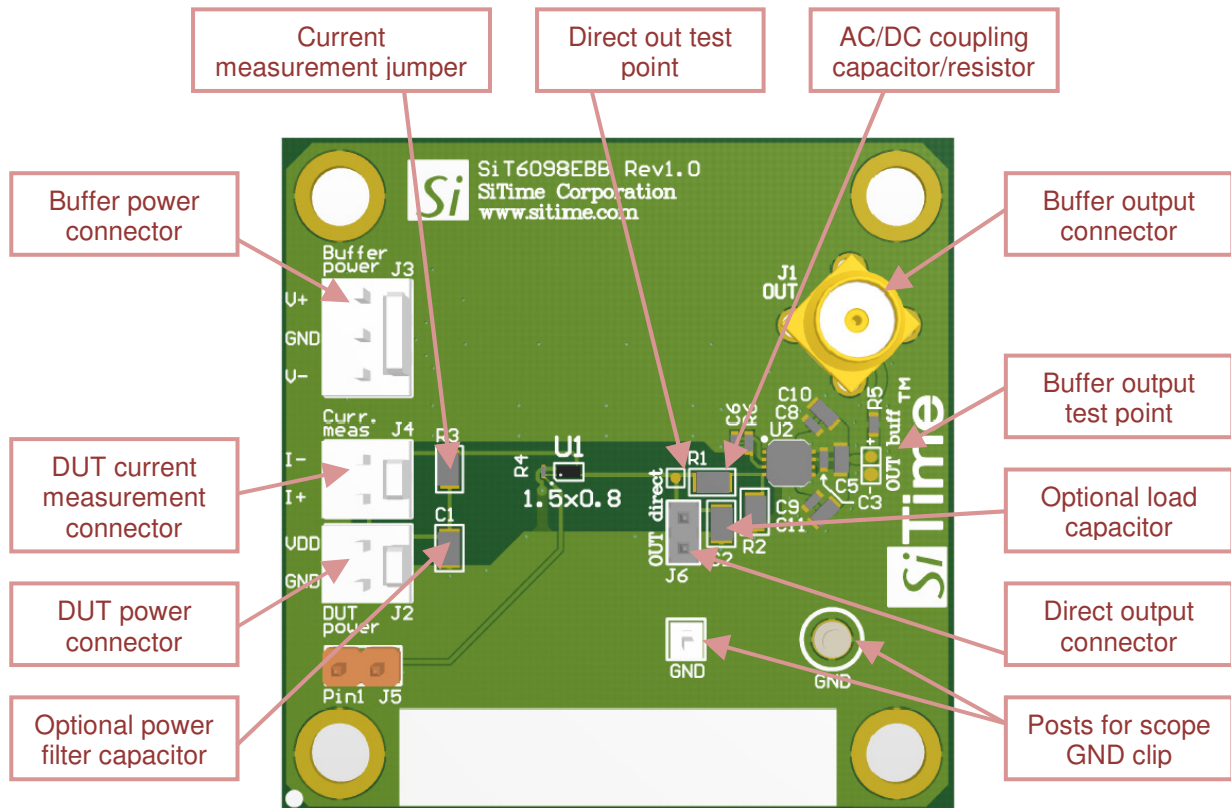


Figure A2: SiT6098EBB layout

SiTime Corporation
 990 Almanor Avenue
 Sunnyvale, CA 94085, USA
 Phone: 408-328-4400
<http://www.sitime.com>

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