
Discera Evaluation Kit for DSC10XX Products
User Manual
MK-Q-E-P-3-060110-01-1



discera



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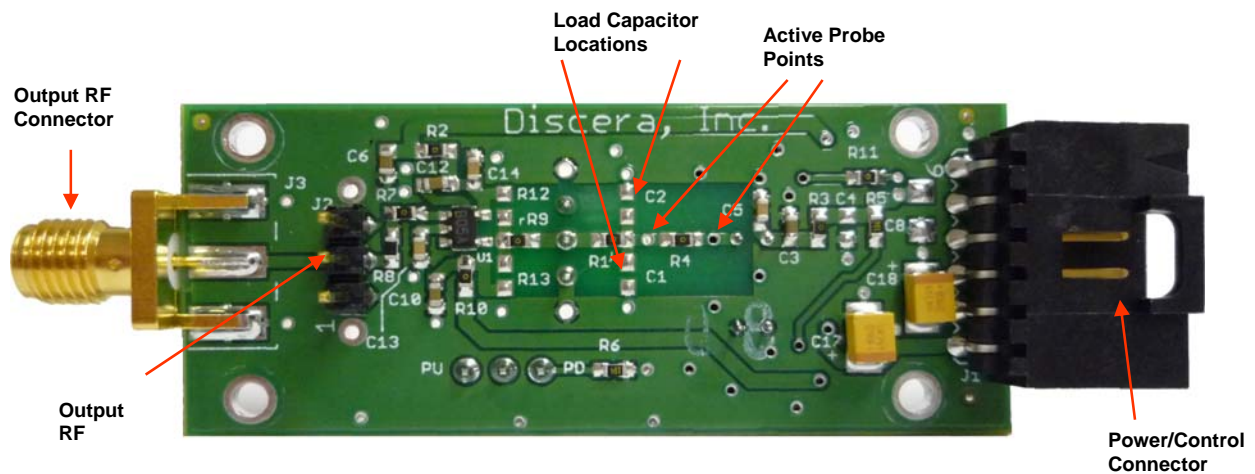
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General

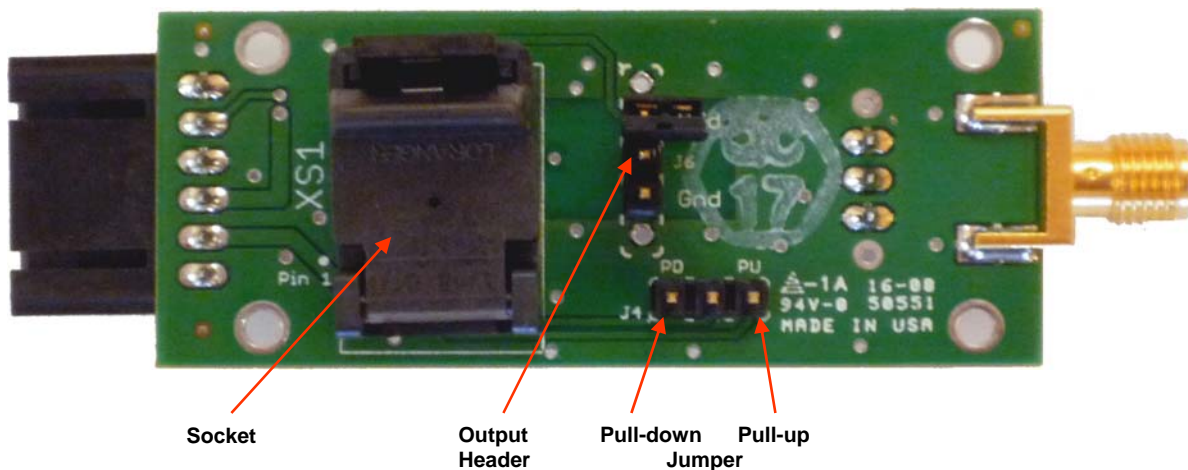
This document describes the Discera MEMS oscillator evaluation platform. Although this document provides some information on the MEMS oscillator device itself, information that is more complete is found in the datasheets. Please refer to the datasheet as well as this user's manual when evaluating the Discera MEMS oscillator.

Description of the Evaluation Platform

The Discera evaluation platform is shown below. It is rated across the full industrial temperature range of -40°C to $+85^{\circ}\text{C}$.



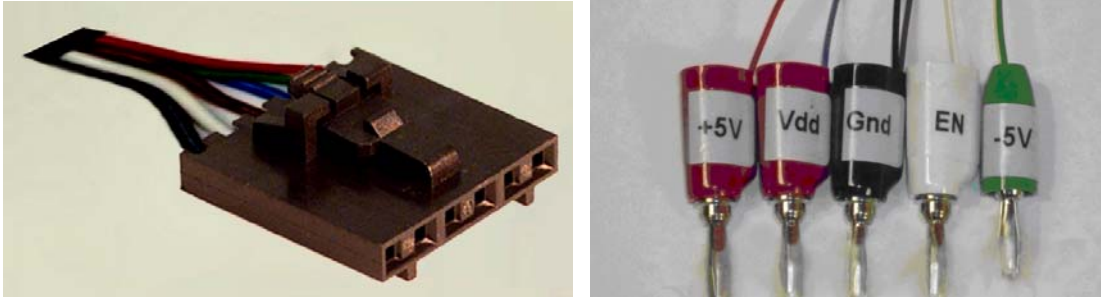
Evaluation Platform: Component Side



Evaluation Platform: Socket Side

Power and Control Cable

The power and control cable consists of three DC supply voltages (VDD, +5v, -5v) and the oscillator enable/disable input signal.



Power & Control Cable

The power / control cable has labeled banana plugs for simple interface to standard laboratory power supplies. Connections should be made as follows:

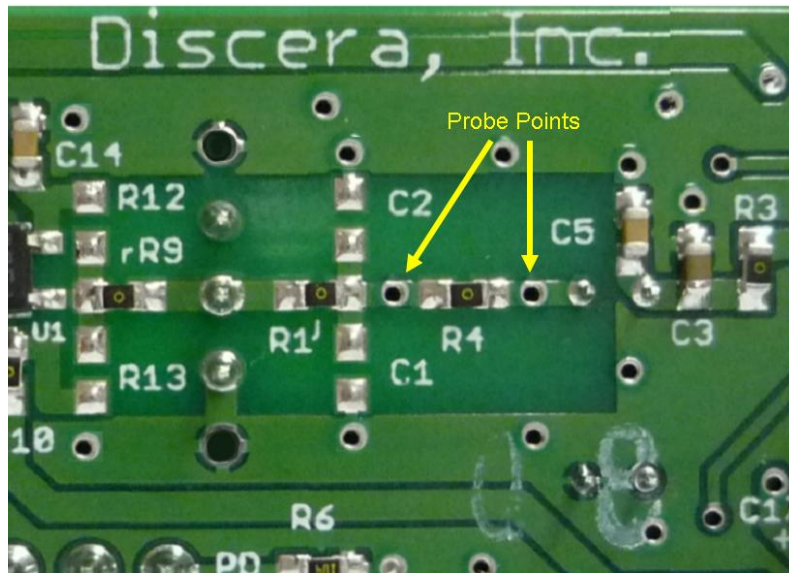
- VDD: MEMS Oscillator Power (1.8v to 3.3v)
- +5v: Analog Buffer Positive supply voltage
- 5v: Analog Buffer Negative supply voltage
- GND: Common Ground
- EN: Standby signal to MEMS Oscillator

Standby Control

The banana plug labeled “EN” is used to enable or disable the oscillator. If the enable/disable signal is not connected to an external supply, an on-board jumper is provided to tie the enable/disable signal either high (PU – enables the proper operation of the oscillator) or low (PD – disables the oscillator and puts it into a very low-current consumption standby mode). The external enable/disable signal overrides the pull-up or pull-down on-board jumper setting. The high signal for the enable/disable control should not exceed the supply voltage supplied to the oscillator and the low signal for the enable/disable control should not fall below 0V.

Evaluation Board Details

The DSC10XX MEMS oscillator is a low-current CMOS oscillator designed to provide the desired output frequency into a high-impedance CMOS load. As a result, the evaluation board is configured to provide an output into a specialized header connector to facilitate high-impedance measurements. As shown below, probe points are also provided on either side of the 0Ω resistor R4.



Probe Points

Direct measurement of waveform shape, rise-time, fall-time, duty cycle and jitter of the oscillator output can be measured at the locations labeled “Probe Points”. These probe points are provided to ease measurement of no-load and loaded waveform parameters.

If no-load measurements are desired, resistor R4 can be removed leaving essentially the capacitance of the socket as the effective load to the oscillator output. Discera recommends the use of a high-impedance, low-capacitance probe at this point.

Output characteristic under loaded conditions can be measured by populating locations C1 and C2 with 0603 size surface-mount capacitors. Discera recommends selecting COG capacitors, bearing in mind that the nominal capacitance of the socket and the external buffer is about 3pF each.

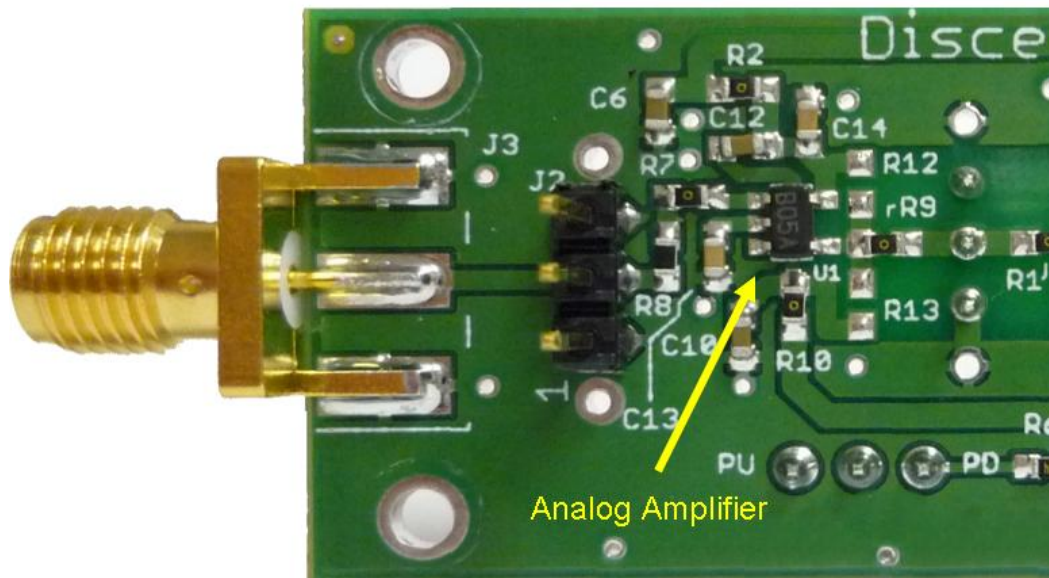
Note for all AC datasheet parameters, the oscillator loading is 15pF. Please also bear in mind any additional loading from the probe capacitance when selecting capacitors for C1 and C2.

Analog Amplifier

An analog amplifier has been included to allow connections through long coaxial cables such as when the evaluation platform is placed inside a temperature chamber. This wideband, unity-gain linear amplifier has a high-impedance input (about 200K Ω shunted by about 3pF) that loads the oscillator in a manner similar to a CMOS input gate.

The output RF connector on the evaluation board provides a signal suitable for measuring the frequency and spectral content of the oscillator, especially in 50 ohm systems using cables (for example, measuring the spectral response over temperature in a temperature chamber). Power for the linear amplifier (+5V and -5V) is provided

through the power and control cable that connects to a 6-pin locking header connector. The amplifier board output RF connector is a standard SMA coaxial connector to facilitate easy connection to standard laboratory test equipment.



Analog Buffer

For maximum signal fidelity in 50 ohm measurement systems, the output of the unity-gain buffer amplifier has been configured with a source termination resistor of 50Ω. When the output of the evaluation board is connected to a 50Ω input, this results in an output swing at the SMA connector of exactly half of the signal swing at the input of the amplifier, due to the voltage divider effect of the 50Ω source termination resistor and the 50Ω load. On the amplifier board, the component R7 can be removed and replaced with a 0.1μF ceramic 0603 capacitor if it is desired to AC couple the output rather than the default DC coupling. If this option is implemented, then there is no need for an external DC block at the input of test equipment that cannot tolerate DC signals.

If measurements in 50 ohm systems are desired, please note that the buffered output of the amplifier board drives levels of 0 to 1.65V and that output is DC coupled by default. This signal level may exceed the maximum input level of some sensitive instruments such as spectrum analyzers. Also, some instruments are not capable of handling signals with substantial DC components: these instruments need a DC block to operate properly.

Discera recommends that commercially available DC blocks and attenuators be used at the input to any instruments that are not capable of handling the DC levels or the power levels provided by this application board. Discera recommends that sufficient attention be paid to the insertion loss of the DC blocks and attenuators to ensure that their spectral characteristics are well understood. For internal tests at Discera, DC blocks (Inmet

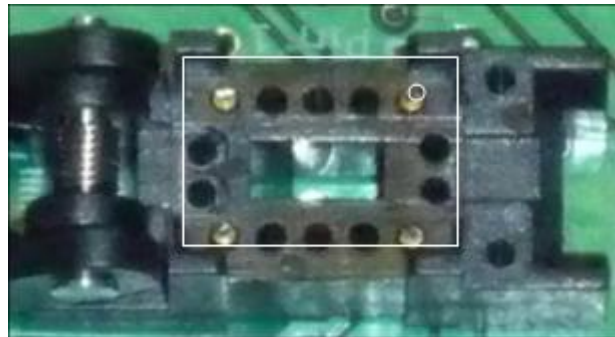
model 8037) and 6dB attenuators (M/A-Com model 2082-6142-06) having SMA connectors are used to protect sensitive spectrum analyzers and signal analyzers.

Socket

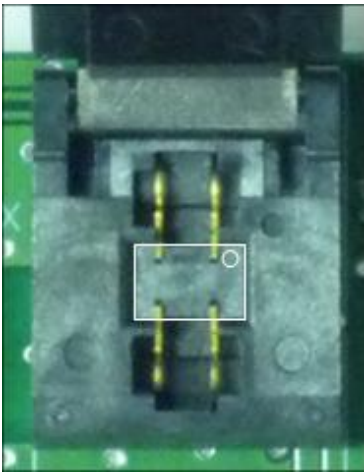
Each evaluation platform is identical except for the socket. Discera has an evaluation board for each package option. The table below gives the product numbers silk screened at the bottom of each board.

7.0 x 5.0mm	1100-00419-001
5.0 x 3.2mm	1100-00416-001
3.2 x 2.5mm	1100-00417-001
2.5 x 2.0mm	1100-00418-001

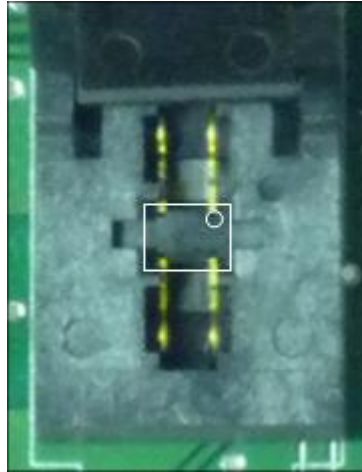
This evaluation board can be used to compare the performance of any standard pin compatible oscillator. Note that there is an orientation mark on the PCB adjacent to the socket to guide the proper insertion of an oscillator into the socket: it indicates the position of pin 1 of the oscillator. For clarity, pin 1 is shown below for all four socket sizes.



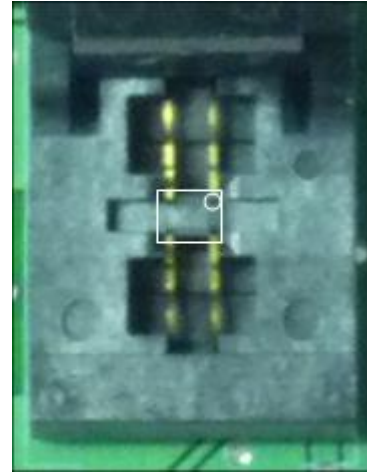
7.0 x 5.0 mm



5.0 x 3.2 mm

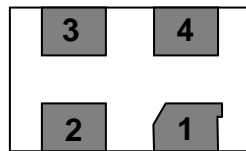


3.2 x 2.5 mm



2.5 x 2.0 mm

The figure below provides the pin description of the MEMS oscillator. A dot on the top of the package and a special angled pad on the bottom designate pin 1.



No.	Pin terminal
1	Disable
2	Gnd
3	Output
4	V _{DD}

Oscillator Pinout

The schematic of the evaluation board is as follows.

