LTC1799, LTC6900, LTC6905, LTC6905-XXX, LTC6906, LTC6907 LTC6908 SOT23 Silicon Oscillators

DESCRIPTION

DC2073B demo board features Linear Technology's SOT23 packaged silicon oscillators. The DC2073B demo board is available in eleven different options; DC2073B-A through DC2073B-K. These eleven options provide for the evaluation of resistor-set oscillator ICs and fixed frequency ICs (Table1).

Design files for this circuit board are available at http://www.linear.com/demo/DC2073B

Table 1. Resistor-Set Oscillator ICs and Maximum Frequency Error at T_A = 25°C

PART NUMBER, BOARD ASSEMBLY	FREQUENCY PROGRAM METHOD	DESCRIPTION
LTC®6905, DC2073B-A	Resistor Programmable	17.225MHz ≤ f_{OSC} ≤ 170MHz, ±1.4% at V^+ = 2.7V and ±2.2% at V^+ = 5V
LTC1799, DC2073B-B	Resistor Programmable	5kHz ≤ f_{OSC} ≤ 10MHz, ±1.5% at V^+ = 3V and ±1.5% at V^+ = 5V (Up to 20MHz)
LTC6900, DC2073B-C	Resistor Programmable	5kHz ≤ f_{OSC} ≤ 10MHz, ±1.5% at V^+ = 3V and ±1.5% at V^+ = 5V (Up to 20MHz)
LTC6905-133, DC2073B-D	Three Fixed Frequencies Set by Three-State Input	f_{OSC} = 133MHz, 66.7MHz and 33.5MHz, ±1.0% at V^+ = 3V and ±1.5% Typical at V^+ = 5V
LTC6905-100, DC2073B-E	Three Fixed Frequencies Set by Three-State Input	f_{OSC} = 100MHz, 50MHz and 25MHz, ±1.0% at V^+ = 3V and ±1.5% Typical at V^+ = 5V
LTC6905-96, DC2073B-F	Three Fixed Frequencies Set by Three-State Input	f_{OSC} = 96MHz, 48MHz and 24MHz, ±1.0% at V^+ = 3V and ±1.5% Typical at V^+ = 5V
LTC6905-80, DC2073B-G	Three Fixed Frequencies Set by Three-State Input	f_{OSC} = 80MHz, 40MHz and 20MHz, ±1.0% at V^+ = 3V and ±1.5% typical at V^+ = 5V
LTC6906, DC2073B-H	Resistor Programmable	10kHz ≤ f_{OSC} ≤ 1MHz, ±0.5% at V^+ = 2.7V to 3.6V and ±0.7% at V^+ = 2.25V
LTC6907, DC2073B-I	Resistor Programmable	400kHz ≤ f_{OSC} ≤ 4MHz, ±0.65% at V^+ = 3V to 3.6V
LTC6908-1, DC2073B-J	Spread Spectrum Modulation, Complementary Outputs (0°/180°) Resistor Programmable	250kHz ≤ f_{OSC} ≤ 5MHz, ±1.5% at V^+ = 2.7V and ±2.0% at V^+ = 5V
LTC6908-2, DC2073B-K	Spread Spectrum Modulation, Quadrature Outputs (0°/90°) Resistor Programmable	250kHz ≤ f_{OSC} ≤ 5MHz, ±1.5% at V^+ = 2.7V and ±2.0% at V^+ = 5V

QUICK START PROCEDURE

Test Equipment:

1. A single 3V power supply.
2. An oscilloscope with a bandwidth of at least 5x f_{OSC}. (For example, if f_{OSC} = 100MHz then use a 500MHz oscilloscope).
3. A screwdriver to adjust the potentiometer.

   Note: The DC2073B potentiometer is shorted with a zero ohm resistor for factory testing. The zero ohm (RJ10) resistor must be removed to allow setting the frequency with a screwdriver. If the potentiometer is set to a high value (>100k), then touching the DC2073B can produce output jitter.

Basic Test Procedure:

1. Connect power supply to V^+ and GND, turrets E4 and E5.
2. Connect oscilloscope probe to OUT1 and GND.

   Note: The ground lead of an oscilloscope probe has a series inductance that can generate a resonant circuit with the probe's capacitance. Probe resonance adds transient peaks and ringing on a high speed waveform. Reliable probing of the high frequency LTC6905 and LTC6905-XXX (with corresponding demo boards DC2073B-A, -D, -E, -F or -G), must use a very short connection of the oscilloscope probe ground to the board GND (see probe tip picture in Figure 1 Test Setup).
3. Set the JP1 jumper to the N divider position for the desired frequency shown on Table2.
4. Turn on supply.
5. The oscilloscope display shows a 3V squarewave (0V to 3V).
6. For the resistor-set ICs (DC2073B-A, -B, -C, -H, -I, -J or -K) turn the RPOT potentiometer for the desired frequency. (The frequency adjustment is very coarse when the potentiometer is turned near the fully clockwise or counter-clockwise position).

Verify Oscillator Accuracy

The f_{OSC} accuracy of the resistor-set ICs (DC2073B-A, -B, -C, -H, -I, -J or -K), can be verified by setting RSET to the exact value from the f_{OSC} equation shown in Table 2. For the DC2073B-A, -B, -C, -J, -K, RSET = RPOT + RSET2. RSET1 and RSET2 are never installed on the same board. Connecting an ohmmeter across RPOT and RSET1 or RSET2 forces current into the IC set pin (Pin 3 or 4) and causes an error in the ohmmeter reading. The RS resistor is in series with RPOT and equal to RSET1 or RSET2 and the equivalent RSET = RPOT + RS.

Procedure to Verify Oscillator Accuracy

a. Calculate RSET for the desired frequency (RSET in Table 2).

b. Remove the power supply leads from DC2073B and connect an ohmmeter from POT (E6) to V^+ (DC2073B-A, -B, -C, -J or -K) or GND (DC2073B-H or-I).

C. Adjust RPOT for the exact value of RSET needed.

   Note: If the potentiometer is turned near the fully clockwise or counter-clockwise position the RPOT adjustment may be too coarse for setting an exact RSET value. In addition, for a frequency adjustment near the upper or lower f_{OSC} range, RSET may be greater or less than the default DC2073B RPOT + RSET1 or RSET2 value, in this case the RSET1 or RSET2 resistor must be removed and replaced with a lower or higher value.

QUICK START PROCEDURE

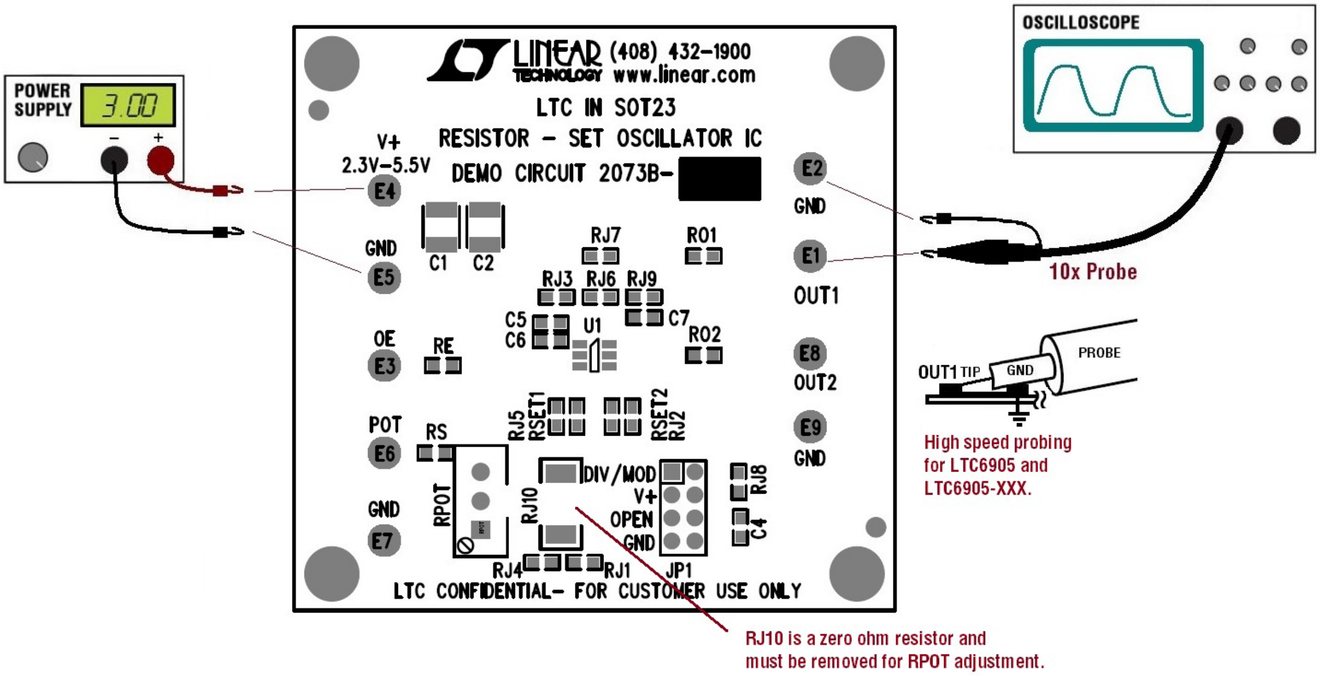

Figure 1. Test Setup

QUICK START PROCEDURE

Table 2. f_{OSC} Frequency and N Divider Setting

LTC6905, DC2073B-A

$$f_{OSC} = \left(\frac{168.5MHz \bullet 10k\Omega}{R_{SET}} + 1.5MHZ\right) \bullet \frac{1}{N},\ R_{SET} = \frac{168.5MHz \bullet 10k\Omega}{N \bullet f_{OSC} - 1.5MHz}$$

N = 1 (JP1 to V^+), 68.9MHz ≤ f_{OSC} ≤ 170MHz
N = 2 (JP1 to OPEN), 34.45MHz ≤ f_{OSC} ≤ 85MHz
N = 4 (JP1 to GND), 7.225MHz ≤ f_{OSC} ≤ 42.5MHz

LTC1799, DC2073B-B

$$f_{OSC} = \frac{10MHz}{N} \bullet \frac{10k\Omega}{R_{SET}},\ R_{SET} = \frac{10MHz}{f_{OSC}} \bullet \frac{10k\Omega}{N}$$

N = 1 (JP1 to GND), 500kHz ≤ f_{OSC} ≤ 20MHz
N = 10 (JP1 to OPEN), 50kHz ≤ f_{OSC} ≤ 2MHz
N = 100 (JP1 to V^+), 5kHz ≤ f_{OSC} ≤ 200kHz

LTC6900, DC1073A-C

$$f_{OSC} = \frac{10MHz}{N} \bullet \frac{20k\Omega}{R_{SET}},\ R_{SET} = \frac{10MHz}{f_{OSC}} \bullet \frac{20k\Omega}{N}$$

N = 1 (JP1 to GND), 500kHz ≤ f_{OSC} ≤ 20MHz
N = 10 (JP1 to OPEN), 50kHz ≤ f_{OSC} ≤ 2MHz
N = 100 (JP1 to V^+), 5kHz ≤ f_{OSC} ≤ 200kHz

LTC6905-133, DC2073B-D

$$f_{OSC} = \frac{133MHz}{N}$$

N = 1 (JP1 to V+), f_{OSC} = 133MHz
N = 2 (JP1 to OPEN), f_{OSC} = 66.7MHz
N = 4 (JP1 to GND), f_{OSC} = 33.5MHz

LTC6905-10, DC2073B-E

$$f_{OSC} = \frac{100MHz}{N}$$

N = 1 (JP1 to V^+), f_{OSC} = 100MHz
N = 2 (JP1 to OPEN), f_{OSC} = 50MHz
N = 4 (JP1 to GND), f_{OSC} = 25MHz

LTC6905-96, DC2073B-F

$$f_{OSC} = \frac{96MHz}{N}$$

N = 1 (JP1 to V^+), f_{OSC} = 96MHz
N = 2 (JP1 to OPEN), f_{OSC} = 48MHz
N = 4 (JP1 to GND), f_{OSC} = 24MHz

LTC6905-80, DC2073B-G

$$f_{OSC} = \frac{80MHz}{N}$$

N = 1 (JP1 to V^+), f_{OSC} = 80MHz
N = 2 (JP1 to OPEN), f_{OSC} = 40MHz
N = 4 (JP1 to GND), f_{OSC} = 20MHz

LTC6906, DC2073B-H

$$f_{OSC} = \frac{1MHz}{N} \bullet \frac{100k\Omega}{R_{SET}},\ R_{SET} = \frac{1MHz}{f_{OSC}} \bullet \frac{100k\Omega}{N}$$

N = 1 (JP1 to GND), 0.1MHz ≤ f_{OSC} ≤ 1MHz
N = 3 (JP1 to OPEN), 33kHz ≤ f_{OSC} ≤ 333kHz
N = 10 (JP1 to V^+), 10kHz ≤ f_{OSC} ≤ 100kHz

LTC6907, DC2073B-I

$$f_{OSC} = \frac{4MHz}{N} \bullet \frac{50k\Omega}{R_{SET}},\ R_{SET} = \frac{4MHz}{f_{OSC}} \bullet \frac{50k\Omega}{N}$$

N = 1 (JP1 to GND), 0.4MHz ≤ f_{OSC} ≤ 4MHz
N = 3 (JP1 to OPEN), 133kHz ≤ f_{OSC} ≤ 1.33MHz
N = 10 (JP1 to V^+), 40kHz ≤ f_{OSC} ≤ 400kHz

LTC6908-1, DC2073B-J

Complementary Outputs (0°/180°) without Modulation:
250kHz ≤ f_{OSC} ≤ 5MHz, (JP1 to DIV/MOD)

$$f_{OSC} = \frac{10MHz}{N} \bullet \frac{10k\Omega}{R_{SET}},\ R_{SET} = \frac{10MHz}{f_{OSC}} \bullet \frac{10k\Omega}{N}$$

Spread Spectrum Modulation Rate:

(JP1 to GND), $f_{OSC}/16$
(JP1 to OPEN), $f_{OSC}/32$
(JP1 to V^+), $f_{OSC}/64$

LTC6908-1, DC2073B-K

Quadrature Outputs (0˚/90˚) without Modulation:
250kHz ≤ f_{OSC} ≤ 5MHz, (JP1 to DIV/MOD)

$$f_{OSC} = \frac{10MHz}{N} \bullet \frac{10k\Omega}{R_{SET}},\ R_{SET} = \frac{10MHz}{f_{OSC}} \bullet \frac{10k\Omega}{N}$$

Spread Spectrum Modulation Rate:

(JP1 to GND), $f_{OSC}/16$
(JP1 to OPEN), $f_{OSC}/32$
(JP1 to V^+), $f_{OSC}/64$

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