DSC8002 Series

**1.8 to 3.3V** Programmable Low-Power CMOS Oscillator

MICREL®

General Description

The DSC8002 is a programmable MEMS based PureSilicon™ Oscillator. Using the DragonFly™ or TimeFlash™ handheld programmer, the end user can program the DSC8002 within seconds to any frequency from 1 to 150MHz in increments of 100Hz (up to four decimal point resolution). The nominal operational range spans from 1.8 to 3.3 Volts, without any need for additional external components, providing ease of use and flexibility in multi-voltage applications.

The DSC8002 incorporates an all silicon resonator that is extremely robust and nearly immune to stress related fractures, common to crystal based oscillators. Without sacrificing the performance and stability required of today's systems, a crystal-less design allows for a higher level of reliability, making the DSC8002 ideal for rugged, industrial, and portable applications where stress, shock, and vibration can damage quartz crystal based systems.

Available in industry standard packages, the DSC8002 can be "dropped-in" to the same PCB footprint as standard crystal oscillators.

Block Diagram
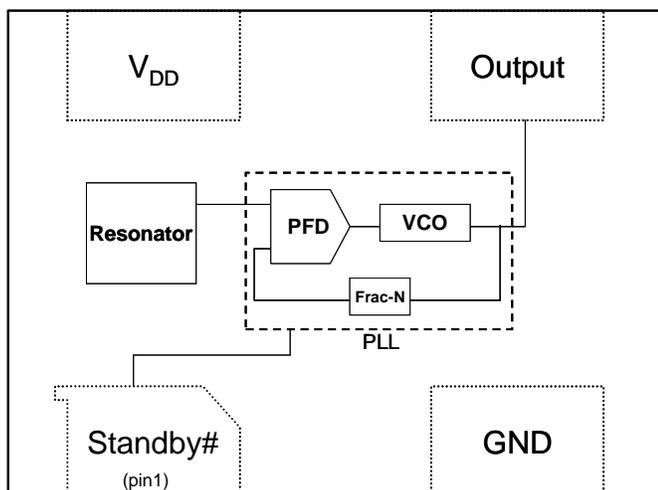
Features

- Frequency Range: 1 to 150MHz
- Exceptional Stability over Temperature
  - ±25 PPM, ±50 PPM
- Operating voltage
  - 1.8 to 3.3V (nominal)
  - 1.65 to 3.60V (absolute max)
- Operating Temperature Range
  - Industrial -40ºC to 85ºC
  - Ext. Commercial -20ºC to 70ºC
  - Commercial 0ºC to 70ºC
- Low Operating and Standby Current
  - 3mA Operating (40MHz)
  - 1uA Standby
- Ultra Miniature Footprint
  - 2.5 x 2.0 x 0.85 mm
  - 3.2 x 2.5 x 0.85 mm
  - 5.0 x 3.2 x 0.85 mm
  - 7.0 x 5.0 x 0.85 mm
- Excellent shock and Vibration Resistance
- Lead Free, RoHS & Reach SVHC Compliant
- Handheld programmer available for purchase

Benefits

- Pin for pin "drop in" replacement for industry standard oscillators
- Semiconductor level reliability, significantly higher than quartz
- Frequency Resolution to 4 decimals
- Fully Programmable Operating Voltage and Frequency
- Longer Battery Life / Reduced Power
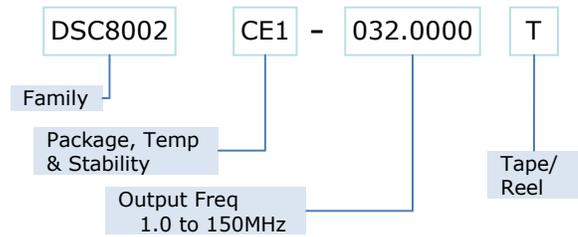- Compact Plastic package
- Cost Effective

Applications

- Mobile Applications
- Consumer Electronics
- Portable Electronics
- CCD Clock for VTR Cameras
- Low Profile Applications
- Industrial

MK-Q-B-P-D-031809-06-6

Absolute Maximum Ratings[1]

Item	Min.	Max	Unit	Condition
Supply Voltage	-0.3	+4.0	V	
Input Voltage	-0.3	VDD+0.3	V	
Junction Temp	-	+150	°C	
Storage Temp	-55	+150	°C	
Soldering Temp	-	+260	°C	40 sec max.
ESD	-		V	
HBM		2000		
MM		200		
CDM		500		

Ordering Code

DSC8002 | CE1 - | 032.0000 | T

Family

Package, Temp & Stability

Output Freq 1.0 to 150MHz

Tape/ Reel

* See Ordering Information for details

Recommended Operating Conditions

Parameter	Symbol	Range
Supply Voltage	V_{DD}	1.65 – 3.60V
Output Load	Z_L	R>10KΩ, C≤15pF
Operating Temperature Option 1 Option 2 Option 3	T	-40 − +85 °C -20 − +70 °C 0 − +70 °C

Specifications

| Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
Frequency	f_0	Single Frequency		1		150	MHz
Frequency Tolerance Option 1 Option 2 Option 3	Δf	-40°C to +85°C -20°C to +70°C 0°C to +70°C				±25,±50 ±25,±50 ±25,±50	ppm
Supply Current, no load	I_{DD}	C_L=0p R_L=∞ T=25°C	1 to 40MHz 40 to 80MHz 80 to 125MHz 125 to 150MHz		3 4 5 6	 10	mA
Supply Current, standby	I_{DD}	T=25°C				1.0	uA
Output Logic Levels Output logic high Output logic low	V_{OH} V_{OL}	C_L=15pF		0.8*V_{DD} -		- 0.2*V_{DD}	Volts
Output Transition time Rise Time Fall Time	t_R t_F	C_L=15pF; T=25°C 20%/80%*V_{DD}			1.3 1.3	2 2	ns
Output Startup Time[2]	t_{SU}	T=25°C			3	10	ms
Output Disable Time	t_{DA}				20	100	ns
Output Duty Cycle	SYM			45		55	%
Input Logic Levels Input logic high Input logic low	V_{IH} V_{IL}			0.75*V_{DD} -		- 0.25* V_{DD}	Volts
Jitter, Cycle to Cycle	J_{CC}	F = 100MHz[3]			95		ps

Notes:
1. Absolute maximum ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated beyond these limits.
2. Output frequency to within 100ppm of final stable output frequency.
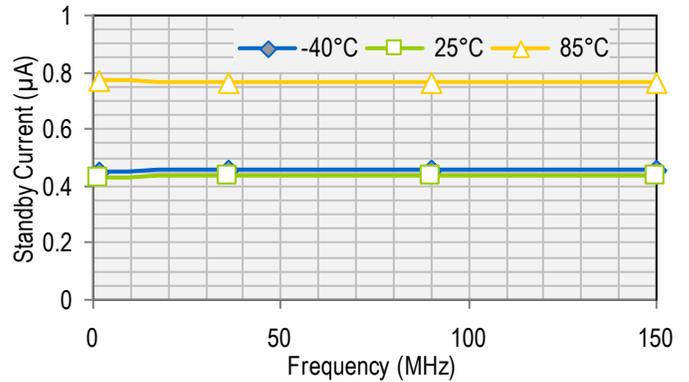3. See typical cycle to cycle jitter graph for frequency dependence.

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Nominal Performance Characteristics

1.8V Characteristics

Supply Current

Standby Current
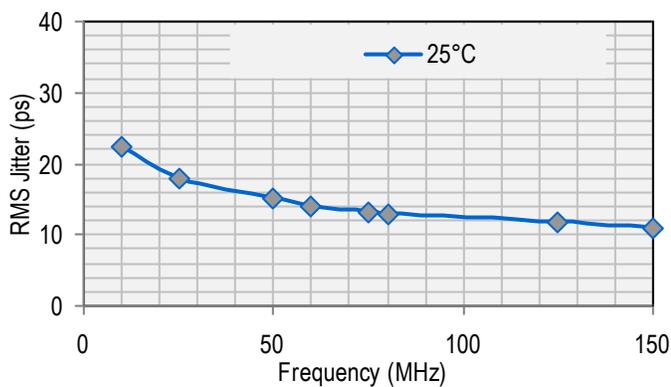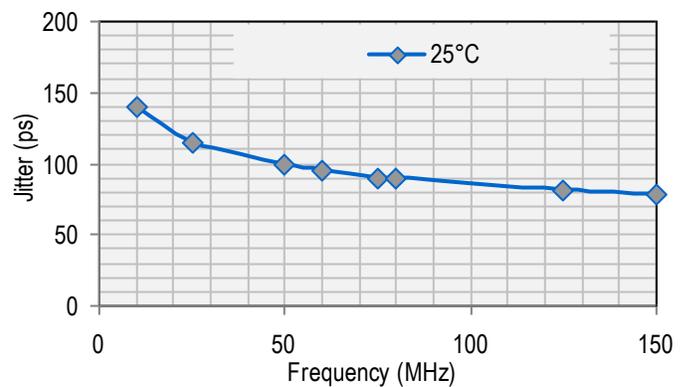

Rise Time

Fall Time

Period Jitter
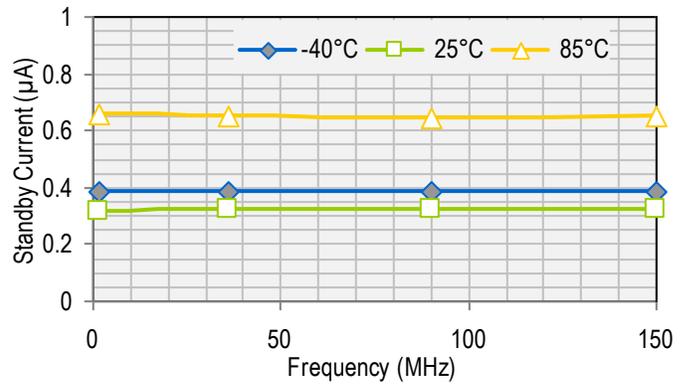

Cycle to Cycle Jitter

MK-Q-B-P-D-031809-06-6
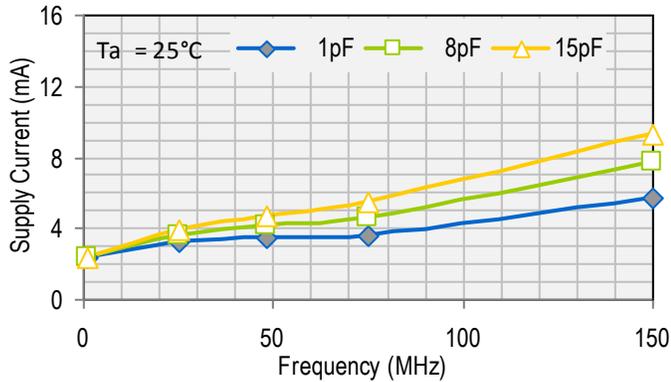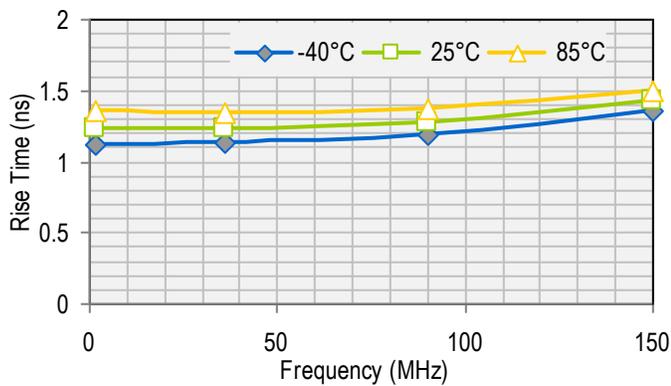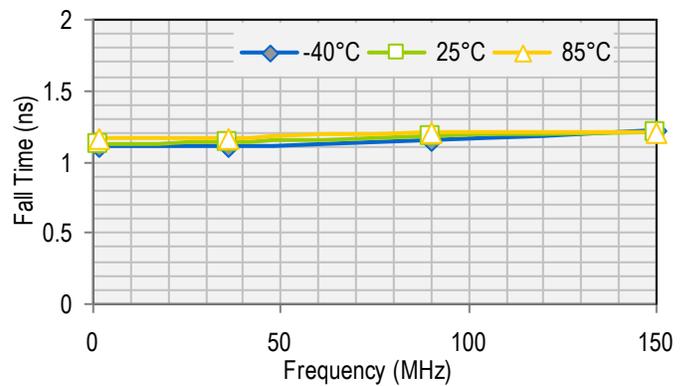
3.3V Characteristics

Supply Current

Standby Current

Rise Time

Fall Time

Period Jitter

Cycle to Cycle Jitter

MK-Q-B-P-D-031809-06-6
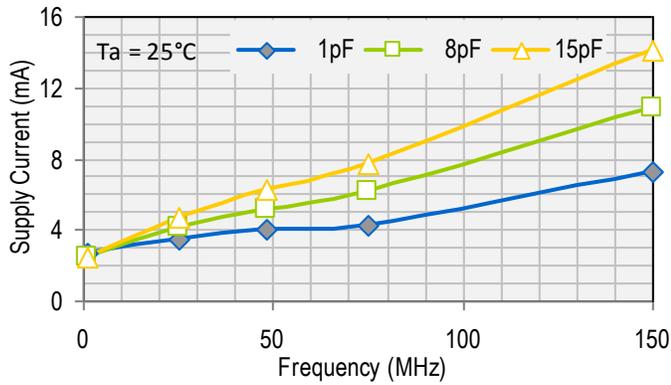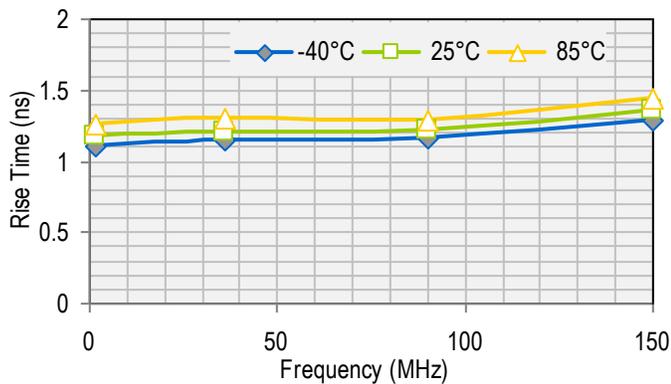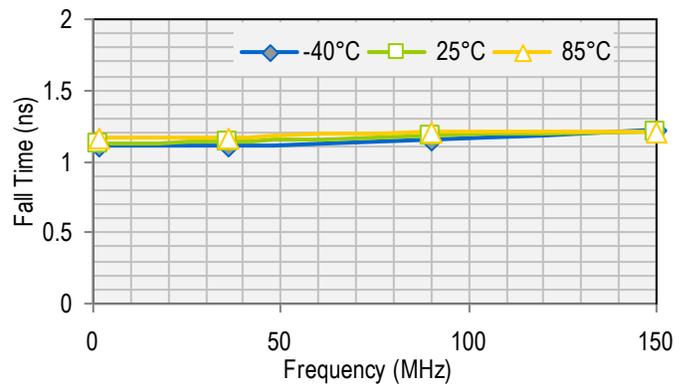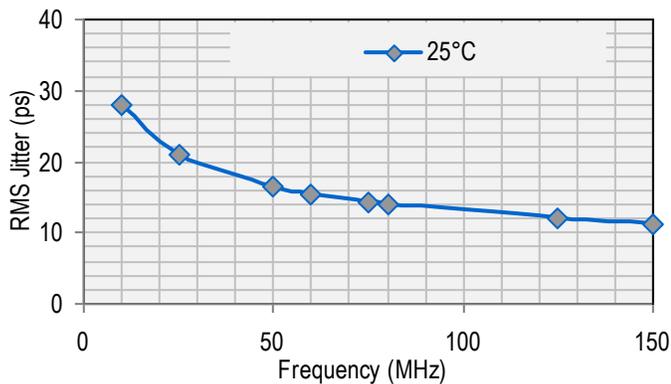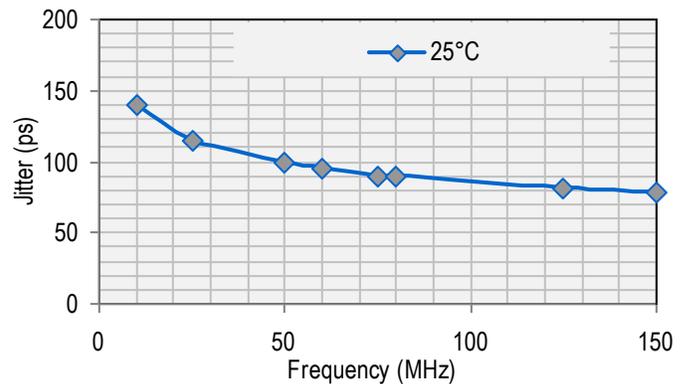
Output Waveform
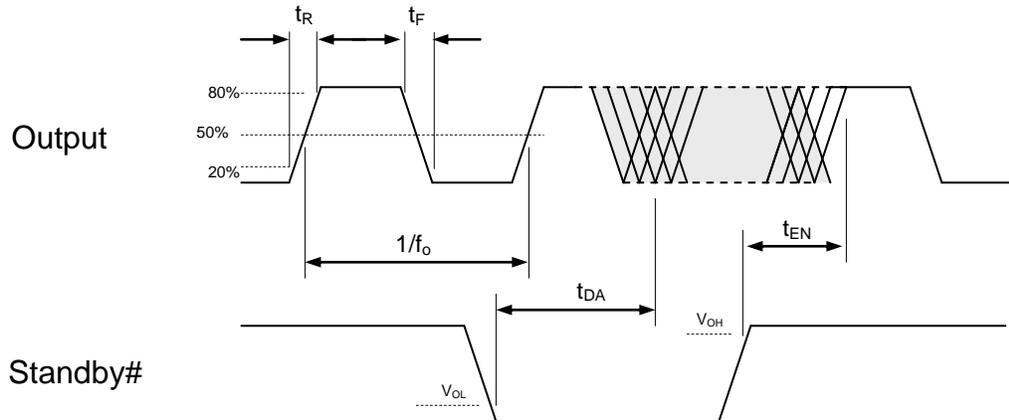
Standby Function

Standby# (pin 1)	Output (pin 3)
Hi Level	Output ON
Open (no connect)	Output ON
Low Level	High Impedance

Test Circuit

*V_{SD} = Standby# Logic Level Input

MK-Q-B-P-D-031809-06-6
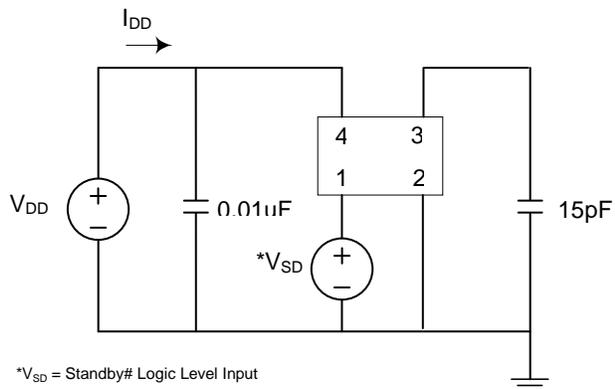
Board Layout (recommended)
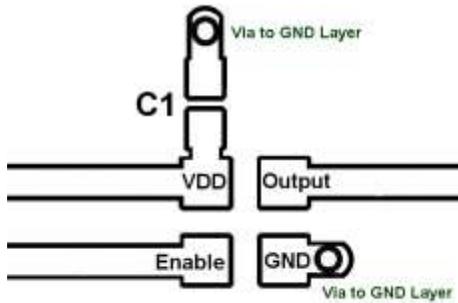
Solder Reflow Profile
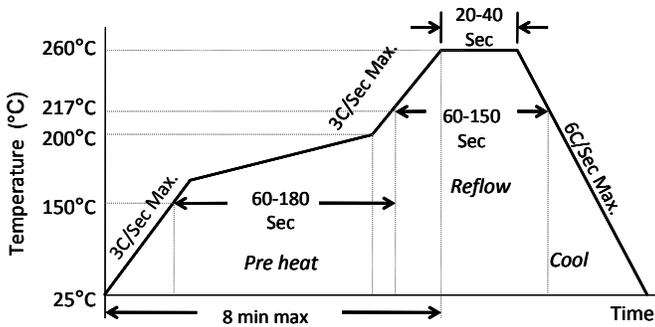
MSL 1 @ 260°C refer to JSTD-020C	
Ramp-Up Rate (200°C to Peak Temp)	3°C/Sec Max.
Preheat Time 150°C to 200°C	60-180 Sec
Time maintained above 217°C	60-150 Sec
Peak Temperature	255-260°C
Time within 5°C of actual Peak	20-40 Sec
Ramp-Down Rate	6°C/Sec Max.
Time 25°C to Peak Temperature	8 min Max.

Package Dimensions

7.0 x 5.0 mm Plastic Package

External Dimensions

No.	Pin Terminal
1	Standby#
2	GND
3	Output
4	VDD

Recommended Land Pattern*

*Note: The center pad is not connected internally and should be left un-connected or tied to GND.

units: mm [inch]

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5.0 x 3.2 mm Plastic Package

External Dimensions

5±0.10 [0.197±0.004]
#4 #3
#1 #2
3.2±0.10 [0.126±0.004]

0.85±0.05 [0.033±0.002]

2.54 [0.100]
#3 #4
2.1 [0.083]
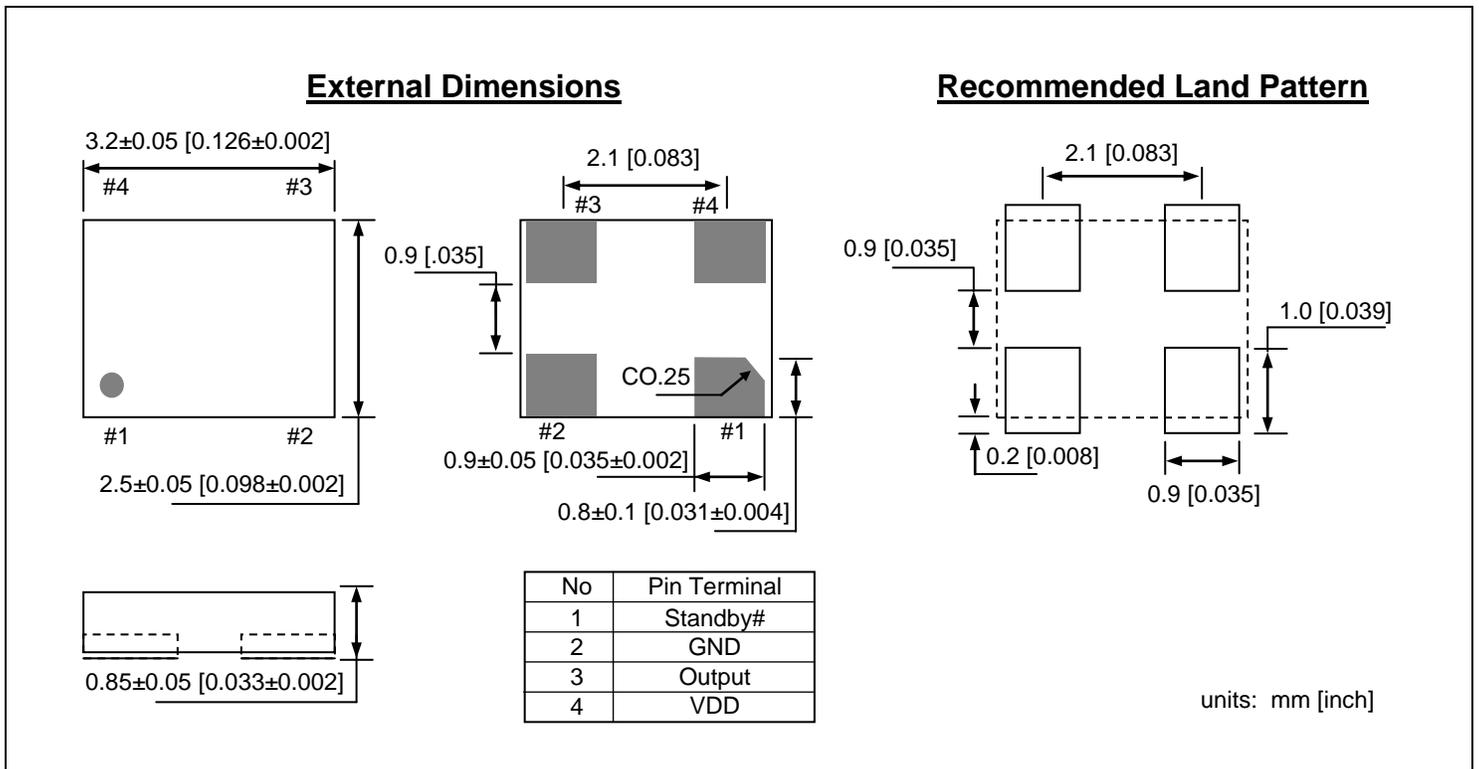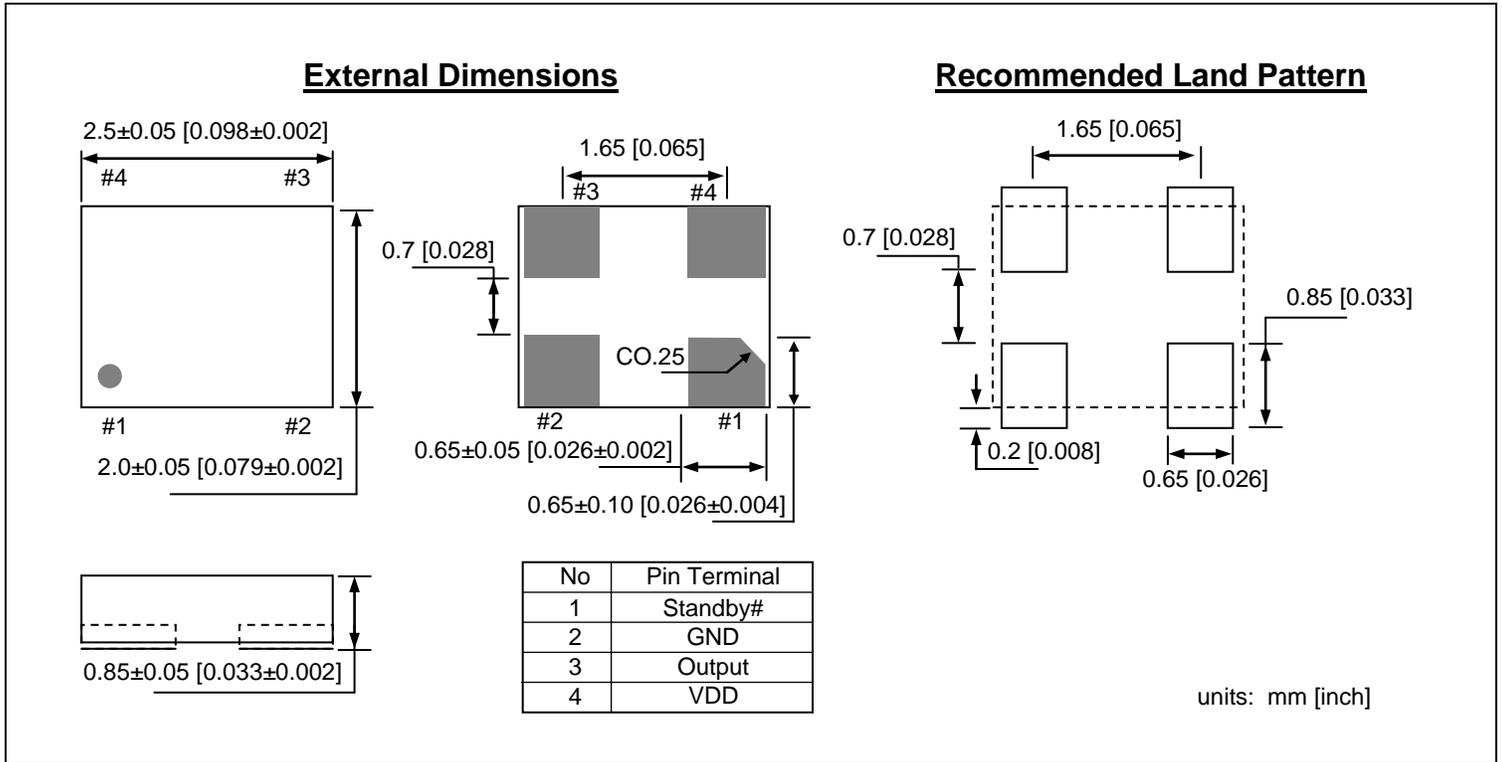0.1 [0.004]
0.2 [0.008]
#2 #1
1.2 [0.047]
0.9 [0.035]

No.	Pin Terminal
1	Standby#
2	GND
3	Output
4	VDD

Recommended Land Pattern

2.54 [0.100]
1.2 [0.047]
1.1 [0.043]
0.1 [0.004]
1.2 [0.047]

units: mm [inch]

3.2 x 2.5 mm Plastic Package

External Dimensions

3.2±0.05 [0.126±0.002]
#4 #3
#1 #2
2.5±0.05 [0.098±0.002]

0.85±0.05 [0.033±0.002]

2.1 [0.083]
#3 #4
0.9 [.035]
CO.25
#2 #1
0.9±0.05 [0.035±0.002]
0.8±0.1 [0.031±0.004]

No	Pin Terminal
1	Standby#
2	GND
3	Output
4	VDD

Recommended Land Pattern

2.1 [0.083]
0.9 [0.035]
1.0 [0.039]
0.2 [0.008]
0.9 [0.035]

units: mm [inch]

2.5 x 2.0 mm Plastic Package

External Dimensions

2.5±0.05 [0.098±0.002]

#4   #3

#1   #2

2.0±0.05 [0.079±0.002]

0.85±0.05 [0.033±0.002]

1.65 [0.065]

#3   #4

0.7 [0.028]

CO.25

#2   #1

0.65±0.05 [0.026±0.002]

0.65±0.10 [0.026±0.004]

No	Pin Terminal
1	Standby#
2	GND
3	Output
4	VDD

Recommended Land Pattern

1.65 [0.065]

0.7 [0.028]

0.85 [0.033]

0.2 [0.008]

0.65 [0.026]

units: mm [inch]

Ordering Information

DSC8002 PTS – T

Package (Plastic QFN)	Temperature	Stability	Packing Option
P=A: 7.0x5.0mm **P=B:** 5.0x3.2mm **P=C:** 3.2x2.5mm **P=D:** 2.5x2.0mm	**T=C:** 0° ~ +70° C **T=E:** -20° ~ +70° C **T=I:** -40° ~ +85° C	**S=1:** ±50ppm **S=2:** ±25ppm	**Blank:** Tubes **T:** Tape & Reel

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