



**THE DATASHEET OF
DSC8002CI2T**





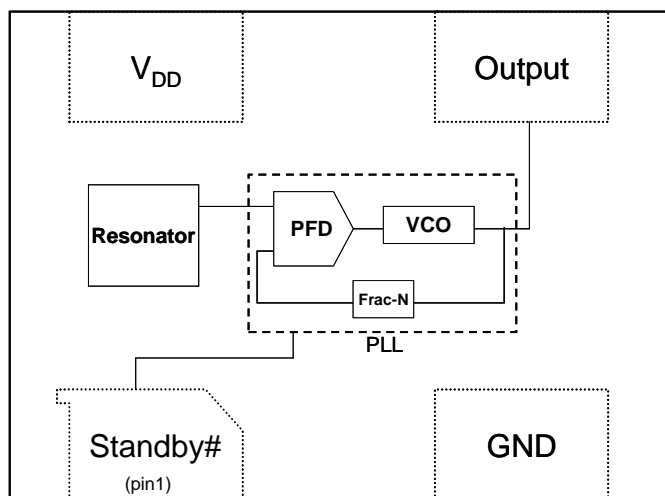
General Description

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 -40°C to 85°C
 - Ext. Commercial -20°C to 70°C
 - Commercial 0°C to 70°C
- 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

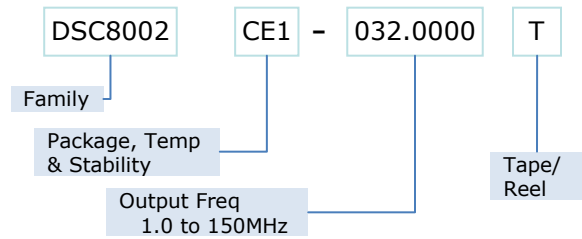
Applications

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

Absolute Maximum Ratings¹

| Item | Min. | Max | Unit | Condition |
|----------------|------|----------------------|------|-------------|
| Supply Voltage | -0.3 | +4.0 | V | |
| Input Voltage | -0.3 | V _{DD} +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



* 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 | T | -40 – +85 °C |
| Option 1 | | -20 – +70 °C |
| Option 2 | | 0 – +70 °C |
| Option 3 | | |

Specifications

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------------|---|--|------------------|----------------------|----------|
| Frequency | f ₀ | Single Frequency | 1 | | 150 | MHz |
| Frequency Tolerance | | | | | | ppm |
| Option 1 | | -40°C to +85°C | | | ±25,±50 | |
| Option 2 | | -20°C to +70°C | | | ±25,±50 | |
| Option 3 | | 0°C to +70°C | | | ±25,±50 | |
| 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 | V _{OH} | C _L =15pF | 0.8*V _{DD} | | - | Volts |
| Output logic low | V _{OL} | | - | | 0.2*V _{DD} | |
| Output Transition time | | | | | | |
| Rise Time | t _R | C _L =15pF; T=25°C | | 1.3 | 2 | ns |
| Fall Time | t _F | 20%/80%*V _{DD} | | 1.3 | 2 | |
| 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 | V _{IH} | | 0.75*V _{DD} | | - | Volts |
| Input logic low | V _{IL} | | - | | 0.25*V _{DD} | |
| Jitter, Cycle to Cycle | J _{CC} | F = 100MHz ³ | | 95 | | ps |

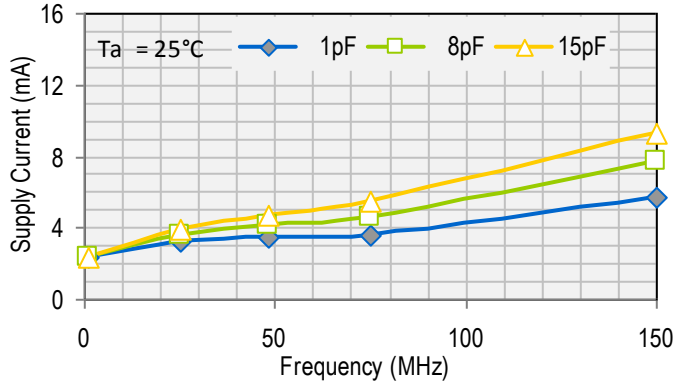
Notes:

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.

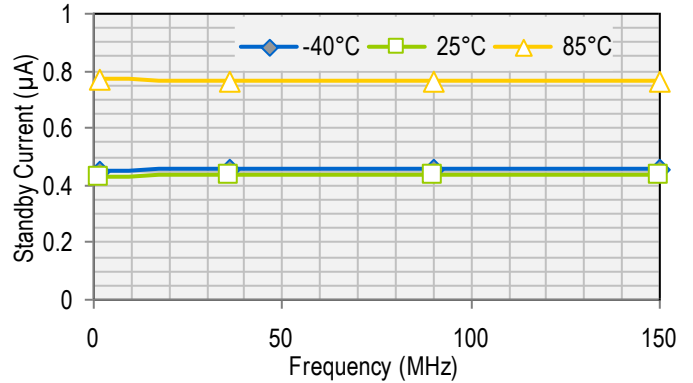
Nominal Performance Characteristics

1.8V Characteristics

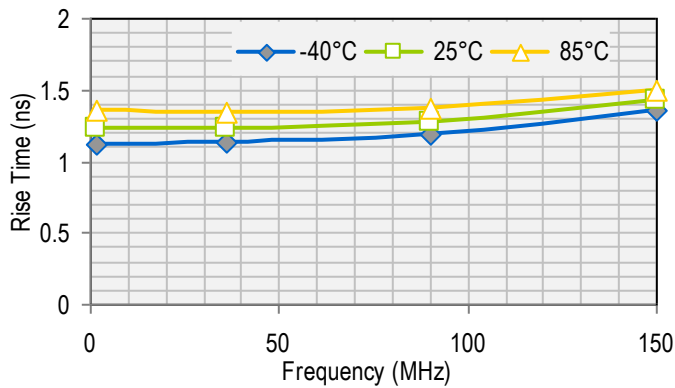
Supply Current



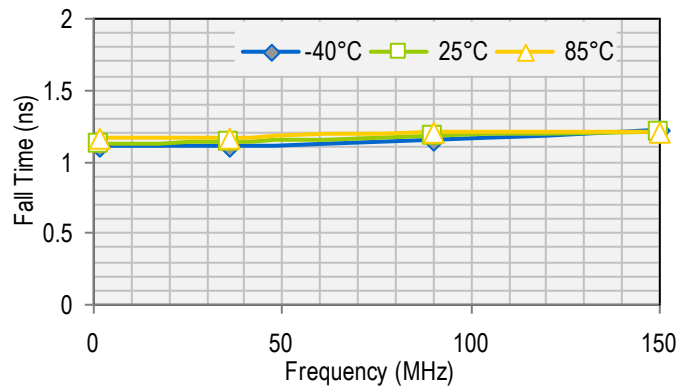
Standby Current



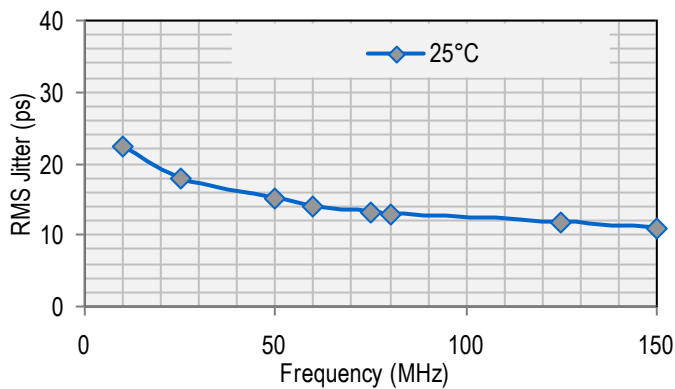
Rise Time



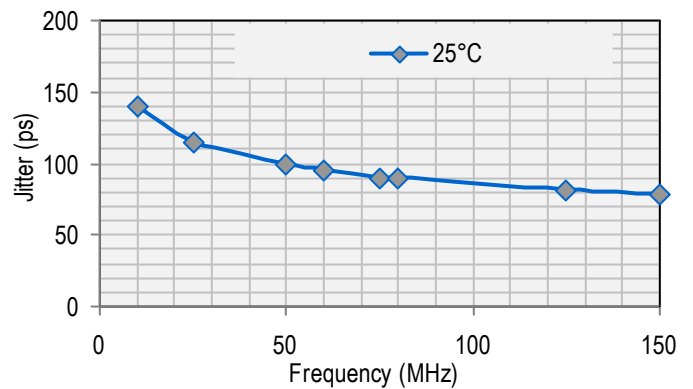
Fall Time



Period Jitter

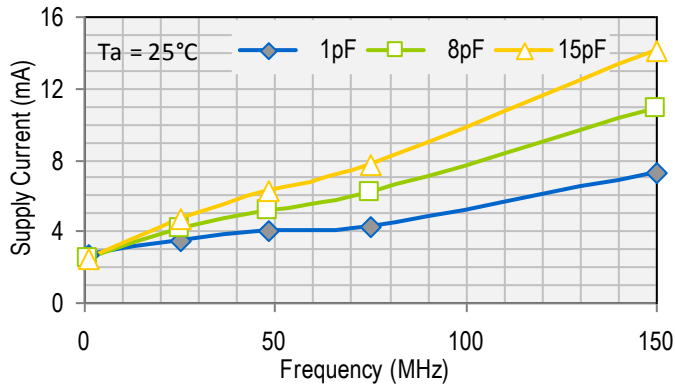


Cycle to Cycle Jitter

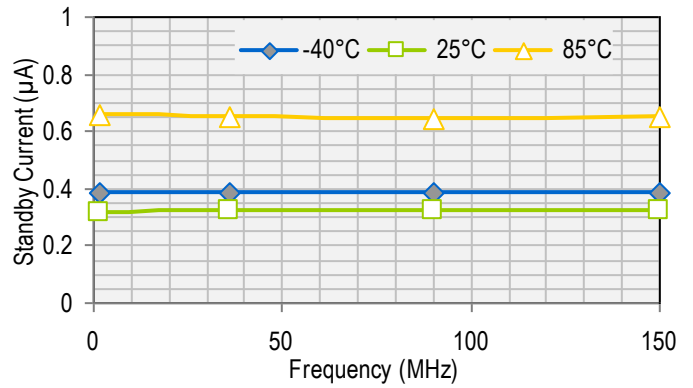


3.3V Characteristics

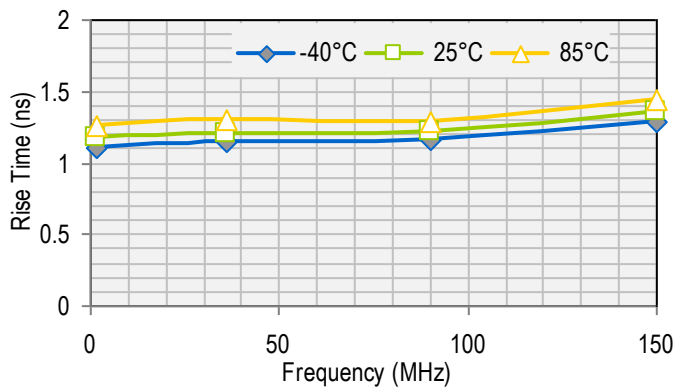
Supply Current



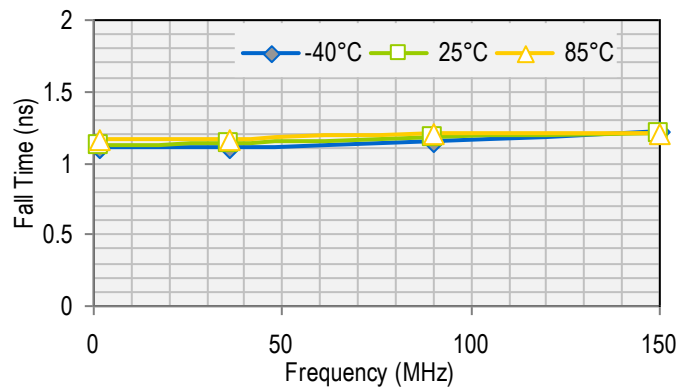
Standby Current



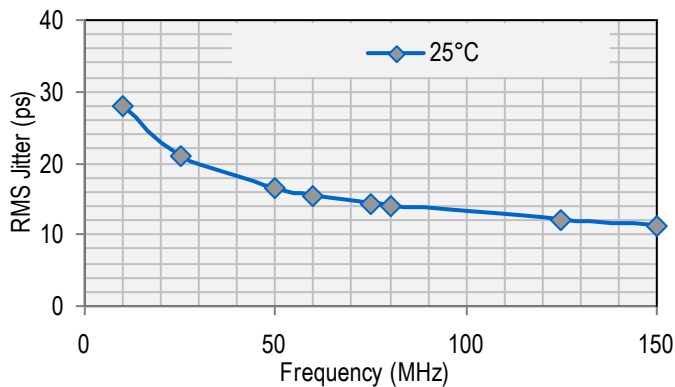
Rise Time



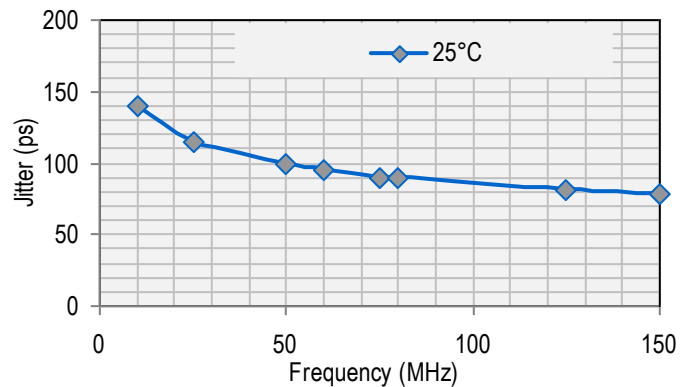
Fall Time



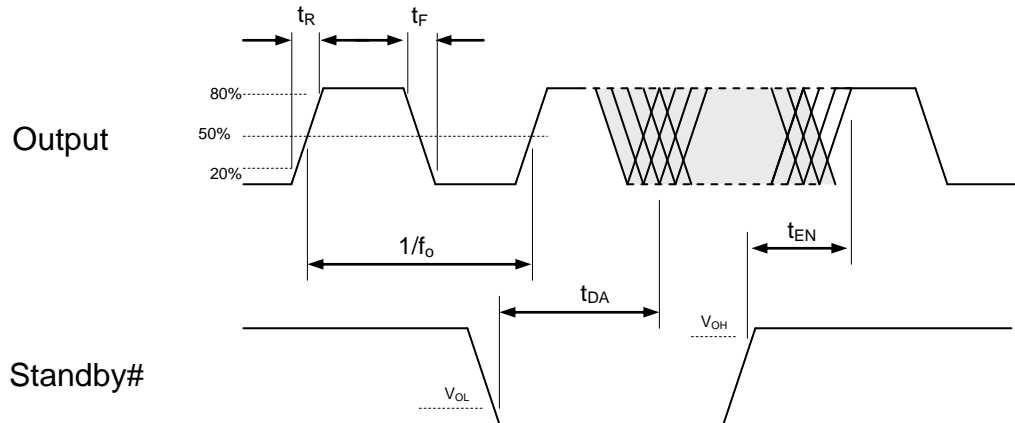
Period Jitter



Cycle to Cycle Jitter



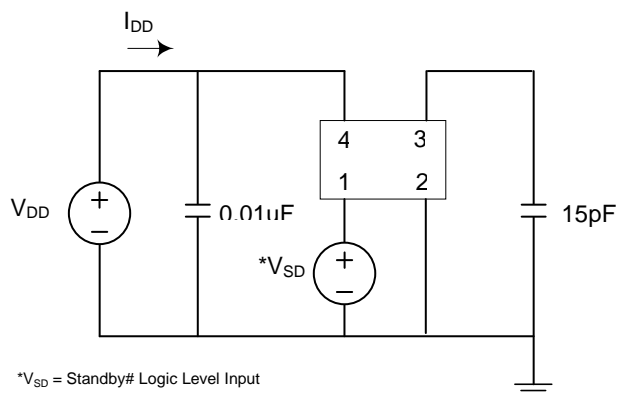
Output Waveform



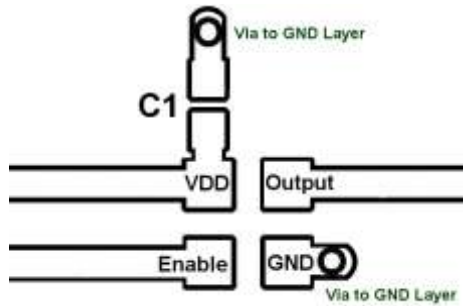
Standby Function

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

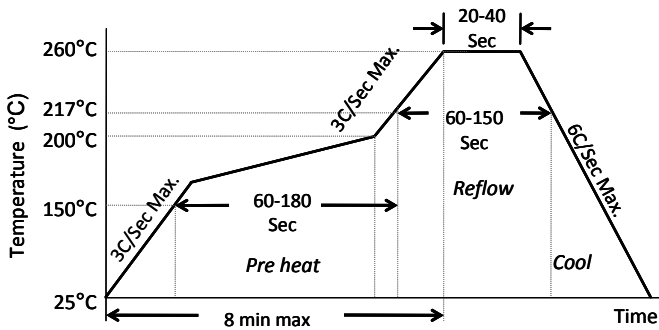
Test Circuit



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

7.0±0.10 [0.276±0.004]
#4 #3
#1 #2
5.0±0.10 [0.197±0.004]
2.6 [0.102]
3.5 [0.138]
2.2 [0.087]
1.4 [0.055]
0.2 [0.008]
1.2 [0.047]

Recommended Land Pattern*

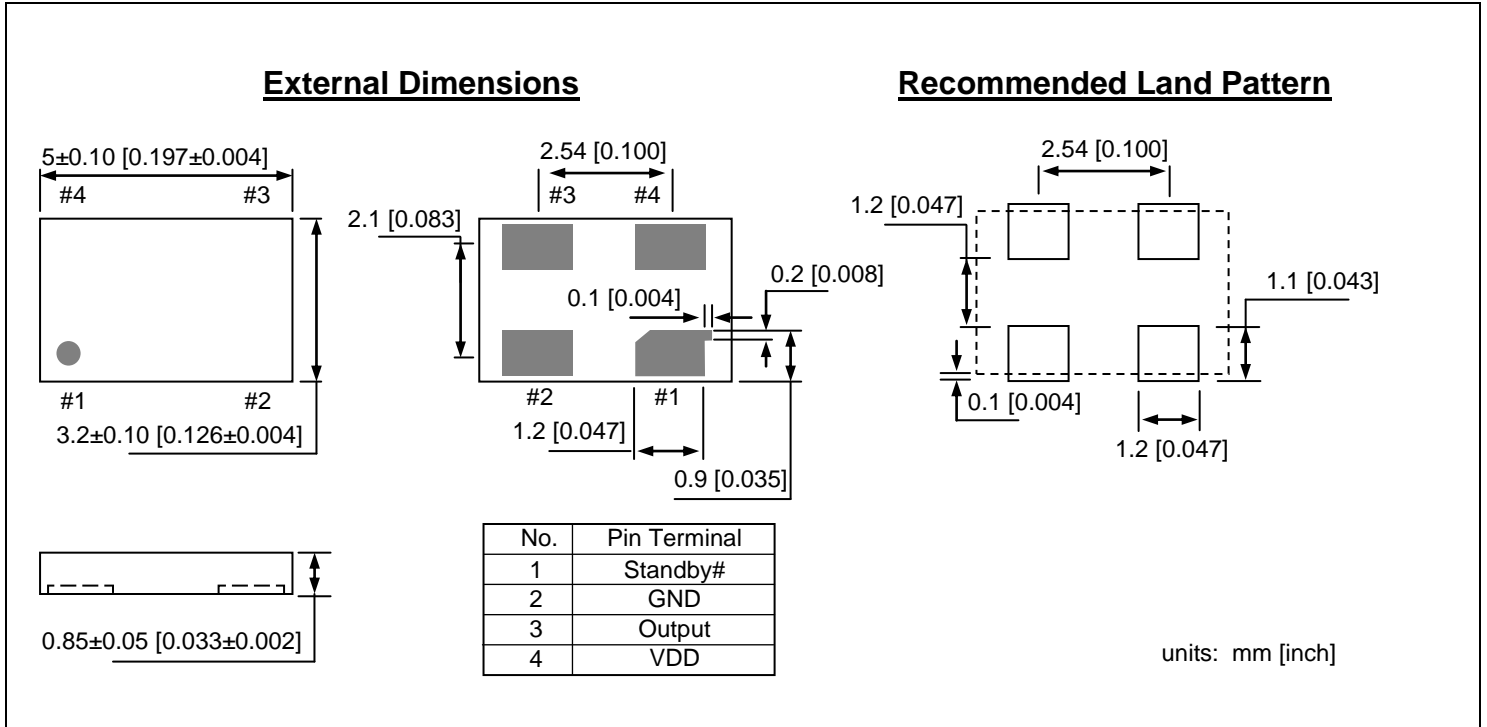
5.08 [0.200]
2.6 [0.102]
0.2 [0.008]
1.4 [0.055]
0.2 [0.008]
1.4 [0.055]

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

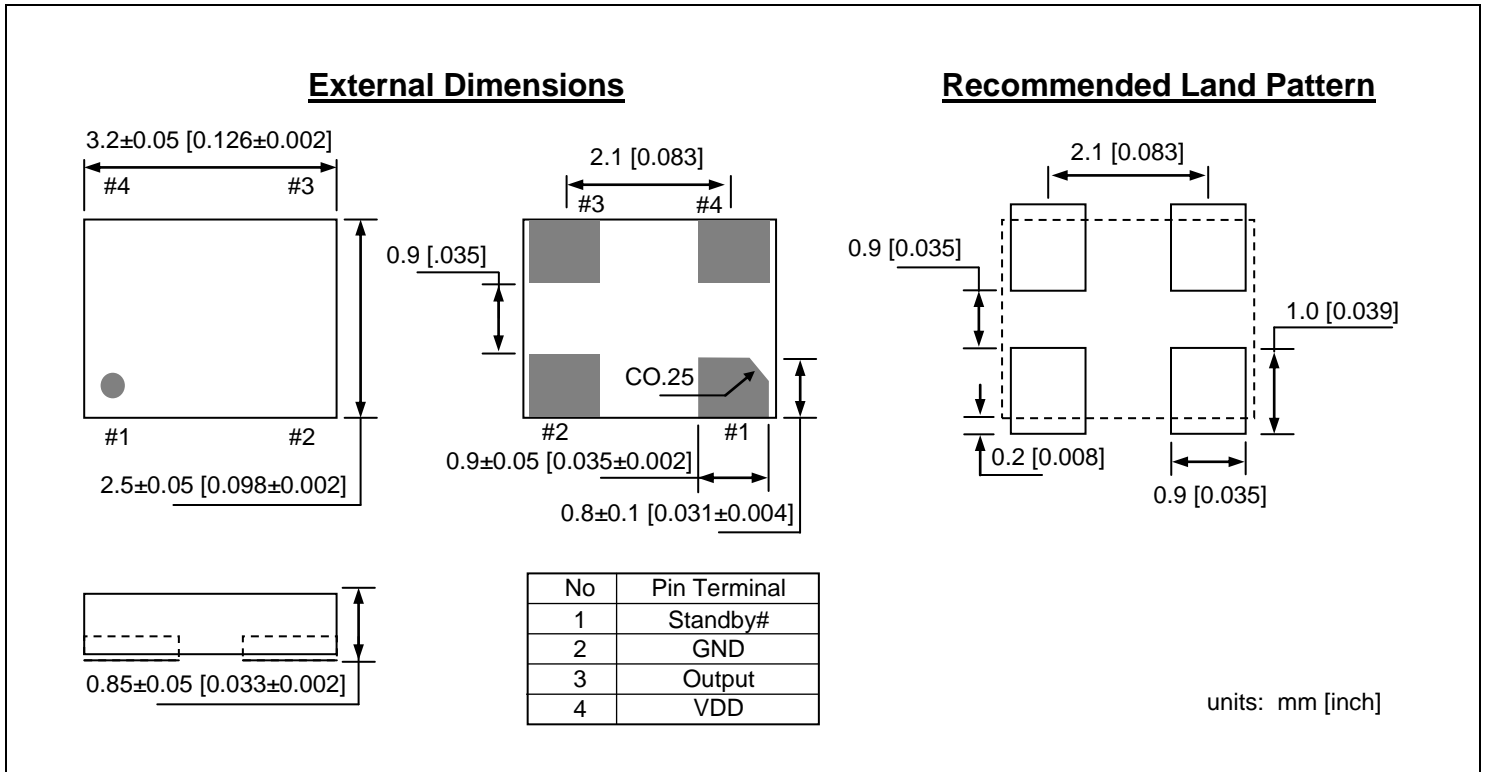
*Note: The center pad is not connected internally and should be left unconnected or tied to GND.

units: mm [inch]

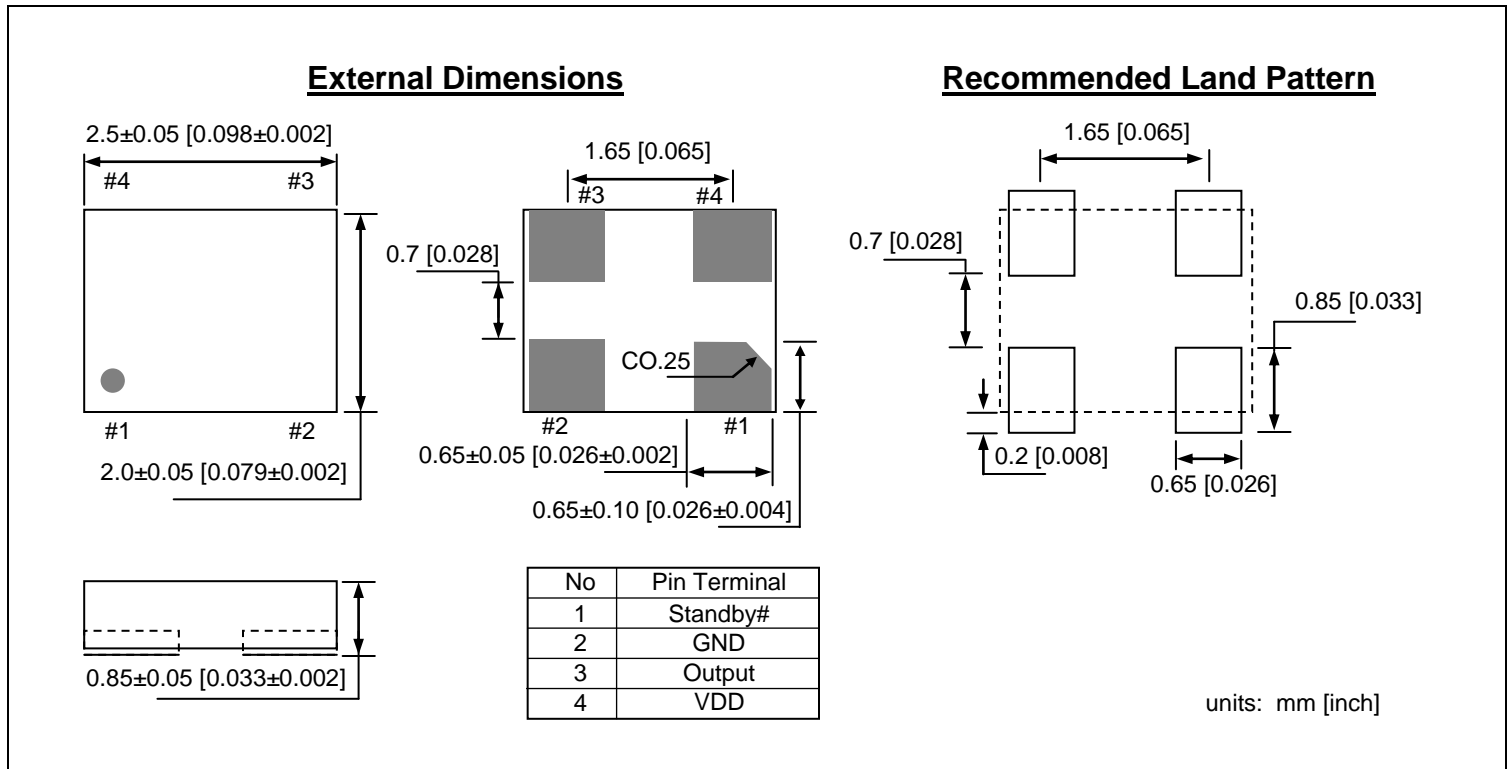
5.0 x 3.2 mm Plastic Package



3.2 x 2.5 mm Plastic Package



2.5 x 2.0 mm Plastic Package



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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