



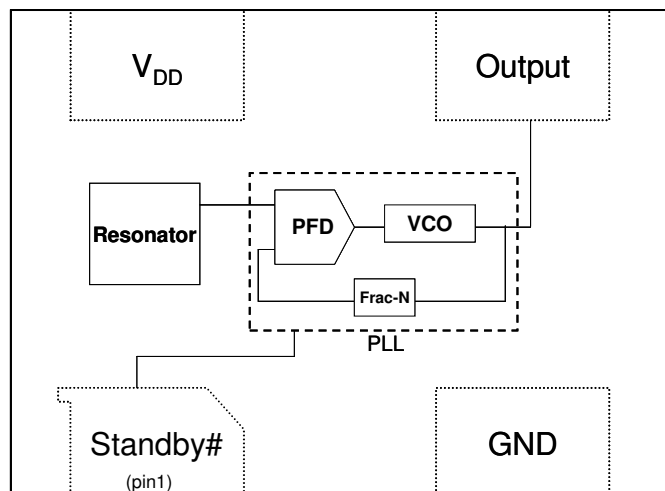
General Description

The DSC8001 is a programmable silicon MEMS based CMOS oscillator offering excellent jitter and stability performance over a wide range of supply voltages and temperatures. The device operates from 1 to 150MHz in increments of 100Hz (up to four decimal point resolution) with supply voltages between 1.8 to 3.3 Volts and extended temperatures from -40°C to 105°C.

The DSC8001 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 DSC8001 ideal for rugged, industrial, and portable applications where stress, shock, and vibration can damage quartz crystal based systems.

Available in industry standard packages, the DSC8001 can be "dropped-in" to the same PCB footprint as standard crystal oscillators.

Block Diagram



Features

- Frequency Range: Programmable from 1 to 150MHz
- Exceptional Stability over Temperature
 - ±10 PPM, ±25 PPM, ±50 PPM
- Operating voltage
 - 1.7 to 3.6V
- Operating Temperature Range
 - Ext. Industrial -40°C to 105°C
 - Industrial -40°C to 85°C
 - Ext. Commercial -20°C to 70°C
 - Commercial 0°C to 70°
- Low Operating and Standby Current
 - 5mA Operating (40MHz)
 - 15uA 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

Benefits

- Pin for pin "drop in" replacement for industry standard oscillators
- Semiconductor level reliability, significantly higher than quartz
- Frequency Resolution to 4 decimals
- Short mass production lead-times
- Longer Battery Life / Reduced Power
- Compact Plastic package
- Cost Effective

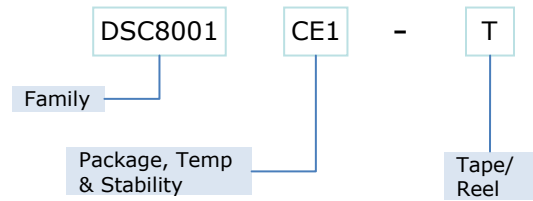
Applications

- Mobile Applications
- Consumer Electronics
- Portable Electronics
- DVR, CCTV, Surveillance Cameras
- Low Profile Applications
- Industrial

Absolute Maximum Ratings¹

| 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 | | 4000 | | |
| MM | | 200 | | |
| CDM | | 1500 | | |

Ordering Code



* See Ordering Information for details

Recommended Operating Conditions

| Parameter | Symbol | Range |
|-----------------------|-----------------|----------------|
| Supply Voltage | V _{DD} | 1.7 – 3.6V |
| Output Load | Z _L | R>10KΩ, C≤15pF |
| Operating Temperature | T | -40 to +105 °C |
| Option 1 | | -40 to +85 °C |
| Option 2 | | -20 to +70 °C |
| Option 3 | | 0 to +70 °C |

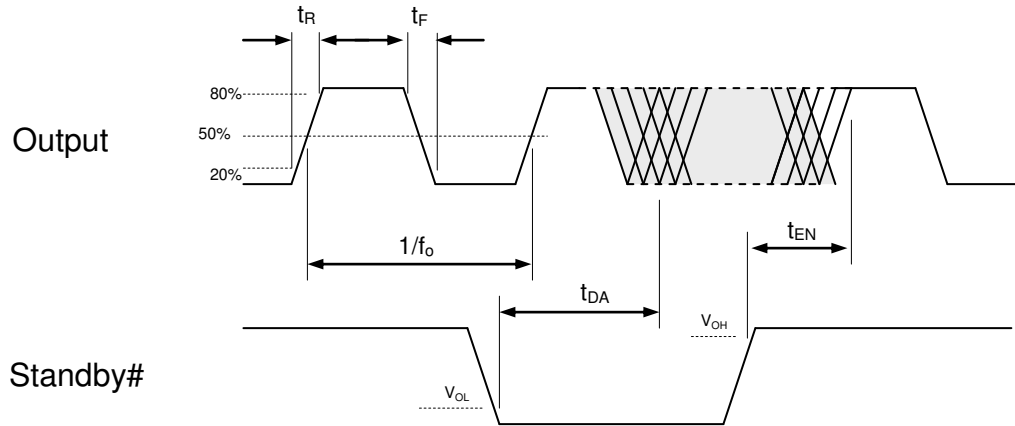
Specifications

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|------------------------------------|--|--|------------------|--|-------|
| Frequency | f ₀ | Single Frequency | 1 | | 150 | MHz |
| Frequency Tolerance Ext. Industrial Industrial Extended Commercial Commercial | Δf | Includes frequency variations due to initial tolerance, temperature and power supply voltage | | | ±25,±50 ±10,±25,±50 ±10,±25,±50 ±10,±25,±50 | ppm |
| Aging | Δf | 1 year @25°C | | | ±5 | ppm |
| Supply Current, no load | I _{DD} | C _L =0p R _L =∞ T=25°C V=1.8V | 1 to 40MHz 40 to 80MHz 80 to 125MHz 125 to 150MHz | 5 6 7 8 | 12 | mA |
| Supply Current, standby | I _{DD} | T=25°C | | | 15 | uA |
| Output Logic Levels Output logic high Output logic low | V _{OH} V _{OL} | -4mA 4mA | 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} | | 1.0 1.0 | 3 3 | ns |
| Output Startup Time ² | t _{SU} | T=25°C | | 3 | 8 | 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 | | 50 | | 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...

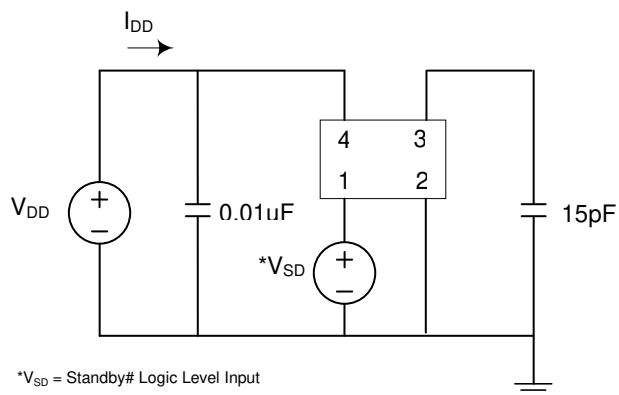
Output Waveform



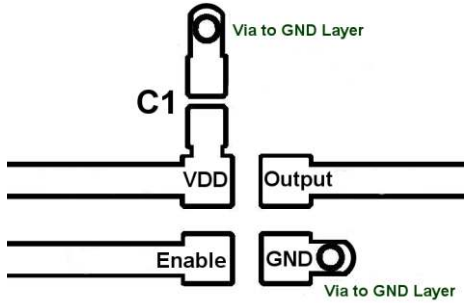
Standby Function

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

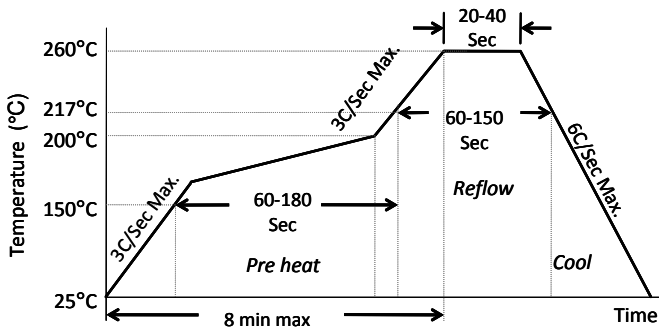
Test Circuit



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]
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]
0.85±0.05 [0.033±0.002]

Recommended Land Pattern*

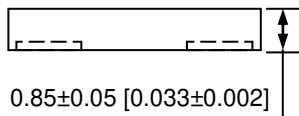
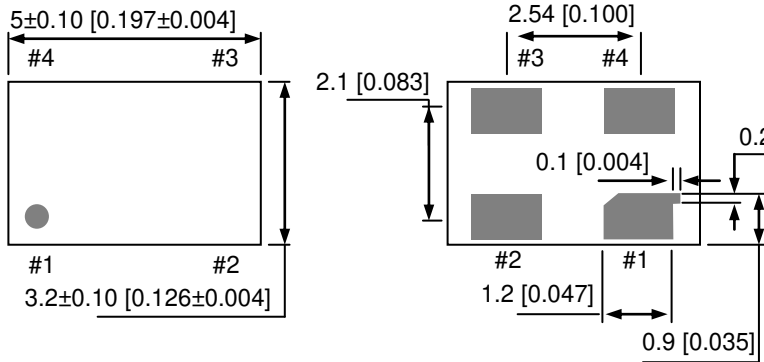
5.08 [0.200]
2.6 [0.102]
1.4 [0.055]
0.2 [0.008]
1.4 [0.055]

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

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

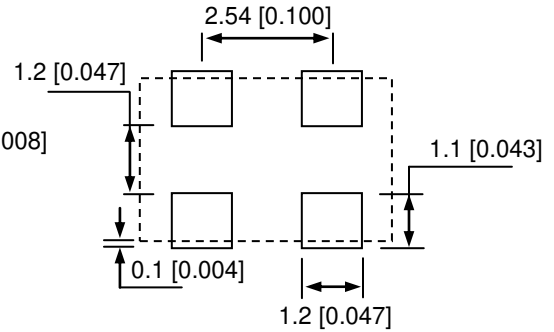
5.0 x 3.2 mm Plastic Package

External Dimensions



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

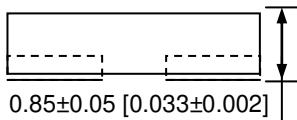
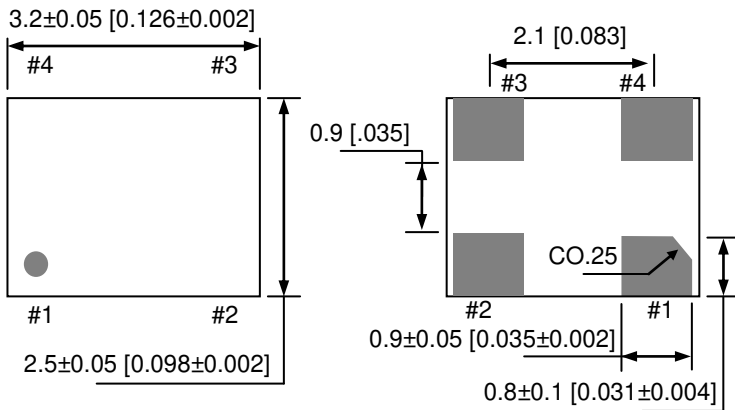
Recommended Land Pattern



units: mm [inch]

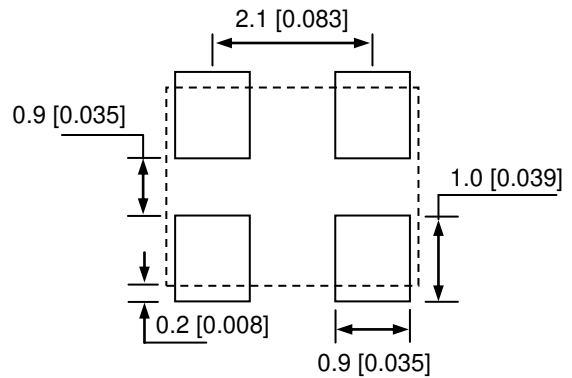
3.2 x 2.5 mm Plastic Package

External Dimensions



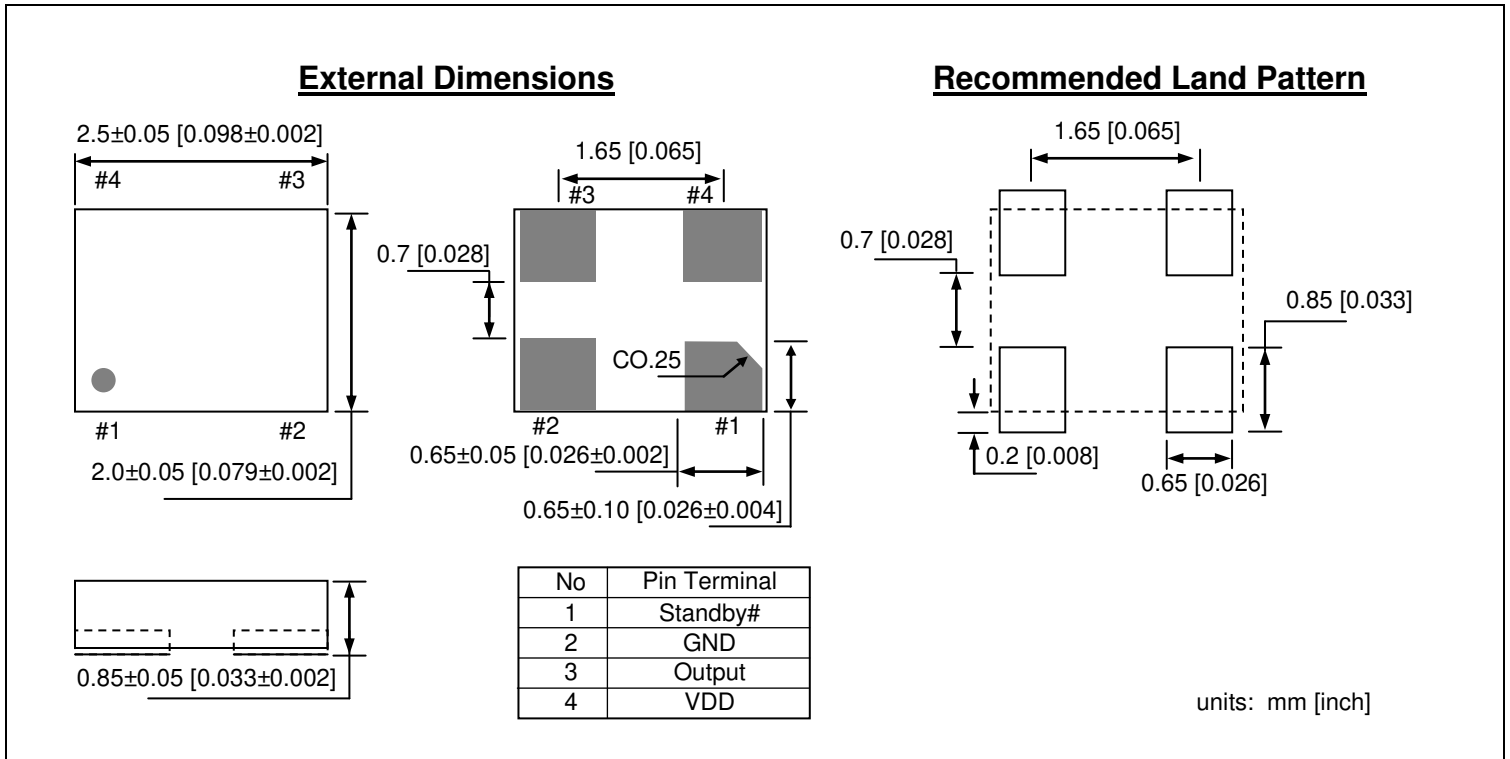
| No. | Pin Terminal |
|-----|--------------|
| 1 | Standby# |
| 2 | GND |
| 3 | Output |
| 4 | VDD |

Recommended Land Pattern



units: mm [inch]

2.5 x 2.0 mm Plastic Package



Ordering Information

DSC8001 PTS - T

| PART NUMBERING GUIDE | | | |
|--|---|--|--|
| 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 T=L: -40° ~ +105° C | S=1: ±50ppm S=2: ±25ppm S=5: ±10ppm | Blank: Tubes T: Tape & Reel |

Example: DSC8001CE1-T

The example part number above is an unprogrammed oscillator in Plastic 3.2x2.5mm package, with ±50ppm stability over an operating temperature of -20 to +70°C, shipped in Tape and Reel.