DSC1030

3.0V Low-Power CMOS Oscillator

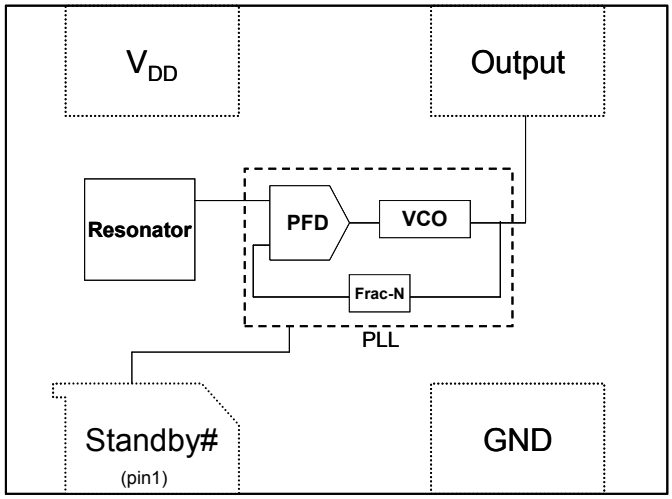
General Description

The DSC1030 is a 3.0V fixed frequency MEMS based PureSilicon™ Oscillator. It can be factory programmed to any frequency from 1 to 150MHz.

The DSC1030 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 DSC1030 ideal for rugged, industrial, and portable applications where stress, shock, and vibration can damage quartz crystal based systems.

Available in industry standard packages, the DSC1030 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
  - 2.7 to 3.3V
- 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

Benefits

- Pin for pin "drop in" replacement for industry standard oscillators
- Semiconductor level reliability, significantly higher than quartz
- Short mass production lead-times
- 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

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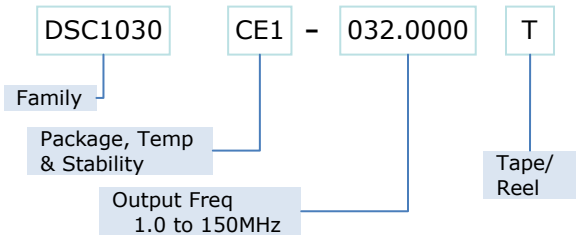
Absolute Maximum Ratings[1]

Item	Min.	Max	Unit	Condition
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 **HBM** **MM** **CDM**	-	 2000 200 500	V	



* See Ordering Information for details

Ordering Code

Recommended Operating Conditions

Parameter	Symbol	Range
Supply Voltage	V_{DD}	2.7 to 3.3V
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			1.5	3	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. t_{SU} is time to stable output frequency after V_{DD} is applied. t_{SU} and t_{EN} (after EN is asserted) are identical values.
3. See typical cycle to cycle jitter graph for frequency dependence.

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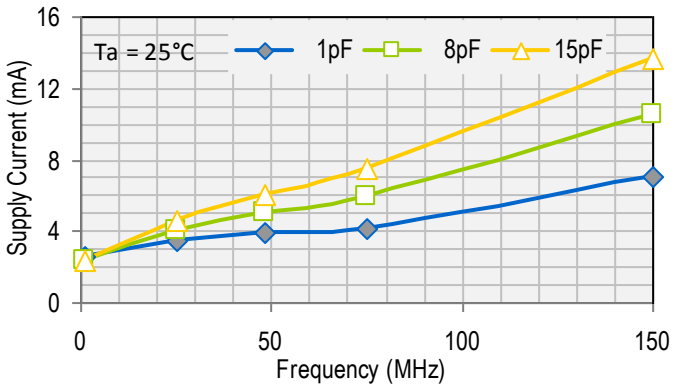
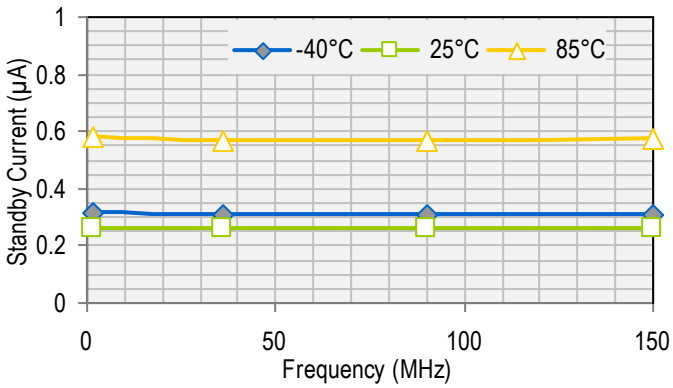
Nominal Performance Characteristics

3.0V Characteristics

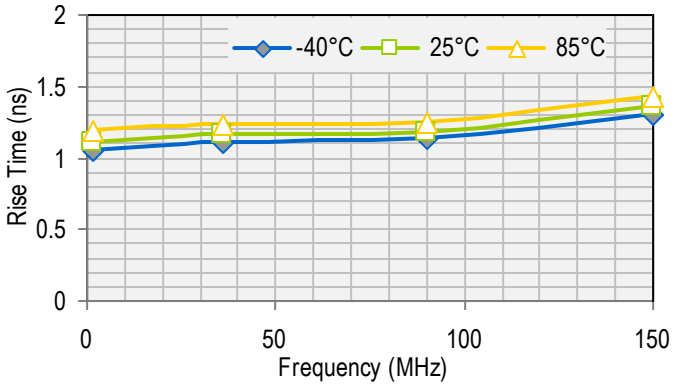
Supply Current



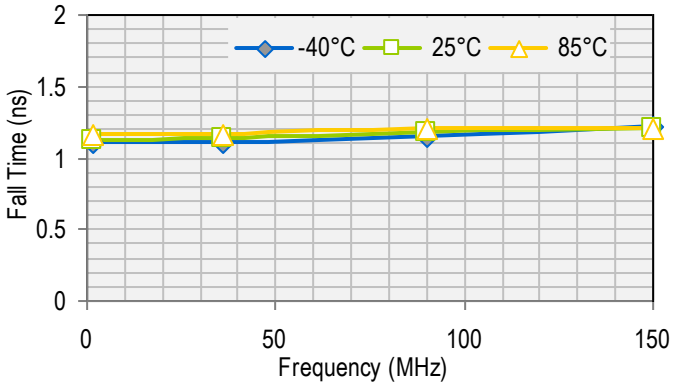
Standby Current



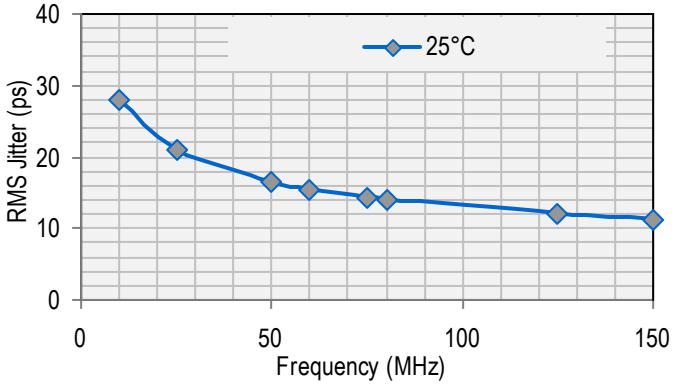
Rise Time



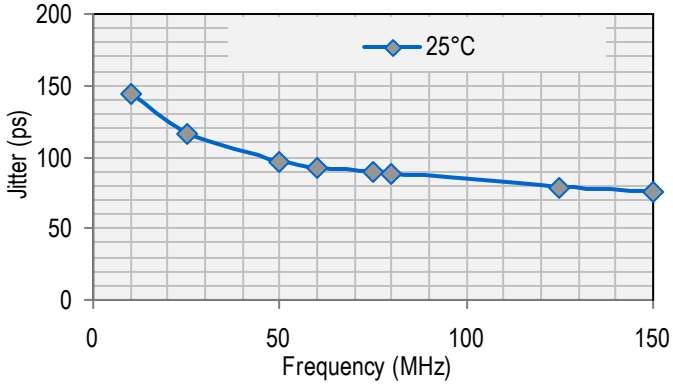
Fall Time



Period Jitter



Cycle to Cycle Jitter



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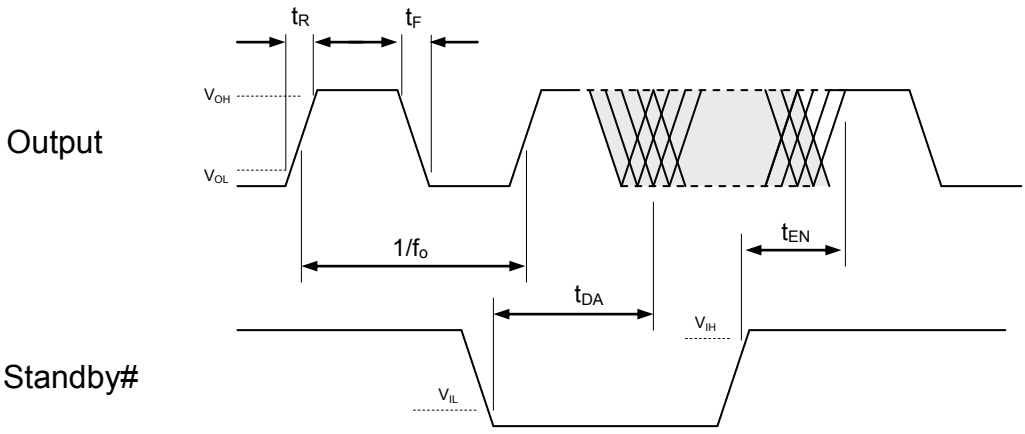
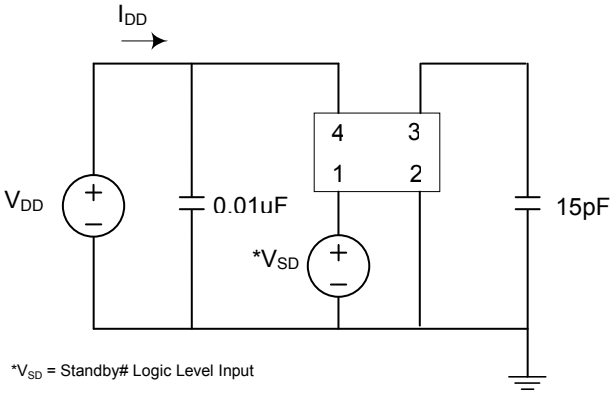
Output Waveform



Standby Function

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

Test Circuit



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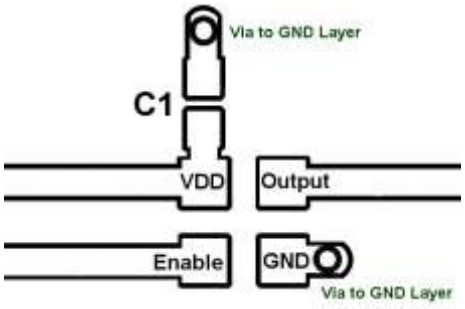
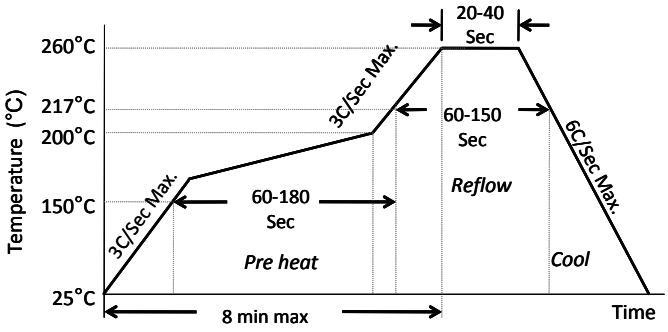
Board Layout (recommended)



Solder Reflow Profile

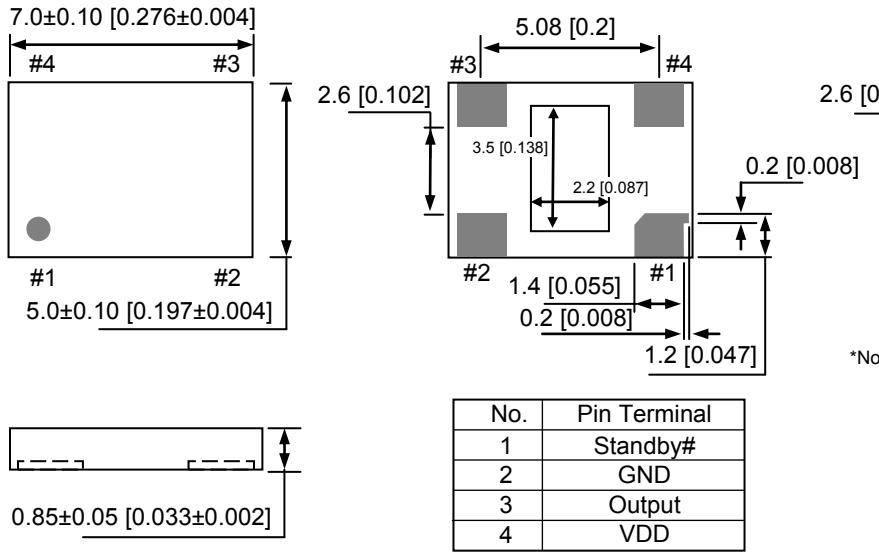


MSL 1 @ 260°C refer to JSTD-020C	
Ramp-Up Rate (200°C to Peak Temp)	3°C/Sec Max.
Preheat Time 150°C to 200°C	60-180 Sec
Time maintained above 217°C	60-150 Sec
Peak Temperature	255-260°C
Time within 5°C of actual Peak	20-40 Sec
Ramp-Down Rate	6°C/Sec Max.
Time 25°C to Peak Temperature	8 min Max.

Package Dimensions

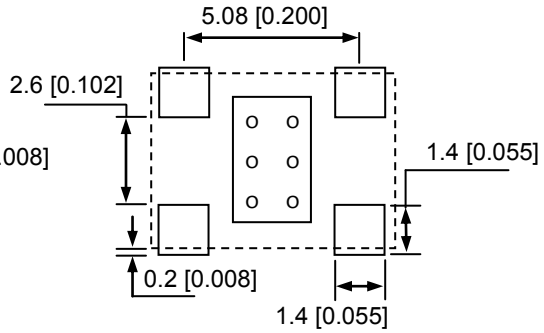
7.0 x 5.0 mm Plastic Package

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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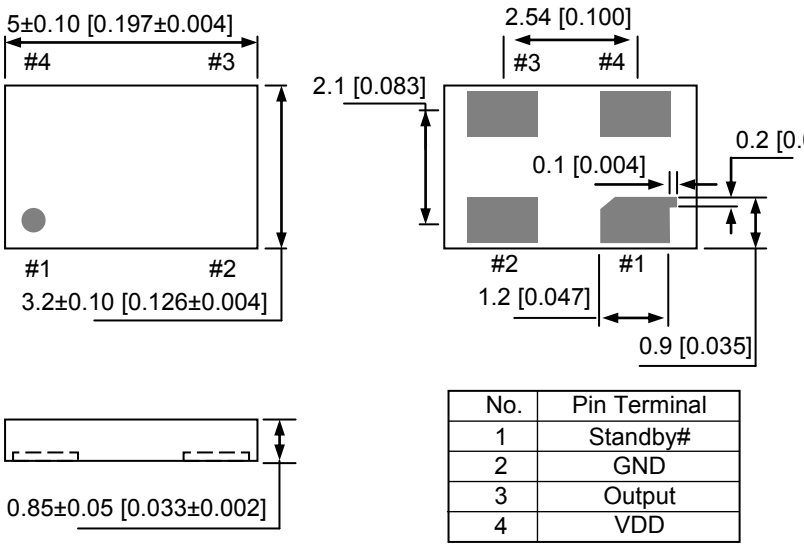
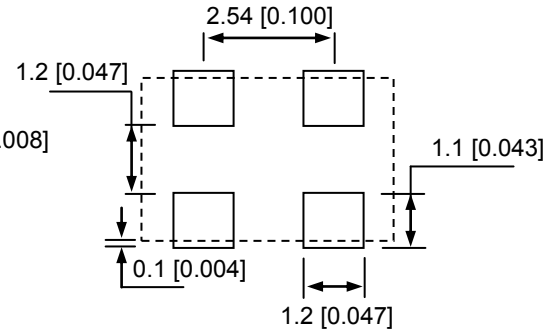
5.0 x 3.2 mm Plastic Package

External Dimensions



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

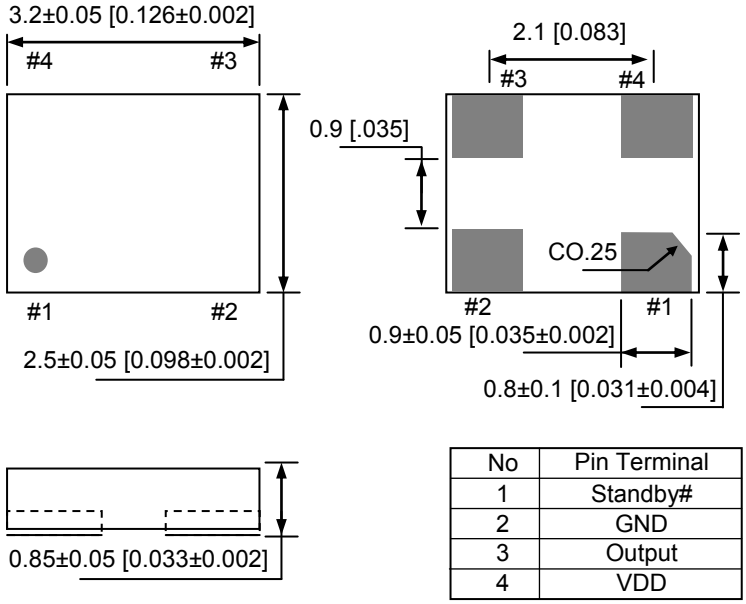
Recommended Land Pattern



units: mm [inch]

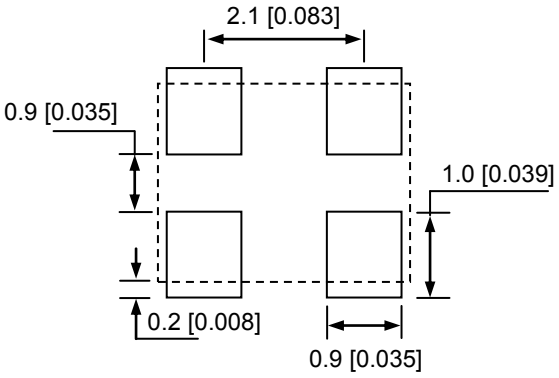
3.2 x 2.5 mm Plastic Package

External Dimensions



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

Recommended Land Pattern



units: mm [inch]

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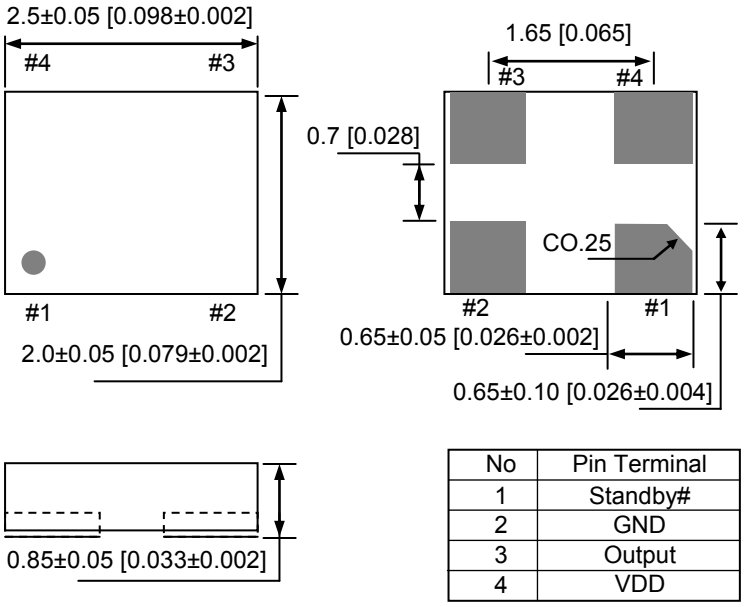
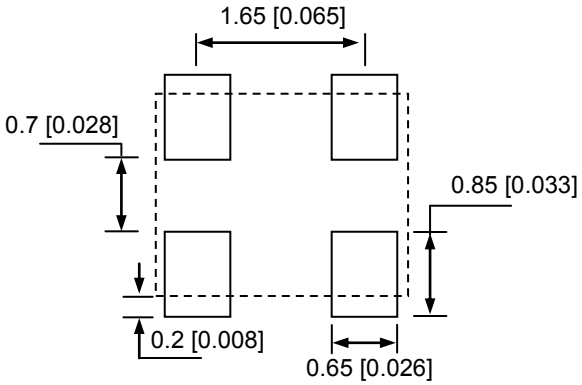
2.5 x 2.0 mm Plastic Package

External Dimensions



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

Recommended Land Pattern



units: mm [inch]

Ordering Information

DSC1030 PTS – xxx.xxxx T

PART NUMBERING GUIDE				
Package (Plastic QFN)	**Temperature**	**Stability**	**Frequency**	**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	**XXX.XXXX** (4 decimal places)	**Blank:** Tubes **T:** Tape & Reel

Example: DSC1030CE1–123.0000T

The example part number above is a 123.0000MHz oscillator in Plastic 3.2x2.5mm package, with ±50ppm stability over an operating temperature of -20 to +70°C, shipped in Tape and Reel. The reel size (7" or 13" diameter) will be determined by the factory based on quantity.

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