

## Ultra-Small, Ultra-Low Power MEMS Oscillator

### Features

- Wide Frequency Range: 2 kHz to 80 MHz
- Ultra-Low Power Consumption: 1.3 mA/1  $\mu$ A (Active/Standby)
- Ultra-Small Footprints
  - 1.6 mm x 1.2 mm
  - 2.0 mm x 1.6 mm
  - 2.5 mm x 2.0 mm
- Frequency Select Input Supports Two Pre-Defined Frequencies
- High Stability:  $\pm 20$  ppm,  $\pm 25$  ppm,  $\pm 50$  ppm
- Wide Temperature Range
  - Automotive:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - Ext. Commercial:  $-20^{\circ}$  to  $+70^{\circ}\text{C}$
- Excellent Shock and Vibration Immunity
  - Qualified to MIL-STD-883
- High Reliability
  - 20x Better MTF Than Quartz Oscillators
- Supply Range of 1.71V to 3.63V
- Short Sample Lead Time: <2 weeks
- Lead Free & RoHS Compliant

### Applications

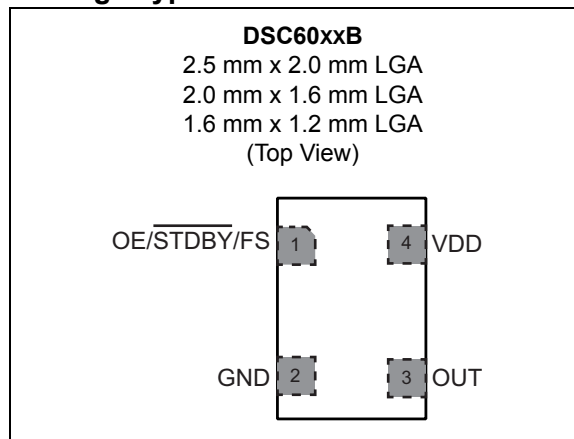
- Low Power/Portable Applications: IoT, Embedded/Smart Devices
- Consumer: Home Healthcare, Fitness Devices, Home Automation
- Automotive: Rear View/Surround View Cameras, Infotainment System (Please refer to DSA60xx Family)
- Industrial: Building/Factory Automation, Surveillance Camera

### General Description

The DSC60xxB family of MEMS oscillators combines industry-leading low-power consumption, ultra-small packages with exceptional frequency stability, and jitter performance over temperature. The single-output DSC60xxB MEMS oscillators are excellent choices for use as clock references in small, battery-powered devices such as wearable and Internet of Things (IoT) devices in which small size, low power consumption, and long-term reliability are paramount. The Automotive Grade AEC-Q100 qualified option is available for this device.

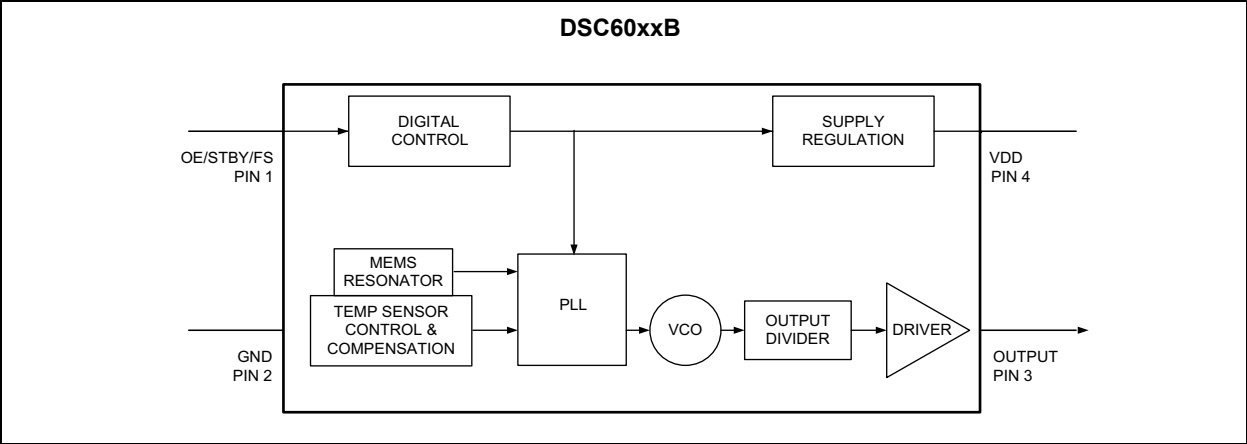
The DSC60xxB family is available in ultra-small 1.6 mm x 1.2 mm, 2.0 mm x 1.6 mm and 2.5 mm x 2.0 mm packages. These packages are “drop-in” replacements for standard 4-pin CMOS quartz crystal oscillators.

### Package Types



# DSC60XXB

## Block Diagram



## 1.0 ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings

|                                  |                             |
|----------------------------------|-----------------------------|
| Supply Voltage .....             | –0.3V to +4.0V              |
| Input Voltage ( $V_{IN}$ ) ..... | –0.3V to $V_{DD}+0.3V$      |
| ESD Protection .....             | 4 kV HBM, 400V MM, 2 kV CDM |

### ELECTRICAL CHARACTERISTICS

| <b>Electrical Characteristics:</b> Unless otherwise indicated, $V_{DD} = 1.8V -5\%$ to $3.3V +10\%$ , $T_A = -40^{\circ}C$ to $+125^{\circ}C$ . |            |                     |      |                                  |            |                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------|------|----------------------------------|------------|------------------------------------------------------------|
| Parameters                                                                                                                                      | Sym.       | Min.                | Typ. | Max.                             | Units      | Conditions                                                 |
| Supply Voltage <a href="#">Note 1</a>                                                                                                           | $V_{DD}$   | 1.71                | —    | 3.63                             | V          | —                                                          |
| Active Supply Current                                                                                                                           | $I_{DD}$   | —                   | 1.3  | —                                | mA         | $F_{OUT} = 24\text{ MHz}$ , $V_{DD} = 1.8V$ , No Load      |
| Power Supply Ramp                                                                                                                               | $t_{PU}$   | 0.1                 | —    | 100                              | ms         | <a href="#">Note 9</a>                                     |
| Standby Supply Current <a href="#">Note 2</a>                                                                                                   | $I_{STBY}$ | —                   | 1.0  | —                                | $\mu A$    | $V_{DD} = 1.8/2.5V$                                        |
|                                                                                                                                                 |            | —                   | 1.5  | —                                |            | $V_{DD} = 3.3V$                                            |
| Frequency                                                                                                                                       | $f_0$      | 0.002               | —    | 80                               | MHz        | —                                                          |
| Frequency Stability <a href="#">Note 3</a>                                                                                                      | $\Delta f$ | —                   | —    | $\pm 20$<br>$\pm 25$<br>$\pm 50$ | ppm        | All temp ranges                                            |
| Aging                                                                                                                                           | $\Delta f$ | —                   | —    | $\pm 5$                          | ppm        | 1st year @25°C                                             |
|                                                                                                                                                 |            | —                   | —    | $\pm 1$                          |            | Per year after first year                                  |
| Startup Time                                                                                                                                    | $t_{SU}$   | —                   | —    | 1.5                              | ms         | From 90% $V_{DD}$ to valid clock output, $T = 25^{\circ}C$ |
| Input Logic Levels <a href="#">Note 4</a>                                                                                                       | $V_{IH}$   | $0.7 \times V_{DD}$ | —    | —                                | V          | Input Logic High                                           |
|                                                                                                                                                 | $V_{IL}$   | —                   | —    | $0.3 \times V_{DD}$              | V          | Input Logic Low                                            |
| Output Disable Time <a href="#">Note 5</a>                                                                                                      | $t_{DA}$   | —                   | —    | 200 +<br>2 Periods               | ns         | —                                                          |
| Output Enable Time <a href="#">Note 6</a>                                                                                                       | $t_{EN}$   | —                   | —    | 1                                | $\mu s$    | —                                                          |
| Enable Pull-Up Resistor <a href="#">Note 7</a>                                                                                                  | —          | —                   | 300  | —                                | k $\Omega$ | If configured                                              |
| Output Logic Levels, Low Drive                                                                                                                  | $V_{OH}$   | $0.8 \times V_{DD}$ | —    | —                                | V          | Output Logic High, $I = 1\text{ mA}$                       |
|                                                                                                                                                 | $V_{OL}$   | —                   | —    | $0.2 \times V_{DD}$              | V          | Output Logic Low, $I = -1\text{ mA}$                       |

- Note 1:** Pin 4  $V_{DD}$  should be filtered with 0.1  $\mu F$  capacitor.
- 2:** Not including current through pull-up resistor on EN pin (if configured).
- 3:** Includes frequency variations due to initial tolerance, temp. and power supply voltage.
- 4:** Input waveform must be monotonic with rise/fall time < 10 ms
- 5:** Output Disable time takes up to two periods of the output waveform + 200 ns.
- 6:** For parts configured with OE, not Standby.
- 7:** Output is enabled if pad is floated or not connected.
- 8:** Output Duty Cycle will be 40% to 60% when output frequency is between 40 MHz to 60 MHz.
- 9:** Time to reach 90% of target  $V_{DD}$ . Power ramp rise must be monotonic.
- 10:** Peak-to-peak period jitter is measured over 10,000 cycles.

# DSC60XXB

## ELECTRICAL CHARACTERISTICS (CONTINUED)

| Electrical Characteristics: Unless otherwise indicated, $V_{DD} = 1.8V -5\%$ to $3.3V +10\%$ , $T_A = -40^{\circ}C$ to $+125^{\circ}C$ . |                 |      |      |      |       |                                                                              |                      |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|------|------|-------|------------------------------------------------------------------------------|----------------------|
| Parameters                                                                                                                               | Sym.            | Min. | Typ. | Max. | Units | Conditions                                                                   |                      |
| Output Transition Time<br>Rise Time/Fall Time                                                                                            | $t_{RX}/t_{FX}$ | —    | 2.5  | 3.5  | ns    | DSC60x3B<br>Low Drive,<br>20% to 80%<br>$C_L = 5\text{ pF}$                  | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                 | —    | 1.5  | 2.2  |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |
|                                                                                                                                          | $t_{RY}/t_{FY}$ | —    | 1.2  | 2.0  | ns    | DSC60x1B<br>Std. Drive,<br>20% to 80%<br>$C_L = 10\text{ pF}$                | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                 | —    | 0.6  | 1.2  |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |
| Output Duty Cycle <a href="#">Note 8</a>                                                                                                 | SYM             | 45   | —    | 55   | %     | —                                                                            |                      |
| Period Jitter, RMS                                                                                                                       | $J_{PER}$       | —    | 28   | —    | ps    | DSC60x3B<br>Low Drive,<br>$F_{OUT} = 27\text{ MHz}$<br>$C_L = 5\text{ pF}$   | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                 | —    | 23   | —    |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |
|                                                                                                                                          |                 | —    | 20   | —    |       | DSC60x1B<br>Std. Drive,<br>$F_{OUT} = 27\text{ MHz}$<br>$C_L = 10\text{ pF}$ | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                 | —    | 18   | —    |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |
| Cycle-to-Cycle Jitter, Peak                                                                                                              | $J_{Cy-Cy}$     | —    | 120  | —    | ps    | DSC60x3B<br>Low Drive,<br>$F_{OUT} = 27\text{ MHz}$<br>$C_L = 5\text{ pF}$   | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                 | —    | 90   | —    |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |
|                                                                                                                                          |                 | —    | 115  | —    |       | DSC60x1B<br>Std. Drive,<br>$F_{OUT} = 27\text{ MHz}$<br>$C_L = 10\text{ pF}$ | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                 | —    | 90   | —    |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |

- Note 1:** Pin 4  $V_{DD}$  should be filtered with 0.1  $\mu F$  capacitor.  
**2:** Not including current through pull-up resistor on EN pin (if configured).  
**3:** Includes frequency variations due to initial tolerance, temp. and power supply voltage.  
**4:** Input waveform must be monotonic with rise/fall time < 10 ms  
**5:** Output Disable time takes up to two periods of the output waveform + 200 ns.  
**6:** For parts configured with OE, not Standby.  
**7:** Output is enabled if pad is floated or not connected.  
**8:** Output Duty Cycle will be 40% to 60% when output frequency is between 40 MHz to 60 MHz.  
**9:** Time to reach 90% of target  $V_{DD}$ . Power ramp rise must be monotonic.  
**10:** Peak-to-peak period jitter is measured over 10,000 cycles.

## ELECTRICAL CHARACTERISTICS (CONTINUED)

| Electrical Characteristics: Unless otherwise indicated, $V_{DD} = 1.8V -5\%$ to $3.3V +10\%$ , $T_A = -40^{\circ}C$ to $+125^{\circ}C$ . |                |      |      |      |       |                                                                              |                      |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------|------|------|------|-------|------------------------------------------------------------------------------|----------------------|
| Parameters                                                                                                                               | Sym.           | Min. | Typ. | Max. | Units | Conditions                                                                   |                      |
| Period Jitter,<br>Peak-to-Peak, <a href="#">Note 10</a>                                                                                  | $J_{PERPK-PK}$ | —    | 210  | —    | ps    | DSC60x3B<br>Low Drive,<br>$F_{OUT} = 27\text{ MHz}$<br>$C_L = 5\text{ pF}$   | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                | —    | 190  | —    |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |
|                                                                                                                                          |                | —    | 160  | —    |       | DSC60x1B<br>Std. Drive,<br>$F_{OUT} = 27\text{ MHz}$<br>$C_L = 10\text{ pF}$ | $V_{DD} = 1.8V$      |
|                                                                                                                                          |                | —    | 144  | —    |       |                                                                              | $V_{DD} = 2.5V/3.3V$ |

- Note 1:** Pin 4  $V_{DD}$  should be filtered with 0.1  $\mu F$  capacitor.
- 2:** Not including current through pull-up resistor on EN pin (if configured).
- 3:** Includes frequency variations due to initial tolerance, temp. and power supply voltage.
- 4:** Input waveform must be monotonic with rise/fall time < 10 ms
- 5:** Output Disable time takes up to two periods of the output waveform + 200 ns.
- 6:** For parts configured with OE, not Standby.
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- 8:** Output Duty Cycle will be 40% to 60% when output frequency is between 40 MHz to 60 MHz.
- 9:** Time to reach 90% of target  $V_{DD}$ . Power ramp rise must be monotonic.
- 10:** Peak-to-peak period jitter is measured over 10,000 cycles.

# DSC60XXB

## TEMPERATURE SPECIFICATIONS (Note 1)

| Parameters                        | Sym.  | Min. | Typ. | Max. | Units | Conditions   |
|-----------------------------------|-------|------|------|------|-------|--------------|
| <b>Temperature Ranges</b>         |       |      |      |      |       |              |
| Maximum Junction Temperature      | $T_J$ | —    | —    | +150 | °C    | —            |
| Storage Ambient Temperature Range | $T_S$ | –55  | —    | +150 | °C    | —            |
| Soldering Temperature             | —     | —    | +260 | —    | °C    | 40 sec. max. |

**Note 1:** The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e.,  $T_A$ ,  $T_J$ ,  $\theta_{JA}$ ). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +150°C rating. Sustained junction temperatures above +150°C can impact the device reliability.

## 2.0 PIN DESCRIPTIONS

The DSC60xxB is a highly configurable device and can be factory programmed in many different ways to meet the customer's needs. Microchip's ClockWorks® Configurator <http://clockworks.microchip.com/Timing/> must be used to choose the necessary options, create the final part number, data sheet, and order samples. The descriptions of the pins are listed in Table 2-1.

**TABLE 2-1: DSC60XXB PIN FUNCTION TABLE**

| Pin Number | Pin Name                  | Description                                                               |
|------------|---------------------------|---------------------------------------------------------------------------|
| 1          | OE                        | Output Enable: H = Active, L = Disabled (High Impedance).                 |
|            | $\overline{\text{STDBY}}$ | Standby: H = Device is active, L = Device is in standby (Low Power Mode). |
|            | FS                        | Frequency Select: H = Output Frequency 1, L = Output Frequency 2.         |
| 2          | GND                       | Ground.                                                                   |
| 3          | OUTPUT                    | Oscillator clock output                                                   |
| 4          | VDD                       | Power Supply: 1.71V to 3.63V.                                             |

An explanation of the different options listed in Table 2-1 follows.

### 2.1 Pin 1

This is a control pin and may be configured to fulfill one of six different functions. If not actively driven, a 10 k $\Omega$  pull-up resistor is recommended.

#### 2.1.1 OUTPUT ENABLE (OE)

Pin 1 may be configured as OE. Oscillator output may be turned on and off according to the state of this pin.

#### 2.1.2 $\overline{\text{STDBY}}$

Pin 1 may be configured as Standby. When the pin is low, both output buffer and PLL will be off and the device will enter a low power mode.

#### 2.1.3 FREQUENCY SELECT (FS)

Pin 1 may be configured as FS. The output may be set to one of two pre-programmed frequencies. The output clock frequencies can only be set to either kHz or MHz. A combination of kHz and MHz cannot be set.

### 2.2 Pins 2 through 4

Pins 2 and 4 are the supply terminals, GND and VDD respectively. Pin 3 is the clock output, programmable to Standard and Low Drive strength settings. Visit ClockWorks® Configurator to customize your device.

# DSC60XXB

## 3.0 DIAGRAMS

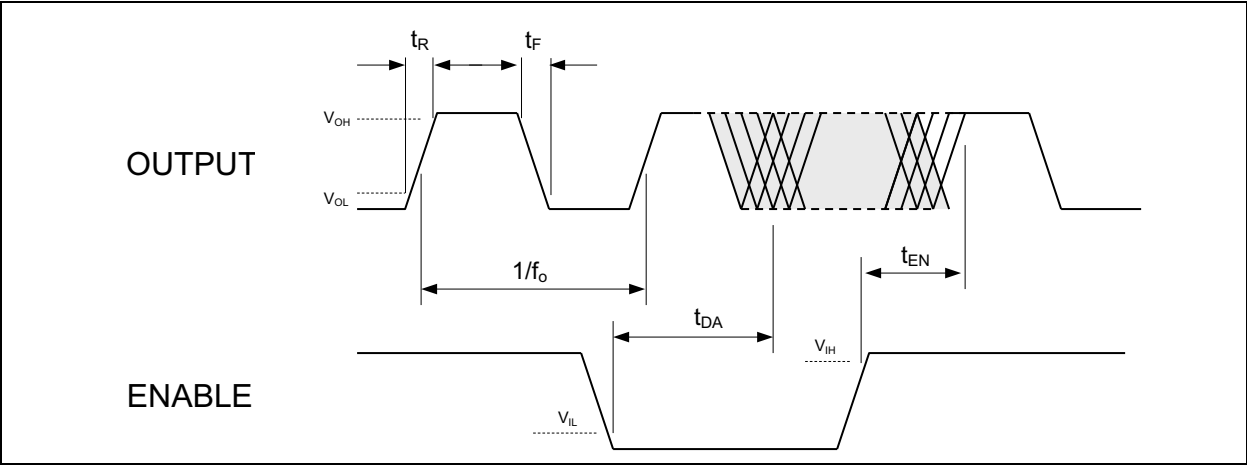


FIGURE 3-1: Output Waveform.

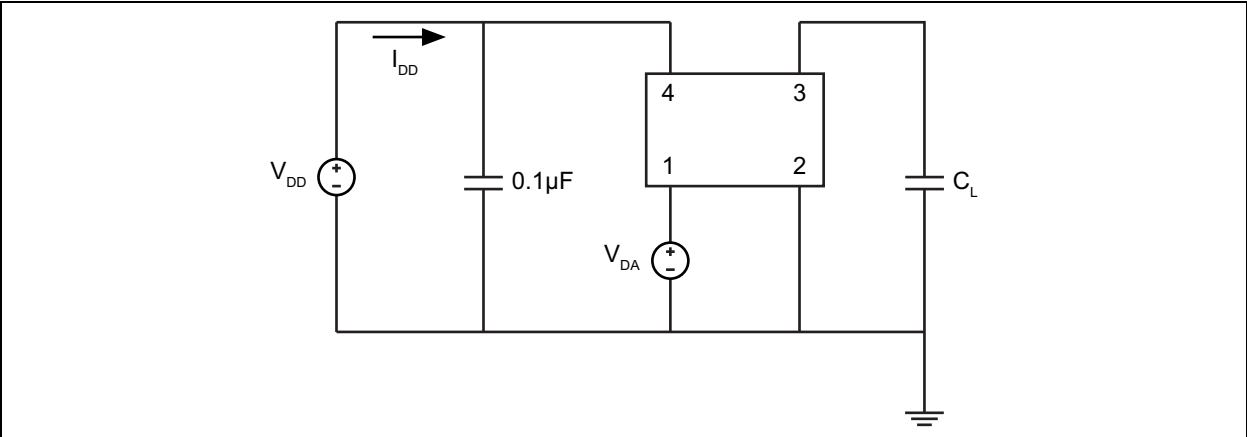


FIGURE 3-2: Test Circuit.

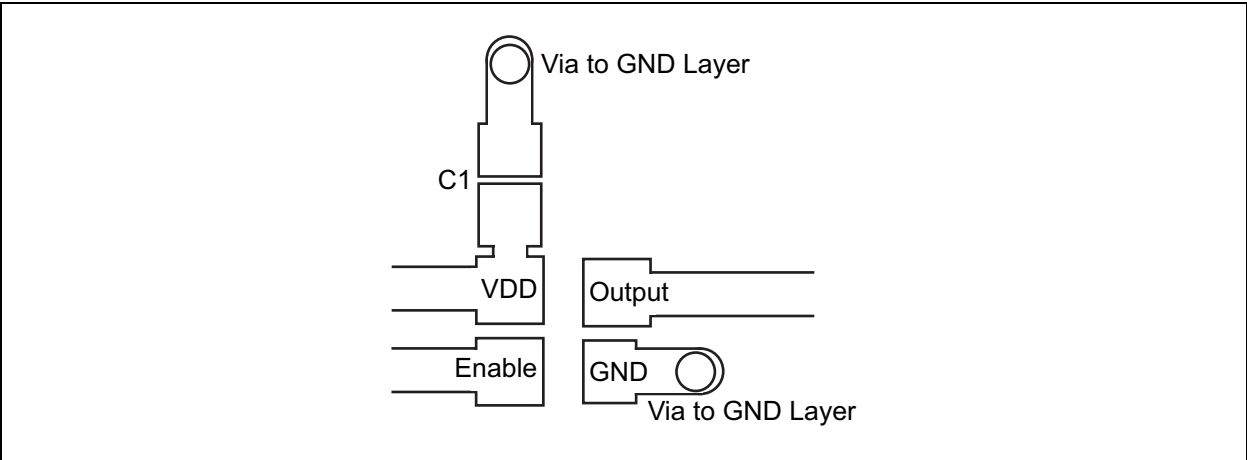
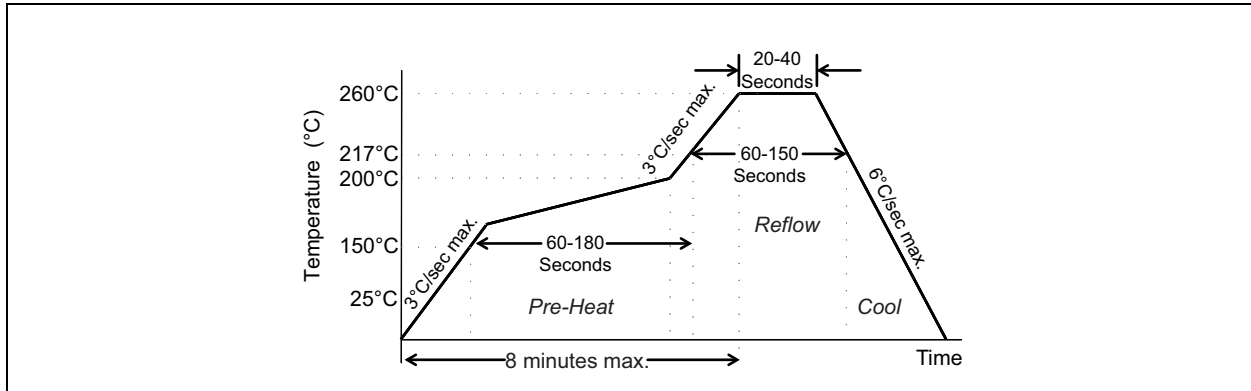


FIGURE 3-3: Recommended Board Layout.



## 4.0 SOLDER REFLOW PROFILE

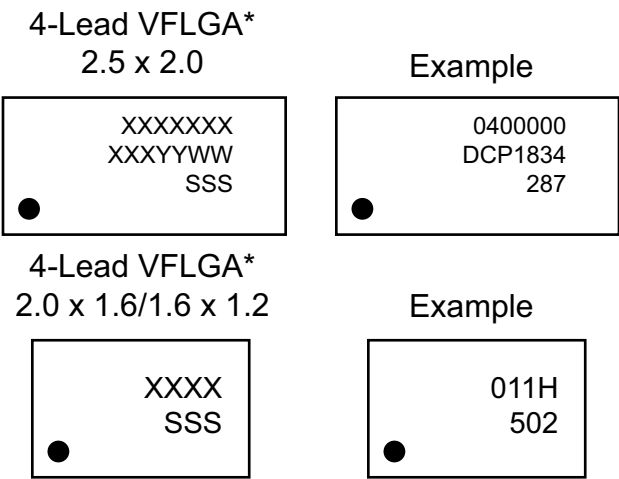


**FIGURE 4-1:** Solder Reflow Profile.

| 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 to 180 sec. |
| Time maintained above 217°C       | 60 to 150 sec. |
| Peak Temperature                  | 255°C to 260°C |
| Time within 5°C of actual Peak    | 20 to 40 sec.  |
| Ramp-Down Rate                    | 6°C/sec. max.  |
| Time 25°C to Peak Temperature     | 8 minutes max. |

5.0 PACKAGING INFORMATION

5.1 Package Marking Information



Legend:

XX...X

Y

YY

WW

SSS

(e3)

\*

Product code or customer-specific information

Year code (last digit of calendar year)

Year code (last 2 digits of calendar year)

Week code (week of January 1 is week '01')

Alphanumeric traceability code

Pb-free JEDEC® designator for Matte Tin (Sn)

This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.

•, ▲, ▼

Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note:

In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

Underbar ( ¯ ) and/or Overbar ( ¯ ) symbol may not be to scale.

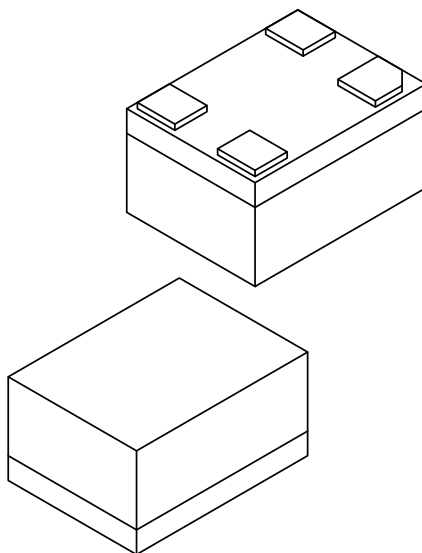


# DSC60XXB

## 4-Lead VFLGA 1.6 mm x 1.2 mm Package Outline

### 4-Lead Very Thin Fine Pitch Land Grid Array (ARA) - 1.6x1.2 mm Body [VFLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



| Units                                |    | MILLIMETERS |       |       |
|--------------------------------------|----|-------------|-------|-------|
| Dimension Limits                     |    | MIN         | NOM   | MAX   |
| Number of Terminals                  | N  | 4           |       |       |
| Terminal Pitch                       | e  | 1.20 BSC    |       |       |
| Terminal Pitch                       | e1 | 0.75 BSC    |       |       |
| Overall Height                       | A  | 0.79        | 0.84  | 0.89  |
| Standoff                             | A1 | 0.00        | 0.02  | 0.05  |
| Substrate Thickness (with Terminals) | A3 | 0.20 REF    |       |       |
| Overall Length                       | D  | 1.60 BSC    |       |       |
| Overall Width                        | E  | 1.20 BSC    |       |       |
| Terminal Width                       | b1 | 0.25        | 0.30  | 0.35  |
| Terminal Width                       | b2 | 0.325       | 0.375 | 0.425 |
| Terminal Length                      | L  | 0.30        | 0.35  | 0.40  |
| Terminal 1 Index Chamfer             | CH | -           | 0.125 | -     |

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

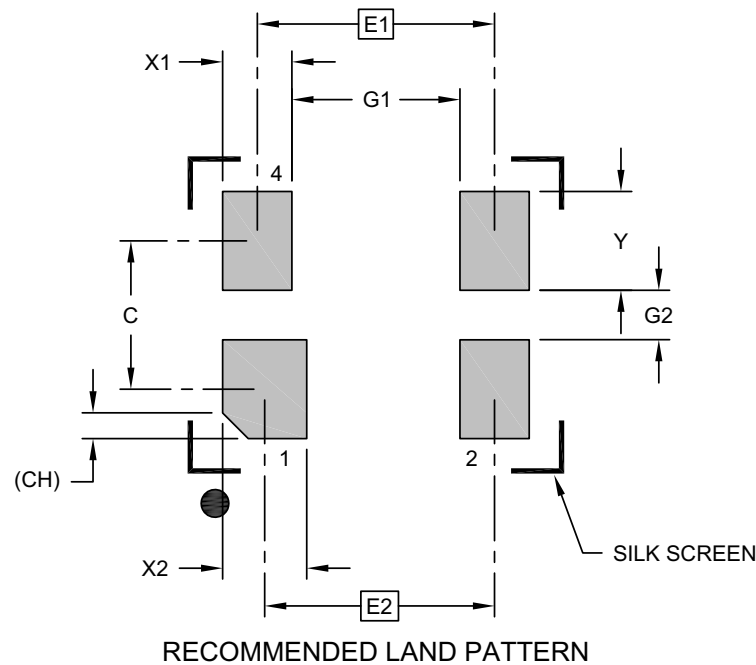
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1199A Sheet 2 of 2

## 4-Lead VFLGA 1.6 mm x 1.2 mm Recommended Land Pattern

### 4-Lead Very Thin Fine Pitch Land Grid Array (ARA) - 1.6x1.2 mm Body [VFLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



|                             |    | Units            | MILLIMETERS    |          |      |
|-----------------------------|----|------------------|----------------|----------|------|
|                             |    | Dimension Limits | MIN            | NOM      | MAX  |
| Contact Pitch               | E1 |                  |                | 1.20 BSC |      |
| Contact Pitch               | E2 |                  |                | 1.16 BSC |      |
| Contact Spacing             | C  |                  |                | 0.75     |      |
| Contact Width (X3)          | X1 |                  |                |          | 0.35 |
| Contact Width               | X2 |                  |                |          | 0.43 |
| Contact Pad Length (X6)     | Y  |                  |                |          | 0.50 |
| Space Between Contacts (X4) | G1 |                  | 0.85           |          |      |
| Space Between Contacts (X3) | G2 |                  | 0.25           |          |      |
| Contact 1 Index Chamfer     | CH |                  | 0.13 X 45° REF |          |      |

**Notes:**

1. Dimensioning and tolerancing per ASME Y14.5M  
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

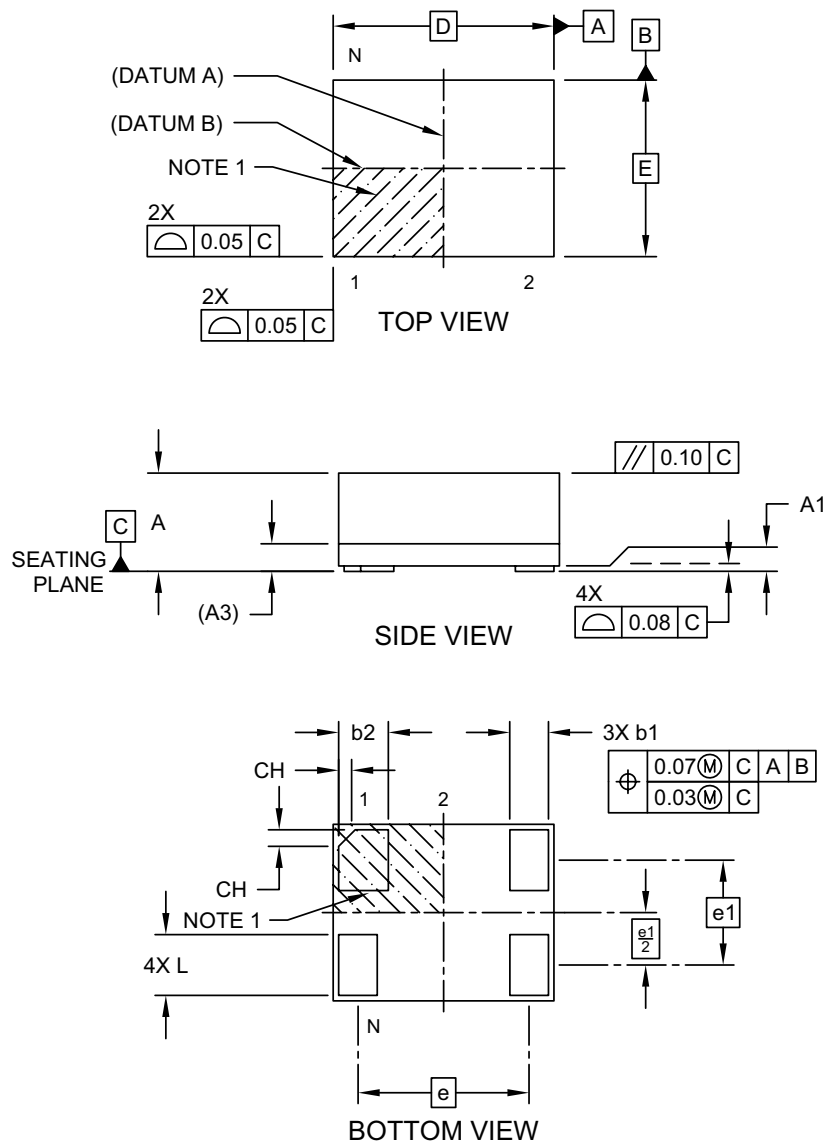
Microchip Technology Drawing C04-3199A

# DSC60XXB

## 4-Lead VFLGA 2.0 mm x 1.6 mm Package Outline

### 4-Lead Very Thin Fine Pitch Land Grid Array (ASA) - 2.0x1.6 mm Body [VFLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

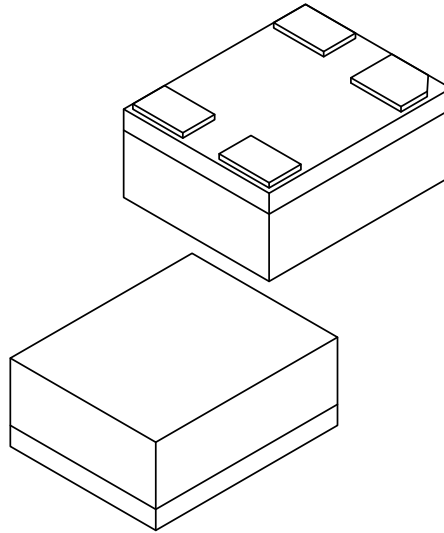


Microchip Technology Drawing C04-1200A Sheet 1 of 2

## 4-Lead VFLGA 2.0 mm x 1.6 mm Package Outline (Continued)

### 4-Lead Very Thin Fine Pitch Land Grid Array (ASA) - 2.0x1.6 mm Body [VFLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



|                                      |    | Units | MILLIMETERS |      |      |
|--------------------------------------|----|-------|-------------|------|------|
| Dimension Limits                     |    |       | MIN         | NOM  | MAX  |
| Number of Terminals                  | N  |       | 6           |      |      |
| Terminal Pitch                       | e  |       | 1.55 BSC    |      |      |
| Terminal Pitch                       | e1 |       | 0.95 BSC    |      |      |
| Overall Height                       | A  |       | 0.79        | 0.84 | 0.89 |
| Standoff                             | A1 |       | 0.00        | 0.02 | 0.05 |
| Substrate Thickness (with Terminals) | A3 |       | 0.20 REF    |      |      |
| Overall Length                       | D  |       | 2.00 BSC    |      |      |
| Overall Width                        | E  |       | 1.60 BSC    |      |      |
| Terminal Width                       | b1 |       | 0.30        | 0.35 | 0.40 |
| Terminal Width                       | b2 |       | 0.40        | 0.45 | 0.50 |
| Terminal Length                      | L  |       | 0.50        | 0.55 | 0.60 |
| Terminal 1 Index Chamfer             | CH |       | -           | 0.15 | -    |

**Notes:**

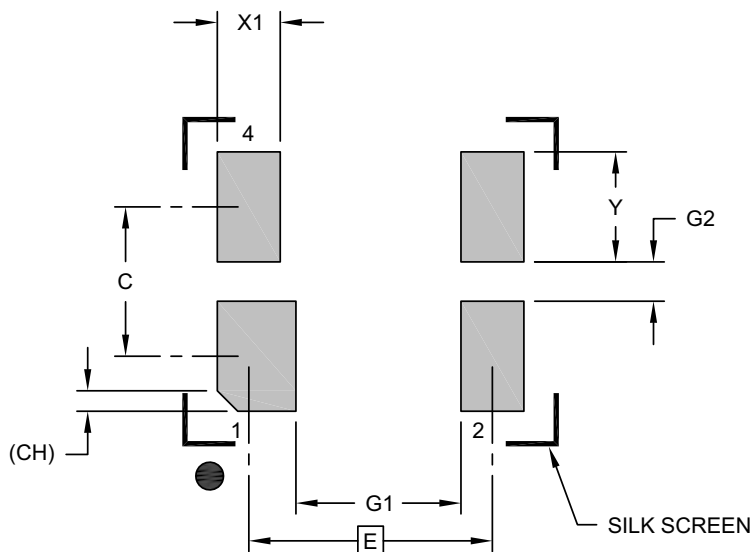
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package is saw singulated
- Dimensioning and tolerancing per ASME Y14.5M
  - BSC: Basic Dimension. Theoretically exact value shown without tolerances.
  - REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1200A Sheet 2 of 2

## 4-Lead VFLGA 2.0 mm x 1.6 mm Package Outline

### 4-Lead Very Thin Fine Pitch Land Grid Array (ASA) - 2.0x1.6 mm Body [VFLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

| Dimension Limits            | Units | MILLIMETERS    |      |      |
|-----------------------------|-------|----------------|------|------|
|                             |       | MIN            | NOM  | MAX  |
| Contact Pitch               | E     | 1.55 BSC       |      |      |
| Contact Spacing             | C     |                | 0.95 |      |
| Contact Width (X4)          | X1    |                |      | 0.50 |
| Contact Width (X2)          | X2    |                |      | 0.40 |
| Contact Pad Length (X6)     | Y     |                |      | 0.70 |
| Space Between Contacts (X4) | G1    | 1.05           |      |      |
| Space Between Contacts (X3) | G2    | 0.25           |      |      |
| Contact 1 Index Chamfer     | CH    | 0.13 X 45° REF |      |      |

#### Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

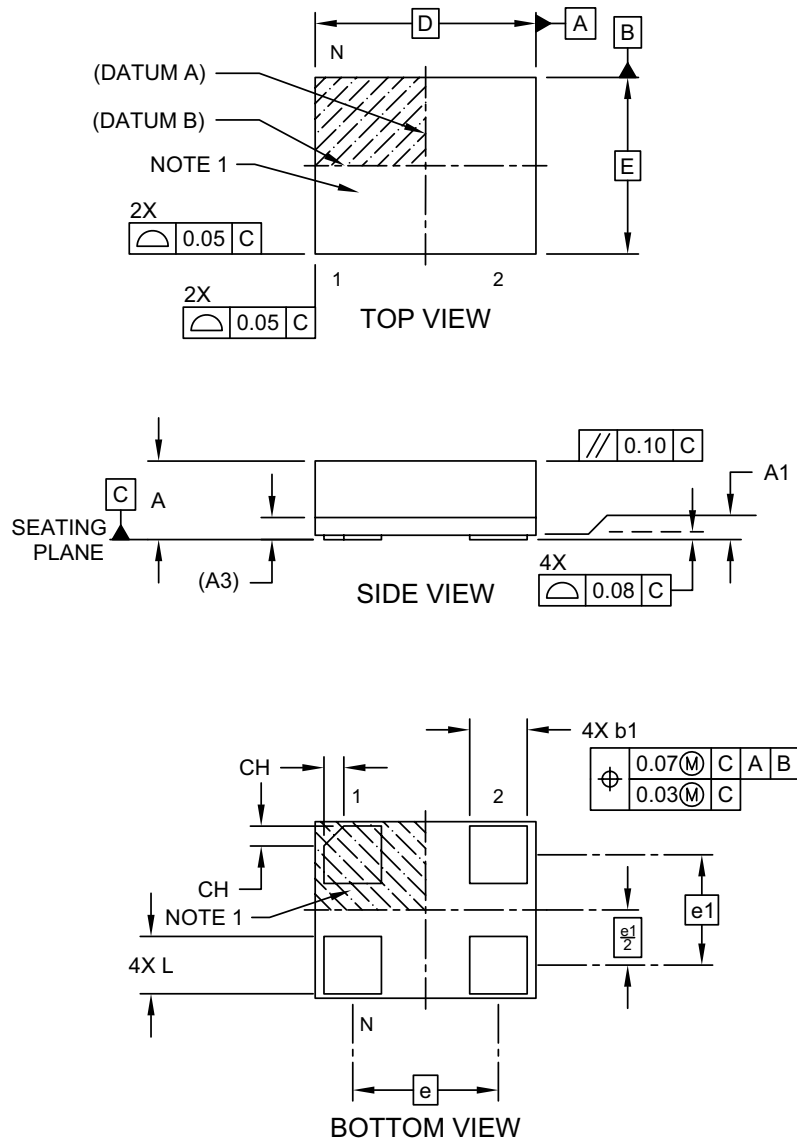
Microchip Technology Drawing C04-3200A



## 4-Lead VLGA 2.5 mm x 2.0 mm Package Outline

### 4-Lead Very Thin Land Grid Array (AUA) - 2.5x2.0 mm Body [VLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

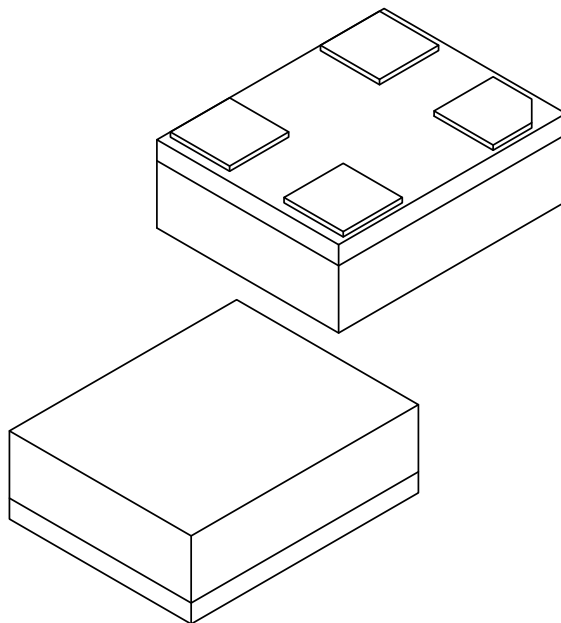


Microchip Technology Drawing C04-1202A Sheet 1 of 2

## 4-Lead VLGA 2.5 mm x 2.0 mm Package Outline (Continued)

### 4-Lead Very Thin Land Grid Array (AUA) - 2.5x2.0 mm Body [VLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



| Units                                |    | MILLIMETERS |       |      |
|--------------------------------------|----|-------------|-------|------|
| Dimension Limits                     |    | MIN         | NOM   | MAX  |
| Number of Terminals                  | N  | 4           |       |      |
| Terminal Pitch                       | e  | 1.65 BSC    |       |      |
| Terminal Pitch                       | e1 | 1.25 BSC    |       |      |
| Overall Height                       | A  | 0.79        | 0.84  | 0.89 |
| Standoff                             | A1 | 0.00        | 0.02  | 0.05 |
| Substrate Thickness (with Terminals) | A3 | 0.20 REF    |       |      |
| Overall Length                       | D  | 2.50 BSC    |       |      |
| Overall Width                        | E  | 2.00 BSC    |       |      |
| Terminal Width                       | b1 | 0.60        | 0.65  | 0.70 |
| Terminal Length                      | L  | 0.60        | 0.65  | 0.70 |
| Terminal 1 Index Chamfer             | CH | -           | 0.225 | -    |

**Notes:**

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package is saw singulated
- Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

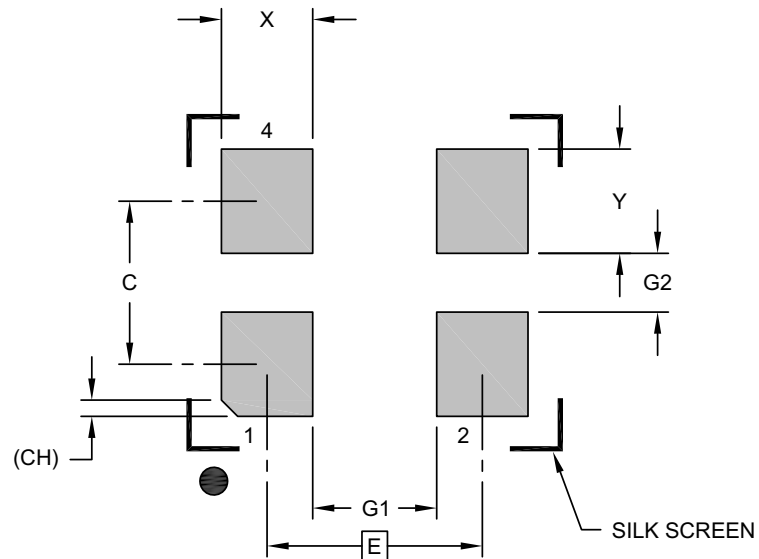
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1202A Sheet 2 of 2

## 4-Lead VLGA 2.5 mm x 2.0 mm Recommended Land Pattern

### 4-Lead Very Thin Land Grid Array (AUA) - 2.5x2.0 mm Body [VLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

| Dimension Limits            | Units | MILLIMETERS    |      |      |
|-----------------------------|-------|----------------|------|------|
|                             |       | MIN            | NOM  | MAX  |
| Contact Pitch               | E     | 1.65 BSC       |      |      |
| Contact Spacing             | C     |                | 1.25 |      |
| Contact Width (X4)          | X     |                |      | 0.70 |
| Contact Pad Length (X6)     | Y     |                |      | 0.80 |
| Space Between Contacts (X4) | G1    | 0.95           |      |      |
| Space Between Contacts (X3) | G2    | 0.45           |      |      |
| Contact 1 Index Chamfer     | CH    | 0.13 X 45° REF |      |      |

**Notes:**

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-3202A

# DSC60XXB

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NOTES:

## APPENDIX A: REVISION HISTORY

### Revision A (January 2019)

- Initial creation of DSC60xxB Microchip data sheet DS20006133A.

# DSC60XXB

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NOTES:

## PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

| PART NO.                                              |                  | X                                                                                                                | X        | X                                     | X                   | X        | X - XXX.XXXX | X             |
|-------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------|---------------------|----------|--------------|---------------|
| Device                                                | Pin 1 Definition | Output Drive Strength                                                                                            | Package  | Temperature Range                     | Frequency Stability | Revision | Frequency    | Tape and Reel |
| <b>Device:</b> DSC60: Ultra-Low Power MEMS Oscillator |                  |                                                                                                                  |          |                                       |                     |          |              |               |
| <b>Pin 1 Definition:</b>                              |                  | Selection                                                                                                        | Pin 1    | Internal Pull-Up Register             |                     |          |              |               |
|                                                       |                  | 0                                                                                                                | OE       | Pull-up                               |                     |          |              |               |
|                                                       |                  | 1                                                                                                                | STDBY    | Pull-up                               |                     |          |              |               |
|                                                       |                  | 2                                                                                                                | FS       | Pull-up                               |                     |          |              |               |
|                                                       |                  | 4                                                                                                                | OE       | None                                  |                     |          |              |               |
|                                                       |                  | 5                                                                                                                | STDBY    | None                                  |                     |          |              |               |
|                                                       |                  | 6                                                                                                                | FS       | None                                  |                     |          |              |               |
| <b>Output Drive Strength:</b>                         |                  | 1                                                                                                                | Standard |                                       |                     |          |              |               |
|                                                       |                  | 3                                                                                                                | Low      |                                       |                     |          |              |               |
| <b>Package:</b>                                       |                  | J                                                                                                                | =        | 4-Lead 2.5 mm x 2.0 mm VLGA           |                     |          |              |               |
|                                                       |                  | M                                                                                                                | =        | 4-Lead 2.0 mm x 1.6 mm VFLGA          |                     |          |              |               |
|                                                       |                  | H                                                                                                                | =        | 4-Lead 1.6 mm x 1.2 mm VFLGA          |                     |          |              |               |
| <b>Temperature Range:</b>                             |                  | A                                                                                                                | =        | -40°C to +125°C (Automotive)          |                     |          |              |               |
|                                                       |                  | L                                                                                                                | =        | -40°C to +105°C (Extended Industrial) |                     |          |              |               |
|                                                       |                  | I                                                                                                                | =        | -40°C to +85°C (Industrial)           |                     |          |              |               |
|                                                       |                  | E                                                                                                                | =        | -20°C to +70°C (Extended Commercial)  |                     |          |              |               |
| <b>Frequency Stability:</b>                           |                  | 1                                                                                                                | =        | ± 50 ppm                              |                     |          |              |               |
|                                                       |                  | 2                                                                                                                | =        | ± 25 ppm                              |                     |          |              |               |
|                                                       |                  | 3                                                                                                                | =        | ± 20 ppm                              |                     |          |              |               |
| <b>Revision:</b>                                      |                  | B                                                                                                                | =        | Revision B                            |                     |          |              |               |
| <b>Frequency:</b>                                     |                  | xxx.xxxx = User-Defined Frequency between 001.0000 MHz and 80.0000 MHz                                           |          |                                       |                     |          |              |               |
|                                                       |                  | xxxkxxx = User-Defined Frequency between 002.000 kHz and 999.999 kHz                                             |          |                                       |                     |          |              |               |
|                                                       |                  | xxxx = Frequency configuration code when pin 1 = FS. Configure the part online through ClockWorks® configurator. |          |                                       |                     |          |              |               |
| <b>Tape and Reel:</b>                                 |                  | <blank>= 140/Tube (J Package Option)                                                                             |          |                                       |                     |          |              |               |
|                                                       |                  | <blank>= 100/Bag (M & H Package Options)                                                                         |          |                                       |                     |          |              |               |
|                                                       |                  | T                                                                                                                | =        | 1,000/Reel                            |                     |          |              |               |
|                                                       |                  | B                                                                                                                | =        | 3,000/Reel                            |                     |          |              |               |

**Examples:**

a) DSC6013JI3B-80.0000:  
Ultra-Low Power MEMS Oscillator, Pin1 = STDBY with Internal Pull-Up, Low Drive Strength, 4-Lead 2.5 mm x 2.0 mm VLGA, Industrial Temperature, ±20 ppm Stability, Revision B, 80 MHz Frequency, 140/Tube

b) DSC6001HE1B-016.0000T:  
Ultra-Low Power MEMS Oscillator, Pin1 = OE with Internal Pull-Up, Standard Drive Strength, 4-Lead 1.6 mm x 1.2 mm VFLGA, Extended Commercial Temp., ±50 ppm Stability, Revision B, 16 MHz Frequency, 1,000/Reel

c) DSC6021MI2B-005Q:  
Ultra-Low Power MEMS Oscillator, Pin1 = Freq. Select with Internal Pull-Up, Standard Drive Strength, 4-Lead 2.0 mm x 1.6 mm VFLGA, Industrial Temperature, ±25 ppm Stability, Revision B, Two Frequencies Configured through ClockWorks, 100/Bag

**Note 1:** Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

### Examples:

- a) DSC6013JI3B-80.0000:  
Ultra-Low Power MEMS Oscillator, Pin1 = STDBY with Internal Pull-Up, Low Drive Strength, 4-Lead 2.5 mm x 2.0 mm VLGA, Industrial Temperature, ±20 ppm Stability, Revision B, 80 MHz Frequency, 140/Tube
- b) DSC6001HE1B-016.0000T:  
Ultra-Low Power MEMS Oscillator, Pin1 = OE with Internal Pull-Up, Standard Drive Strength, 4-Lead 1.6 mm x 1.2 mm VFLGA, Extended Commercial Temp., ±50 ppm Stability, Revision B, 16 MHz Frequency, 1,000/Reel
- c) DSC6021MI2B-005Q:  
Ultra-Low Power MEMS Oscillator, Pin1 = Freq. Select with Internal Pull-Up, Standard Drive Strength, 4-Lead 2.0 mm x 1.6 mm VFLGA, Industrial Temperature, ±25 ppm Stability, Revision B, Two Frequencies Configured through ClockWorks, 100/Bag

**Note 1:** Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

**Note 1:** Please visit Microchip ClockWorks® Configurator Website to configure the part number for customized frequency. <http://clockworks.microchip.com/timing/>.

# DSC60XXB

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NOTES:



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- Microchip is willing to work with the customer who is concerned about the integrity of their code.
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