

Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum for Automotive

Features

- Automotive AEC-Q100 Qualified
- Output Frequency: 1 MHz to 100 MHz LVCMOS
- Spread Spectrum Options:
 - Center-Spread: $\pm 0.25\%$, $\pm 0.5\%$, $\pm 1.0\%$, $\pm 1.5\%$, $\pm 2.0\%$, $\pm 2.5\%$
 - Down-Spread: -0.25% , -0.5% , -1.0% , -1.5% , -2.0% , -3.0%
- Ultra-Low Power Consumption: 3 mA (Active), 1 μ A (Standby)
- Wide Supply Voltage Range: 1.71V ~ 3.63V V_{DD}
- Wide Temperature Range:
 - Automotive Grade 1: -40°C to $+125^{\circ}\text{C}$
 - Automotive Grade 2: -40°C to $+105^{\circ}\text{C}$
 - Automotive Grade 3: -40°C to $+85^{\circ}\text{C}$
- Ultra-Small Package Sizes:
 - 1.6 mm $\times$ 1.2 mm
 - 2.0 mm $\times$ 1.6 mm
 - 2.5 mm $\times$ 2.0 mm
- Excellent Shock and Vibration Immunity
 - Qualified to MIL-STD-883
- High Reliability
 - 20x Better MTBF than Quartz Oscillators
- Lead Free and RoHS Compliant

Applications

- Automotive Infotainment
- Automotive ADAS
- Automotive Camera Module

Benefits

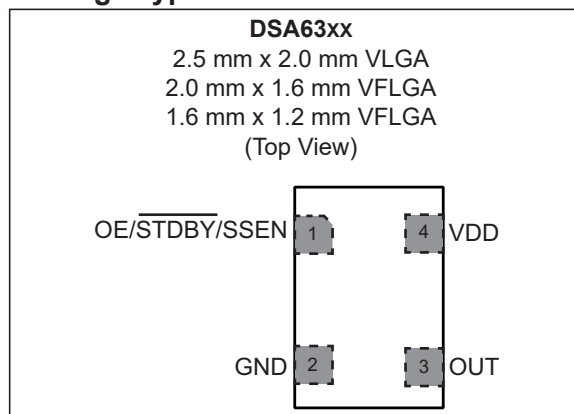
- Replace High-Temperature Crystals and Quartz Oscillators

General Description

The DSA63xx series of clock generators uses a proven silicon MEMS technology to provide excellent frequency stability over a wide range of temperatures as well as small size. Available in three different package sizes with operating current as low as 3 mA, the smallest 4-pin package is a mere 1.6 mm x 1.2 mm in size. The devices support up to $\pm 2.5\%$ or -3% spread spectrum that can achieve up to 15 dB electromagnetic interference (EMI) reduction. Because of industry standard package and pin options, customers can solve last minute EMI problems simply by placing the new DSA63xx on their current board layout with no redesign required.

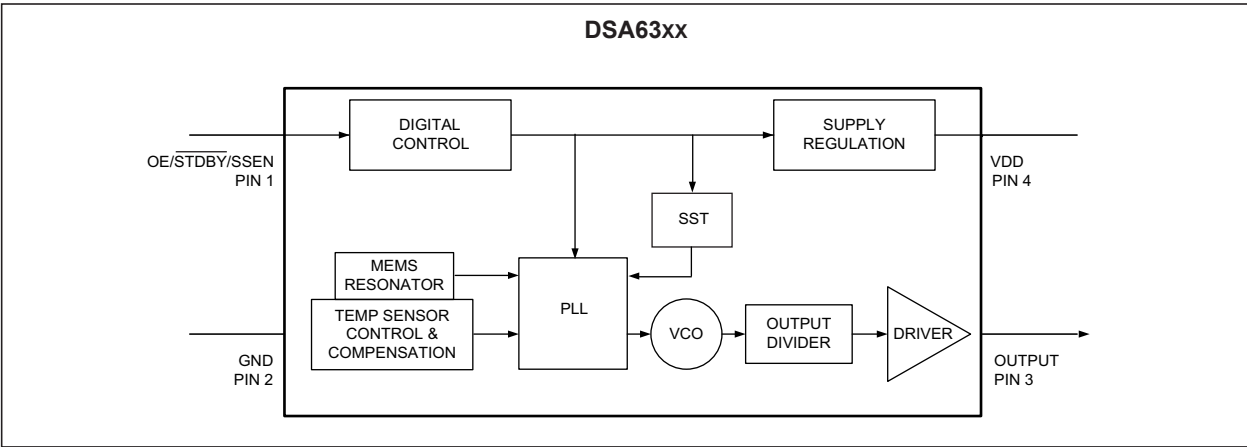
The DSA63xx family is available in 1.6 mm x 1.2 mm and 2.0 mm x 1.6 mm, and 2.5 mm x 2.0 mm packages. These packages are “drop-in” replacements for standard 4-pin CMOS quartz crystal oscillators.

Package Types



DSA63XX

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

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
Supply Voltage	V_{DD}	1.71	—	3.63	V	Note 1
Power Supply Ramp	t_{PU}	0.1	—	100	ms	Note 8
Active Supply Current	I_{DD}	—	3.0	—	mA	$f_{OUT} = 27$ MHz, $V_{DD} = 1.8V$, No Load
Standby Supply Current	I_{STBY}	—	1	—	μA	$V_{DD} = 1.8/2.5V$, Note 2
		—	1.5	—		$V_{DD} = 3.3V$, Note 2
Output Duty Cycle	SYM	45	—	55	%	—
Frequency	f_0	1	—	100	MHz	—
Frequency Stability	Δf	—	—	± 20 ± 25 ± 50	ppm	All temp ranges, Note 3
Aging	Δf	—	—	± 5	ppm	1st year @ $25^{\circ}C$
		—	—	± 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	V_{IH}	$0.7 \times V_{DD}$	—	—	V	Input Logic High, Note 4
	V_{IL}	—	—	$0.3 \times V_{DD}$	V	Input Logic Low, Note 4
Output Disable Time	t_{DA}	—	—	200 + 2 Periods	ns	Note 5
Output Enable Time	t_{EN}	—	—	1	μs	Note 6
OE/ $\overline{STDBY}$ /SS $\overline{EN}$ Pull-up Resistor	—	—	300	—	k Ω	If configured, Note 7

- Note 1:** Pin 4 V_{DD} should be filtered with 0.1 μF 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:** Time to reach 90% of target V_{DD} . Power ramp rise must be monotonic.

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 Logic Levels	V_{OH}	$0.8 \times V_{DD}$	—	—	V	Output Logic High, $I = 3$ mA, Std. Drive	
						Output Logic High, $I = 6$ mA, High Drive	
	V_{OL}	—	—	$0.2 \times V_{DD}$	V	Output Logic Low, $I = -3$ mA, Std. Drive	
						Output Logic Low, $I = -6$ mA, High Drive	
Output Transition Time Rise Time/Fall Time	t_{RX}/t_{FX}	—	1	1.5	ns	DSA61x2 High Drive, 20% to 80% $C_L = 15$ pF	$V_{DD} = 1.8V$
		—	0.5	1.0	ns		$V_{DD} = 2.5V/3.3V$
	t_{RY}/t_{FY}	—	1.2	2.0	ns	DSA61x1 Std Drive, 20% to 80% $C_L = 10$ pF	$V_{DD} = 1.8V$
		—	0.6	1.2	ns		$V_{DD} = 2.5V/3.3V$
Period Jitter, RMS	J_{PER}	—	8.5	—	ps_{RMS}	$f_{OUT} = 27$ MHz, Spread Off	$V_{DD} = 1.8V$
		—	7	—			$V_{DD} = 2.5V/3.3V$
Cycle-to-Cycle Jitter (Peak)	J_{CY-CY}	—	50	70	ps	$f_{OUT} = 27$ MHz, Spread Off	$V_{DD} = 1.8V$
		—	35	60			$V_{DD} = 2.5V/3.3V$
Period Jitter (Peak-to-Peak)	J_{PP}	—	70	—	ps	$f_{OUT} = 27$ MHz, Spread Off	$V_{DD} = 1.8V$
		—	60	—			$V_{DD} = 2.5V/3.3V$
Spread Spectrum Modulation Frequency	f_{SS}	—	33	—	kHz	—	

- Note 1:** Pin 4 V_{DD} should be filtered with 0.1 μF 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:** Time to reach 90% of target V_{DD} . Power ramp rise must be monotonic.

SPREAD SPECTRUM

Ordering Code	Spread Percentage	Spread Type
A	$\pm 0.25\%$	Center-Spread
B	$\pm 0.5\%$	Center-Spread
C	$\pm 1.0\%$	Center-Spread
D	$\pm 1.5\%$	Center-Spread
E	$\pm 2.0\%$	Center-Spread
F	$\pm 2.5\%$	Center-Spread
G	-0.25%	Down-Spread
H	-0.5%	Down-Spread
I	-1.0%	Down-Spread
J	-1.5%	Down-Spread
K	-2.0%	Down-Spread
L	-3.0%	Down-Spread
M	Custom	Center-Spread or Down-Spread

TEMPERATURE SPECIFICATIONS (Note 1)

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Junction Operating Temperature	T_J	-40	—	+150	$^{\circ}\text{C}$	—
Storage Ambient Temperature Range	T_A	-55	—	+150	$^{\circ}\text{C}$	—
Soldering Temperature	T_S	—	+260	—	$^{\circ}\text{C}$	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 , θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +150 $^{\circ}\text{C}$ rating. Sustained junction temperatures above +150 $^{\circ}\text{C}$ can impact the device reliability.

2.0 PIN DESCRIPTIONS

The DSA63xx 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: DSA63XX PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1 (Note 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).
	SSEN	Spread Spectrum Enable: H = Enabled, L = Disabled.
2	GND	Ground.
3	Output	Oscillator clock output.
4	VDD	Power supply: 1.71V to 3.63V.

Note 1: DSA630x/1x/3x has a 300 k Ω internal pull-up resistor on pin 1. DSA634x/5x/7x has no internal pull-up resistor on pin 1 and needs an external pull-up or to be driven by another chip.

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 three different functions. If not actively driven, a 10 k Ω 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 SPREAD SPECTRUM ENABLE (SSEN)

This pin, when high, enables spread spectrum modulation of the clock output. Various levels of center-spread and down-spread are available. For more details, see the [Spread Spectrum](#) section and the spread spectrum ordering codes on the [Product Identification System](#).

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 High Drive strength settings. Visit [ClockWorks® Configurator](#) to customize your device.

2.3 Output Buffer Options

The DSA63xx family is available in multiple output driver configurations.

The standard-drive (63x1) and high-drive (63x2) deliver respective output currents of greater than 3 mA and 6 mA at 20%/80% of the supply voltage. For heavy loads of 15 pF or higher, the high-drive option is recommended.

3.0 DIAGRAMS

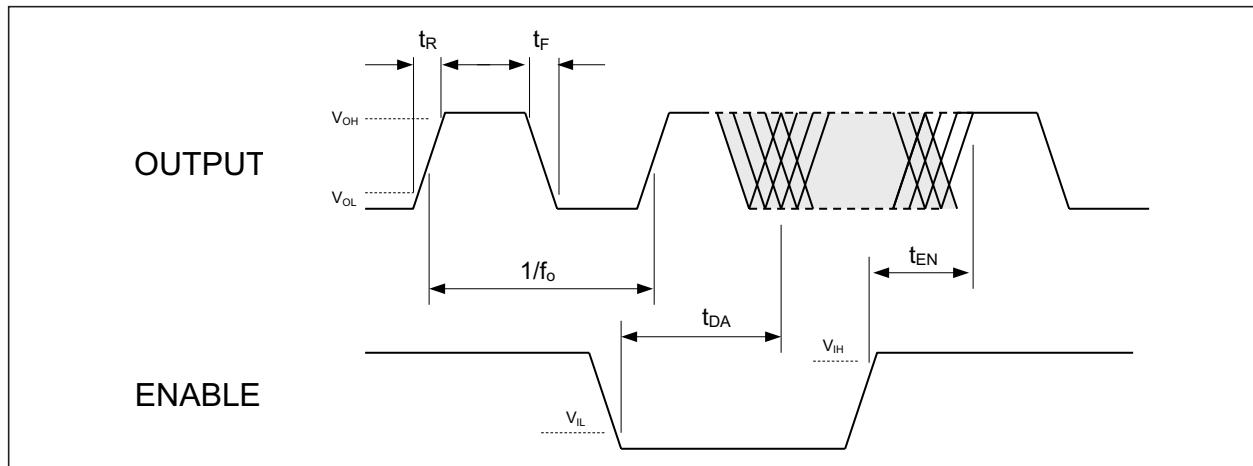


FIGURE 3-1: Output Waveform.

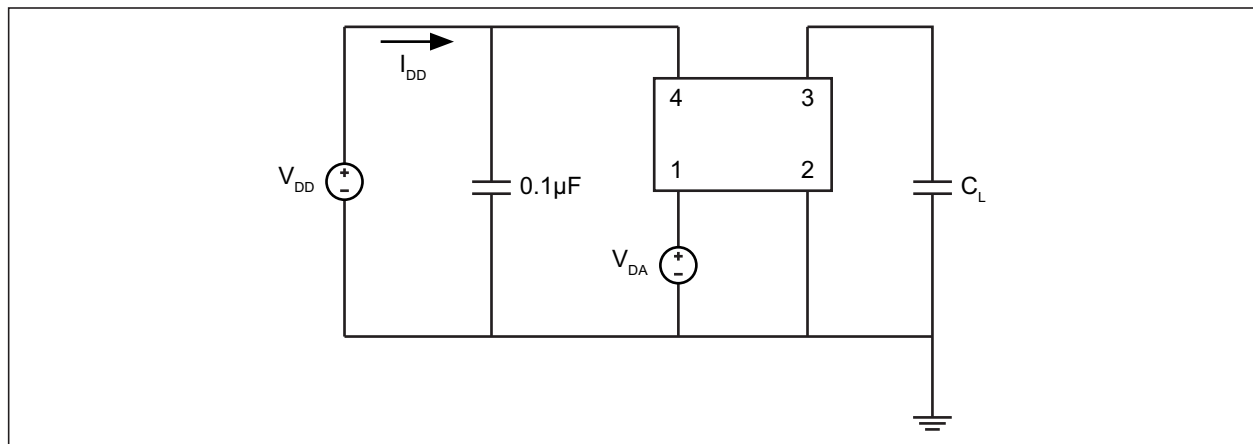


FIGURE 3-2: Test Circuit.

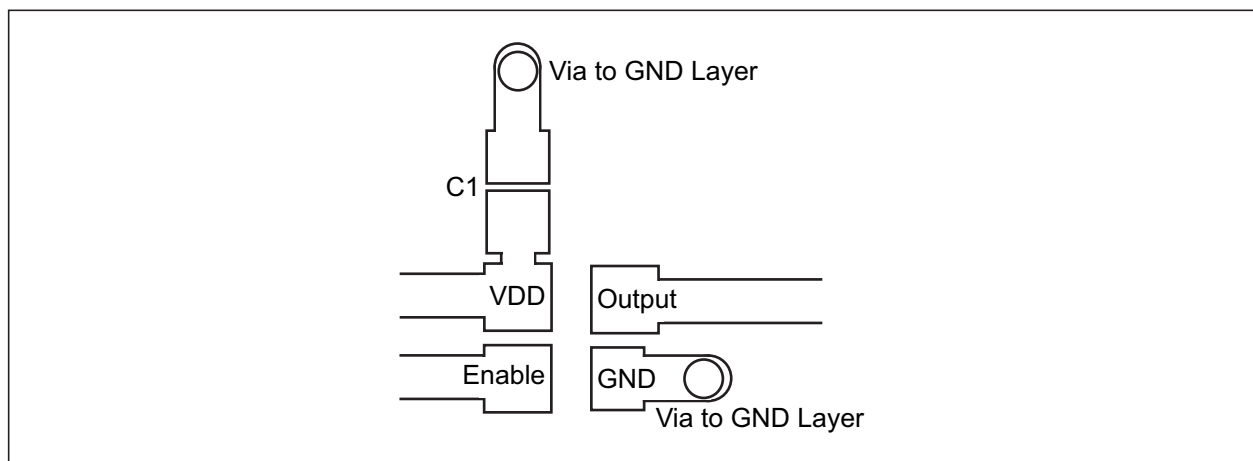


FIGURE 3-3: Recommended Board Layout.

4.0 SPREAD SPECTRUM

Spread spectrum is a slow modulation of the clock frequency over time. The PLL inside the MEMS oscillator is modulated with a triangular wave at 33 kHz. With such a slow modulation, the peak spectral energy of both the fundamental and all the harmonics is spread over a wider frequency range and such an energy is significantly reduced, thus providing an EMI reduction. The triangular wave is chosen because of its flat spectral density.

The DSA63xx MEMS oscillator family offers several modulation options: the spreading is either center-spread or down-spread with respect to the clock frequency. Center-spread ranges from $\pm 0.25\%$ to $\pm 2.5\%$, while down-spread ranges from -0.25% to -3% .

If the clock frequency is 100 MHz and center-spread with $\pm 1\%$ is chosen, the output clock will range from 99 MHz to 101 MHz. If down-spread with -2% is chosen, the output clock will range from 98 MHz to 100 MHz.

Figure 4-1 and Figure 4-2 show a spectrum example of the DSA6331 with a 33.333 MHz clock, modulated with center-spread of $\pm 1\%$.

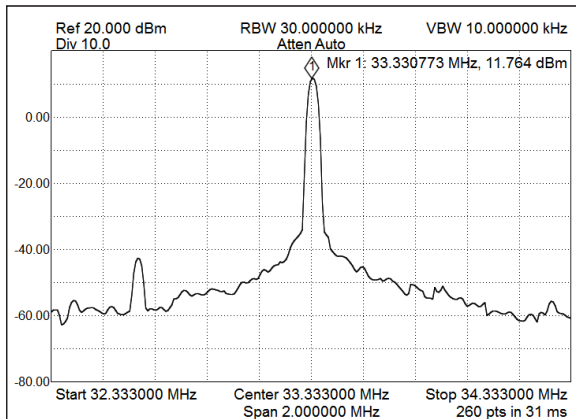


FIGURE 4-1: DSA6331 Spectrum at 33.333 MHz with Modulation Turned Off.

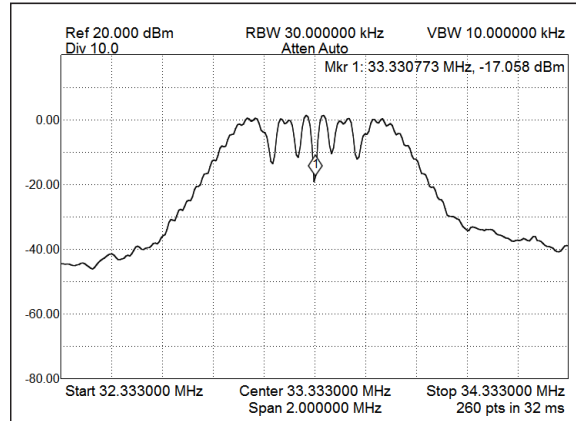


FIGURE 4-2: DSA6331 Spectrum at 33.333 MHz with Modulation Turned On.

It is noticeable that the spread spectrum provides a reduction of about 10 dB from the peak power. Such a reduction may also be estimated by the following equation:

EQUATION 4-1:

$$EMI \text{ Reduction} = 10 \times \log_{10}(|S| \times f_c \div RBW)$$

Where:

- S Peak-to-peak spread percentage (0.01, this example).
- f_c Carrier frequency (33.333 MHz, this example).
- RBW Resolution bandwidth of the spectrum analyzer (30 kHz, this example).

The theoretical calculation for this example provides 10.45 dB, which is consistent with the measurement.

Similarly to the fundamental frequency, all the harmonics are spread and attenuated in similar fashion. Figure 4-3 shows how the DSA6331 fundamental at 33.333 MHz and its odd harmonics are attenuated when various types of modulations are selected. For picture clarity, only the center-spread options are shown. However, down spread with corresponding percentage provides the same level of harmonic attenuation (e.g. center-spread of $\pm 1\%$ provides the same harmonics attenuation of down spread with -2%).

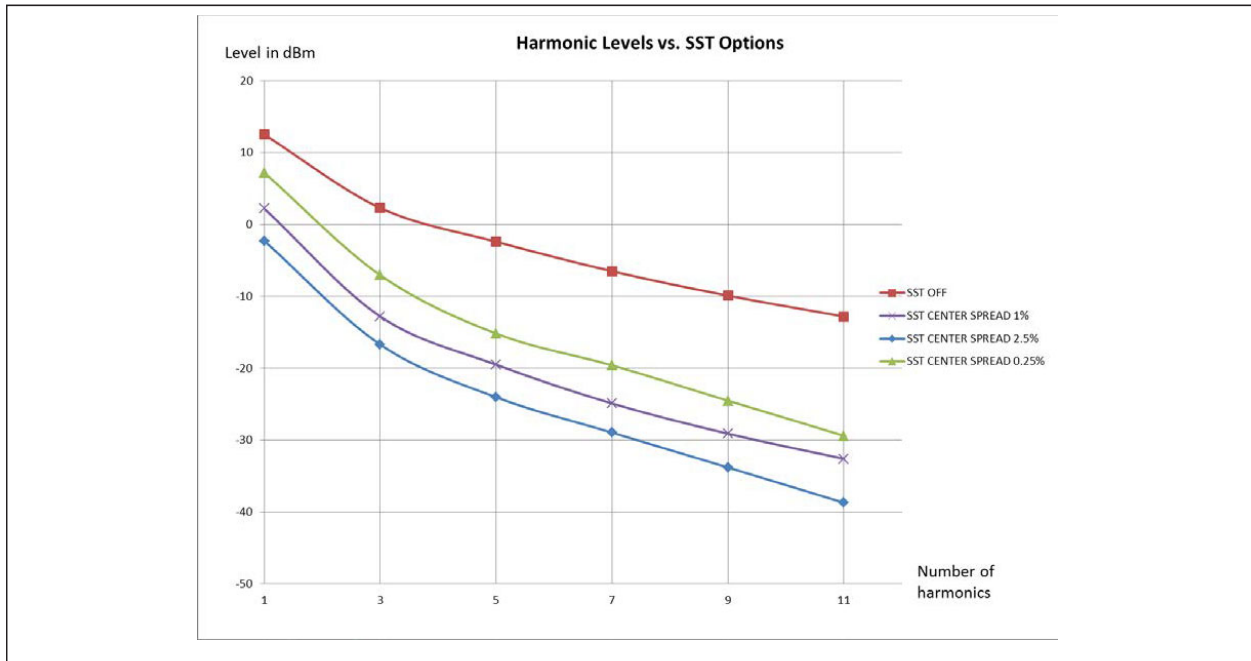


FIGURE 4-3: DSA6331 Harmonic Levels with Various Spread Spectrum Options.

5.0 SOLDER REFLOW PROFILE

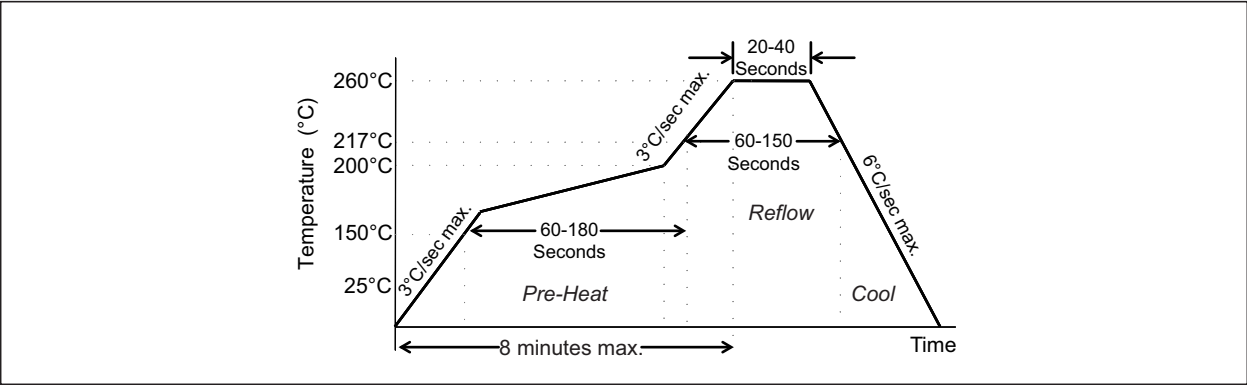


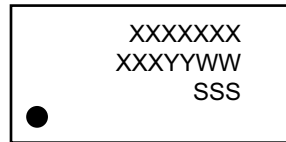
FIGURE 5-1: Solder Reflow Profile.

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.

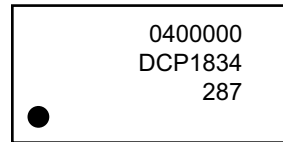
6.0 PACKAGING INFORMATION

6.1 Package Marking Information

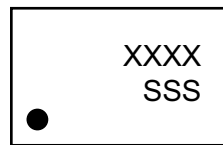
4-Lead VLGA* 2.5 x 2.0



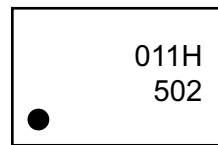
Example



4-Lead VFLGA* 2.0 x 1.6/1.6 x 1.2



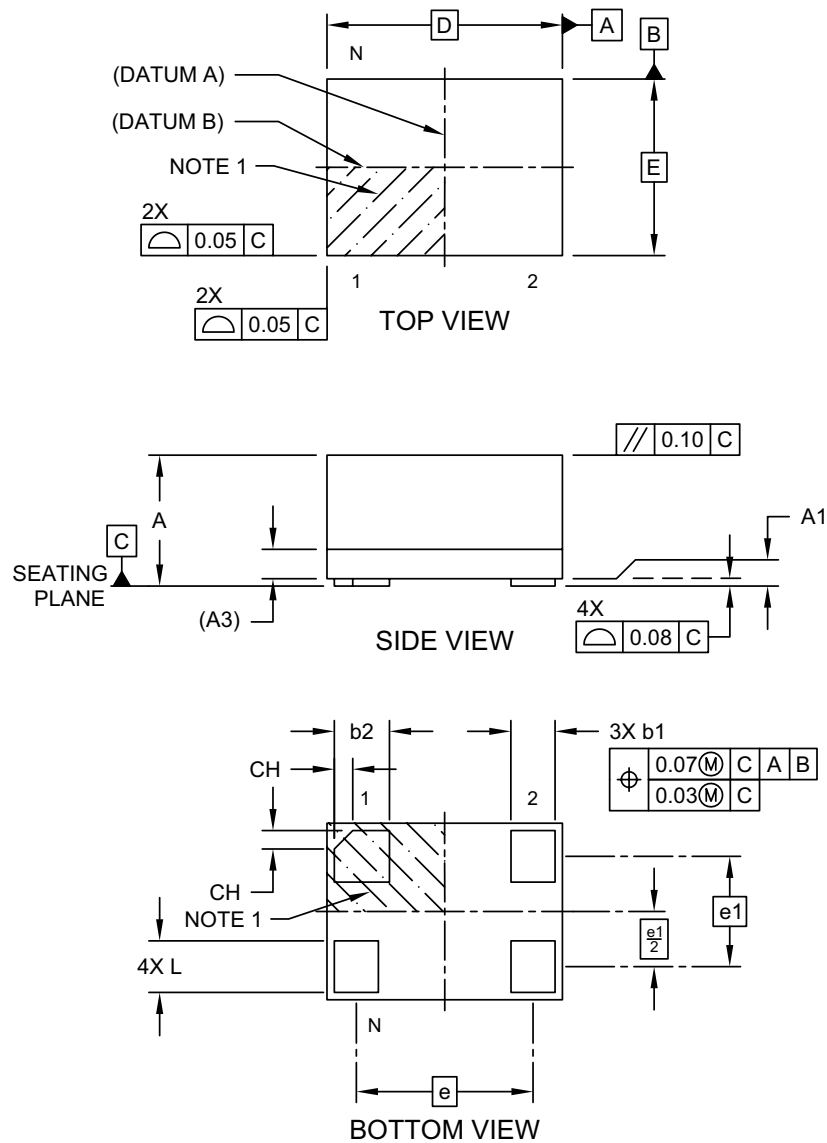
Example



Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	SSS	Alphanumeric traceability code
	(e3)	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.	

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

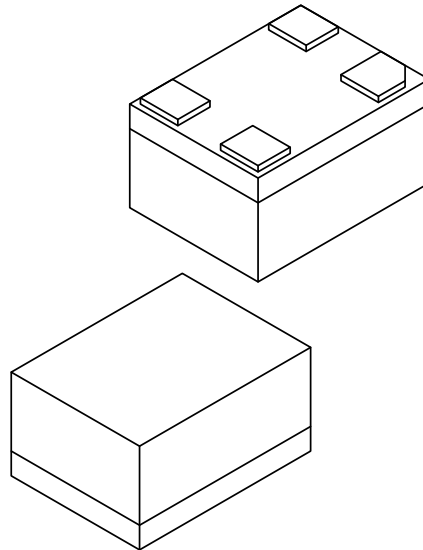
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1199A Sheet 1 of 2

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	-

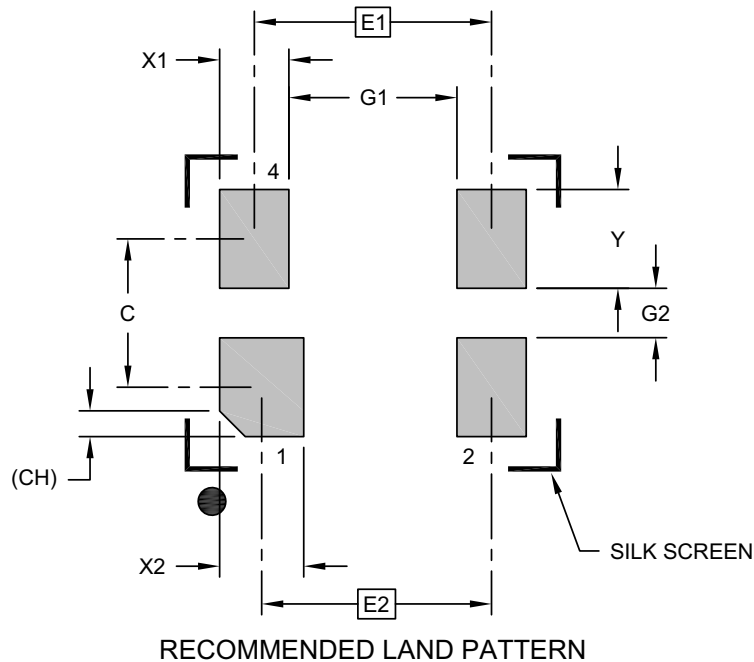
Notes:

- 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 C04-1199A Sheet 2 of 2

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>



Dimension Limits	Units	MILLIMETERS		
		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		

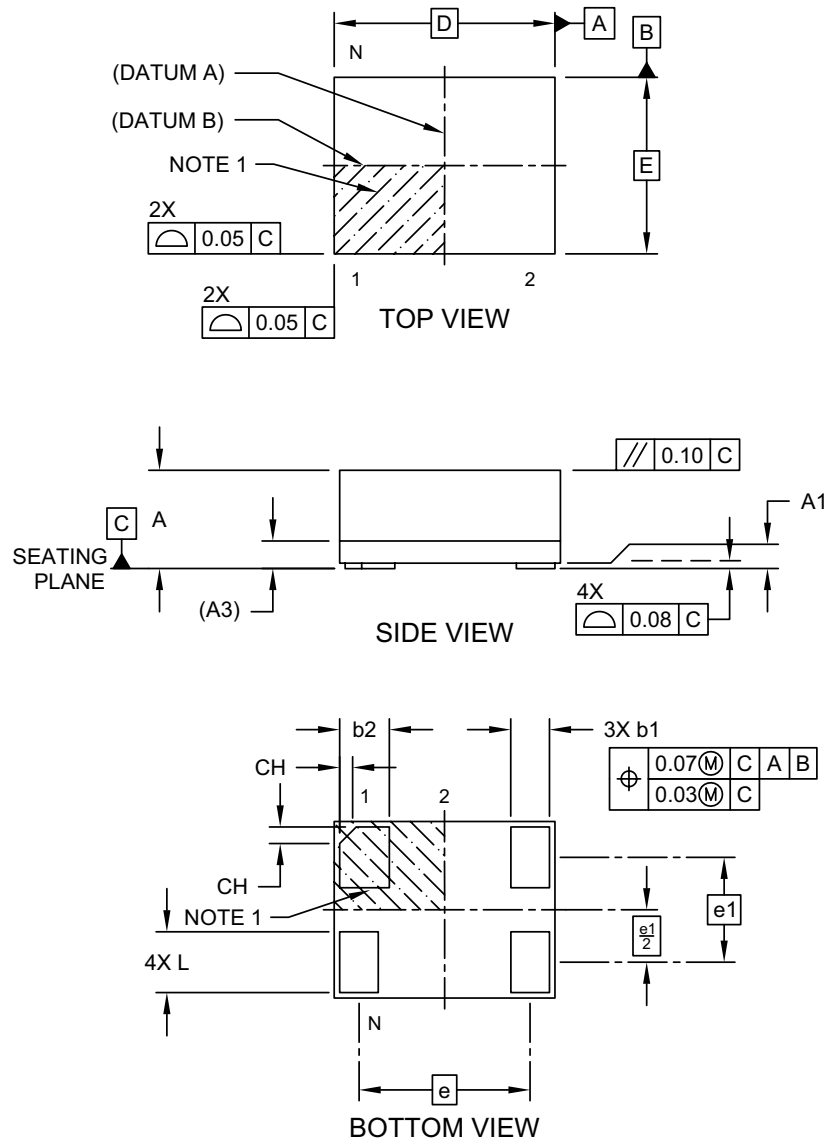
Notes:

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

Microchip Technology Drawing C04-3199A

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

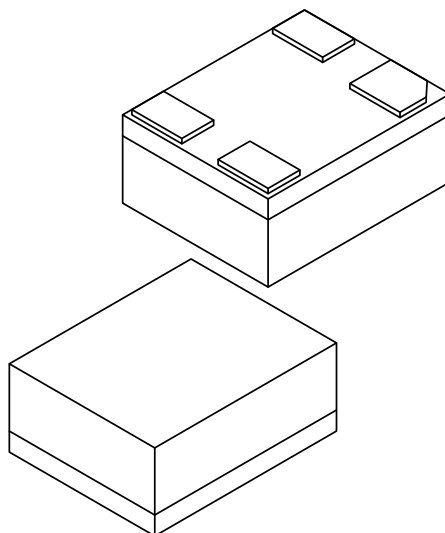
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1200A Sheet 1 of 2

4-Lead 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:

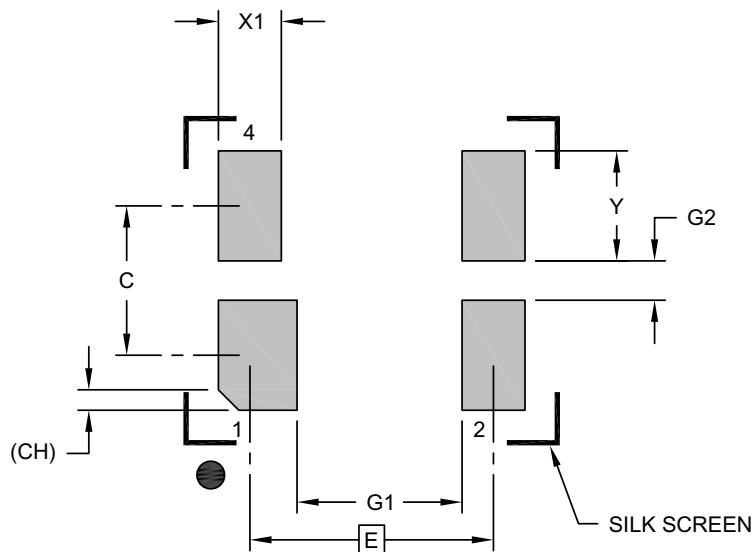
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package is saw singulated
- Dimensioning and tolerancing per ASME Y14.5M

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 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		

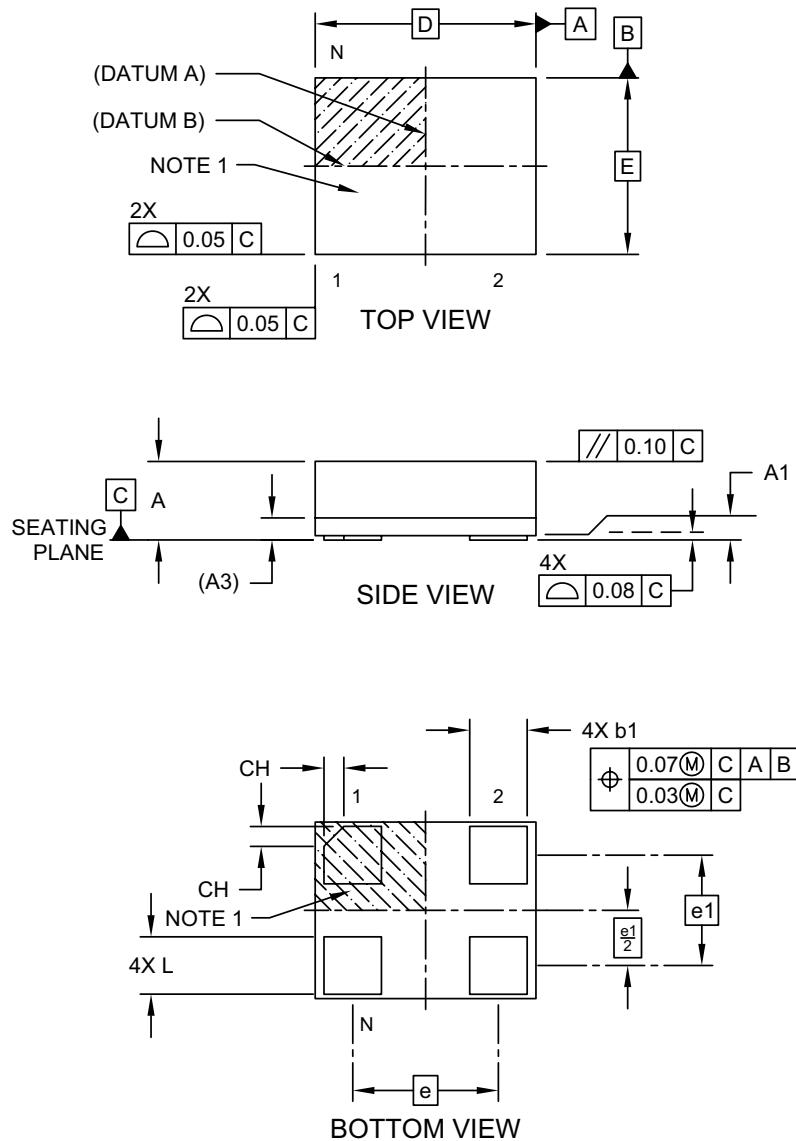
Notes:

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

Microchip Technology Drawing C04-3200A

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

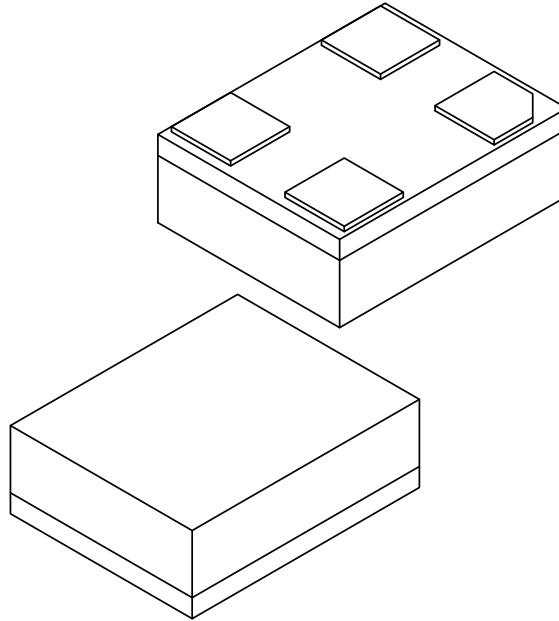
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1202A Sheet 1 of 2

4-Lead 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	-

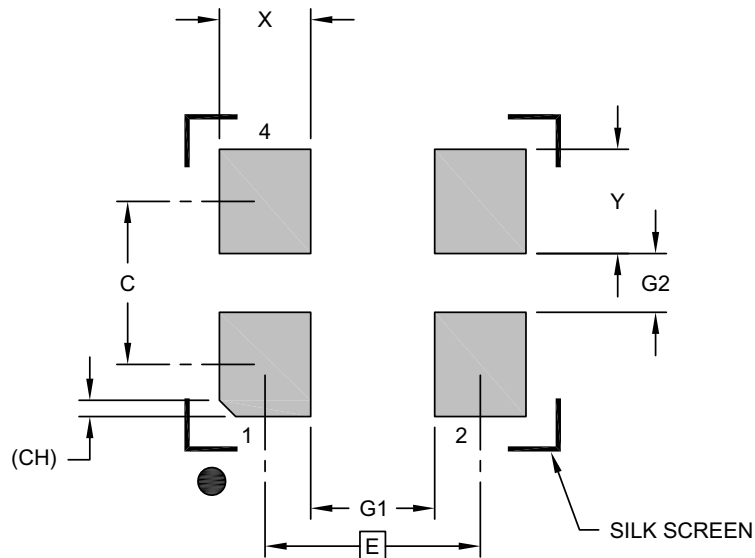
Notes:

- 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 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

APPENDIX A: REVISION HISTORY

Revision A (April 2019)

- Initial creation of DSA63xx Microchip data sheet DS20006189A.

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	X	X - XXX.XXXX	X
Device	Pin 1 Definition	Output Drive Strength	Package	Temp. Range	Freq. Stability	Spread Spectrum	Revision	Frequency	Media Type
Device: DSA63: Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum for Automotive									
Pin Definition: Selection Pin 1 Internal Pull-Up Register									
0 OE Pull-up									
1 STDBY Pull-up									
3 SSEN Pull-up									
4 OE None									
5 STDBY None									
7 SSEN None									
Output Drive Strength: 1 Standard 2 High									
Packages: 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									
Temperature Range: A = -40°C to +125°C (Automotive Grade 1) L = -40°C to +105°C (Automotive Grade 2) I = -40°C to +85°C (Automotive Grade 3)									
Frequency Stability: 1 = ± 50 ppm 2 = ± 25 ppm 3 = ± 20 ppm									
Spread Spectrum: A = ±0.25% Center-Spread B = ±0.5% Center-Spread C = ±1.0% Center-Spread D = ±1.5% Center-Spread E = ±2.0% Center-Spread F = ±2.5% Center-Spread G = -0.25% Down-Spread H = -0.5% Down-Spread I = -1.0% Down-Spread J = -1.5% Down-Spread K = -2.0% Down-Spread L = -3.0% Down-Spread M = Custom									
Revision: B = Revision A									
Frequency: xxx.xxxx = User-Defined Frequency between 001.0000 MHz and 100.0000 MHz									
Media Type: <blank>= 140/Tube (J Package Option) <blank>= 100/Bag (M & H Package Option) T = 1,000/Reel B = 3,000/Reel									

Examples:

a) DSA6312JI2DA-100.0000:
Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum, Pin 1 = STDBY with Internal Pull-Up, High Drive Strength, 4-Lead 2.5 mm x 2.0 mm VLGA, Automotive Grade 3 Temperature, ±25 ppm Stability, ±1.5% Center-Spread, Revision A, 100 MHz Frequency, 140/Tube

b) DSA6301HA1LA-016.0000T:
Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum, Pin 1 = OE with Internal Pull-Up, Standard Drive Strength, 4-Lead 1.6 mm x 1.2 mm VFLGA, Automotive Grade 1 Temperature, ±50 ppm Stability, -3.0% Down-Spread, Revision A, 16 MHz Frequency, 1,000/Reel

c) DSA6331ML2AA-050.5000B:
Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum, Pin 1 = SSEN with Internal Pull-Up, Standard Drive Strength, 4-Lead 2.0 mm x 1.6 mm VFLGA, Automotive Grade 2 Temperature, ±25 ppm Stability, ±0.25% Center-Spread, Revision A, 50.5 MHz Frequency, 3,000/Reel

Note 1: Media Type 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 different media options.

Examples:

- a) DSA6312JI2DA-100.0000:
Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum, Pin 1 = STDBY with Internal Pull-Up, High Drive Strength, 4-Lead 2.5 mm x 2.0 mm VLGA, Automotive Grade 3 Temperature, ±25 ppm Stability, ±1.5% Center-Spread, Revision A, 100 MHz Frequency, 140/Tube
- b) DSA6301HA1LA-016.0000T:
Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum, Pin 1 = OE with Internal Pull-Up, Standard Drive Strength, 4-Lead 1.6 mm x 1.2 mm VFLGA, Automotive Grade 1 Temperature, ±50 ppm Stability, -3.0% Down-Spread, Revision A, 16 MHz Frequency, 1,000/Reel
- c) DSA6331ML2AA-050.5000B:
Ultra-Small, Ultra-Low Power MEMS Oscillator with Spread Spectrum, Pin 1 = SSEN with Internal Pull-Up, Standard Drive Strength, 4-Lead 2.0 mm x 1.6 mm VFLGA, Automotive Grade 2 Temperature, ±25 ppm Stability, ±0.25% Center-Spread, Revision A, 50.5 MHz Frequency, 3,000/Reel

Note 1: Media Type 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 different media options.

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

NOTES:

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- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

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