DSC150X/DSC152X

Low-Power Low-Jitter MEMS Oscillators

Features

- Any Frequency Between:
  - 2.3 MHz to 170 MHz (2.5V and 3.3V)
  - 2.3 MHz to 125 MHz (1.8V)
- Exceptional Total Stability Over Temperature ±20 ppm, ±25 ppm, ±50 ppm
- Low Phase Jitter (1 ps Typical)
- Operating Voltage 1.8V/2.5V to 3.3V
- Standby Mode for Battery Life Saving
- Fast Startup Time (2.5 ms Typical)
- Extended Temperature Range: –40°C to +125°C
- For AEC-Q Qualified, refer to DSA150x/DSA152x Product Family
- Low Operation Current (6.5 mA Typical)
- Ultra-Small Footprints:
  - 2.0 mm × 1.6 mm VFLGA Package
  - 2.5 mm × 2.0 mm VLGA Package
  - 3.2 mm × 2.5 mm VDFN Package
  - 5.0 mm × 3.2 mm VDFN Package
  - 7.0 mm × 5.0 mm VDFN Package
- High Reliability: 20× Better MTF than Quartz Oscillators
- MIL-STD 883 Shock and Vibration Resistant
- Lead-Free and RoHS-Compliant

Applications

- USB, SATA, SAS Reference Clock
- 100M/1G/10G Ethernet Clock
- IP Cam, DVR, OTT-Box
- Storage/SSD
- IoT Terminal/Gateway

Benefits

- Pin for Pin “Drop-In” Replacement for Industry Standard Oscillators
- Semiconductor-Level Reliability, Significantly Higher than Quartz
- Short Production Lead Time
- Longer Battery Life/Reduced Power Consumption
- Compact Plastic Package
- Cost Effective

General Description

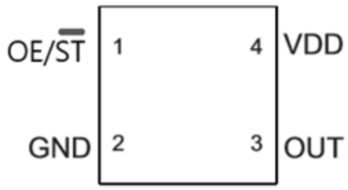
The DSC1501/2/3/4/5 and DSC1521/2/3/4/5 are industry-leading MEMS oscillators that offer excellent jitter and stability performance at very low power over a wide range of supply voltage (1.71V to 3.63V) and temperature (–40°C to +125°C). The devices operate from 2.3 MHz to 170 MHz with 2.5V and 3.3V supply voltage and from 2.3 MHz to 125 MHz with 1.8V supply voltage.

The devices incorporate an all-silicon resonator that is extremely robust. A MEMS-based design allows for a higher level of reliability, making the DSC150x/DSC152x ideal for rugged, industrial, and portable applications where stress, shock, and vibrations can damage quartz crystal-based systems. The devices are also an excellent choice as clock reference for small, battery-operated devices, such as wearables and Internet-of-Things (IoT) devices.

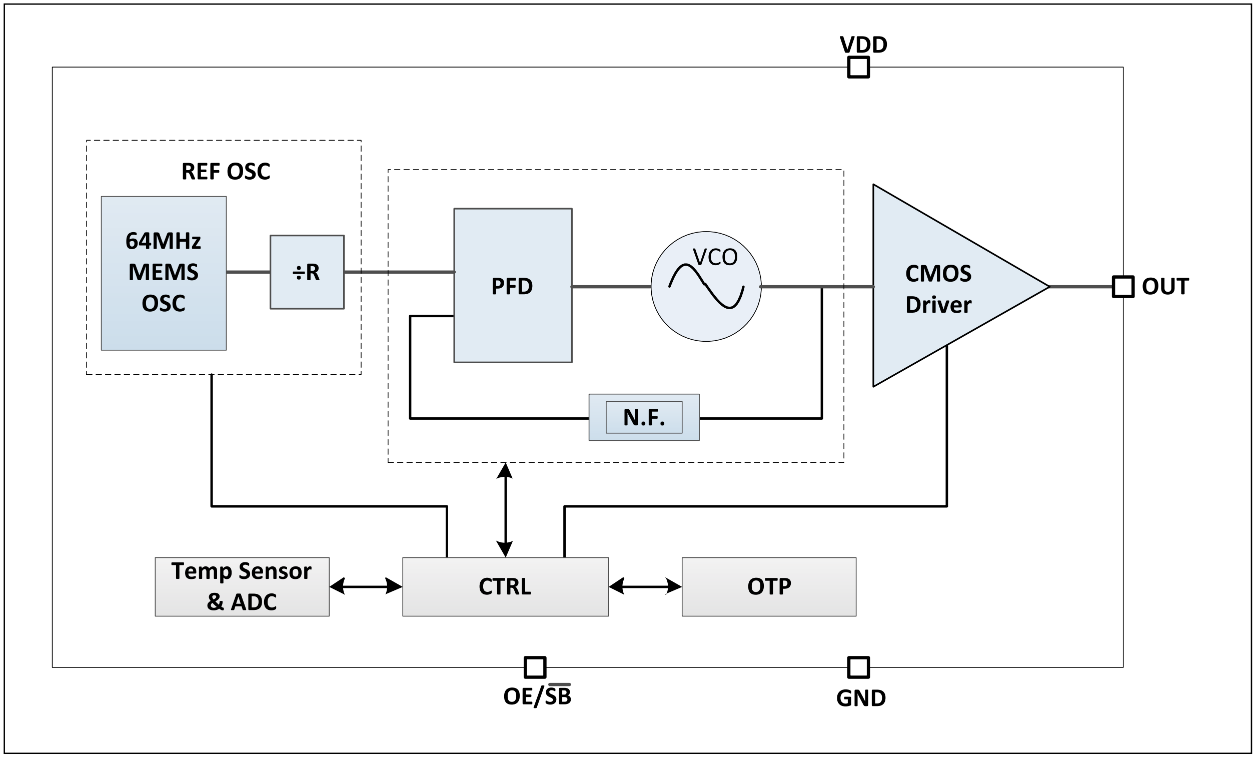
Available in industry standard packages, the DSC150x/DSC152x can be a drop-in replacement to standard crystal oscillators.

Package Type

DSC1501/2/3/4/5
DSC1521/2/3/4/5
4-Lead VDFN/VLGA/VFLGA



Functional Block Diagram



Note: N.F. stands for iNteger/Fractional dividers.

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings † ††

Supply Voltage (V_{CC}) .... –0.3V to +4.0V
LVTTL Input Voltage .... –0.3V to V_{DD} + 0.3V
ESD Protection (HBM) .... 4 kV
ESD Protection (MM) 400V
ESD Protection (CDM) .... 2 kV

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

†† Notice: The data sheet limits are not guaranteed if the device is operated beyond the recommended operating conditions.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: V_{DD} = 1.8V +10%/–5%, V_{DD} = 2.5V ±10%, V_{DD} = 3.3V ±10%; T_A = –40°C to +125°C, unless noted.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions	
Supply Voltage	V_{DD}	2.25	—	3.63	V	Note 1, DSC1501/2/3, DSC1521/2/3	
		1.71	—	1.98		Note 1, DSC1504/5, DSC1524/5	
Power Supply Ramp	t_{PU}	0.1	—	100	ms	Note 2	
Supply Current	I_{DD}	—	6.5	7.5	mA	f_0 = 20 MHz, V_{DD} = 3.3V, no load, output enabled	
		—	6.5	7.8		f_O = 141.249 MHz, V_{DD} = 3.3V, no load, output disabled	
Standby Current	$I_{STDBY\_}$	—	1	—	µA	V_{DD} = 1.8V/2.5V	
		—	1.8	—		V_{DD} = 3.3V	
Input Logic Levels	V_{IH}	0.7 × V_{DD}	—	—	V	Input logic High, Note 3	
	V_{IL}	—	—	0.3 × V_{DD}		Input logic Low, Note 3	
Output Logic Levels	V_{OH}	0.8 × V_{DD}	—	—	V	V_{DD} = 3.3V	I_{OH} = –16 mA, Std. drive
			—	—			I_{OH} = –12 mA, Medium drive
			—	—			I_{OH} = –6 mA, Low drive
			—	—		V_{DD} = 2.5V	I_{OH} = –10 mA, Std. drive
			—	—			I_{OH} = –6 mA, Medium drive
			—	—			I_{OH} = –3 mA, Low drive
			—	—		V_{DD} = 1.8V	I_{OH} = –4 mA, Standard drive
			—	—			I_{OH} = –2 mA, Low drive
Output Logic Levels	V_{OL}	—	—	0.2 × V_{DD}	V	V_{DD} = 3.3V	I_{OL} = 16 mA, Standard drive
		—	—				I_{OL} = 12 mA, Medium drive
		—	—				I_{OL} = 6 mA, Low drive
		—	—			V_{DD} = 2.5V	I_{OL} = 10 mA, Standard drive
		—	—				I_{OL} = 6 mA, Medium drive
		—	—				I_{OL} = 3 mA, Low drive
		—	—			V_{DD} = 1.8V	I_{OL} = 4 mA, Standard drive
		—	—				I_{OL} = 2 mA, Low drive
Output Duty Cycle	—	47	—	53	%	—	

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: V_{DD} = 1.8V +10%/–5%, V_{DD} = 2.5V ±10%, V_{DD} = 3.3V ±10%; T_A = –40°C to +125°C, unless noted.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions	
Frequency	f_0	2.3	—	170	MHz	Standard drive	V_{DD} = 3.3V and V_{DD} = 2.5V
		2.3	—	125		Medium drive	
		2.3	—	50		Low drive	
		2.3	—	125		Standard drive	V_{DD} = 1.8V
		2.3	—	60		Low drive	
Frequency Stability	Δf	—	±20	—	ppm	Includes frequency variations due to initial tolerance, temperature and power supply voltage.	
		—	±25	—			
		—	±50	—			
Aging	Δf	—	±5	—	ppm	First year @ 25°C	
		—	±1	—		Per year after first year	
Startup Time	t_{SU}	—	2.5	—	ms	From 90% V_{DD} until the output starts toggling	
Output Disable Time	t_{ODs}	—	15	—	ns	From OE toggle to output OFF	
Output Enable Time	t_{ENOE}	—	—	1	µs	Pin 1 configured as OE	
	t_{ENST}	—	—	2	ms	Pin 1 configured as Standby	
Enable Pull-up Resistor	—	70	—	—	kΩ	Pull-up resistor at pin 1	
Output Transition Time	t_R/t_F	—	1.4/1.3	—	ns	V_{DD} = 1.8V	DSC1505, Std drive 20%-80%, C_L= 10 pF
		—	1.1/1.0	—		V_{DD} = 2.5V	DSC1502, Std drive 20%-80%, C_L= 10 pF
		—	1.2/1.0	—		V_{DD} = 3.3V	
		—	3.0/2.4	—		V_{DD} = 1.8V	DSC1504, Low drive 20%-80%, C_L= 10 pF
		—	1.9/1.7	—		V_{DD} = 2.5V	DSC1501, Med drive 20%-80%, C_L= 10 pF
		—	1.4/1.1	—		V_{DD} = 3.3V	
		—	4.5/4.1	—		V_{DD} = 2.5V	DSC1503, Low drive 20%-80%, C_L= 10 pF
		—	3.4/2.9	—		V_{DD} = 3.3V	
Cycle-to-Cycle Jitter (Peak)	J_{CC}	—	40	—	ps	V_{DD} = 1.8V	f_{OUT} = 25 MHz
		—	18	—		V_{DD} = 2.5V	
		—	15	—		V_{DD} = 3.3V	
Period Jitter, RMS	J_{PER}	—	6	—	ps	V_{DD} = 1.8V	f_{OUT} = 25 MHz
		—	2.5	—		V_{DD} = 2.5V	
		—	2.5	—		V_{DD} = 3.3V	
Period Jitter (Peak-to-Peak)	J_{PP}	—	45	—	ps	V_{DD} = 1.8V	f_{OUT} = 25 MHz
		—	20	—		V_{DD} = 2.5V	
		—	18	—		V_{DD} = 3.3V	
Integrated Phase Noise	J_{PH}	—	1	—	ps_{RMS}	f_{OUT} = 100 MHz	12 kHz to 20 MHz, V_{DD} = 3.3V

Note 1: V_{DD} pin should be filtered with a 0.1 µF capacitor.

2: Time to reach 90% of target V_{DD}. Power ramp must be monotonic.

3: Input waveform must be monotonic with rise/fall time < 10 ms.

TEMPERATURE SPECIFICATIONS (Note 1)

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Ambient Temperature Range	T_A	–40	—	+125	°C	—
Maximum Junction Temperature	T_J	—	—	+125	°C	—
Storage Temperature Range	T_S	–55	—	+150	°C	—
Lead Temperature	—	—	+260		°C	Soldering, 20 sec.

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°C rating. Sustained junction temperatures above +150°C can impact the device reliability.

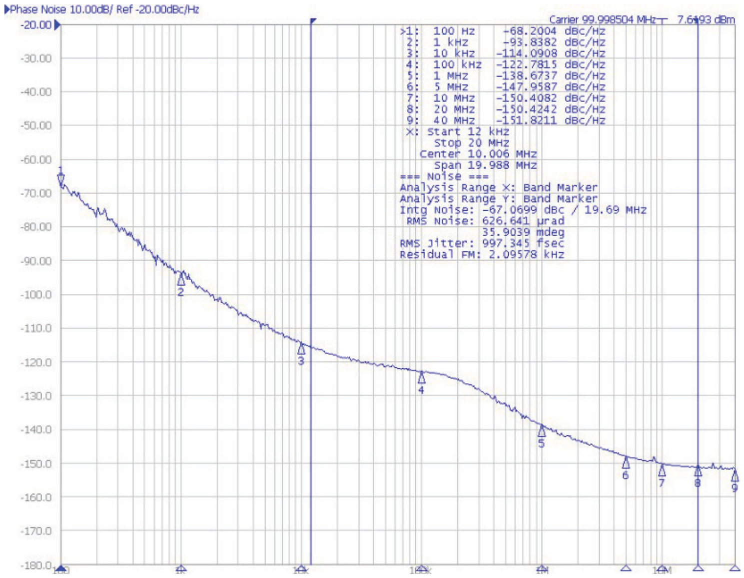
2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	OE	Output Enabled: H = Output buffer Enabled, L = Disabled (High impedance): External pull-up recommended for normal operation.
	$\overline{\text{STB}}$	Standby: H = Device is active, L = Device is in Standby (Both output buffer and PLL disabled): External pull-up recommended for normal operation.
2	GND	Ground
3	OUT	Oscillator clock output
4	VDD	Power Supply: 1.71V to 3.63V

3.0 TYPICAL PHASE NOISE PLOT



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>1:  100 Hz     -68.2004 dBc/Hz
 2:  1 kHz      -93.8382 dBc/Hz
 3:  10 kHz    -114.0908 dBc/Hz
 4:  100 kHz   -122.7815 dBc/Hz
 5:  1 MHz     -138.6737 dBc/Hz
 6:  5 MHz     -147.9587 dBc/Hz
 7:  10 MHz    -150.4082 dBc/Hz
 8:  20 MHz    -150.4242 dBc/Hz
 9:  40 MHz    -151.8211 dBc/Hz
 X: Start 12 kHz
      Stop 20 MHz
    Center 10.006 MHz
      Span 19.988 MHz
=== Noise ===
Analysis Range X: Band Marker
Analysis Range Y: Band Marker
Intg Noise: -67.0699 dBc / 19.69 MHz
 RMS Noise: 626.641 µrad
            35.9039 mdeg
RMS Jitter: 997.345 fsec
Residual FM: 2.09578 kHz
```

FIGURE 3-1: *Typical Phase Noise @ 25°C, 100 MHz, 3.3V.*

4.0 OUTPUT WAVEFORM

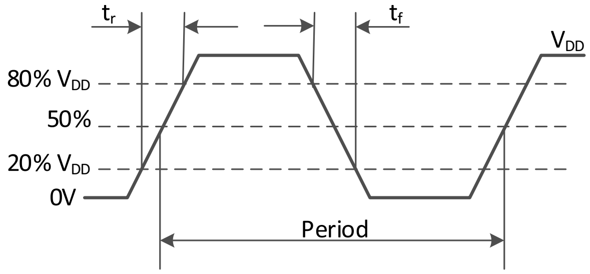


FIGURE 4-1: *Output Waveform.*

5.0 TEST CIRCUIT

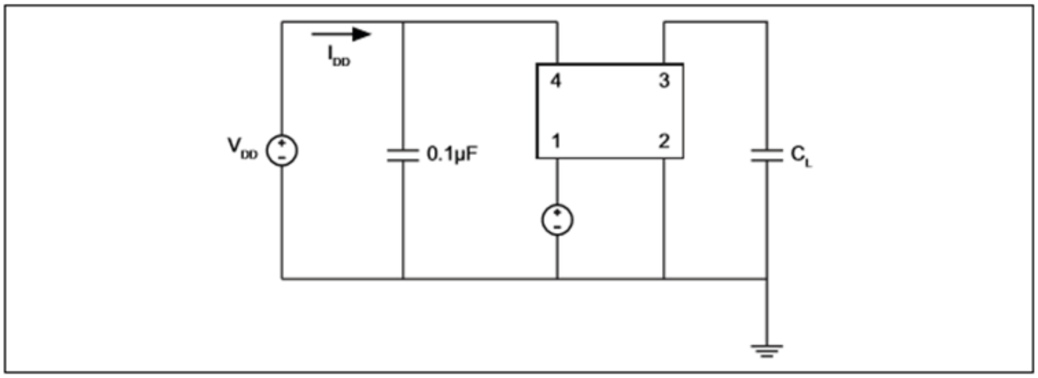


FIGURE 5-1: *Test Circuit.*

6.0 TIMING DIAGRAMS

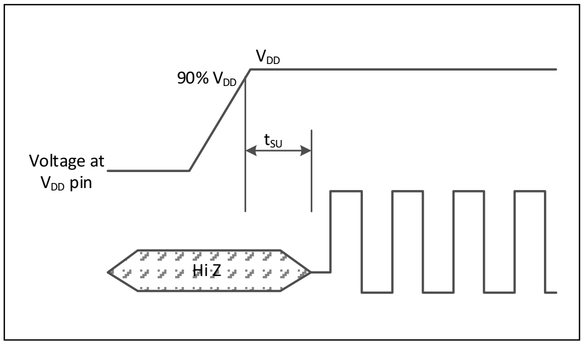


FIGURE 6-1: *Start-Up Time.*

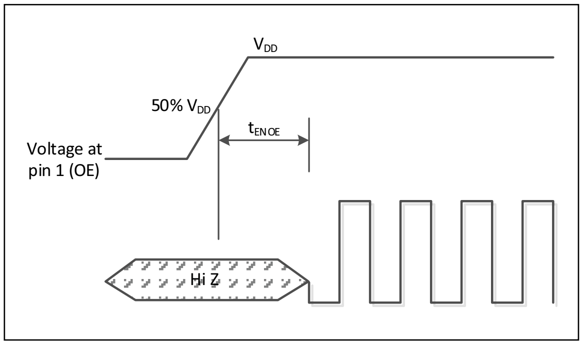


FIGURE 6-3: *Enable Time with Pin 1 Configured as OE.*

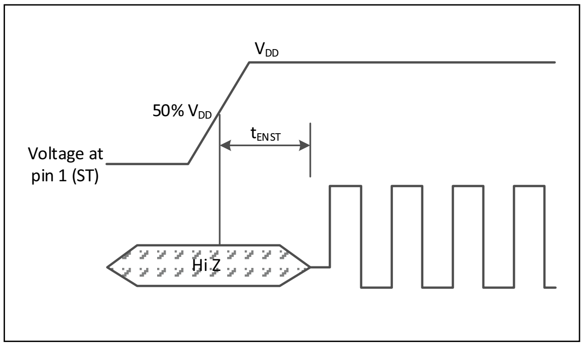


FIGURE 6-2: *Enable Time with Pin 1 Configured as Standby (STB).*

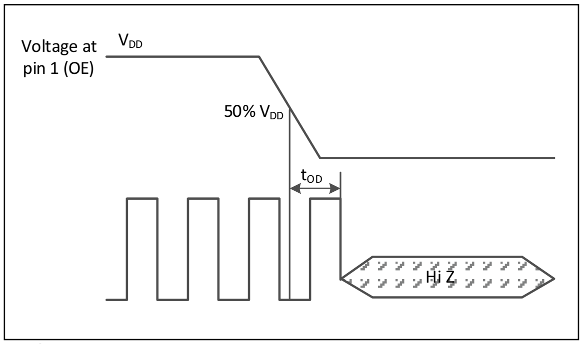


FIGURE 6-4: *Disable Time with Pin 1 Configured as OE.*

As shown, the output Enable/Disable in OE mode (pin 1 configured as OE) happens at the clock falling edge while in Standby mode (pin 1 configured as STB) it happens asynchronously.

7.0 SOLDER REFLOW PROFILE

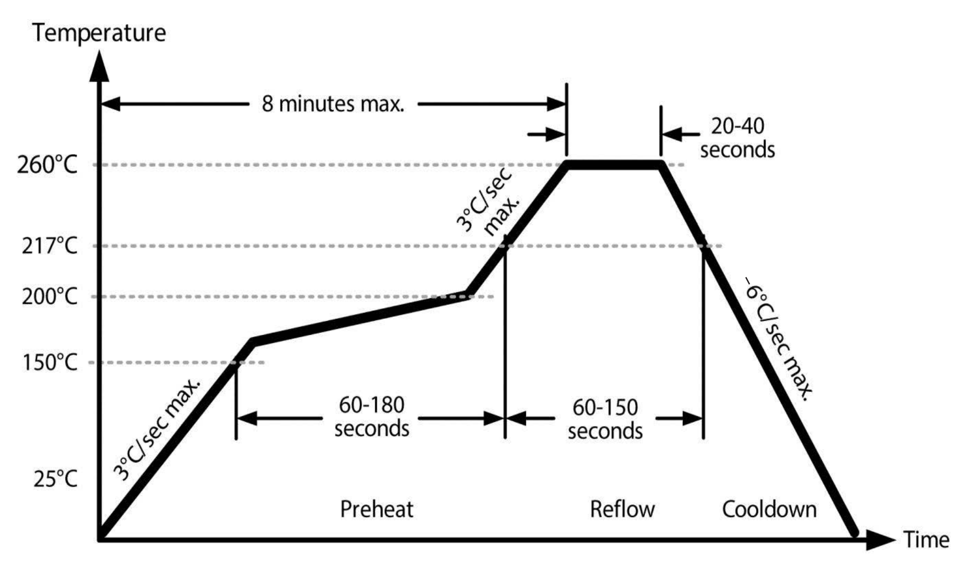


FIGURE 7-1: Solder Reflow Profile.

TABLE 7-1: SOLDER REFLOW

MSL 1 @ 250°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.

8.0 FUNCTIONAL DESCRIPTION

The DSC150x/DSC152x are MEMS-based CMOS oscillators that combine excellent jitter and stability performance at a very low power over a wide range of supply voltage and temperature. The device operates from 2.3 MHz to 170 MHz with 2.5V and 3.3V supply voltage and from 2.3 MHz to 125 MHz with 1.8V supply voltage over –40°C to +125°C temperature range. It has four pins and comes in different industry-standard package sizes.

The standard DSC150x/DSC152x comes with standard output drive strength with optional low and high drive strengths (see Table 8-1). Low output drive strength offers slower edge rates for lower EMI interference.

TABLE 8-1: OUTPUT DRIVE STRENGTH

Device	CMOS Output Strength
DSC1501/21	LVCMOS Medium drive (2.5V/3.3V)
DSC1502/22	LVCMOS Standard drive (2.5V/3.3V)
DSC1503/23	LVCMOS Low drive (2.5V/3.3V)
DSC1504/24	LVCMOS Low drive (1.8V)
DSC1505/25	LVCMOS Standard drive (1.8V)

Pin 1 can be programmed to implement Enable function (OE) or Standby function (STB).

TABLE 8-2: ENABLE AND STANDBY FUNCTION

Control Pin (Pin 1) Definition			
P/N	Function	Pin 1 High	Pin 1 Low
DSC150x	Standby	Active	Standby
DSC152x	Enable/Disable	Enable	Disable

Users can build the part with their desired output drive strength and pin 1 control pin options by using the ClockWorks Configurator online tool.

9.0 RECOMMENDED BOARD LAYOUT

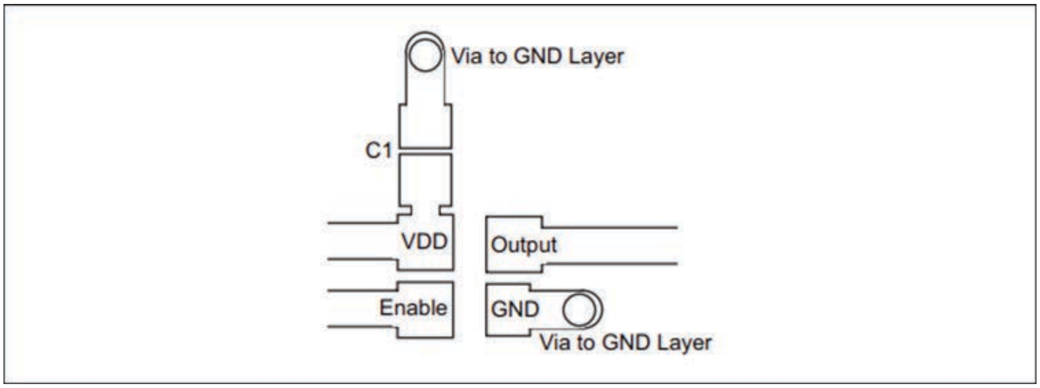
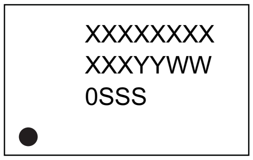


FIGURE 9-1: *Recommended Board Layout.*

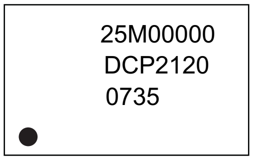
10.0 PACKAGING INFORMATION

10.1 Package Marking Information

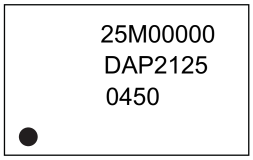
4-Lead LGA/DFN*
2.5 × 2.0 through 7.0 × 5.0 (in mm)



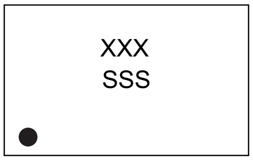
Example 1



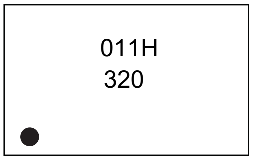
Example 2



2.0 mm × 1.6 mm



Example



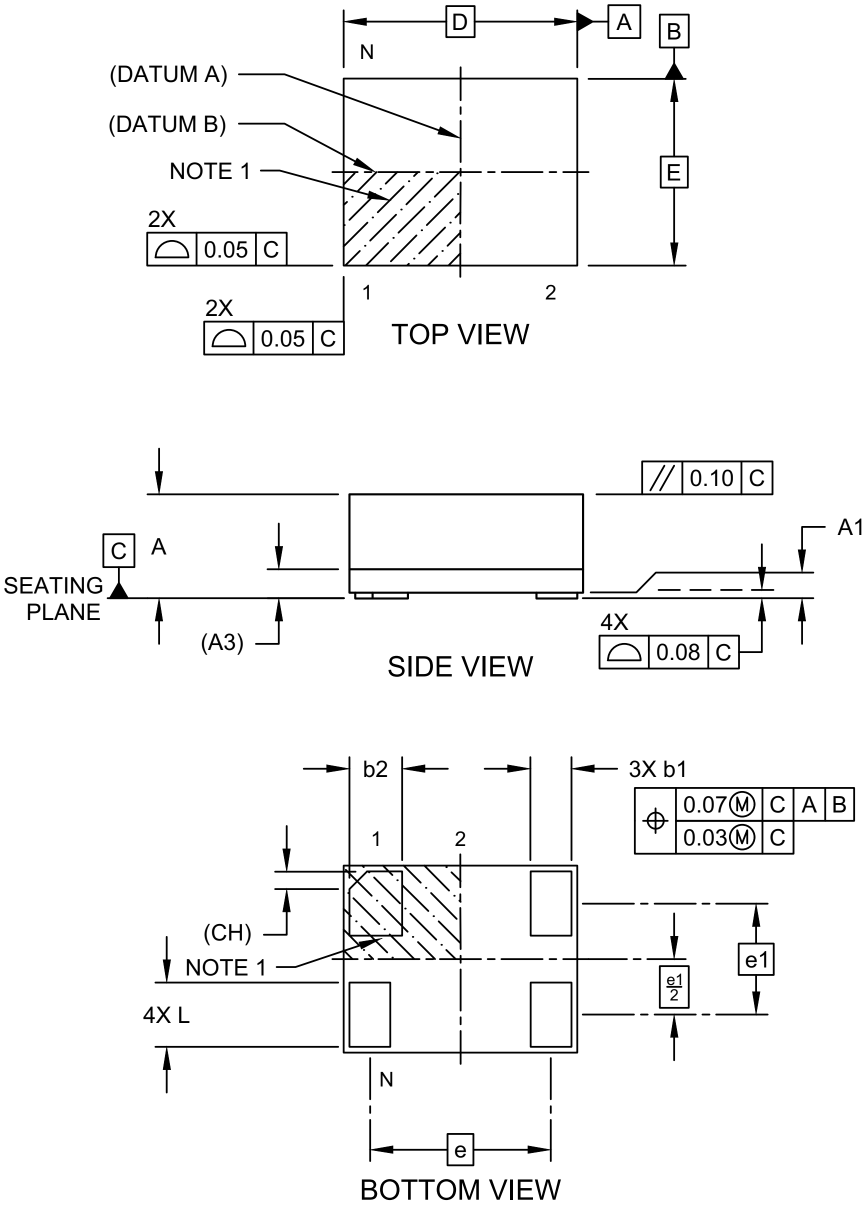
Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	SSS	Alphanumeric traceability code
	ⓔ3	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (ⓔ3) 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 2.0 mm × 1.6 mm Very Thin Fine Pitch Land Grid Array (VFLGA) Package Outline and Recommended Land Pattern [ASA]

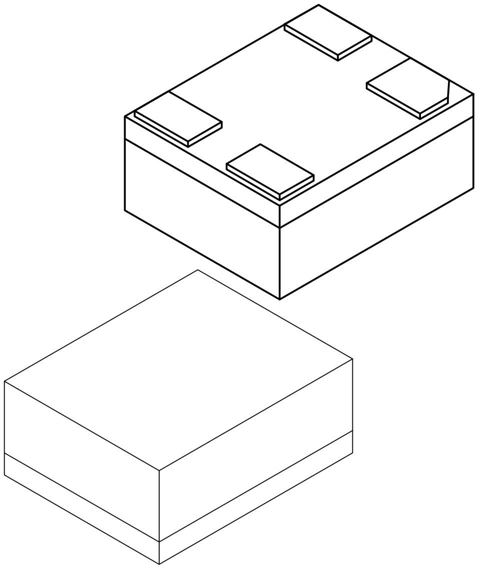
Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Microchip Technology Drawing C04-1200-ASA Rev E Sheet 1 of 2

4-Lead 2.0 mm × 1.6 mm Very Thin Fine Pitch Land Grid Array (VFLGA) Package Outline and Recommended Land Pattern [ASA]

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		1.55 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:

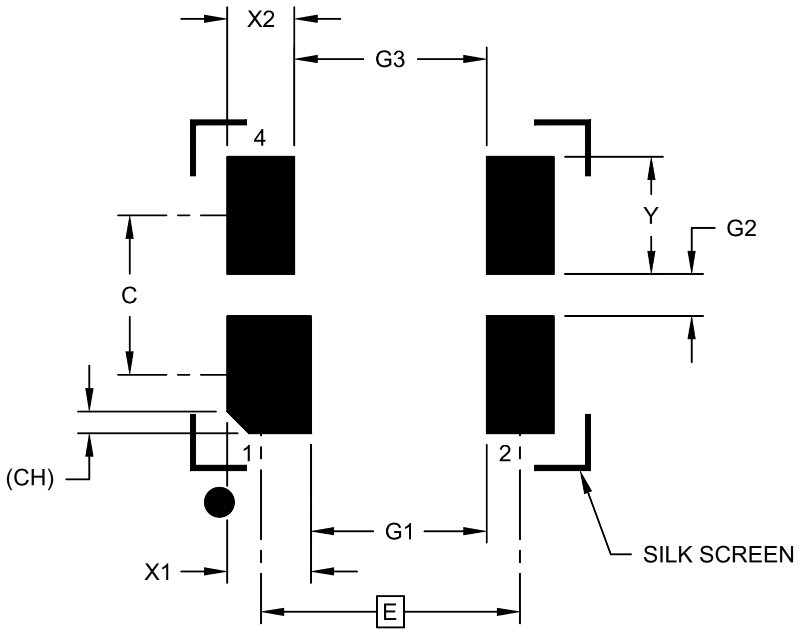
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1200-ASA Rev E Sheet 2 of 2

4-Lead 2.0 mm × 1.6 mm Very Thin Fine Pitch Land Grid Array (VFLGA) Package Outline and Recommended Land Pattern [ASA]

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



RECOMMENDED LAND PATTERN

	Units	MILLIMETERS		
	Dimension Limits	MIN	NOM	MAX
Contact Pitch	E	1.55 BSC		
Contact Spacing	C		0.95	
Contact Width (X1)	X1			0.50
Contact Width (X3)	X2			0.40
Contact Pad Length (X4)	Y			0.70
Space Between Contacts	G1	1.05		
Space Between Contacts	G2	0.25		
Space Between Contacts	G3	1.15		
Contact 1 Index Chamfer	CH	0.13 X 45° REF		

Notes:

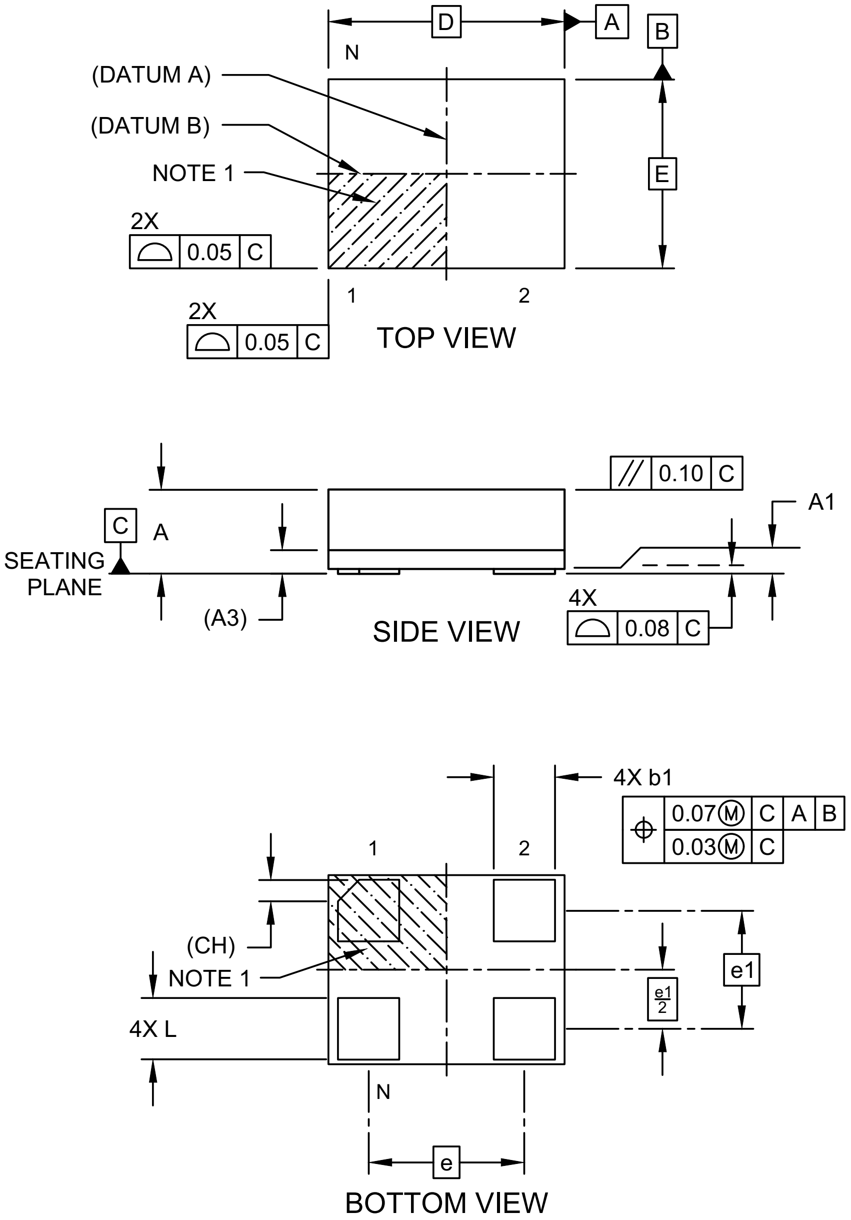
1. Dimensioning and tolerancing per ASME Y14.5M

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

Microchip Technology Drawing C04-3200-ASA Rev E

4-Lead 2.5 mm × 2.0 mm Very Thin Land Grid Array (VLGA) Package Outline and Recommended Land Pattern [AUA]

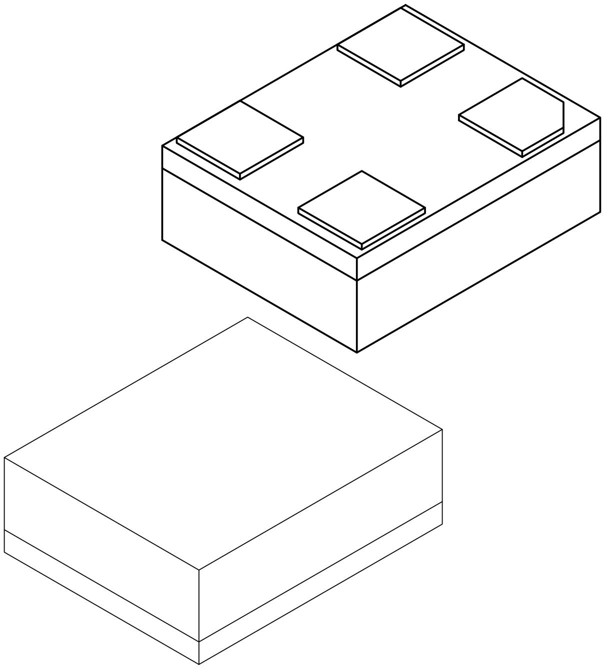
Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Microchip Technology Drawing C04-1202-AUA Rev C Sheet 1 of 2

4-Lead 2.5 mm × 2.0 mm Very Thin Land Grid Array (VLGA) Package Outline and Recommended Land Pattern [AUA]

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:

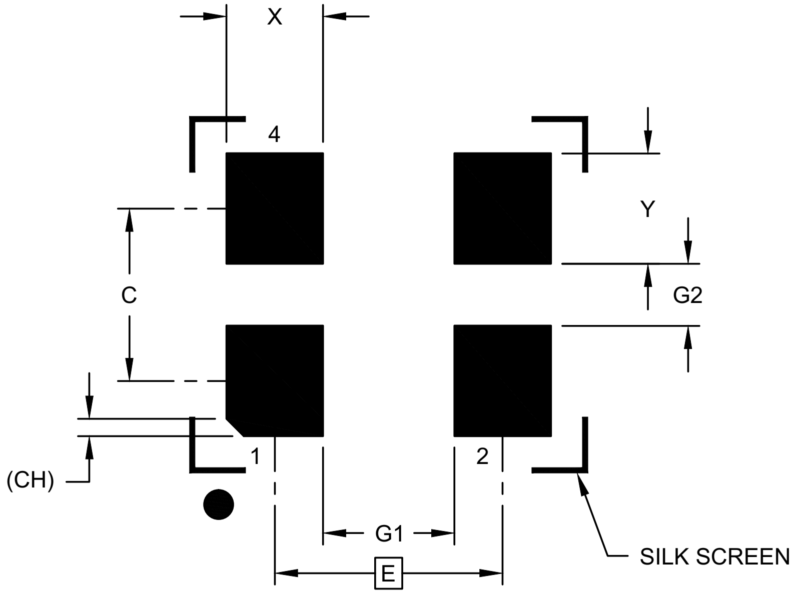
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

   BSC: Basic Dimension. Theoretically exact value shown without tolerances.
   REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1202-AUA Rev C Sheet 2 of 2

4-Lead 2.5 mm × 2.0 mm Very Thin Land Grid Array (VLGA) Package Outline and Recommended Land Pattern [AUA]

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



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	1.65 BSC		
Contact Spacing	C		1.25	
Contact Width (X4)	X			0.70
Contact Pad Length (X4)	Y			0.80
Space Between Contacts (X2)	G1	0.95		
Space Between Contacts (X2)	G2	0.45		
Contact 1 Index Chamfer	CH	0.13 X 45° REF		

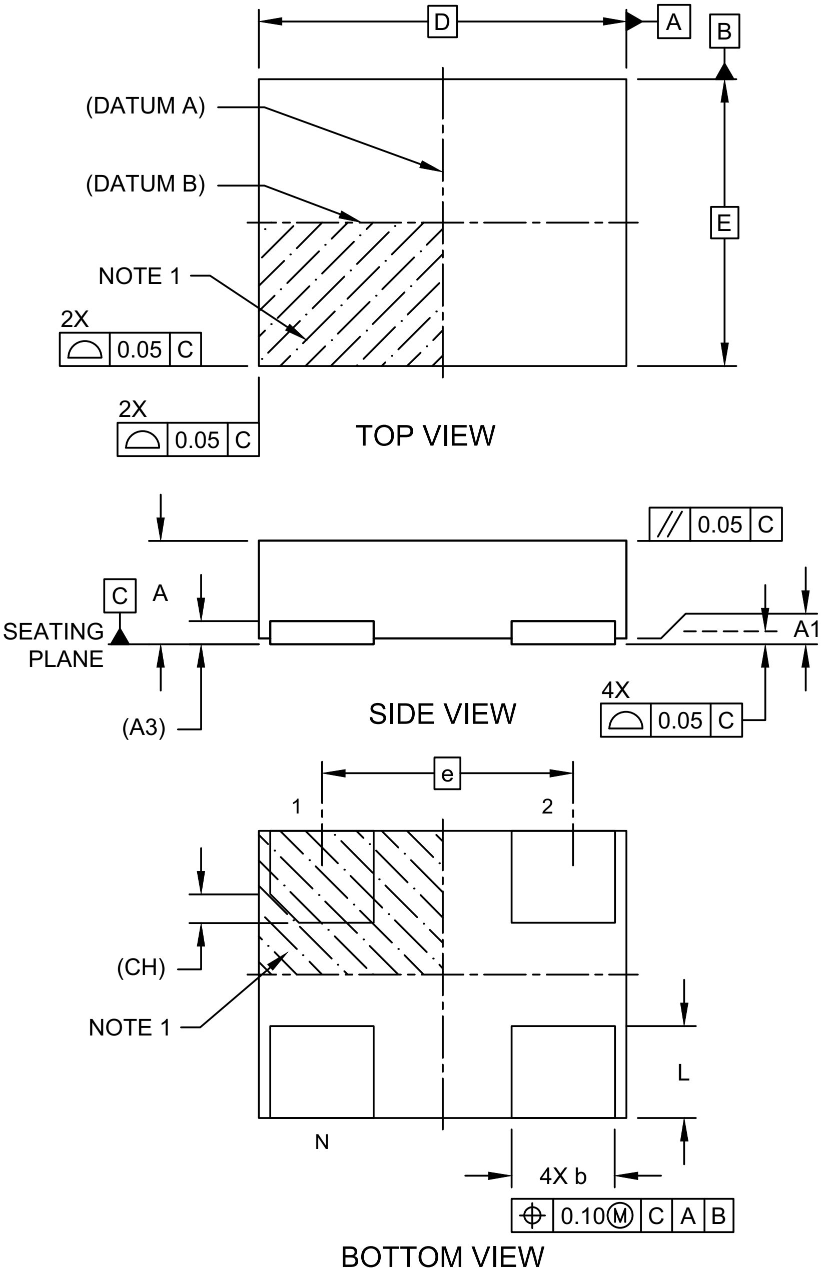
Notes:

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

Microchip Technology Drawing C04-3202-AUA Rev C

4-Lead 3.2 mm × 2.5 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package Outline and Recommended Land Pattern [H4A]

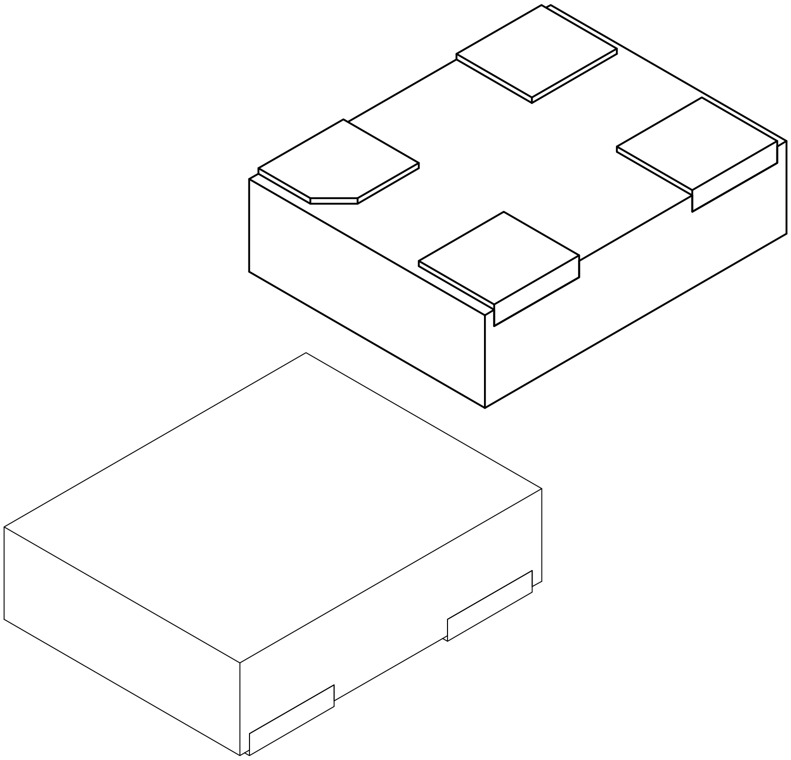
Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Microchip Technology Drawing C04-1006-H4A Rev C Sheet 1 of 2

4-Lead 3.2 mm × 2.5 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package Outline and Recommended Land Pattern [H4A]

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	
Pitch	e		2.10 BSC	
Overall Height	A	0.80	0.85	0.90
Standoff	A1	0.00	0.02	0.05
Overall Length	D		3.20 BSC	
Overall Width	E		2.50 BSC	
Terminal Width	b	0.85	0.90	0.95
Terminal Length	L	0.70	0.80	0.90
Terminal 1 Index Chamfer	CH		0.25 REF	

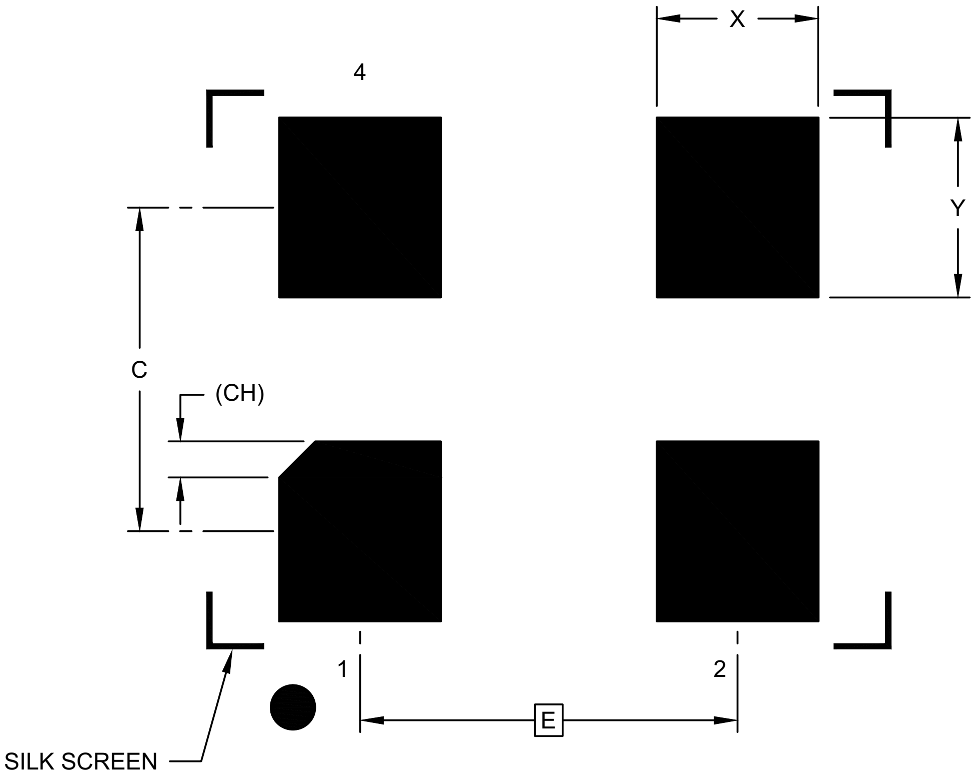
Notes:

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 C04-1006-H4A Rev C   Sheet 2 of 2

4-Lead 3.2 mm × 2.5 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package Outline and Recommended Land Pattern [H4A]

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



RECOMMENDED LAND PATTERN

	Units	MILLIMETERS		
	Dimension Limits	MIN	NOM	MAX
Contact Pitch	E	2.10 BSC		
Contact Pad Spacing	C		1.80	
Contact Pad Width (X4)	X			0.90
Contact Pad Length (X4)	Y			1.00
Contact 1 Index Chamfer	CH	0.20 REF		

Notes:

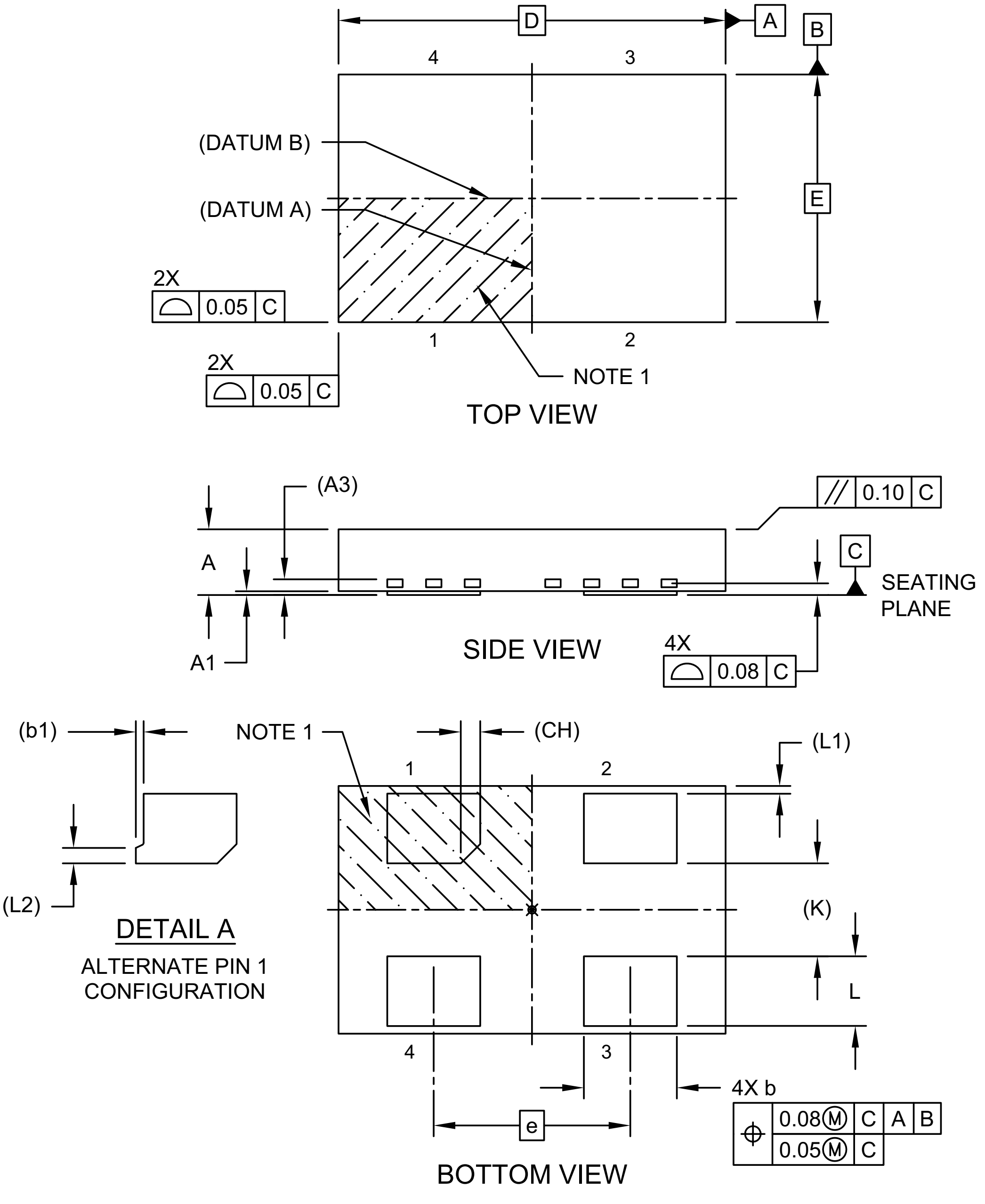
1. Dimensioning and tolerancing per ASME Y14.5M

   BSC: Basic Dimension. Theoretically exact value shown without tolerances.
   REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-3006-H4A Rev C

4-Lead 5.0 mm × 3.2 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package Outline and Recommended Land Pattern [H6A]

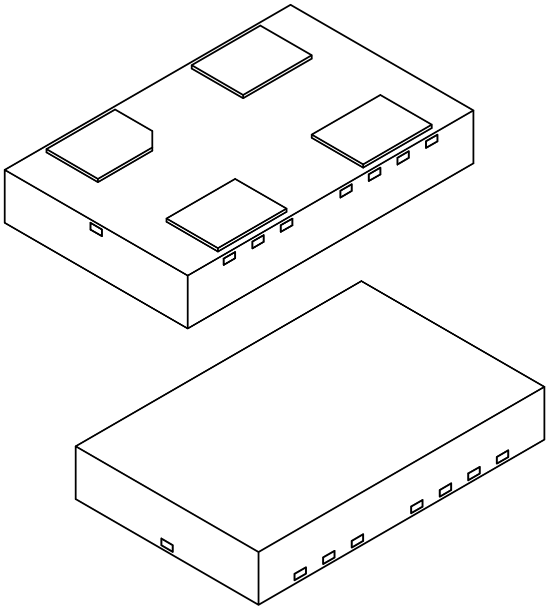
Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Microchip Technology Drawing C04-1008-H6A Rev C Sheet 1 of 2

4-Lead 5.0 mm × 3.2 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package Outline and Recommended Land Pattern [H6A]

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	
Pitch	e		2.54 BSC	
Overall Height	A	0.80	0.85	0.90
Standoff	A1	0.00	0.02	0.05
Terminal Thickness	A3		0.20 REF	
Overall Length	D		5.00 BSC	
Overall Width	E		3.20 BSC	
Terminal Width	b	1.15	1.20	1.25
Terminal 1 Tab	b1		0.10 REF	
Terminal Length	L	0.80	0.90	1.00
Terminal Pull Back	L1		0.10 REF	
Terminal 1 Tab	L2		0.20 REF	
Terminal 1 Chamfer	CH		0.25 REF	
Terminal Spacing	K		1.20 REF	

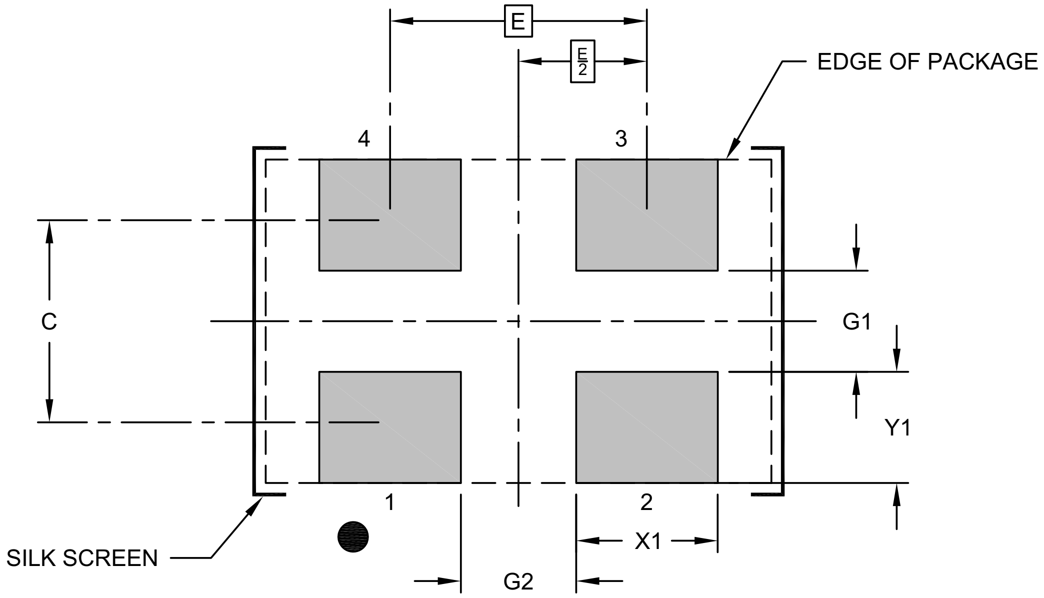
Notes:

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 C04-1008-H6A Rev C Sheet 2 of 2

4-Lead 5.0 mm × 3.2 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package Outline and Recommended Land Pattern [H6A]

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



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		2.54	
Contact Pad Spacing	C		2.00	
Contact Pad Width (X4)	X1			1.40
Contact Pad Length (X4)	Y1			
Contact Pad to Center Pad (X2)	G1	1.00		1.10
Contact Pad to Contact Pad (X2)	G2	1.14		
Terminal 1 Contact Pad Chamfer	CH		0.30	

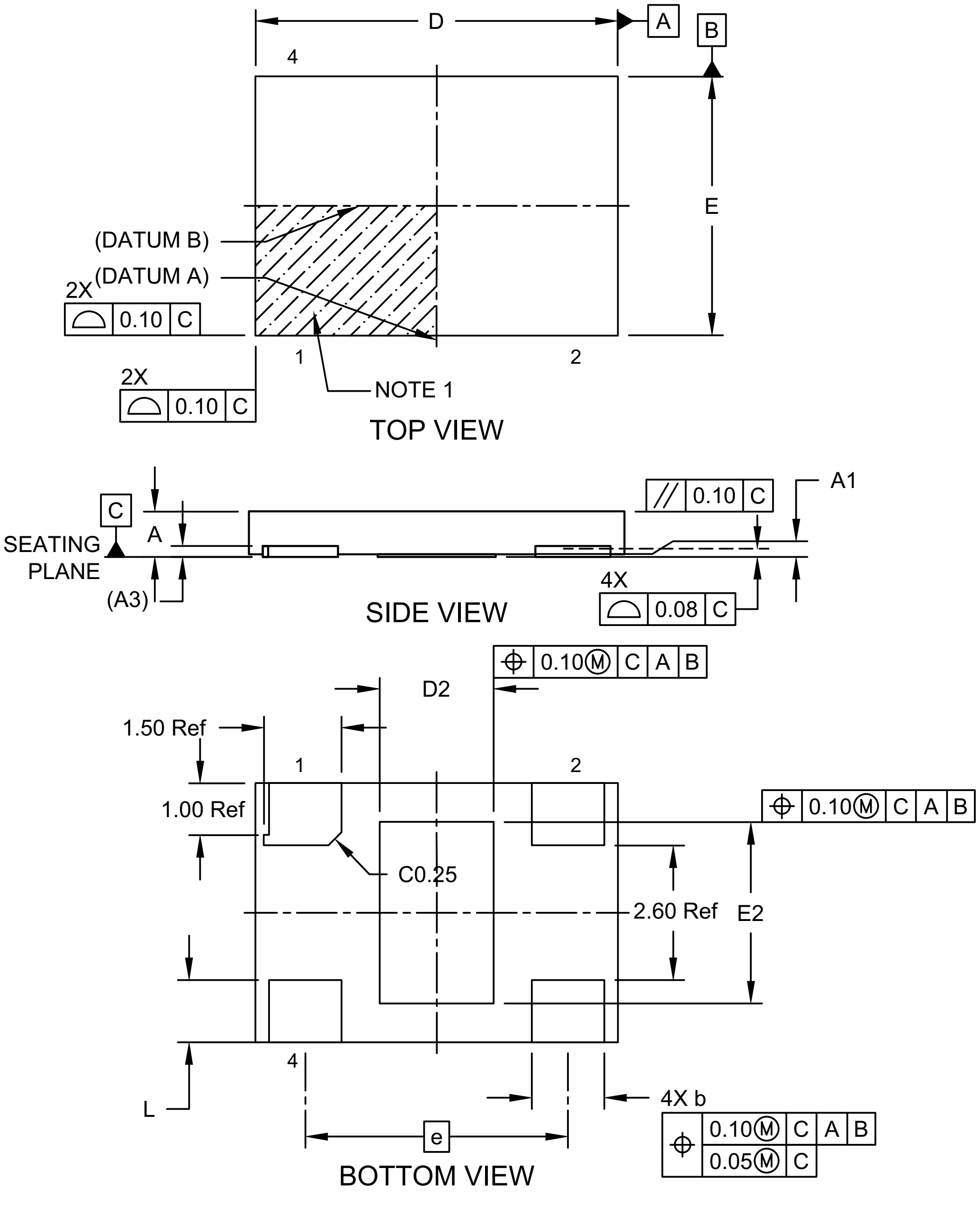
Notes:

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

Microchip Technology Drawing C04-3008 Rev C

4-Lead 7.0 mm × 5.0 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package with 2.2 mm × 3.5 mm Exposed Pad Package Outline and Recommended Land Pattern [JZA]

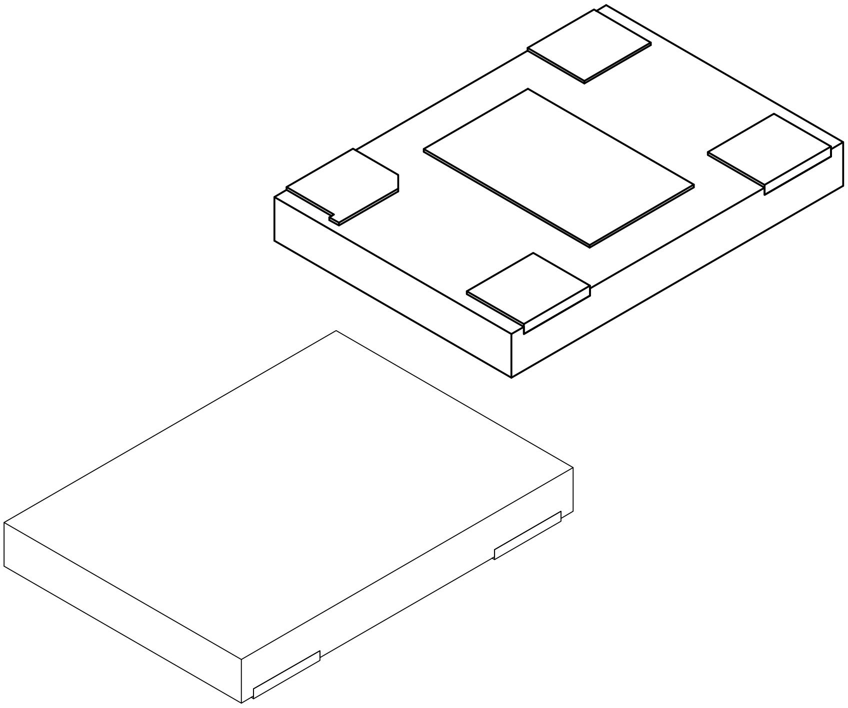
Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Microchip Technology Drawing C04-1025-JZA Rev B Sheet 1 of 2

4-Lead 7.0 mm × 5.0 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package with 2.2 mm × 3.5 mm Exposed Pad Package Outline and Recommended Land Pattern [JZA]

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	004		
Pitch	e	5.08 Ref		
Overall Height	A	0.80	0.85	0.90
Standoff	A1	0.00	-	0.05
Terminal Thickness	A3	0.203 Ref		
Overall Length	D	6.90	7.00	7.10
Exposed Pad Length	D2	2.10	2.20	2.30
Overall Width	E	4.90	5.00	5.10
Exposed Pad Width	E2	3.40	3.50	3.60
Terminal Width	b	1.35	1.40	1.45
Terminal Length	L	1.10	1.20	1.30

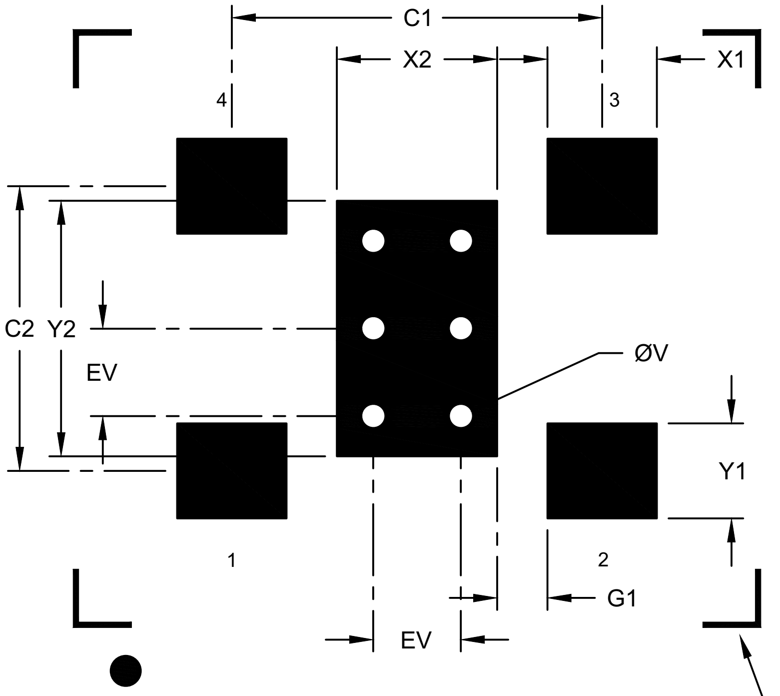
Notes:

1. Pin 1 visual index feature may vary, but must be located within the pin 1 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 C04-1025-JZA Rev B Sheet 2 of 2

4-Lead 7.0 mm × 5.0 mm × 0.9 mm Very Thin Dual Flatpack (VDFN) No-Lead Package with 2.2 mm × 3.5 mm Exposed Pad Package Outline and Recommended Land Pattern [JZA]

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



RECOMMENDED LAND PATTERN

	Units	MILLIMETERS		
	Dimension Limits	MIN	NOM	MAX
Optional Center Pad Width	X2			2.30
Optional Center Pad Length	Y2			3.60
Contact Pad Spacing	C1		5.08	
Contact Pad Spacing	C2		3.90	
Contact Pad Width (Xnn)	X1			1.50
Contact Pad Length (Xnn)	Y1			1.30
Contact Pad to Center Pad (Xnn)	G1	0.69		
Thermal Via Diameter	V		0.33	
Thermal Via Pitch	EV		1.20	

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.
2. For best soldering results, thermal vias, if used, should be filled or tented to avoid solder loss during reflow process

Microchip Technology Drawing C04-3025-JZA Rev B

NOTES:

APPENDIX A: REVISION HISTORY

Revision C (May 2025)

- Made correction to the Conditions cell for the Supply Current row in the Electrical Characteristics table.
- Removed “A, J and M Package options only” from Frequency Stability row on the Product Identification System page.
- Added “For AEC-Q Qualified, refer to DSA150x/DSA152x Product Family” note to Features section on first page and to footnotes on PIS page.

Revision B (December 2024)

- Added information for two additional VDFN package options (3.2 mm × 2.5 mm and 5.0 mm × 3.2 mm) throughout the data sheet.

Revision A (June 2021)

- Initial release of DSC150x/DSC152x as Microchip data sheet DS20006516A.

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	-XXXXXXXX	X
Device	Control Pin	Output Drive Strength	Package	Temperature	Stability	Revision	Output Frequency	Media Type

Device: DSC15: Low-Power Low-Jitter CMOS MEMS Oscillator

Control Pin:
0 = Standby Function (STB)
2 = Enable/Disable Function (OE)

Output Drive Strength:
1 = LVCMOS Medium Drive (2.5V.3.3V)
2 = LVCMOS Standard Drive (2.5V.3.3V)
3 = LVCMOS Low Drive (2.5V.3.3V)
4 = LVCMOS Low Drive (1.8V)
5 = LVCMOS Standard Drive (1.8V)

Package:
A = 7.0 mm × 5.0 mm 4-Lead VDFN
B = 5.0 mm × 3.2 mm 4-Lead VDFN
C = 3.2 mm × 2.5 mm 4-Lead VDFN
J = 2.5 mm × 2.0 mm 4-Lead VLGA
M = 2.0 mm × 1.6 mm 4-Lead VLGA

Temperature:
E = –20°C to +70°C (Extended Commercial)
I = –40°C to +85°C (Industrial)
L = –40°C to +105°C (Extended Industrial)
A = –40°C to +125°C (Automotive)

Frequency Stability:
1 = ±50 ppm
2 = ±25 ppm
3 = ±20 ppm

Revision: A = Revision A

Output Frequency:
xMxxxxxx= ≤ 9.999999 MHz
xxMxxxxx= 10.00000 MHz to 99.99999 MHz
xxxMxxxx= ≥ 100.0000 MHz

Media Type:
<blank> = Bulk (100/Bag) for 2.0 mm × 1.6 mm Package
Bulk in Tube for Other Packages
T = 1,000/Reel
B = 3,000/Reel

Examples:

a) DSC1521ML3A-50M00000: Pin1 OE, CMOS Medium Drive, 4-Lead 2.0 mm × 1.6 mm, –40°C to 105°C Temperature Range, ±20 ppm, 50 MHz, Bulk.

b) DSC1502JI1A-100M0000T: Pin1 STB, CMOS Standard Drive, 4-Lead 2.5 mm × 2.0 mm, –40°C to 85°C Temperature Range, ±50 ppm, 100 MHz, 1,000 Reel.

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.

2: For AEC-Q Qualified, refer to DSA150x/DSA152x Product Family

Please visit the Microchip ClockWorks Configurator® website to configure the part number for customized frequency select settings.

http://clockworks.microchip.com/timing

NOTES:

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