

High Performance Differential MEMS Oscillators

Features

- Very Low RMS Phase Jitter: <650 fs (typ.)
- High Stability: ± 20 ppm, ± 25 ppm, ± 50 ppm
- Wide Temperature Range:
 - Automotive: -40°C to $+125^{\circ}\text{C}$ (DSC12x LVDS Only)
 - Ext. Industrial: -40°C to $+105^{\circ}\text{C}$
 - Industrial: -40°C to $+85^{\circ}\text{C}$
 - Commercial: -20°C to $+70^{\circ}\text{C}$
- Supports LVPECL, LVDS, or HCSL Differential Outputs
- PCIe Gen1-5 Compliant Output
- Wide Frequency Range: 2.5 MHz to 450 MHz
- Small Industry Standard Footprints:
 - 2.5 mm x 2.0 mm
 - 3.2 mm x 2.5 mm
 - 5.0 mm x 3.2 mm
 - 7.0 mm x 5.0 mm
- Excellent Shock and Vibration Immunity
 - Qualified to MIL-STD-883
- High Reliability
 - 20x Better MTF than Quartz Oscillators
- Supply Range of 2.25 to 3.6V
- Standby, Frequency Select, and Output Enable Functions
- Lead-Free and RoHS Compliant

Applications

- Storage Area Networks
- Passive Optical Networks
- 10/100G Ethernet
- HD/SD/SDI Video and Surveillance
- PCI Express Gen 1/2/3/4/5
- Display Port

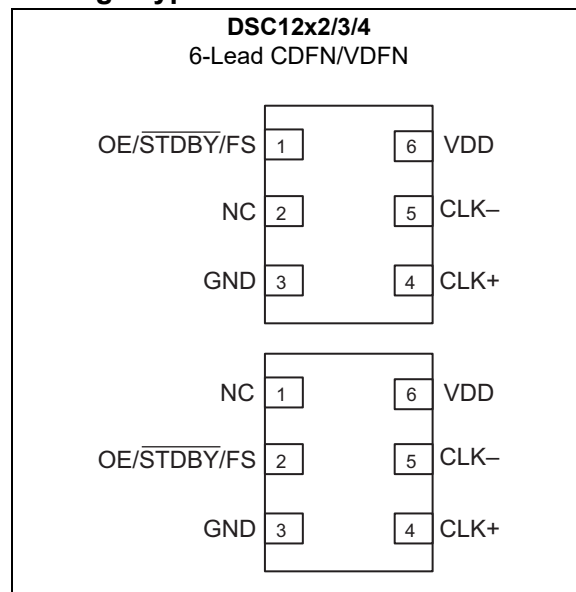
General Description

The DSC12x2/3/4 family of high performance oscillators utilizes the latest generation of silicon MEMS technology that reduces close-in noise and provides excellent jitter and stability over a wide range of supply voltages and temperatures. By eliminating the need for quartz or SAW technology, MEMS oscillators significantly enhance reliability and accelerate product development, while meeting stringent clock performance criteria for a variety of communications, storage, and networking applications.

The DSC12x2/3/4 family features a control function on pin 1 or pin 2 that permits either a standby feature (complete power down when STDBY is low), output enable (output is tri-stated with OE low), or a frequency select (choice of two frequencies selected by FS high/low). See the Product Identification System section for detailed information.

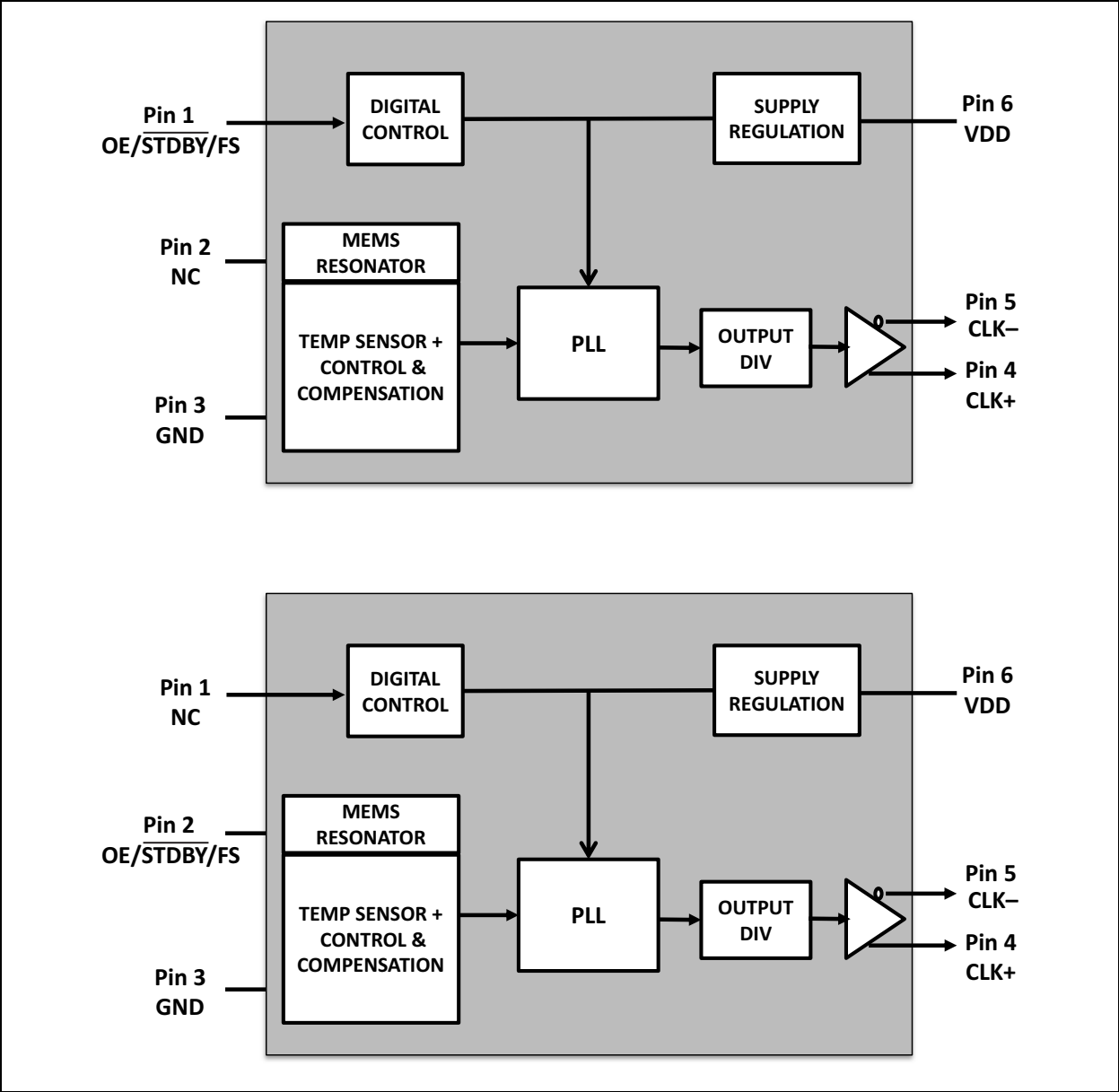
All oscillators are available in industry-standard packages, including the small 2.5 mm x 2.0 mm, and are “drop-in” replacements for standard 6-pin LVPECL/LVDS/HCSL crystal oscillators.

Package Types



DSC12X2/3/4

Functional Block Diagrams



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage	–0.3V to +4.0V
Input Voltage	–0.3V to $V_{DD} + 0.3V$
ESD Protection (HBM)	4 kV
ESD Protection (MM)	400V
ESD Protection (CDM)	1.5 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.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: $V_{DD} = 2.5V \pm 10\%$ or $3.3V \pm 10\%$; $T_A = -40^\circ C$ to $+105^\circ C$, unless noted.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	V_{DD}	2.25	—	3.63	V	Note 1
Supply Current	I_{DD}	—	50	—	mA	LVPECL, $f_{OUT} = 100$ MHz
		—	32	—		LVDS, $f_{OUT} = 100$ MHz
		—	40	—		HCSL, $f_{OUT} = 100$ MHz
		—	23	—		Output disabled (tri-state), $f_{OUT} = 100$ MHz
Standby Current	$I_{STDBY_}$	—	2.5	5	μA	Input pin = \overline{STDBY} = Asserted, ($V_{DD} = 3.3V$)
Frequency Stability	Δf	—	—	± 20	ppm	Includes frequency variations due to initial tolerance, temp., and power supply voltage
		—	—	± 25		
		—	—	± 50		
Aging	Δf	—	—	± 5	ppm	First year @ $25^\circ C$
		—	—	± 1		Per year after first year
Startup Time	t_{SU}	—	5.5	6	ms	From 90% V_{DD} to valid clock output, $T = +25^\circ C$, Note 2
Input Logic Levels	V_{IH}	$0.75 \times V_{DD}$	—	—	V	Input logic high
	V_{IL}	—	—	$0.25 \times V_{DD}$		Input logic low
Output Disable Time	t_{DA}	—	—	25	ns	Note 3
Output Enable Time	t_{EN}	—	—	6	ms	\overline{STDBY}
		—	—	350	ns	OE
Enable Pull-Up Resistor	—	—	1.5	—	M Ω	Pull-up resistor on pin 1, Note 4

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

2: t_{SU} is time to 100 ppm stable output frequency after V_{DD} is applied and outputs are enabled.

3: t_{DA} : See the Output Waveforms and the Test Circuits sections for more information.

4: Output is enabled if pad is floated (not connected).

5: Jitter limits are established by Gen 1.1, Gen 2.1, and Gen 3.0 PCIe standards.

DSC12X2/3/4

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: $V_{DD} = 2.5V \pm 10\%$ or $3.3V \pm 10\%$; $T_A = -40^\circ C$ to $+105^\circ C$, unless noted.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
LVPECL (DSC12x2)						
Frequency	f ₀	2.5	—	450	MHz	—
Output Logic Levels	V _{OH}	V _{DD} – 1.145	—	—	V	R _L = 50Ω
	V _{OL}	—	—	V _{DD} – 1.695		
Peak-to-Peak Output Swing	V _{PP}	—	800	—	mV	Single-Ended
Output Transition Time	t _R	—	200	250	ps	20% to 80%, R _L = 50Ω
	t _F	—	250	300		
Output Duty Cycle	SYM	48	—	52	%	Differential
Period Jitter RMS	J _{PER}	—	2.0	—	ps	f ₀ = 156.25 MHz, 10k cycles
Period Jitter Peak-to-Peak	J _{PTP}	—	20	—	ps	f ₀ = 156.25 MHz, 10k cycles
Integrated Phase Noise (Random)	J _{PH}	—	0.65	—	ps _{RMS}	12 kHz to 20 MHz @156.25 MHz
LVDS (DSC12x3)						
Frequency	f ₀	2.3	—	450	MHz	—
Output Offset Voltage	V _{OS}	1.15	1.25	1.35	V	R = 100Ω Differential
Peak-to-Peak Output Swing	V _{PP}	250	350	150	mV	Single-Ended
Output Transition Time	t _R	120	170	220	ps	20% to 80%, R _L = 100Ω
	t _F					
Output Duty Cycle	SYM	40	—	52	%	Differential
Period Jitter RMS	J _{PER}	—	2.5	—	ps	f ₀ = 156.25 MHz, 10k cycles
Period Jitter Peak-to-Peak	J _{PTP}	—	20	—	ps	f ₀ = 156.25 MHz, 10k cycles
Period Jitter RMS	J _{PER}	—	3	—	ps	f ₀ = 156.25 MHz, T _A = –40°C to +125°C
Period Jitter Peak-to-Peak	J _{PTP}	—	25	—	ps	f ₀ = 156.25 MHz, T _A = –40°C to +125°C
Integrated Phase Noise (Random)	J _{PH}	—	0.65	—	ps _{RMS}	12 kHz to 20 MHz @156.25 MHz, T _A = –40°C to +105°C
		—	0.9	—		2 kHz to 20 MHz @156.25 MHz, T _A = –40°C to +105°C
HCSL (DSC12x4)						
Frequency	f ₀	2.3	—	450	MHz	—
Output Logic Levels	V _{OH}	0.64	—	—	V	R _L = 50Ω
	V _{OL}	—	—	0.1		

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

2: t_{SU} is time to 100 ppm stable output frequency after V_{DD} is applied and outputs are enabled.

3: t_{DA} : See the Output Waveforms and the Test Circuits sections for more information.

4: Output is enabled if pad is floated (not connected).

5: Jitter limits are established by Gen 1.1, Gen 2.1, and Gen 3.0 PCIe standards.

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: $V_{DD} = 2.5V \pm 10\%$ or $3.3V \pm 10\%$; $T_A = -40^\circ C$ to $+105^\circ C$, unless noted.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Peak-to-Peak Output Swing	V_{PP}	—	750	—	mV	Single-Ended
Output Transition Time	t_R	200	260	400	ps	20% to 80%, $R_L = 50\Omega$
	t_F	250	370	500		
Output Duty Cycle	SYM	48	—	52	%	Differential
Period Jitter RMS	J_{PER}	—	2	—	ps	$f_0 = 100.00$ MHz, 10k cycles
Period Jitter Peak-to-Peak	J_{PTP}	—	16	—	ps	$f_0 = 100.00$ MHz, 10k cycles
Integrated Phase Noise (Random)	J_{PH}	—	0.617	—	ps_{RMS}	12 kHz to 20 MHz @100 MHz $T_A = -40^\circ C$ to $+105^\circ C$
		—	0.460	—		100 kHz to 20 MHz @100 MHz $T_A = -40^\circ C$ to $+105^\circ C$
		—	0.212	—		1.875 MHz to 20 MHz @100 MHz $T_A = -40^\circ C$ to $+105^\circ C$
Phase Jitter	T_J	—	3.42	86	ps_{PP}	PCIe Gen 1.1, $T_J = D_J + 14.069 \times R_J$ (BER 10^{-12}), Note 5
	$J_{RMS-CCHF}$	—	0.247	3.1	ps_{RMS}	PCIe Gen 2.1, 1.5 MHz to Nyquist, Note 5
	$J_{RMS-CCHF}$	—	0.08	3.0	ps_{RMS}	PCIeGen2.1, 10 kHz to 1.5 MHz, Note 5
	J_{RMS-CC}	—	0.107	1.0	ps_{RMS}	PCIe Gen 3.0, Note 5
		—	0.107	0.30		PCIe Gen 4.0, 16 GHz
		—	0.043	0.12		PCIe Gen 5.0, 32 GHz

- Note 1:** V_{DD} pin should be filtered with 0.1 μF capacitor.
- 2:** t_{SU} is time to 100 ppm stable output frequency after V_{DD} is applied and outputs are enabled.
- 3:** t_{DA} : See the Output Waveforms and the Test Circuits sections for more information.
- 4:** Output is enabled if pad is floated (not connected).
- 5:** Jitter limits are established by Gen 1.1, Gen 2.1, and Gen 3.0 PCIe standards.

DSC12X2/3/4

TEMPERATURE SPECIFICATIONS (Note 1)

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Maximum Junction Temperature	T_J	—	—	+150	°C	—
Storage Temperature Range	T_S	–55	—	+150	°C	—
Lead Temperature	—	—	—	+260	°C	Soldering, 40 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](#) and [Table 2-2](#).

TABLE 2-1: DSC120x/1x/2x PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	OE/STDBY/FS	Control pin: Output enable/standby/frequency select.
2	NC	No connect.
3	GND	Power supply ground.
4	CLK+	Clock output +.
5	CLK–	Clock output –.
6	VDD	Power supply.

TABLE 2-2: DSC123x/4x/5x PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	NC	No connect.
2	OE/STDBY/FS	Control pin: Output enable/standby/frequency select.
3	GND	Power supply ground.
4	CLK+	Clock output +.
5	CLK–	Clock output –.
6	VDD	Power supply.

DSC12X2/3/4

3.0 TERMINATION SCHEME

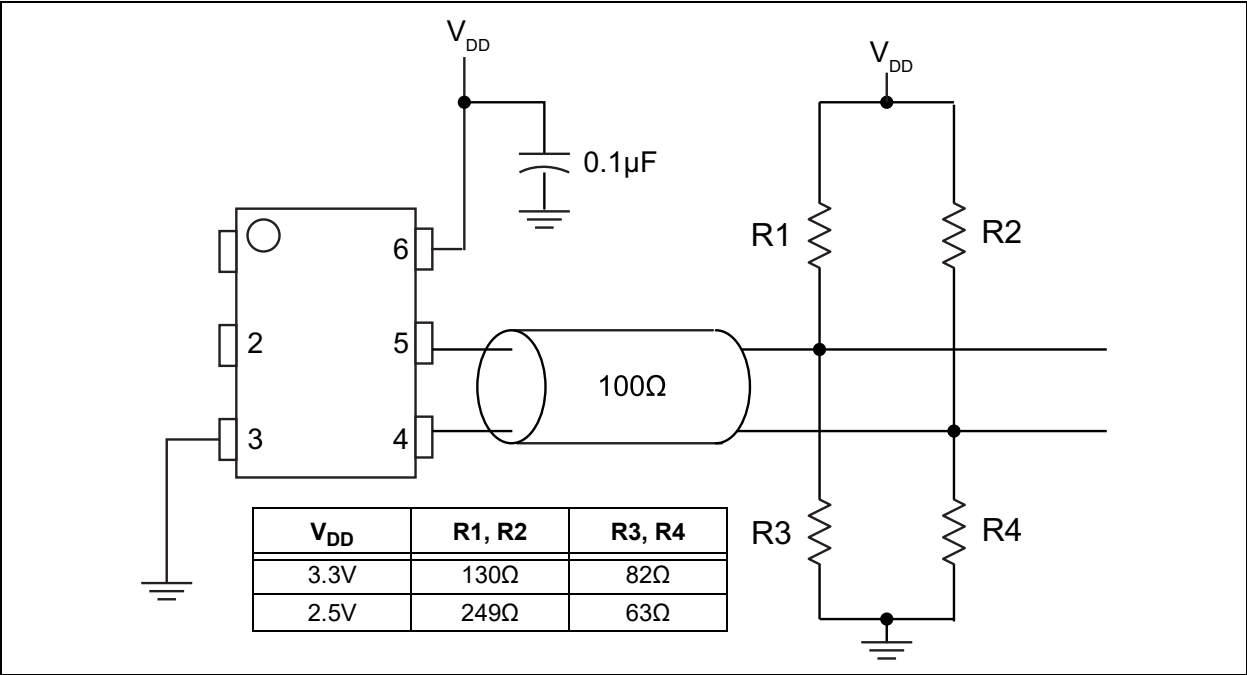


FIGURE 3-1: LVPECL Termination (DSC12x2).

In [Figure 3-1](#), Thevenin termination for 3.3V operation. Values will differ for V_{DD} = 2.5V

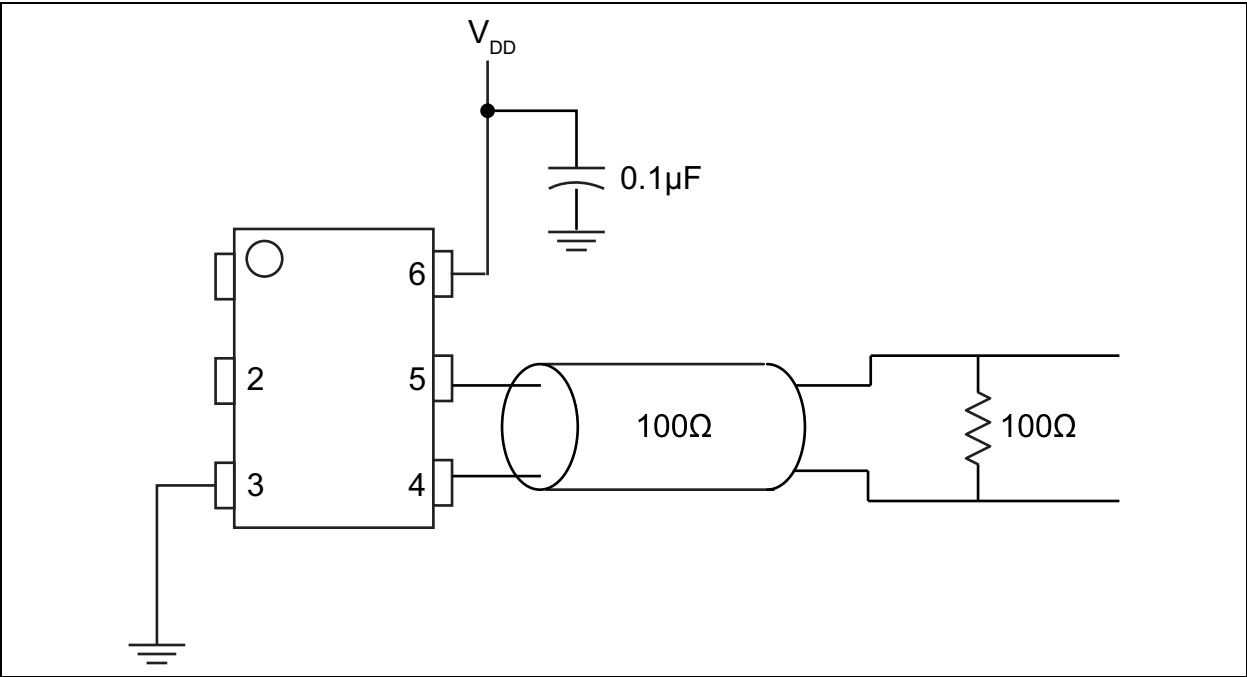


FIGURE 3-2: LVDS Termination (DSC12x3).

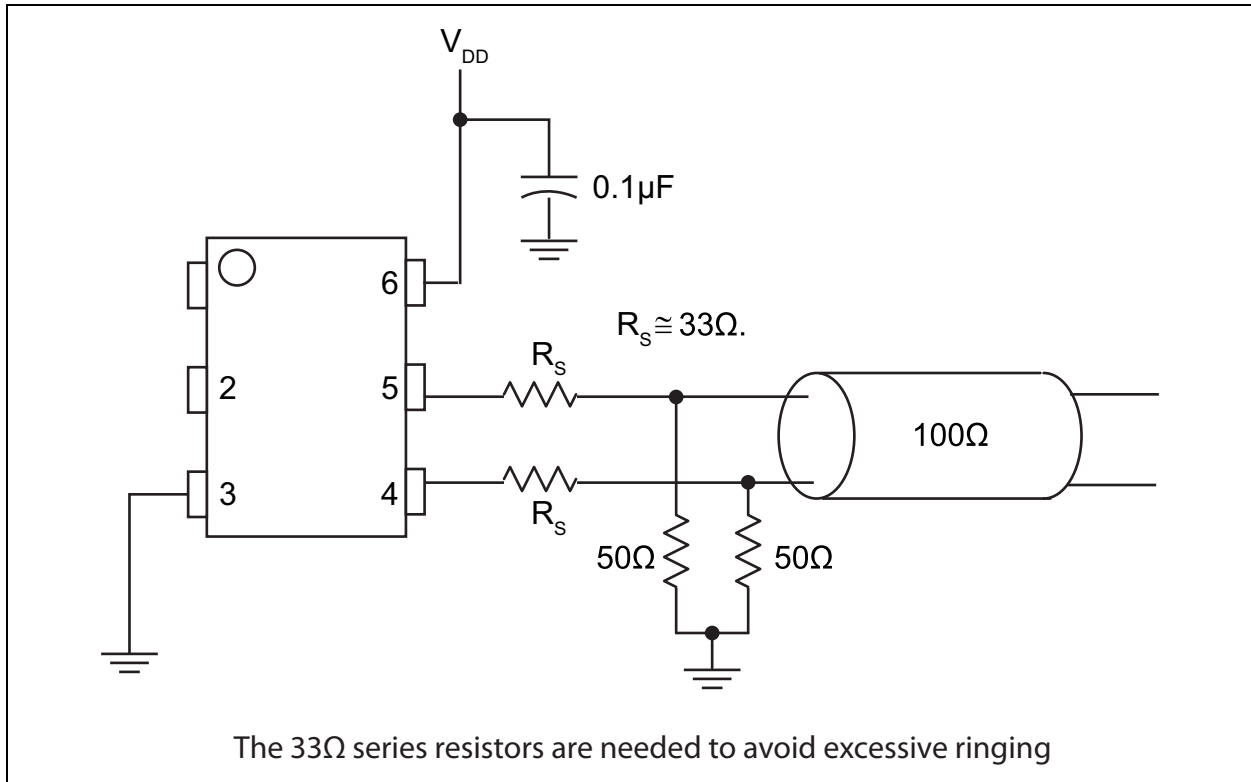


FIGURE 3-3: HCSL Termination (DSC12x4).

4.0 OUTPUT WAVEFORM

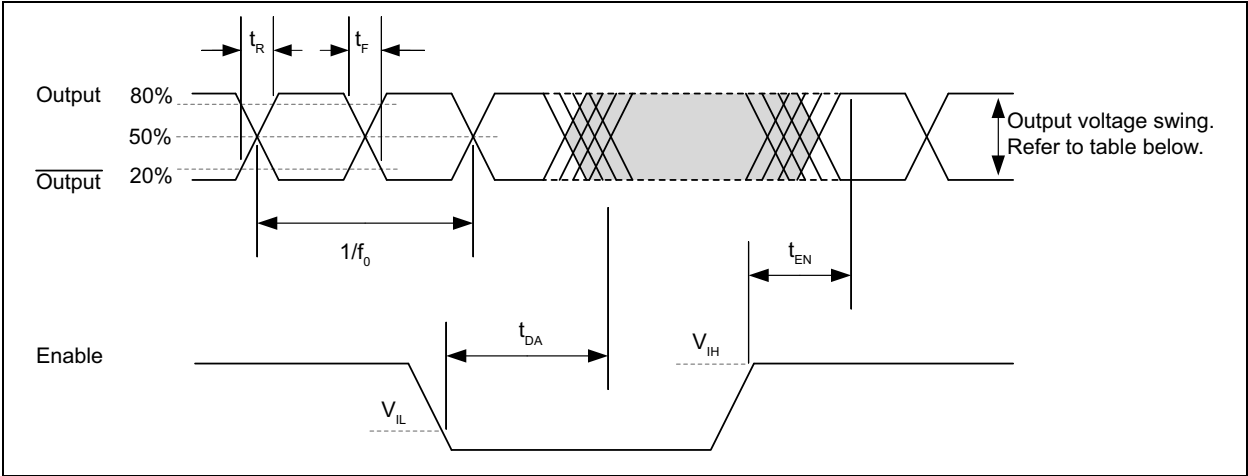


FIGURE 4-1: LVPECL, LVDS, and HCSL Output Waveform.

TABLE 4-1: OUTPUT VOLTAGE SWING BY LOGIC TYPE

Output Logic Protocol	Typical Peak-to-Peak Output Swing
LVPECL	830 mV
LVDS	350 mV
HCSL	675 mV

5.0 TEST CIRCUITS

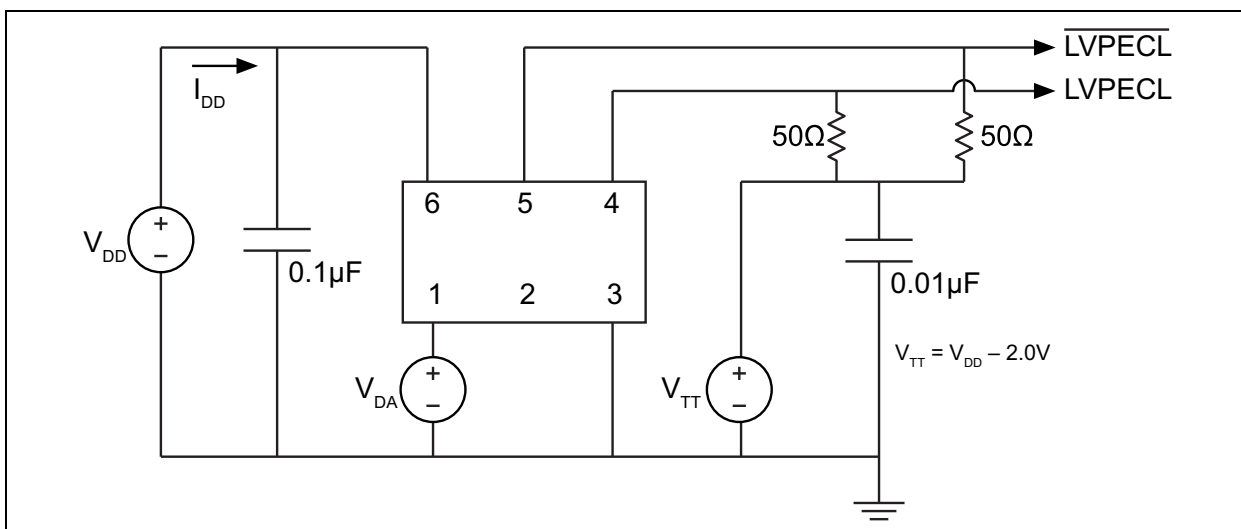


FIGURE 5-1: LVPECL Test Circuit.

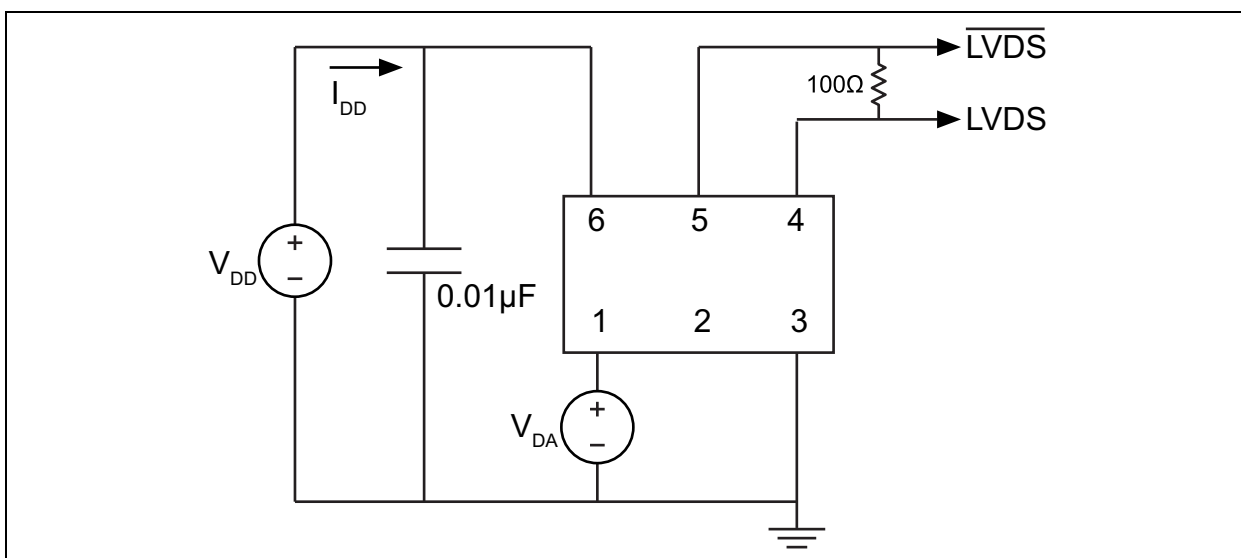


FIGURE 5-2: LVDS Test Circuit.

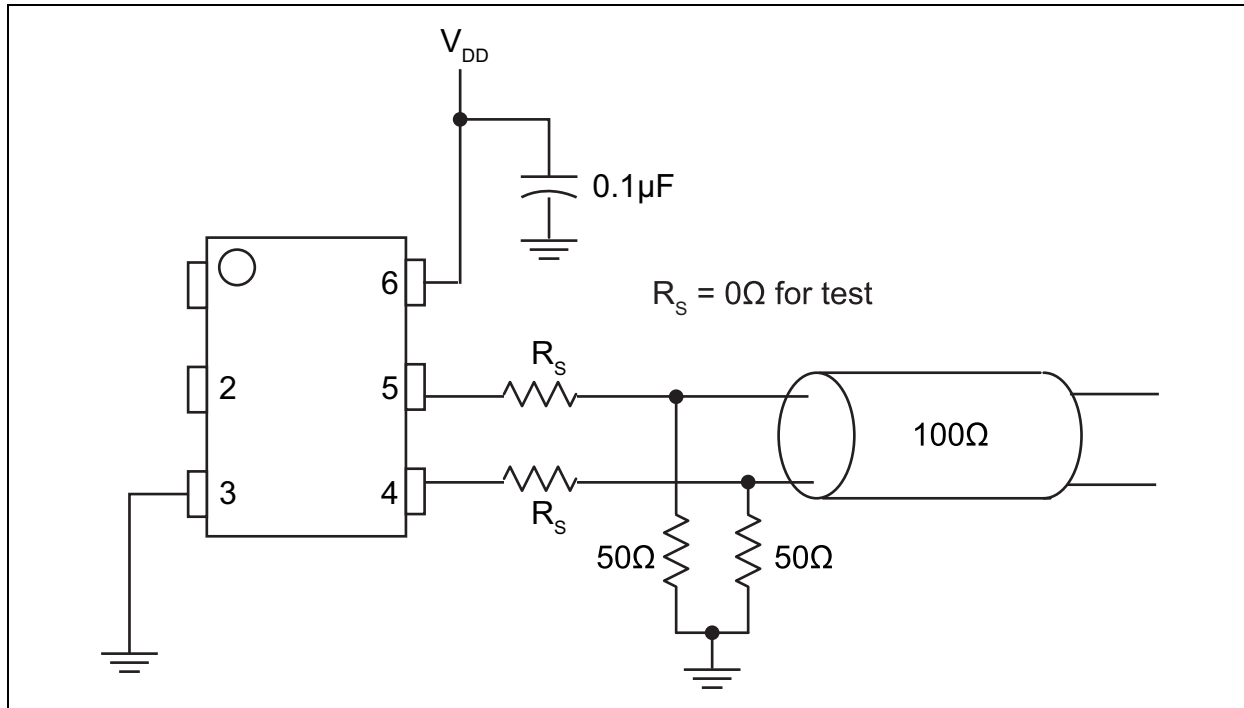


FIGURE 5-3: HCSL Test Circuit.

6.0 SOLDER REFLOW PROFILE

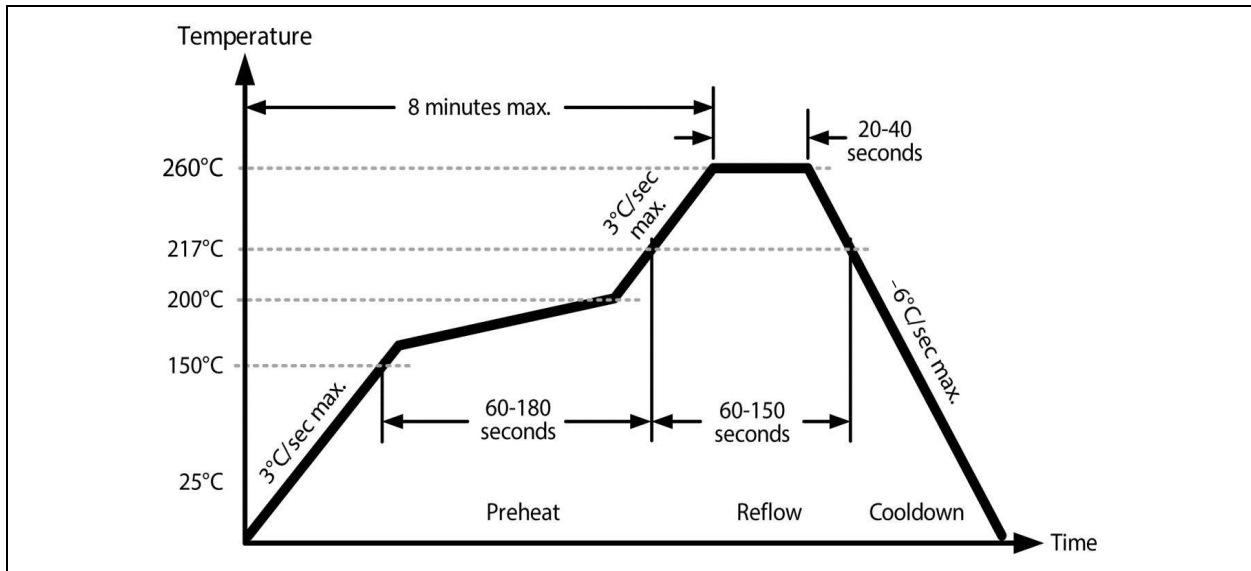


FIGURE 6-1: Solder Reflow Profile.

TABLE 6-1: SOLDER REFLOW

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

DSC12X2/3/4

7.0 BOARD LAYOUT (RECOMMENDED)

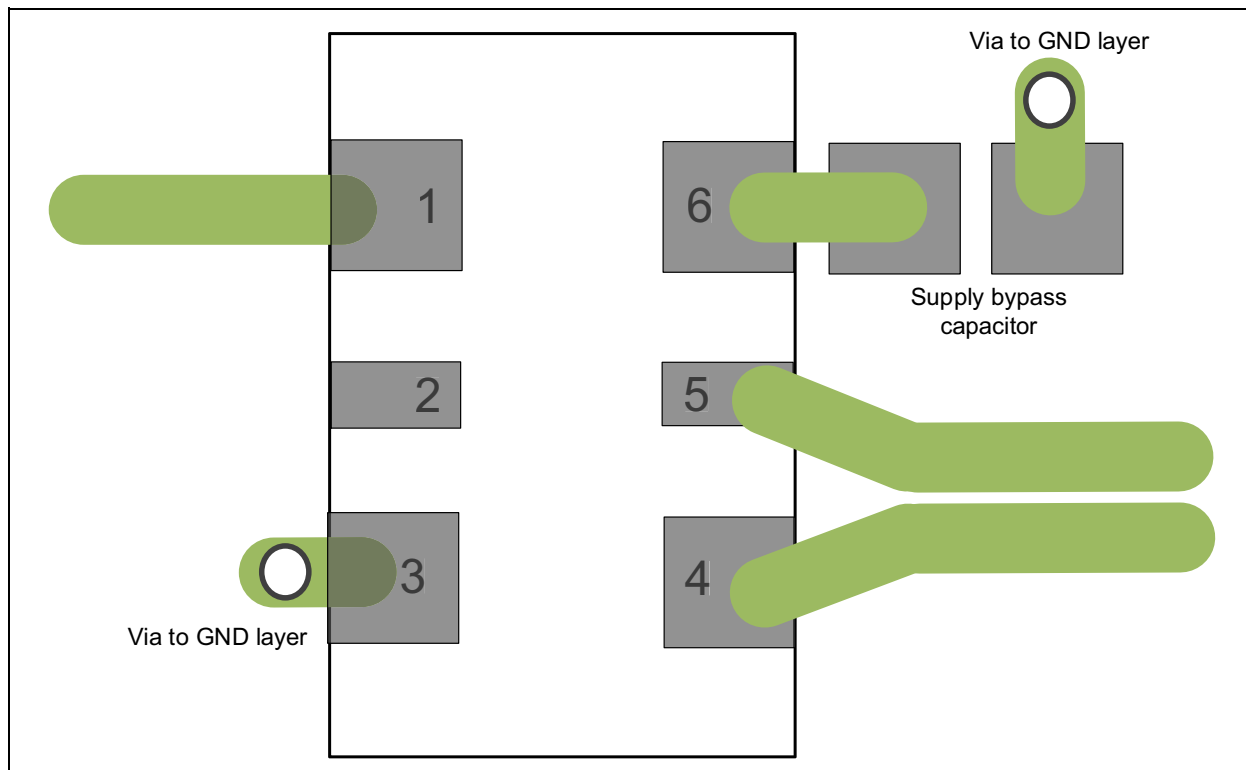


FIGURE 7-1: DSC12x2/3/4 Recommended Board Layout.

8.0 PHASE NOISE

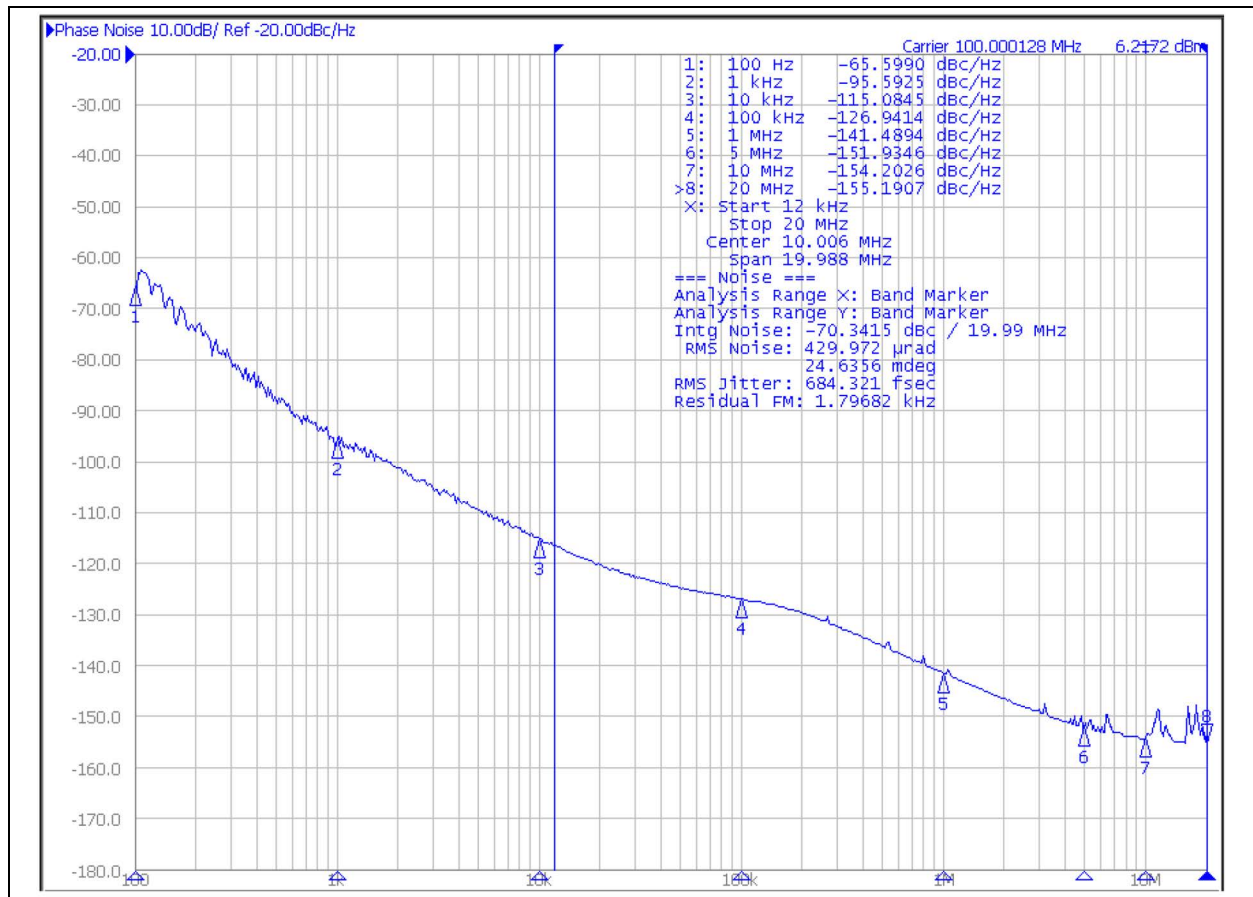


FIGURE 8-1: DSC12x4 Phase Noise at 100 MHz.

DSC12X2/3/4

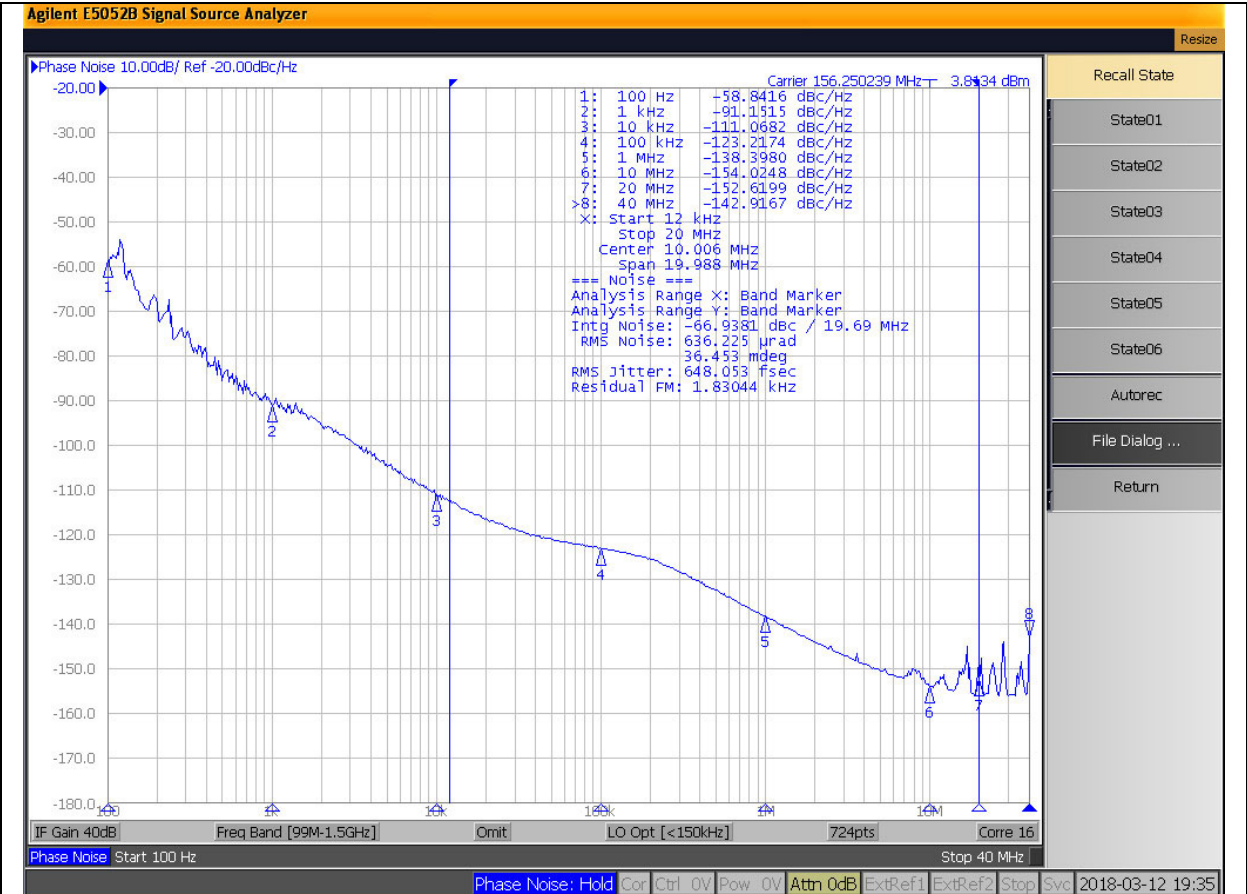
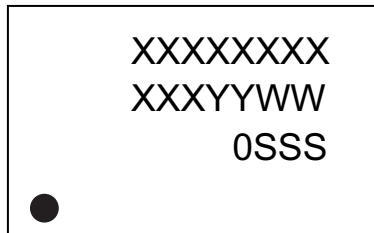


FIGURE 8-2: DSC12x2 Phase Noise at 156.25 MHz.

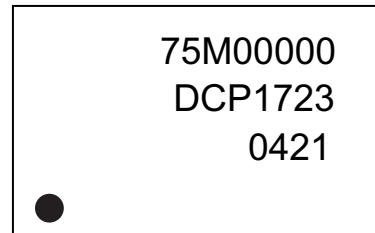
9.0 PACKAGING INFORMATION

9.1 Package Marking Information

6-Pin CDFN/VDFN*



Example



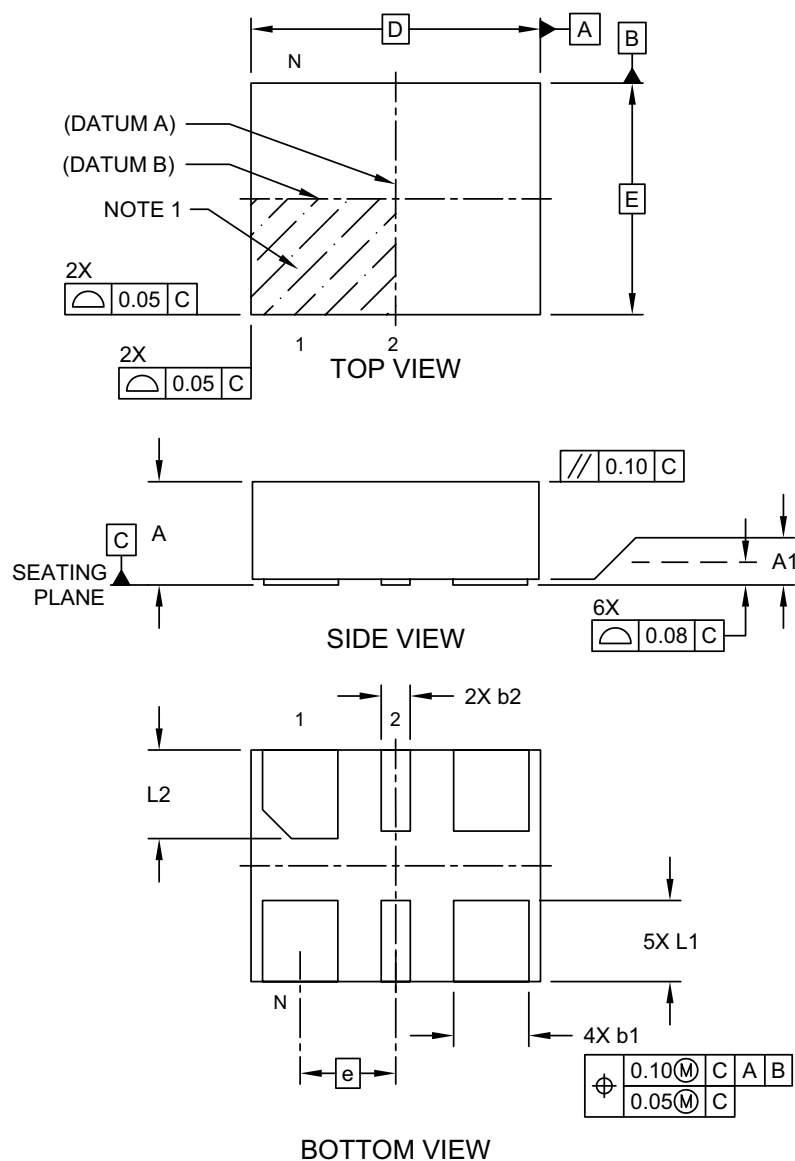
Legend:	XX...X	Product code, customer-specific information, or frequency in MHz without printed decimal point
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	SSS	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® 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)
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.	

DSC12X2/3/4

6-Lead VDFN 2.5 mm x 2.0 mm Package Outline and Recommended Land Pattern

6-Lead Very Thin Dual Flatpack No-Leads (J7A) - 2.5x2.0 mm Body [VDFN]

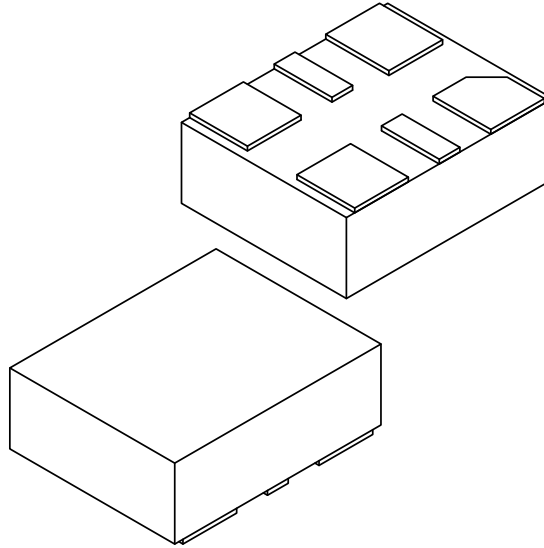
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1005 Rev C Sheet 1 of 2

6-Lead Very Thin Dual Flatpack No-Leads (J7A) - 2.5x2.0 mm Body [VDFN]

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		
Pitch	e	0.825 BSC		
Overall Height	A	0.80	0.85	0.90
Standoff	A1	0.00	0.02	0.05
Overall Length	D	2.50 BSC		
Overall Width	E	2.00 BSC		
Terminal Width	b1	0.60	0.65	0.70
Terminal Width	b2	0.20	0.25	0.30
Terminal Length	L1	0.60	0.70	0.80
Terminal Length	L2	0.665	0.765	0.865

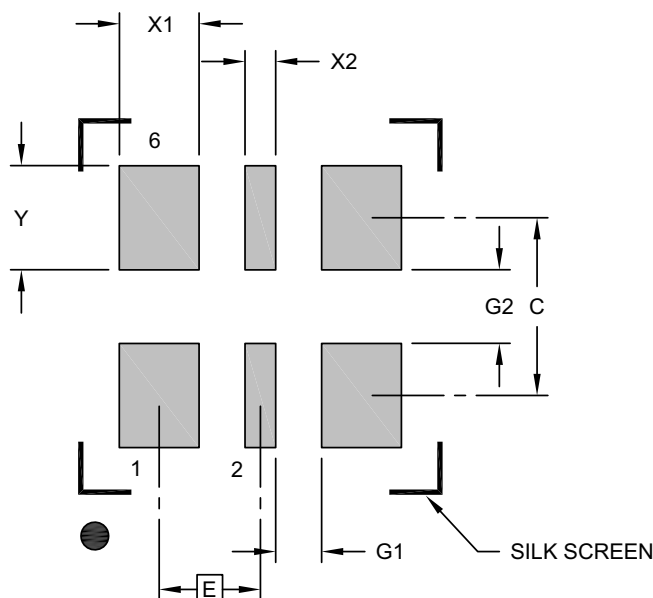
Notes:

- 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 C04-1005 Rev C Sheet 2 of 2

6-Lead Very Thin Dual Flatpack No-Leads (J7A) - 2.5x2.0 mm Body [VDFN]

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	0.825 BSC		
Contact Pad Width (X4)	X1			0.65
Contact Pad Width (X2)	X2			0.25
Contact Pad Length (X6)	Y			0.85
Contact Pad Spacing	C		1.45	
Space Between Contacts (X4)	G1	0.38		
Space Between Contacts (X3)	G2	0.60		

Notes:

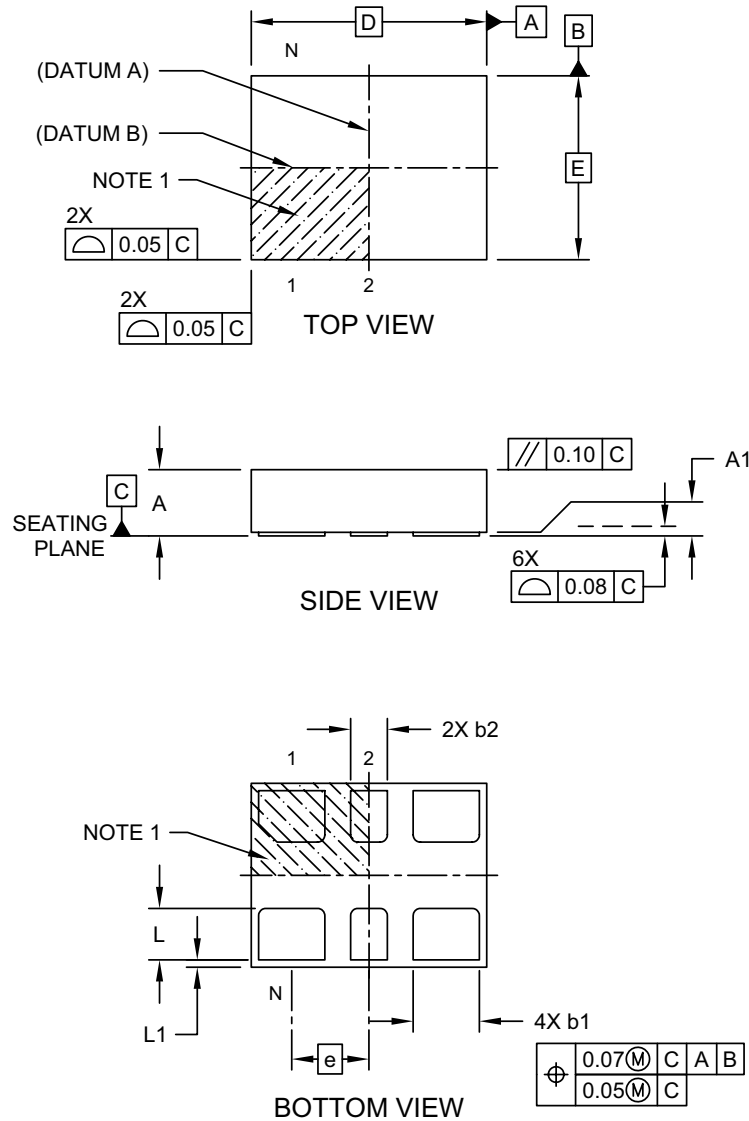
- Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
- For best soldering results, thermal vias, if used, should be filled or tented to avoid solder loss during reflow process

Microchip Technology Drawing C04-3005 Rev C

6-Lead VDFN 3.2 mm x 2.5 mm Package Outline and Recommended Land Pattern

6-Lead Very Thin Plastic Dual Flatpack No-Lead (H5A) - 3.2x2.5 mm Body [VDFN]

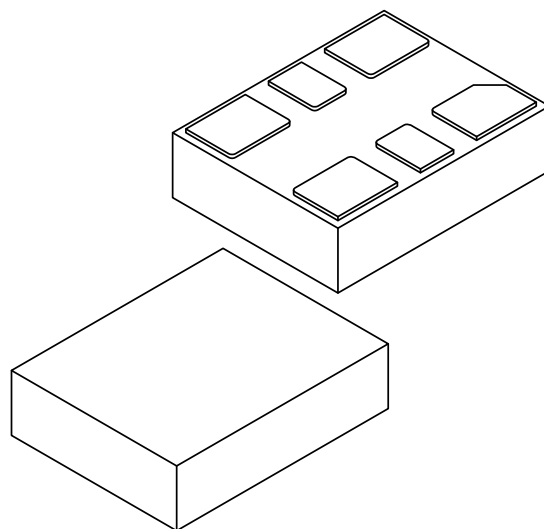
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1007A Sheet 1 of 2

6-Lead Very Thin Plastic Dual Flatpack No-Lead (H5A) - 3.2x2.5 mm Body [VDFN]

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		
Pitch	e	1.05 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	b1	0.85	0.90	0.95
Terminal Width	b2	0.45	0.50	0.55
Terminal Length	L	0.65	0.70	0.75
Terminal Pullback	L1	0.10 REF		

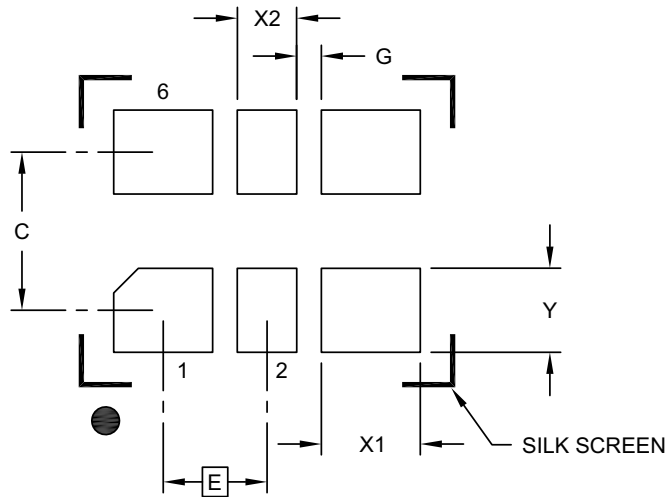
Notes:

- 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 C04-1007A Sheet 2 of 2

6-Lead Very Thin Plastic Dual Flatpack No-Lead (H5A) - 3.2x2.5 mm Body [VDFN]

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		1.05 BSC	
Contact Pad Spacing	C		1.60	
Contact Pad Width (X4)	X1			1.00
Contact Pad Width (X2)	X2			0.60
Contact Pad Length (X6)	Y			0.85
Space Between Contacts (X4)	G1	0.25		

Notes:

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

Microchip Technology Drawing C04-3007A

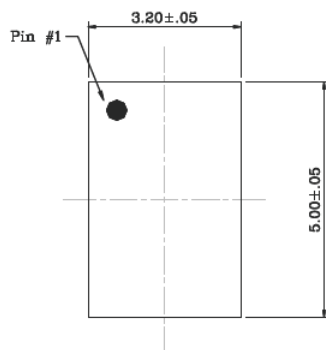
DSC12X2/3/4

6-Lead CDFN 5.0 mm x 3.2 mm Package Outline and Recommended Land Pattern

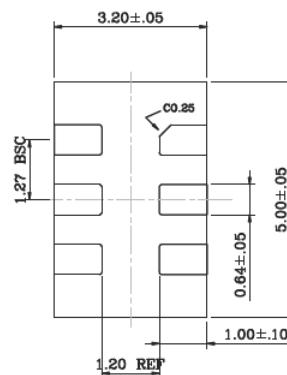
TITLE

6 LEAD CDFN 5.0x3.2mm COL PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

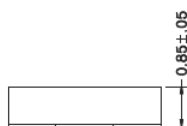
DRAWING #	CDFN5032-6LD-PL-1	UNIT	MM
-----------	-------------------	------	----



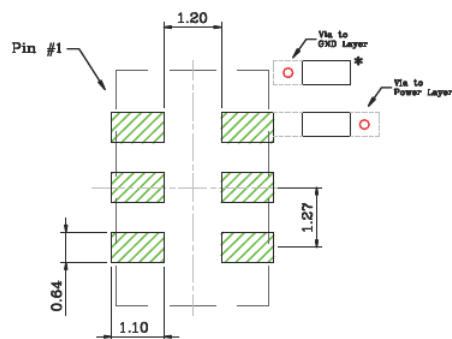
Top View



Bottom View



Side View



Recommended Land Pattern

NOTE:

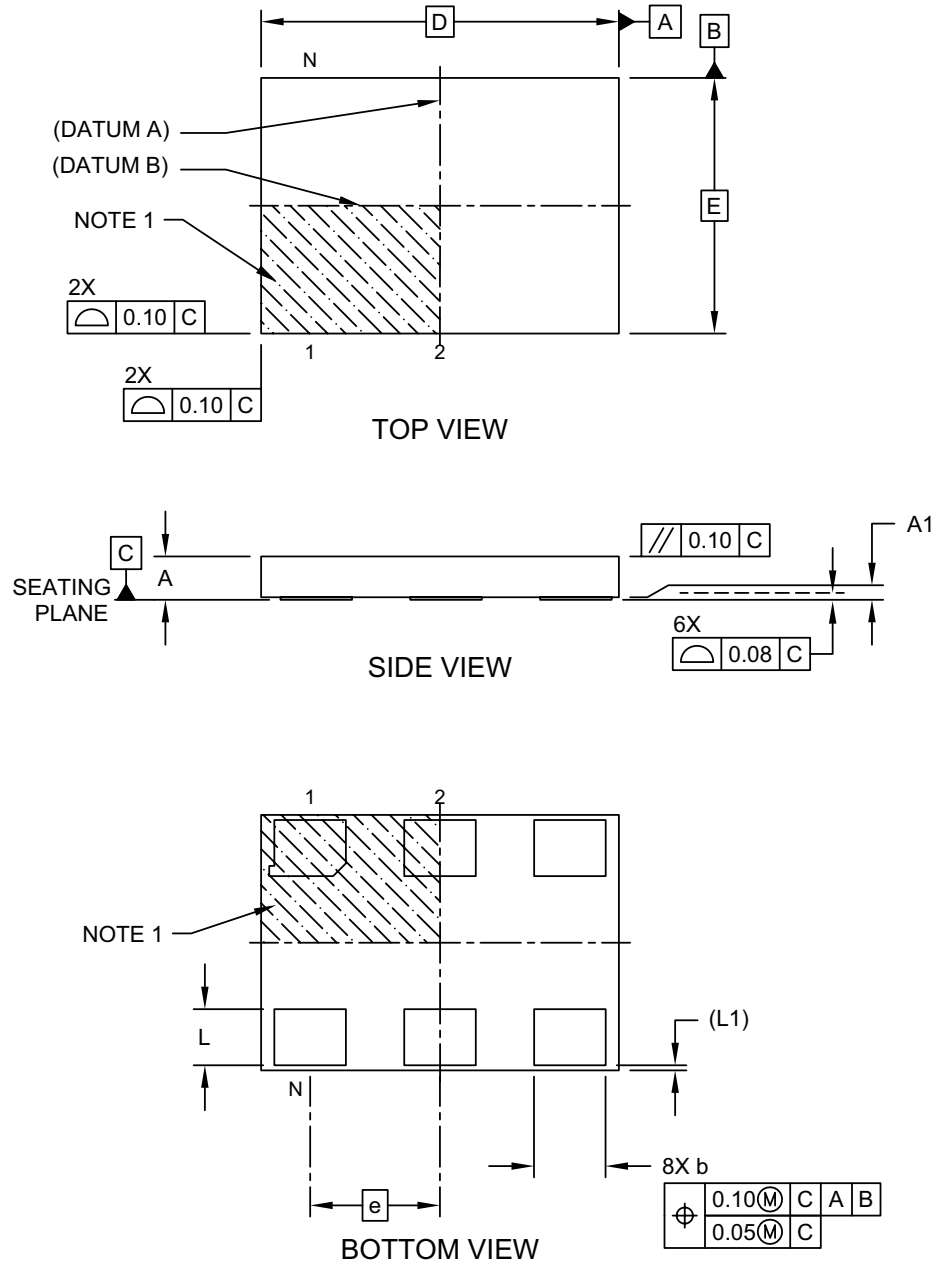
1. * Power Supply Decoupling Capacitor is required in Recommended Land Pattern.
2. Green shaded rectangles in Recommended Land Pattern are solder stencil opening.
3. Red circles in Recommended Land Pattern are thermal VIA.

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

6-Lead VDFN 7.0 mm x 5.0 mm Package Outline and Recommended Land Pattern

6-Lead Very Thin Dual Flatpack, No Lead Package (HPA) - 7x5 mm Body [VDFN]

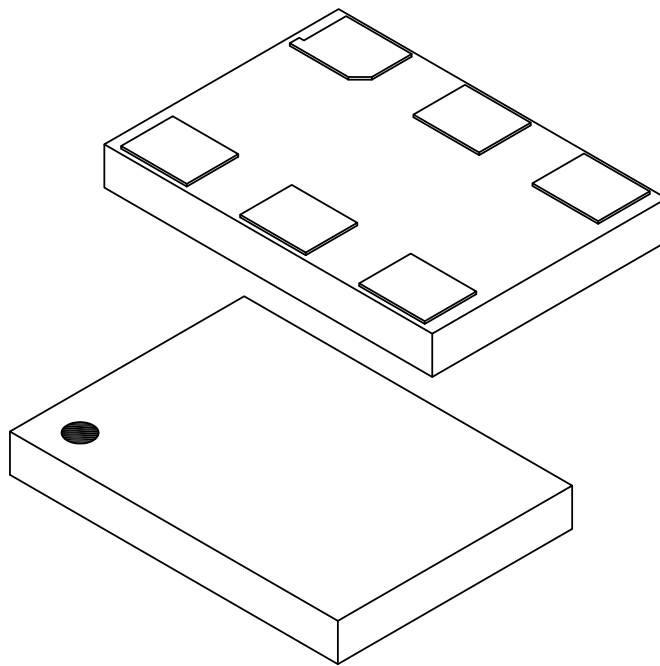
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1227 Rev A Sheet 1 of 2

6-Lead Very Thin Dual Flatpack, No Lead Package (HPA) - 7x5 mm Body [VDFN]

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		
Pitch	e	2.54 BSC		
Overall Height	A	0.80	0.85	0.90
Standoff	A1	0.00	0.02	0.05
Overall Length	D	7.00 BSC		
Overall Width	E	5.00 BSC		
Terminal Width	b	1.30	1.40	1.50
Terminal Length	L	1.00	1.10	1.20
Pullback	L1	0.10 REF		

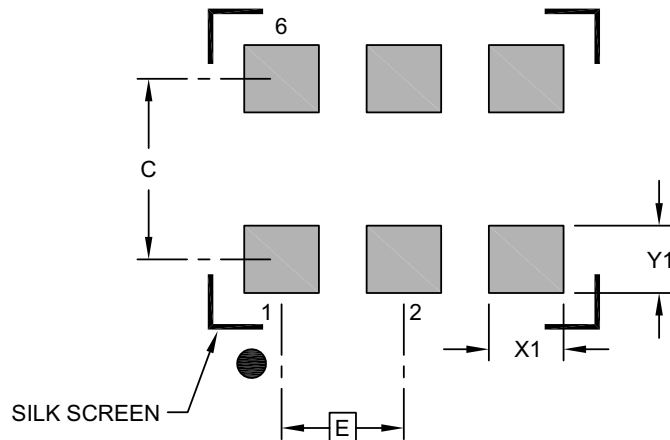
Notes:

- 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 C04-1227 Rev A Sheet 2 of 2

6-Lead Very Thin Dual Flatpack, No Lead Package (HPA) - 7x5 mm Body [VDFN]

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		2.54 BSC	
Contact Pad Spacing	C		3.90	
Contact Pad Width (X6)	X1			1.55
Contact Pad Length (X6)	Y1			1.40

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 C04-3227 Rev A

DSC12X2/3/4

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (April 2019)

- Initial release of DSC12x2/3/4 as Microchip data sheet DS20006011A.

Revision B (June 2020)

- Revisions to the data sheet made in the [Electrical Characteristics](#) table under HCSL: Added new rows for Integrated Phase Noise and Phase Jitter.
- Also added a new bullet under the [Features](#) section.

Revision C (January 2021)

- Updated Phase Jitter maximum values for $J_{\text{RMS-CC}}$ in the [Electrical Characteristics](#) table and added a sixth note.
- Updated package drawing for [6-Lead VDFN 2.5 mm x 2.0 mm Package Outline and Recommended Land Pattern](#).
- Updated [Figure 3-1](#).

Revision D (March 2021)

- Removed Note 6 from the [Electrical Characteristics](#) table.

Revision E (March 2022)

- Added PCI Express Gen 5 to the [Applications](#) list.

DSC12X2/3/4

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	-XXXXXXX	X
Device		Control Pin	Output Format	Package	Temperature	Freq. Stability	Output Frequency	Media Type
Device:		DSC12:	High Performance Differential MEMS Oscillators					
Control Pin:		0	=	Pin 1 <u>STDBY</u> with Pull-up				
		1	=	Pin 1 Frequency Select with Pull-up				
		2	=	Pin 1 <u>OE</u> with Pull-up				
		3	=	Pin 2 <u>STDBY</u> with Pull-up				
		4	=	Pin 2 Frequency Select with Pull-up				
		5	=	Pin 2 OE with Pull-up				
Output Format:		2	=	LVPECL				
		3	=	LVDS				
		4	=	HCSL				
Package:		N	=	7 mm x 5 mm 6-Lead VDFN				
		B	=	5 mm x 3.2 mm 6-Lead CDFN				
		C	=	3.2 mm x 2.5 mm 6-Lead VDFN				
		D	=	2.5 mm x 2 mm 6-Lead VDFN				
Temperature:		A	=	-40°C to +125°C(Available on certain options)				
		L	=	-40°C to +105°C				
		I	=	-40°C to +85°C				
		E	=	-20°C to +70°C				
Frequency Stability:		1	=	±50 ppm				
		2	=	±25 ppm				
		3	=	±20 ppm				
Output Frequency:		xMxxxxxx	=	<10 MHz				
		xxMxxxxx	=	<100 MHz				
		xxxMxxxx	=	>100 MHz				
		CCCCC	=	with Frequency Select				
		PROG	=	TimeFlash				
Media Type:		<blank>	=	Bulk				
		T	=	1,000/Reel				
		B	=	3,000/Reel				

Examples:

a) DSC1202NE1-25M00000T: Pin 1 STDBY with Pull-up, LVPECL Output, 7x5 VDFN, -20°C to +70°C, ±50 ppm, 25 MHz Output Frequency, 1,000/Reel

b) DSC1243CL3-C0013: Pin 2 Frequency Select with Pull-up, LVDS Output, 3.2x2.5 VDFN, -40°C to +105°C, ±20 ppm, Multiple Output Frequency, Bulk

c) DSC1224BI2-19M50000B: Pin 1 OE with Pull-up, HCSL Output, 5x3.2 CDFN, -40°C to +85°C, ±25 ppm, 19.5 MHz Output Frequency, 3,000/Reel

d) DSC1232DL3-55M82000T: Pin 2 STDBY with Pull-up, LVPECL Output, 2.5x2 VDFN, -40°C to +105°C, ±20 ppm, 55.82 MHz Output Frequency, 1,000/Reel

e) DSC1213NI1-C0014B: Pin 1 Frequency Select with Pull-up, LVDS Output, 7x5 VDFN, -40°C to +85°C, ±50 ppm, Multiple Output Frequency, 3,000/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.

Please visit the [Microchip ClockWorks Configurator®](http://clockworks.microchip.com/timing) website to configure the part number for customized frequency select settings.

<http://clockworks.microchip.com/timing>

DSC12X2/3/4

NOTES:

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
 - Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
 - Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
 - Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is “unbreakable”. Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.
-

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at <https://www.microchip.com/en-us/support/design-help/client-support-services>.

THIS INFORMATION IS PROVIDED BY MICROCHIP “AS IS”. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP’S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

For information regarding Microchip’s Quality Management Systems, please visit www.microchip.com/quality.

Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, AnyRate, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Kleer, LANCheck, LinkMD, maxStylus, maxTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, IntelliMOS, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, QuietWire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, TrueTime, WinPath, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, GridTime, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, NVm Express, NVMe, Omniscent Code Generation, PICDEM, PICDEM.net, PICKit, PICTail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQL, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, TSHARC, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, Symmcom, and Trusted Time are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2019 - 2022, Microchip Technology Incorporated and its subsidiaries.

All Rights Reserved.

ISBN: 978-1-5224-9970-1

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453
Tel: 317-536-2380

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
Tel: 951-273-7800

Raleigh, NC
Tel: 919-844-7510

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110
Tel: 408-436-4270

Canada - Toronto
Tel: 905-695-1980
Fax: 905-695-2078

ASIA/PACIFIC

Australia - Sydney
Tel: 61-2-9868-6733

China - Beijing
Tel: 86-10-8569-7000

China - Chengdu
Tel: 86-28-8665-5511

China - Chongqing
Tel: 86-23-8980-9588

China - Dongguan
Tel: 86-769-8702-9880

China - Guangzhou
Tel: 86-20-8755-8029

China - Hangzhou
Tel: 86-571-8792-8115

China - Hong Kong SAR
Tel: 852-2943-5100

China - Nanjing
Tel: 86-25-8473-2460

China - Qingdao
Tel: 86-532-8502-7355

China - Shanghai
Tel: 86-21-3326-8000

China - Shenyang
Tel: 86-24-2334-2829

China - Shenzhen
Tel: 86-755-8864-2200

China - Suzhou
Tel: 86-186-6233-1526

China - Wuhan
Tel: 86-27-5980-5300

China - Xian
Tel: 86-29-8833-7252

China - Xiamen
Tel: 86-592-2388138

China - Zhuhai
Tel: 86-756-3210040

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444

India - New Delhi
Tel: 91-11-4160-8631

India - Pune
Tel: 91-20-4121-0141

Japan - Osaka
Tel: 81-6-6152-7160

Japan - Tokyo
Tel: 81-3-6880-3770

Korea - Daegu
Tel: 82-53-744-4301

Korea - Seoul
Tel: 82-2-554-7200

Malaysia - Kuala Lumpur
Tel: 60-3-7651-7906

Malaysia - Penang
Tel: 60-4-227-8870

Philippines - Manila
Tel: 63-2-634-9065

Singapore
Tel: 65-6334-8870

Taiwan - Hsin Chu
Tel: 886-3-577-8366

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600

Thailand - Bangkok
Tel: 66-2-694-1351

Vietnam - Ho Chi Minh
Tel: 84-28-5448-2100

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4485-5910
Fax: 45-4485-2829

Finland - Espoo
Tel: 358-9-4520-820

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766400

Germany - Heilbronn
Tel: 49-7131-72400

Germany - Karlsruhe
Tel: 49-721-625370

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Rosenheim
Tel: 49-8031-354-560

Israel - Ra'anana
Tel: 972-9-744-7705

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Padova
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Norway - Trondheim
Tel: 47-7288-4388

Poland - Warsaw
Tel: 48-22-3325737

Romania - Bucharest
Tel: 40-21-407-87-50

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Gothenberg
Tel: 46-31-704-60-40

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820