

## High Performance Differential MEMS Oscillators for Automotive

### Features

- Automotive AEC-Q100 Qualified
- Any Frequency between 2.5 MHz and 450 MHz
- Supports LVPECL, LVDS, or HCSL Differential Outputs
- Very Low RMS Phase Jitter: <650 fs (typ.)
- Complies with PCIe Gen1/2/3/4/5 Common Clock Spec
- High Stability:  $\pm 20$  ppm,  $\pm 25$  ppm,  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive Grade 1:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  (DSA12x3 LVDS Output Only)
  - Automotive Grade 2:  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
  - Automotive Grade 3:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- 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 2.25V to 3.63V
- Standby, Frequency Select, and Output Enable Functions
- Lead-Free and RoHS-Compliant

### Applications

- Automotive Infotainment
- Automotive ADAS
- In-Vehicle Networking, CAN Bus, Ethernet

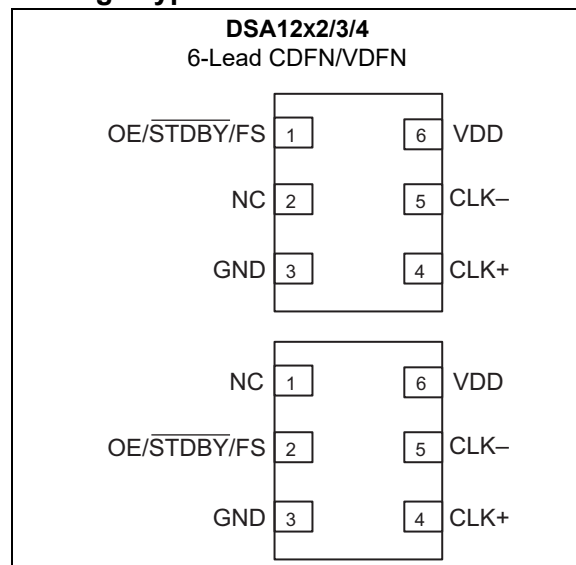
### General Description

The DSA12x2/3/4 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 automotive applications.

The DSA12x2/3/4 family features a control function on pin 1 or pin 2 that permits either a standby feature (complete power down when  $\overline{\text{STDBY}}$  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.

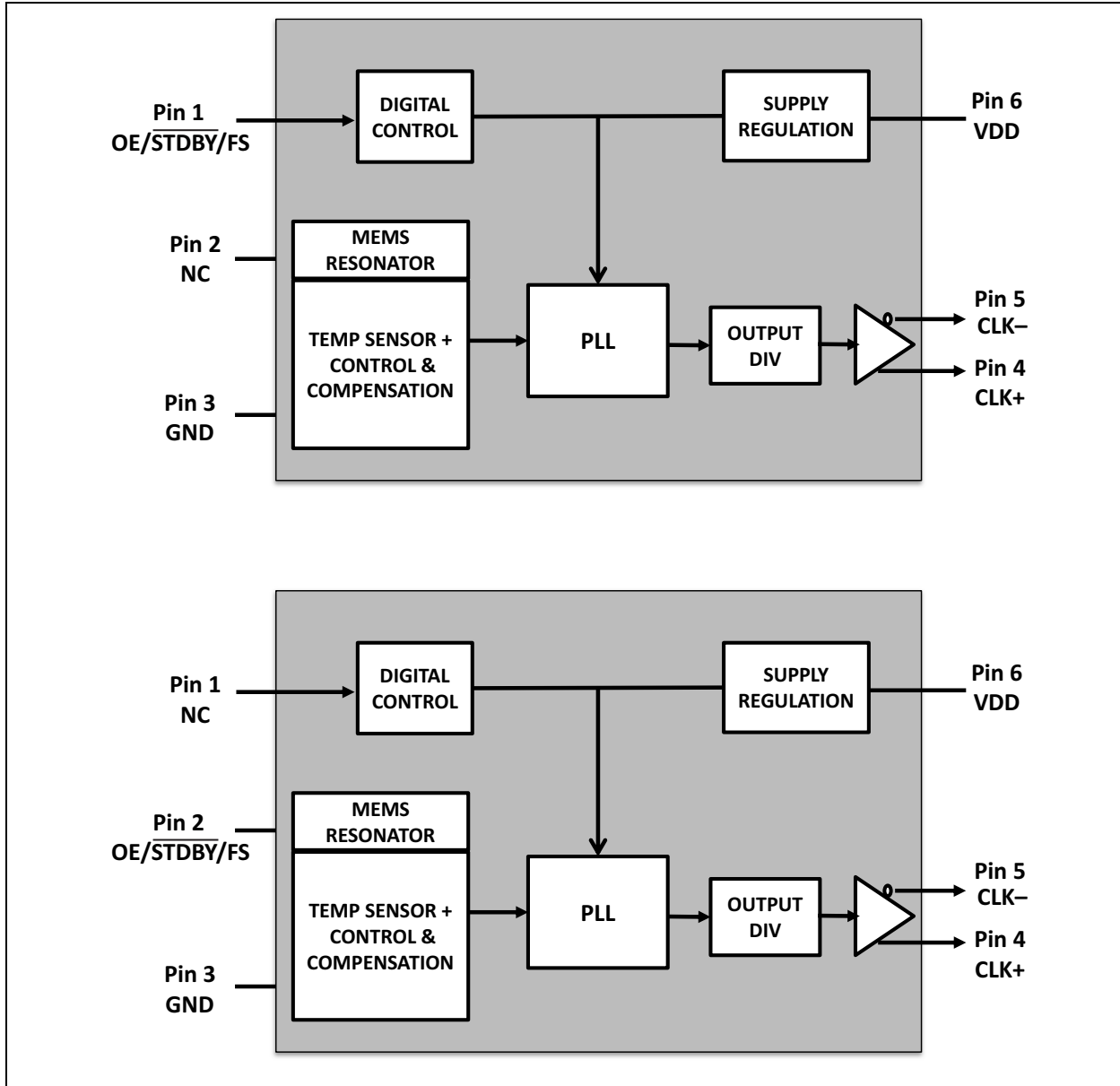
All oscillators are available in industry-standard packages, including the small 2.5 mm x 2.0 mm, and are “drop-in” replacements for standard 6-pin LVPECL/LVDS/HCSL crystal oscillators.

### Package Types



# DSA12X2/3/4

## 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.

Parameter	Symbol	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	$\mu A$	Input pin = STDBY = Asserted ( $V_{DD} = 3.3V$ )
Frequency Stability	$\Delta f$	—	—	$\pm 20$	ppm	Includes frequency variations due to initial tolerance, temp., and power supply voltage
		—	—	$\pm 25$		
		—	—	$\pm 50$		
Aging	$\Delta f$	—	—	$\pm 5$	ppm	First year @ $25^\circ C$
		—	—	$\pm 1$		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	STDBY
		—	—	350	ns	OE
Enable Pull-Up Resistor	—	—	1.5	—	M $\Omega$	Pull-up resistor on pin 1, Note 4
<b>LVPECL (DSA12x2)</b>						
Frequency	$f_0$	2.5	—	450	MHz	—
Output Logic Levels	$V_{OH}$	$V_{DD} - 1.145$	—	—	V	$R_L = 50\Omega$
	$V_{OL}$	—	—	$V_{DD} - 1.695$		
Peak-to-Peak Output Swing	$V_{PP}$	—	800	—	mV	Single-Ended
Output Transition Time	$t_R$	—	200	250	ps	20% to 80%, $R_L = 50\Omega$
	$t_F$	—	250	300		

# DSA12X2/3/4

## 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.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
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
<b>LVDS Integrated Phase Noise (DSA12x3)</b>						
Frequency	$f_0$	2.3	—	450	MHz	—
Output Offset Voltage	$V_{OS}$	1.15	1.25	1.35	V	R = 100 $\Omega$ Differential
Peak-to-Peak Output Swing	$V_{PP}$	250	350	450	mV	Single-Ended
Output Transition Time	$t_R$	120	170	220	ps	20% to 80%, $R_L = 100\Omega$
	$t_F$					
Output Duty Cycle	SYM	48	—	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, $T_A = -40^\circ C$ to $+125^\circ C$
Period Jitter Peak-to-Peak	$J_{PTP}$	—	25	—	ps	$f_0 = 156.25$ MHz, $T_A = -40^\circ C$ to $+125^\circ C$
Integrated Phase Noise (Random)	$J_{PH}$	—	0.65	—	$ps_{RMS}$	12 kHz to 20 MHz @156.25 MHz $T_A = -40^\circ C$ to $+105^\circ C$
		—	0.9	—		2 kHz to 20 MHz @156.25 MHz $T_A = -40^\circ C$ to $+125^\circ C$
<b>HCSL (DSA12x4)</b>						
Frequency	$f_0$	2.3	—	450	MHz	—
Output Logic Levels	$V_{OH}$	0.64	—	—	V	$R_L = 50\Omega$
	$V_{OL}$	—	—	0.1		
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
		—	0.460	—		100 kHz to 20 MHz @100 MHz
		—	0.212	—		1.875 MHz to 20 MHz @100 MHz

## 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.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Phase Jitter	$T_J$	—	23	86	ps <sub>PP</sub>	PCIe Gen 1.1, $T_J = D_J + 14.069 \times R_J$ (BER $10^{-12}$ ), <a href="#">Note 5</a>
	$J_{RMS-CCHF}$	—	2.230	3.1	ps <sub>RMS</sub>	PCIe Gen 2.1, 1.5 MHz to Nyquist, <a href="#">Note 5</a>
	$J_{RMS-CCLF}$	—	0.08	3.0	ps <sub>RMS</sub>	PCIe Gen 2.1, 10 kHz to 1.5 MHz, <a href="#">Note 5</a>
	$J_{RMS-CC}$	—	0.107	1.0	ps <sub>RMS</sub>	PCIe Gen 3.0, <a href="#">Note 5</a>
—		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 a 0.1  $\mu F$  capacitor.  
**2:**  $t_{SU}$  is the time to 100 ppm stable output frequency after  $V_{DD}$  is applied and outputs are enabled.  
**3:**  $t_{DA}$ : See the [Output Waveform](#) and the [Test Circuits](#) sections for more information.  
**4:** Output is enabled if pad is floated (not connected).  
**5:** Jitter limits established by Gen1.1, Gen 2.1, and Gen 3.0 PCIe standards.

## TEMPERATURE SPECIFICATIONS [Note 1](#)

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
<b>Temperature Ranges</b>						
Maximum Junction Temperature	$T_J$	—	—	+150	$^\circ C$	—
Storage Temperature Range	$T_S$	-55	—	+150	$^\circ C$	—
Lead Temperature	—	—	—	+260	$^\circ C$	Soldering, 40s

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

# DSA12X2/3/4

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## 2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 2-1](#).

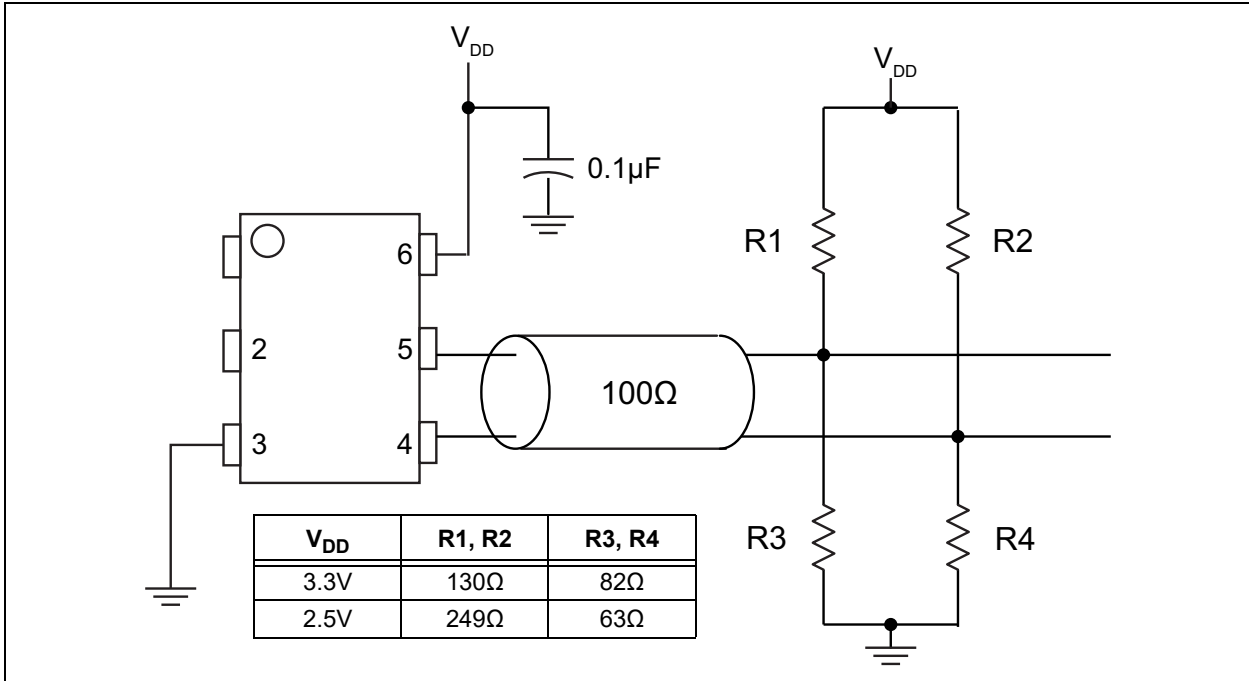
**TABLE 2-1: DSA120X/1X/2X PIN FUNCTION TABLE**

Pin Number	Pin Name	Description
1	OE/ $\overline{\text{STDBY}}$ /FS	Control pin: Output enable/standby/frequency select. External 10 k $\Omega$ pull up recommended when not actively driven.
2	NC	No connect.
3	GND	Power supply ground.
4	CLK+	Clock output +.
5	CLK-	Clock output -.
6	VDD	Power supply.

**TABLE 2-2: DSA123X/4X/5X PIN FUNCTION TABLE**

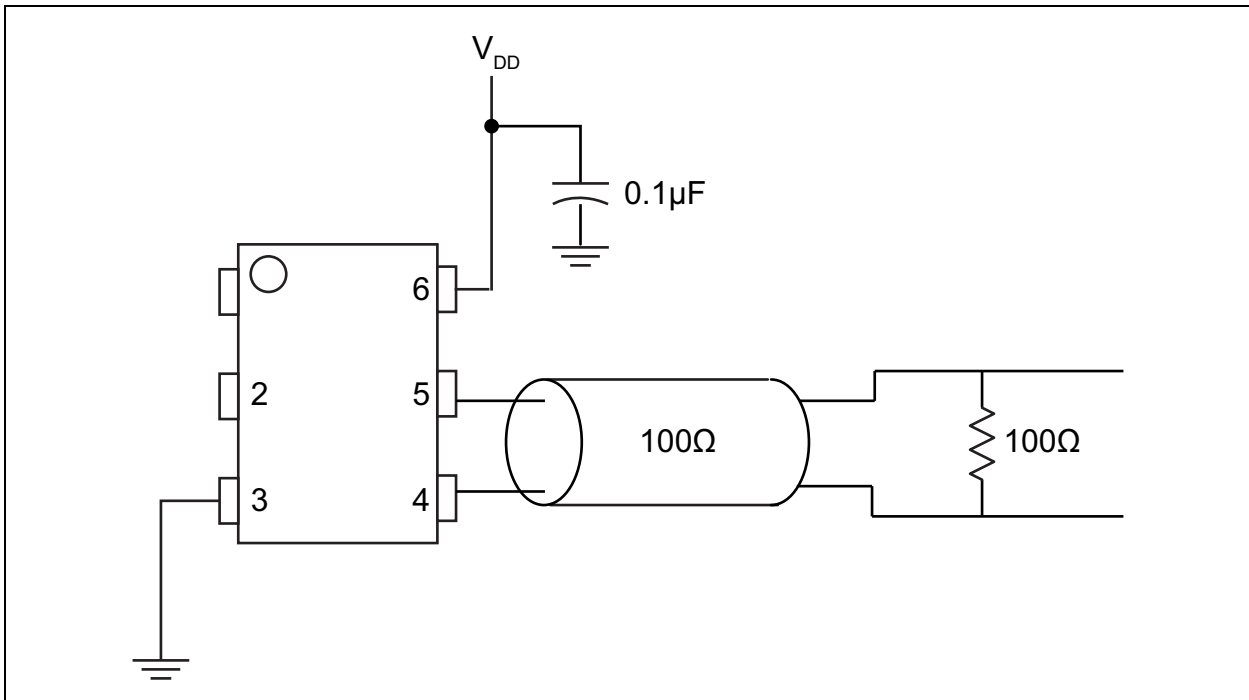
Pin Number	Pin Name	Description
1	NC	No connect.
2	OE/ $\overline{\text{STDBY}}$ /FS	Control pin: Output enable/standby/frequency select. External 10 k $\Omega$ pull up recommended when not actively driven.
3	GND	Power supply ground.
4	CLK+	Clock output +.
5	CLK-	Clock output -.
6	VDD	Power supply.

## 3.0 TERMINATION SCHEME



**FIGURE 3-1:** LVPECL Termination (DSA12x2).

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



**FIGURE 3-2:** LVDS Termination (DSA12x3).

# DSA12X2/3/4

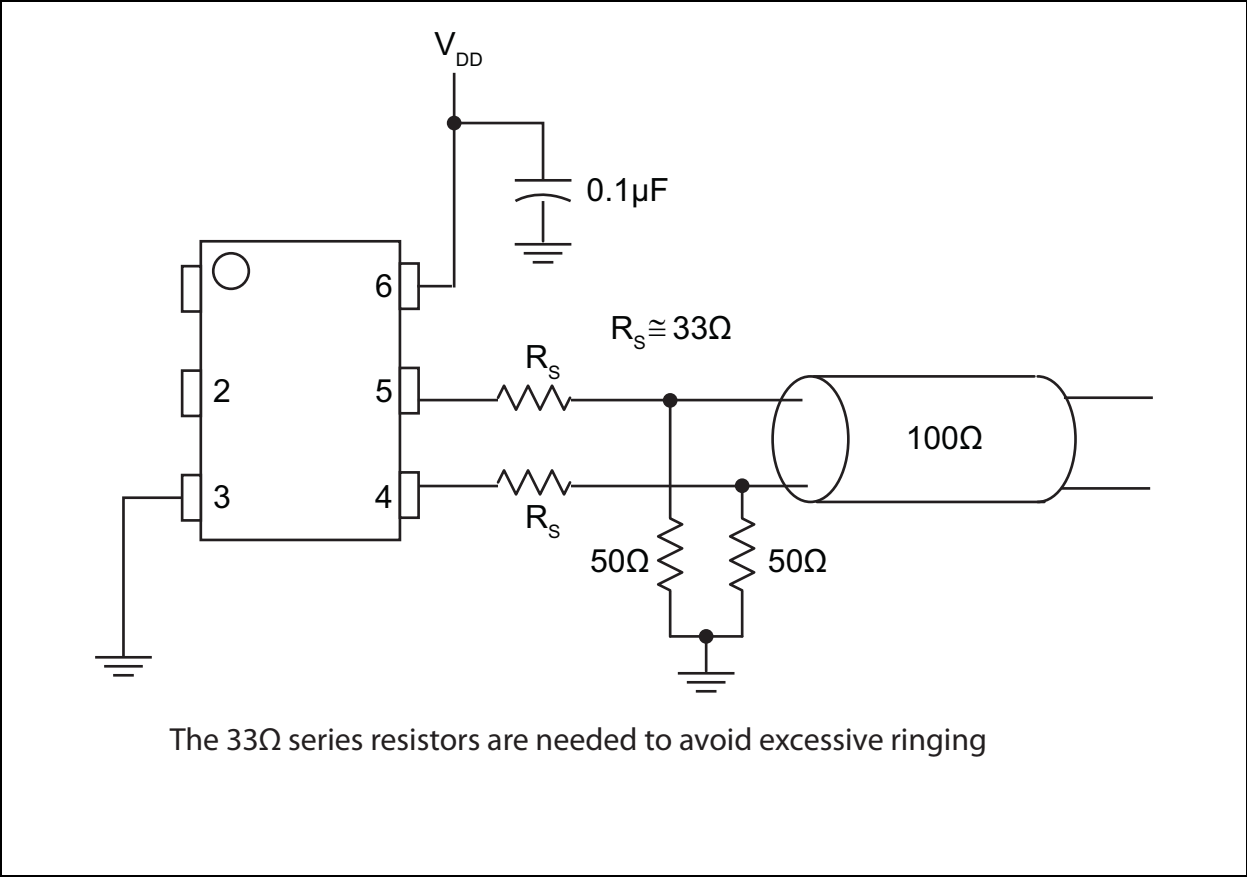
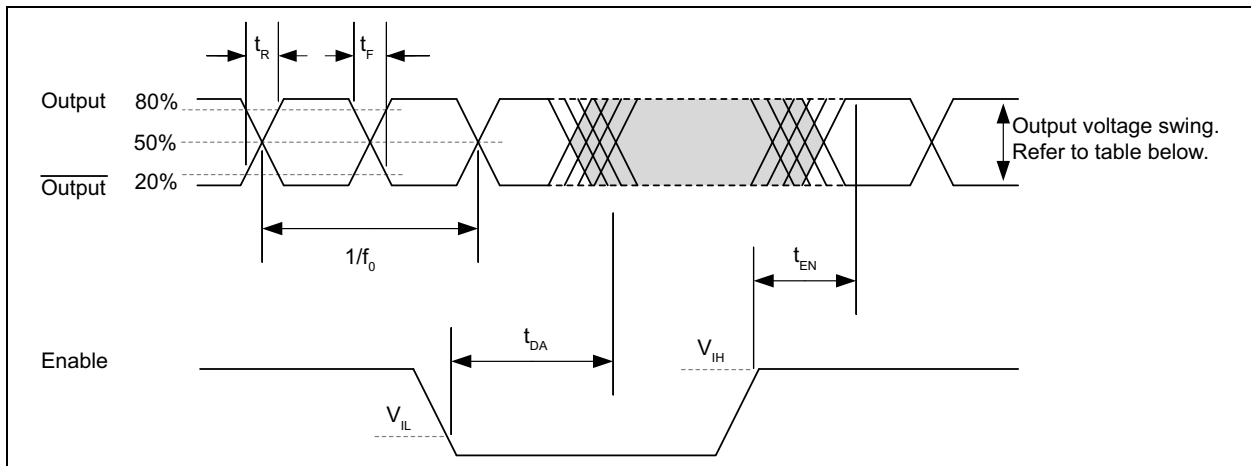


FIGURE 3-3: HCSL Termination (DSA12x4).



## 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

# DSA12X2/3/4

## 5.0 TEST CIRCUITS

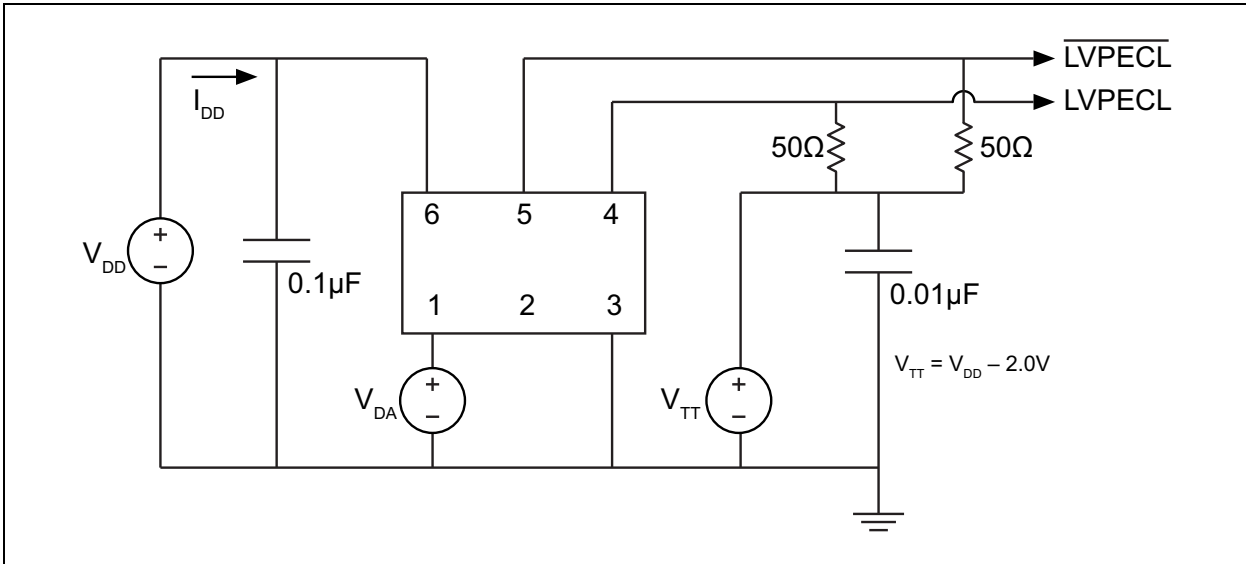


FIGURE 5-1: LVPECL Test Circuit.

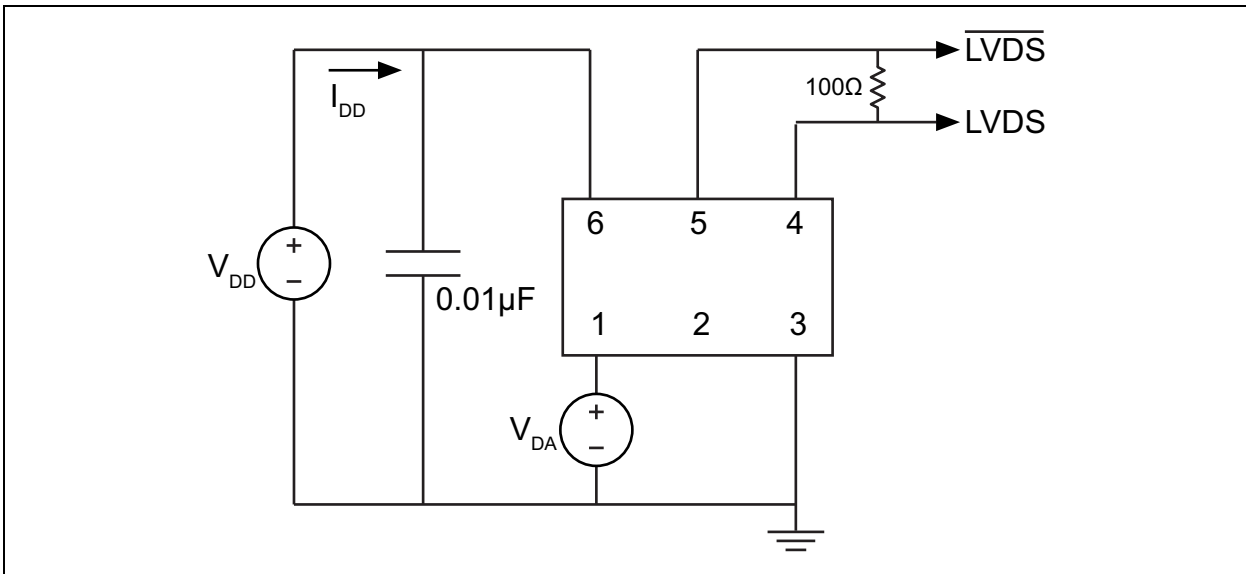
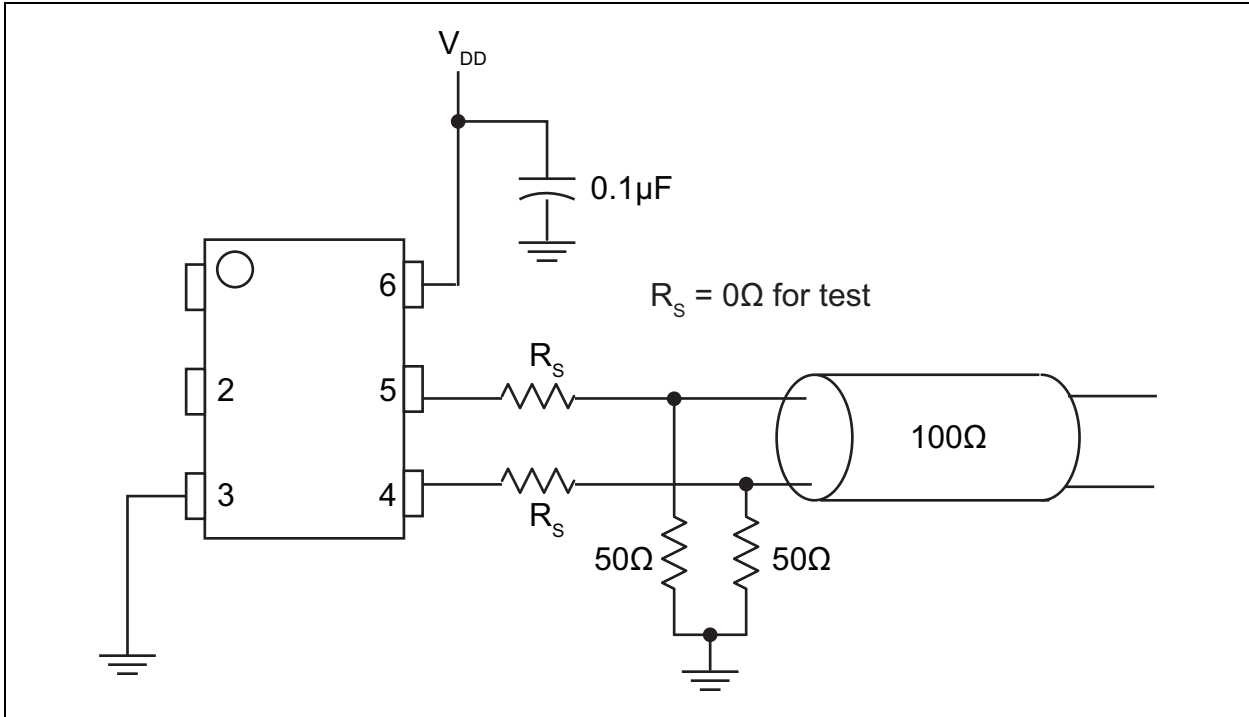


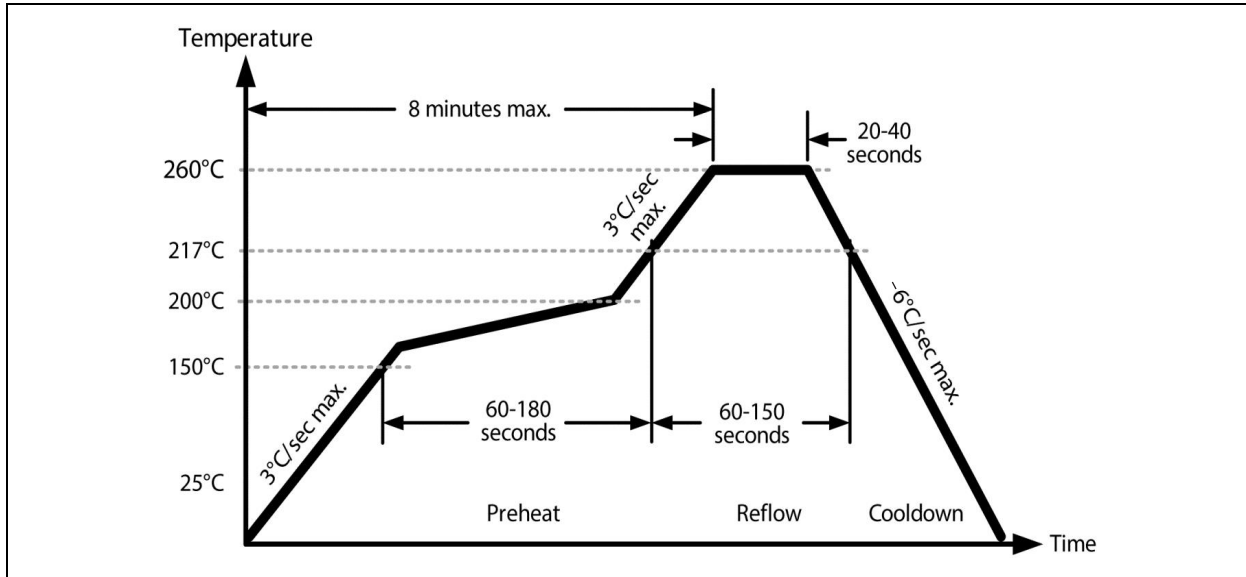
FIGURE 5-2: LVDS Test Circuit.



**FIGURE 5-3:** HCSSL Test Circuit.

# DSA12X2/3/4

## 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 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.

7.0 BOARD LAYOUT (RECOMMENDED)

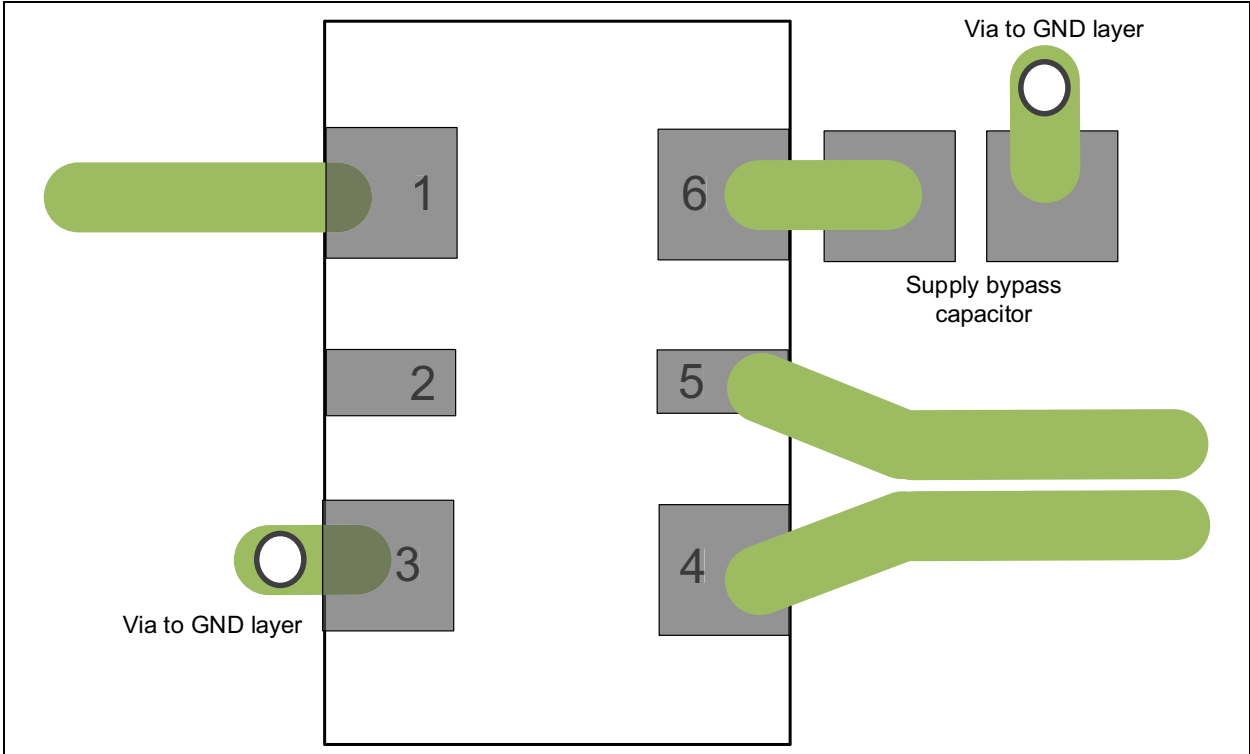


FIGURE 7-1: DSA12x2/3/4 Recommended Board Layout.

# DSA12X2/3/4

## 8.0 PHASE NOISE

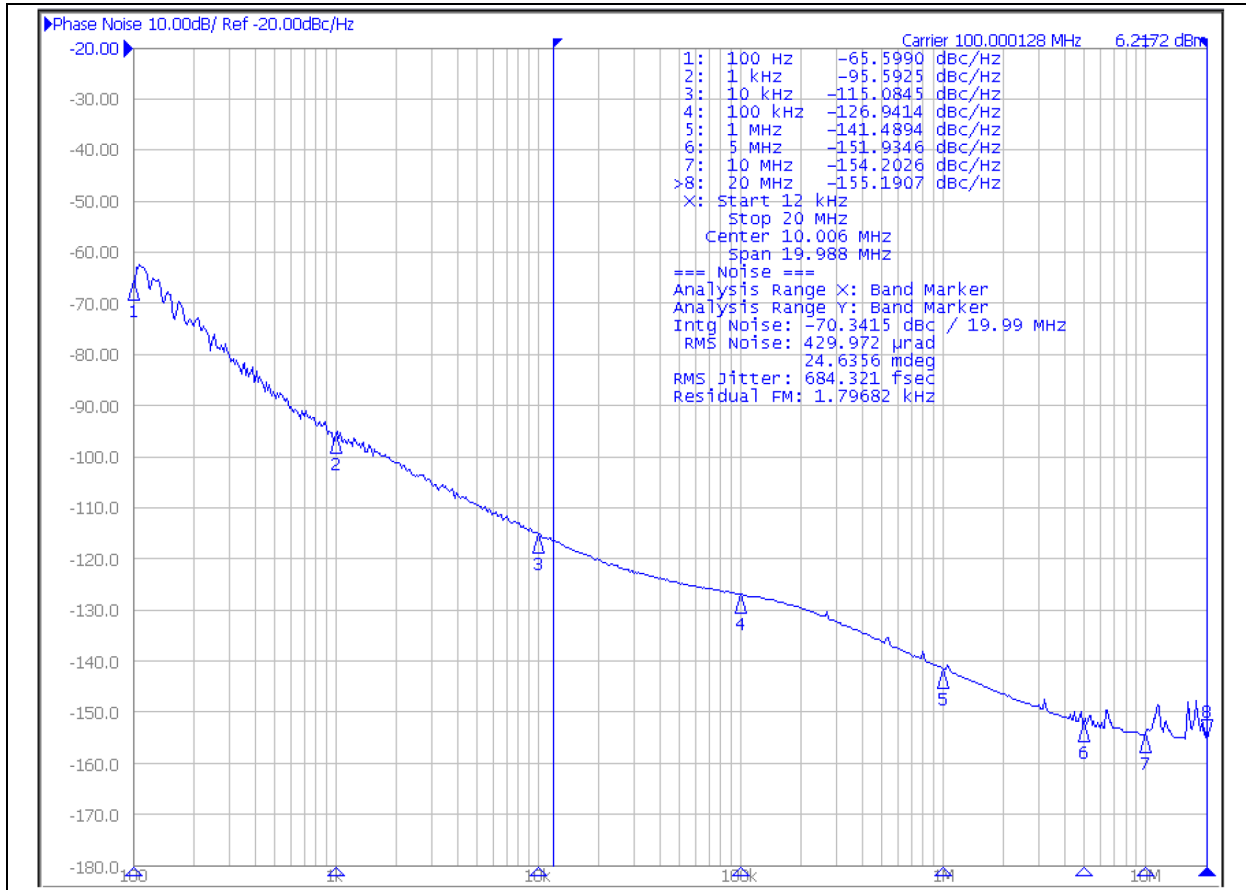
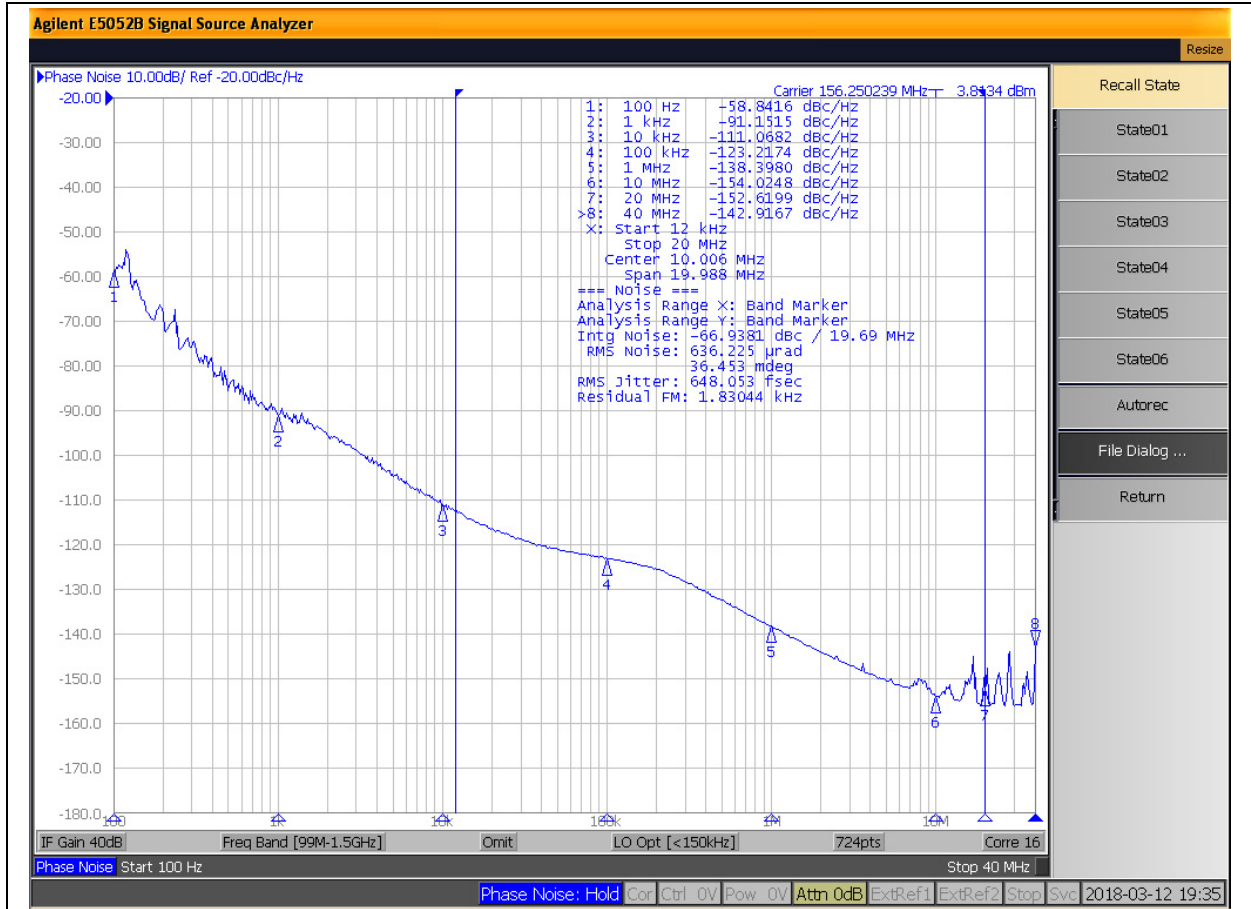


FIGURE 8-1: DSA12x4 Phase Noise at 100 MHz.



**FIGURE 8-2:** DSA12x2 Phase Noise at 156.25 MHz.

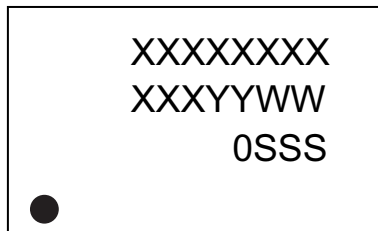
# DSA12X2/3/4

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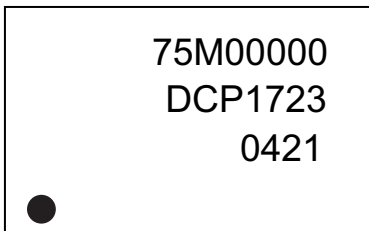
## 9.0 PACKAGING INFORMATION

### 9.1 Package Marking Information

6-Pin CDFN/VDFN\*



Example



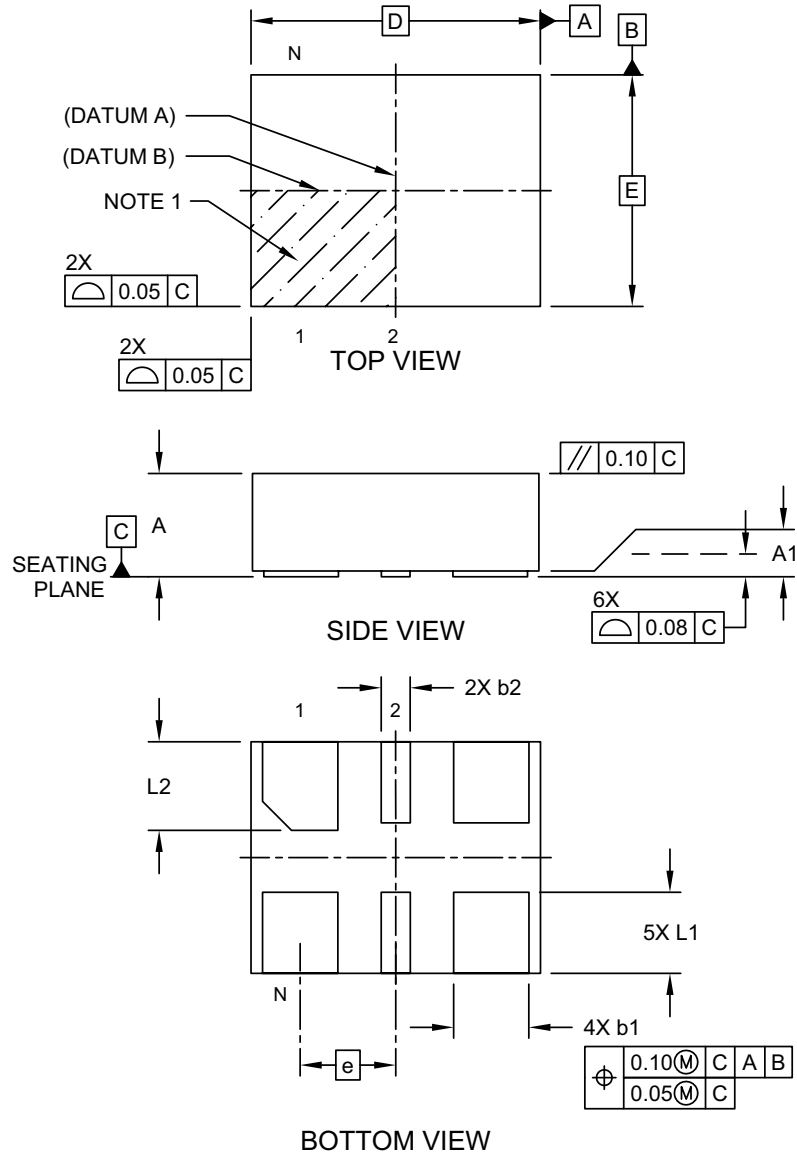
<b>Legend:</b>	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	SSS	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package 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).
<b>Note:</b>	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.	



## 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>

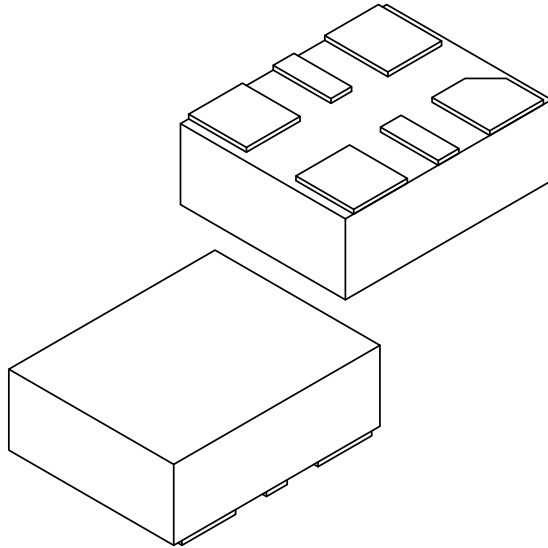


Microchip Technology Drawing C04-1005 Rev C Sheet 1 of 2

# DSA12X2/3/4

## 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>



Dimension Limits	Units	MILLIMETERS		
		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:

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

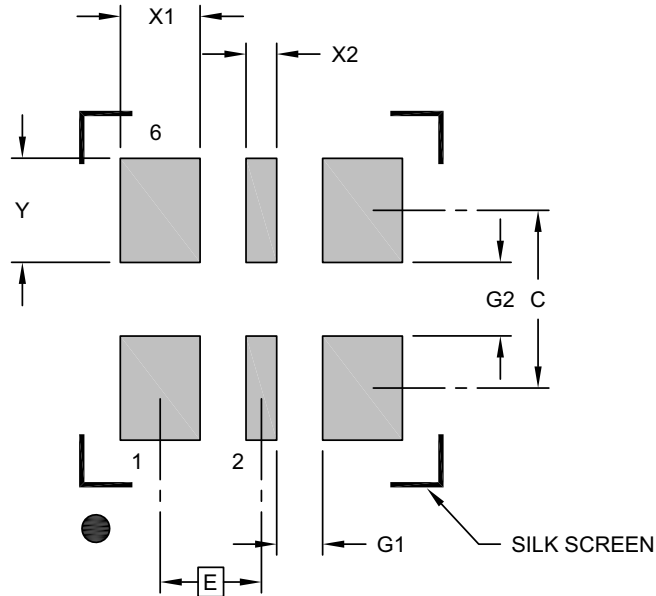
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

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

Microchip Technology Drawing C04-1005 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

Dimension Limits	Units	MILLIMETERS		
		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

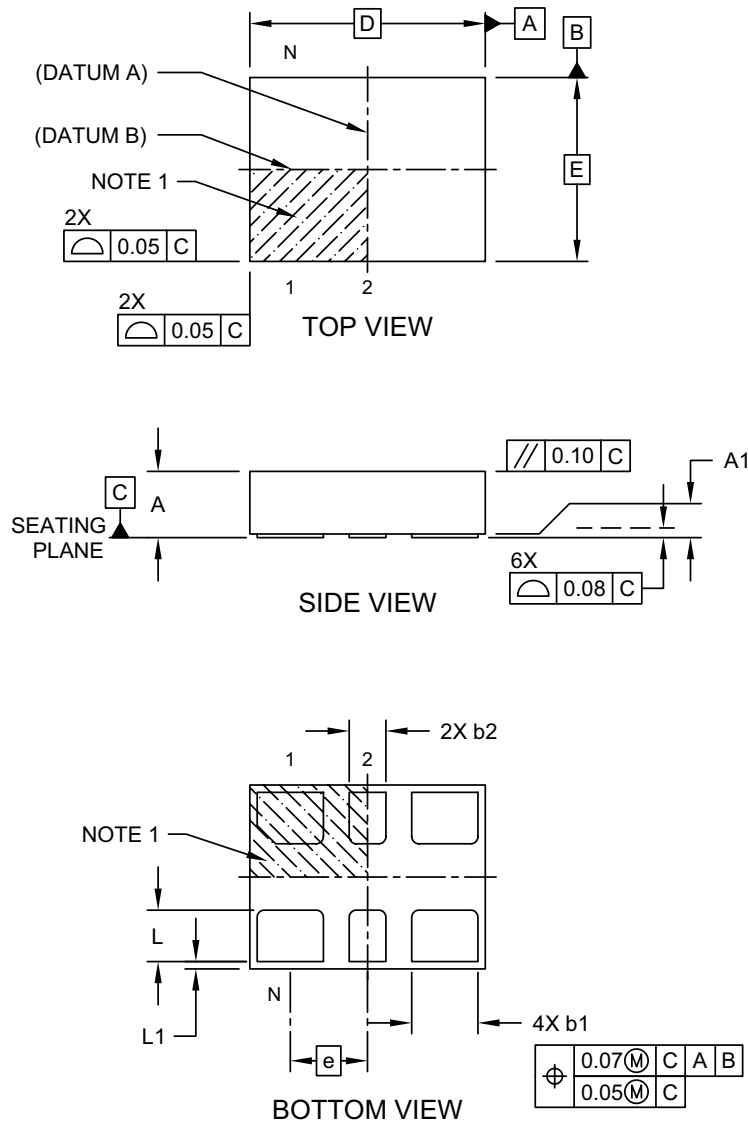
Microchip Technology Drawing C04-3005 Rev C

# DSA12X2/3/4

## 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]

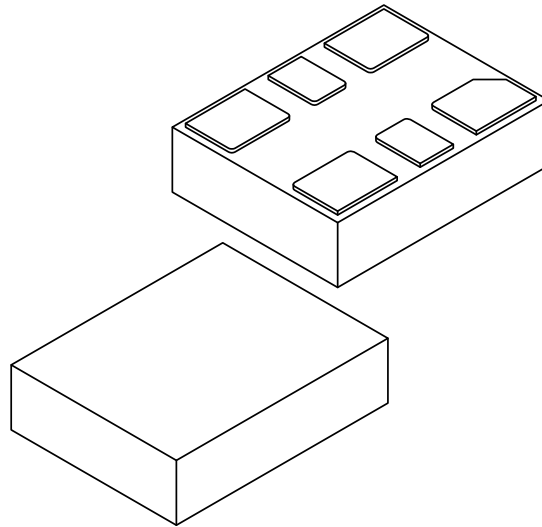
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



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>



Dimension Limits	Units	MILLIMETERS		
		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:**

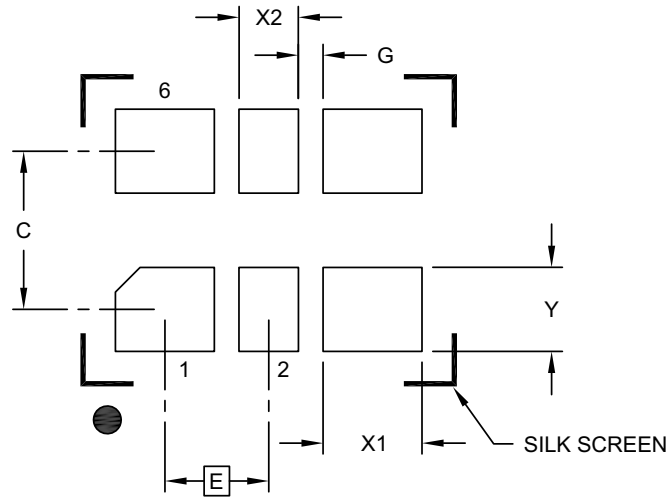
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M
  - BSC: Basic Dimension. Theoretically exact value shown without tolerances.
  - REF: Reference Dimension, usually without tolerance, for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

Microchip Technology Drawing C04-1007A Sheet 2 of 2

# DSA12X2/3/4

## 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	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.

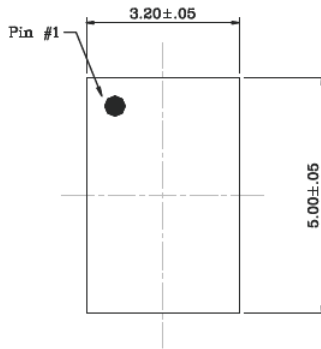
Microchip Technology Drawing C04-3007A

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

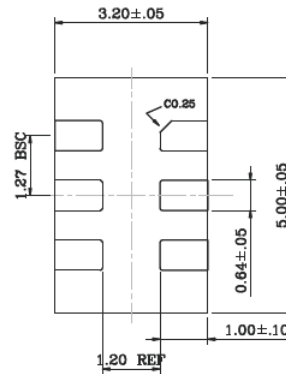
**TITLE**

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

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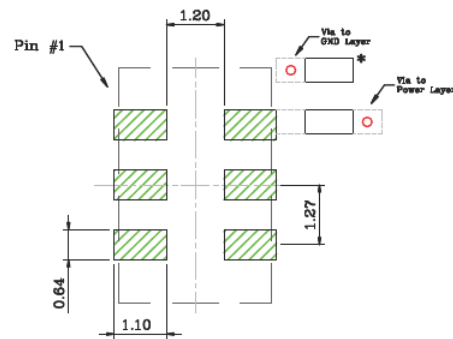
Top View



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.

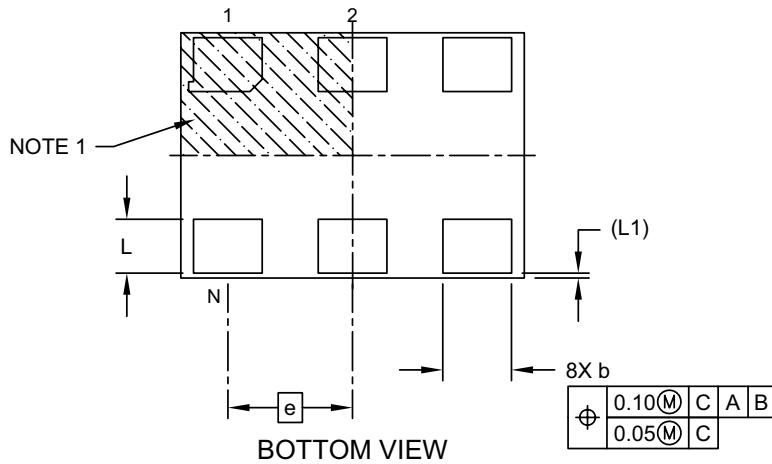
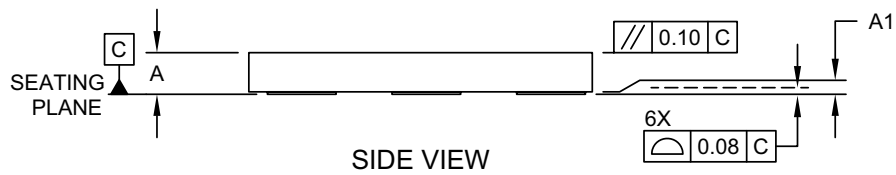
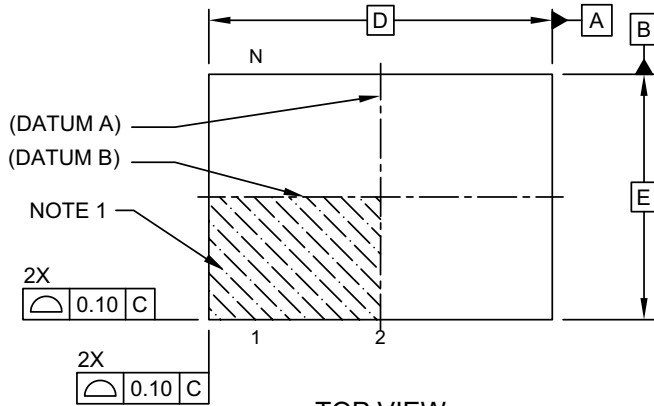
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>.

# DSA12X2/3/4

## 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>

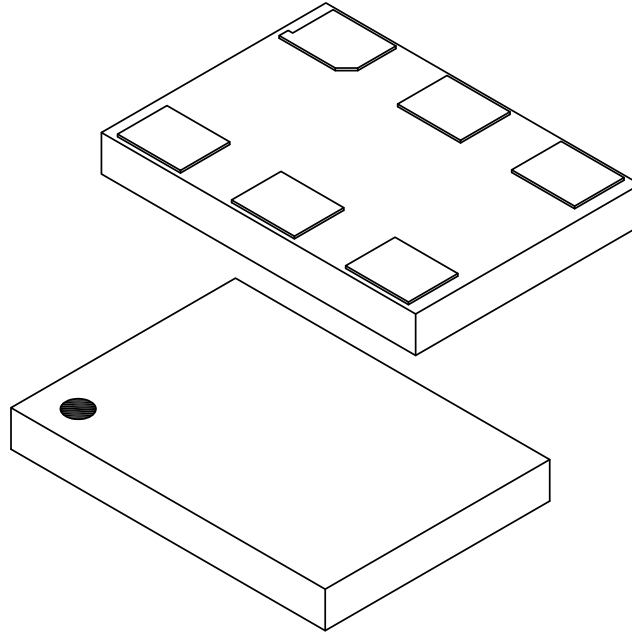


Microchip Technology Drawing C04-1227 Rev A Sheet 1 of 2



## 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>



Dimension Limits	Units	MILLIMETERS		
		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:**

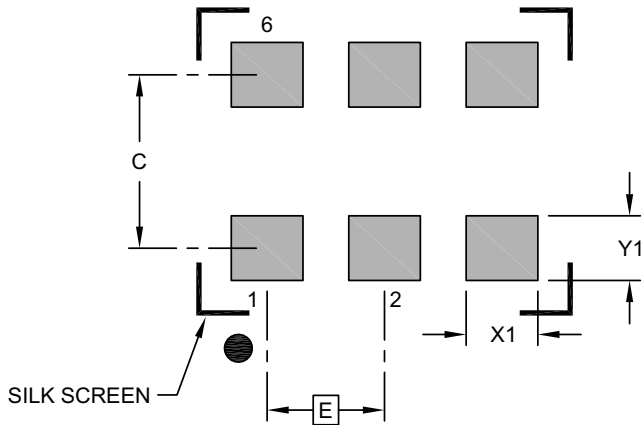
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package is saw singulated
- Dimensioning and tolerancing per ASME Y14.5M
  - BSC: Basic Dimension. Theoretically exact value shown without tolerances.
  - REF: Reference Dimension, usually without tolerance, for information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

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

# DSA12X2/3/4

## 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:**

- 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 C04-3227 Rev A

## APPENDIX A: REVISION HISTORY

### Revision A (June 2020)

- Initial release of DSA12x2/3/4 as Microchip data sheet DS20006378A.

### Revision B (March 2021)

- Updated Phase Jitter maximum values for  $J_{RMS-CC}$  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 C (March 2021)

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

# DSA12X2/3/4

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NOTES:

## PRODUCT IDENTIFICATION SYSTEM

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

PART NO.	X	X	X	X	X	-XXXXXXXX	X	XXX																																																																									
Device	Control Pin	Output Format	Package	Temperature	Freq. Stability	Output Frequency	Media Type	Automotive Suffix																																																																									
<p><b>Device:</b> DSA12: High Performance Differential MEMS Oscillators for Automotive</p> <p><b>Control Pin:</b></p> <table style="width: 100%;"> <tr><td>0</td><td>=</td><td>Pin 1 <u>STDBY</u> with Pull-up</td></tr> <tr><td>1</td><td>=</td><td>Pin 1 Frequency Select with Pull-up</td></tr> <tr><td>2</td><td>=</td><td>Pin 1 <u>OE</u> with Pull-up</td></tr> <tr><td>3</td><td>=</td><td>Pin 2 <u>STDBY</u> with Pull-up</td></tr> <tr><td>4</td><td>=</td><td>Pin 2 Frequency Select with Pull-up</td></tr> <tr><td>5</td><td>=</td><td>Pin 2 OE with Pull-up</td></tr> </table> <p><b>Output Format:</b></p> <table style="width: 100%;"> <tr><td>2</td><td>=</td><td>LVPECL</td></tr> <tr><td>3</td><td>=</td><td>LVDS</td></tr> <tr><td>4</td><td>=</td><td>HCSL</td></tr> </table> <p><b>Package:</b></p> <table style="width: 100%;"> <tr><td>N</td><td>=</td><td>7 mm x 5 mm 6-Lead VDFN</td></tr> <tr><td>B</td><td>=</td><td>5 mm x 3.2 mm 6-Lead CDFN</td></tr> <tr><td>C</td><td>=</td><td>3.2 mm x 2.5 mm 6-Lead VDFN</td></tr> <tr><td>D</td><td>=</td><td>2.5 mm x 2 mm 6-Lead VDFN</td></tr> </table> <p><b>Temperature:</b></p> <table style="width: 100%;"> <tr><td>A</td><td>=</td><td>-40°C to +125°C (Grade 1)</td></tr> <tr><td>L</td><td>=</td><td>-40°C to +105°C (Grade 2)</td></tr> <tr><td>I</td><td>=</td><td>-40°C to +85°C (Grade 3)</td></tr> </table> <p><b>Frequency Stability:</b></p> <table style="width: 100%;"> <tr><td>1</td><td>=</td><td>±50 ppm</td></tr> <tr><td>2</td><td>=</td><td>±25 ppm</td></tr> <tr><td>3</td><td>=</td><td>±20 ppm</td></tr> </table> <p><b>Output Frequency:</b></p> <table style="width: 100%;"> <tr><td>xMxxxxx=</td><td>&lt;10 MHz</td></tr> <tr><td>xxMxxxxx=</td><td>&lt;100 MHz</td></tr> <tr><td>xxxMxxxx=</td><td>&gt;100 MHz</td></tr> <tr><td>CCCCC=</td><td>with Frequency Select</td></tr> <tr><td>PROG =</td><td>TimeFlash</td></tr> </table> <p><b>Media Type:</b></p> <table style="width: 100%;"> <tr><td>&lt;blank&gt;=</td><td>Bulk</td></tr> <tr><td>T</td><td>= 1,000/Reel</td></tr> <tr><td>B</td><td>= 3,000/Reel</td></tr> </table> <p><b>Automotive Suffix:</b> VXX = Automotive Suffix in which "XX" is assigned by Microchip. Default value is "AO" for standard automotive part</p>	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	2	=	LVPECL	3	=	LVDS	4	=	HCSL	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	A	=	-40°C to +125°C (Grade 1)	L	=	-40°C to +105°C (Grade 2)	I	=	-40°C to +85°C (Grade 3)	1	=	±50 ppm	2	=	±25 ppm	3	=	±20 ppm	xMxxxxx=	<10 MHz	xxMxxxxx=	<100 MHz	xxxMxxxx=	>100 MHz	CCCCC=	with Frequency Select	PROG =	TimeFlash	<blank>=	Bulk	T	= 1,000/Reel	B	= 3,000/Reel	<p><b>Examples:</b></p> <p>a) DSA1202NI1-25M0000TVAO: Pin 1 <u>STDBY</u> with Pull-up, LVPECL Output, 7x5 VDFN, -20°C to +85°C, ±50 ppm, 25 MHz Output Frequency, 1,000/Reel, Standard Automotive</p> <p>b) DSA1243CL3-C0013VAO: Pin 2 Frequency Select with Pull-up, LVDS Output, 3.2x2.5 VDFN, -40°C to +105°C, ±20 ppm, Multiple Output Frequency, Bulk, Standard Automotive</p> <p>c) DSA124BI2-19M5000BVAO: 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, Standard Automotive</p> <p>d) DSA1232DL3-55M82000TVAO: Pin 2 <u>STDBY</u> with Pull-up, LVPECL Output, 2.5x2 VDFN, -40°C to +105°C, ±20 ppm, 55.82 MHz Output Frequency, 1,000/Reel, Standard Automotive</p> <p>e) DSA1213NI1-C0014BVAO: Pin 1 Frequency Select with Pull-up, LVDS Output, 7x5 VDFN, -40°C to +85°C, ±50 ppm, Multiple Output Frequency, 3,000/Reel, Standard Automotive</p> <p><b>Note 1:</b> 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.</p>							
0	=	Pin 1 <u>STDBY</u> with Pull-up																																																																															
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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>

# DSA12X2/3/4

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NOTES:

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