

P-Channel NexFET™ Power MOSFET

Check for Samples: [CSD25301W1015](#)

FEATURES

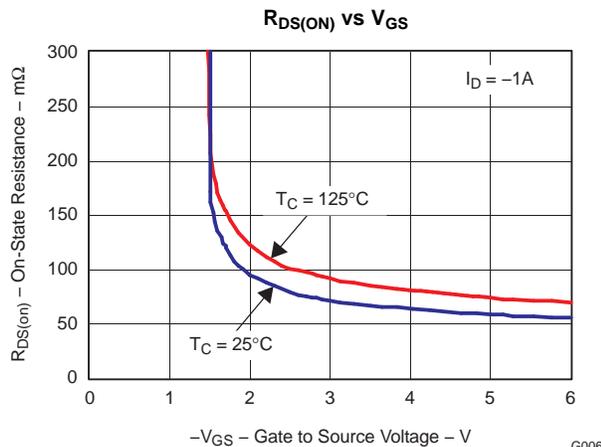
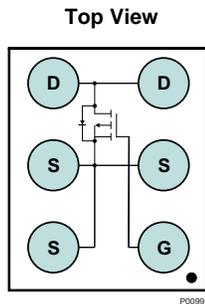
- Ultra Low Q_g and Q_{gd}
- Small Footprint
- Low Profile 0.62mm Height
- Pb Free
- RoHS Compliant
- Halogen Free
- CSP 1 × 1.5 mm Wafer Level Package

APPLICATIONS

- Battery Management
- Load Switch
- Battery Protection

DESCRIPTION

The device has been designed to deliver the lowest on resistance and gate charge in the smallest outline possible with excellent thermal characteristics in an ultra low profile.



PRODUCT SUMMARY

V_{DS}	Drain to Source Voltage	-20	V
Q_g	Gate Charge Total (4.5V)	1.9	nC
Q_{gd}	Gate Charge Gate to Drain	0.4	nC
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -1.5V$	175 mΩ
		$V_{GS} = -2.5V$	80 mΩ
		$V_{GS} = -4.5V$	62 mΩ
$V_{GS(th)}$	Voltage Threshold	-0.75	V

ORDERING INFORMATION

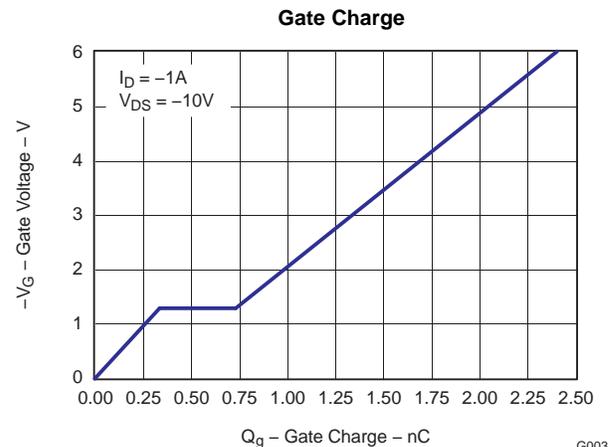
Device	Package	Media	Qty	Ship
CSD25301W1015	1 × 1.5 Wafer Level Package	7-inch reel	3000	Tape and Reel

ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ unless otherwise stated		VALUE	UNIT
V_{DS}	Drain to Source Voltage	-20	V
V_{GS}	Gate to Source Voltage	± 8	V
I_D	Continuous Drain Current, $T_C = 25^\circ\text{C}^{(1)}$	-2.2	A
I_{DM}	Pulsed Drain Current, $T_A = 25^\circ\text{C}^{(2)}$	-8.8	A
P_D	Power Dissipation ⁽¹⁾	1.5	W
T_J , T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

(1) $R_{\theta JA} = 85^\circ\text{C/W}$ on 1in² Cu (2 oz.) on 0.060" thick FR4 PCB.

(2) Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

ELECTRICAL CHARACTERISTICS

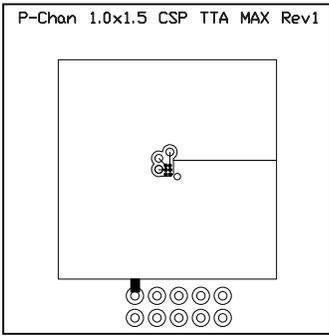
($T_A = 25^\circ\text{C}$ unless otherwise stated)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain to Source Voltage	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
I_{DSS}	Drain to Source Leakage Current	$V_{GS} = 0V, V_{DS} = -16V$			-1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 8V$			-100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4	-0.75	-1	V
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -1.5V, I_D = -1A$		175	220	m Ω
		$V_{GS} = -2.5V, I_D = -1A$		80	100	m Ω
		$V_{GS} = -4.5V, I_D = -1A$		62	75	m Ω
g_{fs}	Transconductance	$V_{DS} = -10V, I_D = -1A$		5.8		S
Dynamic Characteristics						
C_{ISS}	Input Capacitance	$V_{GS} = 0V, V_{DS} = -10V, f = 1MHz$		210	270	pF
C_{OSS}	Output Capacitance			90	120	pF
C_{RSS}	Reverse Transfer Capacitance			30	40	pF
Q_g	Gate Charge Total (-4.5V)	$V_{DS} = -10V, I_D = -1A$		1.9	2.5	nC
Q_{gd}	Gate Charge Gate to Drain			0.4		nC
Q_{gs}	Gate Charge Gate to Source			0.35		nC
$Q_{g(th)}$	Gate Charge at V_{th}			0.17		nC
Q_{OSS}	Output Charge	$V_{DS} = -9.8V, V_{GS} = 0V$		1.7		nC
$t_{d(on)}$	Turn On Delay Time	$V_{DS} = -10V, V_{GS} = -4.5V, I_D = -1A$ $R_G = 20\Omega$		4		ns
t_r	Rise Time			2		ns
$t_{d(off)}$	Turn Off Delay Time			29		ns
t_f	Fall Time			12		ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	$I_S = -1A, V_{GS} = 0V$	-0.75		-1	V
Q_{rr}	Reverse Recovery Charge	$V_{dd} = -9.8V, I_F = -1A, di/dt = 200A/\mu s$		0.9		nC
t_{rr}	Reverse Recovery Time	$V_{dd} = -9.8V, I_F = -1A, di/dt = 200A/\mu s$		8.2		ns

THERMAL CHARACTERISTICS

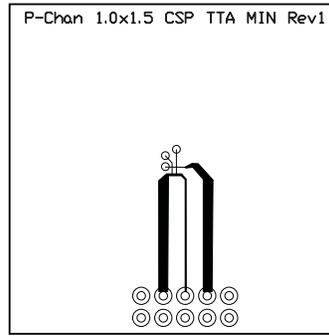
($T_A = 25^\circ\text{C}$ unless otherwise stated)

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Minimum Cu area)			270	$^\circ\text{C/W}$
	Thermal Resistance Junction to Ambient (1 in ² Cu area)			105	$^\circ\text{C/W}$



Max $R_{\theta JA} = 105^{\circ}\text{C/W}$
when mounted on 1
 inch^2 of 2 oz. Cu.

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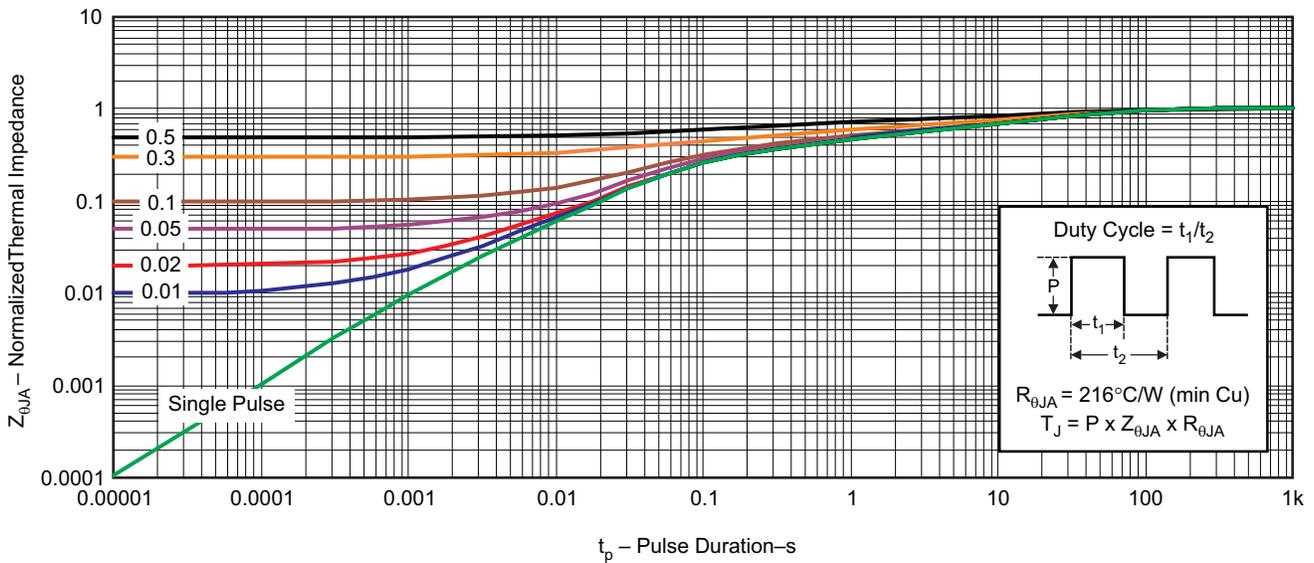


Max $R_{\theta JA} = 270^{\circ}\text{C/W}$
when mounted on
minimum pad area of 2
oz. Cu.

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TYPICAL MOSFET CHARACTERISTICS

($T_A = 25^{\circ}\text{C}$ unless otherwise stated)



G012

Figure 1. Transient Thermal Impedance

TYPICAL MOSFET CHARACTERISTICS (continued)

($T_A = 25^\circ\text{C}$ unless otherwise stated)

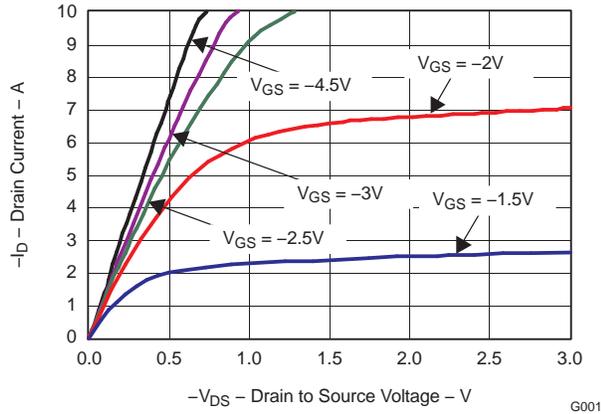


Figure 2. Saturation Characteristics

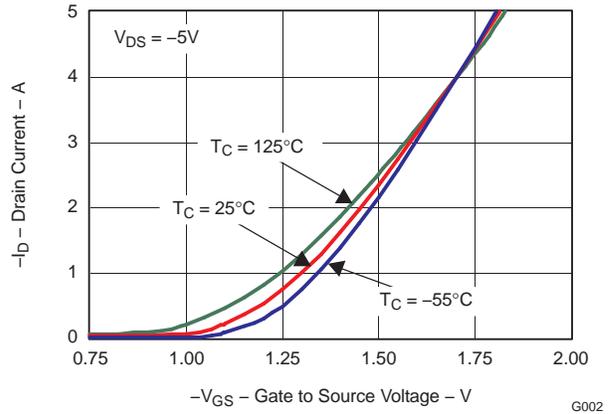


Figure 3. Transfer Characteristics

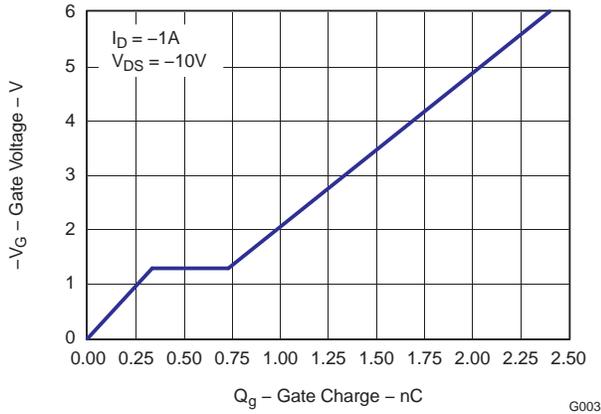


Figure 4. Gate Charge

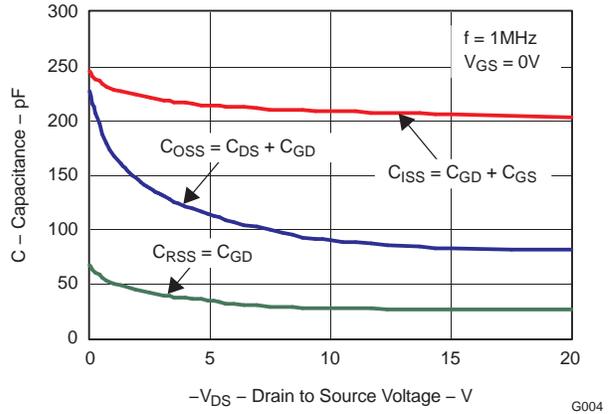


Figure 5. Capacitance

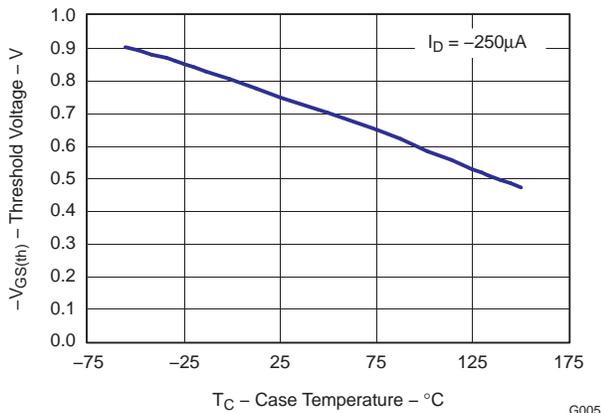


Figure 6. Threshold Voltage vs. Temperature

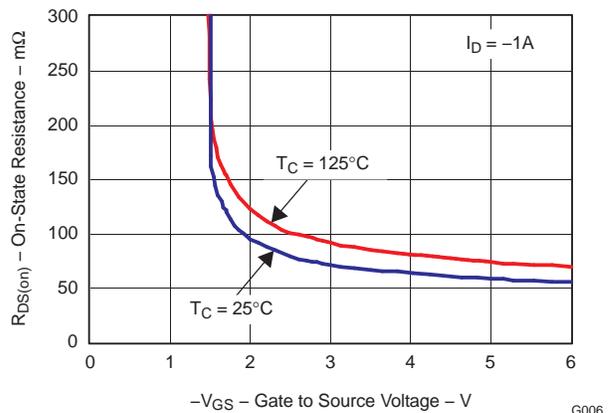


Figure 7. On Resistance vs. Gate Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

($T_A = 25^\circ\text{C}$ unless otherwise stated)

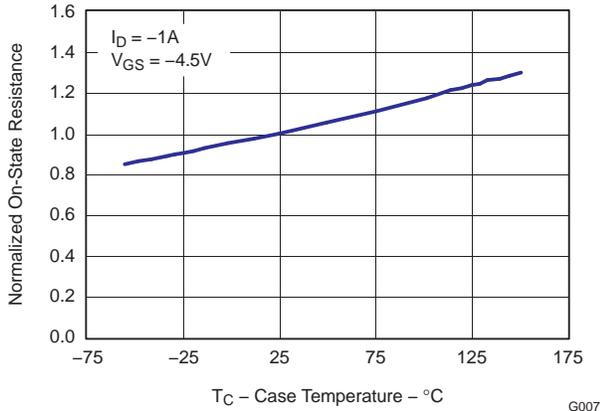


Figure 8. On Resistance vs. Temperature

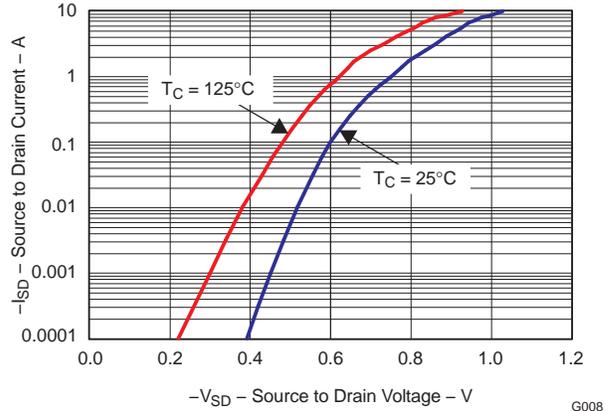


Figure 9. Typical Diode Forward Voltage

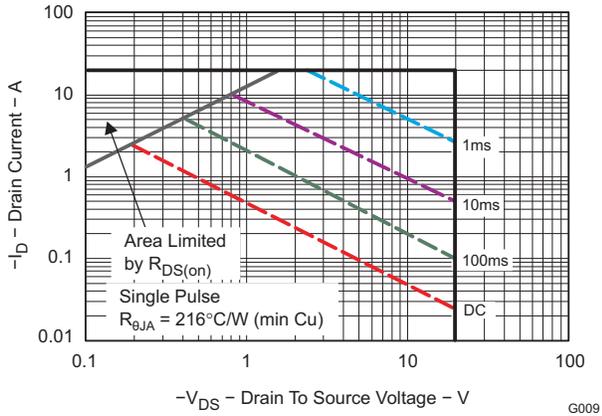


Figure 10. Maximum Safe Operating Area

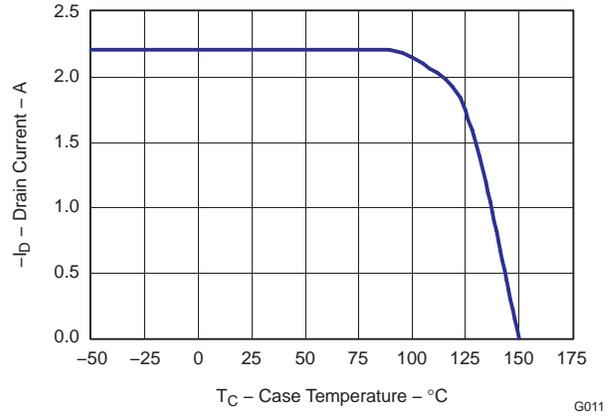
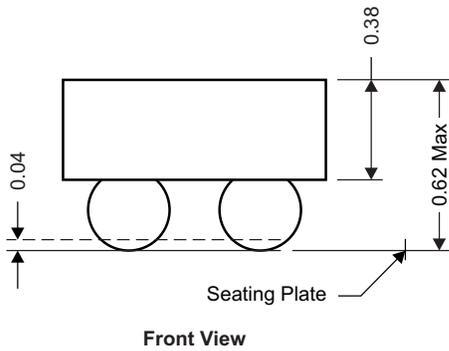
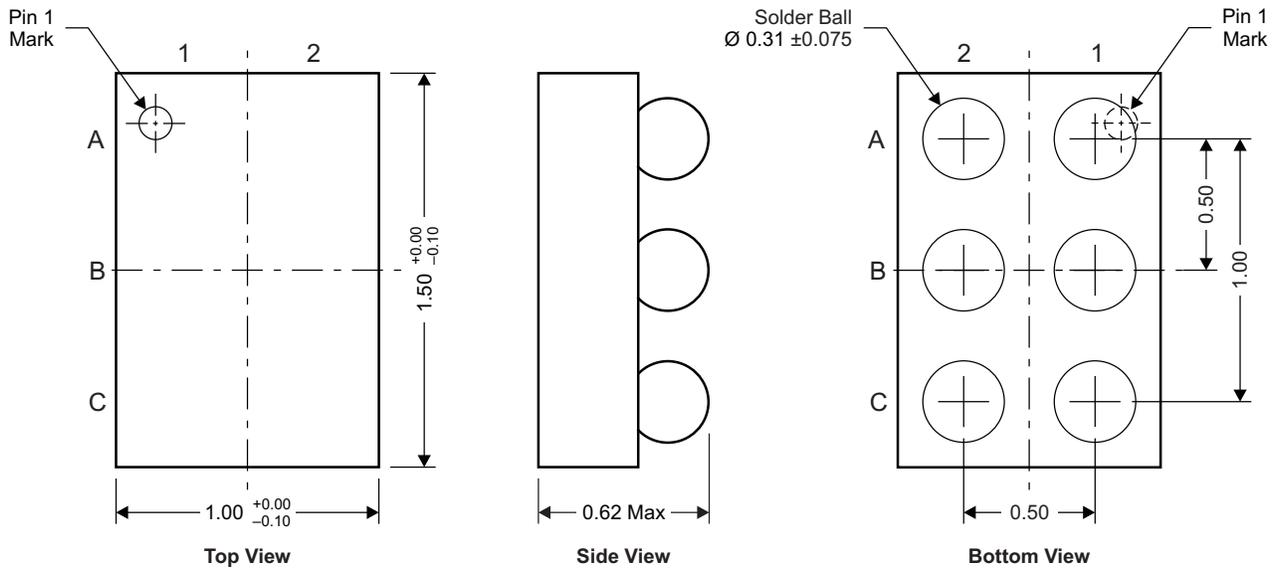


Figure 11. Maximum Drain Current vs. Temperature

MECHANICAL DATA

CSD25301W1015 Package Dimensions



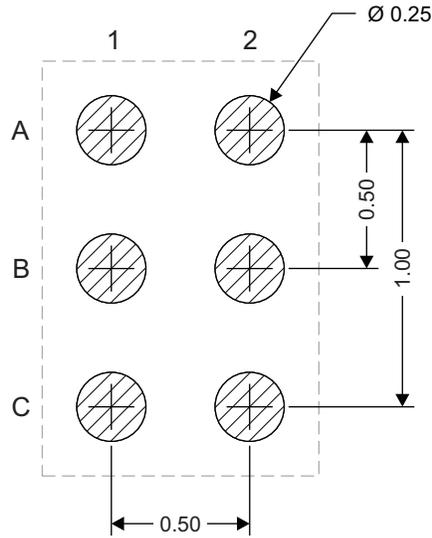
NOTE: All dimensions are in mm (unless otherwise specified)

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Pinout

POSITION	DESIGNATION
C1, C2	Drain
A1	Gate
A2, B1, B2	Source

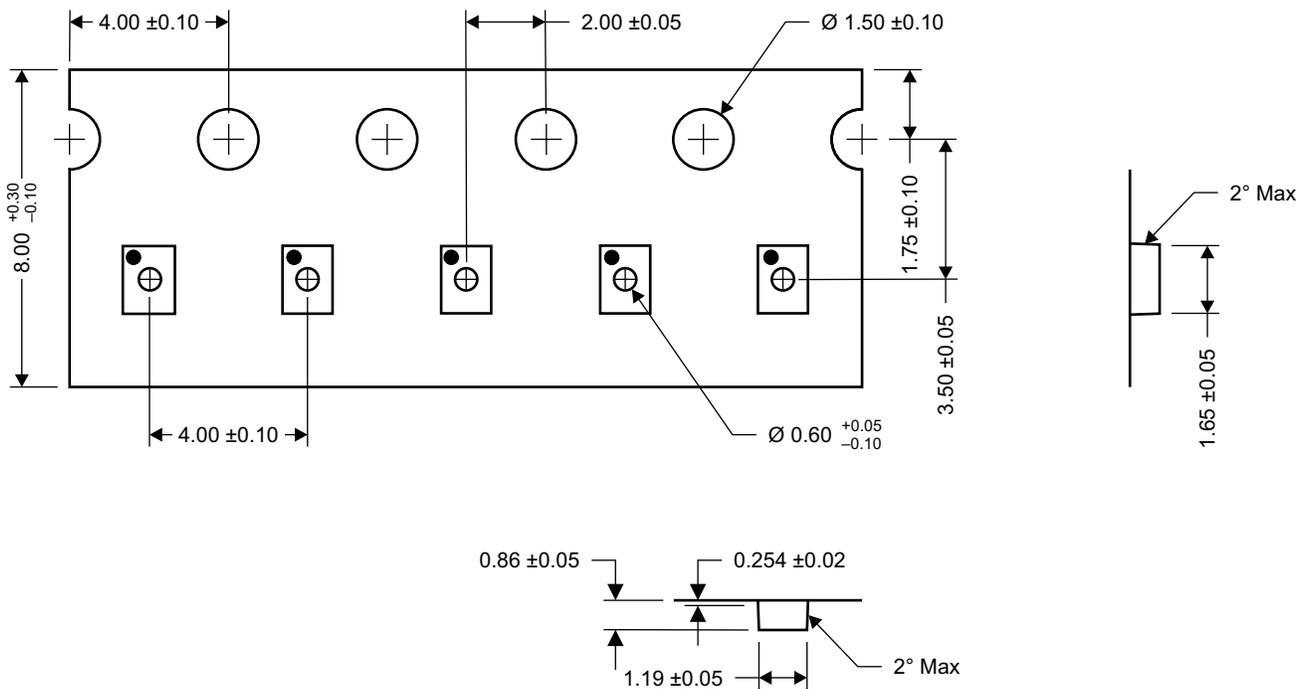
Land Pattern Recommendation



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NOTE: All dimensions are in mm (unless otherwise specified)

Tape and Reel Information



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NOTE: All dimensions are in mm (unless otherwise specified)

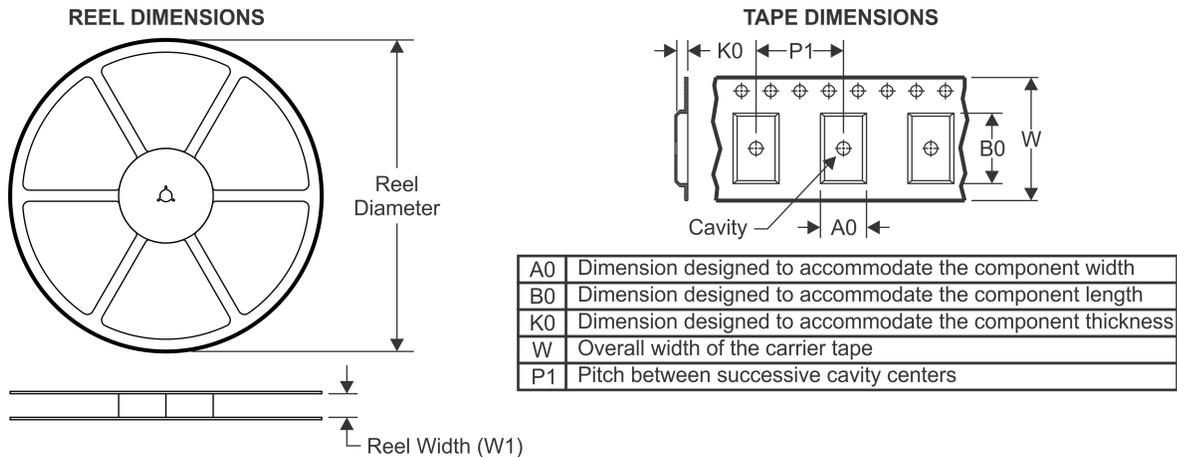
REVISION HISTORY**Changes from Original (August 2009) to Revision A** **Page**

-
- Replaced incorrect label: $R_{\theta JC}$ with $R_{\theta JA}$ in the THERMAL CHARACTERISTICS table. [2](#)
-

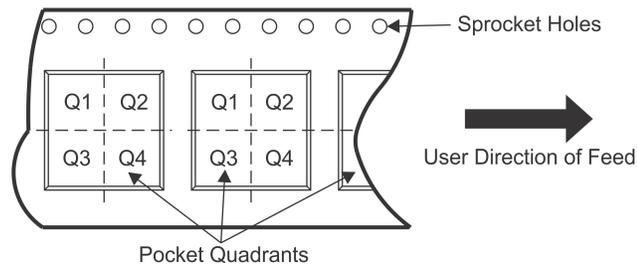
Changes from Revision A (August 2010) to Revision B **Page**

-
- Deleted the Package Marking Information section [7](#)
-

TAPE AND REEL INFORMATION



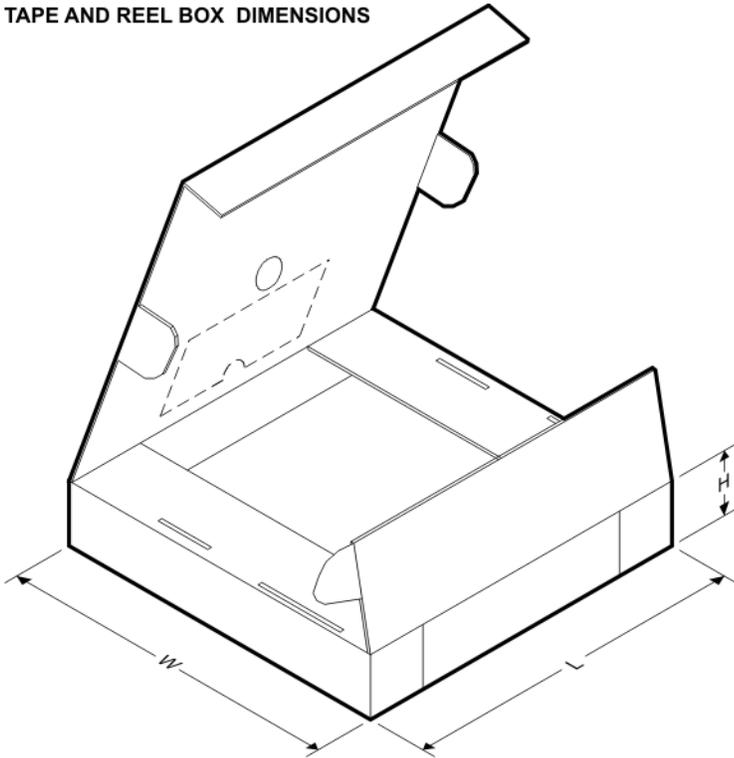
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CSD25301W1015	DSBGA	YZC	6	3000	180.0	8.4	1.09	1.56	0.65	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CSD25301W1015	DSBGA	YZC	6	3000	182.0	182.0	17.0

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