

N-Channel NexFET™ Power MOSFETs

 Check for Samples: [CSD16411Q3](#)

FEATURES

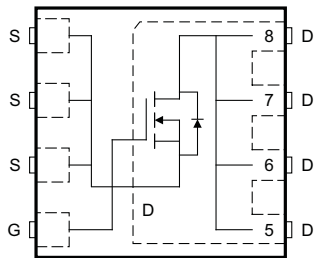
- Ultra Low Qg and Qgd
- Low Thermal Resistance
- Avalanche Rated
- Pb Free Terminal Plating
- RoHS Compliant
- Halogen Free
- SON 3.3mm x 3.3mm Plastic Package

APPLICATIONS

- Point-of-Load Synchronous Buck Converter for Applications in Networking, Telecom and Computing Systems
- Optimized for Control FET Applications

DESCRIPTION

The NexFET™ power MOSFET has been designed to minimize losses in power conversion applications.

Top View


P0095-01

PRODUCT SUMMARY

V_{DS}	Drain to Source Voltage	25	V
Q_g	Gate Charge Total (4.5V)	2.9	nC
Q_{gd}	Gate Charge Gate to Drain	0.7	nC
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 4.5V$	12 mΩ
		$V_{GS} = 10V$	8 mΩ
$V_{GS(th)}$	Threshold Voltage	2	V

ORDERING INFORMATION

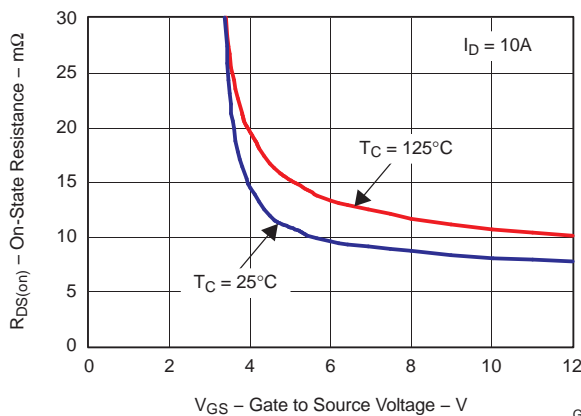
Device	Package	Media	Qty	Ship
CSD16411Q3	SON 3.3x3.3 Plastic Package	13-inch reel	2500	Tape and Reel

ABSOLUTE MAXIMUM RATINGS

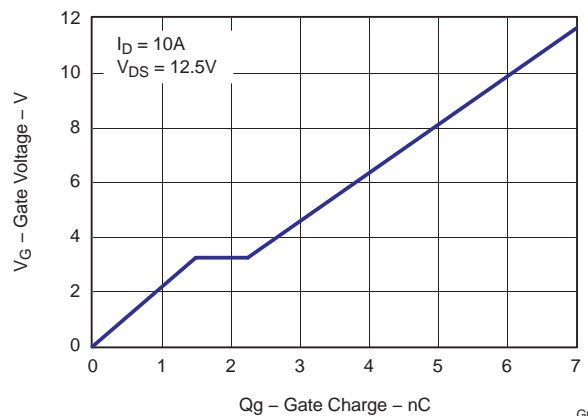
$T_A = 25^\circ\text{C}$ unless otherwise stated		VALUE	UNIT
V_{DS}	Drain to Source Voltage	25	V
V_{GS}	Gate to Source Voltage	+16 / -12	V
I_D	Continuous Drain Current, $T_C = 25^\circ\text{C}$	56	A
	Continuous Drain Current ⁽¹⁾	14	A
I_{DM}	Pulsed Drain Current, $T_A = 25^\circ\text{C}$ ⁽²⁾	138	A
P_D	Power Dissipation ⁽¹⁾	2.7	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
E_{AS}	Avalanche Energy, single pulse $I_D = 18A, L = 0.1mH, R_G = 25\Omega$	16	mJ

(1) $R_{\theta JA} = 47^\circ\text{C/W}$ on 1in² Cu (2 oz.) on 0.060" thick FR4 PCB.

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

 $R_{DS(on)}$ vs V_{GS}


G006

Gate Charge


G003



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ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise stated)

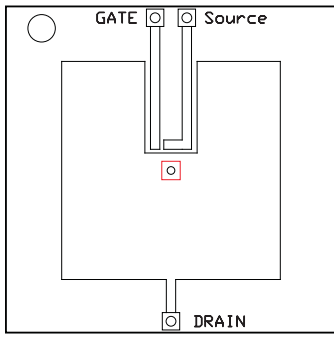
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
B _V DSS	Drain to Source Voltage	V _{GS} = 0V, I _D = 250μA	25			V
I _{DSS}	Drain to Source Leakage Current	V _{GS} = 0V, V _{DS} = 20V			1	μA
I _{GSS}	Gate to Source Leakage Current	V _{DS} = 0V, V _{GS} = +16 / -12			100	nA
V _{GS(th)}	Gate to Source Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1.7	2	2.3	V
R _{DS(on)}	Drain to Source On Resistance	V _{GS} = 4.5V, I _D = 10A		12	15	mΩ
		V _{GS} = 10V, I _D = 10A		8	10	mΩ
g _{fs}	Transconductance	V _{DS} = 15V, I _D = 10A		30		S
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V, V _{DS} = 12.5V, f = 1MHz		440	570	pF
C _{OSS}	Output Capacitance			330	430	pF
C _{RSS}	Reverse Transfer Capacitance			33	43	pF
R _g	Series Gate Resistance	V _{DS} = 12.5V, I _D = 10A		0.8	1.6	Ω
Q _g	Gate Charge Total (4.5V)			2.9	3.8	nC
Q _{gd}	Gate Charge Gate to Drain			0.7		nC
Q _{gs}	Gate Charge Gate to Source			1.5		nC
Q _{g(th)}	Gate Charge at V _{th}			0.9		nC
Q _{OSS}	Output Charge	V _{DS} = 12.5V, V _{GS} = 0V		6.5		nC
t _{d(on)}	Turn On Delay Time	V _{DS} = 12.5V, V _{GS} = 4.5V, I _D = 10A R _G = 2Ω		5.3		ns
t _r	Rise Time			7.8		ns
t _{d(off)}	Turn Off Delay Time			6		ns
t _f	Fall Time			3.1		ns
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _S = 10A, V _{GS} = 0V		0.85	1	V
Q _{rr}	Reverse Recovery Charge	V _{DD} = 12.5V, I _F = 10A, di/dt = 300A/μs		11.7		nC
t _{rr}	Reverse Recovery Time	V _{DD} = 12.5V, I _F = 10A, di/dt = 300A/μs		15.5		ns

THERMAL CHARACTERISTICS

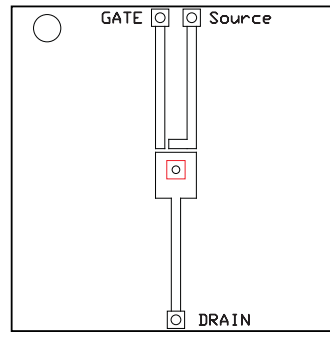
(T_A = 25°C unless otherwise stated)

PARAMETER		MIN	TYP	MAX	UNIT
R _{θJC}	Thermal Resistance Junction to Case ⁽¹⁾			3.5	°C/W
R _{θJA}	Thermal Resistance Junction to Ambient ^{(1) (2)}			59	°C/W

- (1) R_{θJC} is determined with the device mounted on a 1 inch square 2 oz. Cu pad on a 1.5 × 1.5 in .060 inch thick FR4 board. R_{θJC} is specified by design while R_{θJA} is determined by the user's board design.
(2) Device mounted on FR4 Material with 1 inch² of 2 oz. Cu.



Max $R_{\theta JA} = 59^{\circ}\text{C/W}$
when mounted on
1inch² of 2 oz. Cu.



Max $R_{\theta JA} = 165^{\circ}\text{C/W}$
when mounted on
minimum pad area of 2
oz. Cu.

TYPICAL MOSFET CHARACTERISTICS

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

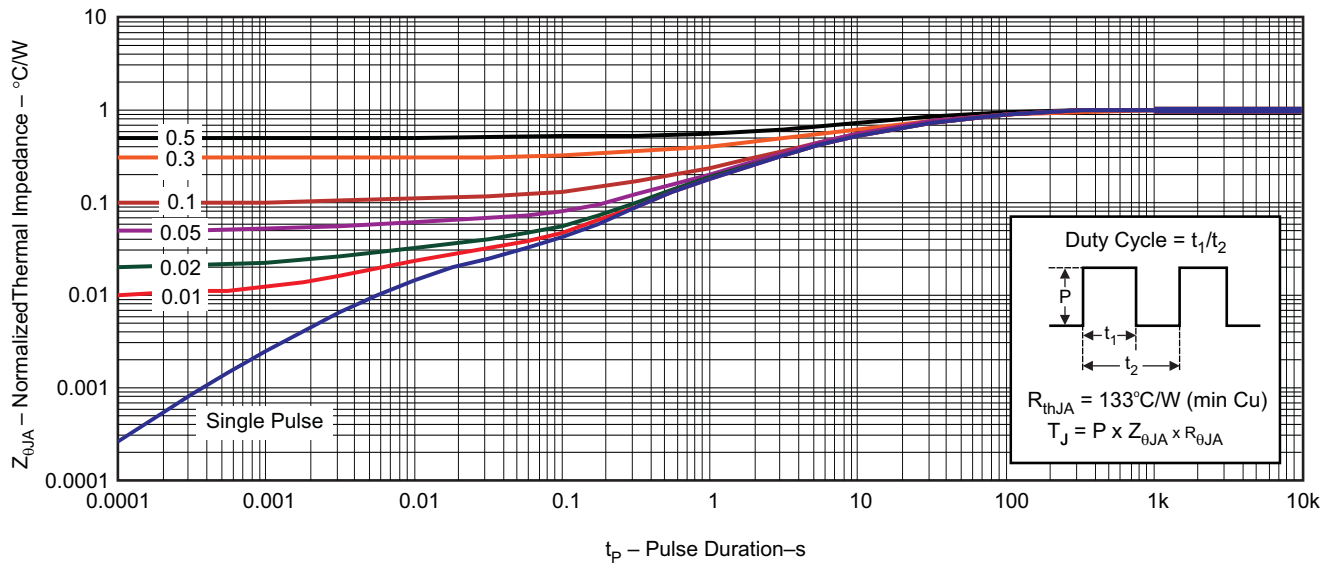


Figure 1. Transient Thermal Impedance

G012

TYPICAL MOSFET CHARACTERISTICS (continued)

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

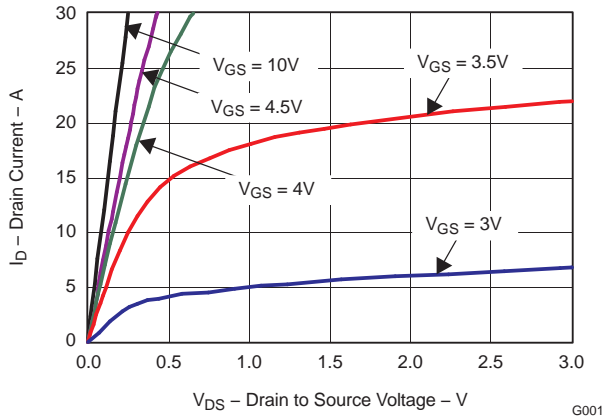


Figure 2. Saturation Characteristics

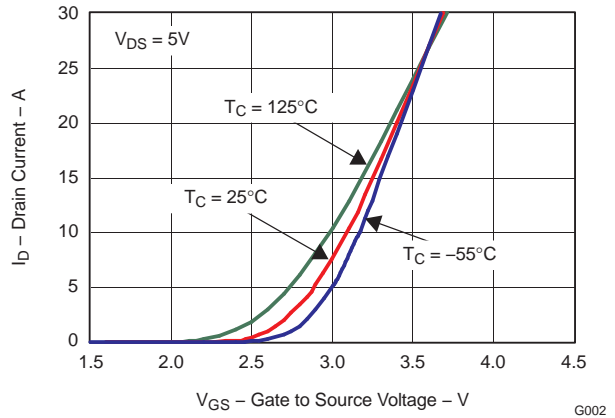


Figure 3. Transfer Characteristics

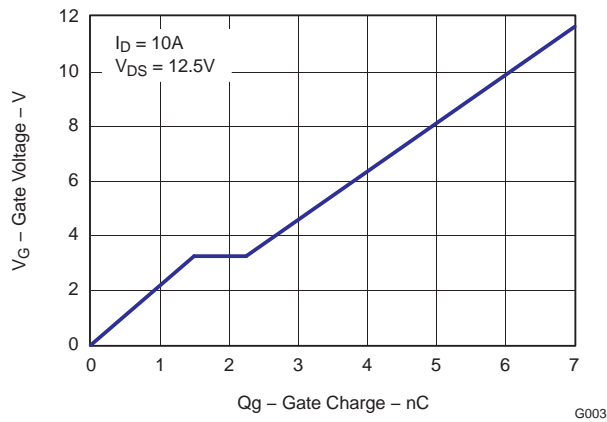


Figure 4. Gate Charge

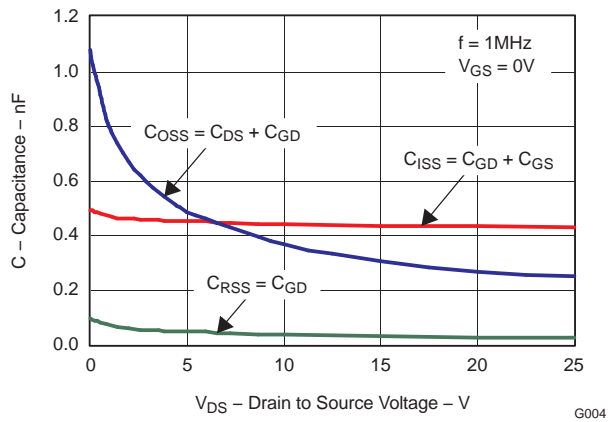


Figure 5. Capacitance

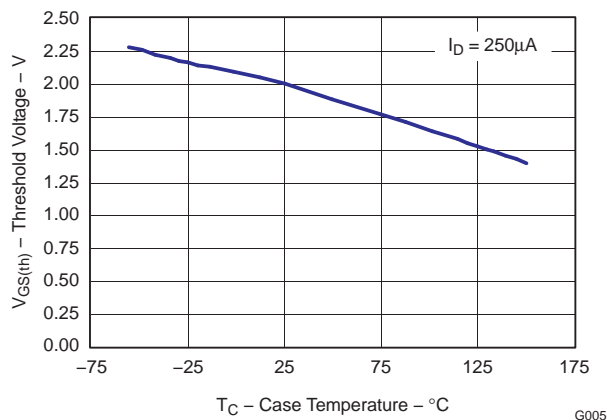


Figure 6. Threshold Voltage vs. Temperature

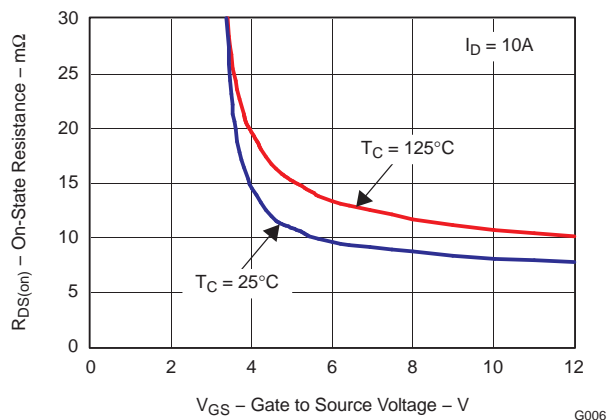


Figure 7. On Resistance vs. Gate Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

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

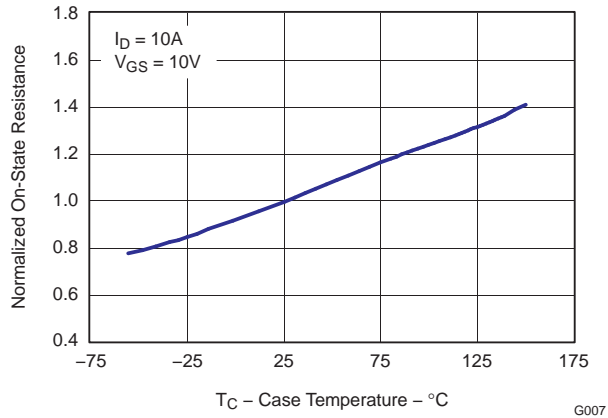


Figure 8. On Resistance vs. Temperature

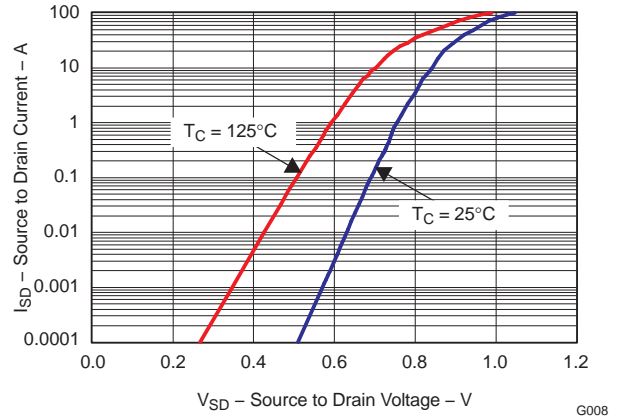


Figure 9. Typical Diode Forward Voltage

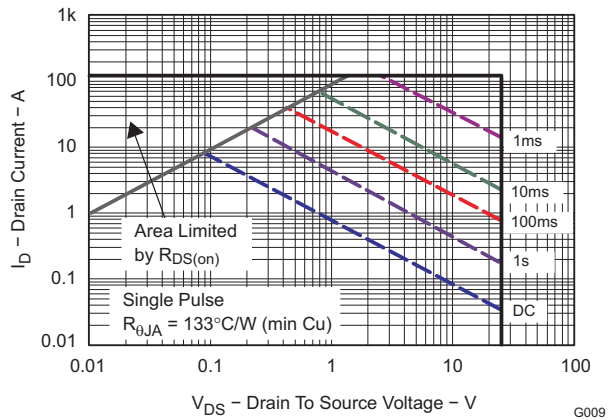


Figure 10. Maximum Safe Operating Area

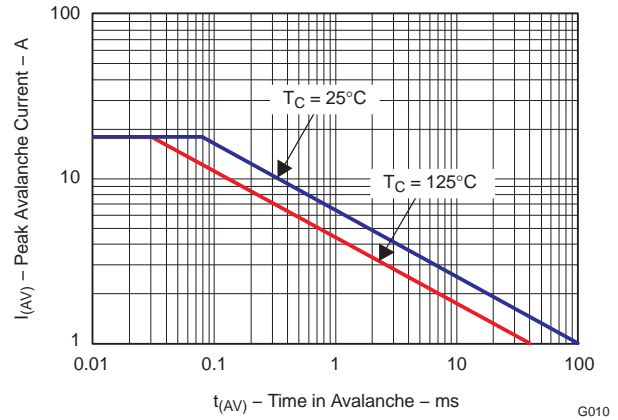


Figure 11. Single Pulse Unclamped Inductive Switching

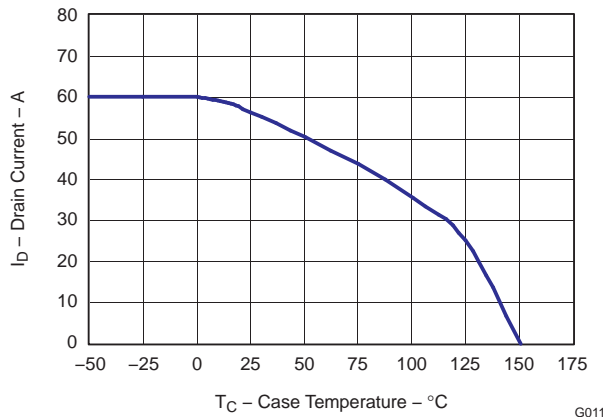
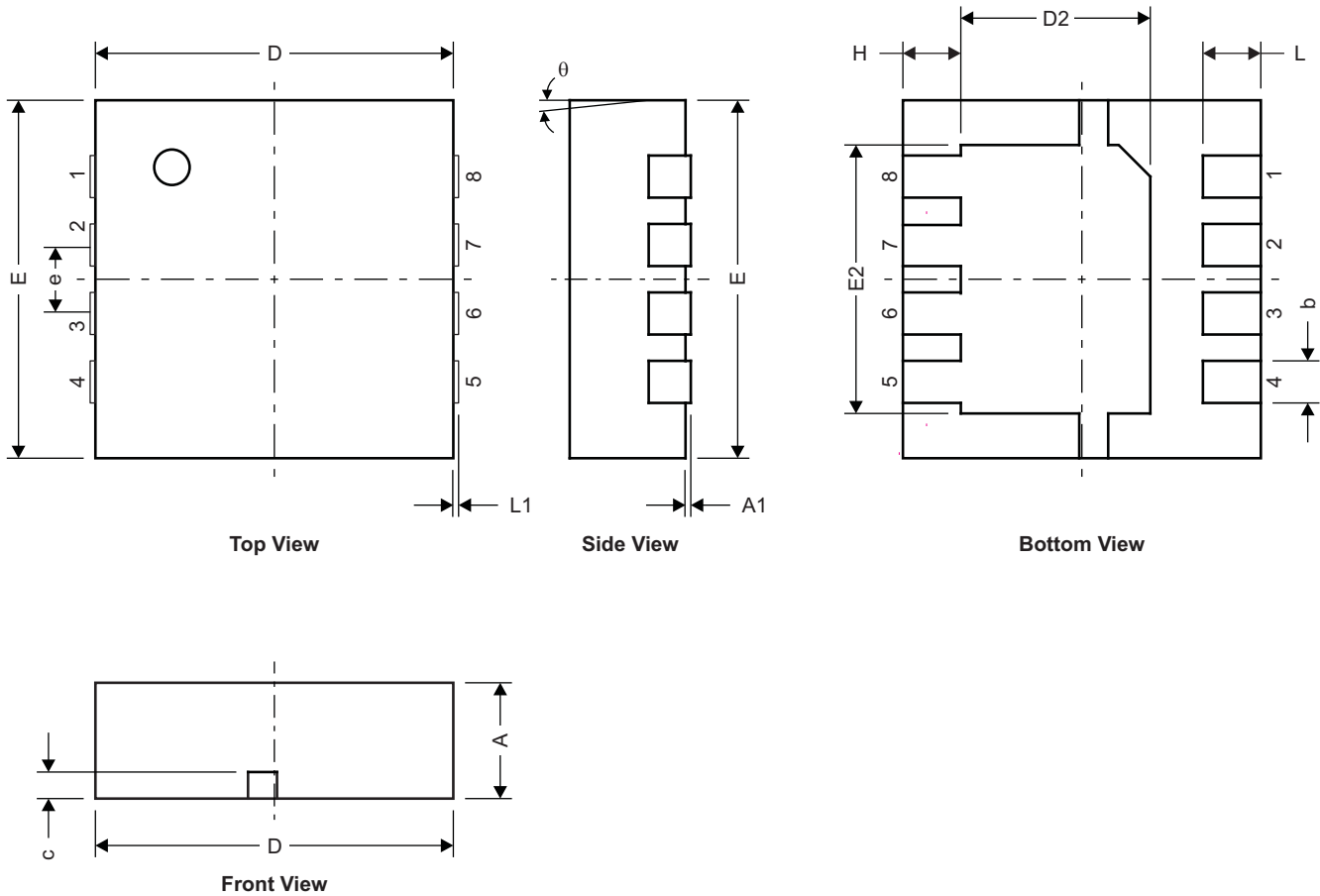


Figure 12. Maximum Drain Current vs. Temperature

MECHANICAL DATA

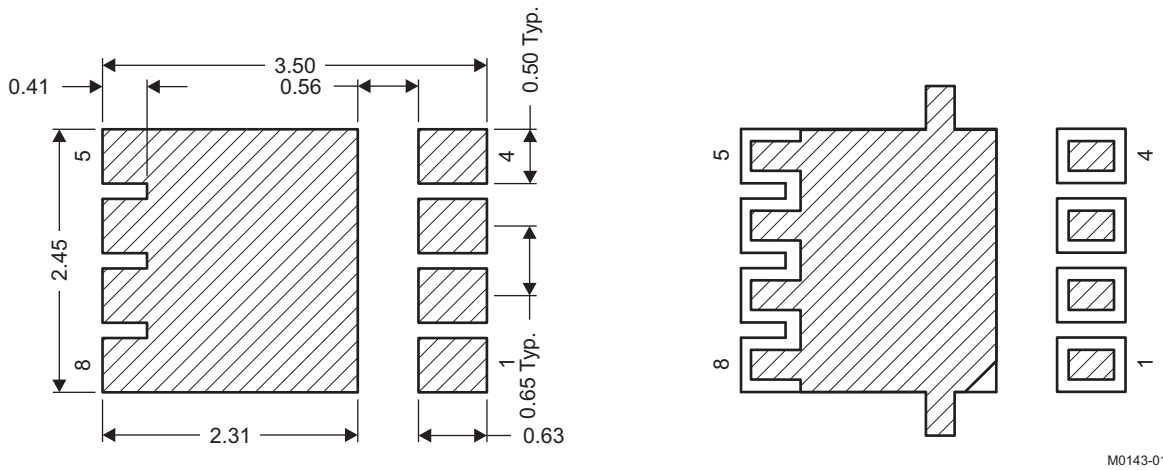
Q3 Package Dimensions



M0142-01

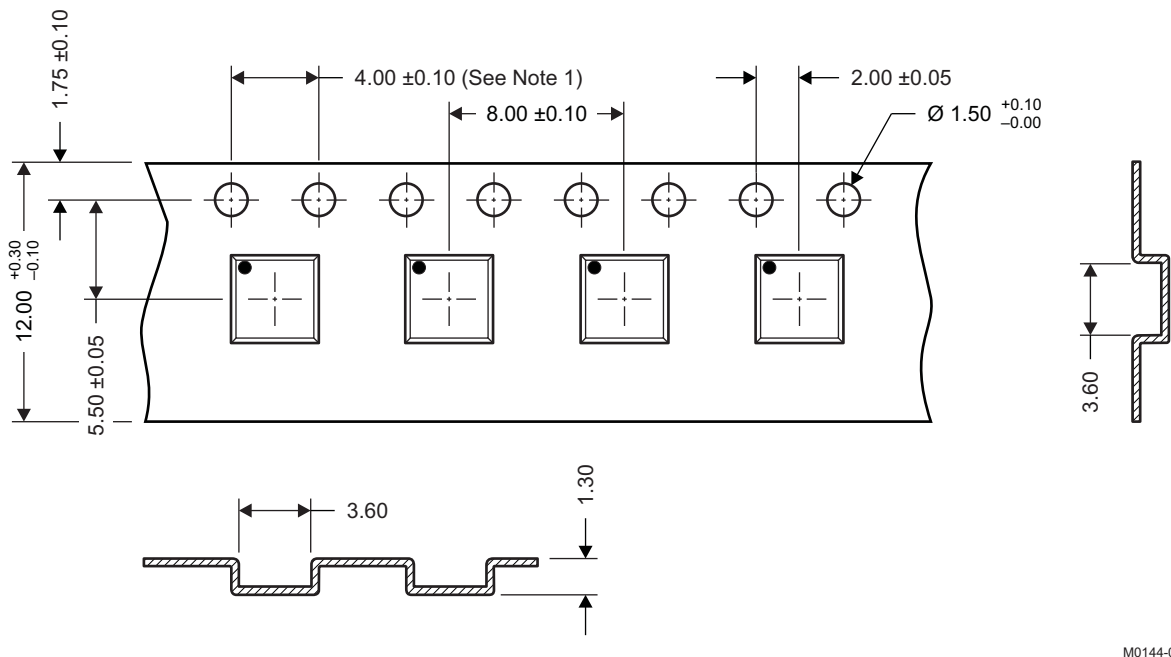
DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.950	1.000	1.100	0.037	0.039	0.043
A1	0.000	0.000	0.050	0.000	0.000	0.002
b	0.280	0.340	0.400	0.011	0.013	0.016
c	0.150	0.200	0.250	0.006	0.008	0.010
D	3.200	3.300	3.400	0.126	0.130	0.134
D1	-	-	-	-	-	-
D2	1.650	1.750	1.800	0.065	0.069	0.071
E	3.200	3.300	3.400	0.126	0.130	0.134
E1	-	-	-	-	-	-
E2	2.350	2.450	2.550	0.093	0.096	0.100
e	0.650 TYP			0.026		
H	0.35	0.450	0.550	0.014	0.018	0.022
L	0.35	0.450	0.550	0.014	0.018	0.022
L1	-	-	-	-	-	-
θ	-	-	-	-	-	-

Recommended PCB Pattern



For recommended circuit layout for PCB designs, see application note [SLPA005 – Reducing Ringing Through PCB Layout Techniques](#).

Q3 Tape and Reel Information



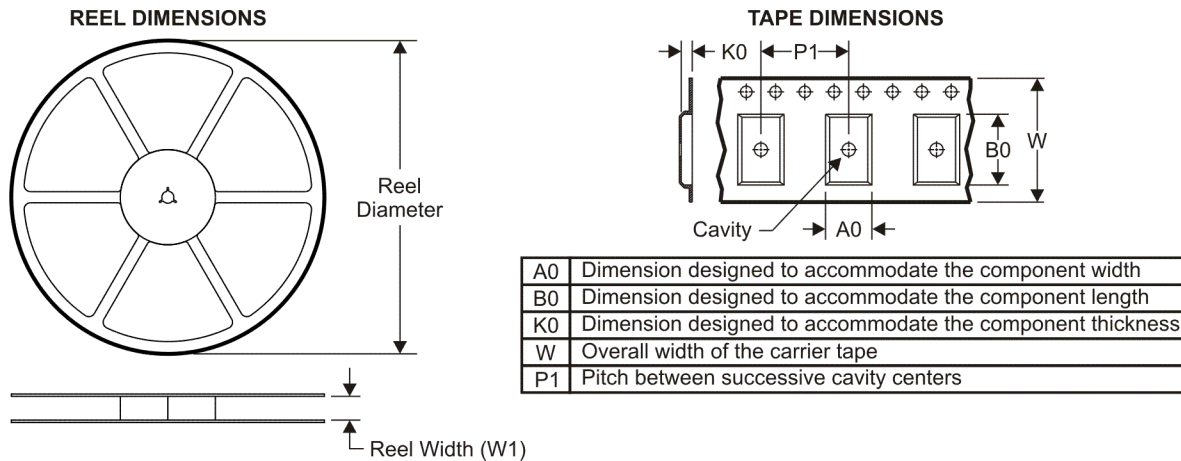
Notes:

1. 10 sprocket hole pitch cumulative tolerance ± 0.2
2. Camber not to exceed 1mm IN 100mm, noncumulative over 250mm
3. Material: black static dissipative polystyrene
4. All dimensions are in mm (unless otherwise specified)
5. Thickness: 0.30 ± 0.05 mm
6. MSL1 260°C (IR and Convection) PbF Reflow Compatible

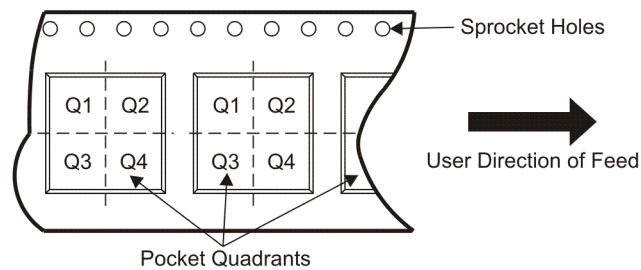
REVISION HISTORY

Changes from Original (August 2009) to Revision A	Page
• 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
CSD16411Q3	SON	DQG	8	2500	330.0	12.8	3.6	3.6	1.2	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CSD16411Q3	SON	DQG	8	2500	335.0	335.0	32.0

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