

30V, N-Channel NexFET™ Power MOSFETs

Check for Samples: **CSD17507Q5A**

FEATURES

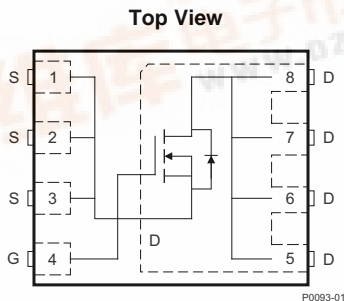
- **Ultralow Q_g and Q_{gd}**
- **Low Thermal Resistance**
- **Avalanche Rated**
- **Pb Free Terminal Plating**
- **RoHS Compliant**
- **Halogen Free**
- **SON 5-mm × 6-mm Plastic Package**

APPLICATIONS

- **Point-of-Load Synchronous Buck 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.



PRODUCT SUMMARY

V_{DS}	Drain to Source Voltage	30	V
Q_g	Gate Charge Total (4.5V)	2.8	nC
Q_{gd}	Gate Charge Gate to Drain	0.7	nC
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 4.5V$	11.8 mΩ
		$V_{GS} = 10V$	9 mΩ
$V_{GS(th)}$	Threshold Voltage	1.6	V

ORDERING INFORMATION

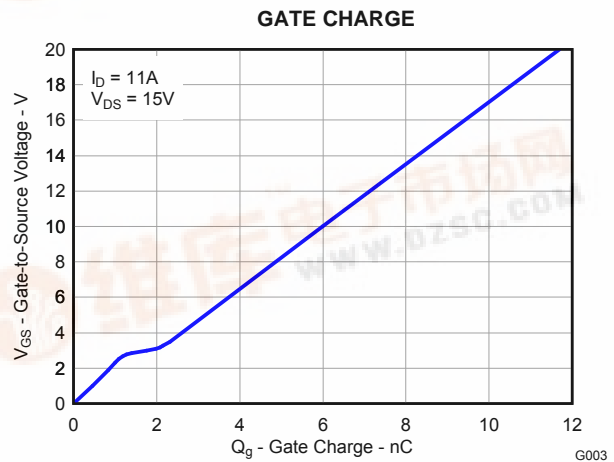
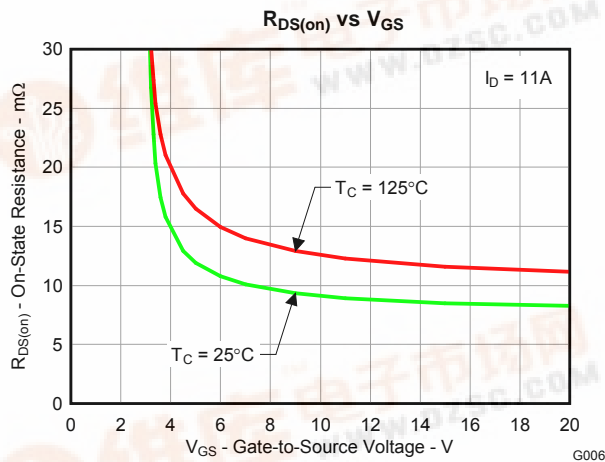
Device	Package	Media	Qty	Ship
CSD17507Q5A	SON 5-mm × 6-mm Plastic Package	13-Inch Reel	2500	Tape and Reel

ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ unless otherwise stated		VALUE	UNIT
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	20 / -12	V
I_D	Continuous Drain Current, $T_C = 25^\circ\text{C}$	65	A
	Continuous Drain Current ⁽¹⁾	13	A
I_{DM}	Pulsed Drain Current, $T_A = 25^\circ\text{C}$ ⁽²⁾	85	A
P_D	Power Dissipation ⁽¹⁾	3	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
E_{AS}	Avalanche Energy, single pulse $I_D = 30A, L = 0.1\text{mH}, R_G = 25\Omega$	45	mJ

(1) Typical $R_{\theta JA} = 44^\circ\text{C/W}$ on 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu pad on a 0.06-inch (1.52-mm) thick FR4 PCB.

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



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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)

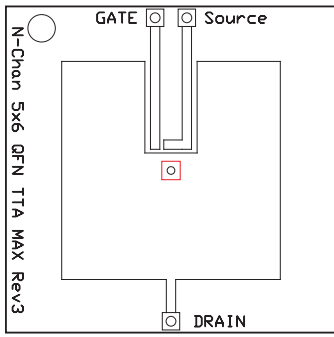
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain to Source Voltage	$V_{GS} = 0V, I_{DS} = 250\mu A$	30			V
I_{DSS}	Drain to Source Leakage Current	$V_{GS} = 0V, V_{DS} = 24V$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{DS} = 0V, V_{GS} = 20/-12V$			100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = 250\mu A$	1.1	1.6	2.1	V
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 4.5V, I_{DS} = 11A$		11.8	16.1	$m\Omega$
		$V_{GS} = 10V, I_{DS} = 11A$		9	10.8	$m\Omega$
g_{fs}	Transconductance	$V_{DS} = 15V, I_{DS} = 11A$		16		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 15V,$ $f = 1MHz$		410	530	pF
C_{oss}	Output Capacitance			270	350	pF
C_{rss}	Reverse Transfer Capacitance			23	30	pF
R_G	Series Gate Resistance			0.7	1.4	Ω
Q_g	Gate Charge Total (4.5V)	$V_{DS} = 15V, I_{DS} = 11A$		2.8	3.6	nC
Q_{gd}	Gate Charge Gate to Drain			0.7		nC
Q_{gs}	Gate Charge Gate to Source			1.3		nC
$Q_{g(th)}$	Gate Charge at V_{th}			0.7		nC
Q_{oss}	Output Charge	$V_{DS} = 13V, V_{GS} = 0V$		7.2		nC
$t_{d(on)}$	Turn On Delay Time	$V_{DS} = 15V, V_{GS} = 4.5V,$ $I_{DS} = 11A, R_G = 2\Omega$		4.7		ns
t_r	Rise Time			5.2		ns
$t_{d(off)}$	Turn Off Delay Time			5.7		ns
t_f	Fall Time			2.3		ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	$I_{SD} = 11A, V_{GS} = 0V$		0.85	1	V
Q_{rr}	Reverse Recovery Charge	$V_{DS} = 13V, I_F = 11A, di/dt = 300A/\mu s$		11		nC
t_{rr}	Reverse Recovery Time			16		ns

THERMAL CHARACTERISTICS

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

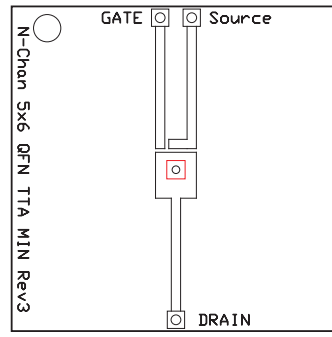
PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Thermal Resistance Junction to Case ⁽¹⁾			1.9	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient ⁽¹⁾⁽²⁾			51	$^\circ\text{C/W}$

- (1) $R_{\theta JC}$ is determined with the device mounted on a 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu pad on a 1.5-inch \times 1.5-inch (3.81-cm \times 3.81-cm), 0.06-inch (1.52-mm) thick FR4 PCB. $R_{\theta JC}$ is specified by design, whereas $R_{\theta JA}$ is determined by the user's board design.
- (2) Device mounted on FR4 material with 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu.



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Max $R_{\theta JA} = 51^{\circ}\text{C/W}$
when mounted on
1 inch² (6.45 cm²) of
2-oz. (0.071-mm thick)
Cu.

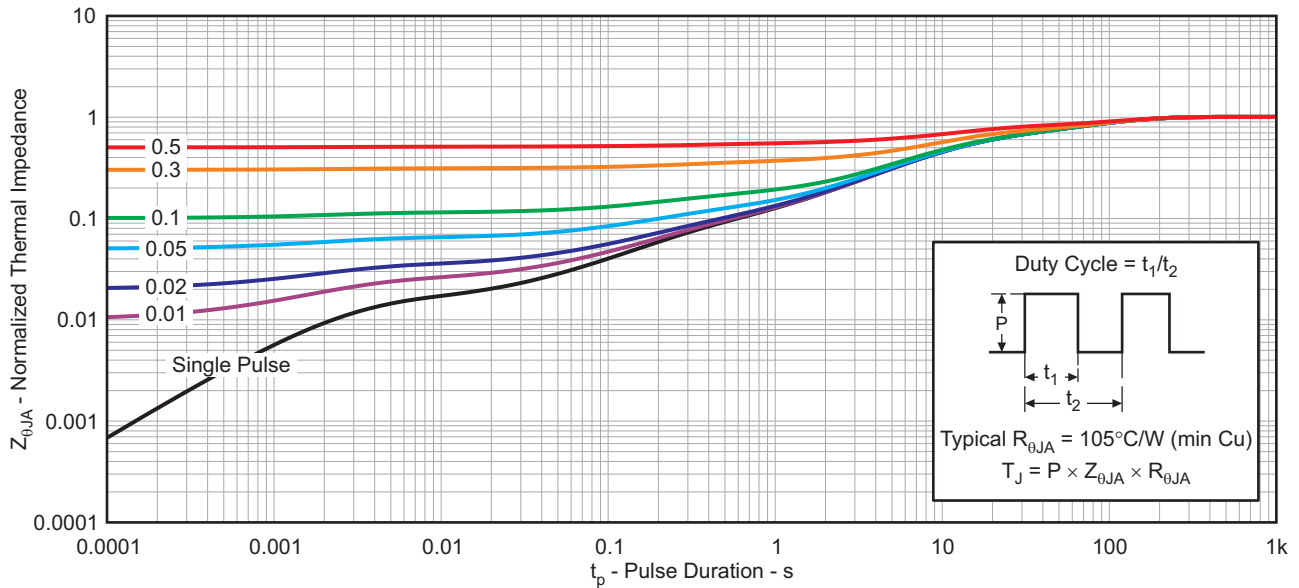


M0137-02

Max $R_{\theta JA} = 131^{\circ}\text{C/W}$
when mounted on a
minimum pad area of
2-oz. (0.071-mm thick)
Cu.

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)

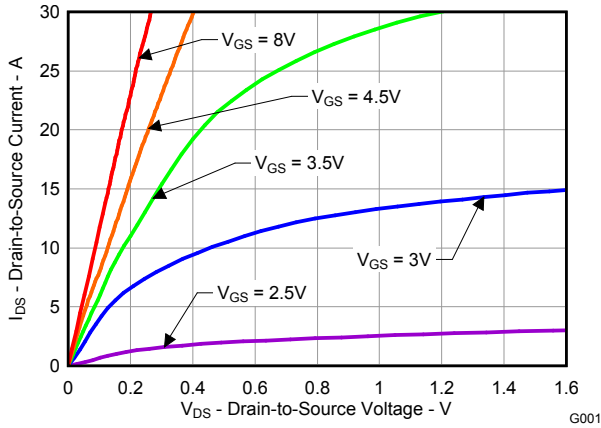


Figure 2. Saturation Characteristics

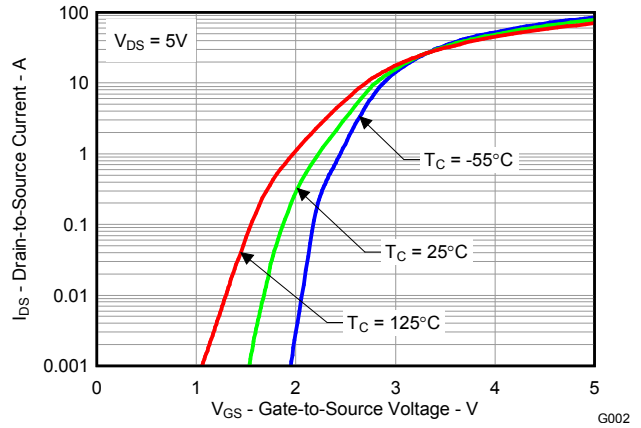


Figure 3. Transfer Characteristics

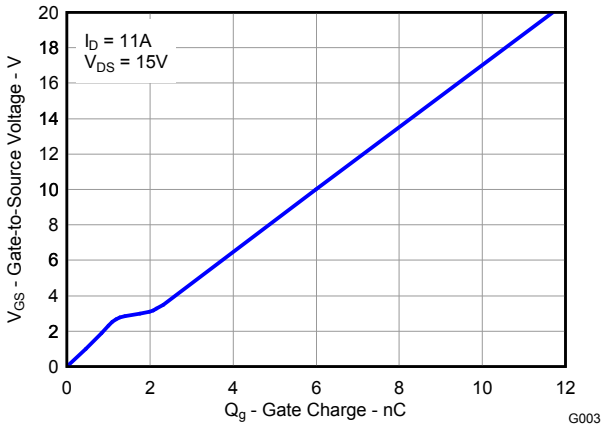


Figure 4. Gate Charge

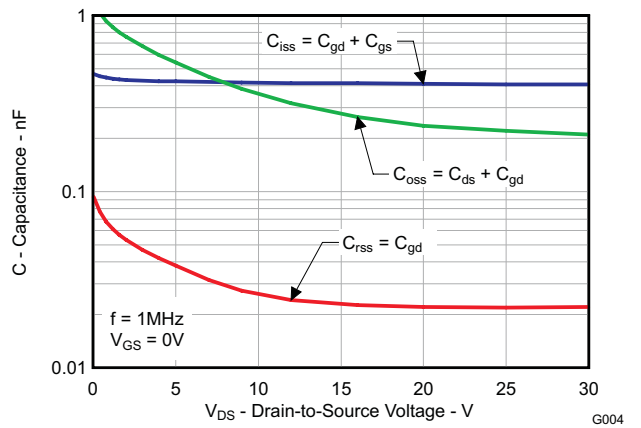


Figure 5. Capacitance

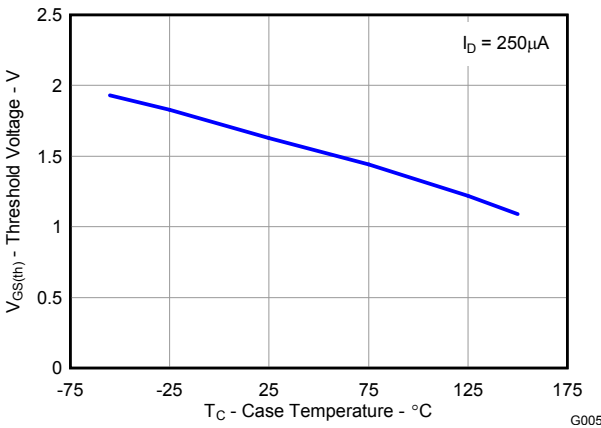


Figure 6. Threshold Voltage vs. Temperature

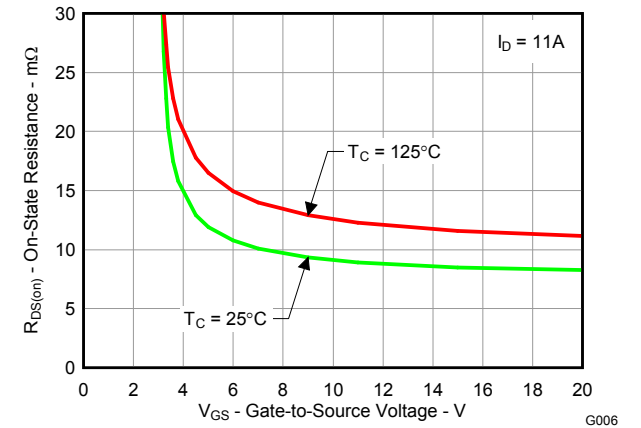


Figure 7. On-State Resistance vs. Gate-to-Source Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

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

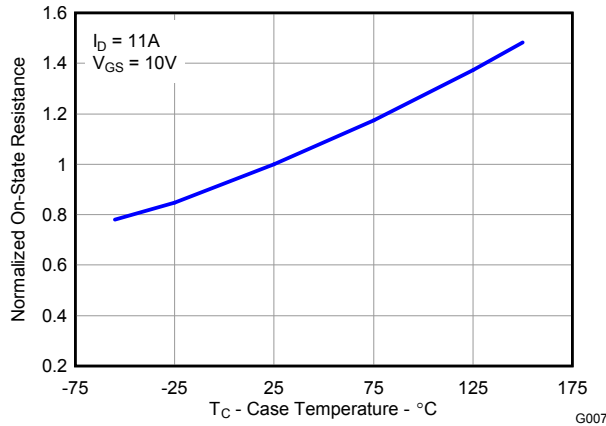


Figure 8. Normalized On-State Resistance vs. Temperature

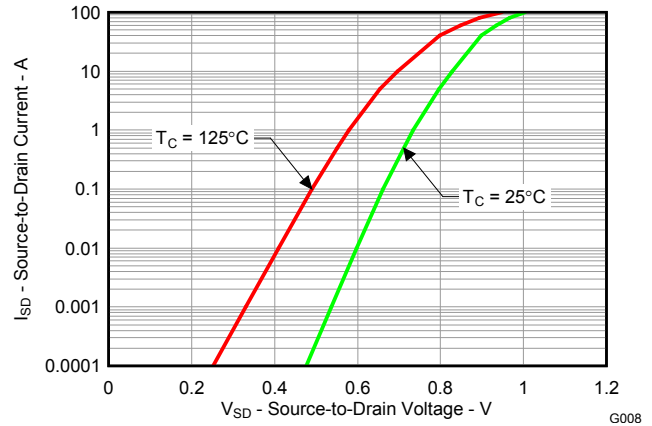


Figure 9. Typical Diode Forward Voltage

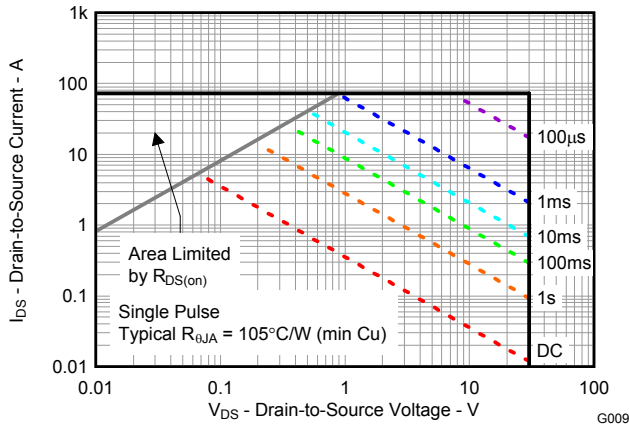


Figure 10. Maximum Safe Operating Area

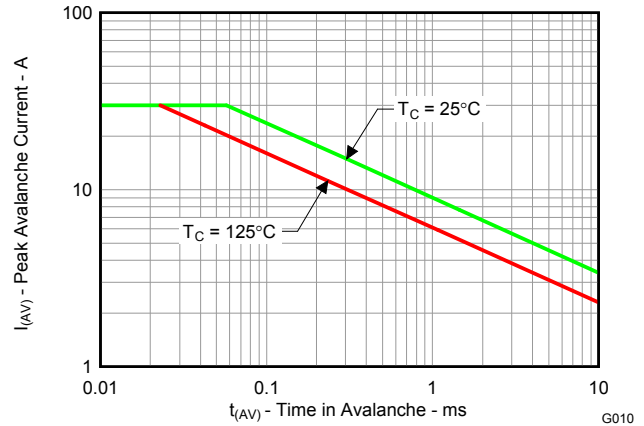


Figure 11. Single Pulse Unclamped Inductive Switching

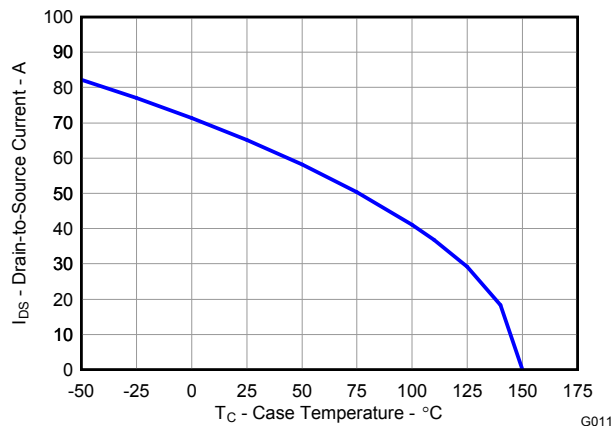
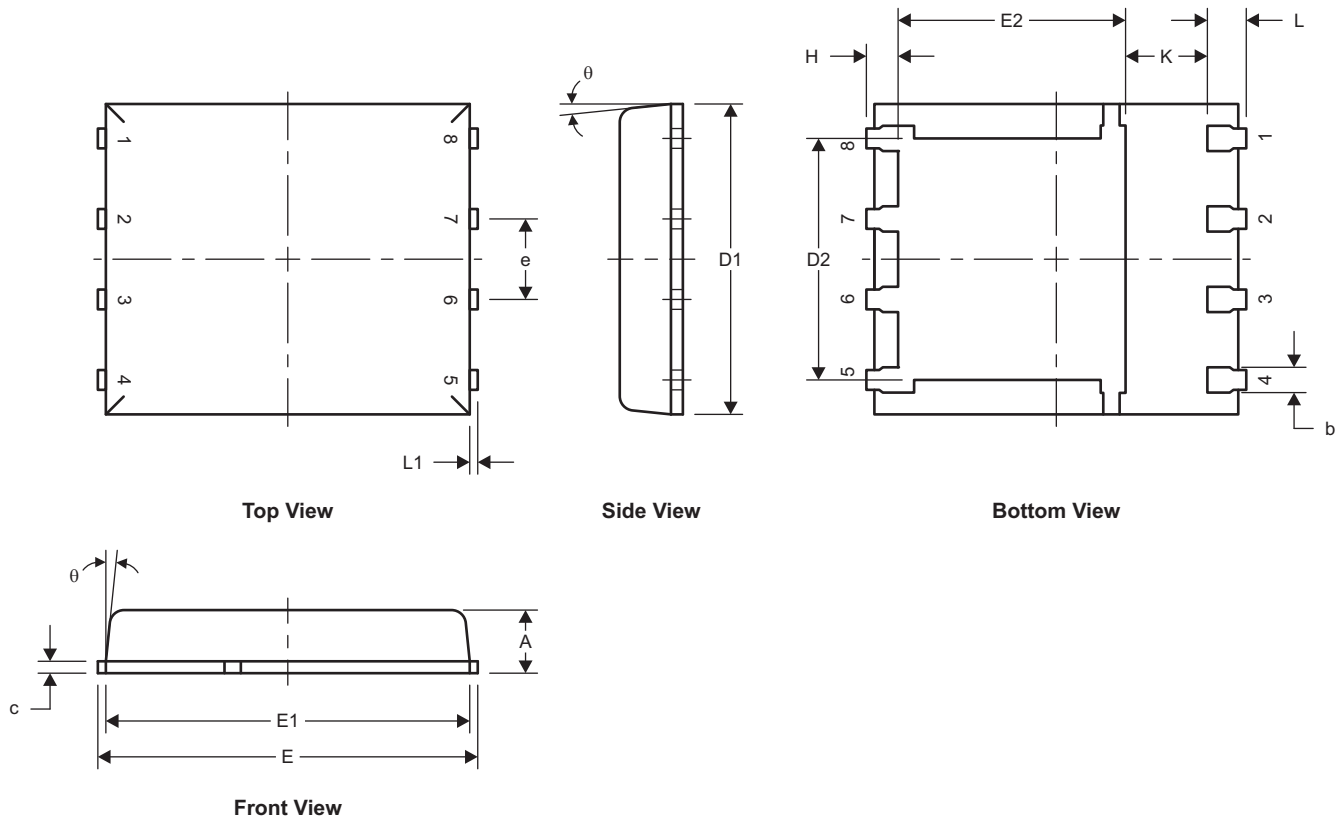


Figure 12. Maximum Drain Current vs. Temperature

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MECHANICAL DATA

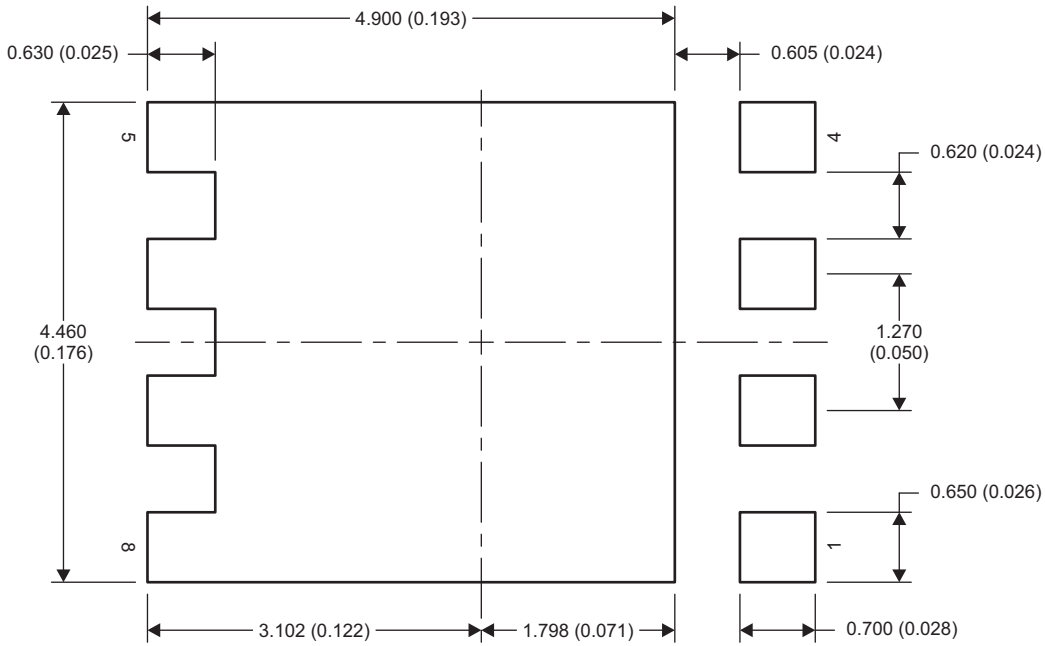
Q5A Package Dimensions



M0135-01

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.33	0.41	0.51
c	0.20	0.25	0.34
D1	4.80	4.90	5.00
D2	3.61	3.81	4.02
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.17	1.27	1.37
H	0.41	0.56	0.71
K	1.10		
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
θ	0°		12°

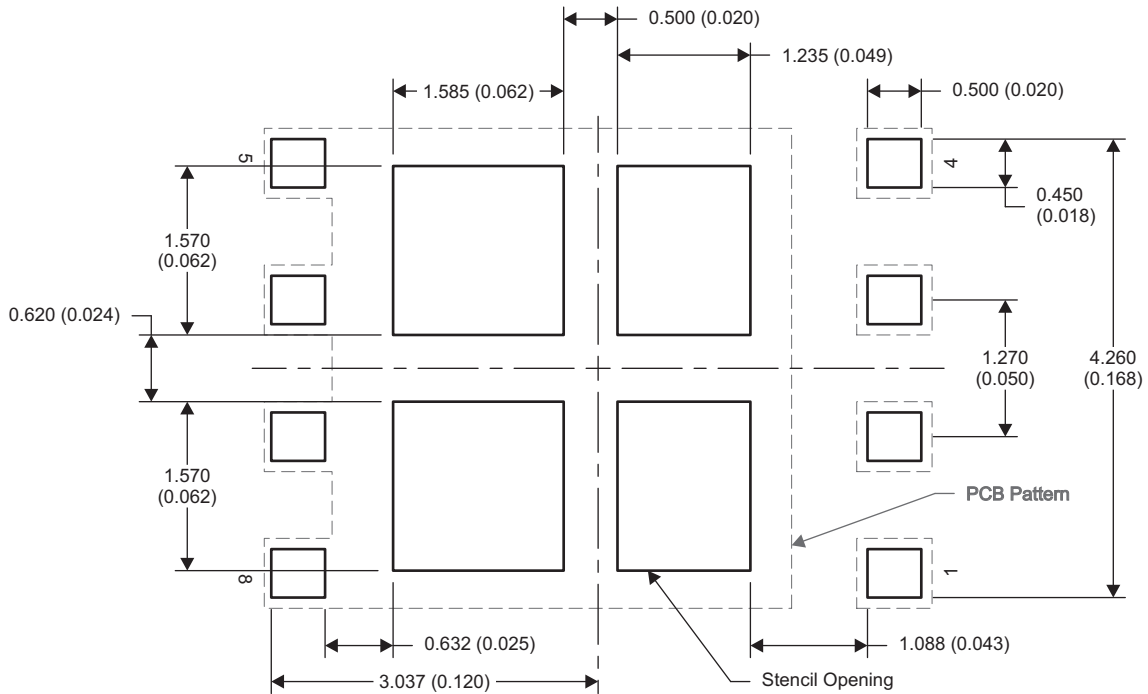
Recommended PCB Pattern



M0139-01

NOTE: Dimensions are in mm (inches).

Stencil Recommendation

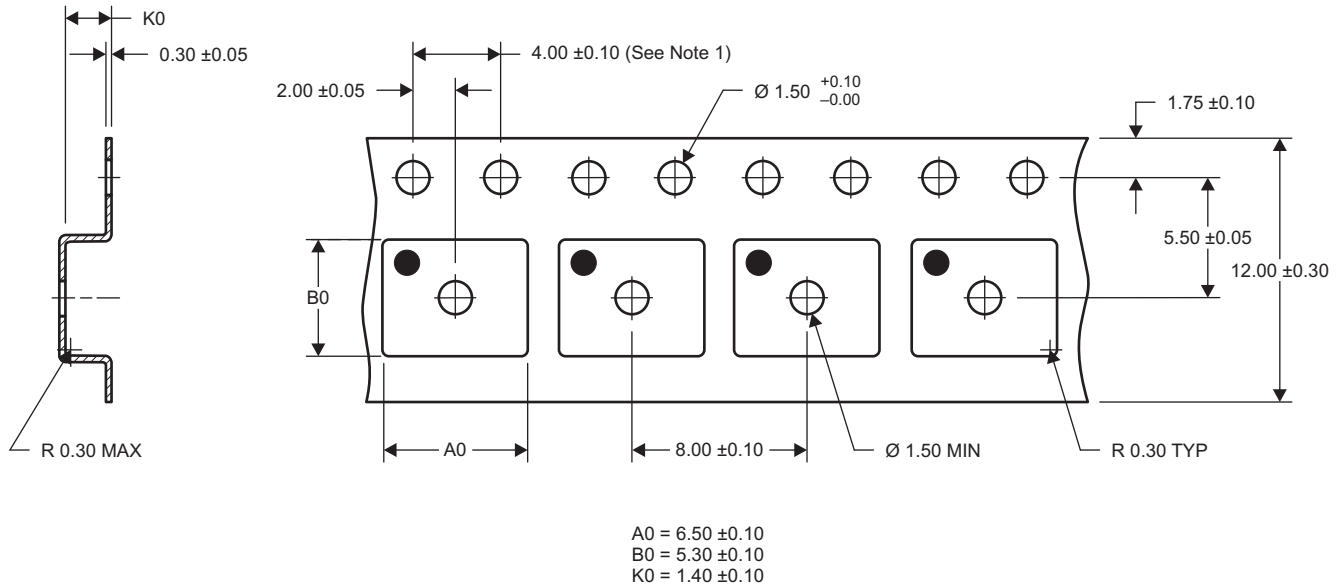


M0209-01

NOTE: Dimensions are in mm (inches).

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

Q5A Tape and Reel Information



M0138-01

- 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. A0 and B0 measured on a plane 0.3mm above the bottom of the pocket

REVISION HISTORY

Changes from Original (July 2010) to Revision A	Page
• Changed the Y axis scale for Figure 5	4
Changes from Revision A (August 2010) to Revision B	Page
• Absolute Maximum Ratings, changed the E_{AS} value from 145 to 45mJ	1
Changes from Revision B (September 2010) to Revision C	Page
• Added the Stencil Recommendation illustration	7

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