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**

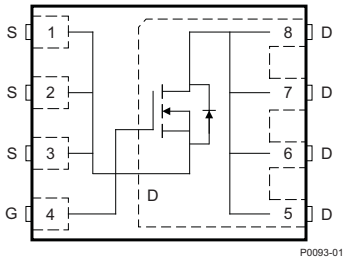
APPLICATIONS

- **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.

Top View



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

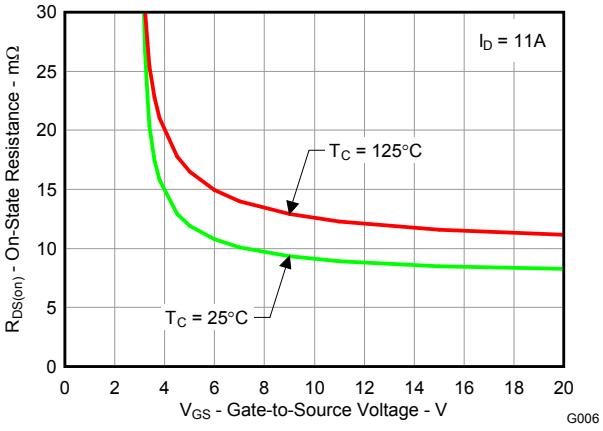
ABSOLUTE MAXIMUM RATINGS

T_A = 25°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°C	65	A
	Continuous Drain Current(1)	13	A
I_{DM}	Pulsed Drain Current, T_A = 25°C(2)	85	A
P_D	Power Dissipation(1)	3	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	–55 to 150	°C
E_{AS}	Avalanche Energy, single pulse I_D = 30A, L = 0.1mH, R_G = 25Ω	145	mJ

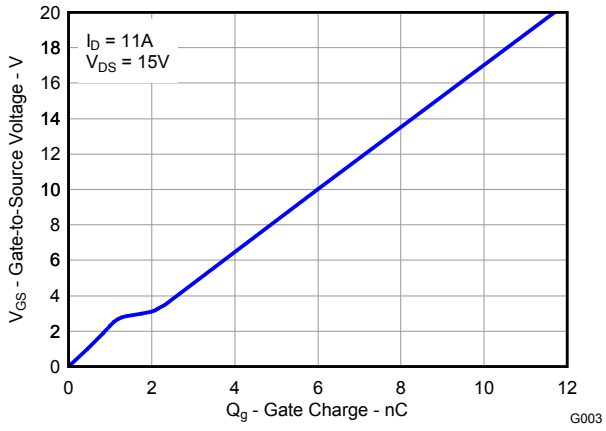
(1) Typical $R_{\theta JA}$ = 44°C/W on 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu pad on a 0.06-inch (1.52-mm) thick FR4 PCB.

(2) Pulse duration ≤300μs, duty cycle ≤2%

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



GATE CHARGE



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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°C unless otherwise stated)

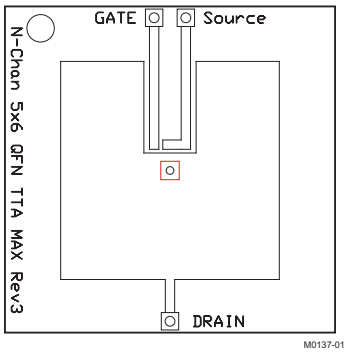
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain to Source Voltage	V_{GS} = 0V, I_{DS} = 250μA	30			V
I_{DSS}	Drain to Source Leakage Current	V_{GS} = 0V, V_{DS} = 24V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{DS} = 0V, V_{GS} = 20/-12V			100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = 250μA	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	mΩ
		V_{GS} = 10V, I_{DS} = 11A		9	10.8	mΩ
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 Vth			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 = 2Ω		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/μs		11		nC
t_{rr}	Reverse Recovery Time			16		ns

THERMAL CHARACTERISTICS

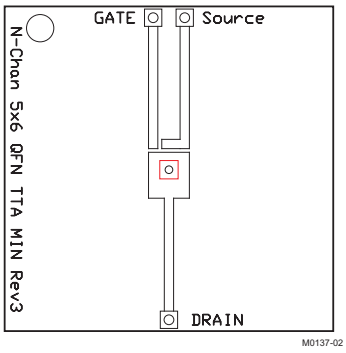
(T_A = 25°C unless otherwise stated)

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

(1) $R_{\theta JC}$ is determined with the device mounted on a 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu pad on a 1.5-inch × 1.5-inch (3.81-cm × 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-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu.



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



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

TYPICAL MOSFET CHARACTERISTICS

(T_A = 25°C unless otherwise stated)

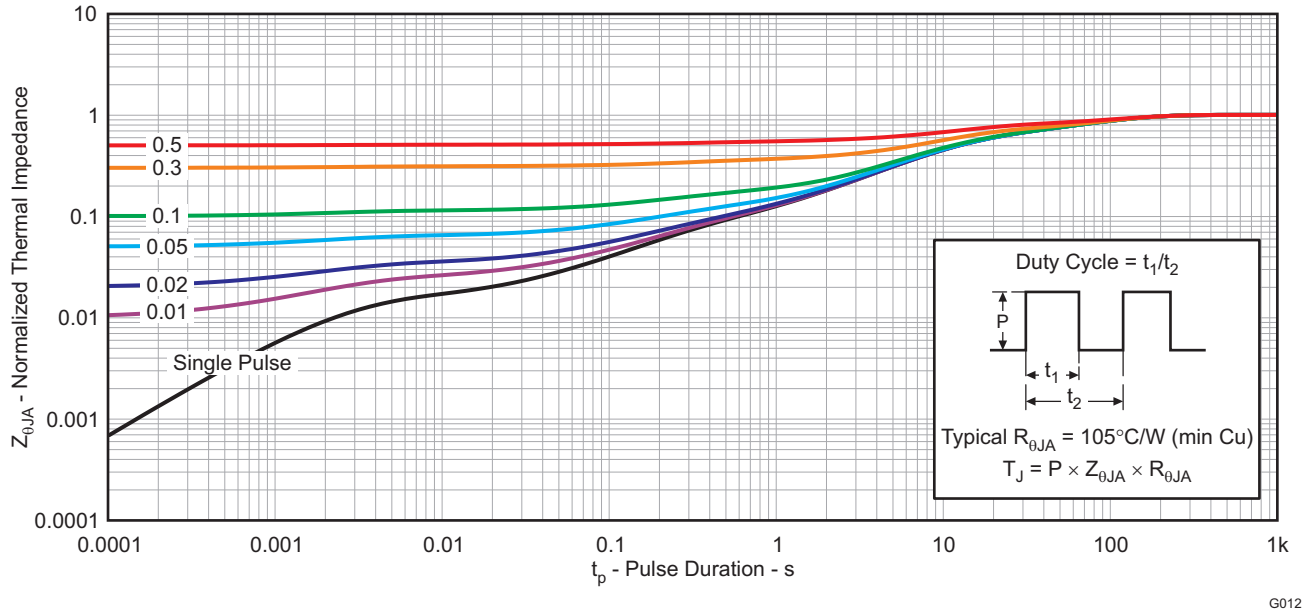


Figure 1. Transient Thermal Impedance

TYPICAL MOSFET CHARACTERISTICS (continued)

(T_A = 25°C unless otherwise stated)

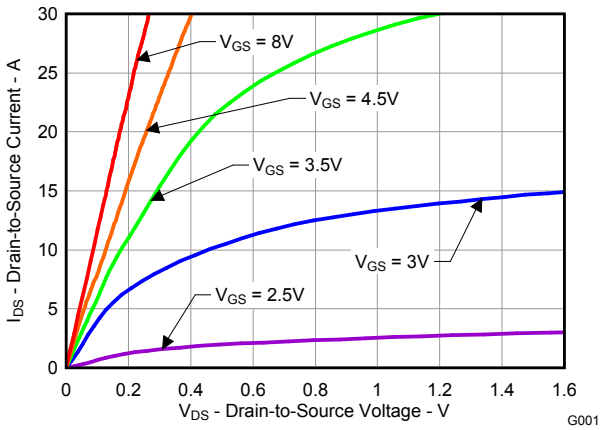


Figure 2. Saturation Characteristics

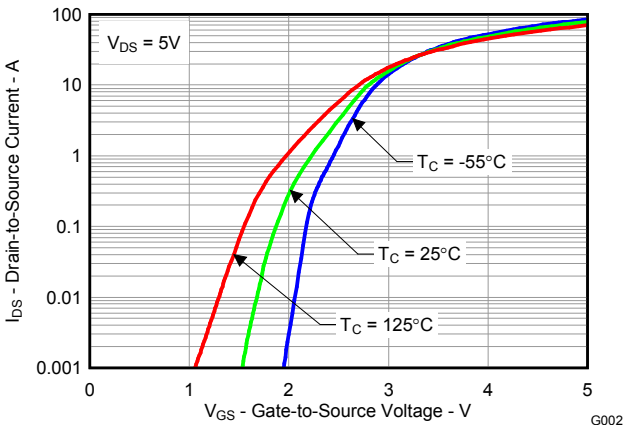


Figure 3. Transfer Characteristics

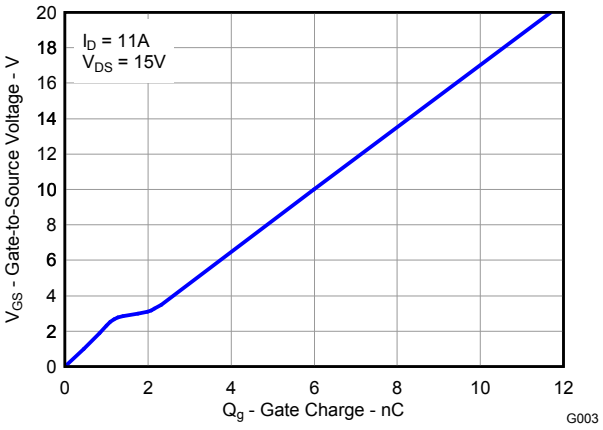


Figure 4. Gate Charge

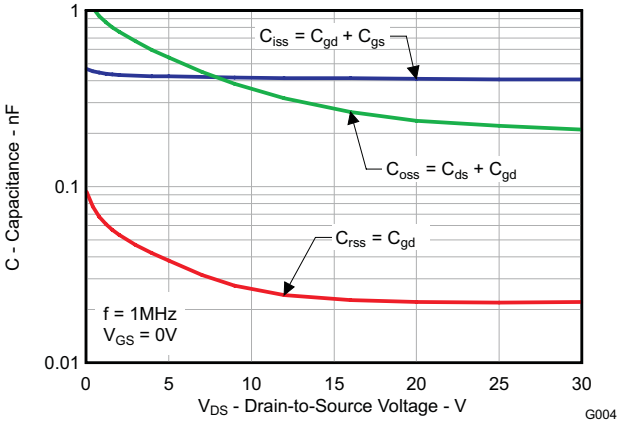


Figure 5. Capacitance

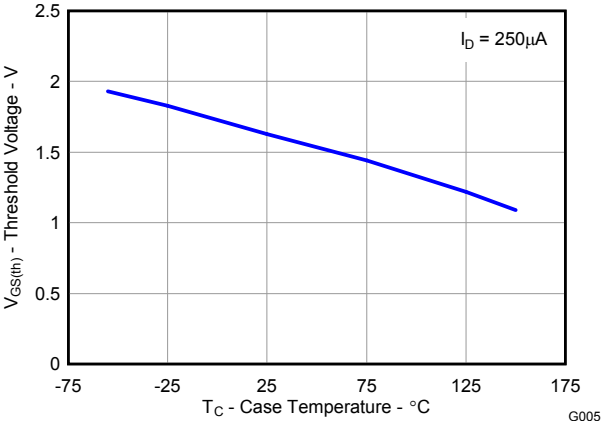


Figure 6. Threshold Voltage vs. Temperature

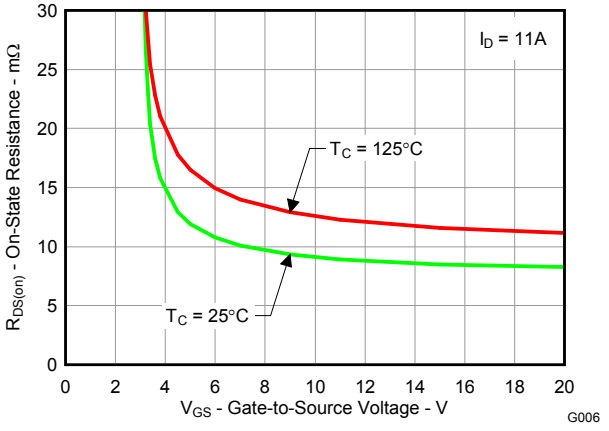


Figure 7. On-State Resistance vs. Gate-to-Source Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

(T_A = 25°C unless otherwise stated)

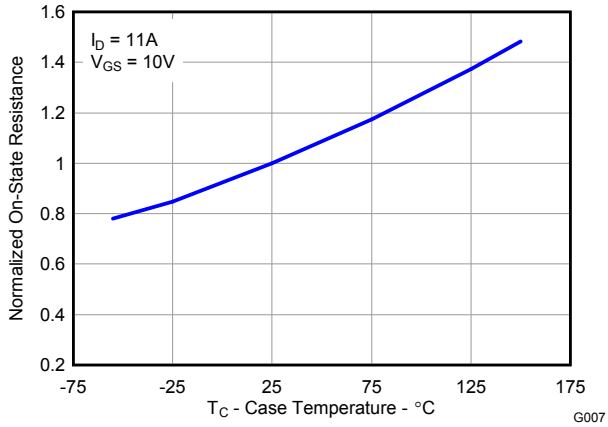


Figure 8. Normalized On-State Resistance vs. Temperature

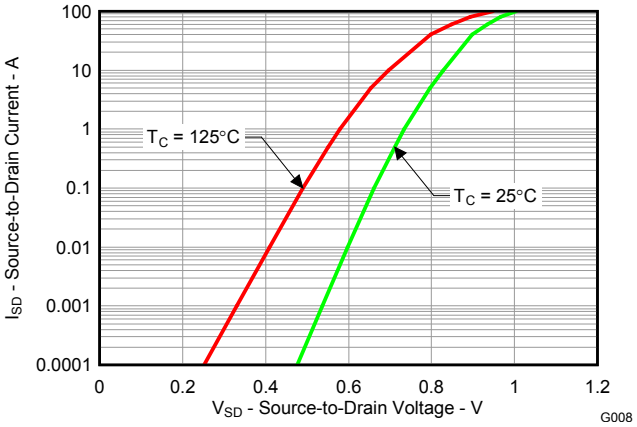


Figure 9. Typical Diode Forward Voltage

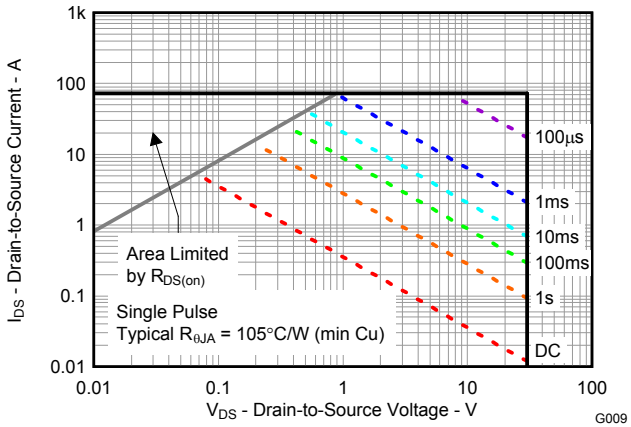


Figure 10. Maximum Safe Operating Area

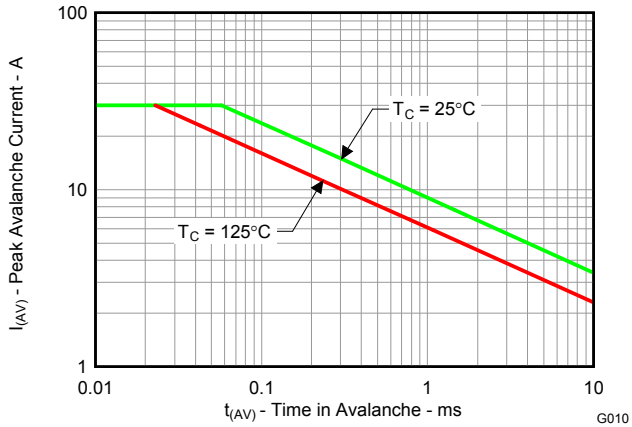


Figure 11. Single Pulse Unclamped Inductive Switching

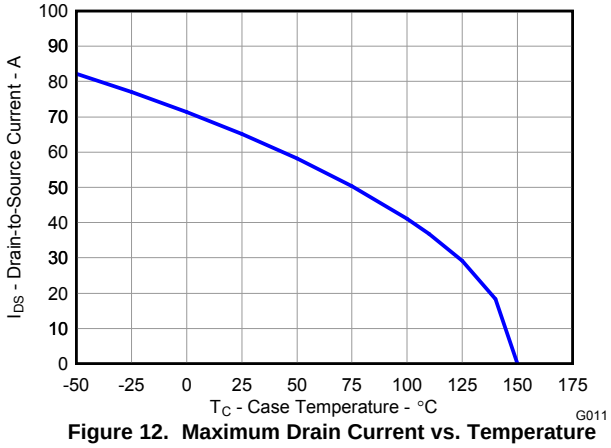
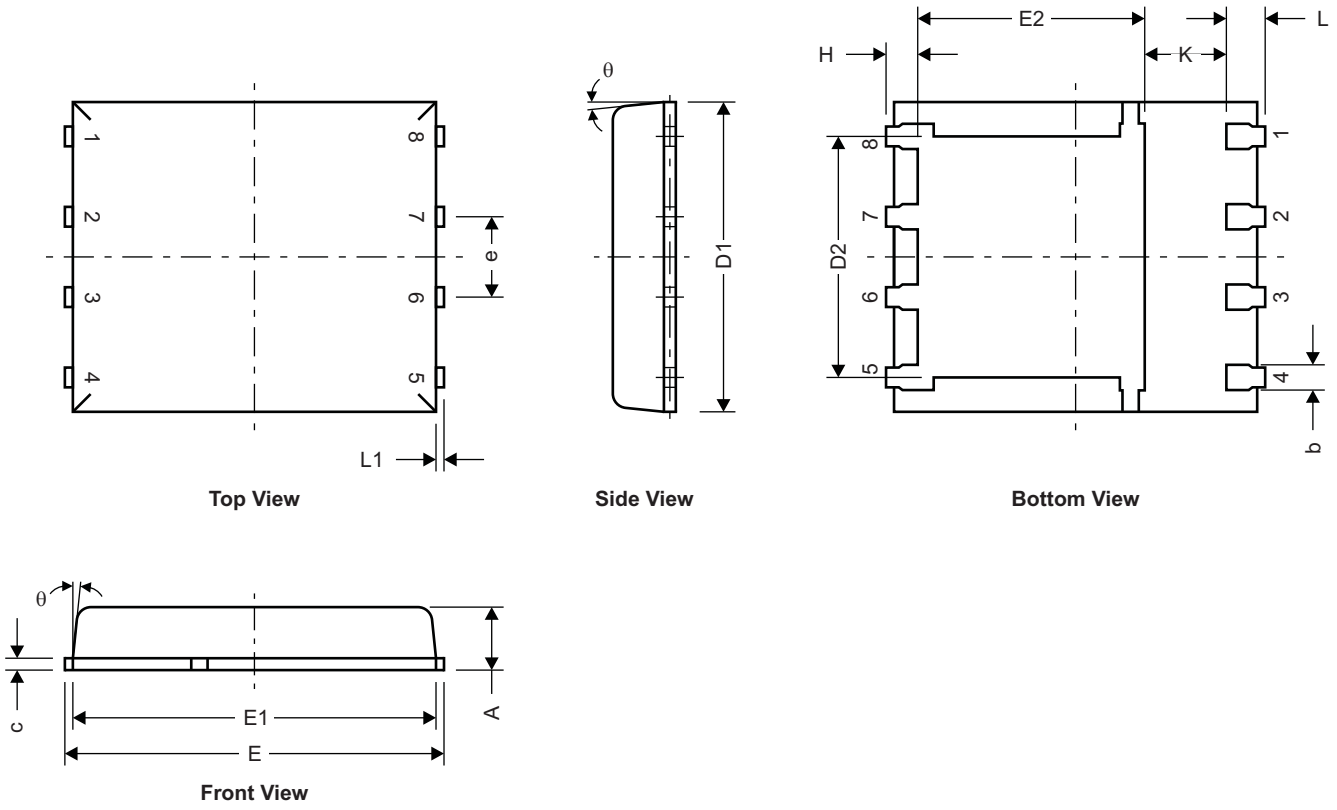


Figure 12. Maximum Drain Current vs. Temperature

MECHANICAL DATA

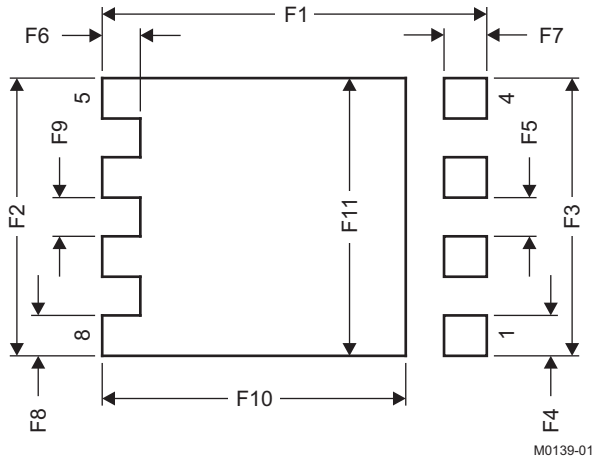
Q5A Package Dimensions



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°

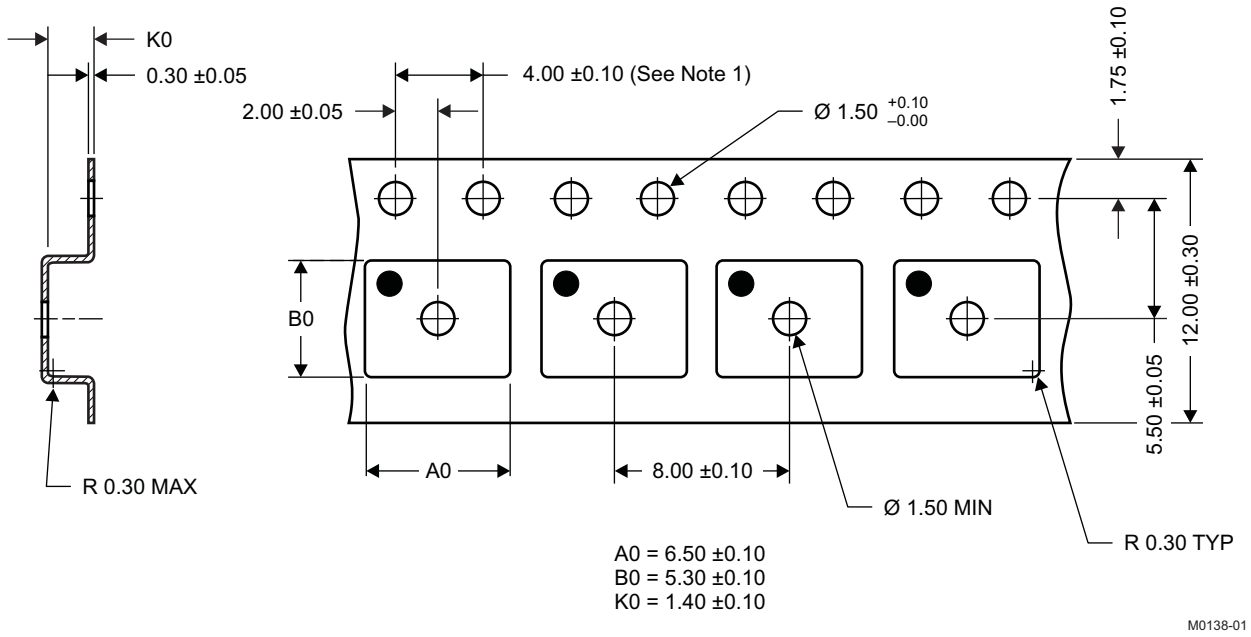
Recommended PCB Pattern



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
F1	6.205	6.305	0.244	0.248
F2	4.46	4.56	0.176	0.18
F3	4.46	4.56	0.176	0.18
F4	0.65	0.7	0.026	0.028
F5	0.62	0.67	0.024	0.026
F6	0.63	0.68	0.025	0.027
F7	0.7	0.8	0.028	0.031
F8	0.65	0.7	0.026	0.028
F9	0.62	0.67	0.024	0.026
F10	4.9	5	0.193	0.197
F11	4.46	4.56	0.176	0.18

For recommended circuit layout for PCB designs, see application note SLPA005 – *Reducing Ringing Through PCB Layout Techniques*.

Q5A 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. 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

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