



DMN2028USS

20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)} \text{ max}$	$I_D \text{ max}$ $T_A = 25^\circ\text{C}$ (Note 3)
20V	20m Ω @ $V_{GS} = 4.5\text{V}$	9.8A
	28m Ω @ $V_{GS} = 2.5\text{V}$	8.3A

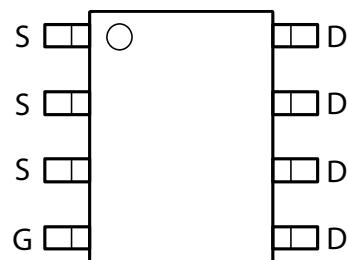
Description and Applications

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

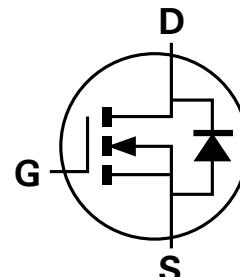
- Battery charging
- Power management functions
- DC-DC converters
- Portable power adaptors



Top View



Top View



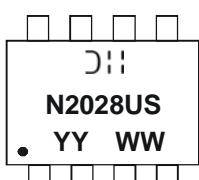
Equivalent Circuit

Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN2028USS-13	N2028US	13	12	2,500

Notes: 1. No purposefully added lead. Diodes Inc.'s "Green" policy and packaging details can be found on our website at <http://www.diodes.com>

Marking Information



○II = Manufacturer's Marking
N2028US = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 10 = 2010)
WW = Week (01-53)

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source voltage	$V_{GS} = 4.5\text{V}$	V_{DSS}	V_{GS}	20	V
Gate-Source voltage		± 12			
Continuous Drain current	$V_{GS} = 4.5\text{V}$	(Note 3)	I_D	9.8	A
		$T_A = 70^\circ\text{C}$ (Note 3)		7.9	
		(Note 2)		7.3	
Pulsed Drain current		(Note 4)	I_{DM}	45.0	
Continuous Source current (Body diode)	(Note 3)	(Note 3)	I_S	6.0	
Pulsed Source current (Body diode)		(Note 4)	I_{SM}	45.0	

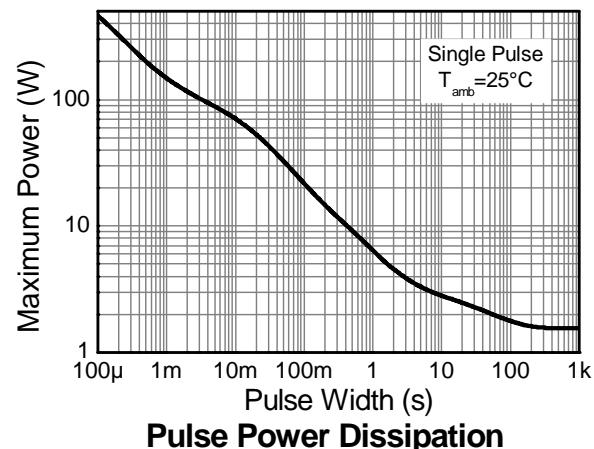
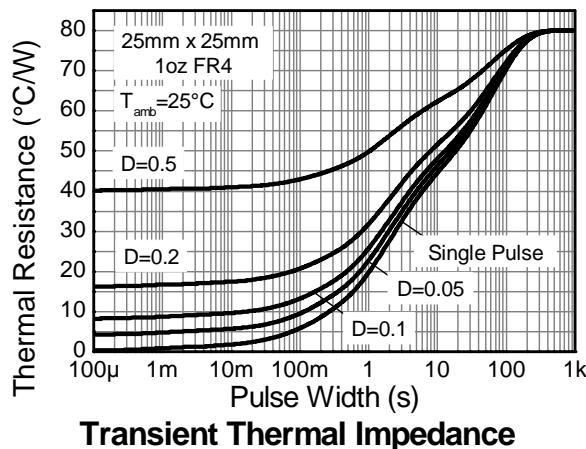
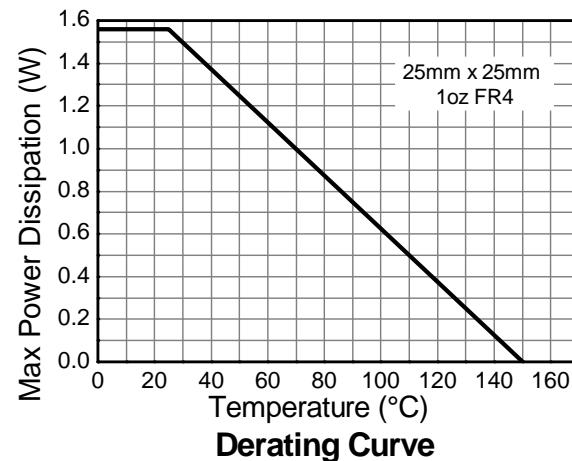
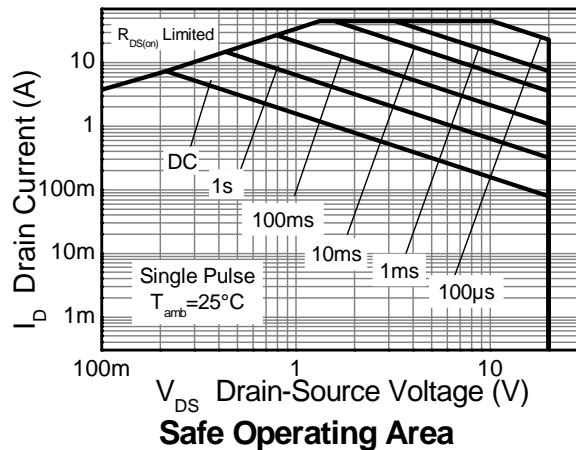
Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 2)	P_D	1.56	W mW/°C
	(Note 3)		12.5	
	(Note 2)		2.81	
	(Note 3)		22.5	
Thermal Resistance, Junction to Ambient	(Note 2)	$R_{\theta JA}$	80.0	°C/W
	(Note 3)		44.5	
Thermal Resistance, Junction to Lead	(Note 5)	$R_{\theta JL}$	37.0	
Operating and storage temperature range		T_J, T_{STG}	-55 to 150	°C

Notes:

2. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
3. Same as note (2), except the device is measured at $t \leq 10$ sec.
4. Same as note (2), except the device is pulsed with $D = 0.02$ and pulse width 300 μs .
5. Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics



Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	20	-	-	V	$V_{\text{GS}} = 0\text{V}$, $I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1.0	μA	$V_{\text{DS}} = 20\text{V}$, $V_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	-	-	± 10	μA	$V_{\text{GS}} = \pm 12\text{V}$, $V_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	0.6	1.0	1.3	V	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance (Note 6)	$R_{\text{DS}(\text{ON})}$	-	11	20	$\text{m}\Omega$	$V_{\text{GS}} = 4.5\text{V}$, $I_D = 9.4\text{A}$
			15	28		$V_{\text{GS}} = 2.5\text{V}$, $I_D = 8.3\text{A}$
Forward Transfer Admittance (Note 6 & 7)	$ Y_{\text{fs}} $	-	16	-	S	$V_{\text{DS}} = 5\text{V}$, $I_D = 9.4\text{A}$
Diode Forward Voltage (Note 6)	V_{SD}	-	0.7	1.3	V	$V_{\text{GS}} = 0\text{V}$, $I_S = 1.3\text{A}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	-	1000	-	pF	$V_{\text{DS}} = 10\text{V}$, $V_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	-	166	-		
Reverse Transfer Capacitance	C_{rss}	-	158	-		
Gate Resistance	R_g	-	1.51	-	Ω	$V_{\text{DS}} = 0\text{V}$, $V_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Total Gate Charge (Note 8)	Q_g	-	7.0	-	nC	$V_{\text{GS}} = 2.5\text{V}$ $V_{\text{DS}} = 10\text{V}$ $V_{\text{GS}} = 4.5\text{V}$ $I_D = 9.4\text{A}$
Total Gate Charge (Note 8)	Q_g	-	11.6	-		
Gate-Source Charge (Note 8)	Q_{gs}	-	2.7	-		
Gate-Drain Charge (Note 8)	Q_{gd}	-	3.4	-		
Turn-On Delay Time (Note 8)	$t_{\text{D}(\text{on})}$	-	11.67	-	ns	$V_{\text{GS}} = 4.5\text{V}$, $V_{\text{DS}} = 10\text{V}$, $R_G = 6\Omega$, $I_D = 1\text{A}$
Turn-On Rise Time (Note 8)	t_r	-	12.49	-		
Turn-Off Delay Time (Note 8)	$t_{\text{D}(\text{off})}$	-	35.89	-		
Turn-Off Fall Time (Note 8)	t_f	-	12.33	-		

Notes:

6. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$
7. For design aid only, not subject to production testing.
8. Switching characteristics are independent of operating junction temperatures.

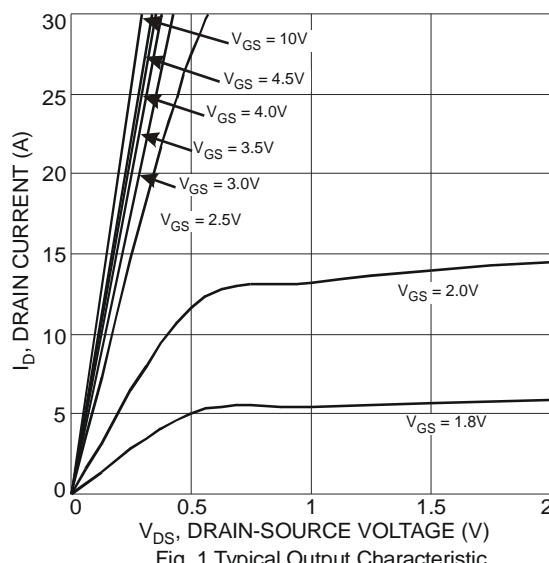


Fig. 1 Typical Output Characteristic

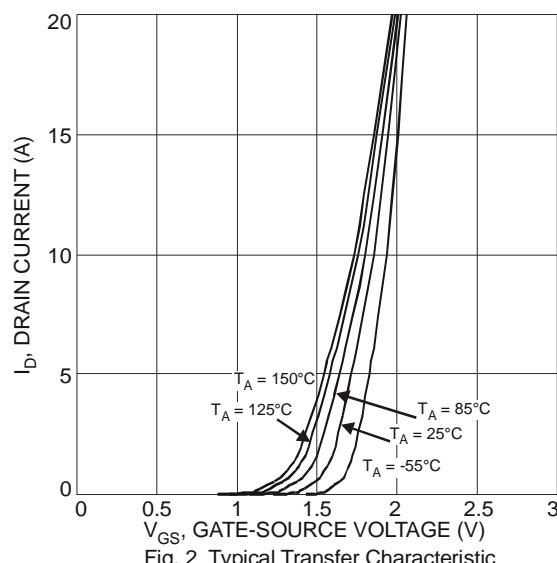


Fig. 2 Typical Transfer Characteristic

DMN2028USS

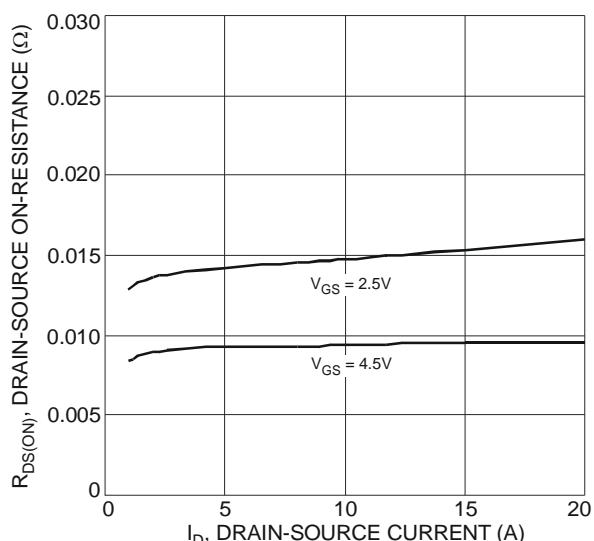


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

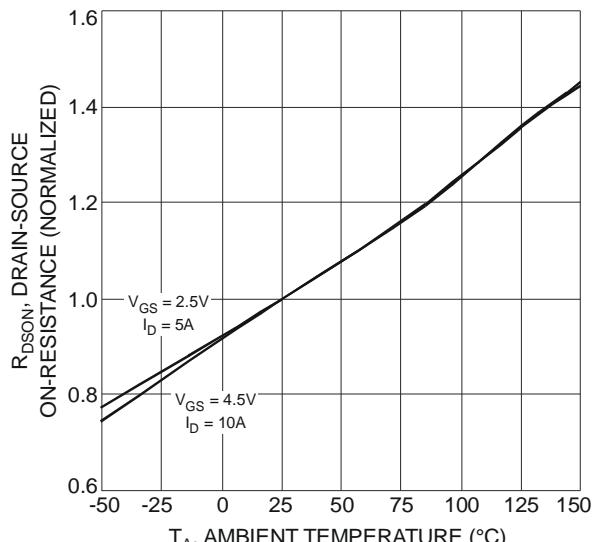


Fig. 5 On-Resistance Variation with Temperature

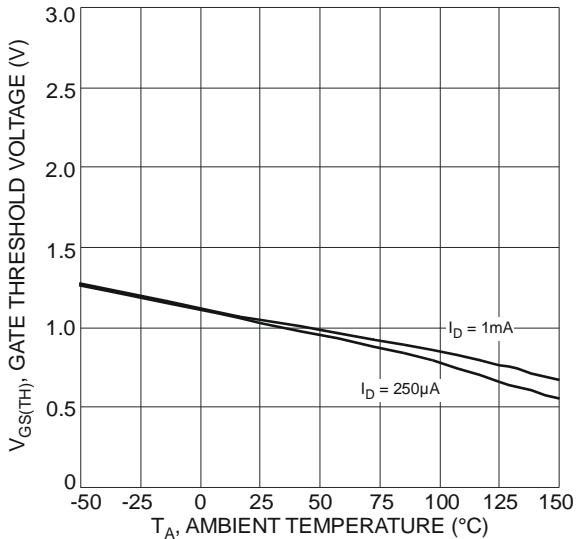


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

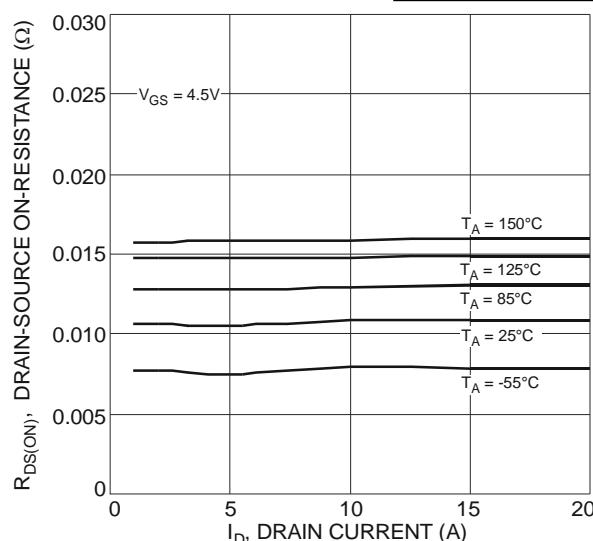


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

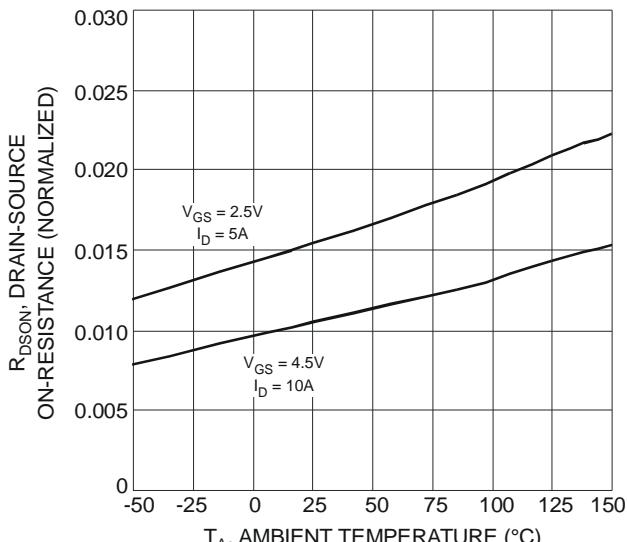


Fig. 6 On-Resistance Variation with Temperature

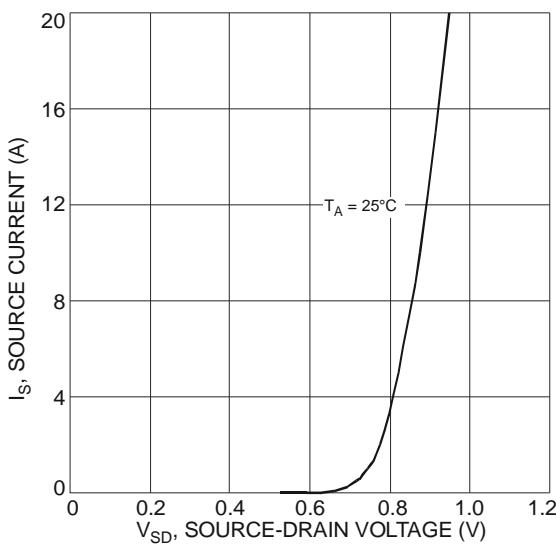


Fig. 8 Diode Forward Voltage vs. Current

DMN2028USS

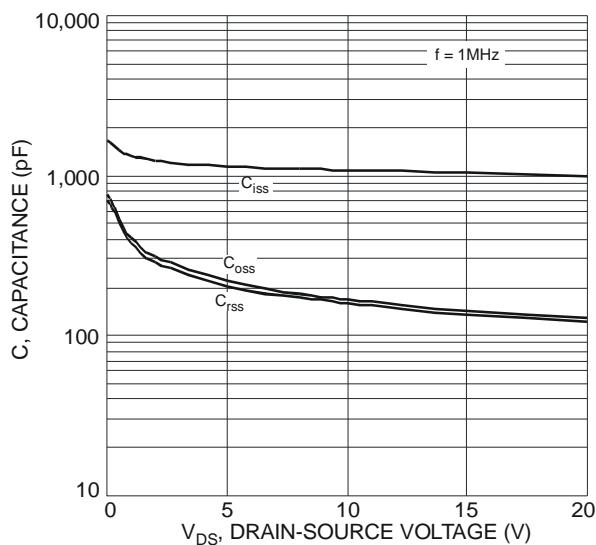


Fig. 9 Typical Total Capacitance

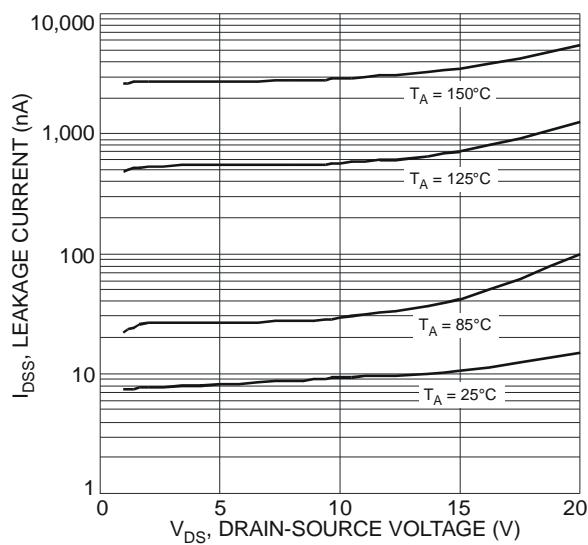


Fig. 10 Typical Leakage Current
vs. Drain-Source Voltage

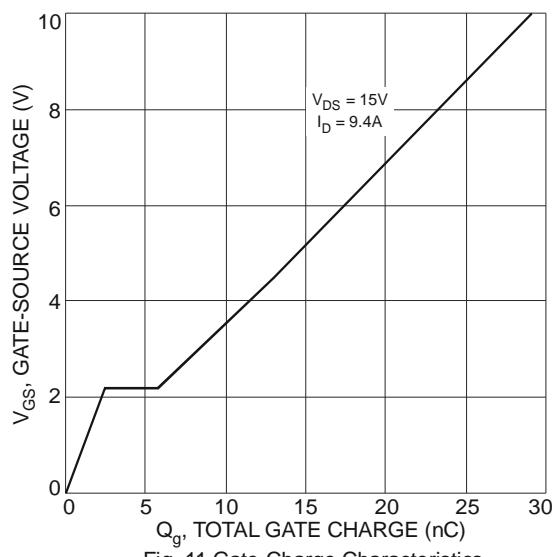
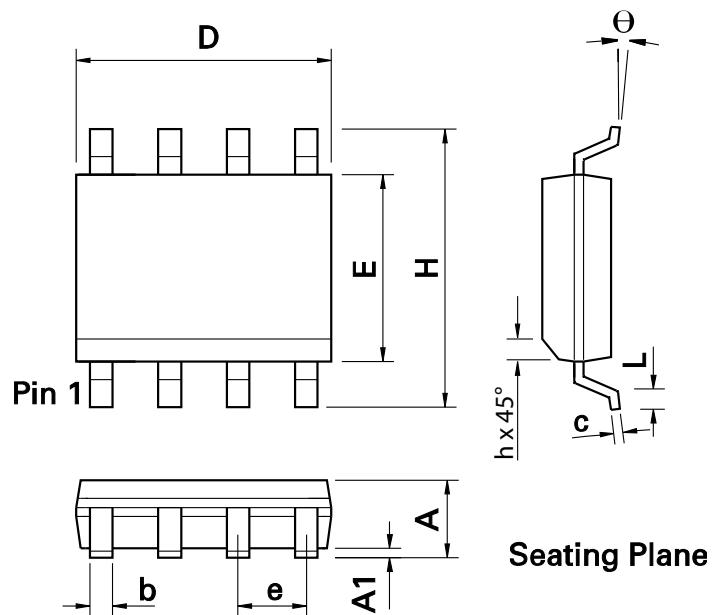


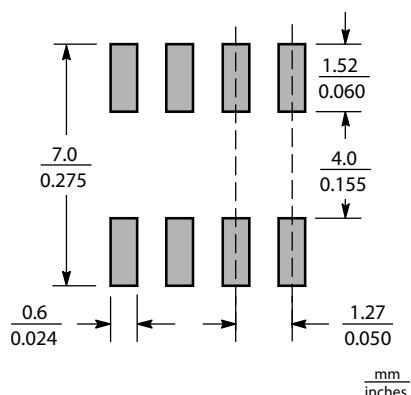
Fig. 11 Gate-Charge Characteristics

Package Outline Dimensions



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	θ	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

Suggested Pad Layout



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