

**20V N-CHANNEL ENHANCEMENT MODE MOSFET IN SOT23**
**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ Max (Note 5)
20V	175m $\Omega$ @ $V_{GS} = 4.5V$	1.40A @ $T_A = 25^\circ C$
	240m $\Omega$ @ $V_{GS} = 2.5V$	1.20A @ $T_A = 25^\circ C$
	360m $\Omega$ @ $V_{GS} = 1.8V$	1.0A @ $T_A = 25^\circ C$

**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.

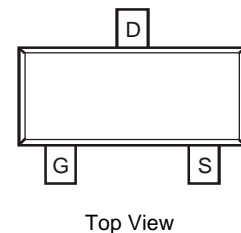
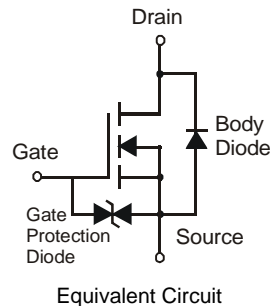
- Load switch

**Features and Benefits**

- On resistance <200m $\Omega$
- Low Gate Threshold Voltage
- Fast Switching Speed
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free. "Green" Device (Note 2)
- ESD Protected Gate 2kV
- Qualified to AEC-Q101 Standards for High Reliability

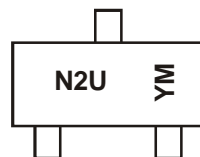
**Mechanical Data**

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin
- Weight: 0.08 grams (approximate)


**Ordering Information** (Note 3)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN2300U-7	N2U	7	8	3000

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

**Marking Information**


N2U = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: Y = 2011)  
M = Month (ex: 9 = September)

**Date Code Key**

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

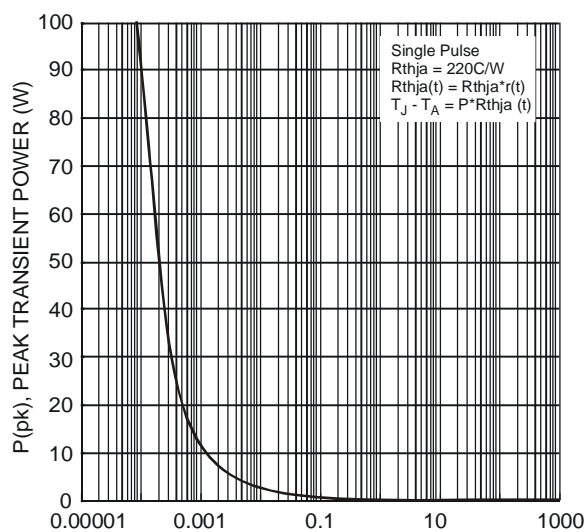
**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current	Steady State	T <sub>A</sub> = 25°C (Note 5)	I <sub>D</sub>	1.40	A
		T <sub>A</sub> = 85°C (Note 5)		1.01	
		T <sub>A</sub> = 25°C (Note 4)		1.24	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	11	A

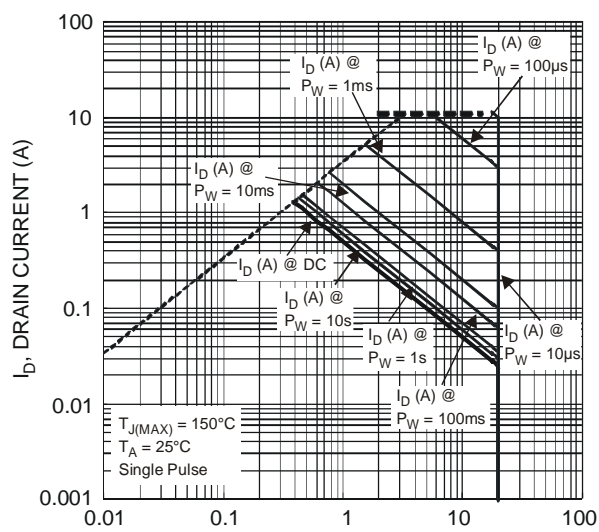
**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 4)	$P_D$	0.43	W
	(Note 5)		0.55	
Thermal Resistance, Junction to Ambient	(Note 4)	$R_{\theta JA}$	288	$^\circ\text{C/W}$
	(Note 5)		228	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

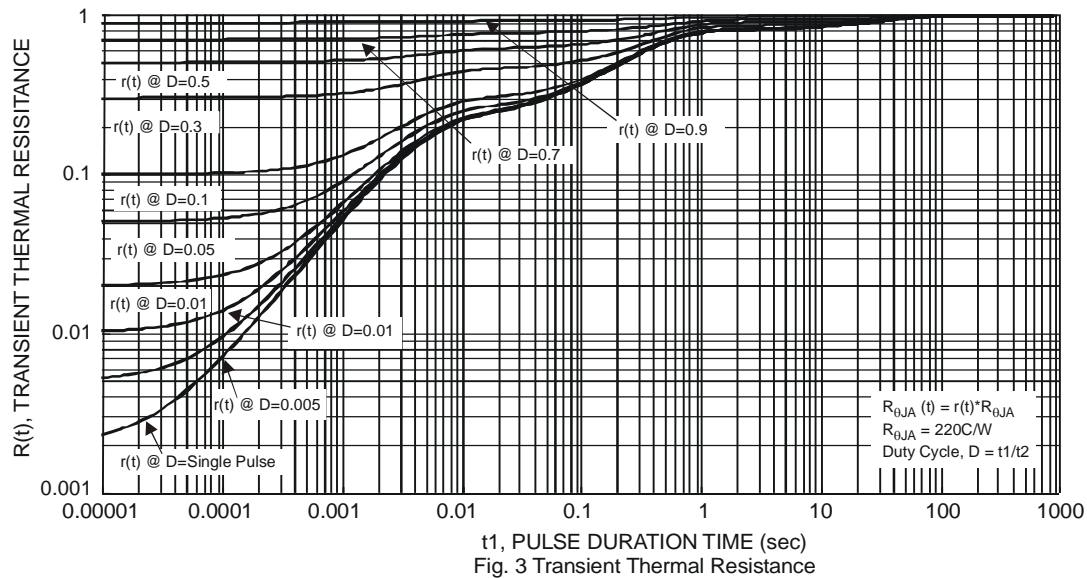
- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
  - Device mounted on 25mm X 25mm square copper plate with FR-4 substrate PC board, 2oz copper
  - Device mounted on minimum recommended pad layout test board, 10 $\mu\text{s}$  pulse duty cycle = 1%.

**Thermal Characteristics**


T1, PULSE DURATION SECTION (sec)  
 Fig. 1 Single Maximum Power Dissipation



$V_{DS}$ , DRAIN-SOURCE VOLTAGE  
 Fig. 2 SOA, Safe Operation Area



### Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA
Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C	I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	10	μA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.45	-	0.95	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-		175	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 300mA
				240		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 250mA
				360		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 100mA
Forward Transfer Admittance	Y <sub>fs</sub>	40	-	-	mS	V <sub>DS</sub> = 3V, I <sub>D</sub> = 30mA
Diode Forward Voltage	V <sub>SD</sub>	-	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 300mA
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	-	64.3	-	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	6.1	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	4.5	-	pF	
Gate Resistance	R <sub>g</sub>	-	70	-	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	-	1.6	-	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 1A
Gate-Source Charge	Q <sub>gs</sub>	-	0.2	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	0.2	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	3.5	-	ns	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1A V <sub>GS</sub> = 10V, R <sub>G</sub> = 6Ω
Turn-On Rise Time	t <sub>r</sub>	-	2.8	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	38	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	13	-	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.

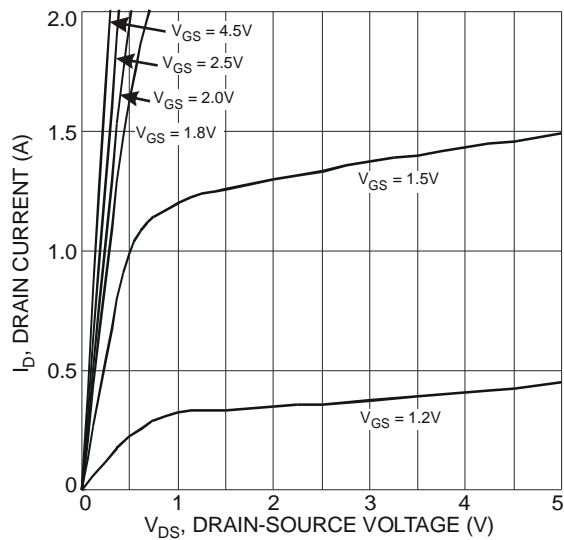


Fig. 4 Typical Output Characteristic

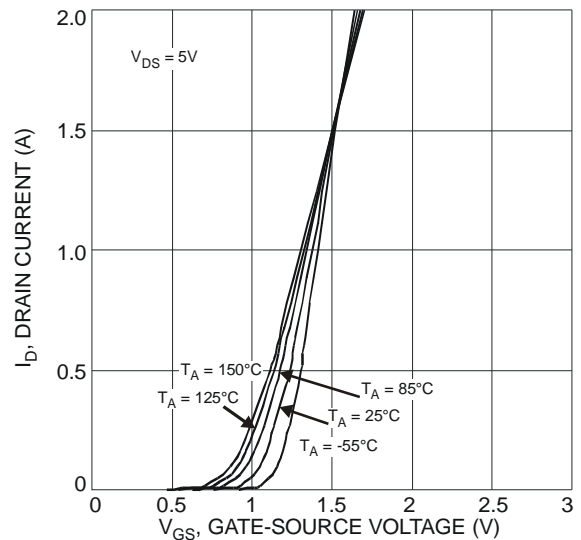


Fig. 5 Typical Transfer Characteristic

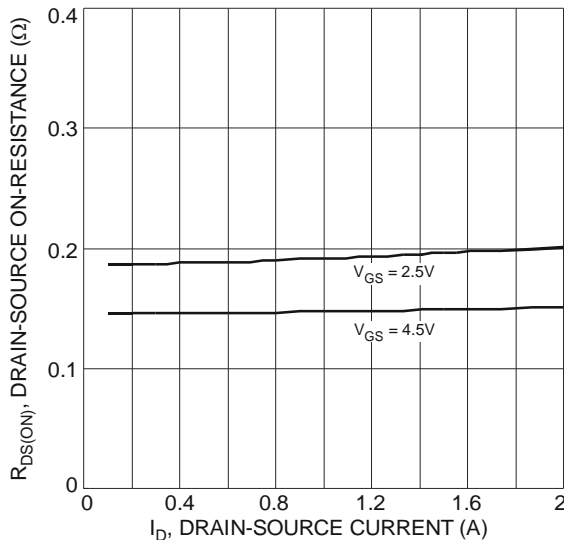


Fig. 6 Typical On-Resistance  
vs. Drain Current and Gate Voltage

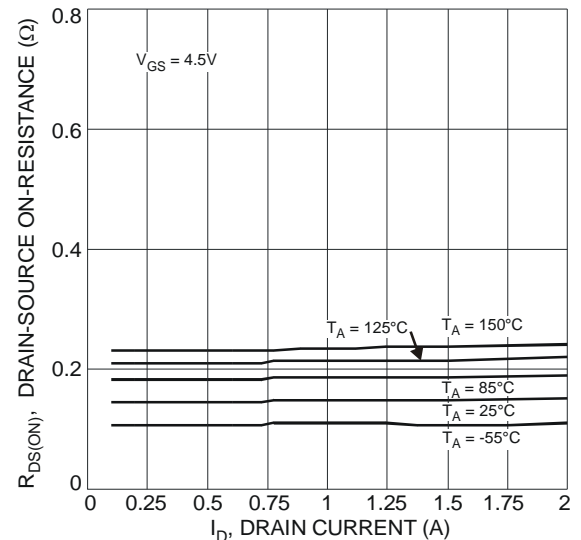


Fig. 7 Typical On-Resistance  
vs. Drain Current and Temperature

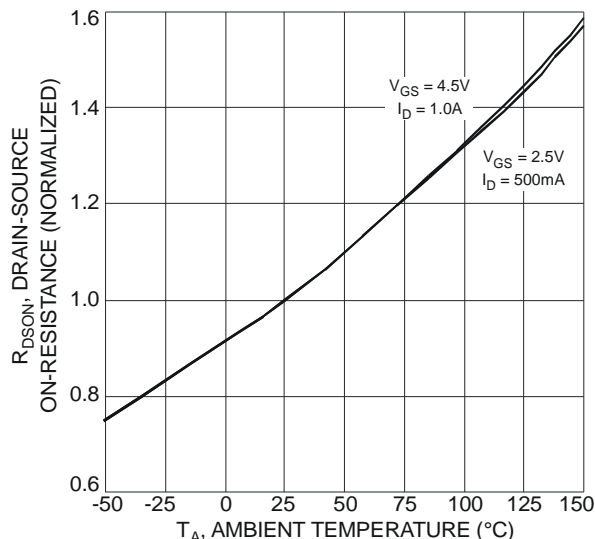


Fig. 8 On-Resistance Variation with Temperature

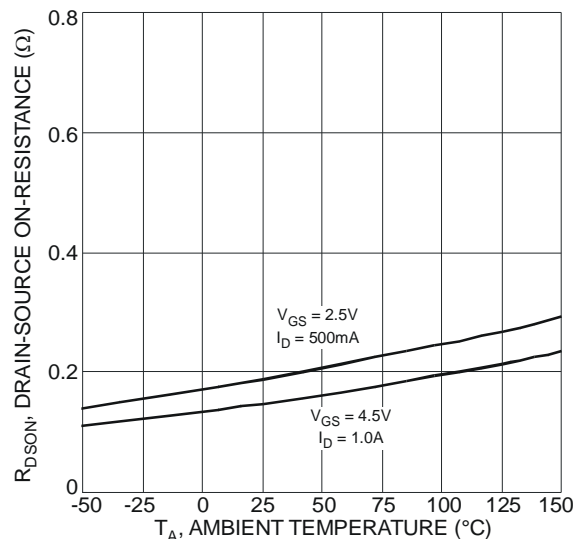


Fig. 9 On-Resistance Variation with Temperature

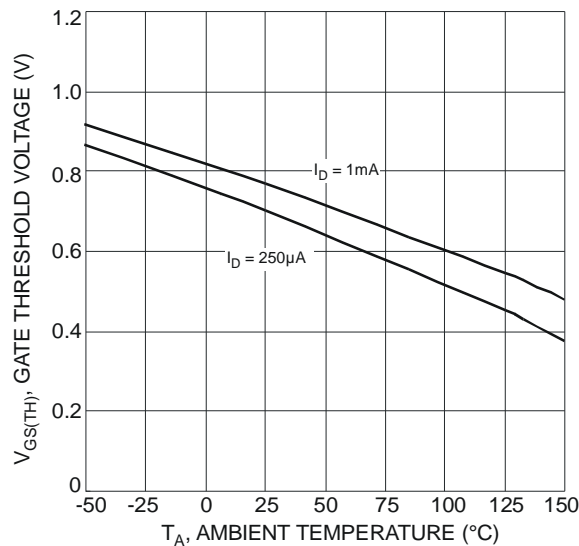


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

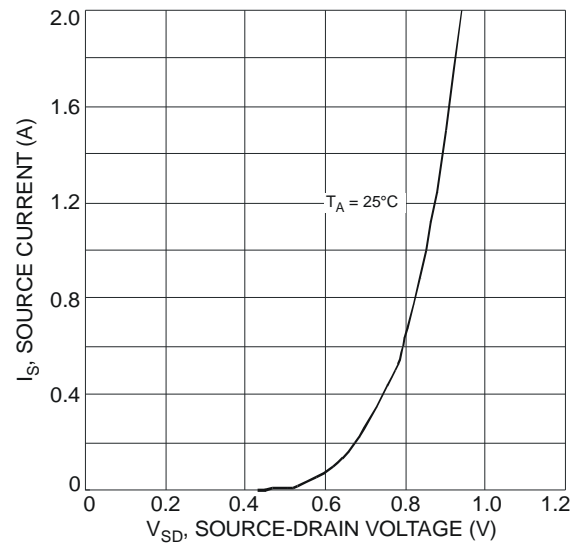


Fig. 11 Diode Forward Voltage vs. Current

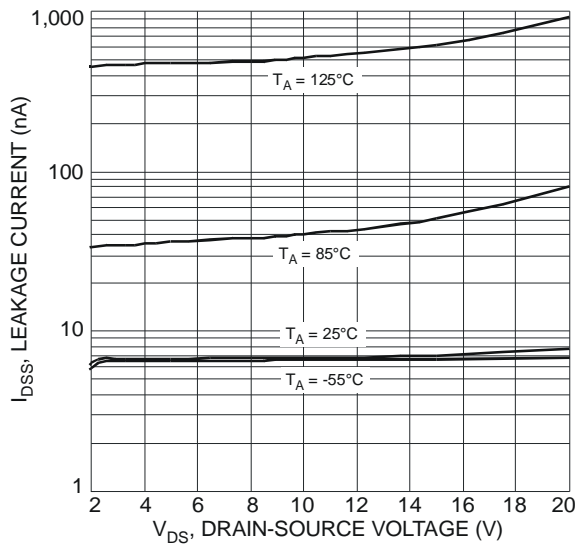


Fig. 12 Typical Leakage Current vs. Drain-Source Voltage

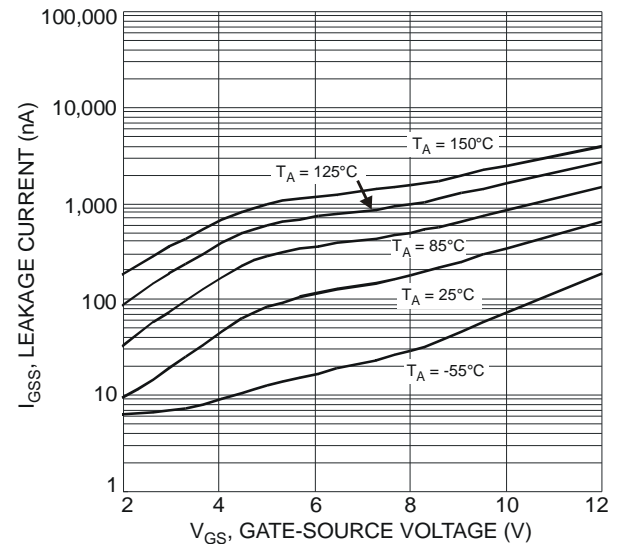


Fig. 13 Leakage Current vs. Gate-Source Voltage

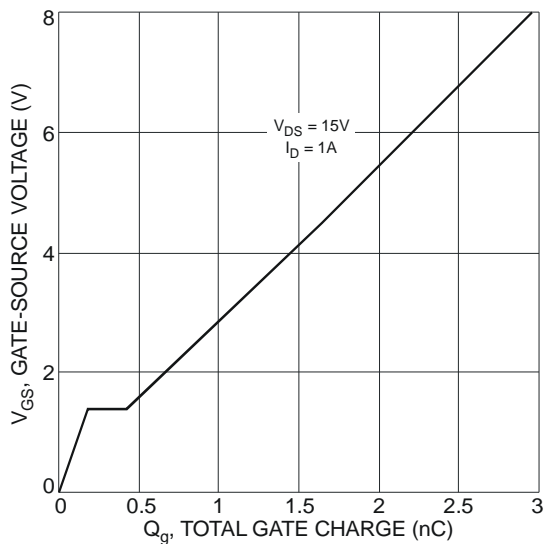
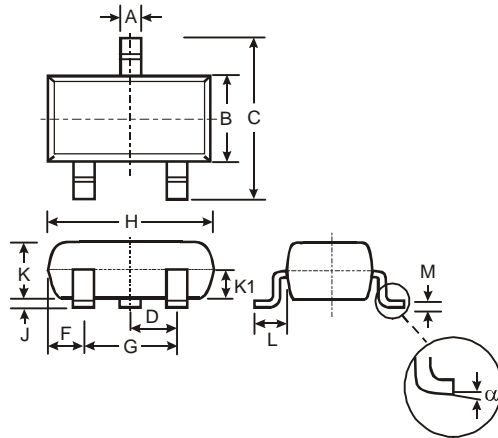


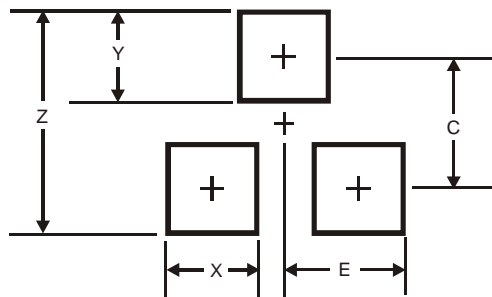
Fig. 14 Gate-Charge Characteristics

## Package Outline Dimensions



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

## Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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