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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FDD86369

N-Channel PowerTrench® MOSFET

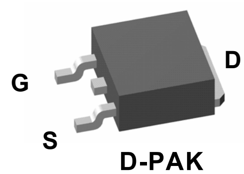
80 V, 90 A, 7.9 mΩ

Features

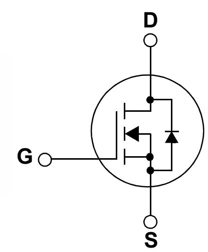
- Typical $R_{DS(on)}$ = 5.9 mΩ at V_{GS} = 10V, I_D = 80 A
- Typical $Q_{g(tot)}$ = 34 nC at V_{GS} = 10V, I_D = 80 A
- UIS Capability
- RoHS Compliant

Applications

- PowerTrain Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12V Systems



D-PAK
(TO-252)



For current package drawing, please refer to the ON website at http://www.fairchildsemi.com/package-drawings/TO/TO252A03.pdf

MOSFET Maximum Ratings T_J = 25°C unless otherwise noted.

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-to-Source Voltage		80	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Drain Current - Continuous (V_{GS}=10) (Note 1)	T_C = 25°C	90	A
	Pulsed Drain Current	T_C = 25°C	See Figure 4	
E_{AS}	Single Pulse Avalanche Energy	(Note 2)	29	mJ
P_D	Power Dissipation		150	W
	Derate Above 25°C		1.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature		-55 to + 175	°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case		1.0	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	(Note 3)	52	°C/W

Notes:
1: Current is limited by bondwire configuration.
2: Starting T_J = 25°C, L = 14µH, I_{AS} = 64A, V_{DD} = 80V during inductor charging and V_{DD} = 0V during time in avalanche.
3: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in^2 pad of 2oz copper.

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD86369	FDD86369	D-PAK(TO-252)	13"	16 mm	2500 units

Electrical Characteristics T_J = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
Off Characteristics							
B_{VDSS}	Drain-to-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V		80	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}=80V,	T_J = 25°C	-	-	1	μA
		V_{GS} = 0V	T_J = 175°C (Note 4)	-	-	1	mA
I_{GSS}	Gate-to-Source Leakage Current	V_{GS} = ±20V		-	-	±100	nA
On Characteristics							
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA		2.0	2.7	4.0	V
$R_{DS(on)}$	Drain to Source On Resistance	I_D = 80A,	T_J = 25°C	-	5.9	7.9	mΩ
		V_{GS}= 10V	T_J = 175°C (Note 4)	-	13.0	17.4	mΩ
Dynamic Characteristics							
C_{iss}	Input Capacitance	V_{DS} = 40V, V_{GS} = 0V, f = 1MHz		-	2530	-	pF
C_{oss}	Output Capacitance			-	430	-	pF
C_{rss}	Reverse Transfer Capacitance			-	16	-	pF
R_g	Gate Resistance	V_{GS} = 0.5V, f = 1MHz		-	2.2	-	Ω
$Q_{g(ToT)}$	Total Gate Charge	V_{GS} = 0 to 10V	V_{DD} = 64V, I_D = 80A	-	36	54	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0 to 2V		-	4.6	-	nC
Q_{gs}	Gate-to-Source Gate Charge			-	13	-	nC
Q_{gd}	Gate-to-Drain "Miller" Charge			-	8.5	-	nC
Switching Characteristics							
t_{on}	Turn-On Time	V_{DD} = 40V, I_D = 80A, V_{GS} = 10V, R_{GEN} = 6Ω		-	-	70	ns
$t_{d(on)}$	Turn-On Delay			-	13	-	ns
t_r	Rise Time			-	34	-	ns
$t_{d(off)}$	Turn-Off Delay			-	22	-	ns
t_f	Fall Time			-	9	-	ns
t_{off}	Turn-Off Time			-	-	46	ns
Drain-Source Diode Characteristics							
V_{SD}	Source-to-Drain Diode Voltage	I_{SD} =80A, V_{GS} = 0V		-	-	1.25	V
		I_{SD} = 40A, V_{GS} = 0V		-	-	1.2	V
t_{rr}	Reverse-Recovery Time	I_F = 80A, dI_{SD}/dt = 100A/μs		-	49	64	ns
Q_{rr}	Reverse-Recovery Charge			-	40	53	nC

Note:

4: The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production.

Typical Characteristics

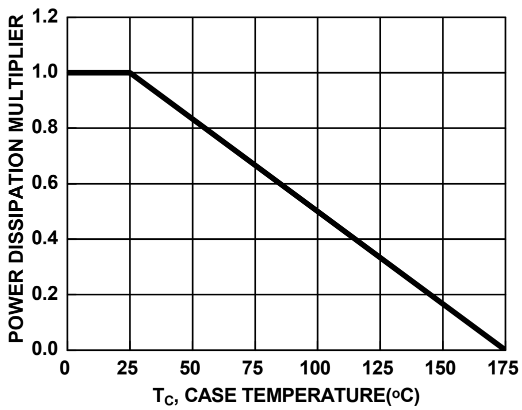


Figure 1. Normalized Power Dissipation vs. Case Temperature

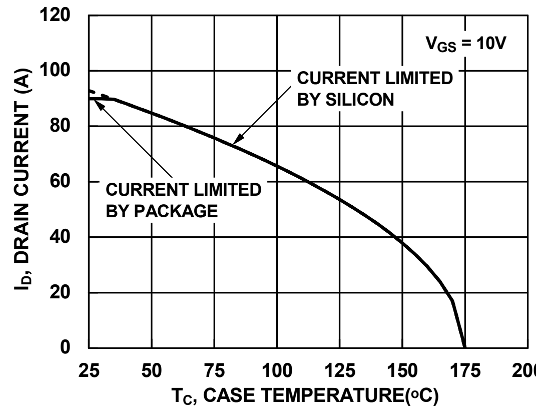


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

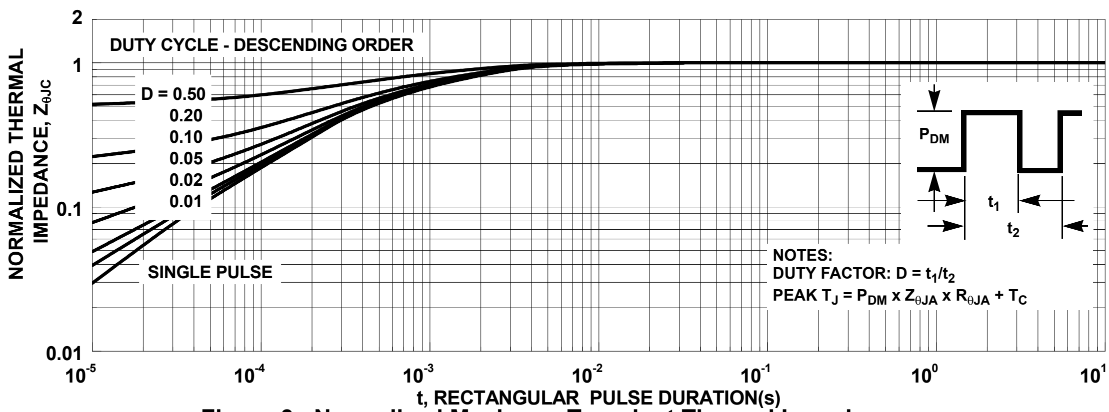


Figure 3. Normalized Maximum Transient Thermal Impedance

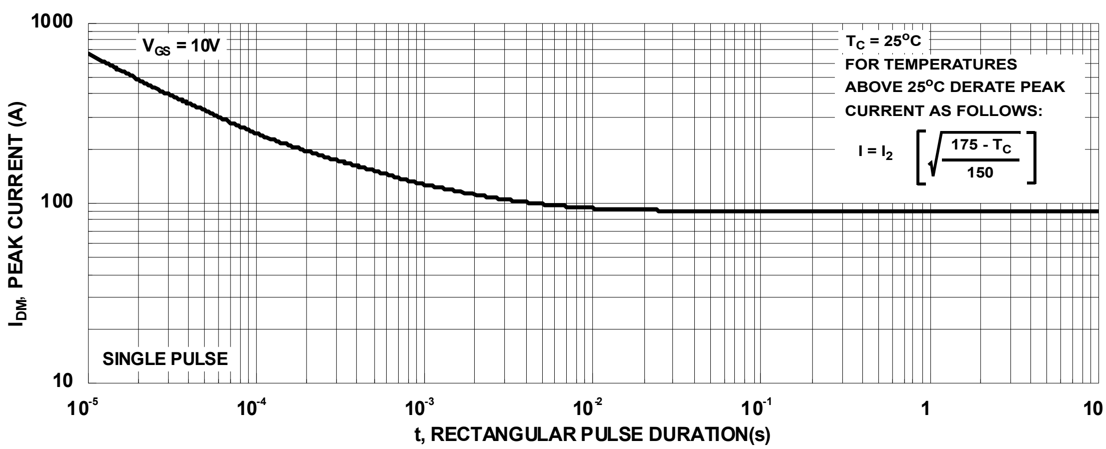


Figure 4. Peak Current Capability

Typical Characteristics

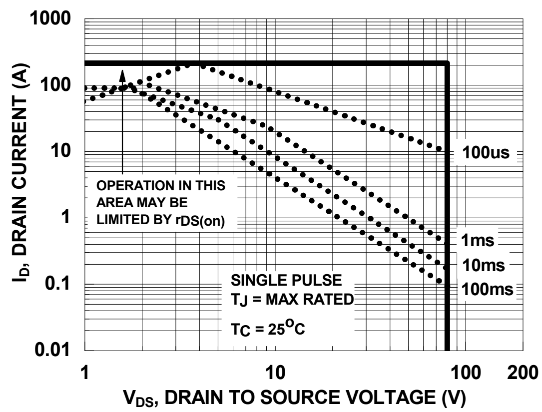
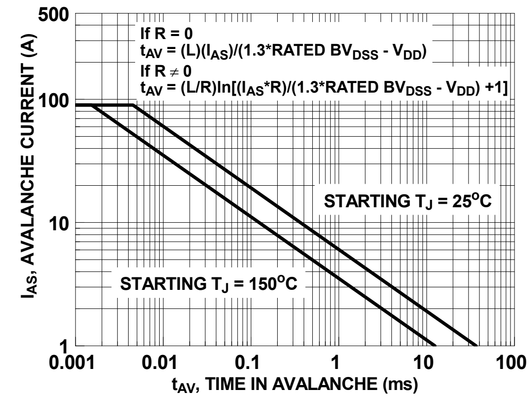


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

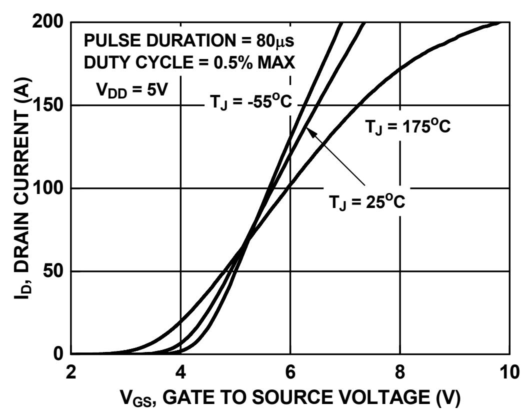


Figure 7. Transfer Characteristics

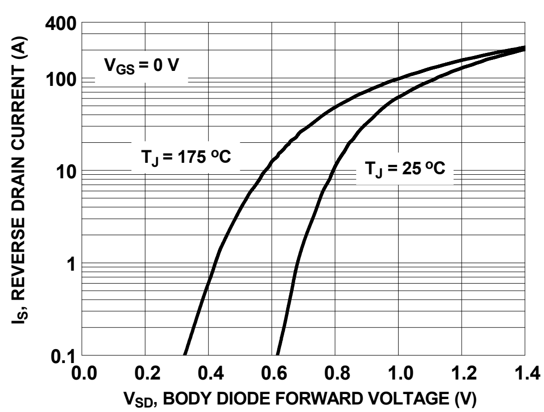


Figure 8. Forward Diode Characteristics

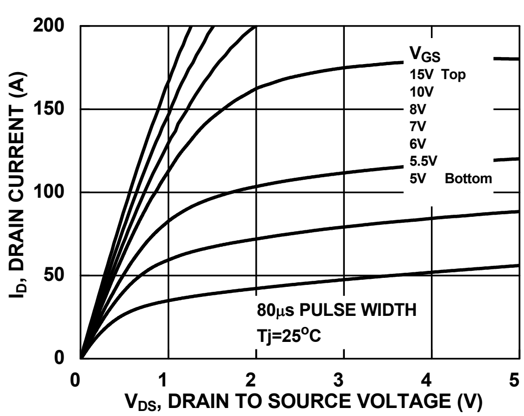


Figure 9. Saturation Characteristics

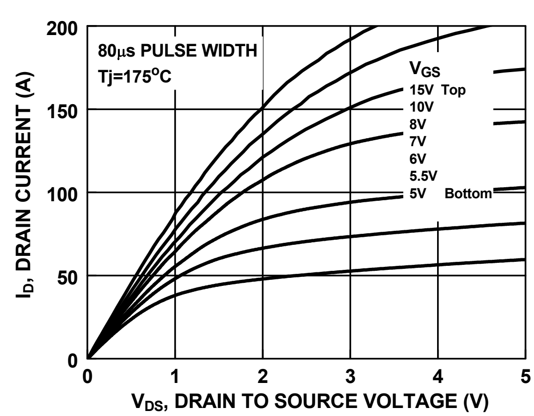


Figure 10. Saturation Characteristics

Typical Characteristics

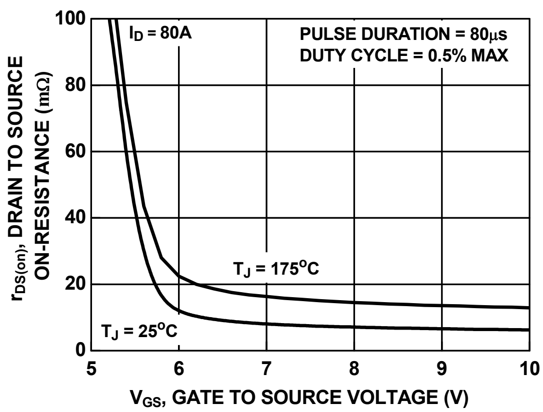


Figure 11. R_{DSON} vs. Gate Voltage

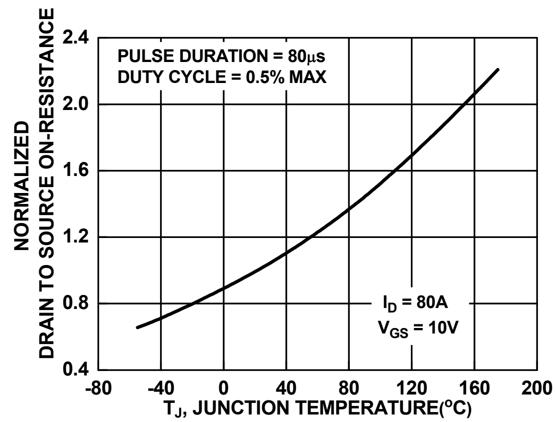


Figure 12. Normalized R_{DSON} vs. Junction Temperature

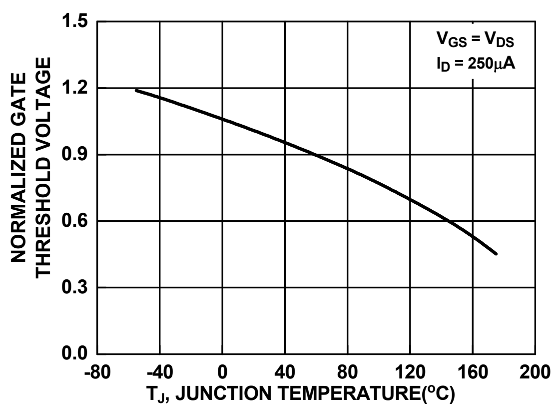


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

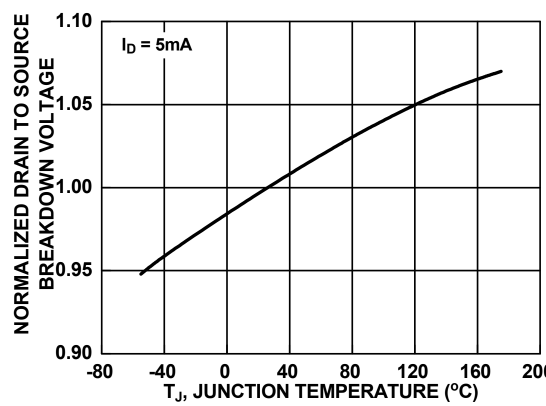


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

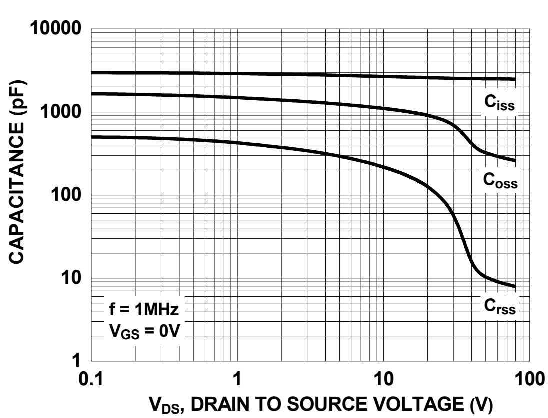


Figure 15. Capacitance vs. Drain to Source Voltage

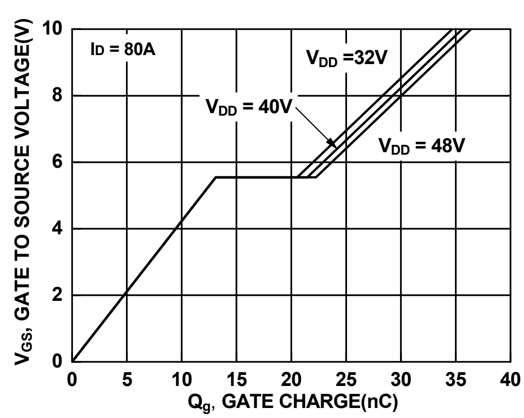
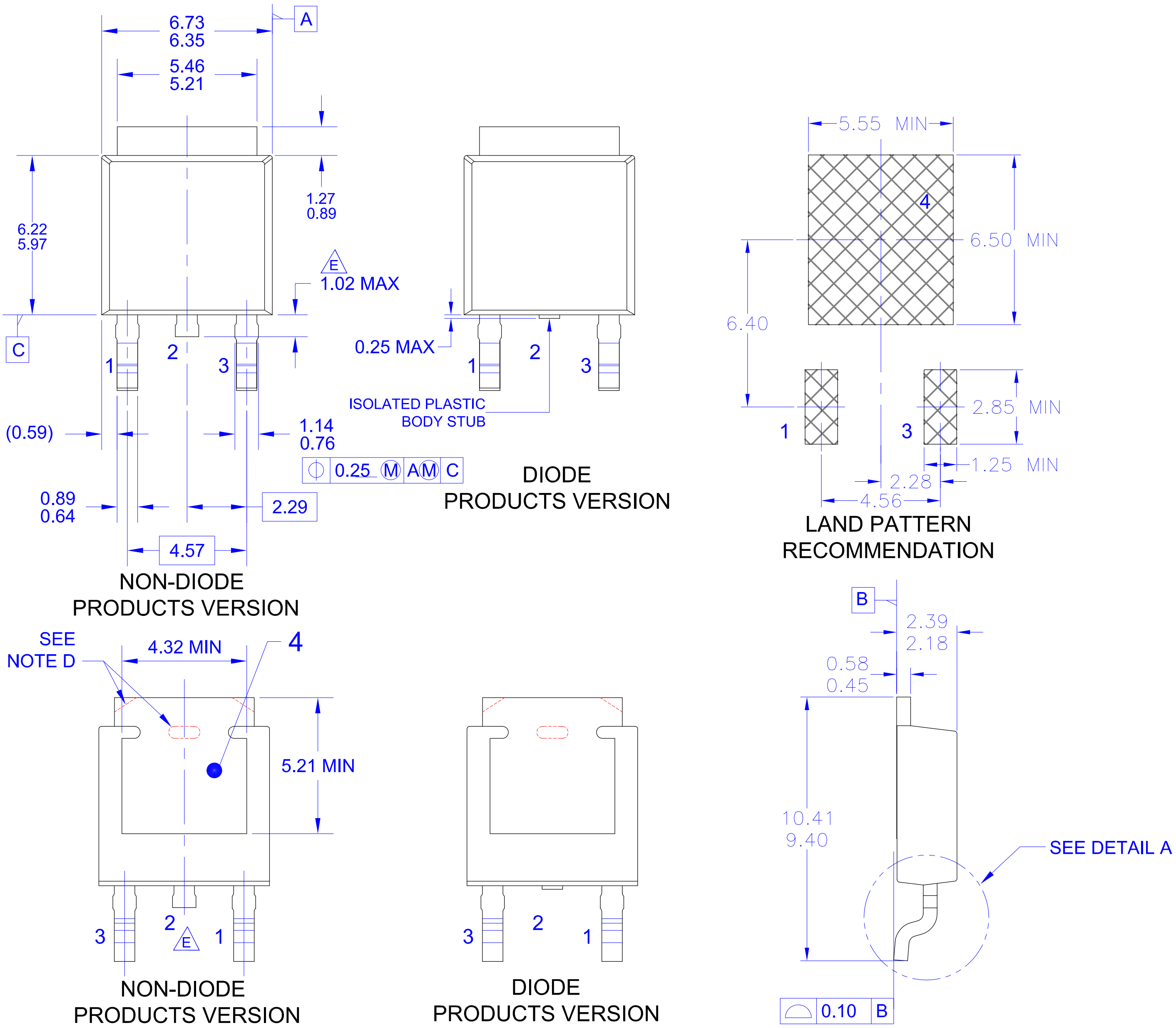
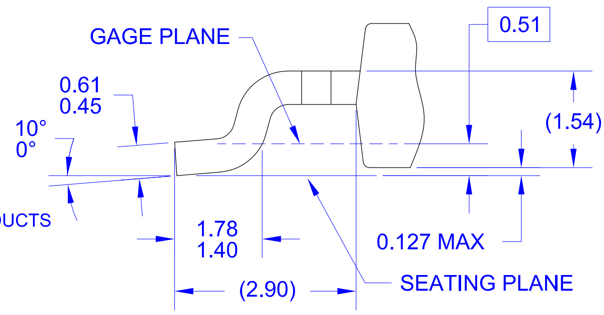


Figure 16. Gate Charge vs. Gate to Source Voltage



NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
E) TRIMMED METAL CENTER LEAD IS PRESENT ON FOR NON-DIODE PRODUCTS
F) DIMENSIONS ARE EXCLUSIVE OF BURS, MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.
H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV11



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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9