FDD9509L-F085

P-Channel PowerTrench® MOSFET

–40 V, –90 A, 7.5 mΩ

Features

- Typ $r_{DS(on)}$ = 6.0 mΩ at V_{GS} = −10 V; I_D = −70 A
- Typ $Q_{g(tot)}$ = 50 nC at V_{GS} = −10 V; I_D = −70 A
- UIS Capability
- Qualified to AEC Q101
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Automotive Engine Control
- Powertrain Management
- Solenoid and Motor Drivers
- Electrical Power Steering
- Integrated Starter/Alternator
- Distributed Power Architectures and VRM
- Primary Switch for 12 V Systems

ABSOLUTE MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

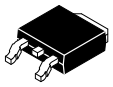
Rating	Symbol	Value	Unit
Drain to Source Voltage	V_{DSS}	−40	V
Gate to Source Voltage	V_{GS}	±16	V
Drain Current − Continuous (V_{GS} = −10 V) (T_C = 25°C) (Note 1)	I_D	−90	A
Pulsed Drain Current (T_C = 25°C)	I_D	See Figure 4	A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	82	mJ
Power Dissipation	P_D	150	W
Derate above 25°C	P_D	1.0	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	−55 to +175	°C
Thermal Resistance (Junction to Case)	$R_{\theta JC}$	1.0	°C/W
Maximum Thermal Resistance (Junction to Ambient) (Note 3)	$R_{\theta JA}$	52	°C/W

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

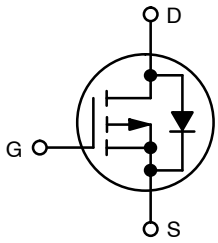
1. Current is limited by wirebond configuration
2. Starting Tj = 25°C, L = 40 μH, I_{AS} = −64 A, V_{DD} = −40 V during inductor charging and V_{DD} = 0 V during time in avalanche
3. $R_{\theta JA}$ is the sum of the junction−to−case and case−to−ambient thermal resistance where the case thermal reference 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 user's board design. The maximum rating presented here is based on mounting on a 1 in^2 pad of 2 oz copper.

ON Semiconductor®

www.onsemi.com



DPAK
TO−252
CASE 369AS



ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Reel Size	Tape Width	Quantity
FDD9509L−F085	FDD9509L	D−PAK (TO−252)	13″	12 mm	2500 Units

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = −250 μA		−40	–	–	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} = −40 V, V_{GS} = 0 V	T_J = 25°C	–	–	−1	μA
			T_J = 175°C (Note 4)	–	–	−1	mA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±16 V		–	–	±100	nA
ON CHARACTERISTICS							
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA		−1	−2	−3	V
$R_{DS(on)}$	Drain to Source On−Resistance	V_{GS} = −4.5 V, I_D = −35 A, T_J = 25°C		–	8.7	15	mΩ
		V_{GS} = −10 V, I_D = −70 A	T_J = 25°C	–	6.0	7.5	mΩ
			T_J = 175°C (Note 4)	–	10	12.6	mΩ
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	V_{DS} = −20 V, V_{GS} = 0 V, f = 1 MHz		–	3350	–	pF
C_{oss}	Output Capacitance			–	1250	–	pF
C_{rss}	Reverse Transfer Capacitance			–	42	–	pF
R_g	Gate Resistance	V_{GS} = −0.5 V, f = 1 MHz		–	22	–	Ω
$Q_{g(tot)}$	Total Gate Charge	V_{DD} = −20 V, I_D = −70 A	V_{GS} = 0 V to −10 V	–	50	75	nC
$Q_{g(-4.5)}$	Total Gate Charge		V_{GS} = 0 V to −4.5 V	–	23	–	nC
$Q_{g(th)}$	Threshold Gate Charge		V_{GS} = 0 V to −1 V	–	3.5	–	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = −20 V, I_D = −70 A		–	12	–	nC
Q_{gd}	Gate to Drain “Miller” Charge			–	6	–	nC
SWITCHING CHARACTERISTICS							
t_{on}	Turn-On Time	V_{DD} = −20 V, I_D = −80 A, V_{GS} = −10 V, R_{GEN} = 6 Ω		–	–	16	ns
$t_{d(on)}$	Turn-On Delay Time			–	8.0	–	ns
t_r	Turn-On Rise Time			–	4.0	–	ns
$t_{d(off)}$	Turn-Off Delay Time			–	190	–	ns
t_f	Turn-Off Fall Time			–	60	–	ns
t_{off}	Turn-Off Time			–	–	375	ns
DRAIN−SOURCE DIODE CHARACTERISTICS							
V_{SD}	Source to Drain Diode Voltage	V_{GS} = 0 V, I_{SD} = −70 A		–	−0.96	−1.25	V
		V_{GS} = 0 V, I_{SD} = −35 A		–	−0.88	−1.2	V
T_{rr}	Reverse Recovery Time	I_F = −70 A, dI_{SD}/dt = 100 A/μs		–	54	71	ns
Q_{rr}	Reverse Recovery Charge			–	43	57	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

TYPICAL CHARACTERISTICS

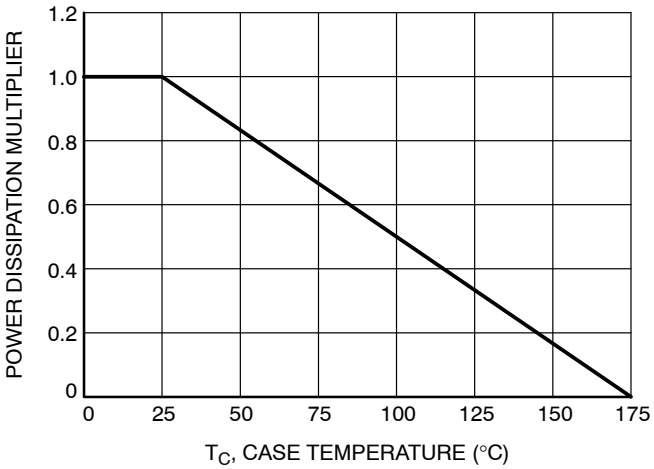


Figure 1. Normalized Power Dissipation vs. Case Temperature

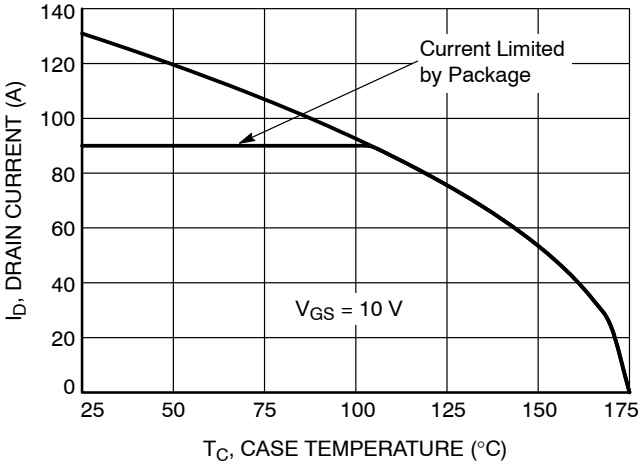


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

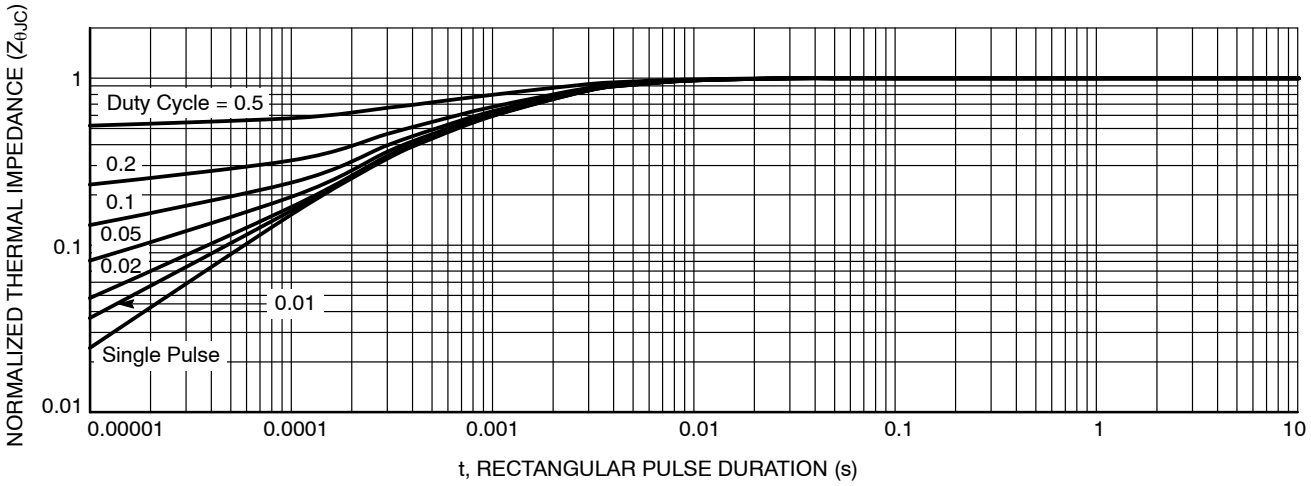


Figure 3. Normalized Maximum Transient Thermal Impedance

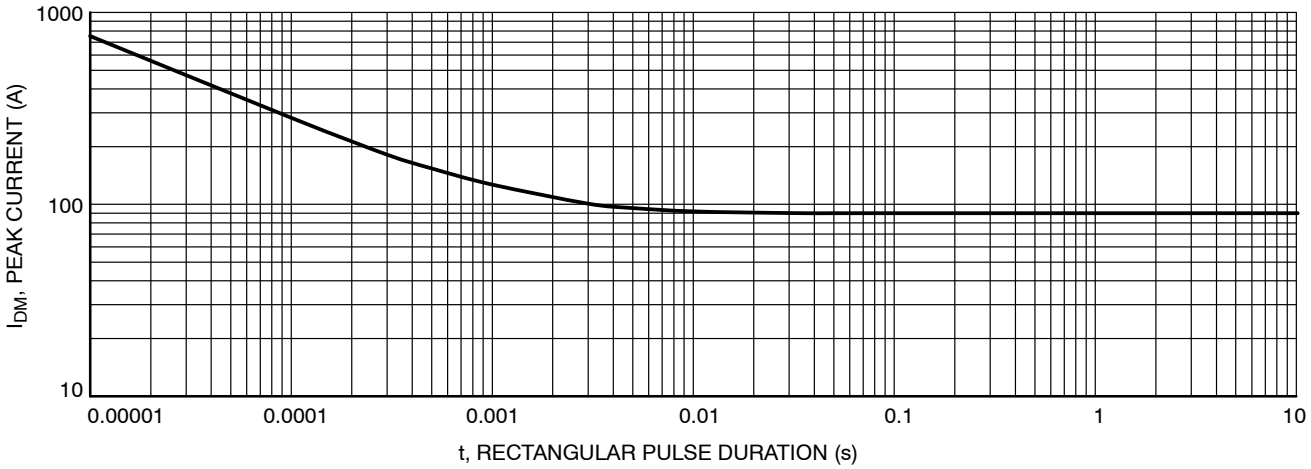


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS

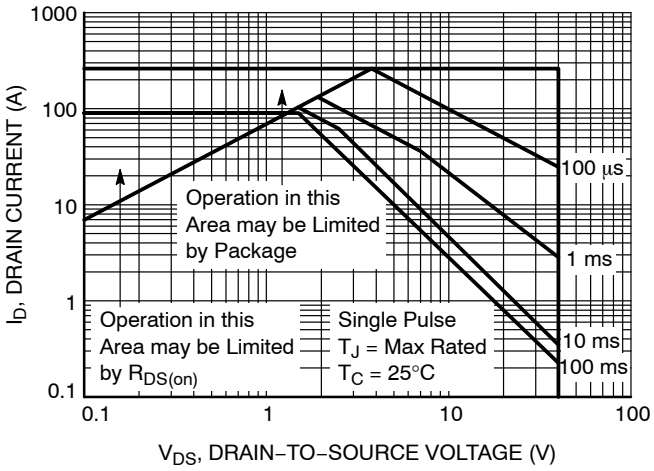


Figure 5. Forward Bias Safe Operating Area

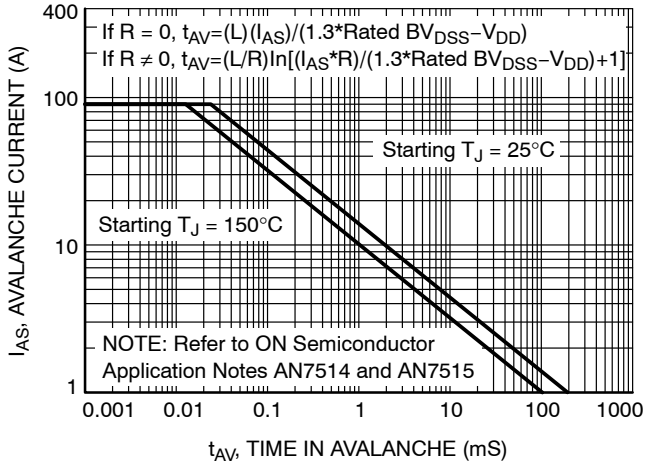


Figure 6. Unclamped Inductive Switching Capability

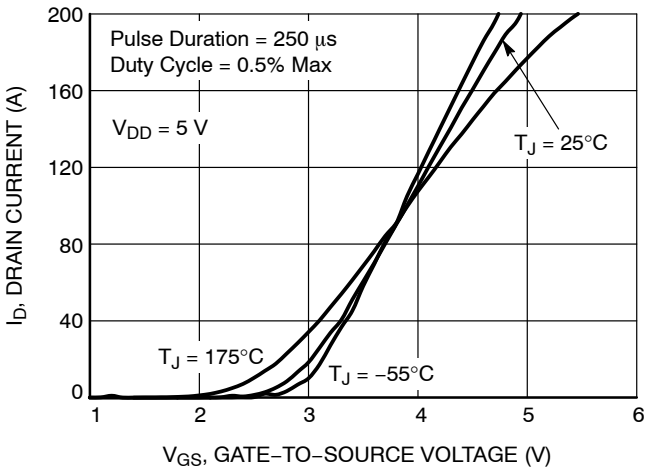


Figure 7. Transfer Characteristics

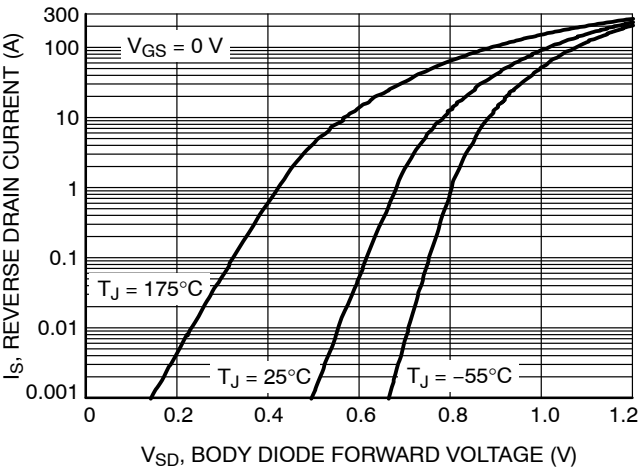


Figure 8. Forward Diode Characteristics

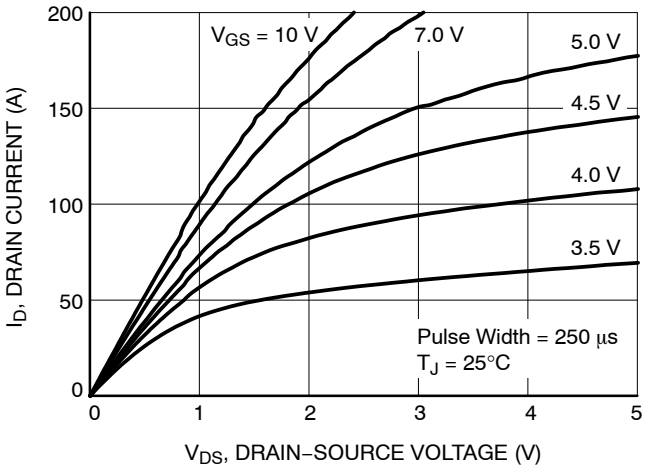


Figure 9. Saturation Characteristics

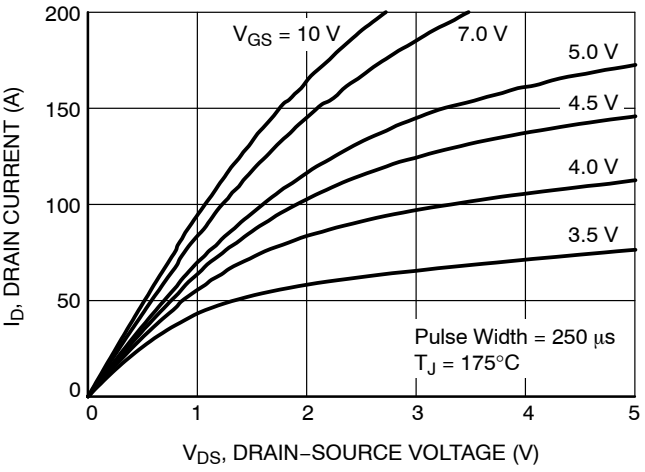


Figure 10. Saturation Characteristics

TYPICAL CHARACTERISTICS

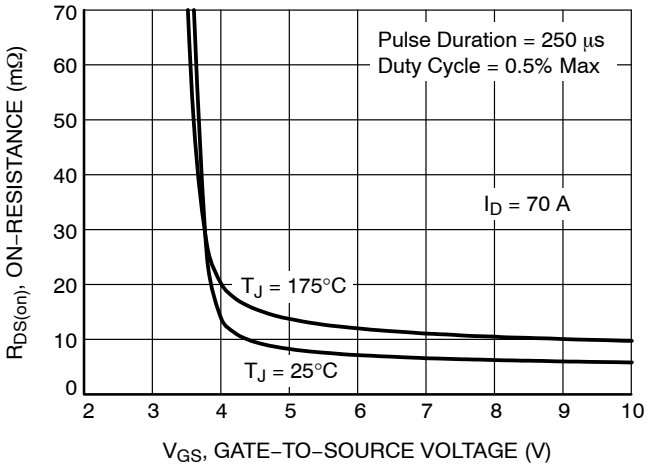


Figure 11. $R_{DS(on)}$ vs. Gate Voltage

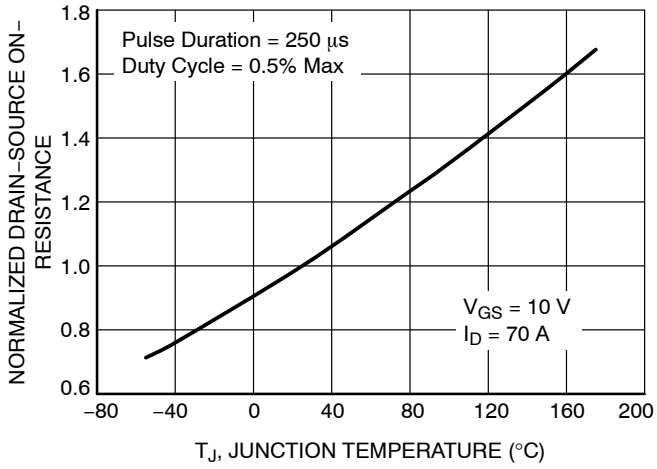


Figure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

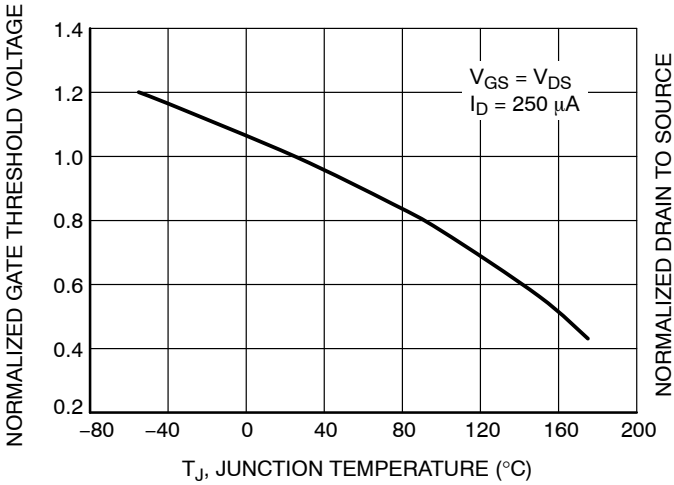


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

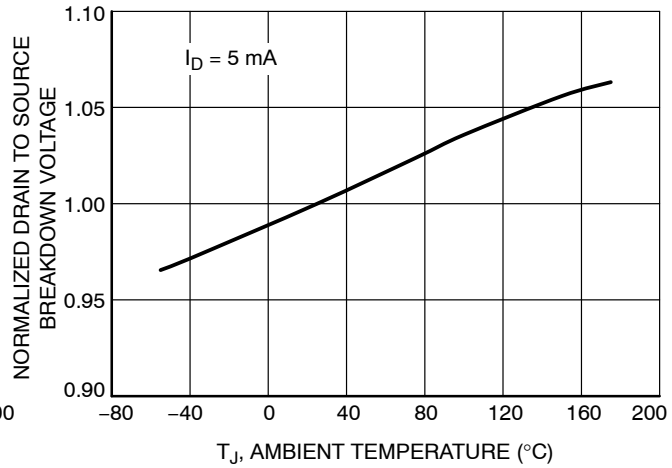


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

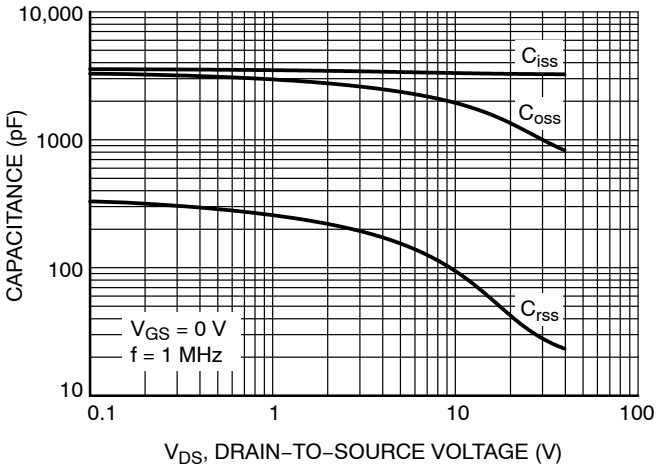


Figure 15. Capacitance vs. Drain to Source Voltage

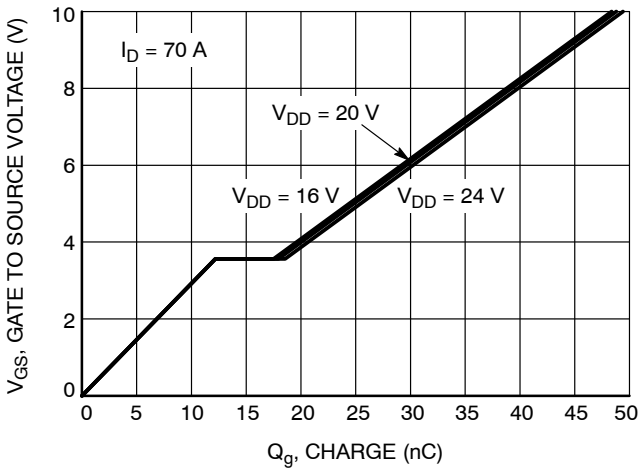
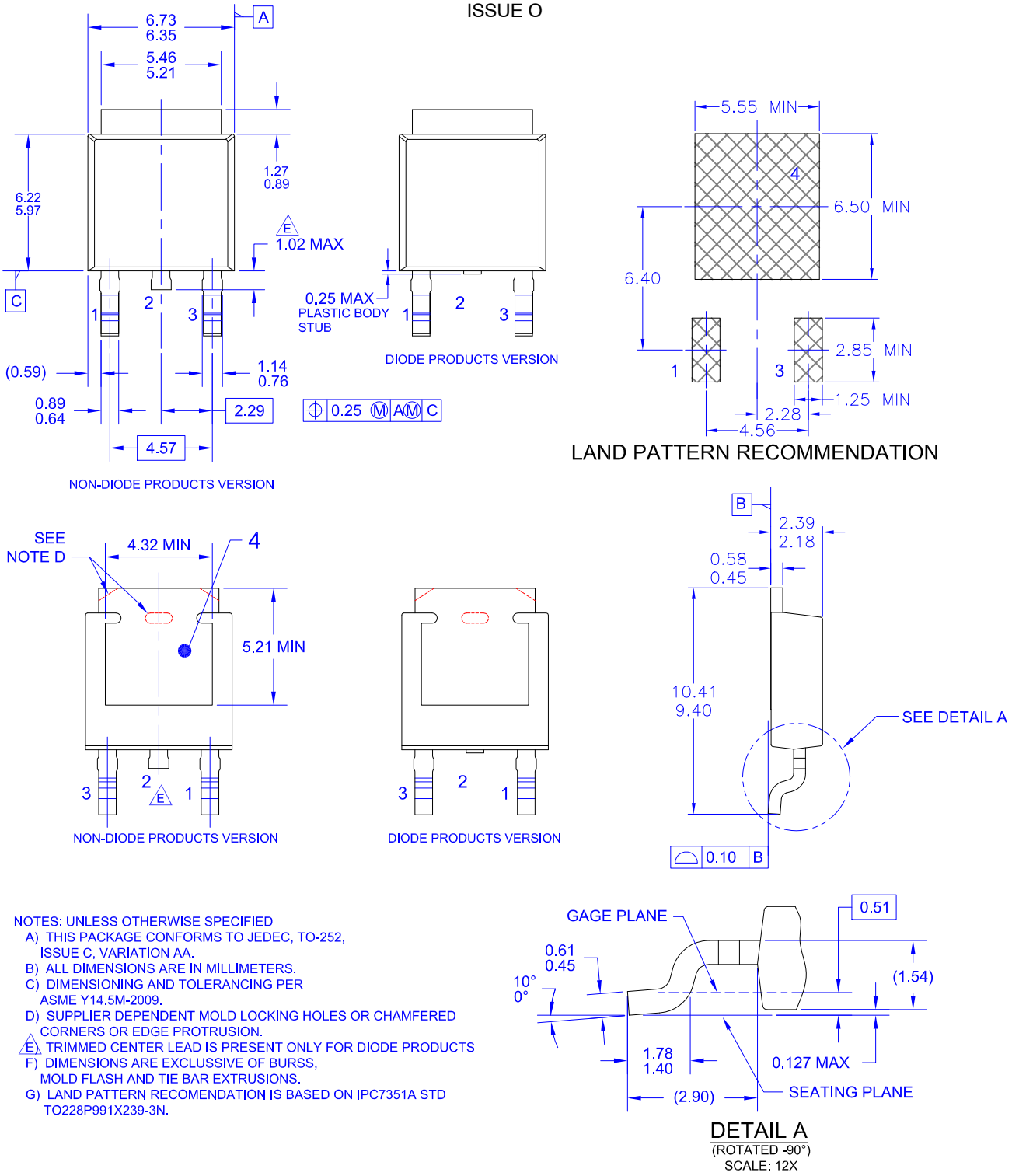


Figure 16. Gate Charge vs. Gate to Source Voltage

PACKAGE DIMENSIONS

DPAK3 (TO−252 3 LD)
CASE 369AS
ISSUE O



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 CENTER LEAD IS PRESENT ONLY FOR DIODE PRODUCTS
F) DIMENSIONS ARE EXCLUSSIVE OF BURSS, MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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