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August 2013

FDD9407 F085

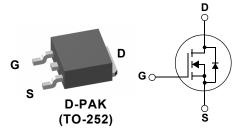
N-Channel Power Trench® MOSFET **40V**, **100A**, **2.0m** Ω

Features

- Typ $r_{DS(on)}$ = 1.6m Ω at V_{GS} = 10V, I_D = 80A
- Typ $Q_{g(tot)}$ = 86nC at V_{GS} = 10V, I_D = 80A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

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





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

Symbol	Parameter		Ratings	Units	
V_{DSS}	Drain to Source Voltage		40	V	
V_{GS}	Gate to Source Voltage		±20	V	
	Drain Current - Continuous (V _{GS} =10) (Note 1) T _C = 25°C		100	A	
ID	Pulsed Drain Current T _C = 25°C		See Figure4		
E _{AS}	Single Pulse Avalanche Energy	(Note 2)	171	mJ	
D	Power Dissipation		227	W	
P_D	Derate above 25°C		1.52	W/°C	
T _J , T _{STG}	Operating and Storage Temperature		-55 to + 175	°C	
$R_{\theta JC}$	Thermal Resistance Junction to Case		0.66	°C/W	
$R_{\theta JA}$	Maximum Thermal Resistance Junction to Ambient	(Note 3)	52	°C/W	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD9407	FDD9407_F085	D-PAK(TO-252)	13"	12mm	2500 units

- 1: Current is limited by bondwire configuration.
 2: Starting $T_J = 25^{\circ}C$, L = 0.08mH, $I_{AS} = 64$ 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 in² pad of 2oz copper.

Units

nΑ

Max

±100

Тур

Electrical Characteristics $T_J = 25^{\circ}C$ unless otherwise noted

Parameter

Gate to Source Leakage Current

Off Ch	Off Characteristics						
B _{VDSS}	Drain to Source Breakdown Voltage	I _D = 250μA, \	/ _{GS} = 0V	40	-	-	V
1	Drain to Source Leakage Current	V _{DS} =40V,	$T_{\rm J} = 25^{\rm o}{\rm C}$	-	-	1	μА
I _{DSS} Drain to Source Leakage Current	$V_{GS} = 0V$	$T_{.1} = 175^{\circ}C(Note 4)$	-	-	1	mA	

 $V_{GS} = \pm 20V$

Test Conditions

Min

On Characteristics

Symbol

 I_{GSS}

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$		2.0	3.1	4.0	V
-	r _{DS(on)} Drain to Source On Resistance	I _D = 80A,	$T_J = 25^{\circ}C$	-	1.6	2	mΩ
DS(on)		V _{GS} = 10V	$T_J = 175^{\circ}C(Note 4)$	-	2.64	3.22	mΩ

Dynamic Characteristics

C _{iss}	Input Capacitance), OE),),	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		6390	-	pF
C _{oss}	Output Capacitance				1580	-	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1101112			95	-	pF
R_g	Gate Resistance	f = 1MHz	f = 1MHz		2.3	-	Ω
$Q_{g(ToT)}$	Total Gate Charge at 10V	V _{GS} = 0 to 10V	V _{DD} = 32V	-	86	112	nC
$Q_{g(th)}$	Threshold Gate Charge	V _{GS} = 0 to 2V	100 0=1		12	15.6	nC
Q_{gs}	Gate to Source Gate Charge				30	-	nC
Q_{ad}	Gate to Drain "Miller" Charge			-	15	-	nC

Switching Characteristics

t _{on}	Turn-On Time		-	-	120	ns
t _{d(on)}	Turn-On Delay Time		-	27	-	ns
t _r	Rise Time	V _{DD} = 20V, I _D = 80A,	-	48	-	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 10V, R_{GEN} = 6Ω	-	42	-	ns
t _f	Fall Time		-	18	-	ns
t _{off}	Turn-Off Time		-	-	97	ns

Drain-Source Diode Characteristics

V _{SD} Source to Drain Diode Voltage	I_{SD} = 80A, V_{GS} = 0V	-	-	1.25	V	
V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 40A, V_{GS} = 0V$	-	-	1.2	V
T _{rr}	Reverse Recovery Time	$I_F = 80A$, $dI_{SD}/dt = 100A/\mu s$,	-	58	88	ns
Q _{rr}	Reverse Recovery Charge	V _{DD} =32V	-	83	143	nC

Notes

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

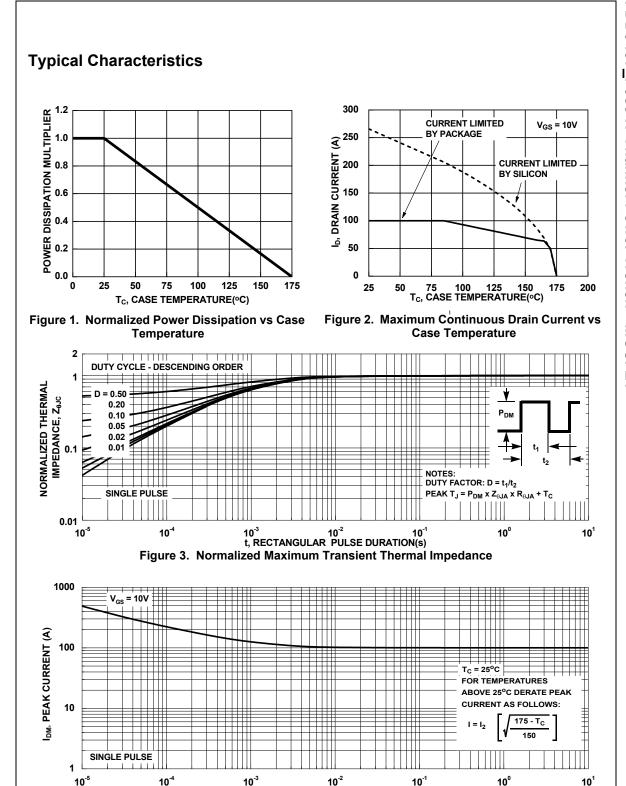


Figure 4. Peak Current Capability

t, RECTANGULAR PULSE DURATION(s)

Typical Characteristics

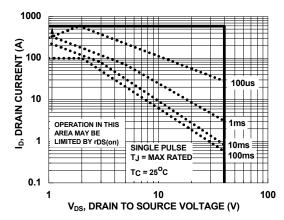
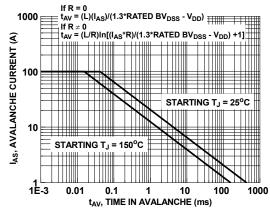


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching

Capability

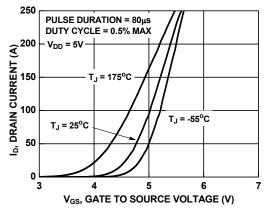


Figure 7. Transfer Characteristics

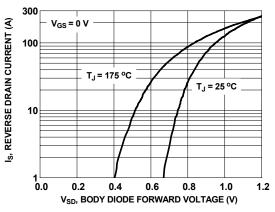


Figure 8. Forward Diode Characteristics

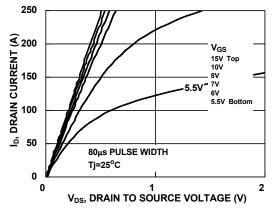


Figure 9. Saturation Characteristics

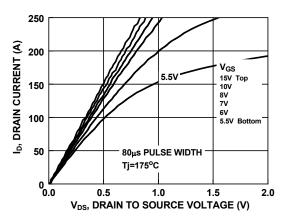


Figure 10. Saturation Characteristics

Typical Characteristics

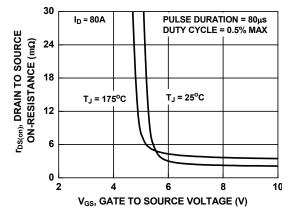


Figure 11. Rdson vs Gate Voltage

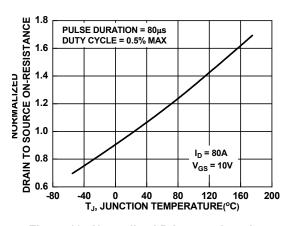


Figure 12. Normalized Rdson vs Junction Temperature

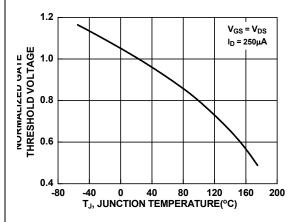


Figure 13. Normalized Gate Threshold Voltage vs Temperature

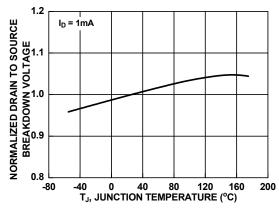


Figure 14. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

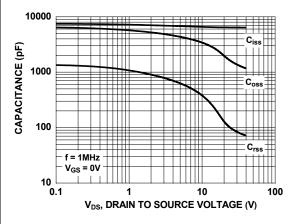


Figure 15. Capacitance vs Drain to Source Voltage

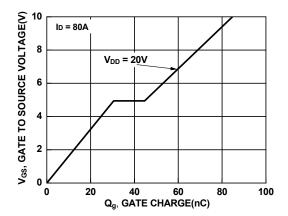


Figure 16. Gate Charge vs Gate to Source Voltage





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