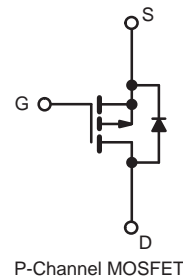
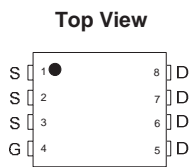
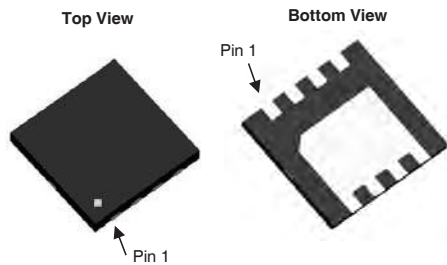


P-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
- 60	0.024 at $V_{GS} = - 10$ V	- 32 ^d	29 nC
	0.029 at $V_{GS} = - 4.5$ V	- 29 ^d	

DFN 3x3 EP



FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

- Battery, Load and Adaptor Switches
 - Notebook Computers
 - Notebook Battery Packs


RoHS
 COMPLIANT

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	- 32 ^d	A
	$T_C = 70$ °C	- 26 ^d	
	$T_A = 25$ °C	- 7.9 ^{a, b}	
	$T_A = 70$ °C	- 4.5 ^{a, b}	
Pulsed Drain Current ($t = 100$ μ s)	I_{DM}	- 125	A
Continuous Source-Drain Diode Current	$T_C = 25$ °C	- 30 ^d	
	$T_A = 25$ °C	- 1.5 ^{a, b}	
Avalanche Current	$L = 0.1$ mH	- 30	mJ
Single-Pulse Avalanche Energy	E_{AS}	35	
Maximum Power Dissipation	$T_C = 25$ °C	26.3	W
	$T_C = 70$ °C	16.8	
	$T_A = 25$ °C	4.4 ^{a, b}	
	$T_A = 70$ °C	2.8 ^{a, b}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, c}	R_{thJA}	23	30	°C/W
Maximum Junction-to-Case	R_{thJC}	5.1	8.5	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

 b. $t = 10$ s.

c. Maximum under steady state conditions is 70 °C/W.

d. Package limited.

e. The DFN3X3 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

f. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

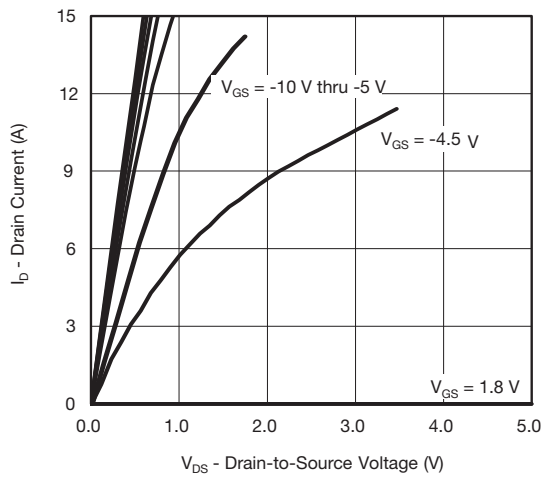
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0, I _D = - 250 μA	- 60			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 20		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			3.6		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 48 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 48 V, V _{GS} = 0 V, T _J = 55 °C			- 5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ - 10 V, V _{GS} = - 10 V	- 32			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 5 A		0.024	0.033	Ω
		V _{GS} = - 4.5 V, I _D = - 5 A		0.029	0.040	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 5 A		25		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 30 V, V _{GS} = 0 V, f = 1 MHz		5550		pF
Output Capacitance	C _{oss}			1390		
Reverse Transfer Capacitance	C _{rss}			436		
Total Gate Charge	Q _g	V _{DS} = - 30 V, V _{GS} = - 10 V, I _D = - 5 A		29		nC
Gate-Source Charge	Q _{gs}	V _{DS} = - 30 V, V _{GS} = - 4.5 V, I _D = - 5 A		18.3		
Gate-Drain Charge	Q _{gd}			10.1		
				33.2		
Gate Resistance	R _g	f = 1 MHz		1.5		Ω
Turn-On Delay Time	t _{d(on)}	V _{DS} = - 30 V, R _L = 3.5 Ω I _D ≅ - 5 A, V _{GEN} = - 10 V, R _g = 1 Ω		25		ns
Rise Time	t _r			13		
Turn-Off DelayTime	t _{d(off)}			29		
Fall Time	t _f			11		
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 30 V, R _L = 3.5 Ω I _D ≅ - 5 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		28		
Rise Time	t _r			30		
Turn-Off DelayTime	t _{d(off)}			22		
Fall Time	t _f			19		
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			- 32	A
Pulse Diode Forward Current (100 μs)	I _{SM}				- 125	
Body Diode Voltage	V _{SD}	I _S = - 3 A, V _{GS} = 0		- 0.7	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 5 A, dI/dt = 100 A/μs, T _J = 25 °C		29		ns
Body Diode Reverse Recovery Charge	Q _{rr}			53		nC
Reverse Recovery Fall Time	t _a			11		ns
Reverse Recovery Rise Time	t _b			15		

Notes:

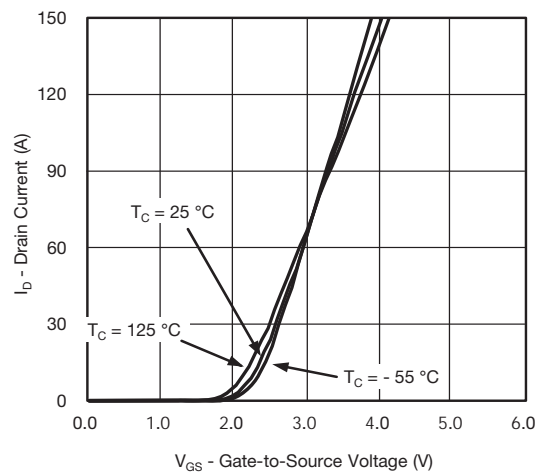
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

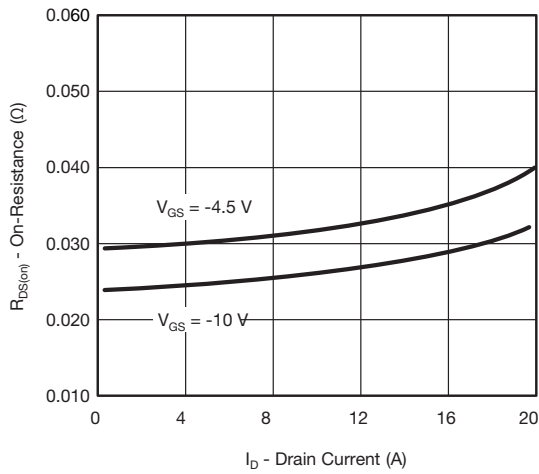
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



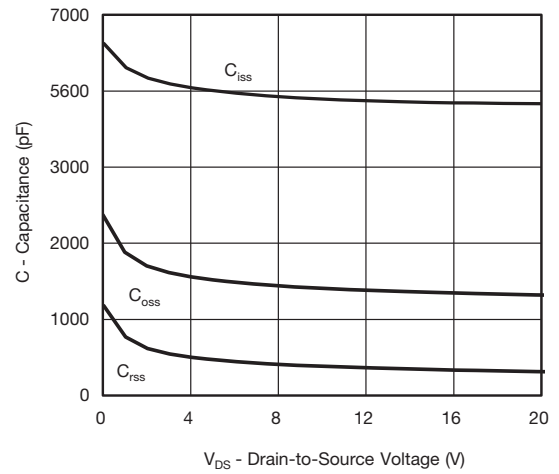
Output Characteristics



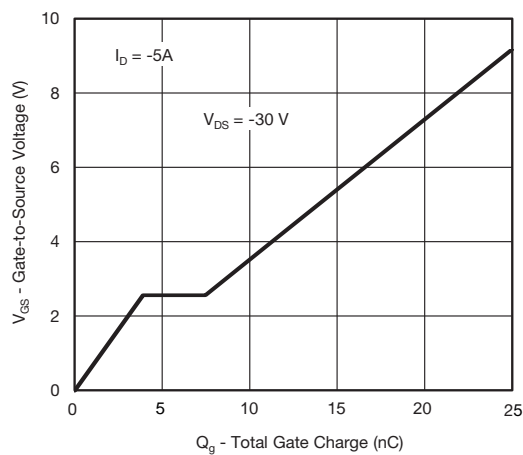
Transfer Characteristics



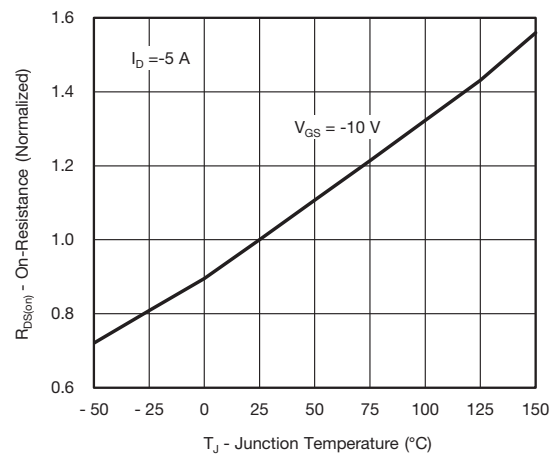
On-Resistance vs. Drain Current



Capacitance

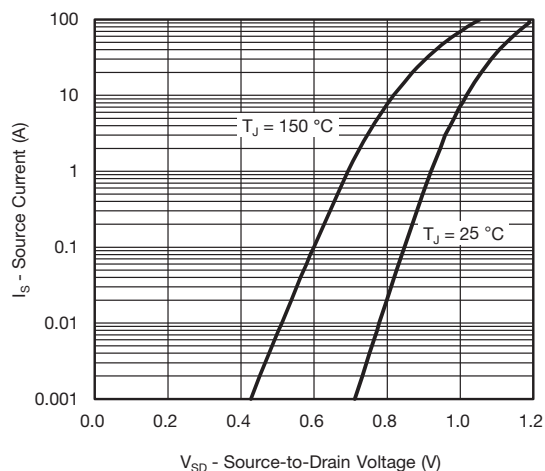


Gate Charge

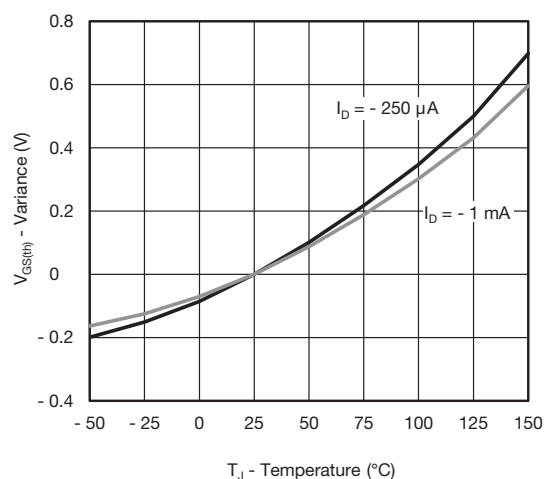


On-Resistance vs. Junction Temperature

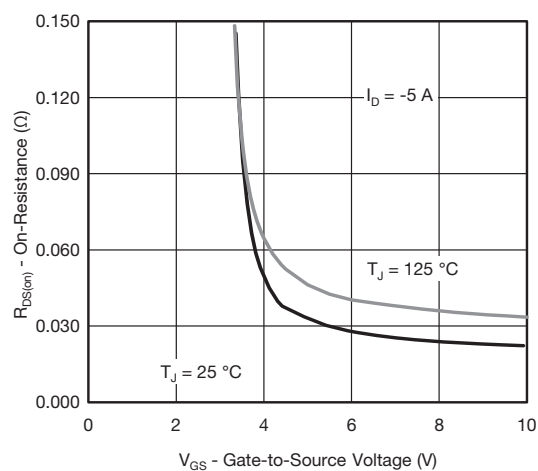
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



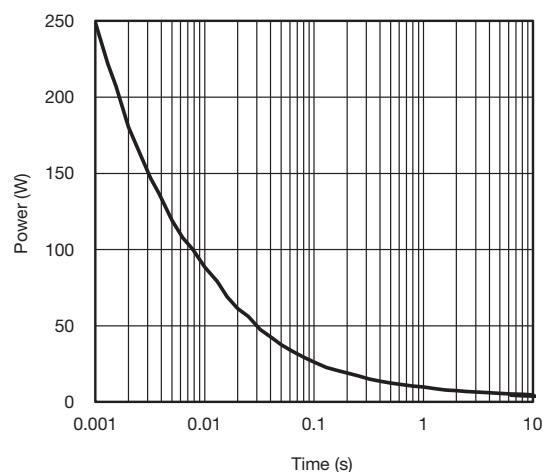
Source-Drain Diode Forward Voltage



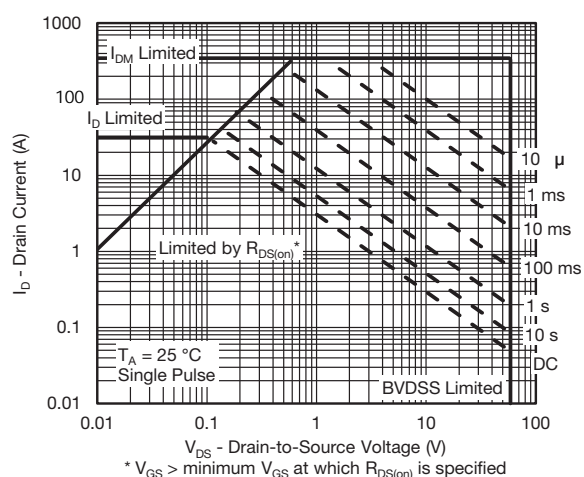
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



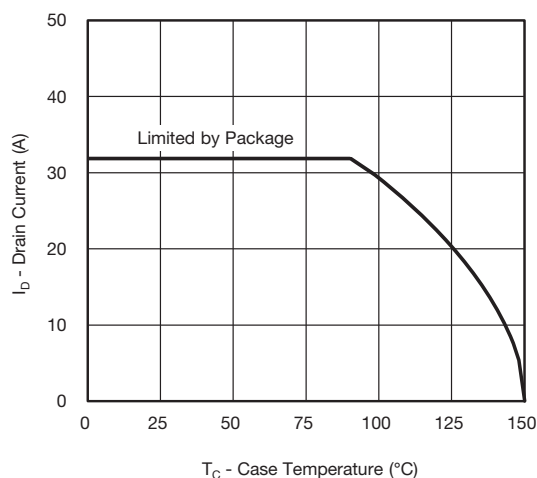
Single Pulse Power, Junction-to-Ambient



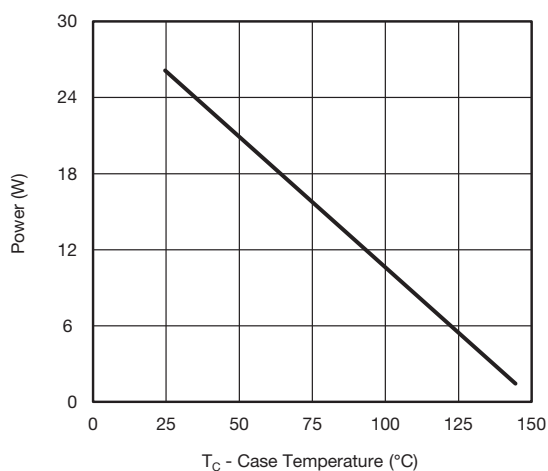
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

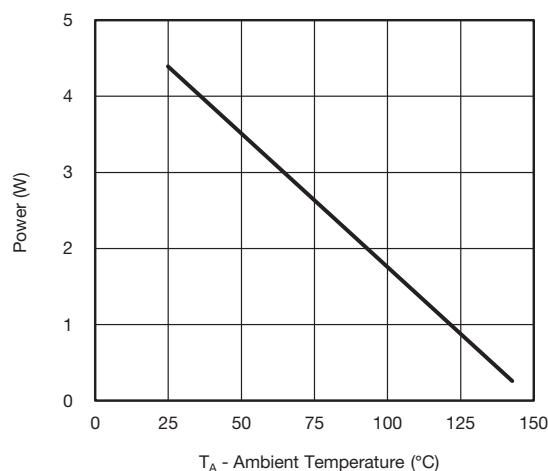
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



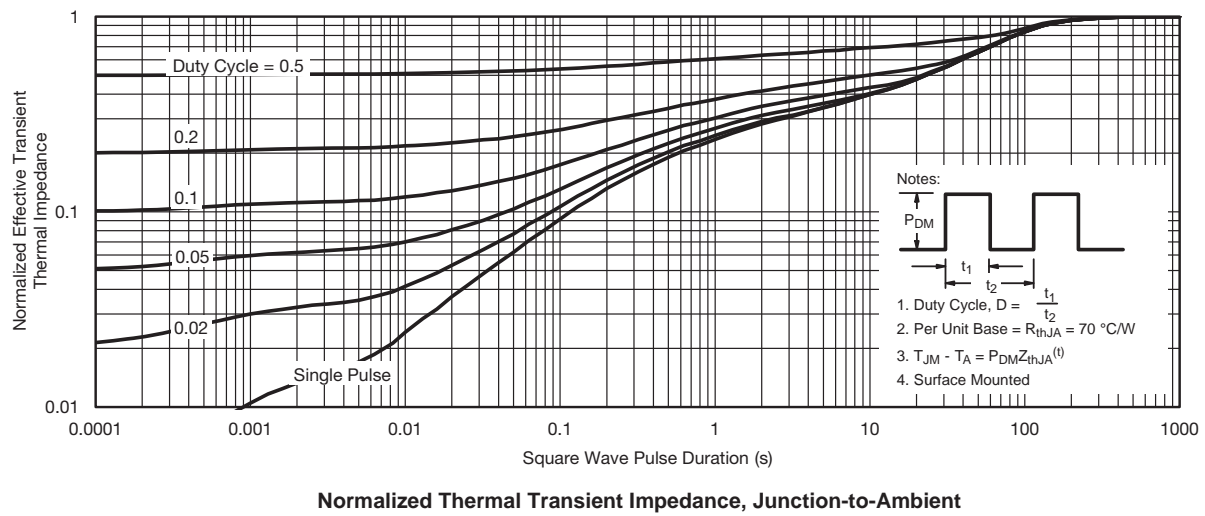
Power, Junction-to-Case



Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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