

Dual N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (m Ω)(Typ.)	I_D (A)	Q_g (Typ.)
60	11 at $V_{GS} = 10$ V	25	14 nC
	15 at $V_{GS} = 4.5$ V	20	

FEATURES

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

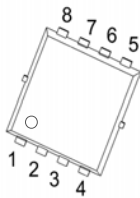
APPLICATIONS

- Power Management
- DC/DC Conversion
- Load Switching
- Motor Driving

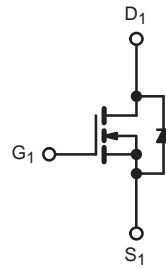
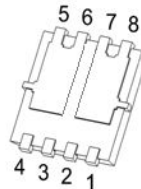

RoHS
 COMPLIANT

PDFN 3.3x3.3

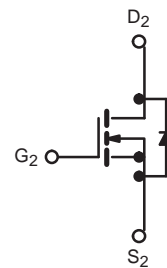
Top View



Bottom View



N-Channel MOSFET



N-Channel MOSFET

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	I_D	25	A
	$T_C = 70$ °C		17	
	$T_A = 25$ °C		5.3 b, c	
	$T_A = 70$ °C		1.9 b, c	
Pulsed drain current ($t = 100$ μ s)		I_{DM}	100	
Continuous source current (MOSFET diode conduction)	$T_C = 25$ °C	I_S	25	
	$T_A = 25$ °C		5.3 b, c	
Single pulse avalanche current	$L = 0.1$ mH	I_{AS}	23	mJ
Single pulse avalanche energy		E_{AS}	29	
Maximum power dissipation	$T_C = 25$ °C	P_D	18	W
	$T_C = 70$ °C		11.5	
	$T_A = 25$ °C		3.6 b, c	
	$T_A = 70$ °C		2.3 b, c	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature)			260	

THERMAL RESISTANCE RATINGS

		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	33	55	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	6	10	

Notes

- $T_C = 25$ °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- Maximum under steady state conditions is 69 °C/W

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

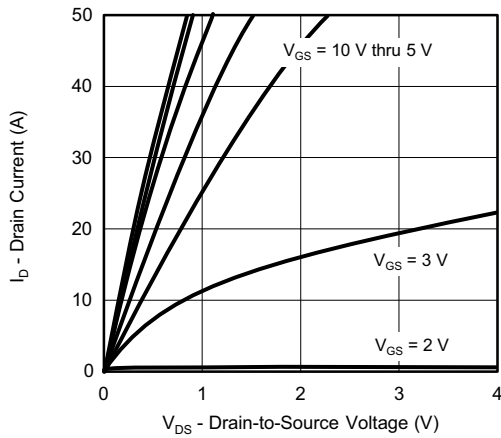
PARAMETER	CHANNEL-1 AND CHANNEL-2					
	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	60	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1	-	3	
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = 60 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} ≥ 5 V, V _{GS} = 10 V	25	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A	-	11	14	mΩ
		V _{GS} = 4.5 V, I _D = 15 A	-	15	20	
Forward transconductance ^a	g _{fs}	V _{DS} = 5 V, I _D = 20 A	-	86	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = 30 V, V _{GS} = 0 V, f = 1 MHz	-	758	-	pF
Output capacitance	C _{oss}		-	202	-	
Reverse transfer capacitance	C _{rss}		-	20	-	
Total gate charge	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 20 A	-	14	-	nC
Gate-source charge	Q _{gs}		-	2.4	-	
Gate-drain charge	Q _{gd}		-	0.67	-	
Gate resistance	R _g	f = 1 MHz	-	1.6	-	Ω
Turn-on delay time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.2 Ω, I _D ≅ 20 A, V _{GEN} = 10 V, R _g = 1 Ω	-	5	-	ns
Rise time	t _r		-	6	-	
Turn-off delay time	t _{d(off)}		-	18	-	
Fall time	t _f		-	8	-	
Drain-source Body Diode Characteristics						
Continuous source-drain diode current	I _S	T _C = 25°C	-	-	25	A
Pulse diode forward current	I _{SM}		-	-	100	
Body diode voltage	V _{SD}	I _S = 1 A, V _{GS} = 0 V	-	0.7	1.0	V
Body diode reverse recovery time	t _{rr}	I _F = 20 A, di/dt = 100 A/μs, T _J = 25 °C	-	20	-	ns
Body diode reverse recovery charge	Q _{rr}		-	10	-	nC
Reverse recovery fall time	t _a		-	8	-	ns
Reverse recovery rise time	t _b		-	7	-	

Notes

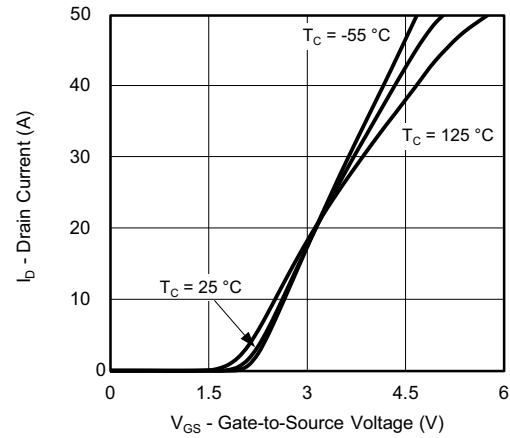
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
 b. Guaranteed by design, not subject to production testing

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.

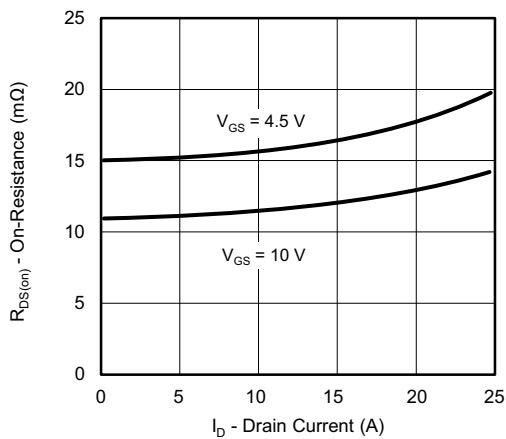
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



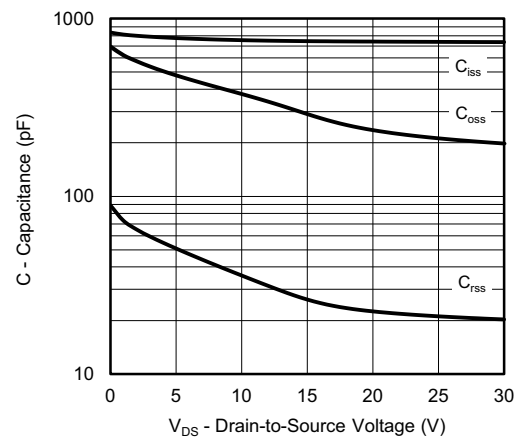
Output Characteristics



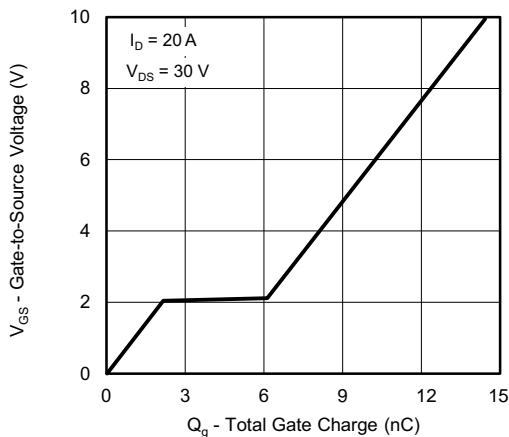
Transfer Characteristics



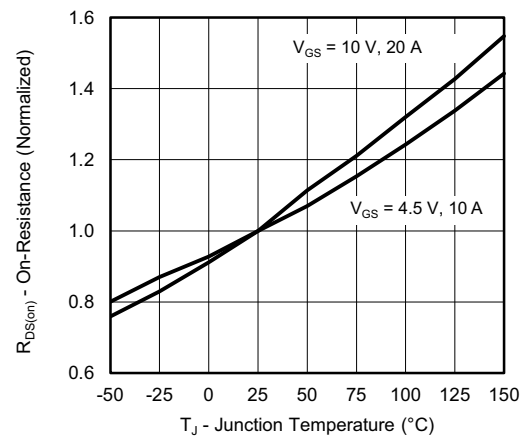
On-Resistance vs. Drain Current and Gate



Capacitance

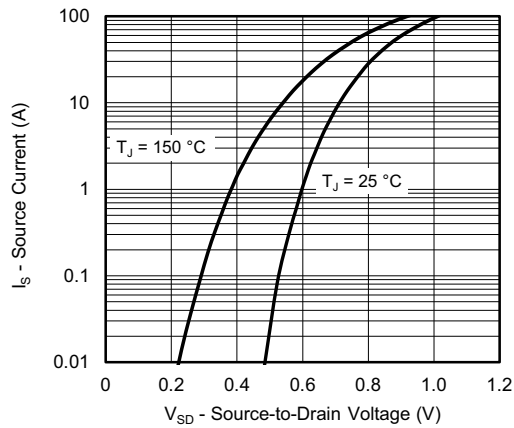


Gate Charge

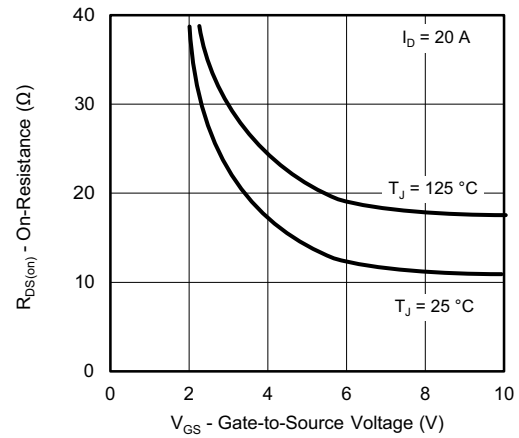


On-Resistance vs. Junction Temperature

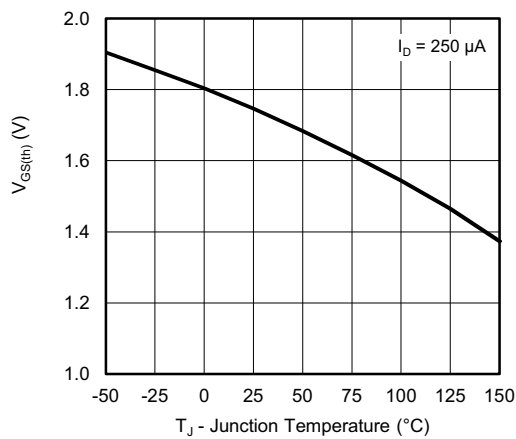
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



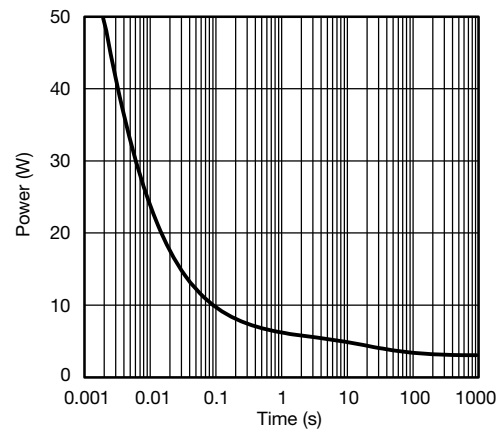
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

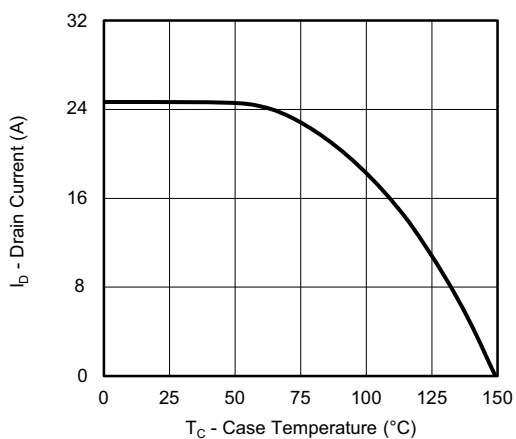


Threshold Voltage

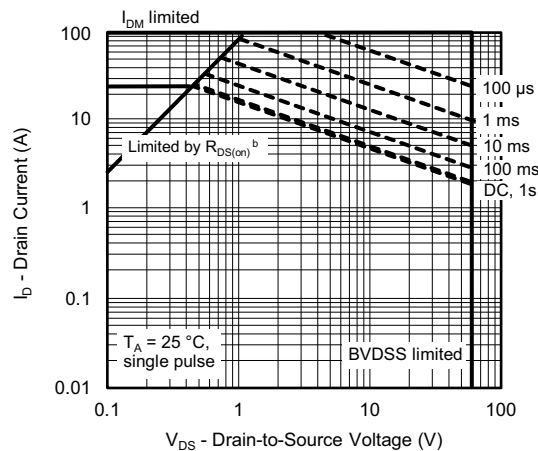


Single Pulse Power

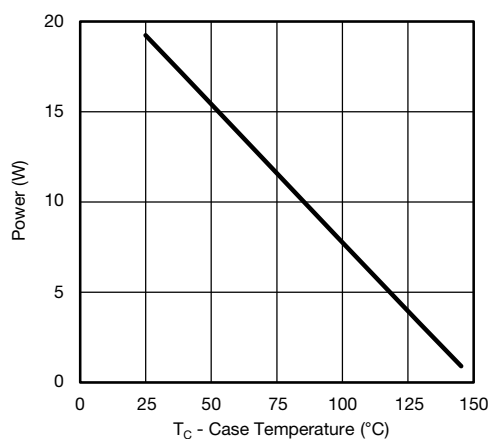
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



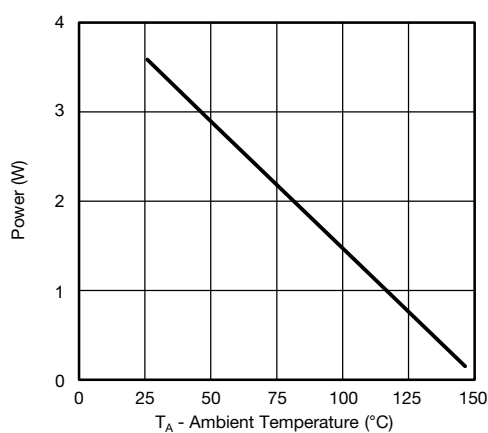
Current Derating ^a



Safe Operating Area, Junction-to-Ambient



Power, Junction-to-Case



Power, Junction-to-Ambient

Notes

- The power dissipation P_D is based on $T_J \text{ max.} = 150^\circ\text{C}$, using junction-to-ambient 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
- $V_{GS} > \text{minimum } V_{GS}$ at which $R_{DS(on)}$ is specified

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