

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
60	0.0155 at $V_{GS} = 10$ V	12	28 nC
	0.0186 at $V_{GS} = 4.5$ V	10	

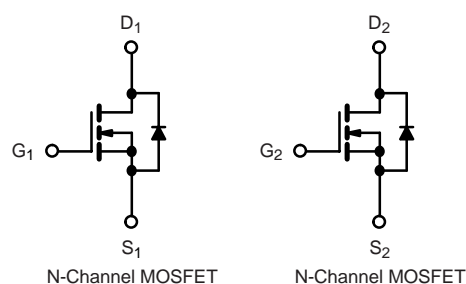
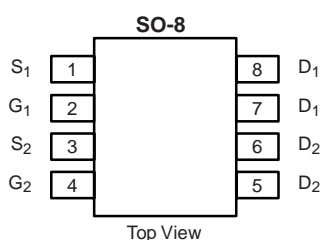
FEATURES

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


RoHS
 COMPLIANT

APPLICATIONS

- System power DC/DC



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	12 ^a	A
	$T_C = 70$ °C		10 ^a	
	$T_A = 25$ °C		7 ^a	
	$T_A = 70$ °C		4.1 ^a	
Pulsed drain current		I_{DM}	48	
Source-drain current diode current	$T_C = 25$ °C	I_S	12	
	$T_A = 25$ °C		2.8 ^{b, c}	
Maximum power dissipation	$T_C = 25$ °C	P_D	22	W
	$T_C = 70$ °C		15	
	$T_A = 25$ °C		2.3 ^{b, c}	
	$T_A = 70$ °C		1.6 ^{b, c}	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature)			260	

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	22	40	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	3.5	6	

Notes

- Package limited
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- Maximum under steady state conditions is 80 °C/W

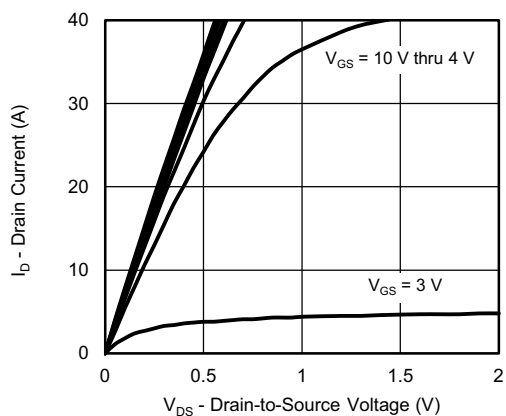
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	60	-	-	V
V _{DS} temperature coefficient	ΔV _{DS} /T _J	I _D = 250 μA	-	38	-	mV/°C
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	-	-4.9	-	
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.0	-	3.0	V
Gate-body 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 = 85 °C	-	-	10	
On-state drain current ^b	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	12	-	-	A
Drain-source on-state resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 8 A	-	0.0155	0.020	Ω
		V _{GS} = 4.5 V, I _D = 6 A	-	0.0186	0.025	
Forward transconductance ^b	g _{fs}	V _{DS} = 30 V, I _D = 8 A	-	38	-	S
Dynamic ^a						
Input capacitance	C _{iss}	V _{DS} = 30 V, V _{GS} = 0 V, f = 1 MHz	-	4550	-	pF
Output capacitance	C _{oss}		-	365	-	
Reverse transfer capacitance	C _{rss}		-	21	-	
Total gate charge	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 8 A	-	28	-	nC
Gate-source charge	Q _{gs}	V _{DS} = 30 V, V _{GS} = 4.5 V, I _D = 6 A	-	8.3	-	
Gate-drain charge	Q _{gd}		-	3.7	-	
			-	1.5	-	
Gate resistance	R _g	f = 1 MHz	-	5.5	-	Ω
Turn-on delay time	t _{d(on)}	V _{DD} = 30 V, R _L = 3.45 Ω I _D ≅ 6.0 A, V _{GEN} = 4.5 V, R _g = 1 Ω	-	19	-	ns
Rise time	t _r		-	40	-	
Turn-off delay time	t _{d(off)}		-	18	-	
Fall time	t _f		-	31	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 30 V, R _L = 3.45 Ω I _D ≅ 8.0 A, V _{GEN} = 10 V, R _g = 1 Ω	-	10	-	
Rise time	t _r		-	26	-	
Turn-off delay time	t _{d(off)}		-	11	-	
Fall time	t _f		-	19	-	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode Current	I _S	T _C = 25 °C	-	-	12	A
Pulse diode forward current ^a	I _{SM}		-	-	48	
Body diode voltage	V _{SD}	I _S = 8.0 A	-	0.7	1.2	V
Body diode reverse recovery time	t _{rr}	I _F = 8.7 A, di/dt = 100 A/μs, T _J = 25 °C	-	35	55	ns
Body diode reverse recovery charge	Q _{rr}		-	32	40	nC
Reverse recovery fall time	t _a		-	11	-	ns
Reverse recovery rise time	t _b		-	18	-	

Notes

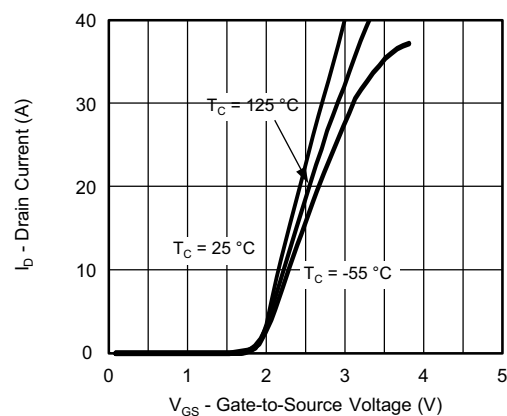
- a. Guaranteed by design, not subject to production testing
 b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

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.

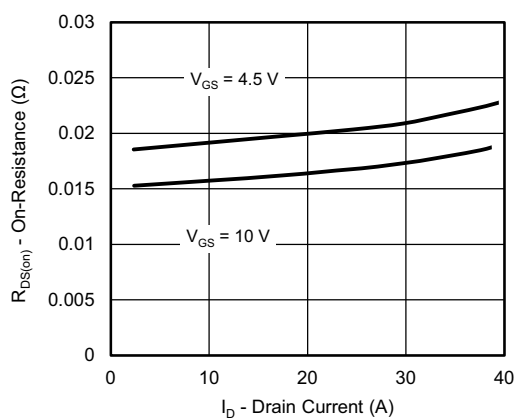
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



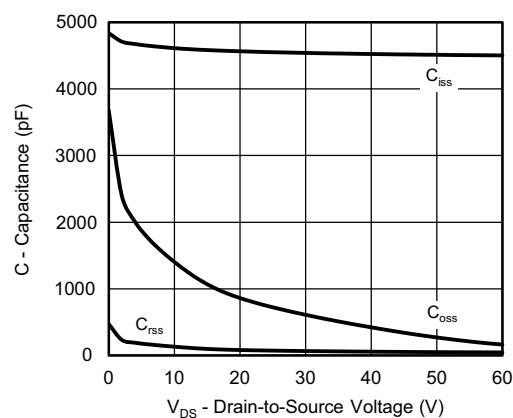
Output Characteristics



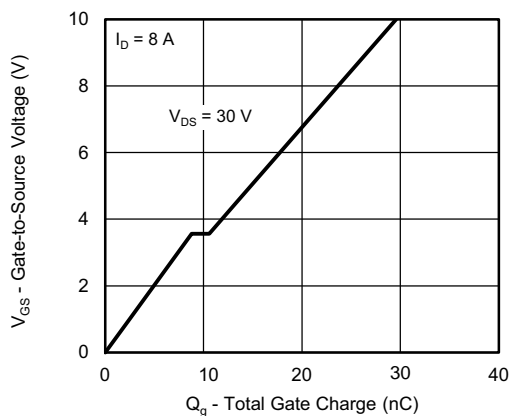
Transfer Characteristics



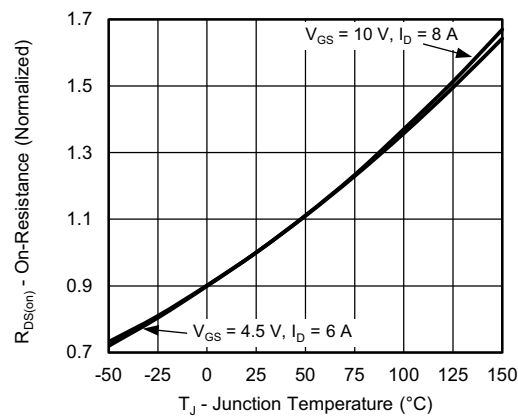
On-Resistance vs. Drain Current



Capacitance

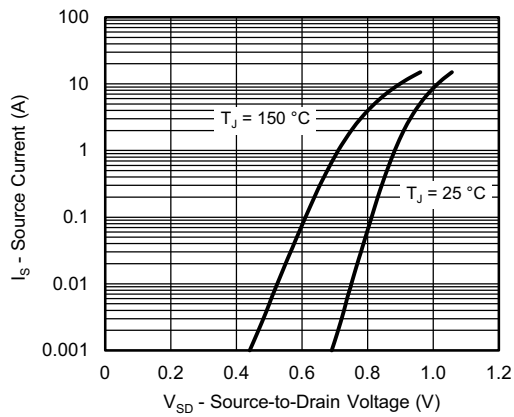


Gate Charge

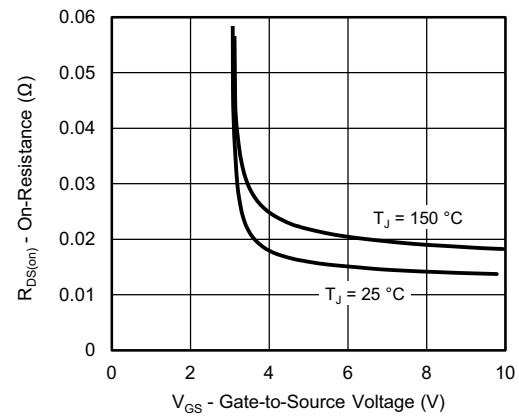


On-Resistance vs. Junction Temperature

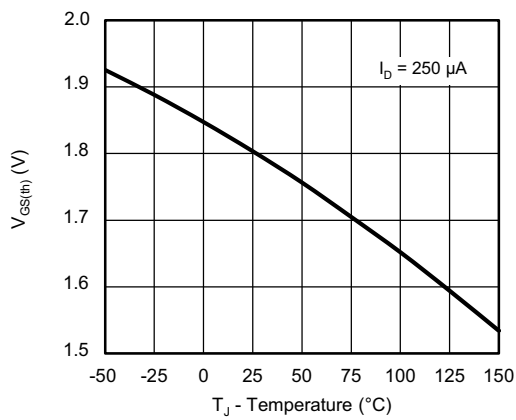
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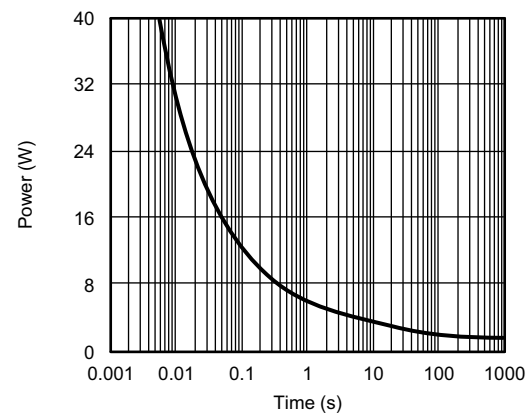
Source-Drain Diode Forward Voltage



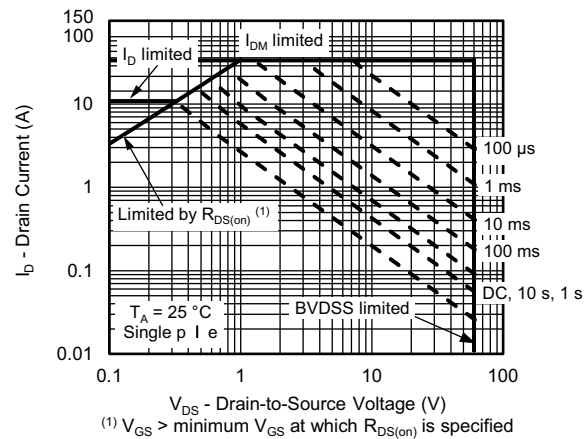
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

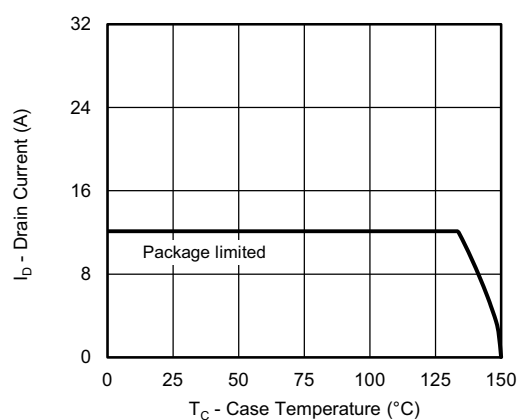


Single Pulse Power

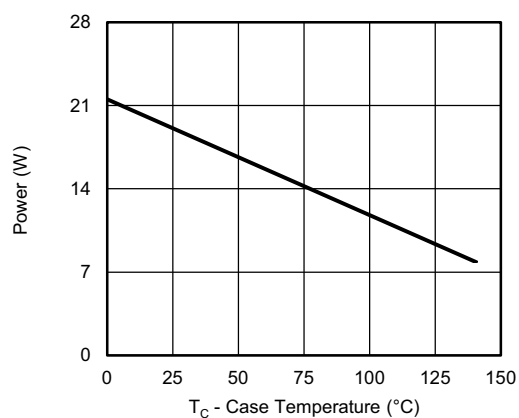


Safe Operating Area, Junction-to-Ambient

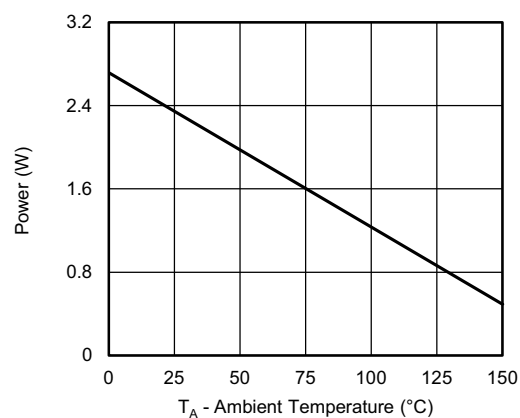
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Power, Junction-to-Case

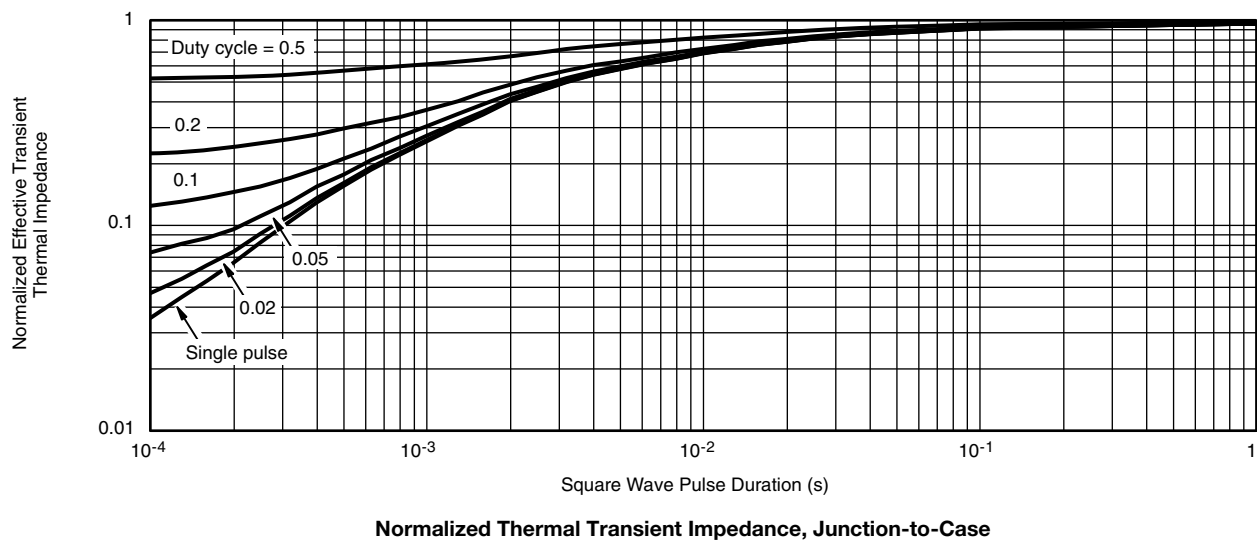
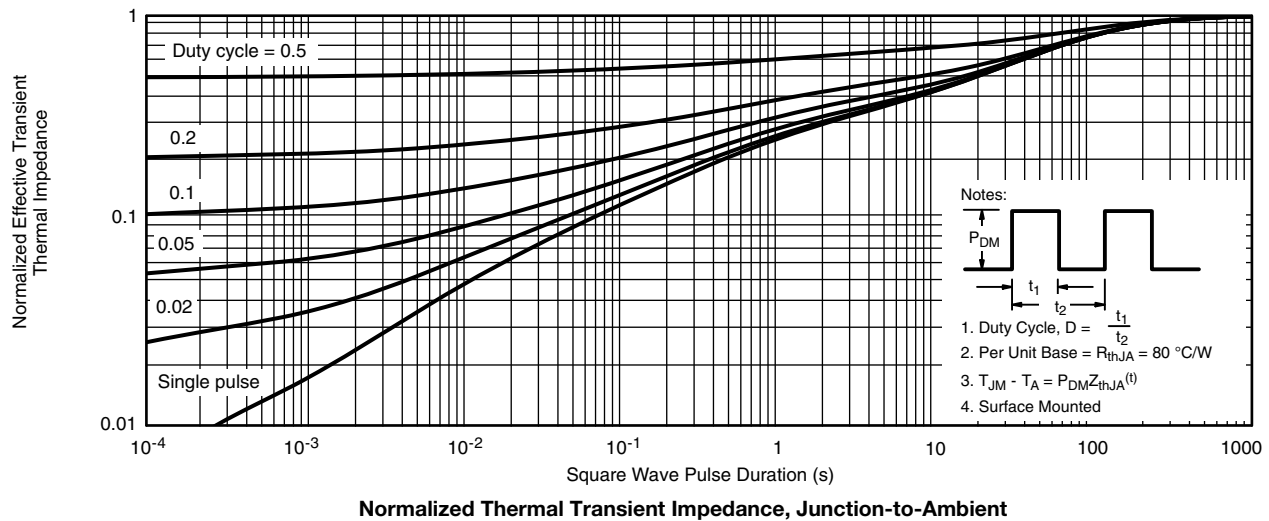


Power, Junction-to-Ambient

Note

- a. 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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