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	0.010 at V_{GS} = 10 V	40	23 nC

FEATURES

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

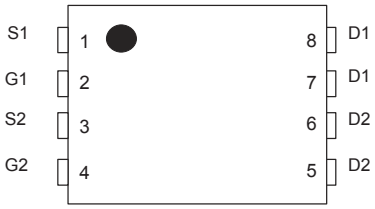
Pb-free

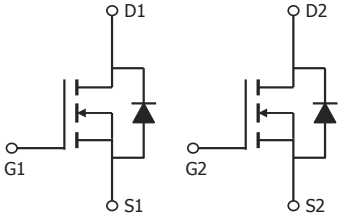
RoHS COMPLIANT

APPLICATIONS

- 12 V Automotive systems
- Motors, lamps and solenoid control
- Transmission control
- Ultra high performance power switching

Top View





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	40[a]	A
	T_C = 70 °C		33	
	T_A = 25 °C		26[b, c]	
	T_A = 70 °C		18[b, c]	
Pulsed Drain Current		I_{DM}	168	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	32	
	T_A = 25 °C		26[b, c]	
Avalanche Current	L = 0.1 mH	I_{AS}	30	
Single-Pulse Avalanche Energy		E_{AS}	61	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	57	W
	T_C = 70 °C		36.5	
	T_A = 25 °C		33[b, c]	
	T_A = 70 °C		21[b, c]	
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[b, d]	t ≤ 10 s	R_{thJA}	30	42	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	3	8	

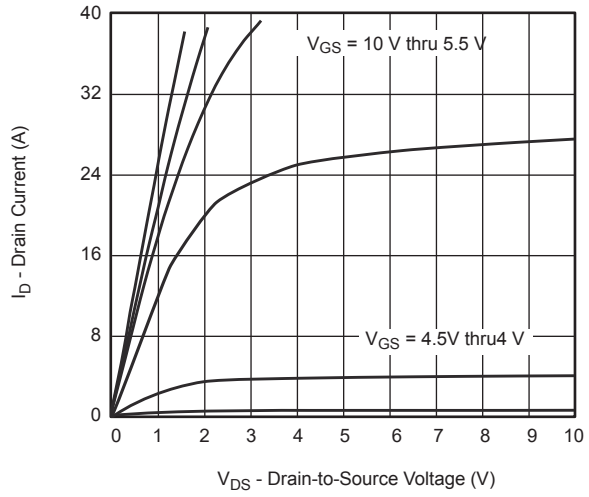
Notes:
a. Package limited.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. Maximum under Steady State conditions is 85 °C/W.

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	$\Delta V_{DS}/T_J$	I_D = 250 µA		55		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 6.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.5		2.5	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} = 48V, V_{GS} = 0 V			1	µA
		V_{DS} = 48 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	40			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10A		0.010	0.013	Ω
		V_{GS} = 4.5 V, I_D = 8A		0.015	0.019	
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 10A		50		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 30 V, V_{GS} = 0 V, f = 1 MHz		2160		pF
Output Capacitance	C_{oss}			198		
Reverse Transfer Capacitance	C_{rss}			83		
Total Gate Charge	Q_g	V_{DS} = 30 V, V_{GS} = 10V, I_D = 10 A		25		nC
Gate-Source Charge	Q_{gs}			4.7		
Gate-Drain Charge	Q_{gd}			8.5		
Gate Resistance	R_g	f = 1 MHz		4.3	5.5	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 30 V, R_L = 5.4 Ω $I_D \cong$ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω		12	19	ns
Rise Time	t_r			30	55	
Turn-Off DelayTime	$t_{d(off)}$			20	33	
Fall Time	t_f			20	29	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 30 V, R_L = 5.4 Ω $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω		8	16	
Rise Time	t_r			13	18	
Turn-Off DelayTime	$t_{d(off)}$			15	23	
Fall Time	t_f			10	15	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	T_C = 25 °C			40	A
Pulse Diode Forward Current[a]	I_{SM}				168	
Body Diode Voltage	V_{SD}	I_S = 2 A		0.7	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 5.5 A, dI/dt = 100 A/µs, T_J = 25 °C		25	50	ns
Body Diode Reverse Recovery Charge	Q_{rr}			25	53	nC
Reverse Recovery Fall Time	t_a			19		ns
Reverse Recovery Rise Time	t_b			6		

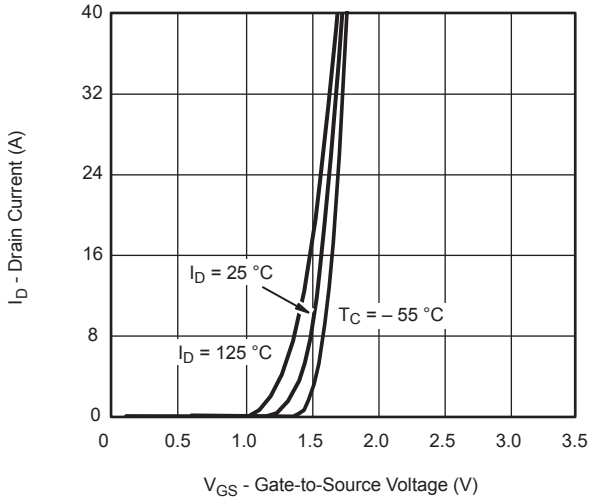
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

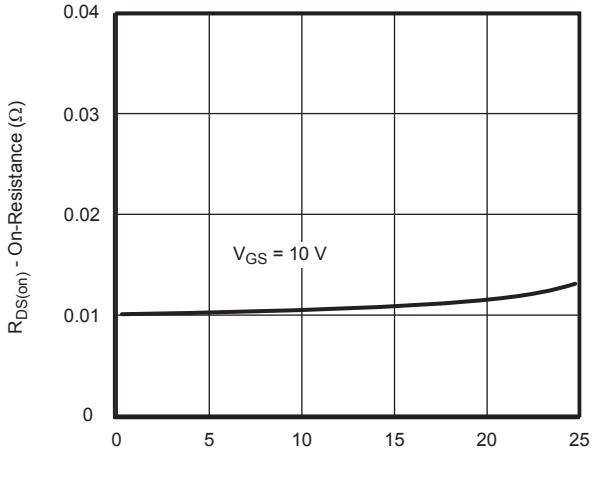
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



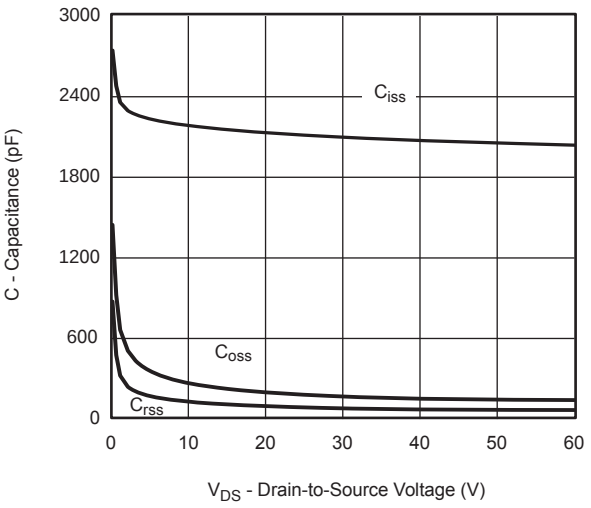
Output Characteristics



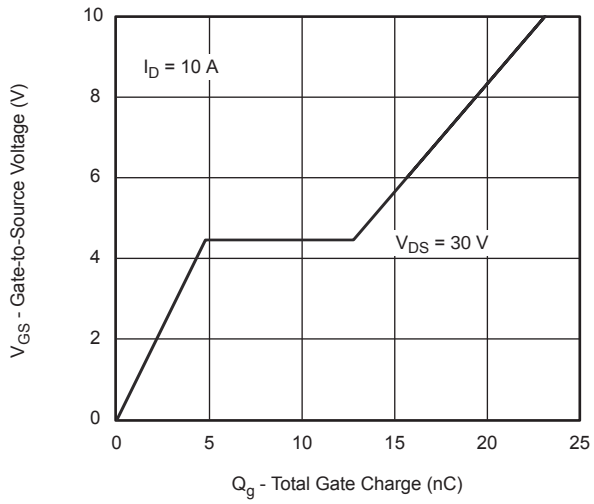
Transfer Characteristics



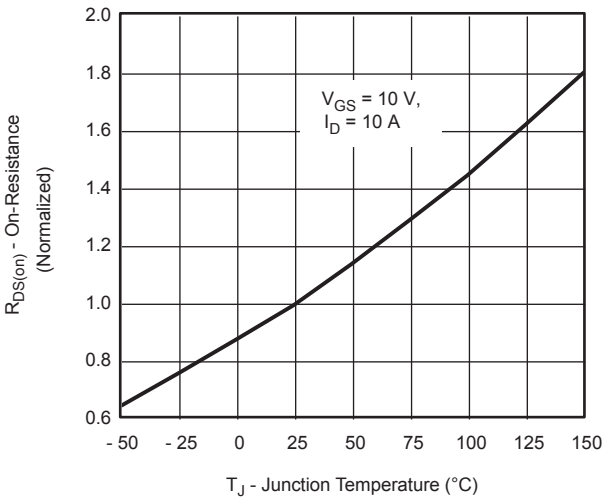
On-Resistance vs. Drain Current



Capacitance

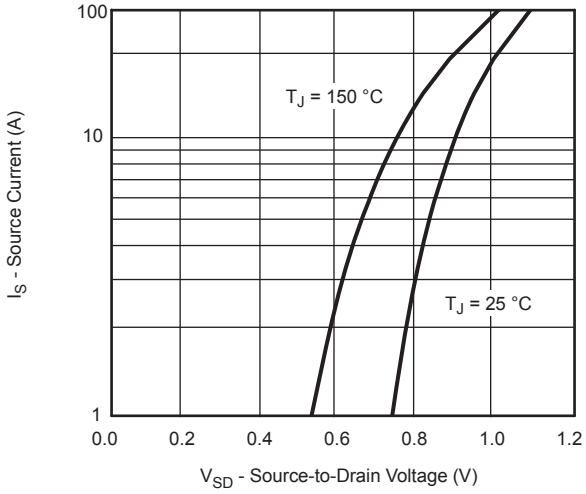


Gate Charge

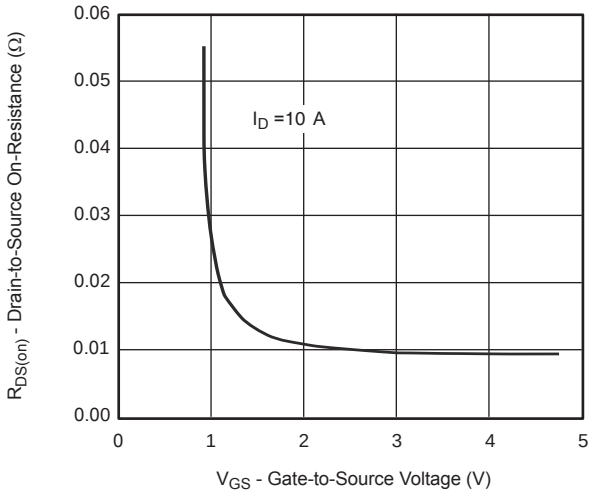


On-Resistance vs. Junction Temperature

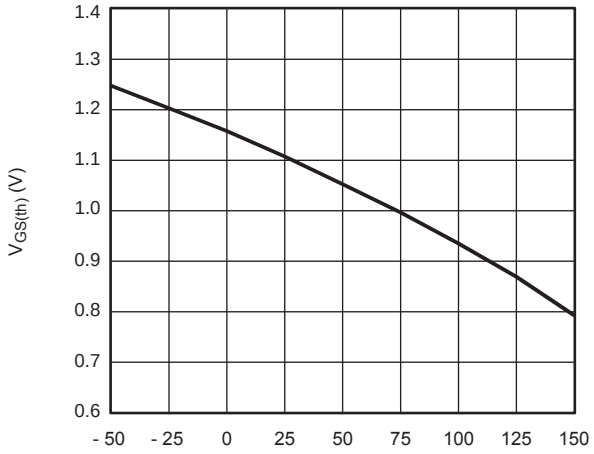
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



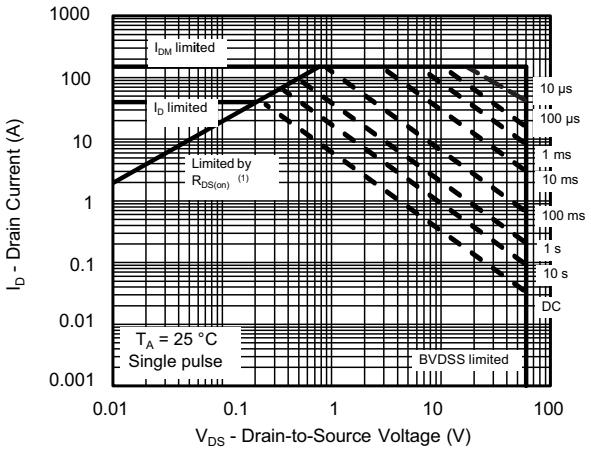
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

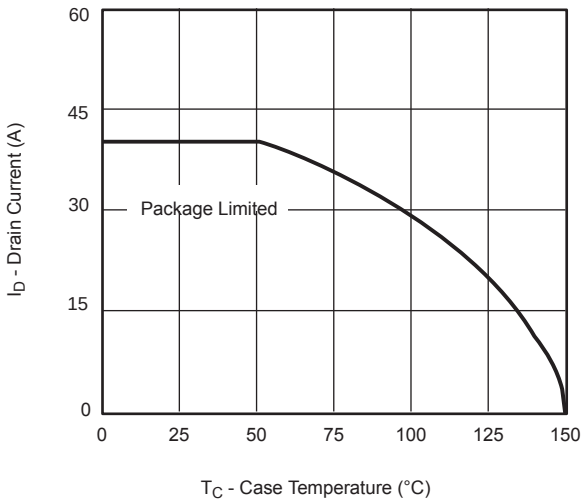


Threshold Voltage

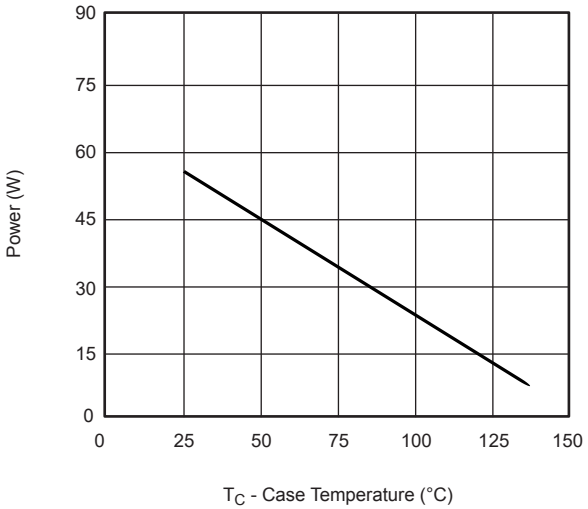


(1) V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient



Current Derating*



Power, Junction-to-Foot

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