

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	0.012 at V _{GS} = 10 V	38	23 nC

FEATURES

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

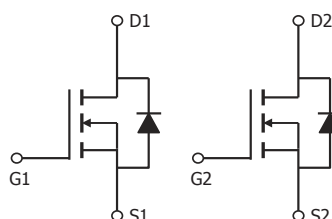
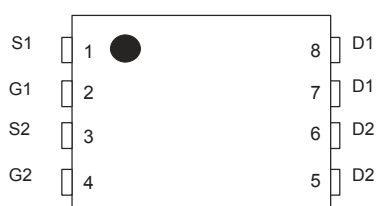


RoHS
COMPLIANT

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)	I _D	T _C = 25 °C	38 ^a
		T _C = 70 °C	32
		T _A = 25 °C	25 ^{b, c}
		T _A = 70 °C	18 ^{b, c}
Pulsed Drain Current	I _{DM}	164	A
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	30
		T _A = 25 °C	25 ^{b, c}
Avalanche Current	I _{AS}	31	
Single-Pulse Avalanche Energy	E _{AS}	56	mJ
Maximum Power Dissipation	P _D	T _C = 25 °C	55
		T _C = 70 °C	35
		T _A = 25 °C	35 ^{b, c}
		T _A = 70 °C	23 ^{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}	R _{thJA}	35	45	°C/W
Maximum Junction-to-Foot (Drain)	R _{thJF}	3	8	

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under Steady State conditions is 85 °C/W.

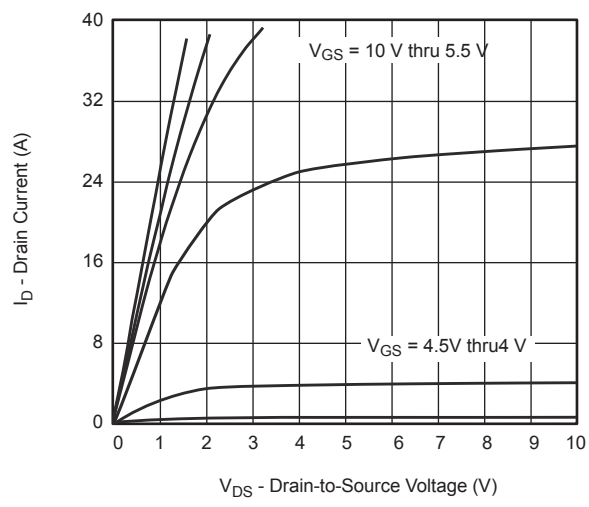
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		55		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-6.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	38			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		0.012	0.016	Ω
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$		50		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1150		μF
Output Capacitance	C_{oss}			158		
Reverse Transfer Capacitance	C_{rss}			103		
Total Gate Charge	Q_g	$V_{DS} = 48\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		23		nC
Gate-Source Charge	Q_{gs}			4.5		
Gate-Drain Charge	Q_{gd}			8.2		
Gate Resistance	R_g	$f = 1\text{ MHz}$		4.3	5.5	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 48\text{ V}, R_L = 5.4\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		12	15	ns
Rise Time	t_r			30	55	
Turn-Off Delay Time	$t_{d(off)}$			20	30	
Fall Time	t_f			20	26	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 48\text{ V}, R_L = 5.4\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		8	15	
Rise Time	t_r			13	15	
Turn-Off Delay Time	$t_{d(off)}$			15	20	
Fall Time	t_f			10	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			38	A
Pulse Diode Forward Current ^a	I_{SM}				164	
Body Diode Voltage	V_{SD}	$I_S = 2\text{ A}$		0.7	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 5.5\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		25	50	ns
Body Diode Reverse Recovery Charge	Q_{rr}			25	50	nC
Reverse Recovery Fall Time	t_a			19		ns
Reverse Recovery Rise Time	t_b			6		

Notes:

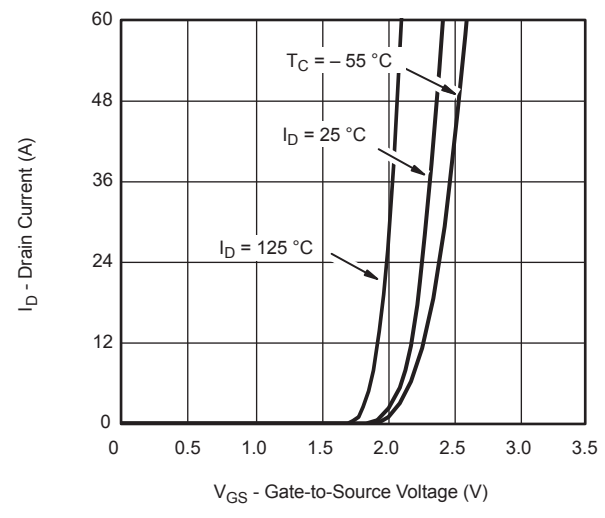
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

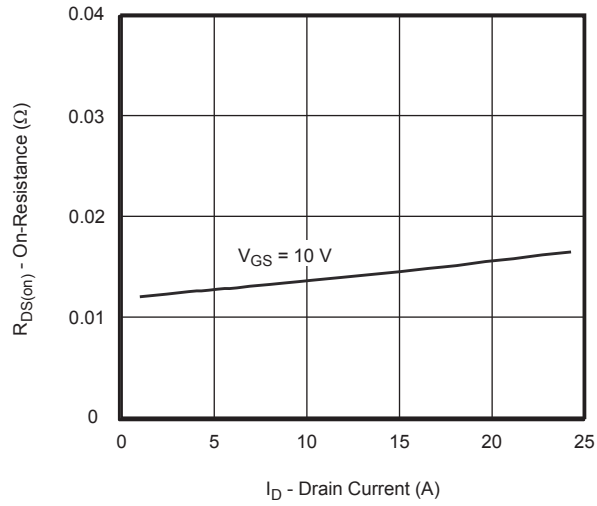
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



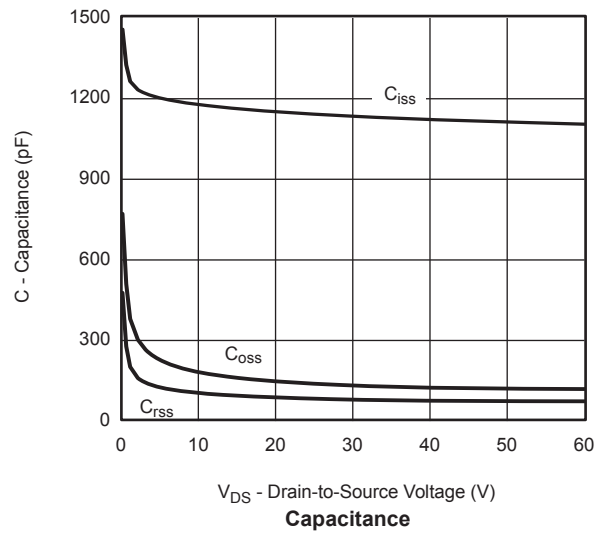
Output Characteristics



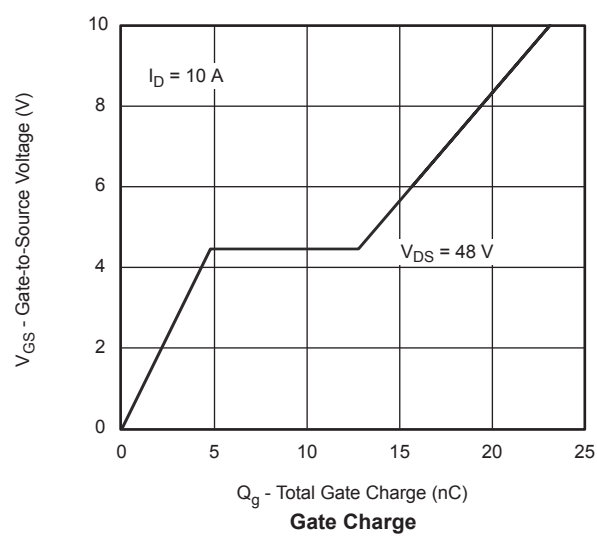
Transfer Characteristics



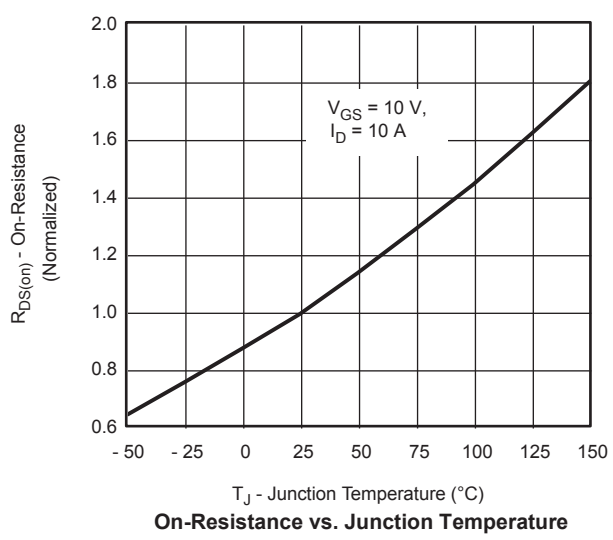
On-Resistance vs. Drain Current



Capacitance

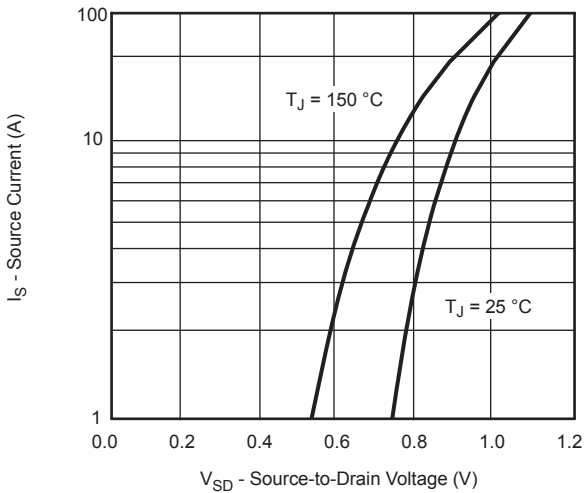


Gate Charge

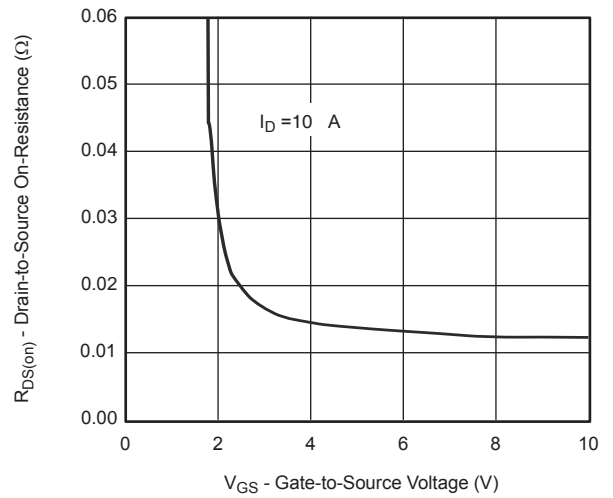


On-Resistance vs. Junction Temperature

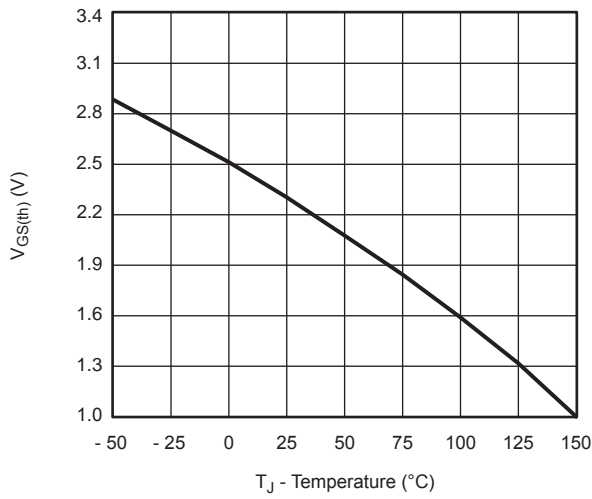
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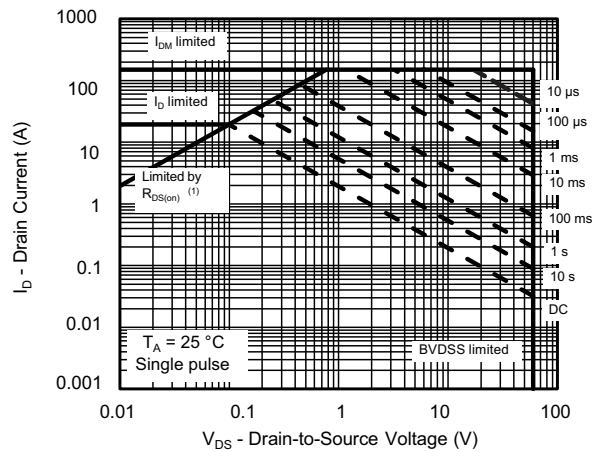
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

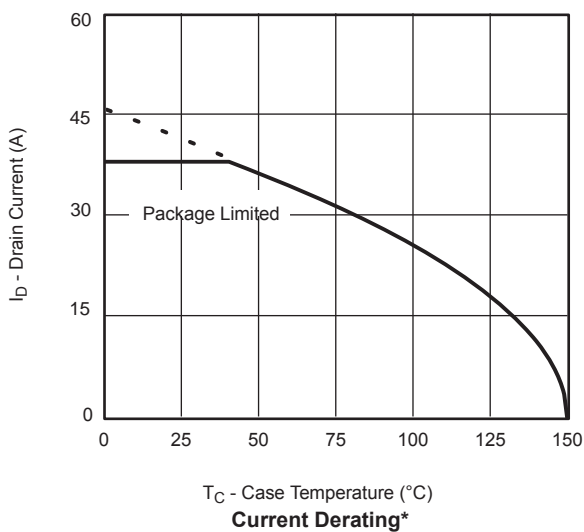


Threshold Voltage

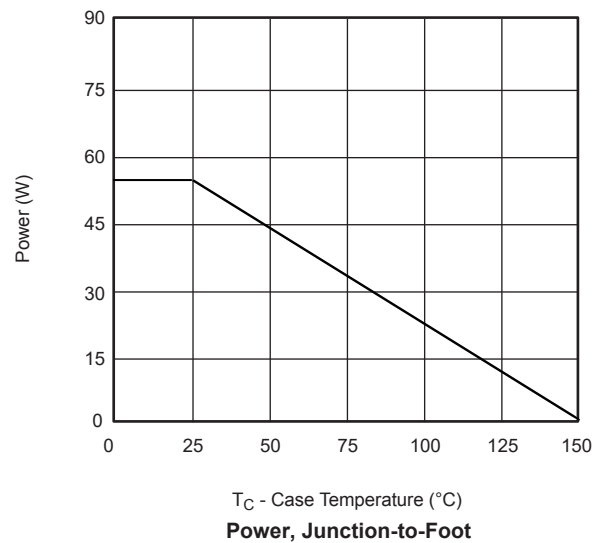


⁽¹⁾ $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

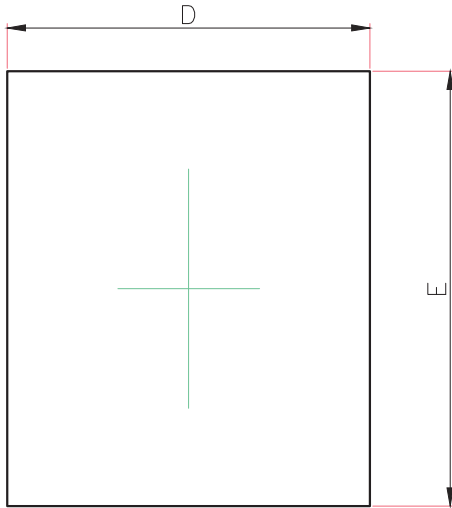


Current Derating*

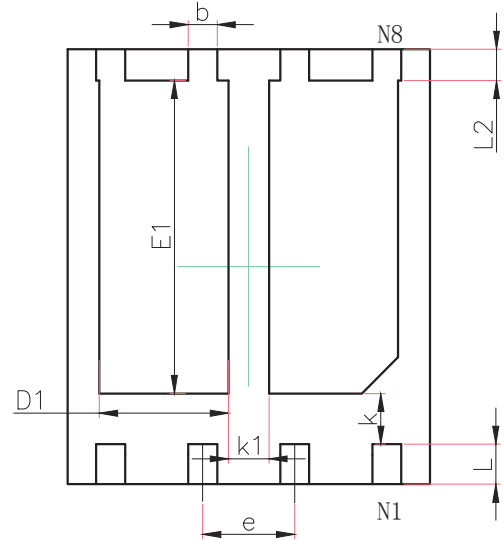


Power, Junction-to-Foot

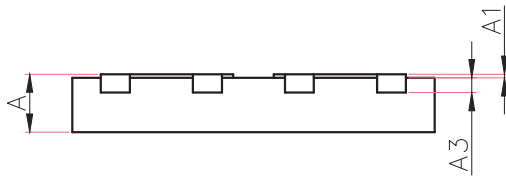
DFNWB5×6-8L-B(P1.27T0.75/0.85) PACKAGE OUTLINE DIMENSIONS



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	4.950	5.050	0.195	0.199
E	5.950	6.050	0.234	0.238
D1	1.680	1.880	0.066	0.074
E1	4.220	4.420	0.166	0.174
k	0.200MIN.		0.008MIN.	
k1	0.200MIN.		0.008MIN.	
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.05TYP.	
L	0.474	0.626	0.019	0.025

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