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	12	10.5 nC
	0.015 at V_{GS} = 4.5 V		

FEATURES

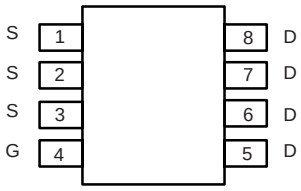
- DT-Trench Power MOSFET
- 100 % R_g and UIS tested

RoHS COMPLIANT

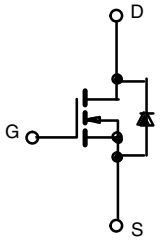
APPLICATIONS

- DC/DC converters
- Power supplies
- Motor drive control
- Battery and load switch

SO-8



Top View



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	12	A
	T_C = 70 °C		9.2	
	T_A = 25 °C		8.8 [a, b]	
	T_A = 70 °C		6.3 [a, b]	
Pulsed drain current (t = 100 µs)		I_{DM}	48	
Continuous source-drain diode current	T_C = 25 °C	I_S	12	
	T_A = 25 °C		2.5 [a, b]	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	45	
Single pulse avalanche energy		E_{AS}	65	mJ
Maximum power dissipation	T_C = 25 °C	P_D	5.9	W
	T_C = 70 °C		3.8	
	T_A = 25 °C		2.7 [a, b]	
	T_A = 70 °C		1.9 [a, b]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) [c]			260	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient [a]	t ≤ 10 s	R_{thJA}	32	50	°C/W
Maximum junction-to-foot (drain)	Steady state	R_{thJF}	20	28	

Notes

a. Surface mounted on 1" x 1" FR4 board
b. t = 10 s
c. 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	-	33	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	-4.8	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1	-	2	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 = 70 °C	-	-	10	
On-state drain current [a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} =10 V	12	-	-	
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} =10 V, I_D = 10 A	-	0.0100	0.0130	Ω
		V_{GS} = 4.5 V, I_D = 5 A	-	0.0150	0.0190	
Forward transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 10 A	-	39	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = 48 V, V_{GS} = 0 V, f = 1 MHz	-	1090	-	pF
Output capacitance	C_{oss}		-	530	-	
Reverse transfer capacitance	C_{rss}		-	25	-	
Total gate charge	Q_g	V_{DS} = 48 V, V_{GS} = 10 V, I_D = 5 A	-	10.5	-	nC
		V_{DS} = 48 V, V_{GS} = 4.5 V, I_D = 5 A	-	5.2	8	
Gate-source charge	Q_{gs}		-	2.2	-	
Gate-drain charge	Q_{gd}		-	1.1	-	
Gate resistance	R_g	f = 1 MHz	-	3	-	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = 48 V, R_L = 6 Ω, I_D ≅ 5 A, V_{GEN} = 10 V, R_g = 1 Ω	-	7	15	ns
Rise time	t_r		-	21	40	
Turn-off delay time	$t_{d(off)}$		-	10	20	
Fall time	t_f		-	10	20	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 48 V, R_L = 6 Ω, I_D ≅ 5 A, V_{GEN} = 4.5 V, R_g = 1 Ω	-	13	25	
Rise time	t_r		-	25	50	
Turn-off delay time	$t_{d(off)}$		-	10	20	
Fall time	t_f		-	22	45	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	12	A
Pulse diode forward current	I_{SM}		-	-	48	
Body diode voltage	V_{SD}	I_S = 5 A, V_{GS} = 0 V	-	0.70	1.2	V
Body diode reverse recovery time	t_{rr}	I_F = 5 A, di/dt = 100 A/µs, T_J = 25 °C	-	30	60	ns
Body diode reverse recovery charge	Q_{rr}		-	60	120	nC
Reverse recovery fall time	t_a		-	15	-	ns
Reverse recovery rise time	t_b		-	15	-	

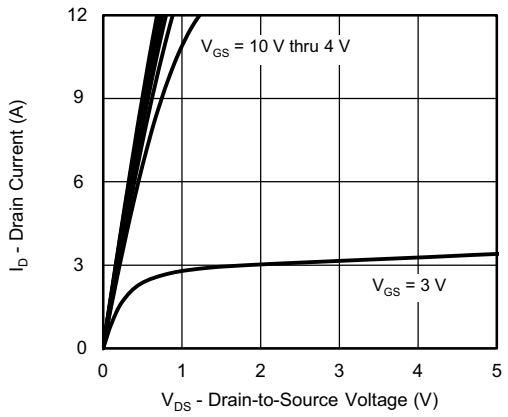
Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

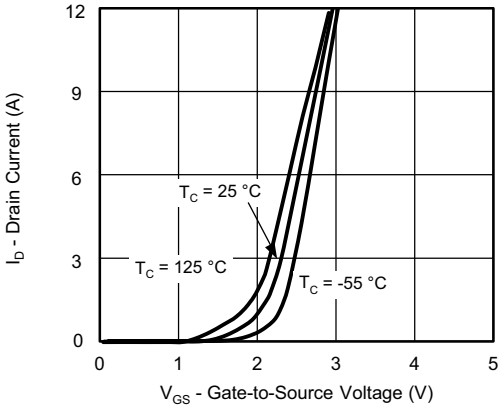
b. Guaranteed by design, not subject to production testing

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.

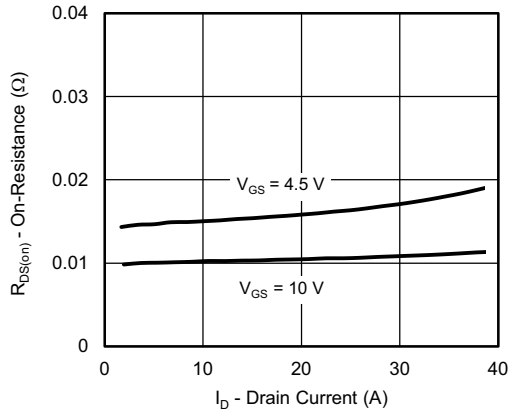
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



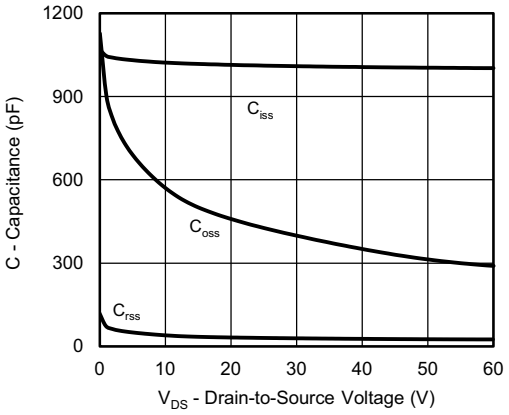
Output Characteristics



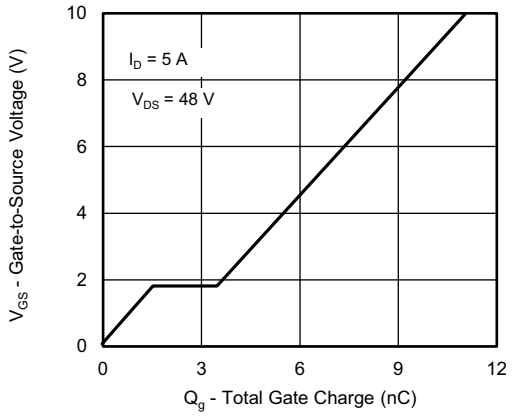
Transfer Characteristics



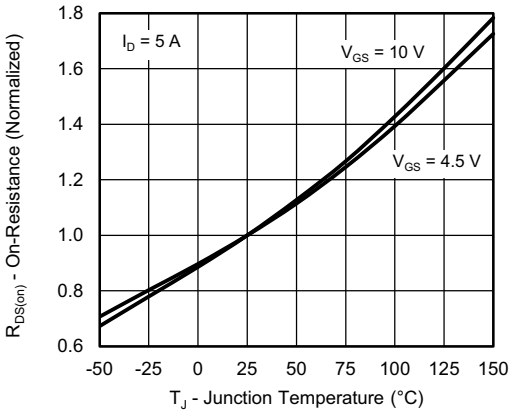
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

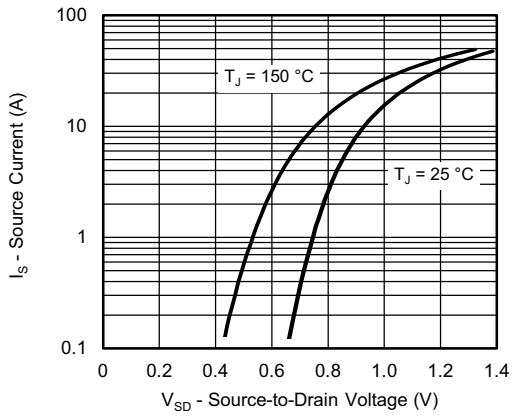


Gate Charge

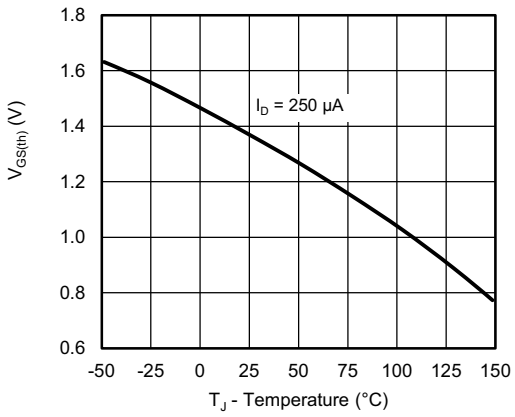


On-Resistance vs. Junction Temperature

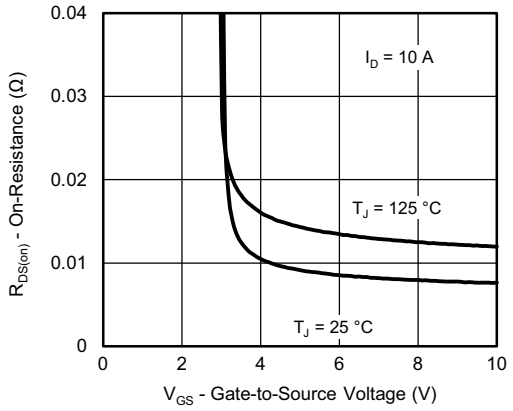
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



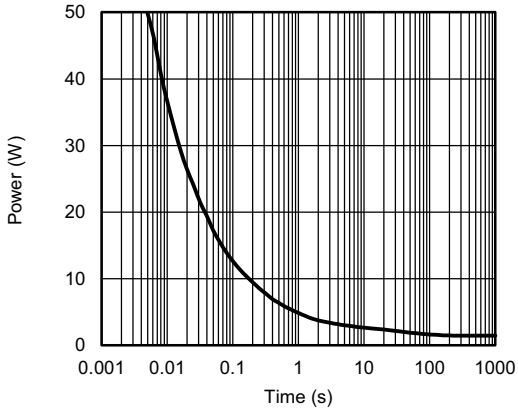
Source-Drain Diode Forward Voltage



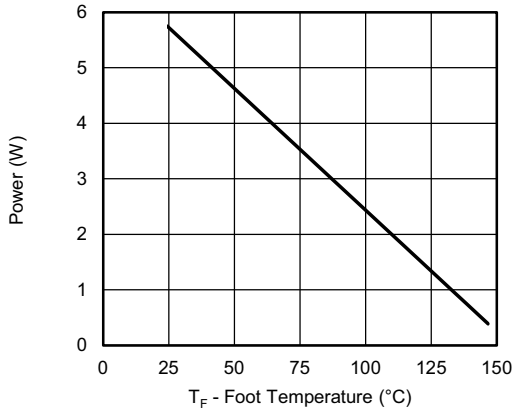
Threshold Voltage



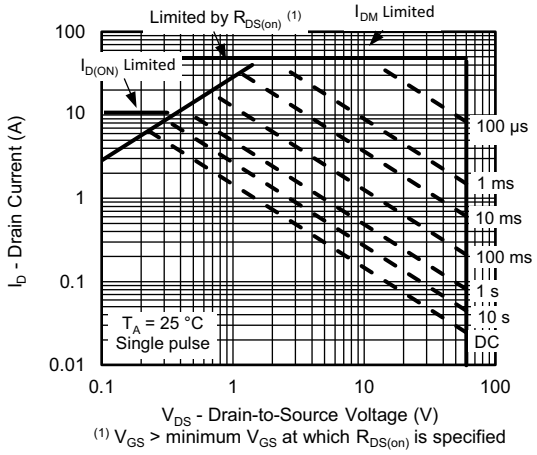
On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power, Junction-to-Ambient

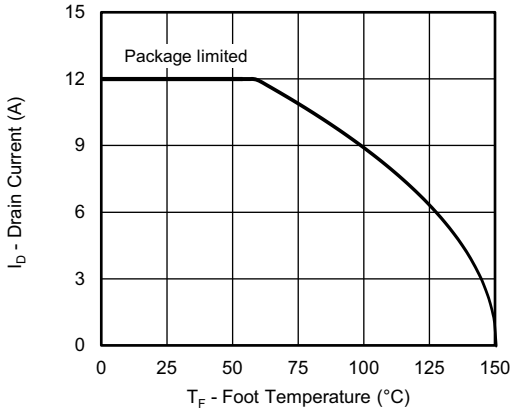


Power, Junction-to-Foot

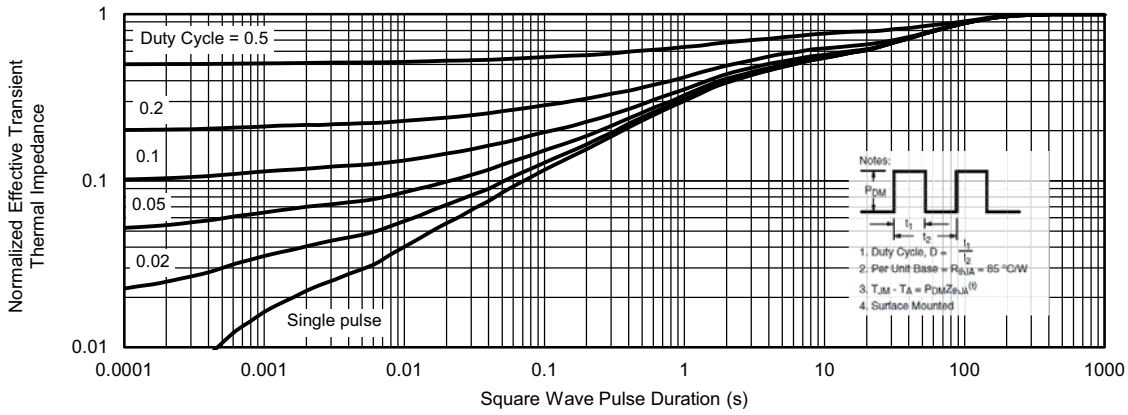


Safe Operating Area, Junction-to-Ambient

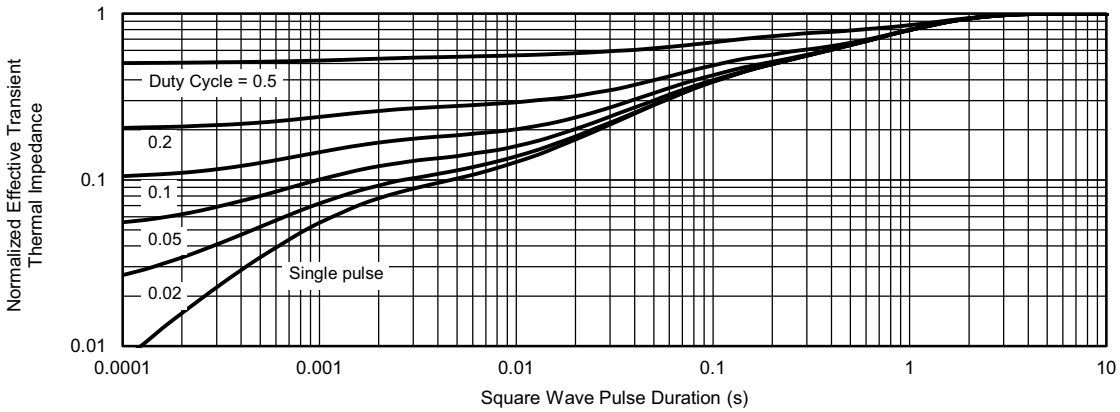
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]



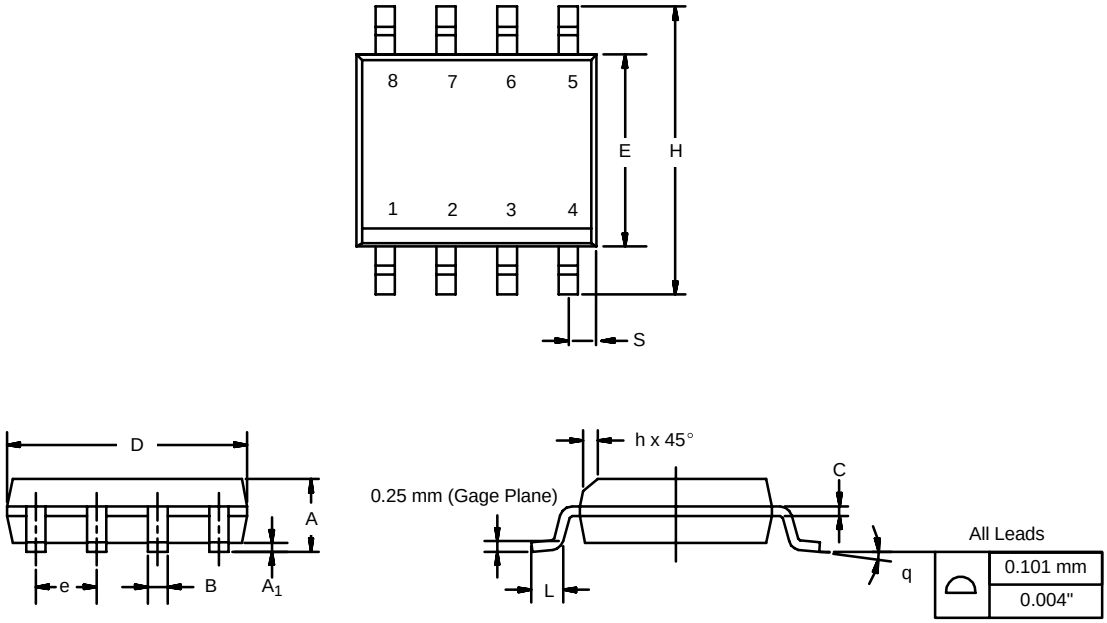
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

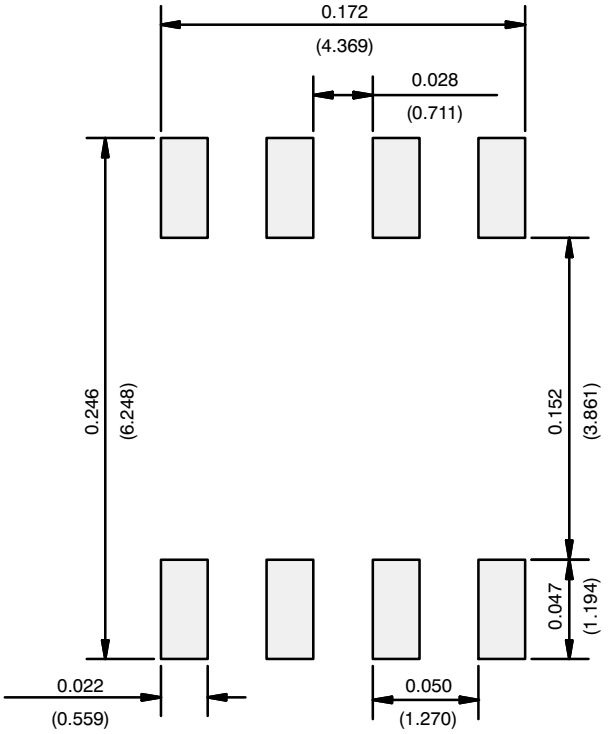
SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A_1	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06 DWG: 5498				

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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