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

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (mΩ)(Typ.)	I_D (A)[a]	Q_g (Typ.)
60	75 at V_{GS} = 10 V	3.0	7.5 nC
	86 at V_{GS} = 4.5 V	2.1	

FEATURES

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

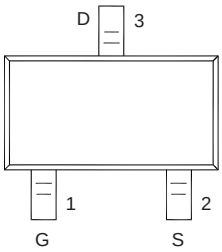
Pb-free

RoHS COMPLIANT

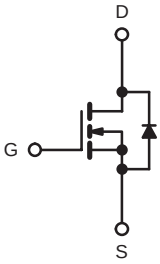
APPLICATIONS

- Battery Switch
- DC/DC Converter

(SOT-23-3L)



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	3.0	A
	T_C = 70 °C		1.8	
	T_A = 25 °C		2.1[b, c]	
	T_A = 70 °C		1.5[b, c]	
Pulsed Drain Current		I_{DM}	9	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	1.39	
	T_A = 25 °C		0.91[b, c]	
Avalanche Current	L = 0.1 mH	I_{AS}	6	
Single-Pulse Avalanche Energy		E_{AS}	1.8	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	1.66	W
	T_C = 70 °C		1.06	
	T_A = 25 °C		1.09[b, c]	
	T_A = 70 °C		0.7[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 ≤ 5 s	R_{thJA}	90	115	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJC}	60	75	

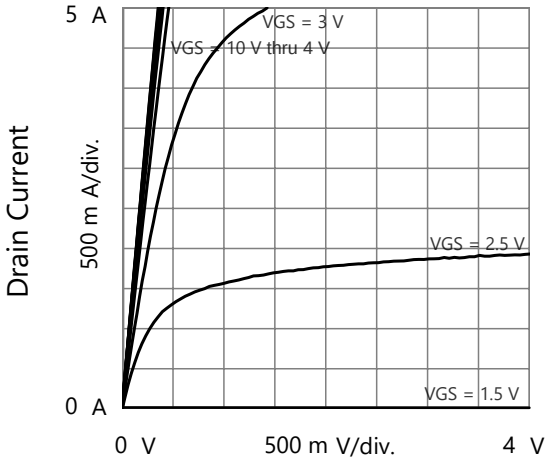
Notes:
a. Based on T_C = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. Maximum under Steady State conditions is 120 °C/W.

MOSFET SPECIFICATIONS T_C = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{DS} = 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	$\Delta V_{GS(th)}/T_J$			- 5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.0		3.0	
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			1.0	µA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	8.0			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 1.9 A		75	90	mΩ
		V_{GS} = 4.5 V, I_D = 1.7 A		86	103	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15V, I_D = 1.9 A		5		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 30 V, V_{GS} = 0 V, f = 1 MHz		271		pF
Output Capacitance	C_{oss}			21		
Reverse Transfer Capacitance	C_{rss}			17		
Total Gate Charge	Q_g	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 1.9 A		7.5		nC
Gate-Source Charge	Q_{gs}			0.5		
Gate-Drain Charge	Q_{gd}			1.7		
Gate Resistance	R_g	f = 1 MHz		2.5		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 30 V, R_L = 20 Ω I_D ≅ 1.9 A, V_{GEN} = 10 V, R_G = 1 Ω		4	6	ns
Rise Time	t_r			10	15	
Turn-Off Delay Time	$t_{d(off)}$			10	15	
Fall Time	t_f			7	10.5	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 30 V, R_L = 20 Ω I_D ≅ 1.9 A, V_{GEN} = 4.5 V, R_G = 1 Ω		15	23	ns
Rise Time	t_r			16	24	
Turn-Off Delay Time	$t_{d(off)}$			11	17	
Fall Time	t_f			11	17	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			3.0	A
Pulse Diode Forward Current[a]	I_{SM}				9.0	
Body Diode Voltage	V_{SD}	I_S = 1 A		0.6	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 1.9 A, dI/dt = 100 A/µs, T_J = 25 °C		15	23	ns
Body Diode Reverse Recovery Charge	Q_{rr}			10	15	nC
Reverse Recovery Fall Time	t_a			12		ns
Reverse Recovery Rise Time	t_b			3		

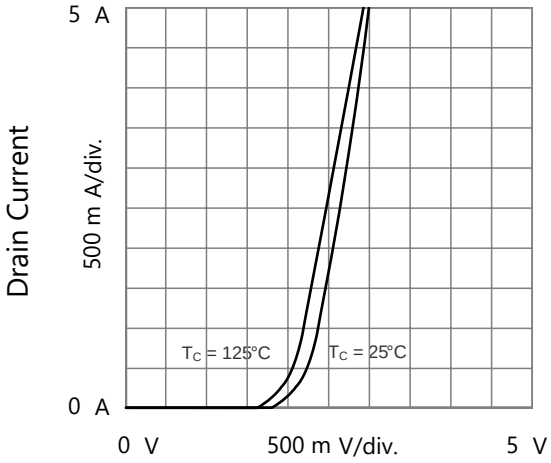
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

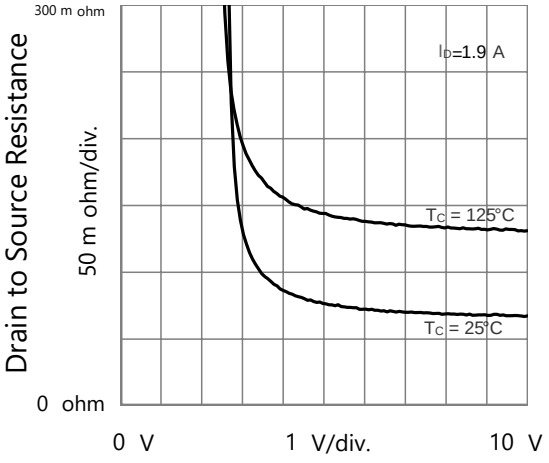
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



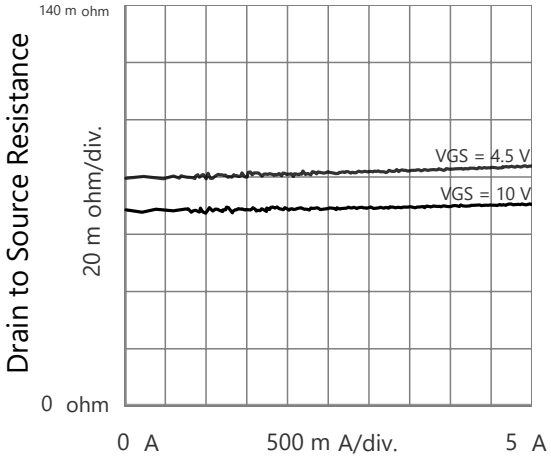
Drain to Source Voltage
Output Characteristics



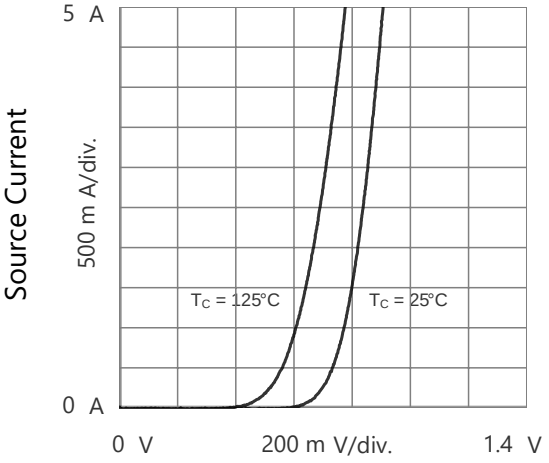
Gate to Source Voltage
Transfer Characteristics



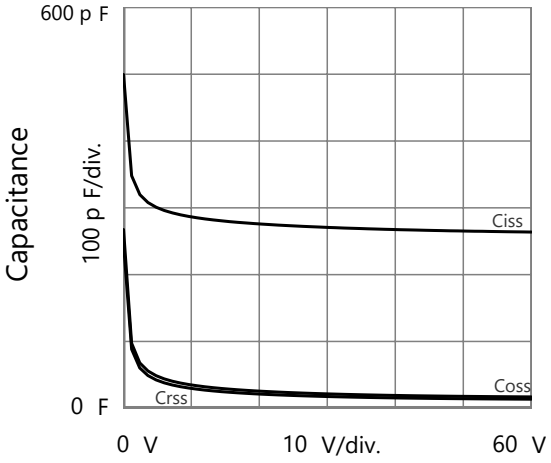
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

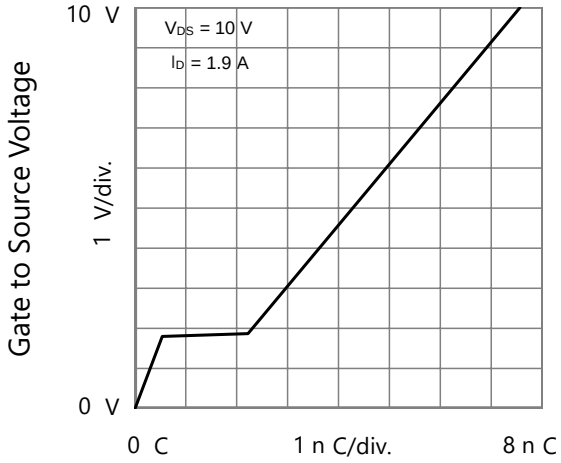


Source to Drain Voltage
Body Diode Forward Characteristics

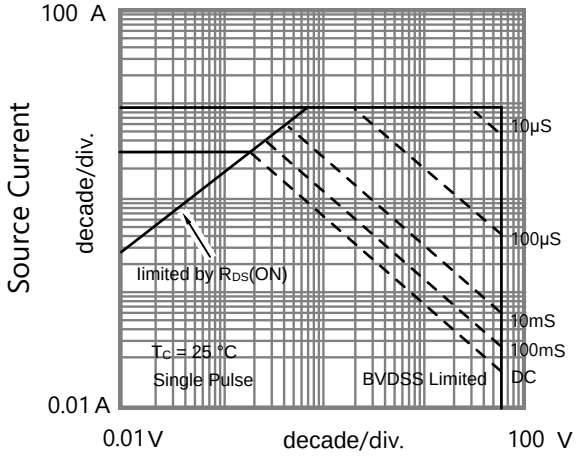


Drain to Source Voltage
Capacitances

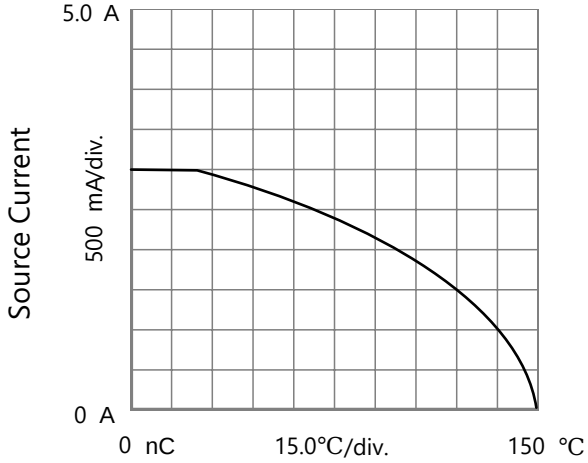
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



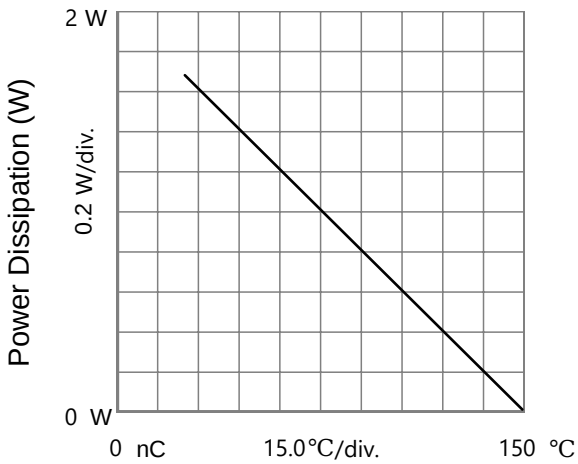
Gate to Source Voltage vs. GateCharge



Safe Operating Area, Junction-to-Ambient

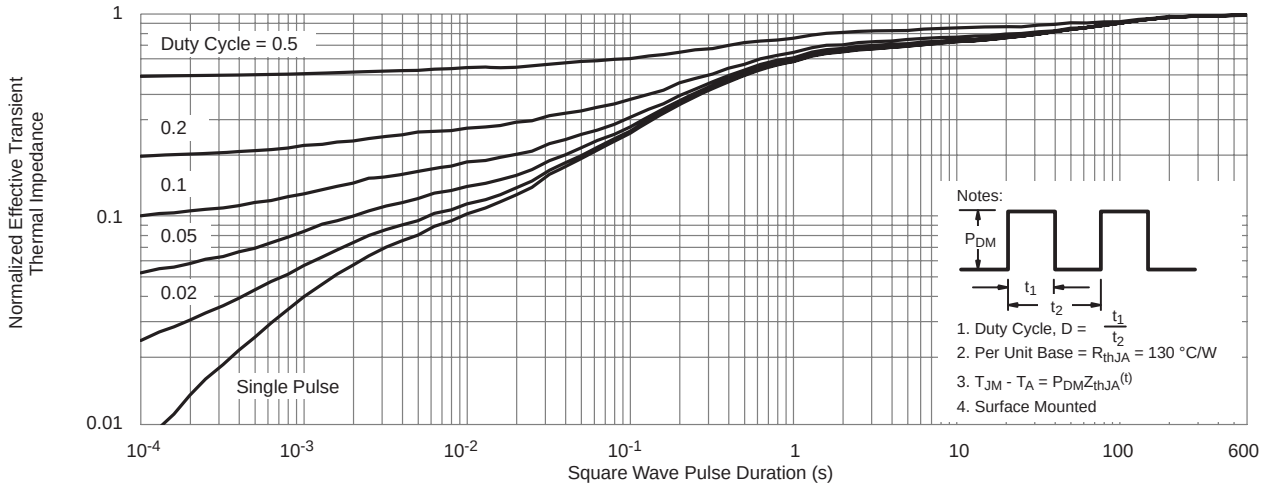


Current Derating

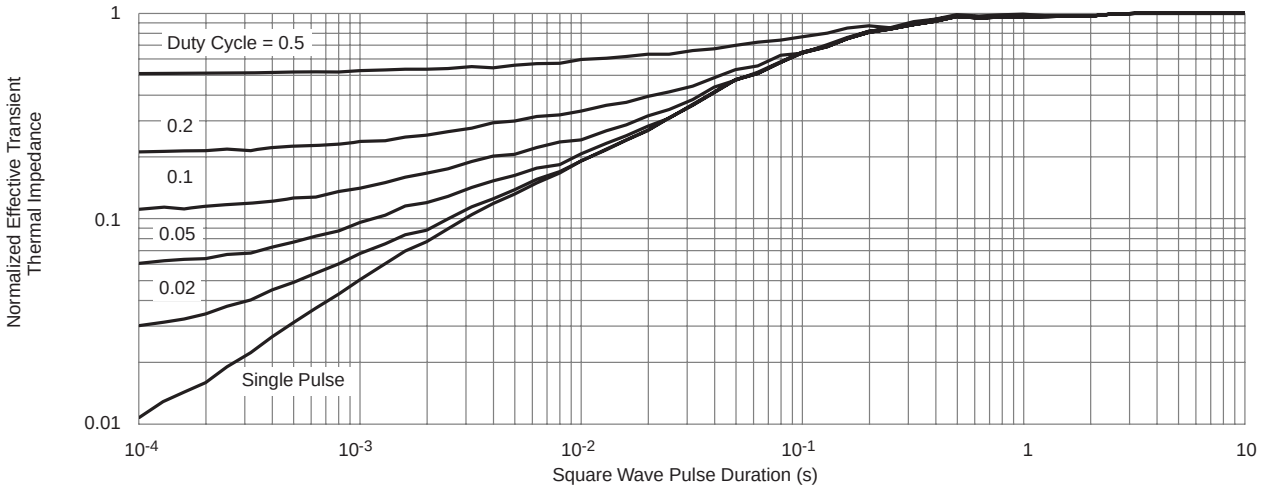


Power Derating

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

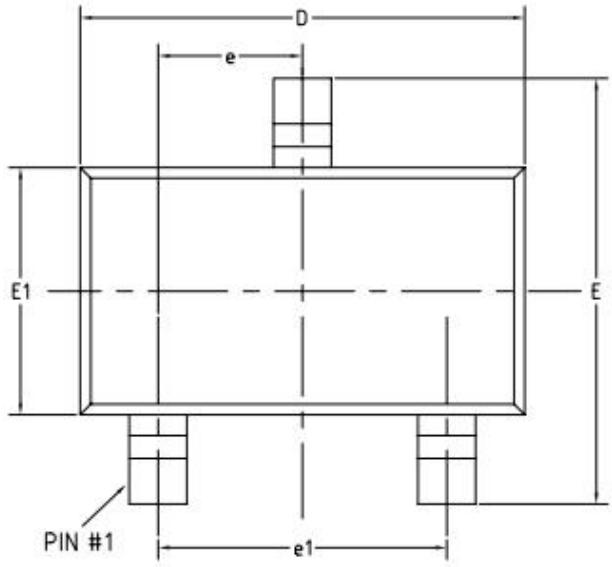


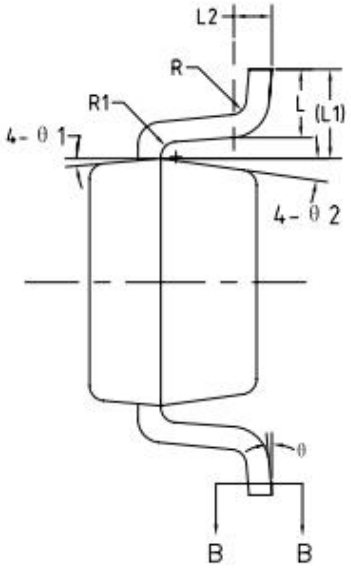
Normalized Thermal Transient Impedance, Junction-to-Ambient

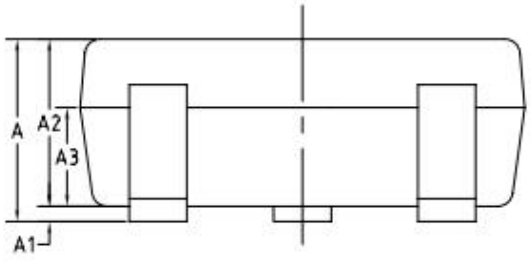


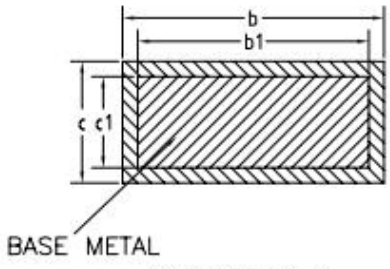
Normalized Thermal Transient Impedance, Junction-to-Foot

SOT-23-3L PACKAGE OUTLINE









SECTION B–B

COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	-	-	1.50
A1	0.00	-	0.18
A2	0.85	1.10	1.35
A3	0.58	0.65	0.72
b	0.23	-	0.53
b1	0.20	0.40	0.50
c	0.09	-	0.22
c1	0.08	0.13	0.21
D	2.78	2.95	3.10
E	2.58	2.80	3.03
E1	1.55	1.65	1.78
e	0.83	0.95	1.07
e1	1.78	1.90	2.02
L	0.28	0.45	0.62
L1	0.59REF		
L2	0.25BSC		
R	0.04	-	-
R1	0.04	-	0.21
θ	0°	-	8°
θ 1	8°	10°	12°
θ 2	8°	10°	12°

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