

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

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^d	Q _g (Typ.)
- 60	0.055 at V _{GS} = - 10 V	- 6.2	23 nC
	0.060 at V _{GS} = - 4.5 V	- 5.6	

FEATURES

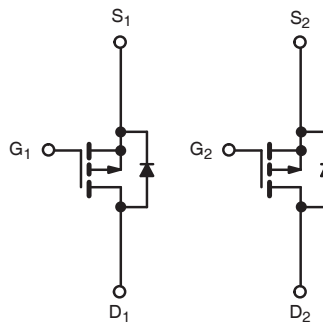
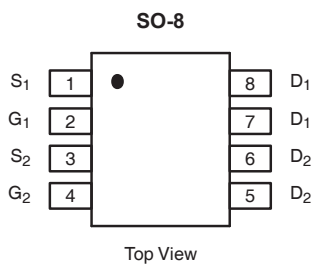
- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

- Power management
- Load switch
- Battery protection



RoHS
COMPLIANT



P-Channel MOSFET P-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)	I _D	T _C = 25 °C	-6.2	A
		T _C = 70 °C	-5.2	
		T _A = 25 °C	-2.7 ^{a,b}	
		T _A = 70 °C	-1.3 ^{a,b}	
Pulsed Drain Current	I _{DM}	-24 ^e		
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	- 6.2	
		T _A = 25 °C	- 2.5 ^{a, b}	
Avalanche Current	I _{AS}	-5.6 ^e		
Single-Pulse Avalanche Energy	E _{AS}	30	mJ	
Maximum Power Dissipation	P _D	T _C = 25 °C	10	W
		T _C = 70 °C	7.1	
		T _A = 25 °C	3.5 ^{a, b}	
		T _A = 70 °C	2.3 ^{a, b}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, c}	R _{thJA}	23	40	°C/W
Maximum Junction-to-Foot	R _{thJF}	55	85	

Notes:

- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under steady state conditions is 110 °C/W.
- Based on T_C = 25 °C.
- Limited by package.

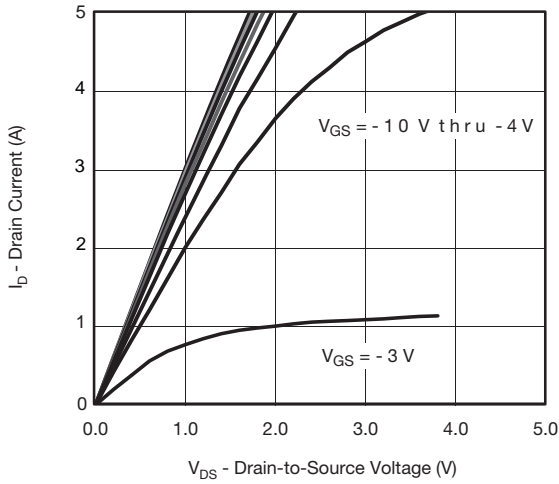
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 52		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		4			
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	$I_{D(on)}$	$V_{DS} \geq -10\text{ V}, V_{GS} = -10\text{ V}$	-7.9			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -5\text{ A}$		0.055	0.070	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -4\text{ A}$		0.060	0.075	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -5\text{ A}$		25		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2475		μF
Output Capacitance	C_{oss}		605			
Reverse Transfer Capacitance	C_{rss}		53			
Total Gate Charge	Q_g	$V_{DS} = -48\text{ V}, V_{GS} = -10\text{ V}, I_D = -5\text{ A}$		23	42	nC
		$V_{DS} = -48\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -4\text{ A}$		18		
Gate-Source Charge	Q_{gs}		5			
Gate-Drain Charge	Q_{gd}		6			
Gate Resistance	R_g	$f = 1\text{ MHz}$		8		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -48\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong -2\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		10		ns
Rise Time	t_r		9			
Turn-Off Delay Time	$t_{d(off)}$		60			
Fall Time	t_f		25			
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -48\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		19		
Rise Time	t_r		15			
Turn-Off Delay Time	$t_{d(off)}$		75			
Fall Time	t_f		30			
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			- 6.2	A
Pulse Diode Forward Current	I_{SM}				- 24	
Body Diode Voltage	V_{SD}	$I_S = -2\text{ A}, V_{GS} = 0\text{ V}$		- 0.7	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		25	52	ns
Body Diode Reverse Recovery Charge	Q_{rr}		22	61	nC	
Reverse Recovery Fall Time	t_a		10		ns	
Reverse Recovery Rise Time	t_b		15			

Notes:

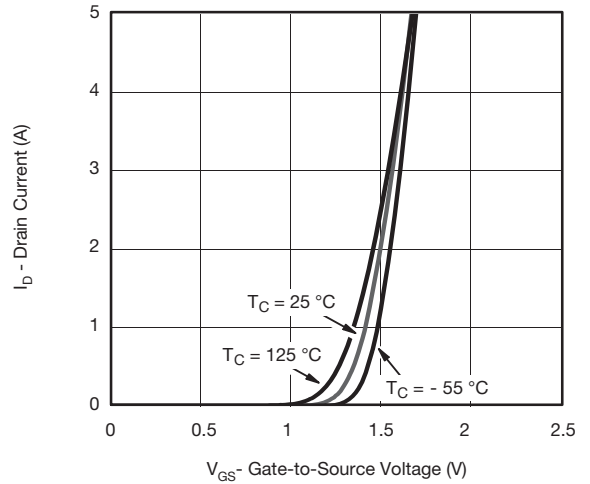
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

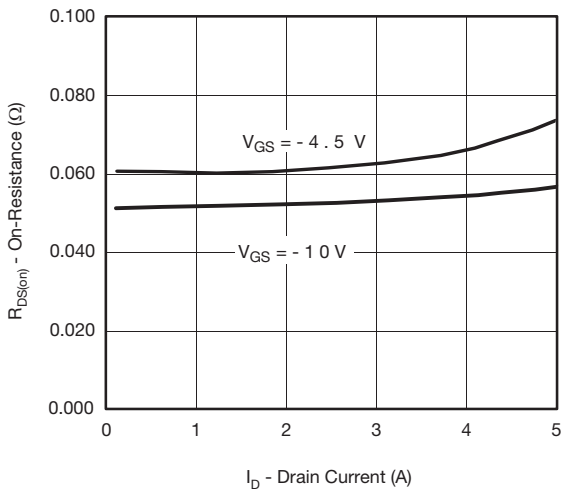
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



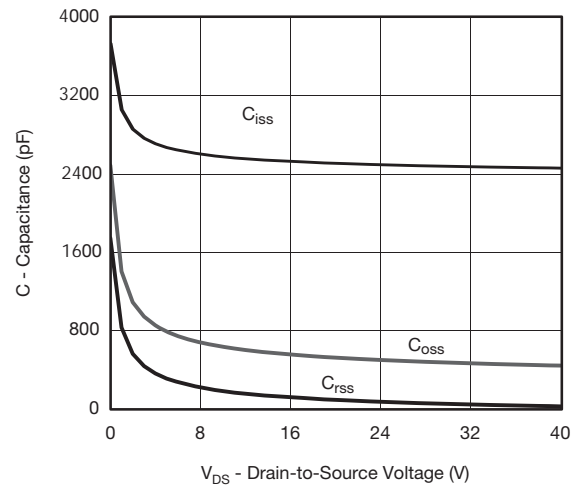
Output Characteristics



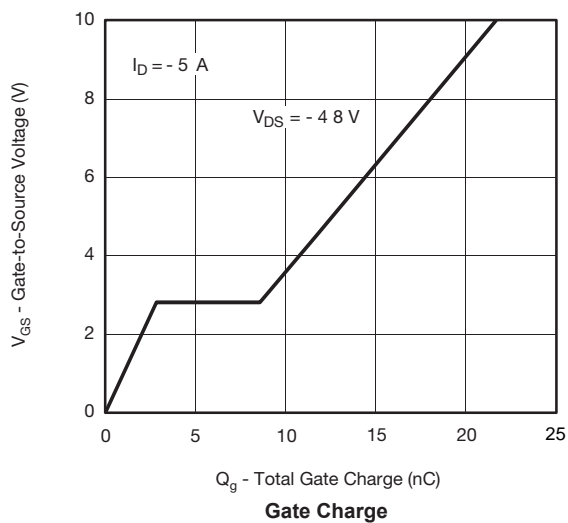
Transfer Characteristics



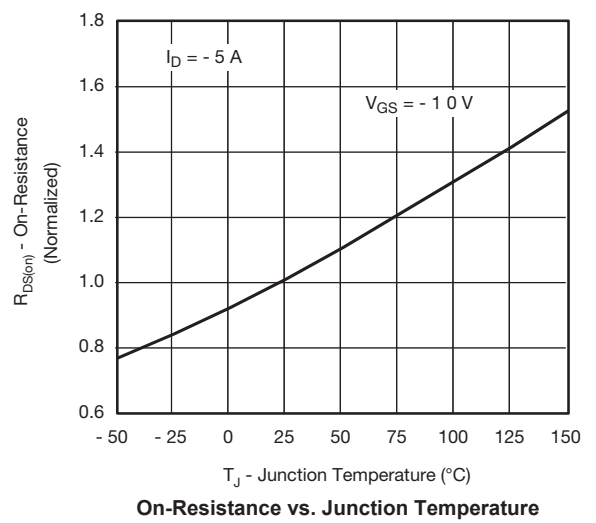
On-Resistance vs. Drain Current



Capacitance

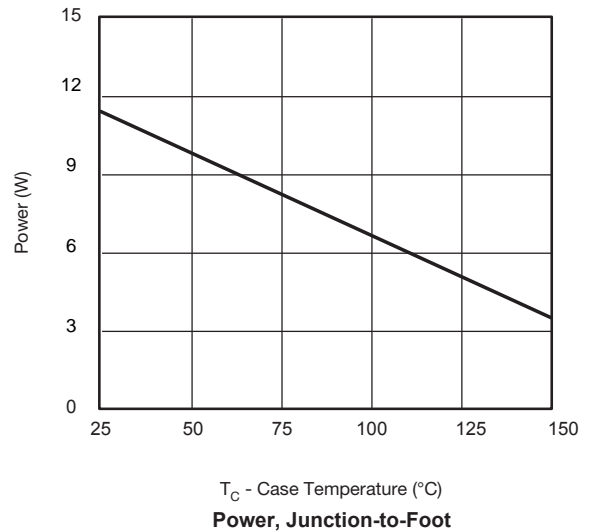
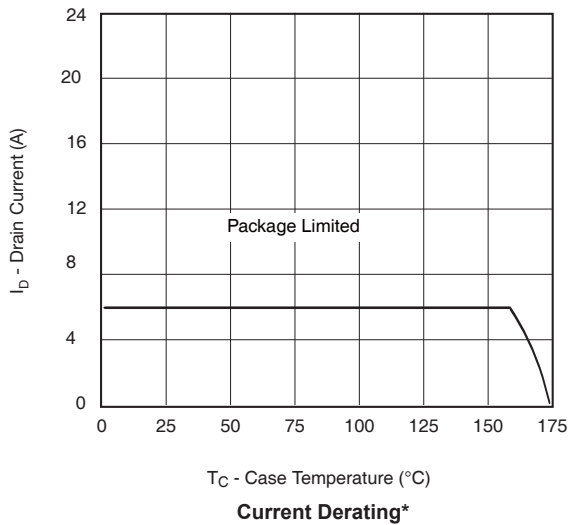
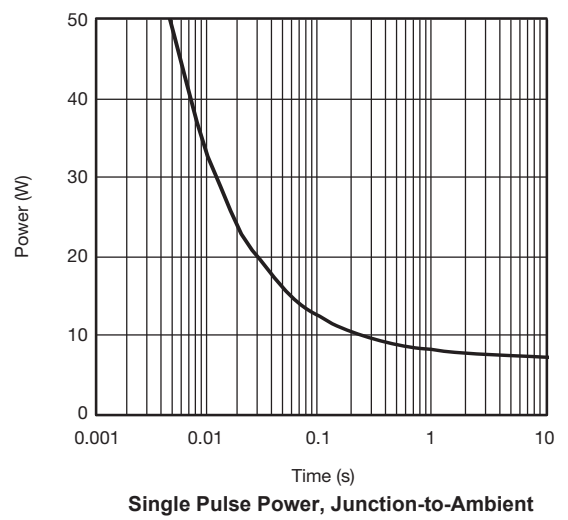
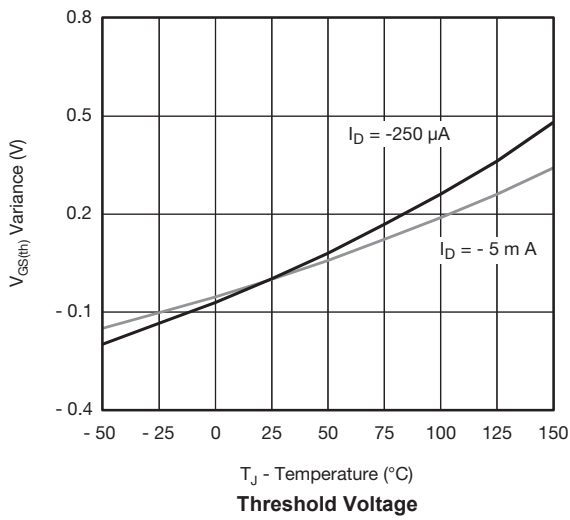
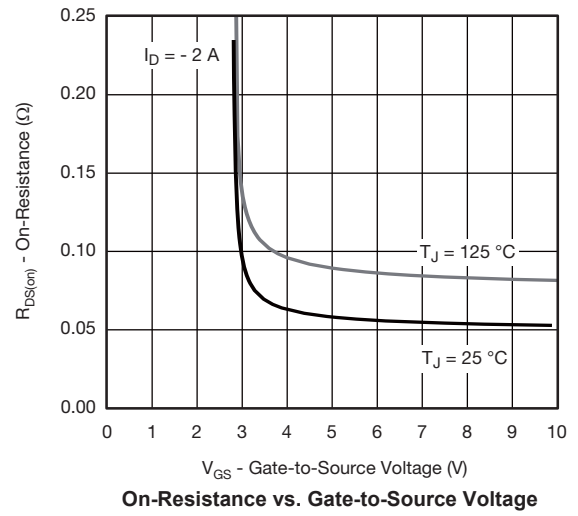
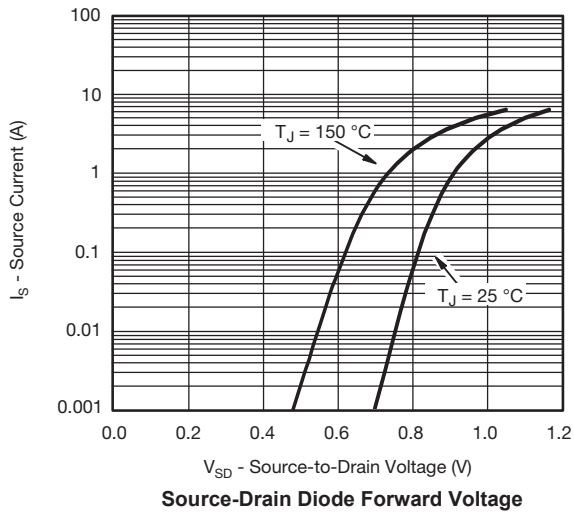


Gate Charge

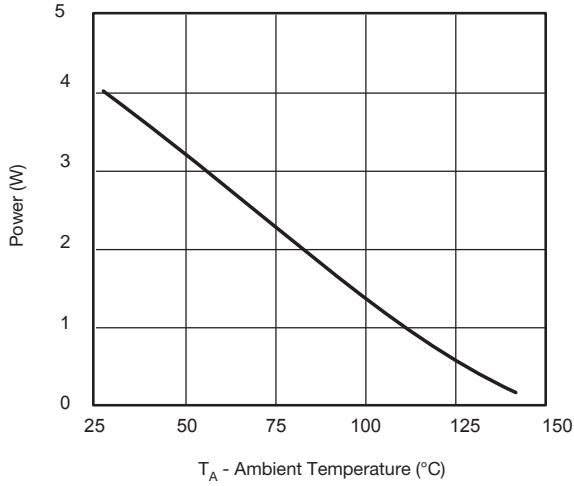


On-Resistance vs. Junction Temperature

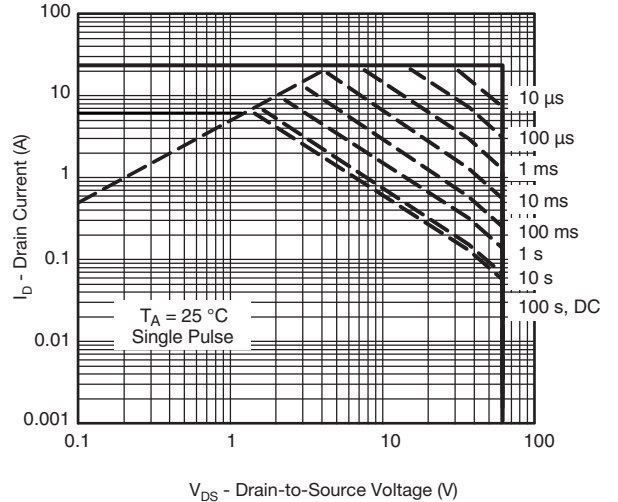
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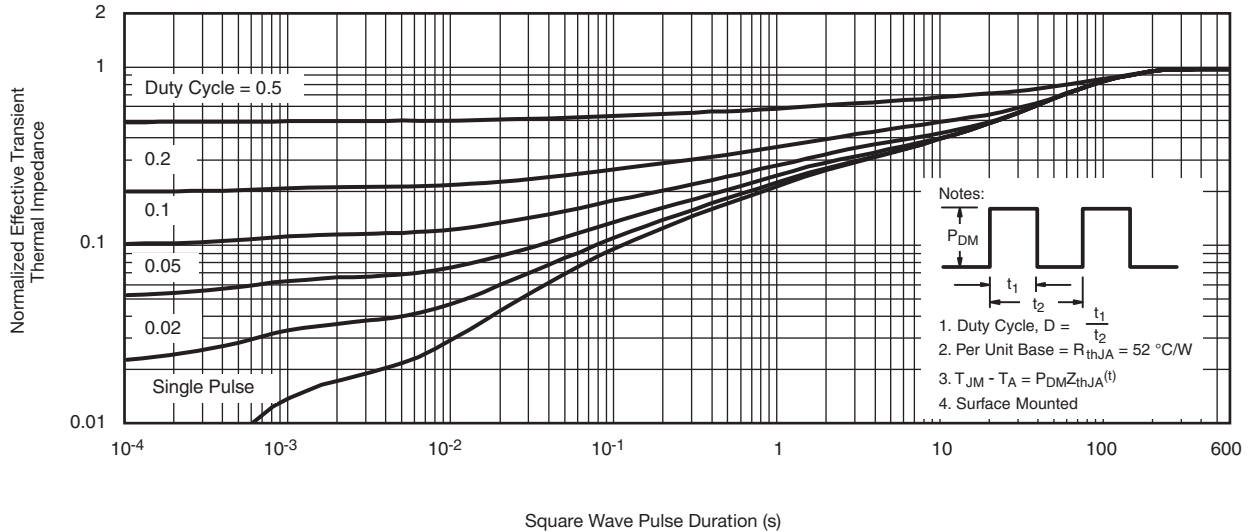


Power Derating, Junction-to-Ambient



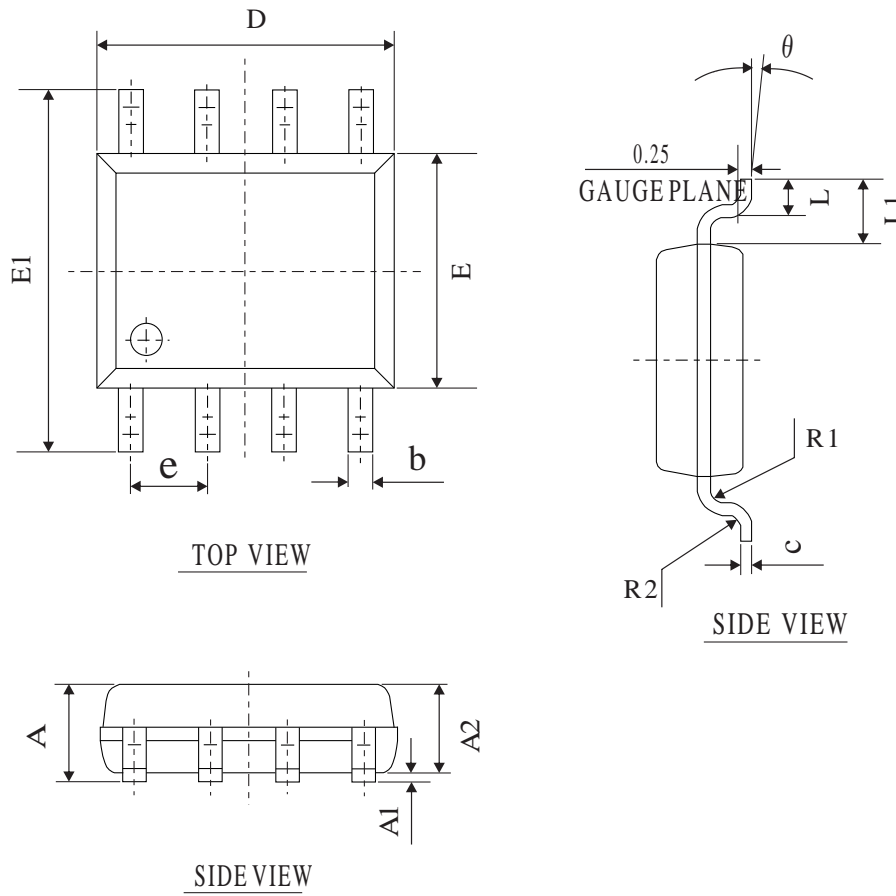
Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

* 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.



Normalized Thermal Transient Impedance, Junction-to-Ambient

SOP-8 PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	1.30	1.60	1.85
A1	0.03	0.15	0.28
A2	1.20	1.45	1.70
b	0.26	0.40	0.54
C	0.132	0.203	0.273
D	4.50	4.90	5.30
E	3.50	3.00	4.30
E1	5.50	6.00	6.50
L	0.30	0.70	1.10
θ	2°	4°	6°
L1	1.04REF		
e	1.27BSC		
R1	0.07TYP		
R2	0.07TYP		

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