

## P-Channel 40 V (D-S) MOSFET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω) Max.	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
- 40	0.012 at V <sub>GS</sub> = - 10 V	- 15 <sup>d</sup>	33 nC
	0.016 at V <sub>GS</sub> = - 4.5 V	- 13 <sup>d</sup>	

### FEATURES

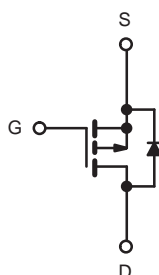
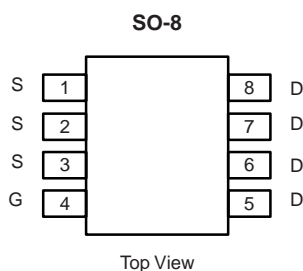
- 100% R<sub>g</sub> and UIS Tested

### APPLICATIONS

- Adaptor Switch
- Load Switch
- Power Management
- Mobile Computing



**RoHS**  
COMPLIANT



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 40	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 15 <sup>d</sup>
		T <sub>C</sub> = 70 °C	- 12 <sup>d</sup>
		T <sub>A</sub> = 25 °C	- 11.7 <sup>a, b</sup>
		T <sub>A</sub> = 70 °C	- 9.7 <sup>a, b</sup>
Pulsed Drain Current (t = 300 μs)	I <sub>DM</sub>	- 65	A
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	- 15 <sup>d</sup>
		T <sub>A</sub> = 25 °C	- 2.5 <sup>a, b</sup>
Avalanche Current	I <sub>AS</sub>	- 14.5	
Single-Pulse Avalanche Energy	E <sub>AS</sub>	18	mJ
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	49
		T <sub>C</sub> = 70 °C	31
		T <sub>A</sub> = 25 °C	3.4 <sup>a, b</sup>
		T <sub>A</sub> = 70 °C	2.18 <sup>a, b</sup>
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) <sup>e, f</sup>		260	

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, c</sup>	R <sub>thJA</sub>	28	35	°C/W
Maximum Junction-to-Case	R <sub>thJC</sub>	1.9	2.8	

Notes:

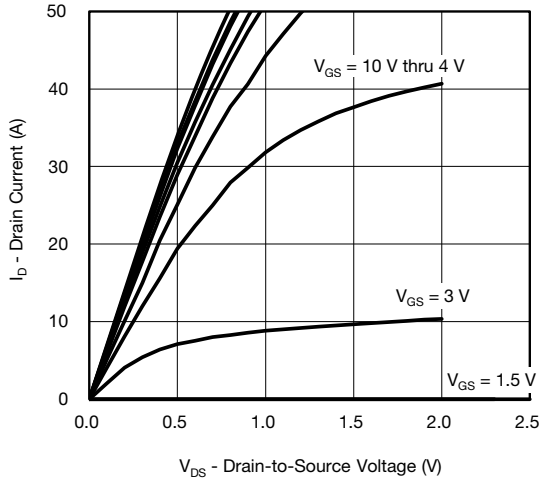
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under steady state conditions is 81 °C/W.
- Package limited.

<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-40			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-25		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		4.6			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1		-2.5	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq -10\text{ V}, V_{GS} = -10\text{ V}$	-30			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		0.012	0.018	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -7\text{ A}$		0.018	0.026	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -10\text{ A}$		48		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2982		$\mu\text{F}$
Output Capacitance	$C_{oss}$		385			
Reverse Transfer Capacitance	$C_{rss}$		189			
Total Gate Charge	$Q_g$	$V_{DS} = -20\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		70	115	nC
				33	57	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -20\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$		9.4		
Gate-Drain Charge	$Q_{gd}$			10.6		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	0.4	1.6	3.2	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		12		ns
Rise Time	$t_r$			12		
Turn-Off Delay Time	$t_{d(off)}$			49		
Fall Time	$t_f$			11		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		62		
Rise Time	$t_r$			85		
Turn-Off Delay Time	$t_{d(off)}$			41		
Fall Time	$t_f$			15		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			-15	A
Pulse Diode Forward Current	$I_{SM}$				-65	
Body Diode Voltage	$V_{SD}$	$I_S = -3\text{ A}, V_{GS} = 0\text{ V}$		-0.7	-1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -10\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		23		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			10		nC
Reverse Recovery Fall Time	$t_a$			9		ns
Reverse Recovery Rise Time	$t_b$			15		

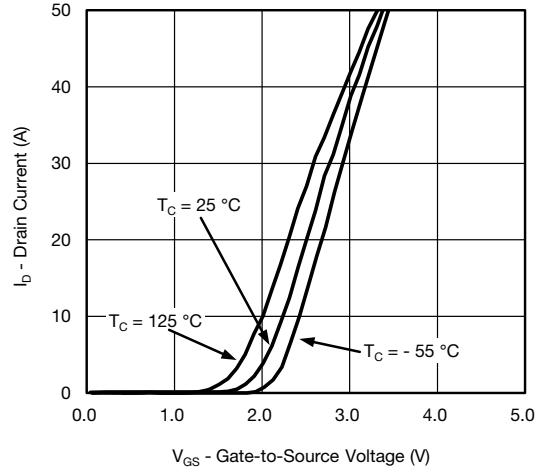
Notes:

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

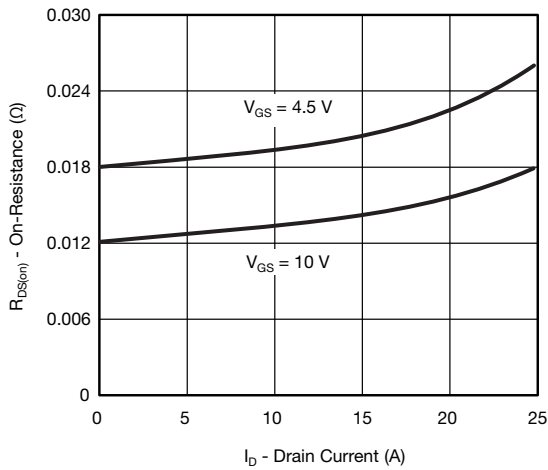
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



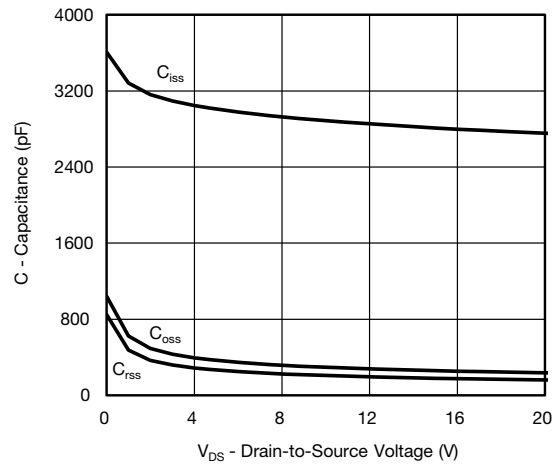
**Output Characteristics**



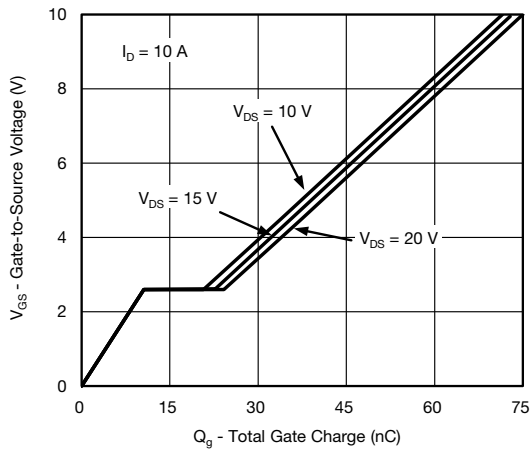
**Transfer Characteristics**



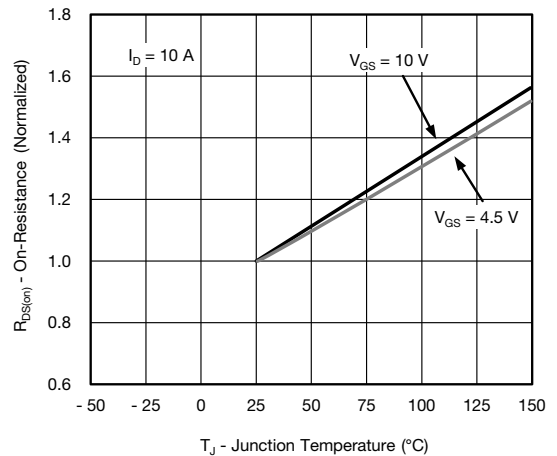
**On-Resistance vs. Drain Current**



**Capacitance**

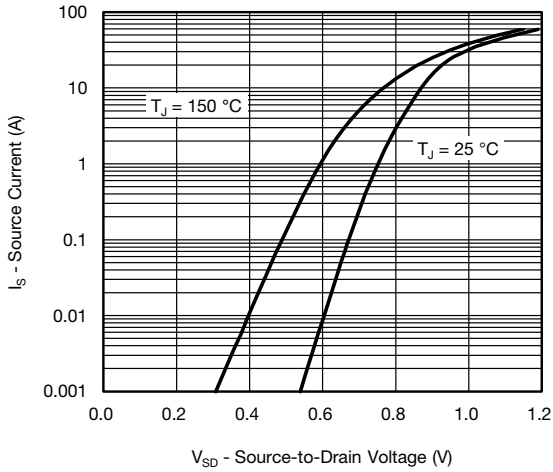


**Gate Charge**

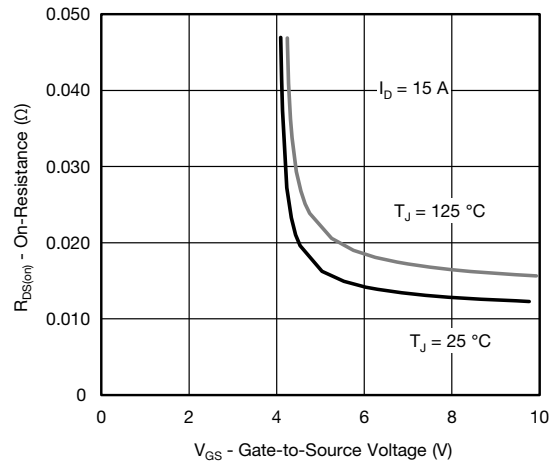


**On-Resistance vs. Junction Temperature**

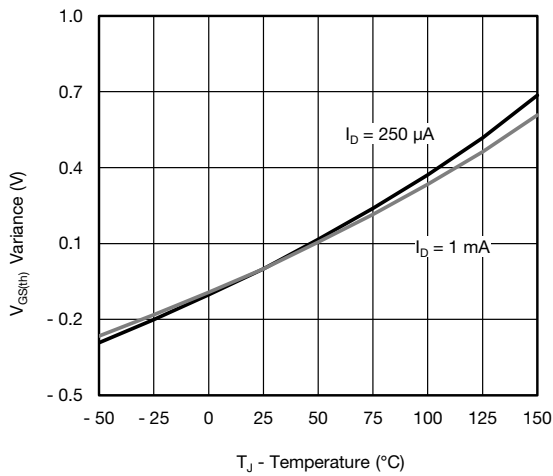
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



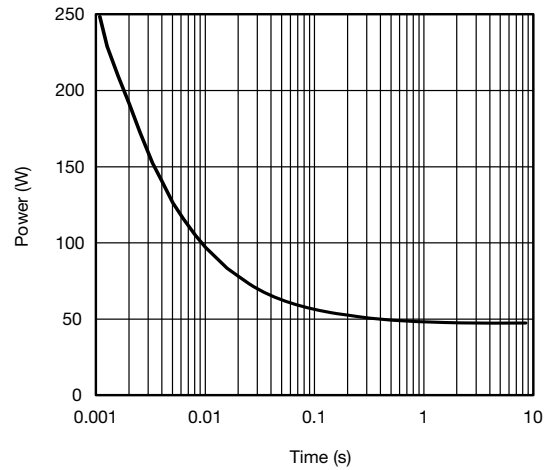
**Source-Drain Diode Forward Voltage**



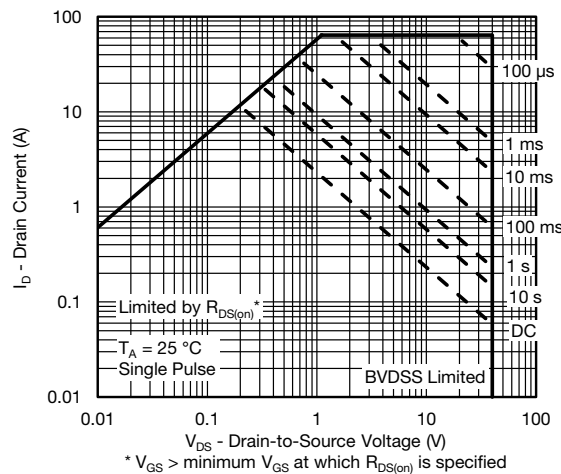
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

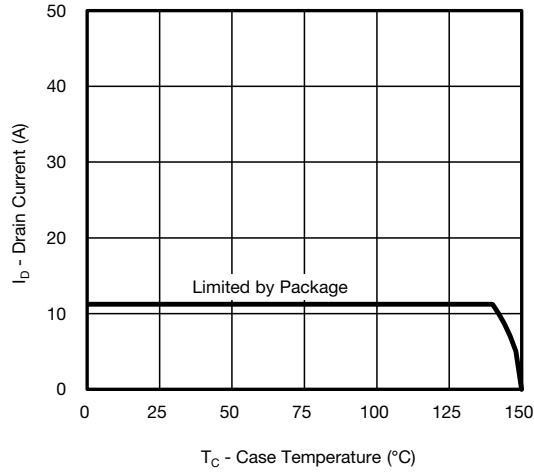


**Single Pulse Power, Junction-to-Ambient**



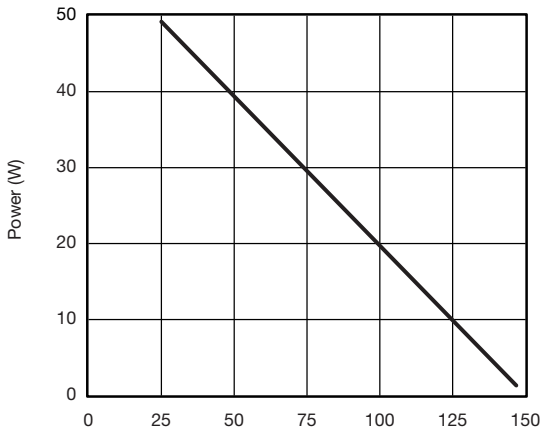
**Safe Operating Area**

**MOSFET TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



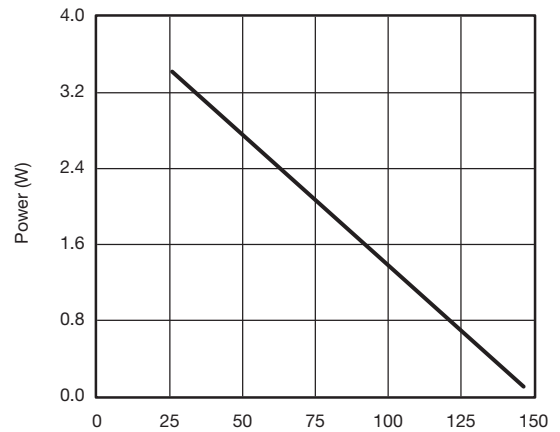
$T_C$  - Case Temperature (°C)

**Current Derating\***



$T_C$  - Case Temperature (°C)

**Power, Junction-to-Case**

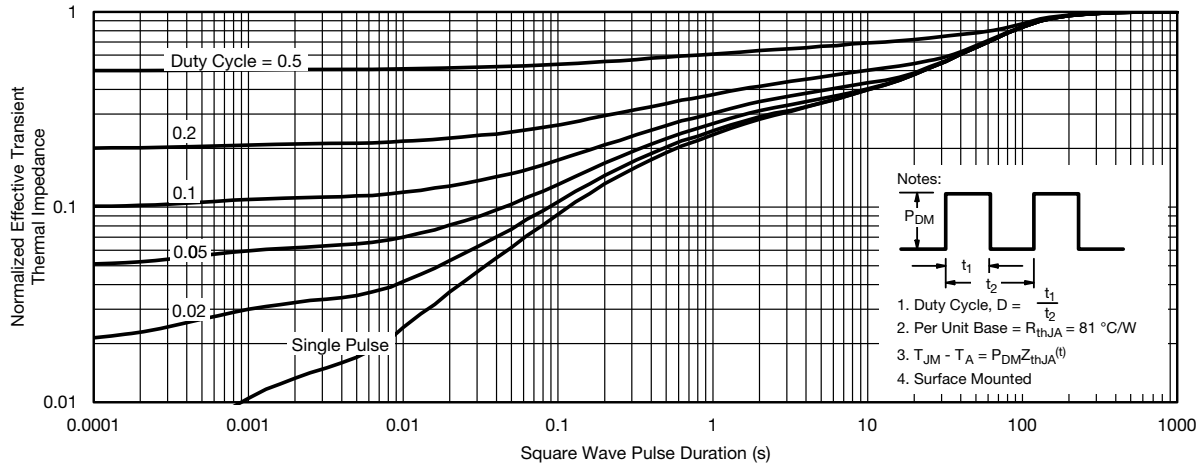


$T_A$  - Ambient Temperature (°C)

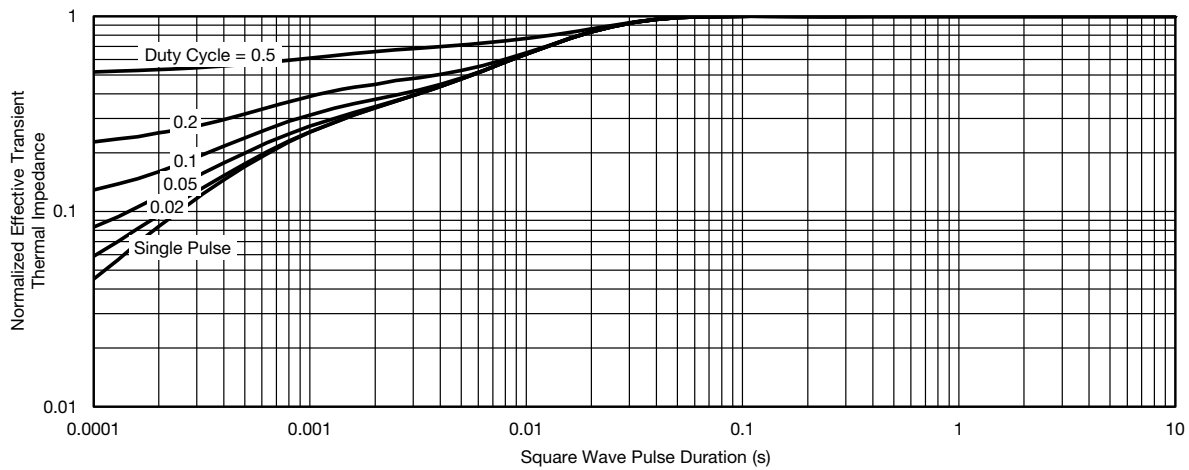
**Power, Junction-to-Ambient**

\* 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.

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

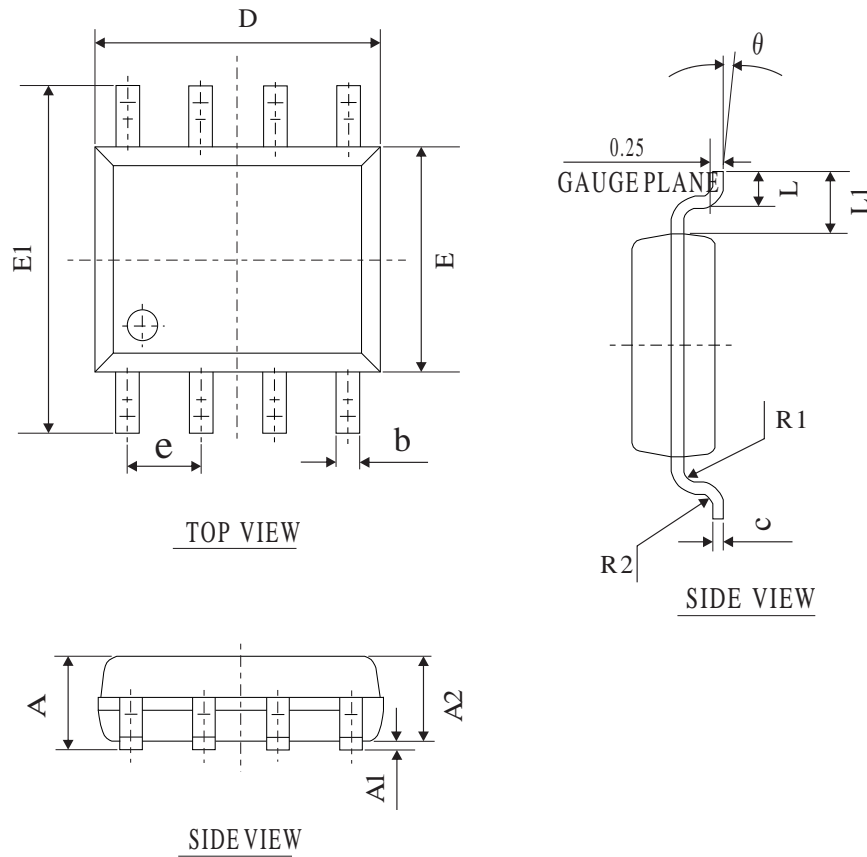


**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Case**

## 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
$\theta$	2°	4°	6°
L1	1.04REF		
e	1.27BSC		
R1	0.07TYP		
R2	0.07TYP		

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