

## P-Channel 100 V (D-S) MOSFET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
- 100	0.202 at V <sub>GS</sub> = - 10 V	- 13.5	23.2 nC
	0.210 at V <sub>GS</sub> = - 6 V	- 10.5	

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

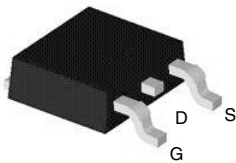


**RoHS**  
COMPLIANT

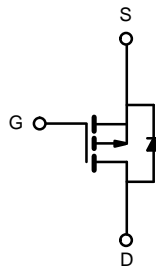
### APPLICATIONS

- Active Clamp in Intermediate DC/DC Power Supplies
- H-Bridge High Side Switch for Lighting Application

### TO-252 Pin Configuration



Top View



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>	- 100	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	- 13.5	A
		T <sub>C</sub> = 70 °C	- 7.1	
		T <sub>A</sub> = 25 °C	- 2.3 <sup>a, b</sup>	
		T <sub>A</sub> = 70 °C	- 1.9 <sup>a, b</sup>	
Pulsed Drain Current	I <sub>DM</sub>	- 41		
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	- 13.5	
		T <sub>A</sub> = 25 °C	- 3 <sup>a, b</sup>	
Avalanche Current	I <sub>AS</sub>	13.5	mJ	
Single-Pulse Avalanche Energy	E <sub>AS</sub>	11.25		
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	52	W
		T <sub>C</sub> = 70 °C	33	
		T <sub>A</sub> = 25 °C	3.7 <sup>a, b</sup>	
		T <sub>A</sub> = 70 °C	2.4 <sup>a, b</sup>	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 50 to 150	°C	
Soldering Recommendations (Peak Temperature)		260		

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. t = 10 s.

**THERMAL RESISTANCE RATINGS**

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, b</sup>	$t \leq 10$ s	$R_{thJA}$	26	33	°C/W
Maximum Junction-to-Case (Drain)	Steady State	$R_{thJC}$	1.9	2.4	

Notes:

- a. Surface mounted on 1" x 1" FR4 board.
- b. Maximum under steady state conditions is 81 °C/W.

**SPECIFICATIONS** ( $T_J = 25$  °C, unless otherwise noted)

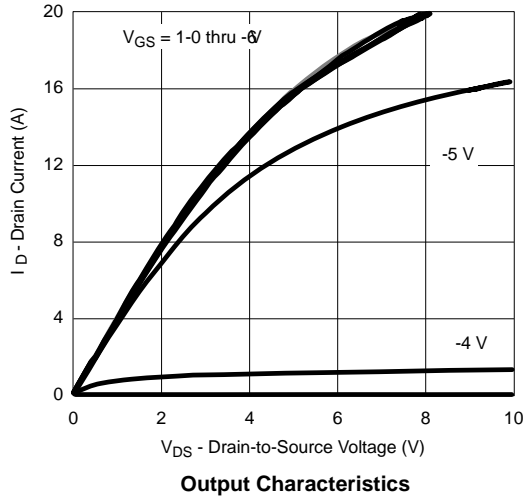
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0$ V, $I_D = -250$ $\mu$ A	-100			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250$ $\mu$ A		-165		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-6.6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250$ $\mu$ A	-2		-4	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -100$ V, $V_{GS} = 0$ V			-1	$\mu$ A
		$V_{DS} = -100$ V, $V_{GS} = 0$ V, $T_J = 55$ °C			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq -5$ V, $V_{GS} = -10$ V	-15			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10$ V, $I_D = -4$ A		0.202	0.223	$\Omega$
		$V_{GS} = -6$ V, $I_D = -3$ A		0.210	0.231	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15$ V, $I_D = 4$ A		12		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -50$ V, $V_{GS} = 0$ V, $f = 1$ MHz		1190		pF
Output Capacitance	$C_{oss}$			61		
Reverse Transfer Capacitance	$C_{rss}$			42		
Total Gate Charge	$Q_g$	$V_{DS} = -75$ V, $V_{GS} = -10$ V, $I_D = -3$ A		27.5	42	nC
		$V_{DS} = -75$ V, $V_{GS} = -6$ V, $I_D = -3$ A		23.2	35	
Gate-Source Charge	$Q_{gs}$			5.4		
Gate-Drain Charge	$Q_{gd}$		8.4			
Gate Resistance	$R_g$	$f = 1$ MHz	1.3	6.1	9.2	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -75$ V, $R_L = 25$ $\Omega$ $I_D \cong -3$ A, $V_{GEN} = -6$ V, $R_g = 1$ $\Omega$		20	30	ns
Rise Time	$t_r$			95	145	
Turn-Off Delay Time	$t_{d(off)}$			38	60	
Fall Time	$t_f$			34	51	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -75$ V, $R_L = 25$ $\Omega$ $I_D \cong -3$ A, $V_{GEN} = -10$ V, $R_g = 1$ $\Omega$		11	18	
Rise Time	$t_r$			28	42	
Turn-Off Delay Time	$t_{d(off)}$			52	78	
Fall Time	$t_f$			35	53	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25$ °C			-13.5	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				-41	
Body Diode Voltage	$V_{SD}$	$I_S = -3$ A		-0.8	-1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -4$ A, $di/dt = 100$ A/ $\mu$ s, $T_J = 25$ °C		65	90	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			180	270	nC
Reverse Recovery Fall Time	$t_a$			45		ns
Reverse Recovery Rise Time	$t_b$			20		

Notes:

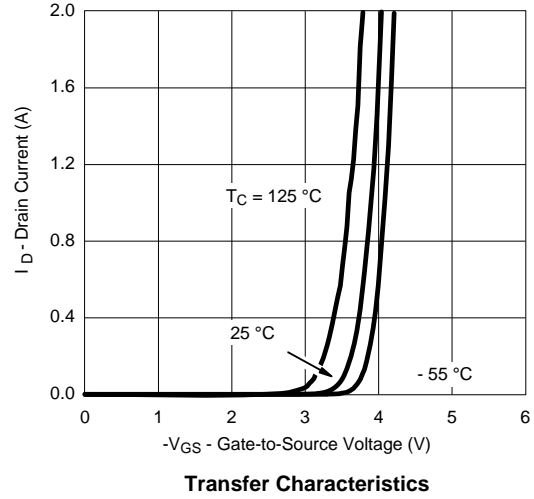
- a. Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.
- b. Guaranteed by design, not subject to production testing.

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.

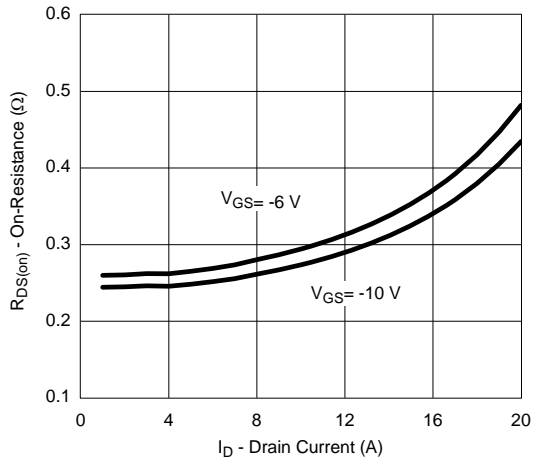
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



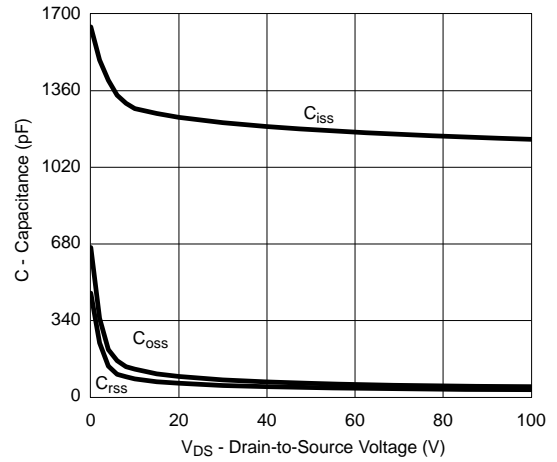
**Output Characteristics**



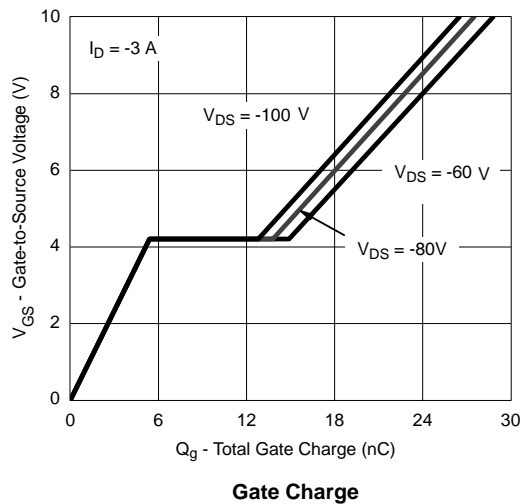
**Transfer Characteristics**



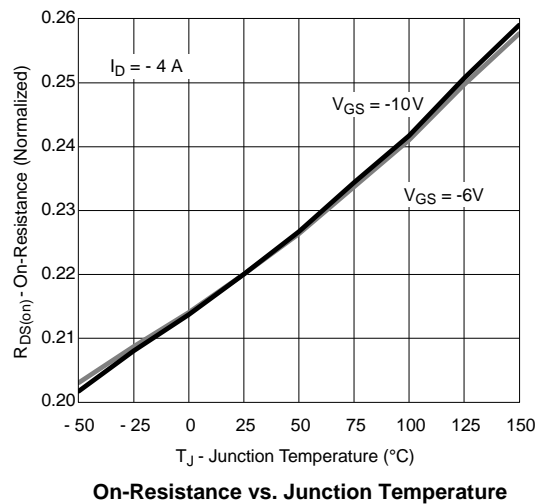
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

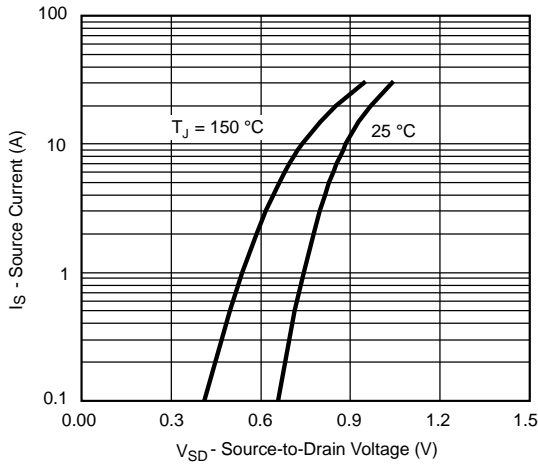


**Gate Charge**

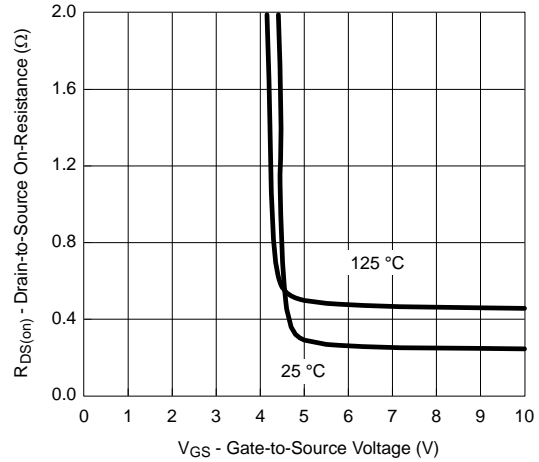


**On-Resistance vs. Junction Temperature**

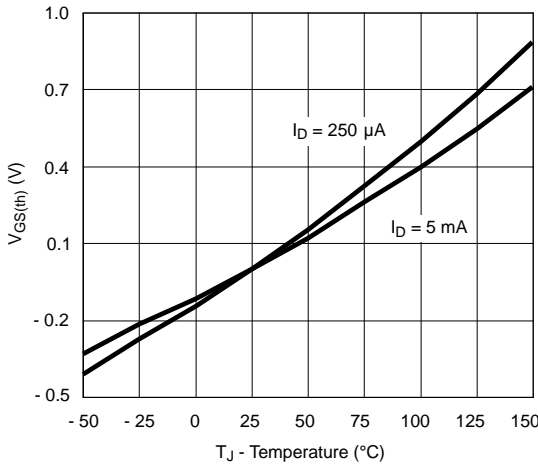
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



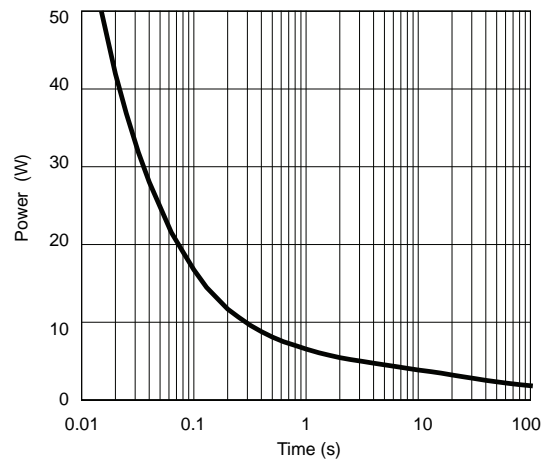
**Source-Drain Diode Forward Voltage**



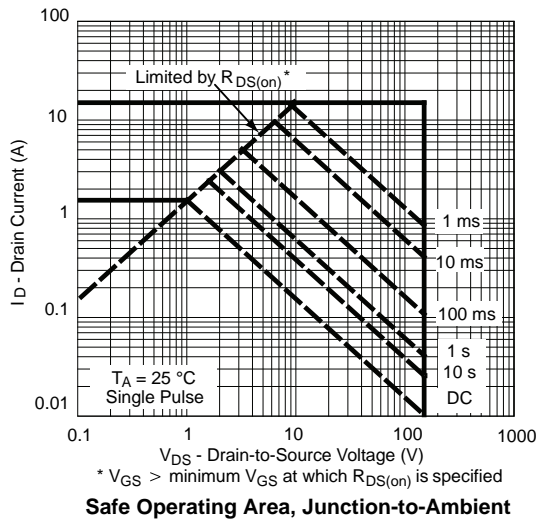
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

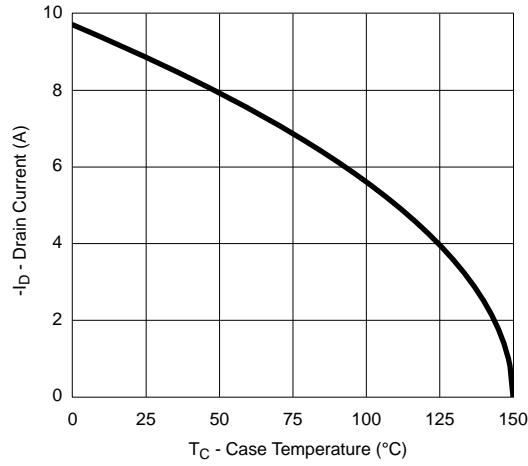


**Single Pulse Power, Junction-to-Ambient**

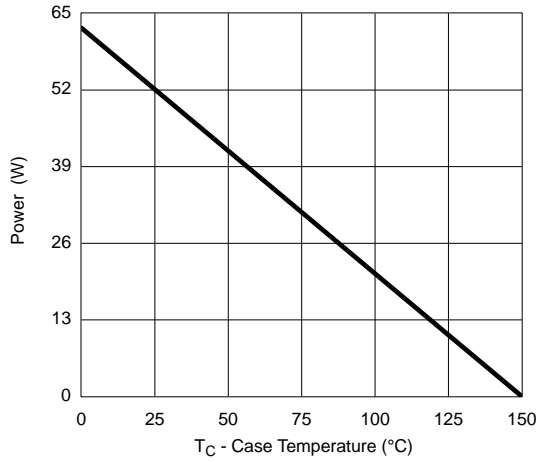


**Safe Operating Area, Junction-to-Ambient**

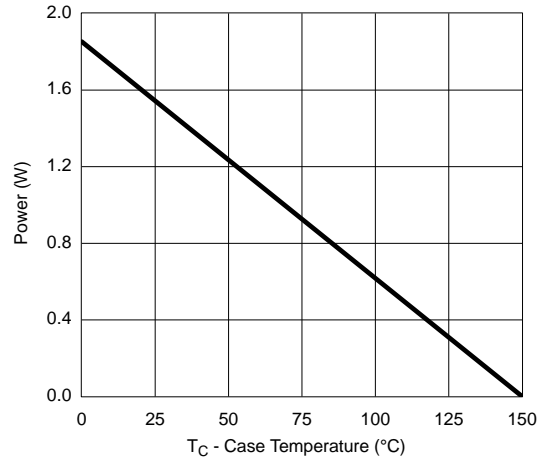
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Current Derating\***



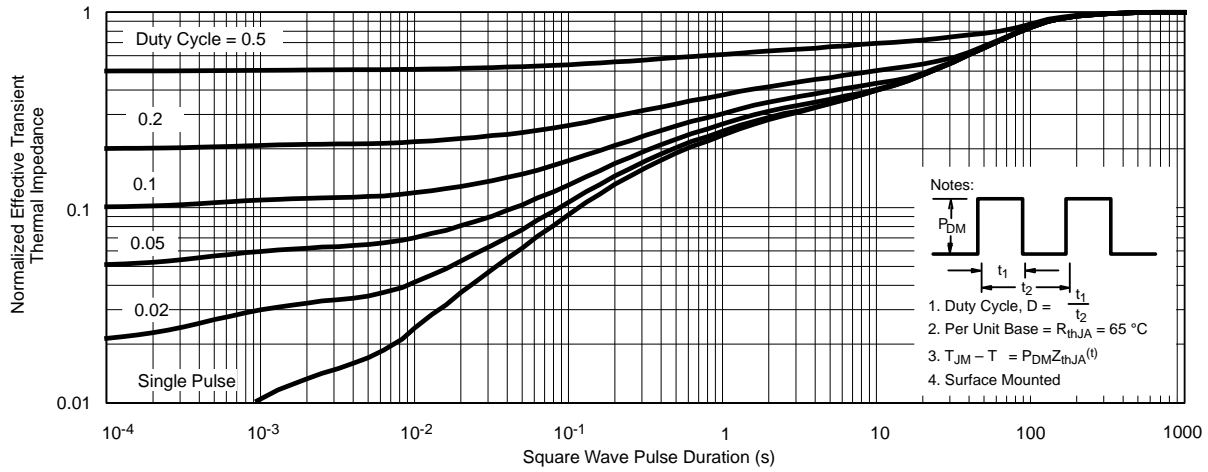
**Power, Junction-to-Case**



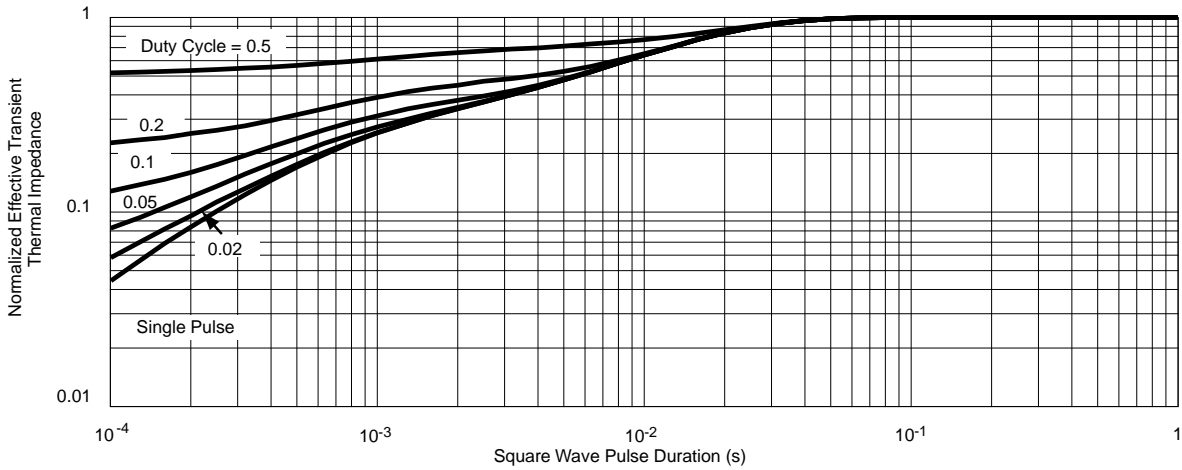
**Power, Junction-to-Ambient**

\* The power dissipation PD is based on T<sub>J(max)</sub> = 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)

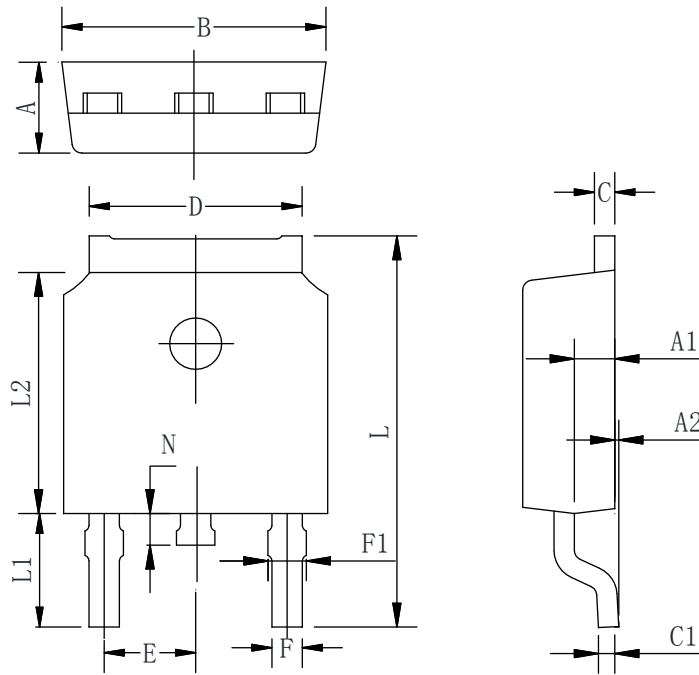


**Normalized Thermal Transient Impedance, Junction-to-Ambient**



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

## TO-252-2L PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	2.10	2.30	2.50
A1	0.88	1.01	1.16
A2	0.00	0.15	0.28
B	6.40	6.60	6.80
C	0.42	0.50	0.63
C1	0.42	0.50	0.63
D	5.08	5.32	5.65
E	2.286 TYP		
F	0.63	0.76	0.89
F1	0.64	0.86	1.08
L	9.30	9.90	10.80
L1	2.4	2.8	3.6
L2	5.90	6.10	6.55
N	0.57	0.80	1.05

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