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

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 100	0.120 at V_{GS} = - 10 V	- 19	16.5 nC
	0.160 at V_{GS} = - 4.5V	- 15.7	

FEATURES

- DT-Trench Power MOSFET
- UIS and R_g Tested

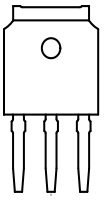
Pb-free

RoHS COMPLIANT

APPLICATIONS

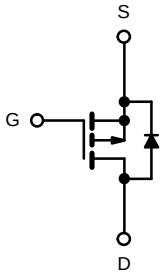
- Active Clamp in Intermediate DC/DC Power Supplies

TO-251



G D S

Top View



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 19.0	A
	T_C = 70 °C		- 12.6	
	T_A = 25 °C		- 15 [a, b]	
	T_A = 70 °C		- 10 [a, b]	
Pulsed Drain Current		I_{DM}	- 20	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 13.2	
	T_A = 25 °C		- 3.0 [a, b]	
Avalanche Current	L = 0.1 mH	I_{AS}	15	
Single-Pulse Avalanche Energy		E_{AS}	11.25	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	52	W
	T_C = 70 °C		33	
	T_A = 25 °C		3.7 [a, b]	
	T_A = 70 °C		2.4	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 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[a, b]	t ≤ 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 conditins is 81 °C/W.

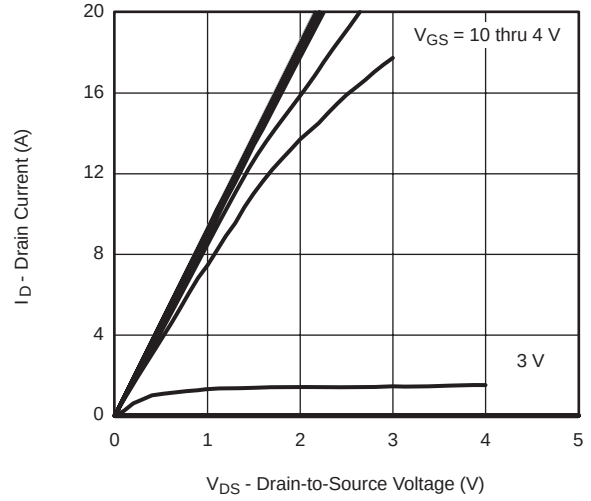
SPECIFICATIONS T_J = 25 °C, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 100		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5.0		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1		- 3	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} = - 100 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 100 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	- 10			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 4 A		0.108	0.120	Ω
		V_{GS} = - 4.5 V, I_D = - 3 A		0.119	0.160	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 15 V, I_D = 4 A		25		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 50 V, V_{GS} = 0 V, f = 1 MHz		1480		pF
Output Capacitance	C_{oss}			80		
Reverse Transfer Capacitance	C_{rss}			60		
Total Gate Charge	Q_g	V_{DS} = - 50 V, V_{GS} = - 10 V, I_D = - 4 A		35	55	nC
		V_{DS} = - 50 V, V_{GS} = - 4.5 V, I_D = - 4 A		16.5	25	
Gate-Source Charge	Q_{gs}			4.7		
Gate-Drain Charge	Q_{gd}			8		
Gate Resistance	R_g	f = 1 MHz		5.3	8	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 50 V, R_L = 12.5 Ω, I_D ≅ - 4 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		30	45	ns
Rise Time	t_r			110	165	
Turn-Off DelayTime	$t_{d(off)}$			51	80	
Fall Time	t_f			40	60	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 50 V, R_L = 12.5 Ω, I_D ≅ - 4 A, V_{GEN} = - 10 V, R_g = 1 Ω		11	18	
Rise Time	t_r			13	20	
Turn-Off DelayTime	$t_{d(off)}$			42	65	
Fall Time	t_f			10	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 19	A
Pulse Diode Forward Current[a]	I_{SM}				- 20	
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/µs, T_J = 25 °C		46	70	ns
Body Diode Reverse Recovery Charge	Q_{rr}			97	150	nC
Reverse Recovery Fall Time	t_a			36		ns
Reverse Recovery Rise Time	t_b			10		

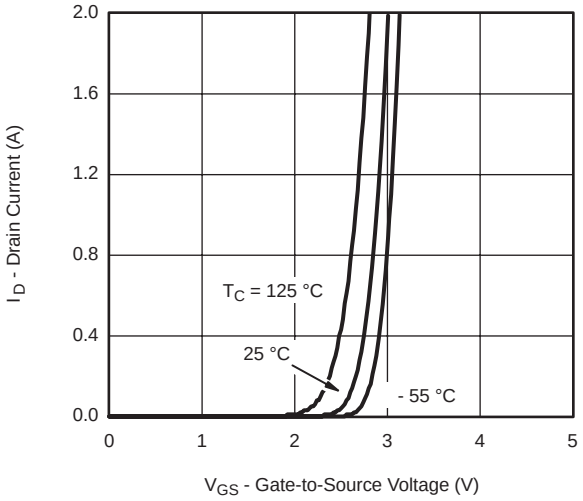
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

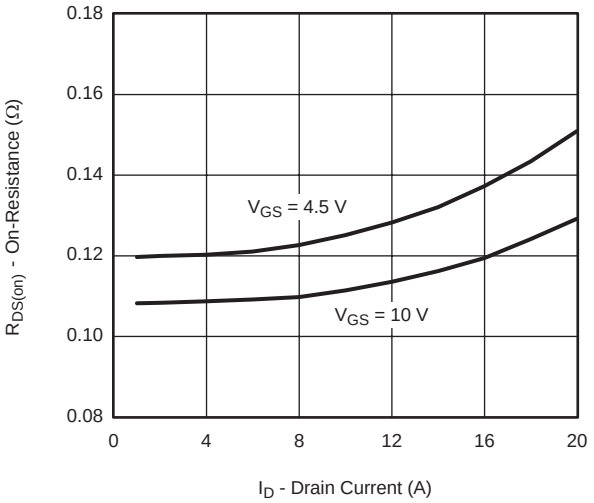
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



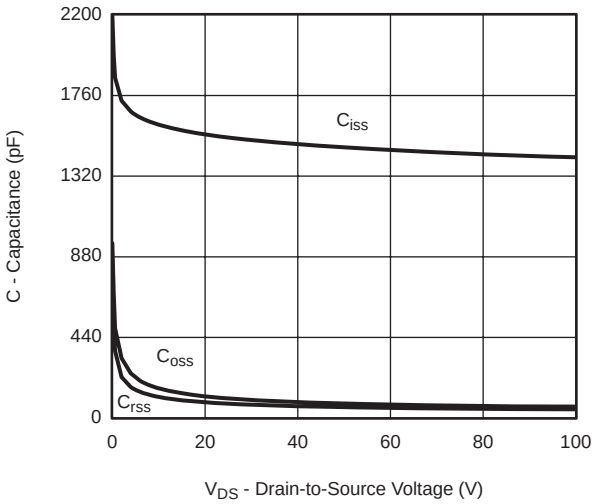
Output Characteristics



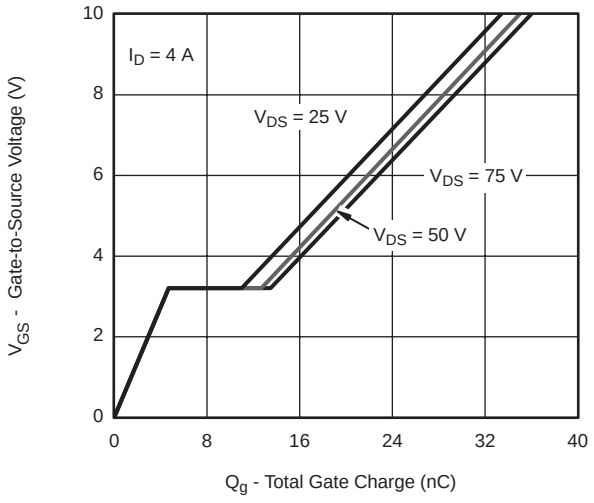
Transfer Characteristics



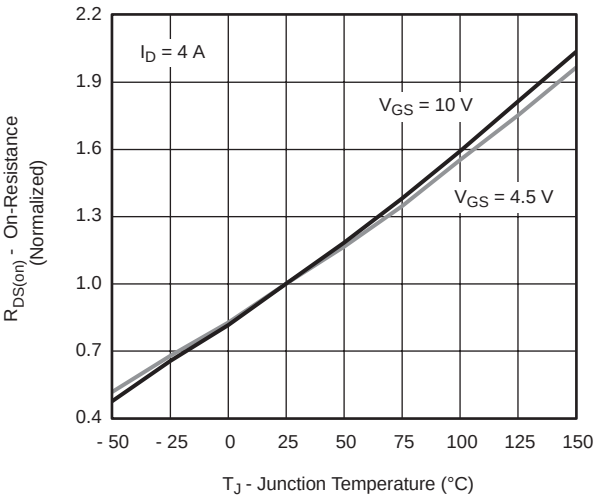
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

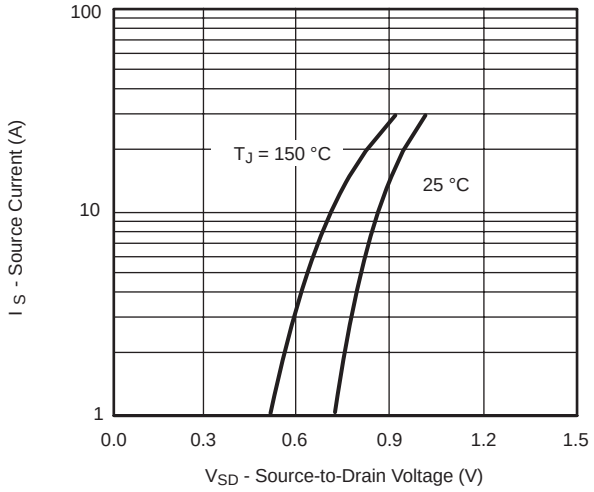


Gate Charge

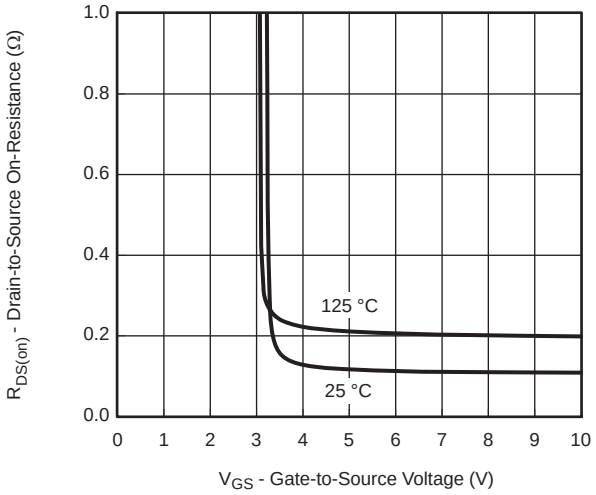


On-Resistance vs. Junction Temperature

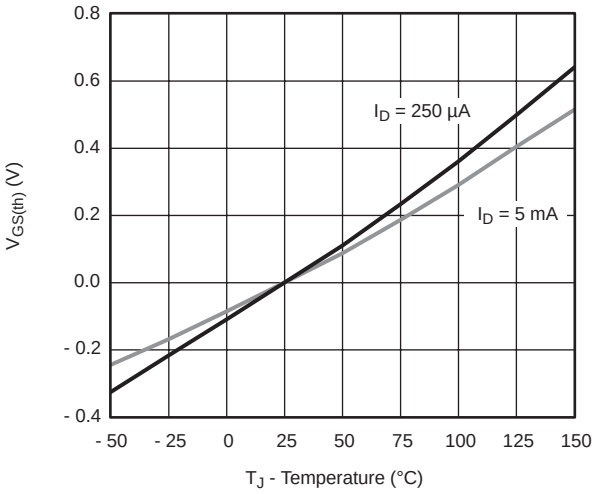
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



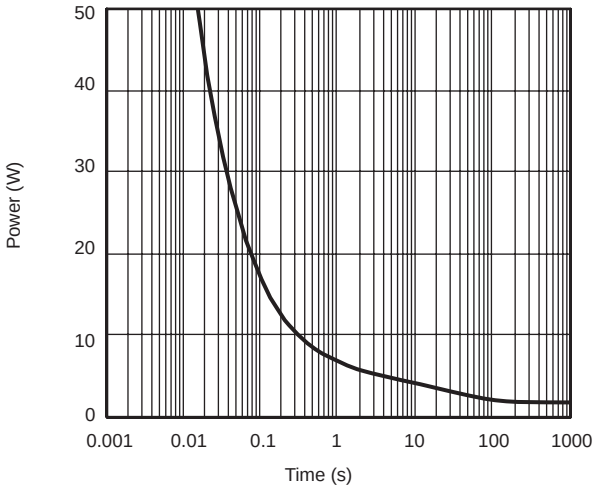
Source-Drain Diode Forward Voltage



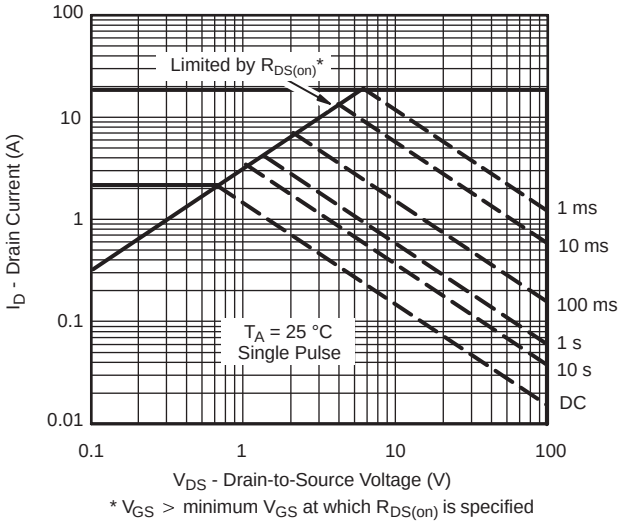
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



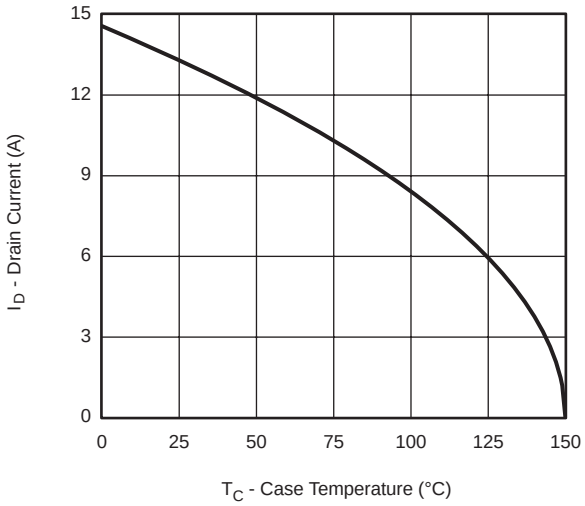
Single Pulse Power, Junction-to-Ambient



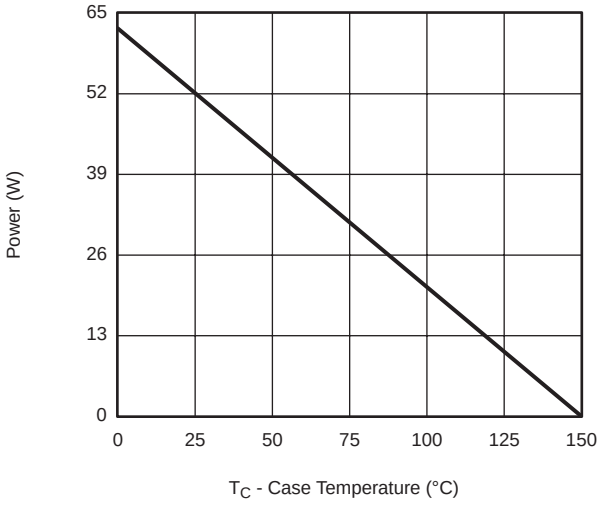
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

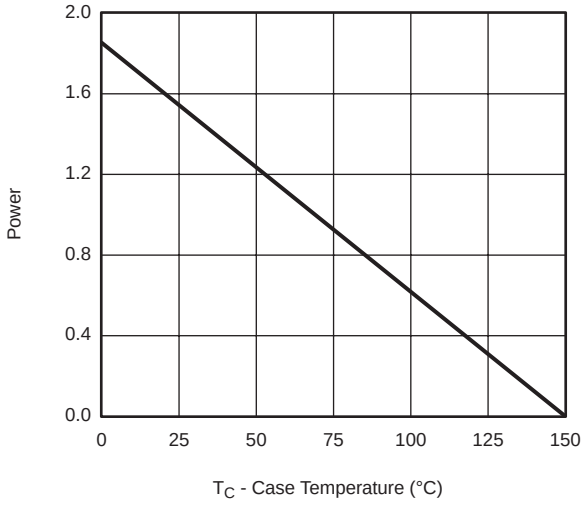
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



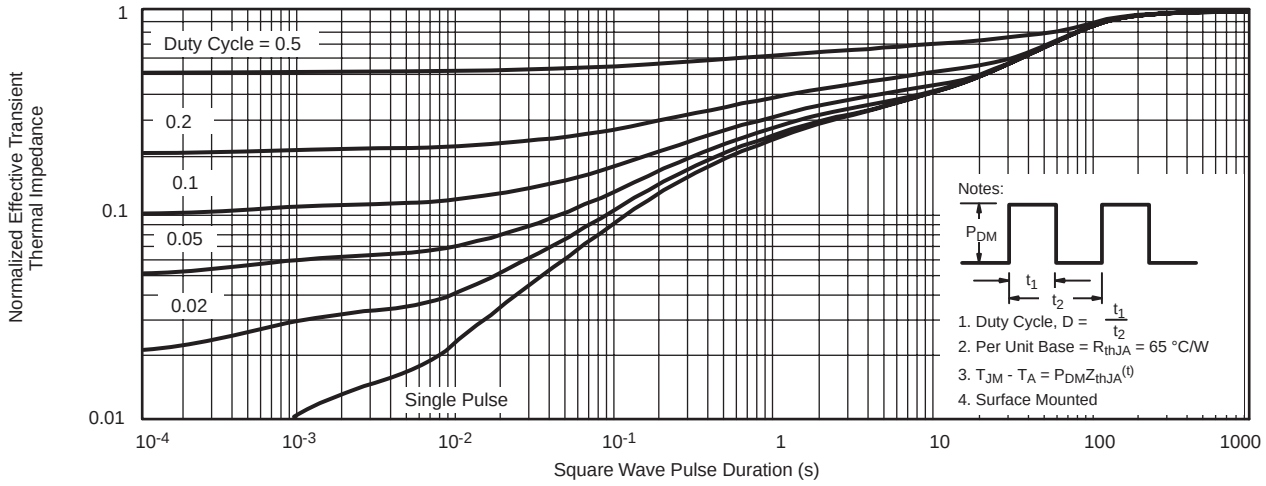
Power, Junction-to-Case



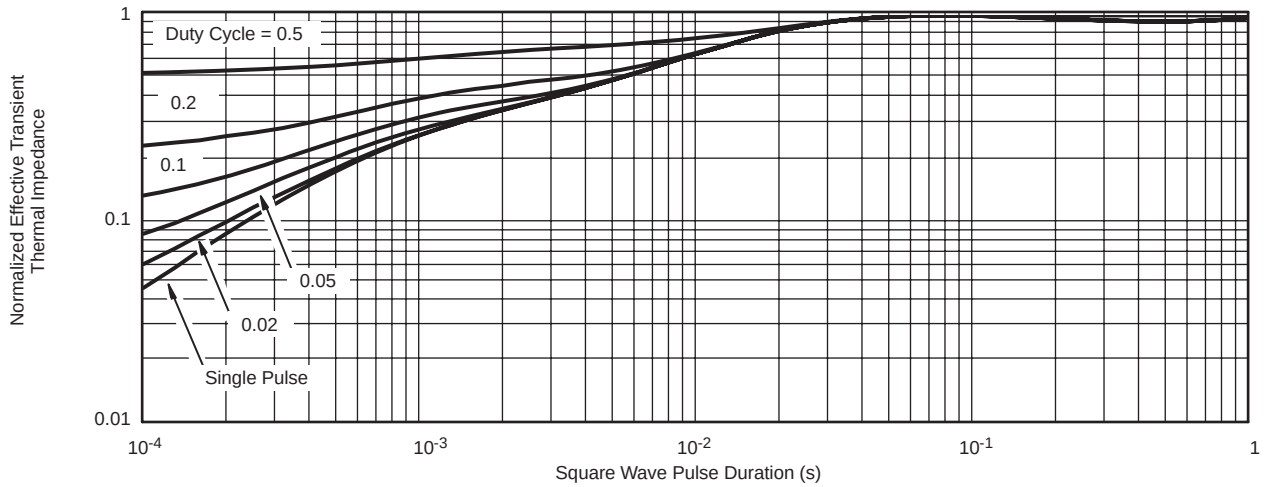
Power, Junction-to-Ambient

* The power dissipation PD is based on $T_{J(max)}$ = 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

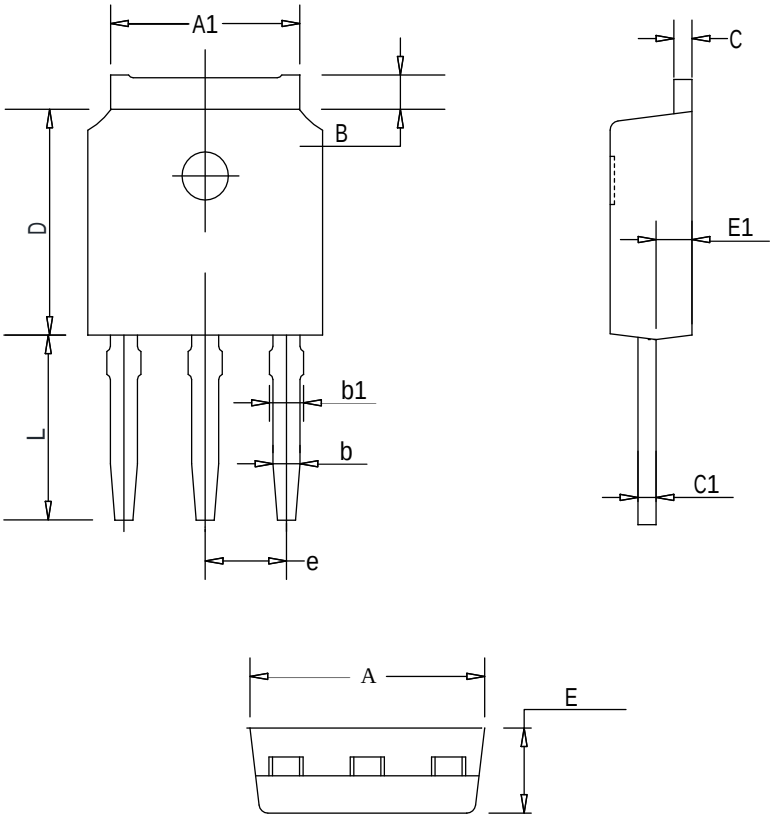


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

TO-251 PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	6.30	6.60	6.90
A1	5.00	5.30	5.60
B	0.80	1.00	1.20
C	0.40	0.50	0.60
C1	0.40	0.50	0.60
D	5.80	6.10	6.40
E	2.10	2.30	2.50
E1	0.80	1.00	1.20
L	4.50	5.00	5.50
e	2.10	2.30	2.50
b	0.66	0.76	0.86
b1	0.66	0.86	1.06

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