

P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)	Q _g (Typ.)
- 30	0.056 at V _{GS} = - 10 V	- 15 ^d	22 nC
	0.073 at V _{GS} = - 4.5 V	- 15 ^d	

FEATURES

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

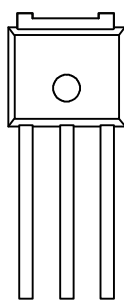


RoHS
COMPLIANT

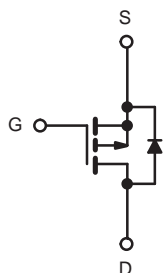
APPLICATIONS

- Notebook Battery Charging
- Notebook Adapter Switch

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}	- 30	V
Gate-Source Voltage		V _{GS}	± 25	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	- 15 ^d	A
	T _C = 70 °C		- 13 ^d	
	T _A = 25 °C		- 10.6 ^{a, b}	
	T _A = 70 °C		- 8.6 ^{a, b}	
Pulsed Drain Current		I _{DM}	- 50	A
Continuous Source-Drain Diode Current	T _C = 25 °C	I _S	- 15 ^d	
	T _A = 25 °C		- 3.0 ^{a, b}	
Avalanche Current	L = 0.1 mH	I _{AS}	- 20	mJ
Single-Pulse Avalanche Energy		E _{AS}	20	
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 ^{a, b}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)			260	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient	t ≤ 10 s	R _{thJA}	26	33	°C/W
Maximum Junction-to-Case	Steady State	R _{thJC}	1.9	2.4	

Notes:

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

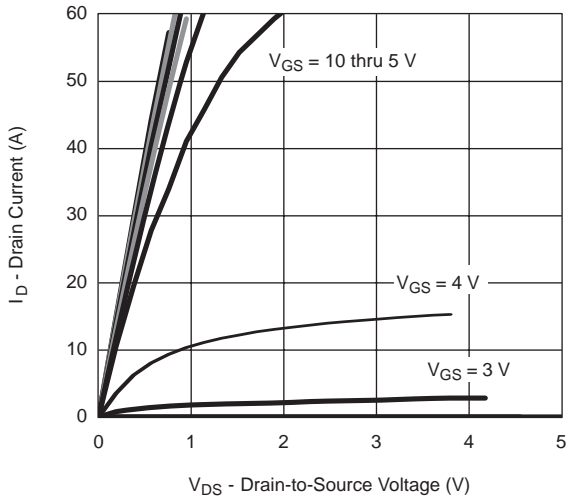
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-31		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		5.5			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1.0		-3.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 25\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq -10\text{ V}, V_{GS} = -10\text{ V}$	-30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		0.056	0.062	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -7\text{ A}$		0.073	0.081	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -10\text{ A}$		23		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1960		pF
Output Capacitance	C_{oss}		380			
Reverse Transfer Capacitance	C_{rss}		325			
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		43	65	nC
				22	33	
Gate-Source Charge	Q_{gs}	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$		6		
Gate-Drain Charge	Q_{gd}			11		
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.3	1.3	2.5	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong -5\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		11	22	ns
Rise Time	t_r			13	25	
Turn-Off Delay Time	$t_{d(off)}$			32	50	
Fall Time	t_f			9	18	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong -5\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		44	70	
Rise Time	t_r			100	160	
Turn-Off Delay Time	$t_{d(off)}$			28	50	
Fall Time	t_f			15	30	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-15	A
Pulse Diode Forward Current	I_{SM}				-50	
Body Diode Voltage	V_{SD}	$I_S = -2\text{ A}, V_{GS} = 0\text{ V}$		-0.75	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		28	45	ns
Body Diode Reverse Recovery Charge	Q_{rr}			20	40	nC
Reverse Recovery Fall Time	t_a			13		ns
Reverse Recovery Rise Time	t_b			15		

Notes:

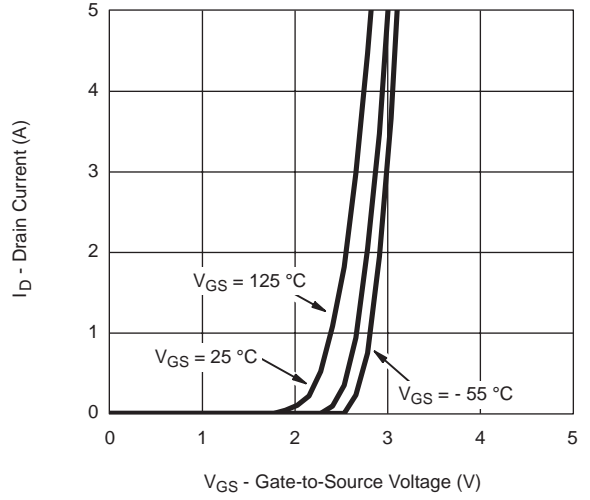
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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.

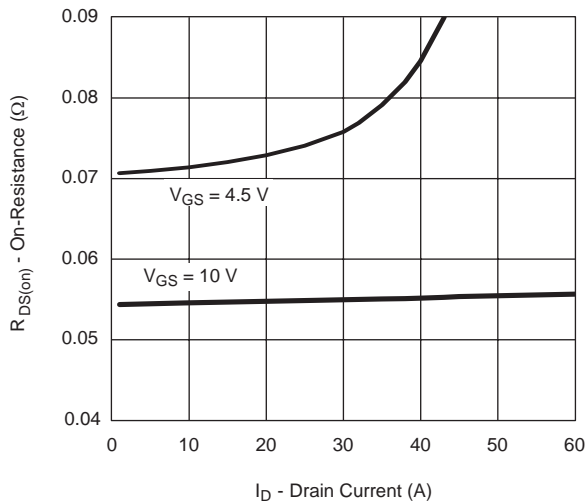
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



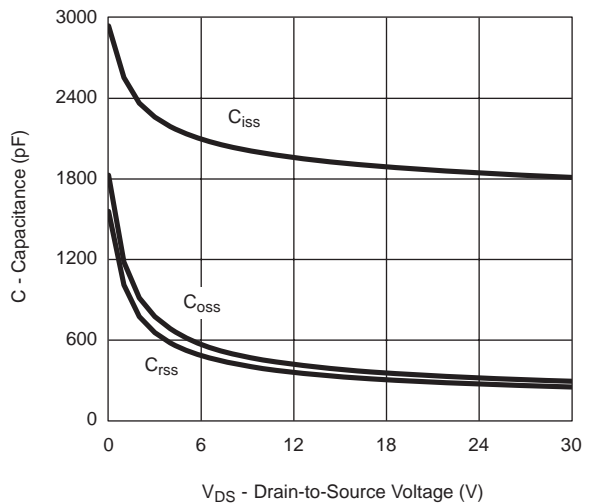
Output Characteristics



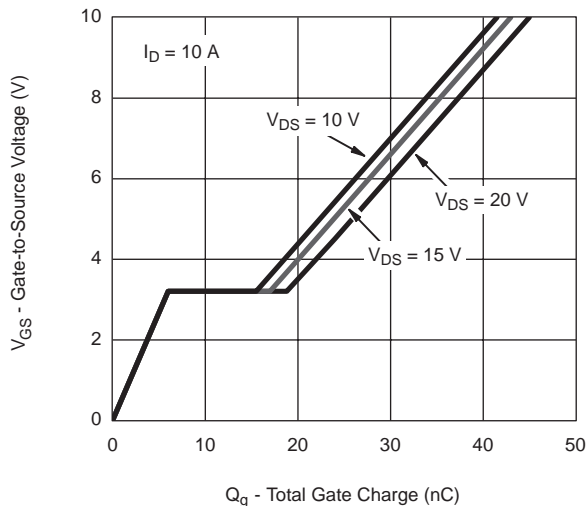
Transfer Characteristics



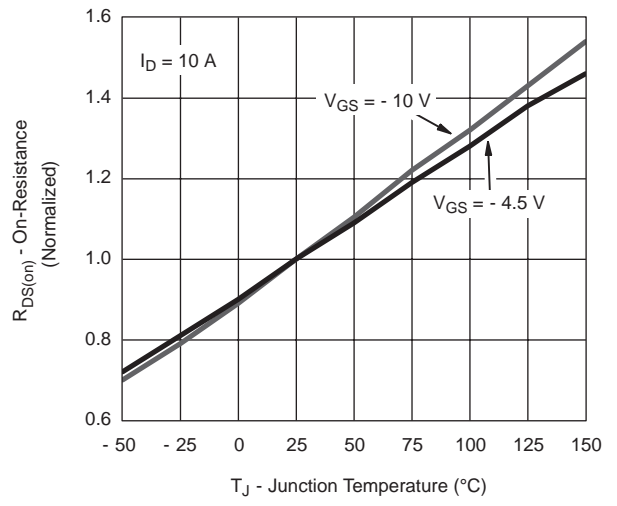
On-Resistance vs. Drain Current



Capacitance

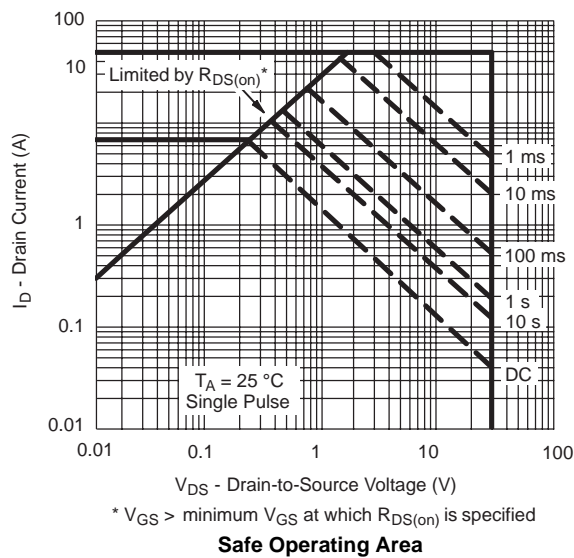
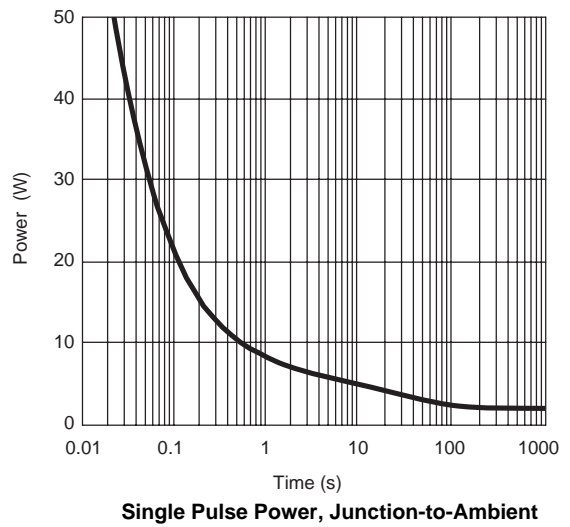
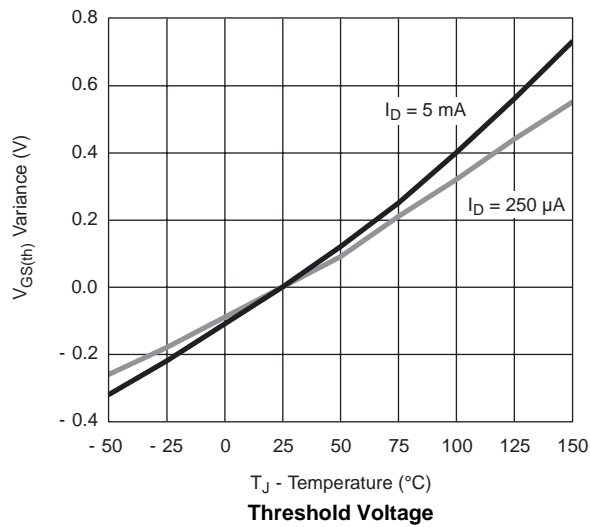
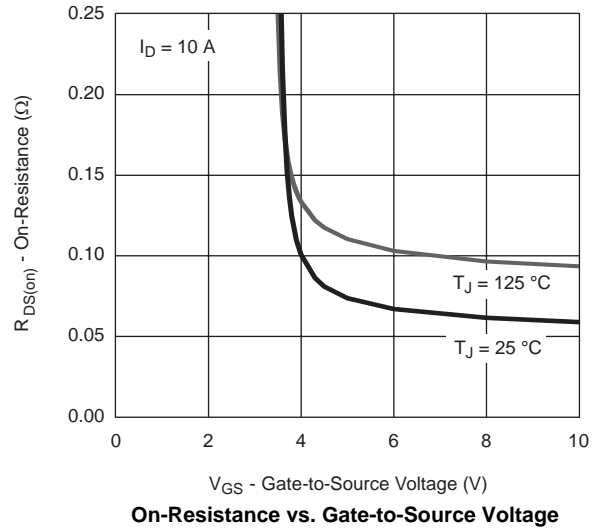
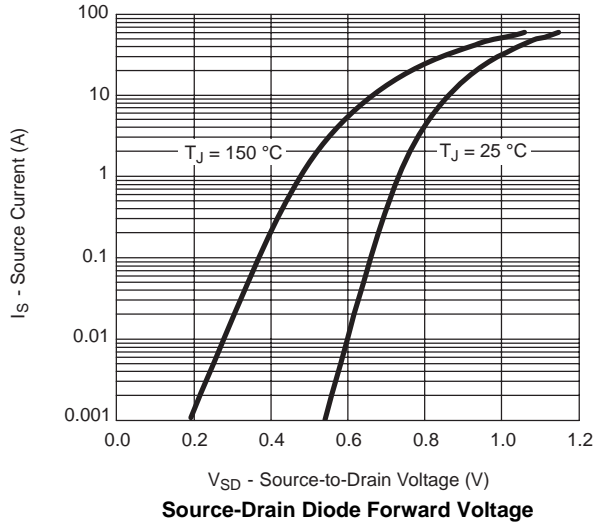


Gate Charge

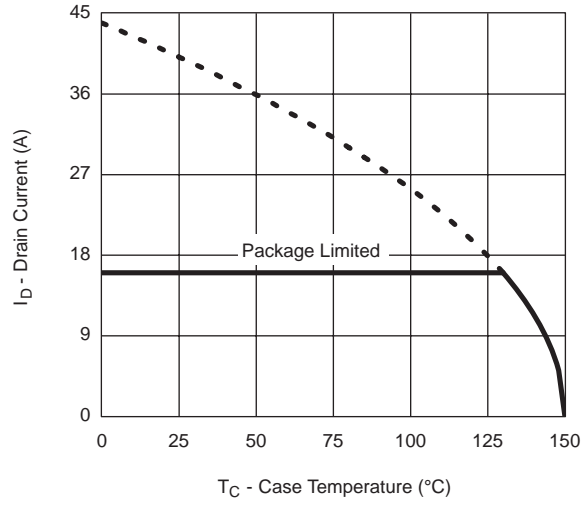


On-Resistance vs. Junction Temperature

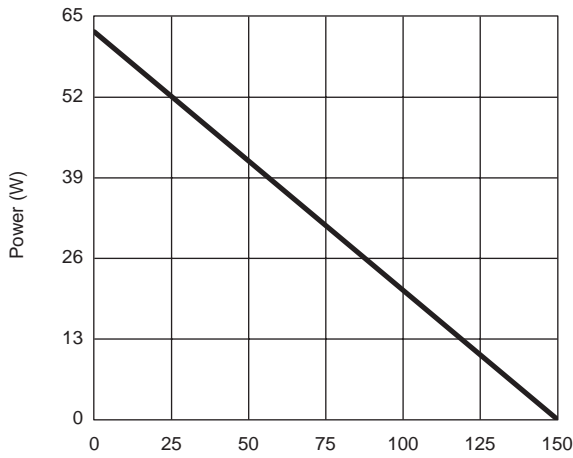
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



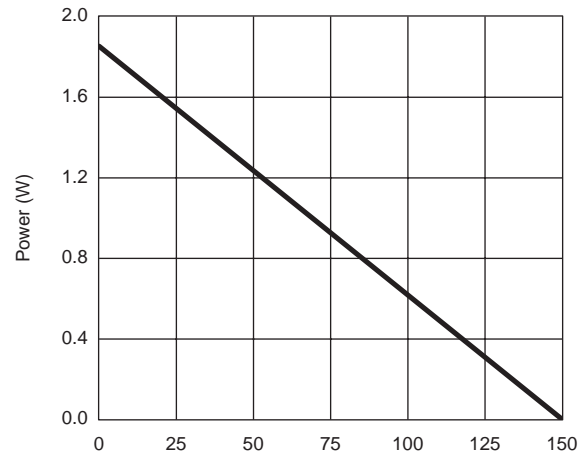
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



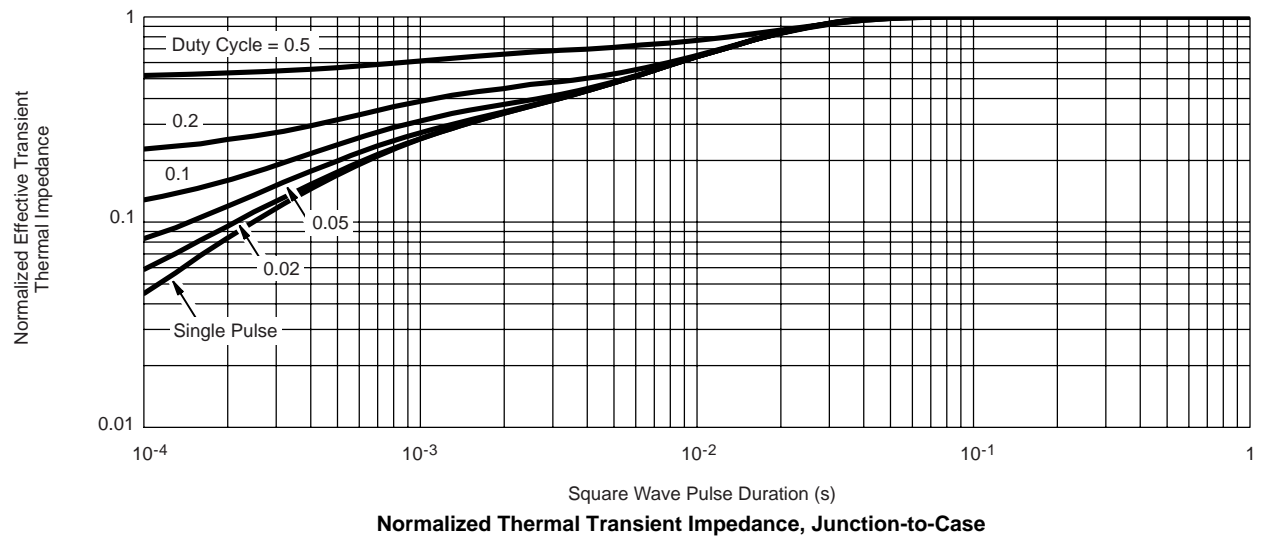
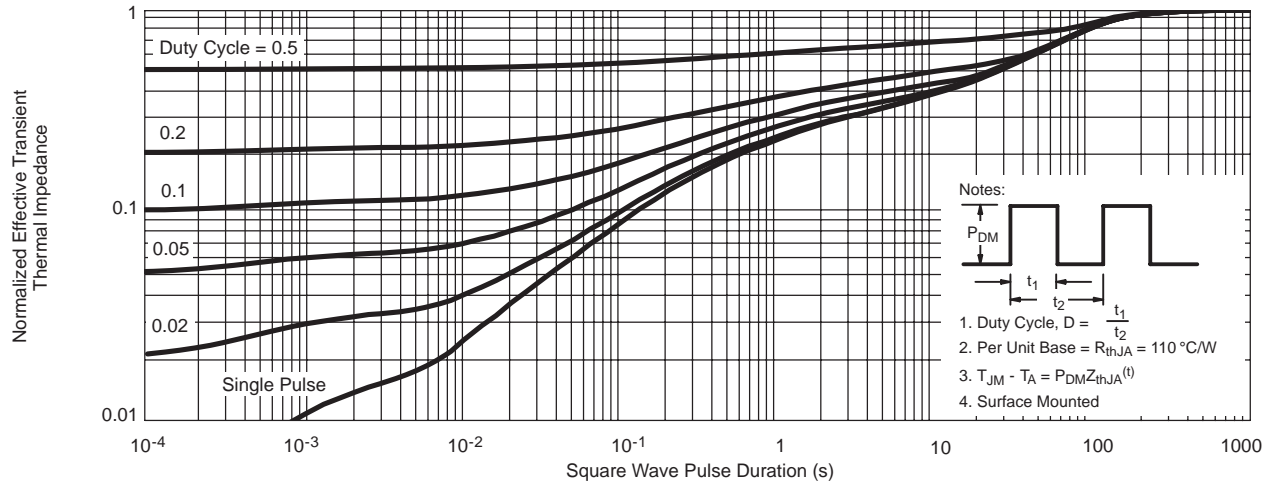
Power, Junction-to-Case



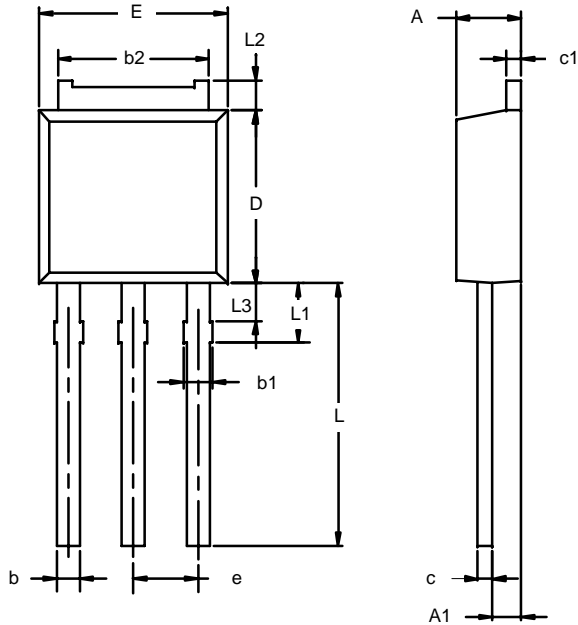
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 175$ °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



TO-251AA (DPAK)



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	8.89	9.53	0.350	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060
ECN: S-03946—Rev. E, 09-Jul-01 DWG: 5346				

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