

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
30	0.007 at $V_{GS} = 10$ V	40	13.8 nC
	0.010 at $V_{GS} = 4.5$ V	40	

FEATURES

- Halogen-free
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested

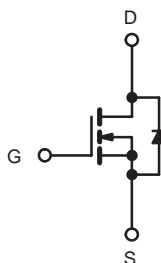
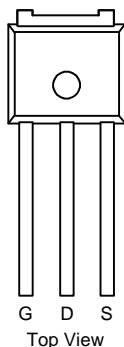


RoHS
COMPLIANT

APPLICATIONS

- Low-Side Switch
- Notebook DC/DC

TO-251



N-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}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	40 ^a	A
		40 ^a	
		22.7 ^{b, c}	
		19.7 ^{b, c}	
Pulsed Drain Current	I_{DM}	120	
Avalanche Current	I_{AS}	35	
Avalanche Energy	E_{AS}	61	mJ
Continuous Source-Drain Diode Current	I_S	40 ^a	A
		4.1 ^{b, c}	
Maximum Power Dissipation	P_D	50	W
		32	
		5 ^{b, c}	
		3.2 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	R_{thJA}	20	25	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	2.0	2.5	

Notes:

- a. Based on $T_C = 25$ °C. Package limited.
 b. Surface Mounted on 1" x 1" FR4 board.
 c. $t = 10$ s.

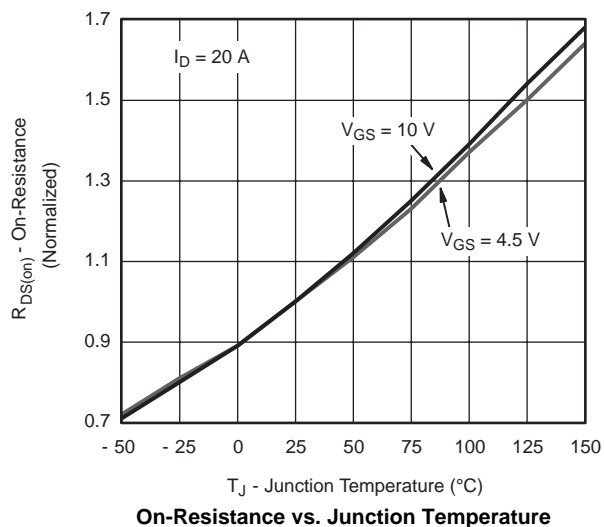
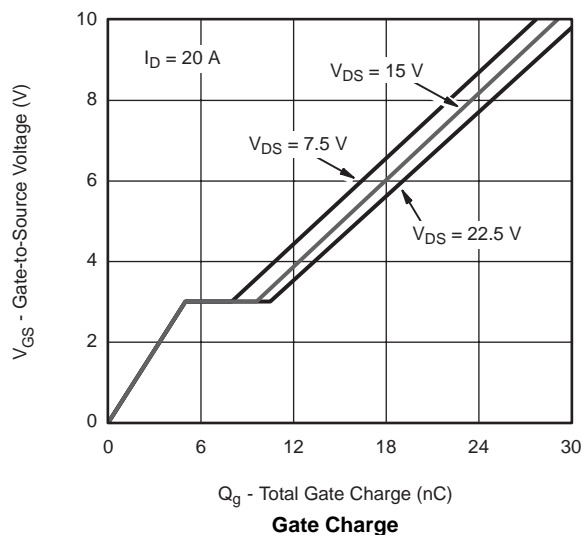
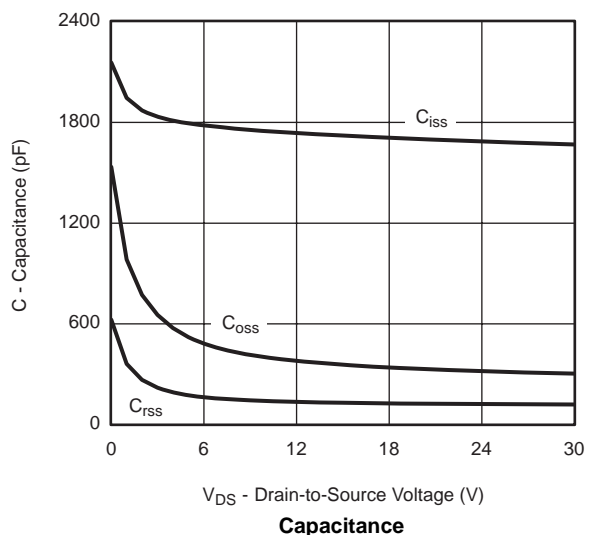
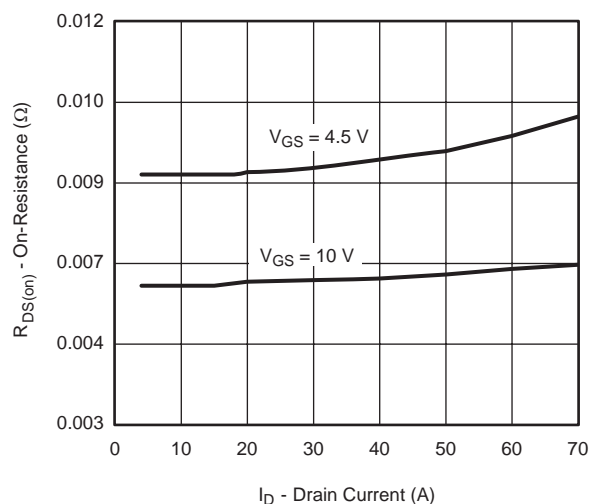
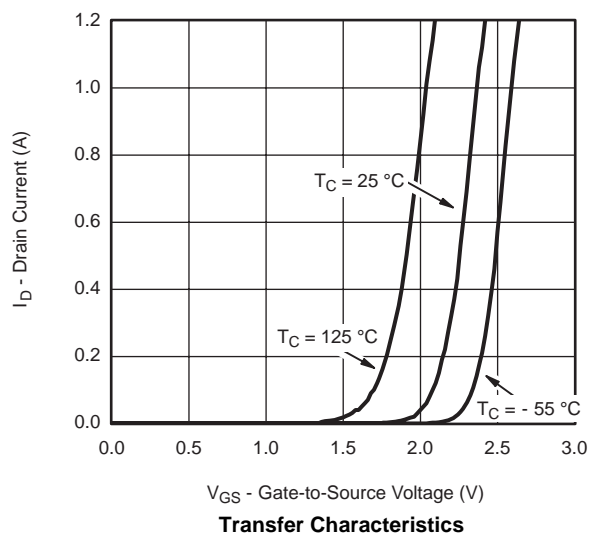
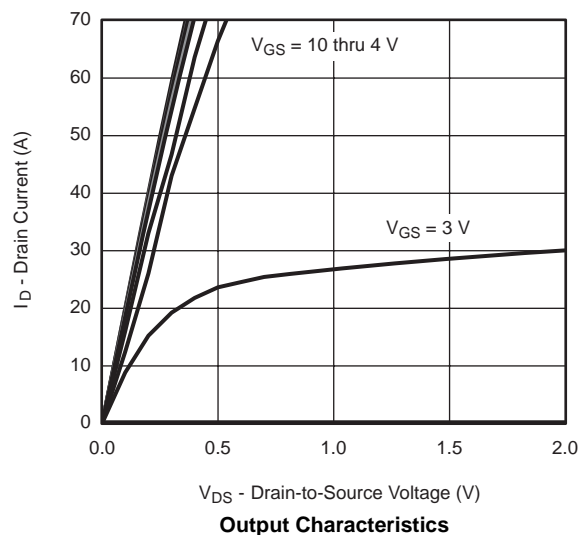
SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		27		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5.5		
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} = 30 V, V _{GS} = 0 V			1	μA
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C			5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	50			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.007	0.008	Ω
		V _{GS} = 4.5 V, I _D = 18 A		0.010	0.011	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A		90		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		1720		pF
Output Capacitance	C _{oss}			355		
Reverse Transfer Capacitance	C _{rss}			130		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 20 A		29	44	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A		13.8	21	
Gate-Source Charge	Q _{gs}			5.0		
Gate-Drain Charge	Q _{gd}			4.6		
Gate Resistance	R _g	f = 1 MHz		1.1	2.2	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 15 Ω I _D ≅ 1.0 A, V _{GEN} = 4.5 V, R _g = 1 Ω		25	40	ns
Rise Time	t _r			14	25	
Turn-Off Delay Time	t _{d(off)}			30	45	
Fall Time	t _f			15	25	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 15 Ω I _D ≅ 1.0 A, V _{GEN} = 10 V, R _g = 1 Ω		11	20	
Rise Time	t _r			9	15	
Turn-Off Delay Time	t _{d(off)}			27	40	
Fall Time	t _f			9	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			40	A
Pulse Diode Forward Current	I _{SM}				120	
Body Diode Voltage	V _{SD}	I _S = 4.1 A, V _{GS} = 0 V		0.75	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 4.1 A, dI/dt = 100 A/μs, T _J = 25 °C		25	50	ns
Body Diode Reverse Recovery Charge	Q _{rr}			17	35	nC
Reverse Recovery Fall Time	t _a			13		ns
Reverse Recovery Rise Time	t _b			12		

Notes:

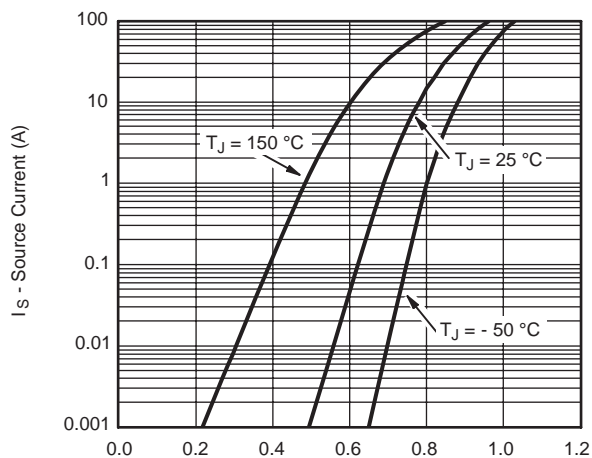
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

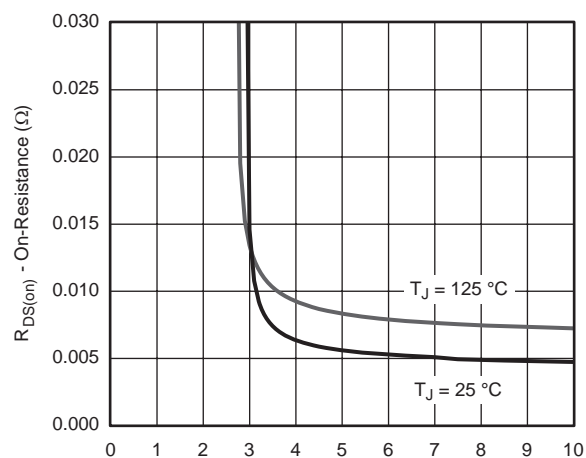
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



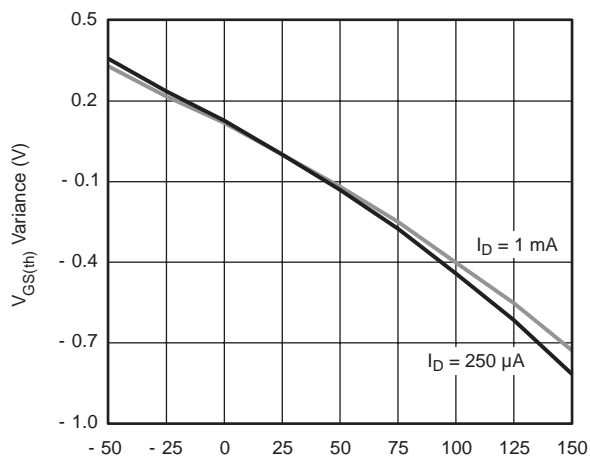
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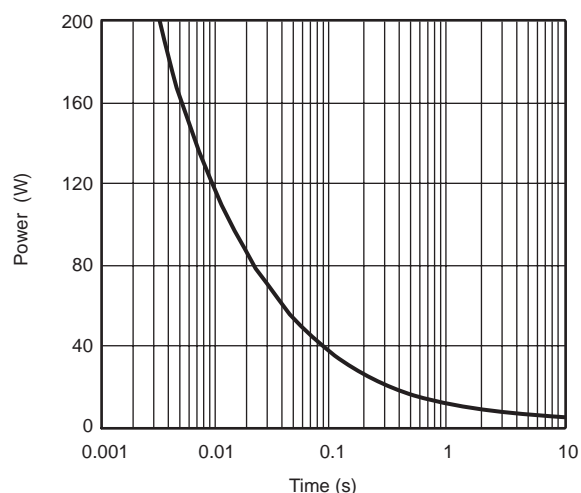
Source-Drain Diode Forward Voltage



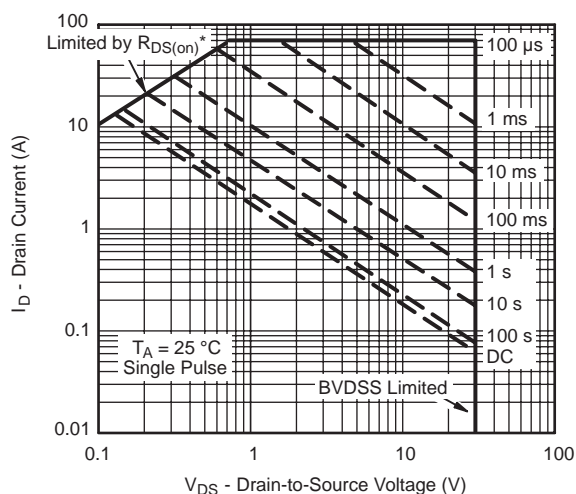
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



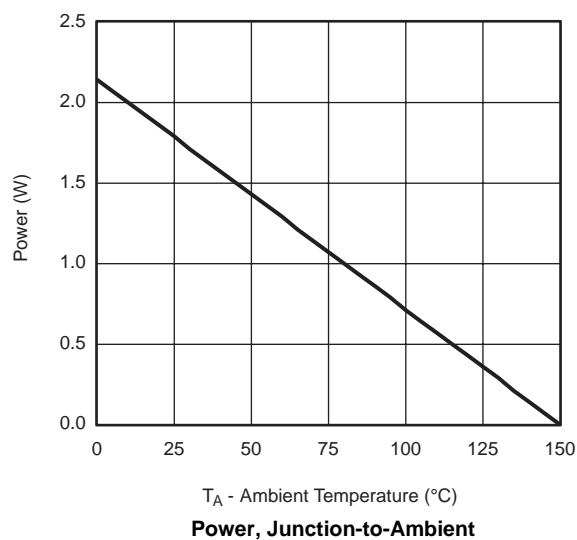
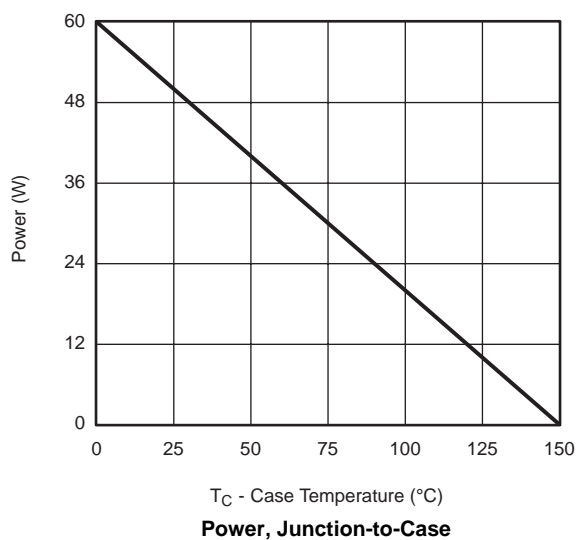
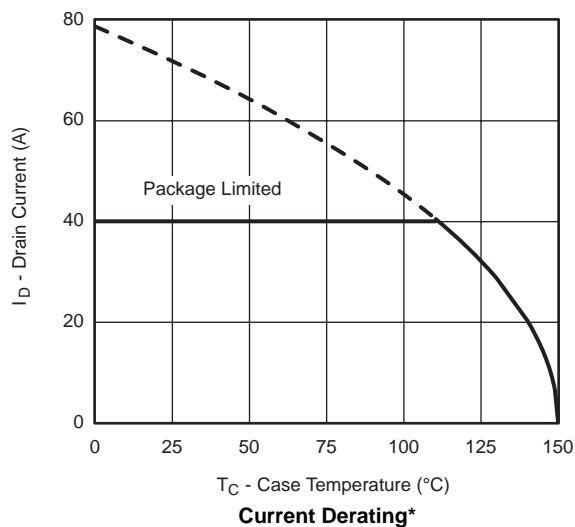
Single Pulse Power (Junction-to-Ambient)



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

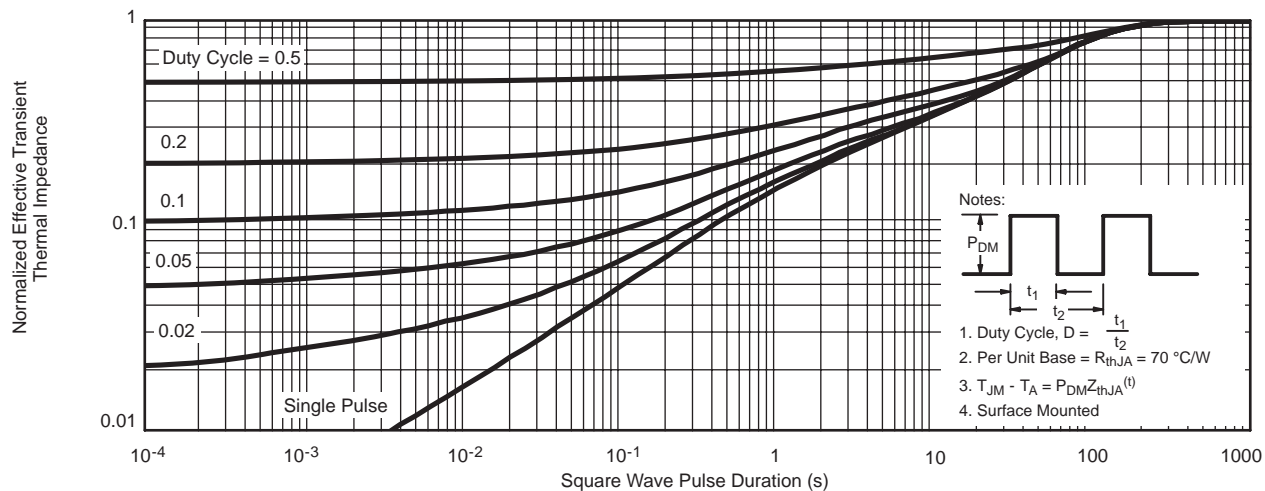
Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

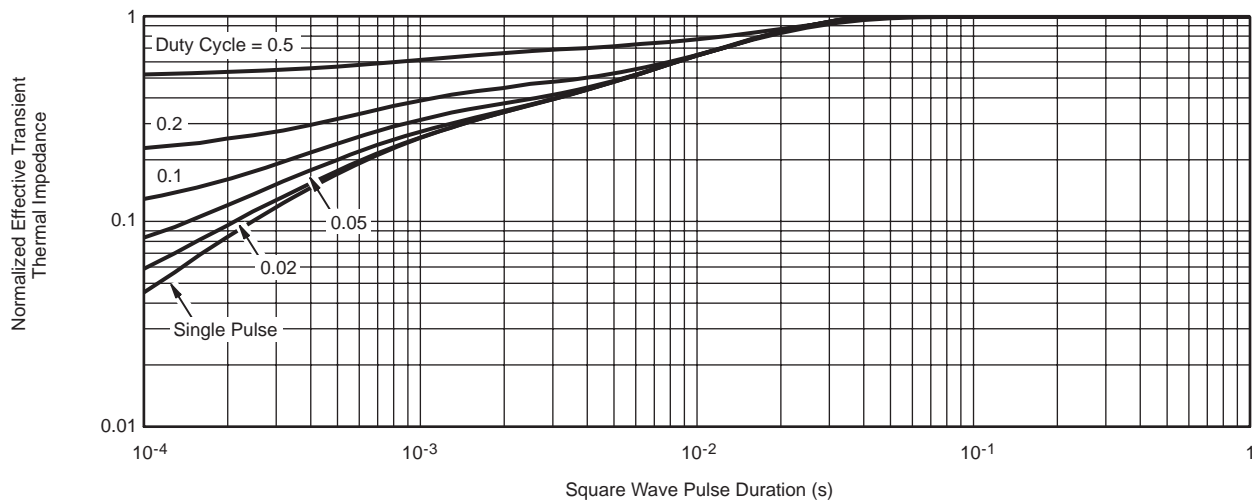


* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

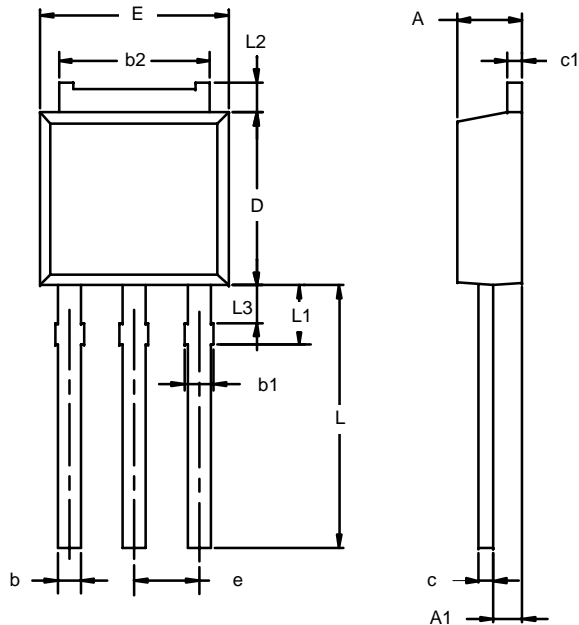


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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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