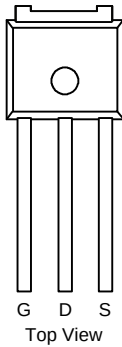


P-Channel 60-V (D-S) MOSFET

V_{DS}		-60	V
$R_{DS(on),typ}$	$V_{GS}=10V$	66	$m\Omega$
$R_{DS(on),typ}$	$V_{GS}=4.5V$	80	$m\Omega$
I_D		-25	A

TO-251



FEATURES

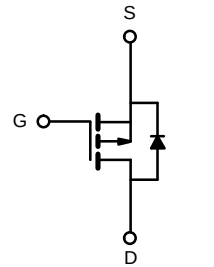
- Trench Power MOSFET
- 100 % UIS Tested

APPLICATIONS

- Load Switch



RoHS
COMPLIANT
HALOGEN
FREE



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$)	I_D	$T_C = 25\text{ }^{\circ}\text{C}$ - 25 ^a	A
		$T_C = 70\text{ }^{\circ}\text{C}$ - 20	
		$T_A = 25\text{ }^{\circ}\text{C}$ - 11 ^b	
		$T_A = 70\text{ }^{\circ}\text{C}$ - 9 ^b	
Pulsed Drain Current	I_{DM}	- 100	
Avalanche Current Pulse	I_{AS}	- 35	
Single Pulse Avalanche Energy	E_{AS}	101	mJ
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$ - 29 ^a	A
		$T_A = 25\text{ }^{\circ}\text{C}$ - 2.1 ^b	
Maximum Power Dissipation	P_D	$T_C = 25\text{ }^{\circ}\text{C}$ 35 ^a	W
		$T_C = 70\text{ }^{\circ}\text{C}$ 20 ^a	
		$T_A = 25\text{ }^{\circ}\text{C}$ 3.0 ^b	
		$T_A = 70\text{ }^{\circ}\text{C}$ 2 ^b	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	R_{thJA}	33	40	$^{\circ}\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	0.98	1.2	

Notes:

a. Based on $T_C = 25\text{ }^{\circ}\text{C}$.

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

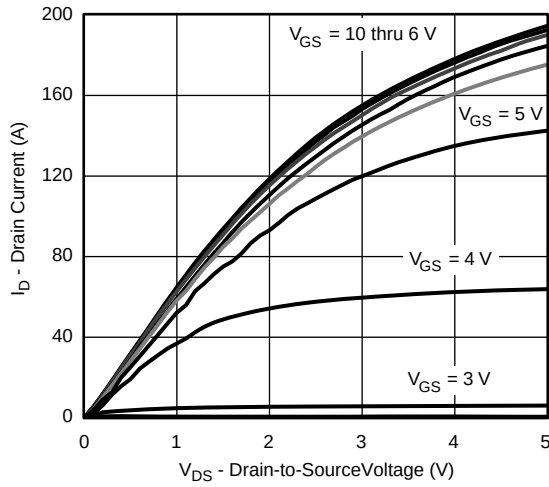
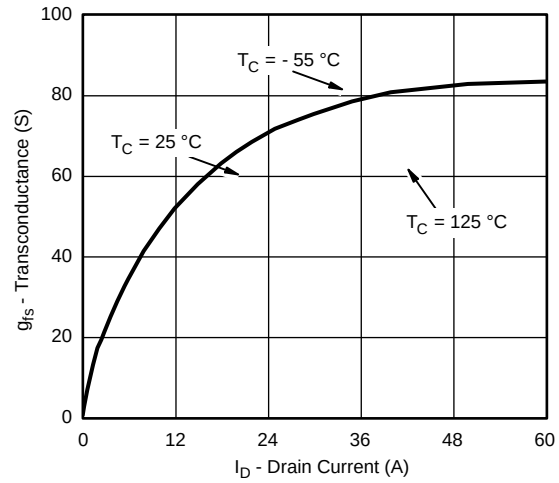
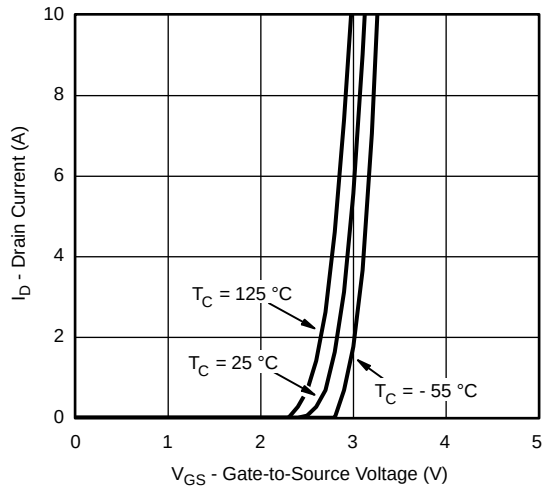
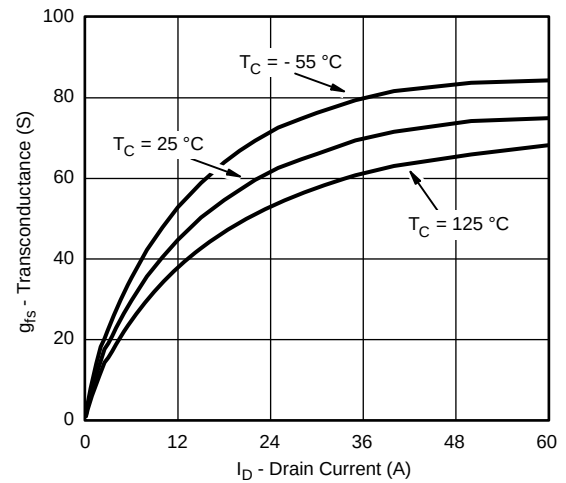
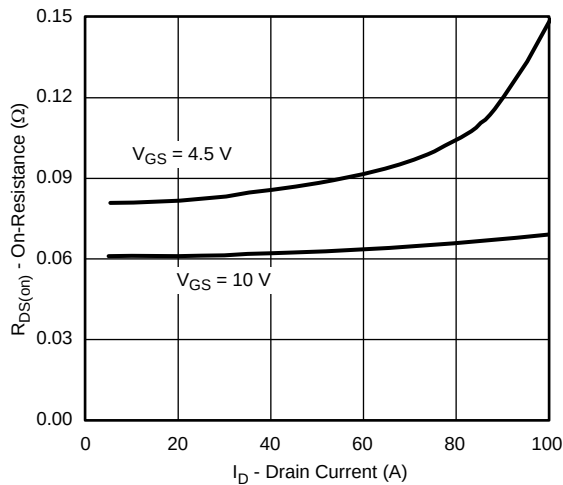
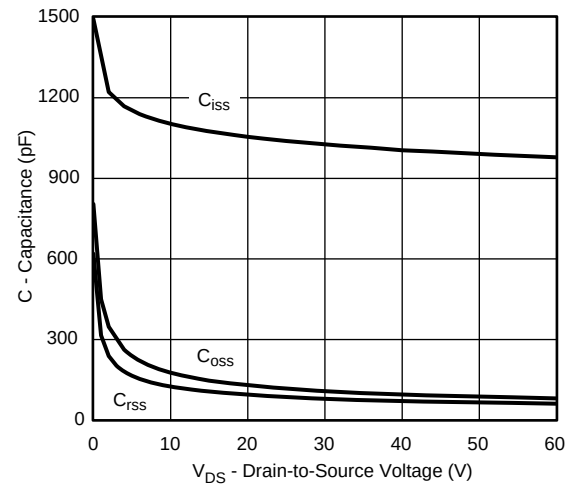
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 60			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		68		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5.2		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.0		- 2.5	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} = - 60 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 60 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	- 120			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 30 A		66		mΩ
		V _{GS} = - 4.5 V, I _D = - 20 A		80		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 50 A	20			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 25 V, V _{GS} = 0 V, f = 1 MHz		1300		pF
Output Capacitance	C _{oss}			200		
Reverse Transfer Capacitance	C _{rss}			150		
Total Gate Charge	Q _g	V _{DS} = - 30 V, V _{GS} = - 10 V, I _D = - 55 A		40		nC
		V _{DS} = - 30 V, V _{GS} = - 4.5 V, I _D = - 55 A		38		
Gate-Source Charge	Q _{gs}			16		
Gate-Drain Charge	Q _{gd}			19		
Gate Resistance	R _g	f = 1 MHz		5.2		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 2 V, R _L = 2 Ω I _D ≅ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		10	15	ns
Rise Time	t _r			7	15	
Turn-Off Delay Time	t _{d(off)}			70	110	
Fall Time	t _f			40	60	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 66	A
Pulse Diode Forward Current ^a	I _{SM}				- 150	
Body Diode Voltage	V _{SD}	I _S = - 30 A		- 1	- 1.5	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 50 A, di/dt = 100 A/μs, T _J = 25 °C		45	68	ns
Body Diode Reverse Recovery Charge	Q _{rr}			59	120	nC
Reverse Recovery Fall Time	t _a			29		ns
Reverse Recovery Rise Time	t _b			16		

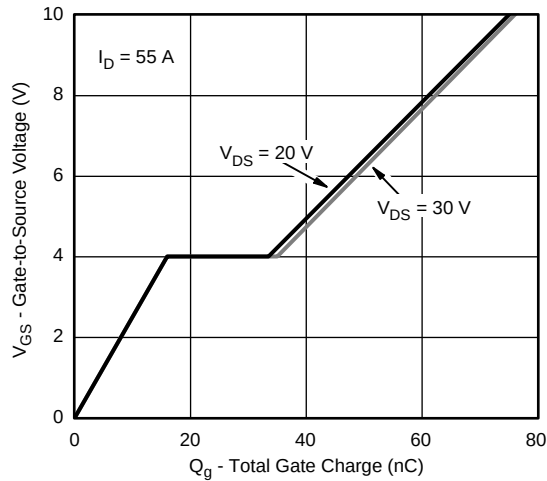
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

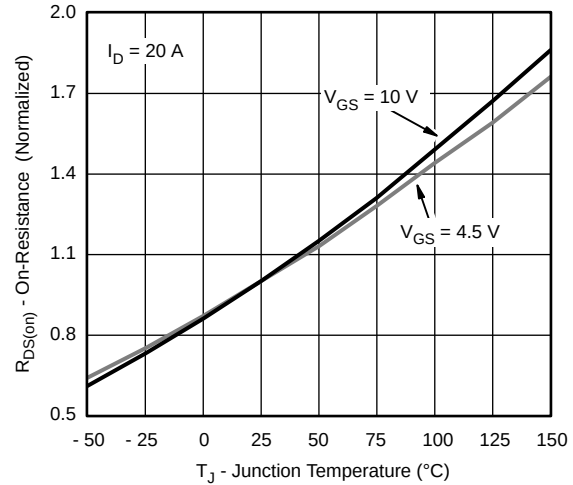
b. Guaranteed by design, not subject to production testing.

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.

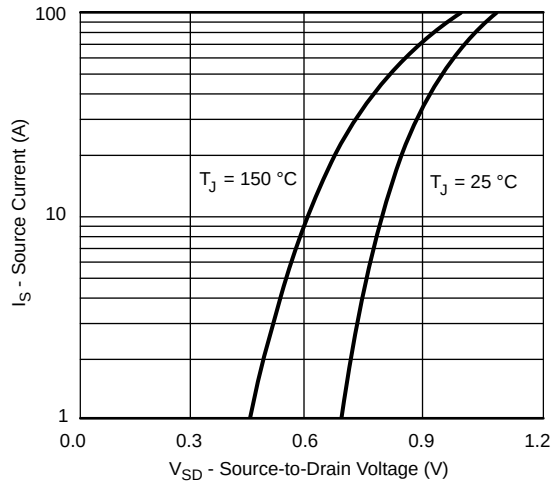
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transconductance

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


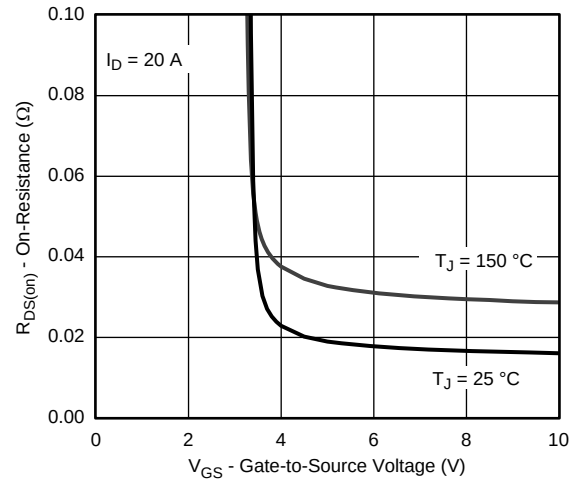
Gate Charge



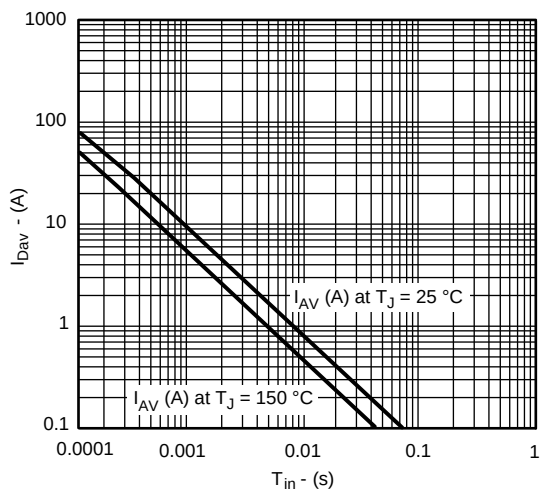
On-Resistance vs. Gate-to-Source Voltage



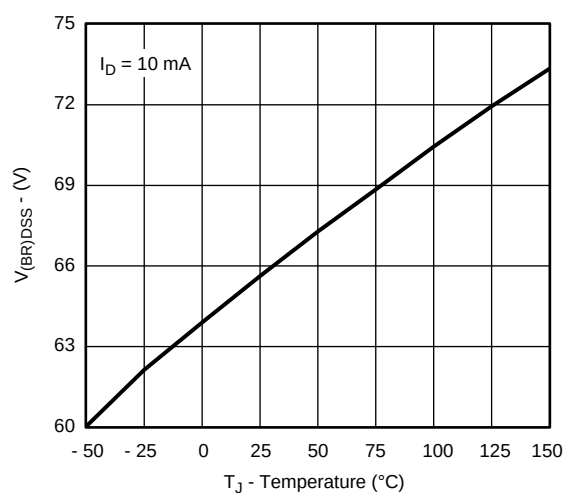
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

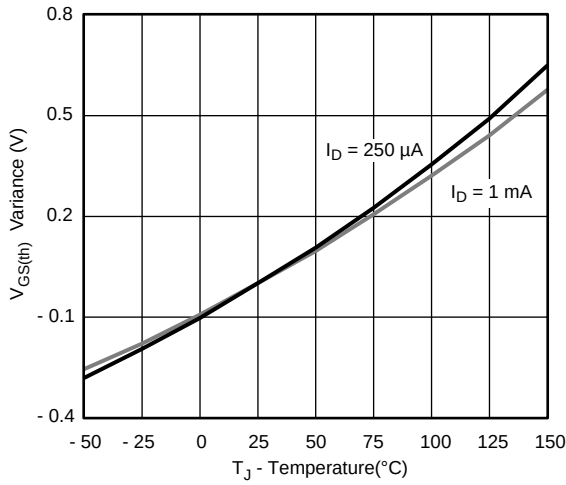


Single Pulse Avalanche Current Capability vs. Time

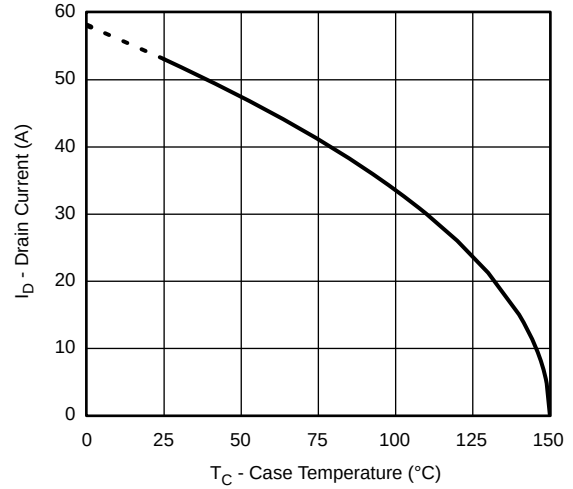


Drain-Source Breakdown Voltage vs. Junction Temperature

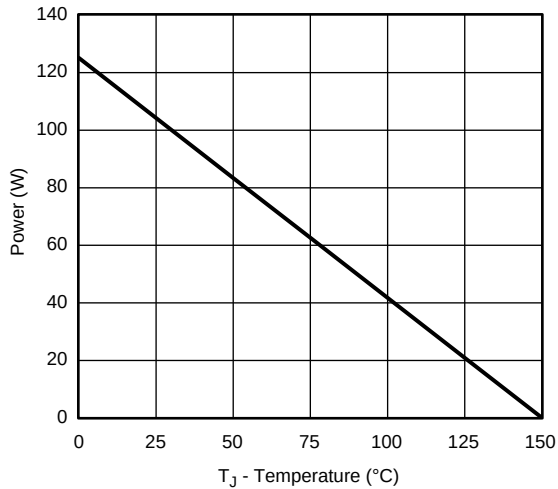
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



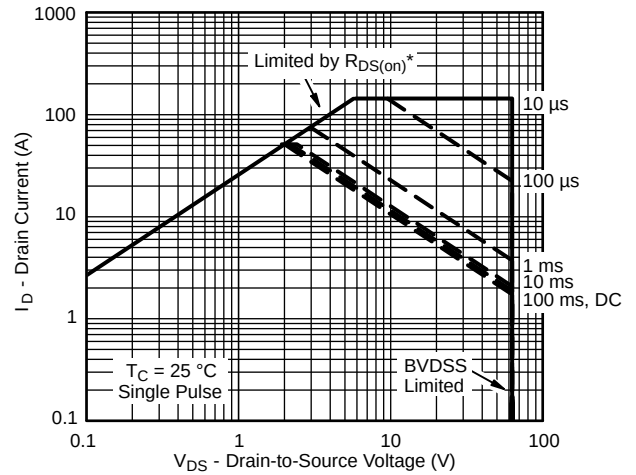
Threshold Voltage



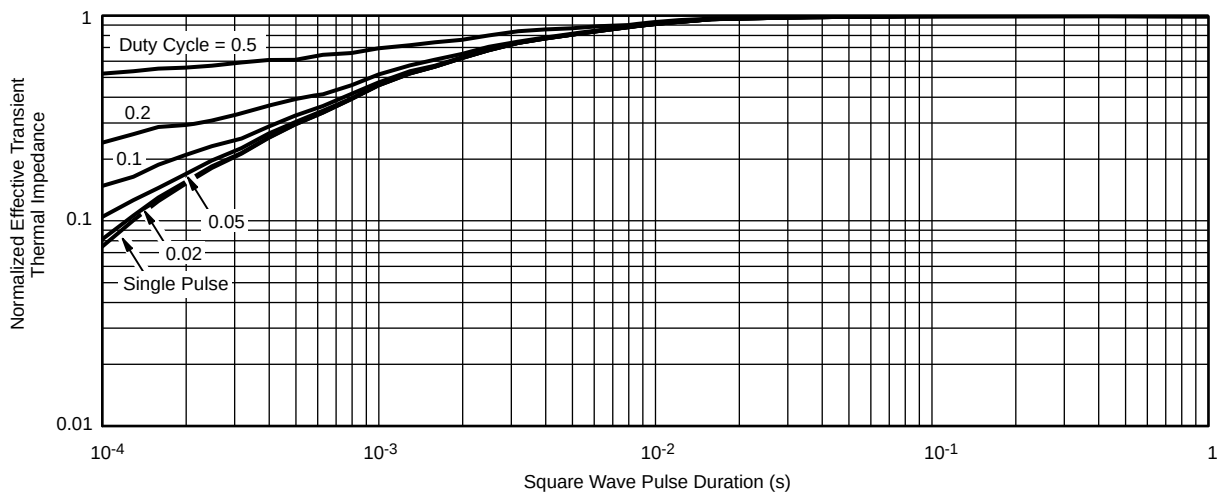
Max. Drain Current vs. Case Temperature



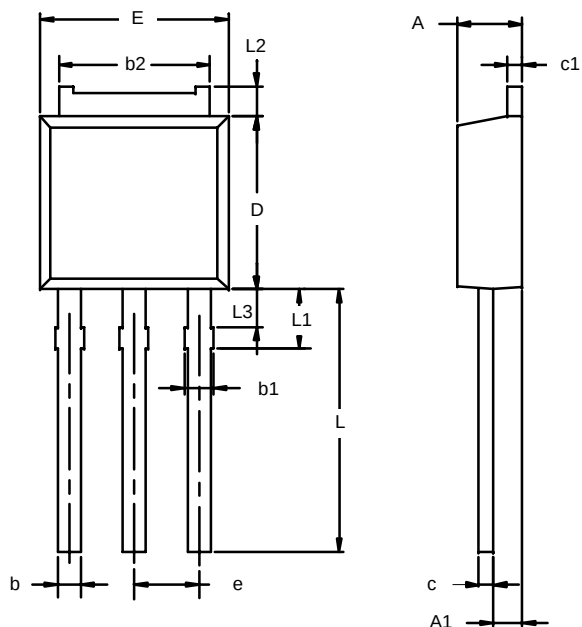
Power Derating, Junction-to-Case



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Case



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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