

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

## PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ.)
30	0.0039 at $V_{GS} = 10$ V	107 <sup>d</sup>	67
	0.0045 at $V_{GS} = 4.5$ V	103 <sup>d</sup>	

## FEATURES

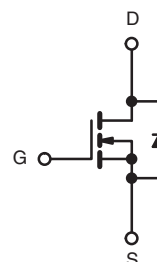
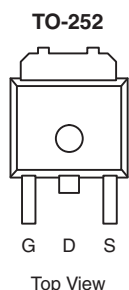
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 %  $R_g$  and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## APPLICATIONS

- DC/DC Converters
- Synchronous Buck Low Side



**Ordering Information:** SUD42N03-3m9P-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

## ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current	$I_D$	$T_C = 25$ °C (Silicon Limited)	A
		$T_C = 70$ °C (Silicon Limited)	
		$T_C = 25$ °C (Package Limited)	
Pulsed Drain Current ( $t = 300$ $\mu$ s)	$I_{DM}$	120	
Avalanche Current	$I_{AS}$	45	mJ
Single Avalanche Energy <sup>a</sup>	$E_{AS}$	101	
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_C = 25$ °C	W
		$T_A = 25$ °C <sup>c</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	°C

## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) <sup>c</sup>	$R_{thJA}$	50	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	1.7	

Notes:

a. Duty cycle  $\leq 1$  %.

b. See SOA curve for voltage derating.

c. When mounted on 1" square PCB (FR-4 material).

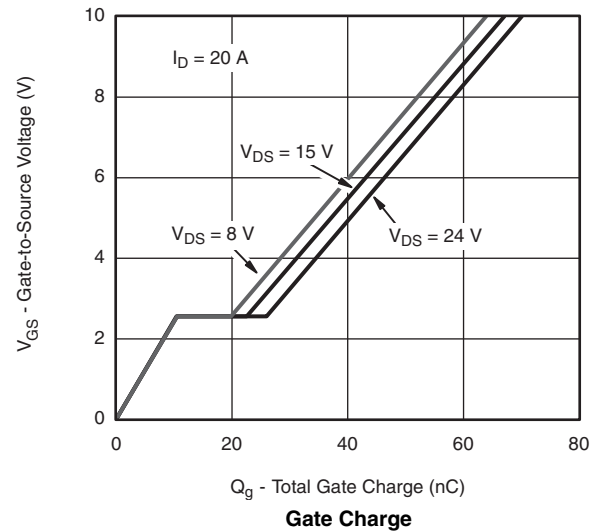
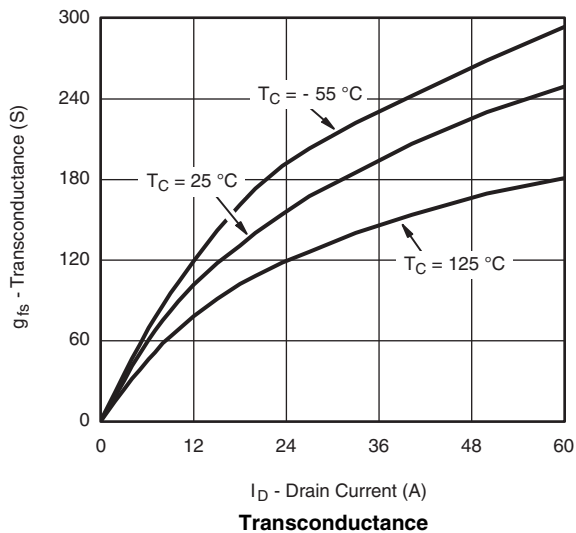
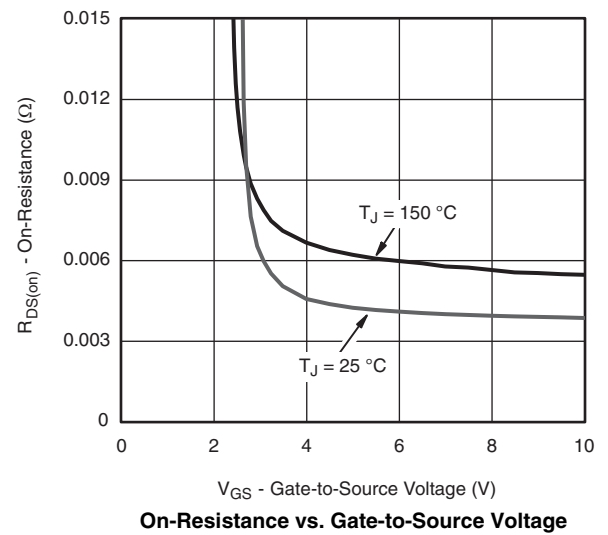
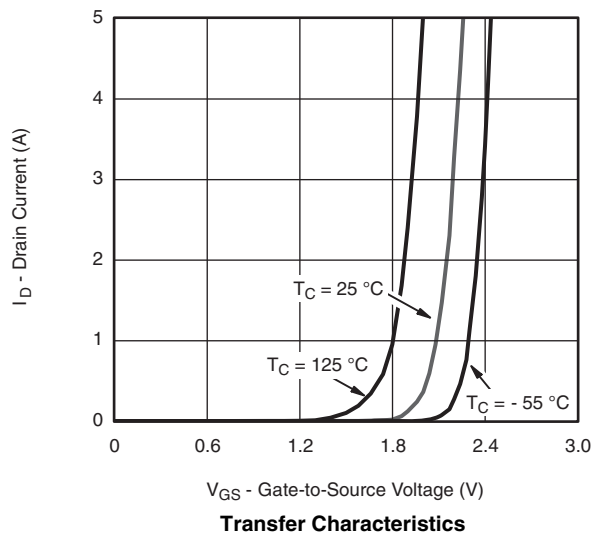
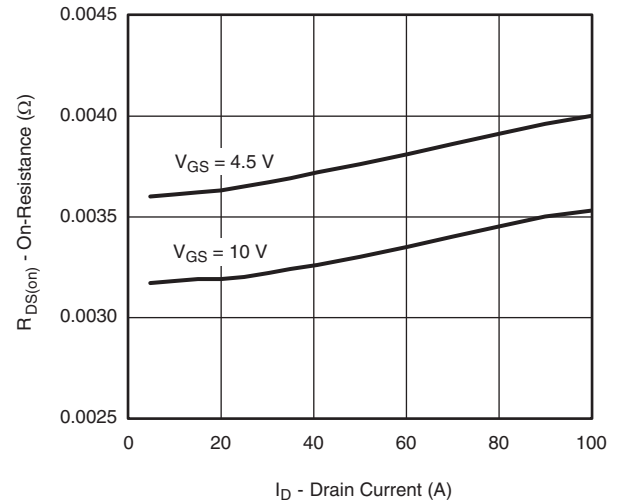
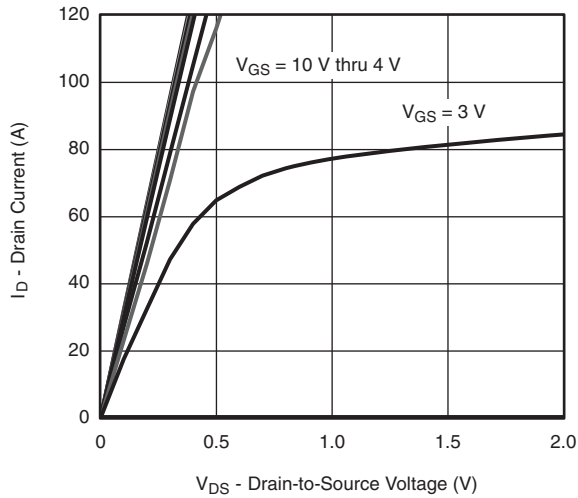
d. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 42 A.

SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1		2.5	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 250	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 150 °C			250	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 10 V, V <sub>GS</sub> = 10 V	50			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 22 A		0.0032	0.0039	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		0.0037	0.0045	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		110		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 15 V, f = 1 MHz		3535		pF
Output Capacitance	C <sub>oss</sub>			680		
Reverse Transfer Capacitance	C <sub>rss</sub>			400		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		67	100	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			10.5		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			12.2		
Gate Resistance	R <sub>g</sub>	f = 1 MHz	0.3	1.4	2.8	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 1.5 Ω I <sub>D</sub> ≅ 10 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω		11	20	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			10	20	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			35	53	
Fall Time <sup>c</sup>	t <sub>f</sub>			10	20	
Drain-Source Body Diode Ratings and Characteristics <sup>b</sup> T <sub>C</sub> = 25 °C						
Continuous Current	I <sub>S</sub>				42	A
Pulsed Current	I <sub>SM</sub>				120	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 10 A, V <sub>GS</sub> = 0 V		0.83	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 10 A, dI/dt = 100 A/μs		41	62	ns
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>			2	3	A
Reverse Recovery Charge	Q <sub>rr</sub>			40	60	nC

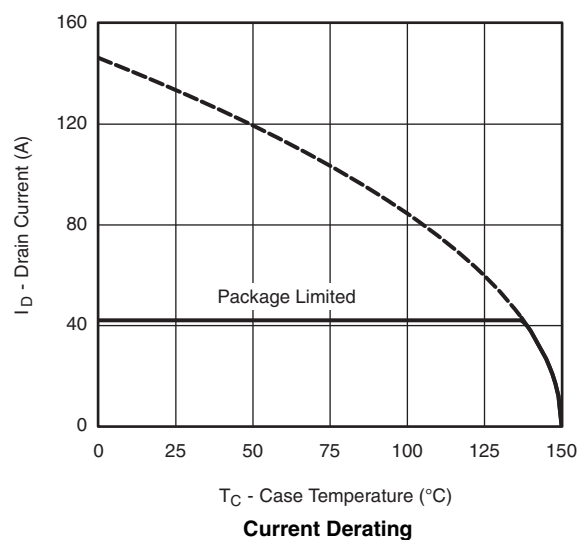
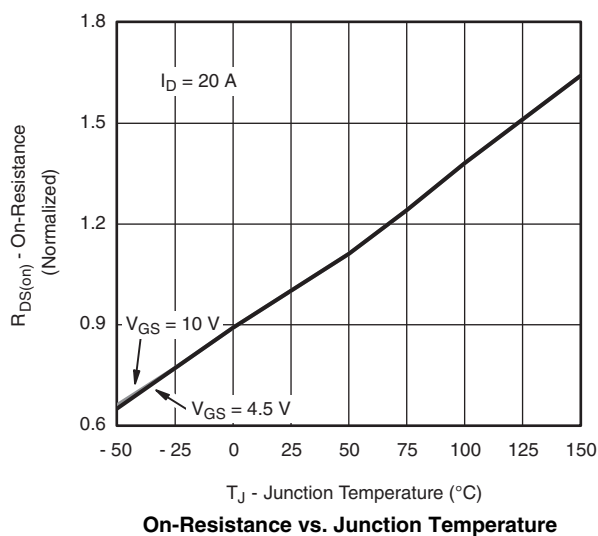
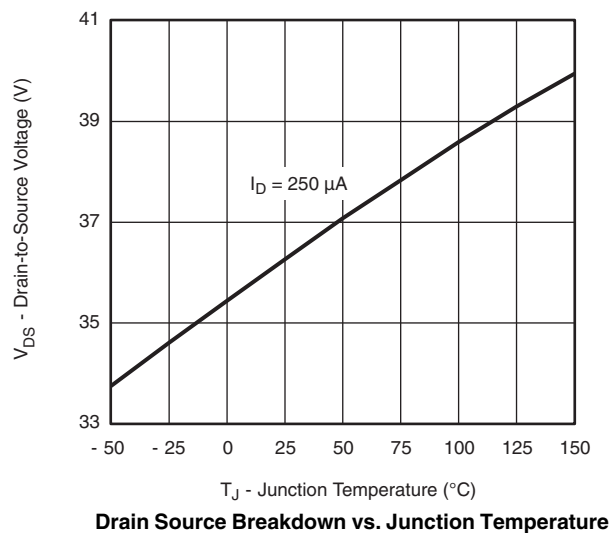
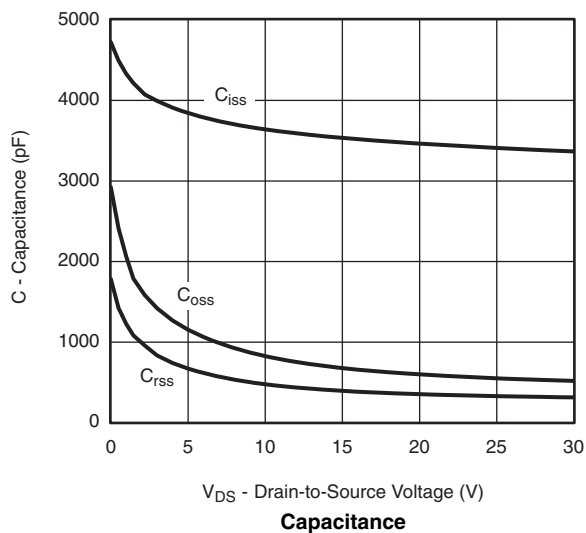
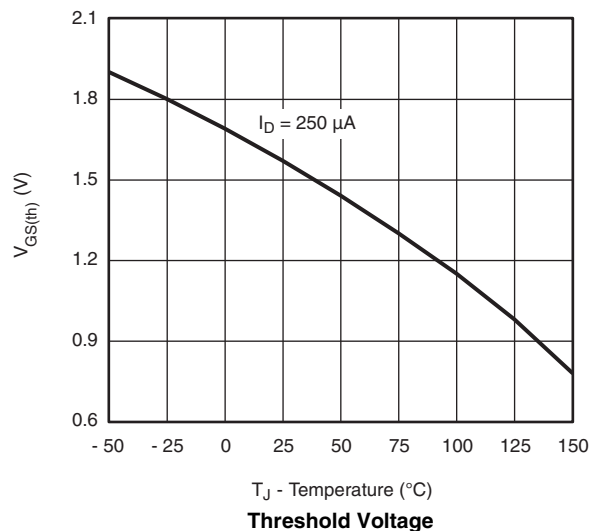
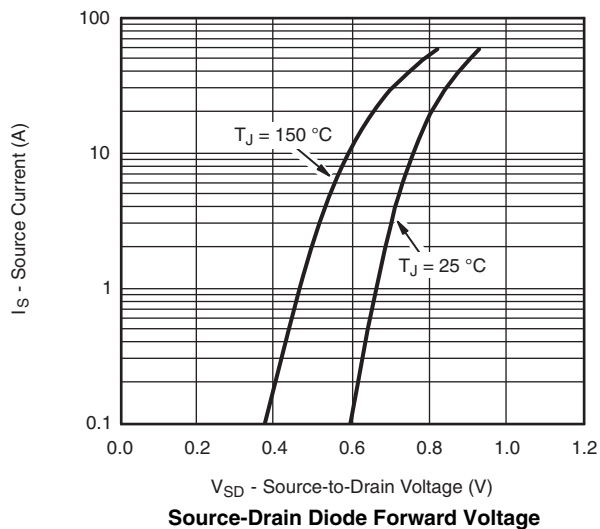
## Notes:

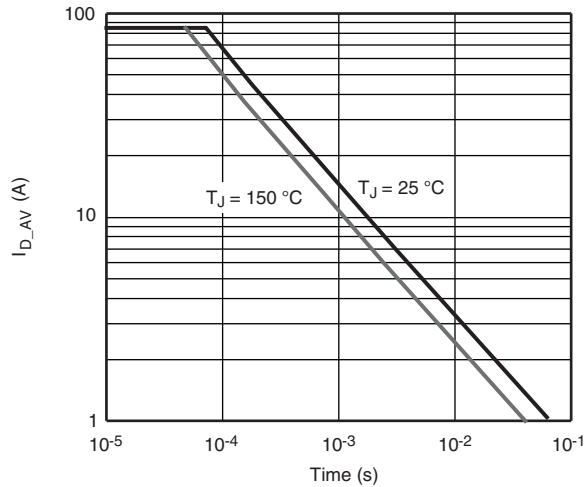
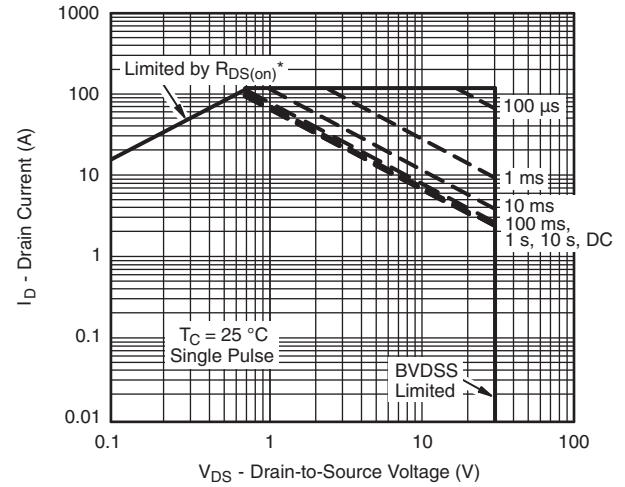
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.  
c. Independent of operating temperature.

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.

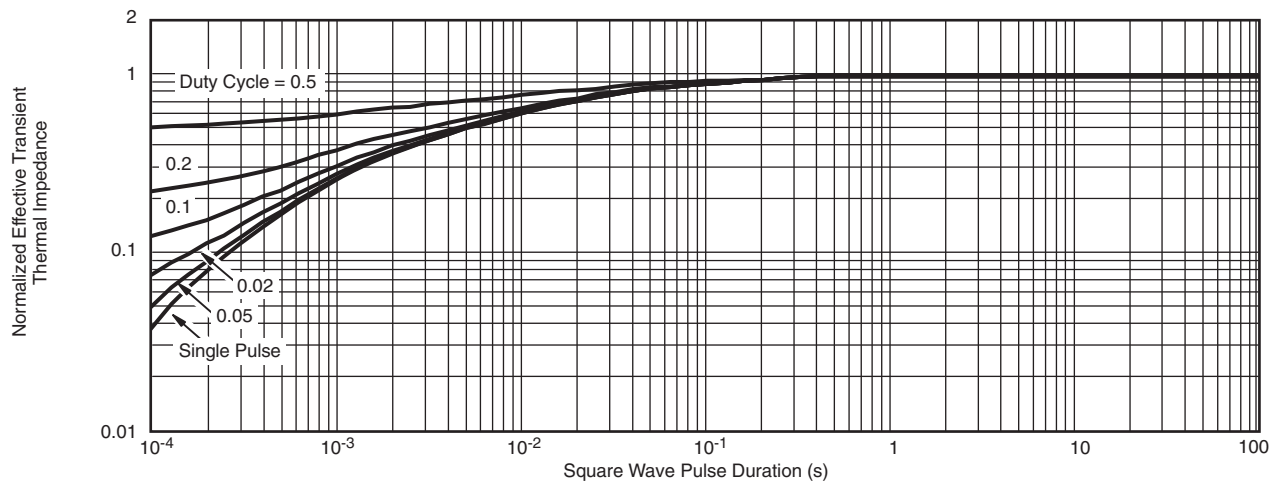
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)


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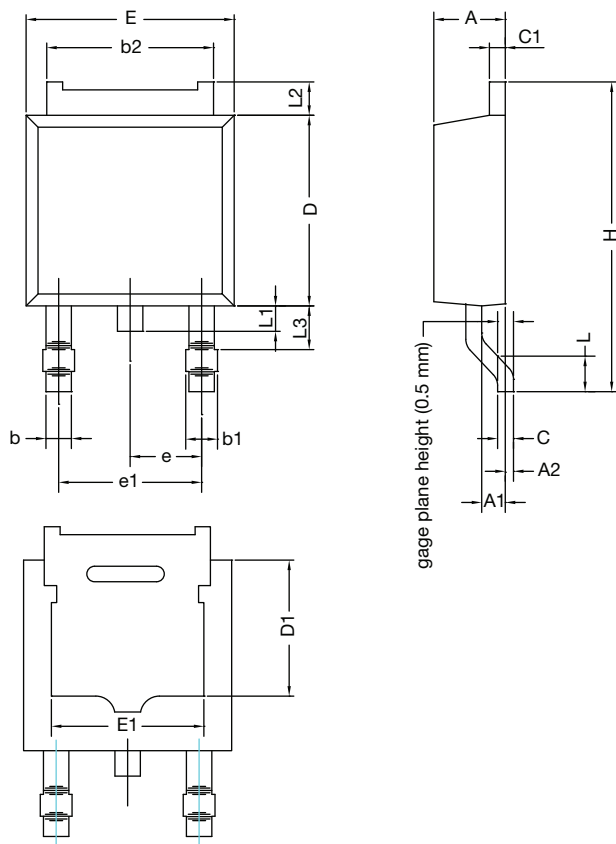
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Single Pulse Avalanche Current Capability vs. Time**


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


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

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## TO-252AA CASE OUTLINE

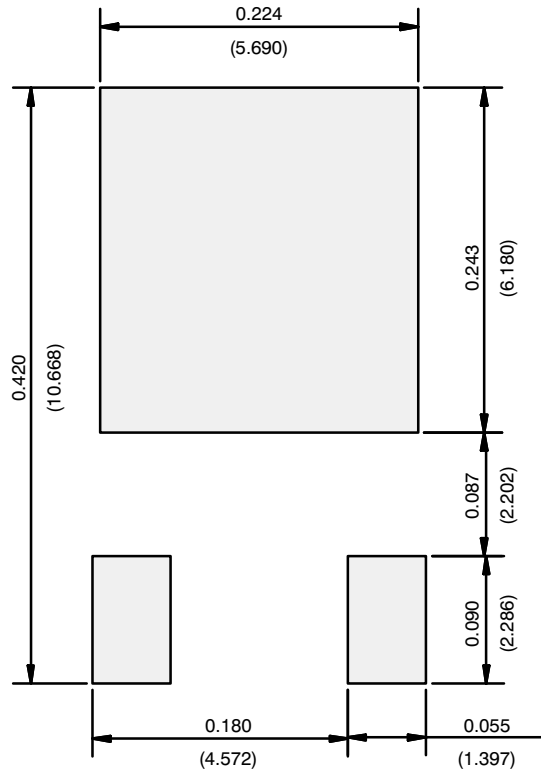


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
A2	0.030	0.127	0.001	0.005
b	0.71	0.88	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.44	0.206	0.214
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
D1	4.10	4.45	0.161	0.175
E	6.48	6.73	0.255	0.265
E1	4.49	5.50	0.177	0.217
e	2.28 BSC		0.090 BSC	
e1	4.57 BSC		0.180 BSC	
H	9.65	10.41	0.380	0.410
L	1.40	1.78	0.055	0.070
L1	0.64	1.02	0.025	0.040
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.040	0.060
ECN: T11-0110-Rev. L, 18-Apr-11 DWG: 5347				

### Note

- Dimension L3 is for reference only.

## RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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