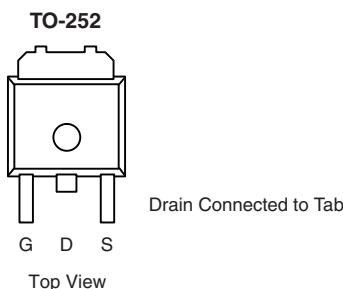


N-Channel 60 V (D-S), MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
60	0.031 at V _{GS} = 10 V	9.1	6.5 nC
	0.045 at V _{GS} = 4.5 V	7.6	



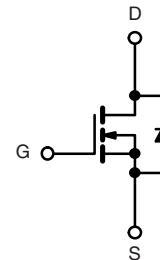
FEATURES

- 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



APPLICATIONS

- DC/DC Converters



Ordering Information: SUD23N06-31-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °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 °C)	T _C = 25 °C	21.4	A
	T _C = 70 °C	17.1	
	T _A = 25 °C	9.1 ^a	
	T _A = 70 °C	7.6 ^a	
Pulsed Drain Current	I _{DM}	50	
Continuous Source-Drain Diode Current	T _C = 25 °C	20.8	
	T _A = 25 °C	3.8 ^a	
Single Pulse Avalanche Current	I _{AS}	20	
Avalanche Energy	E _{AS}	20	mJ
Maximum Power Dissipation	T _C = 25 °C	31.25	W
	T _C = 70 °C	20	
	T _A = 25 °C	5.7 ^a	
	T _A = 70 °C	3.6 ^a	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R _{thJA}	18	22	°C/W
Maximum Junction-to-Case	R _{thJC}	3.2	4.0	

Notes:

a. Surface mounted on 1" x 1" FR4 board, t ≤ 10 s.

SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

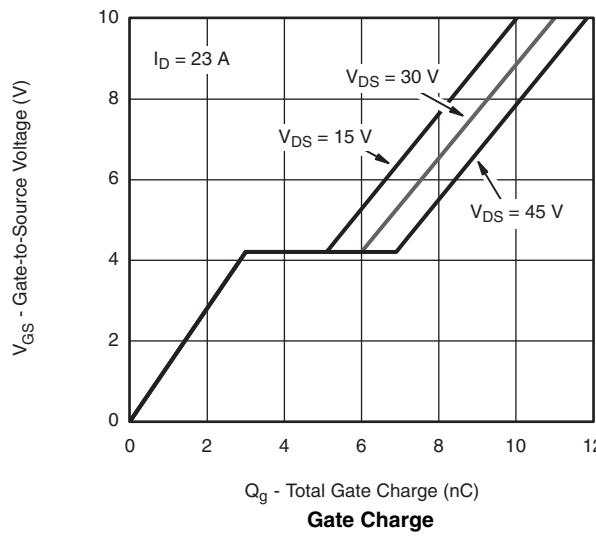
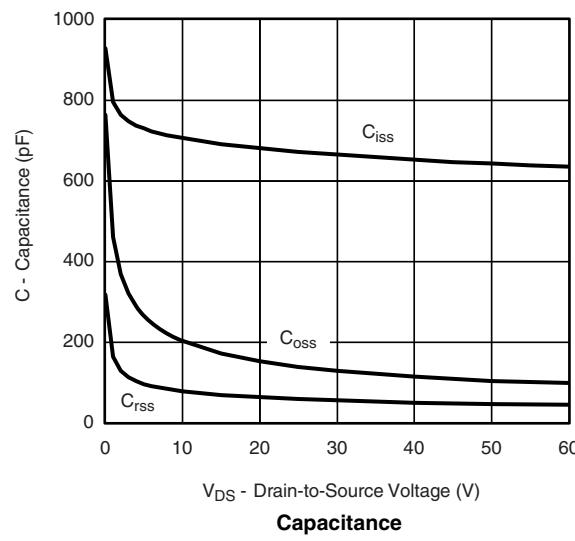
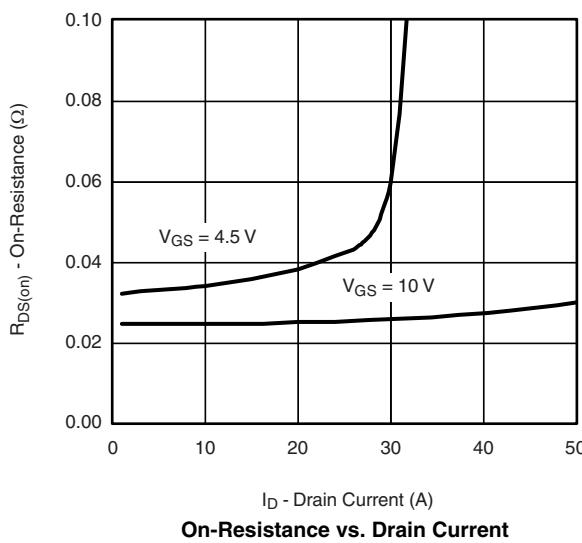
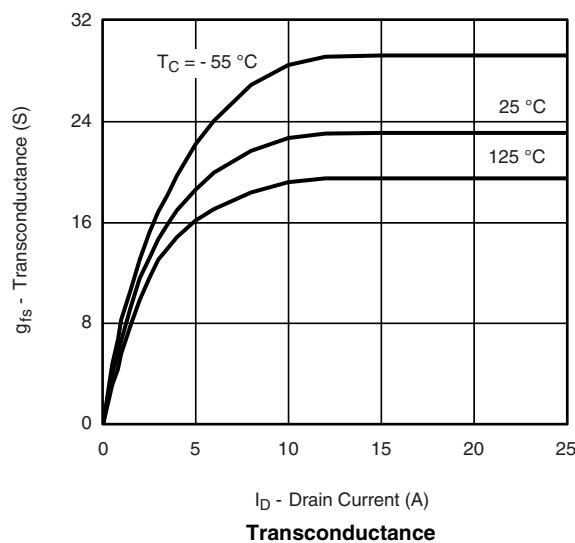
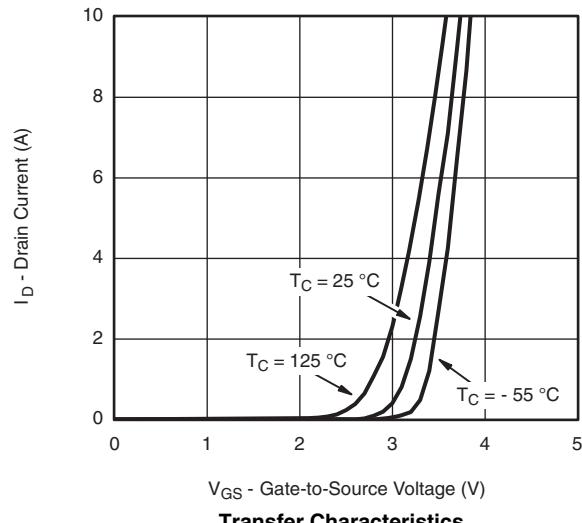
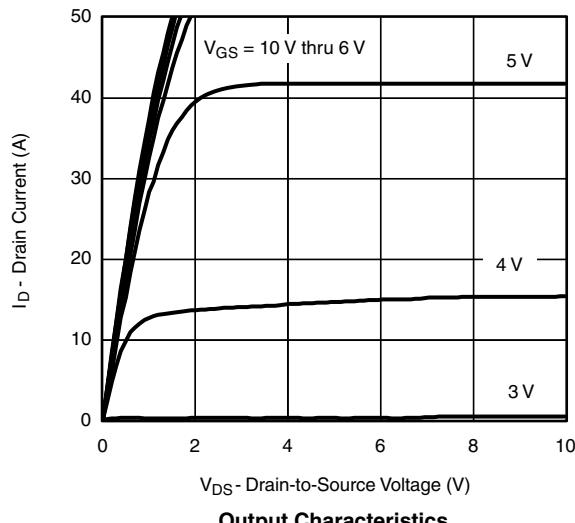
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$		65		$\text{mV}/^\circ\text{C}$
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 6.3		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1.0		3.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$		1		μA
		$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 70^\circ\text{C}$			20	
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} \geq 5 \text{ V}, V_{GS} = 10 \text{ V}$	50			A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$		0.025	0.031	Ω
		$V_{GS} = 4.5 \text{ V}, I_D = 10 \text{ A}$		0.037	0.045	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}, I_D = 15 \text{ A}$		20		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		670		pF
Output Capacitance	C_{oss}			140		
Reverse Transfer Capacitance	C_{rss}			60		
Total Gate Charge	Q_g	$V_{DS} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 23 \text{ A}$		11	17	nC
Gate-Source Charge	Q_{gs}			6.5	13	
Gate-Drain Charge	Q_{gd}			3.0		
Gate Resistance	R_g		$f = 1 \text{ MHz}$	1.6	3.2	Ω
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 30 \text{ V}, R_L = 1.3 \Omega$ $I_D \approx 23 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$		18	30	ns
Rise Time	t_r			250	400	
Turn-Off Delay Time	$t_{d(\text{off})}$			35	55	
Fall Time	t_f			68	110	
Turn-On Delay Time	$t_{d(\text{on})}$			8	15	
Rise Time	t_r	$V_{DD} = 30 \text{ V}, R_L = 1.3 \Omega$ $I_D \approx 23 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$		15	25	ns
Turn-Off Delay Time	$t_{d(\text{off})}$			30	45	
Fall Time	t_f			25	40	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$			20.8	A
Pulse Diode Forward Current ^a	I_{SM}				50	
Body Diode Voltage	V_{SD}	$I_S = 15 \text{ A}$		1.0	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 15 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$		30	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			35	70	nC
Reverse Recovery Fall Time	t_a			20		ns
Reverse Recovery Rise Time	t_b			10		

Notes:

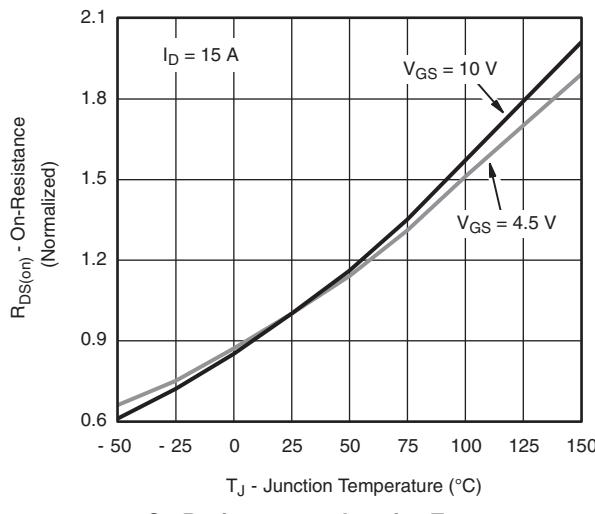
a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.

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

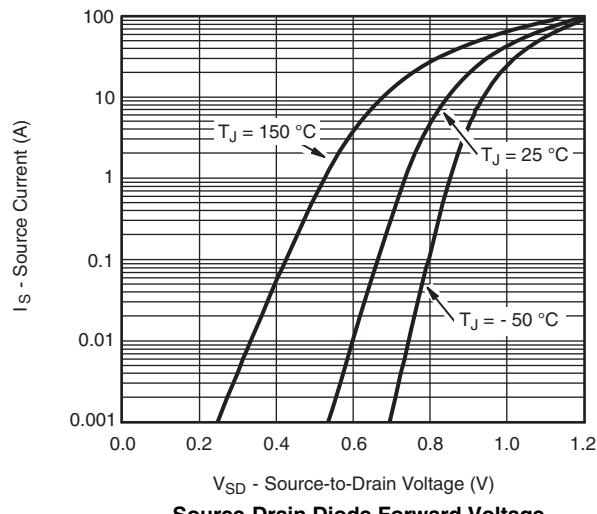
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


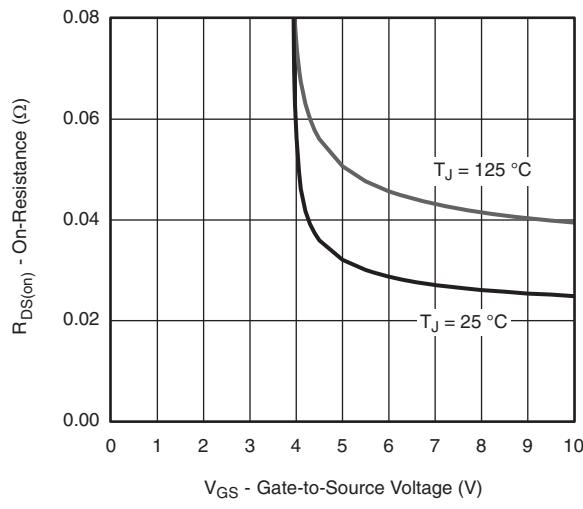
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



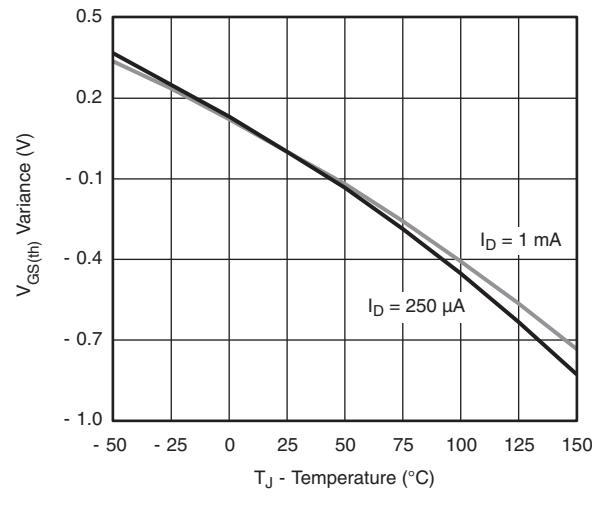
On-Resistance vs. Junction Temperature



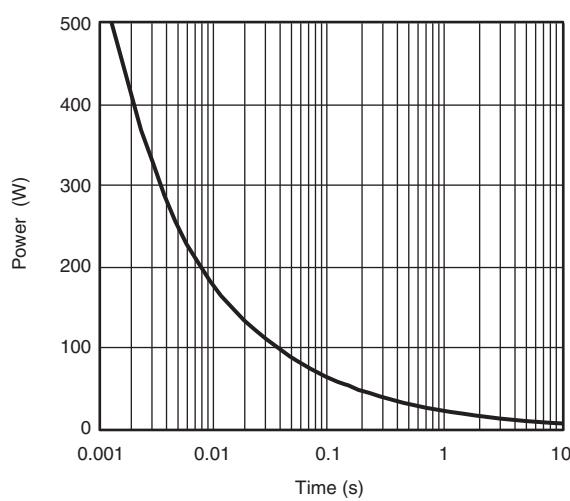
Source-Drain Diode Forward Voltage



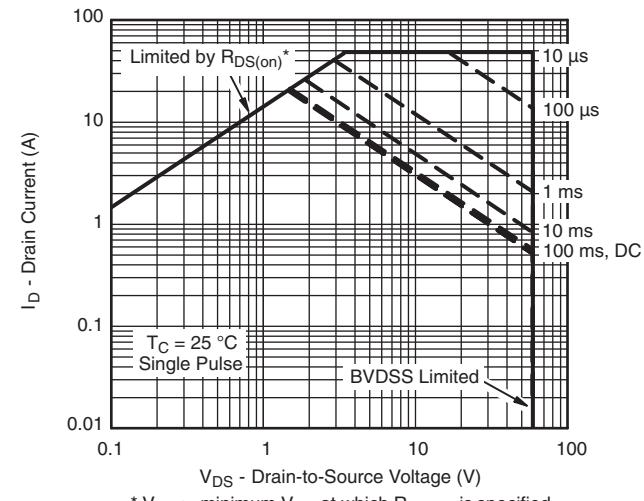
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

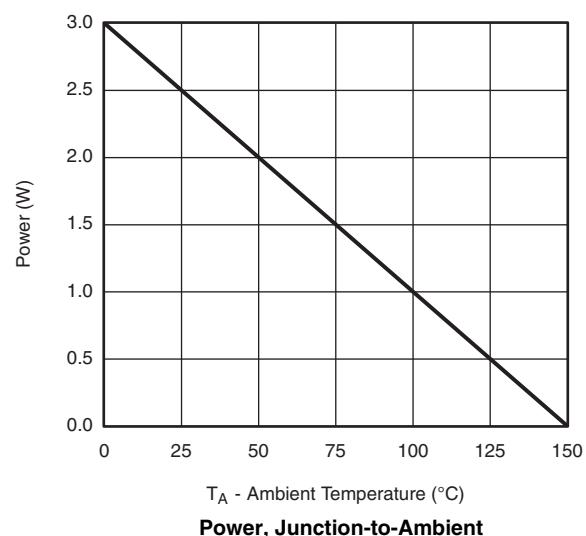
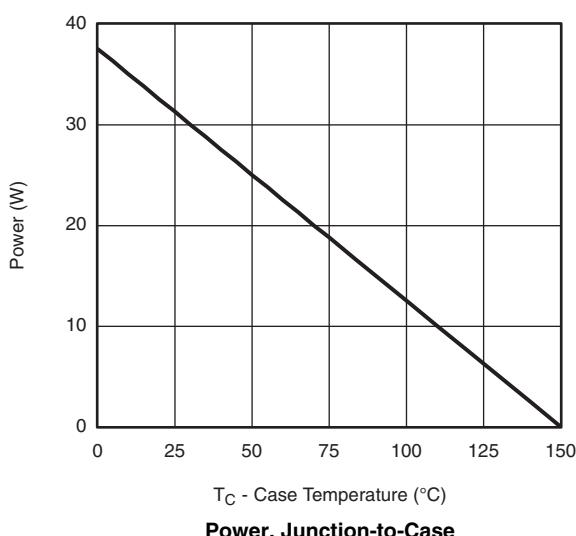
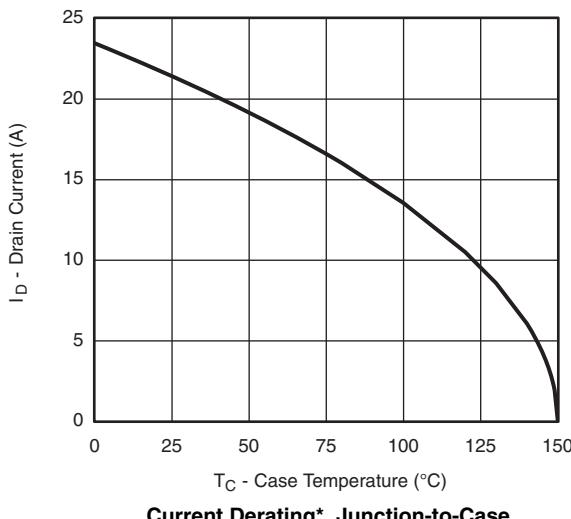


Single Pulse Power, Junction-to-Ambient

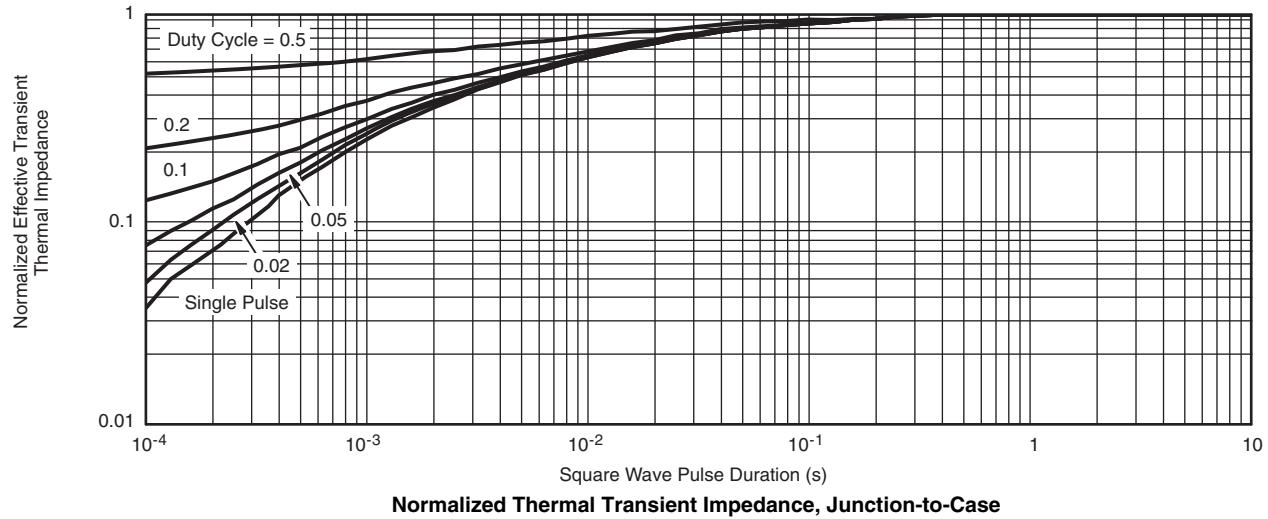
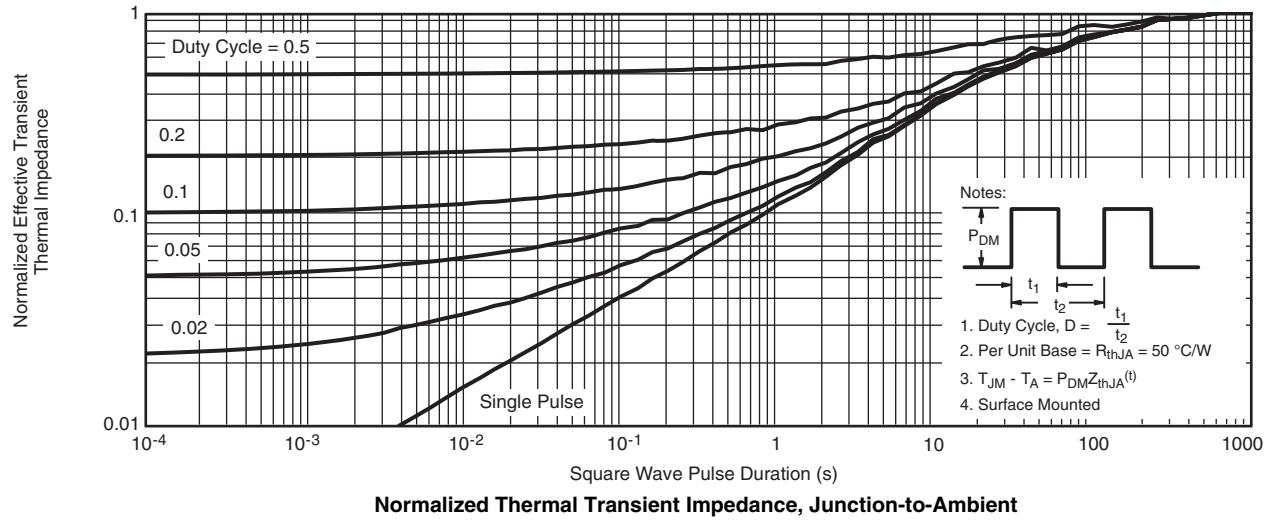


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Single Pulse Power, Junction-to-Case

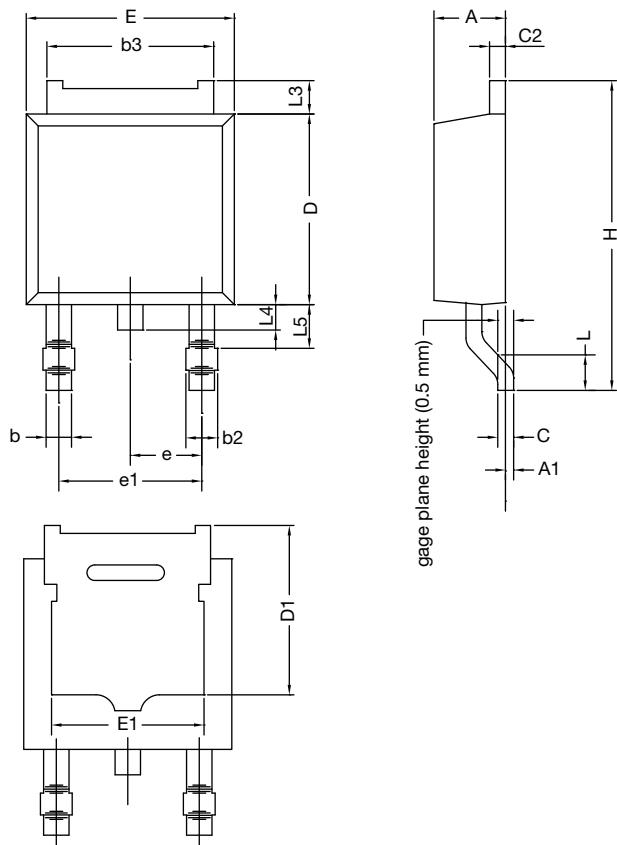
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


* 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)

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?68857.

TO-252AA CASE OUTLINE

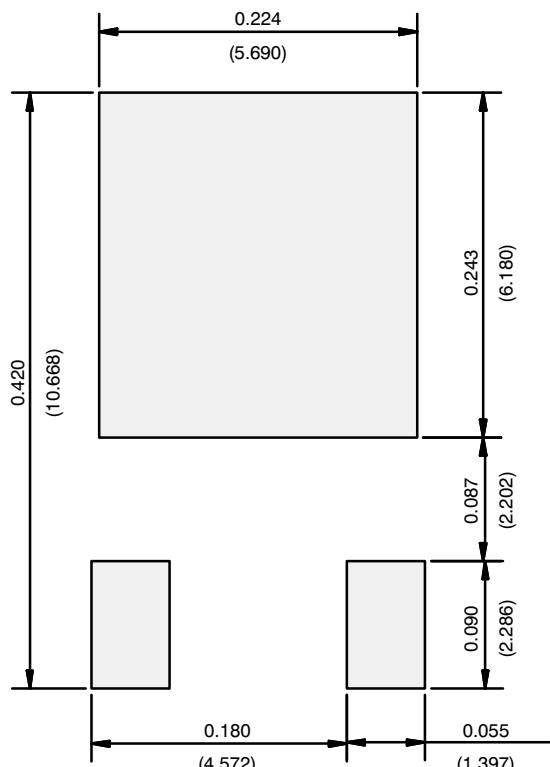


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060

ECN: X12-0247-Rev. M, 24-Dec-12
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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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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