

Automotive N-Channel 300 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	300
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.330
I_D (A)	10
Configuration	Single

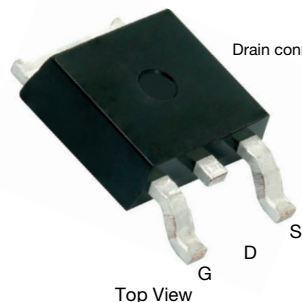
FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- AEC-Q101 qualified ^d
- 100 % R_g tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912

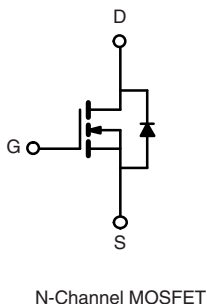


RoHS
COMPLIANT
HALOGEN
FREE

TO-252



Drain connected to tab



ORDERING INFORMATION

Package	TO-252
Lead (Pb)-free and Halogen-free	SQD10N30-330H-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V _{DS}	300	V
Gate-Source Voltage		V _{GS}	± 30	
Continuous Drain Current	T _C = 25 °C	I _D	10	A
	T _C = 125 °C		5	
Continuous Source Current (Diode Conduction) ^a		I _S	50	
Pulsed Drain Current ^b		I _{DM}	16	
Single Pulse Avalanche Current ^e	L = 0.05 mH	I _{AS}	12.65	
Single Pulse Avalanche Energy ^e		E _{AS}	4	mJ
Maximum Power Dissipation ^b	T _C = 25 °C	P _D	107	W
	T _C = 125 °C		35	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R_{thJA}	50	°C/W
Junction-to-Case (Drain)	R_{thJC}	1.4	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.
- 1.5 k Ω resistance in series with the gate.



SPECIFICATIONS (T _C = 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		300	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		3.4	3.8	4.4	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 30 V		-	-	± 100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 300 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 300 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 300 V, T _J = 175 °C	-	-	250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	10	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 14 A	-	0.275	0.330	Ω
		V _{GS} = 10 V	I _D = 14 A, T _J = 125 °C	-	-	0.733	
		V _{GS} = 10 V	I _D = 14 A, T _J = 175 °C	-	-	1.000	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 14 A		-	26	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	1749	2190	pF
Output Capacitance	C _{oss}			-	112	140	
Reverse Transfer Capacitance	C _{rss}			-	44	55	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 150 V, I _D = 7 A	-	31	47	nC
Gate-Source Charge ^c	Q _{gs}			-	8	-	
Gate-Drain Charge ^c	Q _{gd}			-	9.6	-	
Gate Resistance	R _g	f = 1 MHz		0.4	0.8	3	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 150 V, R _L = 21 Ω I _D ≅ 7 A, V _{GEN} = 10 V, R _g = 1 Ω		-	10	15	ns
Rise Time ^c	t _r			-	18	28	
Turn-Off Delay Time ^c	t _{d(off)}			-	20	30	
Fall Time ^c	t _f			-	8	12	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	16	A
Forward Voltage	V _{SD}	I _F = 25 A, V _{GS} = 0 V		-	0.9	1.5	V

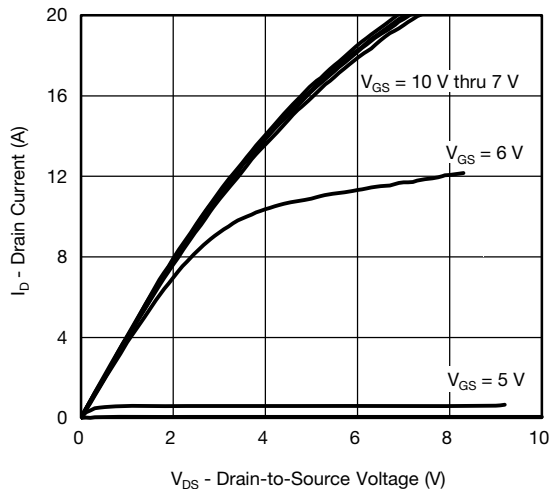
Notes

- 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.

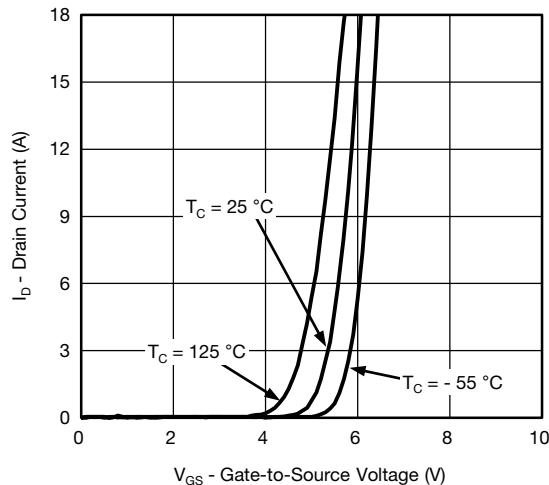
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



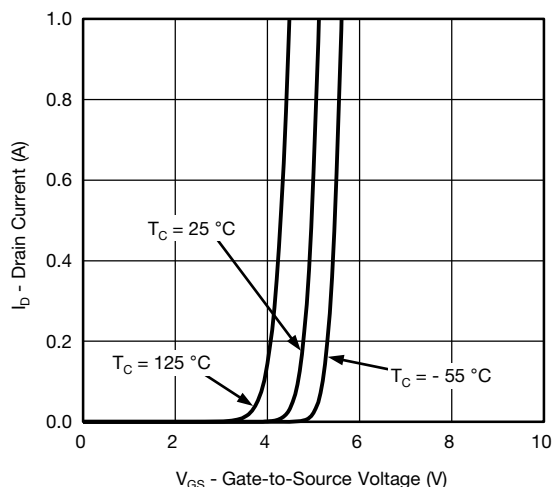
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



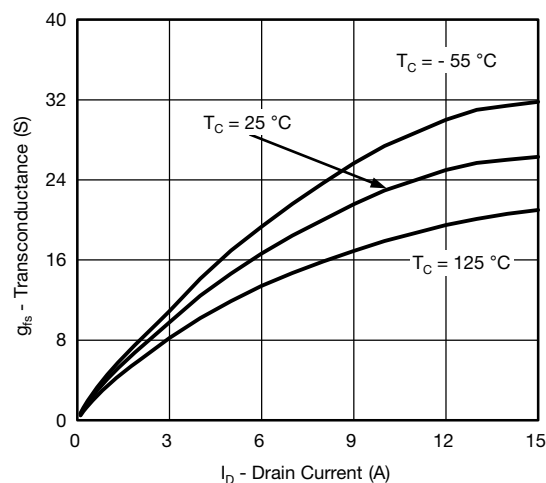
Output Characteristics



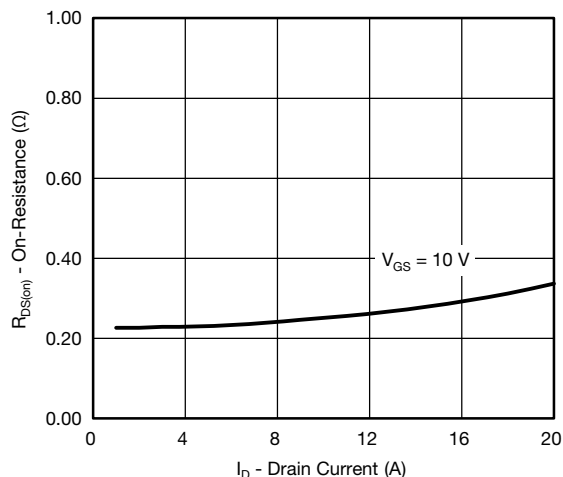
Transfer Characteristics



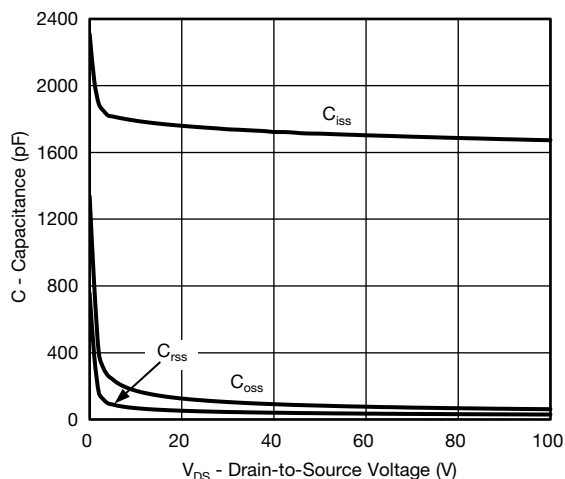
Transfer Characteristics



Transconductance



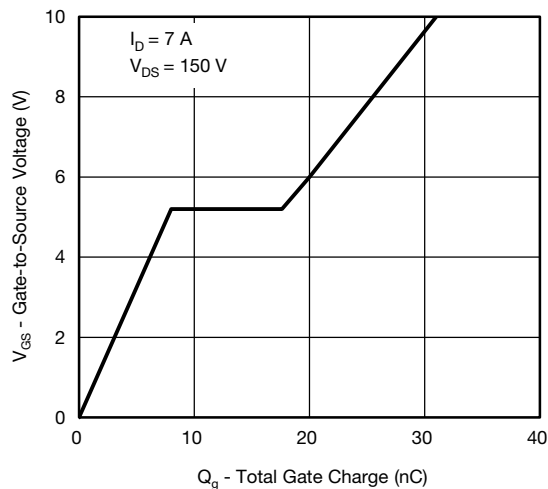
On-Resistance vs. Drain Current



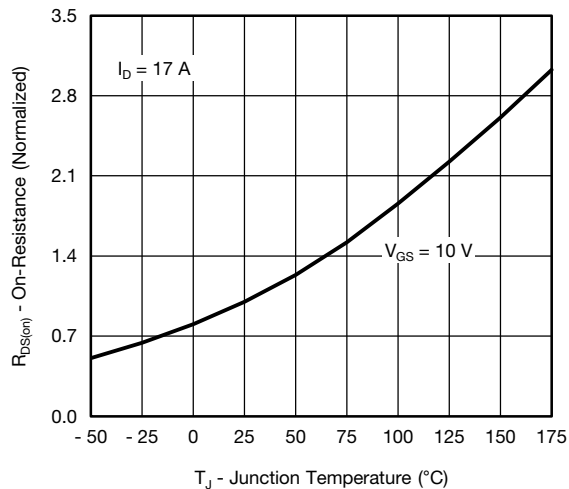
Capacitance



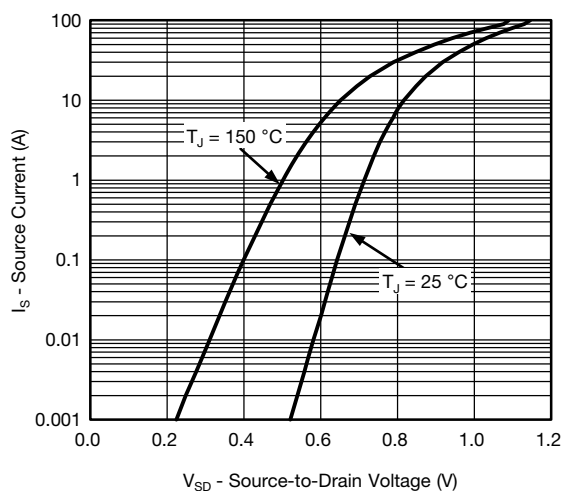
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



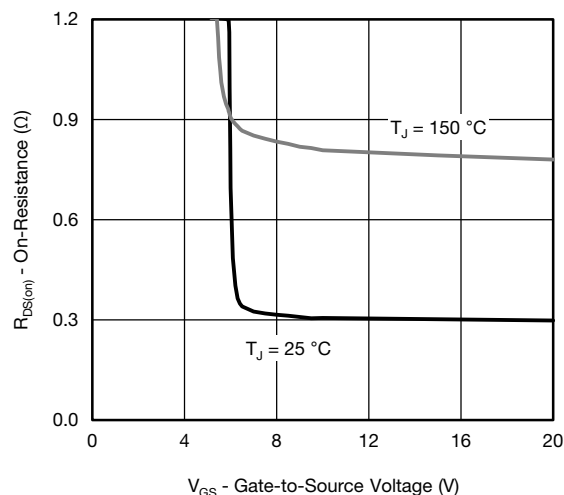
Gate Charge



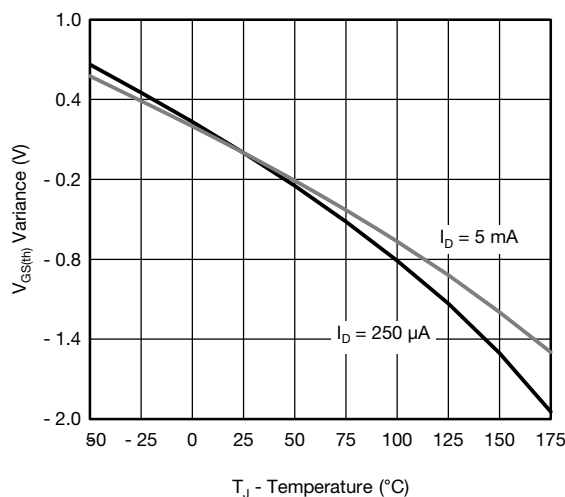
On-Resistance vs. Junction Temperature



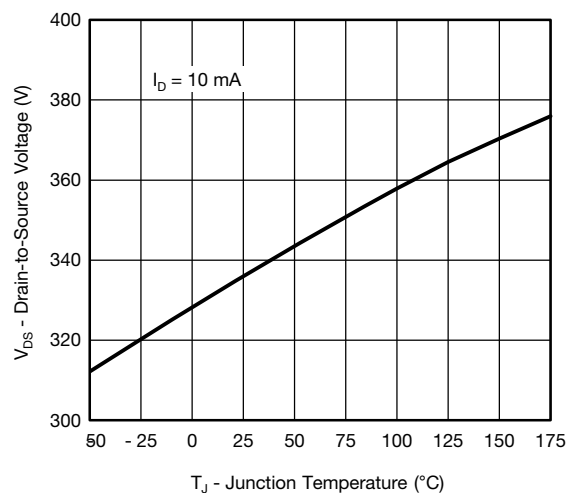
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



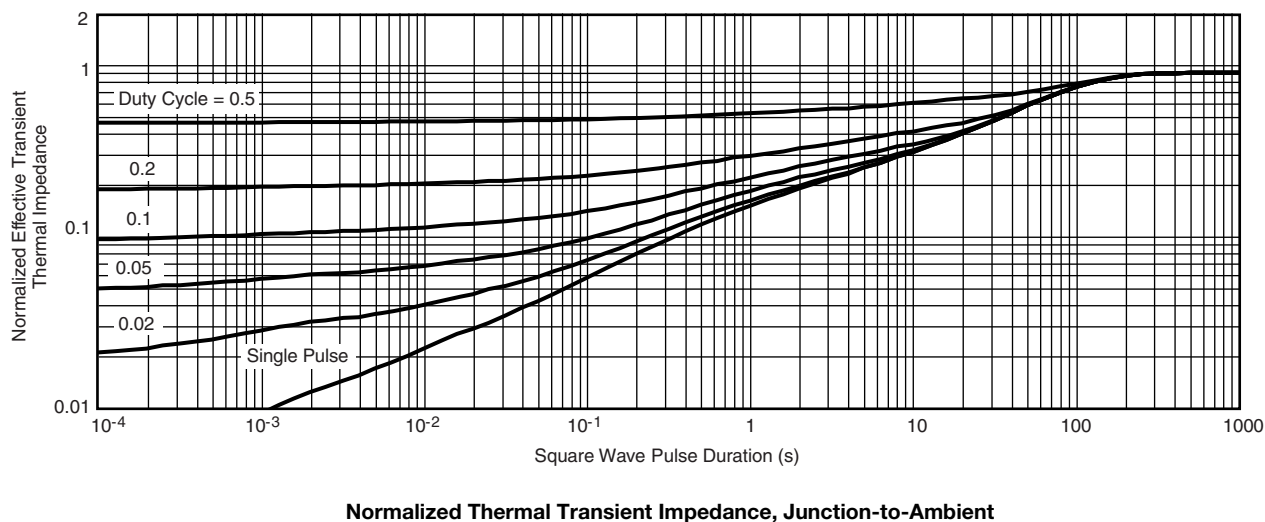
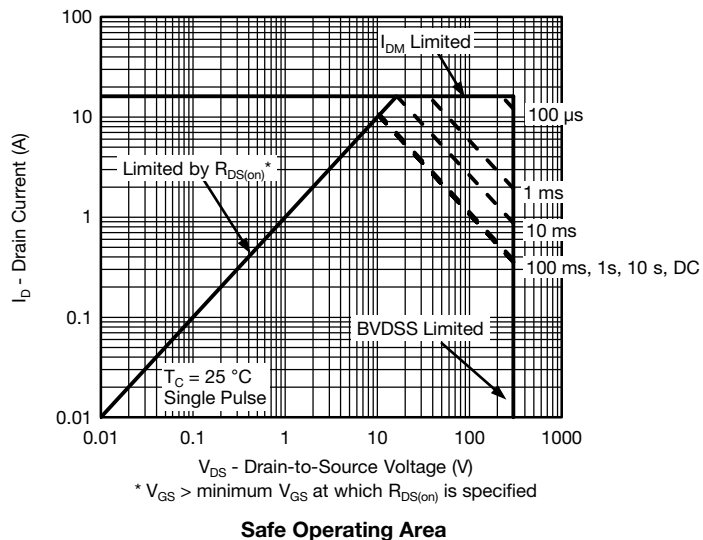
Threshold Voltage



Drain Source Breakdown vs. Junction Temperature

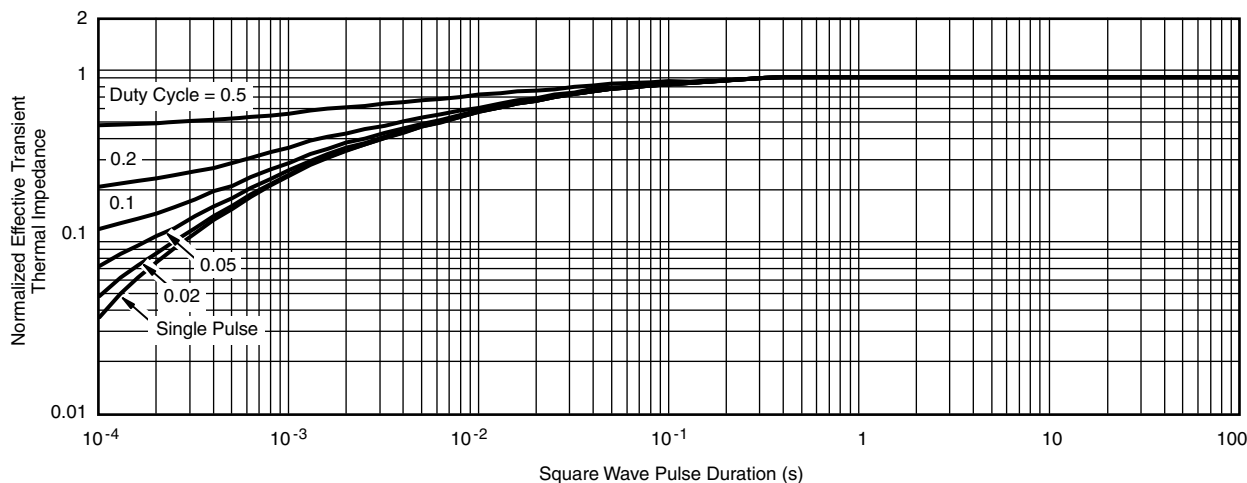


THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)





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



Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^{\circ}\text{C}$)are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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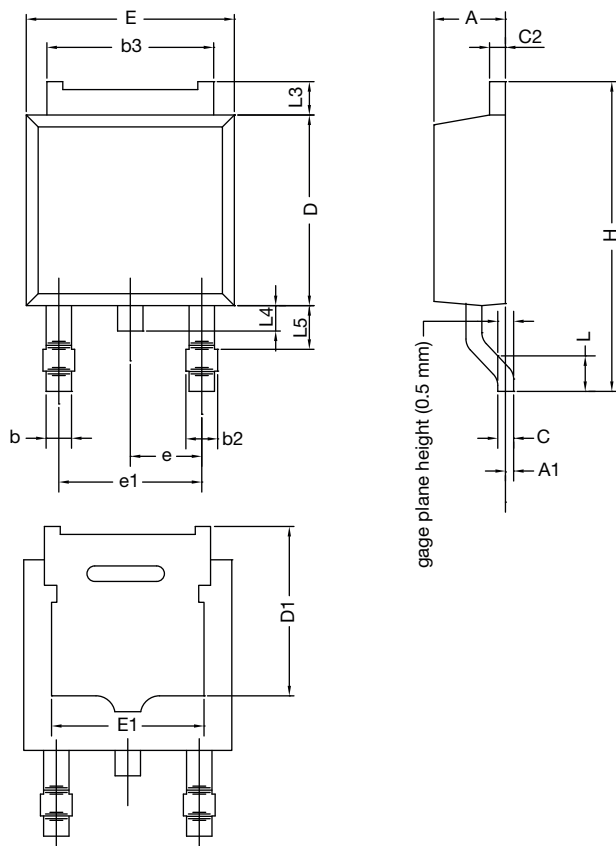


REVISION HISTORY ^a		
REVISION	DATE	DESCRIPTION OF CHANGE
B	26-Feb-2015	• UIS changed
C	04-May-2015	• R_g , C_{iss} and t_r updated

Note

a. As of April 2014

TO-252AA Case Outline

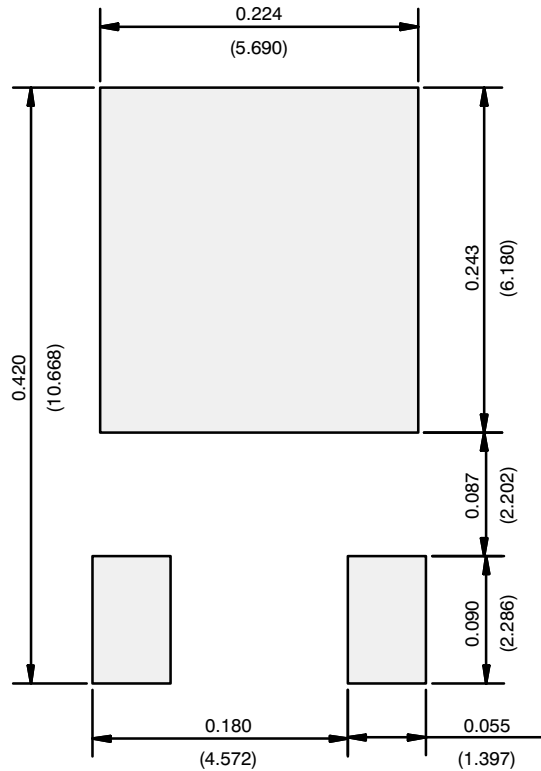


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	4.10	-	0.161	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	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	1.01	1.52	0.040	0.060
ECN: T13-0592-Rev. A, 02-Sep-13 DWG: 6019				

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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