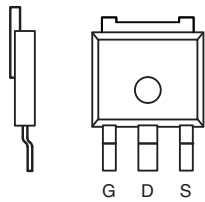


Automotive N-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

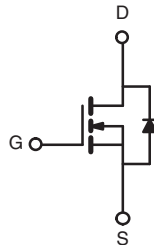
V_{DS} (V)	60
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.0076
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.009
I_D (A)	50
Configuration	Single

**TO-252
Reverse Lead DPAK**



Top View

Drain Connected to Tab



N-Channel MOSFET

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested
- AEC-Q101 Qualified^d
- Compliant to RoHS Directive 2002/95/EC

AUTOMOTIVE
GRADE



RoHS
COMPLIANT
HALOGEN
FREE

ORDERING INFORMATION

Package	TO-252 Reverse Lead DPAK
Lead (Pb)-free and Halogen-free	SQR50N06-07L-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ^a	I_D	$T_C = 25$ °C	A
		$T_C = 125$ °C	
Continuous Source Current (Diode Conduction) ^a	I_S	50	
Pulsed Drain Current ^b	I_{DM}	200	
Single Pulse Avalanche Current	I_{AS}	48	mJ
Single Pulse Avalanche Energy		115	
Maximum Power Dissipation ^b	P_D	$T_C = 25$ °C	W
		$T_C = 125$ °C	
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}	1.1	

Notes

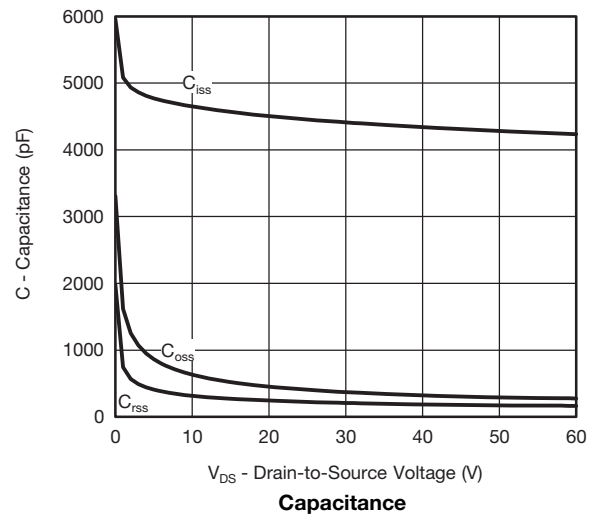
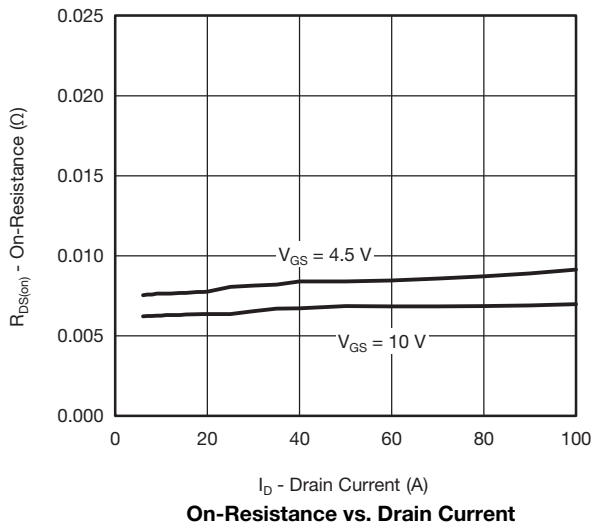
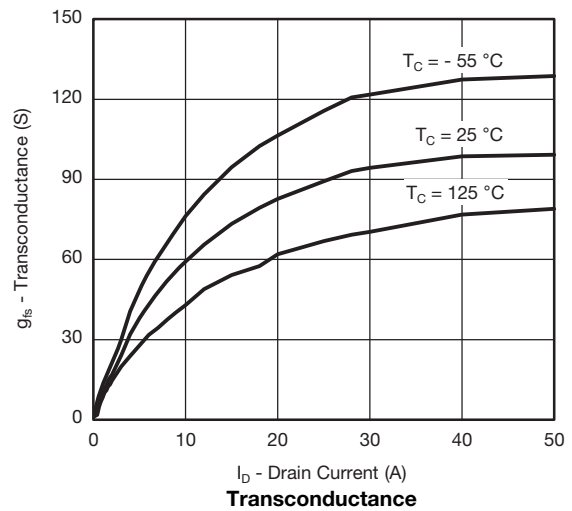
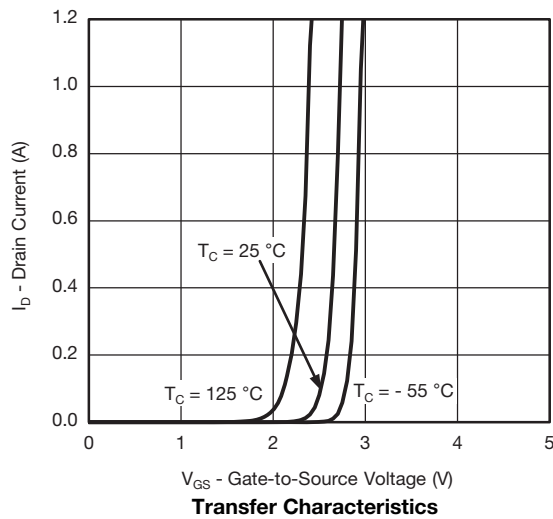
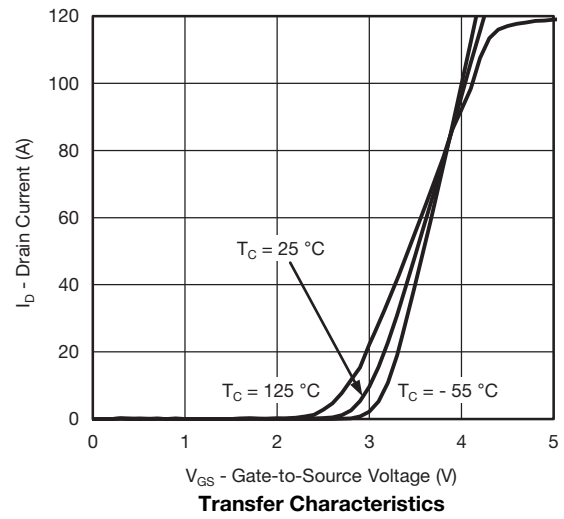
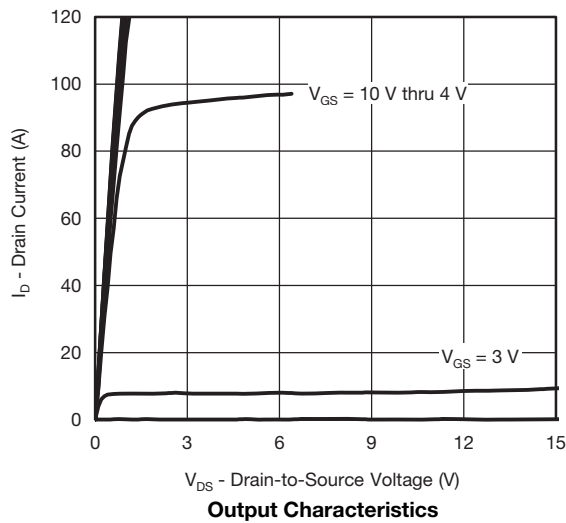
- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

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		60	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.5	2.0	2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 60 V	-	-	1.0	μA
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 175 °C	-	-	250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	50	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 20 A	-	0.0064	0.0076	Ω
		V _{GS} = 10 V	I _D = 20 A, T _J = 125 °C	-	-	0.0130	
		V _{GS} = 10 V	I _D = 20 A, T _J = 175 °C	-	-	0.0160	
		V _{GS} = 4.5 V	I _D = 20 A	-	0.0078	0.0090	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 20 A		-	82	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	4455	5570	pF
Output Capacitance	C _{Oss}			-	407	510	
Reverse Transfer Capacitance	C _{rss}			-	223	280	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 30 V, I _D = 50 A	-	80	120	nC
Gate-Source Charge ^c	Q _{gs}			-	11.1	-	
Gate-Drain Charge ^c	Q _{gd}			-	15.7	-	
Gate Resistance	R _g	f = 1 MHz		1	2	3	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.6 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω		-	12	18	ns
Rise Time ^c	t _r			-	13	20	
Turn-Off Delay Time ^c	t _{d(off)}			-	42	63	
Fall Time ^c	t _f			-	7	11	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	200	A
Forward Voltage	V _{SD}	I _F = 20 A, V _{GS} = 0 V		-	0.85	1.5	V

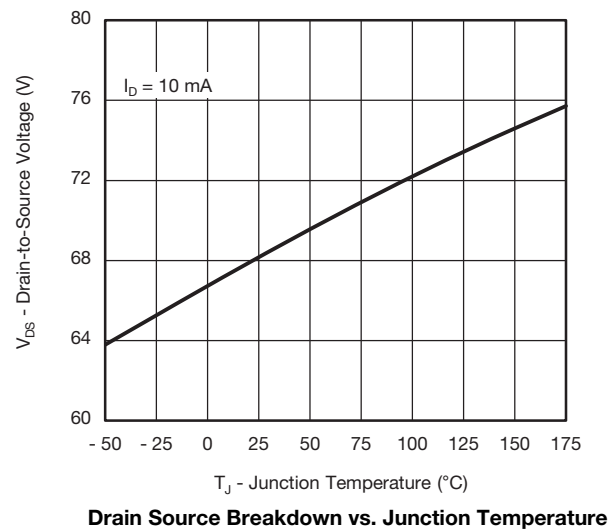
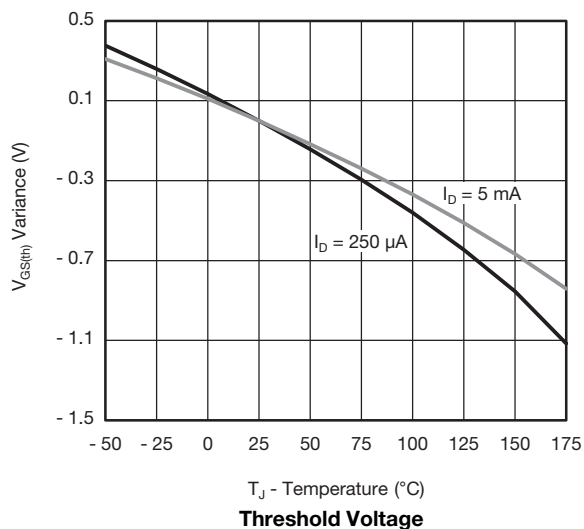
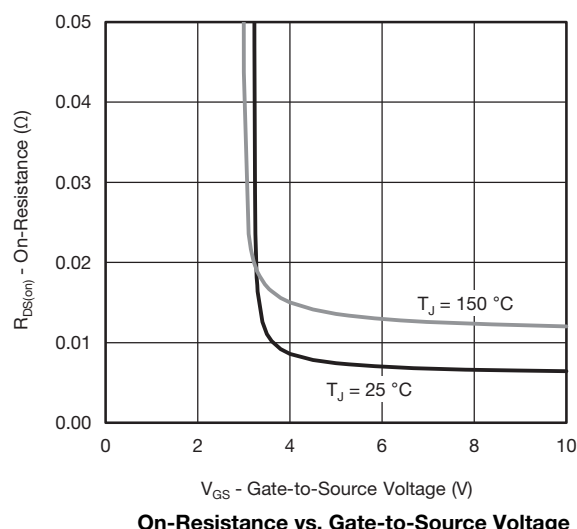
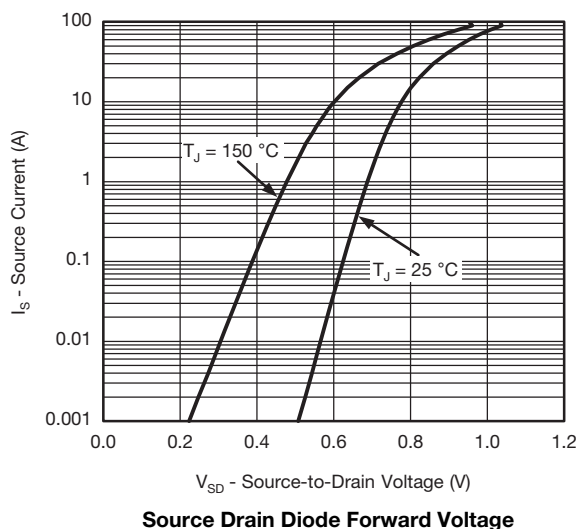
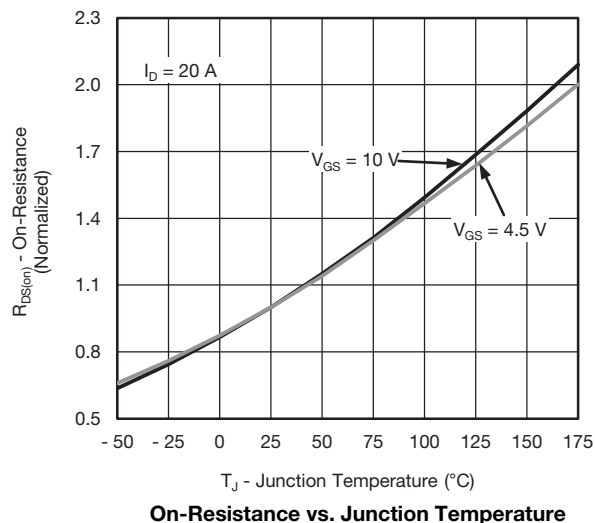
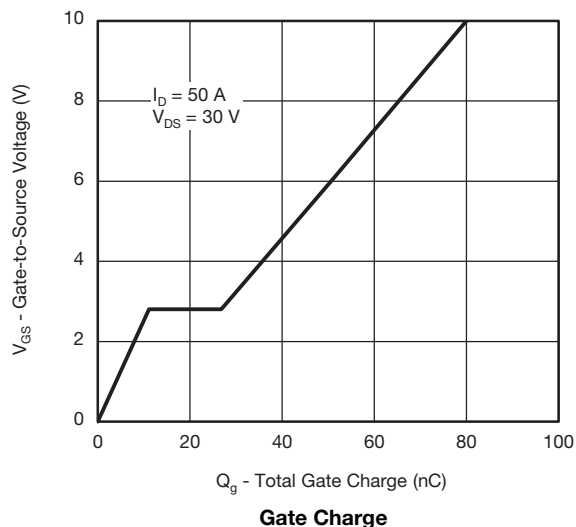
Notes

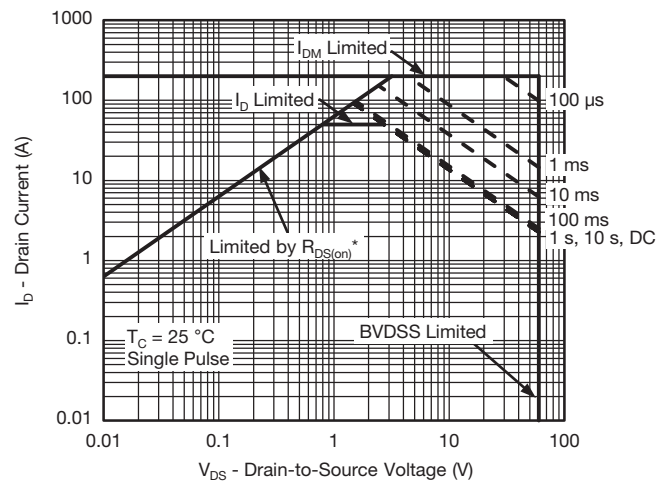
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

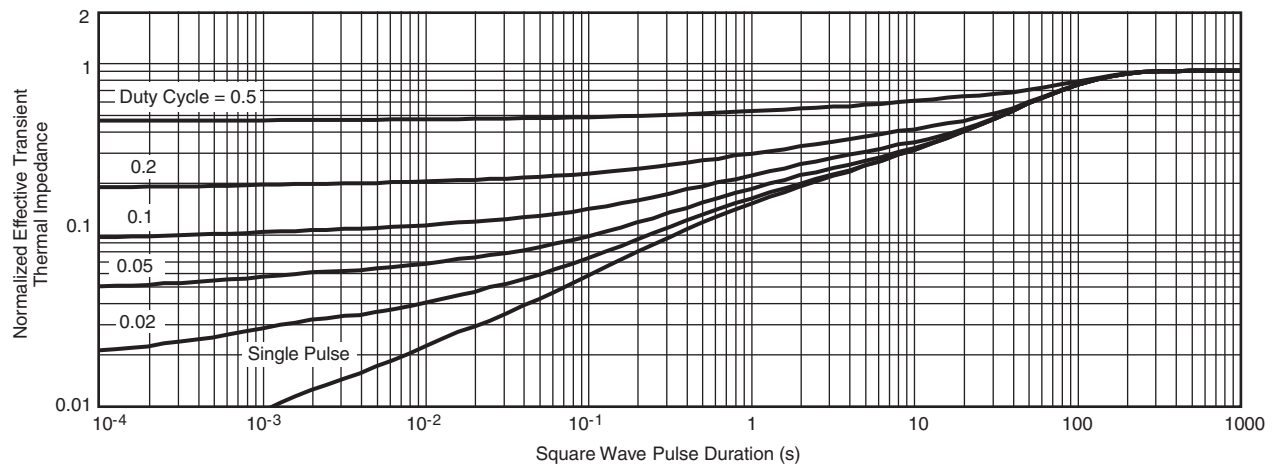
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)


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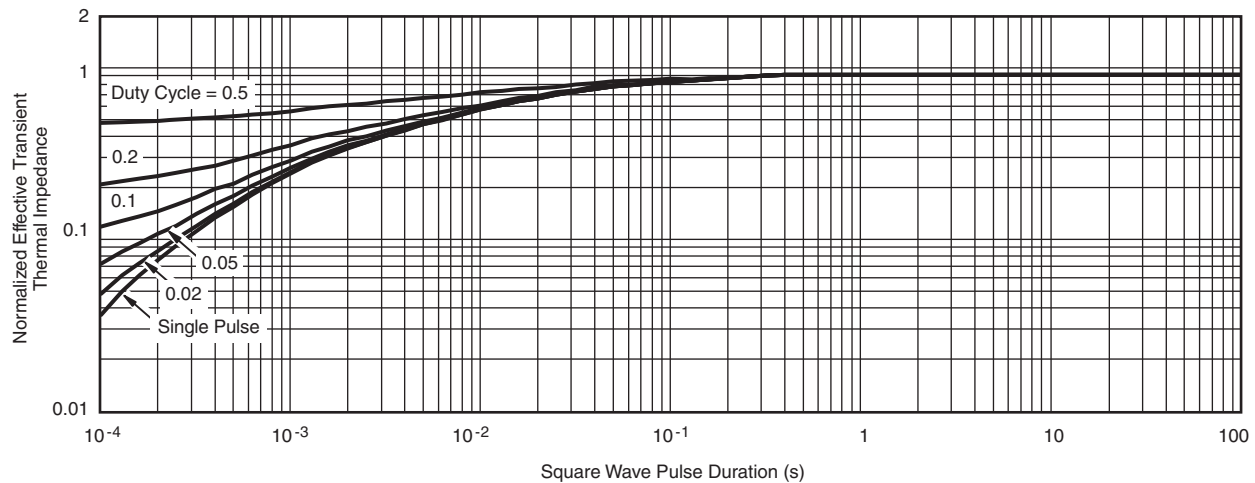


THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)


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

Safe Operating Area

Normalized Thermal Transient Impedance, Junction-to-Ambient

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



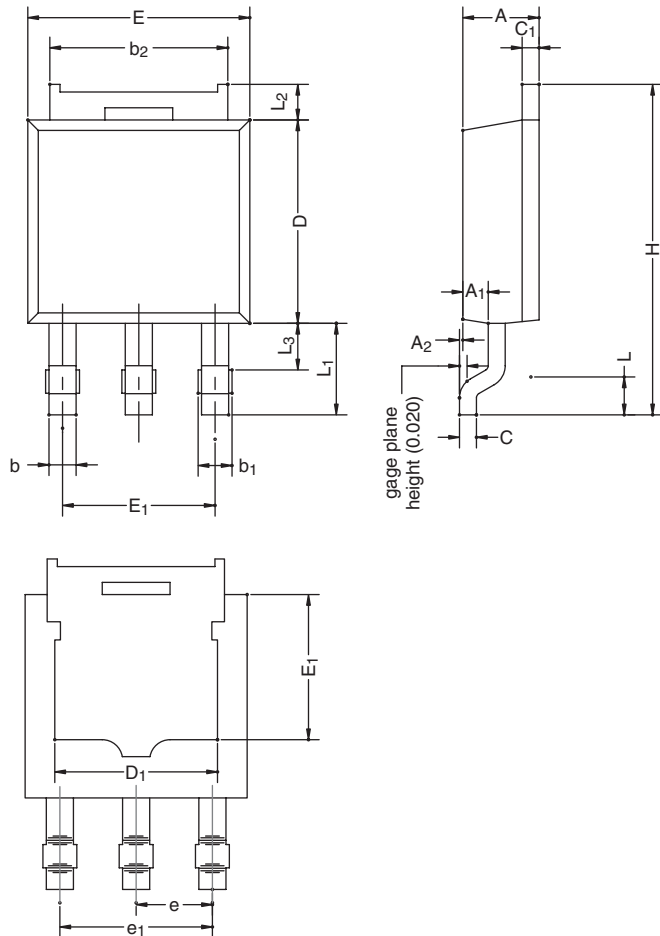
Normalized Thermal Transient Impedance, Junction-to-Case

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.

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?69066.

TO-252 REVERSE LEAD CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.23	2.33	0.088	0.092
A ₁	0.64	0.89	0.025	0.035
A ₂	0.03	0.23	0.001	0.009
b	0.71	0.88	0.028	0.035
b ₁	0.76	1.14	0.030	0.045
b ₂	5.23	5.44	0.206	0.214
C	0.46	0.58	0.018	0.023
C ₁	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
D ₁	4.49	5.00	0.177	0.197
E	6.48	6.73	0.255	0.265
E ₁	4.32	-	0.170	-
e	2.28 BSC		0.090 BSC	
e ₁	4.57 BSC		0.180 BSC	
H	9.65	10.41	0.380	0.410
L	1.40	1.78	0.055	0.070
L ₁	2.74 BSC		0.108 BSC	
L ₂	0.89	1.27	0.035	0.050
L ₃	1.15	1.52	0.040	0.060

ECN: T-08706-Rev. B, 29-Sep-08
DWG: 5894

Note

Dimension L₃ for reference only.



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