

Automotive N-Channel 100 V (D-S) 175 °C MOSFET

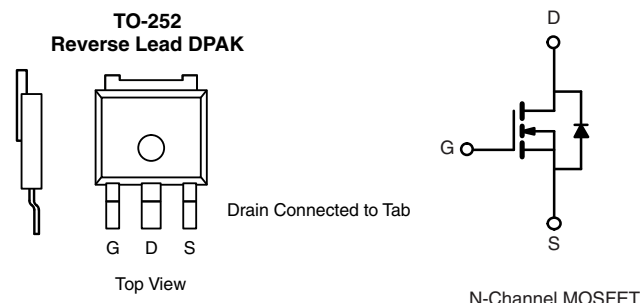


PRODUCT SUMMARY

V_{DS} (V)	100
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.025
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.029
I_D (A)	40
Configuration	Single

FEATURES

- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested
- AEC-Q101 Qualified
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



ORDERING INFORMATION

Package	TO-252 Reverse Lead DPAK
Lead (Pb)-free and Halogen-free	SQR40N10-25-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C = 25$ °C ^a	40
		$T_C = 125$ °C	26
Continuous Source Current (Diode Conduction) ^a	I_S	40	A
Pulsed Drain Current ^b	I_{DM}	160	A
Single Pulse Avalanche Current	I_{AS}	40	A
Single Pulse Avalanche Energy	E_{AS}	80	mJ
Maximum Power Dissipation ^b	P_D	$T_C = 25$ °C	136
		$T_C = 125$ °C	45
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	°C/W

Notes

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

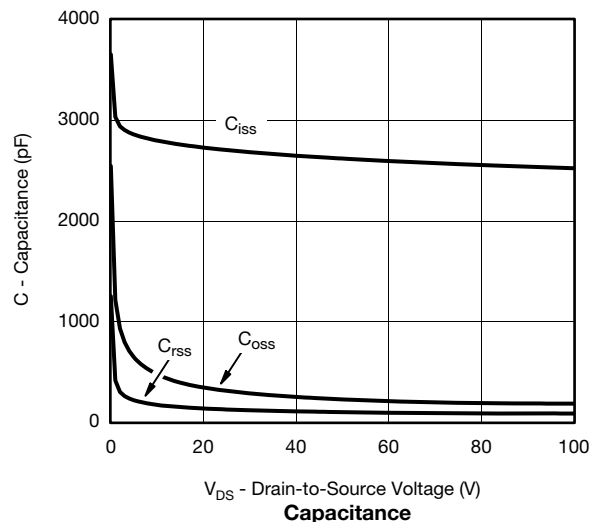
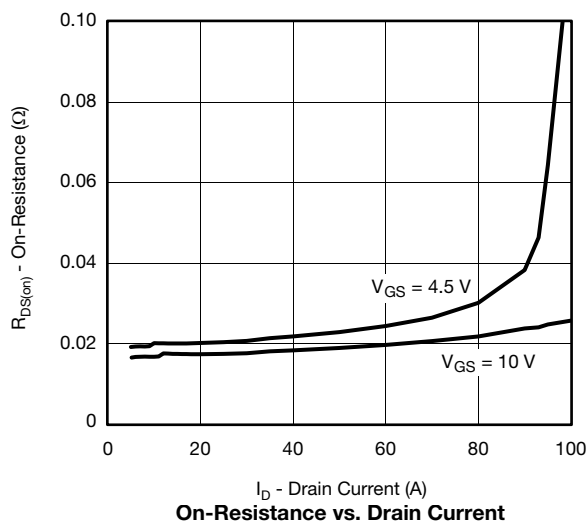
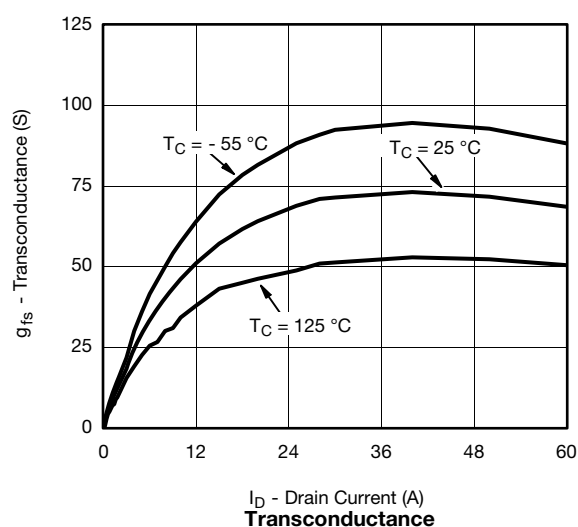
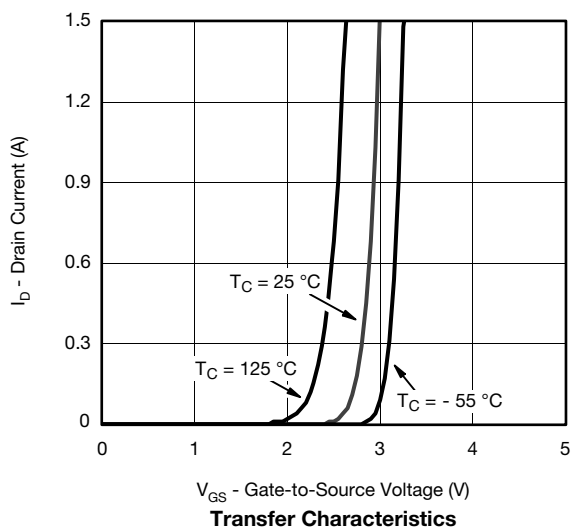
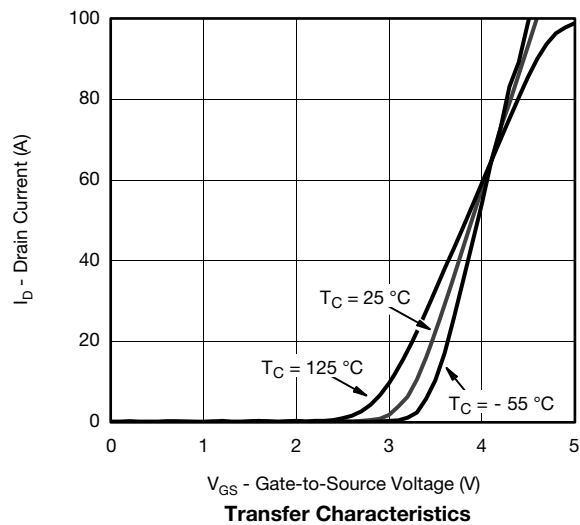
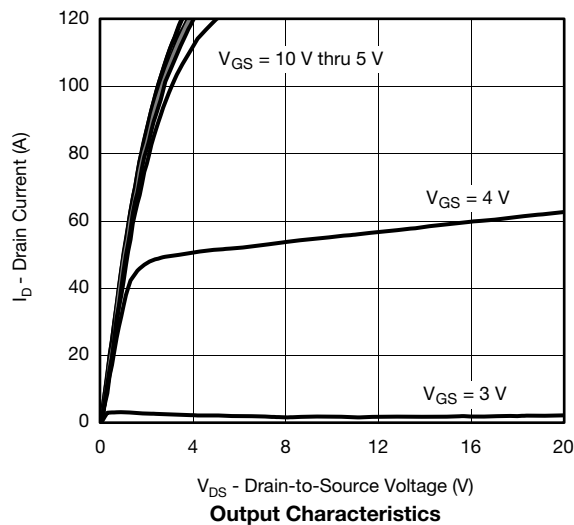


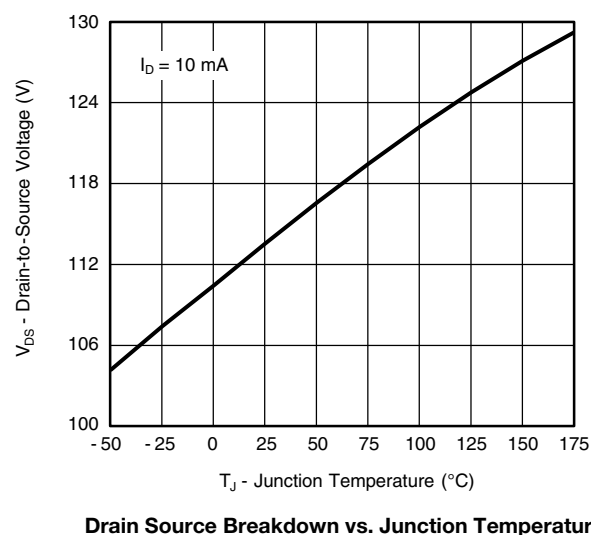
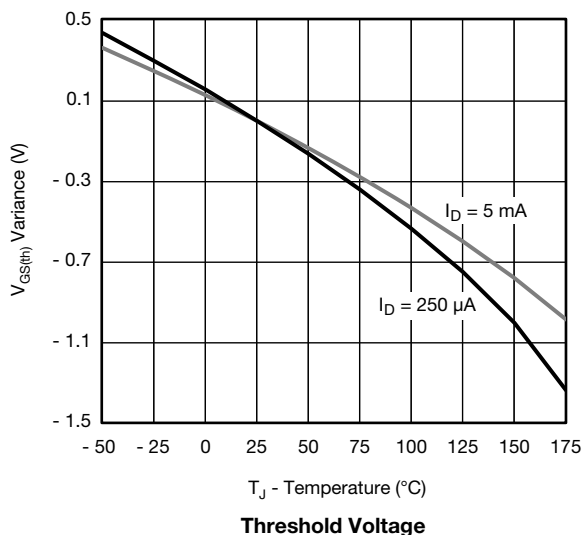
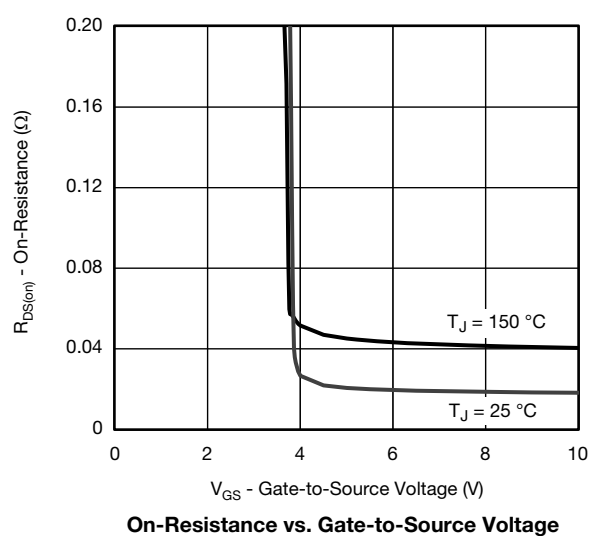
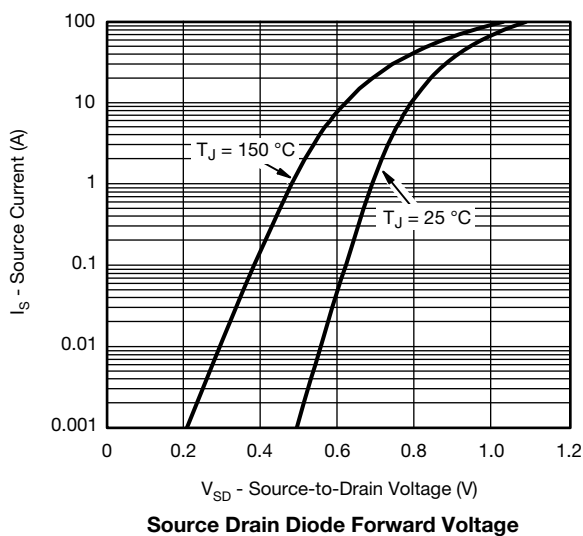
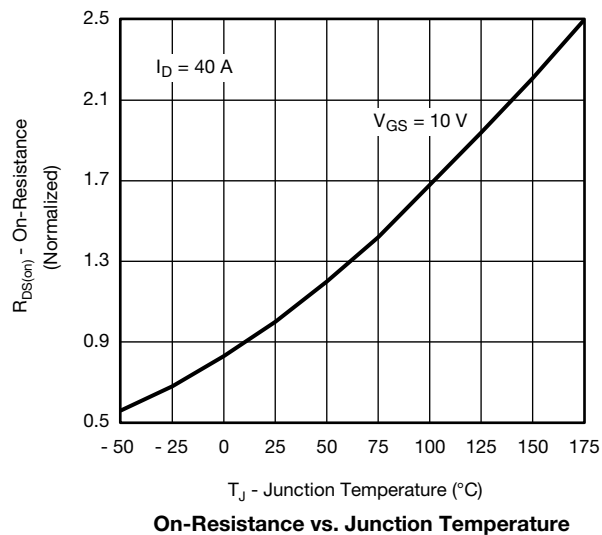
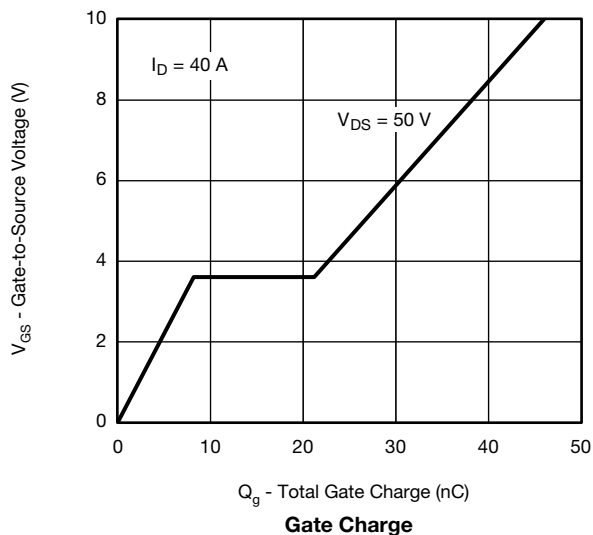
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		100	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.5	-	2.5	
Gate-Source 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} = 100 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 100 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 100 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 = 40 A	-	0.019	0.025	Ω
		V _{GS} = 10 V	I _D = 40 A, T _J = 125 °C	-	-	0.050	
		V _{GS} = 10 V	I _D = 40 A, T _J = 175 °C	-	-	0.063	
		V _{GS} = 4.5 V	I _D = 20 A	-	0.021	0.029	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 40 A		-	73	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	2703	3380	pF
Output Capacitance	C _{oss}			-	312	390	
Reverse Transfer Capacitance	C _{rss}			-	127	160	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 50 V, I _D = 40 A	-	46	70	nC
Gate-Source Charge ^c	Q _{gs}			-	8.2	-	
Gate-Drain Charge ^c	Q _{gd}			-	13	-	
Gate Resistance	R _g	f = 1 MHz		1	2	3.1	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 50 V, R _L = 1.25 Ω I _D ≅ 40 A, V _{GEN} = 10 V, R _g = 1 Ω		-	11	17	ns
Rise Time ^c	t _r			-	11	17	
Turn-Off Delay Time ^c	t _{d(off)}			-	27	41	
Fall Time ^c	t _f			-	6	9	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	160	A
Forward Voltage	V _{SD}	I _F = 40 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.

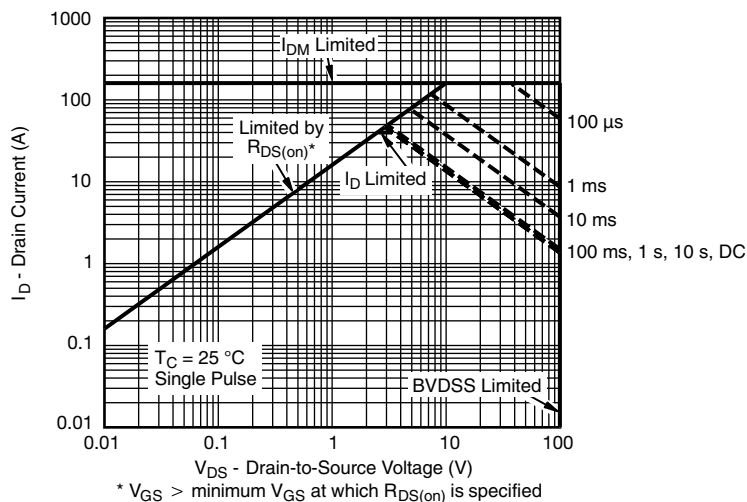
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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


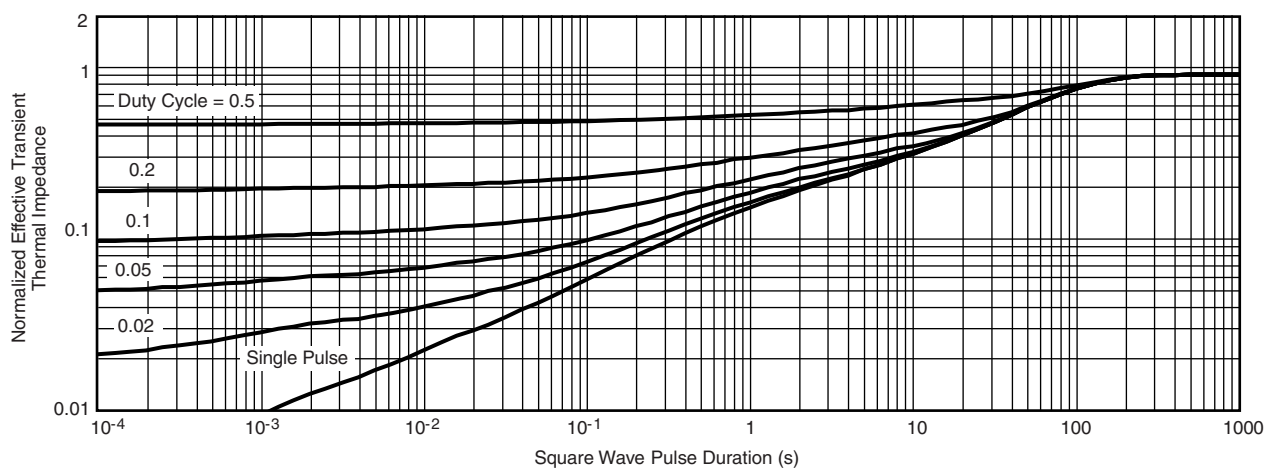
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)




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



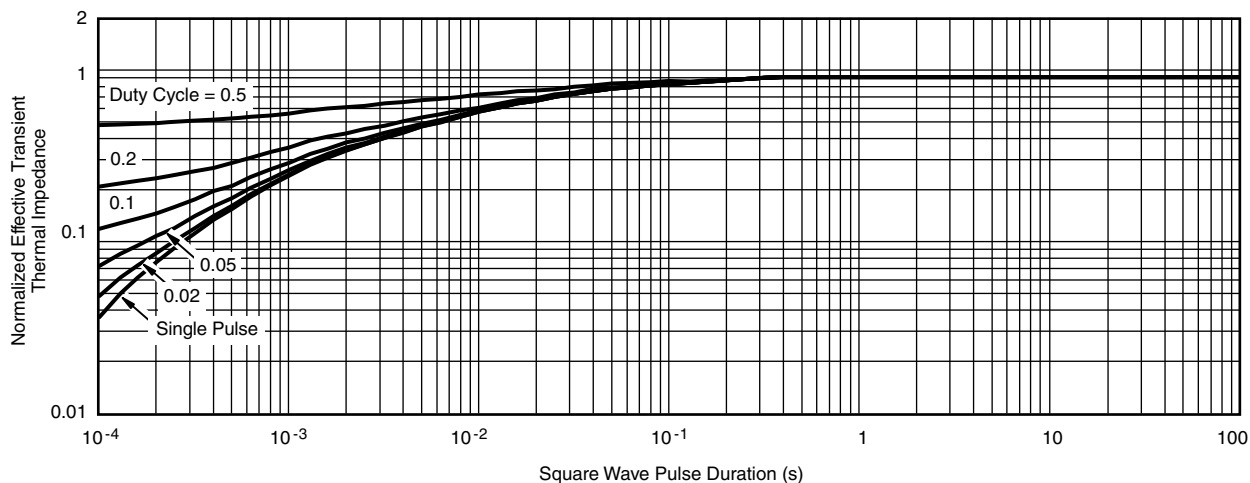
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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



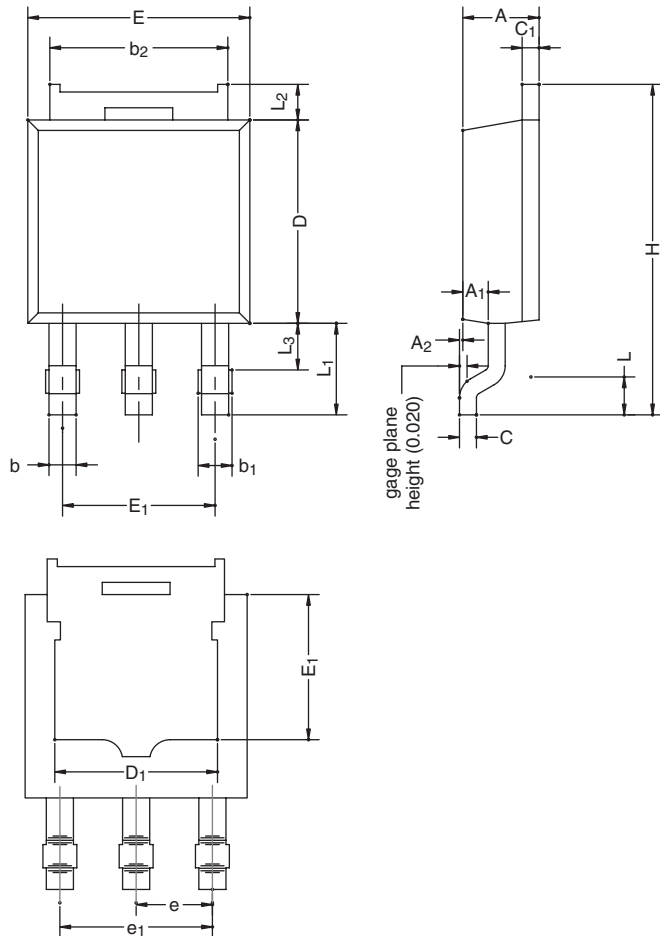
Normalized Thermal Transient Impedance, Junction-to-Case

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.

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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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