

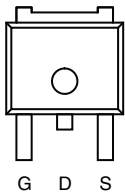


PRODUCT SUMMARY	
V <sub>DS</sub> (V)	- 40
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = - 10 V	0.013
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = - 4.5 V	0.022
I <sub>D</sub> (A)	- 50
Configuration	Single

### FEATURES

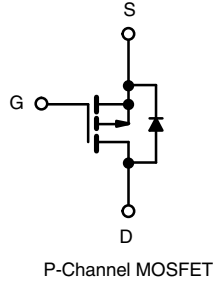
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R<sub>g</sub> and UIS Tested
- Compliant to RoHS Directive 2002/95/EC
- AEC-Q101 Qualified<sup>d</sup>

TO-252



Drain Connected to Tab

Top View



ORDERING INFORMATION	
Package	TO-252
Lead (Pb)-free and Halogen-free	SQD50P04-13L-GE3

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V <sub>DS</sub>	- 40	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25 °C <sup>a</sup>	- 50
		T <sub>C</sub> = 125 °C	- 35
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 50	A
Pulsed Drain Current <sup>b</sup>	I <sub>DM</sub>	- 200	
Single Pulse Avalanche Current	I <sub>AS</sub>	- 39	
Single Pulse Avalanche Energy	E <sub>AS</sub>	76	mJ
Maximum Power Dissipation <sup>b</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	83
		T <sub>C</sub> = 125 °C	27
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R <sub>thJA</sub>	50	°C/W
Junction-to-Case (Drain)	R <sub>thJC</sub>	1.8	

### Notes

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

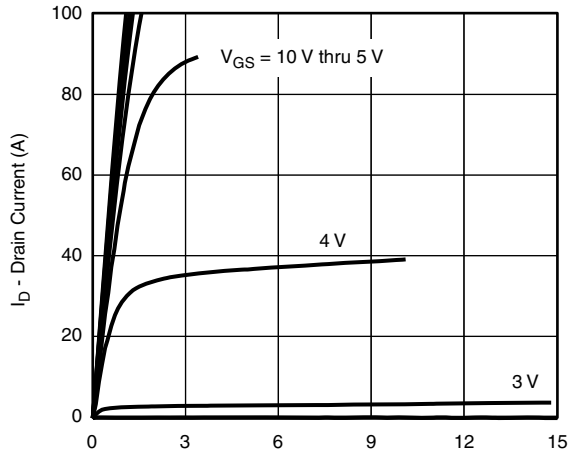
<b>SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$		-40	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$		-1.5	-	-2.5	
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = -40\text{ V}$	-	-	-1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = -40\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	-50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -40\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	-150	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = -10\text{ V}$	$V_{DS} \leq -5\text{ V}$	-50	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$	$I_D = -17\text{ A}$	-	0.010	0.013	$\Omega$
		$V_{GS} = -10\text{ V}$	$I_D = -50\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.019	
		$V_{GS} = -10\text{ V}$	$I_D = -50\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	-	0.023	
		$V_{GS} = -4.5\text{ V}$	$I_D = -14\text{ A}$	-	0.016	0.022	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -17\text{ A}$		-	38	-	S
<b>Dynamic<sup>b</sup></b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = -20\text{ V}, f = 1\text{ MHz}$	-	2872	3590	$\mu\text{F}$
Output Capacitance	$C_{oss}$			-	508	635	
Reverse Transfer Capacitance	$C_{rss}$			-	352	440	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = -10\text{ V}$	$V_{DS} = -40\text{ V}, I_D = -50\text{ A}$	-	60	90	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	5.7	8.6	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	14.7	22	
Gate Resistance	$R_g$	f = 1 MHz		1.5	3	4.5	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 0.4\text{ }\Omega$ $I_D \equiv -50\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		-	10	15	ns
Rise Time <sup>c</sup>	$t_r$			-	12	18	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			-	40	60	
Fall Time <sup>c</sup>	$t_f$			-	16	24	
<b>Source-Drain Diode Ratings and Characteristics<sup>b</sup></b>							
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	-200	A
Forward Voltage	$V_{SD}$	$I_F = -35\text{ A}, V_{GS} = 0\text{ V}$		-	-0.9	-1.5	V

**Notes**

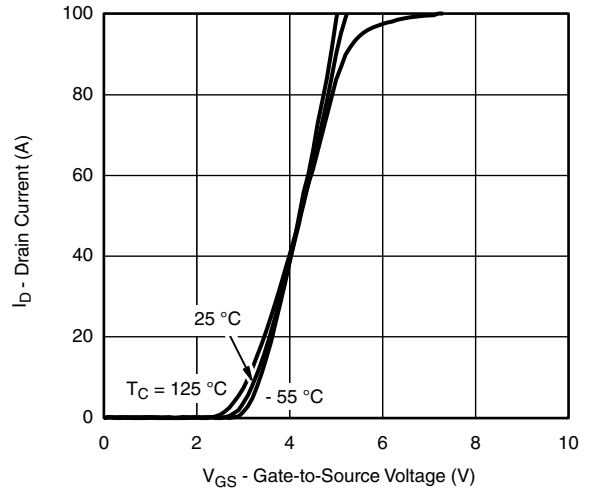
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

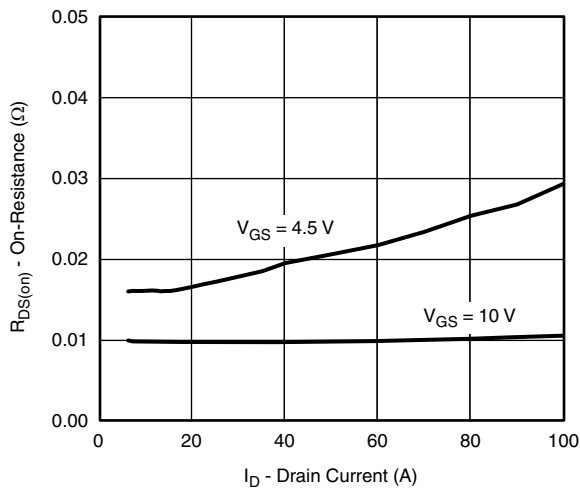
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



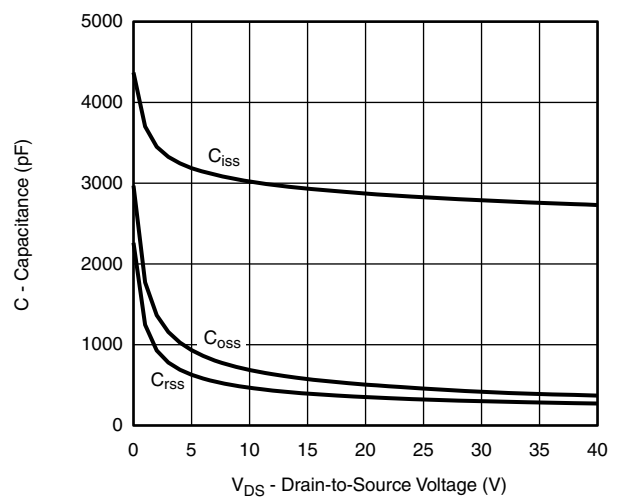
$V_{GS} = 10\text{ V thru } 5\text{ V}$   
 $I_D$  - Drain Current (A)  
 $V_{DS}$  - Drain-to-Source Voltage (V)  
**Output Characteristics**



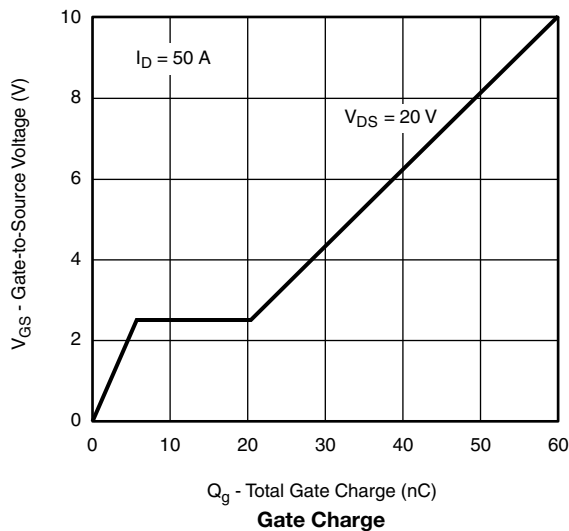
$I_D$  - Drain Current (A)  
 $V_{GS}$  - Gate-to-Source Voltage (V)  
 $T_C = 125\text{ }^\circ\text{C}$   
 $25\text{ }^\circ\text{C}$   
 $-55\text{ }^\circ\text{C}$   
**Transfer Characteristics**



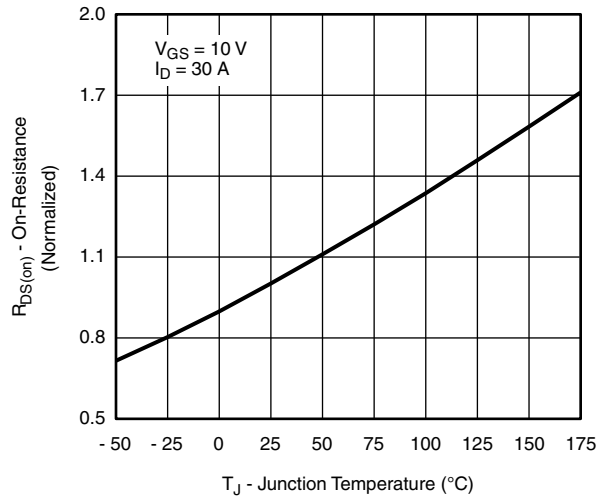
$R_{DS(on)}$  - On-Resistance ( $\Omega$ )  
 $I_D$  - Drain Current (A)  
 $V_{GS} = 4.5\text{ V}$   
 $V_{GS} = 10\text{ V}$   
**On-Resistance vs. Drain Current**



C - Capacitance (pF)  
 $V_{DS}$  - Drain-to-Source Voltage (V)  
 $C_{iss}$   
 $C_{oss}$   
 $C_{rss}$   
**Capacitance**

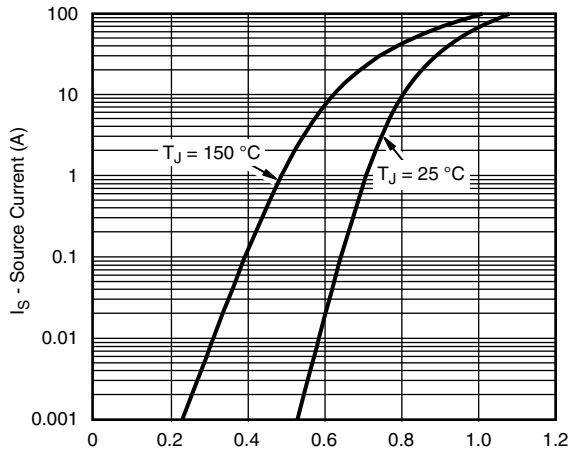


$V_{GS}$  - Gate-to-Source Voltage (V)  
 $Q_g$  - Total Gate Charge (nC)  
 $I_D = 50\text{ A}$   
 $V_{DS} = 20\text{ V}$   
**Gate Charge**

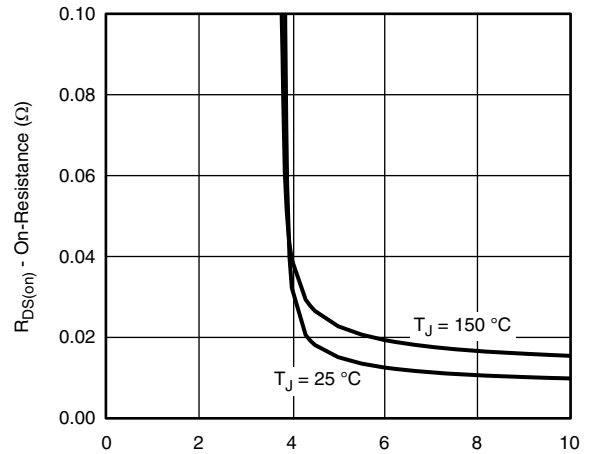


$R_{DS(on)}$  - On-Resistance (Normalized)  
 $T_J$  - Junction Temperature ( $^\circ\text{C}$ )  
 $V_{GS} = 10\text{ V}$   
 $I_D = 30\text{ A}$   
**On-Resistance vs. Junction Temperature**

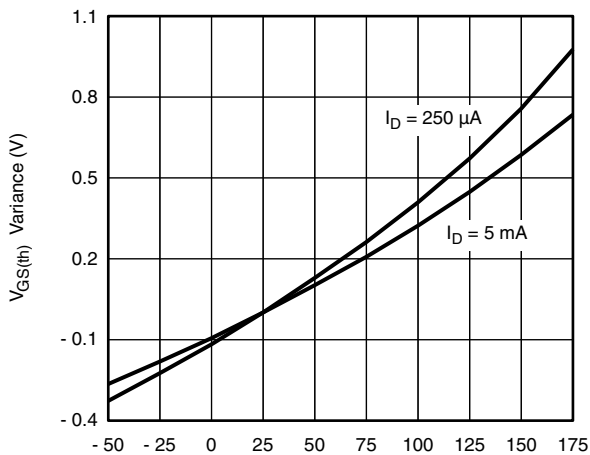
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



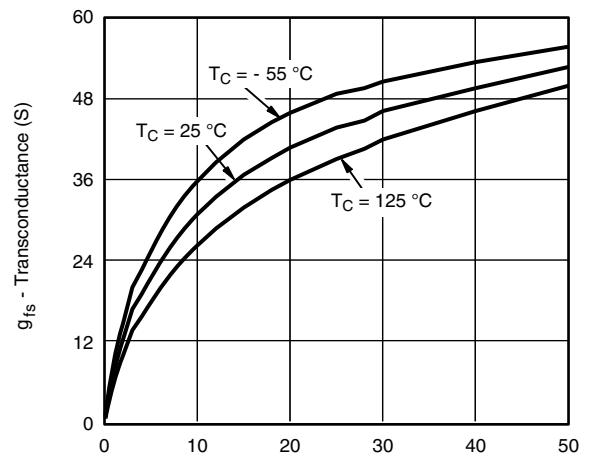
$V_{SD}$  - Source-to-Drain Voltage (V)  
**Source Drain Diode Forward Voltage**



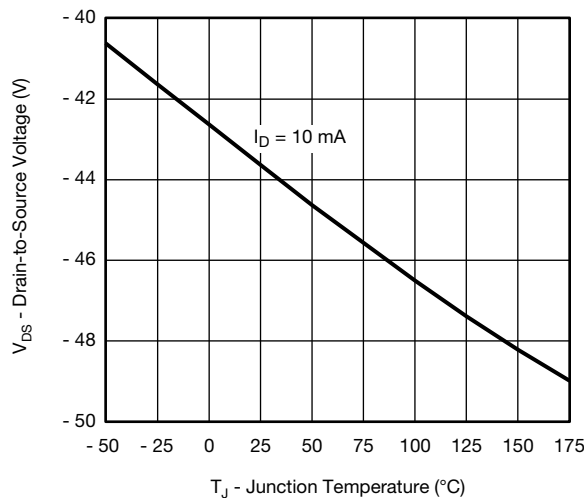
$V_{GS}$  - Gate-to-Source Voltage (V)  
**On-Resistance vs. Gate-to Source Voltage**



$T_J$  - Temperature ( $^\circ\text{C}$ )  
**Threshold Voltage**

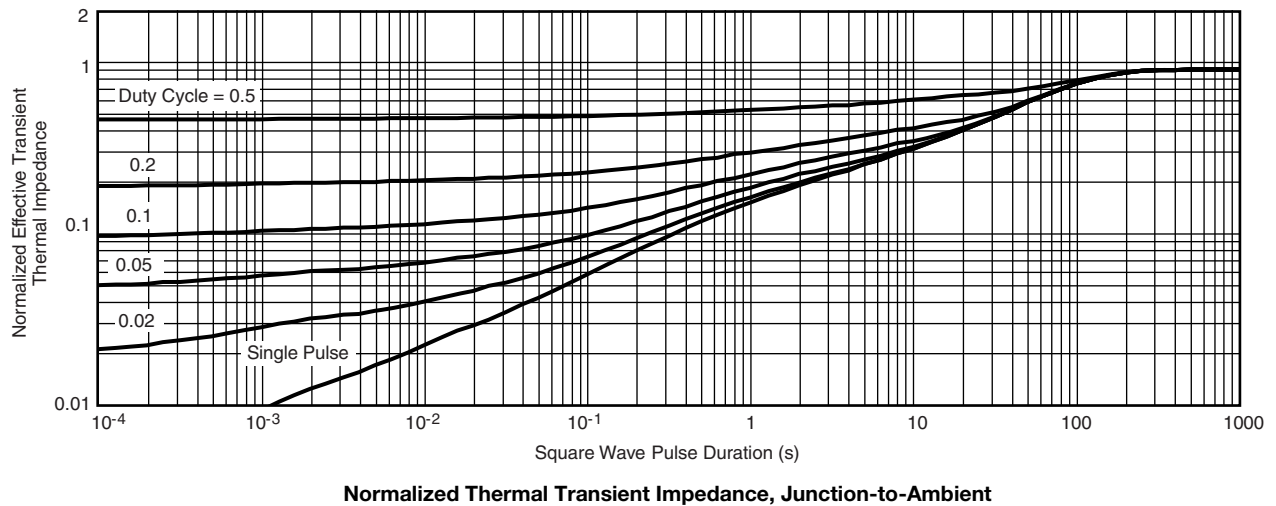
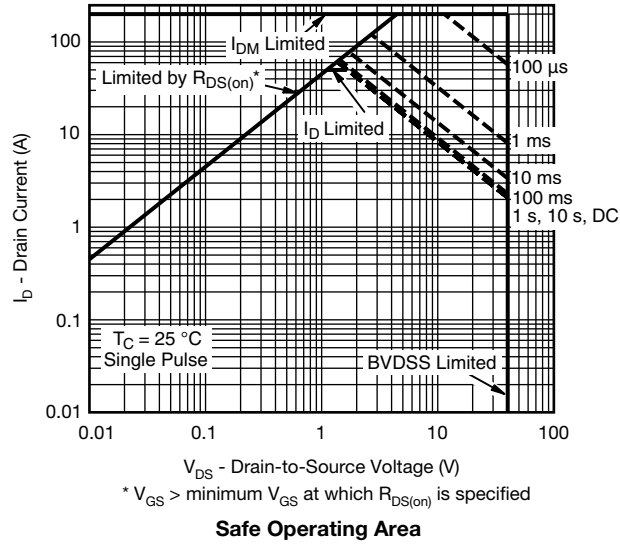


$I_D$  - Drain Current (A)  
**Transconductance**

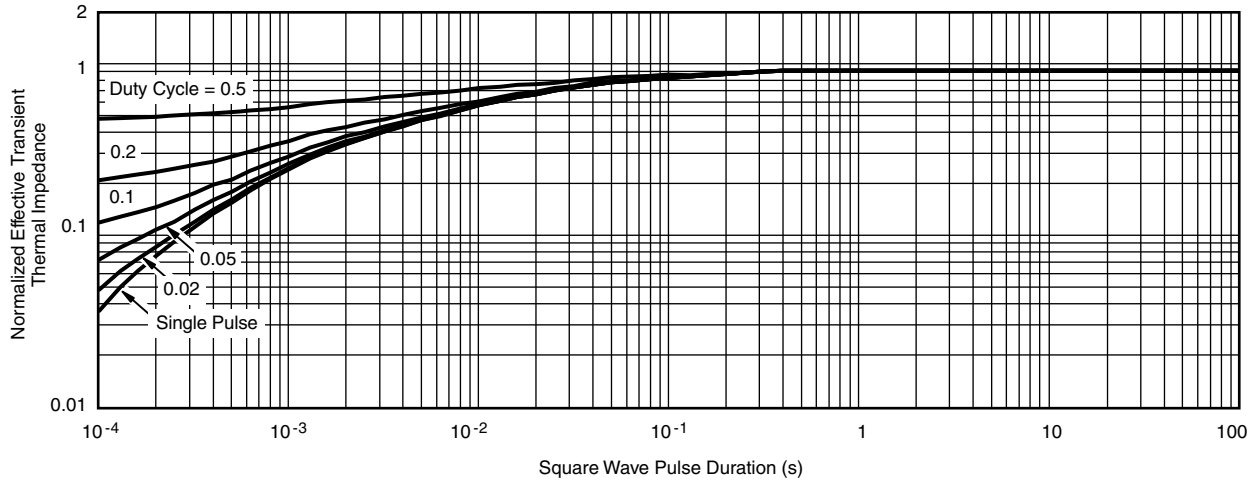


$T_J$  - Junction Temperature ( $^\circ\text{C}$ )  
**Drain Source Breakdown vs. Junction Temperature**

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



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

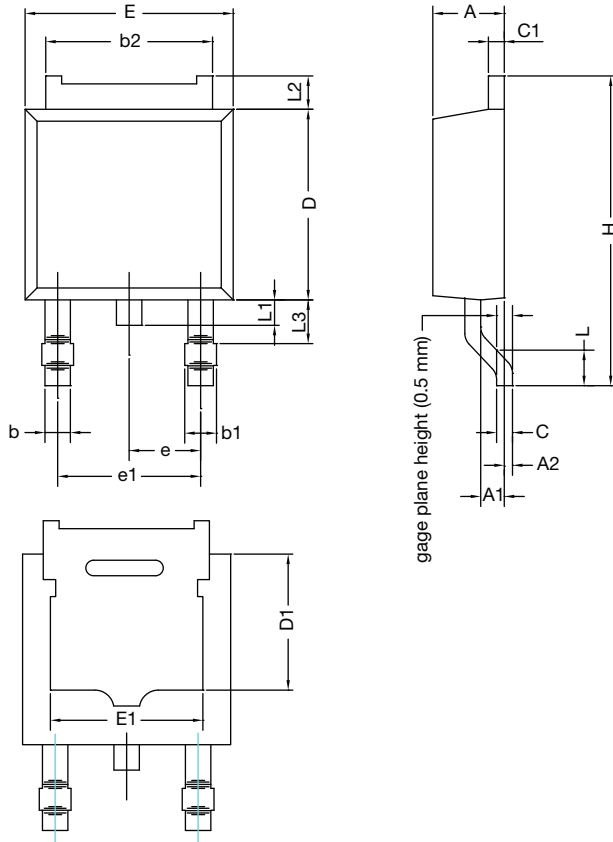


**Normalized Thermal Transient Impedance, Junction-to-Case**

**Note**

- The characteristics shown in the two graphs
    - Normalized Transient Thermal Impedance Junction-to-Ambient ( $25\text{ °C}$ )
    - Normalized Transient Thermal Impedance Junction-to-Case ( $25\text{ °C}$ )
- 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.

**TO-252AA CASE OUTLINE**

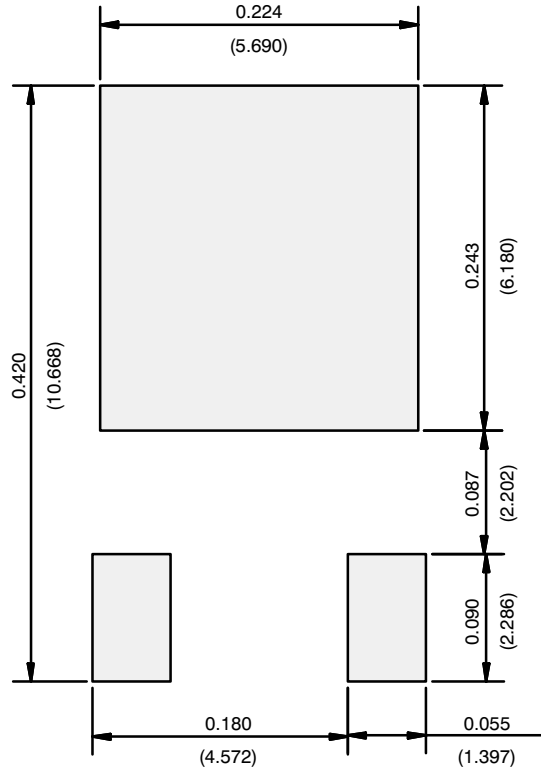


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
A2	0.030	0.127	0.001	0.005
b	0.71	0.88	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.44	0.206	0.214
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
D1	4.10	4.45	0.161	0.175
E	6.48	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)

[Return to Index](#)



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