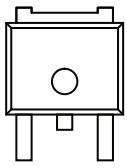


PRODUCT SUMMARY	
V <sub>DS</sub> (V)	20
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = 10 V	0.0043
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = 4.5 V	0.006
I <sub>D</sub> (A)	50
Configuration	Single

### FEATURES

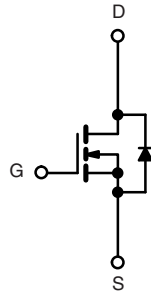
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- AEC-Q101 Qualified<sup>d</sup>
- 100 % R<sub>g</sub> and UIS Tested
- Material categorization:  
For definitions of compliance please see  
[www.freescale.net.cn](http://www.freescale.net.cn)

TO-252



Top View

Drain Connected to Tab



N-Channel MOSFET

ORDERING INFORMATION	
Package	TO-252
Lead (Pb)-free and Halogen-free	SQD50N02-04L-GE3

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V <sub>DS</sub>	20	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current <sup>a</sup>	I <sub>D</sub>	T <sub>C</sub> = 25 °C	A
		T <sub>C</sub> = 125 °C	
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>	L = 0.1 mH	mJ
Single Pulse Avalanche Energy			
Maximum Power Dissipation <sup>b</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	W
		T <sub>C</sub> = 125 °C	
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>	1.1	

### Notes

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

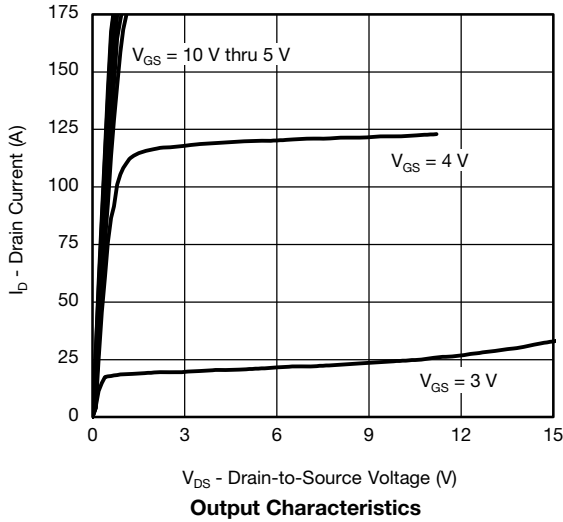
<b>SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		20	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		1.5	2.0	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	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 20\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = 20\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 20\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	50	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 20\text{ A}$	-	0.0033	0.0043	$\Omega$
		$V_{GS} = 10\text{ V}$	$I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.0063	
		$V_{GS} = 10\text{ V}$	$I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.0073	
		$V_{GS} = 4.5\text{ V}$	$I_D = 20\text{ A}$	-	0.0045	0.0060	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$		-	80	-	S
<b>Dynamic<sup>b</sup></b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 10\text{ V}, f = 1\text{ MHz}$	-	5000	6250	$\text{pF}$
Output Capacitance	$C_{oss}$			-	1437	1800	
Reverse Transfer Capacitance	$C_{riss}$			-	731	915	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = 10\text{ V}$	$V_{DS} = 10\text{ V}, I_D = 50\text{ A}$	-	79	119	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	11.5	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	14.1	-	
Gate Resistance	$R_g$	f = 1 MHz		0.8	1.7	2.6	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 0.2\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		-	13	20	ns
Rise Time <sup>c</sup>	$t_r$			-	10	15	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			-	41	62	
Fall Time <sup>c</sup>	$t_f$			-	9	14	
<b>Source-Drain Diode Ratings and Characteristics<sup>b</sup></b>							
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	200	A
Forward Voltage	$V_{SD}$	$I_F = 50\text{ A}, V_{GS} = 0\text{ V}$		-	0.92	1.5	V

**Notes**

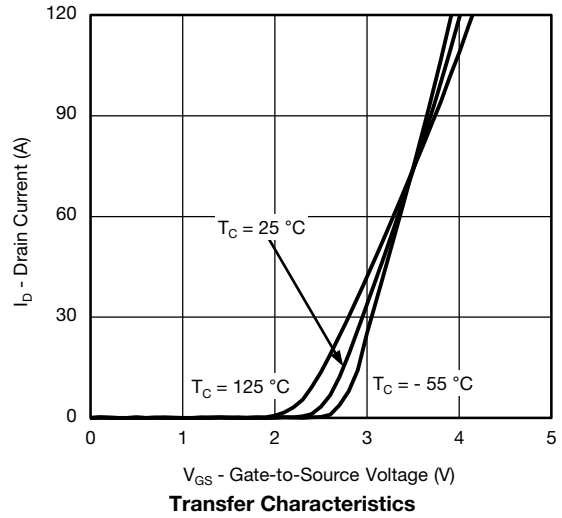
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

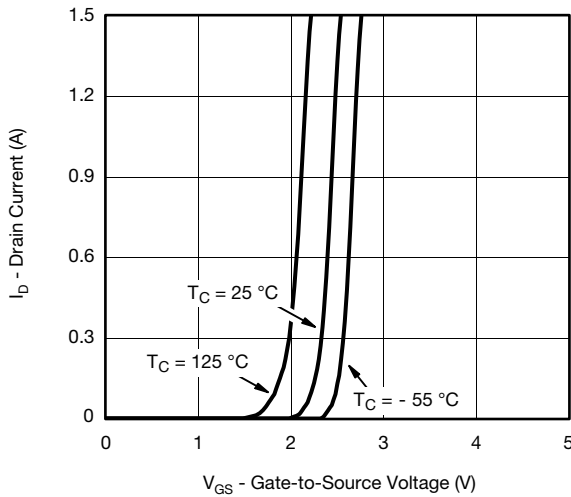
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



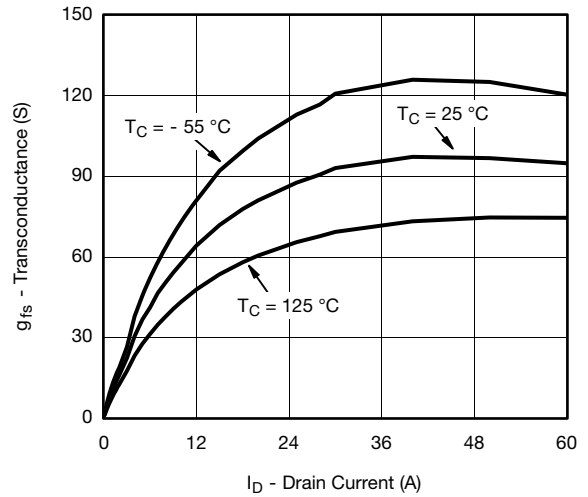
**Output Characteristics**



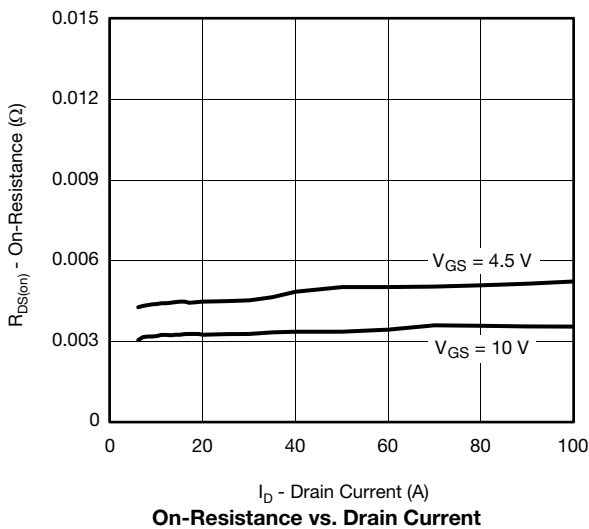
**Transfer Characteristics**



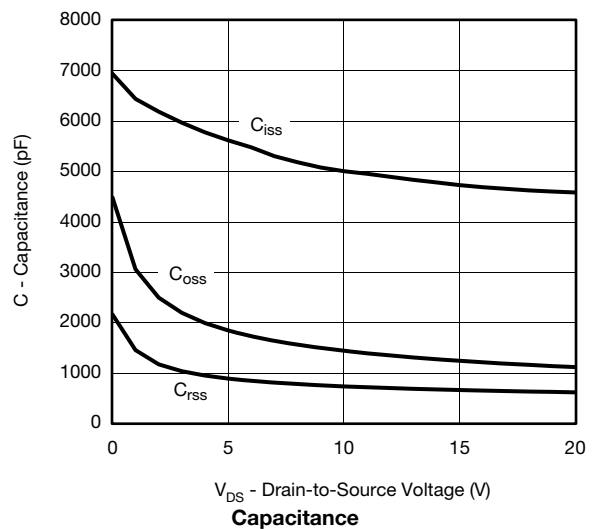
**Transfer Characteristics**



**Transconductance**

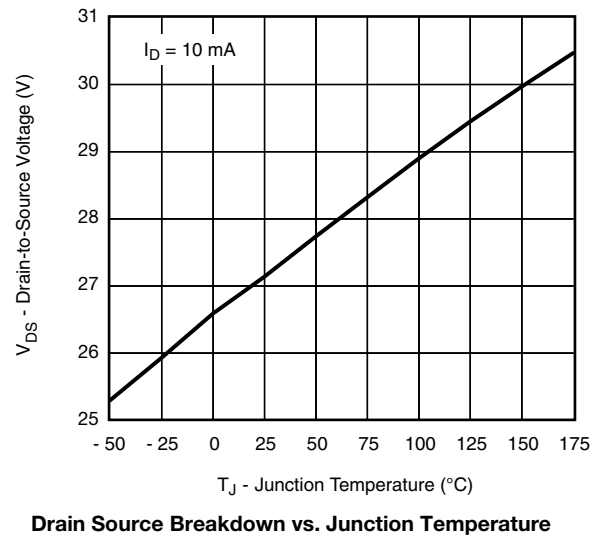
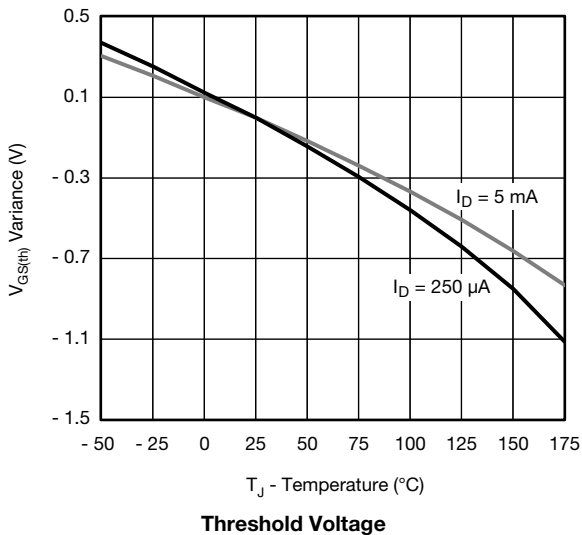
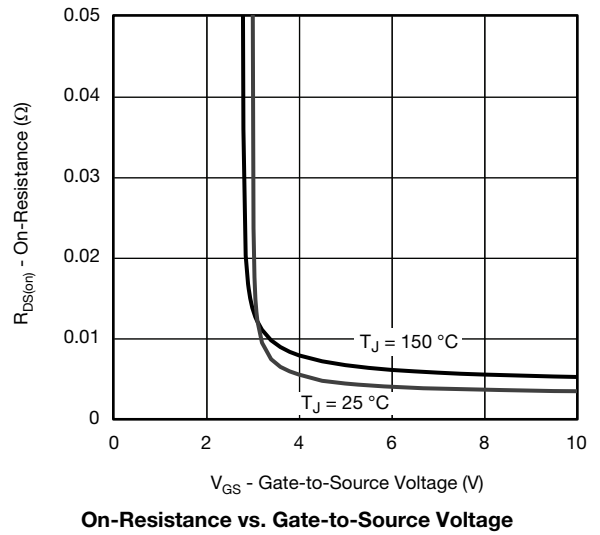
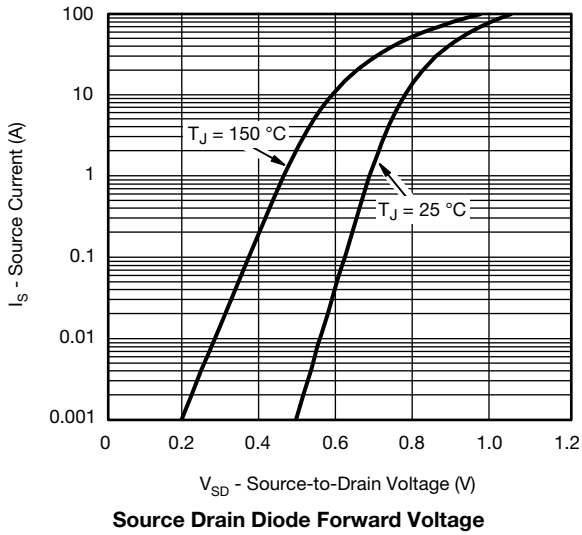
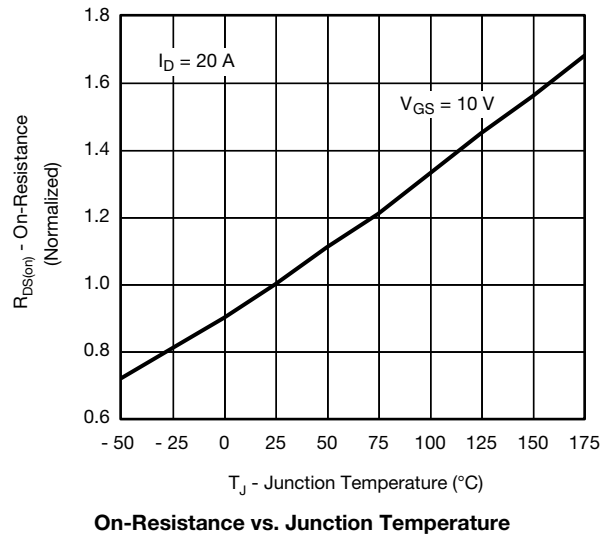
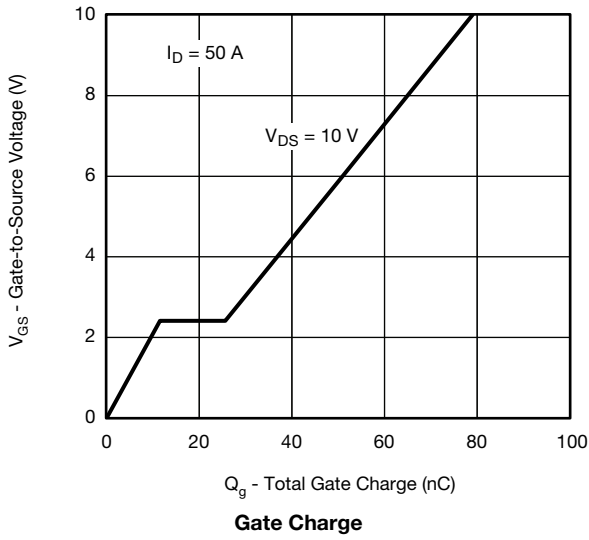


**On-Resistance vs. Drain Current**

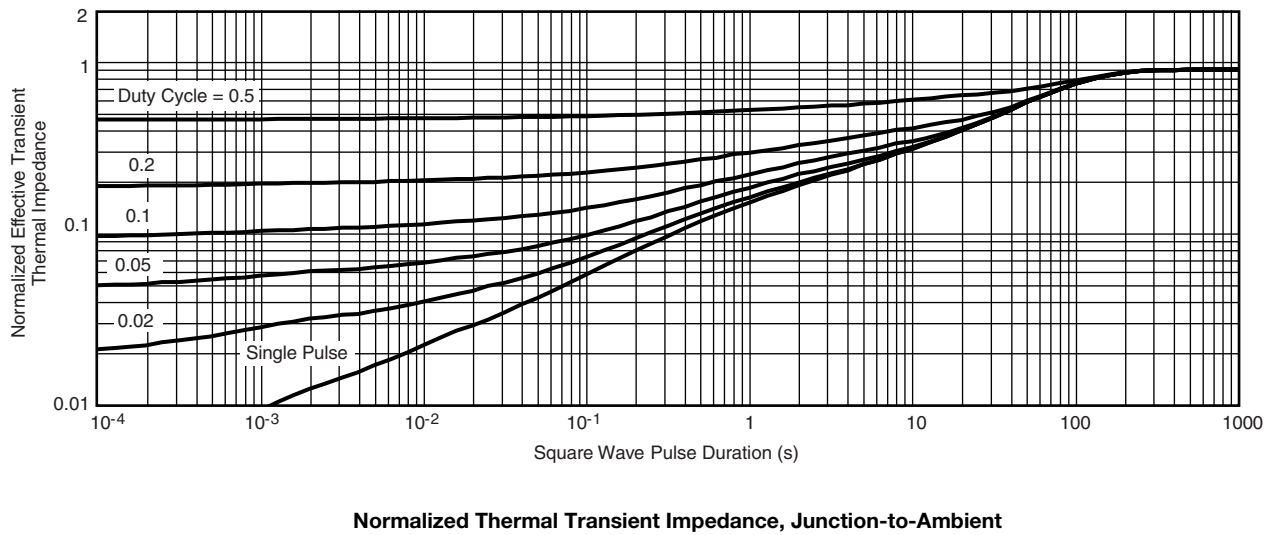
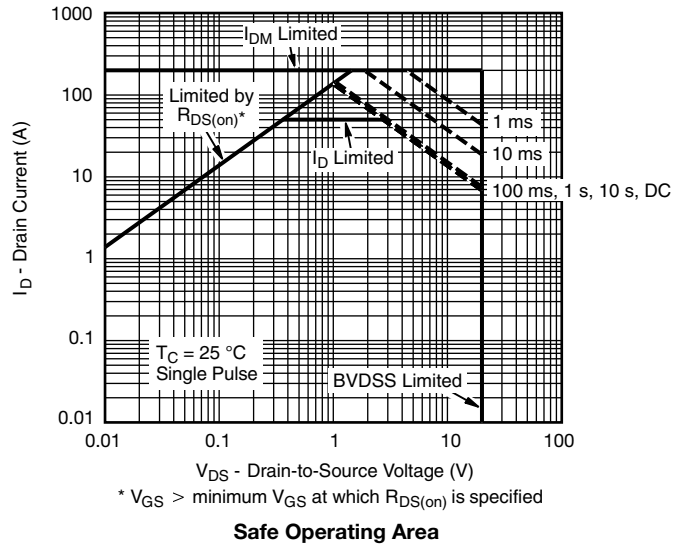


**Capacitance**

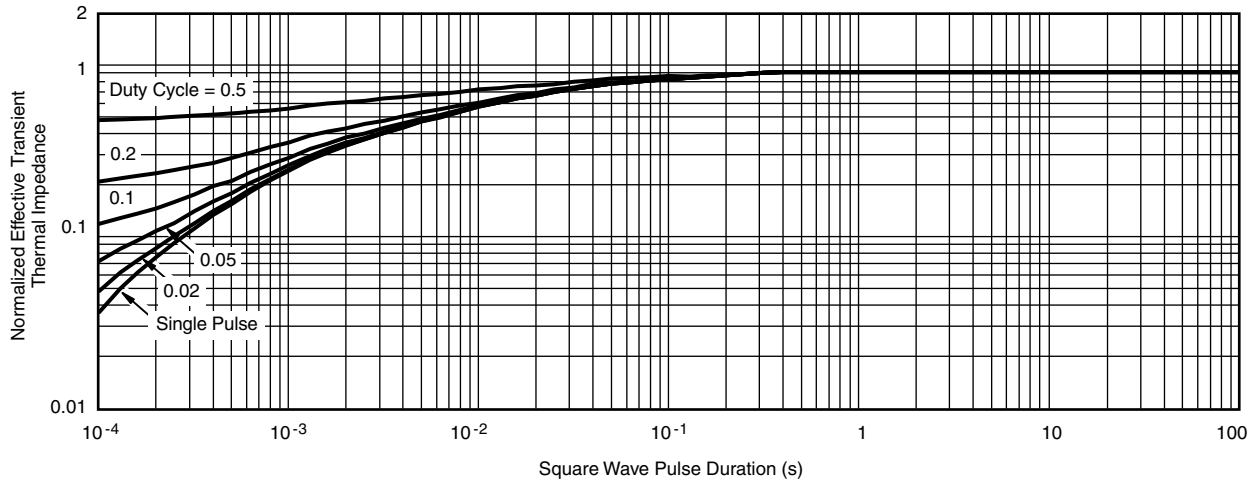
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



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



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

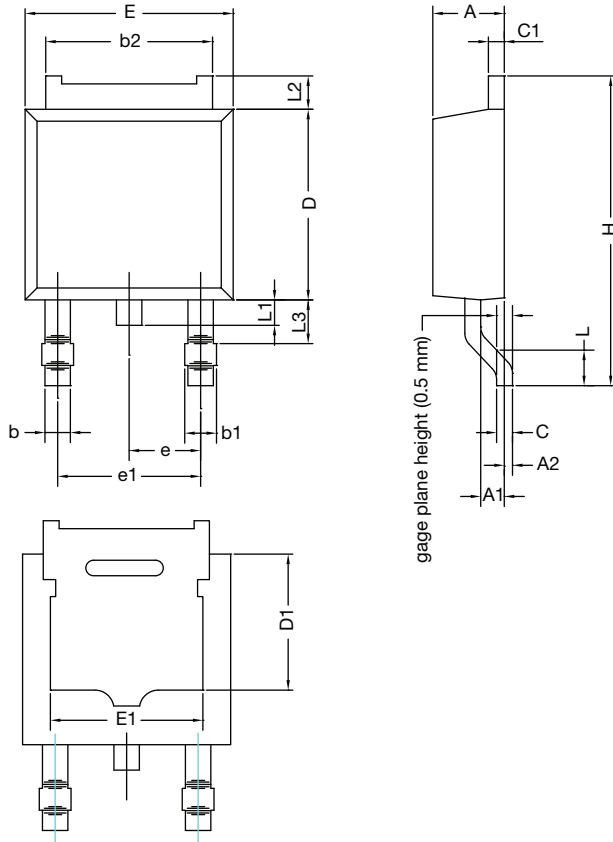


**Normalized Thermal Transient Impedance, Junction-to-Case**

**Note**

- The characteristics shown in the two graphs
    - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
    - Normalized Transient Thermal Impedance Junction-to-Case (25 °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**



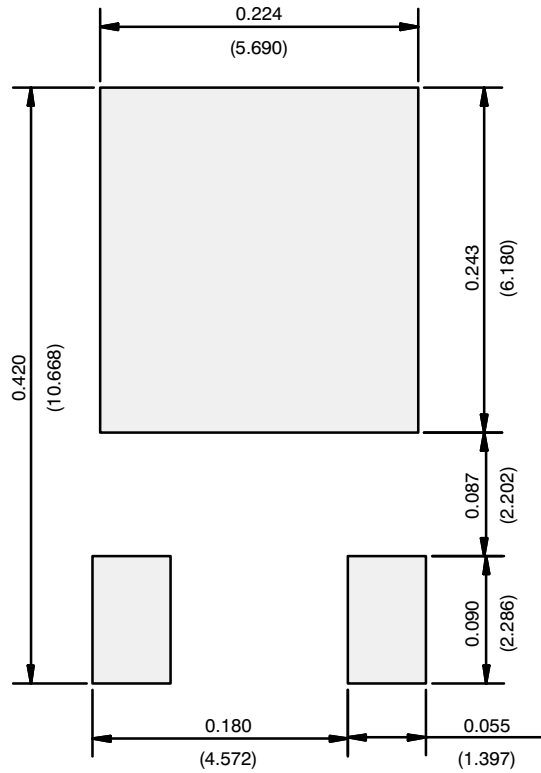
DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
A2	0.030	0.127	0.001	0.005
b	0.71	0.88	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.44	0.206	0.214
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
D1	4.10	4.45	0.161	0.175
E	6.48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



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

freestyle Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "freestyle"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

freestyle makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, freestyle disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on freestyle's knowledge of typical requirements that are often placed on freestyle products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify freestyle's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, freestyle products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the freestyle product could result in personal injury or death. Customers using or selling freestyle products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold freestyle and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that freestyle may

## Material Category Policy

freestyle Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some freestyle documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.