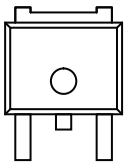
freescale
飞思卡尔(深圳)功率半导体有限公司

SQD40N10-25

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

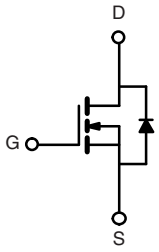
PRODUCT SUMMARY	
V_{DS} (V)	100
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.025
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.029
I_D (A)	40
Configuration	Single

TO-252



Drain Connected to Tab

Top View



N-Channel MOSFET

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.freescale.net.cn

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

ORDERING INFORMATION	
Package	TO-252
Lead (Pb)-free and Halogen-free	SQD40N10-25-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	
Continuous Drain Current	T_C = 25 °C[a]	I_D	40	A
	T_C = 125 °C		26	
Continuous Source Current (Diode Conduction)[a]		I_S	40	
Pulsed Drain Current[b]		I_{DM}	160	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	40	
Single Pulse Avalanche Energy		E_{AS}	80	mJ
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	136	W
	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	PCB Mount[c]	R_{thJA}	50	°C/W
Junction-to-Case (Drain)		R_{thJC}	1.1	

Notes

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

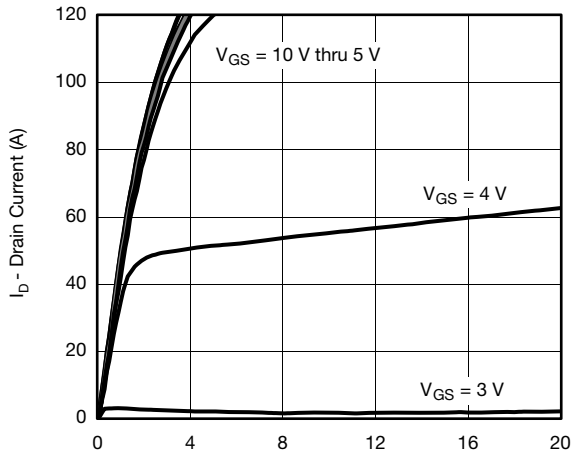
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA		100	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		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	-	-	1.0	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

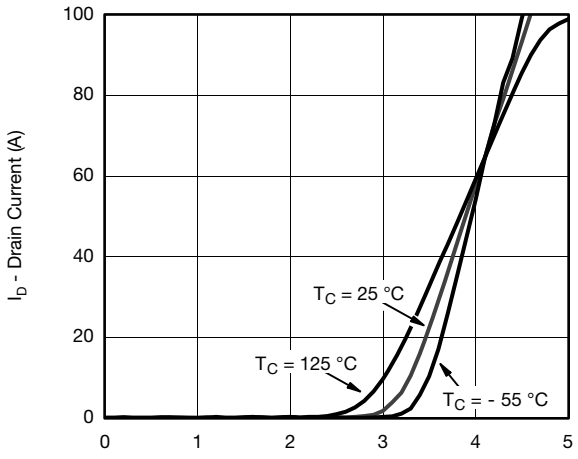
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

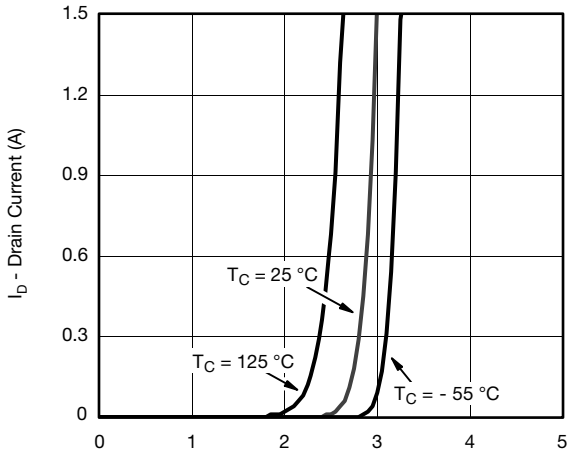
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



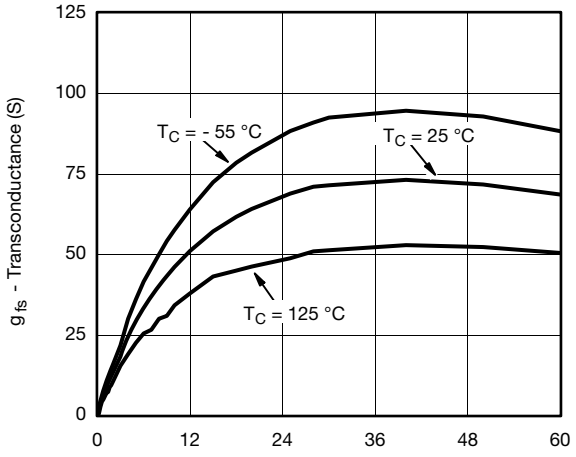
Output Characteristics



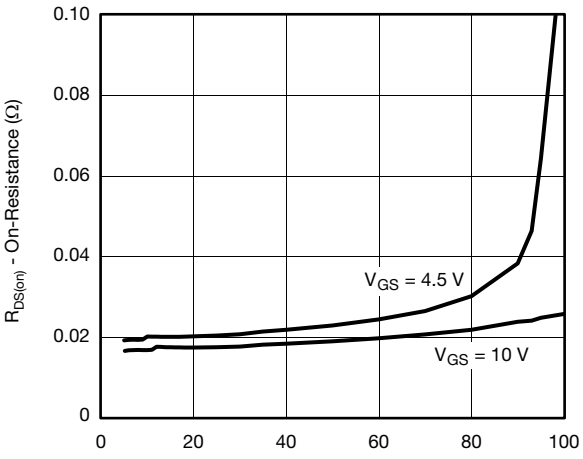
Transfer Characteristics



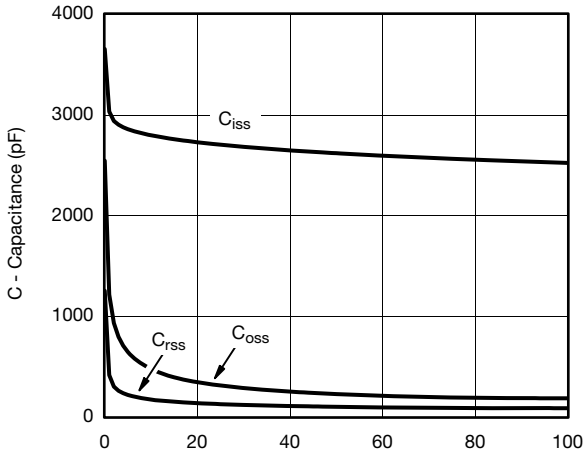
Transfer Characteristics



Transconductance

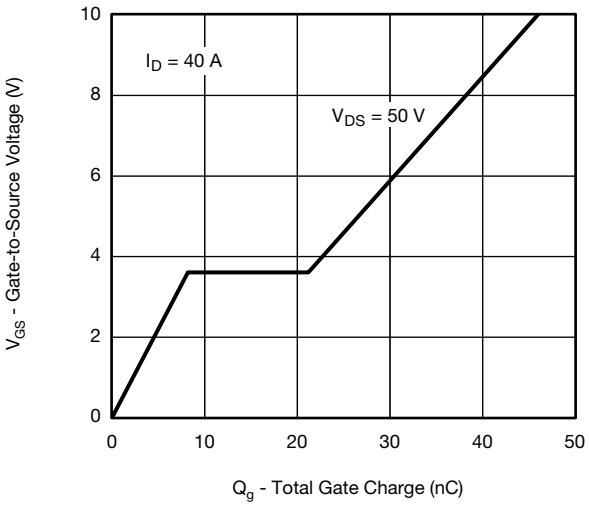


On-Resistance vs. Drain Current

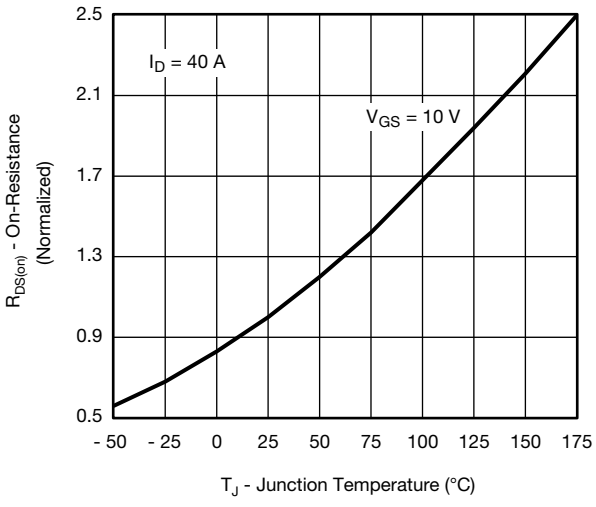


Capacitance

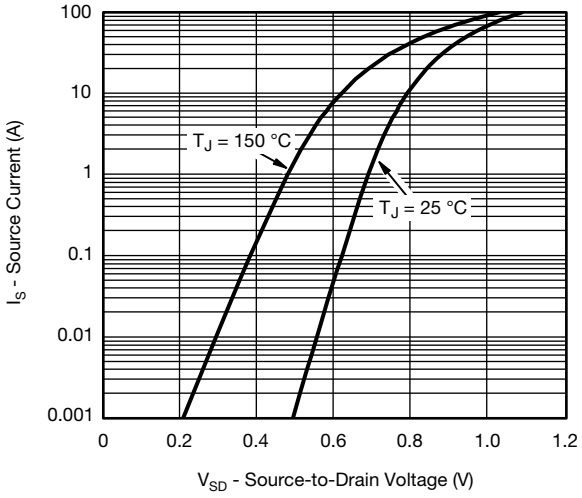
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



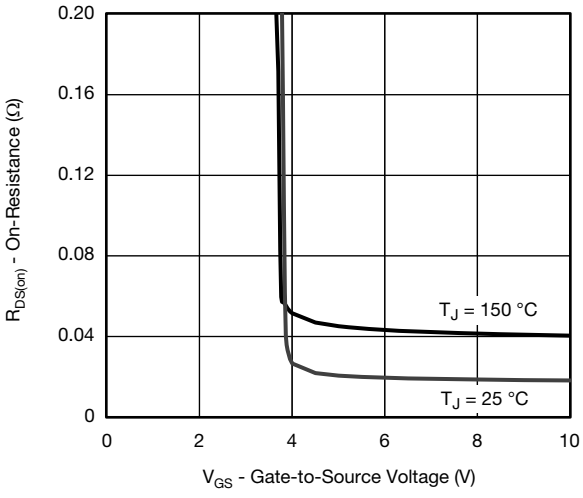
Gate Charge



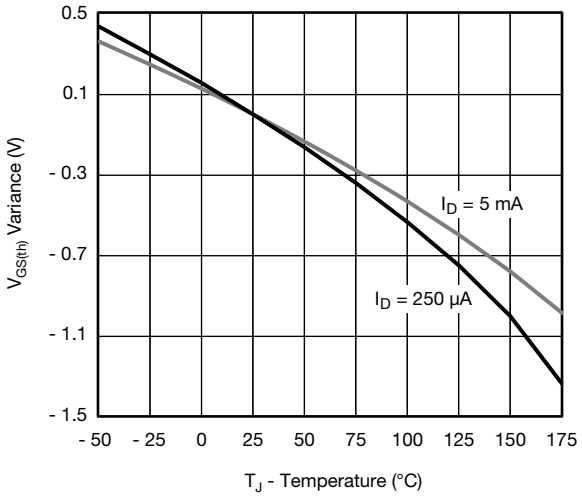
On-Resistance vs. Junction Temperature



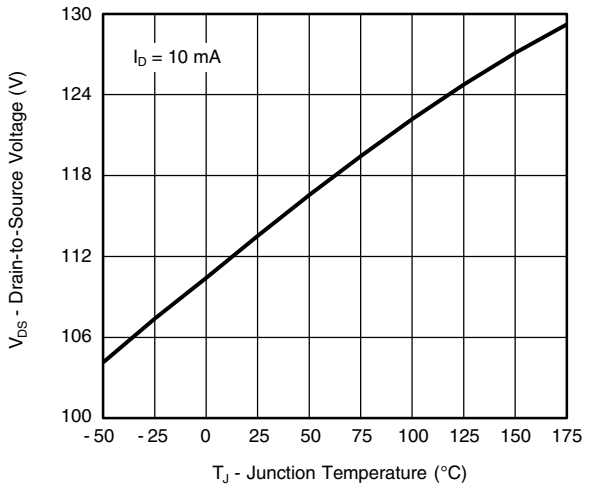
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

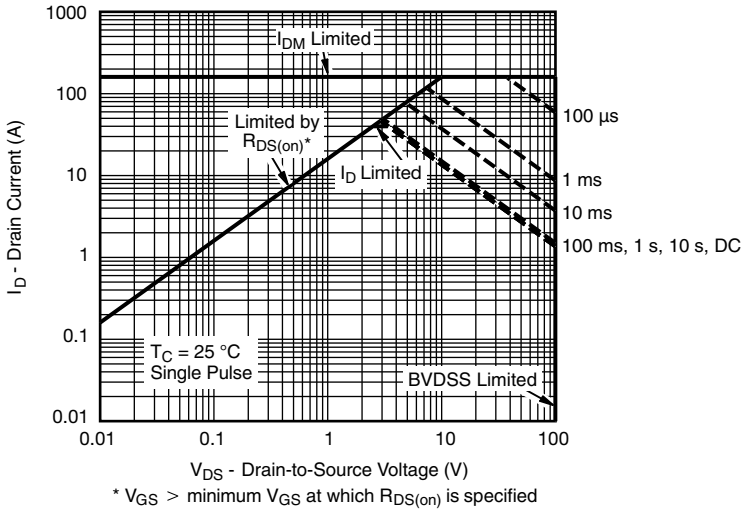


Threshold Voltage

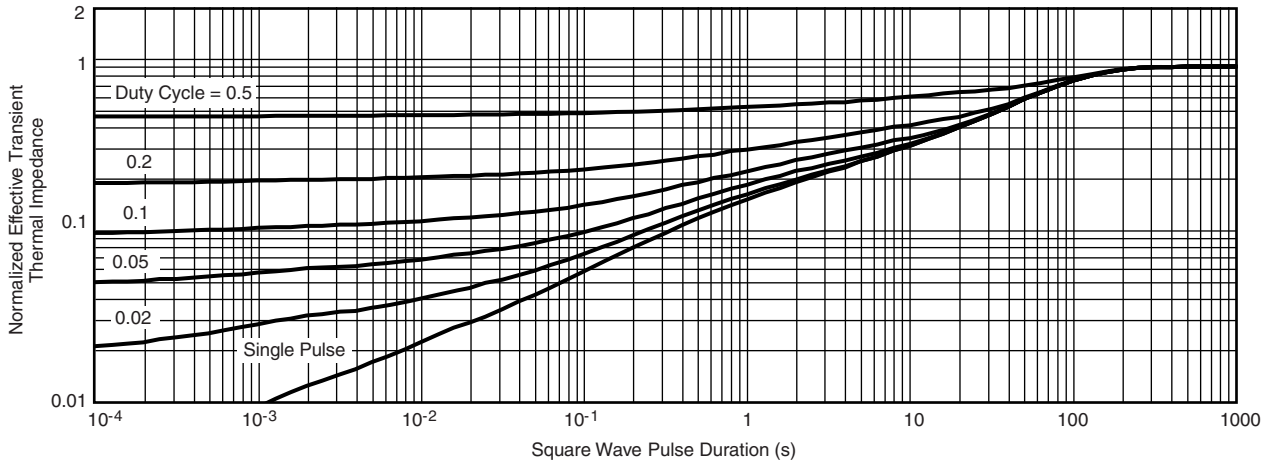


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)

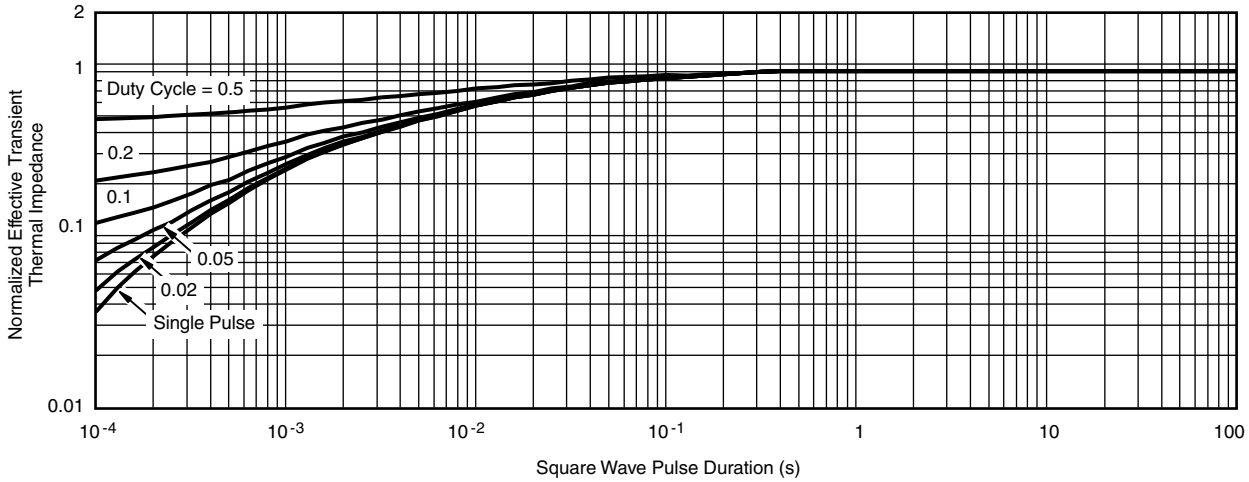


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



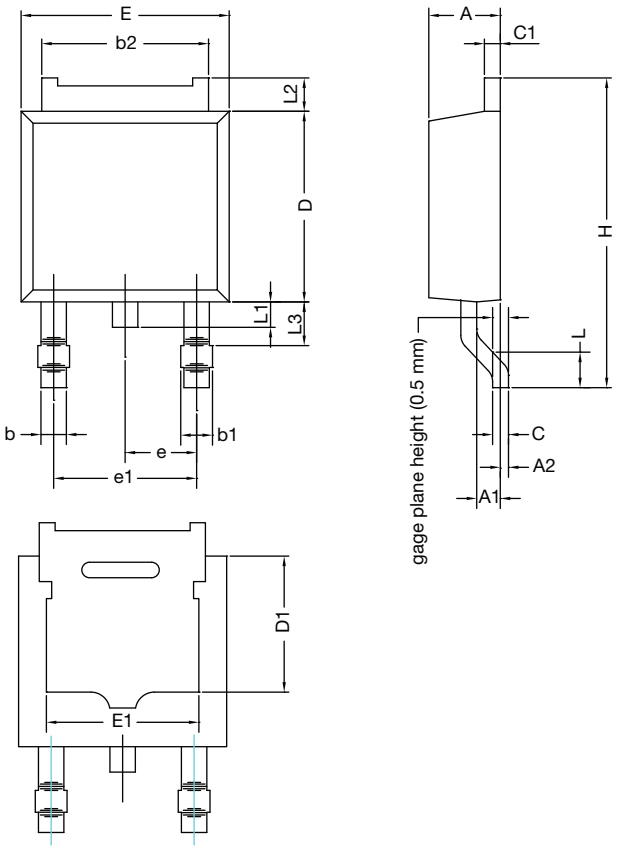
Normalized Thermal Transient Impedance, Junction-to-Case

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

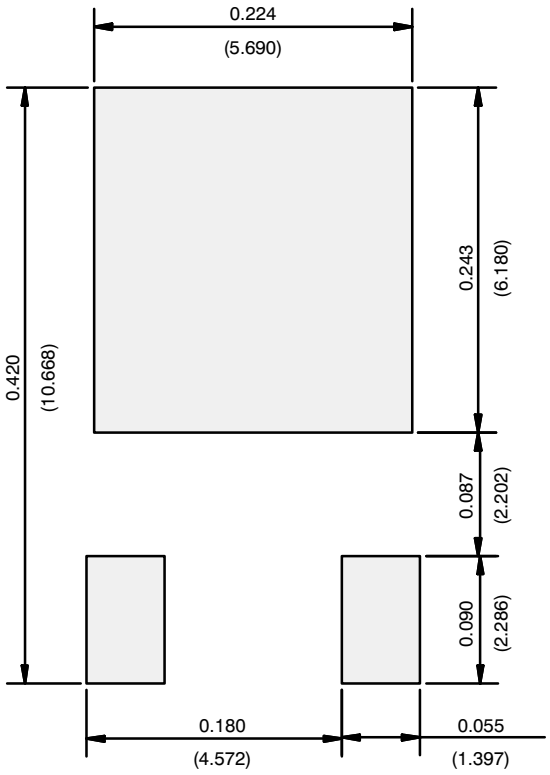


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
A2	0.030	0.127	0.001	0.005
b	0.71	0.88	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.44	0.206	0.214
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
D1	4.10	4.45	0.161	0.175
E	6.48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

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Material Category Policy

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