

2SJ387S-VB Datasheet

P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
- 20	0.016 at $V_{GS} = - 4.5$ V	- 40	13 nC
	0.025 at $V_{GS} = - 2.5$ V	- 35	

FEATURES

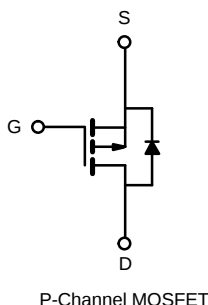
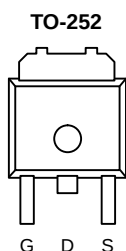
- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- 100 % R_g Tested



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switch
- Battery Switch



ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 20	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	I_D	- 40	A
	$T_C = 70$ °C		- 35	
	$T_A = 25$ °C		- 30.0 ^{a, b}	
	$T_A = 70$ °C		- 28 ^{a, b}	
Pulsed Drain Current		I_{DM}	- 150	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	- 3.5	W
	$T_A = 25$ °C		- 2.1 ^{a, b}	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	40	
	$T_C = 70$ °C		27	
	$T_A = 25$ °C		2.5 ^{a, b}	
	$T_A = 70$ °C		1.6 ^{a, b}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, c}	$t \leq 10$ s	R_{thJA}	40	50	°C/W
Maximum Junction-to-Foot	Steady State	R_{thJF}	24	30	

Notes:

- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 95 °C/W.
- Based on $T_C = 25$ °C.

SPECIFICATIONS T _J = 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	- 20			V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 31		mV/°C	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			4.5			
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	-0.5		- 2.0	V	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V			± 100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 20 V, V _{GS} = 0 V			- 1	μA	
		V _{DS} = -20 V, V _{GS} = 0 V, T _J = 55 °C			- 5		
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 5 V, V _{GS} = - 10 V	- 40			A	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 4.5 V I _D = - 7.0 A		0.016		Ω	
		V _{GS} = - 2.5 V, I _D = - 5.6 A		0.025			
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 7.0 A		18		S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{DS} = - 10 V, V _{GS} = 0 V, f = 1 MHz		1455		pF	
Output Capacitance	C _{oss}			180			
Reverse Transfer Capacitance	C _{rss}			145			
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 10 V, I _D = - 7.0 A		25	38	nC	
		V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 7.0 A		13	20		
					3.5		
					5.5		
Gate-Source Charge	Q _{gs}						
Gate-Drain Charge	Q _{gd}						
Gate Resistance	R _g	f = 1 MHz	0.4	2.0	4.0	Ω	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 2.7 Ω I _D ≅ - 5.6 A, V _{GEN} = - 10 V, R _g = 1 Ω		10	20	ns	
Rise Time	t _r			13	20		
Turn-Off DelayTime	t _{d(off)}			23	35		
Fall Time	t _f			9	18		
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 2.7 Ω I _D ≅ - 5.6 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		38	57		
Rise Time	t _r			89	134		
Turn-Off DelayTime	t _{d(off)}			22	33		
Fall Time	t _f			11	17		
Drain-Source Body Diode Characteristics							
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			- 6.5	A	
Pulse Diode Forward Current	I _{SM}				- 30		
Body Diode Voltage	V _{SD}	I _S = - 5.6 A, V _{GS} = 0 V		- 0.71	- 1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 5.6 A, dI/dt = 100 A/μs, T _J = 25 °C		22	33	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			17	26	nC	
Reverse Recovery Fall Time	t _a			13		ns	
Reverse Recovery Rise Time	t _b			9			

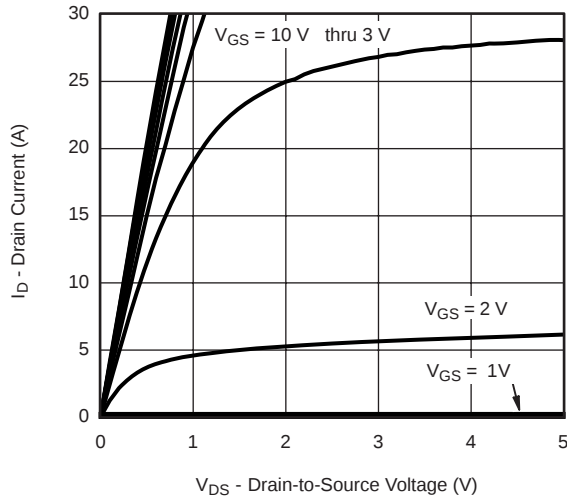
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

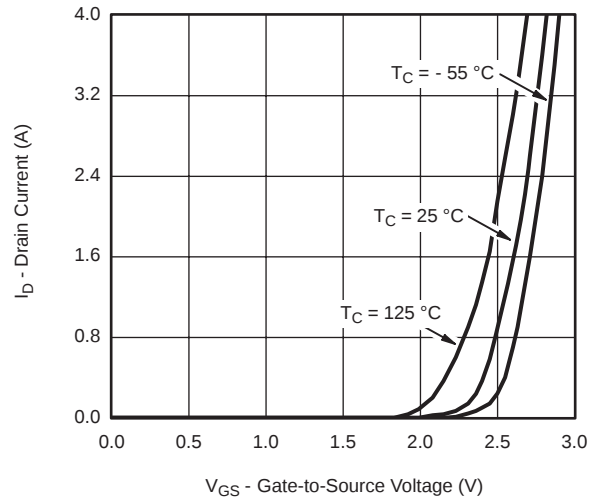
b. Guaranteed by design, not subject to production testing.

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.

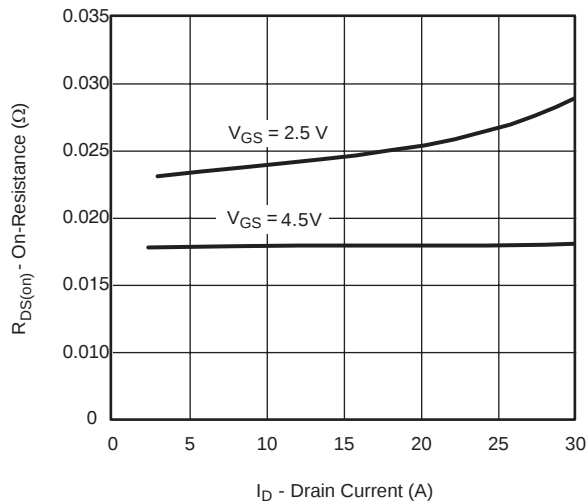
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



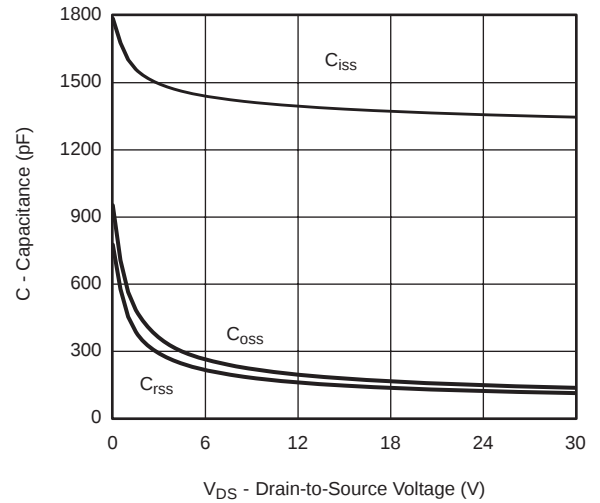
Output Characteristics



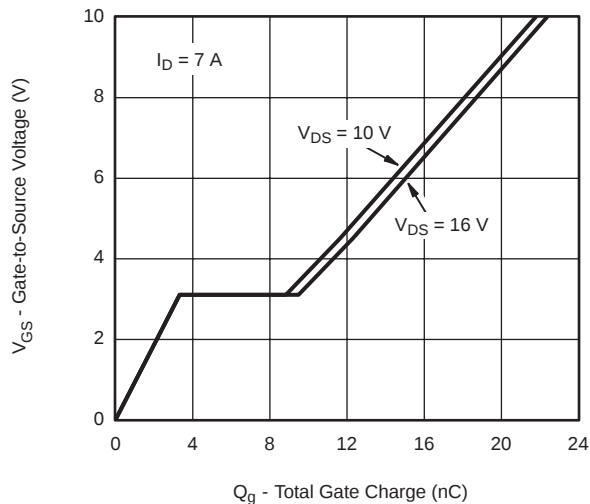
Transfer Characteristics



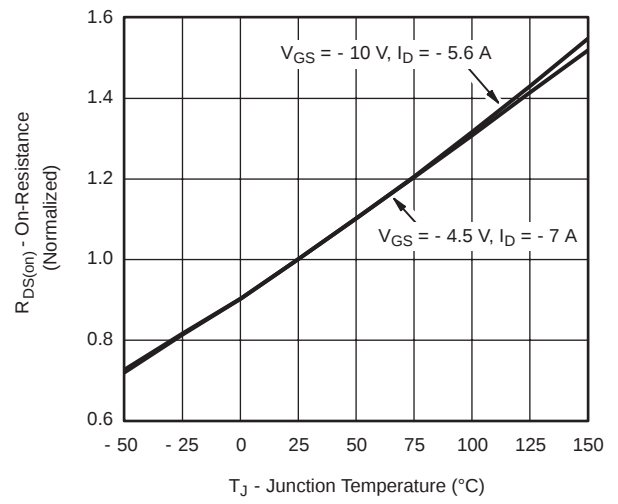
On-Resistance vs. Drain Current



Capacitance

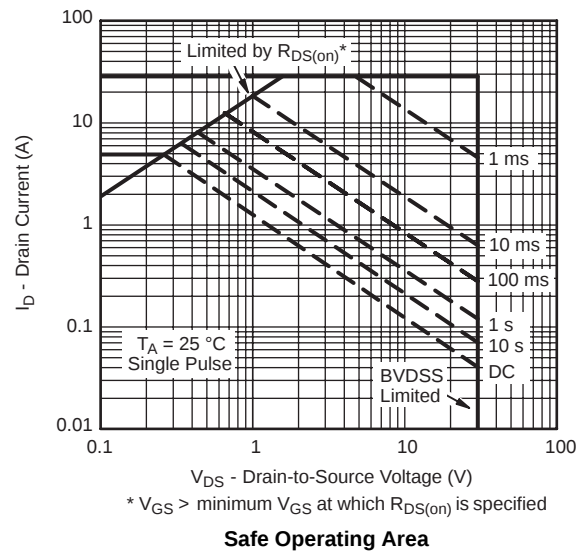
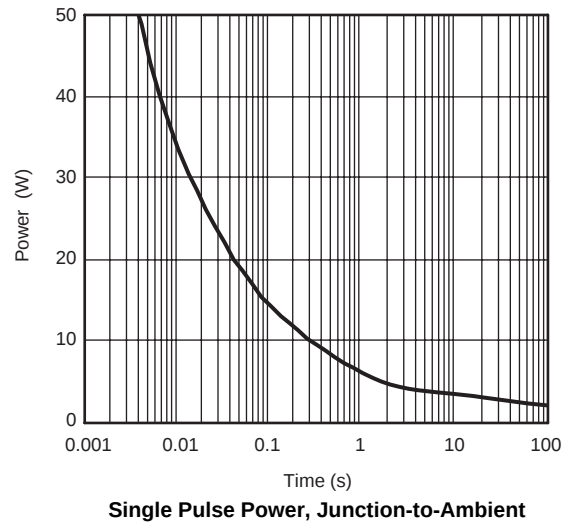
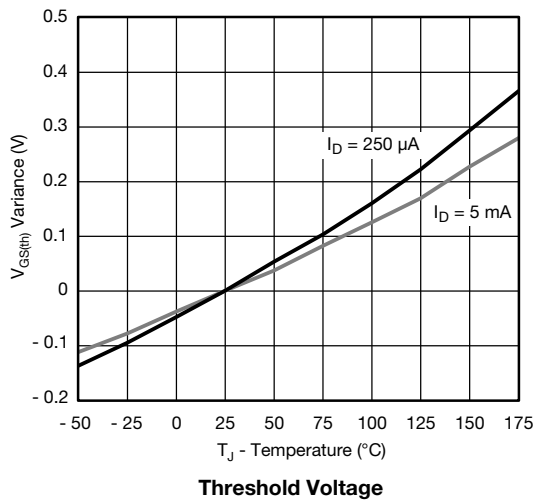
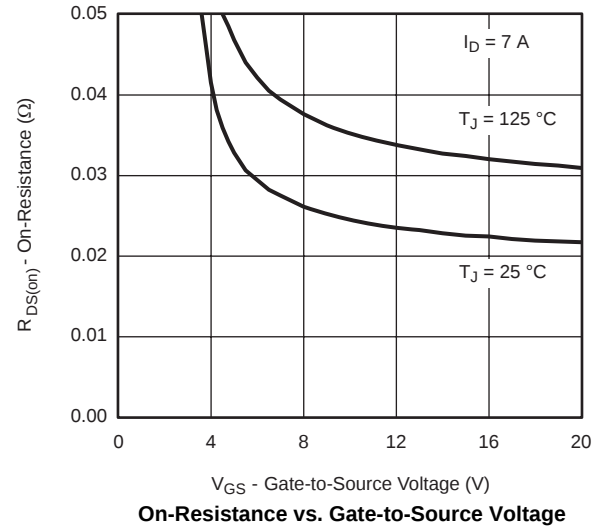
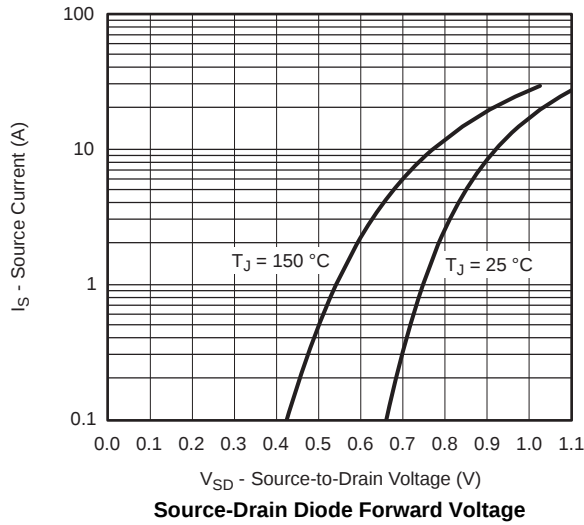


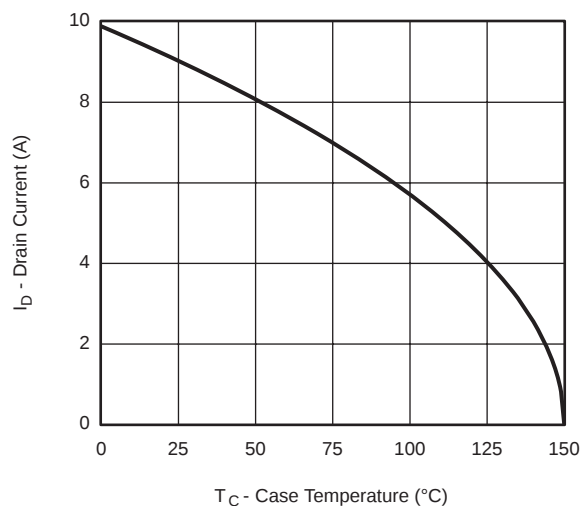
Gate Charge



On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

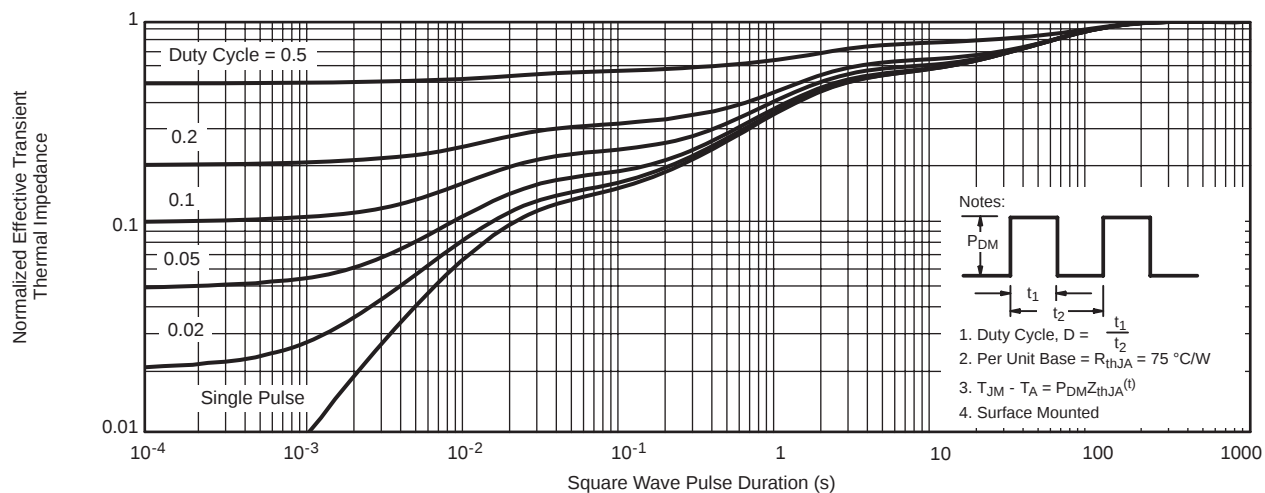
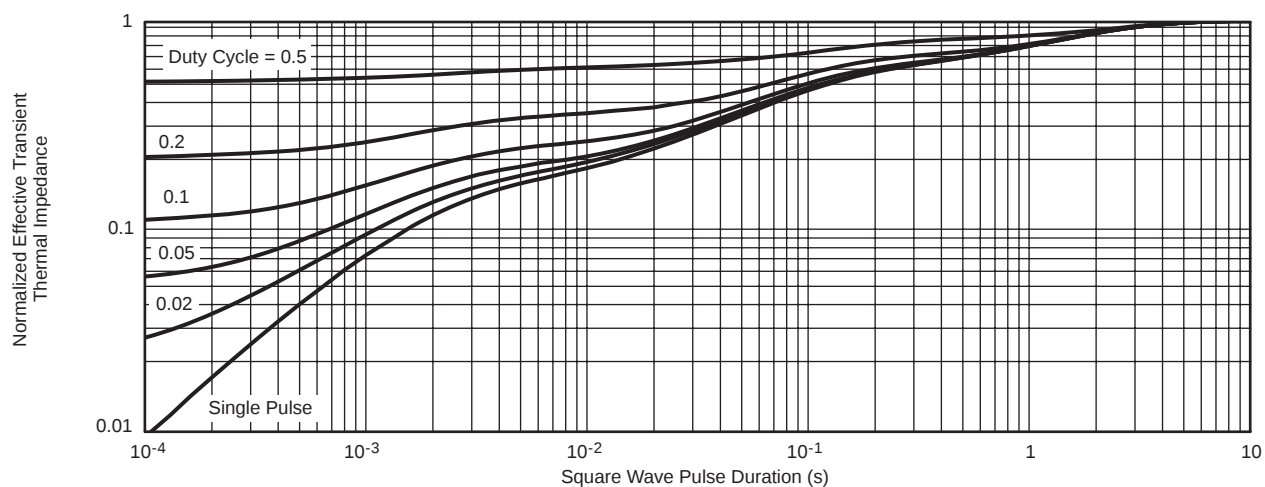


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Current Derating*

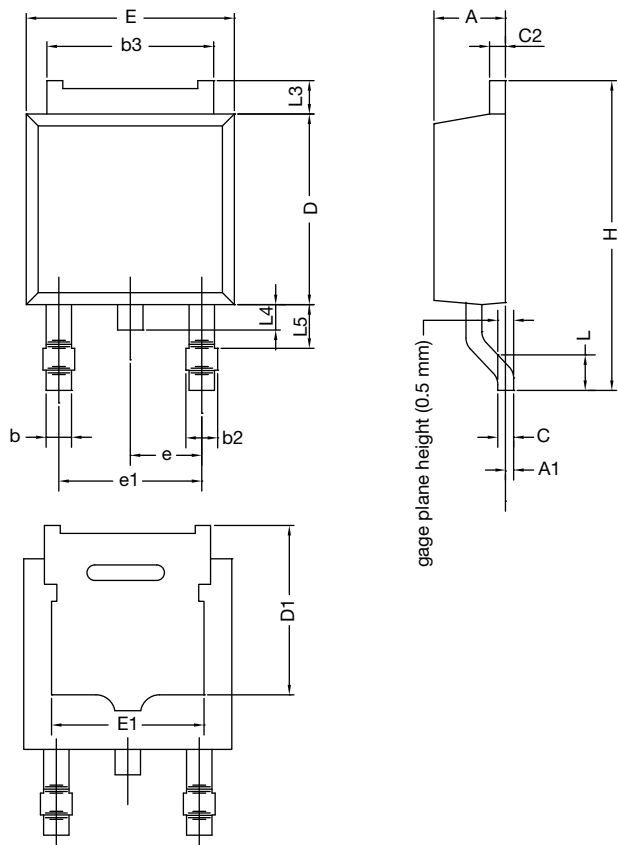
Power, Junction-to-Foot

Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Foot

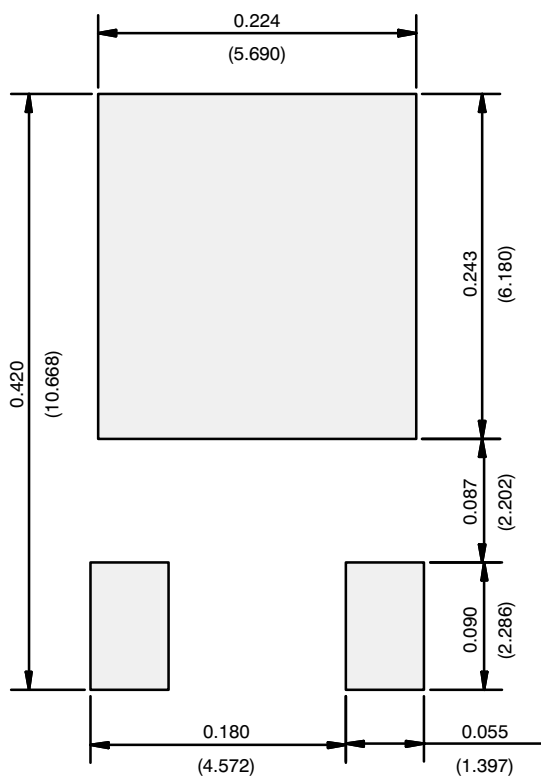
TO-252AA CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060
ECN: X12-0247-Rev. M, 24-Dec-12				
DWG: 5347				

- Note**
- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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