

N-Channel 40 V (D-S) MOSFET



RoHS
COMPLIANT

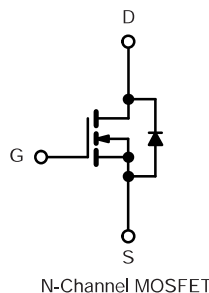
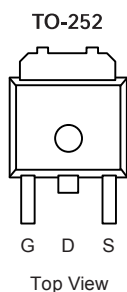
PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)	Q _g (Typ.)
40	0.0127 at V _{GS} = 10 V	55 ^d	19.5
	0.0147 at V _{GS} = 4.5 V	45 ^d	

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

APPLICATIONS

- Power Supply
- Secondary Synchronous Rectification
- DC/DC Converter



ABSOLUTE MAXIMUM RATINGS T _C = 25 °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	40	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	A	
		T _C = 70 °C		
Pulsed Drain Current	I _{DM}	165		
Avalanche Current	I _{AS}	34		
Single Avalanche Energy ^a	E _{AS}	78	mJ	
Maximum Power Dissipation ^a	P _D	T _C = 25 °C	W	
		T _A = 25 °C ^c		
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Limit	Unit	
Junction-to-Ambient (PCB Mount) ^c	R _{thJA}	54	°C/W	
Junction-to-Case (Drain)	R _{thJC}	2.7		

Notes:

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).
- Package limited.

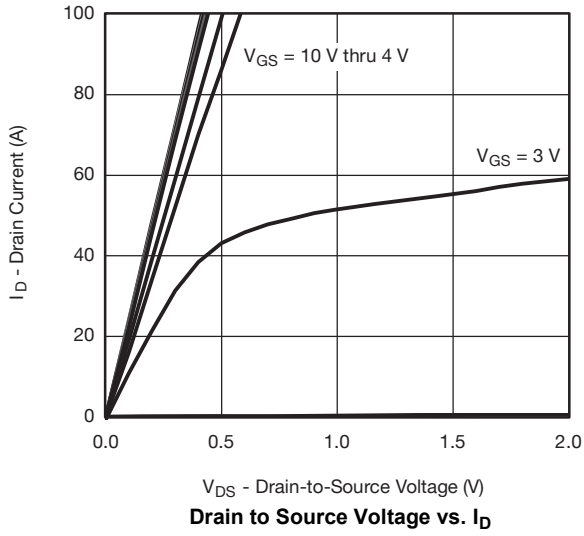
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		2.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	55			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 22\text{ A}$		0.0127	0.015	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		0.0147	0.017	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$		100		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$		992		μF
Output Capacitance	C_{oss}			176		
Reverse Transfer Capacitance	C_{rss}			91		
Total Gate Charge ^c	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		34	56	nC
		$V_{DS} = 20\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		20.1	30.2	
	6					
	5.7					
Gate-Source Charge ^c	Q_{gs}					
Gate-Drain Charge ^c	Q_{gd}					
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.4	2	4	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 1.5\text{ }\Omega, I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		8	16	ns
Rise Time ^c	t_r			9	18	
Turn-Off Delay Time ^c	$t_{d(off)}$			35	53	
Fall Time ^c	t_f			9	18	
Drain-Source Body Diode Ratings and Characteristics $T_C = 25\text{ }^\circ\text{C}$ ^b						
Continuous Current	I_S				55	A
Pulsed Current	I_{SM}				165	
Forward Voltage ^a	V_{SD}	$I_F = 10\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 10\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		34	51	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2	3	A
Reverse Recovery Charge	Q_{rr}			34	51	nC

Notes:

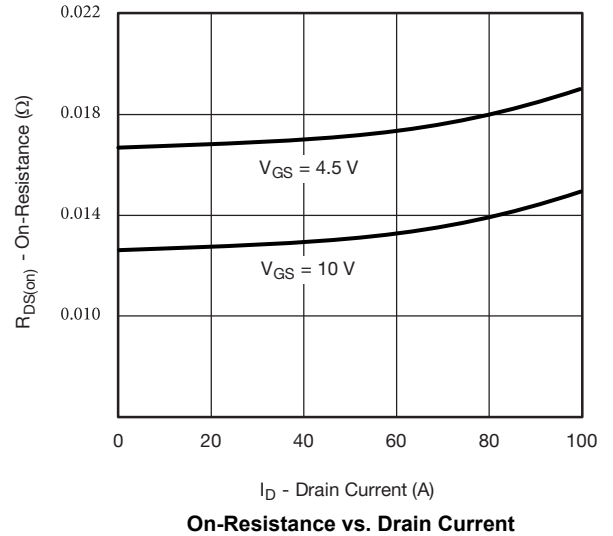
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

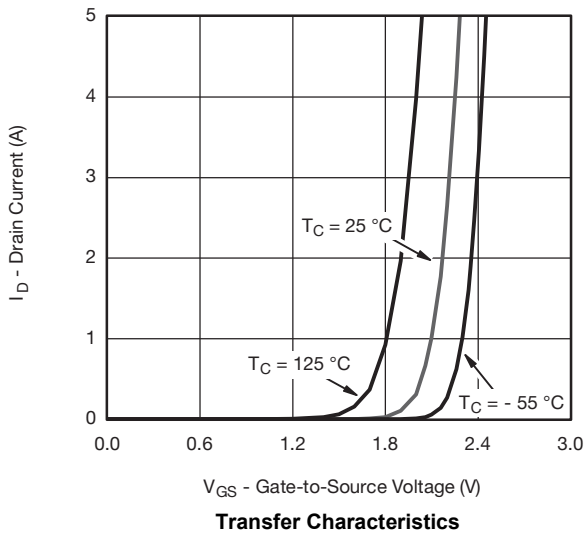
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



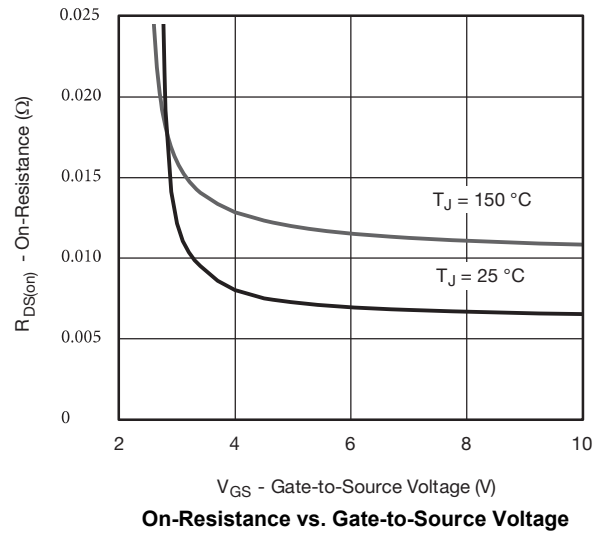
Drain to Source Voltage vs. I_D



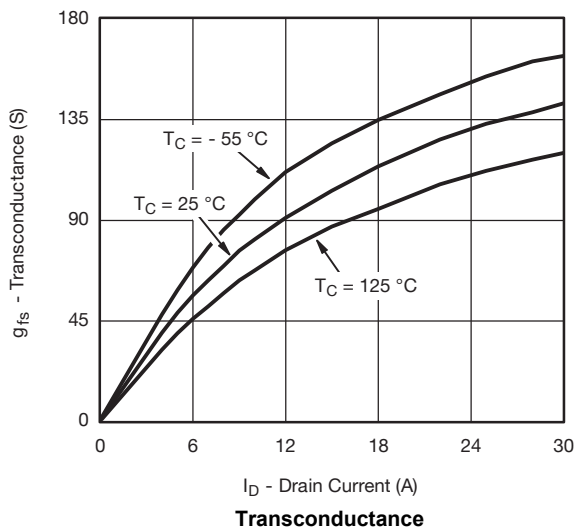
On-Resistance vs. Drain Current



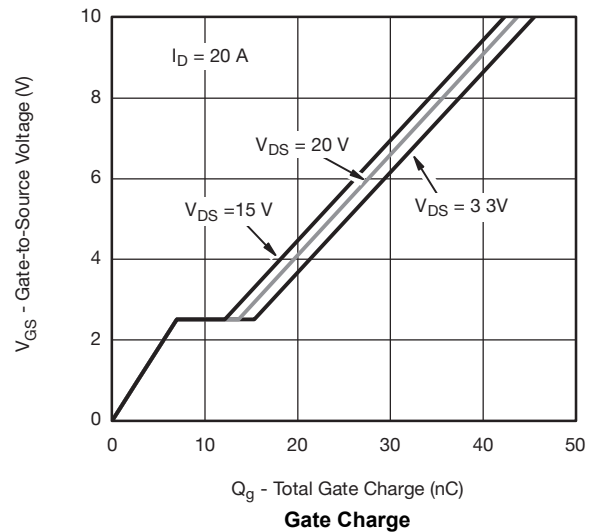
Transfer Characteristics



On-Resistance vs. Gate-to-Source Voltage

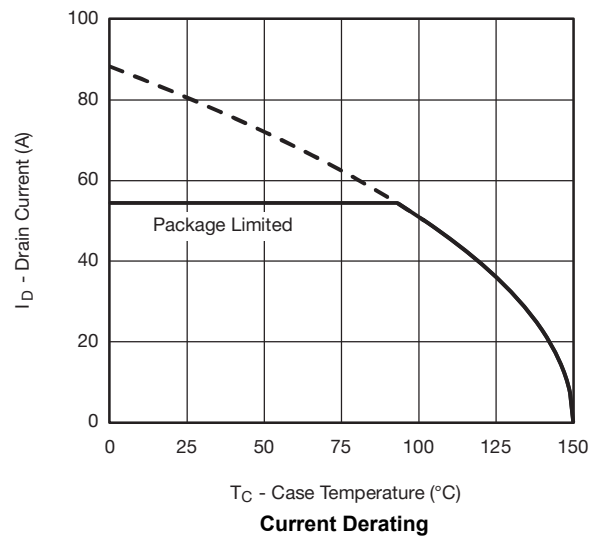
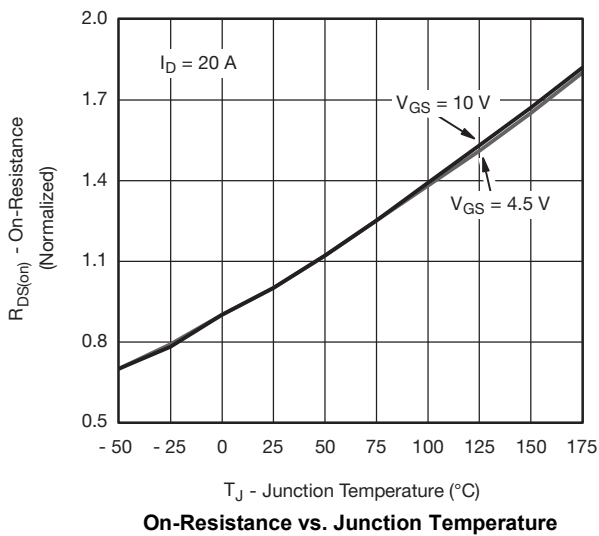
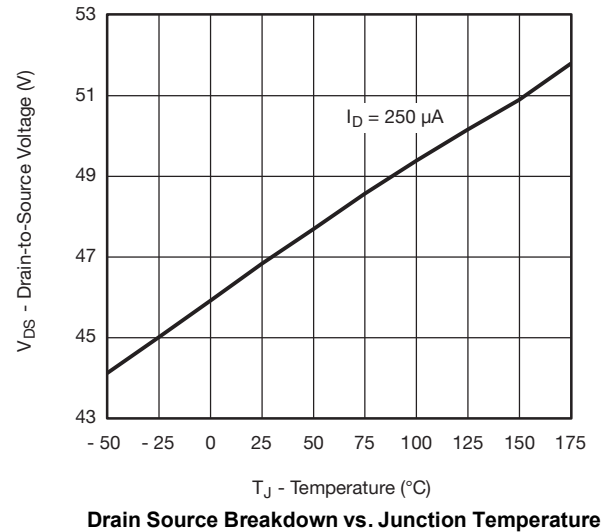
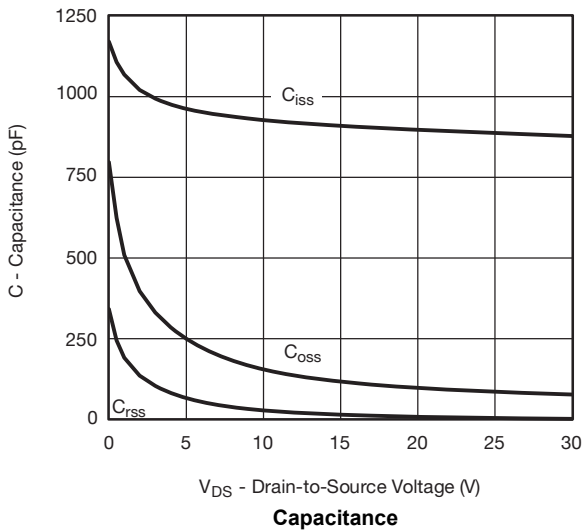
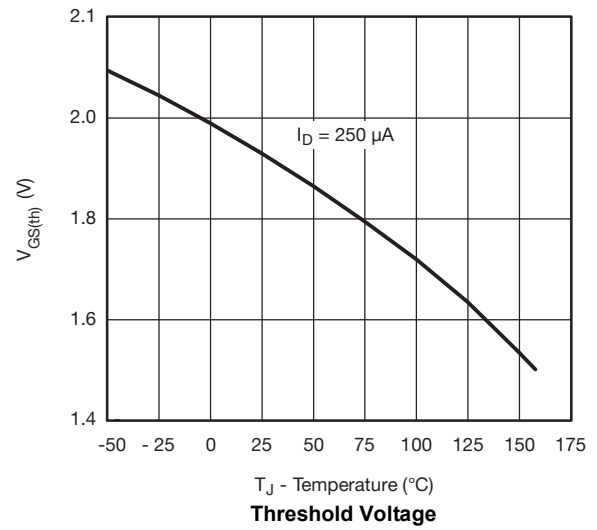
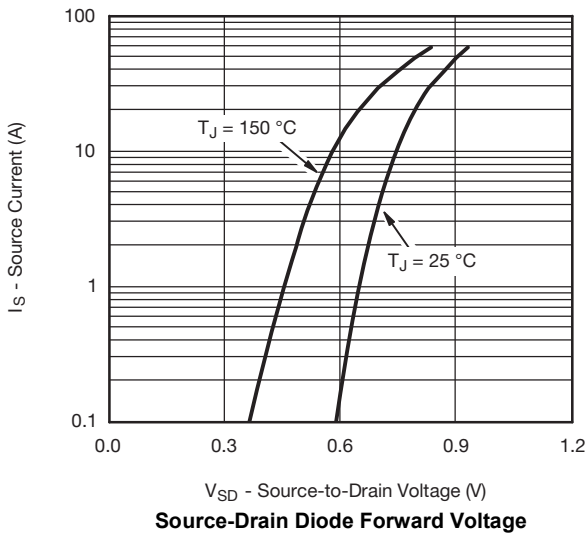


Transconductance



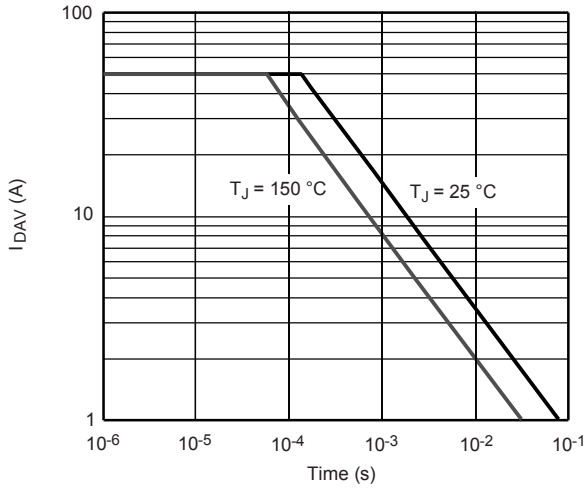
Gate Charge

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

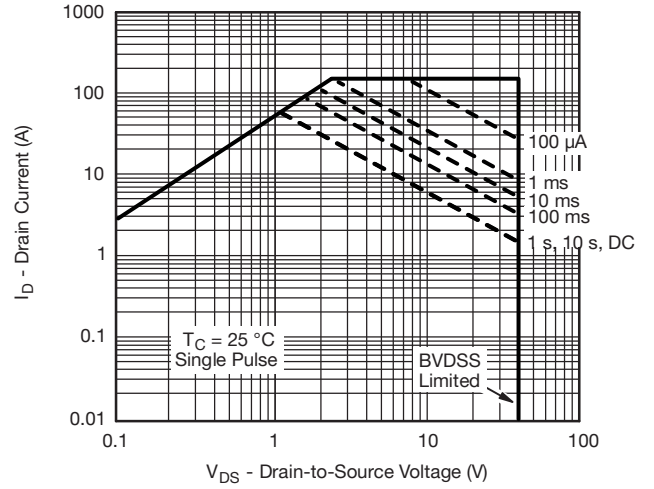


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Limited by $R_{DS(on)}$ *

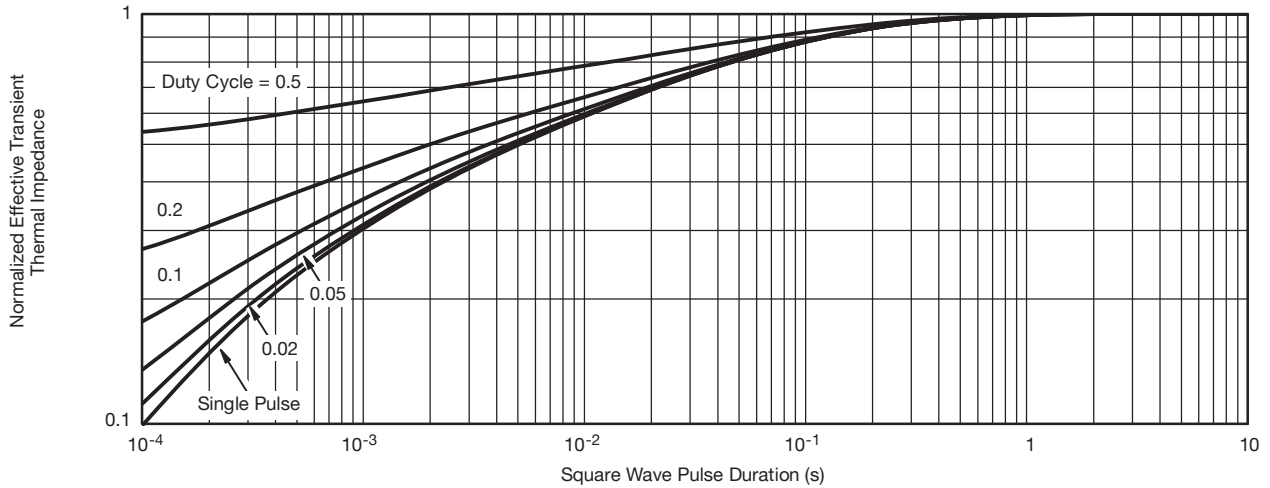


Single Pulse Avalanche Current Capability vs. Time



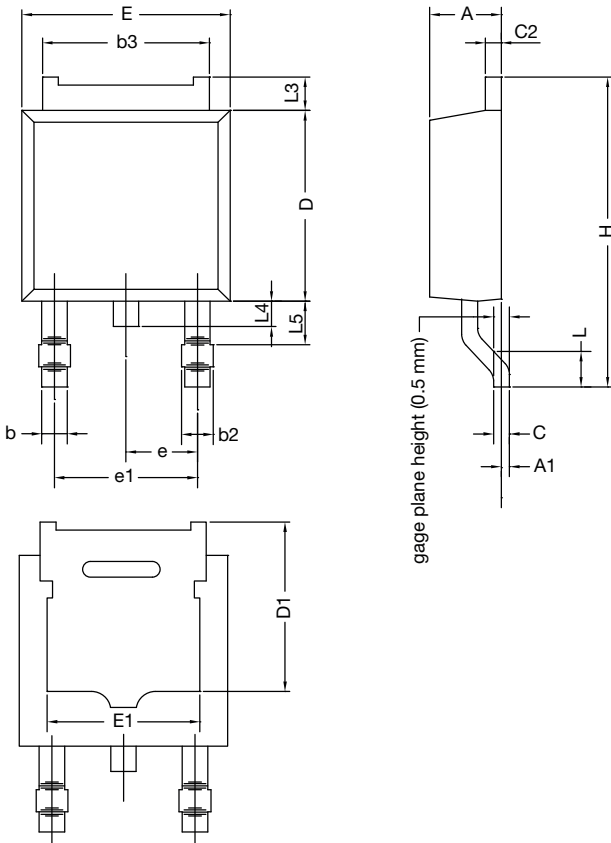
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-252AA CASE OUTLINE

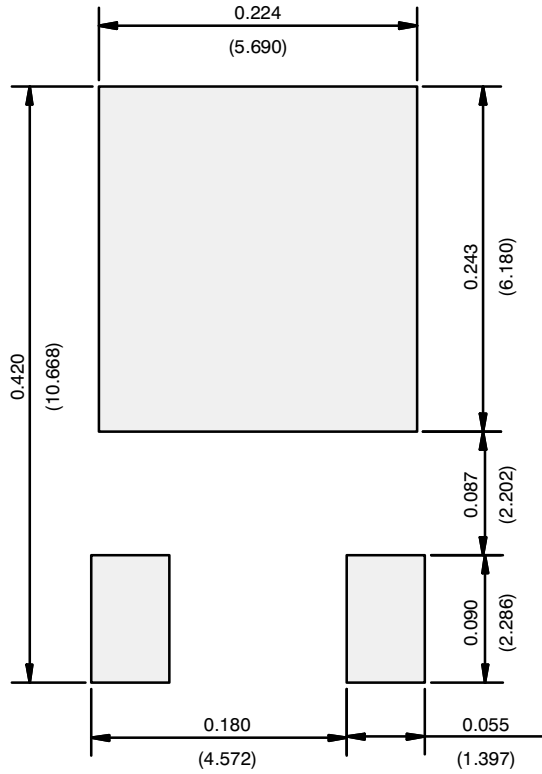


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	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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