

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

PRODUCT SUMMARY			
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^c	Q_g (Typ.)
20	0.0025 at $V_{GS} = 4.5$ V	76	27 nC
	0.0031 at $V_{GS} = 2.5$ V	47	

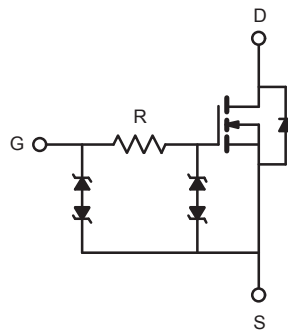
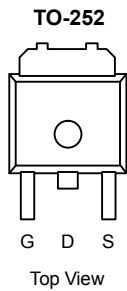
FEATURES

- DT-Trench Power MOSFET
- 175 °C Junction Temperature
- 100 % R_g Tested
- 100 % UIS Tested
- Typical ESD Protection 4000 V



APPLICATIONS

- OR-ing



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 ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	76 ^a
		$T_C = 100$ °C	47 ^a
Pulsed Drain Current	I_{DM}	290	A
Single Pulse Avalanche Current	I_{AS}	62	
Single Pulse Avalanche Energy	E_{AS}	99	
Maximum Power Dissipation ^b	P_D	$T_C = 25$ °C	127 ^c
		$T_A = 25$ °C ^d	3.96
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typ.	Max.	Unit	
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	32	40	°C/W	
Maximum Junction-to-Case	R_{thJC}	1.02	2		

Notes:

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

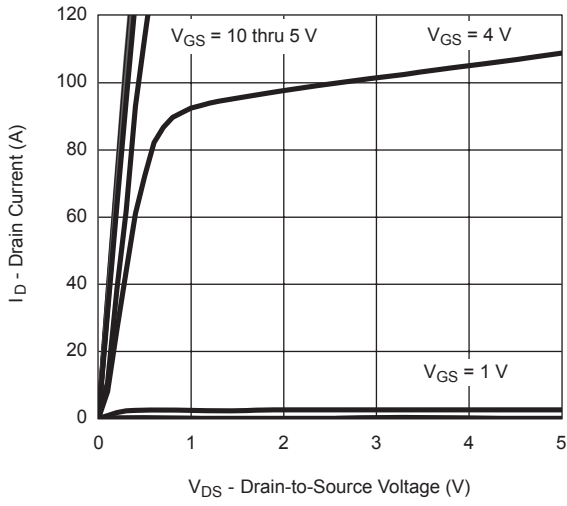
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.5		1.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 10	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		0.0025	0.0031	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.0037	
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.0042	
		$V_{GS} = 2.5\text{ V}, I_D = 15\text{ A}$		0.0031	0.0038	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 20\text{ A}$		98		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 10\text{ V}, f = 1\text{ MHz}$		6250		pF
Output Capacitance	C_{oss}			495		
Reverse Transfer Capacitance	C_{rss}			205		
Total Gate Charge ^b	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 50\text{ A}$		27	50	nC
Gate-Source Charge ^b	Q_{gs}			6.5		
Gate-Drain Charge ^b	Q_{gd}			7		
Gate Resistance	R_g		0.82	1.6	2.8	Ω
Turn-On Delay Time ^b	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 0.2\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1.0\text{ }\Omega$		15	29	ns
Rise Time ^b	t_r			7	17	
Turn-Off Delay Time ^b	$t_{d(off)}$			35	63	
Fall Time ^b	t_f			8	18	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^\circ\text{C}$						
Continuous Current	I_S				76	A
Pulsed Current	I_{SM}				290	
Forward Voltage ^a	V_{SD}	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$		0.73	1.2	V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		22	62	ns
Peak Reverse Recovery Current	I_{RM}			1.4	3.9	A
Reverse Recovery Charge	Q_{rr}			0.019	0.134	μC

Notes:

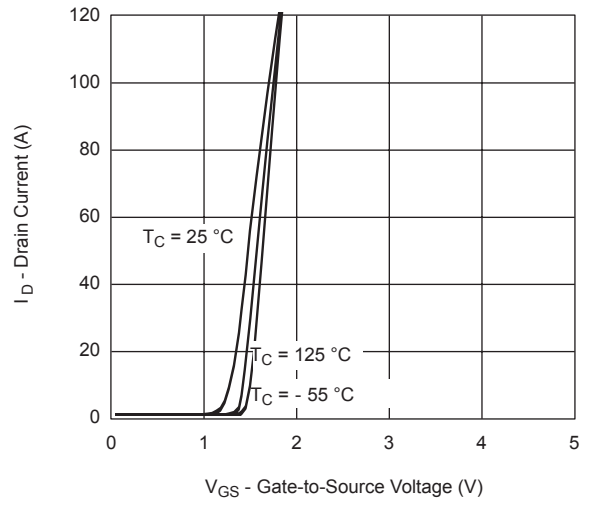
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- Independent of operating temperature.
- Guaranteed by design, not subject to production testing.

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.

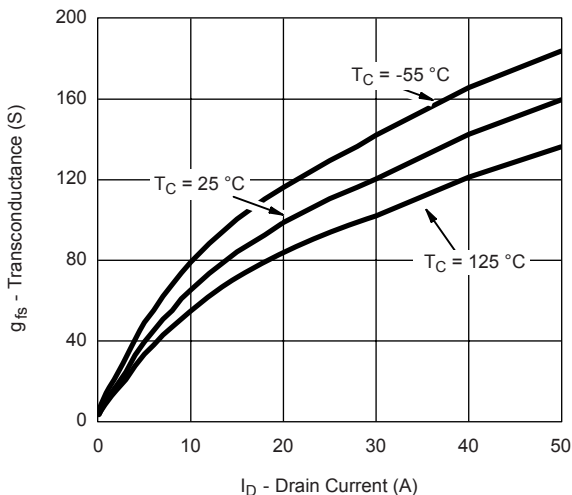
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



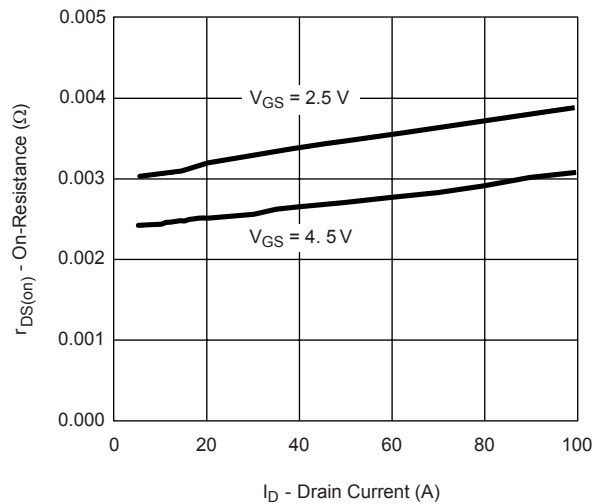
Output Characteristics



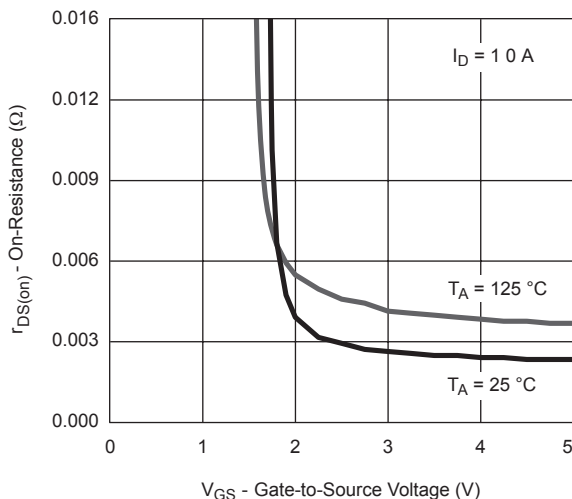
Transfer Characteristics



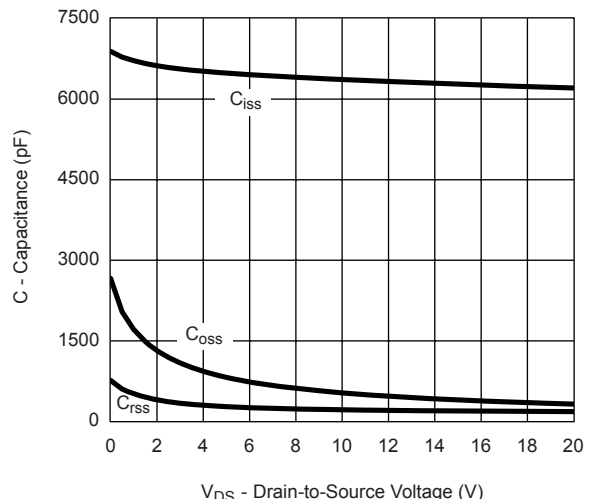
Transconductance



On-Resistance vs. Drain Current

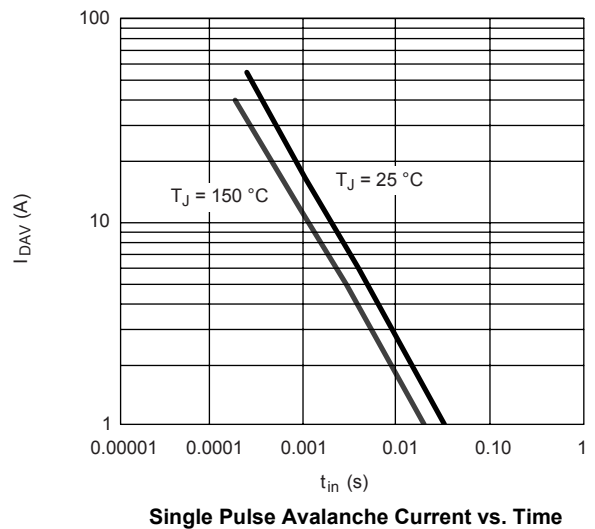
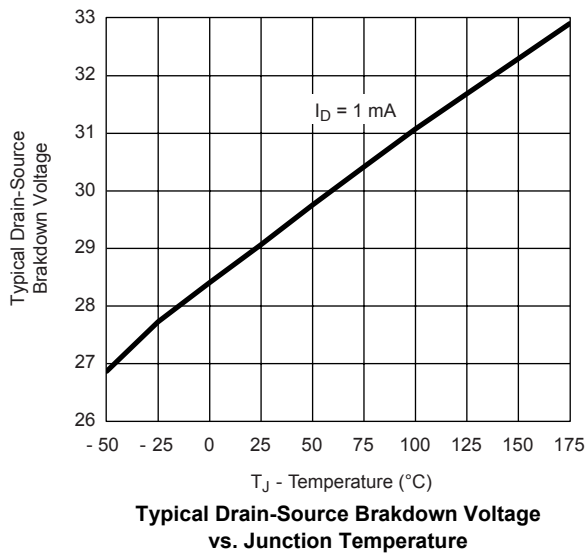
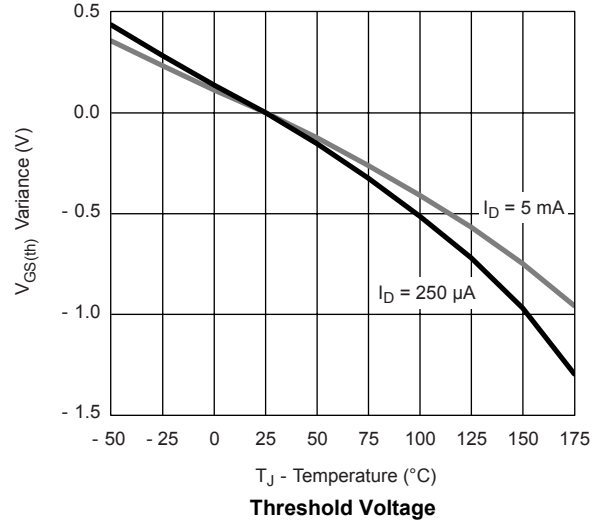
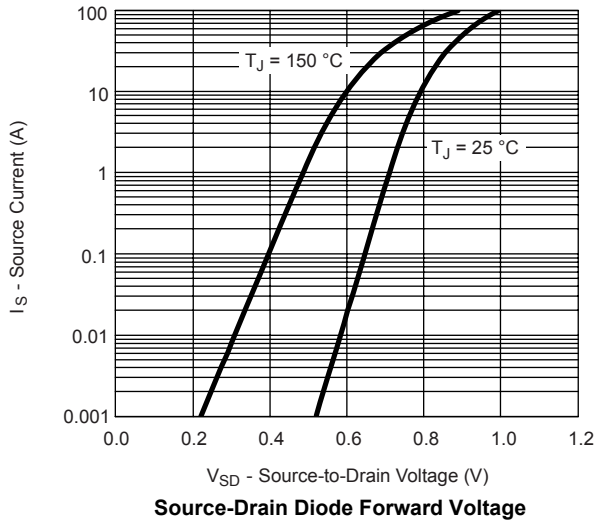
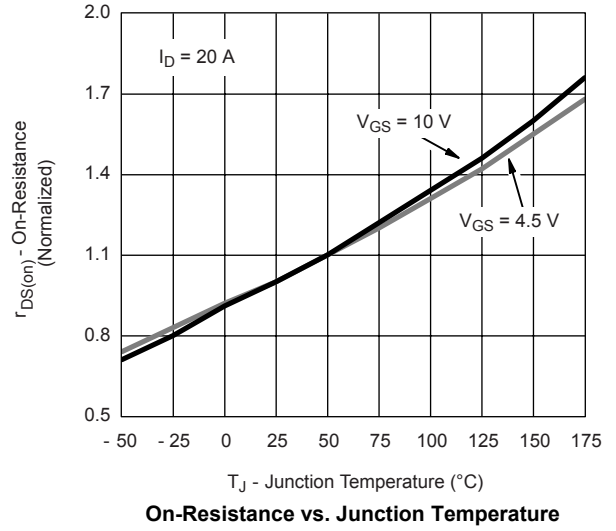
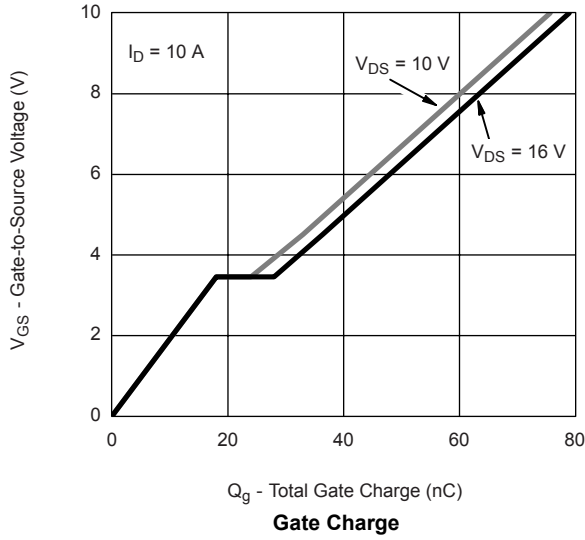


On-Resistance vs. Gate-to-Source Voltage

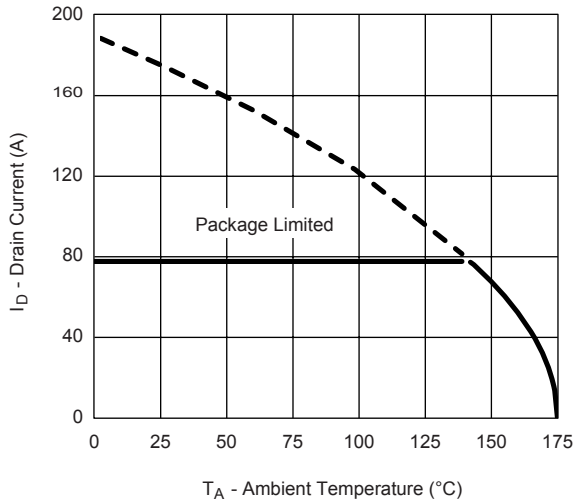


Capacitance

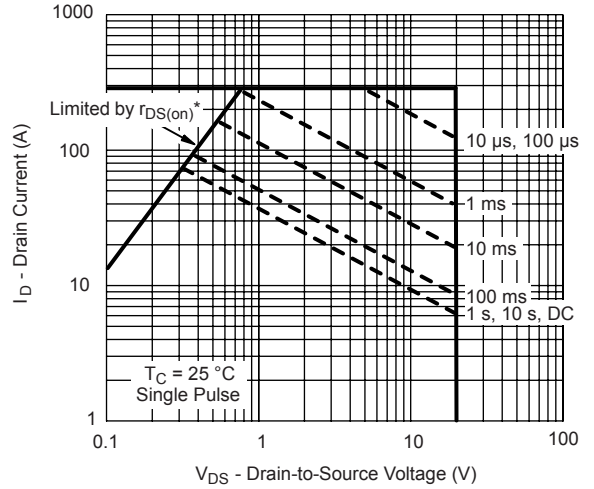
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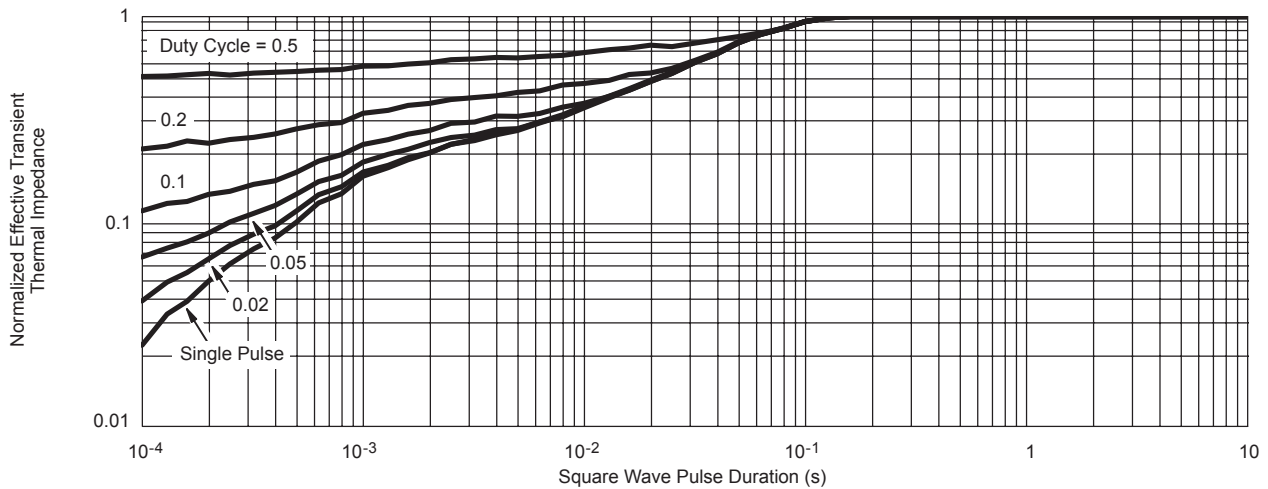


Drain Current vs. Ambient Temperature



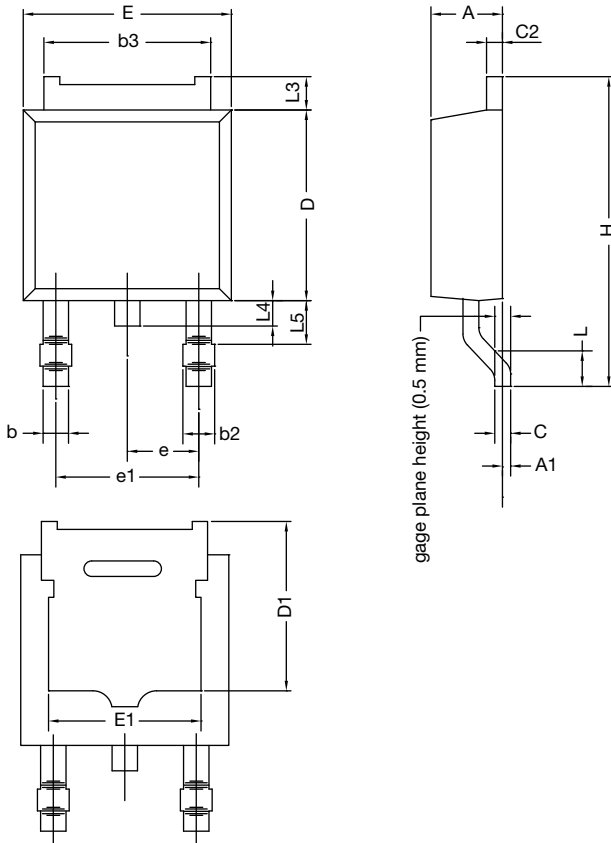
* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-252A CASE OUTLINE

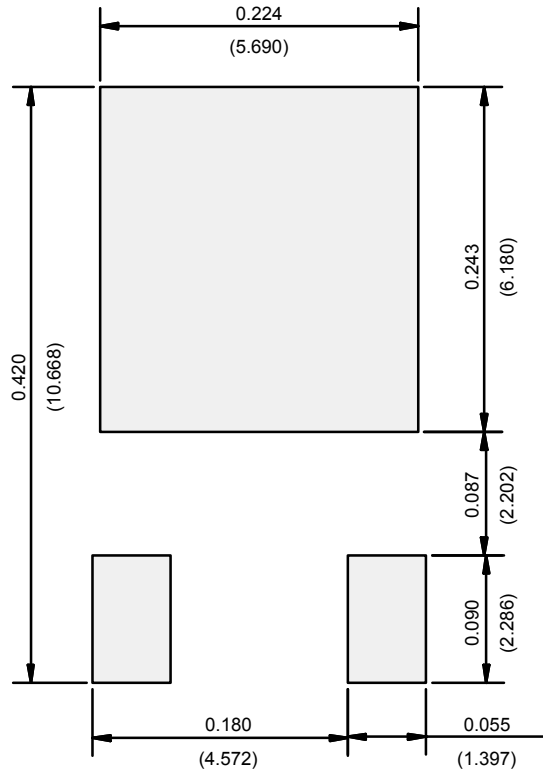


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40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