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

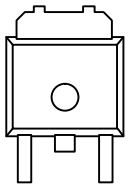
- DT-Trench Power MOSFET
- 175 °C Junction Temperature
- 100 % R_g Tested
- 100 % UIS Tested
- Typical ESD Protection 4000 V

RoHS COMPLIANT

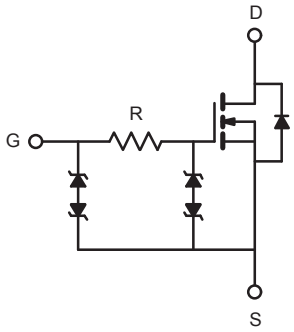
APPLICATIONS

- OR-ing

TO-252



Top View



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)	T_C = 25 °C	I_D	76[a]	A
	T_C = 100 °C		47[a]	
Pulsed Drain Current		I_{DM}	290	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	62	
Single Pulse Avalanche Energy		E_{AS}	99	mJ
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	127[c]	W
	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]	t ≤ 10 sec	R_{thJA}	32	40	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	1.02	2	

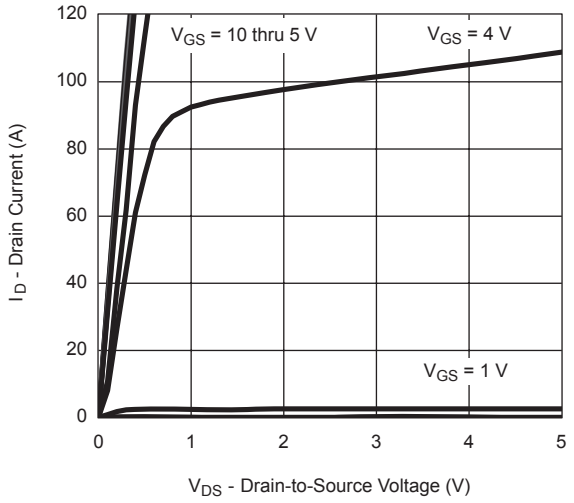
Notes:
a. Package limited.
b. Duty cycle ≤ 1 %.
c. See SOA curve for voltage derating.
d. When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 250 µA	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.5		1.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V			± 10	uA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	µA
		V_{DS} = 16 V, V_{GS} = 0 V, T_J = 125 °C			50	
		V_{DS} = 16V, V_{GS} = 0 V, T_J = 175 °C			250	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	120			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 4.5 V, I_D = 20 A		0.0025	0.0031	Ω
		V_{GS} = 4.5 V, I_D= 10 A, T_J = 125 °C			0.0037	
		V_{GS} = 4.5 V, I_D= 10 A, T_J = 175 °C			0.0042	
		V_{GS} = 2.5 V, I_D = 15 A		0.0031	0.0038	
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 20 A		98		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 10 V, f = 1 MHz		6250		pF
Output Capacitance	C_{oss}			495		
Reverse Transfer Capacitance	C_{rss}			205		
Total Gate Charge[b]	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 50 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 V, R_L = 0.2 Ω $I_D \cong$ 50 A, V_{GEN} = 4.5 V, R_g = 1.0 Ω		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 °C[c]						
Continuous Current	I_S				76	A
Pulsed Current	I_{SM}				290	
Forward Voltage[a]	V_{SD}	I_F = 20 A, V_{GS} = 0 V		0.73	1.2	V
Reverse Recovery Time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs		22	62	ns
Peak Reverse Recovery Current	I_{RM}			1.4	3.9	A
Reverse Recovery Charge	Q_{rr}			0.019	0.134	µC

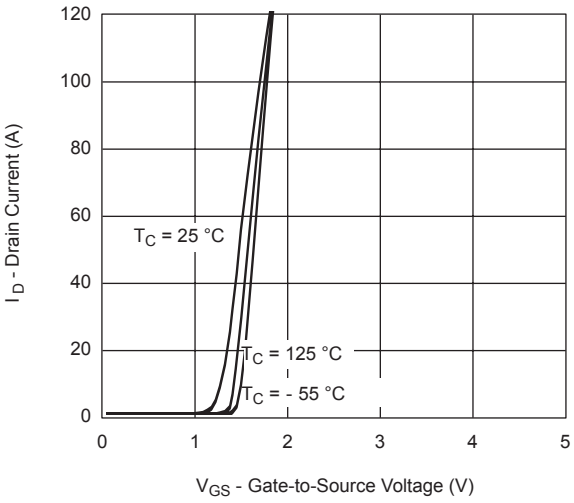
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Independent of operating temperature.
c. Guaranteed by design, not subject to production testing.

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.

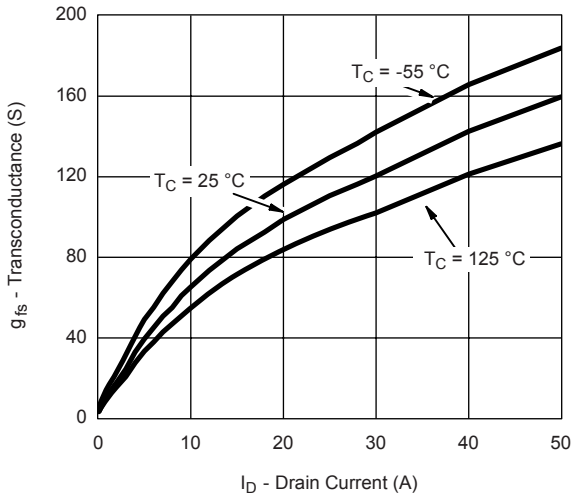
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



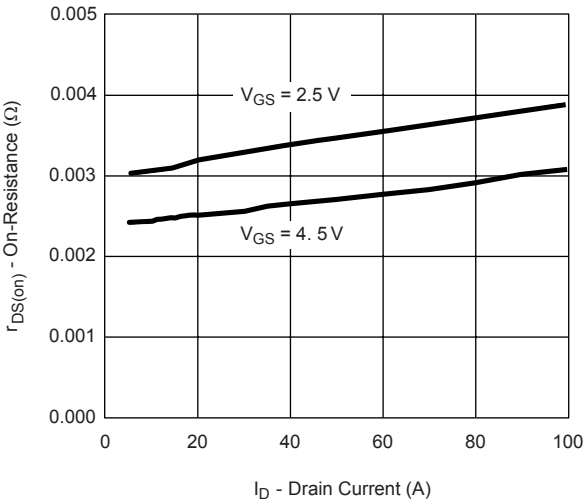
Output Characteristics



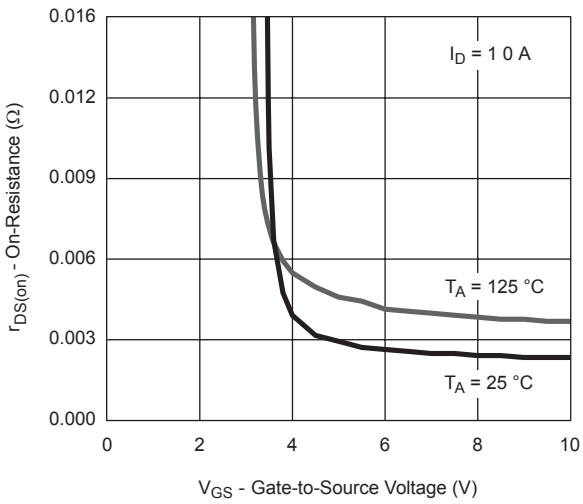
Transfer Characteristics



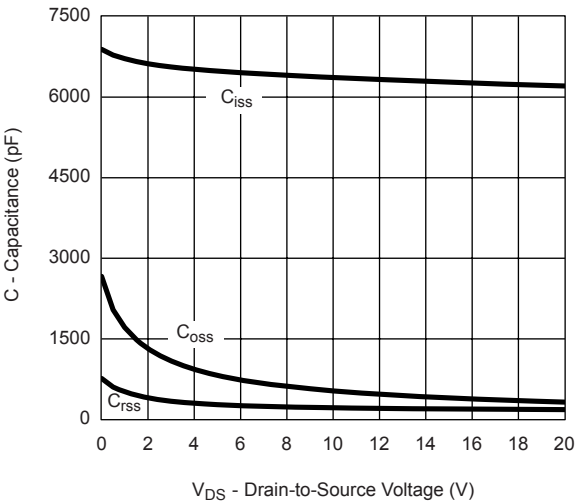
Transconductance



On-Resistance vs. Drain Current

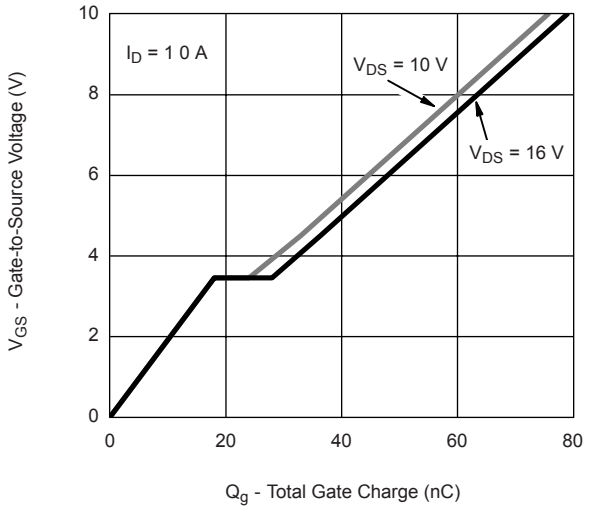


On-Resistance vs. Gate-to-Source Voltage

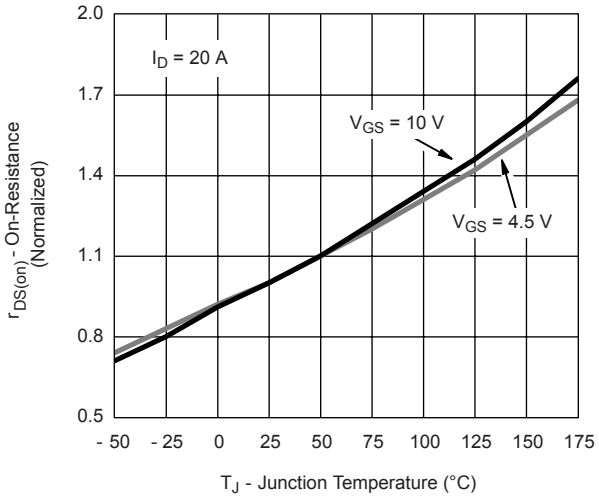


Capacitance

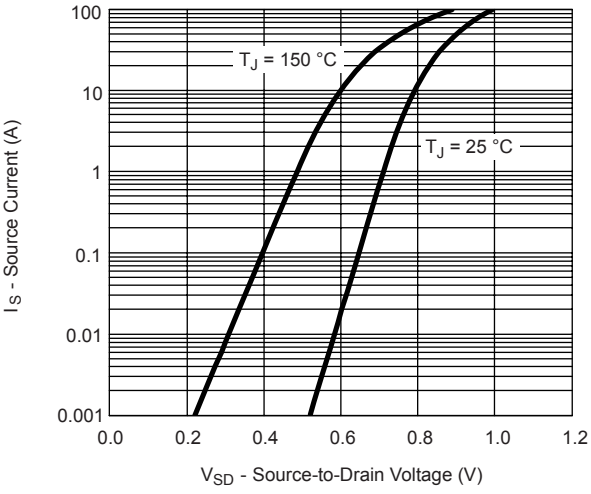
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



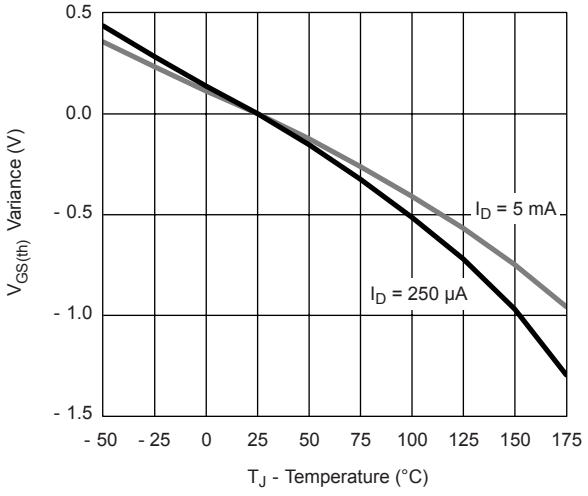
Gate Charge



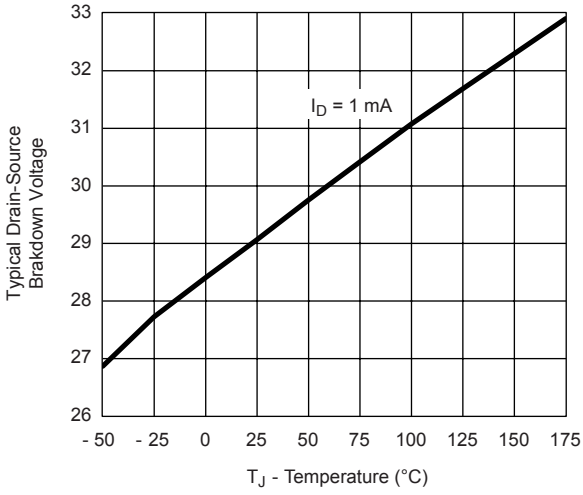
On-Resistance vs. Junction Temperature



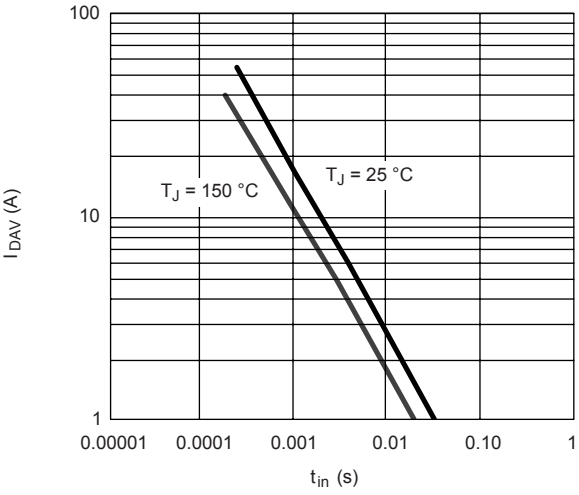
Source-Drain Diode Forward Voltage



Threshold Voltage

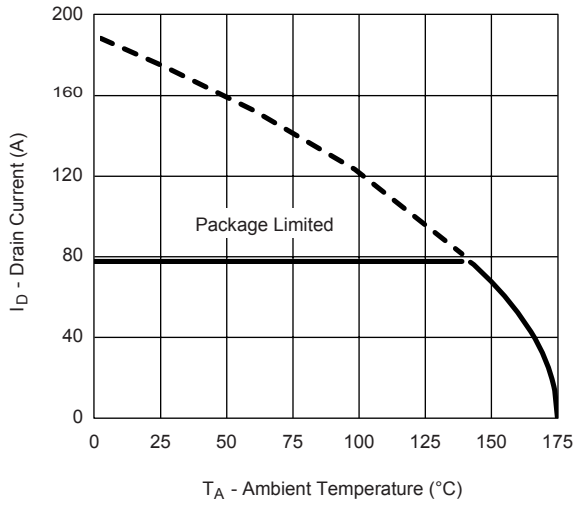


Typical Drain-Source Brakdown Voltage vs. Junction Temperature

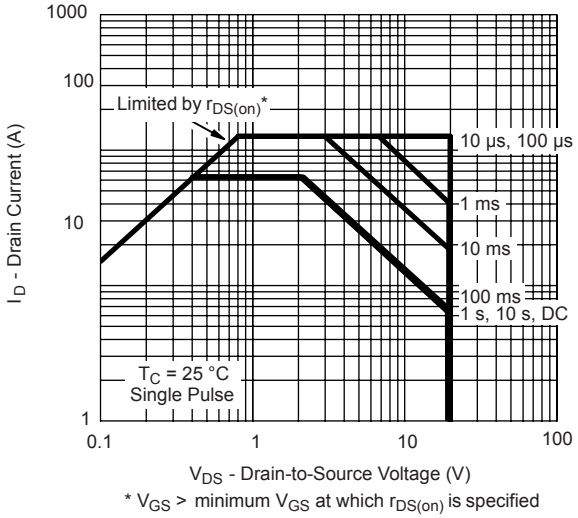


Single Pulse Avalanche Current vs. Time

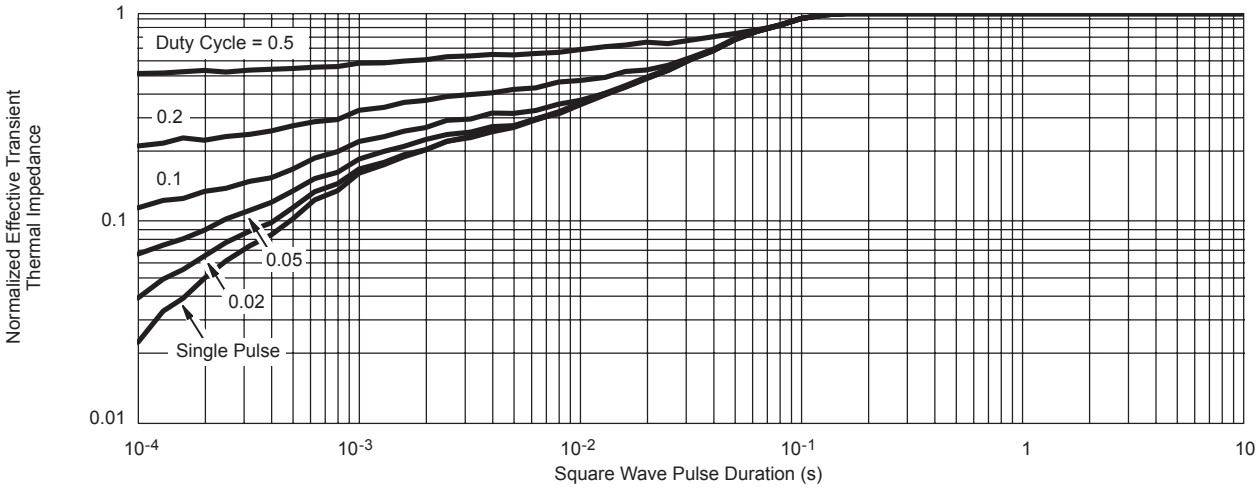
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Drain Current vs. Ambient Temperature

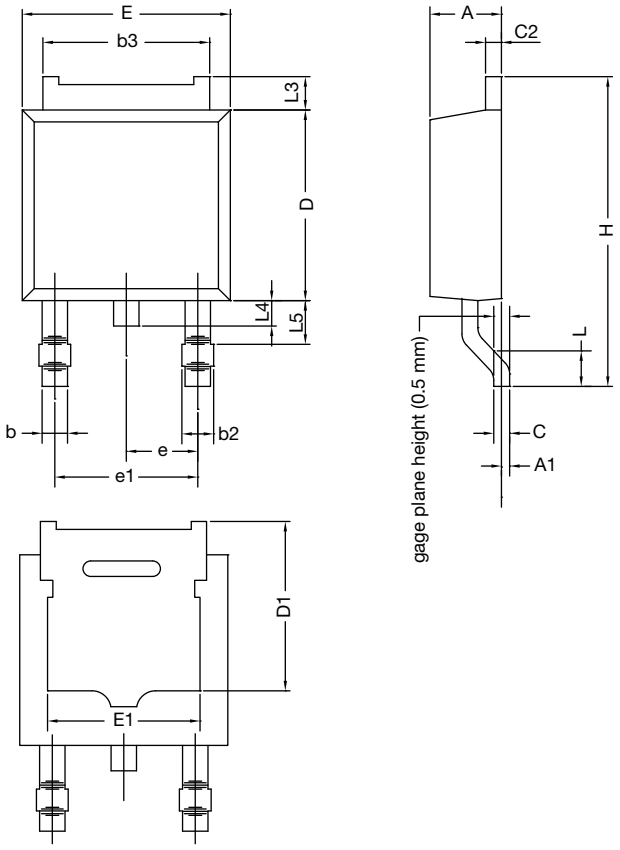


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-252A CASE OUTLINE

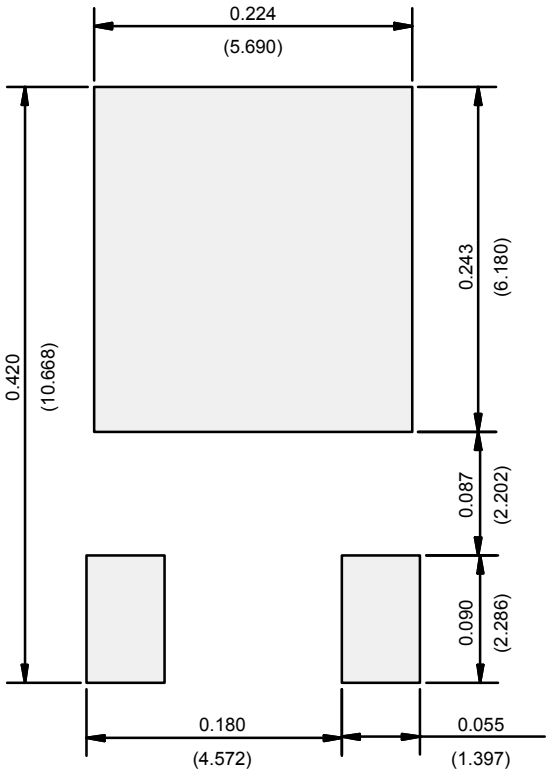


	MILLIMETERS		INCHES	
DIM.	**MIN.**	**MAX.**	**MIN.**	**MAX.**
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32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