

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

### PRODUCT SUMMARY

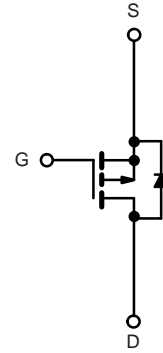
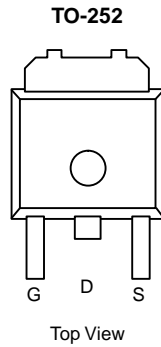
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>
- 20	0.007 at V <sub>GS</sub> = - 4.5 V	- 60
	0.009 at V <sub>GS</sub> = - 2.5 V	- 53

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> Tested
- 100 % UIS Tested



Available  
**RoHS\***  
COMPLIANT



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Gate-Source Voltage	V <sub>GS</sub>	± 12	V
Continuous Drain Current (T <sub>J</sub> = 175 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 60 <sup>a</sup>
		T <sub>C</sub> = 125 °C	- 45
Pulsed Drain Current	I <sub>DM</sub>	- 220	A
Avalanche Current	I <sub>AR</sub>	- 60	
Repetitive Avalanche Energy <sup>b</sup>	E <sub>AR</sub>	130	mJ
Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C (TO-220AB and TO-263)	127 <sup>d</sup>
		T <sub>A</sub> = 25 °C (TO-263) <sup>c</sup>	3.15
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	R <sub>thJA</sub>	PCB Mount (TO-263) <sup>c</sup>	35
		Free Air (TO-220AB)	55
Junction-to-Case	R <sub>thJC</sub>	0.8	°C/W

Notes:

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

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

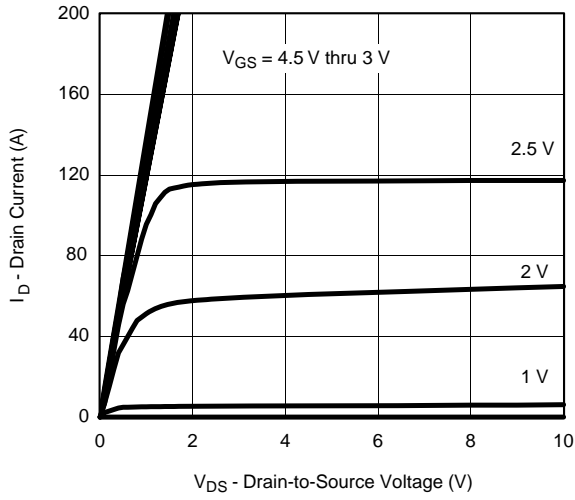
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.5		-2.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			-50	
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			-250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	-60			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -30\text{ A}$		0.007	0.0085	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -30\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.010	
		$V_{GS} = -4.5\text{ V}, I_D = -30\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.013	
		$V_{GS} = -2.5\text{ V}, I_D = -20\text{ A}$		0.009	0.0125	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -16\text{ V}, I_D = -30\text{ A}$	20			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$		8400		$\mu\text{F}$
Output Capacitance	$C_{oss}$			1505		
Reverse Transfer Capacitance	$C_{rss}$			710		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -30\text{ A}$		160	240	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			32		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			30		
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 0.2\text{ }\Omega$ $I_D \cong -30\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 2.5\text{ }\Omega$		27		ns
Rise Time <sup>c</sup>	$t_r$			220		
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			140		
Fall Time <sup>c</sup>	$t_f$			215		
<b>Source-Drain Diode Ratings and Characteristics<sup>b</sup></b> ( $T_C = 25\text{ }^\circ\text{C}$ )						
Continuous Current	$I_S$				-60	A
Pulsed Current	$I_{SM}$				-220	
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = -30\text{ A}, V_{GS} = 0\text{ V}$		-0.8	-1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F = -30\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		55	100	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2.5	5	A
Reverse Recovery Charge	$Q_{rr}$			0.07	0.25	$\mu\text{C}$

**Notes:**

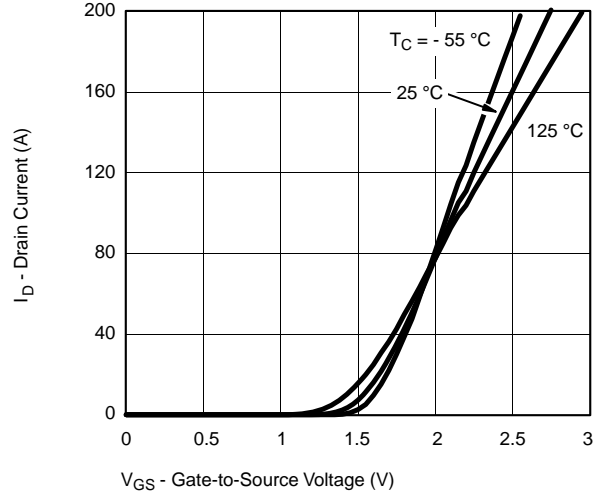
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

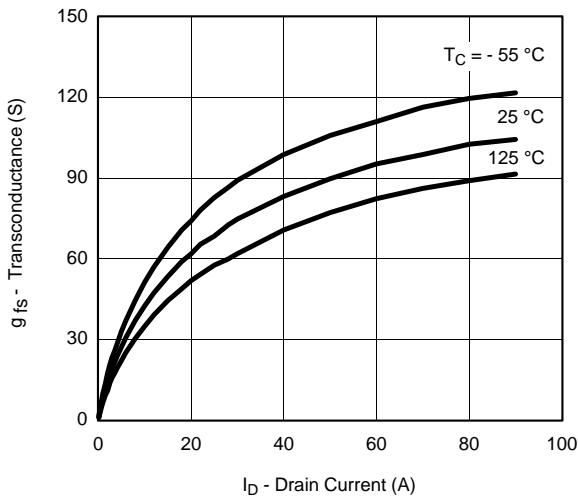
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



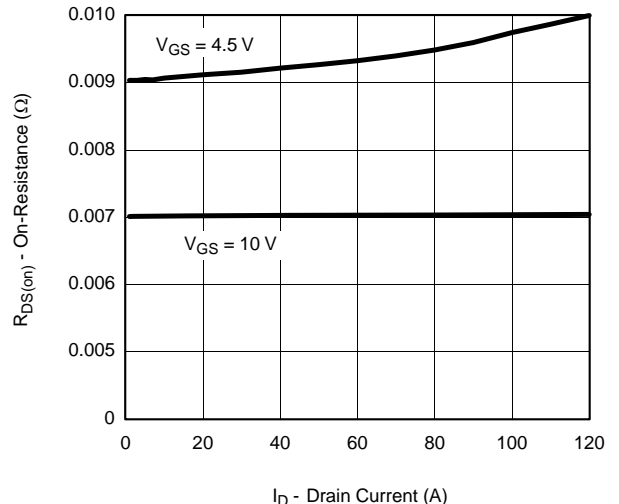
**Output Characteristics**



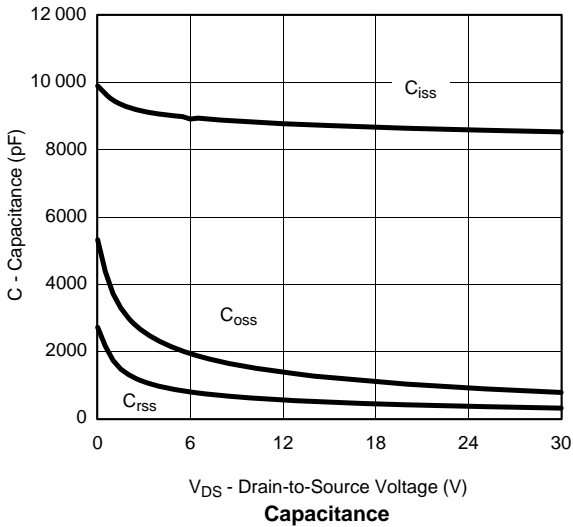
**Transfer Characteristics**



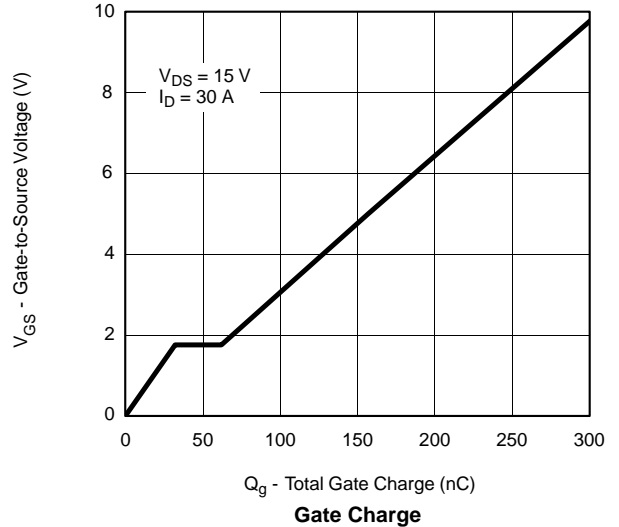
**Transconductance**



**On-Resistance vs. Drain Current**

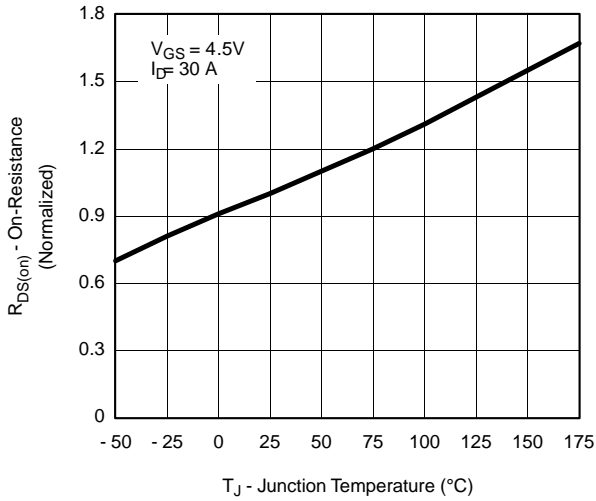


**Capacitance**

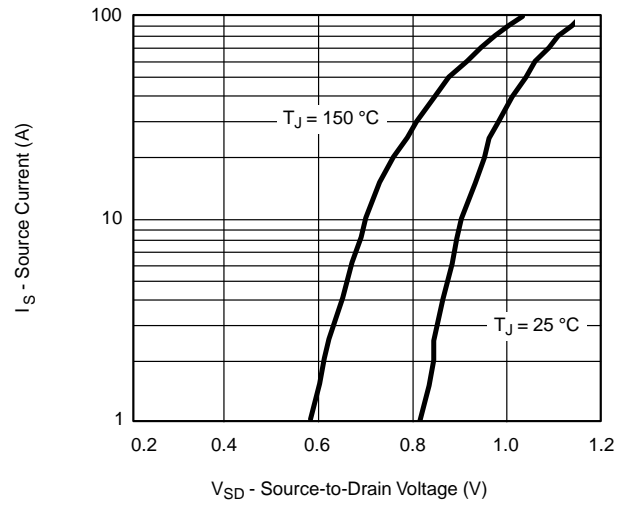


**Gate Charge**

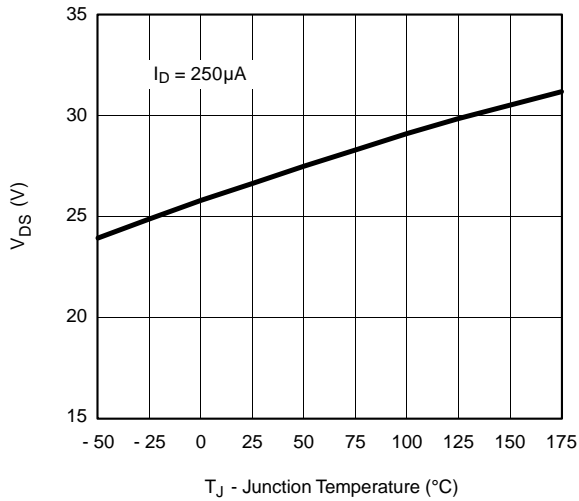
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



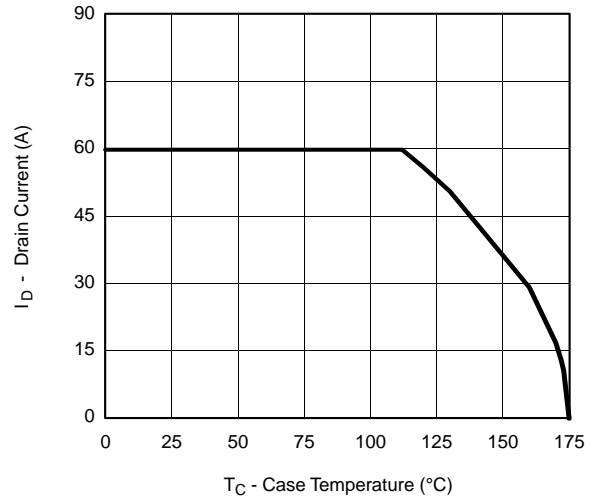
**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**

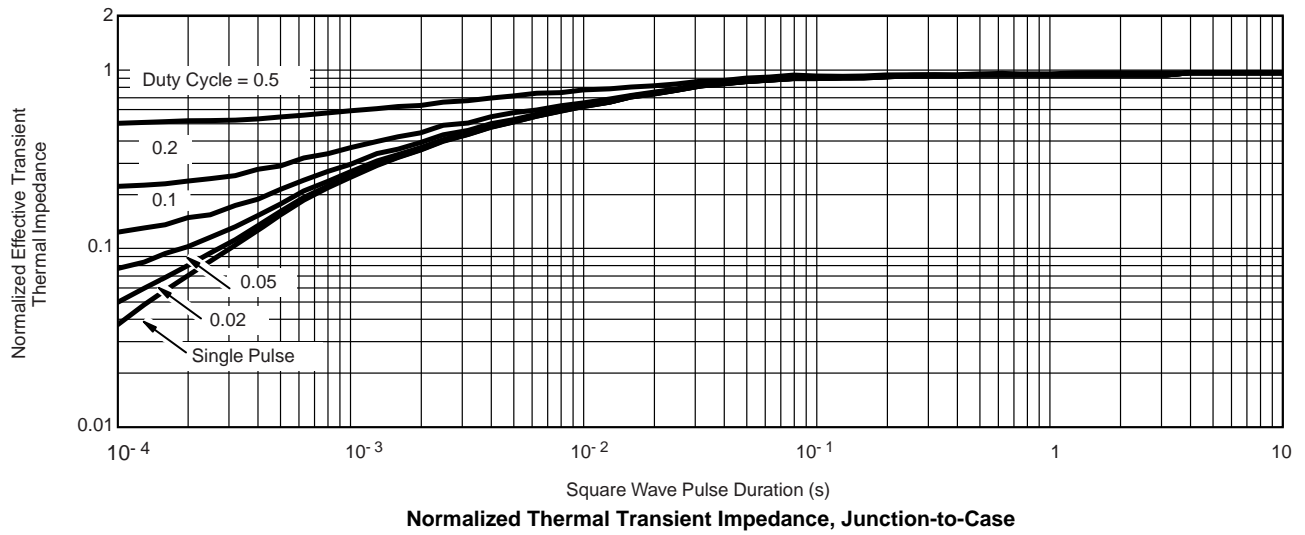
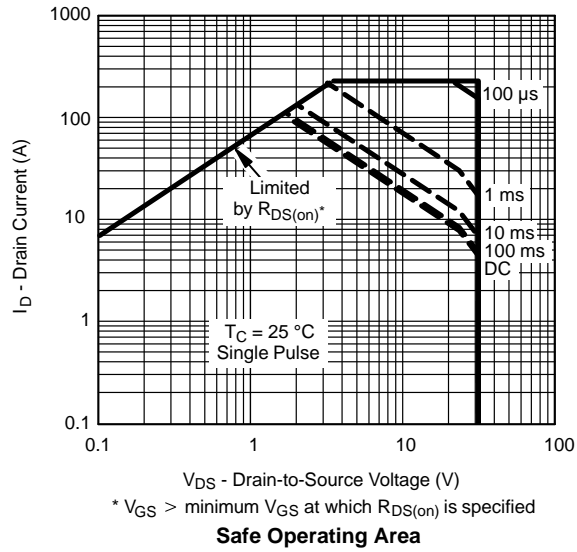


**Drain Source Breakdown vs. Junction Temperature**

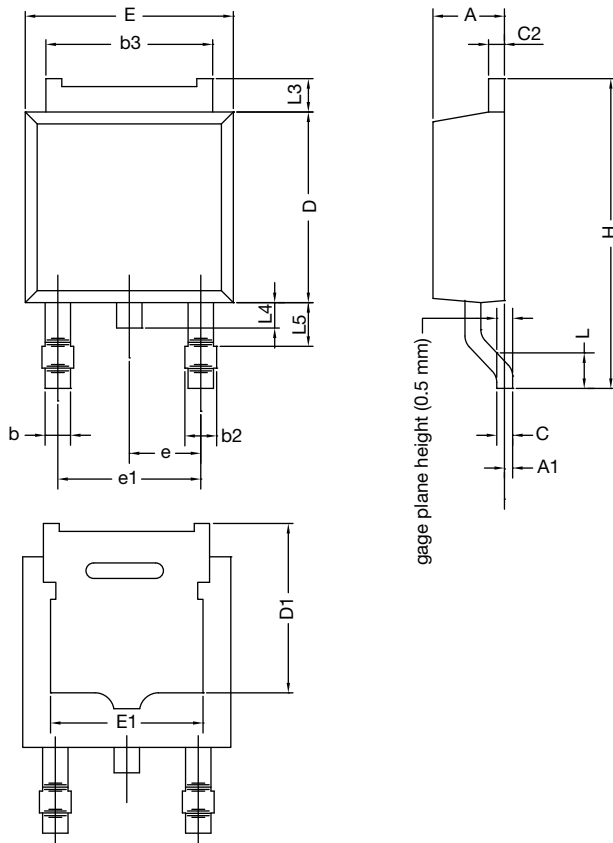


**Maximum Avalanche and Drain Current vs. Case Temperature**

**THERMAL RATINGS**



## TO-252AA CASE OUTLINE

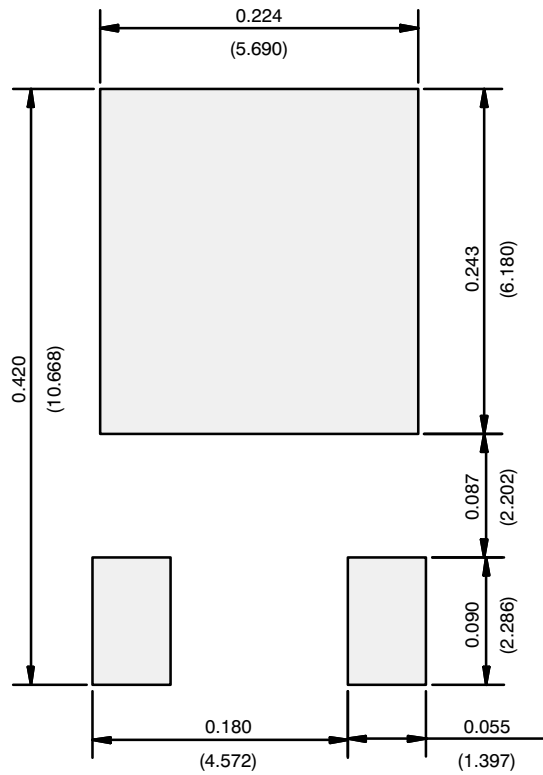


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40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