

## N-Channel 100-V (D-S) 175 °C MOSFET

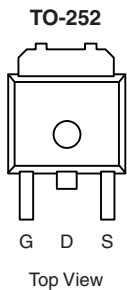
PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.025 at $V_{GS} = 10$ V	40
	0.028 at $V_{GS} = 4.5$ V	38

**FEATURES**

- TrenchFET<sup>®</sup> Power MOSFET
- 175 °C Maximum Junction Temperature
- 100 %  $R_g$  Tested

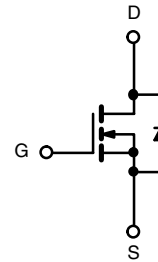


Available

**RoHS\***  
 COMPLIANT


Drain Connected to Tab

Ordering Information: SUD40N10-25  
 SUD40N10-25-E3 (Lead (Pb)-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	100	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 175$ °C) <sup>b</sup>	$I_D$	$T_C = 25$ °C	40	
		$T_C = 125$ °C	23	
Pulsed Drain Current	$I_{DM}$	70	A	
Continuous Source Current (Diode Conduction)	$I_S$	40		
Avalanche Current	$I_{AS}$	40		
Single Pulse Avalanche Energy (Duty Cycle $\leq 1$ %)	$L = 0.1$ mH	$E_{AS}$	80	mJ
Maximum Power Dissipation	$P_D$	$T_C = 25$ °C	136 <sup>b</sup>	W
		$T_A = 25$ °C	3 <sup>a</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	$t \leq 10$ s	15	18	°C/W
		Steady State	40	50	
Junction-to-Case	$R_{thJC}$	0.85	1.1		

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. See SOA curve for voltage derating.

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

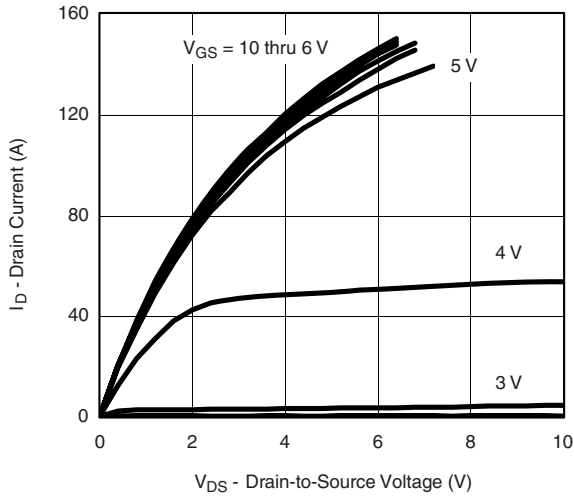
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	70			A
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}$		0.02	0.025	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 40\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.05	
		$V_{GS} = 10\text{ V}, I_D = 40\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.063	
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		0.022	0.028	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 40\text{ A}$		70		S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, F = 1\text{ MHz}$		2400		$\mu\text{F}$
Output Capacitance	$C_{oss}$			290		
Reverse Transfer Capacitance	$C_{rss}$			120		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 40\text{ A}$		40	60	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			11		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			9		
Gate Resistance	$R_g$		1		3.5	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 1.25\text{ }\Omega$ $I_D \cong 40\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		8	13	ns
Rise Time <sup>c</sup>	$t_r$			40	60	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			15	25	
Fall Time <sup>c</sup>	$t_f$			80	120	
<b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25\text{ }^\circ\text{C}$						
Pulsed Current	$I_{SM}$				70	A
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 40\text{ A}, V_{GS} = 0\text{ V}$		1.0	1.5	V
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		75	120	ns

## Notes:

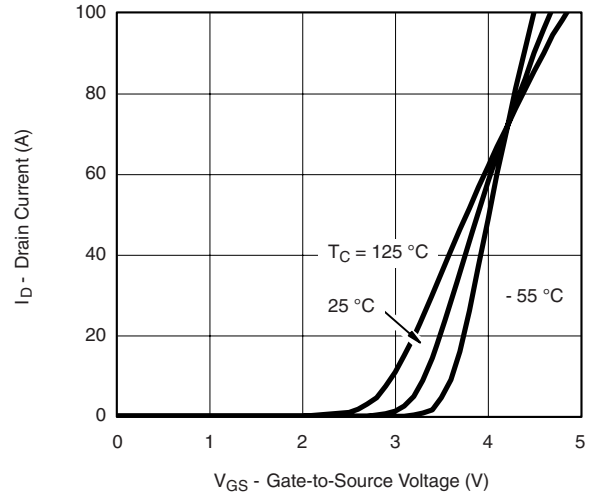
- a. Guaranteed by design, not subject to production testing.  
b. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
c. Independent of operating temperature.

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.

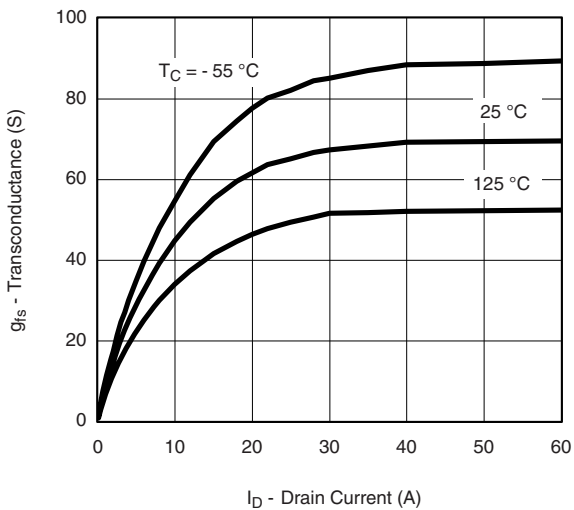
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



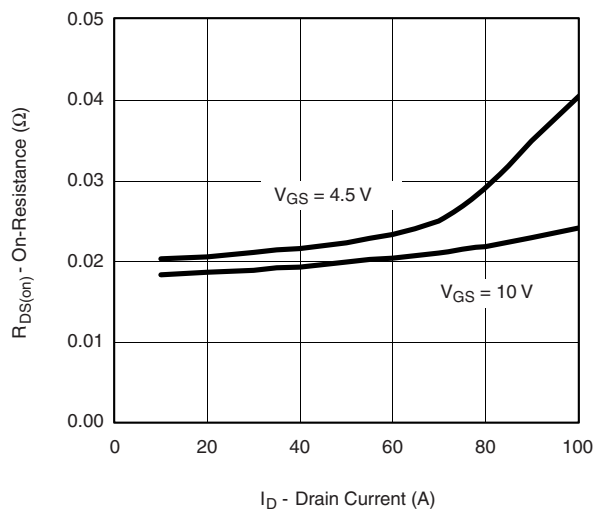
**Output Characteristics**



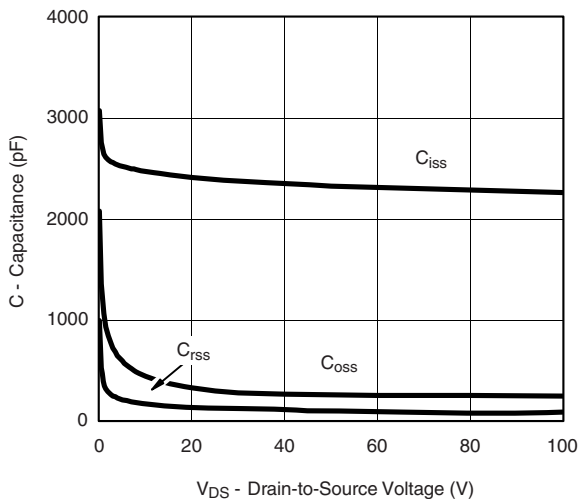
**Transfer Characteristics**



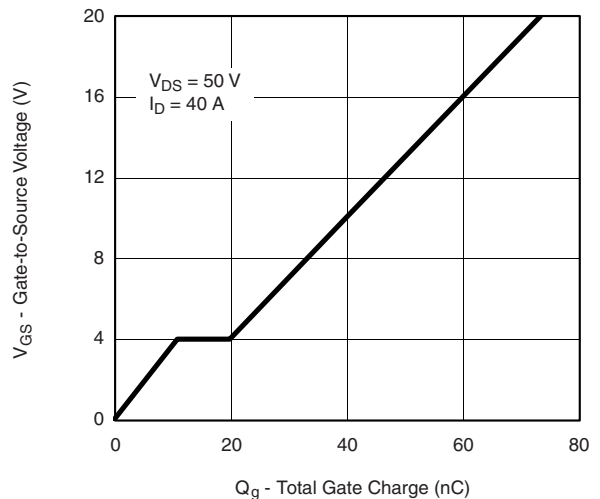
**Transconductance**



**On-Resistance vs. Drain Current**



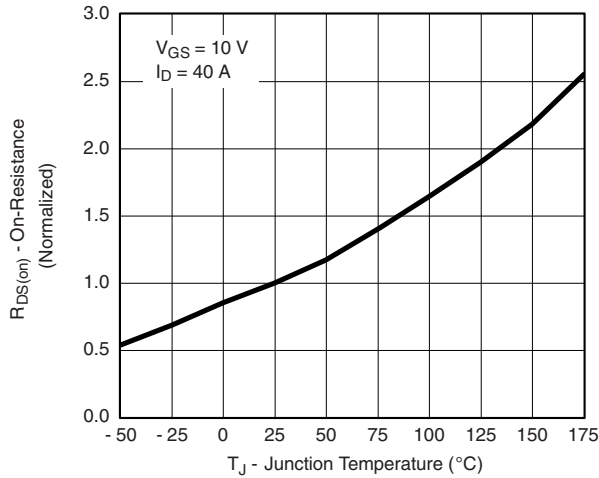
**Capacitance**



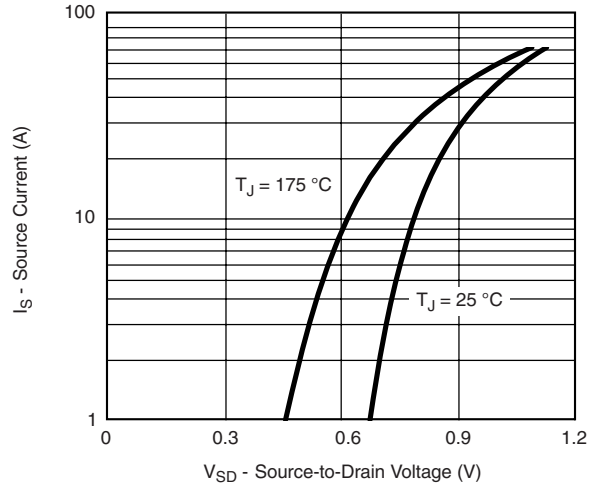
**Gate Charge**



### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

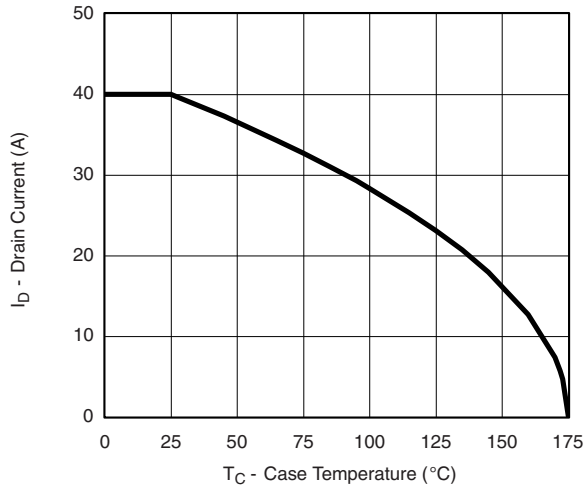


On-Resistance vs. Junction Temperature

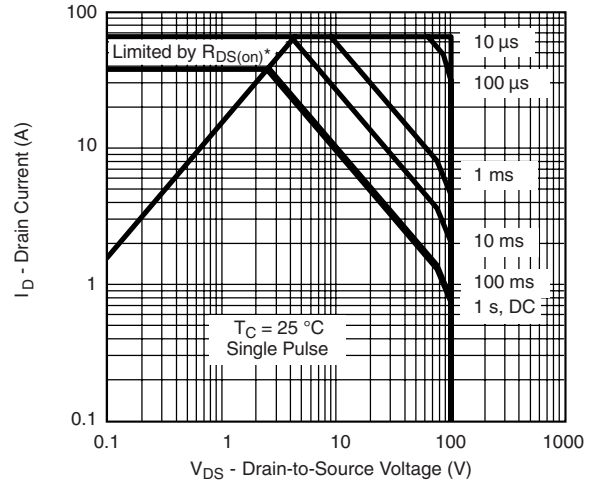


Source-Drain Diode Forward Voltage

### THERMAL RATINGS

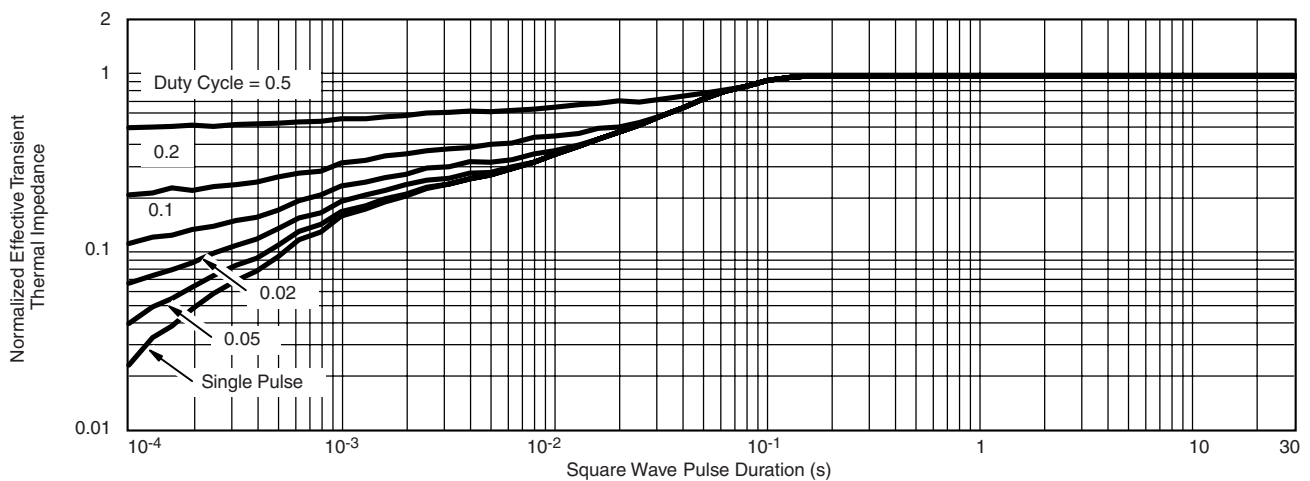


Maximum Avalanche Drain Current vs. Case Temperature



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

Safe Operating Area



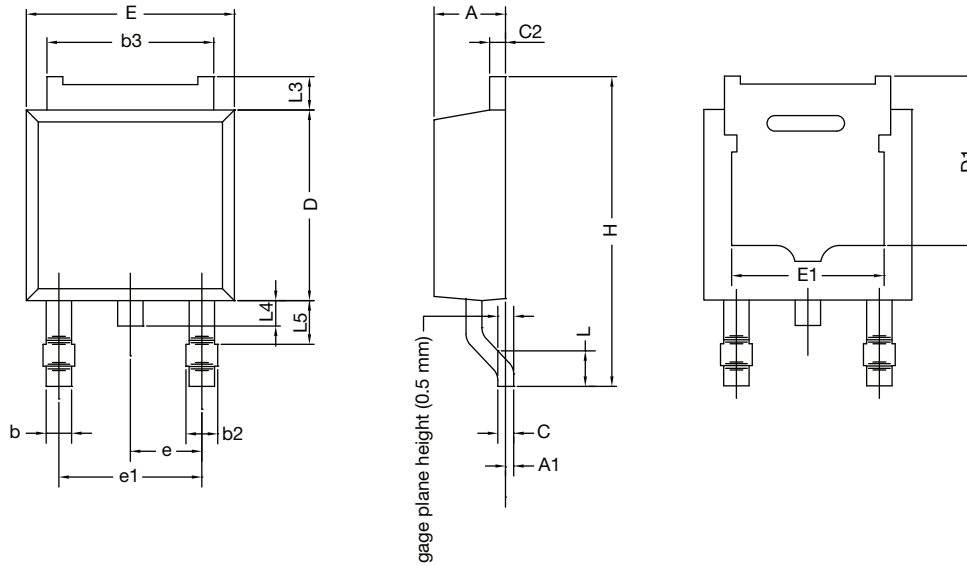
Normalized Thermal Transient Impedance, Junction-to-Case

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# TO-252AA Case Outline

## VERSION 1: FACILITY CODE = Y



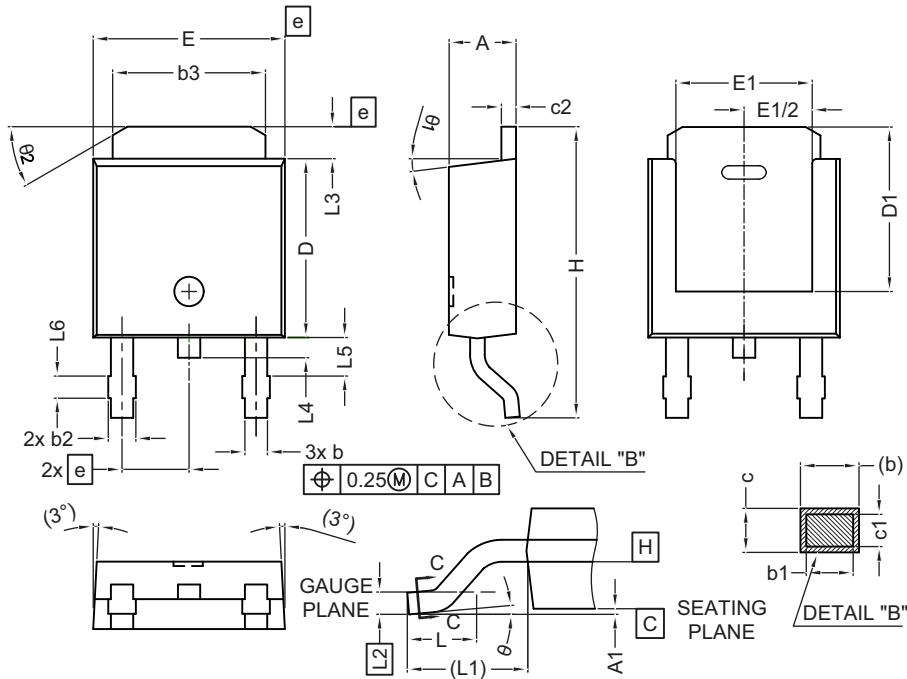
MILLIMETERS		
DIM.	MIN.	MAX.
A	2.18	2.38
A1	-	0.127
b	0.64	0.88
b2	0.76	1.14
b3	4.95	5.46
C	0.46	0.61
C2	0.46	0.89
D	5.97	6.22
D1	4.10	-
E	6.35	6.73
E1	4.32	-
H	9.40	10.41
e	2.28 BSC	
e1	4.56 BSC	
L	1.40	1.78
L3	0.89	1.27
L4	-	1.02
L5	1.01	1.52

### Note

- Dimension L3 is for reference only



VERSION 2: FACILITY CODE = N



DIM.	MILLIMETERS	
	MIN.	MAX.
A	2.18	2.39
A1	-	0.13
b	0.65	0.89
b1	0.64	0.79
b2	0.76	1.13
b3	4.95	5.46
c	0.46	0.61
c1	0.41	0.56
c2	0.46	0.60
D	5.97	6.22
D1	5.21	-
E	6.35	6.73
E1	4.32	-
e	2.29 BSC	
H	9.94	10.34

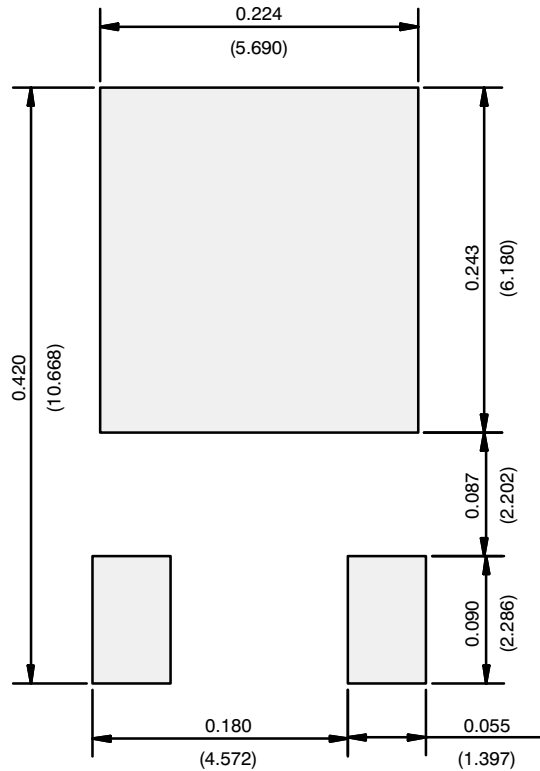
DIM.	MILLIMETERS	
	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
theta	0°	10°
theta1	0°	15°
theta2	25°	35°

Notes

- Dimensioning and tolerance confirm to ASME Y14.5M-1994
- All dimensions are in millimeters. Angles are in degrees
- Heat sink side flash is max. 0.8 mm
- Radius on terminal is optional

ECN: E22-0399-Rev. R, 03-Oct-2022  
 DWG: 5347

## RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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