

## P-Channel 60-V (D-S) 175 °C MOSFET

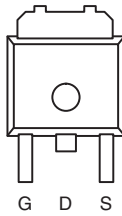
**PRODUCT SUMMARY**

$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ)
- 60	0.060 at $V_{GS} = - 10$ V	- 19	26
	0.077 at $V_{GS} = - 4.5$ V	- 16.8	

**FEATURES**

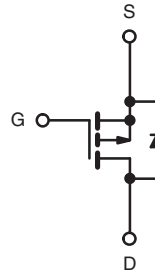
- TrenchFET<sup>®</sup> Power MOSFET
- 175 °C Junction Temperature


**RoHS**  
COMPLIANT

**TO-252**


Top View

Drain Connected to Tab

**Ordering Information:** SUD19P06-60L-E3 (Lead (Pb)-free)


P-Channel MOSFET

**ABSOLUTE MAXIMUM RATINGS**  $T_A = 25$  °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	- 60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	$T_C = 25$ °C	- 19
		$T_C = 125$ °C	- 11
Pulsed Drain Current	$I_{DM}$	- 30	A
Avalanche Current, Single Pulse	$I_{AS}$	- 22	
Repetitive Avalanche Energy, Single Pulse <sup>a</sup>	$E_{AS}$	24.2	mJ
Power Dissipation	$P_D$	$T_C = 25$ °C	46 <sup>c</sup>
		$T_A = 25$ °C	2.7 <sup>b, c</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>b</sup>	$R_{thJA}$	$t \leq 10$ s	17	21
		Steady State	45	55
Junction-to-Case	$R_{thJC}$	2.7	3.25	°C/W

Notes:

 a. Duty cycle  $\leq 1$  %.

b. When mounted on 1" square PCB (FR-4 material).

c. See SOA curve for voltage derating.

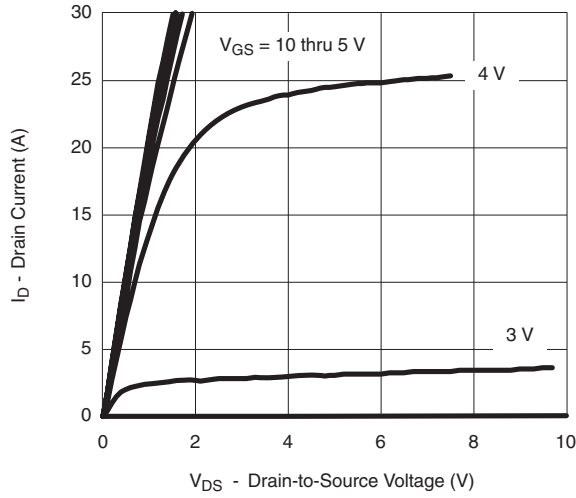
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 3	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			- 1	$\mu\text{A}$
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			- 50	
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			- 150	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 30			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		0.048	0.060	$\Omega$
		$V_{GS} = -10\text{ V}, I_D = -16.8\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.102	
		$V_{GS} = -10\text{ V}, I_D = -16.8\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.129	
		$V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$		0.061	0.077	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -10\text{ A}$		22		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$		1140	1710	$\text{pF}$
Output Capacitance	$C_{oss}$			130		
Reverse Transfer Capacitance	$C_{rss}$			90		
Total Gate Charge	$Q_g$	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		26	40	$\text{nC}$
Gate-Source Charge	$Q_{gs}$			4.5		
Gate-Drain Charge	$Q_{gd}$			7.0		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		7.0		$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong -19\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\text{ }\Omega$		8	15	ns
Rise Time <sup>c</sup>	$t_r$			9	15	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			65	100	
Fall Time <sup>c</sup>	$t_f$			30	45	
<b>Drain-Source Body Diode Characteristics (<math>T_C = 25\text{ }^\circ\text{C}</math>)<sup>b</sup></b>						
Continuous Current	$I_S$				- 30	A
Pulsed Current	$I_{SM}$				- 30	
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = -19\text{ A}, V_{GS} = 0\text{ V}$		- 1.0	- 1.5	V
Reverse Recovery Time	$t_{rr}$	$I_F = -19\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		41	61	ns

Notes:

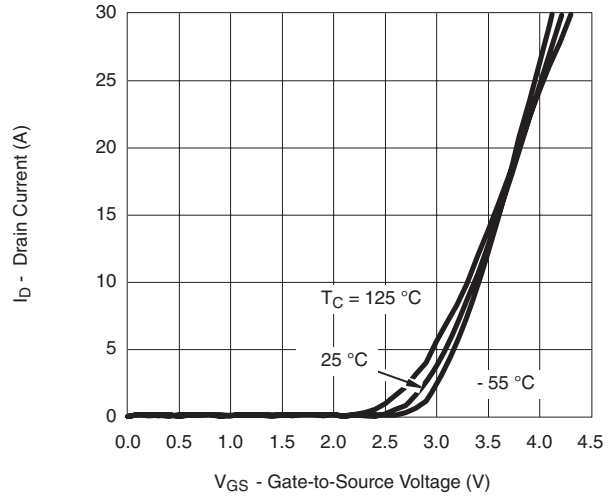
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

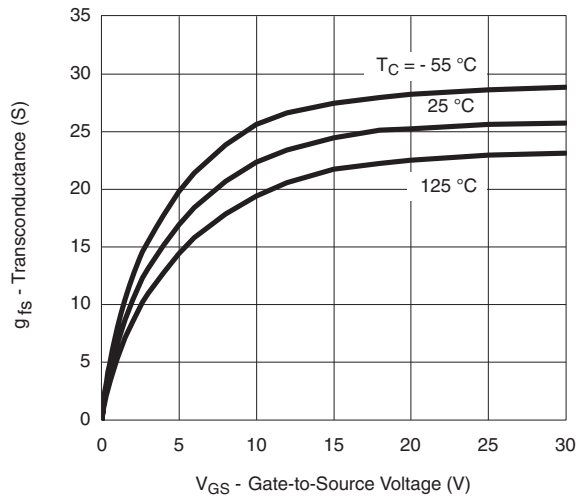
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



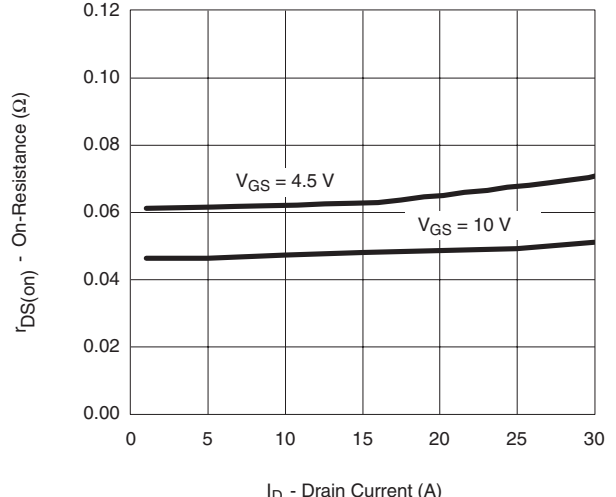
**Output Characteristics**



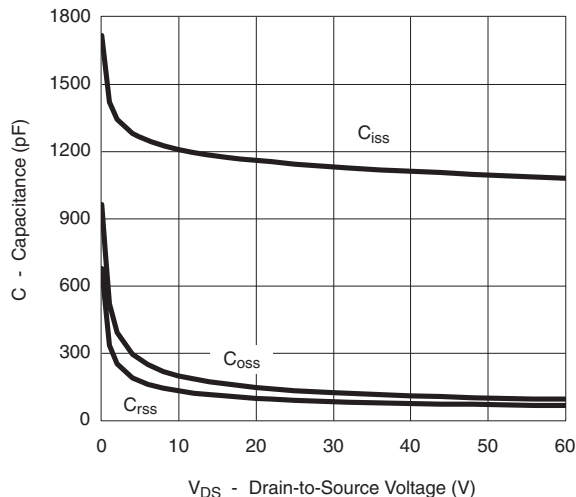
**Transfer Characteristics**



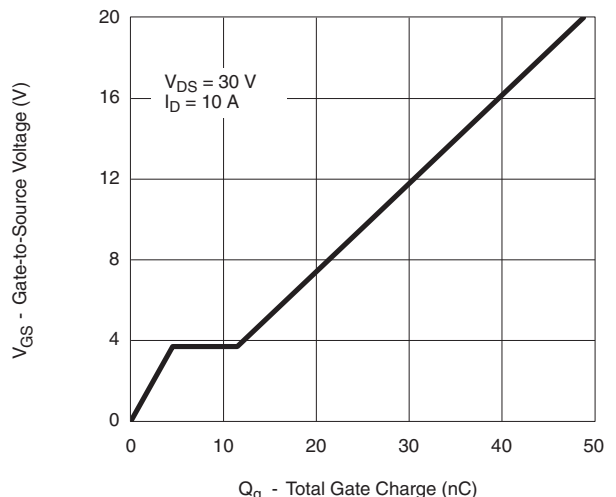
**Transconductance**



**On-Resistance vs. Drain Current**

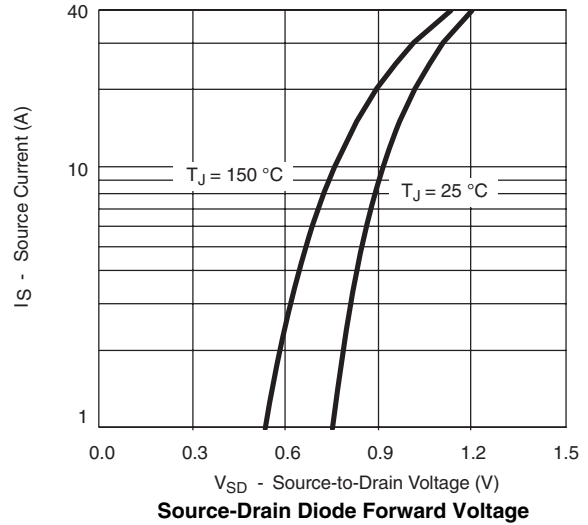
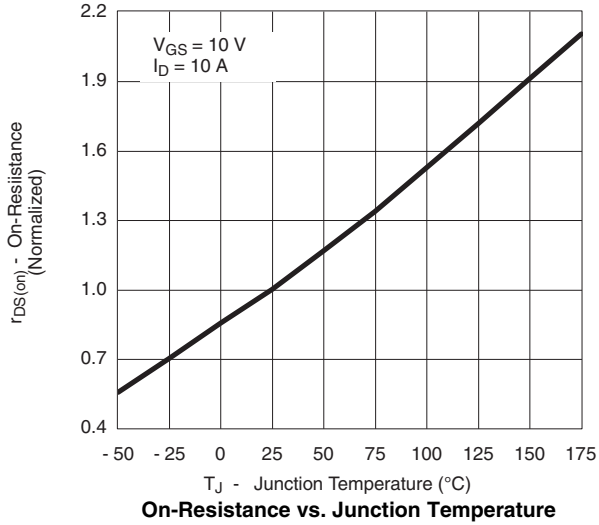


**Capacitance**

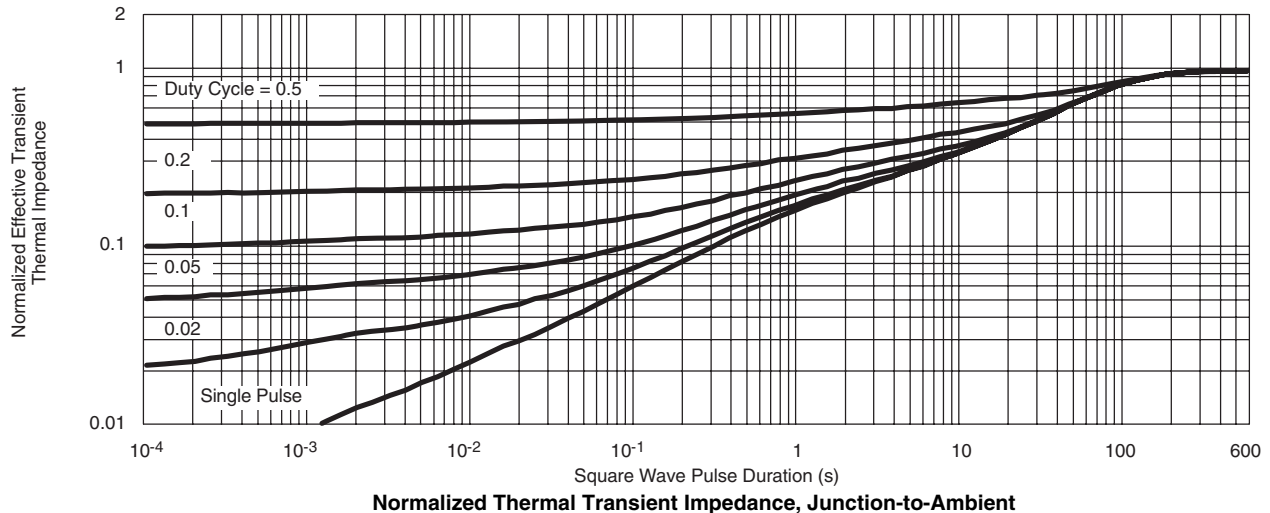
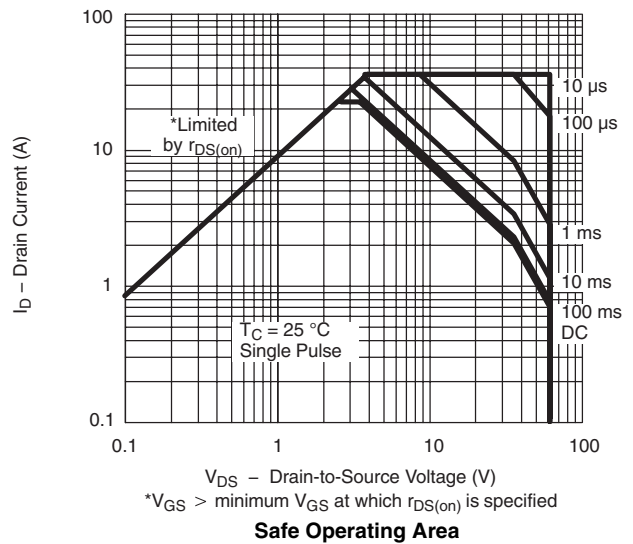
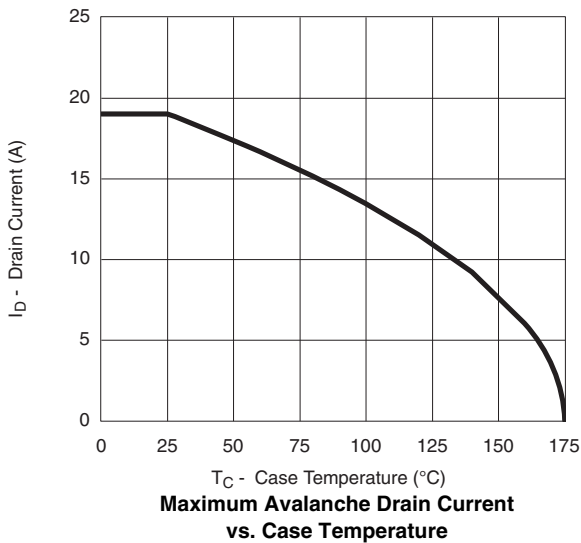


**Gate Charge**

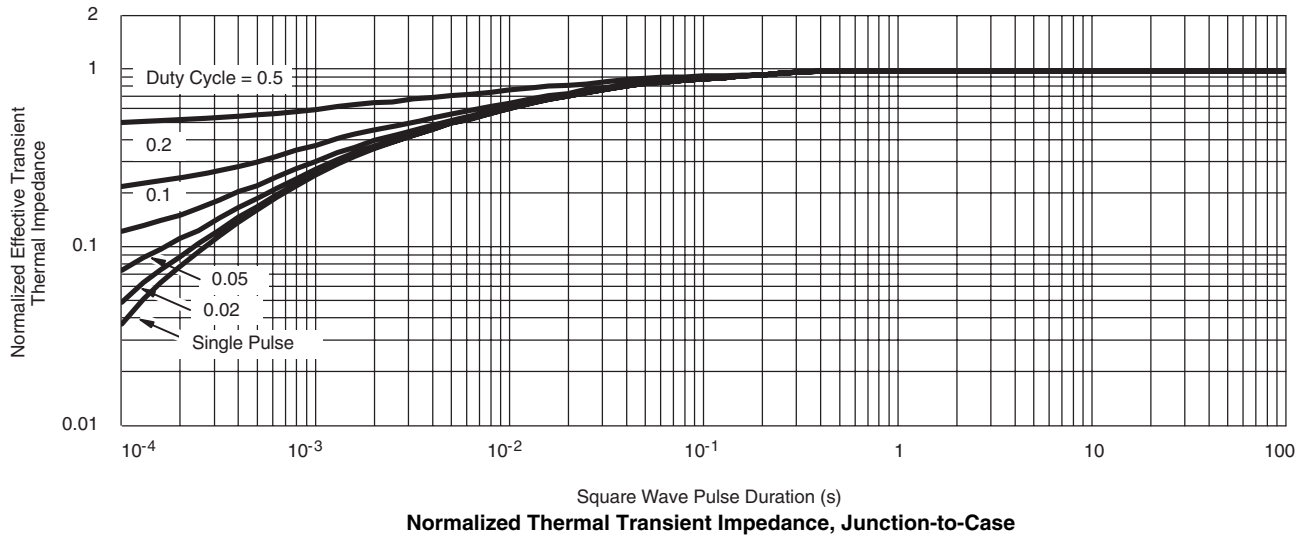
### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



### THERMAL RATINGS



**THERMAL RATINGS**

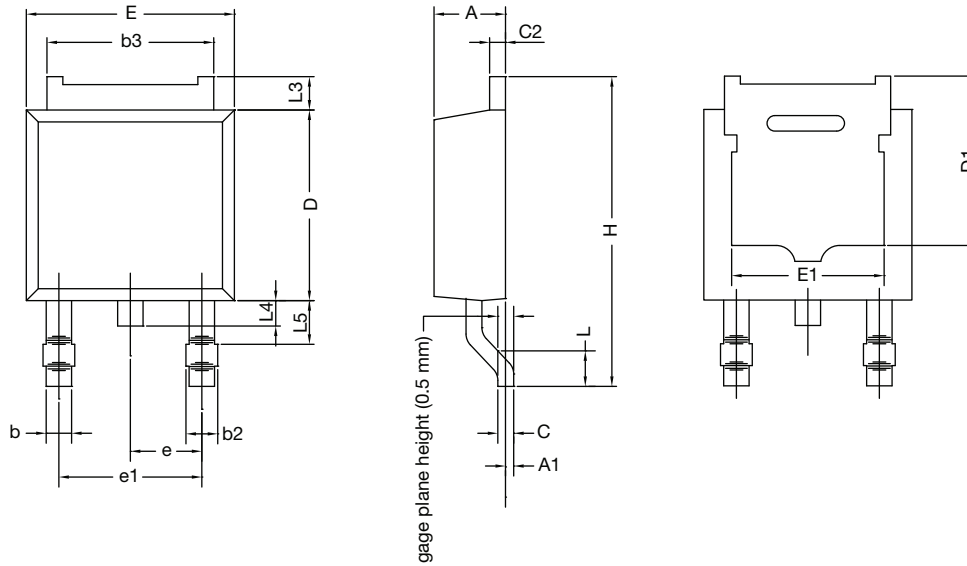


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# TO-252AA Case Outline

## VERSION 1: FACILITY CODE = Y



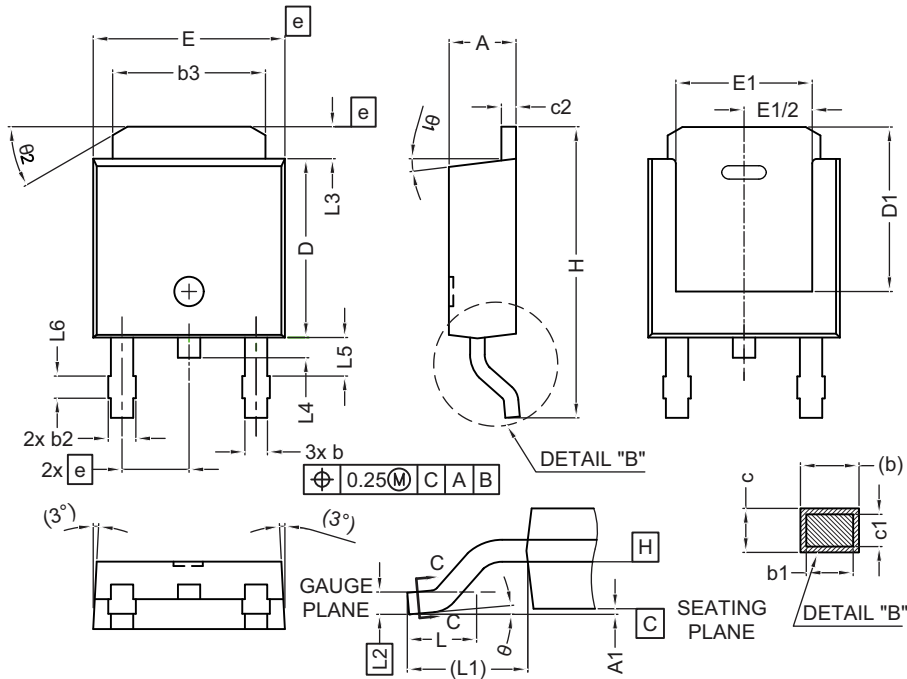
MILLIMETERS		
DIM.	MIN.	MAX.
A	2.18	2.38
A1	-	0.127
b	0.64	0.88
b2	0.76	1.14
b3	4.95	5.46
C	0.46	0.61
C2	0.46	0.89
D	5.97	6.22
D1	4.10	-
E	6.35	6.73
E1	4.32	-
H	9.40	10.41
e	2.28 BSC	
e1	4.56 BSC	
L	1.40	1.78
L3	0.89	1.27
L4	-	1.02
L5	1.01	1.52

### Note

- Dimension L3 is for reference only



VERSION 2: FACILITY CODE = N



MILLIMETERS		
DIM.	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

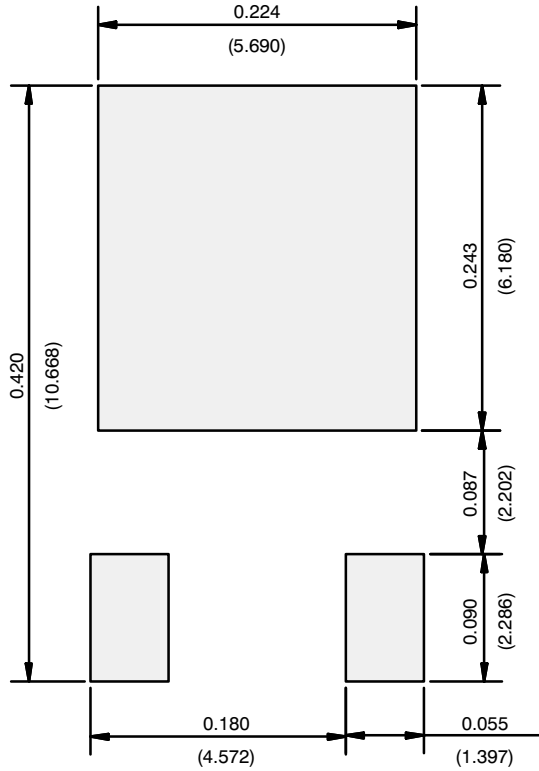
MILLIMETERS		
DIM.	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
θ	0°	10°
θ1	0°	15°
θ2	25°	35°

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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