

P-Channel 60-V (D-S) 175 °C MOSFET

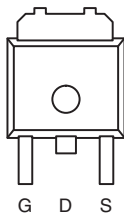
PRODUCT SUMMARY

| V_{DS} (V) | $r_{DS(on)}$ (Ω) | 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[®] Power MOSFET
- 175 °C Junction Temperature

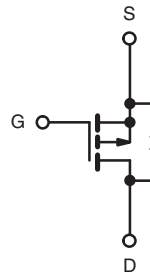

RoHS
COMPLIANT

TO-252


G D S

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} | ± 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 ^a | E_{AS} | 24.2 | mJ |
| Power Dissipation | P_D | $T_C = 25$ °C | 46 ^c |
| | | $T_A = 25$ °C | 2.7 ^{b, c} |
| 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 ^b | 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 ≤ 1 %.

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

c. See SOA curve for voltage derating.

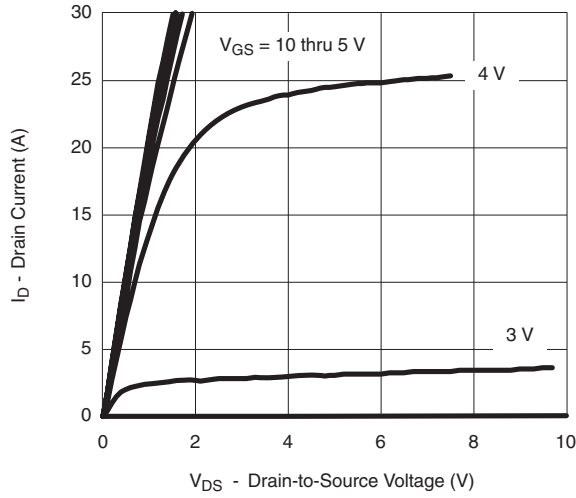
| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|--|---------------|---|------|-------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | - 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} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$ | | | - 1 | μA |
| | | $V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | | | - 50 | |
| | | $V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | | | - 150 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$ | - 30 | | | A |
| Drain-Source On-State Resistance ^a | $r_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -10\text{ A}$ | | 0.048 | 0.060 | Ω |
| | | $V_{GS} = -10\text{ V}, I_D = -16.8\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | | | 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 ^a | g_{fs} | $V_{DS} = -15\text{ V}, I_D = -10\text{ A}$ | | 22 | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$ | | 1140 | 1710 | 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 | 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 | | Ω |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = -30\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong -19\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\text{ }\Omega$ | | 8 | 15 | ns |
| Rise Time ^c | t_r | | | 9 | 15 | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | | 65 | 100 | |
| Fall Time ^c | t_f | | | 30 | 45 | |
| Drain-Source Body Diode Characteristics ($T_C = 25\text{ }^\circ\text{C}$)^b | | | | | | |
| Continuous Current | I_S | | | | - 30 | A |
| Pulsed Current | I_{SM} | | | | - 30 | |
| Forward Voltage ^a | 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:

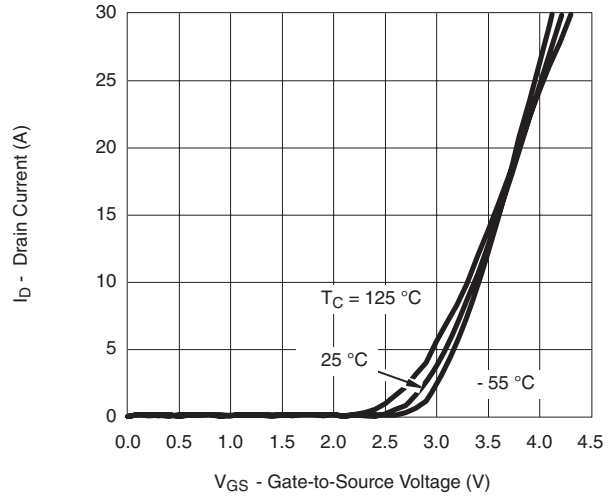
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

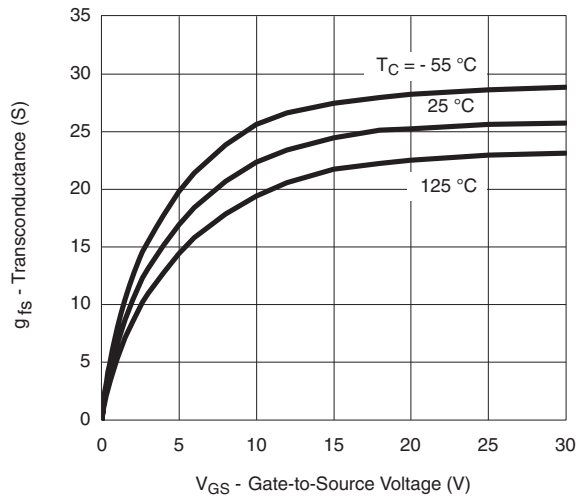
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



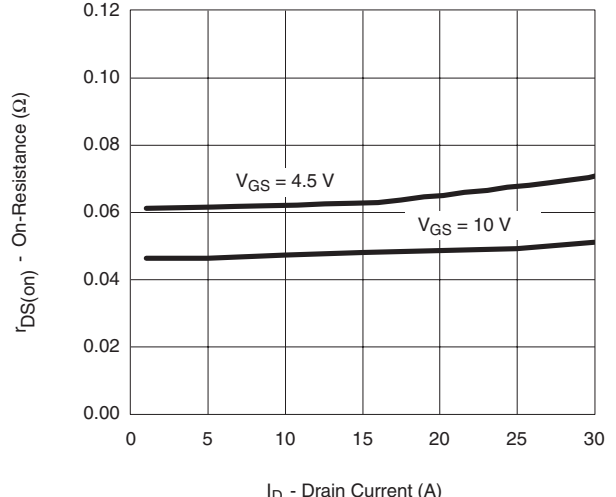
Output Characteristics



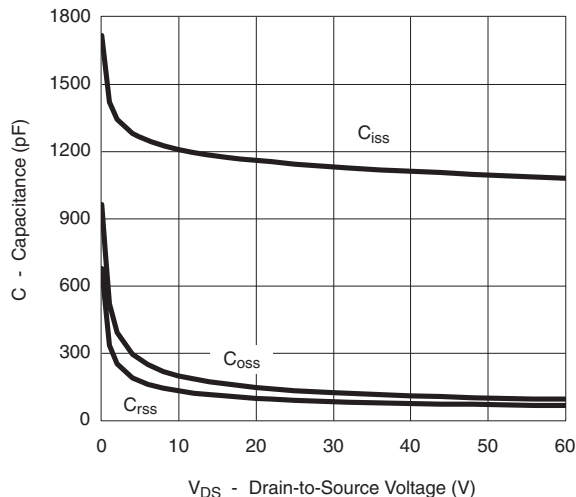
Transfer Characteristics



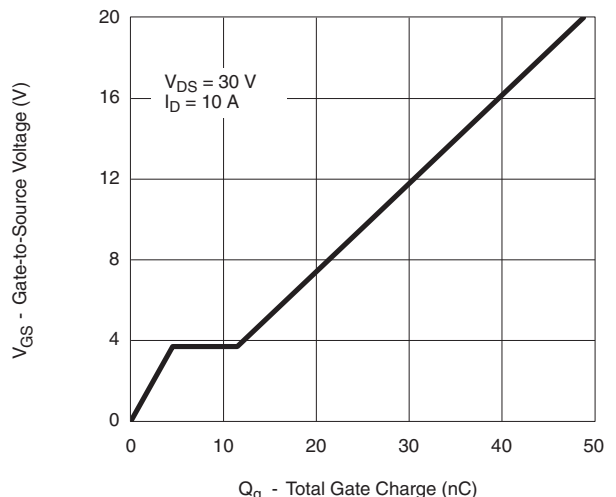
Transconductance



On-Resistance vs. Drain Current

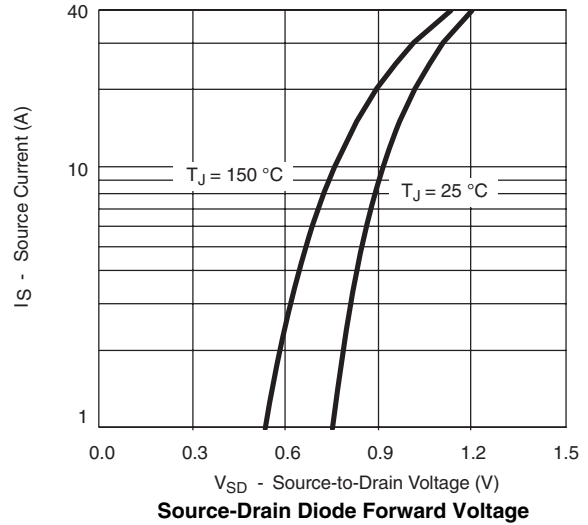
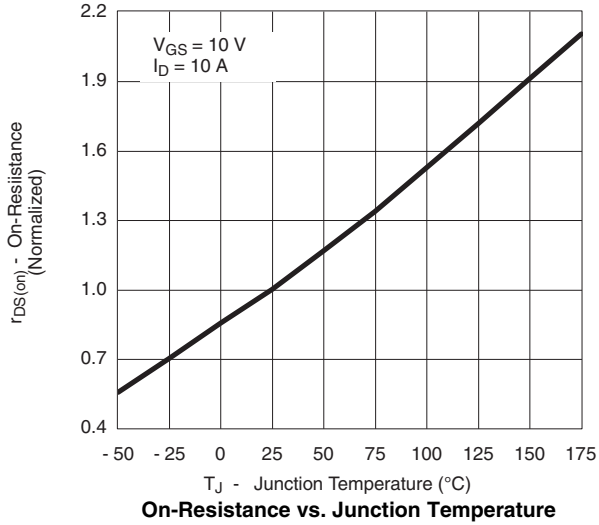


Capacitance

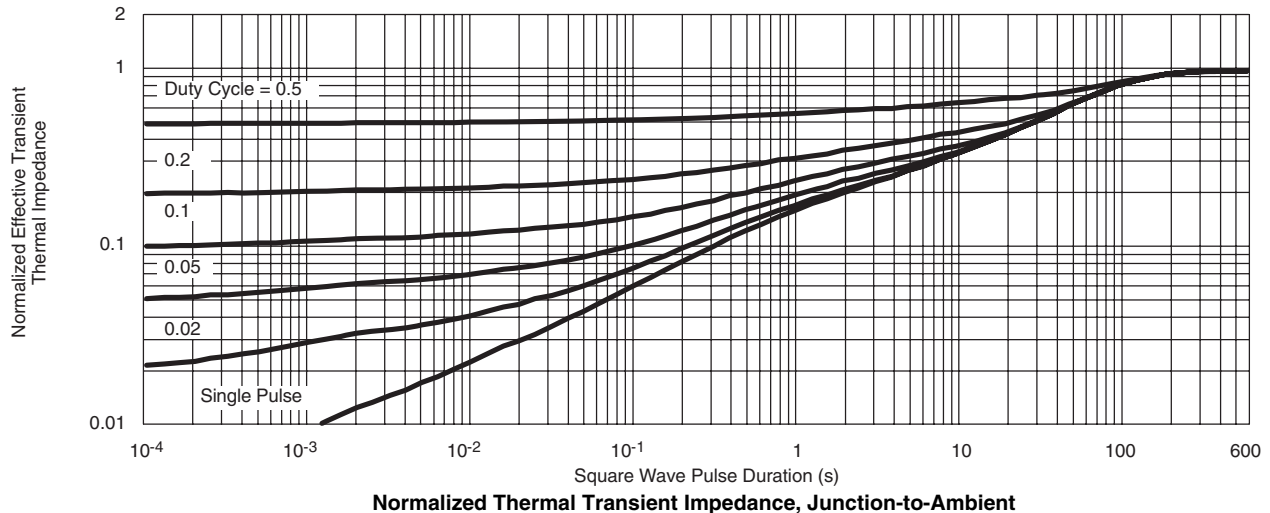
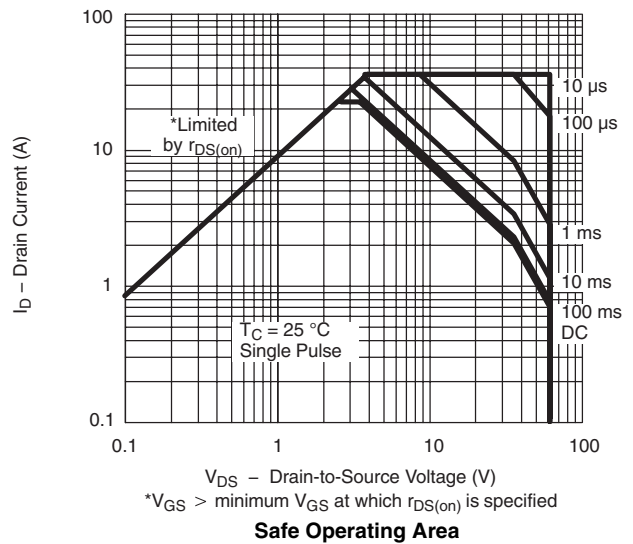
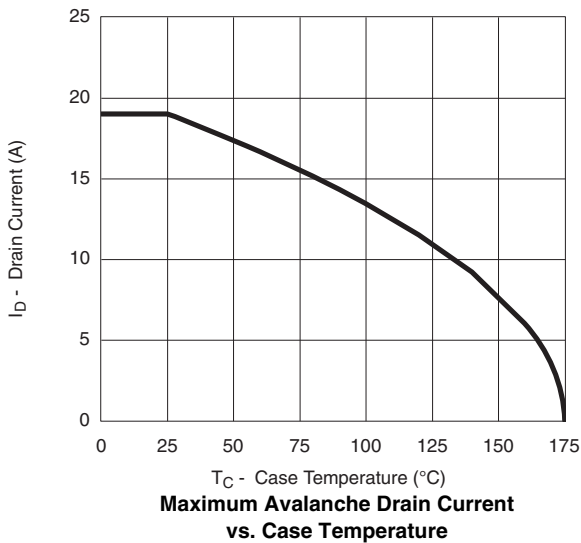


Gate Charge

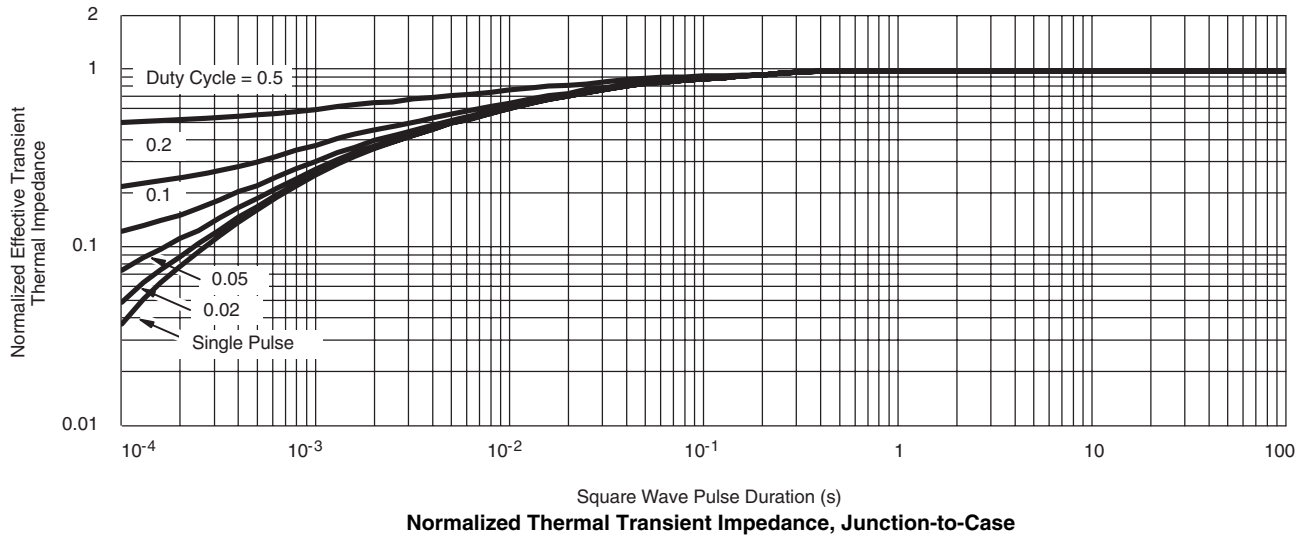
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



THERMAL RATINGS



THERMAL RATINGS

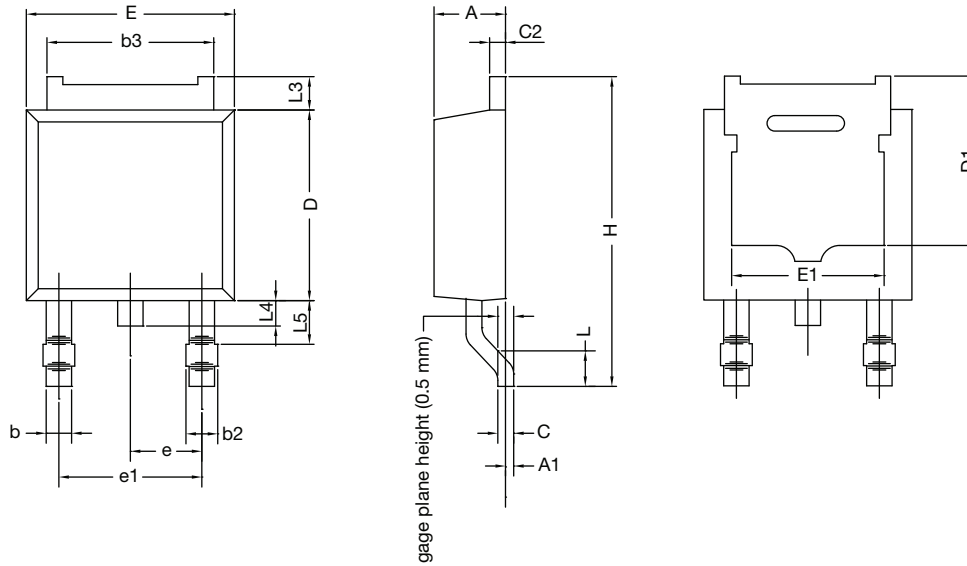


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TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y



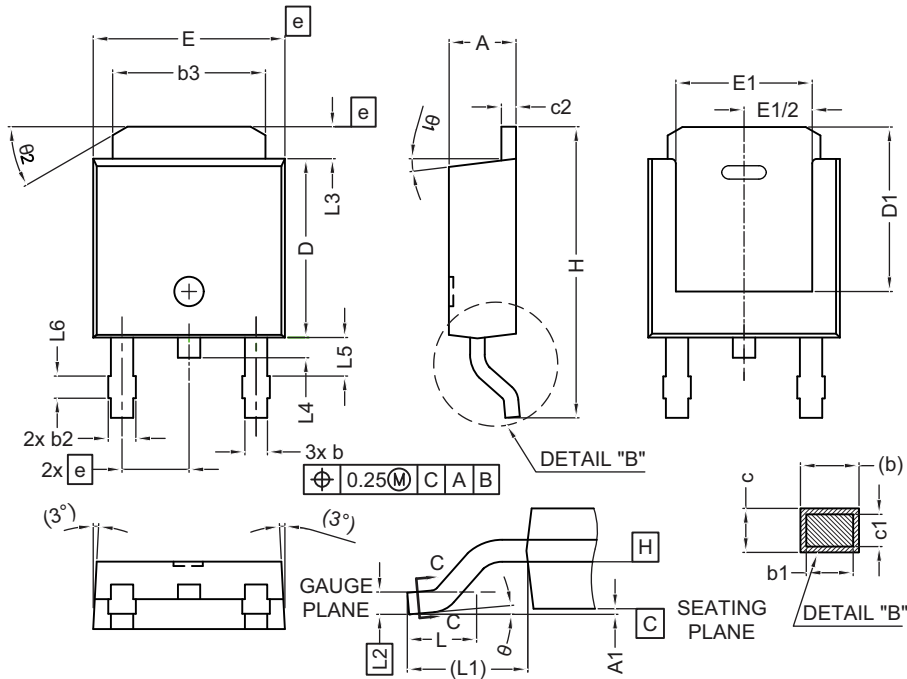
| MILLIMETERS | | |
|-------------|----------|-------|
| DIM. | MIN. | MAX. |
| A | 2.18 | 2.38 |
| A1 | - | 0.127 |
| b | 0.64 | 0.88 |
| b2 | 0.76 | 1.14 |
| b3 | 4.95 | 5.46 |
| C | 0.46 | 0.61 |
| C2 | 0.46 | 0.89 |
| D | 5.97 | 6.22 |
| D1 | 4.10 | - |
| E | 6.35 | 6.73 |
| E1 | 4.32 | - |
| H | 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



| 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 |

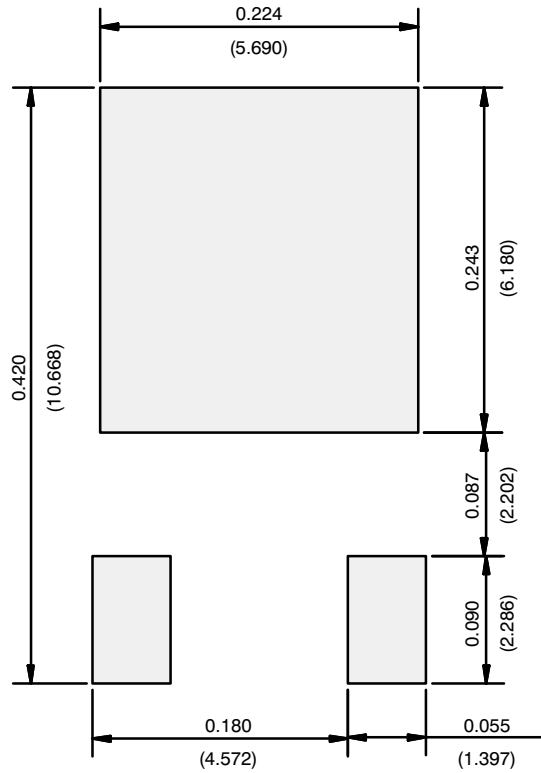
| DIM. | MILLIMETERS | |
|------|-------------|------|
| | MIN. | MAX. |
| L | 1.50 | 1.78 |
| L1 | 2.74 ref. | |
| L2 | 0.51 BSC | |
| L3 | 0.89 | 1.27 |
| L4 | - | 1.02 |
| L5 | 1.14 | 1.49 |
| L6 | 0.65 | 0.85 |
| θ | 0° | 10° |
| θ1 | 0° | 15° |
| θ2 | 25° | 35° |

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)

[Return to Index](#)



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