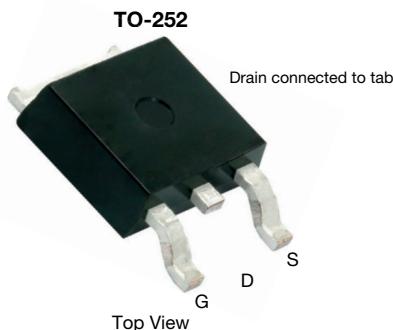


N-Channel 150 V (D-S) 175 °C MOSFET



FEATURES

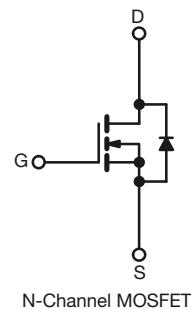
- ThunderFET® power MOSFET
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Boost converter
- LED backlighting
- Synchronous rectification
- Power supplies
- DC/AC inverter



| PRODUCT SUMMARY | |
|---------------------------------------------------|--------|
| V_{DS} (V) | 150 |
| $R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V | 0.0447 |
| Q_g typ. (nC) | 10.5 |
| I_D (A) | 42 d |
| Configuration | Single |

ORDERING INFORMATION

| | |
|---------------------------------|---------------|
| Package | TO-252 |
| Lead (Pb)-free and halogen-free | SUD80460E-GE3 |

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

| PARAMETER | SYMBOL | LIMIT | UNIT |
|--------------------------------------------------|----------------|-------------|------|
| Drain-source voltage | V_{DS} | 150 | V |
| Gate-source voltage | V_{GS} | ± 20 | |
| Continuous drain current | I_D | 42 d | A |
| $T_C = 25$ °C | | 18.1 | |
| Pulsed drain current ($t = 100$ μ s) | I_{DM} | 40 | |
| Continuous source-drain diode current | I_S | 42 d | |
| Single pulse avalanche current a | I_{AS} | 25 | |
| Single pulse avalanche energy a | E_{AS} | 31.25 | mJ |
| Maximum power dissipation | P_D | 65.2 b | W |
| $T_C = 125$ °C | | 21.7 b | |
| Operating junction and storage temperature range | T_J, T_{stg} | -55 to +175 | |
| Soldering recommendations (peak temperature) c | | 260 | °C |

THERMAL RESISTANCE RATINGS

| PARAMETER | SYMBOL | MAXIMUM | UNIT |
|-------------------------------------------|--------------|------------|------|
| Maximum junction-to-ambient (PCB mount) c | R_{thJA} | 50 | °C/W |
| Maximum junction-to-case (drain) | Steady state | R_{thJC} | 2.3 |

Notes

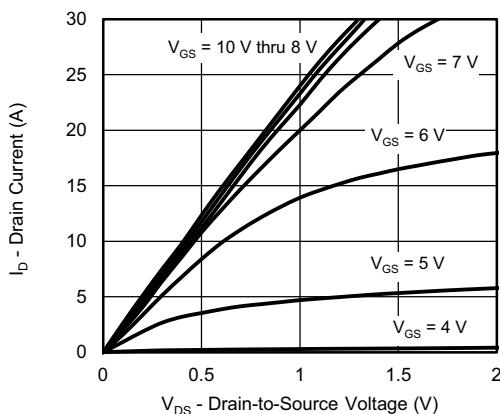
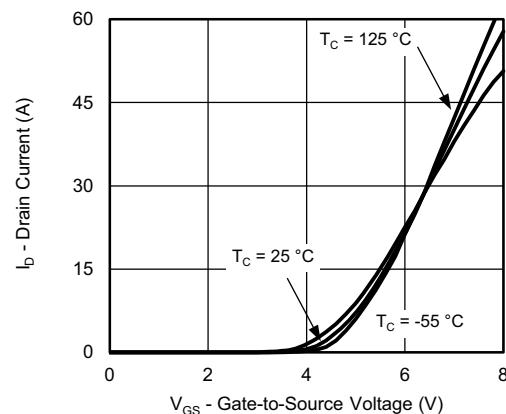
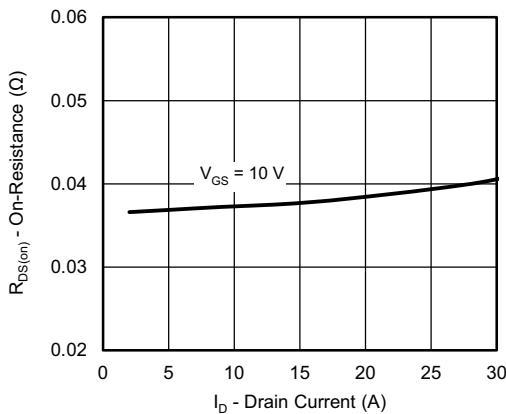
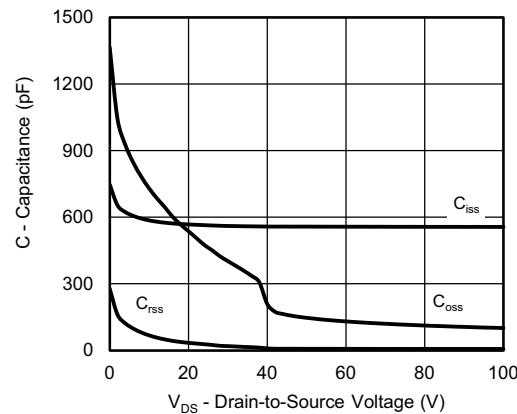
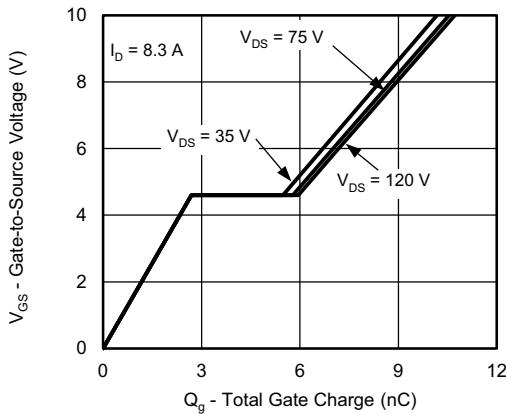
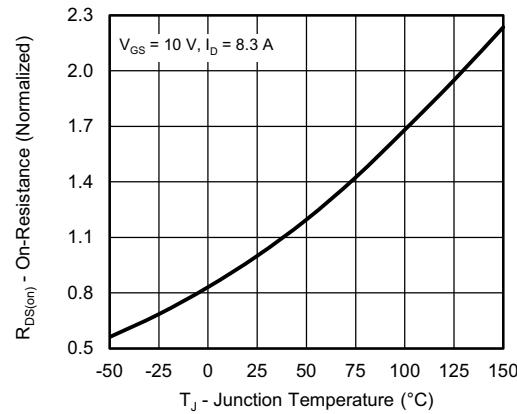
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).
- Package limited.

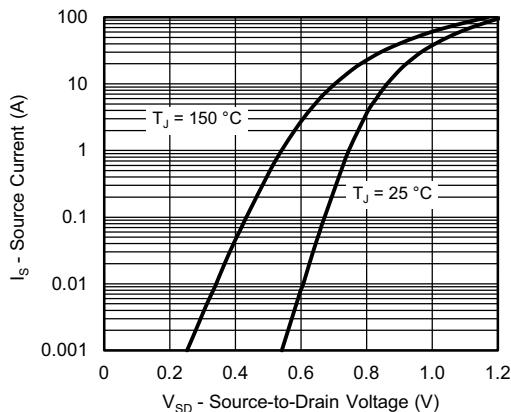
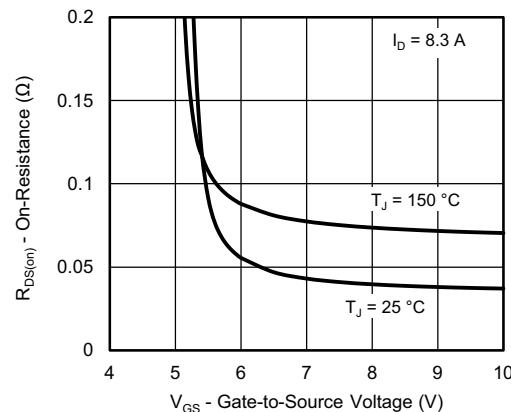
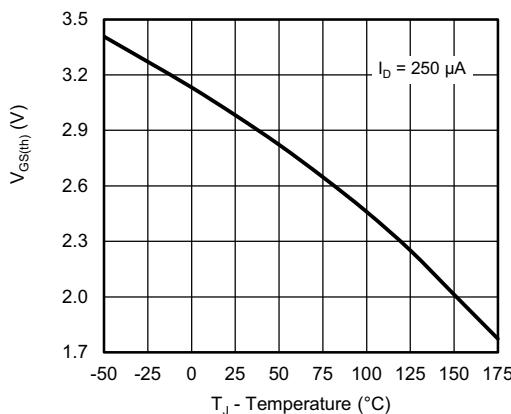
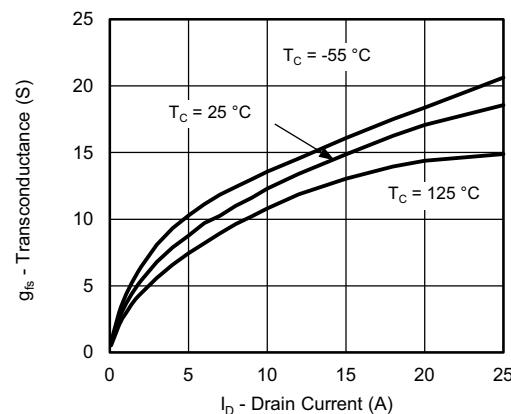
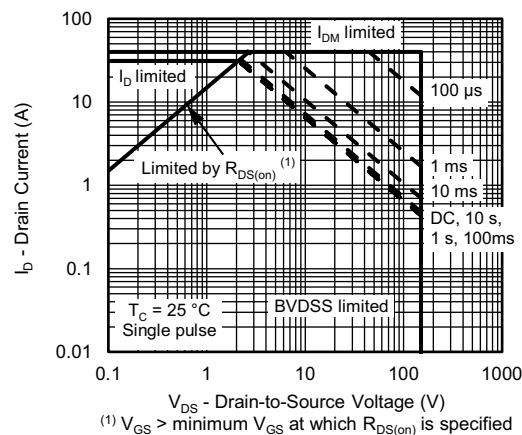
| SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted) | | | | | | |
|----------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------|------|--------|--------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | |
| Drain-source breakdown voltage | V_{DS} | $V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$ | 150 | - | - | V |
| Gate-source threshold voltage | $V_{GS(\text{th})}$ | $V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$ | 2 | - | 4 | V |
| Gate-source leakage | I_{GSS} | $V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$ | - | - | 250 | nA |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 150 \text{ V}$, $V_{GS} = 0 \text{ V}$ | - | - | 1 | μA |
| | | $V_{DS} = 150 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 125^\circ\text{C}$ | - | - | 150 | |
| | | $V_{DS} = 150 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 175^\circ\text{C}$ | - | - | 5 | mA |
| On-state drain current ^a | $I_{D(\text{on})}$ | $V_{DS} \geq 10 \text{ V}$, $V_{GS} = 10 \text{ V}$ | 30 | - | - | A |
| Drain-source on-state resistance ^a | $R_{DS(\text{on})}$ | $V_{GS} = 10 \text{ V}$, $I_D = 8.3 \text{ A}$ | - | 0.0372 | 0.0447 | Ω |
| Forward transconductance ^a | g_{fs} | $V_{DS} = 15 \text{ V}$, $I_D = 8.3 \text{ A}$ | - | 11 | - | S |
| Dynamic ^b | | | | | | |
| Input capacitance | C_{iss} | $V_{DS} = 50 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ | - | 560 | - | pF |
| Output capacitance | C_{oss} | | - | 148 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 8 | - | |
| Total gate charge | Q_g | $V_{DS} = 75 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 8.3 \text{ A}$ | - | 10.5 | 16 | nC |
| Gate-source charge | Q_{gs} | | - | 2.7 | - | |
| Gate-drain charge | Q_{gd} | | - | 3.1 | - | |
| Gate resistance | R_g | $f = 1 \text{ MHz}$ | 1.44 | 7.2 | 14.4 | Ω |
| Turn-on delay time | $t_{d(\text{on})}$ | $V_{DD} = 75 \text{ V}$, $R_L = 10.7 \Omega$, $I_D \geq 7 \text{ A}$, $V_{GEN} = 10 \text{ V}$, $R_g = 1 \Omega$ | - | 8 | 16 | ns |
| Rise time | t_r | | - | 20 | 30 | |
| Turn-off delay time | $t_{d(\text{off})}$ | | - | 15 | 25 | |
| Fall time | t_f | | - | 30 | 50 | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Pulse diode forward current ($t = 100 \mu\text{s}$) | I_{SM} | $I_F = 7 \text{ A}$, $V_{GS} = 0 \text{ V}$ | - | - | 42 | A |
| Body diode voltage | V_{SD} | | - | 0.85 | 1.5 | V |
| Body diode reverse recovery time | t_{rr} | | - | 68 | 102 | ns |
| Body diode reverse recovery charge | Q_{rr} | | - | 0.21 | 0.32 | μC |
| Reverse recovery fall time | t_a | | - | 56 | - | ns |
| Reverse recovery rise time | t_b | | - | 12 | - | |
| Body diode peak reverse recovery charge | $I_{RM(\text{REC})}$ | | - | 5.5 | 10 | A |

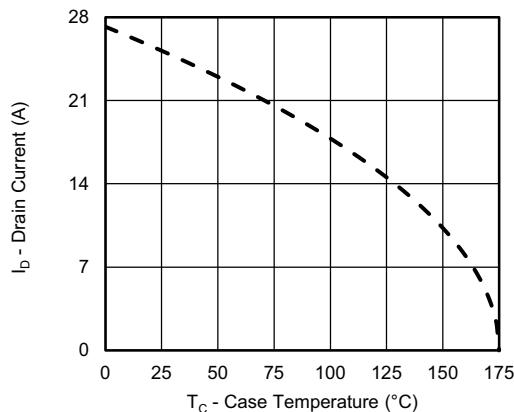
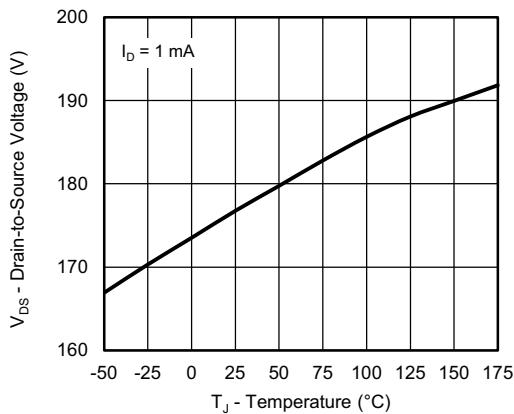
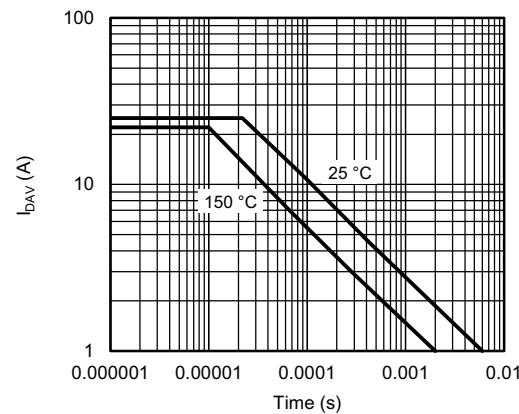
Notes

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

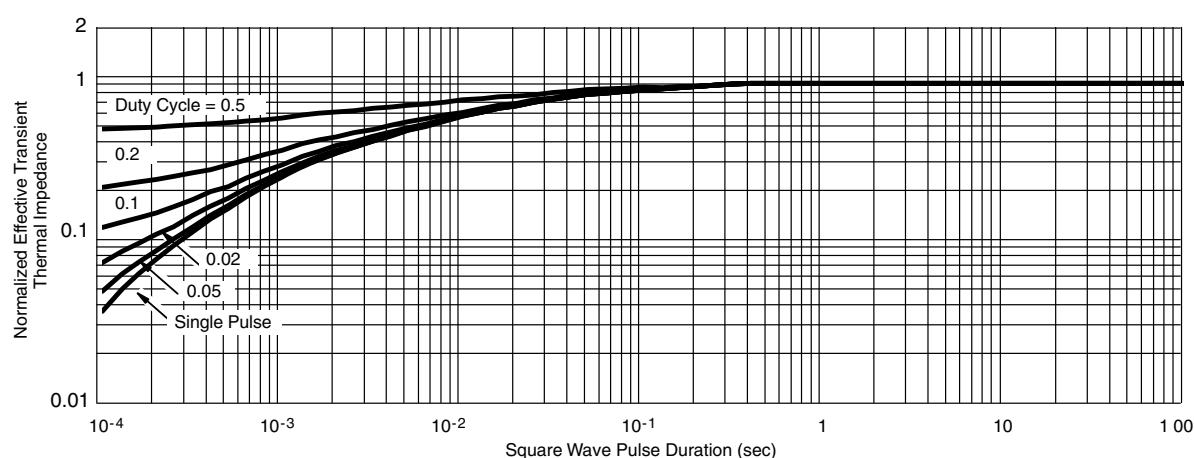
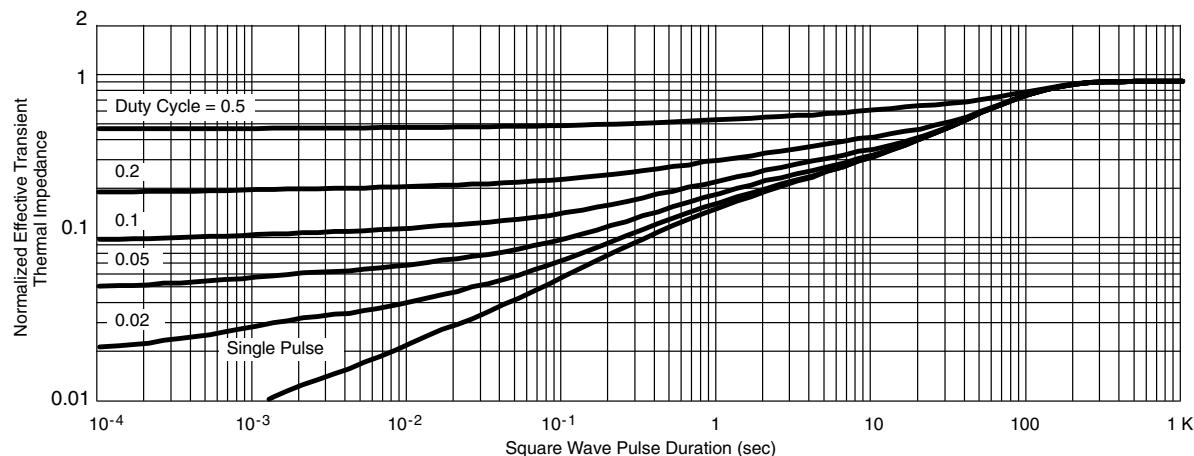
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current and Gate Voltage

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Transconductance

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating ^a

Drain Source Breakdown vs. Junction Temperature

I_{DAV} vs. Time
Note

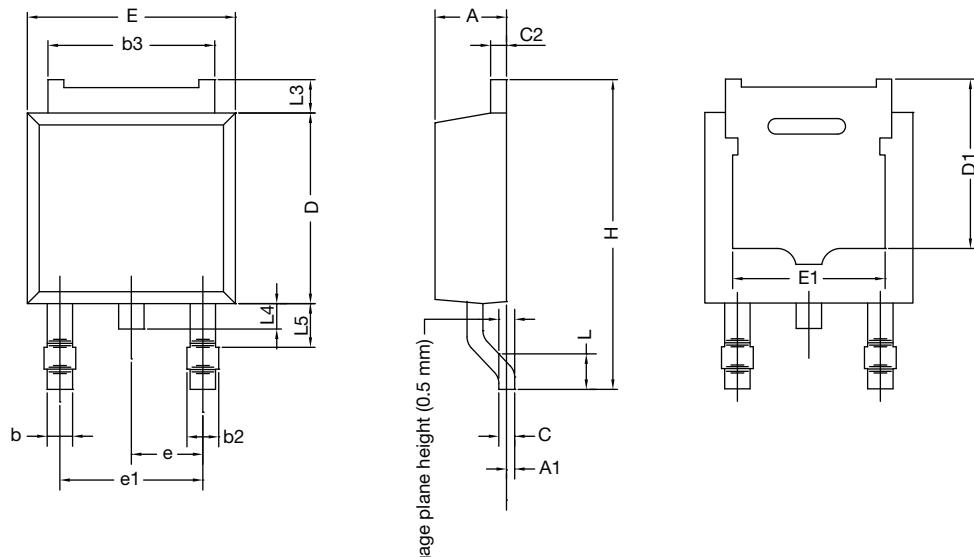
a. The power dissipation P_D is based on T_J max. = 25 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?76248.

TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y

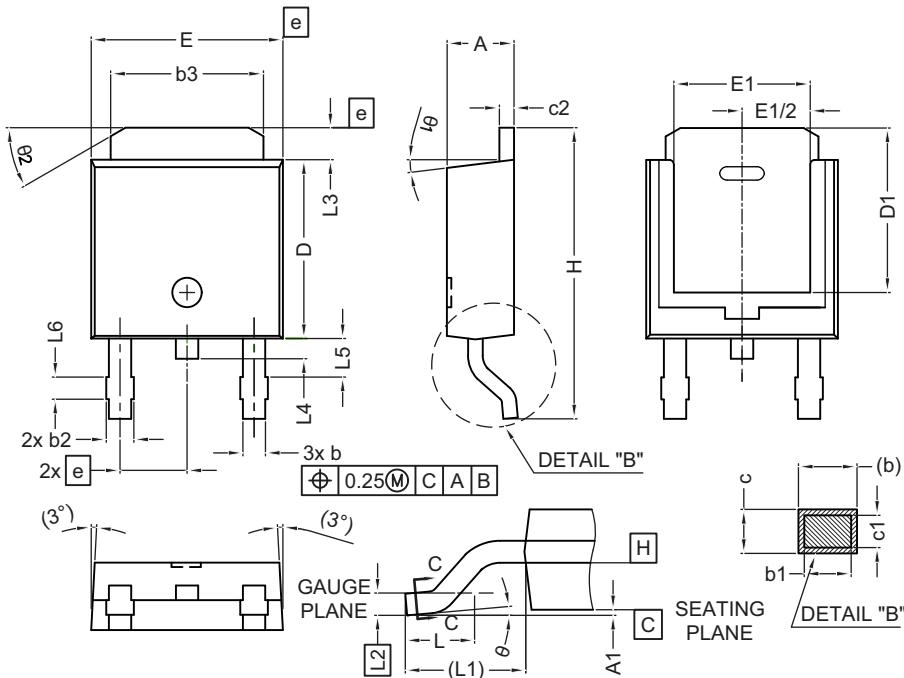


| MILLIMETERS | | |
|--------------------|-------------|-------------|
| DIM. | MIN. | MAX. |
| A | 2.18 | 2.38 |
| A1 | - | 0.127 |
| b | 0.64 | 0.88 |
| b2 | 0.76 | 1.14 |
| b3 | 4.95 | 5.46 |
| C | 0.46 | 0.61 |
| C2 | 0.46 | 0.89 |
| D | 5.97 | 6.22 |
| D1 | 4.10 | - |
| E | 6.35 | 6.73 |
| E1 |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

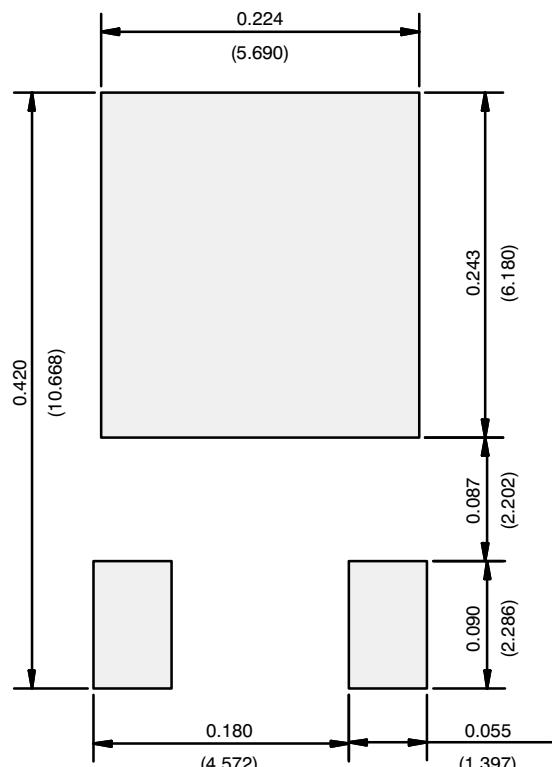
| MILLIMETERS | | |
|---------------------|-------------|-------------|
| DIM. | MIN. | MAX. |
| L | 1.50 | 1.78 |
| L1 | 2.74 ref. | |
| L2 | 0.51 BSC | |
| L3 | 0.89 | 1.27 |
| L4 | - | 1.02 |
| L5 | 1.14 | 1.49 |
| L6 | 0.65 | 0.85 |
| θ | 0° | 10° |
| 01 | 0° | 15° |
| 02 | 25° | 35° |

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: E19-0649-Rev. Q, 16-Dec-2019
DWG: 5347

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



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APPLICATION NOTE

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