

N-CHANNEL POWER MOSFET MEM4N60

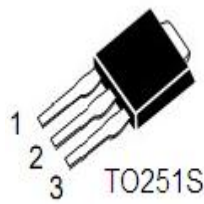
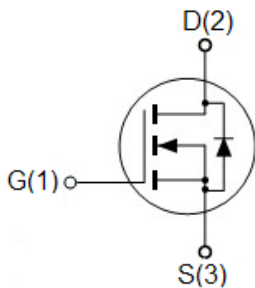
General Description

- Switching regulator application.
- High voltage and high speed.
- Switching application.

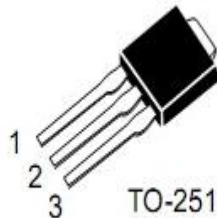
Features

- 600V, 4A
- $R_{DS(ON)}=2.3\Omega@V_{GS}=10V$
- LOW CRSS
- FAST SWITCHING
- PACKAGE :TO251,TO251S,TO252,TO-220F

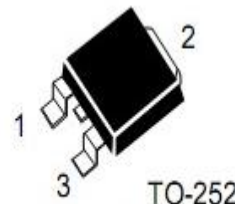
Pin Configuration



MEM4N60THDG



MEM4N60THG



MEM4N60K3G



MEM4N60A3G

Maximum Ratings ($T_A=25^\circ\text{C}$)

| Parameter | | Symbol | Ratings | | Unit |
|-------------------------------------|-------------------------|-----------|----------|----|------------------|
| Drain-Source Voltage | | V_{DSS} | 600V | | V |
| Gate-Source Voltage | | V_{GSS} | ± 30 | | V |
| Drain Current | $T_A=25^\circ\text{C}$ | I_D | 4 | | A |
| | $T_A=100^\circ\text{C}$ | | 2.4 | | |
| Pulsed Drain Current ^{1,2} | | I_{DM} | 16 | | A |
| Total Power Dissipation | $T_A=25^\circ\text{C}$ | P_d | TO-251 | 41 | W |
| | | | TO-220F | 33 | |
| | | | TO-252 | 57 | |
| Operating Temperature Range | | T_{Opr} | -55-150 | | $^\circ\text{C}$ |
| Storage Temperature Range | | T_{stg} | -55-150 | | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Package | TYP | Unit |
|--------------------------------------|---------------|---------|-----|------|
| Thermal Resistance, Junction-to-Case | R θ JC | TO-220F | 3.8 | °C/W |
| | | TO-252 | 2.2 | |

Electrical Characteristics

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|----------------------|---|-----|------|------|------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} =0V, I _D =250uA | 600 | 650 | - | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250uA | 2.0 | 2.8 | 4.0 | V |
| Gate-Body Leakage | I _{GSS} | V _{DS} =0V, V _{GS} =30V | - | 1.1 | 100 | nA |
| | | V _{DS} =0V, V _{GS} =-30V | - | 0.1 | -100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =600V V _{GS} =0V | - | 0.1 | 20 | uA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =2A | - | 1.85 | 2.3 | Ω |
| Forward Transconductance | g _{FS} | V _{DS} =15V, I _D =2A | - | 3.2 | 10 | S |
| Drain-Source Diode Forward Continuous Current | I _S | V _{GS} =0V | - | - | 4 | A |
| Source-drain (diode forward) voltage | V _{SD} | V _{GS} =0V, I _S =2A | | 0.85 | 1.4 | V |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz | - | 676 | - | pF |
| Output Capacitance | C _{oss} | | - | 92.1 | - | |
| Reverse Transfer Capacitance | C _{rss} | | - | 19.7 | - | |
| Switching Characteristics | | | | | | |
| Turn-On Delay Time | td(on) | V _{DD} = 300 V, R _G = 10Ω V _{GS} = 10V, I _D = 4A | - | 21.8 | - | ns |
| Rise Time | tr | | - | 13.2 | - | |
| Turn-Off Delay Time | td(off) | | - | 46.8 | - | |
| Fall-Time | tf | | - | 12.6 | - | |
| Total Gate Charge | Q _g | V _{DS} = 300V, V _{GS} = 10V, I _D = 4A | | 15.6 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 3.16 | - | |
| Gate-Drain Charge | Q _{gd} | | - | 6.76 | - | |

- 1、Repetitive rating, pulse width limited by junction temperature.
- 2、Pulse width <300us , duty cycle <2%.
- 3、I_{SD}=4.0A di/dt≤100A/us, V_{DD}≤BV_{DSS}, T_J≤150°C.
- 4、L=10mH, V_{DD}=50V, I_D=4.0A, R_G=25Ω, Starting T_J=25°C.

Typical performance characteristics

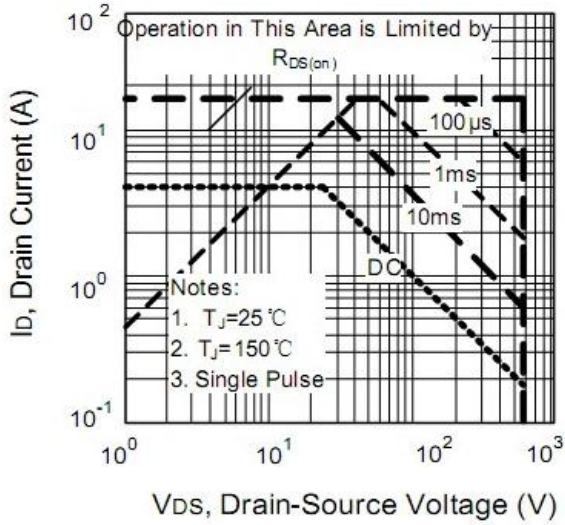


Figure 1 Maximum Safe Operating Area

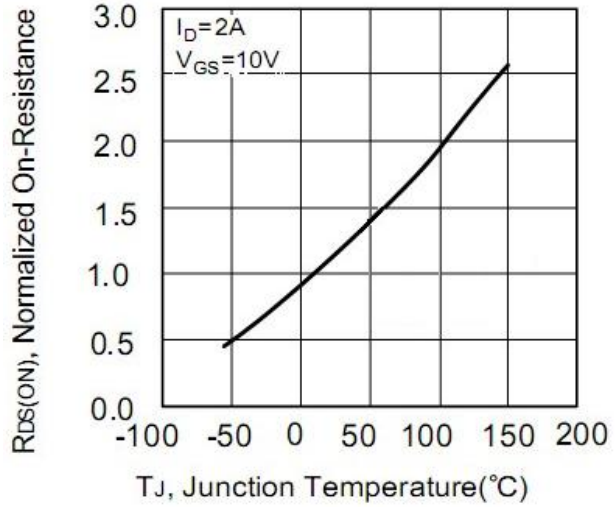


Figure 2. Normalized On-Resistance Variation with Temperature

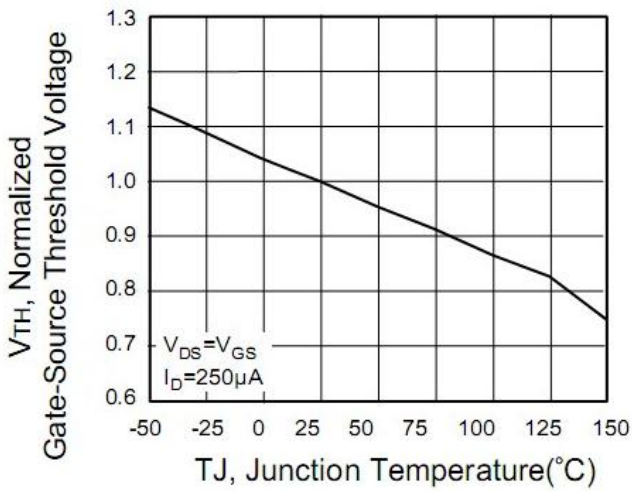


Figure 3. Gate Threshold Variation with Temperature

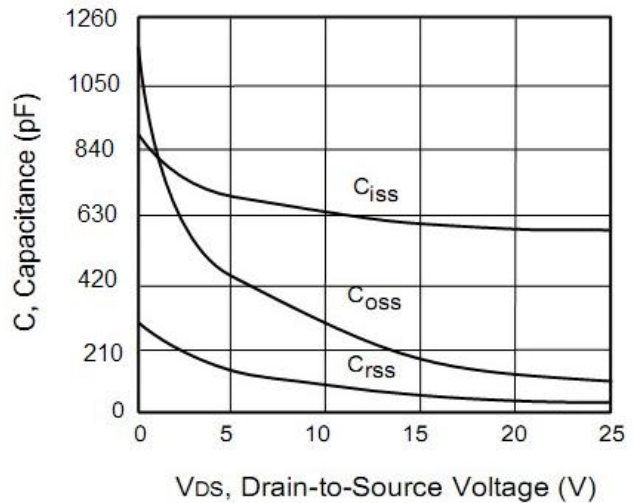


Figure 4. Capacitance Characteristics

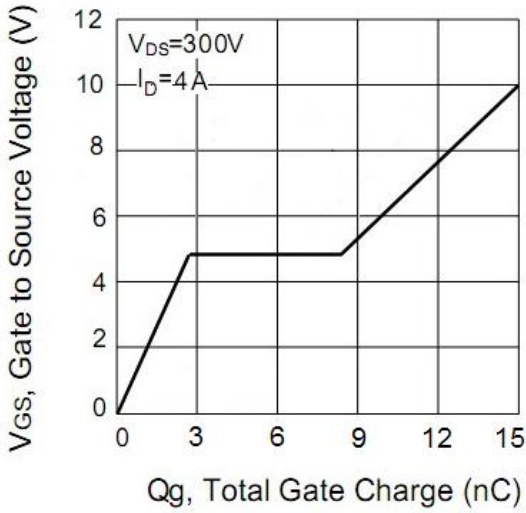


Figure 5. Gate Charge Characteristics

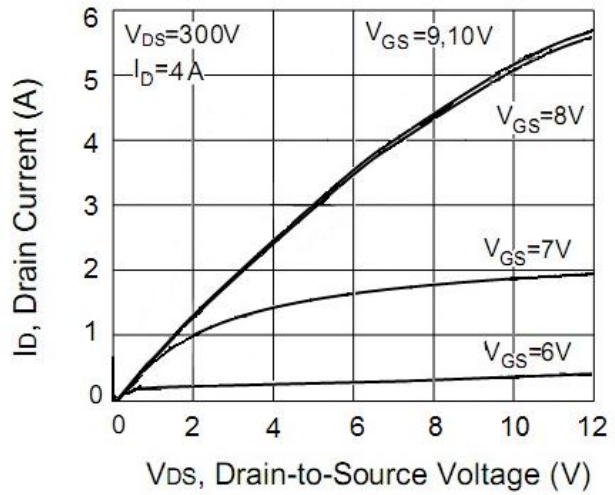


Figure 6. On-State Characteristics

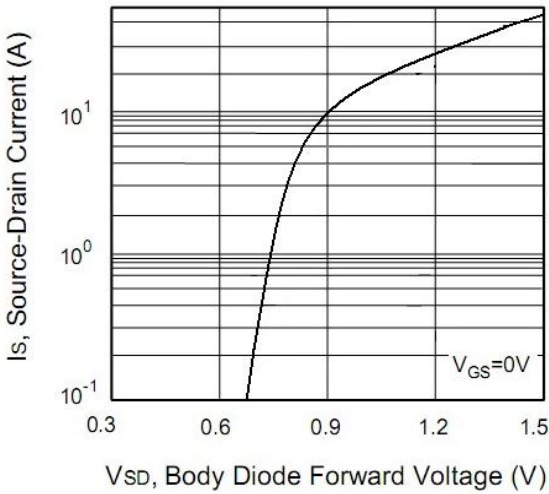


Figure 7. Body Diode Forward Voltage Variation with Source Current

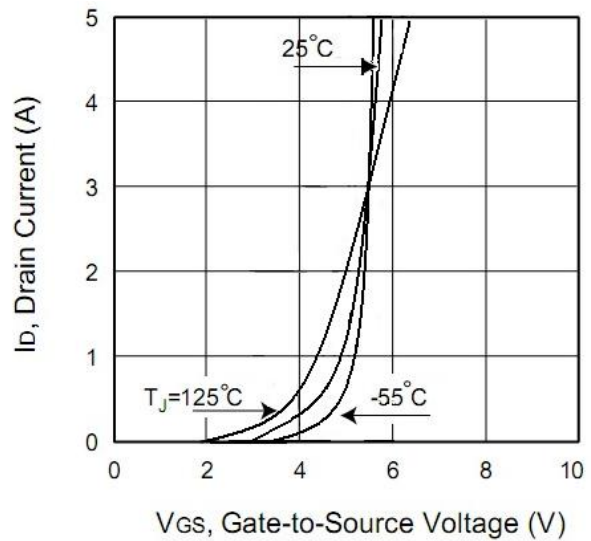


Figure 8. Transfer Characteristics

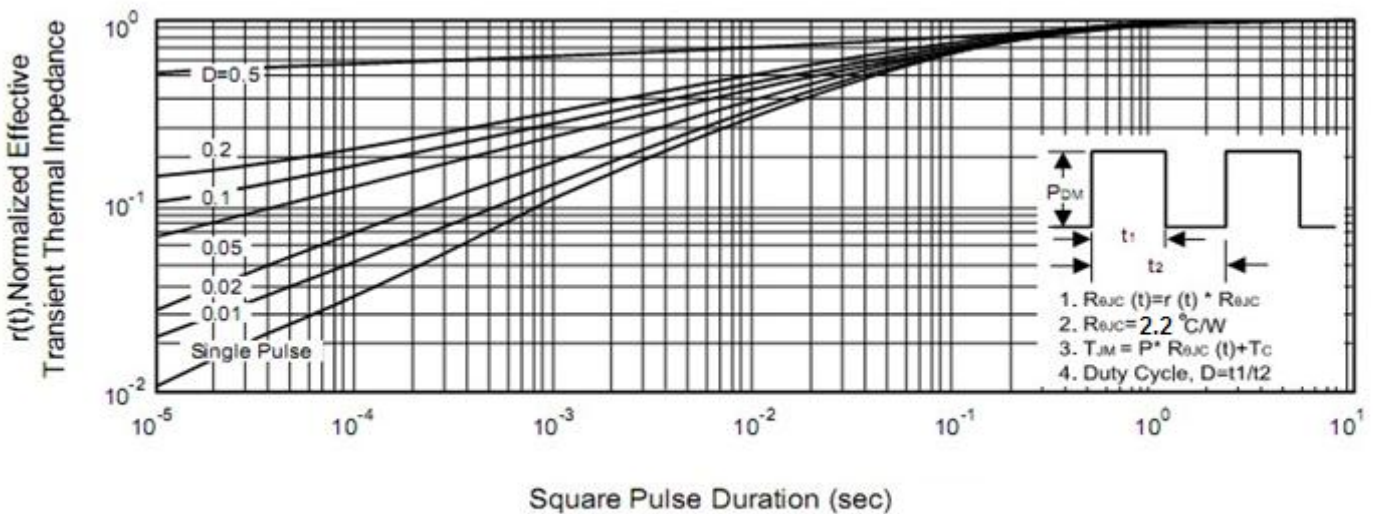
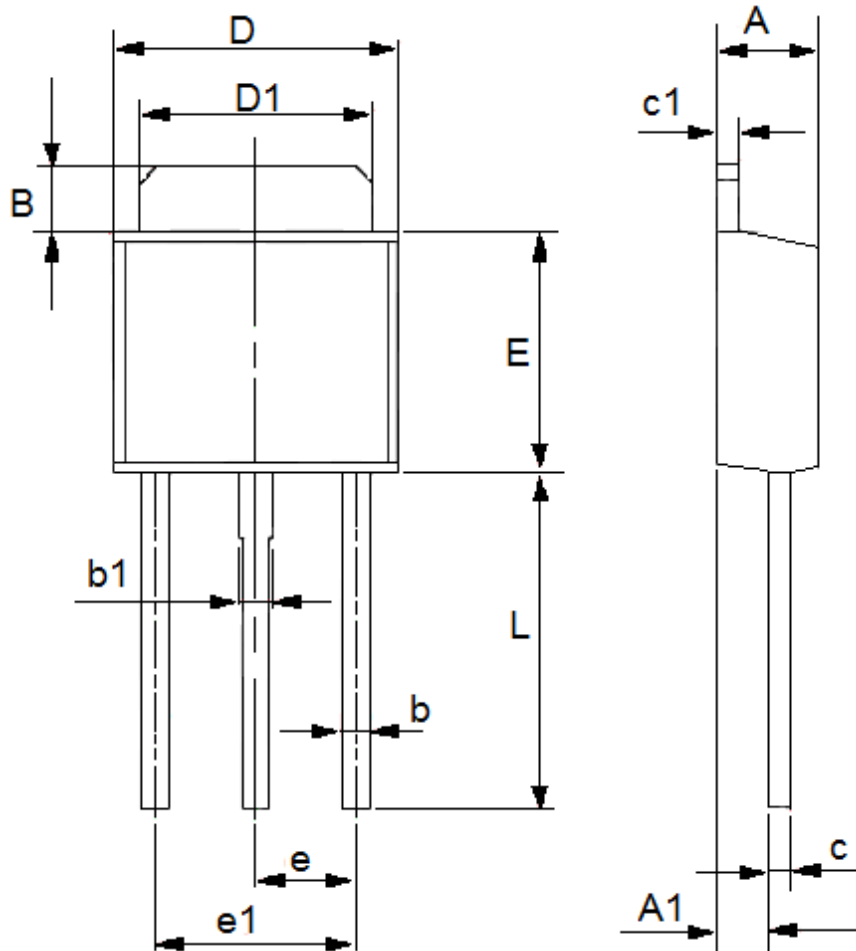


Figure 9 Normalized Effective Transient Thermal Impedance With Pulse Duration

Package Information

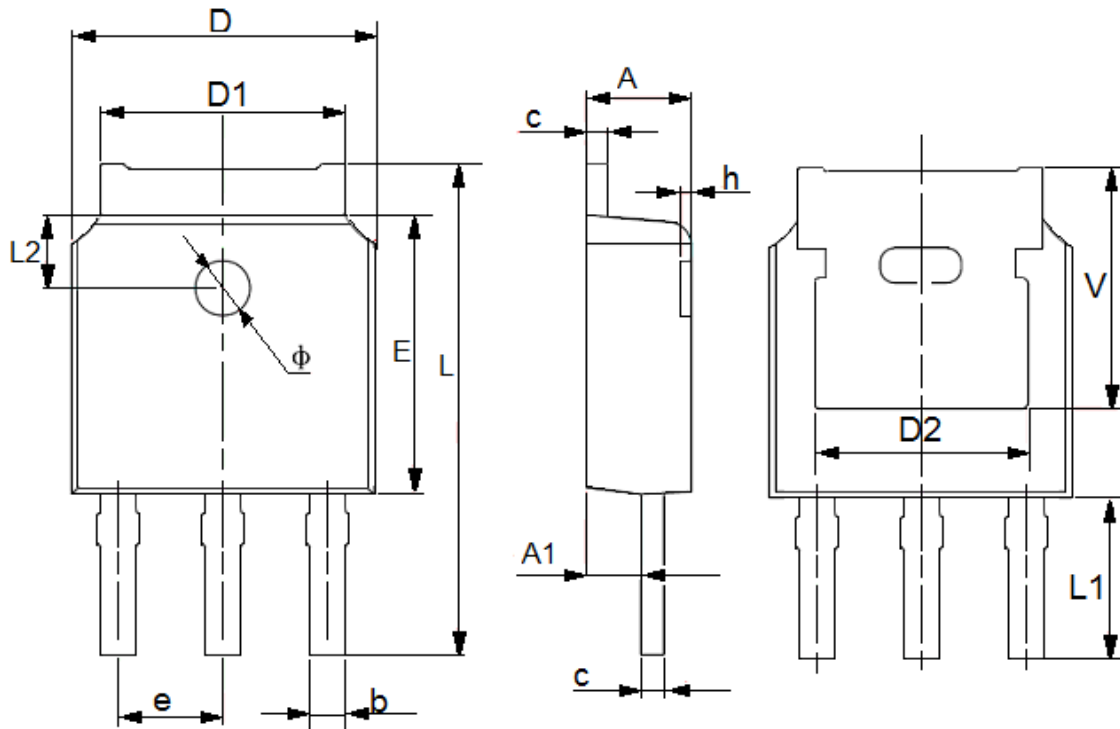
NOTE: (A)、(B)、(C) ...on behalf of the different shapes of the size, the difference is not large, the company random delivery. These sizes are in line with our product requirements, please rest assured that the use of.

- Package Type:TO-251 (A)



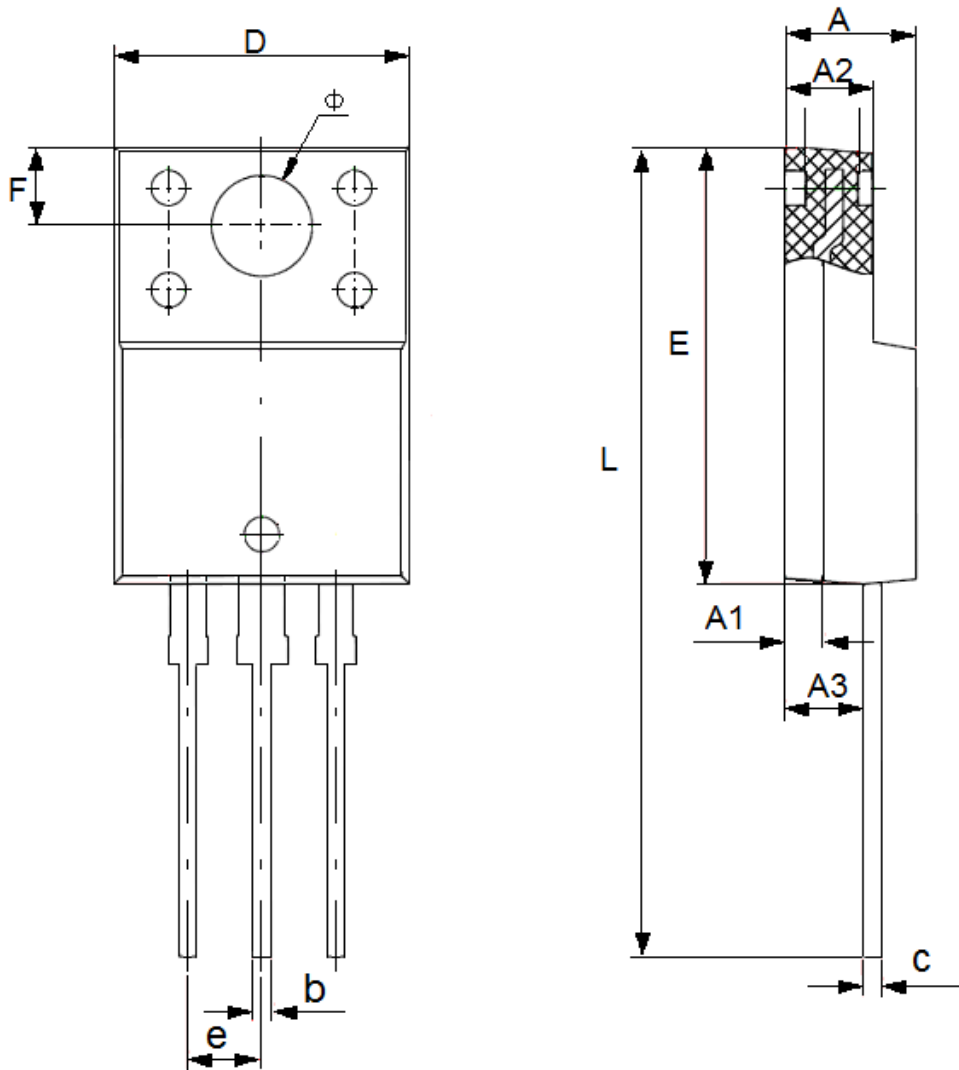
| DIM | Millimeters | | Inches | |
|-----|-------------|------|-------------|--------|
| | Min | Max | Min | Max |
| A | 2.2 | 2.5 | 0.0866 | 0.0984 |
| A1 | 1.05 | 1.35 | 0.0413 | 0.0531 |
| B | 1.3 | 1.65 | 0.0512 | 0.065 |
| b | 0.5 | 0.75 | 0.0197 | 0.0295 |
| b1 | 0.7 | 0.95 | 0.0276 | 0.0374 |
| D | 6.3 | 6.7 | 0.2480 | 0.2638 |
| D1 | 5.2 | 5.4 | 0.2047 | 0.2126 |
| E | 5.3 | 5.8 | 0.2087 | 0.2283 |
| e | 2.3(TYP) | | 0.0906(TYP) | |
| e1 | 4.6(TYP) | | 0.1811(TYP) | |
| L | 7.5 | 8.25 | 0.2953 | 0.3248 |
| c | 0.5(TYP) | | 0.0197(TYP) | |
| c1 | 0.5(TYP) | | 0.0197(TYP) | |

● Package Type: TO-251 (S)



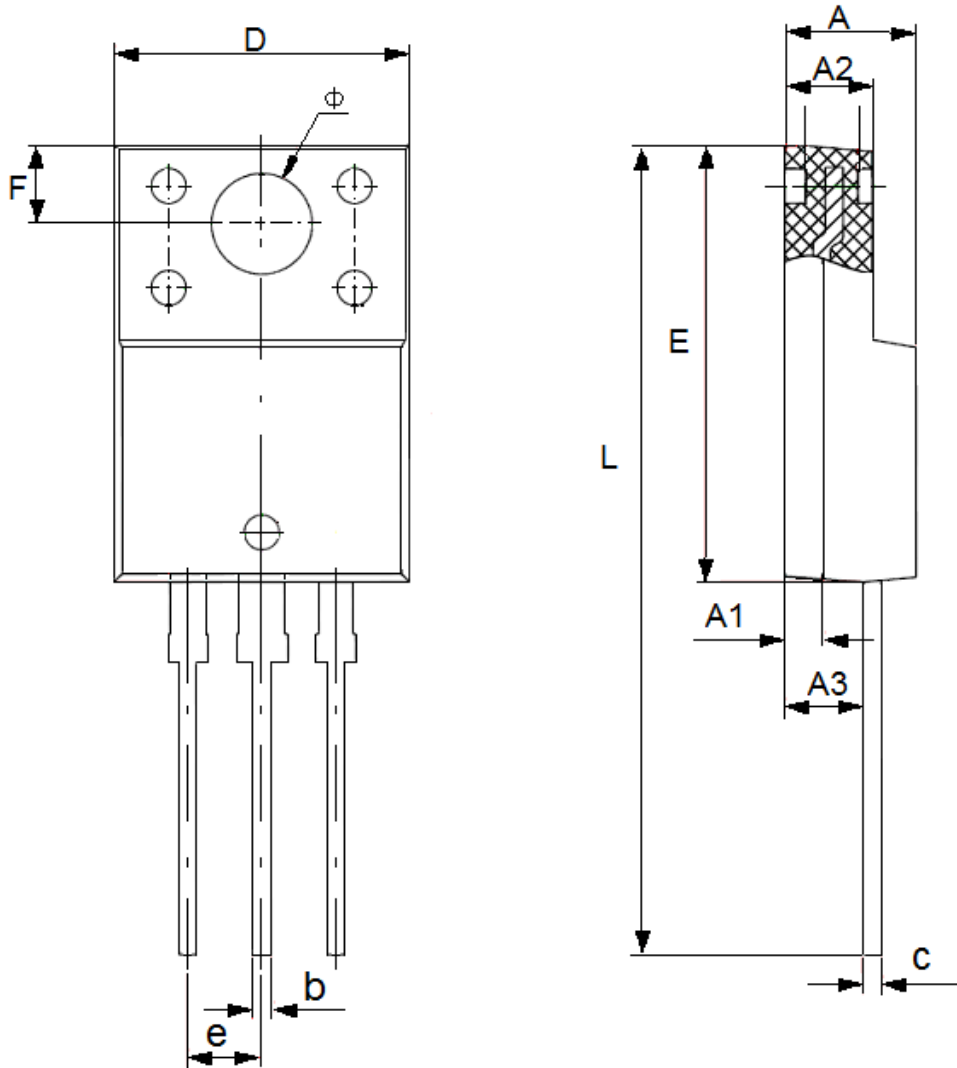
| DIM | Millimeters | | Inches | |
|-----|-------------|-------|-------------|--------|
| | Min | Max | Min | Max |
| A | 2.2 | 2.4 | 0.0866 | 0.0945 |
| A1 | 0.86 | 1.16 | 0.0339 | 0.0457 |
| b | 0.66 | 0.86 | 0.026 | 0.0339 |
| c | 0.46 | 0.58 | 0.0181 | 0.0228 |
| D | 6.5 | 6.7 | 0.256 | 0.2638 |
| D1 | 5.1 | 5.46 | 0.2008 | 0.215 |
| D2 | 4.83(TYP) | | 0.1902(TYP) | |
| E | 6 | 6.2 | 0.2362 | 0.2441 |
| e | 2.186 | 2.386 | 0.0861 | 0.0939 |
| L | 10.4 | 11 | 0.4094 | 0.4331 |
| L1 | 3.3 | 3.7 | 0.1299 | 0.1457 |
| L2 | 1.6(TYP) | | 0.063(TYP) | |
| h | 0 | 0.3 | 0 | |
| Φ | 1.1 | 1.3 | 0.0433 | 0.0118 |
| V | 5.35(TYP) | | 0.2106(TYP) | |

- Package Type: TO-220F (A)



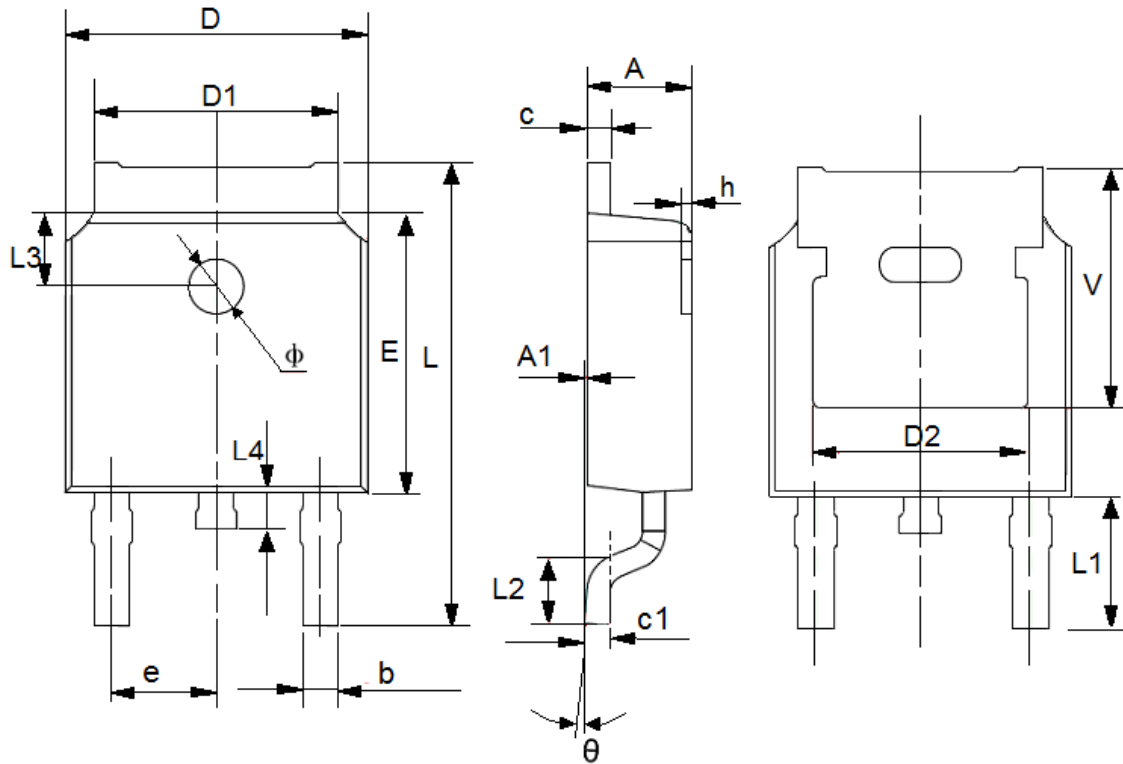
| DIM | Millimeters | | Inches | |
|-----|-------------|-------|----------|--------|
| | Min | Max | Min | Max |
| A | 4.5 | 4.9 | 0.1771 | 0.1929 |
| A1 | 0.75 | 1.05 | 0.0295 | 0.0413 |
| A2 | 2.35 | 2.75 | 0.0925 | 0.1083 |
| A3 | 2.65 | 2.85 | 0.1043 | 0.1122 |
| b | 0.75 | 0.85 | 0.0295 | 0.0334 |
| c | 0.45 | 0.6 | 0.0177 | 0.0236 |
| D | 10 | 10.32 | 0.3937 | 0.4063 |
| E | 15.65 | 16.05 | 0.6161 | 0.6319 |
| e | 2.54REF | | 0.100REF | |
| F | 3.2 | 3.4 | 0.1260 | 0.1338 |
| Φ | 3.08 | 3.28 | 0.1212 | 0.1291 |
| L | 28.45 | 29.25 | 1.1201 | 1.1516 |

● Package Type: TO-220F (B)



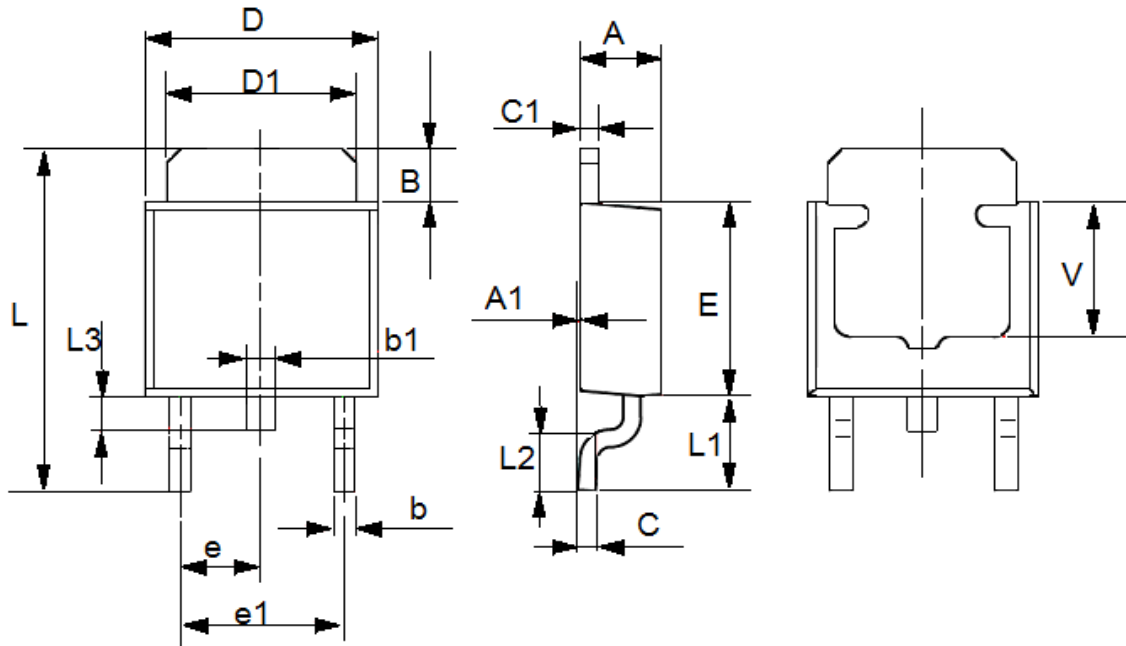
| DIM | Millimeters | | Inches | |
|-----|-------------|-------|----------|--------|
| | Min | Max | Min | Max |
| A | 4.5 | 4.9 | 0.1771 | 0.1929 |
| A1 | 0.75 | 1.05 | 0.0295 | 0.0413 |
| A2 | 2.35 | 2.75 | 0.0925 | 0.1083 |
| A3 | 2.65 | 2.9 | 0.1043 | 0.1142 |
| b | 0.75 | 0.85 | 0.0295 | 0.0334 |
| c | 0.45 | 0.6 | 0.0177 | 0.0236 |
| D | 10 | 10.32 | 0.3937 | 0.4063 |
| E | 15.65 | 16.15 | 0.6161 | 0.6358 |
| e | 2.54REF | | 0.100REF | |
| F | 3.2 | 3.4 | 0.1260 | 0.1338 |
| Φ | 3.08 | 3.28 | 0.1212 | 0.1291 |
| L | 26.2 | 29.8 | 1.0315 | 1.1732 |

● Package Type:TO-252(A)



| DIM | Millimeters | | Inches | |
|-----|-------------|-------|-------------|--------|
| | Min | Max | Min | Max |
| A | 2.2 | 2.4 | 0.0866 | 0.0945 |
| A1 | 0 | 0.127 | 0 | 0.005 |
| b | 0.66 | 0.86 | 0.026 | 0.0339 |
| c | 0.46 | 0.58 | 0.0181 | 0.0228 |
| c1 | 0.498 | 0.6 | 0.0196 | 0.0236 |
| D | 6.5 | 6.7 | 0.2559 | 0.2638 |
| D1 | 5.33(TYP) | | 0.2098(TYP) | |
| D2 | 4.83(TYP) | | 0.1902(TYP) | |
| E | 6 | 6.2 | 0.2362 | 0.2441 |
| e | 2.286(TYP) | | 0.09(TYP) | |
| L | 9.8 | 10.4 | 0.3858 | 0.4094 |
| L1 | 2.9(TYP) | | 0.1142(TYP) | |
| L2 | 1.4 | 1.7 | 0.0551 | 0.0669 |
| L3 | 1.6(TYP) | | 0.063(TYP) | |
| L4 | 0.6 | 1 | 0.0236 | 0.0394 |
| h | 0 | 0.3 | 0 | 0.0118 |
| Φ | 1.1 | 1.3 | 0.0433 | 0.0512 |
| V | 5.3(TYP) | | 0.2087(TYP) | |
| θ | 0 | 8° | 0 | 8° |

● Package Type: TO-252 (B)



| DIM | Millimeters | | Inches | |
|-----|-------------|-------|-------------|--------|
| | Min | Max | Min | Max |
| A | 2.2 | 2.5 | 0.0866 | 0.0984 |
| A1 | 0 | 0.127 | 0 | 0.005 |
| B | 1.15 | 1.65 | 0.0453 | 0.065 |
| b | 0.5 | 0.7 | 0.0197 | 0.0276 |
| b1 | 0.7 | 0.9 | 0.0276 | 0.0354 |
| c | 0.5(TYP) | | 0.0197(TYP) | |
| c1 | 0.52(TYP) | | 0.0205(TYP) | |
| D | 6.3 | 6.7 | 0.2480 | 0.2638 |
| D1 | 5.3(TYP) | | 0.2087(TYP) | |
| E | 5.4 | 5.8 | 0.2126 | 0.2283 |
| e | 2.3(TYP) | | 0.0906(TYP) | |
| e1 | 4.6(TYP) | | 0.1811(TYP) | |
| L | 9.3 | 9.9 | 0.3661 | 0.3898 |
| L1 | 2.35 | 2.95 | 0.0925 | 0.1161 |
| L2 | 1.4 | 1.78 | 0.0551 | 0.07 |
| L3 | 0.35 | 0.95 | 0.0138 | 0.0374 |
| V | 3.8(TYP) | | 0.1496(TYP) | |

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