

MDP18N50B / MDF18N50B

N-Channel MOSFET 500V, 18.0 A, 0.27Ω

General Description

The MDP/F18N50B uses advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

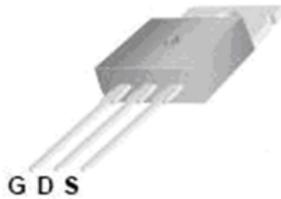
MDP/F18N50B is suitable device for SMPS, HID and general purpose applications.

Features

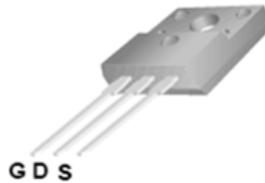
- $V_{DS} = 500V$
- $I_D = 18.0A$ @ $V_{GS} = 10V$
- $R_{DS(ON)} \leq 0.27\Omega$ @ $V_{GS} = 10V$

Applications

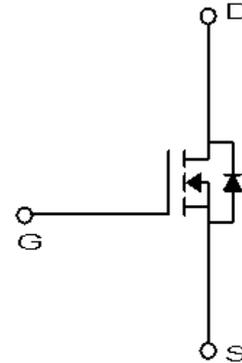
- Power Supply
- PFC
- Ballast



TO-220_Ⓢ
MDP Series_Ⓢ



TO-220F_Ⓢ
MDF Series_Ⓢ



Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | MDP18N50B | MDF18N50B | Unit |
|--|--------------------|----------------|-----------|-----------|------|
| Drain-Source Voltage | | V_{DSS} | 500 | | V |
| Gate-Source Voltage | | V_{GSS} | ±30 | | V |
| Continuous Drain Current | $T_C=25^\circ C$ | I_D | 18 | 18* | A |
| | $T_C=100^\circ C$ | | 11 | 11* | A |
| Pulsed Drain Current ⁽¹⁾ | | I_{DM} | 72 | 72* | A |
| Power Dissipation | $T_C=25^\circ C$ | P_D | 236 | 37 | W |
| | Derate above 25 °C | | 1.89 | 0.29 | W/°C |
| Repetitive Avalanche Energy ⁽¹⁾ | | E_{AR} | 23.6 | | mJ |
| Peak Diode Recovery dv/dt ⁽³⁾ | | dv/dt | 4.5 | | V/ns |
| Single Pulse Avalanche Energy ⁽⁴⁾ | | E_{AS} | 950 | | mJ |
| Junction and Storage Temperature Range | | T_J, T_{stg} | -55~150 | | °C |

※ I_D limited by maximum junction temperature

Thermal Characteristics

| Characteristics | Symbol | MDP18N50B | MDF18N50B | Unit |
|--|-----------------|-----------|-----------|------|
| Thermal Resistance, Junction-to-Ambient ⁽¹⁾ | $R_{\theta JA}$ | 62.5 | 62.5 | °C/W |
| Thermal Resistance, Junction-to-Case ⁽¹⁾ | $R_{\theta JC}$ | 0.53 | 3.4 | |

Ordering Information

| Part Number | Temp. Range | Package | Packing | RoHS Status |
|-------------|-------------|---------|---------|--------------|
| MDP18N50BTH | -55~150°C | TO-220 | Tube | Halogen Free |
| MDF18N50BTH | -55~150°C | TO-220F | Tube | Halogen Free |

Electrical Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|--|--------------|--|-----|------|------|----------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $I_D = 250\mu A, V_{GS} = 0V$ | 500 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 2.0 | - | 4.0 | |
| Drain Cut-Off Current | I_{DSS} | $V_{DS} = 500V, V_{GS} = 0V$ | - | - | 1 | μA |
| Gate Leakage Current | I_{GSS} | $V_{GS} = \pm 30V, V_{DS} = 0V$ | - | - | 100 | nA |
| Drain-Source ON Resistance | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 9A$ | - | 0.22 | 0.27 | Ω |
| Forward Transconductance | g_{fs} | $V_{DS} = 40V, I_D = 9A$ | - | 13 | - | S |
| Dynamic Characteristics | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 400V, I_D = 18.0A, V_{GS} = 10V^{(3)}$ | - | 48 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 10 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 15 | - | |
| Input Capacitance | C_{iss} | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$ | - | 2490 | - | pF |
| Reverse Transfer Capacitance | C_{rss} | | - | 13 | - | |
| Output Capacitance | C_{oss} | | - | 307 | - | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS} = 10V, V_{DS} = 250V, I_D = 18.0A, R_G = 25\Omega^{(3)}$ | - | 32 | - | ns |
| Rise Time | t_r | | - | 82 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 222 | - | |
| Fall Time | t_f | | - | 75 | - | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Maximum Continuous Drain to Source Diode Forward Current | I_S | | - | 18 | - | A |
| Source-Drain Diode Forward Voltage | V_{SD} | $I_S = 18.0A, V_{GS} = 0V$ | - | - | 1.4 | V |
| Body Diode Reverse Recovery Time | t_{rr} | $I_F = 18.0A, di/dt = 100A/\mu s^{(3)}$ | - | 375 | - | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | | - | 4.2 | - | μC |

Note :

- Pulse width is based on $R_{\theta JC}$ & $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.
- Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ C$.
- $I_{SD} \leq 18.0A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$
- $L = 5.3mH$, $I_{AS} = 18.0A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$

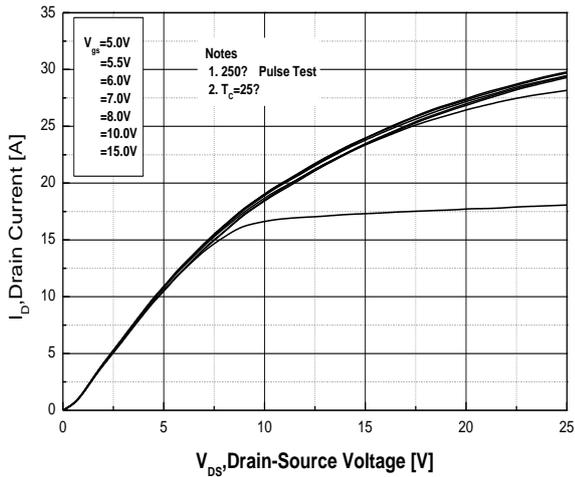


Fig.1 On-Region Characteristics

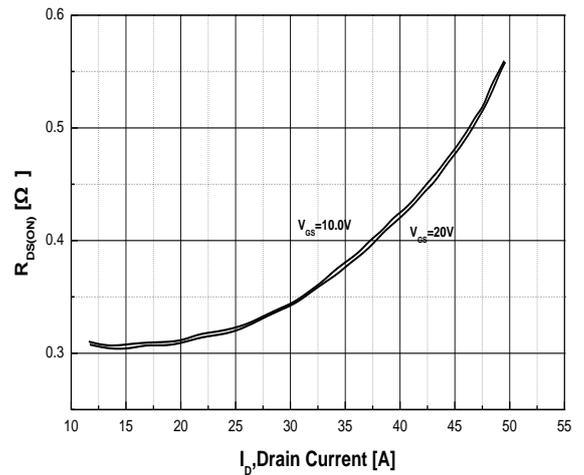


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

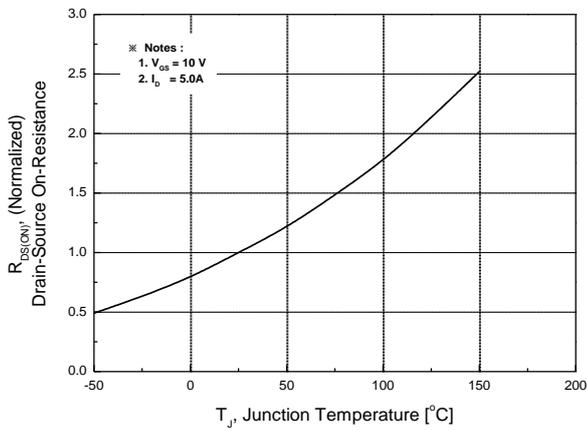


Fig.3 On-Resistance Variation with Temperature

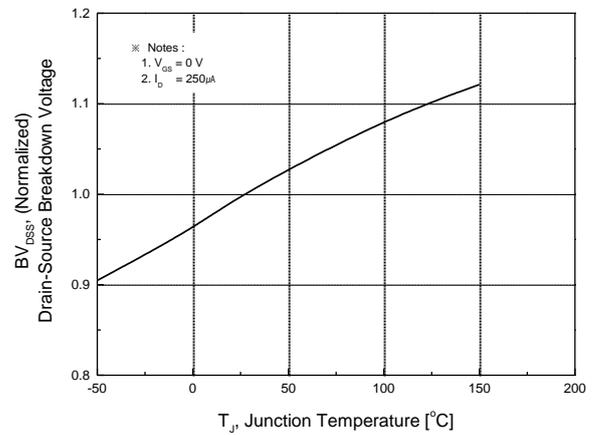


Fig.4 Breakdown Voltage Variation vs. Temperature

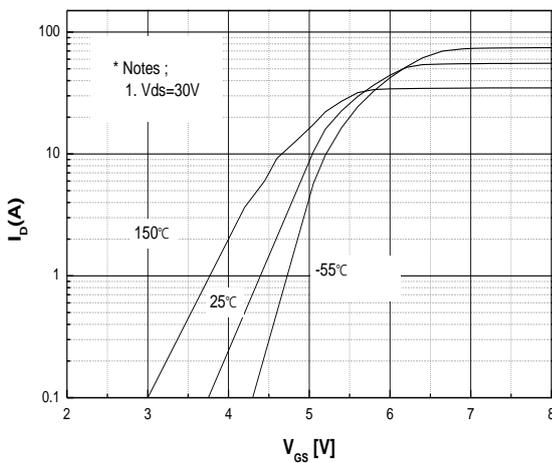


Fig.5 Transfer Characteristics

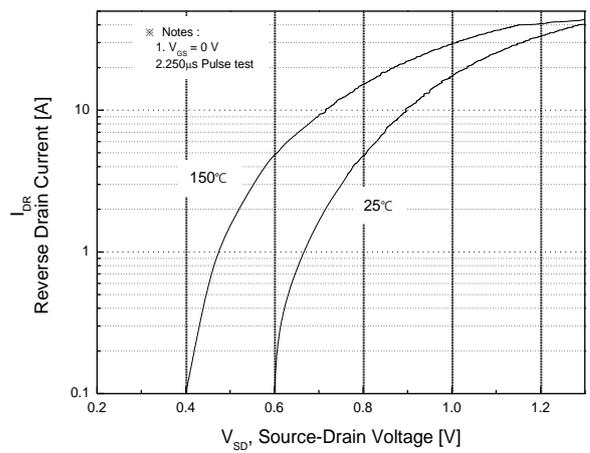


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

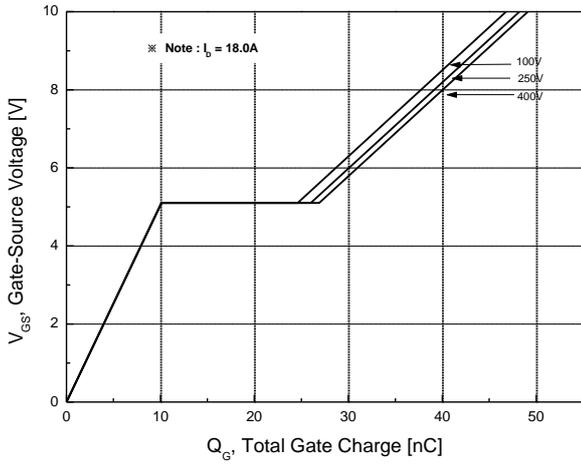


Fig.7 Gate Charge Characteristics

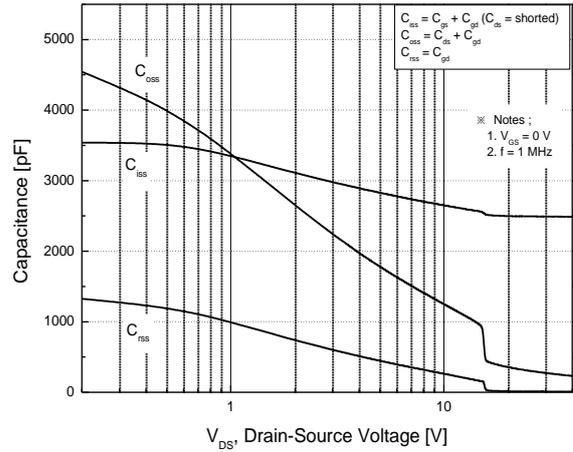


Fig.8 Capacitance Characteristics

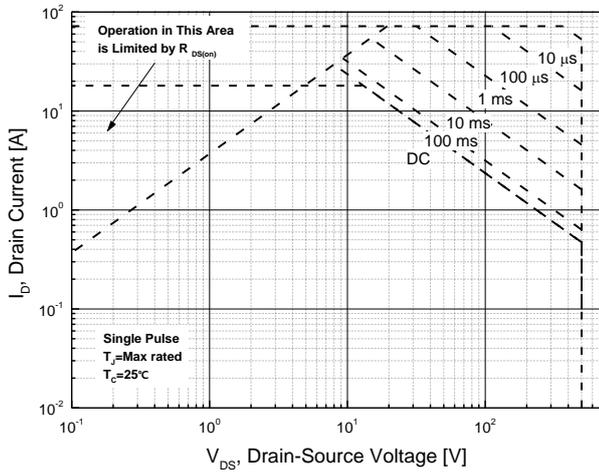


Fig.9 Maximum Safe Operating Area MDP18N50B (TO-220)

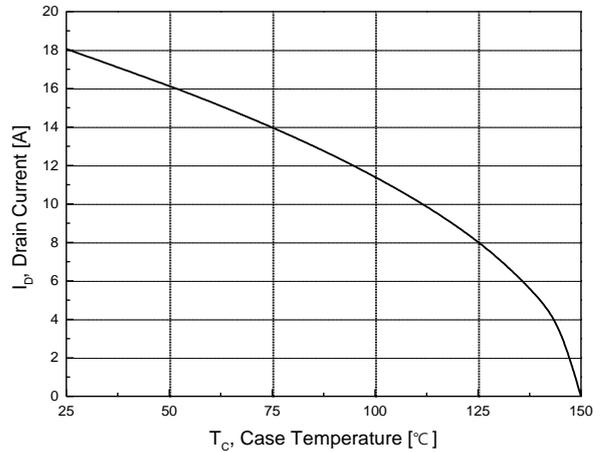


Fig.10 Maximum Drain Current vs. Case Temperature

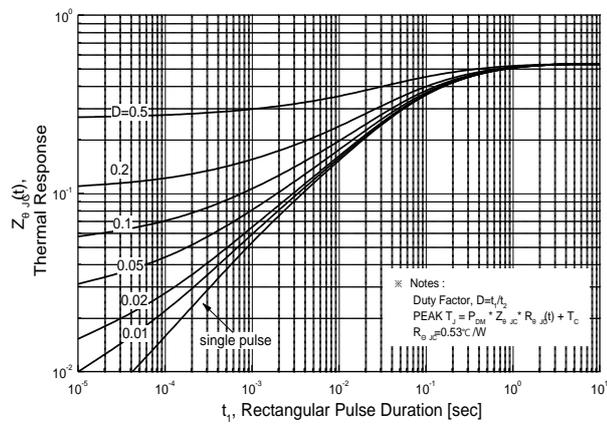


Fig.11 Transient Thermal Response Curve MDP18N50B (TO-220)

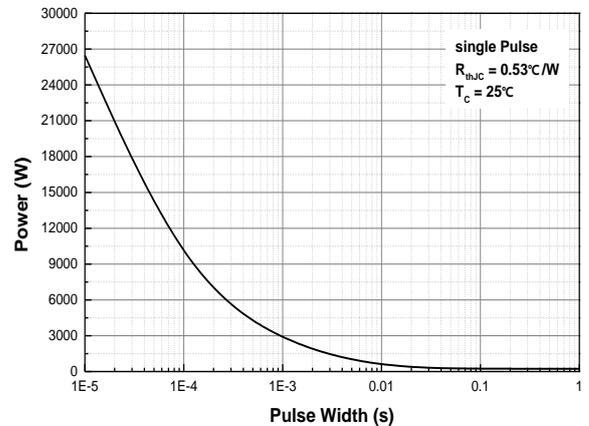
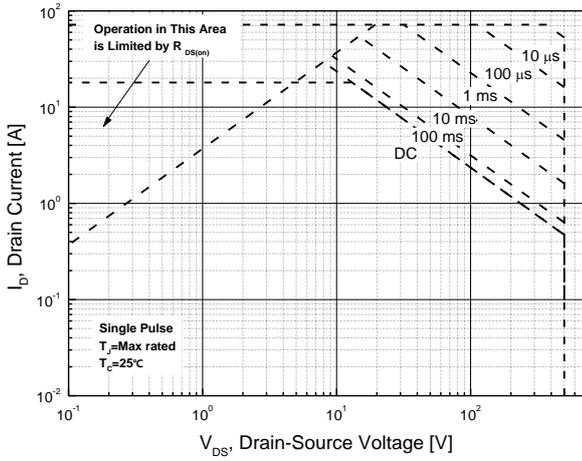
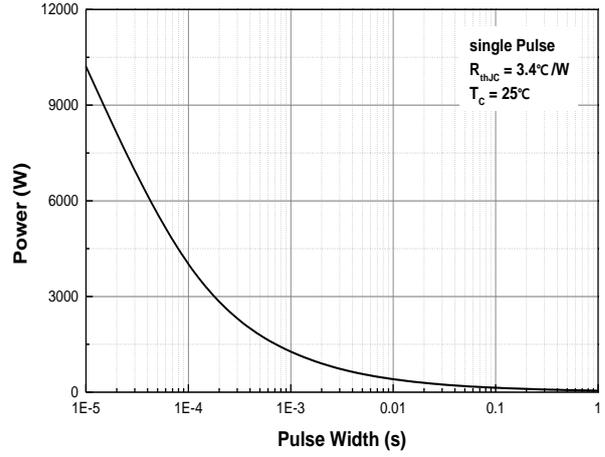


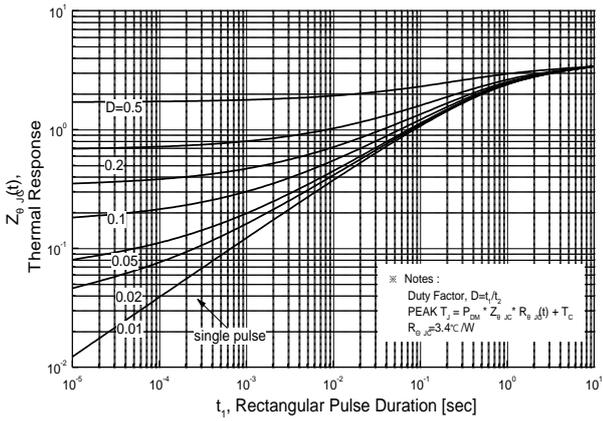
Fig.12 Single Pulse Maximum Power Dissipation – MDP18N50B (TO-220)



**Fig.13 Maximum Safe Operating Area
MDF13N50B (TO-220F)**



**Fig.14 Single Pulse Maximum Power
Dissipation – MDF13N50B (TO-220F)**

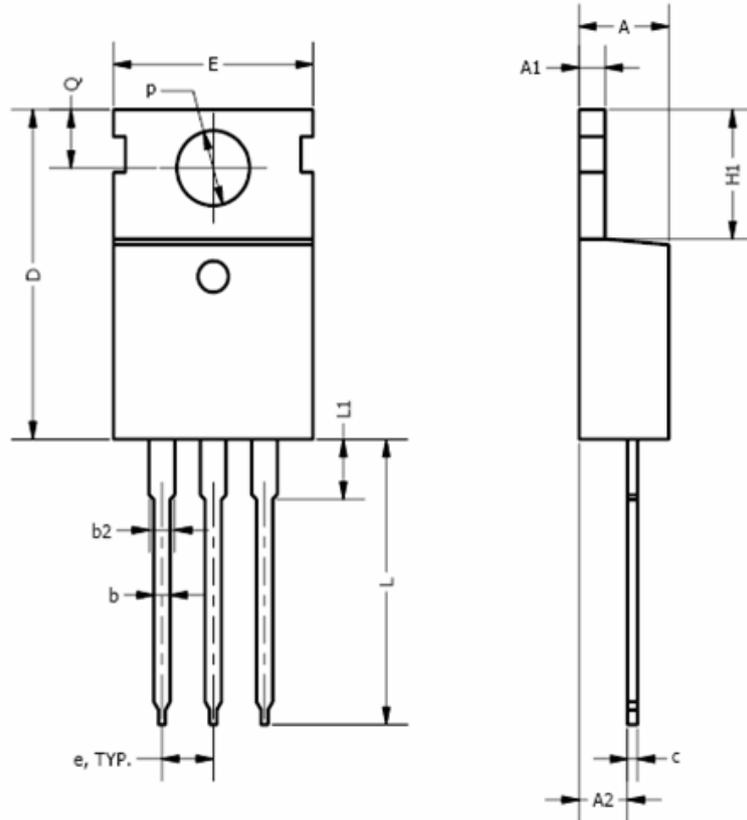


**Fig.15 Transient Thermal Response Curve
MDF13N50B (TO-220F)**

Physical Dimensions

3 Leads, TO-220

Dimensions are in millimeters unless otherwise specified



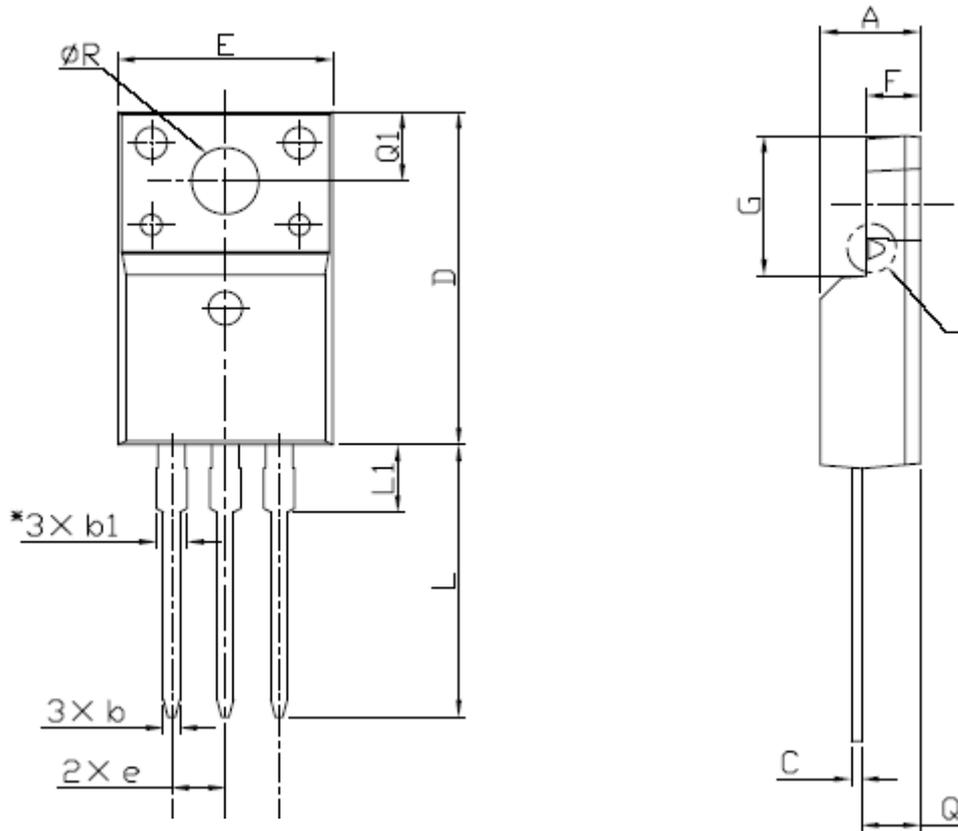
| Symbol | Min | Nom | Max |
|----------|----------|------|-------|
| A | 3.56 | | 4.83 |
| A1 | 0.50 | | 1.40 |
| A2 | 2.03 | | 2.92 |
| b | 0.38 | 0.69 | 1.02 |
| b2 | 1.14 | 1.45 | 1.78 |
| c | 0.36 | | 0.61 |
| D | 14.22 | | 16.51 |
| e | 2.54 TYP | | |
| E | 9.65 | | 10.67 |
| H1 | 5.84 | | 6.86 |
| L | 12.70 | | 14.73 |
| L1 | | | 6.35 |
| ϕP | 3.53 | | 4.09 |
| Q | 2.54 | | 3.43 |

Note : Package body size, length and width do not include mold flash, protrusions and gate burrs.

Physical Dimension

3 Leads, TO-220F

Dimensions are in millimeters unless otherwise specified



| Symbol | Min | Nom | Max |
|----------|-------|------|-------|
| A | 4.50 | | 4.93 |
| b | 0.63 | | 0.91 |
| b1 | 1.15 | | 1.47 |
| C | 0.33 | | 0.63 |
| D | 15.47 | | 16.13 |
| E | 9.60 | | 10.71 |
| e | | 2.54 | |
| F | 2.34 | | 2.84 |
| G | 6.48 | | 6.90 |
| L | 12.24 | | 13.72 |
| L1 | 2.79 | | 3.67 |
| Q | 2.52 | | 2.96 |
| Q1 | 3.10 | | 3.50 |
| ϕR | 3.00 | | 3.55 |

Note : Package body size, length and width do not include mold flash, protrusions and gate burrs.

DISCLAIMER:

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

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