

General Description

The UV60N20R uses advanced Trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

This device is suitable for use in PWM, load switching and general purpose applications.

Features

N-Channel, 5V Logic Level Control

Enhancement Mode

Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=10V$

100% Avalanche Tested

Pb-free lead plating; ROHS compliant

| | | |
|-------------------------------------|-----|-----------|
| VDS | 200 | V |
| $R_{DS(on)\text{TYP}} @ V_{GS}=10V$ | 23 | $m\Omega$ |
| I_D | 60 | A |

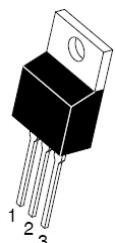
Applications

Power switching application

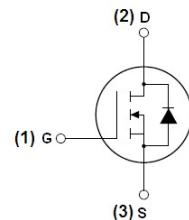
Hard Switched and High Frequency Circuits

Uninterruptible Power Supply

Isolated DC/DC Converters in Telecom and Industrial



TO-220AB-3L Top view



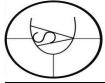
Schematic diagram

Package Marking And Ordering Information

| Part ID | Package Type | Marking | Tape and Reel information |
|----------|--------------|----------|---------------------------|
| UV60N20R | TO-220AB | UV60N20R | 50pcs/Tube |

Maximum ratings, at $T_j=25^\circ C$, unless otherwise specified

| Symbol | Parameter | Rating | Unit |
|----------------|-----------------------------------------|-------------------|------|
| $V_{(BR)DSS}$ | Drain –Source breakdown voltage | 200 | V |
| I_S | Diode continuous forward current | $T_c=25^\circ C$ | A |
| I_D | Continuous drain current @ $V_{GS}=10V$ | $T_c=25^\circ C$ | A |
| | | $T_c=100^\circ C$ | A |
| I_{DM} | Pulse drain current tested① | $T_c=25^\circ C$ | A |
| E_{AS} | Avalanche energy, single pulsed② | 930 | mJ |
| P_D | Maximum power dissipation | $T_c=25^\circ C$ | W |
| V_{GS} | Gate-Source voltage | ± 25 | V |
| $T_{STG}\ T_J$ | Storage and operating temperature range | -55 to 175 | °C |



Thermal Characteristic

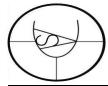
| Symbol | Parameter | Typical | Unit |
|-----------|----------------------------------------|---------|------|
| R_{QJC} | Thermal Resistance-Junction to Case | 1.3 | °C/W |
| R_{QJA} | Thermal Resistance-Junction to Ambient | 62.5 | °C/W |

Typical Characteristics

| Symbol | Parameter | Condition | Min | Type | Max | Unit |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----|------|-----------|------------------|
| Static Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise stated) | | | | | | |
| $V_{(\text{BR})DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$ | 200 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=160\text{V}$, $V_{GS}=0\text{V}$ | | | 1 | μA |
| | Zero Gate Voltage Drain Current($T_j=125^\circ\text{C}$) | $V_{DS}=160\text{V}$, $V_{GS}=0\text{V}$ | | | 100 | μA |
| I_{GSS} | Gate-Body Leakage Current | $V_{GS}=\pm 25\text{V}$, $V_{DS}=0\text{V}$ | | | ± 100 | nA |
| $V_{GS(\text{TH})}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$ | 2 | | 4 | V |
| $R_{DS(\text{ON})}$ | Drain-Source On-State Resistance③ | $V_{GS}=10\text{V}$, $I_D=50\text{A}$ | | 23 | 27 | $\text{m}\Omega$ |
| Dynamic Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise stated) | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=160\text{V}$, $V_{GS}=0\text{V}$, $f=1\text{MHz}$ | | 6000 | | PF |
| C_{oss} | Output Capacitance | | | 540 | | PF |
| C_{rss} | Reverse Transfer Capacitance | | | 320 | | PF |
| R_g | Gate Resistance | $f=1\text{MHz}$ | | 2 | | Ω |
| Q_g | Total Gate Charge | $V_{DS}=160\text{V}$, $I_D=40\text{A}$, $V_{GS}=10\text{V}$ | | 140 | | nC |
| Q_{gs} | Gate-Source Charge | | | 26 | | nC |
| Q_{gd} | Gate-Drain Charge | | | 48 | | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-on Delay time | $V_{DD}=160\text{V}$, $I_D=1\text{A}$, $R_G=2\Omega$, $V_{GS}=10\text{V}$ | | 28 | | nS |
| t_r | Turn-on Rise time | | | 42 | | nS |
| $t_{d(off)}$ | Turn-off Delay time | | | 75 | | nS |
| t_f | Turn-off Fall time | | | 60 | | nS |
| Source-Drain Diode Characteristics | | | | | | |
| V_{SD} | Forward on voltage | $I_{SD}=10\text{A}$, $V_{GS}=0\text{V}$ | | 0.8 | 1.3 | V |
| t_{rr} | Reverse Recovery Time | $T_j=25^\circ\text{C}$, $I_{SD}=40\text{A}$, $V_{GS}=0\text{V}$, $di/dt=500\text{A}/\mu\text{s}$ | | 50 | | nS |
| Q_{rr} | Reverse Recovery Charge | | | 100 | | nC |

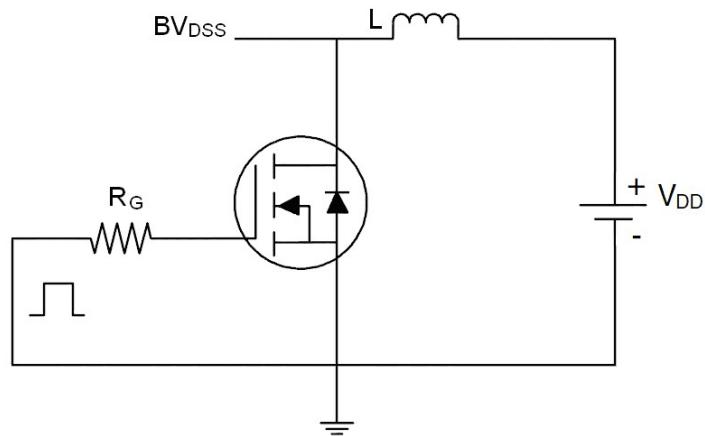
Note:

- ① Repetitive rating; pulse width limited by max, junction temperature.
- ② Limited by T_j max, starting $T_j=25^\circ\text{C}$, $L=0.5\text{mH}$, $R_G=25\Omega$, $I_{AS}=20\text{A}$, $V_{GS}=10\text{V}$, Part not recommended for use above this value
- ③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$

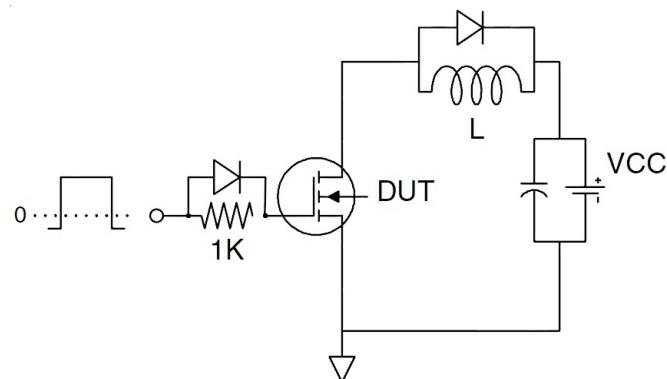


Test circuit

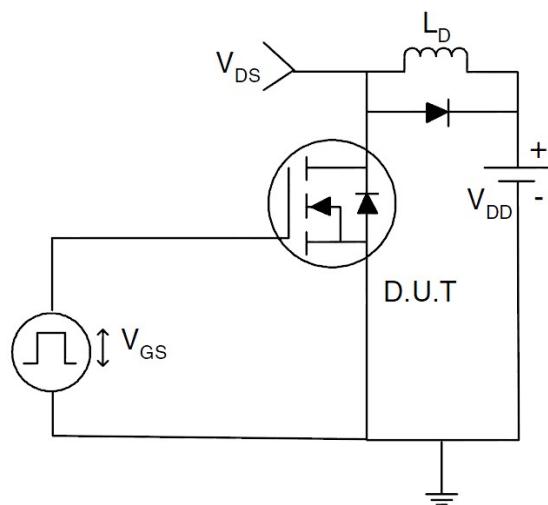
(1) E_{AS} test circuits

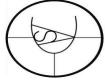


(2) Gate charge test circuit



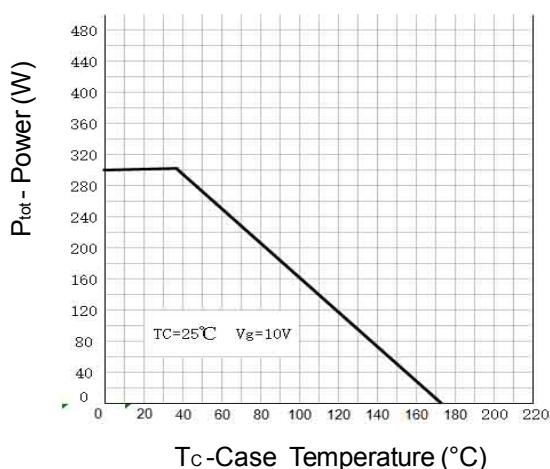
(3) Switch time test circuit



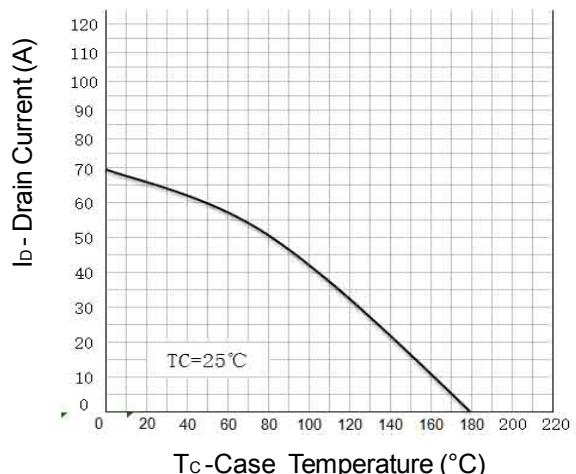


Typical Operating Characteristics

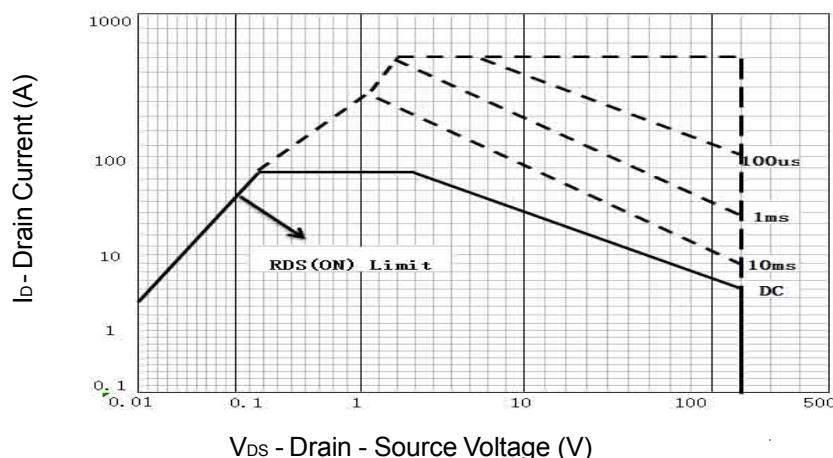
Power Dissipation



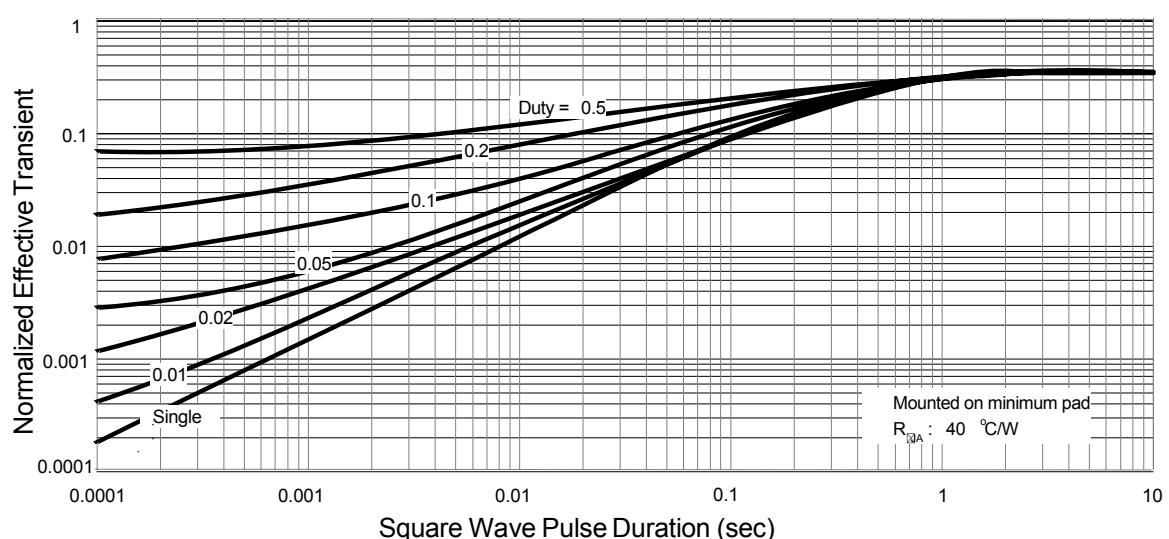
Drain Current

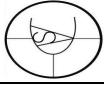


Safe Operation Area

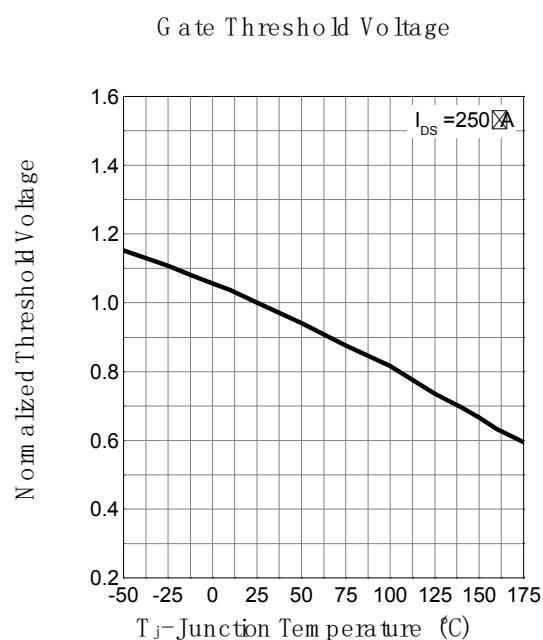
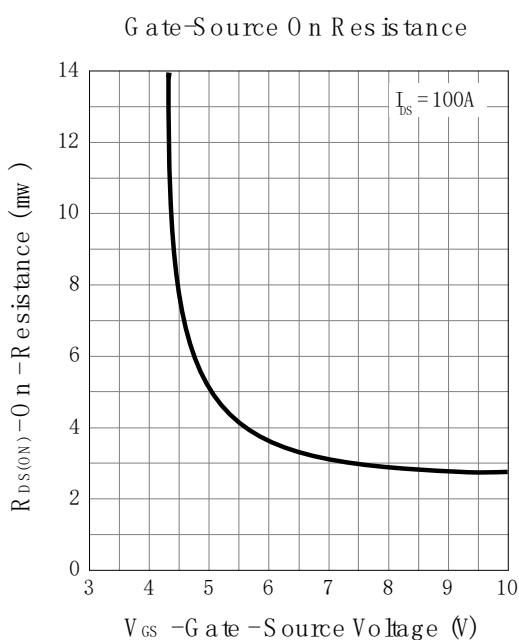
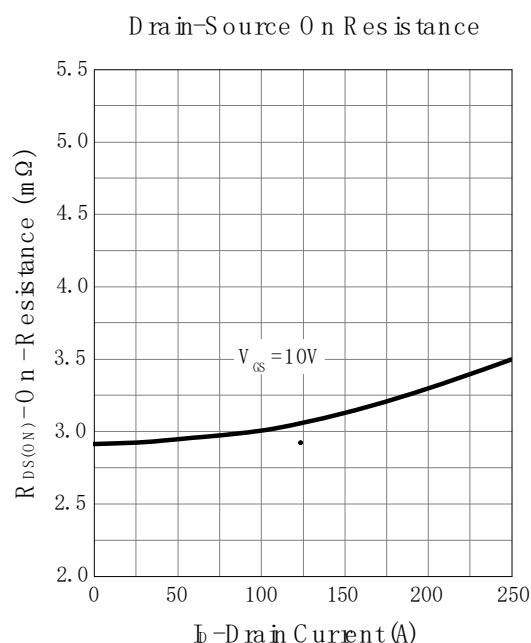
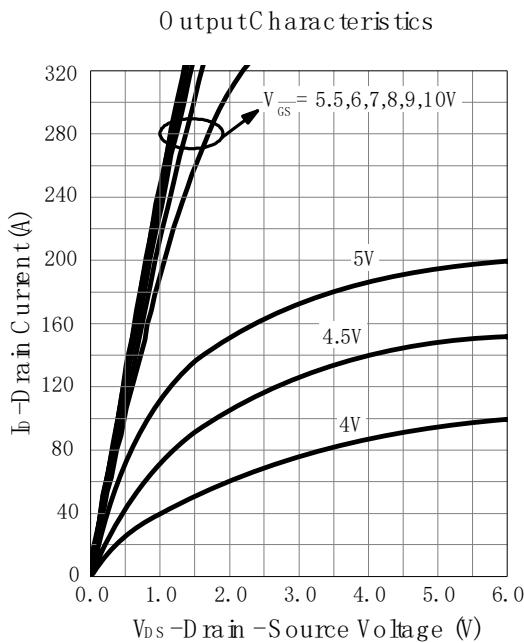


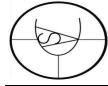
Thermal Transient Impedance



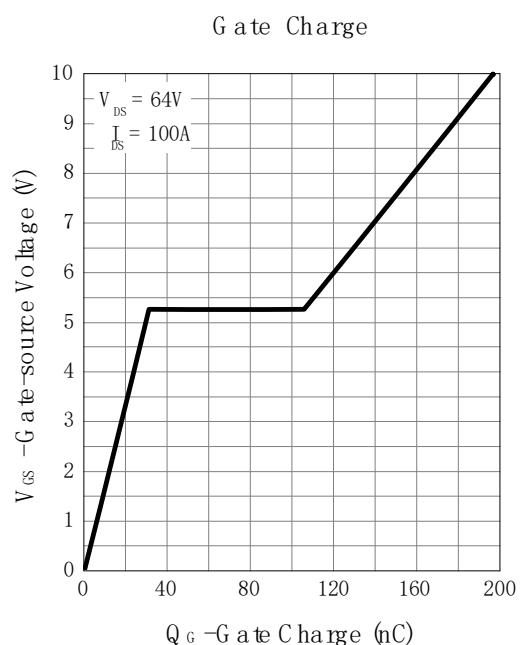
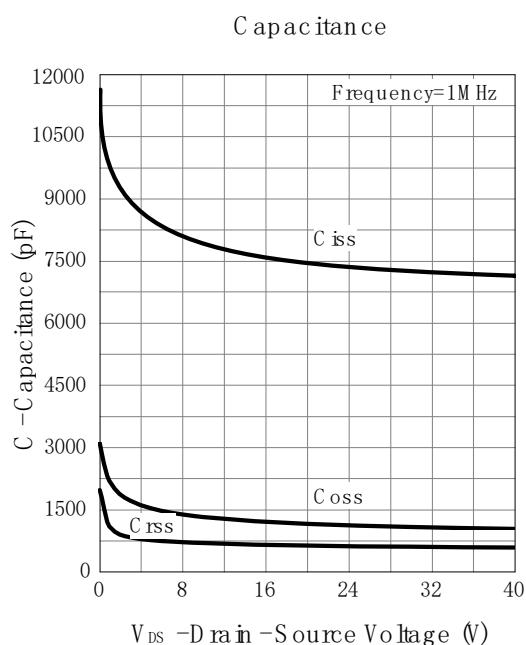
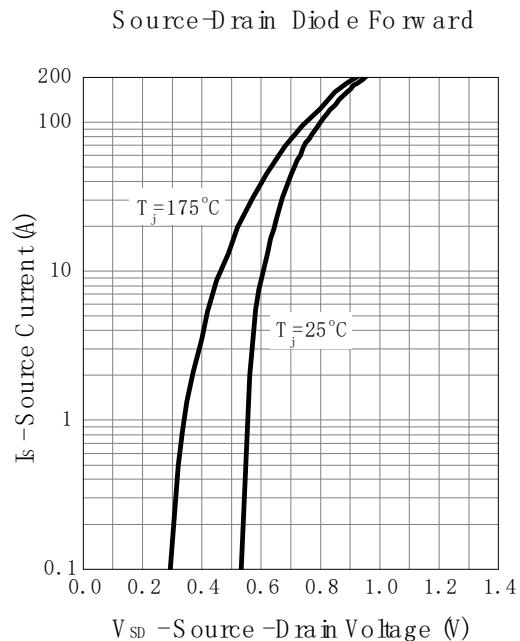
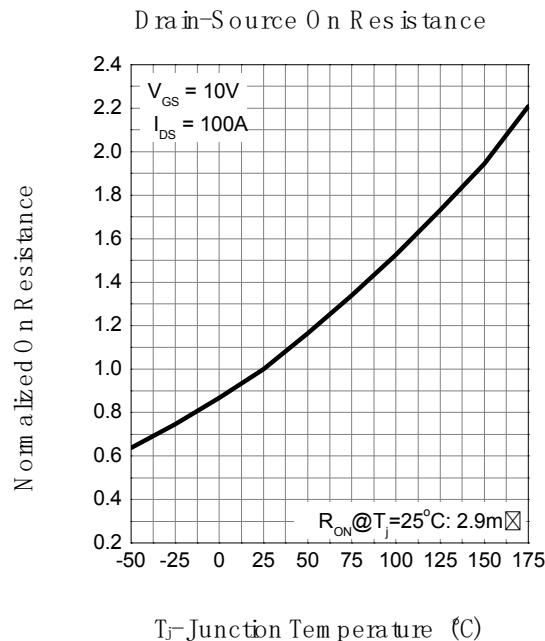


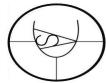
Typical Operating Characteristics (Cont.)



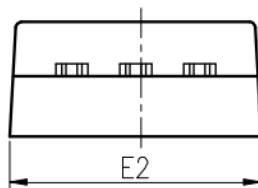
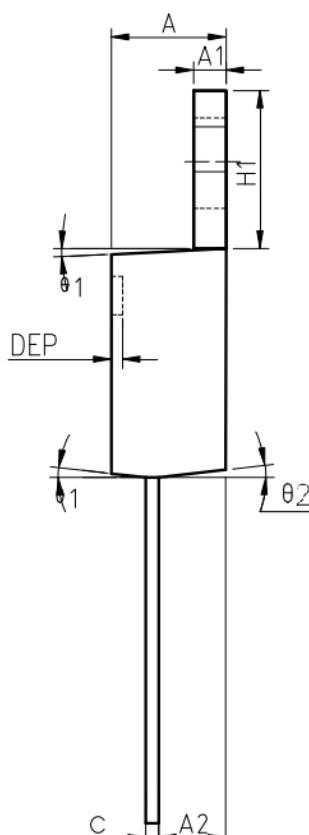
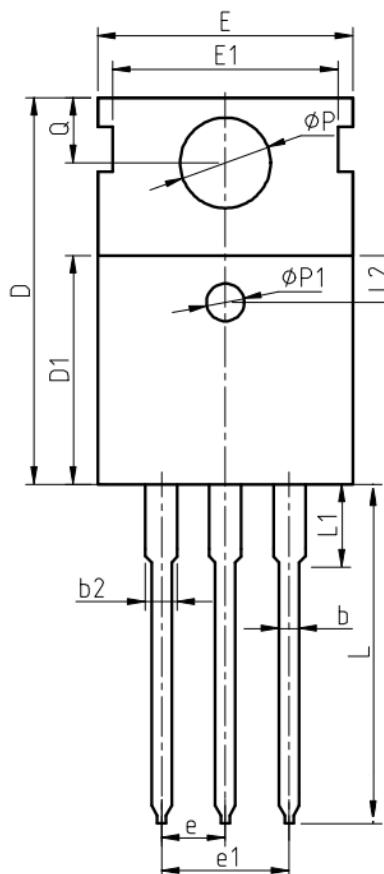


Typical Operating Characteristics (Cont.)





TO-220AB Package Outline Data



| Symbol | Dimensions (unit: mm) | | |
|---------|-----------------------|-------|-------|
| | Min | Typ | Max |
| A | 4.30 | 4.52 | 4.70 |
| A1 | 1.15 | 1.30 | 1.40 |
| A2 | 2.20 | 2.40 | 2.60 |
| b | 0.70 | 0.80 | 1.00 |
| b2 | 1.17 | 1.32 | 1.50 |
| c | 0.45 | 0.50 | 0.61 |
| D | 15.30 | 15.65 | 15.90 |
| D1 | 9.00 | 9.20 | 9.40 |
| DEP | 0.05 | 0.10 | 0.25 |
| E | 9.66 | 9.90 | 10.28 |
| E1 | - | 8.70 | - |
| E2 | 9.80 | 10.00 | 10.20 |
| phi_P1 | 1.40 | 1.50 | 1.60 |
| e | 2.54 BSC | | |
| e1 | 5.08 BSC | | |
| H1 | 6.40 | 6.50 | 6.80 |
| L | 12.70 | - | 14.27 |
| L1 | - | - | 3.95 |
| L2 | 2.40 | 2.50 | 2.60 |
| phi_P | 3.53 | 3.60 | 3.70 |
| Q | 2.70 | 2.80 | 2.90 |
| theta_1 | 5 ° | 7 ° | 9 ° |
| theta_2 | 1 ° | 3 ° | 5 ° |

Notes:

1. Refer to JEDEC TO-220 variation AB
2. Dimension "D" and "E" do NOT include mold flash. Mold flash shall not exceed 0.127mm per side.