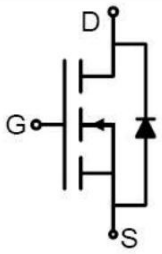
# APG054N10F

**N-Channel Enhancement Mosfet**

**DATA SHEET**

## Features

- 100V,120A
  $R_{DS(ON)}$ <5.4mΩ @$V_{GS}$=10V TYP:4.5mΩ
- Split Gate Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge




**Schematic Diagram**

## Applications

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch
- Rectifier




**Marking and pin Assignment**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|---|---|---|---|---|---|
| G054N10F | APG054N10F | TO-220F | - | - | 1000 |

## ABSOLUTE MAXIMUM RATINGS ($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current (Tc=25℃) (1) | $I_D$ | 120 | A |
| Continuous Drain Current (Tc=100℃) | $I_D$ | 75 | A |
| Pulsed Drain Current (1) | $I_{DM}$ | 440 | A |
| Drain Power Dissipation | $P_D$ | 156 | W |
| Single Pulsed Avalanche Energy (2) | $E_{AS}$ | 225 | mJ |
| Thermal Resistance from Junction to Case | $R_{\theta JC}$ | 0.8 | ℃/W |
| Junction Temperature | $T_J$ | -55~ +150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55~ +150 | ℃ |

**Notes:**

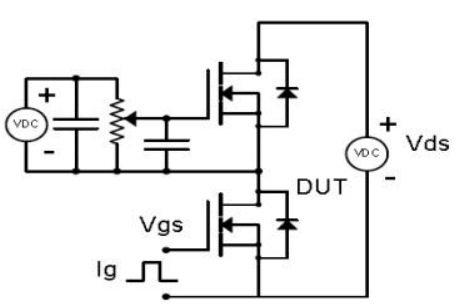
1) Repetitive Rating: pulse width limited by maximum junction temperature
2) EAS condition : $T_J$=25℃, $V_{DD}$=30V, $V_G$=10V, L=0.5mH, $R_g$=25Ω, $I_{AS}$=30A

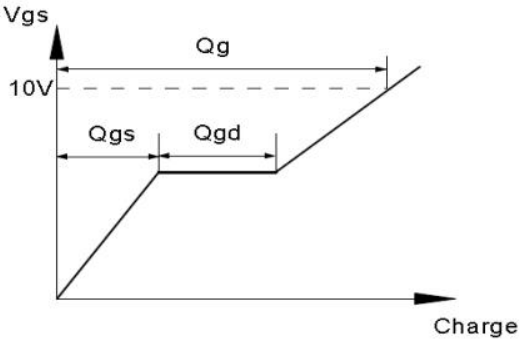
## MOSFET ELECTRICAL CHARACTERISTICS($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =250μA | 100 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =100V, $V_{GS}$ = 0V | - | - | 1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ =±20V, $V_{DS}$ = 0V | - | - | ±100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 2 | 3 | 4 | V |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS}$ =10V, $I_D$ =20A | - | 4.5 | 5.4 | mΩ |
| Forward transconductance | $R_g$ | f=1.0MHz | - | 3.5 | - | Ω |
| **Dynamic characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =50V, VGS=0V, f=1MHz | - | 3244 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 1075 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 52 | - | |
| **Switching characteristics** | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=50V, $I_D$=20A, $R_G$=6Ω, $V_{GS}$=10V | - | 22 | - | nS |
| Turn-on rise time | $t_r$ | | - | 36 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 49 | - | |
| Turn-off fall time | $t_f$ | | - | 31 | - | |
| Total Gate Charge | Qg | $V_{DS}$=50V, $I_D$=20A, $V_{GS}$=10V | - | 51 | - | nC |
| Gate-Source Charge | Qgs | | - | 15 | - | |
| Gate-Drain Charge | Qgd | | - | 13 | - | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward voltage | $V_{SD}$ | $T_J$=25℃, $V_{GS}$ =0V, $I_S$=20A | - | 0.8 | 1.2 | V |
| Diode Forward current | $I_S$ | $T_C$=25℃ | - | - | 120 | A |
| Body Diode Reverse Recovery Time | Trr | di/dt=100A/us,IF=20A | - | 58 | - | nS |
| Body Diode Reverse Recovery Charge | Qrr | di/dt=100A/us,IF=20A | - | 90 | - | nC |

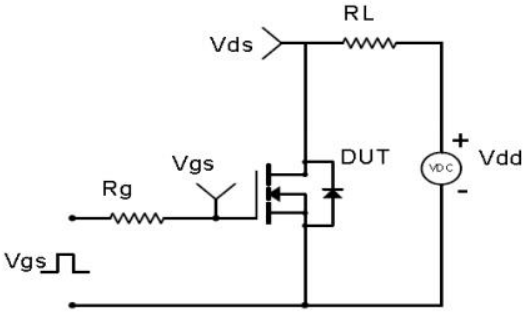
## Test Circuit & Waveform

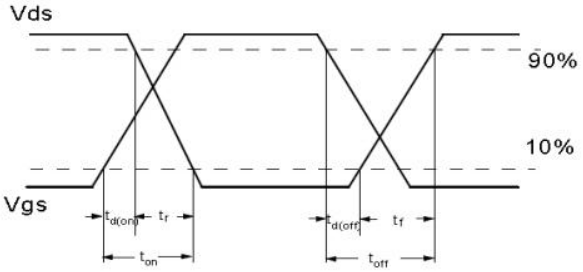
Gate Charge Test Circuit & Waveform



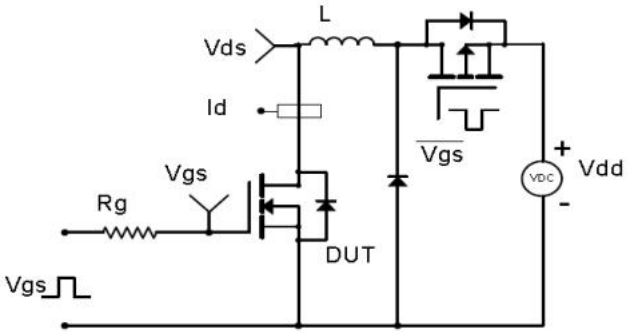



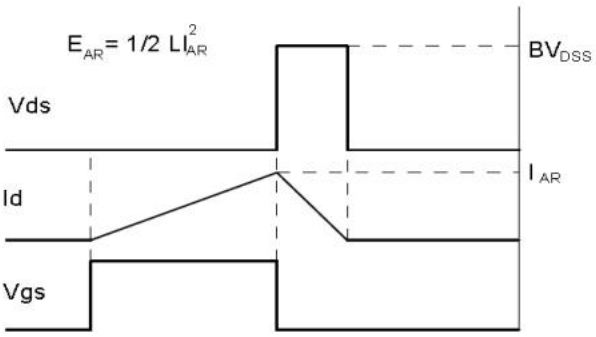

Resistive Switching Test Circuit & Waveforms



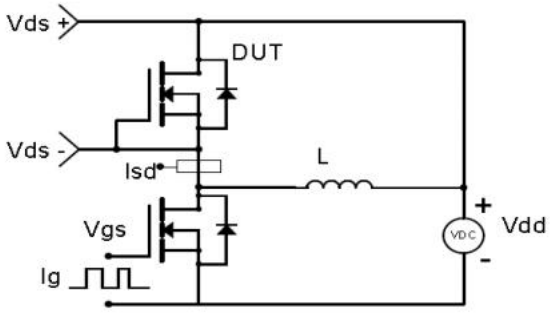



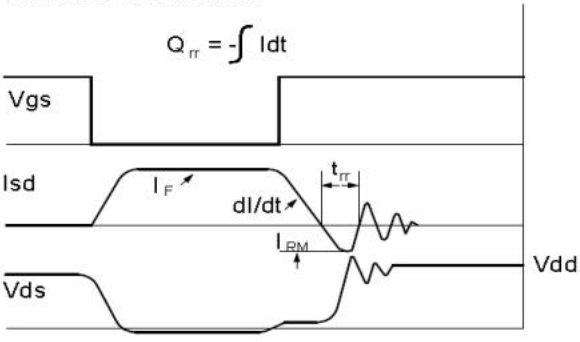

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms



# Electrical Characteristics Diagrams

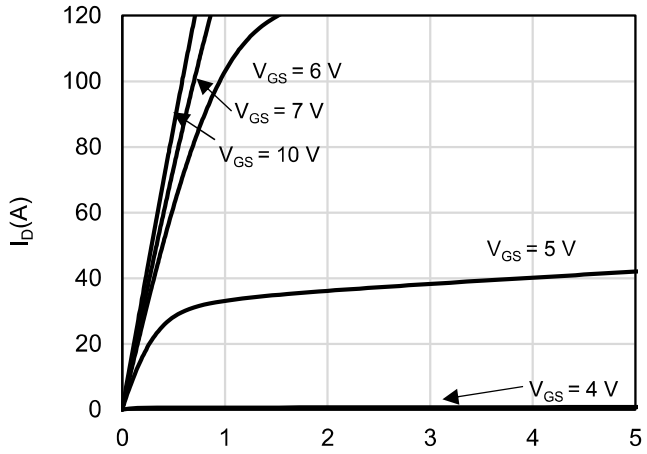


Figure 1: On-Region Characteristics

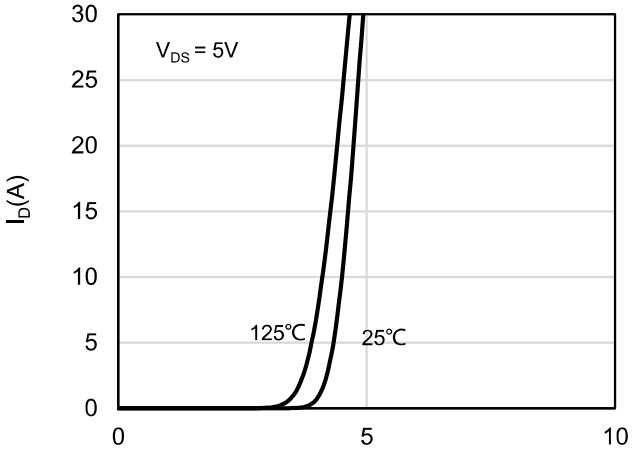


Figure 2: Transfer Characteristics

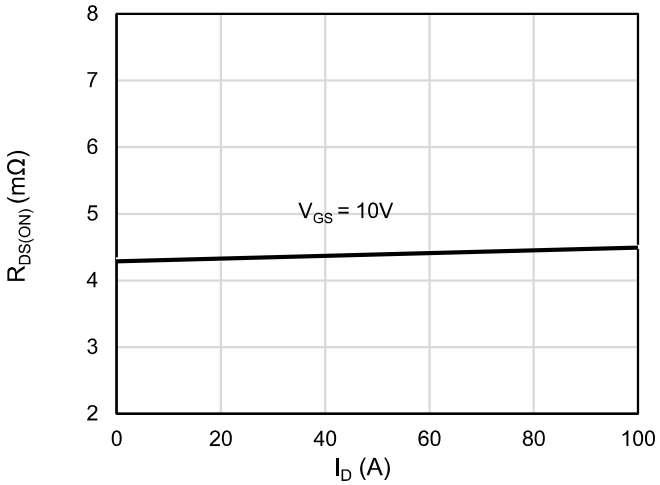


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

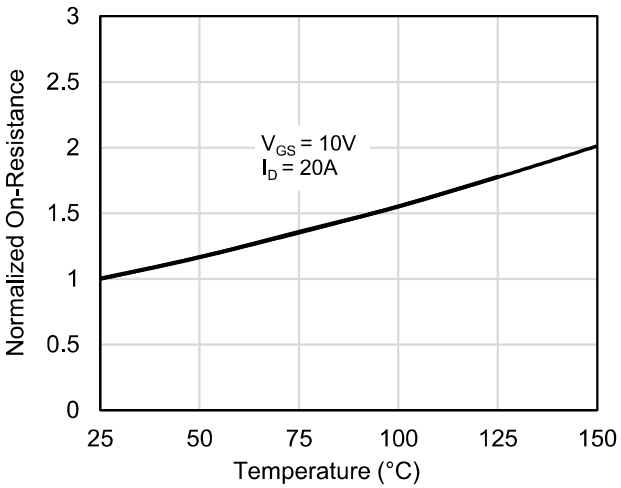


Figure 4: On-Resistance vs. Junction Temperature

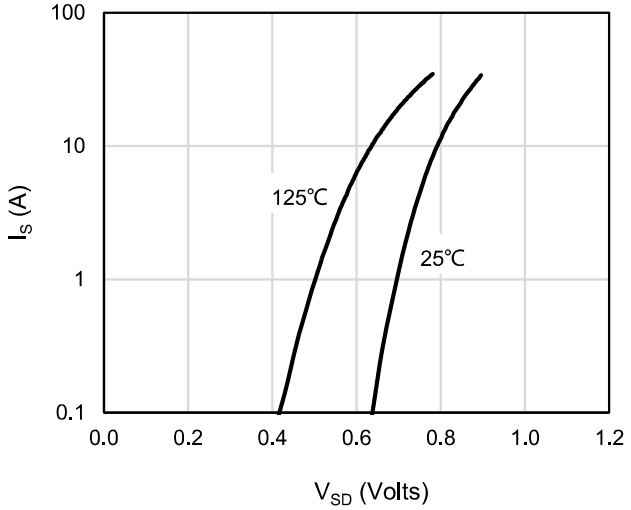


Figure 7: Body-Diode Characteristics

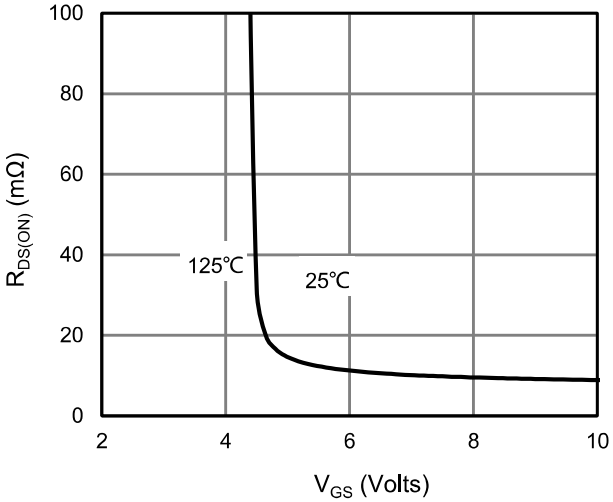


Figure 8: On-Resistance vs. Gate-Source Voltage

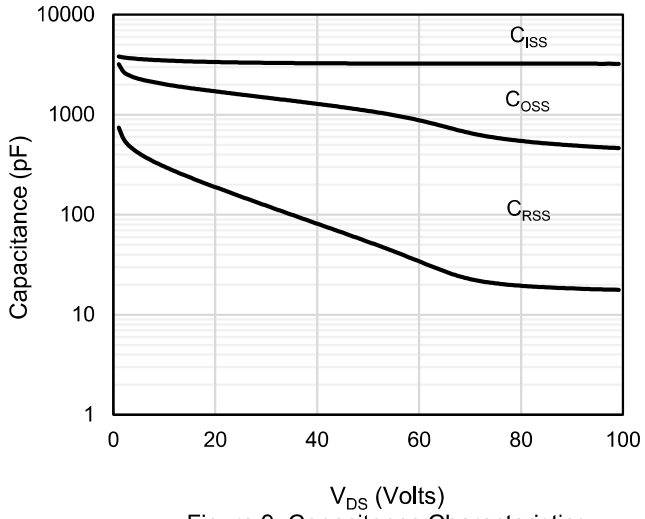


Figure 9: Capacitance Characteristics

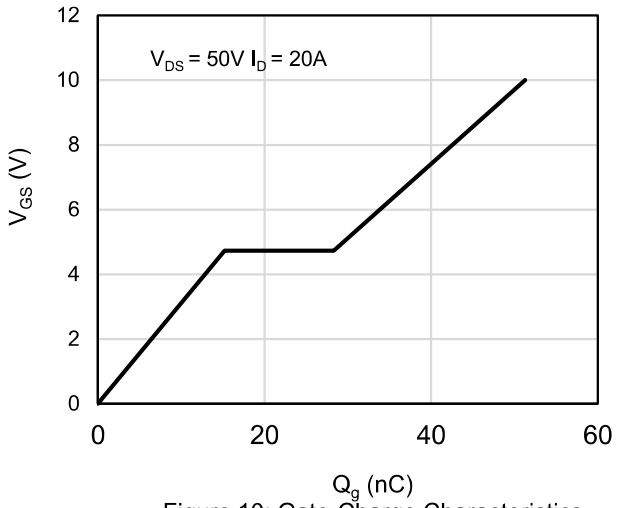


Figure 10: Gate-Charge Characteristics

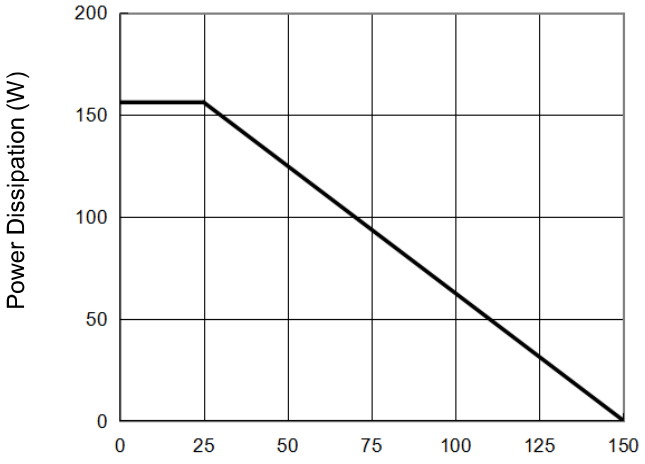


Figure 11: Power De-rating

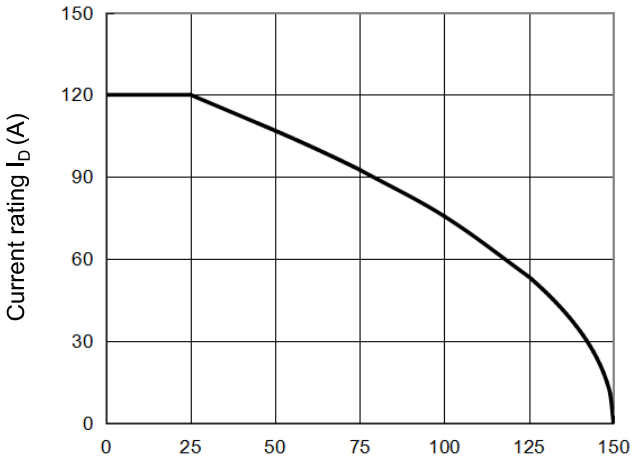


Figure 12: Current De-rating

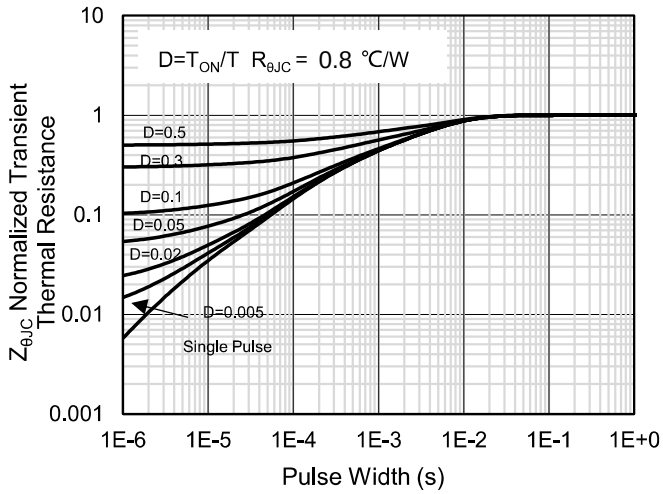


Figure 13: Normalized Maximum Transient Thermal Impedance

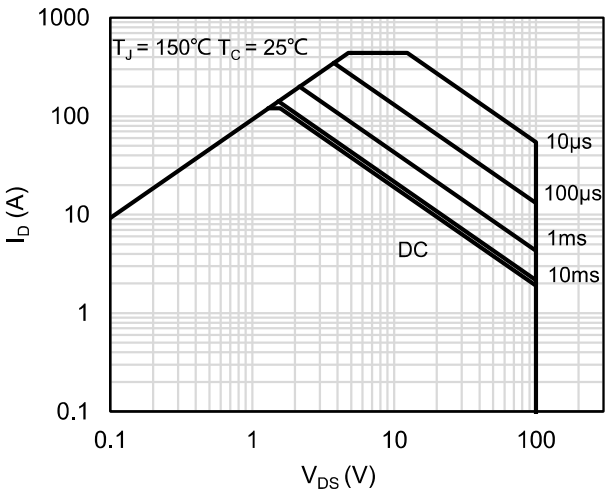
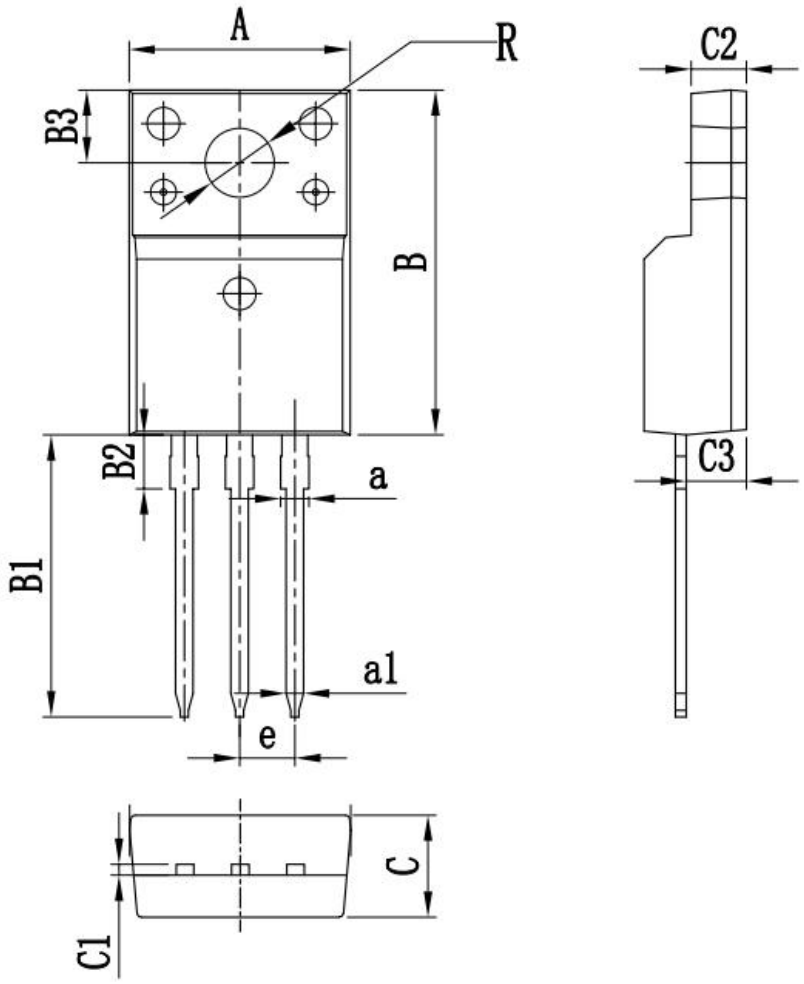


Figure 14: Maximum Forward Biased Safe Operating Area

## TO-220F Package Information




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 9.90 | 10.20 | 10.40 |
| B | 15.50 | 16.00 | 16.50 |
| B1 | 12.40 | 13.00 | 13.50 |
| B2 | 2.85 | 3.30 | 3.70 |
| B3 | 3.30 | 3.40 | 3.50 |
| C | 4.30 | 4.70 | 4.90 |
| C1 | 0.45 | 0.50 | 0.65 |
| C2 | 2.30 | 2.50 | 2.90 |
| C3 | 2.30 | 2.70 | 3.00 |
| a1 | 0.60 | 0.80 | 0.95 |
| R | 3.05 | 3.10 | 3.30 |
| e | 2.35 | 2.50 | 2.75 |
| a | 1.05 | 1.35 | 1.50 |

## Revision History

| Revision | Release | Remark |
|---|---|---|
| V1.0 | 2024/07/16 | Initial Release |

## Disclaimer

The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which
requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements,the information described or contained herein may be changed without prior notice.