## DESCRIPTION

The AM019NS045L is available in the TO-220 Package.

| VDSS | RDSON | ID |
|---|---|---|
| 40V | 1.9mΩ | 80A |

## FEATURES

- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g$ x $R_{DS(on)}$ Product (FOM)
- 100%Avalanche Tested
- Excellent Low Ciss
- High Robustness and Reliability
- Increases Maximum Current Capability
- Low Power Loss, High Power Density
- Easy Paralleling

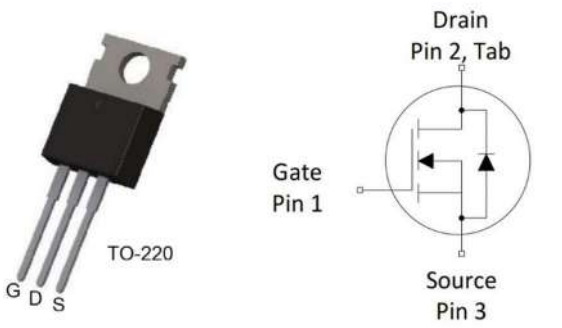
## APPLICATIONS

- Synchronous Rectification for AC/DC Quick Charger
- Battery Management
- UPS (Uninterruptible Power Supplies)

## ORDERING INFORMATION

| Package Type | Part Number | |
|---|---|---|
| TO-220<br>SPQ: 50pcs /Tube | T3 | AM019NS045LT3VU |
| Note | R: Tape & Reel<br>V: Halogen free Package | |
| AiT provides all RoHS products | | |

## PIN DESCRIPTION




| Pin# | Symbol | Function |
|---|---|---|
| 1 | G | Gate |
| 2 | D | Drain |
| 3 | S | Source |

## ABSOLUTE MAXIMUM RATINGS

$T_C$=25℃, unless otherwise Noted

| | | |
|---|---|---|
| $V_{DS}$, Drain-Source Voltage | | 60V |
| $V_{GS}$, Gate-Source Voltage | | ±20V |
| $I_D$, Continue Drain Current | $T_C$=25℃(Silicon limit) | 174A |
| | $T_C$=25℃(Package Limited) | 80A |
| | $T_C$=100℃(Silicon limit) | 110A |
| | Ta=25℃ | 20A |
| $I_{D\_pulse}$, Pulsed Drain Current | $T_C$ = 25°C, $t_p$ =100uS | 320A |
| $E_{AS}$, Avalanche Energy, Single Pulse | L=0.5mH , Vds=32V | 121mJ |
| $R_{thJC}$, Thermal Resistance, Junction-Case | | 1℃/W |
| $R_{thJA}$, Thermal Resistance, Junction-Ambient (Min. Footprint) | | 76℃/W |
| Ptot, Power Dissipation | $T_C$=25℃ | 125W |
| | $T_a$=25℃ | 1.7W |
| $T_J$, Operating Junction Temperature | | -55℃~+150℃ |
| $T_{STG}$, Storage Temperature | | -55℃~+150℃ |
| Tsold, Soldering Temperature, Wave Soldering Only Allowed at Leads (1.6mm from case for 10s) | | 260℃ |

Stresses above 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 Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## ELECTRICAL CHARACTERISTICS

$T_C$ = 25°C, unless otherwise Noted

| Parameter | Symbol | Conditions | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static Characteristic** | | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250μA | | 40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$= 40V, $V_{GS}$=0V | $T_J$ = 25°C | - | 0.05 | 1 | μA |
| | | | $T_J$ = 150°C | - | - | 100 | |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$= 0V, $V_{GS}$=±20V | | - | ±10 | ±100 | nA |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=20A | | - | 1.90 | 2.50 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A | | - | 2.80 | 3.50 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | | 1.20 | - | 2.40 | V |
| Forward Transconductance | gfs | $V_{DS}$=5V, $I_D$=20A | | - | 45 | - | S |
| **Dynamic Characteristic** | | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=20V, $V_{GS}$=0V, f=1MHz | | - | 3983 | - | pF |
| Output Capacitance | $C_{oss}$ | | | - | 1461 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | - | 174 | - | |
| Total Gate Charge | $Q_G$ | $V_{DS}$= 20V, $I_D$=50A, $V_{GS}$= 10V | | - | 74 | - | nC |
| Gate-Source charge | $Q_{gS}$ | | | - | 16 | - | |
| Gate-Drain charge | $Q_{gd}$ | | | - | 16 | - | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$= 20V, $R_{G\_ext}$=2.2Ω, $V_{GS}$= 10V, $I_D$=29A | | - | 0.60 | - | ns |
| Rise Time | $t_r$ | | | - | 1.40 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | - | 54.80 | | |
| Fall Time | $t_f$ | | | - | 2.20 | - | |
| Gate Resistance | Rg | $V_{GS}$=0V, $V_{DS}$ =0V, f=1MHz | | - | 1.90- | - | Ω |
| **Body Diode Characteristic** | | | | | | | |
| Body Diode Continuous Forward Current | $I_S$ | $T_C$ = 25°C | | - | - | 80 | A |
| Body Diode Pulsed Current | $I_{S\_pulse}$ | $T_C$ = 25°C | | - | - | 320 | A |
| Body Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_{SD}$=20A | | - | 0.8 | 1.20 | V |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $V_R$=27V, $I_F$=20A di/dt=100A/μs | | - | 98 | - | ns |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | | - | 258 | - | nC |

## TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Output Characteristics

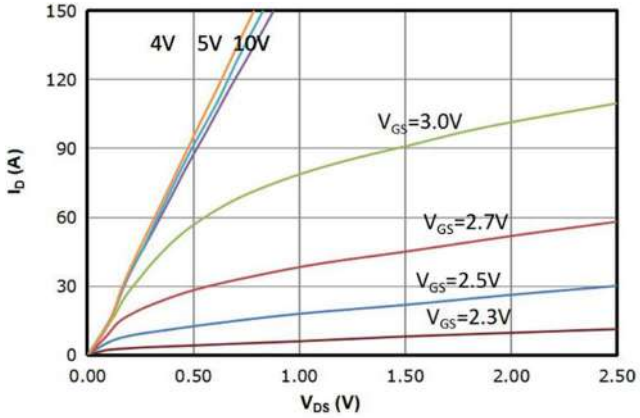



Fig 2. Transfer Characteristics

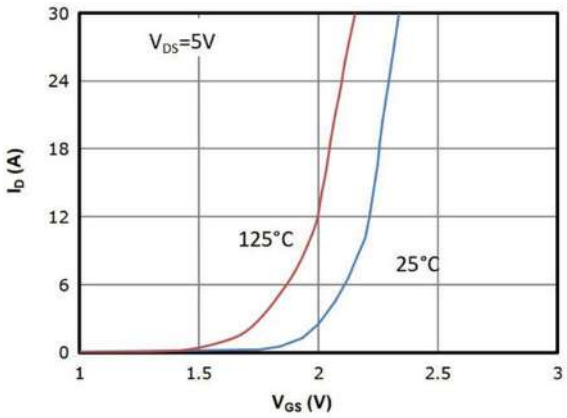



Fig 3. Rds(on) vs. Drain Current and Gate Voltage

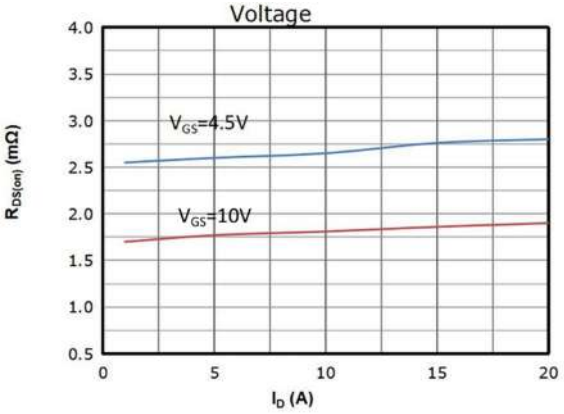



Fig 4. Rds(on) vs. Gate Voltage

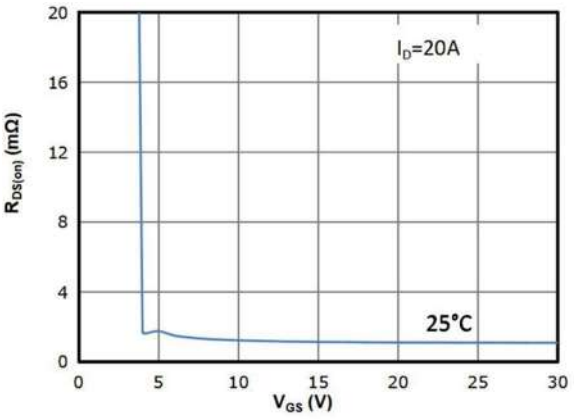



Fig 5. Rds(on) vs. Temperature

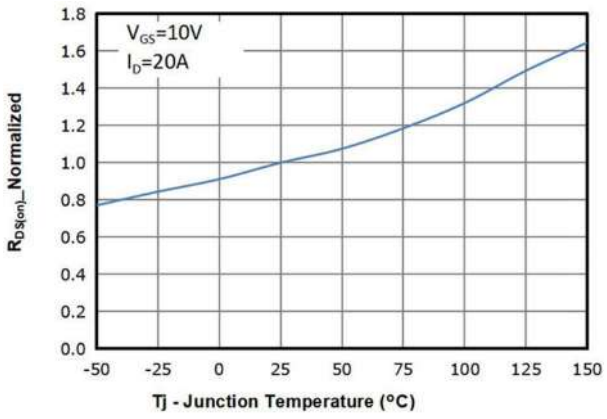



Fig 6. Vgs(th) vs. Temperature

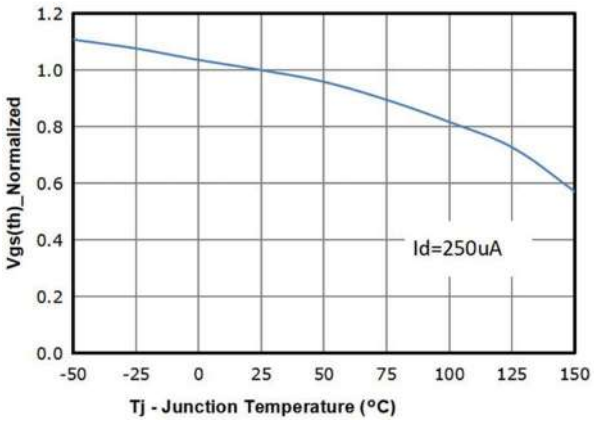


Fig 7. BVdss vs. Temperature

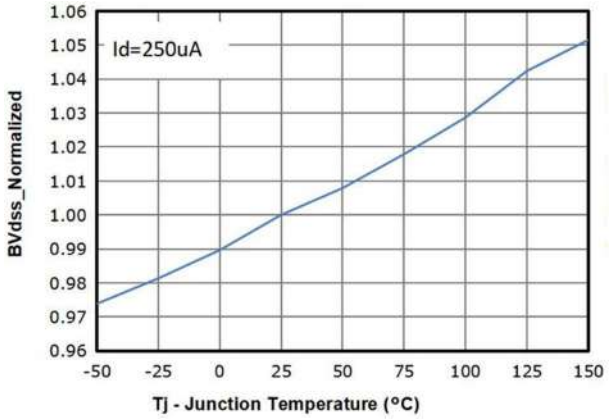



Fig 8. Capacitance Characteristics

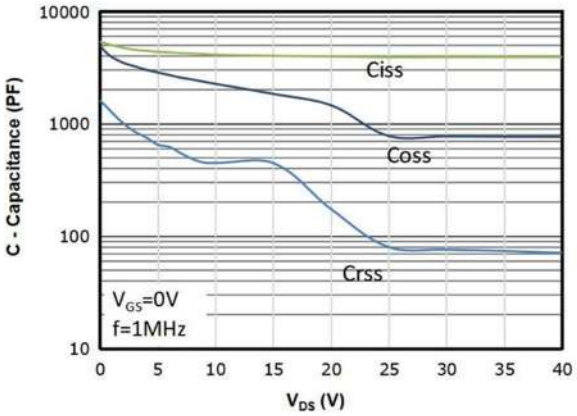



Fig 9. Gate Charge Characteristic

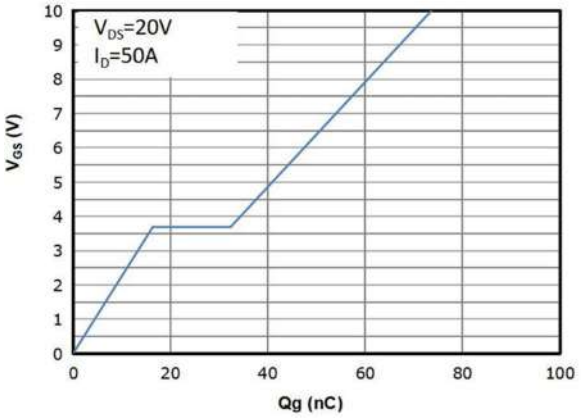



Fig 10. Body-Diode Forward Characteristic

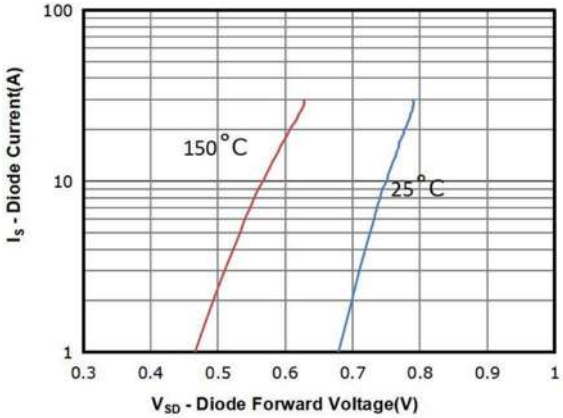



Fig 11. Power Dissipation

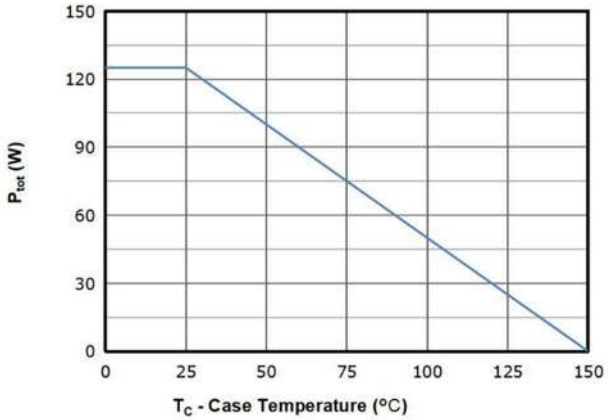



Fig 12. Drain Current Derating

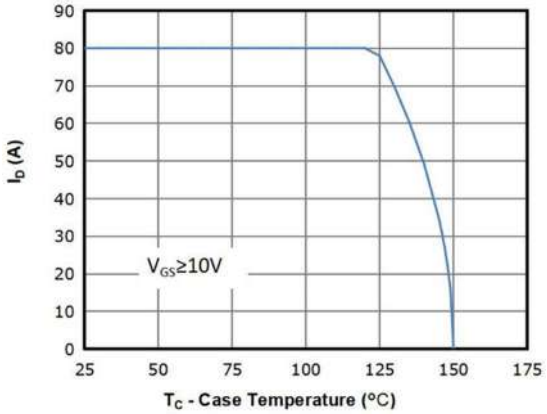


Fig 13. Safe Operating Area

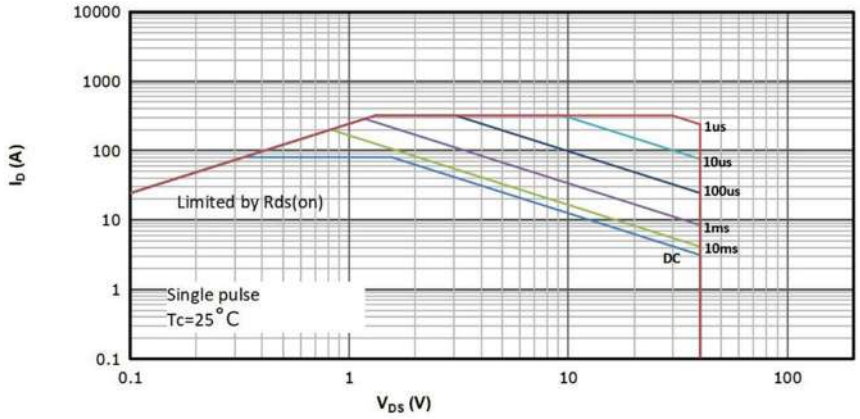



Fig 14. Max. Transient Thermal Impedance

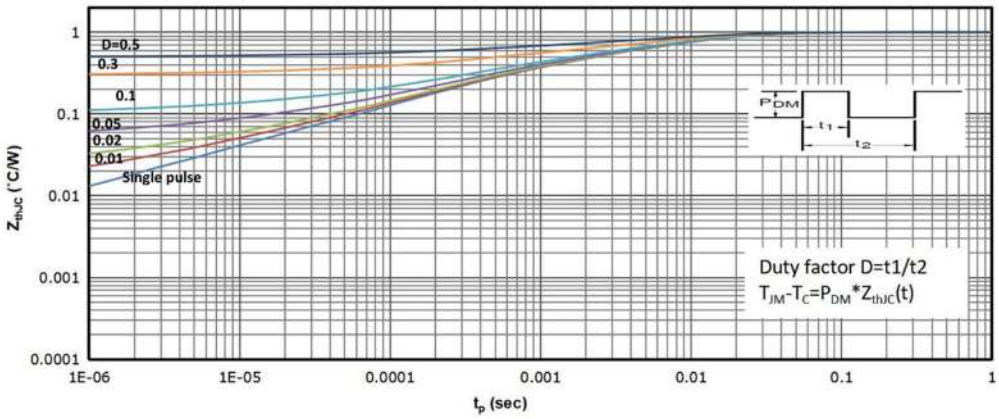
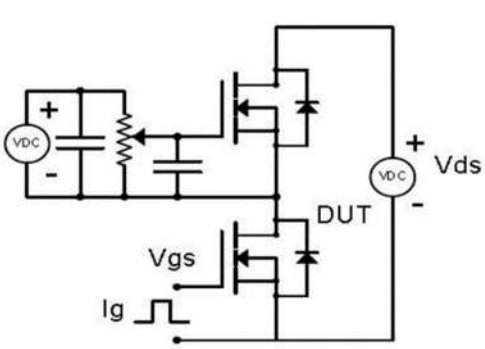



Fig 15. Gate Charge Test Circuit & Waveform



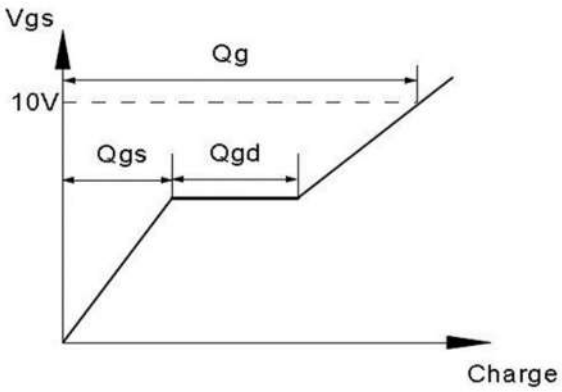



Fig 16. Resistive Switching Test Circuit & Waveforms

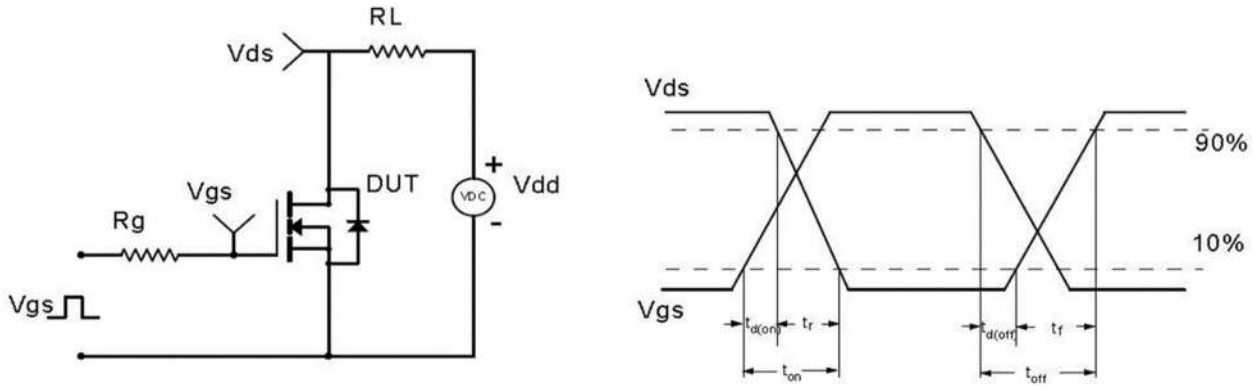



Fig 17. Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

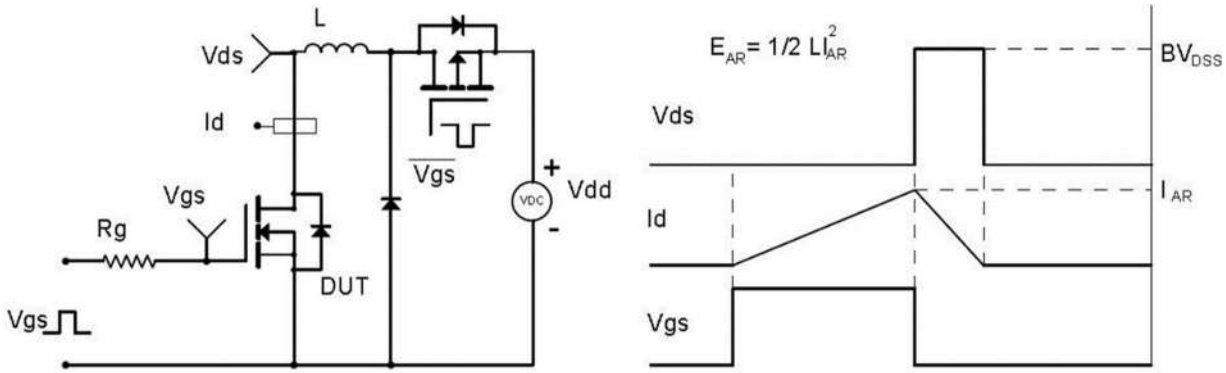
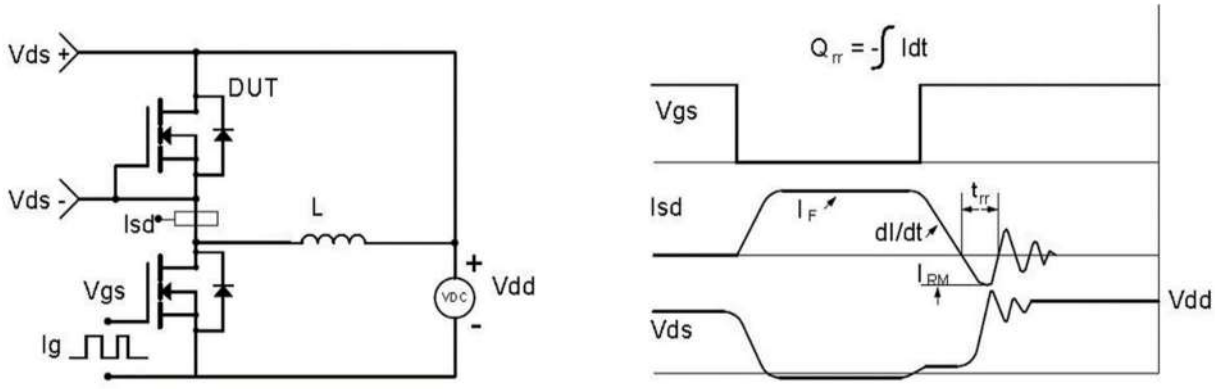
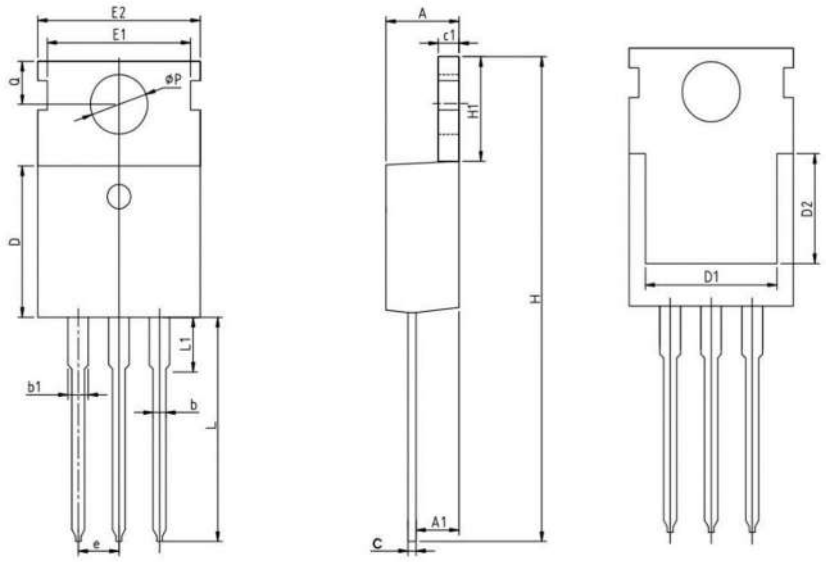


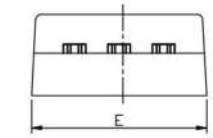

Fig 18. Diode Recovery Test Circuit & Waveforms

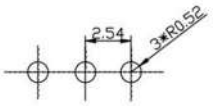


## PACKAGE INFORMATION

Dimension in TO-220(Unit: mm)




UNIT: mm

**RECOMMENDED LAND PATTERN**

| Symbol | Millimeter | |
|---|---|---|
| | Min. | Max. |
| A | 4.400 | 4.800 |
| A1 | 2.250 | 2.550 |
| b | 0.720 | 0.920 |
| b1 | 1.120 | 1.420 |
| c | 0.400 | 0.600 |
| c1 | 1.200 | 1.400 |
| D | 8.800 | 9.400 |
| D1 | 7.750 | 8.150 |
| D2 | 6.550 | 6.950 |
| e | 2.540 | |
| E | 9.650 | 10.350 |
| E1 | 8.700 | |
| E2 | 9.700 | 10.300 |
| H | 28.700 | 29.700 |
| H1 | 6.250 | 6.850 |
| L | 13.200 | 13.800 |
| L1 | 2.800 | 3.400 |
| Q | 2.600 | 3.000 |
| φP | 3.450 | 3.750 |

## IMPORTANT NOTICE

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