# N-CHANNEL POWER MOSFET MEM12N65

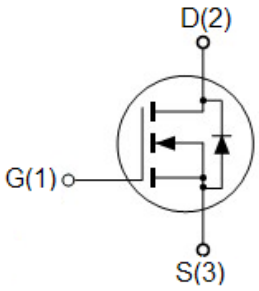
## General Description

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

## Features

- 650V，12A
- RDS(ON)=0.64Ω@$V_{GS}$=10V
- LOW CRSS
- FAST SWITCHING
- PACKAGE ： TO-220F

## Pin Configuration





**MEM12N65A3G**

## Maximum Ratings(Ta=25℃)

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 650V | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Drain Current | $T_A$=25℃ | $I_D$ | 12 | A |
| | $T_A$=100℃ | | 4.0 | |
| Pulsed Drain Current[1,2] | | $I_{DM}$ | 28 | A |
| Total Power Dissipation | $T_A$=25℃ | Pd | 51 | W |
| Operating Temperature Range | | $T_{Opr}$ | -55-150 | ℃ |
| Storage Temperature Range | | $T_{stg}$ | -55-150 | ℃ |

## Thermal Characteristics

| Parameter | Symbol | TYP. | MAX. | Unit |
|---|---|---|---|---|
| Thermal Resistance,Junction-to-Case | RθJC | 2.7 | 3 | ℃/W |

## Electrical Characteristics

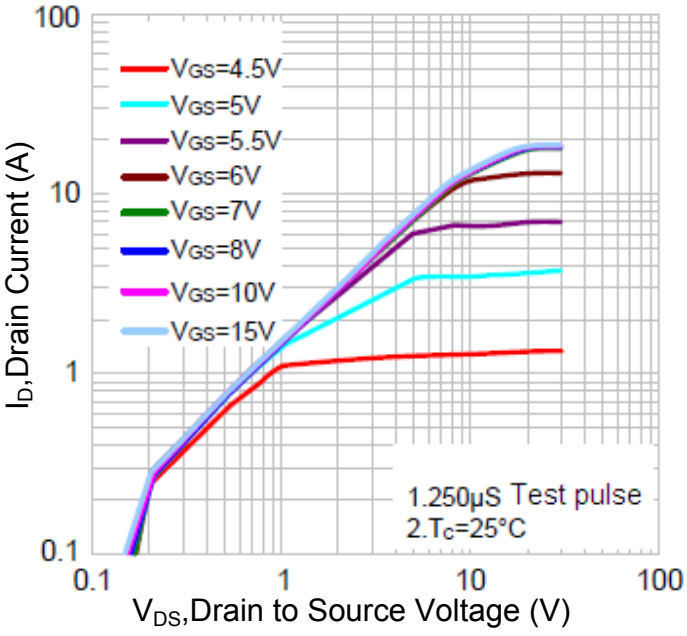
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 650 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=250μA | 2.0 | - | 4.0 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$=0V，$V_{GS}$=30V | - | - | 100 | nA |
| | | $V_{DS}$=0V，$V_{GS}$=-30V | - | - | -100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=650V $V_{GS}$=0V | - | 0.2 | 1 | μA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=3.5A | - | 0.64 | 0.8 | Ω |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ =15V, $I_D$= 3A | - | 2 | 10 | S |
| Drain-Source Diode Forward Continuous Current | Is | $V_{GS}$=0V | - | - | 12 | A |
| Source-drain (diode forward) voltage | $V_{SD}$ | $V_{GS}$=0V,$I_S$=12A | - | - | 1.4 | V |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | Ciss | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1 MHz(Note1,2) | - | 1476 | - | pF |
| Output Capacitance | Coss | | - | 152 | - | |
| Reverse Transfer Capacitance | Crss | | - | 4.5 | - | |
| **Switching Characteristics** | | | | | | |
| Turn-On Delay Time | td(on) | $V_{DD}$ = 325 V, $R_G$ = 25Ω $V_{GS}$ = 10V, $I_D$ = 12A(Note2) | - | 37 | - | ns |
| Rise Time | tr | | - | 61 | - | |
| Turn-Off Delay Time | td(off) | | - | 80 | - | |
| Fall-Time | tf | | - | 46 | - | |
| Total Gate Charge | Qg | $V_{DS}$ = 520V, $V_{GS}$ = 10V, $I_D$ = 12A(Note1,2) | | 24.15 | - | nc |
| Gate-Source Charge | Qgs | | - | 7.86 | - | |
| Gate-Drain Charge | Qgd | | - | 7.47 | - | |

1、Not influenced by junction temperature.

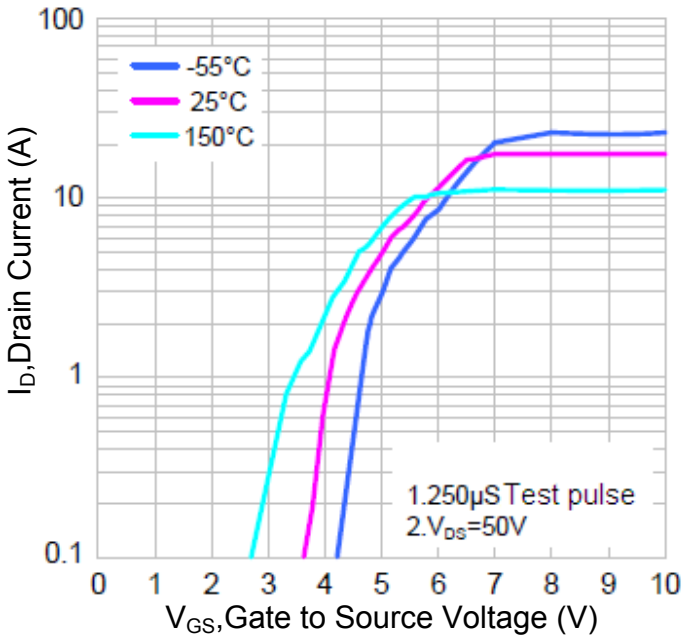
2、Pulse width <300μs , duty cycle <2%.

## Typical performance characteristics

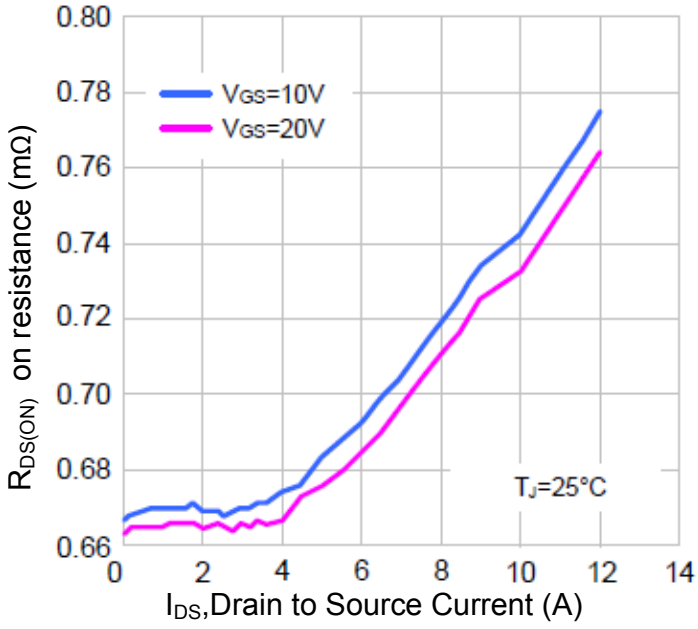
On-state Characteristics



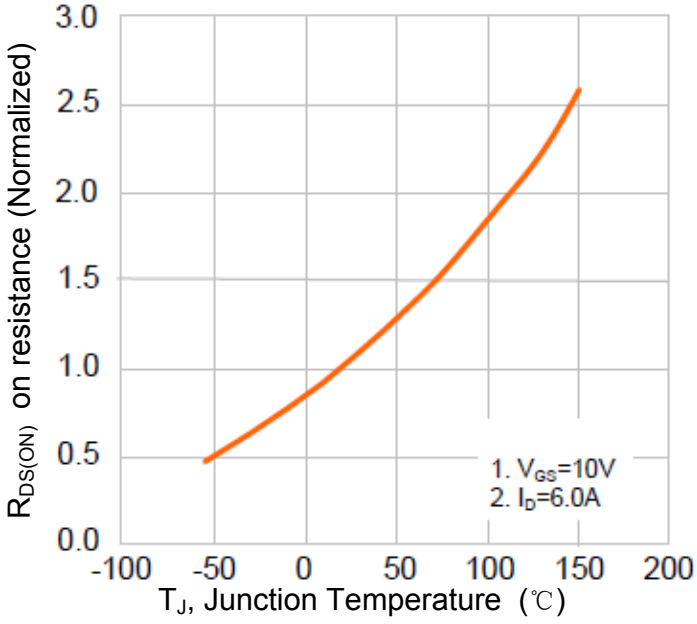

Transfer Characteristics



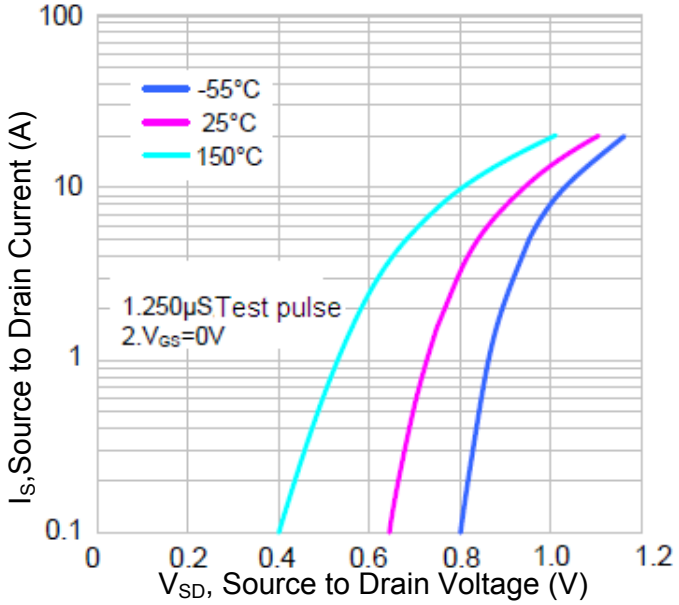

On-Resistance vs. Drain Current



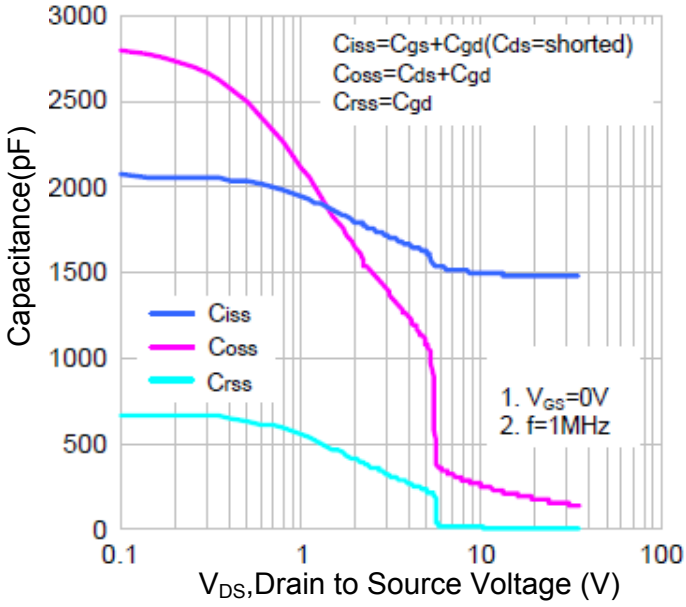

Normalized On-Resistance vs. $T_J$



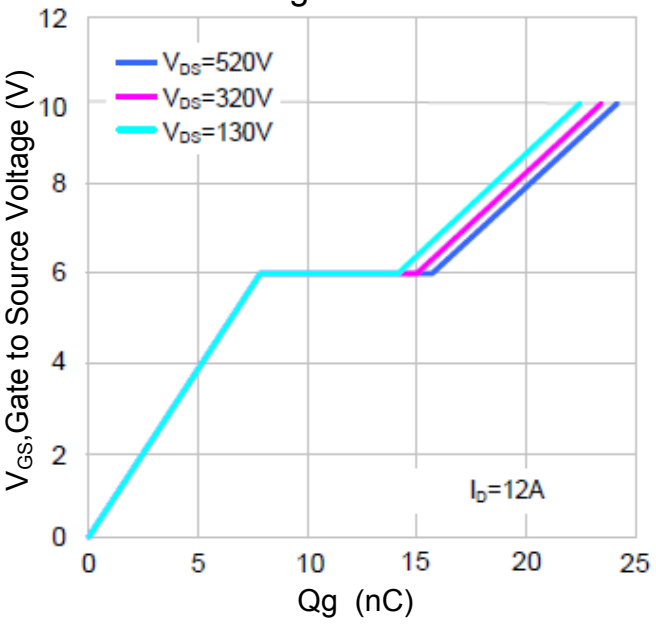
Body Diode Characteristics



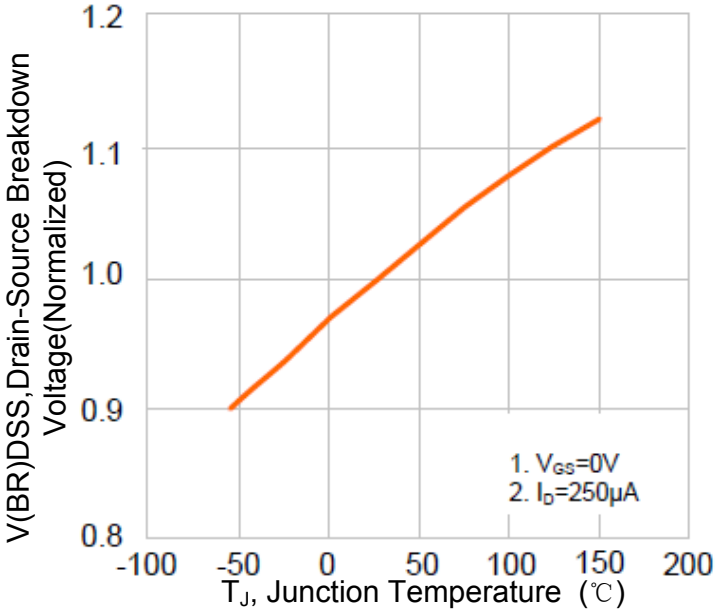

Capacitance vs. Drain-Source Voltage



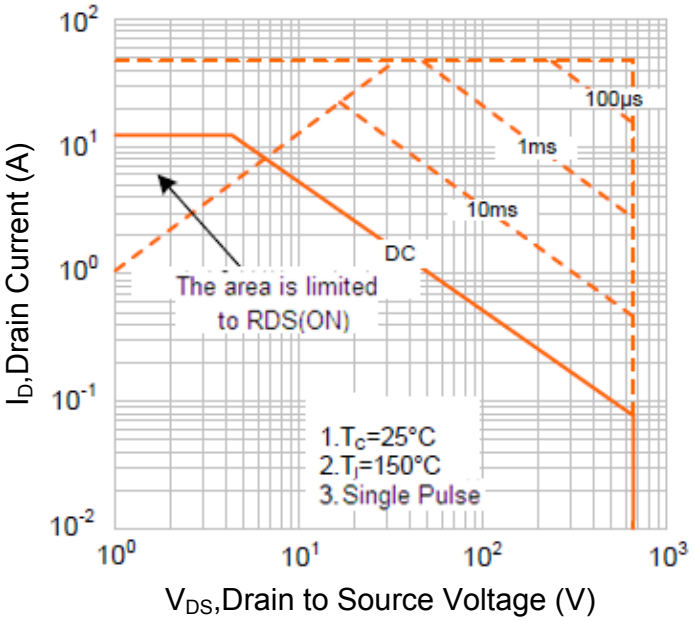

Gate Charge Characteristics



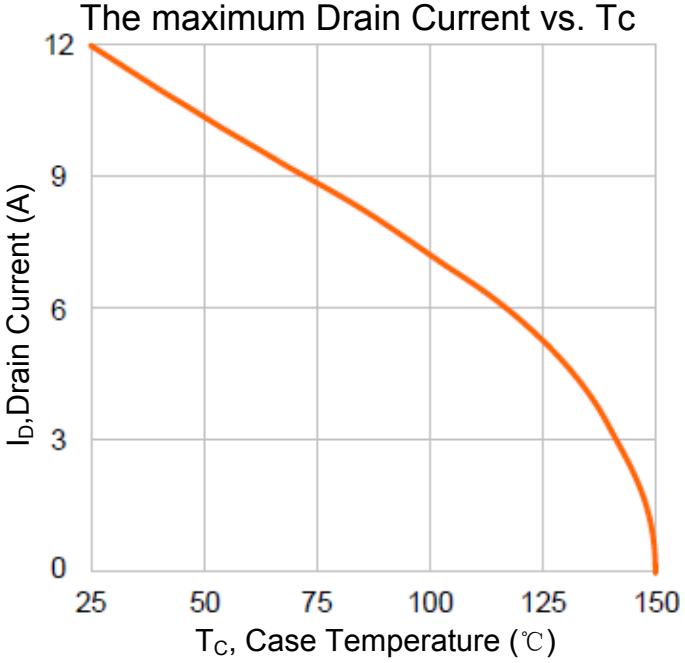

Drain-Source Breakdown Voltage vs. $T_J$



The maximum safe operating area

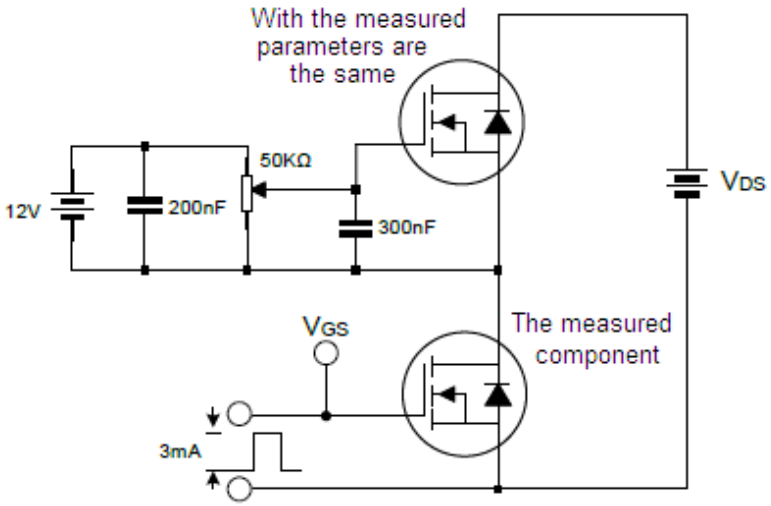


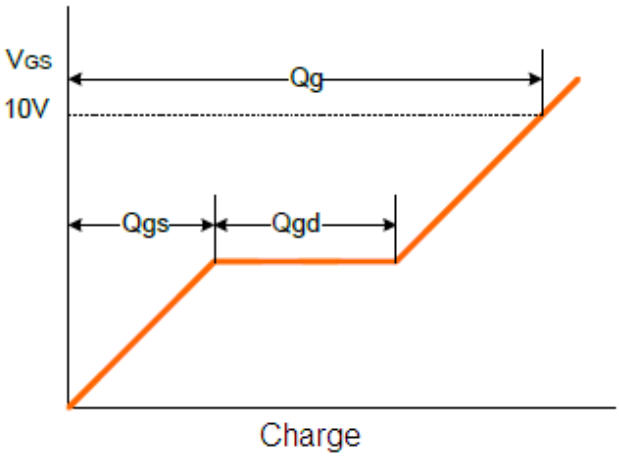

The maximum Drain Current vs. Tc



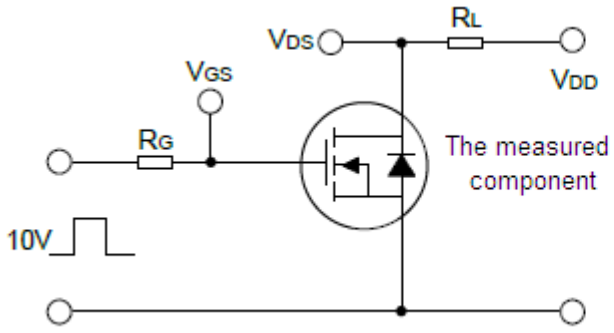

## Typical Circuit

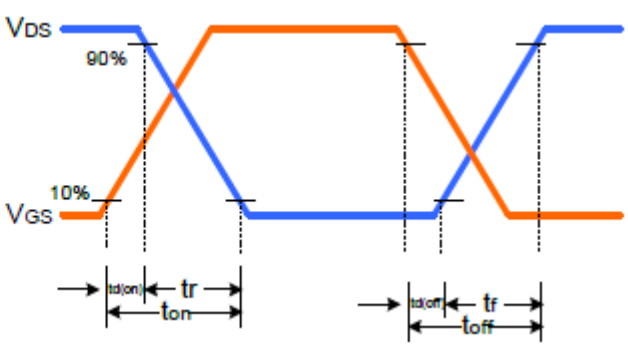
### Gate Charge Testing circuit with Waveform



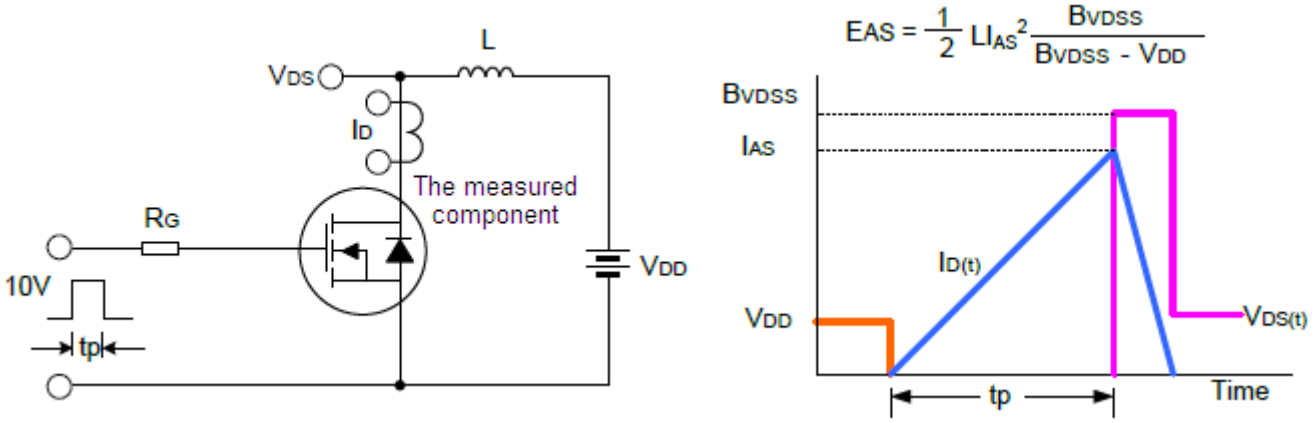




### Switching test circuit with Waveform



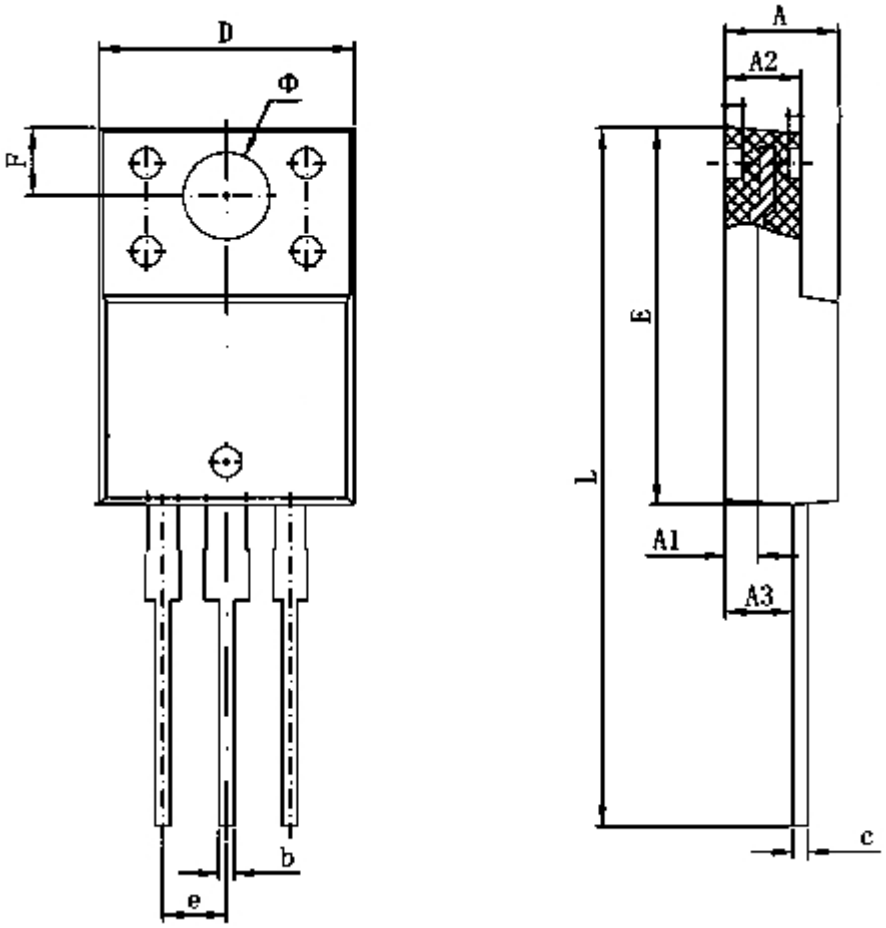



## Eas Test circuit and Waveform



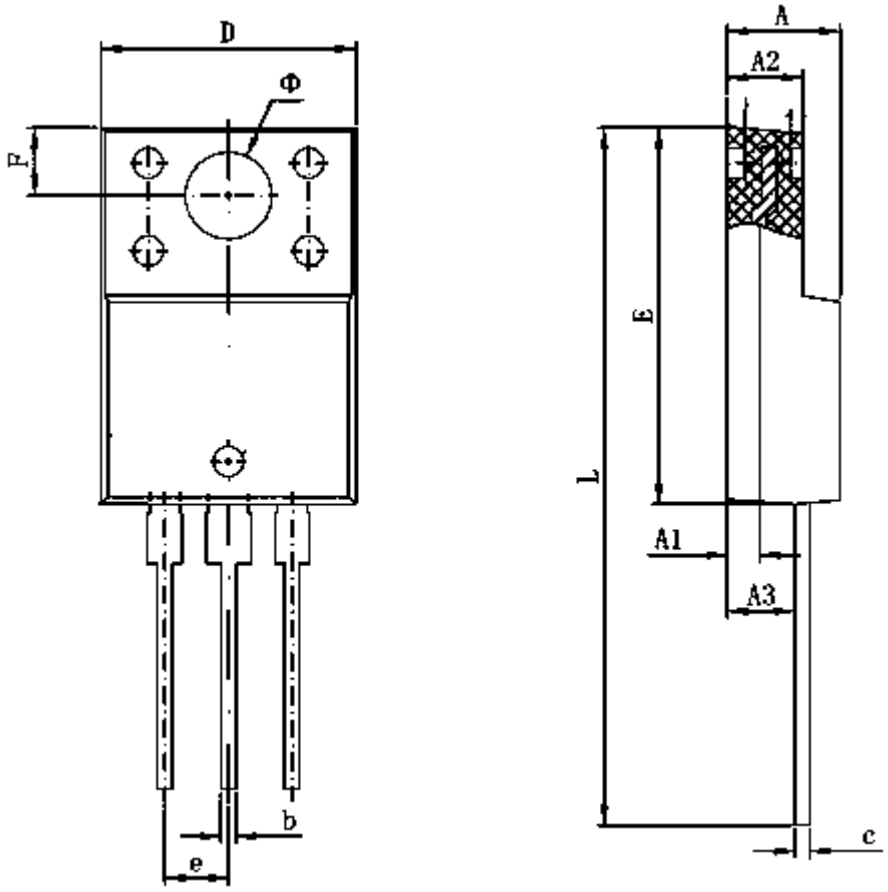
## Package Information

- **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 |

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