# N-CHANNEL POWER MOSFET MEM12N60

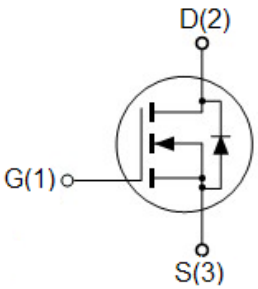
## General Description

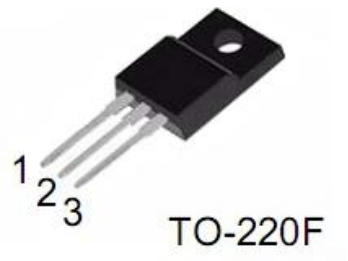
The MEM12N60 is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

## Features

- 600V，12A
- $R_{DS(ON)}$=0.8Ω@$V_{GS}$=10V
- LOW Crss
- Fast Switching
- Avalanche energy specified
- Package ：TO-220F

## Pin Configuration




**MEM12N60A3G**

## Maximum Ratings (Ta=25℃)

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 600V | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Drain Current | $T_A$=25℃ | $I_D$ | 12 ▲ | A |
| | $T_A$=100℃ | | 7.4 ▲ | |
| Pulsed Drain Current[1,2] | | $I_{DM}$ | 48 ▲ | A |
| Total Power Dissipation | $T_A$=25℃ | Pd | 50 | W |
| Operating Junction Temperature Range | | $T_J$ | -40~150 | ℃ |
| Storage Temperature Range | | $T_{stg}$ | -55~150 | ℃ |

▲Drain current limited by maximum junction temperature.

## Thermal Characteristics

| Parameter | Symbol | TYP. | MAX. | Unit |
|---|---|---|---|---|
| Thermal Resistance, Junction-to-Case | RθJC | 2.4 | 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 | 600 | 650 | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=250μA | 2.2 | 3.4 | 4.1 | 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 | $I_{DSS}$ | $V_{DS}$=600V $V_{GS}$=0V | - | 0.1 | 20 | μA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=6A | - | 0.54 | 0.8 | Ω |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ =40V, $I_D$=6A | - | 13 | - | S |
| Drain-Source Diode Forward Continuous Current | Is | $V_{GS}$=0V | - | - | 12 | A |
| Source-drain (diode forward) voltage | $V_{SD}$ | $V_{GS}$=0V,$I_S$=10A | | 0.9 | 1.3 | V |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | Ciss | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1 MHz | - | 1750 | - | pF |
| Output Capacitance | Coss | | - | 185 | - | |
| Reverse Transfer Capacitance | Crss | | - | 22 | - | |
| **Switching Characteristics** | | | | | | |
| Turn-On Delay Time | td(on) | $V_{DD}$ = 300 V, $R_G$ = 25Ω $I_D$ =12A | - | 30 | - | ns |
| Rise Time | tr | | - | 100 | - | |
| Turn-Off Delay Time | td(off) | | - | 105 | - | |
| Fall-Time | tf | | - | 90 | - | |
| Total Gate Charge | Qg | $V_{DS}$ = 400V, $V_{GS}$ = 10V, $I_D$ = 12A | | 45 | - | nc |
| Gate-Source Charge | Qgs | | - | 8.5 | - | |
| Gate-Drain Charge | Qgd | | - | 21 | - | |

1、Repetitive rating, pulse width limited by junction temperature.

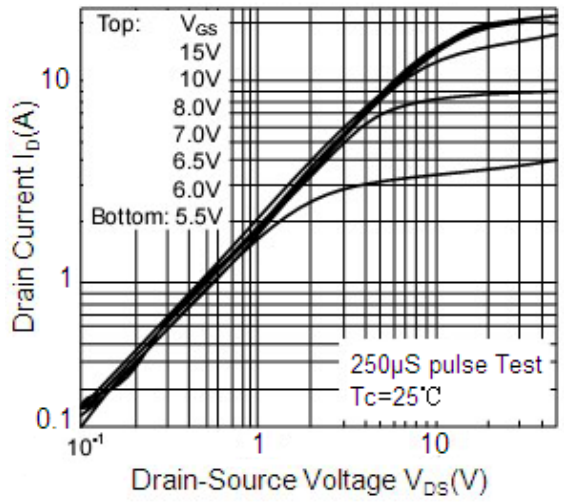
2、Pulse width <300μs , duty cycle <2%.

3、$I_{SD}$≤12A di/dt≤200A/μs,$V_{DD}$≤$BV_{DSS}$, $T_J$≤=150℃.

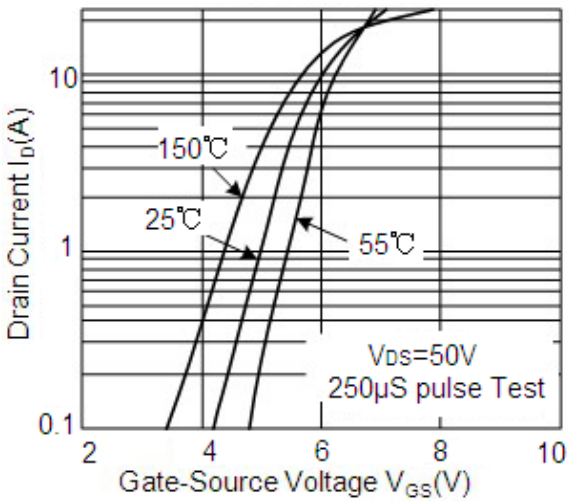
4、L=10mH,$V_{DD}$=50V,$I_D$=12A,$R_G$=25Ω,Starting $T_J$=25℃.

## Typical performance characteristics

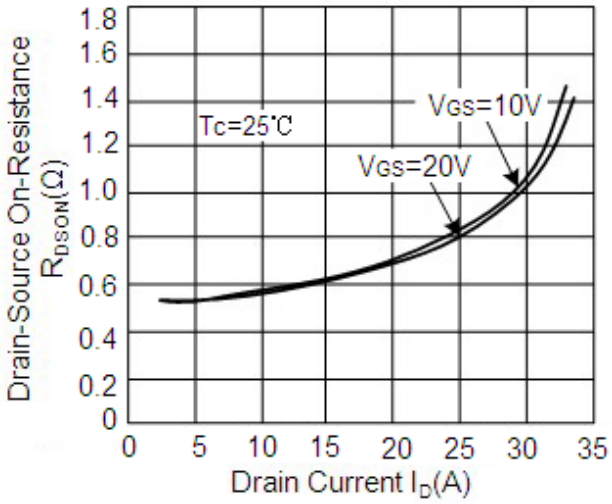
### On-Stage characteristics



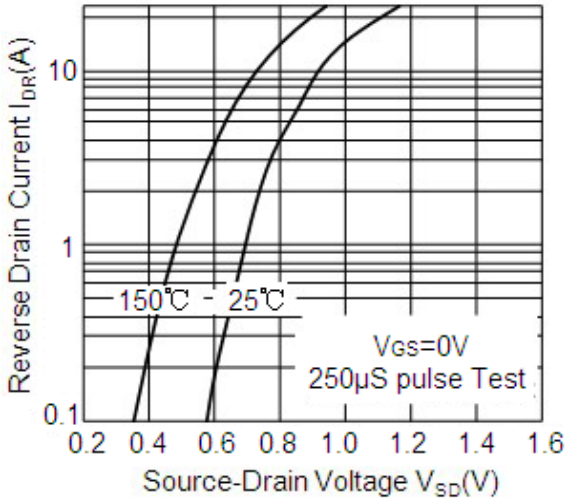

### Transfer characteristics



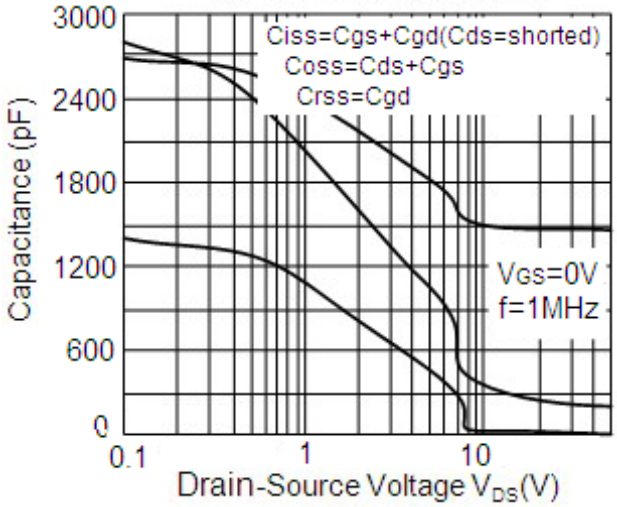

### On-Resistance Variation vs. Drain Current and Gate Voltage



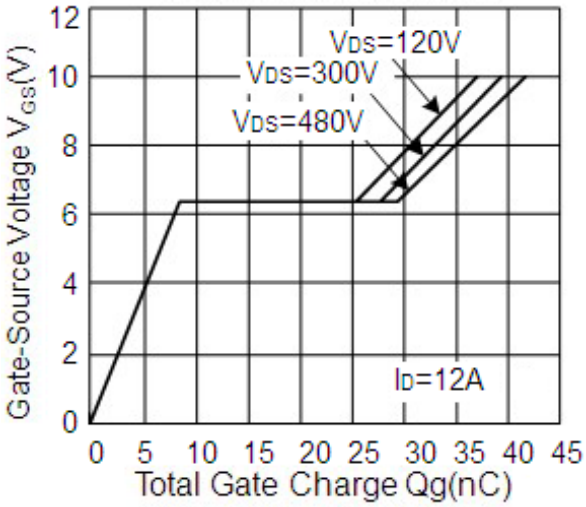

### Body Diode forward Voltage vs. Source Current



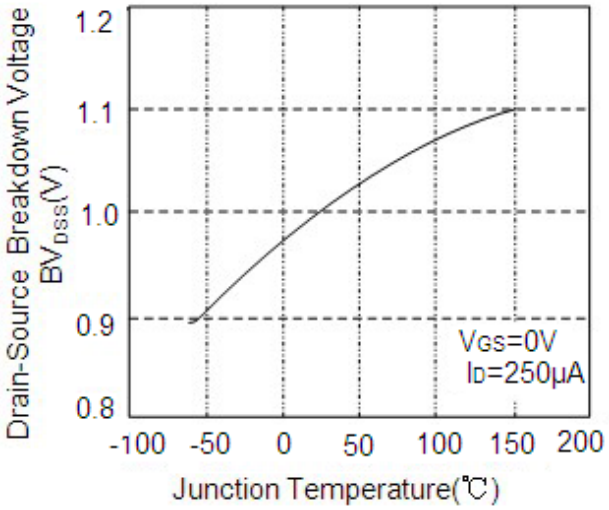

### Capacitance characteristics



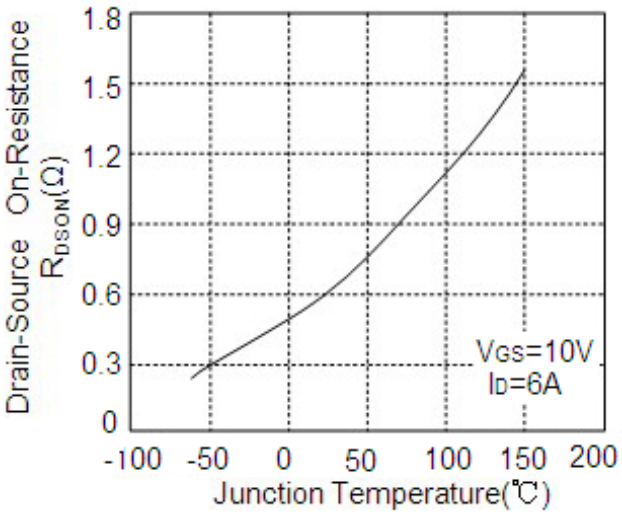

### Gate Charge characteristics



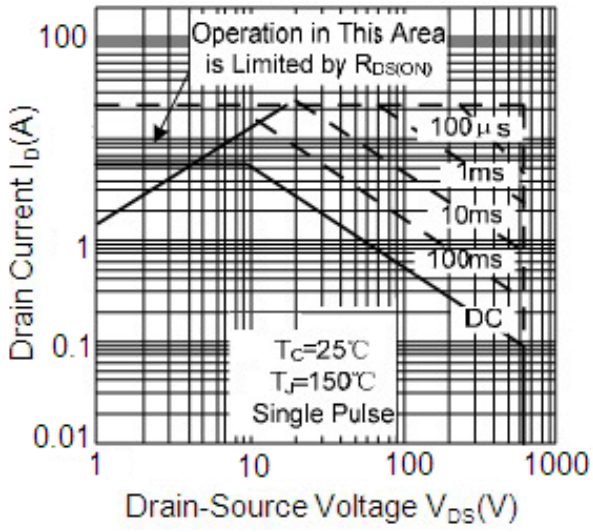
**Breakdown Voltage Variation Vs. Temperature**



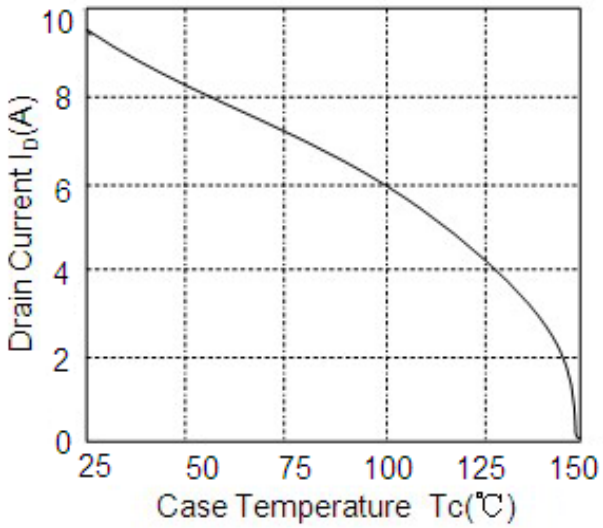

**On-Resistance vs. Temerature**



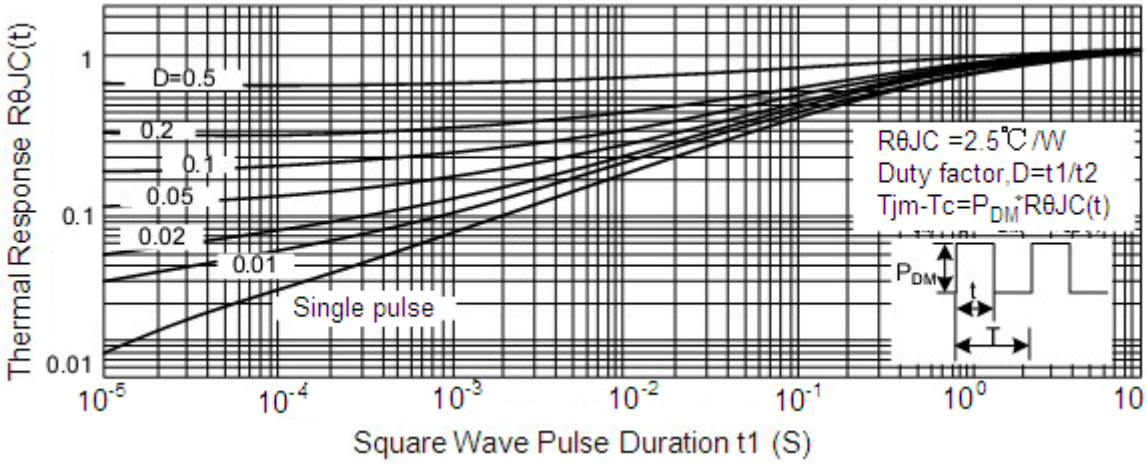

**Maximum safe operating area**




**Maximum Drain Curren vs. Case Temperature**

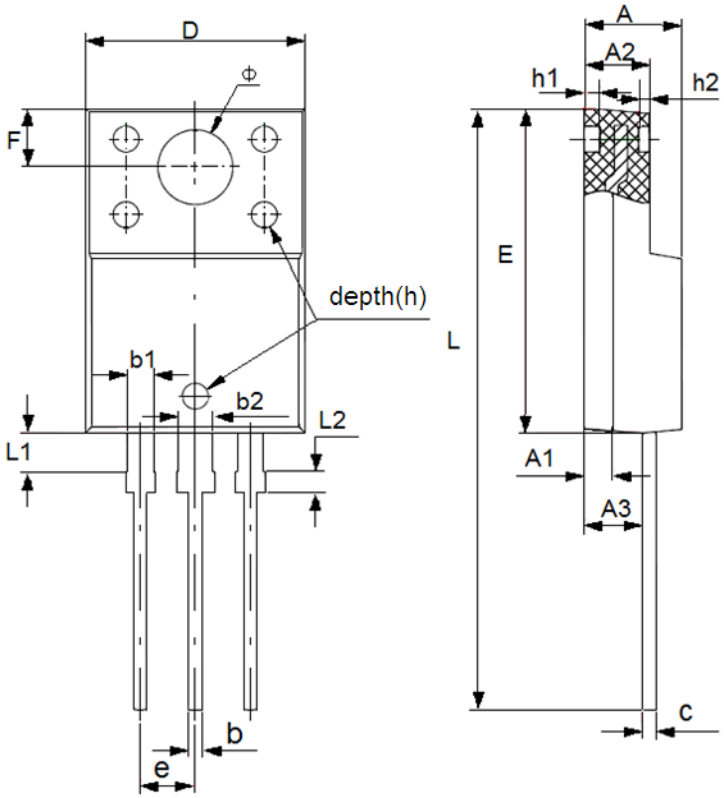



**Transient Thermal Response Curve**



## Package Information

- **Package Type：TO-220F**




| DIM | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 4.3 | 4.83 | 0.1693 | 0.1902 |
| A1 | 1.3(TYP) | | 0.0512(TYP) | |
| A2 | 2.45 | 3.2 | 0.0965 | 0.126 |
| A3 | 2.5 | 2.9 | 0.0984 | 0.1142 |
| b | 0.5 | 0.75 | 0.0197 | 0.0295 |
| b1 | 1.1 | 1.35 | 0.0433 | 0.0531 |
| b2 | 1.5 | 1.75 | 0.0591 | 0.0689 |
| c | 0.5(TYP) | | 0.0197(TYP) | |
| D | 9.96 | 10.4 | 0.3921 | 0.4094 |
| E | 14.8 | 16.1 | 0.5827 | 0.6339 |
| e | 2.54(TYP) | | 0.1(TYP) | |
| F | 2.7(TYP) | | 0.1063(TYP) | |
| Φ | 3.45(TYP) | | 0.1358(TYP) | |
| h | 0.15(TYP) | | 0.0059(TYP) | |
| h1 | 0.8(TYP) | | 0.0315(TYP) | |
| h2 | 0.5(TYP) | | 0.0197(TYP) | |
| L | 28 | 28.8 | 1.1024 | 1.1339 |
| L1 | 1.7 | 1.9 | 0.067 | 0.0748 |
| L2 | 0.9 | 1.1 | 0.0354 | 0.0433 |

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