# MJ N-Channel Enhancement Mode Power MOSFET

## Description

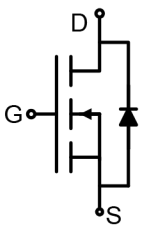
The MJ0102M uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

## General Features

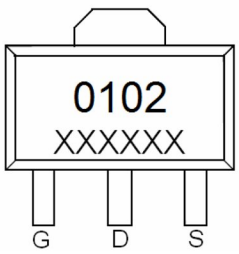
- $V_{DS}$ =100V,$I_D$ =-2A
  $R_{DS(ON)}$ <240mΩ @ $V_{GS}$ =10V (Typ:210mΩ)
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

## Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply




Schematic diagram




SOT-89 -3L top view

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| 0102 | MJ0102M | SOT-89 | Ø330mm | 12mm | 2500 units |

## Absolute Maximum Ratings ($T_C$ =25 ℃unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 2 | A |
| Drain Current-Pulsed (Note 1) | $I_{DM}$ | 5 | A |
| Maximum Power Dissipation | $P_D$ | 1.25 | W |
| Operating Junction and Storage Temperature Range | $T_J$ ,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 100 | ℃/W |

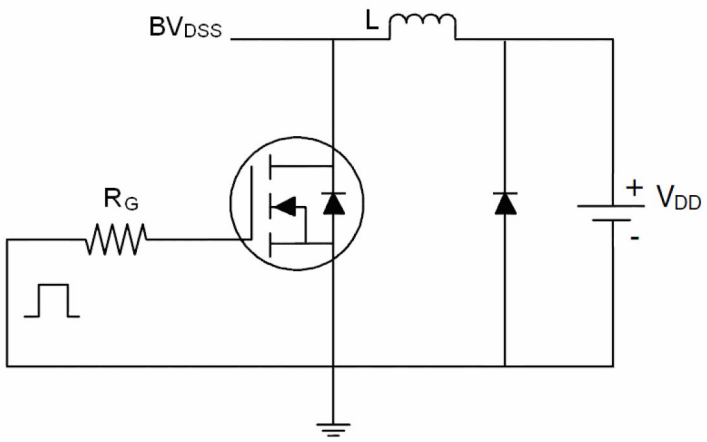
## Electrical Characteristics ($T_A$ =25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ =0V $I_D$ =250μA | 100 | 110 | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ =100V,$V_{GS}$ =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{DS}$ =±20V,$V_{DS}$ =0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$ ,$I_D$ =250μA | 1.2 | 1.8 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$ =10V, $I_D$ =1A | - | 210 | 240 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ =5V,$I_D$ =1A | 1 | - | - | S |
| **Dynamic Characteristics** (Note 4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$ =50V,$V_{GS}$ =0V, F=1.0MHz | - | 190 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 22 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 13 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ =50V, $I_D$ =1.3A, $R_L$ =39Ω,$V_{GS}$ =10V, $R_G$ =1Ω | - | 6 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 10 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 10 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 6 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =50V,$I_D$ =1.3A, $V_{GS}$ =10V | - | 5.2 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 0.75 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 1.4 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$ =0V,$I_S$ =1.3A | - | | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 2 | A |

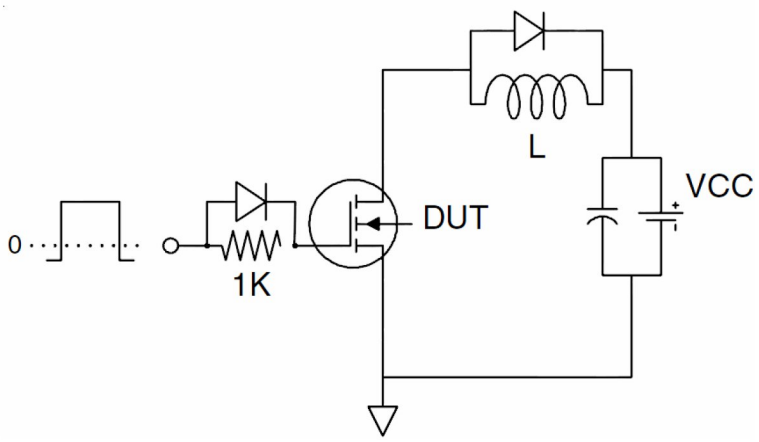
### Notes:

① Repetitive Rating: Pulse width limited by maximum junction temperature.
② Surface Mounted on FR4 Board, t ≤ 10 sec.
③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
④ Guaranteed by design, not subject to production

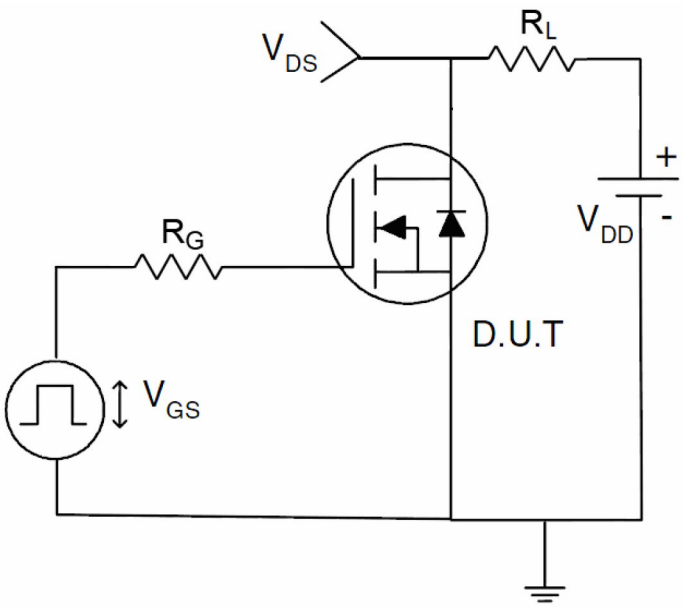
Test circuit




EAS test Circuit




Gate charge test Circuit




Switch Time Test Circuit

## Typical Electrical and Thermal Characteristics (Curves)

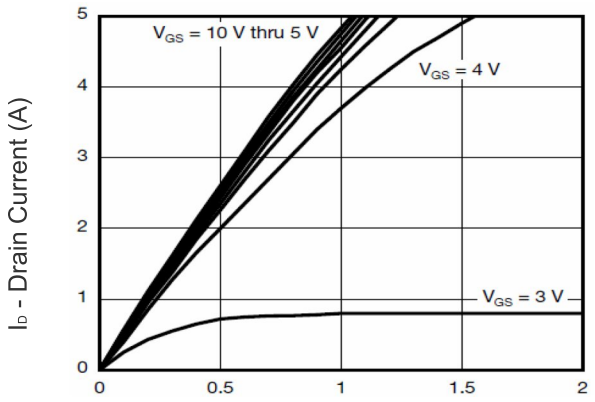



Figure 1 Output Characteristics

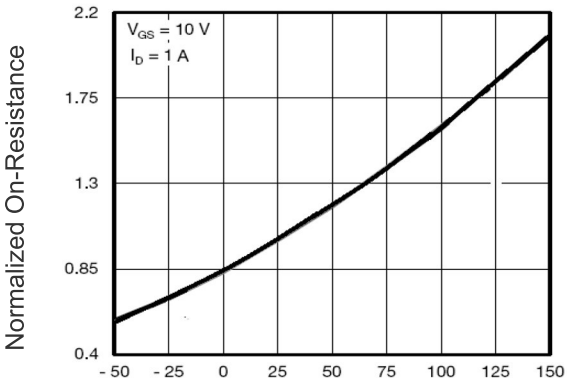



Figure 4 Rdson-Junction Temperature

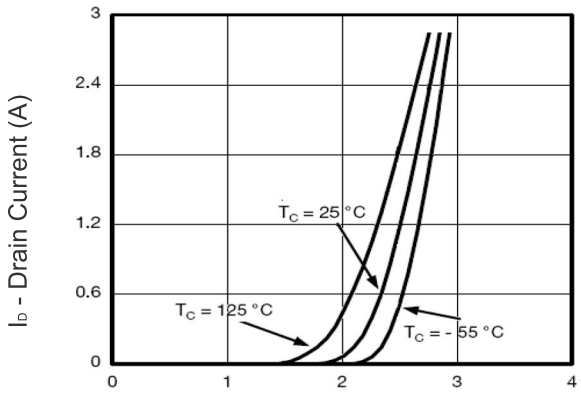



Figure 2 Transfer Characteristics

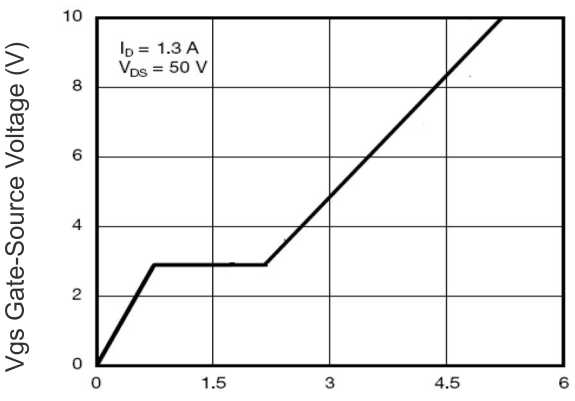



Figure 5 Gate Charge

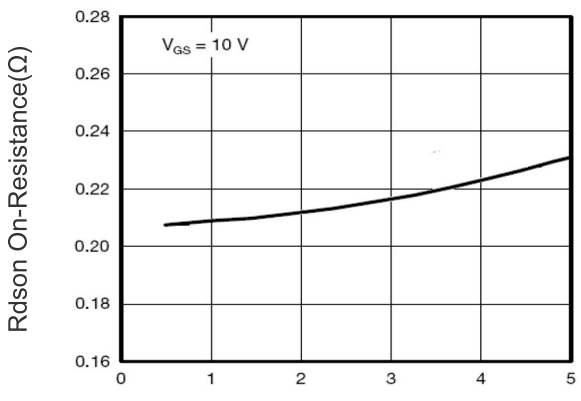



Figure 3 Rdson- Drain Current

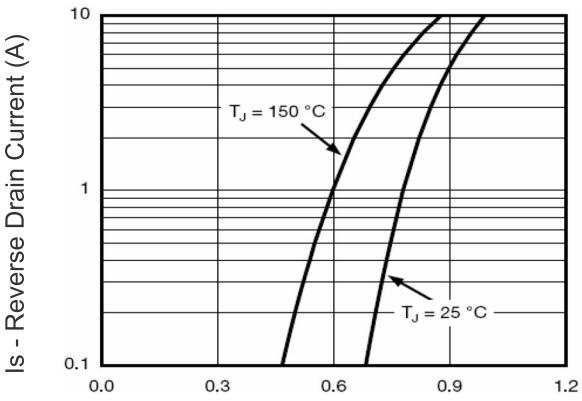



Figure 6 Source- Drain Diode Forward

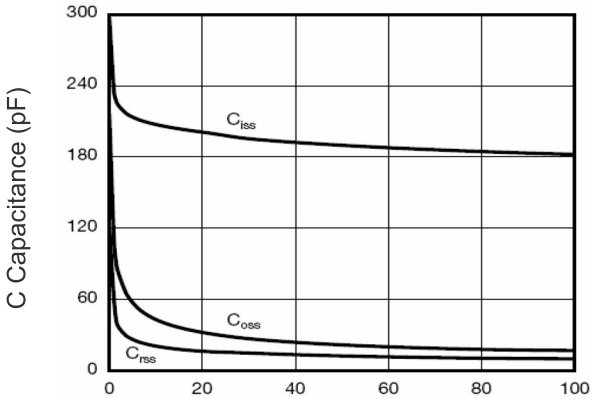



Figure 7 Capacitance vs Vds

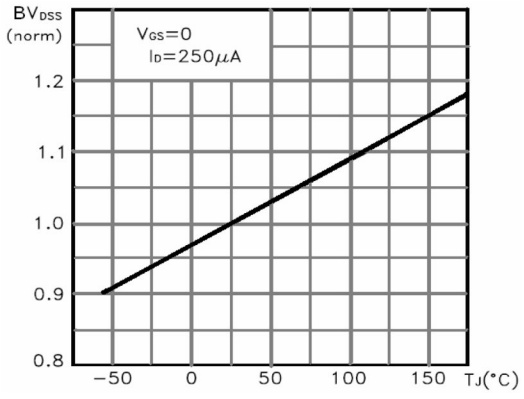



Figure 9 $BV_{DSS}$ vs Junction Temperature

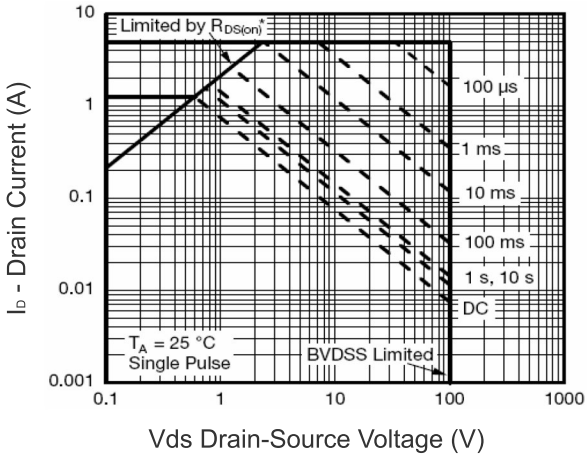



Figure 8 Safe Operation Area

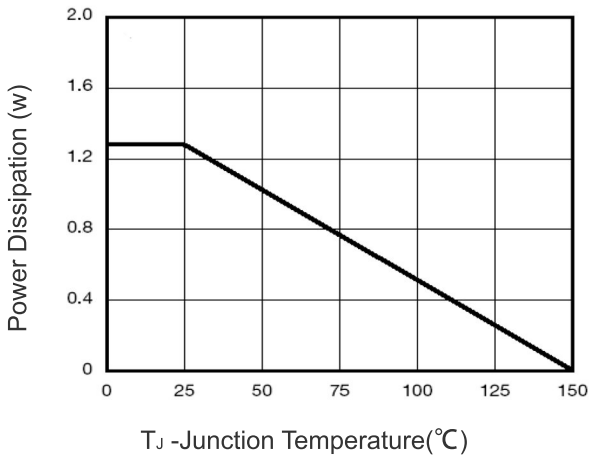



Figure 10 Power De-ratin

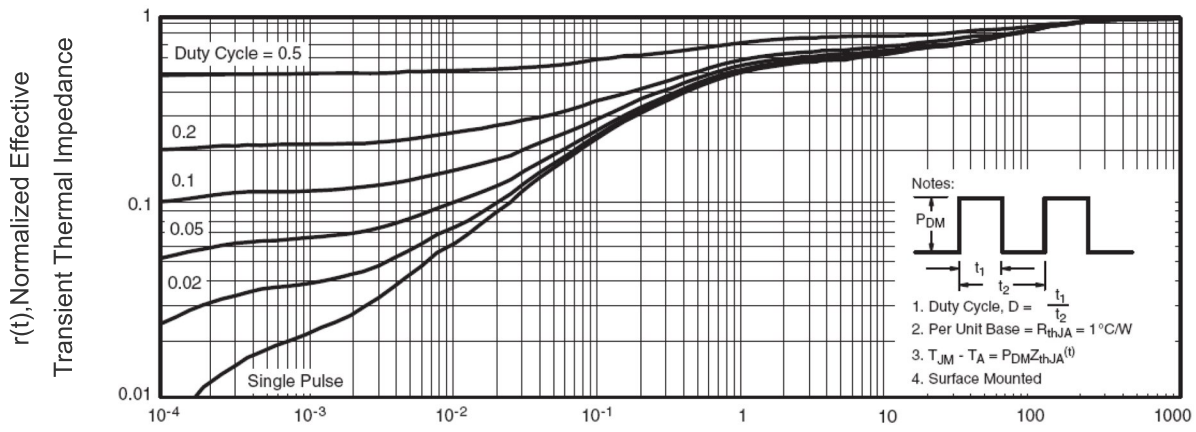
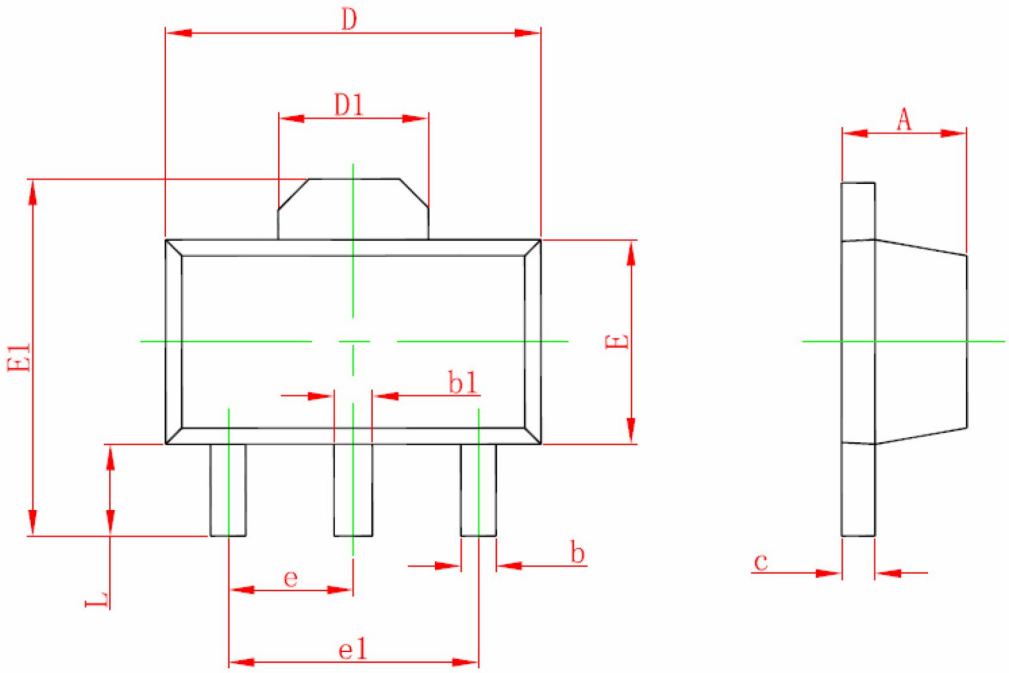



Figure 11 Normalized Maximum Transient Thermal Impedance

## SOT-89-3L Package Information




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.400 | 1.600 | 0.055 | 0.063 |
| b | 0.320 | 0.520 | 0.013 | 0.020 |
| b1 | 0.400 | 0.580 | 0.016 | 0.023 |
| c | 0.350 | 0.440 | 0.014 | 0.017 |
| D | 4.400 | 4.600 | 0.173 | 0.181 |
| D1 | 1.550 REF. | | 0.061 REF. | |
| E | 2.300 | 2.600 | 0.091 | 0.102 |
| E1 | 3.940 | 4.250 | 0.155 | 0.167 |
| e | 1.500 TYP. | | 0.060 TYP. | |
| e1 | 3.000 TYP. | | 0.118 TYP. | |
| L | 0.900 | 1.200 | 0.035 | 0.047 |

Notes:

① All dimensions are in millimeters.
② Tolerance ±0.10mm (4 mil) unless otherwise specified
③ Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
④ Dimension L is measured in gauge plane.
⑤ Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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