

MJ N-Channel Enhancement Mode Power MOSFET

Description

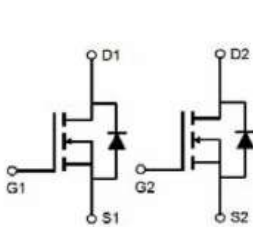
The MJ01ND03S uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

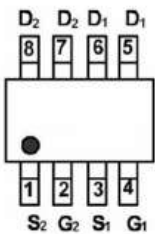
- ◆ $V_{DS} = 100V, I_D = 3A$
 $R_{DS(ON)} < 130m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 140m\Omega @ V_{GS} = 4.5V$
- ◆ High density cell design for ultra low R_{dson}
- ◆ Fully characterized avalanche voltage and current

Application

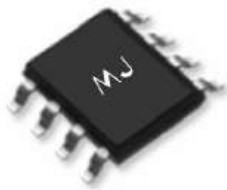
- ◆ Power switching application
- ◆ Hard switched and high frequency circuits
- ◆ Uninterruptible power supply



Schematic diagram



Marking and pin Assignment



SOP-8 top view

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-----------|----------------|-----------|------------|------------|
| MJ01ND03S | MJ01ND03S | SOP-8 | Ø330mm | 12mm | 4000 units |

Absolute Maximum Ratings ($T_A=25^{\circ}C$ 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 | 3 | A |
| Drain Current-Continuous($T_C = 100^{\circ}C$) | $I_{D(100^{\circ}C)}$ | 2.1 | A |
| Pulsed Drain Current ^(Note 1) | I_{DM} | 12 | A |
| Maximum Power Dissipation | P_D | 2 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^{\circ}C$ |

Thermal Characteristic

| Parameter | Symbol | Typ | Max | Unit |
|--|-----------------|------|-----|---------------|
| Thermal Resistance,Junction-to-Ambient ^(Note 2) | $R_{\theta JA}$ | 62.5 | 85 | $^{\circ}C/W$ |

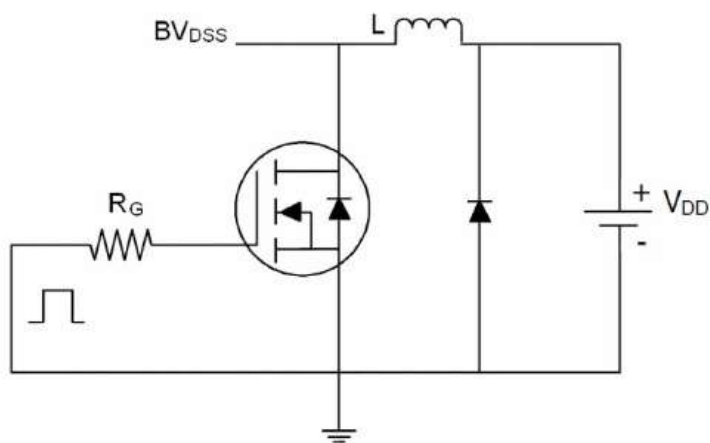
Electrical Characteristics (T_A=25°C unless otherwise noted)

| 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 _{GS} =0V | - | - | ±100 | nA |
| On Characteristics <small>(Note 3)</small> | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} ,I _D =250μA | 1.0 | 1.5 | 2.0 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =3A | - | 95 | 130 | mΩ |
| | | V _{GS} =4.5V, I _D =3A | | 100 | 140 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =5V,I _D =3A | 3.5 | - | - | S |
| Dynamic Characteristics <small>(Note 4)</small> | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =50V,V _{GS} =0V, F=1.0MHz | - | 730 | - | PF |
| Output Capacitance | C _{oss} | | - | 37 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 27 | - | PF |
| Switching Characteristics <small>(Note 4)</small> | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =50V, R _L =15Ω V _{GS} =10V,R _G =2.5Ω | - | 11 | - | nS |
| Turn-on Rise Time | t _r | | - | 7.4 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 35 | - | nS |
| Turn-Off Fall Time | t _f | | - | 9.1 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =50V,I _D =3A V _{GS} =10V | - | 21.5 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 3.2 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 6 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage <small>(Note 3)</small> | V _{SD} | V _{GS} =0V,I _S =3A | - | - | 1.2 | V |
| Diode Forward Current <small>(Note 2)</small> | I _S | | - | - | 3 | A |
| Reverse Recovery Time | t _{rr} | T _J =25°C, I _F =3A di/dt=100A/μs <small>(Note 3)</small> | - | 26 | - | nS |
| Reverse Recovery Charge | Q _{rr} | | - | 27 | - | nC |
| Forward Turn-On Time | t _{on} | Intrinsic turn-on time is negligible(turn-on is dominated by LS+LD) | | | | |

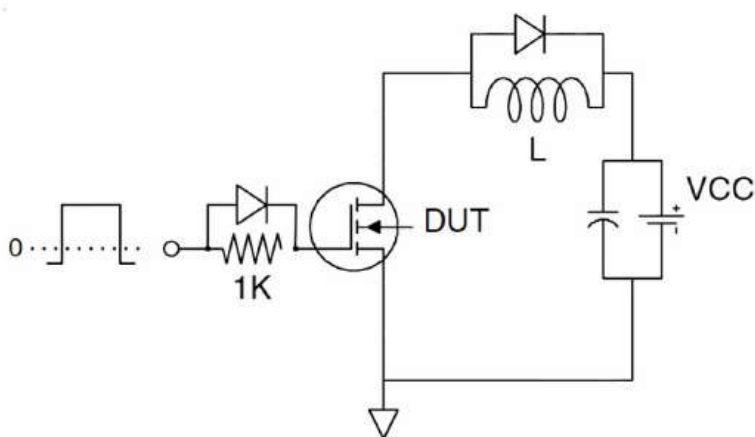
Notes:

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ② The value of R_{θJA} is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.Surface Mounted on FR4 Board, t ≤ 10 sec. The current rating is based on the t ≤10s thermal resistance rating.
- ③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- ④ Guaranteed by design, not subject to production

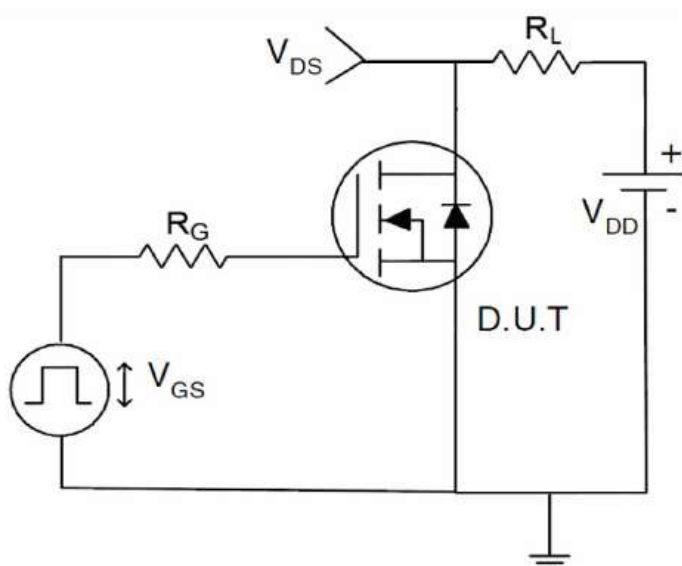
Test circuit



EAS test Circuit

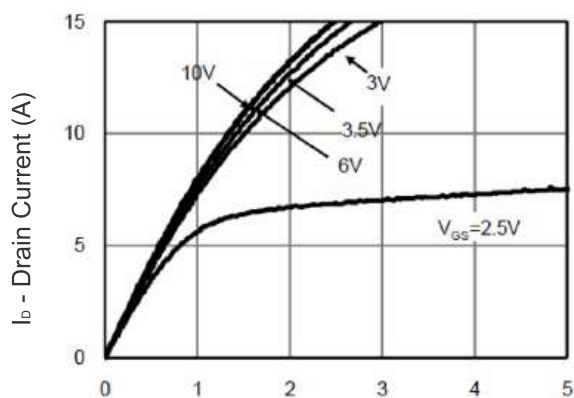


Gate charge test Circuit



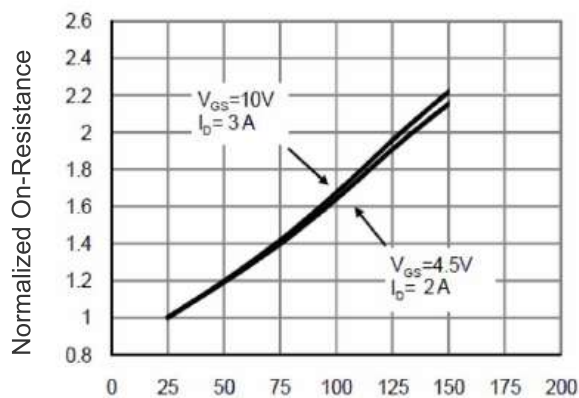
Switch Time Test Circuit

N-channel Typical Electrical and Thermal Characteristics (Curves)



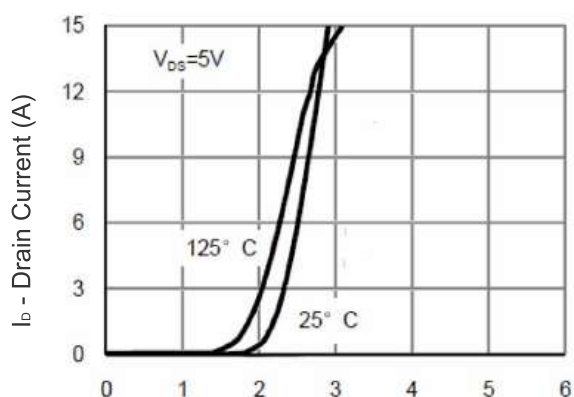
Vds Drain-Source Voltage (V)

Figure 1 Output Characteristics



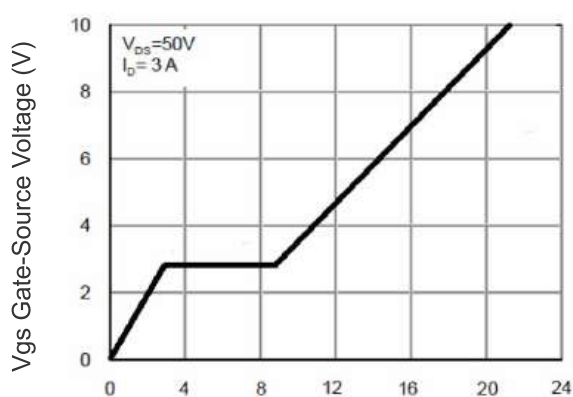
Tj -Junction Temperature(°C)

Figure 4 Rdson-Junction Temperature



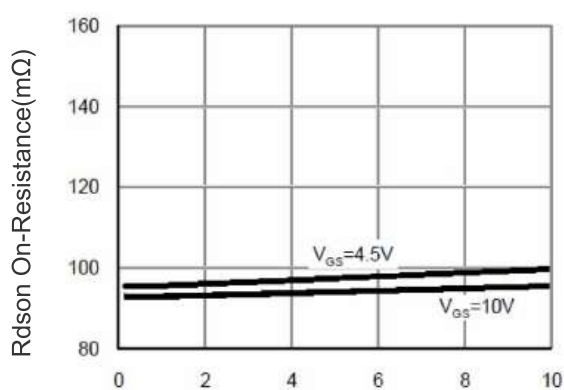
Vgs Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



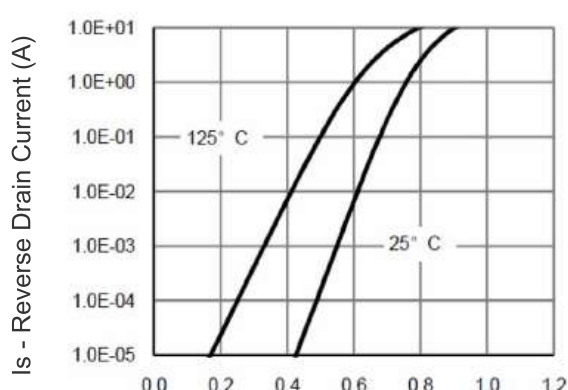
Qg Gate Charge (nC)

Figure 5 Gate Charge



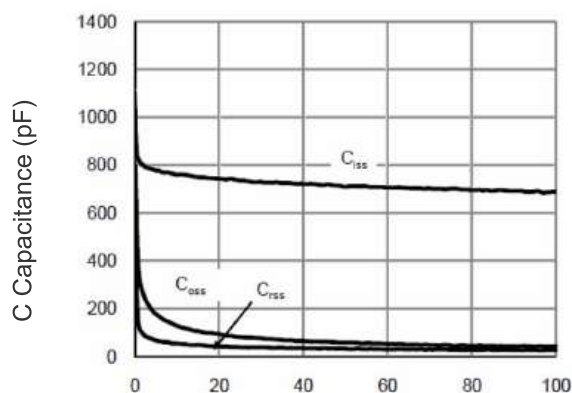
Id - Drain Current (A)

Figure 3 Rdson- Drain Current

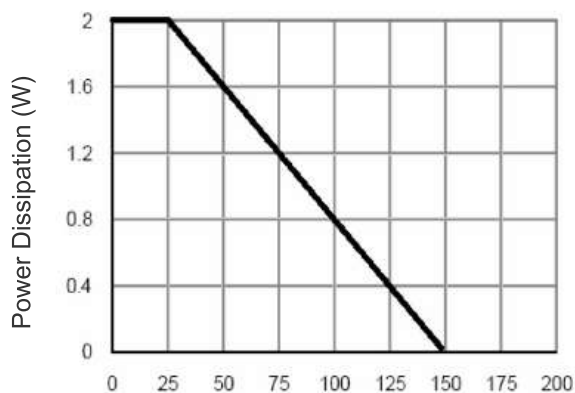


Vsd Source-Drain Voltage (V)

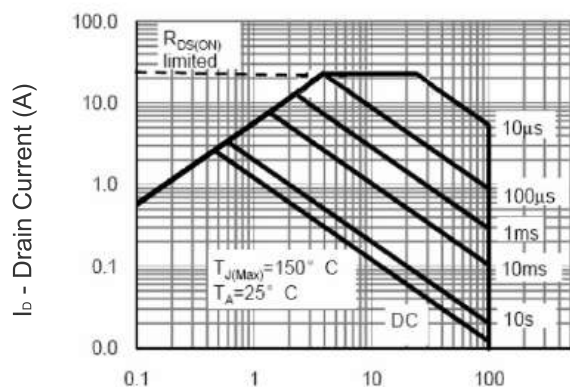
Figure 6 Source- Drain Diode Forward



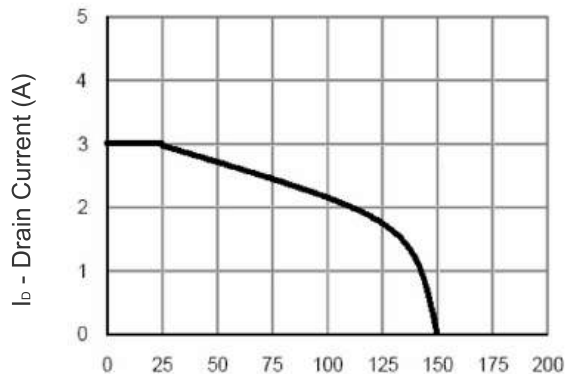
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



TJ -Junction Temperature(°C)
Figure 9 Power De-rating



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



TJ -Junction Temperature(°C)
Figure 10 Current De-rating

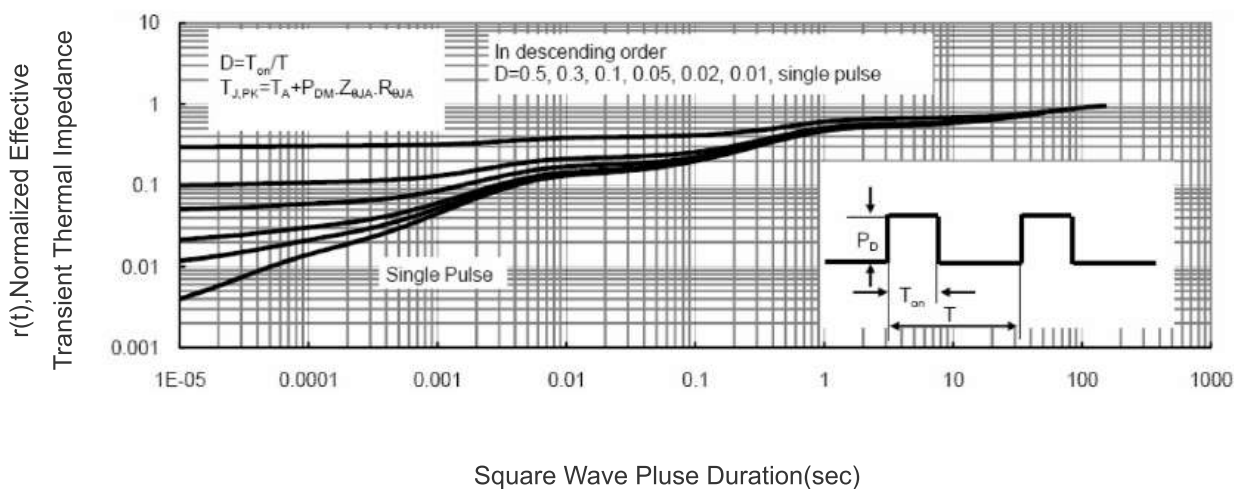
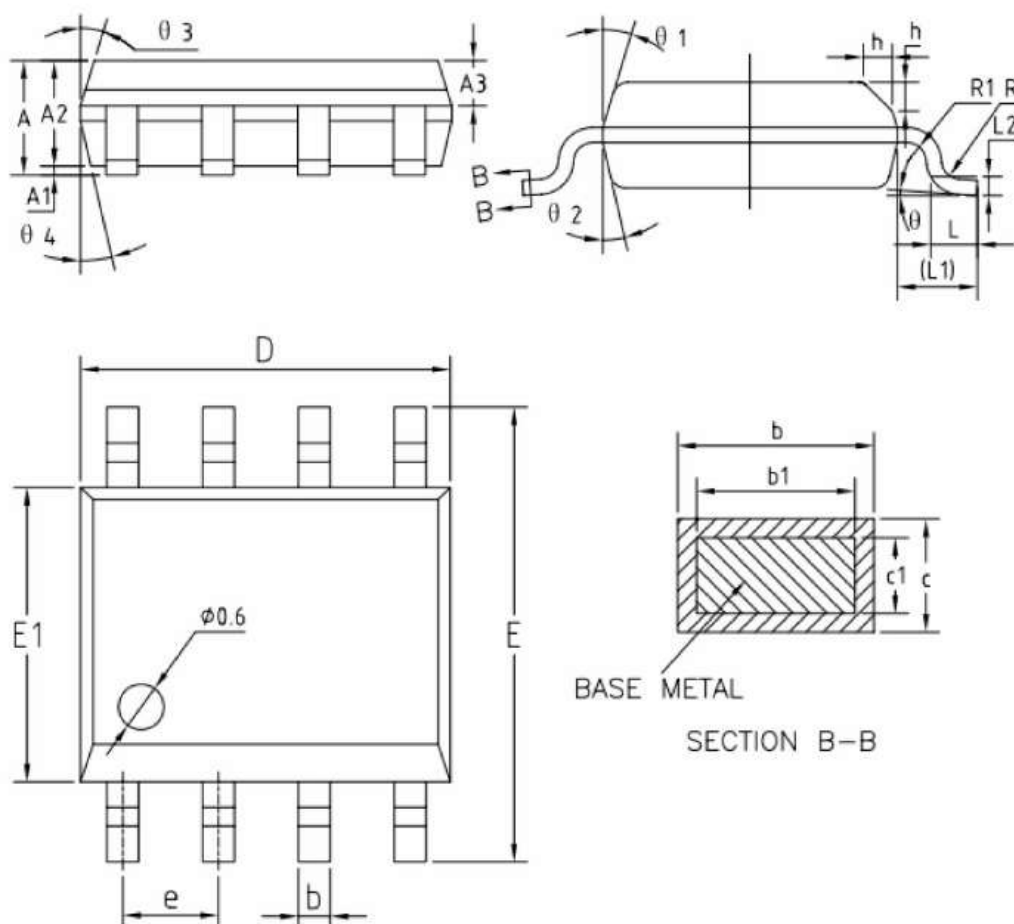


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|--------|---------|------|------|
| A | 1.35 | 1.55 | 1.75 |
| A1 | 0.10 | 0.15 | 0.25 |
| A2 | 1.25 | 1.40 | 1.65 |
| A3 | 0.50 | 0.60 | 0.70 |
| b | 0.38 | — | 0.51 |
| b1 | 0.37 | 0.42 | 0.47 |
| c | 0.18 | — | 0.25 |
| c1 | 0.17 | 0.20 | 0.23 |
| D | 4.80 | 4.90 | 5.00 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.80 | 3.90 | 4.00 |
| e | 1.17 | 1.27 | 1.37 |
| L | 0.45 | 0.60 | 0.80 |
| L1 | 1.04REF | | |
| L2 | 0.25BSC | | |
| R | 0.07 | — | — |
| R1 | 0.07 | — | — |
| h | 0.30 | 0.40 | 0.50 |
| θ | 0° | — | 8° |
| θ 1 | 15° | 17° | 19° |
| θ 2 | 11° | 13° | 15° |
| θ 3 | 15° | 17° | 19° |
| θ 4 | 11° | 13° | 15° |

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