## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---|---|---|
| 100V | 90mΩ@10V | 10A |

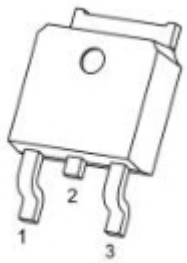
## Feature

- $V_{DS}$ =100V,$I_D$ =10A
- $R_{DS(ON)}$ < 110mΩ @ $V_{GS}$=10V (Typ:90mΩ)
  $R_{DS(ON)}$ < 120mΩ @ $V_{GS}$=4.5V (Typ:100mΩ)
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high EAS
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

## Application

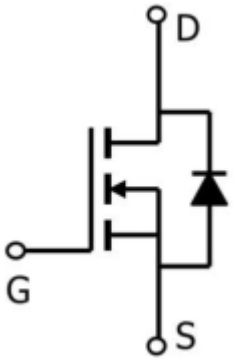
- Power switching application
- Load switching
- Uninterruptible power supply

## Package

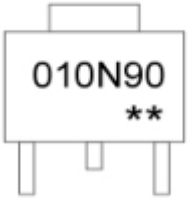



**TO-252(G:1 D:2 S:3)**

## Circuit diagram




## Marking




010N90 : Product code

** : Week code.

## Absolute maximum ratings

($T_a$=25℃ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 10 | W |
| Pulsed Drain Current | $I_{DM}$ | 40 | A |
| Maximum Power Dissipation | $P_D$ | 34 | W |
| Thermal Resistance Junction-to-Case[1] | $R_{\theta JC}$ | 4.4 | ℃/ W |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{STG}$ | -55~ +175 | ℃ |

## Electrical characteristics

($T_A$=25℃, unless otherwise noted)

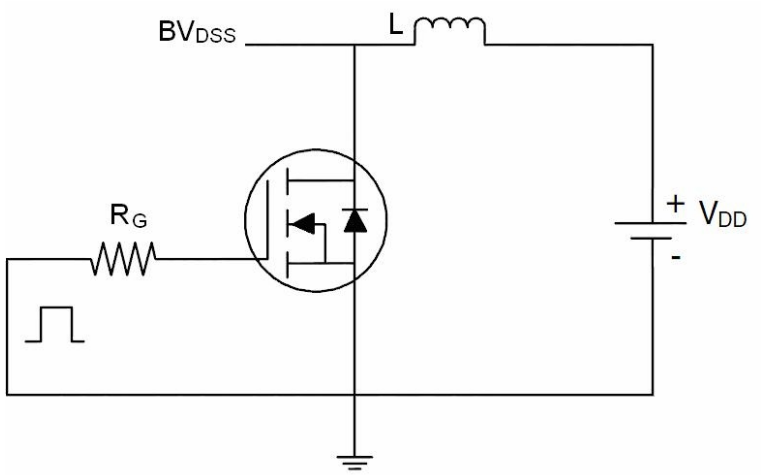
| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ =250μA | 100 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ =100V,$V_{GS}$ = 0V | | | 1 | uA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$ =±20V , $V_{DS}$=0V | | | ±100 | uA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 1.0 | 1.6 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}$ =10V, $I_D$ =10A | | 90 | 110 | mΩ |
| | | $V_{GS}$ =4.5V, $I_D$ =8A | | 100 | 120 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ =25V, $I_D$ =6A | 3.5 | | | S |
| **Dynamic characteristics[4]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=50V,$V_{GS}$=0V, f=1MHz | | 800 | | pF |
| Output Capacitance | $C_{oss}$ | | | 39 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 32 | | |
| **Switching Characteristics[4]** | | | | | | |
| Turn-On Delay Time | $T_{d(on)}$ | $V_{DD}$=50V, $R_L$=6.4Ω, $V_{GS}$=10V, $R_{GEN}$=3Ω | | 5 | | nS |
| Rise Time | $T_r$ | | | 40 | | |
| Turn-Off Delay Time | $T_{d(off)}$ | | | 20 | | |
| Fall Time | $T_f$ | | | 7 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V, $I_D$=10A, $V_{GS}$=10V | | 16 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 2.5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 2.6 | | |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode forward voltage[3] | $V_{SD}$ | $V_{GS}$=0V, $I_S$=15A | | | 1.2 | V |
| Diode Forward Current[2] | $I_S$ | | | | 15 | A |
| Reverse Recovery Time | $t_{rr}$ | $T_J$ = 25°C, $I_F$ =10A di/dt = 100A/μs(Note3) | | 21 | | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | | 97 | | nC |
| Forward Turn-On Time | $t_{ON}$ | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

**Notes:**

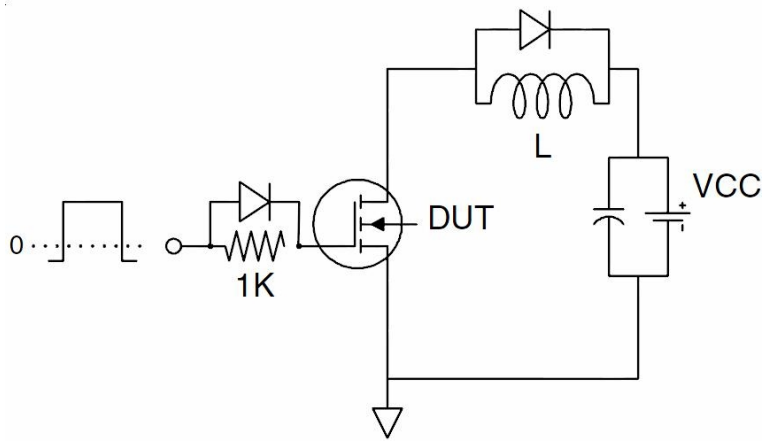
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤2%.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_j$=25℃,$V_{DD}$=50V,$V_G$=10V,L=0.5mH,Rg=25Ω

## Test Circuit

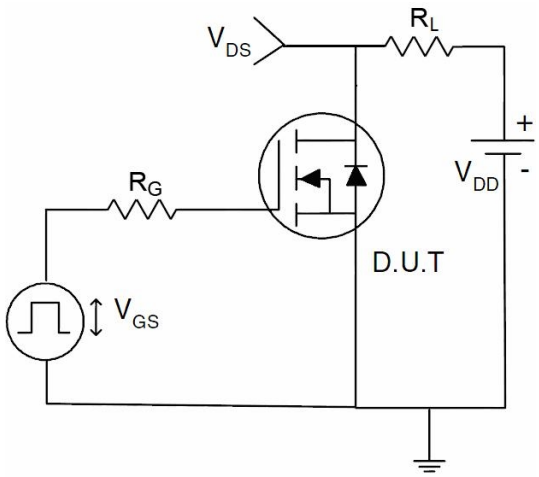
- EAS Test Circuits




- Gate Charge Test Circuit




- Switch Time Test Circuit



## Typical Characteristics

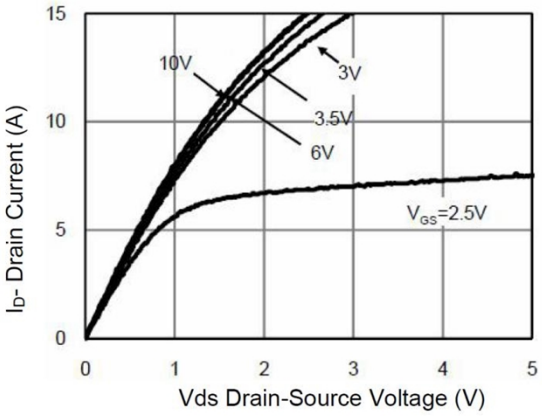



**Figure 1 Output Characteristics**

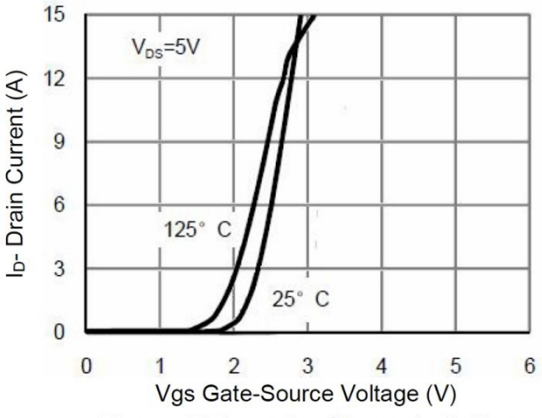



**Figure 2 Transfer Characteristics**

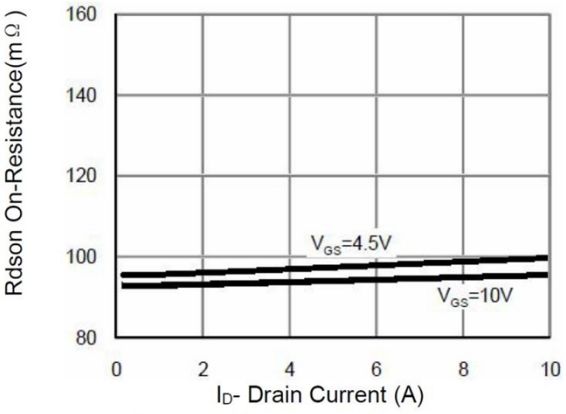



**Figure 3 Rdson- Drain Current**

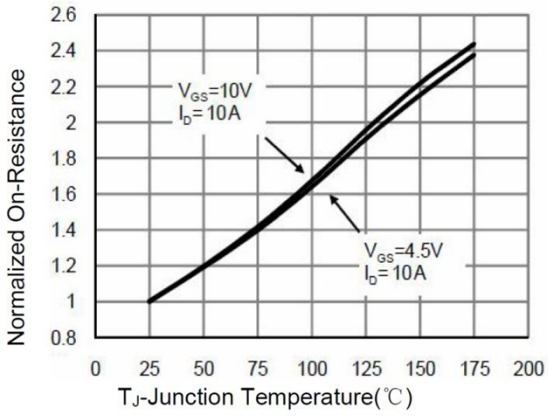



**Figure 4 Rdson-JunctionTemperature**

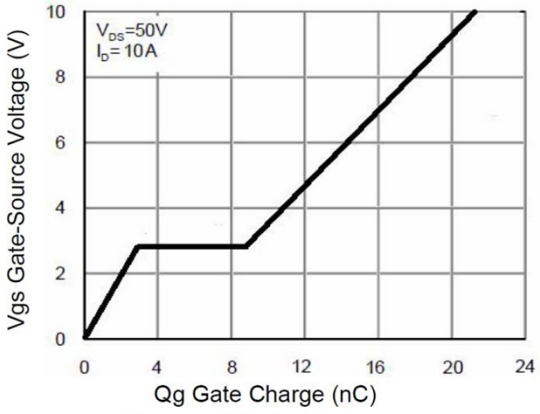



**Figure 5 Gate Charge**

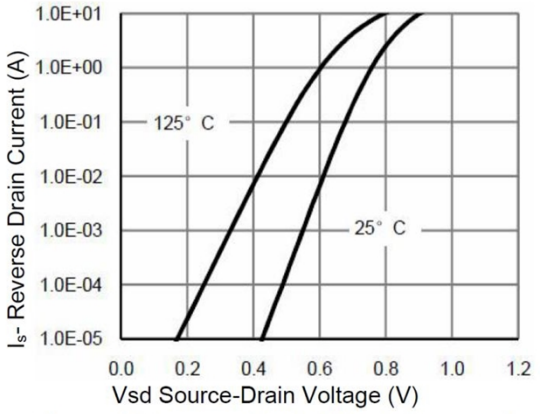



**Figure 6 Source- Drain Diode Forward**

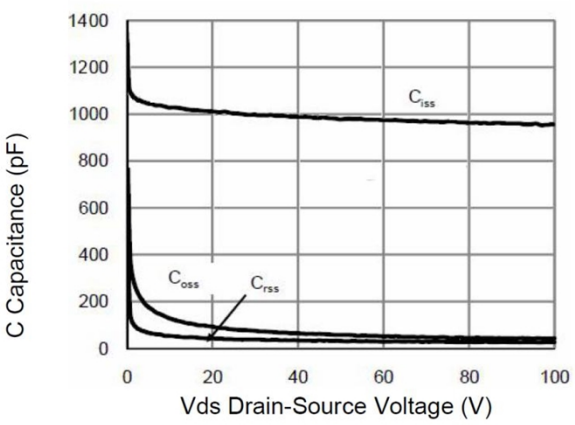



**Figure 7 Capacitance vs Vds**

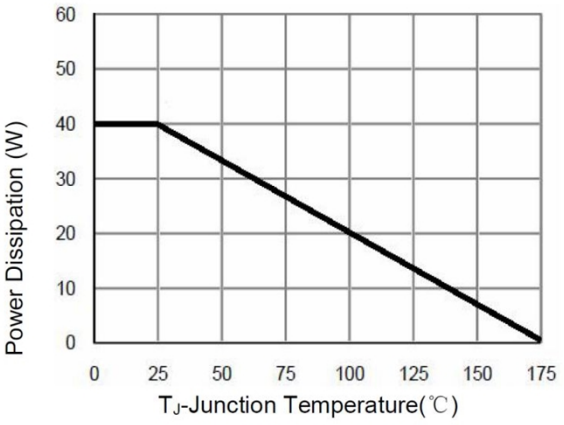



**Figure 9 Power De-rating**

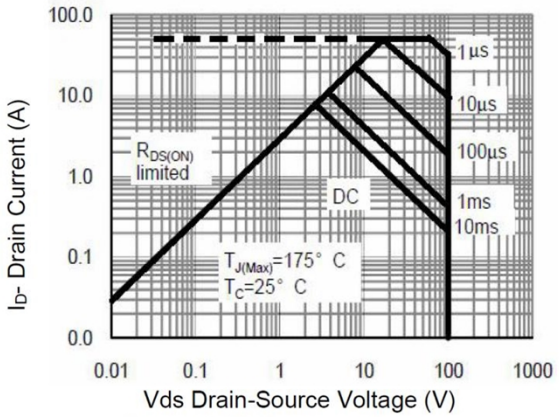



**Figure 8 Safe Operation Area**

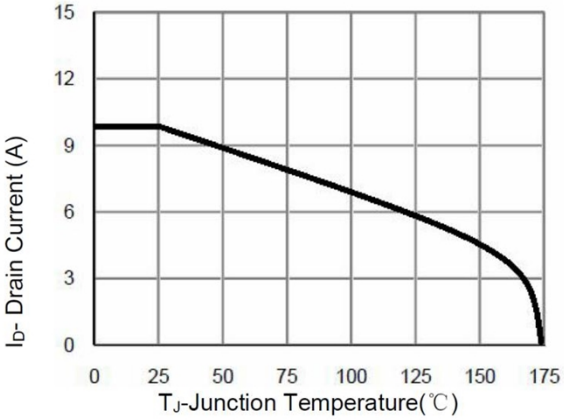



**Figure 10 Current De-rating**

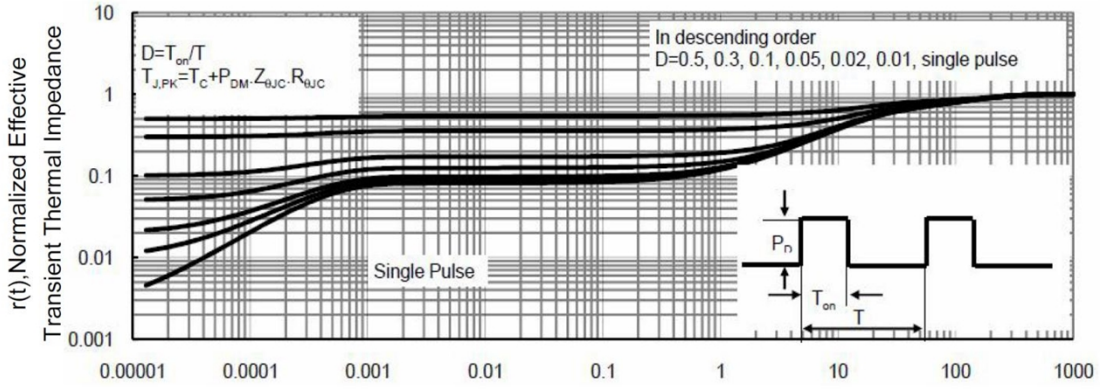
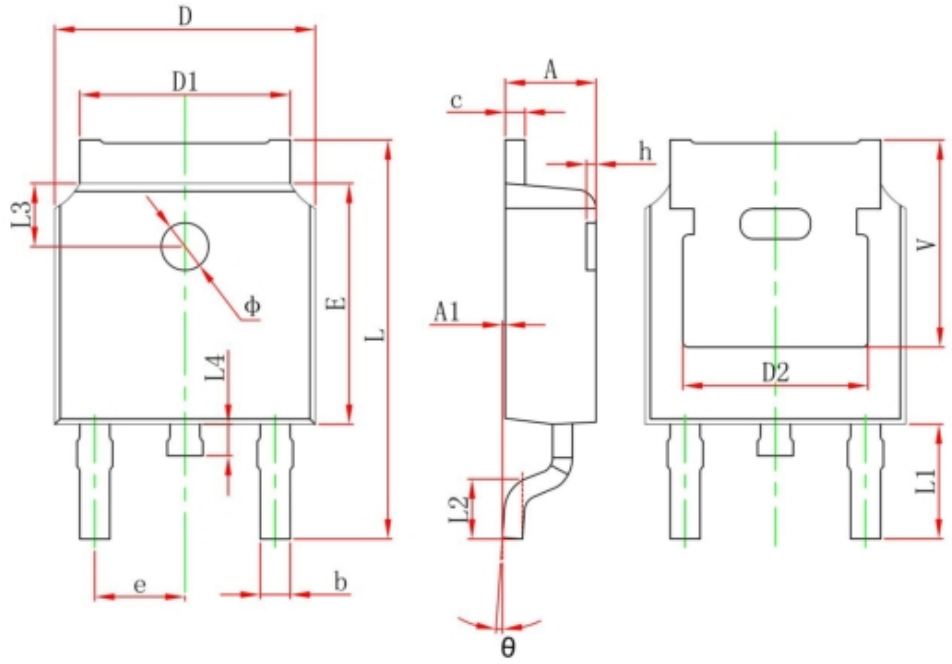



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## TO-252 Package Information




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 REF. | | 0.190 REF. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.900 REF. | | 0.114 REF. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 REF. | | 0.063 REF. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350 REF. | | 0.211 REF. | |