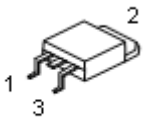
## 1. Features

- $R_{DS(on)}$=1.0Ω @Vgs=10V
- RoHS compliant
- Low on resistance
- Low gate charge(Typical 16.3nC)
- Peak current vs pulse width curve

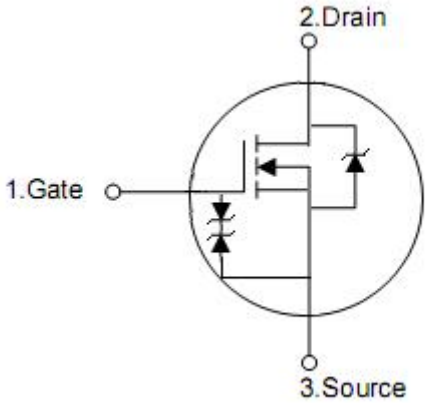
## 2. Applications

- Adaptor
- Charger
- SMPS standby power

## 3.Symbol




TO-252




| Pin | Function |
|---|---|
| 1 | Gate |
| 2 | Drain |
| 3 | Source |

## 4. Absolute maximum ratings

| Parameter | Symbol | Rating | Units |
|---|---|---|---|
| Drain-source voltage | $V_{DSS}$ | 550 | V |
| Continuous drain current $T_C$=25 ºC | $I_D$ | 5.0 | A |
| Continuous drain current $T_C$=100 ºC | | 3.0 | A |
| Pulsed drain current，$V_{GS}$@10V （note1） | $I_{DM}$ | 20 | A |
| Power dissipation（Tc=25℃） | $P_D$ | 61.09 | W |
| Derating factor above 25℃ | | 0.49 | W/℃ |
| Gate-source voltage | $V_{GS}$ | ±20 | V |
| Single pulse avalanche energy （note2） | $E_{AS}$ | 161 | mJ |
| Avalanche energy, repetitive （note1） | $E_{AR}$ | 7.6 | mJ |
| Avalanche Current （note1） | $I_{AR}$ | 5.0 | A |
| Peak diode recovery dv/dt （note3） | dv/dt | 4.5 | V/ns |
| Gate-source ESD(HBM-C=100pF,R=1.5KΩ) | $VESD_{(G-S)}$ | 3000 | V |
| Maximum temperature for soldering | $T_L$ | 300 | ºC |
| Operating junction and storage temperature range | $T_J$ ,$T_{STG}$ | 150,-55 to150 | ºC |

## 5. Thermal characteristics

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 62.5 | ºC/W |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 1.65 | ºC/W |
| R θJS | Thermal Resistance, Case-to-Sink Typ. | 0.5 | ºC/W |

## 6. Electrical characteristics

($T_J$=25°C,unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_{DS}$=250μA | 550 | - | - | V |
| Breakdown voltage temperature coeffcient，Figure 11 | △$BV_{DSS}$/△$T_J$ | Reference to 25℃ $I_D$=250uA | | 0.61 | | V/℃ |
| Drain-source leakage current | $I_{DSS}$ | $V_{DS}$=500V, $V_{GS}$=0V | - | - | 1 | μA |
| | | $V_{DS}$=400V, $V_{GS}$=0V $T_J$=125°C | - | - | 10 | |
| Gate threshold voltage,Figure 12 | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 2 | - | 4 | V |
| Gate-source forward leakage | $I_{GSS}$ | $V_{GS}$=20V | - | - | 1 | uA |
| Gate-source reverse leakage | | $V_{GS}$=-20V | - | - | -1 | |
| Static drain-source on-resistance Figure 9 and 10 | $R_{DS(on)}$ | $V_{GS}$=10V,$I_D$=2.5A | - | 1.0 | 1.2 | Ω |
| Forward transconductance | gfs | $V_{DS}$=40V, $I_D$=2.5A（note4） | - | 3 | - | S |
| Input capacitance | $C_{iss}$ | $V_{DS}$=25V,$V_{GS}$=0V f=1MHz | - | 682 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 23 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 9 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=275V, $I_D$=5A, $R_G$=25Ω,（note4,5） | - | 25 | - | ns |
| Rise time | $t_r$ | | - | 23 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 92.5 | - | |
| Fall time | $t_f$ | | - | 47 | - | |
| Total gate charge | $Q_g$ | $V_{DD}$=440V, $I_D$=5A, $V_{GS}$=10V,（note4,5） | - | 16.3 | - | nC |
| Gate-source charge | $Q_{gs}$ | | - | 3.6 | - | |
| Gate-drain charge | $Q_{gd}$ | | - | 5.1 | - | |
| Continuous source current（body biode） | $I_S$ | Integral pn-diode in MOSFET | - | - | 5 | A |
| Maximum pulsed current（body biode） | $I_{SM}$ | | - | - | 20 | |
| Diode forward voltage | $V_{SD}$ | $I_S$=5A, $V_{GS}$=0V | - | - | 1.4 | V |
| Reverse recovery time | $t_{rr}$ | $I_F$=5A, $V_{GS}$=0V di/dt=100A/μs（note4） | - | 312 | - | nS |
| Reverse recovery charge | $Q_{rr}$ | | - | 2.1 | - | uC |

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 12mH, $I_{AS}$ = 5.0A, $V_{DD}$ = 50V, $R_G$= 25Ω, Starting $T_J$= 25°C
3. $I_{SD}$≤5.0A, di/dt ≤200A/μs, $V_{DD}$ ≤$BV_{DSS}$,Starting $T_J$= 25°C
4. Pulse Test : Pulse width ≤300us, Duty cycle ≤2%
5. Essentially independent of operating temperature

## 7. Typical operating characteristics

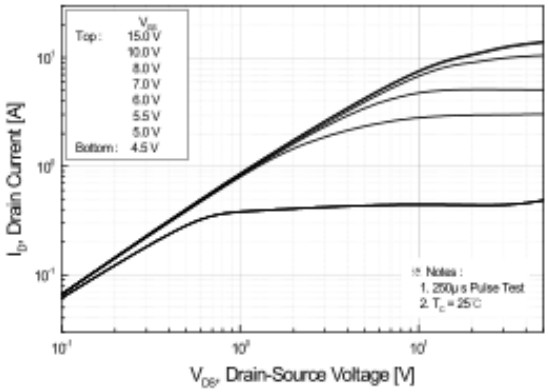



Figure 1. On-Region Characteristics

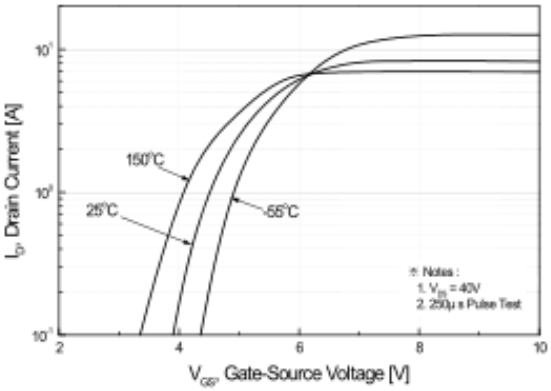



Figure 2. Transfer Characteristics

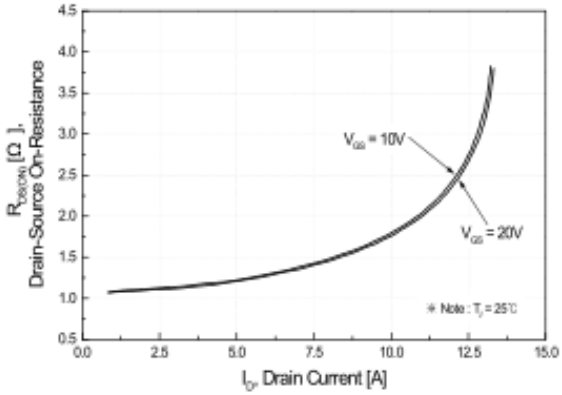



Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

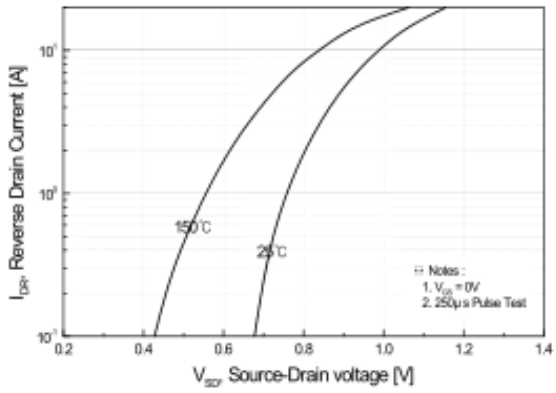



Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

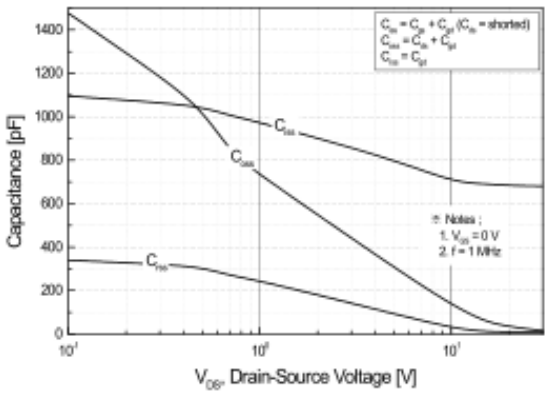



Figure 5. Capacitance Characteristics

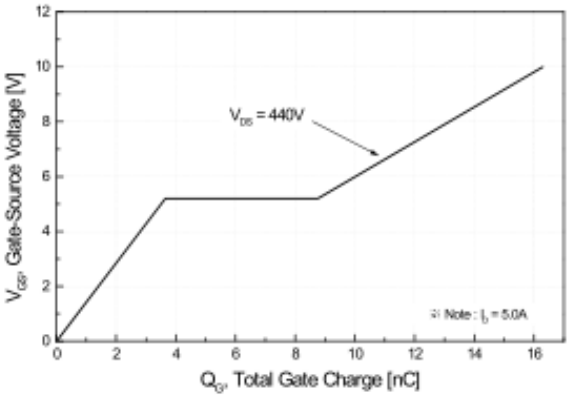



Figure 6. Gate Charge Characteristics

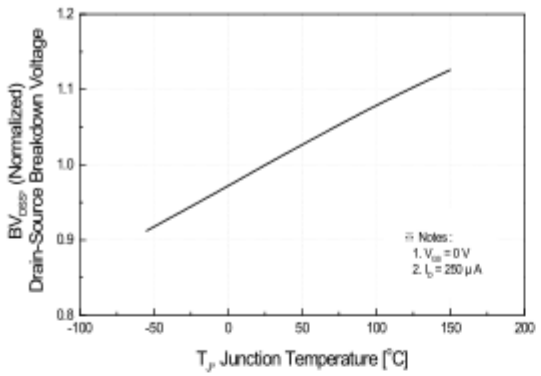



Figure 7. Breakdown Voltage Variation vs Temperature

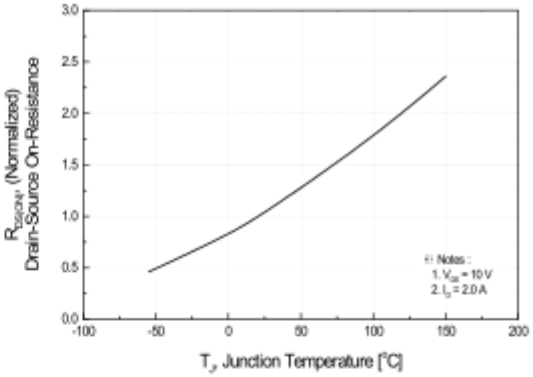



Figure 8. On-Resistance Variation vs Temperature

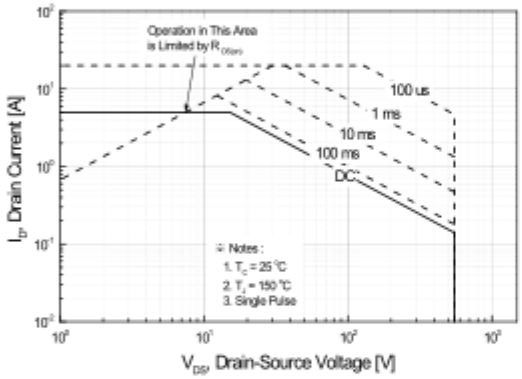



Figure 9. Maximum Safe Operating Area

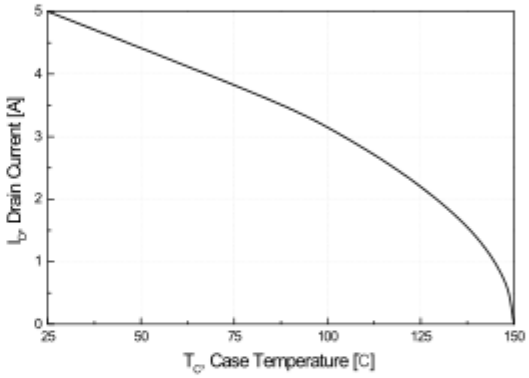



Figure 10. Maximum Drain Current vs Case Temperature

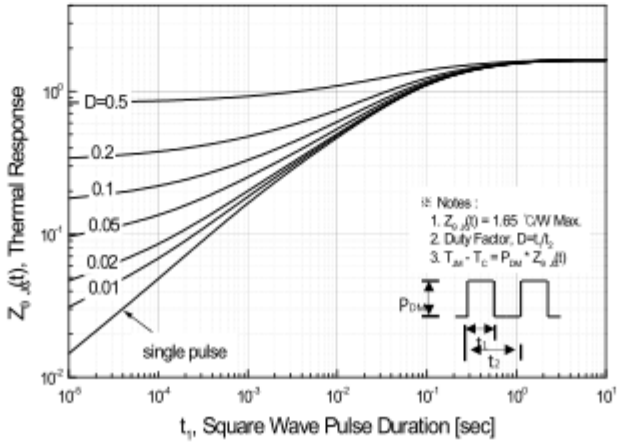
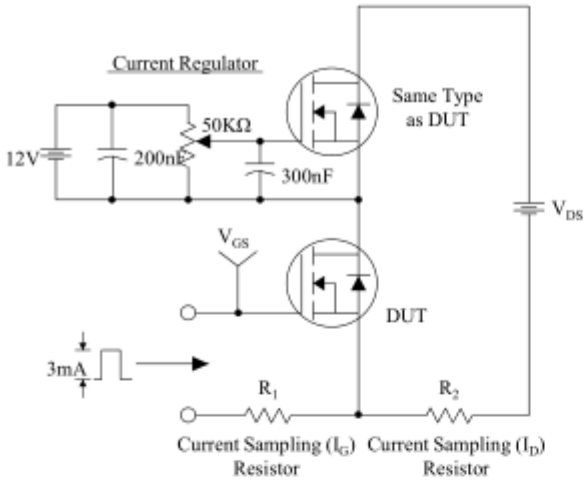
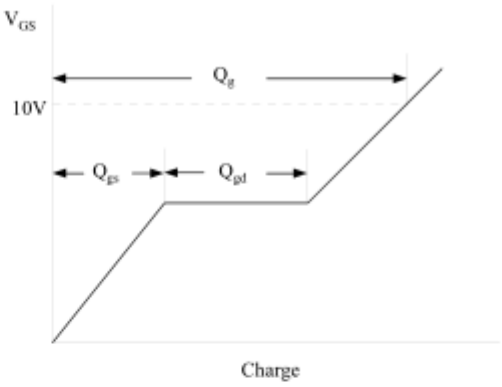


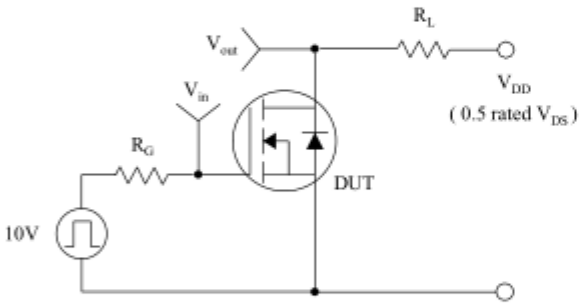

Figure 11. Transient Thermal Response Curve

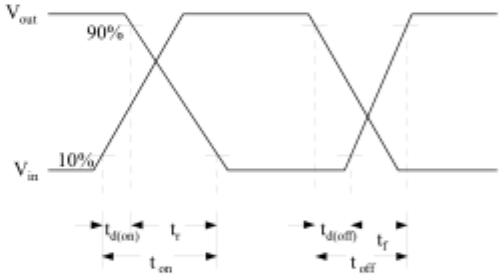
## Gate Charge Test Circuit & Waveform



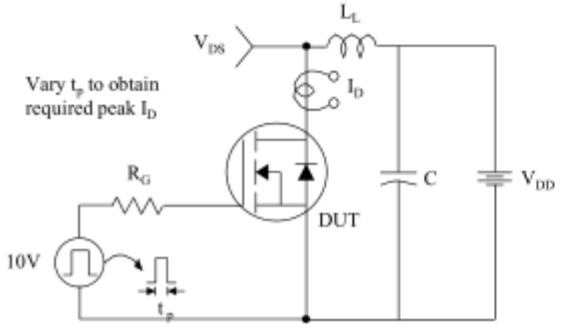



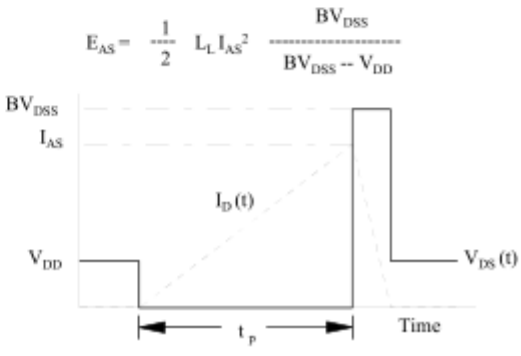

## Resistive Switching Test Circuit & Waveforms




## Unclamped Inductive Switching Test Circuit & Waveforms



## Gate Charge Test Circuit & Waveform