## DESCRIPTION

The AM50N06D is available in TO-252 Package.

| VDS | RDSON | ID |
|---|---|---|
| 60V | 12mΩ | 50A |

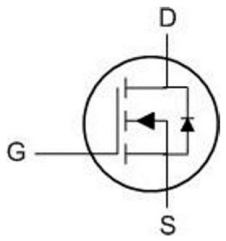
## FEATURE

- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

## ORDERING INFORMATION

| Package Type | Part Number | |
|---|---|---|
| TO-252<br>SPQ: 2,500pcs/Reel | D | AM50N06DVR |
| Note | R: Tape & Reel<br>V: Halogen free Package | |
| AiT provides all RoHS products | | |

## PIN DESCRIPTION





TO-252

| Pin# | Symbol | Function |
|---|---|---|
| 1 | G | Gate |
| 2, 4 | D | Drain |
| 3 | S | Source |

## ABSOLUTE MAXIMUM RATINGS

| | | |
|---|---|---|
| $V_{DS}$, Drain-Source Voltage | | 60V |
| $V_{GS}$, Gate-Source Voltage | | ±20V |
| $I_D$, Continuous Drain Continuous, $V_{GS}$@ 10V (1) | $T_C$=25℃ | 50A |
| | $T_C$=100℃ | 30A |
| | $T_A$=25℃ | 9.20A |
| | $T_A$=70℃ | 7.50A |
| $I_{DM}$ (2), Pulsed Drain Current | | 100A |
| EAS (3), Single Pulse Avalanche Energy | | 72.2mJ |
| $I_{AS}$, Avalanche Current | | 38A |
| $P_D$ (4), Total Power Dissipation | $T_C$=25℃ | 52W |
| | $T_A$=25℃ | 2W |
| $T_{STG}$, Storage Temperature Range | | -55℃~+150℃ |
| $T_J$, Operating Junction Temperature Range | | -55℃~+150℃ |
| $R_{\theta JA}$ (1), Thermal Resistance Junction-Ambient | | 62℃/W |
| $R_{\theta JC}$ (1), Thermal Resistance Junction-Case | | 2.4℃/W |

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(1) The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

(2) The data tested by pulsed, pulse width≦300us, duty cycle≦2%

(3) The EAS data shows Max. rating. The test condition is $V_{DD}$=25V, $V_{GS}$=10V, L=0.1mH, $I_{AS}$=38A

(4) The power dissipation is limited by 150℃ junction temperature

## ELECTRICAL CHARACTERISTICS

$T_J$=25℃,unless otherwise noted.

| Parameter | Symbol | Conditions | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 60 | - | - | V |
| $BV_{DSS}$ Temperature Coefficient | $\triangle BV_{DSS}/\triangle T_J$ | Reference to 25℃, $I_D$=1mA | - | 0.052 | - | V/℃ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=5A | - | - | 12 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=8A | - | - | 15 | |
| Gate Threshold Voltage | $V_{GS\ (th)}$ | $V_{GS}$=$V_{DS}$, $I_D$=250uA | 1.20 | - | 2.50 | V |
| $V_{GS\ (th)}$ Temperature Coefficient | $\triangle V_{GS\ (th)}$ | | - | -5.76 | - | mV/℃ |
| Drain-Current Leakage Voltage | $I_{DSS}$ | $V_{DS}$= 48V, $V_{GS}$=0V, $T_J$=25°C | - | - | 1 | μA |
| | | $V_{DS}$= 48V, $V_{GS}$=0V, $T_J$=55°C | - | - | 5 | |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$ =±20V, $V_{DS}$= 0V | - | - | ±100 | nA |
| Forward Transconductance | gfs | $V_{DS}$=5V, $I_D$=30A | - | 42 | - | S |
| Gate Resistance | $R_g$ | $V_{DS}$=0V, $V_{GS}$=0V, f=1MHz | - | 1.50 | - | Ω |
| Total Gate Charge (4.5V) | $Q_g$ | $V_{DS}$=48V, $V_{GS}$=4.5V $I_D$=15A | - | 28.70 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 10.50 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 9.90 | - | |
| Turn-on Delay Time | $T_{d(on)}$ | $V_{DD}$=30V, $V_{GS}$=10V $R_G$=3.3Ω, $I_D$=15A | - | 10.40 | - | ns |
| Rise Time | $T_r$ | | - | 9.20 | - | |
| Turn-Off Delay Time | $T_{d(off)}$ | | - | 63 | - | |
| Fall Time | $T_f$ | | - | 4.80 | - | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=15V, $V_{GS}$=0V, f=1MHz | - | 2100 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 210 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 146 | - | |
| **Diode Characteristics** | | | | | | |
| Continuous Source Current | $I_S$ | $V_G$=$V_D$=0V, Force Current | - | - | 47 | A |
| Pulsed Source Current | $I_{SM}$ | | - | - | 100 | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=1A, | - | - | 1.20 | V |
| Reverse Recovery Time | $T_{rr}$ | $I_F$=15A, $T_J$=25℃ dI/dt=100A/μs | - | 18 | - | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 14 | - | nC |

## TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Typical Output Characteristics

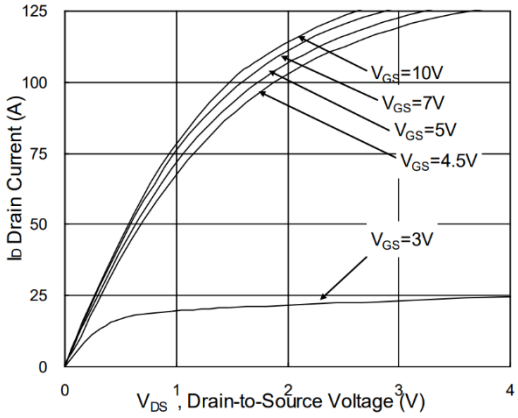



Fig 2. On-Resistance vs. Gate-Source Voltage

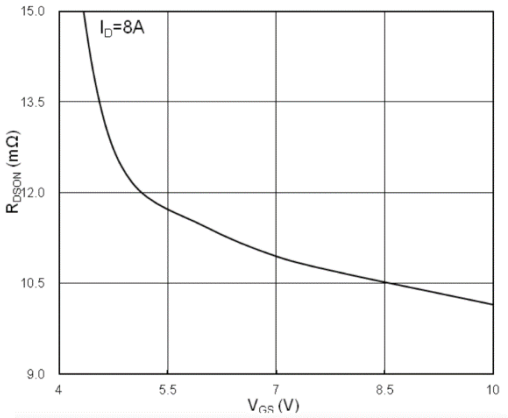



Fig 3. Forward Characteristics of Characteristics

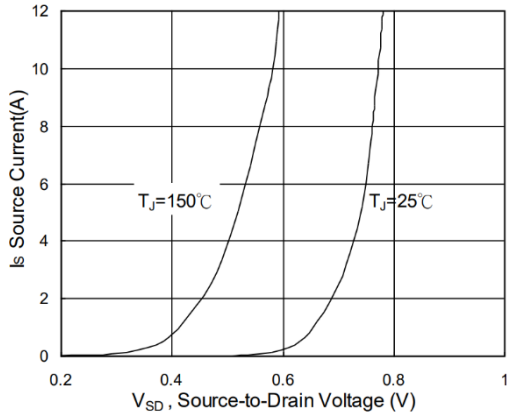



Fig 4. Gate-Charge Characteristics

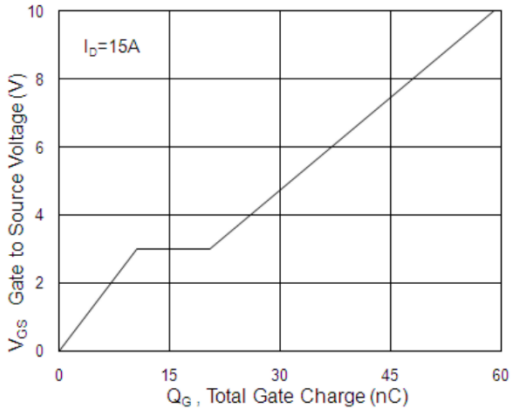



Fig 5. Normalized $V_{GS\,(th)}$ vs. $T_J$

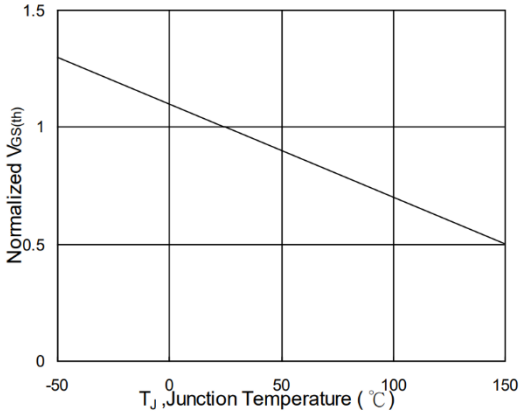



Fig 6. Normalized $R_{DSON}$ vs. $T_J$

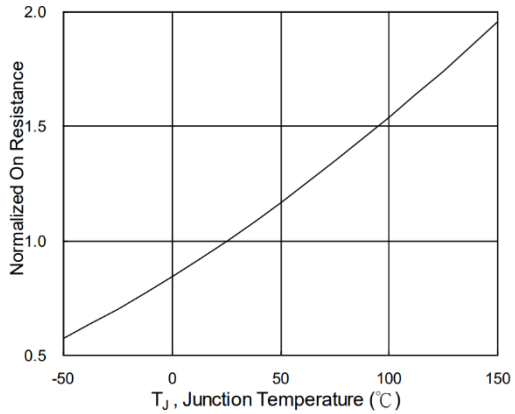


Fig 7. Capacitance

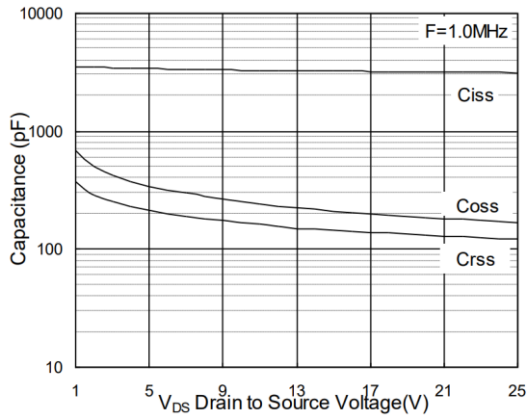



Fig 8. Safe Operating Area

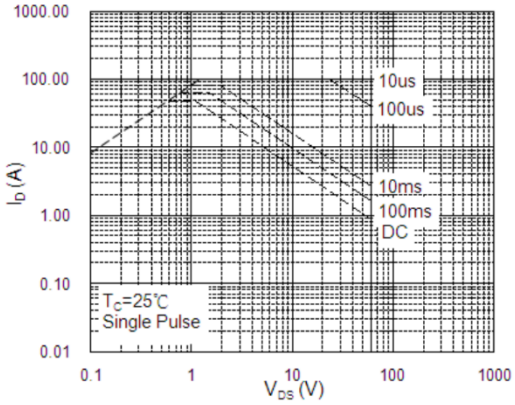



Fig 9. Normalized Maximum Transient Thermal Impedance

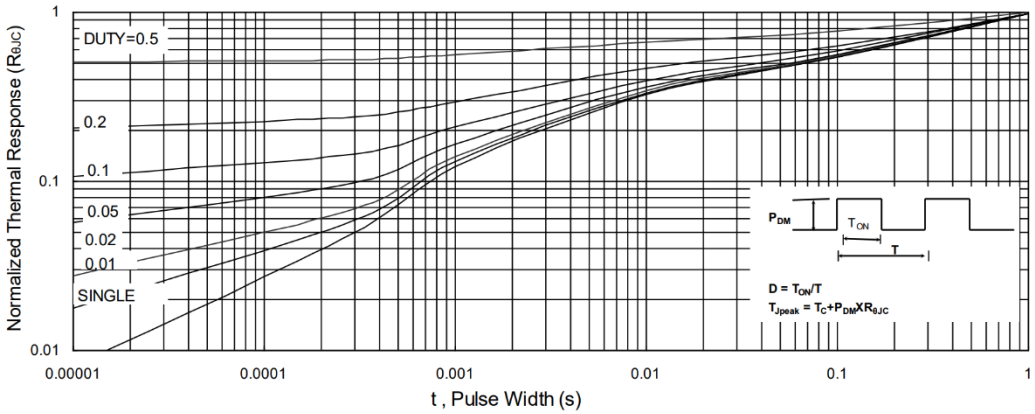



Fig 10. Switching Time Waveforms

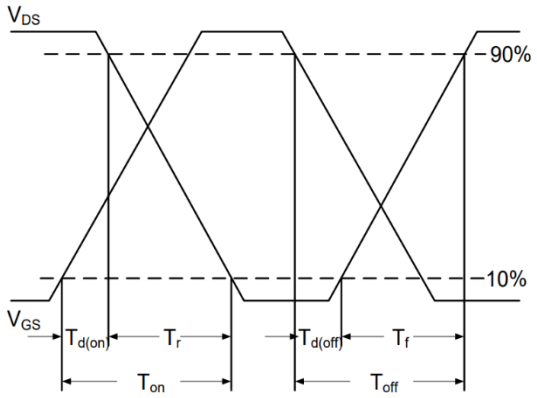
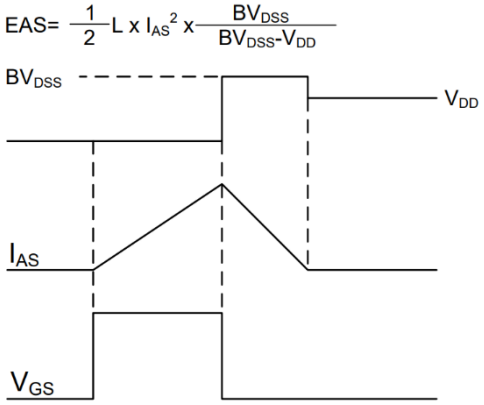
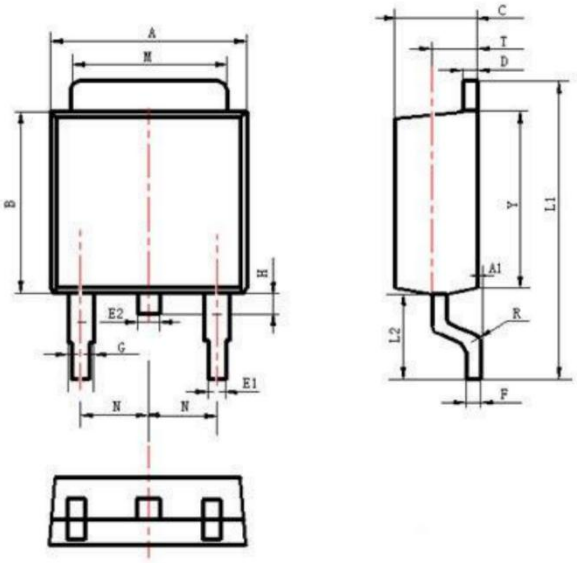



Fig 11. Unclamped Inductive Switching Waveform



## PACKAGE INFORMATION

Dimension in TO-252 Package (Unit: mm)




| Symbol | Values | |
|---|---|---|
| | Min. | Max. |
| A | 6.300 | 6.900 |
| A1 | 0.000 | 0.130 |
| B | 5.700 | 6.300 |
| C | 2.100 | 2.500 |
| D | 0.300 | 0.600 |
| E1 | 0.600 | 0.900 |
| E2 | 0.700 | 1.000 |
| F | 0.300 | 0.600 |
| G | 0.700 | 1.200 |
| H | 0.600 | 1.000 |
| L1 | 9.600 | 10.500 |
| L2 | 2.700 | 3.100 |
| M | 5.100 | 5.500 |
| N | 2.090 | 2.490 |
| R | 0.300 | 0.300 |
| T | 1.400 | 1.600 |
| Y | 5.100 | 6.300 |

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