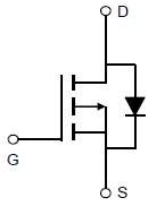
# AP2335

**P-Channel Enhancement Mosfet**

**DATA SHEET**

## Feature

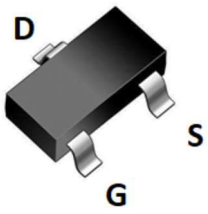
- -20V,-7A
  $R_{DS(ON)}$ <25mΩ @$V_{GS}$=-4.5V TYP: 19 mΩ
  $R_{DS(ON)}$ <35mΩ @$V_{GS}$=-2.5V TYP: 26 mΩ
- Advanced Trench Technology
- Lead free product is acquired




**Schematic Diagram**

## Application

- Interfacing Switching
- Load Switching
- Power management




**SOT-23-3 top view**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|---|---|---|---|---|---|
| 2335 | AP2335 | Sot-23-3 | 7 inch | - | 3000 |

## ABSOLUTE MAXIMUM RATINGS ($T_a$=25℃ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Continuous Drain Current ($T_a$ =25℃) | $I_D$ | -7 | A |
| Continuous Drain Current ($T_a$ =70℃) | $I_D$ | -4.6 | A |
| Pulsed Drain Current | $I_{DM}$ | -28 | A |
| Power Dissipation | $P_D$ | 2.0 | W |
| Thermal Resistance from Junction to Ambient(4) | $R_{\theta JA}$ | `62.5 | ℃/W |
| Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55~ +150 | ℃ |

## MOSFET ELECTRICAL CHARACTERISTICS($T_a$=25℃ unless otherwise noted)

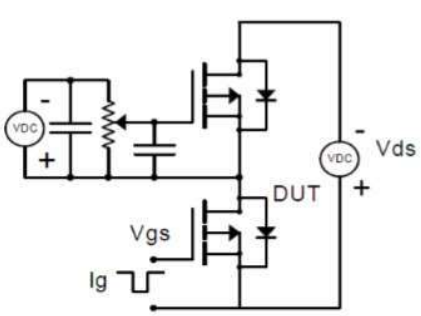
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =-250μA | -20 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =-20V, $V_{GS}$ = 0V | - | - | 1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ =±12V,$V_{DS}$ = 0V | - | - | ±100 | nA |
| Gate threshold voltage(3) | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =-250μA | -0.3 | -0.7 | -1.0 | V |
| Drain-source on-resistance(3) | $R_{DS(on)}$ | $V_{GS}$ =-4.5V, $I_D$ =-5A | - | 19 | 25 | mΩ |
| | | $V_{GS}$ =-2.5V, $I_D$ =-3A | - | 26 | 35 | |
| **Dynamic characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =-10V, $V_{GS}$ =0V, f =1MHz | - | 2000 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 242 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 231 | - | |
| **Switching characteristics** | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-10V, $I_D$=-7.0A, $V_{GS}$=-4.5V, $R_G$=2.5Ω | - | 10 | - | ns |
| Turn-on rise time | $t_r$ | | - | 31 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 28 | - | |
| Turn-off fall time | $t_f$ | | - | 8 | - | |
| Total Gate Charge | Qg | VDS=-10V, ID=-3A, VGS=-4.5V | - | 15.3 | - | nC |
| Gate-Source Charge | Qgs | | - | 2.2 | - | |
| Gate-Drain Charge | Qgd | | - | 4.4 | - | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward voltage(3) | $V_{DS}$ | $V_{GS}$ =0V, $I_S$=-7A | - | - | -1.2 | V |
| Diode Forward current(4) | $I_S$ | | - | - | -7.0 | A |

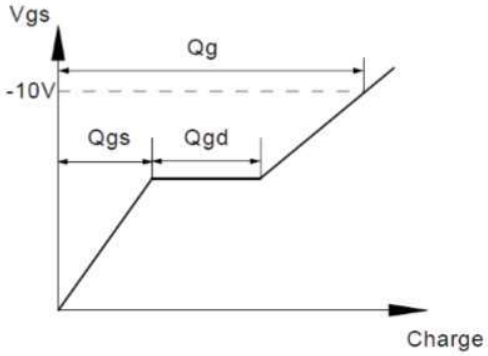
**Notes:**

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width≤300μs, duty cycle≤2%
3. Surface Mounted on FR4 Board,t≤10 sec

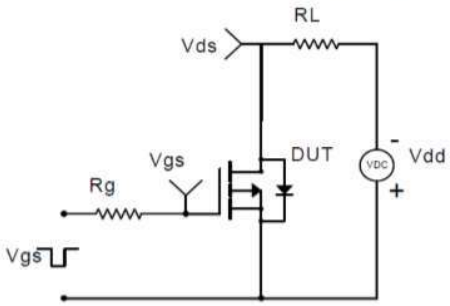
## Test Circuit

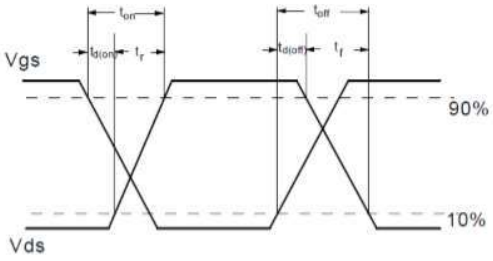
Gate Charge Test Circuit & Waveform



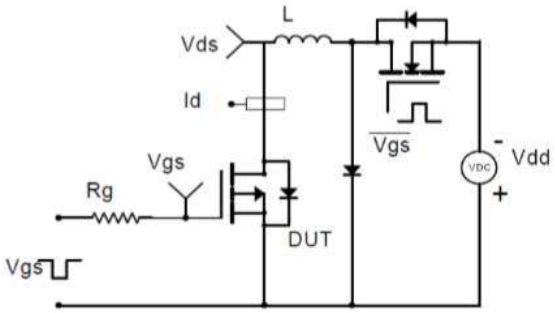



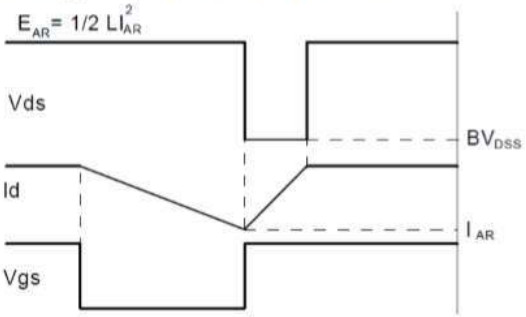

Resistive Switching Test Circuit & Waveforms



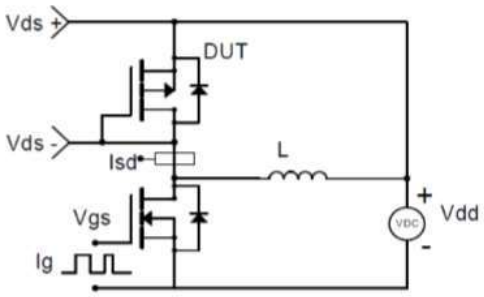



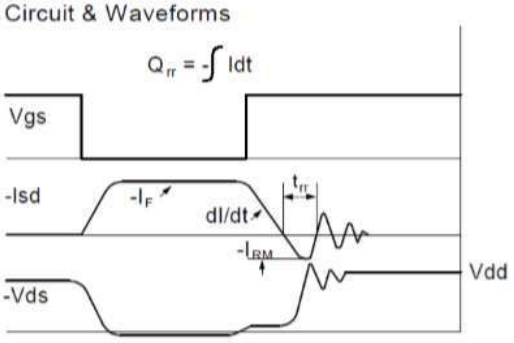

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms



## Typical Performance Characteristics

**Figure1:** Output Characteristics

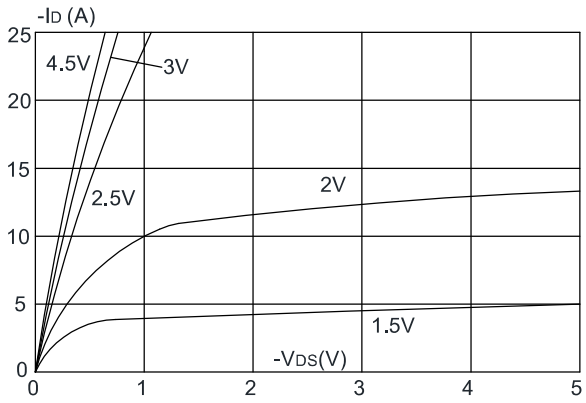



**Figure 2:** Typical Transfer Characteristics

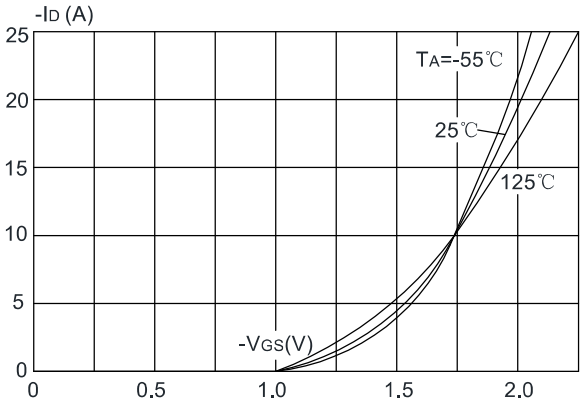



**Figure 3:**On-resistance vs. Drain Current

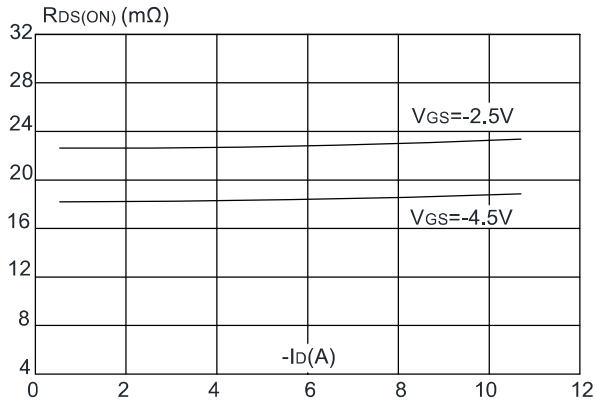



**Figure 4**: Body Diode Characteristics

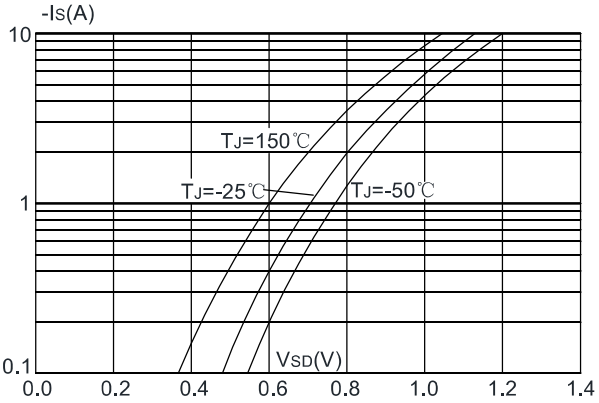



**Figure 5:** Gate Charge Characteristics

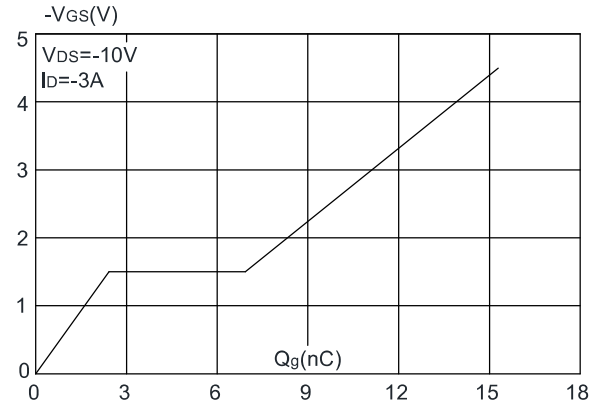



**Figure 6:** Capacitance Characteristics

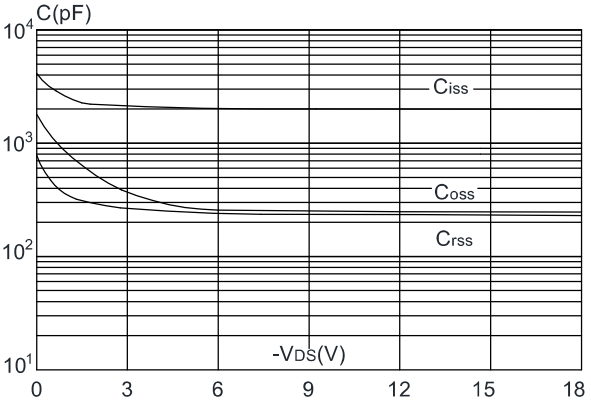


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

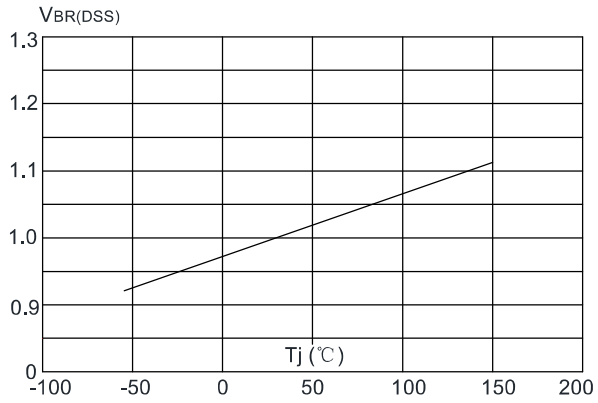



**Figure 8:** Normalized on Resistance vs. Junction Temperature

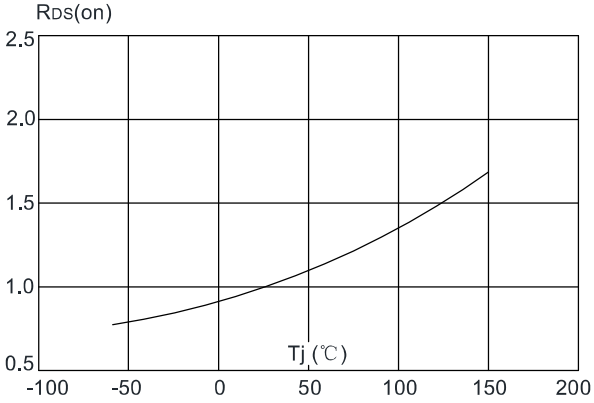



**Figure 9:** Maximum Safe Operating Area

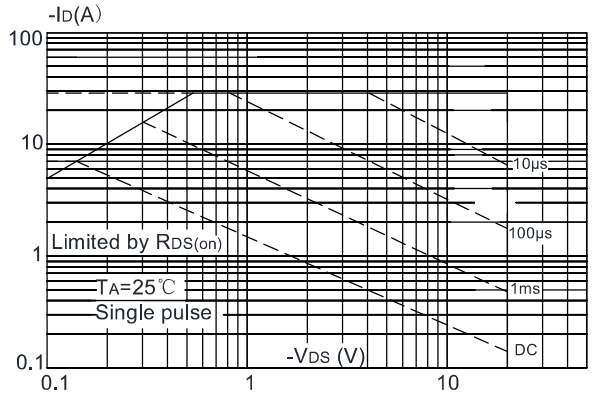



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

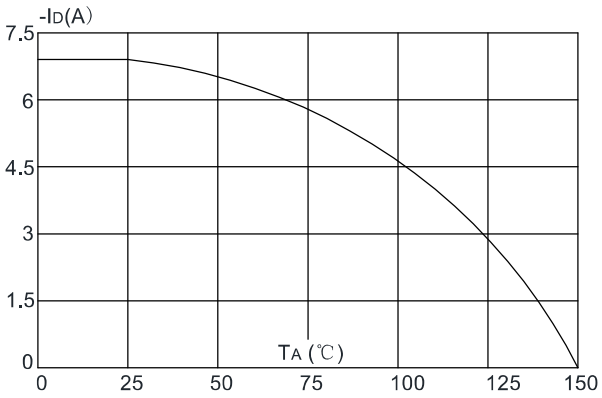
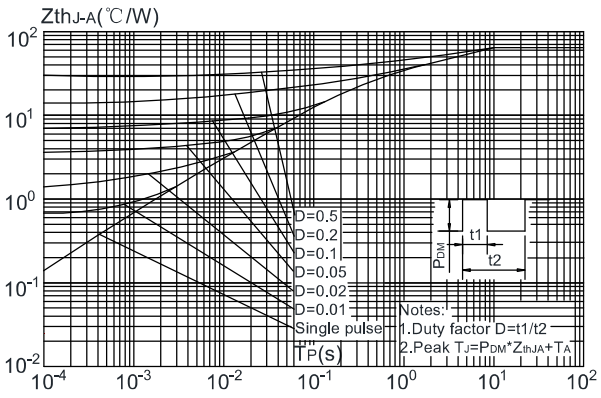
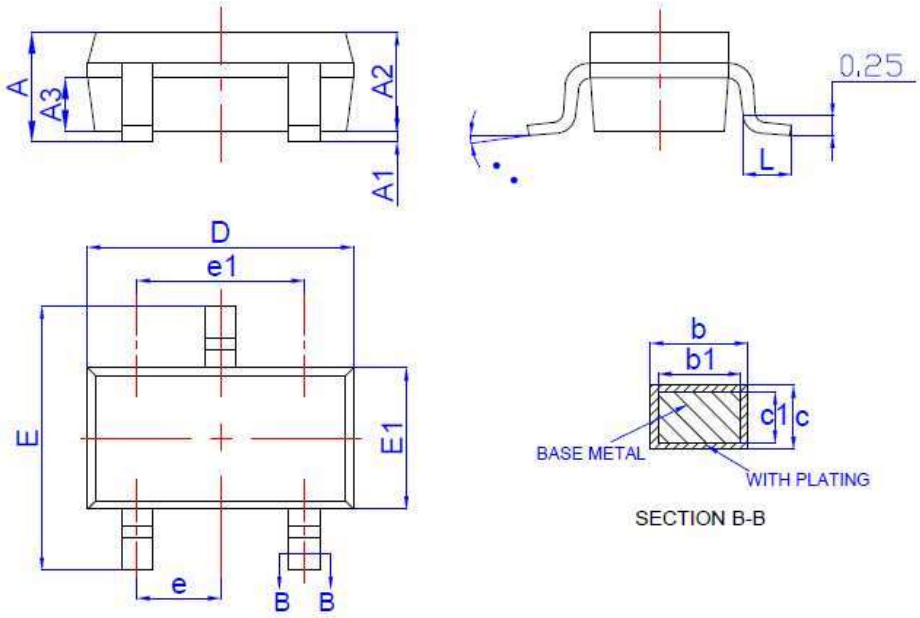



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## SOT-23-3 Package Information




| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | — | — | 1.25 |
| A1 | 0.04 | — | 0.10 |
| A2 | 1.00 | 1.10 | 1.20 |
| A3 | 0.55 | 0.65 | 0.75 |
| b | 0.38 | — | 0.48 |
| b1 | 0.37 | 0.40 | 0.43 |
| c | 0.11 | — | 0.21 |
| c1 | 0.10 | 0.13 | 0.16 |
| D | 2.72 | 2.92 | 3.12 |
| E | 2.60 | 2.80 | 3.00 |
| E1 | 1.40 | 1.60 | 1.80 |
| e | 0.95BSC | | |
| e1 | 1.90BSC | | |
| L | 0.30 | — | 0.60 |
| • • | 0 | — | •••• |