

# AP3400

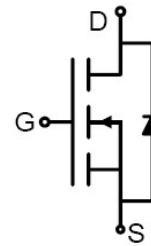
## N-Channel Enhancement Mosfet

# AIPOWER

## DATA SHEET

### Feature

- 30V,5.8A  
 $R_{DS(ON)} < 26m\Omega @ V_{GS}=10V$  TYP=18 m $\Omega$   
 $R_{DS(ON)} < 32m\Omega @ V_{GS}=4.5V$  TYP=23 m $\Omega$
- Advanced Trench Technology
- Lead free product is acquired



### Application

- Interfacing Switching
- Load Switching
- Power management



SOT-23 top view

### Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|--------|----------------|-----------|------------|----------------|
| 3400           | AP3400 | Sot-23         | 7 inch    | -          | 3000           |

### ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter  | Symbol          | Value     | Unit                      |
|--|-----------------|-----------|---------------------------|
| Drain-Source Voltage                                       | $V_{DS}$        | 30        | V                         |
| Gate-Source Voltage  | $V_{GS}$        | $\pm 12$  | V                         |
| Continuous Drain Current ( $T_a=25^\circ\text{C}$ )        | $I_D$           | 5.8       | A                         |
| Continuous Drain Current ( $T_a=70^\circ\text{C}$ )        | $I_D$           | 3.8       | A                         |
| Pulsed Drain Current                                       | $I_{DM}$        | 23        | A                         |
| Power Dissipation  | $P_D$           | 1.36      | W                         |
| Thermal Resistance from Junction to Ambient <sup>(4)</sup> | $R_{\theta JA}$ | 92        | $^\circ\text{C}/\text{W}$ |
| Junction Temperature                                       | $T_J$           | 150       | $^\circ\text{C}$          |
| Storage Temperature  | $T_{STG}$       | -55~ +150 | $^\circ\text{C}$          |

MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^{\circ}\text{C}$  unless otherwise noted)

| Parameter                                 | Symbol        | Test Condition   | Min | Type | Max       | Unit       |
|---|---------------|--|-----|------|-----------|------------|
| <b>Static Characteristics</b>             |               |  |     |      |           |            |
| Drain-source breakdown voltage            | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                                | 30  | -    | -         | V          |
| Zero gate voltage drain current           | $I_{DSS}$     | $V_{DS} = 30V, V_{GS} = 0V$                                  | -   | -    | 1         | $\mu A$    |
| Gate-body leakage current                 | $I_{GSS}$     | $V_{GS} = \pm 12V, V_{DS} = 0V$                              | -   | -    | $\pm 100$ | nA         |
| Gate threshold voltage <sup>(3)</sup>     | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                            | 0.4 | 1.0  | 1.5       | V          |
| Drain-source on-resistance <sup>(3)</sup> | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 5.8A$                                   | -   | 18   | 26        | m $\Omega$ |
|   |               | $V_{GS} = 4.5V, I_D = 3A$                                    | -   | 23   | 32        |            |
|   |               | $V_{GS} = 2.5V, I_D = 1A$                                    | -   | 35   | 50        |            |
| <b>Dynamic characteristics</b>            |               |  |     |      |           |            |
| Input Capacitance                         | $C_{iss}$     | $V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$                        | -   | 700  | -         | pF         |
| Output Capacitance                        | $C_{oss}$     |  | -   | 66   | -         |            |
| Reverse Transfer Capacitance              | $C_{rss}$     |  | -   | 52   | -         |            |
| <b>Switching characteristics</b>          |               |  |     |      |           |            |
| Turn-on delay time                        | $t_{d(on)}$   | $V_{DD} = 15V, I_D = 4A,$<br>$V_{GS} = 4.5V, R_G = 10\Omega$ | -   | 12   | -         | ns         |
| Turn-on rise time                         | $t_r$         |  | -   | 52   | -         |            |
| Turn-off delay time                       | $t_{d(off)}$  |  | -   | 17   | -         |            |
| Turn-off fall time                        | $t_f$         |  | -   | 10   | -         |            |
| Total Gate Charge                         | $Q_g$         | $V_{DS} = 15V, I_D = 4A,$<br>$V_{GS} = 4.5V$                 | -   | 4.8  | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$      |  | -   | 1.2  | -         |            |
| Gate-Drain Charge                         | $Q_{gd}$      |  | -   | 1.7  | -         |            |
| <b>Source-Drain Diode characteristics</b> |               |  |     |      |           |            |
| Diode Forward voltage <sup>(3)</sup>      | $V_{DS}$      | $V_{GS} = 0V, I_S = 5.8A$                                    | -   | -    | 1.2       | V          |
| Diode Forward current <sup>(4)</sup>      | $I_S$         |  | -   | -    | 5.8       | A          |

**Notes:**

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

**Test Circuit**

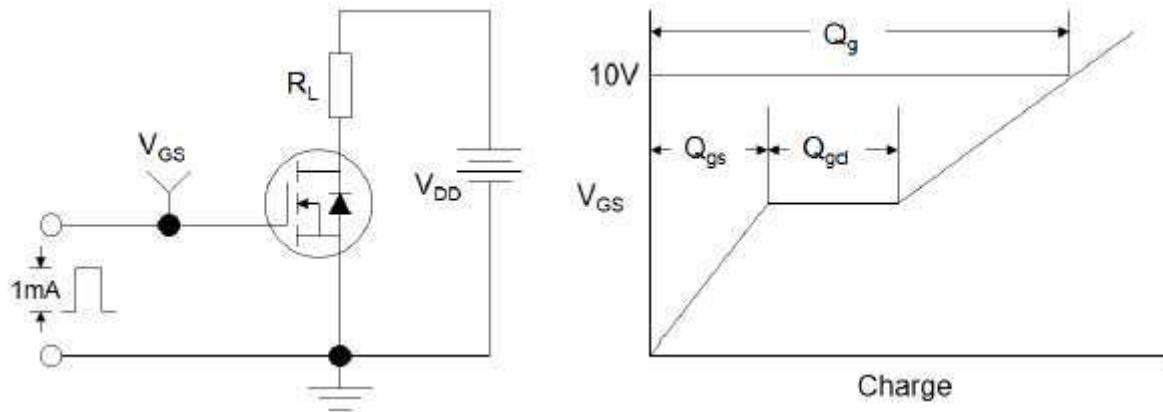


Figure1:Gate Charge Test Circuit & Waveform

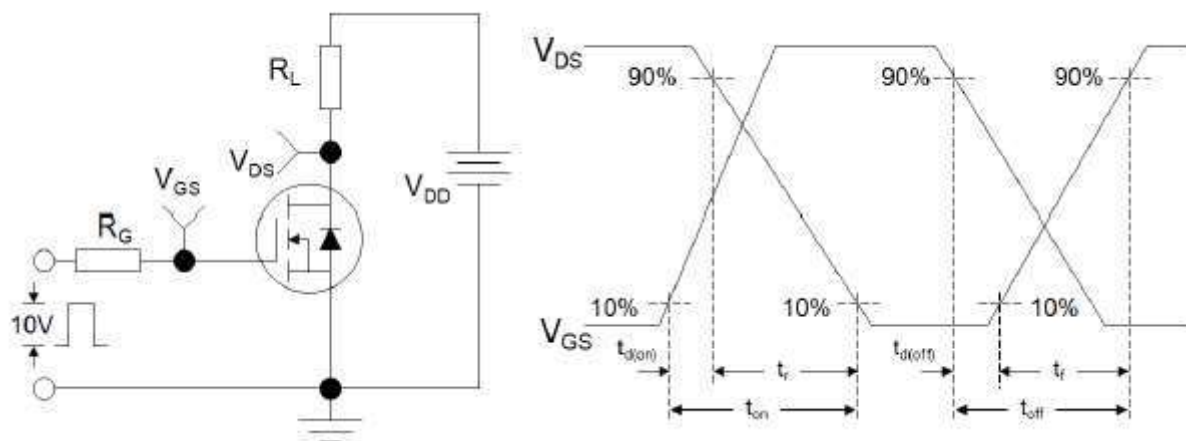


Figure 2: Resistive Switching Test Circuit & Waveforms

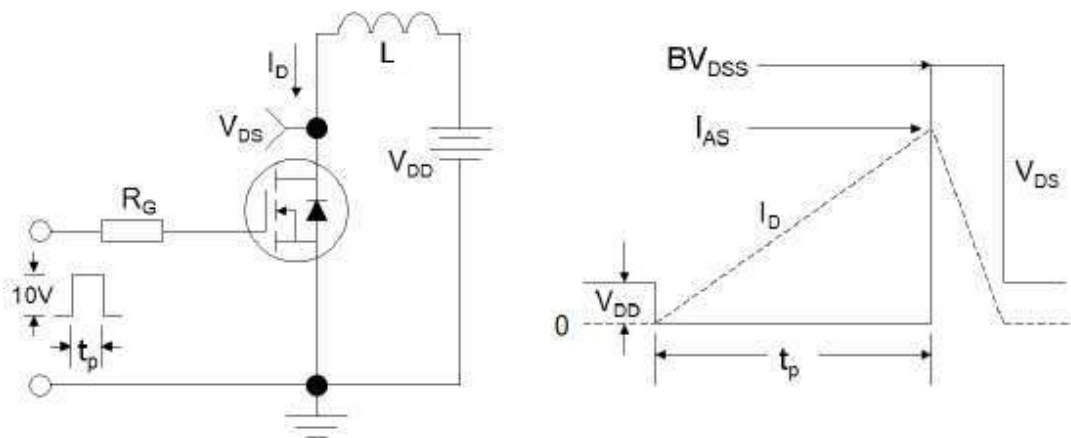
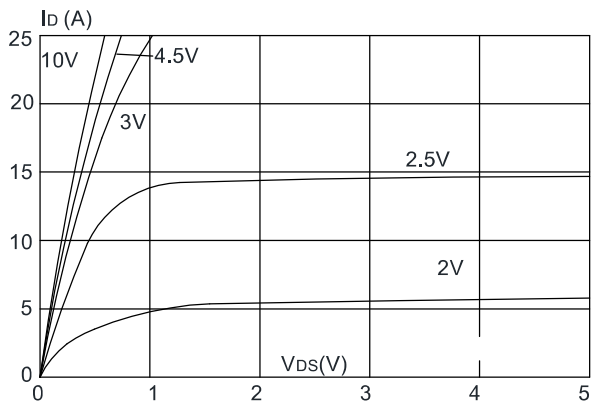


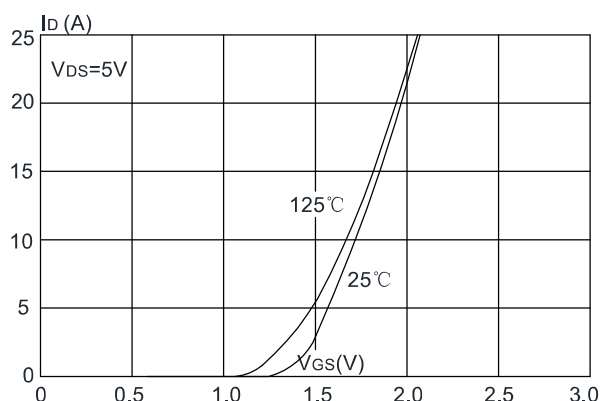
Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

**Typical Performance Characteristics**

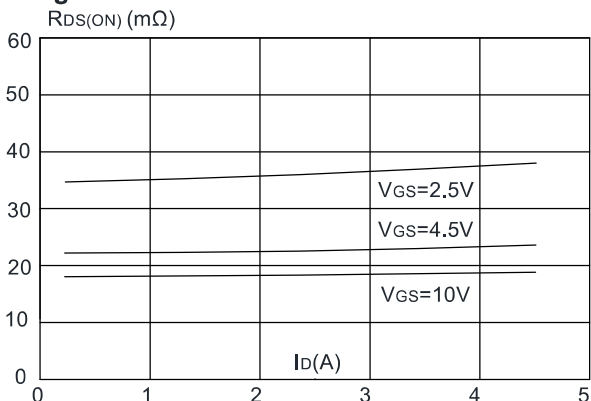
**Figure 1: Output Characteristics**



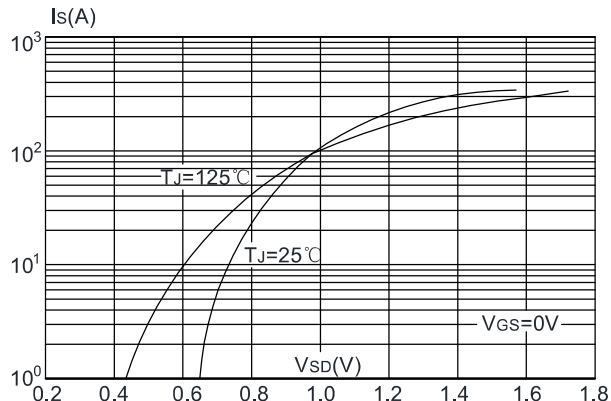
**Figure 2: Typical Transfer Characteristics**



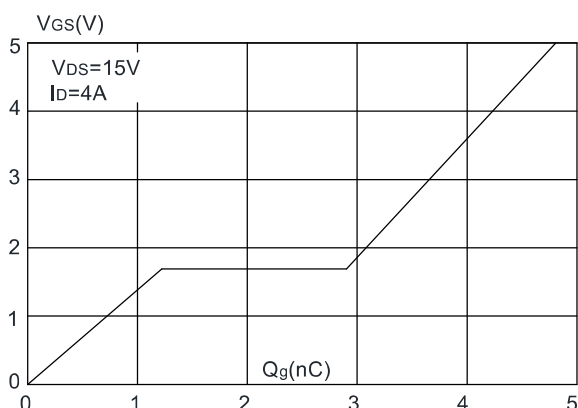
**Figure 3: On-resistance vs. Drain Current**



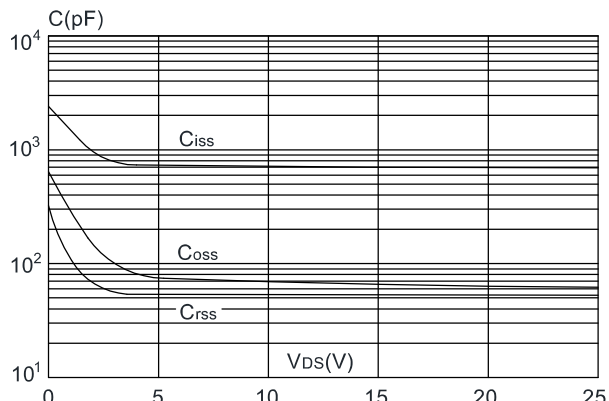
**Figure 4: Body Diode Characteristics**



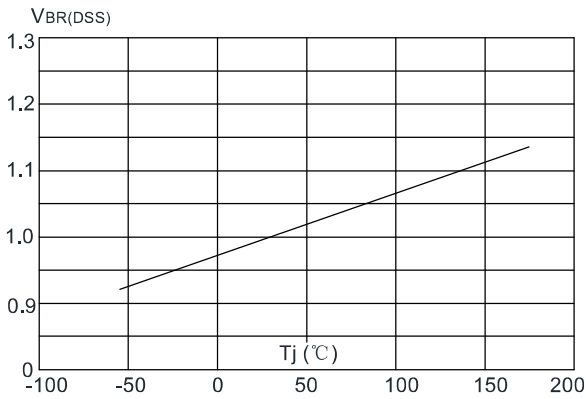
**Figure 5: Gate Charge Characteristics**



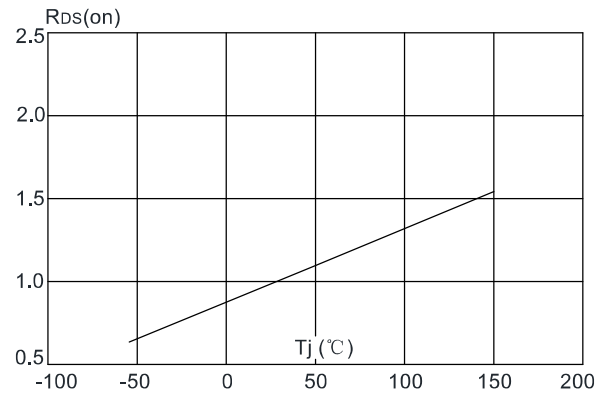
**Figure 6: Capacitance Characteristics**



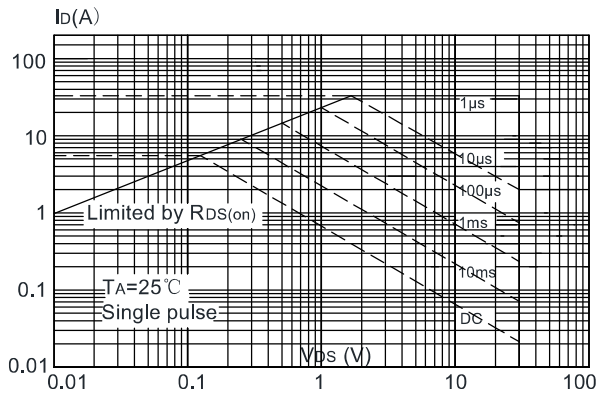
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



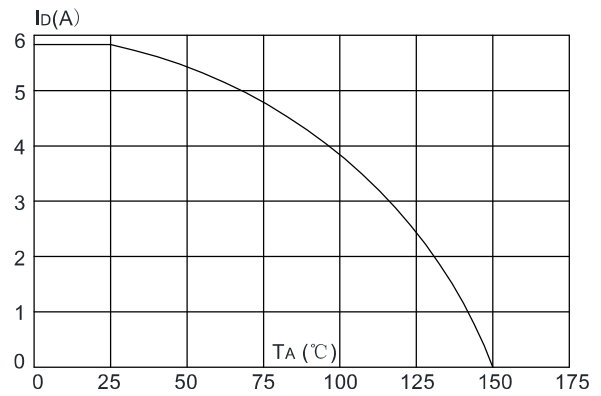
**Figure 8:** Normalized on Resistance vs. Junction Temperature



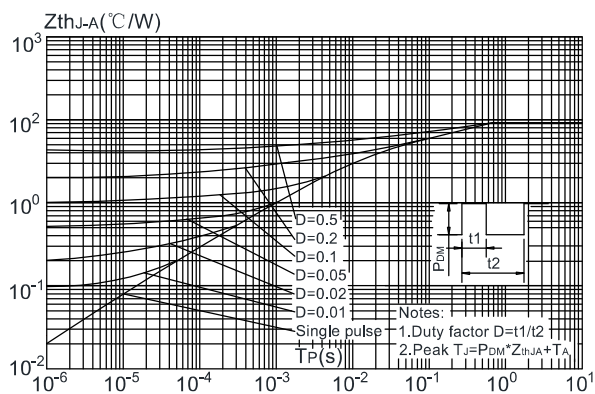
**Figure 9:** Maximum Safe Operating Area



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



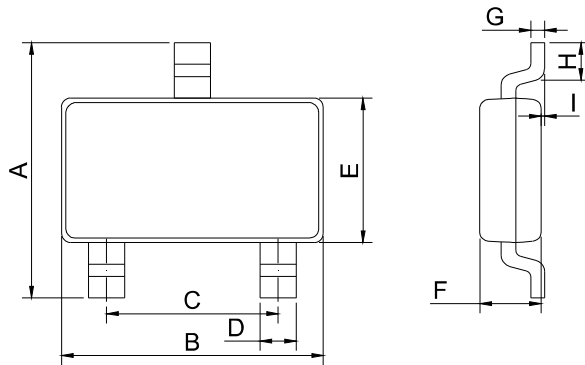
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



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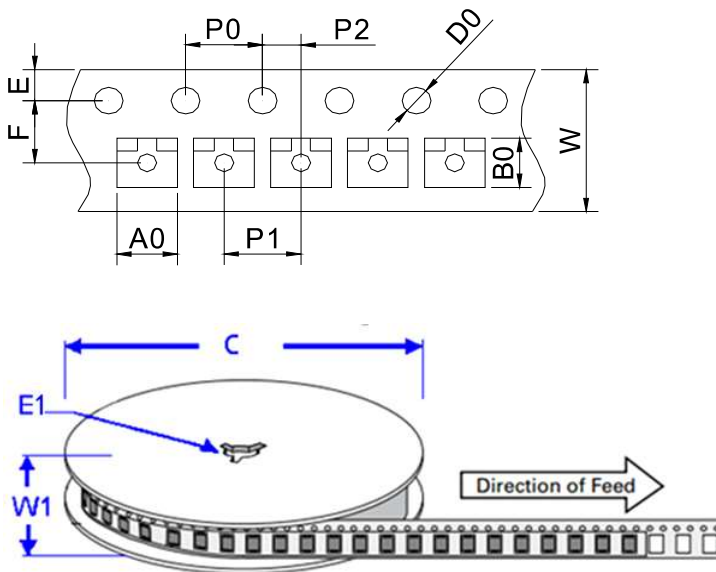
### SOT-23 Package Information



SOT-23

| Ref. | Dimensions  |      |      |           |       |       |
|------|-------------|------|------|-----------|-------|-------|
|      | Millimeters |      |      | Inches    |       |       |
|      | Min.        | Typ. | Max. | Min.      | Typ.  | Max.  |
| A    | 2.30        | 2.40 | 2.50 | 0.091     | 0.095 | 0.098 |
| B    | 2.80        | 2.90 | 3.00 | 0.110     | 0.114 | 0.118 |
| C    | 1.90 REF    |      |      | 0.075 REF |       |       |
| D    | 0.35        | 0.40 | 0.45 | 0.014     | 0.016 | 0.018 |
| E    | 1.20        | 1.30 | 1.40 | 0.047     | 0.051 | 0.055 |
| F    | 0.90        | 1.00 | 1.10 | 0.035     | 0.039 | 0.043 |
| G    |             | 0.10 | 0.15 |           | 0.004 | 0.006 |
| H    | 0.20        |      |      | 0.008     |       |       |
| I    | 0           |      | 0.10 | 0         |       | 0.004 |

### Package Information-SOT-23



| Ref. | Dimensions  |               |
|------|-------------|---------------|
|      | Millimeters | Inches        |
| A0   | 3.15 ± 0.3  | 0.124 ± 0.012 |
| B0   | 2.77 ± 0.3  | 0.109 ± 0.012 |
| C    | 178         | 7.0           |
| D0   | 1.50±0.1    | 0.059 ± 0.004 |
| E    | 1.75 ± 0.2  | 0.069 ± 0.008 |
| E1   | 13.3±0.3    | 0.524± 0.012  |
| F    | 3.5 ± 0.2   | 0.138 ± 0.008 |
| P0   | 4.00 ± 0.2  | 0.157 ± 0.008 |
| P1   | 4.00 ± 0.2  | 0.157 ± 0.008 |
| P2   | 2.00 ± 0.2  | 0.079 ± 0.008 |
| W    | 8.00 ± 0.2  | 0.315 ± 0.008 |
| W1   | 11.5±1.0    | 0.453 ± 0.039 |