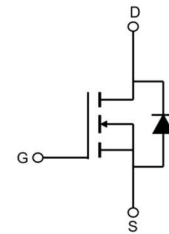


# AP80N06

## N-Channel Enhancement Mosfet

### Feature

- 60V,80A  
 $R_{DS(on)} < 10m\Omega @ V_{GS}=10V$   
 $R_{DS(on)} < 14m\Omega @ V_{GS}=4.5V$
- Advanced Trench Technology
- Lead free product is acquired
- Excellent  $R_{DS(on)}$  and Low Gate Charge



Schematic Diagram



Marking and pin assignment

### Application

- PWM applications
- Load Switch
- Power management

### Package Marking and Ordering Information

| Device Marking | Device  | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|---------|----------------|-----------|------------|----------------|
| 80N06          | AP80N06 | TO-220C        | -         | -          | 1000           |

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

| Parameter  | Symbol          | Value     | Unit                      |
|--|-----------------|-----------|---------------------------|
| Drain-Source Voltage                                   | $V_{DS}$        | 60        | V                         |
| Gate-Source Voltage                                    | $V_{GS}$        | $\pm 20$  | V                         |
| Continuous Drain Current ( $T_a = 25^\circ\text{C}$ )  | $I_D$           | 80        | A                         |
| Continuous Drain Current ( $T_a = 100^\circ\text{C}$ ) | $I_D$           | 56        | A                         |
| Pulsed Drain Current <sup>(1)</sup>                    | $I_{DM}$        | 232       | A                         |
| Singel Pulsed Avalanche Energy <sup>(2)</sup>          | $E_{AS}$        | 110       | mJ                        |
| Power Dissipation                                      | $P_D$           | 70        | W                         |
| Thermal Resistance from Junction to Case               | $R_{\theta JC}$ | 2.14      | $^\circ\text{C}/\text{W}$ |
| 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            | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$  | 60  | -    | -         | V          |
| Zero gate voltage drain current           | $I_{DSS}$     | $V_{DS} = 60V, V_{GS} = 0V$   | -   | -    | 1         | $\mu A$    |
| Gate-body leakage current                 | $I_{GSS}$     | $V_{GS} = \pm 20V, V_{DS} = 0V$   | -   | -    | $\pm 100$ | nA         |
| Gate threshold voltage <sup>(3)</sup>     | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$   | 1   | 1.7  | 2.5       | V          |
| Drain-source on-resistance <sup>(3)</sup> | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 30A$   | -   | 7.5  | 10        | m $\Omega$ |
|   |               | $V_{GS} = 4.5V, I_D = 20A$  | -   | 10   | 14        |            |
| Forward tranconductance <sup>(3)</sup>    | $g_{FS}$      | $V_{DS} = 10V, I_D = 30A$   | 20  | -    | -         | S          |
| <b>Dynamic characteristics</b>            |               |   |     |      |           |            |
| Input Capacitance                         | $C_{iss}$     | $V_{DS} = 25V, V_{GS} = 0V, f = 1MHz$                                     | -   | 4400 | -         | pF         |
| Output Capacitance                        | $C_{oss}$     |   | -   | 210  | -         |            |
| Reverse Transfer Capacitance              | $C_{rss}$     |   | -   | 190  | -         |            |
| <b>Switching characteristics</b>          |               |   |     |      |           |            |
| Turn-on delay time                        | $t_{d(on)}$   | $V_{DD} = 30V, I_D = 30A, R_L = 1\Omega$<br>$V_{GS} = 10V, R_G = 3\Omega$ | -   | 7.1  | -         | ns         |
| Turn-on rise time                         | $t_r$         |   | -   | 5.3  | -         |            |
| Turn-off delay time                       | $t_{d(off)}$  |   | -   | 27.2 | -         |            |
| Turn-off fall time                        | $t_f$         |   | -   | 6.2  | -         |            |
| Total Gate Charge                         | $Q_g$         | $V_{DS} = 30V, I_D = 30A,$<br>$V_{GS} = 10V$                              | -   | 77   | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$      |   | -   | 9    | -         |            |
| Gate-Drain Charge                         | $Q_{gd}$      |   | -   | 23   | -         |            |
| <b>Source-Drain Diode characteristics</b> |               |   |     |      |           |            |
| Diode Forward voltage <sup>(3)</sup>      | $V_{DS}$      | $V_{GS} = 0V, I_S = 30A$  | -   | -    | 1.2       | V          |
| Diode Forward current <sup>(4)</sup>      | $I_S$         |   | -   | -    | 80        | A          |
| Body Diode Reverse Recovery Time          | $t_{rr}$      | $T_J = 25^\circ, I_F = 30A, di/dt = 100A/us$                              |     | 29   |           | ns         |
| Body Diode Reverse Recovery Charge        | $Q_{rr}$      | $T_J = 25^\circ, I_F = 30A, di/dt = 100A/us$                              |     | 45   |           | nc         |

**Notes:**

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition:  $T_J = 25^\circ\text{C}, V_{DD} = 20V, R_G = 25\Omega, L = 0.5mH, I_{AS} = 21A$
3. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
4. Surface Mounted on FR4 Board,  $t \leq 10$  sec

**Test Circuit**

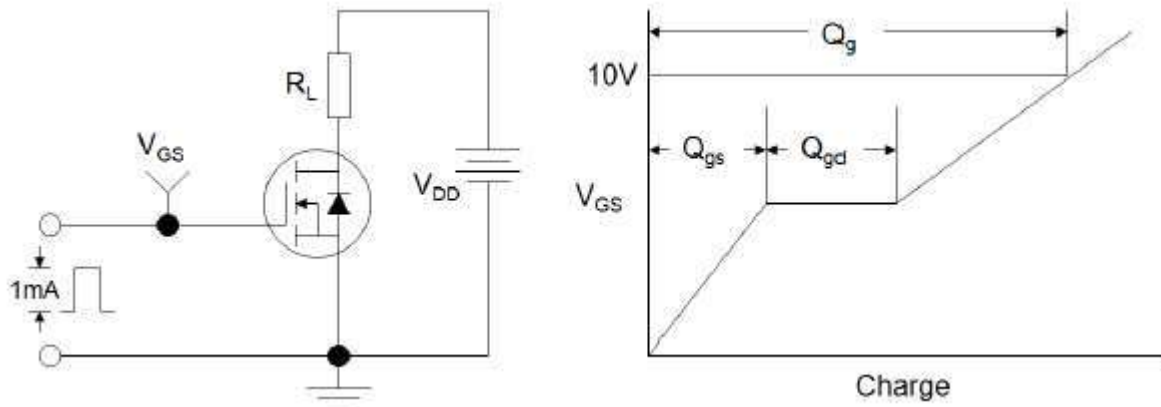


Figure1:Gate Charge Test Circuit & Waveform

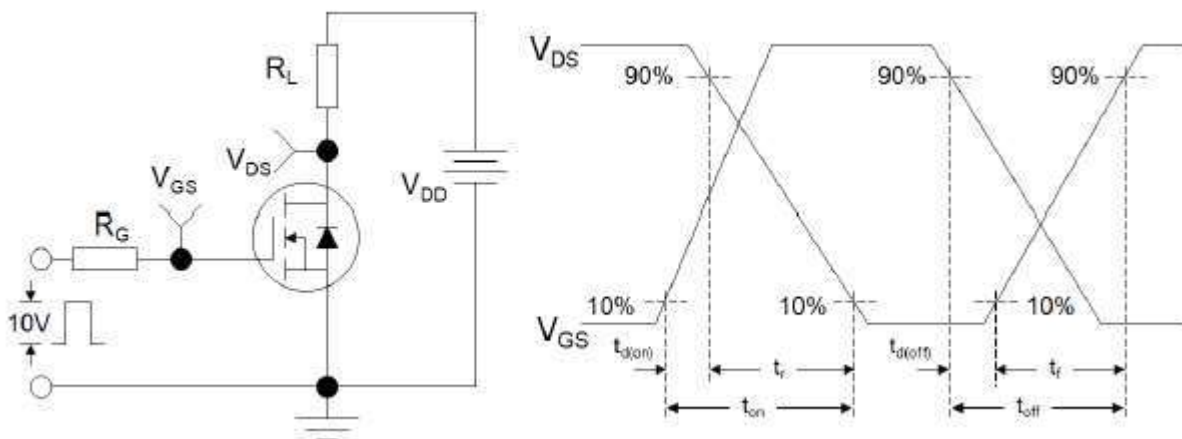


Figure 2: Resistive Switching Test Circuit & Waveforms

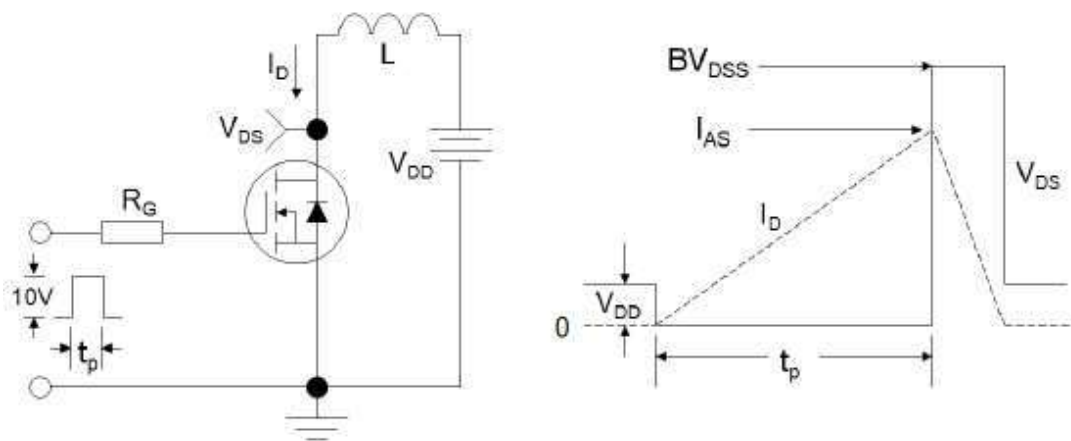
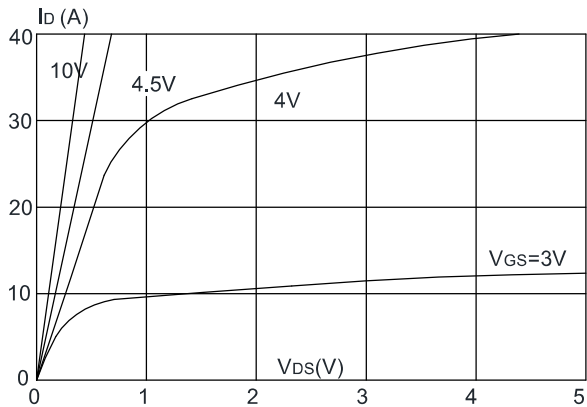
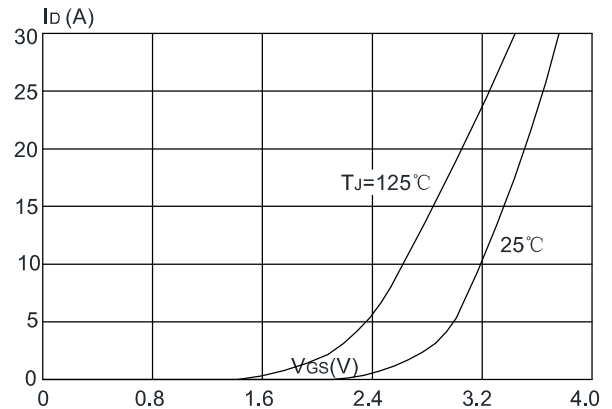


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

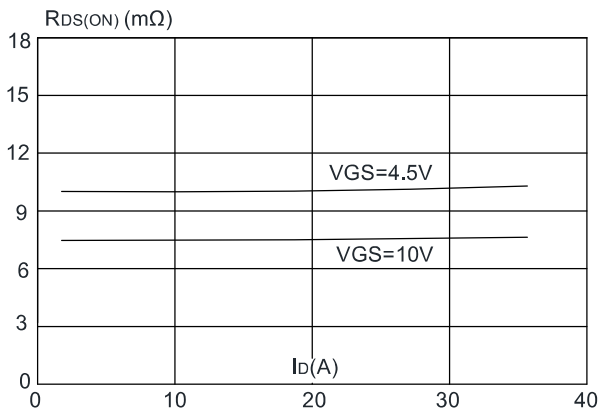
**Figure 1: Output Characteristics**



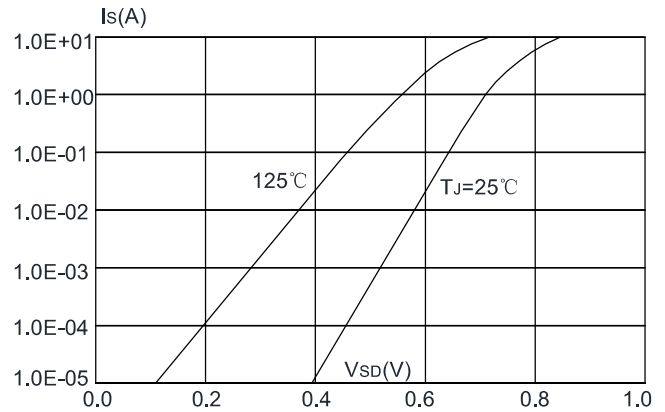
**Figure 2: Typical Transfer Characteristics**



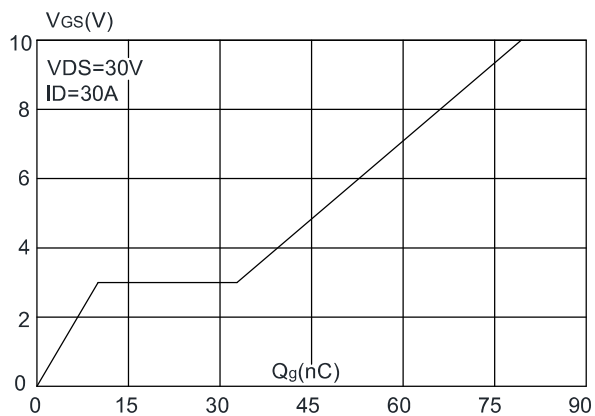
**Figure 3: On-resistance vs. Drain Current**



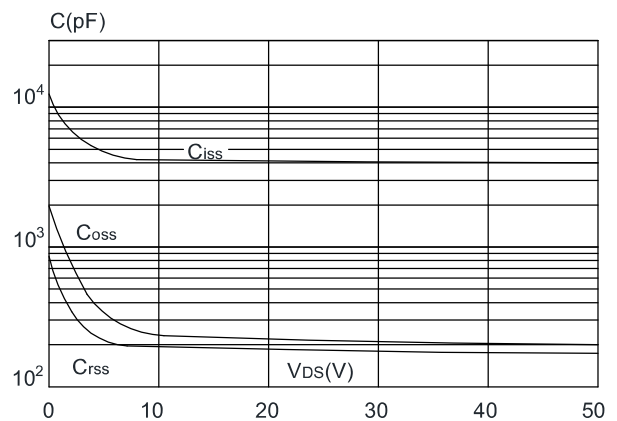
**Figure 4: Body Diode Characteristics**



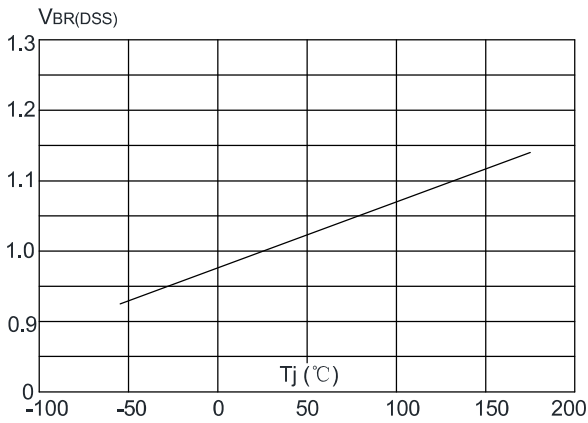
**Figure 5: Gate Charge Characteristics**



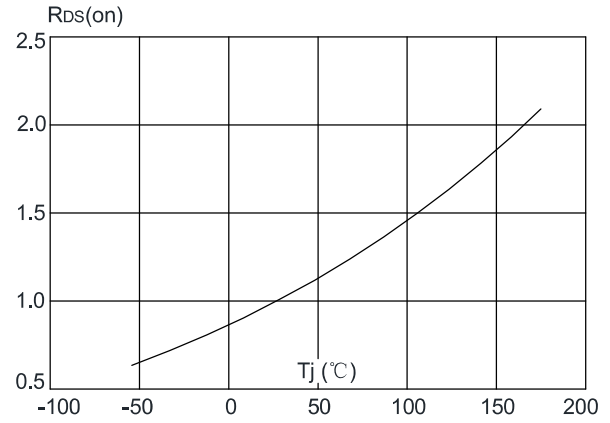
**Figure 6: Capacitance Characteristics**



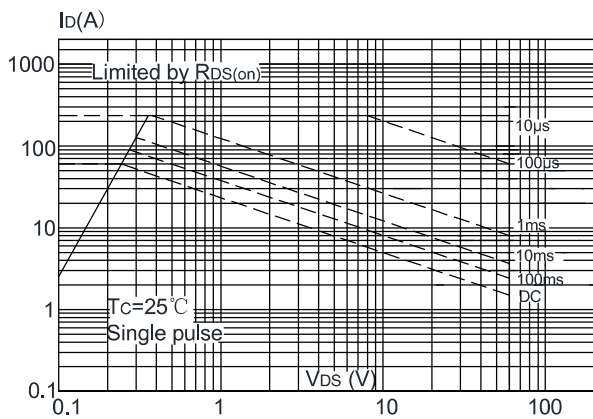
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



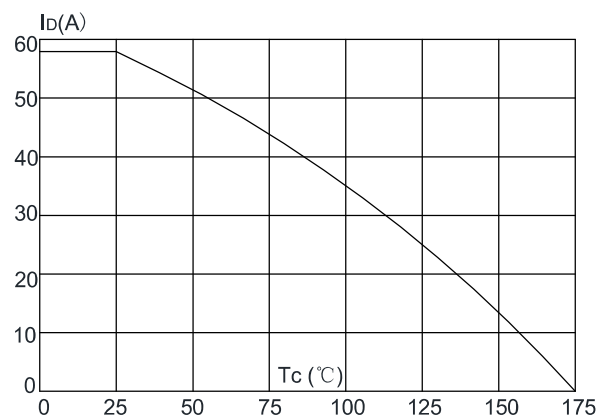
**Figure 8:** Normalized on Resistance vs. Junction Temperature



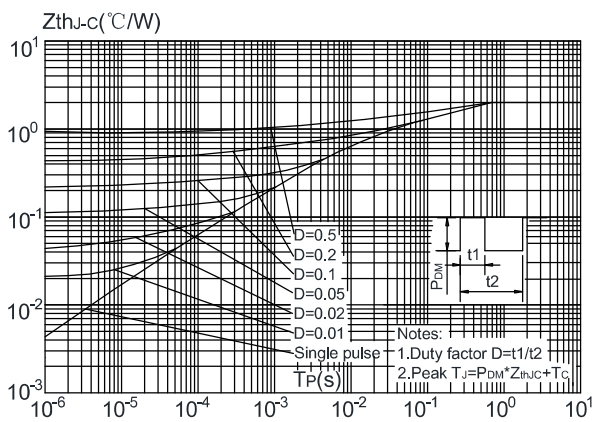
**Figure 9:** Maximum Safe Operating Area



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



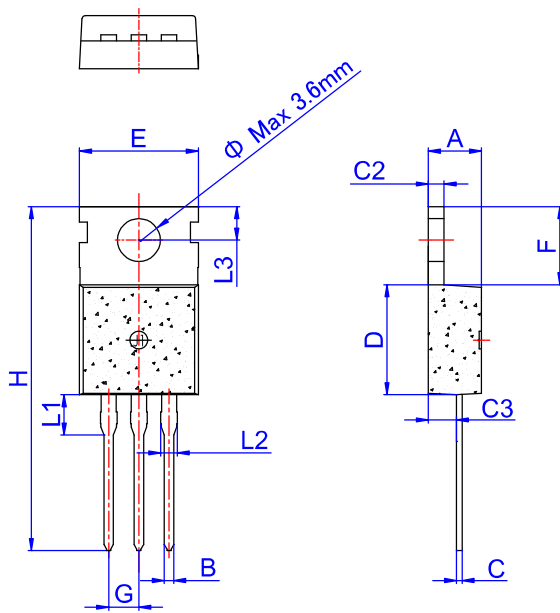
**Figure 11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



# AP80N06

N-Channel Enhancement Mosfet

### TO-220C Package Information



TO-220C

| Ref.   | Dimensions  |      |      |        |       |       |
|--------|-------------|------|------|--------|-------|-------|
|        | Millimeters |      |      | Inches |       |       |
|        | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A      | 4.40        |      | 4.60 | 0.173  |       | 0.181 |
| B      | 0.70        |      | 0.90 | 0.028  |       | 0.035 |
| C      | 0.45        |      | 0.60 | 0.018  |       | 0.024 |
| C2     | 1.23        |      | 1.32 | 0.048  |       | 0.052 |
| C3     | 2.20        |      | 2.60 | 0.087  |       | 0.102 |
| D      | 8.90        |      | 9.90 | 0.350  |       | 0.390 |
| E      | 9.90        |      | 10.3 | 0.390  |       | 0.406 |
| F      | 6.30        |      | 6.90 | 0.248  |       | 0.272 |
| G      |             | 2.54 |      |        | 0.1   |       |
| H      | 28.0        |      | 29.8 | 1.102  |       | 1.173 |
| L1     |             | 3.39 |      |        | 0.133 |       |
| L2     | 1.14        |      | 1.70 | 0.045  |       | 0.067 |
| L3     | 2.65        |      | 2.95 | 0.104  |       | 0.116 |
| $\Phi$ |             | 3.6  |      |        | 0.142 |       |