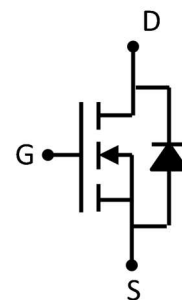


## Feature

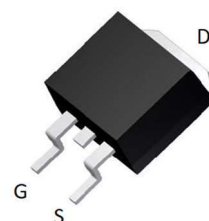
- 85V,135A  
 $R_{DS(ON)} < 5m\Omega @ V_{GS}=10V$
- Advanced Trench Power MOSFET
- Provide Excellent  $R_{DS(ON)}$  And Low Gate Charge



Schematic Diagram

## Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch
- Rectifier



TO-263 top view

## Package Marking and Ordering Information

| Device Marking | Device     | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|------------|----------------|-----------|------------|----------------|
| G050N85D       | APG050N85D | TO-263         |           | -          | 800            |

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

| Parameter                                       | Symbol          | Value     | Unit          |
|-------------------------------------------------|-----------------|-----------|---------------|
| Drain-Source Voltage                            | $V_{DS}$        | 85        | V             |
| Gate-Source Voltage                             | $V_{GS}$        | $\pm 20$  | V             |
| Continuous Drain Current ( $T_a=25^{\circ}C$ )  | $I_D$           | 135       | A             |
| Continuous Drain Current ( $T_a=100^{\circ}C$ ) | $I_D$           | 80        | A             |
| Pulsed Drain Current <sup>(1)</sup>             | $I_{DM}$        | 260       | A             |
| Singel Pulsed Avalanche Energy <sup>(2)</sup>   | $E_{AS}$        | 238       | mJ            |
| Power Dissipation                               | $P_D$           | 196       | W             |
| Thermal Resistance from Junction to Case        | $R_{\theta JC}$ | 0.59      | $^{\circ}C/W$ |
| Junction Temperature                            | $T_J$           | 150       | $^{\circ}C$   |
| Storage Temperature                             | $T_{STG}$       | -55~ +150 | $^{\circ}C$   |

**MOSFET ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C unless otherwise noted)**

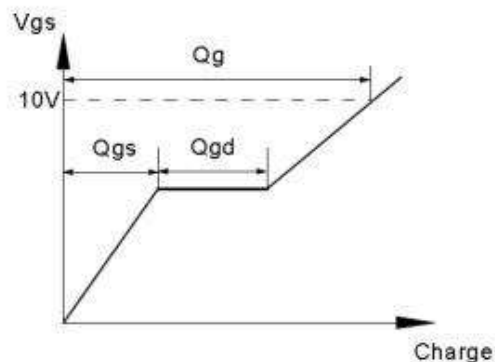
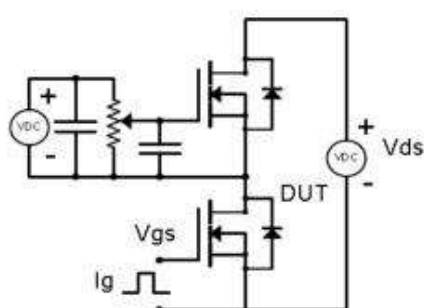
| Parameter                                 | Symbol               | Test Condition                                                                          | Min | Type | Max  | Unit |
|-------------------------------------------|----------------------|-----------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics                    |                      |                                                                                         |     |      |      |      |
| Drain-source breakdown voltage            | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                             | 85  | -    | -    | V    |
| Zero gate voltage drain current           | I <sub>DSS</sub>     | V <sub>DS</sub> =85V, V <sub>GS</sub> = 0V                                              | -   | -    | 1    | μA   |
| Gate-body leakage current                 | I <sub>GSS</sub>     | V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V                                             | -   | -    | ±100 | nA   |
| Gate threshold voltage <sup>(3)</sup>     | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 2   | 3    | 4    | V    |
| Drain-source on-resistance <sup>(3)</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =70A                                               | -   | 4.5  | 5    | mΩ   |
| Forward tranconductance <sup>(3)</sup>    | g <sub>FS</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =70A                                               | -   | 95   | -    | S    |
| Dynamic characteristics                   |                      |                                                                                         |     |      |      |      |
| Input Capacitance                         | C <sub>iss</sub>     | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, f =1MHz                                      | -   | 2924 | -    | pF   |
| Output Capacitance                        | C <sub>oss</sub>     |                                                                                         | -   | 771  | -    |      |
| Reverse Transfer Capacitance              | C <sub>rss</sub>     |                                                                                         | -   | 15   | -    |      |
| Switching characteristics                 |                      |                                                                                         |     |      |      |      |
| Turn-on delay time                        | t <sub>d(on)</sub>   | V <sub>DD</sub> =40V, I <sub>D</sub> =70A,<br>V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω | -   | 19   | -    | ns   |
| Turn-on rise time                         | t <sub>r</sub>       |                                                                                         | -   | 33   | -    |      |
| Turn-off delay time                       | t <sub>d(off)</sub>  |                                                                                         | -   | 29   | -    |      |
| Turn-off fall time                        | t <sub>f</sub>       |                                                                                         | -   | 19   | -    |      |
| Total Gate Charge                         | Q <sub>g</sub>       | V <sub>DS</sub> =40V, I <sub>D</sub> =70A,<br>V <sub>GS</sub> =10V                      | -   | 48   | -    | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>      |                                                                                         | -   | 13   | -    |      |
| Gate-Drain Charge                         | Q <sub>gd</sub>      |                                                                                         | -   | 19   | -    |      |
| Source-Drain Diode characteristics        |                      |                                                                                         |     |      |      |      |
| Diode Forward voltage <sup>(3)</sup>      | V <sub>DS</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =70A                                                | -   | -    | 1.2  | V    |
| Diode Forward current <sup>(4)</sup>      | I <sub>S</sub>       |                                                                                         | -   | -    | 135  | A    |
| Reverse recovery time                     | T <sub>rr</sub>      | I <sub>S</sub> =60A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/us                   |     | 52   |      | ns   |
| Reverse recovery charge                   | Q <sub>rr</sub>      | I <sub>S</sub> =60A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/us                   |     | 73   |      | nC   |

**Notes:**

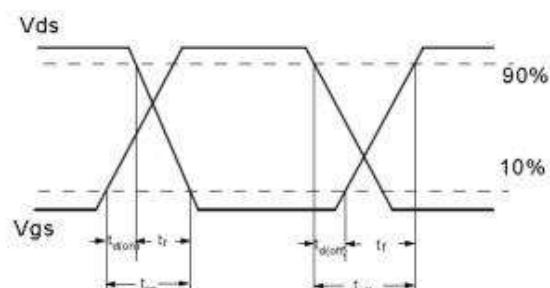
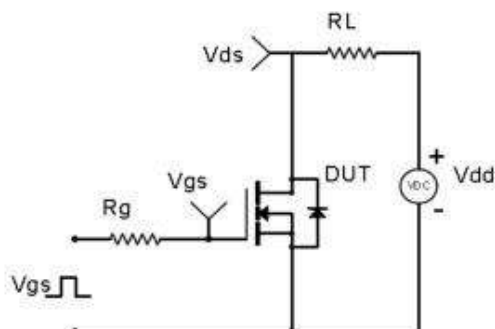
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=10V, R<sub>G</sub>=20 Ω, L=0.5mH, I<sub>AS</sub>=30A
3. Pulse Test: pulse width≤300μs, duty cycle≤2%
4. Surface Mounted on FR4 Board, t≤10 sec

## Test Circuit & Waveform

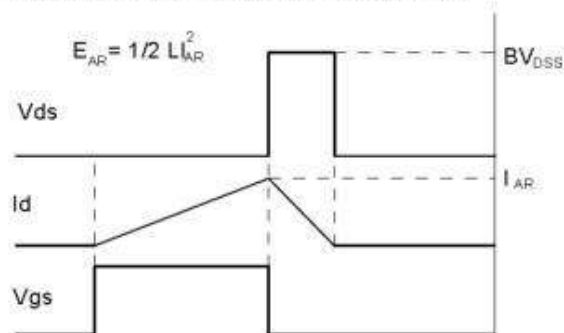
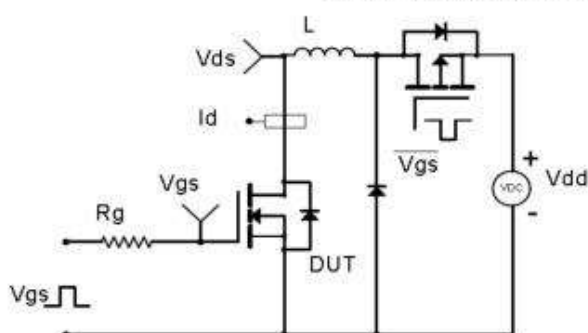
Gate Charge Test Circuit & Waveform



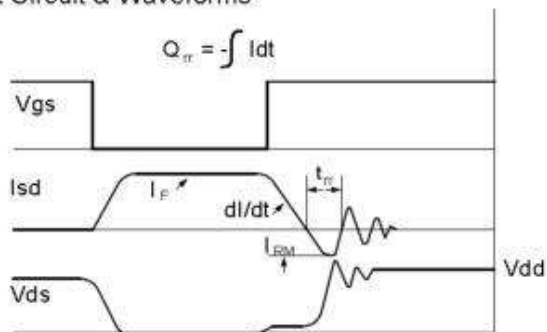
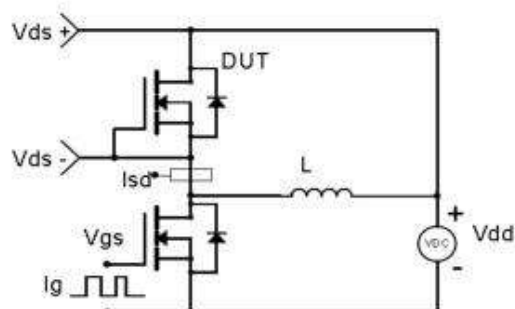
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## Typical Electronic and Thermal Characteristics

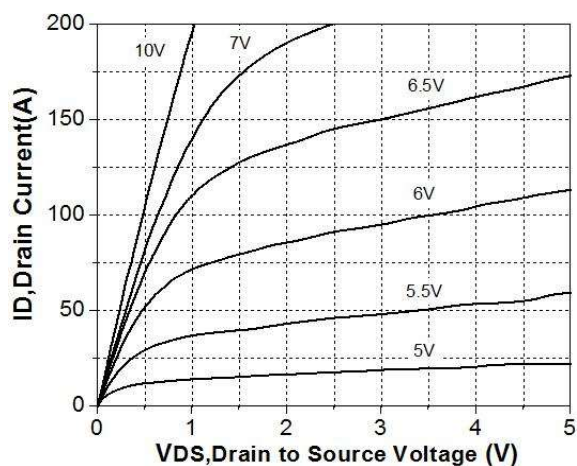


Figure 1. On-Region Characteristics

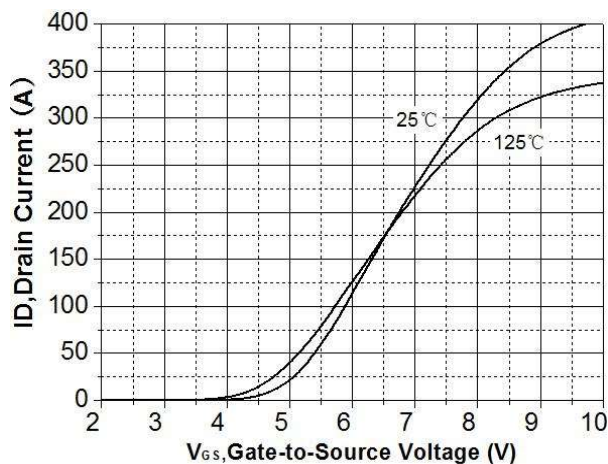


Figure 2. Transfer Characteristics

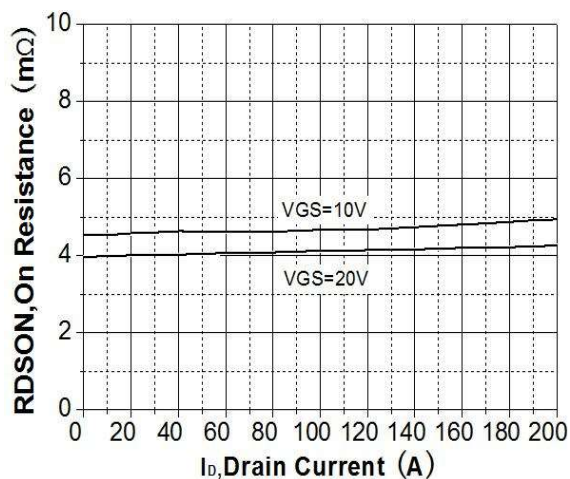


Figure 3. On-Resistance Variation vs Drain Current

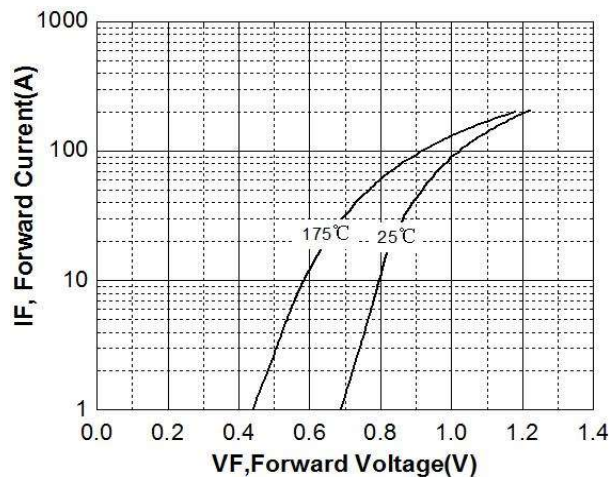


Figure 4. Body Diode Forward Voltage Vs Reverse Drain Current

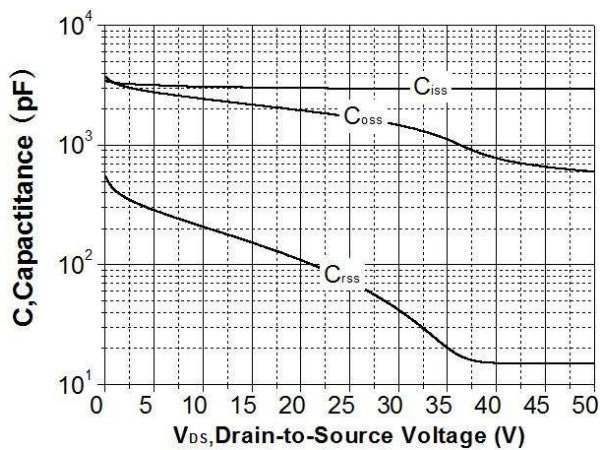


Figure 5. Capacitance Characteristics

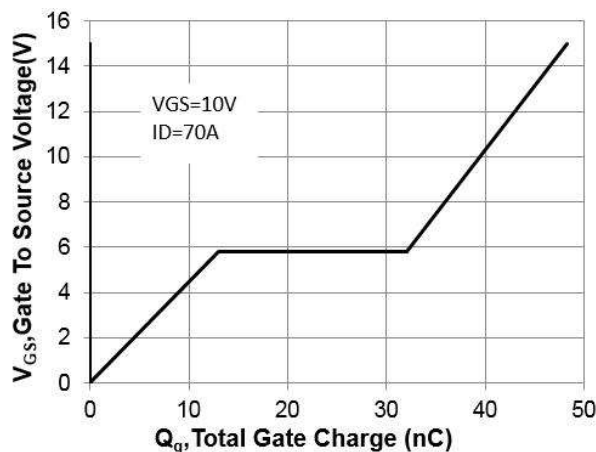


Figure 6. Gate Charge Characteristics

## Typical Electronic and Thermal Characteristics

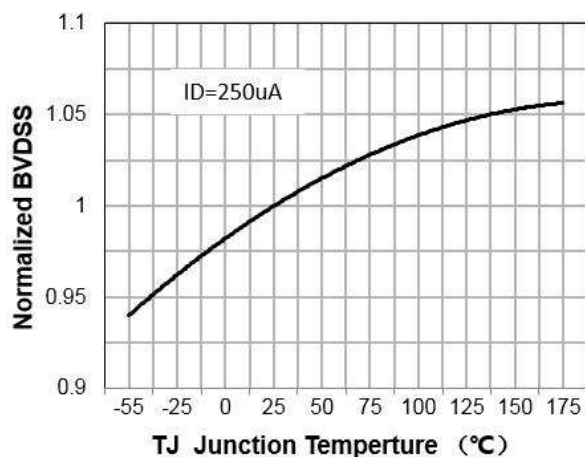


Figure 7. Breakdown Voltage Variation vs Temperature

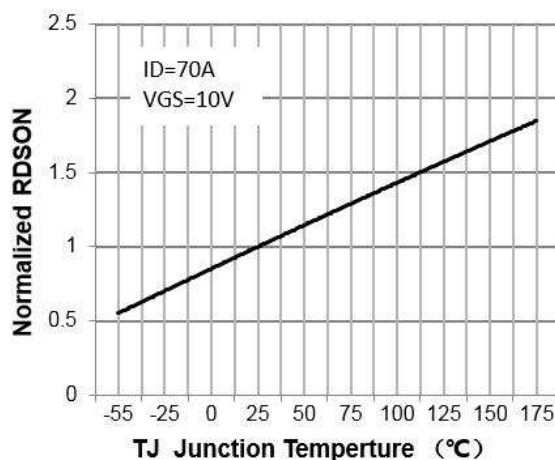


Figure 8. On-Resistance Variation vs Temperature

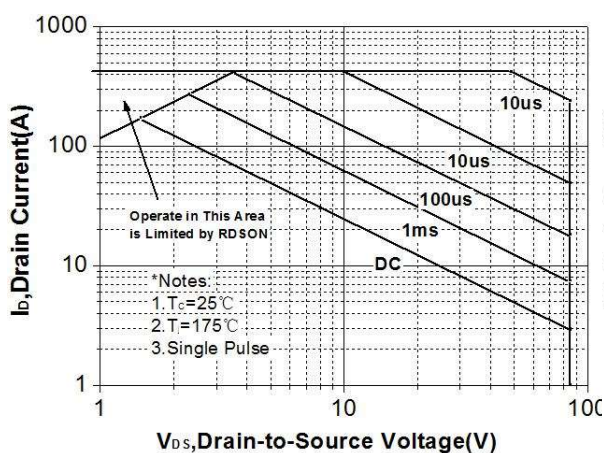


Figure 9. Maximum Safe Operating Area

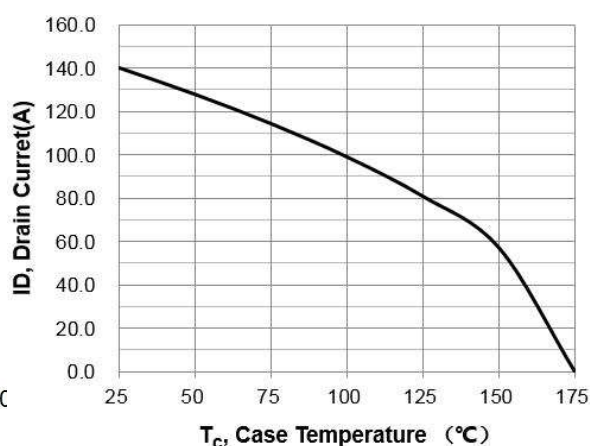


Figure 10. Maximum Drain Current vs Case Temperature

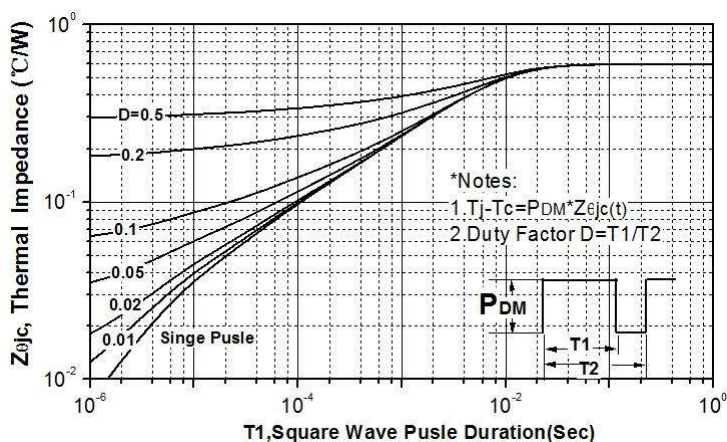
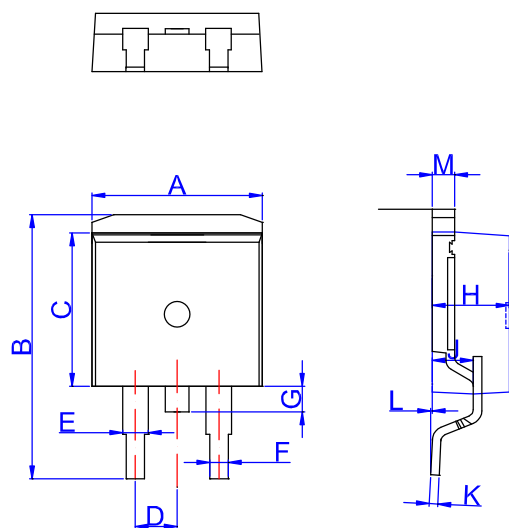


Figure 11. Transient Thermal Response Curve

TO-263 Package Information



TO-263

| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 9.90        |      | 10.20 | 0.390  |       | 0.402 |
| B    | 14.70       |      | 15.80 | 0.579  |       | 0.622 |
| C    | 9.4         |      | 9.6   | 0.37   |       | 0.378 |
| D    |             | 2.54 |       |        | 0.100 |       |
| E    | 1.20        |      | 1.40  | 0.047  |       | 0.055 |
| F    | 0.75        |      | 0.85  | 0.029  |       | 0.033 |
| G    |             |      | 1.75  |        |       | 0.069 |
| H    | 4.40        |      | 4.70  | 0.173  |       | 0.185 |
| J    | 2.30        |      | 2.70  | 0.091  |       | 0.106 |
| K    | 0.38        |      | 0.55  | 0.015  |       | 0.022 |
| L    | 0           | 0.10 | 0.25  | 0      | 0.004 | 0.010 |
| M    | 1.25        |      | 1.35  | 0.049  |       | 0.053 |