

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 60V           | 3.3mΩ@10V       | 140A  |
|               | 4.2mΩ@4.5V      |       |

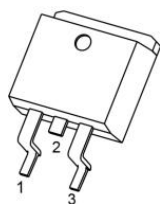
## Feature

- Fast Switching
- Low Gate Charge and Rdson
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test

## Applications

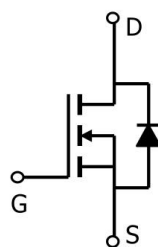
- DC-DC Converters
- Power Management

## Package

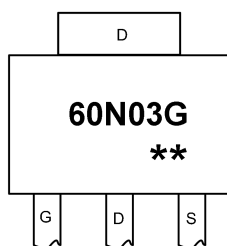


TO-263(G:1 D:2 S:3)

## Circuit diagram



## Marking



60N03G      =Device Code  
\*\*            =Week    Code

**Absolute maximum ratings (Ta=25°C unless otherwise noted)**

| Parameter                                       | Symbol          | Rating     | Units |
|-------------------------------------------------|-----------------|------------|-------|
| Drain-Source Voltage                            | $V_{DS}$        | 60         | V     |
| Gate-Source Voltage                             | $V_{GS}$        | $\pm 20$   | V     |
| Continuous Drain Current <sup>1</sup> (Tc=25°C) | $I_D$           | 140        | A     |
| Pulsed Drain Current <sup>2</sup>               | $I_{DM}$        | 560        | A     |
| Single Pulse Avalanche Energy <sup>3</sup>      | $E_{AS}$        | 961        | mJ    |
| Total Power Dissipation <sup>4</sup> (Tc=25°C)  | $P_D$           | 140        | W     |
| Thermal Resistance Junction-Case <sup>1</sup>   | $R_{\theta JC}$ | 0.89       | °C/W  |
| Storage Temperature Range                       | $T_{STG}$       | -55 to 150 | °C    |
| Operating Junction Temperature Range            | $T_J$           | -55 to 150 | °C    |

**Electrical characteristics (Ta=25°C, unless otherwise noted)**

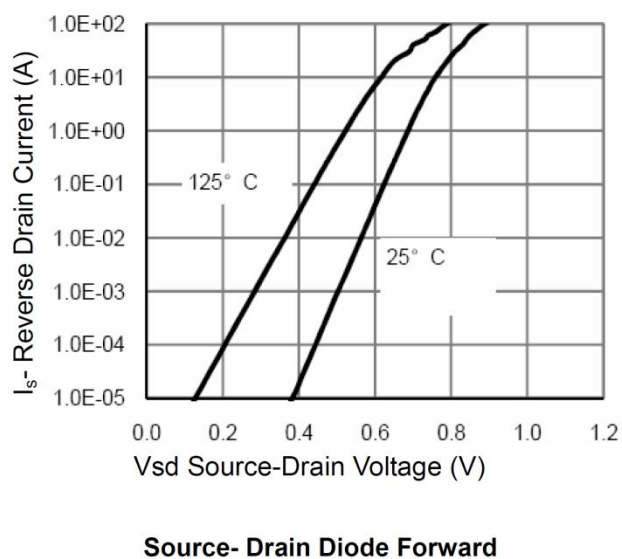
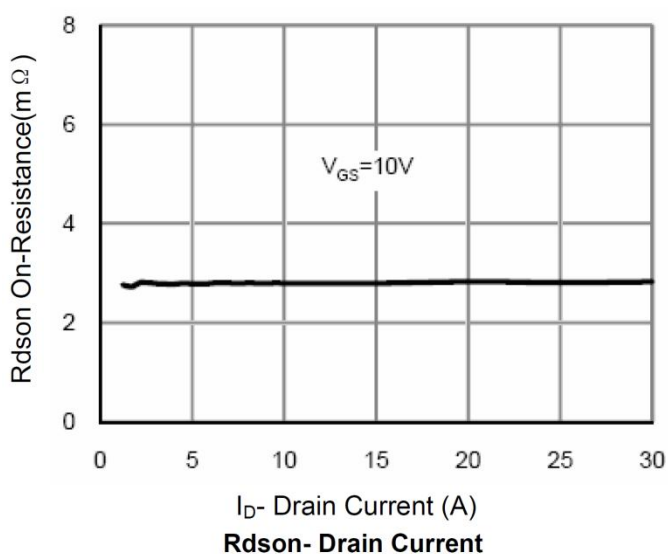
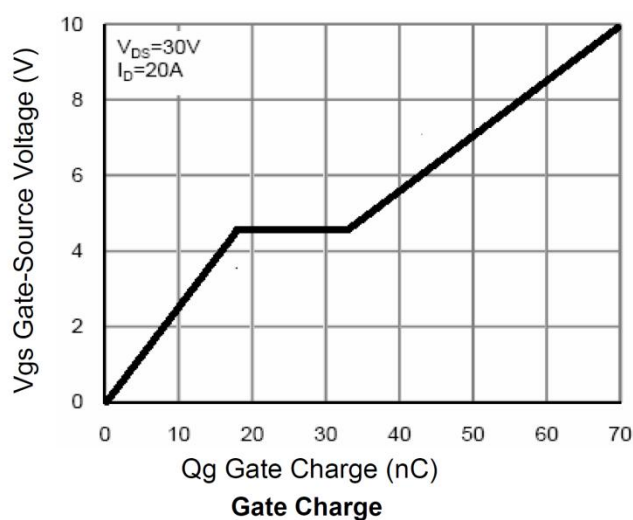
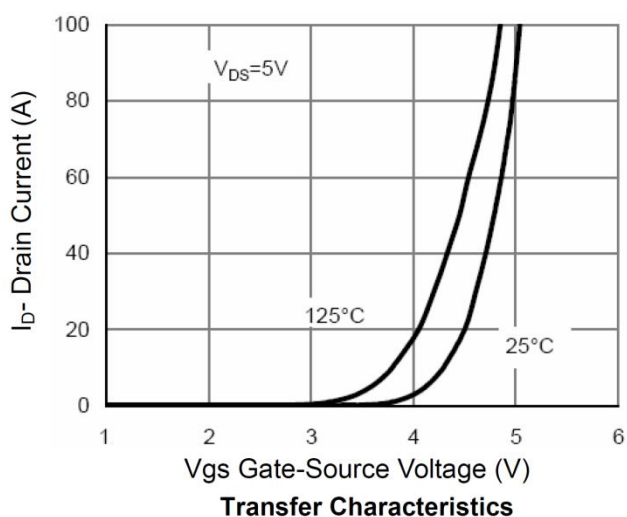
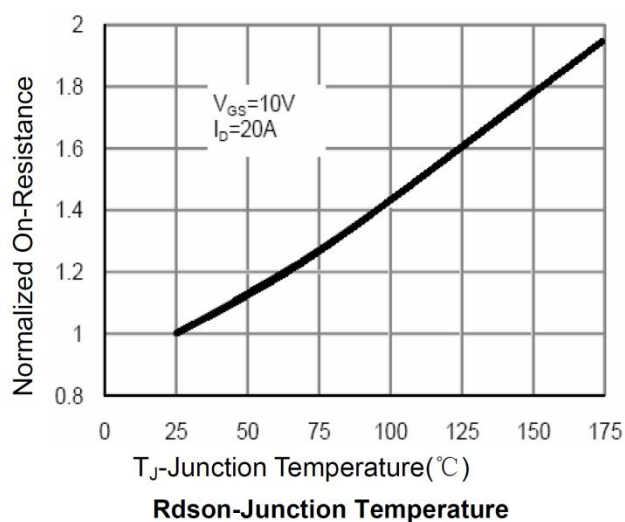
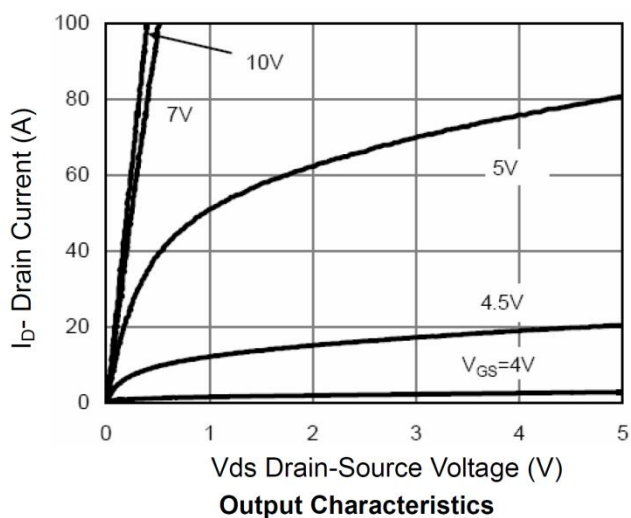
| Parameter                                      | Symbol            | Conditions                          | Min. | Typ. | Max. | Unit |
|------------------------------------------------|-------------------|-------------------------------------|------|------|------|------|
| Static Characteristics                         |                   |                                     |      |      |      |      |
| Drain-Source Breakdown Voltage                 | BV <sub>DSS</sub> | VGS=0V , ID=250uA                   | 60   | ---  | ---  | V    |
| Drain-Source Leakage Current                   | IDSS              | VDS=48V , VGS=0V                    | ---  | ---  | 1    | uA   |
| Gate-Source Leakage Current                    | IGSS              | VGS=±20V , VDS=0V                   | ---  | ---  | ±100 | nA   |
| Gate Threshold Voltage                         | VGS(th)           | VGS=VDS , ID =250uA                 | 1.0  | 1.7  | 2.5  | V    |
| Static Drain-Source On-Resistance <sup>2</sup> | RDS(ON)           | VGS=10V , ID=20A                    | ---  | 3.3  | 4.2  | mΩ   |
|                                                |                   | VGS=4.5V , ID=20A                   | ---  | 4.2  | 5.6  | mΩ   |
| Dynamic characteristics                        |                   |                                     |      |      |      |      |
| Input Capacitance                              | Ciss              | VDS=30V , VGS=0V , f=1MHz           | ---  | 4250 | ---  | pF   |
| Output Capacitance                             | Coss              |                                     | ---  | 975  | ---  |      |
| Reverse Transfer Capacitance                   | Crss              |                                     | ---  | 41   | ---  |      |
| Switching Characteristics                      |                   |                                     |      |      |      |      |
| Total Gate Charge                              | Qg                | VDS=30V , VGS=10V , ID=20A          | ---  | 68   | ---  | nC   |
| Gate-Source Charge                             | Qgs               |                                     | ---  | 19   | ---  |      |
| Gate-Drain Charge                              | Qgd               |                                     | ---  | 14   | ---  |      |
| Turn-On Delay Time                             | Td(on)            | VDD=30V , VGS=10V , RG=4.7Ω, ID=20A | ---  | 6    | ---  | ns   |
| Rise Time                                      | Tr                |                                     | ---  | 12   | ---  |      |
| Turn-Off Delay Time                            | Td(off)           |                                     | ---  | 24   | ---  |      |
| Fall Time                                      | Tf                |                                     | ---  | 5    | ---  |      |
| Diode Characteristics                          |                   |                                     |      |      |      |      |
| Diode Forward Voltage <sup>2</sup>             | VSD               | VGS=0V , IS=1A , TJ=25℃             | ---  | ---  | 1.2  | V    |

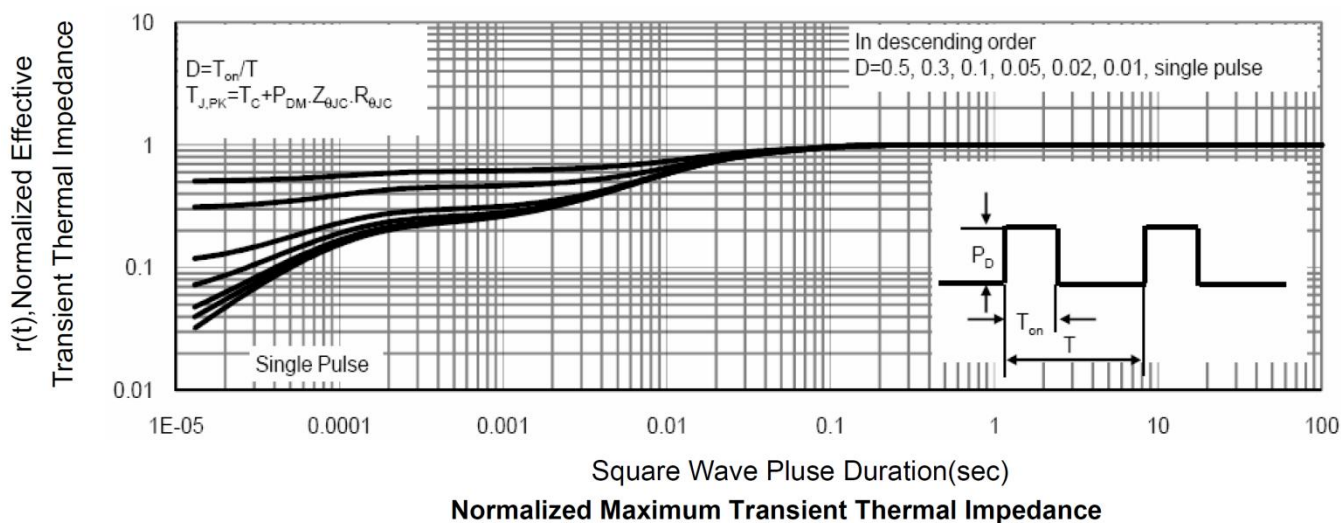
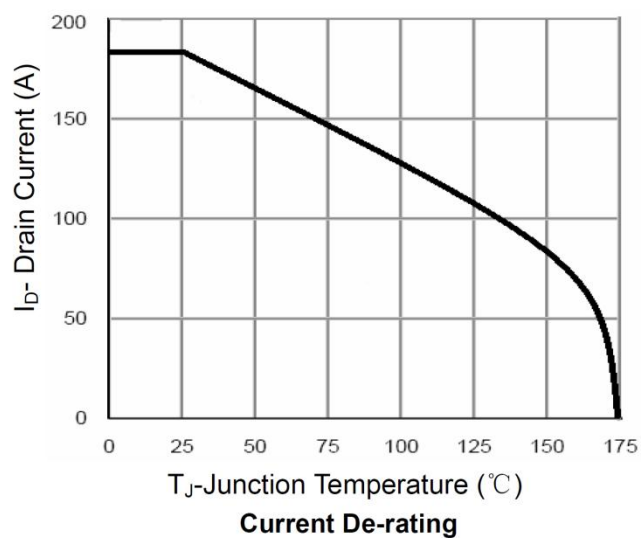
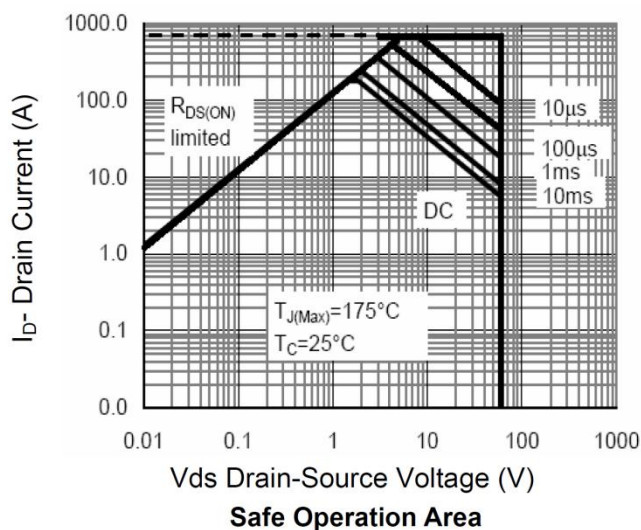
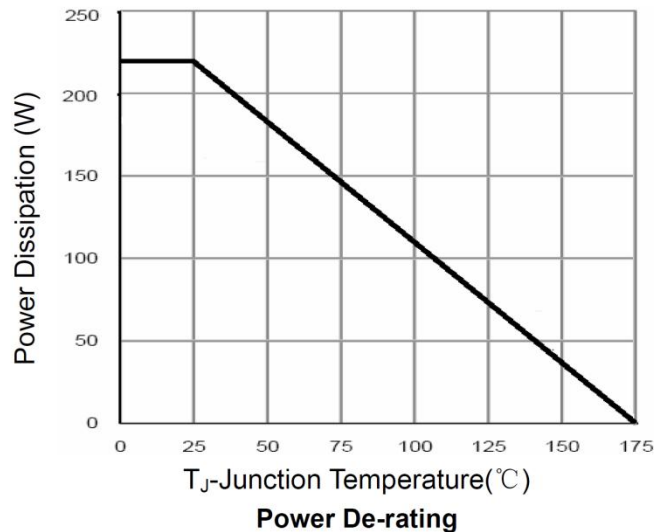
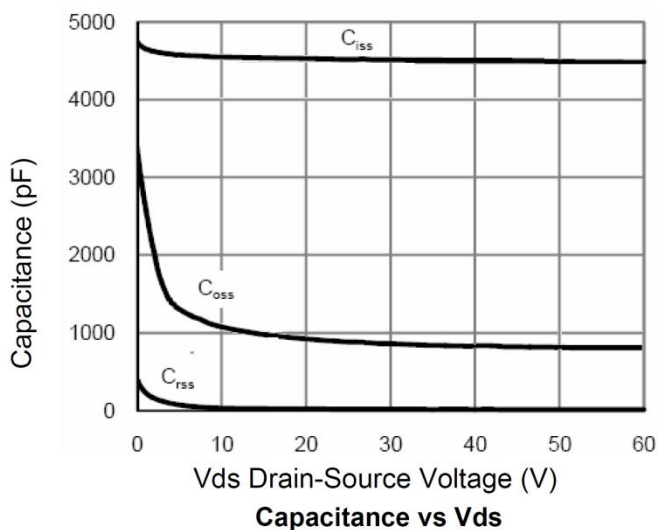
**Note :**

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating . The test condition is  $V_{DD}=30V$ ,  $V_{GS}=10V$ ,  $L=0.5mH$ ,  $R_G=25\Omega$
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.



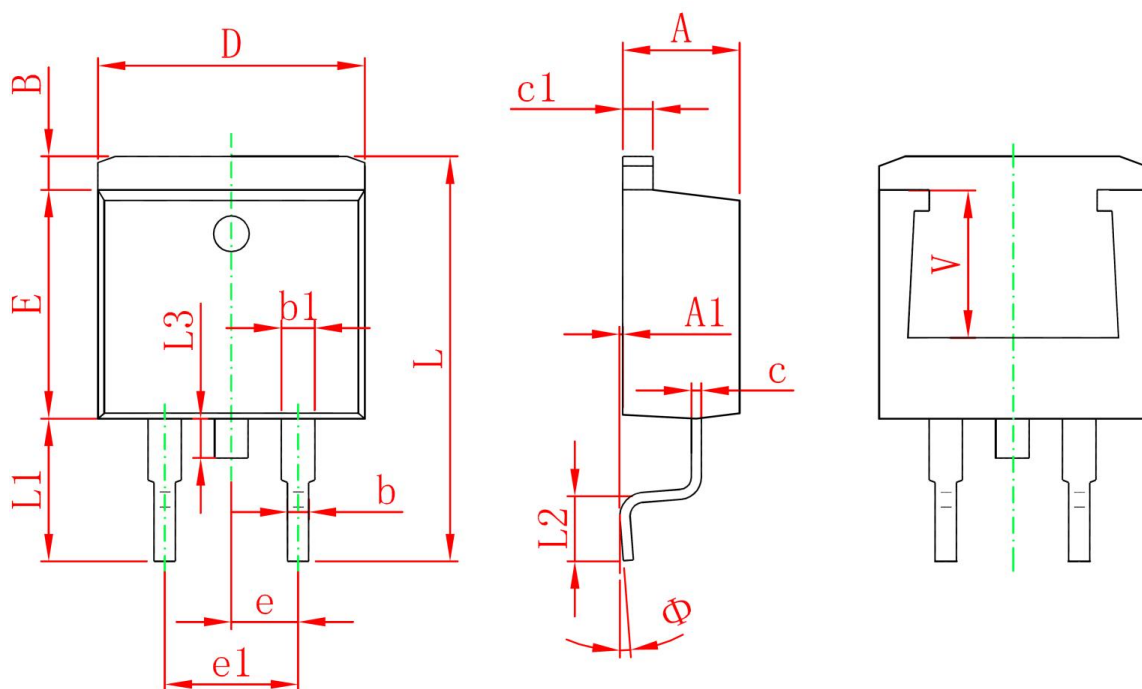
## Typical Characteristics







TO-263 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 4.470                     | 4.670  | 0.176                | 0.184 |
| A1     | 0.000                     | 0.150  | 0.000                | 0.006 |
| B      | 1.120                     | 1.420  | 0.044                | 0.056 |
| b      | 0.710                     | 0.910  | 0.028                | 0.036 |
| b1     | 1.170                     | 1.370  | 0.046                | 0.054 |
| c      | 0.310                     | 0.530  | 0.012                | 0.021 |
| c1     | 1.170                     | 1.370  | 0.046                | 0.054 |
| D      | 10.010                    | 10.310 | 0.394                | 0.406 |
| E      | 8.500                     | 8.900  | 0.335                | 0.350 |
| e      | 2.540 TYP.                |        | 0.100 TYP.           |       |
| e1     | 4.980                     | 5.180  | 0.196                | 0.204 |
| L      | 14.940                    | 15.500 | 0.588                | 0.610 |
| L1     | 4.950                     | 5.450  | 0.195                | 0.215 |
| L2     | 2.340                     | 2.740  | 0.092                | 0.108 |
| L3     | 1.300                     | 1.700  | 0.051                | 0.067 |
| Φ      | 0°                        | 8°     | 0°                   | 8°    |
| V      | 5.600 REF.                |        | 0.220 REF.           |       |