

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 60V           | 1.3mΩ@10V       | 330A  |

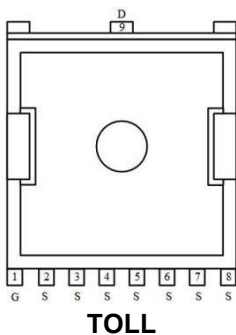
### Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

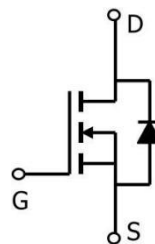
### Applications

- Power switching application
- DC-DC Converter
- Power Management

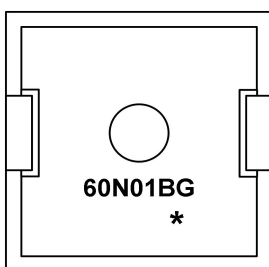
### Package



### Circuit diagram



### Marking



**60N01BG** : Product code  
\* : Month code

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

| Parameter                                       | Symbol           | Rating     | Units |
|---|------------------|------------|-------|
| Drain-Source Voltage                            | V <sub>DS</sub>  | 60         | V     |
| Gate-Source Voltage                             | V <sub>GS</sub>  | ±20        | V     |
| Continuous Drain Current <sup>1</sup> (Tc=25°C) | I <sub>D</sub>   | 330        | A     |
| Pulsed Drain Current <sup>2</sup>               | I <sub>DM</sub>  | 1320       | A     |
| Single Pulse Avalanche Energy <sup>3</sup>      | E <sub>AS</sub>  | 485        | mJ    |
| Total Power Dissipation <sup>4</sup> (Tc=25°C)  | P <sub>D</sub>   | 355        | W     |
| Thermal Resistance Junction-Case <sup>1</sup>   | R <sub>θJC</sub> | 0.35       | °C/W  |
| Storage Temperature Range                       | T <sub>STG</sub> | -55 to 150 | °C    |
| Operating Junction Temperature Range            | T <sub>J</sub>   | -55 to 150 | °C    |

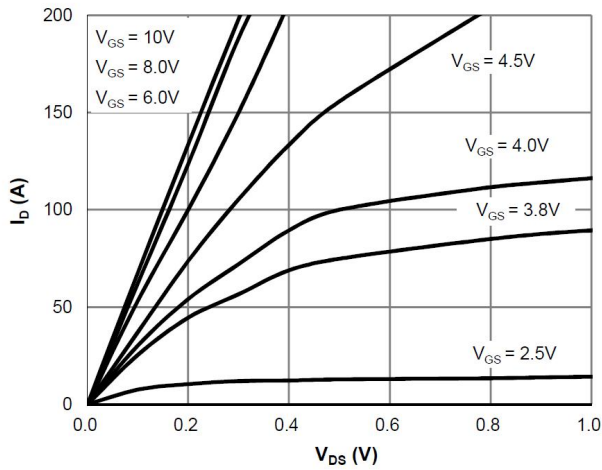
**Electrical characteristics (Ta=25°C, unless otherwise noted)**

| Parameter                                      | Symbol              | Conditions  | Min. | Typ. | Max. | Unit |
|--|---------------------|---|------|------|------|------|
| <b>Static Characteristics</b>                  |                     |   |      |      |      |      |
| Drain-Source Breakdown Voltage                 | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V , I <sub>D</sub> =250uA   | 60   | ---  | ---  | V    |
| Drain-Source Leakage Current                   | I <sub>DSS</sub>    | V <sub>DS</sub> =48V , V <sub>GS</sub> =0V  | ---  | ---  | 1    | uA   |
| Gate-Source Leakage Current                    | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V   | ---  | ---  | ±100 | nA   |
| Gate Threshold Voltage                         | V <sub>GS(th)</sub> | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                              | 2.0  | 3.0  | 4.0  | V    |
| Static Drain-Source On-Resistance <sup>2</sup> | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V , I <sub>D</sub> =30A  | ---  | 1.3  | 1.65 | mΩ   |
| <b>Dynamic characteristics</b>                 |                     |   |      |      |      |      |
| Input Capacitance                              | C <sub>iss</sub>    | V <sub>DS</sub> =25V , V <sub>GS</sub> =0V , f=1MHz                                   | ---  | 6649 | ---  | pF   |
| Output Capacitance                             | C <sub>oss</sub>    |   | ---  | 1281 | ---  |      |
| Reverse Transfer Capacitance                   | C <sub>rss</sub>    |   | ---  | 57.4 | ---  |      |
| <b>Switching Characteristics</b>               |                     |   |      |      |      |      |
| Total Gate Charge                              | Q <sub>g</sub>      | V <sub>DS</sub> =48V , V <sub>GS</sub> =10V , I <sub>D</sub> =30A                     | ---  | 105  | ---  | nC   |
| Gate-Source Charge                             | Q <sub>gs</sub>     |   | ---  | 20   | ---  |      |
| Gate-Drain Charge                              | Q <sub>gd</sub>     |   | ---  | 18   | ---  |      |
| Turn-On Delay Time                             | T <sub>d(on)</sub>  | V <sub>DD</sub> =48V , V <sub>GS</sub> =10V , R <sub>G</sub> =2Ω, I <sub>D</sub> =30A | ---  | 32.3 | ---  | ns   |
| Rise Time                                      | T <sub>r</sub>      |   | ---  | 52.1 | ---  |      |
| Turn-Off Delay Time                            | T <sub>d(off)</sub> |   | ---  | 91   | ---  |      |
| Fall Time                                      | T <sub>f</sub>      |   | ---  | 27.8 | ---  |      |
| <b>Diode Characteristics</b>                   |                     |   |      |      |      |      |
| Diode Forward Voltage <sup>2</sup>             | V <sub>SD</sub>     | V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C                       | ---  | ---  | 1.2  | V    |

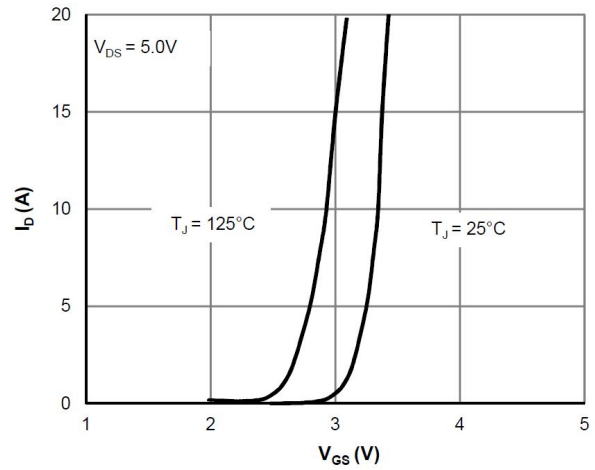
**Note :**

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
- The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=30V,V<sub>GS</sub>=10V,L=0.5mH,R<sub>G</sub>=25Ω

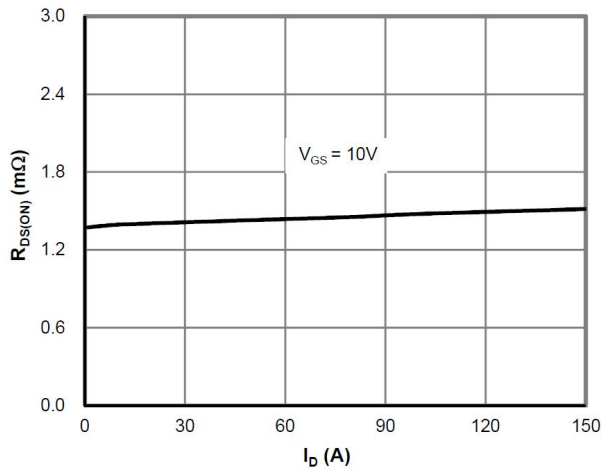
**Typical Characteristics**



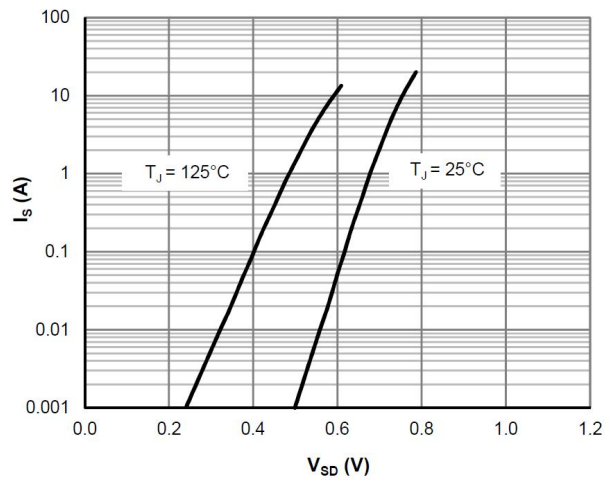
Saturation Characteristics



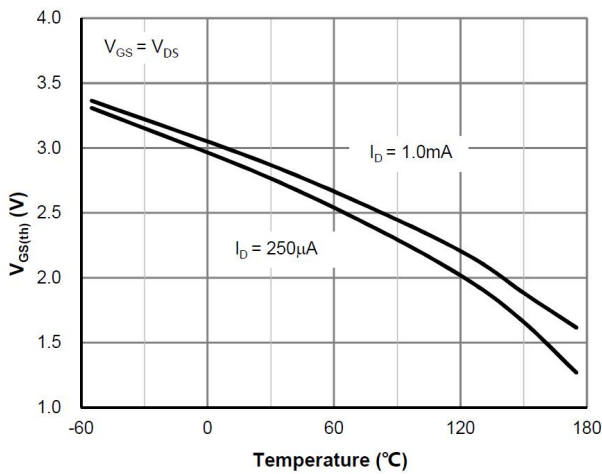
Transfer Characteristics



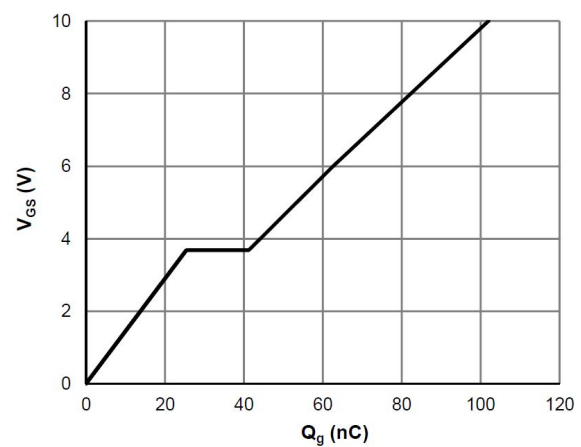
$R_{DS(on)}$  vs. Drain Current



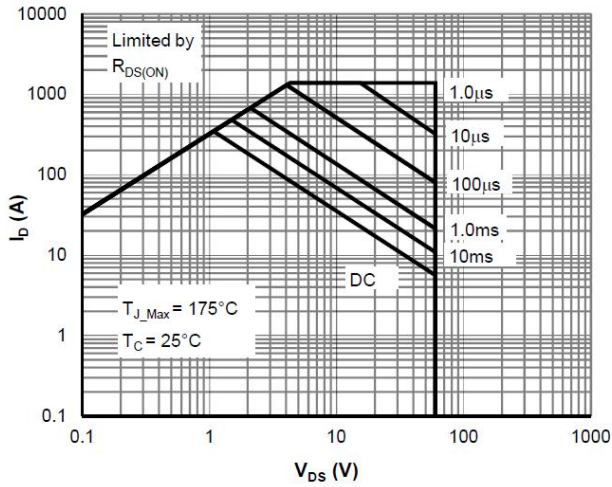
Body-Diode Characteristics



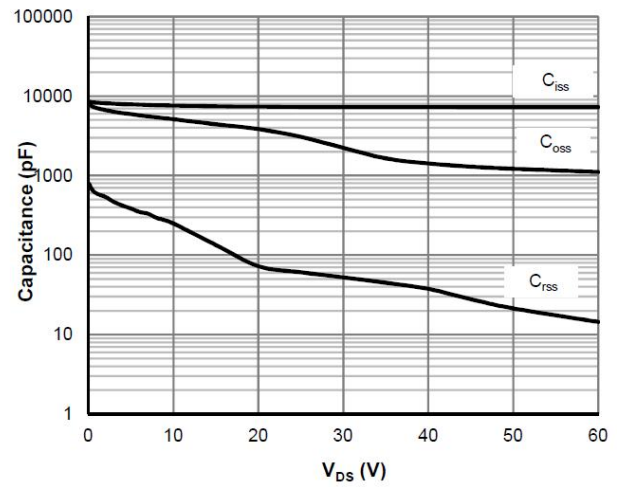
$V_{GS(th)}$  vs. Junction Temperature



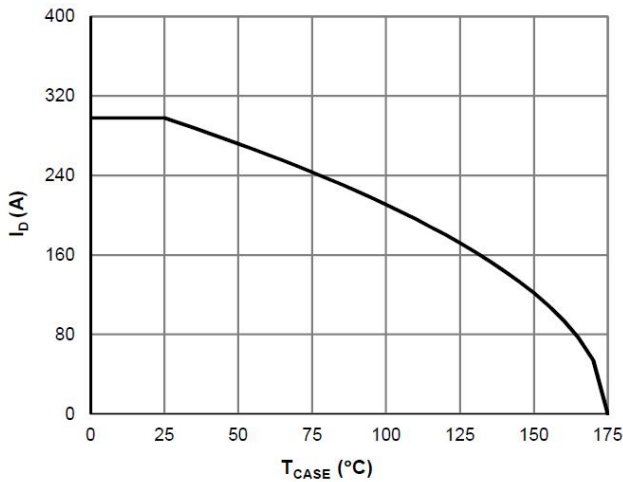
Gate Charge



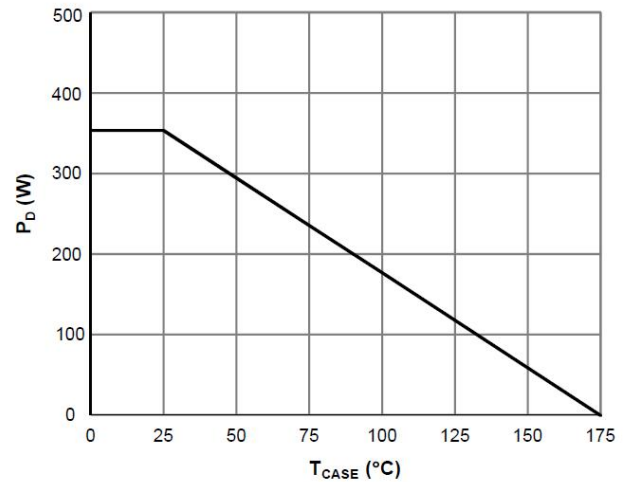
Maximum Safe Operating Area



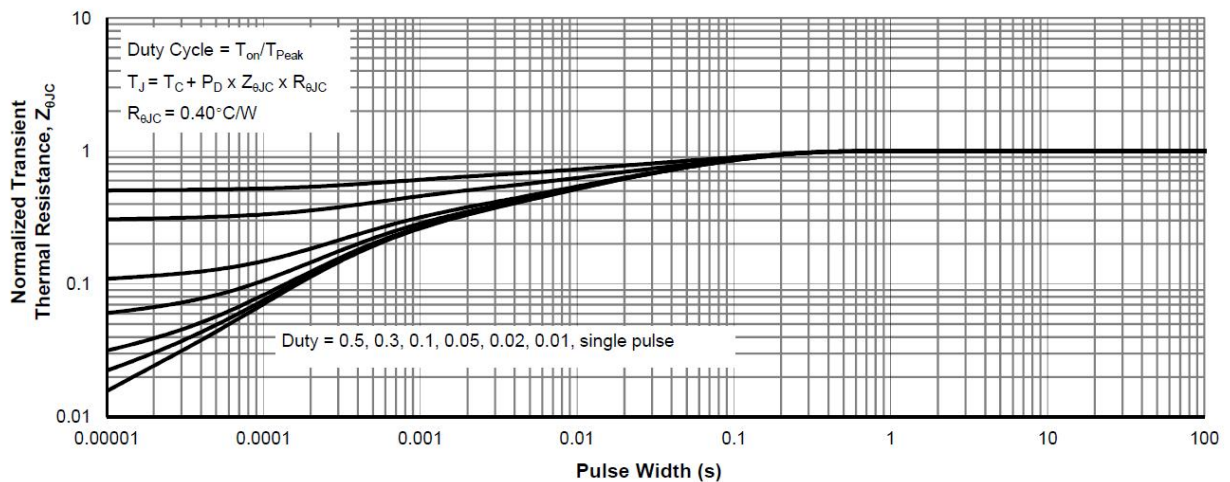
Capacitance Characteristics



Current De-rating



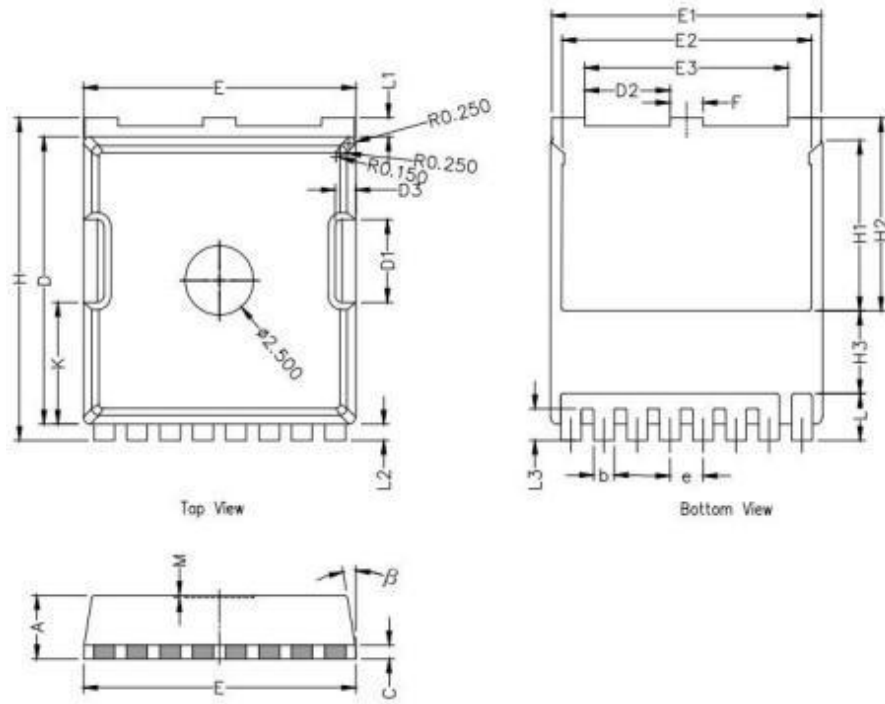
Power De-rating



Normalized Maximum Transient Thermal Impedance



TOLL Package Information



| Symbol  | Dimensions In Millimeters |       |       |
|---------|---------------------------|-------|-------|
|         | Min.                      | Nom.  | Max.  |
| A       | 2.20                      | 2.30  | 2.40  |
| b       | 0.65                      | 0.75  | 0.85  |
| C       | 0.508 REF                 |       |       |
| D       | 10.25                     | 10.40 | 10.55 |
| D1      | 2.85                      | 3.00  | 3.15  |
| E       | 9.75                      | 9.90  | 10.05 |
| E1      | 9.65                      | 9.80  | 9.95  |
| E2      | 8.95                      | 9.10  | 9.25  |
| E3      | 7.25                      | 7.40  | 7.55  |
| e       | 1.20 BSC                  |       |       |
| F       | 1.05                      | 1.20  | 1.35  |
| H       | 11.55                     | 11.70 | 11.85 |
| H1      | 6.03                      | 6.18  | 6.33  |
| H2      | 6.85                      | 7.00  | 7.15  |
| H3      | 3.00 BSC                  |       |       |
| L       | 1.55                      | 1.70  | 1.85  |
| L1      | 0.55                      | 0.7   | 0.85  |
| L2      | 0.45                      | 0.6   | 0.75  |
| M       | 0.08 REF.                 |       |       |
| $\beta$ | 8°                        | 10°   | 12°   |
| K       | 4.25                      | 4.40  | 4.55  |

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