

## Features

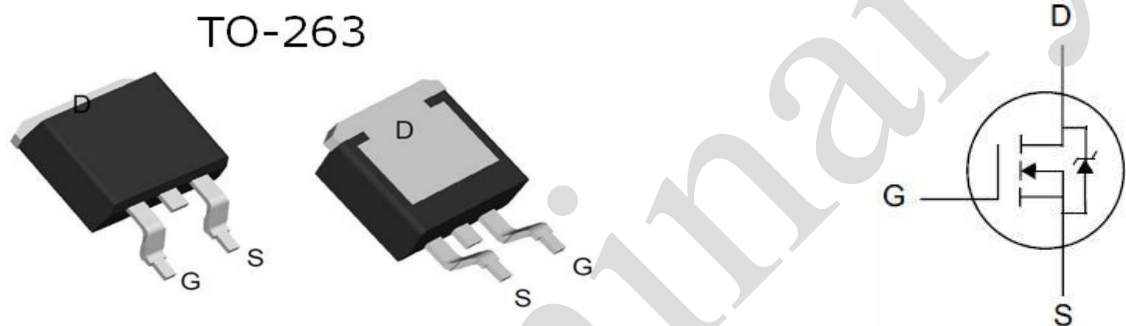
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- $R_{DS(on).typ}=2.4m\Omega@V_{GS}=10V$
- High Reliability Capability

## Application

- Charger
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

## Product Summary

|                             |       |
|-----------------------------|-------|
| $V_{DS}$                    | 100V  |
| $R_{DS(on).typ}@V_{GS}=10V$ | 2.4mΩ |
| $I_D$                       | 185A  |



## Package Marking and Ordering Information

| Type        | Package | Marking     | Reel Size  | Qty |
|-------------|---------|-------------|------------|-----|
| LR027N10SM2 | TO-263  | LR027N10SM2 | 330*28.5mm | 800 |

## Maximum Ratings

| Parameter                                                             | Symbol                | Value      | Unit       |
|-----------------------------------------------------------------------|-----------------------|------------|------------|
| Drain-source Voltage                                                  | $V_{DS}$              | 100        | V          |
| Continuous Drain Current<br>$T_C = 25^\circ C$<br>$T_C = 100^\circ C$ | $I_D$                 | 185<br>130 | A          |
| Pulsed Drain Current                                                  | $I_{D \text{ pulse}}$ | 740        | A          |
| Avalanche Energy, Single Pulse                                        | $E_{AS}$              | 1406       | mJ         |
| Gate-emitter Voltage                                                  | $V_{GS}$              | $\pm 20$   | V          |
| Power Dissipation, $T_C = 25^\circ C$                                 | $P_D$                 | 260        | W          |
| Operating Junction And Storage Temperature                            | $T_j, T_{stg}$        | -55~150    | $^\circ C$ |

## Thermal Resistance

| Parameter                               | Symbol     | Typ | Max  | Unit         |
|-----------------------------------------|------------|-----|------|--------------|
| Thermal Resistance, Junction to Case    | $R_{thJC}$ | -   | 0.48 | $^\circ C/W$ |
| Thermal Resistance, Junction to Ambient | $R_{thJA}$ | -   | 62   | $^\circ C/W$ |

**Electrical Characteristic, at Tj = 25 °C, unless otherwise specified**

| Parameter                        | Symbol        | Test Condition                | Value |      |           | Unit       |
|----------------------------------|---------------|-------------------------------|-------|------|-----------|------------|
|                                  |               |                               | min.  | typ. | max.      |            |
| Static Characteristic            |               |                               |       |      |           |            |
| Drain-source Breakdown Voltage   | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$     | 100   | -    | -         | V          |
| Gate Threshold Voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2     | 3    | 4         |            |
| Zero Gate Voltage Drain Current  | $I_{DSS}$     | $V_{DS}=100V, V_{GS}=0V$      | -     | -    | 1         | $\mu A$    |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=\pm 20V, V_{DS}=0V$   | -     | -    | $\pm 100$ | nA         |
| Drain-source on-state Resistance | $R_{DS(on)}$  | $V_{GS}=10V, I_D=75A$         | -     | 2.4  | 2.7       | m $\Omega$ |

**Dynamic Characteristic**

|                              |              |                                                                 |   |      |   |    |
|------------------------------|--------------|-----------------------------------------------------------------|---|------|---|----|
| Input Capacitance            | $C_{iss}$    | $V_{GS}=0V,$<br>$V_{DS}=50V,$<br>$f=1MHz$                       | - | 9006 | - | pF |
| Output Capacitance           | $C_{oss}$    |                                                                 | - | 1873 | - |    |
| Reverse Transfer Capacitance | $C_{rss}$    |                                                                 | - | 84   | - |    |
| Gate Total Charge            | $Q_g$        | $V_{GS}=10V,$<br>$V_{DS}=50V,$<br>$I_D=80A$                     | - | 125  | - | nC |
| Gate-Source charge           | $Q_{gs}$     |                                                                 | - | 36   | - |    |
| Gate-Drain charge            | $Q_{gd}$     |                                                                 | - | 28   | - |    |
| Turn-on Delay Time           | $t_{d(on)}$  | $V_{GS}=10V,$<br>$V_{DD}=50V,$<br>$I_D=80A,$<br>$R_G=1.6\Omega$ | - | 29   | - | ns |
| Turn-on Rise Time            | $t_r$        |                                                                 | - | 13   | - |    |
| Turn-off Delay Time          | $t_{d(off)}$ |                                                                 | - | 63   | - |    |
| Turn-off Fall Time           | $t_f$        |                                                                 | - | 19   | - |    |

**Body Diode Characteristic**

|                            |          |                                 |   |     |     |    |
|----------------------------|----------|---------------------------------|---|-----|-----|----|
| Body Diode Forward Voltage | $V_{SD}$ | $V_{GS}=0V, I_{SD}=80A$         | - | -   | 1.2 | V  |
| Reverse Recovery Time      | $t_{rr}$ | $I_F=80A,$<br>$dI_F/dt=100A/us$ | - | 73  | -   | ns |
| Reverse Recovery Charge    | $Q_{rr}$ |                                 | - | 184 | -   | nC |

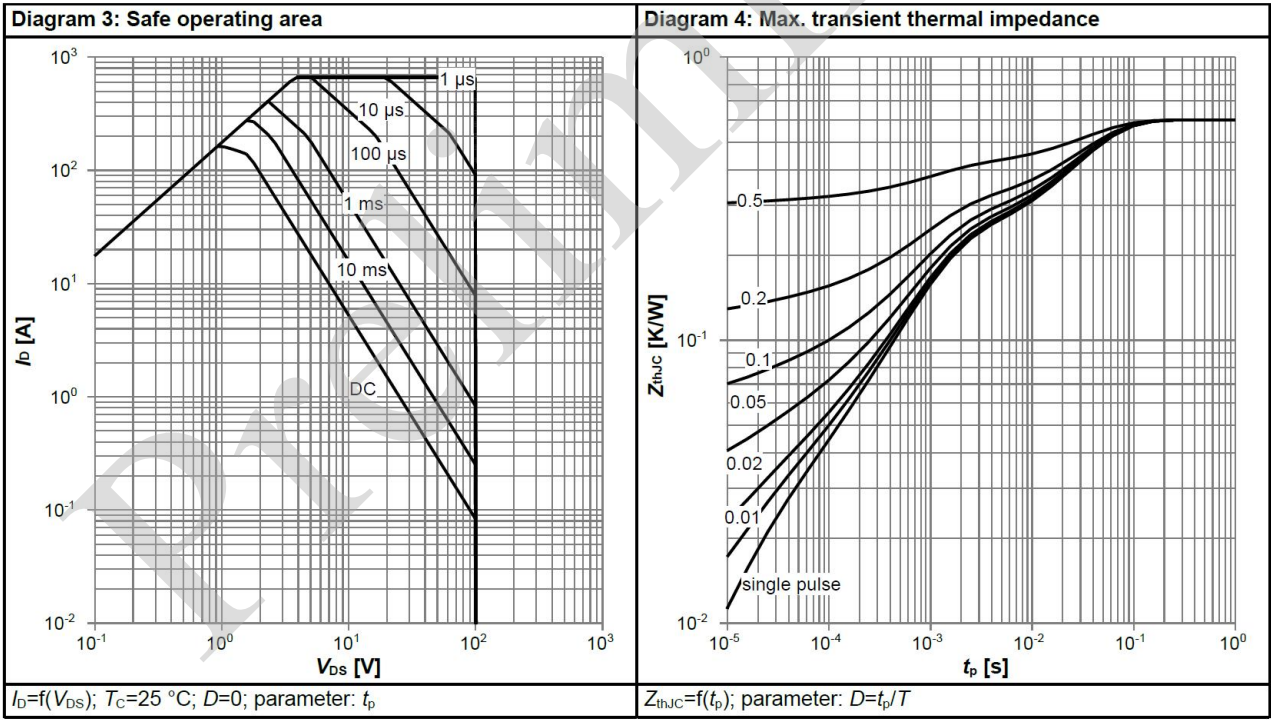
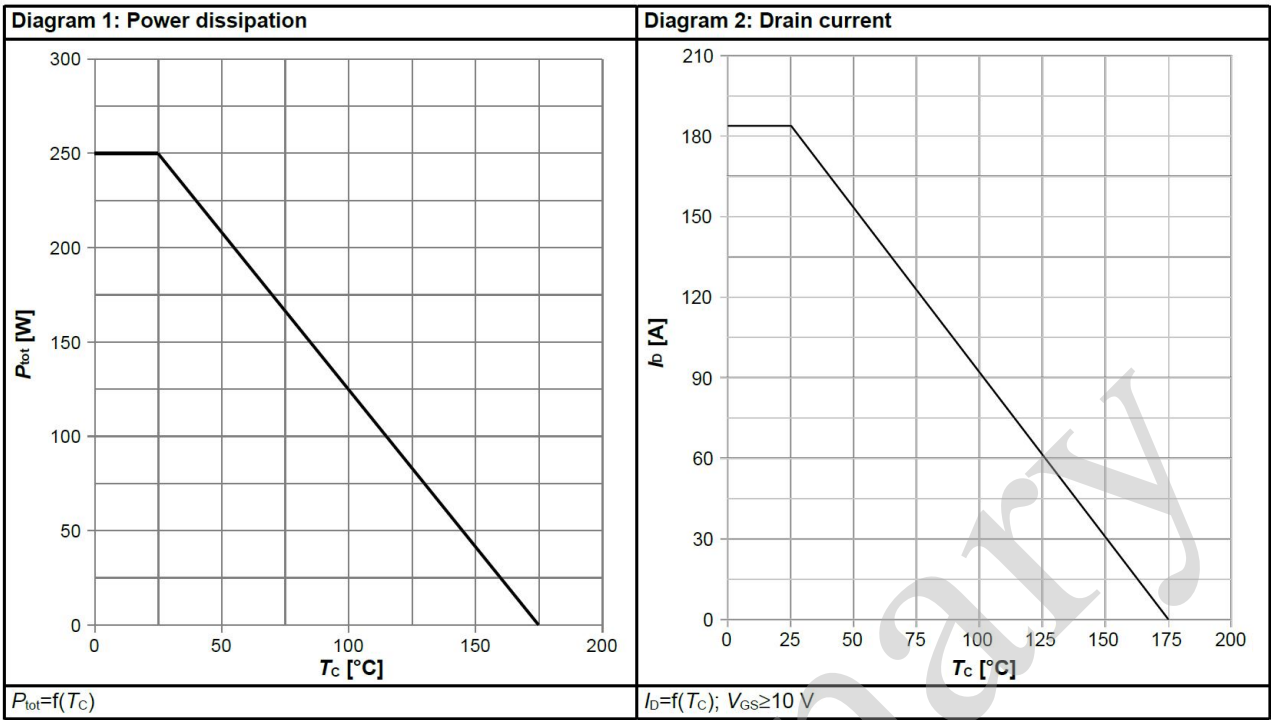
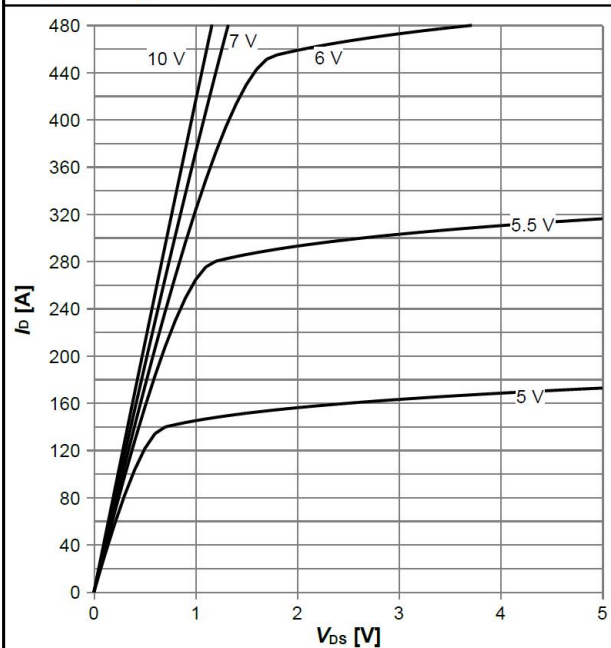
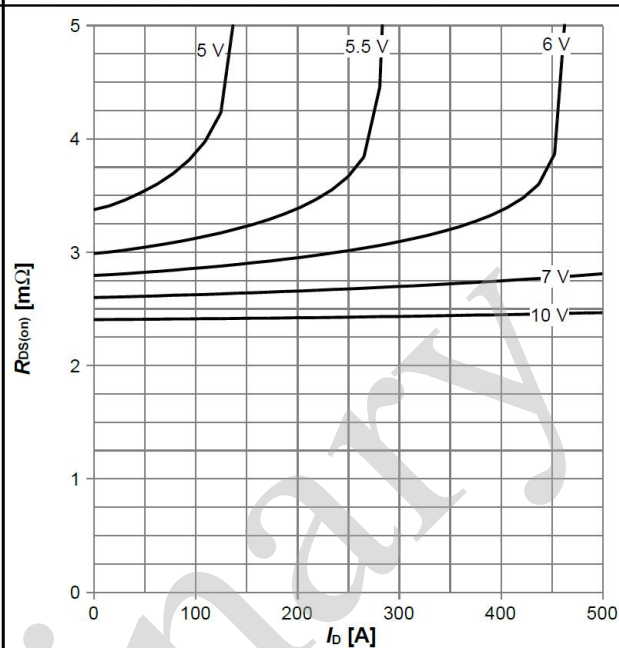


Diagram 5: Typ. output characteristics



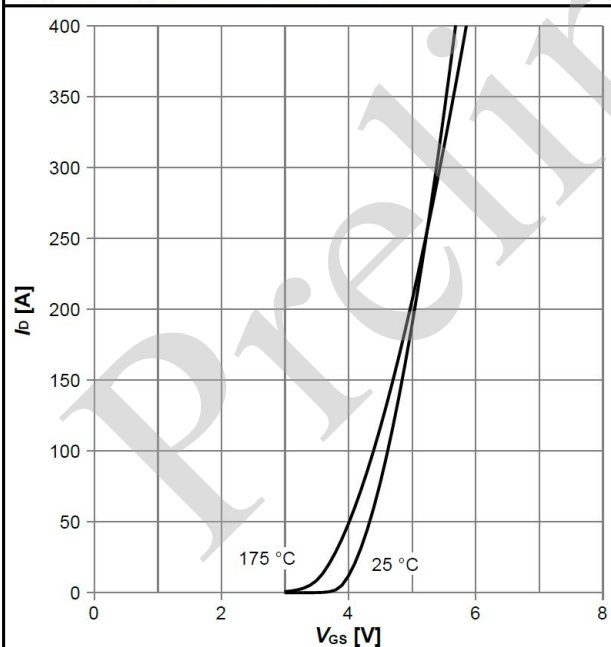
$I_D = f(V_{DS})$ ;  $T_J = 25^\circ\text{C}$ ; parameter:  $V_{GS}$

Diagram 6: Typ. drain-source on resistance



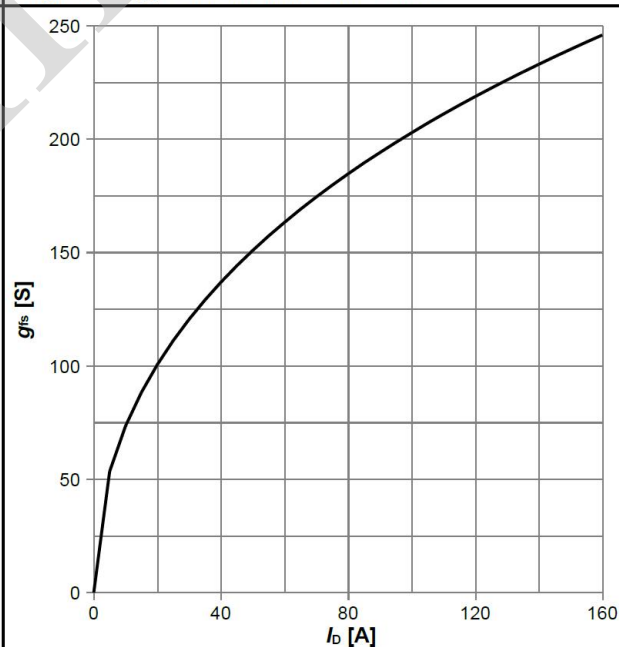
$R_{DS(on)} = f(I_D)$ ;  $T_J = 25^\circ\text{C}$ ; parameter:  $V_{GS}$

Diagram 7: Typ. transfer characteristics



$I_D = f(V_{GS})$ ;  $|V_{DS}| > 2|I_D|R_{DS(on)max}$ ; parameter:  $T_J$

Diagram 8: Typ. forward transconductance



$g_{fs} = f(I_D)$ ;  $T_J = 25^\circ\text{C}$

Diagram 9: Drain-source on-state resistance

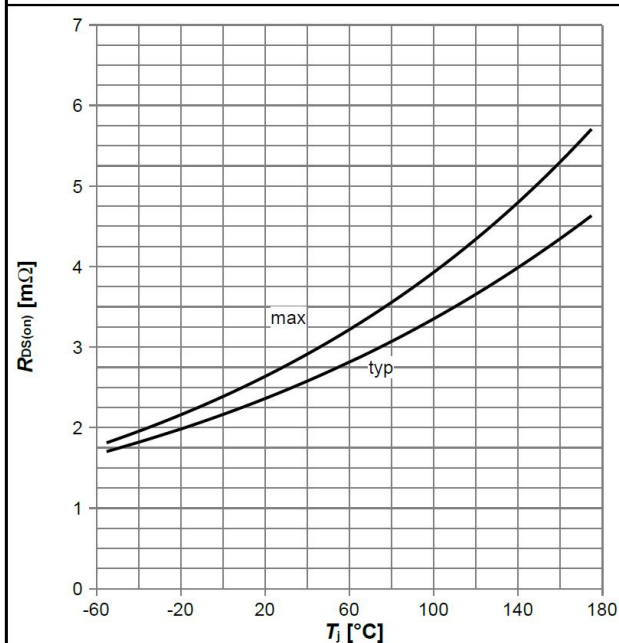

 $R_{DS(on)} = f(T_J); I_D = 100 \text{ A}; V_{GS} = 10 \text{ V}$ 

Diagram 10: Typ. gate threshold voltage

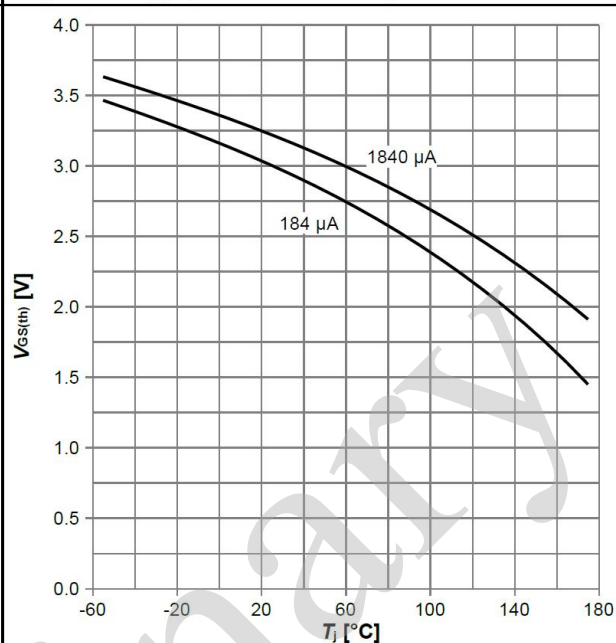

 $V_{GS(th)} = f(T_J); V_{GS} = V_{DS}; \text{parameter: } I_D$ 

Diagram 11: Typ. capacitances

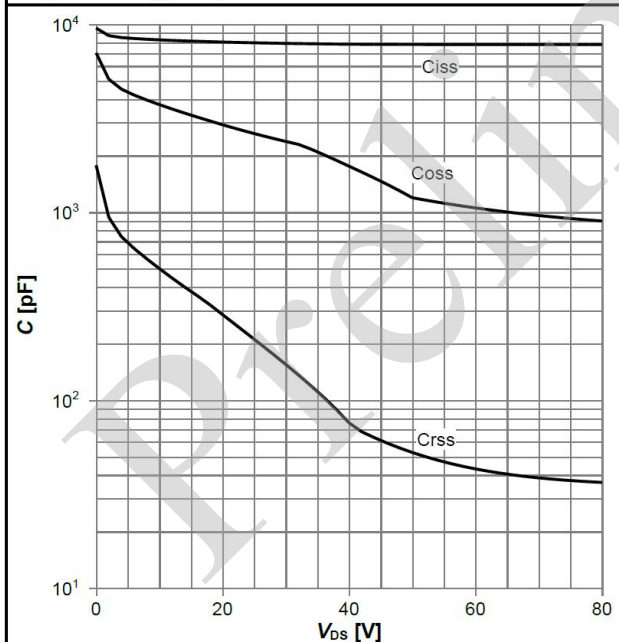

 $C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$ 

Diagram 12: Forward characteristics of reverse diode

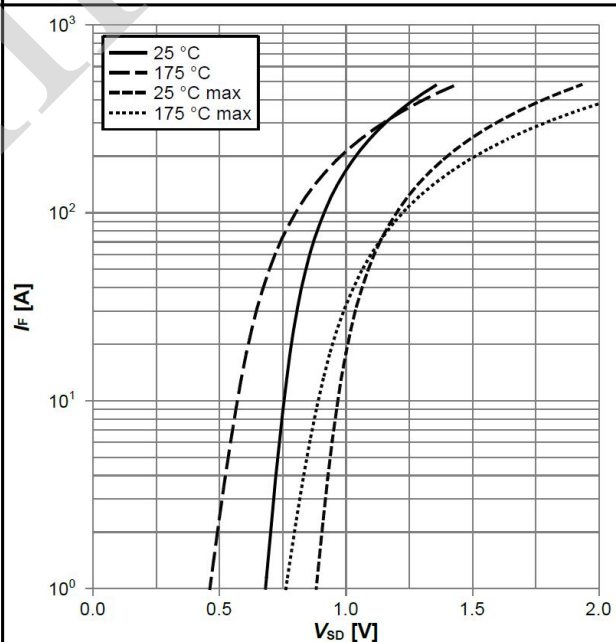
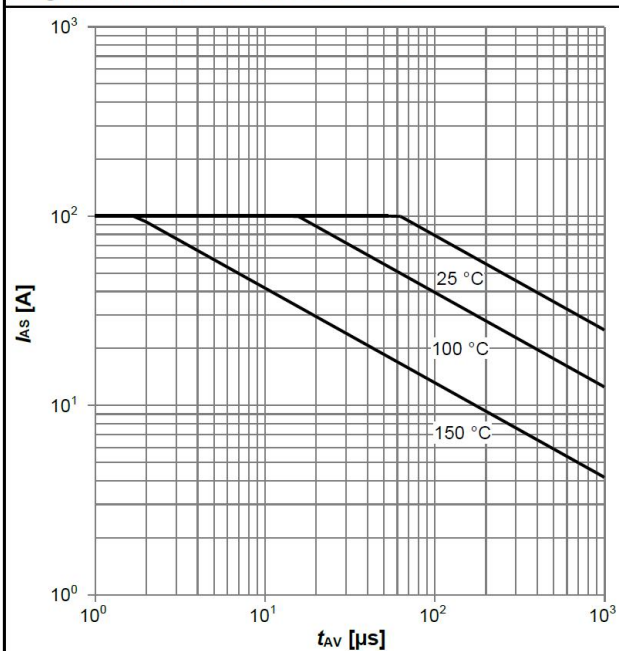
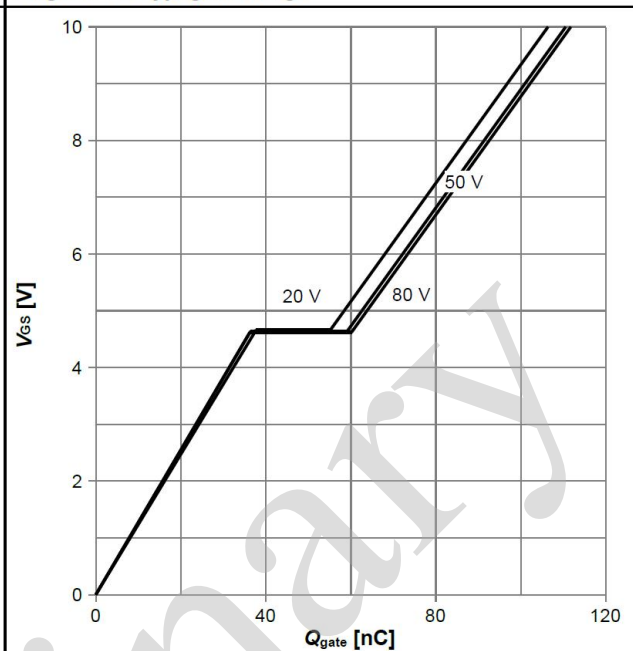

 $I_F = f(V_{SD}); \text{parameter: } T_J$

Diagram 13: Avalanche characteristics



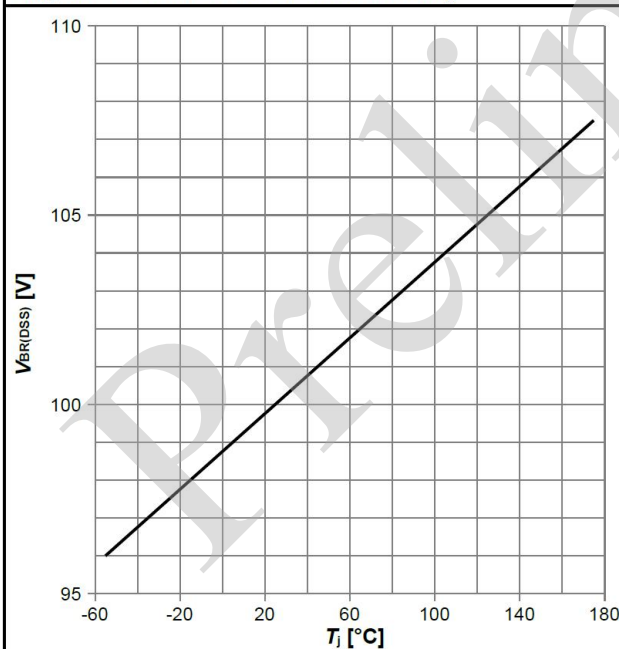
$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$ ; parameter:  $T_{j(start)}$

Diagram 14: Typ. gate charge

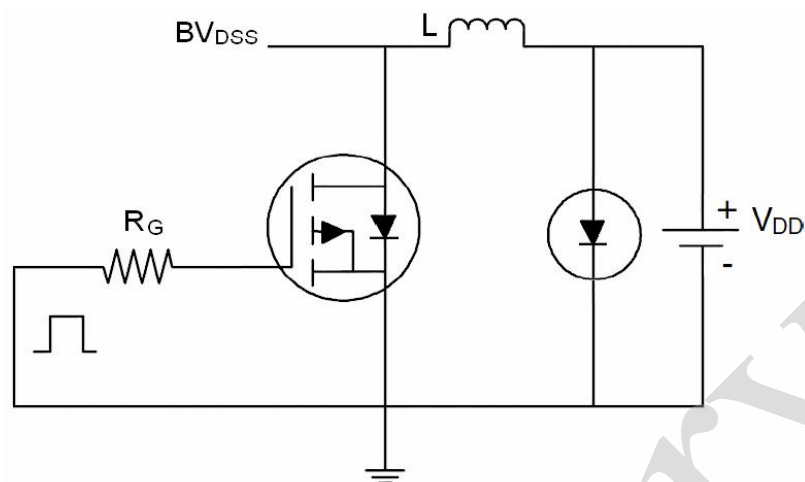
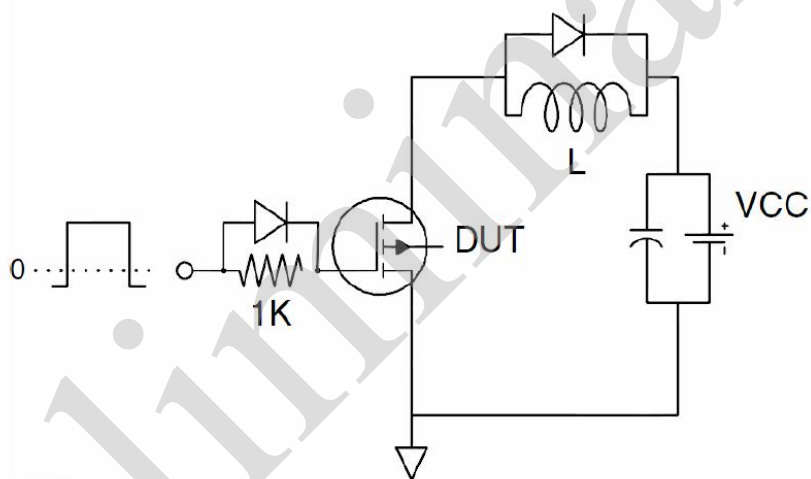
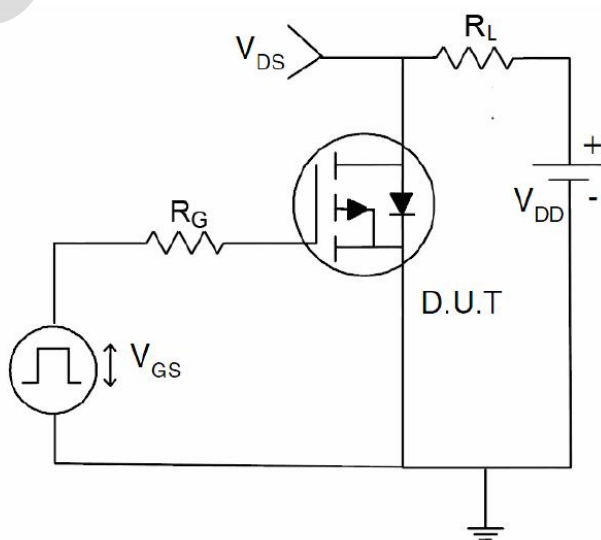


$V_{GS}=f(Q_{gate}); I_D=100 \text{ A pulsed}$ ; parameter:  $V_{DD}$

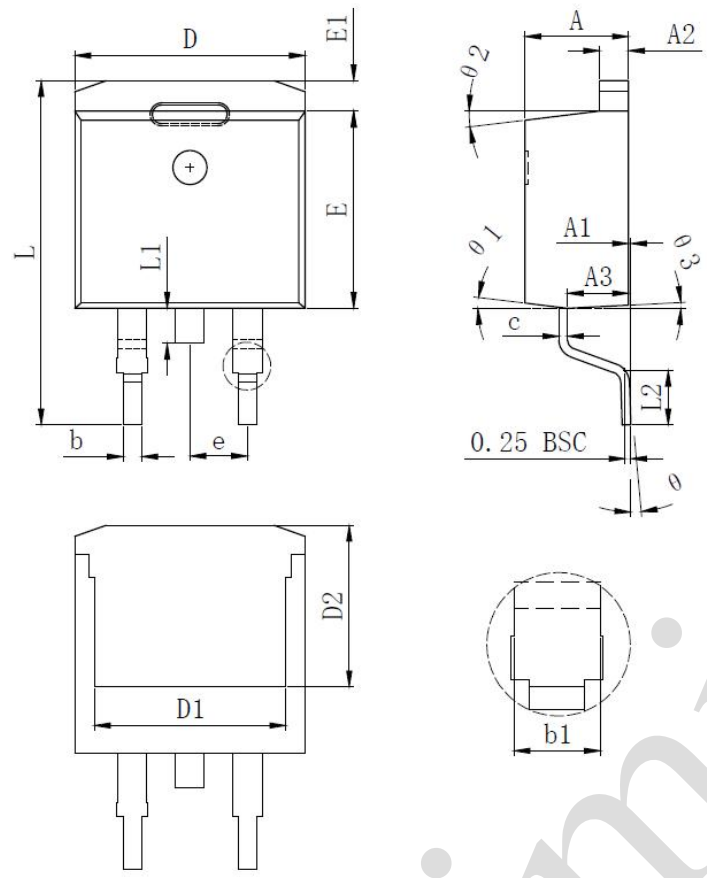
Diagram 15: Drain-source breakdown voltage



$V_{BR(DSS)}=f(T_j); I_D=1 \text{ mA}$

**Test Circuit & Waveform****1)  $E_{AS}$  Test Circuit****2) Gate Charge Test Circuit****3) Switch Time Test Circuit**

Package Outline: TO-263



| SYMBOL | MILLIMETER |        |        |
|--------|------------|--------|--------|
|        | MIN        | Typ.   | MAX    |
| A      | 4.370      | 4.570  | 4.770  |
| A1     | 0.000      |        | 0.250  |
| A2     | 1.220      | 1.270  | 1.420  |
| A3     | 2.490      | 2.690  | 2.890  |
| b      | 0.700      | 0.810  | 0.960  |
| b1     | 1.170      | 1.270  | 1.470  |
| c      | 0.300      | 0.380  | 0.530  |
| D      | 9.860      | 10.160 | 10.360 |
| D1     | 8.400 REF  |        |        |
| D2     | 7.073 REF  |        |        |
| E      | 8.500      | 8.700  | 8.900  |
| E1     | 1.070      | 1.270  | 1.470  |
| e      | 2.540 TYP  |        |        |
| L      | 14.700     | 15.100 | 15.500 |
| L1     | 1.400      | 1.550  | 1.700  |
| L2     | 2.000      | 2.300  | 2.600  |
| θ      | 0°         |        | 9°     |
| θ1     | 7° TYP     |        |        |
| θ2     | 7° TYP     |        |        |
| θ3     | 3° TYP     |        |        |