

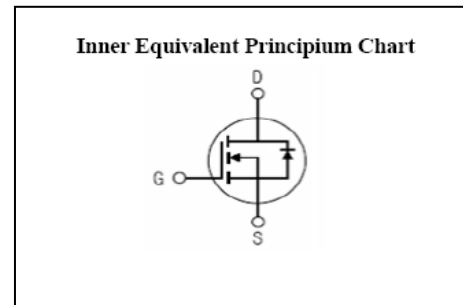
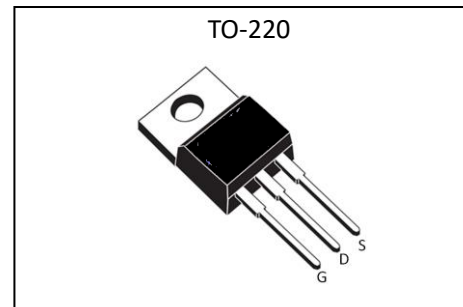
**Features**

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

**Applications**

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

|                         |      |    |
|-------------------------|------|----|
| V <sub>DSS</sub>        | 60   | V  |
| I <sub>D</sub>          | 50   | A  |
| P <sub>D</sub>          | 90   | W  |
| R <sub>DS(ON)type</sub> | 13.5 | mΩ |



**Absolute** (T<sub>c</sub>=25°C unless otherwise specified)

| Symbol                            | Parameter  | Rating          | Units |
|-----------------------------------|--|-----------------|-------|
| V <sub>DSS</sub>                  | Drain-to-Source Voltage                          | 60              | V     |
| I <sub>D</sub>                    | Continuous Drain Current                         | 50              | A     |
|                                   | Continuous Drain Current T <sub>c</sub> = 100 °C | 35              | A     |
| I <sub>DM</sub>                   | Pulsed Drain Current                             | 200             | A     |
| V <sub>GS</sub>                   | Gate-to-Source Voltage                           | ±20             | V     |
| E <sub>AS</sub> <sup>a2</sup>     | Single Pulse Avalanche Energy                    | 300             | mJ    |
| E <sub>AR</sub> <sup>a1</sup>     | Avalanche Energy ,Repetitive                     | 50              | mJ    |
| I <sub>AR</sub> <sup>a1</sup>     | Avalanche Current                                | 28              | A     |
| dv/dt <sup>a3</sup>               | Peak Diode Recovery dv/dt                        | 5.0             | V/ns  |
| P <sub>D</sub>                    | Power Dissipation                                | 90              | W     |
| T <sub>J</sub> , T <sub>stg</sub> | Operating Junction and Storage Temperature Range | 175, -55 to 175 | °C    |
| T <sub>L</sub>                    | Maximum Temperature for Soldering                | 300             | °C    |

Caution Stresses greater than those in the "Absolute Maximum Ratings" may cause permanent damage to the device

**Thermal Characteristics**

| Symbol           | Parameter        | Typ. | Units |
|------------------|------------------|------|-------|
| R <sub>θJc</sub> | Junction-to-Case | 1.39 | °C/W  |

**Electrical Characteristics** (Tc=25°C unless otherwise specified)

| <b>OFF Characteristics</b>          |                                   |   |        |      |      |       |
|-------------------------------------|-----------------------------------|---|--------|------|------|-------|
| Symbol                              | Parameter                         | Test Conditions   | Rating |      |      | Units |
|                                     |                                   |   | Min.   | Typ. | Max. |       |
| V <sub>DSS</sub>                    | Drain to Source Breakdown Voltage | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                        | 60     | --   | --   | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | Bvdss Temperature Coefficient     | I <sub>D</sub> =250uA, Reference 25°C                             | --     | 0.1  | --   | V/°C  |
| I <sub>DSS</sub>                    | Drain to Source Leakage Current   | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, T <sub>a</sub> =25°C   | --     | --   | 1    | μA    |
|                                     |                                   | V <sub>DS</sub> =48V, V <sub>GS</sub> = 0V, T <sub>a</sub> =125°C | --     | --   | 250  |       |
| I <sub>GSS(F)</sub>                 | Gate to Source Forward Leakage    | V <sub>GS</sub> = +20V  | --     | --   | 1    | μA    |
| I <sub>GSS(R)</sub>                 | Gate to Source Reverse Leakage    | V <sub>GS</sub> = -20V  | --     | --   | -1   | μA    |

| <b>ON Characteristics</b>      |                               |  |        |      |      |       |
|--------------------------------|-------------------------------|--|--------|------|------|-------|
| Symbol                         | Parameter                     | Test Conditions  | Rating |      |      | Units |
|                                |                               |  | Min.   | Typ. | Max. |       |
| R <sub>DS(ON)</sub>            | Drain-to-Source On-Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =25A                | --     |      | 18   | mΩ    |
| V <sub>GS(TH)</sub>            | Gate Threshold Voltage        | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA | 1.0    |      | 2.5  | V     |
| Pulse width tp ≤ 380μs, δ ≤ 2% |                               |  |        |      |      |       |

| <b>Dynamic Characteristics</b> |                              |   |        |      |      |       |
|--------------------------------|------------------------------|---|--------|------|------|-------|
| Symbol                         | Parameter                    | Test Conditions                                       | Rating |      |      | Units |
|                                |                              |   | Min.   | Typ. | Max. |       |
| g <sub>fs</sub>                | Forward Transconductance     | V <sub>DS</sub> =5V, I <sub>D</sub> =20A              | 18     | --   | --   | S     |
| C <sub>iss</sub>               | Input Capacitance            | V <sub>GS</sub> =0V, V <sub>DS</sub> =30V<br>f=1.0MHz | --     | 2050 | --   | pF    |
| C <sub>oss</sub>               | Output Capacitance           |   | --     | 158  | --   |       |
| C <sub>rss</sub>               | Reverse Transfer Capacitance |   | --     | 120  | --   |       |

| <b>Resistive Switching Characteristics</b> |                                  |   |        |      |      |       |
|--|----------------------------------|---|--------|------|------|-------|
| Symbol                                     | Parameter                        | Test Conditions   | Rating |      |      | Units |
|  |                                  |   | Min.   | Typ. | Max. |       |
| t <sub>d(ON)</sub>                         | Turn-on Delay Time               | I <sub>D</sub> =20A, V <sub>DD</sub> =30V<br>V <sub>GS</sub> =10V, R <sub>G</sub> =3.0Ω | --     | 7.5  | --   | ns    |
| t <sub>r</sub>                             | Rise Time                        |   | --     | 5.0  | --   |       |
| t <sub>d(OFF)</sub>                        | Turn-Off Delay Time              |   | --     | 28.0 | --   |       |
| t <sub>f</sub>                             | Fall Time                        |   | --     | 5.5  | --   |       |
| Q <sub>g</sub>                             | Total Gate Charge                | I <sub>D</sub> =20A, V <sub>DD</sub> =30V<br>V <sub>GS</sub> =10V                       | --     | 50   | --   | nC    |
| Q <sub>gs</sub>                            | Gate to Source Charge            |   | --     | 6    | --   |       |
| Q <sub>gd</sub>                            | Gate to Drain ( "Miller" )Charge |   | --     | 15   | --   |       |

| Source-Drain Diode Characteristics |  |                              |        |      |      |       |
|------------------------------------|--|------------------------------|--------|------|------|-------|
| Symbol                             | Parameter                              | Test Conditions              | Rating |      |      | Units |
|                                    |  |                              | Min.   | Typ. | Max. |       |
| $I_S$                              | Continuous Source Current (Body Diode) |                              | --     | --   | 50   | A     |
| $I_{SM}$                           | Maximum Pulsed Current (Body Diode)    |                              | --     | --   | 200  | A     |
| $V_{SD}$                           | Diode Forward Voltage                  | $I_S=50A, V_{GS}=0V$         | --     | --   | 1.5  | V     |
| $t_{rr}$                           | Reverse Recovery Time                  | $I_S=20A, T_j = 25^\circ C$  | --     | 30   | --   | ns    |
| $Q_{rr}$                           | Reverse Recovery Charge                | $di_F/dt=100A/us, V_{GS}=0V$ | --     | 40   | --   | nC    |

Pulse width  $t_p \leq 380\mu s, \delta \leq 2\%$

a1: Repetitive rating; pulse width limited by maximum junction temperature

a2: EAS condition :  $T_j=25^\circ C, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

a3:  $I_{SD} = 20A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_j=25^\circ C$

Test Circuit and Waveform

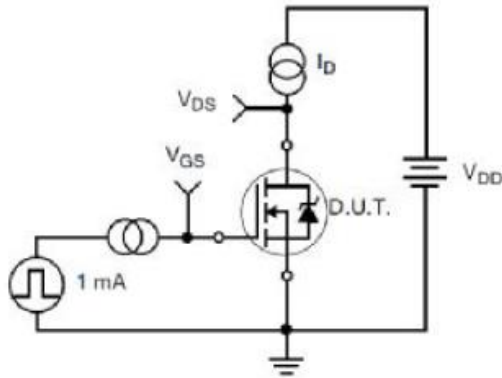


Figure 17. Gate Charge Test Circuit

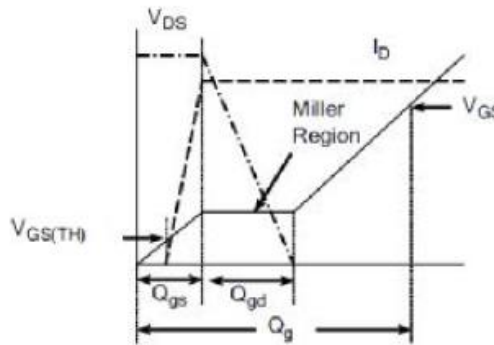


Figure 18. Gate Charge Waveform

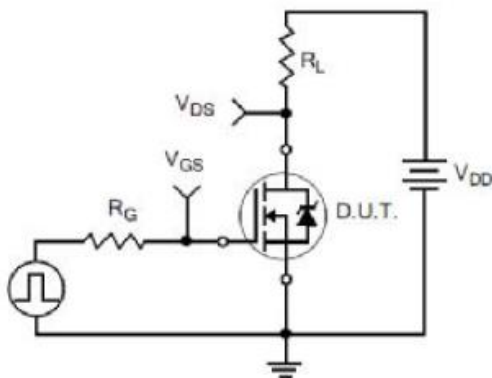


Figure 19. Resistive Switching Test Circuit

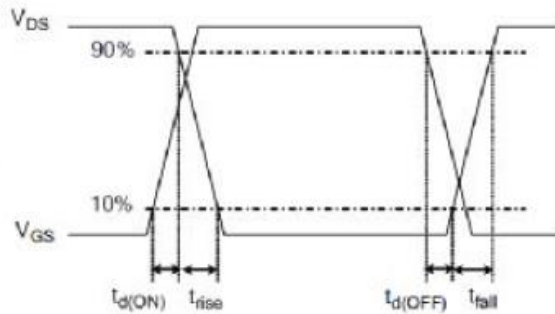


Figure 20. Resistive Switching Waveforms

Characteristics Curves

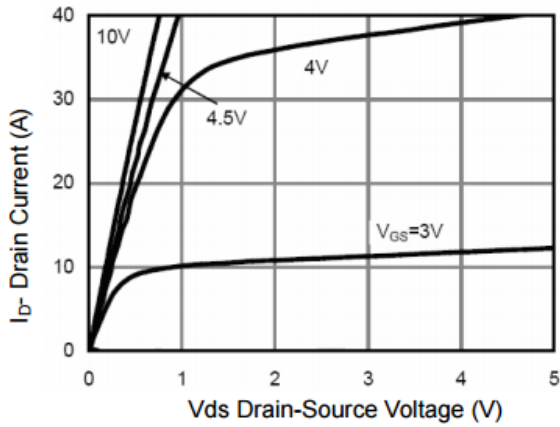


Figure 1 Output Characteristics

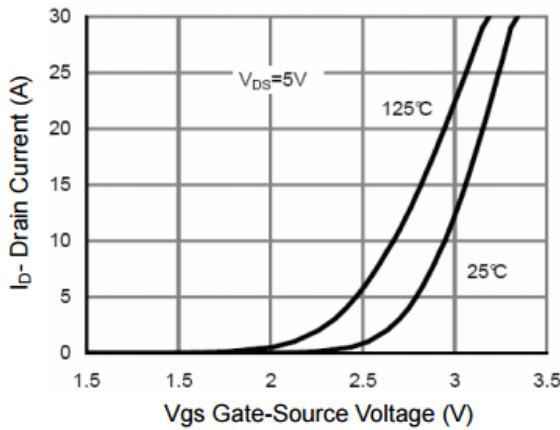


Figure 2 Transfer Characteristics

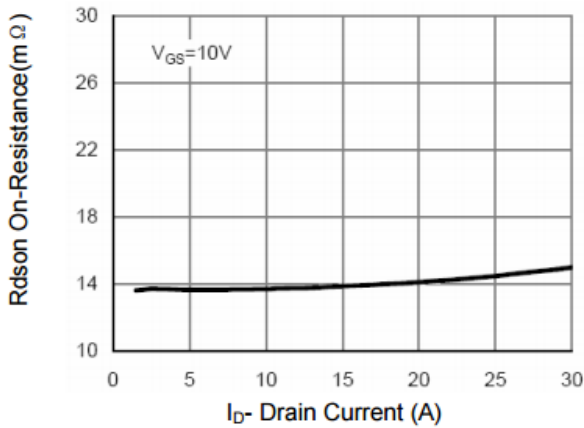


Figure 3 Rdson- Drain Current

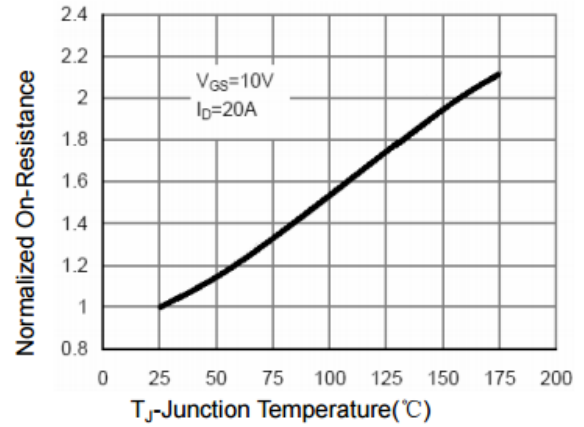


Figure 4 Rdson-Junction Temperature

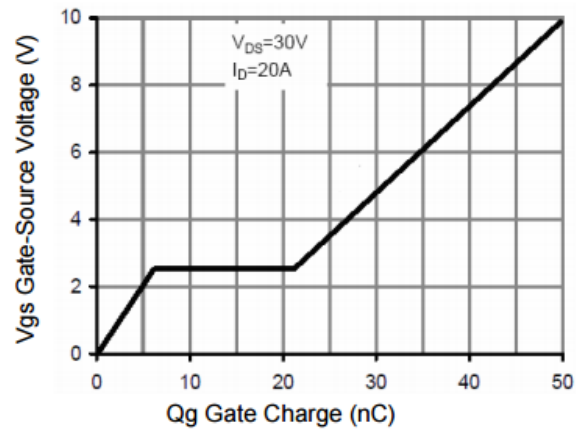


Figure 5 Gate Charge

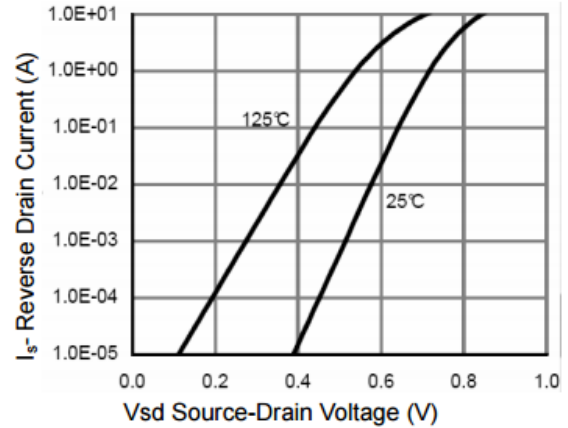


Figure 6 Source- Drain Diode Forward

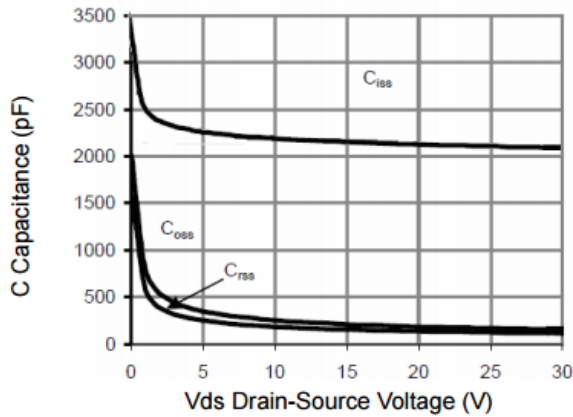


Figure 7 Capacitance vs Vds

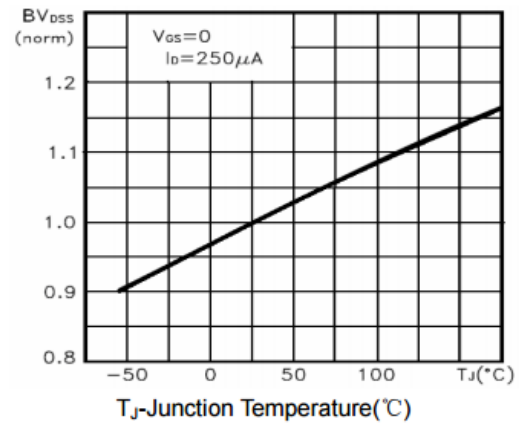


Figure 9  $BV_{DSS}$  vs Junction Temperature

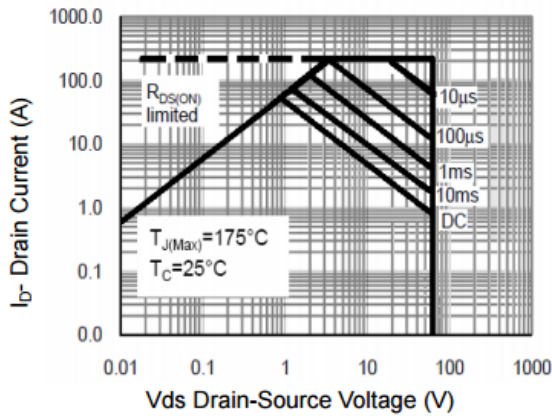


Figure 8 Safe Operation Area

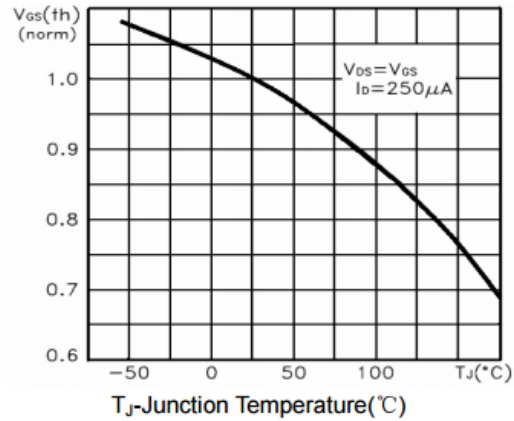


Figure 10  $V_{GS(th)}$  vs Junction Temperature

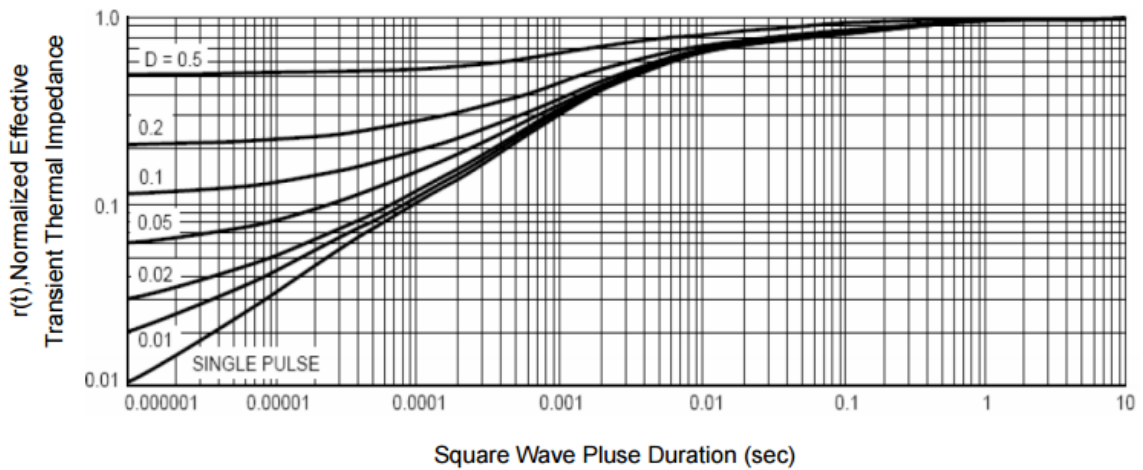


Figure 11 Normalized Maximum Transient Thermal Impedance

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