

**Features•**

30V, 100A

$R_{DS(ON)} 3.88m\Omega @ V_{GS} = 10V$  (Typ)

- Advanced Trench Technology
- Provide Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

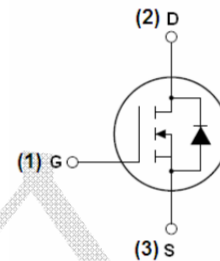
**Application**

- Load Switch
- PWM Application
- Power management

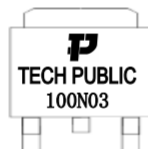
**Package and Pin Configuration**

(TO-252-3L)

Top View



**Marking:**



**Absolute Maximum Ratings** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

| Symbol                            | Parameter                                       |                        | Max.        | Units |
|-----------------------------------|-------------------------------------------------|------------------------|-------------|-------|
| V <sub>DSS</sub>                  | Drain-Source Voltage                            |                        | 30          | V     |
| V <sub>GSS</sub>                  | Gate-Source Voltage                             |                        | ±20         | V     |
| I <sub>D</sub>                    | Continuous Drain Current                        | T <sub>C</sub> = 25°C  | 100         | A     |
|                                   |                                                 | T <sub>C</sub> = 100°C | 60          | A     |
| I <sub>DM</sub>                   | Pulsed Drain Current <sup>note1</sup>           |                        | 180         | A     |
| EAS                               | Single Pulsed Avalanche Energy <sup>note2</sup> |                        | 225         | mJ    |
| P <sub>D</sub>                    | Power Dissipation                               | T <sub>C</sub> = 25°C  | 181         | W     |
| R <sub>θJC</sub>                  | Thermal Resistance, Junction to Case            |                        | 0.83        | °C/W  |
| T <sub>J</sub> , T <sub>STG</sub> | Operating and Storage Temperature Range         |                        | -55 to +175 | °C    |

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

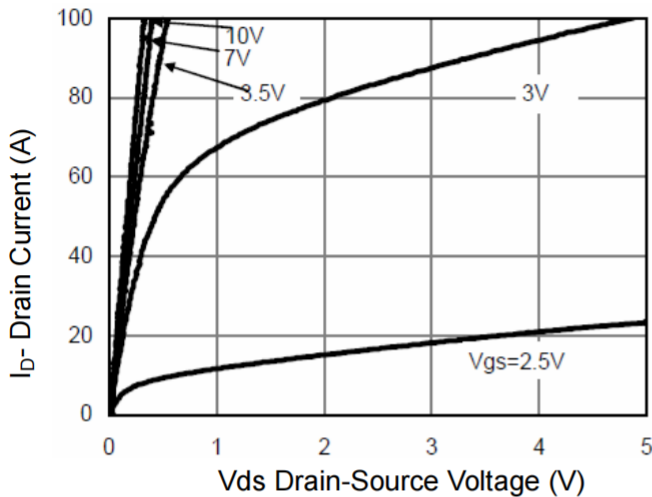
| Symbol                                                 | Parameter                                                | Test Condition                                                                           | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                          |                                                                                          |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                           | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                               | 30   | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> =30V, V <sub>GS</sub> = 0V,                                              | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                             | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                              | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                          |                                                                                          |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                 | 0.8  | 1.4  | 2.0  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance                        | V <sub>GS</sub> =10V, I <sub>D</sub> =10A                                                | -    | 3.88 | 5.0  | mΩ    |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance                        | V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A                                                | -    | 6.3  | 7.5  | mΩ    |
| Dynamic Characteristics                                |                                                          |                                                                                          |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                        | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                   | -    | 5672 | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                       |                                                                                          | -    | 392  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                             |                                                                                          | -    | 352  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                        | V <sub>DS</sub> =30V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V                       | -    | 103  | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                       |                                                                                          | -    | 15   | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                              |                                                                                          | -    | 32   | -    | nC    |
| Switching Characteristics                              |                                                          |                                                                                          |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                       | V <sub>DS</sub> =30V, I <sub>D</sub> =30A,<br>R <sub>G</sub> =1.8Ω, V <sub>GS</sub> =10V | -    | 12   | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                        |                                                                                          | -    | 8    | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                      |                                                                                          | -    | 49   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                       |                                                                                          | -    | 15   | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                          |                                                                                          |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current |                                                                                          | -    | -    | 100  | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                          | -    | -    | 180  | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> =0V, I <sub>S</sub> =5A                                                  | -    | 0.78 | 1.0  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                         | I <sub>F</sub> =30A,<br>dI/dt=100A/μs                                                    | -    | 27   | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Charge                       |                                                                                          | -    | 48   | -    | nC    |

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

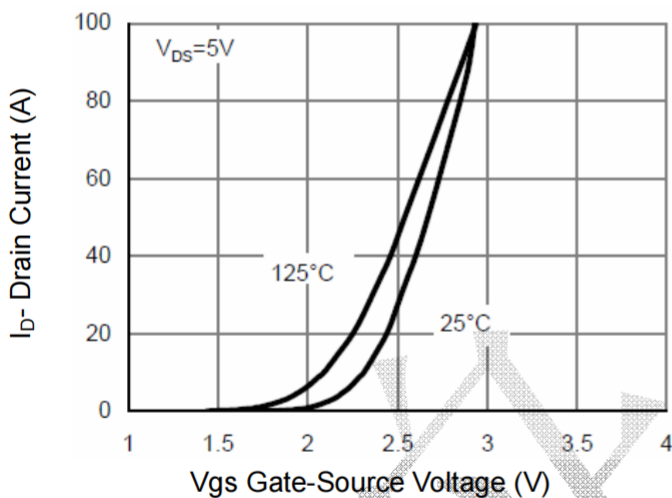
2. EAS condition :  $T_J=25^\circ\text{C}$ ,  $V_{DD}=30V$ ,  $V_G=10V$ ,  $L=0.5mH$ ,  $R_G=25\Omega$ ,  $I_{AS}=30A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

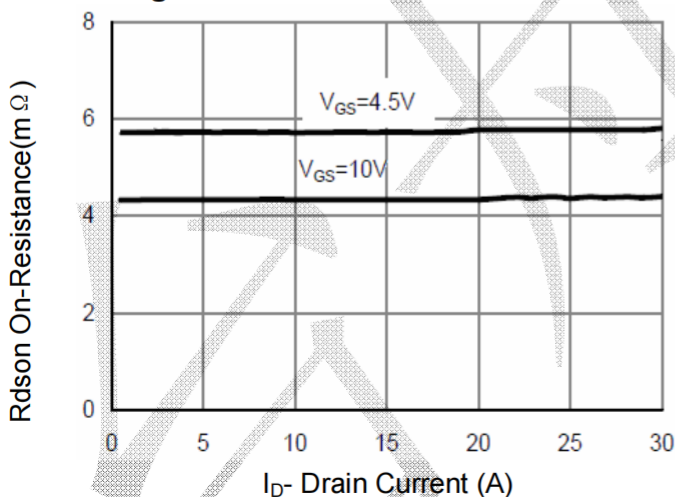
## Typical Electrical and Thermal Characteristic Curves



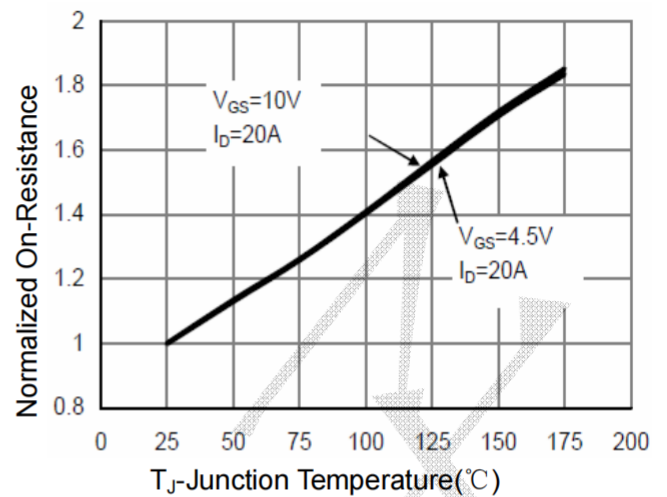
**Figure 1 Output Characteristics**



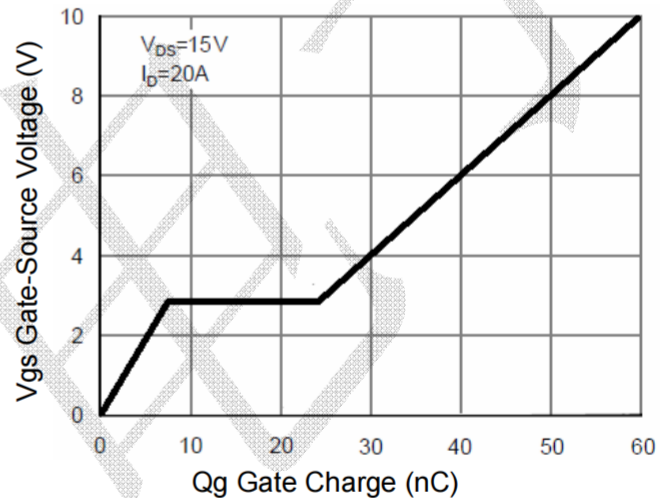
**Figure 2 Transfer Characteristics**



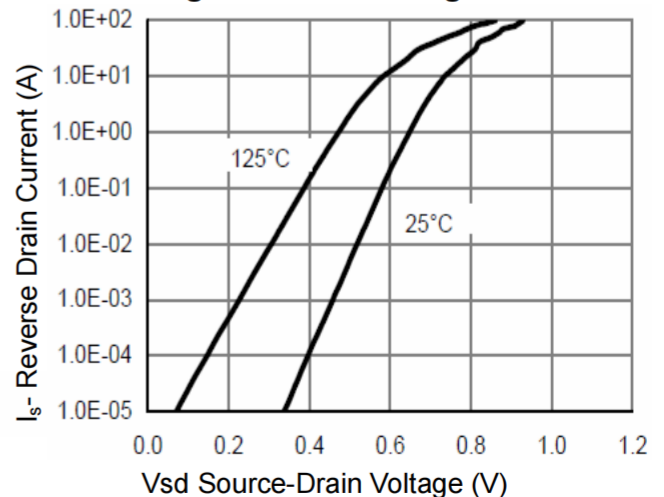
**Figure 3 Rdson- Drain Current**



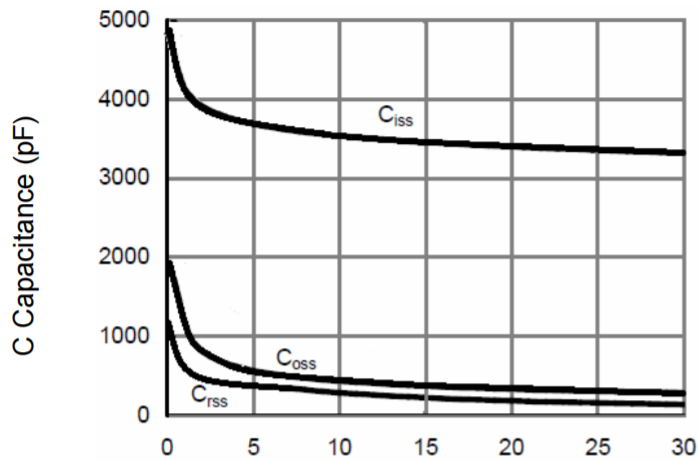
**Figure 4 Rdson-Junction Temperature**



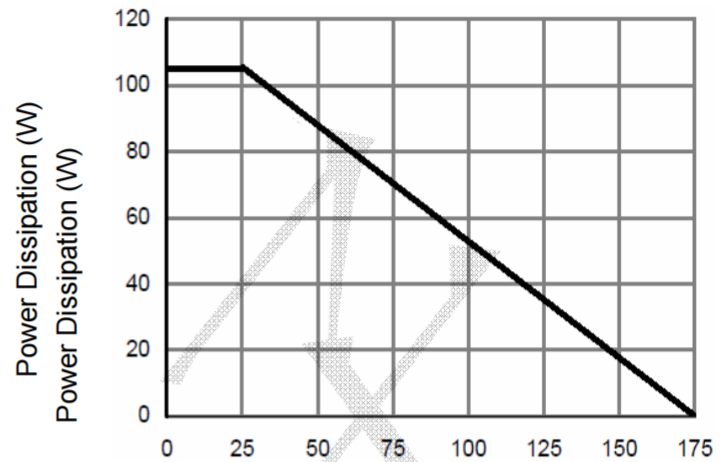
**Figure 5 Gate Charge**



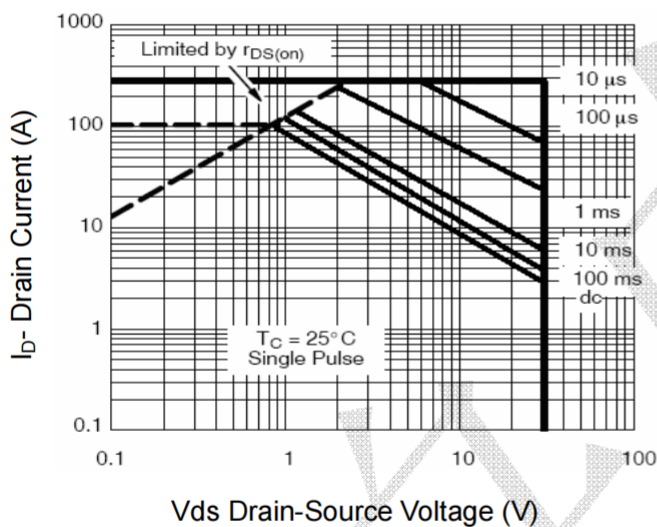
**Figure 6 Source- Drain Diode Forward**



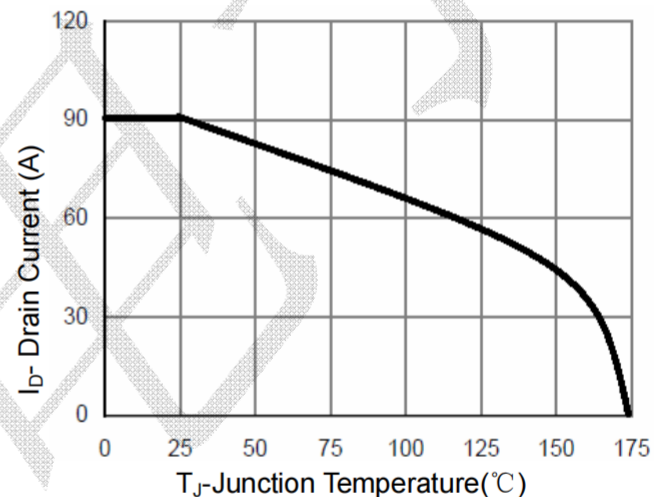
**Figure 7 Capacitance vs Vds**



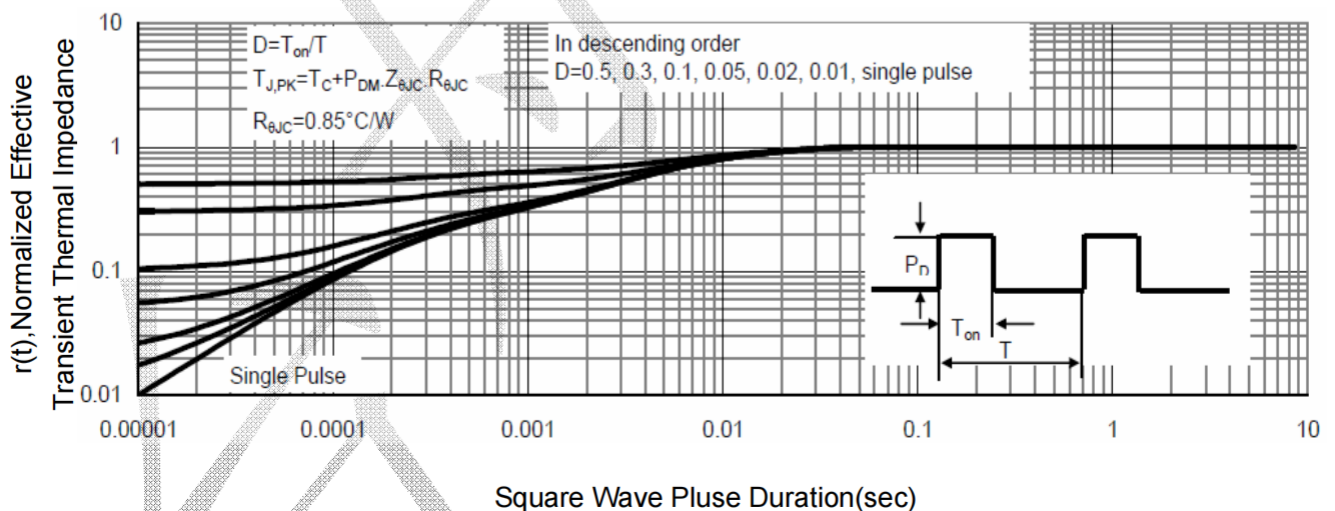
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**

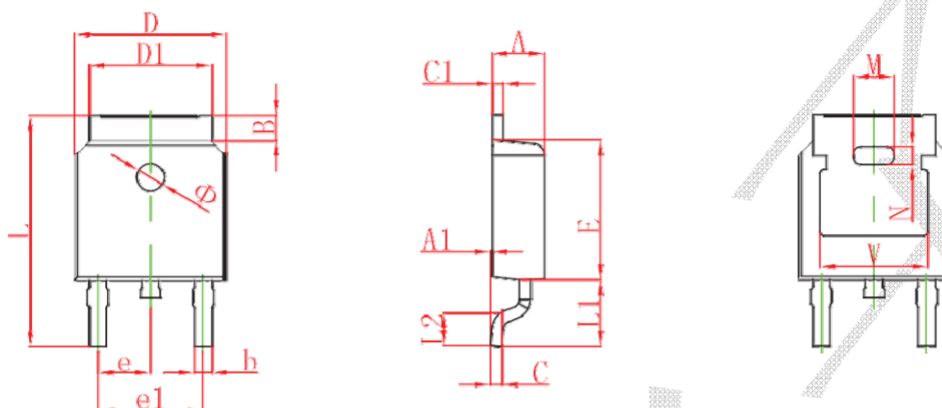


**Figure 10 ID Current Derating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

**TO252 Package Information**



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.380  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.100  | 0.000                | 0.004 |
| B      | 0.800                     | 1.400  | 0.031                | 0.055 |
| b      | 0.710                     | 0.810  | 0.028                | 0.032 |
| c      | 0.460                     | 0.560  | 0.018                | 0.022 |
| c1     | 0.460                     | 0.560  | 0.018                | 0.022 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.130                     | 5.460  | 0.202                | 0.215 |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.286 TYP.                |        | 0.090 TYP.           |       |
| e1     | 4.327                     | 4.727  | 0.170                | 0.186 |
| M      | 1.778 REF.                |        | 0.070 REF.           |       |
| N      | 0.762 REF.                |        | 0.018 REF.           |       |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.9 REF.                  |        | 0.114 REF.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| V      | 4.830 REF.                |        | 0.190 REF.           |       |
| ⌀      | 1.100                     | 1.300  | 0.043                | 0.0±1 |