

### Features

- Low drain-source on-resistance:  $R_{DS(ON)}=0.34\Omega$  (typ)
- Very Low FOM ( $R_{DS(on)} \times Q_g$ )
- Extremely low switching loss
- Excellent stability and uniformity
- 100% avalanche tested

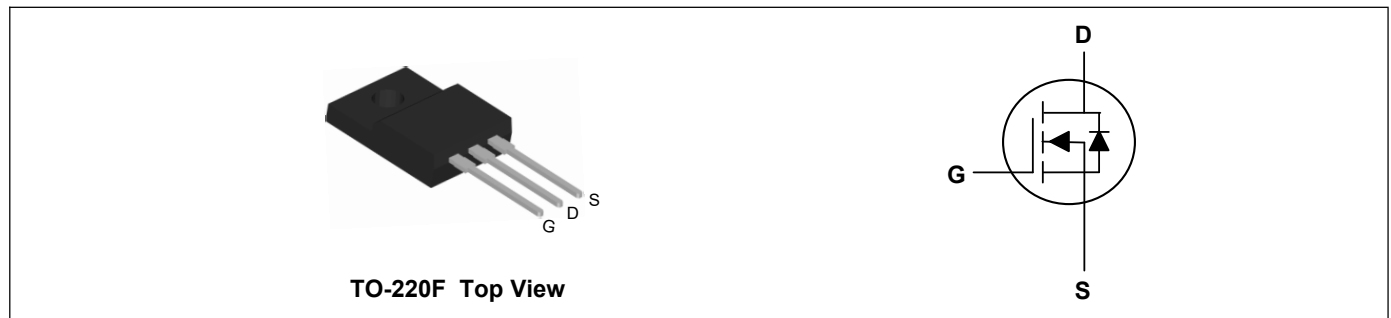
### Key Performance Parameters



| Parameter            | Value | Unit       |
|----------------------|-------|------------|
| $V_{DS} @ T_{j,max}$ | 700   | V          |
| $R_{DS(ON),max}$     | 380   | m $\Omega$ |
| $I_D$                | 11    | A          |
| $Q_{g,typ}$          | 22.6  | nC         |
| $I_{DM}$             | 33    | A          |

### Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- TV power & LED Lighting Power



### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ , unless otherwise noted)

| Parameter  | Symbol                        | Value      | Unit             |
|--|-------------------------------|------------|------------------|
| Drain-Source Voltage   | $V_{DS}$                      | 700        | V                |
| Gate-Source Voltage  | $V_{GS}$                      | $\pm 30$   | V                |
| Continuous Drain Current <sup>1</sup>  | $I_D @ T_C=25^\circ\text{C}$  | 11         | A                |
| Continuous Drain Current <sup>1</sup>  | $I_D @ T_C=100^\circ\text{C}$ | 6.7        | A                |
| Pulsed Drain Current <sup>2</sup>  | $I_{DM}$                      | 33         | A                |
| Single Pulse Avalanche Energy <sup>4</sup>                                     | EAS                           | 140        | mJ               |
| Avalanche Current  | $I_{AS}$                      | 1.8        | A                |
| MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 520\text{V}$                        | dv/dt                         | 50         | V/ns             |
| Reverse diode dv/dt <sup>3</sup> $V_{DS}=0 \dots 520\text{V}, I_{DS} \leq I_D$ |                               | 15         |                  |
| Total Power Dissipation ( $T_C=25^\circ\text{C}$ )                             | $P_D$                         | 30         | W                |
| Storage Temperature Range  | $T_{STG}$                     | -55 to 150 | $^\circ\text{C}$ |
| Operating Junction Temperature Range   | $T_J$                         | -55 to 150 | $^\circ\text{C}$ |

### Thermal Characteristics

| Parameter                                 | Symbol          | Value | Unit               |
|---|-----------------|-------|--------------------|
| Thermal Resistance Junction-Ambient (Max) | $R_{\theta JA}$ | 62.5  | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-Case (Max)    | $R_{\theta JC}$ | 4.1   | $^\circ\text{C/W}$ |

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

| Parameter                         | Symbol       | Conditions                                      | Min | Typ  | Max     | Unit       |
|-----------------------------------|--------------|---|-----|------|---------|------------|
| Drain-Source Breakdown Voltage    | $BV_{DSS}$   | $V_{GS}=0V, I_D=1mA$                            | 700 | ---  | ---     | V          |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=3.4A$                          | --- | 340  | 380     | m $\Omega$ |
| Gate Threshold Voltage            | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=370\mu A$                   | 2.0 | ---  | 4.5     | V          |
| Drain-Source Leakage Current      | $I_{DSS}$    | $V_{DS}=700V, V_{GS}=0V,$                       | --- | ---  | 1       | $\mu A$    |
|                                   |              | $V_{DS}=700V, V_{GS}=0V, T_C=150^\circ\text{C}$ | --- | ---  | 100     | $\mu A$    |
| Gate-Source Leakage Current       | $I_{GSS}$    | $V_{GS}=\pm 30V, V_{DS}=0V$                     | --- | ---  | $\pm 1$ | $\mu A$    |
| Total Gate Charge                 | $Q_g$        | $V_{DD}=520V, V_{GS}=10V, I_D=4.8A$             | --- | 22.6 | ---     | nC         |
| Gate-Source Charge                | $Q_{gs}$     |   | --- | 4.6  | ---     |            |
| Gate-Drain Charge                 | $Q_{gd}$     |   | --- | 6.4  | ---     |            |
| Turn-On Delay Time                | $T_{d(on)}$  | $V_{DD}=325V, R_G=25\Omega, I_D=4.8A$           | --- | 30   | ---     | ns         |
| Rise Time                         | $T_r$        |   | --- | 23   | ---     |            |
| Turn-Off Delay Time               | $T_{d(off)}$ |   | --- | 190  | ---     |            |
| Fall Time                         | $T_f$        |   | --- | 20   | ---     |            |
| Input Capacitance                 | $C_{iss}$    | $V_{DS}=100V, V_{GS}=0V, f=1MHz$                | --- | 990  | ---     | pF         |
| Output Capacitance                | $C_{oss}$    |   | --- | 40   | ---     |            |
| Reverse Transfer Capacitance      | $C_{rss}$    |   | --- | 2.3  | ---     |            |

**Drain-Source Diode Characteristics**

| Parameter                 | Symbol   | Conditions                               | Min | Typ | Max | Unit    |
|---------------------------|----------|--|-----|-----|-----|---------|
| Continuous Source Current | $I_S$    | $T_C=25^\circ\text{C}$                   | --- | --- | 11  | A       |
| Pulsed Source Current     | $I_{SM}$ |  | --- | --- | 33  | A       |
| Diode Forward Voltage     | $V_{SD}$ | $V_G=0V, I_S=4.8A, T_J=25^\circ\text{C}$ | --- | --- | 1.3 | V       |
| Reverse Recovery Time     | $t_{rr}$ | $V_G=0V, I_S=4.8A, di_f/dt=100A/\mu s$   | --- | 240 | --- | ns      |
| Reverse Recovery Charge   | $Q_{rr}$ |  | --- | 2.1 | --- | $\mu C$ |

**Note:**

- Limited by  $T_{J,max}$ . Maximum Duty Cycle  $D = 0.50$
- Pulse width  $t_p$  limited by  $T_{J,max}$
- Identical low side and high side switch with identical  $R_G$
- $V_{DD}=50V, R_G=25\Omega, I_{AS}=1.8A$ , Starting  $T_J=25^\circ\text{C}$

Handwritten text: Hnd]WU 7\ UFUWYf]gh]Vg

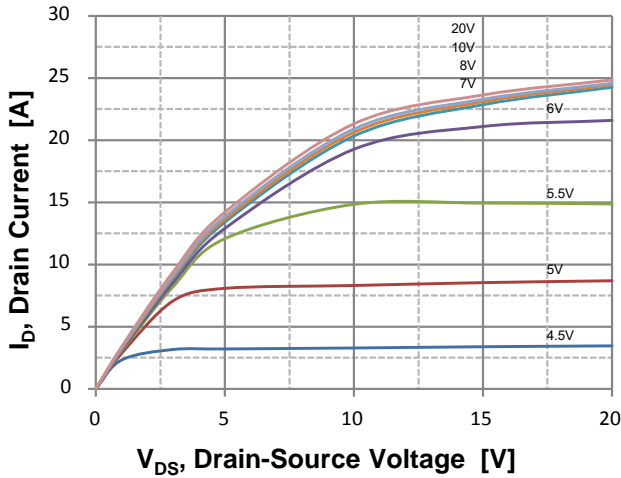


Figure 1. On Region Characteristics

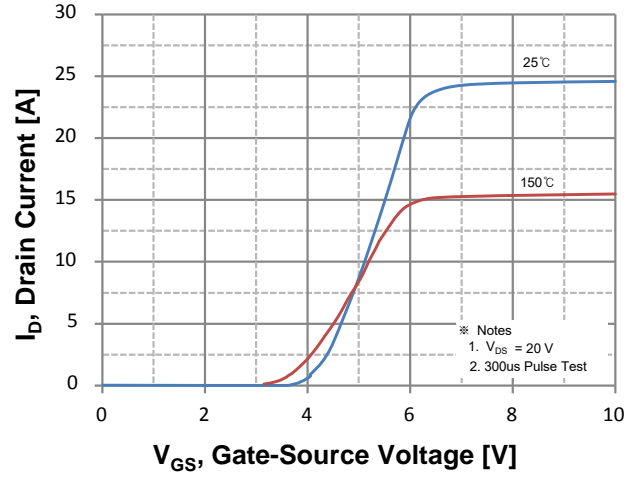


Figure 2. Transfer Characteristics

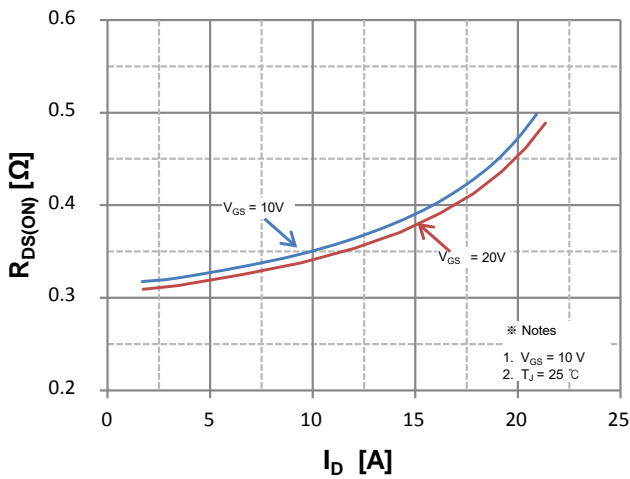


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

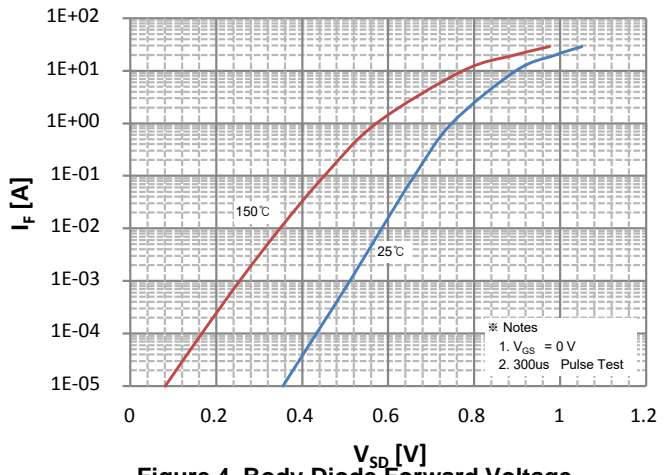


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

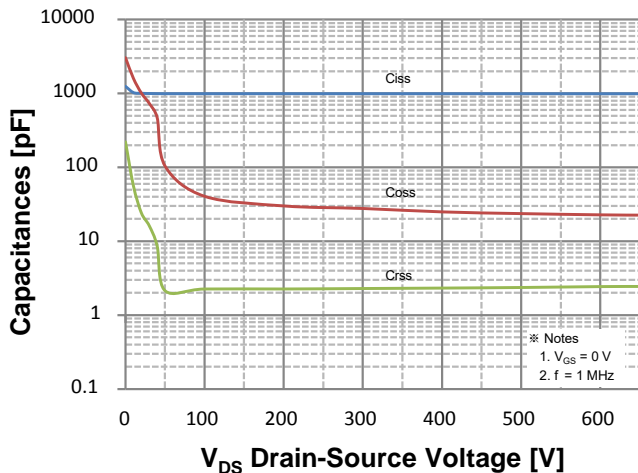


Figure 5. Capacitance Characteristics

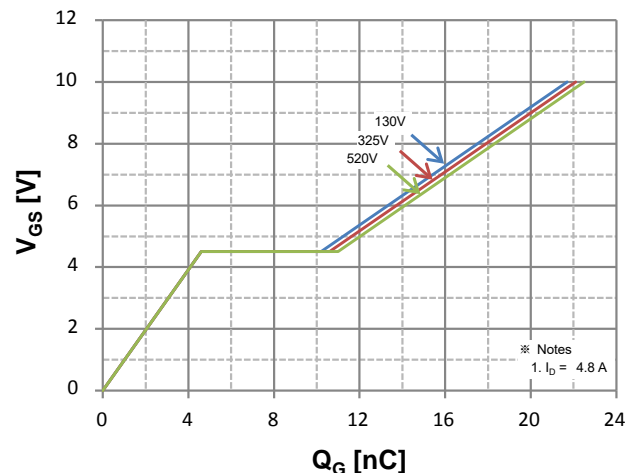
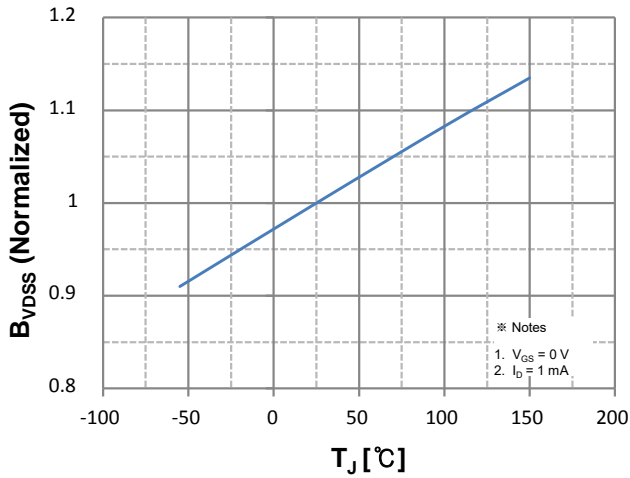
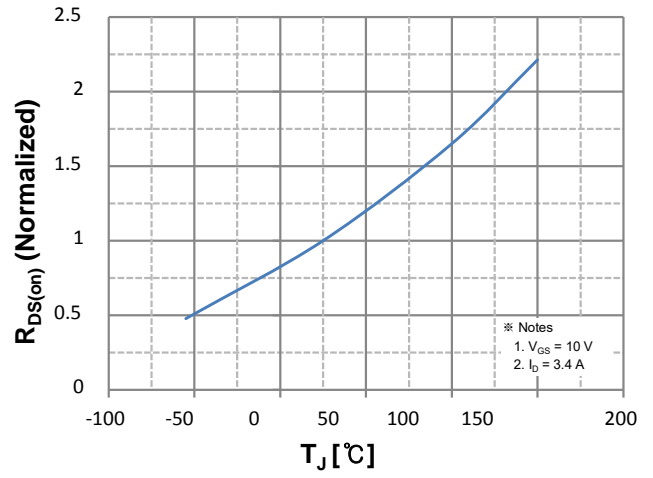


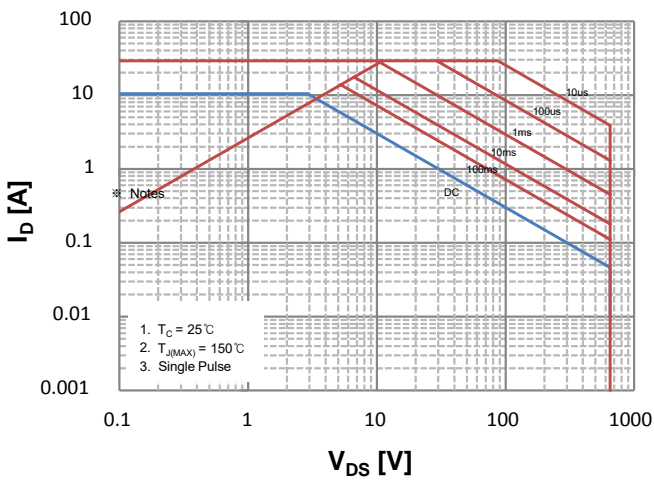
Figure 6. Gate Charge Characteristics



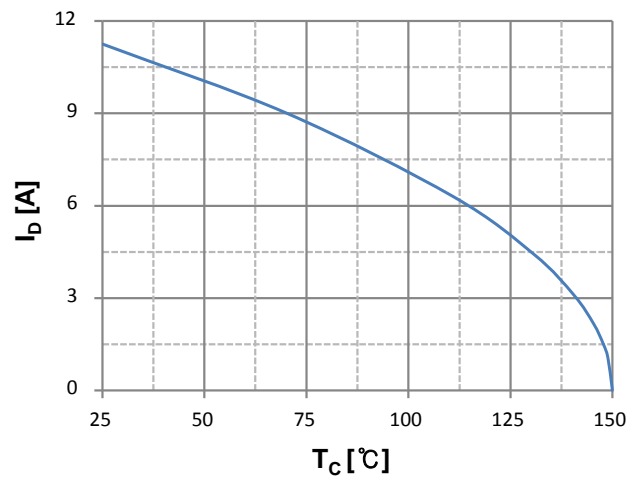
**Figure 7. Breakdown Voltage Variation vs. Temperature**



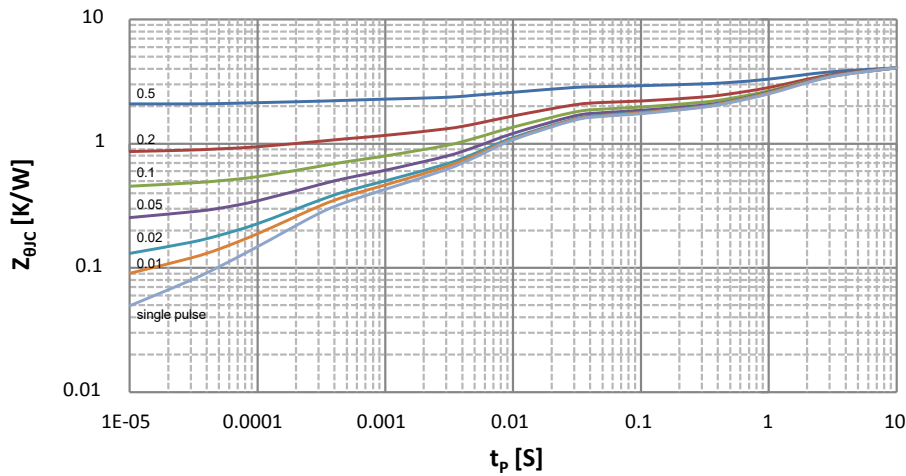
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**

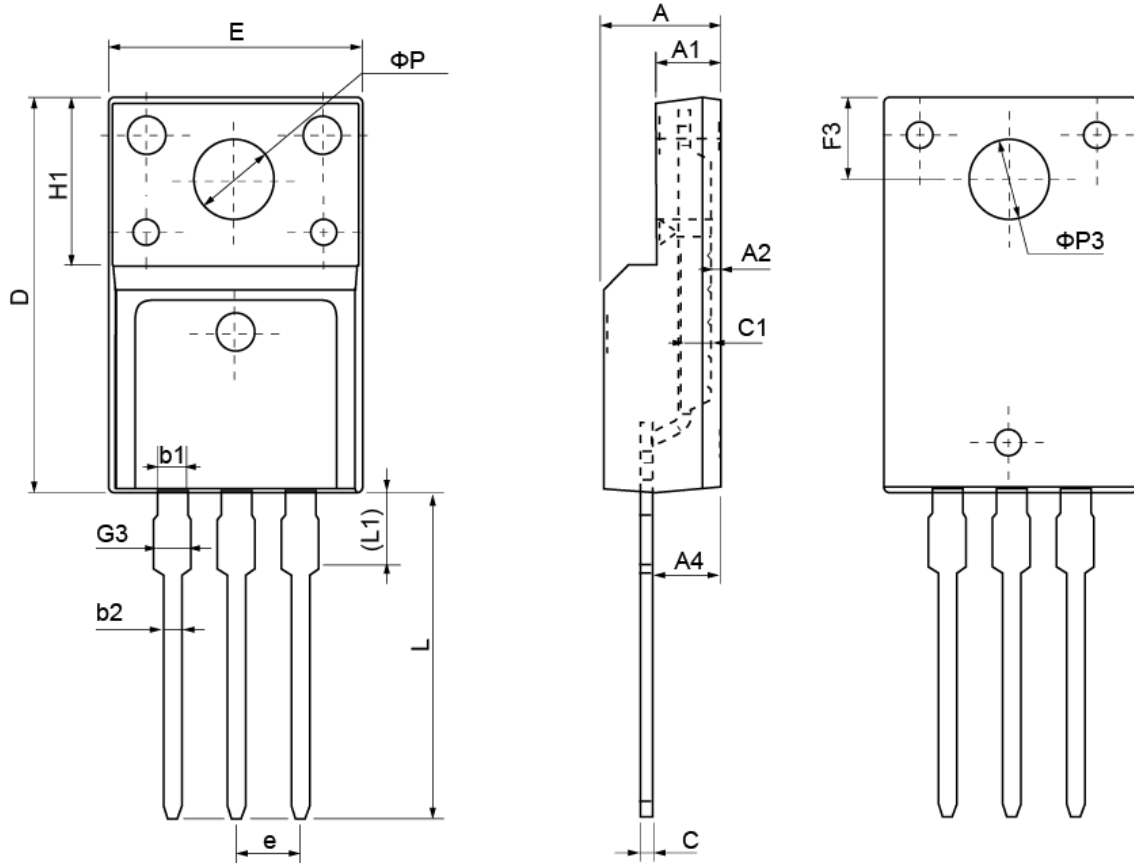


**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. Transient Thermal Response Curve**

**TO-220F Package Outline Dimensions**



| Symbol    | Dimensions (unit:mm) |       |       | Symbol        | Dimensions (unit:mm) |       |       |
|-----------|----------------------|-------|-------|---------------|----------------------|-------|-------|
|           | Min                  | Typ   | Max   |               | Min                  | Typ   | Max   |
| <b>A</b>  | 4.40                 | 4.70  | 5.00  | <b>H1</b>     | 6.70 REF             |       |       |
| <b>A1</b> | 2.30                 | 2.55  | 2.80  | <b>L</b>      | 12.30                | 12.98 | 13.30 |
| <b>A2</b> | 0.30                 | 0.50  | 0.70  | <b>L1</b>     | 2.95                 | 3.10  | 3.50  |
| <b>A4</b> | 2.45                 | 2.80  | 3.05  | <b>phi P</b>  | 3.03                 | 3.20  | 3.50  |
| <b>c</b>  | 0.30                 | 0.50  | 0.70  | <b>phi P3</b> | 3.15                 | 3.45  | 3.65  |
| <b>c1</b> | 1.20                 | 1.30  | 1.40  | <b>b1</b>     | 1.10                 | 1.30  | 1.45  |
| <b>D</b>  | 15.40                | 15.90 | 16.40 | <b>b2</b>     | 0.60                 | 0.80  | 1.00  |
| <b>E</b>  | 9.86                 | 10.16 | 10.46 | <b>F3</b>     | 3.05                 | 3.30  | 3.55  |
| <b>e</b>  | 2.54 BSC             |       |       | <b>G3</b>     | 1.15                 | 1.35  | 1.55  |