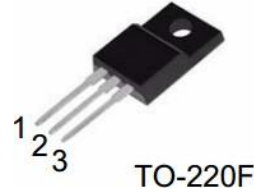
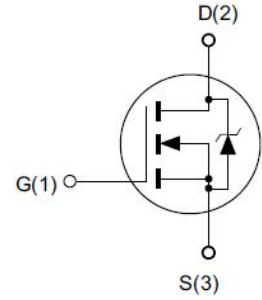


### Features

- ◆ 650V, 20A,  $R_{DS(ON)}(Max.) = 0.50\Omega @ V_{GS} = 10V$ .
- ◆ Low  $C_{rss}$
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

### Application

- ◆ Adaptor
- ◆ Standby Power
- ◆ Switching power supply



### Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter  | Limit      | Unit             |
|----------------|--|------------|------------------|
|                |  | TO-220F    |                  |
| $V_{DS}$       | Drain-Source Voltage <sup>a</sup>                    | 650        | V                |
| $V_{GS}$       | Gate-Source Voltage                                  | $\pm 30$   | V                |
| $I_D$          | Drain Current-Continuous, $T_c = 25^\circ\text{C}$   | 20         | A                |
|                | Drain Current-Continuous, $T_c = 100^\circ\text{C}$  | 12.5       | A                |
| $I_{DM}$       | Drain Current-Pulsed <sup>b</sup>                    | 80         | A                |
| $P_D$          | Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$ | 85         | W                |
| EAS            | Single Pulsed Avalanche Energy <sup>d</sup>          | 980        | mJ               |
| $T_J, T_{STG}$ | Operating and Store Temperature Range                | -55 to 150 | $^\circ\text{C}$ |

### Thermal Characteristics

| Symbol          | Parameter                                | Value | Unit               |
|-----------------|--|-------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-Case Max.   | 1.47  | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient Max. | 62.5  | $^\circ\text{C/W}$ |

### Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

#### ■ Off Characteristics

| Symbol     | Parameter                         | Test Condition                      | Min. | Typ. | Max.      | Unit          |
|------------|-----------------------------------|-------------------------------------|------|------|-----------|---------------|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage    | $V_{GS} = 0V, I_D = 250\mu\text{A}$ | 650  | -    | -         | V             |
| $I_{DSS}$  | Zero Gate Voltage Drain Current   | $V_{DS} = 650V, V_{GS} = 0V$        | -    | -    | 1         | $\mu\text{A}$ |
| $I_{GSS}$  | Forward Gate Body Leakage Current | $V_{DS} = 0V, V_{GS} = \pm 30V$     | -    | -    | $\pm 100$ | nA            |



# MPF20N65

## N-Channel Power MOSFET

### On Characteristics

| Symbol       | Parameter                                      | Test Condition                    | Min. | Typ. | Max. | Unit     |
|--------------|--|-----------------------------------|------|------|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 2    | -    | 4    | V        |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance <sup>c</sup> | $V_{GS} = 10V, I_D = 10A$         | -    | 0.40 | 0.50 | $\Omega$ |

### Dynamic Characteristics

| Symbol    | Parameter                    | Test Condition                                    | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|---|------|------|------|------|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 25V,$<br>$V_{GS} = 0V,$<br>$f = 1.0MHz$ | -    | 3059 | -    | pF   |
| $C_{oss}$ | Output Capacitance           |   | -    | 291  | -    | pF   |
| $C_{rss}$ | Reverse Transfer Capacitance |   | -    | 16   | -    | pF   |

### On Characteristics

| Symbol       | Parameter           | Test Condition                                | Min. | Typ. | Max. | Unit |
|--------------|---------------------|---|------|------|------|------|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD} = 325V, I_D = 20A,$<br>$V_{GS} = 10V$ | -    | 37   | -    | ns   |
| $t_r$        | Turn-On Rise Time   |   | -    | 70   | -    | ns   |
| $t_{d(off)}$ | Turn-Off Delay Time |   | -    | 89   | -    | ns   |
| $t_f$        | Turn-Off Fall Time  |   | -    | 49   | -    | ns   |
| $Q_g$        | Total Gate Charge   | $V_{DS} = 325V, I_D = 20A,$<br>$V_{GS} = 10V$ | -    | 54.5 | -    | nC   |
| $Q_{gs}$     | Gate-Source Charge  |   | -    | 13.3 | -    | nC   |
| $Q_{gd}$     | Gate-Drain Charge   |   | -    | 18.7 | -    | nC   |

### Drain-Source Diode Characteristics

| Symbol   | Parameter                                     | Test Condition                                | Min. | Typ. | Max. | Unit    |
|----------|---|---|------|------|------|---------|
| $I_S$    | Drain-Source Diode Forward Continuous Current | $V_{GS} = 0V$                                 | -    | -    | 20   | A       |
| $I_{SM}$ | Maximum Pulsed Current                        | $V_{GS} = 0V$                                 | -    | -    | 80   | A       |
| $V_{SD}$ | Drain-Source Diode Forward Voltage            | $V_{GS} = 0V, I_S = 20A$                      | -    | -    | 1.4  | V       |
| $T_{rr}$ | Body Diode Reverse Recovery Time              | $di/dt = 100A/us$<br>$I_S = 20A, V_{GS} = 0V$ | -    | 561  | -    | ns      |
| $Q_{rr}$ | Reverse Recovery Charge                       |   | -    | 6.9  | -    | $\mu C$ |

Notes:

- a.  $T_J = +25^\circ C$  to  $+150^\circ C$ .
- b. Repetitive rating; pulse width limited by maximum junction temperature.
- c. Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- d.  $L = 10mH, V_{DD} = 50V, I_{AS} = 14A, R_G = 25\Omega$  Starting  $T_J = 25^\circ C$ .

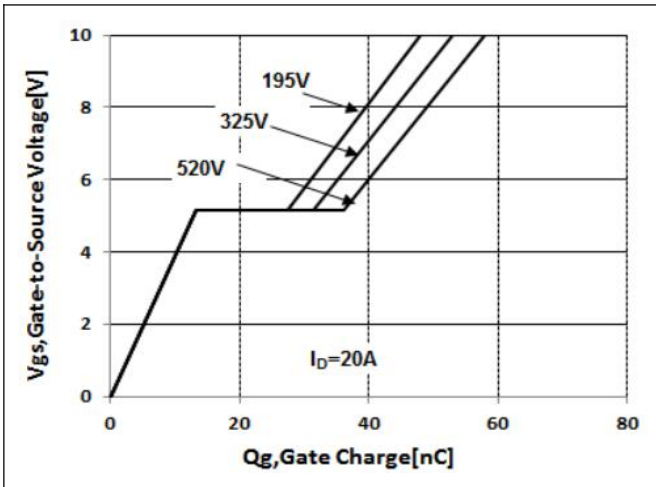


Figure 1. Gate Charge Characteristics

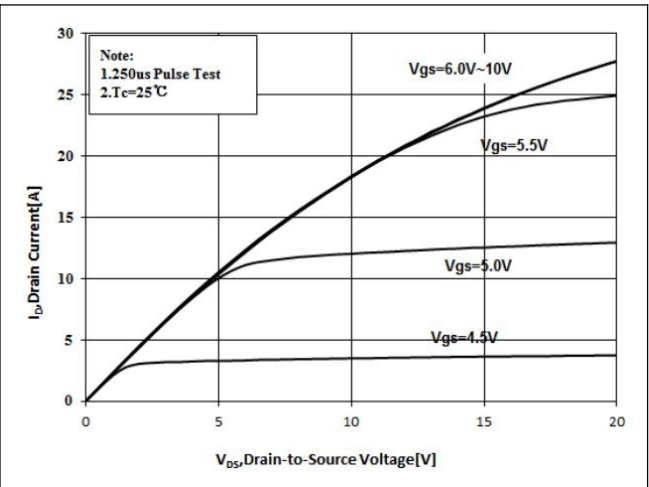


Figure 2. On-State Characteristics

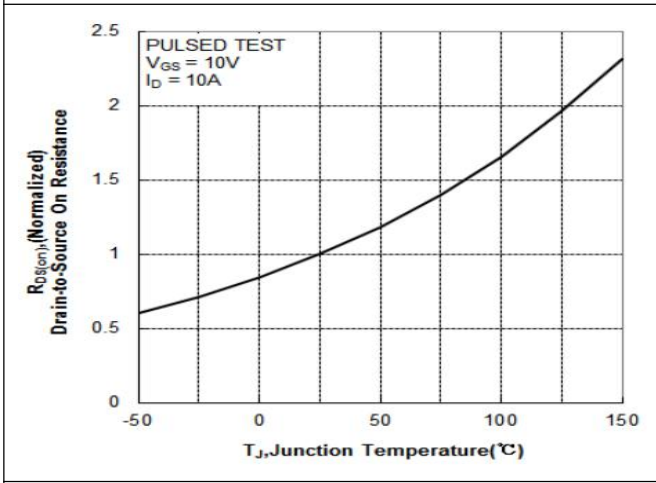


Figure 3. Normalized On-Resistance Variation with Temperature

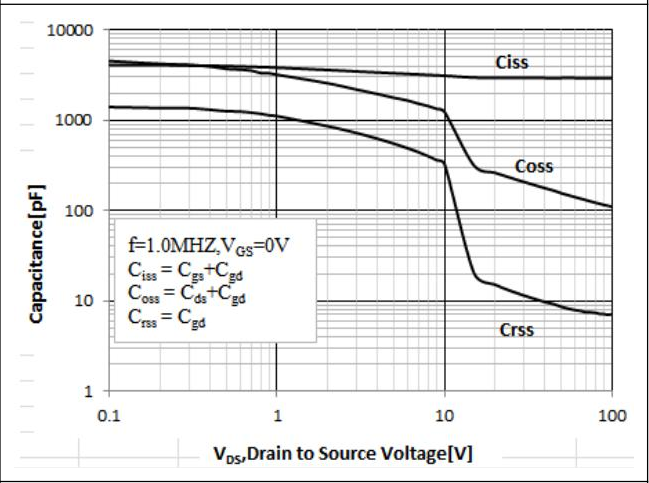


Figure 4. Typical Capacitance vs Drain to Source Voltage

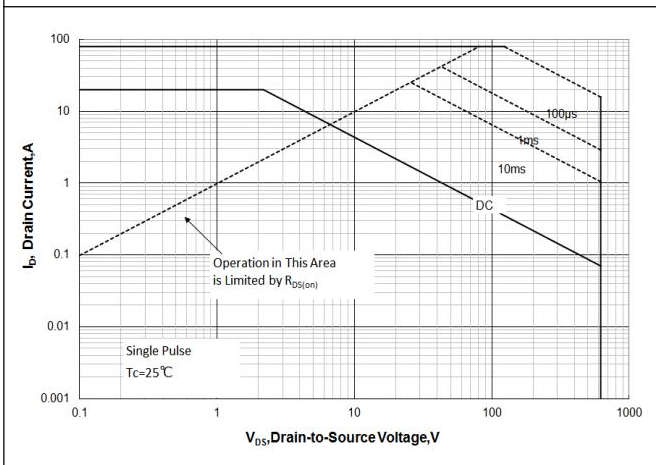


Figure 5 Maximum Forward Bias Safe Operating Area  
TO-220F

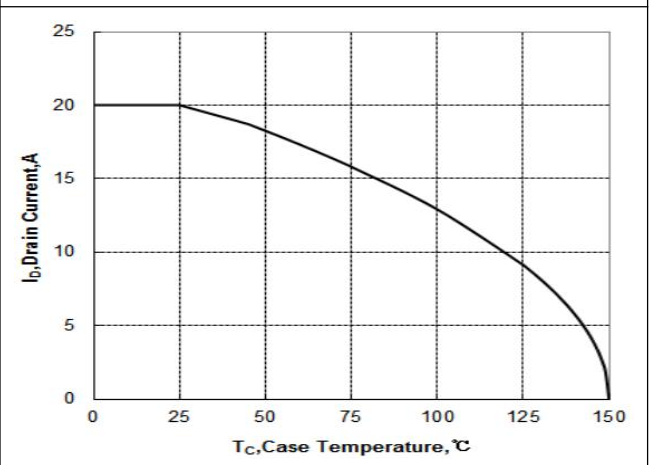


Figure 6. Maximum Continuous Drain Current vs Case Temperature

### ■ Package Information

