



# MPF07N65

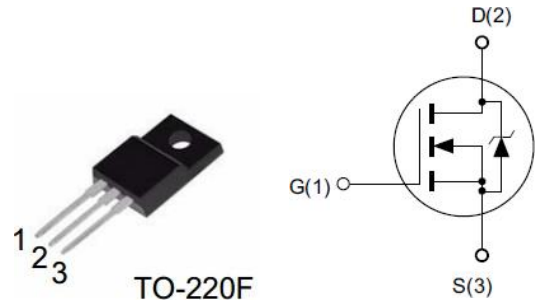
## N-Channel Power MOSFET

### Features

- ◆ 650V, 7A,  $R_{DS(ON)}$ (Typ.) =  $1.1\Omega$ @ $V_{GS} = 10V$ .
- ◆ Low  $C_{rss}$
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

### Application

- ◆ Adapter
- ◆ LCD Panel Power
- ◆ E-Bike Charger
- ◆ Switching Mode 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, $T_c = 25^\circ\text{C}$   | 7          | A                |
|                | Drain Current-Continuous, $T_c = 100^\circ\text{C}$  | 4          | A                |
| $I_{DM}$       | Drain Current-Pulsed <sup>b</sup>                    | 28         | A                |
| $P_D$          | Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$ | 35         | W                |
| EAS            | Single Pulsed Avalanche Energy <sup>d</sup>          | 245        | 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.   | 3.5   | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | 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    | $V_{GS} = 0V, I_D = 250\mu A$   | 650  | -    | -         | V       |
| $I_{DSS}$  | Zero Gate Voltage Drain Current   | $V_{DS} = 650V, V_{GS} = 0V$    | -    | -    | 1         | $\mu A$ |
| $I_{GSS}$  | Forward Gate Body Leakage Current | $V_{DS} = 0V, V_{GS} = \pm 30V$ | -    | -    | $\pm 100$ | nA      |

### ■ On Characteristics

| Symbol       | Parameter                                      | Test Condition                   | Min. | Typ. | Max. | Unit     |
|--------------|------------------------------------------------|----------------------------------|------|------|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{DS}=V_{GS}$ , $I_D=250\mu A$ | 2.0  | -    | 4.0  | V        |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance <sup>c</sup> | $V_{GS}=10V$ , $I_D=3.5A$        | -    | 1.1  | 1.4  | $\Omega$ |

### ■ Dynamic Characteristics

| Symbol    | Parameter                    | Test Condition                                | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|-----------------------------------------------|------|------|------|------|
| $C_{iss}$ | Input Capacitance            | $V_{DS}=25V$ ,<br>$V_{GS}=0V$ ,<br>$f=1.0MHz$ | -    | 1135 | -    | pF   |
| $C_{oss}$ | Output Capacitance           |                                               | -    | 88   | -    | pF   |
| $C_{rss}$ | Reverse Transfer Capacitance |                                               | -    | 4.6  | -    | pF   |

### ■ On Characteristics

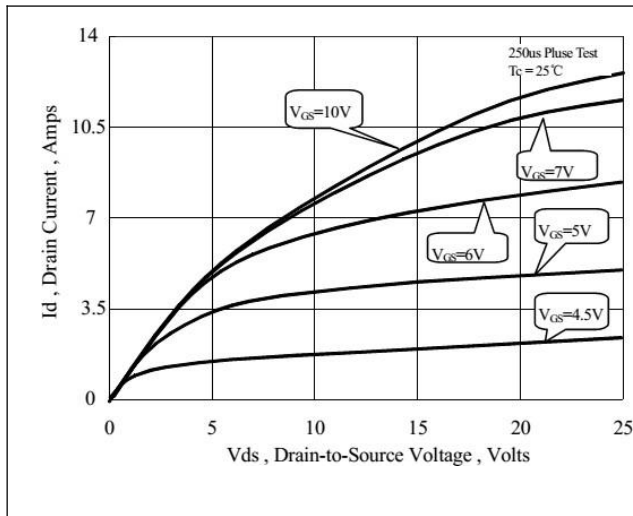
| Symbol       | Parameter           | Test Condition                                              | Min. | Typ. | Max. | Unit |
|--------------|---------------------|-------------------------------------------------------------|------|------|------|------|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD}=325V$ , $I_D=7A$ ,<br>$R_G=10\Omega$ , $V_{GS}=10V$ | -    | 19   | -    | ns   |
| $t_r$        | Turn-On Rise Time   |                                                             | -    | 21   | -    | ns   |
| $t_{d(off)}$ | Turn-Off Delay Time |                                                             | -    | 42   | -    | ns   |
| $t_f$        | Turn-Off Fall Time  |                                                             | -    | 19   | -    | ns   |
| $Q_g$        | Total Gate Charge   | $V_{DS}=520V$ , $I_D=7A$ ,<br>$V_{GS}=10V$                  | -    | 24   | -    | nC   |
| $Q_{gs}$     | Gate-Source Charge  |                                                             | -    | 5.1  | -    | nC   |
| $Q_{gd}$     | Gate-Drain Charge   |                                                             | -    | 9.5  | -    | nC   |

### ■ Drain-Source Diode Characteristics

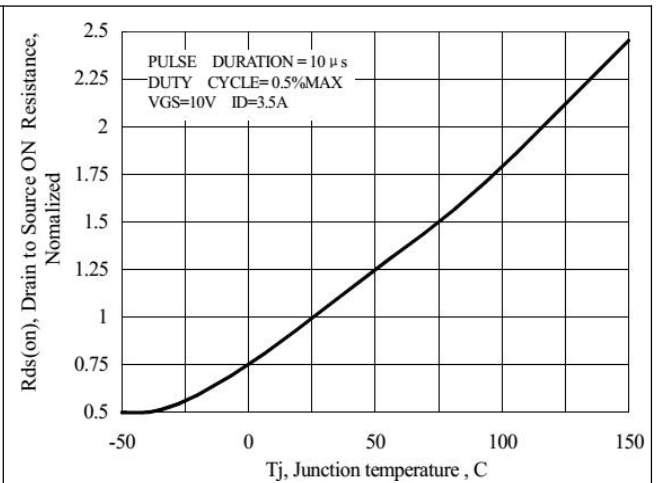
| Symbol   | Parameter                                     | Test Condition                                | Min. | Typ. | Max. | Unit |
|----------|-----------------------------------------------|-----------------------------------------------|------|------|------|------|
| $I_S$    | Drain-Source Diode Forward Continuous Current | $V_{GS}=0V$                                   | -    | -    | 7    | A    |
| $I_{SM}$ | Maximum Pulsed Current                        | $V_{GS}=0V$                                   | -    | -    | 28   | A    |
| $V_{SD}$ | Drain-Source Diode Forward Voltage            | $V_{GS}=0V$ , $I_S=7A$                        | -    | -    | 1.4  | V    |
| $T_{rr}$ | Body Diode Reverse Recovery Time              | $di/dt=100A/\mu s$<br>$I_S=10A$ , $V_{GS}=0V$ | -    | 370  | -    | ns   |
| $Q_{rr}$ | Reverse Recovery Charge                       |                                               | -    | 1920 | -    | nC   |

Notes:

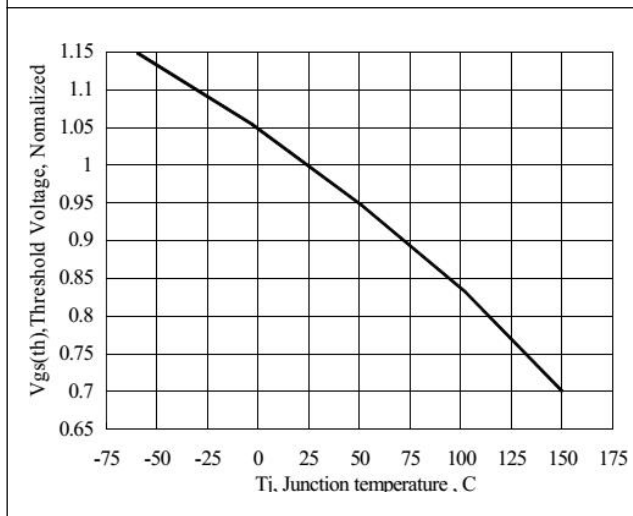
- $T_J=-55^\circ C$  to  $+150^\circ C$ .
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- $L=10mH$ ,  $V_{DD}=50V$ ,  $I_{AS}=7A$ ,  $R_G=25\Omega$  Starting  $T_J=25^\circ C$ .



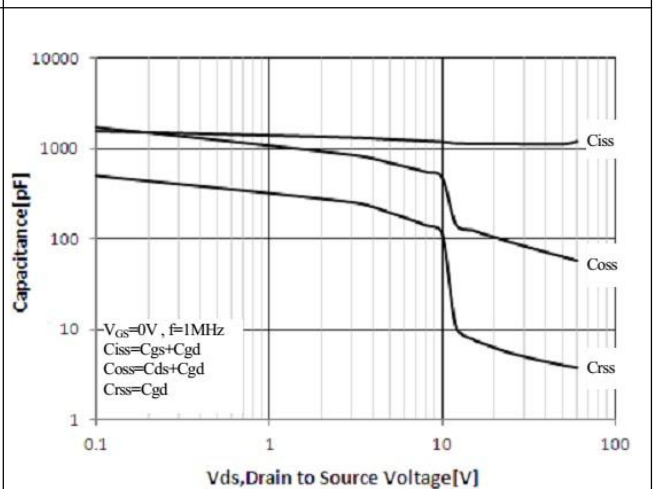
**Figure 1. On-State Characteristics**



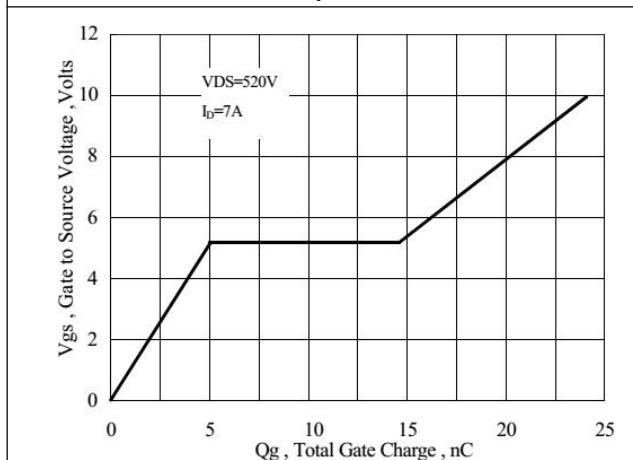
**Figure 2. Normalized On-Resistance Variation with Temperature**



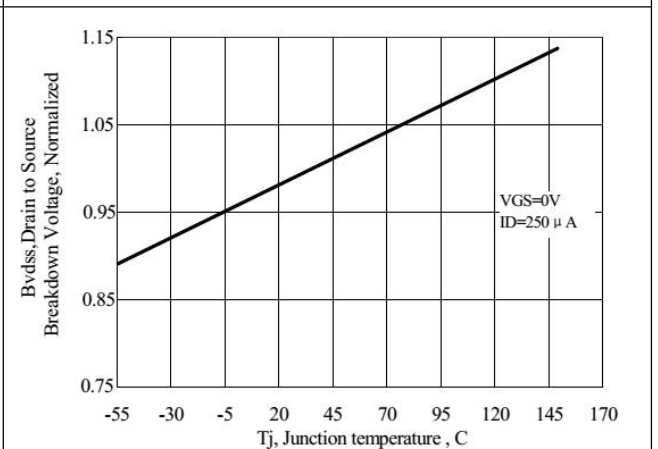
**Figure 3. Typical Theshold Voltage vs Junction Temperature**



**Figure 4. Capacitance Characteristics**



**Figure 5. Gate Charge Characteristics**



**Figure 6. Typical Breakdown Voltage vs Junction Temperature**

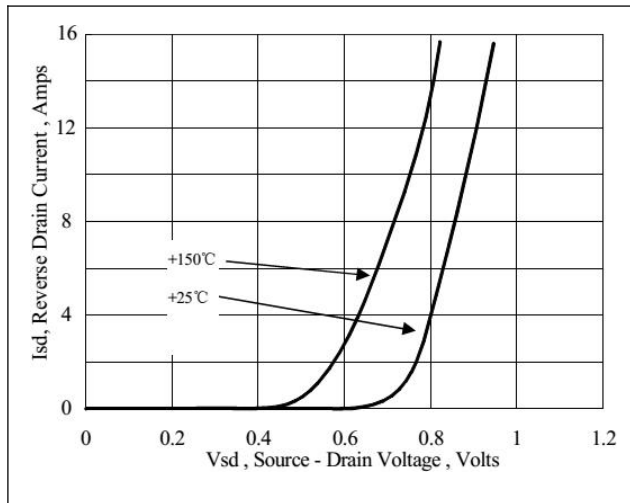


Figure 7. Typical Body Diode Transfer Characteristics

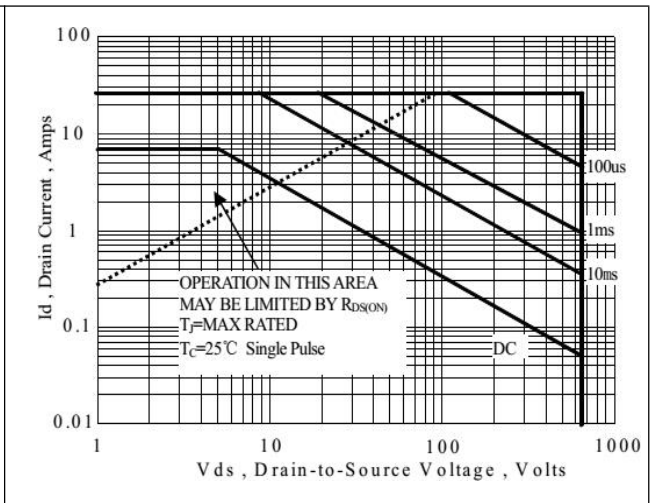


Figure 8. Maximum Safe Operating Area

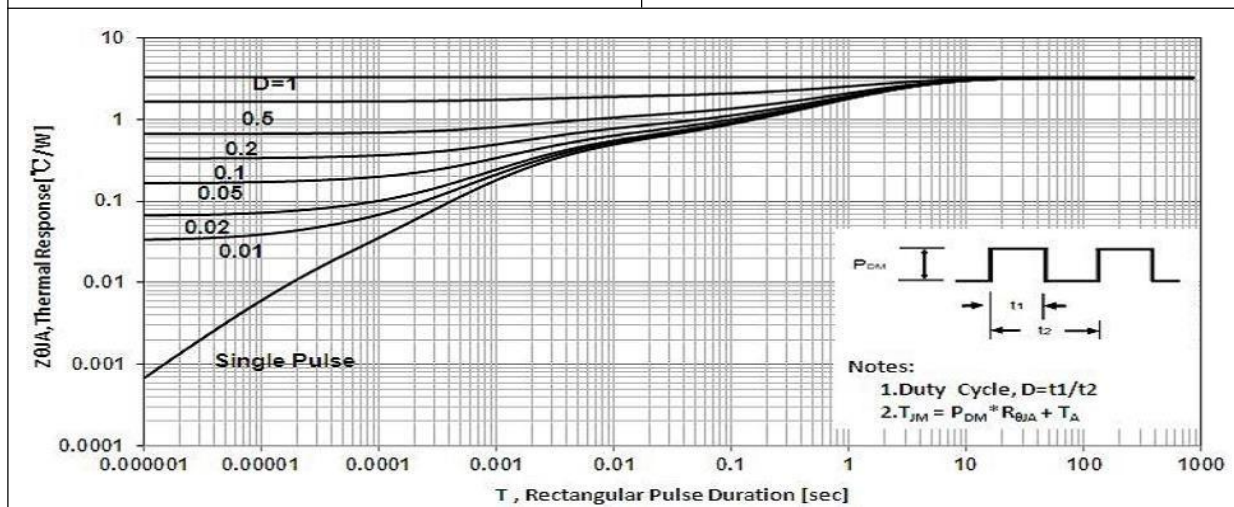


Figure 9. Maximum Effective Thermal Impedance , Junction to Case



Technical drawing of a mechanical part, showing three views: top, front, and side. The drawing includes dimensions in millimeters.

**Top View:**

- Overall width:  $10.16 \pm 0.2$
- Overall height:  $15.87 \pm 0.2$
- Central circular hole:  $\varnothing 3.18$
- Four smaller holes (two on each side of the center):  $\varnothing 1.5 \times 0.1 \pm 0.05 \text{ DP}$
- Distance from center to side holes:  $2.54$
- Distance from center to bottom holes:  $2.54$
- Distance from center to side holes (inner):  $1.27 \pm 0.05$
- Distance from center to bottom holes (inner):  $1.20$
- Distance from center to bottom holes (outer):  $0.80$

**Front View:**

- Overall width:  $10.16 \pm 0.2$
- Overall height:  $15.87 \pm 0.2$
- Central circular hole:  $\varnothing 3.18$
- Four smaller holes (two on each side of the center):  $\varnothing 1.5 \times 0.1 \pm 0.05 \text{ DP}$
- Distance from center to side holes:  $2.54$
- Distance from center to bottom holes:  $2.54$
- Distance from center to side holes (inner):  $1.27 \pm 0.05$
- Distance from center to bottom holes (inner):  $1.20$
- Distance from center to bottom holes (outer):  $0.80$

**Side View:**

- Overall width:  $10.16 \pm 0.2$
- Overall height:  $15.87 \pm 0.2$
- Central circular hole:  $\varnothing 3.18$
- Four smaller holes (two on each side of the center):  $\varnothing 1.5 \times 0.1 \pm 0.05 \text{ DP}$
- Distance from center to side holes:  $2.54$
- Distance from center to bottom holes:  $2.54$
- Distance from center to side holes (inner):  $1.27 \pm 0.05$
- Distance from center to bottom holes (inner):  $1.20$
- Distance from center to bottom holes (outer):  $0.80$