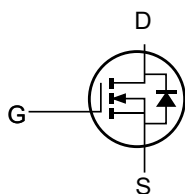
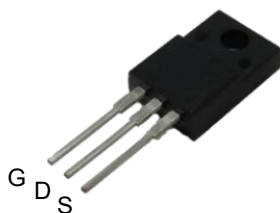


## 650V N-Channel Power MOSFET

**MPR2N65CTF**

**TO-220F**



### Features

- Low gate charge
- Low Ciss
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- Halogen free and RoHS compliant

### Application

- Switch Mode Power Supply
- Uninterruptible Power Supply (UPS)
- TV Power
- A dapter/Charger

**Maximum ratings, at  $T_A = 25^\circ\text{C}$ , unless otherwise specified**

| Symbol   | Parameter                                    | Rating     | Unit |
|----------|----------------------------------------------|------------|------|
| V(BR)DSS | Drain-Source breakdown voltage               | 650        | V    |
| VGS      | Gate-Source voltage                          | $\pm 30$   | V    |
| ID       | Continuous drain current <sup>①</sup>        | TC=25°C    | A    |
|          |                                              | TC=100°C   |      |
| IDM      | Pulse drain current tested <sup>②</sup>      | 8          | A    |
| EAS      | Avalanche energy, single pulsed <sup>③</sup> | 160        | mJ   |
| dv/dt    | Peak Diode Recovery dv/dt <sup>④</sup>       | 5          | V/ns |
| PD       | Power Dissipation                            | 14         | W    |
| IS       | Continuous Diode Forward Current             | 2          | A    |
| IS,pulse | Diode Pulsed Current                         | 8          |      |
| TSTG,TJ  | Storage and Junction Temperature Range       | -55 to 150 | °C   |

NOTE: ① Limited by maximum junction temperature.

② Repetitive Rating: Pulse width limited by maximum junction temperature.

③  $I_D = 2\text{A}$ ,  $L = 80\text{mH}$ ,  $R_G = 25\Omega$ ,  $V_{DD} = 100\text{V}$ ,  $T_J = 25^\circ\text{C}$ .

④  $I_{SD} \leq 2\text{A}$ ,  $di/dt \leq 100\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Start  $T_J = 25^\circ\text{C}$ .

## Thermal Characteristics

| Symbol           | Parameter                               | Typical | Unit |
|------------------|-----------------------------------------|---------|------|
| R <sub>θJC</sub> | Thermal Resistance, Junction-to-Case    | 8.5     | °C/W |
| R <sub>θJA</sub> | Thermal Resistance, Junction-to-Ambient | 80      | °C/W |

## Electrical Characteristics

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------|------|------|------|------|
|--------|-----------|-----------|------|------|------|------|

### Static Electrical Characteristics @ T<sub>j</sub>=25°C (unless otherwise stated)

|                     |                                       |                                                          |     |      |      |    |
|---------------------|---------------------------------------|----------------------------------------------------------|-----|------|------|----|
| V(BR)DSS            | Drain-Source Breakdown Voltage        | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA               | 650 | --   | --   | V  |
| IDSS                | Zero Gate Voltage Drain Current@25°C  | V <sub>DS</sub> =650V, V <sub>GS</sub> =0V               | --  | --   | 1    | μA |
|                     | Zero Gate Voltage Drain Current@125°C | V <sub>DS</sub> =650V, V <sub>GS</sub> =0V               | --  | --   | 100  | μA |
| IGSS                | Gate-Body Leakage Current             | V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V               | --  | --   | ±100 | nA |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA | 2   | --   | 4    | V  |
| R <sub>DS(on)</sub> | Drain-Source On-State Resistance      | V <sub>GS</sub> =10V, I <sub>D</sub> =1A                 | --  | 3.8  | 5.0  | Ω  |
| R <sub>G</sub>      | Gate Resistance                       | f=1.0MHz open drain                                      | --  | 1.84 | --   | Ω  |

### Dynamic Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)

|                  |                              |                                                                       |    |     |    |    |
|------------------|------------------------------|-----------------------------------------------------------------------|----|-----|----|----|
| C <sub>iss</sub> | Input Capacitance            | V <sub>DS</sub> =100V,<br>V <sub>GS</sub> =0V,<br>f=1MHz              | -- | 372 | -- | pF |
| C <sub>oss</sub> | Output Capacitance           |                                                                       | -- | 29  | -- | pF |
| C <sub>rss</sub> | Reverse Transfer Capacitance |                                                                       | -- | 1.0 | -- | pF |
| Q <sub>g</sub>   | Total Gate Charge            | V <sub>DS</sub> =520V,<br>I <sub>D</sub> =2A,<br>V <sub>GS</sub> =10V | -- | 13  | -- | nC |
| Q <sub>gs</sub>  | Gate-Source Charge           |                                                                       | -- | 4   | -- | nC |
| Q <sub>gd</sub>  | Gate-Drain Charge            |                                                                       | -- | 5   | -- | nC |

## Switching Characteristics

|         |                     |                                                                                                                        |    |    |    |    |
|---------|---------------------|------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
| Td(on)  | Turn-on Delay Time  | V <sub>DD</sub> =325V,<br>I <sub>D</sub> =2A,<br>R <sub>G</sub> =25Ω,<br>V <sub>GS</sub> =10V,<br>T <sub>j</sub> =25°C | -- | 11 | -- | ns |
| Tr      | Turn-on Rise Time   |                                                                                                                        | -- | 13 | -- | ns |
| Td(off) | Turn-Off Delay Time |                                                                                                                        | -- | 29 | -- | ns |
| Tf      | Turn-Off Fall Time  |                                                                                                                        | -- | 12 | -- | ns |

## Source- Drain Diode Characteristics@ T<sub>j</sub> = 25°C (unless otherwise stated)

|     |                         |                                              |    |     |     |    |
|-----|-------------------------|----------------------------------------------|----|-----|-----|----|
| VSD | Forward on voltage      | I <sub>SD</sub> =2A, V <sub>GS</sub> =0V     | -- | --  | 1.2 | V  |
| Trr | Reverse Recovery Time   | I <sub>S</sub> =2A,<br>V <sub>GS</sub> =400V | -- | 187 | --  | ns |
| Qrr | Reverse Recovery Charge | di/dt=100A/μs                                | -- | 0.6 | --  | μC |

## Typical Characteristics

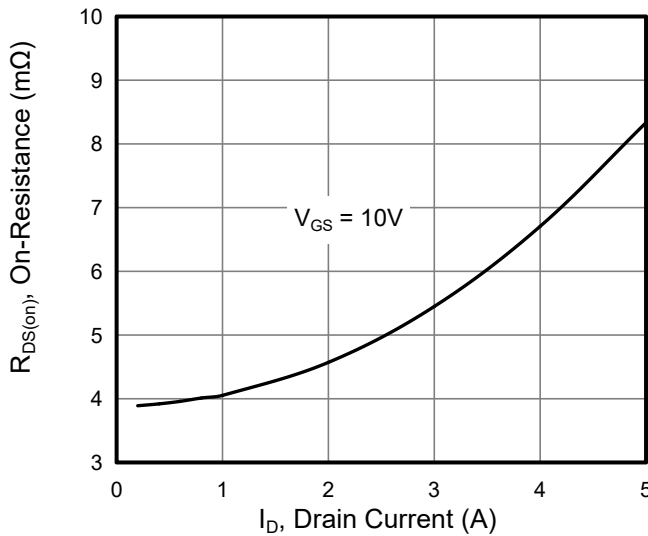


Figure 1. On-Resistance vs Drain Current

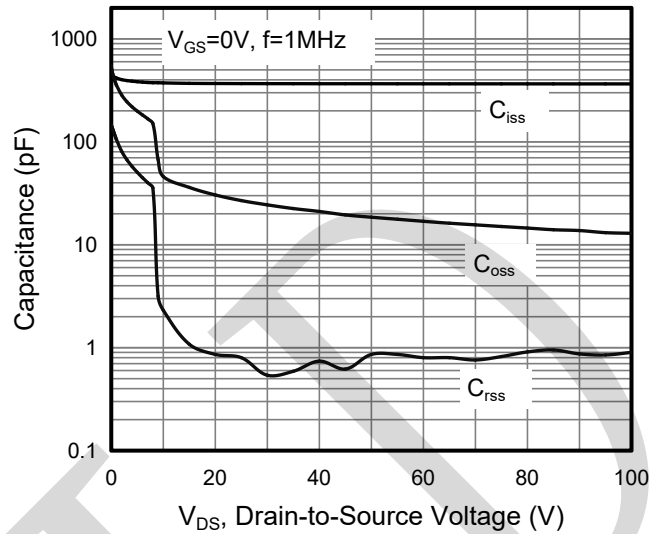


Figure 2. Capacitance

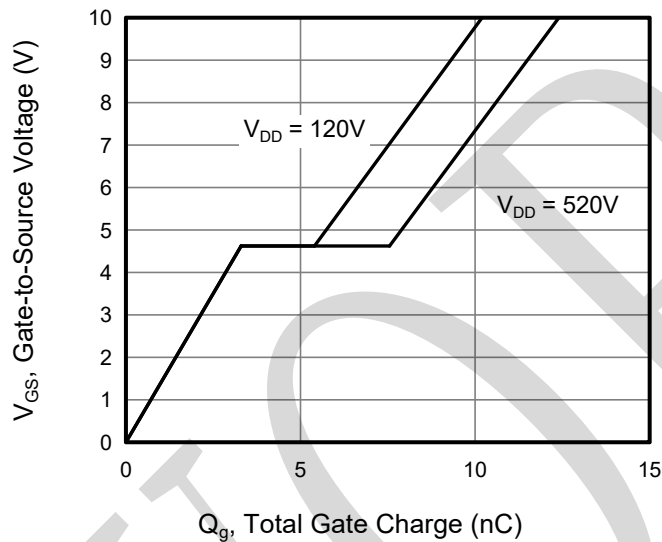


Figure 3. Gate Charge

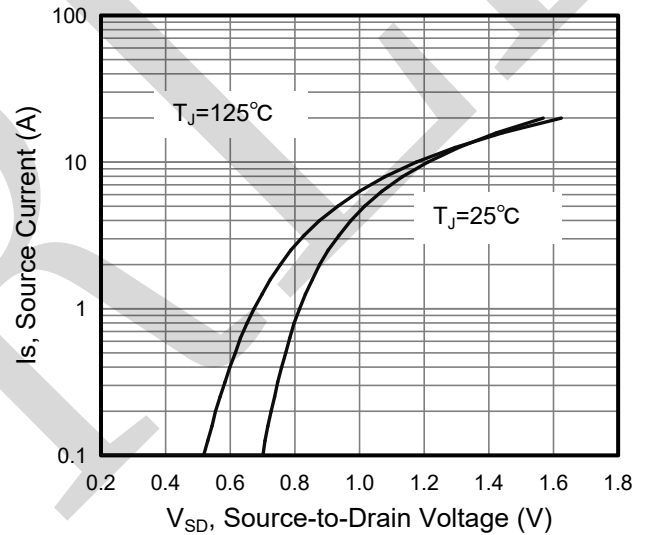


Figure 4. Body Diode Forward Voltage

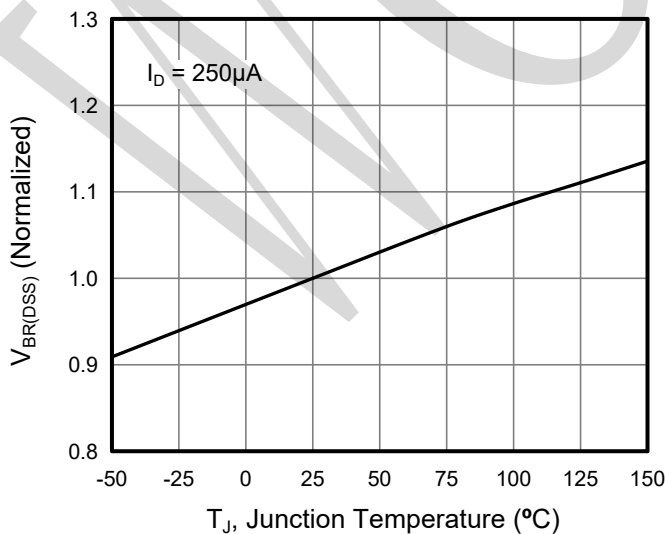


Figure 5. Breakdown Voltage vs Junction Temperature

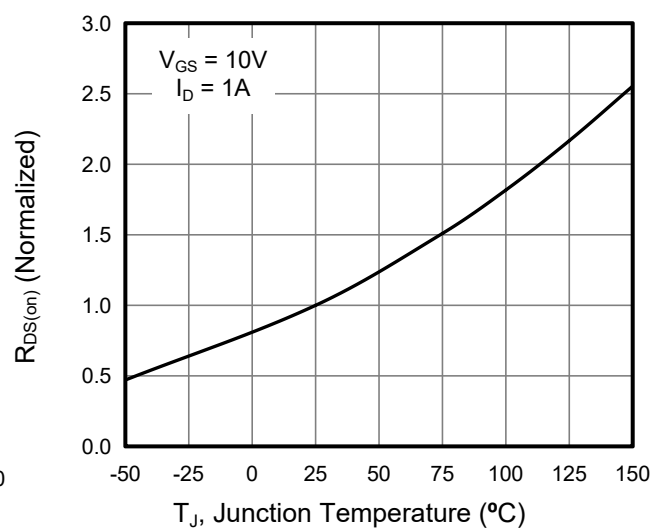


Figure 6. On-Resistance vs Temperature

## Typical Characteristics

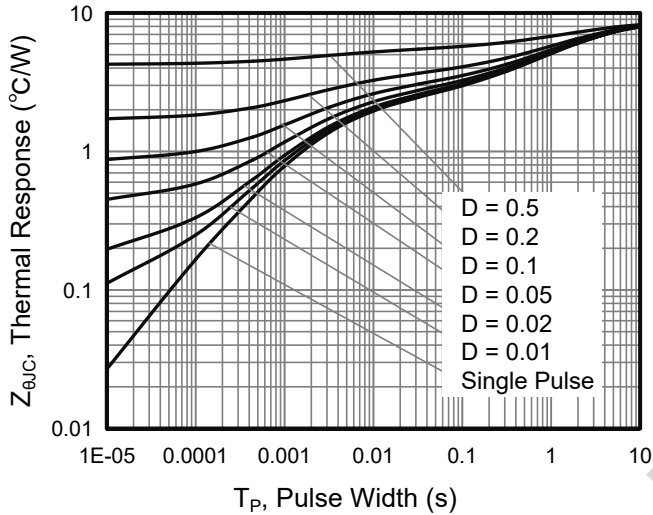


Figure 7. Transient Thermal Impedance

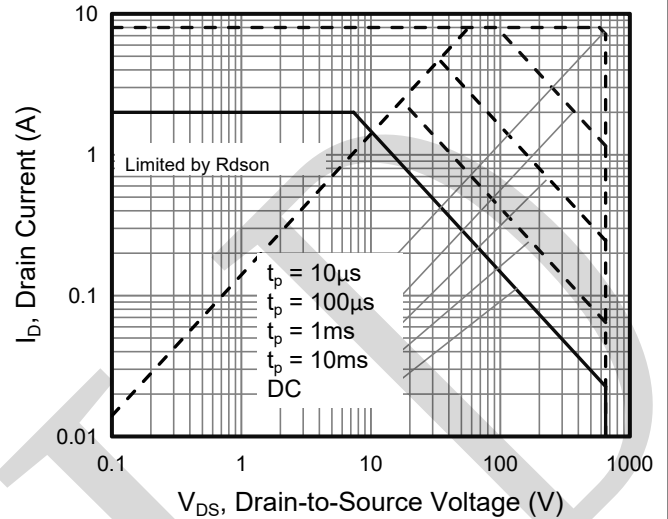


Figure 8. Safe Operation Area

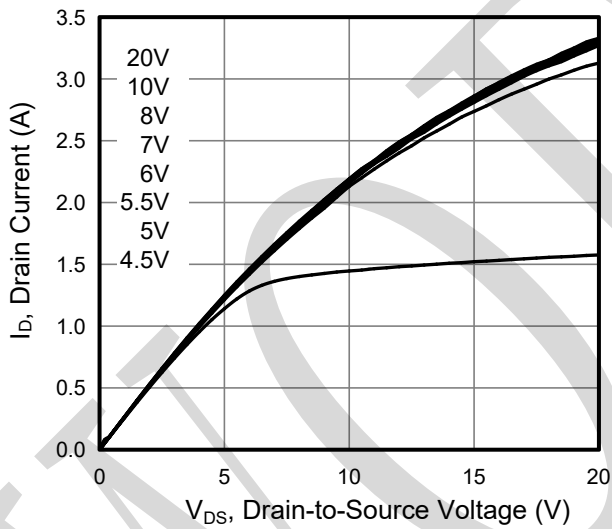


Figure 9. Output Characteristics

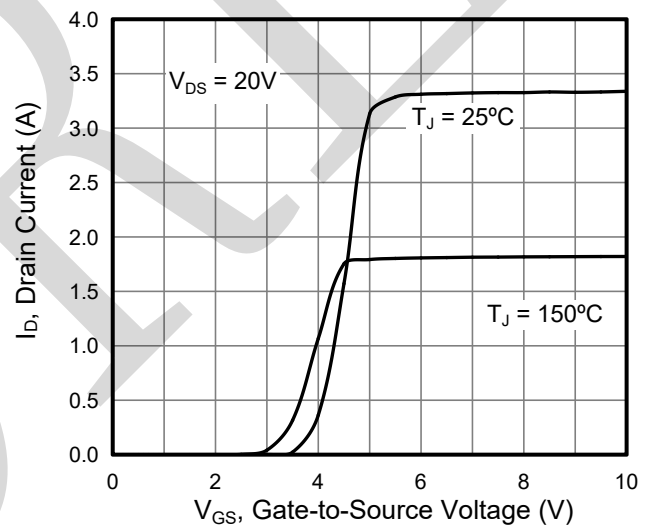
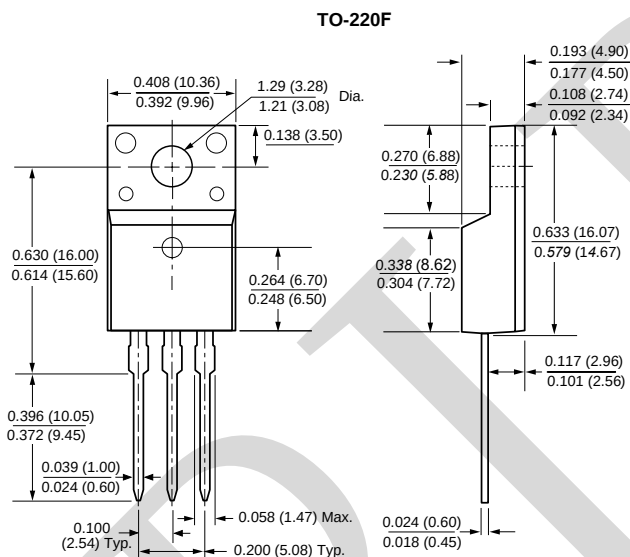


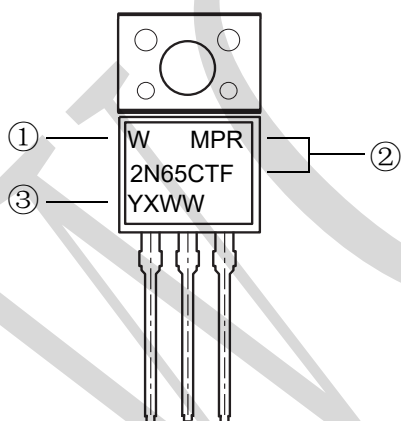
Figure 10. Transfer Characteristics

## PACKAGE OUTLINE DIMENSIONS

Note:unit mm



## Marking Information



- ① W : Company's trademark
- ② Product model : MPR2N65CTF
- ③ PDC information :

Y X WW

WW:Week code(01 to 53)

X:Internal identification code

Y:Year code(ex:0=2020)