

# PRM6R0N03N3

# PFC Device Corporation

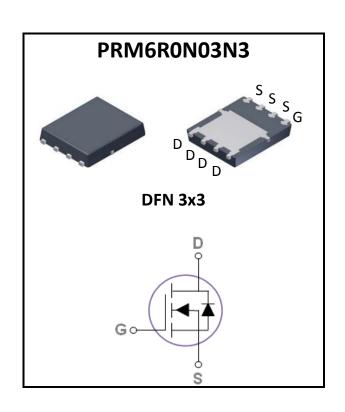
# 30V Single N-Channel MOSFET

### Major ratings and characteristics

| Characteristics                                  | Values      | Units |
|--|-------------|-------|
| V <sub>DS</sub>                                  | 30          | V     |
| $I_{D}^{5} (T_{C}=25^{\circ}C)$                  | 60          | Α     |
| Max. R <sub>DS(ON)</sub> @V <sub>GS</sub> =10V   | 6.0         | mΩ    |
| T <sub>J</sub> Operating Junction<br>Temperature | -50 to +150 | °C    |

## **General Description**

The N-Channel enhancement mode power field effect transistor is using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. The device is well suited for high efficiency fast switching applications.



# **Typical Applications**

- Charger Adapter
- Power Tools
- LED Lighting

#### **Features**

- Max. R<sub>DS(ON)</sub>=6.0mΩ@V<sub>GS</sub>=10V
- Improved dv/dt capability
- Fast switching
- 100% E<sub>AS</sub> Guaranteed
- Green Device Available

# 1. Characteristics

### **Maximum Ratings Characteristics**

( $T_A = 25$  °C unless otherwise specified)

| Symbol                      | Parameter  | Rating     | Units |
|-----------------------------|--|------------|-------|
| $V_{DS}$                    | Drain-Source Voltage                               | 30         | V     |
| $V_{GS}$                    | Gate-Source Voltage                                | ±20        | V     |
| l <sub>D</sub> <sup>4</sup> | Drain Current – Continuous (T <sub>C</sub> =25°C)  | 72         | Α     |
| ID                          | Drain Current – Continuous (T <sub>C</sub> =100°C) | 40         | Α     |
| $I_D^5$                     | Drain Current – Continuous (T <sub>C</sub> =25°C)  | 60         | Α     |
| I <sub>DM</sub>             | Drain Current – Pulsed <sup>1</sup>                | 242        | Α     |
| E <sub>AS</sub>             | Single Pulse Avalanche Energy <sup>2</sup>         | 22         | mJ    |
| I <sub>AS</sub>             | Single Pulse Avalanche Current <sup>2</sup>        | 21         | Α     |
| В                           | Power Dissipation (T <sub>C</sub> =25°C)           | 44         | W     |
| P <sub>D</sub>              | Power Dissipation – Derate above 25°C              | 0.26       | W/°C  |
| T <sub>STG</sub>            | Storage Temperature Range                          | -55 to 150 | °C    |
| T <sub>J</sub>              | Operating Junction Temperature Range               | -55 to 150 | °C    |

### **Thermal Characteristics**

| Symbol          | Parameter                              | Тур. | Max. | Unit |
|-----------------|--|------|------|------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient |      | 62   | °C/W |
| $R_{	heta JC}$  | Thermal Resistance Junction to Case    |      | 2.8  | °C/W |



Version 4.0 2 / 7

#### **Electrical Characteristics**

( $T_J = 25$  °C unless otherwise specified)

#### Off Characteristics

| Symbol            | Parameter                      | Conditions  | Min. | Тур. | Max. | Unit     |
|-------------------|--------------------------------|---|------|------|------|----------|
| BV <sub>DSS</sub> | Drain-Source Breakdown Voltage | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                      | 30   |      |      | <b>V</b> |
| I <sub>DSS</sub>  | Drain-Source Leakage Current   | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C |      |      | 1    | uA       |
| I <sub>GSS</sub>  | Gate-Source Leakage Current    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                      |      |      | 100  | nA       |

#### **On Characteristics**

| В                   | Static Drain-Source On-Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =20A  |     | 4.8 | 6.0 | mΩ |
|---------------------|-----------------------------------|--|-----|-----|-----|----|
| R <sub>DS(ON)</sub> |                                   | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A |     | 6.7 | 9.0 | mΩ |
| $V_{GS(th)}$        | Gate Threshold Voltage            | $V_{GS}=V_{DS}$ , $I_{D}=250uA$            | 1.0 | 1.6 | 2.5 | V  |
| g <sub>fs</sub>     | Forward Transconductance          | $V_{DS}$ =5V, $I_D$ =20A                   |     | 54  |     | S  |

**Dynamic and switching Characteristics** 

|                  | ina emiterining emanaetemente | 1  |          |   |    |
|------------------|-------------------------------|--|----------|---|----|
| $Q_{g}$          | Total Gate Charge             |  | <br>12.5 |   |    |
| $Q_gs$           | Gate-Source Charge            | $V_{DS}$ =15V, $V_{GS}$ =4.5V, $I_{D}$ =20A                      | <br>4.1  |   | nC |
| $Q_gd$           | Gate-Drain Charge             |  | <br>5.2  |   |    |
| $T_{d(on)}$      | Turn-On Delay Time            |  | <br>7.8  |   |    |
| $T_r$            | Turn-On Rise Time             | $V_{DD}$ =15V, $V_{GS}$ =10V, $R_{G}$ =3.3 $\Omega$ $I_{D}$ =15A | <br>53   |   | ne |
| $T_{d(off)}$     | Turn-Off Delay Time           |  | <br>25   |   | ns |
| $T_f$            | Turn-Off Fall Time            |  | <br>10   |   |    |
| C <sub>iss</sub> | Input Capacitance             |  | <br>1330 | - |    |
| C <sub>oss</sub> | Output Capacitance            | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                | <br>185  | - | pF |
| $C_{rss}$        | Reverse Transfer Capacitance  |  | <br>125  |   |    |
| $R_{g}$          | Gate resistance               | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                 | <br>2.7  |   | Ω  |

#### **Drain-Source Diode Characteristics**

| V <sub>SD</sub> <sup>3</sup> | Source to Drain Diode Voltage | V <sub>GS</sub> =0V, I <sub>S</sub> =1A | <br>   | 1 | V  |
|------------------------------|-------------------------------|---|--------|---|----|
| t <sub>rr</sub>              | Reverse Recovery Time         | 1 4 0 0 1 / 14 4 0 0 0 0 / 1 0          | <br>22 |   | ns |
| Q <sub>rr</sub>              | Reverse Recovery Charge       | I <sub>S</sub> =1A, di/dt=100A/us       | <br>7  |   | nC |

#### Note:

- 1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
- 2.  $V_{DD}$ =25V,  $V_{GS}$ =10V, L=0.1mH,  $I_{AS}$ =21A, RG=25 $\Omega$ , Starting TJ=25 $^{\circ}$ C
- 3. The data tested by pulsed, pulse width  $\leq$ 300us, duty cycle  $\leq$ 2%.
- 4. Silicon limited.
- 5. Package limited.

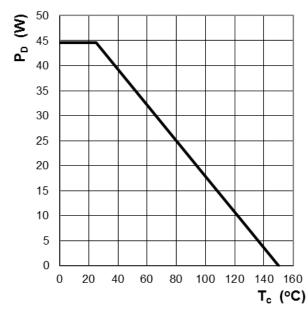


Version 4.0 3 / 7

### 2. Characteristics Curves

### **Ratings and Characteristics Curves**

### (T<sub>A</sub> = 25°C unless otherwise specified)



**Figure 1: Power Dissipation** 

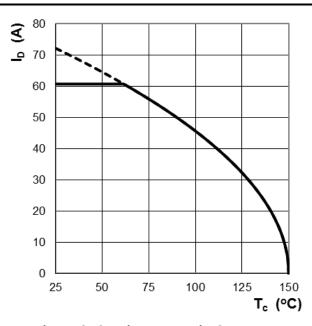


Figure 2: Continuous Drain Current vs. Tc

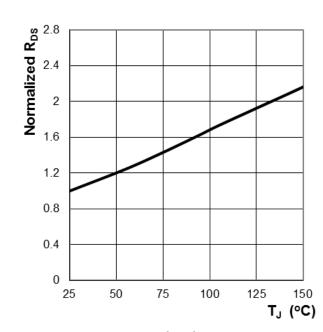


Figure 3: Normalized R<sub>DS(ON)</sub> vs. T<sub>J</sub>

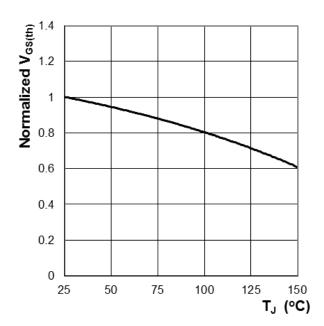


Figure 4: Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>



Version 4.0 4 / 7

#### **Ratings and Characteristics Curves**

( $T_A = 25^{\circ}C$  unless otherwise specified)

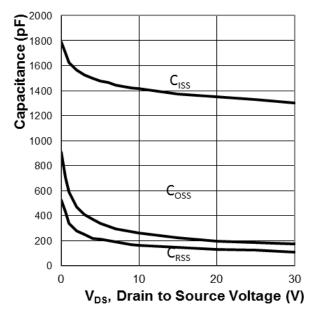


Figure 5: Typ. Capacitance Characteristics

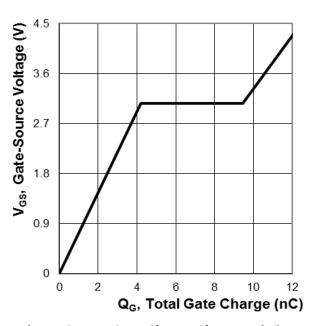


Figure 6: Typ. Gate Charge Characteristics

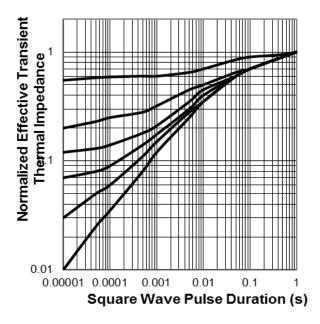
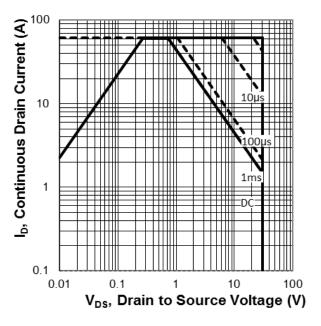


Figure 7: Normalized Thermal Transient Impedance, Junction-to-Case



**Figure 8: Maximum Safe Operation Area** 



Version 4.0 5 / 7

# 3. Marking information

**Top Marking Rule** 

PFC PRM 6R0N03 YM ABS PRM6R0N03 = Product Type Marking Code

YM = Date Code

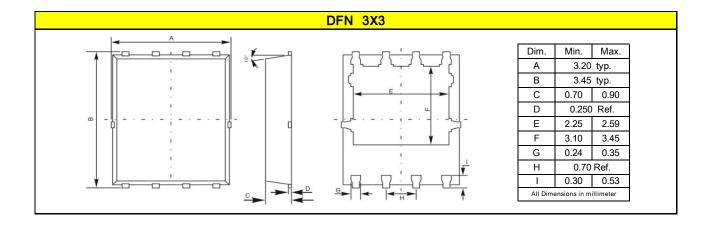
Y = Year code

M = Month code

ABS = Assembly code

## 4. Package information

Package Outline Dimensions millimeters





Version 4.0 6 / 7

## 5. Ordering information

| Part Number | Package | Delivery mode                |
|-------------|---------|------------------------------|
| PRM6R0N03N3 | DFN 3X3 | 5000 pcs / 13" diameter reel |

#### Mechanical

Molder Plastic: UL Flammability Classification Rating 94V-0
Device Weight: 0.0025 ounces (0.072grams) – DFN 3X3

PFC Device Corp reserves the right to make changes without further notice to any products herein. PFC Device Corp makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does PFC Device Corp assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in PFC Device Corp data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typical" must be validated for each customer application by customer's technical experts. PFC Device Corp does not convey any license under its patent rights nor the rights of others. PFC Device Corp products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the PFC Device Corp product could create a situation where personal injury or death may occur. Should Buyer purchase or use PFC Device Corp products for any such unintended or unauthorized application, Buyer shall indemnify and hold PFC Device Corp and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that PFC Device Corp. was negligent regarding the design or manufacture of the part.



Version 4.0 7 / 7