# PRM8R9N06CT

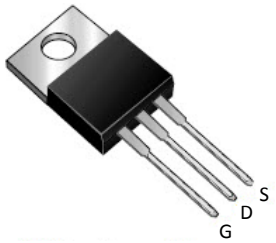
PFC Device Corporation

## 60V Single N-Channel MOSFET

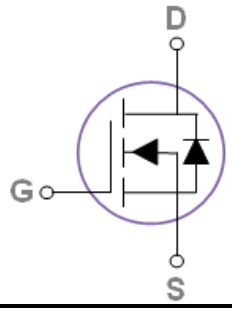
### Major ratings and characteristics

| Characteristics | Values | Units |
|---|---|---|
| $V_{DS}$ | 60 | **V** |
| $I_D$[6] ($T_C$=25°C) | 60 | **A** |
| Max. $R_{DS(ON)}$@$V_{GS}$=10V | 8.9 | **mΩ** |
| Max. $R_{DS(ON)}$@$V_{GS}$=4.5V | 15 | **mΩ** |
| $T_J$ Operating Junction Temperature | -55 to +150 | **°C** |

**PRM8R9N06CT**




**TO-220AB**




### 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. $R_{DS(ON)}$=8.9mΩ@$V_{GS}$=10V
- Improved dv/dt capability
- Fast switching
- 100% $E_{AS}$ 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 | 60 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$[5] | Drain Current – Continuous ($T_C$=25°C) | 78 | A |
| | Drain Current – Continuous ($T_C$=100°C) | 48 | A |
| $I_D$[6] | Drain Current – Continuous ($T_C$=25°C) | 60 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | 240 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy[2] | 16 | mJ |
| $I_{AS}$ | Single Pulse Avalanche Current[2] | 17 | A |
| $P_D$ | Power Dissipation ($T_C$=25°C) | 83.3 | W |
| | Power Dissipation – Derate above 25°C | 0.67 | W/°C |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |

**Thermal Characteristics**

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 60 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 1.5 | °C/W |

## Electrical Characteristics ( $T_J$ = 25 °C unless otherwise specified )

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250uA | 60 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=60V, $V_{GS}$=0V, $T_J$=25°C | --- | --- | 1 | uA |
| | | $V_{DS}$=48V, $V_{GS}$=0V, $T_J$=125°C | --- | --- | 100 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | --- | --- | ±100 | nA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=20A | --- | 7.5 | 8.9 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=10A | --- | 11 | 15 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250uA | 1.0 | 1.7 | 2.5 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=20A | --- | 38 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge[3,4] | $V_{DS}$=30V, $V_{GS}$=10V, $I_D$=10A | --- | 21.5 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge[3,4] | | --- | 3.7 | --- | |
| $Q_{gd}$ | Gate-Drain Charge[3,4] | | --- | 5.1 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time[3,4] | $V_{DD}$=30V, $V_{GS}$=10V, $R_G$=3Ω $I_D$=10A | --- | 7 | --- | ns |
| $T_r$ | Turn-On Rise Time[3,4] | | --- | 25 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time[3,4] | | --- | 20 | --- | |
| $T_f$ | Turn-Off Fall Time[3,4] | | --- | 9 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=25V, $V_{GS}$=0V, f=1MHz | --- | 1241 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 466 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 44 | --- | |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | --- | 0.8 | --- | Ω |

### Drain-Source Diode Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Source to Drain Diode Voltage | $V_{GS}$=0V, $I_S$=20A | --- | --- | 1.5 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_S$=20A, di/dt=100A/us | --- | 15 | --- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 4 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. VDD=50V, VGS=10V, L=0.1mH, RG=25Ω, Starting TJ=25℃
3. The data tested by pulsed, pulse width ≦300us, duty cycle ≦2%.
4. Essentially independent of operating temperature.
5. Silicon limited
6. Package limited.

## 2. Characteristics Curves

**Ratings and Characteristics Curves ( $T_A$ = 25℃ unless otherwise specified )**

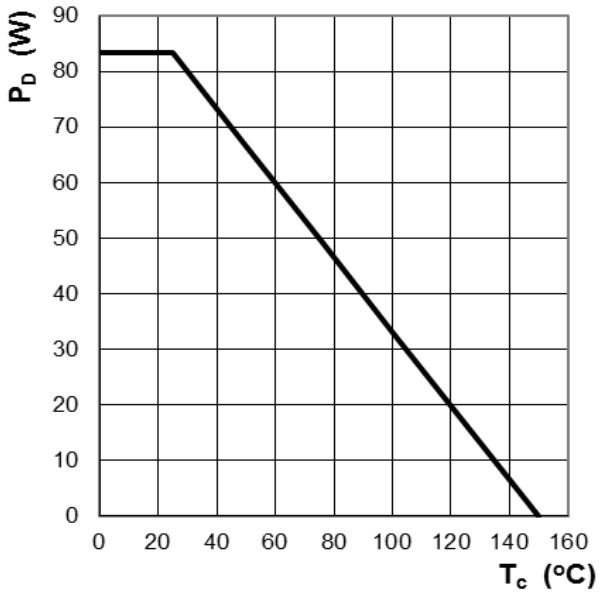



**Figure 1: Power Dissipation**

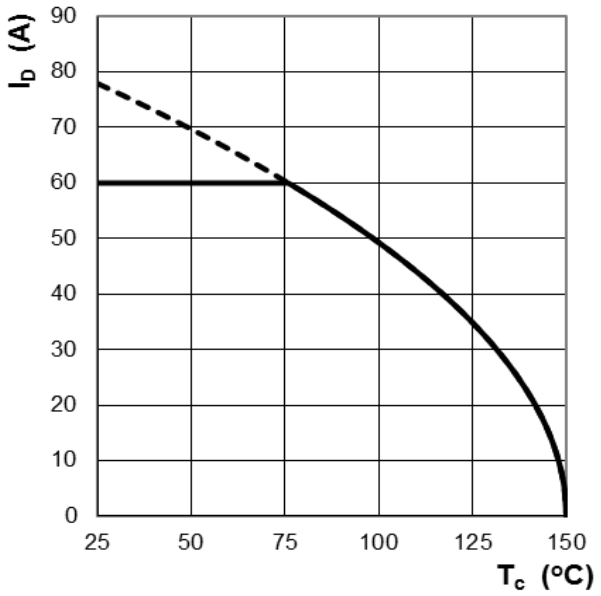



**Figure 2: Continuous Drain Current vs. $T_C$**

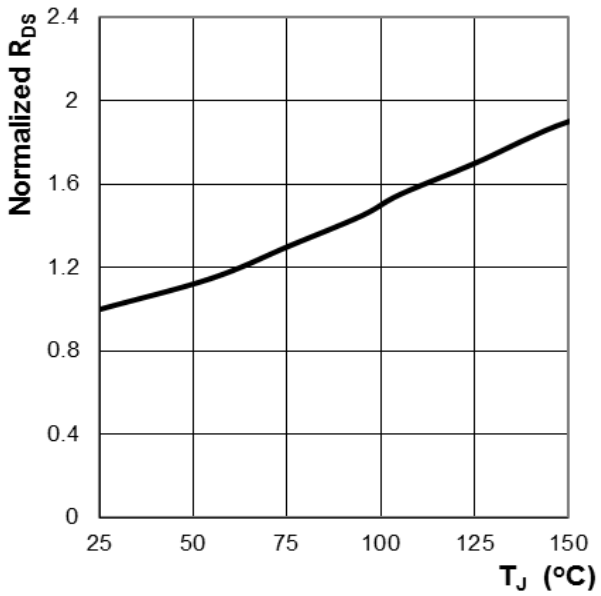



**Figure 3: Normalized $R_{DS(ON)}$ vs. $T_J$**

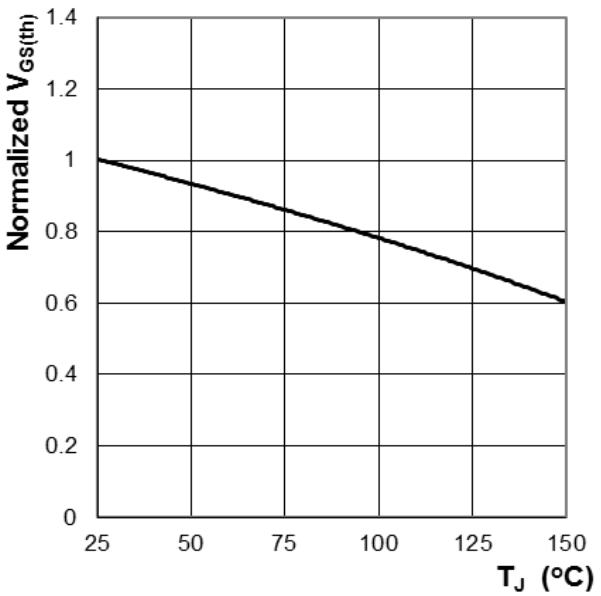



**Figure 4: Normalized $V_{GS(th)}$ vs. $T_J$**

**Ratings and Characteristics Curves** **( $T_A$ = 25℃ unless otherwise specified )**

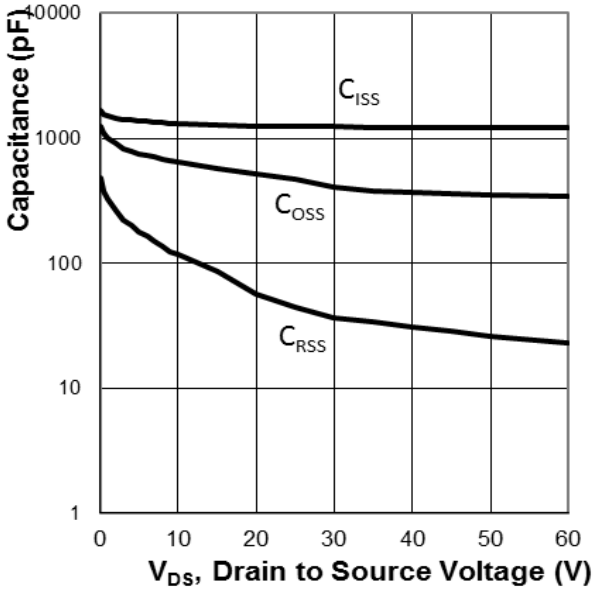



**Figure 7: Typ. Capacitance Characteristics**

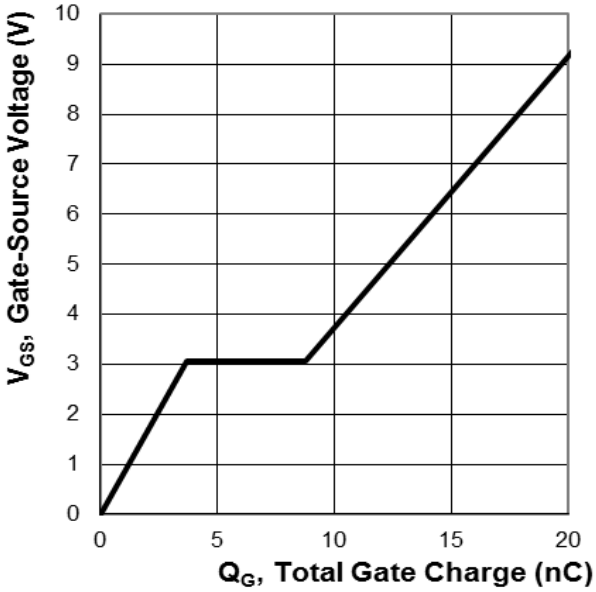



**Figure 8: Typ. Gate Charge Characteristics**

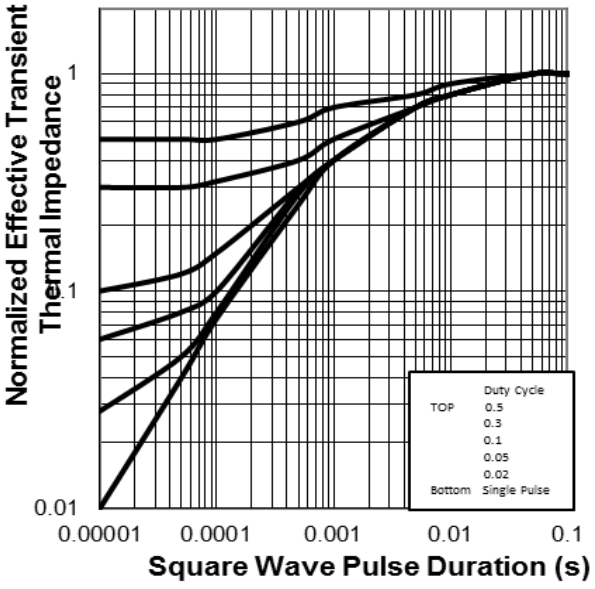



**Figure 9: Normalized Thermal Transient Impedance, Junction-to-Case**

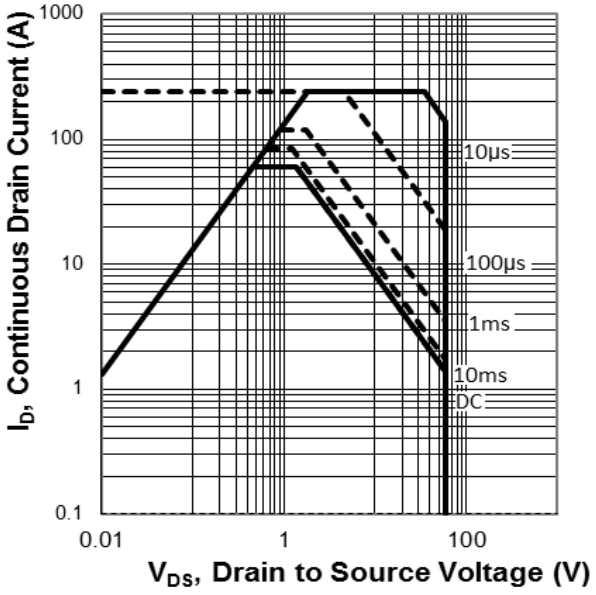



**Figure 10: Maximum Safe Operation Area**

## 3. Marking information

**Top Marking Rule**

| PFC PRM |
|---|
| 8R9N06CT |
| YYWW ABSH |

PRM8R9N06CT = Product Type Marking Code

YYWW = Date Code

YY = Last two digits of year

WW = Week code

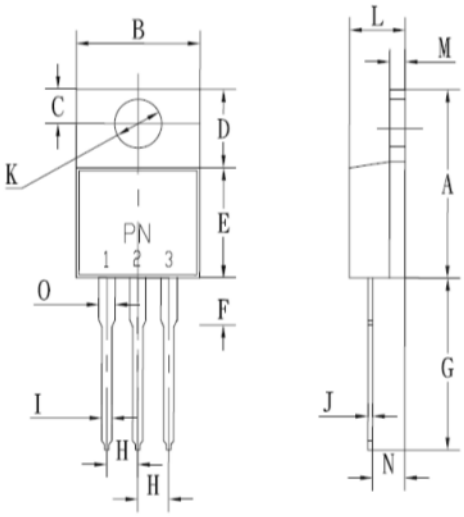
ABS = Assembly code

H = Halogen Free (N/A = common molding compound)

## 4. Package information

**Package Outline Dimensions millimeters**

**TO-220AB**




| Dim. | Min. | Max. |
|---|---|---|
| A | 14.60 | 15.40 |
| B | ----- | 10.50 |
| C | 2.50 | 3.50 |
| D | 5.84 | 6.86 |
| E | 8.50 | 9.50 |
| F | ----- | 4.50 |
| G | 13.10 | 14.20 |
| H | 2.29 | 2.79 |
| I | 0.60 | 1.00 |
| J | 0.30 | 0.64 |
| K | 3.50 | 4.10 |
| L | 4.20 | 4.80 |
| M | 1.10 | 1.40 |
| N | 2.40 | 2.79 |
| O | 1.15 | 1.49 |
| All Dimensions in millimeter | | |

## 5. Ordering information

| Part Number | Package | Delivery mode |
|---|---|---|
| PRM8R9N06CT | TO-220AB | 50 pcs / Tube |

Mechanical

- Molder Plastic: UL Flammability Classification Rating 94V-0
- Device Weight : 0.07 ounces (1.96grams) - TO-220AB
- Mounting Torque : Recommended 4~5 kg-cm