



PFC Device Corporation

PRM012N10E

100V Single N-Channel MOSFET

Major ratings and characteristics

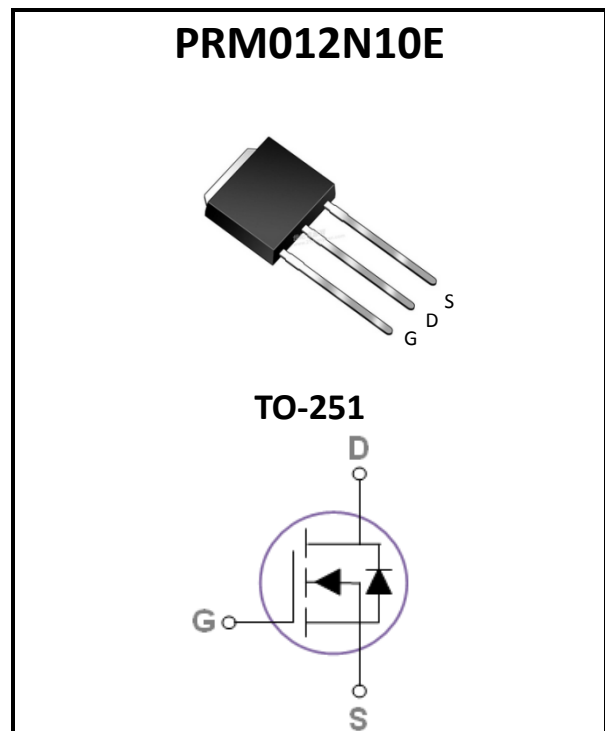
| Characteristics | Values | Units |
|--|-------------|------------------|
| V_{DS} | 100 | V |
| I_D^6 ($T_C=25^\circ\text{C}$) | 50 | A |
| Max. $R_{DS(ON)}$ @ $V_{GS}=10\text{V}$ | 12 | m Ω |
| Max. $R_{DS(ON)}$ @ $V_{GS}=4.5\text{V}$ | 15 | m Ω |
| T_J Operating Junction Temperature | -55 to +150 | $^\circ\text{C}$ |

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. $R_{DS(ON)}=12\text{m}\Omega$ @ $V_{GS}=10\text{V}$
- Improved dv/dt capability
- Fast switching
- 100% E_{AS} Guaranteed
- Green Device Available

1. Characteristics

Maximum Ratings Characteristics ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------------|
| V_{DS} | Drain-Source Voltage | 100 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D^5 | Drain Current – Continuous ($T_C=25\text{ }^\circ\text{C}$) | 56 | A |
| | Drain Current – Continuous ($T_C=100\text{ }^\circ\text{C}$) | 35.5 | A |
| I_D^6 | Drain Current – Continuous ($T_C=25\text{ }^\circ\text{C}$) | 50 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 160 | A |
| E_{AS} | Single Pulse Avalanche Energy ² | 58 | mJ |
| I_{AS} | Single Pulse Avalanche Current ² | 17 | A |
| P_D | Power Dissipation ($T_C=25\text{ }^\circ\text{C}$) | 78.1 | W |
| | Power Dissipation – Derate above $25\text{ }^\circ\text{C}$ | 0.63 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 1.6 | $^\circ\text{C/W}$ |



Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------|--------------------------------|---|------|------|-----------|---------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 100 | --- | --- | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=100V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=100V, V_{GS}=0V, T_J=125^\circ\text{C}$ | --- | --- | 250 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|-------------------------------|-----|-----|-----|------------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V, I_D=20A$ | --- | --- | 12 | m Ω |
| | | $V_{GS}=4.5V, I_D=10A$ | --- | --- | 15 | m Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.0 | --- | 2.5 | V |
| g_{fs} | Forward Transconductance | $V_{DS}=5V, I_D=20A$ | --- | 55 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|------------------------------------|--|-----|------|-----|----------|
| Q_g | Total Gate Charge ^{3,4} | $V_{DS}=50V, V_{GS}=10V, I_D=20A$ | --- | 37 | --- | nC |
| Q_{GS} | Gate-Source Charge ^{3,4} | | --- | 7 | --- | |
| Q_{GD} | Gate-Drain Charge ^{3,4} | | --- | 7 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time ^{3,4} | $V_{DD}=50V, V_{GS}=10V, R_G=6\Omega, I_D=20A$ | --- | 11 | --- | ns |
| T_r | Turn-On Rise Time ^{3,4} | | --- | 42 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{3,4} | | --- | 41 | --- | |
| T_f | Turn-Off Fall Time ^{3,4} | | --- | 80 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=50V, V_{GS}=0V, f=1\text{MHz}$ | --- | 2200 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 210 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 30 | --- | |
| R_g | Gate resistance | $V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$ | --- | 1.6 | --- | 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 | $I_S=20A, di/dt=100A/\mu s$ | --- | 45 | --- | ns |
| Q_{rr} | Reverse Recovery Charge | | --- | 51 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=50V, V_{GS}=10V, L=0.4\text{mH}, I_{AS}=17A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.
5. Silicon limited.
6. Package limited.



2. Characteristics Curves

Ratings and Characteristics Curves

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

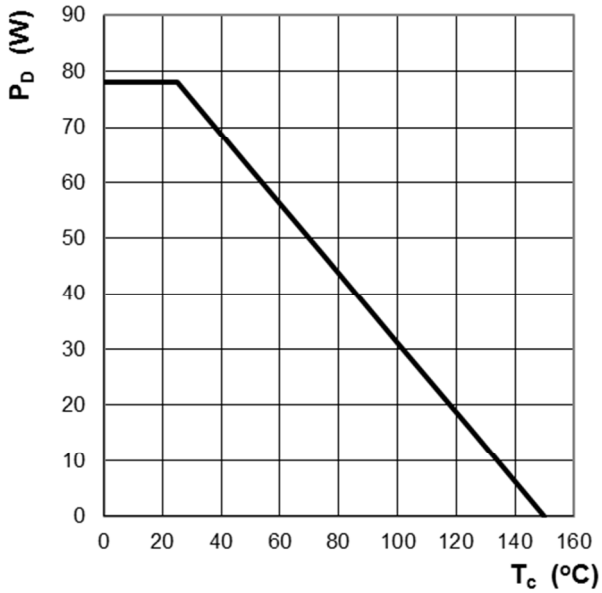


Figure 1: Power Dissipation

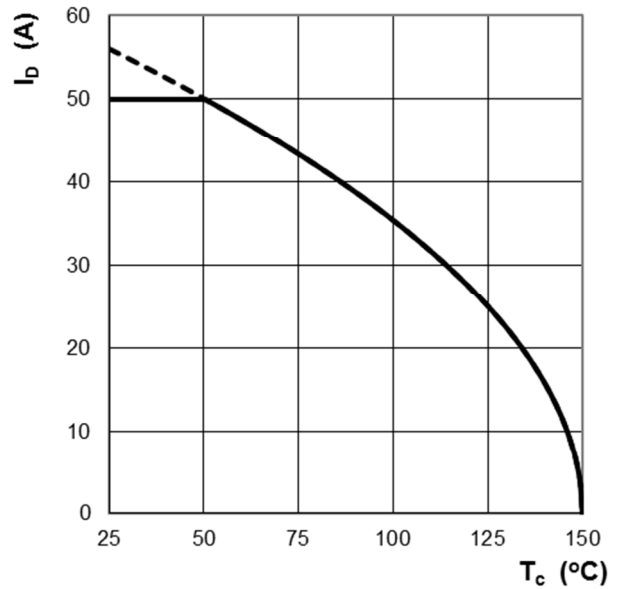


Figure 2: Continuous Drain Current vs. T_c

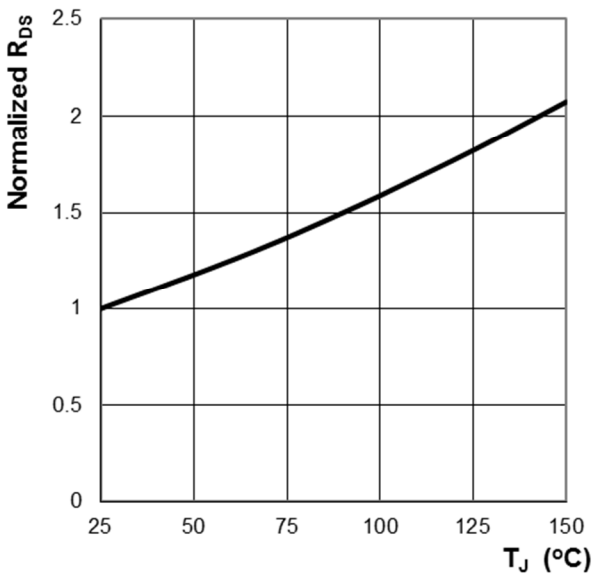


Figure 3: Normalized $R_{DS(ON)}$ vs. T_J

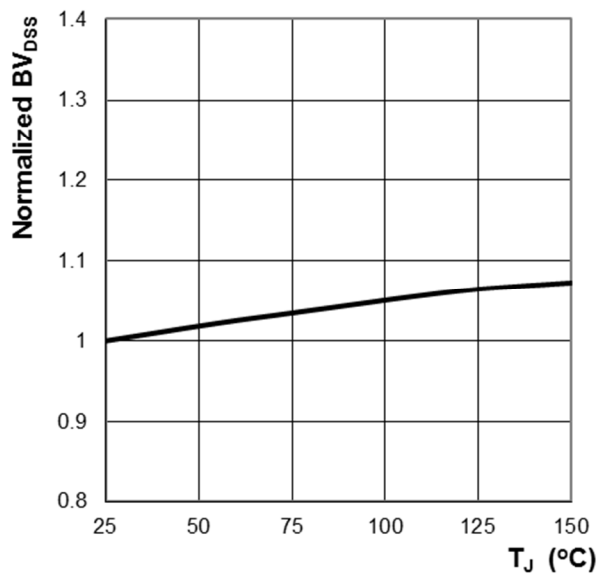


Figure 4: Normalized BV_{DSS} vs. T_J



Ratings and Characteristics Curves

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

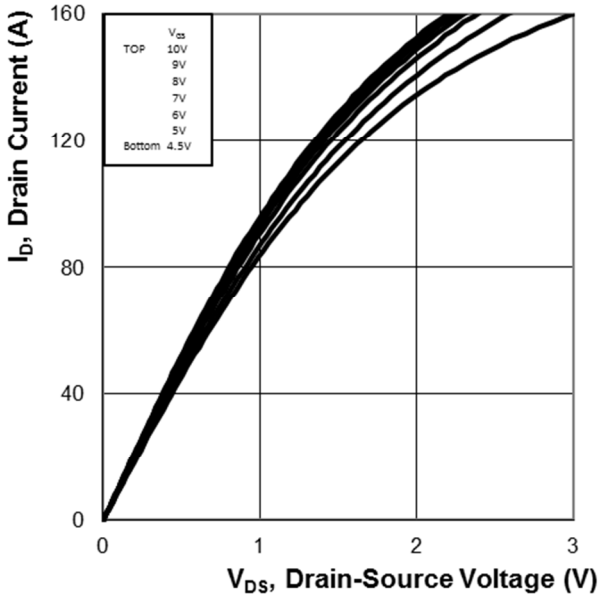


Figure 5: On-Region Characteristics

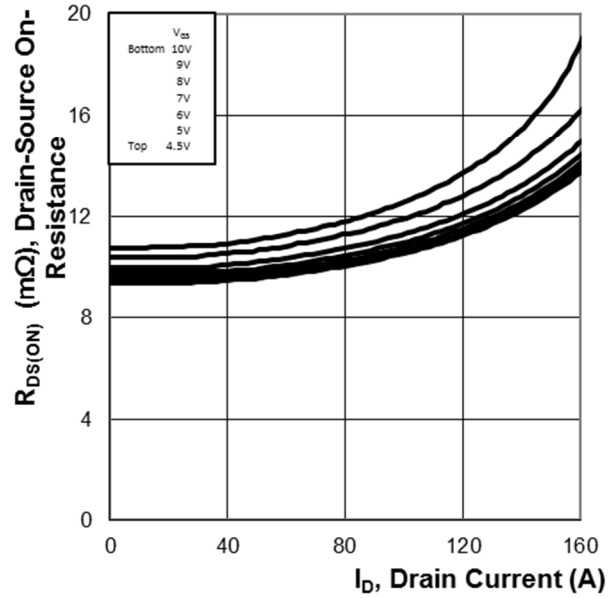


Figure 6: Typ. R_{DS} Variation vs. I_D and V_{GS}

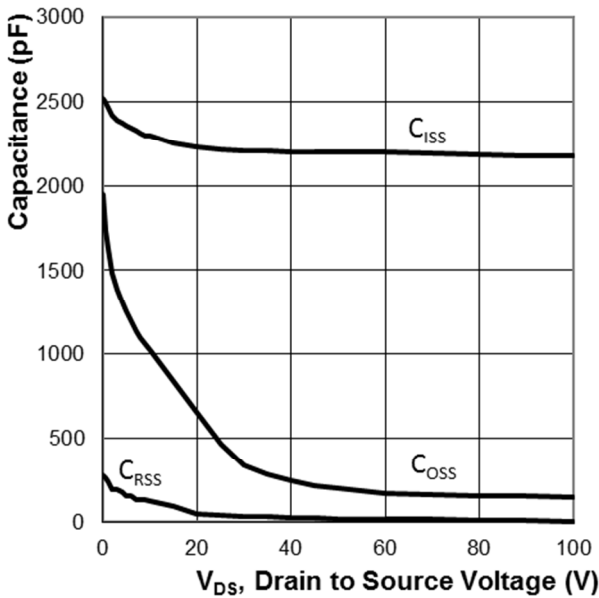


Figure 7: Typ. Capacitance Characteristics

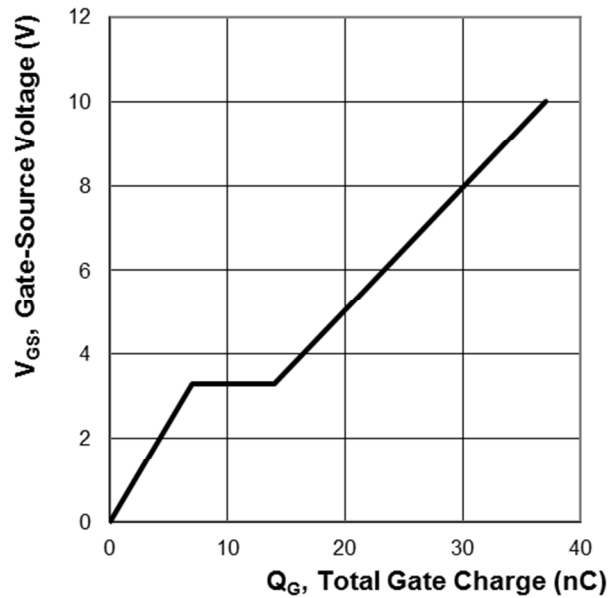


Figure 8: Typ. Gate Charge Characteristics



Ratings and Characteristics Curves ($T_A = 25^\circ\text{C}$ unless otherwise specified)

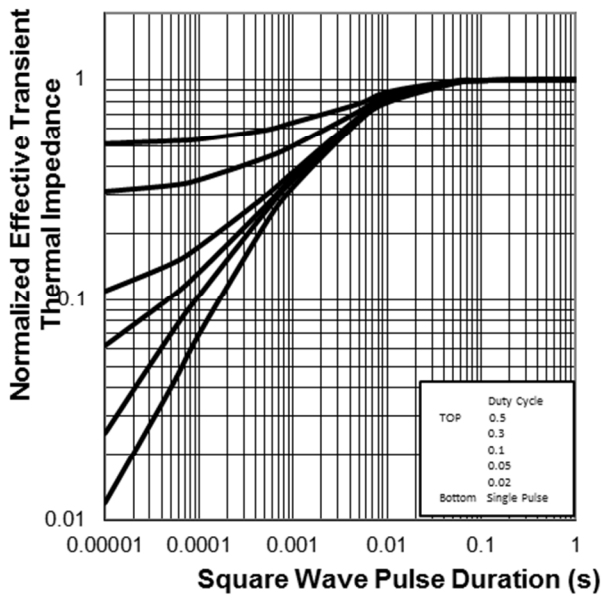


Figure 9: Normalized Thermal Transient Impedance, Junction-to-Case

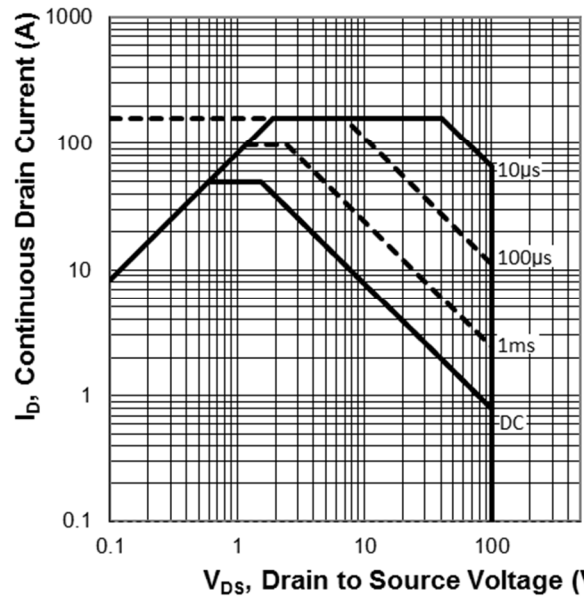
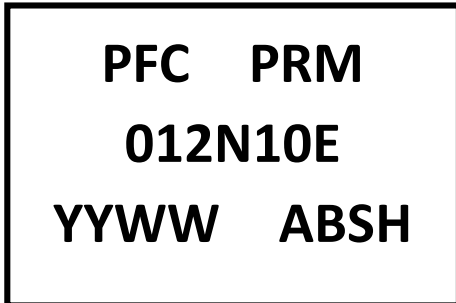


Figure 10: Maximum Safe Operation Area



3. Marking information

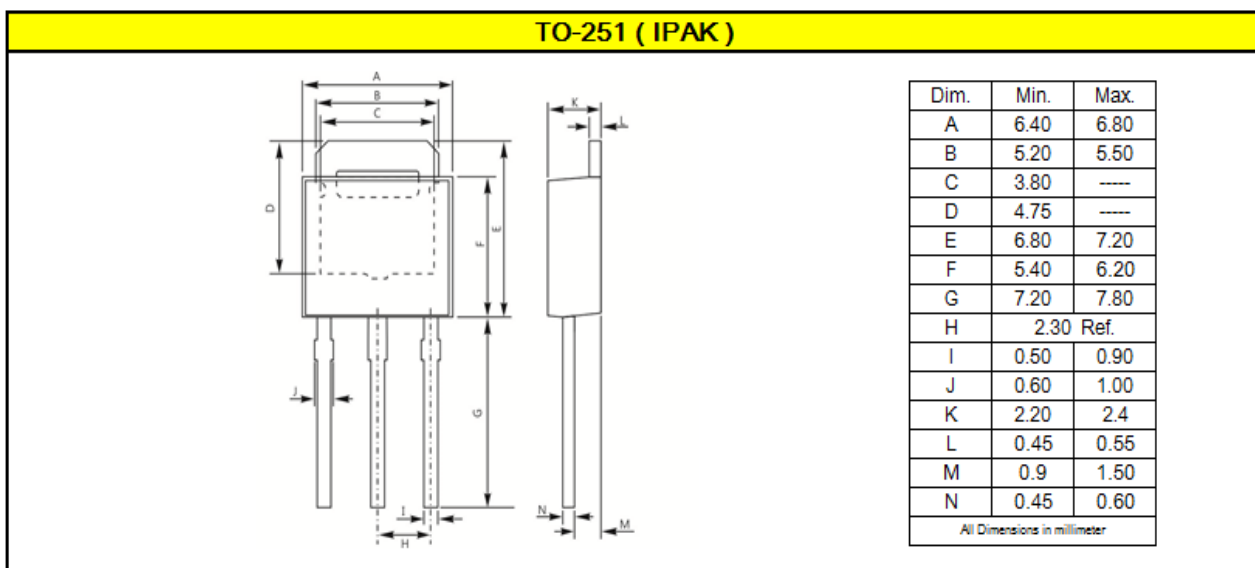
Top Marking Rule



PRM012N10E = 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



5. Ordering information

| Part Number | Package | Delivery mode |
|-------------|----------------|---------------|
| PRM012N10E | TO-251 (I-PAK) | 75 pcs / Tube |

Mechanical

- Molder Plastic: UL Flammability Classification Rating 94V-0
- Device Weight : 0.01 ounces (0.3grams) - TO-251 (I-PAK)

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