



**PRM2R9N10CTB**  
*PFC Device Corporation*

## 100V Single N-Channel MOSFET

### Major ratings and characteristics

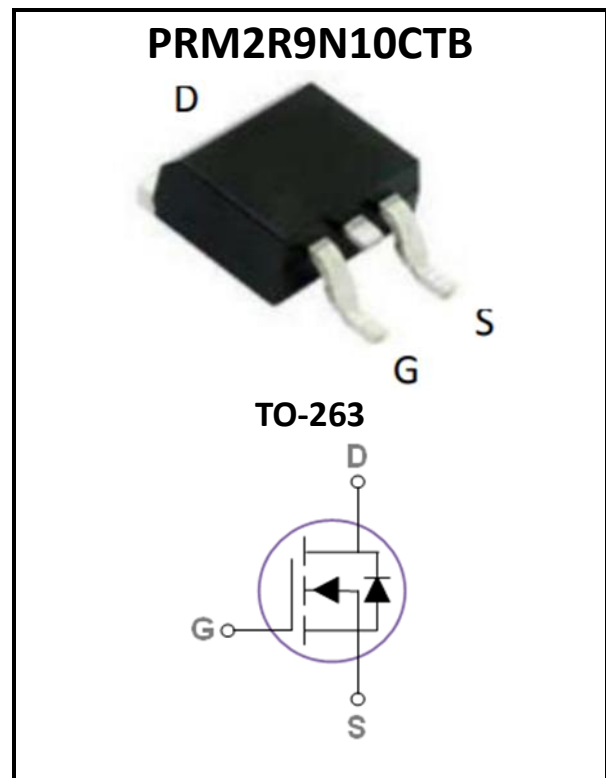
| Characteristics                         | Values      | Units            |
|---|-------------|------------------|
| $V_{DS}$                                | 100         | V                |
| $I_D^6(T_C=25^\circ\text{C})$           | 60          | A                |
| Max. $R_{DS(ON)}$ @ $V_{GS}=10\text{V}$ | 2.9         | m $\Omega$       |
| $T_J$ 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.  $R_{DS(ON)}=2.9\text{m}\Omega@V_{GS}=10\text{V}$
- Improved dv/dt capability
- Fast switching
- 100%  $E_{AS}$  Guaranteed
- Green Device Available

## 1. Characteristics

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

| Symbol    | Parameter  | Rating     | Units               |
|-----------|--|------------|---------------------|
| $V_{DS}$  | Drain-Source Voltage                                   | 100        | V                   |
| $V_{GS}$  | Gate-Source Voltage                                    | $\pm 20$   | V                   |
| $I_D^5$   | Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )  | 240        | A                   |
|           | Drain Current – Continuous ( $T_C=100^\circ\text{C}$ ) | 152        | A                   |
| $I_D^6$   | Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )  | 60         | A                   |
| $I_{DM}$  | Drain Current – Pulsed <sup>1</sup>                    | 240        | A                   |
| $E_{AS}$  | Single Pulse Avalanche Energy <sup>2</sup>             | 262        | mJ                  |
| $I_{AS}$  | Single Pulse Avalanche Current <sup>2</sup>            | 36         | A                   |
| $P_D$     | Power Dissipation ( $T_C=25^\circ\text{C}$ )           | 284        | W                   |
|           | Power Dissipation – Derate above $25^\circ\text{C}$    | 2.3        | 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 | ---  | 60   | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case    | ---  | 0.44 | $^\circ\text{C}/\text{W}$ |



## 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         | $\mu A$ |
|            |                                | $V_{DS}=80V, V_{GS}=0V, T_J=100^\circ\text{C}$ | ---  | ---  | 100       | $\mu A$ |
| $I_{GSS}$  | Gate-Source Leakage Current    | $V_{GS}=\pm 20V, V_{DS}=0V$                    | ---  | ---  | $\pm 100$ | nA      |

### On Characteristics

|              |                                   |                               |     |     |     |           |
|--------------|-----------------------------------|-------------------------------|-----|-----|-----|-----------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V, I_D=20A$         | --- | 2.4 | 2.9 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{GS}=V_{DS}, I_D=250\mu A$ | 2.0 | 2.7 | 4.0 | V         |
| $g_{fs}$     | Forward Transconductance          | $V_{DS}=5V, I_D=20A$          | --- | 84  | --- | S         |

### Dynamic and switching Characteristics

|              |                                     |   |     |      |     |          |
|--------------|-------------------------------------|---|-----|------|-----|----------|
| $Q_g$        | Total Gate Charge <sup>3, 4</sup>   | $V_{DS}=50V, V_{GS}=10V, I_D=20A$               | --- | 111  | --- | nC       |
| $Q_{gs}$     | Gate-Source Charge <sup>3, 4</sup>  |   | --- | 31   | --- |          |
| $Q_{gd}$     | Gate-Drain Charge <sup>3, 4</sup>   |   | --- | 20   | --- |          |
| $T_{d(on)}$  | Turn-On Delay Time <sup>3, 4</sup>  | $V_{DD}=50V, V_{GS}=10V, R_G=10\Omega, I_D=20A$ | --- | 49   | --- | ns       |
| $T_r$        | Turn-On Rise Time <sup>3, 4</sup>   |   | --- | 72   | --- |          |
| $T_{d(off)}$ | Turn-Off Delay Time <sup>3, 4</sup> |   | --- | 118  | --- |          |
| $T_f$        | Turn-Off Fall Time <sup>3, 4</sup>  |   | --- | 84   | --- |          |
| $C_{iss}$    | Input Capacitance                   | $V_{DS}=50V, V_{GS}=0V, f=1\text{MHz}$          | --- | 7601 | --- | pF       |
| $C_{oss}$    | Output Capacitance                  |   | --- | 1115 | --- |          |
| $C_{rss}$    | Reverse Transfer Capacitance        |   | --- | 58   | --- |          |
| $R_g$        | Gate resistance                     | $V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$           | --- | 1.2  | --- | $\Omega$ |

### Drain-Source Diode Characteristics

|          |                               |                             |     |     |     |    |
|----------|-------------------------------|-----------------------------|-----|-----|-----|----|
| $V_{SD}$ | Source to Drain Diode Voltage | $V_{GS}=0V, I_S=20A$        | --- | --- | 1.2 | V  |
| $t_{rr}$ | Reverse Recovery Time         | $I_S=20A, di/dt=100A/\mu s$ | --- | 89  | --- | ns |
| $Q_{rr}$ | Reverse Recovery Charge       |                             | --- | 205 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=0.4mH, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$
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 )

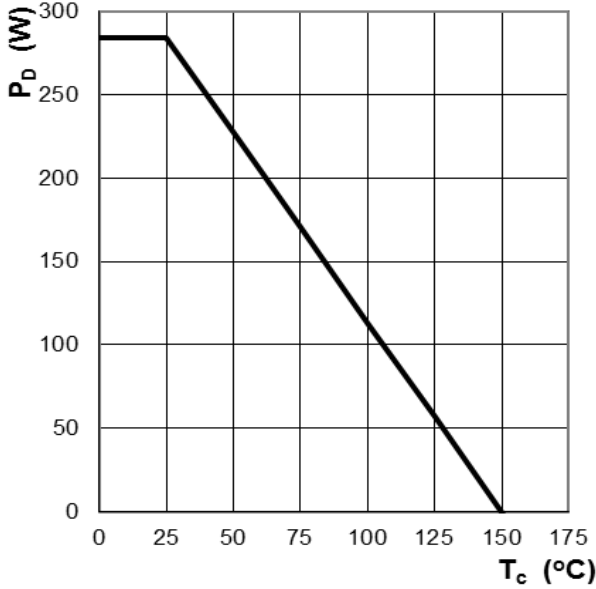


Figure 1: Power Dissipation

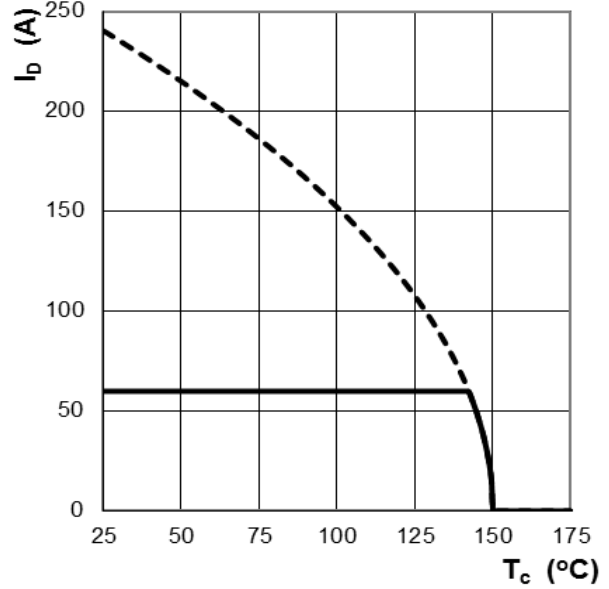


Figure 2: Continuous Drain Current vs.  $T_c$

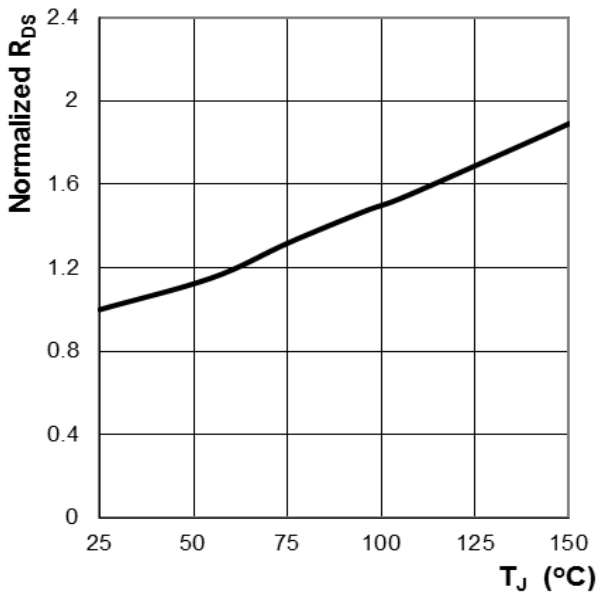


Figure 3: Normalized  $R_{DS(ON)}$  vs.  $T_J$

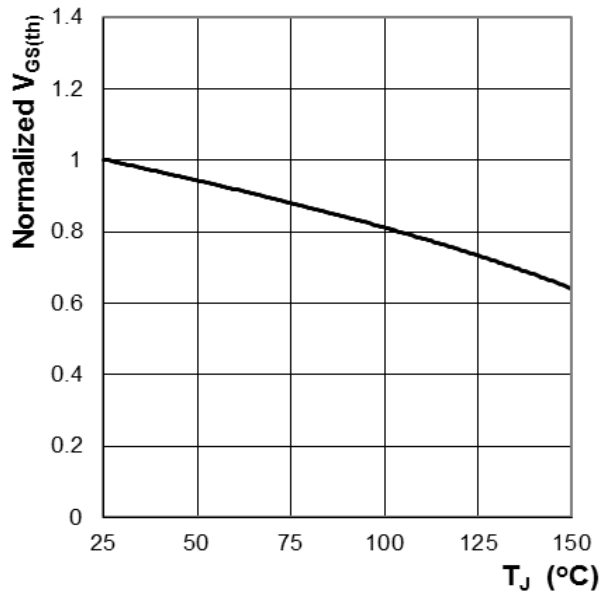


Figure 4: Normalized  $V_{th}$  vs.  $T_J$



Ratings and Characteristics Curves

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

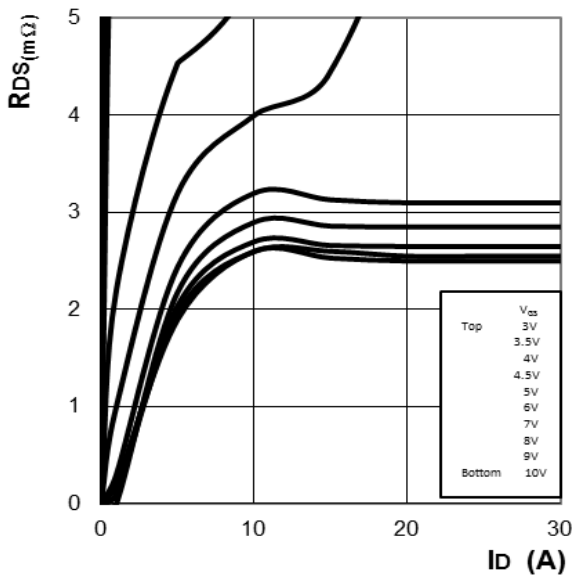


Figure 5: RDS(ON) vs. Drain Current and Gate Voltage

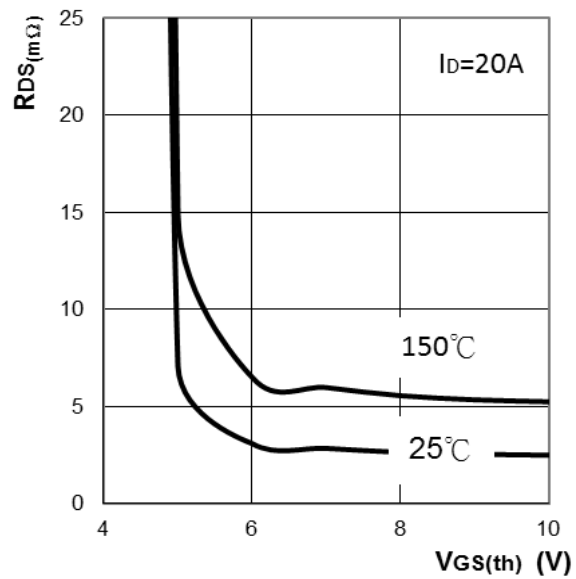


Figure 6: RDS(ON) vs. Gate Voltage

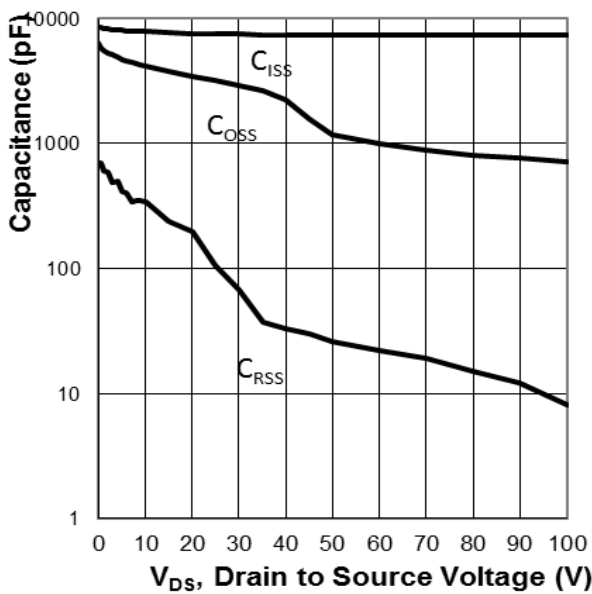


Figure 7: Typ. Capacitance Characteristics

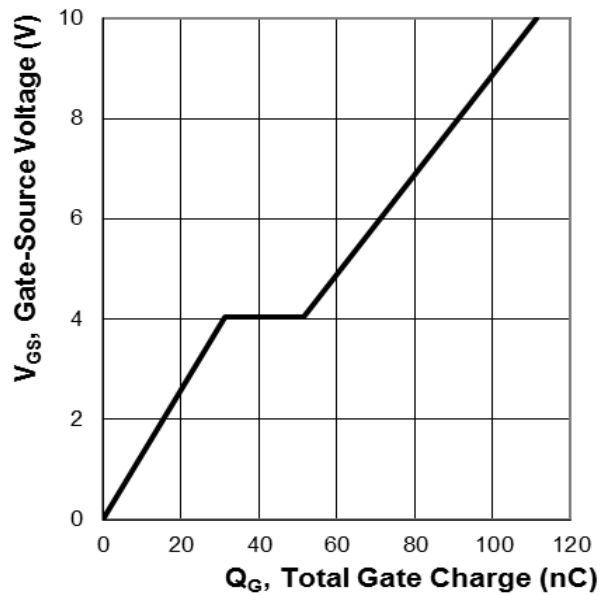


Figure 8: Typ. Gate Charge Characteristics



Ratings and Characteristics Curves

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

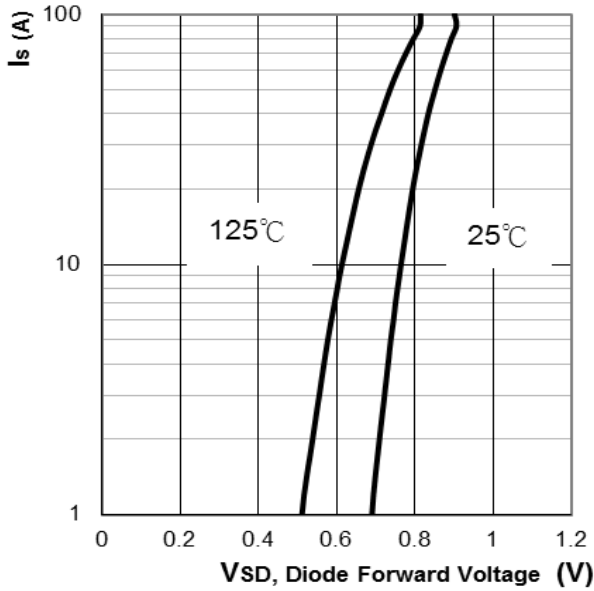


Figure 9: Body Diode Characters

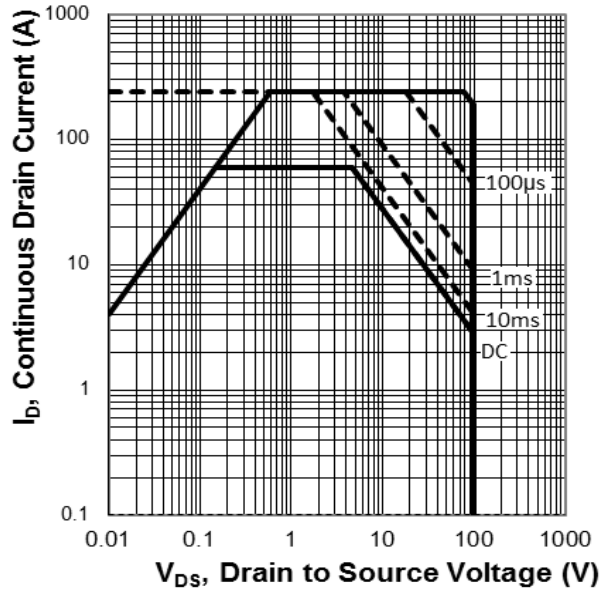


Figure 10: Maximum Safe Operation Area

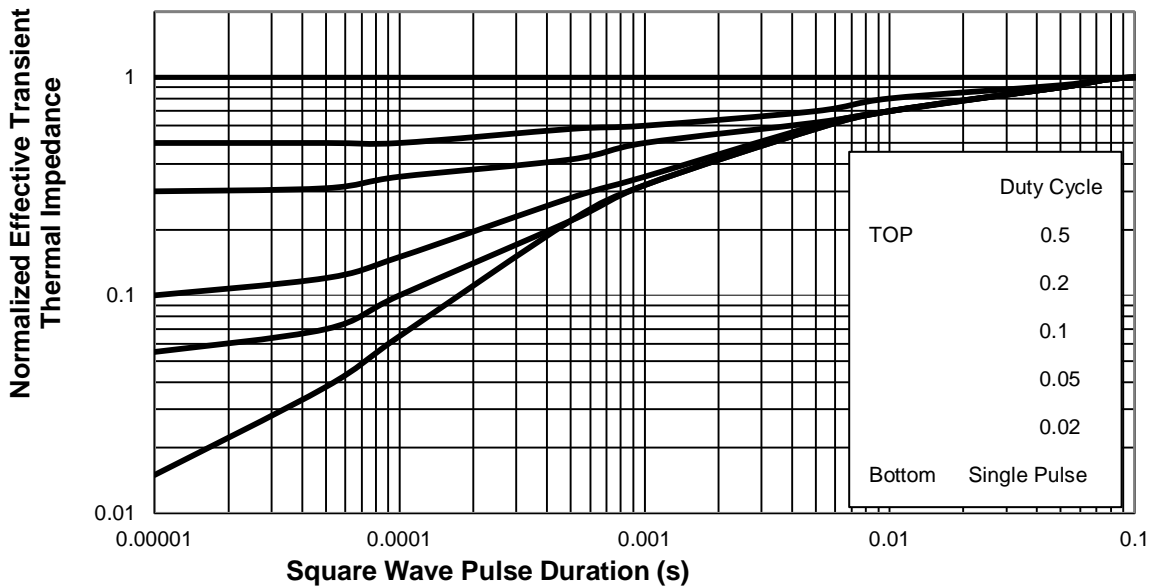
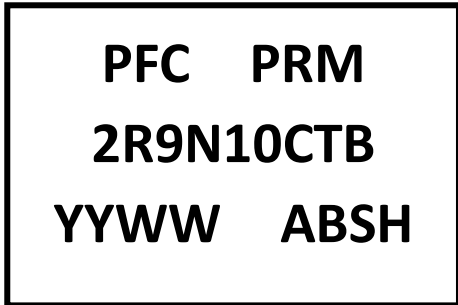


Figure 11: Normalized Thermal Transient Impedance, Junction-to-Case



**3. Marking information**

Top Marking Rule



PRM2R9N10CTB = Product Type Marking Code

YYWW = Date Code

YY = Last two digits of year

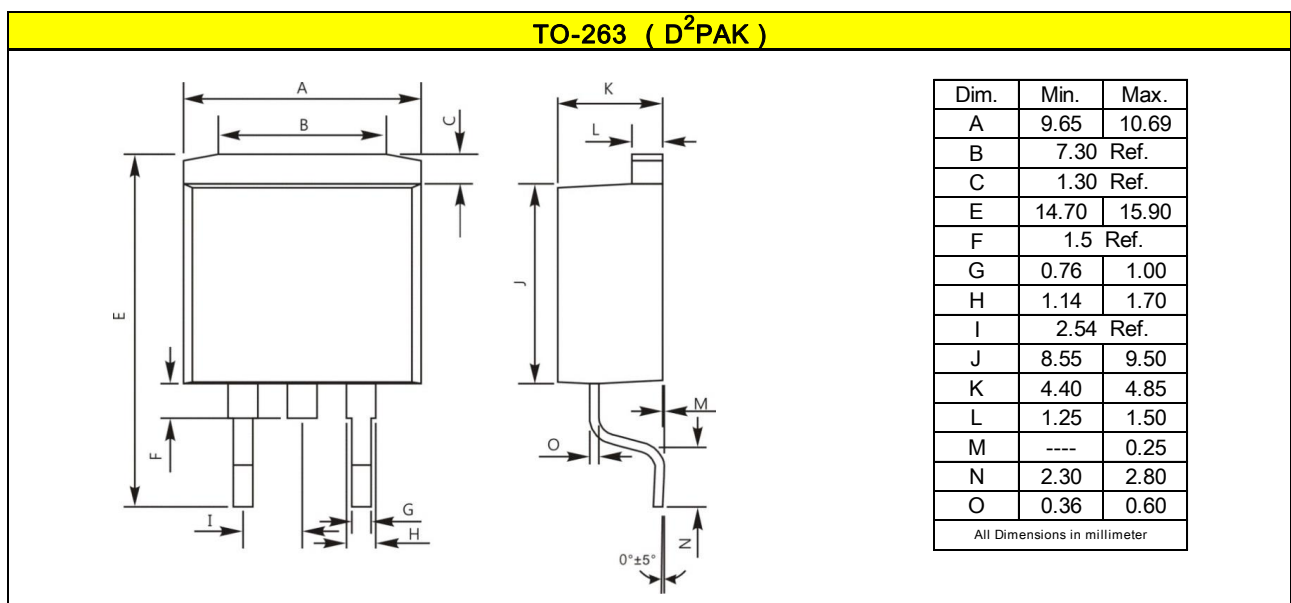
WW = Week code

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               |
|--------------|---------|-----------------------------|
| PRM2R9N10CTB | TO-263  | 800 pcs / 13" diameter reel |

Mechanical

- Molder Plastic: UL Flammability Classification Rating 94V-0
- Device Weight : 0.04 ounces (1.16grams) - TO-263
- Mounting Torque : Recommended 4~5 kg-cm

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