PRM9R0N03N3

PFC Device Corporation

30V Single N-Channel MOSFET

Major ratings and characteristics

Characteristics	Values	Units
V_{DS}	30	**V**
I_D[4] (T_C=25˚C)	53	**A**
Max. $R_{DS(ON)}$@V_{GS}=10V	9.0	**mΩ**
T_J Operating Junction Temperature	-50 to +150	**ºC**

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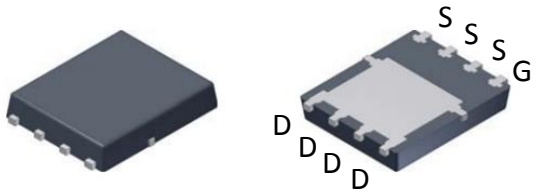
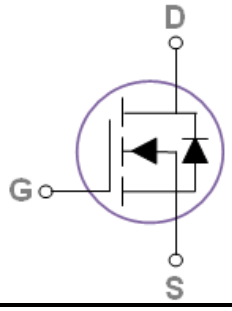


DFN 3x3



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. $R_{DS(ON)}$=9.0mΩ@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	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D[4]	Drain Current – Continuous (T_C=25°C)	53	A
	Drain Current – Continuous (T_C=100°C)	33	A
I_{DM}	Drain Current – Pulsed[1]	212	A
E_{AS}	Single Pulse Avalanche Energy[2]	14	mJ
I_{AS}	Single Pulse Avalanche Current[2]	17	A
P_D	Power Dissipation (T_C=25°C)	35	W
	Power Dissipation – Derate above 25°C	0.28	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	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	3.6	°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	30	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=30V, V_{GS}=0V, T_J=25℃	---	---	1	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=16A	---	7.2	9.0	mΩ
		V_{GS}=4.5V, I_D=8A		10.8	13	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=250uA	1.0	1.6	2.5	V
g_{fs}	Forward Transconductance	V_{DS}=5V, I_D=20A	---	42	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_D=20A	---	7.1	---	nC
Q_{gs}	Gate-Source Charge		---	3.0	---	
Q_{gd}	Gate-Drain Charge		---	2.7	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V, V_{GS}=10V, R_G=3.3Ω I_D=15A	---	6.1	---	ns
T_r	Turn-On Rise Time		---	62	---	
$T_{d(off)}$	Turn-Off Delay Time		---	17	---	
T_f	Turn-Off Fall Time		---	9.5	---	
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1MHz	---	838	---	pF
C_{oss}	Output Capacitance		---	133	---	
C_{rss}	Reverse Transfer Capacitance		---	75	---	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	---	2.7	---	Ω

Drain-Source Diode Characteristics

V_{SD} [3]	Source to Drain Diode Voltage	V_{GS}=0V, I_S=1A	---	---	1	V
t_{rr}	Reverse Recovery Time	I_S=10A, di/dt=100A/us	---	7	---	ns
Q_{rr}	Reverse Recovery Charge		---	0.3	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=17A, RG=25Ω, Starting TJ=25℃
3. The data tested by pulsed, pulse width ≦300us, duty cycle ≦2%.
4. Silicon limited.

2. Characteristics Curves

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

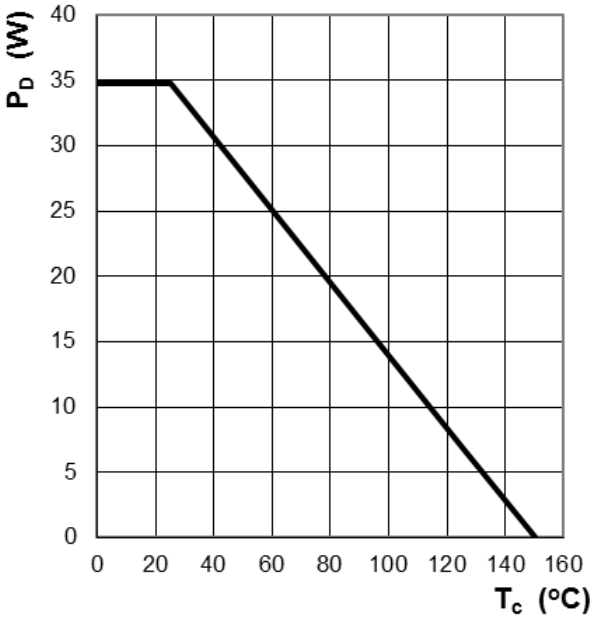


Figure 1: Power Dissipation

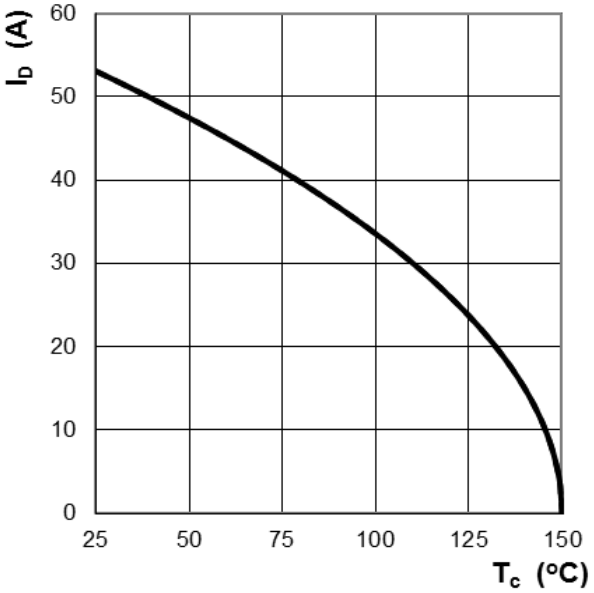


Figure 2: Continuous Drain Current vs. T_C

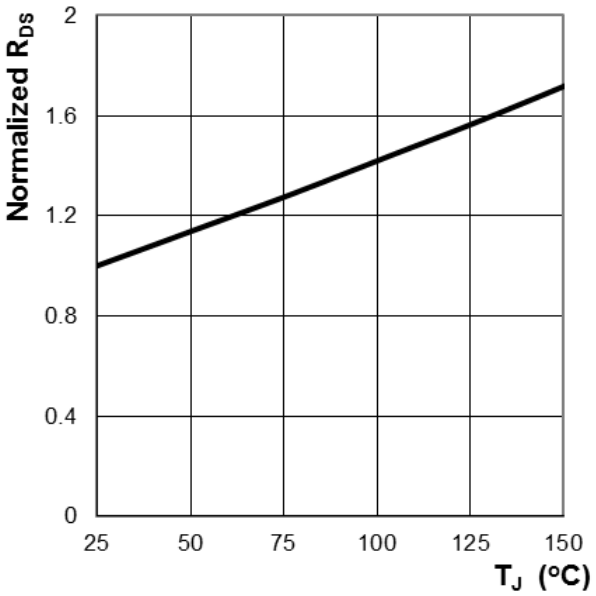


Figure 3: Normalized $R_{DS(ON)}$ vs. T_J

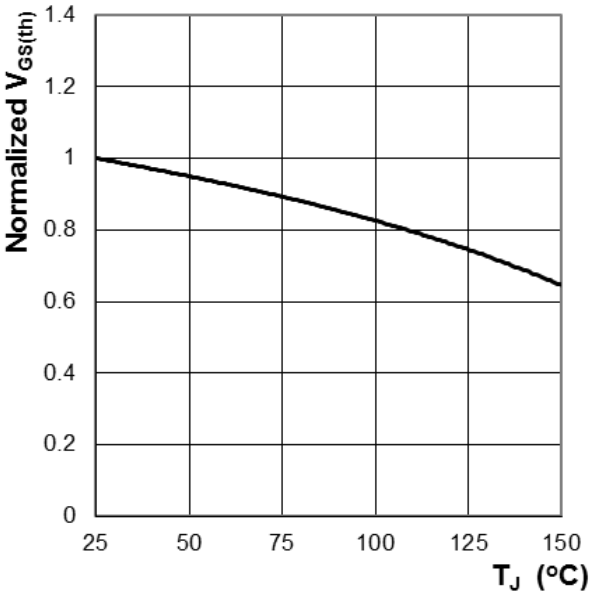


Figure 4: Normalized $V_{GS(th)}$ vs. T_J

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

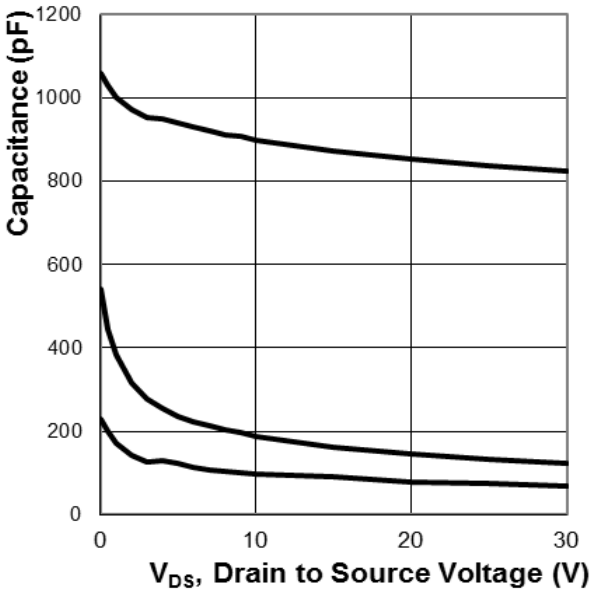


Figure 5: Typ. Capacitance Characteristics

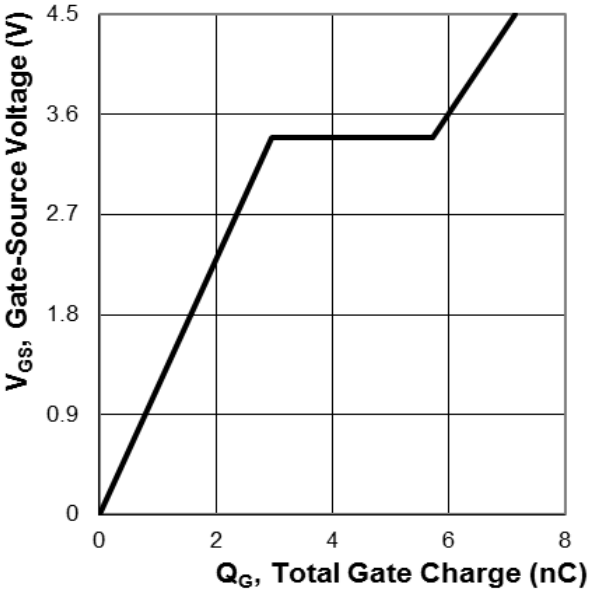


Figure 6: Typ. Gate Charge Characteristics

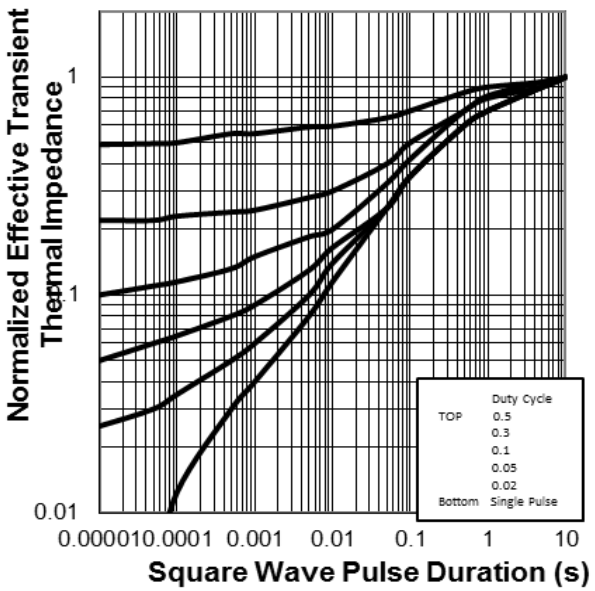


Figure 7: Normalized Thermal Transient Impedance, Junction-to-Case

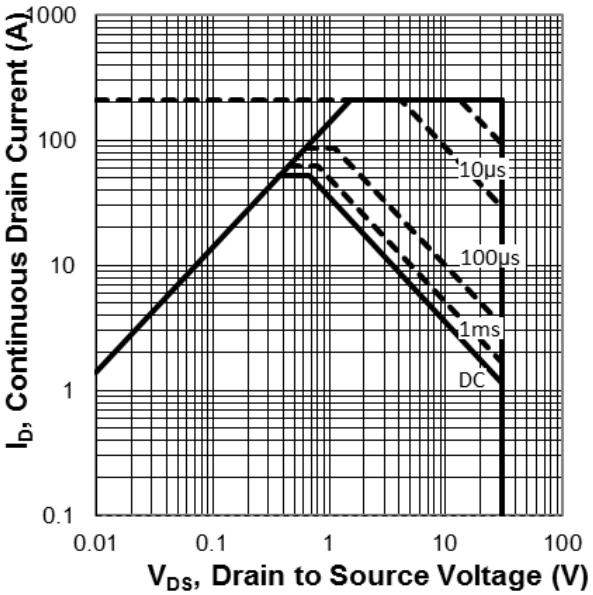


Figure 8: Maximum Safe Operation Area

3. Marking information

Top Marking Rule

PFC PRM
9R0N03
YM ABS

PRM9R0N03 = Product Type Marking Code

YM = Date Code

Y = Year code

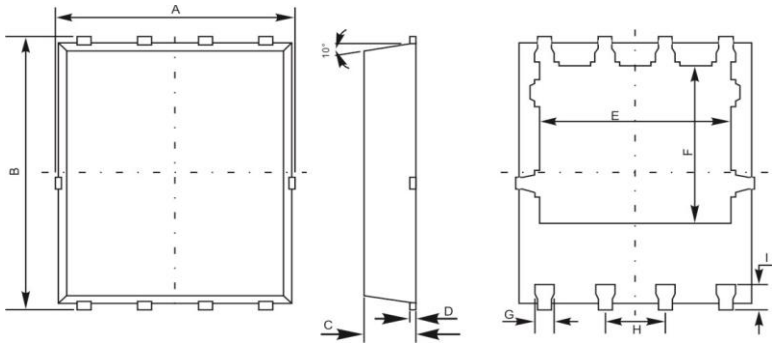
M = Month code

ABS = Assembly code

4. Package information

Package Outline Dimensions millimeters

DFN 3X3



Dim.	Min.	Max.
A	3.20 typ.	
B	3.45 typ.	
C	0.70	0.90
D	0.250 Ref.	
E	2.25	2.59
F	3.10	3.45
G	0.24	0.35
H	0.70 Ref.	
I	0.30	0.53
All Dimensions in millimeter		

5. Ordering information

Part Number	Package	Delivery mode
PRM9R0N03N3	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