

PRM5R5N03D

PFC Device Corporation

30V Single N-Channel MOSFET

Major ratings and characteristics

Characteristics	Values	Units
V_{DS}	30	٧
$I_{D}^{6} (T_{C}=25^{\circ}C)$	50	Α
Max. R _{DS(ON)} @V _{GS} =10V	5.5	mΩ
Max. R _{DS(ON)} @V _{GS} =4.5V	9	mΩ
T _J Operating Junction Temperature	-55 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.

PRM5R5N03D TO-252 (D-PAK)

Typical Applications

- Charger Adapter
- Power Tools
- LED Lighting

Features

- Max. R_{DS(ON)}=5.5mΩ@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 ⁵	Drain Current – Continuous (T _C =25°C)	77	Α
'D	Drain Current – Continuous (T _C =100°C)	48	Α
I_D^6	Drain Current – Continuous (T _C =25°C)	50	Α
I _{DM}	Drain Current – Pulsed ¹	300	Α
E _{AS}	Single Pulse Avalanche Energy ²	39	mJ
I _{AS}	Single Pulse Avalanche Current ²	28	Α
В	Power Dissipation (T _C =25°C)	54.3	W
P _D	Power Dissipation – Derate above 25°C	0.43	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	Тур.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient		62	°C/W
$R_{ heta JC}$	Thermal Resistance Junction to Case		2.3	°C/W



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Electrical Characteristics

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

Off Characteristics

Symbol	Parameter	Conditions	Min.	Тур.	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°C			1	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA

On Characteristics

D	ON) Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A			5.5	mΩ
$R_{DS(ON)}$		V _{GS} =4.5V, I _D =10A	-		9	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0		3.0	V
Q_{fs}	Forward Transconductance	V _{DS} =5V, I _D =20A		60		S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{3,4}		 31	
Q_{gs}	Gate-Source Charge ^{3, 4}	V _{DS} =15V, V _{GS} =10V, I _D =20A	 5.4	 nC
Q_{qd}	Gate-Drain Charge ^{3, 4}		 6.6	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}		 13	
T _r	Turn-On Rise Time ^{3,4}	V_{DD} =15V, V_{GS} =10V, R_{G} =6 Ω	 117	 nc
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		 35	 ns
T _f	Turn-Off Fall Time ^{3,4}		 113	
C _{iss}	Input Capacitance		 1800	
C _{oss}	Output Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	 270	 pF
C_{rss}	Reverse Transfer Capacitance		 200	
R_{q}	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	 2.7	 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	 6		ns
Q_{rr}	Reverse Recovery Charge	1 _S =20A, di/di=100A/dS	 1		nC

Note:

- 1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
- 2. L=0.1mH, R_G =25 Ω , Starting T_J =25 $^{\circ}C$
- 3. The data tested by pulsed , pulse width \leq 300us , duty cycle \leq 2%.
- 4. Essentially independent of operating temperature.
- 5. Silicon limited.
- 6. Package limited.



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2. Characteristics Curves

Ratings and Characteristics Curves

(T_A = 25°C unless otherwise specified)

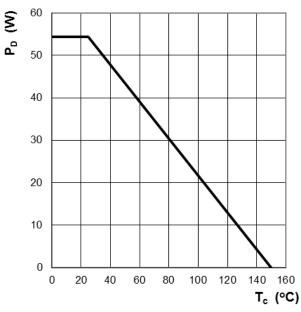


Figure 1: Power Dissipation

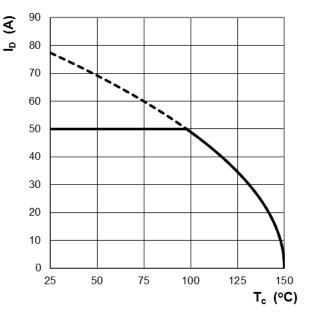


Figure 2: Continuous Drain Current vs. T_C

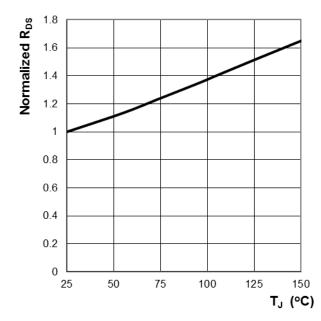


Figure 3: Normalized R_{DS(ON)} vs. T_J

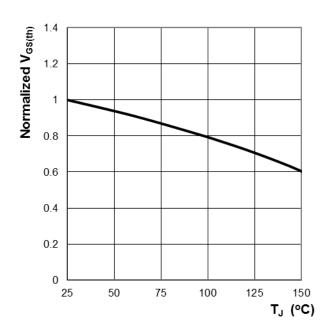


Figure 4: Normalized V_{GS(th)} vs. T_J



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Ratings and Characteristics Curves

(T_A = 25° unless otherwise specified)

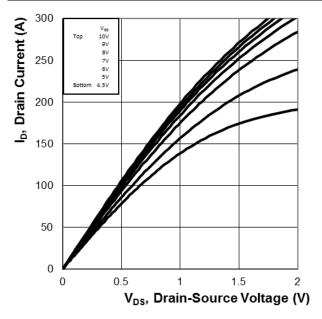


Figure 5: On-Region Characteristics

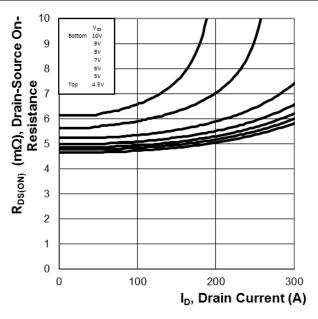


Figure 6: Typ. R_{DS} Variation vs. I_D and V_{GS}

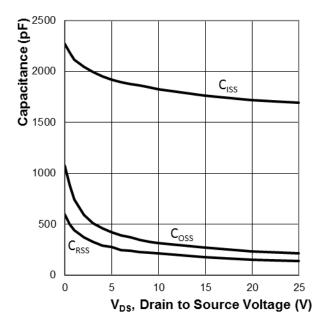


Figure 7: Typ. Capacitance Characteristics

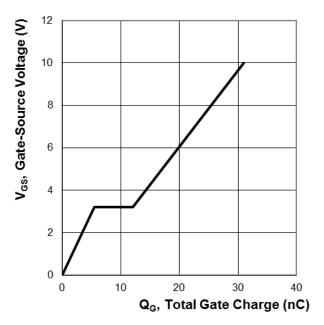


Figure 8: Typ. Gate Charge Characteristics



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Characteristics PRM5R5N03D

Ratings and Characteristics Curves

(T_A = 25°C unless otherwise specified)

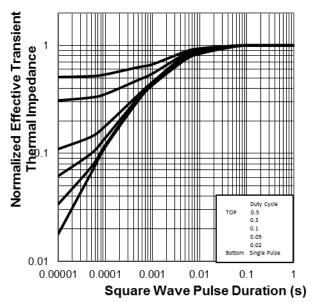


Figure 9: Normalized Thermal Transient Impedance, Junction-to-Case

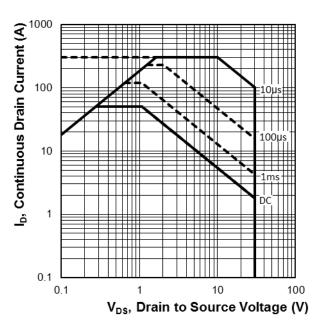


Figure 10: Maximum Safe Operation Area



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3. Marking information

Top Marking Rule

PFC PRM
5R5N03D
YYWW ABSH

PRM5R5N03D = Product Type Marking Code

YYWW = Date Code

YY = Last two digits of year

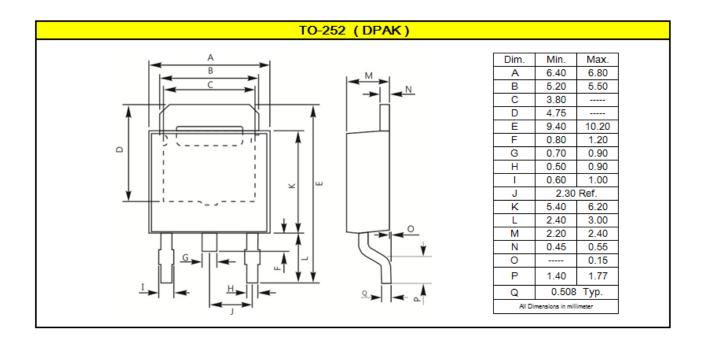
WW = Week code

ABS = Assembly code

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

4. Package information

Package Outline Dimensions millimeters





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5. Ordering information

Part Number	Package	Delivery mode
PRM5R5N03D	TO-252 (D-PAK)	2500 pcs / 13" diameter reel

Mechanical

Molder Plastic: UL Flammability Classification Rating 94V-0
 Device Weight: 0.01 ounces (0.3grams) - TO-252 (D-PAK)

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