

PRM012N10D

PFC Device Corporation

100V Single N-Channel MOSFET

Major ratings and characteristics

Characteristics	Values	Units
V_{DS}	100	٧
$I_{D}^{6} (T_{C}=25^{\circ}C)$	50	Α
Max. R _{DS(ON)} @V _{GS} =10V	12	mΩ
Max. R _{DS(ON)} @V _{GS} =4.5V	15	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.

PRM012N10D TO-252 (D-PAK)

Typical Applications

- Charger Adapter
- Power Tools
- LED Lighting

Features

- Max. $R_{DS(ON)}=12m\Omega@V_{GS}=10V$
- 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	100	V
V_{GS}	Gate-Source Voltage	±20	V
I _D ⁵	Drain Current – Continuous (T _C =25°C)	56	Α
'D	Drain Current – Continuous (T _C =100°C)	35.5	Α
I_D^6	Drain Current – Continuous (T _C =25°C)	50	Α
I _{DM}	Drain Current – Pulsed ¹	160	Α
E _{AS}	Single Pulse Avalanche Energy ²	58	mJ
I _{AS}	Single Pulse Avalanche Current ²	17	Α
P _D	Power Dissipation (T _C =25°C)	78.1	W
ГD	Power Dissipation – Derate above 25°C	0.63	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		1.6	°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	100			V
	Davis Commoderate Commode	V _{DS} =100V, V _{GS} =0V, T _J =25°C			1	uA
I _{DSS}	Drain-Source Leakage Current	V _{DS} =100V, V _{GS} =0V, T _J =125°C			250	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	$V_{GS}=10V$, $I_D=20A$			12	mΩ	
$H_{DS(ON)}$		V _{GS} =4.5V, I _D =10A			15	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_{D}=250uA$	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}		 37	
Q_{gs}	Gate-Source Charge ^{3, 4}	V _{DS} =50V, V _{GS} =10V, I _D =20A	 7	 nC
Q_{gd}	Gate-Drain Charge ^{3,4}		 7	
$T_{d(on)}$	Turn-On Delay Time ^{3,4}		 11	
T_r	Turn-On Rise Time ^{3,4}	V_{DD} =50V, V_{GS} =10V, R_G =6 Ω I_D =20A	 42	 ns
$T_{d(off)}$	Turn-Off Delay Time ^{3,4}		 41	 115
T_f	Turn-Off Fall Time ^{3,4}		 80	
C_{iss}	Input Capacitance		 2200	
C _{oss}	Output Capacitance	V _{DS} =50V, V _{GS} =0V, f=1MHz	 210	 pF
C_{rss}	Reverse Transfer Capacitance		 30	
R_{g}	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	 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	L 2014 di/dt 1001/up	 45		ns
Q_{rr}	Reverse Recovery Charge	I _S =20A, di/dt=100A/us	 51		nC

Note:

- 1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
- 2. VDD=50V, VGS=10V, L=0.4mH, IAS=17A, RG=25 Ω , Starting TJ=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)

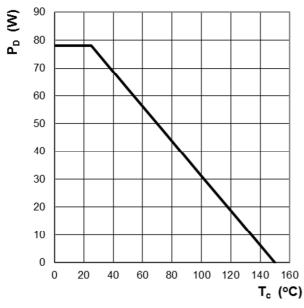


Figure 1: Power Dissipation

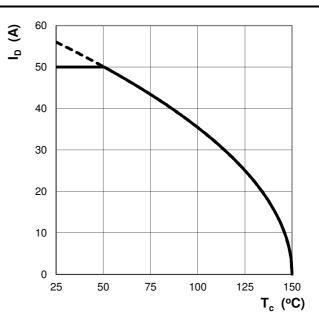


Figure 2: Continuous Drain Current vs. T_C

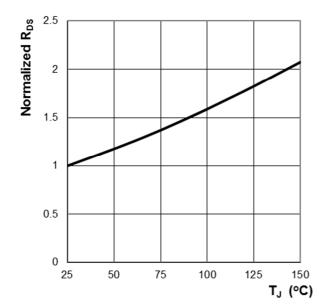


Figure 3: Normalized R_{DS(ON)} vs. T_J

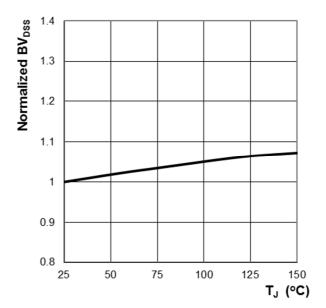


Figure 4: Normalized BV_{DSS} vs. T_J



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Ratings and Characteristics Curves

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

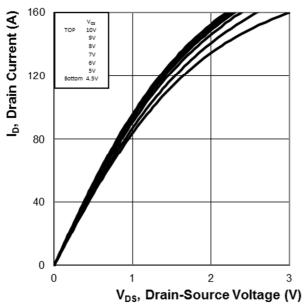


Figure 5: On-Region Characteristics

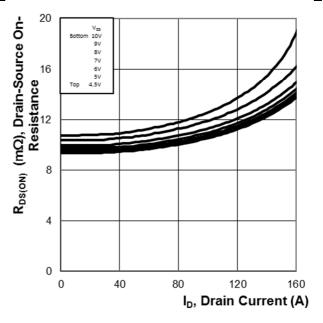


Figure 6: Typ. R_{DS} Variation vs. I_D and V_{GS}

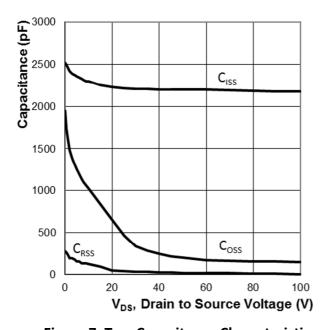


Figure 7: Typ. Capacitance Characteristics

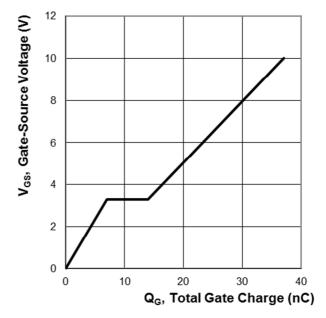


Figure 8: Typ. Gate Charge Characteristics



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Ratings and Characteristics Curves

(T_A = 25°C unless otherwise specified)

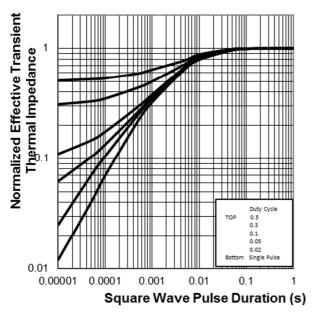


Figure 9: Normalized Thermal Transient Impedance, Junction-to-Case

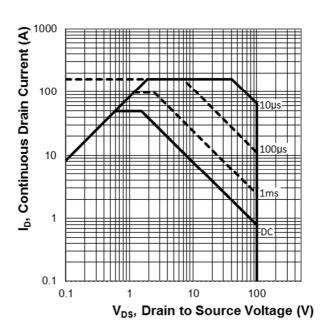


Figure 10: Maximum Safe Operation Area



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3. Marking information

Top Marking Rule

PFC PRM
012N10D
YYWW ABSH

PRM012N10D = Product Type Marking Code

YYWW = Date Code

YY = Last two digits of year

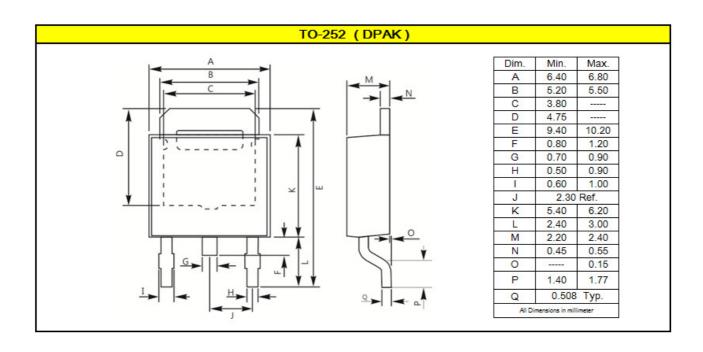
WW = Week code

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
PRM012N10D	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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