PRM020N06E

PFC Device Corporation

60V Single N-Channel MOSFET

Major ratings and characteristics

Characteristics	Values	Units
V_{DS}	60	**V**
I_D (T_C=25˚C)	31.7	**A**
Max. $R_{DS(ON)}$@V_{GS}=10V	20	**mΩ**
Max. $R_{DS(ON)}$@V_{GS}=4.5V	24	**mΩ**
T_J Operating Junction Temperature	-55 to +150	**°C**

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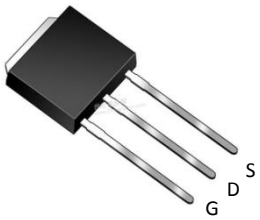
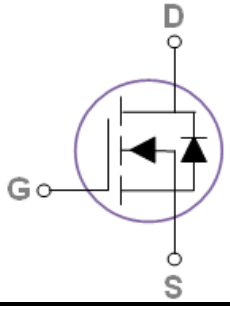


TO-251



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. $R_{DS(ON)}$=20mΩ@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	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current – Continuous (T_C=25˚C)	31.7	A
	Drain Current – Continuous (T_C=100˚C)	20	A
I_{DM}	Drain Current – Pulsed[1]	100	A
E_{AS}	Single Pulse Avalanche Energy[2]	20	mJ
I_{AS}	Single Pulse Avalanche Current[2]	20	A
P_D	Power Dissipation (T_C=25˚C)	43.1	W
	Power Dissipation – Derate above 25˚C	0.34	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	---	2.9	˚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	60	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=60V, V_{GS}=0V, T_J=25℃	---	---	1	uA
		V_{DS}=60V, V_{GS}=0V, T_J=125℃	---	---	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	---	---	20	mΩ
		V_{GS}=4.5V, I_D=10A	---	---	24	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=250uA	1.0	---	3.0	V
g_{fs}	Forward Transconductance	V_{DS}=5V, I_D=20A	---	40	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[3,4]	V_{DS}=30V, V_{GS}=10V, I_D=20A	---	28.5	---	nC
Q_{gs}	Gate-Source Charge[3,4]		---	6	---	
Q_{gd}	Gate-Drain Charge[3,4]		---	6.5	---	
$T_{d(on)}$	Turn-On Delay Time[3,4]	V_{DD}=30V, V_{GS}=10V, R_G=6Ω I_D=20A	---	14	---	ns
T_r	Turn-On Rise Time[3,4]		---	95	---	
$T_{d(off)}$	Turn-Off Delay Time[3,4]		---	34	---	
T_f	Turn-Off Fall Time[3,4]		---	116	---	
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1MHz	---	1600	---	pF
C_{oss}	Output Capacitance		---	110	---	
C_{rss}	Reverse Transfer Capacitance		---	80	---	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	---	1.1	---	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=10A, di/dt=100A/us	---	15	---	ns
Q_{rr}	Reverse Recovery Charge		---	4	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=50V, V_{GS}=10V, L=0.1mH, I_{AS}=20A, R_G=25Ω, Starting T_J=25℃
3. The data tested by pulsed , pulse width ≦300us , duty cycle ≦2%.
4. Essentially independent of operating temperature.

2. Characteristics Curves

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

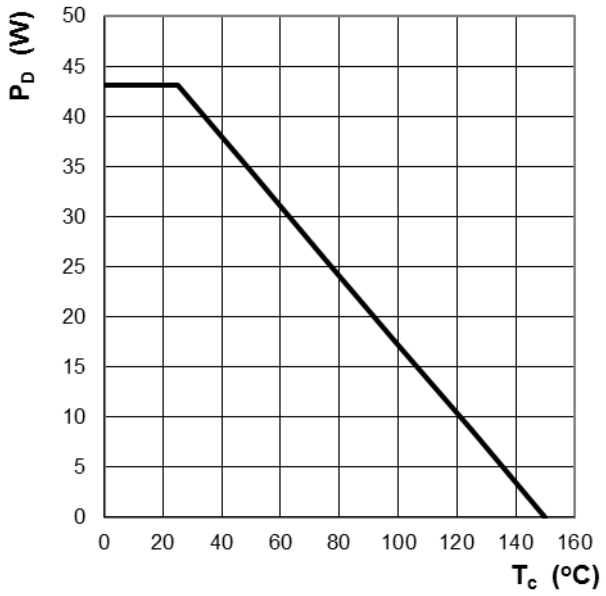


Figure 1: Power Dissipation

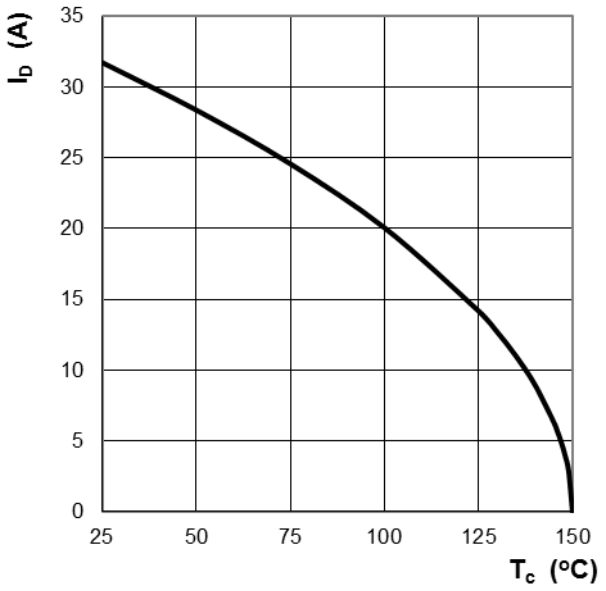


Figure 2: Continuous Drain Current vs. T_C

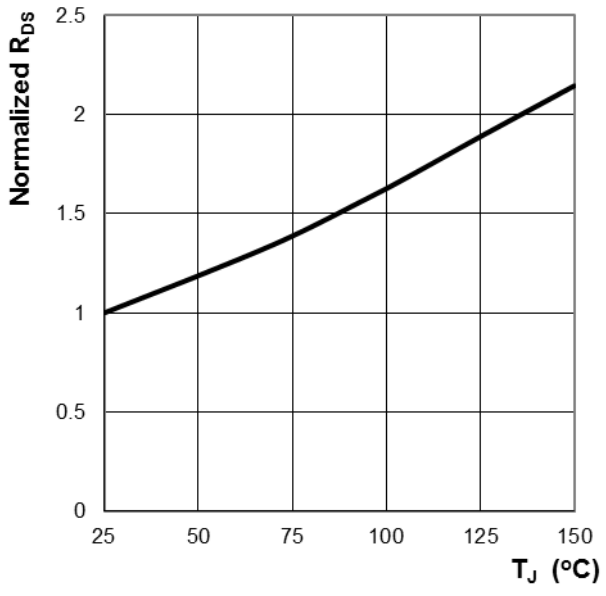


Figure 3: Normalized $R_{DS(ON)}$ vs. T_J

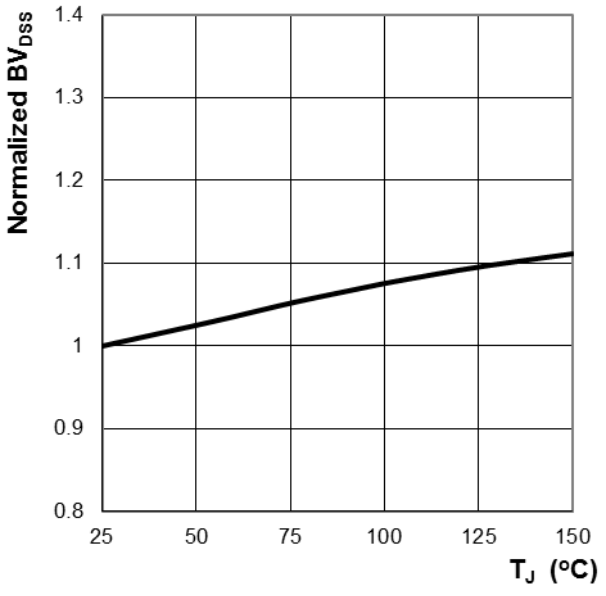


Figure 4: Normalized BV_{DSS} vs. T_J

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

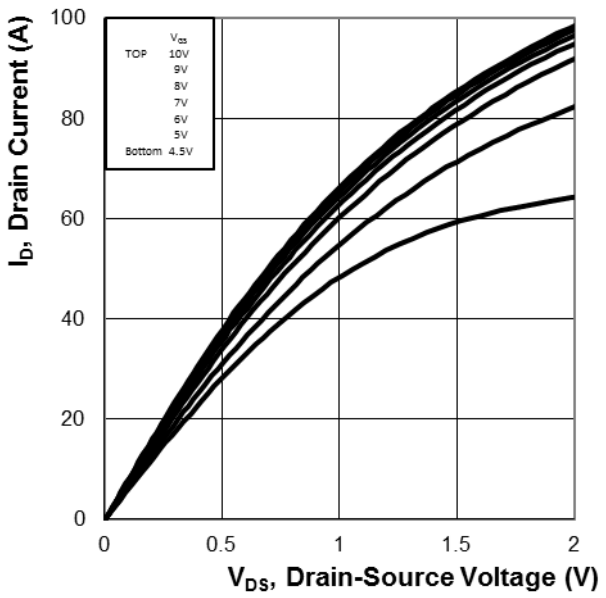


Figure 5: On-Region Characteristics

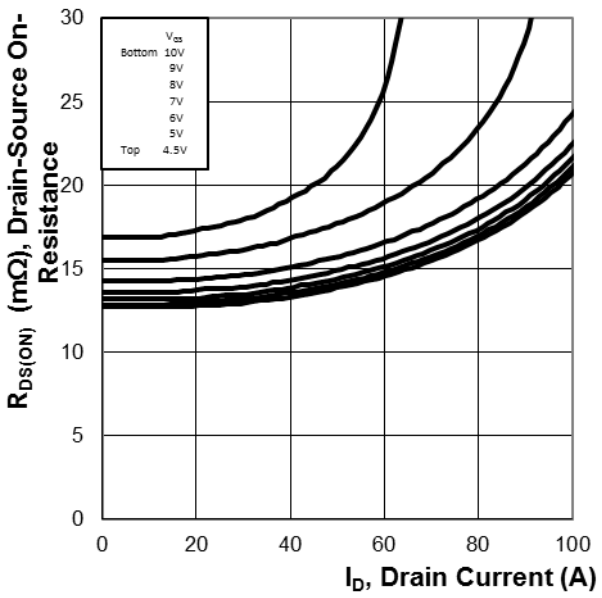


Figure 6: Typ. R_{DS} Variation vs. I_D and V_{GS}

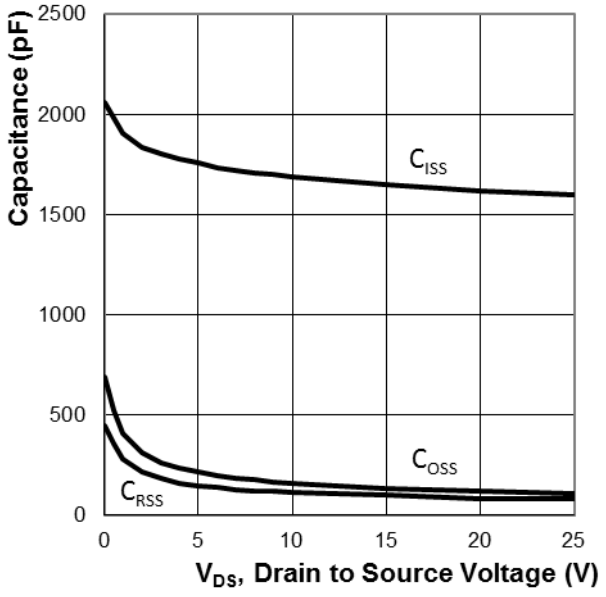


Figure 7: Typ. Capacitance Characteristics

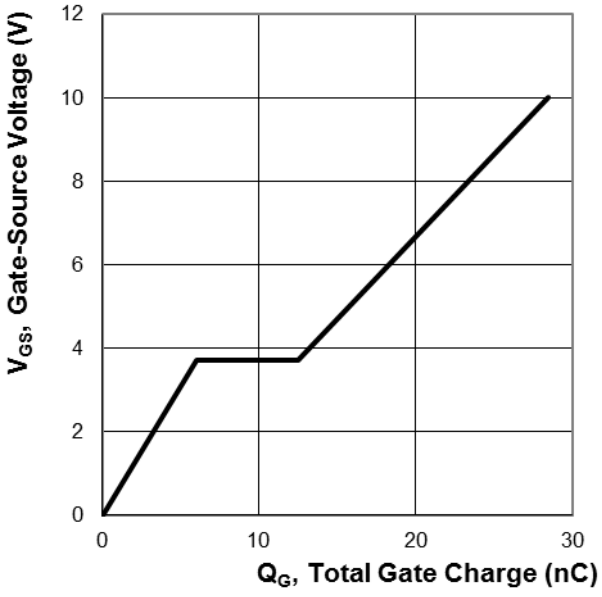


Figure 8: Typ. Gate Charge Characteristics

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

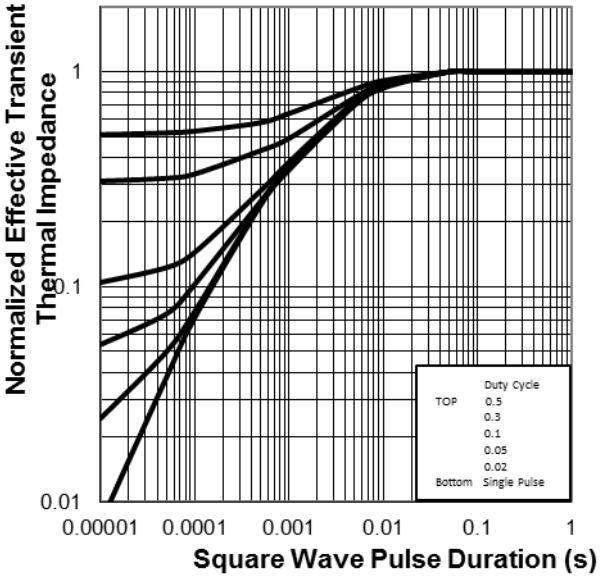


Figure 9: Normalized Thermal Transient Impedance, Junction-to-Case

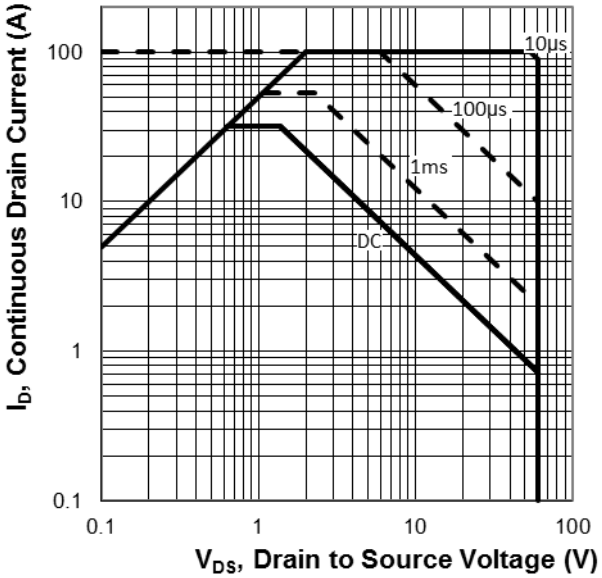


Figure 10: Maximum Safe Operation Area

3. Marking information

Top Marking Rule

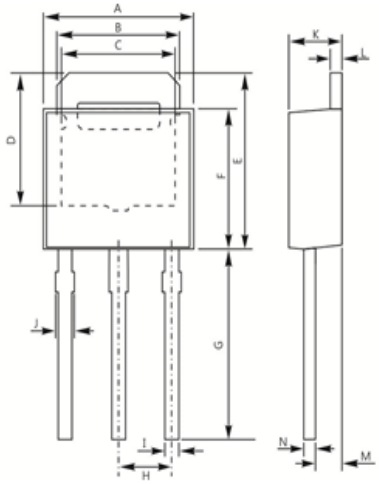
PFC PRM
020N06E
YYWW ABSH

PRM020N06E = 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

TO-251 (IPAK)



Dim.	Min.	Max.
A	6.40	6.80
B	5.20	5.50
C	3.80	-----
D	4.75	-----
E	6.80	7.20
F	5.40	6.20
G	7.20	7.80
H	2.30 Ref.	
I	0.50	0.90
J	0.60	1.00
K	2.20	2.4
L	0.45	0.55
M	0.9	1.50
N	0.45	0.60
All Dimensions in millimeter		

5. Ordering information

Part Number	Package	Delivery mode
PRM020N06E	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)