PRM020C03S8

PFC Device Corporation

30V Single N+P Channel MOSFET

Major ratings and characteristics

Characteristics	Values	Units
N-CH		
V_{DS}	30	**V**
I_D (T_C=25˚C)	8	**A**
Max. $R_{DS(ON)}$@V_{GS}=10V	20	**mΩ**
P-CH		
V_{DS}	-30	**V**
I_D (T_C=25˚C)	-5.5	**A**
Max. $R_{DS(ON)}$@V_{GS}=10V	50	**mΩ**
T_J Operating Junction Temperature	-55 to +150	**°C**

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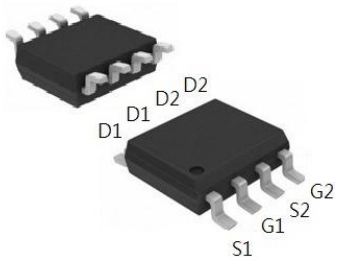
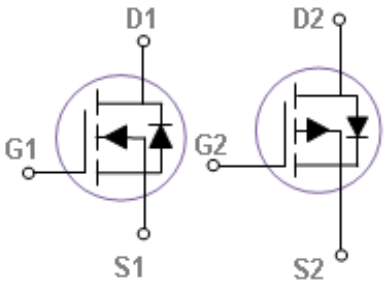


SOP-8



General Description

These N+P dual Channel enhancement mode power field effect transistors are 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. These devices are well suited for high efficiency fast switching applications.

Typical Applications

- DC Fan
- Motor Drive Applications
- Networking Half / Full Bridge Topology

Features

- Fast switching
- Green Device Available
- Suit for 4.5V Gate Drive Applications

1. Characteristics

Maximum Ratings Characteristics (T_A = 25 °C unless otherwise specified)

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D	Drain Current – Continuous (T_C=25°C)	8	-5.5	A
	Drain Current – Continuous (T_C=100°C)	5	-3.5	A
I_{DM}[1]	Drain Current – Pulsed[1]	32	-22	A
E_{AS}	Single Pulse Avalanche Energy[2]	14	5	mJ
I_{AS}	Single Pulse Avalanche Current[2]	17	10	A
P_D	Power Dissipation (T_C=25°C)	2.5		W
	Power Dissipation – Derate above 25°C	0.02		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	---	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	25	°C/W

N-CH 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
		V_{DS}=24V, V_{GS}=0V, T_J=125℃	---	---	10	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=8A	---	15	20	mΩ
		V_{GS}=4.5V, I_D=5A	---	21	30	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=250uA	1.2	1.5	2.5	V
△$V_{GS(th)}$	VGS(th) Temperature Coefficient		---	-4	---	mV/℃
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=3A	---	3	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_D=8A	---	4.1	6	nC
Q_{gs}	Gate-Source Charge		---	1	1.4	
Q_{gd}	Gate-Drain Charge		---	2.1	4	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V, V_{GS}=10V, R_G=6Ω I_D=1A	---	2.8	5	ns
T_r	Turn-On Rise Time		---	7.2	14	
$T_{d(off)}$	Turn-Off Delay Time		---	15.8	30	
T_f	Turn-Off Fall Time		---	4.6	9	
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1MHz	---	345	500	pF
C_{oss}	Output Capacitance		---	55	80	
C_{rss}	Reverse Transfer Capacitance		---	32	55	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	---	3.2	6.4	Ω

Drain-Source Diode Characteristics

I_S	Continuous Source Current	V_G=V_D=0V , Force Current			8	A
I_{SM}	Pulsed Source Current				16	A
V_{SD}[3]	Source to Drain Diode Voltage	V_{GS}=0V, I_S=1A, T_J=25℃	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. L=0.1mH, RG=25Ω, Starting TJ=25℃
3. The data tested by pulsed, pulse width ≦300us, duty cycle ≦2%.

2. N-CH Characteristics Curves

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

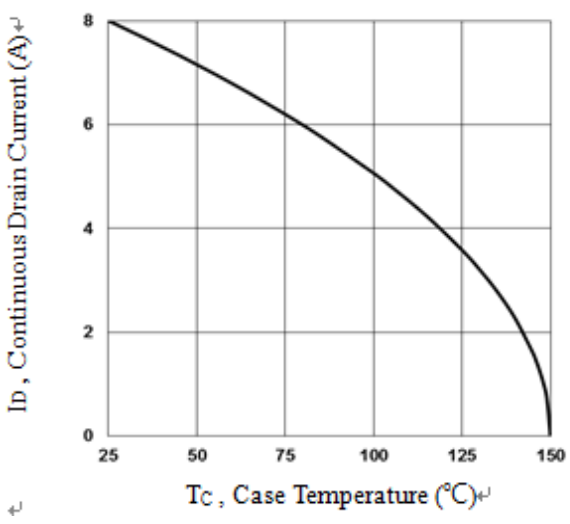


Fig.1 Continuous Drain Current vs. T_C

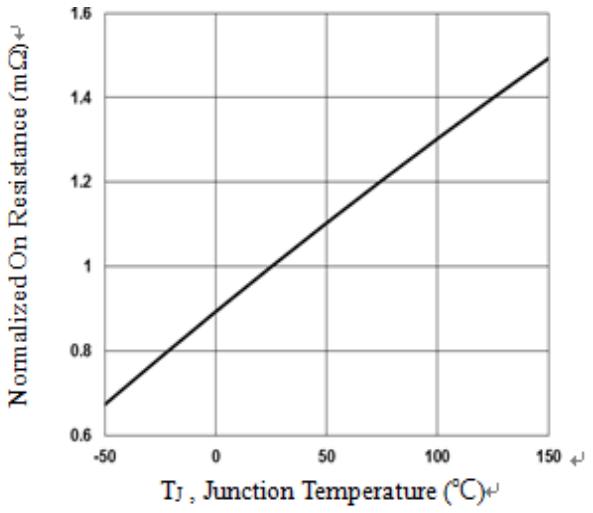


Fig.2 Normalized RDSON vs. T_J

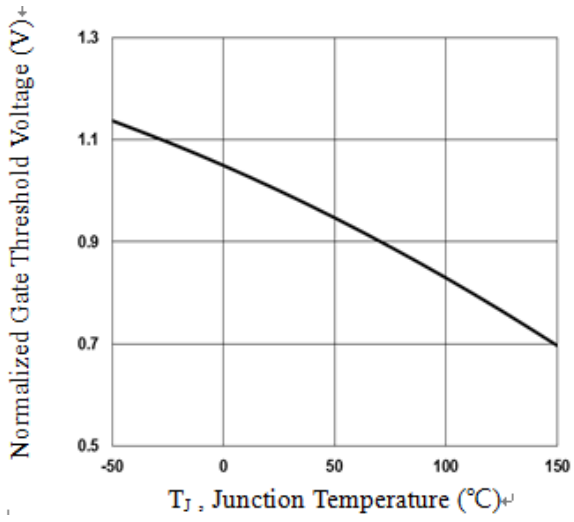


Fig.3 Normalized V_{th} vs. T_J

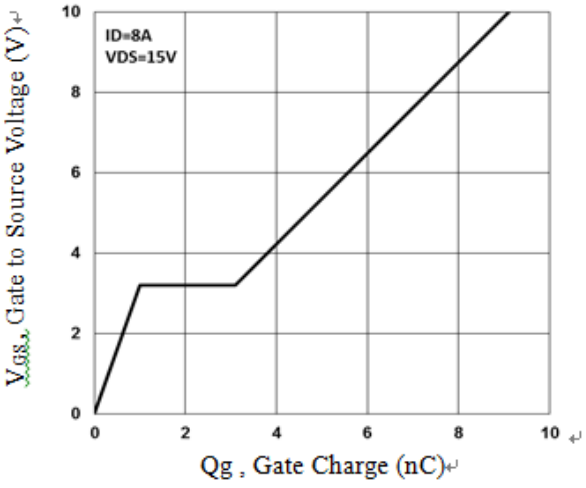


Fig.4 Gate Charge Waveform

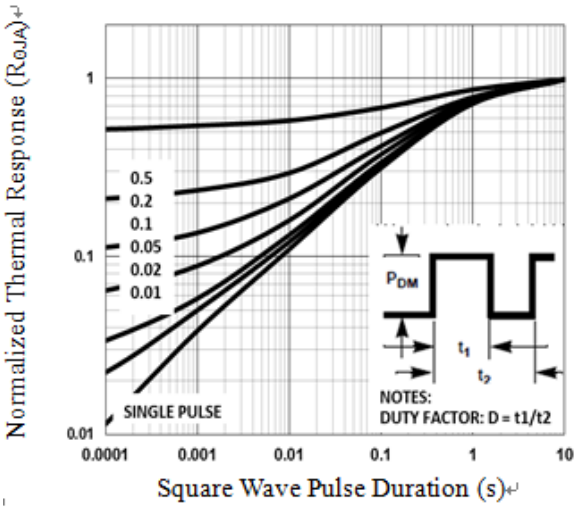


Fig.5 Normalized Transient Response

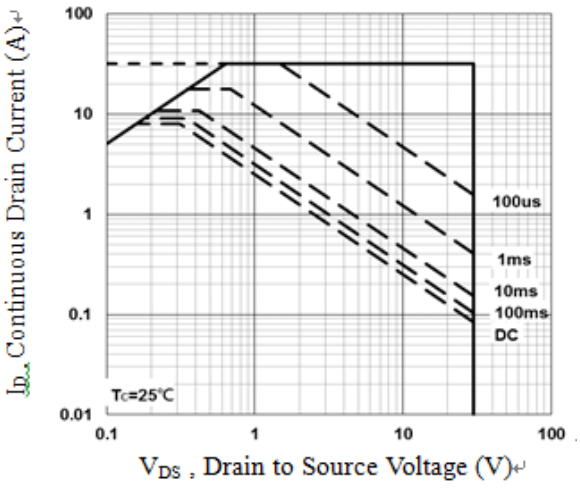


Fig.6 Maximum Safe Operation Area

3. P-CH Characteristics

P-CH 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
$\triangle B_{VDSS}/\triangle T_J$	B_{VDSS} Temperature Coefficient	Reference to 25℃, I_D=1mA	---	-0.03	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=30V, V_{GS}=0V, T_J=25℃	---	---	-1	uA
		V_{DS}=24V, V_{GS}=0V, T_J=125℃	---	---	-10	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=-5A	---	40	50	mΩ
		V_{GS}=-4.5V, I_D=-3A	---	67	90	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=-250uA	-1.2	-1.6	-2.5	V
$\triangle V_{GS(th)}$	VGS(th) Temperature Coefficient		---	4	---	mV/℃
g_{fs}	Forward Transconductance	V_{DS}=-10V, I_D=-3A	---	3.5	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-4.5V, I_D=-3A	---	5.1	7	nC
Q_{gs}	Gate-Source Charge		---	2	3	
Q_{gd}	Gate-Drain Charge		---	2.2	4	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-15V, V_{GS}=-10V, R_G=6Ω I_D=-1A	---	3.4	6	ns
T_r	Turn-On Rise Time		---	10.8	21	
$T_{d(off)}$	Turn-Off Delay Time		---	26.9	51	
T_f	Turn-Off Fall Time		---	6.9	13	
C_{iss}	Input Capacitance	V_{DS}=-15V, V_{GS}=0V, f=1MHz	---	560	810	pF
C_{oss}	Output Capacitance		---	55	80	
C_{rss}	Reverse Transfer Capacitance		---	40	60	

Drain-Source Diode Characteristics

I_S	Continuous Source Current	V_G=V_D=0V , Force Current			-5.5	A
I_{SM}	Pulsed Source Current				-11	A
V_{SD}[1]	Source to Drain Diode Voltage	V_{GS}=0V, I_S=1A, T_J=25℃	---	---	-1	V

Note :

1. The data tested by pulsed, pulse width ≦300us, duty cycle ≦2%.

4. P-CH Characteristics Curves

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

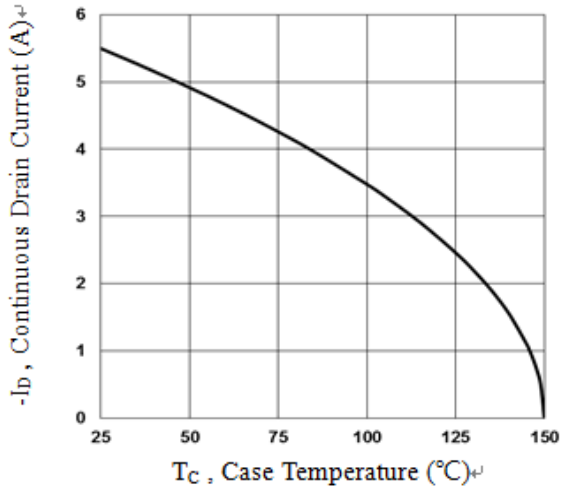


Fig.7 Continuous Drain Current vs. T_C

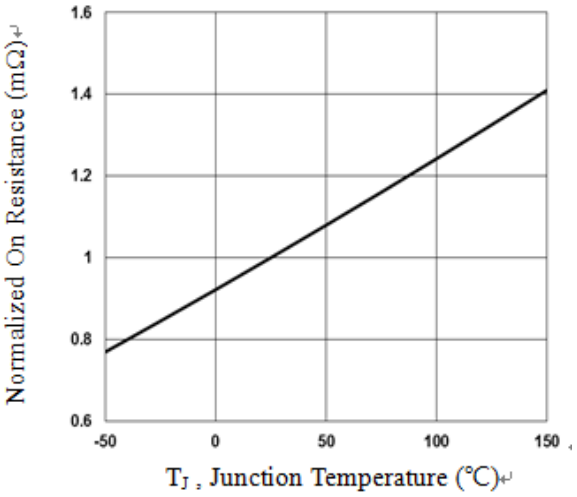


Fig.8 Normalized RDSON vs. T_J

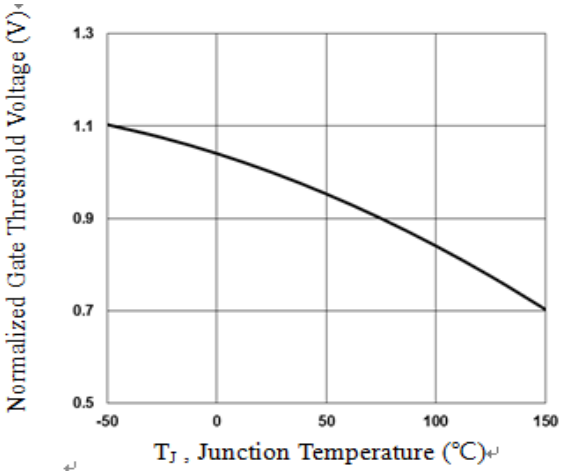


Fig.9 Normalized V_{th} vs. T_J

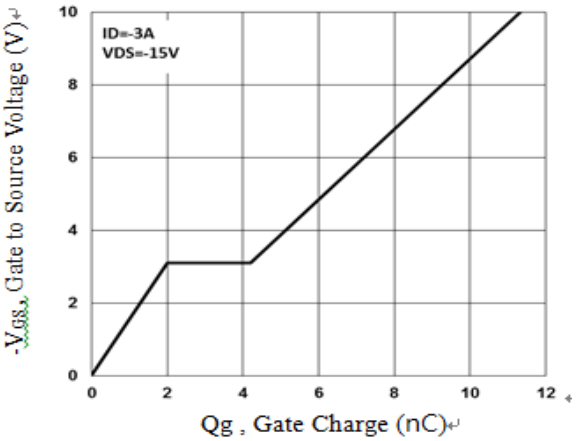


Fig.10 Gate Charge Waveform

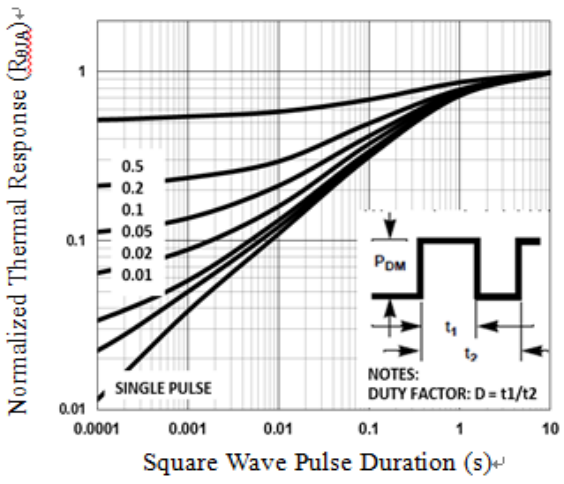


Fig.11 Normalized Transient Response

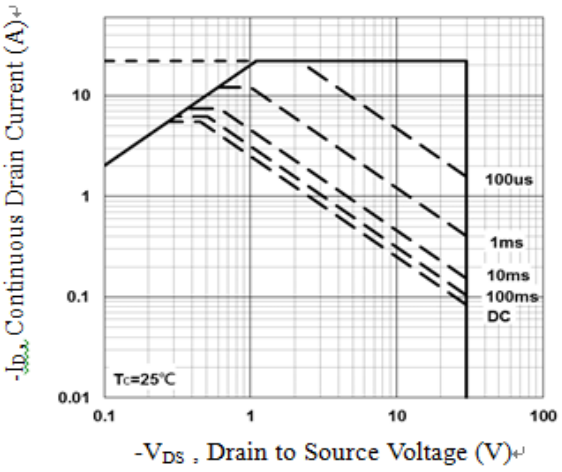


Fig.12 Maximum Safe Operation Area

5. Marking information

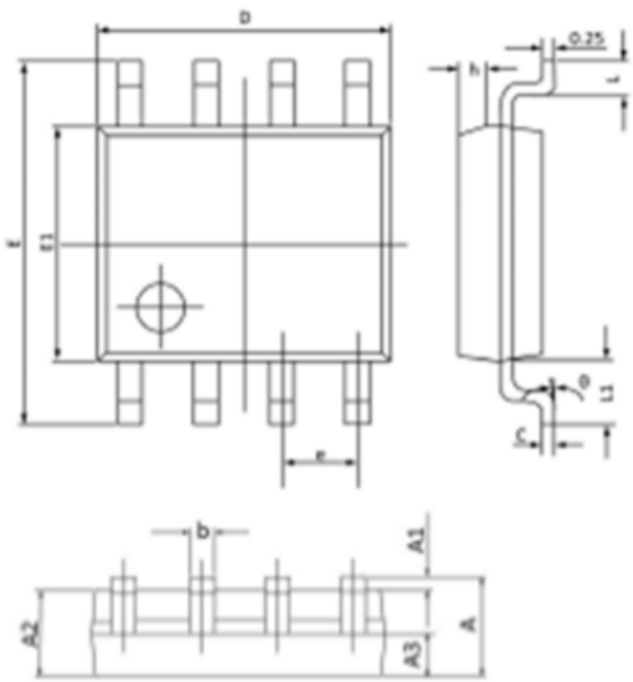
Top Marking Rule

PFC PRM
020C03S8
YYWW ABSH

PRM020C03S8 = 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)

6. Package information

Package Outline Dimensions millimeters



Dim.	Min.	Max.
A	1.35	1.75
A1	0.10	0.25
A2	1.30	---
A3	0.60	0.70
b	0.35	0.49
c	0.18	0.26
D	4.70	5.10
E	5.80	6.20
E1	3.70	4.10
e	1.27 BSC	
h	0.25	0.50
L	0.40	0.90
L1	1.05 BSC	
θ	0°	8°
All Dimensions in mm		

7. Ordering information

Part Number	Package	Delivery mode
PRM020C03S8	SOP-8	3000 pcs / 13” diameter reel

Mechanical

- Molder Plastic: UL Flammability Classification Rating 94V-0
- Device Weight : 0.003 ounces (0.085grams) – SOP-8