



PFC Device Corporation

PRM020C03S8

30V Single N+P Channel MOSFET

Major ratings and characteristics

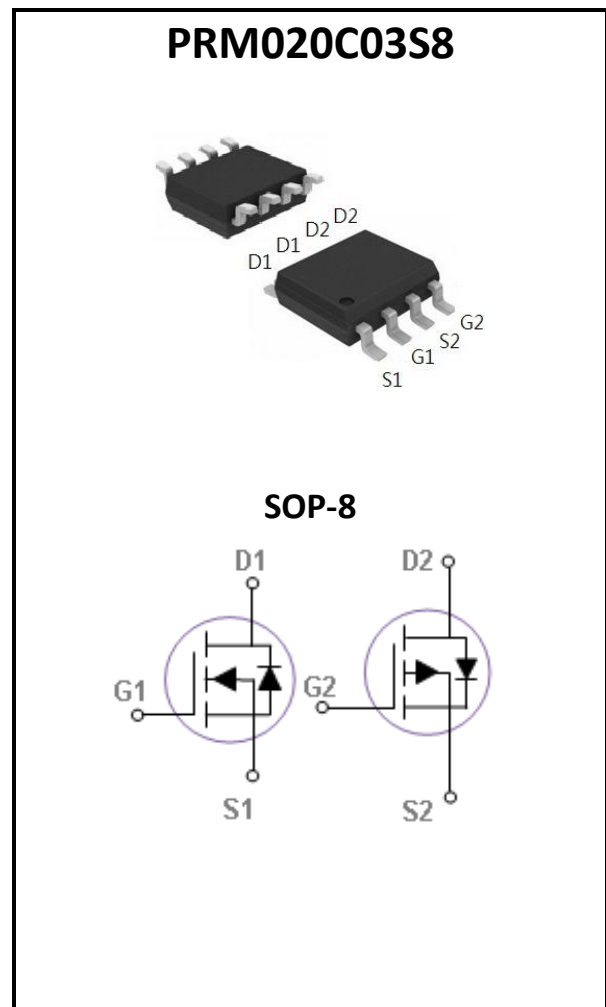
Characteristics	Values	Units
N-CH		
V_{DS}	30	V
I_D ($T_C=25^\circ\text{C}$)	8	A
Max. $R_{DS(ON)}$ @ $V_{GS}=10\text{V}$	20	$\text{m}\Omega$
P-CH		
V_{DS}	-30	V
I_D ($T_C=25^\circ\text{C}$)	-5.5	A
Max. $R_{DS(ON)}$ @ $V_{GS}=10\text{V}$	50	$\text{m}\Omega$
T_J Operating Junction Temperature	-55 to +150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

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 ($T_A = 25^\circ\text{C}$ 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 ($T_C=25^\circ\text{C}$)	8	-5.5	A
	Drain Current – Continuous ($T_C=100^\circ\text{C}$)	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 ($T_C=25^\circ\text{C}$)	2.5		W
	Power Dissipation – Derate above 25°C	0.02		W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150		$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62.5	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	25	$^\circ\text{C}/\text{W}$



N-CH Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=8A$	---	15	20	$m\Omega$
		$V_{GS}=4.5V, I_D=5A$	---	21	30	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.5	2.5	V
$\Delta V_{GS(th)}$	VGS(th) Temperature Coefficient		---	-4	---	$mV/^\circ\text{C}$
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	$V_{DD}=15V, V_{GS}=10V, R_G=6\Omega, I_D=1A$	---	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	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	345	500	pF
C_{oss}	Output Capacitance		---	55	80	
C_{rss}	Reverse Transfer Capacitance		---	32	55	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	---	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	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $L=0.1\text{mH}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.



2. N-CH Characteristics Curves

Ratings and Characteristics Curves

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

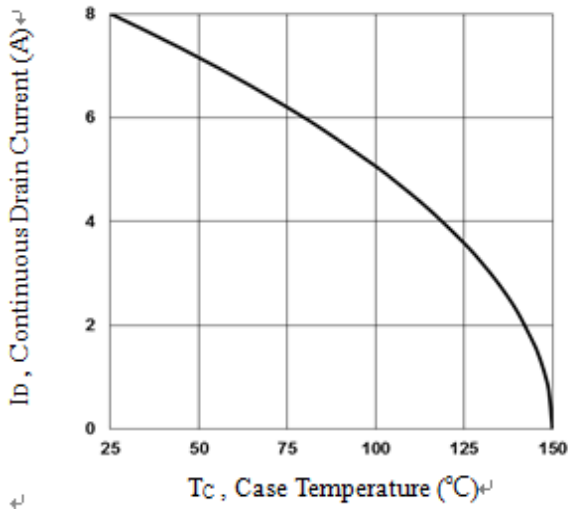


Fig.1 Continuous Drain Current vs. T_C

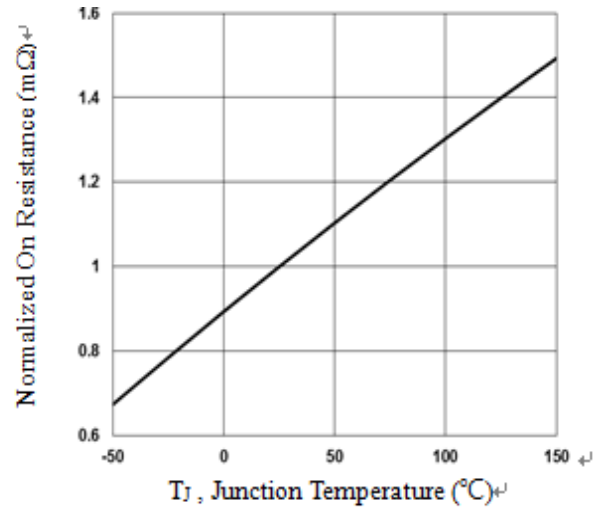


Fig.2 Normalized RDSON vs. T_J

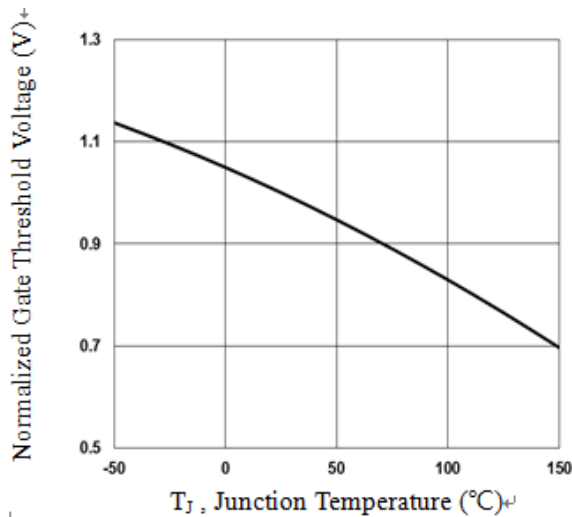


Fig.3 Normalized V_{th} vs. T_J

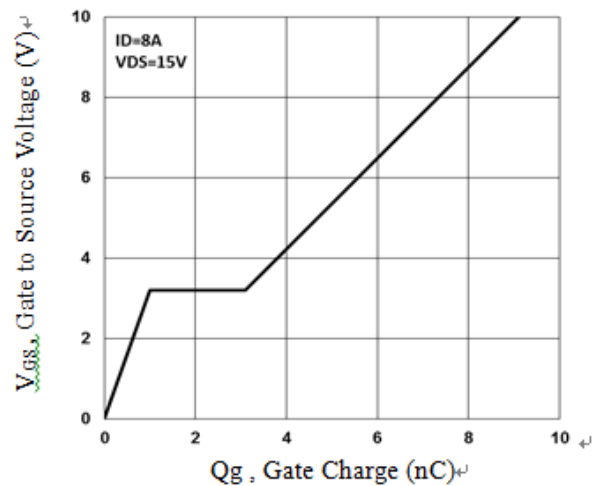


Fig.4 Gate Charge Waveform



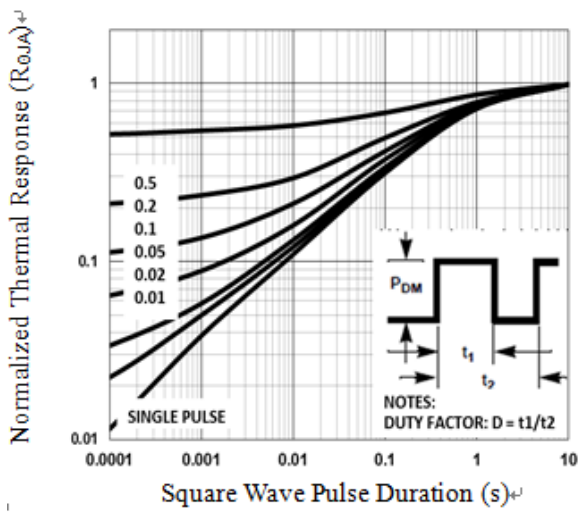


Fig.5 Normalized Transient Response

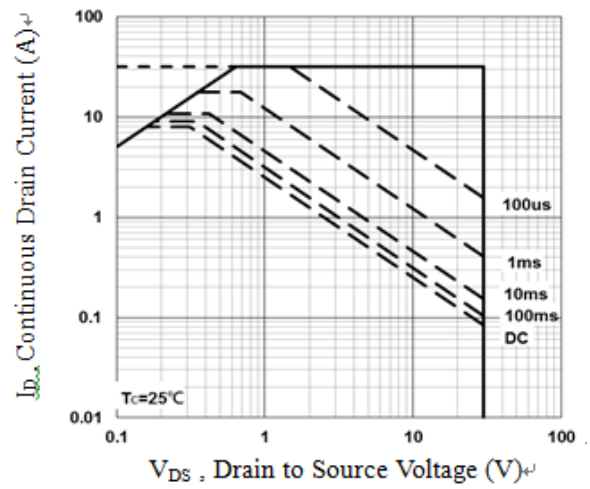


Fig.6 Maximum Safe Operation Area



3. P-CH Characteristics

P-CH Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	-30	---	---	V
$\Delta B_{V_{DSS}}/\Delta T_J$	$B_{V_{DSS}}$ Temperature Coefficient	Reference to $25^\circ\text{C}, I_D=1\text{mA}$	---	-0.03	---	$V/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-5A$	---	40	50	$m\Omega$
		$V_{GS}=-4.5V, I_D=-3A$	---	67	90	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.6	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4	---	$mV/^\circ\text{C}$
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	$V_{DD}=-15V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A$	---	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	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	560	810	pF
C_{oss}	Output Capacitance		---	55	80	
C_{riss}	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	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

1. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.



4. P-CH Characteristics Curves

Ratings and Characteristics Curves

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

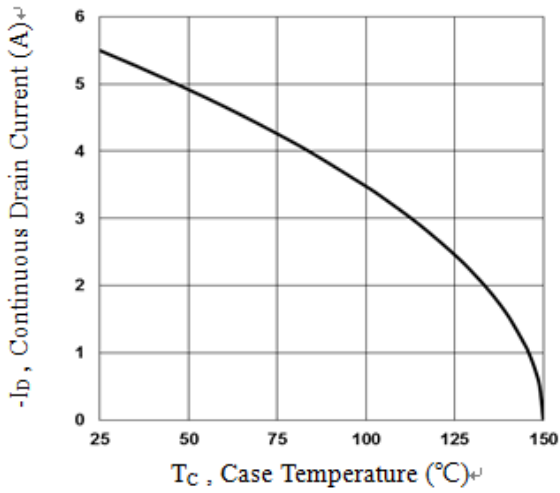


Fig.7 Continuous Drain Current vs. T_C

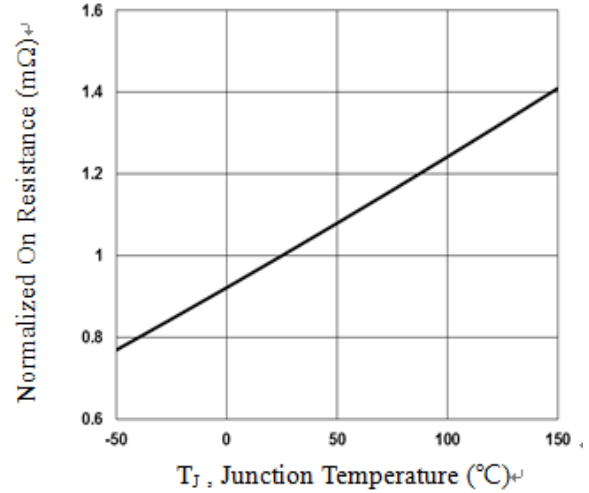


Fig.8 Normalized R_{DSON} vs. T_J

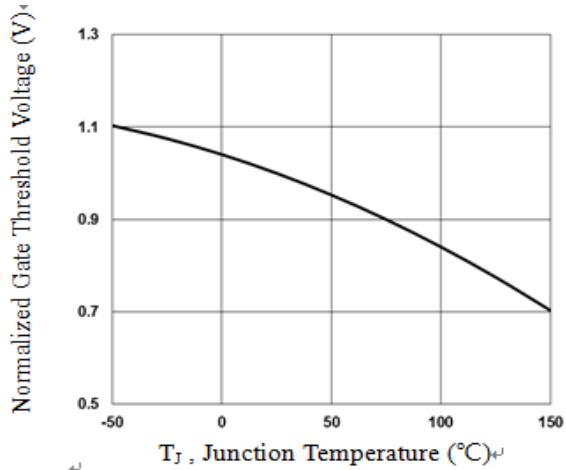


Fig.9 Normalized V_{th} vs. T_J

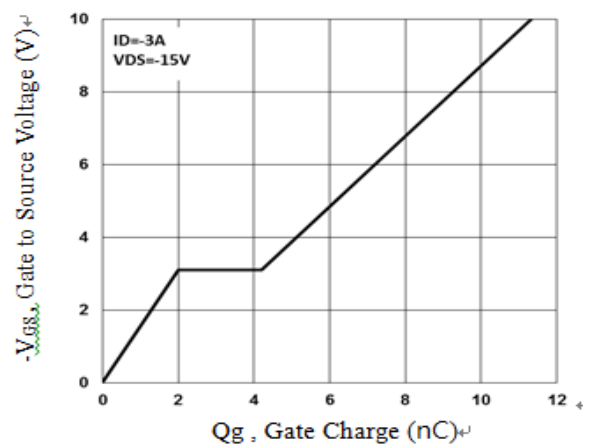


Fig.10 Gate Charge Waveform



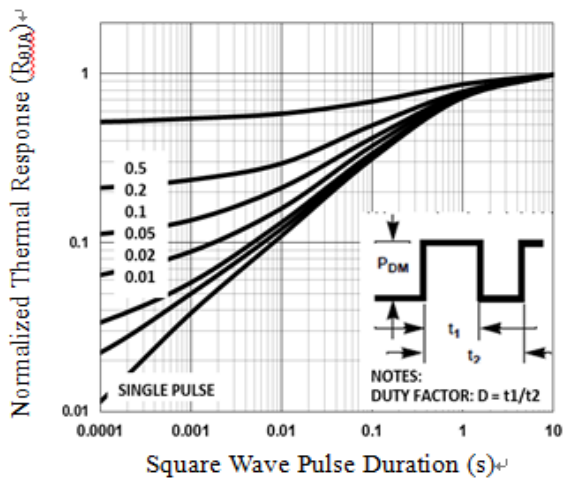


Fig.11 Normalized Transient Response

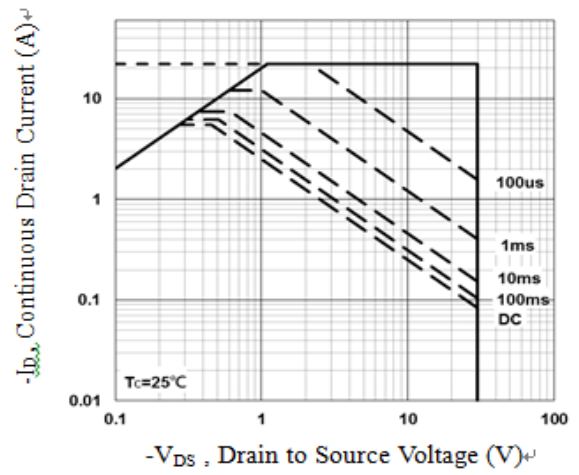
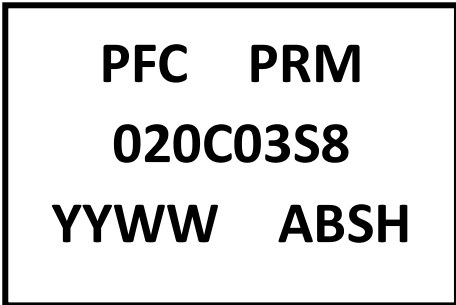


Fig.12 Maximum Safe Operation Area



5. Marking information

Top Marking Rule



PRM020C03S8 = Product Type Marking Code

YYWW = Date Code

YY = Last two digits of year

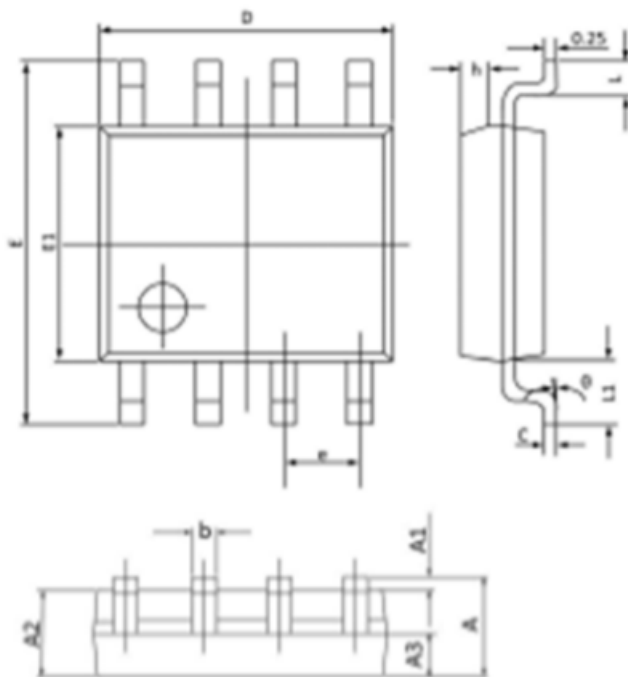
WW = Week code

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

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