P5MBC012

30V N+P Dual Channel MOSFETs

BV_{DSS}	$R_{DS(ON)}$	I_D
30 V	12 mΩ	23.3 A
-30 V	29 mΩ	-15.2 A

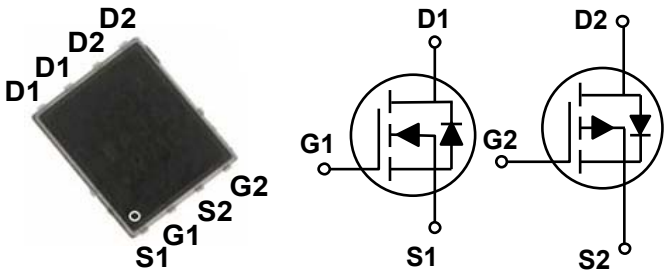
General Description

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.

Features

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

PPAK5X6 Dual Pin Configuration



Applications

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

Absolute Maximum Ratings T_C=25°C unless otherwise noted

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)	23.3	-15.2	A
	Drain Current - Continuous (T_C=100°C)	14.7	-9.6	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	93.2	-60.8	A
EAS	Single Pulse Avalanche Energy (NOTE 2、6)	39.2	39.2	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	28	28	A
P_D	Power Dissipation (T_C=25°C)	17.4		W
T_J	Operating Junction Temperature Range	-55 to 150		°C
T_{STG}	Storage Temperature Range	-55 to 150		°C
Marking Code		BC012		

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	---	7.2	°C/W

N Channel Electrical Characteristics (T_J=25°C, unless otherwise noted)

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°C	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=125°C	---	---	10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=10A	---	---	12	mΩ
		V_{GS}=4.5V , I_D=5A	---	---	18	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250uA	1.2	---	2.5	V
gfs	Forward Transconductance	V_{DS}=5V , I_D=5A	---	6.4	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}=15V , V_{GS}=4.5V , I_D=5A (NOTE 3、4)	---	7.4	---	nC
Q_{gs}	Gate-Source Charge		---	2.3	---	
Q_{gd}	Gate-Drain Charge		---	3	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=6Ω , I_D=1A (NOTE 3、4)	---	3.8	---	nS
T_r	Rise Time		---	10	---	
$T_{d(off)}$	Turn-Off Delay Time		---	22	---	
T_f	Fall Time		---	6.6	---	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	680	---	pF
C_{oss}	Output Capacitance		---	150	---	
C_{rss}	Reverse Transfer Capacitance		---	70	---	
Rg	Gate Resistance	V_{GS}=0V , V_{DS}=0V , F=1MHz	---	2.8	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	23.3	A
I_{SM}	Pulsed Source Current		---	---	46.6	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1	V

NOTES：

1. Repetitive Rating：Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=28A, R_G=25Ω, Starting T_J=25°C.
3. The data tested by pulsed, pulse width ≦ 300us, duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

Characteristics Curves

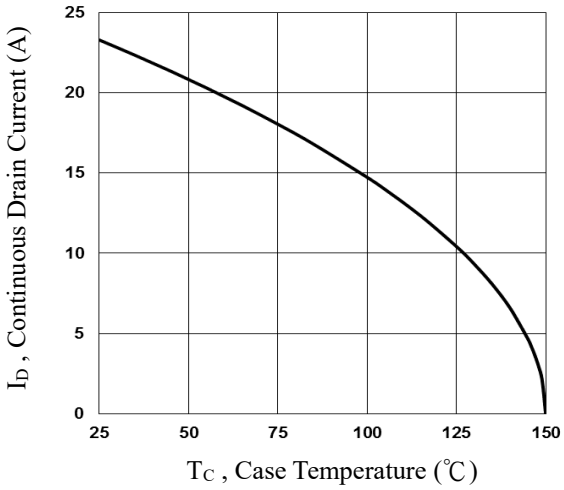


Fig.1 Continuous Drain Current vs. T_C

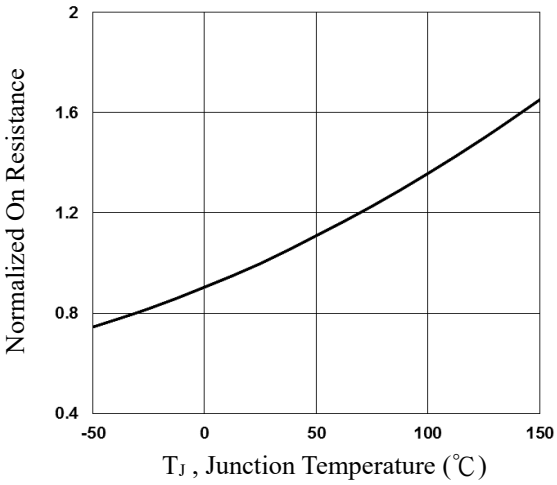


Fig.2 Normalized RDSON vs. T_J

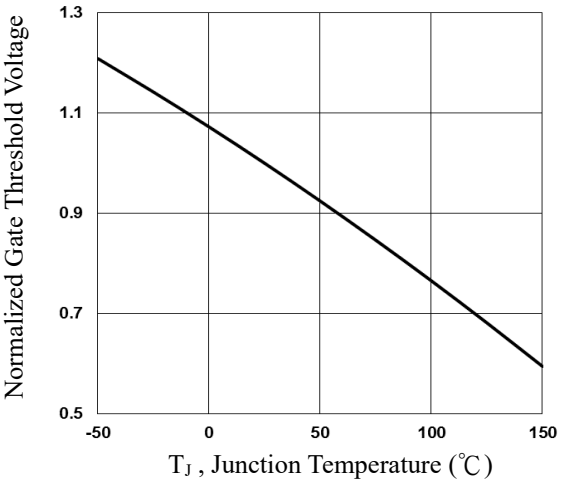


Fig.3 Normalized V_{th} vs. T_J

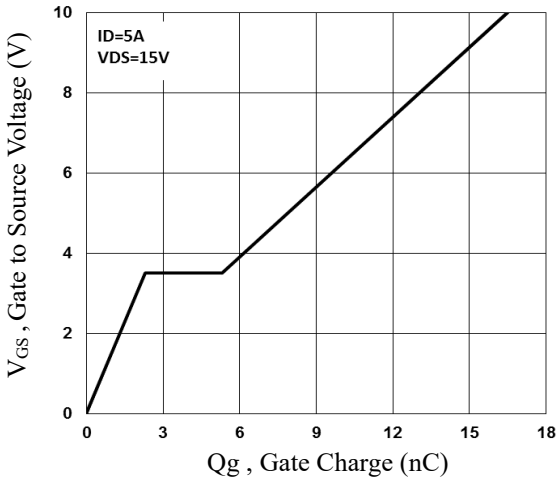


Fig.4 Gate Charge Waveform

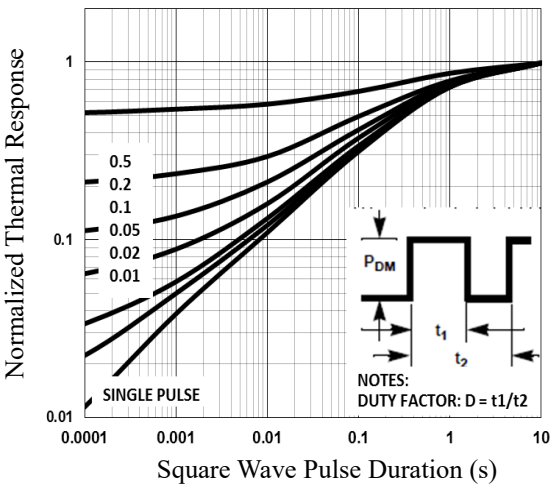


Fig.5 Normalized Transient Response

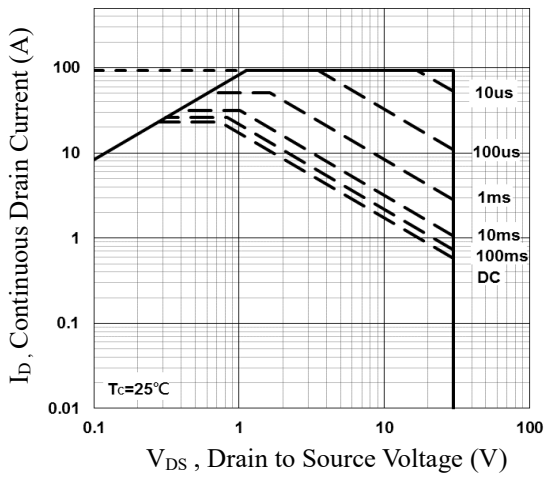


Fig.6 Maximum Safe Operation Area

P Channel Electrical Characteristics (T_J=25°C, unless otherwise noted)

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°C	---	---	-1	uA
		V_{DS}= -24V , V_{GS}= 0V , T_J=125°C	---	---	-10	
I_{GSS}	Gate-Source Leakage Current	V_{GS}= ±20V , V_{DS}= 0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}= -10V , I_D= -4A	---	---	29	mΩ
		V_{GS}= -4.5V , I_D= -2A	---	---	46	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D= -250uA	-1.2	---	-2.5	V
gfs	Forward Transconductance	V_{DS}= -10V , I_D= -3A	---	5.4	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}= -15V , V_{GS}= -4.5V , I_D= -5A (NOTE 7、8)	---	8	---	nC
Q_{gs}	Gate-Source Charge		---	3.3	---	
Q_{gd}	Gate-Drain Charge		---	2.3	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}= -15V , V_{GS}= -10V , R_G= 6Ω , I_D= -1A (NOTE 7、8)	---	4.6	---	nS
T_r	Rise Time		---	14	---	
$T_{d(off)}$	Turn-Off Delay Time		---	34	---	
T_f	Fall Time		---	18	---	
C_{iss}	Input Capacitance	V_{DS}= -15V , V_{GS}= 0V , F= 1MHz	---	930	---	pF
C_{oss}	Output Capacitance		---	148	---	
C_{rss}	Reverse Transfer Capacitance		---	115	---	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-15.2	A
I_{SM}	Pulsed Source Current		---	---	-30.4	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S= -1A , T_J=25°C	---	---	-1	V

NOTES：

5. Repetitive Rating：Pulsed width limited by maximum junction temperature.
6. V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-28A, R_G=25Ω, Starting T_J=25°C.
7. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
8. Essentially independent of operating temperature.

Characteristics Curves

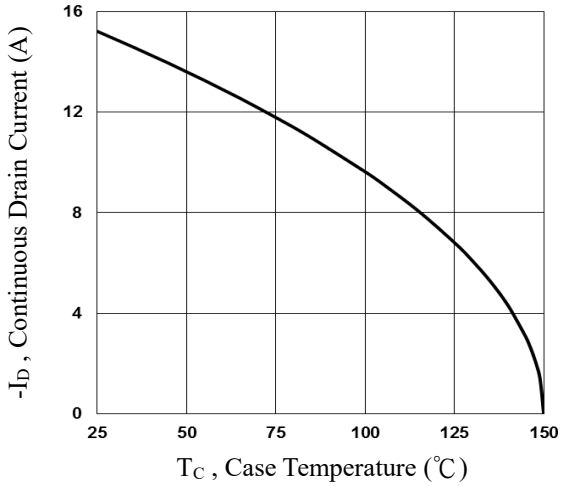


Fig.7 Continuous Drain Current vs. T_C

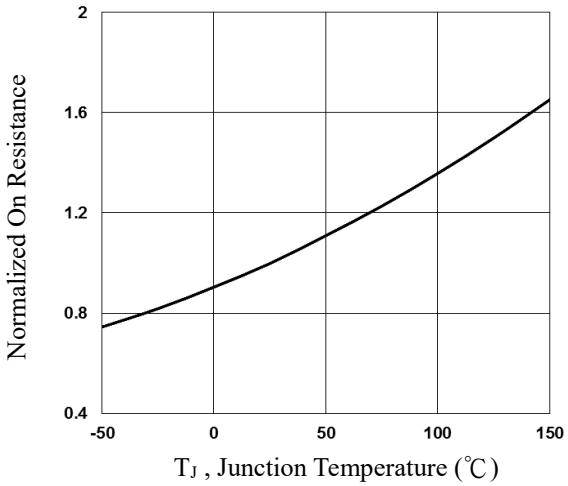


Fig.8 Normalized RDSON vs. T_J

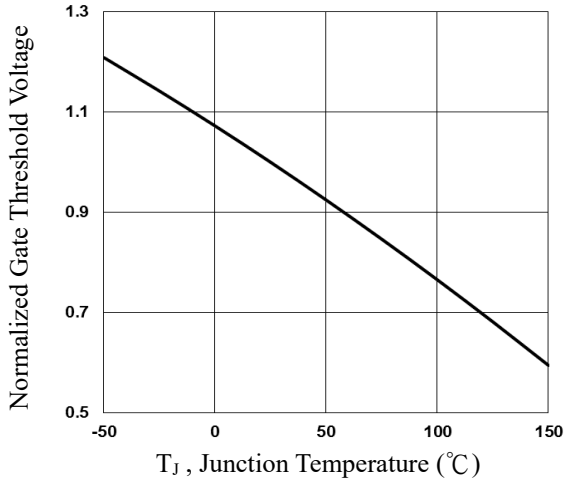


Fig.9 Normalized V_{th} vs. T_J

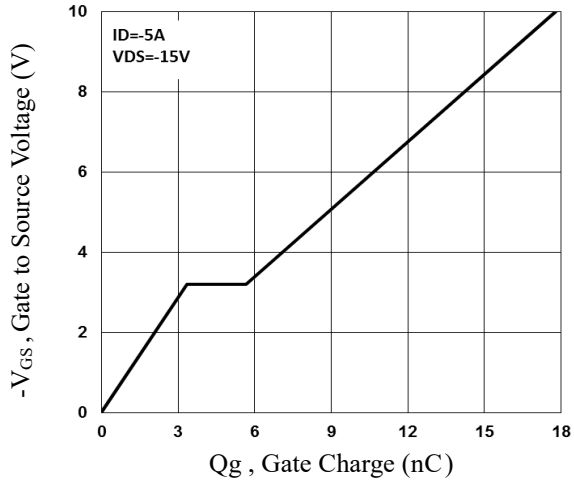


Fig.10 Gate Charge Waveform

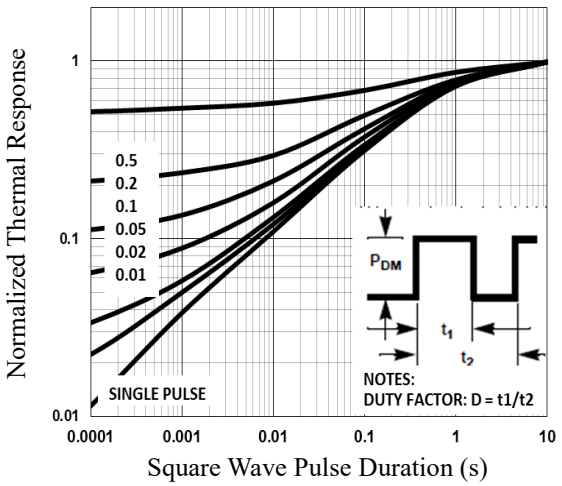


Fig.11 Normalized Transient Impedance

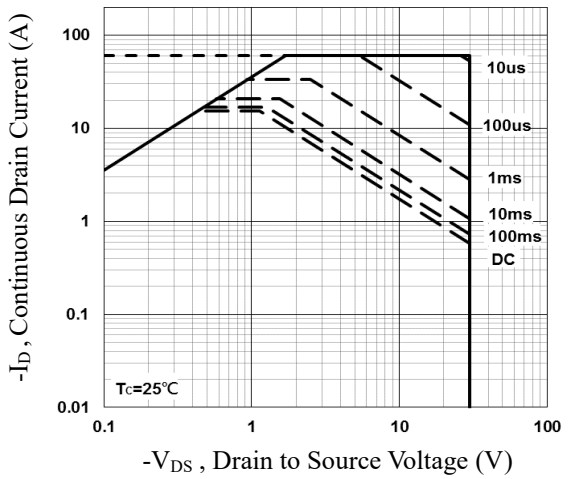
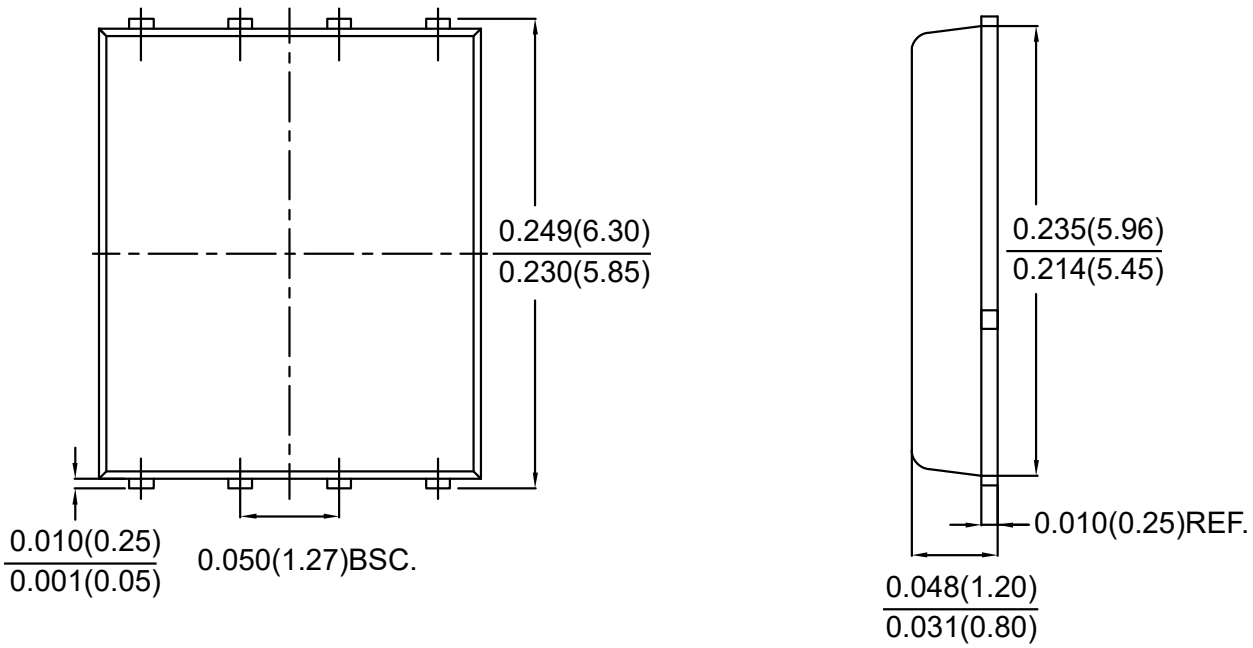
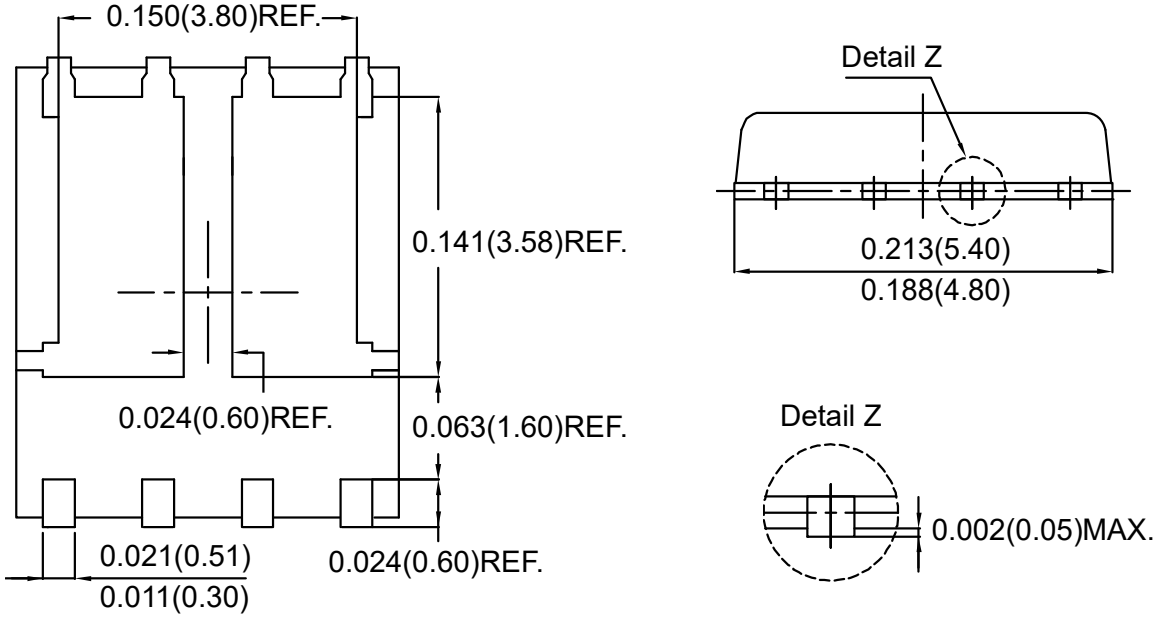


Fig.12 Maximum Safe Operation Area

Package Outline Dimensions





PPAK5X6 Dual

Dimensions in inches and (millimeters)

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