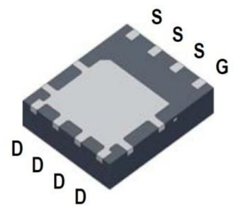
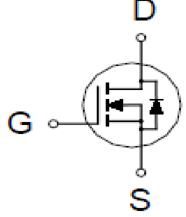
PK5E4BA

N-Channel Enhancement Mode MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
30V	9.5mΩ @V_{GS} = 10V	40A





PDFN 5X6P

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current[3]	T_C = 25 °C	I_D	40	A
	T_C = 100 °C		25	
Pulsed Drain Current[1]		I_{DM}	120	
Continuous Drain Current	T_A = 25 °C	I_D	14	
	T_A= 70 °C		11	
Avalanche Current		I_{AS}	21	
Avalanche Energy	L =0.1mH	E_{AS}	22	mJ
Power Dissipation	T_C = 25 °C	P_D	29	W
	T_C = 100 °C		12	
Power Dissipation[4]	T_A = 25 °C	P_D	3.9	W
	T_A = 70 °C		2.5	
Operating Junction & Storage Temperature Range		T_J, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE		SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Ambient[2]	t ≦10s	$R_{\theta JA}$		32	°C / W
Junction-to-Ambient[2]	Steady-State	$R_{\theta JA}$		58	
Junction-to-Case	Steady-State	$R_{\theta JC}$		4.2	

[1]Pulse width limited by maximum junction temperature.

[2]The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C.

[3]Package limitation current is 35A.

[4]The Power dissipation is based on $R_{\theta JA}$ t ≦10s value.

PK5E4BA

N-Channel Enhancement Mode MOSFET

ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS MIN	LIMITS TYP	LIMITS MAX	UNITS
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	30			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.3	1.5	2.3	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V			1	μA
		V_{DS} = 20V, V_{GS} = 0V, T_J = 55 °C			10	μA
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 8.8A		10	15	mΩ
		V_{GS} = 10V , I_D = 11A		7	9.5	mΩ
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 11A		30		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 15V, f = 1MHz		530		pF
Output Capacitance	C_{oss}			155		pF
Reverse Transfer Capacitance	C_{rss}			94		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz		2.5		Ω
Total Gate Charge[2]	Q_g (V_{GS} =10V)	V_{DS} = 15V, V_{GS} = 10V, I_D = 11A		13.5		nC
	Q_g (V_{GS} =4.5V)			7.7		nC
Gate-Source Charge[2]	Q_{gs}			1		nC
Gate-Drain Charge[2]	Q_{gd}			4.5		nC
Turn-On Delay Time[2]	$t_{d(on)}$	V_{DS} = 15V, I_D ≅ 11A, V_{GS} = 10V, R_{GEN} = 6Ω		18		nS
Rise Time[2]	t_r			16		nS
Turn-Off Delay Time[2]	$t_{d(off)}$			35		nS
Fall Time[2]	t_f			17		nS
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)						
Continuous Current	I_S				24	A
Forward Voltage[1]	V_{SD}	I_F = 11A, V_{GS} = 0V			1.2	V
Reverse Recovery Time	t_{rr}	I_F = 11A, dI_F/dt = 100A / μS		14		nS
Reverse Recovery Charge	Q_{rr}			4		nC

[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

PK5E4BA

N-Channel Enhancement Mode MOSFET

Output Characteristics

VGS=10V
VGS=9V
VGS=8V
VGS=7V
VGS=6V
VGS=5V
VGS=4.5V
VGS=3.5V
VGS=3V

ID, Drain-To-Source Current(A)

VDS, Drain-To-Source Voltage(V)

Transfer Characteristics

25℃
125℃
-20℃

ID, Drain-To-Source Current(A)

VGS, Gate-To-Source Voltage(V)

Gate charge Characteristics

VDS=15V
ID=11A

VGS , Gate-To-Source Voltage(V)

Qg , Total Gate Charge(nC)

Capacitance Characteristic

CISS
COSS
CRSS

C , Capacitance(pF)

VDS, Drain-To-Source Voltage(V)

On-Resistance VS Gate-To-Source

ID=11A

RDS(ON)ON-Resistance(OHM)

VGS, Gate-To-Source Voltage(V)

On-Resistance VS Drain Current

VGS=4.5V
VGS=10V

RDS(ON)ON-Resistance(OHM)

ID , Drain-To-Source Current(A)

PK5E4BA

N-Channel Enhancement Mode MOSFET

On-Resistance VS Temperature

Normalized Drain to Source ON-Resistance

2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4

VGS=10V
ID=11A

-50 -25 0 25 50 75 100 125 150

T_J , Junction Temperature(°C)

Source-Drain Diode Forward Voltage

I_S , Source Current(A)

100
10
1
0.1

150℃
25℃

0.0 0.2 0.4 0.6 0.8 1.0 1.2

V_{SD}, Source-To-Drain Voltage(V)

Safe Operating Area

I_D , Drain Current(A)

1000
100
10
1
0.1
0.01

Operation in This Area is Limited by RDS(ON)

1ms
10ms
100ms
DC

NOTE :
1.VGS= 10V
2.TA=25°C
3.RθJA = 58°C/W
4.Single Pulse

0.1 1 10 100

V_{DS}, Drain-To-Source Voltage(V)

Single Pulse Maximum Power Dissipation

Power(W)

45
36
27
18
9
0

Single Pulse
RθJA = 58°C/W
TA=25°C

0.001 0.01 0.1 1 10 100

Single Pulse Time(s)

Transient Thermal Response Curve

r(t) , Normalized Effective Transient Thermal Resistance

10
1
0.1
0.01

Duty cycle=0.5
0.2
0.1
0.05
0.02
0.01

single pulse

Notes
P_{DM}
t1
t2
1.Duty cycle, D= t1 / t2
2.RthJA = 58 ℃/W
3.TJ-TA = P*RthJA(t)
4.RthJA(t) = r(t)*RthJA

0.0001 0.001 0.01 0.1 1 10 100

T_1 , Square Wave Pulse Duration[sec]

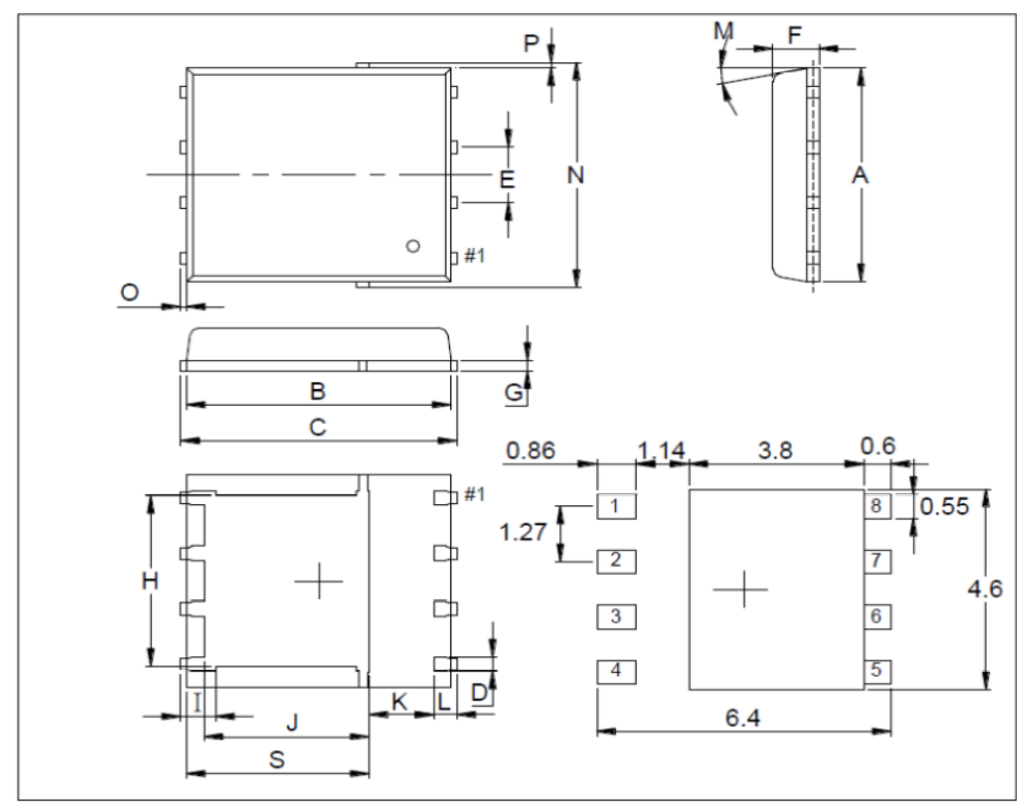
PK5E4BA

N-Channel Enhancement Mode MOSFET

Package Dimension

PDFN 5x6P MECHANICAL DATA

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.8		5.15	J	3.34		3.9
B	5.42		5.9	K	0.9		
C	5.9		6.35	L	0.38		0.711
D	0.3		0.51	M	0°		12°
E	1.17	1.27	1.37	N	4.8		5.4
F	0.8	1	1.2	O	0.05		0.36
G	0.15		0.35	P	0.05		0.25
H	3.67		4.31	S	3.73		4.19
I	0.38		0.71				



PK5E4BA

N-Channel Enhancement Mode MOSFET

A. Marking Information

D D D D

XXX — Logo

XXXXXXX — Part.NO.

XXXXXXXXX — LOT.NO.

S S S G

B. Tape&Reel Information:3000pcs/Reel

TRL

Pin1

FEED DIRECYION

1.50+0.1 -0.0

8.00±0.10

2.00±0.05

4.00±0.10

5.50±0.05

1.75±0.1

R0.3 MAX

12.00±0.3

1.5+1.0 -0.1

1.4±0.1

R159

R165±0.5

2.2

13

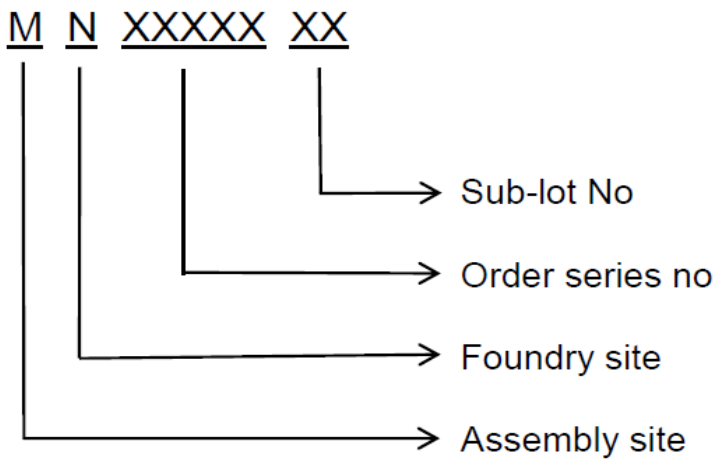
97.0±1.0

PK5E4BA

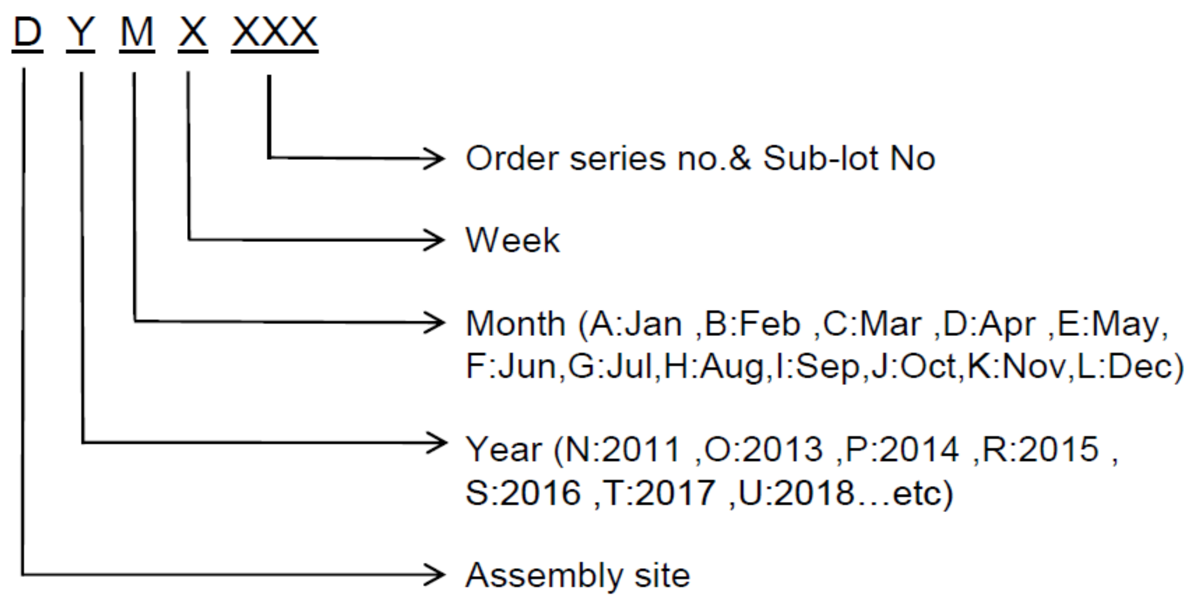
N-Channel Enhancement Mode MOSFET

C. Lot No.&Date Code rule

1.Lot No.



2.Date Code



PK5E4BA

N-Channel Enhancement Mode MOSFET

D.Label rule

标签内容(Label content)

1	Label Size	30 * 90 mm
2	Font style	Times New Roman or Arial （或可区分英文”0”和数字”0”，”G和”Q”的字型即可）
3	U-NIKC	Height: 4 mm
4	Package	Height: 2 mm
5	Date	Height: 2 mm Shipping date: YYYY/MM/DD, ex. 2008/09/12
6	Device	Height: 3 mm (Max: 16 Digit)
7	Lot	Height: 3 mm (Max: 9 Digit) Sub lot
8	D/C	Height: 3 mm (Max: 7 Digit)
9	QTY	Height: 3 mm (Max: 6 Digit) Thousand mark is no needed
10	RoHS label	RoHS long axis: 12 mm minor axis:6 mm bottom color: White Font color: Black Font style: Arial
11	Halogen Free label	G Diameter: 10 mm bottom color: Green Font color: Black Font style: Arial
12	Scan information	Device / Lot / D/C / QTY , Insert " / " between every parts. for example: P3055LDG/G12345601/GGG2301/2000 DPI (Dots per inch): Over 300 dpi Code : Code 128 Height: 6 mm at least