N And P-Channel Enhancement Mode MOSFET

Description

The NP6661BQR uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge . The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

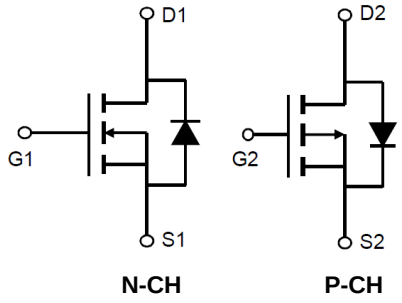
General Features

- **N-channel：**
  V_{DS} =30V，ID =10A
  $R_{DS(ON)}$=9.6mΩ (typical) @ VGS=10V
  $R_{DS(ON)}$=13.7mΩ (typical) @ VGS=4.5V
  P-Channel：
  V_{DS} =-30V，ID =-10A
  $R_{DS(ON)}$=20mΩ (typical) @ VGS=-10V
  $R_{DS(ON)}$=29mΩ (typical) @ VGS=-4.5V
- Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- Very low on-resistance $R_{DS(ON)}$
- 150 °C operating temperature
- Pb-free lead plating

Application

- Pch+Nch Complementary MOSFET for DC-FAN
- H-Bridge application

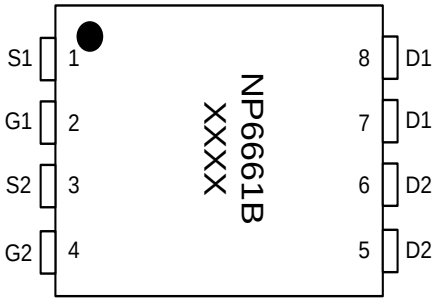
Schematic diagram



Marking and pin assignment

PDFN3×3-8L

（Top View）



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP6661BQR-G	-55°C to +150°C	PDFN3*3-8L	5000

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

Parameter		Symbol	Limit		Unit
			N	P	
Drain-source voltage		V_{DS}	30	-30	V
Gate-source voltage		V_{GS}	±20	±20	V
Operating junction Temperature range		T_j	-55—150	-55—150	℃
Drain Current-Continuous (Silicon Limited)	T_A=25°C	I_D	10	-10	A
	T_A=75°C		6	-6	
Pulsed Drain Current (Package Limited)		I_{DM}	72	-72	A

Avalanche Current [C]		I_{AS}, I_{AR}	22	-27	A
Avalanche energy L=0.1mH[C]		E_{AS}, E_{AR}	24	36	mJ
Power Dissipation [B]	T_A=25°C	P_D	12	20	W
	T_A=75°C		5	8	
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		℃

N-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	30	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	1.73	3.0	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	9.6	13	mΩ
		V_{GS}=4.5V, I_D=10A	-	13.7	17	
Forward transconductance	gfs	V_{DS}=5V, I_D=10A	-	43	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=15V ,V_{GS}=0V f=1.0MHz	-	971	-	pF
Output capacitance	C_{OSS}		-	171	-	
Reverse transfer capacitance	C_{RSS}		-	131	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	1.6	2.4	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=15V V_{GS}=10V R_L=1.5Ω R_{GEN}=3Ω	-	4.4	-	ns
Rise time	tr		-	9	-	
Turn-off delay time	$t_{D(OFF)}$		-	17	-	
Fall time	tf		-	6	-	
Total gate charge	Qg	V_{DS}=15V,I_D=10A V_{GS}=10V	-	19.4	-	nC
Gate-source charge	Qgs		-	3	-	
Gate-drain charge	Qgd		-	3.9	-	

Typical Performance Characteristics

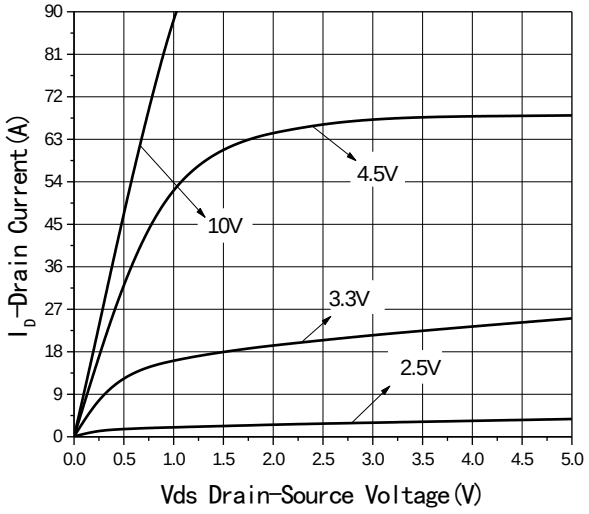


Fig1 Output Characteristics

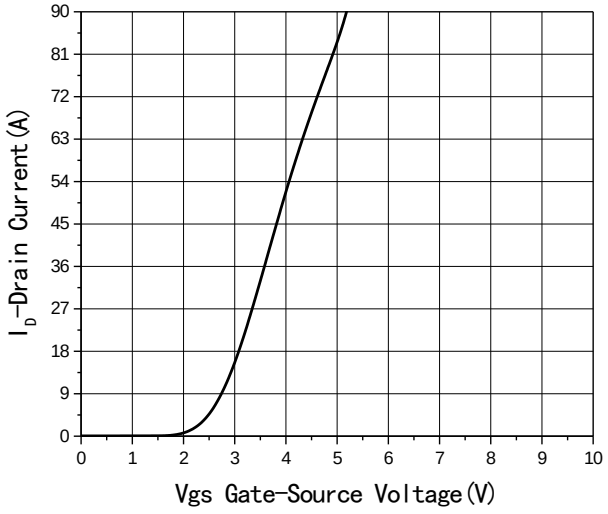


Fig2 Transfer Characteristics

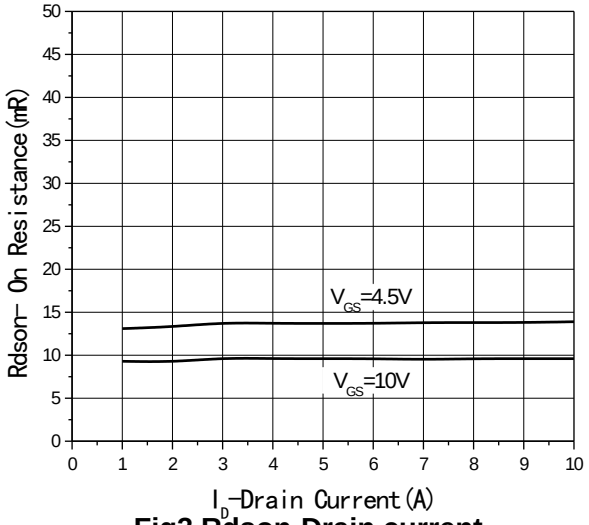


Fig3 Rdson-Drain current

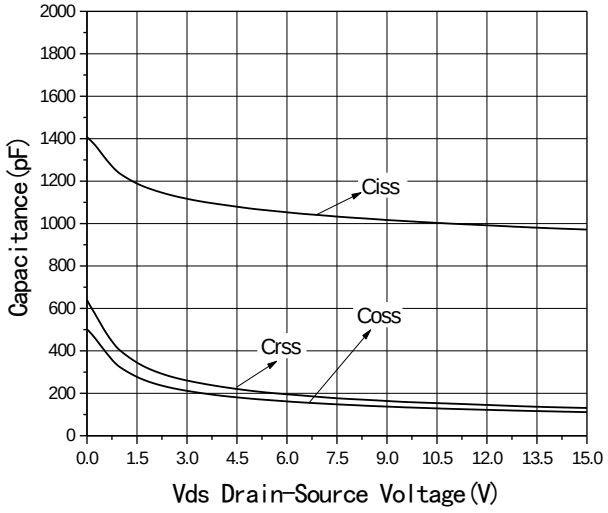


Fig4 Capacitance vs Vds

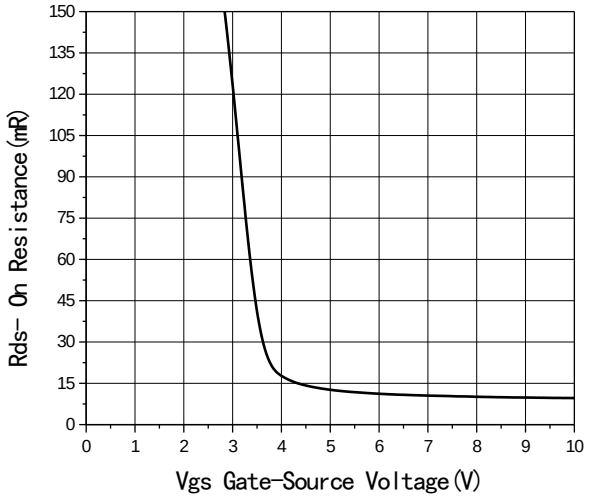


Fig5 Rdson-Gate Drain voltage

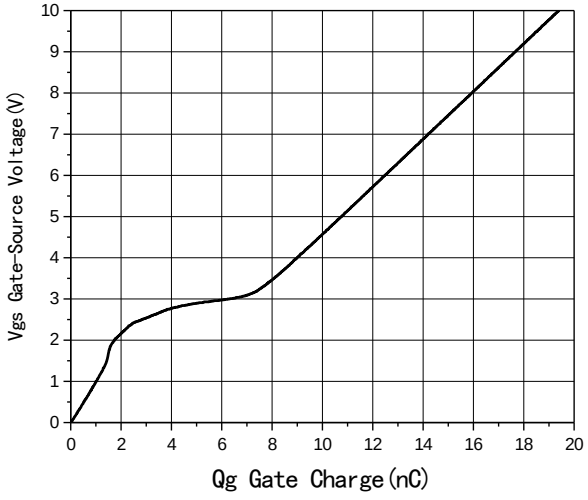


Fig6 Gate Charge

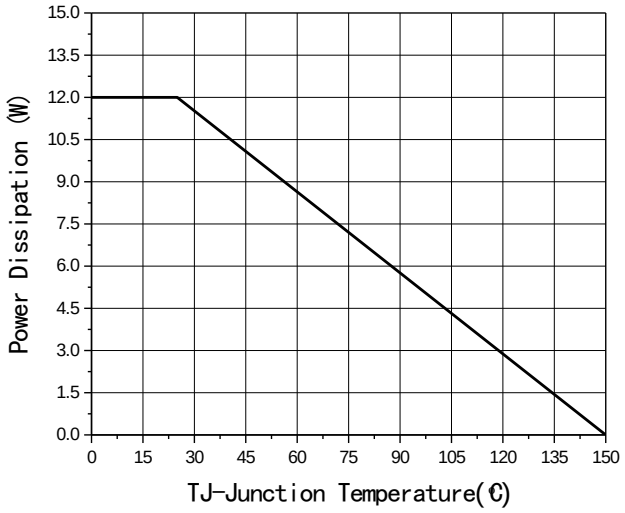


Fig7 Power De-rating

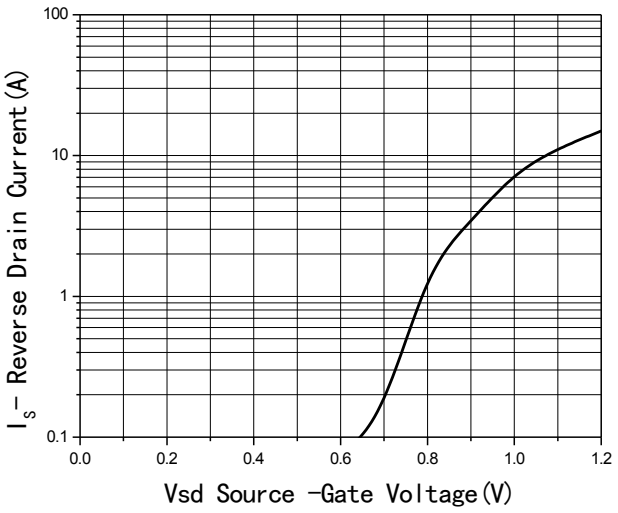


Fig8 Source-Drain Diode Forward

P-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-30	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V	-	-	-1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.6	-2.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-10A	-	20	25	mΩ
		V_{GS}=-4.5V, I_D=-10A	-	29	40	
Forward transconductance	gfs	V_{DS}=-5V, I_D=-10A	-	18	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-15V ,V_{GS}=0V f=1.0MHz	-	1240	-	pF
Output capacitance	C_{OSS}		-	151	-	
Reverse transfer capacitance	C_{RSS}		-	138	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	4	-	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=-15V V_{GS}=-10V R_L=2.3Ω R_{GEN}=3Ω	-	10	-	ns
Rise time	tr		-	5.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	3.6	-	
Fall time	tf		-	4.6	-	
Total gate charge	Qg	V_{DS}=-15V,I_D=-10A V_{GS}=-10V	-	24	-	nC
Gate-source charge	Qgs		-	3.5	-	
Gate-drain charge	Qgd		-	4.7	-	

Typical Performance Characteristics

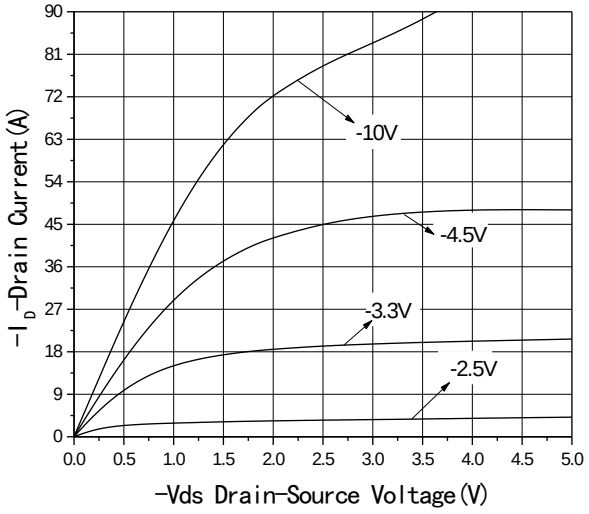


Fig1 Output Characteristics

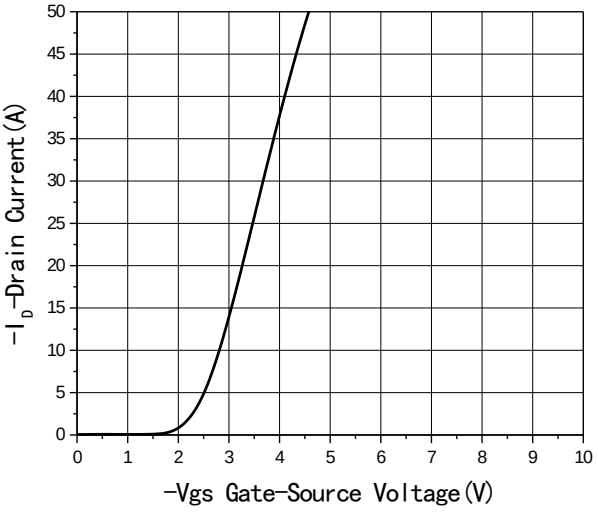


Fig2 Transfer Characteristics

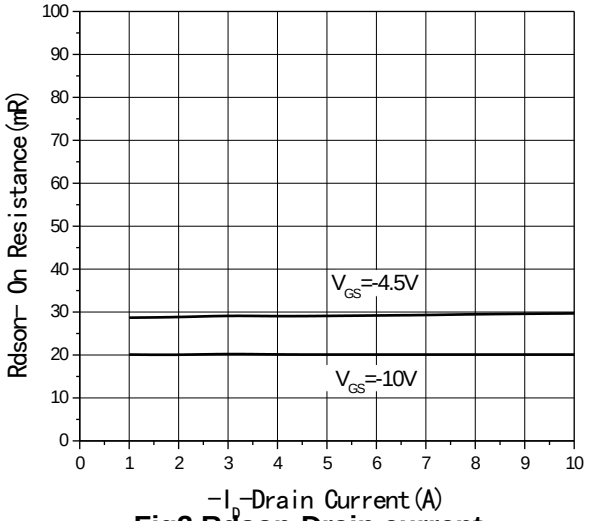


Fig3 Rdson-Drain current

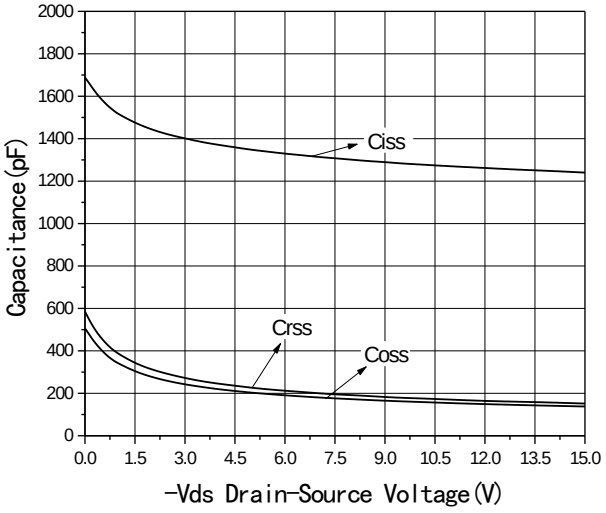


Fig4 Capacitance vs Vds

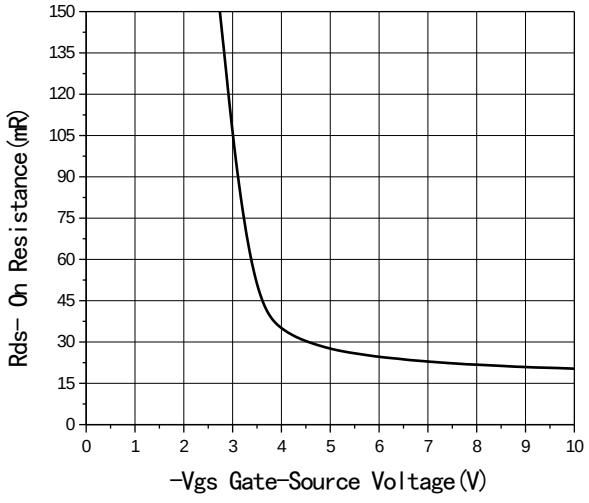


Fig5 Rdson-Gate Drain voltage

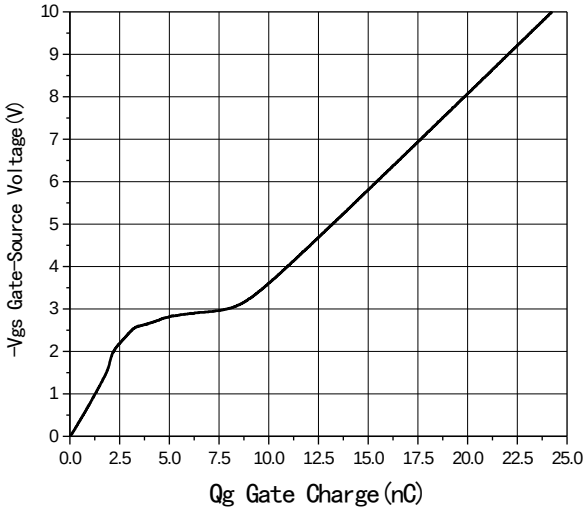


Fig6 Gate Charge

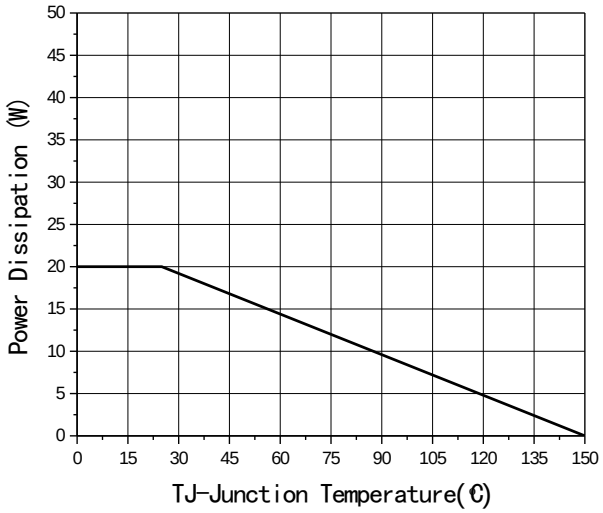


Fig7 Power De-rating

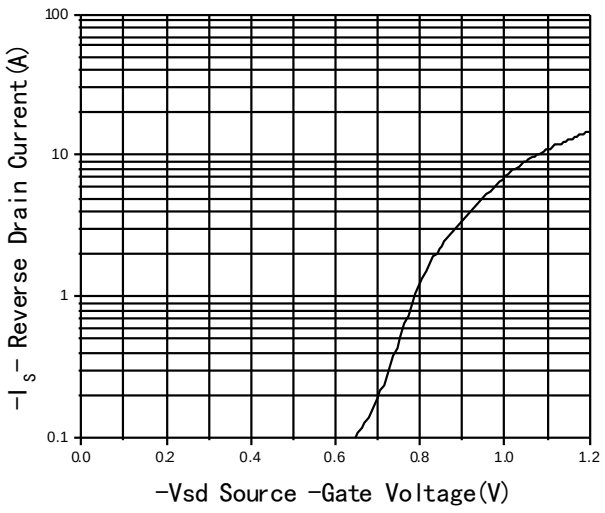
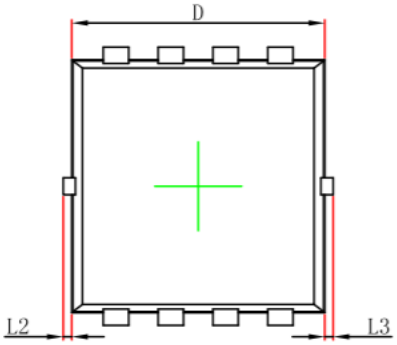


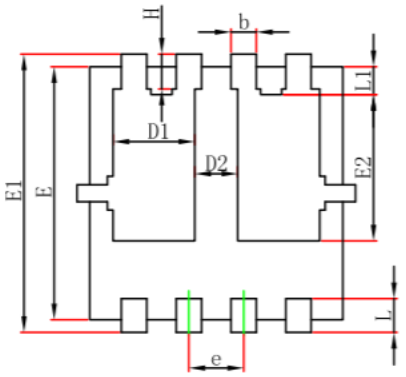
Fig8 Source-Drain Diode Forward

Package Information

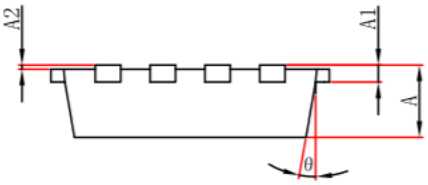
- **PDFN3*3-8L**



Top View
[顶视图]



Bottom View
[背视图]



Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	0.935	1.135	0.037	0.045
D2	0.280	0.480	0.011	0.019
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°