20V N And P-Channel Enhancement Mode MOSFET

Description

The NP6608QR 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.

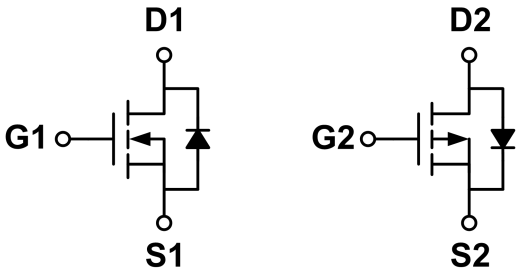
General Features

- **N-channel：**
  V_{DS} =20V，ID =10A
  $R_{DS(ON)}$=8.8mΩ (typical) @ VGS=4.5V
  $R_{DS(ON)}$=11.3mΩ (typical) @ VGS=2.5V
  P-Channel：
  V_{DS} =-20V，ID =-10A
  $R_{DS(ON)}$=15.3mΩ (typical) @ VGS=-4.5V
  $R_{DS(ON)}$=19.7mΩ (typical) @ VGS=-2.5V
- Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- Very low on-resistance $R_{DS(ON)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

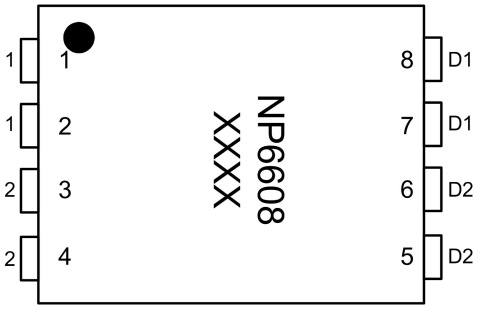
Schematic diagram



n-channel　　p-channel

Marking and pin assignment

PDFN3×3-8L
（Top View）



Package

PDFN3×3-8L

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP6608QR-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}		20	-20	V
Gate-source voltage	V_{GS}		±10	±12	V
Drain Current-Continuous (Silicon Limited)	T_A=25°C	I_D	10	-10	A
	T_A=75°C		8	-8	

Pulsed Drain Current (Package Limited)	I_{DM}		40	-40	A
Avalanche energy L=0.1mH[C]	E_{AS}, E_{AR}		46	43	mJ
Power Dissipation [B]	T_A=25°C	P_D	2	2	W
	T_A=75°C		1.3	1.3	
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	20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±10V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.45	0.66	1.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=10A	-	8.8	12	mΩ
		V_{GS}=2.5V, I_D=10A	-	11.3	15	
Forward transconductance	gfs	V_{DS}=10V, I_D=10A	-	17	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=10V ,V_{GS}=0V f=1.0MHz	-	987	-	pF
Output capacitance	C_{OSS}		-	185	-	
Reverse transfer capacitance	C_{RSS}		-	170	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	2.4		Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=10V V_{GS}=5V R_L=2.5Ω R_{GEN}=3Ω	-	4.5	-	ns
Rise time	tr		-	2.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	14.5	-	
Fall time	tf		-	3.5	-	
Total gate charge	Qg	V_{DS}=10V,I_D=10A V_{GS}=5V	-	14.3	-	nC
Gate-source charge	Qgs		-	2.3	-	
Gate-drain charge	Qgd		-	3.6	-	pC
Drain-source Diode Characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=10A	-	0.78	1.5	V

Typical Electrical And Thermal Characteristics

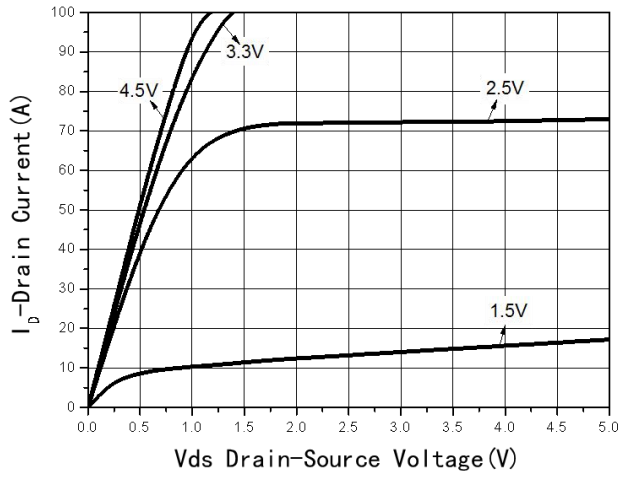


Fig1 Output Characteristics

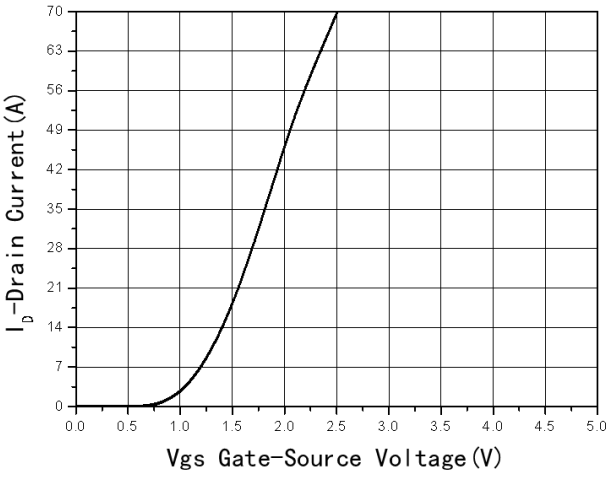


Fig2 Transfer Characteristics

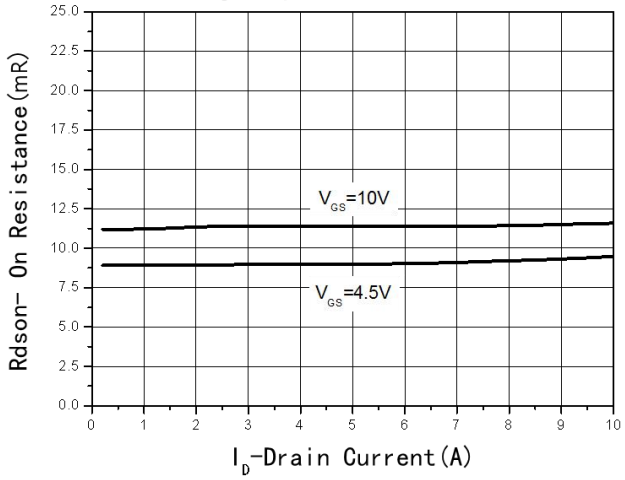


Fig3 Rdson-Drain current

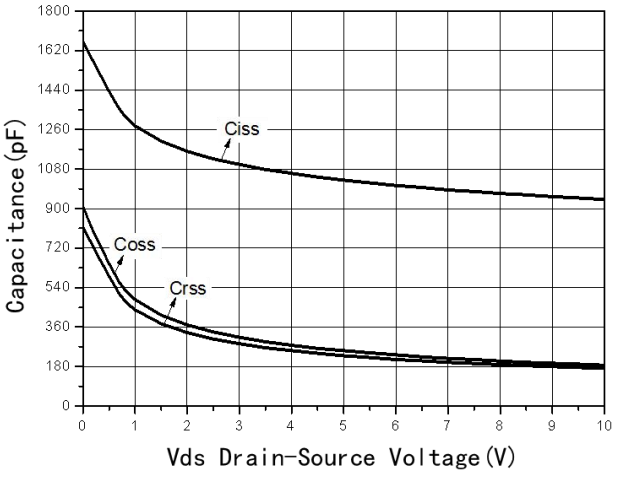


Fig4 Capacitance vs Vds

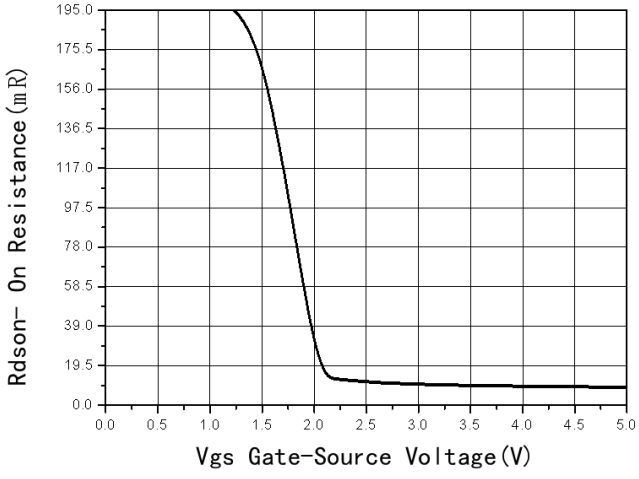


Fig5 Rdson-Gate Drain voltage

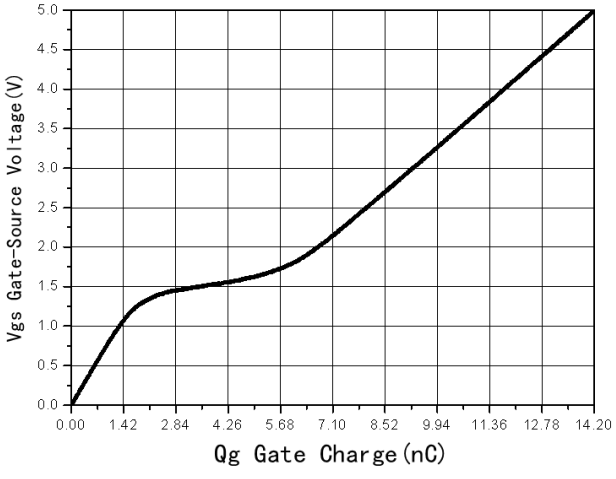


Fig6 Gate Charge

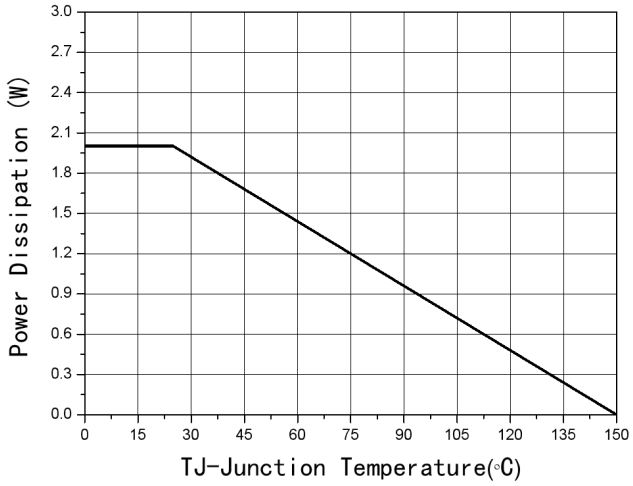


Fig7 Power De-rating

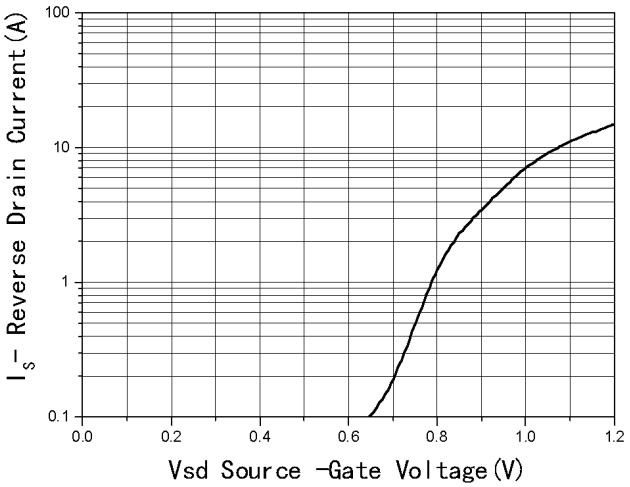


Fig8 Source-Drain Diode Forward

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	-20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V	-	-	-1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.4	-0.6	-1.0	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-10A	-	15.3	20	mΩ
		V_{GS}=-2.5V, I_D=-10A	-	19.7	25	
Forward transconductance	gfs	V_{DS}=-10V, I_D=-10A	-	18	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-10V ,V_{GS}=0V f=1.0MHz	-	1286	-	pF
Output capacitance	C_{OSS}		-	173	-	
Reverse transfer capacitance	C_{RSS}		-	149	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	14.2		Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=-10V V_{GS}=-5V R_L=2.3Ω R_{GEN}=3Ω	-	8	-	ns
Rise time	tr		-	6	-	
Turn-off delay time	$t_{D(OFF)}$		-	17	-	
Fall time	tf		-	5	-	
Total gate charge	Qg	V_{DS}=-10V,I_D=-10A V_{GS}=-5V	-	15.4	-	nC
Gate-source charge	Qgs		-	3	-	
Gate-drain charge	Qgd		-	2.8	-	
Drain-source Diode Characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=-10A	-	0.83	-1.5	V

Typical Electrical And Thermal Characteristics

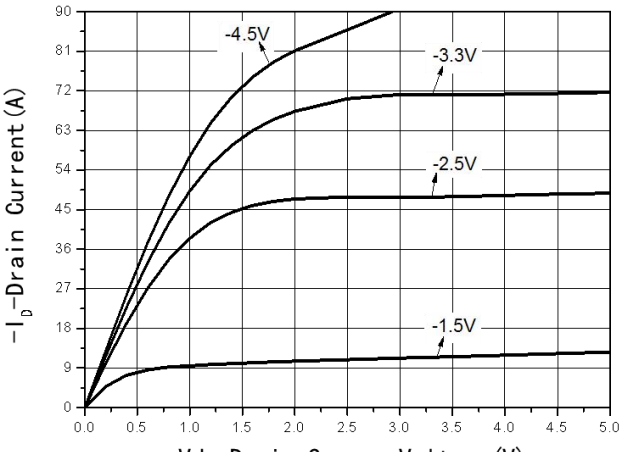


Fig1 Output Characteristics

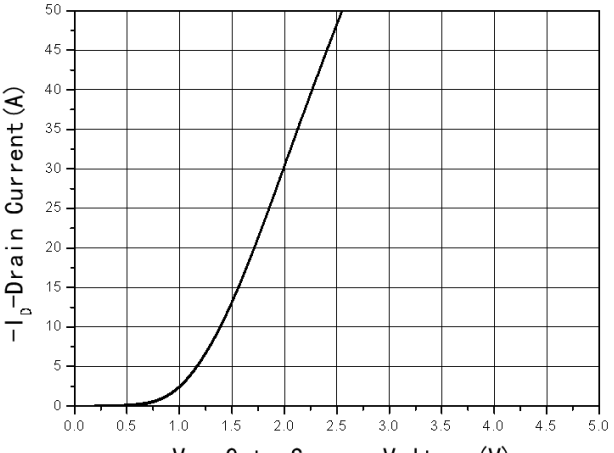


Fig2 Transfer Characteristics

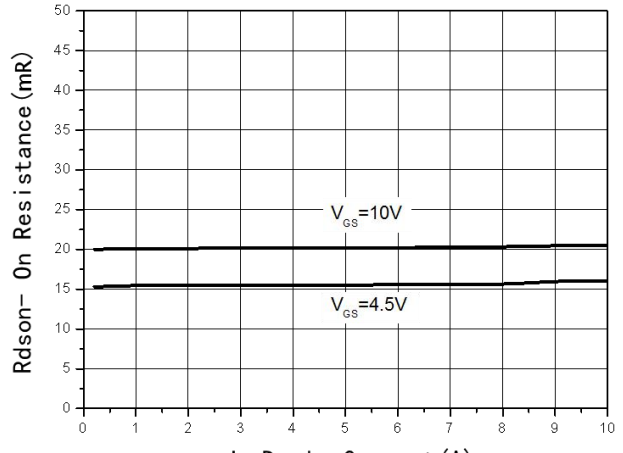


Fig3 Rdson-Drain current

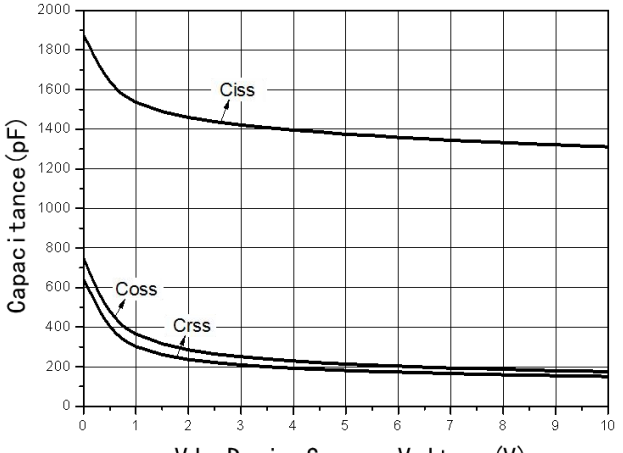


Fig4 Capacitance vs Vds

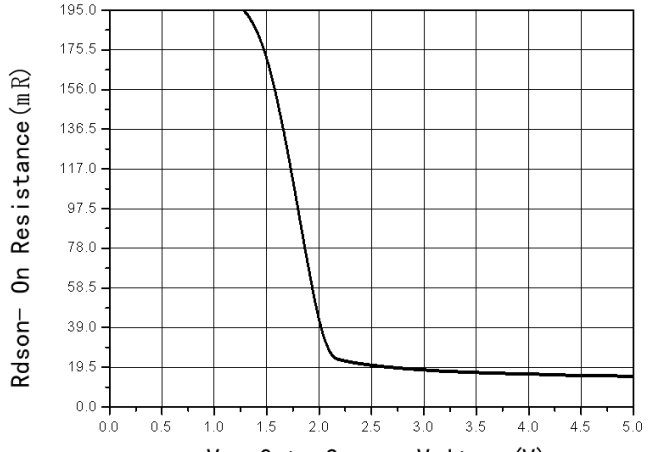


Fig5 Rdson-Gate Drain voltage

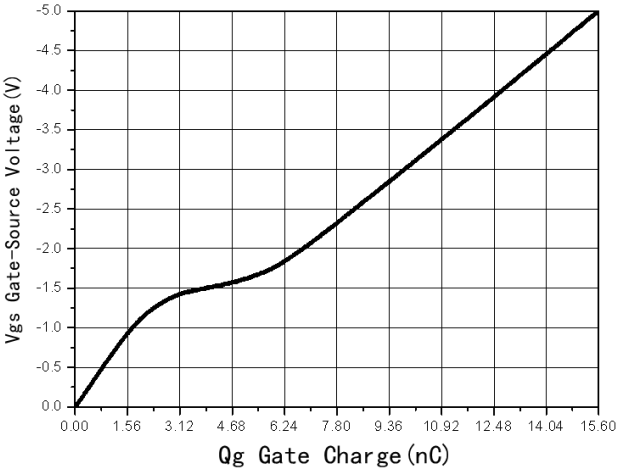


Fig6 Gate Charge

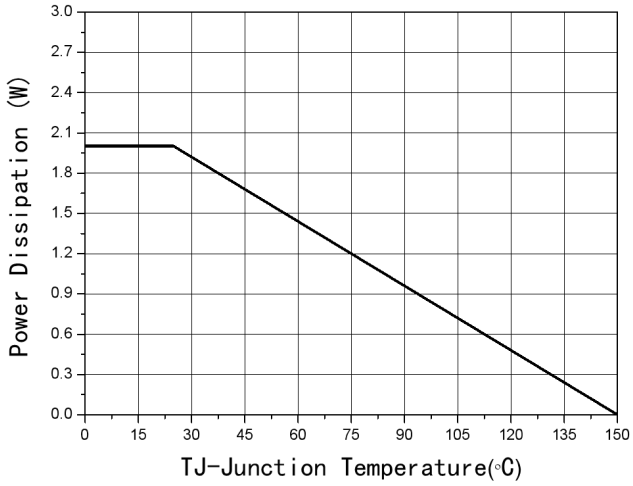


Fig7 Power De-rating

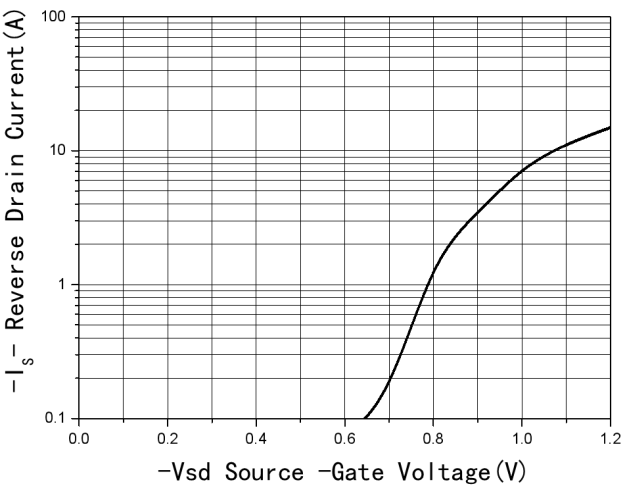
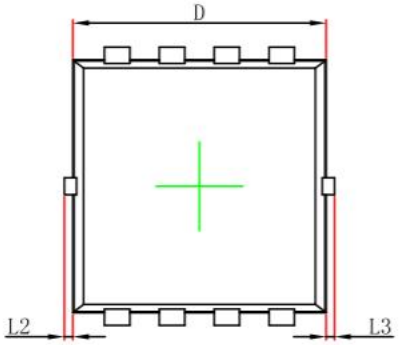


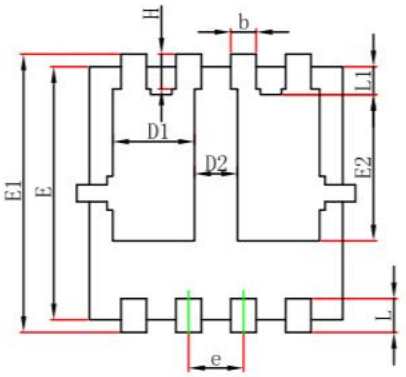
Fig8 Source-Drain Diode Forward

Package Information

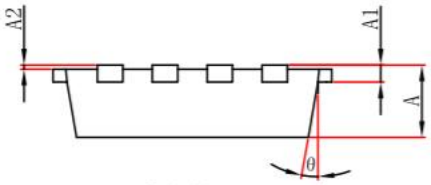
- **PDFN3*3-8L**



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°