30V N And P-Channel Enhancement Mode MOSFET

Description

The NP6601AMR 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.

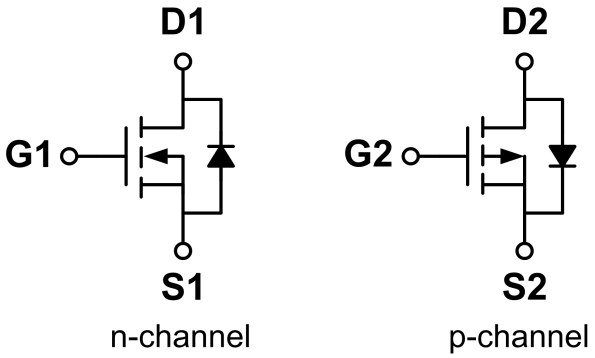
General Features

- **N-channel:**
  V_{DS} =30V，ID =4A
  $R_{DS(ON)}$=31.3mΩ (typical) @ VGS=4.5V
  $R_{DS(ON)}$=43.8mΩ (typical) @ VGS=2.5V
  P-Channel:
  V_{DS} =-30V，ID =-4A
  $R_{DS(ON)}$=54.4mΩ (typical) @ VGS=-4.5V
  $R_{DS(ON)}$=68.5mΩ (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

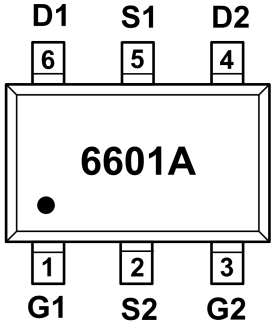
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

Schematic diagram



Marking and pin assignment

SOT-23-6L
(TOP VIEW)



Package

- SOT-23-6L

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP6601AMR-G	-55°C to +150°C	SOT-23-6L	3000

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}	±12	±12	V
Maximum power dissipation	P_D	1.1		W
Operating junction Temperature range	T_j	-55—150	-55—150	℃

Drain Current-Continuous (Silicon Limited)	T_A=25°C	I_D	4	-4	A
	T_A=75°C		3	-3	
Pulsed Drain Current (Package Limited)		I_{DM}	16	-16	A
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		℃

Thermal Characteristics

Thermal Resistance junction-to ambient	Rth JA	100	℃/W

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}=±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.6	0.9	1.3	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=4A	-	31.3	37.6	mΩ
		V_{GS}=2.5V, I_D=4A	-	43.8	52.6	
Forward transconductance	gfs	V_{GS}=5V, I_D=4A	-	5	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=15V ,V_{GS}=0V f=1.0MHz	-	449	-	pF
Output capacitance	C_{OSS}		-	38	-	
Reverse transfer capacitance	C_{RSS}		-	33	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=15V R_L=3.3 ohm V_{GEN}=4.5V R_{GEN}=6ohm	-	3.3	-	ns
Rise time	tr		-	4.8	-	
Turn-off delay time	$t_{D(OFF)}$		-	25	-	
Fall time	tf		-	4	-	
Total gate charge	Qg	V_{DS}=15V I_D=4A V_{GS}=4.5V	-	11.5	-	nC
Gate-source charge	Qgs		-	1.1	-	
Gate-drain charge	Qgd		-	1.4	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=3A	-	0.76	1.16	V

Typical Performance Characteristics

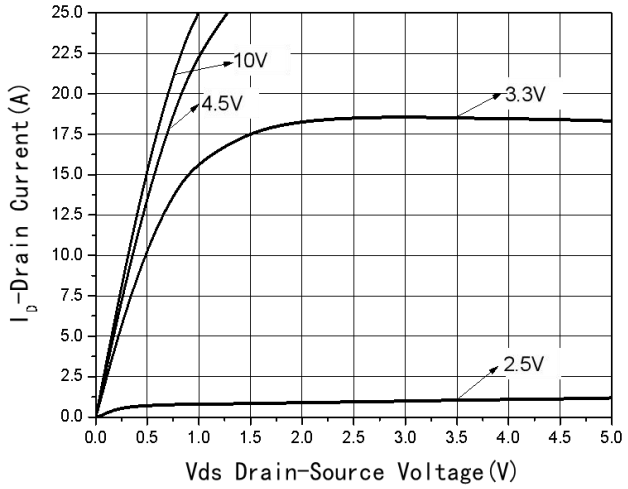


Fig1 Output Characteristics

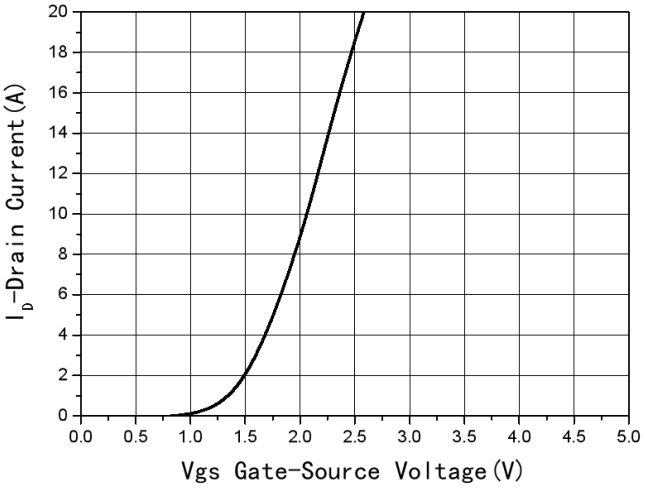


Fig2 Transfer Characteristics

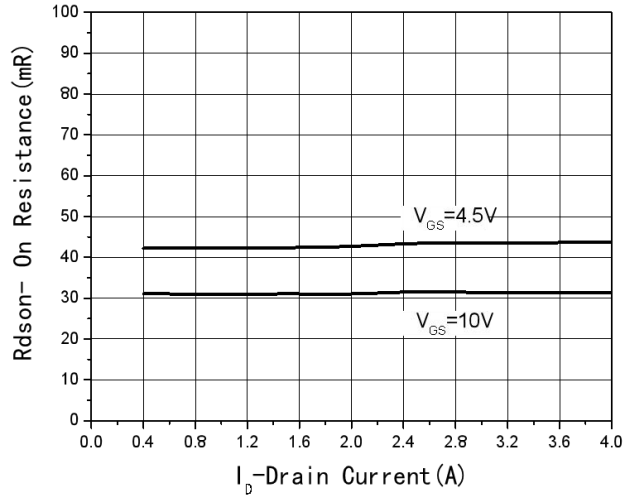


Fig3 Rdson-Drain current

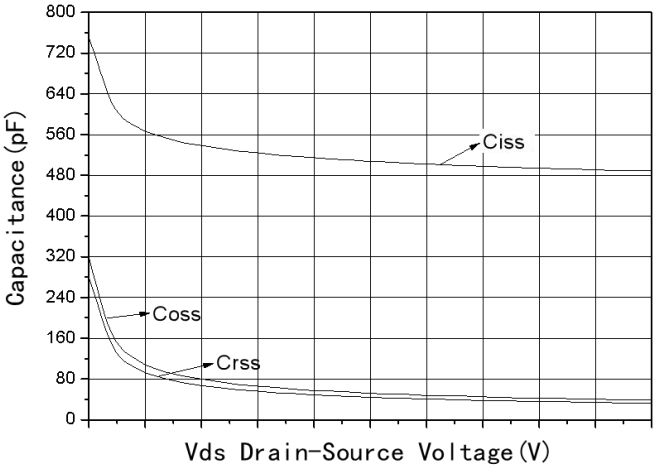


Fig4 Capacitance vs Vds

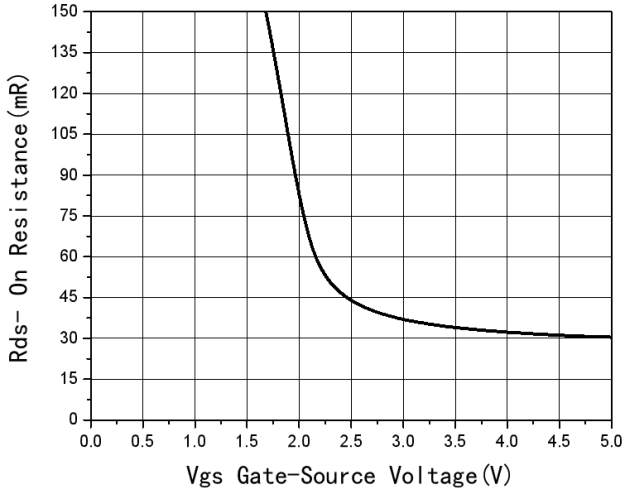


Fig5 Rdson-Gate Drain voltage

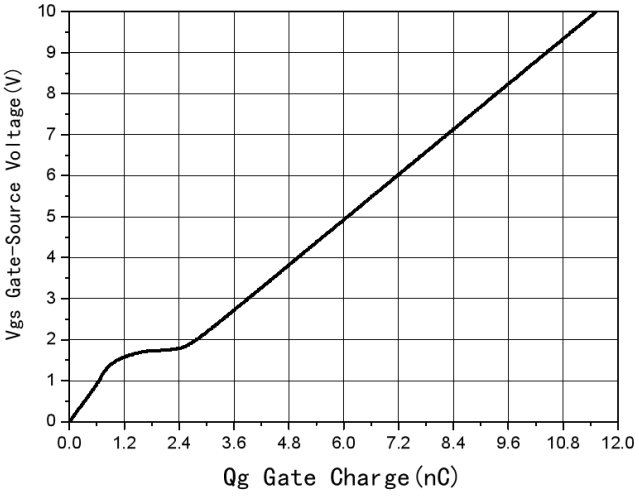


Fig6 Gate Charge

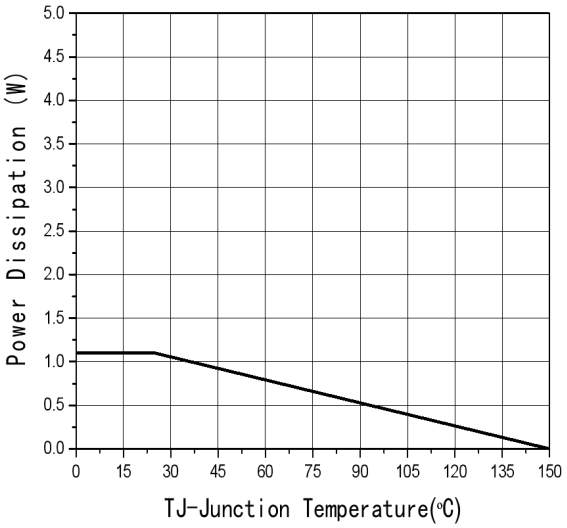


Fig7 Power De-rating

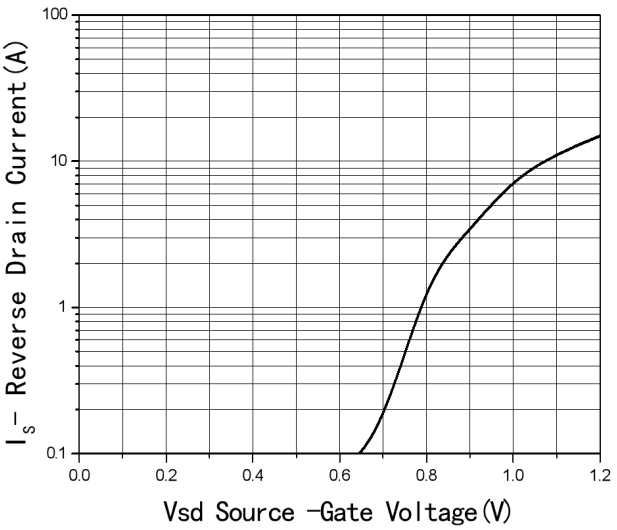


Fig8 Source-Drain Diode Forward

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}=±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.6	-0.9	-1.2	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-4A	-	54.4	65.3	mΩ
		V_{GS}=-2.5V, I_D=-4A	-	68.5	82.2	
Forward transconductance	gfs	V_{GS}=-5V, I_D=-4.2A	-	5	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-15V ,V_{GS}=0V f=1.0MHz	-	795	-	pF
Output capacitance	C_{OSS}		-	56.9	-	
Reverse transfer capacitance	C_{RSS}		-	43.1	-	
Gate resistance	Rg	V_{DS}=V_{GS}=0V, f=1.0MHz	-	17	-	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DD}=-15V I_D=-4.2A V_{GEN}=-10V R_L=10ohm R_{GEN}=6ohm	-	2.8	3.5	ns
Rise time	tr		-	31	35	
Turn-off delay time	$t_{D(OFF)}$		-	50	55	
Fall time	tf		-	8	12	
Total gate charge	Qg	V_{DS}=-15V,I_D=-4.2A V_{GS}=-4.5V	-	4	-	nC
Gate-source charge	Qgs		-	3.9	-	
Gate-drain charge	Qgd		-	22.1	-	
Body Diode Reverse Recovery Time	trr	IF=-4.2A, dI/dt=100A/ms	-	22	-	nS
Body Diode Reverse Recovery Charge	Qrr	IF=-4.2A, dI/dt=100A/ms	-	1.8	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=-4.2A	-	-0.81	-1.2	V

Typical Performance Characteristics

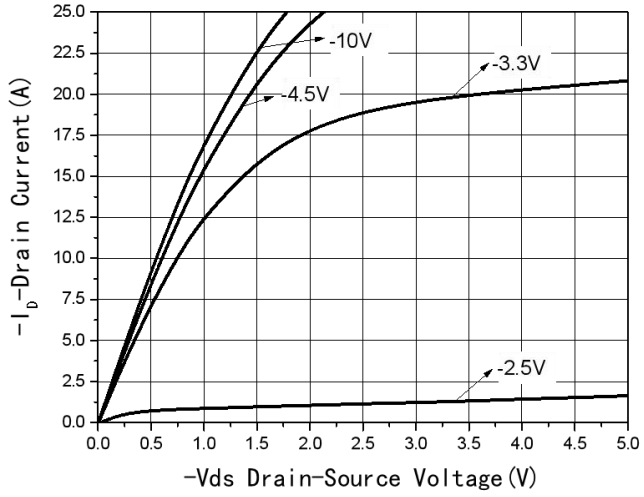


Fig1 Output Characteristics

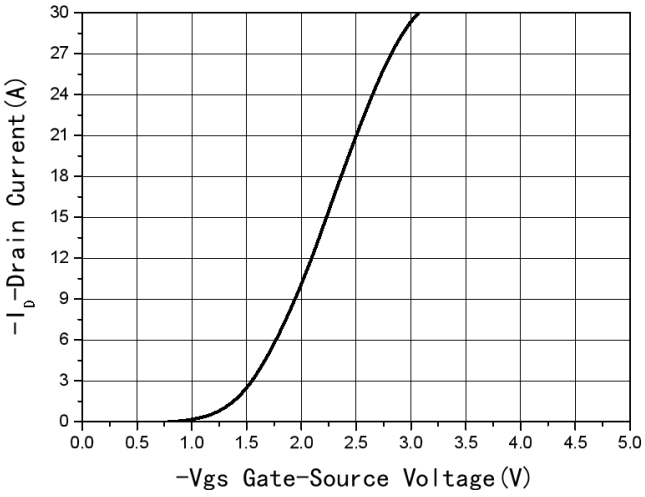


Fig2 Transfer Characteristics

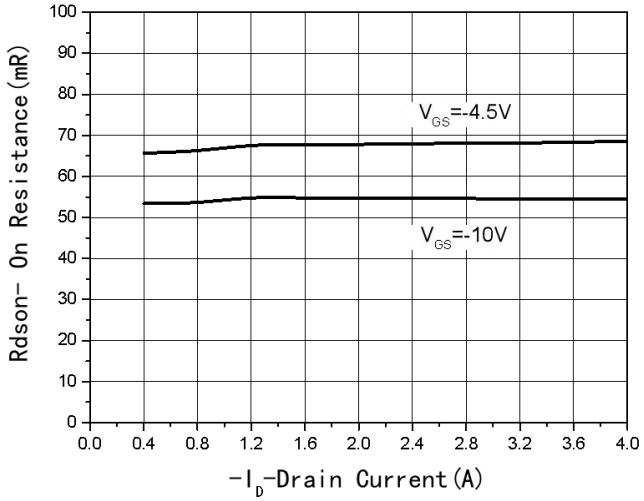


Fig3 Rdson-Drain current

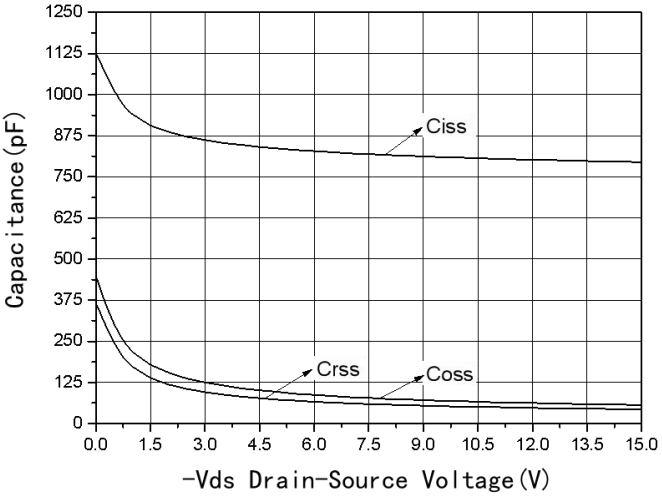


Fig4 Capacitance vs Vds

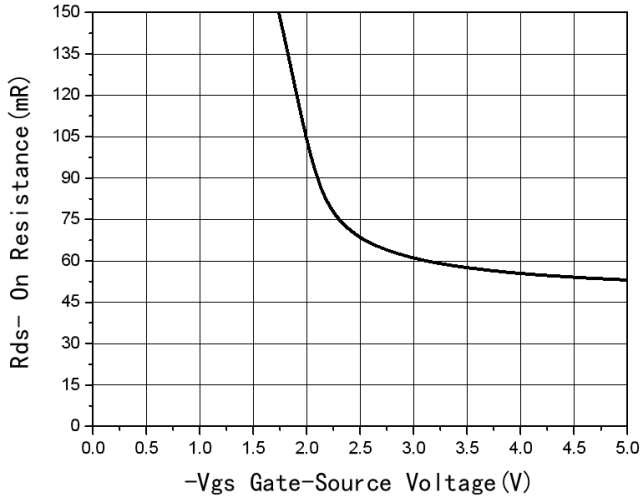


Fig5 Rdson-Gate Drain voltage

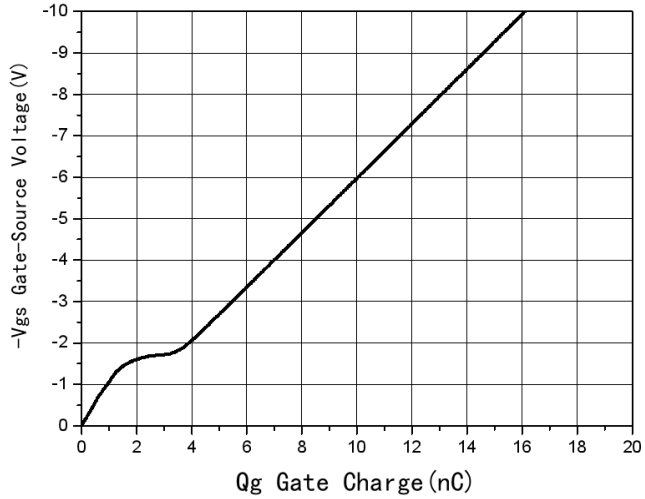


Fig6 Gate Charge

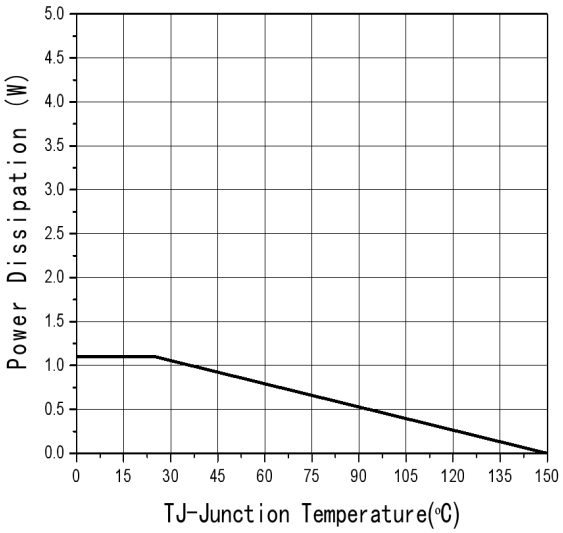


Fig7 Power De-rating

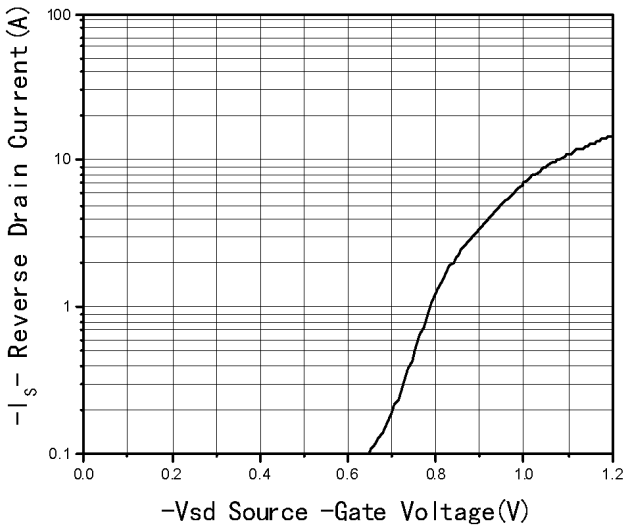
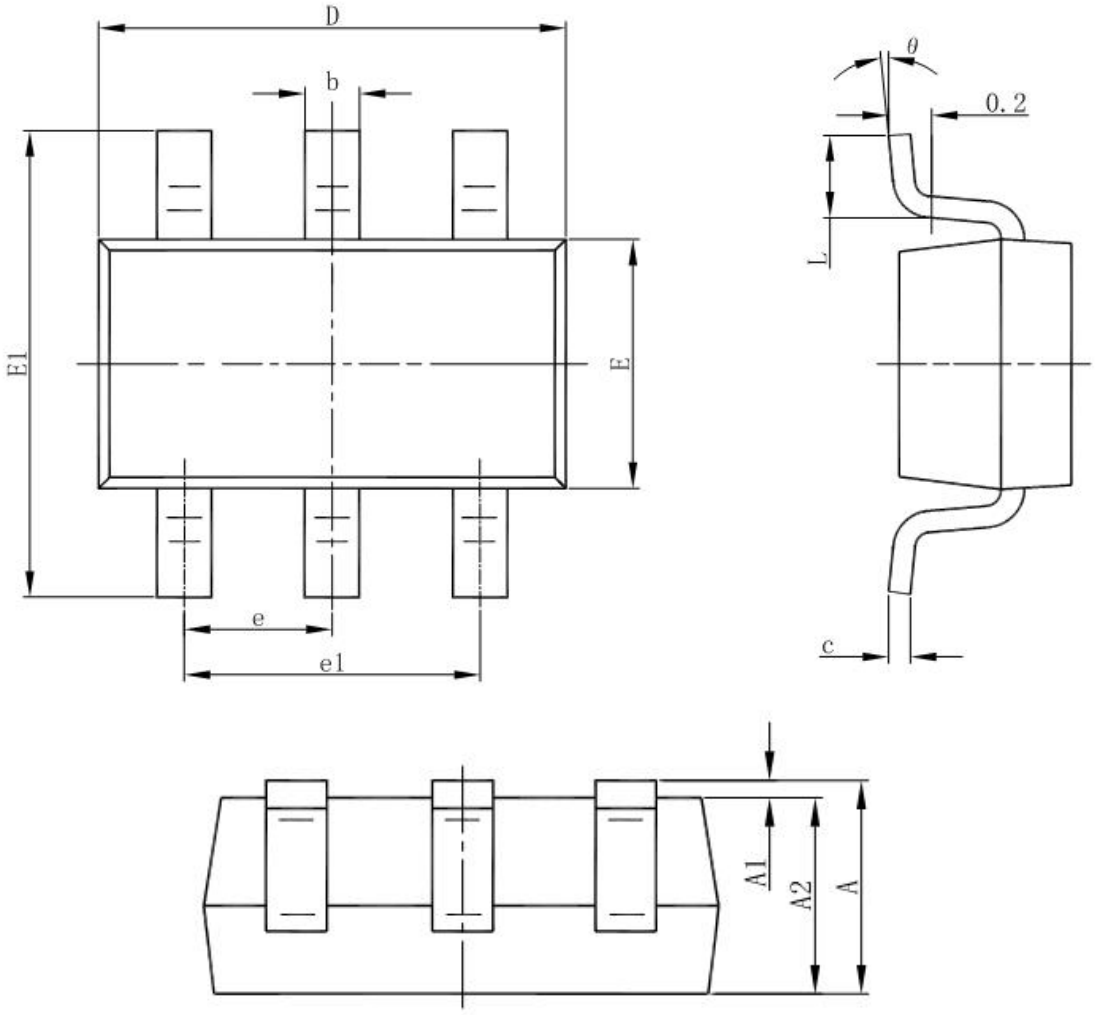


Fig8 Source-Drain Diode Forward

Package Information

- **SOT-23-6L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°