

60V N And P-Channel Enhancement Mode MOSFET

Description

The PECN4613SR 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:

$V_{DS} = 60V, ID = 6A$

$R_{DS(ON)} = 33m\Omega$ (typical) @ $VGS = 10V$

$R_{DS(ON)} = 36m\Omega$ (typical) @ $VGS = 4.5V$

P-Channel:

$V_{DS} = -60V, ID = -6A$

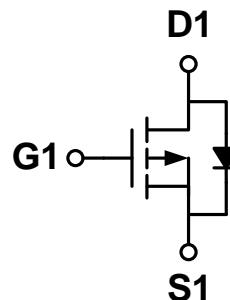
$R_{DS(ON)} = 53m\Omega$ (typical) @ $VGS = -10V$

$R_{DS(ON)} = 64m\Omega$ (typical) @ $VGS = -4.5V$

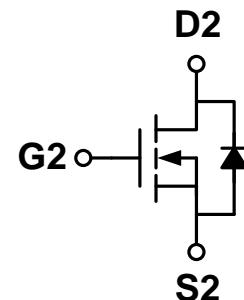
- ◆ Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(ON)}$
- ◆ 150 °C operating temperature
- ◆ Pb-free lead plating
- ◆ 100% UIS tested

Application

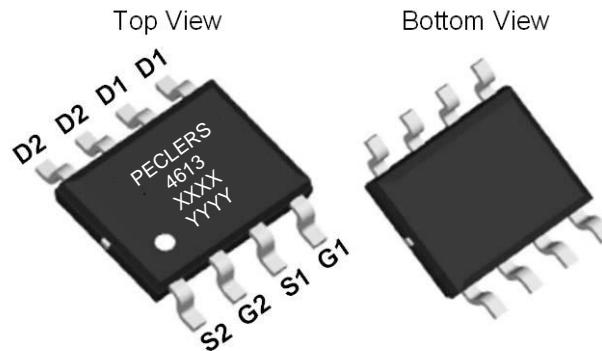
- ◆ DC/DC Converter
- ◆ Ideal for high-frequency switching and synchronous rectification

Schematic diagram

p-channel



n-channel

Marking and pin assignment

Top View

Bottom View

XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN4613SR	-55°C to +150°C	SOP-8	4000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit		Unit
		N	P	
Drain-source voltage	V_{DS}	60	-60	V
Gate-source voltage	V_{GS}	± 20	± 20	V
Maximum power dissipation	P_D	2.0	2.0	W
Operating junction Temperature range	T_j	-55—150	-55—150	°C

Drain Current-Continuous (Silicon Limited)	T _A =25°C	I _D	6	-6	A
	T _A =75°C		6	-5	
Pulsed Drain Current (Package Limited)		I _{DM}	24	-24	A
Avalanche Current ^C		I _{AS} , I _{AR}	20	20	A
Avalanche energy L=0.1mH ^C		E _{AS} , E _{AR}	15	25	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		°C

Thermal Characteristics

Parameter		Symbol	Device	Typ	Max	Unit
Maximum Junction-to-Ambient ^A	≤ 10s	R _{θJA}	n-ch	48	62.5	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		n-ch	74	110	
Maximum Junction-to-Lead ^B	Steady-State		R _{θJC}	n-ch	35	
Maximum Junction-to-Ambient ^A	≤ 10s		R _{θJA}	p-ch	48	
Maximum Junction-to-Ambient ^A	Steady-State			p-ch	74	
Maximum Junction-to-Lead ^B	Steady-State	R _{θJC}	p-ch	35	50	

A: The value of R_{θJA} 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. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

B: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

N-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$	60	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{\text{DS}}=60\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	μA
Gate-body leakage	I_{GSS}	$V_{\text{DS}}=0\text{V}, V_{\text{GS}}=\pm20\text{V}$	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{\text{GS(th)}}$	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=250\mu\text{A}$	1.0	1.9	3.0	V
Drain-source on-state resistance	$R_{\text{DS(ON)}}$	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=6\text{A}$	-	33	40	$\text{m}\Omega$
		$V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=5\text{A}$	-	36	45	
Forward transconductance	g_{fs}	$V_{\text{DS}}=5\text{V}, I_{\text{D}}=6\text{A}$	15	-	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{\text{DS}}=30\text{V}, V_{\text{GS}}=0\text{V}$ $f=1.0\text{MHz}$	-	480	-	pF
Output capacitance	C_{OSS}		-	55	-	
Reverse transfer capacitance	C_{RSS}		-	20	-	
Gate resistance	R_g	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=0\text{V}$, $f=1.0\text{MHz}$	-	1.6	-	Ω
Switching Characteristics						
Turn-on delay time	$t_{\text{D(ON)}}$	$V_{\text{DS}}=30\text{V}$ $V_{\text{GS}}=10\text{V}$ $R_L=4.7\Omega$ $R_{\text{GEN}}=3\Omega$	-	5	-	ns
Rise time	t_r		-	2.6	-	
Turn-off delay time	$t_{\text{D(OFF)}}$		-	15	-	
Fall time	t_f		-	2	-	
Total gate charge	Q_g	$V_{\text{DS}}=30\text{V}, I_{\text{D}}=6\text{A}$ $V_{\text{GS}}=10\text{V}$	-	25	-	nC
Gate-source charge	Q_{gs}		-	4.5	-	
Gate-drain charge	Q_{gd}		-	6.5	-	

Typical Performance Characteristics

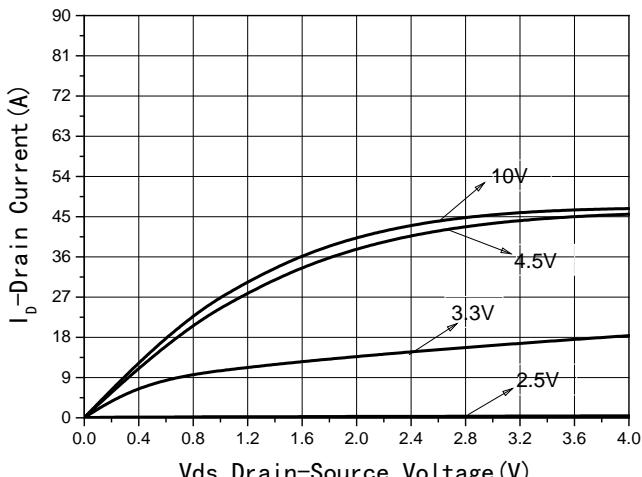


Fig1 Output Characteristics

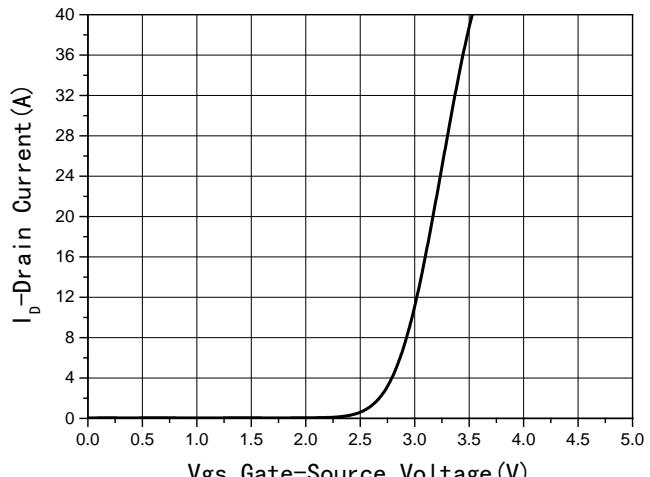


Fig2 Transfer Characteristics

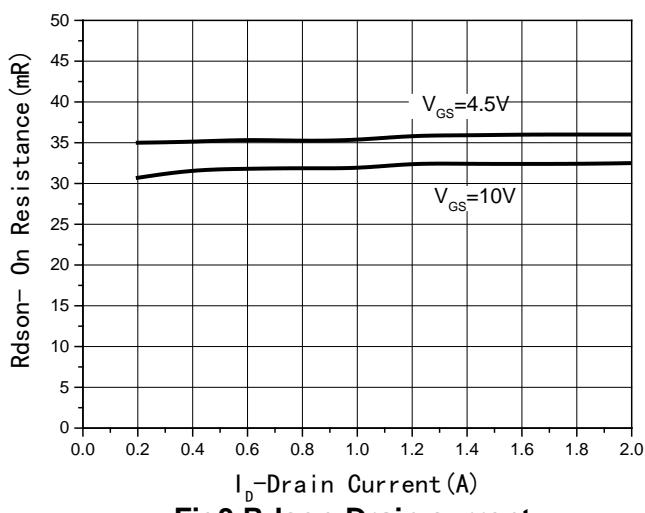


Fig3 Rdson-Drain current

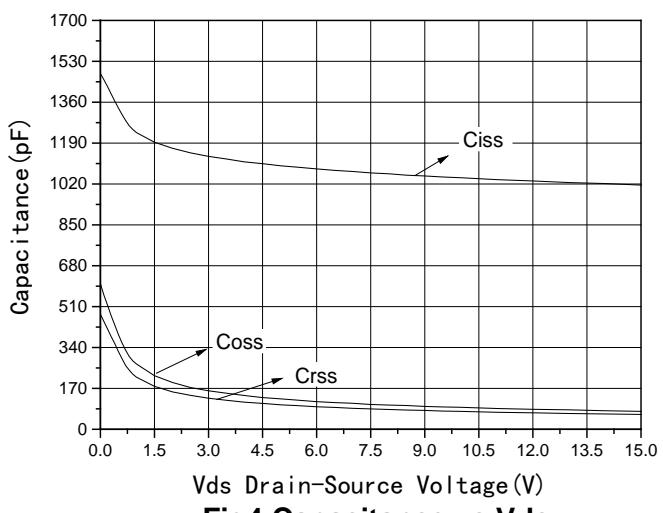


Fig4 Capacitance vs Vds

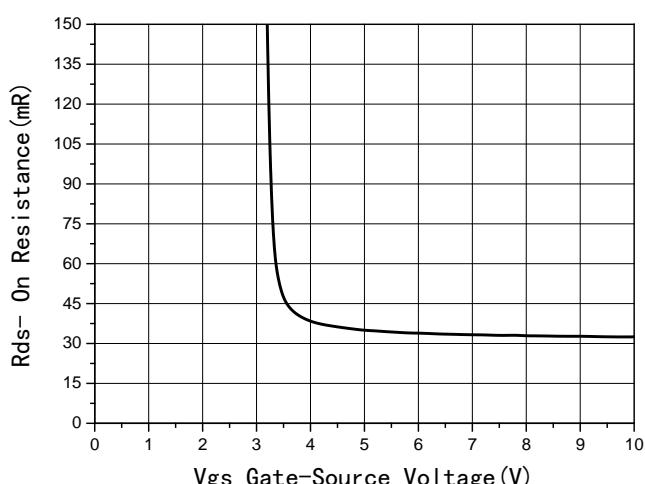


Fig5 Rdson-Gate drain voltage

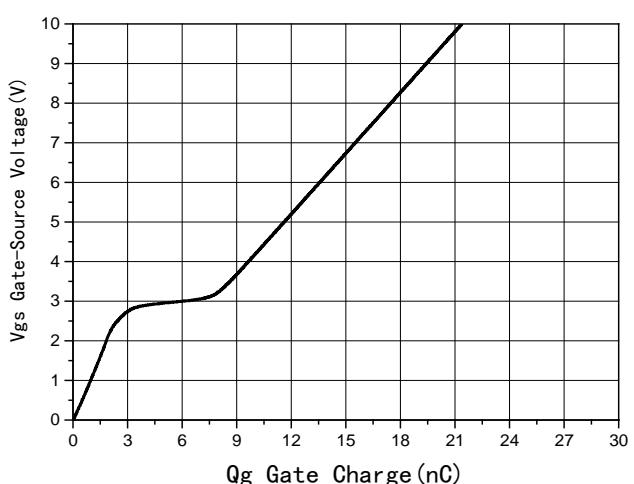


Fig6 Gate Charge

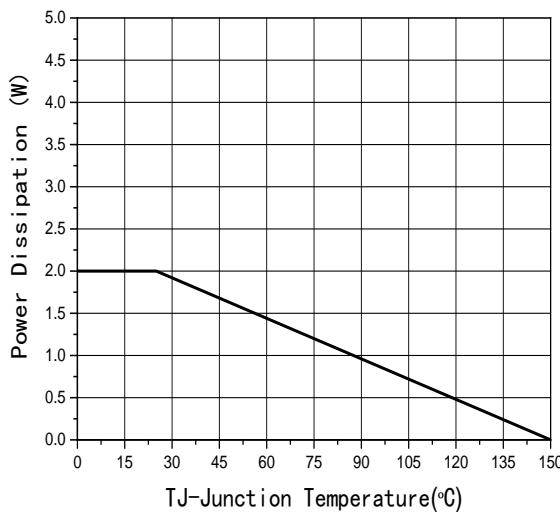


Fig7 Power De-rating

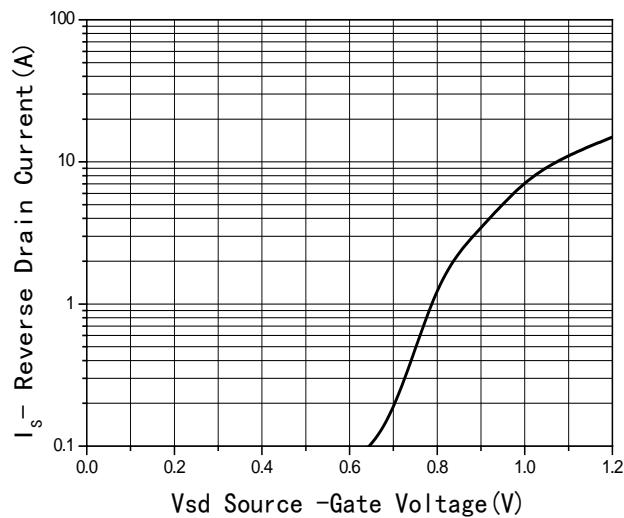


Fig8 Source-Drain Diode Forward

P-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=-250\mu\text{A}$	-60	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{\text{DS}}=-60\text{V}, V_{\text{GS}}=0\text{V}$	-	-	-1	μA
Gate-body leakage	I_{GSS}	$V_{\text{DS}}=0\text{V}, V_{\text{GS}}=\pm20\text{V}$	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=-250\mu\text{A}$	-1.0	-1.6	-2.5	V
Drain-source on-state resistance	$R_{\text{DS(ON)}}$	$V_{\text{GS}}=-10\text{V}, I_{\text{D}}=-6\text{A}$	-	53	70	$\text{m}\Omega$
		$V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-5\text{A}$	-	64	80	
Forward transconductance	g_{fs}	$V_{\text{DS}}=-5\text{V}, I_{\text{D}}=-6\text{A}$	16	-	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{\text{DS}}=-30\text{V}, V_{\text{GS}}=0\text{V}$ $f=1.0\text{MHz}$	-	1550	-	pF
Output capacitance	C_{OSS}		-	180	-	
Reverse transfer capacitance	C_{RSS}		-	125	-	
Gate resistance	R_g	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=0\text{V}, f=1.0\text{MHz}$	-	4	-	Ω
Switching Characteristics						
Turn-on delay time	$t_{\text{D(ON)}}$	$V_{\text{DS}}=-30\text{V}$ $V_{\text{GS}}=-10\text{V}$ $R_L=2.3\Omega$ $R_{\text{GEN}}=3\Omega$	-	10	-	ns
Rise time	t_r		-	5.5	-	
Turn-off delay time	$t_{\text{D(OFF)}}$		-	3.6	-	
Fall time	t_f		-	4.6	-	
Total gate charge	Q_g	$V_{\text{DS}}=-30\text{V}, I_{\text{D}}=-6\text{A}$ $V_{\text{GS}}=-10\text{V}$	-	28	-	nC
Gate-source charge	Q_{gs}		-	4.8	-	
Gate-drain charge	Q_{gd}		-	7.2	-	

Typical Performance Characteristics

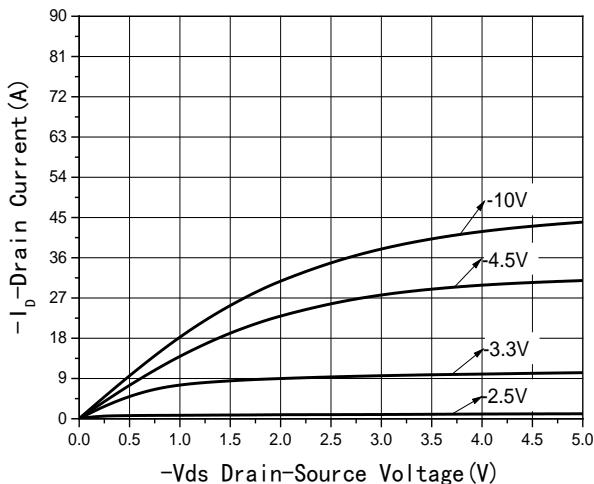


Fig1 Output Characteristics

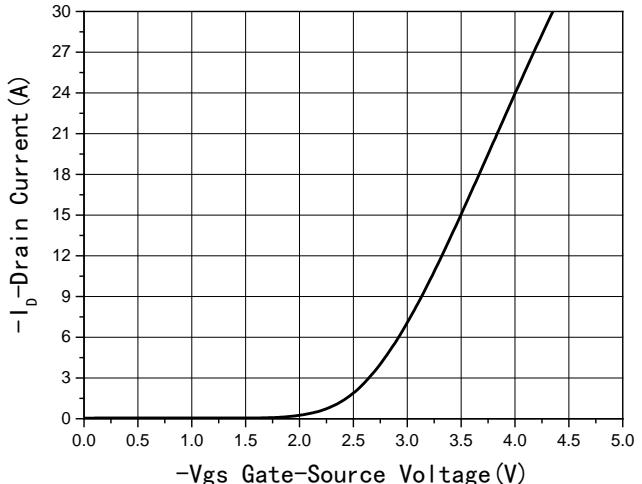


Fig2 Transfer Characteristics

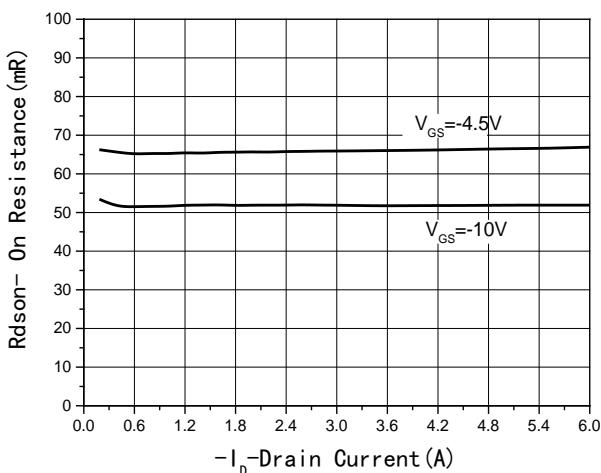


Fig3 Rdson-Drain current

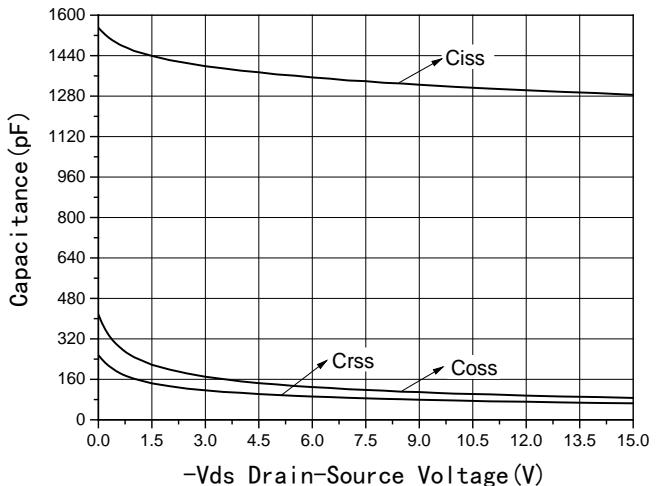


Fig4 Capacitance vs Vds

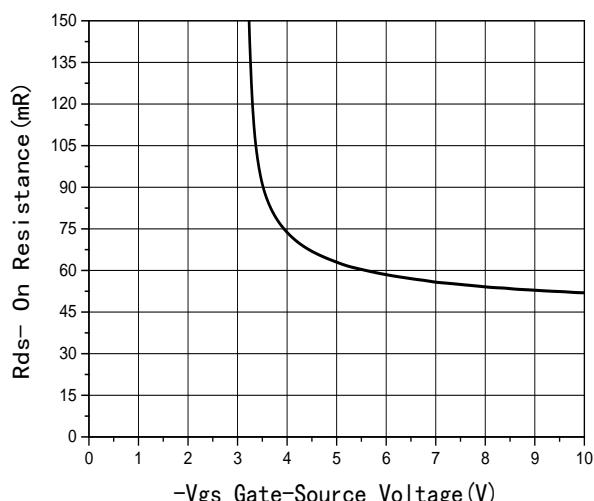


Fig5 Rdson-Gate voltage

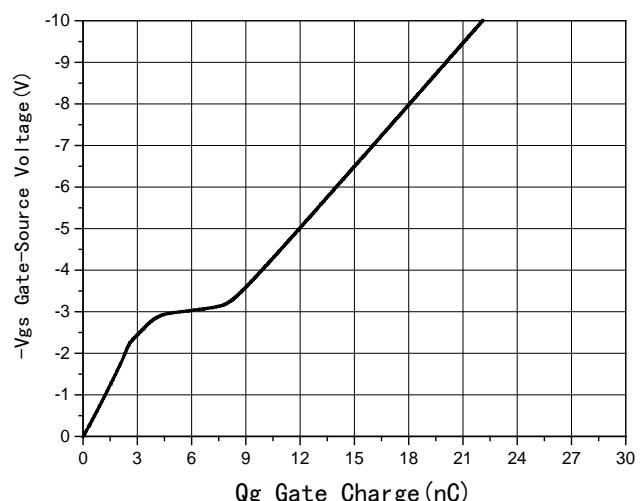


Fig6 Gate Charge

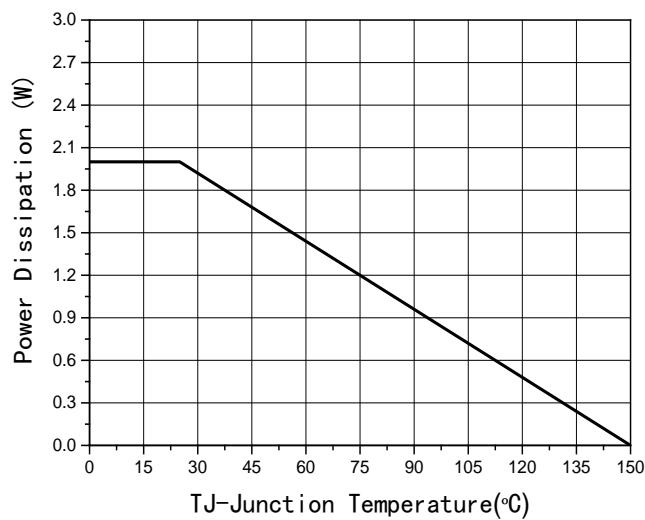


Fig7 Power De-rating

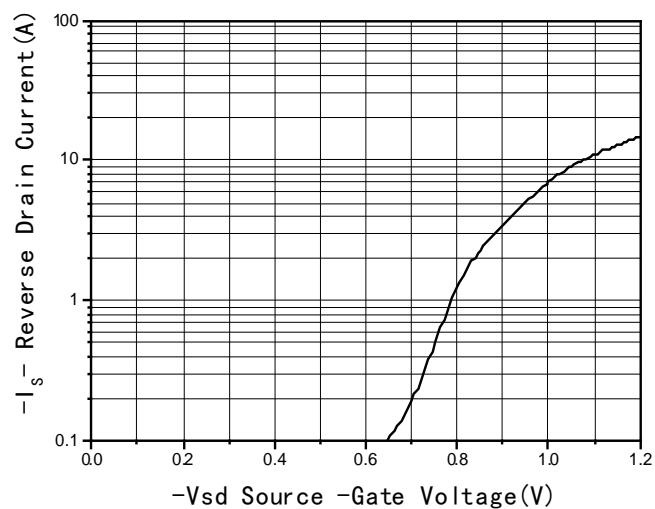
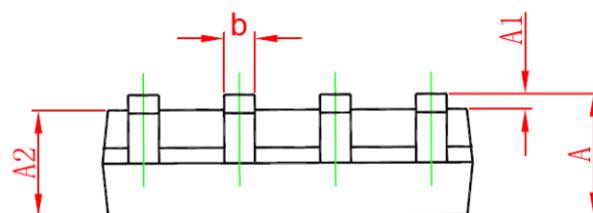
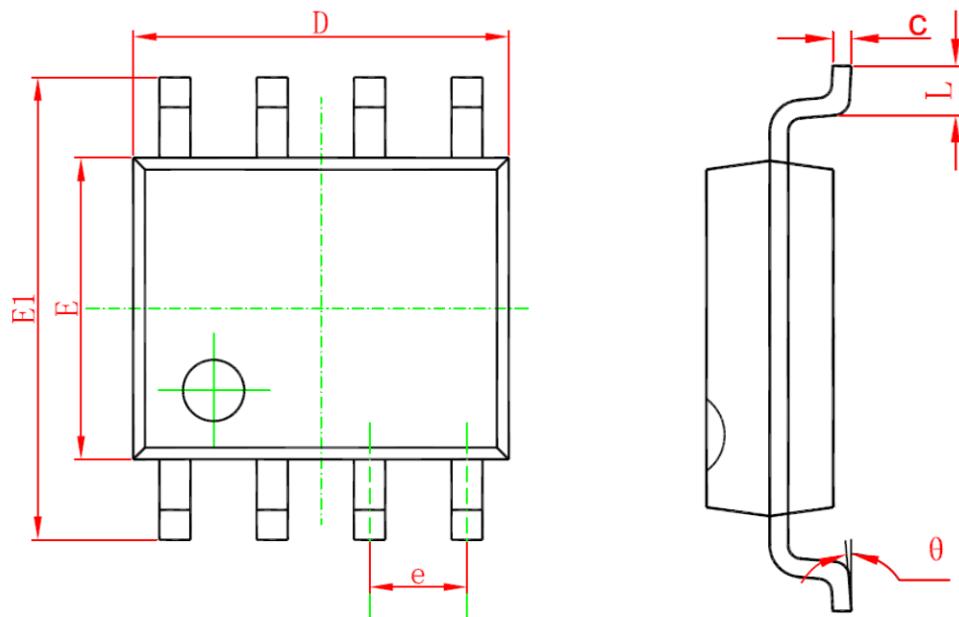


Fig8 Source-Drain Diode Forward

Package Information

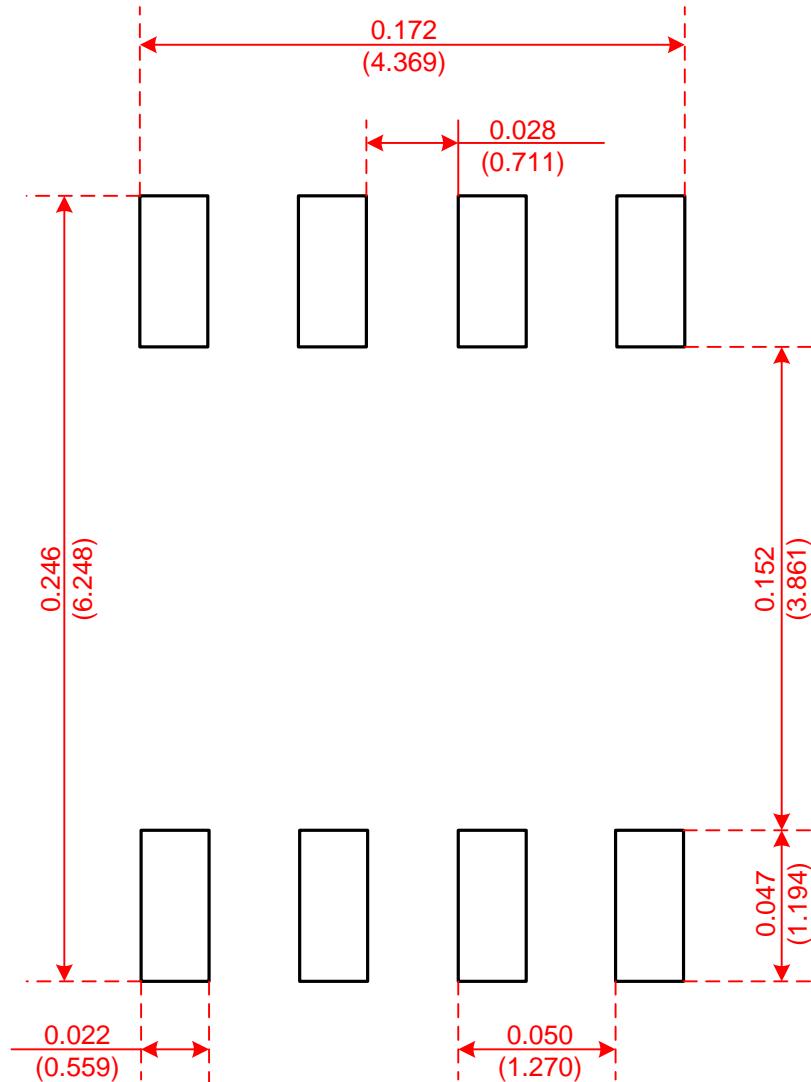
- SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Recommended Minimum Pads

- SOP-8



Recommended Minimum Pads
Dimensions in Inches/(mm)