

40V N And P-Channel Enhancement Mode MOSFET

Description

The PECN4614SR uses advanced trench to provide excellent $R_{DS(ON)}$ and low gate charge. The technology complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

General Features

◆ N-channel:

$V_{DS} = 40V$, $I_D = 8A$

$R_{DS(ON)} = 14.9m\Omega$ (typical) @ $V_{GS} = 10V$

$R_{DS(ON)} = 16.8m\Omega$ (typical) @ $V_{GS} = 4.5V$

P-Channel:

$V_{DS} = -40V$, $I_D = -6A$

$R_{DS(ON)} = 28.3m\Omega$ (typical) @ $V_{GS} = -10V$

$R_{DS(ON)} = 39.4m\Omega$ (typical) @ $V_{GS} = -4.5V$

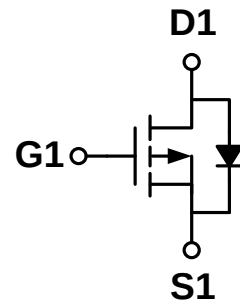
- ◆ Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(ON)}$
- ◆ 150 °C operating temperature
- ◆ Pb-free lead plating
- ◆ 100% UIS tested

Application

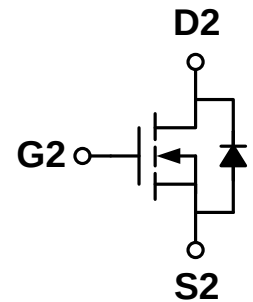
- ◆ DC/DC Converter
- ◆ Ideal for high-frequency switching and synchronous rectification



Schematic diagram

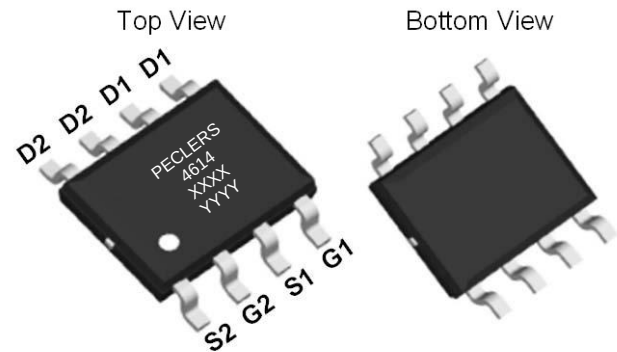


p-channel



n-channel

Marking and pin assignment



XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN4614SR	-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}	40	-40	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)	$T_A=25^{\circ}\text{C}$	I_D	8	-6	A
	$T_A=75^{\circ}\text{C}$		6.5	-5	
Pulsed Drain Current (Package Limited)		I_{DM}	32	-24	A
Avalanche Current ^C		I_{AS}, I_{AR}	16	20	A
Avalanche energy $L=0.1\text{mH}^C$		E_{AS}, E_{AR}	12	25	mJ
Power Dissipation ^B	$T_A=25^{\circ}\text{C}$	P_D	2	2	W
	$T_A=75^{\circ}\text{C}$		1.3	1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		$^{\circ}\text{C}$

Thermal Characteristics

Parameter		Symbol	Device	Typ	Max	Unit
Maximum Junction-to-Ambient ^A	$\leq 10\text{s}$	$R_{\theta JA}$	n-ch	48	62.5	$^{\circ}\text{C/W}$
Maximum Junction-to-Ambient ^A	Steady-State		n-ch	74	110	
Maximum Junction-to-Lead ^B	Steady-State	$R_{\theta JC}$	n-ch	35	60	
Maximum Junction-to-Ambient ^A	$\leq 10\text{s}$	$R_{\theta JA}$	p-ch	48	62.5	
Maximum Junction-to-Ambient ^A	Steady-State		p-ch	74	110	
Maximum Junction-to-Lead ^B	Steady-State	$R_{\theta JC}$	p-ch	35	60	

A: 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 $T_A=25^{\circ}\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

B: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	40	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =40V, 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	1.35	2.0	V
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10V, I _D =8A	-	14.9	20	mΩ
		V _{GS} =4.5V, I _D =6A	-	16.8	23	
Forward transconductance	g _{fs}	V _{DS} =5V, I _D =8A	-	15	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =20V, V _{GS} =0V f=1.0MHz	-	1002	-	pF
Output capacitance	C _{OSS}		-	102	-	
Reverse transfer capacitance	C _{RSS}		-	89	-	
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1.0MHz	-	1.1	-	Ω
Switching Characteristics						
Turn-on delay time	t _{D(on)}	V _{DS} =20V V _{GS} =10V R _L =1.8Ω R _{GEN} =3Ω	-	4	-	ns
Rise time	t _r		-	3	-	
Turn-off delay time	t _{D(off)}		-	15	-	
Fall time	t _f		-	2	-	
Total gate charge	Q _g	V _{DS} =20V, I _D =8A V _{GS} =10V	-	25	-	nC
Gate-source charge	Q _{gs}		-	2.3	-	
Gate-drain charge	Q _{gd}		-	5	-	

Typical Performance Characteristics

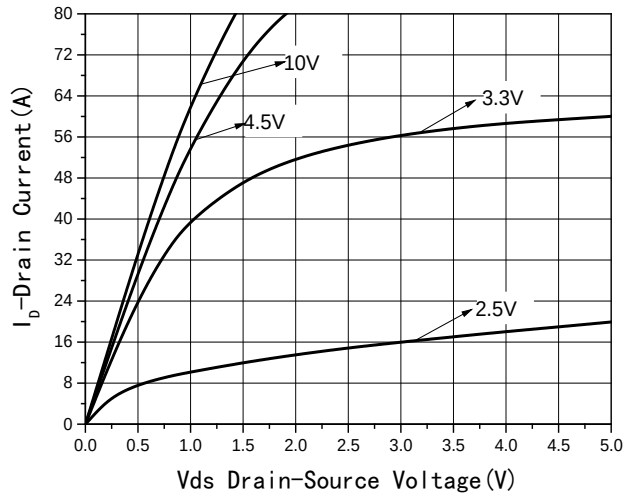


Fig1 Output Characteristics

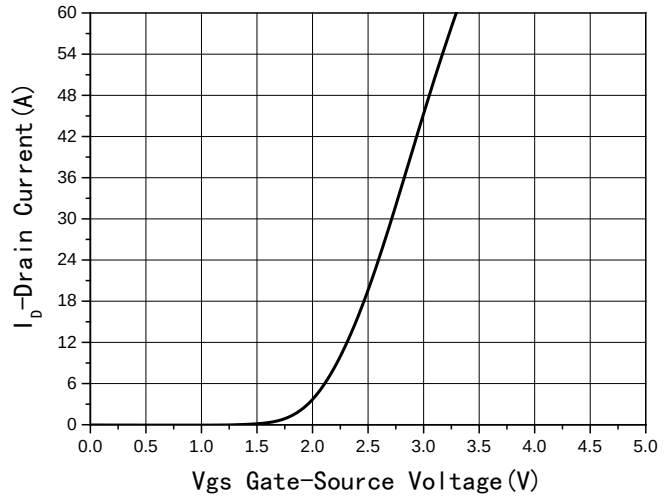


Fig2 Transfer Characteristics

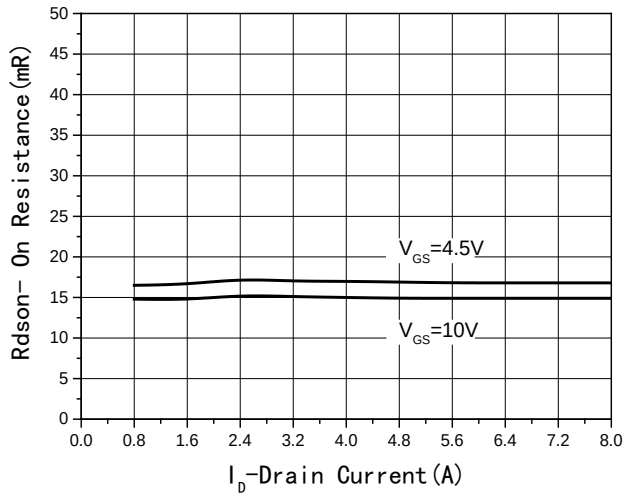


Fig3 $R_{DS(on)}$ -Drain current

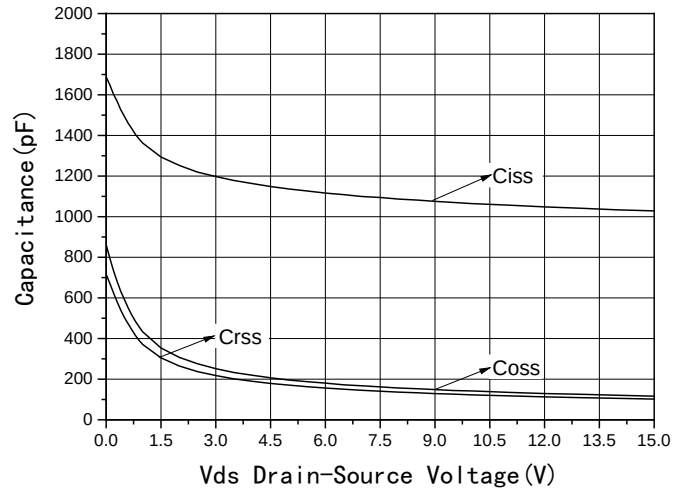


Fig4 Capacitance vs V_{DS}

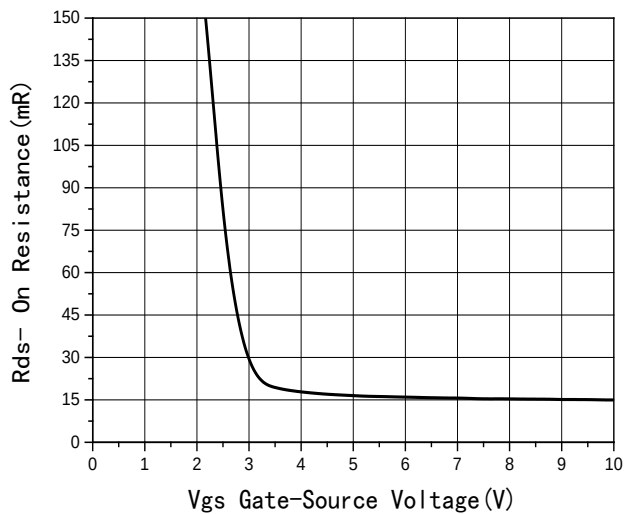


Fig5 $R_{DS(on)}$ -Gate Drain voltage

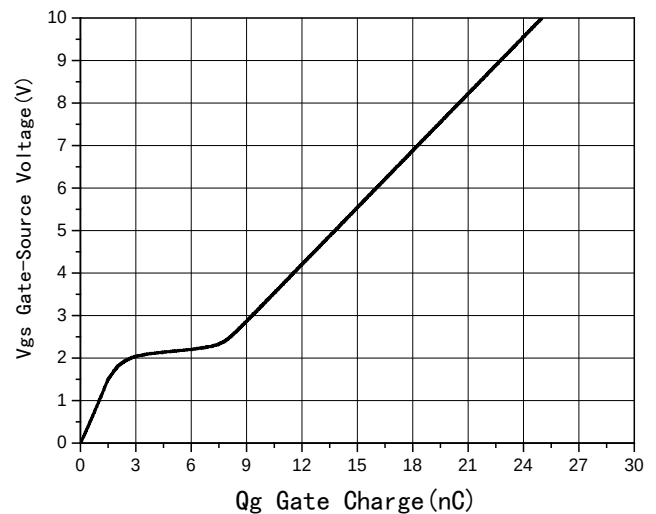


Fig6 Gate Charge

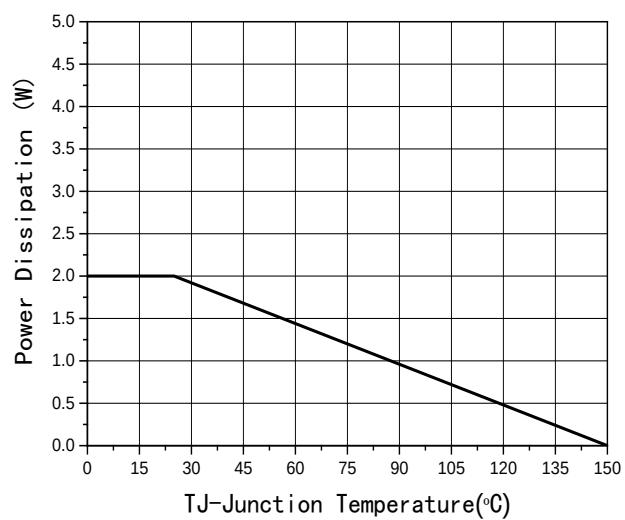


Fig7 Power De-rating

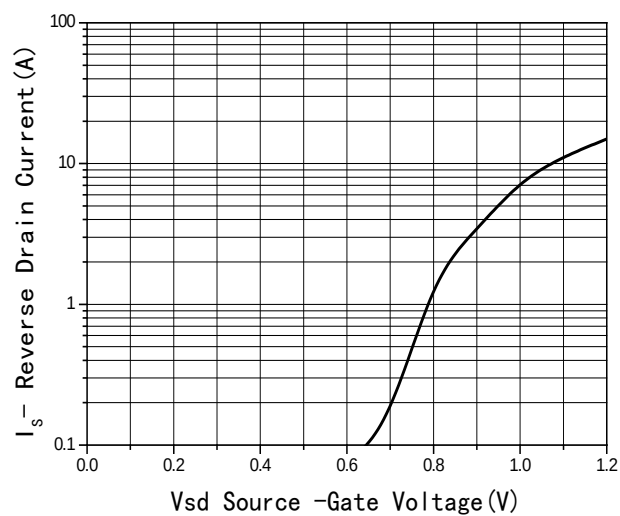


Fig8 Source-Drain Diode Forward

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-40	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-40V, 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	-1.35	-2.0	V
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-6A	-	28.3	32	mΩ
		V _{GS} =-4.5V, I _D =-5A	-	39.4	46	
Forward transconductance	gfs	V _{DS} =-5V, I _D =-6A	-	18	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =-20V, V _{GS} =0V f=1.0MHz	-	1340	-	pF
Output capacitance	C _{OSS}		-	111	-	
Reverse transfer capacitance	C _{RSS}		-	88	-	
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} =-20V 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} =-20V, I _D =-6A V _{GS} =-10V	-	23	-	nC
Gate-source charge	Qgs		-	3.4	-	
Gate-drain charge	Qgd		-	3.6	-	

Typical Performance Characteristics

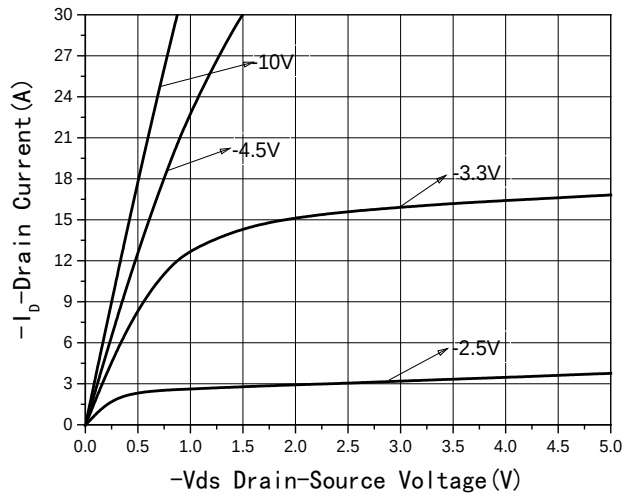


Fig1 Output Characteristics

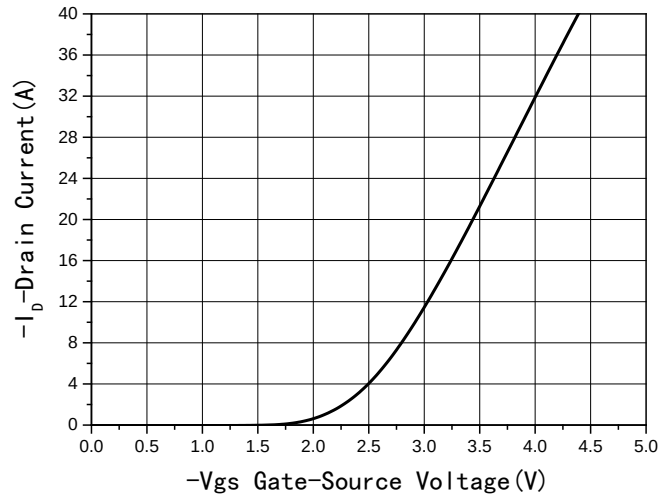


Fig2 Transfer Characteristics

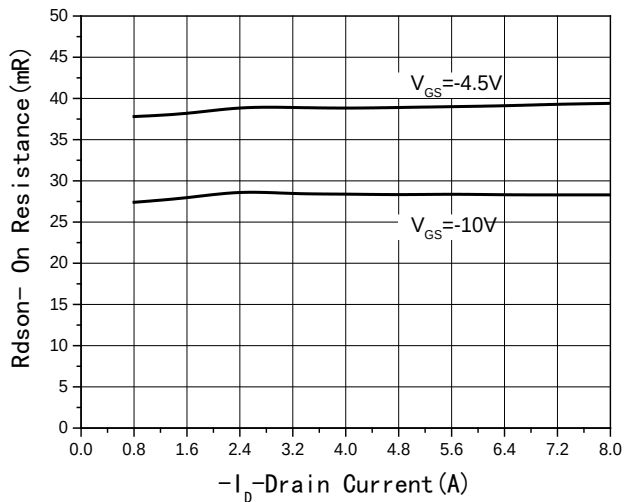


Fig3 Rdson-Drain current

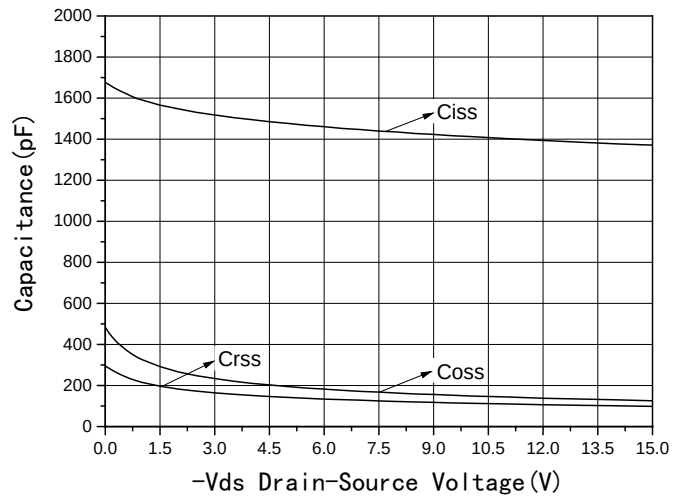


Fig4 Capacitance vs Vds

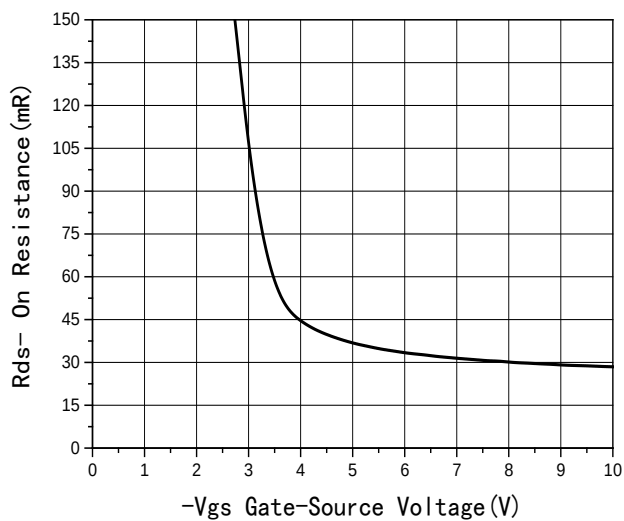


Fig5 Rdson-Gate Drain voltage

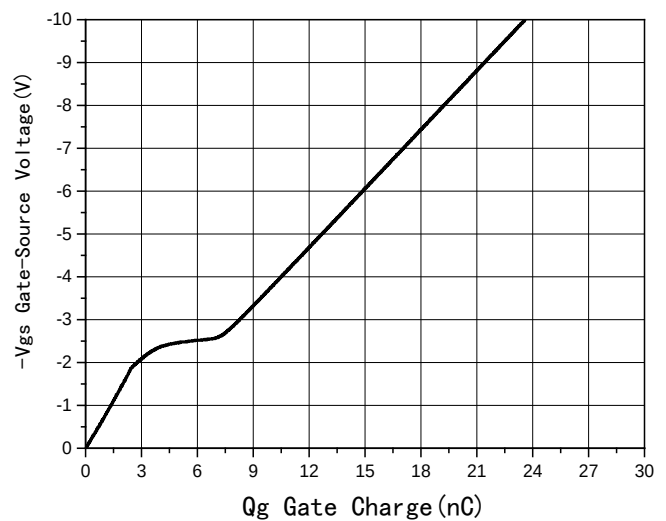


Fig6 Gate Charge

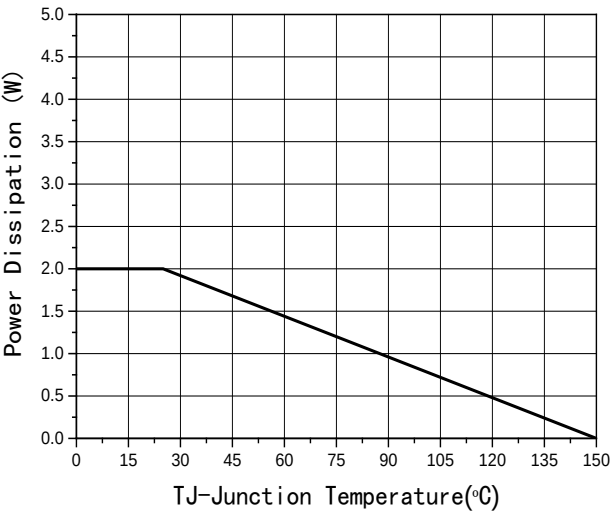


Fig7 Power De-rating

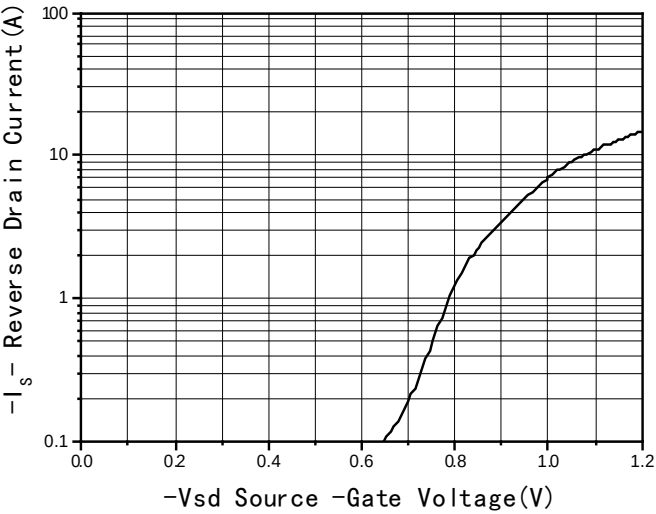
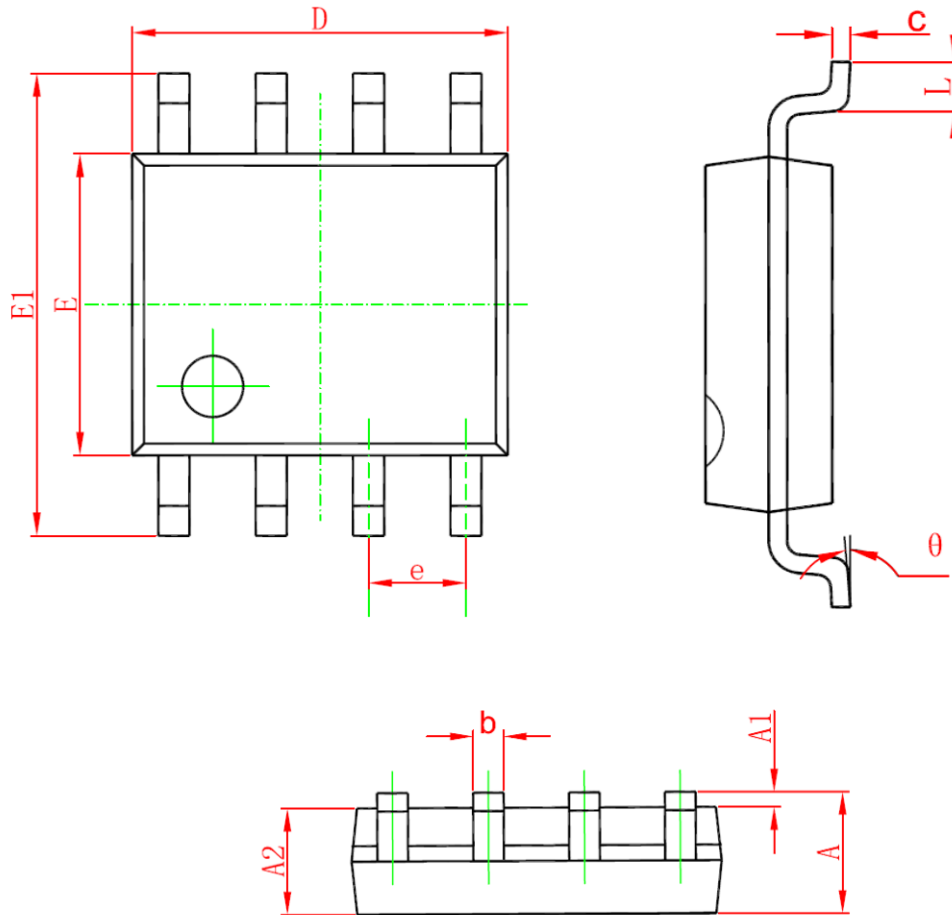


Fig8 Source-Drain Diode Forward

Package Information

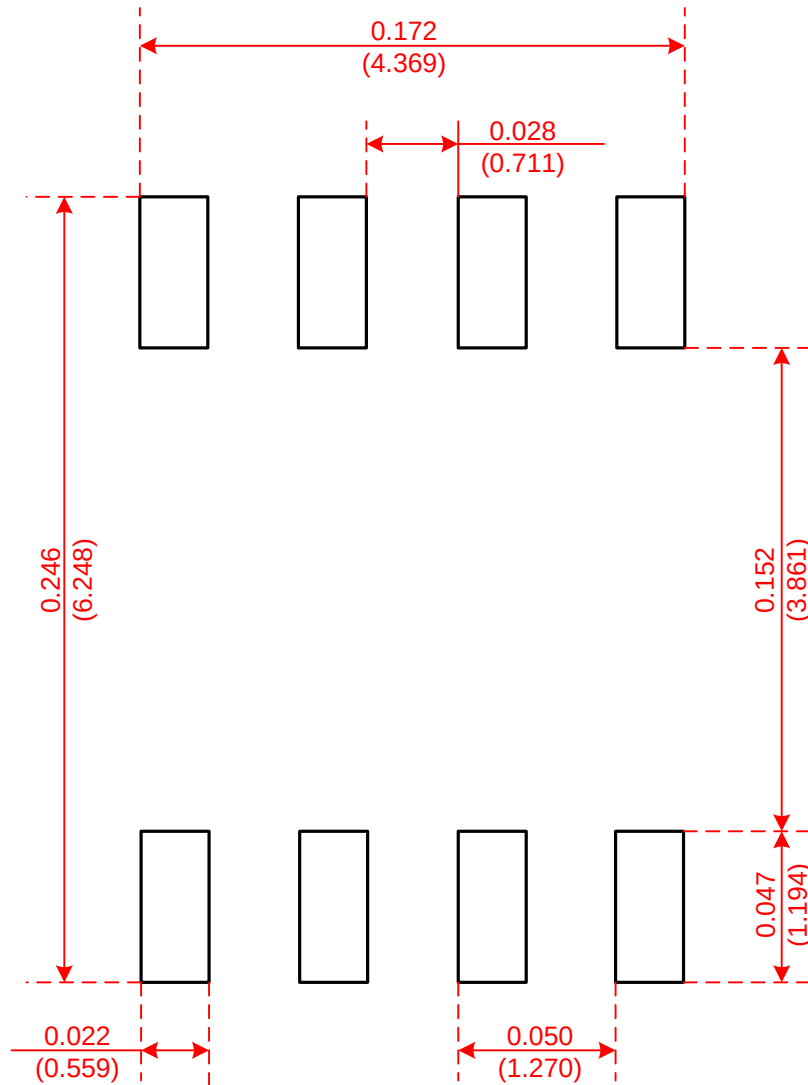
- SOP-8



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)