

N And P-Channel Enhancement Mode MOSFET

Description

The HM4616D 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:

$V_{DS} = 30V, I_D = 35A$

$R_{DS(ON)} = 5.5m\Omega$ (typical) @ $V_{GS} = 10V$

$R_{DS(ON)} = 7.8m\Omega$ (typical) @ $V_{GS} = 4.5V$

P-Channel:

$V_{DS} = -30V, I_D = -18A$

$R_{DS(ON)} = 15m\Omega$ (typical) @ $V_{GS} = -10V$

$R_{DS(ON)} = 20m\Omega$ (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

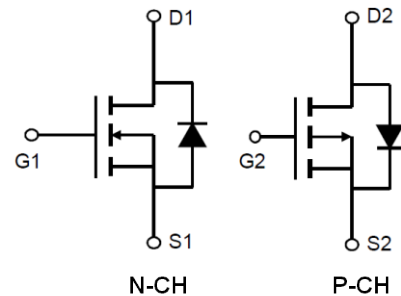
100% UIS TESTED!

100% ΔV_{ds} TESTED!

Application

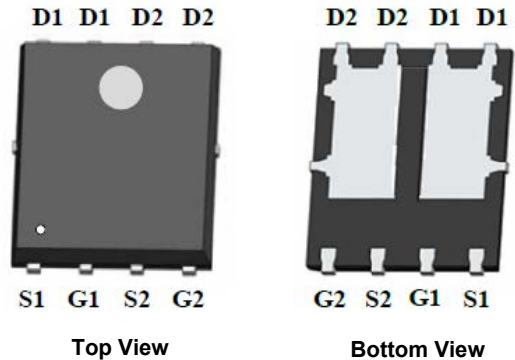
- ◆ Pch+Nch Complementary MOSFET for DC-FAN
- ◆ H-Bridge application

Schematic diagram



Marking and pin assignment

PDFN5×6-8L



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
HM4616D	-55°C to +150°C	PDFN5×6-8L	5000

Absolute Maximum Ratings (TA=25°C 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	°C
Drain Current-Continuous (Silicon Limited)	T _A =25°C	I _D	35	-18	A
	T _A =75°C		24.5	-12.6	

Pulsed Drain Current (Package Limited)		I_{DM}	105	-54	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	$T_A=25^{\circ}C$	P_D	12	20	W
	$T_A=75^{\circ}C$		5	8	
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		$^{\circ}C$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-body leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=13A$	-	5.5	7.0	m Ω
		$V_{GS}=4.5V, I_D=13A$	-	7.8	12	
Forward transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$	-	43	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{DS}=15V, V_{GS}=0V$ $f=1.0MHz$	-	985	-	pF
Output capacitance	C_{OSS}		-	132	-	
Reverse transfer capacitance	C_{RSS}		-	114	-	
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=0V,$ $f=1.0MHz$	-	1.6	2.4	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	$V_{DS}=15V$ $V_{GS}=10V$ $R_L=1.5\Omega$ $R_{GEN}=3\Omega$	-	4.4	-	ns
Rise time	t_r		-	9	-	
Turn-off delay time	$t_{D(OFF)}$		-	17	-	
Fall time	t_f		-	6	-	
Total gate charge	Q_g	$V_{DS}=15V, I_D=13A$ $V_{GS}=10V$	-	19.9	-	nC
Gate-source charge	Q_{gs}		-	3.7	-	
Gate-drain charge	Q_{gd}		-	4	-	

Typical Performance Characteristics

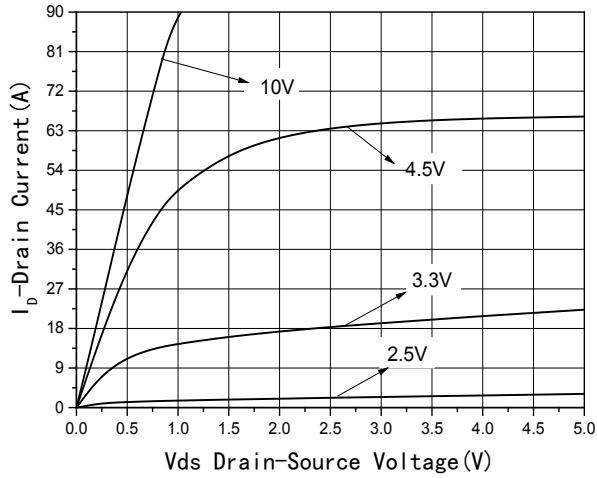


Fig1 Output Characteristics

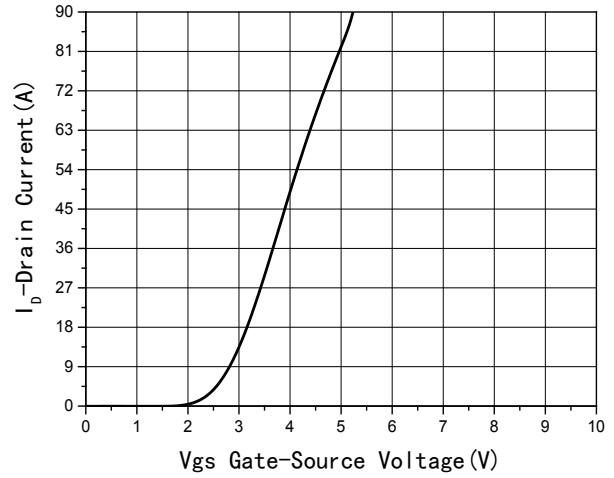


Fig2 Transfer Characteristics

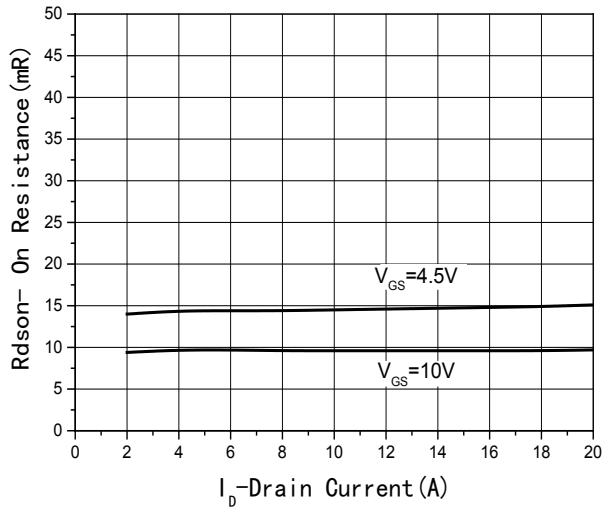


Fig3 Rdson-Drain current

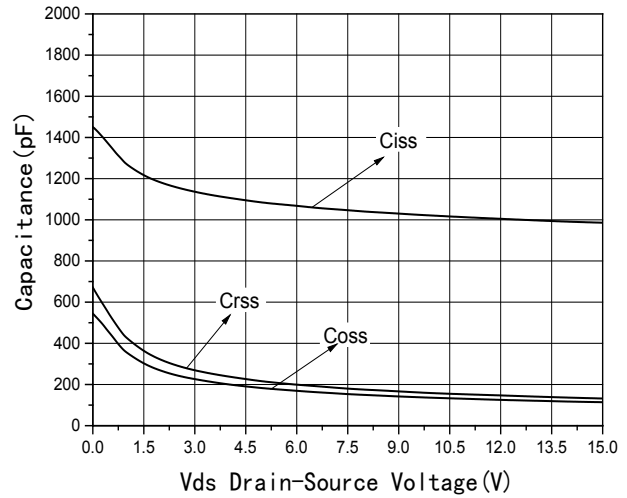


Fig4 Capacitance vs V_DS

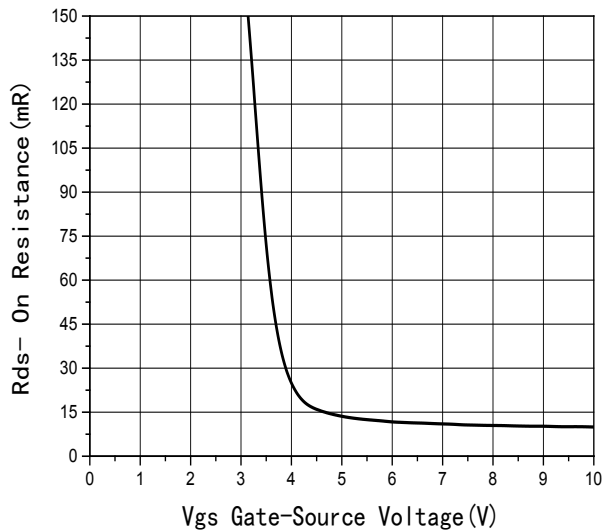


Fig5 Rdson-Gate Drain voltage

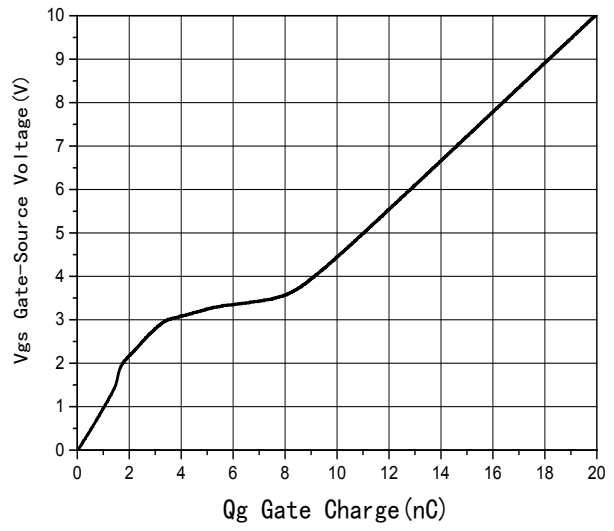


Fig6 Gate Charge

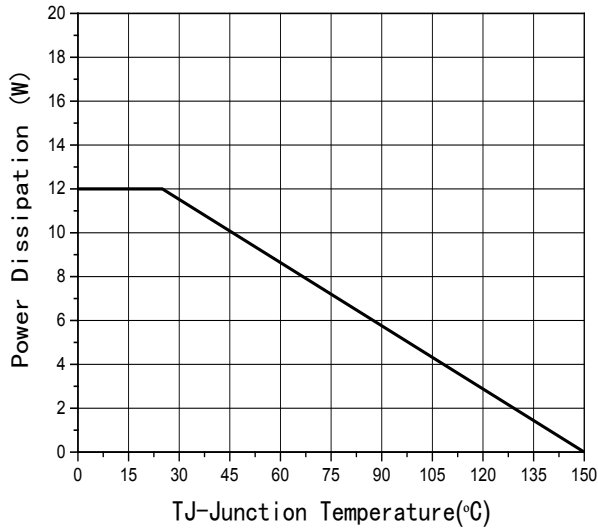


Fig7 Power De-rating

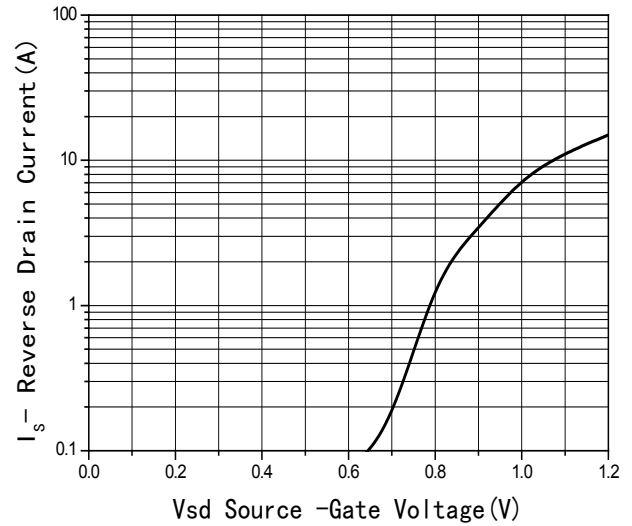
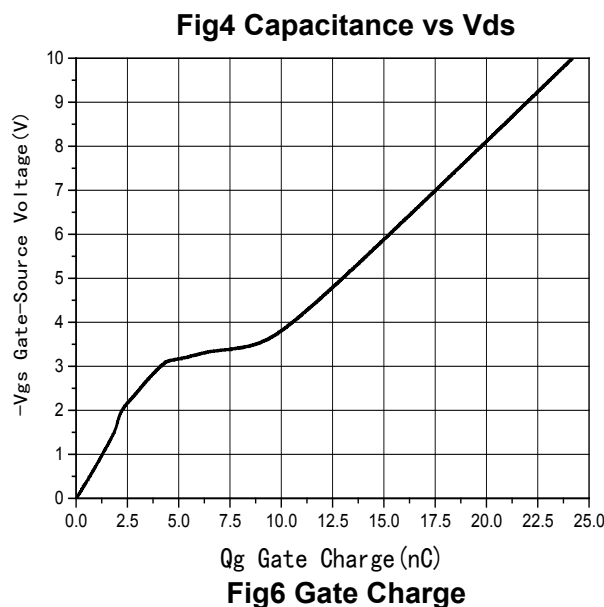
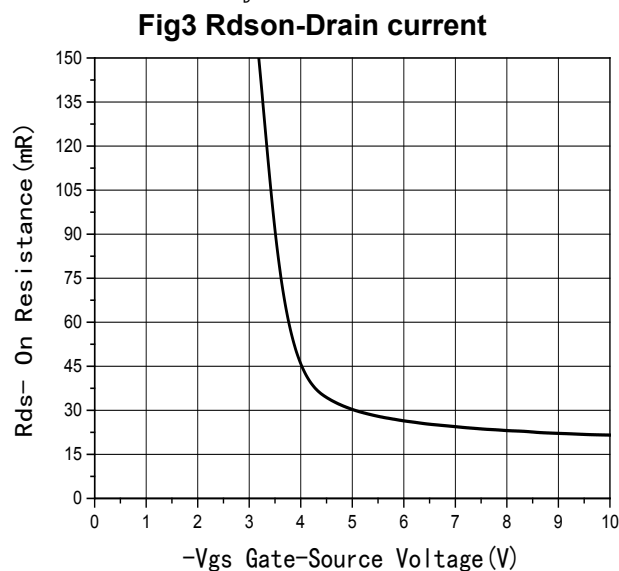
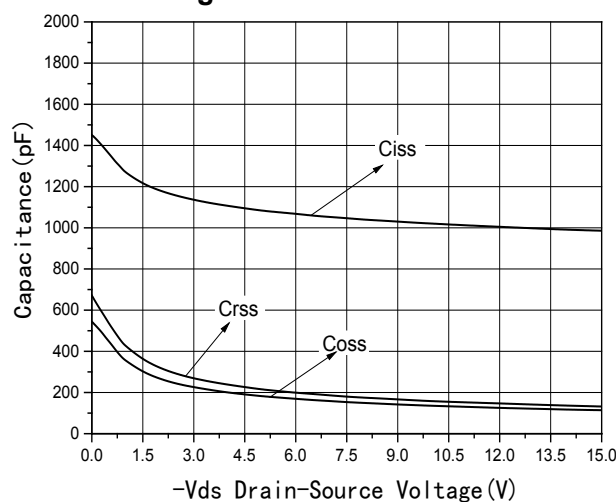
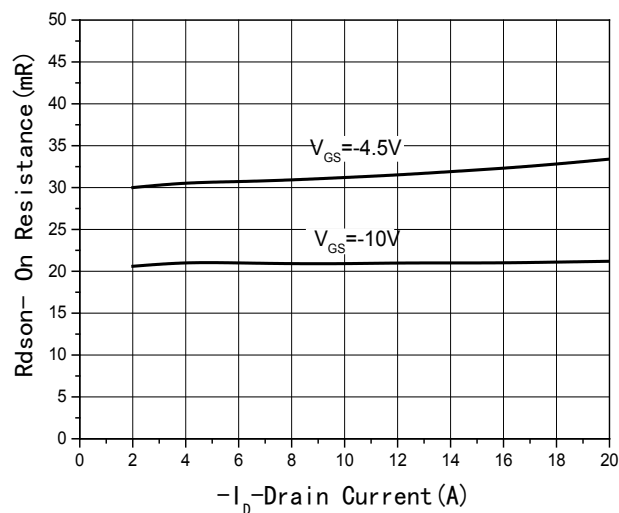
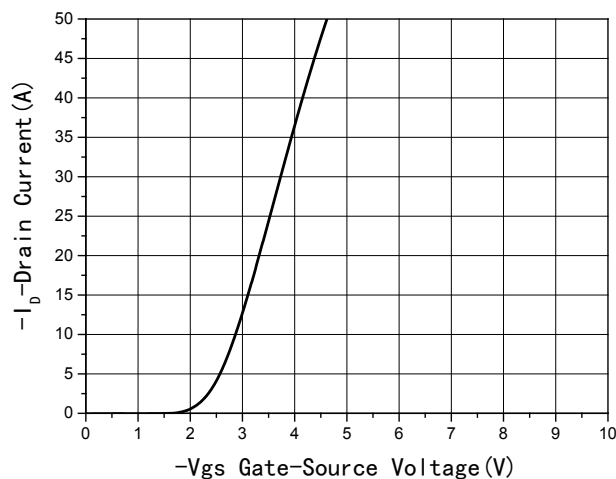
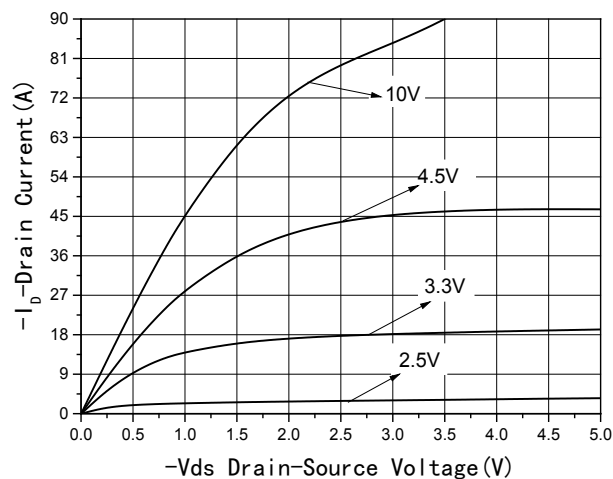


Fig8 Source-Drain Diode Forward

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	-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	-1.5	-2.4	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-20A	-	15	18	mΩ
		V _{GS} =-4.5V, I _D =-20A	-	20	25	
Forward transconductance	g _{fs}	V _{DS} =-5V, I _D =-10A	-	18	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =-15V, V _{GS} =0V f=1.0MHz	-	24	-	pF
Output capacitance	C _{OSS}		-	4.6	-	
Reverse transfer capacitance	C _{RSS}		-	4.2	-	
Gate resistance	R _g	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	t _r		-	5.5	-	
Turn-off delay time	t _{D(OFF)}		-	3.6	-	
Fall time	t _f		-	4.6	-	
Total gate charge	Q _g	V _{DS} =-15V, I _D =-20A V _{GS} =-10V	-	1261	-	nC
Gate-source charge	Q _{gs}		-	152	-	
Gate-drain charge	Q _{gd}		-	137	-	

Typical Performance Characteristics



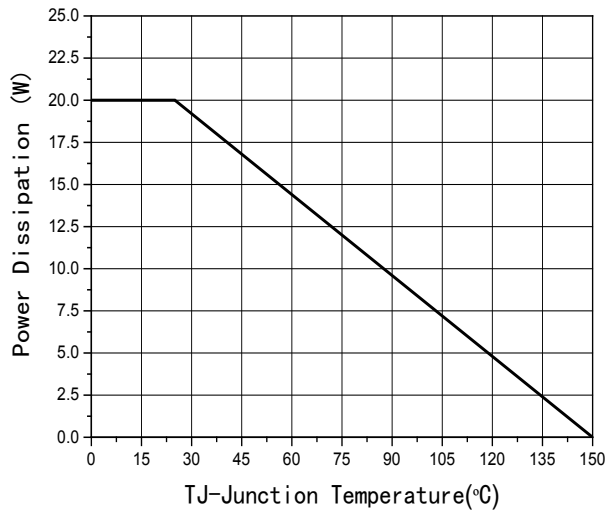


Fig7 Power De-rating

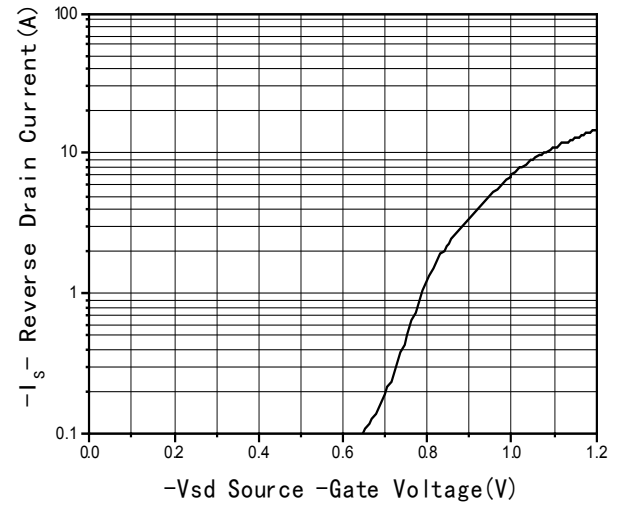
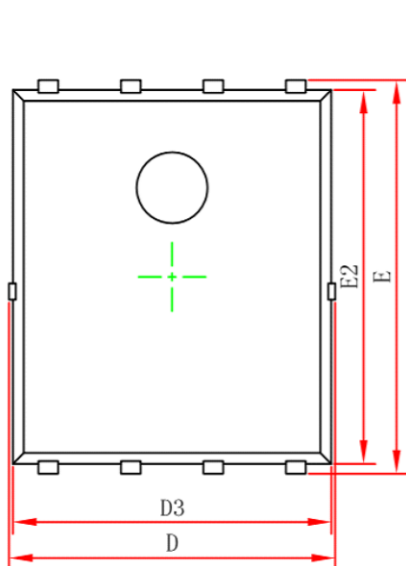


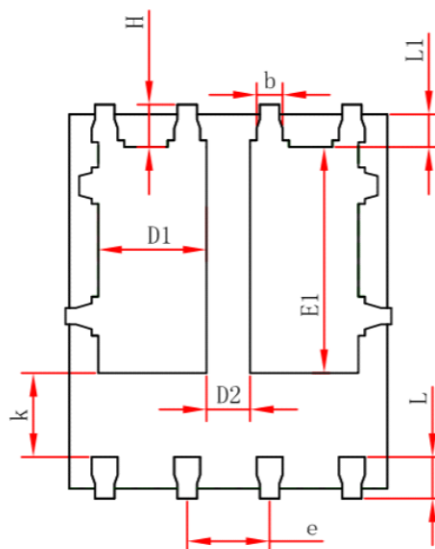
Fig8 Source-Drain Diode Forward

Package Information

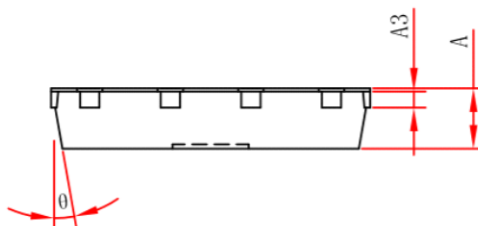
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Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°