

30V N&P-Channel Trench Power MOSFET

General Description

The EJP4606 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as $\pm 4.5V$. This device is suitable for use as a wide variety of applications.

Features

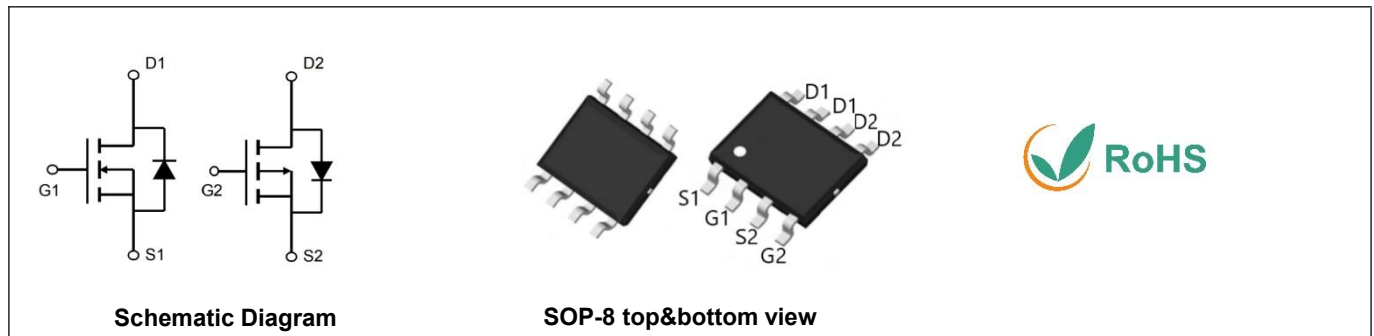
- Low Gate Charge
- High Power and current handing capability
- Lead free product is acquired

Application

- Battery Protection
- Power Management
- Load Switch

Key Performance Parameters

Parameter	Value	Value	Unit
V_{DS}	30	-30	V
$R_{DS(ON_TYP)}$	12	30	m Ω
I_D	11.2	-7	A
Q_G	14	16	nC



Package Marking and Ordering Information

Device/Ordering Code	Package	Packing	Reel Size	Tape width	Quantity
EJP4606	SOP-8	Tape	\	\	4000 Pcs

Table 1. Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N Limit	P Limit	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	30	-30	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	± 20	V
I_D	Drain Current-Continuous($T_A=25^\circ C$)	11.2	-7	A
	Drain Current-Continuous($T_A=100^\circ C$)	7.1	-4.4	A
$I_{DM(pulse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	44.8	-28	A
P_D	Maximum Power Dissipation($T_A=25^\circ C$)	3	2.9	W
	Maximum Power Dissipation($T_A=100^\circ C$)	1.2	1.2	W
E_{AS}	Avalanche energy (Note 2)	36	30	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150		$^\circ C$

EJP4606

Table 2. Thermal Characteristic

Symbol	Parameter	N Max	P Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to- Ambient	42.3	43	°C/W

Table 3. N-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

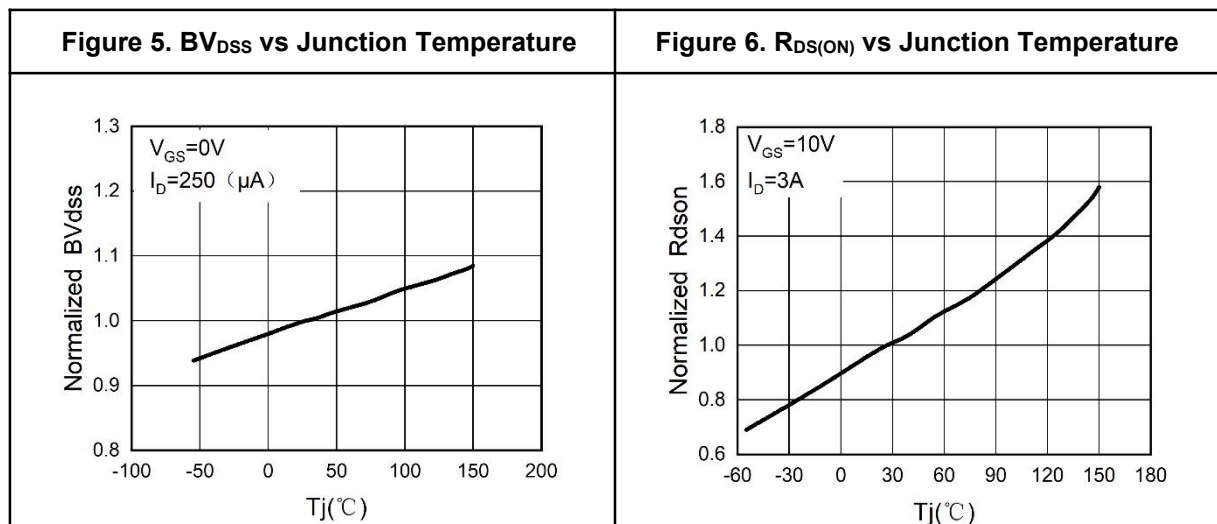
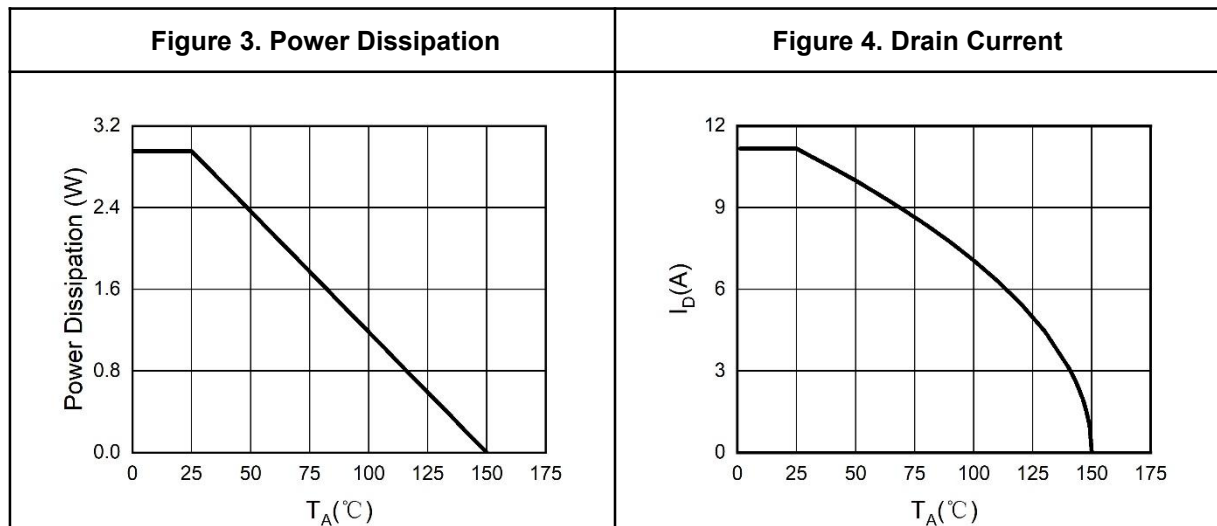
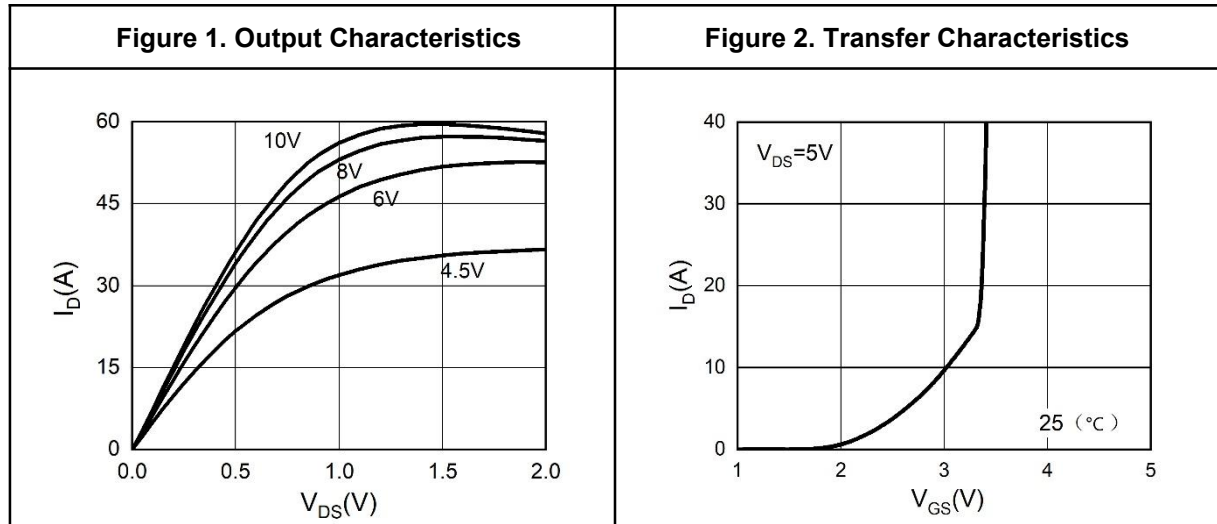
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V T _J =25℃			1	μA
		V _{DS} =30V, V _{GS} =0V T _J =125℃			100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0		2.5	V
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =3A		6.4		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =3A T _J =25℃		12	15	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =2A T _J =25℃		18.1	24.1	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1.0MHz		600		pF
C _{oss}	Output Capacitance			75		pF
C _{rss}	Reverse Transfer Capacitance			61		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		1.2		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =15V, R _L =5Ω, R _{GEN} =3Ω		4.5		ns
t _r	Turn-on Rise Time			2.5		ns
t _{d(off)}	Turn-Off Delay Time			14.5		ns
t _f	Turn-Off Fall Time			3.5		ns
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =3A		14		nC
Q _{gs}	Gate-Source Charge			2		nC
Q _{gd}	Gate-Drain Charge			3		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current (Body Diode)				11.2	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =3A			1.2	V
t _{rr}	Reverse Recovery Time	I _F =3A, dI/dt=500A/μs		10		ns
Q _{rr}	Reverse Recovery Charge	I _F =3A, dI/dt=500A/μs		5		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

Notes 2.EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_G=10V, R_g=25\Omega, L=0.5\text{mH}$.

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

N-Channel Typical Electrical And Thermal Characteristics (Curves)



EJP4606

N-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 7. Gate Charge Waveforms

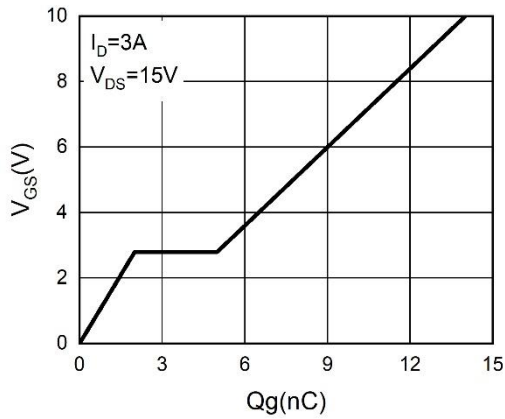


Figure 8. Capacitance

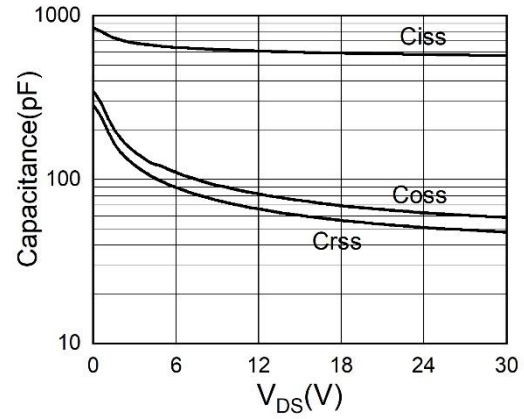


Figure 9. Body-Diode Characteristics

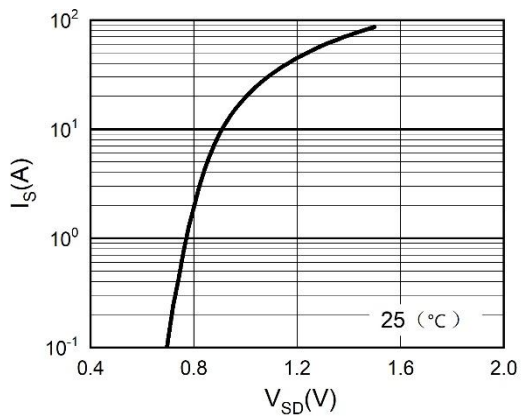
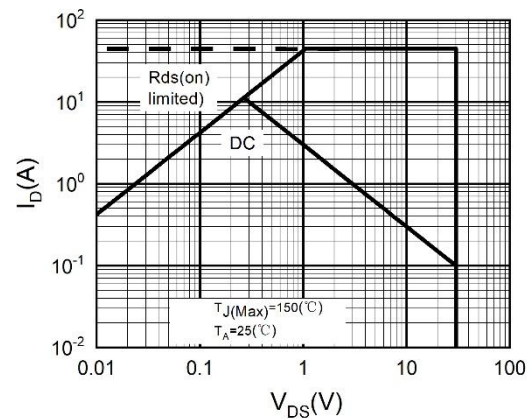


Figure 10. Maximum Safe Operating Area



EJP4606

Table 4. P-Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

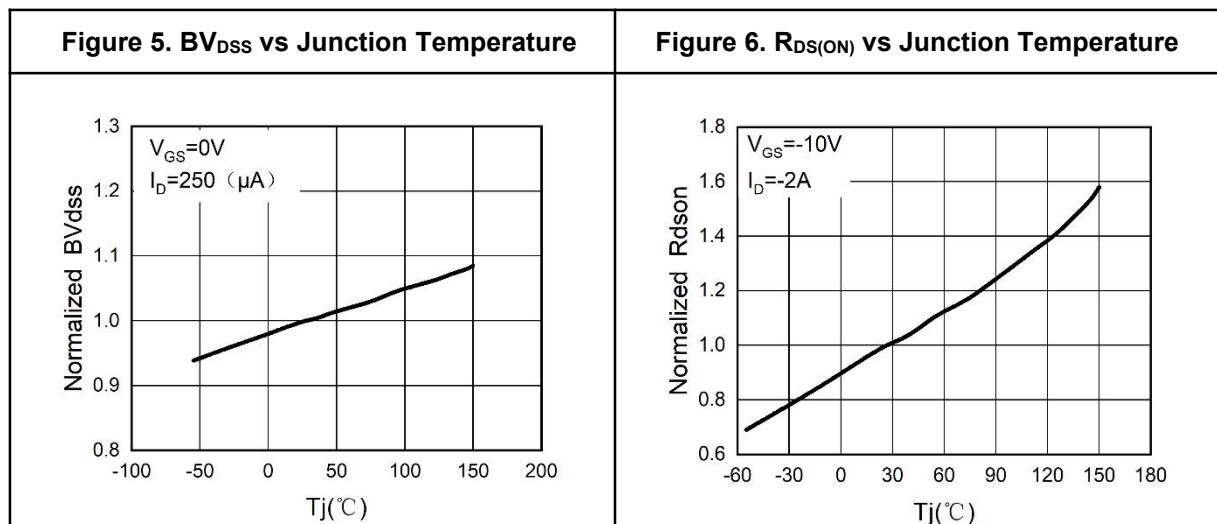
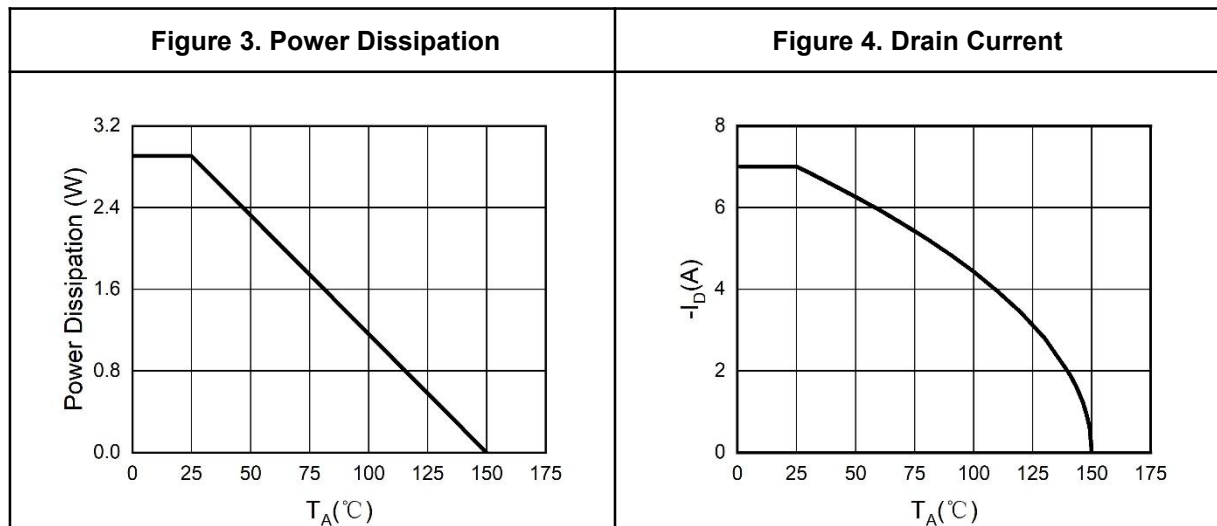
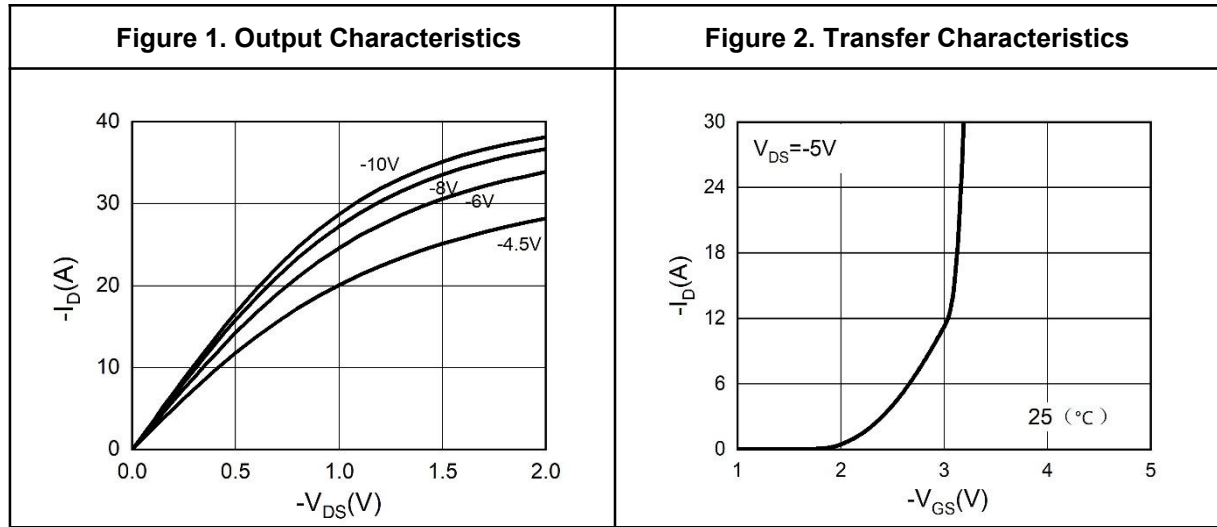
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =-250μA	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V T _J =25℃			-1	μA
		V _{DS} =-30V, V _{GS} =0V T _J =125℃			-100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1		-2.5	V
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-2A		4.8		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-2A T _J =25℃		30	37.5	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-1.5A T _J =25℃		37.9	50.4	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1.0MHz		617		pF
C _{oss}	Output Capacitance			79		pF
C _{rss}	Reverse Transfer Capacitance			63		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		6.5		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =-10V, V _{DS} =-15V, R _L =7.5Ω, R _{GEN} =3Ω		7.5		ns
t _r	Turn-on Rise Time			5.5		ns
t _{d(off)}	Turn-Off Delay Time			19		ns
t _f	Turn-Off Fall Time			7		ns
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-2A		16		nC
Q _{gs}	Gate-Source Charge			2		nC
Q _{gd}	Gate-Drain Charge			4		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current (Body Diode)				-7	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =-2A			-1.2	V
t _{rr}	Reverse Recovery Time	I _F =3A, dI/dt=500A/μs		15		ns
Q _{rr}	Reverse Recovery Charge	I _F =3A, dI/dt=500A/μs		10		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

Notes 2.EAS condition: T_J=25°C, V_{DD}=-30V, V_G=-10V, R_g=25Ω, L=0.5mH.

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

P-Channel Typical Electrical And Thermal Characteristics (Curves)



EJP4606

P-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 7. Gate Charge Waveforms

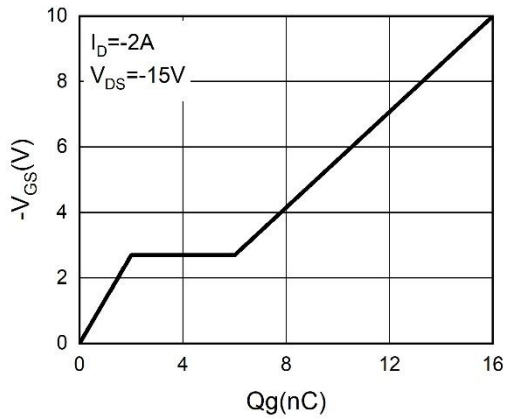


Figure 8. Capacitance

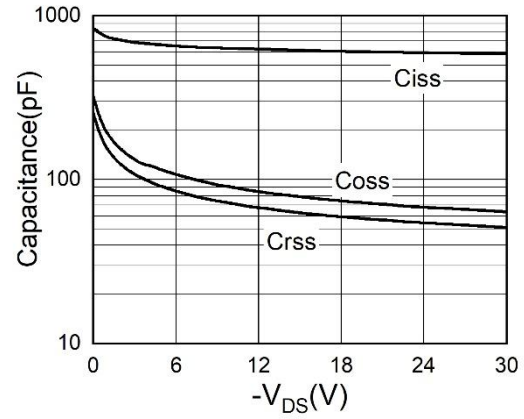


Figure 9. Body-Diode Characteristics

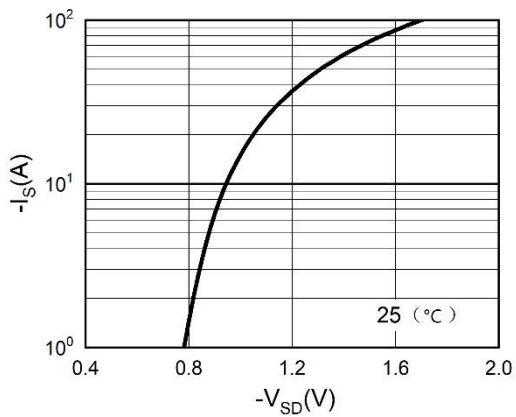
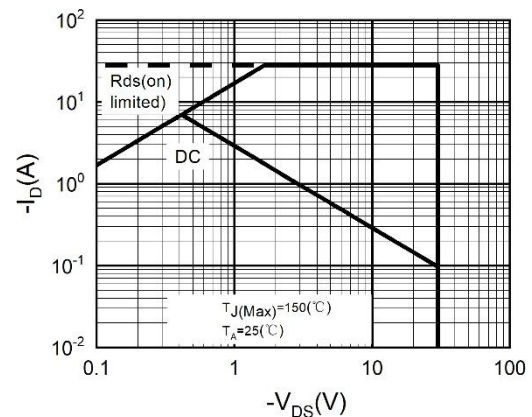
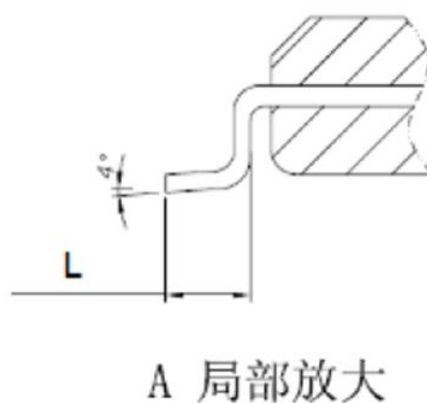
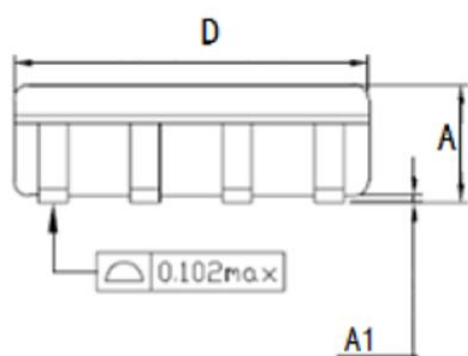
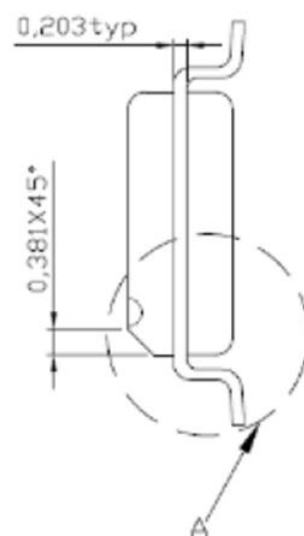
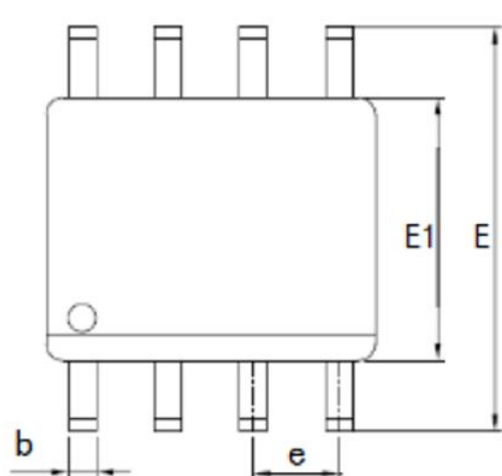


Figure 10. Maximum Safe Operating Area



EJP4606

SOP-8 Package Information



A 局部放大

Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	1.35	1.55	1.75
A1	0.1	0.15	0.2
b	0.346	0.406	0.466
D	4.8	4.89	4.98
E	5.75	6.00	6.25
E1	3.81	3.90	3.99
e	1.27 TYP		
L	0.406	0.838	1.27