SJD40NP430

40V N&P-Channel Trench Power MOSFET

General Description

The SJD40NP430 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a wide variety of applications.

Features

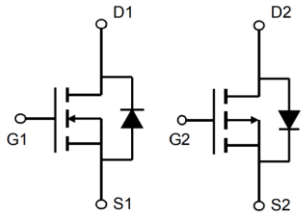
- Low Gate Charge
- 100% UIS Tested, 100% DVDS Tested
- High Power and current handing capability
- Lead free product is acquired

Application

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

Key Performance Parametes

Parameter	Value	Value	Unit
V_{DS}	40	-40	V
$R_{DS(ON)\_TYP}$	10	27	mΩ
I_D	36	-22	A
Q_G	24.5	60	nC



Schematic Diagram

TO-252-4L top&bottom view

RoHS

Package Marking and Ordering Information

Device/Ordering Code	Marking	Package	Packing	Reel Size	Tape width	Quantity
SJD40NP430	SJD40NP430	TO-252-4L	Tape	\	\	2500 Pcs

Table 1. Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Symbol	Parameter	N Limit	P Limit	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V)	40	-40	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±20	±20	V
I_D	Drain Current-Continuous(T_C=25℃)	36	-22	A
	Drain Current-Continuous(T_C=100℃)	23	-13.5	A
I_{DM} (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 1)	144	-88	A
P_D	Maximum Power Dissipation(T_C=25℃)	29	27	W
	Maximum Power Dissipation(T_C=100℃)	12	11	W
E_{AS}	Avalanche energy (Note 2)	64	56	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150		℃

Table 2. Thermal Characteristic

Symbol	Parameter	N Limit	P Limit	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to- Case	4.3	4.6	℃/W

Table 3. N-Channel Electrical Characteristics (T_J=25℃ 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	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V T_J=25℃			1	μA
		V_{DS}=40V, 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	V
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=15A		20		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=15A T_J=25℃		10	13	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=10A T_J=25℃		14.5	19.3	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1.0MHz		1160		pF
C_{oss}	Output Capacitance			84		pF
C_{rss}	Reverse Transfer Capacitance			70		pF
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		1.6		Ω
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=10V, V_{DS}=20V, R_L=1.3Ω, R_{GEN}=3Ω		4.6		nS
t_r	Turn-on Rise Time			12		nS
$t_{d(off)}$	Turn-Off Delay Time			18.8		nS
t_f	Turn-Off Fall Time			6		nS
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=20V, I_D=15A		24.5		nC
Q_{gs}	Gate-Source Charge			3.7		nC
Q_{gd}	Gate-Drain Charge			6.3		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				34	A
V_{SD}	Forward on Voltage (Note 3)	V_{GS}=0V, I_S=15A			1.2	V
t_{rr}	Reverse Recovery Time	I_F=15A, dI/dt=100A/μs		17.5		ns
Q_{rr}	Reverse Recovery Charge	I_F=15A, dI/dt=100A/μs		10.9		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.E_{AS} condition: T_J=25℃,V_{DD}=30V,V_G=10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

N-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 1. Output Characteristics

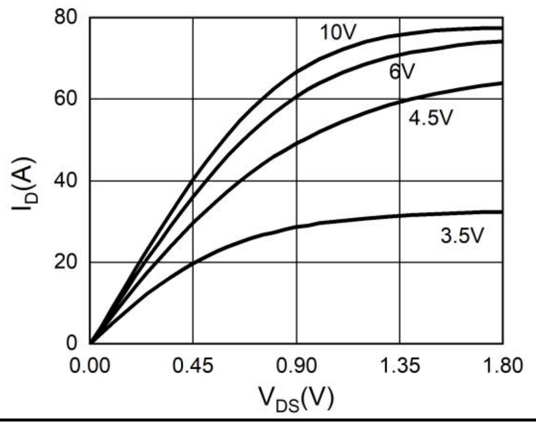


Figure 2. Transfer Characteristics

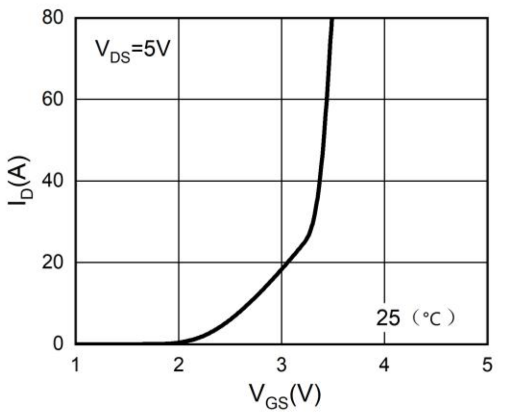


Figure 3. Power Dissipation

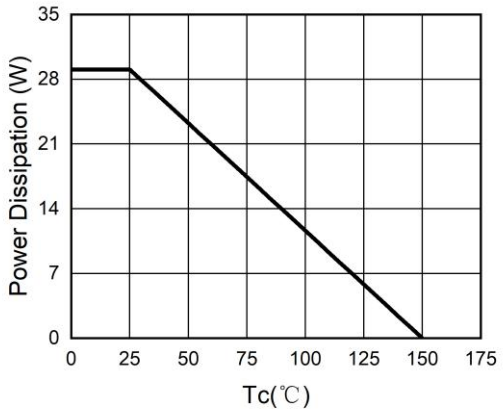


Figure 4. Drain Current

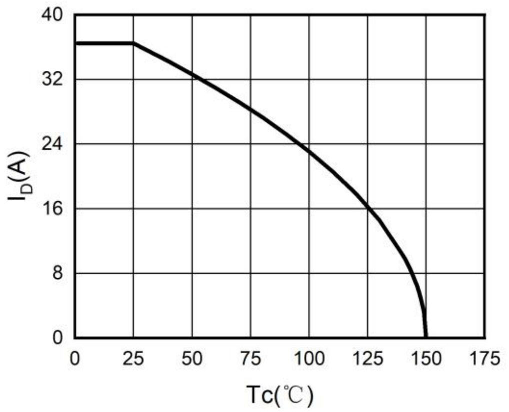


Figure 5. BV$_{DSS}$ vs Junction Temperature

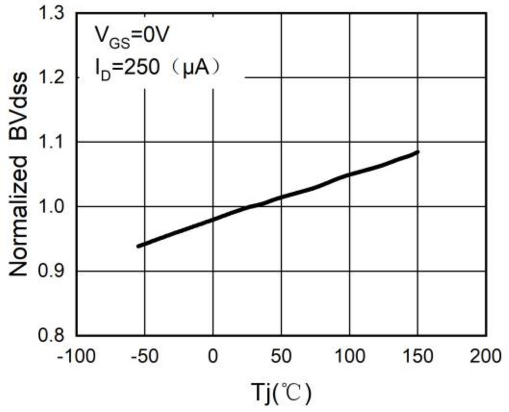
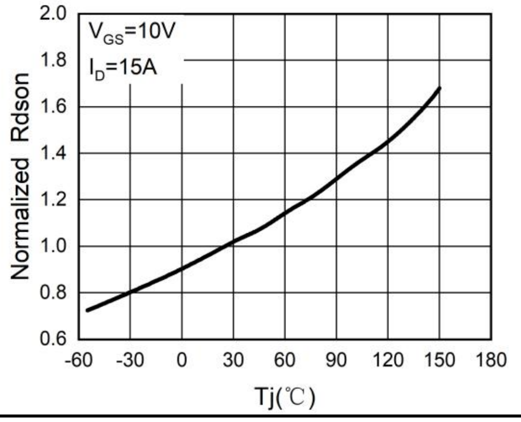


Figure 6. R$_{DS(ON)}$ vs Junction Temperature



N-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 7. Gate Charge Waveforms

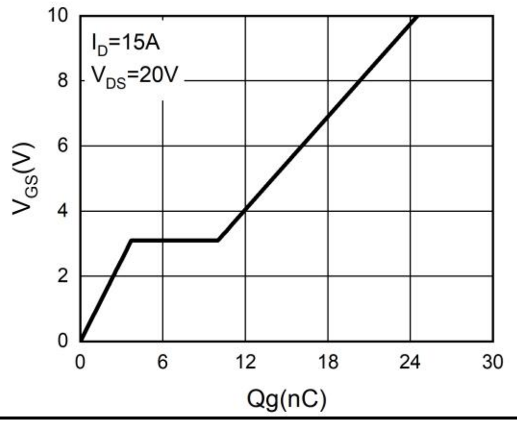


Figure 8. Capacitance

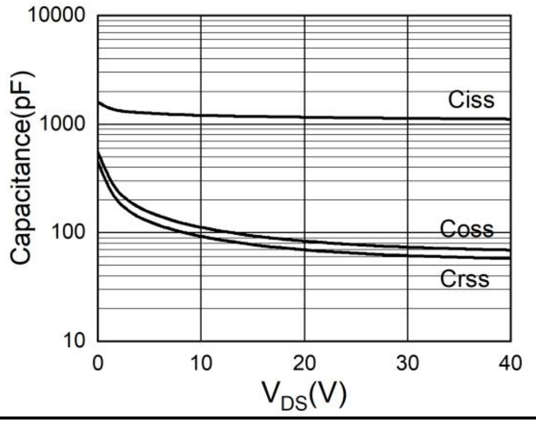


Figure 9. Body-Diode Characteristics

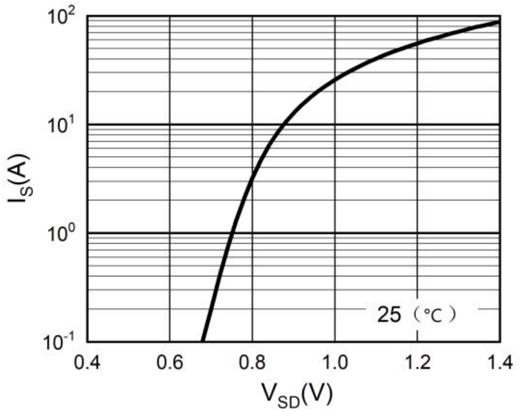


Figure 10. Maximum Safe Operating Area

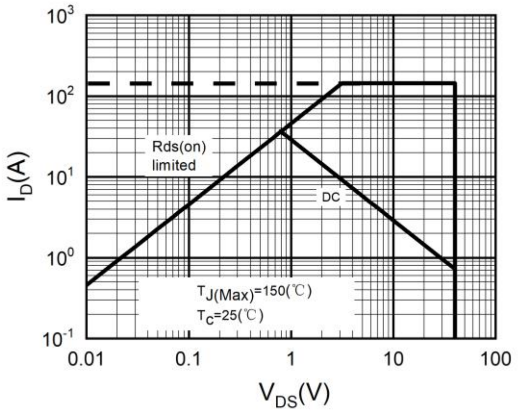


Table 4. P-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-40V, V_{GS}=0V T_J=25℃			-1	μA
		V_{DS}=-40V, 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=-3A		7		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-3A T_J=25℃		27	35	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-2A T_J=25℃		34	45.2	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-20V,V_{GS}=0V, f=1.0MHz		1010		pF
C_{oss}	Output Capacitance			96		pF
C_{rss}	Reverse Transfer Capacitance			83		pF
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		5.1		Ω
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=-10V, V_{DS}=-20V, R_L=6.7Ω, R_{GEN}=3Ω		10		nS
t_r	Turn-on Rise Time			15		nS
$t_{d(off)}$	Turn-Off Delay Time			38		nS
t_f	Turn-Off Fall Time			16.4		nS
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-20V, I_D=-3A		60		nC
Q_{gs}	Gate-Source Charge			8.5		nC
Q_{gd}	Gate-Drain Charge			13		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				-18	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=-100A/μs		17.3		ns
Q_{rr}	Reverse Recovery Charge	I_F=-3A, dI/dt=-100A/μs		9.5		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.E_{AS} condition: T_J=25℃,V_{DD}=-40V,V_G=-10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

P-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 1. Output Characteristics

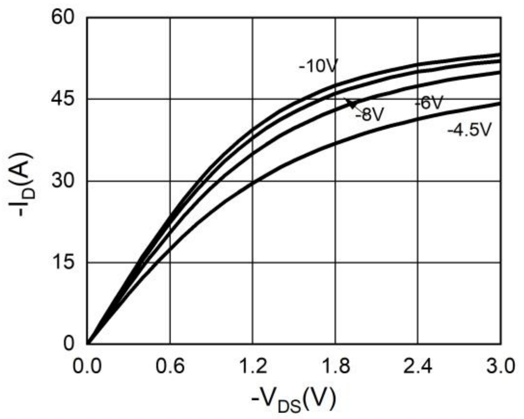


Figure 2. Transfer Characteristics

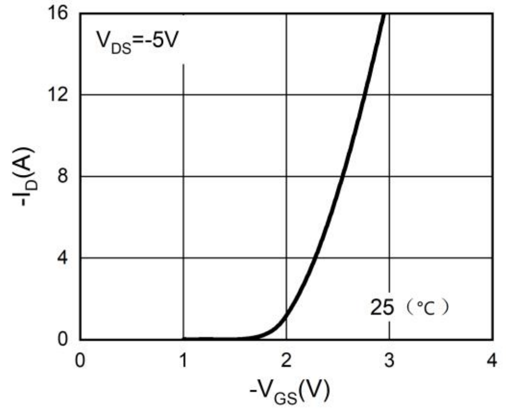


Figure 3. Power Dissipation

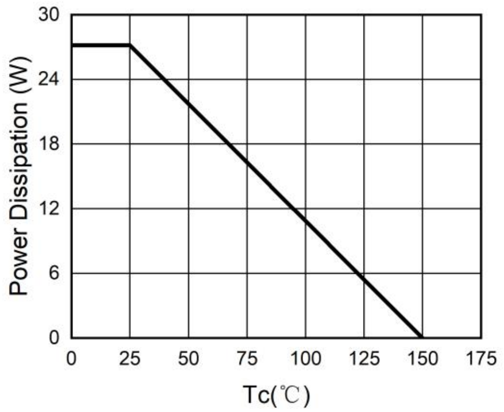


Figure 4. Drain Current

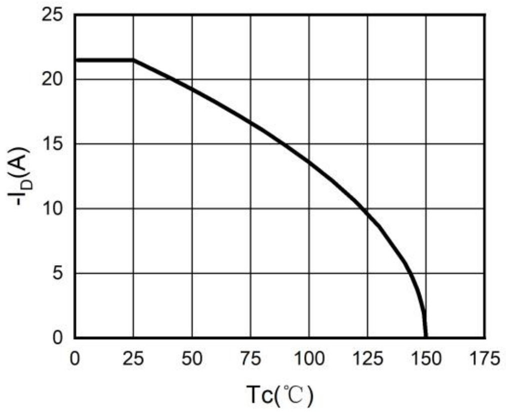


Figure 5. BV_{DSS} vs Junction Temperature

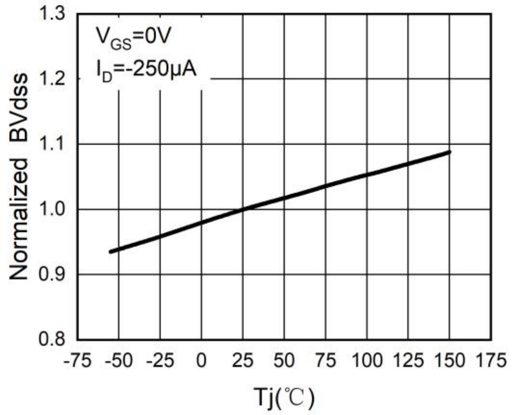
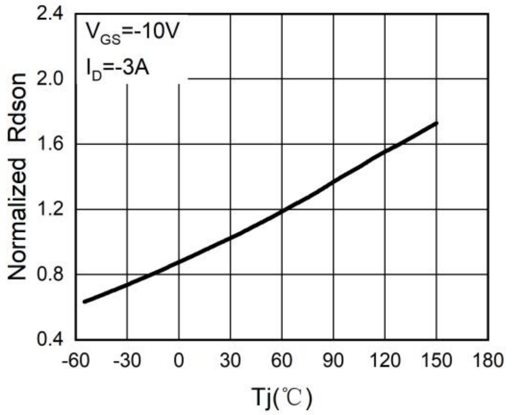


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



P-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 7. Gate Charge Waveforms

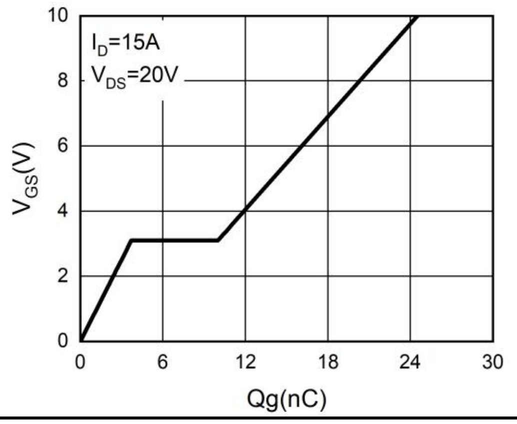


Figure 8. Capacitance

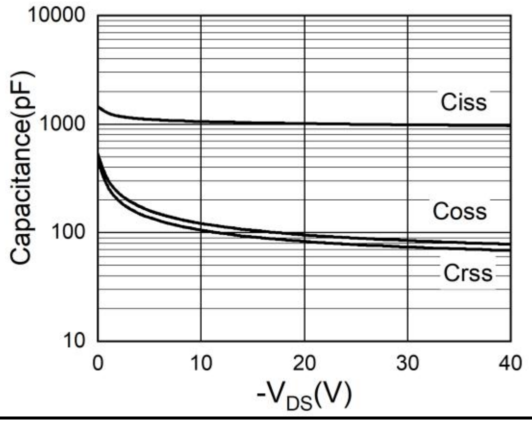


Figure 9. Body-Diode Characteristics

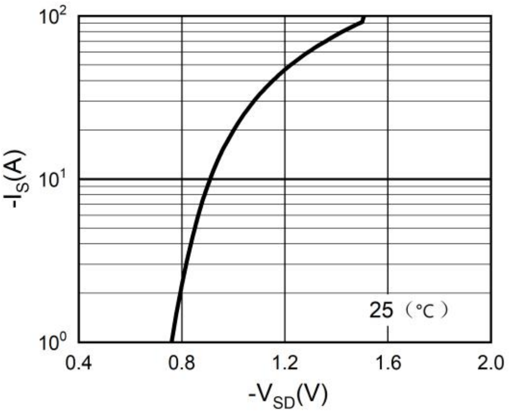
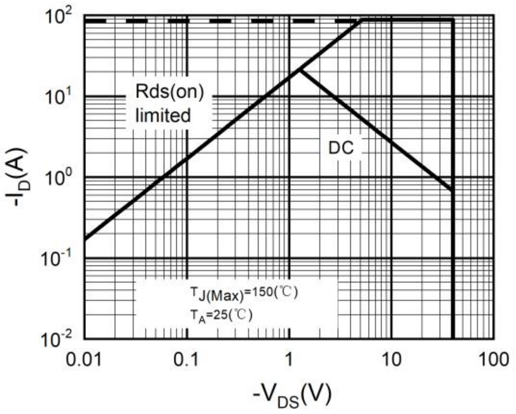
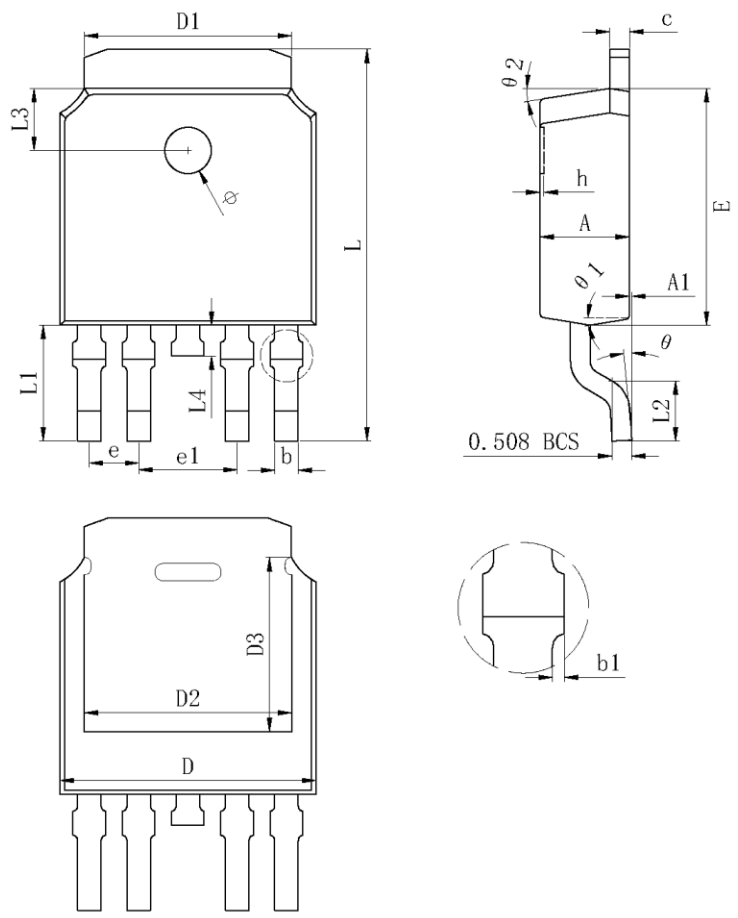


Figure 10. Maximum Safe Operating Area



TO-252-4L Package Information



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.550	0.600	0.650
b1	0.000		0.120
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	5.346 REF		
D3	4.490 REF		
E	6.000	6.100	6.200
e	1.270 TYP		
e1	2.540 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.700	0.800	0.900
Φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		

Attention

This product described in this document can not be used in life support devices or systems, aircraft's control systems, and other applications whose failure can be reasonably expected to result in serious physical and/or material damage，apart from that when an application agreement is signed between customer and Wuxi Shangjia Semiconductor.

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