Product Summary

- V_{DS} = -20V, I_D = -3A

  $R_{DS(ON)}$ < 140mΩ @ V_{GS}=-2.5V

  $R_{DS(ON)}$ < 110mΩ @ V_{GS}=-4.5V

- Package SOT-23

Application

- Battery protection
- Load switch
- Power management

Package and Pin Configuration

SOT23

D

G
S
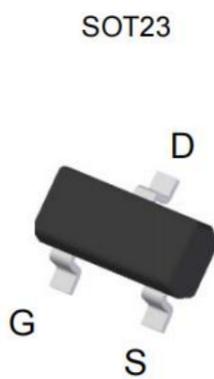
Marking: 2301Or 2301x

Circuit diagram

D

G

S
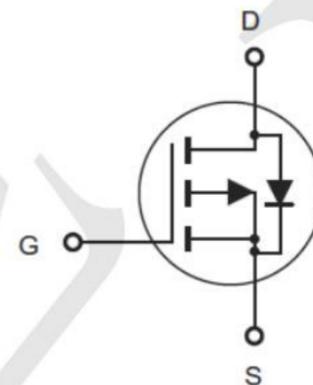
Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	-3	A
Drain Current -Pulsed (Note 1)	I_{DM}	-10	A
Maximum Power Dissipation	P_D	1	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	℃/W

Electrical Characteristics (T$_A$=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$=0V I$_D$=-250μA	-20	-24	-	V
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$=-20V,V$_{GS}$=0V	-	-	-1	μA

| Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	I$_{GSS}$	V$_{GS}$=±12V,V$_{DS}$=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$=V$_{GS}$,I$_D$=-250μA	-0.4	-0.7	-1	V
Drain-Source On-State Resistance	R$_{DS(ON)}$	V$_{GS}$=-4.5V, I$_D$=-3A	-	64	110	mΩ
		V$_{GS}$=-2.5V, I$_D$=-2A	-	89	140	mΩ
Forward Transconductance	g$_{FS}$	V$_{DS}$=-5V,I$_D$=-2A	5	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C$_{Iss}$	V$_{DS}$=-10V,V$_{GS}$=0V, F=1.0MHz	-	405	-	PF
Output Capacitance	C$_{oss}$		-	75	-	PF
Reverse Transfer Capacitance	C$_{rss}$		-	55	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t$_{d(on)}$	V$_{DD}$=-10V,I$_D$=-1A V$_{GS}$=-4.5V,R$_{GEN}$=10Ω	-	11	-	nS
Turn-on Rise Time	t$_r$		-	35	-	nS
Turn-Off Delay Time	t$_{d(off)}$		-	30	-	nS
Turn-Off Fall Time	t$_f$		-	10	-	nS
Total Gate Charge	Q$_g$	V$_{DS}$=-10V,I$_D$=-3A, V$_{GS}$=-2.5V	-	3.3	12	nC
Gate-Source Charge	Q$_{gs}$		-	0.7	-	nC
Gate-Drain Charge	Q$_{gd}$		-	1.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V$_{SD}$	V$_{GS}$=0V,I$_S$=1.3A	-	-	-1.2	V
Diode Forward Current (Note 2)	I$_S$		-	-	-3	A

Typical Electrical and Thermal Characteristics
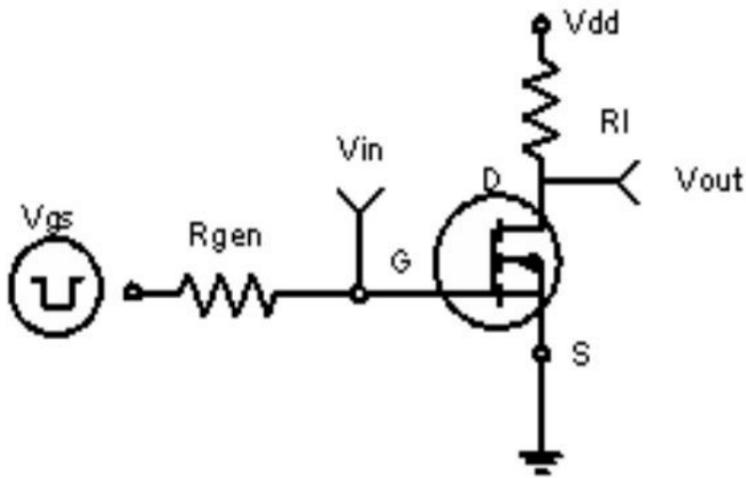
Figure 1:Switching Test Circuit
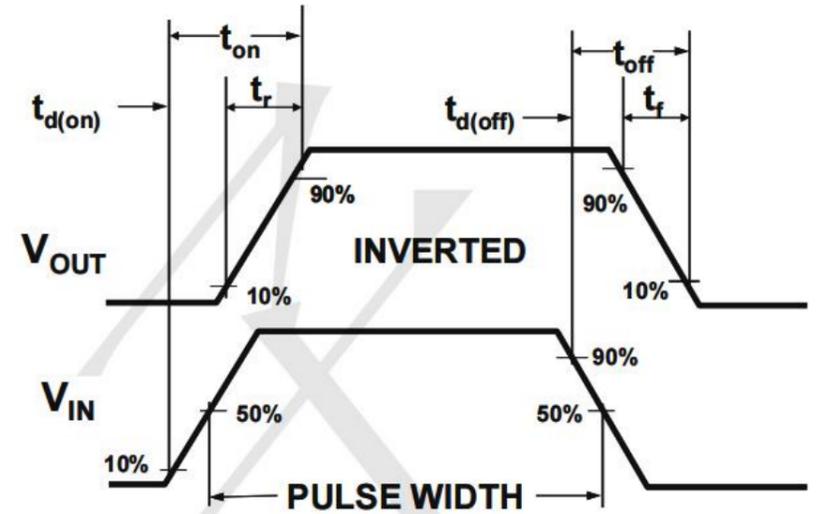
Figure 2:Switching Waveforms
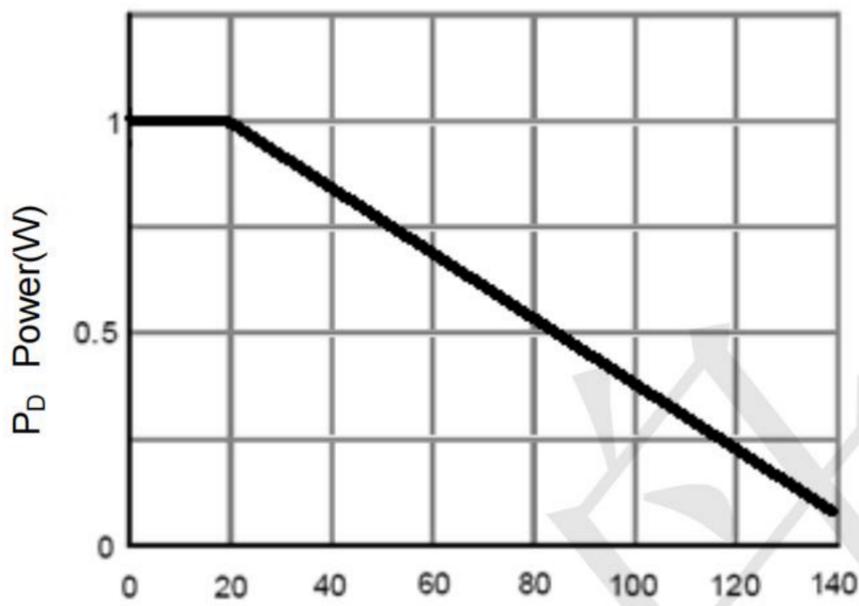
Figure 3 Power Dissipation

P_D Power(W)
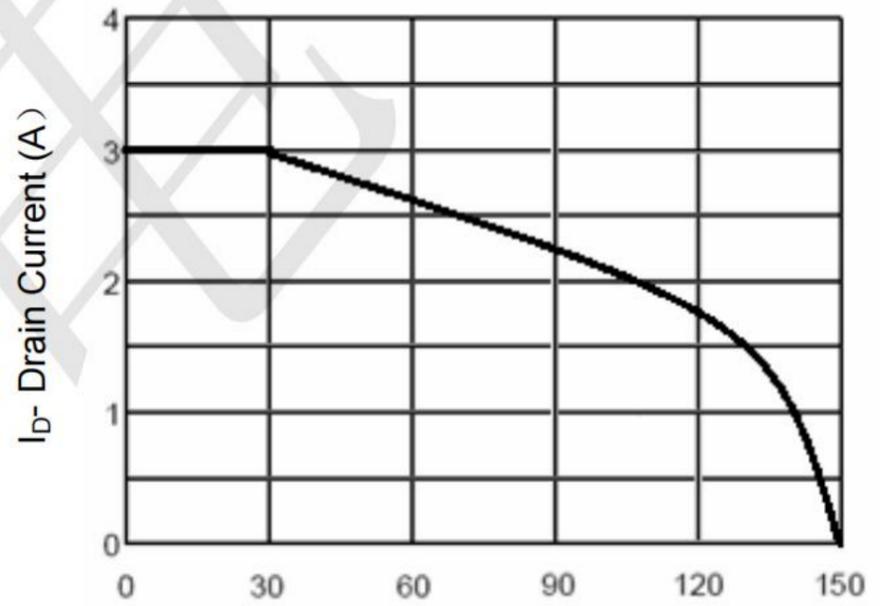
T_J-Junction Temperature(℃)

Figure 4 Drain Current

I_D- Drain Current (A)

T_J-Junction Temperature(℃)

Figure 5 Output Characteristics

I_D- Drain Current (A)

V_{GS} = 5 thru 2.5 V

2 V

1.5 V
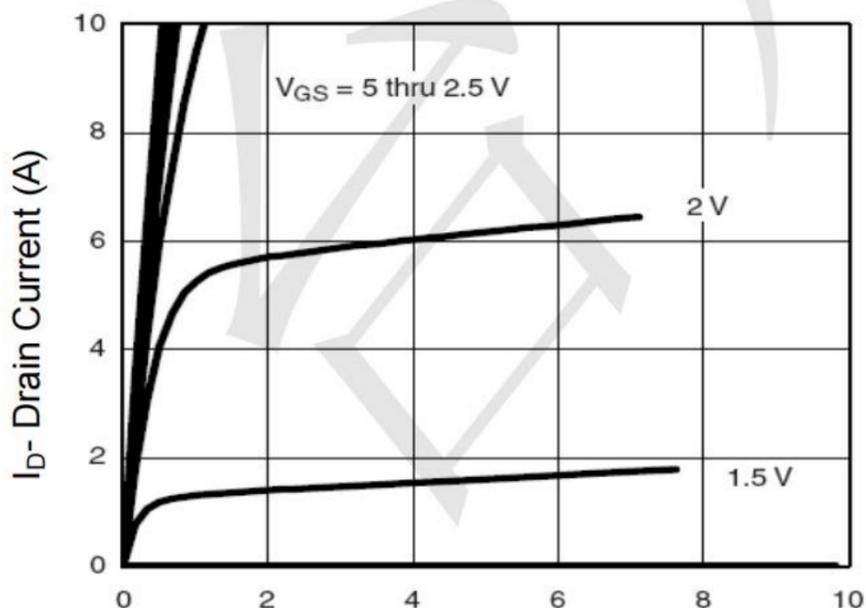
Vds Drain-Source Voltage (V)

Figure 6 Drain-Source On-Resistance

Rdson On-Resistance(Ω)

V_{GS} = 2.5 V

V_{GS} = 4.5 V
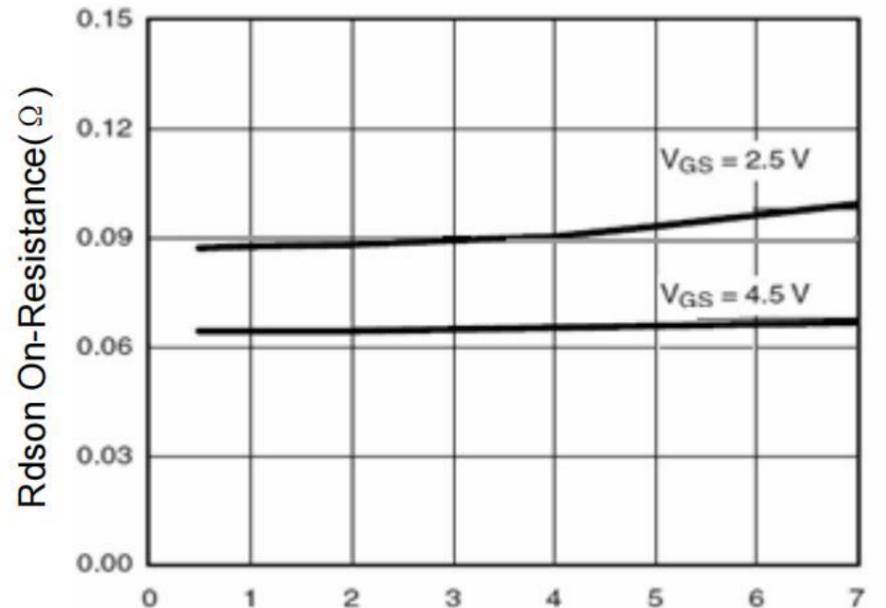
I_D- Drain Current (A)
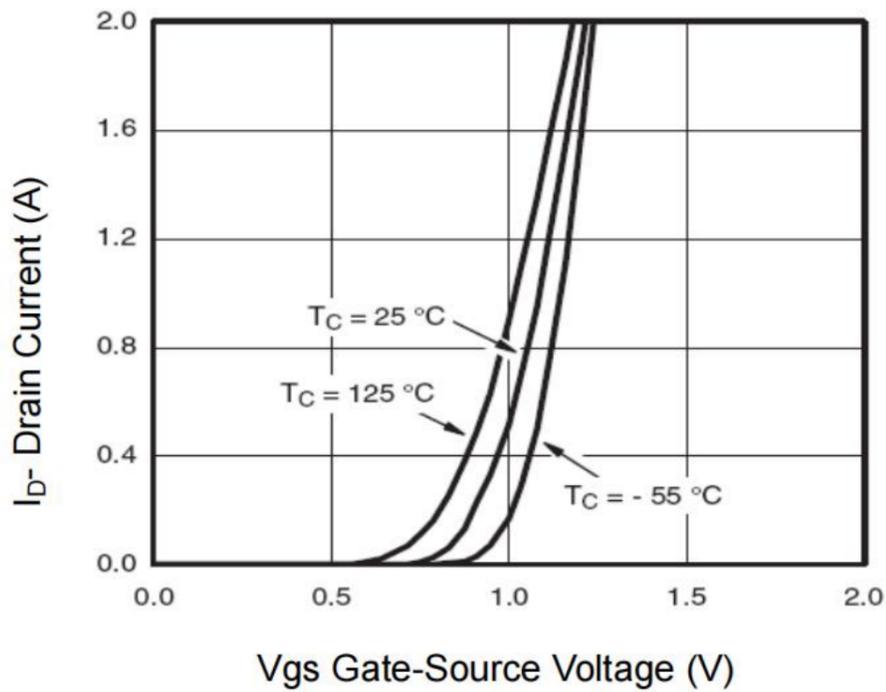
Figure 7 Transfer Characteristics
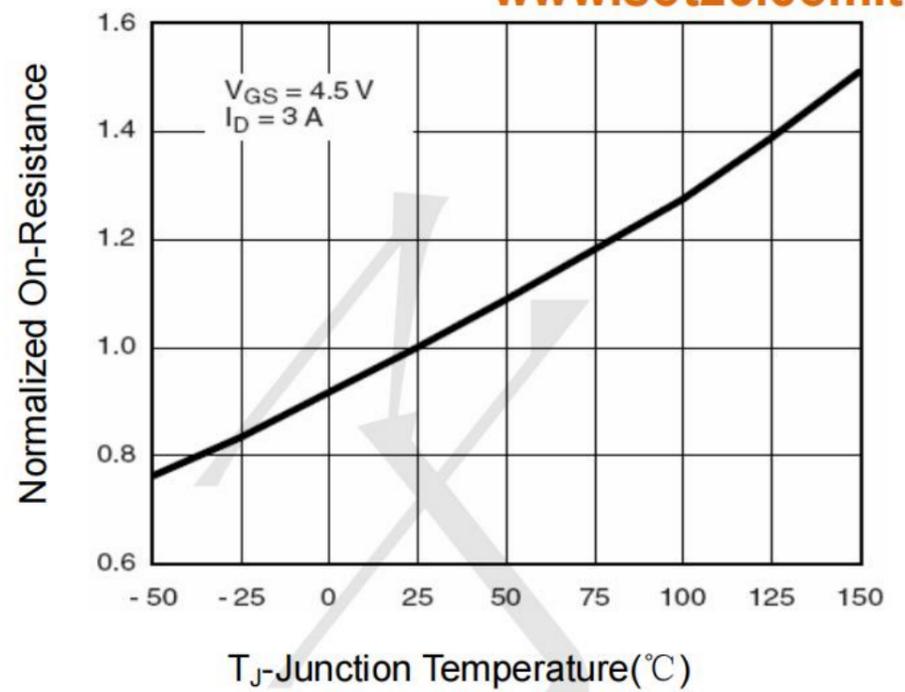
**Figure 8 Drain-Source On-Resistance**
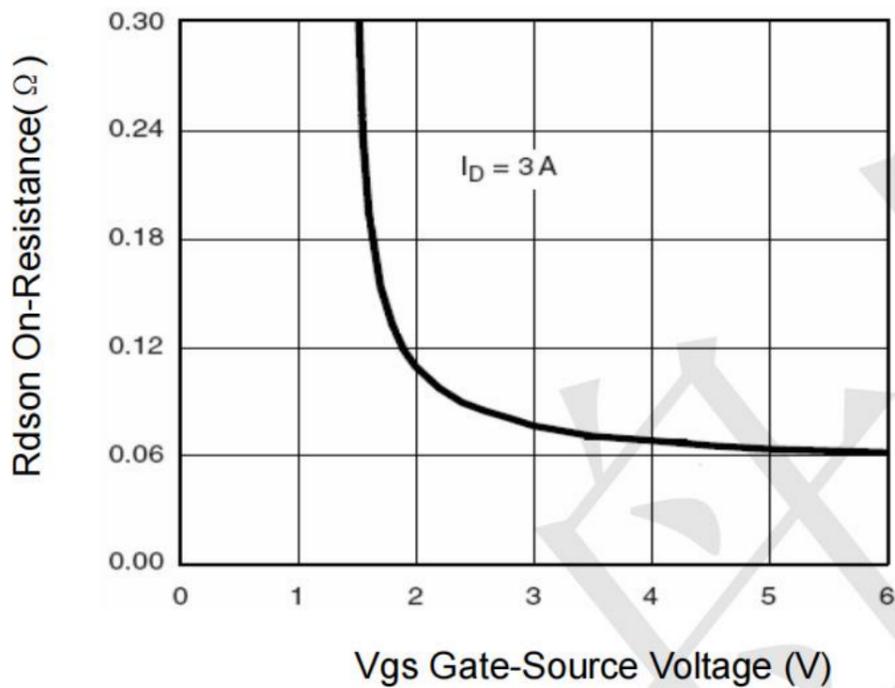
Figure 9 Rdson vs Vgs
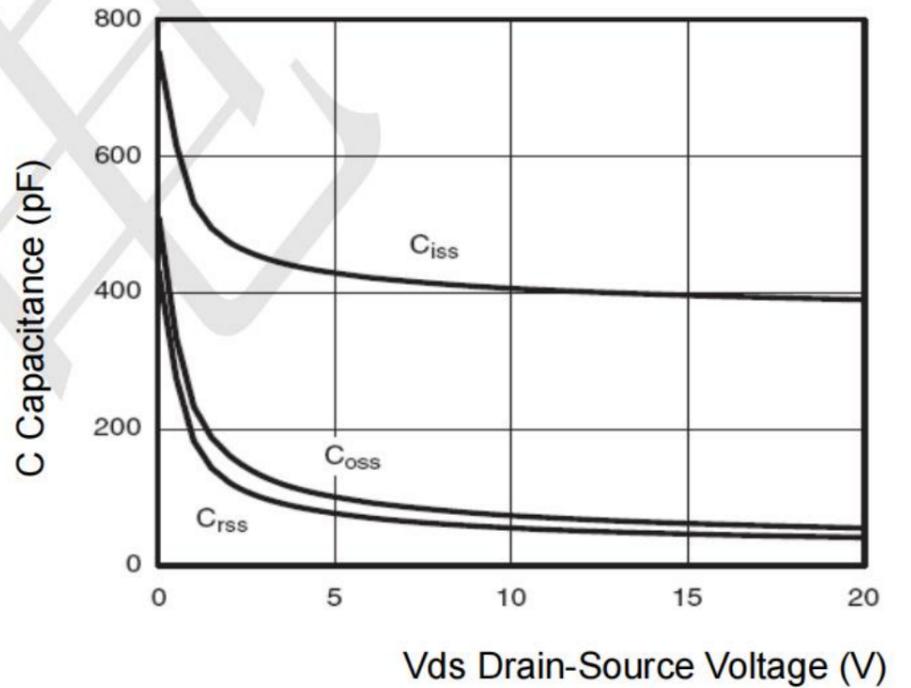


Figure 10 Capacitance vs Vds
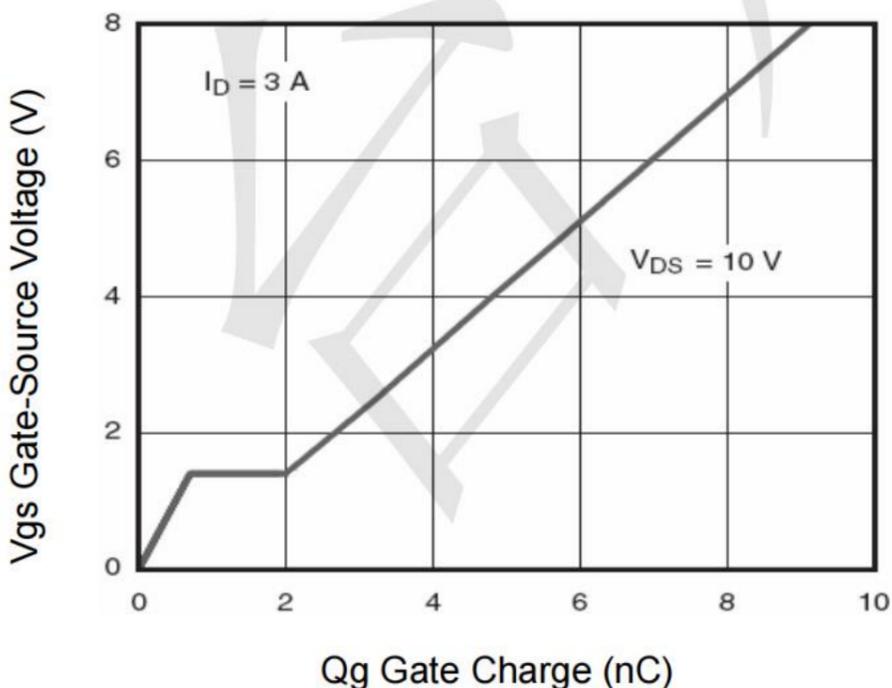
**Figure 11 Gate Charge**
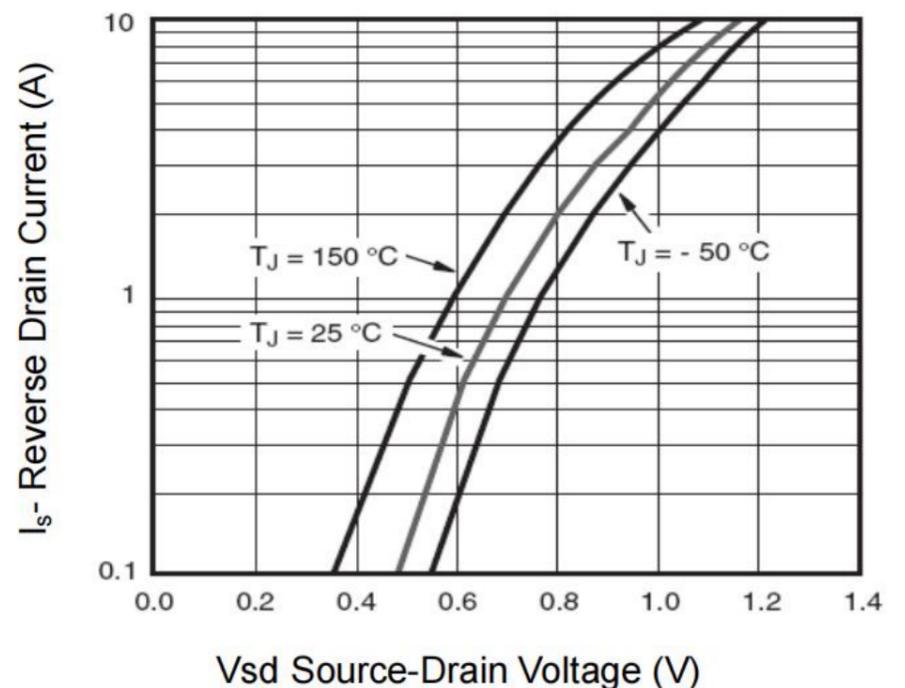
**Figure 12 Source- Drain Diode Forward**
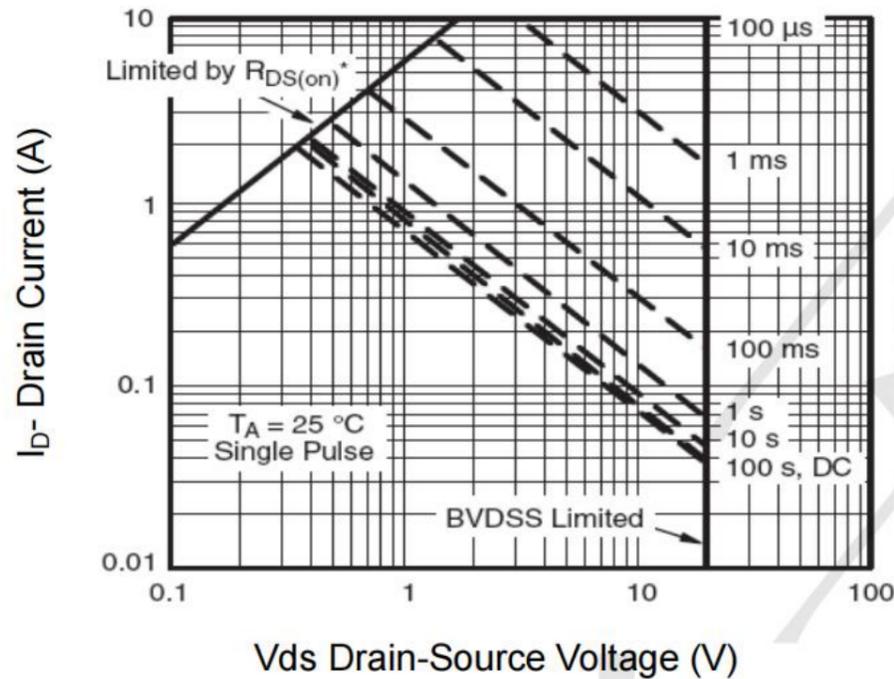
Figure 13 Safe Operation Area
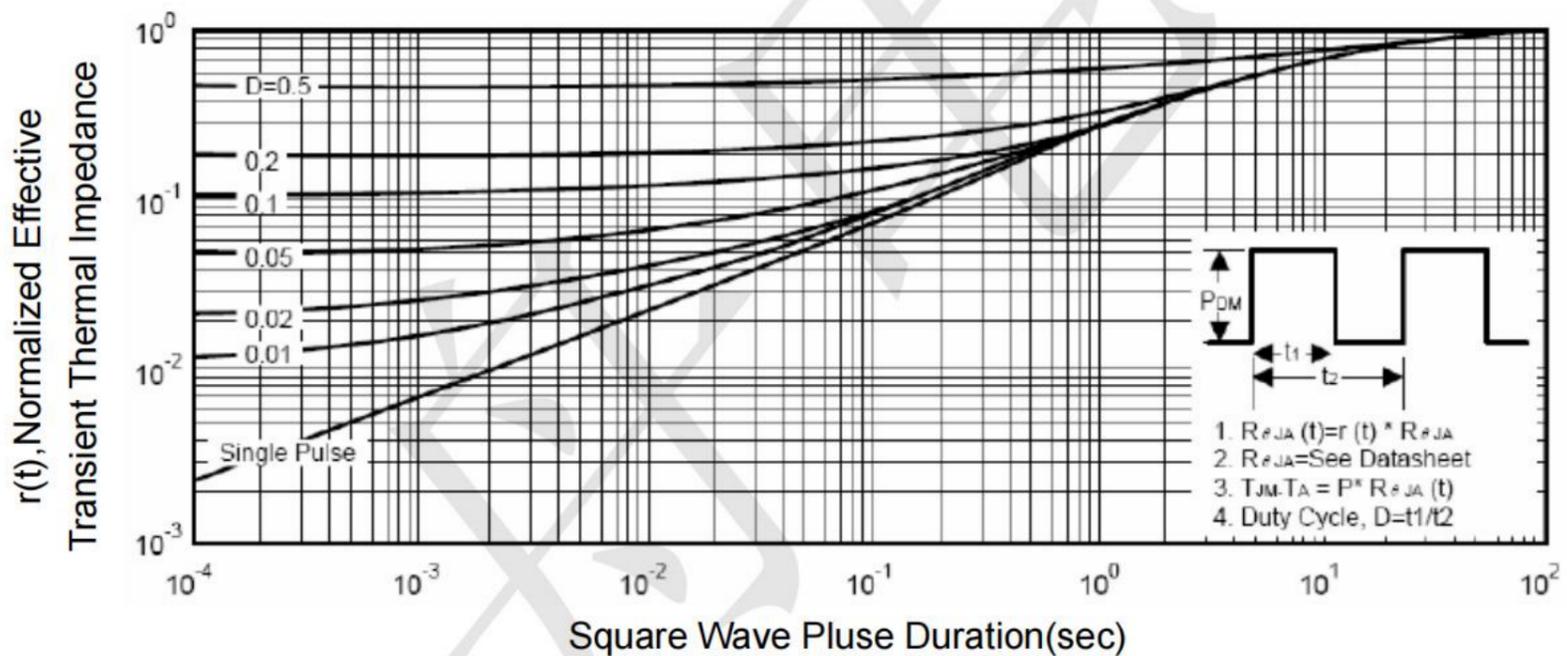
Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information

(UNIT)：mm
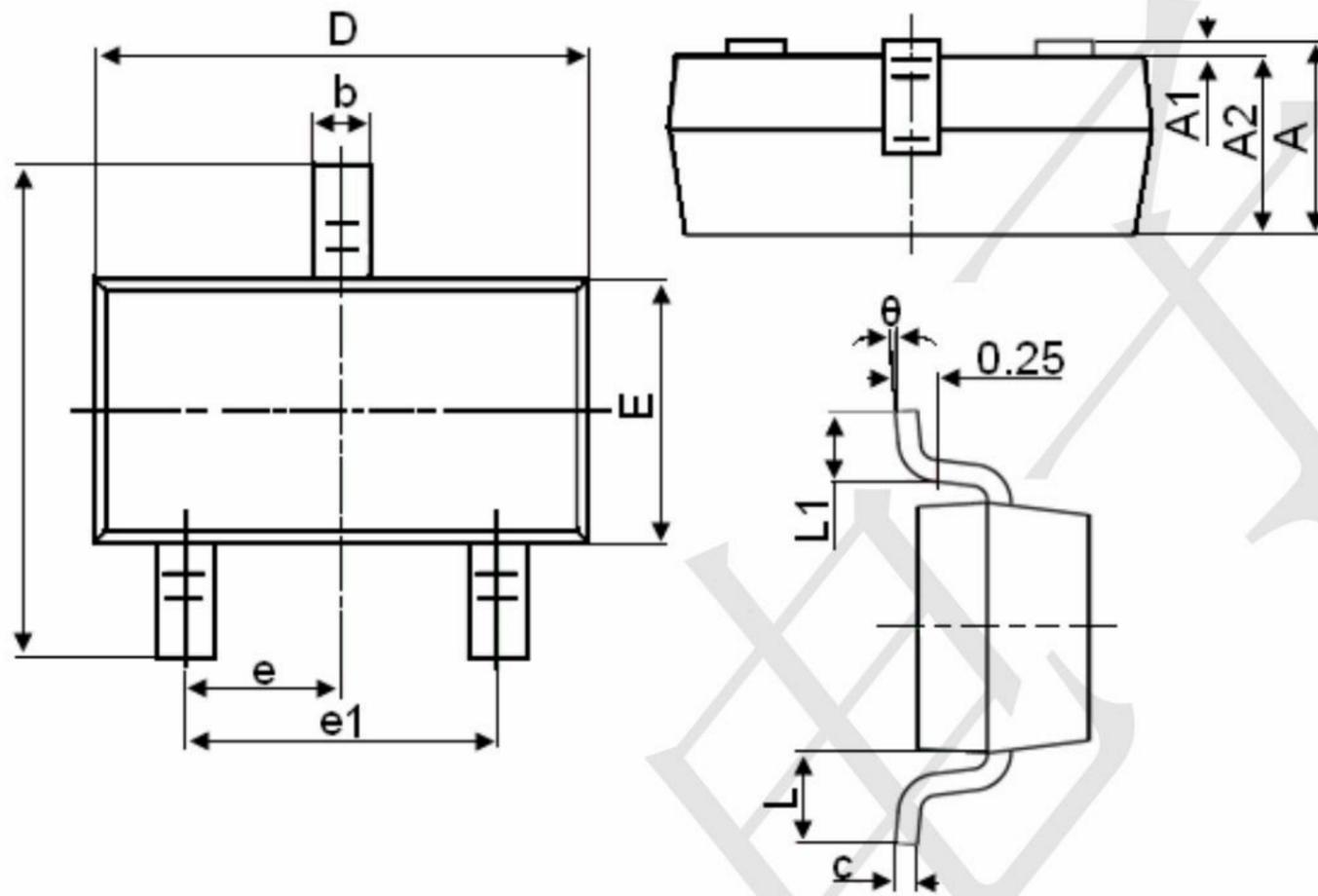
Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°