Wuxi Unigroup Microelectronics CO.,LTD.

20V N-Channel Trench MOSFET(Preliminary)

General Description

- Trench Power technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications

Applications

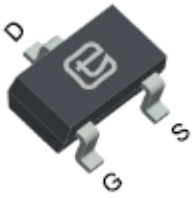
- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

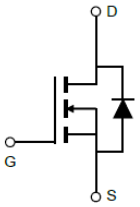
Product Summary

V_{DS}	20V
I_D (at V_{GS}=10V)	3.7A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 24mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 27mΩ
$R_{DS(ON)}$ (at V_{GS}=2.5V)	< 37mΩ

RoHS

SOT-23





Part Number	Package Type	Form	Marking
TTX2302A	SOT-23	Tape&Reel	2302A

Absolute Maximum Ratings (T_A =25°C unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [B]	T_C =25°C	I_D	3.7	A
	T_C =70°C		3.7	
Pulsed Drain Current [A]		I_{DM}	9	A
Avalanche Current [A]		I_{AS}	6	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	5.4	mJ
Power Dissipation [C]	T_C =25°C	P_D	0.89	W
	T_C =70°C		0.57	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	120	°C/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	140	

Electrical Characteristics(T_J =25ºC unless otherwise noted)

Symbol	Parameter	Conditions		Value			Units
				Min	Typ	Max	
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D =250μA,V_{GS} =0V		20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =20V, V_{GS} =0V	T_J =25ºC			1	μA
			T_J =125ºC			100	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±12V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =250μA		0.45	0.7	0.95	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =10V, I_D =3A			20	24	mΩ
		V_{GS} =4.5V, I_D =3A			22	27	mΩ
		V_{GS} =2.5V, I_D =3A			30	37	mΩ
g_{FS}	Forward Transconductance	V_{DS} =5V, I_D =6A			13		S
V_{SD}	Diode Forward Voltage	I_S =3A, V_{GS} =0V				1	V
I_S	Maximum Body-Diode Continuous Current [B]					3.7	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =10V, f =1MH_Z			408		pF
C_{oss}	Output Capacitance				60		
C_{rss}	Reverse Transfer Capacitance				53		
R_g	Gate Resistance	f =1MH_Z			4		Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =10V,V_{DS} =10V, I_D =3A			10.5		nC
Q_g(4.5V)					5.1		
Q_{gs}	Gate Source Charge				1		
Q_{gd}	Gate Drain Charge				0.8		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =10V,V_{DS} =10V, I_D =3A, R_G =2.5Ω			3.2		ns
t_r	Turn-On Rise Time				2.4		
$t_{D(off)}$	Turn-Off Delay Time				17		
t_f	Turn-Off Fall Time				3.8		
t_{rr}	Body Diode Reverse Recovery Time	I_F =3A, di/dt =100A/μs			4.6		ns
Q_{rr}	Body Diode Reverse Recovery Charge				1.8		nC

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation P_D is based on $T_{J(MAX)}$ =150ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

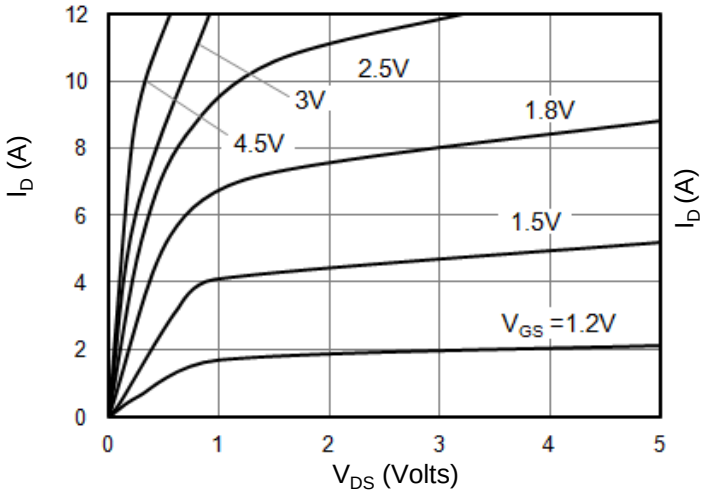


Figure 1: On-Region Characteristics

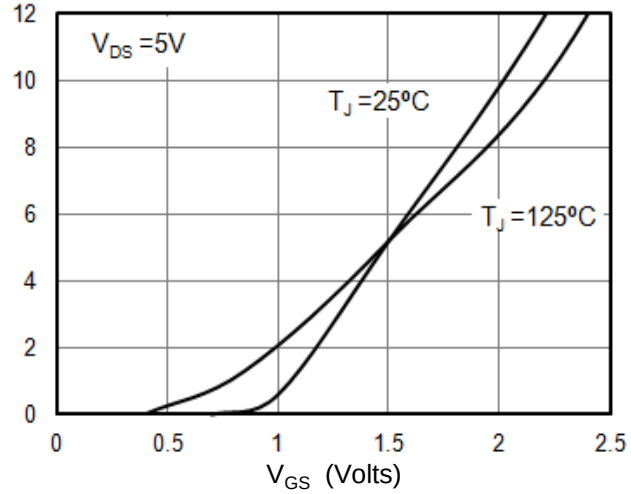


Figure 2: Transfer Characteristics

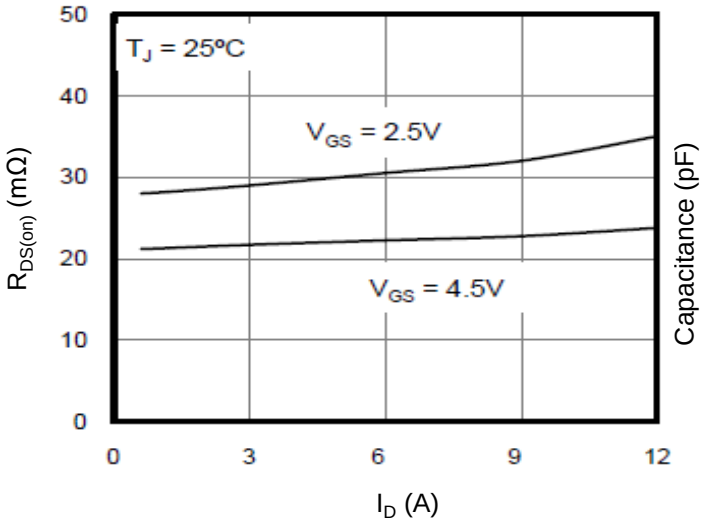


Figure 3: On-Resistance vs. Drain Current

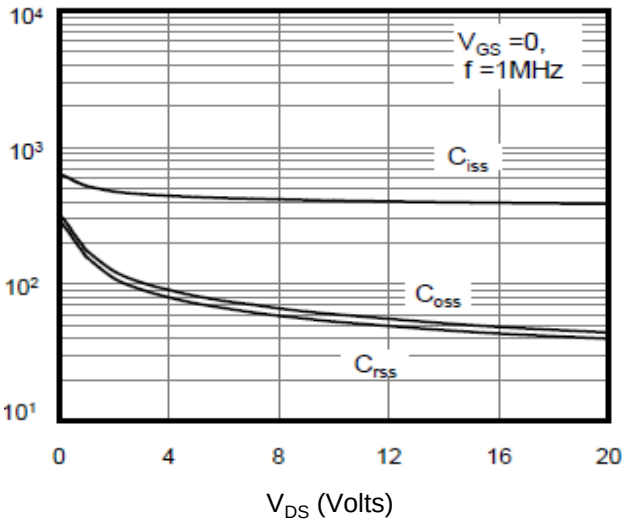


Figure 4: Capacitance Characteristics

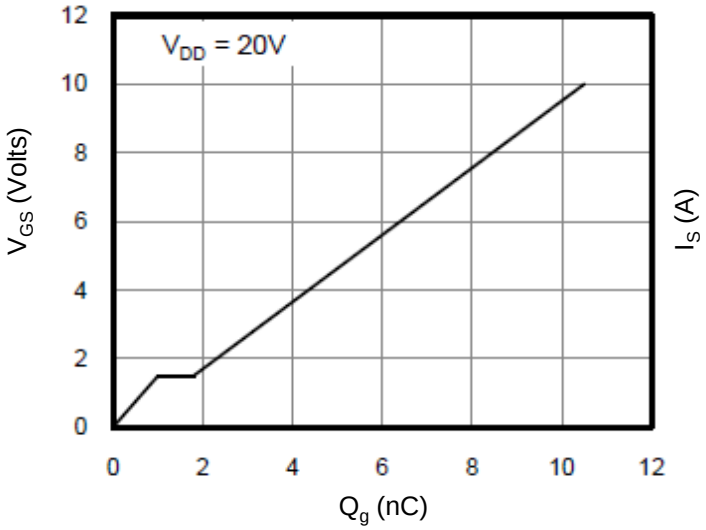


Figure 5: Gate Charge Characteristics

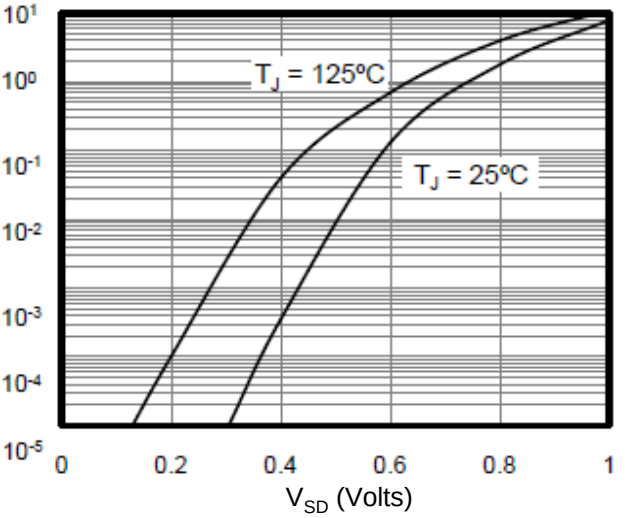


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

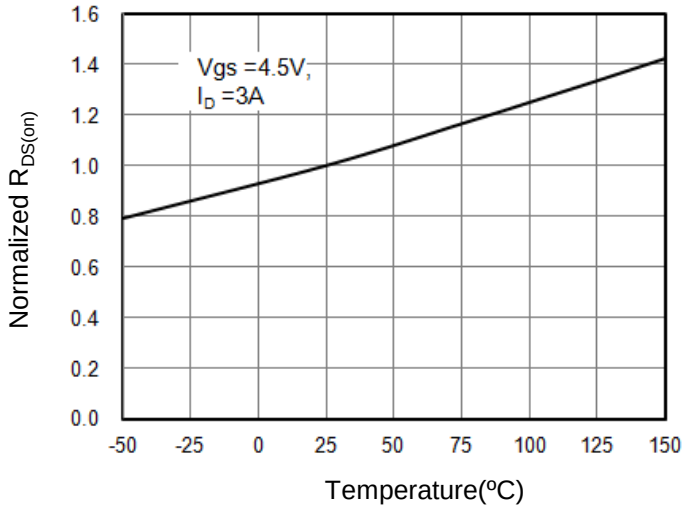


Figure 7: On-Resistance vs. Junction Temperature

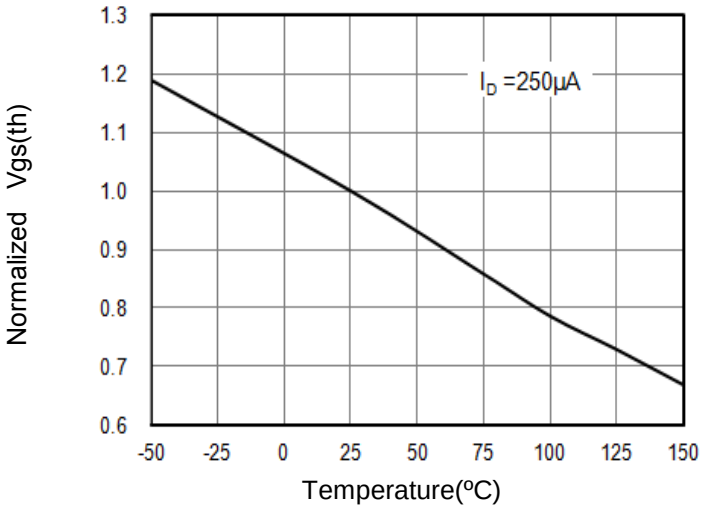


Figure 8: Vgs(th) vs. Junction Temperature

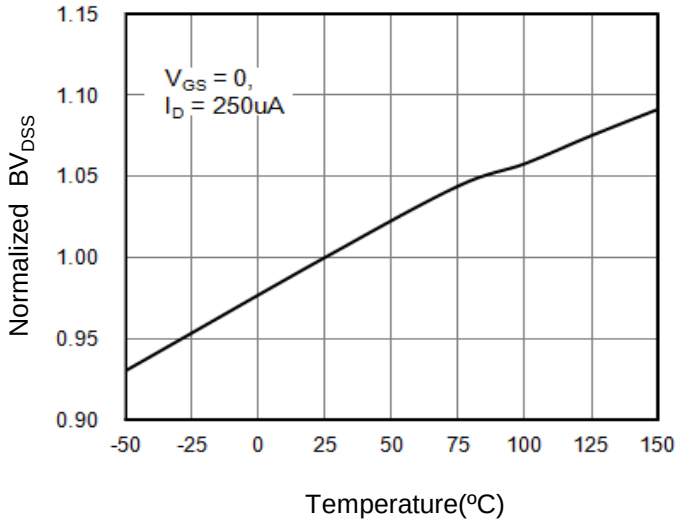


Figure 9: BV_{DSS} vs. Junction Temperature

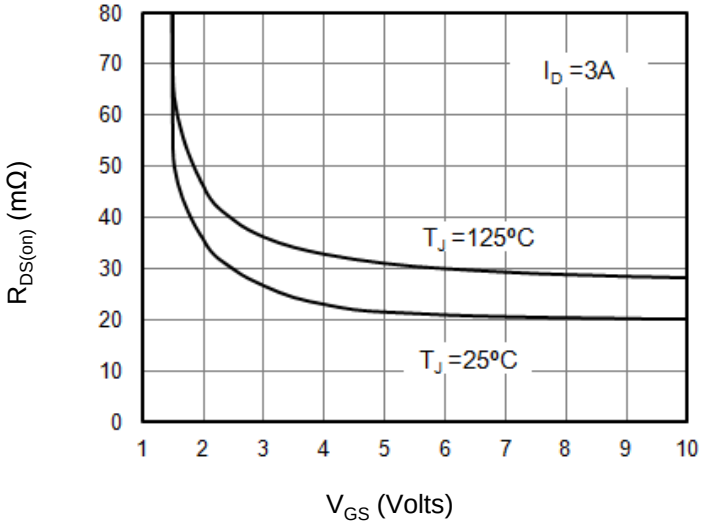


Figure 10: On-Resistance vs. Gate-Source Voltage

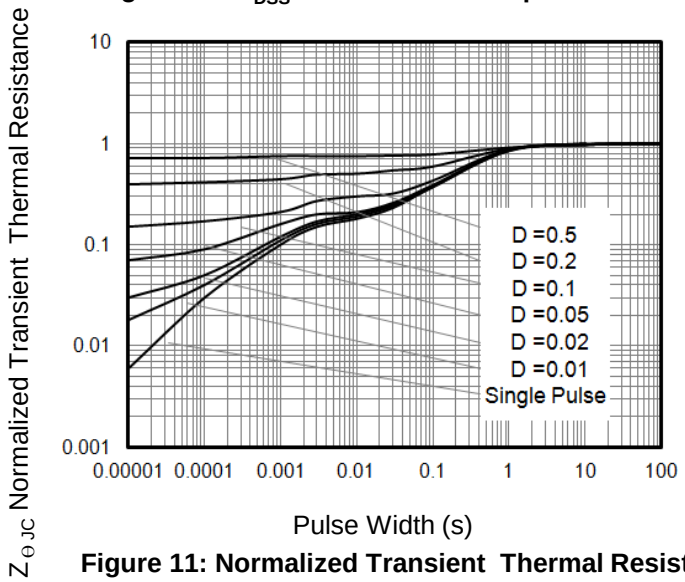


Figure 11: Normalized Transient Thermal Resistance

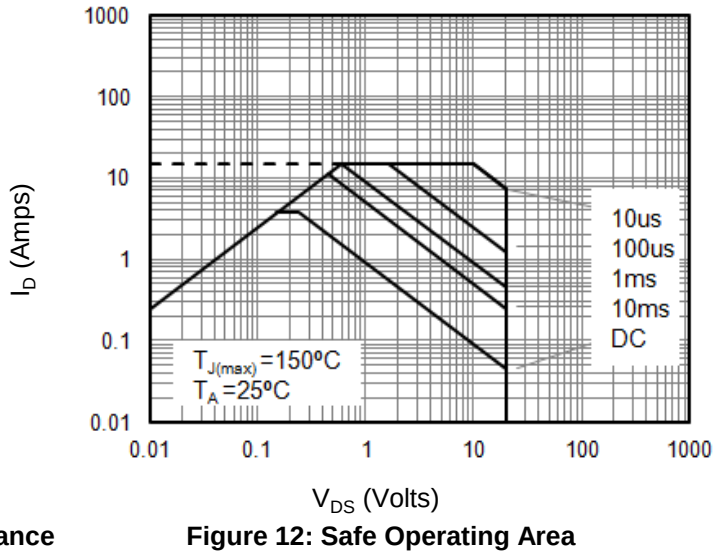


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveforms

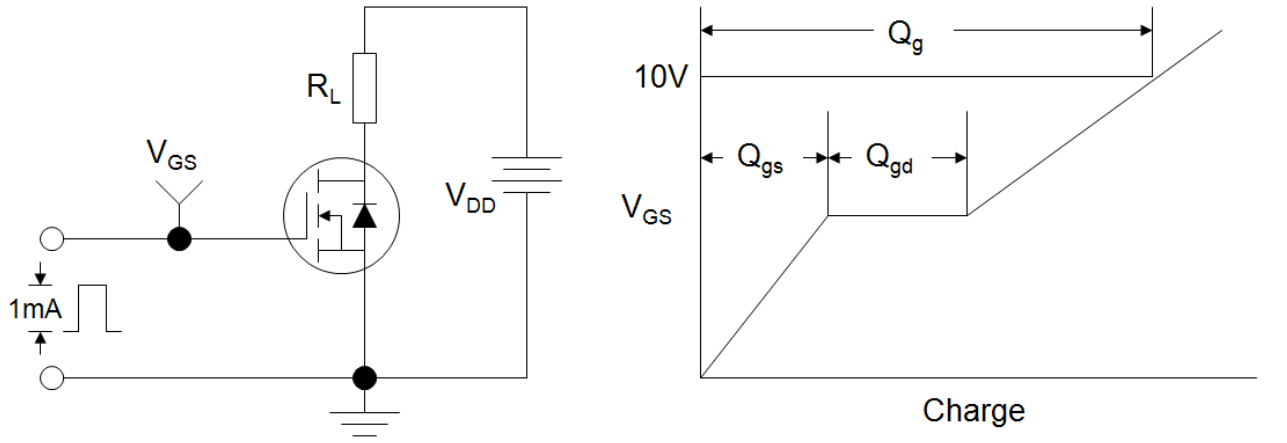


Figure B：Resistive Switching Test Circuit and Waveforms

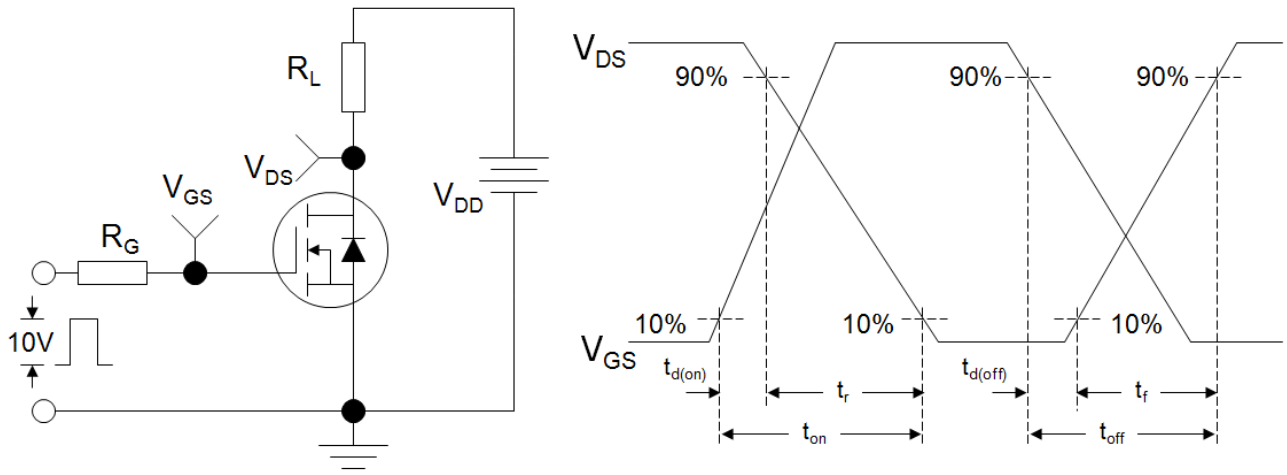
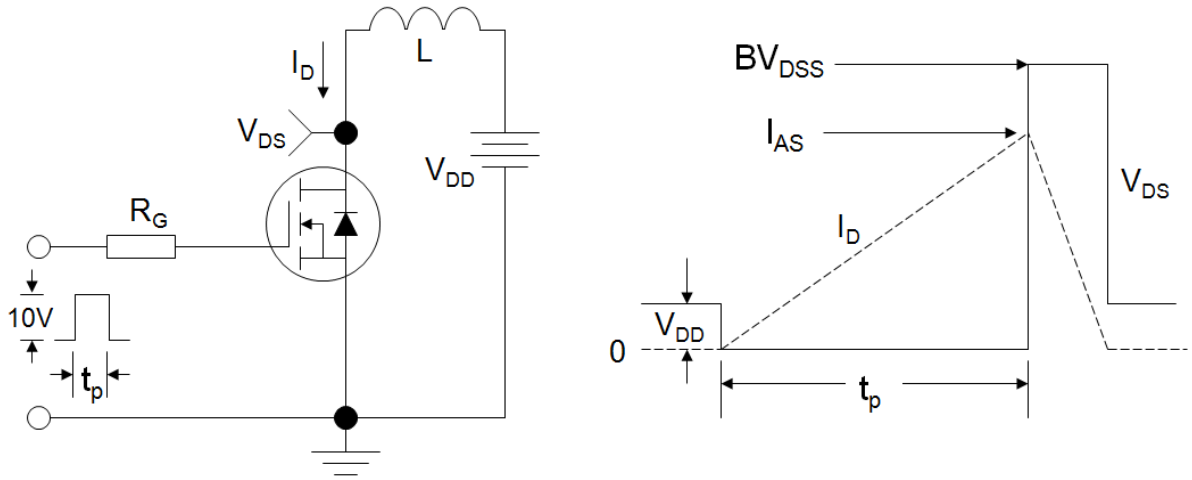
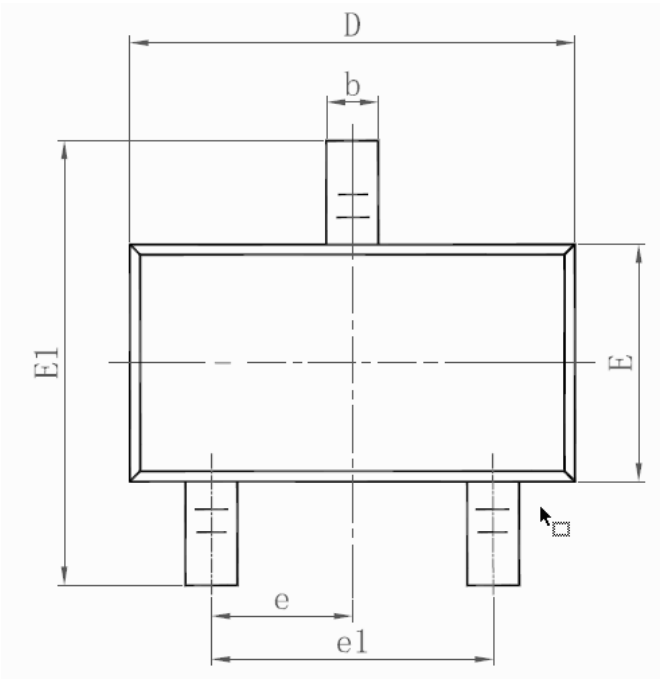
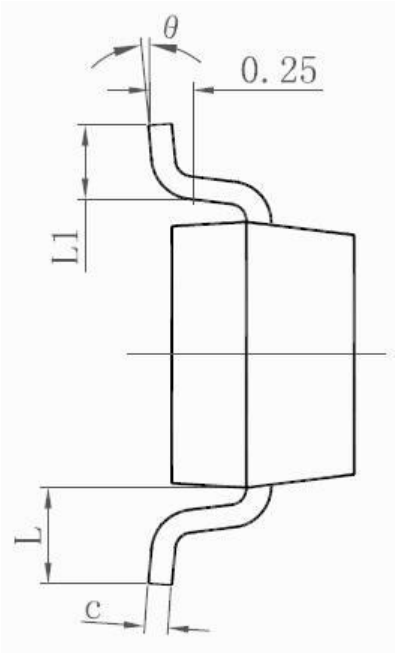


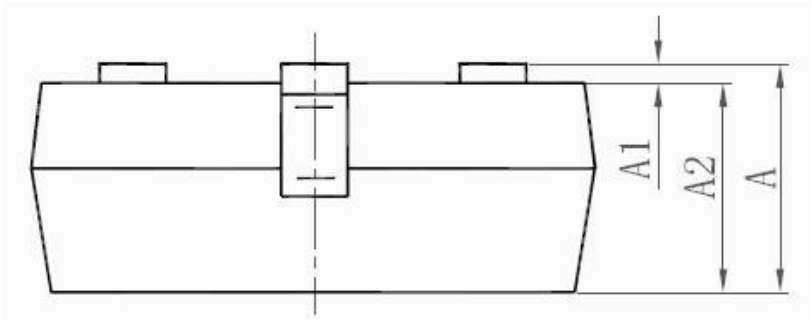
Figure C：Unclamped Inductive Switching (UIS) Test Circuit and Waveforms



SOT-23(K)

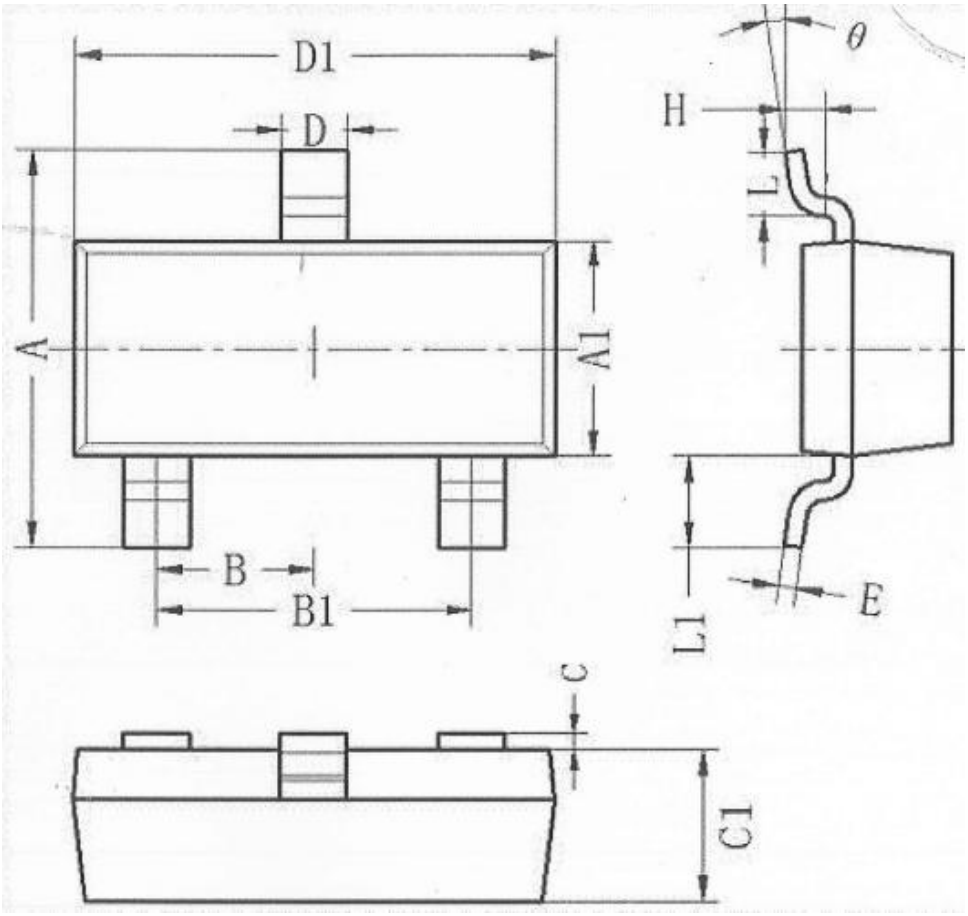






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23(N)



符号	标准	下公差	上公差	下限值	上限值
A	2.4	-0.15	0.15	2.25	2.55
A1	1.3	-0.1	0.1	1.2	1.4
B	0.95	-0.05	0.05	0.90	1.00
B1	1.9	-0.1	0.1	1.8	2
C	0.08	-0.06	0.06	0.02	0.14
C1	0.95	-0.05	0.05	0.9	1
D	0.4	-0.1	0.1	0.3	0.5
D1	2.9	-0.1	0.1	2.8	3
E	0.1	-0.03	0.03	0.07	0.13
H	0.25	-0.03	0.03	0.22	0.28
L	0.4	-0.1	0.1	0.3	0.5
L1	0.55	-0.07	0.07	0.48	0.62
θ	4	-3	3		7

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