20V P-Channel Trench MOSFET(Preliminary)

General Description

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

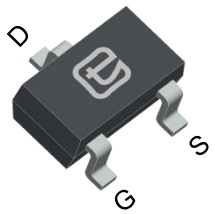
Applications

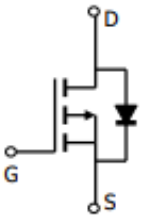
- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

Product Summary

V_{DS}	-20V
I_D (at V_{GS}=-10V)	-4.5A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 40mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 48mΩ
$R_{DS(ON)}$ (at V_{GS}=-2.5V)	< 62mΩ

RoHS





Part Number	Package Type	Form	Marking
TTX2305A	SOT-23	Tape &Reel	2305A

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	-4.5	A
	T_C =70°C		-3.6	
Pulsed Drain Current [A]		I_{DM}	-13.5	A
Avalanche Current [A]		I_{AS}	27	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	109	mJ
Power Dissipation [C]	T_C =25°C	P_D	1.66	W
	T_C =70°C		1.06	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	$R_{\theta JL}$	60	°C/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	100	

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 =100ºC			-25	
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 =-4.5A			31	40	mΩ
		V_{GS} =-4.5V, I_D =-4.5A			36	48	mΩ
		V_{GS} =-2.5V, I_D =-4.5A			45	62	mΩ
g_{FS}	Forward Transconductance	V_{DS} =-5V, I_D =-4.5A			5		S
V_{SD}	Diode Forward Voltage	I_S =-4.5A, V_{GS} =0V				-1.2	V
I_S	Maximum Body-Diode Continuous Current [B]					-4.5	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =-10V, f =1MH_Z			1053		pF
C_{oss}	Output Capacitance				128		
C_{rss}	Reverse Transfer Capacitance				124		
R_g	Gate Resistance	f =1MH_Z			6.9		Ω
SWITCHING PARAMETERS							
Q_g	Total Gate Charge	V_{GS} =-4.5V,V_{DS} =-10V, I_D =-4A			11.2		nC
Q_{gs}	Gate Source Charge				1.8		
Q_{gd}	Gate Drain Charge				2.1		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =-4.5V,V_{DS} =-10V, I_D =-4A, R_G =3.3Ω			13		ns
t_r	Turn-On Rise Time				32		
$T_{D(off)}$	Turn-Off Delay Time				28		
t_f	Turn-Off Fall Time				11		

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

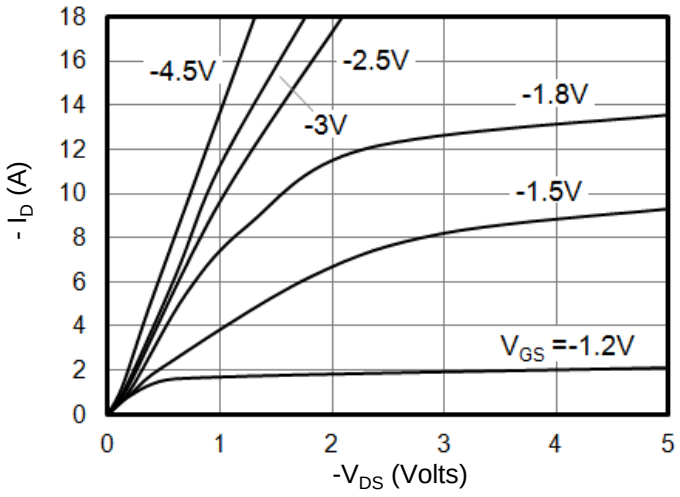


Figure 1: On-Region Characteristics

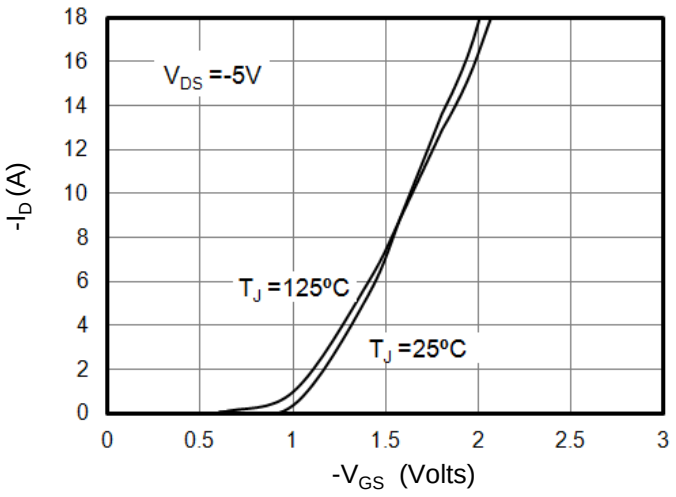


Figure 2: Transfer Characteristics

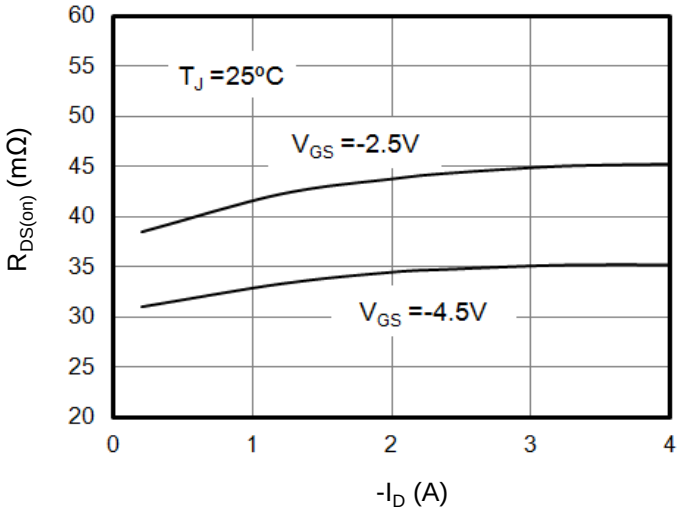


Figure 3: On-Resistance vs. Drain Current

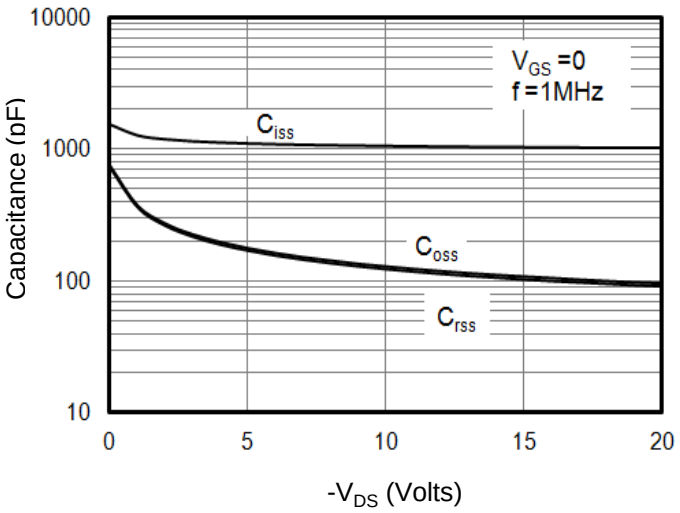


Figure 4: Capacitance Characteristics

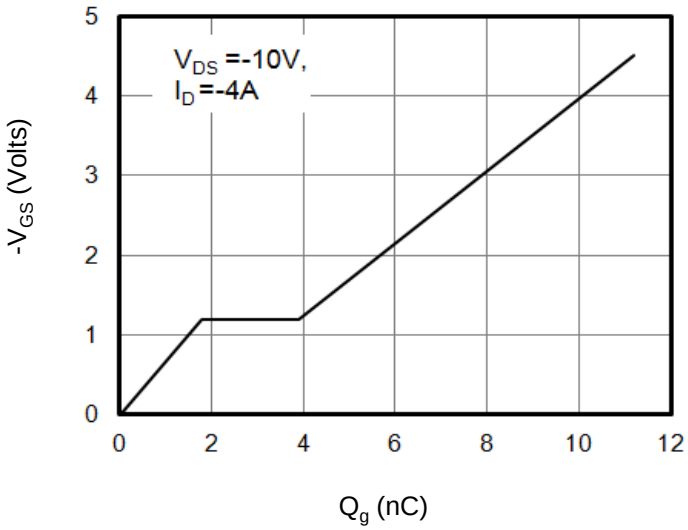


Figure 5: Gate Charge Characteristics

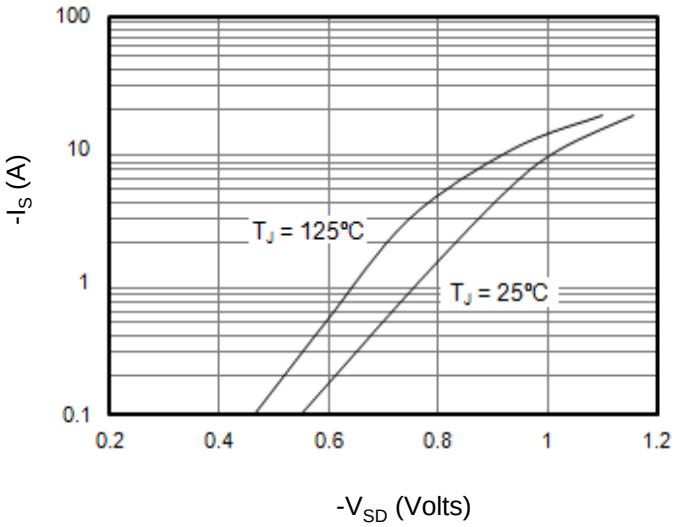


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

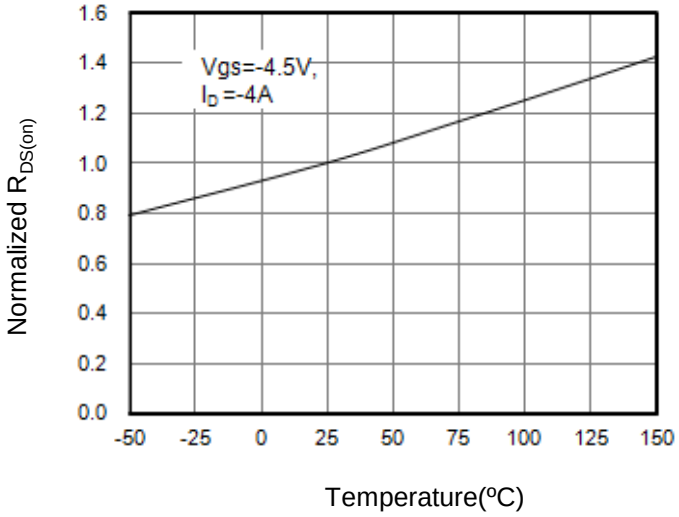


Figure 7: On-Resistance vs. Junction Temperature

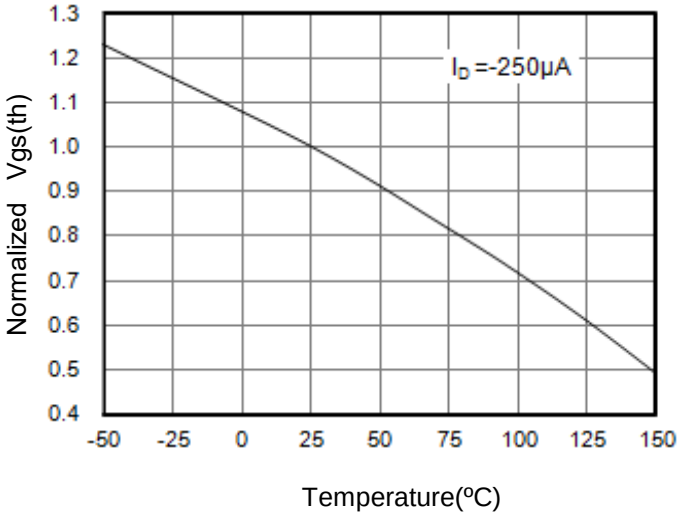


Figure 8: Vgs(th) vs. Junction Temperature

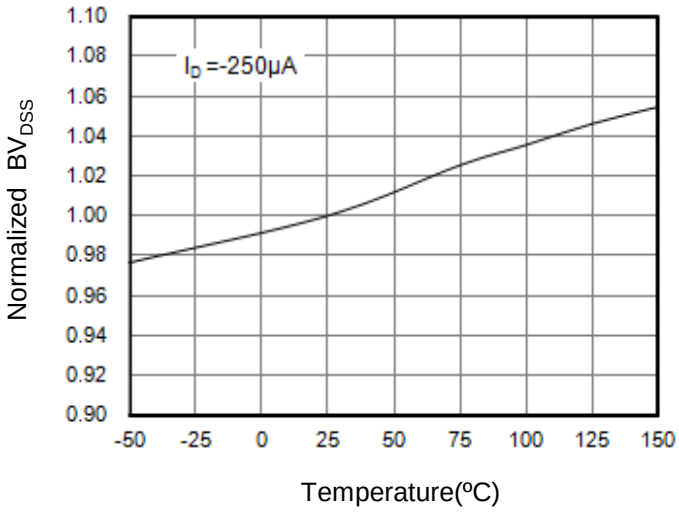


Figure 9: BV_{DSS} vs. Junction Temperature

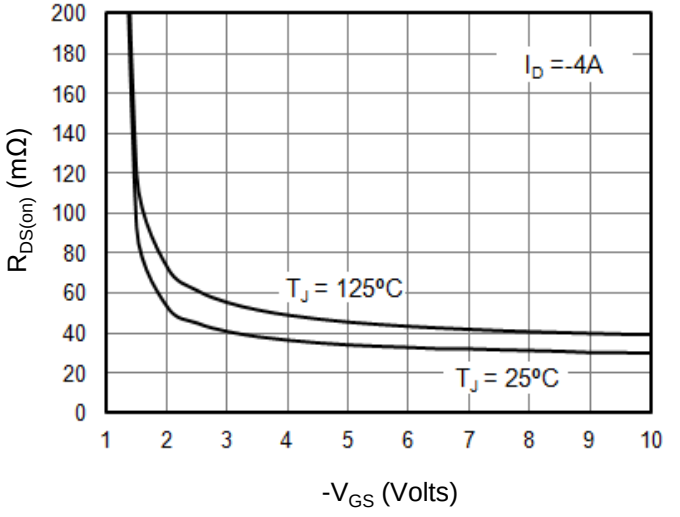


Figure 10: On-Resistance vs. Gate-Source Voltage

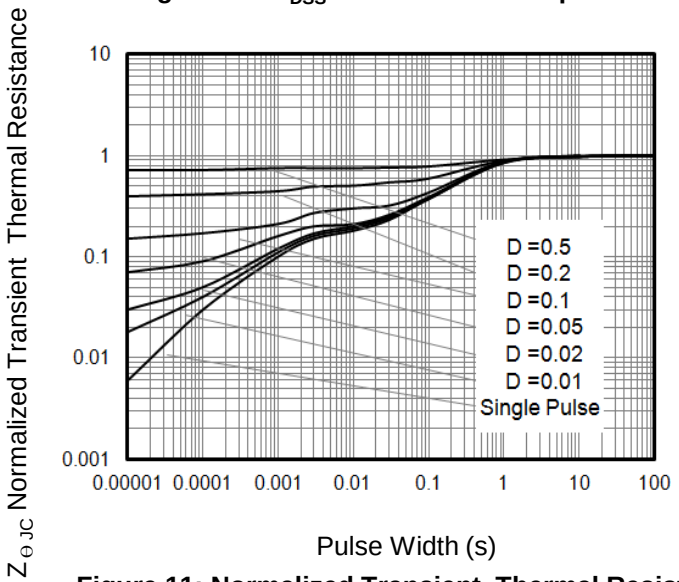


Figure 11: Normalized Transient Thermal Resistance

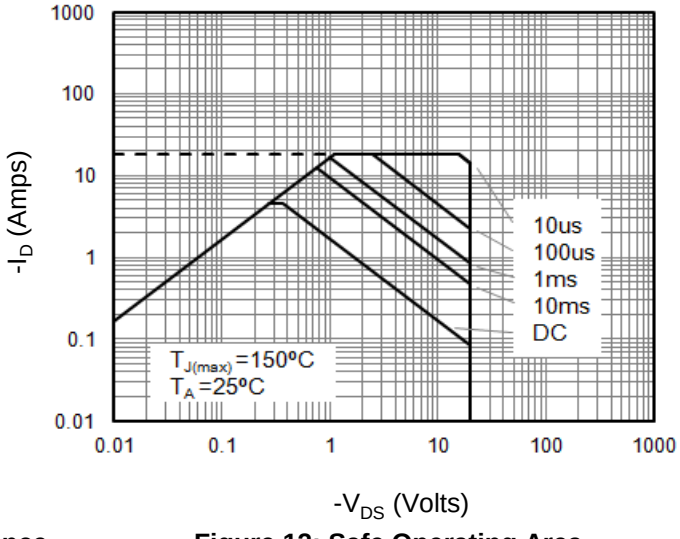


Figure 12: Safe Operating Area

Figure A： Gate Charge Test Circuit and Waveforms

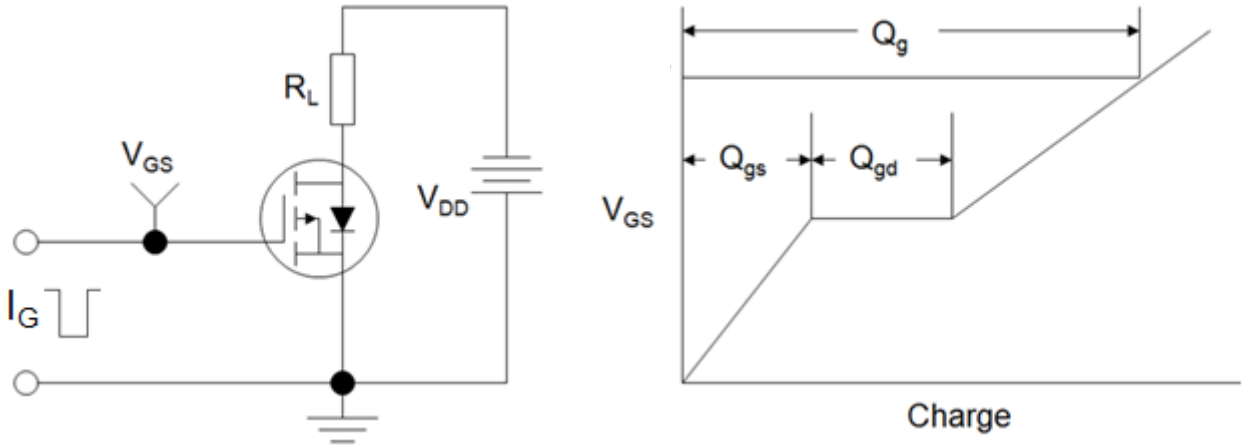


Figure B：Resistive Switching Test Circuit and Waveforms

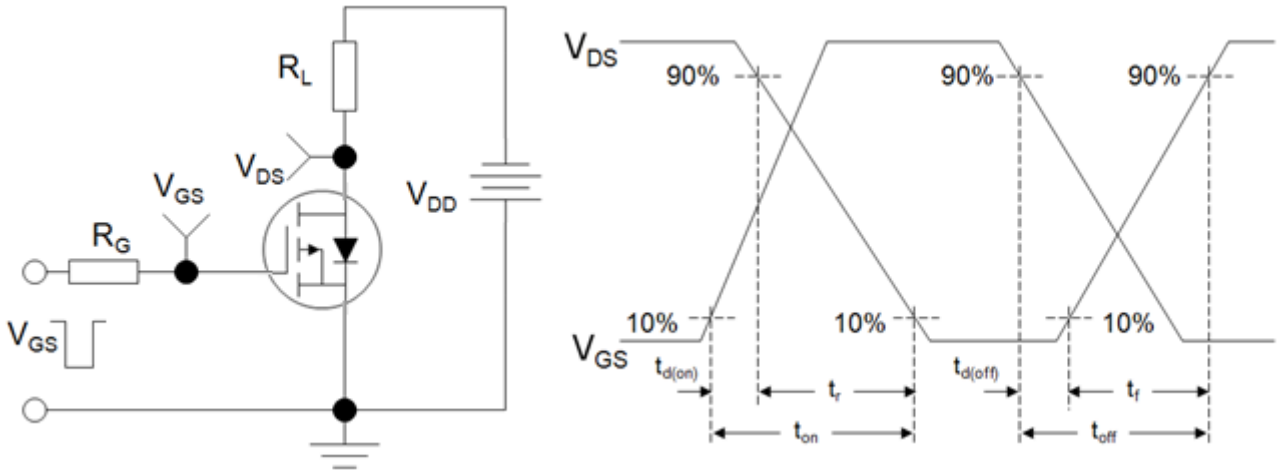
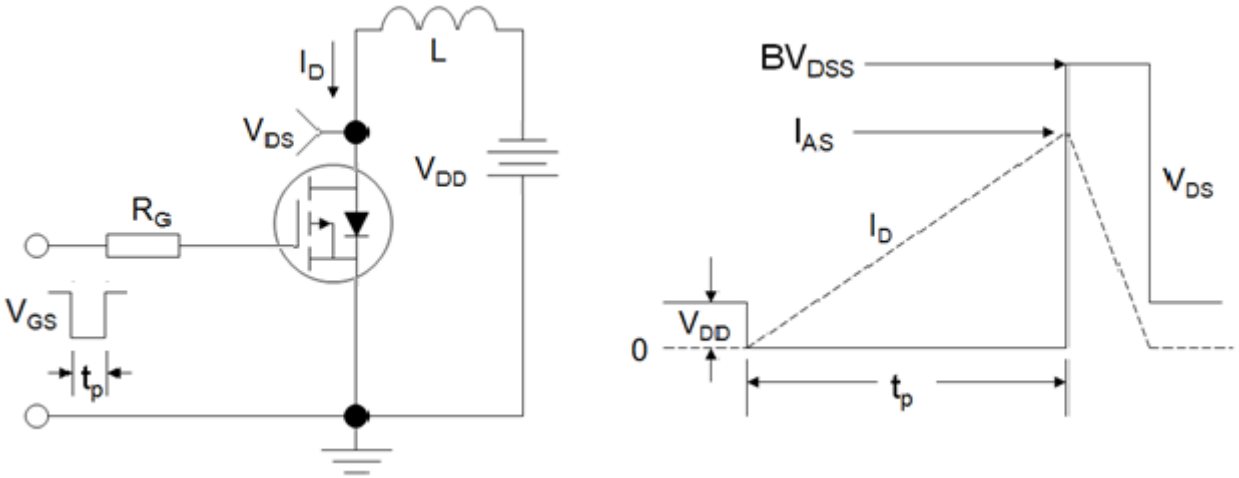
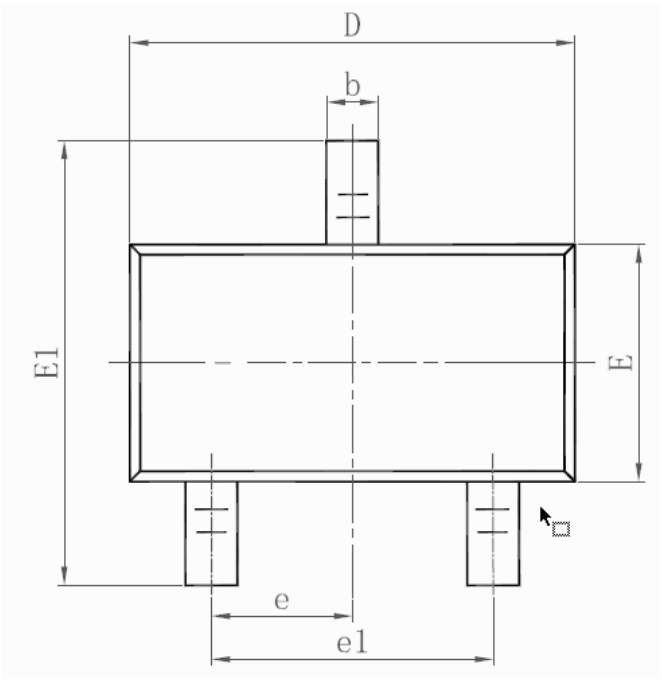
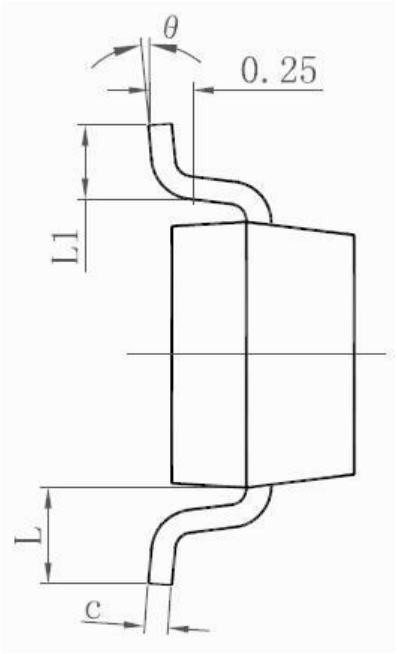


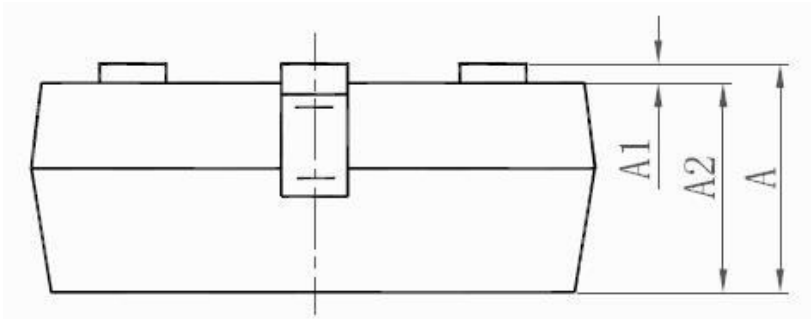
Figure C：Unclamped Inductive Switching Test Circuit and Waveforms



SOT-23(K)

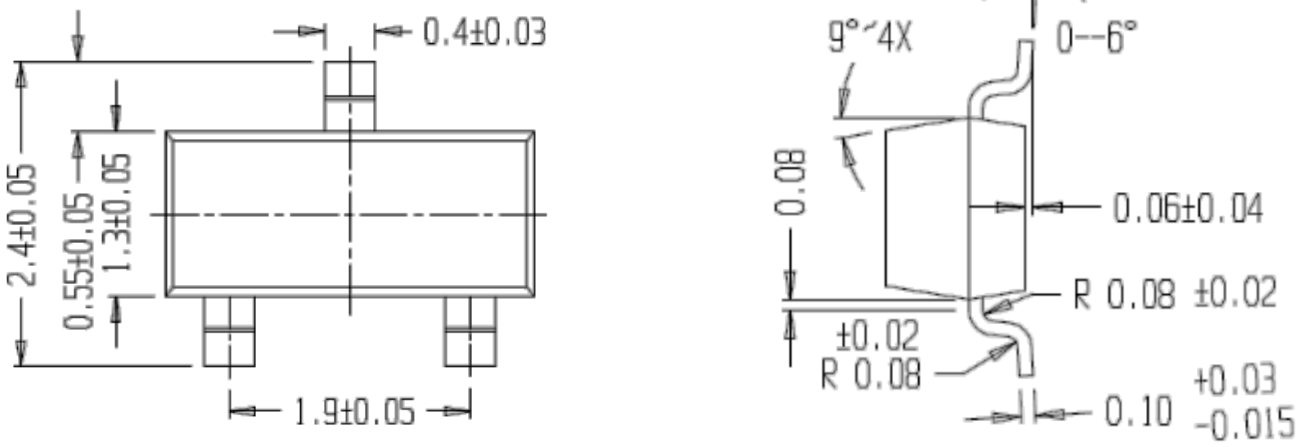


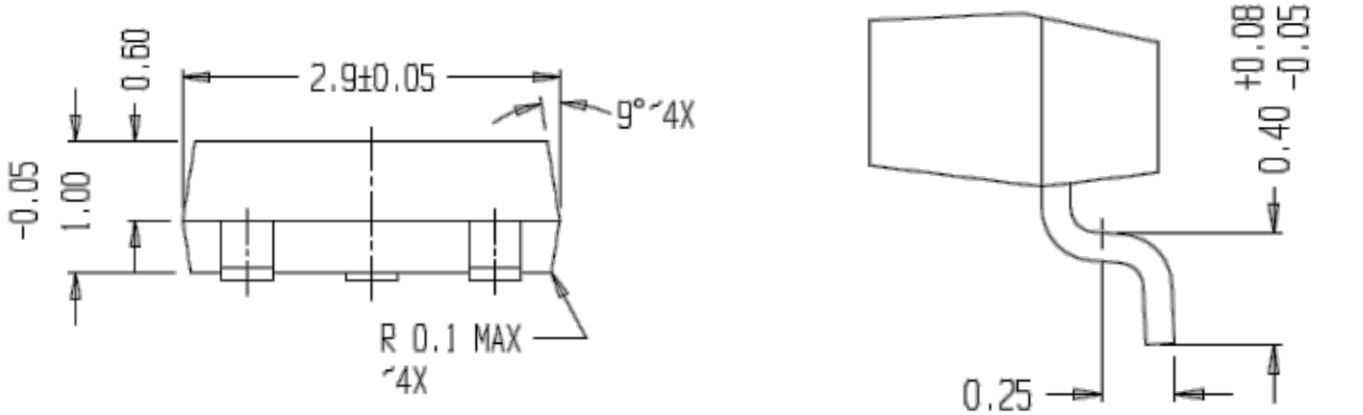




Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		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)


0.4±0.03
2.4±0.05
0.55±0.05
1.3±0.05
1.9±0.05
g°~4X
0~6°
0.08
0.06±0.04
R 0.08 ±0.02
±0.02
R 0.08
0.10
+0.03
-0.015


0.60
2.9±0.05
g°~4X
1.00
-0.05
R 0.1 MAX
~4X
+0.08
-0.05
0.40
0.25

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