Wuxi Unigroup Microelectronics CO.,LTD.

30V P-Channel Trench MOSFET(Preliminary)

General Description

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

Applications

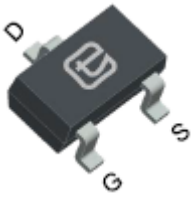
- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

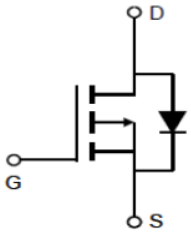
Product Summary

V_{DS}	-30V
I_D (at V_{GS}=-10V)	-4A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 50mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 79mΩ

RoHS

SOT-23-3L





Part Number	Package Type	Form	Marking
TTX04P03ATK	SOT-23-3L	Tape & Reel	04P03

Absolute Maximum Ratings (T_A =25ºC unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [B]	T_C =25ºC	I_D	-4	A
	T_C =70ºC		-3.6	
Pulsed Drain Current [A]		I_{DM}	-12	A
Avalanche Current [A]		I_{AS}	-18	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	48.6	mJ
Power Dissipation [C]	T_C =25ºC	P_D	1.56	W
	T_C =70ºC		1	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	ºC

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	70	ºC/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	80	

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		-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =-30V, V_{GS} =0V	T_J =25ºC			-1	μA
			T_J =125ºC			-100	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =-250μA		-1	-1.6	-2.4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =-10V, I_D =-2A			43	50	mΩ
		V_{GS} =-4.5V, I_D =-2A			66	79	mΩ
g_{FS}	Forward Transconductance	V_{DS} =-5V, I_D =-4A			5.5		S
V_{SD}	Diode Forward Voltage	I_S =-2A, V_{GS} =0V				-1	V
I_S	Maximum Body-Diode Continuous Current [B]					-4	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =-15V, f =1MH_Z			623		pF
C_{oss}	Output Capacitance				71		
C_{rss}	Reverse Transfer Capacitance				64		
R_g	Gate Resistance	f =1MH_Z			5.8		Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =-10V,V_{DS} =-15V, I_D =-4A			16		nC
Q_g(4.5V)	Total Gate Charge				6.8		
Q_{gs}	Gate Source Charge				3		
Q_{gd}	Gate Drain Charge				3		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =-10V,V_{DS} =-15V, I_D =-4A, R_G =2.5Ω			9.3		ns
t_r	Turn-On Rise Time				4.2		
$t_{D(off)}$	Turn-Off Delay Time				21		
t_f	Turn-Off Fall Time				6.9		
t_{rr}	Body Diode Reverse Recovery Time	I_F =-2A, di/dt =100A/μs			11		ns
Q_{rr}	Body Diode Reverse Recovery Charge				23		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

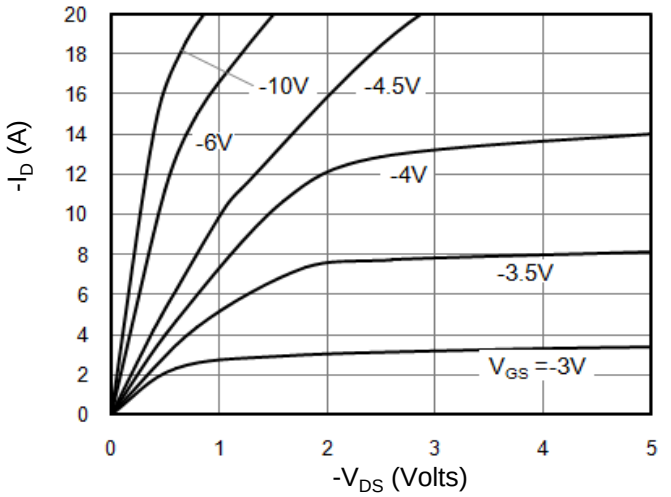


Figure 1: On-Region Characteristics

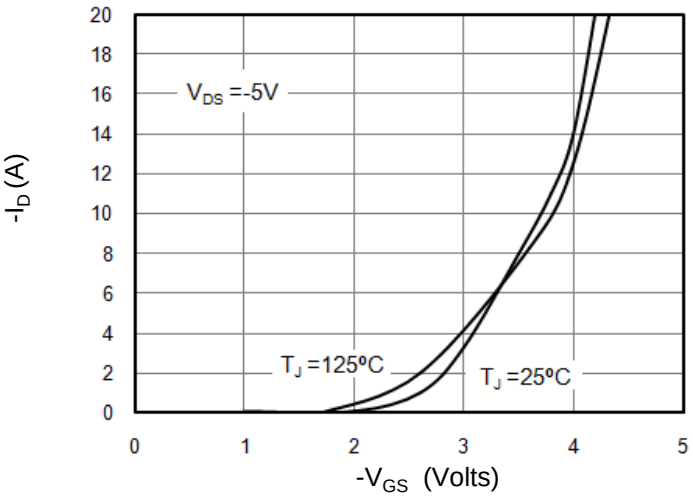


Figure 2: Transfer Characteristics

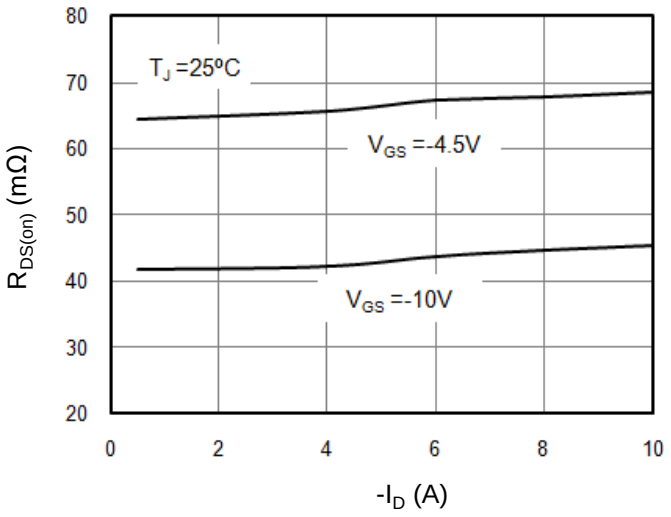


Figure 3: On-Resistance vs. Drain Current

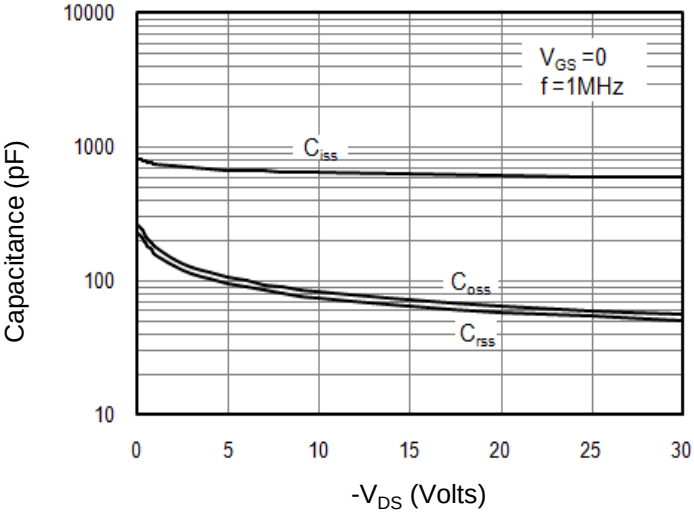


Figure 4: Capacitance Characteristics

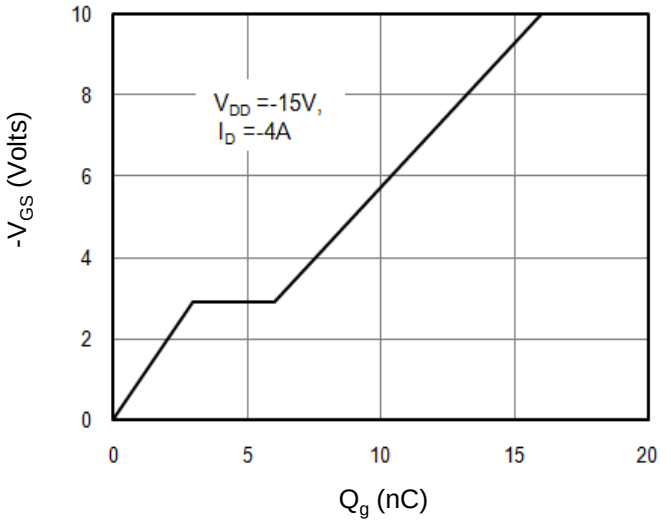


Figure 5: Gate Charge Characteristics

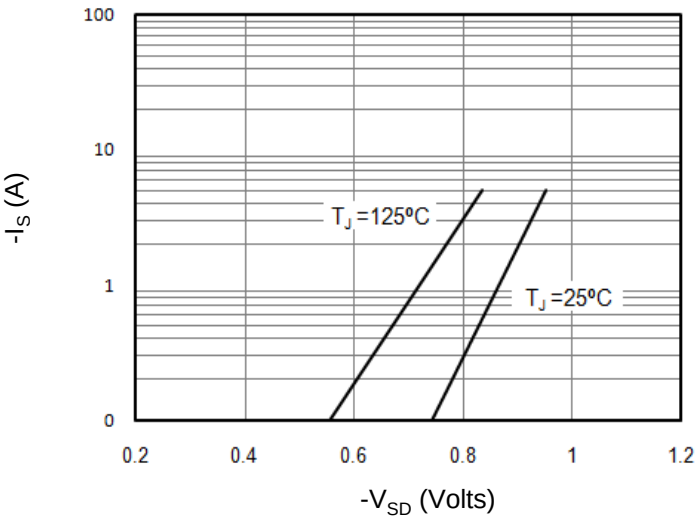


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

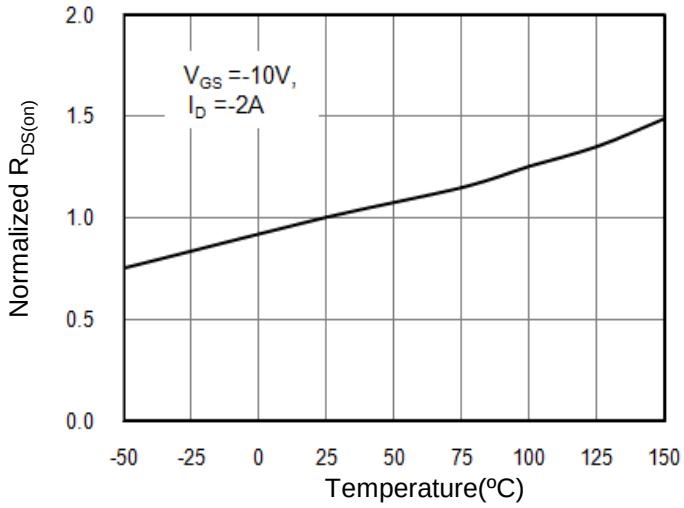


Figure 7: On-Resistance vs. Junction Temperature

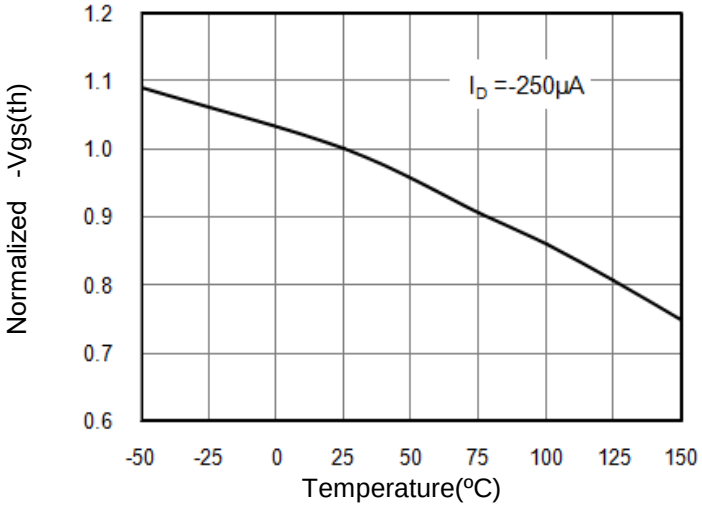


Figure 8: Vgs(th) vs. Junction Temperature

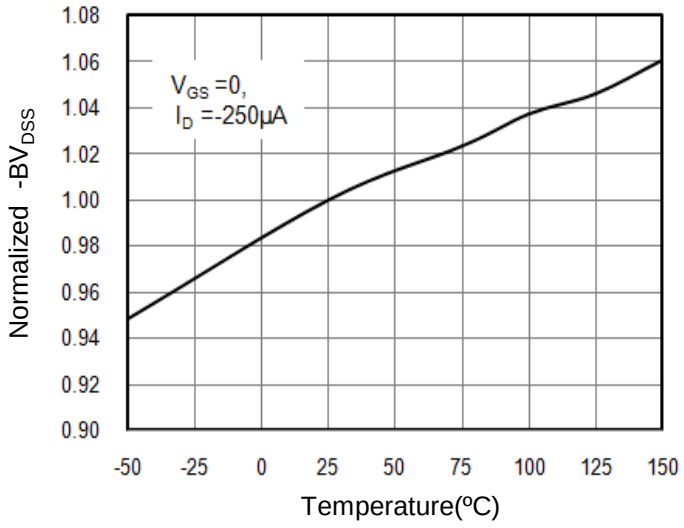


Figure 9: BV_{DSS} vs. Junction Temperature

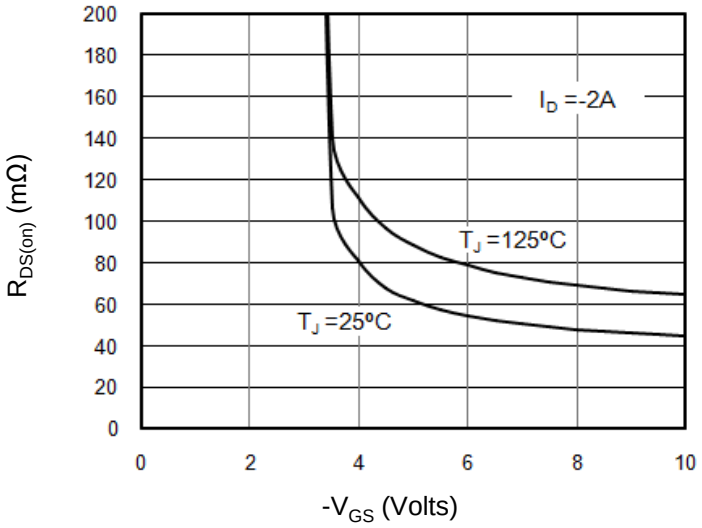


Figure 10: On-Resistance vs. Gate-Source Voltage

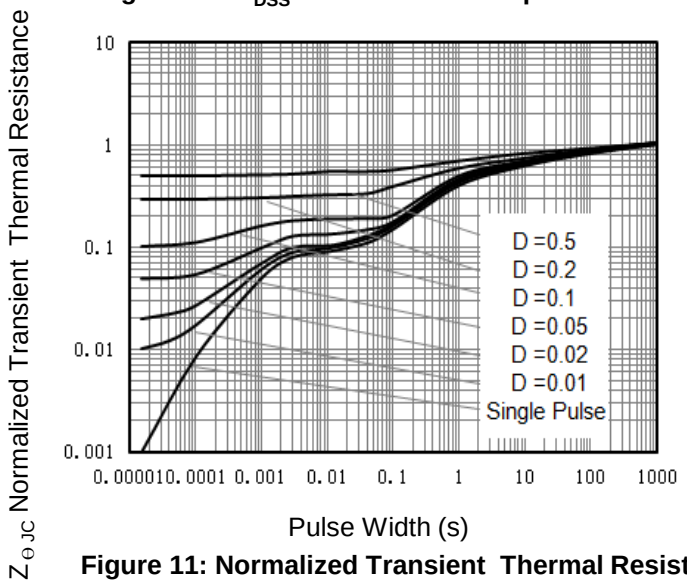


Figure 11: Normalized Transient Thermal Resistance

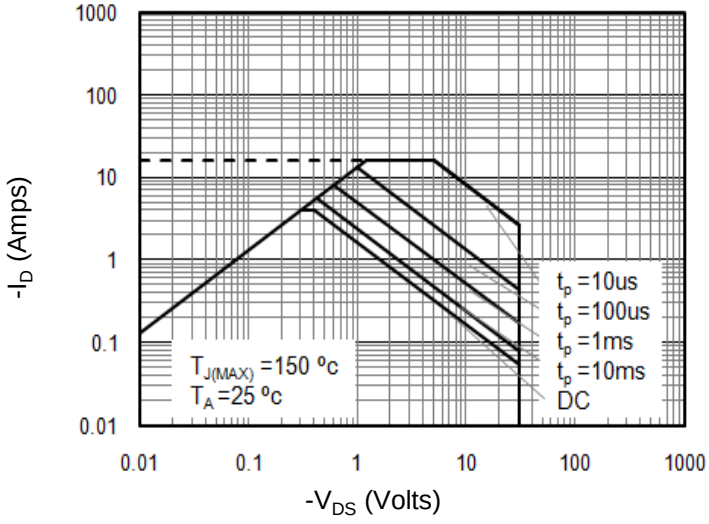


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveform

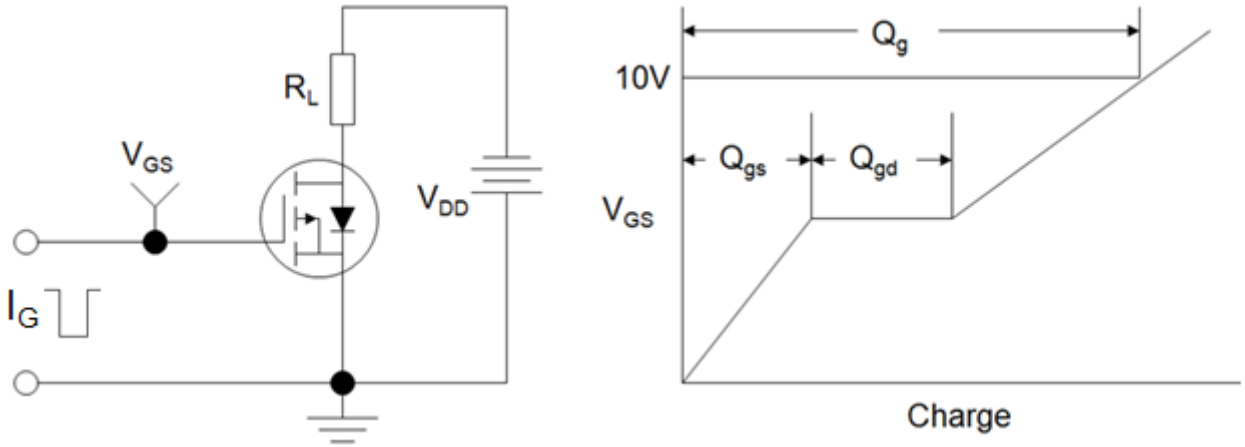


Figure B：Resistive Switching Test Circuit and Waveform

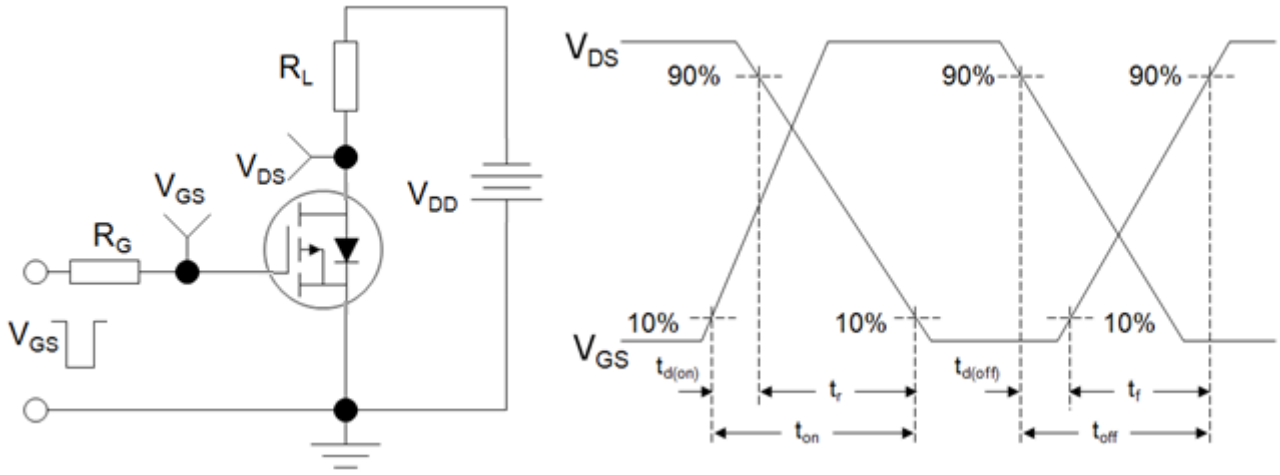
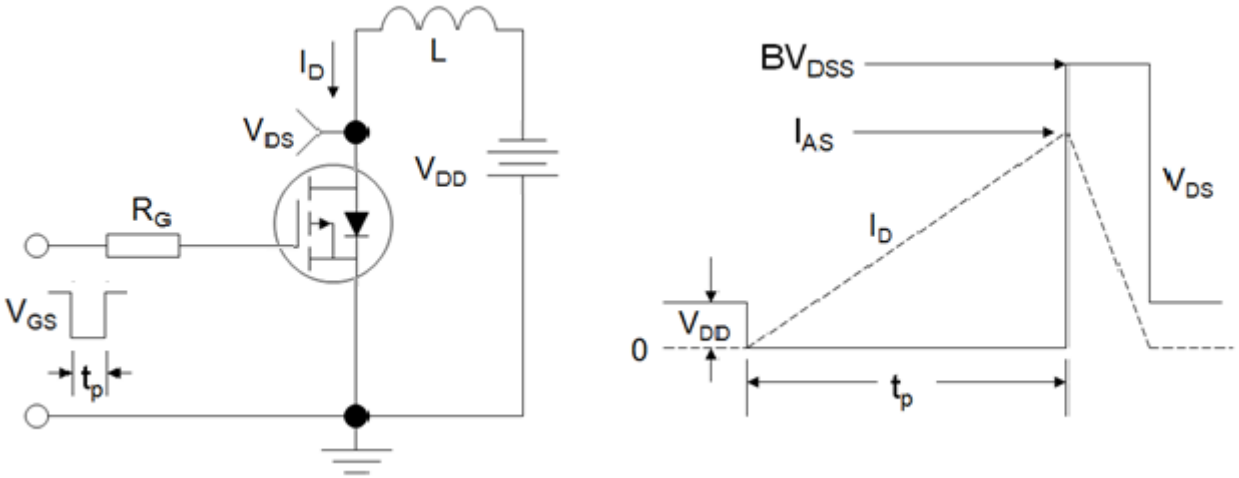
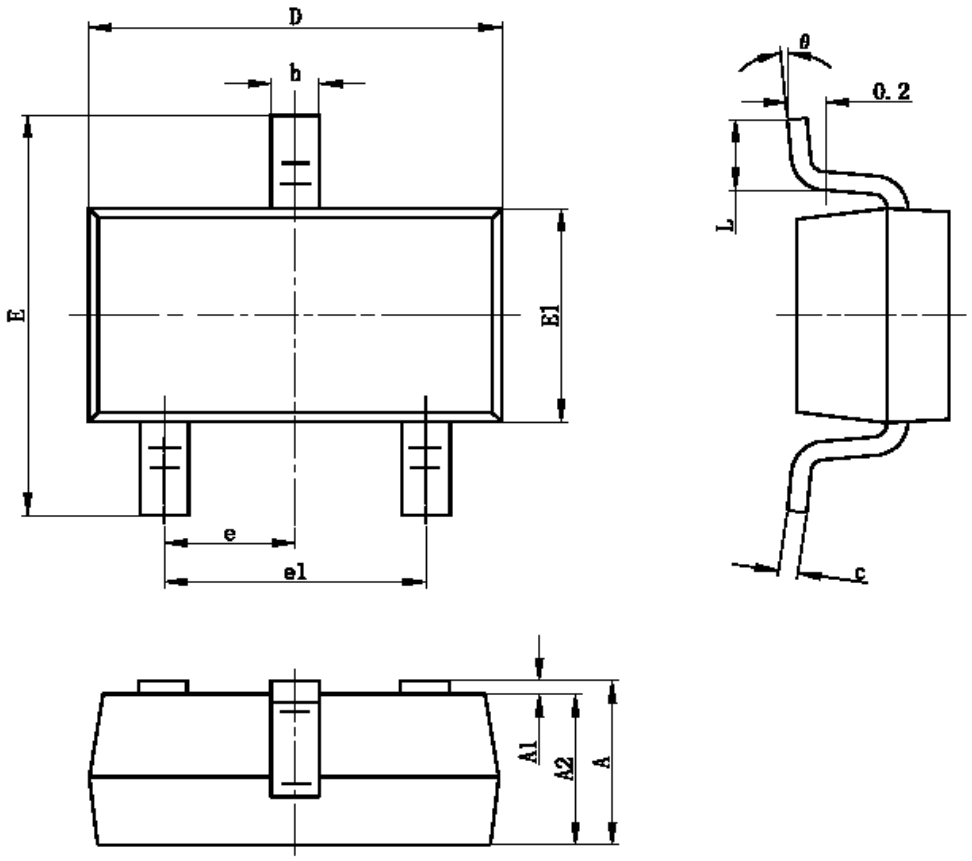


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



SOT-23-3L(长电)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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