
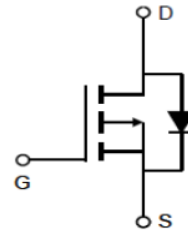
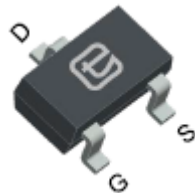


**30V P-Channel Trench MOSFET(Preliminary)**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>● Trench Power technology</li> <li>● Low <math>R_{DS(ON)}</math></li> <li>● Low Gate Charge&amp;</li> <li>● Optimized for fast-switching applications</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>● Synchronous Rectification in DC/DC and AC/DC Converters</li> <li>● Isolated DC/DC Converters in Telecom and Industrial</li> </ul>	<p><b>Product Summary</b></p> <table> <tr> <td><math>V_{DS}</math></td> <td>-30V</td> </tr> <tr> <td><math>I_D</math> (at <math>V_{GS}=-10V</math>)</td> <td>-4A</td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS}=-10V</math>)</td> <td>&lt; 52m<math>\Omega</math></td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS}=-4.5V</math>)</td> <td>&lt; 60m<math>\Omega</math></td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS}=-2.5V</math>)</td> <td>&lt; 85m<math>\Omega</math></td> </tr> </table> <div style="text-align: right;">  </div>	$V_{DS}$	-30V	$I_D$ (at $V_{GS}=-10V$ )	-4A	$R_{DS(ON)}$ (at $V_{GS}=-10V$ )	< 52m $\Omega$	$R_{DS(ON)}$ (at $V_{GS}=-4.5V$ )	< 60m $\Omega$	$R_{DS(ON)}$ (at $V_{GS}=-2.5V$ )	< 85m $\Omega$
$V_{DS}$	-30V										
$I_D$ (at $V_{GS}=-10V$ )	-4A										
$R_{DS(ON)}$ (at $V_{GS}=-10V$ )	< 52m $\Omega$										
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SOT-23



Part Number	Package Type	Form	Marking
TTX3401A	SOT-23	Tape & Reel	3401A

**Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$  unless otherwise noted)**

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>B</sup>	$I_D$	$T_C = 25^\circ\text{C}$	-4
		$T_C = 70^\circ\text{C}$	-3.3
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	-12	A
Avalanche Current <sup>A</sup>	$I_{AS}$	-18	A
Single Pulse Avalanche Energy $L = 0.3\text{mH}$ <sup>A</sup>	$E_{AS}$	48.6	mJ
Power Dissipation <sup>C</sup>	$P_D$	$T_C = 25^\circ\text{C}$	1.4
		$T_C = 70^\circ\text{C}$	0.89
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Lead	$R_{\theta JL}$	90	$^\circ\text{C/W}$
Maximum Junction-to-Ambient			
	$R_{\theta JA}$	100	



Electrical Characteristics( $T_J = 25^\circ\text{C}$ unless otherwise noted)						
Symbol	Parameter	Conditions	Value			Units
			Min	Typ	Max	
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V}$	$T_J = 25^\circ\text{C}$		-1	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		-100	
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 12\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-0.6	-0.9	-1.2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{V}, I_D = -2\text{A}$		43	52	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -2\text{A}$		50	60	$\text{m}\Omega$
		$V_{GS} = -2.5\text{V}, I_D = -1.5\text{A}$		65	85	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\text{V}, I_D = -4\text{A}$		9		S
$V_{SD}$	Diode Forward Voltage	$I_S = -2\text{A}, V_{GS} = 0\text{V}$			-1	V
$I_S$	Maximum Body-Diode Continuous Current <sup>B</sup>				-4	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = -15\text{V}, f = 1\text{MHz}$		903		$\text{pF}$
$C_{oss}$	Output Capacitance			70		
$C_{rss}$	Reverse Transfer Capacitance			63		
$R_g$	Gate Resistance	$f = 1\text{MHz}$		5.5		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS} = -10\text{V}, V_{DS} = -15\text{V}, I_D = -4\text{A}$		17.1		$\text{nC}$
$Q_g(4.5\text{V})$	Total Gate Charge			8.2		
$Q_{gs}$	Gate Source Charge			1.8		
$Q_{gd}$	Gate Drain Charge			2		
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -10\text{V}, V_{DS} = -15\text{V}, I_D = -4\text{A}, R_G = 2.5\Omega$		6.2		$\text{ns}$
$t_r$	Turn-On Rise Time			3.2		
$t_{D(off)}$	Turn-Off Delay Time			36		
$t_f$	Turn-Off Fall Time			8.8		
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = -4\text{A}, di/dt = 100\text{A}/\mu\text{s}$		12		$\text{ns}$
$Q_{rr}$	Body Diode Reverse Recovery Charge			3.8		$\text{nC}$

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  $T_{J(MAX)} = 150^\circ\text{C}$ , 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

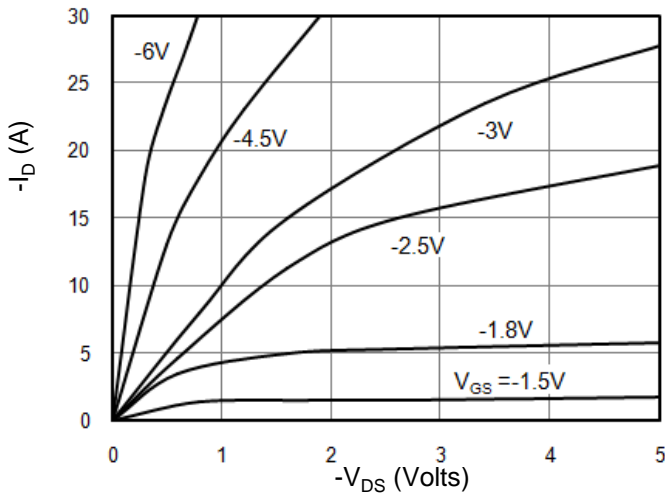


Figure 1: On-Region Characteristics

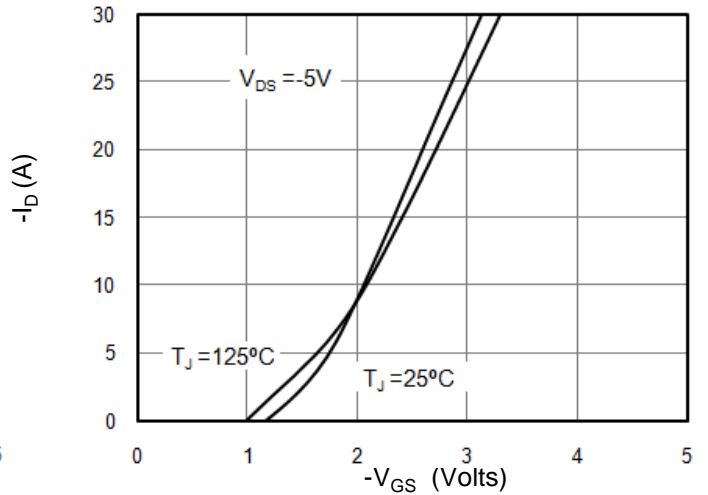


Figure 2: Transfer Characteristics

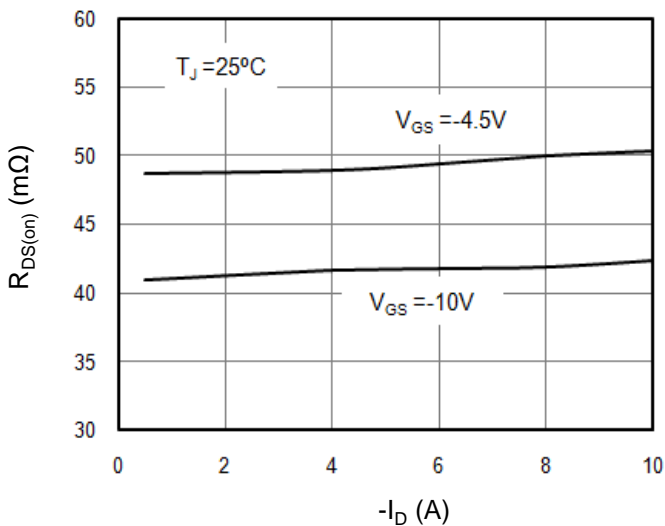


Figure 3: On-Resistance vs. Drain Current

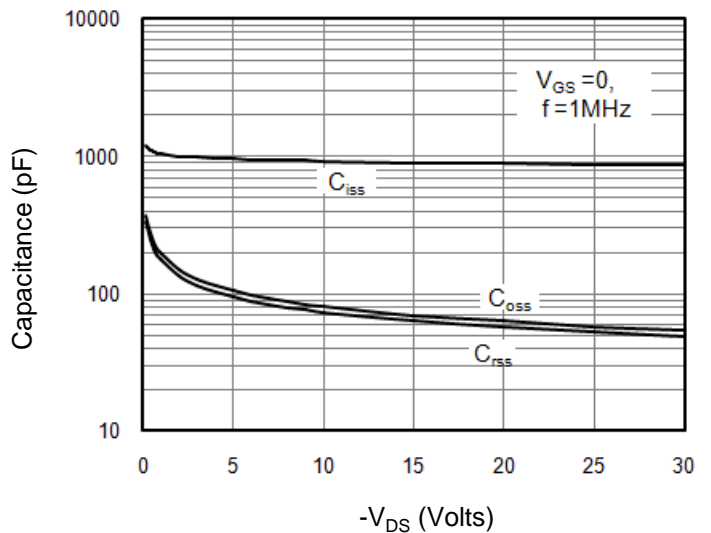


Figure 4: Capacitance Characteristics

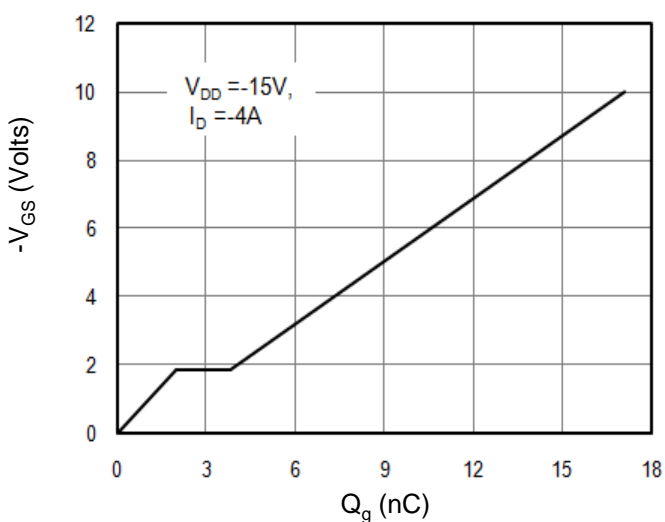


Figure 5: Gate Charge Characteristics

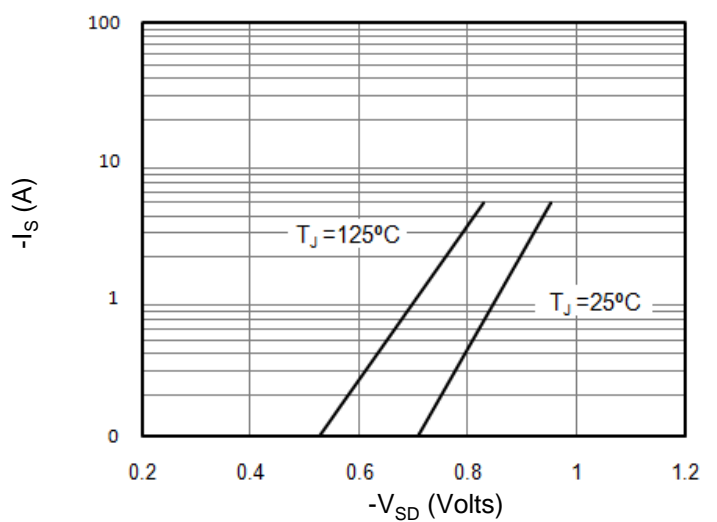


Figure 6: Body Diode Forward Voltage



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

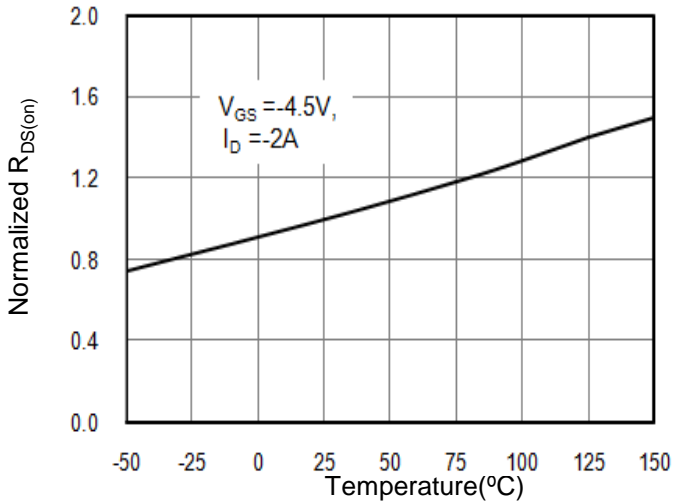


Figure 7: On-Resistance vs. Junction Temperature

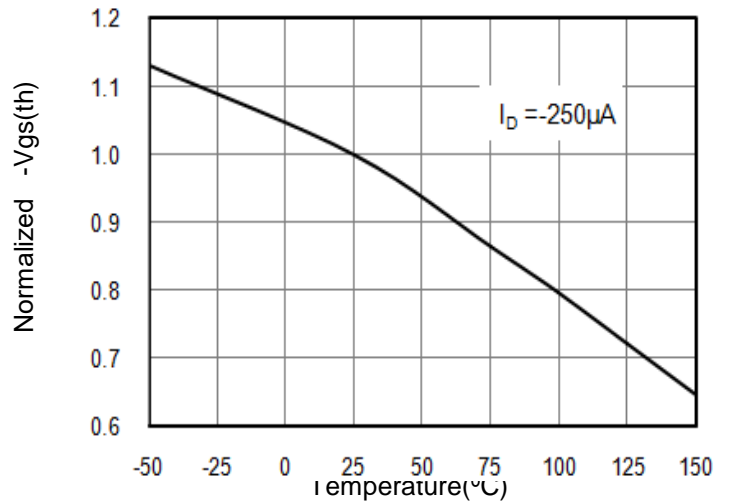


Figure 8: V\_GS(th) vs. Junction Temperature

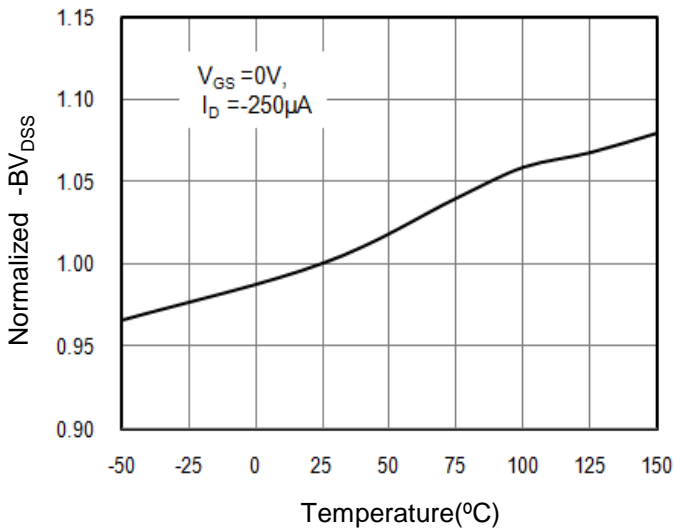


Figure 9: BV\_DS vs. Junction Temperature

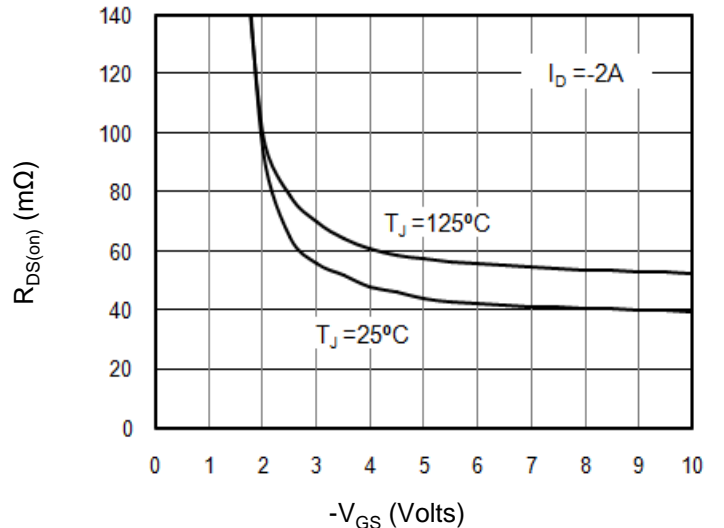


Figure 10: On-Resistance vs. Gate-Source Voltage

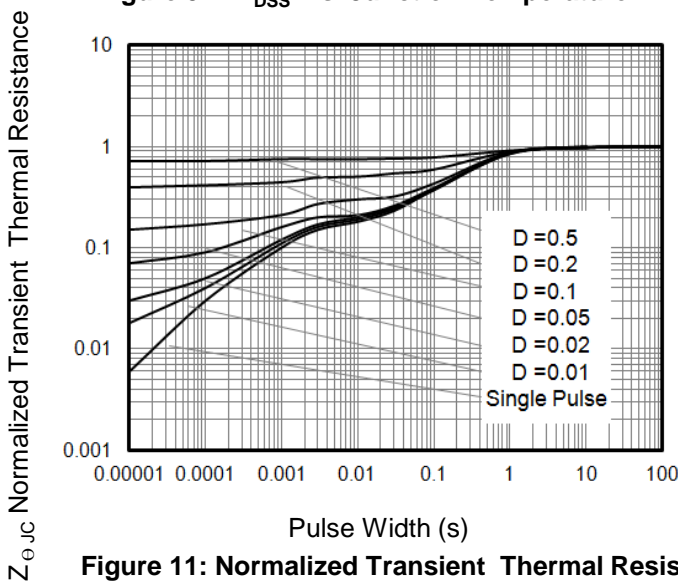


Figure 11: Normalized Transient Thermal Resistance

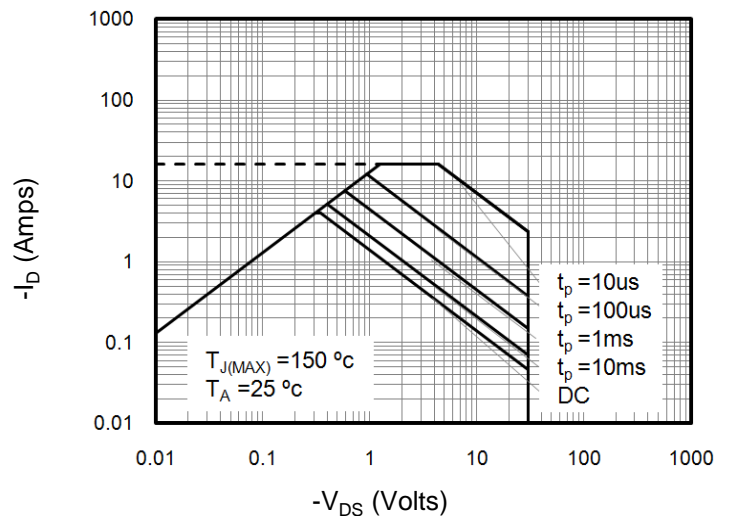


Figure 12: Safe Operating Area



Figure A: Gate Charge Test Circuit and Waveform

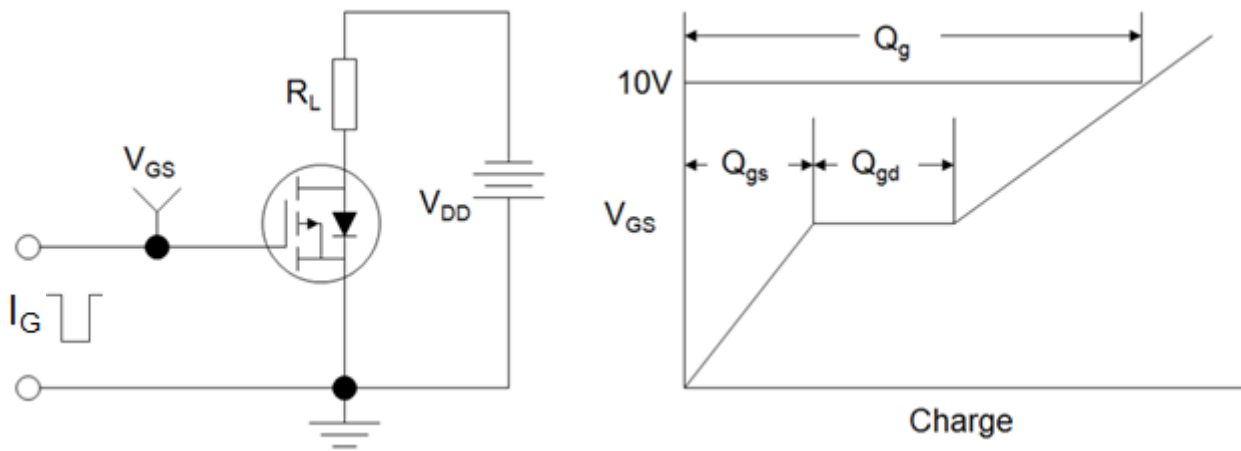


Figure B: Resistive Switching Test Circuit and Waveform

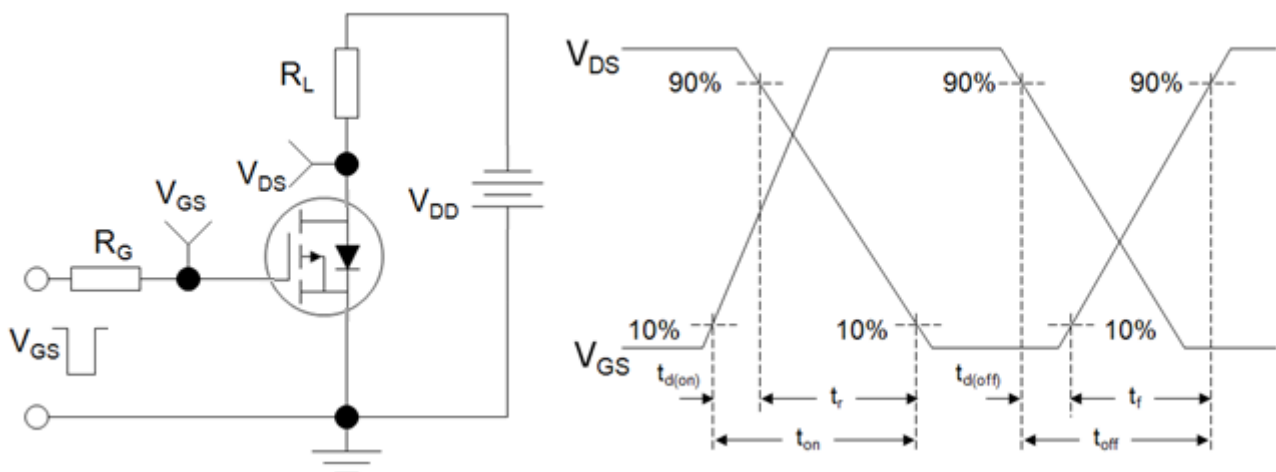
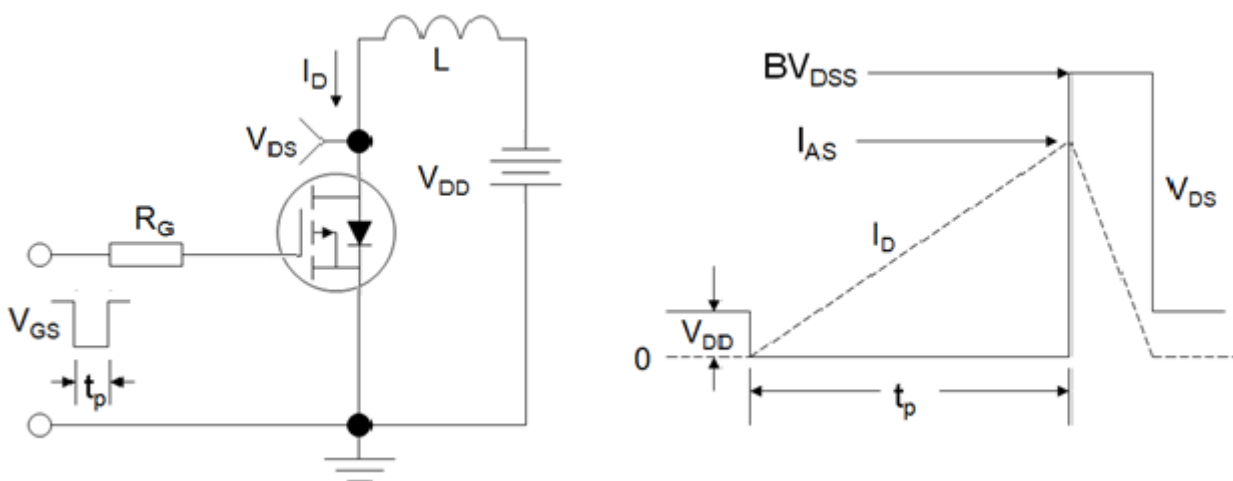
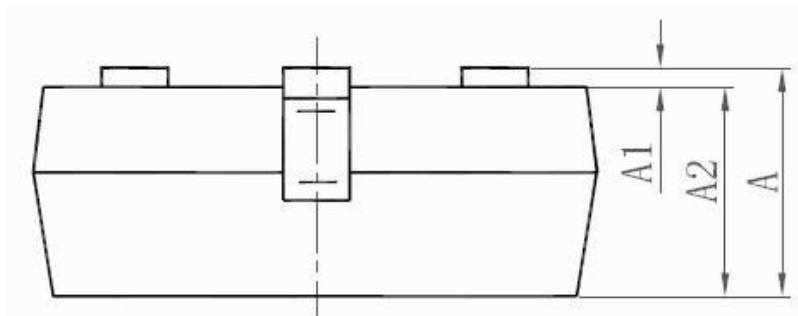
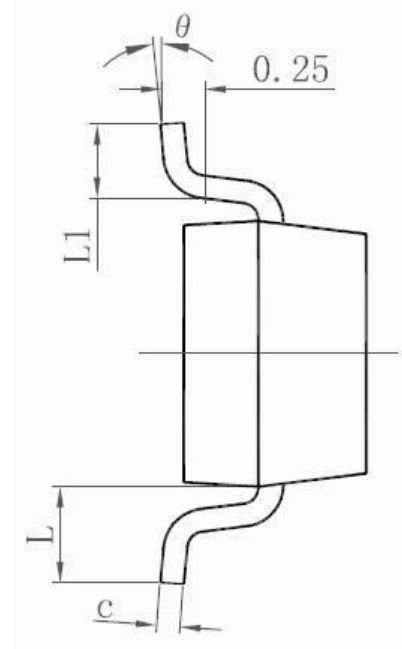
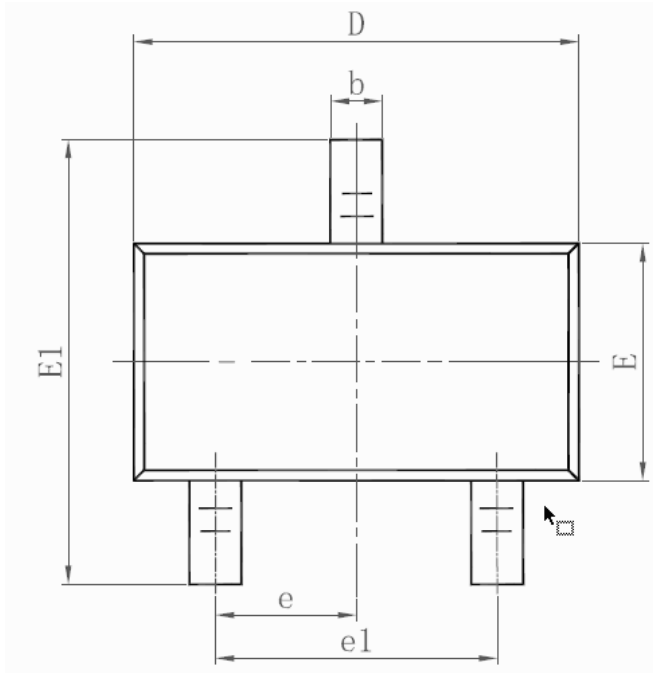


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





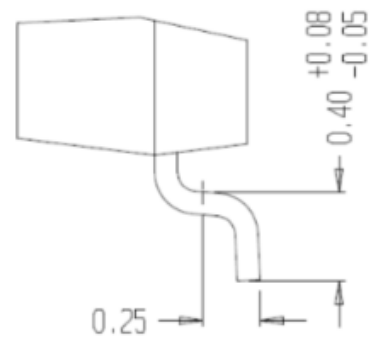
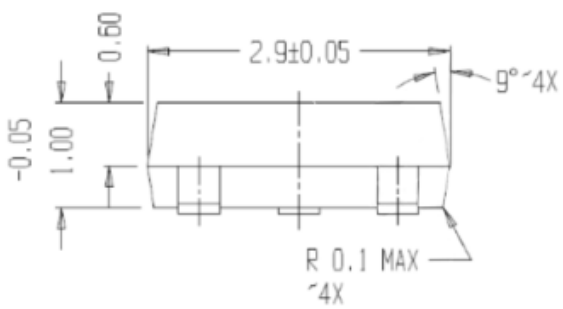
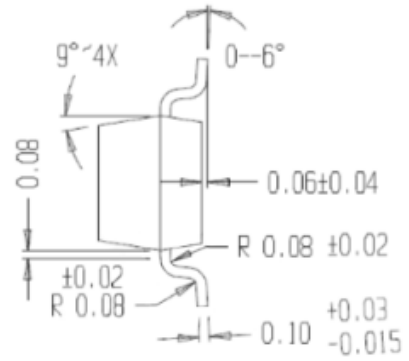
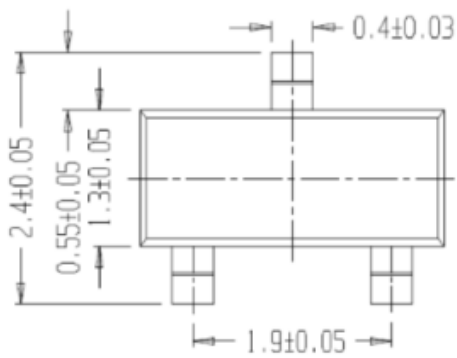
## SOT-23(长电)



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
$\theta$	0°	8°	0°	8°

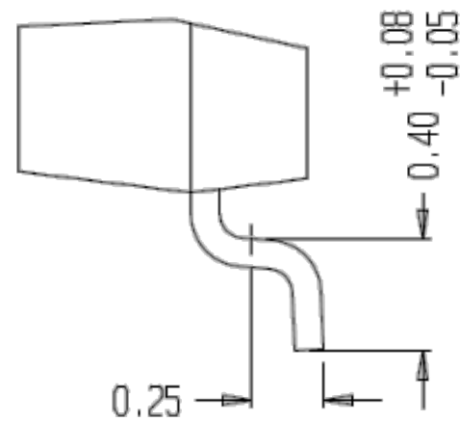
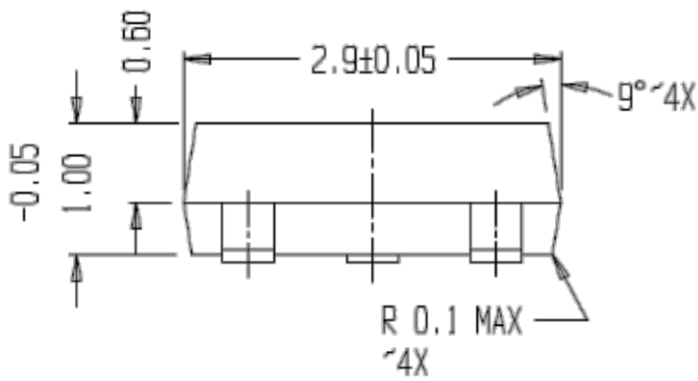
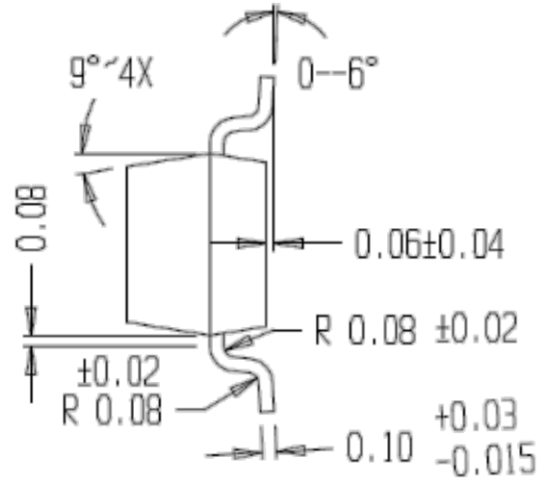
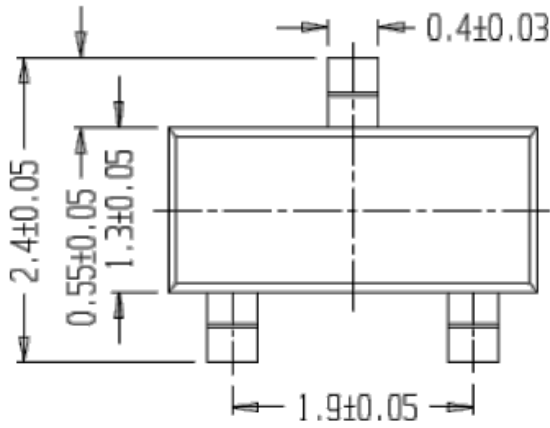


## SOT-23(友润)





### SOT-23(集佳)







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