
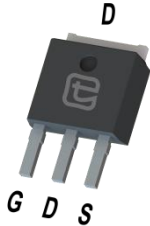
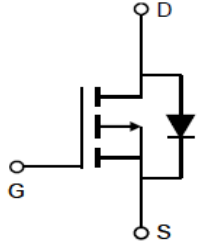


**30V P-Channel Trench MOSFET**

Features <ul style="list-style-type: none"> ● Trench Power Technology ● Low $R_{DS(ON)}$ ● Low Gate Charge ● Optimized for Fast-switching Applications 		Product Summary	
Applications <ul style="list-style-type: none"> ● Synchronous Rectification in DC/DC and AC/DC Converters ● Isolated DC/DC Converters in Telecom and Industrial 		V_{DS}	-30V
		$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 0.15 Ω
		$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 0.24 Ω
		I_D (at $V_{GS}=-10V$)	-5A
		100% UIS Tested	
 			
Device	Package	Marking	
TTU05P03ATS	TO-251-SL	05P03AT	

Absolute Maximum Ratings $T_C = 25^\circ C$, unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	-30	V
Continuous Drain Current	I_D	$T_C = 25^\circ C$	-5
		$T_C = 100^\circ C$	-3.5
Pulsed Drain Current (note1)	I_{DM}	-20	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	5.4	mJ
Avalanche Current	I_{AS}	-6	A
Power Dissipation (note3)	P_D	$T_C = 25^\circ C$	10
		$T_C = 100^\circ C$	5
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+175	$^\circ C$

Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	15	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	



Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	-1	μA
		$V_{DS} = -30V, V_{GS} = 0V, T_J = 100^\circ\text{C}$	--	--	-25	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.7	-2.4	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -1A$	--	120	150	$m\Omega$
		$V_{GS} = -4.5V, I_D = -1A$	--	190	240	$m\Omega$
Forward Transconductance (Note3)	g_{fs}	$V_{DS} = -5V, I_D = -1A$	17	--	--	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = -15V,$ $f = 1.0\text{MHz}$	--	266	--	pF
Output Capacitance	C_{oss}		--	36	--	
Reverse Transfer Capacitance	C_{rss}		--	11	--	
Total Gate Charge	Q_g	$V_{DD} = -15V, I_D = -1A,$ $V_{GS} = -10V$	--	30	--	nC
Gate-Source Charge	Q_{gs}		--	4.6	--	
Gate-Drain Charge	Q_{gd}		--	10	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15V, I_D = -1A,$ $R_G = 2.5\Omega$	--	11	--	ns
Turn-on Rise Time	t_r		--	10	--	
Turn-off Delay Time	$t_{d(off)}$		--	24	--	
Turn-off Fall Time	t_f		--	12	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	-5	A
Pulsed Diode Forward Current	I_{SM}		--	--	-20	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = -1A, V_{GS} = 0V$	--	--	-1.2	V
Reverse Recovery Time	t_{rr}	$I_F = -1A,$ $di_F/dt = 100A/\mu s$	--	30	--	ns
Reverse Recovery Charge	Q_{rr}		--	22	--	nC

Notes

1. Repetitive Rating: Pulse Width limited by maximum junction temperature
2. $I_{AS} = -6A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1\%$



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

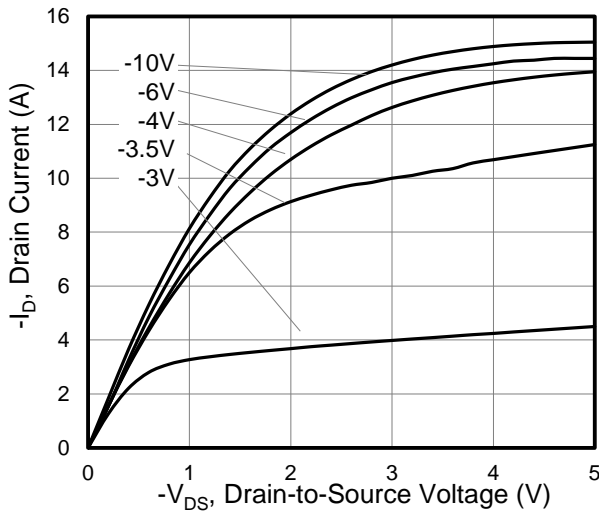


Figure 2. Transfer Characteristics

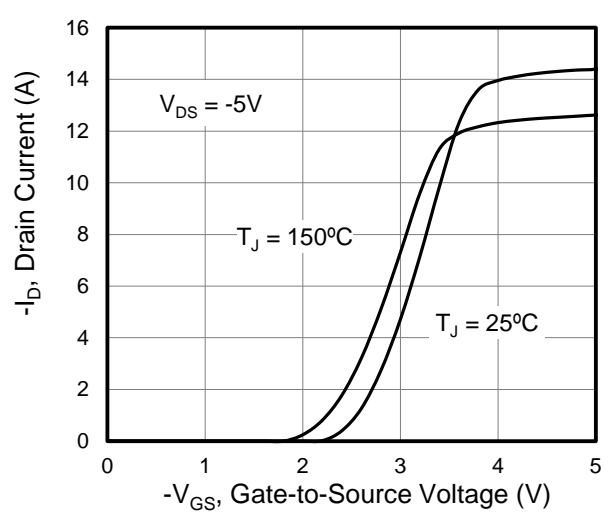


Figure 3. On-Resistance vs. Drain Current

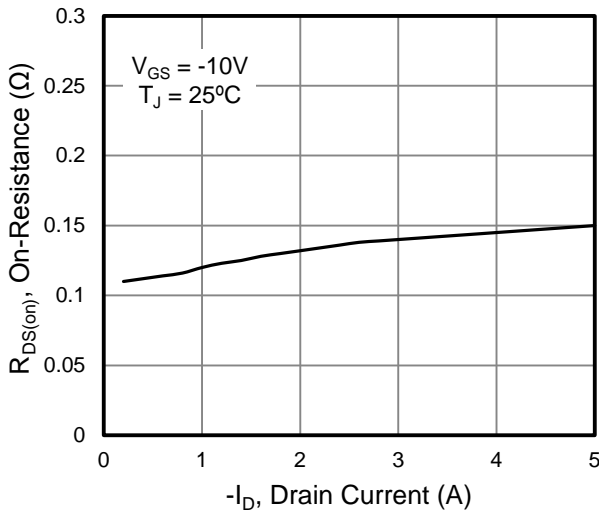


Figure 4. Capacitance

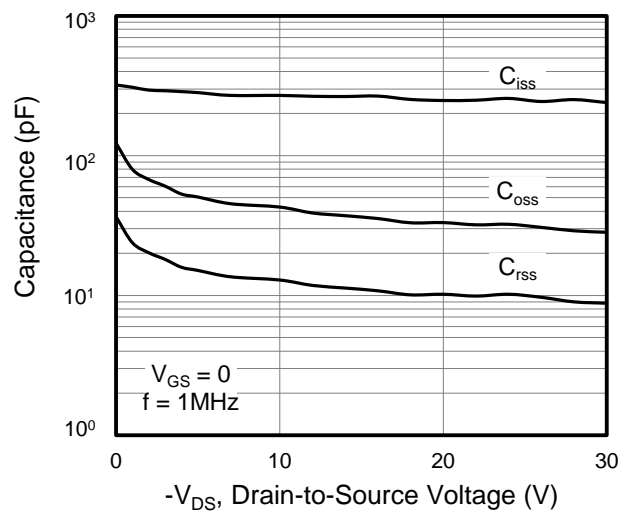


Figure 5. Gate Charge

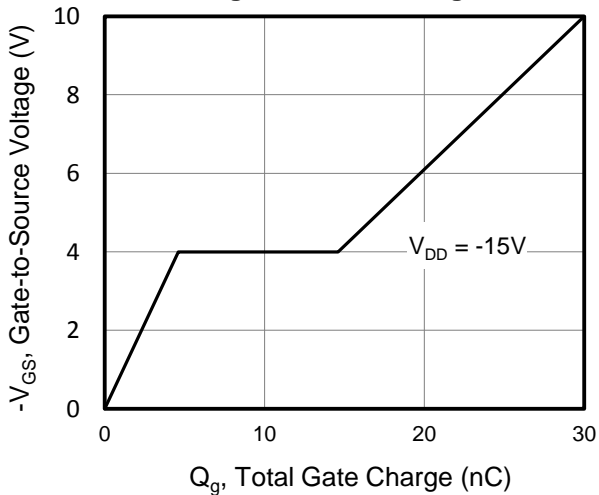
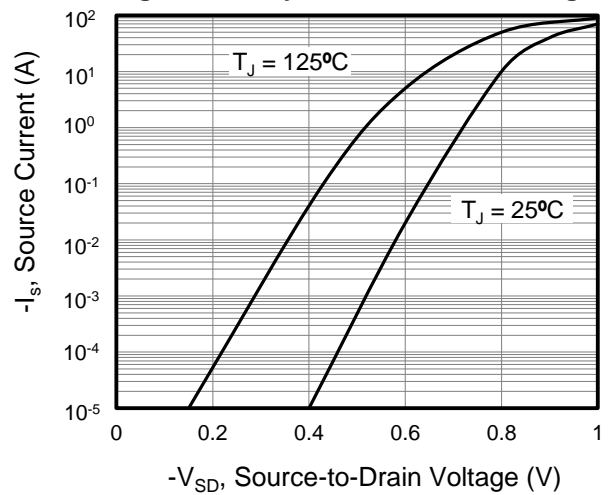


Figure 6. Body Diode Forward Voltage





Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

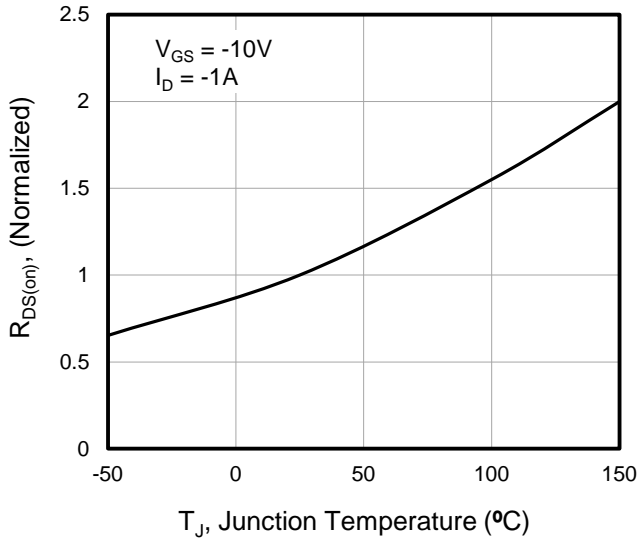


Figure 8. Threshold Voltage vs. Junction Temperature

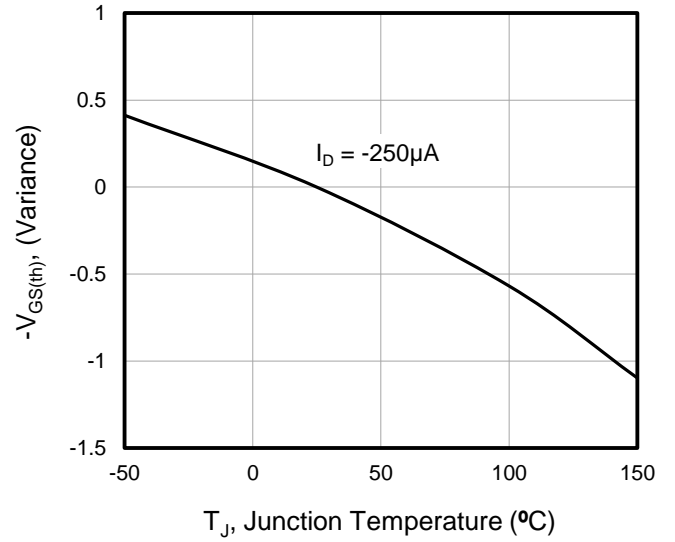


Figure 9. Transient Thermal Impedance

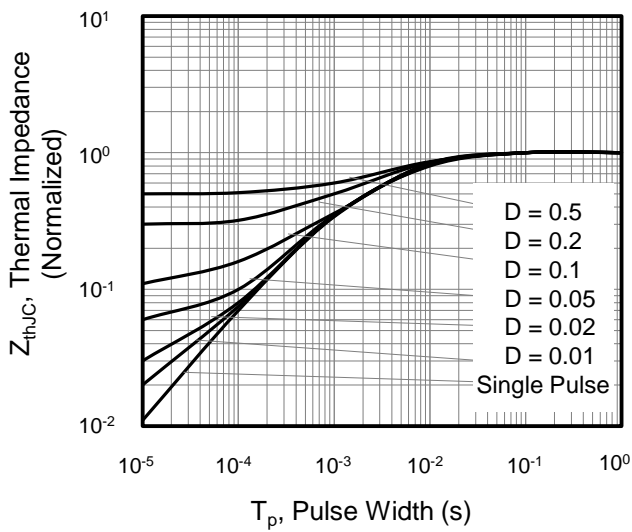


Figure 10. Safe operation area

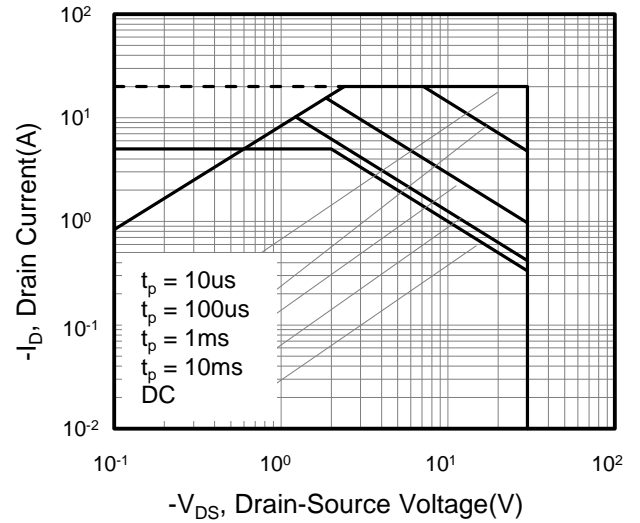




Figure A: Gate Charge Test Circuit and Waveform

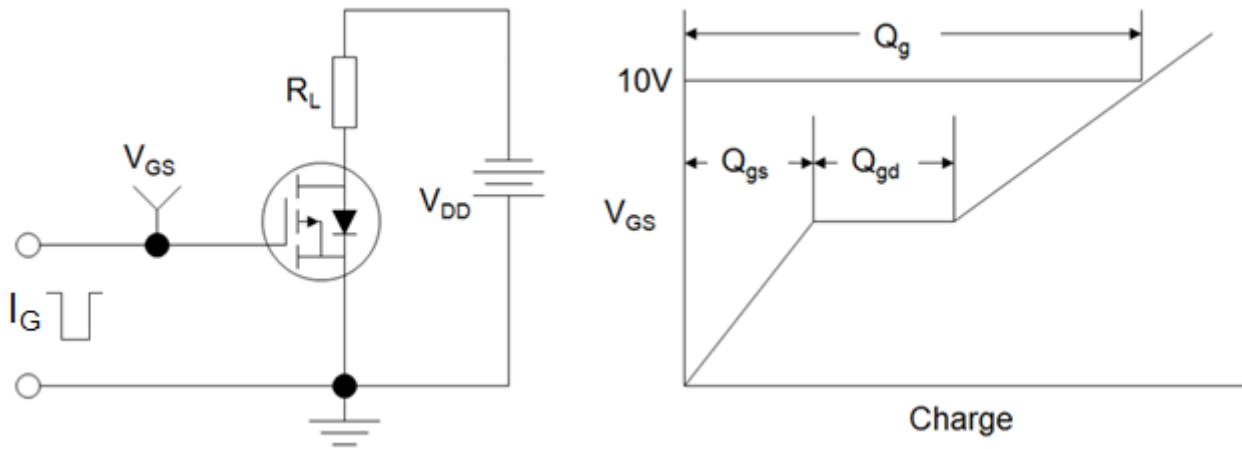


Figure B: Resistive Switching Test Circuit and Waveform

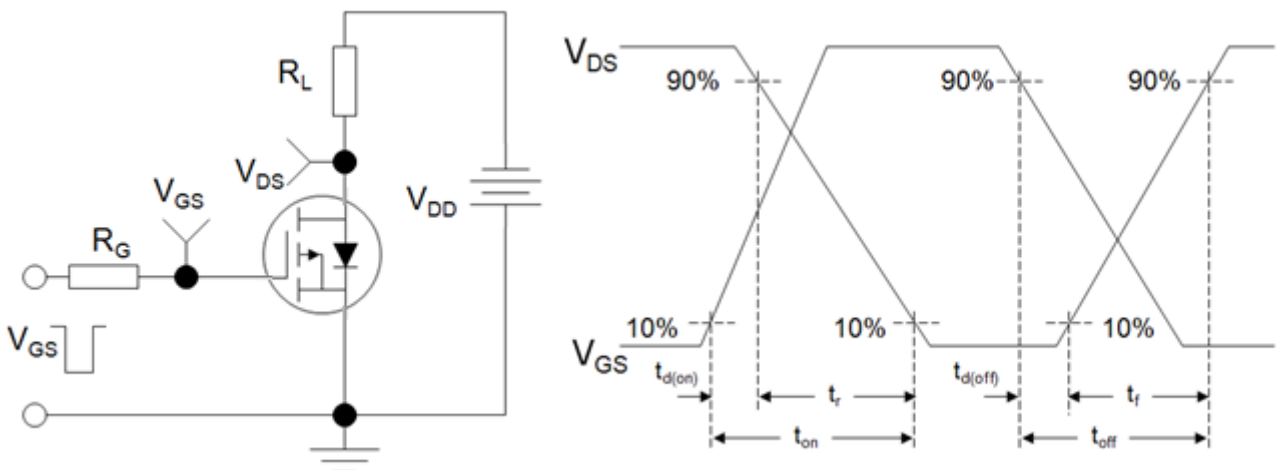
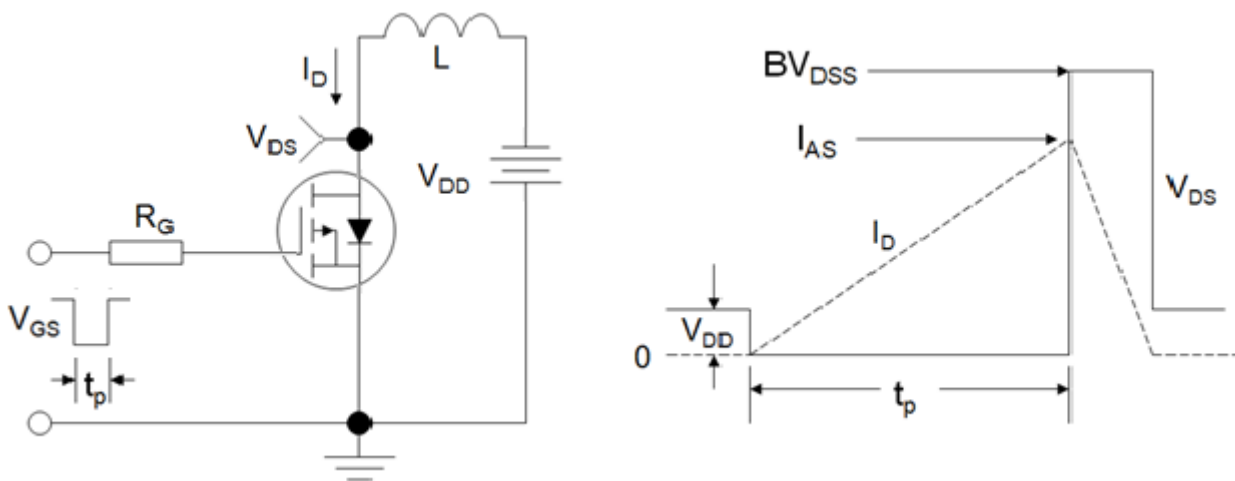
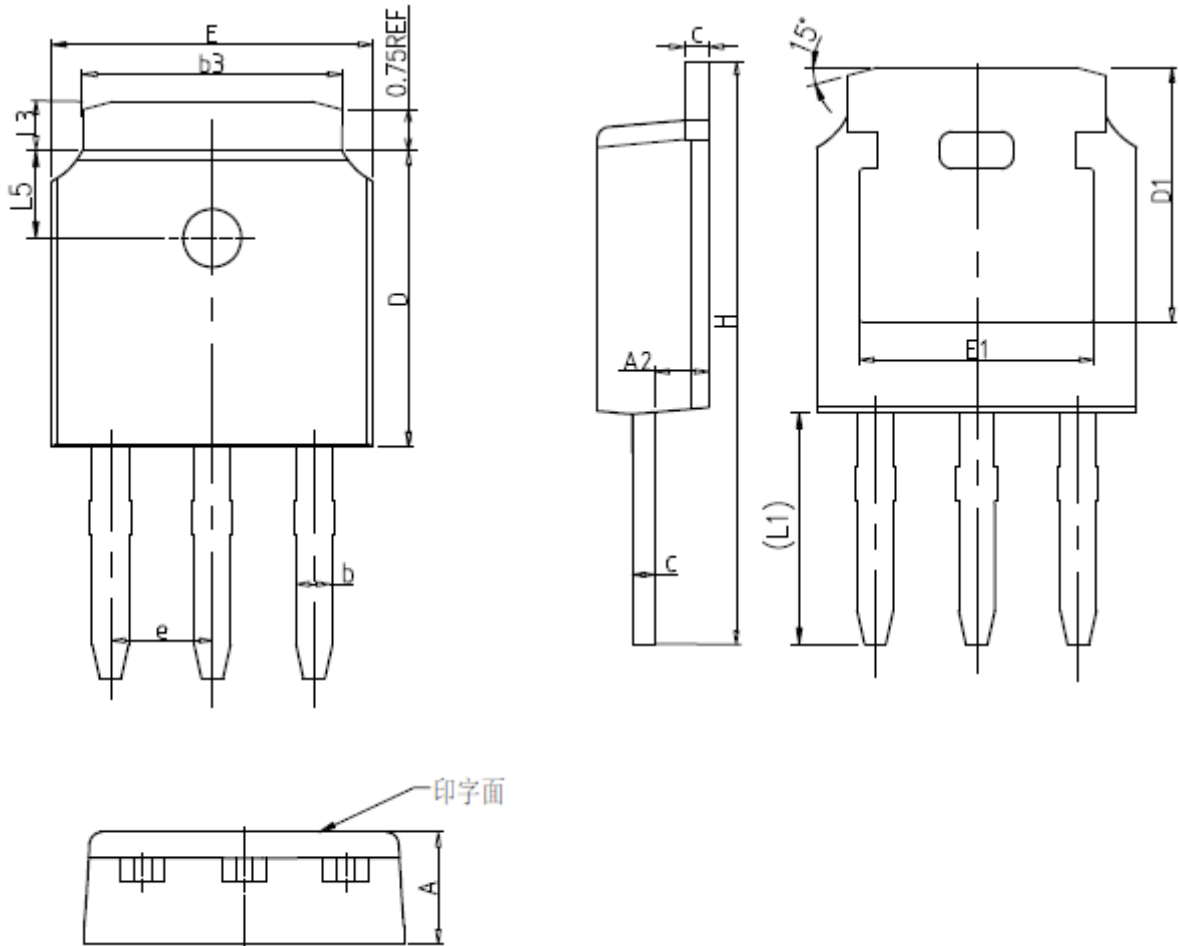


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





TO-251-SL



SYMBOL	MM		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286BSC		
H	10.00	11.22	11.44
L1	3.90	4.10	4.30
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95



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