
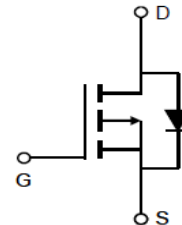
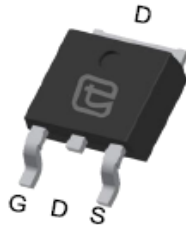




30V P-Channel Trench MOSFET(Preliminary)

<p>General Description</p> <ul style="list-style-type: none"> ● Trench Power technology ● Low $R_{DS(ON)}$ ● Low Gate Charge ● Optimized for fast-switching applications <p>Applications</p> <ul style="list-style-type: none"> ● Synchronous Rectification in DC/DC and AC/DC Converters ● Isolated DC/DC Converters in Telecom and Industrial 	<p>Product Summary</p> <table> <tr> <td>V_{DS}</td> <td>-30V</td> </tr> <tr> <td>I_D (at $V_{GS}=10V$)</td> <td>-40A</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=-10V$)</td> <td>< 19mΩ</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)</td> <td>< 32mΩ</td> </tr> </table> <p>100% UIS Tested</p> 	V_{DS}	-30V	I_D (at $V_{GS}=10V$)	-40A	$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 19m Ω	$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 32m Ω
V_{DS}	-30V								
I_D (at $V_{GS}=10V$)	-40A								
$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 19m Ω								
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 32m Ω								

TO-252



Part Number	Package Type	Form	Marking
TTD40P03AT	TO-252	Tape&Reel	40P03AT

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}	± 20	V
Continuous Drain Current ^B	I_D	$T_C = 25^\circ\text{C}$	-40
		$T_C = 100^\circ\text{C}$	-28
Pulsed Drain Current ^A	I_{DM}	-120	A
Avalanche Current ^A	I_{AS}	-20	A
Single Pulse Avalanche Energy $L = 0.3\text{mH}$ ^A	E_{AS}	60	mJ
Power Dissipation ^C	P_D	$T_C = 25^\circ\text{C}$	60
		$T_C = 100^\circ\text{C}$	30
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Case	$R_{\theta JC}$	2.5	$^\circ\text{C}/\text{W}$
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	
STATIC PARAMETERS						
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	μA
			$T_J = 100^\circ\text{C}$		-100	
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-1	-1.7	-2.4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{V}, I_D = -20\text{A}$		14	19	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -20\text{A}$		27	32	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{V}, I_D = -20\text{A}$		20		S
V_{SD}	Diode Forward Voltage	$I_S = -15\text{A}, V_{GS} = 0\text{V}$			-1	V
I_S	Maximum Body-Diode Continuous Current ^B				-40	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = -20\text{V}, f = 1\text{MHz}$		2500		pF
C_{oss}	Output Capacitance			288		
C_{rss}	Reverse Transfer Capacitance			254		
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS} = -10\text{V}, V_{DS} = -20\text{V}, I_D = -20\text{A}$		50		nC
Q_{gs}	Gate Source Charge			12		
Q_{gd}	Gate Drain Charge			8		
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -10\text{V}, V_{DS} = -20\text{V}, I_D = -20\text{A}, R_G = 2.5\Omega$		12		ns
t_r	Turn-On Rise Time			17		
$T_{D(off)}$	Turn-Off Delay Time			54		
t_f	Turn-Off Fall Time			24		
t_{rr}	Body Diode Reverse Recovery Time	$I_F = -20\text{A}, di/dt = 100\text{A}/\mu\text{s}$		28		ns
Q_{rr}	Body Diode Reverse Recovery Charge			19		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 $T_{J(MAX)} = 175^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.



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

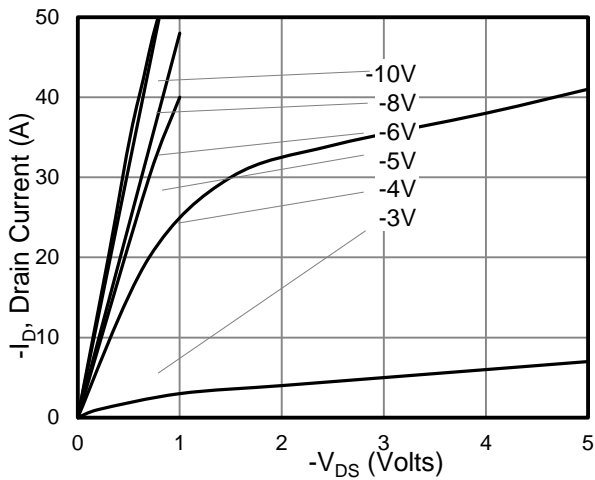


Figure 1: On-Region Characteristics

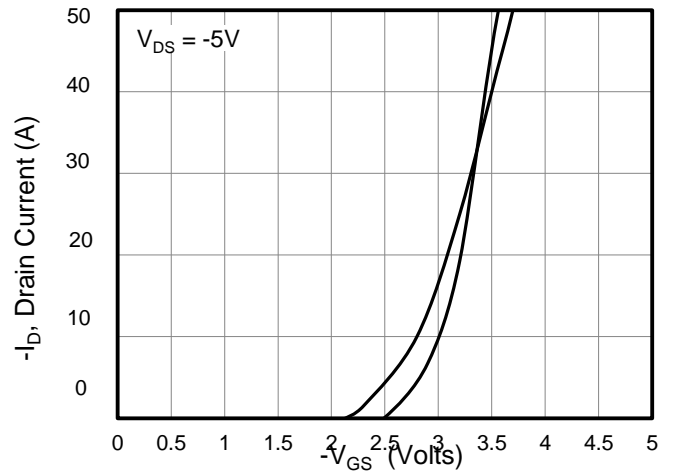


Figure 2: Transfer Characteristics

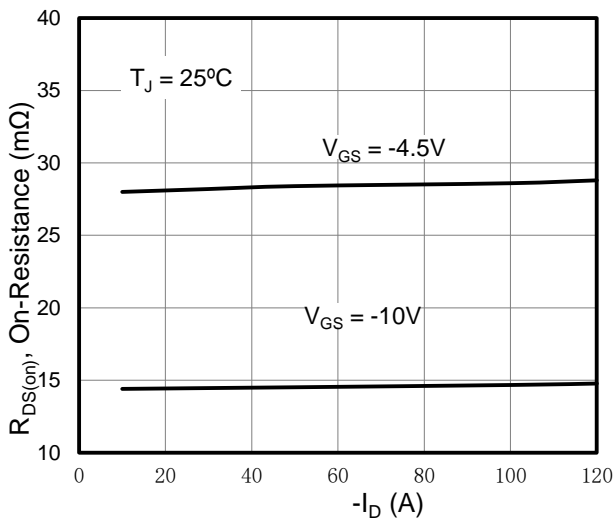


Figure 3: On-Resistance vs. Drain Current

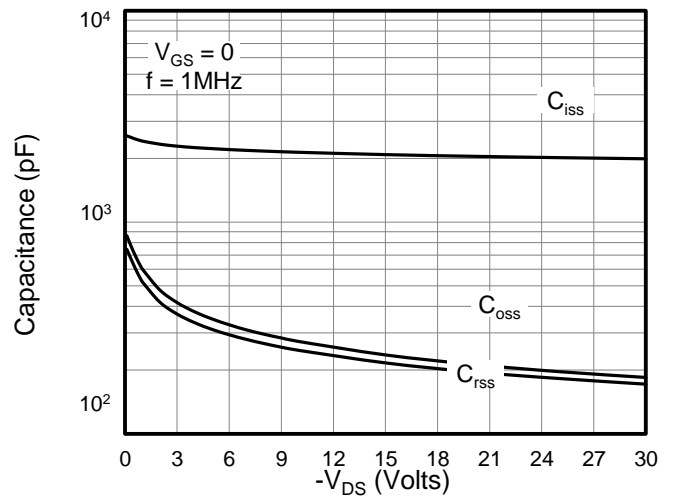


Figure 4: Capacitance Characteristics

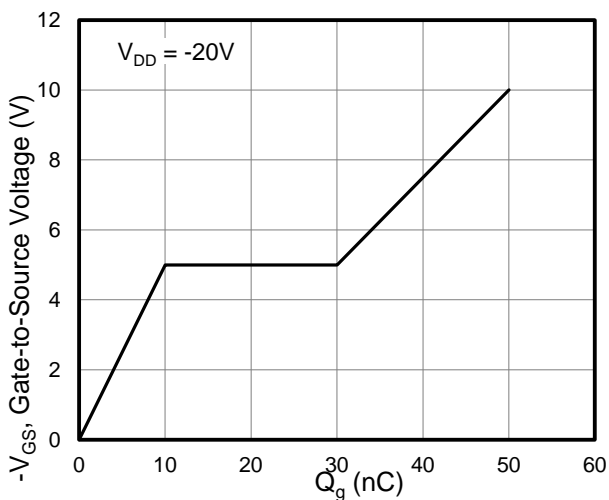


Figure 5: Gate Charge Characteristics

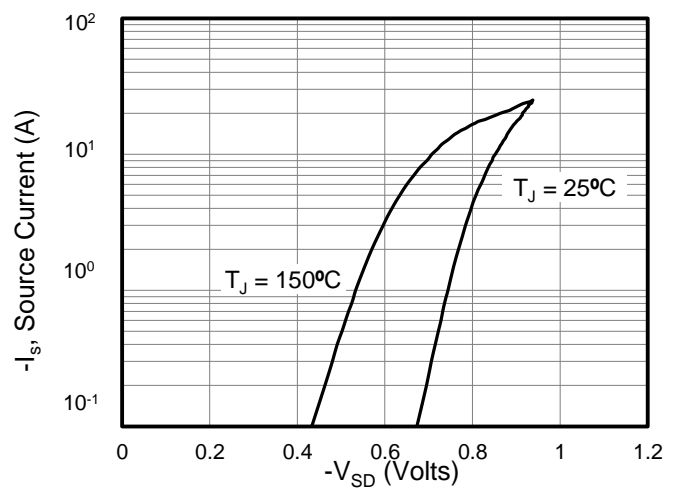


Figure 6: Body Diode Forward Voltage



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

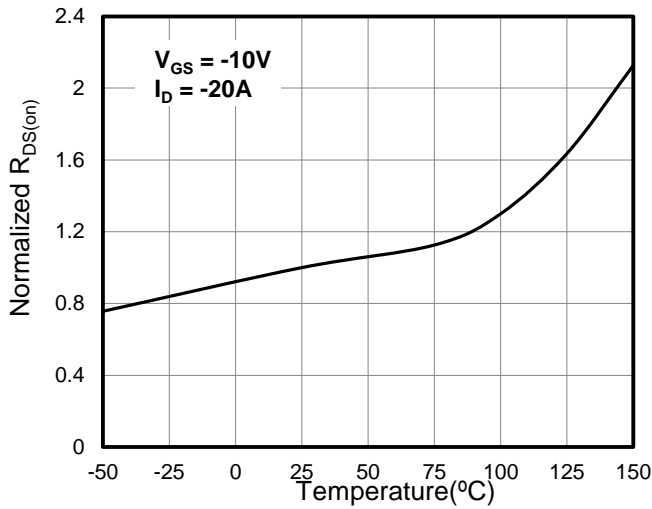


Figure 7: On-Resistance vs. Junction Temperature

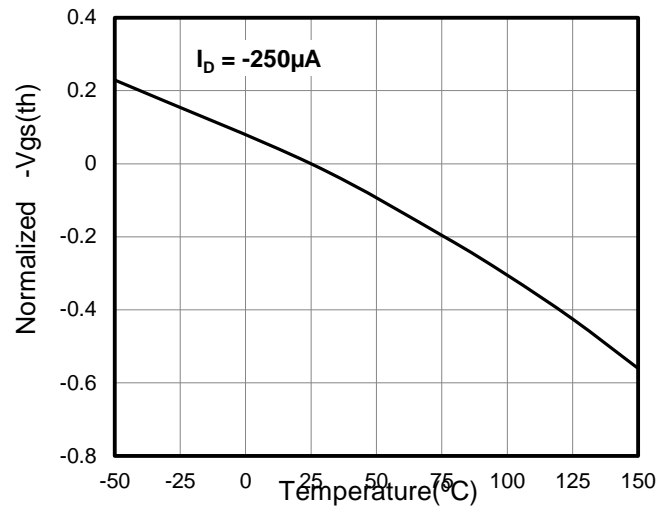


Figure 8: $V_{GS(th)}$ vs. Junction Temperature

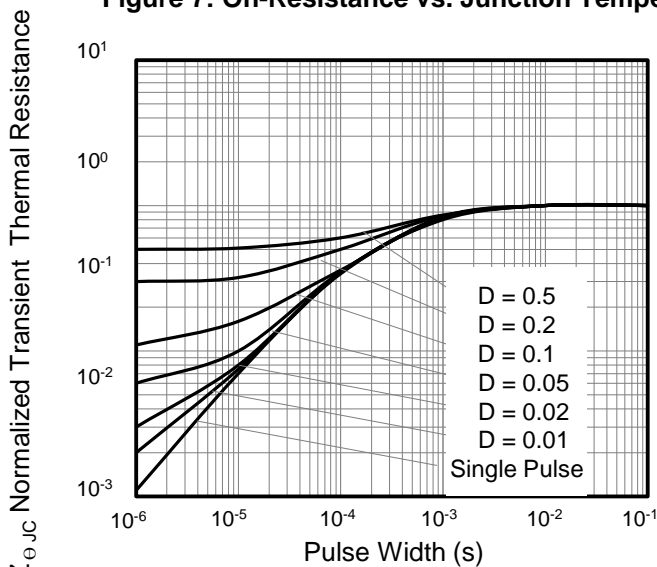


Figure 11: Normalized Transient Thermal Resistance

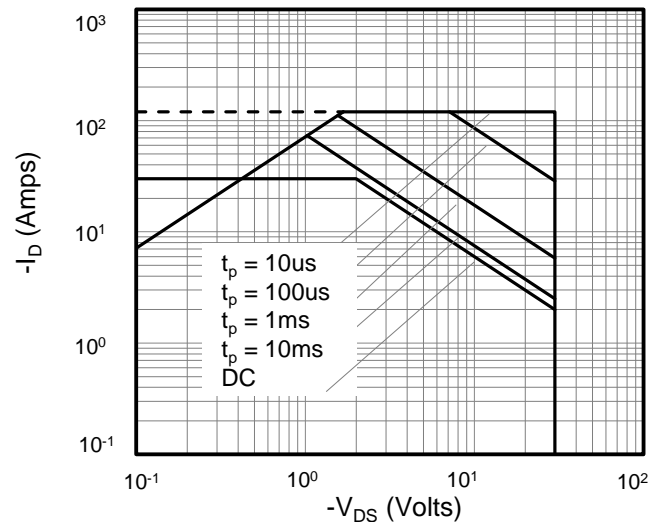


Figure 12: Safe Operating Area



Figure A: Gate Charge Test Circuit and Waveform

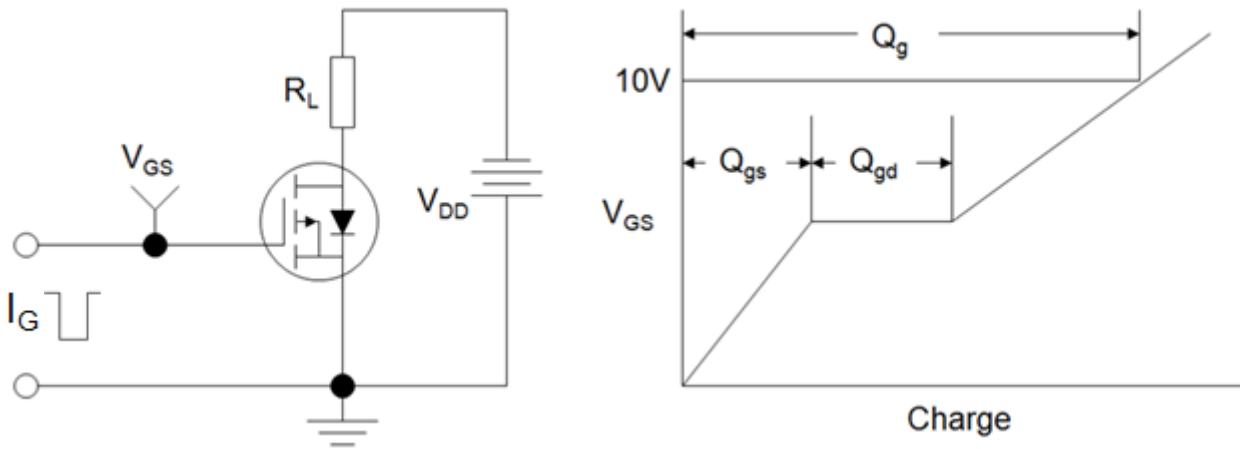


Figure B: Resistive Switching Test Circuit and Waveform

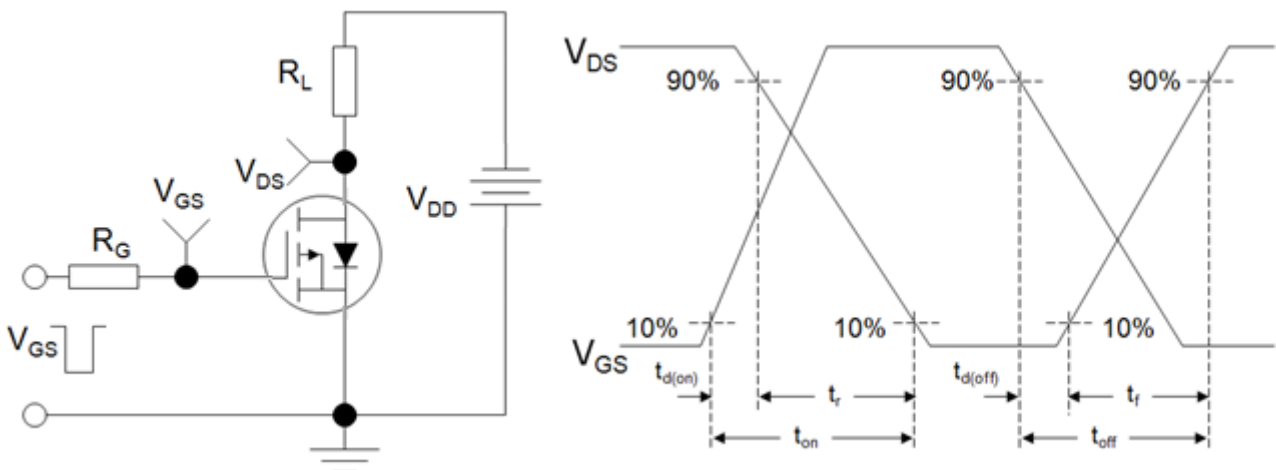
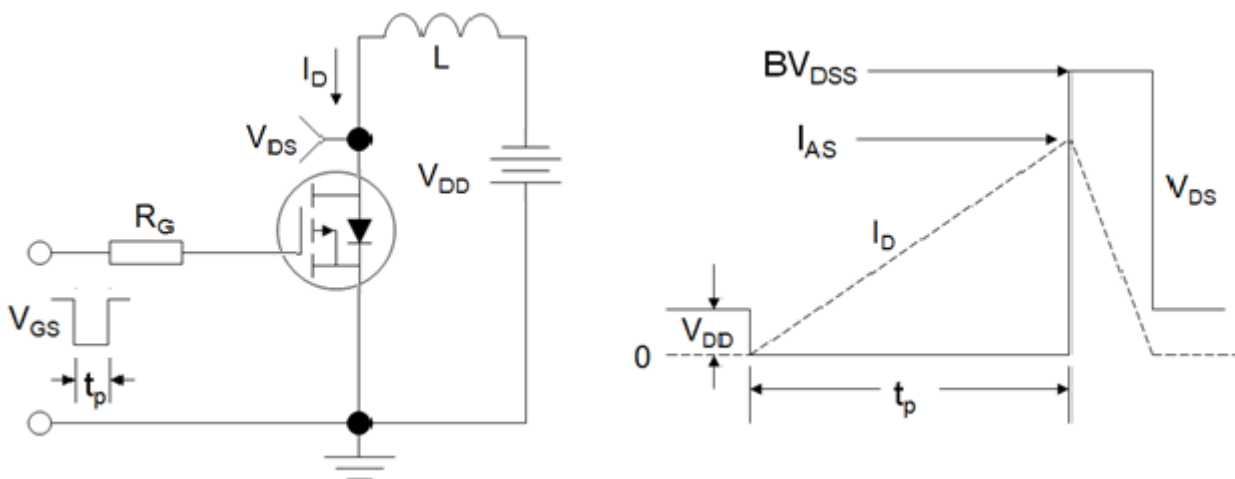
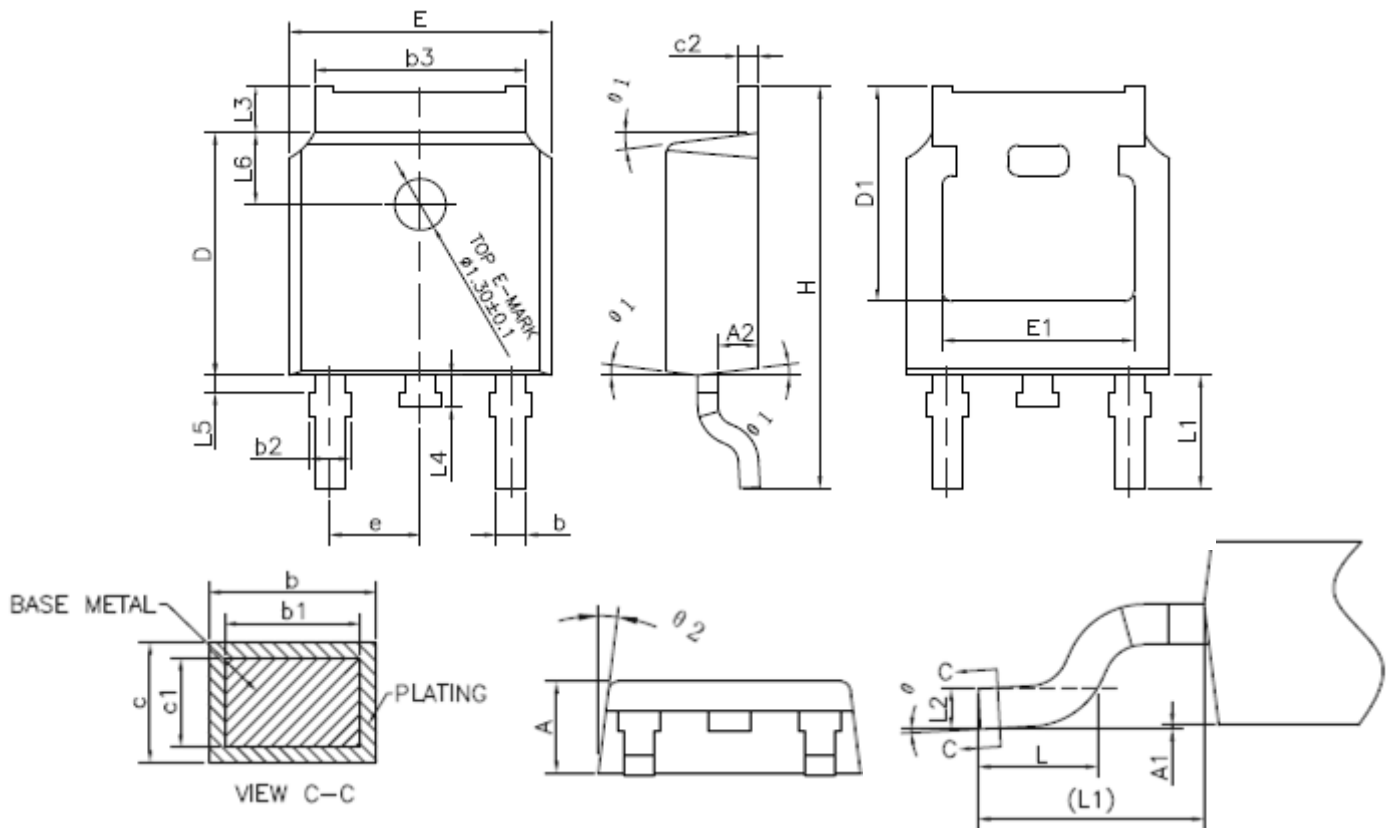


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





TO-252(集佳)



SYMBOL	MIN	NOM	MAX
A	2,20	2,30	2,38
A1	0	—	0,10
A2	0,90	1,01	1,10
b	0,72	—	0,85
b1	0,71	0,76	0,81
b2	0,72	—	0,90
b3	5,13	5,33	5,46
c	0,47	—	0,60
c1	0,46	0,51	0,56
c2	0,47	—	0,60
D	6,00	6,10	6,20
D1	5,25	—	—
E	6,50	6,60	6,70
E1	4,70	—	—
e	2,186	2,286	2,386
H	9,80	10,10	10,40
L	1,40	1,50	1,70
L1	2,90 REF		
L2	0,508 BSC		
L3	0,90	—	1,25
L4	0,60	0,80	1,00
L5	0,15	—	0,75
L6	1,80 REF		
θ	0°	—	8°
θ_1	5°	7°	9°
θ_2	5°	7°	9°



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