



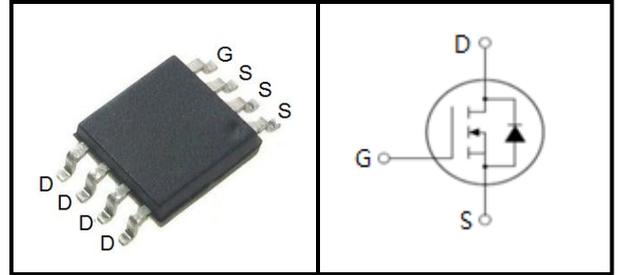
## 40V N-Channel Trench MOSFET

### FEATURES

- Trench Power MOSFET 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



Device Marking and Package Information		
Device	Package	Marking
TTJ06N04AT	SOP-8	06N04AT

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage ( $V_{GS} = 0\text{V}$ )	$V_{DSS}$	40	V
Continuous Drain Current	$I_D$	6	A
Pulsed Drain Current (note1)	$I_{DM}$	24	A
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Single Pulse Avalanche Energy (note2)	$E_{AS}$	7.4	mJ
Avalanche Current	$I_{AS}$	7	A
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	2	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150	$^\circ\text{C}$

Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	$^\circ\text{C}/\text{W}$



Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted								
Parameter	Symbol	Test Conditions	Value			Unit		
			Min.	Typ.	Max.			
<b>Static</b>								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu\text{A}$	40	--	--	V		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu\text{A}$		
		$V_{DS} = 40V, V_{GS} = 0V, T_J = 150^\circ\text{C}$	--	--	100			
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1	1.7	2.4	V		
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 3A$	--	26	30	m $\Omega$		
		$V_{GS} = 4.5V, I_D = 3A$	--	36	42			
Forward Transconductance (Note3)	$g_{fs}$	$V_{DS} = 5V, I_D = 6A$	--	6.8	--	S		
<b>Dynamic</b>								
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 20V,$ $f = 1.0\text{MHz}$	--	775	--	pF		
Output Capacitance	$C_{oss}$		--	56	--			
Reverse Transfer Capacitance	$C_{rss}$		--	40	--			
Total Gate Charge	$Q_g(10V)$	$V_{DD} = 20V, I_D = 6A,$ $V_{GS} = 10V$	--	10.8	--	nC		
	$Q_g(4.5V)$		--	5.2	--			
Gate-Source Charge	$Q_{gs}$		--	1.7	--			
Gate-Drain Charge	$Q_{gd}$		--	1.6	--			
Turn-on Delay Time	$t_{d(on)}$		$V_{DD} = 20V, I_D = 6A,$ $R_G = 2.5\Omega$	--	7		--	ns
Turn-on Rise Time	$t_r$			--	5		--	
Turn-off Delay Time	$t_{d(off)}$	--		17	--			
Turn-off Fall Time	$t_f$	--		8	--			
<b>Drain-Source Body Diode Characteristics</b>								
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	6	A		
Pulsed Diode Forward Current	$I_{SM}$		--	--	24			
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 6A, V_{GS} = 0V$	--	0.9	1.2	V		
Reverse Recovery Time	$t_{rr}$	$I_F = 6A,$ $di_F/dt = 100\text{A}/\mu\text{s}$	--	20	--	ns		
Reverse Recovery Charge	$Q_{rr}$		--	12	--	nC		

**Notes**

1. Repetitive Rating: Pulse Width limited by maximum junction temperature
2.  $V_{DD} = 40V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 1\%$



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

Figure 1. Output Characteristics

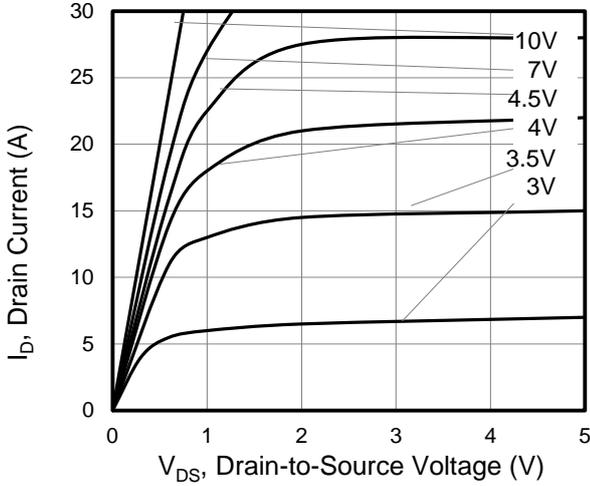


Figure 2. Transfer Characteristics

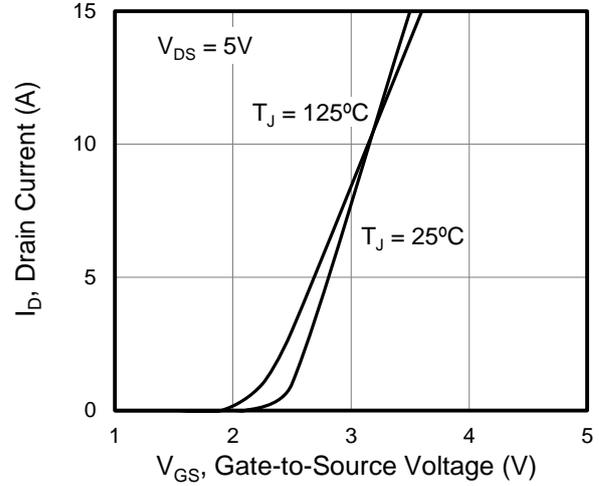


Figure 3. On-Resistance vs. Drain Current

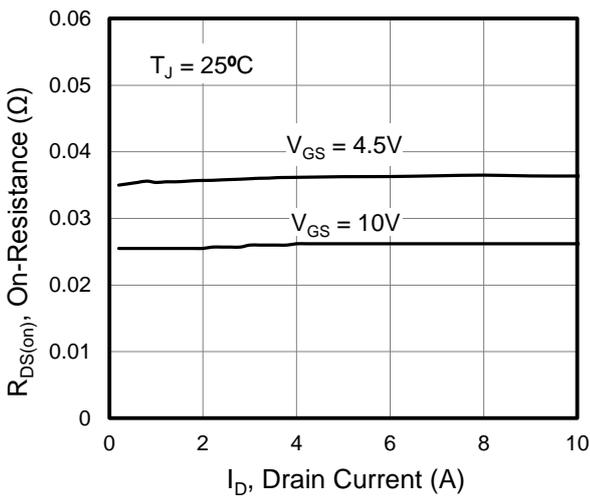


Figure 4. Capacitance

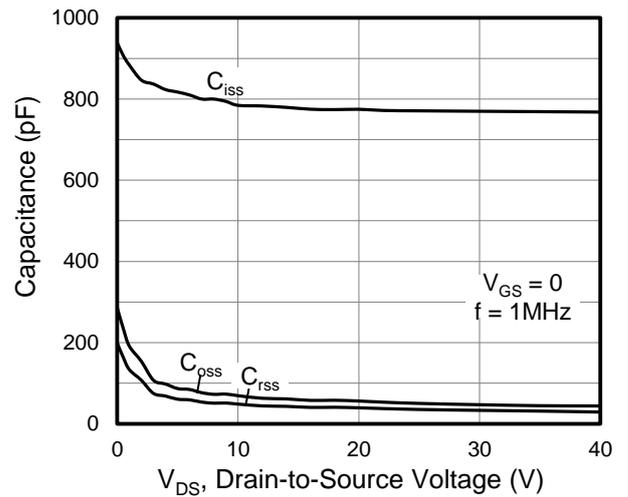


Figure 5. Gate Charge

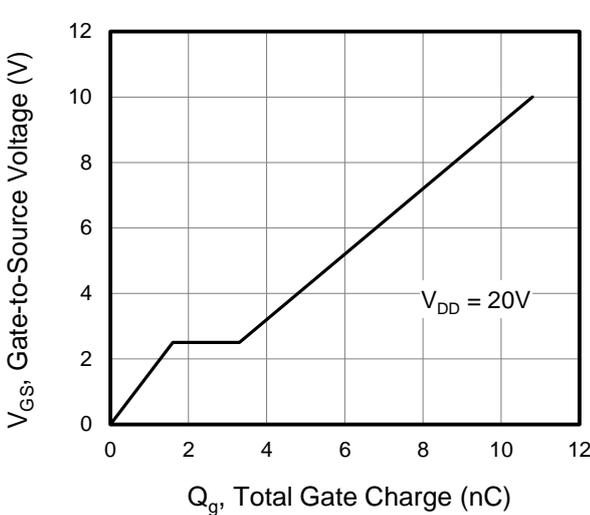
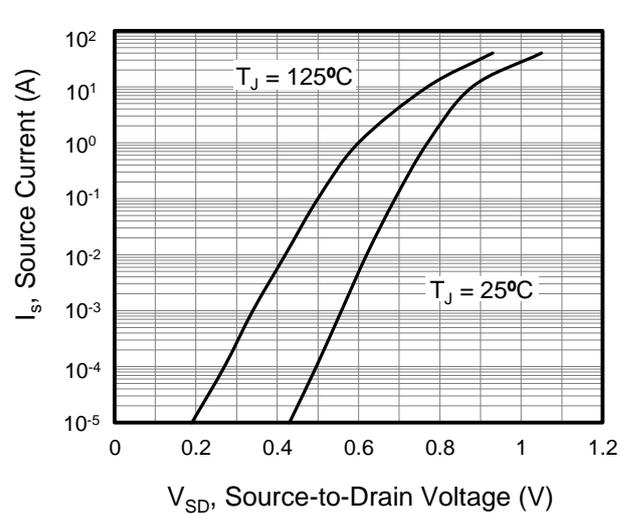


Figure 6. Body Diode Forward Voltage





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

Figure 7. On-Resistance vs. Junction Temperature

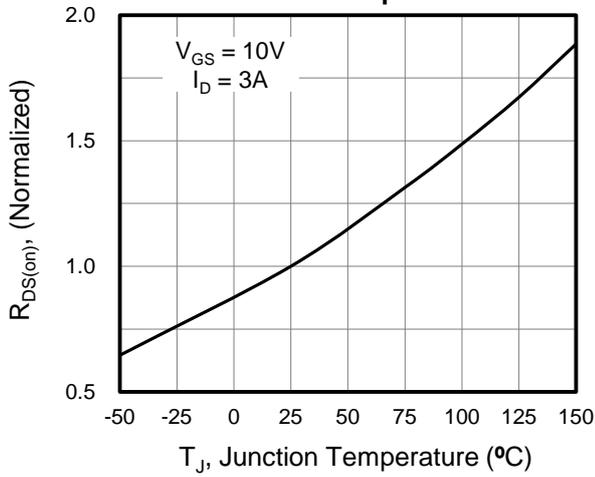


Figure 8. Threshold Voltage vs. Junction Temperature

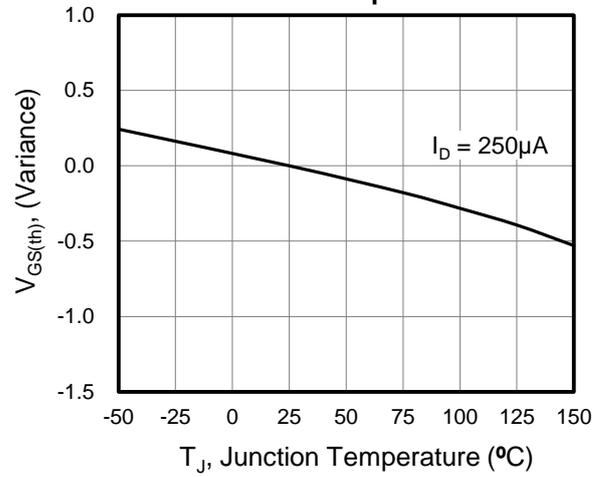


Figure 9. Breakdown voltage vs. Junction Temperature

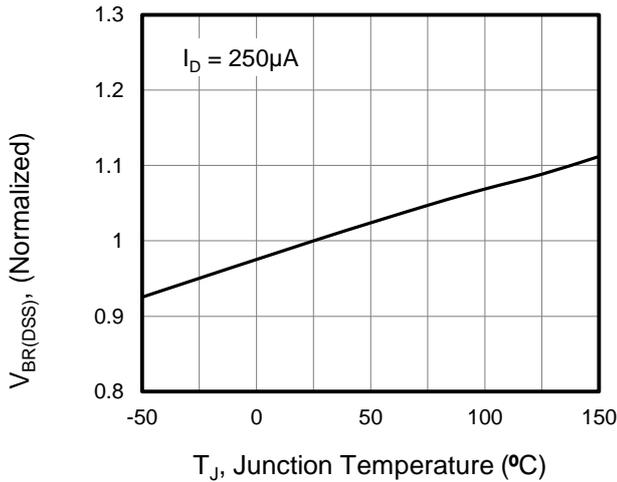


Figure 10. Transient Thermal Impedance

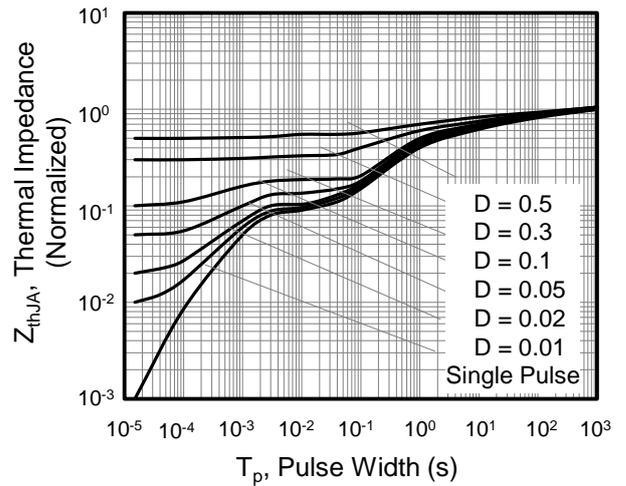


Figure 11. Safe operation area for

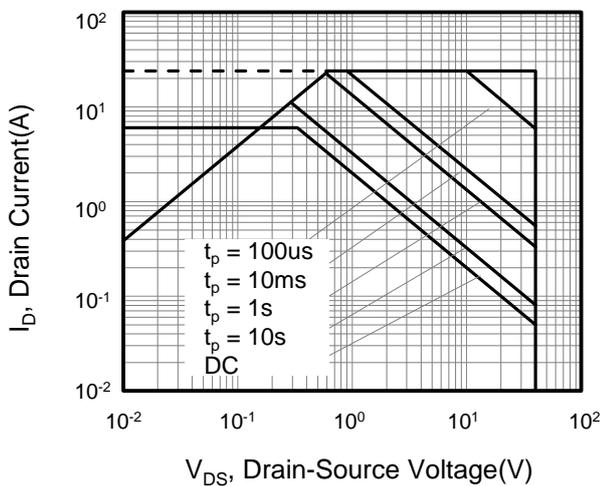




Figure A: Gate Charge Test Circuit and Waveform

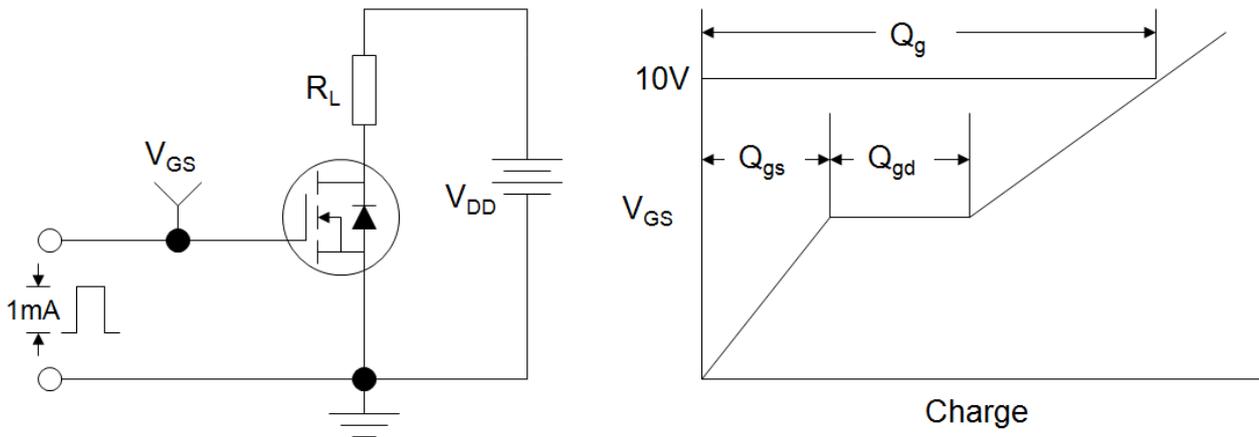


Figure B: Resistive Switching Test Circuit and Waveform

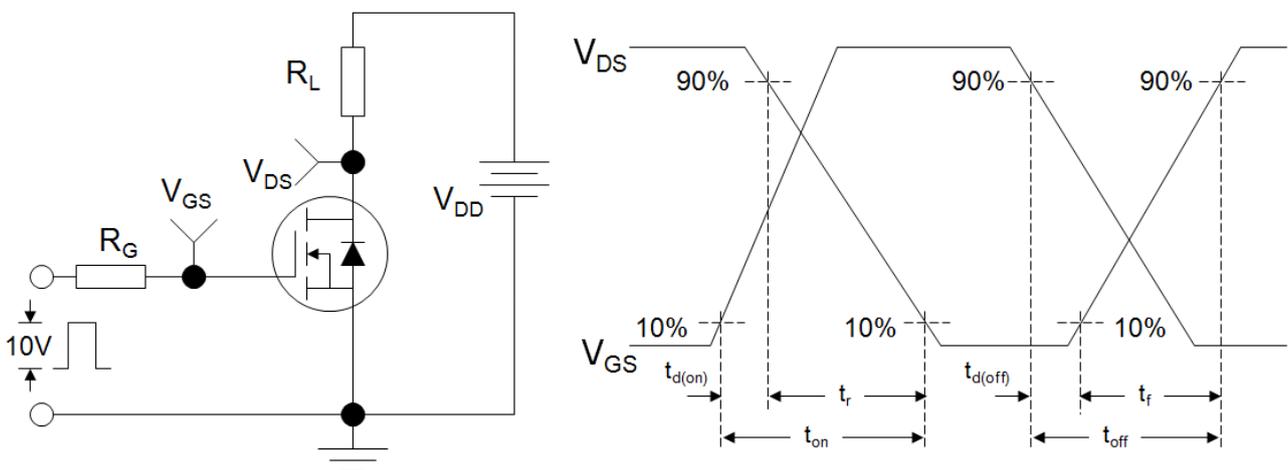
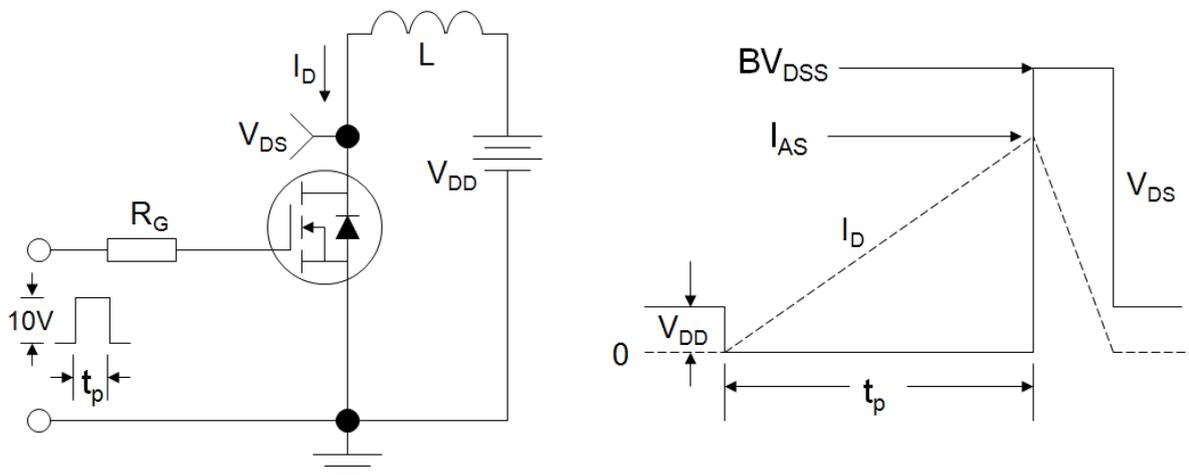
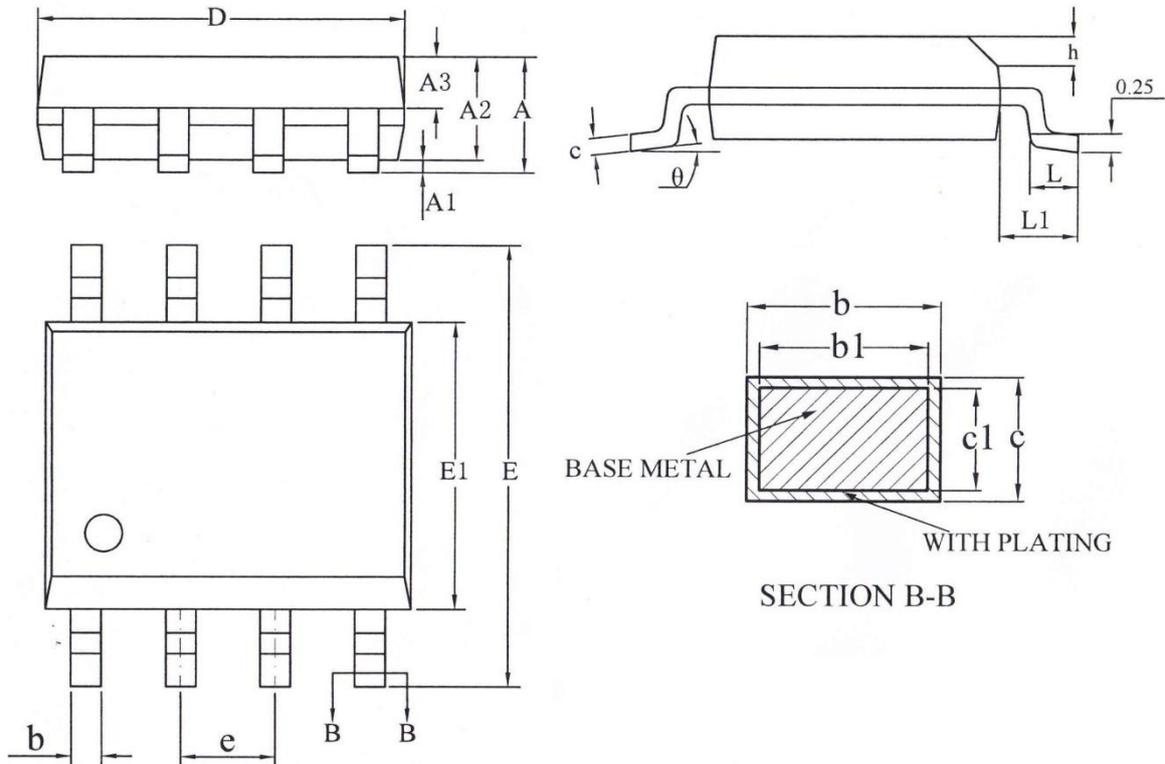


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





### SOP-8



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.48
b1	0.38	0.41	0.43
c	0.21	—	0.26
c1	0.19	0.20	0.21

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05BSC		
θ	0	—	8°



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