



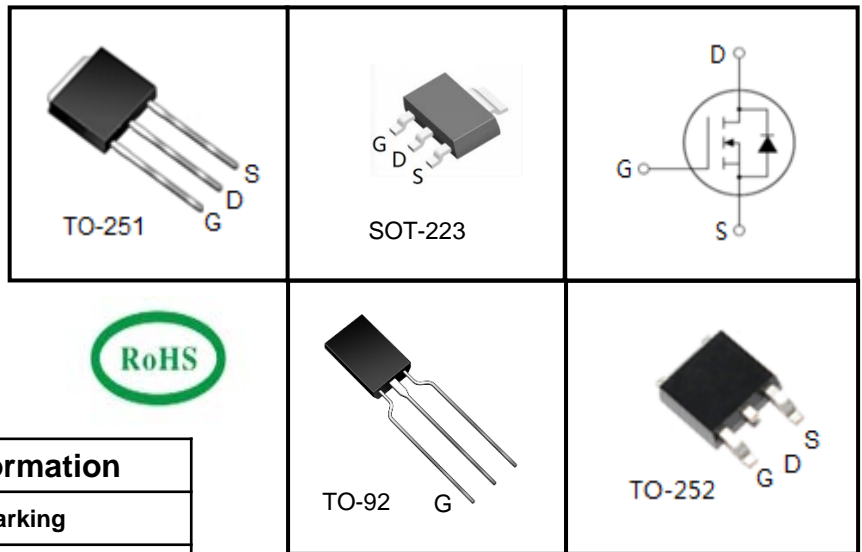
600V N-Channel MOSFET

FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



Device Marking and Package Information		
Device	Package	Marking
TMD1N60H	TO-252	D1N60H
TMU1N60H	TO-251	U1N60H
TMY1N60H	SOT-223	Y1N60H
TMZ1N60H	TO-92	Z1N60H

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Value				Unit
		TO-252	TO-251	SOT-223	TO-92	
Drain-Source Voltage ($V_{GS} = 0\text{V}$)	V_{DSS}	600				V
Continuous Drain Current	I_D	1				A
Pulsed Drain Current (note1)	I_{DM}	4				A
Gate-Source Voltage	V_{GSS}	± 30				V
Single Pulse Avalanche Energy (note2)	E_{AS}	78				mJ
Avalanche Current (note1)	I_{AR}	1.3				A
Repetitive Avalanche Energy (note1)	E_{AR}	3.9				mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	28		1		W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150				$^\circ\text{C}$

Thermal Resistance						
Parameter	Symbol	Value				Unit
		TO-252	TO-251	SOT-223	TO-92	
Thermal Resistance, Junction-to-Lead	R_{thJL}	4.53		50		$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60		140		



Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	600	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
		$V_{DS} = 480V, V_{GS} = 0V, T_J = 125^\circ\text{C}$	--	--	100	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 0.5A$	--	7.0	8.0	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	247	319	μF
Output Capacitance	C_{oss}		--	38	50	
Reverse Transfer Capacitance	C_{rss}		--	4.9	6.4	
Total Gate Charge	Q_g	$V_{DD} = 480V, I_D = 1A,$ $V_{GS} = 10V$	--	9.1	12	nC
Gate-Source Charge	Q_{gs}		--	1.2	--	
Gate-Drain Charge	Q_{gd}		--	3.3	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 300V, I_D = 1A,$ $R_G = 25\Omega$	--	11	26	ns
Turn-on Rise Time	t_r		--	33	72	
Turn-off Delay Time	$t_{d(off)}$		--	26	59	
Turn-off Fall Time	t_f		--	26	59	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	1	A
Pulsed Diode Forward Current	I_{SM}		--	--	4	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 1A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 1A,$ $di_F/dt = 100A/\mu s$	--	163	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.85	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 92\text{mH}, V_{DD} = 50V, R_G = 25\Omega$, 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 ($T_J = 25^\circ\text{C}$)

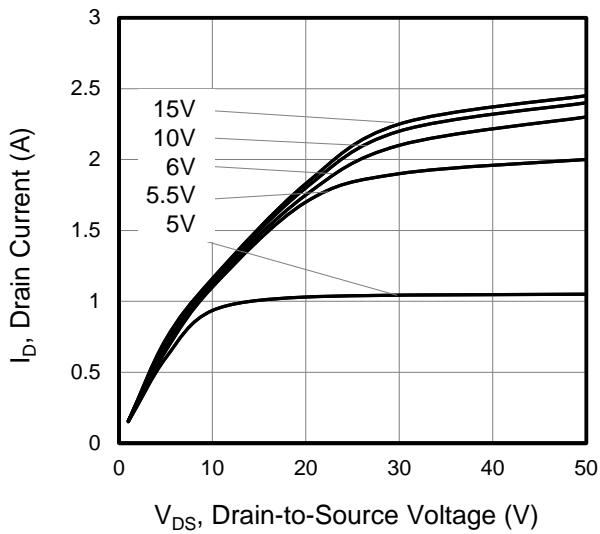


Figure 2. Forward Bias Safe Operating Area

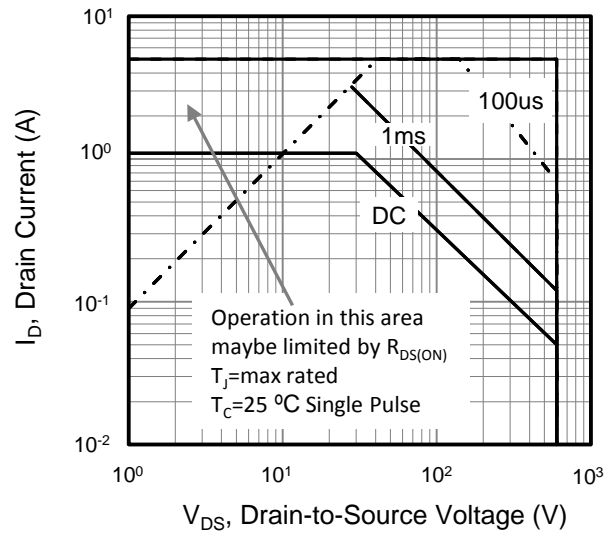


Figure 3. Drain Current vs. Temperature

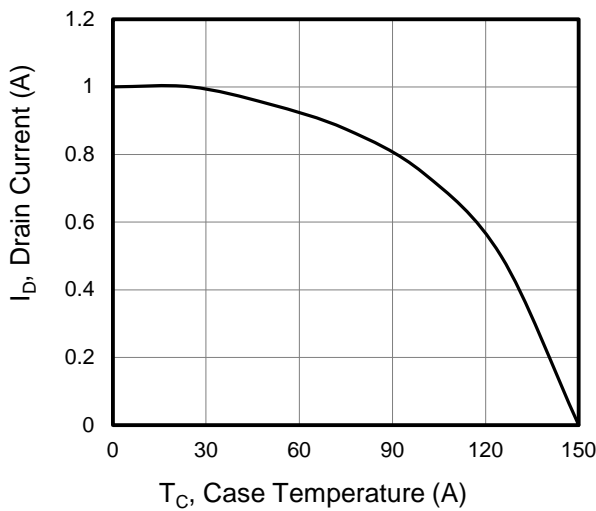


Figure 4. BV_{DSS} Variation vs. Temperature

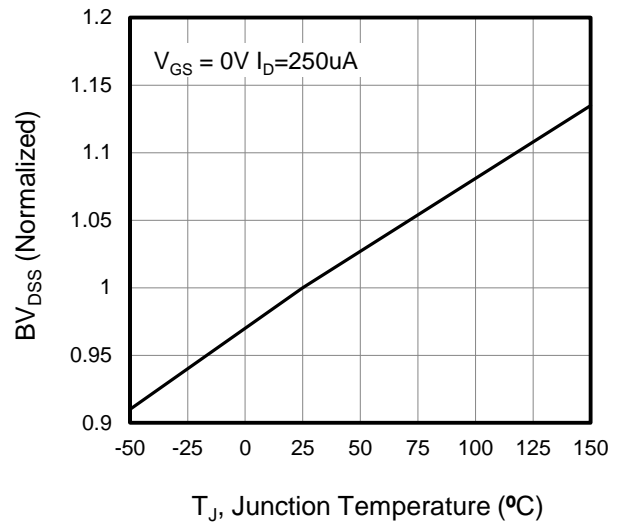


Figure 5. Transfer Characteristics

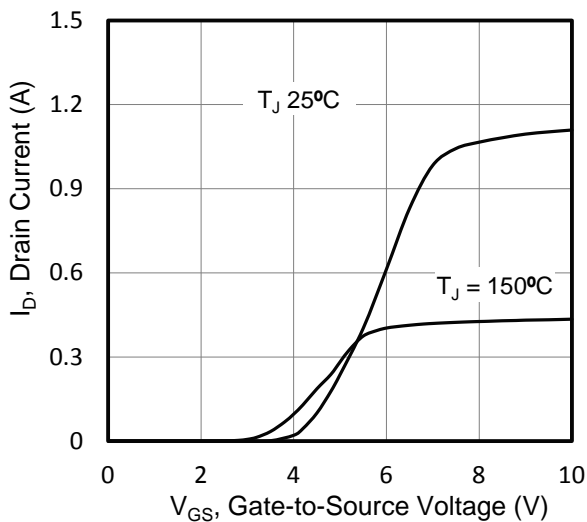
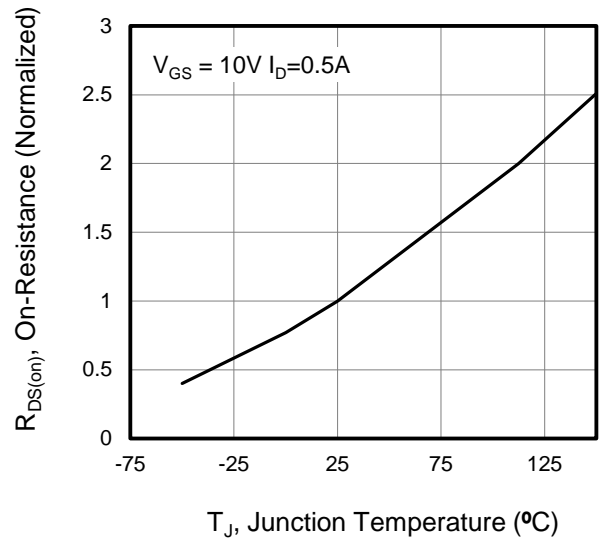


Figure 6. On-Resistance vs. Temperature





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

Figure 7. Capacitance

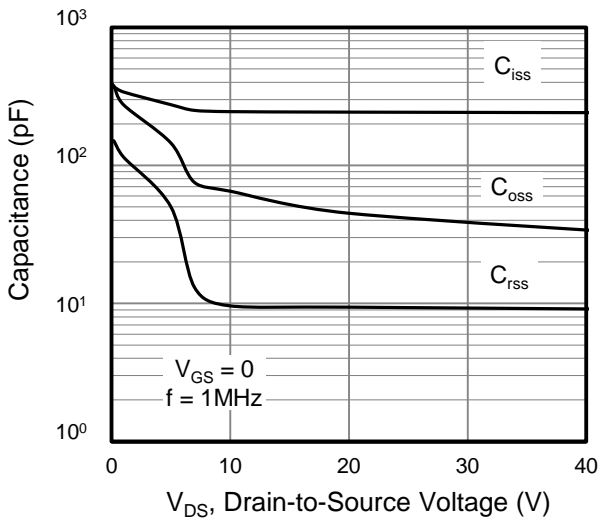


Figure 8. Gate Charge

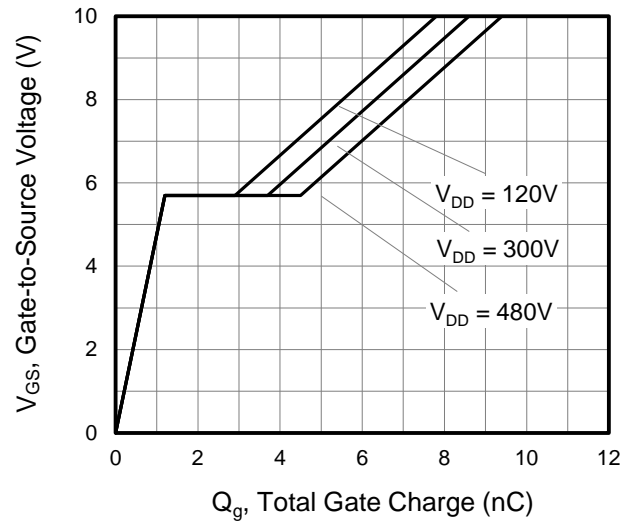


Figure 9. Body Diode Forward Voltage

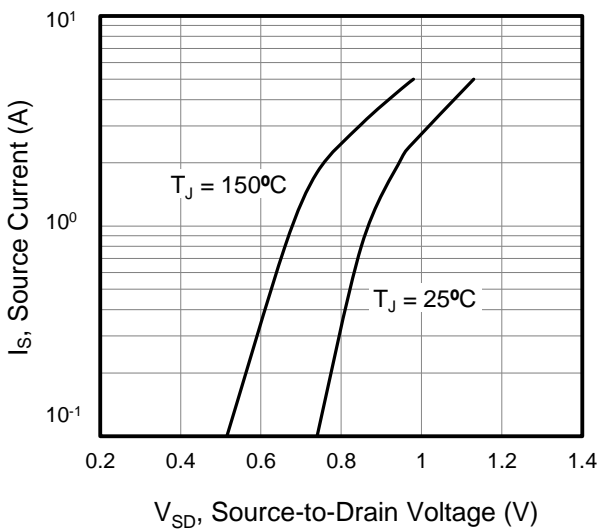


Figure 10. Transient Thermal Impedance SOT-223, TO-92

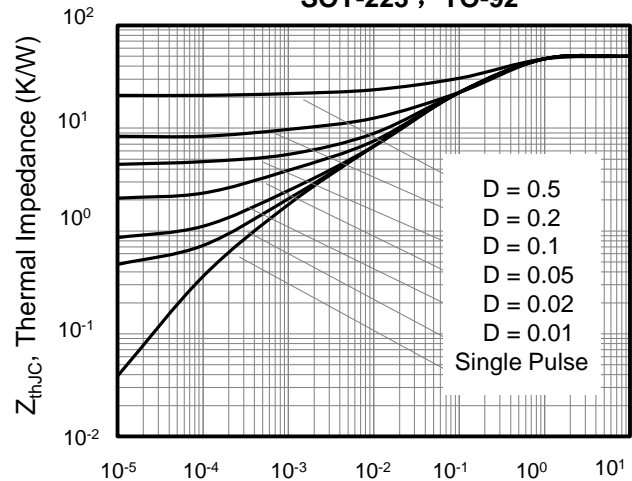


Figure 11. Transient Thermal Impedance TO-252, TO-251

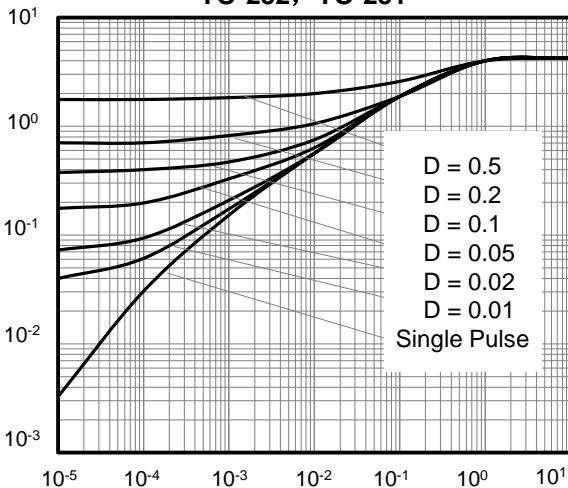




Figure A: Gate Charge Test Circuit and Waveform

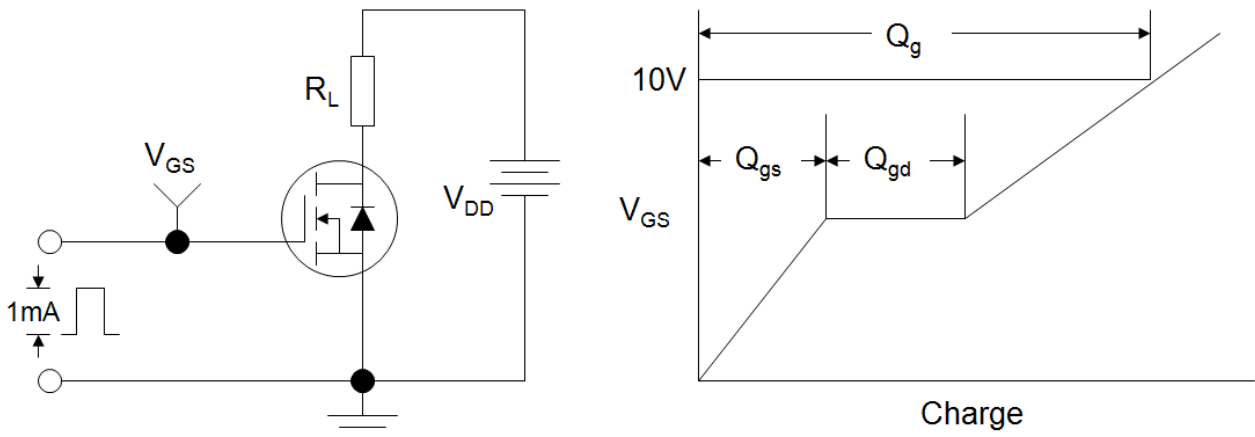
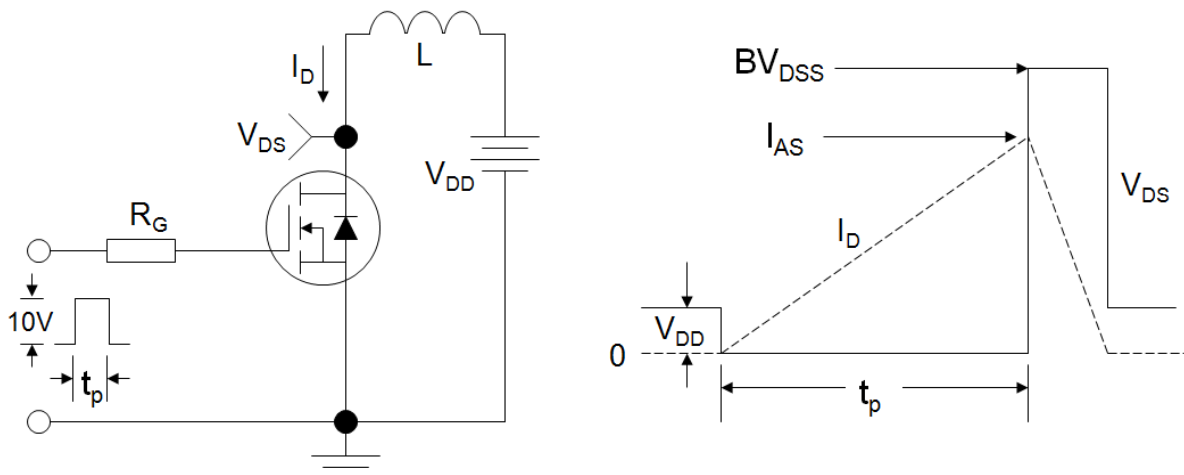


Figure B: Resistive Switching Test Circuit and Waveform

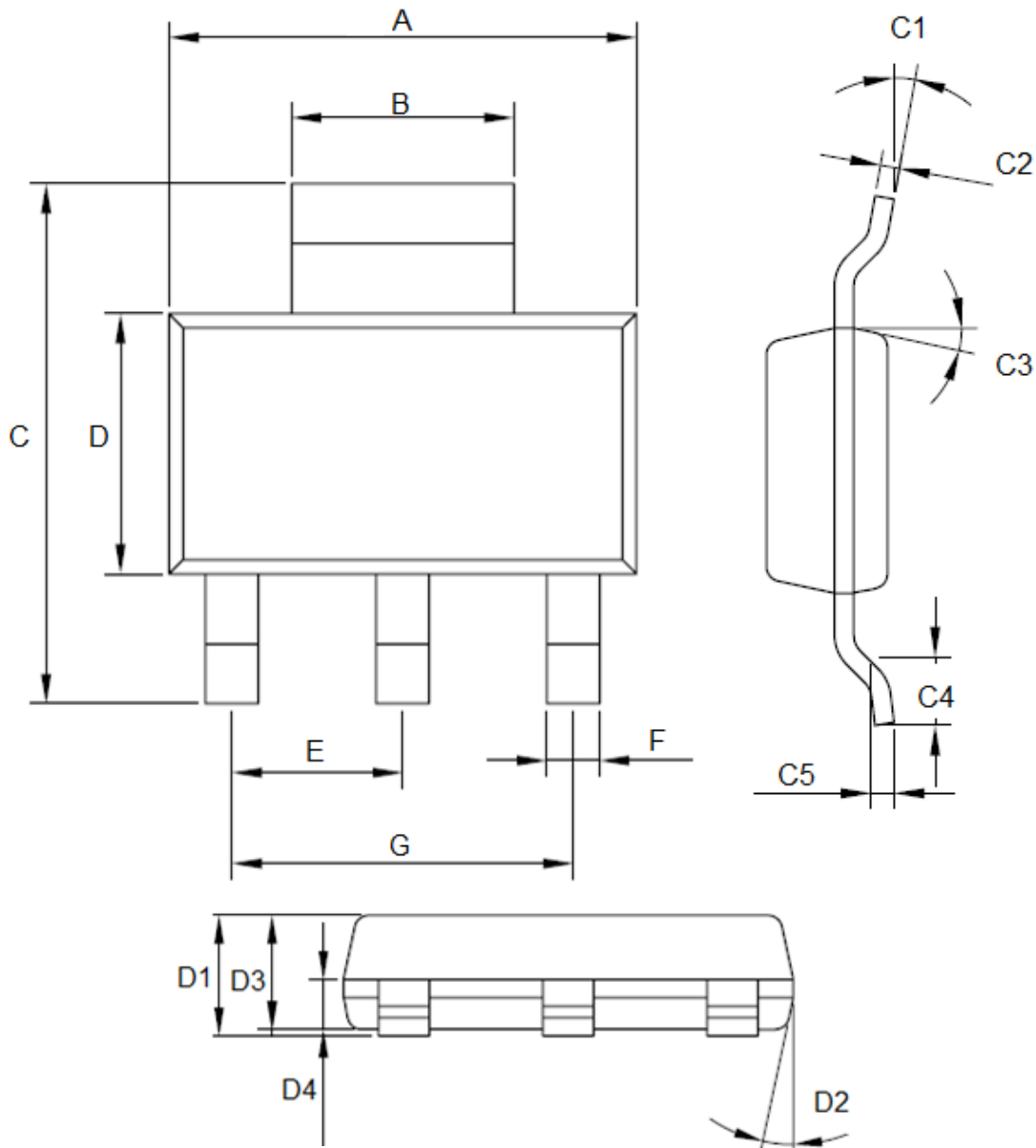


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





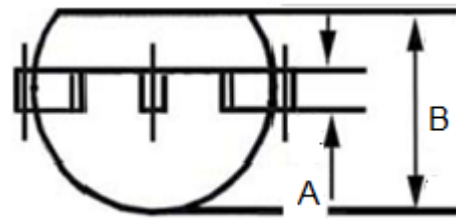
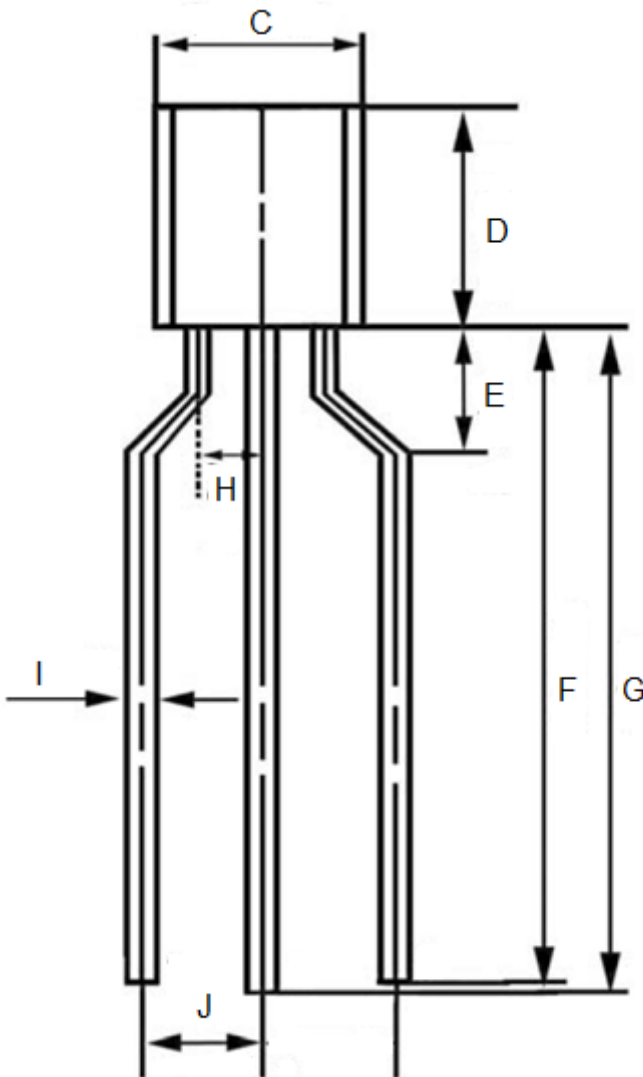
SOT-223



Unit:mm			Unit:mm		
Symbol	Min.	Max.	Symbol	Min.	Max.
A	6.20	6.40	C2	0.24	0.32
B	2.90	3.10	C3	11.80°	12.2°
C	6.70	7.30	C4	0.90	
D	3.30	3.70	C5	0.30	
E	2.30		D1	1.50	1.80
F	0.60	0.80	D2	11.80°	12.20°
G	4.60		D3	1.60	
C1	0°	10°	D4	0.60	0.80



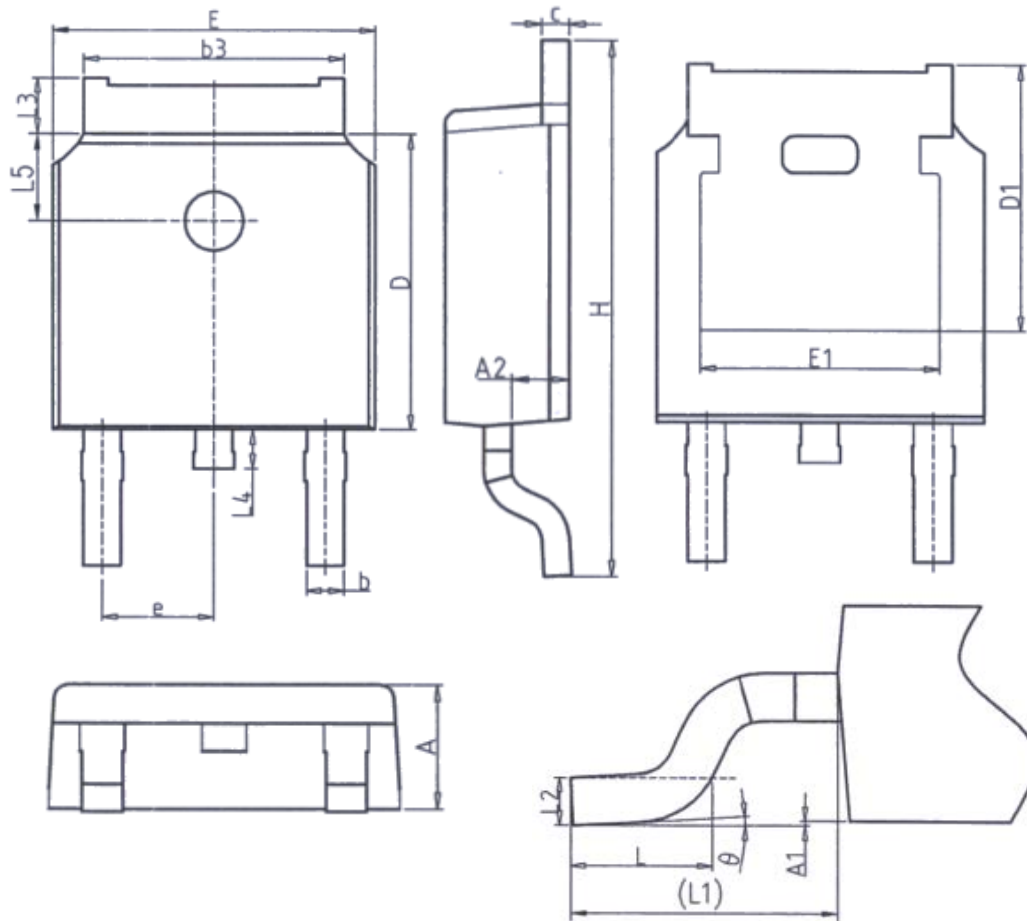
TO-92



Unit:mm		
Symbol	Min.	Max.
A	0.32	0.48
B	3.40	3.80
C	4.40	4.80
D	4.30	4.70
E	2.80	3.00
F	13.40	13.60
G	15.00	16.00
H	1.27	
I	0.40	0.50
J	2.40	2.80



TO-252

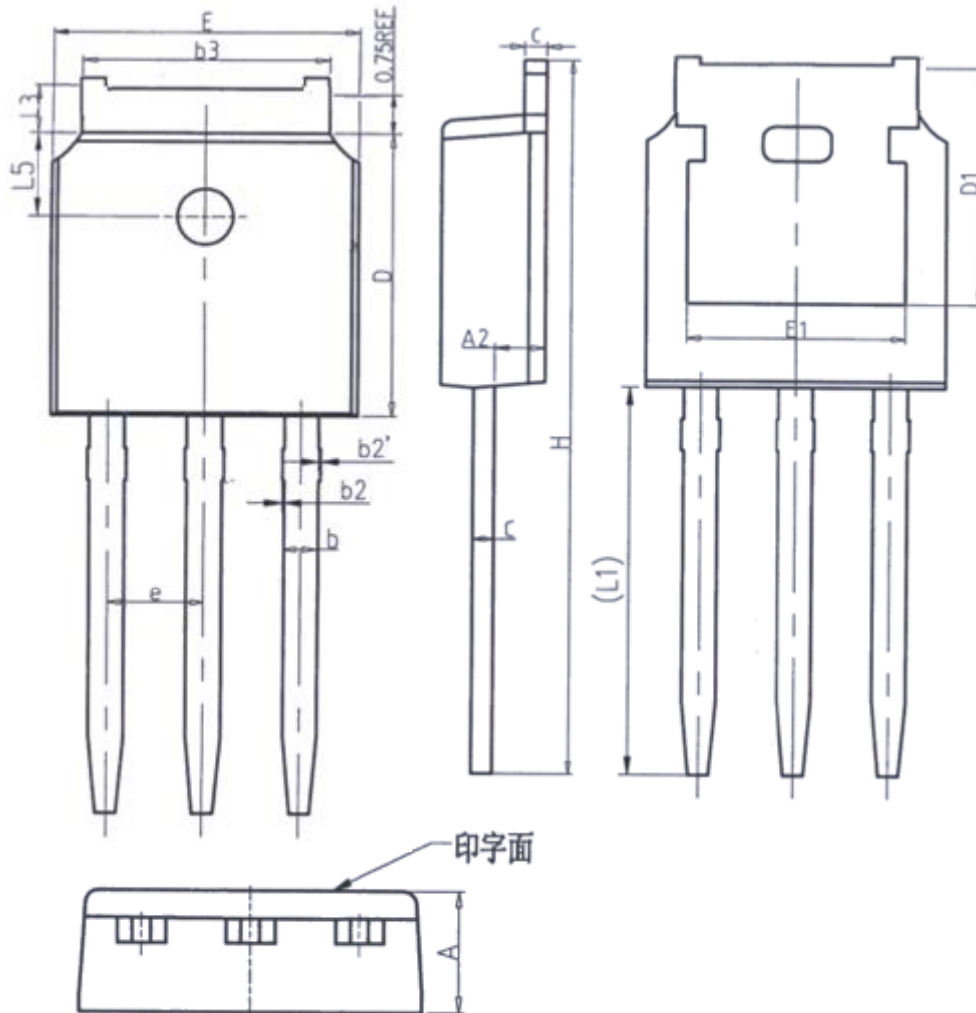


Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A1	0.00	0.20
A2	0.97	1.17
b	0.68	0.90
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22
D1	5.30REF	
E	6.40	6.80
E1	4.63	-

Unit: mm		
Symbol	Min.	Max.
e	2.286BSC	
H	9.40	10.50
L	1.38	1.75
L1	2.90REF	
L2	0.51BSC	
L3	0.88	1.28
L4	-	1.00
L5	1.65	1.95
θ	0°	8°



TO-251



Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A2	0.97	1.17
b	0.68	0.90
b2	0.00	0.10
b2'	0.00	0.10
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22

Unit: mm		
Symbol	Min.	Max.
D1	5.30REF	
E	6.40	6.80
E1	4.63	-
e	2.286BSC	
H	16.22	16.82
L1	9.15	9.65
L3	0.88	1.28
L5	1.65	1.95



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