

N-Channel Super Junction Power MOSFET III

General Description

The series of devices use advanced trench gate super junction technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications.

V_{DS}	700	V
$R_{DS(ON)TYP.}$	1500	m Ω
I_D	3	A

Features

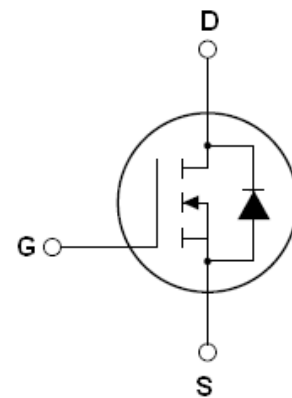
- New technology for high voltage device
- Low on-resistance and low conduction losses
- Small package
- Ultra Low Gate Charge cause lower driving requirements
- 100% Avalanche Tested
- ROHS compliant

Application

- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)
- Halogen-free

Package Marking And Ordering Information

Device	Device Package	Marking
RM3N700S4	SOT-223-2L	3N700



Schematic diagram



SOT-223-2L

Absolute Maximum Ratings T_C 25°C, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V_{GS} 0V)	V_{DSS}	700	V
Continuous Drain Current	I_D	3	A
		1.8	
Pulsed Drain Current (note1)	I_{DM}	9	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	26	mJ
Repetitive Avalanche Energy (note2)	E_{AR}	0.10	mJ

Avalanche Current	I_{AR}	0.6	A
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 480V$	dv/dt	50	V/ns
Power Dissipation	P_D	6.2	W
Continuous Body Diode Current	I_S	2.5	A
Pulsed Diode Forward Current (note1)	I_{SM}	33	
Reverse diode dv/dt (note3)	dv/dt	15	V/ns
Maximum diode commutation speed (note3)	di_f/dt	500	A/us
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	20	°C/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	160	

Specifications $T_J = 25^\circ C$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	700	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 700V, V_{GS} = 0V, T_J = 25^{\circ}C$	--	--	1	μA
		$V_{DS} = 700V, V_{GS} = 0V, T_J = 150^{\circ}C$	--	--	100	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 1	μA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5	--	4.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 1.5A$	--	1.3	1.5	Ω
Gate resistance	R_G	f = 1.0MHz open drain	--	5.5	--	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 100V,$ f = 1.0MHz	--	225	--	pF
Output Capacitance	C_{oss}		--	10	--	
Reverse Transfer Capacitance	C_{rss}		--	0.4	--	
Total Gate Charge	Q_g	$V_{DD} = 560V, I_D = 3A,$ $V_{GS} = 10V$	--	7	--	nC
Gate-Source Charge	Q_{gs}		--	1.3	--	
Gate-Drain Charge	Q_{gd}		--	3.5	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 3A,$ $R_G = 25\Omega$	--	8.5	--	ns
Turn-on Rise Time	t_r		--	7.7	--	
Turn-off Delay Time	$t_{d(off)}$		--	19.0	--	
Turn-off Fall Time	t_f		--	16.5	--	

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Drain-Source Body Diode Characteristics						
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 1.5A, V _{GS} = 0V	--	0.9	1.2	V
Reverse Recovery Time	t _{rr}	V _R = 400V, I _F = 3A, di _F /dt = 100A/μs	--	155	--	ns
Reverse Recovery Charge	Q _{rr}		--	0.85	--	μC
Peak Reverse Recovery Current	I _{rrm}		--	11	--	A

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 0.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$
3. Identical low side and high side switch with identical R_G

RATING AND CHARACTERISTICS CURVES (RM3N700S4)

Figure 1. Output Characteristics

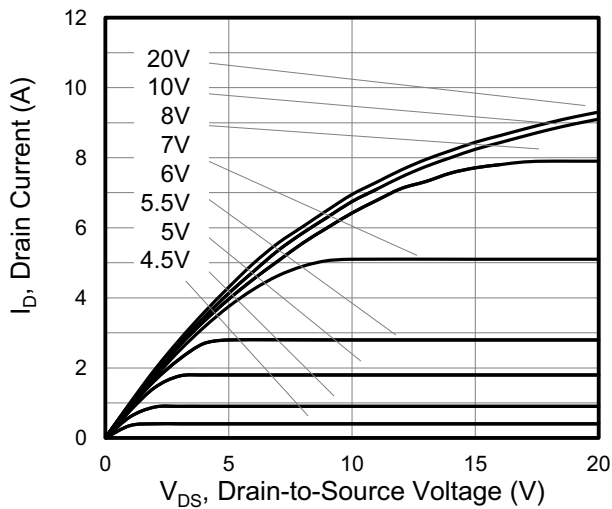


Figure 2. Transfer Characteristics

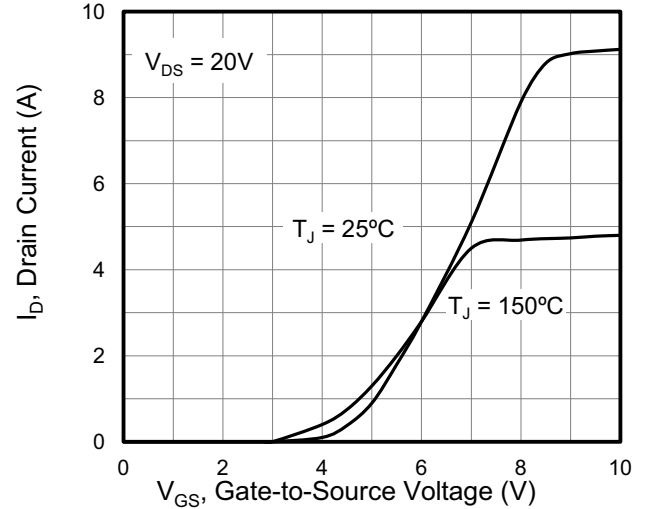


Figure 3. On-Resistance vs. Drain Current

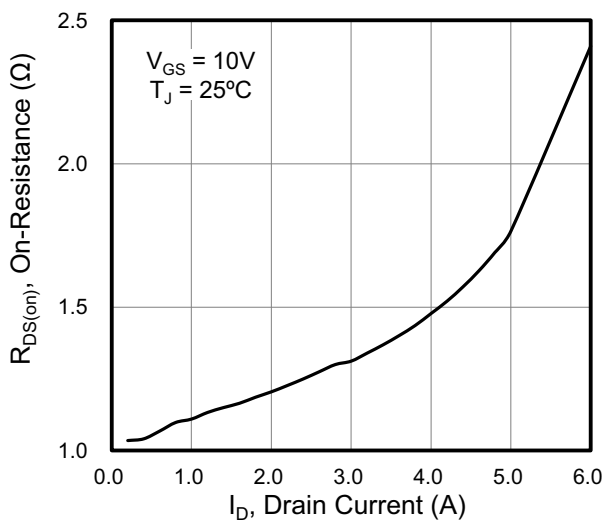


Figure 4. Capacitance

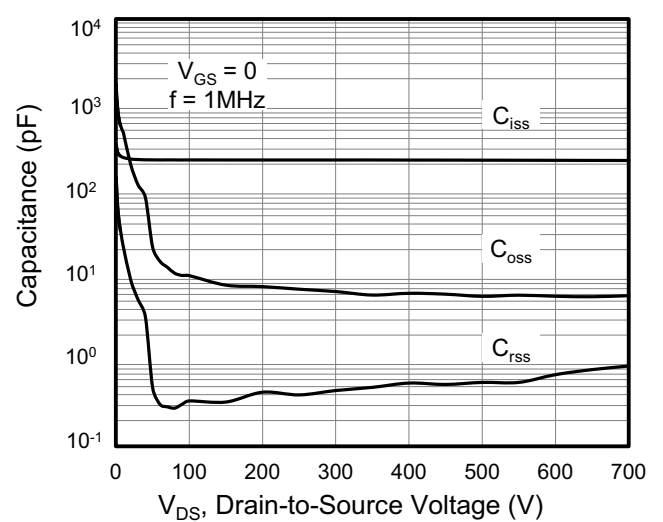


Figure 5. Gate Charge

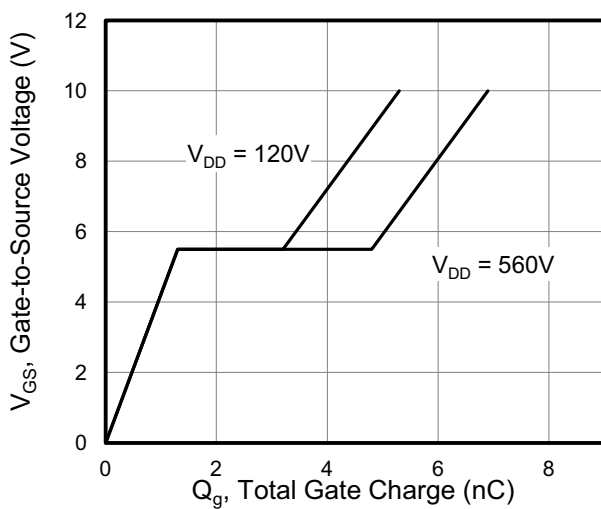
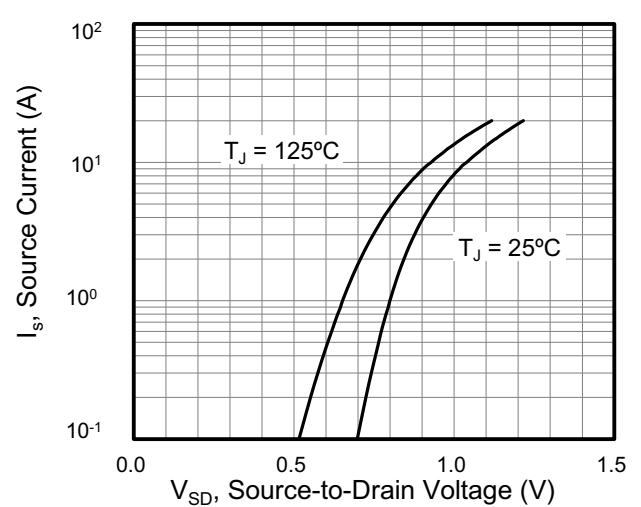


Figure 6. Body Diode Forward Voltage



RATING AND CHARACTERISTICS CURVES (RM3N700S4)

Figure 7. On-Resistance vs. Junction Temperature

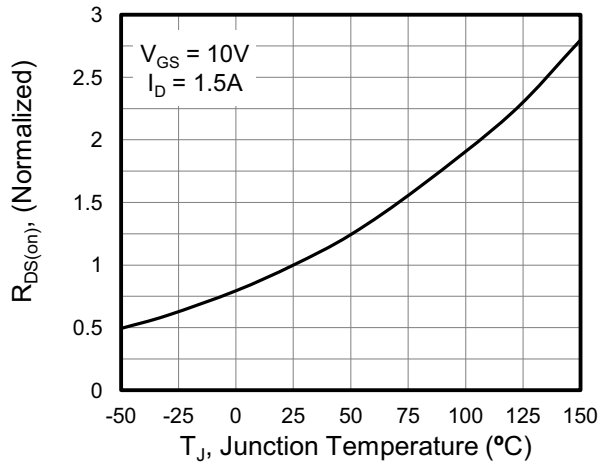


Figure 8. Breakdown voltage vs. Junction Temperature

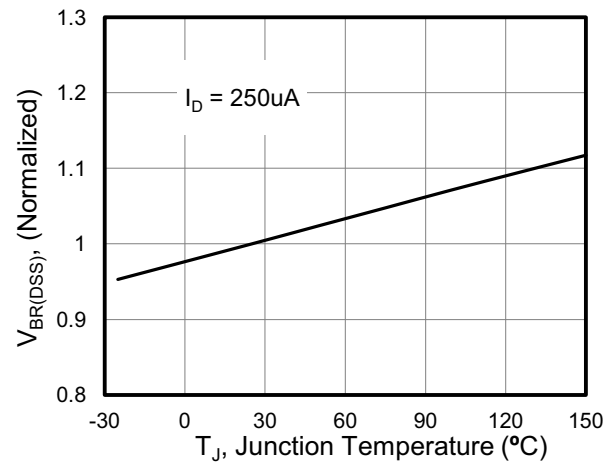


Figure 9. Transient Thermal Impedance for SOT-223-2L

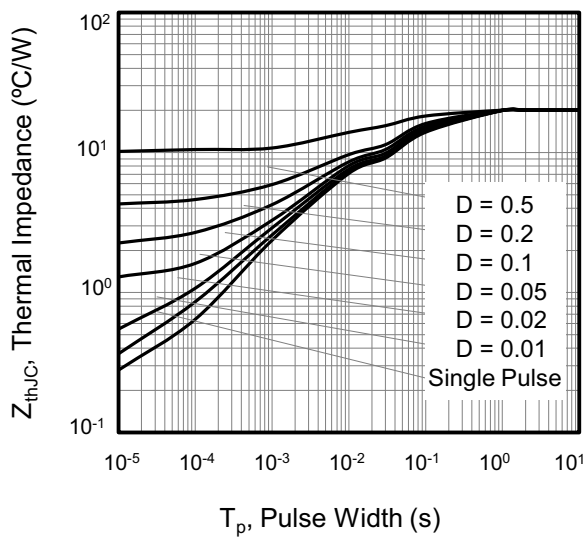
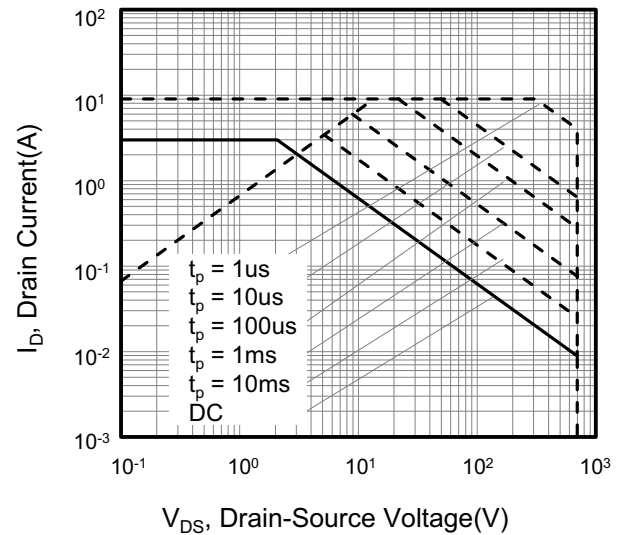


Figure 10. Safe operation area for SOT-223-2L



Test circuit

Figure A: Gate Charge Test Circuit and Waveform

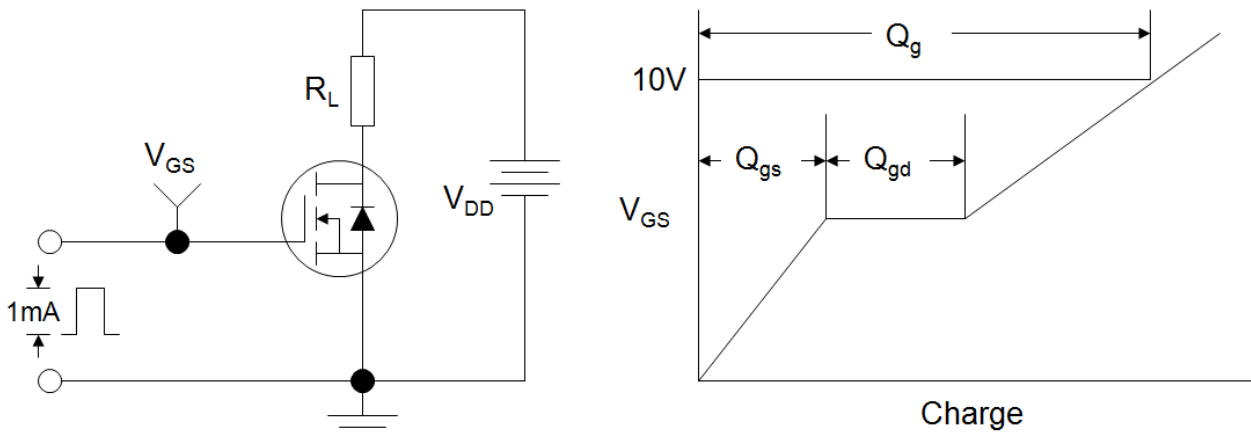


Figure B: Resistive Switching Test Circuit and Waveform

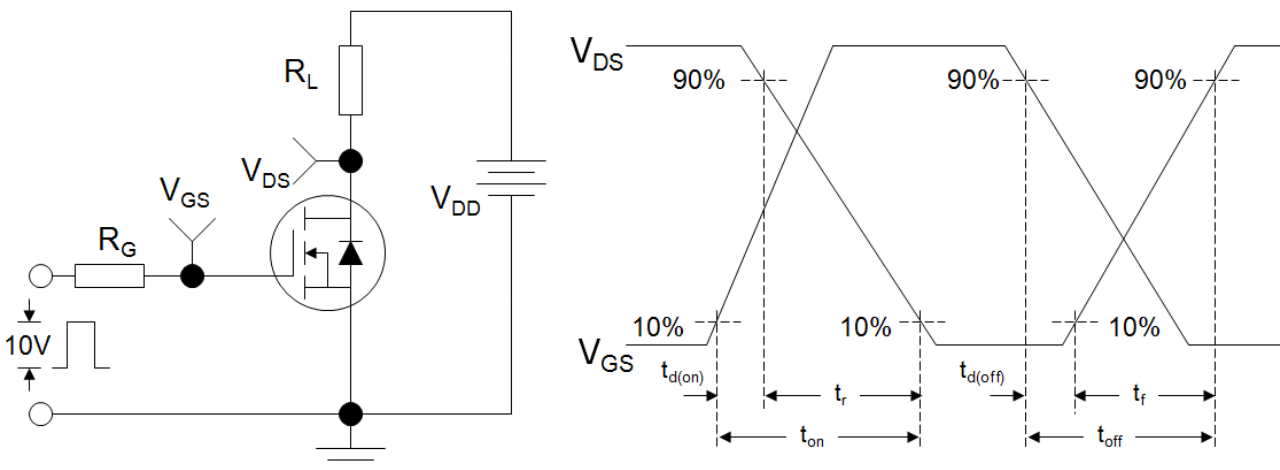
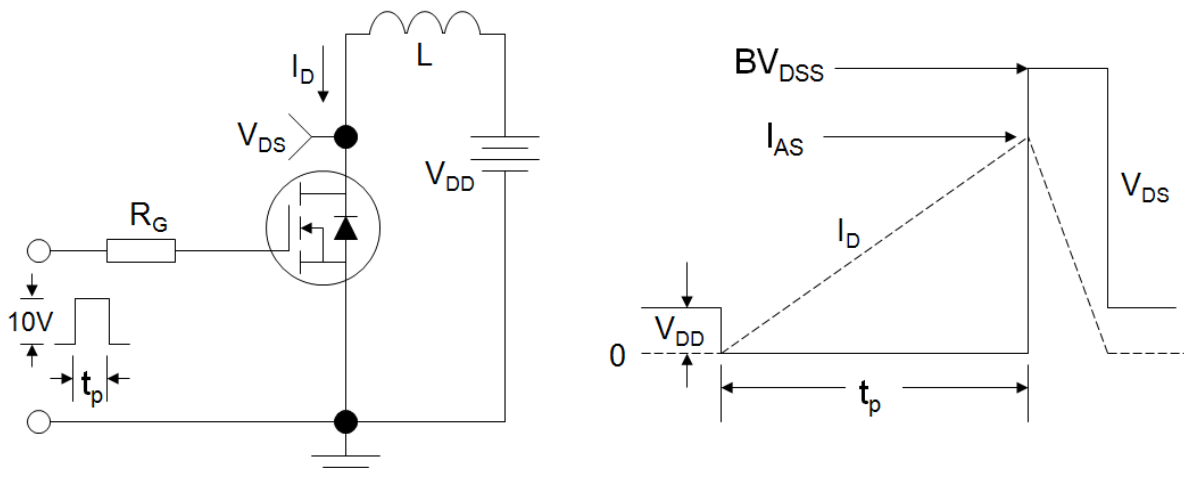
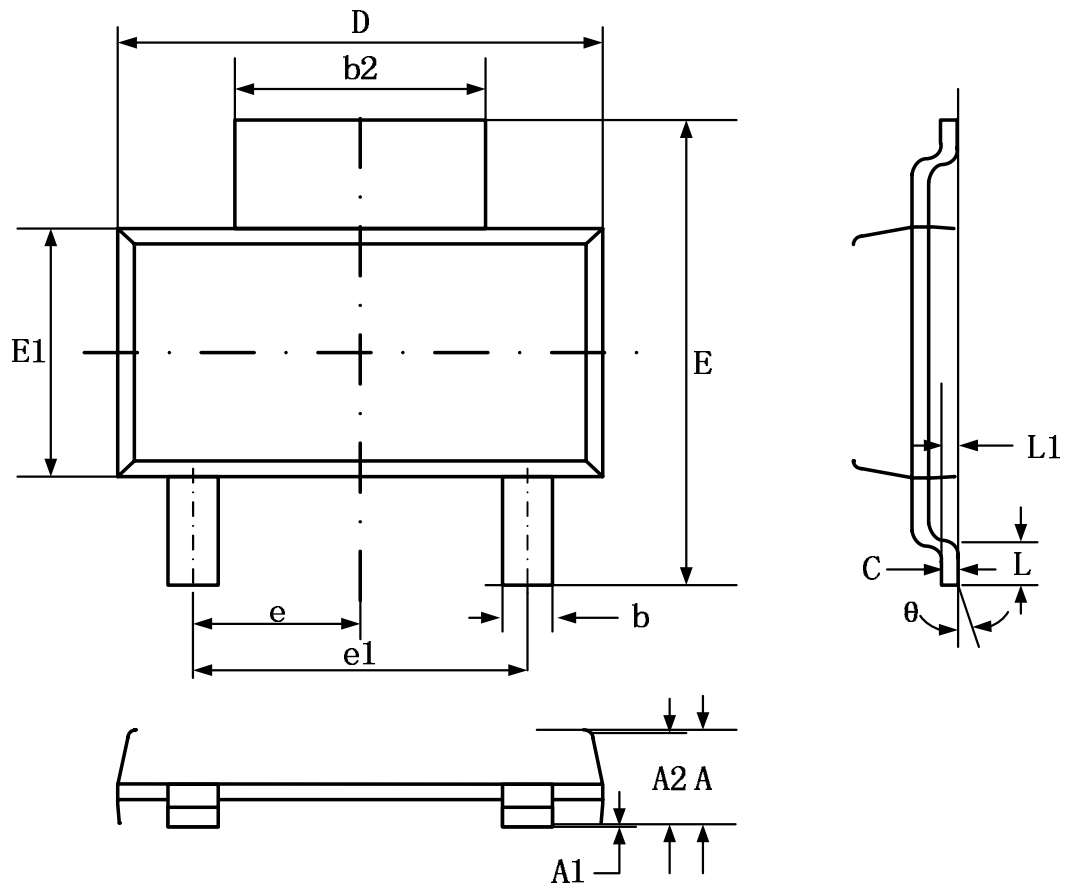


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



SOT-223-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	—	1.80	—	0.071
A1	0.02	0.10	0.001	0.004
A2	1.50	1.70	0.059	0.067
b	0.66	0.84	0.026	0.033
b2	2.90	3.10	0.114	0.122
c	0.23	0.35	0.009	0.014
D	6.30	6.70	0.248	0.264
E	6.70	7.30	0.264	0.287
E1	3.30	3.70	0.130	0.146
e	2.30 BSC.		0.091 BSC.	
e1	4.60 BSC.		0.182 BSC.	
L	0.81	—	0.032	—
L1	0.25 BSC.		0.032 BSC.	
θ	0°	10°	0°	10°

DISCLAIMER NOTICE

Rectron Inc reserves the right to make changes without notice to any product specification herein, to make corrections, modifications, enhancements or other changes. Rectron Inc or anyone on its behalf assumes no responsibility or liability for any errors or inaccuracies. Data sheet specifications and its information contained are intended to provide a product description only. "Typical" parameters which may be included on RECTRON data sheets and/ or specifications can and do vary in different applications and actual performance may vary over time. Rectron Inc does not assume any liability arising out of the application or use of any product or circuit.

Rectron products are not designed, intended or authorized for use in medical, life-saving implant or other applications intended for life-sustaining or other related applications where a failure or malfunction of component or circuitry may directly or indirectly cause injury or threaten a life without expressed written approval of Rectron Inc. Customers using or selling Rectron components for use in such applications do so at their own risk and shall agree to fully indemnify Rectron Inc and its subsidiaries harmless against all claims, damages and expenditures.