

General Description:

3N06, the silicon N-channel Enhanced VDMOSFETs, is obtained by the high density Trench technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. This device is suitable for use as a battery protect or in other applications. The package form is SOT-23, which accords with the RoHS standard.

Features:

- | **Fast Switching**
- | **Low ON Resistance**($R_{ds(on)} \leq 105m\Omega$)
- | **Low Gate Charge**
- | **Low Reverse transfer capacitances**
- | **100% Single Pulse avalanche energy Test**
- | **Halogen Free**

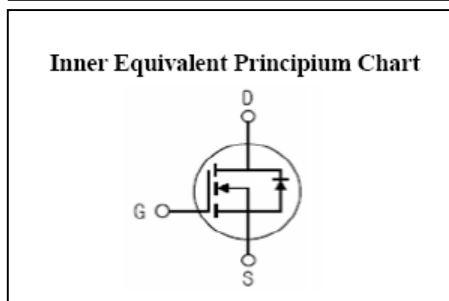
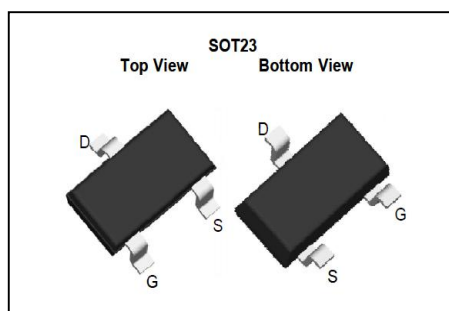
Applications:

LED、electric tools

Absolute ($T_A = 25^\circ C$ unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	60	V
I_D	Continuous Drain Current	3	A
	Continuous Drain Current $T_A = 100^\circ C$	1.8	A
I_{DM}^{a1}	Pulsed Drain Current	12	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	11	mJ
P_D	Power Dissipation	1.1	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ C$

V_{DSS}	60	V
I_D	3	A
$R_{DS(ON)Typ}$	75	$m\Omega$



Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS} = 60V, V_{GS} = 0V,$ $T_J = 25^\circ\text{C}$	--	--	1	μA
		$V_{DS} = 48V, V_{GS} = 0V,$ $T_J = 125^\circ\text{C}$	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=20V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS} = -20V$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=3A$	--	75	105	$m\Omega$
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=2A$	--	98	125	$m\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.8	--	2.0	V
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{FS}	Forward transconductance	$V_{DS}=15V, I_D=2A$	--	4.7	--	S
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	--	2.9	--	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 30V$ $f = 1.0\text{MHz}$	--	282	--	pF
C_{oss}	Output Capacitance		--	24	--	
C_{rss}	Reverse Transfer Capacitance		--	17	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{GS}=10V, R_g=1\Omega$ $V_{DD}=30V, I_D=3A$	--	6.2	--	ns
t_r	Rise Time		--	3.1	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	18.5	--	
t_f	Fall Time		--	2.6	--	
$Q_g(V_{GS}=4.5V)$	Total Gate Charge	$V_{GS}=10V$ $V_{DD}=30V, I_D=3A$	--	4.3	--	nC
$Q_g(V_{GS}=10V)$	Total Gate Charge		--	7.8	--	
Q_{gs}	Gate to Source Charge		--	1.0	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	2.6	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	$T_A = 25\text{ }^\circ\text{C}$	--	--	3	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	12	A
V_{SD}	Diode Forward Voltage	$I_S = 3.0\text{A}, V_{GS} = 0\text{V}$	--	--	1.2	V
t_{rr}	Reverse Recovery Time	$di/dt = 100\text{A}/\mu\text{s}$	--	12.6	--	ns
Q_{rr}	Reverse Recovery Charge	$I_S = 3\text{A}$	--	8.3	--	nC
Pulse width $t_p \leq 300\mu\text{s}$, $\delta \leq 2\%$						

Symbol	Parameter	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient	105	$^\circ\text{C}/\text{W}$

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

^{a2}: $L = 1\text{mH}$, $V_{DD} = 30\text{V}$, $I_{as} = 4.7\text{A}$, Start $T_j = 25\text{ }^\circ\text{C}$

^{a3}: Recommend soldering temperature defined by IPC/JEDEC J-STD 020

Characteristics Curve:

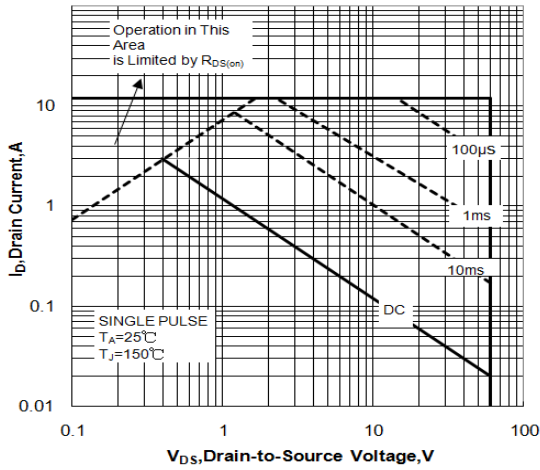


Figure 1. Maximum Safe Operating Area

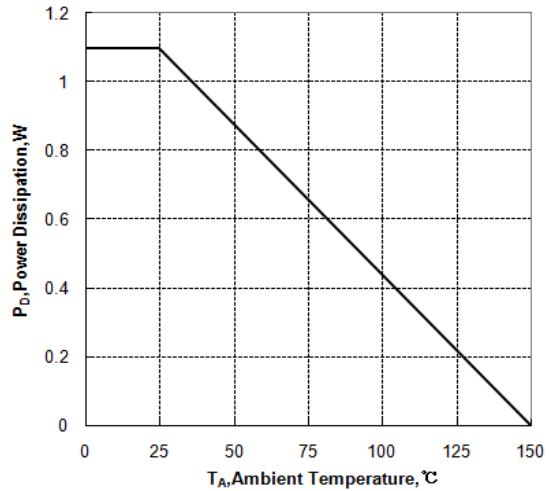


Figure 2. Maximum Power Dissipation vs Ambient Temperature

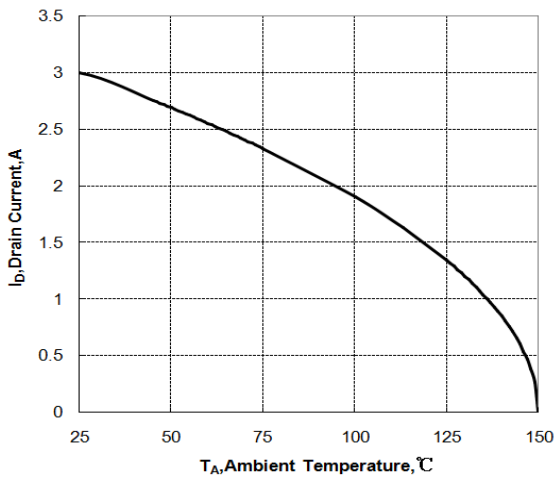


Figure 3. Maximum Continuous Drain Current vs Ambient Temperature

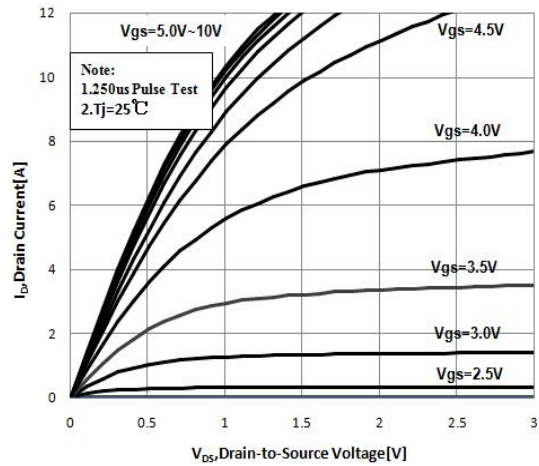


Figure 4. Typical output Characteristics

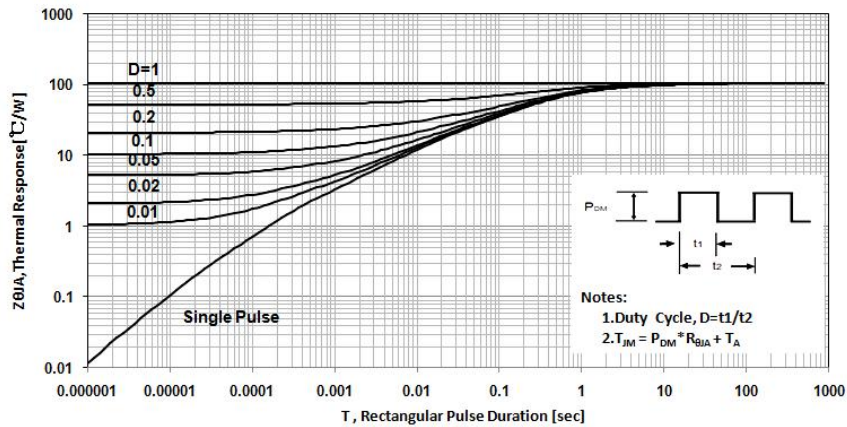


Figure 5 Maximum Effective Thermal Impedance, Junction to Ambient

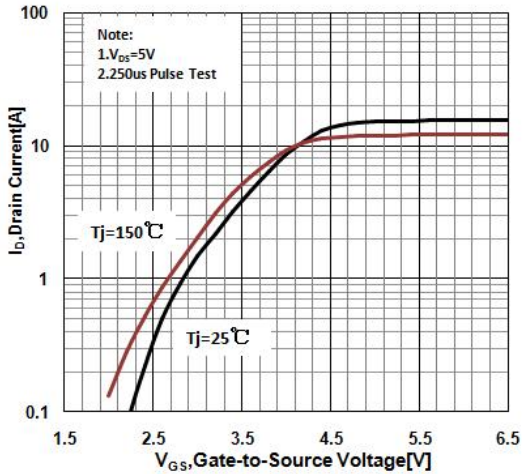


Figure 6 Typical Transfer Characteristics

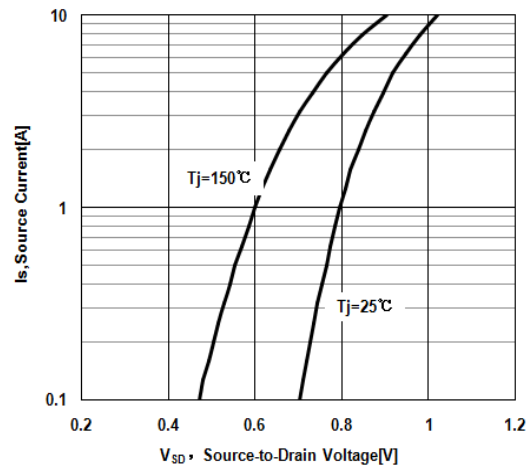


Figure 7 Typical Body Diode Transfer Characteristics

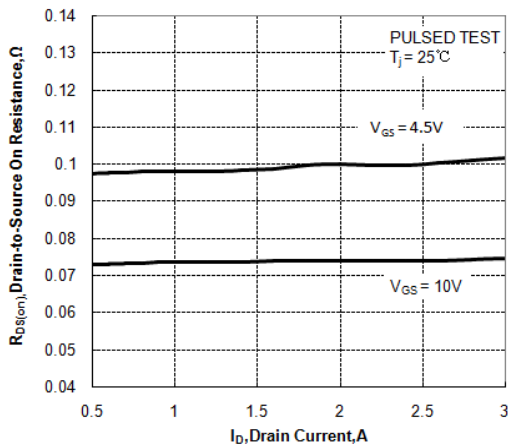


Figure 8. Drain-to-Source On Resistance vs Drain Current

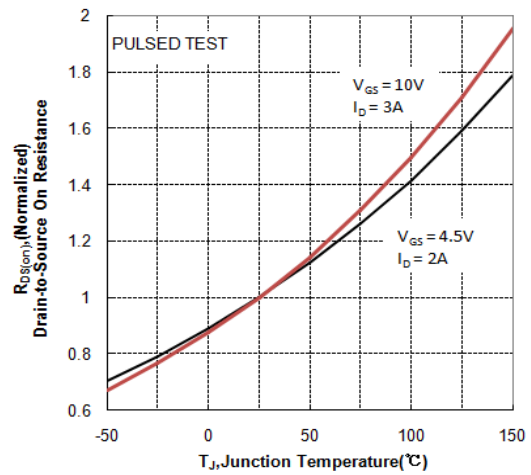


Figure 9. Normalized On Resistance vs Junction Temperature

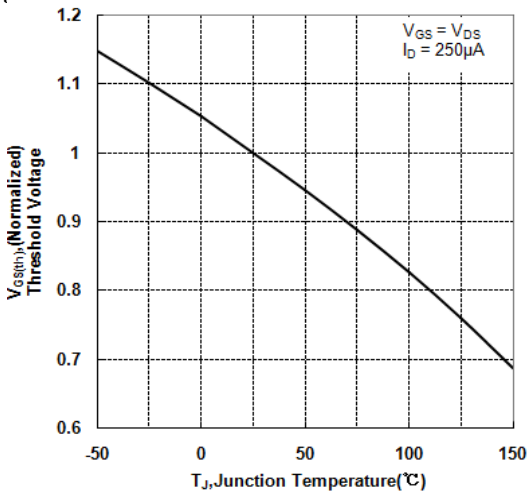


Figure 10. Normalized Threshold Voltage vs Junction Temperature

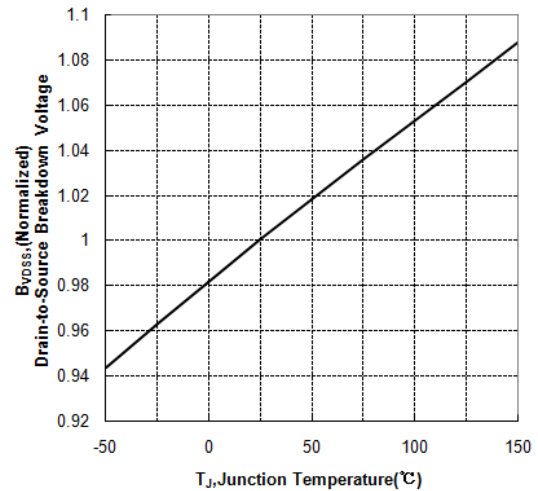


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

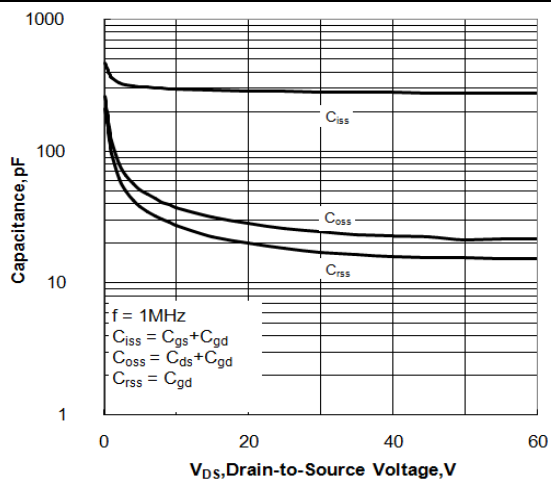


Figure 12. Capacitance Characteristics

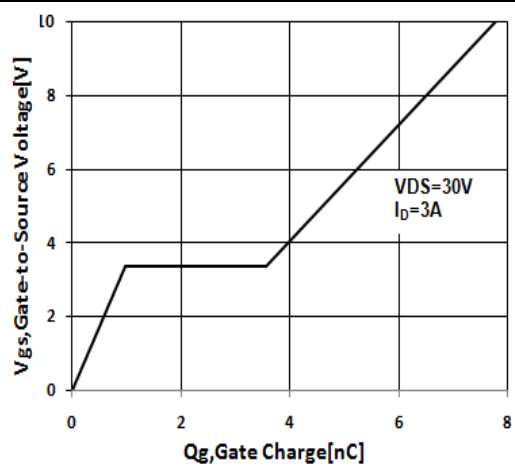


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform

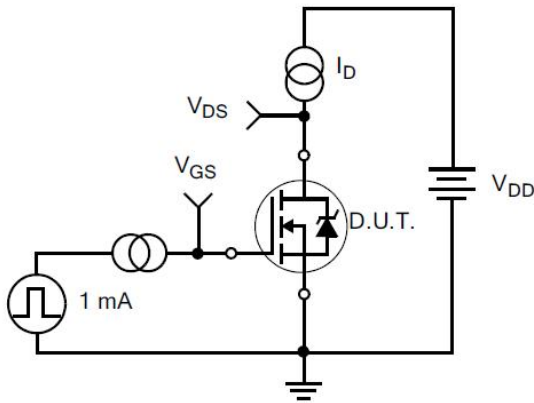


Figure 14. Gate Charge Test Circuit

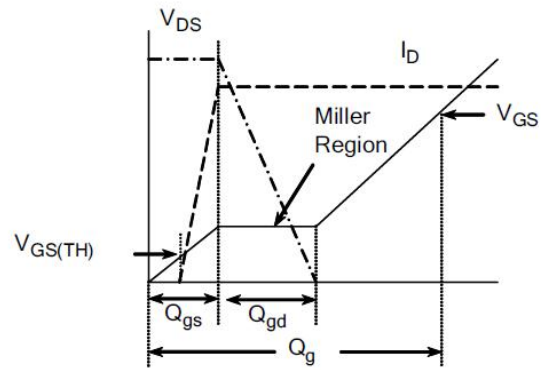


Figure 15. Gate Charge Waveforms

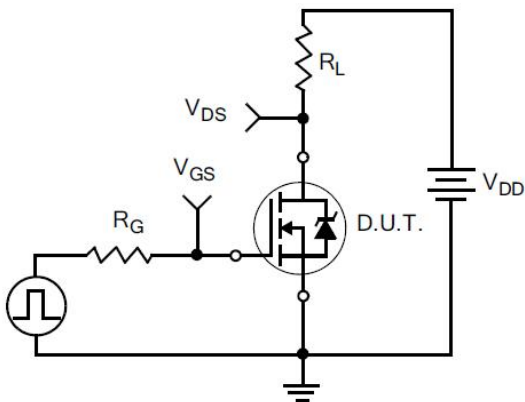


Figure 16. Resistive Switching Test Circuit

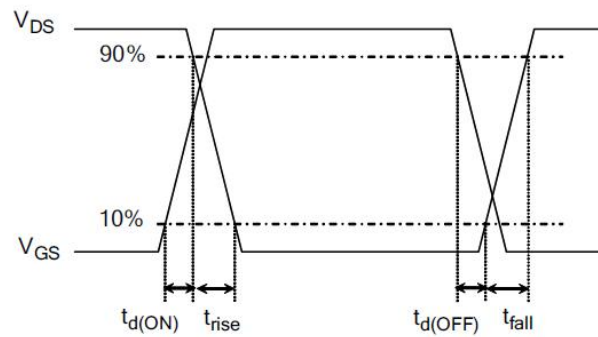


Figure 17. Resistive Switching Waveforms

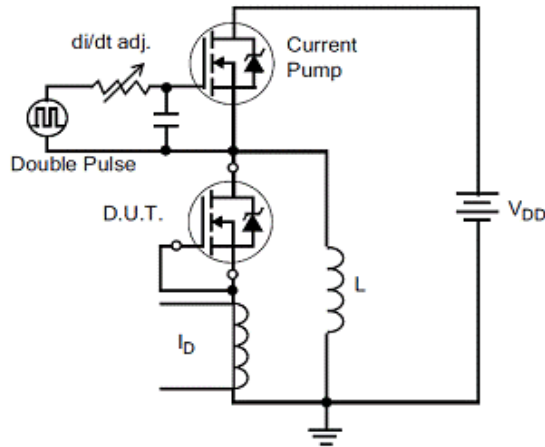


Figure 18. Diode Reverse Recovery Test Circuit

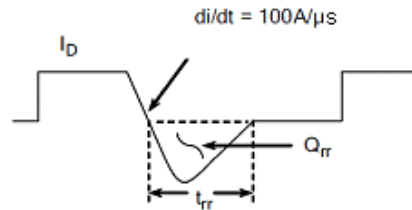


Figure 19. Diode Reverse Recovery Waveform

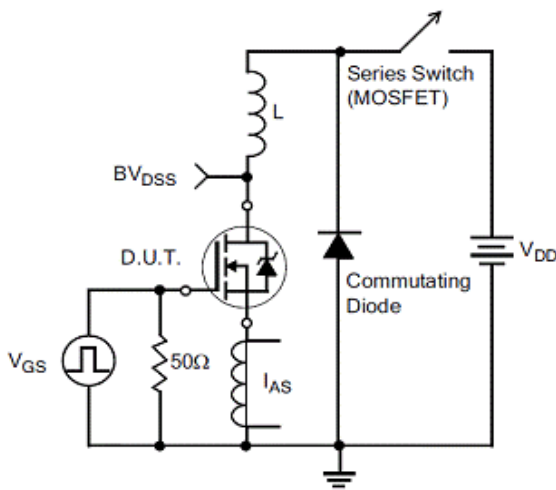


Figure 20. Unclamped Inductive Switching Test Circuit

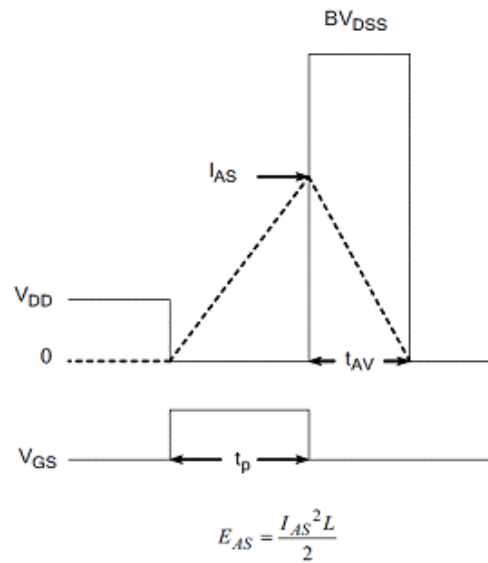
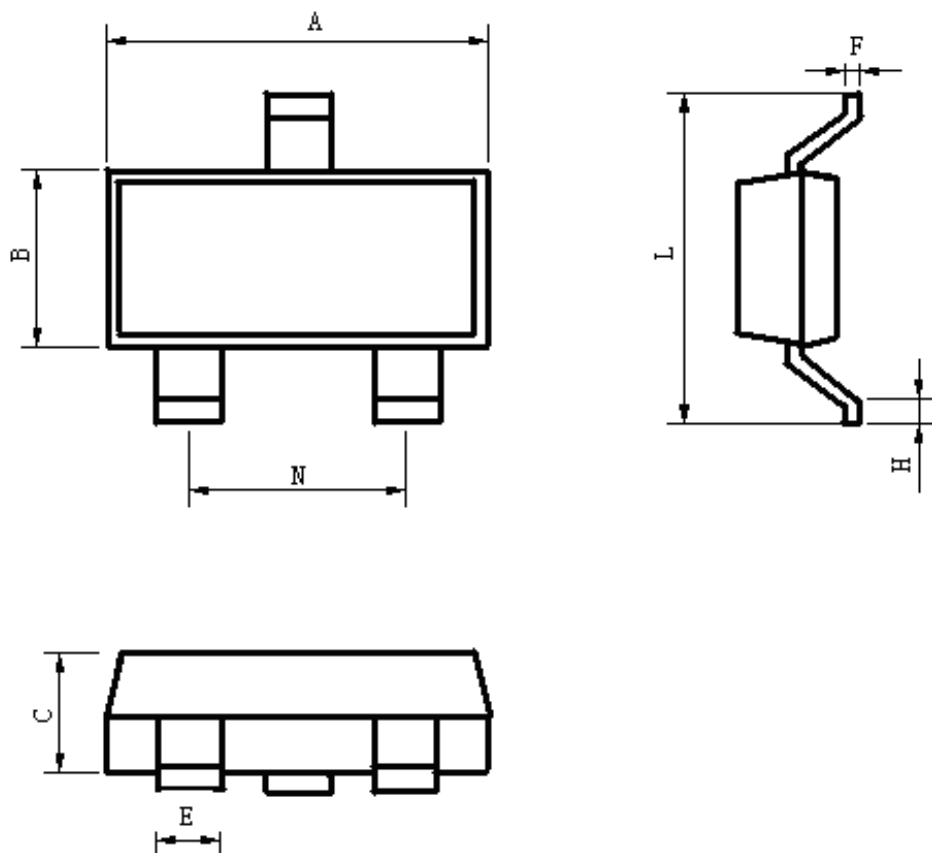


Figure 21. Unclamped Inductive Switching Waveform

Package Information



Items	Values(mm)	
	MIN	MAX
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
E	0.25	0.55
F	0.07	0.23
H	0.25	0.55
L	2.20	2.60
N	1.80	2.00

SOT-23 Package