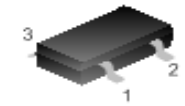
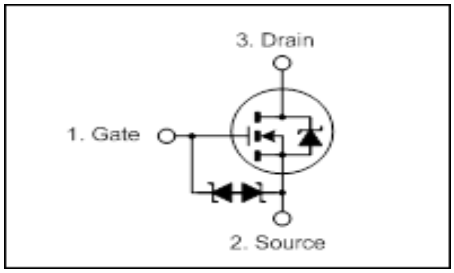
General Description:

CS1N15ASFD-G, the silicon N-channel Depletion-Mode VDMOSFETs, is obtained by advanced planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is SOT-23, which accords with the RoHS standard.

V_{DSX}	150	V
$I_{D\ min}$	0.2	A
$R_{DS(ON)Typ}$	4	Ω



SOT-23



Features:

- **ESD improved Capability**
- **Depletion-mode (Normally-on)**
- **Fast Switching**
- **Low On-Resistance**
- **Improved dv/dt capability**
- **Halogen free available**

Applications:

Power switch circuit of adaptor and charger.

Absolute（Ta= 25℃ unless otherwise specified）:

Symbol	Parameter	Rating	Units
V_{DSX}	Drain-to-Source Voltage	150	V
I_D	Continuous Drain Current	0.2	A
I_{DM}[1]	Pulsed Drain Current	0.8	A
V_{GS}	Gate-to-Source Voltage	±20	V
P_D	Power Dissipation	1.2	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, –55 to 150	℃

Electrical Characteristics（Ta= 25℃ unless otherwise specified）:

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Unit
			Min.	Typ.	Max.	s
BV_{DSX}	Drain to Source Breakdown Voltage	V_{GS}=-15V,I_D=250μA	150	--	--	V
$I_{D(OFF)}$	Drain-to-Source cutoff current	V_{DS} =150V, V_{GS}= -15V, T_a = 25℃	--	--	1	μA
		V_{DS} =150V, V_{GS}= -15V T_a = 125℃			1	mA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+20V	--	--	10	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-20V	--	--	-10	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{DSS}	Saturated Drain-to-Source Current	V_{GS}=0V, V_{DS} =25V	200			mA
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=0V,I_D=200mA	--	4	10	Ω
$V_{GS(OFF)}$	Gate-to-Source Cut-off Voltage	V_{DS} =3V, I_D =8μA	-7	-6.2	-5	V
Pulse width tp≤300μs, δ ≤2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS} =-10V V_{DS} = 25V f = 1.0MHz	--	15	--	pF
C_{oss}	Output Capacitance		--	6.1	--	
C_{rss}	Reverse Transfer Capacitance		--	3.6	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D =0.2A V_{DD} =75V R_G =20Ω V_{GS} =-10V~0V	--	10.1	--	ns
tr	Rise Time		--	20.2	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	9.2	--	
t_f	Fall Time		--	28.8	--	
Q_g	Total Gate Charge	I_D =1A V_{DS} =75V V_{GS} =-10V~0V	--	1.93		nC
Q_{gs}	Gate to Source Charge		--	0.91		
Q_{gd}	Gate to Drain (“Miller”)Charge		--	0.64		

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	0.2	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	0.8	A
V_{SD}	Diode Forward Voltage	I_S=0.2A,V_{GS}=-10V	--	0.83	1.2	V
Pulse width tp≤300μs, δ ≤2%						

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	105	℃/W

[1] Repetitive rating, pulse width limited by maximum junction temperature

[2] Tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

[3] Recommend soldering temperature defined by IPC/JEDEC J-STD 020

Typical Electrical and Thermal Characteristics (Curves)

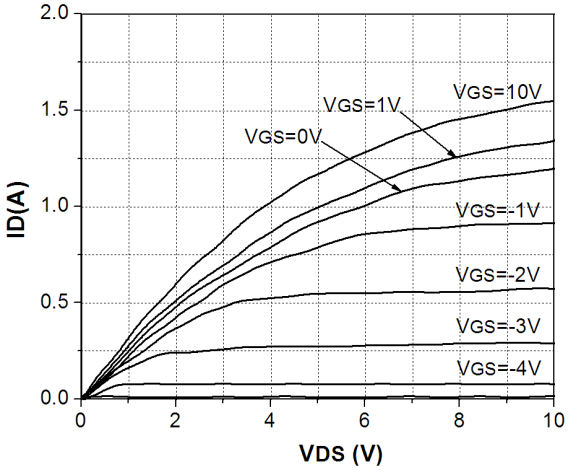


Figure 1. Output Characteristics

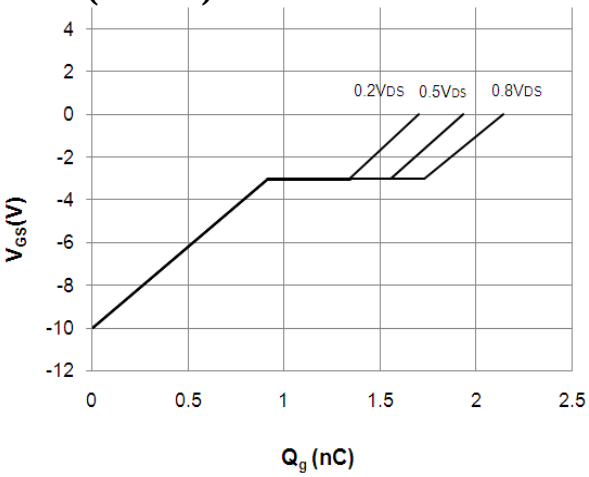


Figure 2. Gate Charge

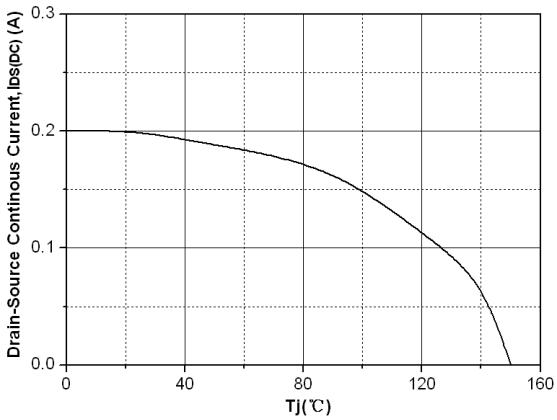


Figure 3. Continuous Drain Current Derating vs. Junction Temperature

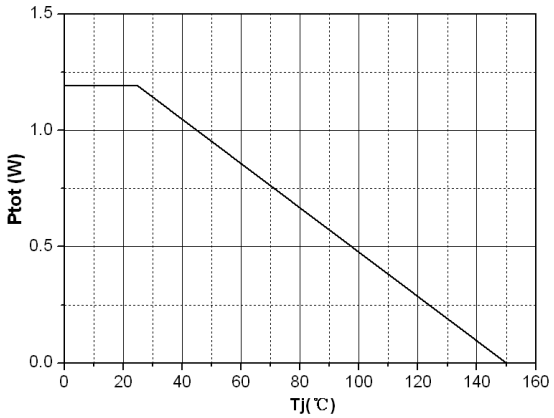


Figure 4. Power Dissipation Derating vs. Junction Temperature

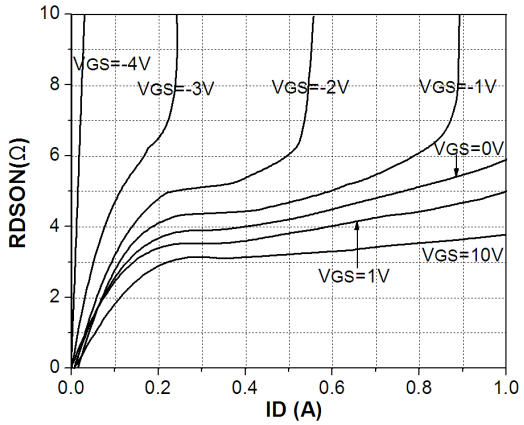


Figure 5. Typ.Drain Source on Resistance Tj = 25 ºC

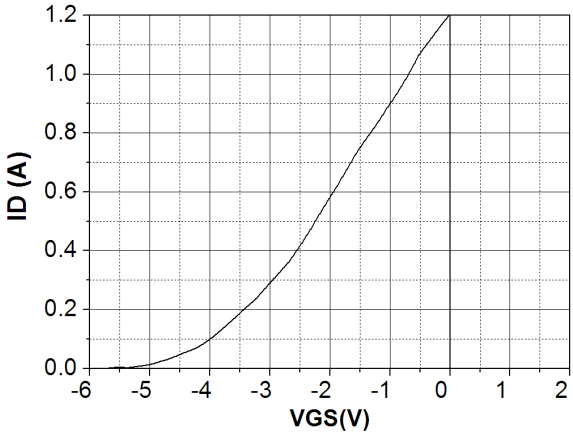


Figure 6. Typ. Transfer Characteristics

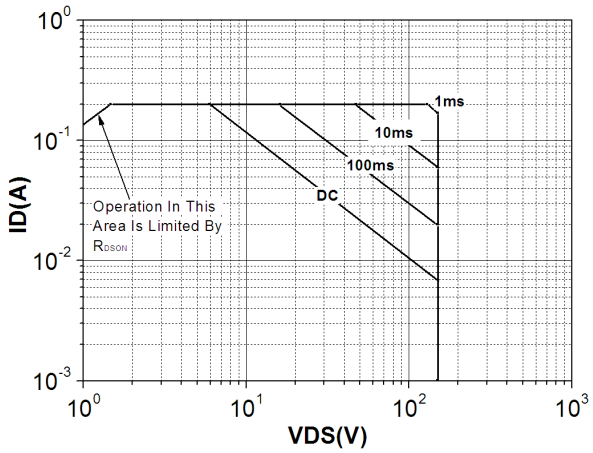


Figure 7. Safe Operation Area

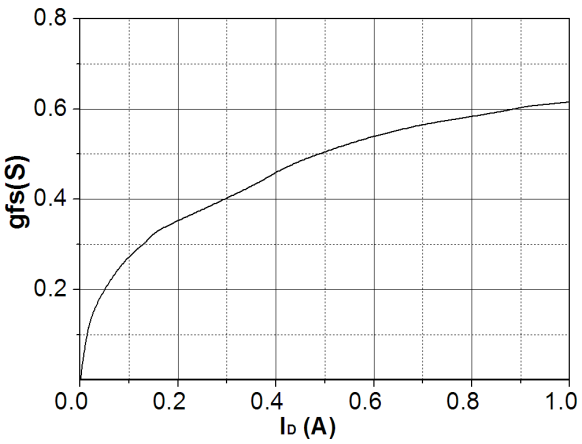


Figure 8. Typ. Forward Trans conductance

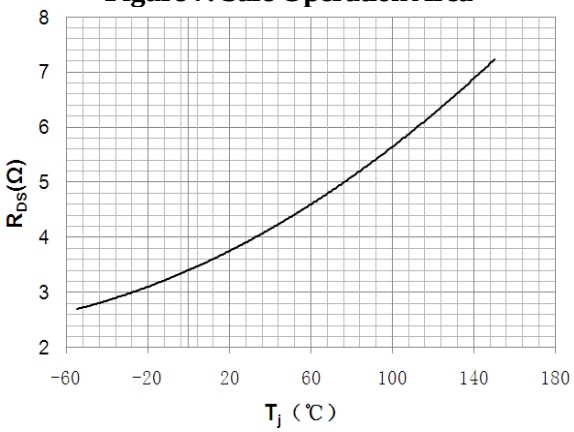


Figure 9. Drain Source on state Resistance

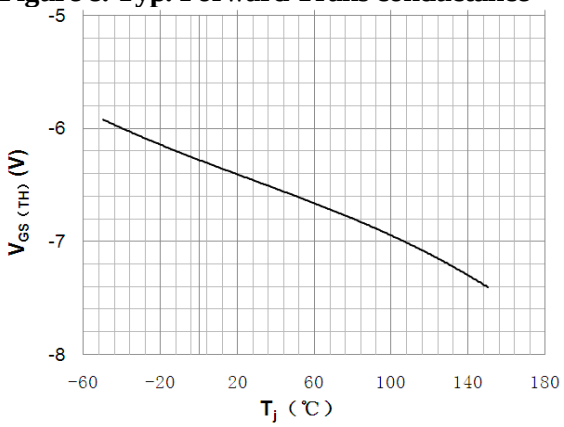


Figure 10 .Typ. Gate Threshold Voltage

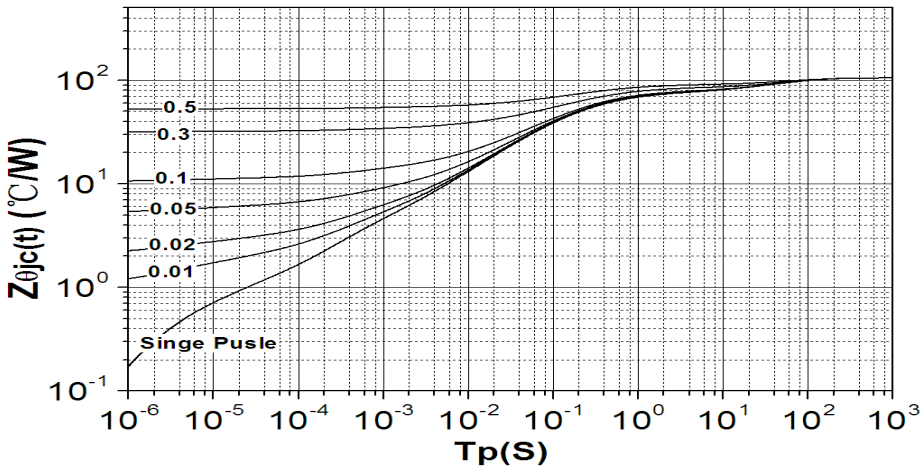


Figure 11. Transient Thermal Impedance
(Junction – Case Mounted on Specified Board)

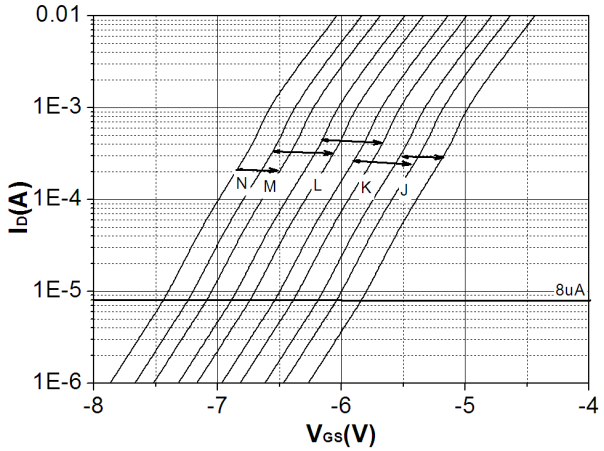


Figure 12. Threshold Voltage Bands

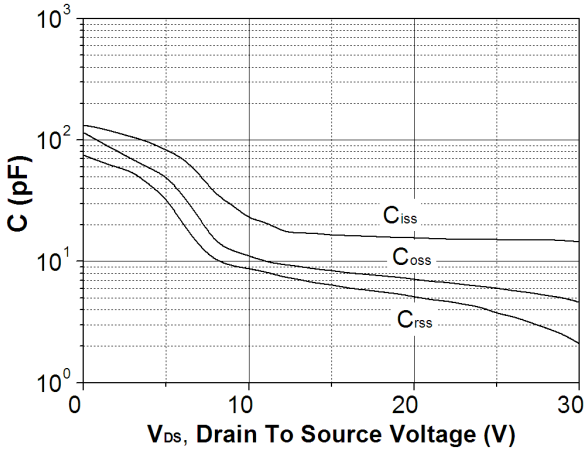


Figure 13. Typ. capacitances

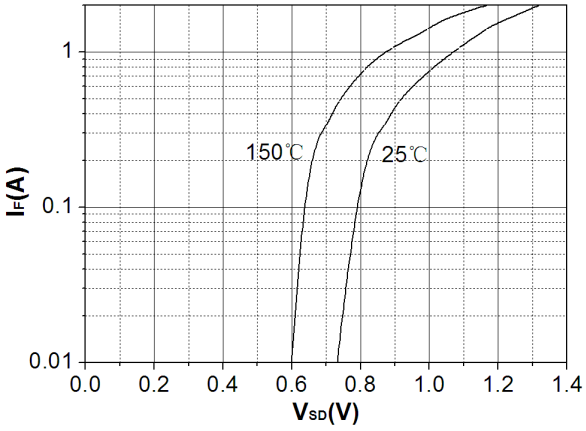


Figure 14. Forward Characteristics of reverse diode

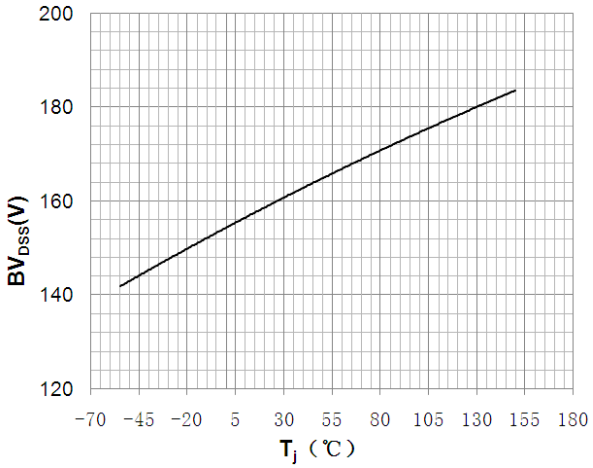


Figure 15. Drain Source Breakdown Voltage

Test Circuit and Waveform

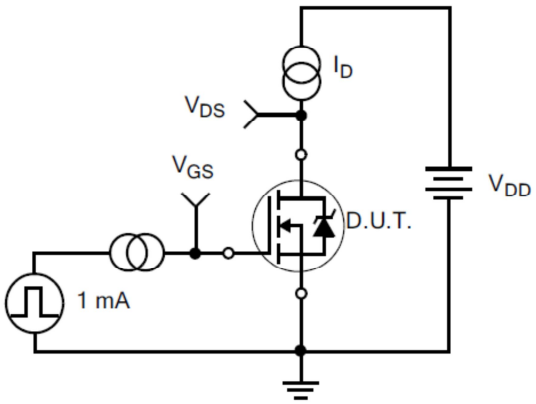


Figure 16. Gate Charge Test Circuit

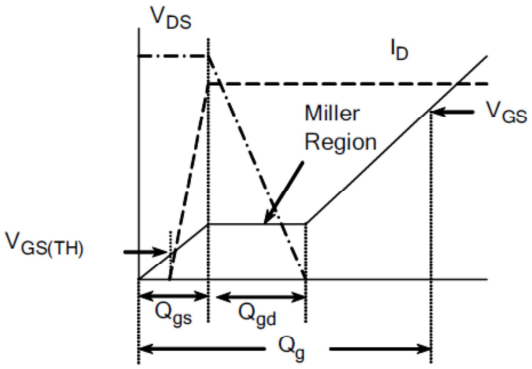


Figure 17. Gate Charge Waveforms

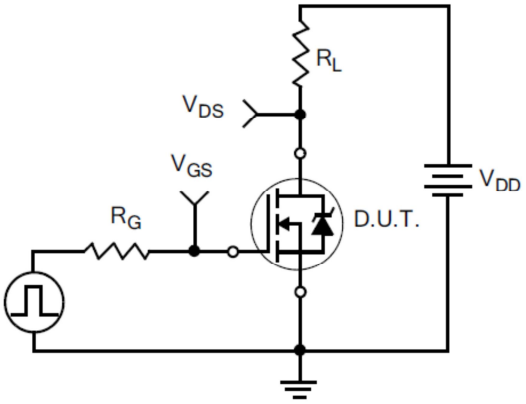


Figure 18. Resistive Switching Test Circuit

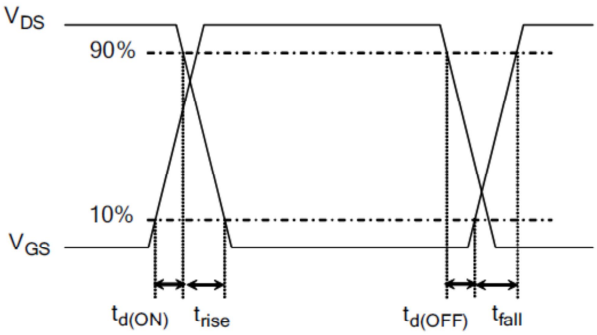


Figure 19. Resistive Switching Waveforms

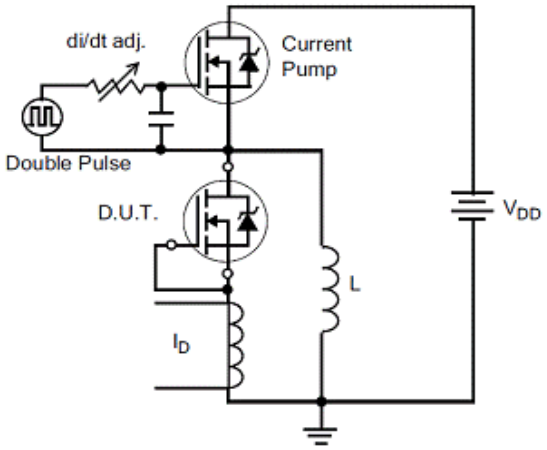


Figure 20. Diode Reverse Recovery Test Circuit

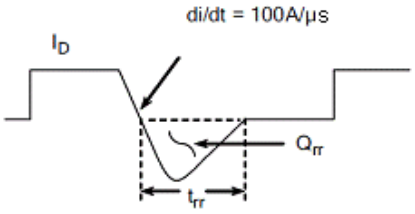


Figure 21. Diode Reverse Recovery Waveform

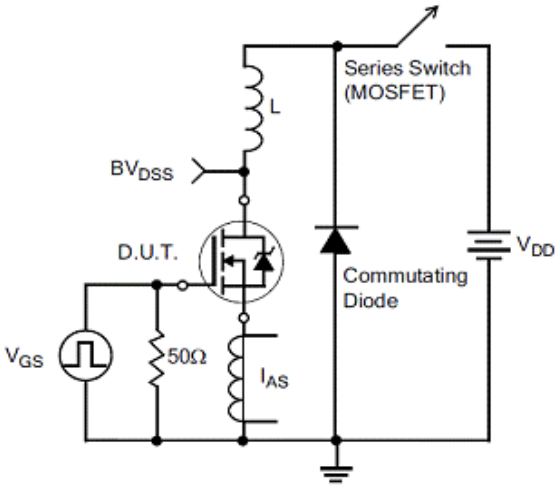


Figure 22.Unclamped Inductive Switching Test Circuit

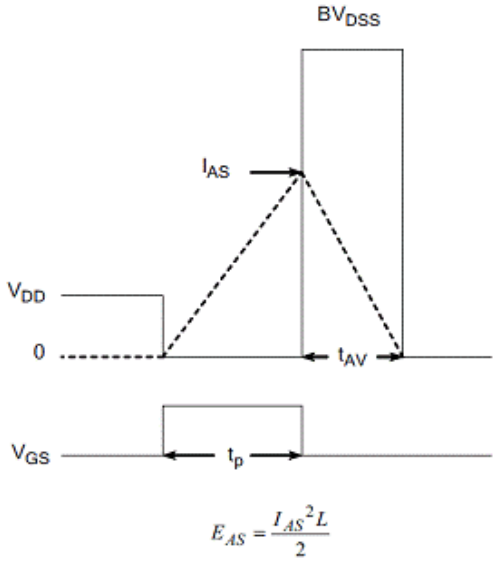
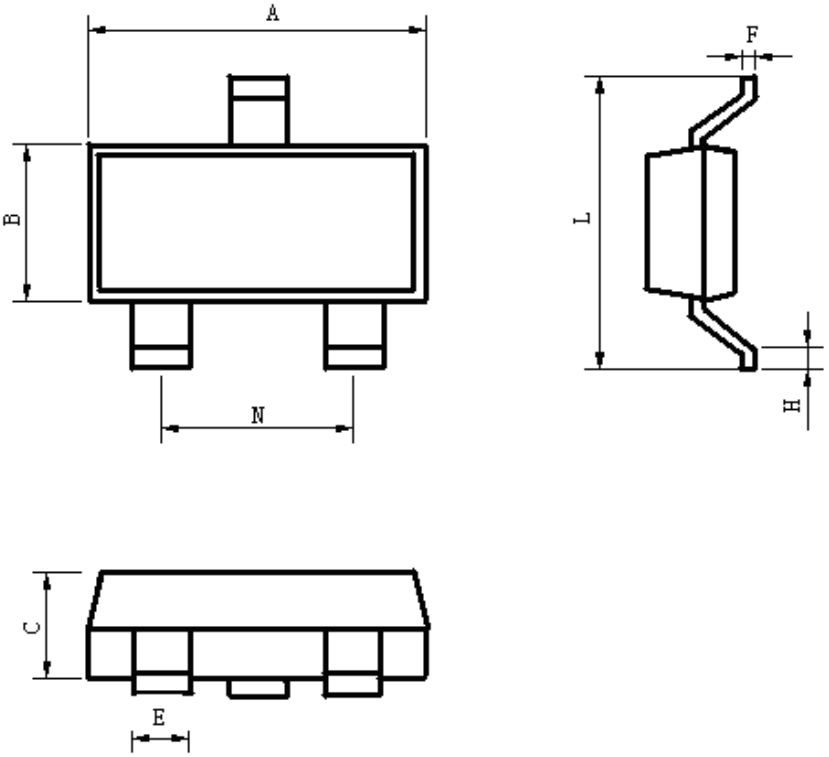


Figure 23.Unclamped Inductive Switching Waveform

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

The name and content of poisonous and harmful material in products

Part's Name	Hazardous Substance									
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE	DIBP	DEHP	DBP	BBP
Limit	≤0.1%	≤0.1%	≤ 0.01%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%
Lead Frame	○	○	○	○	○	○	○	○	○	○
Molding	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○	○	○	○	○
Electric glue	○	○	○	○	○	○	○	○	○	○
Note	○: Means the hazardous material is under the criterion of 2011/65/EU. ×: Means the hazardous material exceeds the criterion of 2011/65/EU. The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup's RoHS.									

Warnings

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. It is suggested to be used under 80 percent of the maximum ratings of the device.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. VDMOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. This publication is made by Huajing Microelectronics and subject to regular change without notice.

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