NSS060N10S

N-Channel Enhanced Shielded Gate Trench Power MOSFET

Pb-Free RoHS COMPLIANT

Voltage:	100 Volts	Current:	93 Ampers	Package:	TO-252

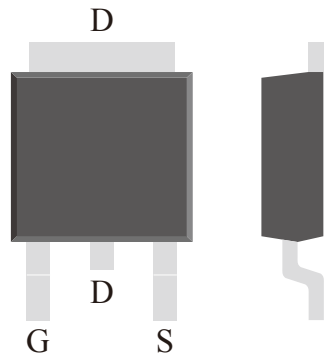
Features

- NH'S Advanced SGT Technology
- Low Reverse Transfer Capacitances
- Low Gate Charge For Low Switching Loss
- Excellent Qg*Rds(on) Product(FOM）

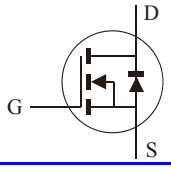
Typical Applications

- Synchronous Rectification
- High-Frequency Circuits
- The Motor Drives
- Automotive Electronics

Diagram:



Polarity:



Product Summary

VDS Min.@T_j	100	**V**
I_D Min.@Ta	93	**A**
RDS(ON)(TYP)@10V	6	**mΩ**

***100% UIS TESTED**

***100% ΔVDS TESTED**

Absolute Maximum Ratings (Ta=25℃ Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Note 1)	Ta= 25 ℃ Ta= 100 ℃	I_D	93 59	A
Drain Current-Pulse (Note 1)	T_J< 150 ℃	I_{DM}	324	A
Maximum Power Dissipation Power Dissipation Derating Factor Above 25℃	Ta= 25 ℃ Ta= 100 ℃	P_D	89 36	W
Derating Factor		D_F	0.71	W/℃
Avalanche Current,Single Pulse (Note 1)	L= 0.5 mH	I_{AS}	20	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.16	L= 0.5 mH IAS= 20 A,RG= 10.0 Ω Starting Tj=25 ℃,VG = 10.0 V	E_{AS}	100	mJ

Thermal Characteristcs (Ta=25℃ Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Typ.	Unit
Junction Temperature		T_J	-55 to 150	℃
Storage Temperature Range		T_{STD}	-55 to 150	℃
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With Ta=25℃	$R_{\theta JA}$	50	℃/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 1 in2 FR-4 Board With 2oz. Copper	$R_{\theta JC}$	1.4	

Notes: 1.Pulse Width Limited By Max. Junction Temperature. (See Fig. 13).

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Electrical Characteristcs (Ta=25℃ Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Static Off Characteristics						
Drain-Source Breakdown Voltage	VGS=0V,ID=250uA	BV_{DSS}	100	--	--	V
Bvdss Temperature Coefficient	ID=250uA,Reference25℃	$\Delta BV_{DSS}/\Delta T_J$	--	0.11	--	V/℃
Drain-Source Leakage Current	VDS= 100 V,VGS=0V	I_{DSS}	--	--	1	uA
Gate-Body Leakage Current	VGS= ±20 V,VDS=0V	I_{GSS}	--	--	±100	nA
Forward Transconductance	ID= 20.0 A,VDS= 5 V	gfs	--	25	--	S
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS ID=250uA	$V_{GS(TH)}$	1.2	1.7	2.5	V
Drain-Source On Resistance	ID= 20.0 A,VGS= 10.0 V ID= 20.0 A,VGS= 4.5 V	$R_{DS(ON)}$	-- --	6 7.6	7.2 10.8	mΩ
Dynamic Characteristics						
Input Capacitance	VDS= 50 V	C_{iss}	--	2170	--	pF
Output Capacitance	VGS= 0 V	C_{oss}	--	788	--	pF
Reverse Transfer Capacitance	F= 1 MHZ	C_{rss}	--	22.5	--	pF
Gate Resistance	VGS=0V,VDS=0V, Freq.=1MHz	R_g	--	1.1	--	Ω
Switching Paramters (Test Circuit & Waveform See Fig.14)						
Turn-On Delay Time	VDS= 50 V	$t_{d(on)}$	--	17	--	ns
Turn-On Rise Time	VGS= 10.0 V	t_r	--	35	--	ns
Turn-Off Delay Time	RG= 10.0 Ω	$t_{d(off)}$	--	40	--	ns
Turn-Off Rise Time		t_f	--	24	--	ns
Gate Charge Paramters (Test Circuit & Waveform See Fig.15)						
Total Gate Charge	VDS= 50 V	Q_g	--	65	--	nC
Gate-Source Charge	VGS= 10.0 V	Q_{gs}	--	13	--	nC
Gate-Drain Charge	ID= 20.0 A	Q_{gd}	--	10	--	nC
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.17)						
Max. Diode Forward Cuurent		I_S	--	--	93	A
Max. Pulsed Forward Cuurent		I_{SM}	--	--	324	A
Diode Forward Voltage	ID= 20.0 A,VGS=0V	V_{SD}	--	0.7	1.2	V
Reverse Recovery Time	IS= 20.0 A,di/dt= 100 A/us	t_{rr}	--	65	--	ns
Reverse Recovery Charge	VGS= 0.0 V	Q_{rr}	--	120	--	nC
Reverse Recovery Current		I_{RRM}	--	4	--	A

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Typical Characteristics Curves

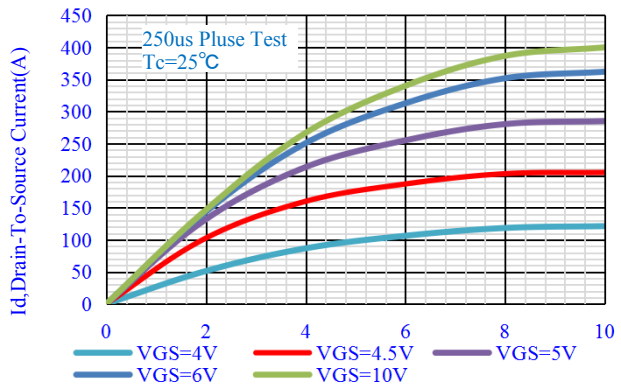


Fig.1-Output Characteritsics

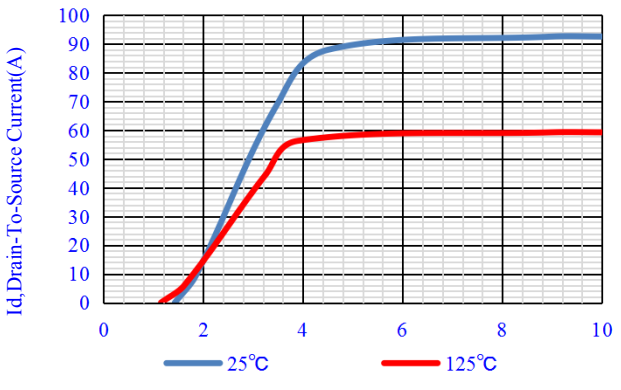


Fig.2-Transfer Characteritsics

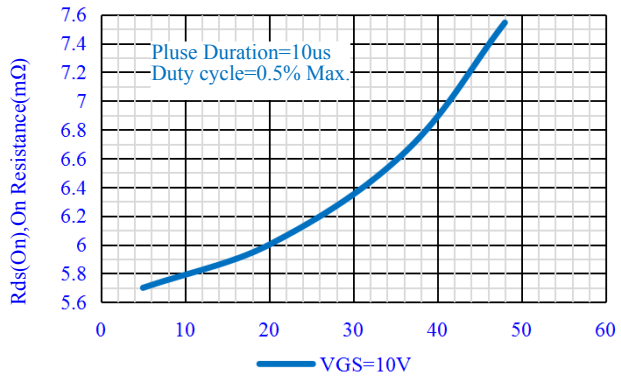


Fig.3-On Resistance Vs. Drain Current

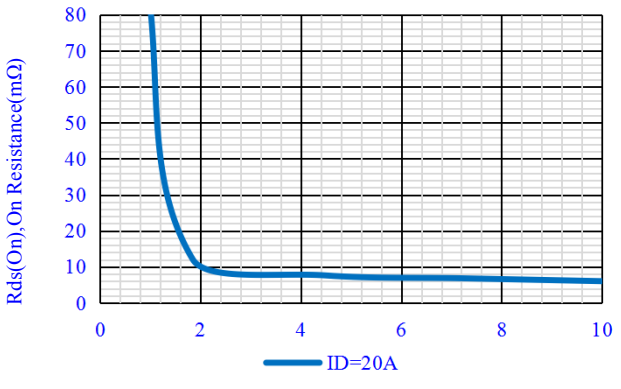


Fig.4-On Resistance Vs. Gate Source Voltage

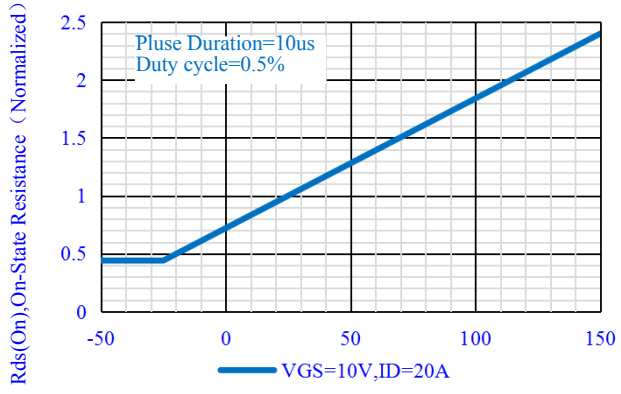


Fig.5-On Resistance Vs. Junction Temperature

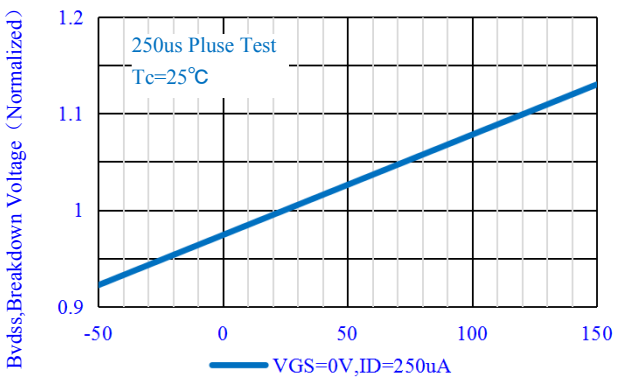


Fig.6-Breakdown Voltage Vs. Junction Temperature

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Typical Characteristics Curves

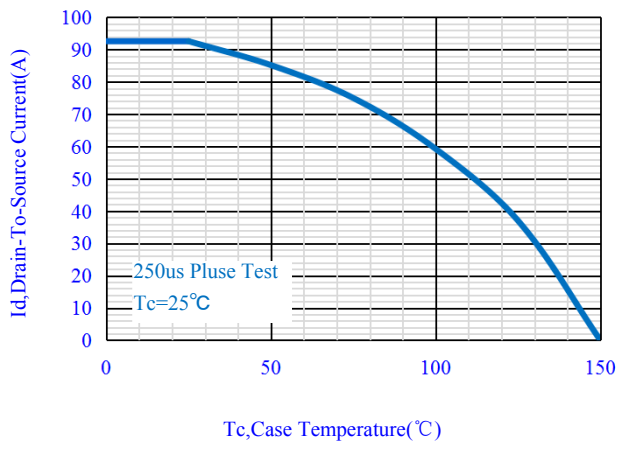


Fig.7-Maximum Continuous Drain Current Vs. Case Temperature

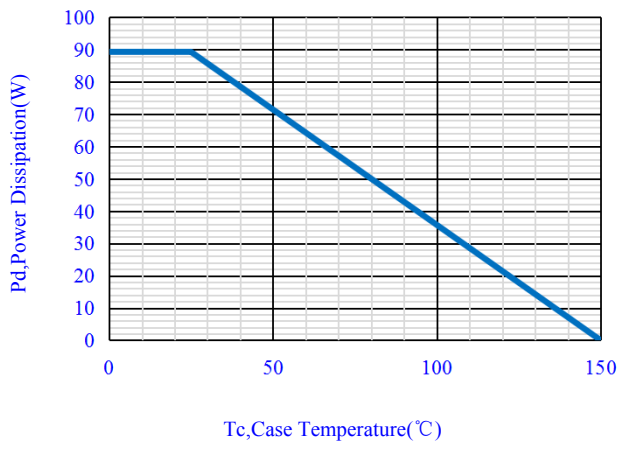


Fig.8-Maximum Power Dissipation Vs. Case Temperature

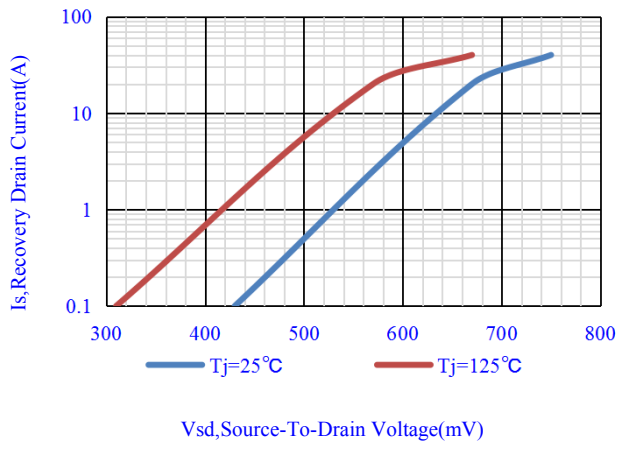


Fig.9-Source-To-Drain Diode Forward Voltage

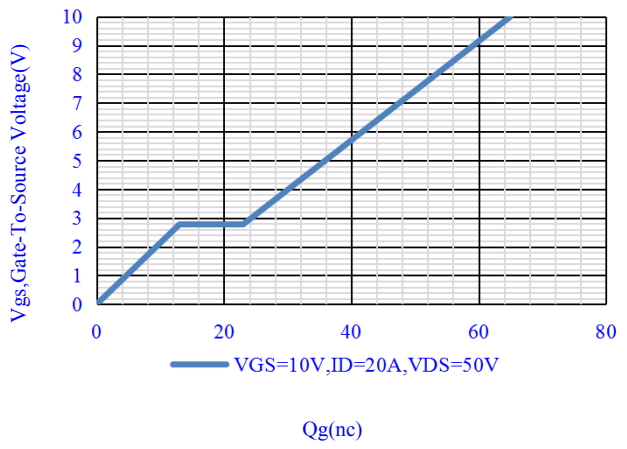


Fig.10-Gate Charge Waveform

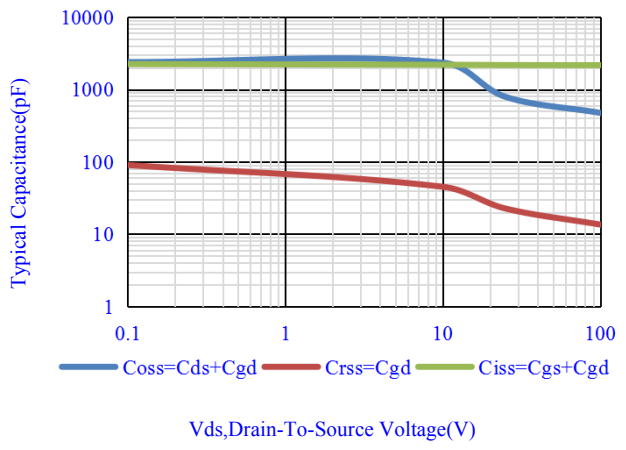


Fig.11-Typical Capacitance Vs. Drain-To-Source Voltage

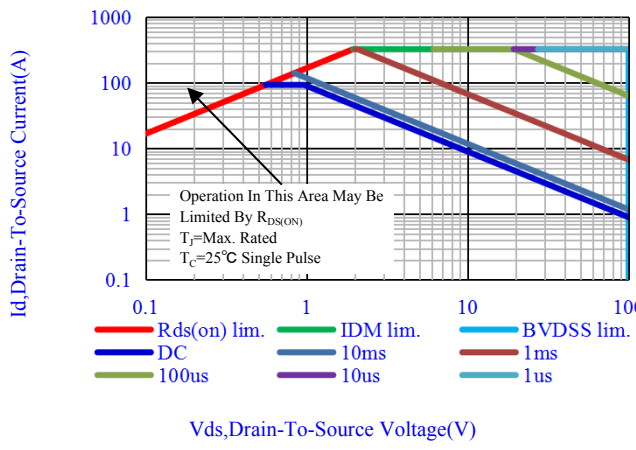


Fig.12-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

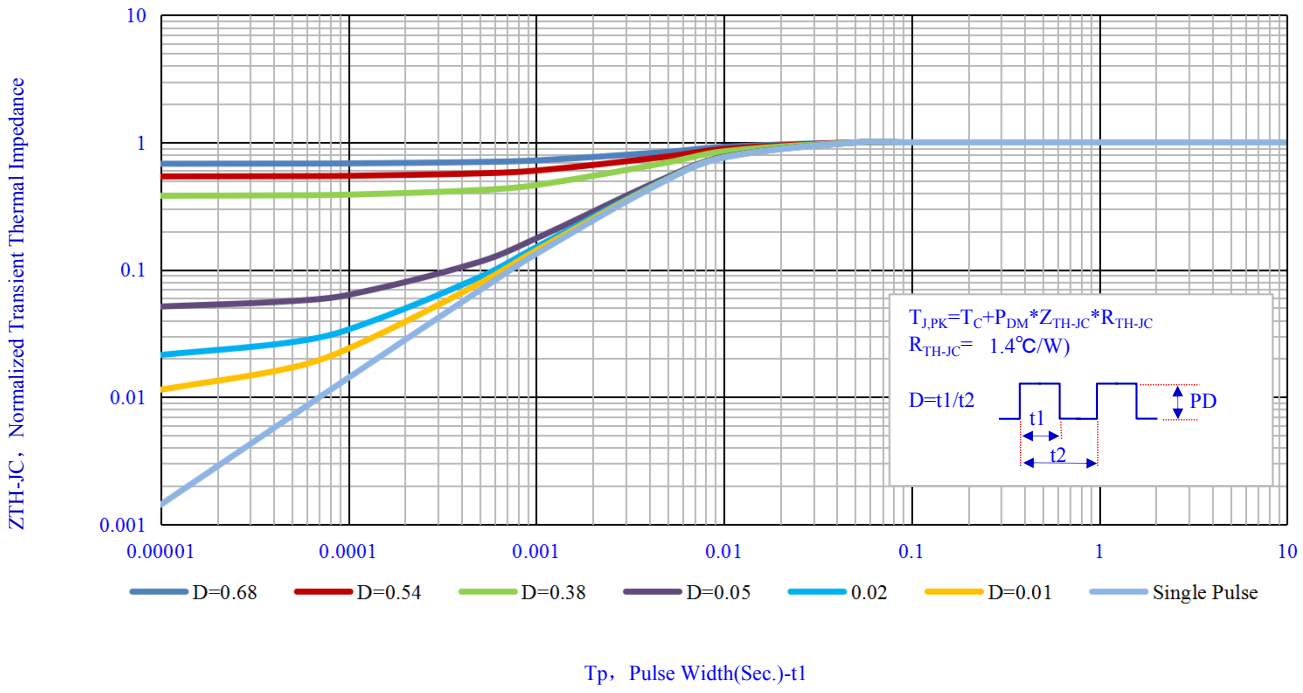
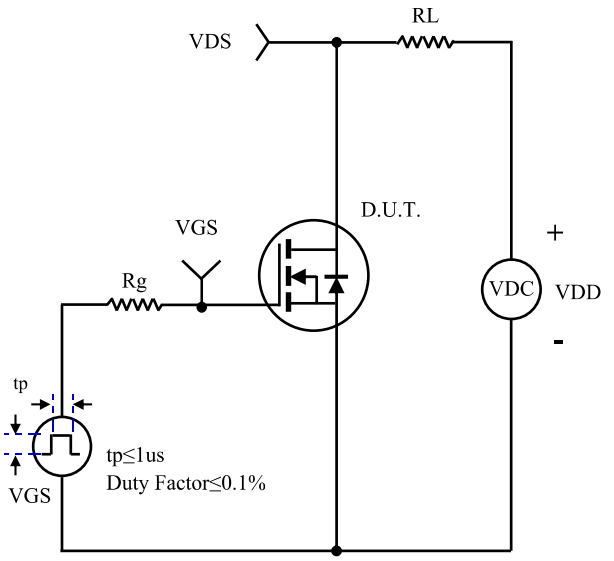


Fig.13- Normalized Maximum Transient Thermal Impedance Vs.Pulse Width

Test Circuit & Waveform



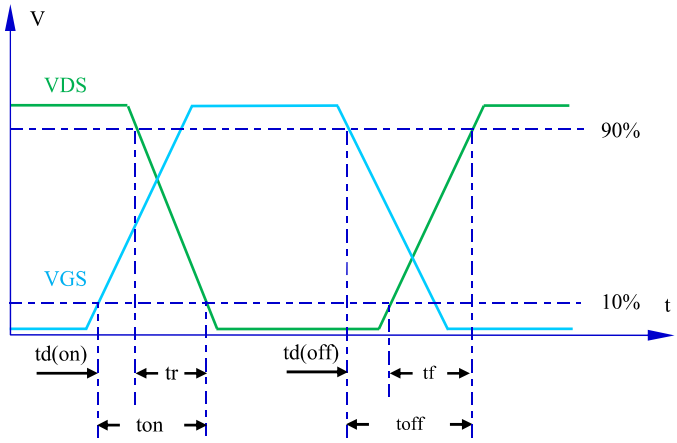


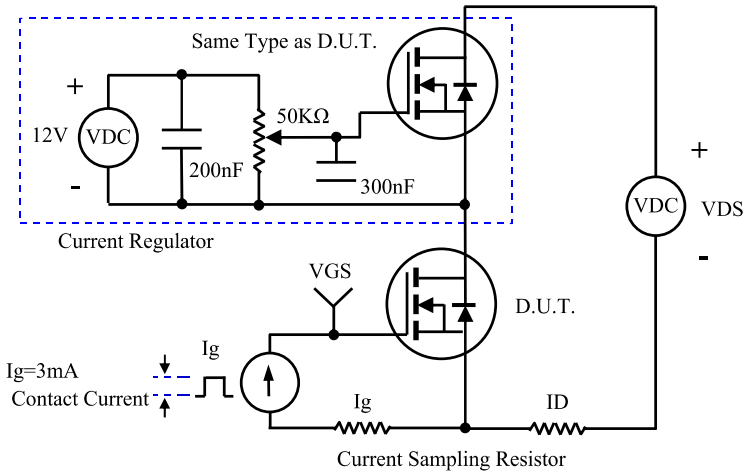
Fig.14- Resistive Switching Test Circuit & Waveform

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Test Circuit & Waveform



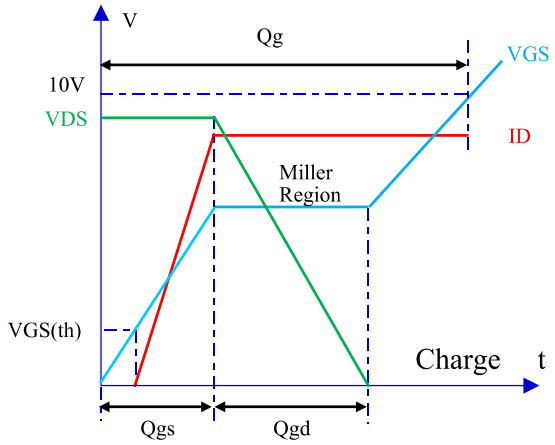
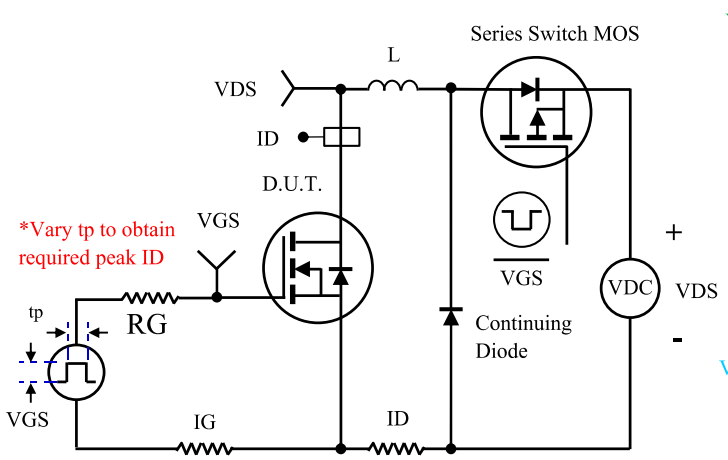


Fig.15-Gate Charge Test Circuit & Waveform



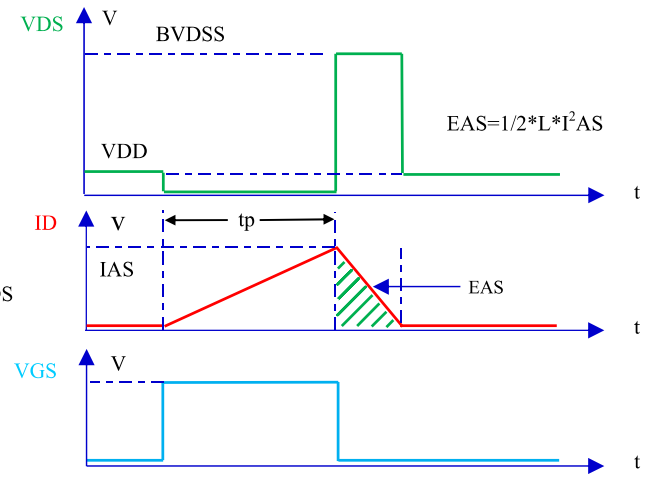
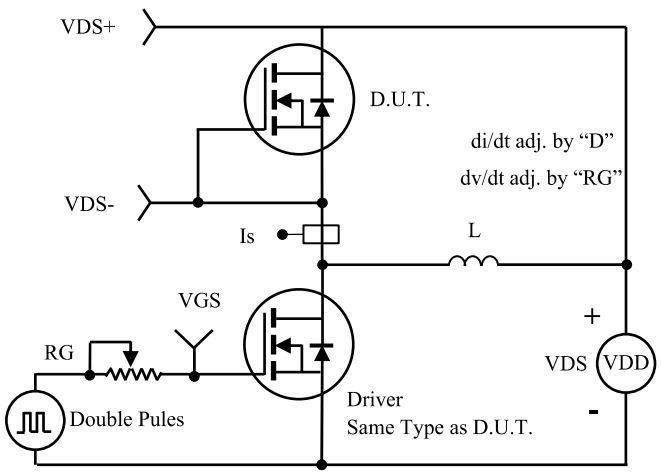


Fig.16- Unclamped Inductive Switching (UIS) Test Circuit & Waveform



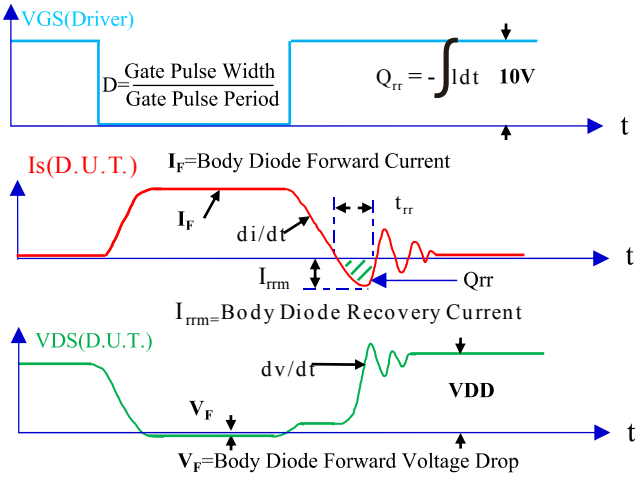


Fig.17- Diode Recovery Test Circuit & Waveform

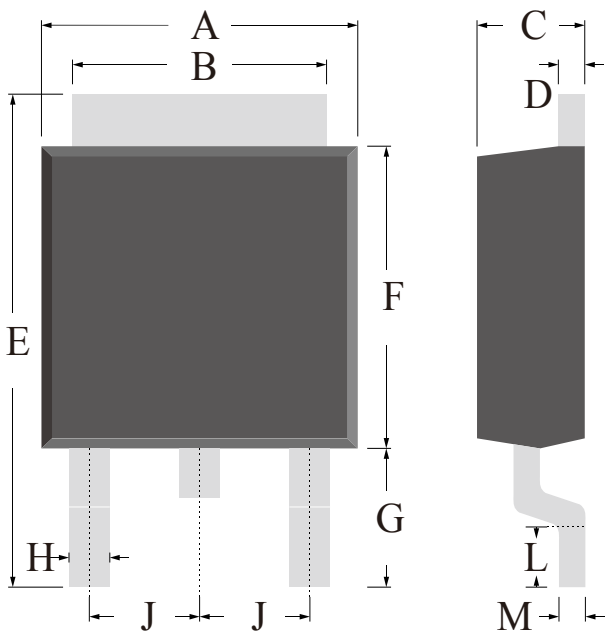
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OUTLINE DRAWINGS

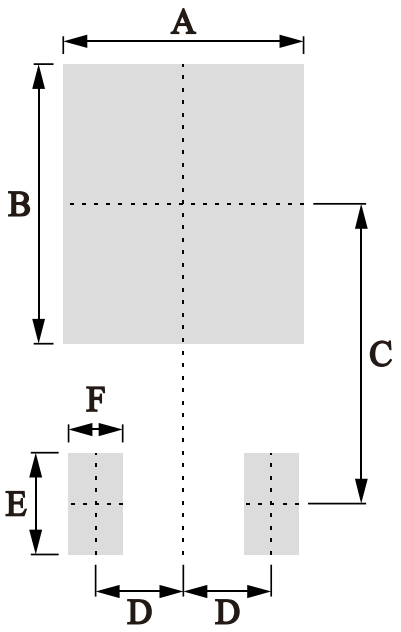
TO-252



OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.10	-	7.10	0.2402	-	0.2795
B	4.80	-	5.80	0.1890	-	0.2283
C	1.95	-	2.55	0.0768	-	0.1004
D	0.35	-	0.75	0.0138	-	0.0295
E	9.25	-	10.75	0.3642	-	0.4232
F	5.60	-	6.60	0.2205	-	0.2598
G	2.50	-	3.10	0.0984	-	0.1220
H	0.65	-	1.05	0.0256	-	0.0413
J	2.10	-	2.50	0.0827	-	0.0984
L	1.00	-	1.40	0.0394	-	0.0551
M	0.35	-	0.75	0.0138	-	0.0295

RECOMMEDNED LAYOUT DRAWINGS

TO-252



OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	6.09	-	-	0.2398	-
B	-	7.57	-	-	0.2980	-
C	-	6.64	-	-	0.2610	-
D	-	2.30	-	-	0.0910	-
E	-	2.76	-	-	0.1090	-
F	-	1.42	-	-	0.0560	-

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MARKING INFORMATION



MARKING INSTRUCTIONS

NH=Niuhang Trademark

FF=Product Line Code,According To Actual Changes

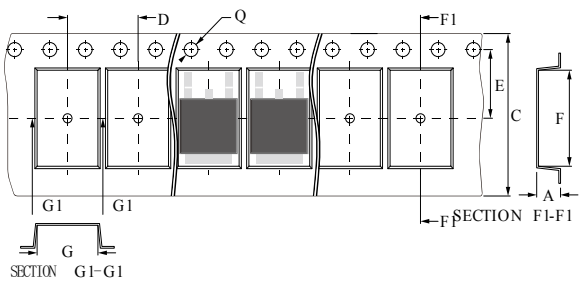
YWW=Date Code,According To Actual Changes

LLWWF=Inernal Code,According To Actual Changes

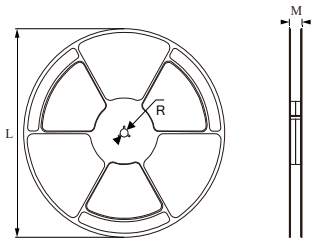
NSS060N10S=Model

PACKAGING

TAPE



REEL



TO-252

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
TAPE						
A	2.60	-	2.80	0.1024	-	0.1102
C	15.60	-	16.40	0.6142	-	0.6457
D	7.70	-	8.30	0.3031	-	0.3268
E	7.30	-	7.70	0.2874	-	0.3031
F	10.20	-	10.80	0.4016	-	0.4252
G	6.70	-	7.10	0.2638	-	0.2795
Q Φ	1.40	-	1.60	0.0551	-	0.0630
REEL						
L	328.00	-	332.00	12.913	-	13.071
R	12.00	-	14.00	0.4724	-	0.5512
M	19.40	-	23.40	0.7638	-	0.9213

PACKING INFORMATION

Package Type	Package Code	Productor Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
TO-252	P1	0.321	13" Reel	2500	5000	30000
TO-252	P2	0.321	13" Reel	2500	2500	25000

NSS060N10S

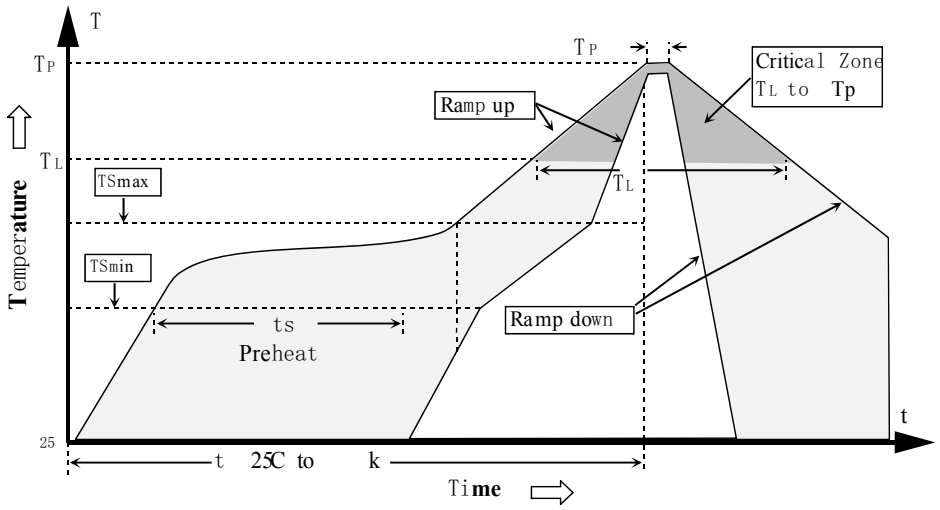
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Pb Pb-Free RoHS COMPLIANT

Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(TS min) −Temperature Max(TS max) −Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(TP)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

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