

NSH300N15P3



N-Channel Enhanced Shielded Gate Trench Power MOSFET

Voltage: 150 Volts

Current: 29.0 Ampers

Package: PDFN3*3

Features

- NH'S Advanced SGT Technology
- Low Reverse Transfer Capacitances
- Low Gate Charge For Low Switching Loss
- Excellent $Q_g \cdot R_{ds(on)}$ Product(FOM)

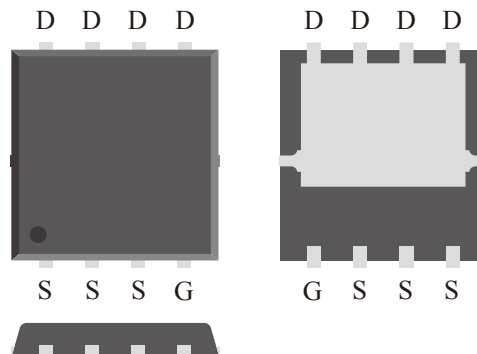
Typical Applications

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

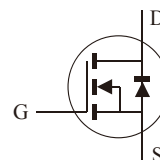
Product Summary

V _{DS} Min.@T _j	150	V
I _D Min.@T _a	29.0	A
R _{DS(ON)} (TYP)@10V	25.50	mΩ

Diagram:



Polarity:



***100% UIS TESTED**

***100% ΔV_{DS} TESTED**

Absolute Maximum Ratings (T_a=25°C Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Ratings	Unit
Drain-Source Voltage		V _{DS}	150	V
Gate-Source Voltage		V _{GS}	±20	V
Continuous Drain Current (Note 1)	T _a = 25 °C	I _D	29.0	A
	T _a = 100 °C		18.6	
Drain Current-Pulse (Note 1)	T _j < 150 °C	I _{DM}	116	A
Maximum Power Dissipation Power	T _a = 25 °C	P _D	52	W
	T _a = 100 °C		21	
Derating Factor		D _F	0.42	W/°C
Avalanche Current,Single Pulse (Note 1)	L= 0.5 mH	I _{AS}	2.5	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.16	L= 0.5 mH I _{AS} = 2.5 A,R _G = 10.0 Ω Starting T _j =25 °C,V _G = 10.0 V	E _{AS}	1.6	mJ

Thermal Characteristics (T_a=25°C Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Typ.	Unit
Junction Temperature		T _J	-55 to 150	°C
Storage Temperature Range		T _{STD}	-55 to 150	°C
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With T _a =25 °C	R _{θJA}	50.0	°C/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 1 in2 FR-4 Board With 2oz. Copper	R _{θJC}	2.40	

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

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Electrical Characteristics (Ta=25°C Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Static Off Characteristics						
Drain-Source Breakdown Voltage	VGS=0V,ID=250uA	BV _{DSS}	150	--	--	V
Bvdss Temperature Coefficient	ID=250uA,Reference25℃	ΔBV _{DSS} /ΔT _J	--	0.17	--	V/℃
Drain-Source Leakage Current	VDS= 150 V,VGS=0V	I _{DSS}	--	--	1	uA
Gate-Body Leakage Current	VGS= ±20 V,VDS=0V	I _{GSS}	--	--	±100	nA
Forward Transconductance	ID= 14.5 A,VDS= 5 V	g _{fs}	--	29.0	--	S
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS ID=250uA	V _{GS(TH)}	2.0	3.0	4.0	V
Drain-Source On Resistance	ID= 14.5 A,VGS= 10.0 V	R _{DS(ON)}	--	25.5	30.0	mΩ
	ID= 14.5 A,VGS= 4.5 V		--	29.3	40.2	
Dynamic Characteristics						
Gate Resistance	VGS=0V,VDS=0V, Freq.=1MHz	R _g	--	1.7	--	Ω
Input Capacitance	VDS= 50 V	C _{iss}	--	875.0	--	pF
Output Capacitance	VGS= 0 V	C _{oss}	--	134.0	--	pF
Reverse Transfer Capacitance	F= 1 MHZ	C _{rss}	--	9.4	--	pF
Switching Paramters (Test Circuit & Waveform See Fig.14)						
Turn-On Delay Time	VDS= 75 V	t _{d(on)}	--	12.8	--	ns
Turn-On Rise Time	VGS= 10.0 V	t _r	--	3.0	--	ns
Turn-Off Delay Time	RG= 10.0 Ω	t _{d(off)}	--	17.4	--	ns
Turn-Off Rise Time		t _f	--	8.6	--	ns
Gate Charge Paramters (Test Circuit & Waveform See Fig.15)						
Total Gate Charge	VDS= 75 V	Q _g	--	12.0	--	nC
Gate-Source Charge	VGS= 10.0 V	Q _{gs}	--	4.3	--	nC
Gate-Drain Charge	ID= 14.5 A	Q _{gd}	--	2.0	--	nC
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.17)						
Max. Diode Forward Cuurent		I _S	--	--	29.0	A
Max. Pulsed Forward Cuurent		I _{SM}	--	--	116.0	A
Diode Forward Voltage	ID= 14.5 A,VGS=0V	V _{SD}	--	0.86	1.55	V
Reverse Recovery Time	IS= 14.5 A,di/dt= 100 A/us	t _{rr}	--	60.0	--	ns
Reverse Recovery Charge	VGS= 0.0 V	Q _{rr}	--	103.0	--	nC
Reverse Recovery Current		I _{RRM}	--	3.4	--	A

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Typical Characteristics Curves

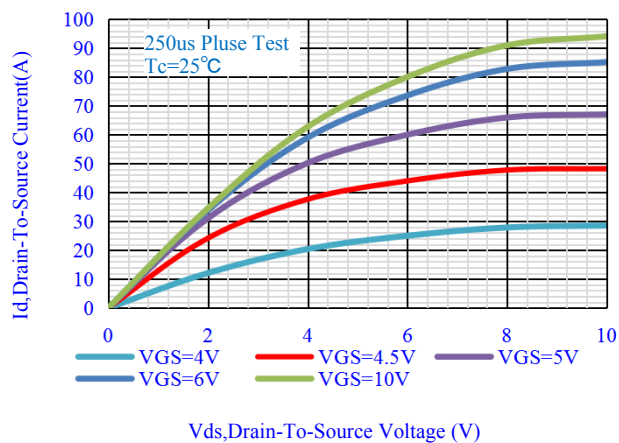


Fig.1-Output Characteristics

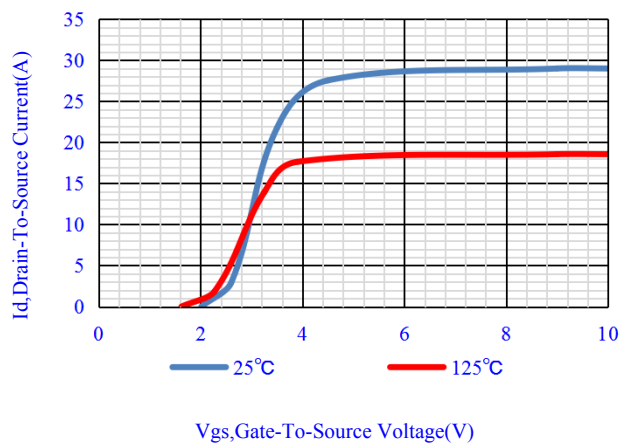


Fig.2-Transfer Characteristics

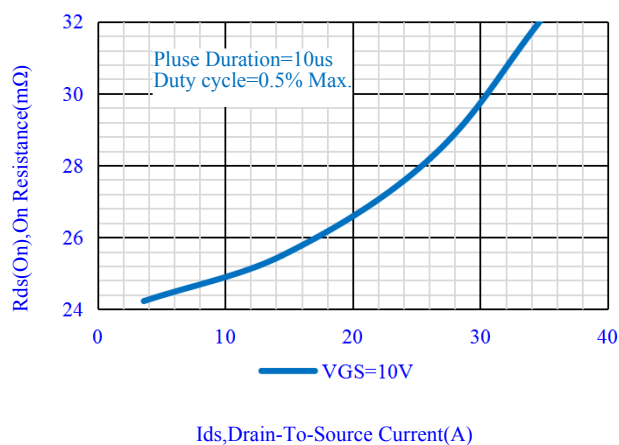


Fig.3-On Resistance Vs. Drain Current

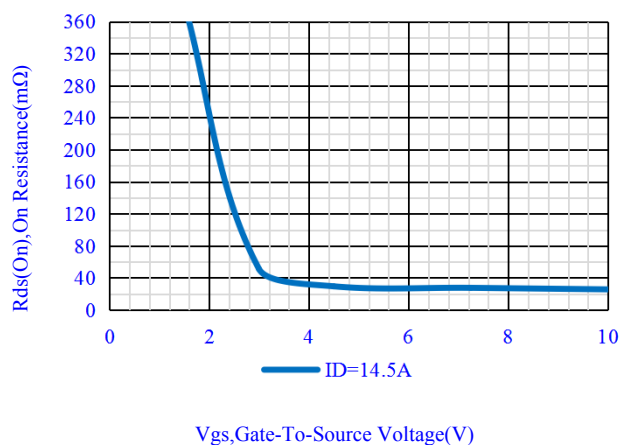


Fig.4-On Resistance Vs. Gate Source Voltage

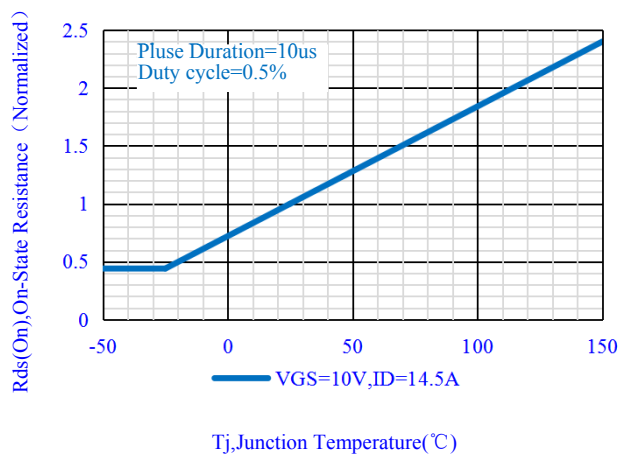


Fig.5-On Resistance Vs. Junction Temperature

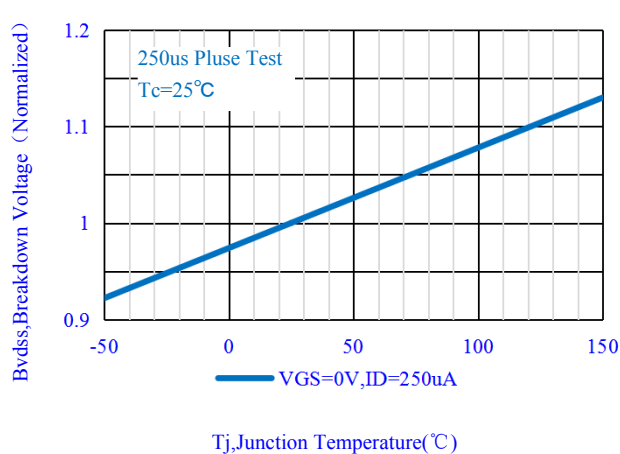


Fig.6-Breakdown Voltage Vs. Junction Temperature

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Typical Characteristics Curves

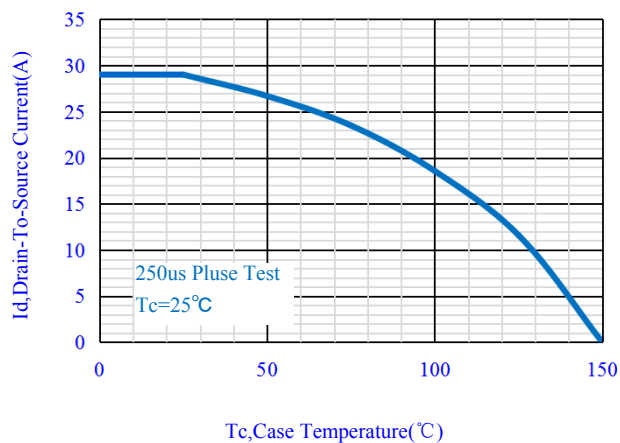


Fig.7-Maximum Continuous Drain Current Vs. Case Temperature

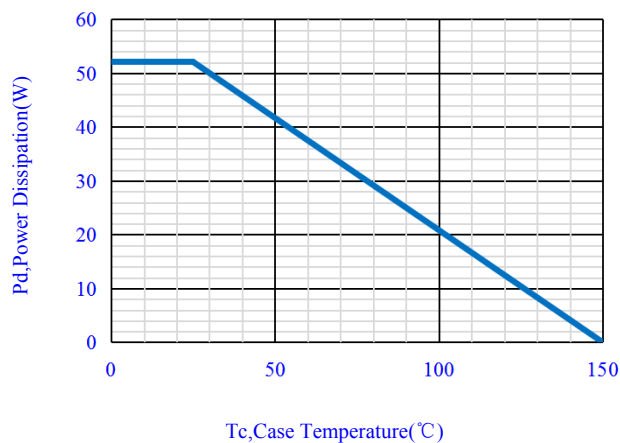


Fig.8-Maximum Power Dissipation Vs. Case Temperature

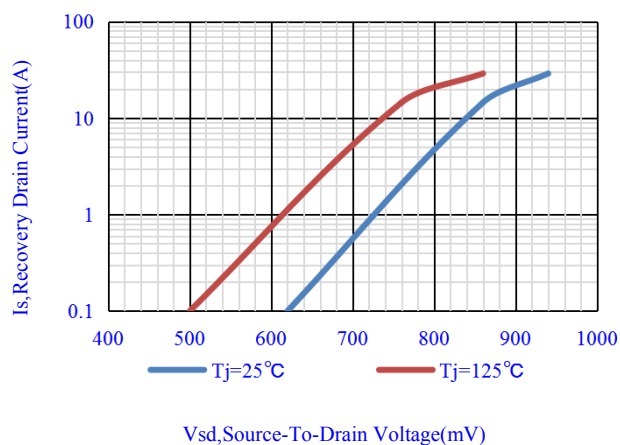


Fig.9-Source-To-Drain Diode Forward Voltage

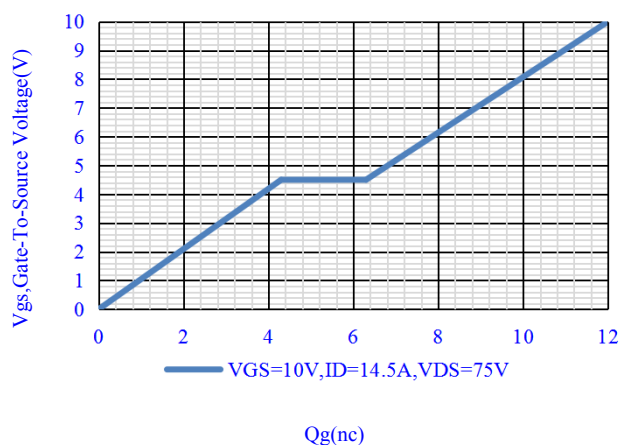


Fig.10-Gate Charge Waveform

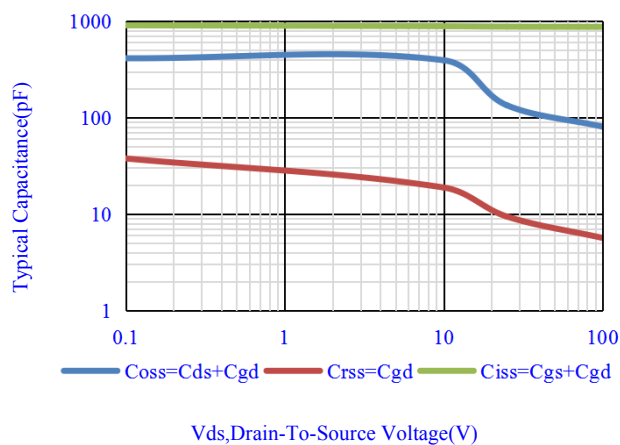


Fig.11-Typical Capacitance Vs. Drain-To-Source Voltage

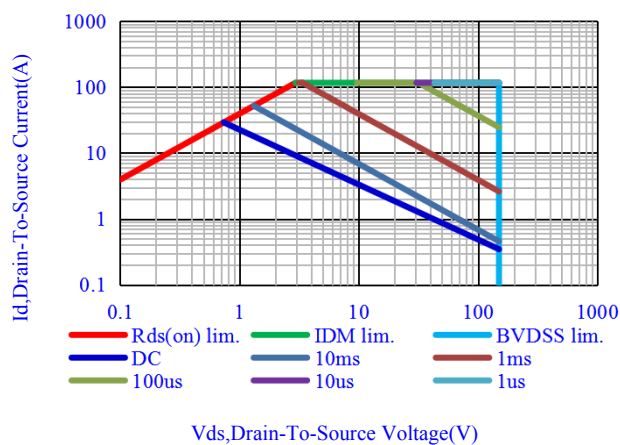


Fig.12-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

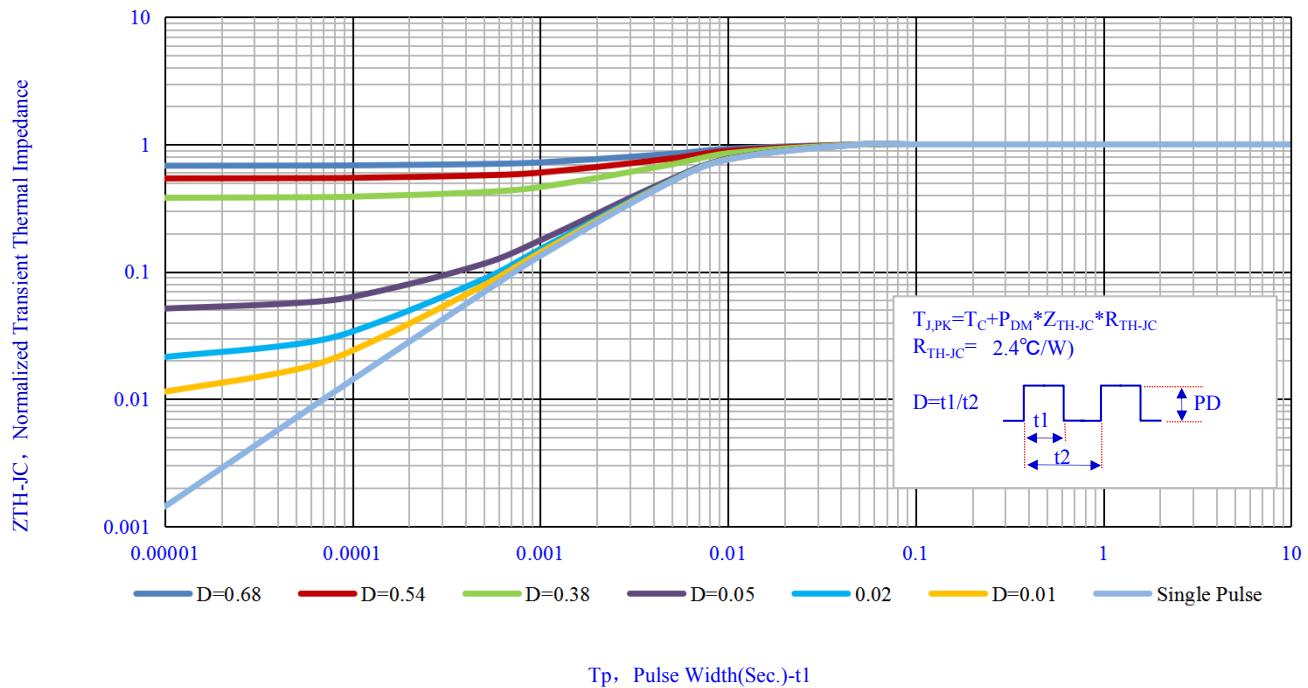


Fig.13- Normalized Maximum Transient Thermal Impedance Vs.Pulse Width

Test Circuit & Waveform

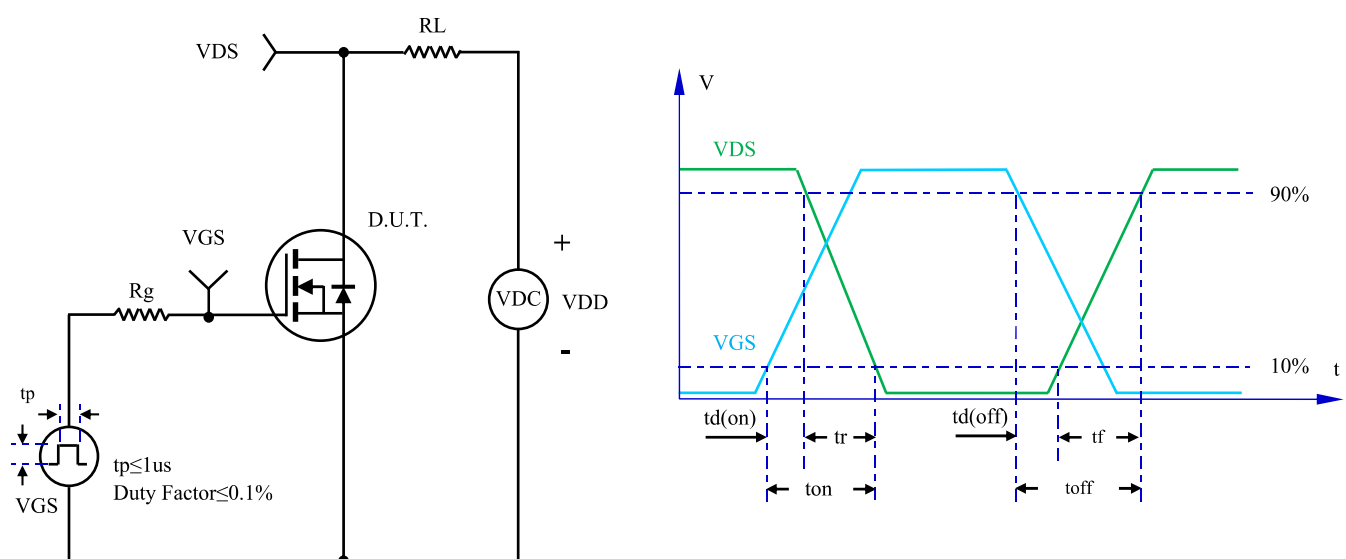


Fig.14- Resistive Switching Test Circuit & Waveform

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Test Circuit & Waveform

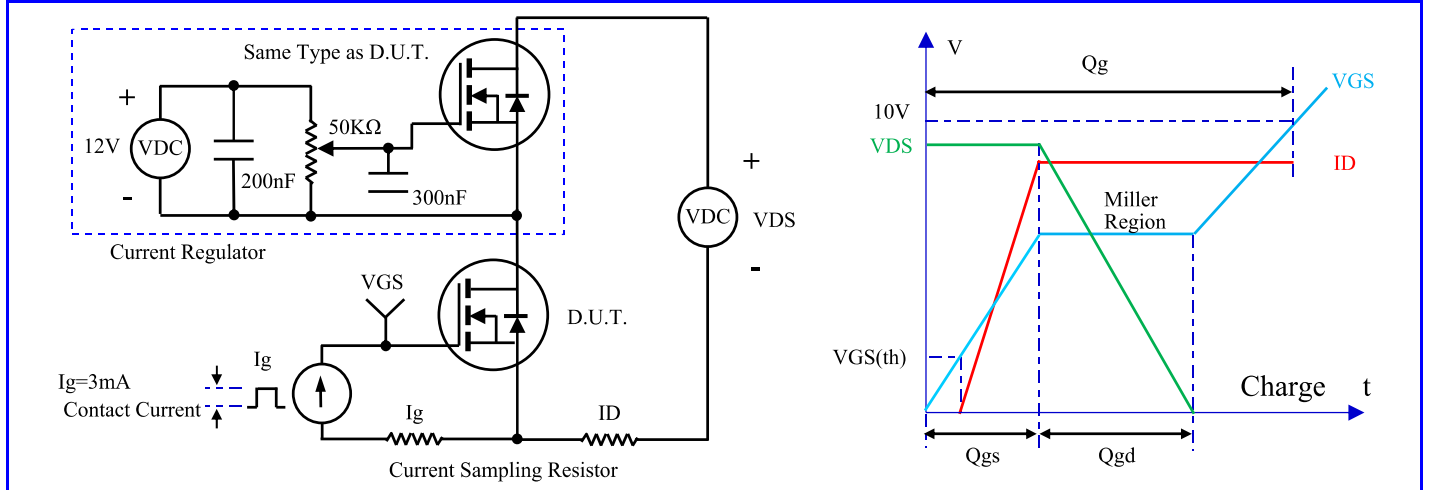


Fig.15- Gate Charge Test Circuit & Waveform

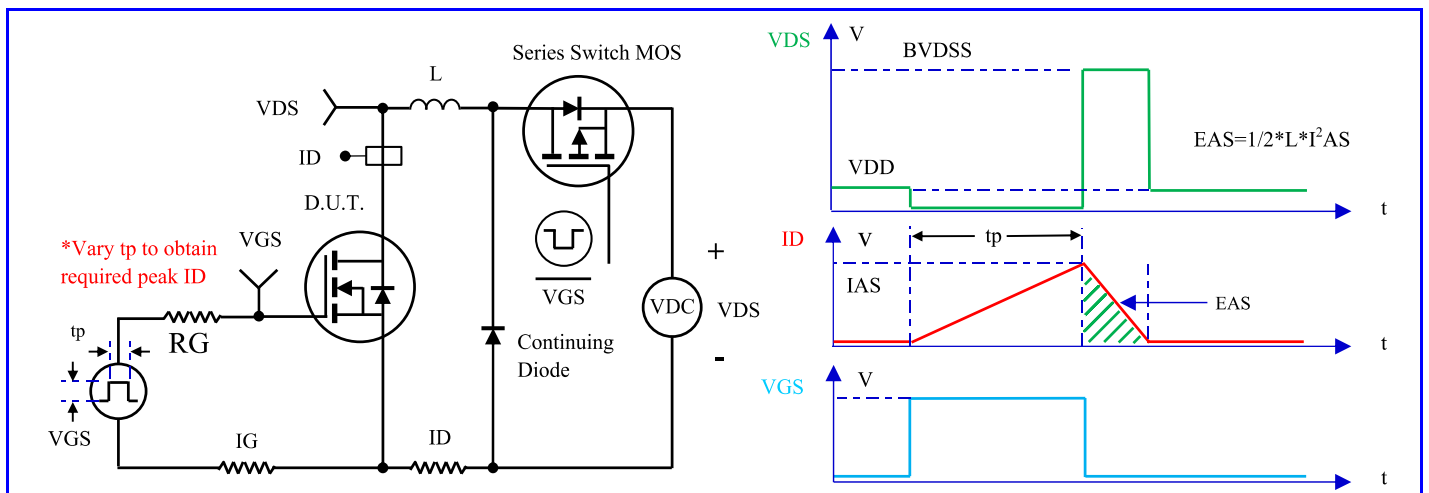


Fig.16- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

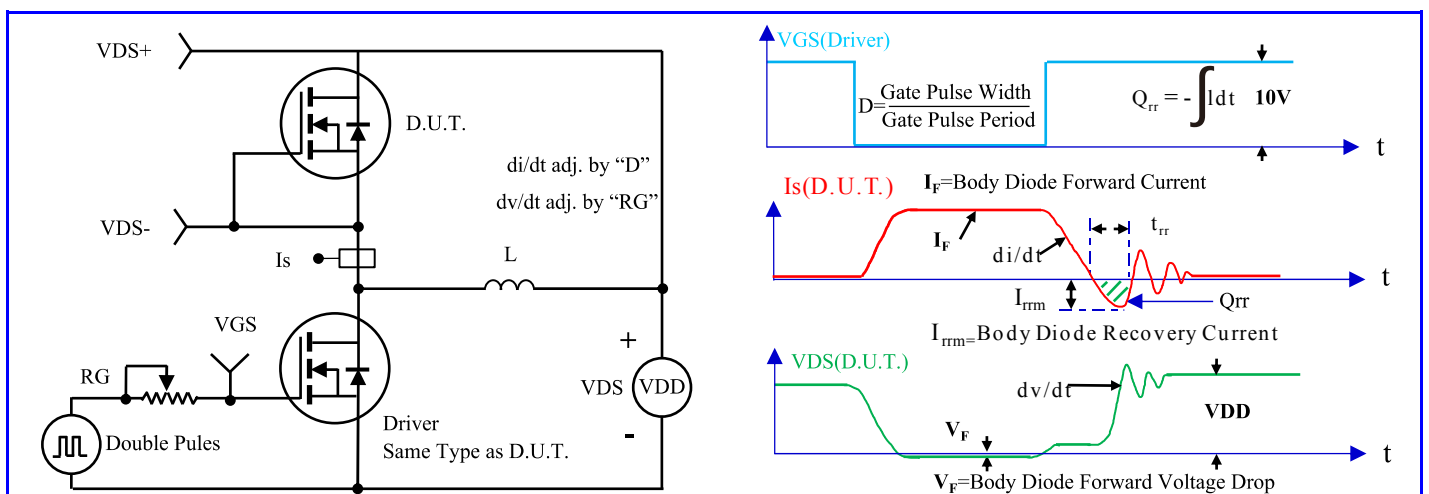


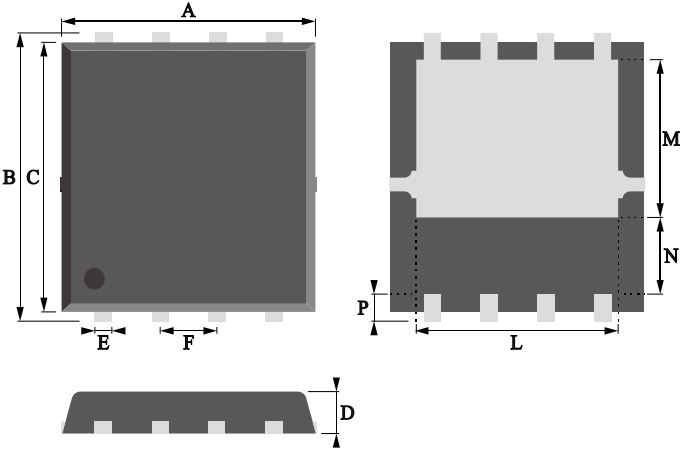
Fig.17- Diode Recovery Test Circuit & Waveform

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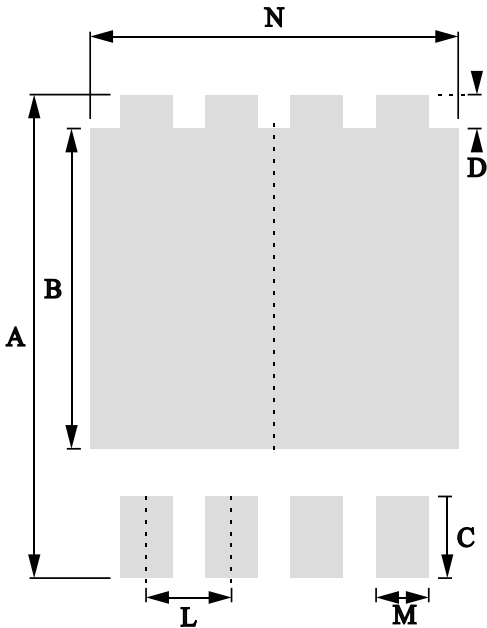
OUTLINE DRAWINGS



PDFN3*3

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.80	-	3.60	0.1102	-	0.1417
B	2.70	-	3.50	0.1063	-	0.1378
C	3.00	-	3.80	0.1181	-	0.1496
D	0.55	-	1.05	0.0217	-	0.0413
E	0.15	-	0.45	0.0059	-	0.0177
F	0.40	-	0.90	0.0157	-	0.0354
M	1.50	-	2.10	0.0591	-	0.0827
L	2.30	-	2.90	0.0906	-	0.1142
N	0.45	-	0.95	0.0177	-	0.0374
P	0.20	-	0.60	0.0079	-	0.0236

RECOMMEDND LAYOUT DRAWINGS



PDFN3*3

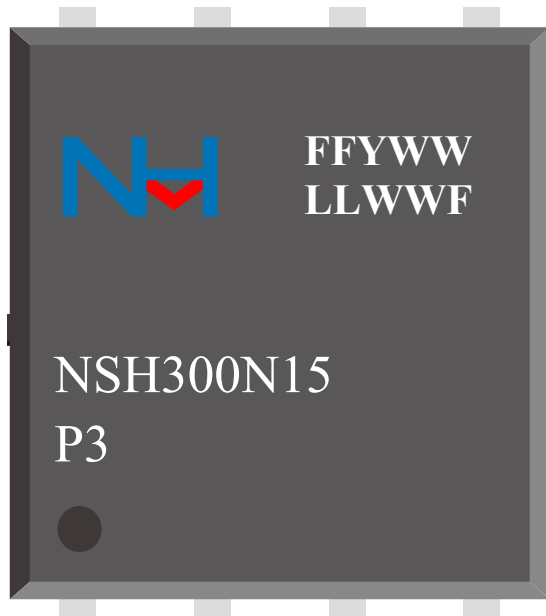
OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	3.55	-	-	0.1398	-
B	-	2.35	-	-	0.0925	-
C	-	0.60	-	-	0.0236	-
D	-	0.25	-	-	0.0098	-
L	-	0.65	-	-	0.0256	-
M	-	0.40	-	-	0.0157	-
N	-	2.80	-	-	0.1102	-

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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

NSH300N15P3=Model

PACKING INFORMATION

Package Type	Package Code	Product Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
PDFN3*3	P1	0.0198	13" Reel	5000	10000	50000

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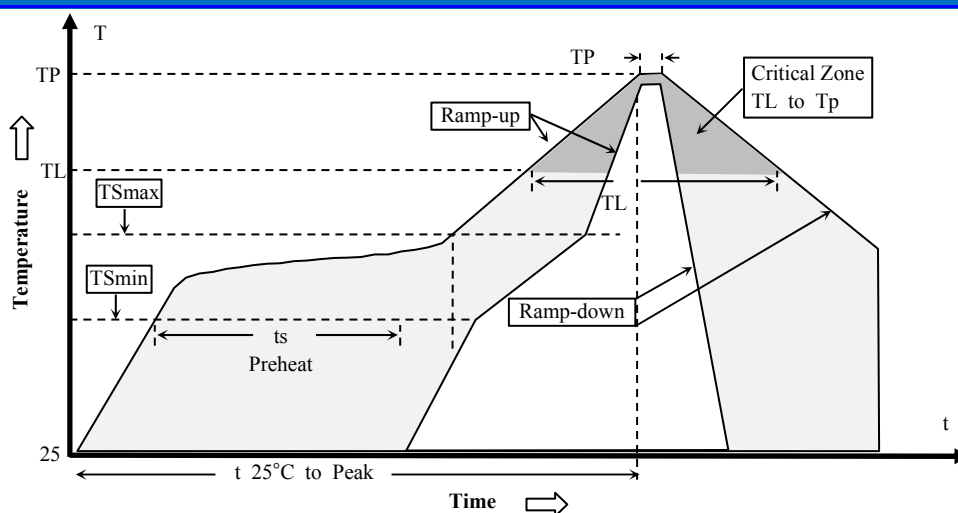
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Recommended wave soldering condition

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 (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat -Temperature Min(T _S min) -Temperature Max(T _S max) -Time(t _s min to t _s max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T _L) - Time (t _L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T _P)	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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