

NSS045N06C



N-Channel Enhancement Mode Trench Power MOSFET

Voltage: 60 Volts

Current: 125 Amperes

Package: TO-220C

Features

- NH'S Advanced Trench Technology
- Low Rds(on) For Low On-State Loss
- High EAS For High Reliability
- Excellent Qg*Rds(on) Product(FOM)

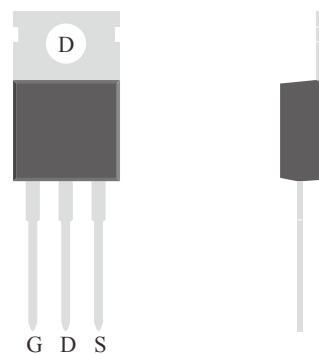
Typical Applications

- DC-DC Converter
- Battery Management System(BMS)
- Printed Circuit Board For Control Circuit
- Uninterruptible Power Supplies(UPS)

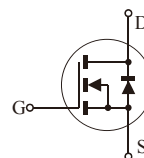
Product Summary

VDS Min.@Tj	60	V
ID Min.@Ta	125	A
RDS(ON)(TYP)@10V	4.5	mΩ

Diagram:



Polarity:



***100% UIS TESTED**

***100% ΔVDS TESTED**

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

Parameter	Test Conditions	Symbol	Ratings	Unit
Drain-Source Voltage		V _{DS}	60	V
Gate-Source Voltage		V _{GS}	±20	V
Continuous Drain Current (Note 1)	Ta= 25 °C	I _D	125	A
	Ta= 100 °C		80	
Drain Current-Pulse (Note 1)	Tj< 150 °C	I _{DM}	500	A
Maximum Power Dissipation Power Dissipation Derating Factor Above 25°C	Ta= 25 °C	P _D	125	W
	Ta= 100 °C		50	
Derating Factor		D _F	1.00	W/°C
Avalanche Current,Single Pulse (Note 1)	L= 0.5 mH	I _{AS}	21	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.17	L= 0.5 mH IAS= 21 A, RG= 10.0 Ω Starting Tj=25 °C, VG = 10.0 V	E _{AS}	110	mJ

Thermal Characteristics (Ta=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 Ta=25 °C	R _{θJA}	62.5	°C/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 75mm x 45mm x 2.5mm Alu. Heat.	R _{θJC}	1	

Notes: 1.Pulse Width Limited By Max. Junction Temperature. (See Fig.14)

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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}	60	--	--	V
Bvdss Temperature Coefficient	ID=250uA,Reference25℃	ΔBV _{DSS} /ΔT _J	--	0.07	--	V/℃
Drain-Source Leakage Current	VDS= 60 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	g _{fs}	--	55	--	S
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS ID=250uA	V _{GS(TH)}	1	1.8	2.5	V
Drain-Source On Resistance	ID= 20.0 A,VGS= 10.0 V	R _{DS(ON)}	--	4.5	5.5	mΩ
	ID= 20.0 A,VGS= 5.0 V		--	6.7	9.8	
Dynamic Characteristics						
Gate Resistance	VGS=0V,VDS=0V, Freq.=1MHz	R _g	--	1.3	--	Ω
Input Capacitance	VDS= 30 V VGS= 0 V F= 1 MHZ	C _{iss}	--	2500	--	pF
Output Capacitance		C _{oss}	--	590	--	pF
Reverse Transfer Capacitance		C _{rss}	--	35	--	pF
Switching Paramters With Inductive Load(Test Circuit & Waveform See Fig.15)						
Turn-On Delay Time	VDS= 30 V VGS= 10.0 V RG= 10.0 Ω L= 0.5 mH	t _{d(on)}	--	18	--	ns
Turn-On Rise Time		t _r	--	2	--	ns
Turn-Off Delay Time		t _{d(off)}	--	55	--	ns
Turn-Off Rise Time		t _f	--	18	--	ns
Gate Charge Paramters (Test Circuit & Waveform See Fig.16)						
Total Gate Charge	VDS= 30 V VGS= 10.0 V ID= 20.0 A	Q _g	--	58	--	nC
Gate-Source Charge		Q _{gs}	--	8	--	nC
Gate-Drain Charge		Q _{gd}	--	6	--	nC
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.18)						
Max. Diode Forward Current		I _S	--	--	125.0	A
Max. Pulsed Forward Current		I _{SM}	--	--	500	A
Diode Forward Voltage	ID= 20.0 A,VGS=0V	V _{SD}	--	0.9	1.3	V

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Typical Characteristics Curves

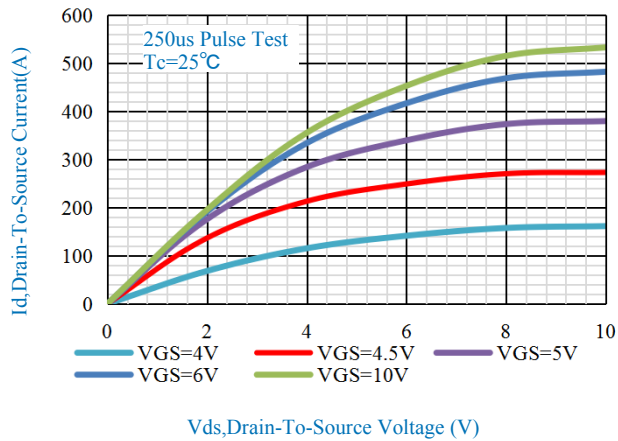


Fig.1-Output Characteristic

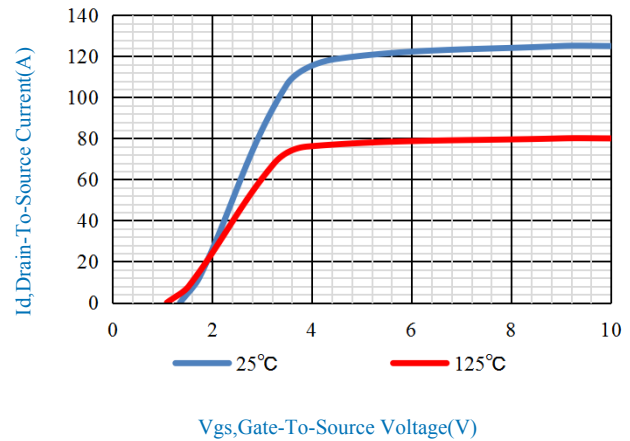


Fig.2-Transfer Characteristic

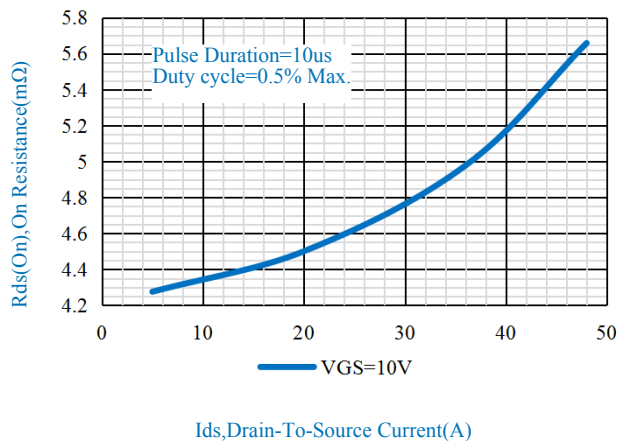


Fig.3-On Resistance Vs. Drain Current

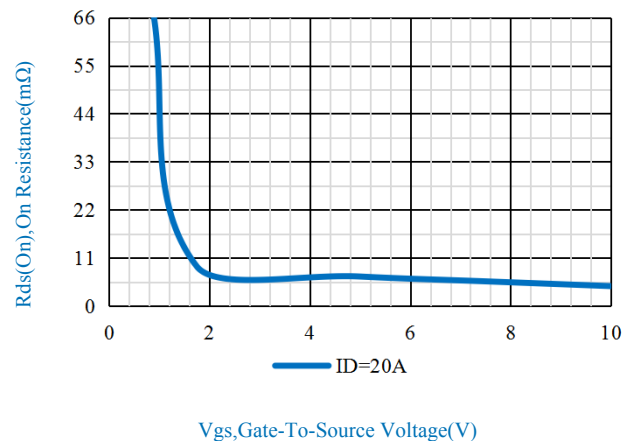


Fig.4-On Resistance Vs. Gate Source Voltage

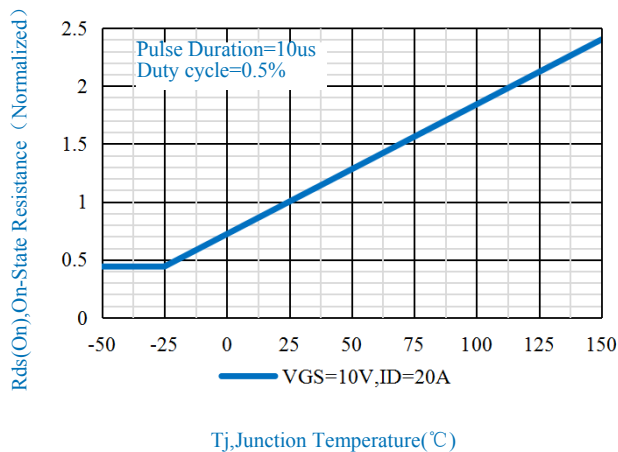


Fig.5-On Resistance Vs. Junction Temperature

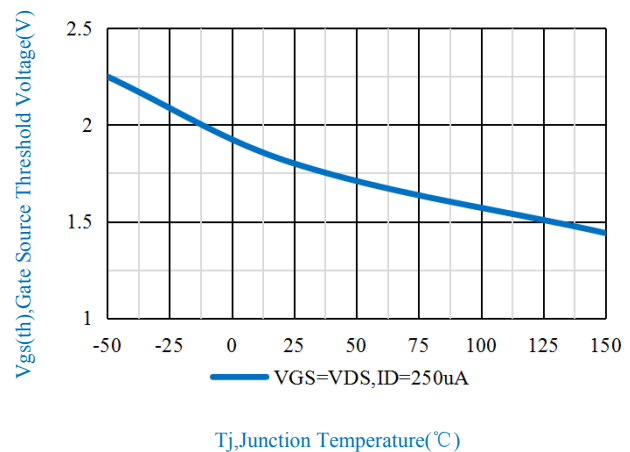


Fig.6-Gate Source Threshold Voltage Vs. Junction Temperature

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Typical Characteristics Curves

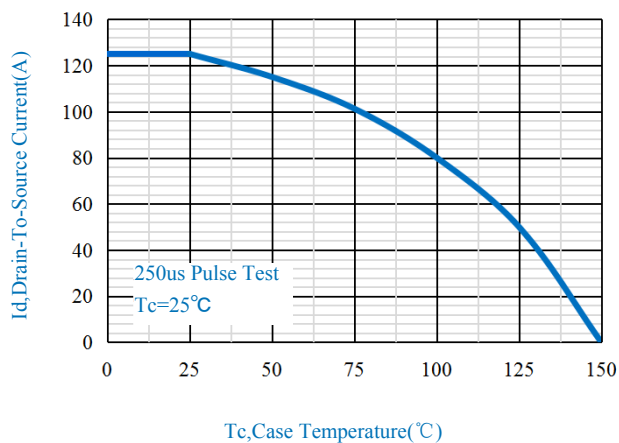


Fig.7-Maximum Continuous Drain Current Vs. Case Temperature

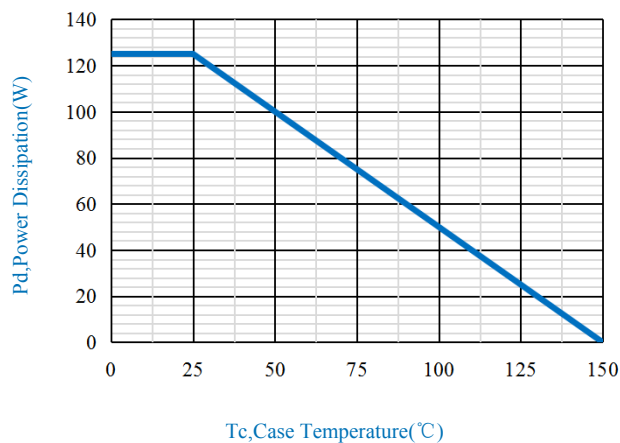


Fig.8-Maximum Power Dissipation Vs. Case Temperature

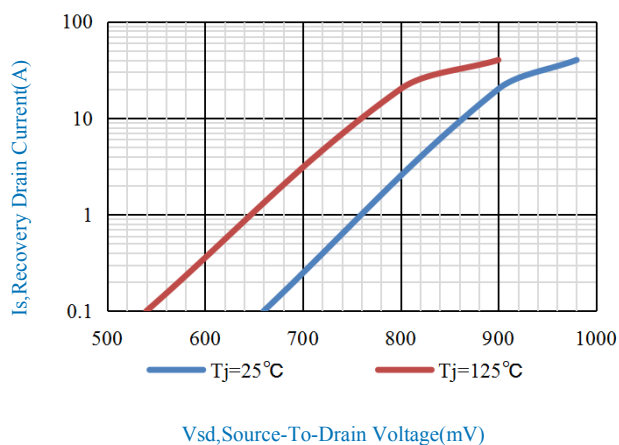


Fig.9-Source-To-Drain Diode Forward Voltage

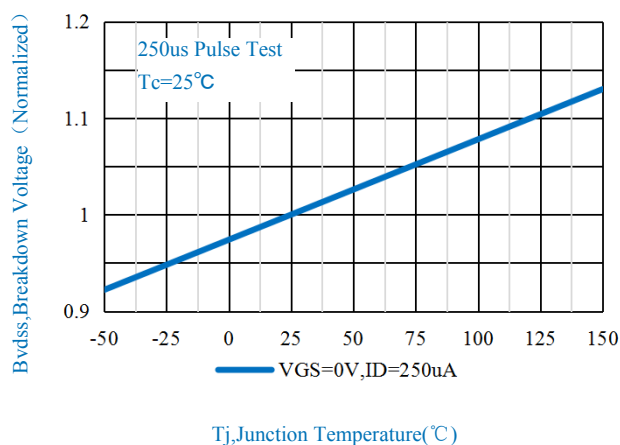


Fig.10-Breakdown Voltage Vs. Junction Temperature

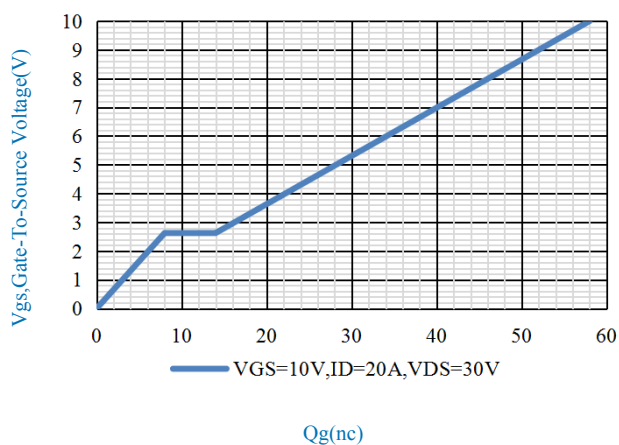


Fig.11-Gate Charge Waveform

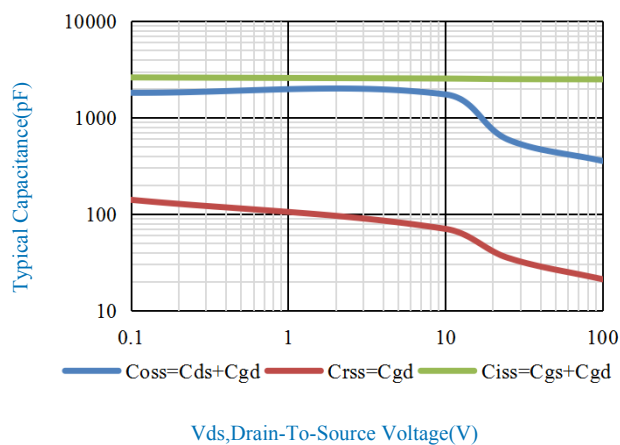


Fig.12-Typical Capacitance Vs. Drain-To-Source Voltage

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Typical Characteristics Curves

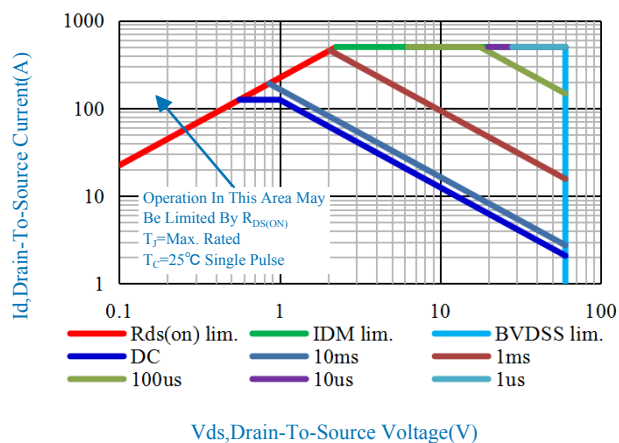


Fig.13-Maximum Safe Operating Area(SOA)

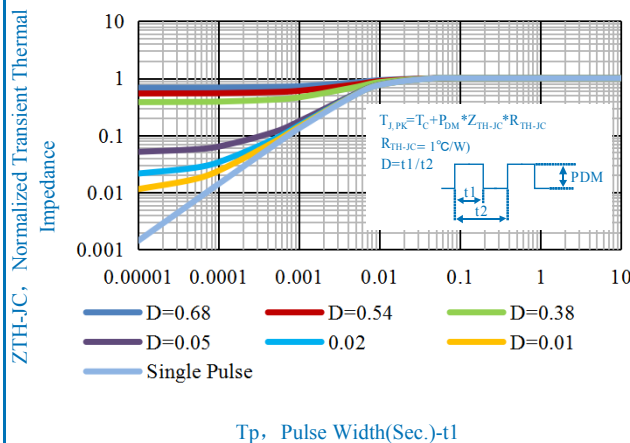


Fig.14- Normalized Maximum Transient Thermal Impedance Vs. Pulse Width

Inductive Load Test Circuit & Waveform

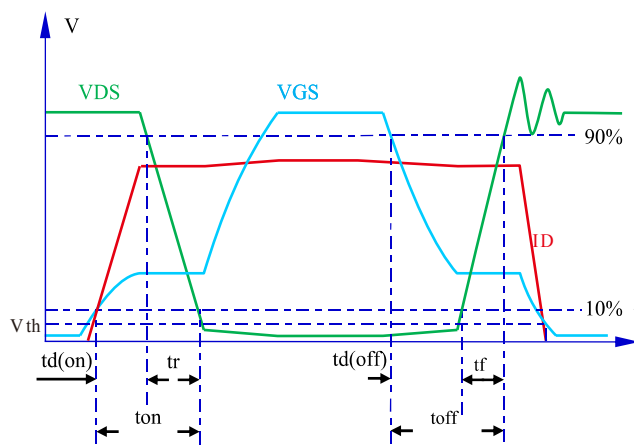
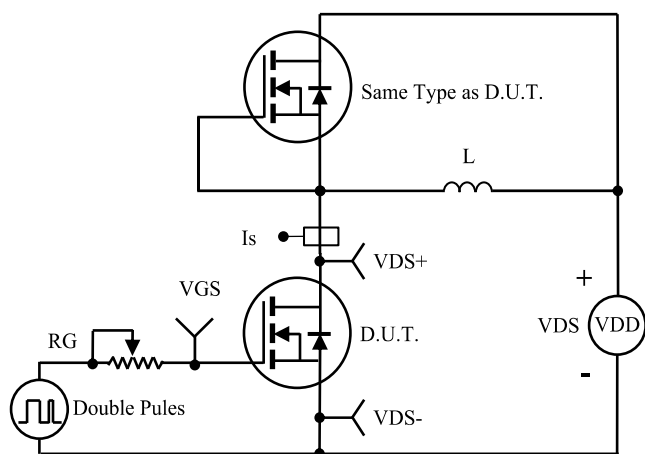


Fig.15- Inductive Switching Test Circuit & Waveform

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Test Circuit & Waveform

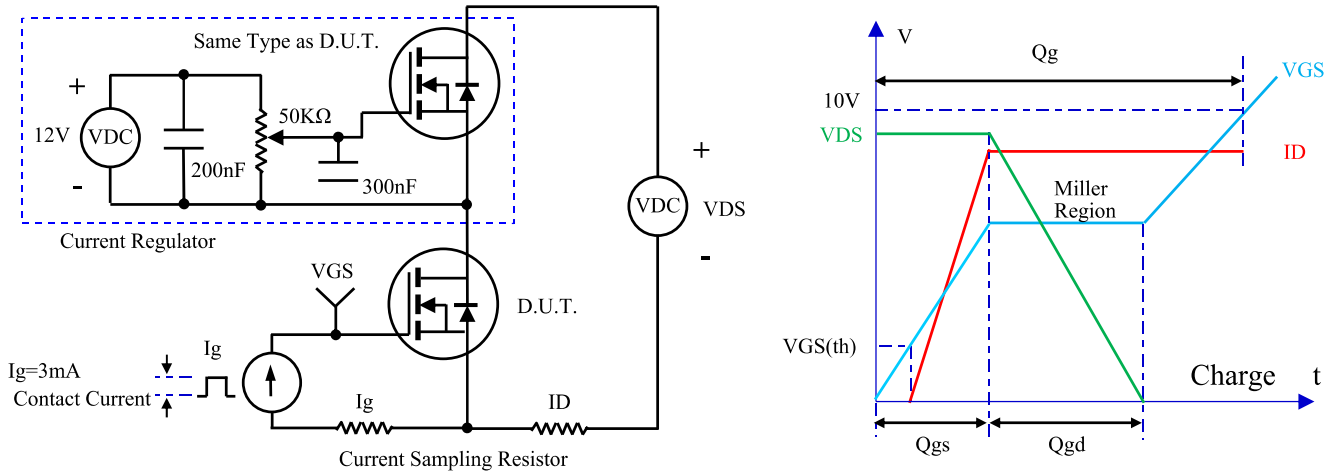


Fig.16-Gate Charge Test Circuit & Waveform

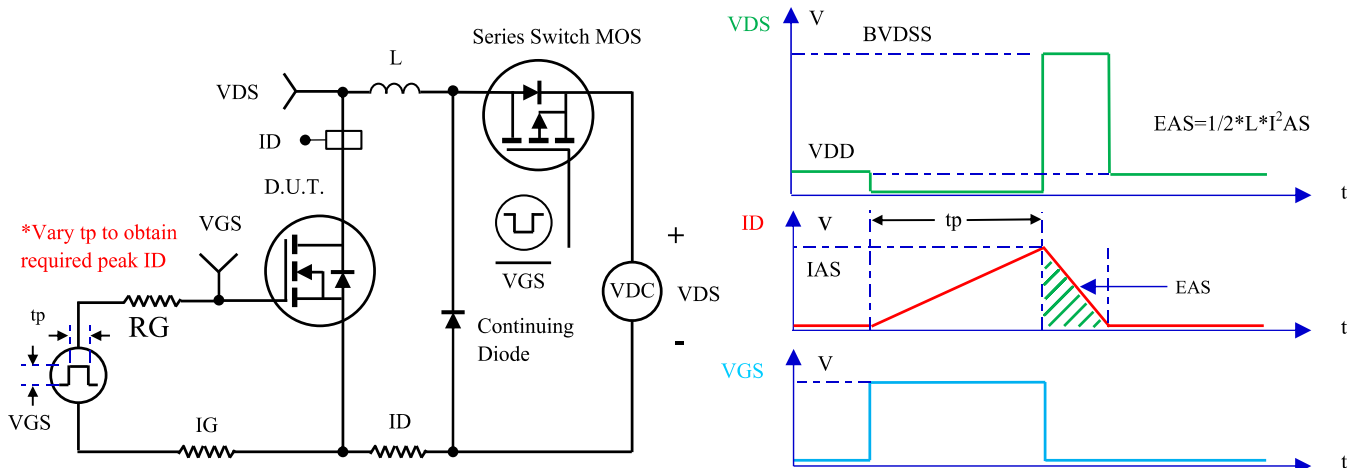


Fig.17- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

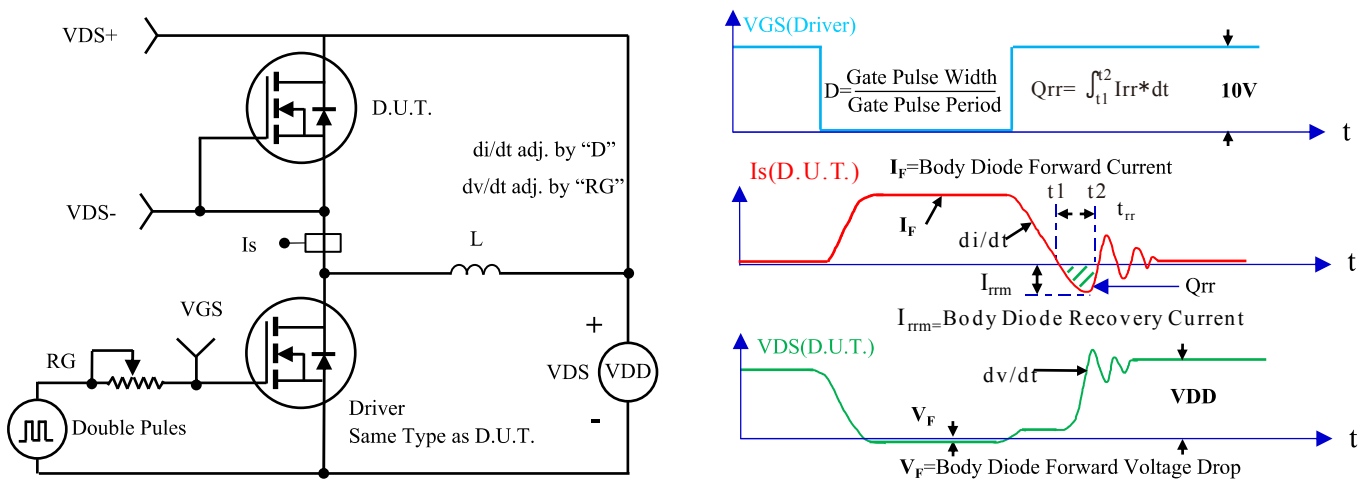


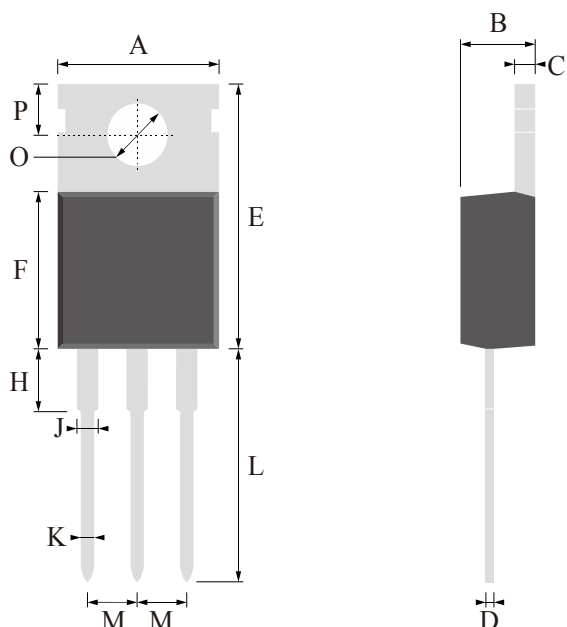
Fig.18- Diode Recovery Test Circuit & Waveform

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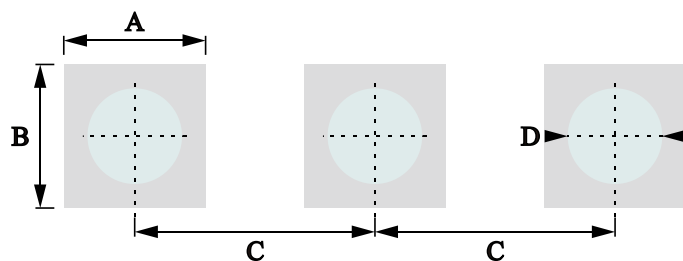
OUTLINE DRAWINGS



TO-220C

OUTLINE DIMENSIONS						
Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.25	-	10.75	0.3642	-	0.4232
B	4.15	-	4.95	0.1634	-	0.1949
C	1.10	-	1.65	0.0433	-	0.0650
D	0.25	-	0.65	0.0098	-	0.0256
E	14.50	-	16.70	0.5709	-	0.6575
F	8.40	-	9.95	0.3307	-	0.3917
L	12.15	-	14.30	0.4783	-	0.5630
H	3.00	-	3.80	0.1181	-	0.1496
J	1.05	-	1.60	0.0413	-	0.0630
K	0.65	-	0.95	0.0256	-	0.0374
M	2.10	-	2.90	0.0827	-	0.1142
O	3.20	-	4.10	0.1260	-	0.1614
P	2.45	-	3.10	0.0965	-	0.1220

RECOMMENDED LAYOUT DRAWINGS



TO-220C

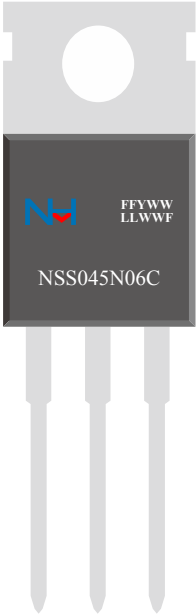
OUTLINE DIMENSIONS						
Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	1.60	-	-	0.0630	-
B	-	1.60	-	-	0.0630	-
C	-	2.54	-	-	0.1000	-
D	-	1.00	-	-	0.0394	-

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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
NSS045N06C=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)
TO-220C	P1	2.057	Tube	50	1000	5000

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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 (t _p)	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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Specification Revision History

Rev.	Date	Changed Items	Pre-Changed Content	Changed Content
A/1	2014-10-20	First Issue		
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