

NTS400N06K



N-Channel Enhancement Mode Trench Power MOSFET

Voltage: 60 Volts

Current: 10 Ampers

Package: SOT-89

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)

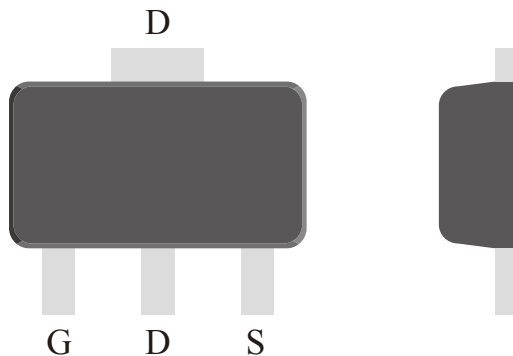
Typical Applications

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

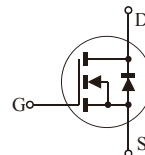
Product Summary

VDS Min.@Tj	60	V
ID Min.@Ta	10	A
RDS(ON)(TYP)@10V	40	mΩ

Diagram:



Polarity:



***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}	60	V
Gate-Source Voltage		V _{GS}	±20	V
Continuous Drain Current (Note 1)	Ta= 25 ℃	I _D	10	A
	Ta= 100 ℃		9	
Drain Current-Pulse (Note 1)	Tj< 175 ℃	I _{DM}	30	A
Maximum Power Dissipation Power Dissipation Derating Factor Above 25℃	Ta= 25 ℃	P _D	4.0	W
	Ta= 100 ℃		2	
Derating Factor		D _F	0.03	W/℃
Avalanche Current,Single Pulse (Note 1)	L= 0.5 mH	I _{AS}	5	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.17	L= 0.5 mH IAS= 5 A, RG= 10.0 Ω Starting Tj=25 ℃, VG= 10.0 V	E _{AS}	6	mJ

Thermal Characteristics (Ta=25℃ Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Typ.	Unit
Junction Temperature		T _J	-55 to 175	℃
Storage Temperature Range		T _{STD}	-55 to 175	℃
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With Ta=25℃	R _{θJA}	37.5	℃/W

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	--	0.06	--	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
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS ID=250uA	V _{GS(TH)}	1	1.7	2.5	V
Drain-Source On Resistance	ID= 5.0 A,VGS= 10.0 V	R _{DS(ON)}	--	40	50	mΩ
	ID= 5.0 A,VGS= 5.0 V		--	45	65	
Dynamic Characteristics						
Input Capacitance	VDS= 30 V	C _{iss}	--	825	--	pF
Output Capacitance	VGS= 0 V	C _{oss}	--	50	--	pF
Reverse Transfer Capacitance	F= 1 MHZ	C _{rss}	--	41	--	pF
Switching Paramters (Test Circuit & Waveform See Fig.15)						
Turn-On Delay Time	VDS= 30 V	t _{d(on)}	--	5	--	ns
Turn-On Rise Time	VGS= 10.0 V	t _r	--	2.6	--	ns
Turn-Off Delay Time	RG= 10.0 Ω	t _{d(off)}	--	16	--	ns
Turn-Off Rise Time	L= 0.5 mH	t _f	--	2.5	--	ns
Gate Charge Paramters (Test Circuit & Waveform See Fig.16)						
Total Gate Charge	VDS= 30 V	Q _g	--	14	--	nC
Gate-Source Charge	VGS= 10.0 V	Q _{gs}	--	3	--	nC
Gate-Drain Charge	ID= 10.0 A	Q _{gd}	--	5.2	--	nC
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.18)						
Max. Diode Forward Cuurent		I _S	--	--	10.0	A
Max. Pulsed Forward Cuurent		I _{SM}	--	--	30	A
Diode Forward Voltage	ID= 5.0 A,VGS=0V	V _{SD}	--	0.7	1.2	V
Reverse Recovery Time	IS= 5.0 A,di/dt= 100 A/us	t _{rr}	--	35	--	ns
Reverse Recovery Charge	VGS= 0.0 V	Q _{rr}	--	53	--	nC
Reverse Recovery Current		I _{RRM}	--	3.0	--	A

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Typical Characteristics Curves

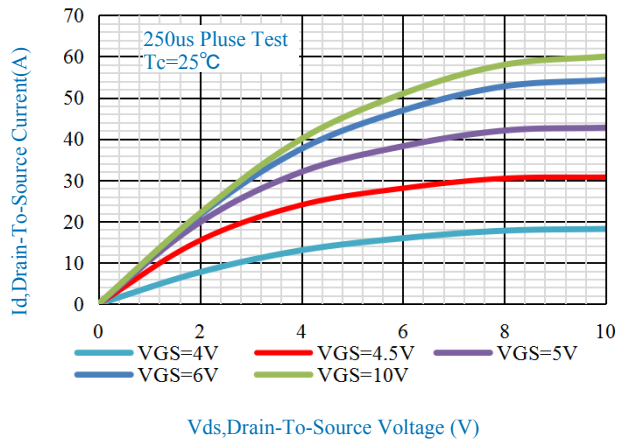


Fig.1-Output Characteristics

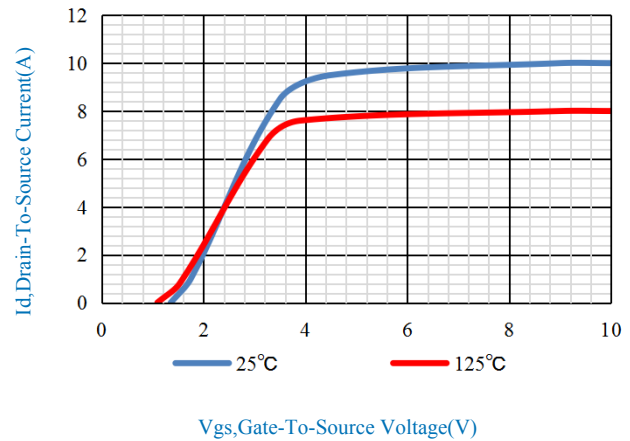


Fig.2-Transfer Characteristics

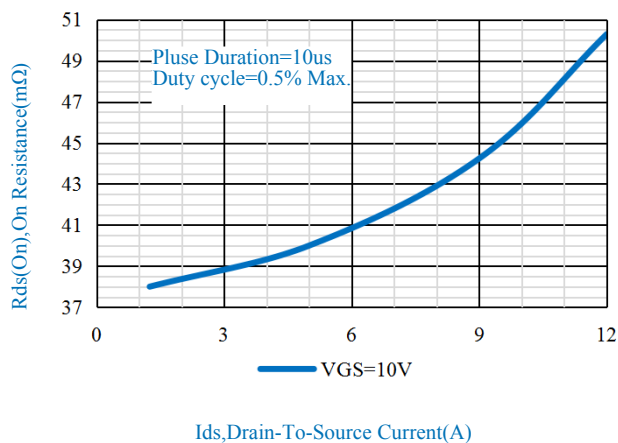


Fig.3-On Resistance Vs. Drain Current

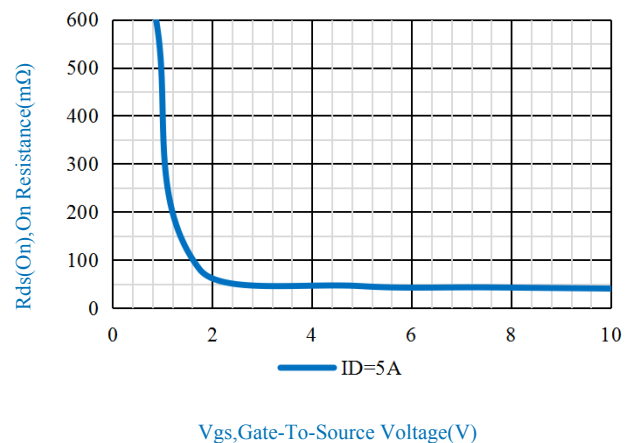


Fig.4-On Resistance Vs. Gate Source Voltage

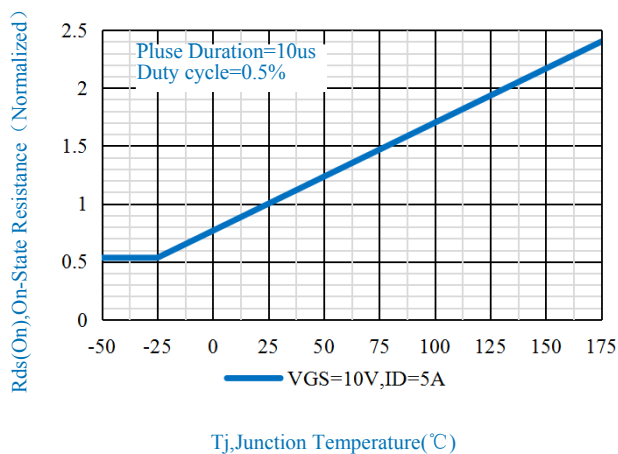


Fig.5-On Resistance Vs. Junction Temperature

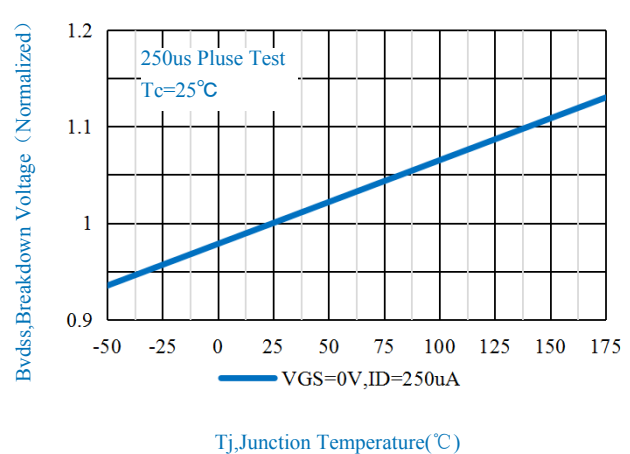


Fig.6-Breakdown Voltage Vs. Junction Temperature

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Typical Characteristics Curves

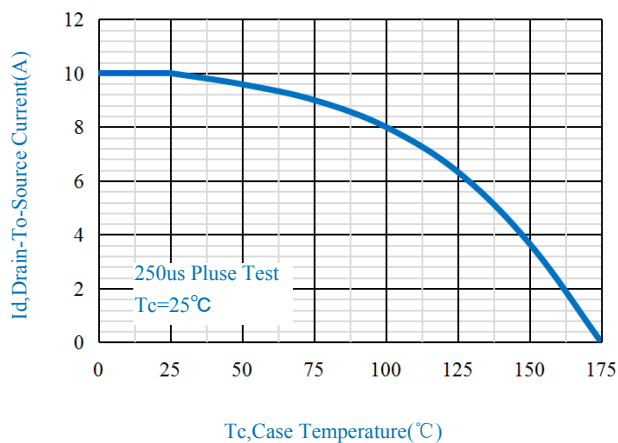


Fig.7-Maximum Continuous Drain Current Vs. Case Temperature

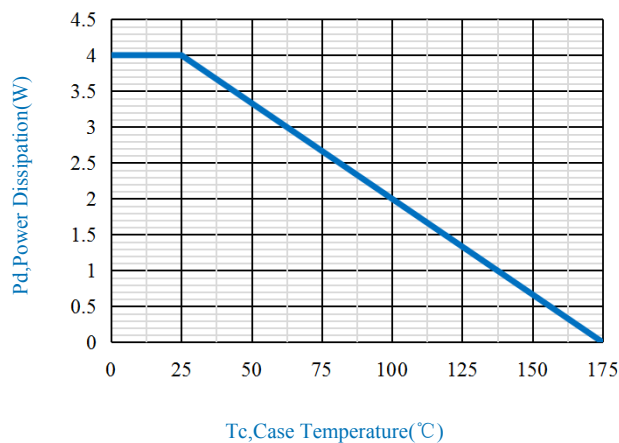


Fig.8-Maximum Power Dissipation Vs. Case Temperature

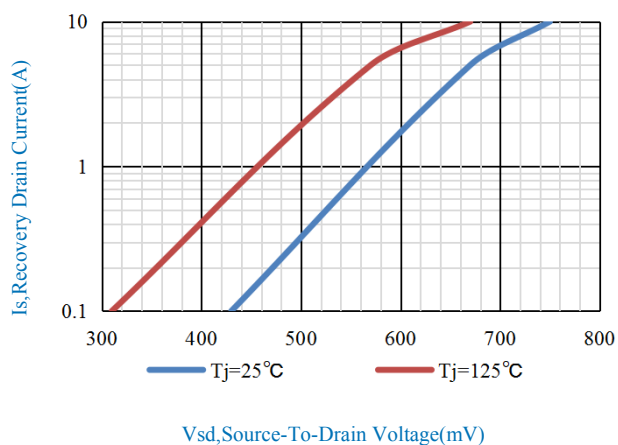


Fig.9-Source-To-Drain Diode Forward Voltage

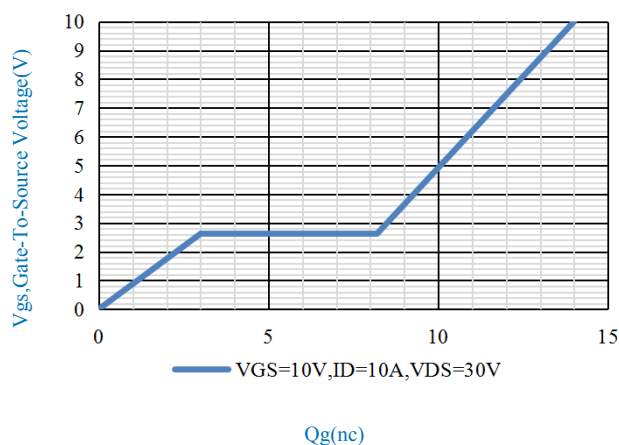


Fig.10-Gate Charge Waveform

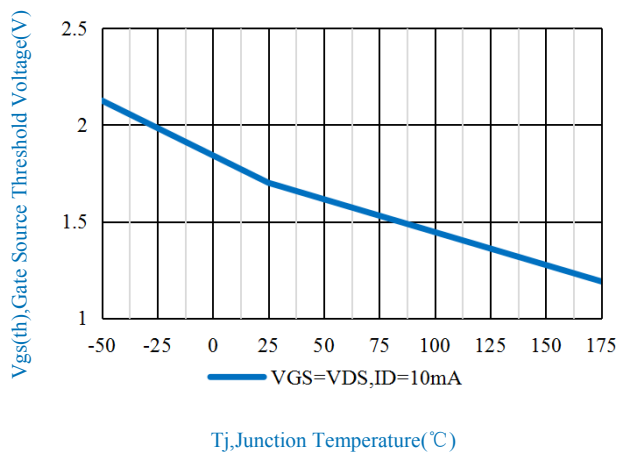


Fig.11-Gate Source Threshold Voltage Vs. Junction Temperature

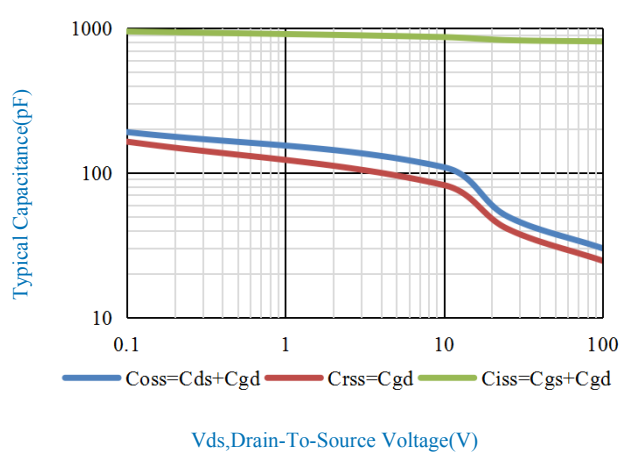


Fig.12-Typical Capacitance Vs. Drain-To-Source Voltage

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Typical Characteristics Curves

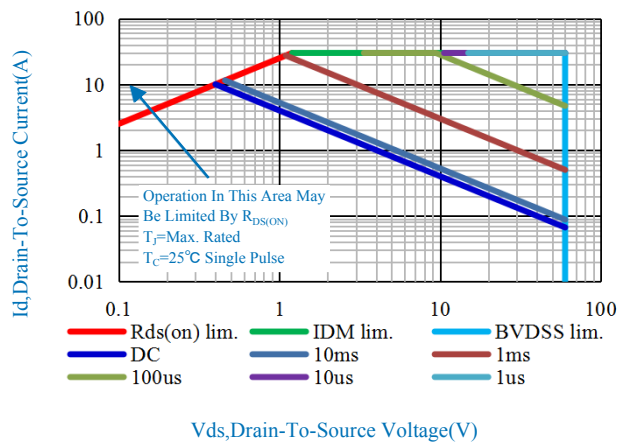


Fig.13-Maximum Safe Operating Area(SOA)

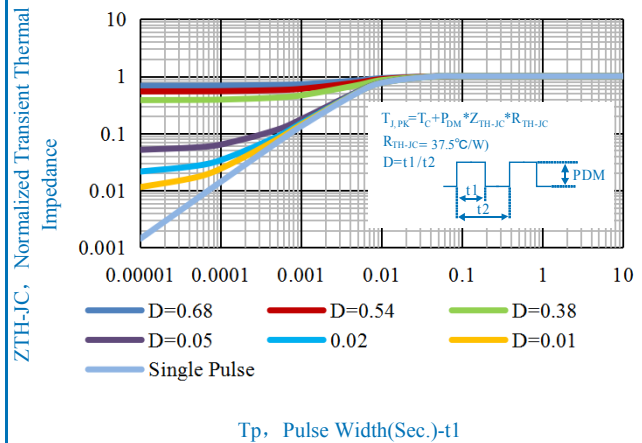


Fig.14- Normalized Maximum Transient Thermal Impedance Vs. Pulse Width

Test Circuit & Waveform

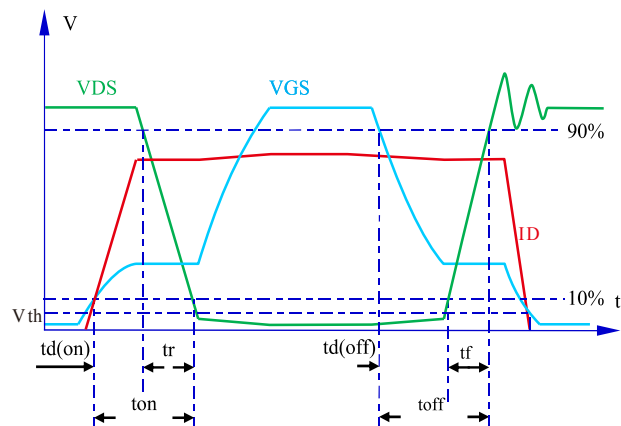
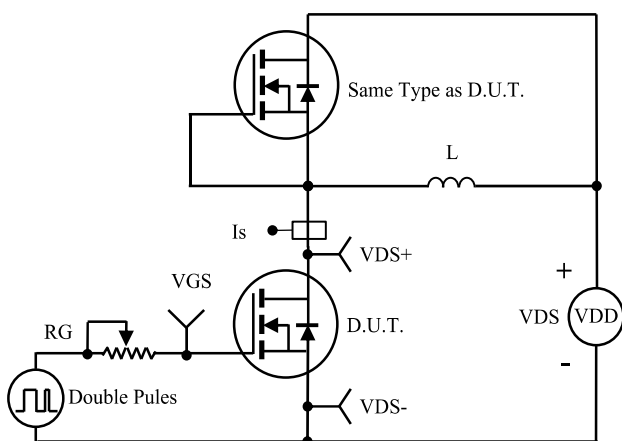


Fig.15- Inductive Switching Test Circuit & Waveform

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Test Circuit & Waveform

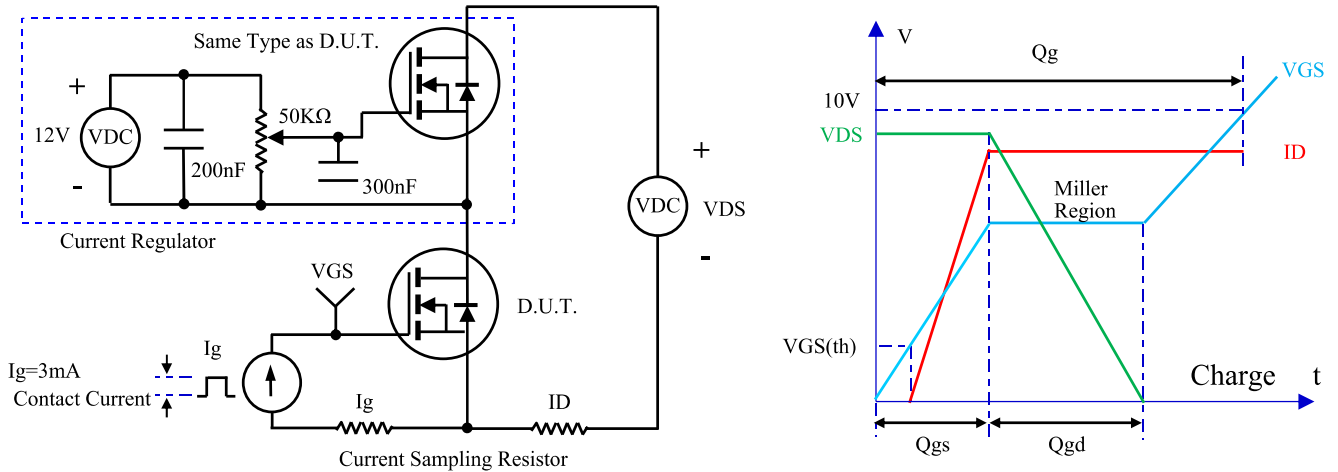


Fig.16-Gate Charge Test Circuit & Waveform

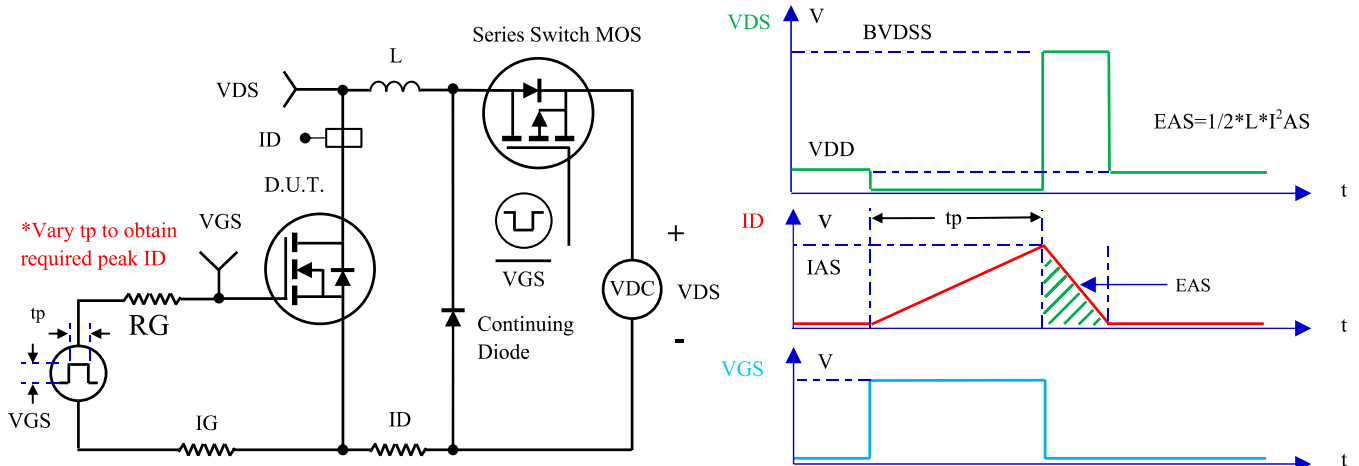


Fig.17- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

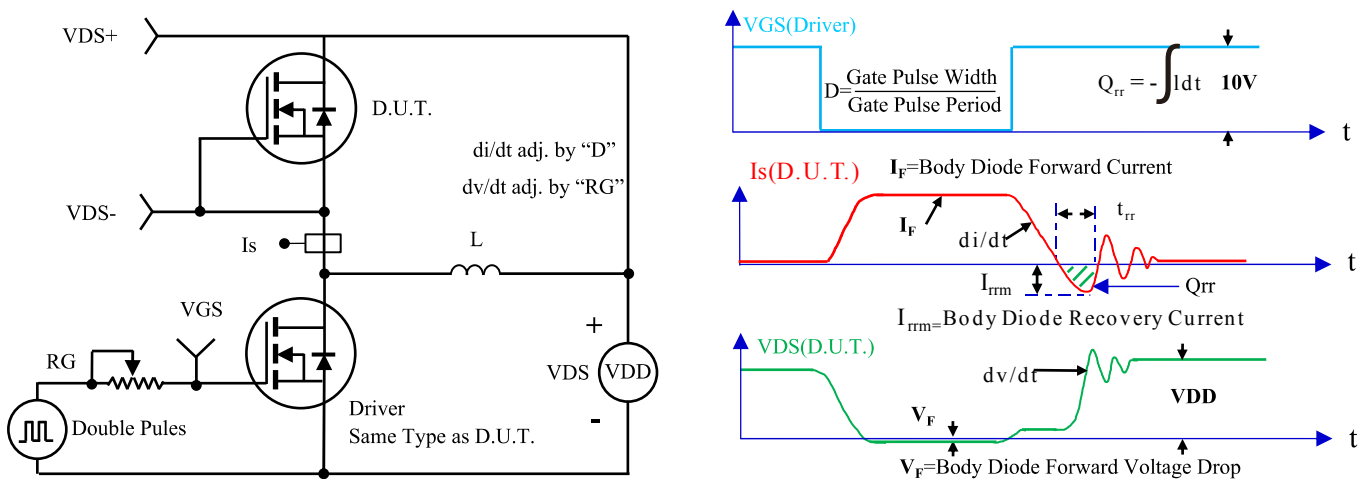


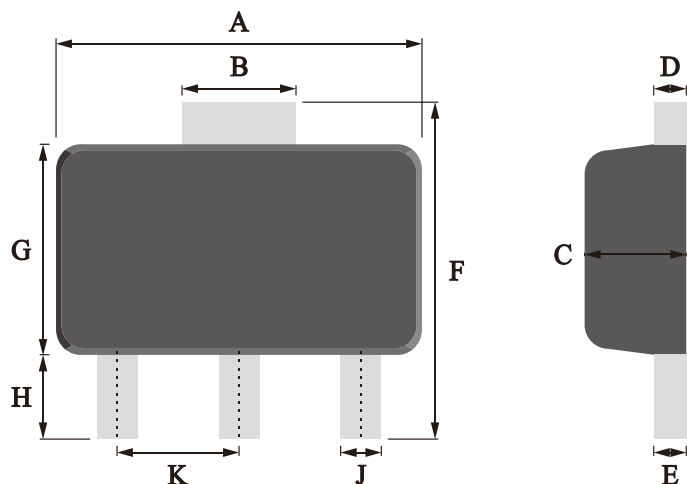
Fig.18- Diode Recovery Test Circuit & Waveform

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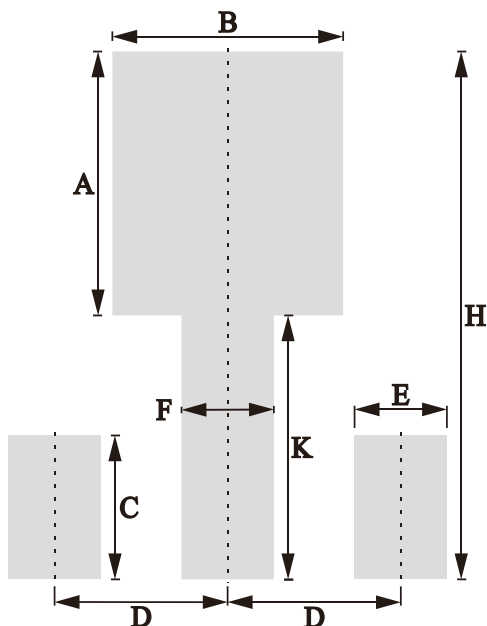
OUTLINE DRAWINGS



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OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.00	-	5.00	0.1575	-	0.1969
B	1.40	-	1.80	0.0551	-	0.0709
C	1.25	-	1.75	0.0492	-	0.0689
D	0.20	-	0.60	0.0079	-	0.0236
E	0.20	-	0.60	0.0079	-	0.0236
F	3.60	-	4.40	0.1417	-	0.1732
G	2.20	-	2.80	0.0866	-	0.1102
H	0.80	-	1.20	0.0315	-	0.0472
J	0.30	-	0.70	0.0118	-	0.0276
K	1.25	-	1.75	0.0492	-	0.0689

RECOMMENDED LAYOUT DRAWINGS



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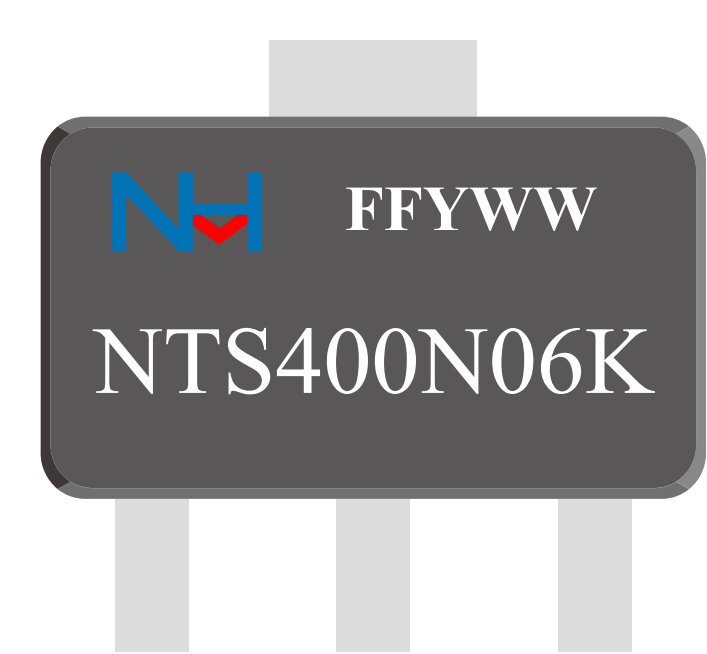
OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	2.20	-	-	0.0866	-
B	-	2.00	-	-	0.0787	-
C	-	1.20	-	-	0.0472	-
D	-	1.50	-	-	0.0591	-
E	-	0.80	-	-	0.0315	-
F	-	0.80	-	-	0.0315	-
H	-	47.00	-	-	1.8504	-
K	-	2.20	-	-	0.0866	-

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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
NTS400N06K=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)
SOT-89	P1	0.055	7" Reel	1000	10000	40000

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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 _{Smin}) -Temperature Max (T _{Smax}) -Time(ts min to ts 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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Specification Revision History

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