

NCH75R800S

N-Channel Silicon Carbide MOSFET



Voltage: 750 Volts

Current: 6.0 Ampers

Package: TO-252

Features

- NH'S Advanced Silicon Carbide MOSFET Technology
- High Blocking Voltage And Low Capacitances
- High-Speed Switching For Very Low Switching Losses
- Excellent $Q_g \cdot R_{ds(on)}$ Product(FOM)

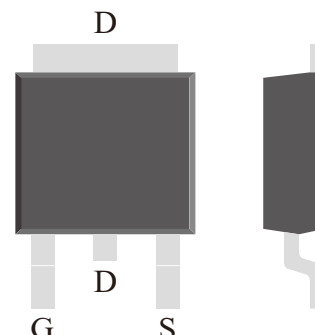
Typical Applications

- High Voltage DC/DC Converters
- Adaptor And Charger
- Battery Chargers And Motor Drives
- LED Drives And LED Lighting

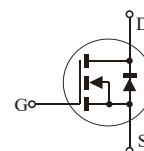
Product Summary

V _{DS} Min.@T _j	750	V
I _D Min.@T _a	6.0	A
R _{DS(ON)} (TYP)@18V,T _j =25°C	800	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}	750	V
Gate-Source Voltage		V _{GS} MAX. V _{GS} O.P.	-10/+22 0/+15 or 18	V
Continuous Drain Current (Note 1)	T _a = 25 °C T _a = 100 °C	I _D	6.0 4.8	A
Drain Current-Pulse(Note 1)	T _j < 175 °C	I _{DM}	18	A
Maximum Power Dissipation Power	T _a = 25 °C	P _D	32	W
Dissipation Derating Factor Above 25°C	T _a = 100 °C		16	
Derating Factor		D _F	0.21	W/°C
Avalanche Current,Single Pulse (Note 1)	L= 0.5 mH	I _{AS}	6.5	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.22	L= 0.5 mH I _{AS} = 6.5 A,R _G = 10.0 Ω Starting T _j =25 °C,V _G = 18.0 V	E _{AS}	10.6	mJ

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

Parameter	Test Conditions	Symbol	Typ.	Unit
Junction Temperature		T _J	-55 to 175	°C
Storage Temperature Range		T _{STD}	-55 to 175	°C
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With T _a =25°C	R _{θJA}	50	°C/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 1 in2 FR-4 Board With 2oz. Copper	R _{θJC}	4.76	

Notes: 1.Pulse Width Limited By Max. Junction Temperature. (See Fig. 19).

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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=100uA	BV _{DSS}	750	--	--	V
Zero Gate Voltage Drain Current	VDS= 0 V,VGS=0V,Tj=25°C	I _{DSS}	--	0.1	20	uA
	VDS= 750 V,VGS=0V,Tj=175°C		--	3	--	
Gate To Source Leakage Current	VGS= 22 V,VDS=0V	I _{GSS}	--	--	250	nA
Source To Gate Leakage Current	VGS= -10 V,VDS=0V	I _{SGS}	--	--	250	nA
Forward Transconductance	ID= 2.6 A,VDS= 20 V,Tj=25°C	g _{fs}	--	0.9	--	S
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS, ID=10mA ,Tj=25°C	V _{GS(th)}	2	2.8	4	V
	VGS= VDS, ID=10mA ,Tj=175°C		--	2.0	--	
Drain-Source On Resistance	ID= 2.6 A,VGS= 18.0 V,Tj=25°C	R _{DS(ON)}	--	800	950	mΩ
	ID= 2.6 A,VGS= 18.0 V,Tj=175°C		--	1000	1188	
	ID= 2.6 A,VGS= 15.0 V,Tj=25°C		--	1024	1425	
	ID= 2.6 A,VGS= 15.0 V,Tj=175°C		--	1106	1539	
Dynamic Characteristics						
Input Capacitance	VDS= 650 V	C _{iss}	--	68	--	pF
Output Capacitance	VGS= 0 V	C _{oss}	--	12	--	pF
Reverse Transfer Capacitance	F= 1 MHZ	C _{rss}	--	1.8	--	pF
Internal Gate Resistance	VGS=0V,VDS=0V,Freq.=1MHz	R _{g(int)}	--	10	--	Ω
Switching Paramters (Test Circuit & Waveform See Fig.20)						
Turn-On Delay Time	VDS= 400 V ID= 2.6 A	Tj=25°C	t _{d(on)}	--	1	ns
		Tj=175°C		--	0.95	
Turn-On Rise Time	VGS= 0/+18 V Rg(ext)= 10.0 Ω	Tj=25°C	t _r	--	6	ns
		Tj=175°C		--	5.7	
Turn-Off Delay Time	L= 600 μH	Tj=25°C	t _{d(off)}	--	3	ns
		Tj=175°C		--	3.7	
Turn-Off Rise Time		Tj=25°C	t _f	--	19	ns
		Tj=175°C		--	19.2	
Turn-On Switching Loss		Tj=25°C	E _{on}	--	8.2	μJ
		Tj=175°C		--	7.8	
Turn-Off Switching Loss		Tj=25°C	E _{off}	--	4.0	μJ
		Tj=175°C		--	4.0	
Total Switching Energy		Tj=25°C	E _{tot}	--	12.2	μJ
		Tj=175°C		--	11.8	

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

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Gate Charge Parameters (Test Circuit & Waveform See Fig.21)						
Total Gate Charge	VDS= 400 V	Q_g	--	5.9	--	nC
Gate-Source Charge	VGS= 0/+18 V	Q_{gs}	--	1.5	--	nC
Gate-Drain Charge	ID= 2.6 A	Q_{gd}	--	3.5	--	nC
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.23)						
Max. Diode Forward Current	Tj= 25 °C	I_s	--	--	6.0	A
tp Limited by Tj(max)	Tj= 100 °C		--	--	4.8	A
Max. Pulsed Forward Current		I_{SM}	--	--	18	A
Diode Forward Voltage	ID= 1.8 A, VGS=-4V	V_{SD}	--	5.1	--	V
			--	4.3	--	
Reverse Recovery Time	IS= 3.0 A di/dt= 1000.0 A/us	Tj=25°C t_{rr}	--	33	--	ns
		Tj=175°C	--	37.3	--	
Reverse Recovery Charge	VGS= 0.0 V VDS= 400 V	Tj=25°C Q_{rr}	--	23	--	nC
		Tj=175°C	--	26.5	--	
Reverse Recovery Current		Tj=25°C I_{rrm}	--	1.0	--	A
		Tj=175°C	--	1.4	--	
Reverse Recovery Energy		Tj=25°C E_{rr}	--	6.6	--	μJ
		Tj=175°C	--	10.6	--	

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Typical Characteristics Curves

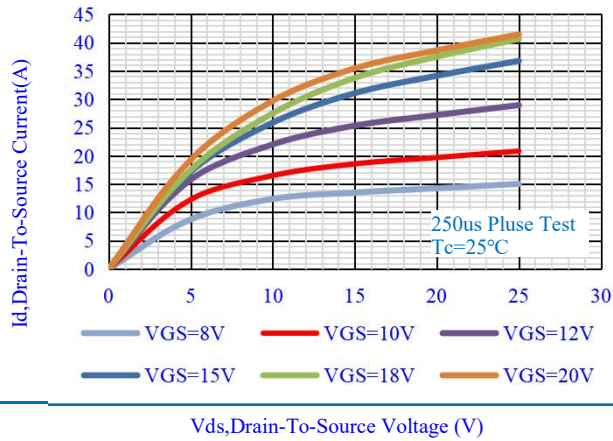


Fig.1-Output Characteristics@Tj=25°C

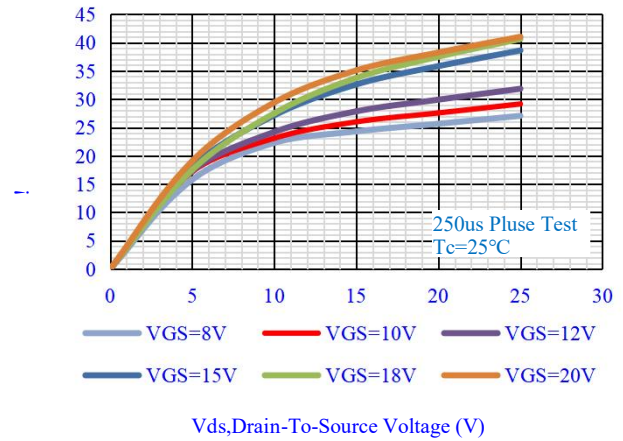


Fig.2-Output Characteristics@Tj=175°C

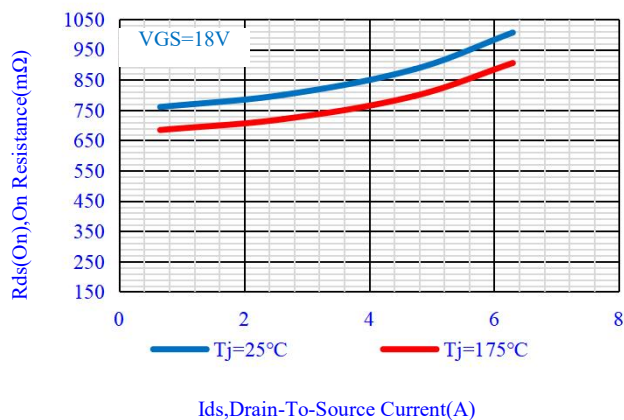


Fig.3-On Resistance Vs. Drain Current

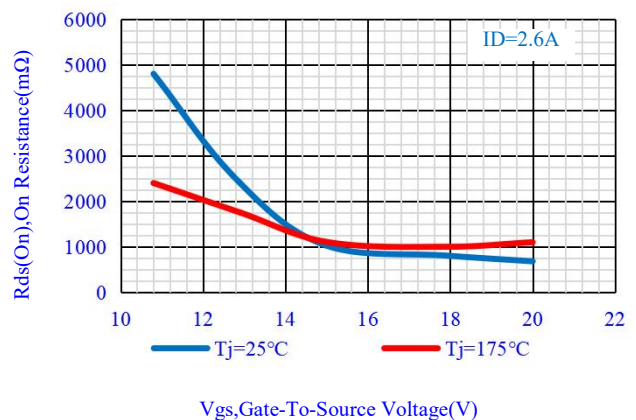


Fig.4-On Resistance Vs. Gate Source Voltage

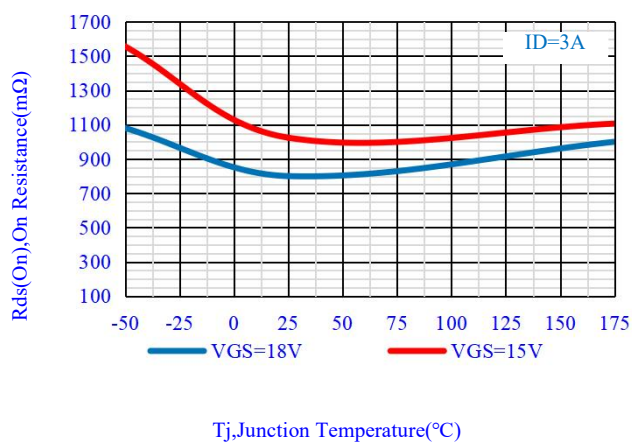


Fig.5-On Resistance Vs. Junction Temperature

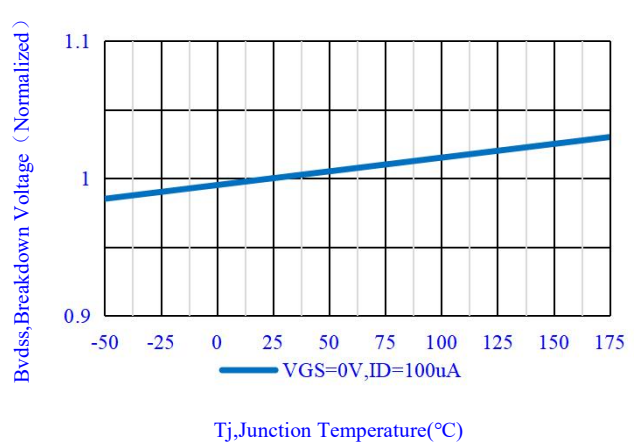


Fig.6-Breakdown Voltage Vs. Junction Temperature

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Typical Characteristics Curves

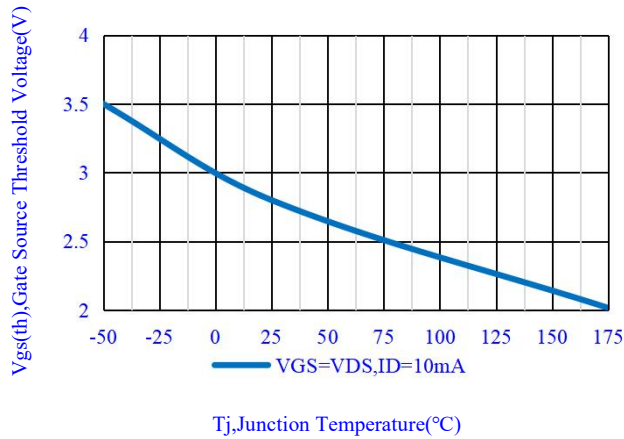


Fig.7-Gate Source Threshold Voltage Vs. Junction Temperature

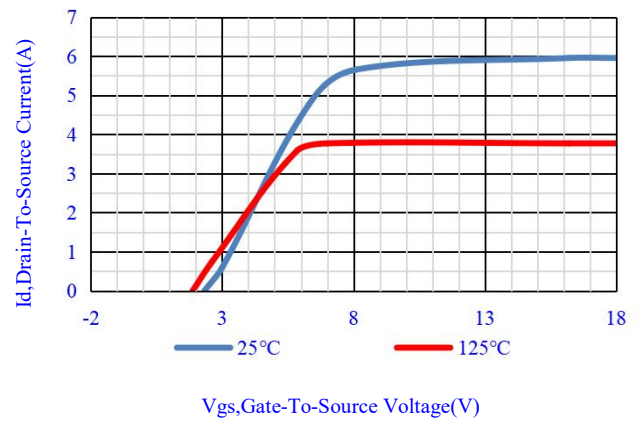


Fig.8-Transfer Characteristics

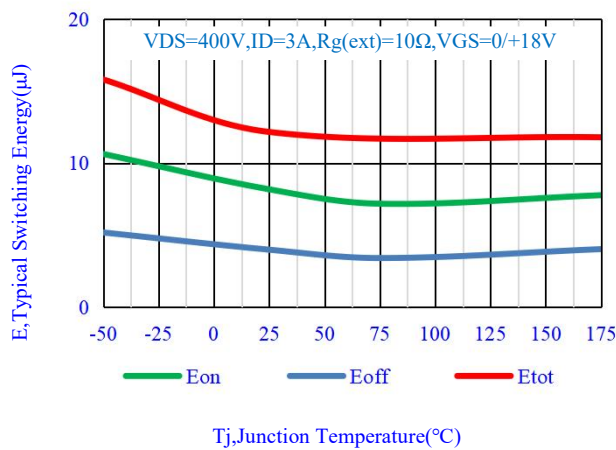


Fig.9-Typical Switching Energy Vs. Junction Temperature

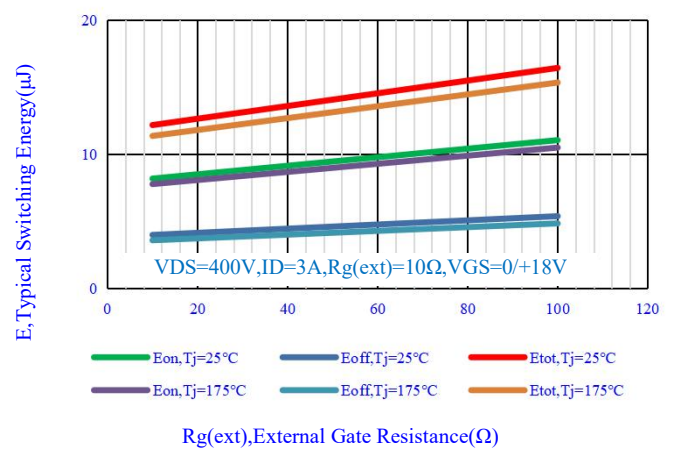


Fig.10-Typical Switching Energy Vs. External Gate Resistance

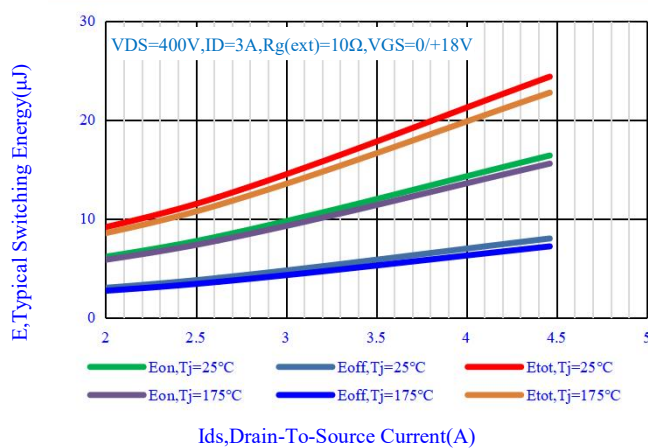


Fig.11-Typical Switching Energy Vs. Drain Source Current

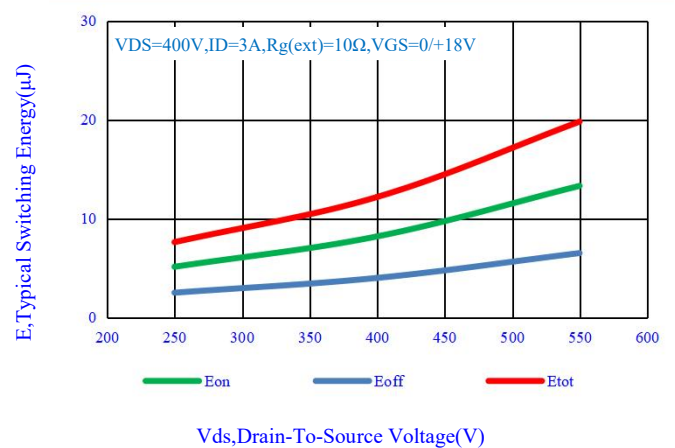


Fig.12-Typical Switching Energy Vs. Drain Source Voltage

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Typical Characteristics Curves

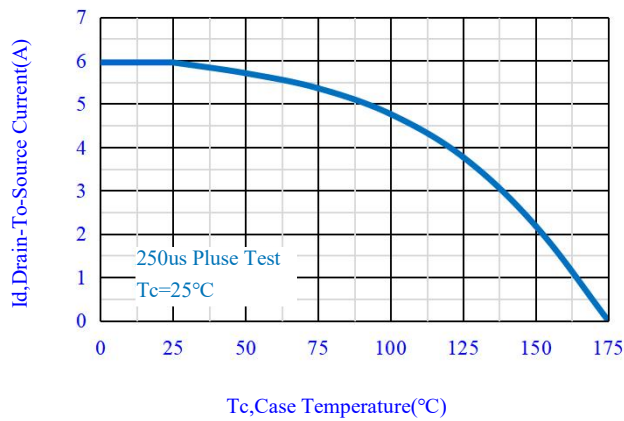


Fig.13-Maximum Continuous Drain Current Vs. Case Temperature

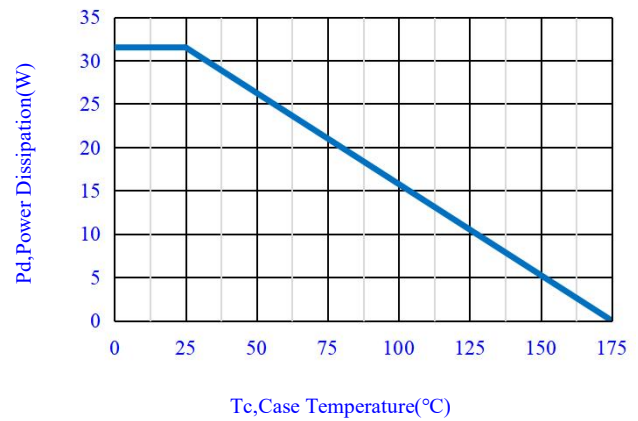


Fig.14-Maximum Power Dissipation Vs. Case Temperature

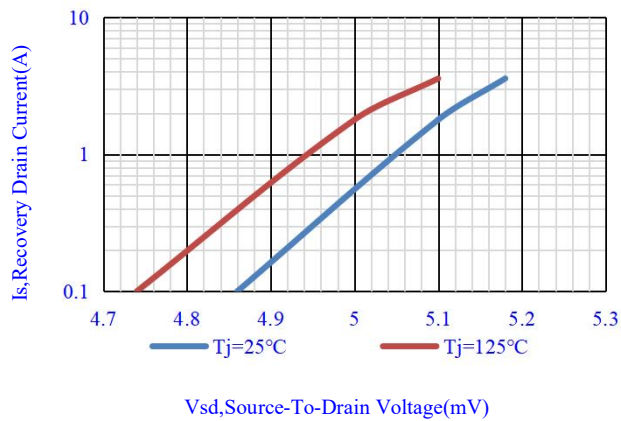


Fig.15-Source-To-Drain Diode Forward Voltage

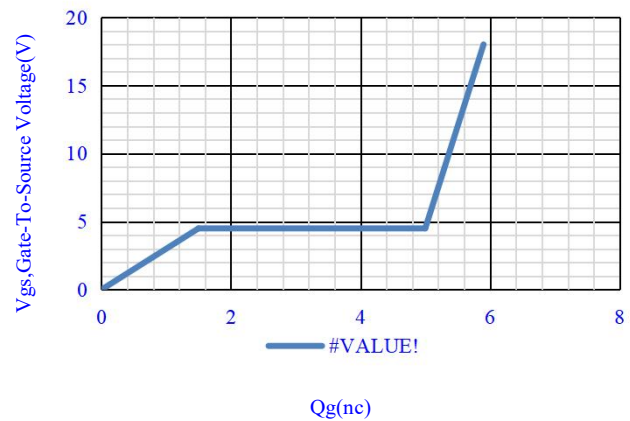


Fig.16-Gate Charge Waveform

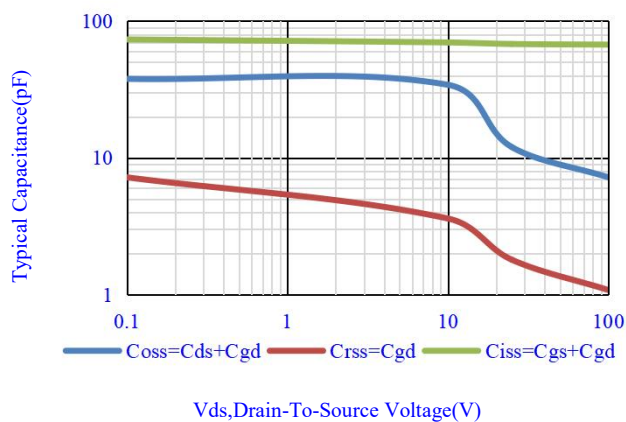


Fig.17-Typical Capacitance Vs. Drain-To-Source Voltage

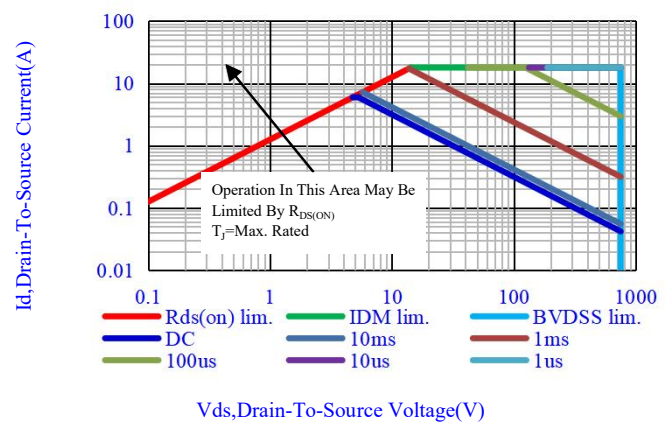


Fig.18-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

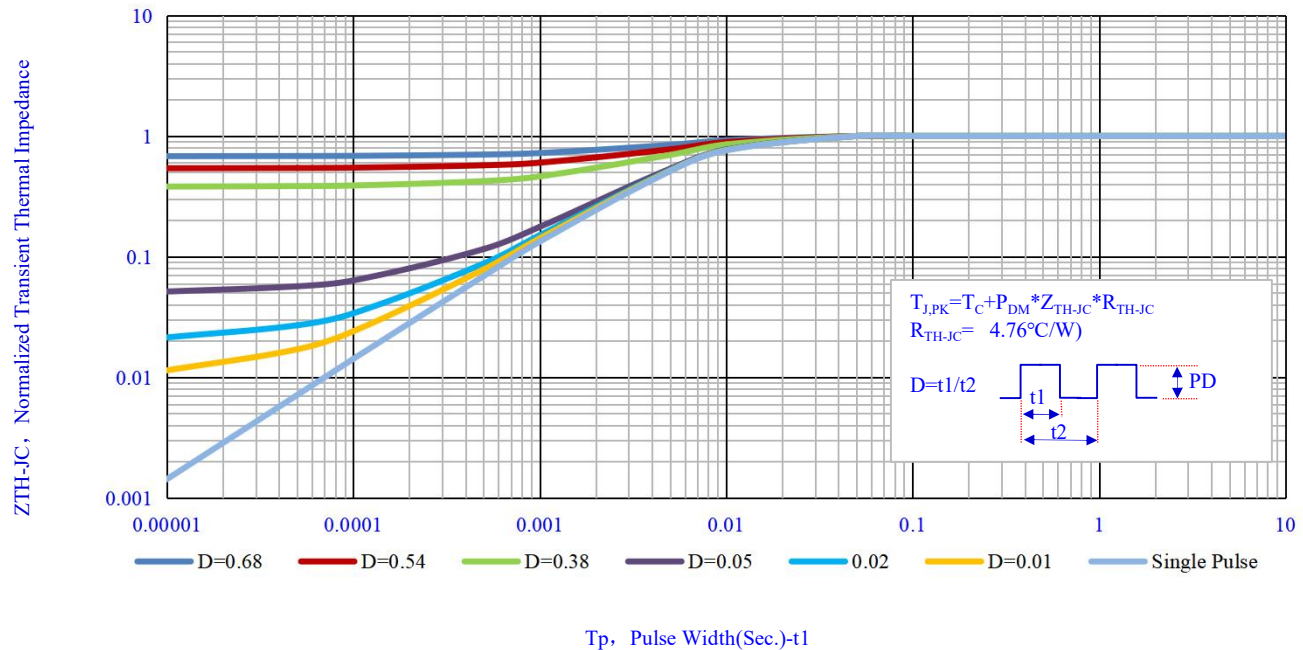


Fig.19- Normalized Maximum Transient Thermal Impedance Vs.Pulse Width

Test Circuit & Waveform

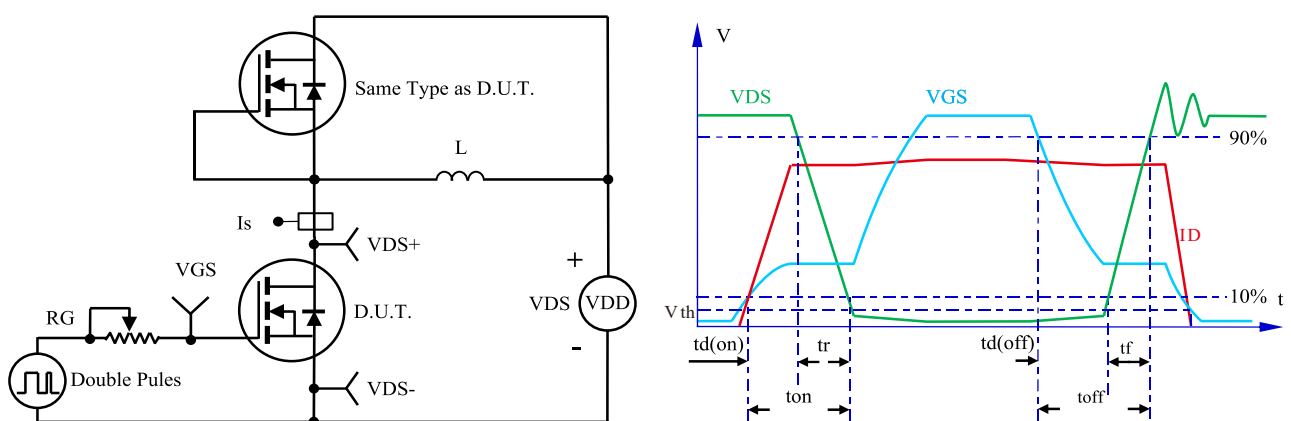


Fig.20- Inductive Switching Test Circuit & Waveform

Test Circuit & Waveform

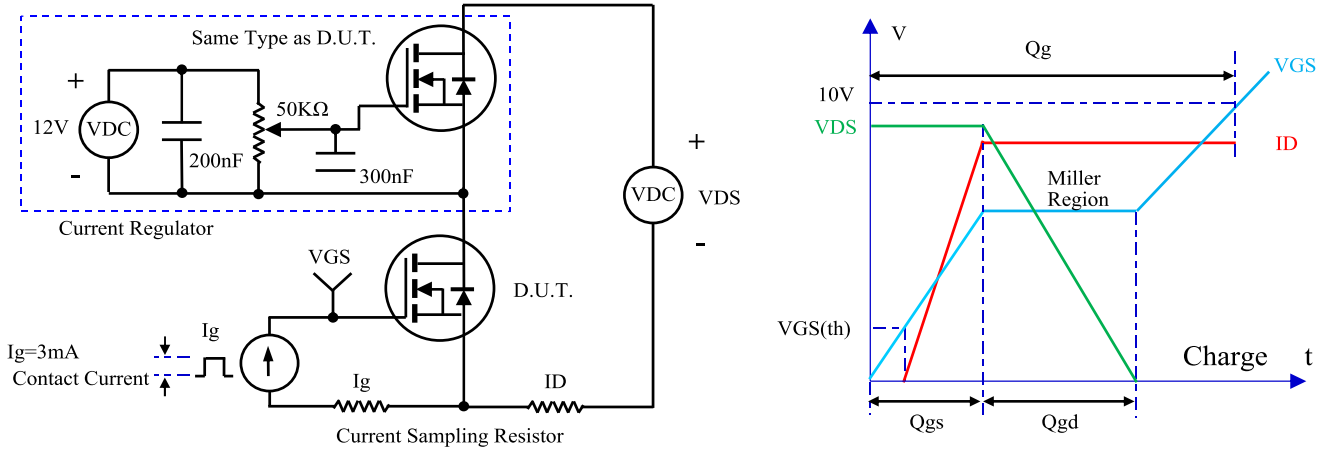


Fig.21-Gate Charge Test Circuit & Waveform

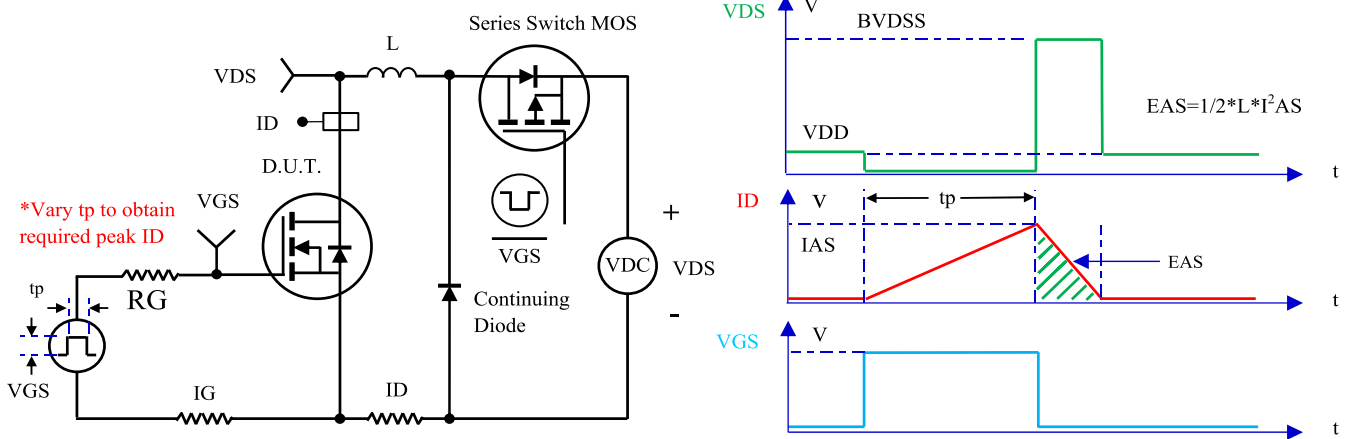


Fig.22- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

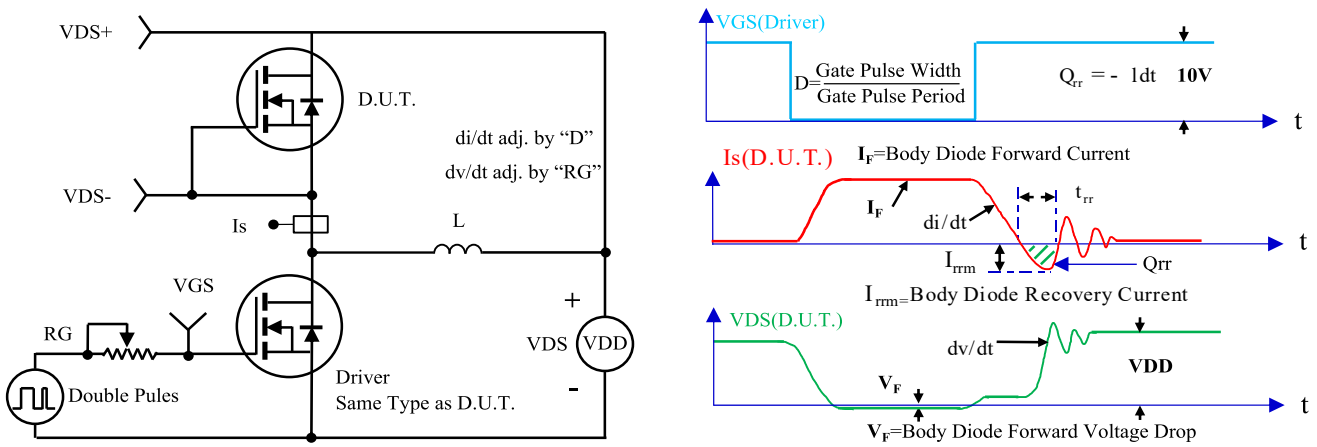


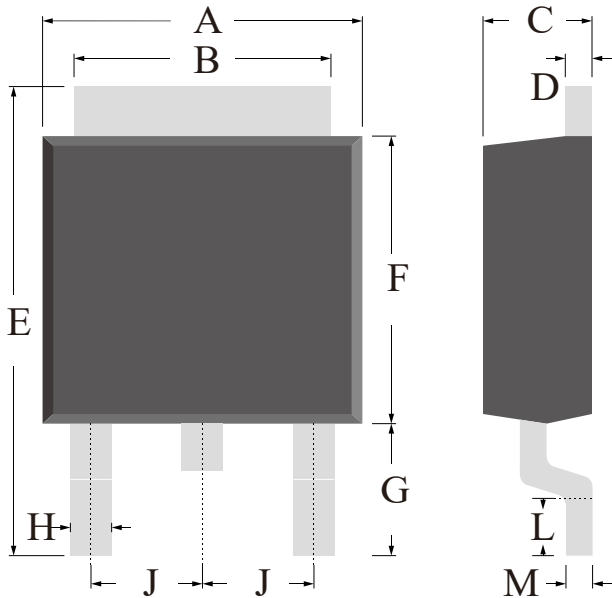
Fig.23- Diode Recovery Test Circuit & Waveform

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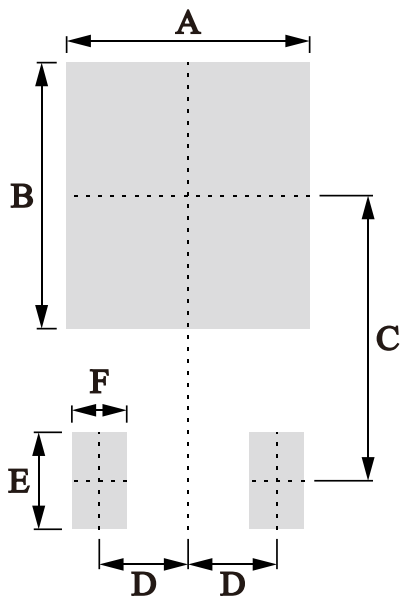
OUTLINE DRAWINGS



TO-252

OUTLINE DIMENSIONS						
Dim.	Millimeters			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

RECOMMENDED LAYOUT DRAWINGS



TO-252

OUTLINE DIMENSIONS						
Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	6.09	-	-	0.2398	-
B	-	7.57	-	-	0.2980	-
C	-	6.64	-	-	0.2614	-
D	-	2.30	-	-	0.0906	-
E	-	2.76	-	-	0.1087	-
F	-	1.42	-	-	0.0559	-

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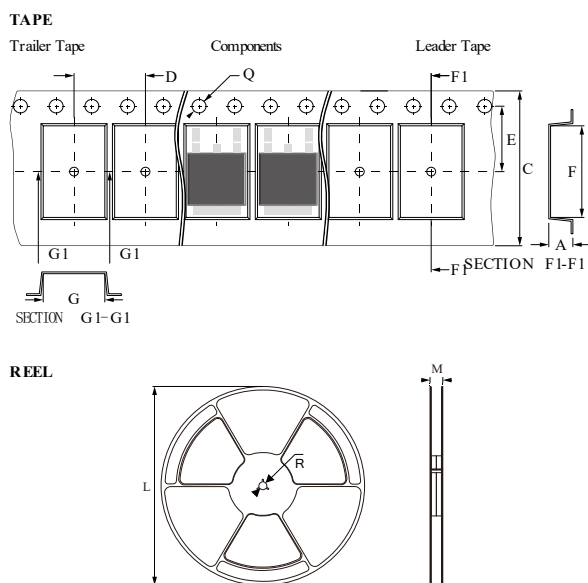
MARKING INFORMATION



MARKING INSTRUCTIONS

NH=Nihang Trademark
FF=Product Line Code,According To Actual Changes
YWW=Date Code,According To Actual Changes
LLWWF=Internal Code,According To Actual Changes
NCH75R800S=Model

PACKAGING



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	Product 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

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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	2025-10-20	First Issue		
		Blank Below		