

NCH75R300S

N-Channel Silicon Carbide MOSFET



Voltage: 750 Volts

Current: 8.8 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)

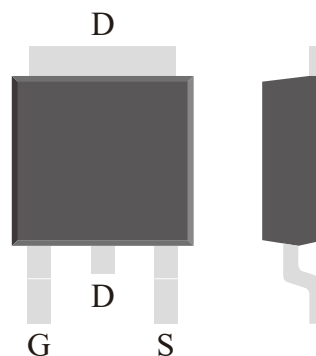
Typical Applications

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

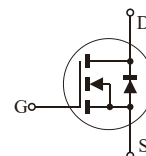
Product Summary

VDS Min.@Tj	750	V
Id Min.@Ta	8.8	A
RDS(ON)(TYP)@18V,Tj=25°C	300	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}	750	V
Gate-Source Voltage		$V_{GS\ MAX.}$ $V_{GS\ O.P.}$	-10/+22 0/+15 or 18	V
Continuous Drain Current (Note 1)	Ta= 25 °C Ta= 100 °C	I_D	8.8 7.1	A
Drain Current-Pulse (Note 1)	Tj< 175 °C	I_{DM}	16	A
Maximum Power Dissipation Power	Ta= 25 °C	P_D	56	W
Dissipation Derating Factor Above 25 °C	Ta= 100 °C		28	
Derating Factor		D_F	0.37	W/°C
Avalanche Current,Single Pulse (Note 1)	L= 0.5 mH	I_{AS}	7.3	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.22	L= 0.5 mH IAS= 7.3 A, RG= 10.0 Ω Starting Tj=25 °C, VG = 18.0 V	E_{AS}	13.3	mJ

Thermal Characteristics (Ta=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 Ta=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	$R_{θJC}$	2.7	

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= 3.5 A, VDS= 20 V	g _{fs}	--	3	--	S		
Static On Characteristics								
Gate Threshold Voltage	VGS= VDS, ID=10mA ,Tj=25°C	V _{GS(TH)}	3	3.8	5	V		
	VGS= VDS, ID=10mA ,Tj=175°C		--	2.7	--			
Drain-Source On Resistance	ID= 3.5 A, VGS= 18.0 V, Tj=25°C	R _{DS(ON)}	--	300	360	mΩ		
	ID= 3.5 A, VGS= 18.0 V, Tj=175°C		--	330	396			
	ID= 3.5 A, VGS= 15.0 V, Tj=25°C		--	390	540			
	ID= 3.5 A, VGS= 15.0 V, Tj=175°C		--	382	529			
Dynamic Characteristics								
Input Capacitance	VDS= 650 V	C _{iss}	--	170	--	pF		
Output Capacitance	VGS= 0 V		C _{oss}	--	13		--	pF
Reverse Transfer Capacitance	F= 1 MHZ		C _{rss}	--	1.2		--	
Gate Resistance	VGS=0V, VDS=0V, Freq.=1MHz	R _g	--	27	--	Ω		
Switching Paramters (Test Circuit & Waveform See Fig.20)								
Turn-On Delay Time	VDS= 400 V ID= 3.5 A	Tj=25°C	t _{d(on)}	--	10	--	ns	
		Tj=175°C		--	9.5			--
Turn-On Rise Time	VGS= 0/+18 V RG= 10.0 Ω	Tj=25°C	t _r	--	7	--	ns	
		Tj=175°C		--	6.7			--
Turn-Off Delay Time	L= 600 μH	Tj=25°C	t _{d(off)}	--	7	--	ns	
		Tj=175°C		--	6.7			--
Turn-Off Rise Time		Tj=25°C	t _f	--	4.5	--	ns	
		Tj=175°C		--	3.8			--
Turn-On Switching Loss		Tj=25°C	E _{on}	--	12.0	--	μJ	
		Tj=175°C		--	11.4			--
Turn-Off Switching Loss		Tj=25°C	E _{off}	--	8.1	--	μJ	
		Tj=175°C		--	7.4			--
Total Switching Energy		Tj=25°C	E _{tot}	--	20.1	--	μJ	
		Tj=175°C		--	18.8			--

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

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Gate Charge Paramters (Test Circuit & Waveform See Fig.21)						
Total Gate Charge	VDS= 400 V	Q_g	--	8	--	nC
Gate-Source Charge	VGS= 0/+18 V	Q_{gs}	--	3.2	--	nC
Gate-Drain Charge	ID= 3.5 A	Q_{gd}	--	1.1	--	nC
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.23)						
Max. Diode Forward Cuurent	Tj= 25 °C	I_s	--	--	8.8	A
tp Limited by Tj(max)	Tj= 100 °C		--	--	7.1	A
Max. Pulsed Forward Cuurent		I_{SM}	--	--	18	A
Diode Forward Voltage	ID= 2.6 A, VGS=-0V Tj=25°C Tj=175°C	V_{SD}	--	3.8 3.2	--	V
Reverse Recovery Time	IS= 4.4 A di/dt= 1000.0 A/us Tj=25°C Tj=175°C	t_{rr}	--	9 10.2	--	ns
Reverse Recovery Charge	VGS= 0.0 V VDS= 400 V Tj=25°C Tj=175°C	Q_{rr}	--	23 26.5	--	nC
Reverse Recovery Current	Tj=25°C Tj=175°C	I_{rrm}	--	5.0 5.2	--	A
Reverse Recovery Energy	Tj=25°C Tj=175°C	E_{rr}	--	9.0 10.6	--	μJ

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Typical Characteristics Curves

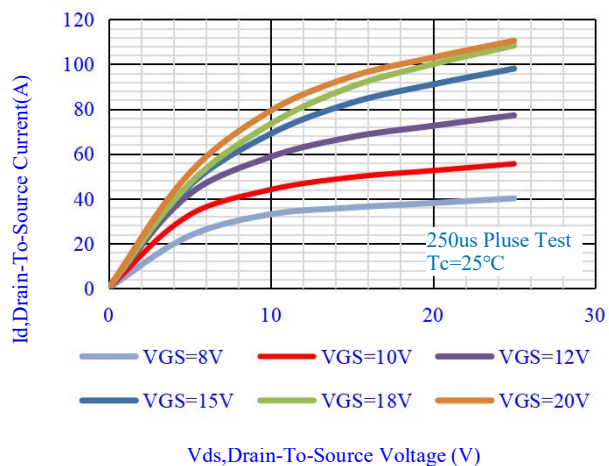


Fig.1-Output Characteristics@Tj=25°C

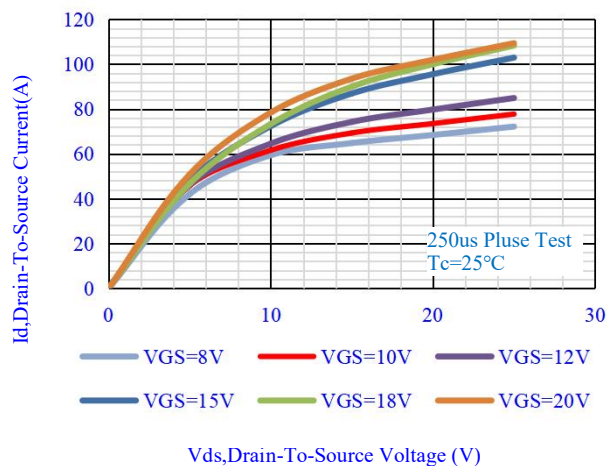


Fig.2-Output Characteristics@Tj=175°C

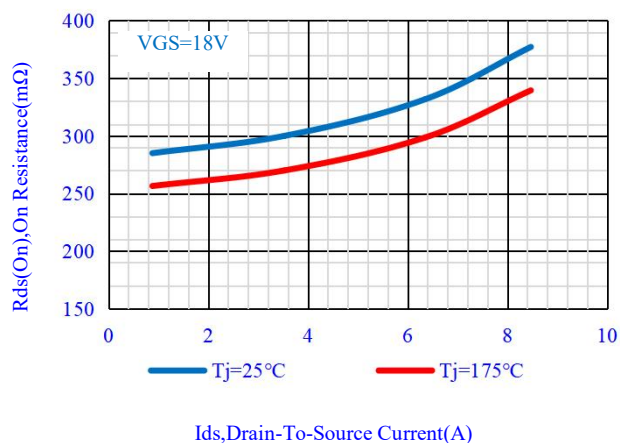


Fig.3-On Resistance Vs. Drain Current

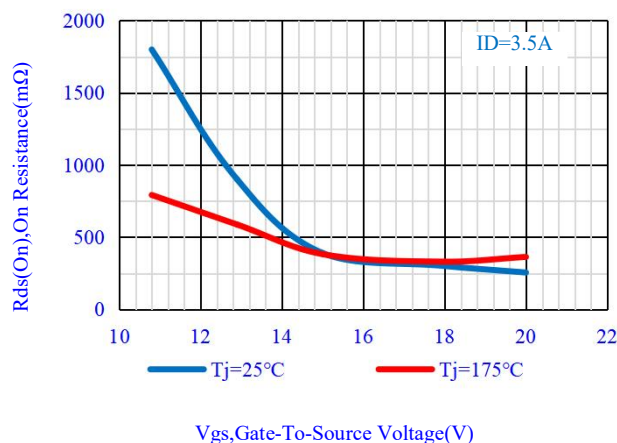


Fig.4-On Resistance Vs. Gate Source Voltage

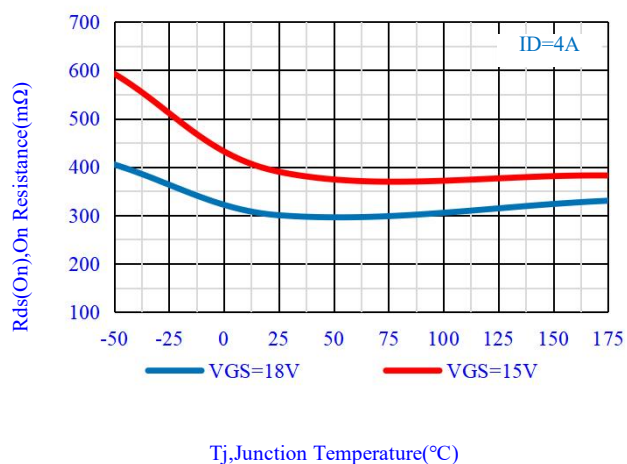


Fig.5-On Resistance Vs. Junction Temperature

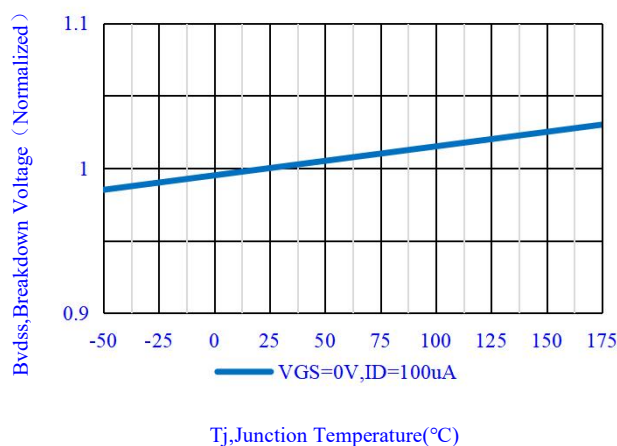


Fig.6-Breakdown Voltage Vs. Junction Temperature

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Typical Characteristics Curves

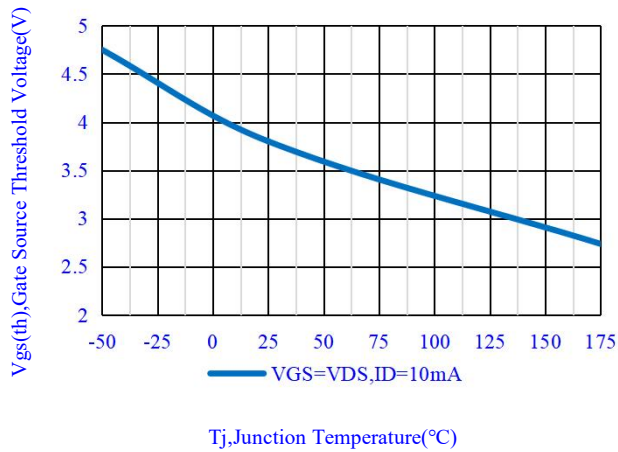


Fig.7-Gate Source Threshold Voltage Vs. Junction Temperature

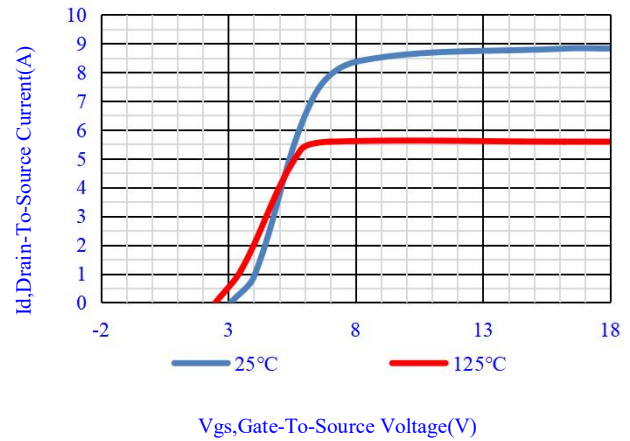


Fig.8-Transfer Characteristics

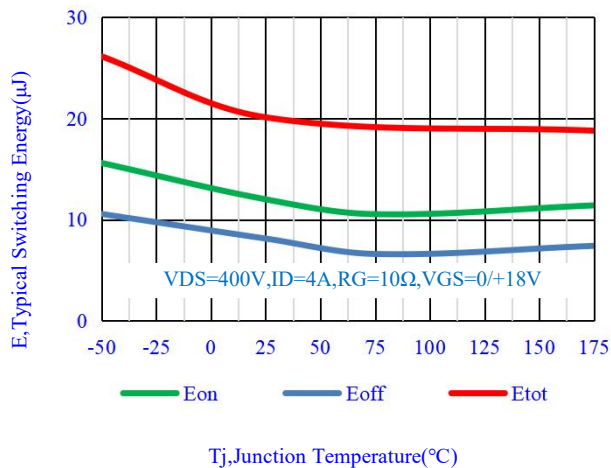


Fig.9-Typical Switching Energy Vs. Junction Temperature

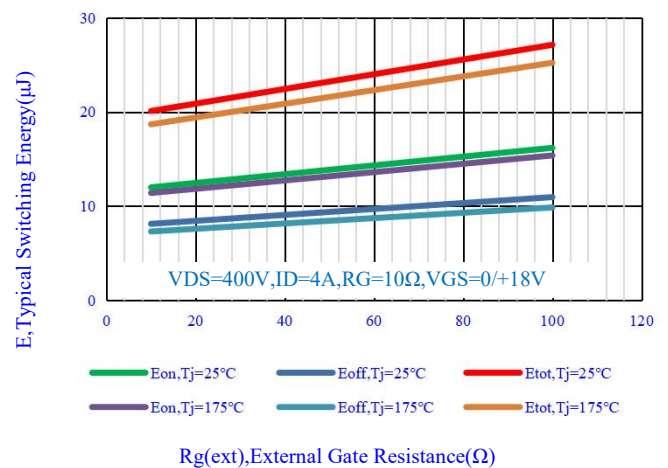


Fig.10-Typical Switching Energy Vs. External Gate Resistance

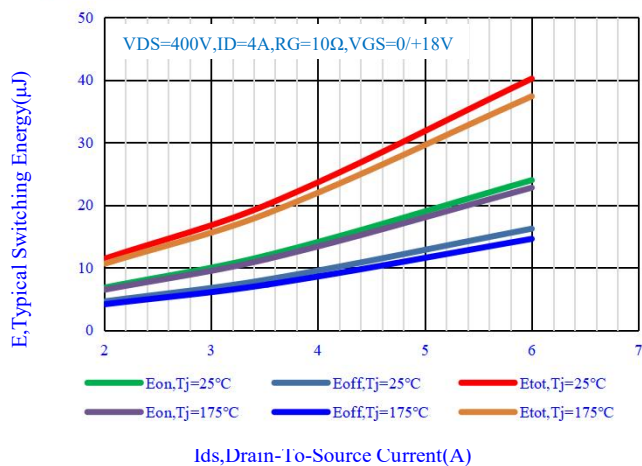


Fig.11-Typical Switching Energy Vs. Drain Source Current

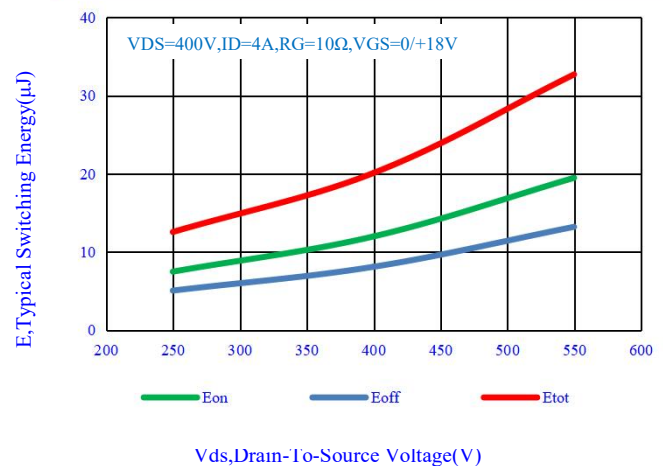


Fig.12-Typical Switching Energy Vs. Drain Source Voltage

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Typical Characteristics Curves

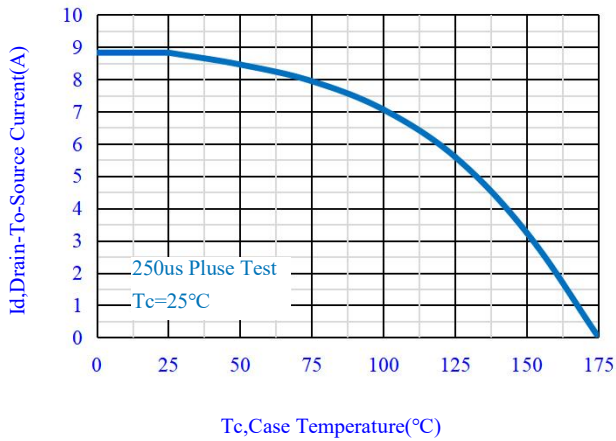


Fig.13-Maximum Continuous Drain Current Vs. Case Temperature

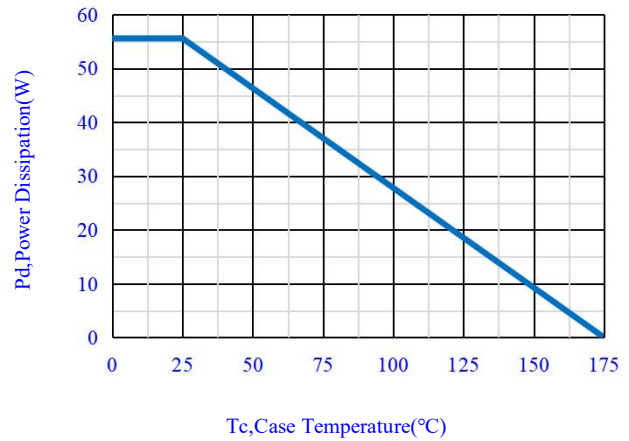


Fig.14-Maximum Power Dissipation Vs. Case Temperature

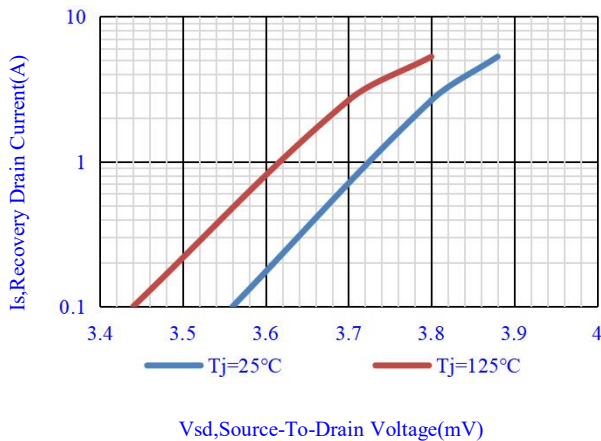


Fig.15-Source-To-Drain Diode Forward Voltage

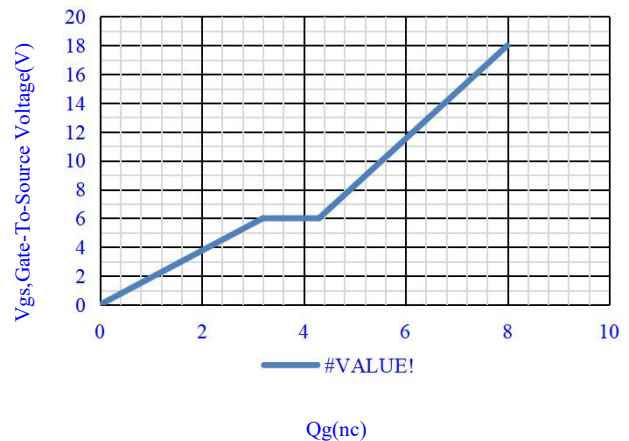


Fig.16-Gate Charge Waveform

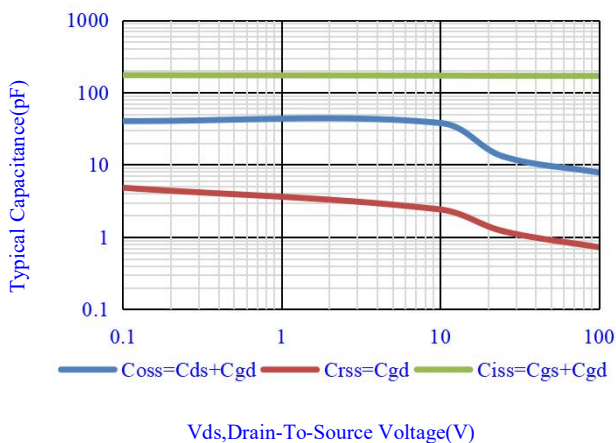


Fig.17-Typical Capacitance Vs. Drain-To-Source Voltage

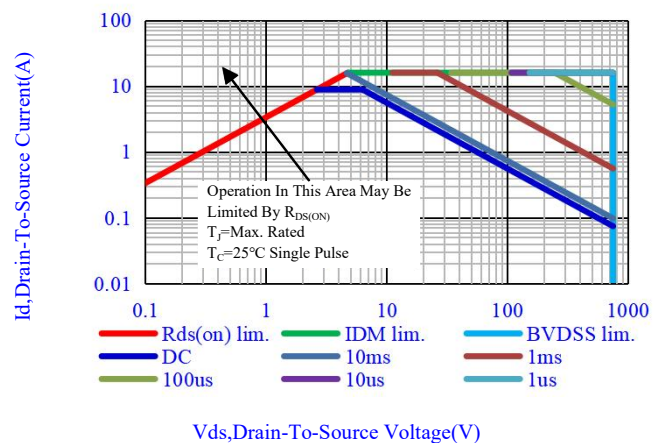


Fig.18-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

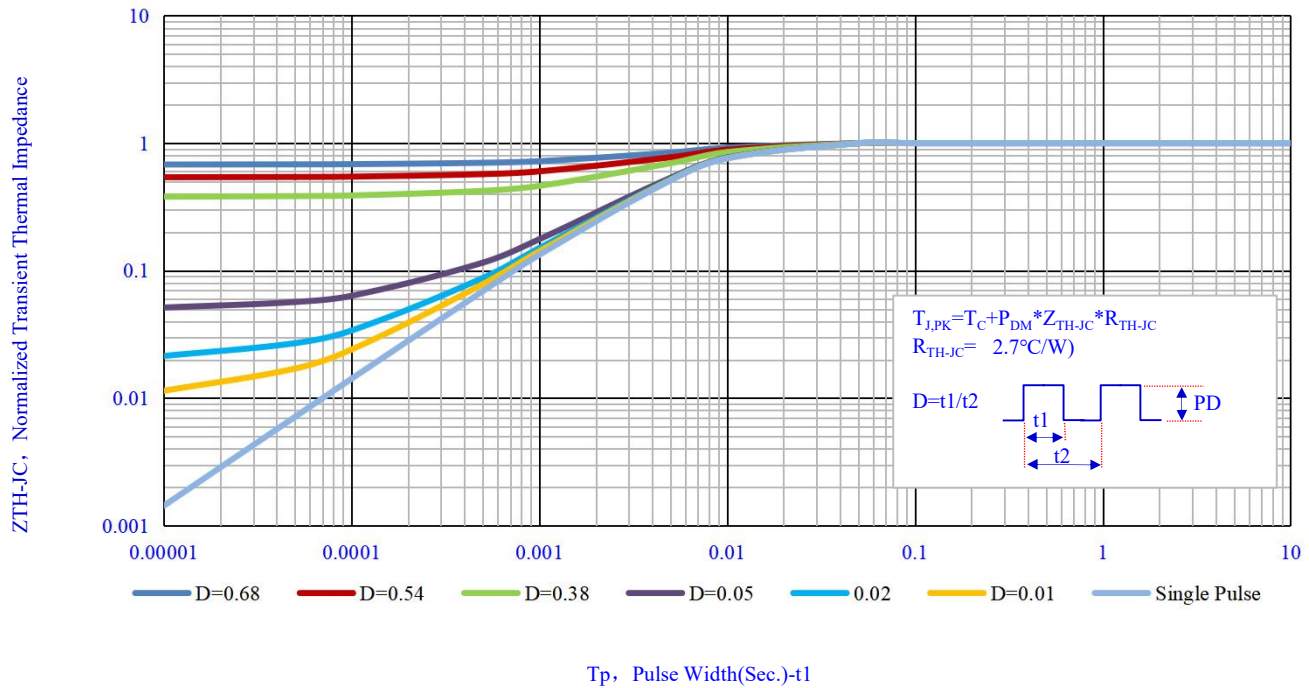


Fig.19- Normalized Maximum Transient Thermal Impedance Vs.Pulse Width

Test Circuit & Waveform

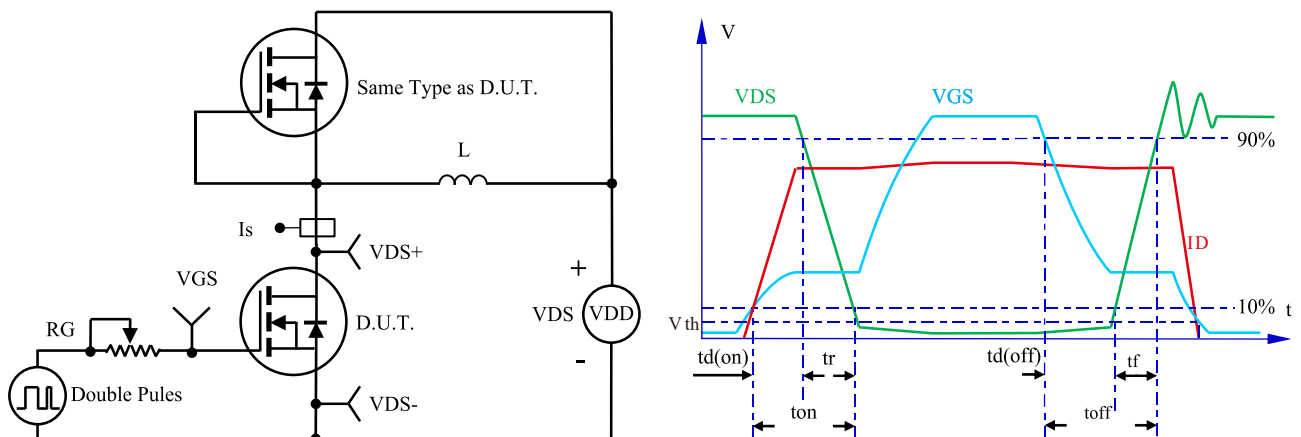


Fig.20- Inductive Switching Test Circuit & Waveform

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Test Circuit & Waveform

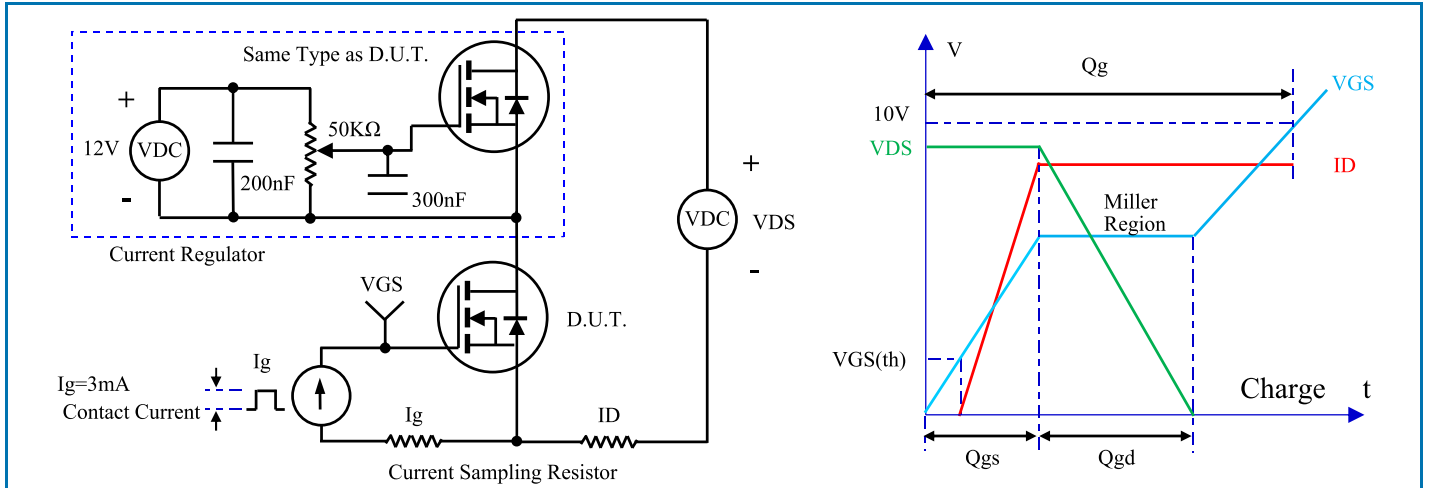


Fig.21-Gate Charge Test Circuit & Waveform

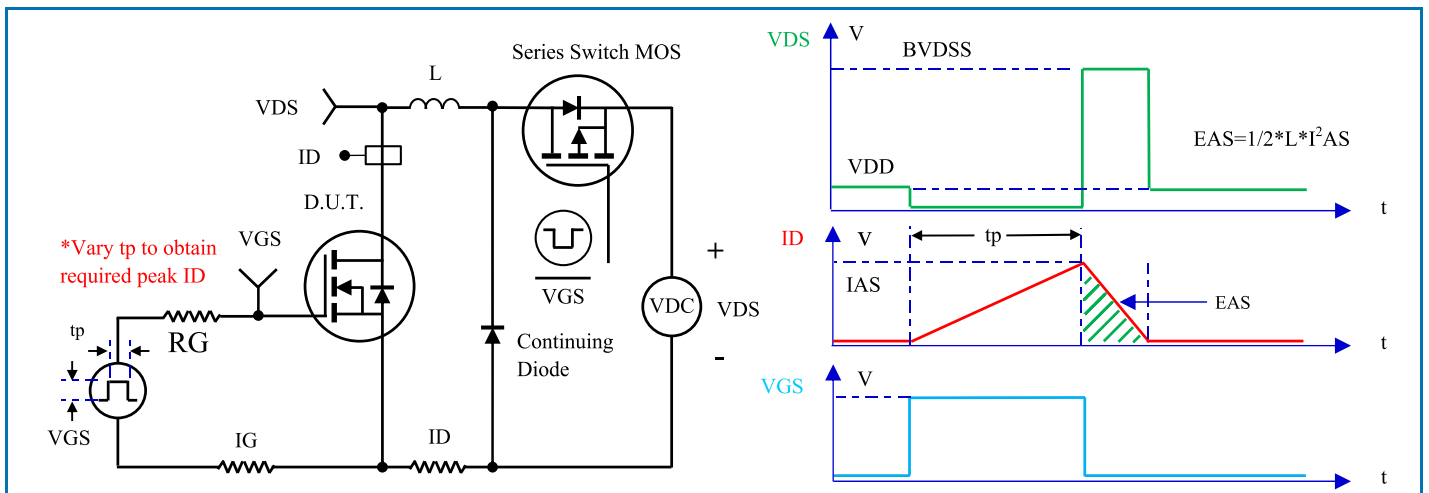


Fig.22- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

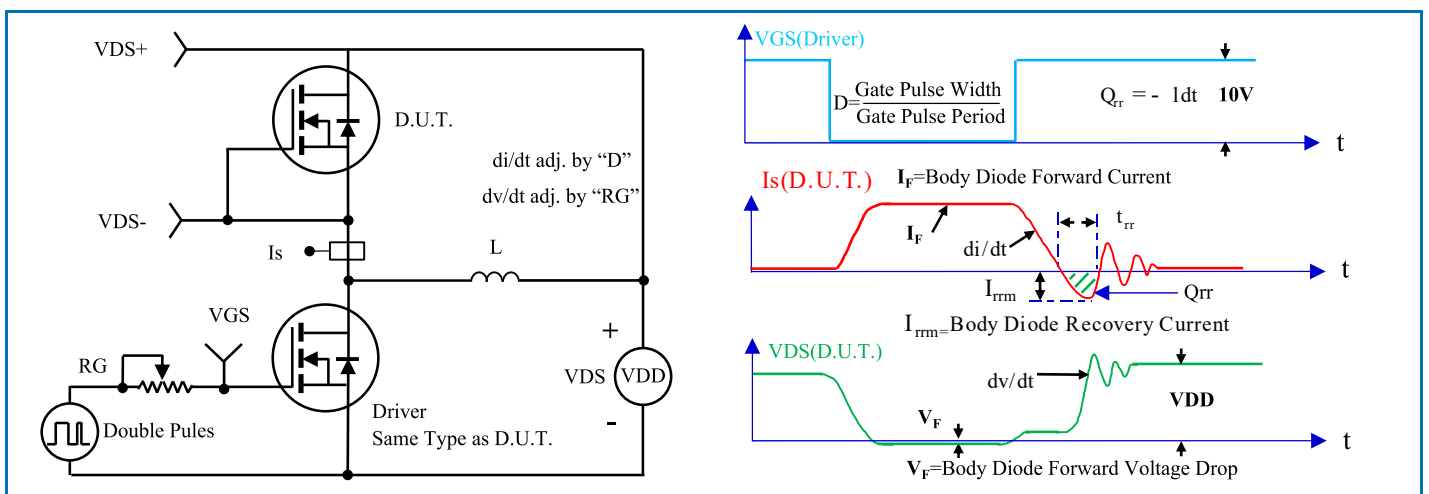


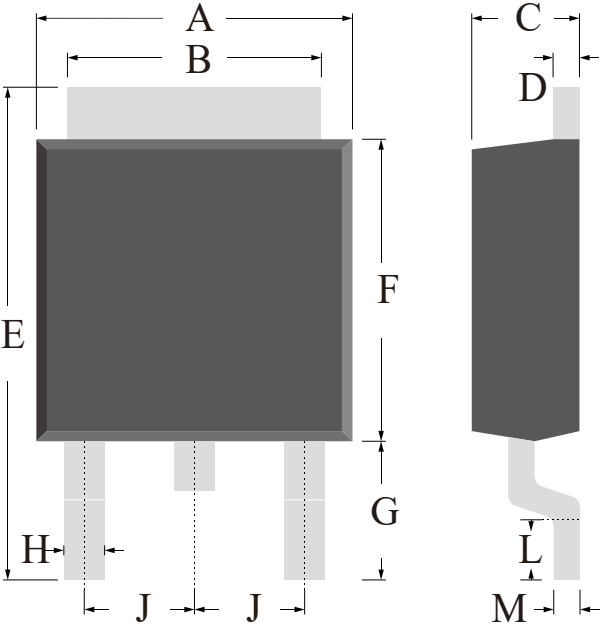
Fig.23- Diode Recovery Test Circuit & Waveform

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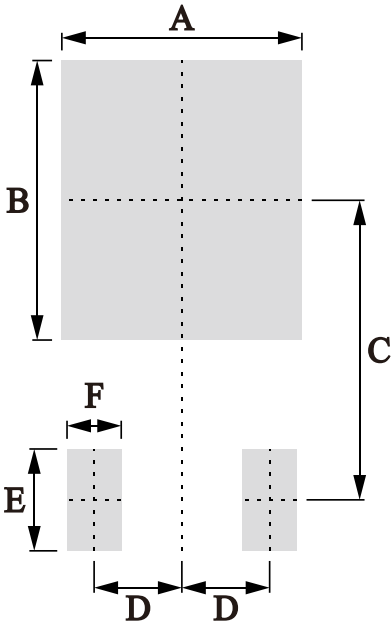
OUTLINE DRAWINGS



TO-252

OUTLINE DIMENSIONS						
Dim.	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

RECOMMEDND 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	-	-	0.2614	-
D	-	2.30	-	-	0.0906	-
E	-	2.76	-	-	0.1087	-
F	-	1.42	-	-	0.0559	-

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MARKING INFORMATION



MARKING INSTRUCTIONS

NH=Niuhan Trademark

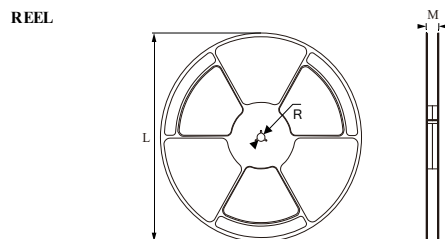
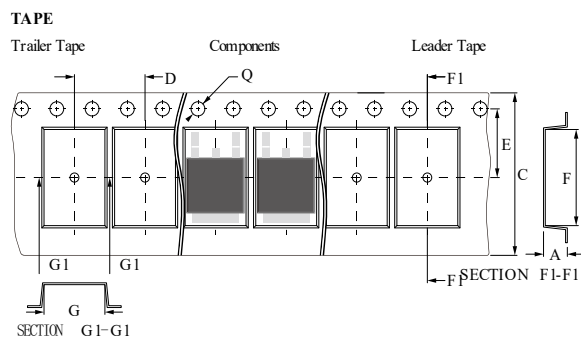
FF=Product Line Code,According To Actual Changes

YWW=Date Code,According To Actual Changes

LLWWF=Internal Code,According To Actual Changes

NCH75R300S=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 (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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- When the appearance of the product and chip size does not change, in order to product the customer. quality, change the internal structure and the production process Niuhan can not notify

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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		