

NCH75R060PT

N-Channel Silicon Carbide MOSFET



Voltage: 750 Volts

Current: 58 Amperes

Package: TO-247

Features

- NH'S Advanced Silicon Carbide MOSFET Technology
- High Blocking Voltage And Low Capacitances
- High-Speed Switching For Very Low Switching Losses
- Excellent Qg*Rds(on) Product(FOM)

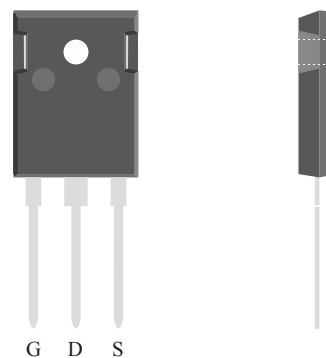
Typical Applications

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

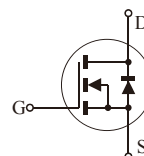
Product Summary

VDS Min.@Tj	750	V
ID Min.@Ta	58	A
RDS(ON)(TYP)@18V,Tj=25℃	80	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}	750	V
Gate-Source Voltage		V _{GS} MAX.	-10/+25	V
		V _{GS} O.P.	-5/+20	
Continuous Drain Current (Note 1)	Ta= 25 ℃	I _D	58	A
	Ta= 100 ℃		46	
Drain Current-Pulse (Note 1)	Tj< 175 ℃	I _{DM}	104	A
Maximum Power Dissipation Power	Ta= 25 ℃	P _D	254	W
Dissipation Derating Factor Above 25℃	Ta= 100 ℃		127	
Derating Factor		D _F	1.69	W/℃

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}	50	℃/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 75mm x 45mm x 2.5mm Alu. Heat.	R _{θJC}	0.59	

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= 750 V,VGS=0V,Tj=25℃	I _{DSS}	--	10	100	uA	
Gate To Source Leakage Current	VGS= 20.0 V,VDS=0V	I _{GSS}	--	--	250	nA	
Source To Gate Leakage Current	VGS= -10.0 V,VDS=0V	I _{SGS}	--	--	250	nA	
Static On Characteristics							
Gate Threshold Voltage	VGS= VDS, ID=10mA ,Tj=25℃	V _{GS(TH)}	2	3	4	V	
Drain-Source On Resistance	ID= 13.2 A,VGS= 18.0 V,Tj=25℃	R _{DS(ON)}	--	80	100	mΩ	
	ID= 13.2 A,VGS= 18.0 V,Tj=175℃		--	93	110		
	ID= 13.2 A,VGS= 15.0 V,Tj=25℃		--	104	150		
	ID= 13.2 A,VGS= 15.0 V,Tj=175℃		--	112	162		
Dynamic Characteristics							
Gate Resistance	VGS=0V,VDS=0V,Freq.=1MHz	R _g	--	3	--	Ω	
Input Capacitance	VDS= 600 V VGS= 0 V F= 1 MHZ	C _{iss}	--	1130	--	pF	
Output Capacitance		C _{oss}	--	115	--	pF	
Reverse Transfer Capacitance		C _{rss}	--	6.5	--	pF	
Coss Stored Energy		E _{oss}	--	25	--	uJ	
Switching Paramters (Test Circuit & Waveform See Fig.20)							
Turn-On Delay Time	VDS= 400.0 V ID= 13.2 A VGS= -5/+20 V RG= 2.5 Ω	Tj=25℃	t _{d(on)}	--	21	--	ns
Turn-On Rise Time		Tj=25℃	t _r	--	15	--	ns
Turn-Off Delay Time		Tj=25℃	t _{d(off)}	--	18	--	ns
Turn-Off Rise Time		Tj=25℃	t _f	--	14	--	ns
Turn-On Switching Loss		Tj=25℃	E _{on}	--	102.96	--	μJ
Turn-Off Switching Loss		Tj=25℃	E _{off}	--	14.784	--	μJ
Total Switching Energy		Tj=25℃	E _{tot}	--	117.744	--	μJ
Gate Charge Paramters (Test Circuit & Waveform See Fig.21)							
Total Gate Charge	VDS= 400 V VGS= -5/+20 V ID= 13.2 A	Q _g	--	62	--	nC	
Gate-Source Charge		Q _{gs}	--	18	--	nC	
Gate-Drain Charge		Q _{gd}	--	33	--	nC	

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

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.23)						
Max. Diode Forward Current	Tj= 25 °C	I_S	--	--	58	A
tp Limited by Tj(max)	Tj= 100 °C		--	--	46	
Max. Pulsed Forward Current		I_{SM}	--	--	116	A
Diode Forward Voltage	ID= 6.6 A, VGS=-0V	V_{SD}	Tj=25°C	3.0	--	V
			Tj=175°C	2.6	--	
Reverse Recovery Time	IS= 13.2 A di/dt= 2100 A/us	t_{rr}	Tj=25°C	23	--	ns
			Tj=175°C	26.0	--	
Reverse Recovery Charge	VGS= -5.0 V VDS= 400 V	Q_{rr}	Tj=25°C	132	--	nC
			Tj=175°C	151.8	--	
Reverse Recovery Current		I_{rrm}	Tj=25°C	11.0	--	A
			Tj=175°C	11.7	--	
Reverse Recovery Energy		E_{rr}	Tj=25°C	50.6	--	μJ
			Tj=175°C	60.8	--	

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Typical Characteristics Curves

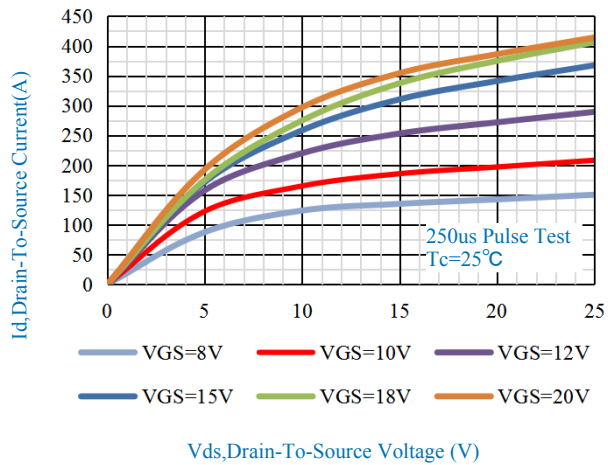


Fig.1-Output Characteristic@ $T_j=25^{\circ}\text{C}$

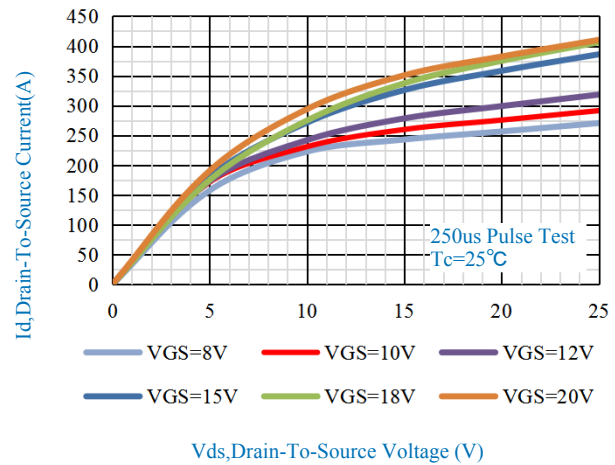


Fig.2-Output Characteristic@ $T_j=175^{\circ}\text{C}$

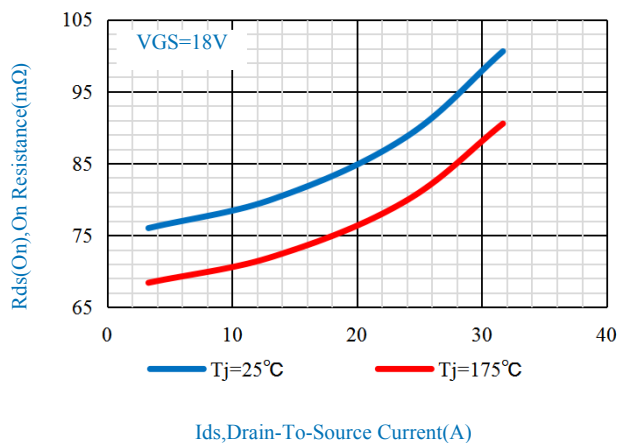


Fig.3-On Resistance Vs. Drain Current

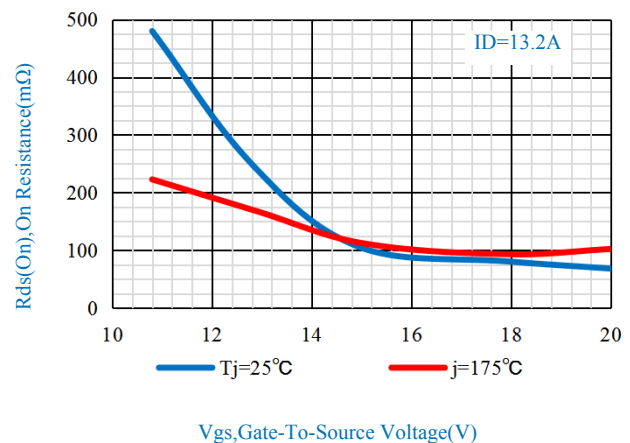


Fig.4-On Resistance Vs. Gate Source Voltage

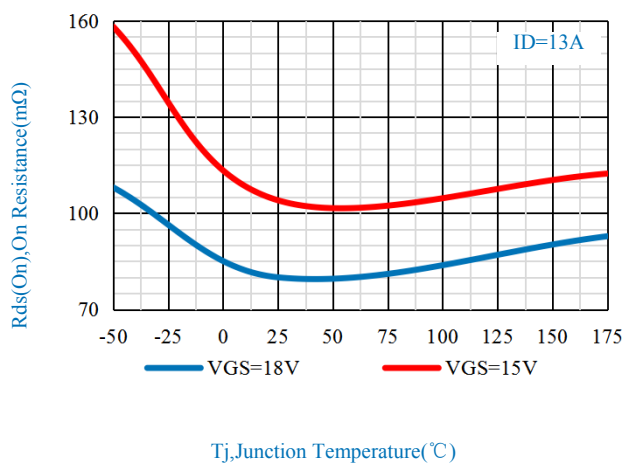


Fig.5-On Resistance Vs. Junction Temperature

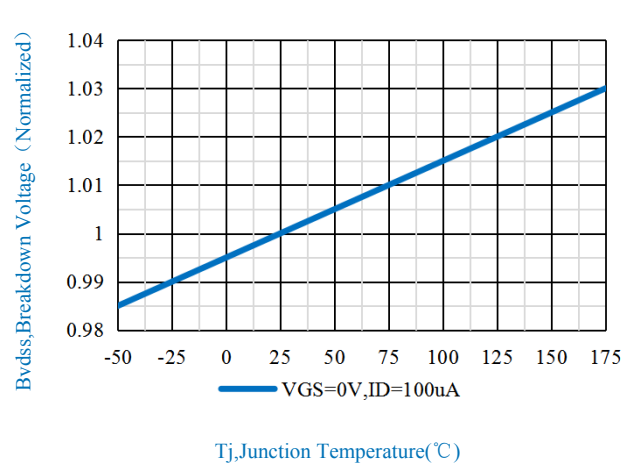


Fig.6-Breakdown Voltage Vs. Junction Temperature

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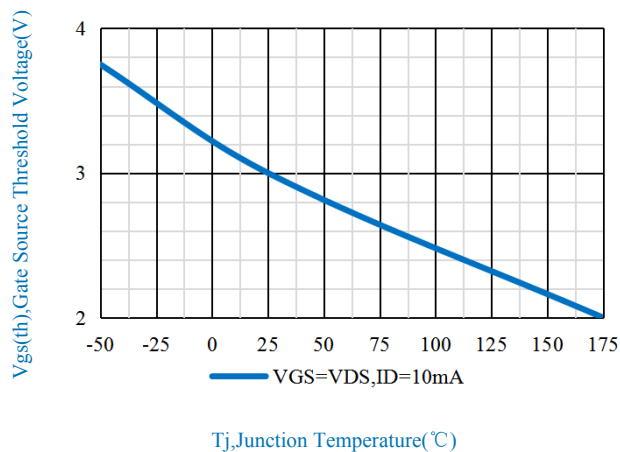


Fig.7-Gate Source Threshold Voltage Vs. Junction Temperature

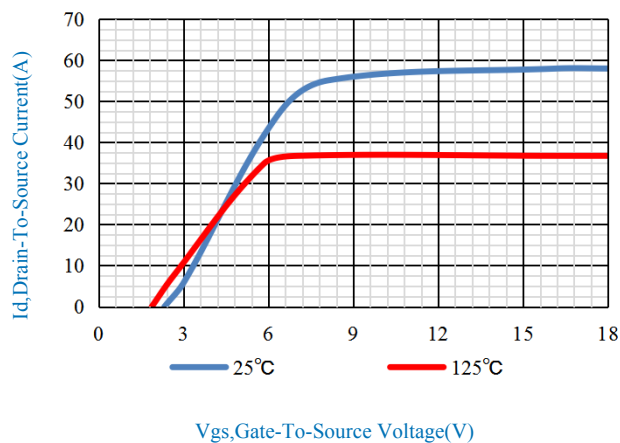


Fig.8-Transfer Characteristic

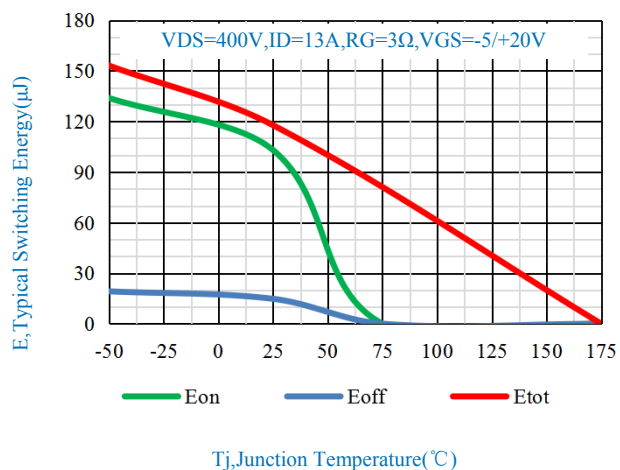


Fig.9-Typical Switching Energy Vs. Junction Temperature

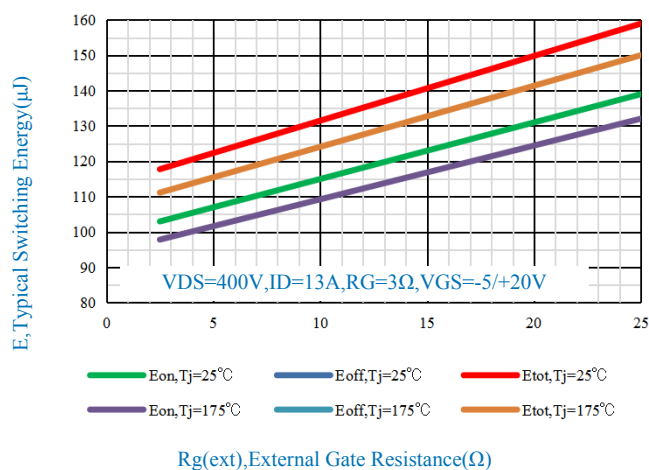


Fig.10-Typical Switching Energy Vs. External Gate Resistance

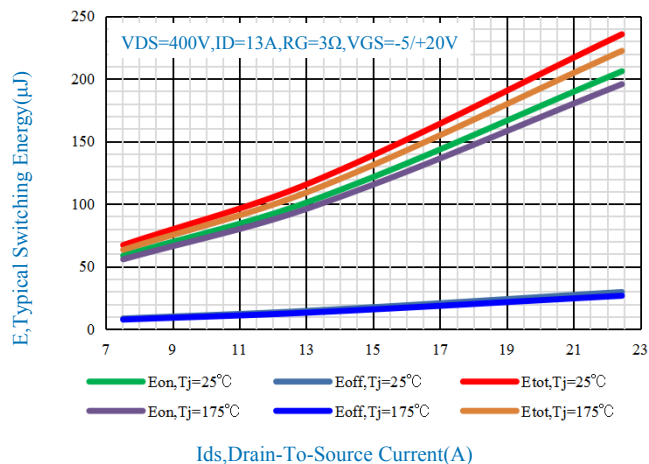


Fig.11-Typical Switching Energy Vs. Drain Source Current

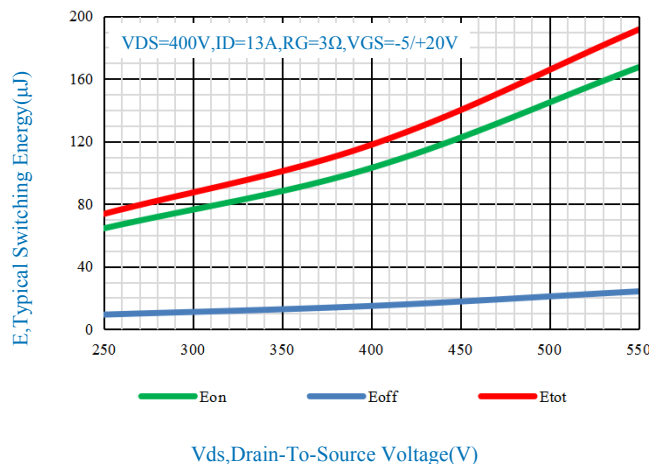


Fig.12-Typical Switching Energy Vs. Drain Source Voltage

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Typical Characteristics Curves

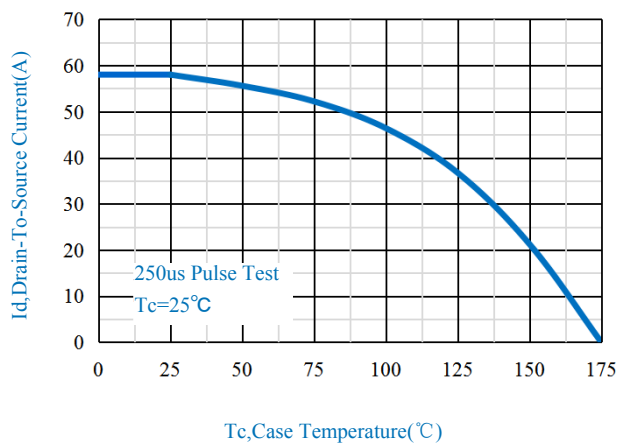


Fig.13-Maximum Continuous Drain Current Vs. Case Temperature

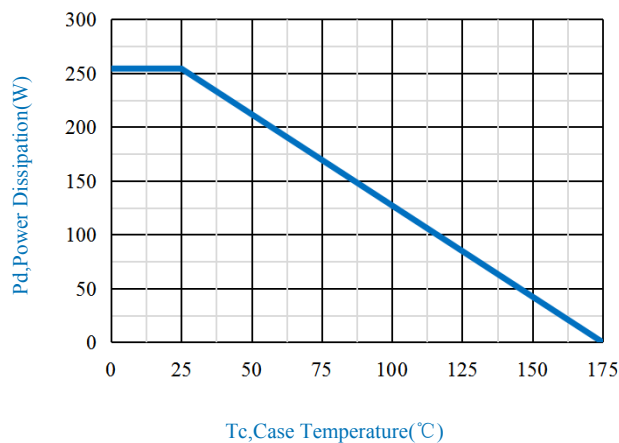


Fig.14-Maximum Power Dissipation Vs. Case Temperature

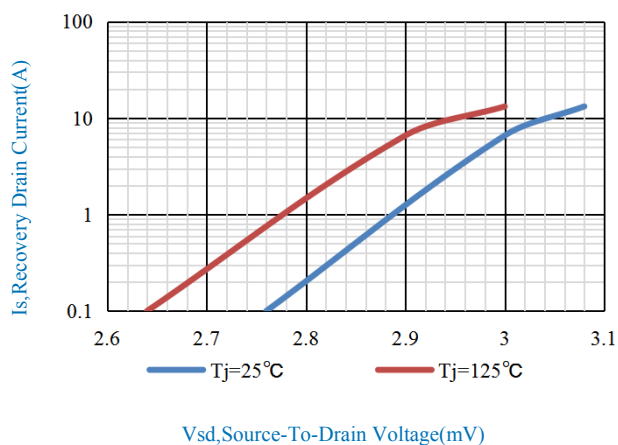


Fig.15-Source-To-Drain Diode Forward Voltage

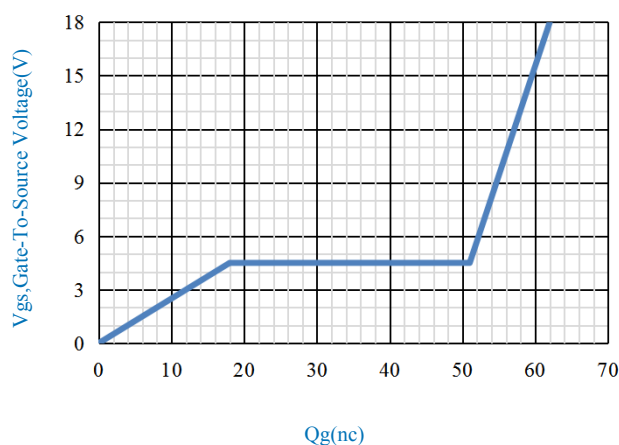


Fig.16-Gate Charge Waveform

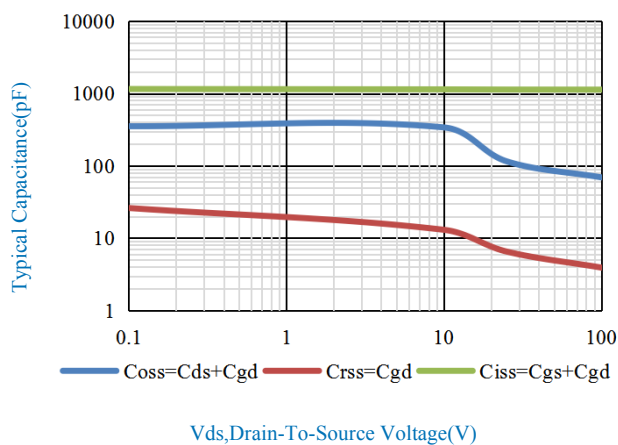


Fig.17-Typical Capacitance Vs. Drain-To-Source Voltage

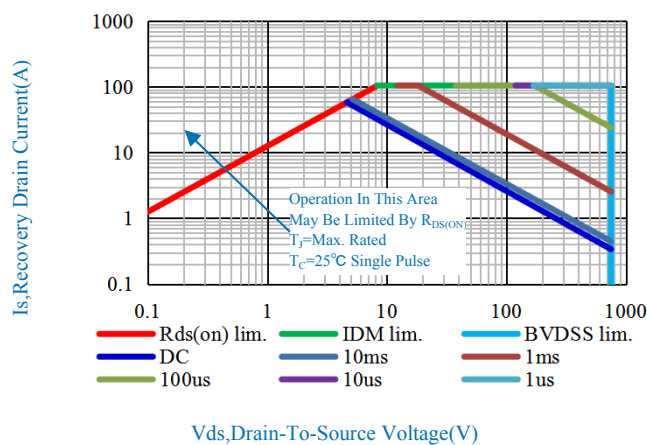


Fig.18-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

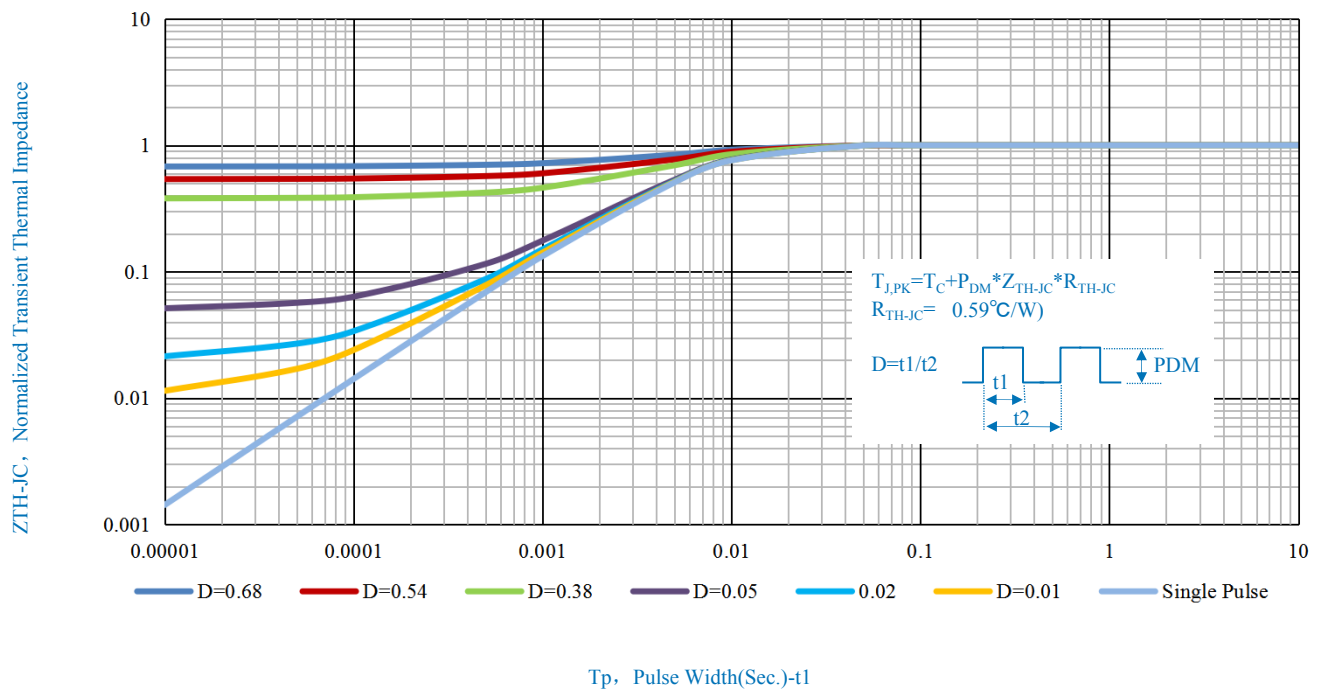


Fig.19- Normalized Maximum Transient Thermal Impedance Vs.Pulse Width

Test Circuit & Waveform

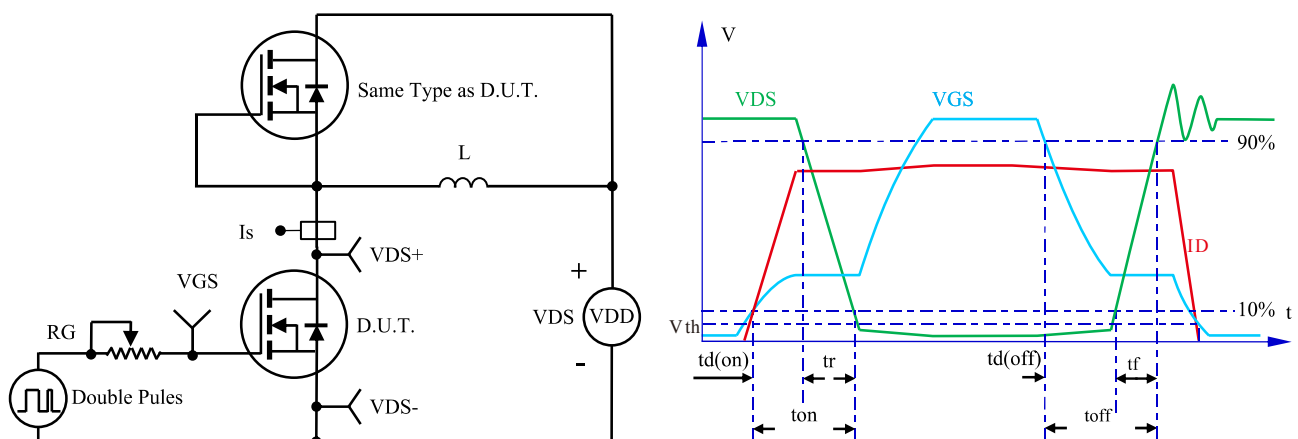


Fig.20- Inductive Switching Test Circuit & Waveform

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Test Circuit & Waveform

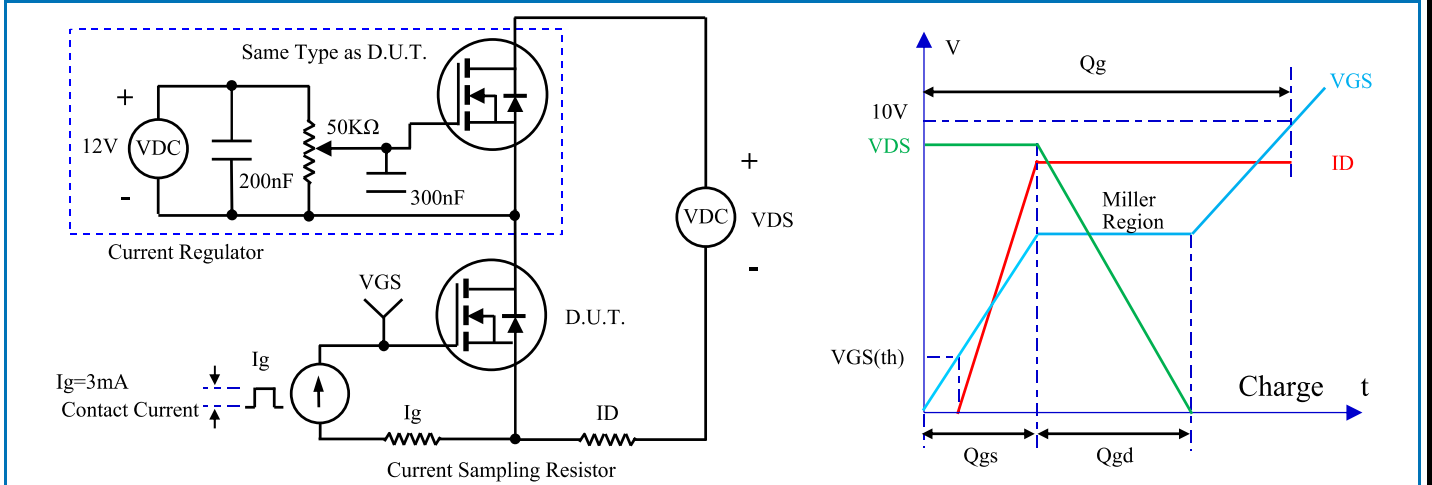


Fig.21-Gate Charge Test Circuit & Waveform

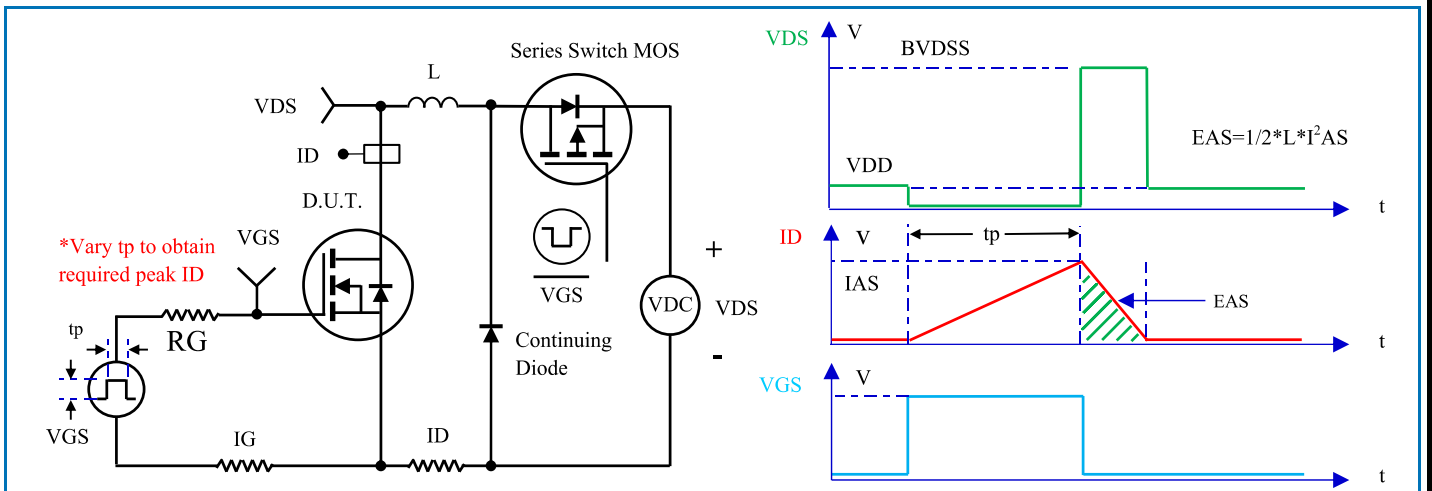


Fig.22- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

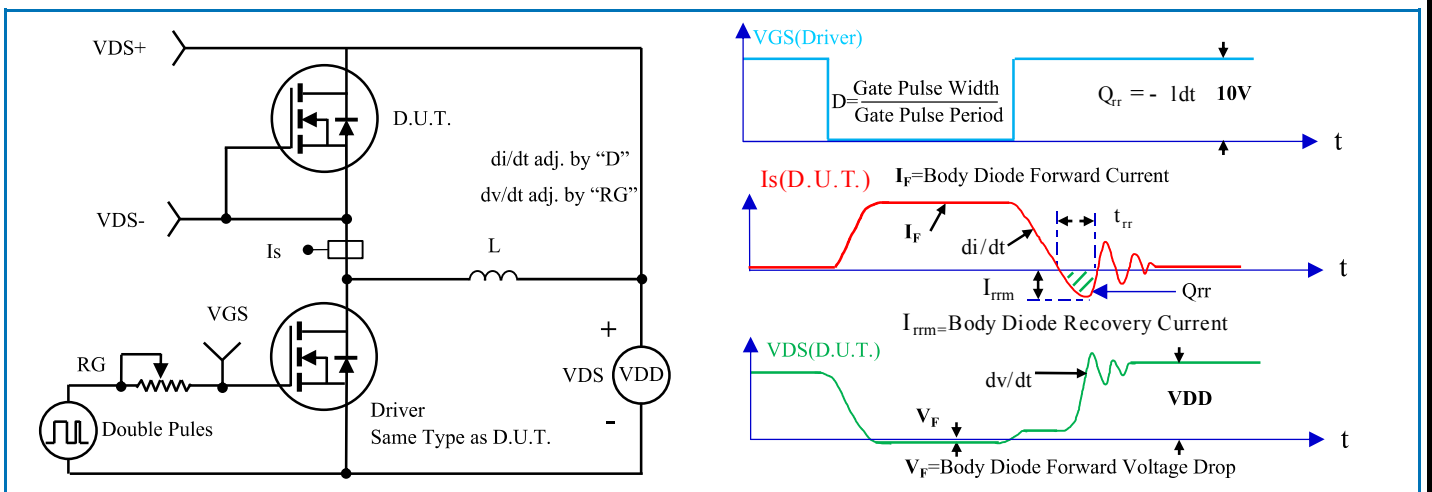


Fig.23- Diode Recovery Test Circuit & Waveform

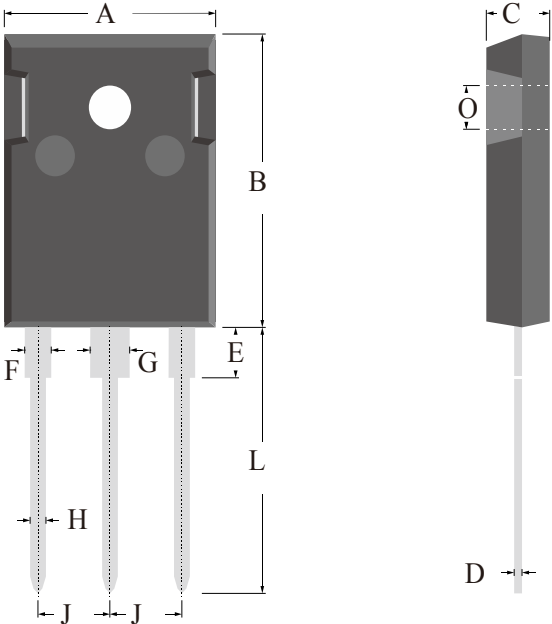
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OUTLINE DRAWINGS

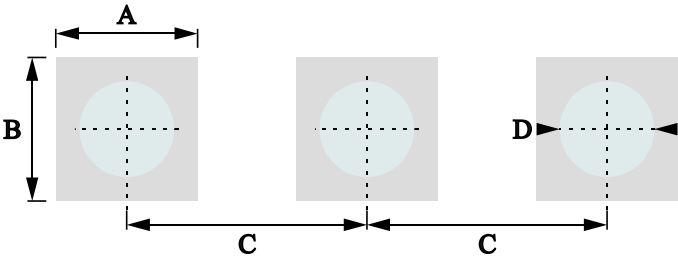
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OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.25	-	16.75	0.6004	-	0.6594
B	20.50	-	22.50	0.8071	-	0.8858
C	4.50	-	5.10	0.1772	-	0.2008
D	0.40	-	0.80	0.0157	-	0.0315
E	3.40	-	5.00	0.1339	-	0.1969
F	1.80	-	2.50	0.0709	-	0.0984
G	2.70	-	3.30	0.1063	-	0.1299
H	1.00	-	1.40	0.0394	-	0.0551
J	5.15	-	5.75	0.2028	-	0.2264
L	18.50	-	20.50	0.7283	-	0.8071
O	2.85	-	3.15	0.1122	-	0.1240

RECOMMEDND LAYOUT DRAWINGS

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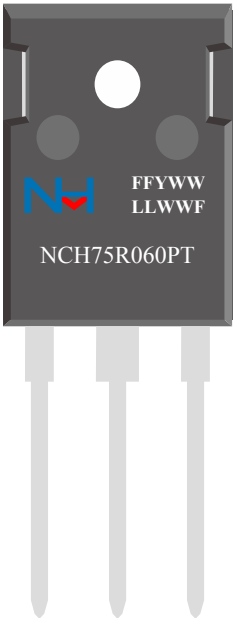
OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	2.00	-	-	0.0787	-
B	-	2.00	-	-	0.0787	-
C	-	5.50	-	-	0.2165	-
D	-	1.40	-	-	0.0551	-

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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
NCH75R060PT=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-247	P1	5.778	Tube	30	600	2400

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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		
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