

NCH80R060H

N-Channel Silicon Carbide MOSFET



Voltage: 800 Volts

Current: 37 Amperes

Package: ITO-220AB

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)

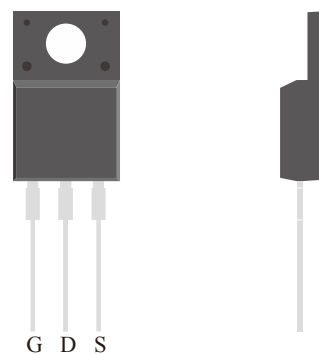
Typical Applications

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

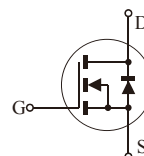
Product Summary

VDS Min.@Tj	800	V
ID Min.@Ta	37	A
RDS(ON)(TYP)@18V,Tj=25℃	60	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}	800	V
Gate-Source Voltage		$V_{GS\ MAX.}$	-10/+22	V
		$V_{GS\ O.P.}$	0/+15	
Continuous Drain Current (Note 1)	Ta= 25 ℃	I_D	37	A
	Ta= 100 ℃		30	
Drain Current-Pulse (Note 1)	Tj< 175 ℃	I_{DM}	67	A
Maximum Power Dissipation Power	Ta= 25 ℃	P_D	115	W
	Ta= 100 ℃		58	
Derating Factor		D_F	0.77	W/℃
Avalanche Current,Single Pulse (Note 1)	L= 0.5 mH	I_{AS}	17	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.22	L= 0.5 mH IAS= 17.0 A,RG= 10.0 Ω Starting Tj=25 ℃,VG = 18.0 V	E_{AS}	72	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℃	$R_{θJA}$	62.5	℃/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 75mm x 45mm x 2.5mm Alu. Heat.	$R_{θJC}$	1.3	

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}	800	--	--	V
Zero Gate Voltage Drain Current	VDS= 800 V, VGS=0V, Tj=25℃	I _{DSS}	--	0.3	50	uA
	VDS= 800 V, VGS=0V, Tj=175℃		--	1.5	--	
Gate To Source Leakage Current	VGS= 22.0 V, VDS=0V	I _{GSS}	--	--	250	nA
Source To Gate Leakage Current	VGS= -10.0 V, VDS=0V	I _{SGS}	--	--	250	nA
Forward Transconductance	ID= 16.5 A, VDS= 20 V	g _{fs}	--	12	--	S
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS, ID=10mA ,Tj=25℃	V _{GS(TH)}	3	3.3	4	V
	VGS= VDS, ID=10mA ,Tj=175℃		--	2.4	--	
Drain-Source On Resistance	ID= 16.5 A, VGS= 18.0 V, Tj=25℃	R _{DS(ON)}	--	60	80	mΩ
	ID= 16.5 A, VGS= 18.0 V, Tj=175℃		--	70	88	
	ID= 16.5 A, VGS= 15.0 V, Tj=25℃		--	78	120	
	ID= 16.5 A, VGS= 15.0 V, Tj=175℃		--	84	130	
Dynamic Characteristics						
Gate Resistance	VGS=0V, VDS=0V, Freq.=1MHz	R _g	--	3.5	--	Ω
Input Capacitance	VDS= 694 V VGS= 0 V F= 1 MHZ	C _{iss}	--	960	--	pF
Output Capacitance		C _{oss}	--	60	--	pF
Reverse Transfer Capacitance		C _{rss}	--	3	--	pF
Switching Paramters (Test Circuit & Waveform See Fig.20)						
Turn-On Delay Time	VDS= 500.0 V ID= 16.5 A VGS= 0/+15 V RG= 15.0 Ω L= 200 μH	Tj=25℃	t _{d(on)}	--	24.6	ns
		Tj=175℃		--	22.9	
Tj=25℃		t _r	--	9.7	ns	
Tj=175℃			--	9.7		
Tj=25℃		t _{d(off)}	--	18	ns	
Tj=175℃			--	20.5		
Tj=25℃		t _f	--	9.7	ns	
Tj=175℃			--	9.7		
Turn-On Switching Loss		Tj=25℃	E _{on}	--	207	μJ
		Tj=175℃		--	235	
Turn-Off Switching Loss	Tj=25℃	E _{off}	--	28	μJ	
	Tj=175℃		--	29		
Total Switching Energy	Tj=25℃	E _{tot}	--	235	μJ	
	Tj=175℃		--	264		

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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= 500 V	Q_g	--	32	--	nC
Gate-Source Charge	VGS= 0/+15 V	Q_{gs}	--	10	--	nC
Gate-Drain Charge	ID= 16.5 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	--	--	37	A
tp Limited by TJ(max)	Tj= 100 °C		--	--	30	
Max. Pulsed Forward Current		I_{SM}	--	--	74	A
Diode Forward Voltage	ID= 18.5 A,VGS=0V	V_{SD}	Tj=25°C	3.3	--	V
			Tj=175°C	2.8	--	
Reverse Recovery Time	IS= 18.5 A di/dt= 950 A/us	t_{rr}	Tj=25°C	16	--	ns
			Tj=175°C	19.0	--	
Reverse Recovery Charge	VGS= 0.0 V VDS= 500 V	Q_{rr}	Tj=25°C	81	--	nC
			Tj=175°C	141.0	--	
Reverse Recovery Current		I_{rrm}	Tj=25°C	9.0	--	A
			Tj=175°C	8.0	--	
Reverse Recovery Energy		E_{rr}	Tj=25°C	1.7	--	μJ
			Tj=175°C	5.6	--	

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Typical Characteristics Curves

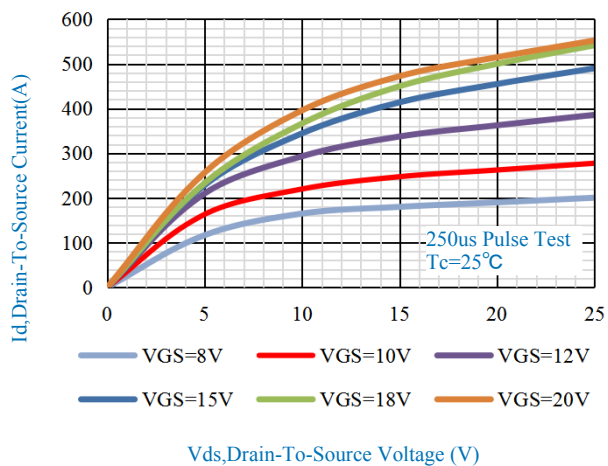


Fig.1-Output Characteristic@ $T_j=25^\circ\text{C}$

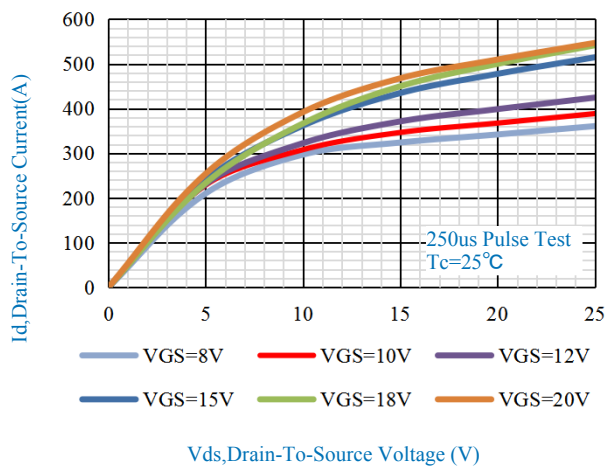


Fig.2-Output Characteristic@ $T_j=175^\circ\text{C}$

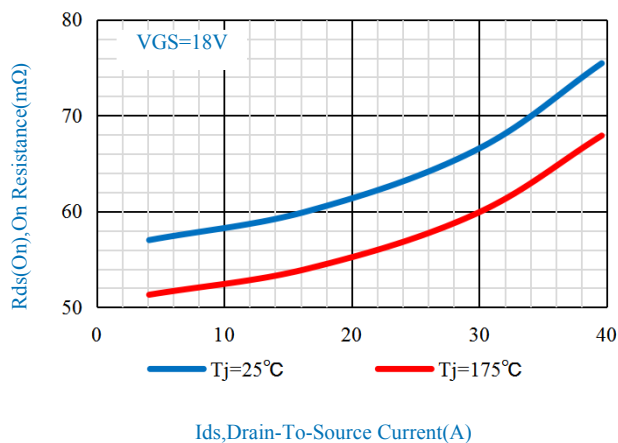


Fig.3-On Resistance Vs. Drain Current

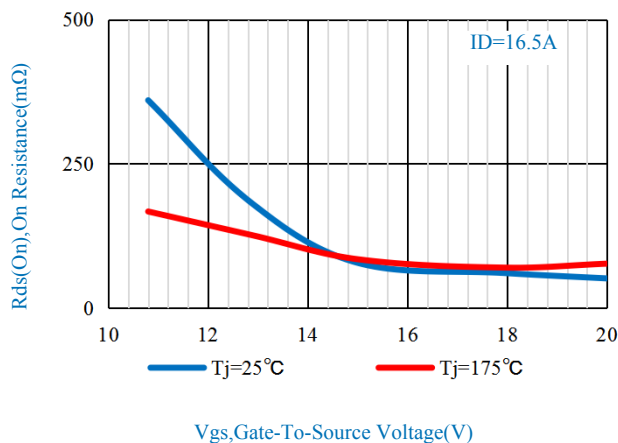


Fig.4-On Resistance Vs. Gate Source Voltage

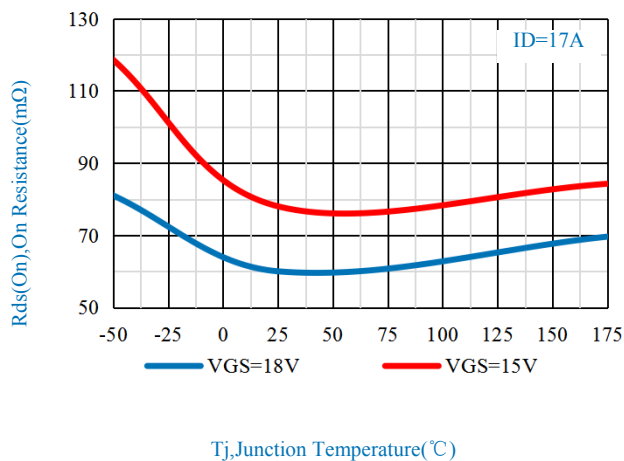


Fig.5-On Resistance Vs. Junction Temperature

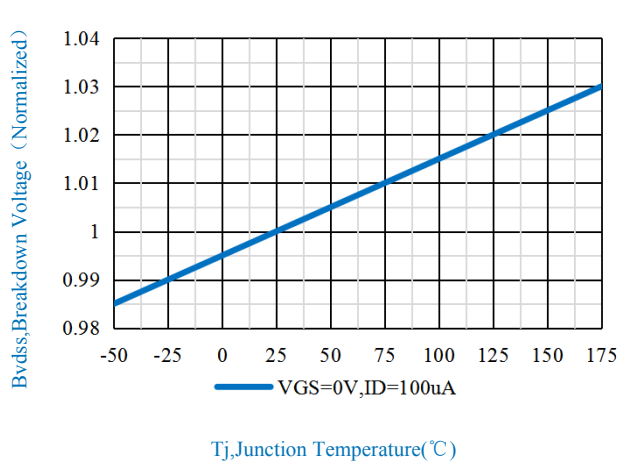


Fig.6-Breakdown Voltage Vs. Junction Temperature

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Typical Characteristics Curves

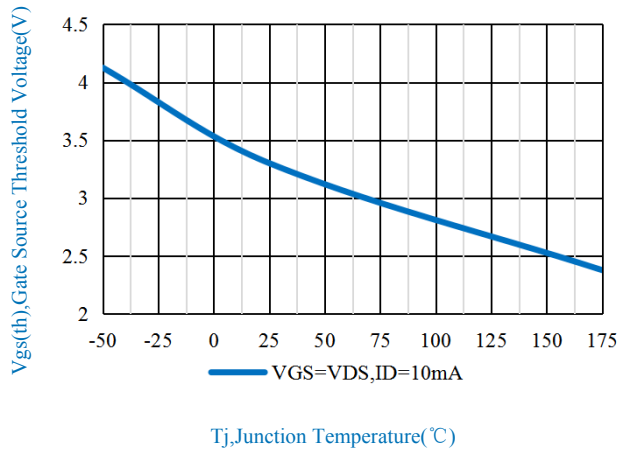


Fig.7-Gate Source Threshold Voltage Vs. Junction Temperature

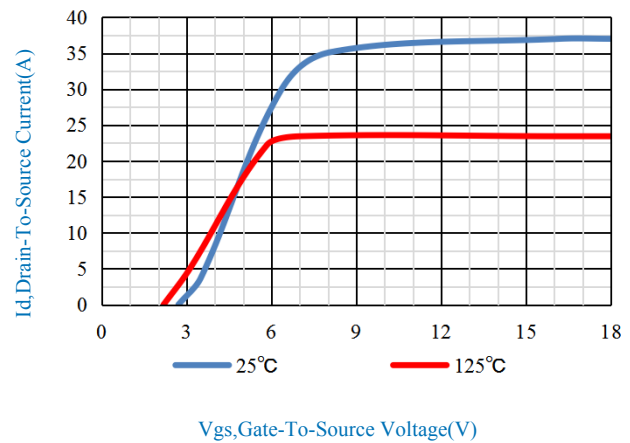


Fig.8-Transfer Characteristic

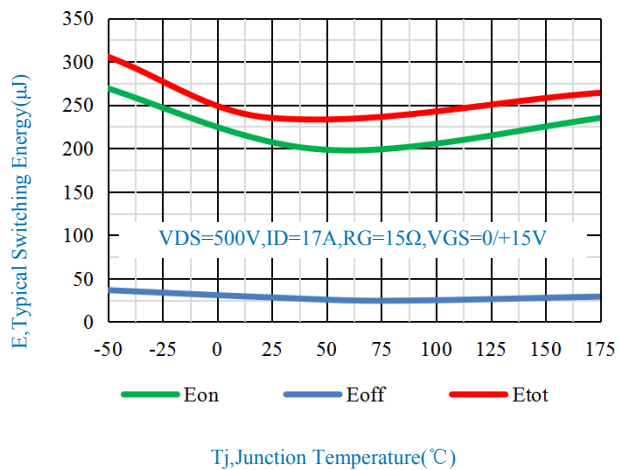


Fig.9-Typical Switching Energy Vs. Junction Temperature

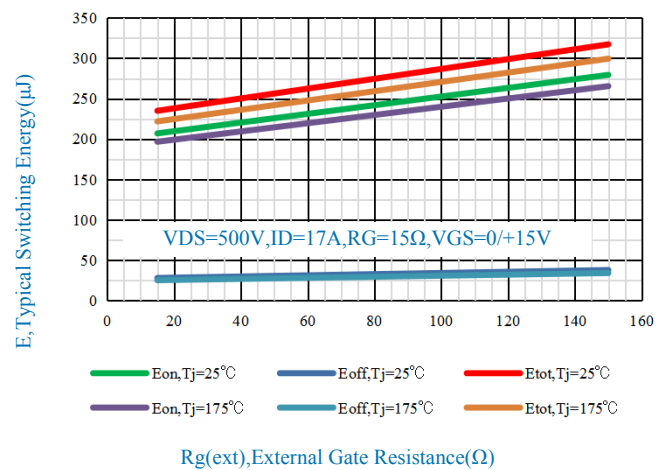


Fig.10-Typical Switching Energy Vs. External Gate Resistance

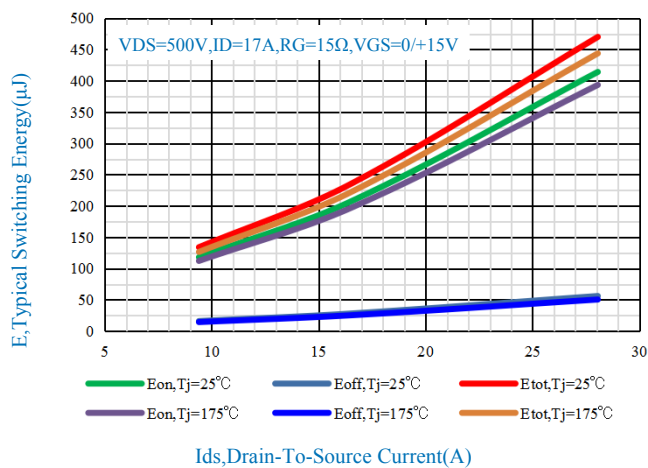


Fig.11-Typical Switching Energy Vs. Drain Source Current

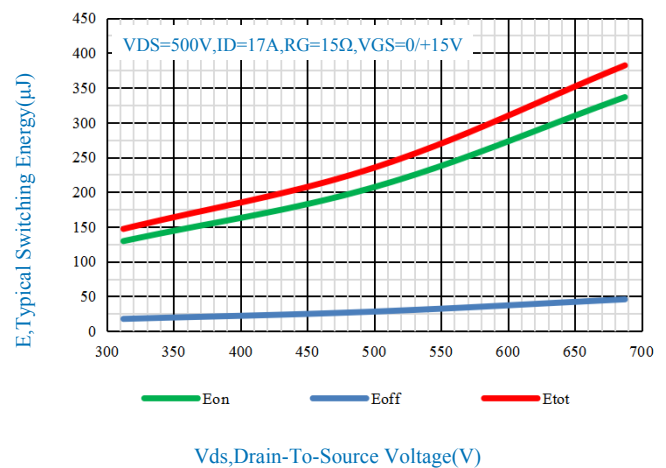


Fig.12-Typical Switching Energy Vs. Drain Source Voltage

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Typical Characteristics Curves

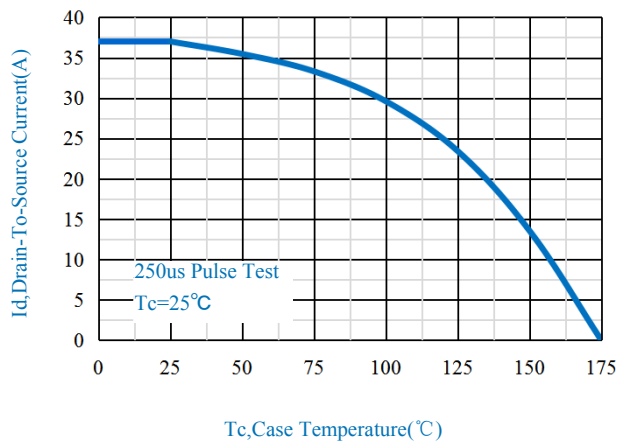


Fig.13-Maximum Continuous Drain Current Vs. Case Temperature

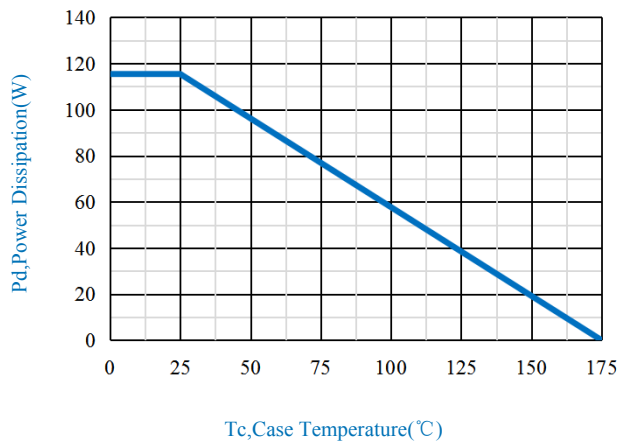


Fig.14-Maximum Power Dissipation Vs. Case Temperature

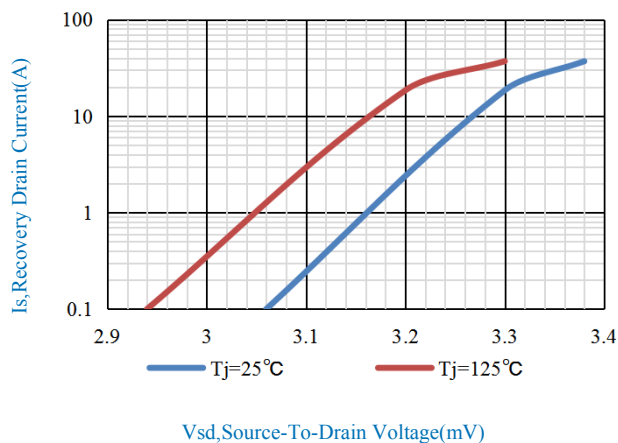


Fig.15-Source-To-Drain Diode Forward Voltage

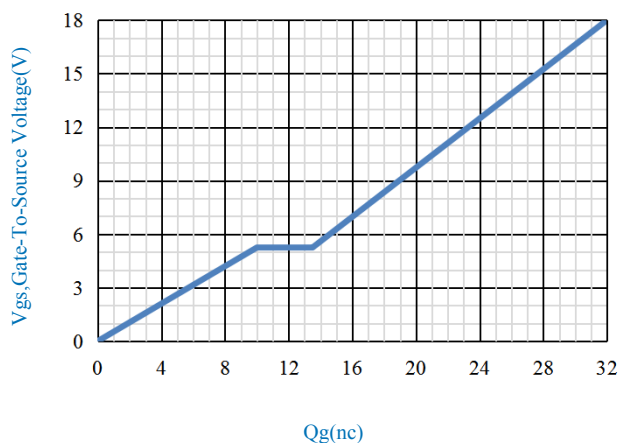


Fig.16-Gate Charge Waveform

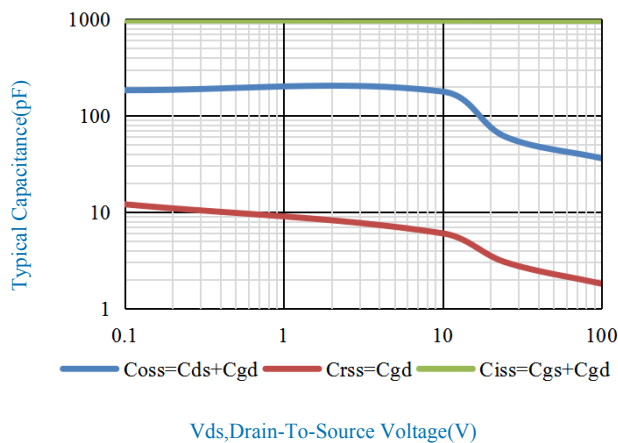


Fig.17-Typical Capacitance Vs. Drain-To-Source Voltage

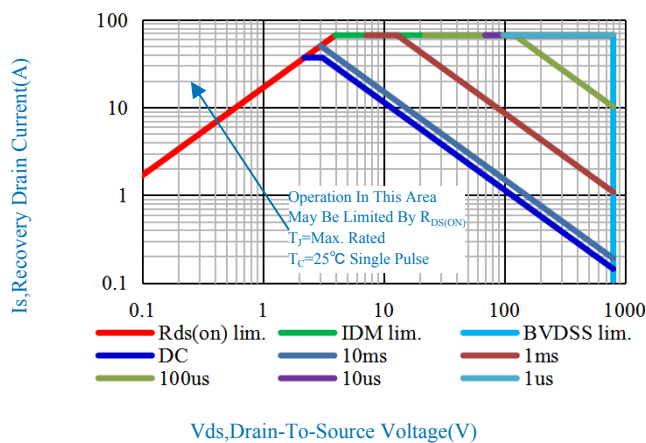


Fig.18-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

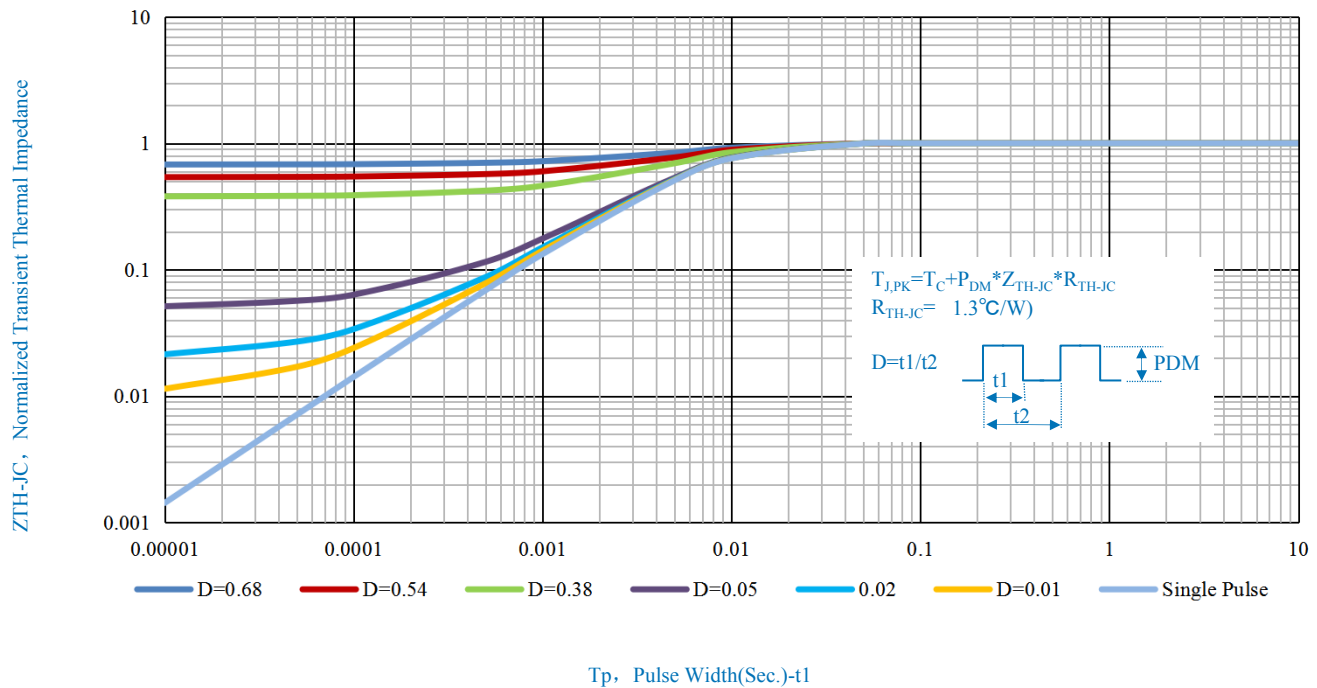


Fig.19- Normalized Maximum Transient Thermal Impedance Vs.Pulse Width

Test Circuit & Waveform

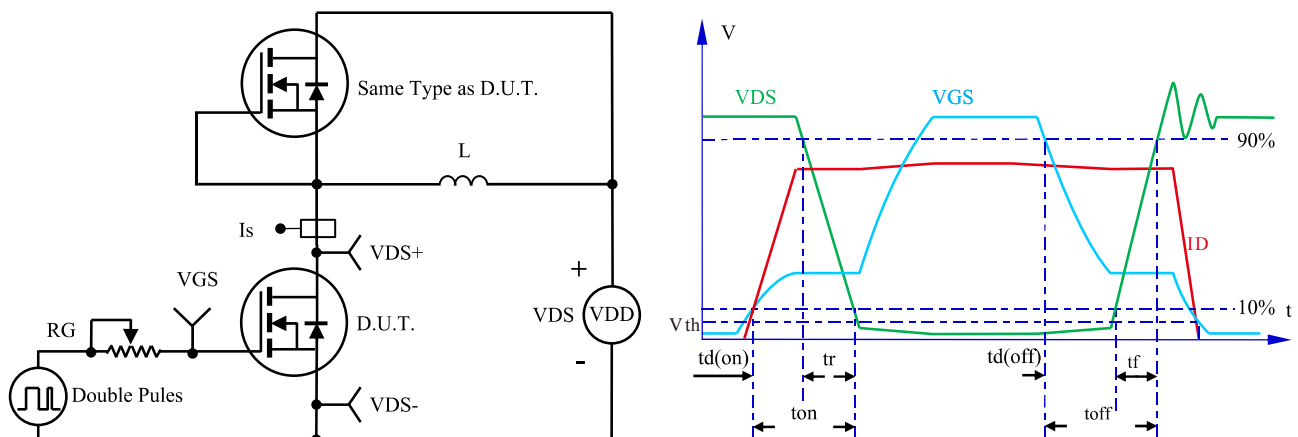


Fig.20- Inductive Switching Test Circuit & Waveform

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Test Circuit & Waveform

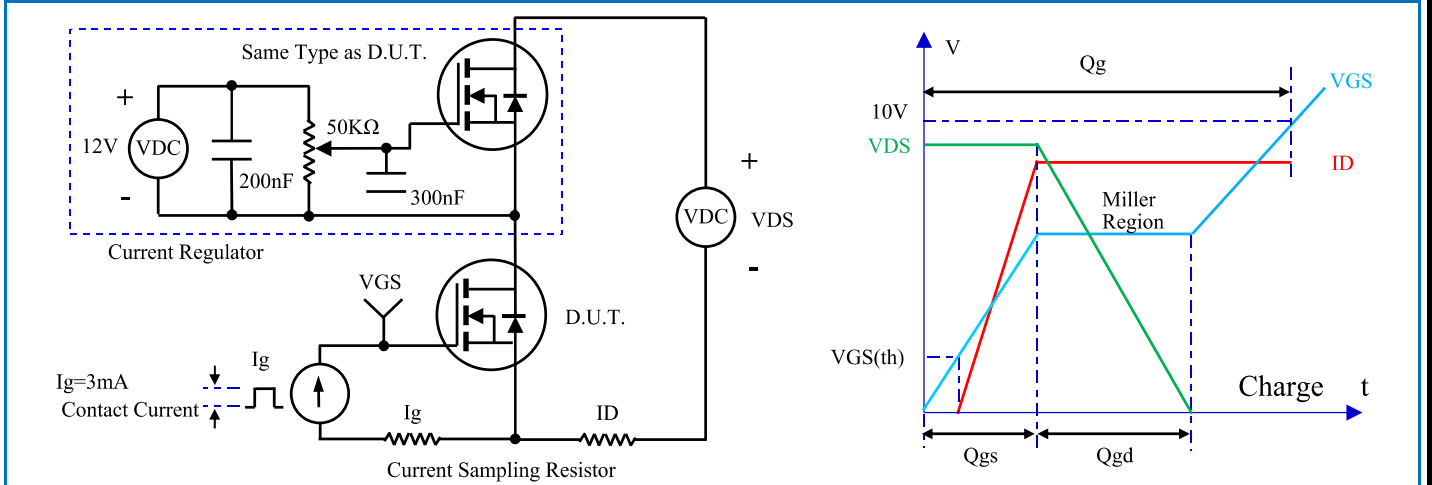


Fig.21-Gate Charge Test Circuit & Waveform

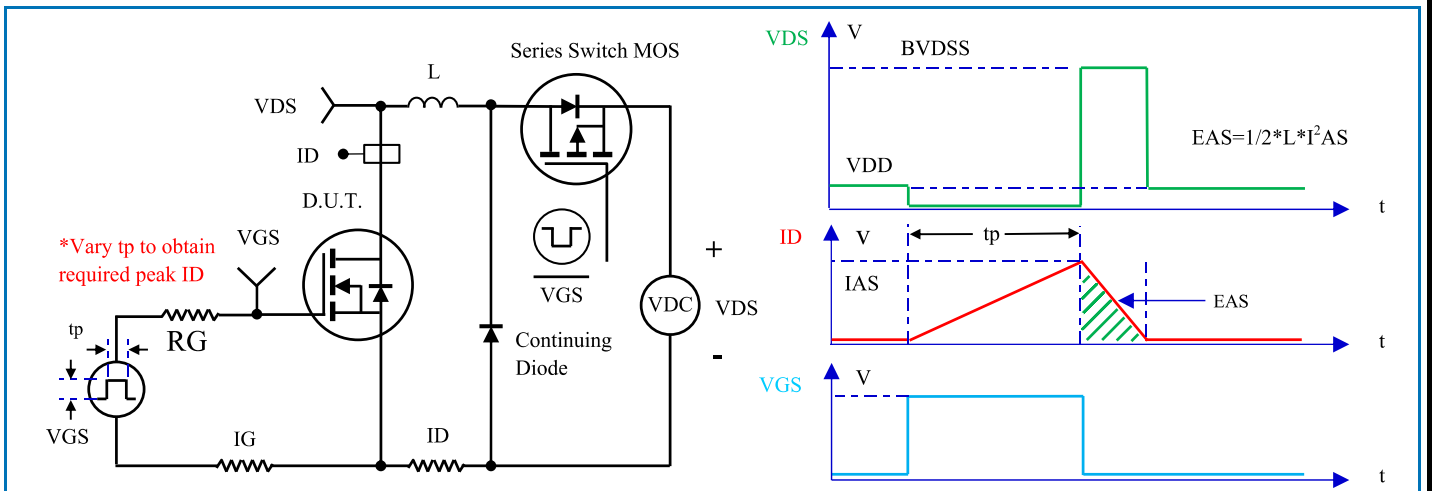


Fig.22- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

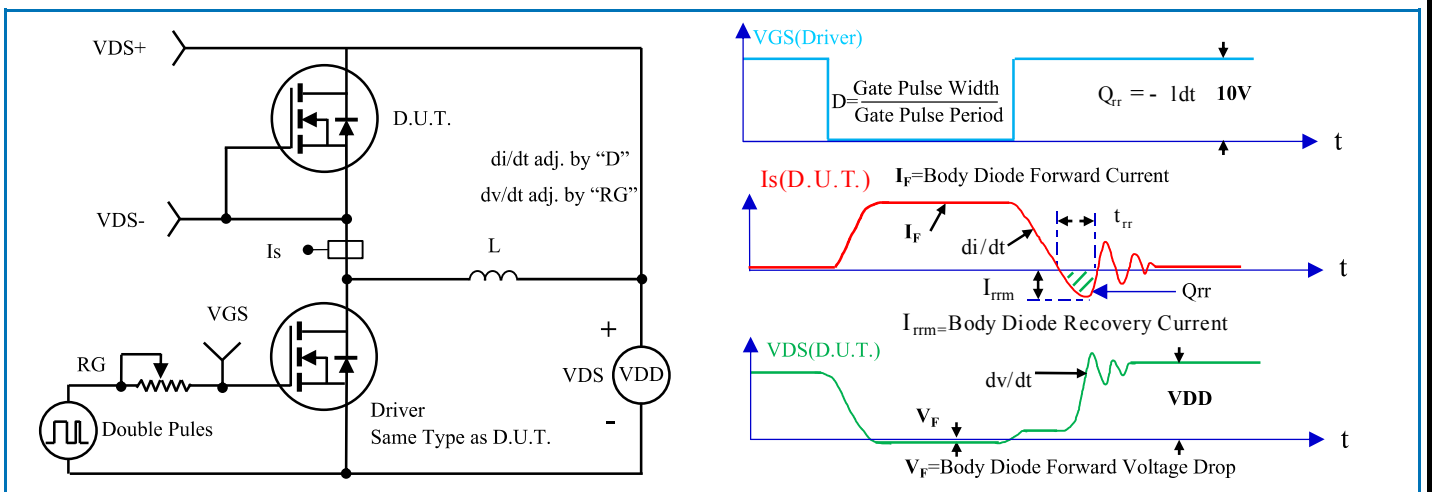
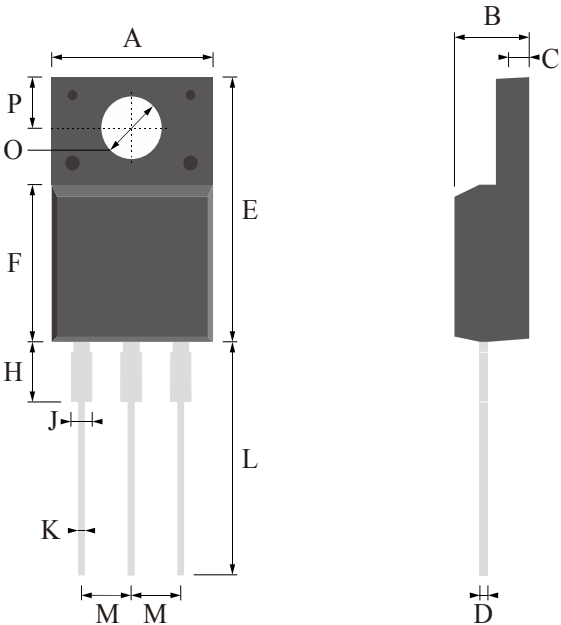


Fig.23- Diode Recovery Test Circuit & Waveform

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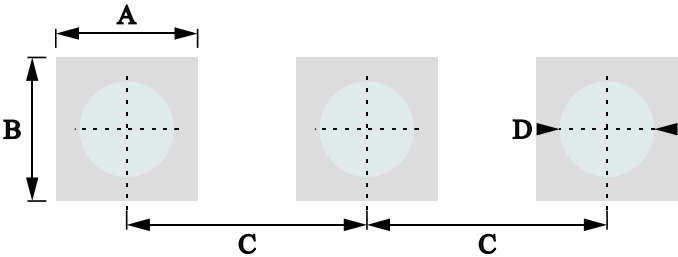
OUTLINE DRAWINGS



ITO-220AB

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.25	-	10.75	0.3642	-	0.4232
B	3.95	-	4.95	0.1555	-	0.1949
C	2.75	-	3.35	0.1083	-	0.1319
D	0.45	-	0.85	0.0177	-	0.0335
E	14.15	-	16.15	0.5571	-	0.6358
F	7.65	-	9.15	0.3012	-	0.3602
L	12.55	-	14.55	0.4941	-	0.5728
H	3.50	-	4.20	0.1378	-	0.1654
J	1.05	-	1.45	0.0413	-	0.0571
K	0.40	-	0.70	0.0157	-	0.0276
M	2.20	-	3.00	0.0866	-	0.1181
O	2.85	-	3.65	0.1122	-	0.1437
P	2.50	-	3.10	0.0984	-	0.1220

RECOMMEDND LAYOUT DRAWINGS



ITO-220AB

OUTLINE DIMENSIONS						
Dim.	Milimeters			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
NCH80R060H=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)
ITO-220AB	P1	1.715	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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- 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 Niuhang 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		
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