

NPS1N60G

N-Channel Enhancement Mode Power MOSFET



Voltage: 600 Volts

Current: 1.0 Amperes

Polarity And Marking

Package: SOT-223

Features

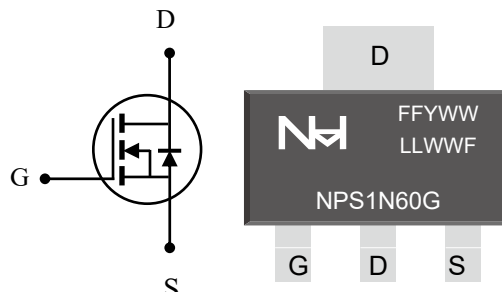
- NH'S Advanced Planar DMOS Technology
- Low Rds(on) For Low On-State Loss
- High EAS For High Reliability
- Qualified According To JEDEC Criteria

Typical Applications

- AC/DC Converter
- Adaptor And Charger
- PC Power
- LED Drives And LED Lighting
- Weight: App. 0.19 Grams (0.2038 Ounce)

Product Summary

VDS Min.@Tj	600	V
ID Min.@Ta	1.0	A
RDS(ON)Typ.@10V	8	Ω



Remark:

- NH=Niuhang Trademark
- FF=Product Line Code,According To Actual Changes
YWW=Date Code,According To Actual Changes
LLWWF=Internal Code,According To Actual Changes
- NPS1N60G=Model

***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}	600	V
Gate-Source Voltage		V _{GS}	±30	V
Continuous Drain Current (Note 1)	Ta= 25 °C	I _D	1.0	A
	Ta= 100 °C		0.6	
Drain Current-Pulse (Note 1)	Tj< 150 °C	I _{DM}	4	A
Maximum Power Dissipation Power	Ta= 25 °C	P _D	3	W
	Ta= 100 °C		1	
Derating Factor		D _F	0.02	W/°C
Avalanche Current,Single Pulse (Note 1)	L= 10.0 mH	I _{AS}	2.2	A
Single Pulse Avalanche Energy (Note 1) Test Circuit & Waveform See Fig.16	L= 10.0 mH IAS= 2.2 A, RG= 10.0 Ω Starting Tj=25 °C, VG = 10.0 V	E _{AS}	24	mJ

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

Parameter	Test Conditions	Symbol	Typ.	Unit
Junction Temperature		T _J	-55 to 150	°C
Storage Temperature Range		T _{STD}	-55 to 150	°C
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With Ta=25 °C	R _{θJA}	200.0	°C/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 1 in2 FR-4 Board With 2oz. Copper	R _{θJC}	41.7	

Notes: 1.Pulse Width Limited By Max. Junction Temperature. (See Fig. 13).

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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}	600	--	--	V
Bvdss Temperature Coefficient	ID=250uA,Reference25℃	ΔBV _{DSS} /ΔT _J	--	0.71	--	V/℃
Drain-Source Leakage Current	VDS= 600 V,VGS=0V	I _{DSS}	--	--	10	uA
Gate-Body Leakage Current	VGS= ±30 V,VDS=0V	I _{GSS}	--	--	±100	nA
Forward Transconductance	ID= 0.5 A,VDS= 15 V	g _{fs}	--	1.5	--	S
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS ID=250uA	V _{GS(TH)}	2.0	3.0	4.0	V
Drain-Source On Resistance	ID= 0.5 A,VGS= 10.0 V	R _{DS(ON)}	--	8.0	10.0	Ω
	ID= 0.5 A,VGS= 4.5 V		--	9.2	13.4	
Dynamic Characteristics						
Input Capacitance	VDS= 50 V	C _{iss}	--	200.0	--	pF
Output Capacitance	VGS= 0 V	C _{oss}	--	20.0	--	pF
Reverse Transfer Capacitance	F= 1 MHZ	C _{rss}	--	3.0	--	pF
Switching Paramters (Test Circuit & Waveform See Fig.14)						
Turn-On Delay Time	VDS= 300 V	t _{d(on)}	--	8.0	--	ns
Turn-On Rise Time	VGS= 10.0 V	t _r	--	10.0	--	ns
Turn-Off Delay Time	RG= 10.0 Ω	t _{d(off)}	--	25.0	--	ns
Turn-Off Rise Time		t _f	--	14.0	--	ns
Gate Charge Paramters (Test Circuit & Waveform See Fig.15)						
Total Gate Charge	VDS= 300 V	Q _g	--	9.0	--	nC
Gate-Source Charge	VGS= 10.0 V	Q _{gs}	--	0.6	--	nC
Gate-Drain Charge	ID= 0.5 A	Q _{gd}	--	6.0	--	nC
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.17)						
Max. Diode Forward Cuurent		I _s	--	--	1.0	A
Max. Pulsed Forward Cuurent		I _{SM}	--	--	3.5	A
Diode Forward Voltage	ID= 0.5 A,VGS=0V	V _{SD}	--	1.08	1.5	V
Reverse Recovery Time	ID= 0.5 A,di/dt= 100 A/us	t _{rr}	--	330.0	--	ns
Reverse Recovery Charge	VGS= 10.0 V,VDD= 300 V	Q _{rr}	--	360.0	--	nC

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Typical Characteristics Curves

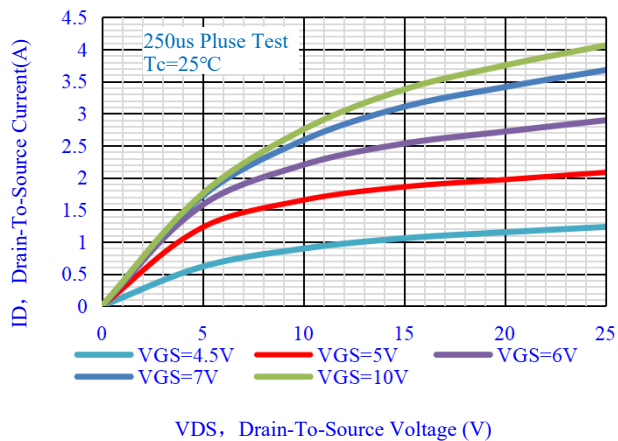


Fig.1-Output Characteristics

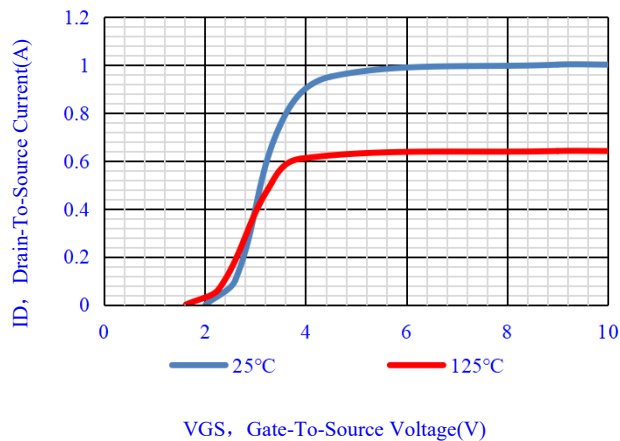


Fig.2- Transfer Characteristics

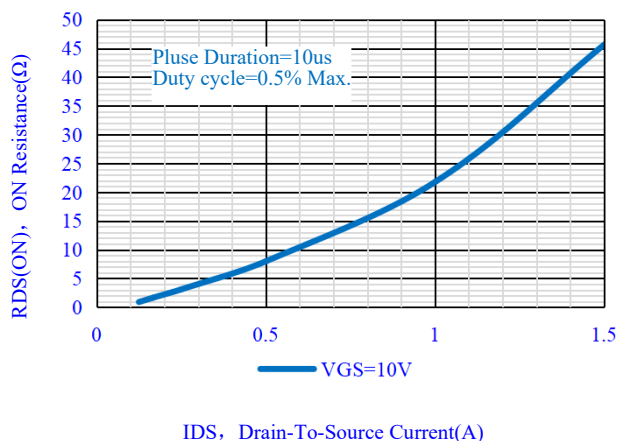


Fig.3- On Resistance vs. Drain Current

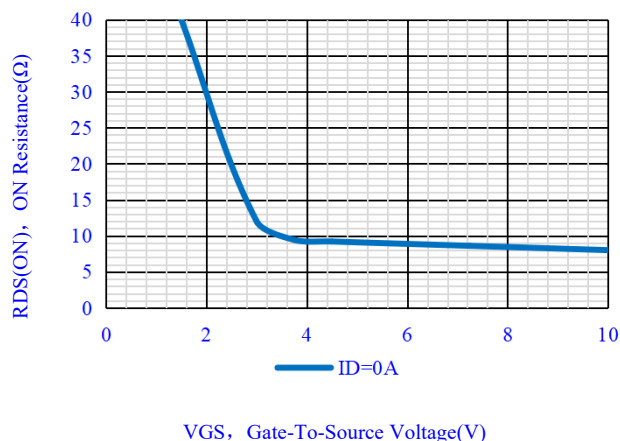


Fig.4- On Resistance vs. Gate Source Voltage

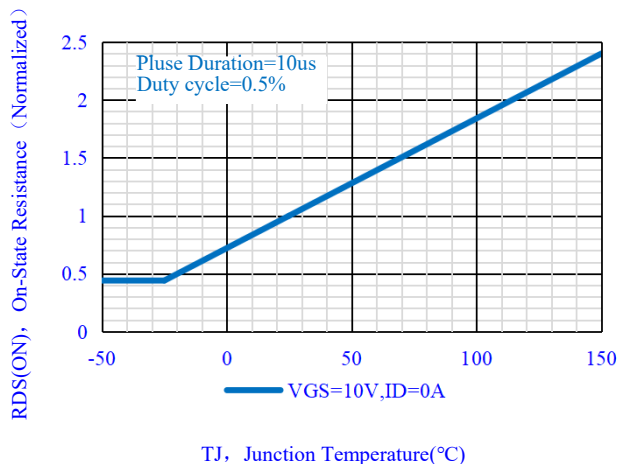


Fig.5- On Resistance vs. Junction Temperature

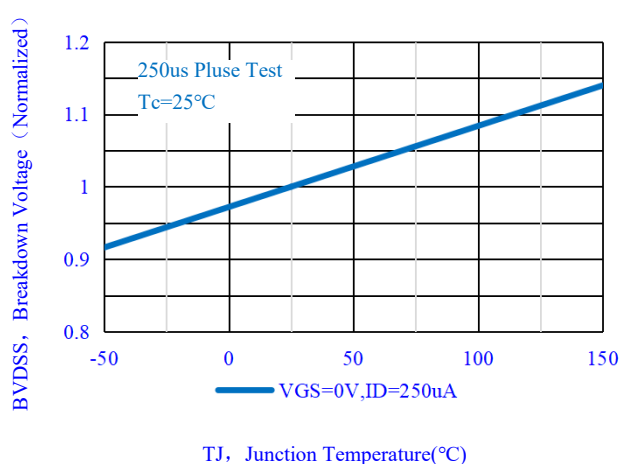


Fig.6- Breakdown Voltage vs. Junction Temperature

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Typical Characteristics Curves

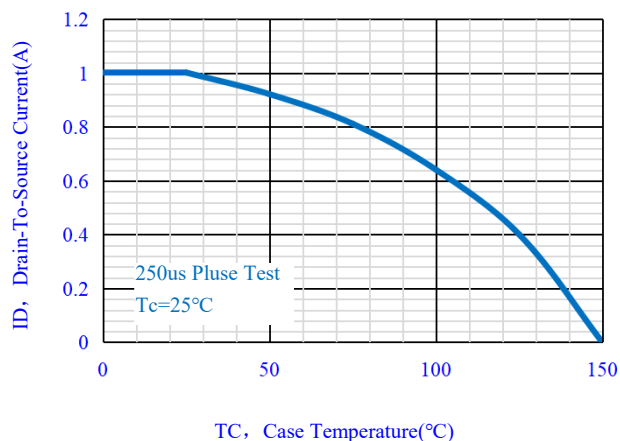


Fig.7-Maximum Continuous Drain Current vs. Case Temperature

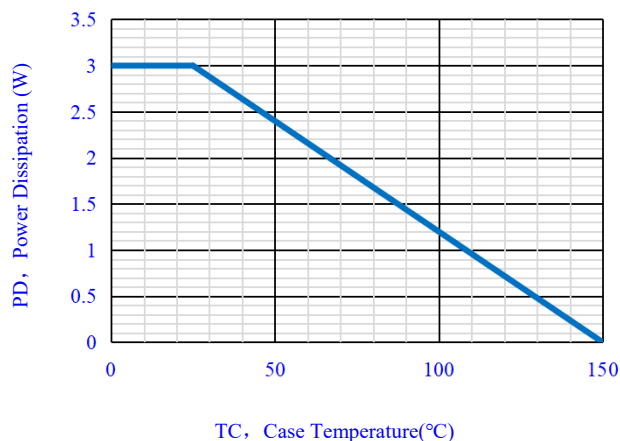


Fig.8-Maximum Power Dissipation vs. Case Temperature

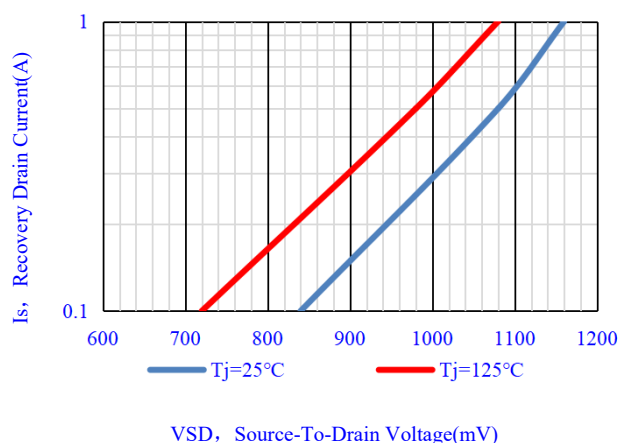


Fig.9- Source-To-Drain Diode Forward Voltage

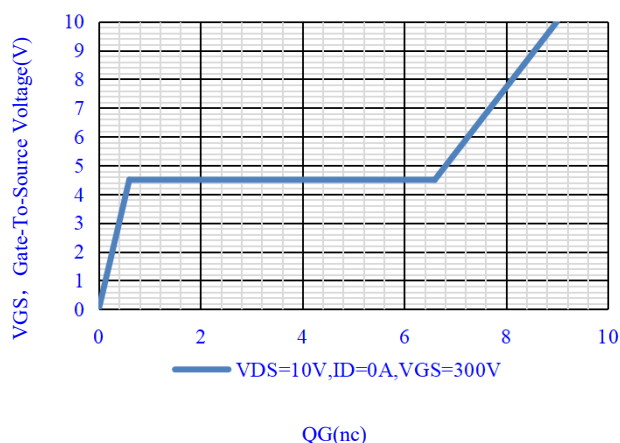


Fig.10-Gate Charge Waveform

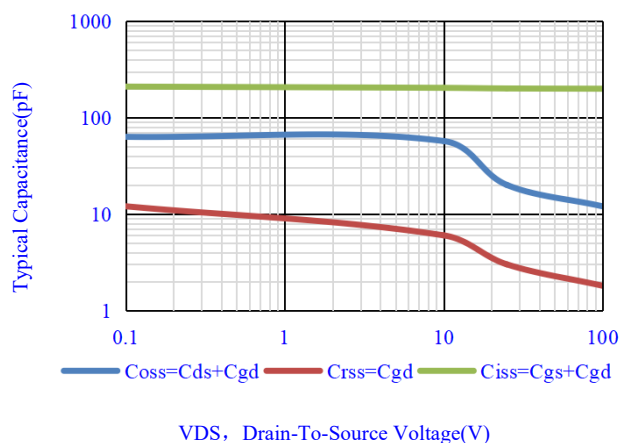


Fig.11-Typical Capacitance vs. Drain-To-Source Voltage

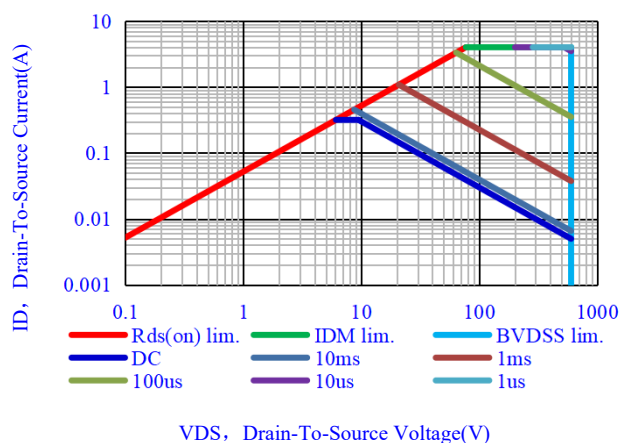


Fig.12-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

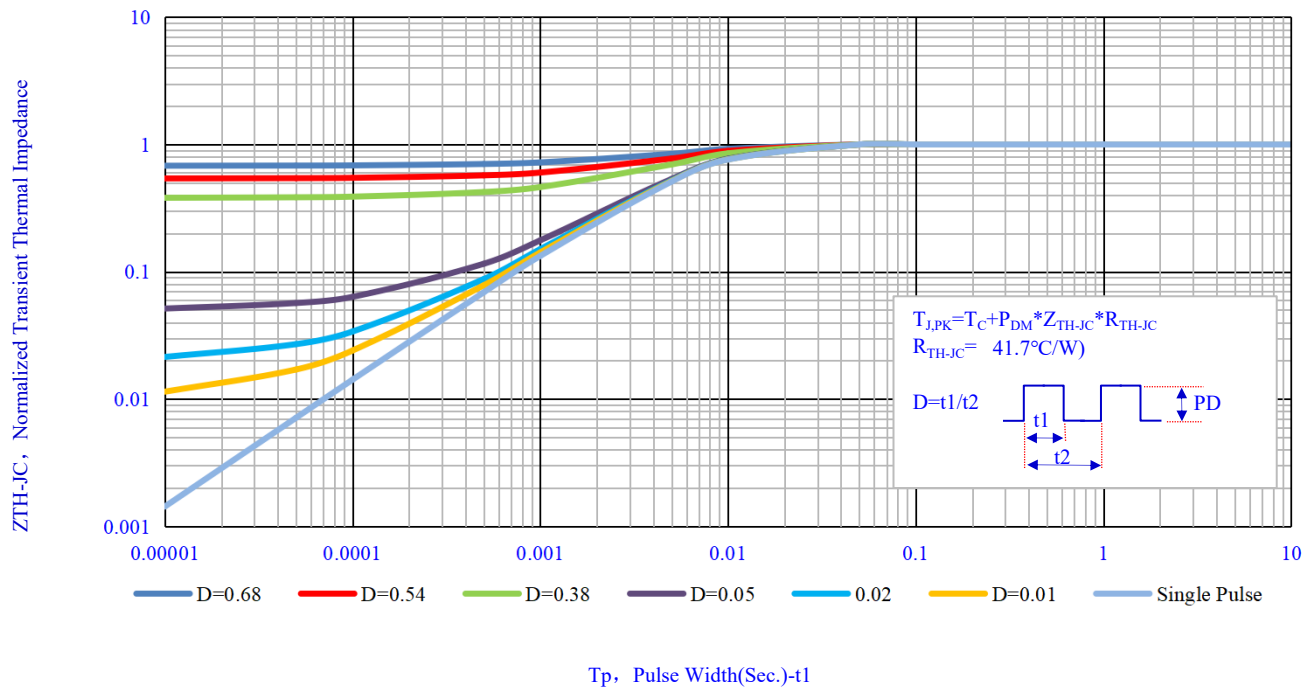


Fig.13- Normalized Maximum Transient Thermal Impedance vs.Pulse Width

Test Circuit & Waveform

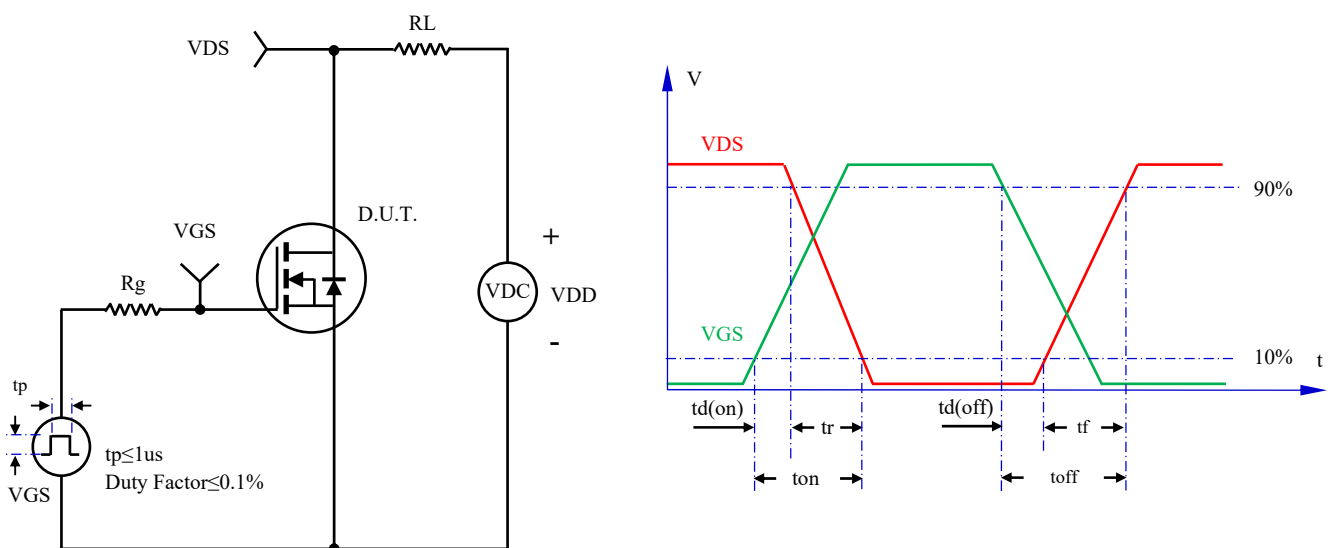


Fig.14- Resistive Switching Test Circuit & Waveform

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Test Circuit & Waveform

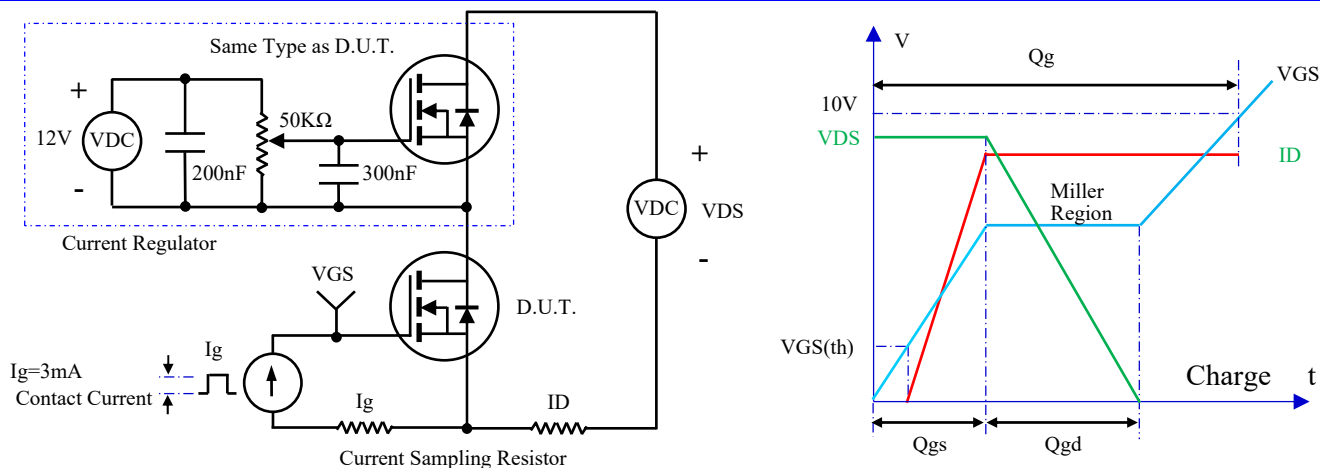


Fig.15-Gate Charge Test Circuit & Waveform

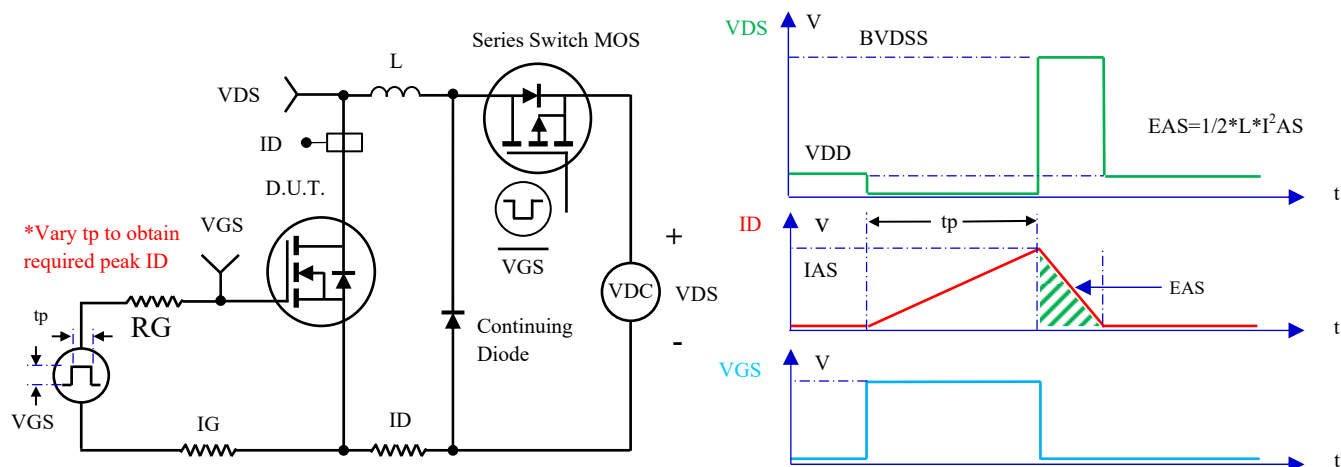


Fig.16- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

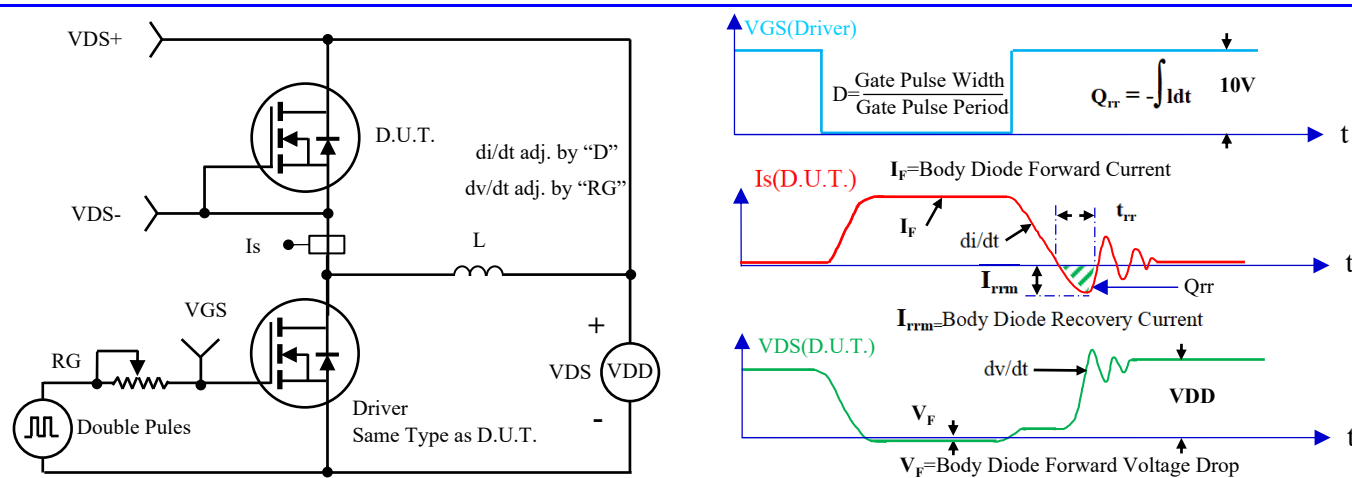


Fig.17- Diode Recovery Test Circuit & Waveform

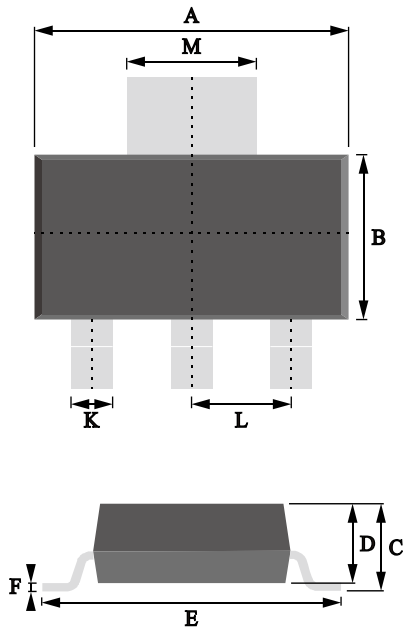
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OUTLINE DRAWINGS

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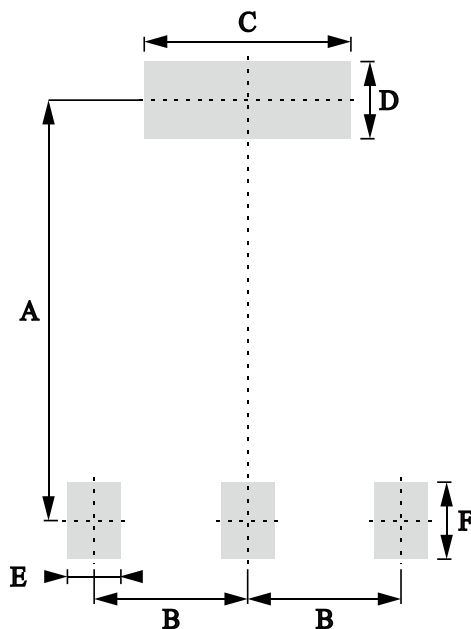


OUTLINE DIMENSIONS

Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.05	-	6.60	0.2382	-	0.2598
B	3.30	-	3.70	0.1299	-	0.1457
C	1.45	-	1.85	0.0571	-	0.0728
D	1.40	-	1.80	0.0551	-	0.0709
E	6.70	-	7.20	0.2638	-	0.2835
F	0.20	-	0.40	0.0079	-	0.0157
K	0.55	-	0.85	0.0217	-	0.0335
L	2.10	-	2.50	0.0827	-	0.0984
M	2.85	-	3.25	0.1122	-	0.1280

RECOMMENDED LAYOUT DRAWINGS

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OUTLINE DIMENSIONS

Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	6.00	-	-	0.0000	-
B	-	2.30	-	-	0.0906	-
C	-	3.10	-	-	0.1220	-
D	-	1.10	-	-	0.0433	-
E	-	0.80	-	-	0.0315	-
F	-	1.10	-	-	0.0433	-

PACKING INFORMATION

Package Code	Package Method	Min. Pack. Size (mm)	Quantity (Pcs/Min. Pack.)	Inner Box Size L×W×H(mm)	Quantity (Pcs/Inner Box)	Outer Carton Size L×W×H(mm)	Quantity (Pcs/Carton)
0	RL	330	2500	357x340x50	5000	540x370x360	50000

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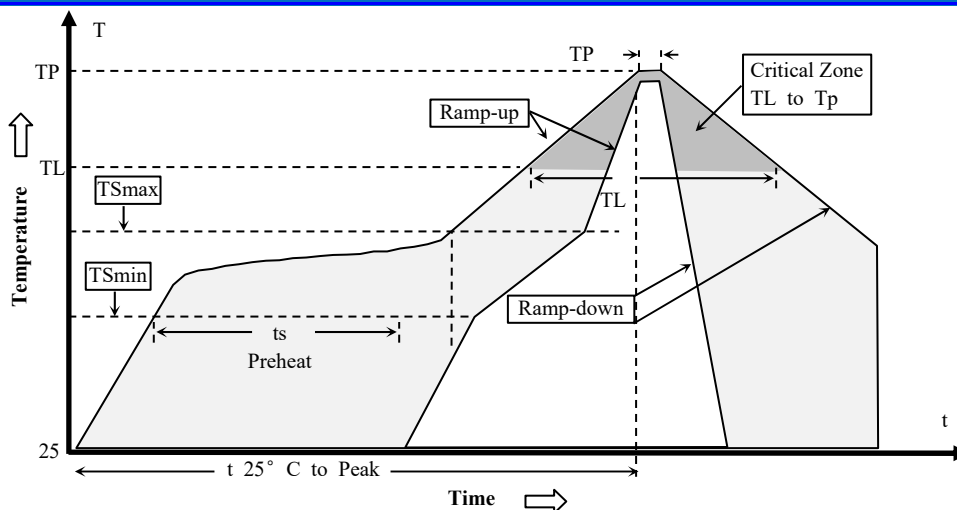
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Recommended wave soldering condition

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(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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