

NHTL190N02S2



N-Channel Enhancement Mode Trench Power MOSFET

Voltage: 20 Volts

Current: 0.75 Amperes

Package: SOT-323

Features

- NH'S Advanced Trench Technology
- Low Rds(on) For Low On-State Loss
- High EAS For High Reliability
- Excellent Qg*Rds(on) Product(FOM)
- Built-in ESD Protected

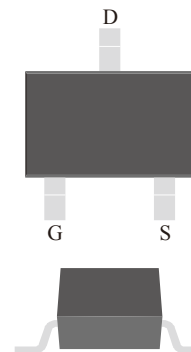
Typical Applications

- DC-DC Converter
- Battery Management System(BMS)
- Printed Circuit Board For Control Circuit
- Uninterruptible Power Supplies(UPS)

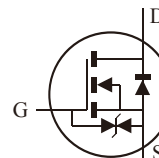
Product Summary

VDS Min.@Tj	20	V
Id Min.@Ta	0.75	A
RDS(ON)(TYP)@4.5V	190	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}	20	V
Gate-Source Voltage		V _{GS}	±12	V
Continuous Drain Current (Note 1)	Ta= 25 ℃	I _D	0.75	A
	Ta= 100 ℃		0.48	
Drain Current-Pulse (Note 1)	Tj< 150 ℃	I _{DM}	3	A
Maximum Power Dissipation Power	Ta= 25 ℃	P _D	200	mW
Dissipation Derating Factor Above 25℃	Ta= 100 ℃		80	
Derating Factor		D _F	1.60	mW/℃

Thermal Characteristics (Ta=25℃ Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Typ.	Unit
Junction Temperature		T _J	-55 to 150	℃
Storage Temperature Range		T _{STD}	-55 to 150	℃
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With Ta=25℃	R _{θJA}	625	℃/W

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}	20	--	--	V
Bvdss Temperature Coefficient	ID=250uA,Reference25℃	ΔBV _{DSS} /ΔT _J	--	0.02	--	V/℃
Drain-Source Leakage Current	VDS= 20 V,VGS=0V	I _{DSS}	--	--	1	uA
Gate-Body Leakage Current	VGS= ±12 V,VDS=0V	I _{GSS}	--	--	±20	uA
Forward Transconductance	ID= 0.4 A,VDS= 5 V	g _{fs}	--	1.6	--	S
Static On Characteristics						
Gate Threshold Voltage	VGS= VDS ID=250uA	V _{GS(TH)}	0.35	0.75	1	V
Drain-Source On Resistance	ID= 0.4 A,VGS= 4.5 V	R _{DS(ON)}	--	190	380	mΩ
	ID= 0.4 A,VGS= 2.5 V		--	260	450	
Dynamic Characteristics						
Input Capacitance	VDS= 10 V	C _{iss}	--	80	--	pF
Output Capacitance	VGS= 0 V	C _{oss}	--	13	--	pF
Reverse Transfer Capacitance	F= 1 MHZ	C _{rss}	--	10	--	pF
Switching Paramters With Inductive Load(Test Circuit & Waveform See Fig.14)						
Turn-On Delay Time	VDS= 10 V	t _{d(on)}	--	6.7	--	ns
Turn-On Rise Time	VGS= 4.5 V	t _r	--	47.3	--	ns
Turn-Off Delay Time	RG= 10.0 Ω	t _{d(off)}	--	4.8	--	ns
Turn-Off Rise Time		t _f	--	7.4	--	ns
Drain-Source Diode Characteristics And Maximum Ratings (Test Circuit & Waveform See Fig.17)						
Max. Diode Forward Current		I _S	--	--	0.75	A
Max. Pulsed Forward Current		I _{SM}	--	--	3	A
Diode Forward Voltage	ID= 0.4 A,VGS=0V	V _{SD}	--	0.7	1.2	V

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Typical Characteristics Curves

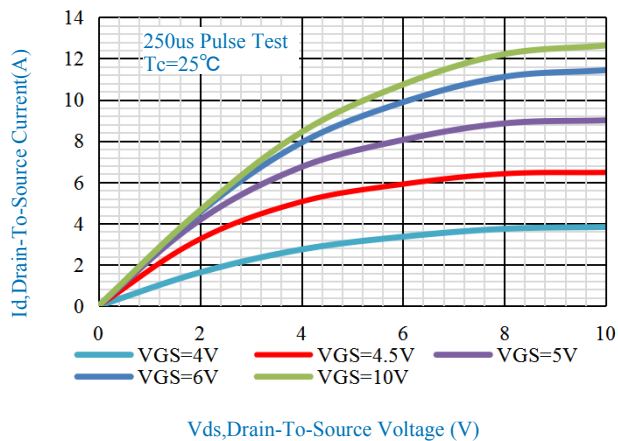


Fig.1-Output Characteristic

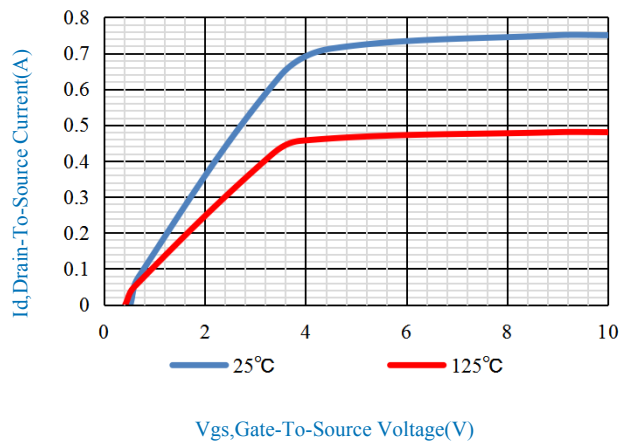


Fig.2-Transfer Characteristic

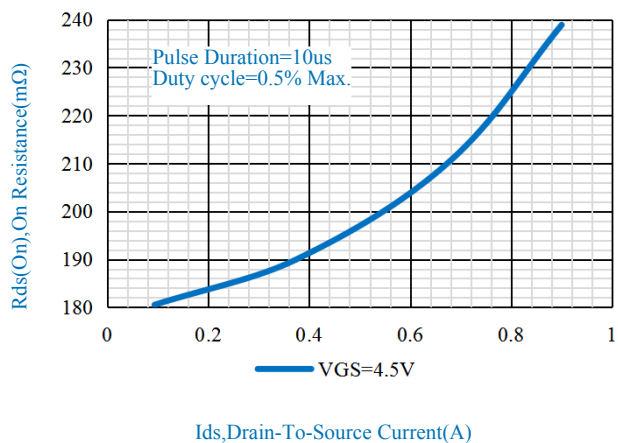


Fig.3-On Resistance Vs. Drain Current

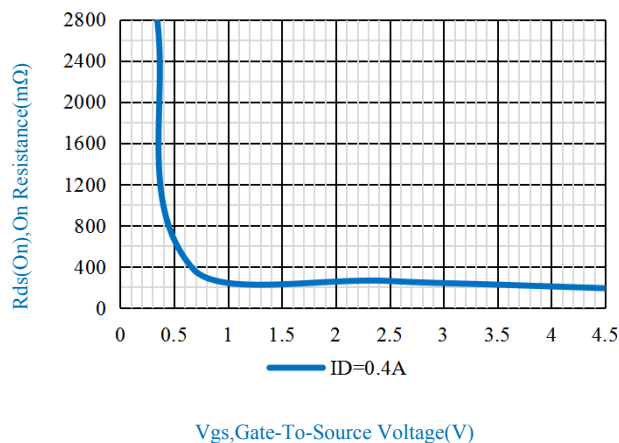


Fig.4-On Resistance Vs. Gate Source Voltage

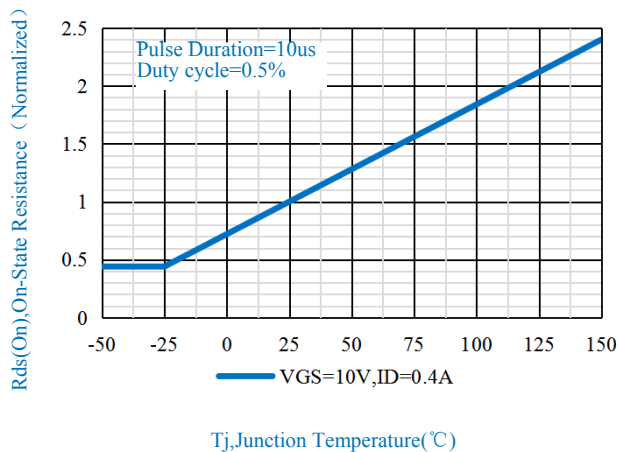


Fig.5-On Resistance Vs. Junction Temperature

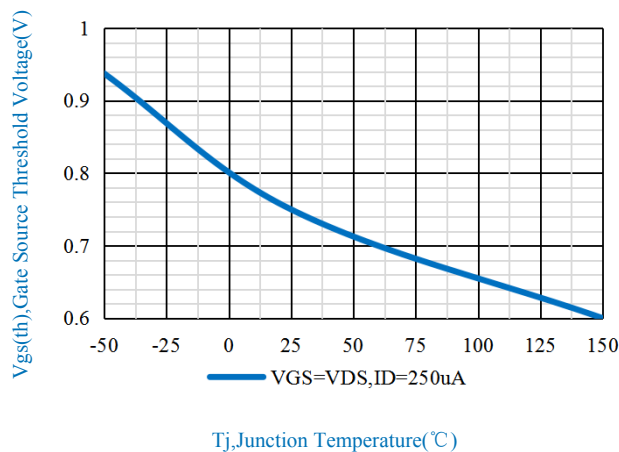


Fig.6-Gate Source Threshold Voltage Vs. Junction Temperature

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Typical Characteristics Curves

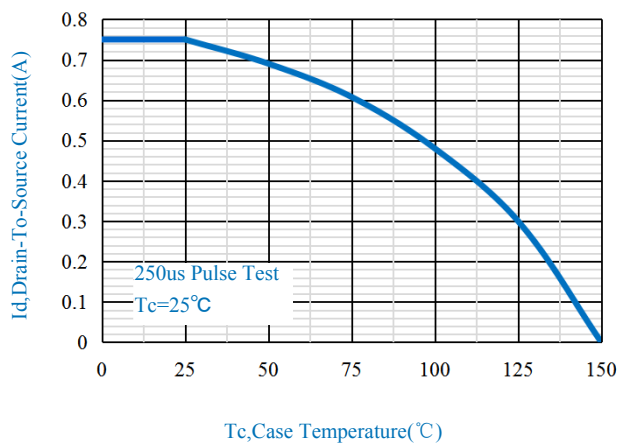


Fig.7-Maximum Continuous Drain Current Vs. Case Temperature

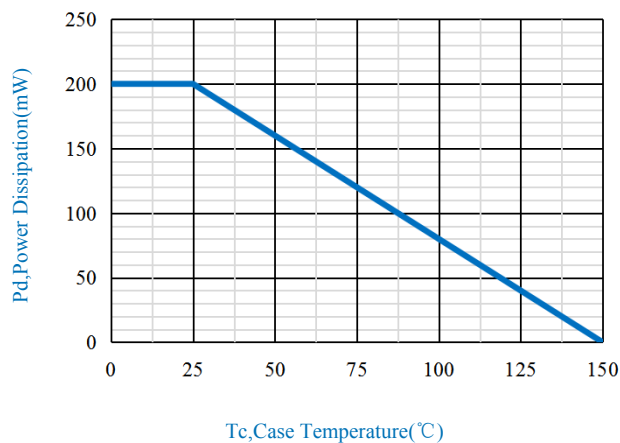


Fig.8-Maximum Power Dissipation Vs. Case Temperature

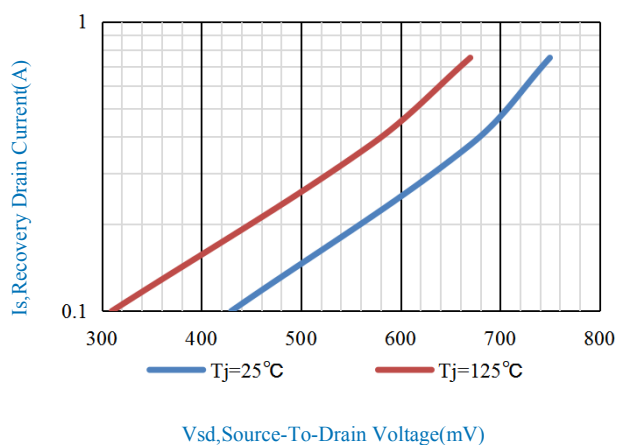


Fig.9-Source-To-Drain Diode Forward Voltage

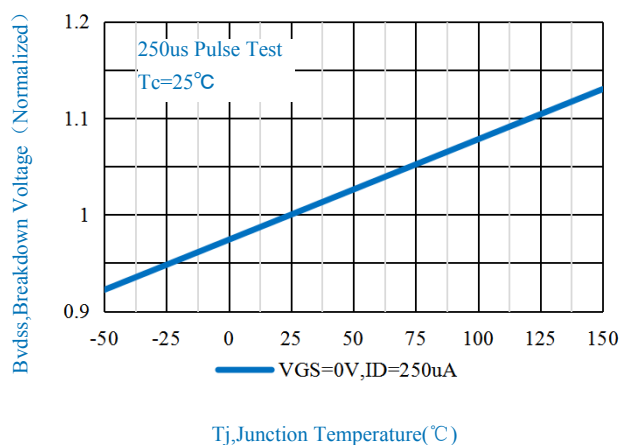


Fig.10-Breakdown Voltage Vs. Junction Temperature

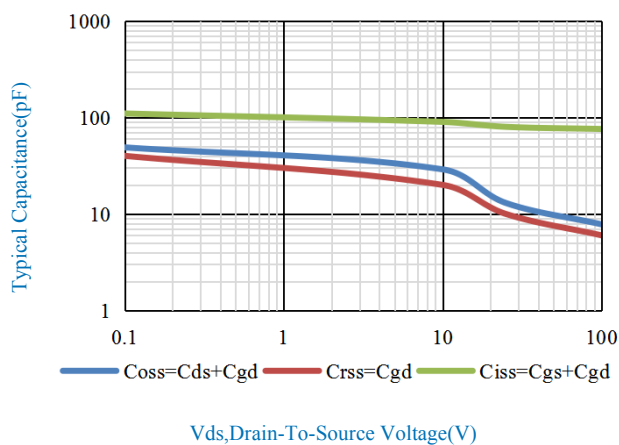


Fig.11-Typical Capacitance Vs. Drain-To-Source Voltage

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Typical Characteristics Curves

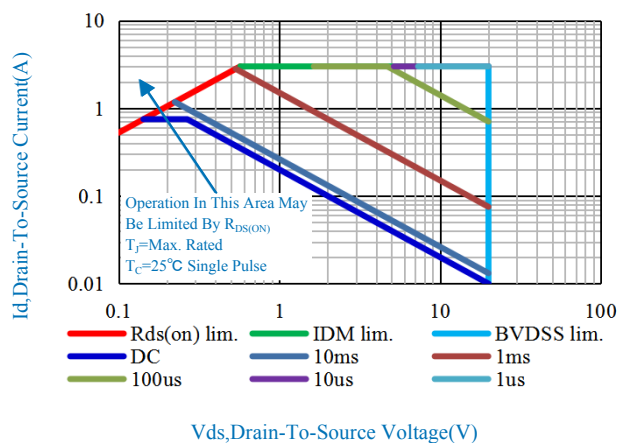


Fig.12-Maximum Safe Operating Area(SOA)

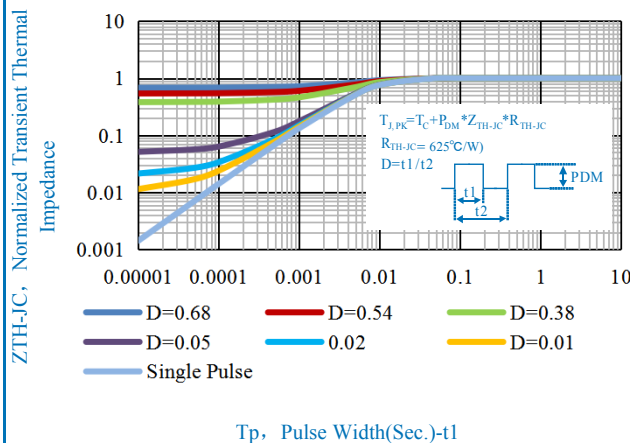


Fig.13- Normalized Maximum Transient Thermal Impedance Vs. Pulse Width

Inductive Load Test Circuit & Waveform

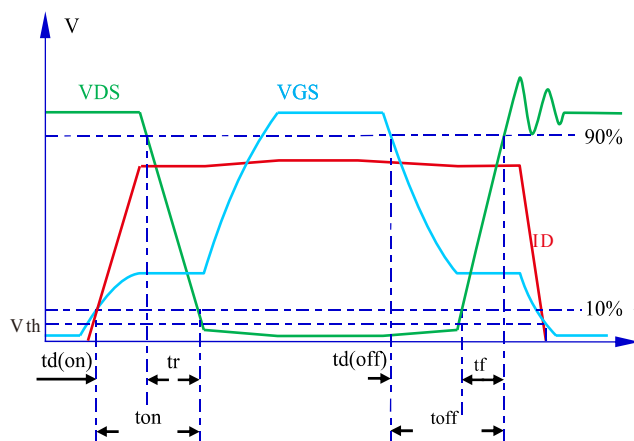
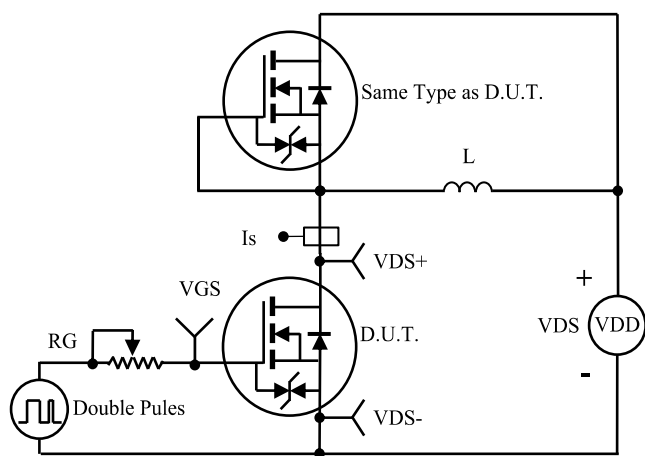


Fig.14- Inductive Switching Test Circuit & Waveform

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Test Circuit & Waveform

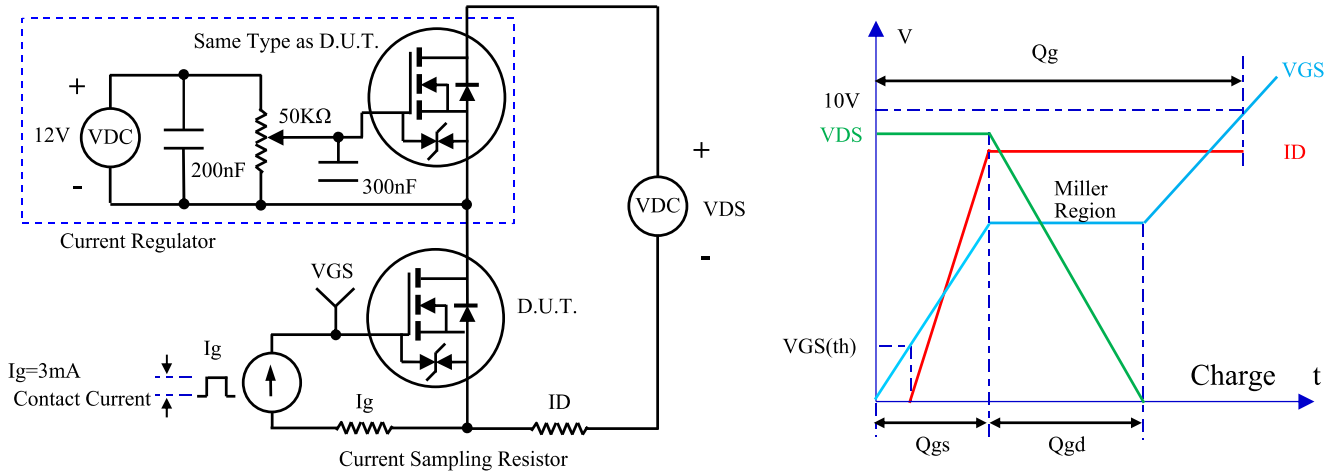


Fig.15- Gate Charge Test Circuit & Waveform

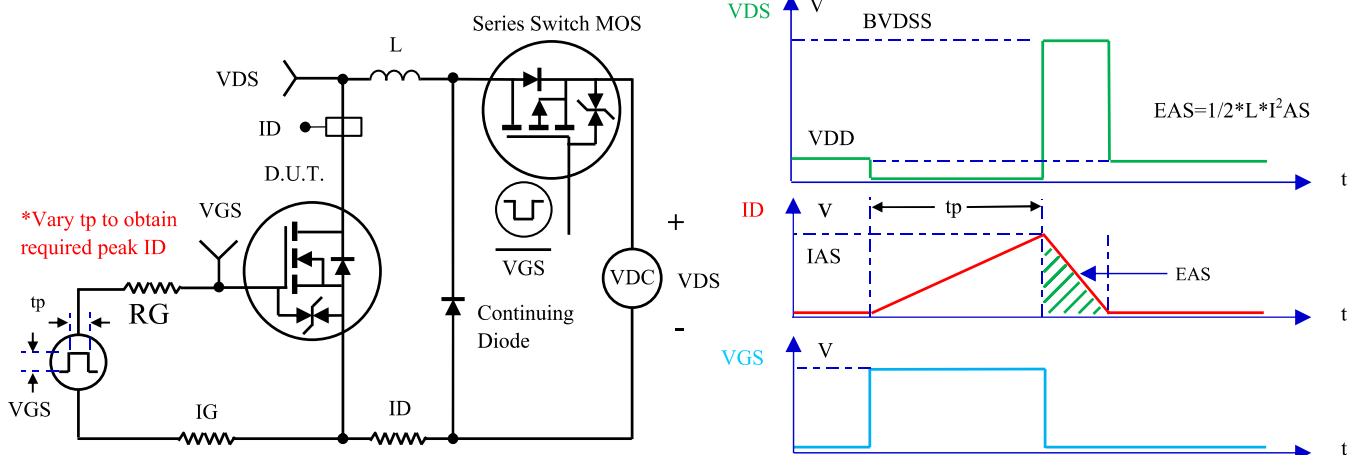


Fig.16- Unclamped Inductive Switching (UIS) Test Circuit & Waveform

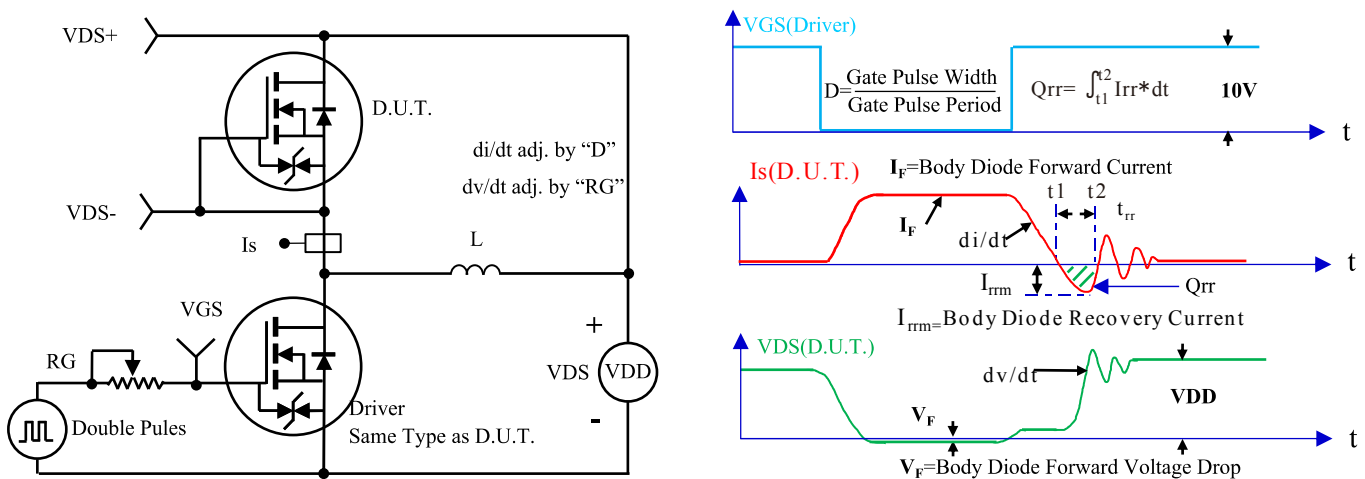


Fig.17- Diode Recovery Test Circuit & Waveform

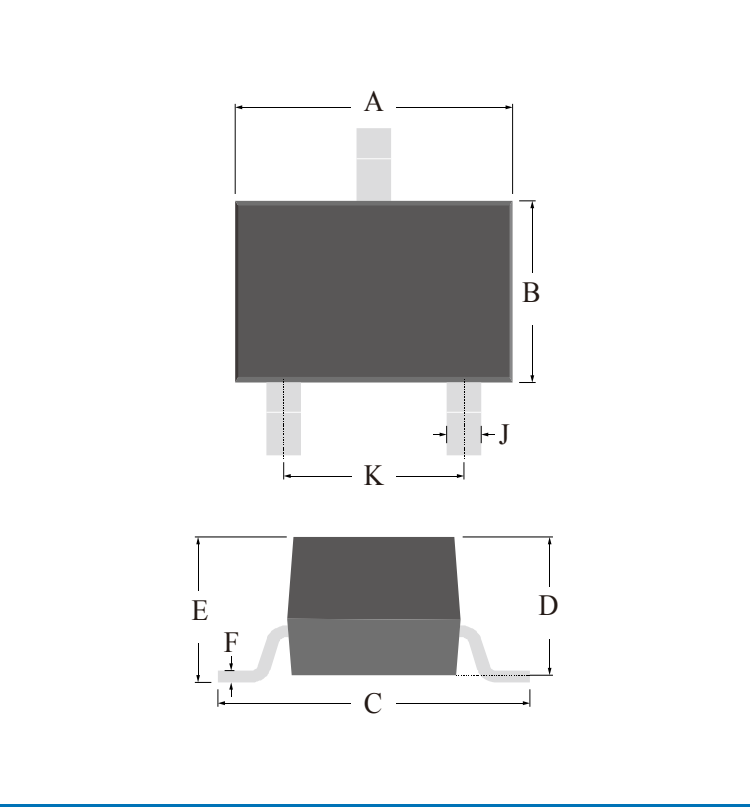
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OUTLINE DRAWINGS

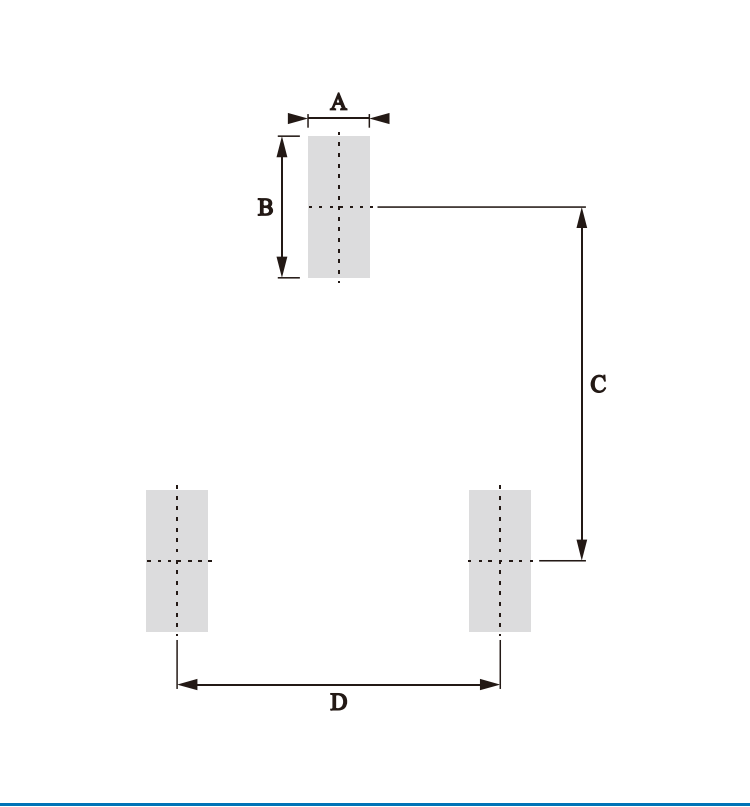
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OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.80	-	2.20	0.0709	-	0.0866
B	1.10	-	1.40	0.0433	-	0.0551
C	2.05	-	2.45	0.0807	-	0.0965
D	0.80	-	1.10	0.0315	-	0.0433
E	0.85	-	1.15	0.0335	-	0.0453
F	0.08	-	0.18	0.0031	-	0.0071
J	0.15	-	0.35	0.0059	-	0.0138
K	1.10	-	1.50	0.0433	-	0.0591

RECOMMEDND LAYOUT DRAWINGS

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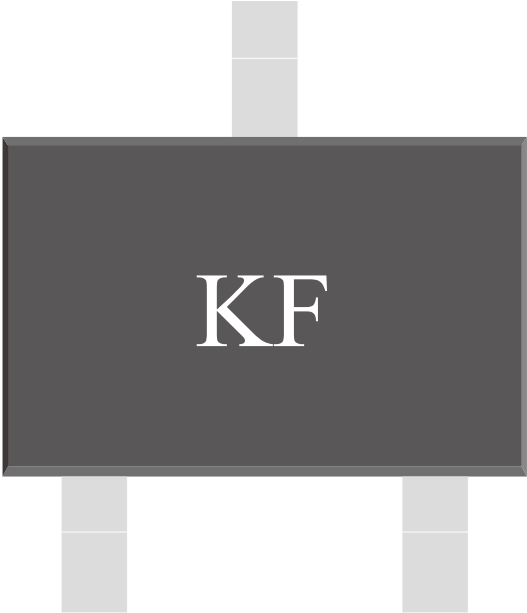
OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	0.60	-	-	0.0000	-
B	-	0.80	-	-	0.0315	-
C	-	2.00	-	-	0.0787	-
D	-	1.40	-	-	0.0551	-

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MARKING INFORMATION



MARKING INSTRUCTIONS

KF=Mark

PACKING INFORMATION

Package Type	Package Code	Product Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
SOT-323	P1	0.0291	7" Reel	3000	45000	180000

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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	2014-10-20	First Issue		
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