

ES1AF THRU ES1JF
Super Fast Recovery Rectifiers



Voltage:	50~600 Volts	Current:	1 Amperes	Package:	SMAF
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Features

- NH'S Super Fast Recovery Rectifiers Chip Technology
- Low Switching Loss For High Efficiency
- Low Leakage Current For High Reliability
- Super Fast Switching Speed

Mechanical Data

- **Case:** Molded With UL-94 ClassV-0 Recognized, RoHS-Compliant
- **Polarity:** Look At The Diagram And Polarity On The Right
- **Terminals:** Tin Plated Leads,Solderable Per J-STD-002 And JESD22-B102

Typical Applications

- Switch Mode Power Supplies (SMPS)
- Fast Chargers
- LED Driver And Monitor Lighting
- Automotive Electronics And Charging Posts

Diagram:



Polarity:



Single Phase,Half Wave,60Hz,Resistive Or Inductive Load.For Capacitive Load,Derate Current By 20%

Maximum Ratings (Ta=25°C Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	ES 1AF	ES 1BF	ES 1DF	ES 1FF	ES 1GF	ES 1HF	ES 1JF	Unit
Maximum Repetitive Peak Reverse Voltage		V_{RRM}	50	100	200	300	400	500	600	V
Maximum RMS Voltag		V_{RMS}	35	70	140	210	280	350	420	V
Maximum DC Blocking Voltage		V_{DC}	50	100	200	300	400	500	600	V
Maximum Average Forward Rectified Current		$I_{F(AV)}$	1							A
Peak Forward Surge Current	8.3ms Single Half Sine-wave Superimposed On Rate Load	I_{FSM}	30							A
Current Squared Time	$t < 8.3ms$	I^2t	3.7							A ² sec

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

Parameter	Test Conditions	Symbol	ES 1AF	ES 1BF	ES 1DF	ES 1FF	ES 1GF	ES 1HF	ES 1JF	Unit	
Maximum Instantaneous Forward Voltage	I _F = 1.0 A	V _F	0.95			1.30		1.70		V	
Maximum DC Reverse Current at Rated DC Blocking Voltage	Ta=25℃ ,V _R =VRRM Ta=125℃ ,V _R =VRRM*80%	I _{RRM}	5 200								uA uA
Typical Junction Capacitance	4 V,1MHz	C _J	18			12		10		pF	
Maximum Reverse Recovery Time	IF=0.5A, IR=1.0A, IRR=0.25A	Trr	35								nS

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

Parameter	Test Conditions	Symbol	ES 1AF	ES 1BF	ES 1DF	ES 1FF	ES 1GF	ES 1HF	ES 1JF	Unit
Operating Junction Temperature Range		T _J	-55~150							℃
Storage Temperature Range		T _{STD}	-55~150							
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With Ta=25℃	R _{θJA}	68.0							℃/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 1 in2 FR-4 Board With 2oz. Copper	R _{θJC}	18.0							

Notes: 1.Pulse Test: 300 Us Pulse Width,1% Duty Cycle

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Typical Characteristics Curves

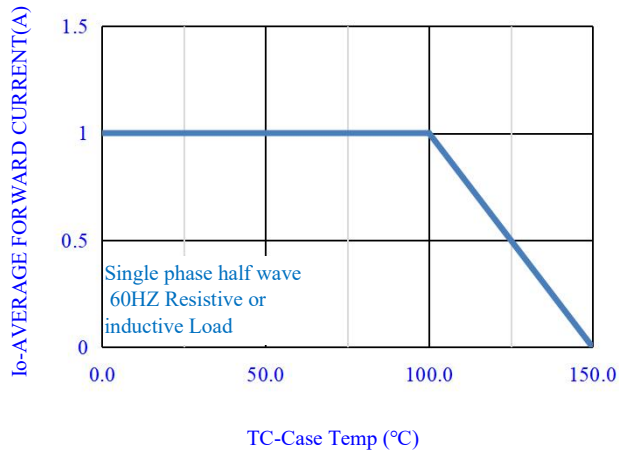


Fig.1-FORWARD CURRENT DERATING CURVE

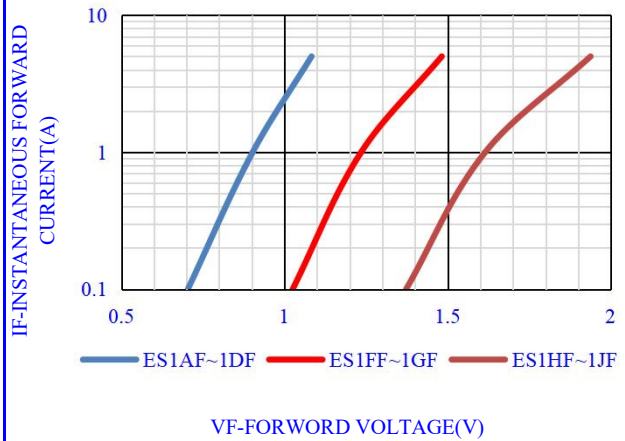


Fig.2- TYPICAL INSTANTANEOUS FORWARD

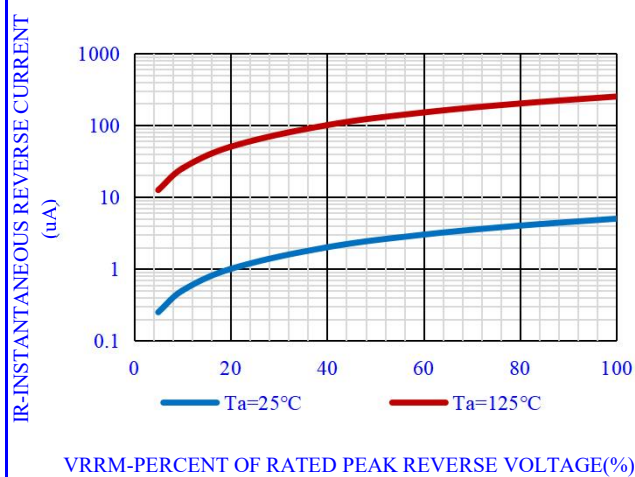


Fig.3- TYPICAL REVERSE CHARACTERISTICS

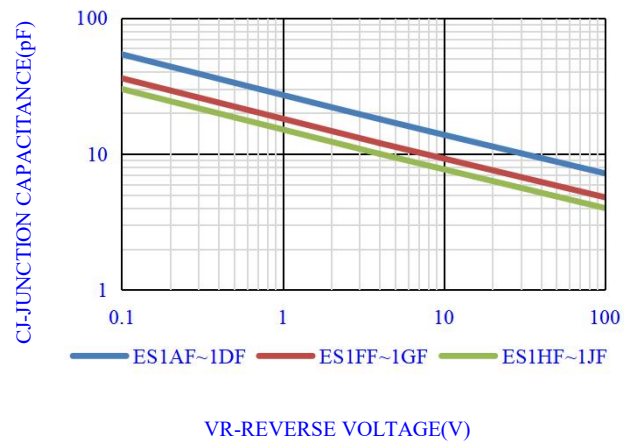


Fig.4- TYPICAL JUNCTION CAPACITANCE

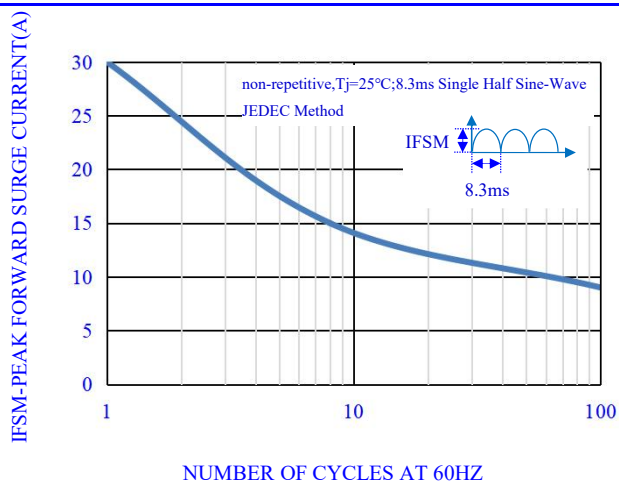


Fig.5-MAX. NON-REPETITIVE SURGE CURRENT

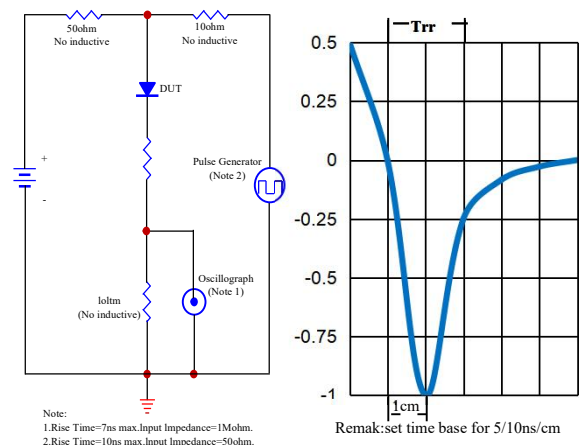
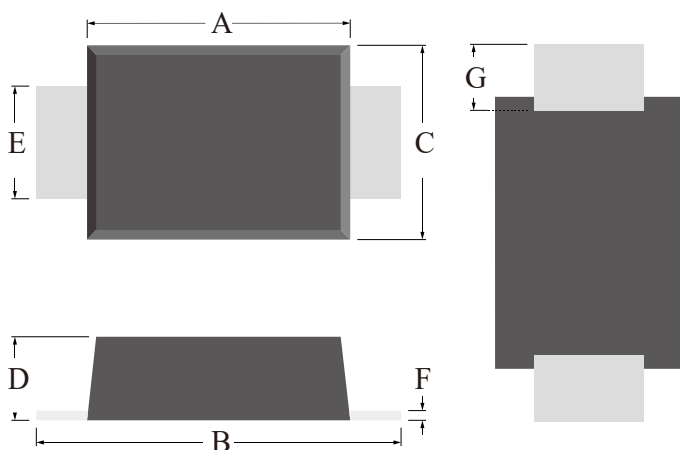


Fig.6-REVERSE RECOVERY TIME CHARACTERISTIC AND TEST CIRCUIT

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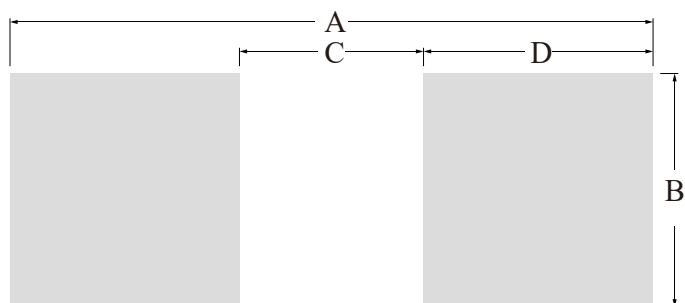
OUTLINE DRAWINGS



SMAF

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	3.20	-	3.80	0.1260	-	0.1496
B	4.40	-	5.30	0.1732	-	0.2087
C	2.30	-	2.70	0.0906	-	0.1063
D	0.95	-	1.20	0.0374	-	0.0472
E	1.30	-	1.60	0.0512	-	0.0630
F	0.08	-	0.17	0.0031	-	0.0067
G	0.50	-	1.20	0.0197	-	0.0472

RECOMMENDED LAYOUT DRAWINGS



SMAF

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	5.30	-	-	0.2087	-
B	-	2.06	-	-	0.0811	-
C	-	1.66	-	-	0.0654	-
D	-	2.07	-	-	0.0815	-

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MARKING



MARKING INSTRUCTION

NH=Niuhan Trademark
FF=Product Line Code,According To Actual Changes
YWW=Date Code,According To Actual Changes
ES1xF=Model,x=A,B,D,F,G,H,J
White band denotes cathode

PACKING INFORMATION

Package Type	Package Code	Product Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
SMAF	P1	0.026	13" Reel	5000	10000	80000
SMAF	P1	0.026	13" Reel	5000	10000	100000

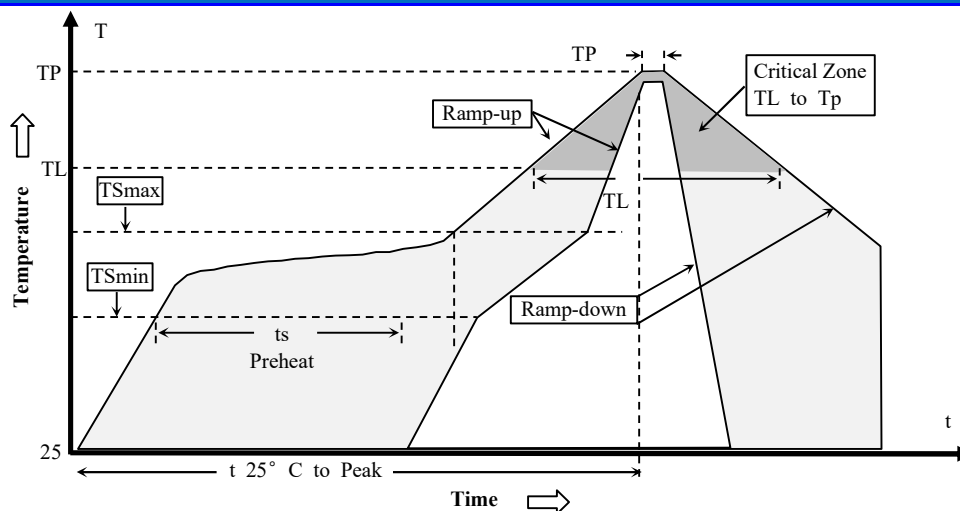
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Recommended wave soldering condition

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 (Tsmx 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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