

ES1AF THRU ES1MF
Super Fast Recovery Rectifiers



Voltage: 50~1000 Volts

Current: 1 Amperes

Polarity And Marking

Package: SMAF

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 Class V-0 Recognized, RoHS-Compliant
- Polarity:** Look At The Polarity And Marking On The Right
- Terminals:** Tin Plated Leads, Solderable Per J-STD-002 And JESD22-B102
- Weight:** App. 0.026 Grams (0.07019 Ounce)

Typical Applications

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



Remark:

- NH=Niuhang Trademark
- FF=Product Line Code, According To Actual Changes
YWW=Date Code, According To Actual Changes
- ES1xF=Model, x=A,B,D,G,J,K,M
- White band denotes cathode

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 1GF	ES 1JF	ES 1KF	ES 1MF	Unit
Maximum Repetitive Peak Reverse Voltage		V_{RRM}	50	100	200	400	600	800	1000	V
Maximum RMS Voltage		V_{RMS}	35	70	140	280	420	560	700	V
Maximum DC Blocking Voltage		V_{DC}	50	100	200	400	600	800	1000	V
Maximum Average Forward Rectified Current	@TC= 100 °C	$I_{F(AV)}$	1							A
Peak Forward Surge Current	8.3ms Single Half Sine-wave Superimposed On Rate Load	I_{FSM}	30							A
Current Squared Time	t< 8.3 ms	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 1GF	ES 1JF	ES 1KF	ES 1MF	Unit
Maximum Instantaneous Forward Voltage	Ta=25°C Ta=125°C If= 1.0 A	V_F	0.95 0.96			1.30 1.26	1.70 1.66	1.85 1.80	3.50 3.40	V
Maximum DC Reverse Current at Rated DC Blocking Voltage	Ta=25°C Ta=125°C $V_R = V_{RRM}$ $V_R = V_{RRM}$	I_{RRM}	5 200							uA uA
Typical Junction Capacitance	4 V, 1MHz	C_J	18			12	10	8	6	pF
Maximum Reverse Recovery Time	IF=0.5A, IR=1.0A, IRR=0.25A	T_{rr}	35							nS

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

Parameter	Test Conditions	Symbol	ES 1AF	ES 1BF	ES 1DF	ES 1GF	ES 1JF	ES 1KF	ES 1MF	Unit
Operating Junction Temperature Range		T _J	-55 to 150							°C
Storage Temperature Range		T _{STD}	-55 to 150							
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With Ta=25°C	R _{θJA}	75.0							°C/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 1 in2 FR-4 Board With 2oz. Copper	R _{θJC}	20.0							

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

ES1AF THRU ES1MF

Super Fast Recovery Rectifiers



Typical Characteristics Curves

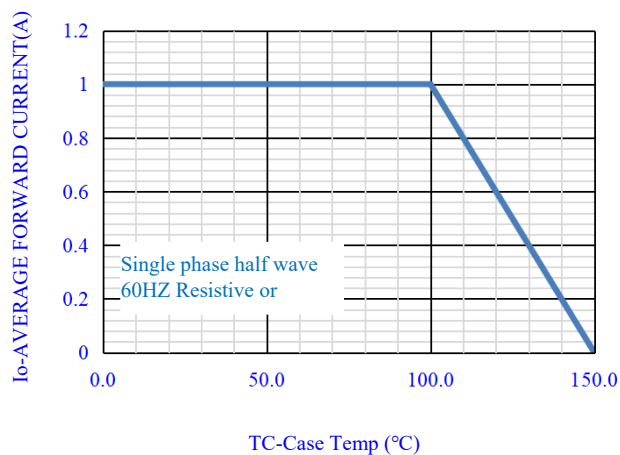


Fig.1-FORWARD CURRENT DERATING CURVE

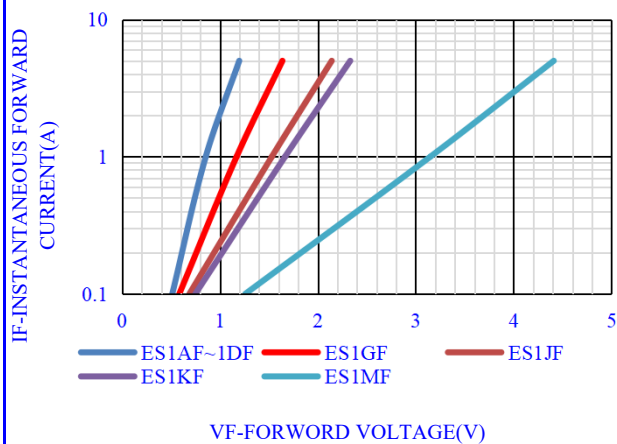


Fig.2- TYPICAL INSTANTANEOUS FORWARD

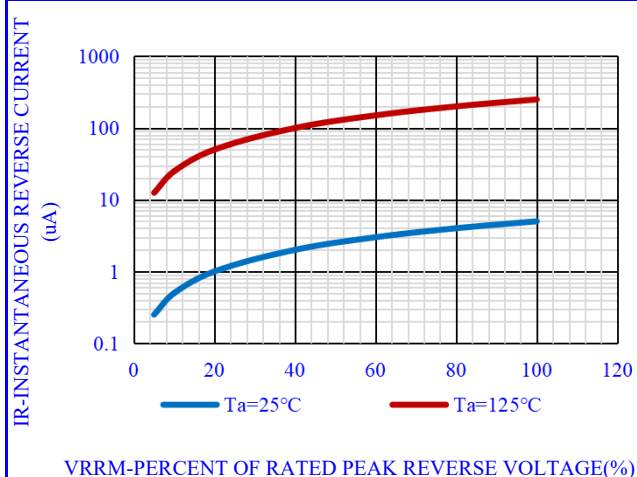


Fig.3- TYPICAL REVERSE CHARACTERISTICS

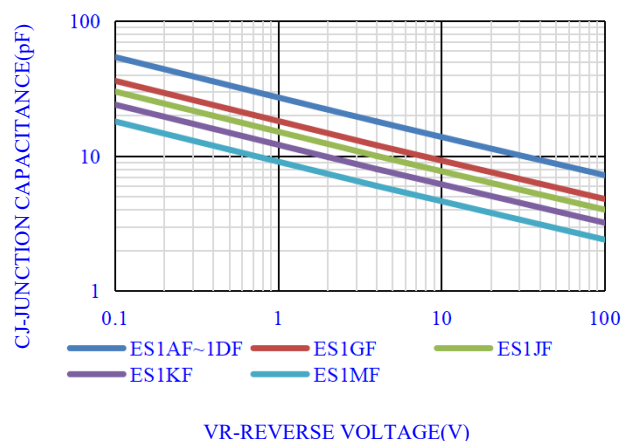


Fig.4- TYPICAL JUNCTION CAPACITANCE

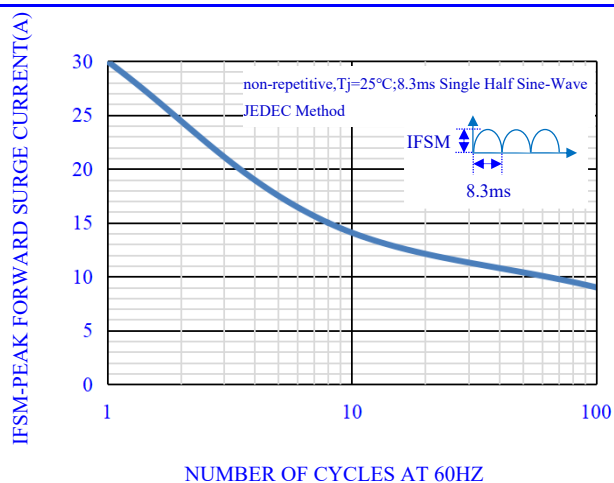


Fig.5-MAX. NON-REPETITIVE SURGE CURRENT

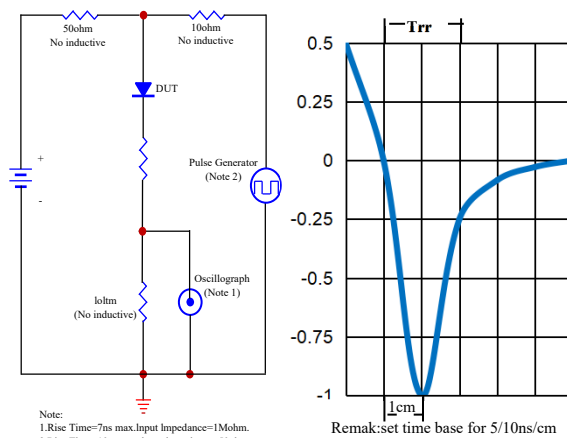
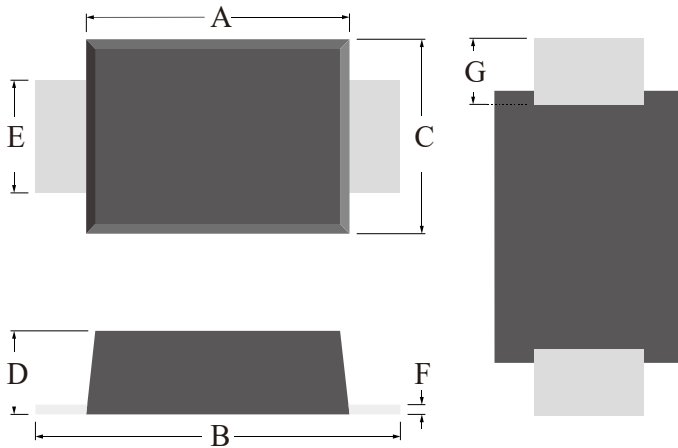


Fig.6-REVERSE RECOVERY TIME CHARACTERISTIC AND TEST CIRCUIT

ES1AF THRU ES1MF
Super Fast Recovery Rectifiers



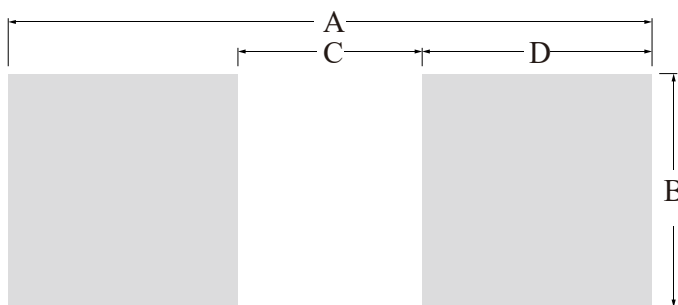
OUTLINE DRAWINGS



SMAF

OUTLINE DIMENSIONS						
Dim.	Millimeters			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.	Millimeters			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	-

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)
SMAF	#T/R	#Φ330	#5000	#340×340×42	#10000	#365×365×360	#80000

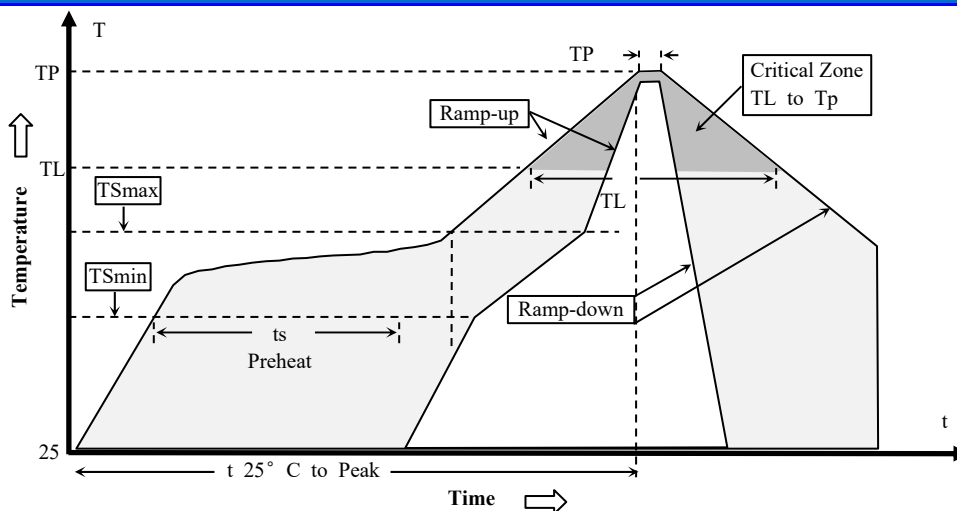
ES1AF THRU ES1MF
Super Fast Recovery Rectifiers



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.

ES1AF THRU ES1MF
Super Fast Recovery Rectifiers



Disclaimer

- Reproducing and modifying information of the document is prohibited without permission from niuhang Electronics Technology co., LTD
- Niuhan Electronics Technology co., LTD. reserves the rights to make changes of the content herein the document anytime without notification.
- Niuhan Electronics Technology co., LTD. disclaims any and all liability arising out of the application or use of any product including damages incidentally and consequentially occurred.
- Niuhan Electronics Technology co., LTD. does not assume any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.
- Applications shown on the herein document are examples of standard use and operation. Customers are responsible in comprehending the suitable use in particular applications. niuhang Electronics Technology co., LTD. makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.
- The products shown herein are not designed and authorized for equipments requiring high level of reliability or relating to human life and for any applications concerning life-saving or life-sustaining, such as medical instruments, transportation equipment, aerospace machinery et cetera. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify niuhang Electronics Technology co., LTD. for any damages resulting from such improper use or sale.
- When the appearance of the product and chip size does not change, in order to protect the customer's quality, change the internal structure and the production process Niuhan can not notify