

ES5A THRU ES5M

SURFACE MOUNT SUPER FAST RECOVERY RECTIFIERS



VOLTAGE: 50~1000 Volts	CURRENT: 5.0 Amperes	SMC(DO-214AB)	Marking and Polarity
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FEATURES

- Glass passivated chip junction
- Super fast recovery time
- Low Forward Voltage Drop for high efficiency
- Low leakage current for high reliability
- High forward surge capability for high reliability

MECHANICAL DATA

- **Terminals:** Plated Leads Solderable per MIL-STD-202, Method 208
- **Mounting Position:** Any
- **Lead Free:** Lead Free Finish, RoHS Compliant
- **Weight:** App. 0.254 grams (0.009 ounce)

TYPICAL APPLICATIONS

- For use in high frequency inverter, AC/DC converter, DC/DC converter, LED driver etc. applications



Remark:

- ①. NH=niu hang trademark
- ②. FF=Product line, According to actual changes;
YWW=Periodic code, According to actual changes;
- ③. ES5x=Model, x=A, B, D, G, J, K, M
- ④. White band denotes cathode

Maximum Ratings (Ratings at 25°C ambient temperature unless otherwise specified.)

Parameter	Symbol	ES5A	ES5B	ES5D	ES5G	ES5J	ES5K	ES5M	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 (see fig.1)	$I_{F(AV)}$	5.0							A	
Peak forward surge current 8.3ms single half sine-wave superimposed on rated load (JEDEC method at rated TL) (see fig.5)	I_{FSM}	150					120			A
Current Squared Time Per Diode ($t < 8.3ms$)	I^2t	93.38					59.76			A ² sec

Electrical Characteristics (Ratings at 25°C ambient temperature unless otherwise specified.)

Parameter	Test Conditions		Symbol	ES5A	ES5B	ES5D	ES5G	ES5J	ES5K	ES5M	Unit
Maximum instantaneous forward voltage (see fig.2) (Note 1)	$T_A=25^\circ C$	IF= 5.0 A	V_F	0.95			1.25	1.68	1.95	3.50	V
	$T_A=125^\circ C$	IF= 5.0 A		0.90			1.20	1.60	1.90	3.40	
Maximum instantaneous reverse current at rated DC blocking voltage (see fig.3)(Note 1)	$T_A=25^\circ C$	VR= V_{RRM}	I_R	5							uA
	$T_A=125^\circ C$	VR= 80% V_{RRM}		100							
Maximum Reverse Recovery Time	IF=0.5A, IR=1.0A, IRR=0.25A		T_{RR}	35							ns
Typical junction capacitance (see fig.4)	4V, 1MHz		C_J	80					35		pF

Thermal Characteristics (Ratings at 25°C ambient temperature unless otherwise specified)

Parameter	Symbol	ES5A	ES5B	ES5D	ES5G	ES5J	ES5K	ES5M	Unit
Operating junction	T_J	-55 to 150							°C
Storage temperature range	T_{STG}	-55 to 150							
Typical thermal resistance (Note 2)	$R_{\theta JA}$	45							°C/W
	$R_{\theta JC}$	10							

Note: 1. Pulse width < 300 uS, Duty cycle < 2%
2. Mounted on P.C.B. with 0.6" x 0.6" (15.24 mm x 15.24 mm) copper pad areas

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RATING AND CHARACTERISTIC CURVES

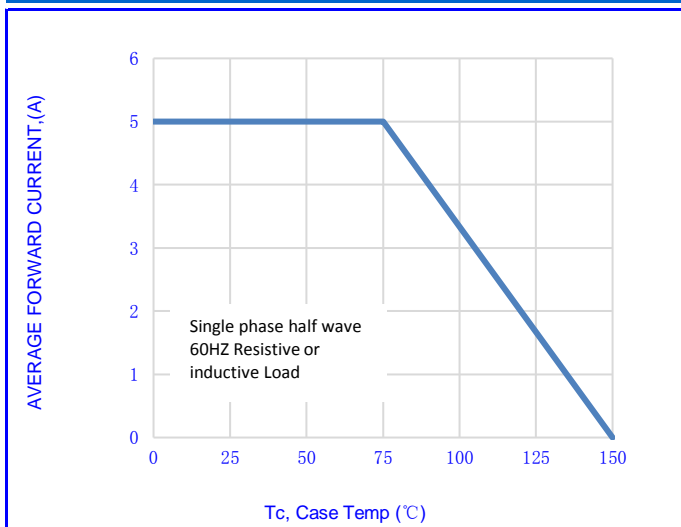


Fig.1- FORWARD CURRENT DERATING CURVE

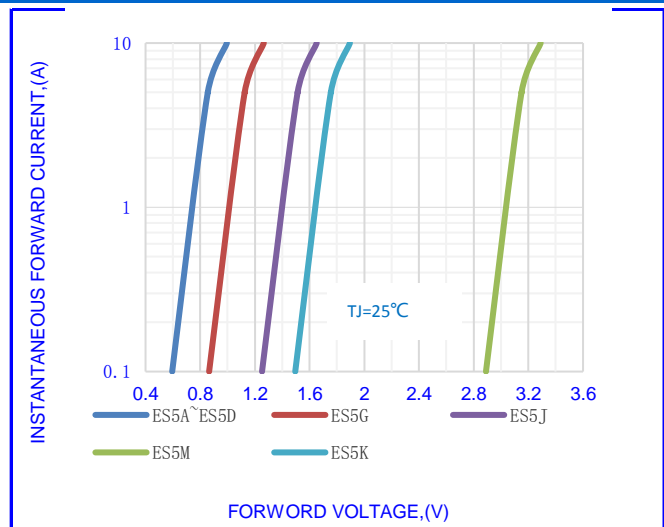


Fig.2-TYPICAL INSTANTANEOUS FORWARD

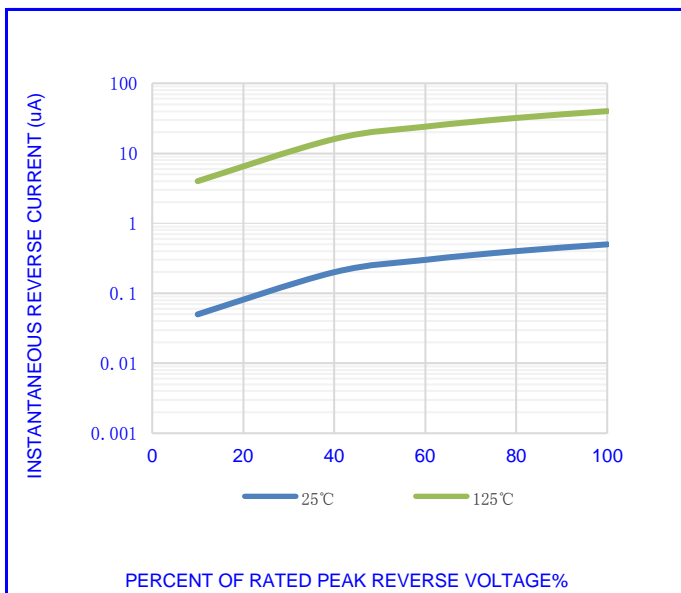


Fig.3-TYPICAL REVERSE CHARACTERISTICS

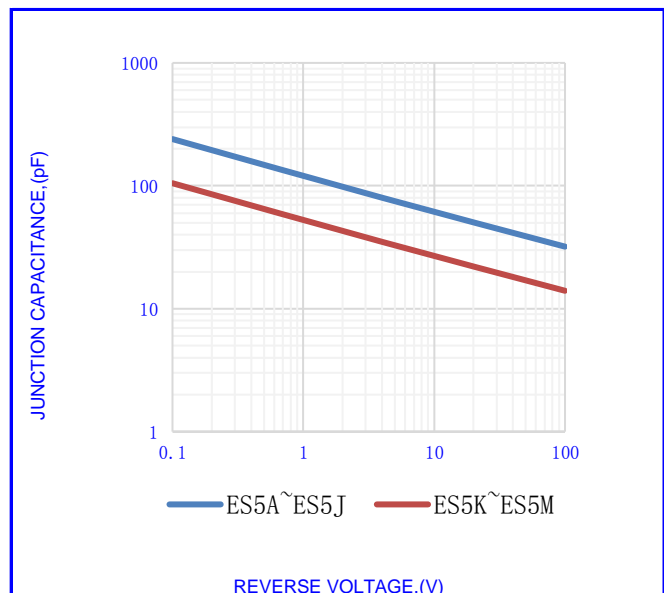


Fig.4- TYPICAL JUNCTION CAPACITANCE

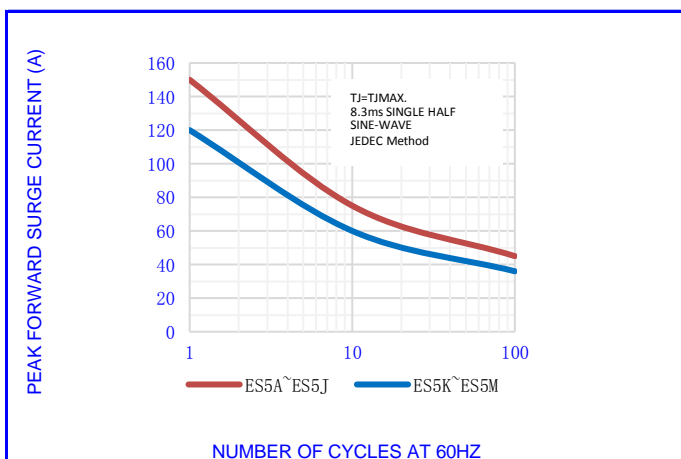


Fig.5-MAX. NON-REPETITIVE SURGE CURRENT

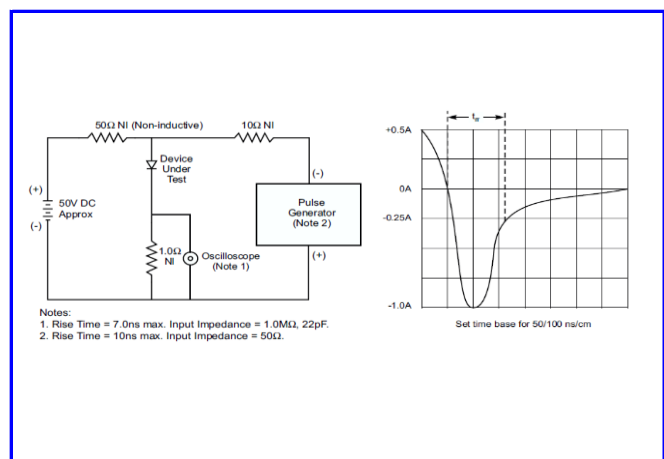


Fig.6-REVERSE RECOVERY TIME CHARACTERISTIC AND TEST CIRCUIT

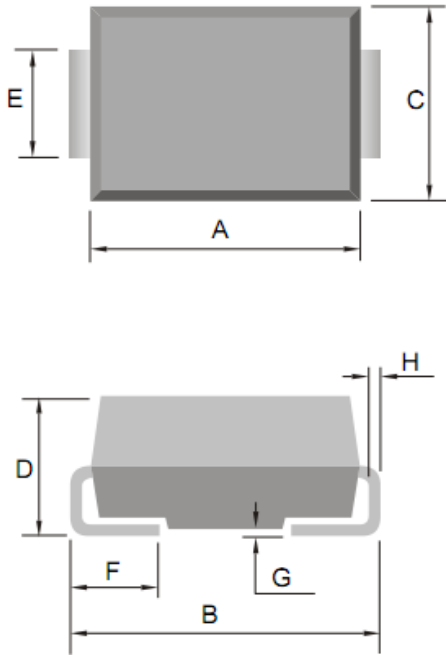
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OUTLINE DRAWINGS

SMC(DO-214AB)

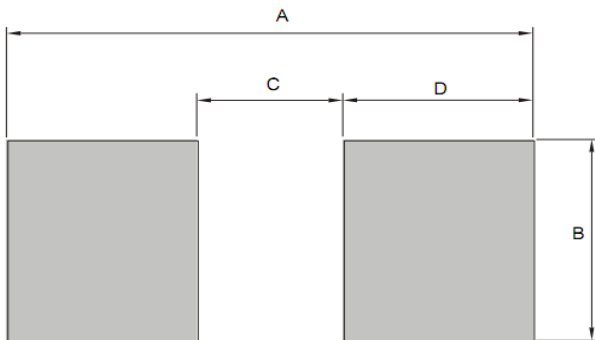


OUTLINE DIMENSIONS

Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.600	-	7.110	0.260	-	0.280
B	7.750	-	8.130	0.305	-	0.320
C	5.590	-	6.220	0.220	-	0.245
D	2.000	-	2.620	0.079	-	0.103
E	2.750	-	3.250	0.108	-	0.128
F	0.760	-	1.520	0.030	-	0.060
G	0.051	-	0.203	0.002	-	0.008
H	0.152	-	0.305	0.006	-	0.012

RECOMMENDED LAYOUT DRAWINGS

SMC(DO-214AB)



RECOMMENDED MOUNTING PAD DIMENSIONS

Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	9.900	-	-	0.390	-
B	-	3.820	-	-	0.150	-
C	-	3.840	-	-	0.151	-
D	-	3.030	-	-	0.119	-

PACKING INFORMATION

SMC(DO-214AB)

Package Method	Reel Size (mm)	Quantity (pcs/reel)	Inner Box Size LxWxH(mm)	Quantity (pcs/Inner Box)	Carton Size LxWxH(mm)	Quantity (pcs/carton)
Tape Reel	Φ330	3000	340x340x45	6000	360x360x470	60000

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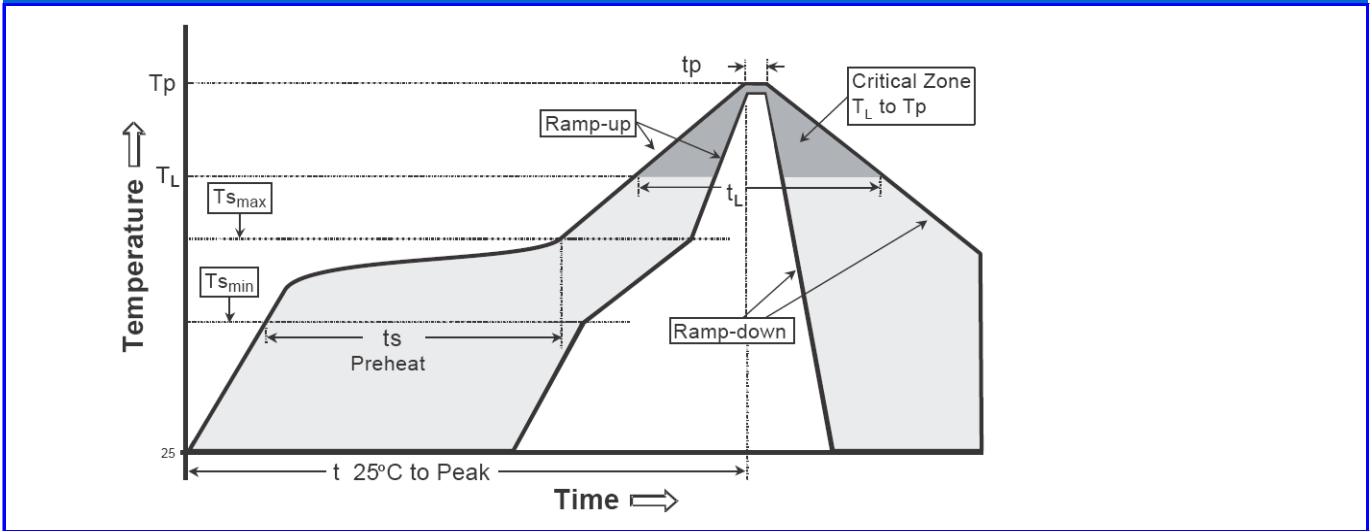
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Recommended wave soldering condition

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 (Tsmmax 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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