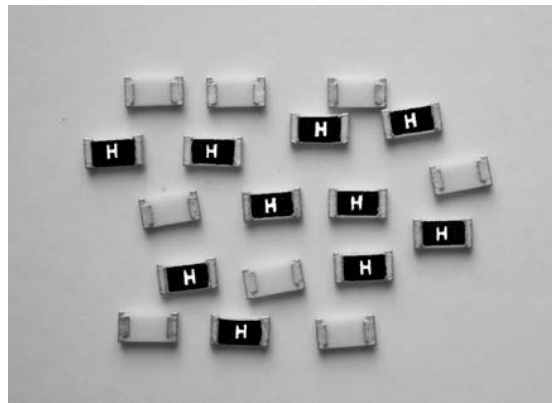


KLS ELECTRONIC CO;LTD

Engineering Product Specification

SMD FUSE 0603 FAST ACTING



KLS ELECTRONIC CO;LTD

Title: Engineering Product Specification F0603 Series	Revision: F
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1. Scope

This Specification applies to F0603 series SMD fuses.

2. General

- Fast acting
- 1.6mm×0.8mm physical size
- Thick film manufacturing method, ceramic substrate, silver fusing element
- Higher temperature profiles
- Excellent environmental integrity
- RoHS compliant
- Halogen-free

3. Manufacturer and Production Facility

- Manufacturer
Nanjing Sinochip Technology & development Co.,
Ltd. Qingma Road 6#
Maqun Science & Technology Park
Nanjing City, Jiangsu Province, P. R. China
Phone: 086-25-52153215
Fax: 086-25-52157065

4. Agency / Certificate Information

- UL Recognition Card:
JDYX2.E319540, JDYX8.E319540
- ISO 9001:2000, Certificate Number 10807Q10334ROS

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Title: Engineering Product Specification F0603 Series	Revision: F
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5. Catalog Symbol

Example F0603-1.0A

F 0603-1.0A

① ② ③ ④

①. Symbol of SINOCHIP Electrical Characteristic: F = Fast acting

②. Size Number

③. Ampere Rating: 1A

6. Ordering Information

Part Number	Marking	Current Rating (A)	Voltage Rating (V)	Interrupting Rating 32V DC	Typical Cold DCR* (Ω)	Nominal I ² T** (A ² S)
F0603 -0.5A	F	0.50	32	50A	0.940	0.0067
F0603-0.75A	G	0.75	32	50A	0.448	0.0087
F0603-1.0A	H	1.00	32	50A	0.252	0.0150
F0603-1.5A	K	1.50	32	50A	0.108	0.0365
F0603-2.0A	N	2.00	32	50A	0.058	0.0595
F0603-2.5A	O	2.50	32	50A	0.043	0.1222
F0603-3.0A	P	3.00	32	50A	0.044	0.1350
F0603-3.5A	R	3.50	32	50A	0.032	0.1891
F0603-4.0A	S	4.00	32	35A	0.019	0.3559
F0603-5.0A	T	5.00	32	35A	0.0135	0.7030
F0603-6.0A	6	6.00	32	35A	0.0115	0.8861

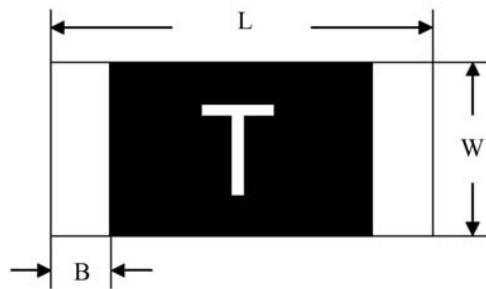
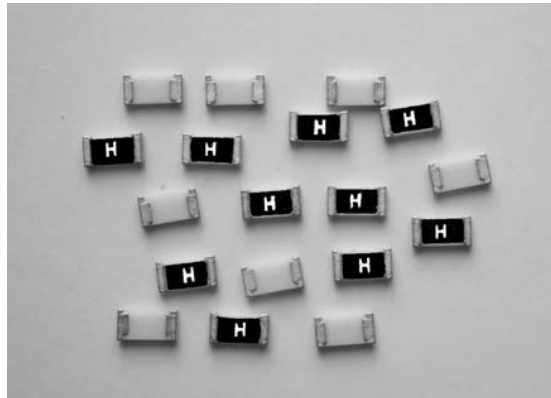
* Measured at $\leq 10\%$ rated current and 25°C.

** Melting I²T at 10 times of rated current.

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7. Shape & Dimensions: (mm)

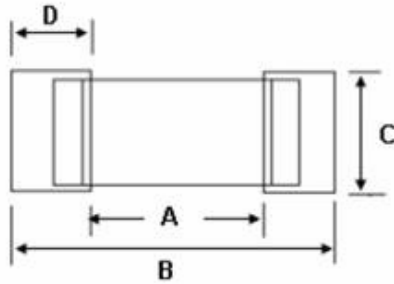


L	W	T	B
1.60±0.15	0.80±0.15	0.40±0.10	0.30±0.10

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8. Recommended Land Patterns: (mm)



A	B	C	D
1.0±0.2	2.50±0.3	0.8±0.2	1.2±0.3

9. Materials:

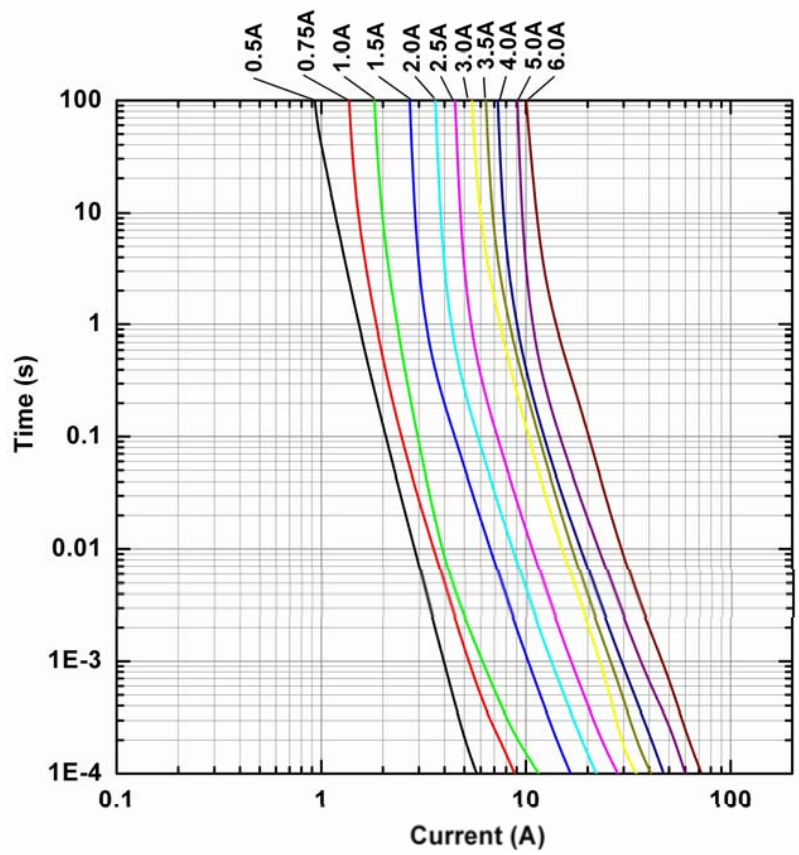
	Components	Material
1	Substrate	Ceramic
2	Terminations	Silver over-plated with tin (100%)
3	Element	Silver or Silver / Palladium

KLS ELECTRONIC CO;LTD

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10. Time Current Curve:

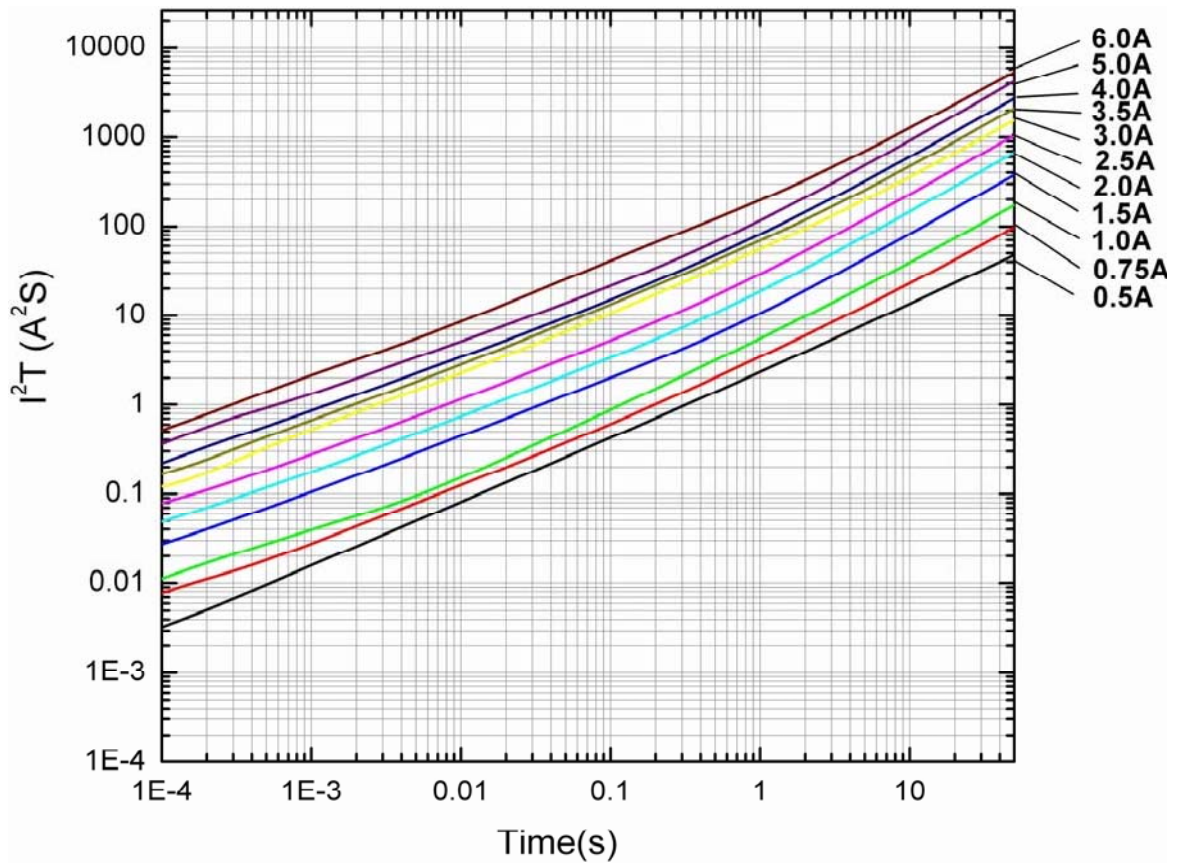
Electrical Characteristics		
Ampere Rating	% of Current Rating	Opening Time
500mA-6A	100%	4 Hours Min.
500mA-750mA	200%	60 Seconds Max.
500mA-6A	250%	5 Seconds Max.



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11. I^2T vs Time Curve:



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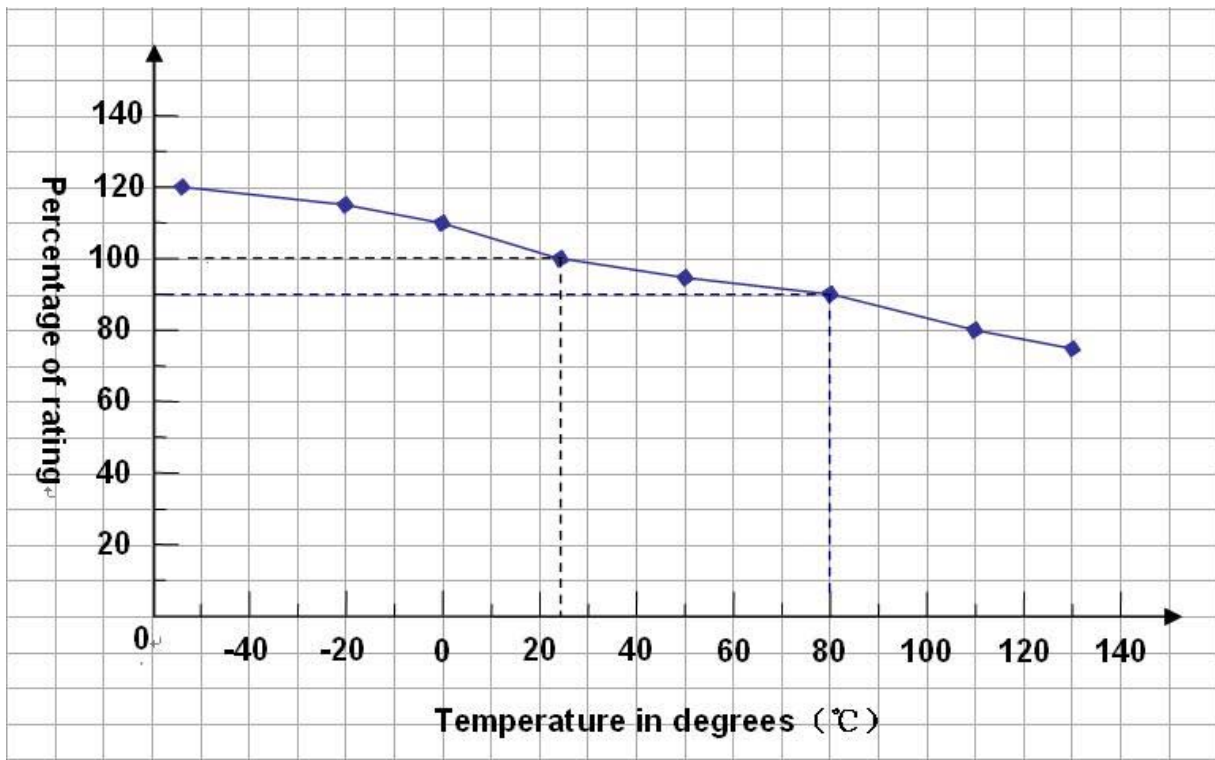
12. Temperature Derating Curve: (Ambient temperature on current-carrying capacity)

- For Circuit, current rating shall be derated in accordance with the figure.
- This current derating curve is for fusing characteristics.

Example,

Work Temp: 80°C, Temp derating factor = 90%

$$\text{Melting } I^2 t_{\text{fuse}} \geq I^2 t_{\text{pulse}} / F_p / 0.9$$



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13. Reliability Test:

Characteristics	Test condition / Methods	Requirement	Test Reference
Carrying capacity	100% of its rated current	No Fusing, 4hr min	Refer to SINOCHIP File
Fusing Time	200% of its rated current (500~750mA)	Within 60sec	Refer to SINOCHIP File
	250% of its rated current	Within 5sec	Refer to SINOCHIP File
Solderability	235°C±5 °C, 3s±0.5s	95% coverage min	IEC60127/A.3.3; IEC60068-2-20; MIL-STD-202 Method 208H
Resistance to soldering	260°C±5°C, 10s±0.5s	ΔR:<10%	MIL-STD-202 Method 210
Bending test	Distance between holding points: 90mm, Bending: 1mm, 1time, 10sec	(1) No mechanical damages (2) ΔR: <10%	Refer to SINOCHIP File
High Temperature Operating Life	96hours, 125°C at 60% rated current. Measure cold resistance and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Moisture Resistance	10 Cycles. Measure cold resistance and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 106
High Temperature Exposure	1000 hrs. @ T=125°C. Unpowered. Measure cold resistance. and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Insulation Resistance	DC resistance	0.1MΩ min	IEC60127-4
ON /OFF Cycle Test	Surge current and 100% rated current; 50s ON; 10s OFF; 100,000 Cycles	(1)No open; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	Refer to SINOCHIP File

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Salt spray	5% salt solution, 48 hours exposure	$\Delta R: <10\%$	MIL-STD-202 Method 101
Thermal Shock	10 cycles between -55°C/+125°C, 30 minutes @each extreme	No mechanical damage; $\Delta R: <10\%$	IEC 60068-2-14
Interrupting Ability	Loading current 50A	without permanent arcing,ignition and bursting of fuse link	UL248-14

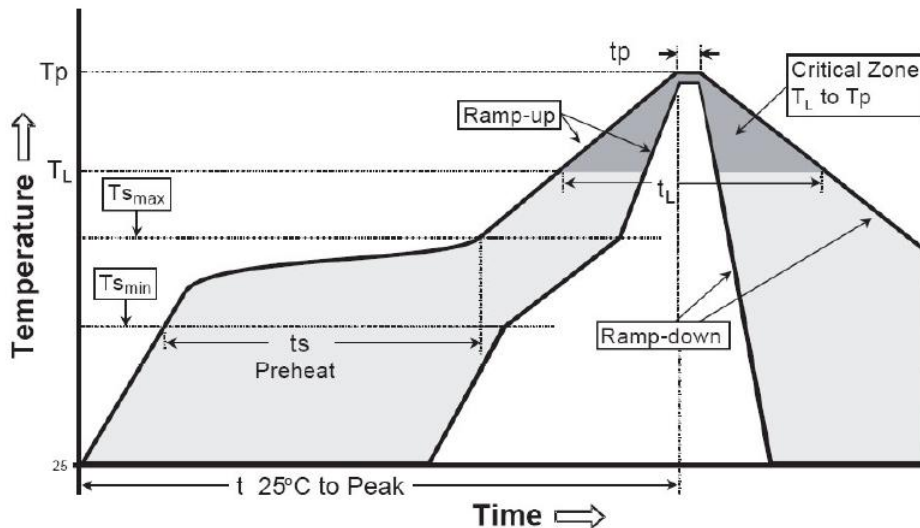
14. Recommended Solder Curve:

14.1 Infrared Reflow

14.1.1 Temperature:260°C

14.1.2 Time:30 Seconds Maximum

14.1.3 Recommend Reflow profile



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate($T_{s_{max}}$ to T_p)	3°C/second max.
Preheat Temperature	150°C
Min($T_{s_{min}}$) Temperature	200°C
Max($T_{s_{max}}$) Time($T_{s_{min}}$ to $T_{s_{max}}$)	60-120 seconds
Peak Temperature(T_p)	260°C
Time within 5°C of actual Peak Temperature(T_p)	20-40 seconds
Ramp-Down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

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14.2 Wave soldering

14.2.1 Reservoir Temperature:260°C

14.2.2 Time in Reservoir:10 Seconds Maximum

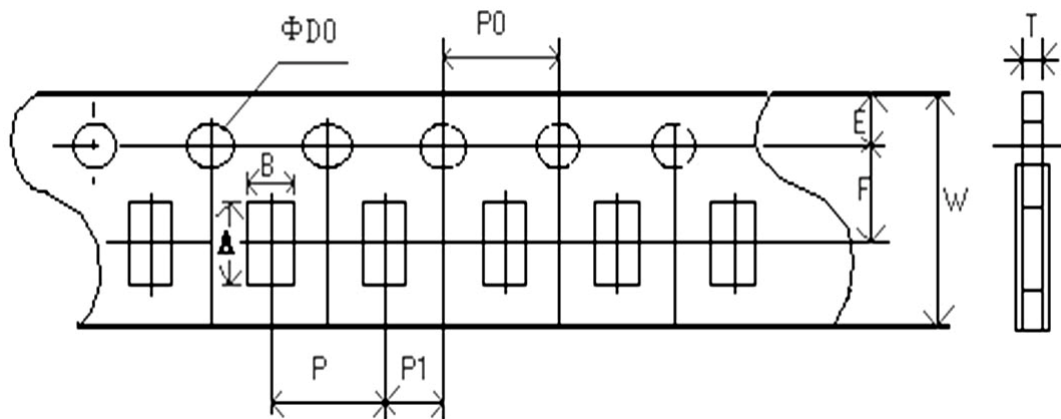
14.3 Hand Soldering

14.3.1 Temperature:380°C

14.3.2 Time:5 Seconds Maximum

15. Packaging:

- 5,000 pieces of fuses in paper taper and reeled on a 178mm(7 inch) reel.



Type	A	B	W	F	E
F0603	1.85±0.10	1.10±0.10	8.00±0.20	3.50±0.05	1.75±0.10
Type	P	P0	P1	D0	T
F0603	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.60±0.10

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Type	M	W	T	A	B	C	D
F0603	178 ±2.0	10.0 ±1.5	12.0 ±2.0	2.5 ±0.5	13.0 ±0.5	31.0 ±1.0	80.0 ±1.0

16. Storage:

- The maximum ambient temperature shall not exceed 40°C. Storage temperature higher than 40°C could result in the deformation of packaging materials.
- The maximum relative humidity recommended for storage is 65%. High humidity with high temperature can accelerate the oxidation of the solder plating on the termination and reduce the solderability of the components.
- Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use. The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.

17. Application:

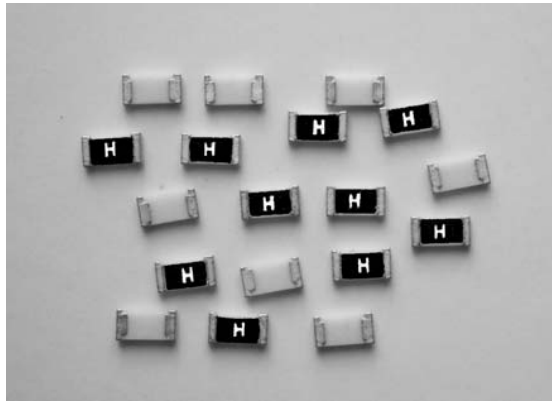
- Battery pack
- PC related equipment and peripherals (Hard drive, Printer, etc.)
- Portable devices (Mobile phone, PDA battery charger, etc.)
- Digital camera (Digital still camera)
- Game equipment
- LCD monitor, LCD modules
- Wireless basestation

END

KLS ELECTRONIC CO;LTD

Engineering Product Specification

SMD FUSE 0603 SLOW ACTING



KLS ELECTRONIC CO;LTD

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1. Scope

This Specification applies to S0603 series SMD fuses.

2. General

- Slow Blow
- RoHS compliant
- Halogen-free
- 1.6mm×0.8mm physical size
- Thick film manufacturing method, ceramic substrate, silver fusing element
- Higher temperature profiles
- Excellent environmental integrity

3. Manufacturer and Production Facility

- Manufacturer
Nanjing SINOCHIP Technology & development
Co., Ltd. Qingma Road 6#
Maqun Science & Technology Park
Nanjing City, Jiangsu Province, P. R. China
Phone: 086-25-52153380
Fax: 086-25-52157065

4. Agency / Certificate Information

- ISO 9001:2000, Certificate Number 10807Q10334ROS
- UL Recognition Card:
JDYX2.E319540, JDYX8.E319540

KLS ELECTRONIC CO;LTD

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5. Catalog Symbol

Example S0603-1.0A

S 0603-1.0A

① ② ③ ④

①. Symbol of SINOCHIP Electrical Characteristic: S = Slow blow

②. Size Number

③. Ampere Rating: 1A

6. Ordering Information

Part Number	Marking	Current Rating (A)	Voltage Rating (V)	Interrupting Rating 32V DC	Typical Cold DCR* (Ω)	Nominal I ² T** (A ² S)
S0603 -0.5A	F	0.50	32	50A	1.148	0.0072
S0603-0.75A	G	0.75	32	50A	0.582	0.0113
S0603-1.0A	H	1.00	32	50A	0.260	0.0746
S0603-1.5A	K	1.50	32	50A	0.104	0.1125
S0603-2.0A	N	2.00	32	50A	0.054	0.1752
S0603-2.5A	O	2.50	32	50A	0.036	0.4001
S0603-3.0A	P	3.00	32	50A	0.027	0.7329
S0603-3.5A	R	3.50	32	50A	0.022	0.9758
S0603-4.0A	S	4.00	32	35A	0.016	2.1722
S0603-5.0A	T	5.00	32	35A	0.0105	2.9022
S0603-6.0A	6	6.00	32	35A	0.0075	8.4692

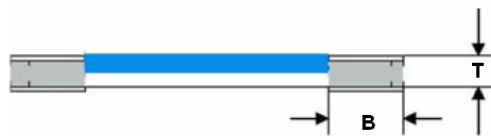
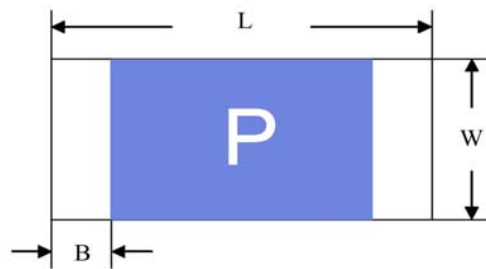
* Measured at $\leq 10\%$ rated current and 25°C.

** Melting I²T at 10 times of rated current.

KLS ELECTRONIC CO;LTD

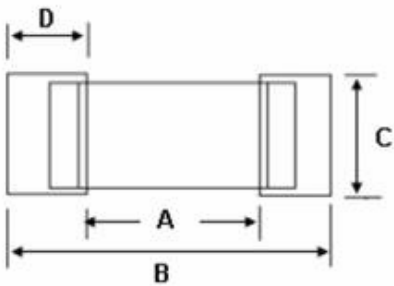
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7. Shape & Dimensions: (mm)



L	W	T	B
1.60±0.15	0.80±0.15	0.40±0.10	0.30±0.10

8. Recommended Land Patterns: (mm)



A	B	C	D
1.0±0.2	2.50±0.3	0.8±0.2	1.2±0.3

9. Materials:

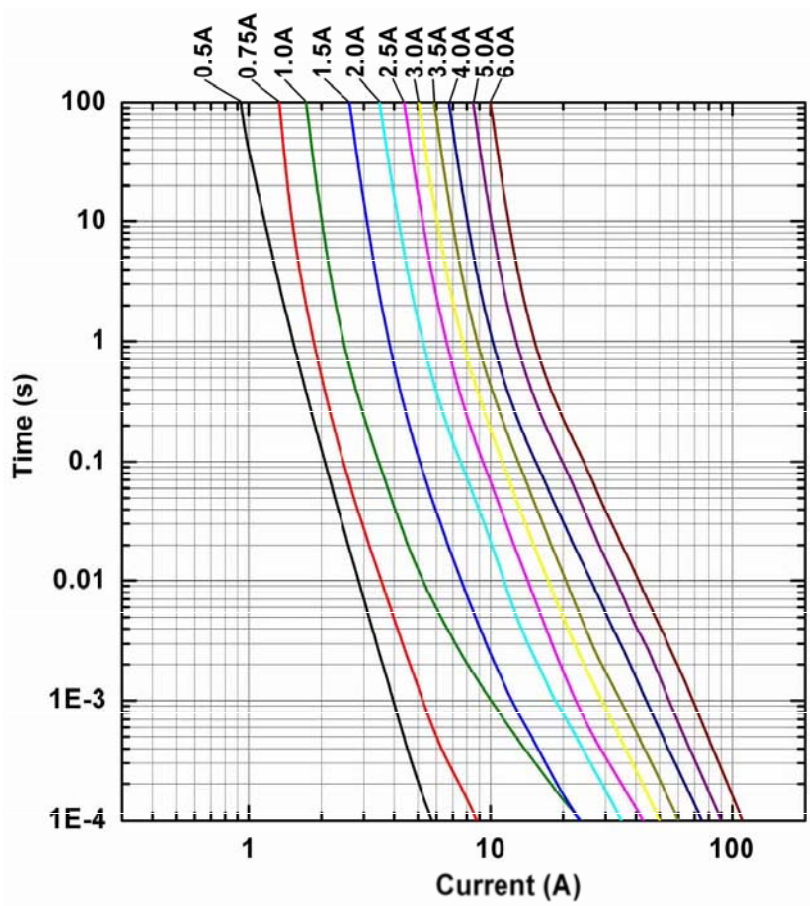
	Components	Material
1	Substrate	Ceramic
2	Terminations	Silver over-plated with tin (100%)
3	Element	Silver or Silver / Palladium

KLS ELECTRONIC CO;LTD

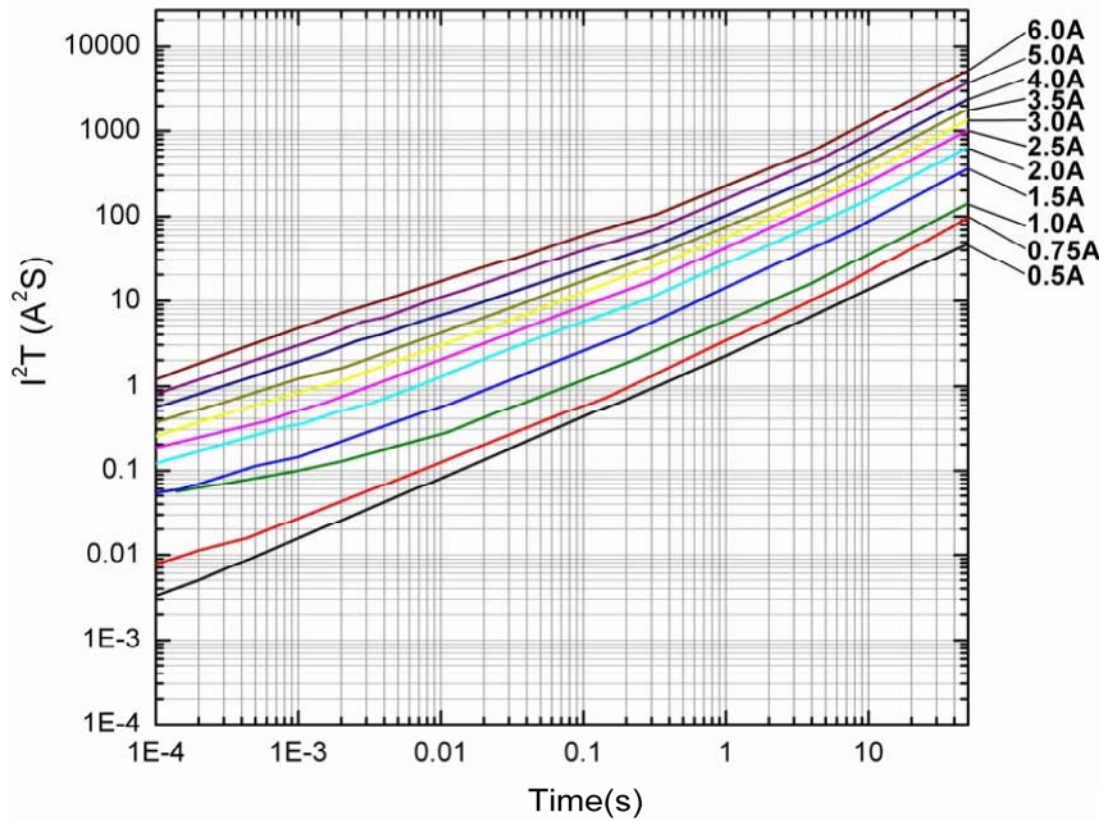
Title: Engineering Product Specification S0603 Series	Revision: C
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10. Time Current Curve:

Electrical Characteristics		
Ampere Rating	% of Current Rating	Opening Time
500mA-6A	100%	4 Hours Min.
500mA-6A	200%	60 Seconds Max.
500mA-750mA	1000%	0.2-0.6mS
1A-6A	1000%	0.6-2.0mS



11. I^2T vs Time Curve:



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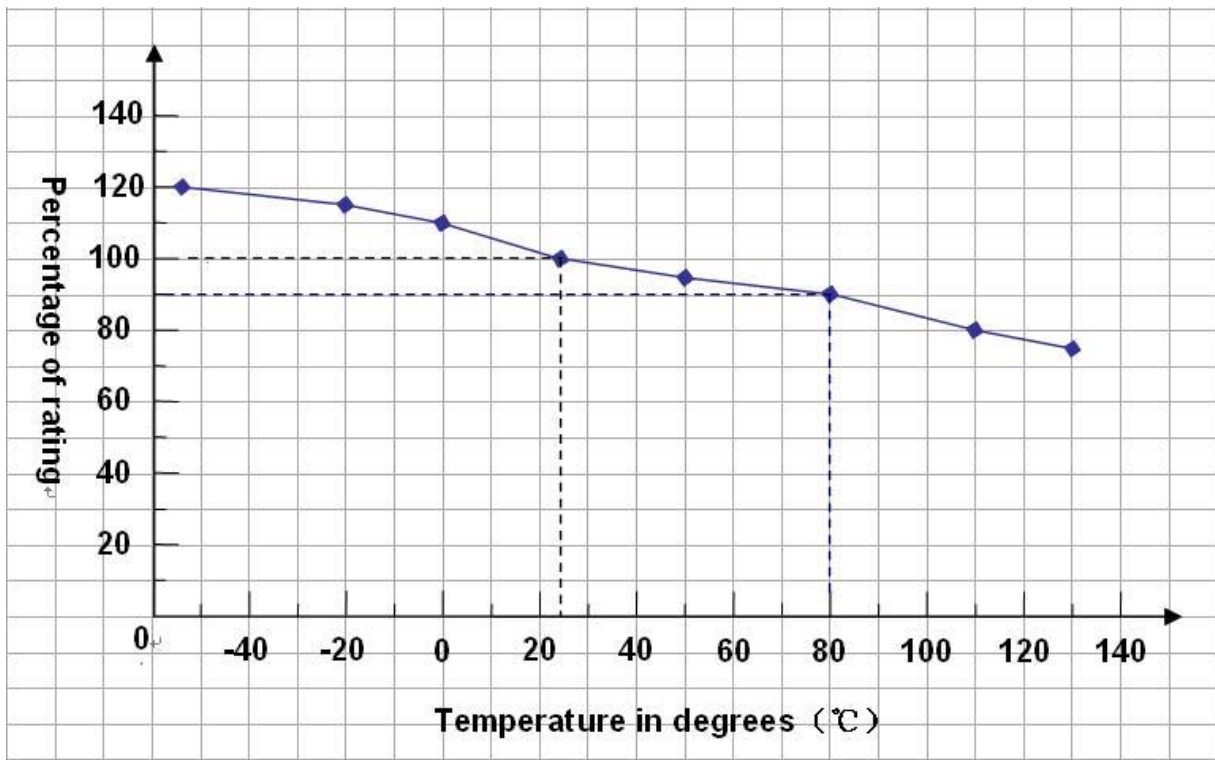
12. Temperature Derating Curve: (Ambient temperature on current-carrying capacity)

- For Circuit, current rating shall be derated in accordance with the figure.
- This current derating curve is for fusing characteristics.

Example,

Work Temp: 80°C, Temp derating factor = 90%

$$\text{Melting } I^2 t_{\text{fuse}} \geq I^2 t_{\text{pulse}} / F_p / 0.9$$



13. Reliability Test:

Characteristics	Test condition / Methods	Requirement	Test Reference
Carrying capacity	100% of its rated current	No Fusing, 4hr min	Refer to SINOCHIP File
Fusing Time	200% of its rated current (500~6A)	Within 60sec	Refer to SINOCHIP File
	1000% of its rated current (500~750mA)	Within 0.0002~0.0006sec	Refer to SINOCHIP File
	1000% of its rated current (1~6A)	Within 0.0006~0.002sec	Refer to SINOCHIP File
Solderability	235°C±5 °C, 3s±0.5s	95% coverage min	IEC60127/A.3.3; IEC60068-2-20; MIL-STD-202 Method 208H
Resistance to soldering	260°C±5°C, 10s±0.5s	△R:<10%	MIL-STD-202 Method 210
Bending test	Distance between holding points: 90mm, Bending: 1mm, 1time, 10sec	(1) No mechanical damages (2) △R: <10%	Refer to SINOCHIP File
High Temperature Operating Life	96hours, 125°C at 60% rated current. Measure cold resistance and Time-Current characteristics.	(1)△R: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Moisture Resistance	10 Cycles. Measure cold resistance and Time-Current characteristics.	(1)△R: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 106
High Temperature Exposure	1000 hrs. @ T=125°C. Unpowered. Measure cold resistance. and Time-Current characteristics.	(1)△R: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Insulation Resistance	DC resistance	0.1MΩ min	IEC60127-4
ON /OFF Cycle Test	Surge current and 100% rated current; 50s ON; 10s OFF; 100,000 Cycles	(1)No open; (2)100% of Rating Current, Opening time >4 hours	Refer to SINOCHIP File

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		(3)200% of Rating Current, Opening time <60 seconds	
Salt spray	5% salt solution, 48 hours exposure	$\Delta R: <10\%$	MIL-STD-202 Method 101
Thermal Shock	10 cycles between $-55^{\circ}\text{C}/+125^{\circ}\text{C}$, 30 minutes @each extreme	No mechanical damage; $\Delta R: <10\%$	IEC 60068-2-14
Interrupting Ability	Loading current 50A	without permanent arcing,ignition and bursting of fuse link	UL248-14

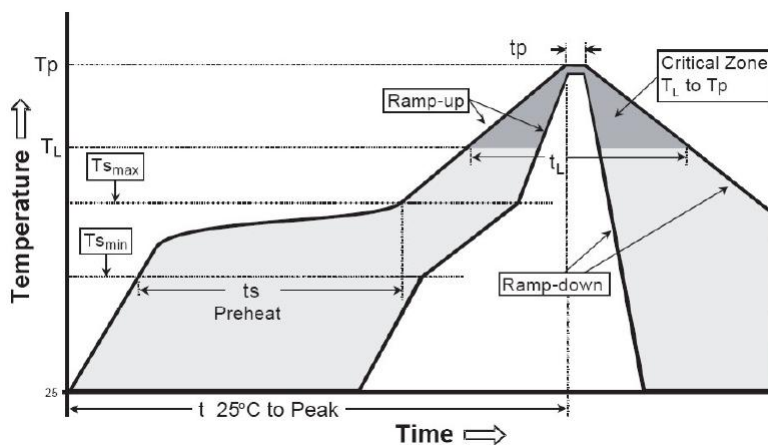
14. Recommended Solder Curve:

14.1 Infrared Reflow

14.1.1 Temperature:260°C

14.1.2 Time:30 Seconds Maximum

14.1.3 Recommend Reflow profile



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate($T_{s_{max}}$ to T_p)	3°C/second max.
Preheat	
Temperature Min($T_{s_{min}}$)	150°C
Temperature Max($T_{s_{max}}$)	200°C
Time($T_{s_{min}}$ to $T_{s_{max}}$)	60-120 seconds
Peak Temperature(T_p)	260°C
Time within 5°C of actual Peak Temperature(T_p)	20-40 seconds
Ramp-Down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

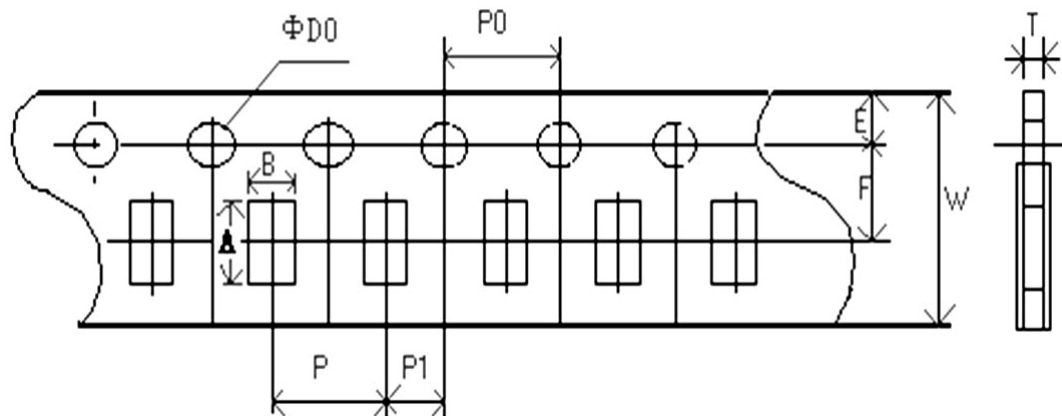
14.2 Wave soldering

14.2.1 Reservoir Temperature:260°C
14.2.2 Time in Reservoir:10 Seconds Maximum

14.3 Hand Soldering
14.3.1 Temperature:380°C
14.3.2 Time:5 Seconds Maximum

15. Packaging:

- 5,000 pieces of fuses in paper taper and reeled on a 178mm(7 inch) reel.



Type	A	B	W	F	E
S0603	1.85±0.10	1.10±0.10	8.00±0.20	3.50±0.05	1.75±0.10
Type	P	P0	P1	D0	T
S0603	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.60±0.10

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Type	M	W	T	A	B	C	D
S0603	178 ±2.0	10.0 ±1.5	12.0 ±2.0	2.5 ±0.5	13.0 ±0.5	31.0 ±1.0	80.0 ±1.0

16. Storage:

- The maximum ambient temperature shall not exceed 40°C. Storage temperature higher than 40°C could result in the deformation of packaging materials.
- The maximum relative humidity recommended for storage is 65%. High humidity with high temperature can accelerate the oxidation of the solder plating on the termination and reduce the solderability of the components.
- Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use. The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.

17. Application:

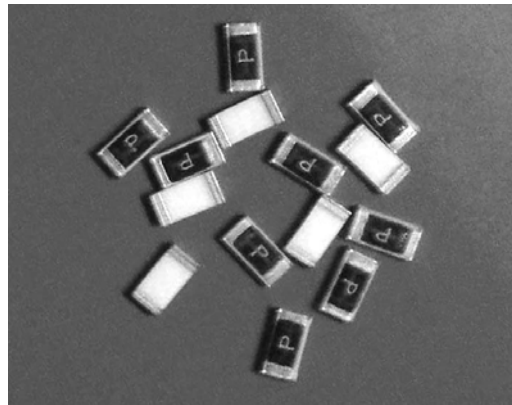
- Battery pack
- PC related equipment and peripherals (Hard drive, Printer, etc.)
- Portable devices (Mobile phone, PDA battery charger, etc.)
- Digital camera (Digital still camera)
- Game equipment
- LCD monitor, LCD modules
- Wireless basestation

END

KLS ELECTRONIC CO;LTD

Engineering Product Specification

SMD FUSE 1206 FAST ACTING



KLS ELECTRONIC CO;LTD

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Title: Engineering Product Specification F1206 Series	Revision: G
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1. Scope

This Specification applies to F1206 series SMD fuses.

2. General

- Fast acting
- RoHS compliant
- Halogen-free
- 3.1mm×1.55mm physical size
- Thick film manufacturing method,ceramic substrate, silver fusing element
- Higher temperature profiles
- Excellent environmental integrity

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Title: Engineering Product Specification F1206 Series	Revision: G
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5. Catalog Symbol

Example F1206-1.0A

F 1206- 1.0A

① ② ③

- ①. Symbol of Sinochip Electrical Characteristic: F = Fast acting
- ②. Size Number
- ③. Ampere Rating: 1A

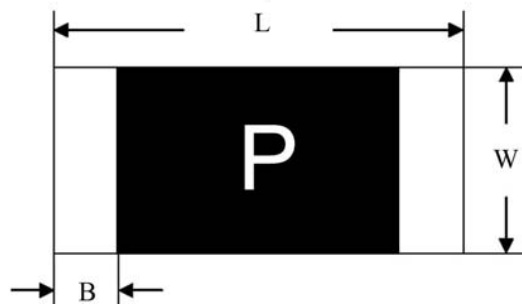
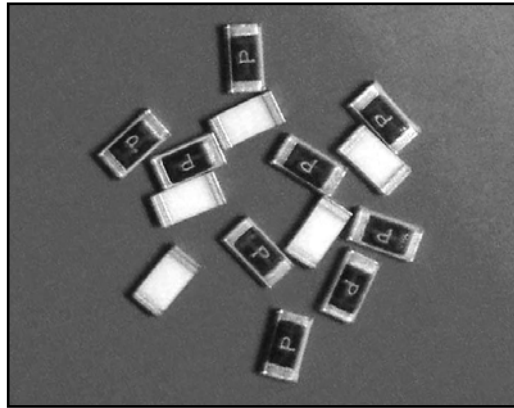
6. Ordering Information

Part Number	Mark	Current Rating (A)	Voltage Rating (V)	Interrupting Rating 32V DC	Typical Cold DCR* (Ω)	Nominal I^2T ** (A^2S)
F1206-0.5A	F	0.50	32	50A	1.375	0.0155
F1206-0.75A	G	0.75	32	50A	0.605	0.0267
F1206-1.0A	H	1.00	32	50A	0.270	0.0279
F1206-1.5A	K	1.50	32	50A	0.130	0.0491
F1206-2.0A	N	2.00	32	50A	0.074	0.1251
F1206-2.5A	O	2.50	32	50A	0.051	0.1255
F1206-3.0A	P	3.00	32	50A	0.033	0.1350
F1206-3.15A	R	3.15	32	50A	0.030	0.1490
F1206-3.5A	R	3.50	32	50A	0.0325	0.1948
F1206-4.0A	S	4.00	32	35A	0.021	0.3025
F1206-5.0A	T	5.00	32	35A	0.0165	0.5207
F1206-6.0A	6	6.00	32	35A	0.0145	0.8134
F1206-7.0A	U	7.00	32	35A	0.0085	4.0418

* Measured at $\leq 10\%$ rated current and 25°C .

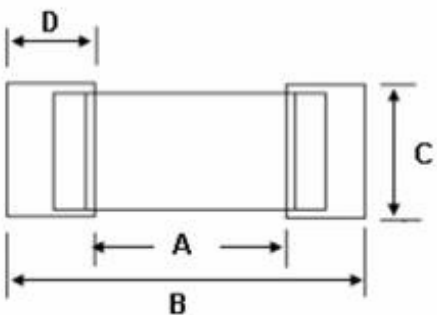
** Melting I^2T at 10 times of rated current.

7. Shape & Dimensions: (mm)



L	W	T	B
3.10±0.20	1.55±0.20	0.55±0.20	0.40±0.10

8. Recommended Land Patterns: (mm)



A	B	C	D
2.1±0.3	4.7±0.5	1.5±0.3	1.5±0.3

9. Materials:

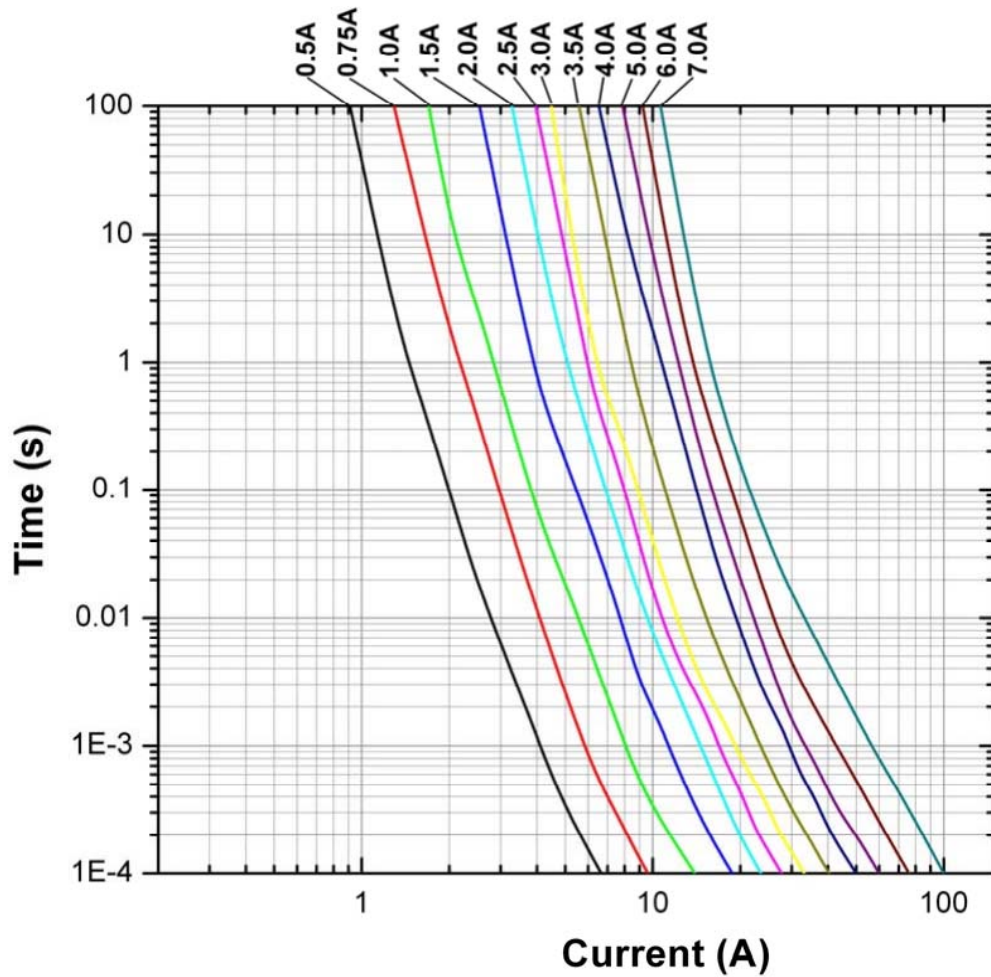
	Components	Material
1	Substrate	Ceramic
2	Terminations	Silver over-plated with tin (100%)
3	Element	Silver or Silver/palladium

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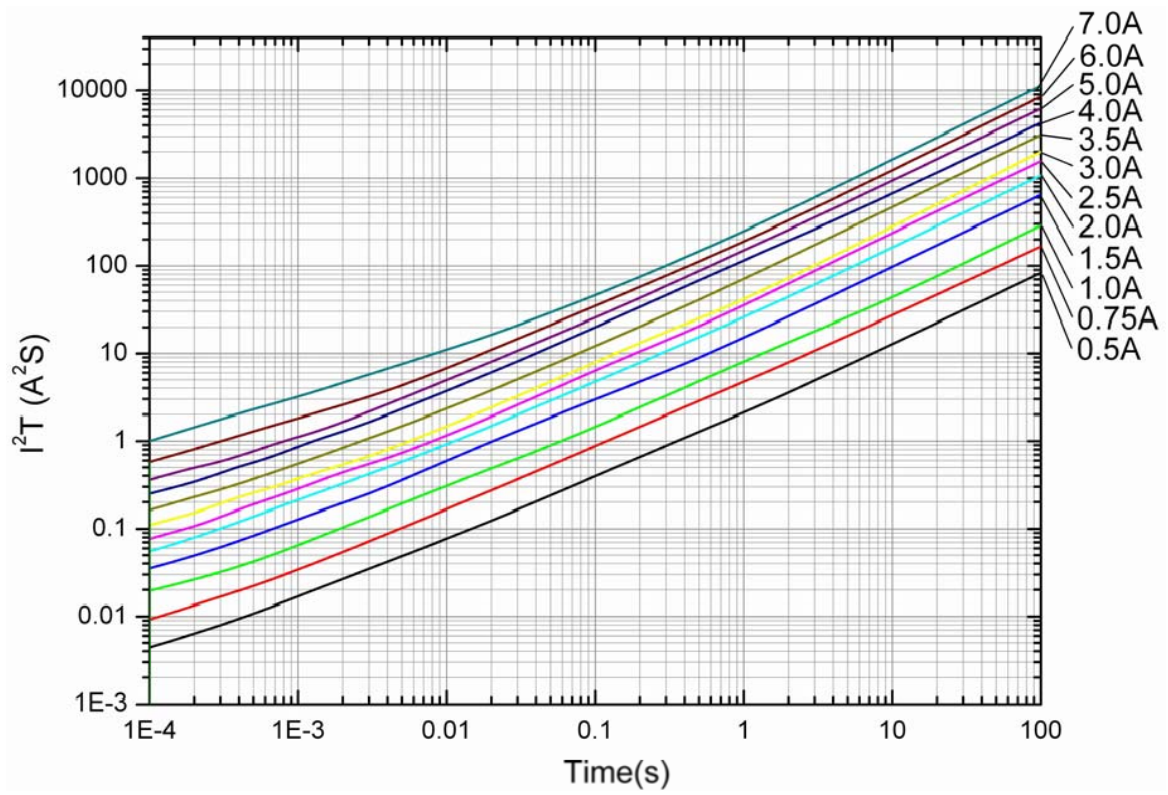
Title: Engineering Product Specification F1206 Series	Revision: G
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10. Time Current Curve:

Electrical Characteristics		
Ampere Rating	% of Current Rating	Opening Time
500mA-7A	100%	4 Hours Min.
500mA-7A	200%	60 Seconds Max.
500mA-7A	250%	5 Seconds Max.



11. I^2T vs Time Curve:



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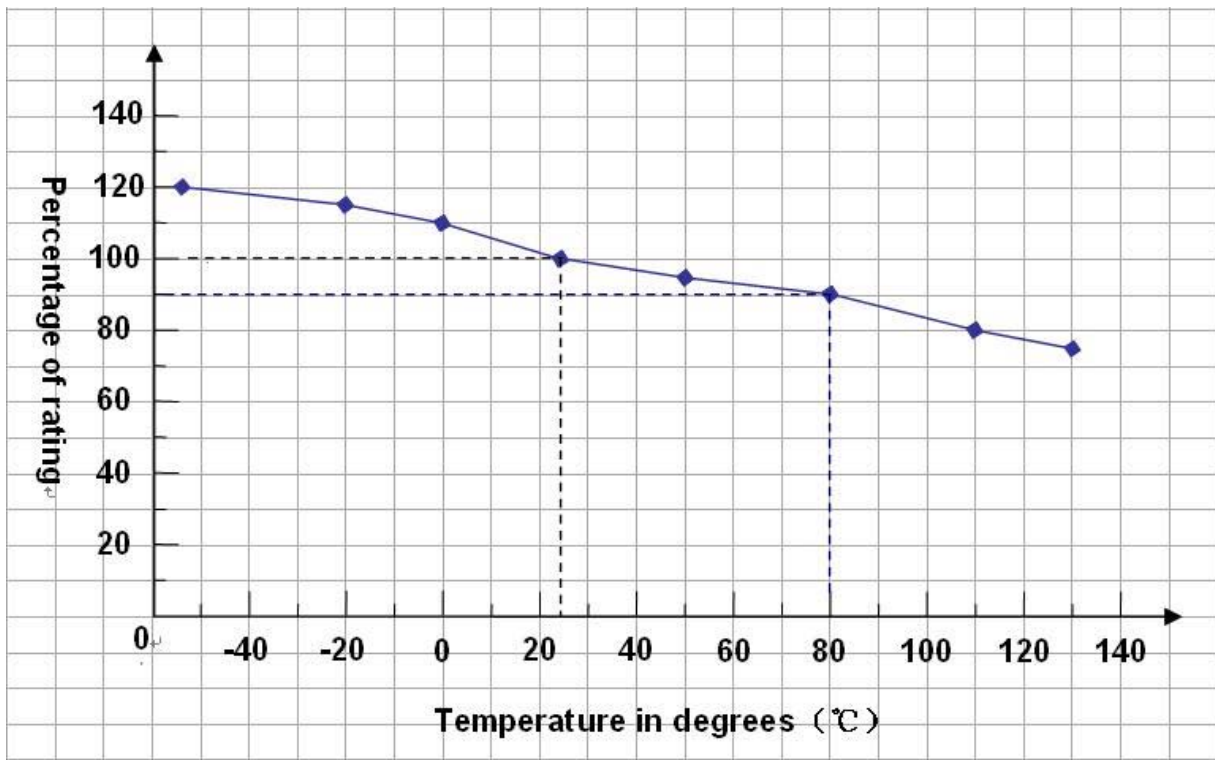
12. Temperature Derating Curve: (Ambient temperature on current-carrying capacity)

- For Circuit, current rating shall be derated in accordance with the figure.
- This current derating curve is for fusing characteristics.

Example,

Work Temp: 80°C, Temp derating factor = 90%

$$\text{Melting } I^2 t_{\text{fuse}} \geq I^2 t_{\text{pulse}} / F_p / 0.9$$



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Title: Engineering Product Specification F1206 Series	Revision: G
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13. Reliability Test:

Characteristics	Test condition / Methods	Requirement	Test Reference
Carrying capacity	100% of its rated current	No Fusing, 4hr min	Refer to SINOCHIP File
Fusing Time	200% of its rated current	Within 60sec	Refer to SINOCHIP File
	250% of its rated current	Within 5sec	Refer to SINOCHIP File
Solderability	235°C±5 °C, 3s±0.5s	95% coverage min	IEC60127/A.3.3; IEC60068-2-20; MIL-STD-202 Method 208H
Resistance to soldering	260°C±5°C, 10s±0.5s	ΔR:<10%	MIL-STD-202 Method 210
Bending test	Distance between holding points: 90mm, Bending: 1mm, 1time, 10sec	(1) No mechanical damages (2) ΔR: <10%	Refer to SINOCHIP File
High Temperature Operating Life	96hours, 125°C at 60% rated current. Measure cold resistance and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Moisture Resistance	10 Cycles. Measure cold resistance and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 106
High Temperature Exposure	1000 hrs. @ T=125°C. Unpowered. Measure cold resistance. and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Insulation Resistance	DC resistance	0.1MΩ min	IEC60127-4
ON /OFF Cycle Test	Surge current and 100% rated current; 50s ON; 10s OFF; 100,000 Cycles	(1)No open; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	Refer to SINOCHIP File

KLS ELECTRONIC CO;LTD

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Salt spray	5% salt solution, 48 hours exposure	$\Delta R: <10\%$	MIL-STD-202 Method 101
Thermal Shock	10 cycles between $-55^{\circ}\text{C}/+125^{\circ}\text{C}$, 30 minutes @each extreme	No mechanical damage; $\Delta R: <10\%$	IEC 60068-2-14
Interrupting Ability	Loading current 50A	without permanent arcing, ignition and bursting of fuse link	UL248-14

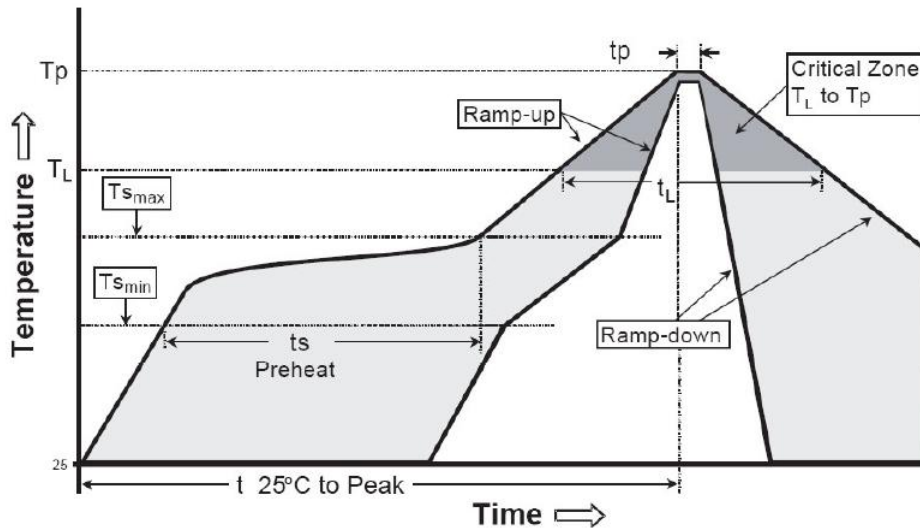
14. Recommended Solder Curve:

14.1 Infrared Reflow

14.1.1 Temperature: 260°C

14.1.2 Time: 30 Seconds Maximum

14.1.3 Recommend Reflow profile



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate($T_{s_{max}}$ to T_p)	$3^{\circ}\text{C}/\text{second max.}$
Preheat Temperature	150°C
Min($T_{s_{min}}$) Temperature	200°C
Max($T_{s_{max}}$) Time($T_{s_{min}}$ to $T_{s_{max}}$)	60-120 seconds
Peak Temperature(T_p)	260°C
Time within 5°C of actual Peak Temperature(T_p)	20-40 seconds
Ramp-Down Rate	$6^{\circ}\text{C}/\text{second max.}$
Time 25°C to Peak Temperature	8 minutes max.

14.2 Wave soldering

14.2.1 Reservoir Temperature:260°C

14.2.2 Time in Reservoir:10 Seconds Maximum

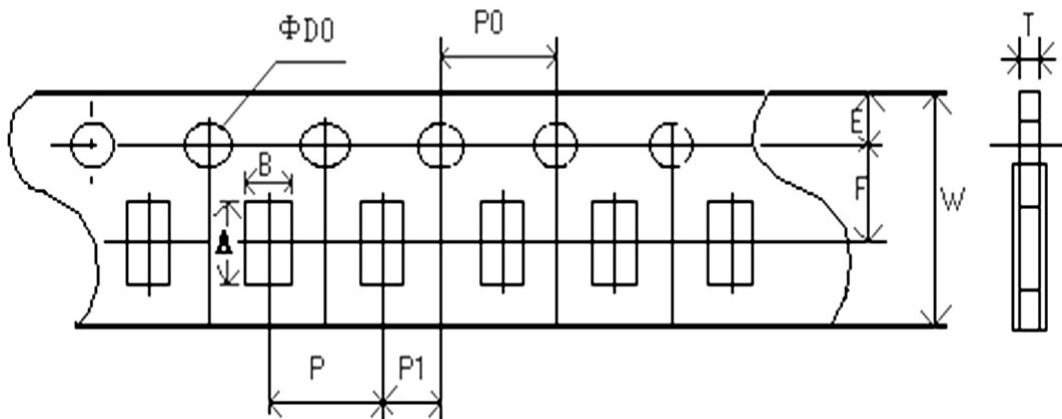
14.3 Hand Soldering

14.3.1 Temperature:380°C

14.3.2 Time:5 Seconds Maximum

15. Packaging:

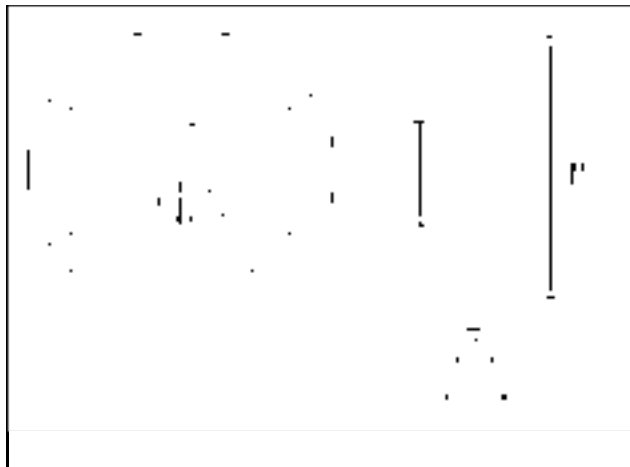
- **5,000 pieces of fuses in paper taper and reeled on a 178mm(7 inch) reel.**



Type	A	B	W	F	E
F1206	3.50 ±0.20	1.90 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10
Type	P	P0	P1	D0	T
F1206	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.50 ±0.10	0.75 ±0.10

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Type	M	W	T	A	B	C	D
F1206	178 ±2.0	10.0 ±1.5	12.0 ±2.0	2.5 ±0.5	13.0 ±0.5	31.0 ±1.0	80.0 ±1.0

16. Storage:

- The maximum ambient temperature shall not exceed 40°C. Storage temperature higher than 40°C could result in the deformation of packaging materials.
- The maximum relative humidity recommended for storage is 65%. High humidity with high temperature can accelerate the oxidation of the solder plating on the termination and reduce the solderability of the components.
- Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use. The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.

17. Application:

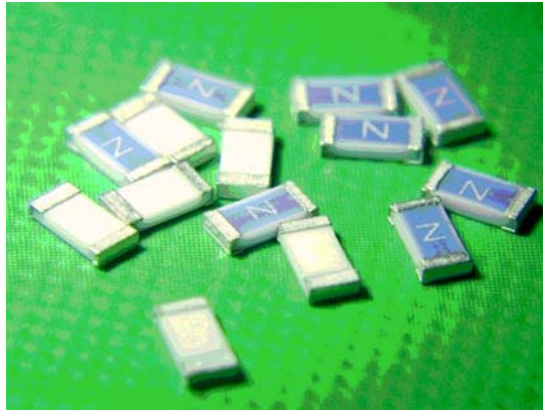
- Battery pack
- PC related equipment and peripherals(Hard drive,Printer,etc.)
- Portable devices(Mobile phone,PDA battery charger,etc.)
- Digital camera(Digital still camera)
- Game equipment
- LCD monitor,LCD modules
- Wireless basestation

END

KLS ELECTRONIC CO;LTD

Engineering Product Specification

SMD FUSE 1206 SLOW ACTING



KLS ELECTRONIC CO;LTD

Title: Engineering Product Specification S1206 Series	Revision: G
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KLS ELECTRONIC CO;LTD

Title: Engineering Product Specification S1206 Series	Revision: G
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1. Scope

This Specification applies to S1206 series SMD fuses.

2. General

- Slow Blow(Time Delay),high inrush withstand capability
- RoHS compliant
- Halogen-free
- 3.1mm×1.55mm physical size
- Thick film manufacturing method,ceramic substrate, silver fusing element
- Higher temperature profiles
- Excellent environmental integrity

KLS ELECTRONIC CO;LTD

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5. Catalog Symbol

Example S1206-1.0A

S **1206-1.0A**

① ② ③ ④

- ①. Symbol of SINOCHIP Electrical Characteristic: S = Slow blow
- ②. Size Number
- ③. Ampere Rating: 1A

6. Ordering Information

Part Number	Mark	Current Rating (A)	Voltage Rating (V)	Interrupting Rating 32V DC	Typical Cold DCR* (Ω)	Nominal I ² T** (A ² S)
S1206-0.5A	F	0.50	32	50A	1.344	0.0200
S1206-0.75A	G	0.75	32	50A	0.672	0.0358
S1206-1.0A	H	1.00	32	50A	0.358	0.1945
S1206-1.5A	K	1.50	32	50A	0.157	0.4137
S1206-2.0A	N	2.00	32	50A	0.103	0.4383
S1206-2.5A	O	2.50	32	50A	0.073	0.7343
S1206-3.0A	P	3.00	32	50A	0.041	1.5267
S1206-3.5A	R	3.50	32	50A	0.035	1.5312
S1206-4.0A	S	4.00	32	35A	0.027	2.5356
S1206-5.0A	T	5.00	32	35A	0.019	3.3999
S1206-6.0A	6	6.00	32	35A	0.015	5.7505
S1206-7.0A	U	7.00	32	35A	0.008	8.8200

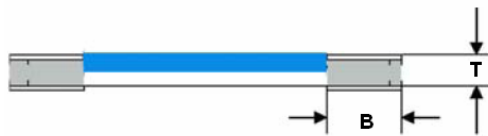
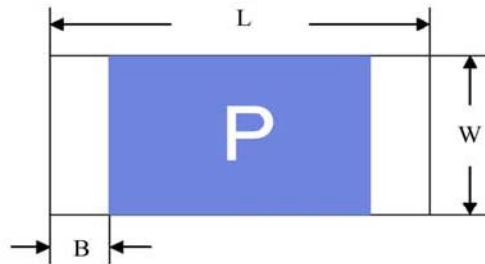
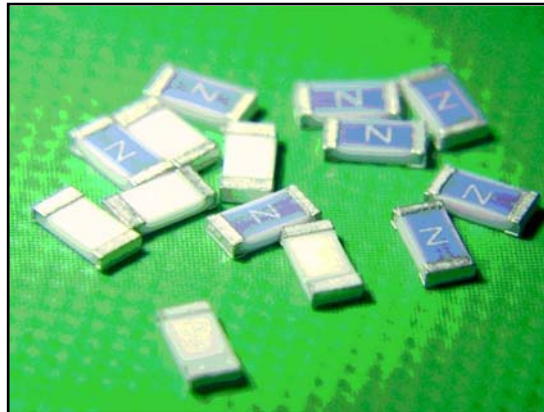
* Measured at ≤10% rated current and 25°C.

** Melting I²T at 10 times of rated current.

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7. Shape & Dimensions: (mm)

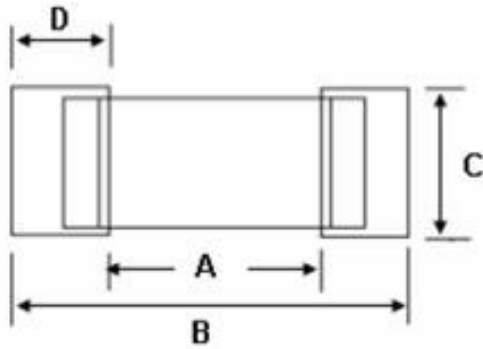


L	W	T	B
3.10±0.20	1.55±0.20	0.55±0.20	0.40±0.10

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8. Recommended Land Patterns: (mm)



A	B	C	D
2.1±0.3	4.7±0.5	1.5±0.3	1.5±0.3

9. Materials:

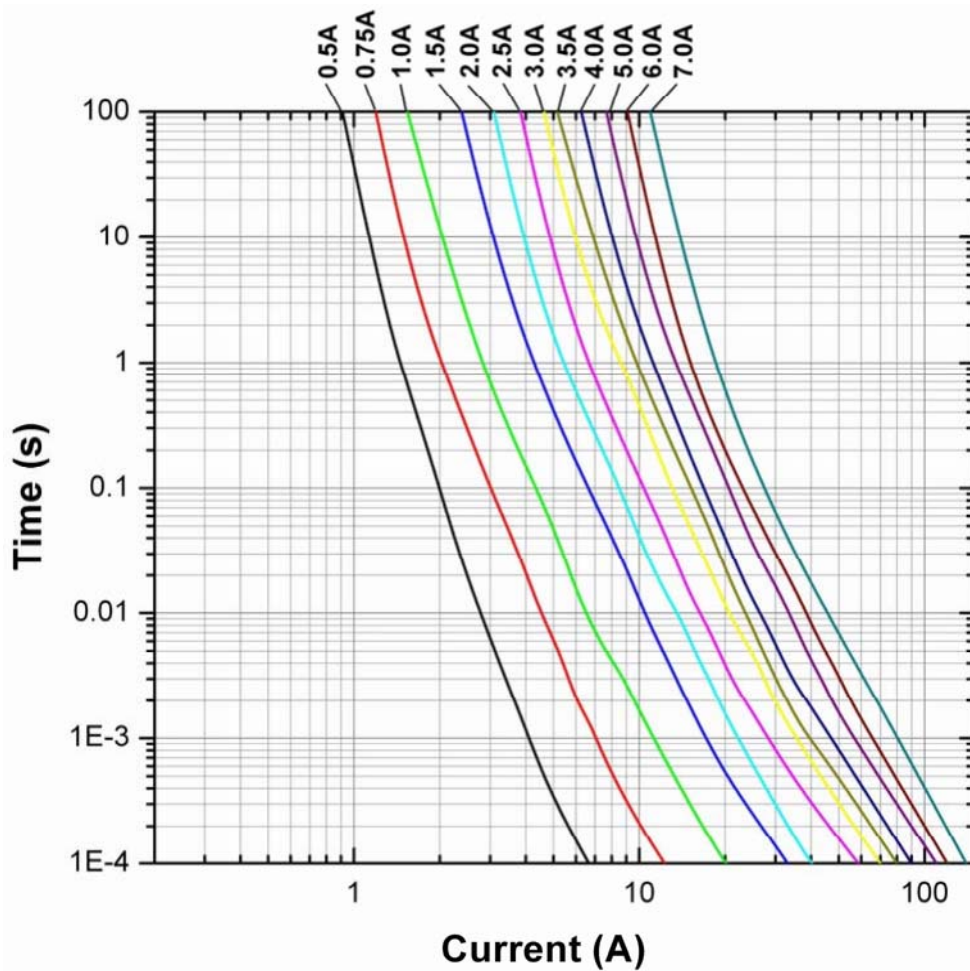
	Components	Material
1	Substrate	Ceramic
2	Terminations	Silver over-plated with tin (100%)
3	Element	Silver or Silver / Palladium

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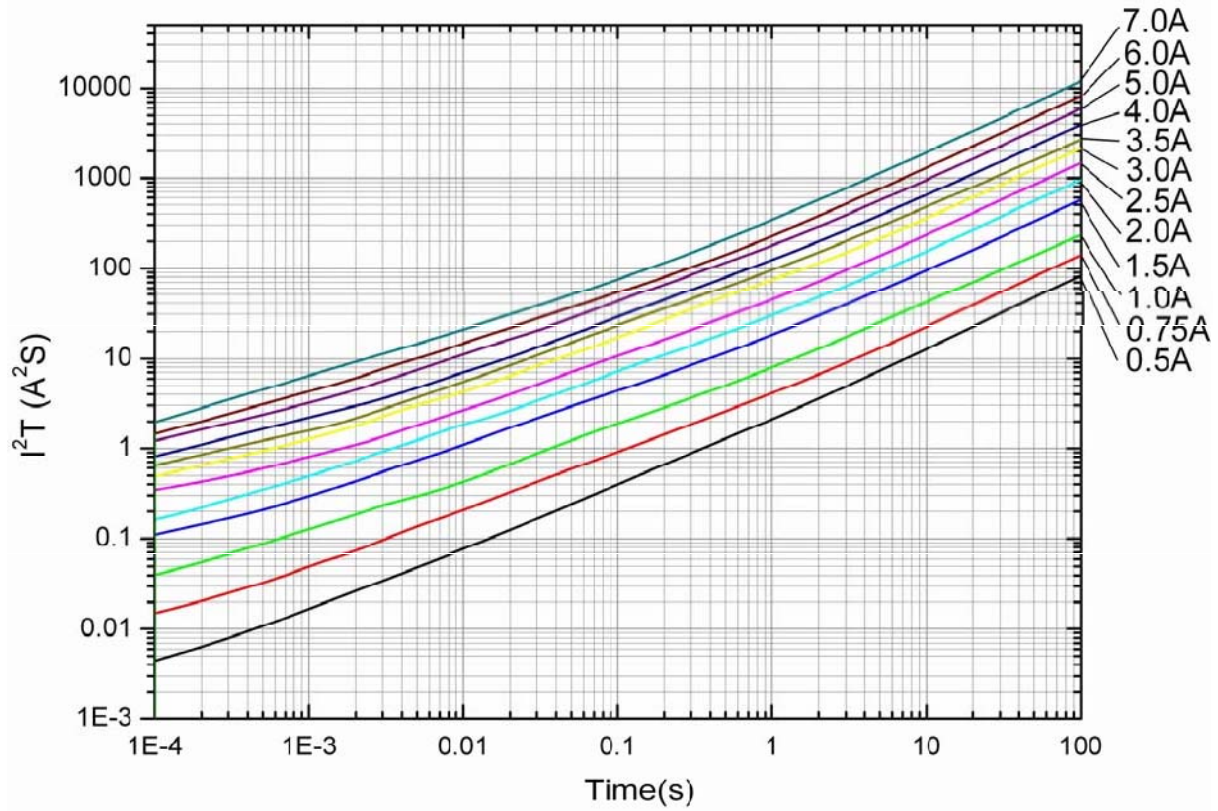
Title: Engineering Product Specification S1206 Series	Revision: G
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10. Time Current Curve:

Electrical Characteristics		
Ampere Rating	% of Current Rating	Opening Time
500mA-7A	100%	4 Hours Min.
500mA-7A	200%	60 Seconds Max.
500mA-750mA	1000%	0.5~4ms
1A-7A	1000%	1-5ms



11. I^2T vs Time Curve:



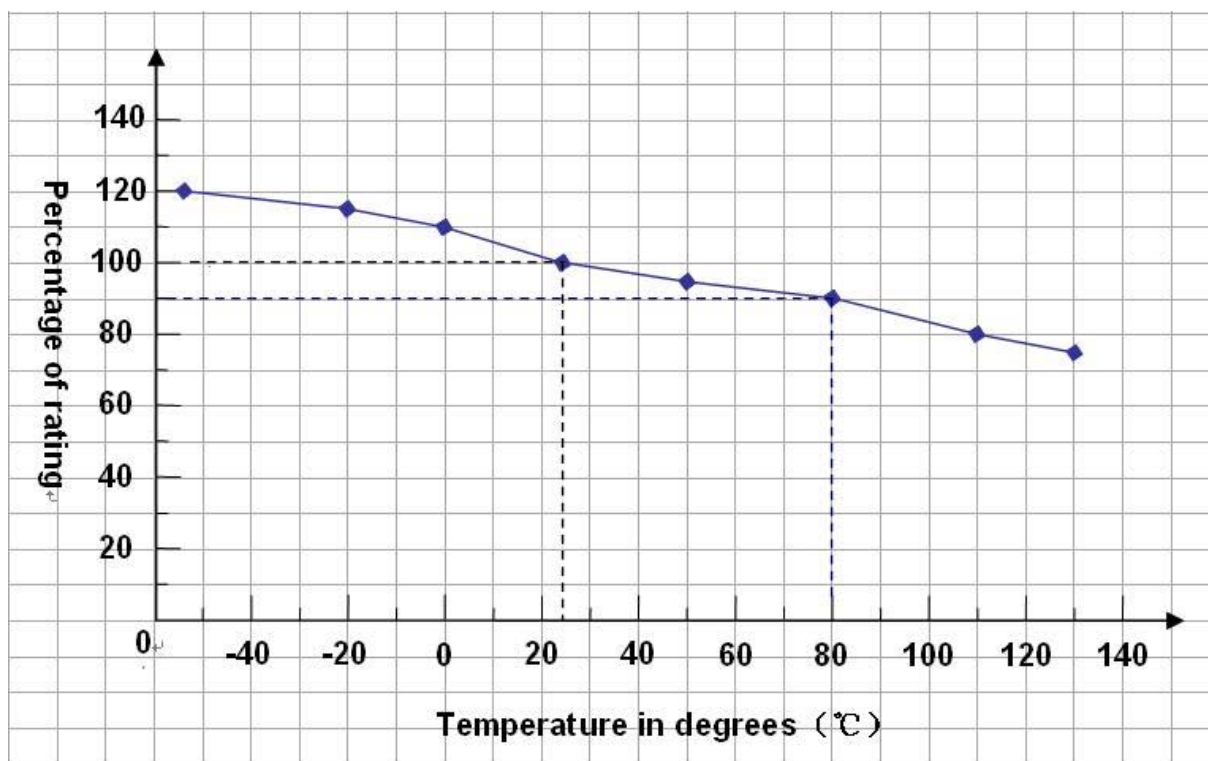
12. Temperature Derating Curve: (Ambient temperature on current-carrying capacity)

- For Circuit, current rating shall be derated in accordance with the figure.
- This current derating curve is for fusing characteristics.

Example,

Work Temp: 80°C, Temp derating factor = 90%

$$\text{Melting } I^2t_{\text{fuse}} \geq I^2t_{\text{pulse}} / F_p / 0.9$$



13. Reliability Test:

Characteristics	Test condition / Methods	Requirement	Test Reference
Carrying capacity	100% of its rated current	No Fusing, 4hr min	Refer to SINOCHIP File
Fusing Time	200% of its rated current (500~7A)	Within 60sec	Refer to SINOCHIP File
	1000% of its rated current (500~750mA)	Within 0.0005~0.004sec	Refer to SINOCHIP File
	1000% of its rated current (1~7A)	Within 0.001~0.005sec	Refer to SINOCHIP File
Solderability	235°C±5 °C, 3s±0.5s	95% coverage min	IEC60127/A.3.3; IEC60068-2-20; MIL-STD-202 Method 208H
Resistance to soldering	260°C±5 °C, 10s±0.5s	ΔR:<10%	MIL-STD-202 Method 210
Bending test	Distance between holding points: 90mm, Bending: 1mm, 1time, 10sec	(1) No mechanical damages (2) ΔR: <10%	Refer to SINOCHIP File
High Temperature Operating Life	96hours, 125°C at 60% rated current. Measure cold resistance and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Moisture Resistance	10 Cycles. Measure cold resistance and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 106
High Temperature Exposure	1000 hrs. @ T=125°C. Unpowered. Measure cold resistance. and Time-Current characteristics.	(1)ΔR: <10%; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time <60 seconds	MIL-STD-202 Method 108
Insulation Resistance	DC resistance	0.1MΩ min	IEC60127-4
ON /OFF Cycle Test	Surge current and 100% rated current; 50s ON; 10s OFF; 100,000 Cycles	(1)No open; (2)100% of Rating Current, Opening time >4 hours (3)200% of Rating Current, Opening time	Refer to SINOCHIP File

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		<60 seconds	
Salt spray	5% salt solution, 48 hours exposure	$\Delta R: <10\%$	MIL-STD-202 Method 101
Thermal Shock	10 cycles between $-55^{\circ}\text{C}/+125^{\circ}\text{C}$, 30 minutes @each extreme	No mechanical damage; $\Delta R: <10\%$	IEC 60068-2-14
Interrupting Ability	Loading current 50A	without permanent arcing,ignition and bursting of fuse link	UL248-14

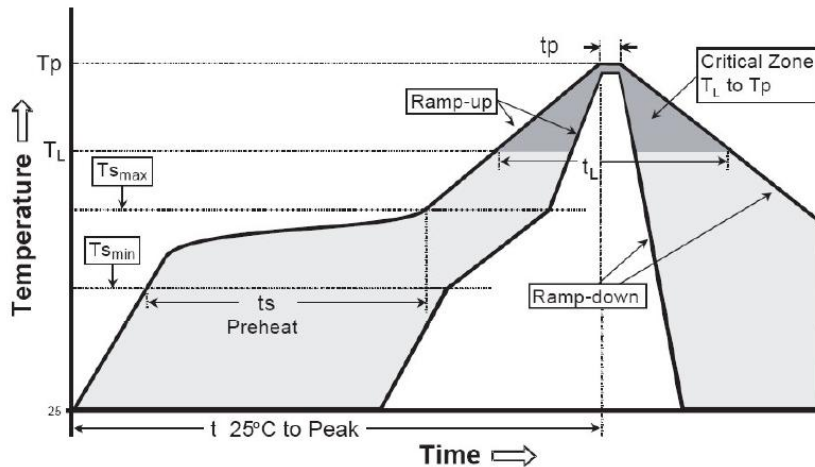
14. Recommended Solder Curve:

14.1 Infrared Reflow

14.1.1 Temperature:260°C

14.1.2 Time:30 Seconds Maximum

14.1.3 Recommend Reflow profile



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate($T_{s_{max}}$ to T_p)	3°C/second max.
Preheat	
Temperature Min($T_{s_{min}}$)	150°C
Temperature Max($T_{s_{max}}$)	200°C
Time($T_{s_{min}}$ to $T_{s_{max}}$)	60-120 seconds
Peak Temperature(T_p)	260°C
Time within 5°C of actual Peak Temperature(T_p)	20-40 seconds
Ramp-Down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

KLS ELECTRONIC CO;LTD

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14.2 Wave soldering

14.2.1 Reservoir Temperature:260°C

14.2.2 Time in Reservoir:10 Seconds Maximum

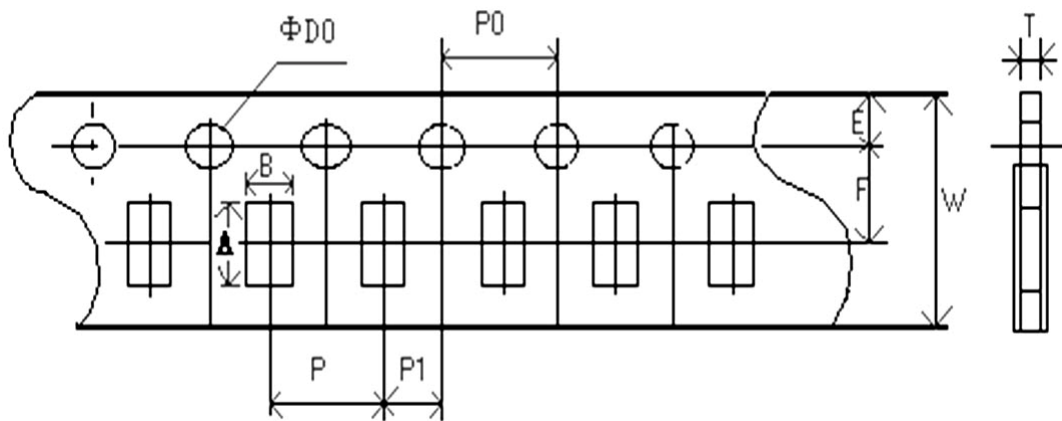
14.3 Hand Soldering

14.3.1 Temperature:380°C

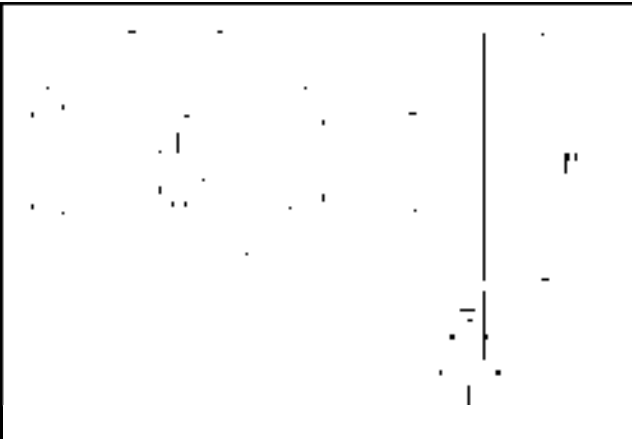
14.3.2 Time:5 Seconds Maximum

15. Packaging:

- **5,000 pieces of fuses in paper taper and reeled on a 178mm(7 inch) reel.**



Type	A	B	W	F	E
S1206	3.50 ±0.20	1.90 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10
Type	P	P0	P1	D0	T
S1206	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.50 ±0.10	0.75 ±0.10



Type	M	W	T	A	B	C	D
S1206	178 ±2.0	10.0 ±1.5	12.0 ±2.0	2.5 ±0.5	13.0 ±0.5	31.0 ±1.0	80.0 ±1.0

16. Storage:

- The maximum ambient temperature shall not exceed 40°C. Storage temperature higher than 40°C could result in the deformation of packaging materials.
- The maximum relative humidity recommended for storage is 65%. High humidity with high temperature can accelerate the oxidation of the solder plating on the termination and reduce the solderability of the components.
- Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use. The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.

17. Application:

- PC related equipment and peripherals(Hard drive,Printer,etc.)
- Portable devices(Mobile phone,PDA battery charger,etc.)
- Digital camera(Digital still camera)
- Game equipment
- LCD monitor,LCD modules,LCD backlight inverter,LCD panel
- Wireless basestation
- Cooling fan system
- Networking
- Industrial equipment
- Medical equipment

END

KLS ELECTRONIC CO;LTD

Engineering Product Specification

SMD FUSE 2410 FAST ACTING







General

- Fast acting, Inrush withstand capability
- Wire-In-Air performance
- Wide range of current rating available
- 6.1mm× 2.5mm square shape surface mount
- Higher temperature profiles
- -50°C~125°C operating temperature
- Excellent environmental integrity
- RoHS compliant
- Halogen-free

Agency / Certificate Information

Agency	File Number	Ampere Range
		1A~20A
		1A~20A
		1A~5A
		6.3A~10A

Application

- Battery pack
- PC related equipment and peripherals (Hard drive, Printer, etc.)
- Digital camera (Digital still camera)
- LCD monitor, LCD modules
- Wireless basestation
- Power supply
- Medical device

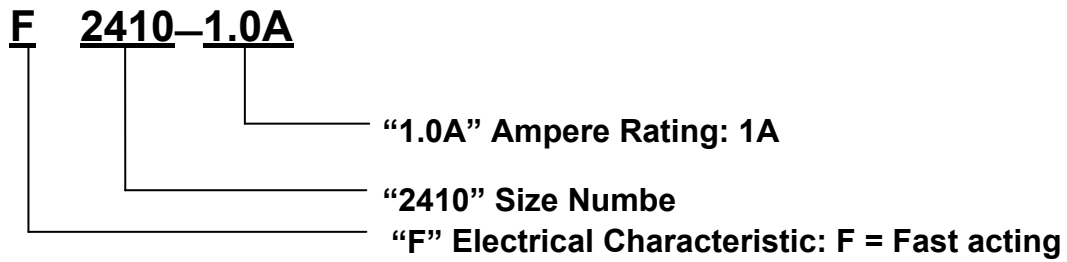
Ordering Information

Part Number	Current Rating (A)	Voltage Rating (V)	Interrupting Rating	Typical Cold DCR* (mΩ)	Nominal I ² T** (A ² S)	
F2410 -1.0A	1	125	UL 50A 125V AC 160V DC PSE 100A 100V AC	100	0.355	
F2410-1.25A	1.25	125		89	0.481	
F2410-1.6A	1.6	125		58	0.847	
F2410-2.0A	2	125		32	0.84	
F2410-2.5A	2.5	125		27	1.403	
F2410-3.15A	3.15	125		21	2.054	
F2410-4.0A	4	125		16	3.44	
F2410-5.0A	5	125		14	4.843	
F2410-6.3A	6.3	125		10	10.558	
F2410-7.0A	7	125		9.4	10.584	
F2410-8.0A	8	125		7.4	17.628	
F2410-10.0A	10	125		5.9	30.3	
F2410-12.0A	12	65		UL 50A 65VAC/DC	4.8	42.221
F2410-15.0A	15	65			3.7	69.753
F2410-20.0A	20	65	3		132	

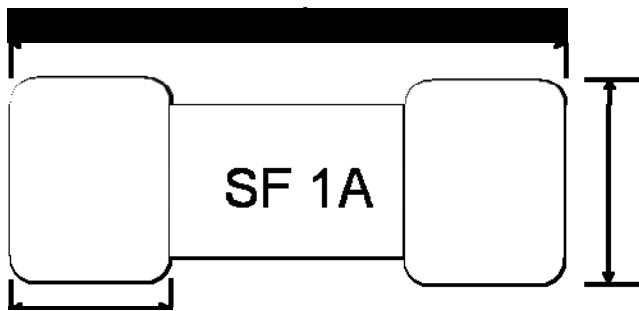
* Measured at ≤10% rated current and 25 °C

** Melting I²T at 10 times of rated current

Catalog Symbol



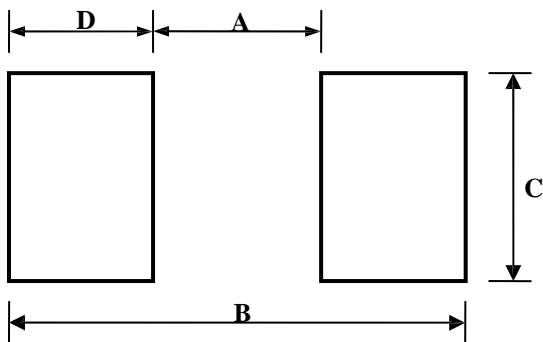
Dimensions



Unit:mm

L	W	t	D
6.1±0.2	2.5±0.1	2.5±0.1	1.4±0.1

Recommended Land Patterns



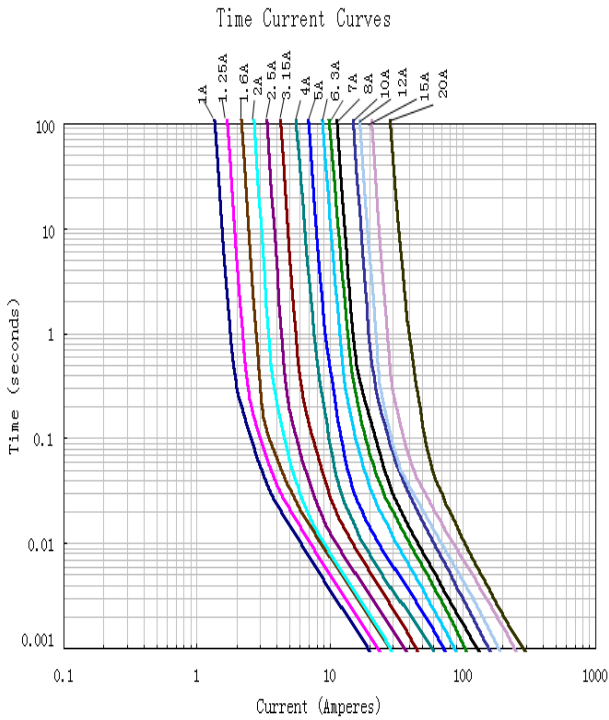
Materials

Components	Material
Body	Ceramic
Terminations	Au Plated Brass Cap
Element	Silver Plated or Copper Alloy wire

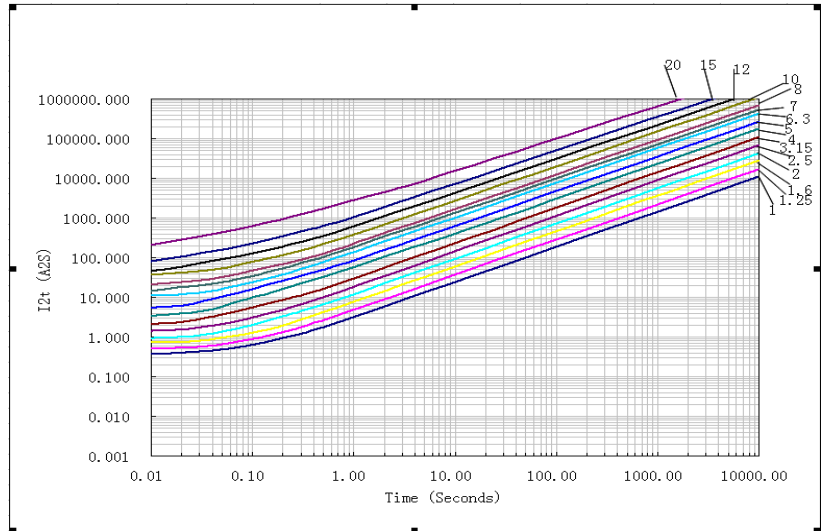
Dimensions	A	B	C	D
Spec	3.0±0.3	8.0±0.3	3.0±0.3	2.5±0.3

Unit:mm

Time Current Curve



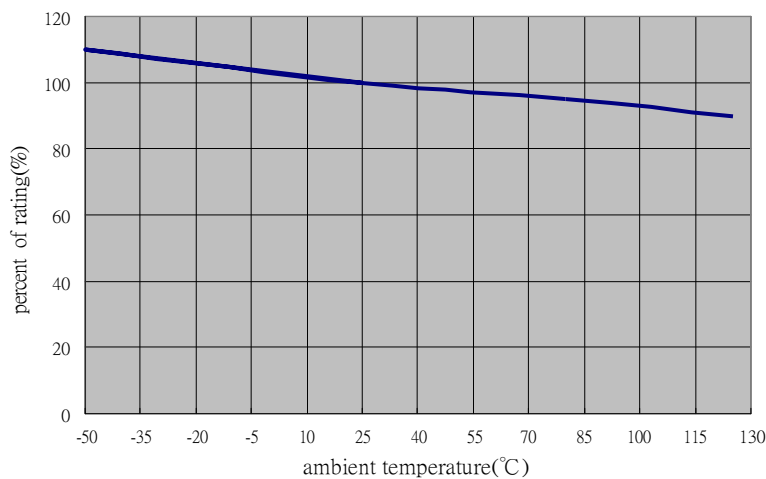
I²T vs Time Curve



Electrical Characteristics

Ampere Rating	% of Current Rating	Opening Time
1A-20A	100%	Min.4hr.
1A-10A	200%	Max.5s
12A - 20A	200%	Max.20s

Temperature Derating Curve



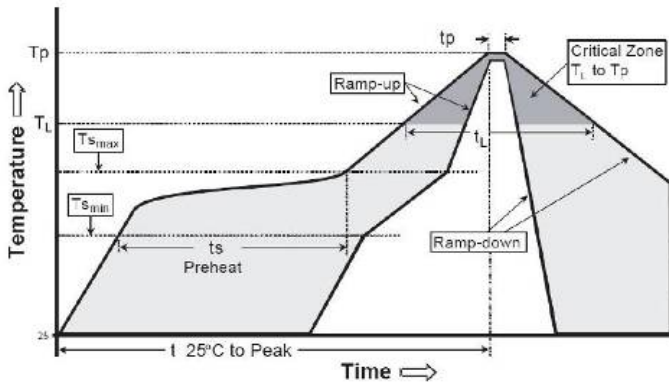
Reliability Test

Item	Test condition / Methods	Performance	Standard
Carrying capacity	100% of its rated current	No Fusing, 4hr min	UL248-14
Fusing Time	200% of its rated current	1~10A < 5 s 12~20A < 20 s	Refer to SinoChip File
Fusing Time	1000% of its rated current	1ms-10ms	IEC60127-4
Voltage Drop	100% of its rated current	1-6.3A<300mv 7-10A<220mv 12A-20A<150mv	IEC-60127-4
Endurance Test	UL:100% of its rated current PSE: 125% of its rated current	1-6.3A<70K 7-10A<85K 12-20A<105K	IEC-60127-4 UL248-14
Interrupting Ability	UL 50A@125V AC160V DC 50A@ 65VAC/DC	without permanent arcing,ignition and bursting of fuse link	UL248-14 IEC60127-4
Solderability	240°C±5 °C,3s±0.5s	95% coverage min	IEC60127-4 IEC60068-2-20; MIL-STD-202
Resistance to soldering	260 C±5°C, 10s±0.5s	△R:<10%	MIL-STD-202 Method 210
High Temperature Operating Life	T=70±2°C, 0.6In, 96h;	△R: <10%	MIL-STD-202 Method 108
Humidity(steady state)	T=40±2°C, 90~95%RH, 1000h;	△R: <10%	MIL-STD-202 Method 103
Low Temperature Storage	T=-55±3°C, 96 h	△R: <10%	IEC60068-2-1
High Temperature Storage	T=125±2°C, 96h	△R: <10%	IEC60068-2-2
Salt Spray	5% salt solution , 48 h	△R: <10%	MIL-STD-202 Method 101
Thermal Shock	5 cycles between -55°C/+125°C, 60 minutes @each extreme	△R: <±(10%R+0.005)	IEC 60068-2-14

Recommended Solder Curve

1. Infrared Reflow:
 Temperature : 260°C
 Time : 5s max.

Recommend Reflow profile



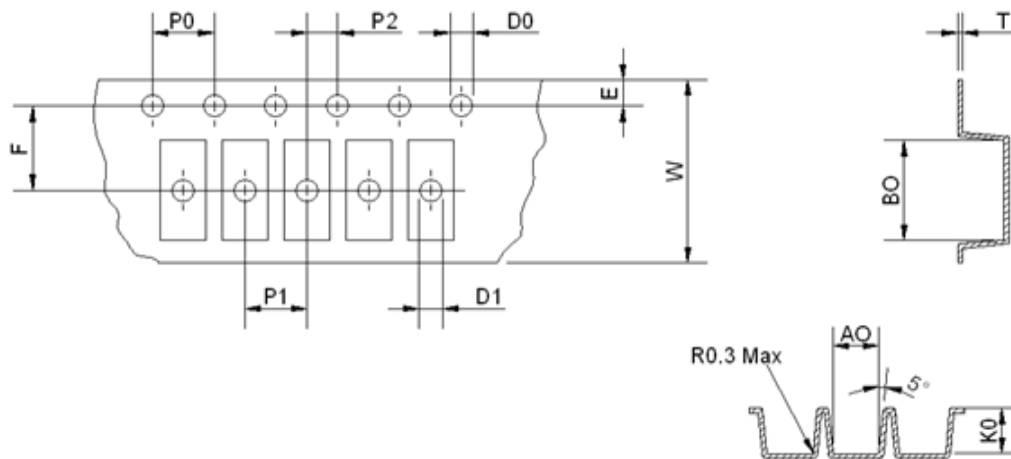
Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate($T_{s_{max}}$ to T_p)	3°C/s max.
Preheat Temperature Min($T_{s_{min}}$)	150°C
Temperature Max($T_{s_{max}}$)	200°C
Time($T_{s_{min}}$ to $T_{s_{max}}$)	60-120s
Peak Temperature(T_p)	260°C
Time within 5°C of actual Peak Temperature(T_p)	5s
Melting tin time(t_L)	20~40s
Ramp-Down Rate	6°C/s max.
Time 25°C to Peak Temperature	8 minutes max.

2. Wave soldering
 Reservoir Temperature : 260°C
 Time in Reservoir : 10s max.

3. Hand Soldering
 Temperature : 350°C
 Time : 5s max.

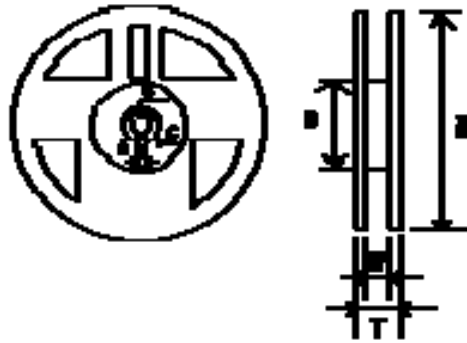
Packaging

1000 pieces of fuses in emboss taper and reeled on a 178mm(7 inch) reel



Symbol	A0	B0	K0	P0	P1	P2
Spec	3.00±0.10	6.50±0.10	3.00±0.10	4.00±0.10	4.00±0.10	2.00±0.10
Symbol	E	F	D0	D1	W	T
Spec	1.75±0.10	5.50±0.05	1.50±0.10	1.50MIN	12.0±0.20	0.30±0.05

Unit:mm



Unit:mm

Type	M	W	T	A	B	C	D
Spec	178±2.0	12.5±1.0	14.5±1.5	2.0±0.5	13.0±0.5	21.0±0.5	58.0±2.0

Storage

- The ambient temperature shall between 5~30°C.
- The relative humidity recommended for storage is between 25~ 60%.
- Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use. The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.