High Current Reflowable Thermal Protection Mini Device

Specification Status: Released

HCRTP-mini is low resistance, surface mountable thermal protector which can be installed on PCB using surface mount assembly and reflow process. By using specified solder paste in the user's system, HCRTP-mini can protect the components on the user's PCB from overheating when the temperature is higher than the melting point of the solder paste.

1. Configuration and Dimension:

Terminal Material: C1100 1/2H (Tough-Pitch Copper)
Thickness: 0.6mm
Plating: Ni/Tin

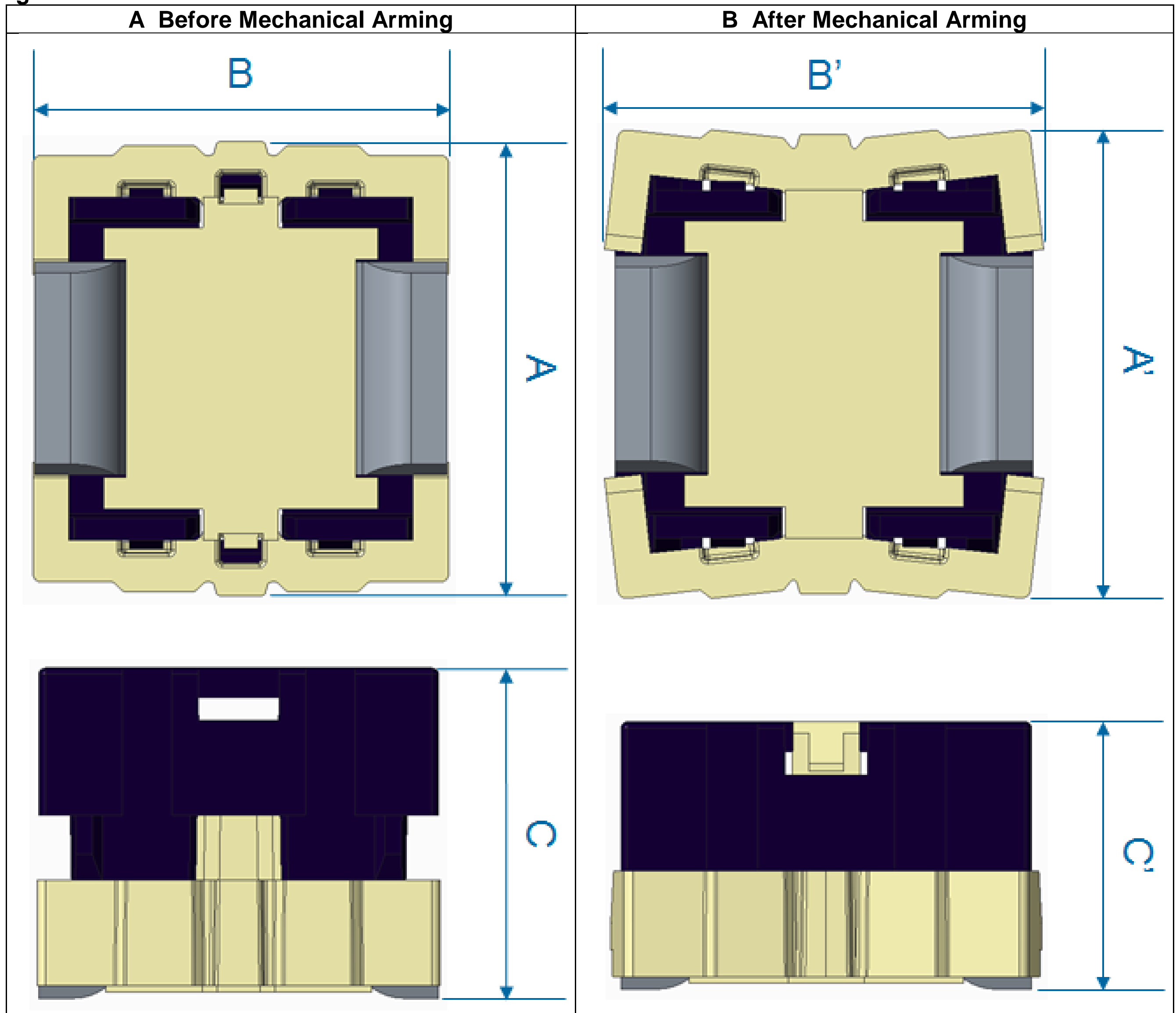

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Table-1. Dimensions:

	Before Mechanical Arming						After Mechanical Arming					
	A		B		C		A’		B’		C’	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
mm	6.14	7.14	5.56	6.56	4.8	5.2	6.83	7.83	6.15	7.15	3.8	4.2
in	0.242	0.281	0.219	0.258	0.189	0.205	0.269	0.308	0.242	0.281	0.150	0.165

2. Marking: Each lot of devices is marked on the body for traceability.

- ☐ _ A (Cap type)
- ☐☐☐☐_ Batch Number

3. Ratings & Spring Characteristics

Table 2. Ratings

DC Open Voltage (Vdc)	DC Interrupt Current @ 16Vdc (A)	Operating Temperature (ºC)		Resistance @ 23ºC (μΩ)		
Max	Max	Min	Max	Min	Typ.	Max
16	500	-55	150	50	67.5	85

Note 1: Performance capability at these conditions can be influenced by board design.
Performance should be verified in the user’s system.
Note 2: Resistance should be measured by a 4 wired method unless otherwise specified.

Table 3. Cap Integrity

	Min	Typ.	Max	Units
Vertical pull force			3	N

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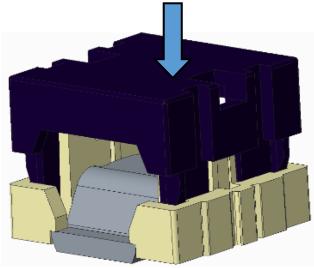
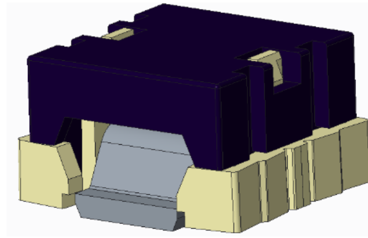
4. Arming

Arming is to occur after surface mount installation.

Method: Cap depressed manually or by mechanical plunger



Downward force required for mechanical arming



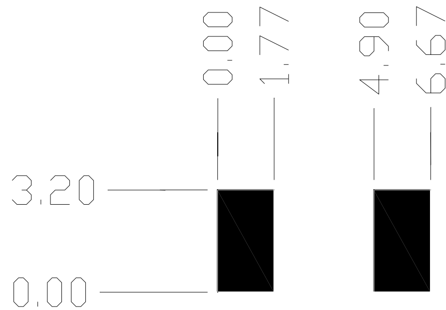
Device after mechanical arming completed

Warning: The device will not function without proper arming.
If the device will be depressed by mechanical plunger, the plunger speed should be verified in the user's process.

Table 4. Arming Recommendation:

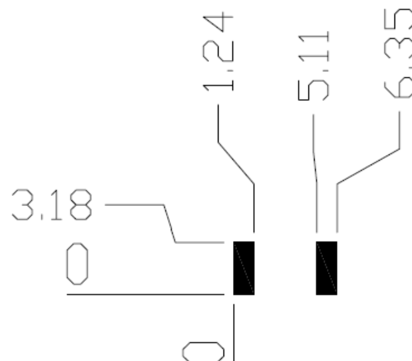
Description	Min.	Typ.	Max.	Units
Arming Force (Normal to PCB surface)	25	32.5	40	N
Distance of travel	0.94	1.00	1.06	mm

5. Recommended Solder Pad Layout (Dimensions in mm):



6. Recommended Solder Stencil Opening (Dimensions in mm):

Stencil thickness used for testing: 0.110 ~ 0.140mm
Solder paste used for testing: Indium 5.8LS, SAC 305 (96.5% tin, 3% silver and 0.5% copper)



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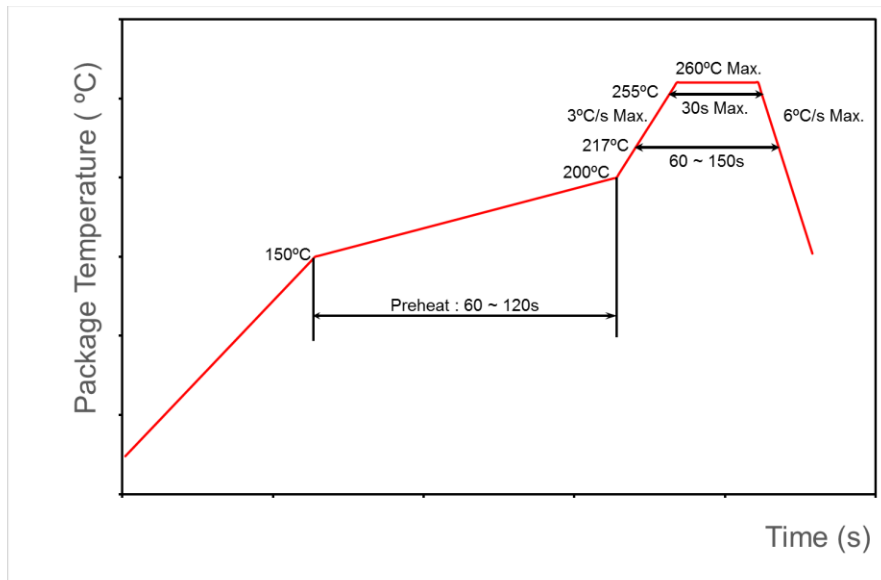
7. Solder Reflow Recommendation

As per JEDEC J-STD-020D

Classification Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Average ramp-up rate (T_{SMAX} to T_P)	3ºC/second max.
Preheat	
● Temperature min. (T_{SMIN})	150ºC
● Temperature max. (T_{SMAX})	200ºC
● Time (T_{SMIN} to T_{SMAX})	60 -120 seconds
Time maintained above:	
● Temperature (T_L)	217ºC
● Time (t_L)	60 - 150 seconds
Peak/Classification temperature (T_P)	260ºC
Time (t_P) within 5ºC of the specified classification temperature (t_C)	
Time (t_C)	30 seconds max.
Ramp-down rate	6ºC/second max.
Time 25ºC to peak temperature	8 minutes max.

Note: All temperatures refer to topside of the package, measured on the package body surface.



8. Referenced Performance

Results obtained on 44.4mm x 57.2 mm x1.6mm of 2-sided FR4 board T4485 with 4.0 oz. Copper Trace.
HCRTP-mini device pad connection of

- 374 sq. mm 4.0 oz. copper heat spreader connected to P1 Pad.
- 327 sq. mm 4.0 oz. copper heat spreader connected to P2 Pad.

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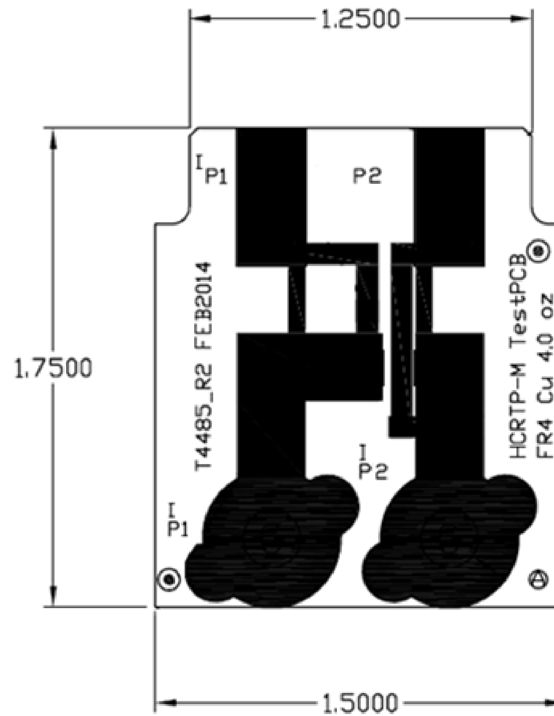

HCRTP-mini device surface-mounted on test board T4485 using solder paste SAC 305 with recommended pad layout and solder stencil opening and thickness.
Post reflow resistance based on SMT 1x reflow as outlined in solder reflow recommendation.
Results are highly installation-dependent. Users should confirm for their own application.

Table 5. Referenced performance.

Performances		Min	Typ.	Max	Units
Post Reflow Resistance	@ 23±3ºC	50	100	150	µΩ
	@ 150±3ºC	110	155	200	
Hold Current	@ 23±3ºC			90	A
	@ 140±3ºC			45	
Max Interrupt Current	16Vdc			500	A
Open Temperature	Zero Bias	212	220	228	ºC

Post reflow resistance should be measured by a 4 wired method.

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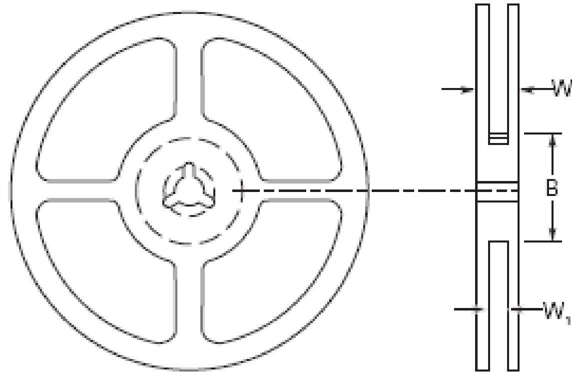
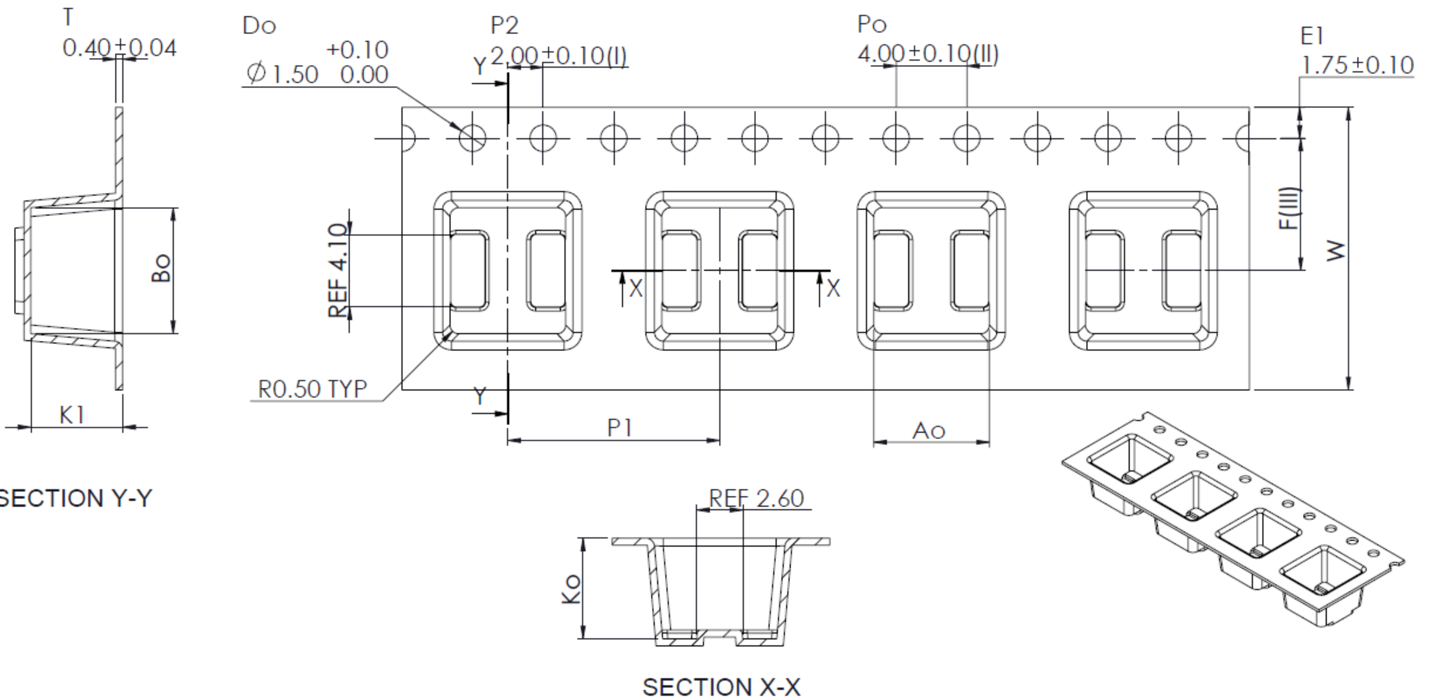
9. Packaging Information:



	B		W_1		W_2	
	Min	Max	Min	Max	Min	Max
mm	79	81	16.5	18.5	20.5	22.5
Inch	3.11	3.19	0.65	0.73	0.81	0.89



	Ao		Bo		Ko		K1		F		P1		W	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
mm	6.46	6.66	7.04	7.24	5.6	5.8	5.1	5.3	7.4	7.6	11.9	12.1	15.7	16.3
Inch	0.25	0.26	0.28	0.29	0.22	0.23	0.20	0.21	0.29	0.30	0.47	0.48	0.62	0.64

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Precedence: This specification takes precedence over documents referenced herein.
Effectivity: Reference documents shall be the issue in effect on the date of invitation for bid.

Important Installation Instructions:

Note 1: HCRTP-mini devices are to be board-mounted using solder paste SAC 305 (96.5% Tin, 3% Silver, and 0.5% Copper).
Note 2: HCRTP-mini devices are not compatible with conformal coating. If selective coatings are used, avoid covering the HCRTP-mini device, and it needs to be verified in the user's system with their own risk.
Note 3: HCRTP-mini devices are not to be reworked in any manner which affects values stated in Table 2.

MATERIALS INFORMATION

RoHS Compliant

Directive 2002/95/EC Compliant

ELV Compliant

Directive 2000/53/EC Compliant

Pb-Free

Halogen Free*

* Halogen Free refers to: Br≤900ppm, Cl≤900ppm, Br+Cl≤1500ppm.

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