
Product Specifications

Type	:	Reflowable XH-H Capacitor
Model	:	XH311HG IV07E
Code	:	

This is a "Standard Spec sheet " which is a general documentation for your evaluation.

Before we will start to supply this part to you, we would like you to ask us the formal version of this spec sheet.

We will issue the formal specification sheet for you.

(Basically the contents is the same as this one.)

We would like you to put your signature on it to state your approval of the specification, and send it back to us.

It will be a kind of contract between you and us.

Seller: Seiko Instruments Inc.

Network Components Business Unit

Micro-Energy Division

Address: Arcacentral 13F, 2-1 Kinshi 1-Chome Sumida-ku Tokyo, Japan
Postal code: 130-0013

Sales Dep.

History of Revision

No.	Described	Details of Change	Checked	Issue Date
01	QA Sec R. Ito	Initial Release for Standard Specifications No. STDE-B-XH0311HG0ARIV07E-0014-1	QA Sec H. Ishikawa	Nov.01. 2007

Manufacturer information

Company name: Seiko Instruments Inc.
Network Components Business Unit
Micro-Energy Division

Address: 45-1, Aza-Matsubara, Kami-ayashi, Aoba-ku, Sendai-shi, Miyagi,
Japan, postal code: 989-3124

Responsible: Quality Assurance Department

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Appendix

Leakage Criteria
 Construction of Capacitor
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1. Application

This specification applies to the coin-type Reflowable XH-HG Capacitor, which Seiko Instruments Inc. Manufactures, and which supplies to the customer specified in the cover page of this document.

2. Model

Refer to the Model in this cover page.

3. Chemical System and Structure

Refer to the document attached as “The construction of capacitor”.

4. Nominal Specifications

		Model
No.	Characteristics	XH311HG
4-1	Operating temperature range	-20°C to +60°C
4-2	Rated Operating Voltage	3.3V
4-3	Charging voltage	3.3V or less
4-4	Nominal Capacity Discharge capacity (3.3V to 2.0V) Electrostatic capacity	6.5uAh 0.02F
4-5	Nominal Internal impedance	300 ohm
4-6	Nominal dimensions Diameter Height	3.8mm 1.1mm
4-7	Standard mass	0.04g
4-8	Recommended Storage conditions Temperature Humidity	+10°C to +30°C 60%RH or less
4-9	The voltage at the delivery time	Max 0.3V

5. Characteristics

No.	Characteristics	Model	Test Methods	Measuring Methods
		XH311HG		
1	Capacity (initial)		7-1	6-2-1
	24°C	4.5 uAh or more		
	-20°C	1.0 uAh or more		
	60°C	4.0 uAh or more		
2	Max.Internal impedance (initial)		7-1	6-3
	24°C	Max.800 ohm		
	-20°C	Max.8000 ohm		
	60°C	Max.800 ohm		
3	Float-Charge Characteristics		7-2	6-2-1 6-3
	Capacity	60% or more of value measured at 24°C		
	Internal impedance	Max.8000 ohm		
4	High Temperature and High Humidity Storage Characteristics		7-3	6-2-1 6-3
	Capacity	60% or more of value measured at 24°C		
	Internal impedance	8000 ohm or less		
5	Charge / Discharge Cycle Characteristics		7-4	6-2-1 6-3
	Capacity	60% or more of value measured at 24°C		
	Internal impedance	8000 ohm or less		
6	Leakage Resistance	Level S3 (*1) or less (There is no significant leakage, which effects capacitor's performance.)	7-5	6-5
7	Appearance			6-5
	Initial	No leakage. There is no foreign body adhesion (over level S2). There is no significant deformation, stain, stricken mark, rust and burr.	Initial	
	After Test	There is no significant leakage (C1 or more), deformation, stain, stricken mark, rust and burr.	7-2 7-3 7-4	

*1: Refer to "Leakage Criteria"

6. Measuring Methods

6-1. Measuring Environment, Meters and Equipment

6-1-1: Environment

Testing and Measuring must be conducted under the environment of the normal temperature (24+/-2°C) and the normal humidity (65+/-20%RH), if not specified.

6-1-2: Dimensions

For measuring dimension JIS B 7503 (Dial gauge), JIS B 7507 (Vernier caliper) and JIS B 7502 (External micrometer) or meter with same grade in accuracy must be used.

6-1-3: DC Voltmeter

Voltmeter with class 0.2 of JIS C 1102 (Electric indicating instrument) or meter with same or better grade in accuracy, and its input impedance is over 10Mohm must be used.

6-1-4: DC Ammeter and AC Ammeter

Ammeter with class 0.2 of JIS C 1102 (Electric indicating instrument) or meter with same or better grade in accuracy must be used.

6-1-5: Resistance

Resistance should include all resistance in external circuit and its tolerance must be within +/-0.5%.

6-1-6: Initialization of capacitor

All measurements must be conducted after 30 minutes of short-circuit.

6-2. Capacity

6-2-1. Discharge capacity

1) Charging condition:

Charge capacitor by voltage of 3.3V through protective resistance of 100 ohms for 1 hour. (3.3...2.0V range)

2) Discharging condition:

Discharge the capacitor by using constant current of 5uA to 2.0V. Then the capacity is calculated by the duration. (3.3...2.0V range)

The electrical discharge by the fixed resistance of 280kohm is allowed as substitution of 5uA in a fixed current ampere. However, the calculation of capacity must be used the division mensuration.

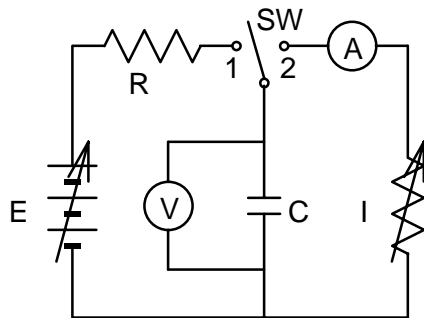
$$Capacity(C) = \sum_i \left(\frac{(V_i + V_{i+1})}{2} \times \frac{1}{Rd} \times (T_{i+1} - T_i) \right)$$

6-2-2. Electrostatic Capacity (for reference)

- 1) Follow next measuring method in the circuit shown in Fig. 6-2-1.
- 2) Set DC voltage (E) as listed in Table 6-2.
- 3) Turn SW toward 1 for charging. Charge and impress listed voltage (E) for listed time (T) in Table 6-2 through protective resistance (R).
- 4) After having impressed the voltage for listed time, then turn SW toward 2 for discharging by listed discharging current (I) in Table 6-2 through constant-current load device.
- 5) Measure the time while the tab-voltage of product (capacitor) changes from listed starting voltage (V1) to ending voltage (V2) in Table 6-2 (Td=T2-T1). Then calculate capacity (C) by following formula. Please refer to Fig. 6-2-2.

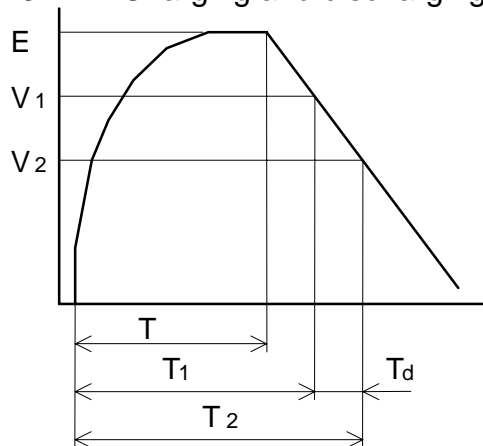
$$C \text{ (F)} = \frac{I \times (T_2 - T_1)}{V_1 - V_2}$$

<Fig. 6-2-1 : Measureing Circuit>



C : Test Sample
 E : DC Constant-voltage Power
 R : Protective Resistance
 V : DC Voltmeter
 I : Constant-current Load Device
 A : DC Ammeter

<Fig. 6-2-2 : Charging and discharging Curve>



<Table: 6-2>

Model	Charging voltage (E)	Protective Resistance (R)	Charging Time (T)	Discharging Current (I)	Starting Voltage (V1)	Ending Voltage (V2)
XH311HG	3.30 V	100 ohm	1 hour.	5 uA	2.0 V	1.5 V

6-3. Internal Impedance

Measure by alternating method with Frequency 1kHz.

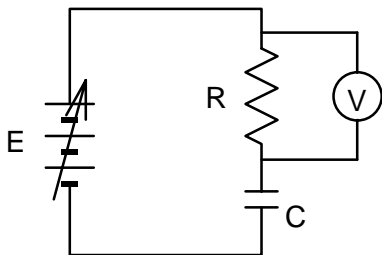
6-4. Charging Current (for reference)

After test sample is charged in the circuit shown in Fig.6-4 by listed voltage (E) and listed protective resistance (R) for listed time in Table 6-4, measure the voltage (V) between tabs of protective resistance (R).

Then calculate charging current (I) by following formula.

$$I = \frac{V}{R}$$

<Fig. 6-4 Charging Current
Measuring Circuit>



<Table 6-4>

Charging voltage (E)	Protective resistance (R)	Charging Time (T)
3.30 V	100 ohm	1 hour.

6-5. Appearance: Refer to “Leakage Criteria”

- After Test : Use microscope, which has magnification of from 10 to 15.
- General : Naked eye

7. Test Methods

7-1. Temperature Characteristic Test

Measure electrical characteristics after exposing capacitor to each temperature atmosphere for 2 hours.

Temperature : -20+/-2°C, +24+/-2°C, +60+/-2 °C

7-2. Float-Charge Characteristics Test

Measure electrical characteristics and conduct appearance check after charging capacitor continuously with charging voltage of V_c and charging resistance of 100ohm at temperature 60+/-2°C for 500 hours.

Model	XH311HG
V_c	3.3 V

7-3. High Temperature and High Humidity Storage Characteristics Test

Measure electrical characteristics and check the appearance after storage of capacitor at temperature 60+/-2°C and 90+/-2%RH for 500 hours.

7-4. Charge / Discharge Cycle Characteristics Test

Charge : Apply V_c through protective resistance (R_p) for 9 minutes.

Discharge : Discharge with load resistance (R_l) for 1 minutes.

Cycles : 10000 cycles

* R_p and R_l of each model are shown as below table

Model	V_c	(R_p)	(R_l)
XH311HG	3.3 V	100 ohm	100 ohm

7-5. Leakage Resistance Characteristics Test (Thermal Shock Test: Air to Air)

Hold capacitor at -10+/-2°C for 1 hour then hold it at 60+/-2°C for 1 hour.

Repeat 100 cycles between above conditions. (Chamber) Not humidity controlled.

8. Mounting Methods

8-1. Capacitor with tabs

1) For soldering iron

Use the conditions as follows

	Model
	XH311HG
Temperature	260°C or less
Soldering time	Within five seconds

Within above conditions, do not heat capacitor over 100°C.

Do not solder directly to the capacitor.

2) Dip soldering

It is possible to apply. Do not heat the capacitor over 100°C.

3) Reflow soldering

It is possible to apply. Execute it when the capacitor has the voltage of 0.3V or less.

Refer to "Reflow Profile" attached.

9. Indications (Markings)

9-1. Dies

Following items are indicated on the surface of capacitor and/or tab.

(1) Model code

(2) Positive polarity (+)

(3) Name of Manufacturer, or monogram

(4) Country of origin

Above items can be omitted except item (2).

9-2. Lot number

Date of Manufacturing is marked on the positive tab or the capacitor (if possible) and label of each package as.

Example:

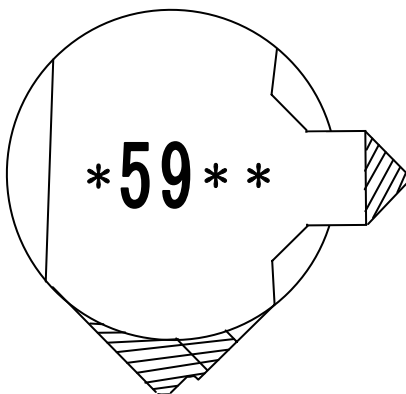
59...manufactured in September 2005

6 Y...manufactured in November 2006

Abbreviation of month:

Jan. (1), Feb. (2), ..., Sep. (9)

Oct. (0), Nov. (Y), Dec. (Z)



* is identification code of product.

**is our own number, and might be omitted.

Method of marking of manufacturing date is laser type.

10. Inspection (Outgoing and Incoming)

10-1. Lot composition

Lot must be composed within the same manufacturing conditions.

10-2. Outgoing Inspection

Seiko Instruments Inc. shall do outgoing inspection before shipping. The inspection items are as below table. The inspection results shall be submitted immediately for the customer request.

No	Characteristics	Inspection levels	Frequency
1	Capacity (initial)	n=6, c=0	per lot
2	Internal Resistance (initial)	n=6, c=0	per lot
3	Leakage Resistance	n=10, c=0	per lot

10-3. Incoming Inspection

The customer should do incoming inspection within 30 days from the receiving day.

If defects are find out at the incoming inspection, the customer immediately should notify to Seiko Instruments Inc. in writing, with the defective products, for replacement request. When there was no contact from you within 30 days, we shall judge that those were accepted.

11. Package specifications

Examples of the tray etc. for wrapping, wrapping specification, and packing specification are shown in the following.

11-1. Wrapping

Refer to "Drawing of Emboss Carrier Tape" and "Taping specifications".

11-2. Wrapping and packing

Refer to "Package Specifications".

12. In case of quality trouble

The warranties set forth herein are the only warranties on the Products.

The liabilities of Seiko Instruments Inc. in connection with the Products under these specifications are expressly limited to the replacement of defective Products.

13. Operation of this Specification

13-1. Agreement

Before these specifications being revised, the agreement, of the customer, seller and manufacturer, is required.

13-2. Negotiation

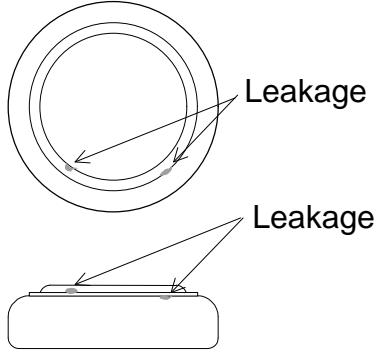
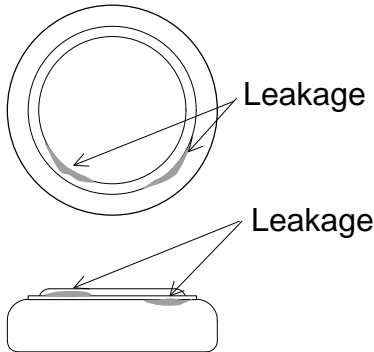
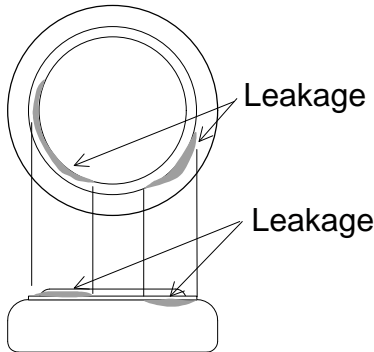
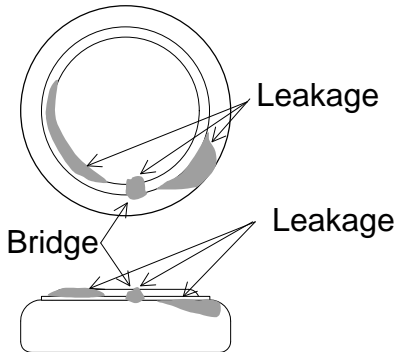
If some accident not specified on these specifications occurs, the customer, seller and manufacturer must negotiate in order to solve the problem faithfully.

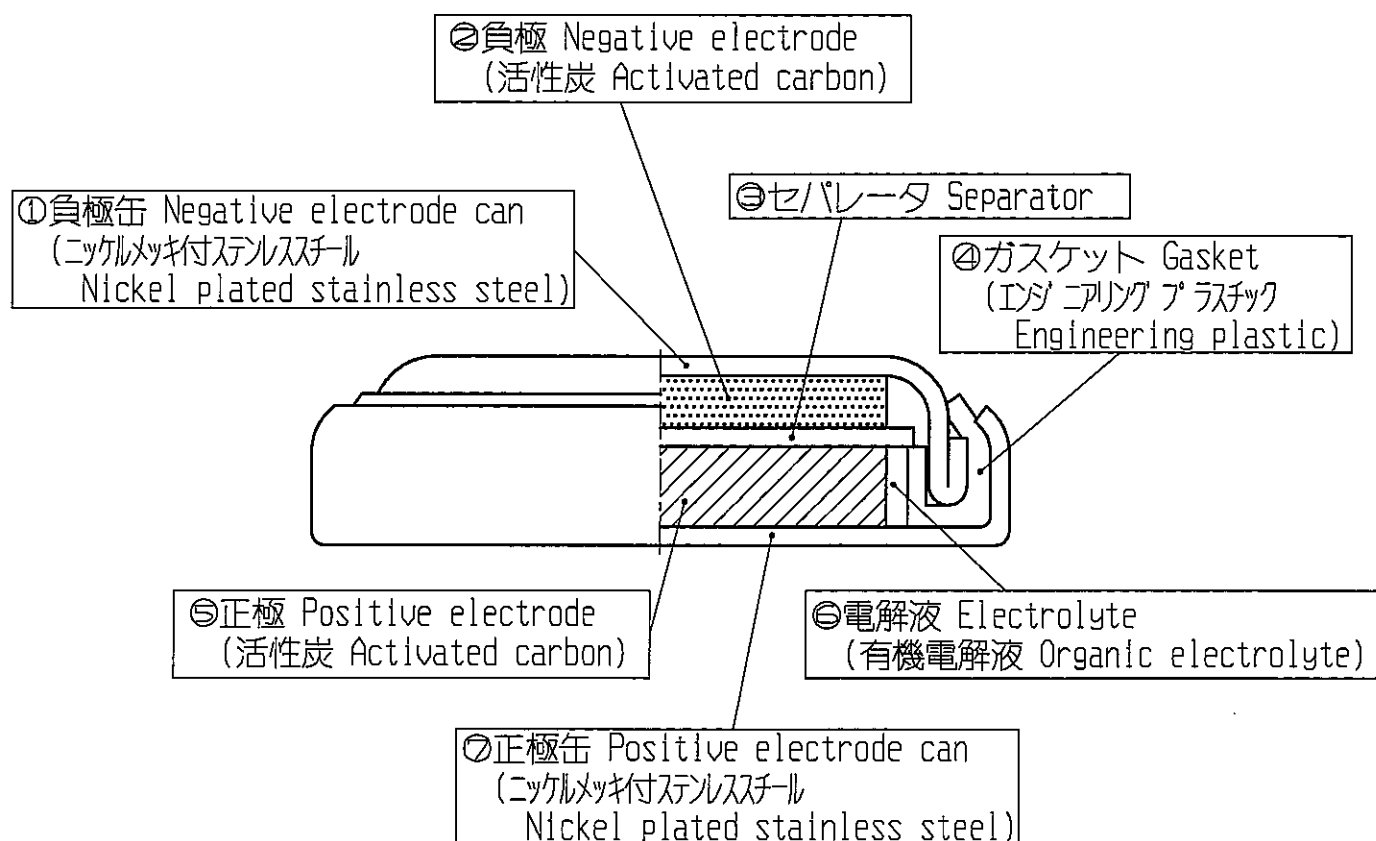
14. Notice

14-1. Defective samples

The defect for the cause analysis has occasionally received thermal damage. In many cases, overheating when detaching it from the PCB is a cause. The root cause might not be able to investigate with the being overheated defective goods. Please send the defective goods on each PCB as it is, as much as possible. Please cut the terminal with nippers etc., for avoiding the influence of heat when detaching it.

Leakage Criteria

Grade	Criteria	
	Diagram	Definition
S1		<p>The leakage can not be seen by naked eyes, but can be seen by microscope, which have magnification of 10 to 15.</p>
S2		<p>The leakage can be seen by naked eyes. The area of leakage is within half of the round and reaching to neither the flat area of the negative can nor the straight area of the positive can. The leakage is not bridged between the negative can and the positive can.</p>
S3		<p>The area of leakage is from half to all of the round and reaching to neither the flat area of the negative can nor the straight area of the positive can. The leakage is not bridged between the negative can and the positive can.</p>
C1		<p>The area of leakage is reaching to either the flat area of the negative can or the straight area of the positive can. The leakage is bridged between the negative can and the positive can.</p>

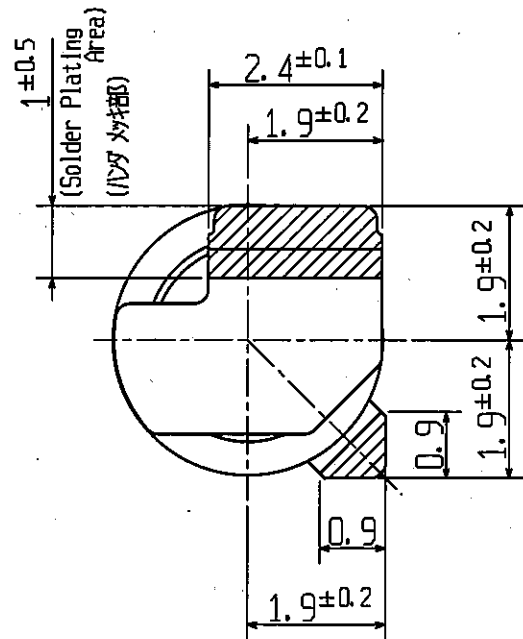
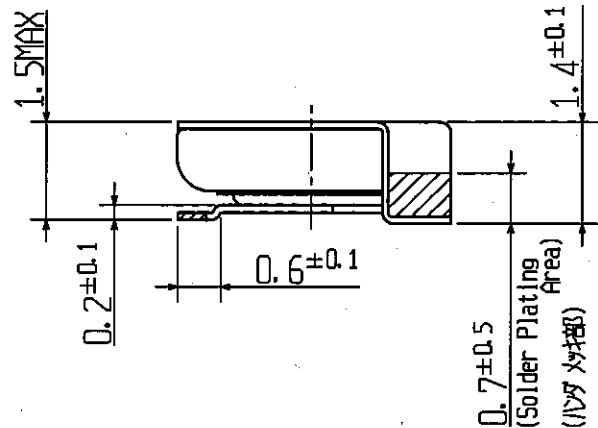
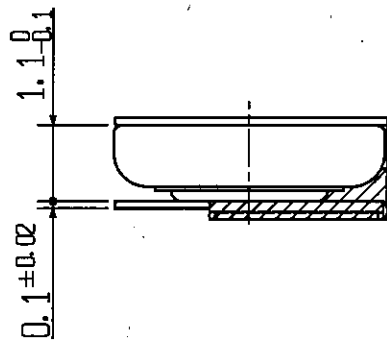
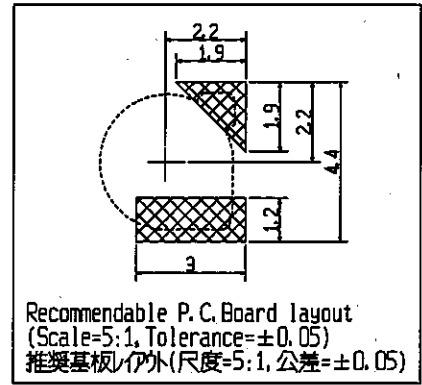
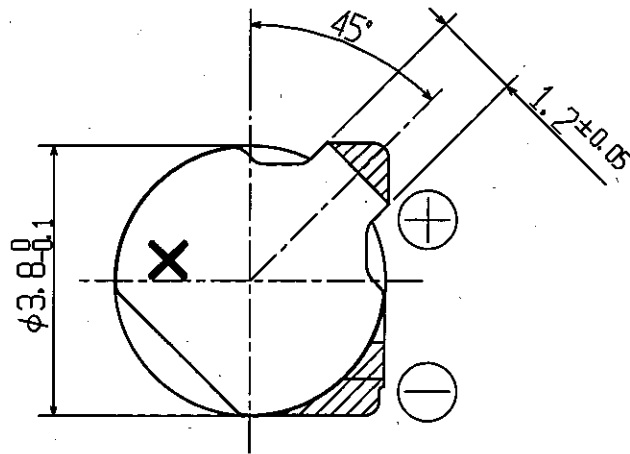


		File No.		30480000-XC000-3
		Material		
		Process		
	15. Mar. '02	名称変更、図番変更		
E01A-027	20. Dec. '01	物質名見直し		
	23. Oct. '01	設定		
History	Date	Reason		
Approved	Checked	Drawn	Scale	Cal. No. XC***, XH***
赤坂	冨塚	尾形	Unit 1=1mm	
			Rev. 3	Drw. No. 3048 XC000

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(NOTES) 1. TAB pulling strength : Over 9.8N(1.0kgf)

(注) 1. 端子引張強度 : 9.8N(1.0kgf) 以上



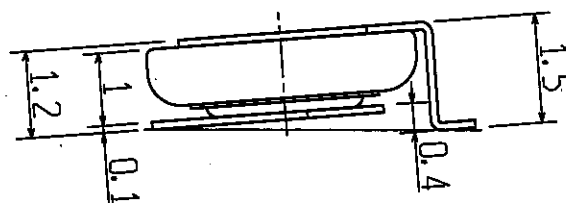
Tolerances of linear dimensions 長さ寸法公差		
Dimension 寸法		Tolerance 公差
0 - 3		±0.20
3 - 6		±0.20
6 - 30		±0.50
Tolerances of angular dimensions 角度寸法公差		
±2°		

			File No. 文件番号	3048G240-IV07E-2
			Material 材料	TAB: SUS304 NI-P H/2
			Process 处理	 : Solder plating ハンダメッキ 2~4μm (Sn 100%)
E07B-013	Mar. 12.' 07	負極端子高さ変更(0.25±0.1→0.2±0.1), 純高さ追記(1.5MAX)		Date 日付 Jan. 12.' 07
E07A-006	Jan. 12.' 07	設定		Name 名称 Capacitor drawing with tabs
History履歴	Date 日付	Reason 理由		端子付け方ハツ図面
Approved 承認	Checked 検査	Drawn 製図	Scale 尺度 10:1	Cal. No. 製品番号 XH311HG IV07E
富塚		尾形	Unit 単位 1=1mm	Draw. No. 図面番号 G24 IV07E
				
			Rev. 改訂 2	

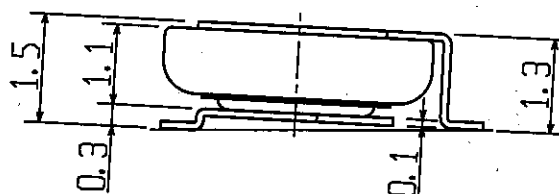
Seiko Instruments Inc.

Capacitor negative side based
 容量側負極側基準

Gap : +0.4mm
 ギャップ : +0.4mm



Gap : +0.1mm
 ギャップ : +0.1mm



				File No. 文件番号	3048G240-IV07EC2
				Material 材料	
				Process 処理	
E07B-013	Mar. 12. '07	負極端子高さ変更(0.25±0.1→0.2±0.1)			Date 日付 Jan. 12. '07
E07A-006	Jan. 12. '07	設定			Name 名称 Explanation of coplanarity
History 履歴	Date 日付	Reason 理由			平坦度説明図
Approved 承認	Checked 検査	Drawn 製図	Scale 尺度	Cal. No. 製品番号	XH311HG IV07E
富塚		尾形	Unit 単位 1=1mm	Draw. No. 図面番号	G24 IV07E C
			Rev. 改訂 2		

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Reflow Profile

< Reflow Soldering Conditions >

Reflow Soldering Profile: As per shown in Fig.-1.

The times of repeated reflow soldering must be **two times or less**.

The temperature must be measured at top of the cell.

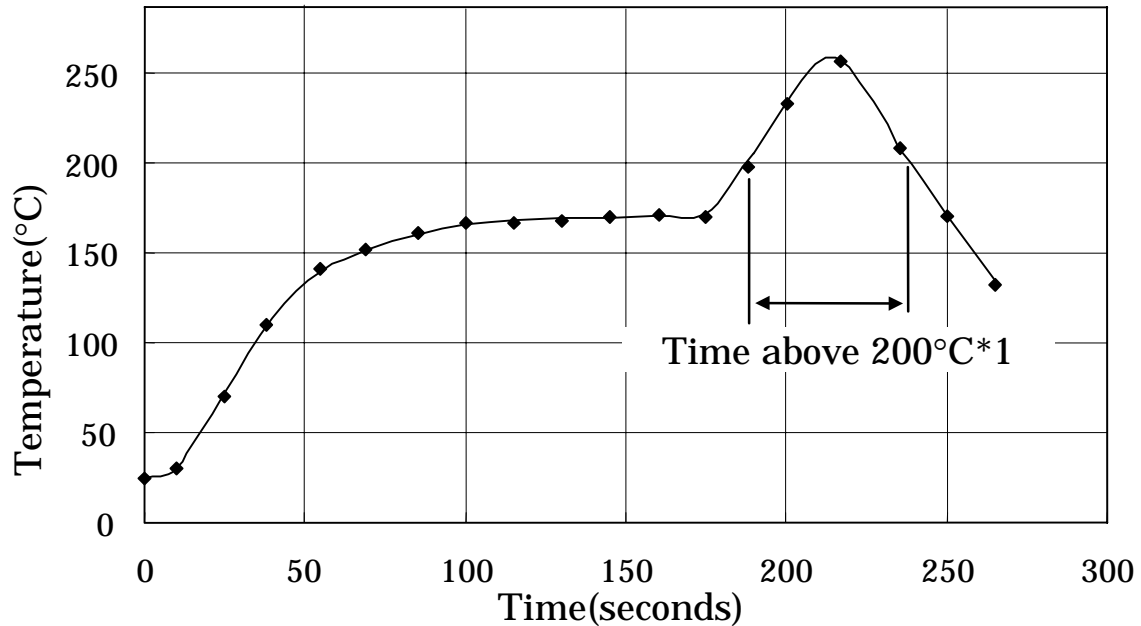


Fig.-1: Reflow soldering profile (for reference only)

*1: Time above 200°C must be max. 80seconds.

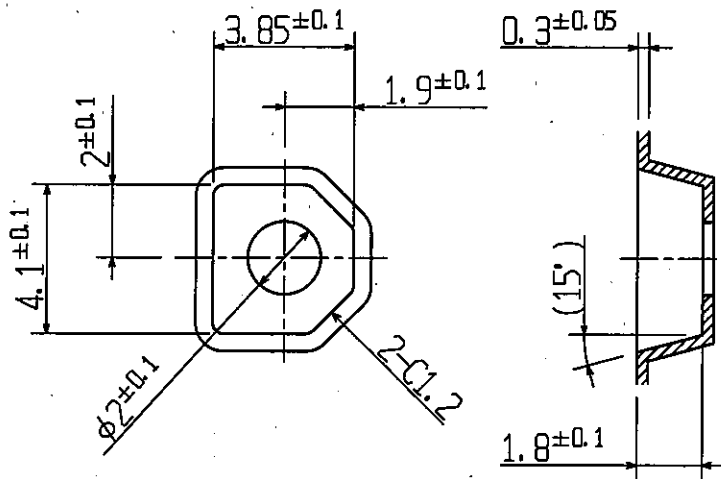
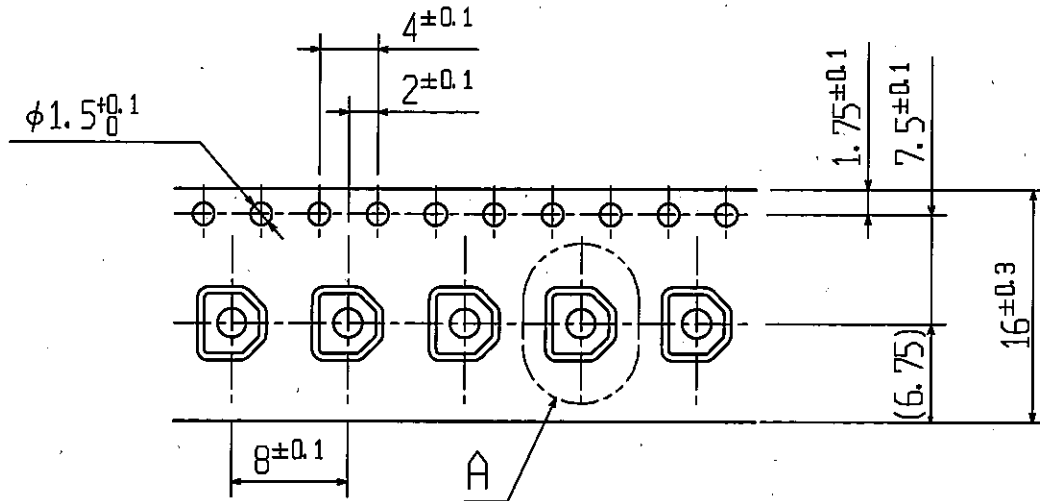
Total length of profile must be max. 300seconds.

	Model
Peak Temperature	XH311HG
Max.260°C	Applicable (within 5 seconds)

< Underfilling Conditions >

Temperature: Max.160°C, Time: Max.10 minutes.

- (Notes) 1. All fillets not specified : R max 0.3
 2. The plan dimension is the bottom of emboss pocket
 3. Accumulation tolerance of holes: $40 \pm 0.2\text{mm}$ (10 holes)
 注) 1. 指示のないコーナーは R0.3 以下のこと
 2. 平面図における寸法はエンボスポケット底での寸法である
 3. 送り丸穴累積公差は、10ピッチで $40 \pm 0.2\text{mm}$ とする。



Detail A (5:1)
 詳細 A (5:1)

Tolerances of linear dimensions 長さ寸法公差		
Dimension 寸法	Tolerance 公差	
0 - 3	±0.20	
3 - 6	±0.20	
6 - 30	±0.50	
Tolerances of angular dimensions 角度寸法公差		
±2°		

				File No. 文件番号	3177E280-00000-2
				Material 材料	Conductive polystyren 導電性ポリスチレン
				Process 処理	
Jan. 25. '07 ポケット形状変更(R1.5→C1.2)				Date 日付	Jan. 23. '07
E07A-009 Jan. 23. '07 設定				Name 名称	Drawing of emboss carrier tape エンボスキャリアテープ 図面
History 履歴	Date 日付	Reason 理由			
Approved 承認	Checked 検査	Drawn 製図	Scale 尺度	2:1	Cal. No. 製品番号
		Unit 単位	1=1mm		**311
		Rev. 改訂	2	Draw. No. 図面番号	3177 E28
尾形					

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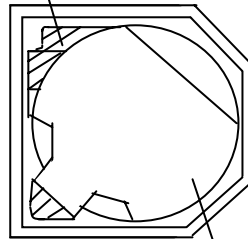
Capacitor position in emboss tape

1. Model

XH311HG IV07E

2. Capacitor position

Negative side



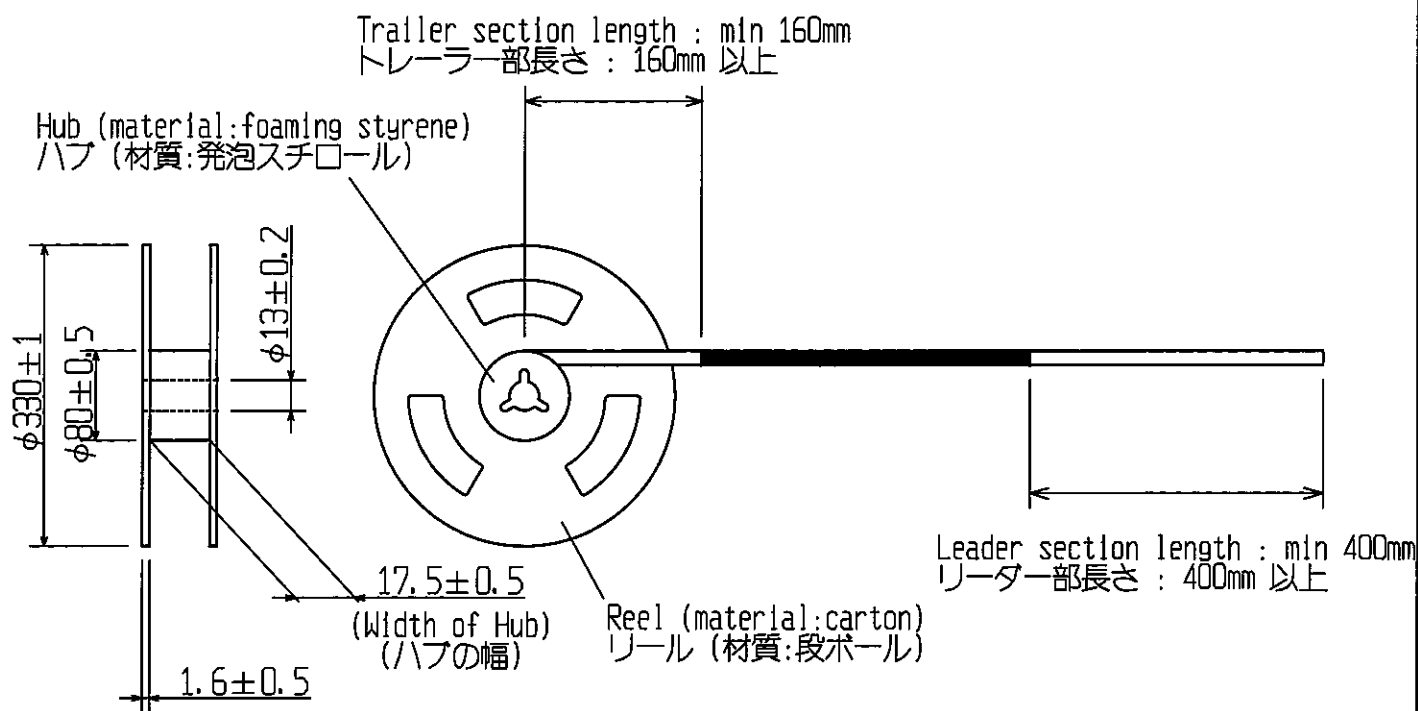
Positive side

3. Quantity / reel

MAX. 4,000 pcs / reel

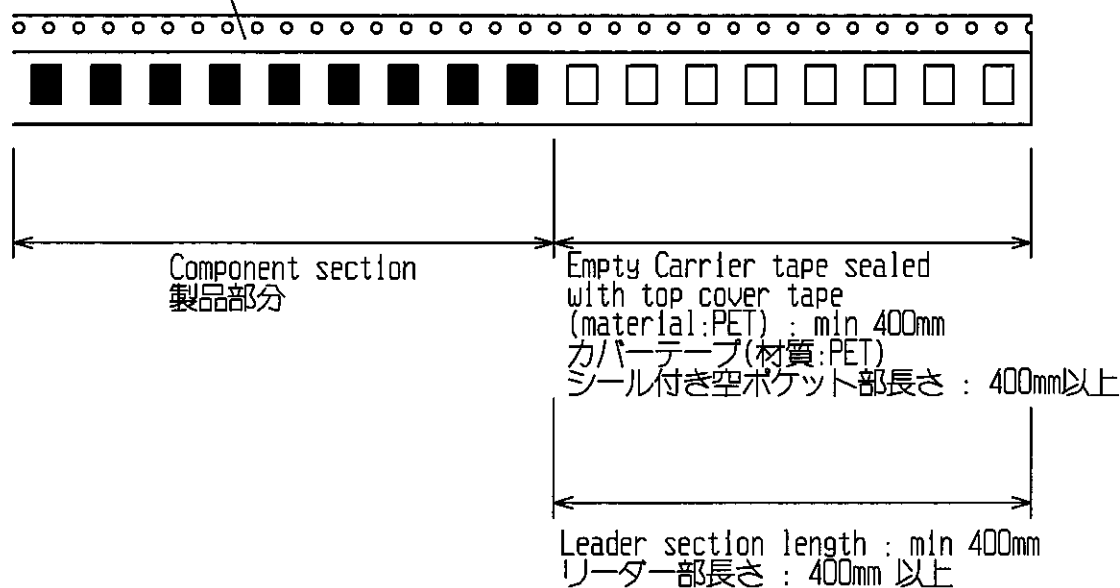
Seiko Instruments Inc.

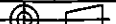
(Notes) There is no part lack in the component section.
(注) 製品部分には、部品欠落の無いこと



Carrier tape
(material: Conductive polystyrene)
キャリアテープ
(材質: 導電性ポリスチレン)

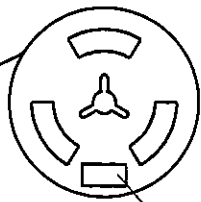
Drawing direction
引き出し方向



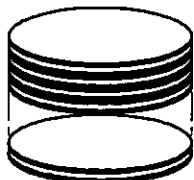
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E04B-019	07. Jun. '04	リールの寸法、公差設定			Date 日付	09. May. '03
E03A-020	19. Jul. '01	設定			Name 名称	Taping specifications テーピング仕様
History履歴	Date 日付	Reason 理由				
Approved 承認	Checked 検査	Drawn 製図	Scale 尺度		Cal. No. 製品番号	
山田	冨塚	尾形	Unit 単位	1=1mm	Drw. No. 図面番号	3177 0E16
						
			Rev. 改訂	2		

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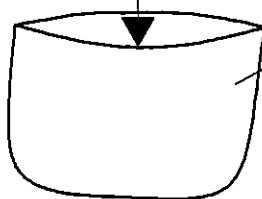
Drawing direction
引出し方向



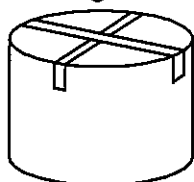
Label: Model, quantity
ラベル: 製品名, 数量



Max 15reels



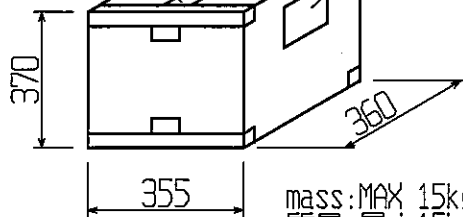
Plastic bag
ビニール袋



Large hard carton
段ボール箱



Gummed tape
ガムテープ



mass: MAX 15kg
質量: 最大15kg

カートンラベル: 行き先, 原産国, カートンNo.
! 注意表示(リチウム二次電池在中)等
Carton label: Destination, country of origin,
carton number.
! CAUTION(Lithium rechargeable
Batteries Inside)etc.

Emboss tape reel
テープリール

Max15reels in plastic bag packing
最大15巻ビニール袋梱包

Outer packing
外箱梱包

Package appearance
梱包外観

The above packaging specifications are standard.
These specifications vary with the quantity to be supplied.
上記、梱包形態は標準的なもので、納入時の数量により異なります。

E03B-025	08. Aug. '03	注意表示の内容変更			File No. ファイル番号	317750A7-00000-3	
E03B-015	07. May. '03	名称誤記訂正(国内→海外)			Date 日付	24. Apr. '03	
E03A-019	24. Apr. '03	設定			Name 名称	Package specifications(Overseas) 梱包仕様(海外向け)	
History履歴	Date 日付	Reason 理由			Cal. No. 製品番号	A7	
Approved承認	Checked検査	Drawn製図	Scale尺度	Unit単位	Drw. No. 図面番号	3177 50A7	
山田	富塚	尾形	Unit 単位	1=1mm			
			Rev. 改訂	3			

Seiko Instruments Inc.

Precautions for Your Safety

All capacitors (XC, XH, CP) contain flammable organic solvents.

For your safety, please follow following prohibitions.



WARNING!

1. Do not charge by high current or high voltage.
Doing so may generate gas inside the capacitor, resulting, swelling, catching fire, heat generation or bursting.
2. Do not reverse placement of (+) and (-)
All capacitors have polarity. If the (+) and (-) side of the capacitor is reverse inserted, it may cause a short-circuiting or over discharge of the capacitor on some equipment and it may induce overheating, explosion or fire.
3. Do not solder directly to the capacitor
If soldering is performed directly to the capacitor, the capacitor is heated up, consequently cause leakage, explosion or fire due to overheating from internal short-circuiting.
4. Keep capacitors out of children's reach.
If leaked liquid is ingested or a capacitor is swallowed, consult a physician immediately.
5. Do not heat, disassemble nor dispose of in fire
Doing so damages the insulation materials and may cause catching fire, heat generation, leakage or bursting.
6. Do not discharge by force
If the capacitor is discharged by direct connection to an external power supply etc., voltage of the capacitor will decline lower than 0 volts (electrical reversal) and will cause the capacitor case to expand, overheat, leak, explode or burn.
7. In case of leakage or a strange-smell; keep away from fire to prevent ignition of any leaked electrolyte.



CAUTION!

1. If leaked liquids gets in the eyes, wash them with clean water, and consult a physician immediately.
2. Do not use nor leave the capacitors neither in direct sunlight nor in high-temperature areas.
It may cause catching fire, heat generation, leakage or bursting.
3. Do not use new and used capacitors together.
Do not use different types of capacitors together.
4. If you connect two or more capacitors in series or parallel, please consult us in advance.
It may cause bursting or catching fire due to unbalanced load or voltage.
5. Keep capacitors away from direct sunlight, high temperature and humidity.
It may cause heat generation or performance deterioration.

For prevention quality trouble in capacitor

1. Do not conduct reflow soldering after charging the capacitor.
The deterioration of the capacitor shall be caused. In serious case, the capacitor may start swell and explode or leakage.
2. Pay attention to soldering by tips
Do not touch the capacitor by solder chips, in case of soldering another components after equipping capacitor. In basically, keep any high temperature process away from capacitor. (Except for reflow soldering and underfilling)
3. Pay attention to the operating temperature.
The ambient temperature greatly affects the lifetime of the capacitor.
By reducing the temperature by 10deg.-C, the lifetime can be approximately doubled.
4. Do not welding the tab to the capacitor.
The tab welding by inappropriate conditions will lead to damage or breakage of the capacitor. In serious case, the capacitor may start swell and leakage or catch fire and explode. If needs capacitor with tabs, please consult us.
5. Pay attention to washing and drying.
Some detergent or high temperature drying cause deteriorates of capacitor. If you need to wash capacitors, consult us.

Disposal

Disposal

Recent environmental protection concerns have increased globally and waste and recycling are regulated in the world. The current regulations differ in each country, state and local municipality. Please consult local regulations and authorities for recommended disposal of batteries. If you are in question of application or safety of our batteries, please consult your local authorities.