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# Product Specifications

Type	:	Reflowable XH Capacitor
Model	:	XH414H 1106E

**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: SII Micro Parts Ltd.**

**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	Engineering Dept. K. Tomitsuka	Initial Release for Standard Specifications	QA Sec. Y. Saito	Jul. 16, 2004
02	QA Sec. Y. Saito	Reworded 7-2	Engineering Dept. K. Tomitsuka	Nov.5,2004
03	QA Sec. Y. Saito	Had added model name in Reflow profile Ver. STDE-B-XH0414H02R1106E-0008-3	Engineering Dept. K. Tomitsuka	Dec.24,2004
04	QA Sec. Y. Saito	Changed seller's address Ver. STDE-B-XH0414H02R1106E-0010-1	QA Sec. H. Ishikawa	Oct. 14,2005

## Manufacturer information

Company name: SII Micro Parts Ltd.

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

Quality Assurance Section

## Index

Contents	page
Cover page	1
History of revision Manufacturer Information	2
Index	3
1 Application	4
2 Model	4
3 Chemical System and Structure	4
4 Nominal Specifications	4
5 Characteristics	5
6 Measuring Methods	6
7 Test Methods	9
8 Mounting Methods	10
9 Indications (Markings)	10
10 Inspection (Outgoing and Incoming)	11
11 Package Specifications	11
12 In case of quality trouble	11
13 Operation of this Specification	11
14 Notice	12

## Appendix

Leakage Criteria  
 Construction of Capacitor  
 Capacitor drawing with tabs  
 Explanation of coplanarity  
 Reflow Profile  
 Drawing of Emboss Carrier Tape  
 Capacitor position in emboss tape  
 Taping specifications  
 Package specifications  
 Precautions for Your Safety

## 1. Application

This specification applies to the coin-type Reflowable XH Capacitor, which SII Micro Parts Ltd. manufactures and 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	XH414H
4-1	Operating temperature range	-25°C to +70°C
4-2	Rated Operating Voltage	3.3V
4-3	Charging voltage	3.3V or less
4-4	Nominal Capacity	
	Discharge capacity	0.015 mAh (3.3V to 2.0V)
	Electrostatic capacity	0.07F (3.3V to 0.0V)
4-5	Internal impedance	70 ohm
4-6	Nominal dimensions	
	Diameter	4.8mm
	Height	1.4mm
4-7	Standard mass	0.06g
4-8	Recommended Storage conditions	
	Temperature	+10°C to +30°C
	Humidity	60%RH or less
4-9	The voltage at the delivery time (V)	0.3 Max.

## 5. Characteristics

No.	Characteristics	Model XH414H	Test Method s	Measuring Methods
1	Capacity (initial)		7-1	6-2-1
	24°C	0.01 mAh or more		
	-25°C	50% or more of value measured at 24°C		
	70°C	80% or more of value measured at 24°C		
2	Internal impedance (initial)		7-1	6-3
	24°C	150ohm or less		
	-25°C	1000 ohm or less		
	70°C	1000 ohm or less		
3	Over Charge (Floating) Characteristics		7-2	6-2-1 6-3
	Capacity	70% or more of initial value measured at 24°C		
	Internal impedance	1000 ohm or less		
4	High Temperature and High Humidity Storage Characteristics		7-3	6-2-1 6-3
	Capacity	70% or more of initial value measured at 24°C		
	Internal impedance	1000 ohm or less		
5	Charge / Discharge Cycle Characteristics		7-4	6-2-1 6-3
	Capacity	70% or more of initial value measured at 24°C		
	Internal impedance	1000 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		Initial  7-2 7-3 7-4	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.		
	After Test	There is no significant leakage (C1 or more), deformation, stain, stricken mark, rust and burr.		

\*1: Refer to "Leakage Criteria"

"Initial" means within one month after deliver.

## 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 5 hours.

##### 2) Discharging condition:

Discharge the capacitor by using constant current of 20uA to 2.0V. Then the capacity is calculated by the duration.

The electrical discharge by the fixed resistance of 100kohm is allowed as substitution of 20uA in a fixed current ampere. However, the calculation of capacity must be used the division mensuration.

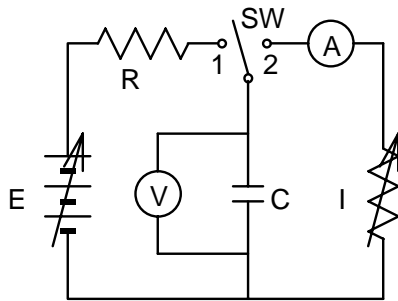
$$Capacity(C) = \sum_i \left( \frac{(V_i + V_{i+1})}{2} \times \frac{1}{Rd} \times (T_{i+1} - T_i) \right)$$

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.

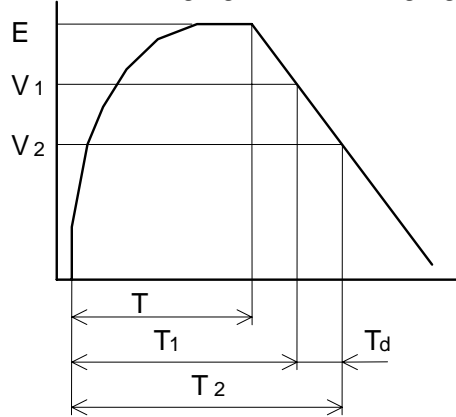
$$C \text{ (F)} = \frac{I \times (T_2 - T_1)}{V_1 - V_2}$$

<Fig. 6-2-1 : Measuring 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)
XH414H	3.30V	100ohm	30 min.	20uA	2.0V	1.5V

### 6-3. Internal Impedance

Measure by alternating method with Frequency 1kHz.

### 6-4. Charging Current (for reference)

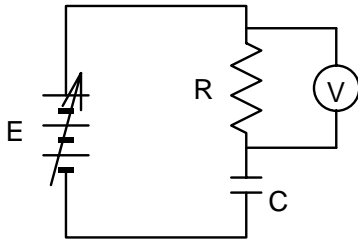
After test sample is charged in the circuit shown in Fig.6-4 by listed voltage (E) and listed protective resistance (R) for listed time in Table 6-4, measure the voltage (V) between tabs of protective resistance (R).

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)
3.30V	100ohm	30 min.

### 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 : -25+/-2°C, +24+/-2°C, +70+/-2 °C

### 7-2. Over Charge (Floating) Characteristics Test

Measure electrical characteristics and conduct appearance check after charging capacitor continuously with charging voltage of Vc and charging resistance of 100ohm at temperature 70+/-2 ° C for 500 hours.

Model	XH414H
Vc	3.3V

### 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 Vc through protective resistance (Rp) for 9 minutes.

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

Cycles : 10000 cycles

\*Rp and RI of each model are shown as below table

Model	Vc	(Rp)	(RI)
XH414H	3.3V	100ohm	100ohm

### 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.

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

## 8. Mounting Methods

### 8-1. Capacitor with tabs

#### 1) For soldering iron

Use the conditions as follows

	Model
	XH414H
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.

### 8-2. Capacitor without tabs

Use the spring terminal, which meets the specification as follows.

Surface treatment: Nickel plating or Gold plating

Contact force: 0.5N or more

Note contact failure with the terminal because the ink of the insulation thing adheres on the side of capacitor.

## 9. Indications (Markings)

### 9-1. Dies

Following items are indicated on the surface of capacitor.

(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

As lot number, the date when the product was manufactured is marked on the main body of the product and on the label of each minimum package.

The following system applies to marking of the lot number.

The lot number is composed from 2 to 4 characters, and two characters of the head means the lot number. The head means an end of the Christian era, and the next means an abbreviation of month. Two characters of the back are used by the manufacturer, and might be omitted.

Example: 11...manufactured in January 2001

2Y...manufactured in November 2002

Abbreviation of month: Jan. (1), Feb. (2),..., Sep. (9)\_

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

2Y\*\*

The position is random.

## 10. Inspection (Outgoing and Incoming)

### 10-1. Lot composition

Lot must be composed within the same manufacturing conditions.

### 10-2. Outgoing Inspection

SII Micro Parts Ltd., 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 Impedance (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 SII Micro Parts Ltd. in writing, with the defective products, for replacement request. When there was no connection 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 SII Micro Parts Ltd. 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

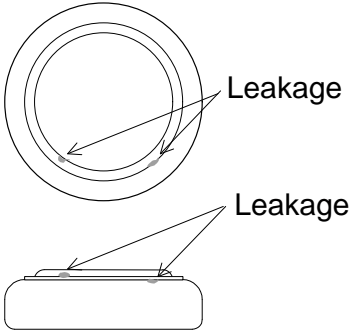
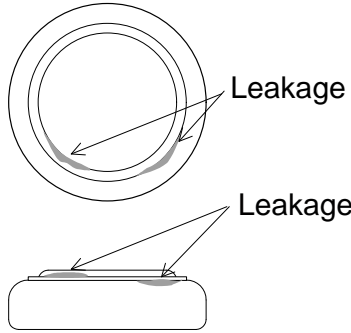
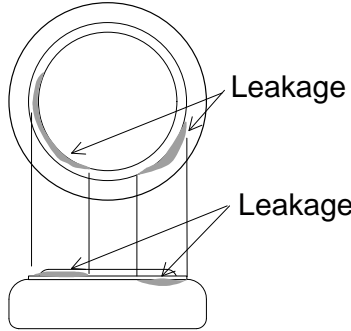
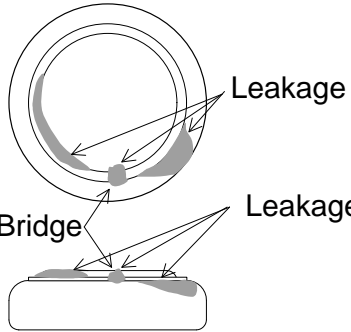
14-1. To draw out the performance of the XH414H to its maximum.

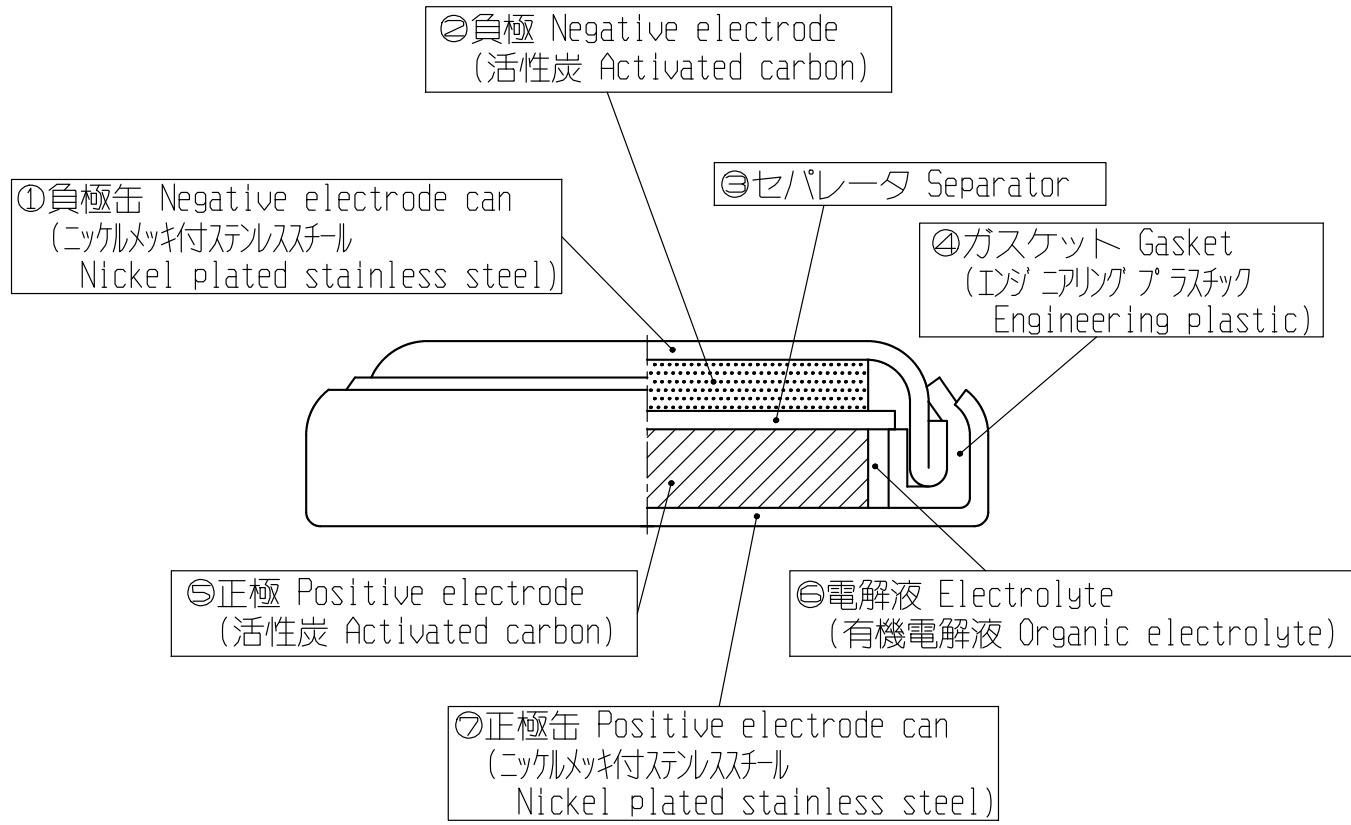
When XH414H is discharged by current 10uA or more on the circuit, in some cases, the voltage of XH414H will be going down for around 1 second or less than 1 second. In such cases, Electrolytic condensers/capacitors, which was mounted in parallel, can prevent the voltage drop of XH414H.

14-2. 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>

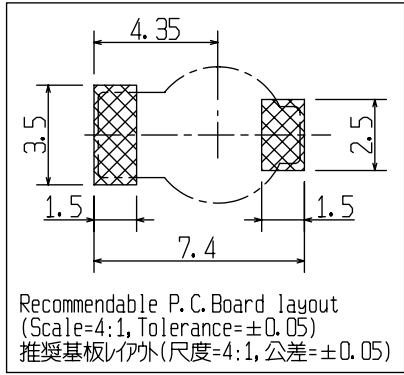
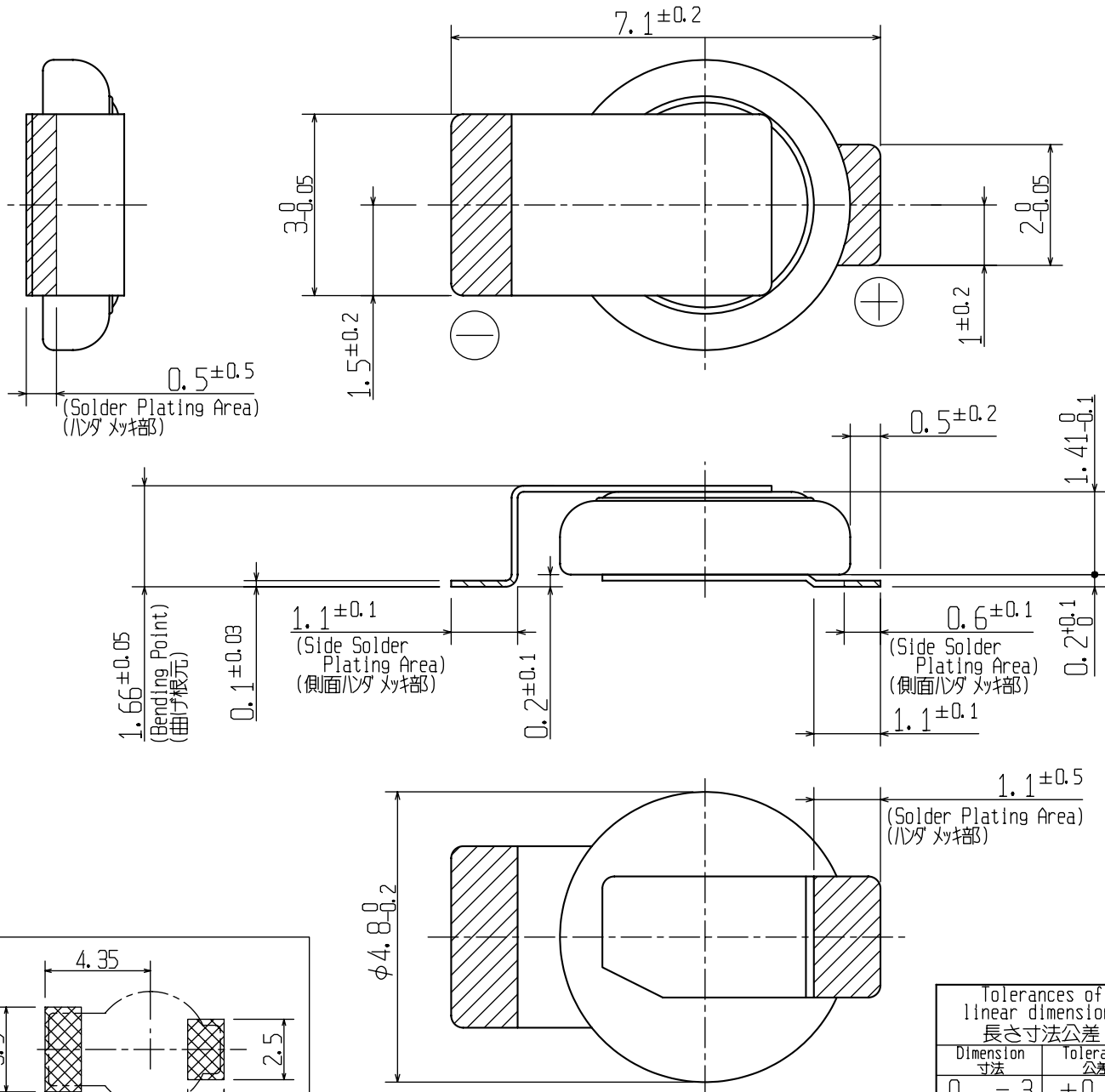


				File No.	30480000-XC000-3
				Material	
				Process	
	15. Mar. '02	名称変更、図番変更		Date	23. Oct. '01
E01A-027	20. Dec. '01	物質名見直し		Name	Construction of capacitor
	23. Oct. '01	設定			キャパシタ構成図
History	Date	Reason			
Approved	Checked	Drawn	Scale	Cal. No.	XC***, XH***
			Unit		
赤坂	富塚	尾形	1=1mm		Rev.
				Drw. No.	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. ファイル番号 30481440-II06E-2	
		Material 材料 TAB:SUS304-Ni·P H/2	
		Process 処理  :Solder plating ハンダメッキ 2~4μm (Sn 100%)	
E04B-008 Feb. 17.'04		Date 日付 19. Apr.'02	
E02A-032 19. Apr.'02		Name 名称 Capacitor drawing with tabs 端子付キャパシタ図面	
History 履歴		Reason 理由	
Approved 承認	Checked 検査	Drawn 製図	Scale 尺度 10:1
山田	冨塚	尾形	Unit 単位 1=1mm
			Cal. No. 製品番号 XH414H II06E
			Rev. 改訂 2
			Draw. No. 図面番号 144 II06E

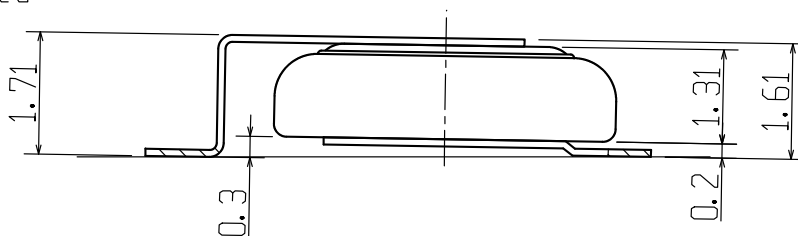
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(NOTES)1. TAB pulling strength : Over 9.8N(1.0kgf)

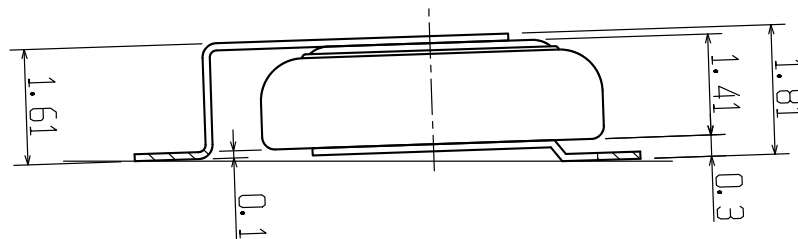
(注)1. 端子引張強度 : 9.8N(1.0kgf) 以上

Battery positive  
side based

Gap : +0.3mm



Gap : +0.1mm



Tolerances of linear dimensions	
Dimension	Tolerance
0.5 - 3	±0.20
3 - 6	±0.20
6 - 30	±0.50
Tolerances of angular dimensions	
±2°	

				File No.	30481440-II06E11	
				Material		
				Process		
				Date	26. Nov. '02	
26. Nov. '02 設定				Name	Explanation of coplanarity 平坦度説明図	
History	Date	Reason		Cal. No.	XH414H II06E	
山田	富塚	尾形	Scale	10:1 Unit 1=1mm	Rev.	1
			Unit			
				Drw. No.	144 II06E C	

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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.

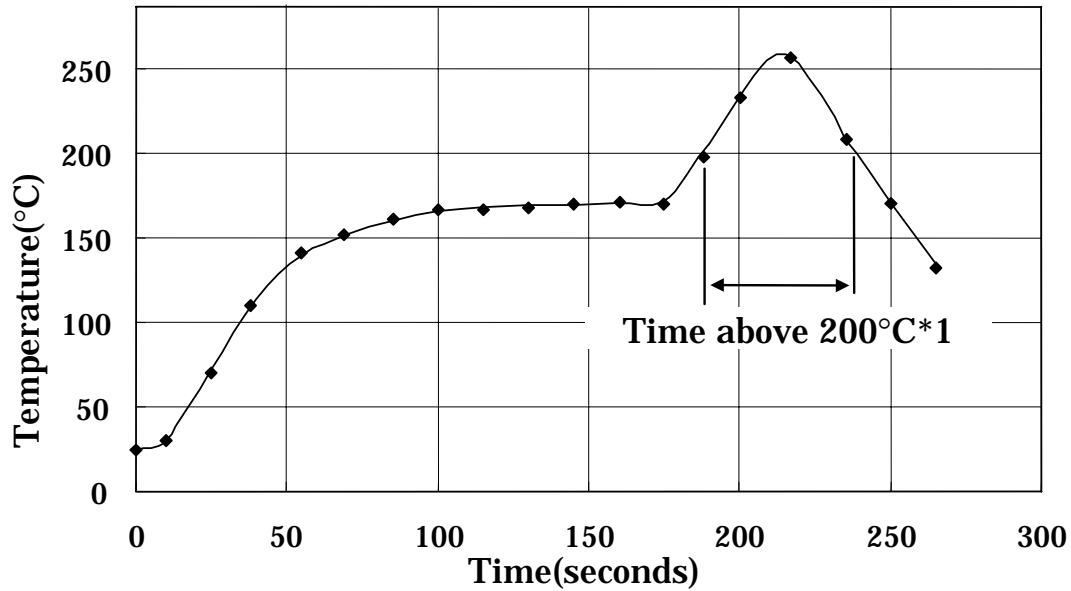


Fig.-1: Reflow soldering profile (for reference only)

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

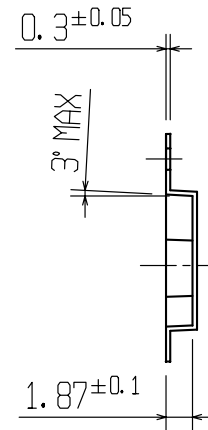
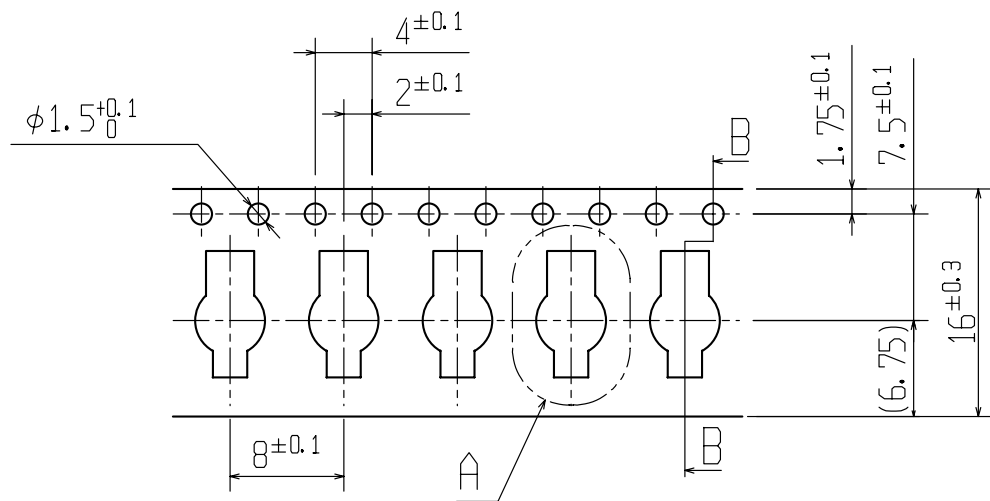
Total length of profile must be max. 300seconds.

	Model			
Peak Temperature	HB414	XH414H	TS414H	NBS414H
Max.260°C	Applicable (within 5 seconds)			

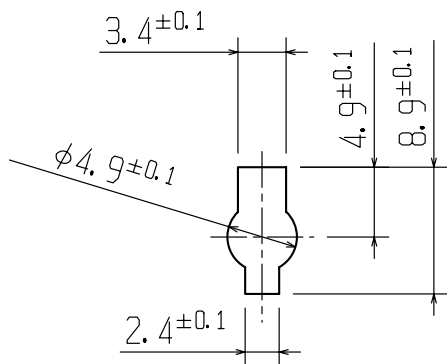
### < Underfilling Conditions >

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

- (Notes) 1. All fillets not specified : R max 0.3  
 2. The plan dimension : the bottom of emboss pocket  
 3. Accumulation tolerance of holes: 40±0.2mm(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±0.2mmとする。



Section B-B  
断面 B-B



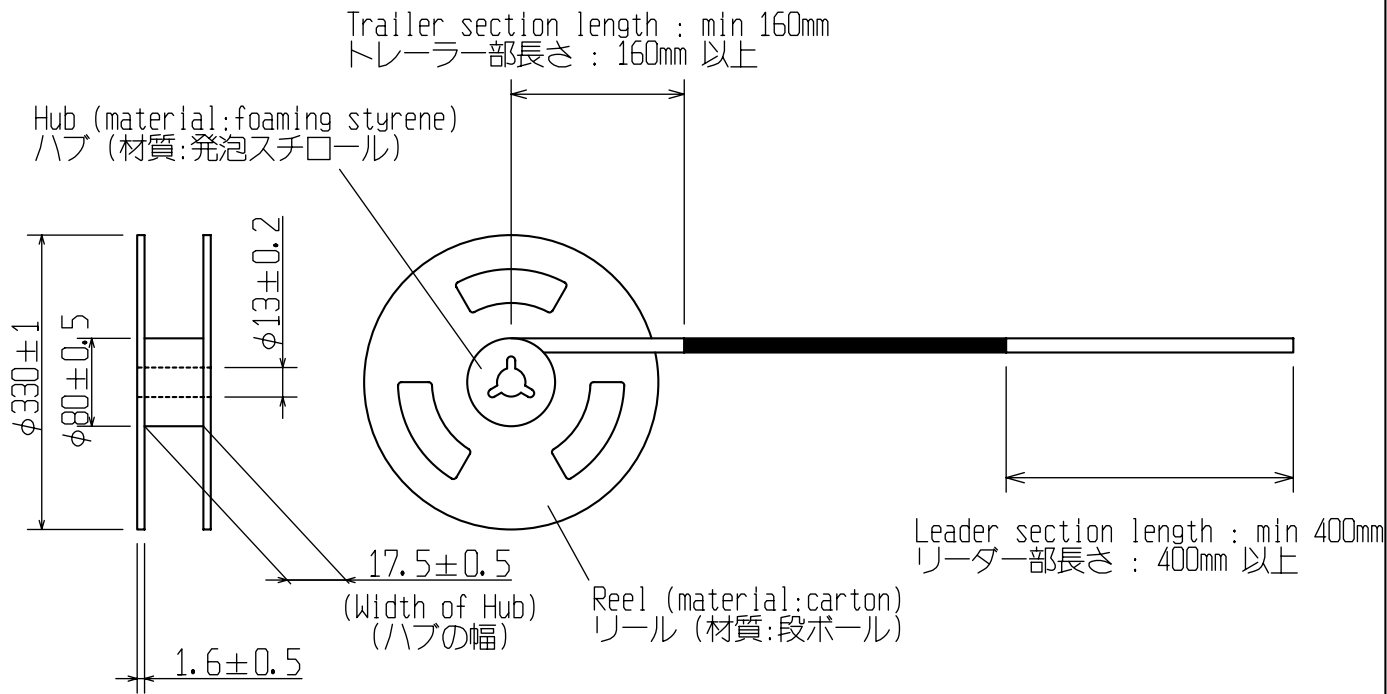
Detail A  
詳細 A

Tolerances of linear dimensions 長さ寸法公差	
Dimension 寸法	Tolerance 公差
0.5 - 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	3177E020-00000-4
			Material 材料	Conductive polystyren 導電性ポリスチレン
E02B-043	30. May. '02	函番・書式変更	Process 処理	
E02B-024	27. Mar. '02	名称変更		
	08. Feb. '01	書式変更		
			Date 日付	18. Oct. '00
E00A-018	28. Nov. '00	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
赤坂	冨塚	尾形	Unit 単位	1=1mm
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			Rev. 改訂	4
			Drw. No. 図面番号	3177 E02

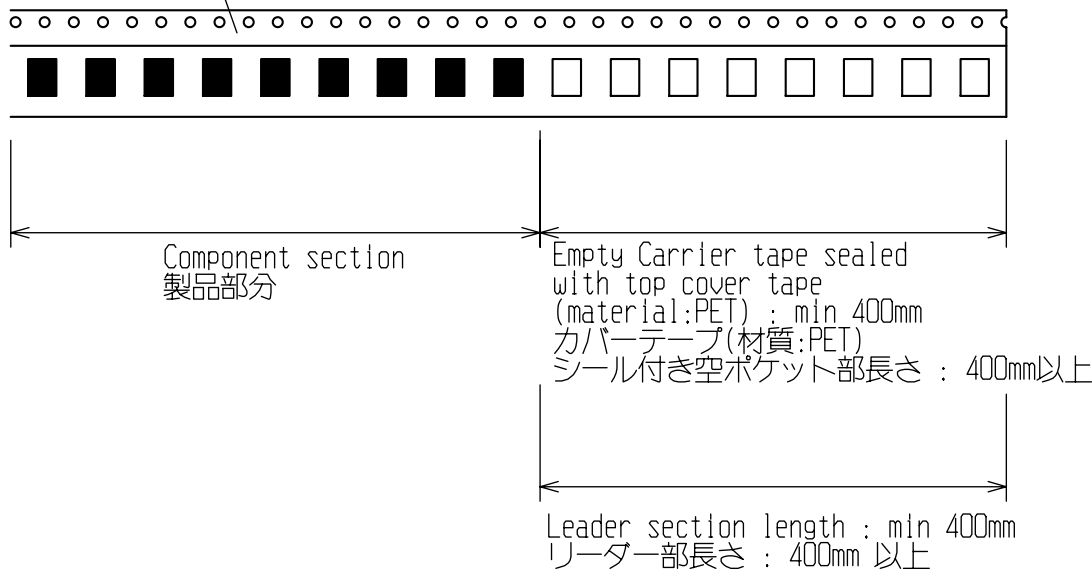
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(Notes) There is no part lack in the component section.  
 (注) 製品部分には、部品欠落の無いこと



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

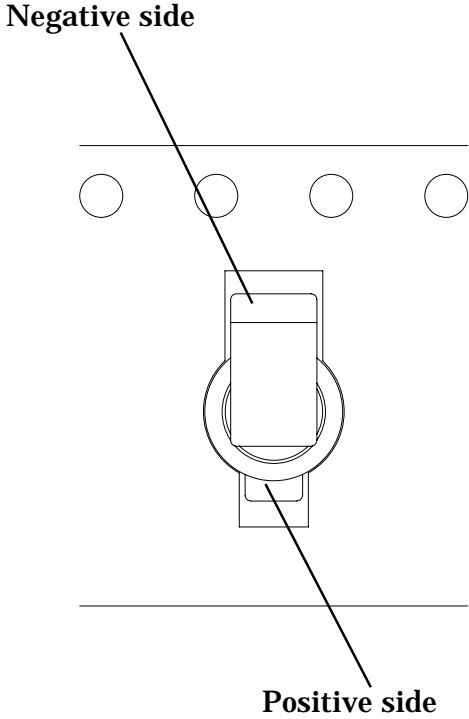
Drawing direction  
 引き出し方向



				Fail No. 失败番号	31770E16-00000-2
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
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
			Rev. 改訂	2	

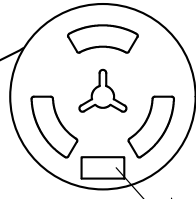
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## Capacitor position in emboss tape

<b>1. Model</b>
XH414H II06E
<b>2. Capacitor position in emboss tape</b>

<b>3. Quantity / reel</b>
MAX. 3600pcs / reel

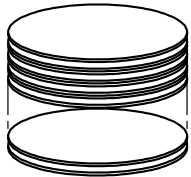
SII Micro Parts Ltd.

Drawing direction  
引出し方向



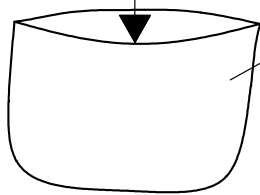
Label: Model, quantity  
ラベル: 製品名, 数量

Emboss tape reel  
テープリール

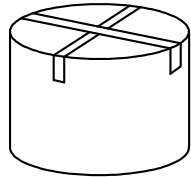


Max 15 reels

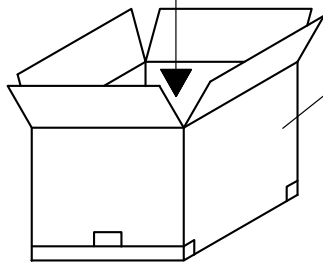
Max 15 reels in plastic bag packing  
最大15巻ビニール袋梱包



Plastic bag  
ビニール袋



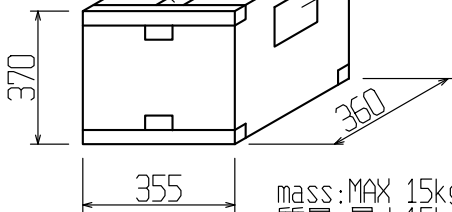
Outer packing  
外箱梱包



Large hard carton  
段ボール箱



Gummed tape  
ガムテープ



Label: Model, quantity, delivery date,  
purchase order number etc.  
ラベル: 製品名, 納入数量, 納入月日  
注番 等

Package appearance  
梱包外観

mass: MAX 15kg  
質量: 最大15kg

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。

				File No. 部品番号	317700A7-00000-1
				Date 日付	25. Jul. '02
E02A-047	25. Jul. '02	設定		Name 名称	Package specifications 梱包仕様
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	A7
赤坂	富塚	尾形	Unit 単位	1=1mm	Drw. No. 図面番号
			Rev. 改訂	1	

SII Micro Parts LTD.

# Precautions for Your Safety

**SII capacitors (XC, XH) 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 (-)  
SII 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.