

# Product Specifications

Type	:	Reflowable ML Lithium Rechargeable Battery
Model	:	ML414H IV01E

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.**  
Electronic Components Business Unit  
Micro-Energy Division  
Sales Dep.

## History of Revision

No.	Described by	Details of Change	Checked by	Issue Date
01	QA Dept R.Ito	Initial Release for Standard specifications No.STDE-B-ML0414-0AGIV01E-0014-1	QA Dep H. Ishikawa	Nov.01.2007
02	QA Dept R.Ito	The pocket form of a emboss carrier tape is changed. No. STDE-B-HB0414-0AGV01E-0014-2	QA Dep H. Ishikawa	May.07.2008

## Manufacturer information

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

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

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## 1. Application

This specification applies to the Reflowable ML Lithium Rechargeable Battery, which is manufactured and supplied by Seiko Instruments Inc. to the customer specified in the cover page of this document.

## 2. Model

Model described in cover.

## 3. Chemical System and Structure

Refer to the document "The construction of battery" attached.

## 4. Nominal Specifications

		Model
No.	Characteristics	ML414H
4-1	Range of temperature in which it can be operated	From -20°C to 60°C
4-2	Recommended range of preservation temperature and humidity	From 10°C to 30°C 60%RH or less
4-3	Nominal voltage	3V
4-4	Charging voltage	From 2.7V to 3.1V
4-5	Recommended Charging voltage	From 3.0V to 3.1V
4-6	Nominal capacity: after charging(mAh) From 3.1V to 2.0V	1.0
4-7	Standard Discharge Current (mA)	0.005
4-8	Nominal dimensions	
	Diameter (mm) Height (mm)	4.8 1.4
4-9	Standard mass (g)	0.07 (without tabs)
4-10	Applicable Safety Standard	UL1642 (Not acquired)

## 5. Characteristics

\* "Initial" means within one month after deliver.

\* Attached "Leakage Criteria" is used for the judgment of leakage.

### 5-1. Electric characteristics

No.	Characteristics	Model	Test Methods	Measuring Methods
		ML414H		
1	Open Circuit Voltage (V) at delivery		-	6-4
	Maximum	2.8		
	Minimum	2.3		
2	Open Circuit Voltage (V) after charge		-	6-2 1) 2) 6-4
	Maximum	3.1		
	Minimum	2.8		
3	Initial Capacity (mAh)		7-2	6-2
	24°C	0.8 or more		
	-20°C	0.2 or more		
	60°C	0.8 or more		
4	Initial Internal Impedance (ohm)		7-2	6-3
	24°C	1500 or less		
	-20°C	5000 or less		
	60°C	1500 or less		

### 5-2. Mechanical characteristics

No.	Characteristics	Model	Test Methods	Measuring Methods
		ML414H		
1	Tab Pulling Strength (N): With the terminal		-	6-8
	-	Refer to Battery Drawing with tabs attached		
2	External Appearance		-	6-9
	Initial	No leakage There must not be foreign body adhesion (over level S2). There is no significant deformation, stain, stricken mark, rust and burr.		
	After Tests	There is no significant leakage (over level C1), deformation, stain, stricken mark, rust and burr.		
3	Free fall	Satisfy initial capacity and internal impedance. There is no significant leakage, deformation, stain, stricken mark, rust and burr, which effect battery performance.	7-9	6-2 6-3 6-9
4	Vibration	Satisfy initial capacity and internal impedance. There is no significant leakage, deformation, stain, stricken mark, rust and burr, which effect battery performance.	7-10	6-2 6-3 6-9

## 5-3. Reliability

No.	Characteristics	Model ML414H	Test Methods	Measuring Methods
1	High Temperature Storage Characteristics		7-3	
	Capacity (mAh)	0.68 or more		6-2
3	Low Temperature Storage Characteristics		7-4	
	Capacity (mAh)	0.70 or more		6-2
3	Float Charge Characteristics		7-5	
	Capacity (mAh)	0.68 or more		6-2
	Internal Impedance (ohm)	3000 or more		6-3
4	Over Discharge Characteristics		7-6	
	Capacity (mAh)	0.68 or more		6-2
5	Charge / Discharge Cycle Characteristics (Cycles)			6-2
	10% D.O.D.	300cycle or more	7-7	
6	Leakage Resistance	Level S3 (*1) or less (There is no significant leakage which effect battery performance.)	7-8	6-9

## 5-4. Table of Parameter for Test and Measuring

No.	Characteristics	Model ML414H	Test Methods	Measuring Methods
1	Capacity		-	6-2
	Vinit (V)	2.0		
	Vc (V)	3.1		
	Rp (kohm)	3		
	Tc (hrs)	72		
	Rd (kohm)	470		
	Voff (V)	2.0		
2	Float Charge Characteristics		7-5	
	Vc (V)	3.1		
	Rp (kohm)	3		
3	Over Discharge Characteristics		7-6	
	Rs (kohm)	33		
4	Charge / Discharge Cycle		7-7	
	Vc (V)	3.1		
	Rp (kohm)	3		
	Tcs (hrs)	5		
	Rds (kohm)	100		
	Tds (hours)	4		

## 6. Measuring Methods

### 6-1. General Conditions

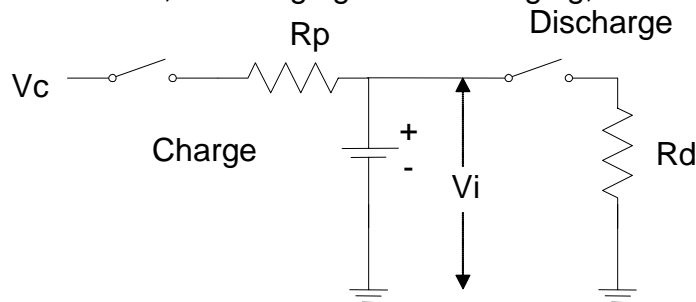
The measuring conditions are temperature of 24+/-2 °C, humidity of 65+/-20%Rh and within one month after delivering, if not specified.

### 6-2. Capacity

- 1) Charging: Apply specified voltage ( $V_c$ ) through the protective resistance ( $R_p$ ) for specified time ( $T_c$ ).
- 2) Discharging: Discharging with load resistance ( $R_d$ ) until the cell voltage reaches the cut off voltage ( $V_{off}$ ), the cell voltage ( $V_i$ ) and time ( $T_i$ ) should be measured at intervals within one hour.
- 3) Calculation: The capacity value is calculated by the expression below.

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

- 4) General Circuit: The circuit, for charging and discharging, is shown as follows.



### 6-3. Internal Impedance

Measure by alternating current method using frequency of 1KHz.

### 6-4. Voltage

Use a direct current voltage meter, which has input impedance of 10Mohm or more and accuracy of +/-0.2% or less.

### 6-5. Current

Use an ammeter with accuracy of +/-0.2% or less.

### 6-6. Resistance

Resistance, which includes resistance of all external circuits, requires accuracy of 2.0% or less.

### 6-7. Size measurement

Use the size measurement instruments with accuracy of 0.01mm or 0.001mm if necessary.

### 6-8. Terminal pull strength: The direction of the pull is vertical.

Use a digital force gauge, which has accuracy of +/-1.0% or less.

### 6-9. Appearance

- |             |  |
|-------------|--|
| After Test  | : Microscope, which has magnification of 10 times. |
| At delivery | : Naked eye  |

## 7. Test Methods

### 7-1. General conditions

If not specified, the test conditions are temperature of  $24\pm 2\text{ }^{\circ}\text{C}$ , humidity of  $65\pm 20\%$ Rh and The test should be started within one month after delivering.

### 7-2. Temperature Characteristics Test

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

Temperature:  $-20\pm 2\text{ }^{\circ}\text{C}$ ,  $+24\pm 2\text{ }^{\circ}\text{C}$ ,  $+60\pm 2\text{ }^{\circ}\text{C}$

### 7-3. High Temperature Storage

After Charging at voltage of  $V_c$  through protective resistance of  $R_p$  for  $T_c$  hours, store battery at temperature  $60\pm 2\text{ }^{\circ}\text{C}$  for 20days.

### 7-4. Low Temperature Storage

After Charging at voltage of  $V_c$  through protective resistance of  $R_p$  for  $T_c$  hours, store battery at temperature of  $-40\pm 2\text{ }^{\circ}\text{C}$  for 96 hours.

### 7-5. Float Charge Characteristics Test

Charge battery at voltage of  $V_c$  through protective resistance of  $R_p$  at temperature of  $24\pm 2\text{ }^{\circ}\text{C}$  for 30days.

### 7-6. Over Discharge Characteristics Test

Discharge the battery by discharge resistance of  $R_s$  for 30 days.

### 7-7. Charge / Discharge Cycle Characteristics Test

Charge : Apply specified voltage ( $V_c$ ) through protective resistance ( $R_p$ ) for specified period ( $T_{cs}$ ).

Discharge : With load resistance ( $R_{ds}$ ) for specified period ( $T_{ds}$ ).

The battery is repeated in the above condition. Its closed circuit voltage is 2.00V or more.

### 7-8. Leakage Resistance (Thermal Shock Test: Air to Air)

Hold battery at  $-10\pm 2\text{ }^{\circ}\text{C}$  for 1 hour then hold it at  $60\pm 2\text{ }^{\circ}\text{C}$  for 1 hour.

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

### 7-9. Free Fall Test

Drop the battery ten times in an arbitrary direction on the board of the oak of 3cm in thickness from the height of 75cm. The tabs of battery should be cut before test.

### 7-10. Vibration Test

Vibrate the battery in the direction of 3(x, y, z) for 30 minutes by 1000 cycles per minute with amplitude of 2mm. The tabs of battery should be cut before test.



## 8. Mounting Conditions

### 8-1. Battery with tabs

#### 1) For soldering iron

Use the conditions as follows

	Model
	ML414H
Temperature	260°C or less
Soldering time	Within five seconds

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

Do not solder directly to the battery.

#### 2) Dip soldering

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

#### 3) Reflow soldering

It is possible to apply.

Refer to "Reflow Profile" attached.

### 8-2. Battery 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

## 9. Indications (Markings)

### 9-1. Dies

Following items are indicated on battery.

Below items can be omitted except item (2).

(1) Model code

(2) Cathode polarity (+)

(3) Manufacturer's name or monogram

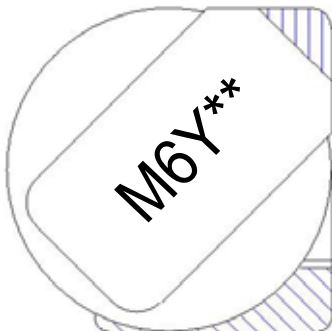
(4) Country of origin

### 9-2. Date of Manufacturing

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

(Example) M51...manufactured in January 2005  
M6Y...manufactured in November 2006  
M70...manufactured in October 2007

Abbreviation of month: Jan. (1), Feb. (2).... Sep. (9), Oct. (0), Nov. (Y), Dec. (Z)



\*\*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 by the customer request.

No	Characteristics	Inspection levels	Frequency
1	Open circuit voltage	n=6, c=0	per lot
2	Internal Impedance	n=6, c=0	per lot
3	Discharge capacity	n=6, c=0	per month
4	Leakage resistance	n=10, c=0	per lot

### 10-3. Incoming Inspection

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

If defective products are find out at 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 or the Emboss tape for wrapping, wrapping specification, and packing specification are shown in the following as our standard.

### 11-1. Wrapping

Refer to “Drawing of Emboss Carrier Tape”, “Battery position in emboss tape” and “Taping specifications”.

### 11-2. Wrapping and packing

Refer to “Package specifications (Overseas)” attached.

## 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

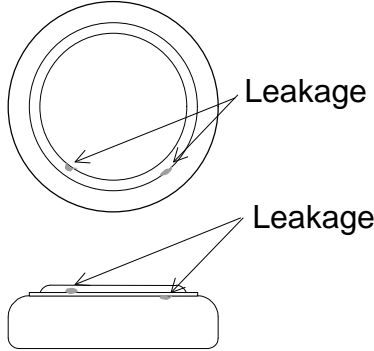
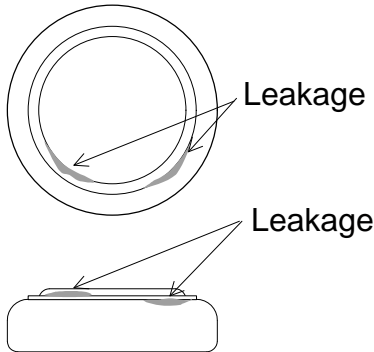
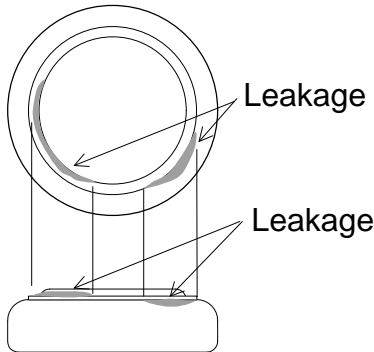
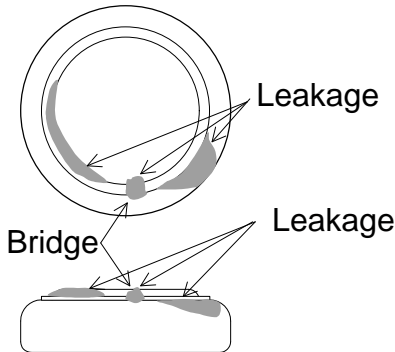
### 13-1. Agreement

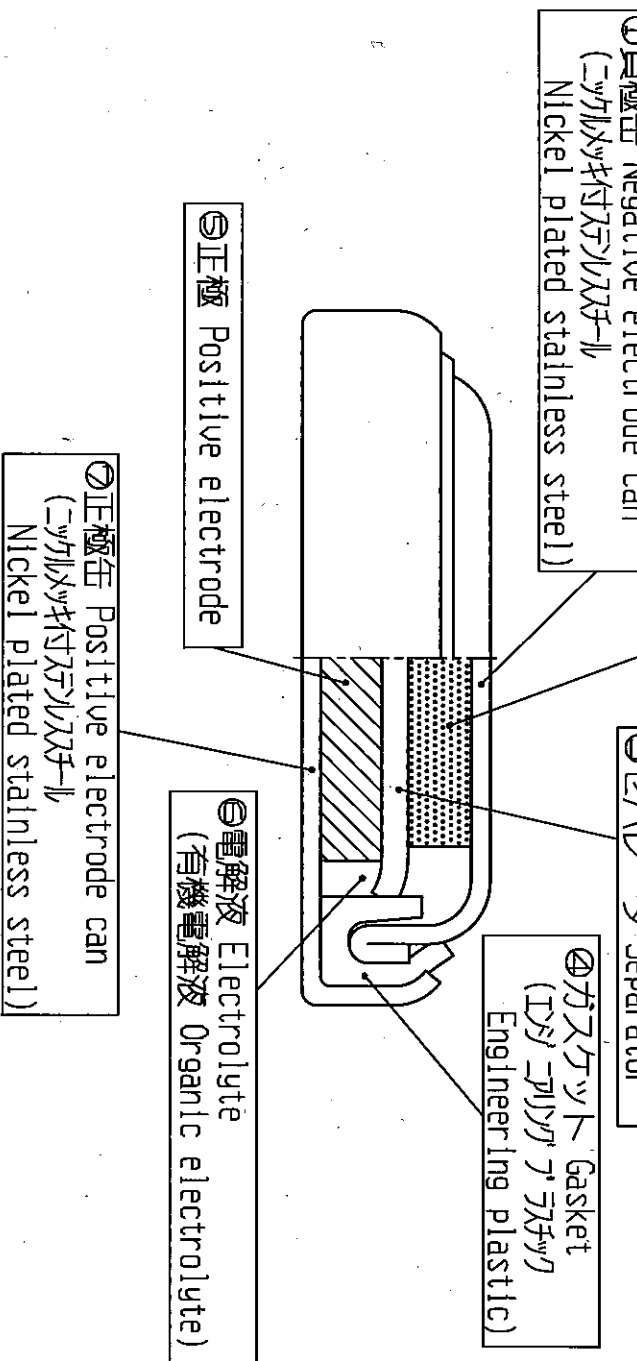
Before these specifications being revised, the agreement, of the customer, seller and manufacturer, is required.

### 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.

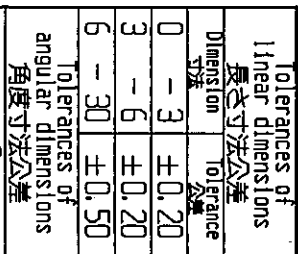
## Leakage Criteria

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>

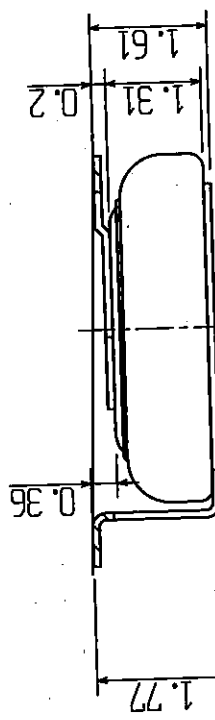


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		Material 材料			
		Process 処理			
		Date 日付		31. May. '07	
E07A-027 31. May. '07 設定		Name 名称		Construction of battery	
History 履歴		Date 日付		電池構成図	
Approved 承認		Checked 検査		Reason 理由	
		Drawn 製図		Scale 尺度	
				Unit 単位	
				1=1mm	
				Cal. No. 製品番号	
				ML***	
渡邊		金谷		内藤	
		Rev. 改訂		1	
		Drw. No. 図面番号		3046 ML000	

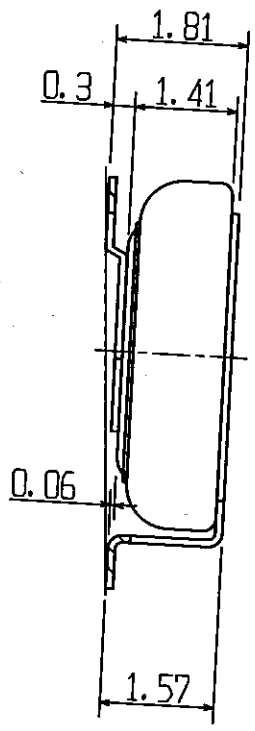
Seiko Instruments Inc.

Seiko Instruments Inc.

Gap : +0.36mm  
ギヤツ : +0.36mm



Gap : +0.06mm  
ギヤツ : +0.06mm



				File No. 文件番号	30461090-IV01EC1
				Material 材料	
				Process 处理	
				Date 日付	10. May. '07
E07A-02410. May. '07 設定				Name 名称	Explanation of coplanarity 平坦度説明図
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	
渡邊		金谷	内藤	Unit 単位	1=1mm
				Rev. 改訂	1
				Draw. No. 図面番号	109 IV01E C

## 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.

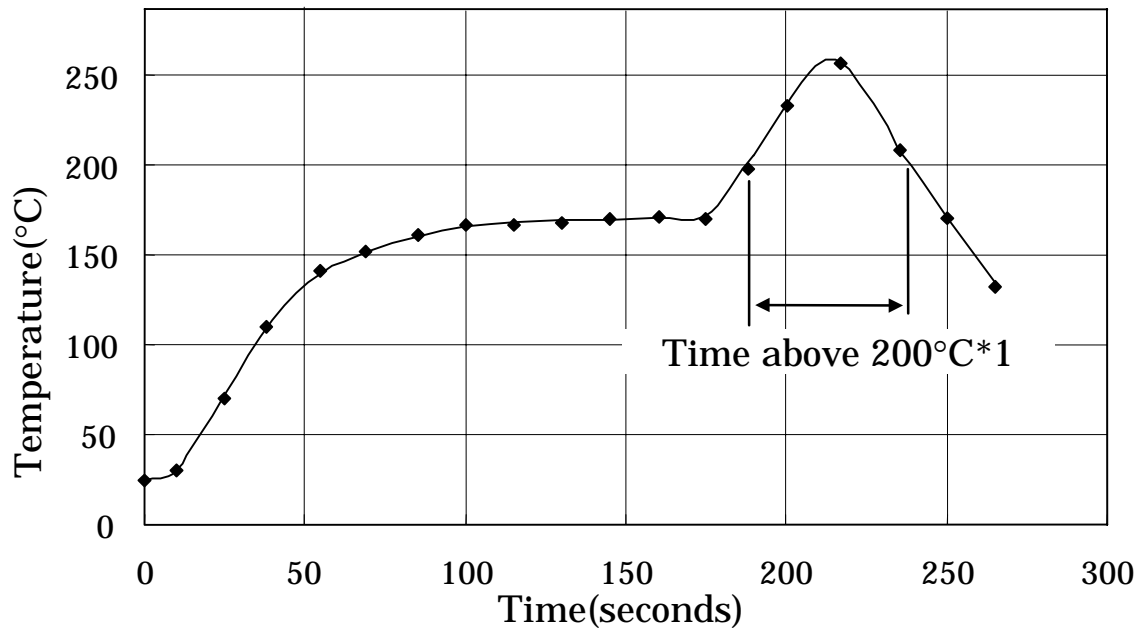


Fig.-1: Reflow soldering profile (for reference only)

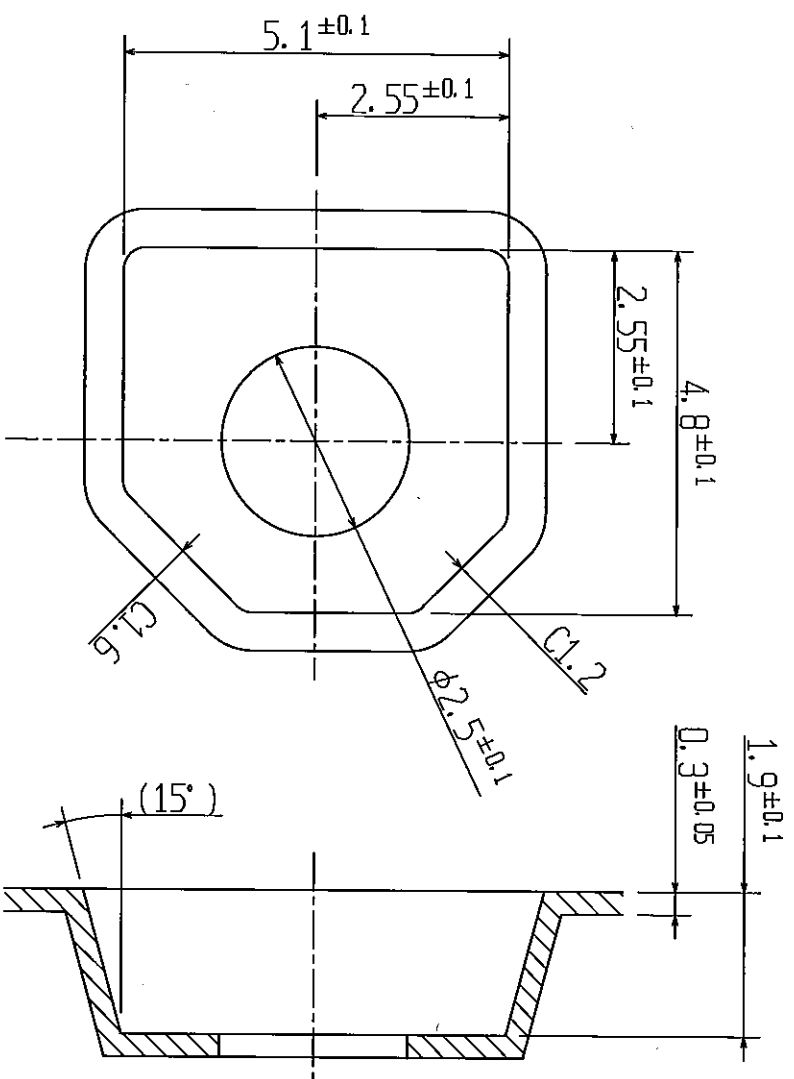
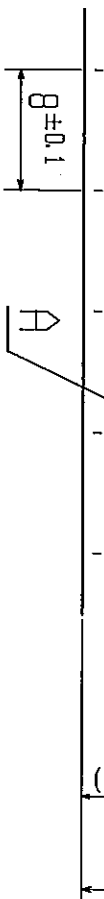
\*1: Time above 200°C must be max. 80seconds.

Total length of profile must be max. 300seconds.

	Model
Peak Temperature	ML414H
Max.260°C	Applicable (within 5 seconds)

### < Underfilling Conditions >

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



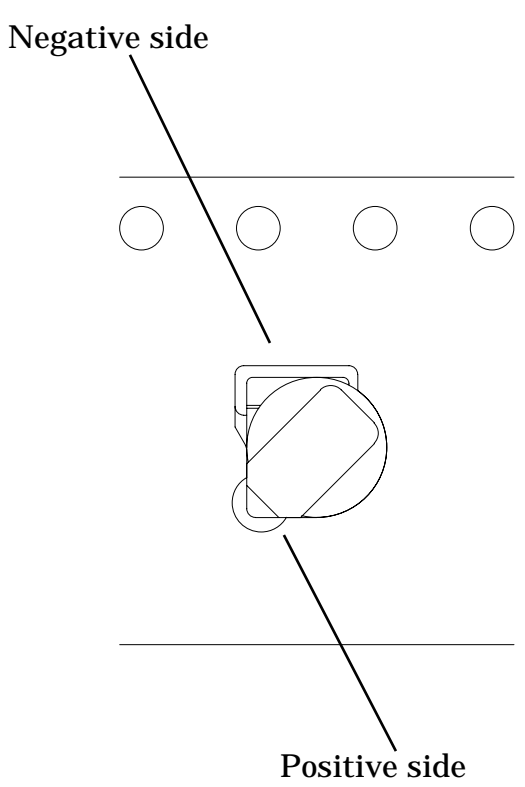
Detail A (10:1)  
詳細 A (10:1)

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°	

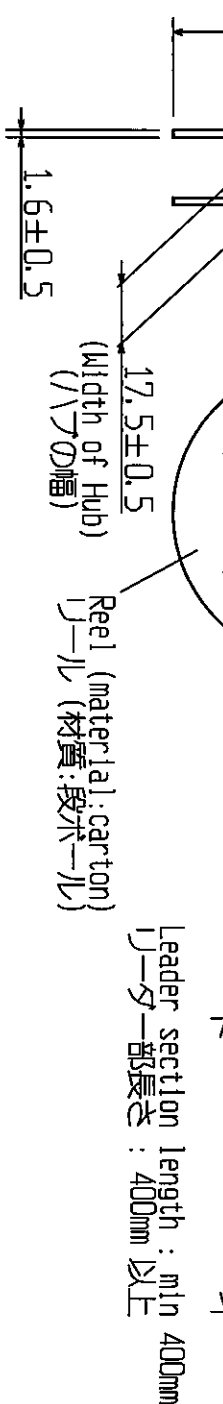
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Process 処理		16,700 P/R	
Date 日付		Apr. 01, 2007	
Name 名称		Drawing of emboss carrier tape 凹凸キャリアテープ図面	
Cal. No. 製品番号		** 414	
Rev. 改訂		3177 N31	
Scale 尺度		2:1	
Unit 単位		1=1mm	
Reason 理由			
Date 日付		Apr. 02, 2007	
Checked 検査		設定	
Drawn 製図			
Rev. 改訂		1	



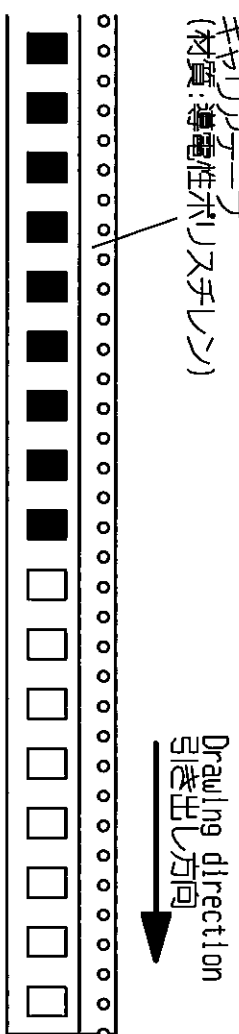
# Battery position in emboss tape

1. Model
ML414H IV01E
2. Capacitor position in emboss tape
 <p>Negative side</p> <p>Positive side</p>
3. Quantity / reel
MAX. 4000 pcs / reel

Seiko Instruments Inc.



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

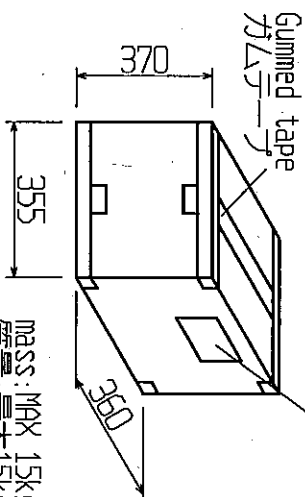
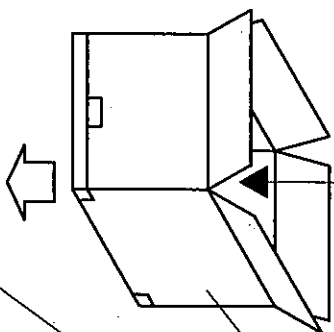
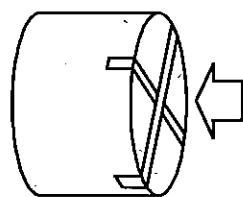


Empty Carrier tape sealed  
with top cover tape  
(material: PET) : min 400mm  
キャリアテープ (材質: PET)  
シール付き型ホック部長さ : 400mm以上

Leader section length : min 400mm  
リーダー部長さ : 400mm 以上

EO4B-019 07. Jun. '04 リールの寸法、公差設定		Fall No. 774 番号 31770E16-00000-2	
EO3A-020 19. Jul. '01 設定		Date 日付 09. May. '03	
History履歴		Reason 理由	
Approved 承認	Checked 検査	Drawn 製図	Cal. No. 製品番号
Date 日付		Scale 尺度	製品番号
		Unit 単位	1=1mm
		Rev. 改訂	2
山田	富塚	尾形	Drw. No. 図面番号
			3177 0E16

Seiko Instruments Inc.



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。

\* CAUTION(Lithium rechargeable Batteries inside)etc.  
\* 空・海上輸送時のみ  
\* Fit the aircraft and the ship transportation

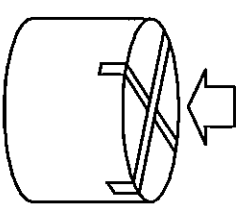
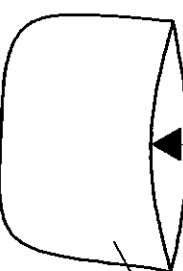
Package appearance  
梱包外観

Outer packing  
外箱梱包

EO3B-025	18. Aug. '03	注意表示の内容変更	File No. 774番号	3177D0A7-00000-2
EO3A-019	24. Apr. '03	設定	Date 日付	24. Apr. '03
History履歴	Date 日付	Reason 理由	Name 名称	Package specifications(Domestic)
Approved 承認	Checked 検査	Drawn 製図	Scale 尺度	Cal. No. 製品番号
			Unit 単位	1=1mm
山田	冨塚	尾形	Rev. 改訂	2
			Drw. No. 図面番号	3177 D0A7

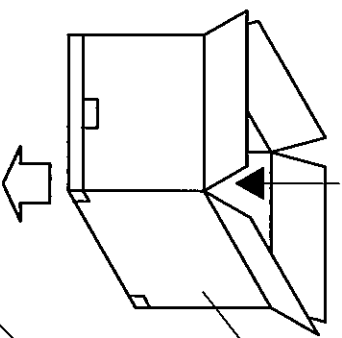
Seiko Instruments Inc.

Plastic bag  
ビニール袋

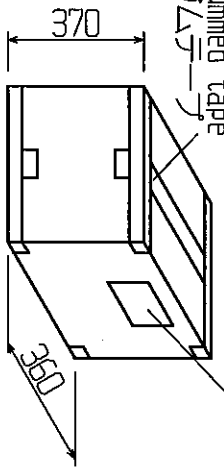


Large hard carton  
段ボール箱

Outer packing  
外箱梱包



Gummed tape  
カシメテープ



Package appearance  
梱包外観

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.

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。

EO3B-025	08. Aug. '03	注意表示の内容変更	File No. 7744番号	317750A7-000000-3
EO3B-015	07. May. '03	名称誤記訂正 (国内→海外)	Date 日付	24. Apr. '03
EO3A-019	24. Apr. '03	設定	Name 名称	Package specifications (Overseas)
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
			Unit 単位	1=1mm
			Rev. 改訂	3
山田	富塚	尾形	Drw. No. 図面番号	3177 50A7

Seiko Instruments Inc.

# Precautions for Your Safety

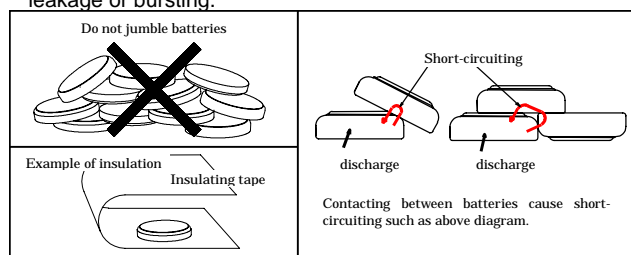
**SII Lithium rechargeable batteries (ML, MS, HB, TS) contain flammable organic solvents. For your safety, please follow following prohibitions.**



## **WARNING!**

1. Do not charge by high current or high voltage.  
Doing so may generate gas inside the battery, resulting swelling, catching fire, and heat generation or bursting.
2. 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.
3. Do not solder directly to the battery  
If soldering is performed directly to the battery, the battery is heated up, consequently cause leakage, explosion or fire due to overheating from internal short-circuiting.
4. Do not short.  
If the (+) and (-) come into contact with metal materials, short-circuiting occurs. As a result, catching fire, heat generation, leakage or bursting.
5. Keep batteries out of children's reach.  
If leaked liquid is ingested or a battery is swallowed, consult a physician immediately.
6. Do not reverse placement of (+) and (-)  
If the (+) and (-) side of the battery is reverse inserted, it may cause a short-circuiting or over discharge of the battery on some equipment and it may induce overheating, explosion or fire.

7. Do not discharge by force  
If the battery is discharged by direct connection to an external power supply etc., voltage of the battery will decline lower than 0 volts (electrical reversal) and will cause the battery case to expand, overheat, leak, explode or burn.
8. In case of leakage or a strange-smell; keep away from fire to prevent ignition of any leaked electrolyte.
9. In case of disposal, insulate between (+) and (-) of battery by an insulating  
Jumbling batteries or with other metal materials cause short-circuiting. As a result, catching fire, heat generation, leakage or bursting.



## **CAUTION!**

1. If leaked liquids gets in the eyes, wash them with clean water and consult a physician immediately.
2. Do not use new and used batteries together. Do not use different types of batteries together.  
It may cause catching fire, heat generation, leakage or bursting.
3. If you connect two or more batteries in series or parallel, please consult us in advance.  
It may cause bursting or catching fire due to unbalanced load or voltage.
4. Do not use nor leave the batteries in direct sunlight nor in high-temperature areas.  
It may cause catching fire, heat generation, leakage or bursting.
5. Do not apply strong pressure to the batteries nor handle roughly.  
It may cause catching fire, heat generation, leakage or bursting.
6. Avoid contact with water.  
It may cause heat generation.
7. Keep batteries away from direct sunlight, high temperature and humidity.  
It may cause heat generation.

## For prevention the performance of battery

1. Pay attention to mat or sheet for ESD  
Battery with tabs or battery on PCB may short circuit on the mat for ESD. As a result the voltage of cell drops down.
2. Pay attention to soldering by tips  
Do not touch the battery by solder chips, in case of soldering another components after equipping battery.  
In basically, keep any high temperature process away from battery.
3. Pay attention to material of jig for pick and place  
Use nonconductive material of jig for pick and place of batteries, for short-circuit protect. If short circuit of battery is occurred, the voltage of battery drops down quickly but raise gradually.
4. Pay attention to washing and drying  
Some detergent or high temperature drying cause deteriorates of battery. If wash batteries, consult us.

## International Transportation and Disposal

### International Air / Marine / Ground Transportation

Regarding the transport of Lithium battery and Lithium-ion battery, organizations like IATA, ICAO, IMO, DOT have determined transport regulations, based on the United Nations Regulations. The SII Lithium rechargeable batteries can be transported being not subject to the provisions of dangerous goods, if they meet the following requirements.

- (a) **<Lithium content>**The Lithium content is not more than 1g.
- (b) **<Safety Certification>**Each battery is of a type proved to meet the requirements of each test in the UN Manual of Tests and Criteria, Part 3, sub-section 38.3.
- (c) **<Strong packaging>**Batteries are separated so as to prevent short circuits and are packed in strong packaging.
- (d) **<Caution Label>**Each package must be marked indicating that it contains lithium batteries and that special procedures should be followed in the event that the package is damaged.
- (e) **<Not Restricted Declaration>**Each shipment must be accompanied with a document indicating that the packages contain lithium batteries and that special procedures should be

followed in the event that a package is damaged.

(f) **<Package Drop Test>**Each packages is capable of withstanding a 1.2 m drop test in any orientation without damage to batteries contained.

(g) **<Weight Limit>**Except in the case of packed with equipment, packages may not exceed 30 kg gross mass.

(h) **<Transport to U.S.A>**When you transport to U.S.A., emergency contact information must be indicated on the required documents.

**For further information, please consult with us.**

### 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.