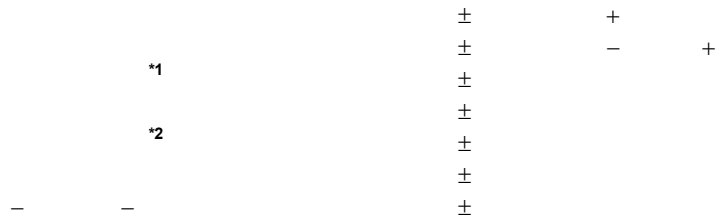


**■ Features**

- 



- 

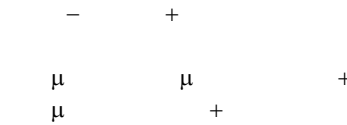
- 

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- 

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- 



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\*1.

-

\*2.

+

**■ Applications**

- 

- 

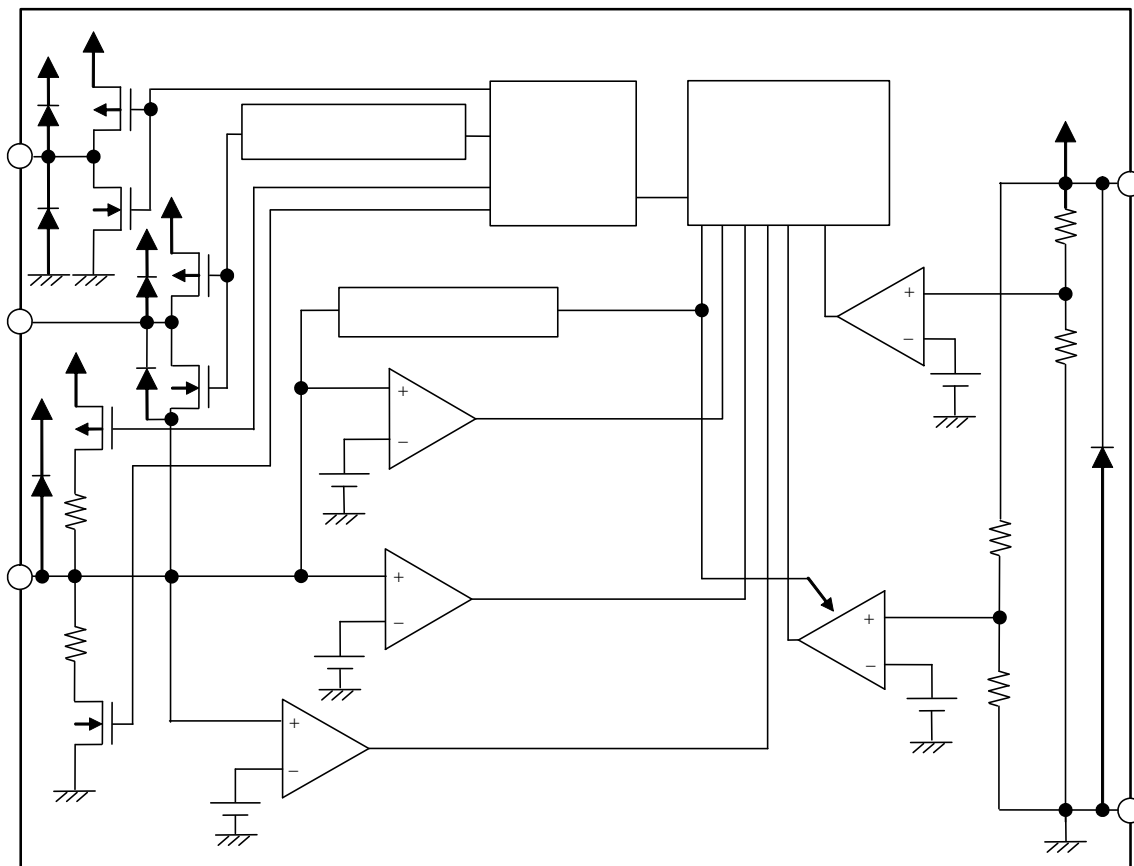
**■ Packages**

- 

-

# BATTERY PROTECTION IC FOR 1-CELL PACK S-8200A Series

## ■ Block Diagram

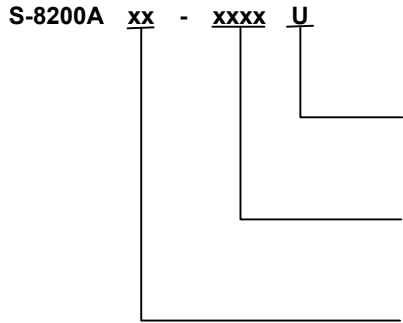


Remark

Figure 1

**■ Product Name Structure**

**1. Product name**



\*1

\*2

\*1.

\*2.

**3. Product name list**

**2. Packages**

**Table 1 Package Drawing Codes**

				-



**BATTERY PROTECTION IC FOR 1-CELL PACK**  
**S-8200A Series**

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Table 4

				$\mu$	
				$\mu$	
				$\mu$	
				$\mu$	
				$\mu$	
				$\mu$	

Remark

Table 5

Table 5

				*1	
			*1		
			*1		
		$\mu$ *1	$\mu$		
			*1		

\*1.

# BATTERY PROTECTION IC FOR 1-CELL PACK

## S-8200A Series

### ■ Pin Configurations

#### 1. SOT-23-6

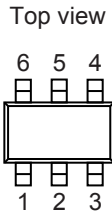


Figure 2

Table 6

	*1	

\*1.

#### 2. SNT-6A

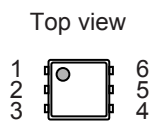


Figure 3

Table 7

	*1	

\*1.

**BATTERY PROTECTION IC FOR 1-CELL PACK**  
**S-8200A Series**

---

---

■ **Absolute Maximum Ratings**

Table 8

			+		
			-	+	
			-	+	
			-	+	
			-	+	

**BATTERY PROTECTION IC FOR 1-CELL PACK**  
**S-8200A Series**

■ **Electrical Characteristics**

1. Ta = +25°C

Table 9

+									
<b>Detection Voltage</b>									
		-	-	-		+			
		-	+ *1	-		+			
		≠		-		+			
				-		+			
			-	-		+			
		≠		-		+			
				-		+			
			-	-		+			
			-	-		+			
			-	-		+			
<b>0 V Battery Charge Function</b>									
<b>Internal Resistance</b>									
								Ω	
								Ω	
<b>Input Voltage</b>									
			-		-				-
			-		-				-
<b>Input Current (With Power-down Function)</b>									
								μ	
				-	-			μ	
<b>Input Current (Without Power-down Function)</b>									
								μ	
				-	-			μ	
<b>Output Resistance</b>									
								Ω	
								Ω	
								Ω	
								Ω	
<b>Delay Time</b>									



**BATTERY PROTECTION IC FOR 1-CELL PACK**  
**S-8200A Series**

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2.  $T_a = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ <sup>\*1</sup>

Table 10

- + \*1

--	--	--	--	--	--	--	--	--	--

Detection Voltage



8. Resistance between VM pin and VDD pin  
(Test circuit 3)
  
9. Resistance between VM pin and VSS pin  
(Test circuit 3)
  
10. CO pin resistance "H"  
(Test circuit 4)
  
11. CO pin resistance "L"  
(Test circuit 4)
  
12. DO pin resistance "H"  
(Test circuit 4)
  
13. DO pin resistance "L"  
(Test circuit 4)
  
14. Overcharge detection delay time  
(Test circuit 5)
  
15. Overdischarge detection delay time  
(Test circuit 5)
  
16. Discharge overcurrent detection delay time  
(Test circuit 5)

## **BATTERY PROTECTION IC FOR 1-CELL PACK**

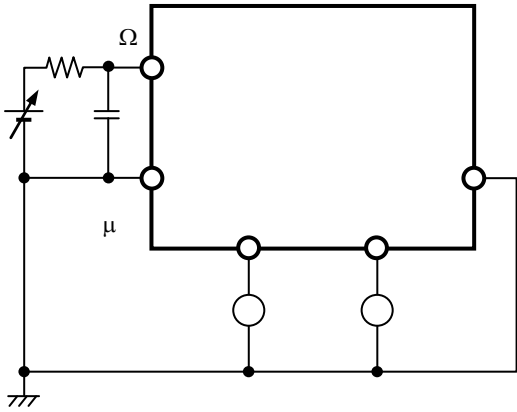
### **S-8200A Series**

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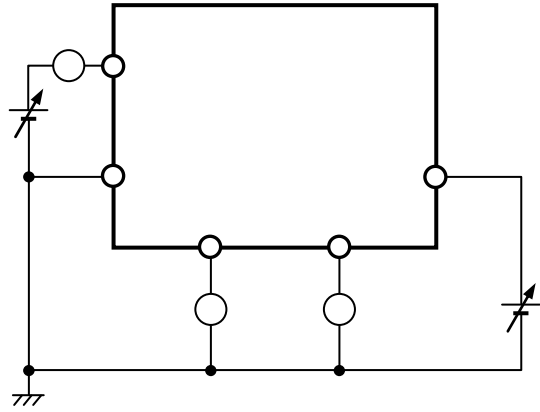
---

- 17. Load short-circuiting detection delay time**  
(Test circuit 5)
  
- 18. Charge overcurrent detection delay time**  
(Test circuit 5)
  
- 19. 0 V battery charge starting charger voltage (0 V battery charge function "available")**  
(Test circuit 2)
  
- 20. 0 V battery charge inhibition battery voltage (0 V battery charge function "unavailable")**  
(Test circuit 2)

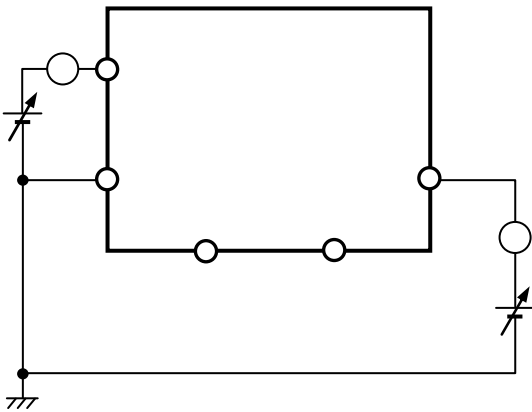
**BATTERY PROTECTION IC FOR 1-CELL PACK**  
**S-8200A Series**



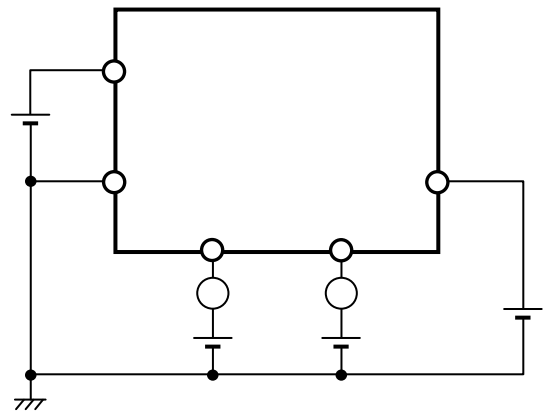
**Figure 5 Test Circuit 1**



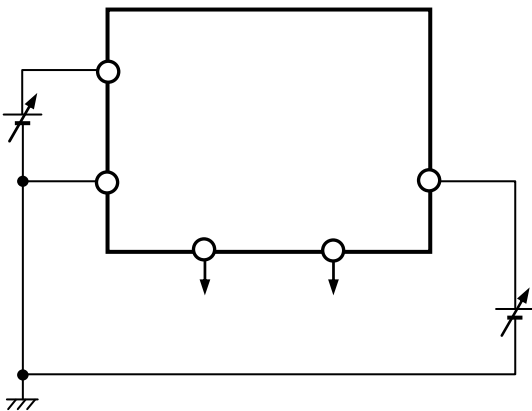
**Figure 6 Test Circuit 2**



**Figure 7 Test Circuit 3**



**Figure 8 Test Circuit 4**



**Figure 9 Test Circuit 5**

# BATTERY PROTECTION IC FOR 1-CELL PACK

## S-8200A Series

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### ■ Operation

Remark            ■ Battery Protection IC Connection Example

#### 1. Normal status

**Caution** When the battery is connected for the first time, the S-8200A Series may not be in the normal status. In this case, short the VM pin and VSS pin, or set the VM pin voltage at the level of  $V_{C1OV}$  or more and at the level of  $V_{D1OV}$  or less by connecting the charger. The S-8200A Series then becomes the normal status.

#### 2. Overcharge status

2. 1  $V_{CL} \neq V_{CU}$  (Product in which overcharge release voltage differs from overcharge detection voltage)

(

**Caution** If the battery is charged to a voltage higher than  $V_{CU}$  and the battery voltage does not fall below  $V_{CU}$  even when a heavy load is connected, discharge overcurrent detection and load short-circuiting detection do not function until the battery voltage falls below  $V_{CU}$ . Since an actual battery has an internal impedance of tens of  $m\Omega$ , the battery voltage drops immediately after a heavy load that causes overcurrent is connected, and discharge overcurrent detection and load short-circuiting detection function.

**2. 2  $V_{CL}$   $V_{CU}$  (Product in which overcharge release voltage is the same as overcharge detection voltage)**

- Caution**
- 1. If the battery is charged to a voltage higher than  $V_{CU}$  and the battery voltage does not fall below  $V_{CU}$  even when a heavy load is connected, discharge overcurrent detection and load short-circuiting detection do not function until the battery voltage falls below  $V_{CU}$ . Since an actual battery has an internal impedance of tens of  $m\Omega$ , the battery voltage drops immediately after a heavy load that causes overcurrent is connected, and discharge overcurrent detection and load short-circuiting detection function.**
  - 2. When a charger is connected after overcharge detection, the overcharge status is not released even if the battery voltage is below  $V_{CL}$ . The overcharge status is released when the VM pin voltage goes over  $V_{CIOV}$  by removing the charger.**

**3. Overdischarge status**

**3. 1 With power-down function**

# BATTERY PROTECTION IC FOR 1-CELL PACK

## S-8200A Series

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4. Discharge overcurrent status (discharge overcurrent, load short-circuiting)

5. Charge overcurrent status

6. 0 V battery charge function "available"

+                      -

- Caution**
1. Some battery providers do not recommend charging for a completely self-discharged battery. Please ask the battery provider to determine whether to enable or inhibit the 0 V battery charge function.
  2. The 0 V battery charge function has higher priority than the charge overcurrent detection function. Consequently, a product in which use of the 0 V battery charge function is enabled charges a battery forcibly and the charge overcurrent cannot be detected when the battery voltage is lower than  $V_{DL}$ .

7. 0 V battery charge function "unavailable"

-

- Caution** Some battery providers do not recommend charging for a completely self-discharged battery. Please ask the battery provider to determine whether to enable or inhibit the 0 V battery charge function.



8. Delay circuit

Remark

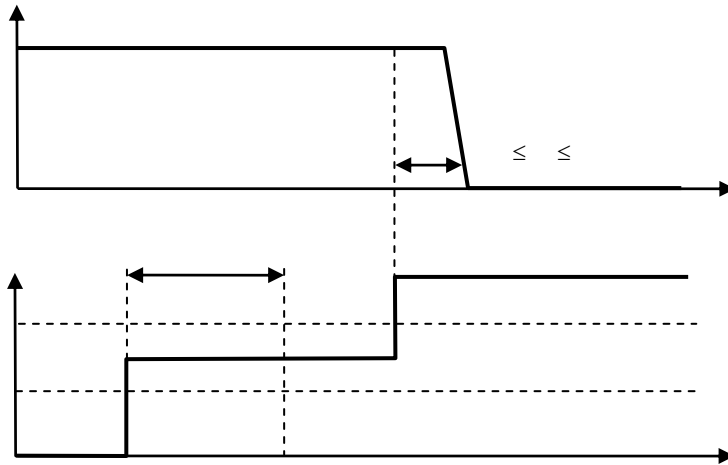


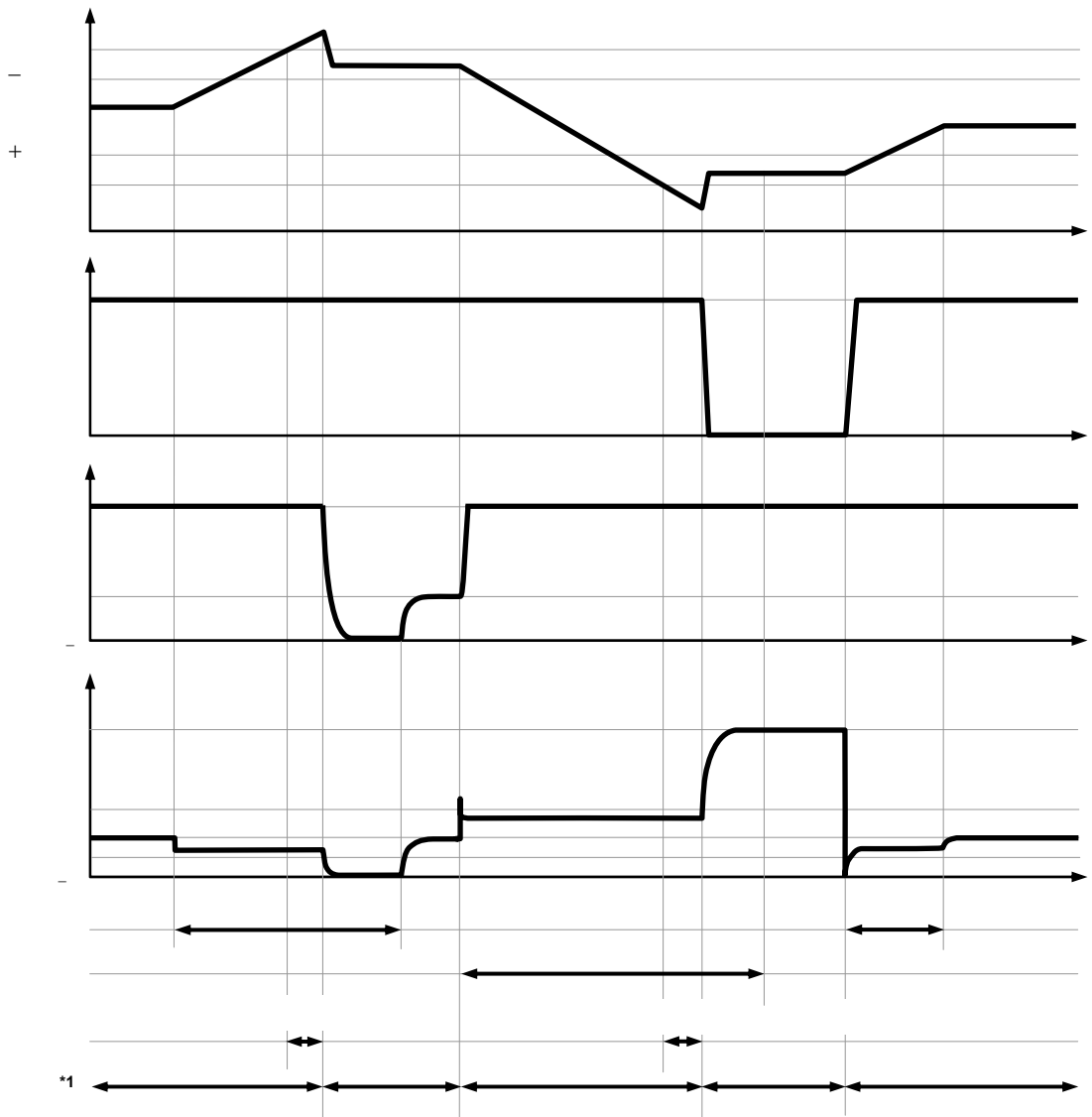
Figure 10

# BATTERY PROTECTION IC FOR 1-CELL PACK

## S-8200A Series

### ■ Timing Charts

#### 1. Overcharge detection, overdischarge detection

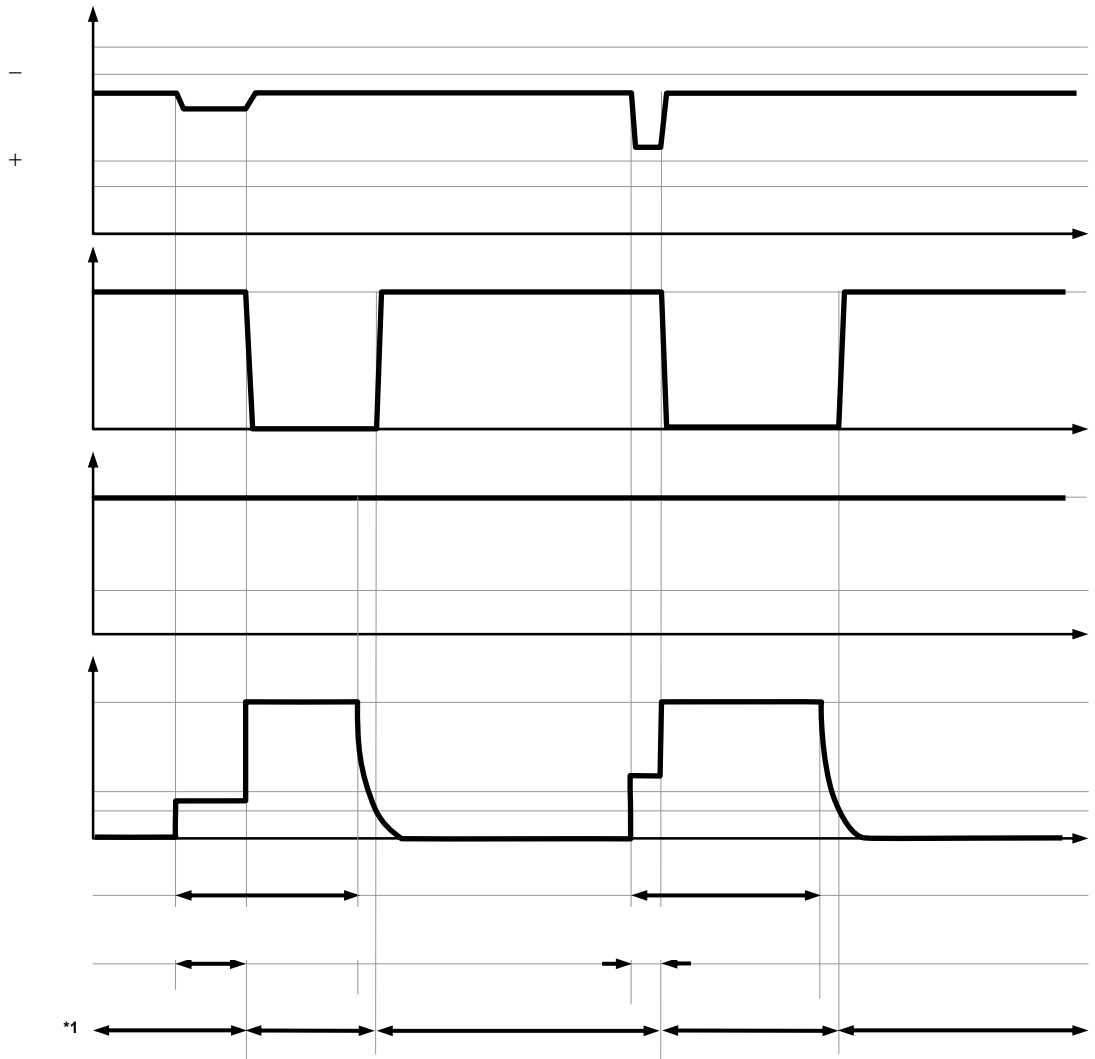


\*1.

Remark

Figure 11

2. Discharge overcurrent detection



\*1.

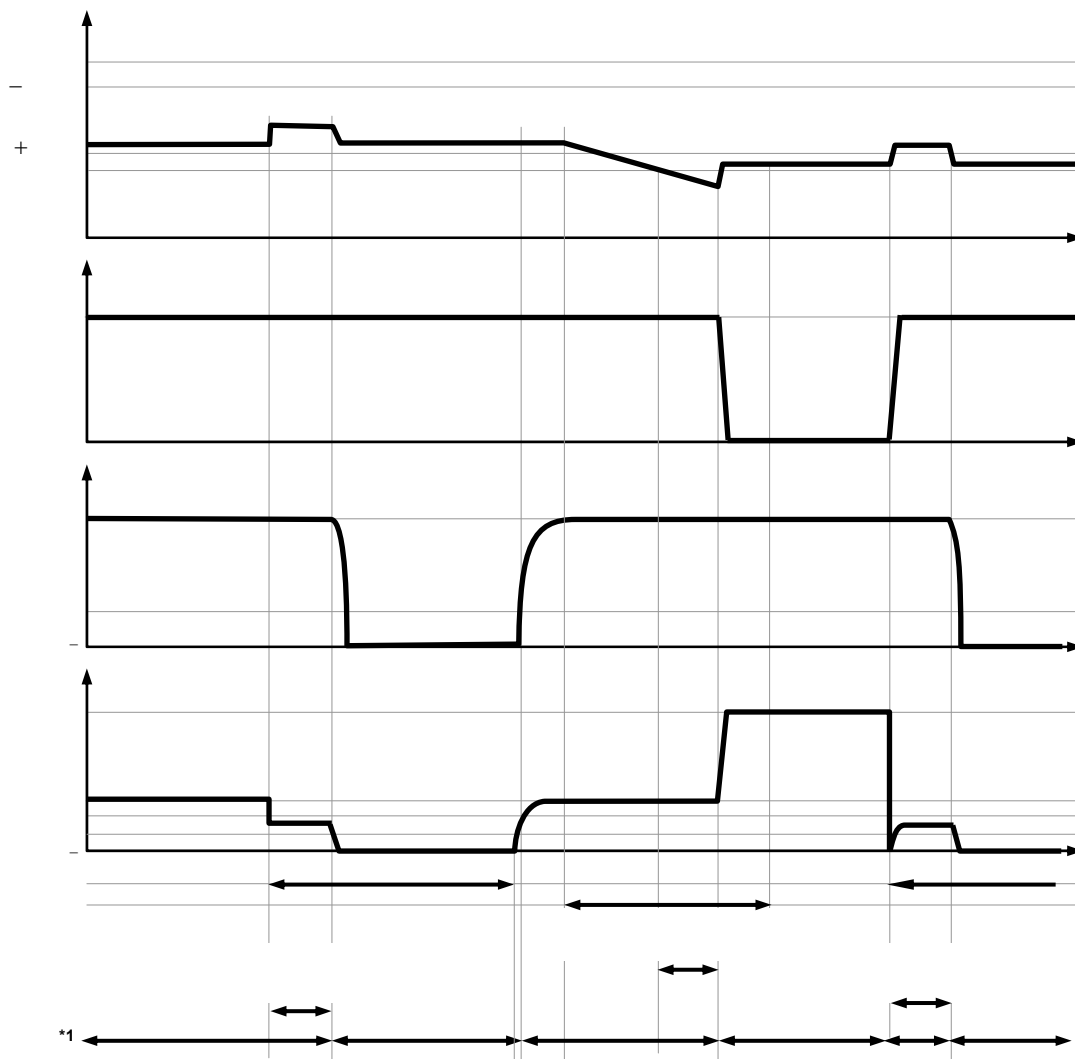
Remark

Figure 12

# BATTERY PROTECTION IC FOR 1-CELL PACK

## S-8200A Series

### 3. Charge overcurrent detection



\*1.

Remark

Figure 13

# BATTERY PROTECTION IC FOR 1-CELL PACK S-8200A Series

## ■ Battery Protection IC Connection Example

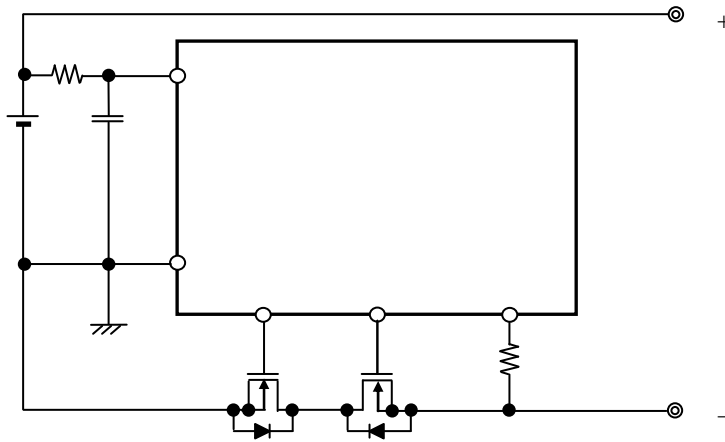


Figure 14

Table 11 Constants for External Components

			-	-	-	$\leq$ *1	$\geq$ *2
			-	-	-	$\leq$ *1	$\geq$ *2
			$\Omega$	$\Omega$	$\Omega$	*3	
			$\mu$	$\mu$	$\mu$	*4	
			$\Omega$	$\Omega$	$\Omega$	*5	

\*1.

\*2.

\*3.

$\Omega$

\*4.

$\Omega$

$\Omega$

$\mu$

\*5.

$\Omega$

Caution 1. The above constants may be changed without notice.

- It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. In addition, the example of connection shown above and the constant do not guarantee proper operation. Perform thorough evaluation using the actual application to set the constant.

## BATTERY PROTECTION IC FOR 1-CELL PACK

### S-8200A Series

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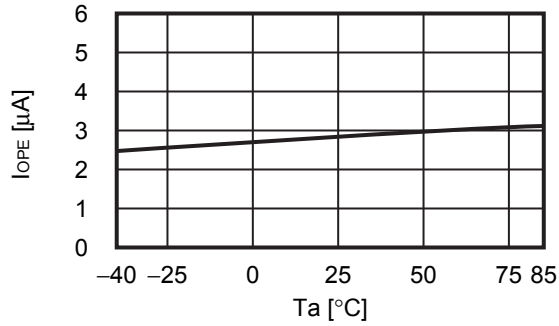
#### ■ Precautions

- 
- 
-

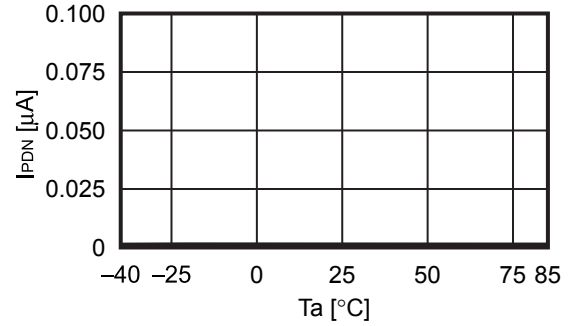
■ Characteristics (Typical Data)

1. Current consumption

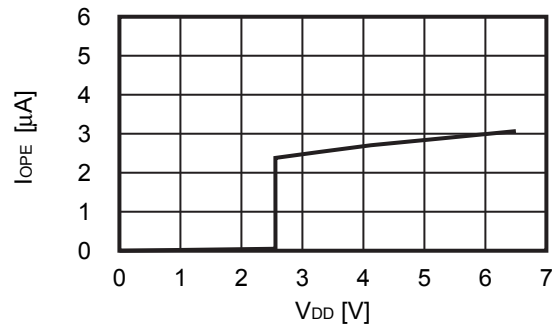
1.1  $I_{OPE}$  vs.  $T_a$



1.2  $I_{PDN}$  vs.  $T_a$



1.3  $I_{OPE}$  vs.  $V_{DD}$

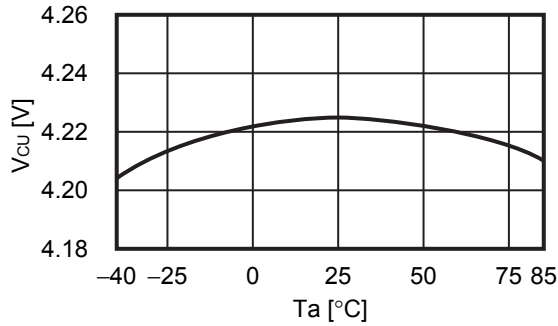


# BATTERY PROTECTION IC FOR 1-CELL PACK

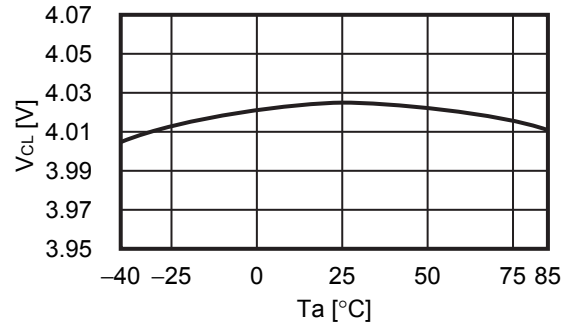
## S-8200A Series

### 2. Overcharge detection / release voltage, overdischarge detection / release voltage, overcurrent detection voltage, charge overcurrent detection voltage, and delay time

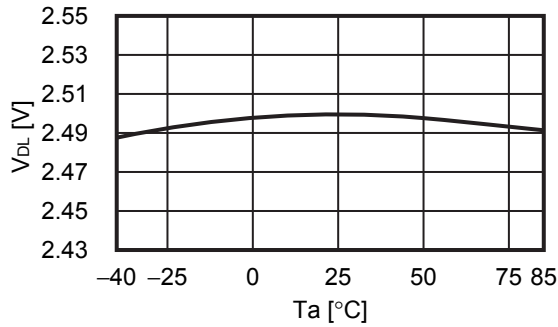
2.1  $V_{CU}$  vs.  $T_a$



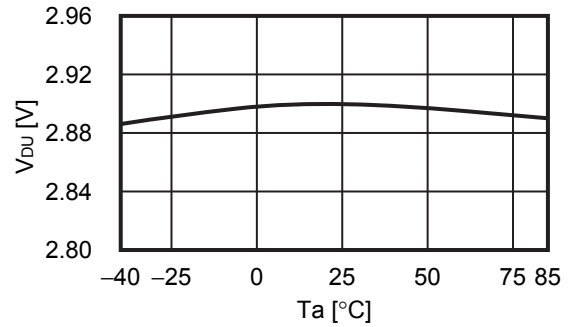
2.2  $V_{CL}$  vs.  $T_a$



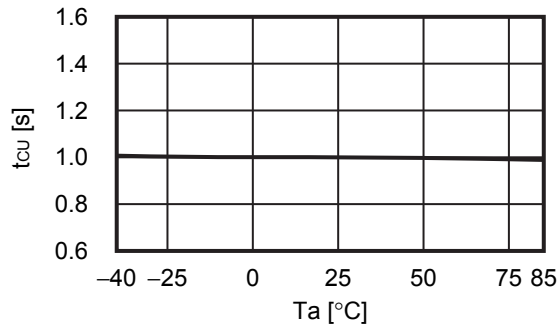
2.3  $V_{DL}$  vs.  $T_a$



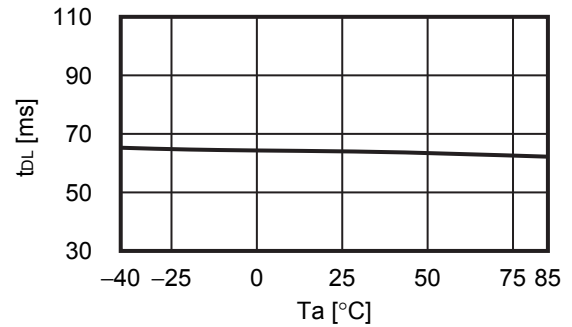
2.4  $V_{DU}$  vs.  $T_a$



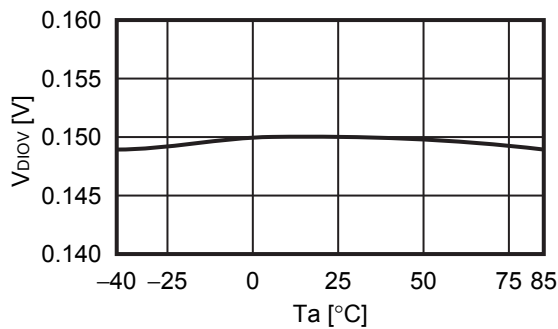
2.5  $t_{CU}$  vs.  $T_a$



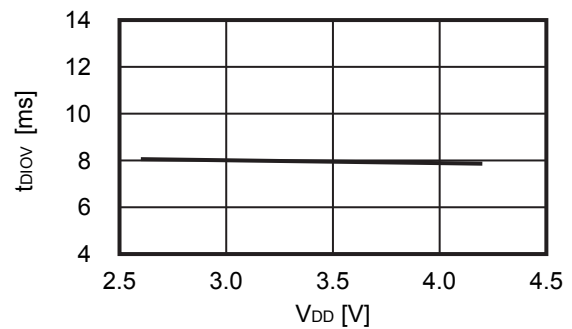
2.6  $t_{DL}$  vs.  $T_a$



2.7  $V_{DIOV}$  vs.  $T_a$



2.8  $t_{DIOV}$  vs.  $V_{DD}$

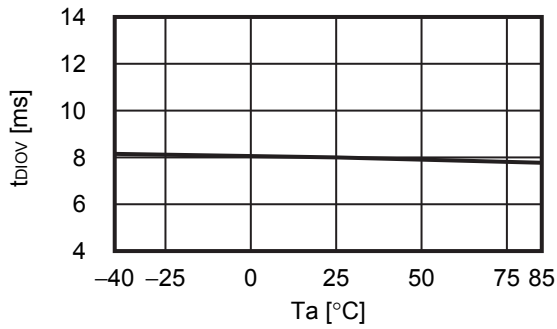




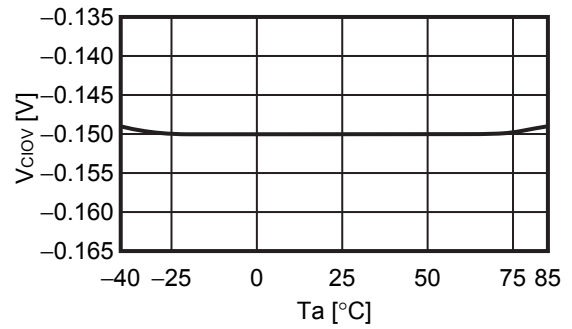
# BATTERY PROTECTION IC FOR 1-CELL PACK

## S-8200A Series

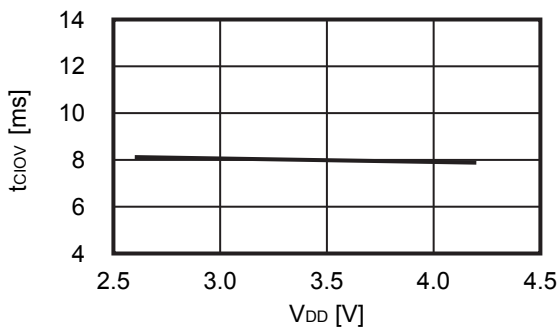
2. 9  $t_{DIOV}$  vs.  $T_a$



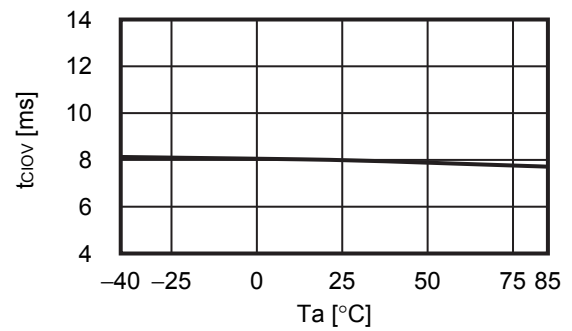
2. 10  $V_{CIOV}$  vs.  $T_a$



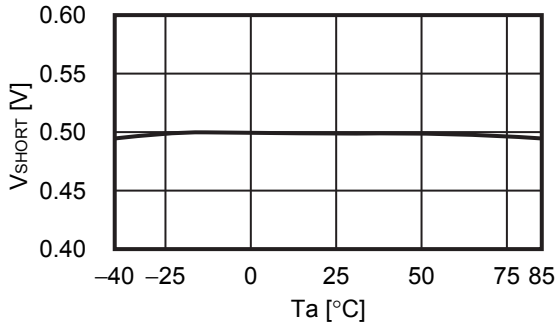
2. 11  $t_{CIOV}$  vs.  $V_{DD}$



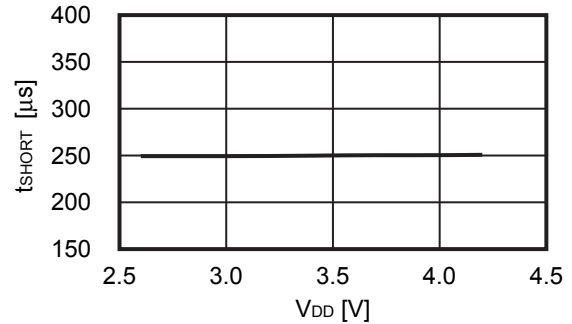
2. 12  $t_{CIOV}$  vs.  $T_a$



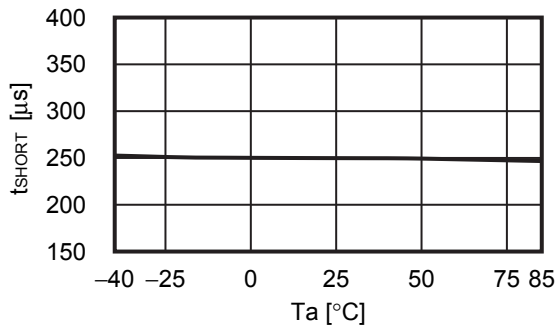
2. 13  $V_{SHORT}$  vs.  $T_a$



2. 14  $t_{SHORT}$  vs.  $V_{DD}$



2. 15  $t_{SHORT}$  vs.  $T_a$



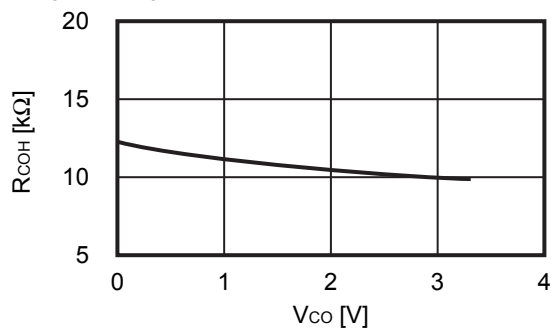
# BATTERY PROTECTION IC FOR 1-CELL PACK

## S-8200A Series

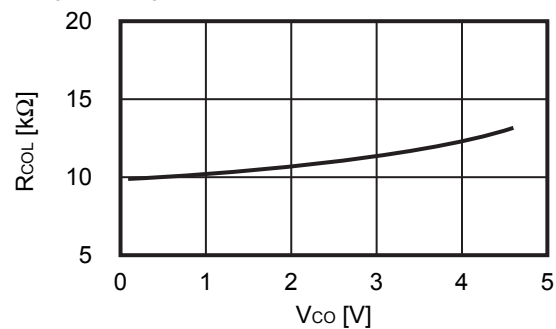
---

### 3. CO pin / DO pin

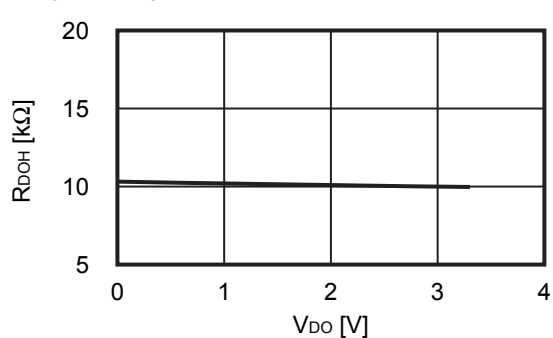
3.1  $R_{COH}$  vs.  $V_{CO}$



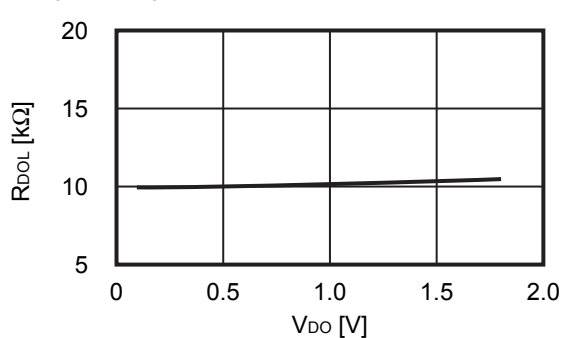
3.2  $R_{COL}$  vs.  $V_{CO}$



3.3  $R_{DOH}$  vs.  $V_{DO}$

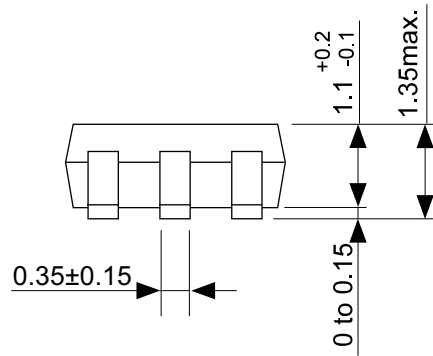
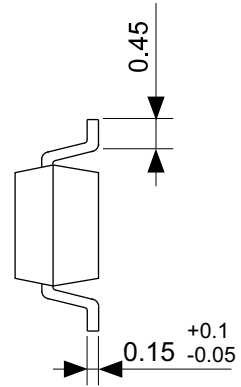
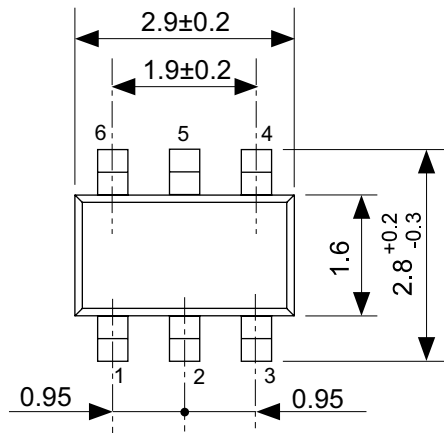


3.4  $R_{DOL}$  vs.  $V_{DO}$



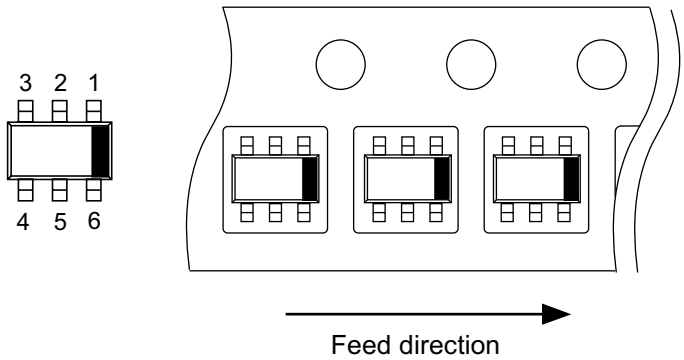
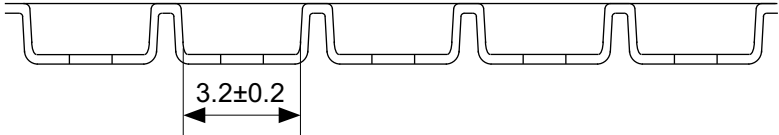
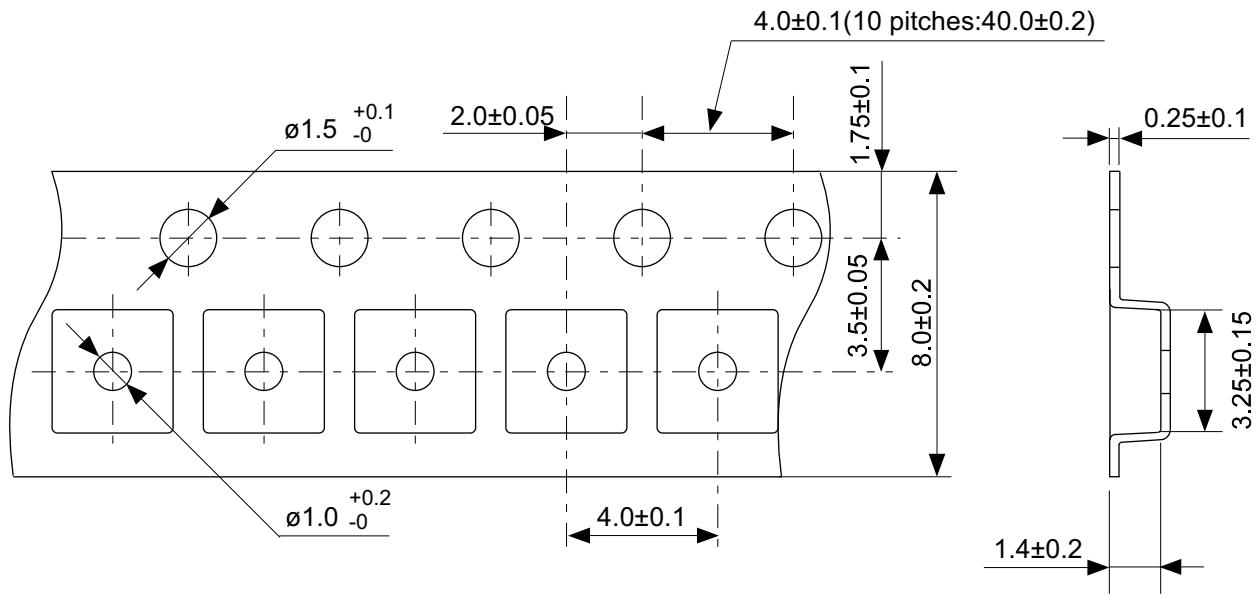






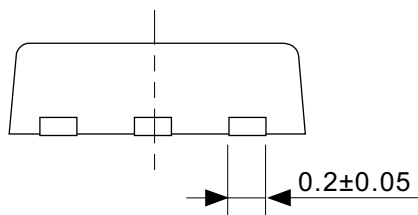
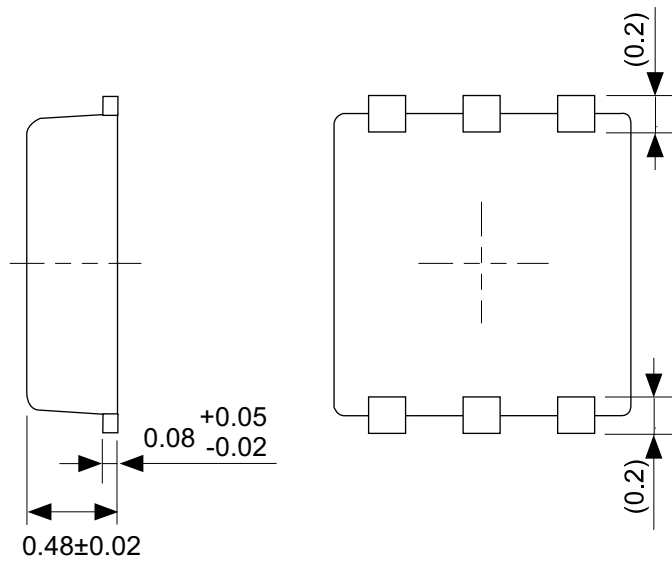
No. MP006-A-P-SD-2.1

TITLE	SOT236-A-PKG Dimensions
No.	MP006-A-P-SD-2.1
ANGLE	
UNIT	mm
<b>ABLIC Inc.</b>	



No. MP006-A-C-SD-3.1

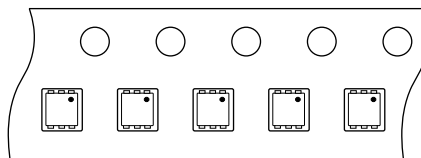
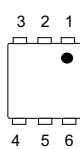
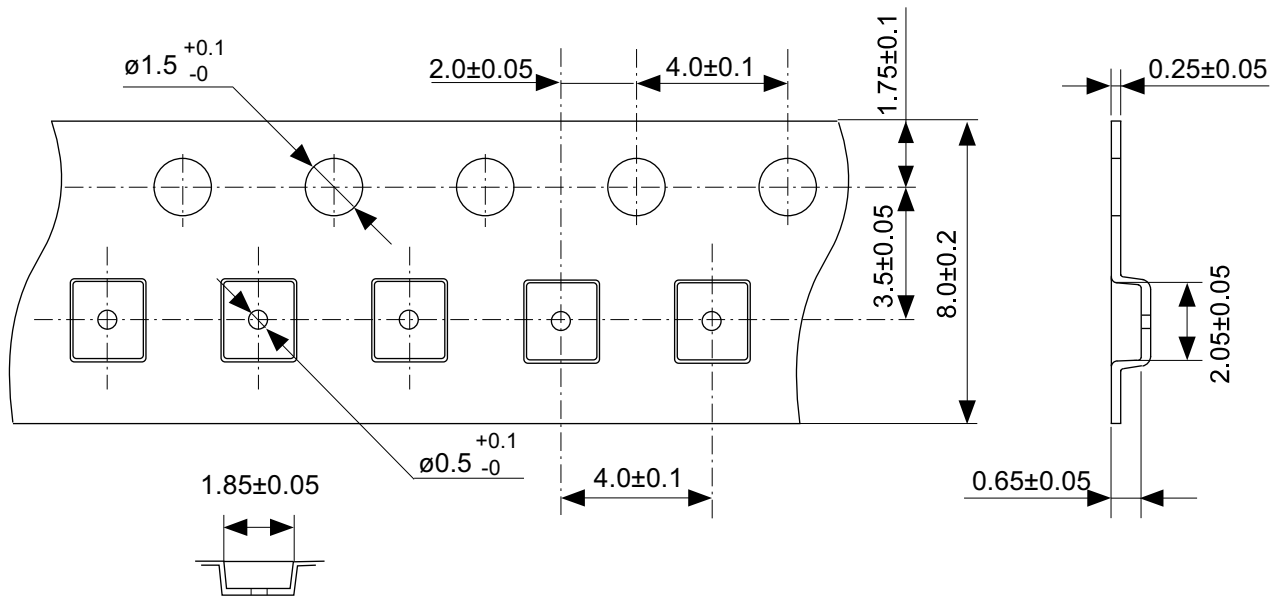
TITLE	SOT236-A-Carrier Tape
No.	MP006-A-C-SD-3.1
ANGLE	
UNIT	mm
<b>ABLIC Inc.</b>	

No. PG006-A-P-SD-2.1

TITLE	SNT-6A-A-PKG Dimensions
No.	PG006-A-P-SD-2.1
ANGLE	
UNIT	mm
<b>ABLIC Inc.</b>	

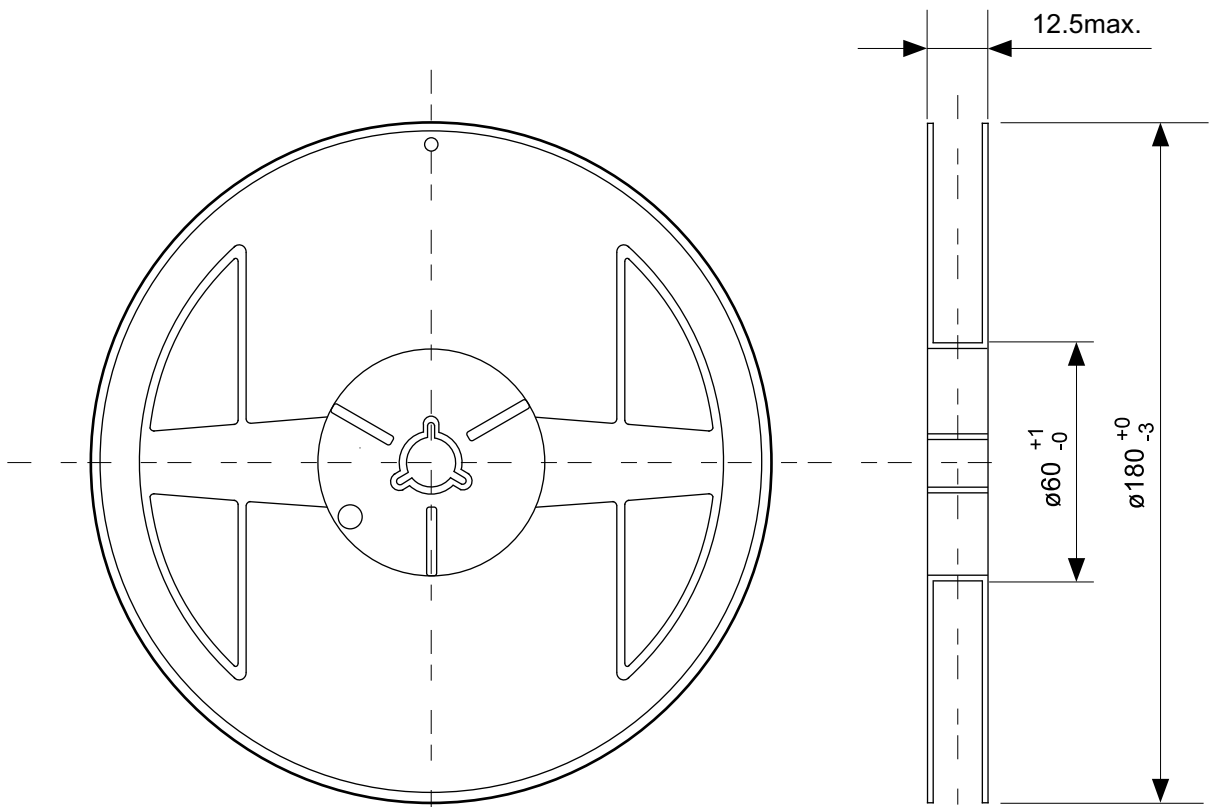




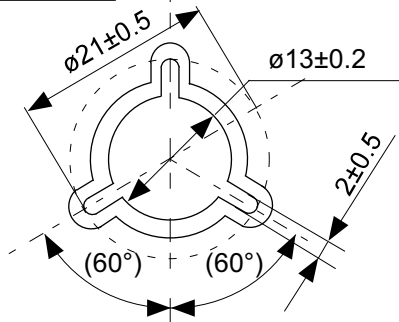
Feed direction

No. PG006-A-C-SD-2.0

TITLE	SNT-6A-A-Carrier Tape
No.	PG006-A-C-SD-2.0
ANGLE	
UNIT	mm
<b>ABLIC Inc.</b>	

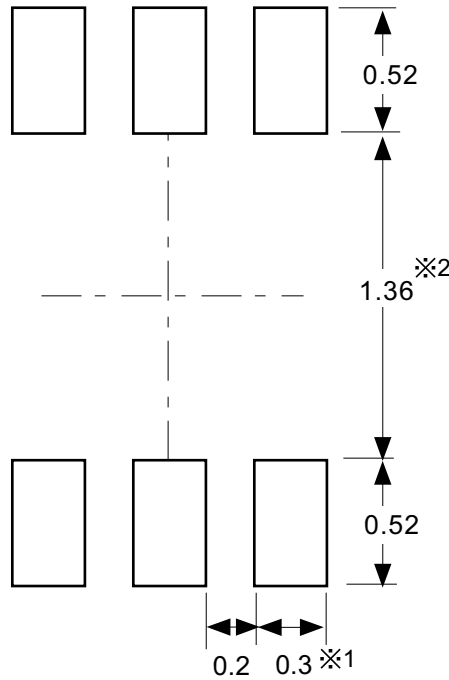


Enlarged drawing in the central part



No. PG006-A-R-SD-1.0

TITLE	SNT-6A-A-Reel		
No.	PG006-A-R-SD-1.0		
ANGLE		QTY.	5,000
UNIT	mm		
<b>ABLIC Inc.</b>			



※1. ランドパターンの幅に注意してください (0.25 mm min. / 0.30 mm typ.).  
 ※2. パッケージ中央にランドパターンを広げないでください (1.30 mm ~ 1.40 mm)。

- 注意
1. パッケージのモールド樹脂下にシルク印刷やハンダ印刷などしないでください。
  2. パッケージ下の配線上のソルダーレジストなどの厚みをランドパターン表面から0.03 mm以下にしてください。
  3. マスク開口サイズと開口位置はランドパターンと合わせてください。
  4. 詳細は "SNTパッケージ活用の手引き" を参照してください。

※1. Pay attention to the land pattern width (0.25 mm min. / 0.30 mm typ.).  
 ※2. Do not widen the land pattern to the center of the package ( 1.30 mm ~ 1.40 mm ).

- Caution**
1. Do not do silkscreen printing and solder printing under the mold resin of the package.
  2. The thickness of the solder resist on the wire pattern under the package should be 0.03 mm or less from the land pattern surface.
  3. Match the mask aperture size and aperture position with the land pattern.
  4. Refer to "SNT Package User's Guide" for details.

※1. 请注意焊盘模式的宽度 (0.25 mm min. / 0.30 mm typ.).  
 ※2. 请勿向封装中间扩展焊盘模式 (1.30 mm ~ 1.40 mm)。

- 注意
1. 请勿在树脂型封装的下面印刷丝网、焊锡。
  2. 在封装下、布线上的阻焊膜厚度 (从焊盘模式表面起) 请控制在 0.03 mm 以下。
- ※ 1. 封装的开口尺寸和开口位置请与焊盘模式对齐。  
 ※ 2. 详细内容请参阅 "SNT 封装的应用指南"。

No. PG006-A-L-SD-4.1

TITLE	SNT-6A-A -Land Recommendation
No.	PG006-A-L-SD-4.1
ANGLE	
UNIT	mm
<b>ABLIC Inc.</b>	

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