

# PH5502B2NA1-E4

## Data Sheet

R08DS0038EJ0100

Rev.1.00

Oct 05, 2011

### Ambient Illuminance Sensor

#### DESCRIPTION

The PH5502B2NA1-E4 is an ambient illuminance sensor with a photo diode and current amplifier. This product has spectral characteristics close to human eye sensitivity and outputs light current proportional to the ambient brightness.

The PH5502B2NA1-E4 can be used to improve the performance and reduce the power consumption of digital equipment such as FPD-TV sets and mobile phones, by enabling automatic brightness control and automatic switching on and off of lighting systems.

#### FEATURES

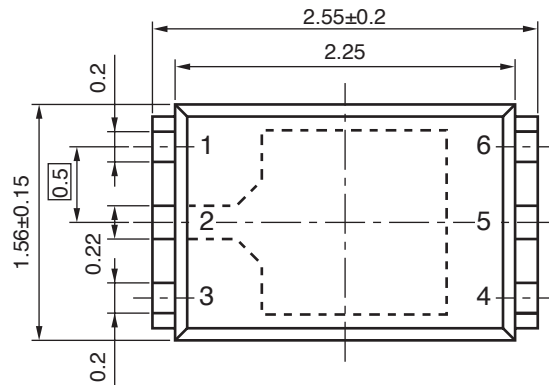
- Small and thin SON package                      2.55 x 1.56 x 0.55 mm
- Spectral characteristics close to human eye sensitivity  
Peak sensitivity wavelength                      555 nm TYP.
- Output characteristics proportional to illuminance
- Large output light current                      230  $\mu$ A TYP.@100 lx (Fluorescent light)
- Low voltage operation                               $V_{CC} = 1.8$  to 5.5 V
- Pb-free

#### APPLICATIONS

- FPD TV sets, displays
- Mobile phones, smartphones
- Notebook PCs, tablet PCs
- DSCs, DVCs
- FA equipment
- Lighting systems, etc.

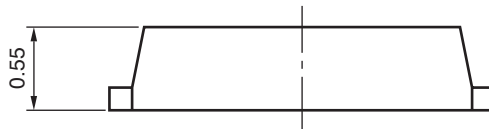
## PACKAGE DIMENSIONS (UNIT: mm)

### TOP VIEW

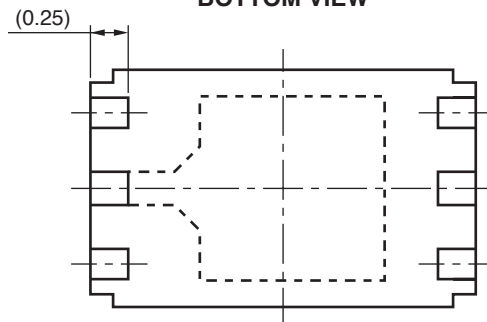


**Remark** Pin 1 is distinguishable by the shape of the lead frame.

### SIDE VIEW



### BOTTOM VIEW



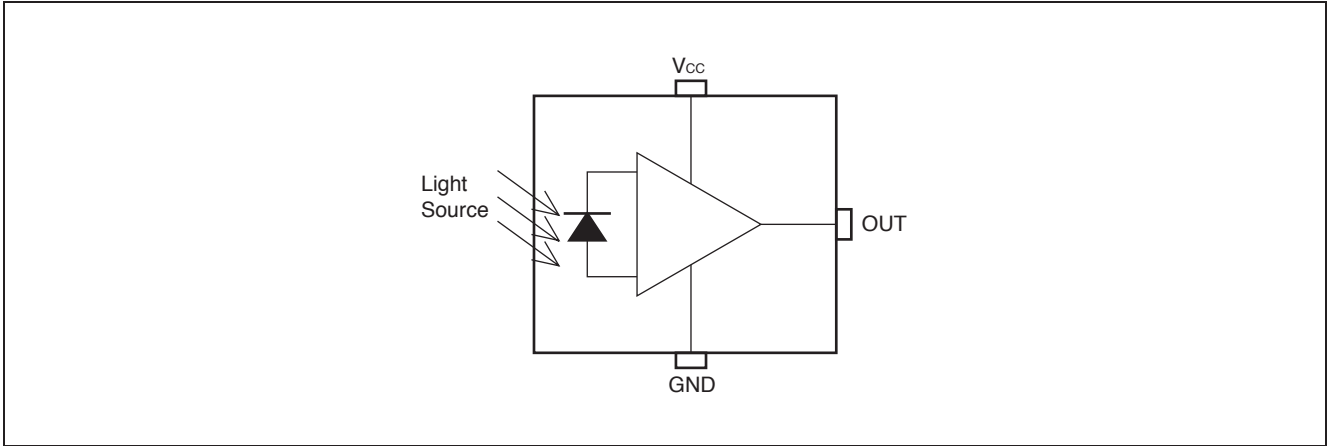
**Remark** ( ) indicates nominal dimensions.

Pin No.	Terminal
1	OUT
2	GND
3	V <sub>CC</sub>
4	NC
5	NC
6	NC

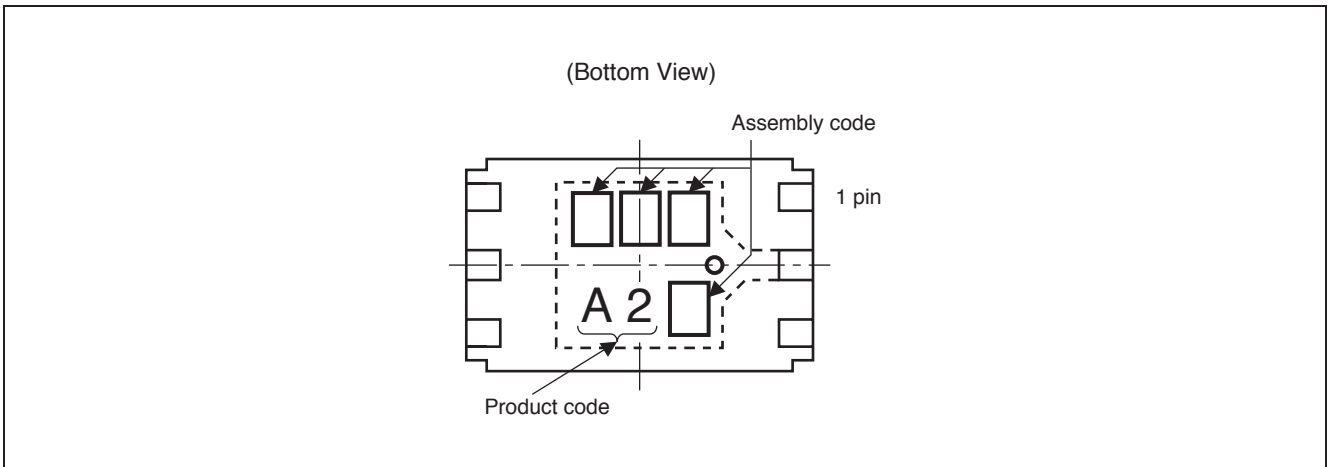
**Remark**

1. Connect all the NC terminals to GND or V<sub>CC</sub>.
2. The bypass capacitor between V<sub>CC</sub> and GND is to be mounted within 20 mm of the package body.

### BLOCK DIAGRAM



### MARKING EXAMPLE



**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C, unless otherwise specified)**

Parameter	Symbol	Ratings	Unit
Supply Voltage	V <sub>CC</sub>	6	V
Light Current	I <sub>O</sub>	5	mA
Power Dissipation *1	P <sub>D</sub>	135	mW
Operating Temperature	T <sub>opt</sub>	-30 to +85	°C
Storage Temperature	T <sub>stg</sub>	-40 to +100	°C

Note: \*1. Mounted on glass epoxy board (18 mm × 13 mm × t<sub>0.8</sub> mm)

**RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V <sub>CC</sub>	1.8	3.0	5.5	V

**ELECTRO-OPTICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, V<sub>CC</sub> = 3.0 V, unless otherwise specified)**

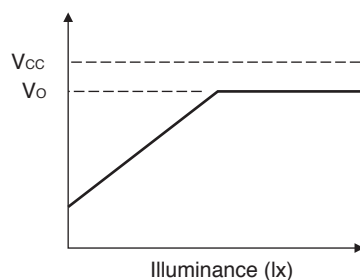
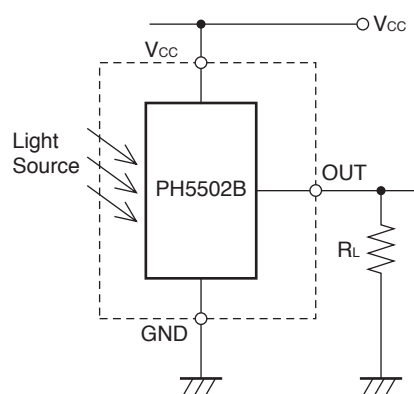
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Supply Current *1	I <sub>CC</sub>	E <sub>V</sub> = 100 lx *2	–	260	–	μA
Peak Sensitivity Wavelength	λ <sub>p</sub>	–	–	555	–	nm
Light Current *1	I <sub>O0</sub>	E <sub>V</sub> = 0 lx	–	–	0.1	μA
	I <sub>O1</sub>	E <sub>V</sub> = 10 lx *2	–	23	–	μA
	I <sub>O2</sub>	E <sub>V</sub> = 100 lx *3	–	330	–	μA
	I <sub>O3</sub>	E <sub>V</sub> = 100 lx *2	195	230	265	μA
Saturation Output Voltage *4	V <sub>O</sub>	E <sub>V</sub> = 100 lx, R <sub>L</sub> = 150 kΩ *2	2.6	2.9	–	V
Switching Time *5	Rise Time	R <sub>L</sub> = 5 kΩ *6	–	200	–	μs
	Fall Time		–	250	–	μs
	Delay Time		–	400	–	μs
	Storage Time		–	10	–	μs

Note: \*1 Measured under load resistance conditions of an output current unsaturated

\*2 Fluorescent light

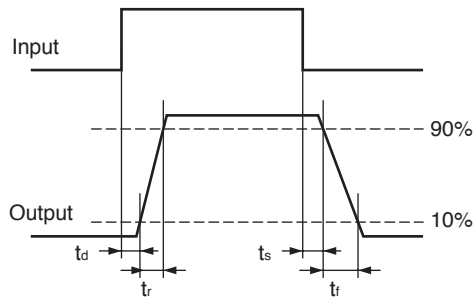
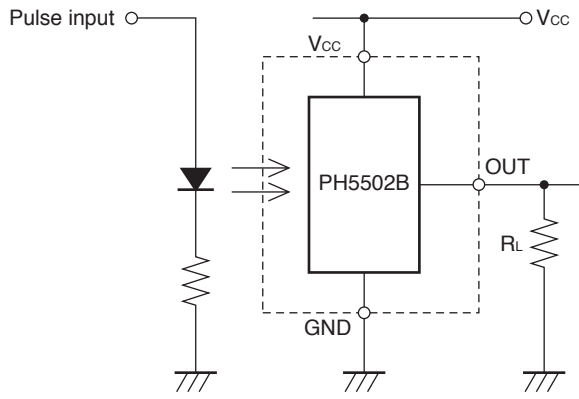
\*3 Incandescent light

\*4 Saturation output voltage measurement method:



**PH5502B2NA1-E4**

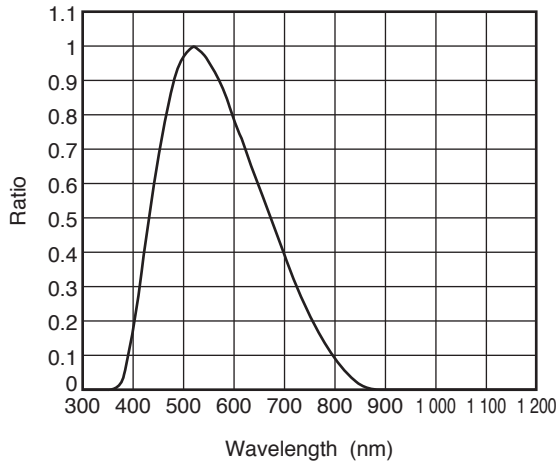
\*5 Switching Time



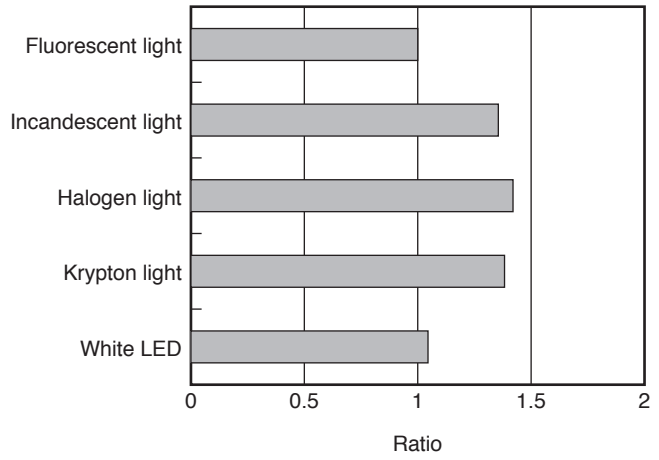
\*6 White LED

**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ ,  $V_{CC} = 3.0\text{ V}$ , unless otherwise specified)**

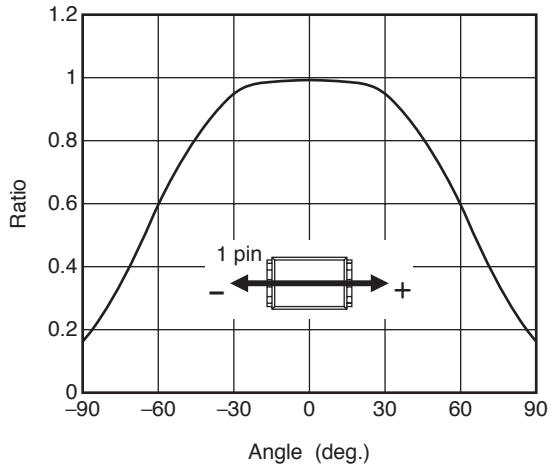
**SPECTRAL SENSITIVITY CHARACTERISTICS**



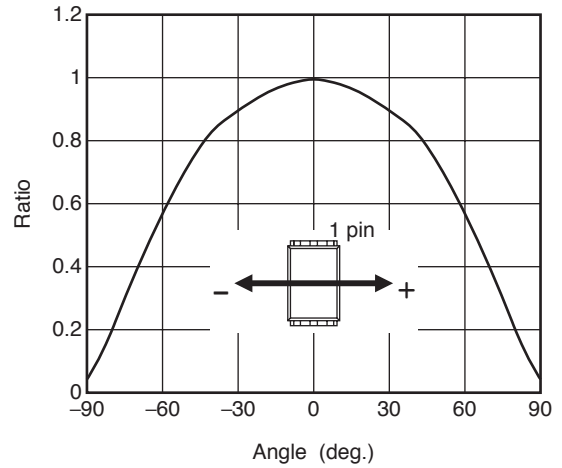
**LIGHT SOURCE SENSITIVITY VARIATION**



**DIRECTIONAL CHARACTERISTICS 1**

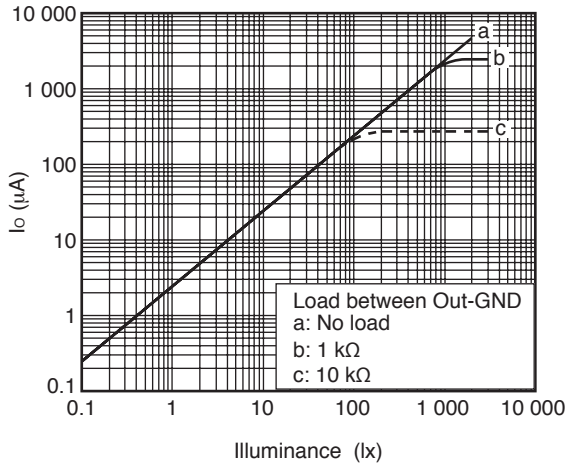


**DIRECTIONAL CHARACTERISTICS 2**

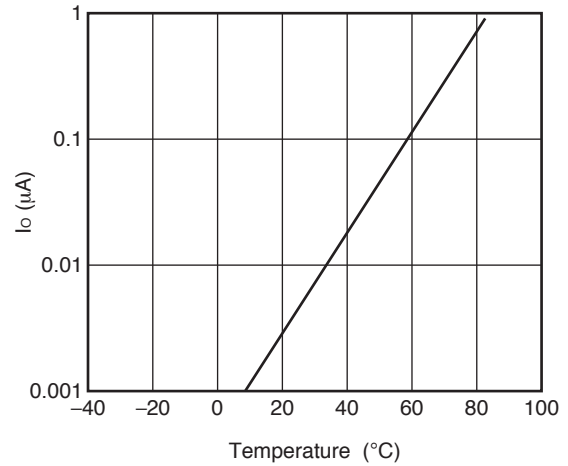


**Remark** The graphs indicate nominal characteristics.

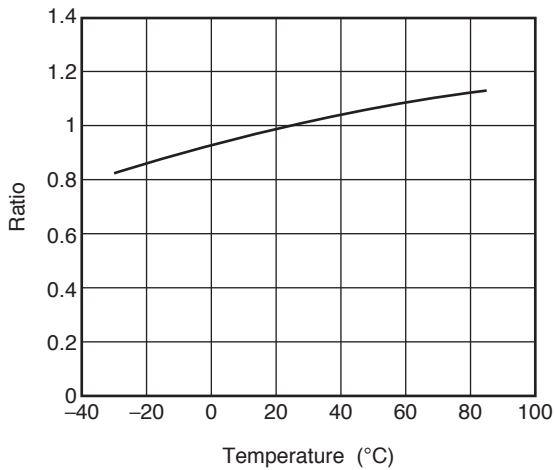
LIGHT CURRENT VS. ILLUMINANCE



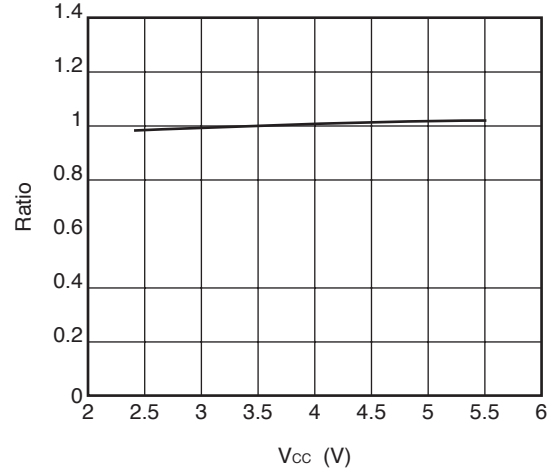
TEMPERATURE DEPENDENCY OF LIGHT CURRENT AT 0 lx



TEMPERATURE DEPENDENCY OF LIGHT CURRENT AT 100 lx (NORMALIZED AT 25°C)



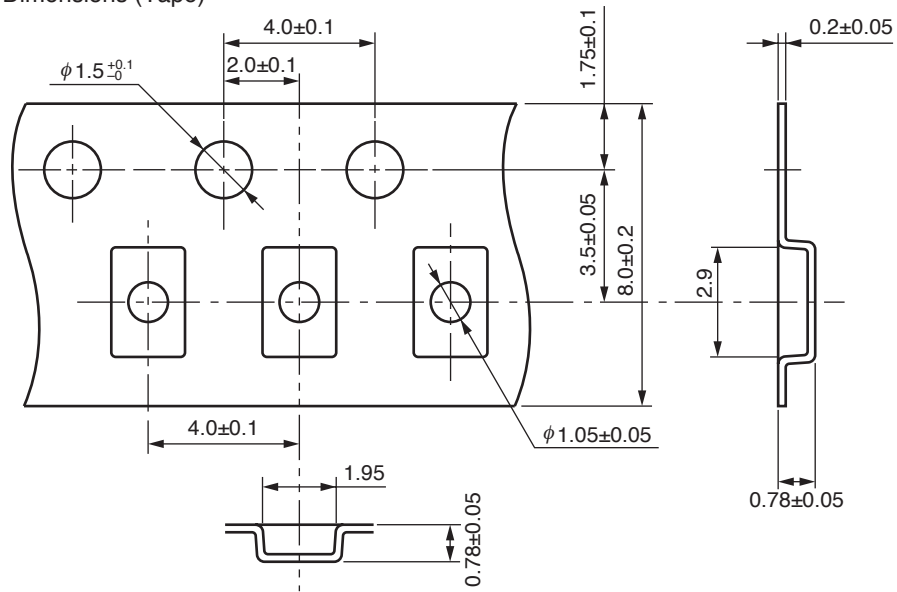
VCC DEPENDENCY OF LIGHT CURRENT AT 100 lx (NORMALIZED AT VCC = 3 V)



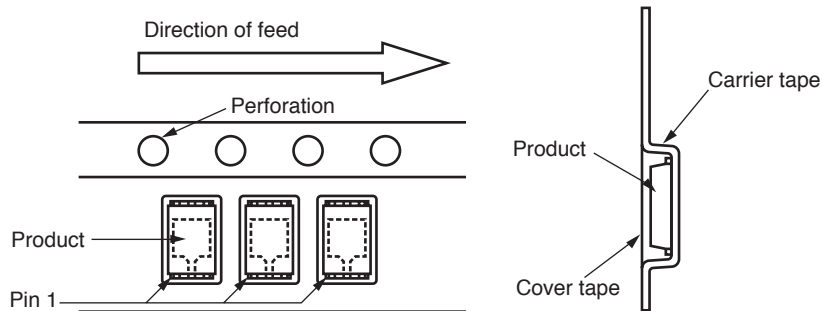
**Remark** The graphs indicate nominal characteristics.

**TAPING SPECIFICATIONS (UNIT: mm)**

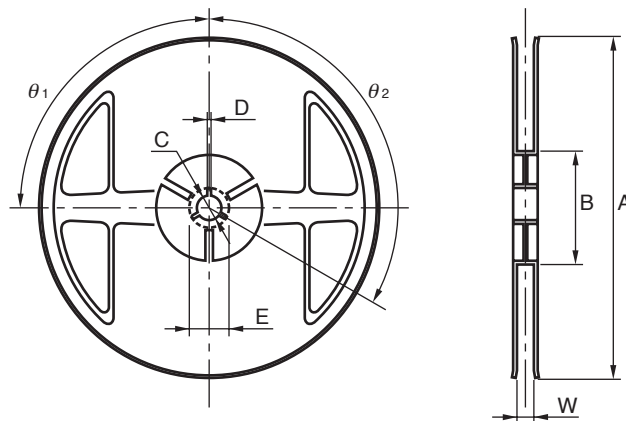
Outline and Dimensions (Tape)



Tape Direction



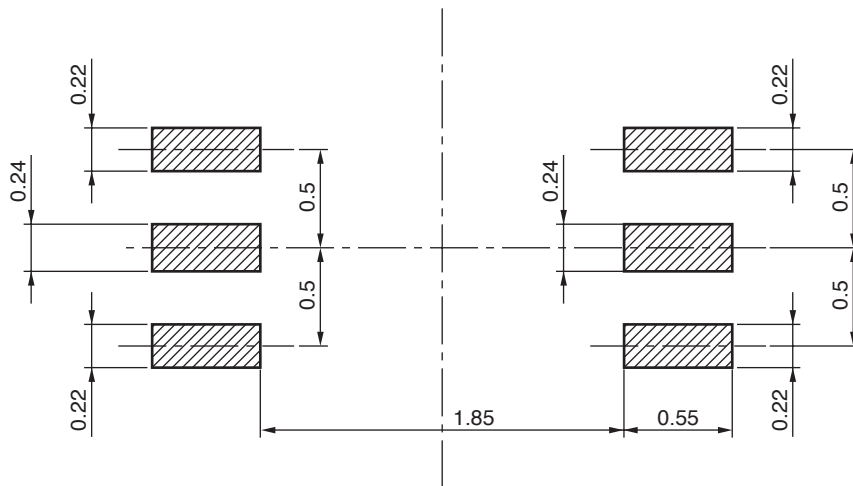
Outline and Dimensions (Reel)



Symbol	Dimensions (mm)
A	$\phi 180^{+0}_{-1.5}$
B	$\phi 60^{+1}_{-0}$
W	$9.0^{+1}_{-0}$

Symbol	Dimensions (mm)
C	$\phi 13 \pm 0.2$
D	$2.0 \pm 0.5$
E	$21.0 \pm 0.8$
$\theta_1$	$90^\circ$
$\theta_2$	$120^\circ$



**RECOMMENDED MOUNT PAD DIMENSIONS (Unit: mm)**

**Remark** All dimensions in this figure must be evaluated before use.

## NOTES ON HANDLING

### 1. Recommended reflow soldering conditions

(including infrared reflow, convection reflow, and infrared + convection reflow)

- (1) This product is dry-packed with desiccant in order to avoid moisture absorption.
- (2) After breaking the seal, reflow soldering must be done within 168 hours under the recommended temperature profile shown below.
- (3) If more than 168 hours have passed after breaking the seal, the baking process must be done by using a tape and reel.

Baking conditions: Once, with tape and reel,  $60\pm 5^{\circ}\text{C}$ , 10 to 24 hours

After the baking process, this product must be stored under conditions of  $30^{\circ}\text{C}$  or below, 70% RH or below, and reflow soldering must be done within 168 hours.

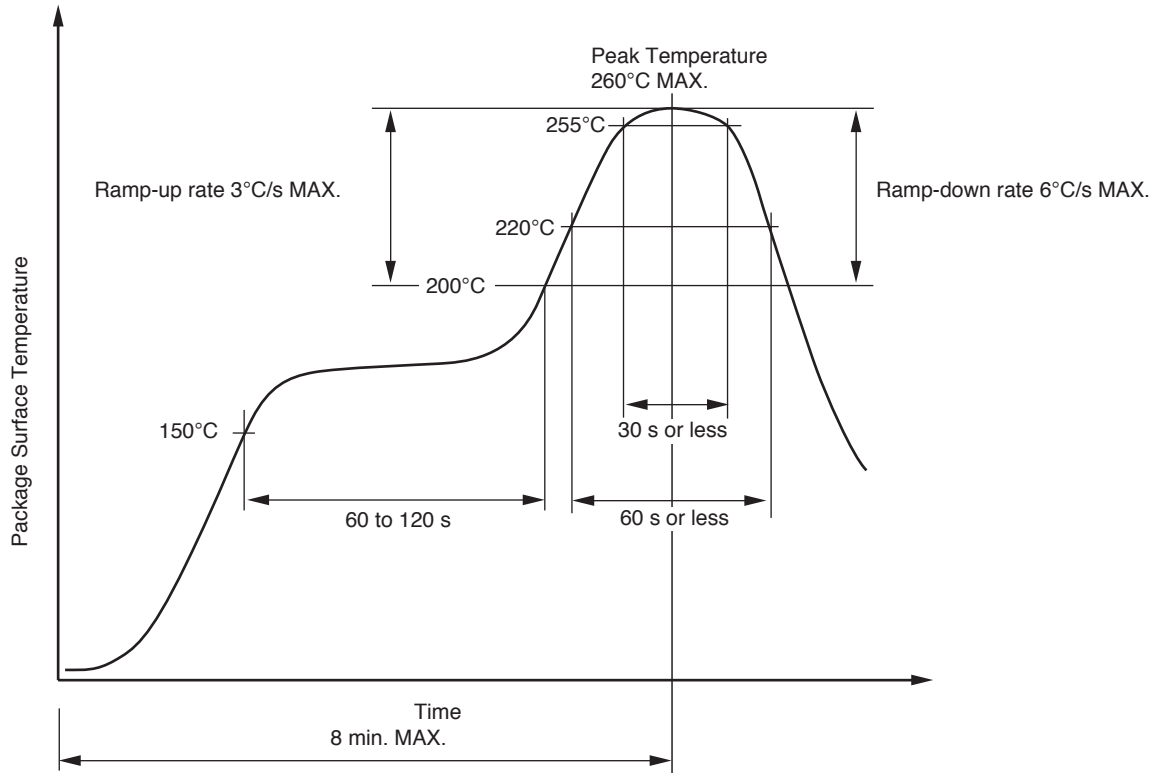
<Storage conditions after breaking seal>

- Storage conditions :  $30^{\circ}\text{C}$  or below, 70% RH or below
- Maximum storage period after breaking seal : 168 hours (Second reflow soldering must be completed within 168 hours.)

<Reflow soldering conditions>

- Peak reflow temperature :  $260^{\circ}\text{C}$  or below (Package surface temperature)
- Maximum number of reflows : 2
- No repair by hand soldering
- Maximum chlorine content of rosin flux (percentage mass) : 0.2% or less

Recommended Temperature Profile of Reflow



<b>Revision History</b>	<b>PH5502B2NA1-E4 Data Sheet</b>
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<b>Rev.</b>	<b>Date</b>	<b>Description</b>	
		<b>Page</b>	<b>Summary</b>
1.00	Oct 05, 2011	-	First edition issued

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