PH5503A2NA1

Ambient Illuminance Sensor

R08DS0055EJ0100
Rev.1.00
Dec 13, 2011

DESCRIPTION

The PH5503A2NA1 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

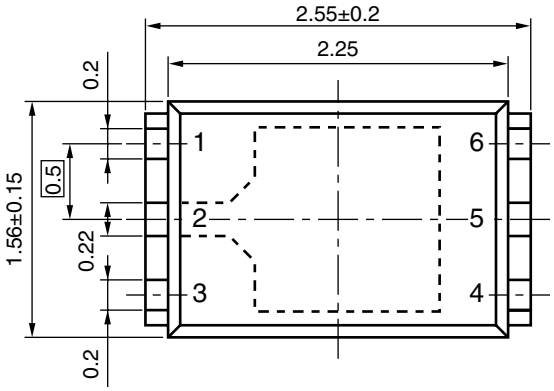
- Small and thin SON package 2.55 x 1.56 x 0.55 mm
- Spectral characteristics close to human eye sensitivity
  Peak sensitivity wavelength 555 nm TYP.
- Output characteristics proportional to illuminance
- Output light current 60 μA TYP.@100 lx (Fluorescent light)
- Reduced variation of output current among light sources
- 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)

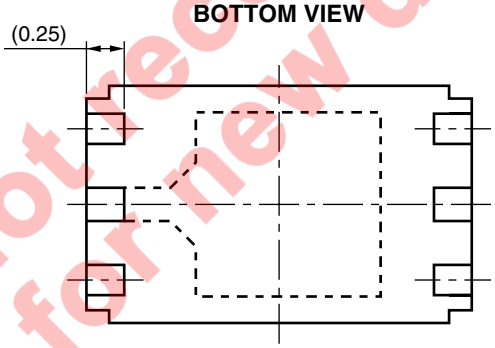
TOP VIEW



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

SIDE VIEW

BOTTOM VIEW

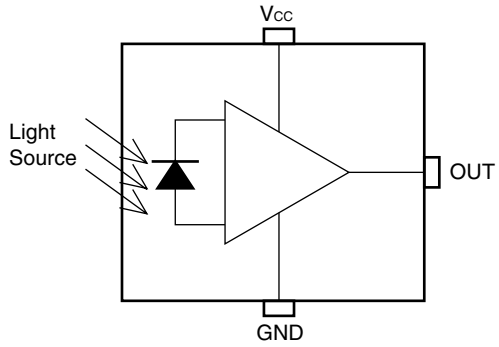


Remark ( ) indicates nominal dimensions.

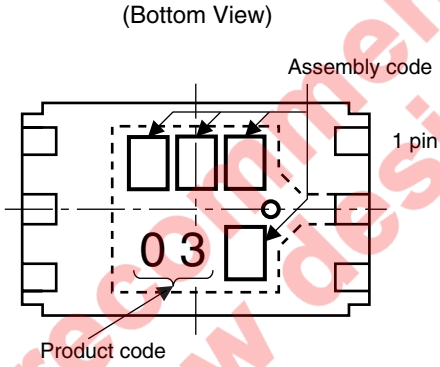
Pin No.	Terminal
1	OUT
2	GND
3	V_{CC}
4	NC
5	NC
6	NC

Remark 1. Connect all the NC terminals to GND or V_{CC}.
2. The bypass capacitor between V_{CC} and GND is to be mounted within 20 mm of the package body.

BLOCK DIAGRAM



MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Order Number	Packing Style
PH5503A2NA1	PH5503A2NA1-E4	Embossed Tape 3 000 pcs/reel

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Supply Voltage	V_{CC}	6	V
Light Current	I_O	5	mA
Power Dissipation *1	P_D	135	mW
Operating Temperature	T_{opt}	–30 to +85	°C
Storage Temperature	T_{stg}	–40 to +100	°C

Note: *1. Mounted on glass epoxy board (18 mm × 13 mm × t0.8 mm)

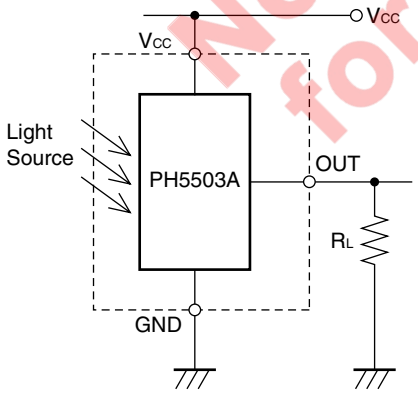
RECOMMENDED OPERATING CONDITIONS

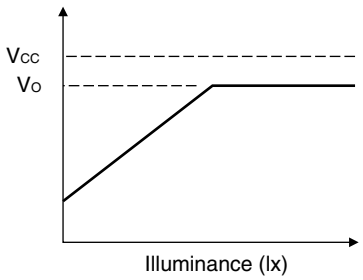
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{CC}	1.8	3.0	5.5	V

ELECTRO-OPTICAL CHARACTERISTICS (T_A = 25°C, V_{CC} = 3.0 V, unless otherwise specified)

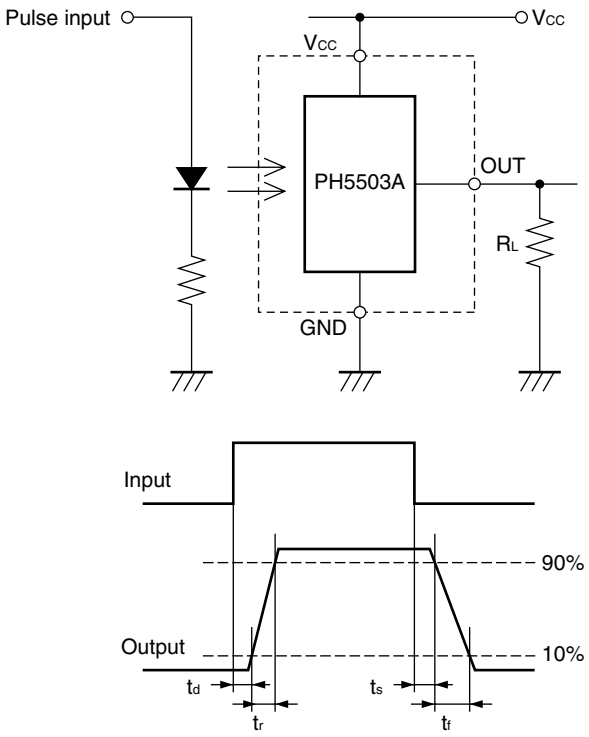
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Supply Current *1		I_{CC}	E_V = 100 lx *2	–	68	–	μA
Peak Sensitivity Wavelength		λ_p	–	–	555	–	nm
Light Current *1		I_{O0}	E_V = 0 lx	–	–	0.1	μA
		I_{O1}	E_V = 100 lx *2	48	60	72	μA
Sensitivity Ratio of Fluorescent/Incandescent		–	E_V = 100 lx	–	1	–	Multiple
Saturation Output Voltage *3		V_O	E_V = 100 lx, R_L = 150 kΩ *2	2.6	2.9	–	V
Switching Time *4	Rise Time	t_r	R_L = 5 kΩ *5	–	50	–	μs
	Fall Time	t_f		–	80	–	μs
	Delay Time	t_d		–	160	–	μs
	Storage Time	t_s		–	4	–	μs

Note: *1 Measured under load resistance conditions of an output current unsaturated
*2 Fluorescent light
*3 Saturation output voltage measurement method:





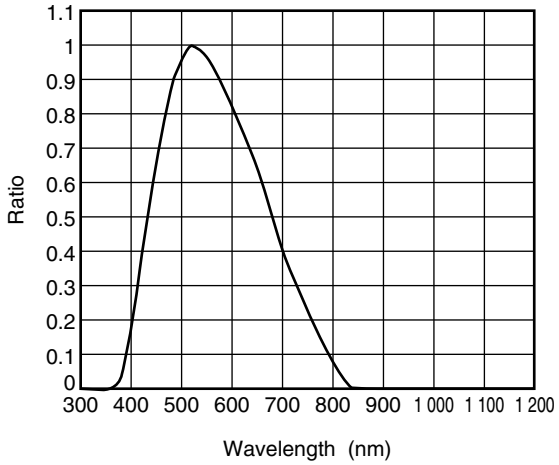
*4 Switching Time



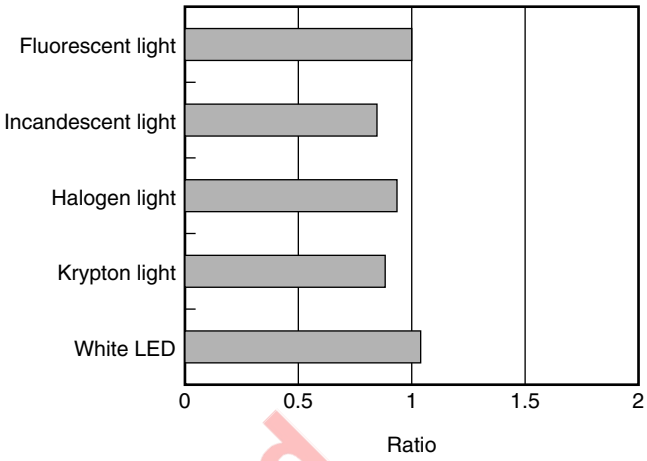
*5 White LED

TYPICAL CHARACTERISTICS (T_A = 25°C, V_{CC} = 3.0 V, unless otherwise specified)

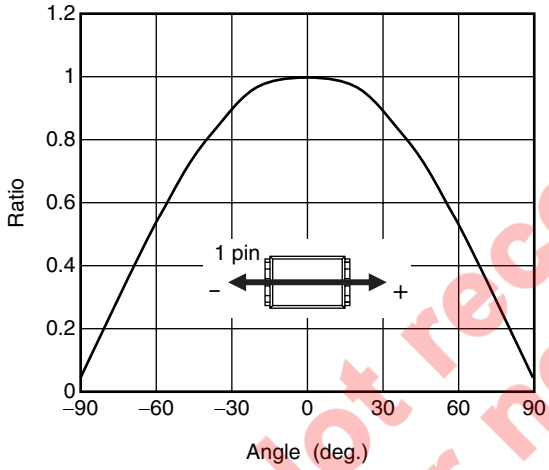
SPECTRAL SENSITIVITY CHARACTERISTICS



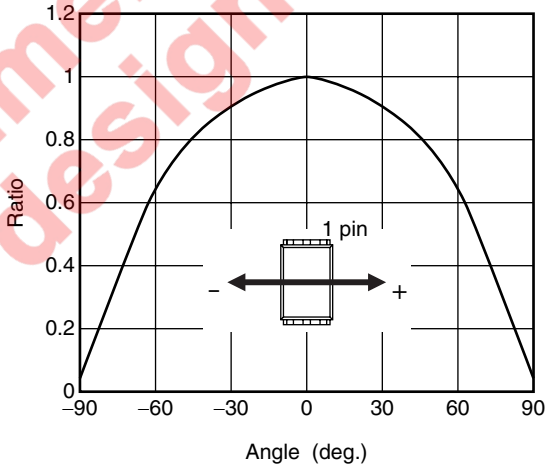
LIGHT SOURCE SENSITIVITY VARIATION



DIRECTIONAL CHARACTERISTICS 1

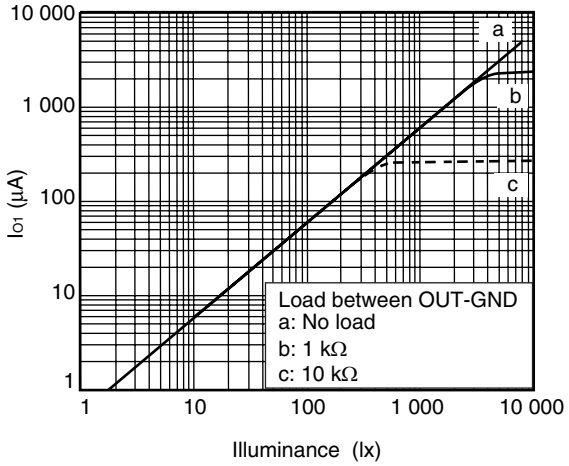


DIRECTIONAL CHARACTERISTICS 2

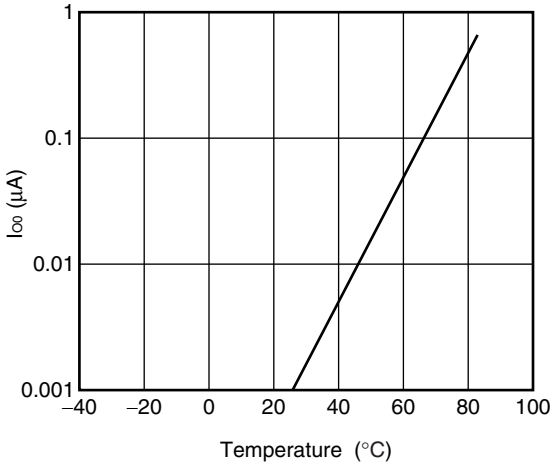


Remark The graphs indicate nominal characteristics.

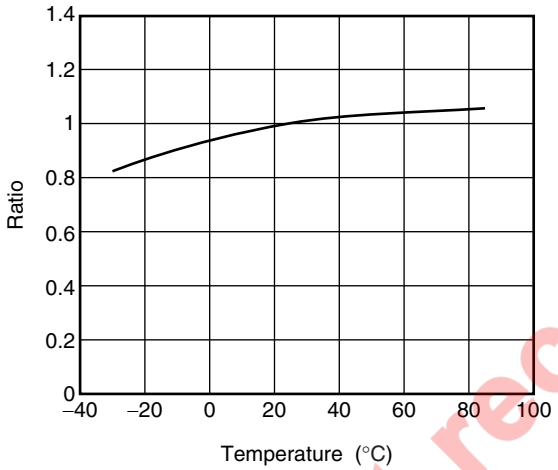
LIGHT CURRENT VS. ILLUMINANCE



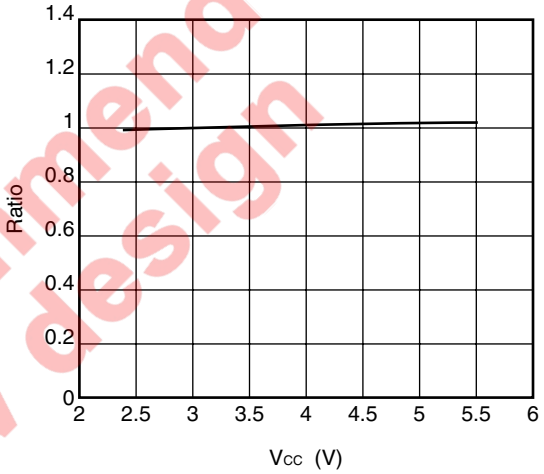
TEMPERATURE DEPENDENCY OF LIGHT CURRENT AT 0 lx



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

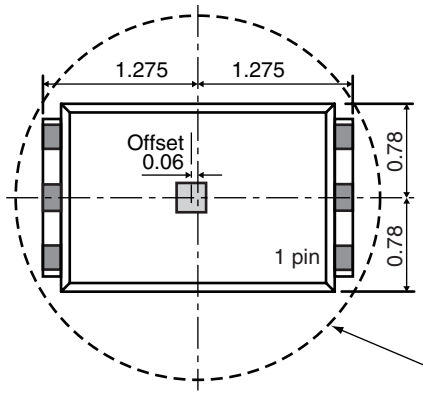


V_{CC} DEPENDENCY OF LIGHT CURRENT AT 100 lx (NORMALIZED AT V_{CC} = 3 V)



Remark The graphs indicate nominal characteristics.

RECOMMENDED OPTICAL LAYOUT (UNIT: mm)



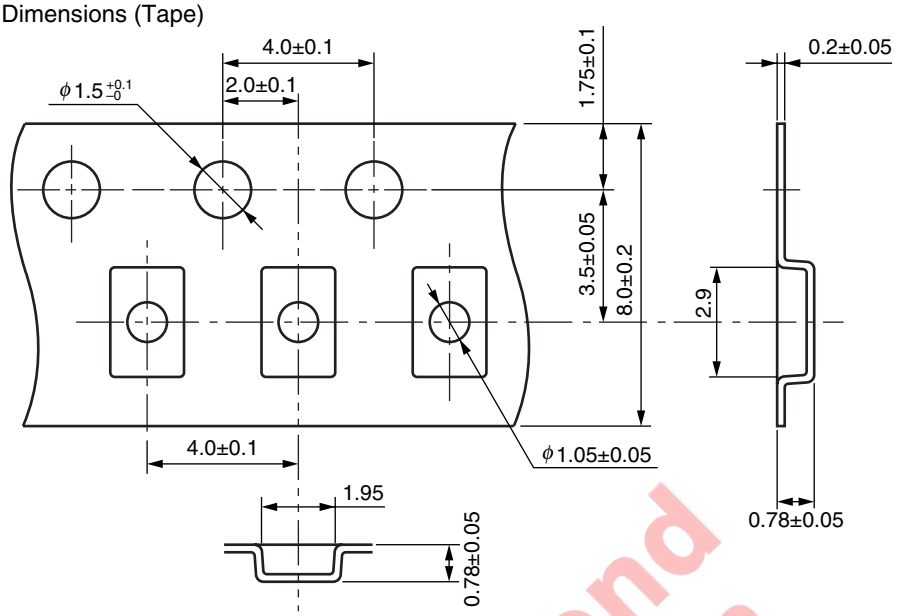
It is recommended to position the sensor so that light hits a circular area (shown by the dotted line) with a radius of 1.5 to 2 mm (diameter of 3 to 4 mm) from the center of the package.

Light detecting area (0.24 x 0.24 mm)

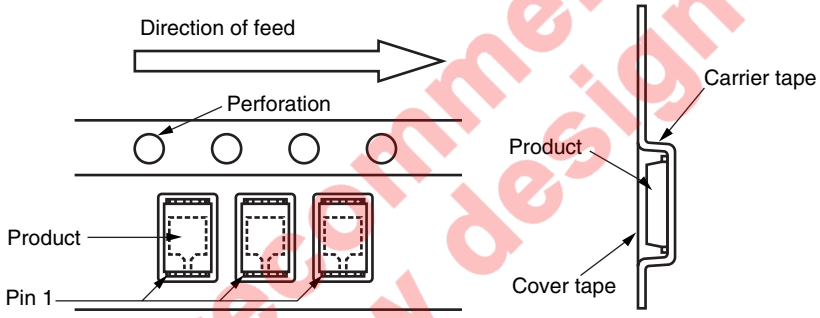
Recommended area for light to hit (1.5 to 2 mm radius)

TAPING SPECIFICATIONS (UNIT: mm)

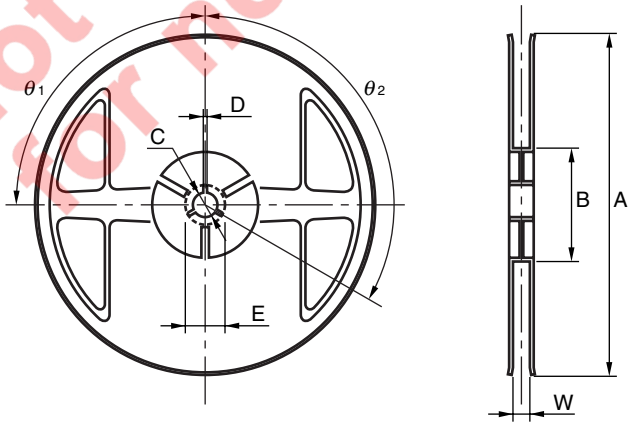
Outline and Dimensions (Tape)



Tape Direction



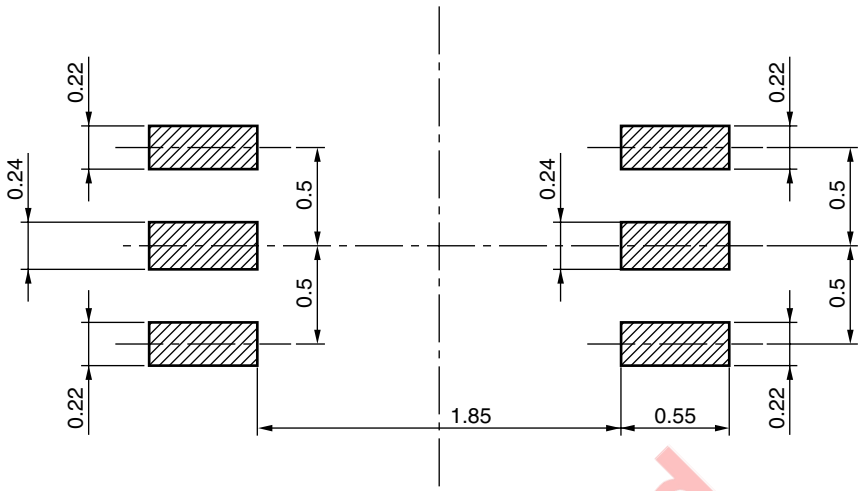
Outline and Dimensions (Reel)



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

Symbol	Dimensions (mm)
C	ϕ13±0.2
D	2.0±0.5
E	21.0±0.8
θ_1	90°
θ_2	120°

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±5°C, 10 to 24 hours
   After the baking process, this product must be stored under conditions of 30°C or below, 70% RH or below, and reflow soldering must be done within 168 hours.

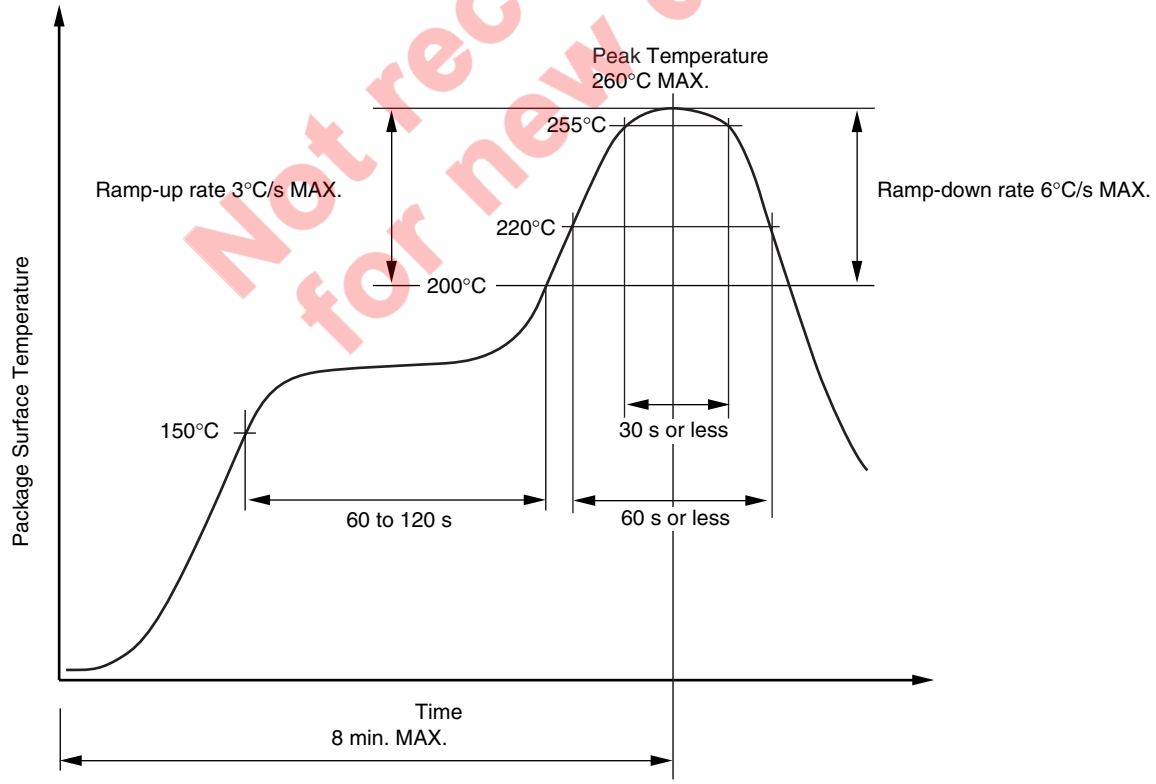
   < Storage conditions after breaking seal >

   - Storage conditions : 30°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°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



Revision History	PH5503A2NA1 Data Sheet

Rev.	Date	Description	
		Page	Summary
1.00	Dec 13, 2011	–	First edition issued

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Colophon 1.1