

# VCSEL Array Module (Product Specification)

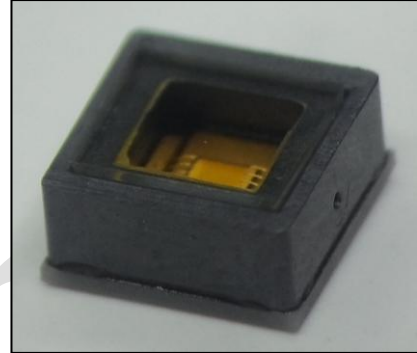
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## Approval Sheet

PV88QP4 V5 VCSEL Array Module  
Product Specification

RoHS

Product	VCSEL Array Module
Part Number	PV88QP4 V5
Customer	
Issue Date	2023/04/26



### ■ Features

- ✓ Compact dimensions : 3.5 mm × 3.5 mm × 1.6 mm
- ✓ Peak wavelength:  $\lambda_p = 940$  nm
- ✓ 20° VCSEL with clear glass cover
- ✓ Environmental friendly ; RoHS compliance

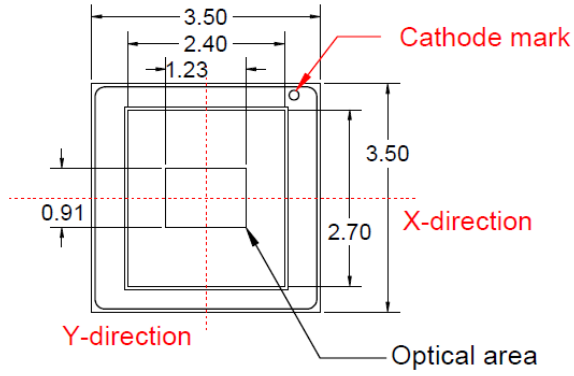
### ■ Applications

- ✓ Scene understanding with multi-object detection
- ✓ 3D depth assistance
- ✓ Presence detection

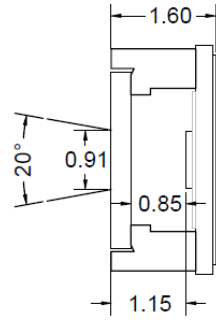
**Outline Dimension**

PV88QP4 V5 VCSEL Array Module  
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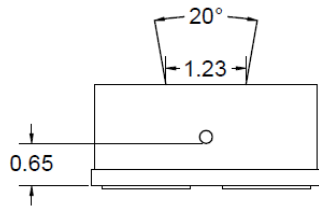
**Package Dimension**



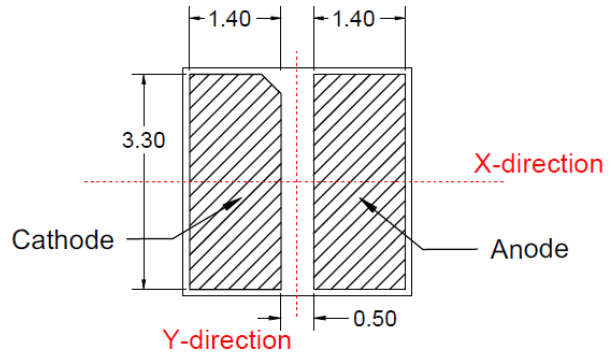
Top



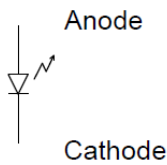
Side-Y



Side-X



Bottom



Circuit Diagram

Unit: mm  
 Tolerance:  $\pm 0.1\text{mm}$

## Characteristics

PV88QP4 V5 VCSEL Array Module  
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### ■ Electro-optical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	Min.	Typical	Max.	Unit
Forward Voltage	$V_F$	$I_F = 3.5 \text{ A}$	1.8	2.2	2.4	V
Forward voltage temperature variation	$\Delta V_F / \Delta T$	$I_F = 3.5 \text{ A}$		-2		mV/°C
Wavelength	$\lambda_p$	$I_F = 3.5 \text{ A}$	930	940	950	nm
Wavelength temperature variation	$\Delta \lambda_p / \Delta T$	$I_F = 3.5 \text{ A}$		0.07		nm/°C
Radiant Power	$\Phi_e$	$I_F = 3.5 \text{ A}$	2000	2500	3200	mW
Slope Efficiency	SE		0.7	0.9	1.2	W/A
Spectral Width(FWHM)	$\Delta \lambda$	$I_F = 3.5 \text{ A}$	1	1.8	2.2	nm
Threshold Current	$I_{th}$		0.3	0.7	1	A
Power Conversion Efficiency	PCE	$I_F = 3.5 \text{ A}$	30	35		%
FOV-x	$FOV_x$	$I_F = 3 \text{ A}$	18	20	25	deg
FOV-y	$FOV_y$	$I_F = 3 \text{ A}$	18	20	25	deg
Series resistance	$R_s$	$I_F = 3.5 \text{ A}$		0.18		Ohm

Note:

- (1) Lextar maintains a tolerance of  $\pm 10\%$  on radiant power,  $\pm 0.1\text{V}$  on forward voltage and  $\pm 1\text{nm}$  on peak wavelength measurements.
- (2) All test item are measured with 0.5ms pulse current, single pulse
- (3) Field of view (FOV) is distribution of radiation intensity which is measured with a goniometer system. Emitted light from package is measured by a photo-detector directly without a screen.

■ **Absolute Maximum Ratings**

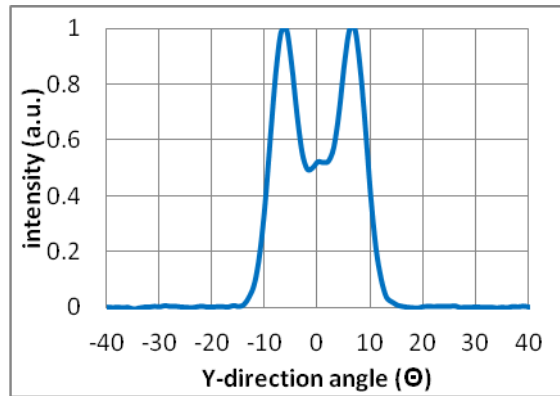
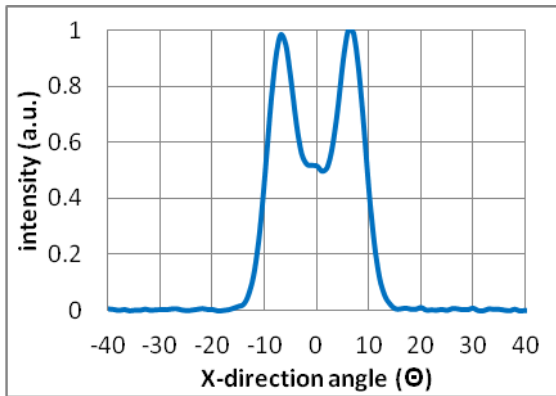
Parameter	Symbol	VALUE	Unit
Operation Temperature-extended <sup>(1)</sup>	T <sub>op</sub>	-40~105	°C
Storage Temperature	T <sub>stg</sub>	-40~125	°C
Junction temperature	T <sub>j</sub>	135	°C

Note:

- (1) Proper current rating must be observed to maintain junction temperature below maximum at all time.
- (2) Reliability tests are based on MCPCB board.

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■ **Field of View**

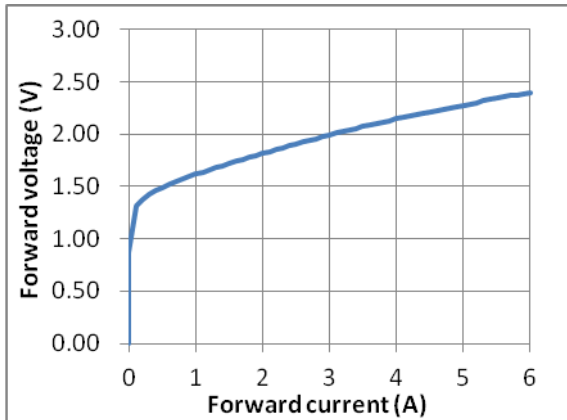


Note:

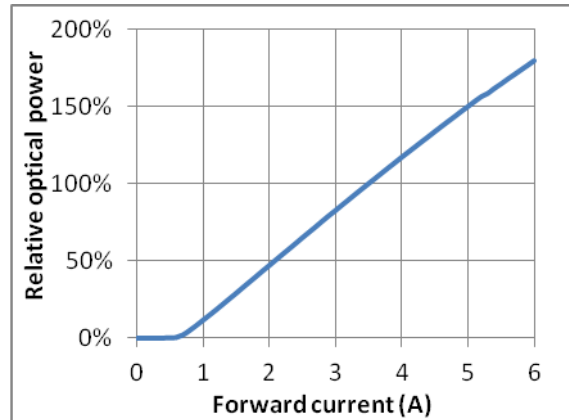
Field of view (FOV) is distribution of radiation intensity which is measured with a goniometer system. Emitted light from package is measured by a photo-detector directly without a screen.

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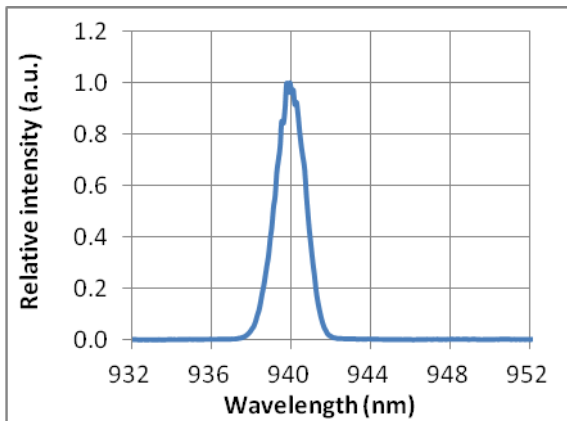
■ **Forward Voltage vs. Current**



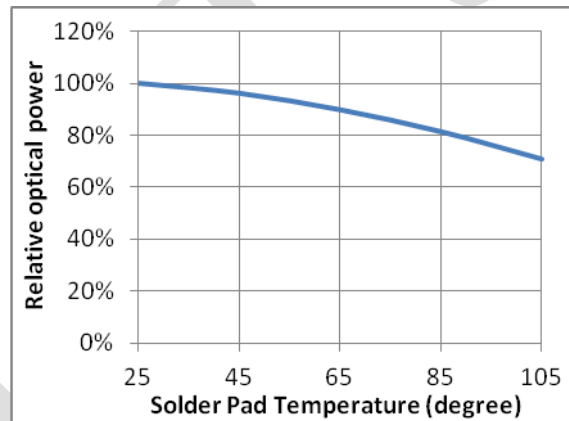
■ **Radiant Power vs. Current**



■ **Spectrum**



■ **Radiant Power vs. Temperature**



**Classification table**

PV88QP4 V5 VCSEL Array Module  
 Product Specification

**Forward voltage BIN table**

Bin code	Range		Unit	Condition
	Min.	Max.		
P	1.8	2.4	V	$I_F=3.5A$

**Radiant power BIN table**

Bin code	Range		Unit	Condition
	Min.	Max.		
R1	2000	3200	mW	$I_F=3.5A$

**Peak wavelength BIN table**

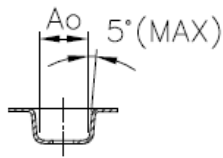
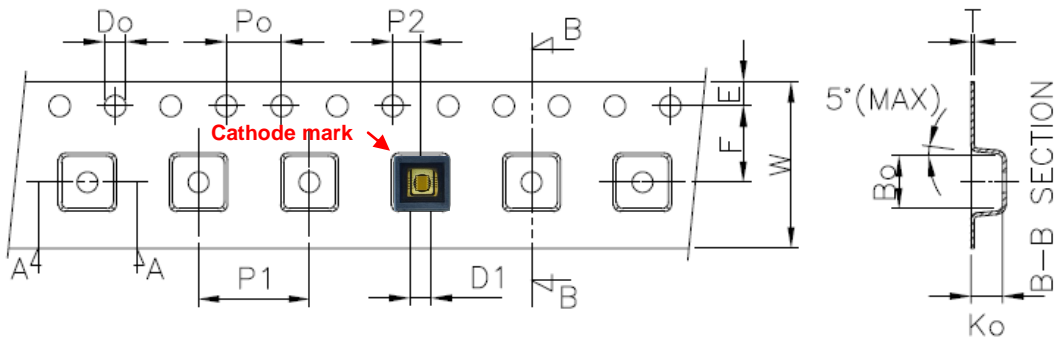
Bin code	Range		Unit	Condition
	Min.	Max.		
Y2001	930	935	nm	$I_F=3.5A$
Y2002	935	940		
Y2003	940	945		
Y2004	945	950		



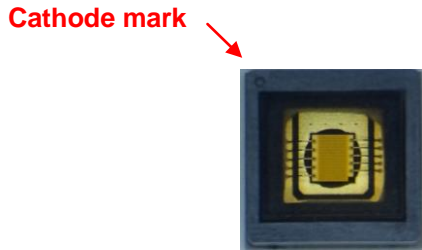
**Packing**

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**Emitter Reel Packing**

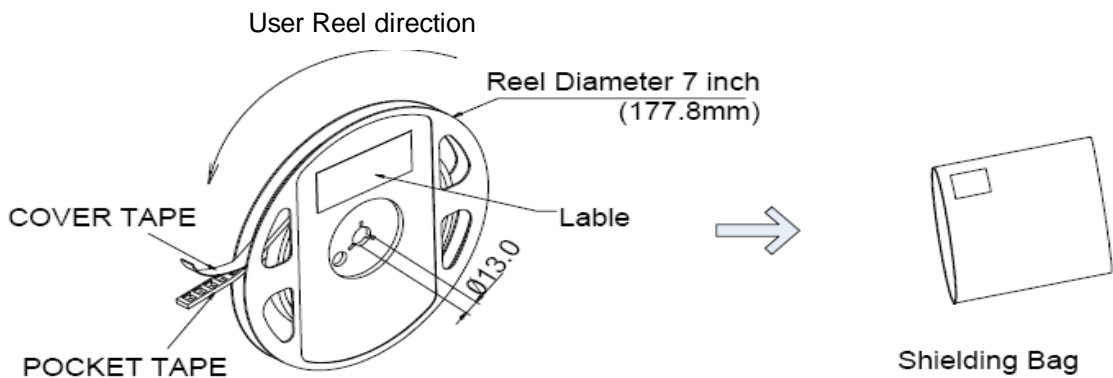


A-A SECTION



UNIT: mm

symbol	$A_o$	$B_o$	$K_o$	$P_o$	$P_1$	$P_2$	$T$
spec	$3.70 \pm 0.10$	$3.70 \pm 0.10$	$2.4 \pm 0.10$	$4.00 \pm 0.10$	$8.00 \pm 0.10$	$2.00 \pm 0.05$	$0.3 \pm 0.05$
symbol	$E$	$F$	$D_o$	$D_1$	$W$	$10P_o$	--
spec	$1.75 \pm 0.10$	$5.50 \pm 0.05$	$1.55 \pm 0.10$	1.5 min	$12.0 \pm 0.20$	$40.0 \pm 0.20$	--

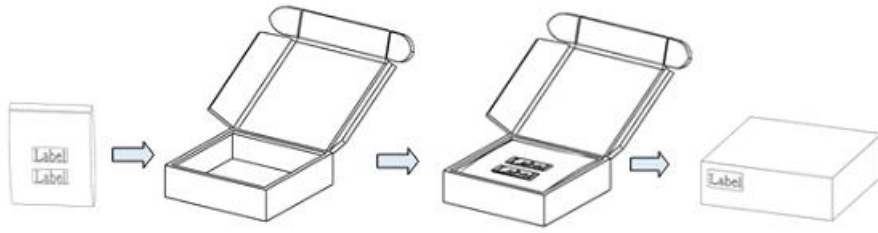


7 inch Anti-Static Reel

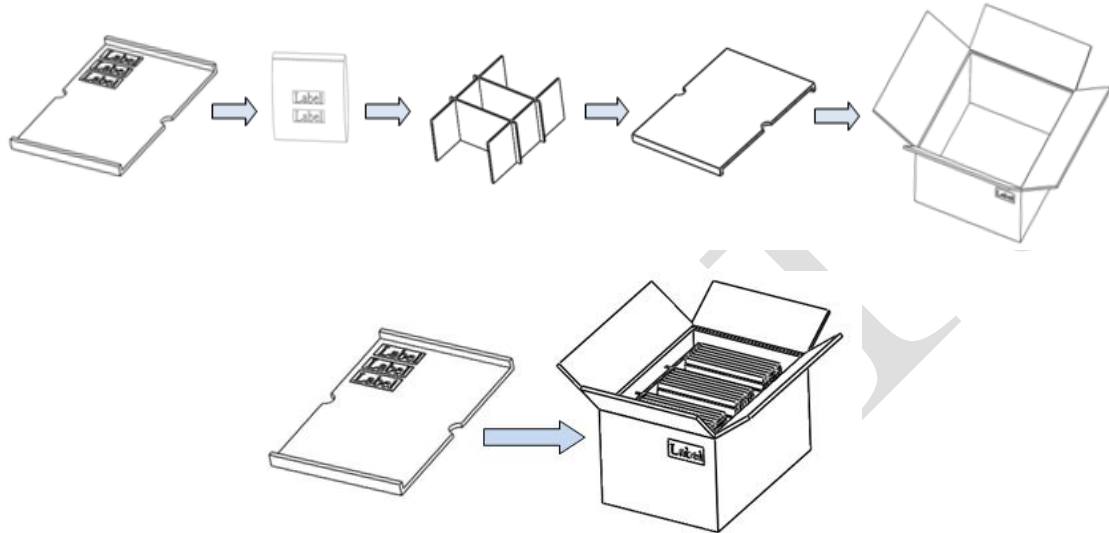
Max 500pcs/reel

Min 200pcs/reel

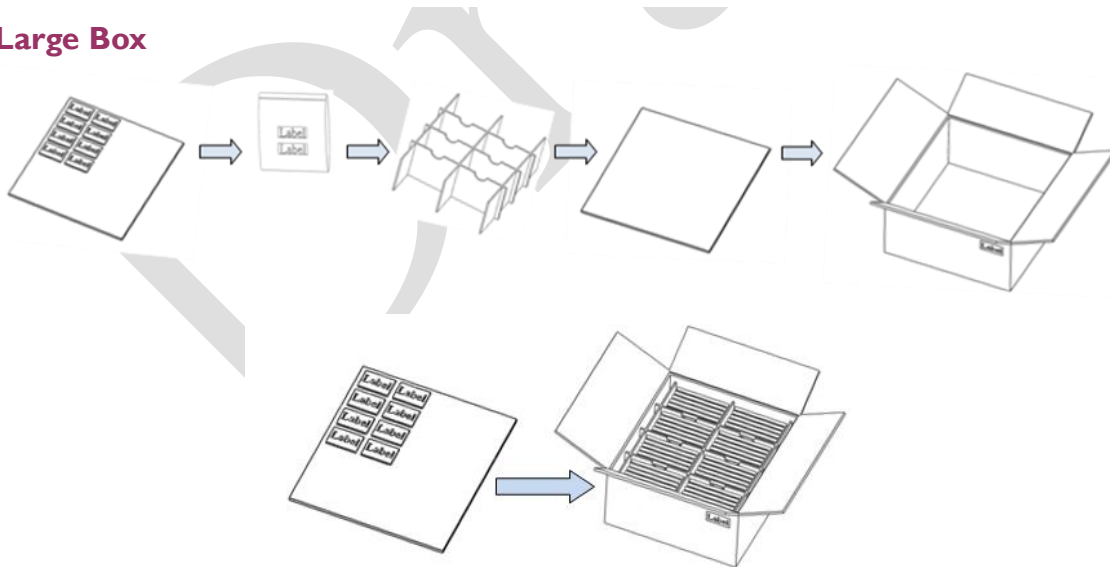
■ **Small Box**



■ **Medium Box**



■ **Large Box**

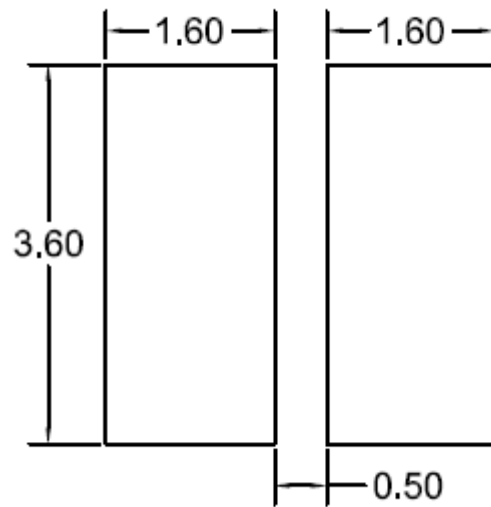


5 inner boxes in one carton  
L x W x H = 390x310x260mm

## Application Notes

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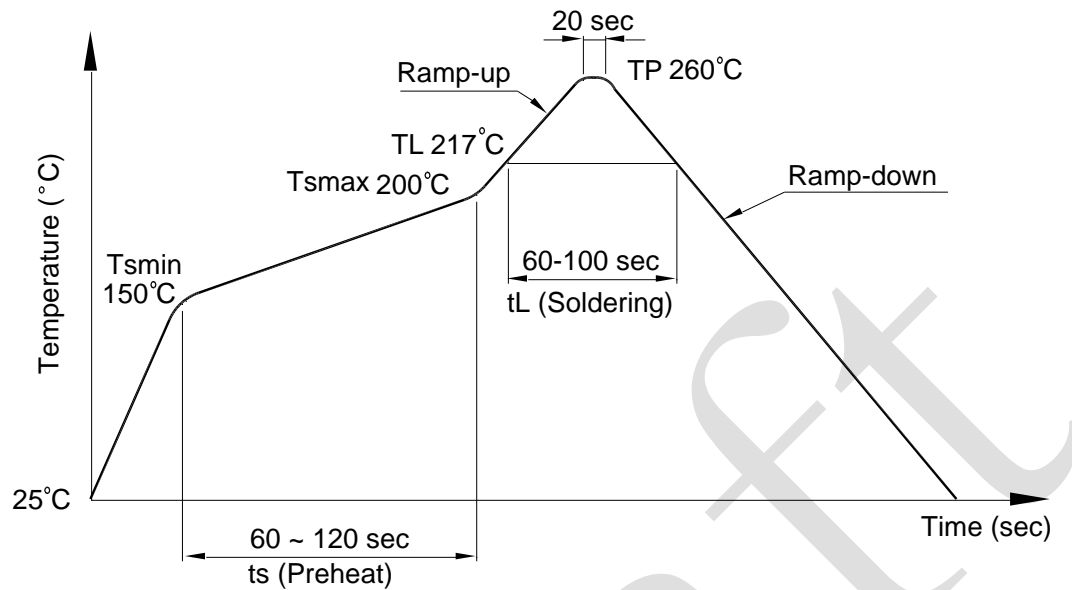
### ■ Recommended PCB solder pads layout



Unit: mm

Tolerance:  $\pm 0.1$ mm

■ **Recommended Reflow Soldering Profile (JEDEC-STD-020 latest version compliant)**



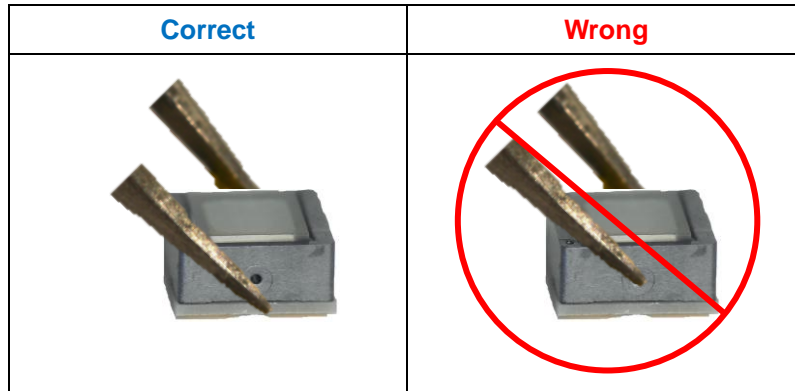
Profile Items	Conditions
Preheat	
-Temperature Min.( $T_{Smin}$ )	150°C
-Temperature Max.( $T_{Smax}$ )	200°C
-Time(Min. to Max.)( $t_s$ )	90±30 sec
Soldering Zone	
-Temperature( $T_L$ )	217°C
-Time	60~100 sec
Peak Temperature( $T_P$ )	260°C
Ramp-up rate	3°C / sec max.
Ramp-down rate	3~6°C / sec

**Note:**

1. One time soldering is recommended; do not exceed 3 times reflow process.
2. The recommended peak temperature is 245°C. The maximum soldering temperature should be controlled under 260°C.

■ **Handling manual**

Do not touch the lens and housing with the tweezers or fingers. Do not push on the lens. Do not apply more than 1Kg of force directly onto the lens. Excessive force on the lens could damage the PKG. Please handle the component by clamping ceramic substrate.



### ■ Storage

- Before opening the package, the Device should storage under 30°C, 70% RH. Recommend to use within one year.
- After opening the package bag, the Device should be keep under 30°C, 60% RH. Recommend to use within 7days. If unused Device remain, suggest to store into moisture proof bag or original package bag with moisture absorbent material such as silica gel. Reseal well is necessary.
- If the product exceeded the storage period or the moisture absorbent material faded away, baking treatment should be done by following conditions.  
Bake condition: 60°C, 12hours (One time only).

### ■ Static Electricity

- Device package is extremely sensitive to static electricity. It's recommended that anti-electrostatic glove and wrist band is necessary when handling the Device. All devices are also be grounded properly as well.
- Protection devices design should be considered in the Device driving circuit

### ■ Cleaning

- Do not clean the device by dipping into any liquid or flushing with any liquid.
- Recommend to clean the device by air blowing, if necessary.

## Revision History

PV88QP4 V5 VCSEL Array Module  
Product Specification

Revision	Date	Description
A_00	14/5/2021	- Preliminary Document
A_01	21/6/2021	- Add Active area
A_02	9/7/2021	-Add junction temperature
A_03	22/10/2021	-modify operation temperature
A_04	06/01/2022	-modify figure - add up and low limit of characteristic
A_05	26/04/2023	-Peak wavelength classification

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