

VCSEL Array Module (Product Specification)

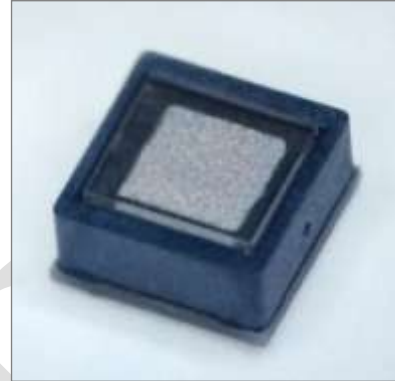
Preliminary

Approval Sheet

PV88QB4 V5 VCSEL Array Module
Product Specification

RoHS

Product	VCSEL Array Module
Part Number	PV88QB4 V5
Customer	
Issue Date	2020/12/09



■ Features

- ✓ Compact dimensions : 3.5 mm × 3.5 mm × 1.6 mm
- ✓ Peak wavelength: $\lambda_p = 940$ nm
- ✓ Rectangular emission pattern with a 116° × 98° diffuser
- ✓ Environmental friendly ; RoHS compliance

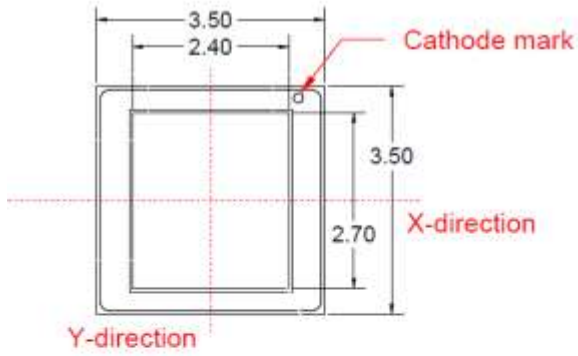
■ Applications

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

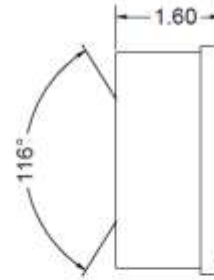
Outline Dimension

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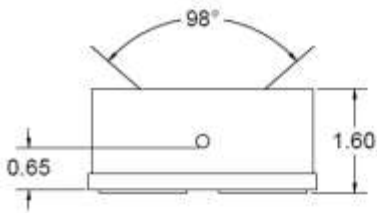
Package Dimension



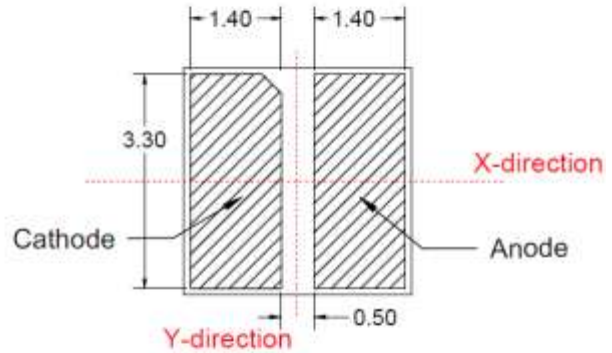
Top



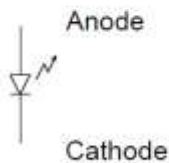
Side-Y



Side-X



Bottom



Circuit Diagram

Unit: mm
Tolerance: ± 0.1 mm

Characteristics

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■ Electro-optical Characteristics ($T_a=25^\circ\text{C}$)

Parameter	Symbol	Condition	Min.	Typical	Max.	Unit
Forward Voltage	V_F	$I_F = 3.5 \text{ A}$	1.9	2.2	2.5	V
Forward voltage temperature variation	$\Delta V_F / \Delta T$	$I_F = 3.5 \text{ A}$	--	-2	--	mV/ $^\circ\text{C}$
Wavelength	λ_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/ $^\circ\text{C}$
Radiant Power	Φ_e	$I_F = 3.5 \text{ A}$	2000	2700	3200	mW
Slope Efficiency	SE		0.6	0.8	1.1	W/A
Spectral Width	$\Delta \lambda$	$I_F = 3.5 \text{ A}$	1	1.8	2.2	nm
Threshold Current	I_{th}		0.3	0.75	1	A
Power Conversion Efficiency	PCE	$I_F = 3.5 \text{ A}$	30	35	--	%
X-direction Divergence Angle(FWHM)	θ_x	$I_F = 3.5 \text{ A}$	71	76	81	degree
Y-direction Divergence Angle(FWHM)	θ_y	$I_F = 3.5 \text{ A}$	95	101	117	degree
FOV-x	FOV_x	$I_F = 3.5 \text{ A}$	93	98	103	degree
FOV-y	FOV_y	$I_F = 3.5 \text{ A}$	110	116	122	degree

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) For production, devices are tested with $I_F = 3.5 \text{ A}$, 0.5 ms pulse width, single pulse. $I_F = 18 \text{ A}$ is applicable for operating at 15 ns pulse width, 0.24% duty cycle, with the device soldered on a PCB.
- (3) For divergence angle, emitted light from the device was projected on a flat screen. Divergence angle was calculated from full-width-half-maximum (FWHM) intensity distribution of the projected emission pattern.
- (4) Field of view (FOV) is distribution of radiation intensity which is measured with a goniometer system. Emitted light from the device is measured by a photo-detector directly without a screen.

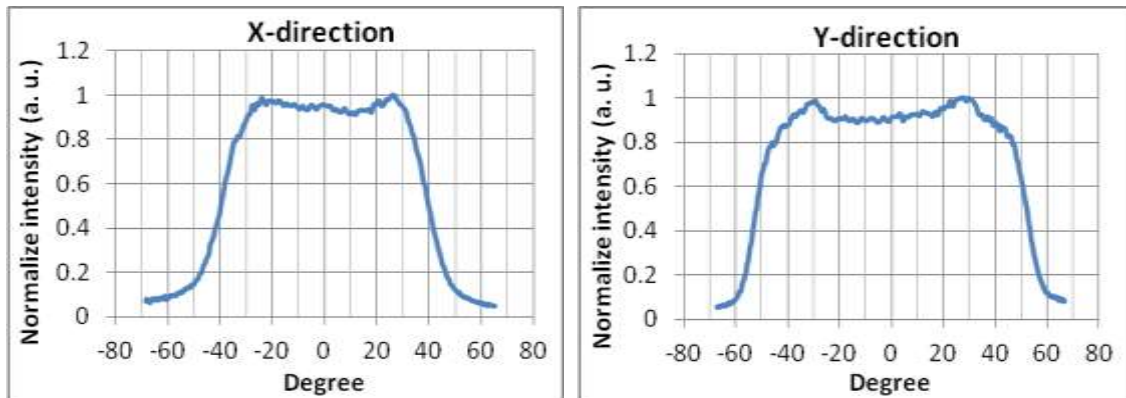
■ **Absolute Maximum Ratings**

Parameter	Symbol	VALUE	Unit
Operation Temperature	T_{op}	-40~105	°C
Storage Temperature	T_{stg}	-40~125	°C
Reverse Power Supply Voltage	V_r	5	V
Relative Humidity		5%~95%	
Peak CW Forward Current	$I_F(CW)$	3	A
Peak Pulsed Forward Current	I_{peak}	20	A
ESD Exposure (Human Body Model)	ESD HBM	1	KV

Note:

Operation condition for peak pulsed forward current: pulse width < 100ns and duty cycle < 1%

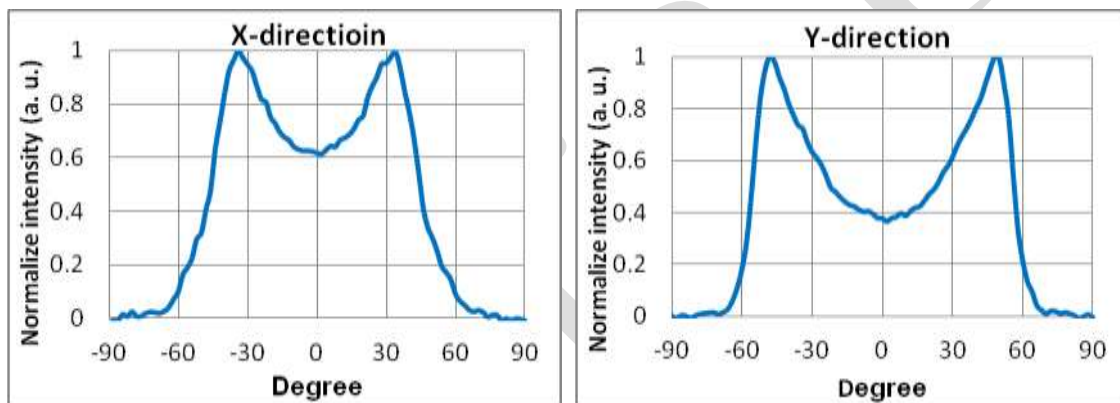
■ Intensity Distribution of Projected Pattern



Note:

Emitted light from the device was projected on a flat screen. The projected emission pattern was captured by a CCD for obtaining intensity distribution.

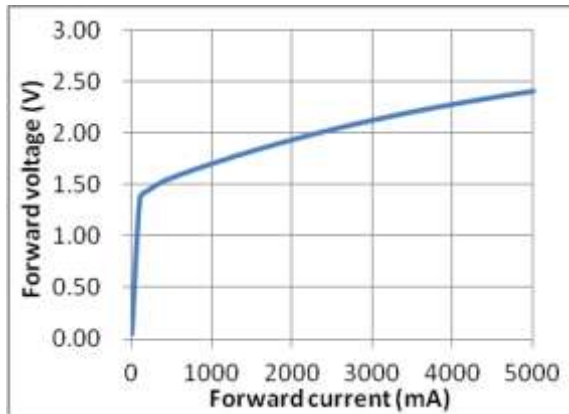
■ Field of View



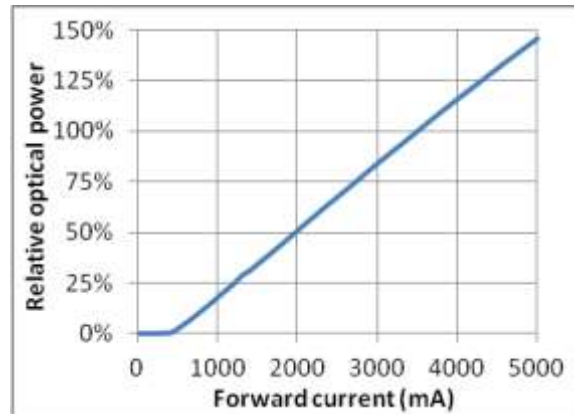
Note:

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

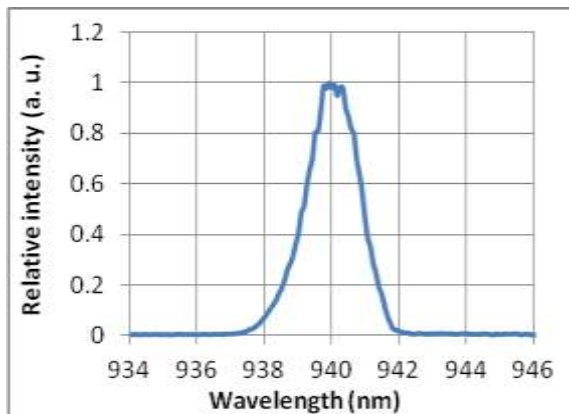
■ Forward Voltage vs. Current



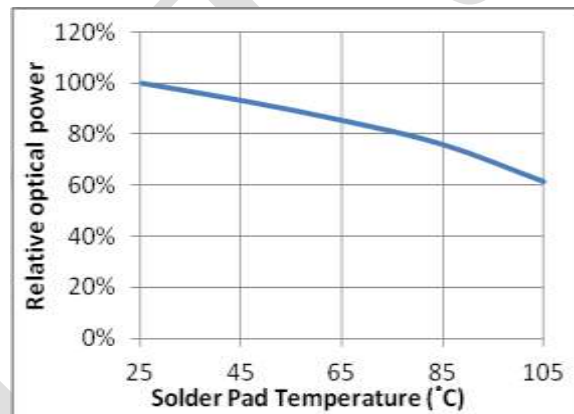
■ Radiant Power vs. Current



■ Spectrum



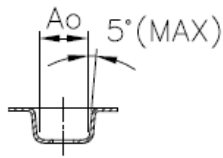
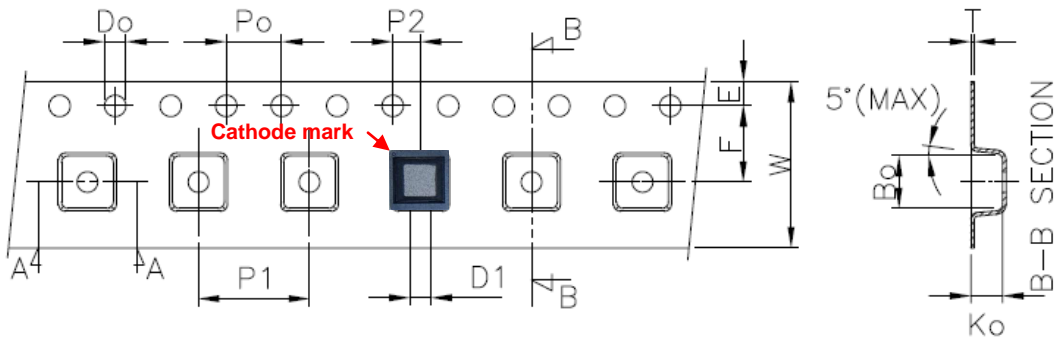
■ Radiant Power vs. Temperature



Packing

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Emitter Reel Packing



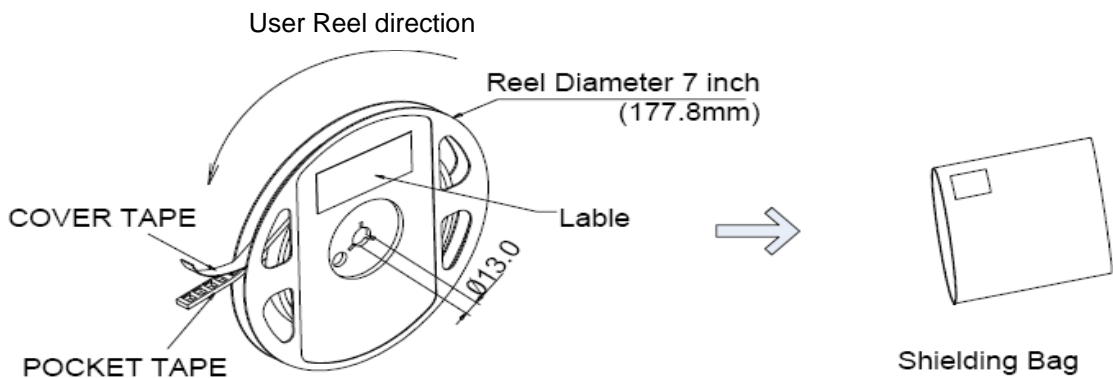
A-A SECTION

Cathode mark



UNIT:mm

symbol	Ao	Bo	Ko	Po	P1	P2	T
spec	3.70±0.10	3.70±0.10	2.4±0.10	4.00±0.10	8.00±0.10	2.00±0.05	0.3±0.05
symbol	E	F	Do	D1	W	10Po	--
spec	1.75±0.10	5.50±0.05	1.55±0.10	1.5 min	12.0±0.20	40.0±0.20	--

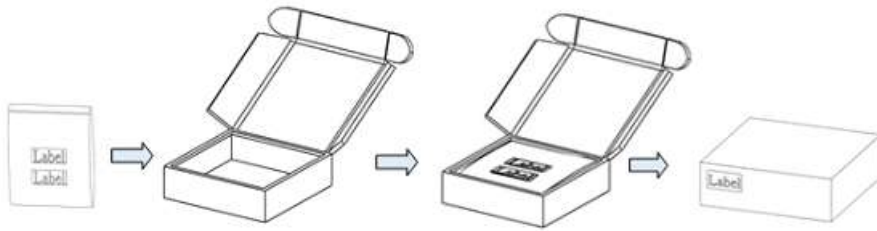


7 inch Anti-Static Reel

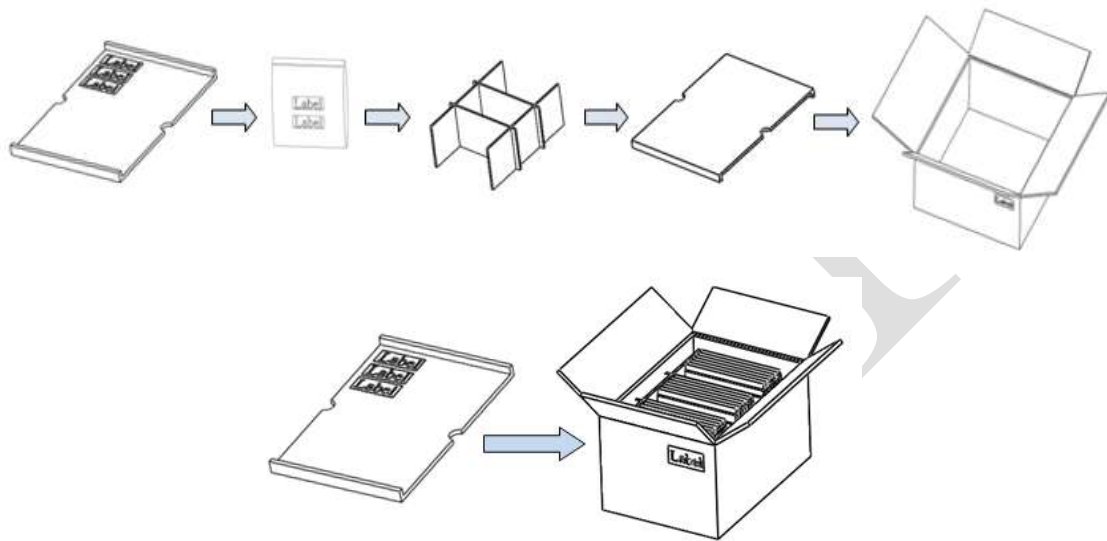
Max 500pcs/reel

Min 200pcs/reel

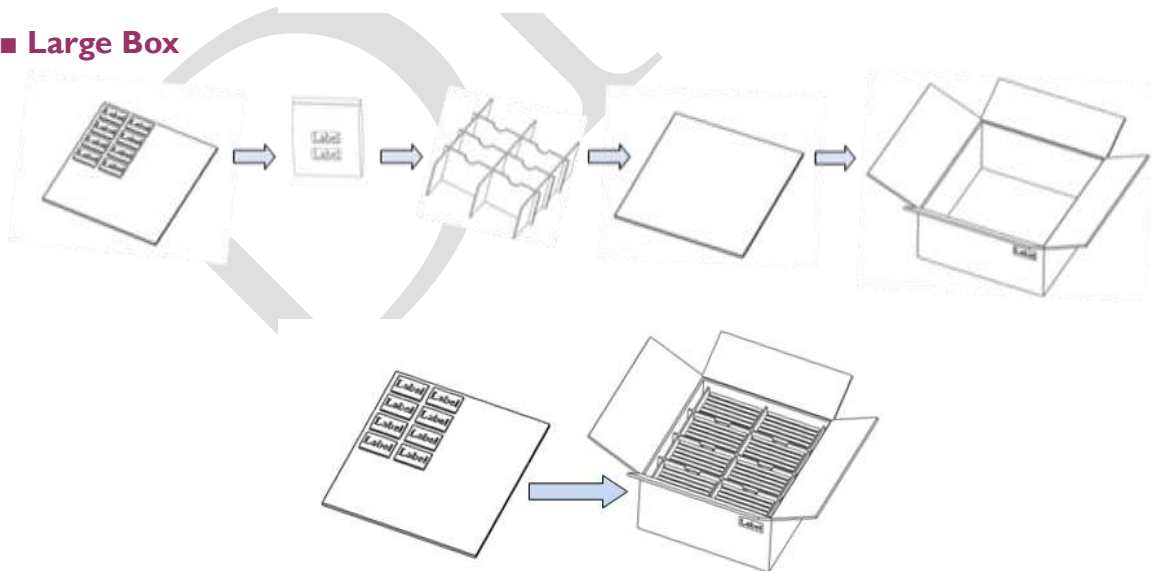
■ **Small Box**



■ **Medium Box**



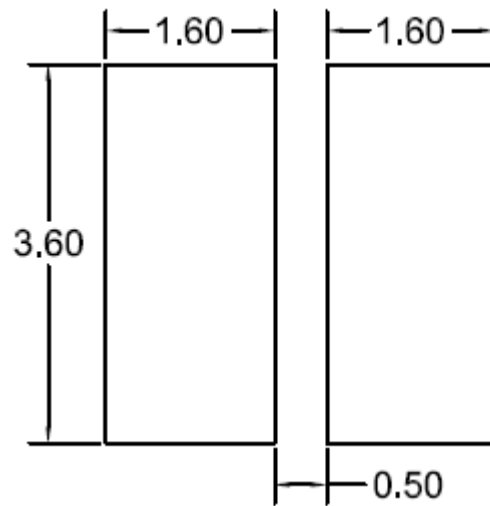
■ **Large Box**



Application Notes

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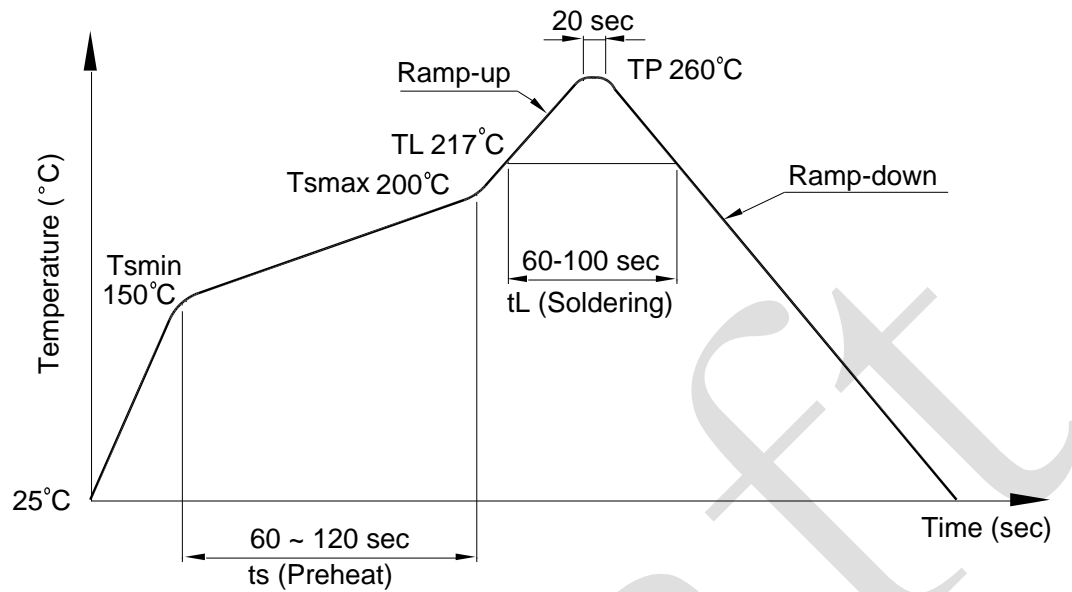
■ Soldering PAD Design



Unit: mm

Tolerance: ± 0.1 mm

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



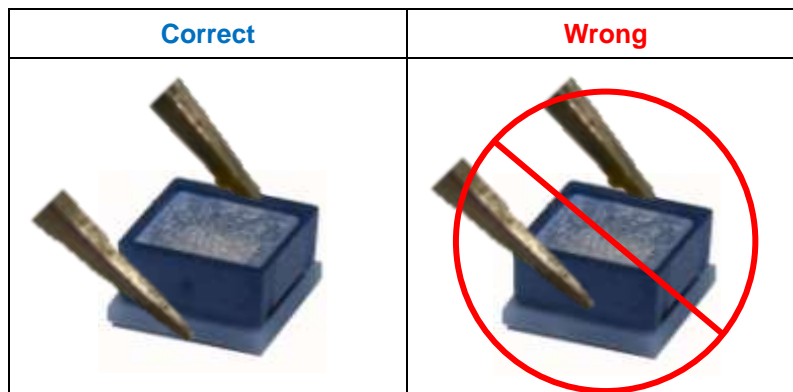
Profile Items	Conditions
Preheat	
-Temperature Min.(T_{Smin})	150°C
-Temperature Max.(T_{Smax})	200°C
-Time(Min. to Max.)(t_s)	90±30 sec
Soldering Zone	
-Temperature(T_L)	217°C
-Time	60~100 sec
Peak Temperature(T_P)	260°C
Ramp-up rate	3°C / sec max.
Ramp-down rate	3~6°C / sec

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

PV88QB4 V5 VCSEL Array Module
Product Specification

Revision	Date	Description
A_00	07/01/2020	- Preliminary document
A_01	12/10/2020	- Modified carrier spec.
A_02	09/12/2020	- Change diffuser LENS to 116*98 - Update product outline

Draft