

VCSEL Array Module

(Product Specification)

Preliminary

Approval Sheet

PV85QD4 V5 VCSEL Array Module
Product Specification

RoHS

Product	VCSEL Array Module
Part Number	PV85QD4 V5
Customer	
Issue Date	2021/01/29



■ Features

- ✓ Compact dimensions: 3.5 mm × 3.2 mm × 1.6 mm
- ✓ Peak wavelength: $\lambda_p = 940 \text{ nm}$
- ✓ Rectangular emission pattern with a $127^\circ \times 104^\circ$ diffuser
- ✓ Environmental friendly ; RoHS compliance

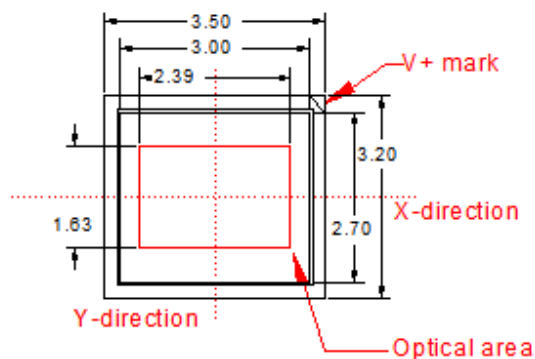
■ Applications

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

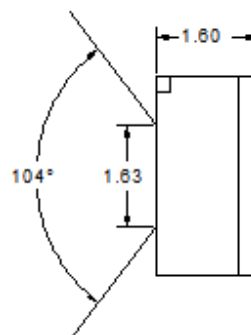
Outline Dimension

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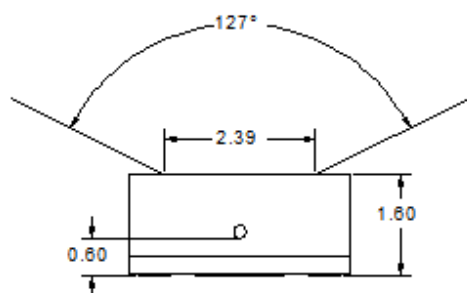
Package Dimension



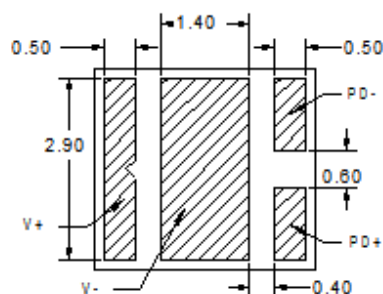
Top view



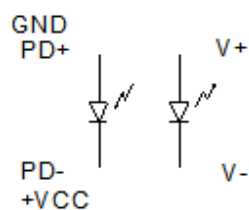
Side-Y view



Side-X view



Bottom view



Circuit Diagram

Unit: mm
Tolerance: ± 0.1 mm

Characteristics

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■ Electro-optical Characteristics (T_a=25°C)

Parameter	Symbol	Condition	Min.	Typical	Max.	Unit
Forward Voltage	V _F	I _F = 4.5 A	1.8	2.2	2.4	V
Forward voltage temperature variation	ΔV _F /ΔT	I _F = 4.5 A		-2		mV/°C
Wavelength	λ _p	I _F = 4.5 A	930	940	950	nm
Wavelength temperature variation	Δλ _p /ΔT	I _F = 4.5 A		0.07		nm/°C
Radiant Power	Φ _e	I _F = 4.5 A	2900	3400	--	mW
Slope Efficiency	SE		0.6	0.8	1.1	W/A
Spectral Width(FWHM)	Δλ	I _F = 4.5 A	1	1.8	2.2	nm
Threshold Current	I _{th}			0.7		A
Power Conversion Efficiency	PCE	I _F = 4.5 A	30	34		%
x-direction Divergence Angle(FWHM)	θ _x	I _F = 4.5 A		86		deg
y-direction Divergence Angle(FWHM)	θ _y	I _F = 4.5 A		78		deg
FOV-x	FOV _x	I _F = 4.5 A		127		deg
FOV-y	FOV _y	I _F = 4.5 A		104		deg
Series resistance	R _s	I _F = 4.5 A		0.18		Ohm

Note:

- (1) Lextar maintains a tolerance of ±10% on radiant power, ±0.1V on forward voltage and ±1nm on peak wavelength measurements.
- (2) All test item are measured with 0.5ms pulse current, single pulse
- (3) For divergence angle, emitted light from the package 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 package is measured by a photo-detector directly without a screen.

■ Photo-diode Electro-Optical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	$I_F = 10\text{mA}$, $H=0$	0.5		1.3	V
Reverse Breakdown Voltage	V_{BR}	$I_R = 100\mu\text{A}$, $H=0$	35			V
Reverse Dark Current	I_D	$V_R=10\text{V}$		2	10	nA
Light Current	I_L	$V_R=5\text{V}$ $IF(\text{VCSEL})=4.5\text{A}$		2.0		mA
Peak Sensing Wavelength	λ_p			940		nm
Junction Capacitance	C_J	$V_R=3\text{V}$, $H=0$ $F=1\text{ MHz}$		2	10	pF

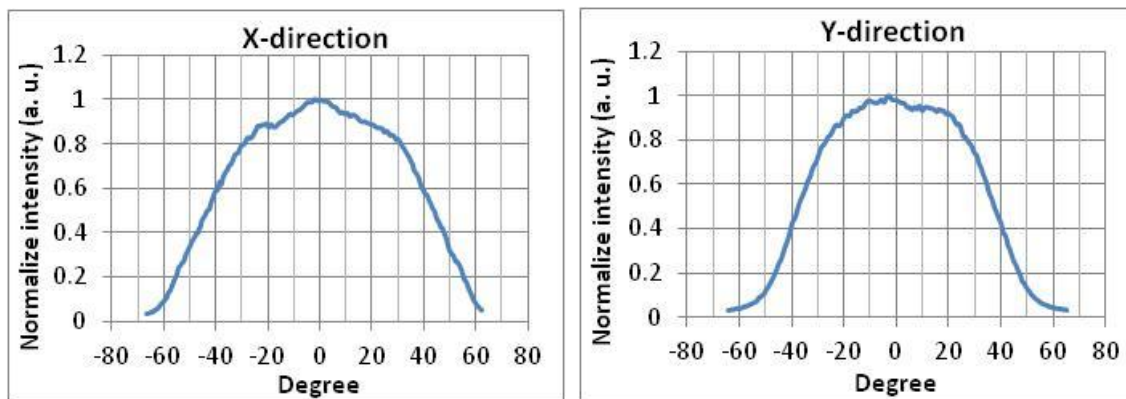
■ Absolute Maximum Ratings

Parameter	Symbol	VALUE	Unit
Operation Temperature-extended ⁽¹⁾	T_{op}	-40~105	°C
Storage Temperature	T_{stg}	-40~125	°C

Note:

(1) Extended operation temperature for <1% of operation time

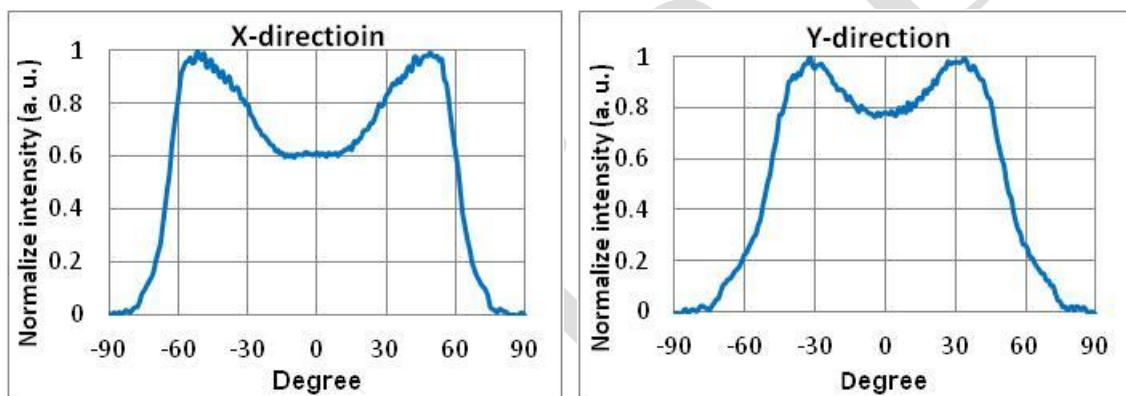
■ Intensity Distribution of Projected Pattern



Note:

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

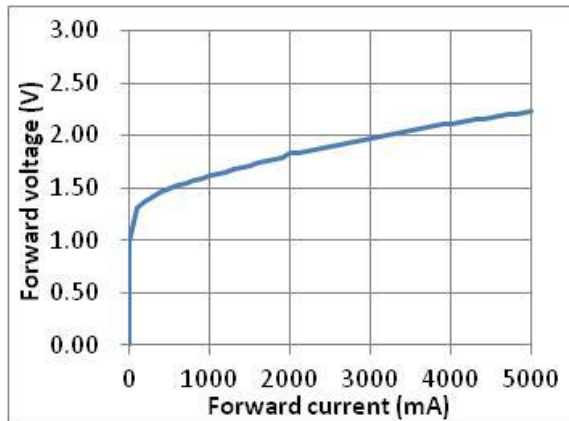
■ Field of View



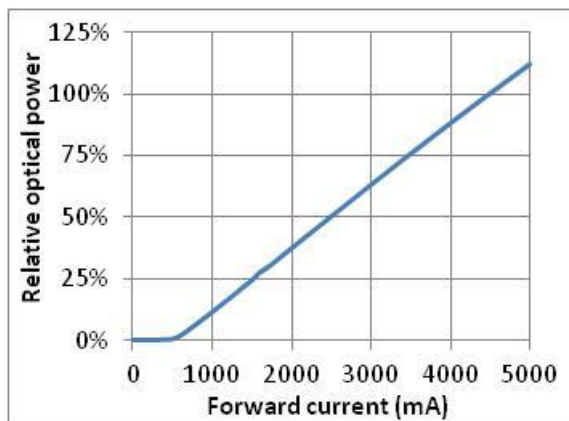
Note:

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

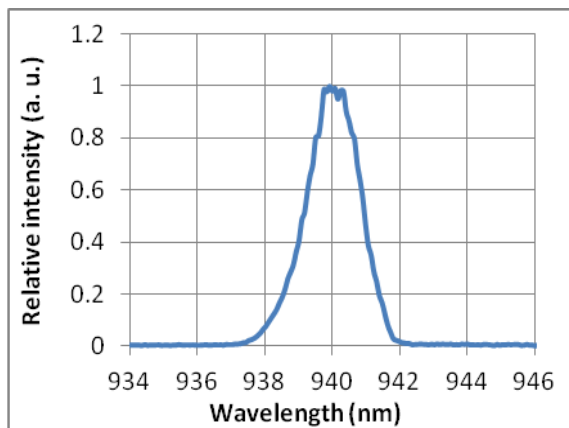
■ **Forward Voltage vs. Current**



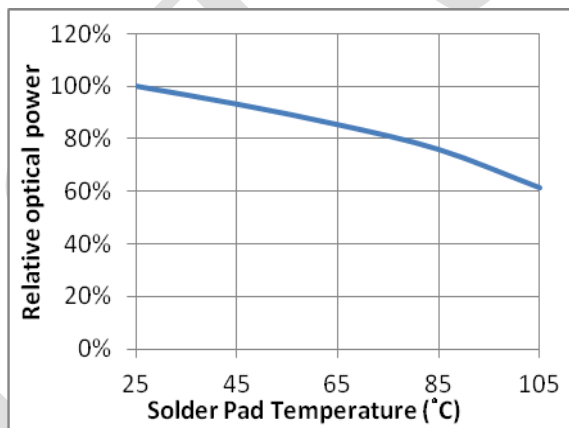
■ **Radiant Power vs. Current**



■ **Spectrum**



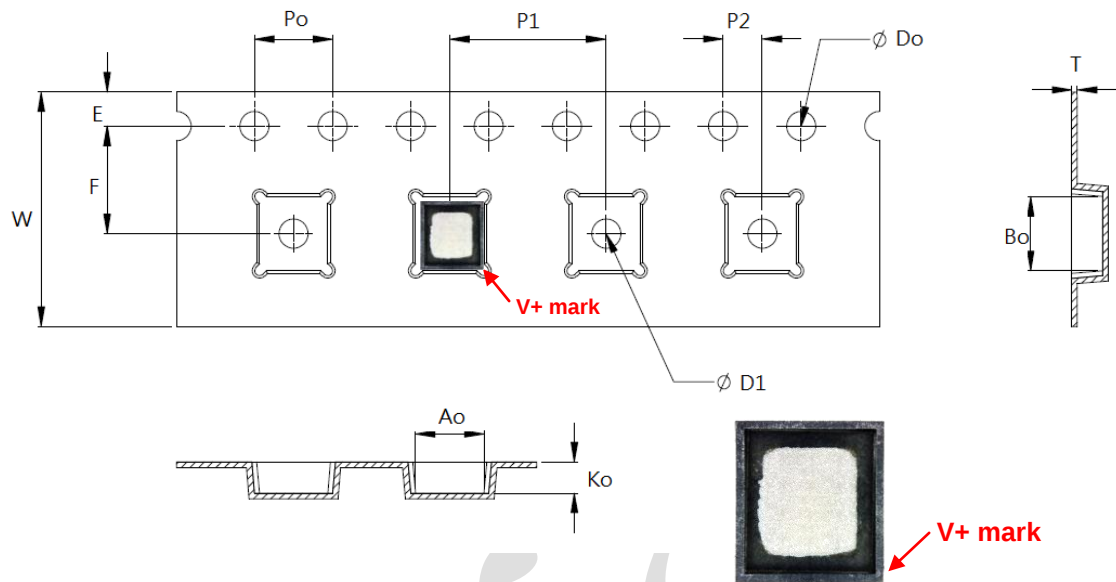
■ **Radiant Power vs. Temperature**



Packing

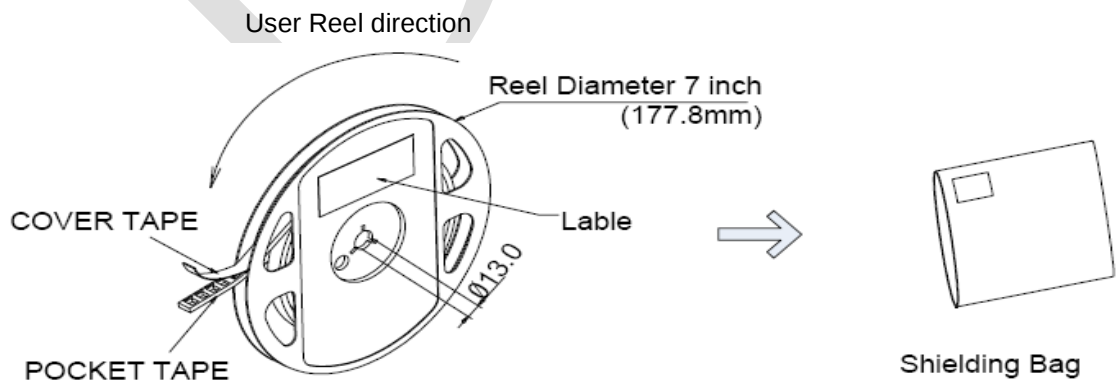
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Emitter Reel Packing



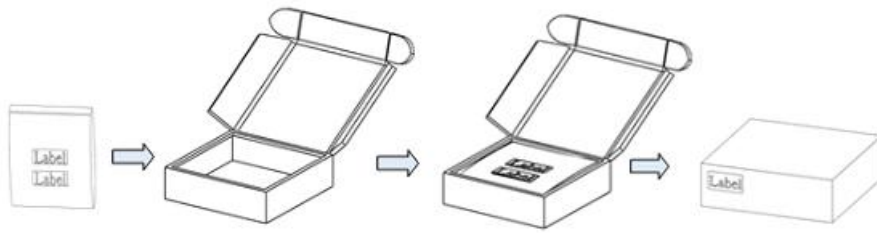
UNIT:mm

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±0.10
symbol	E	F	Do	D1	W	10Po	--
spec	1.75±0.10	5.50±0.05	1.55±0.05	1.5 min	12.0±0.30	40.0±0.20	--

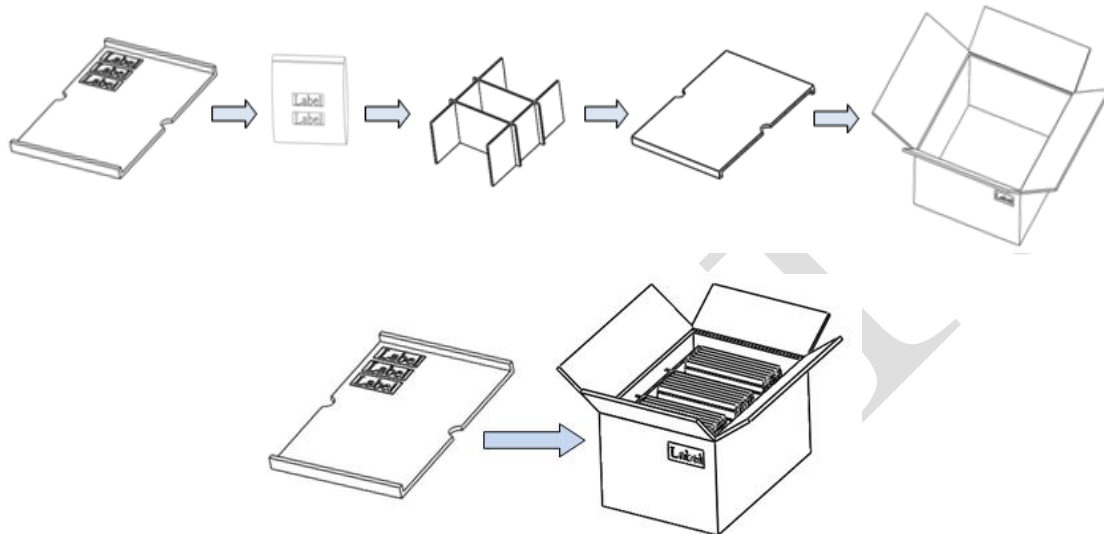


7 inch Anti-Static Reel
Max 500pcs/reel
Min 200pcs/reel

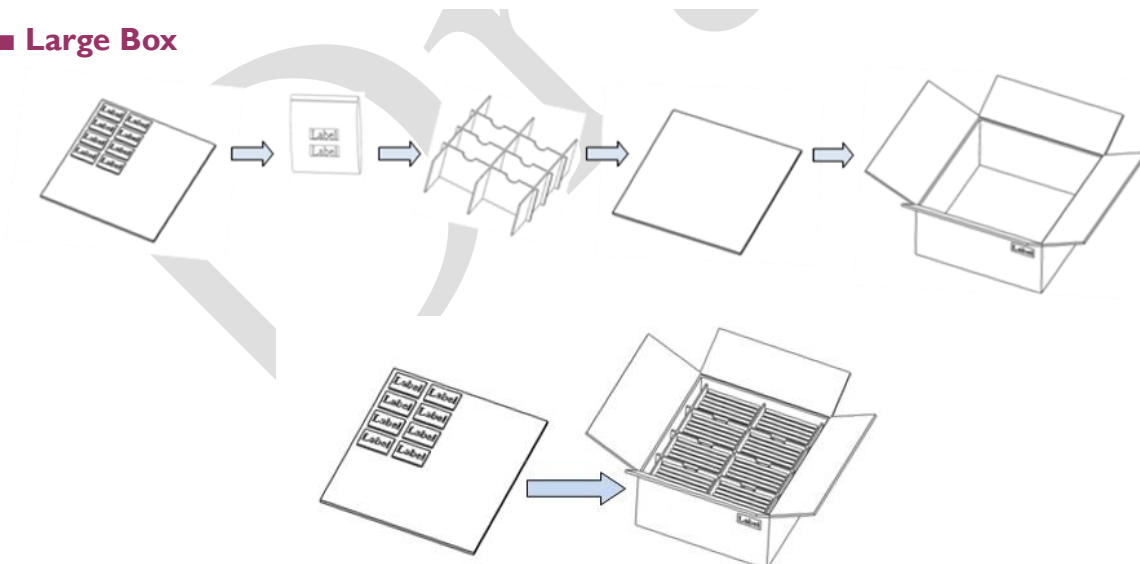
■ Small Box



■ Medium Box



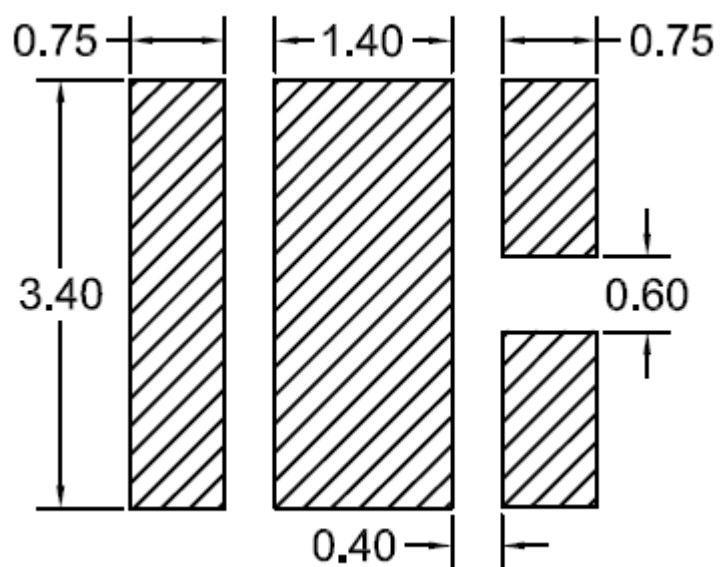
■ Large Box



Application Notes

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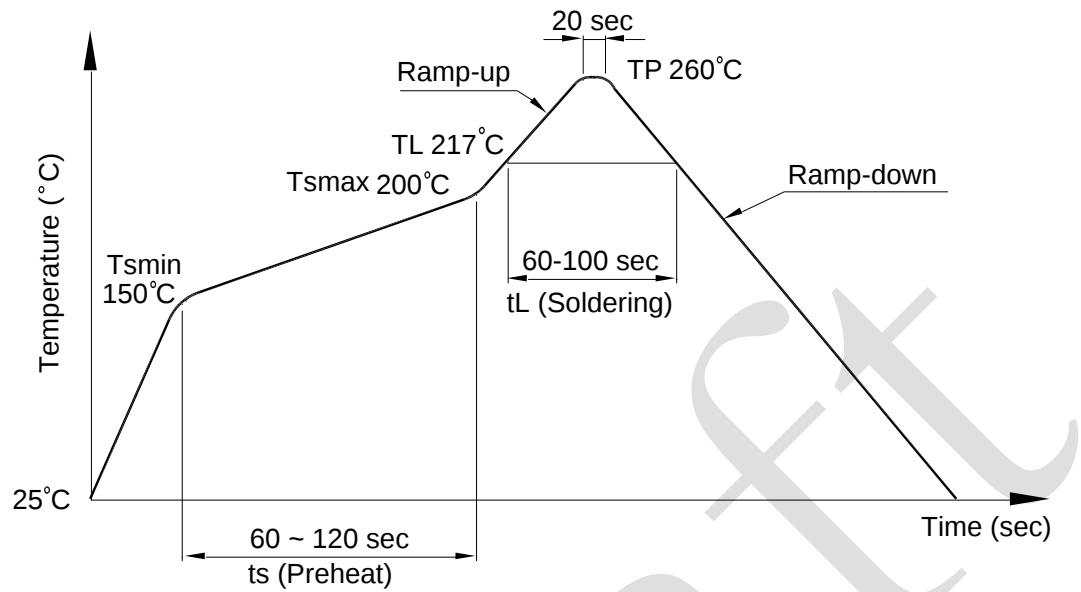
■ Recommended PCB solder pads layout



Unit: mm

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

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



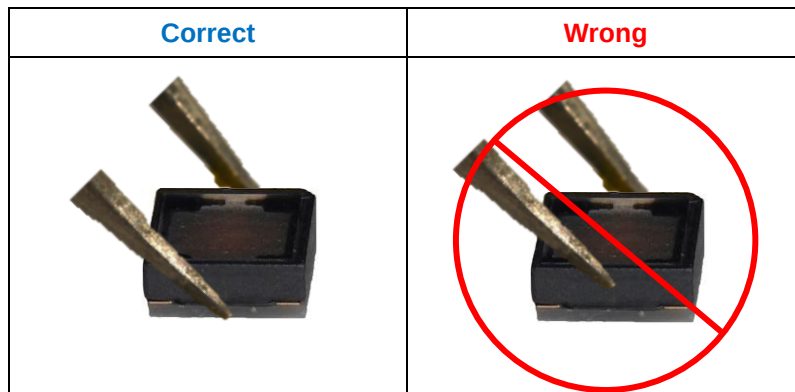
Profile Items	Conditions
Preheat	
-Temperature Min.(T _{Smin})	150°C
-Temperature Max.(T _{Smax})	200°C
-Time(Min. to Max.)(t _S)	90±30 sec
Soldering Zone	
-Temperature(T _L)	217°C
-Time	60~100 sec
Peak Temperature(T _P)	260°C
Ramp-up rate	3°C / sec max.
Ramp-down rate	3~6°C / sec

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

PV85QD4 V5 VCSEL Array Module
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Revision	Date	Description
A_00	29/1/2021	- Preliminary Document

Draft