

## 850-940nm 8mW Mixed VCSEL Diode + Photo Diode MV-8594C-008M-2C-3A0

MV-8594C-008M-2C-3A0 consists of two VCSEL chips one is 850nm 8mW and the other is 940nm 8mW, together with 1 or 2 photo diodes incorporated into in one 3535 packaging (Al<sub>2</sub>O<sub>3</sub>).

### Features

- Single wavelength
- Low wavelength drift
- Dual VCSEL package
- Low threshold current
- High reliability
- Easy to collimate

### Applications

- Proximity sensors
- Wristband pulse oximeter
- Glucose sensor
- PM2.5/10 detector
- Smoke detector
- Steam sensor

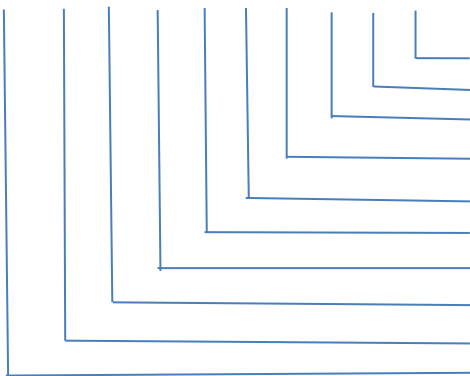
### PRODUCT IDENTIFY

Part Number	Description
MV-8594C-008M-2C-3A0	850-940nm 8mW mixed VCSEL Diode

### CODE RULES

MV - 8594C - 008M - 2 C - 3 A 0

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩



Annex, option 0  
 Product version, A  
 Photo diode, 3= contains PD@850 and @940  
 Package type, 3535  
 Substrate, 2= Al<sub>2</sub>O<sub>3</sub>  
 Power units, M =milliwatts  
 Power, 8  
 Number of chips, C  
 1<sup>st</sup> Wavelength, 850 nm, 2<sup>nd</sup> wavelength, 940 nm  
 Product classification, **Multi VCSEL**

No of chips	First wavelength	Second wavelength	PD
A	1	1	0
B	1	1	1
C	1	1	2

Photodiode	Range	filter	substrate	responsivity
1	400-1100 nm	no	Si	0.97@850nm
2	870-970nm	yes	Si	0.98@940nm
3	Contain PDs (1+2)			

## I. Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Case Operating Temp	Top	-25 to 60	°C
Storage Temp	Tsto	-40 to 85	°C
Reflow Soldering Temperature	Tsdr	260°C(10s)	°C
Reverse Voltage	Vr	5	V
Maximum Continuous Current	I <sub>max</sub>	20	mA
ESD exposure (Human body) model	ESD	2K	V

### Note:

1. Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or other conditions above those indicated in the operations section for extended periods of time may affect reliability.
2. In its maximum rating diode laser operation could damage its performance or cause potential safety hazard such as equipment failure.
3. Electrostatic discharge is the main reason for the laser fault of the diode. Take effective precautions against ESD. When dealing with laser diodes, use the wrist strap, grounding work surface and strict antistatic technology.

## II. Optical-electrical characteristics @25°C

### 850nm 8mW (CW mode)

Parameters	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Optical Power Output	P <sub>o</sub>	I <sub>F</sub> = 11.2mA		8	10	mW
Threshold Current	I <sub>TH</sub>	-	-	0.5	-	mA
Slope Efficiency	η	P <sub>o</sub> = 8mW	-	0.6	-	mW/mA
Power Conversion Efficiency	PCE	I <sub>F</sub> = 11.2mA	-	27.5		%
Peak Wavelength	λ <sub>P</sub>	I <sub>F</sub> = 11.2mA	840	850	860	nm
Laser Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 11.2mA		2.5	2.7	V
Series Resistance	R <sub>S</sub>	I <sub>F</sub> = 11.2mA	-	60		Ohm
Beam Angle	θ	I <sub>F</sub> = 11.2mA	-	25	-	Degrees
Wavelength shift	∂λ <sub>P</sub> /∂T	I <sub>F</sub> = 11.2mA	-	-	0.07	nm/°C

### 940nm 8mW (pulsewidth 0.1ms, 1% duty cycle)

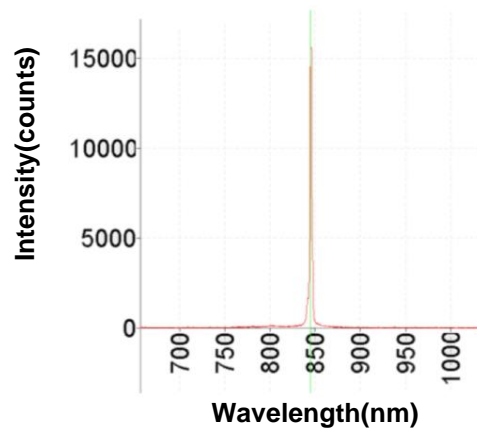
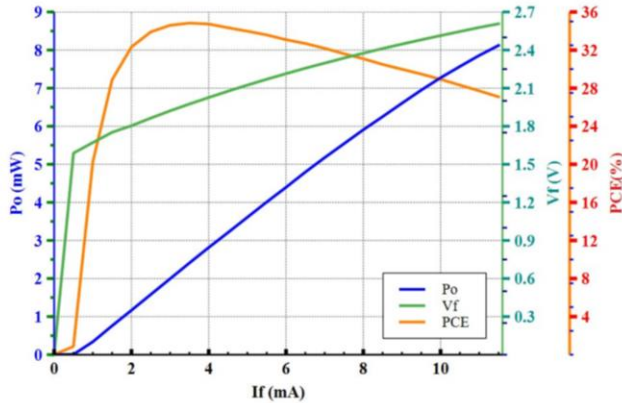
Parameters	Conditions	Symbol	Unit	Min.	Typ.	Max.
Optical Power	I <sub>F</sub> = 11.8mA	P <sub>o</sub>	mW	-	8	-
Threshold Current	-	I <sub>th</sub>	mA	-	1.2	-
Forward Current	-	I <sub>F</sub>	mA	-	11.8	-
Power conversion efficiency	I <sub>F</sub> = 11.8mA	η	%	-	25	-
Slope efficiency	P <sub>o</sub> = 8mW	-	mW/mA	-	0.68	-
Peak Wavelength	I <sub>F</sub> = 11.8mA	-	nm	930	940	950
Laser Forward Voltage	I <sub>F</sub> = 11.8mA	V <sub>f</sub>	V	2.4	2.5	-
Series Resistance	I <sub>F</sub> = 11.8mA	R	Ω	-	60	-
Original Beam Angle	I <sub>F</sub> = 11.8mA	-	Degrees	-	30	-

Wavelength Temp. drift	$I_F=11.8\text{mA}$	-	nm/°C	-	0.07	-
Soldering Temperature	-	-	°C	-	-	260(10s)

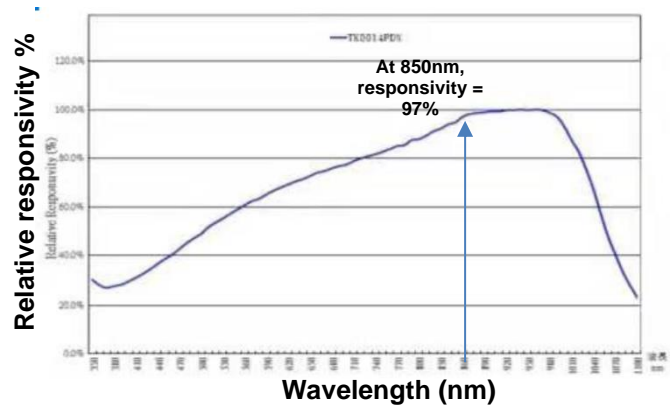
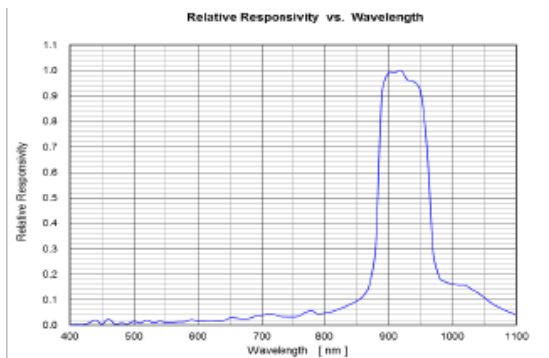
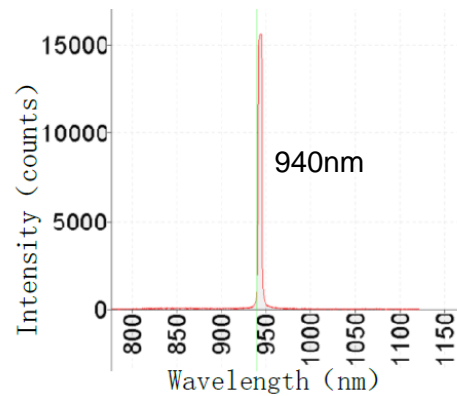
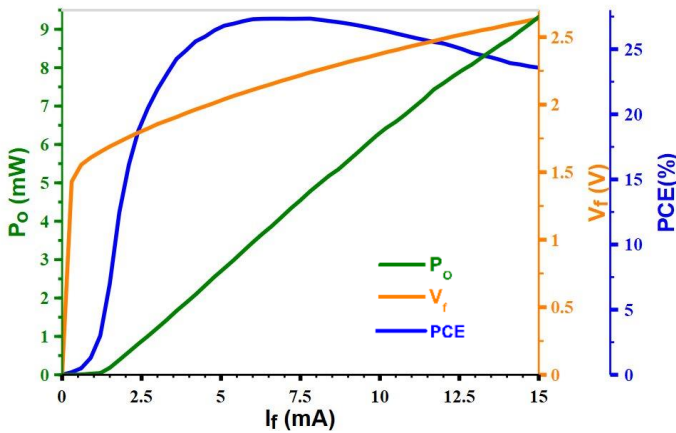
- Note: 1. Forward Voltage ( $V_F$ ) measurement allowance is  $\pm 0.1\text{ V}$ .  
 2. Peak Wavelength ( $\lambda_P$ ) measurement allowance is  $\pm 1.5\text{ nm}$ .  
 3. Others measurement allowance is  $\pm 10\%$ .

### III. LIV Graph and Wavelength

850nm 8mW:

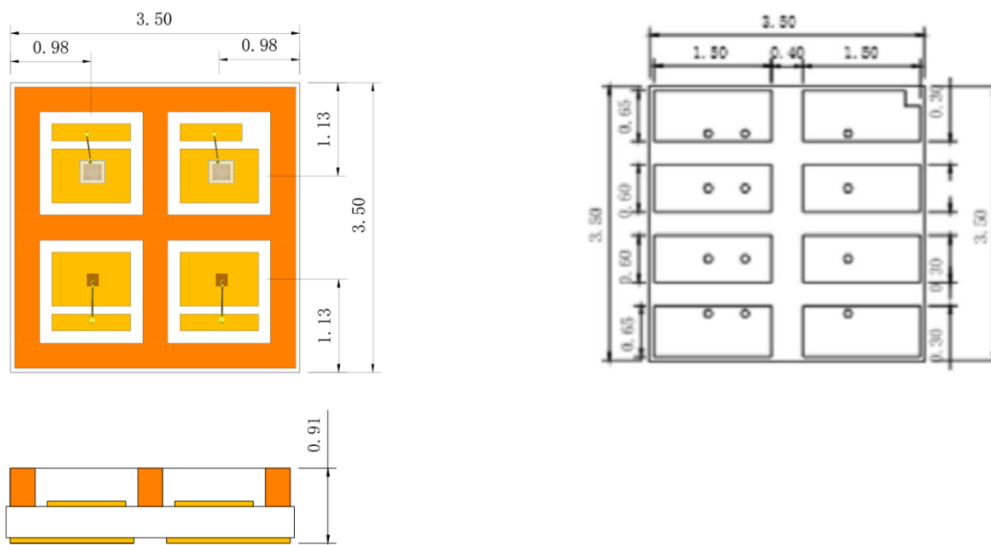


940nm 8mW:



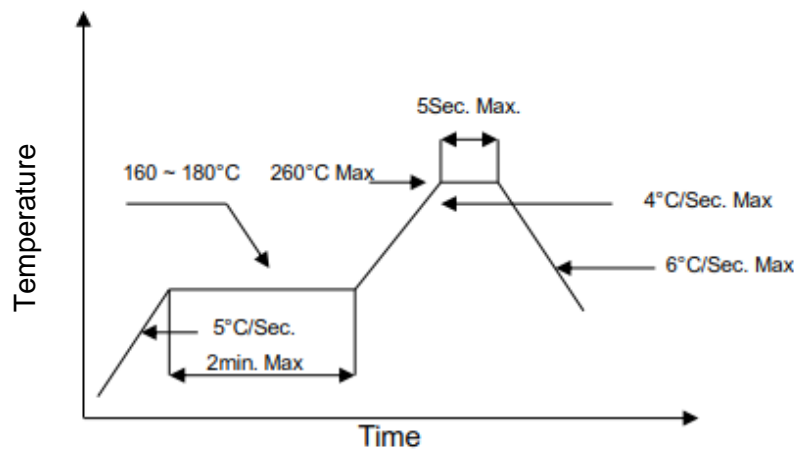
Photodiode responsivity chart

## IV. Mechanical Schematics (Substrate Al<sub>2</sub>O<sub>3</sub>, 3535 packaging, unit:mm)



**Note:** There may be some changes between sample and drawing, thus, the actual spec please refer to the sample that you received. And if any question please contact us.

## V. SMT reflow soldering curve



Note: Reflow soldering can be operated only one time. During the temperature ramp-up, no forces may be exerted on the LD which could deform or damage them. After soldering completed, please also do not process until the product temperature ramp down to room temperature.

## VI. Treatment and protection measures

### Soldering precautions

The temperature of soldering iron must be controlled under 300°C during manual soldering. Also, VCSEL can be only soldered one time with the soldering time less than 3s. But, it is very hard to control the soldering temperature and homogenize solder paste because of the smaller size of

VCSEL. In addition, it is easy to damage VCSEL structure even causes VCSEL losing efficacy. So, we advise you to use re-flow soldering machine for operation.

**Storage precautions**

Our products were sealed by aluminum foil bag attaching packed desiccant, they are moisture proof and anti-static. Please handle these gently to avoid damage. At the same time, please be ready for storage and take some moisture-proof measures to keep VCSEL away from dampness that may causes reliability failure.

Before opening, VCSEL must be kept below 30°C with 60% RH. Recommend for use within 90 days.

After opening, VCSEL must be kept in an environment that temperature lower than 30°C and humidity lower than 60% RH and used up within 24 hours. When the storage humidity reaches and exceeds 60%, the products must be dehumidified at 60 °C for more than 24 hours before use.

**Others**

1. Please use solder paste to cure the laser diode.
2. Please make sure that the heat of VD has been completely conducted to metal shell, to avoid affecting the optical power output.
3. This VD can be only used in constant voltage and current.
4. Operating voltage and current, refer to the table in paragraph II .
5. Please do not aim the laser to people or animal.
6. You can observe the laser spot through an image monitoring equipment.
7. Please do not touch VD surface by naked hands or squeeze the sealant on LD surface, or it may cause wrong optical angle and distorted laser spot, even damage the VD.
8. Please use ceramic suction nozzle to absorb the VD, so as to avoid VD sticking to the nozzle.
9. Please add a 0.02 s blowing action after locating the laser diode to aluminum substrate.

**VII. Revision history**

Revision	Date	Description
V.01	2020/01/06	The first official edition (0003C5, 0011C1.19)
V.02	2020/06/16	Update part name

\*\*Brightlaser reserves the right to make modification at any time due to improved design from time to time, the merit behind is in order to supply the best product possible.