ST UM0555 VT5363 USB Wired Reference Mouse User Manual

ST UM0555 VT5363 USB Wired Reference Mouse

Contents

Introduction

The STV-363-R04 is a wired laser low-speed reference mouse developed by EDOM. The reference design consists of the VT5363V032 mouse sensor and the EDOM ML-00036 lens, DA-00075 aperture and 4EVSFMFAZ VCSEL. The mouse can be supplied either from STMicroelectronics or EDOM.
The STMicroelectronics VT5363 sensor is a complete solid state optical tracking engine. This single chip optical mouse sensor provides excellent control and precision, it supports two, three or five button mouse designs with a mechanical scroll wheel encoder. An external EEPROM can be used to implement customer specific USB configurations (PID, VID and descriptor string).
The lens, aperture and VCSEL are designed to work with the VT5363 sensor so that the mouse works accurately on a wide range of surfaces. The design of the reference mouse also ensures high reliability, optical alignment and easy mass production.

Figure 1. EDOM reference mouse

This user manual, along with the VT5363 datasheet enable you to evaluate the EDOM STV-363-R04 laser wired reference mouse and assist you in the design of your own VT5363 mouse. Support can be obtained though EDOM (contact details shown in Chapter 3) or through the normal ST regional sales/support groups.

Reference mouse

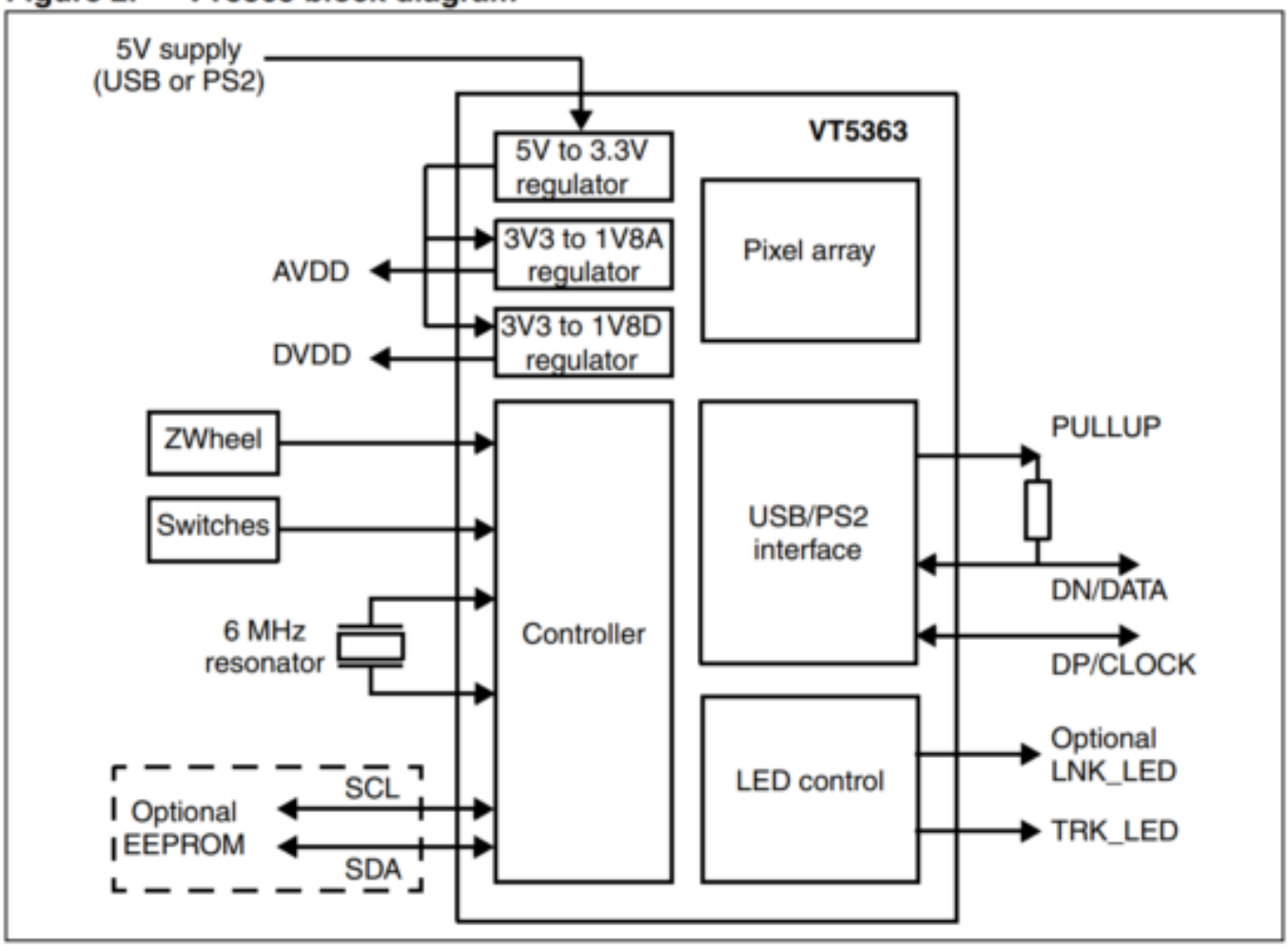
Features

- Complete wired laser reference mouse
- Single chip design with minimal support circuitry
- USB 1.1 low-speed compliance
- 800 cpi (400 cpi selectable)
- Accurate motion up to 40 ips
- 9600 frames per second
- Supports up to 5 buttons and a scroll wheel
- Accurate navigation on a wide range surfaces (including glossy)
- Customization possible for VID, PID and descriptor string with external EEPROM
- No optical alignment required

Kit contents

- EDOM wired reference mouse (STV-363-R04)
- 5 x VT5363V032 mouse sensor
- 5 x laser optics/aperture plus 5 x VCSEL
- CD containing STV-363-R04 user manual and gerber files

Figure 2. VT5363 block diagram



Hardware

Mouse schematic

Figure 3. Mouse schematic sensor board

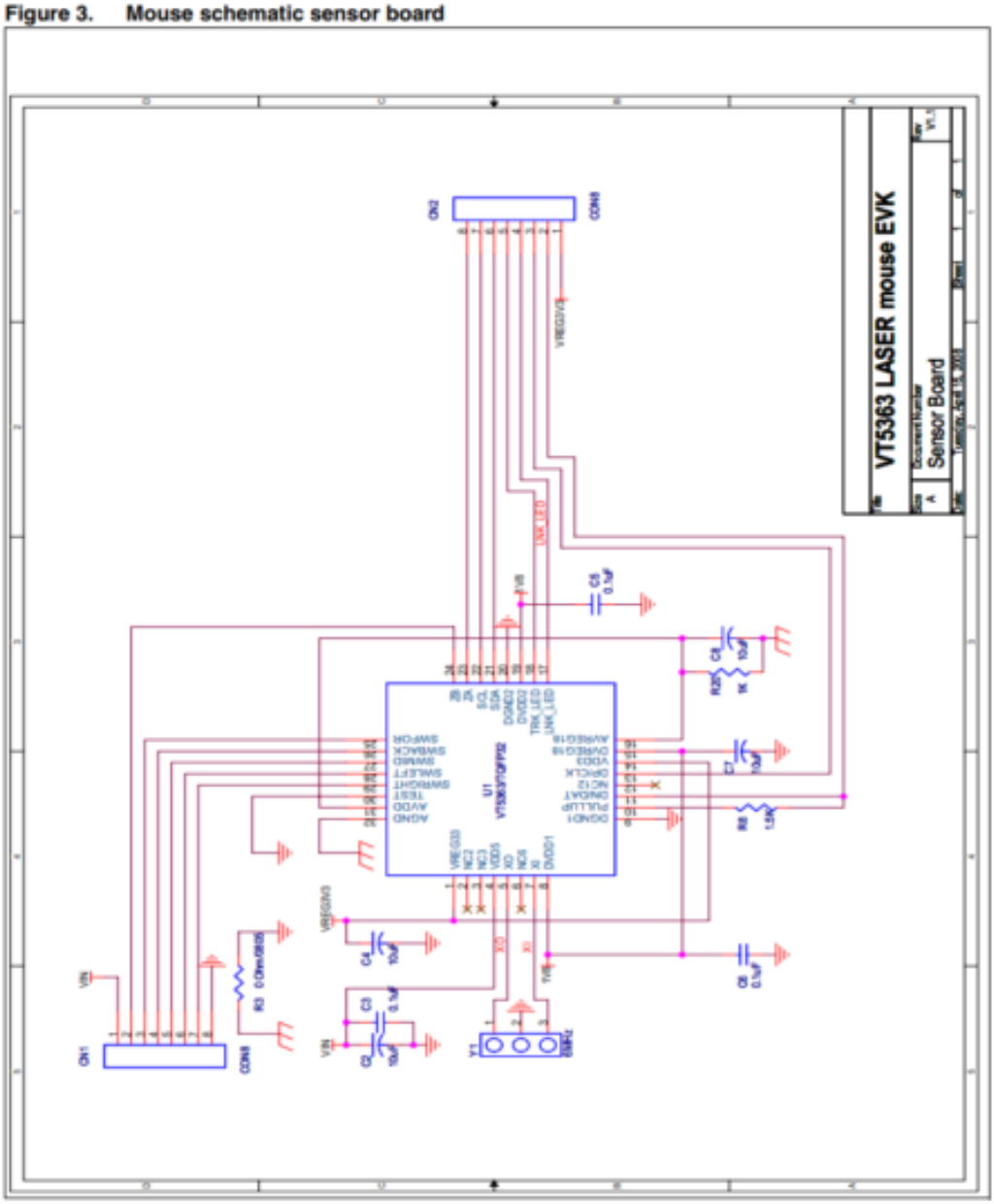
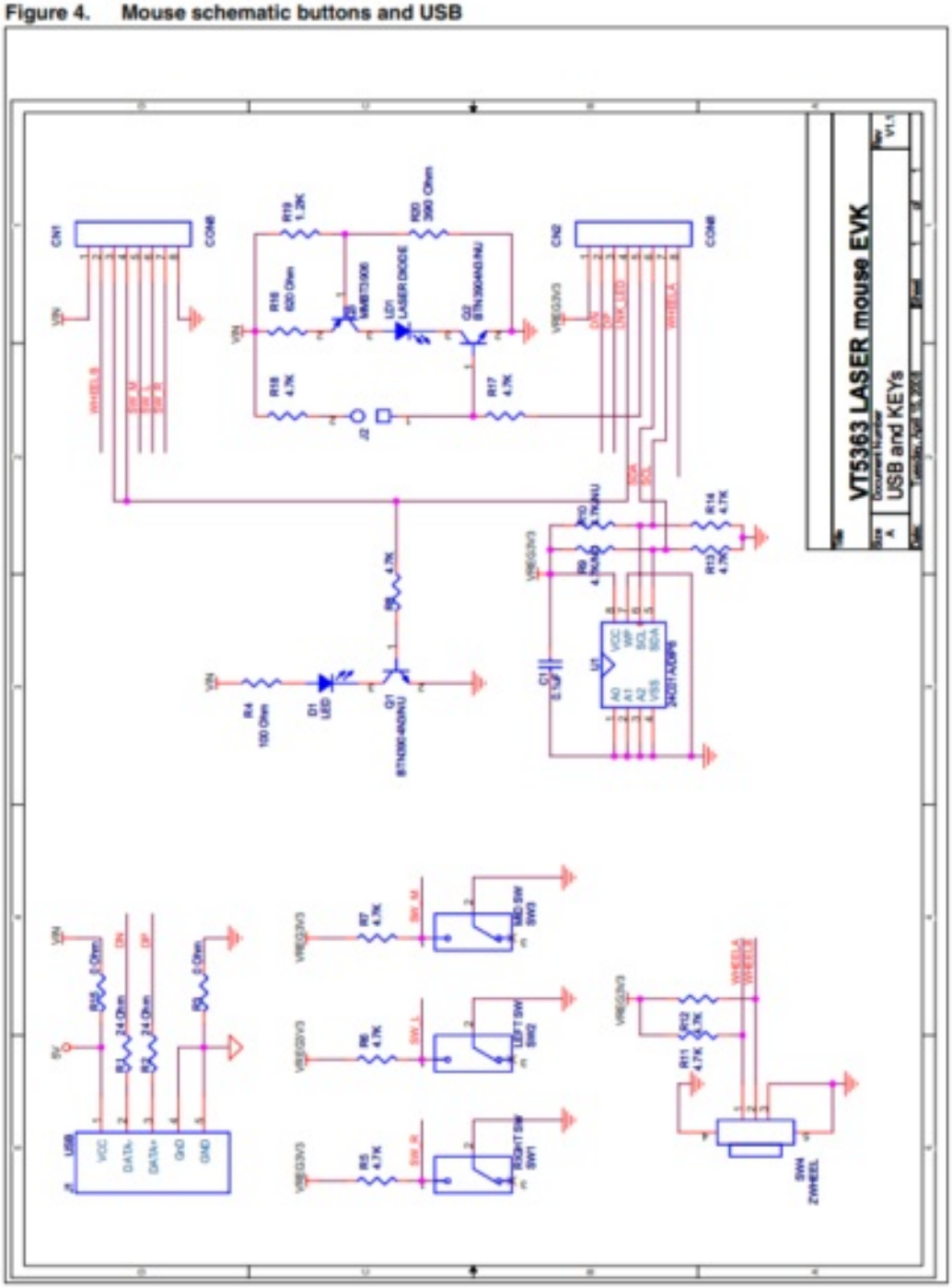


Figure 4. Mouse schematic buttons and USB



Mouse bill of materials

Table 1. Mouse BOM buttons and USB

Reference	Description	Manufacturer	Part number
U1	24C01 DIP8	STMicroelectronics	M24C01
C1	0.1uF_16V_X7R 0603	Standard component – many suppliers	
R1, R2	24R 0603	Standard component – many suppliers	

R4	100R 0603	Standard component – many suppliers	
R5-R8, R11-R14, R17, R18	4K7 0603	Standard component – many suppliers	
R16	620R 0603	Standard component – many suppliers	
R19	1K2 0603	Standard component – many suppliers	
R20	390R 0603	Standard component – many suppliers	
R3, R15	0R 0805	Standard component – many suppliers	
D1	LED 3mm RED	Standard component – many suppliers	
LD1	laser diode	EDOM – see *Chapter 3: Optics and VCSEL*	
Q1, Q2	MMBT3904 NPN transistor	Standard component – many suppliers	
Q3	MMBT3906 PNP transistor	Standard component – many suppliers	
SW4	ZWHEEL (EN028D-11PS-30)	Dicgu Enterprise Co. Ltd	EN028D-11PS-30
SW1, SW1, SW3	Right, left, middle buttons (DM1-00P-60)	Dicgu Enterprise Co	DM1-00P-60
CN1, CN2	8-pin single row connector, pitch 2.54 mm	Standard component – many suppliers	
J2	2-pin single row connector, pitch 2.54 mm	Standard component – many suppliers	
Optics/aperture		EDOM – see *Chapter 3: Optics and VCSEL*	
J1	1 m USB cable	Standard component – many suppliers	

R9, R10	N/F		

Table 2. Mouse BOM sensor board

Reference	Description	Manufacturer	Part number
U1	VT5366 optical mouse sensor	STMicroelectronics	VT5366V032
Y1	6 MHz resonator	Standard component – many suppliers	
R8	1K5 0603	Standard component – many suppliers	
R20	1K 0603	Standard component – many suppliers	
R3	0R 0805	Standard component – many suppliers	
C3, C5, C6	100nF 0603	Standard component – many suppliers	
C2, C4, C7, C8	10uF 0805	Standard component – many suppliers	
CN1, CN2	8-pin single row connector, pitch 2.54 mm	Standard component – many suppliers	

Optics and VCSEL

Optics order details

EDOM TECHNOLOGY CO., LTD.
8F., No.50, Lane 10, Kee Hu Road,
Nei Hu Taipei (114), Taiwan, R.O.C.
Tel : (886-2) 2657-8811 ext. 3508
Fax: (886-2) 7721-0133
E-mail: **Jerryk@edom.com.tw**
www.edom.com.tw
The order codes are detailed in **Table 3.**

Table 3. EDOM order codes

Part number	Description
ML-00036	Optics
DA-00075	Aperture
MS-F0006	Optics + aperture
4EVSFMFAZ	VCSEL

Optics drawings

Figure 5. EDOM laser optics - 1

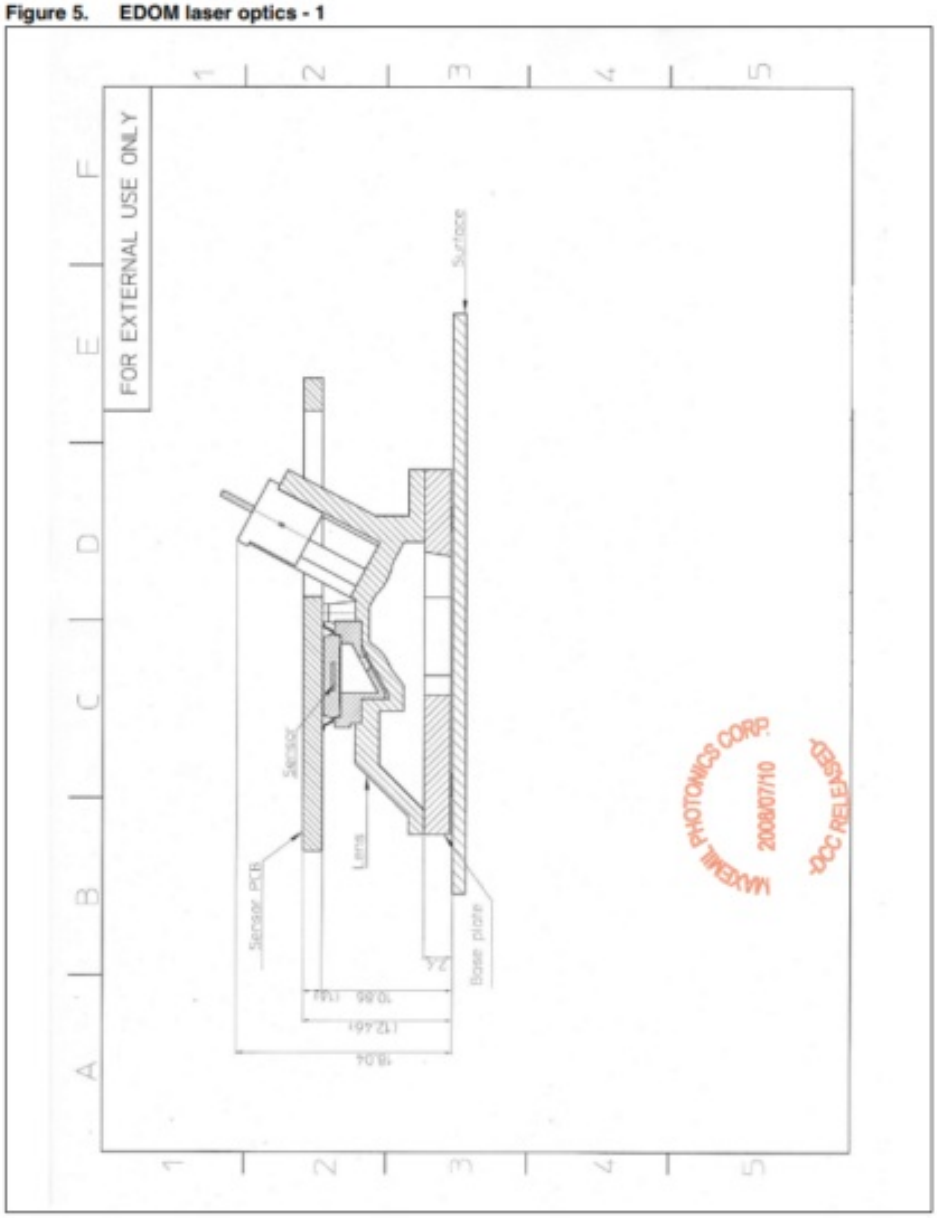


Figure 6. EDOM laser optics - 2

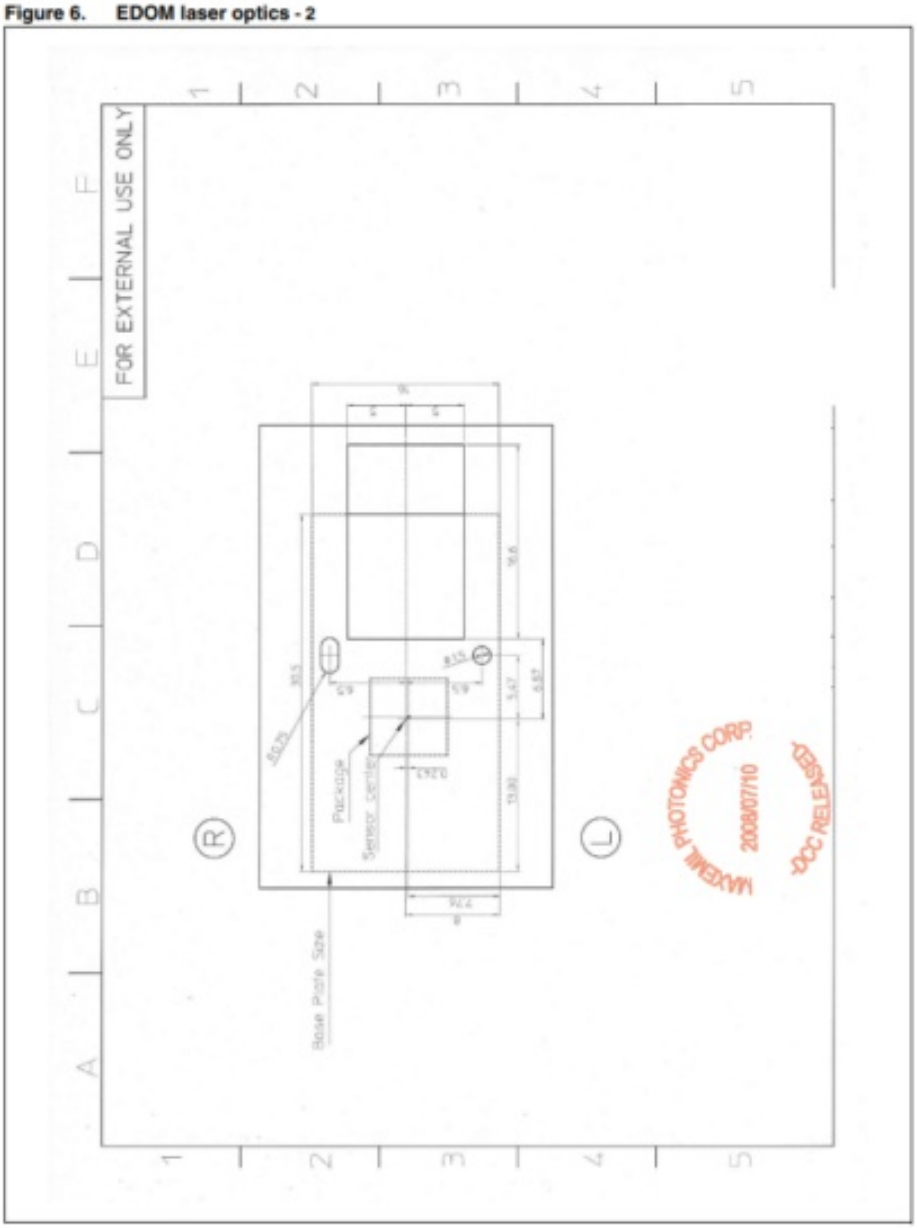


Figure 7. EDOM laser optics - 3

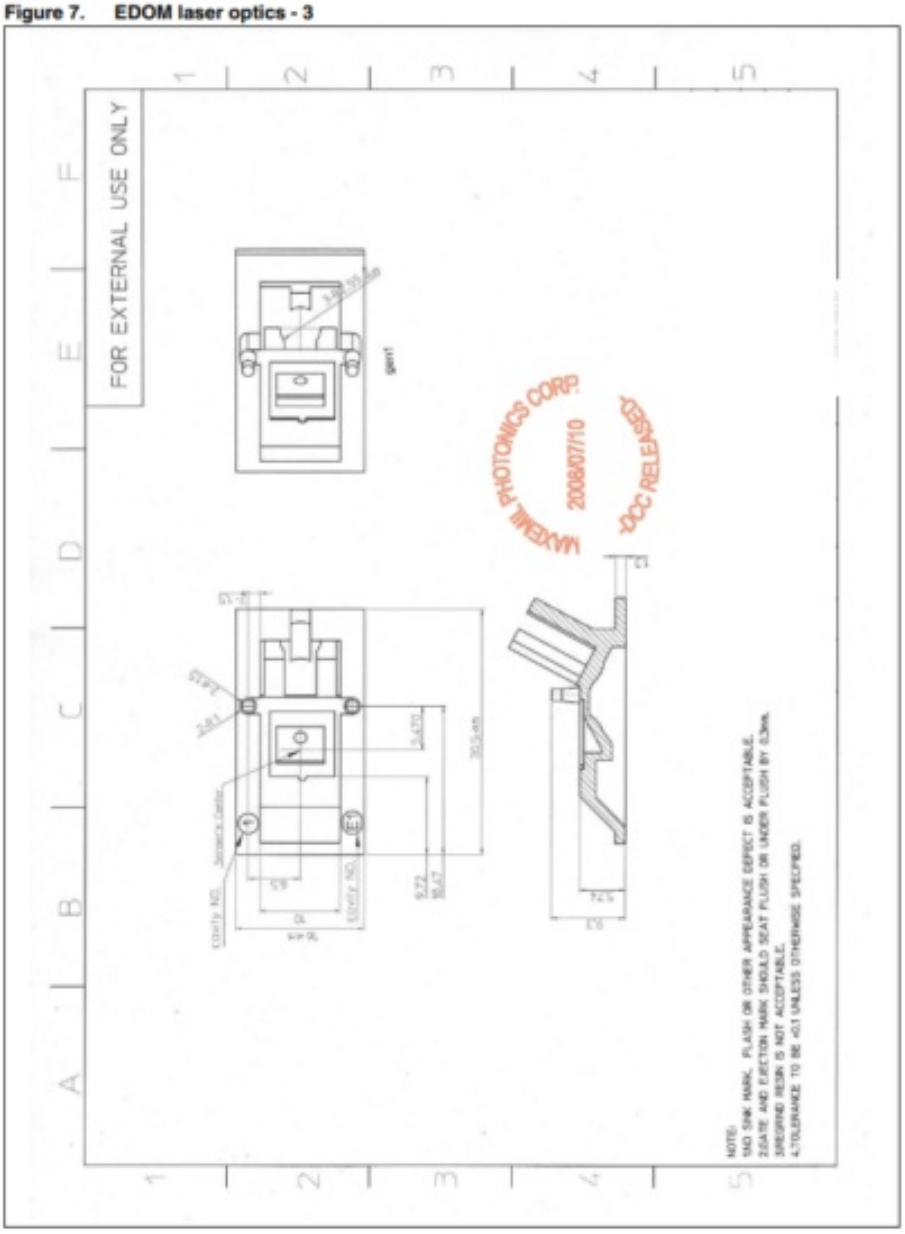
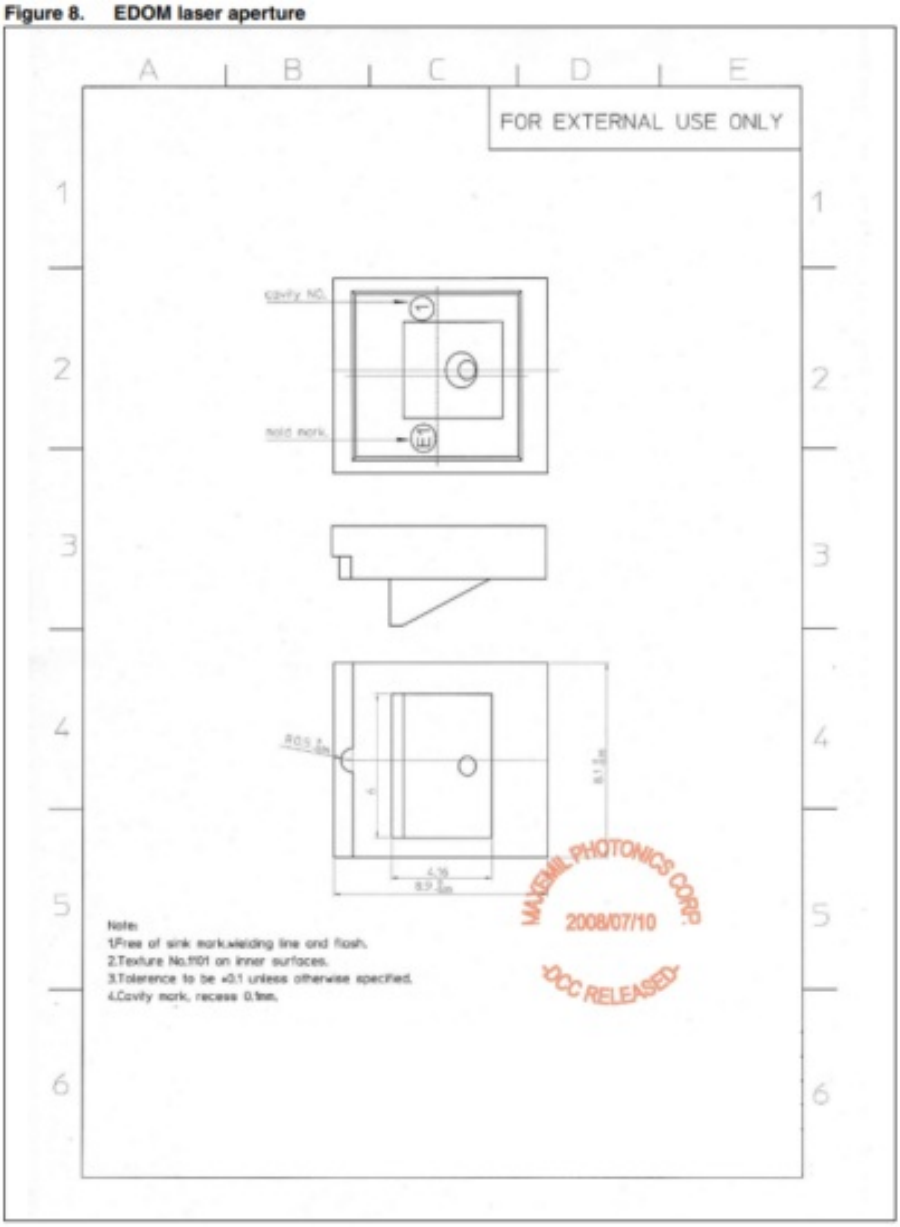


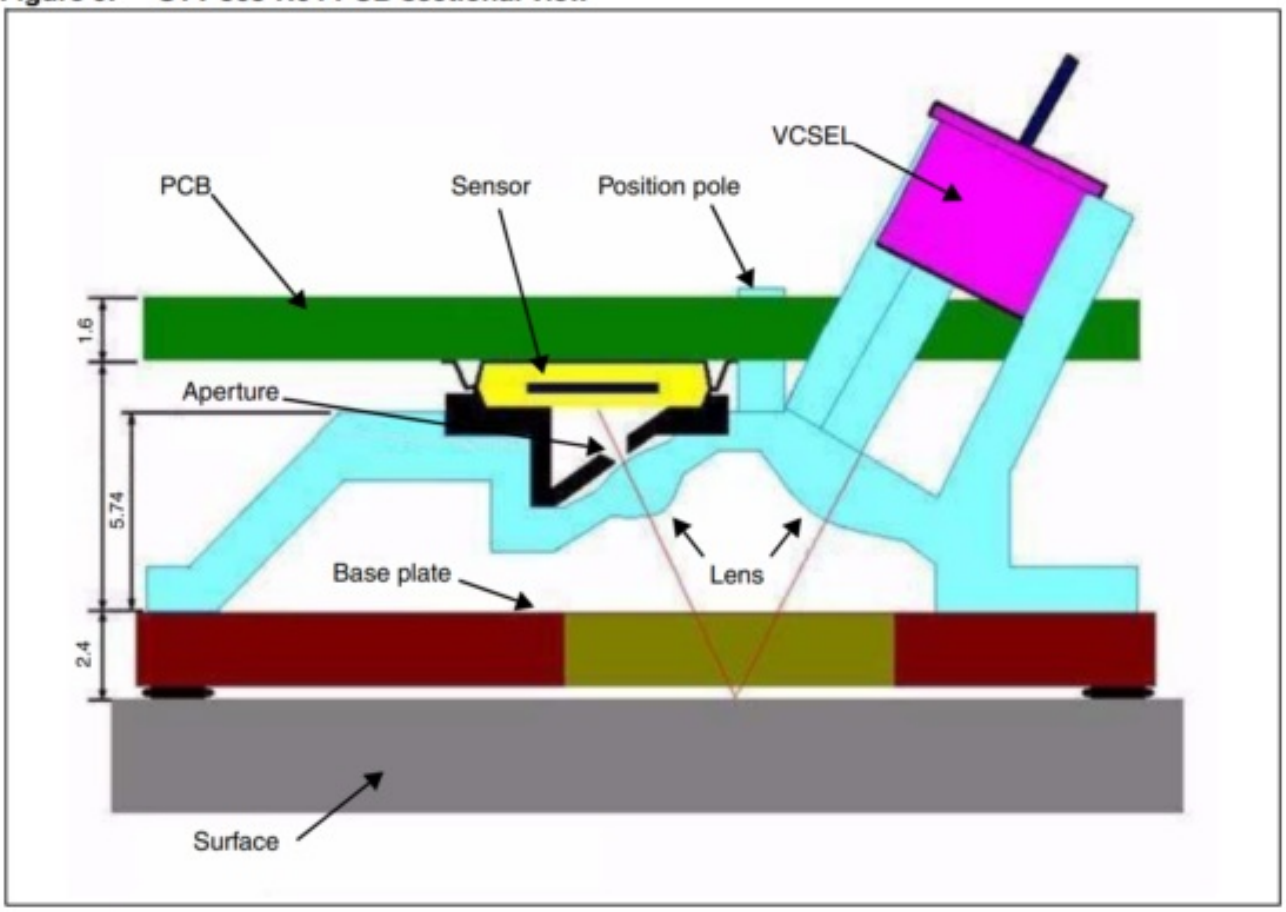
Figure 8. EDOM laser aperture



PCB sectional view

The optics consists of two lenses (incidence and object), the incidence lens ensures that the light going to the sensor is parallel, while the object lens has the magnification of 0.5 x to provide high-speed and accuracy. The aperture is designed to fit tightly around the sensor package and into the optics, there are also two position poles for aligning the optics to the PCB.

Figure 9. STV-363-R04 PCB sectional view



Optics assembly exploded view

The exploded view drawing shows that the aperture, optics and VCSEL are self-aligned when mounted onto the base plate of the mouse.
Care should be taken when handling the optics to avoid scratching the optical surfaces.

Figure 10. Optics assembly exploded view

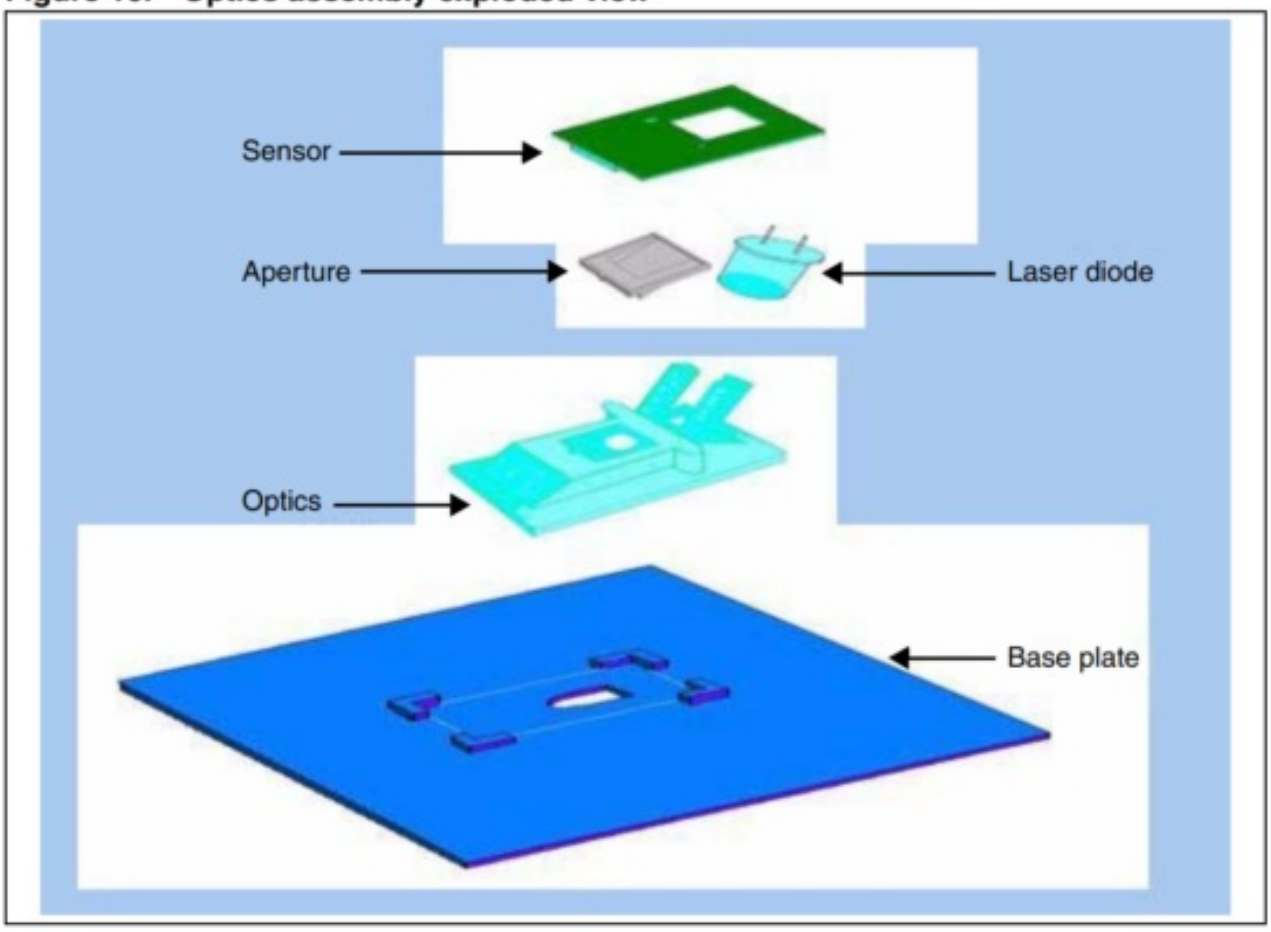


Figure 11. VCSEL datasheet - 1

Millennium Communication Co., Ltd.

850nm VCSEL Lamp - Flat **No: LMVS0850IR000C1M**

Features & Applications

- 850 nm Center Optical Wavelength
- High Uniformity
- Low Beam Divergence Angle
- Low Dependence of Electrical and Optical Characteristics over Temperature
- Laser Mouse

Chip Material	Lens Color
GaAs	Water Clear

Package Dimensions (mm):

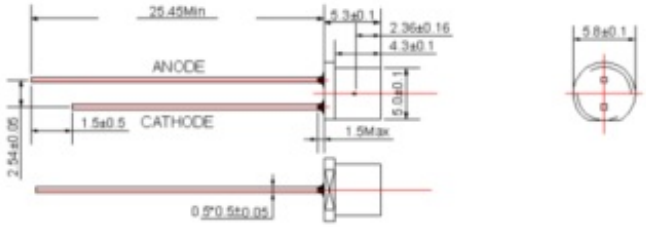


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Figure 12. VCSEL datasheet - 2

Millennium Communication Co., Ltd.

Absolute Maximum Ratings (T = 25 °C)

Parameter	Maximum Rating	Unit
Optical Power	2	mW
Operating Temperature Range	-10 ~+85	℃
Storage Temperature Range	-20 ~+85	℃
Lead Soldering Temperature	260℃ for 5 seconds	

Electro-Optical Specifications (T = 25 °C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Threshold Current	I_{th}	1.5	***	4	mA	*****
Operation Voltage	V_{op}	***	1.8	2.2	V	P_{op} = 0.5mW
Operation Current	I_{op}	P_{op} = 0.5mW				
		2	***	3	mA	4EVSFMFA1
		3	***	4	mA	4EVSFMFA2
		4	***	5	mA	4EVSFMFA3
Slope Efficiency (S.E.)	η	0.15	0.4	***	mW/mA	P_{op} = 0.5 ~ 1.5mW
Spectral Line Half Width	Δλ	***	0.5	***	nm	P_{op} = 0.5mW
Center Wavelength	λ_c	830	850	860	nm	P_{op} = 0.5mW
Beam Divergence	2θ	***	12	***	deg.	P_{op} = 0.5mW

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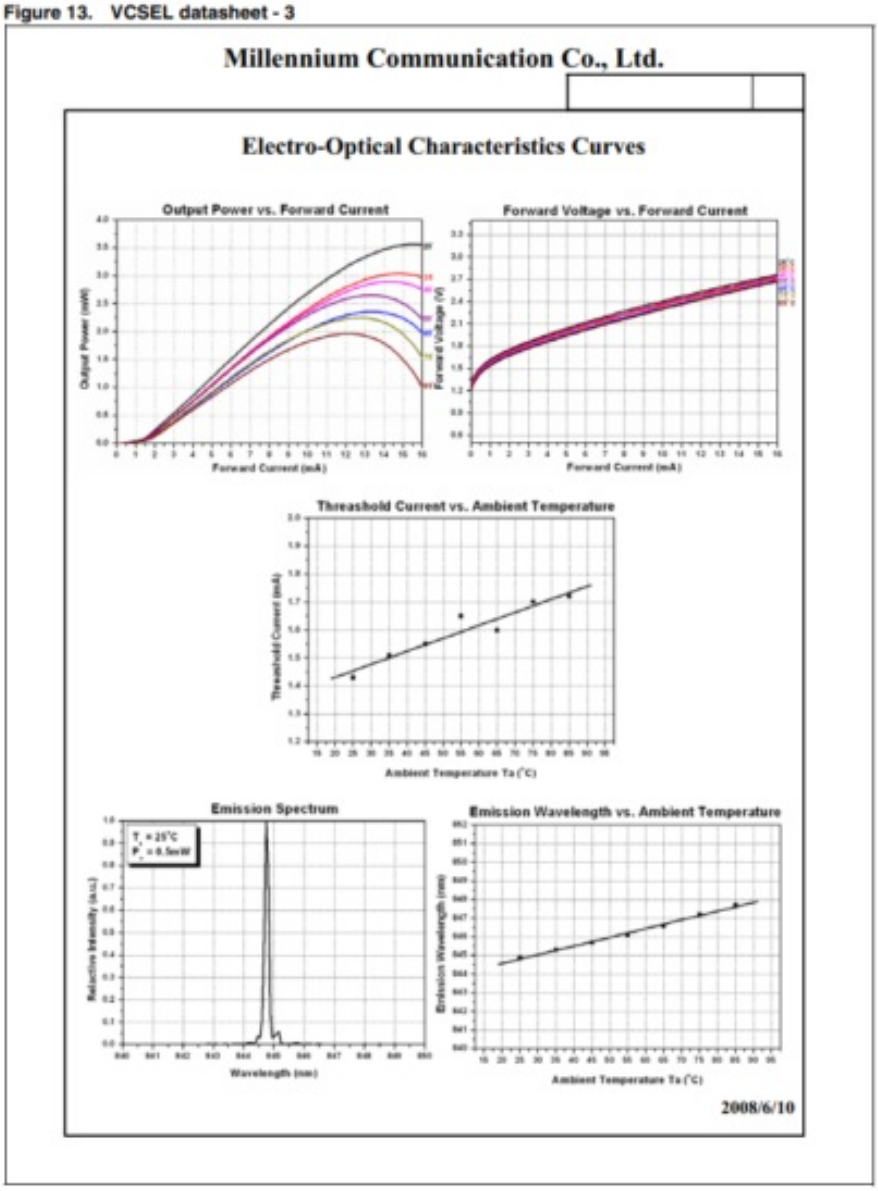
Figure 13. VCSEL datasheet - 3

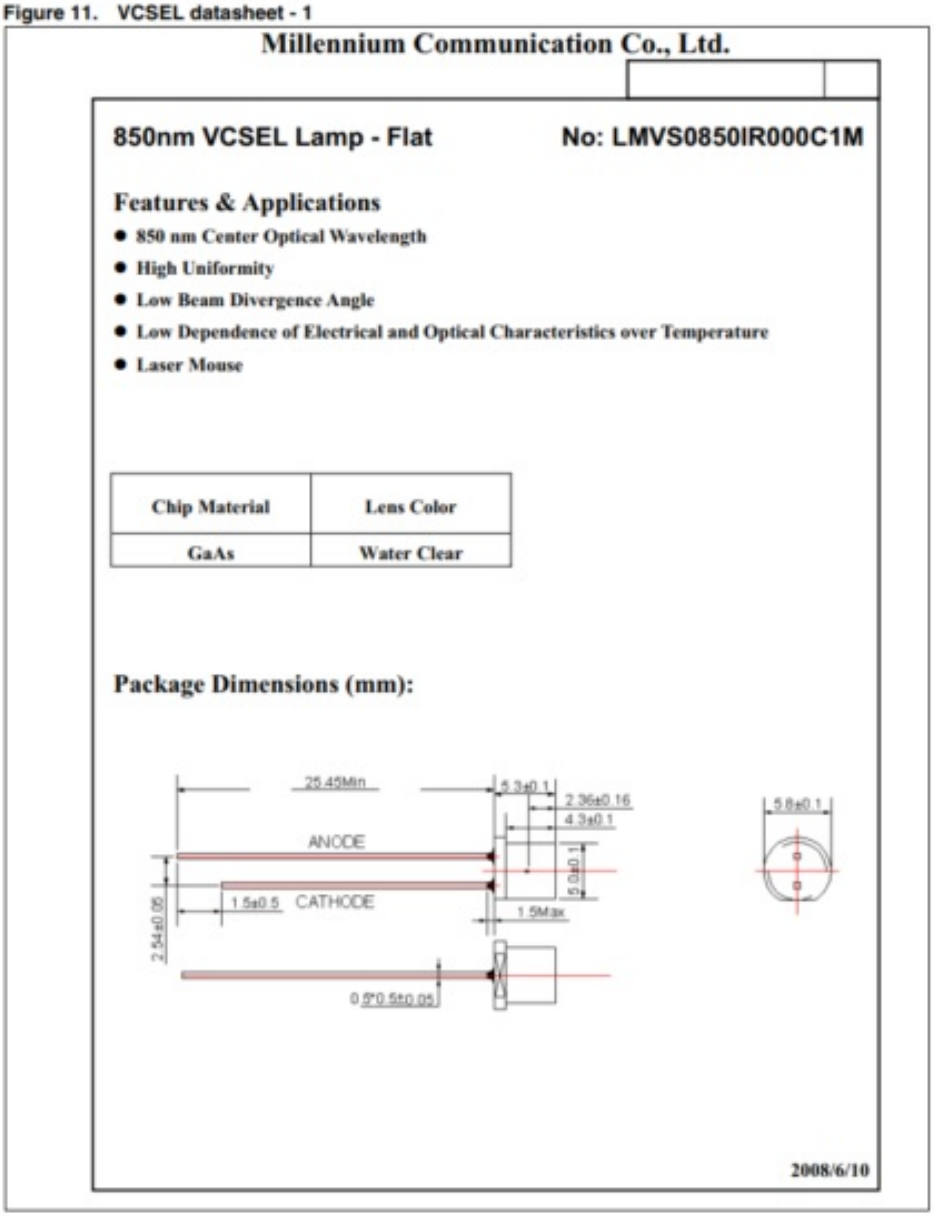


VCSEL binning

There are three separate grades for the VCSEL laser. As part of the manufacturing process the VCSELs are manually sorted into the three grades which means it is a simple process of choosing the right resistor for the grade of laser received.

Table 4. VCSEL binning

Figure 11. VCSEL datasheet - 1



Millennium Communication Co., Ltd.

850nm VCSEL Lamp - Flat No: LMVS0850IR000C1M

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- Laser Mouse

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GaAs	Water Clear

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Figure 12. VCSEL datasheet – 2

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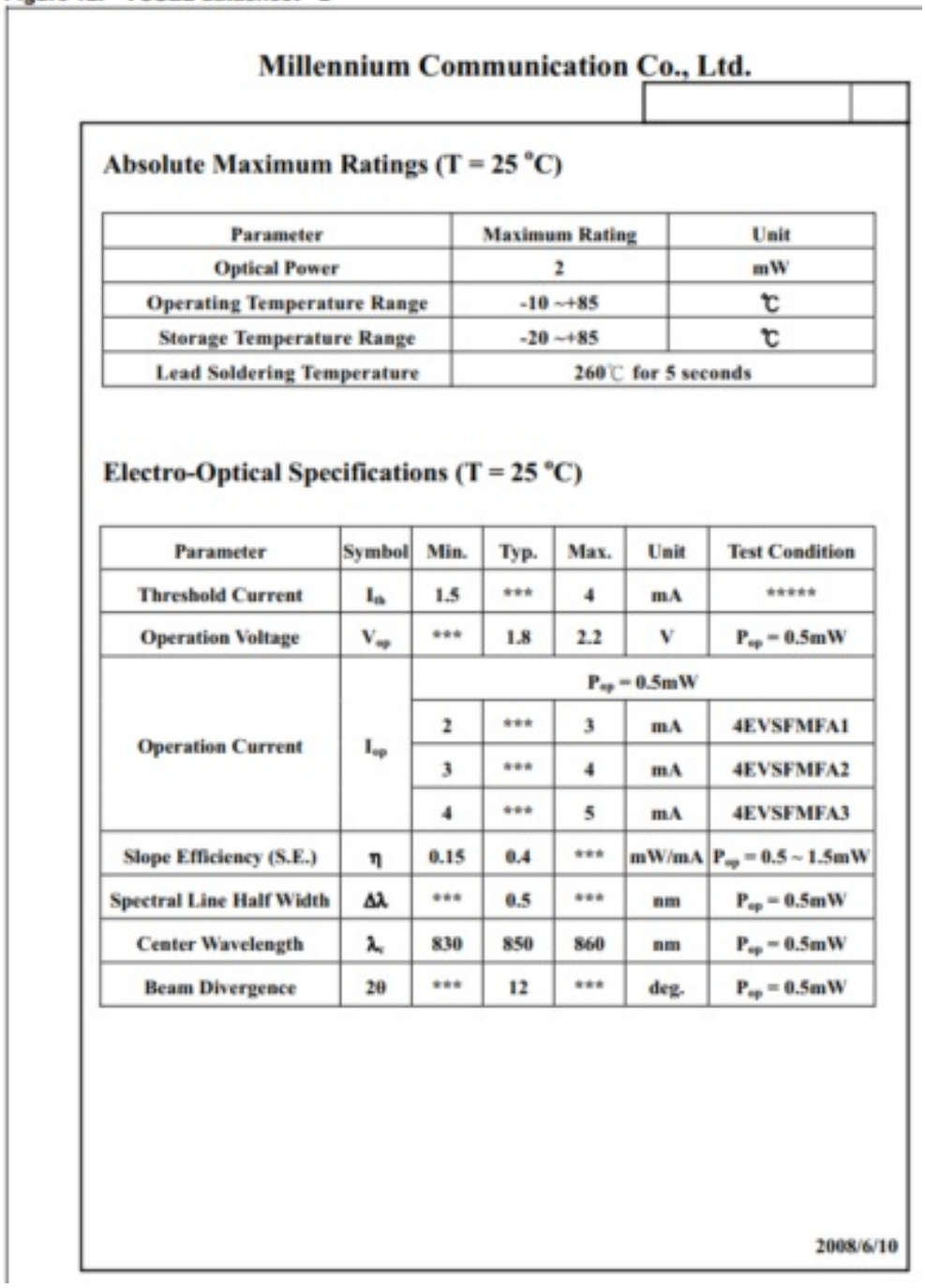

Millennium Communication Co., Ltd.

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		3	***	4	mA	4EVSFMFA2
		4	***	5	mA	4EVSFMFA3
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Figure 13. VCSEL datasheet – 3

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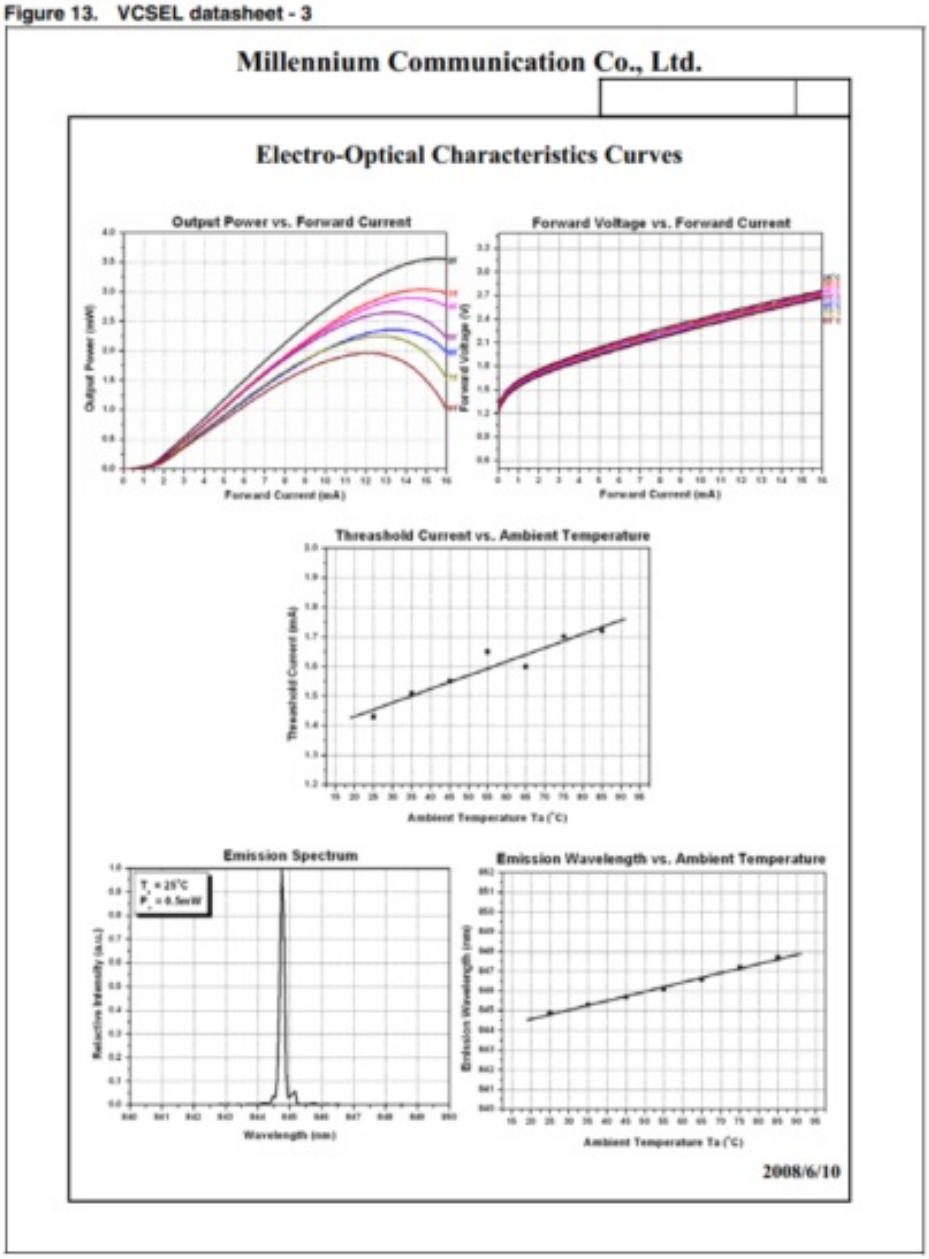

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Table 4. VCSEL binning

Bin grade	R28 value
Bin 1	1K
Bin 2	750R
Bin 3	620R

General

How to use the VT5363 wired mouse

The STV-363-R04 has the usual left, middle, right, forward and back buttons plus ZWheel The cpi can be swapped between 800 (default) and 400. To do this hold down the left and right buttons for 2 seconds.

Support documentation

- VT5363 datasheet – **http://www.st.com/imaging**

Revision history

Table 5. Document revision history

Date	Revision	Changes
10-Sep-2008	1	Initial release.

Please Read Carefully

STMicroelectronics group of companies
Australia – Belgium – Brazil – Canada – China – Czech Republic – Finland – France – Germany – Hong Kong – India – Israel – Italy – Japan –
Malaysia – Malta – Morocco – Singapore – Spain – Sweden – Switzerland – United Kingdom – United States of America
www.st.com

Documents / Resources

	ST UM0555 VT5363 USB Wired Reference Mouse [pdf] User Manual UM0555, VT5363, USB Wired Reference Mouse, VT5363 USB Wired Reference Mouse, UM0555 VT5363 USB Wired Reference Mouse

References

- com.twedom.com.tw
- groups.st.com
- Imaging and Photonics Solutions - STMicroelectronics Asset 1 Asset 1