1403nm MEMS VCSEL Laser Diode

Product Description

Vertical-Cavity Surface-Emitting Laser (VCSEL) is a semiconductor laser based on gallium arsenide (GaAs) material, which emits light vertically from the top surface, fundamentally different from light-emitting diodes (LEDs) and laser diodes (LDs).It consists of reflective mirrors, an active layer, and a metal contact layer. The two emission mirrors are P-type and N-type distributed Bragg reflectors (DBR) respectively, and the active region is composed of quantum wells.A metal contact layer is fabricated on the outer surface of the P-type DBR to form ohmic contact, and a circular aperture is

opened on the P-type DBR for laser output.This laser features a small far-field divergence angle with a narrow, circular beam, low threshold current, and high modulation frequency up to 300 kHz.Wavelength tuning can be realized by adjusting the driving current and operating temperature.The package integrates a thermoelectric cooler (TEC) and a photodetector (PD), specially designed for high-speed optical fiber applications.

Product features

7-pin design; aspheric lens cap; integrated thermoelectric cooler (TEC) for temperature stability control;output power: 1.6 mW;single-mode operation covering the C-L band;broad spectral tuning range: > 8 nm;fast wavelength tuning: ~100 kHz

Part Number

MP-VCS-1403-1.6-A81-SA-TEC

Application area

Tunable Diode Laser Absorption Spectroscopy (TDLAS) Gas Measurement System | Face Recognition | LiDAR | Data Centers & Cloud Computing

Core parameters

Center Wavelength
1403nm

General Parameters

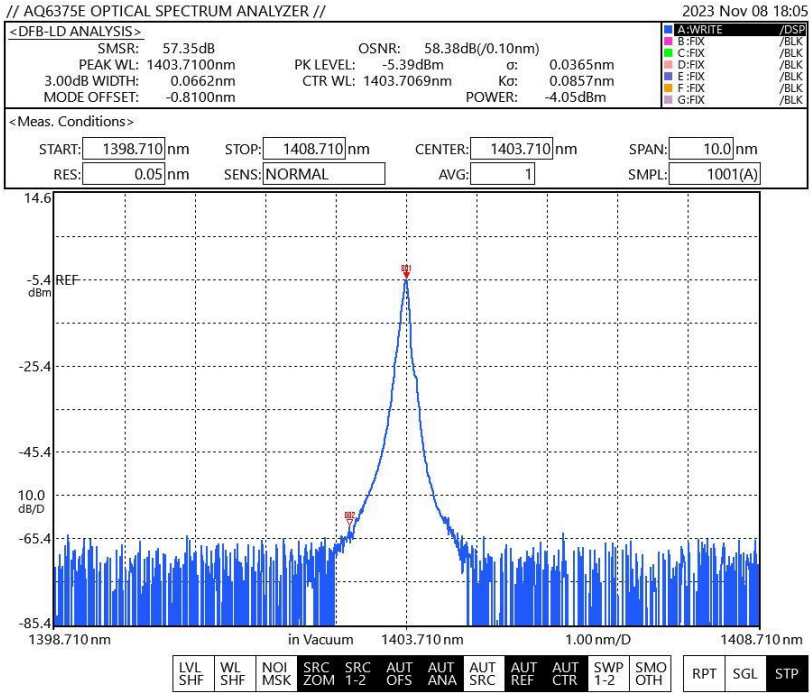
Technical Specifications

Tc = 20 °C, IOP = 2.0 mA unless otherwise noted(Tc = chip backside temperature, controlled by TEC)

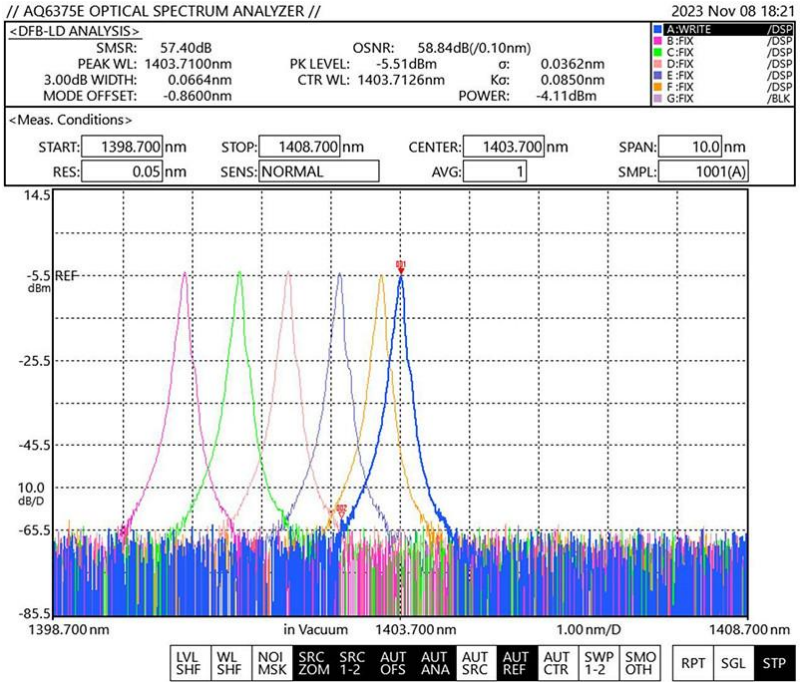
Parameter	Symbol	Min.	Typ.	Max.	Unit
Optical Output Peak Power @ 25 °C	P	1.0	1.6	–	mW
Operating Bias Current	Iop	0	18	25	mA
Operating Temperature Range	Top	-40	25	85	°C
Threshold Current	Ith	–	8	12	mA
Slope Efficiency (CW, Tc = 25 °C)	SE	0.14	0.18	–	mW/mA
Laser Drive Voltage	VCC	0	1.5	2.5	V
Series Resistance	Rs	–	50	–	Ω
Center Wavelength	–	1400	–	1410	nm

Guaranteed Tuning Range(Positive voltage reduces peak wavelength)	λ	8	10	–	nm
Max. Frequency Tuning Response	fmax	100	200	–	kHz
Side Mode Suppression Ratio	SMSR	30	40	–	dB
Linewidth (-3 dB FWHM, CW bias = IOP)	σ	–	–	300	MHz
Relative Intensity Noise	RIN	–	–	-128	dB/Hz
Tuning Voltage	Vtune	0	Test Sheet	Test Sheet	V
Tuning Current	Itune	0	–	100	μA
TEC Voltage	VTEC	–	0.35	1.5	V
TEC Current	ITEC	–	0.05	0.6	A

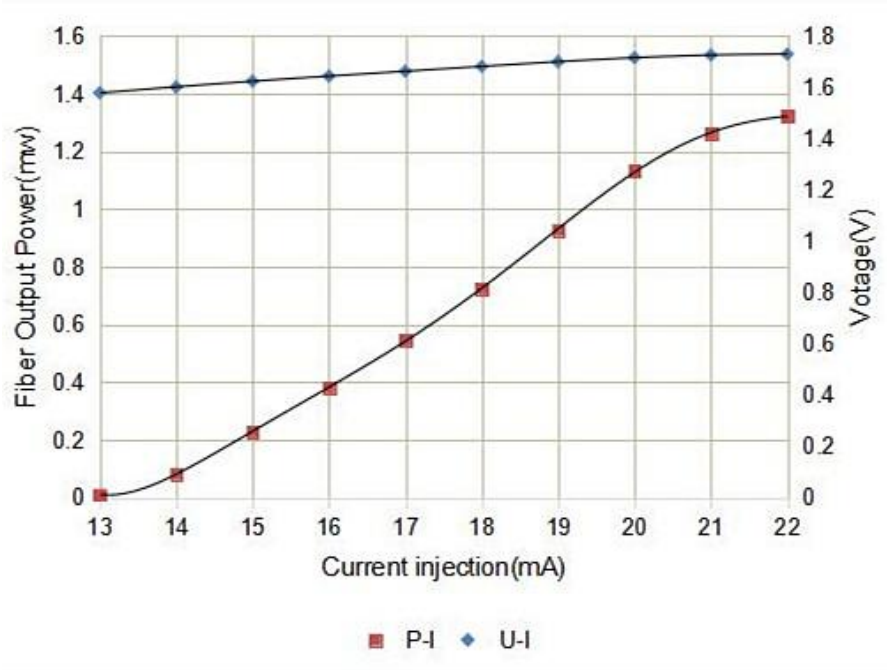
Experimental Data



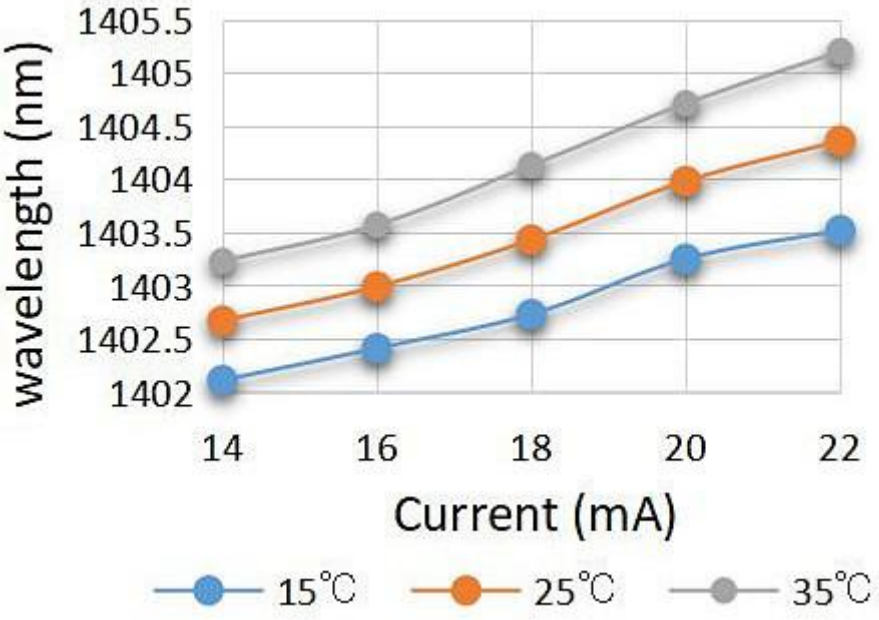
Operating bias current = 19 mA, continuous wave at 25 °C (0 to +15 V)



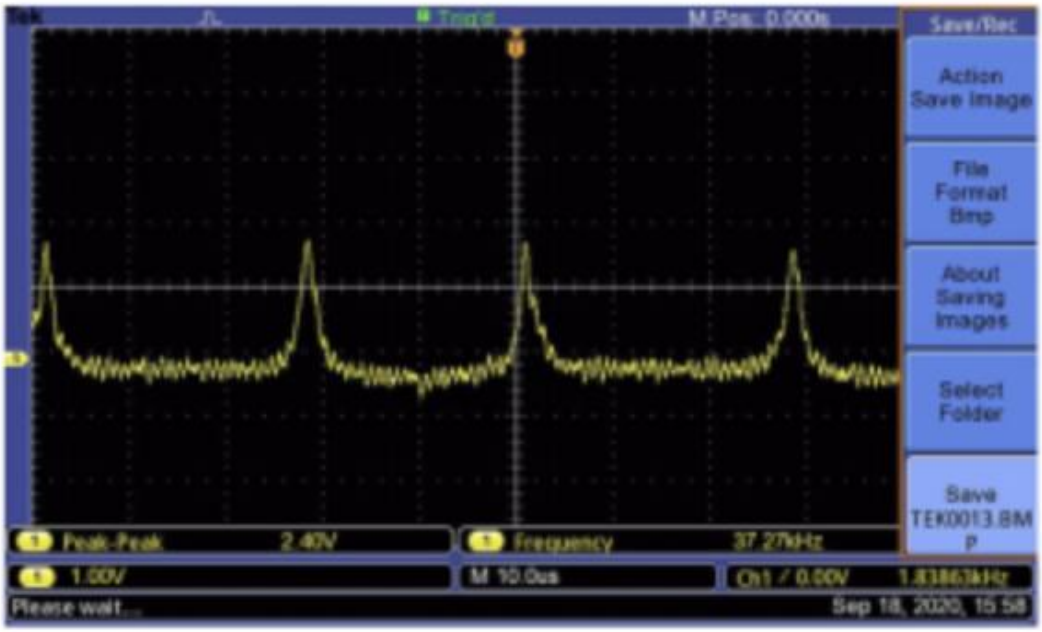
Optical Power vs. Current Curve (at 25°C)



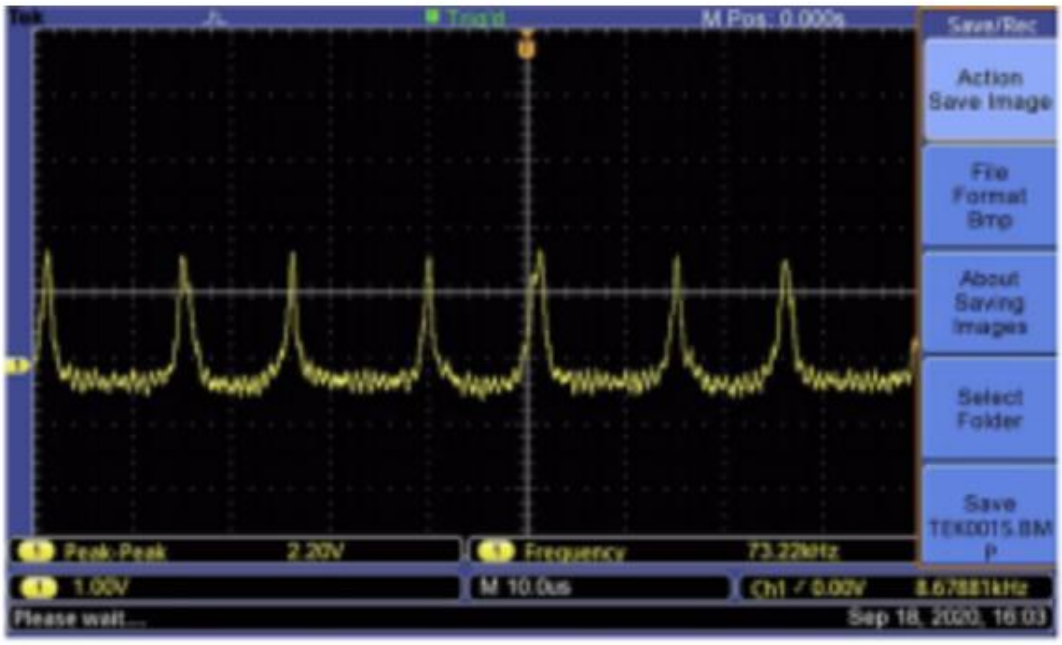
Tuning Characteristics



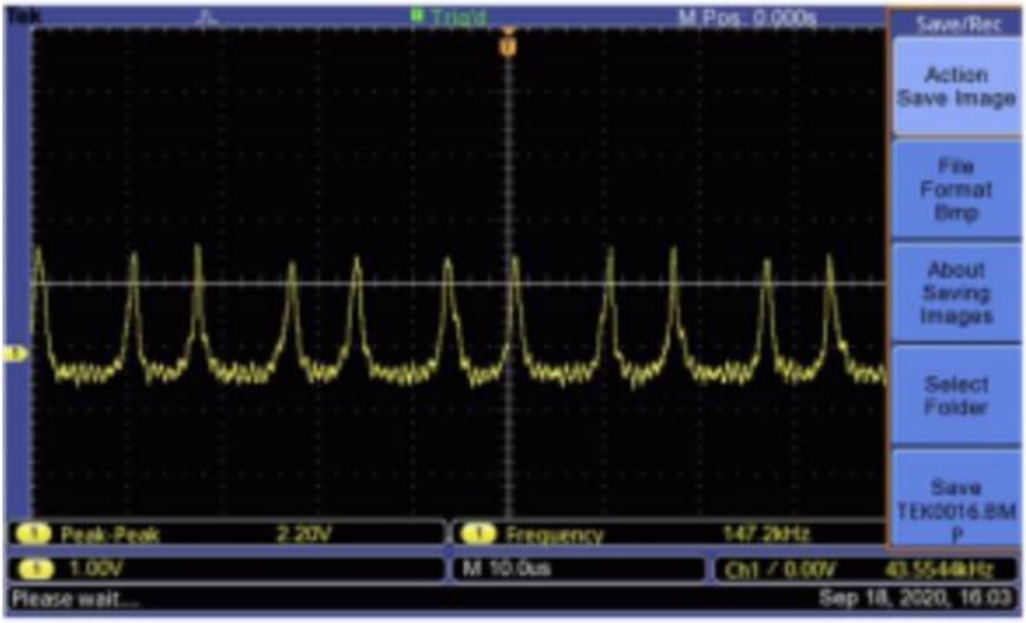
Load Variation at Different Frequencies



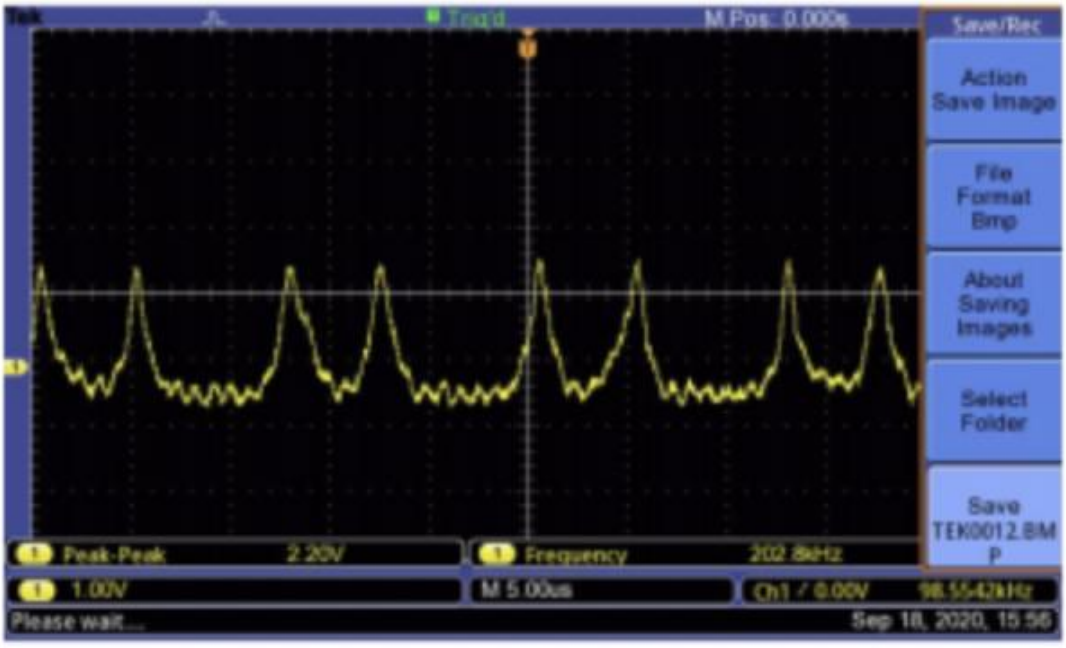
Waveform@5V 20kHz



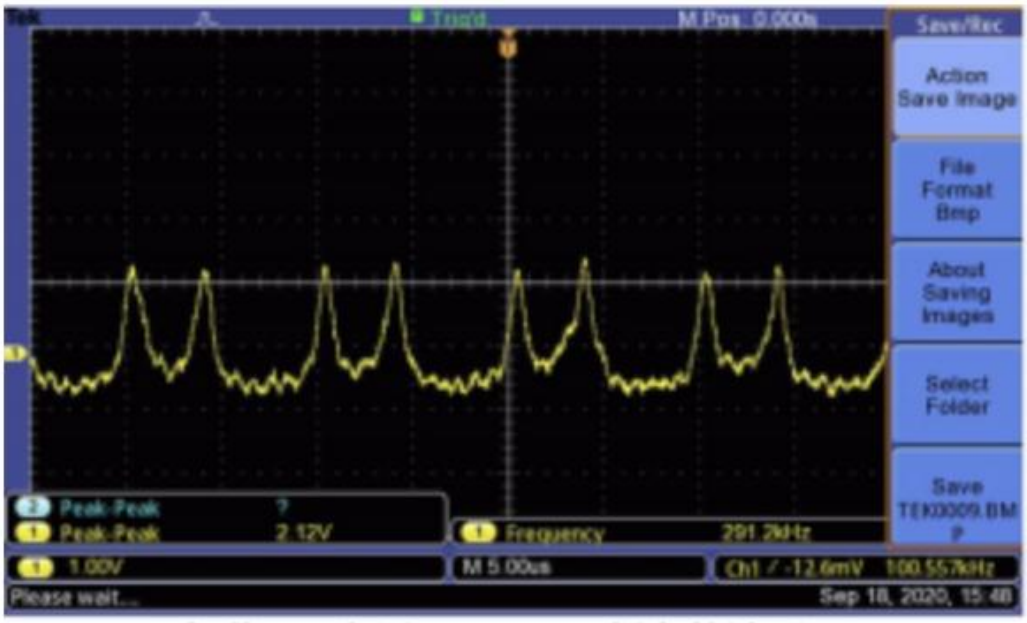
Waveform@5V 40kHz



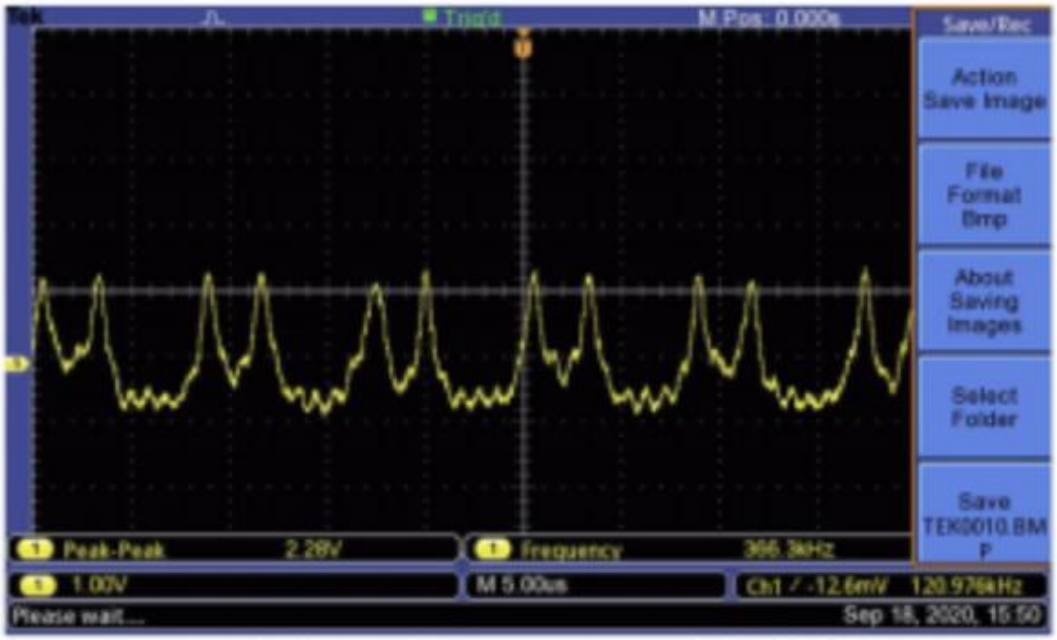
Waveform@5V 60kHz



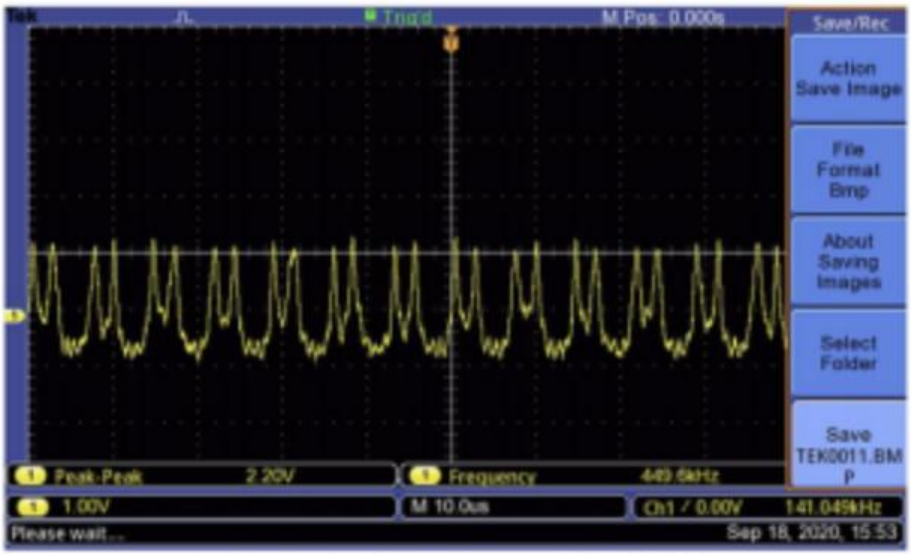
Waveform@5V 80kHz



Waveform@5V 100kHz



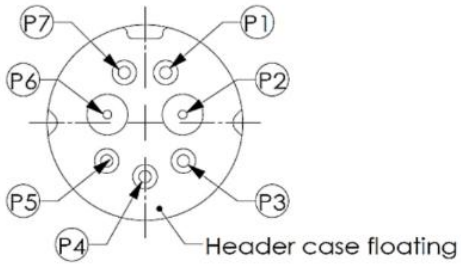
Waveform@5V 120kHz

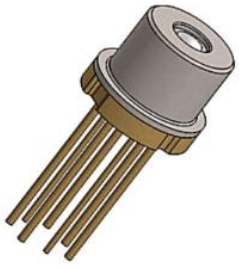


Waveform@5V 140kHz

With a constant 5V voltage applied, the frequency was varied to obtain the figure above. Our modulation frequency is extremely high, allowing it to carry a greater amount of information and provide a faster response speed.

Pin Definition





Bottom View

PIN NUMBERS	ASSIGNMENT
P1	TEC (+)
P2	LD (-)
P3	TUNING Vf (-)
P4	THERMISTOR (-)
P5	THERMISTOR (+)
P6	LD (+) & Vf (+)
P7	TEC (-)

The generation of VCSEL laser mainly consists of three components: the laser gain medium, the pump source, and the optical resonant cavity.The pump source excites the gain medium to achieve population inversion and generate light emission.Within the resonant cavity formed by the bottom and top mirrors, the light is amplified and oscillates, finally outputting from the top mirror.The output light is confined only to the central region without an oxide layer, forming vertical-cavity surface-emitting laser and producing a stable, continuous, high-quality laser beam with sufficient output power.

Ordering Information

MP-VCS-W□□□□-☆-A8▽

□□□□: Wavelength

0760: 760nm

0795: 794.7nm

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1310: 1310nm

1567: 1567nm

☆ : TEC

0: Without TEC

1: With TEC

▽: Wavelength Tolerance

1: ±0.5nm

2: ±1.5nm