

4.53um 20mW DFB-CW QCL Continuous Wave Quantum Cascade Laser



● Product Description

QCL is a semiconductor laser that emits in the mid-infrared region (4 um to 10 um). Due to its emission mechanism being completely different from conventional laser diodes, QCLs have attracted significant attention as an innovative solution for mid-infrared applications such as trace gas analysis in environmental monitoring. The quantum cascade laser utilizes SPC (Single Phonon Continuum) depopulation and a DFB (Distributed Feedback) structure, emitting continuous-wave mid-infrared laser radiation at room



temperature. The operating temperature of the chip is controlled by a Peltier element housed in an HHL package, allowing mode-hop-free tuning of the emission wavelength while maintaining longitudinal single-mode operation.

● Product features

Continuous wave output; DFB single-mode characteristics; precise temperature control; low-noise driving; industrial-grade package

● Part Number

MP-QCL-4530-DFB-20

● Application area

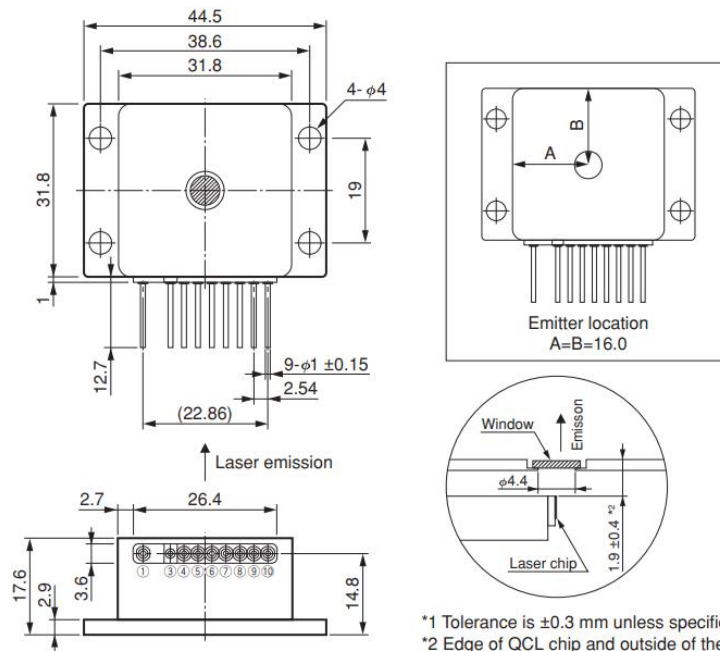
Gas Sensing | Medical Diagnostics | Defense and Security | Environmental Monitoring | Semiconductor Metrology

● Core parameters

Center Wavelength	Output Power
4.53um	20 mW



● Dimension Drawing



*1 Tolerance is ±0.3 mm unless specified.

*2 Edge of QCL chip and outside of the package.

Pin No. *3	Function	Pin No. *3	Function
①	TEC cathode (-)	⑦	QCL cathode (-)
③	N.C.	⑧	Thermistor, (Top(c))
④	QCL anode (+)	⑨	Thermistor, (Top(c))
⑤	Thermistor, (T _{op(qcl)})	⑩	TEC anode (+)
⑥	Thermistor, (T _{op(qcl)})	—	—

*3 Pin of ③ is electrically connected to the case; package body. Other all pins are floating to the case

● General Parameters

Model Parameters

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature (QCL) *2	Top(qcl)	K *1 = 2209 cm ⁻¹	+10	—	+50	°C
Spectral Linewidth *3	ΔκL	K *1 = 2209 cm ⁻¹	—	—	0.2 *4	cm ⁻¹



Wavenumber Tuning Range *5	ΔkT	$K *1 = 2209$ cm^{-1}	± 1.0	—	—	cm^{-1}
Radiant Power	Fe	$K *1 = 2209$ cm^{-1}	20	—	—	mW
Laser Threshold Current	I _{th}	Top(qcl) = +20 °C	—	—	1.0	A
Minimum Side Mode Suppression Ratio	SMSR	Top(qcl) = +20 °C	25 *4	—	—	dB

Notes

*1 K: Emission wavenumber (cm^{-1}).

*2 The device can emit the target wavenumber at a specific Top(qcl) within the indicated temperature range.

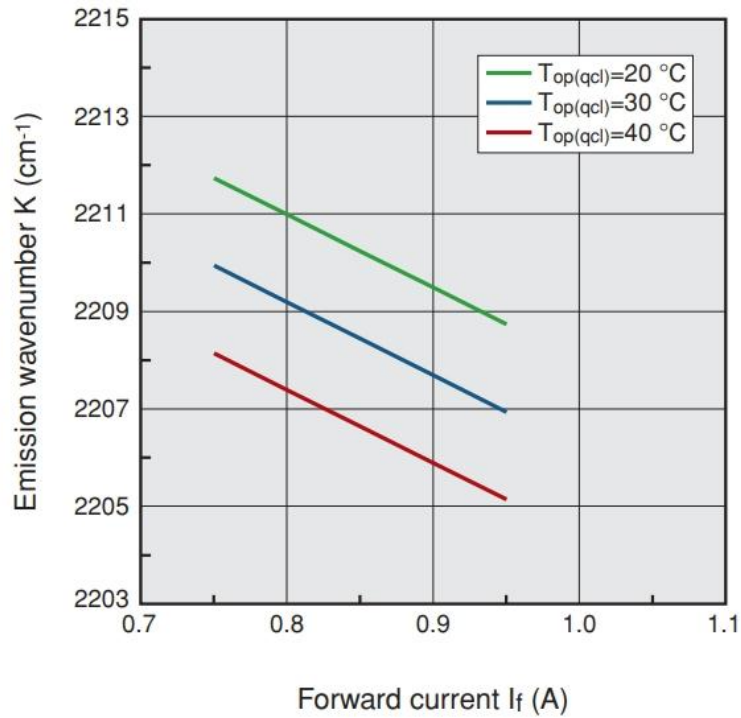
*3 FWHM.

*4 These values are limited by instrument resolution and signal-to-noise ratio during measurement.

*5 Continuous wavenumber scan range; the center of the tuning range is the emission wavenumber (K).

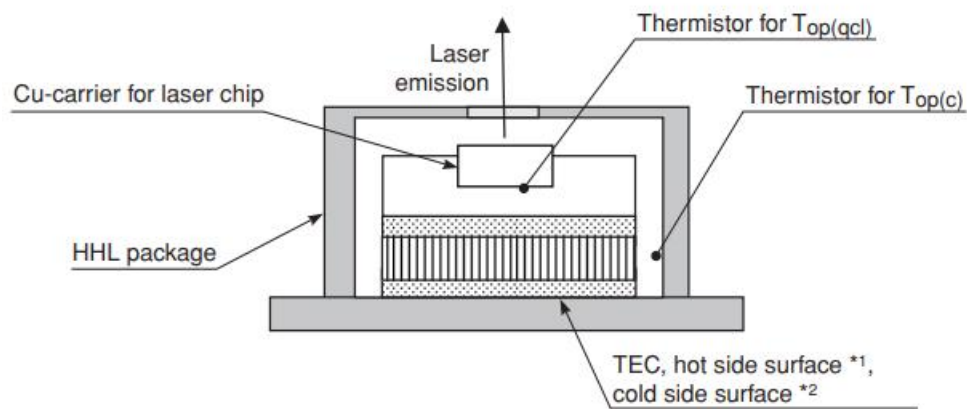
Typical Characteristics

Figure 1: Typical characteristics



General Parameters

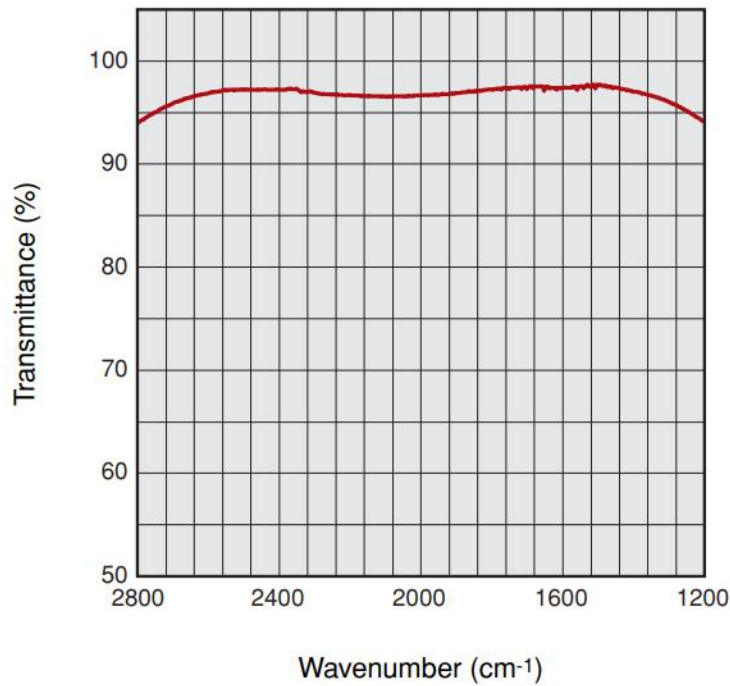
Thermistor Configuration (Schematic Diagram)



*1 when TEC is operated in cooling mode.

*2 when TEC is operated in heating mode.

Typical Transmittance Curve of the Window



DFB-CW QCL Continuous Wave Quantum Cascade Laser Model List

HHL Package

Wavelength	Wavenumber	Target gases
4.33 μm	2310 cm^{-1}	CO ₂ , CO ₂ isotope
4.53 μm	2209 cm^{-1}	N ₂ O
4.57 μm	2190 cm^{-1}	N ₂ O, CO



5.26 μm	1900 cm^{-1}	NO
6.13 μm	1631 cm^{-1}	NO₂
7.18 μm	1392 cm^{-1}	SO₃
7.39 μm	1354 cm^{-1}	SO₂
7.73 μm	1294 cm^{-1}	CH₄