SIMTRUM

QCL Housing-1000 High Powered THz Lasers

2022 V1

For customized projects please Contact us:

info@simtrum.com

QCL Housing-1000 High Powered THz Lasers

The QCL Housing-1000 system is our latest generation of turnkey terahertz Quantum Cascade Laser source, offering average power levels of up to 20mW* thanks to the more powerful Pulse Tube cryocooler. The system is configurable with a wide range of QCLs emitting at discrete frequencies between 1.9 and 5 THz in CW/pulsed and single/multimode. Multiple QCLs can be mounted in the same cooler (Multi-QCL option) and is available on request.

Features

The QCL Housing-1000 system Includes

- QCL laser diode module
- Closed cycle single-stage Pulse Tube Cryocooler
- QCL drive electronics capable of pulsed or continuous-wave operation (0.4 µs up to DC)
- All necessary accessories for turnkey operation

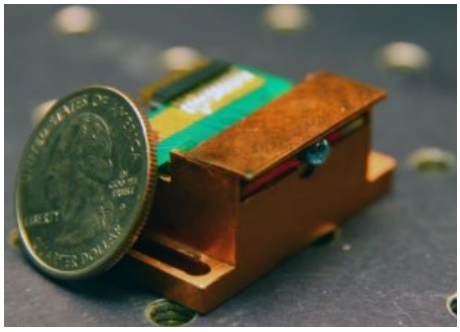
QCL Housing-1000 Main body
(with compressor detached)

A variety of user-interchangeable QCL modules are available

- 10's of Milli-watt average power levels
- Continuous wave operation available at select frequencies
- Choice of center frequencies ranging from 1.9 to 5 THz
- Multimode operation
- Single-mode DFB output at select frequencies

The QCL Housing-1000 system is designed for ease of use:

- Cryogen-free – laser diode cooling is by a closed cycle refrigeration
- No optical alignment
- Cooler is maintenance-free
- The Main system is tabletop compact and operates on 240 V single-phase power source



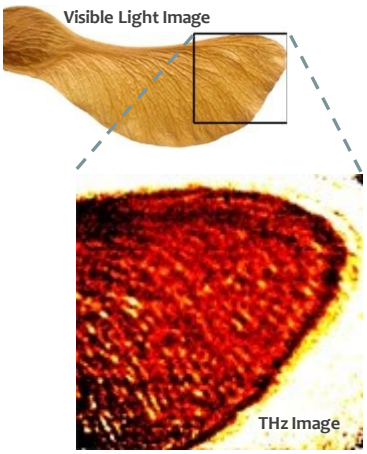
THz QCL Sub-mount

* At select frequencies, see QCL Power and Spectra Data Sheet.

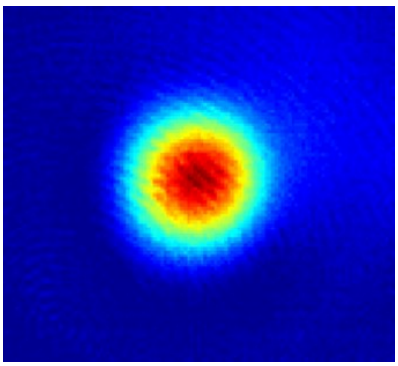
Applications

- High power Illumination source for focal plane arrays
- Noise and responsivity Characterization of detectors
- Local oscillator to pump Schottky-diode mixers for heterodyne detection

Illumination source for THz imaging

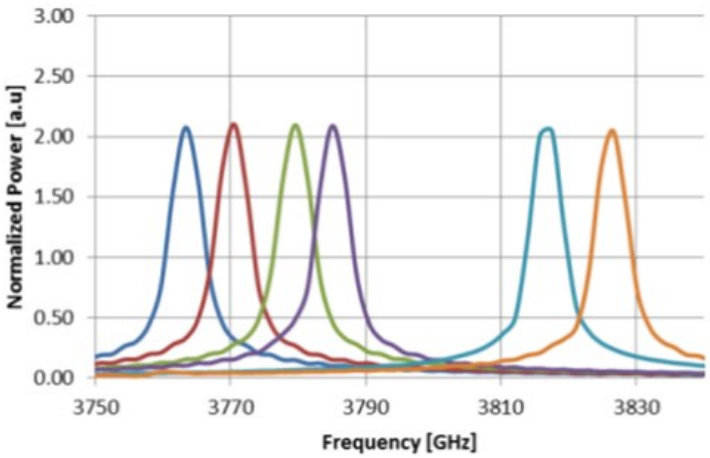


High-Quality Beam for Pumping Heterodyne Mixer

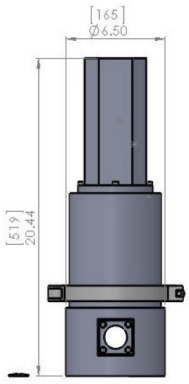


Beam focused using f/1 dia/25 mm High Resistivity Silicon Lens onto NEC IRV-TO831 Focal Plane Array

Single Mode Radiations for High-Resolution Spectroscopy



Product Size



Approximate Dimensions in inches [mm]

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Technical Data

Laser Driver Specifications QCL Driver Electronics (FPO typical values)

Current	Up to 2 A
Voltage	Up to 100 V
Pulsed Width	400 ns up to 5 ms
Frequency	100 Hz to 500 kHz
Triggering	TTL Internal/External Gate BNC connector
Interface	USB
Compatibility	Windows 7/8.1/10
Software Options	Laser bias current/voltage, pulse width, duty cycle and trigger source (internal external)
AC Voltage Range	100 - 125 / 200 - 240 V
Rated Frequency	50 - 60 Hz
Rated Current	120 V/5 A – 240 V/ 2.5 A

Pulse-Tube Cryocooler Specifications

Operation Temperature	Room Temperature, no cryogens.
Cooldown Time	< 45 min to ~50 K
Maintenance	Cold head requires periodic
Vacuum Purge	to -10^{-2} mBar with a provided compact vacuum pump (e.g. Edwards E2M0.7 or similar). No turbo pumping is required.

QCL Characteristics

Laser Diodes	Multimode and single-mode laser diodes are available.
Beam Divergence	from 5 to 35 degrees FWHM

* Select devices operable in continuous wave

General Paraments

AC Voltage Range	200VAC / 208-230VAC
Rated Frequency	50 / 60 Hz
Rated Power Consumption	3.5 kW / 4.2 kW
Operating Modes	Open Loop
Dimensions	Cooler 17 x 17 x 52 cm Compressor 50 x 56 x 56 cm
Weight	Cooler 10 kg Compressor 80 kg

Included Components

- QCL device(s) characterized for wavelength, output power, beam divergence and current versus voltage
- Vacuum chamber with electrical feedthroughs and vacuum gauge
- Liquid/Air cooled, Pulse-Tube cryocooler
- LWP-PS3 pulsed laser driver or DC power supply (for CW operation)
- Compact rotary vane vacuum pump
- Laptop PC with software for control of the driver and cryocooler

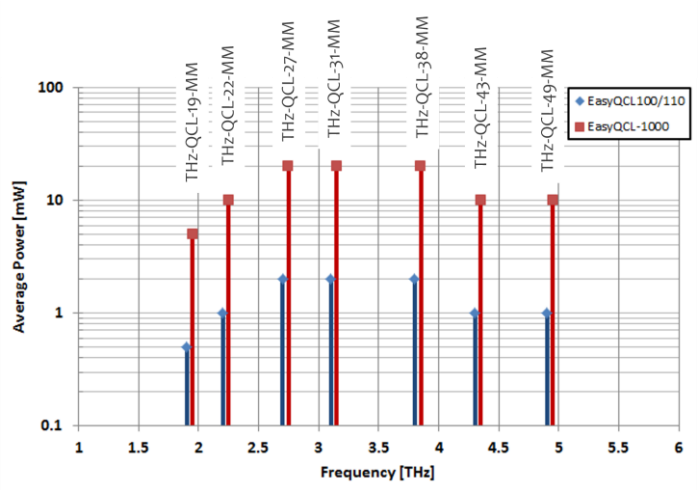
Warranty

- One-year parts and labour
- First compressor maintenance: 15,000 Hours

*Due to ongoing continuous product improvement, specifications are subject to change without notice.

Multi-mode THz QCLs

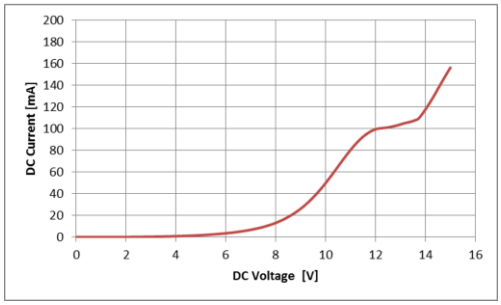
•Minimum average power levels are shown below when used in QCL Housing-100/110/1000 systems
•The QCL Housing-100/110/1000 systems permit the user to exchange devices allowing maximum experimental flexibility



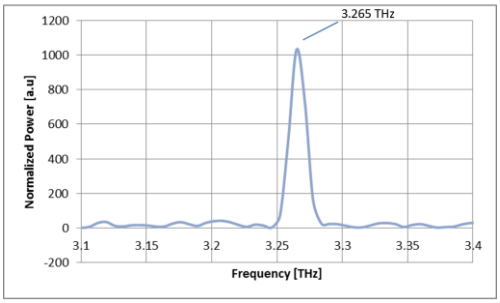
Technical Specification for Multi-mode 3.265 THz QCL Chip

Device Type	Fabry-Perot with Integrated Lens
Operating Mode	CW
Measurement Temp	48-49k
Lasing Frequency	3.265THz (see below)
CW Power	>6 mW (V = 15.0V, I = 155mA)
Absolute Max Current	**155mA (at >15.2 V)**

Current vs Voltage

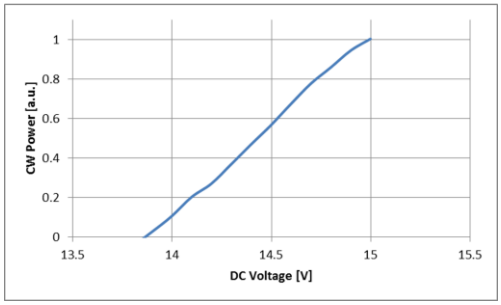


Spectral Characteristics

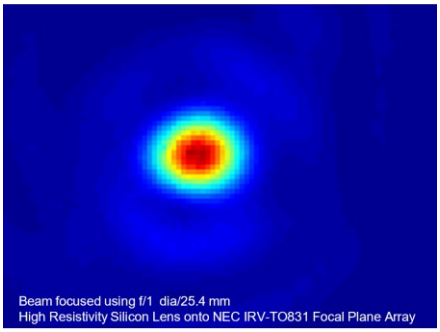


Pulse spectrum taken at 48K (V=12.8. V, I=225 mA)

Power vs Current



Focused Beam



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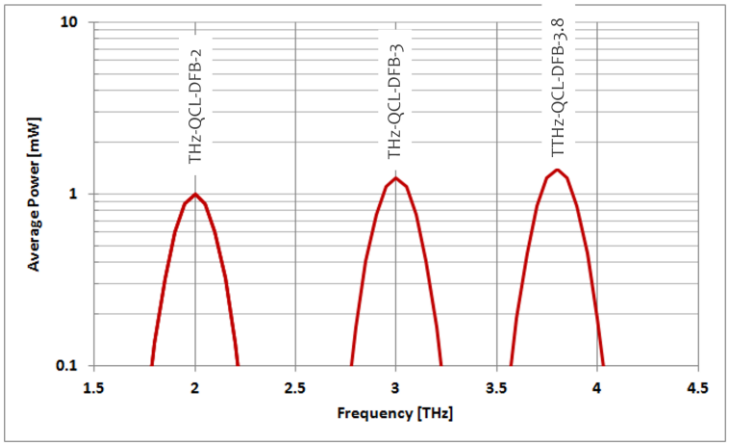
Single-mode DFB THz QCLs

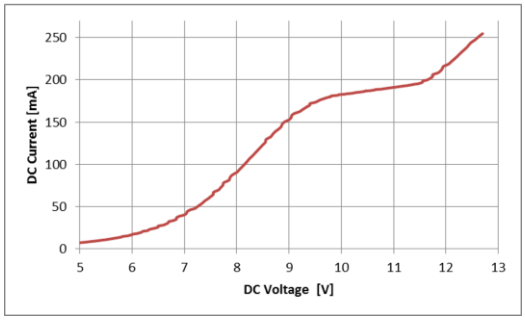
•Single-mode DFB devices are available with center frequencies of 2 THz, 3THz and 3.8THz
•Power levels are typical>1 mW CW power at the peak wavelength
•Available as single devices, or 20-element QCL arrays spanning > 80 GHz
•Customized fabrication available within =/- 6 GHz of the target frequency
•Minimum average power levels are shown below vs frequency when used in EASY QCL-100/110/1000 systems
•The QCL Housing-100/110/1000 systems permit the user to exchange devices allowing maximum experimental flexibility



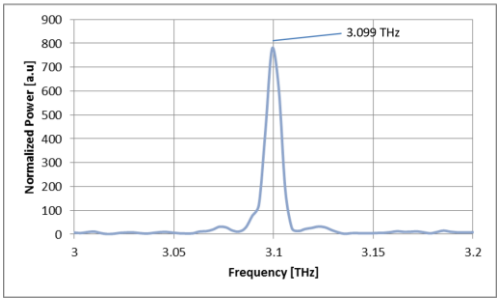
Technical Specification for Single-mode 3.1 THz QCL Chip

Device Type	Third-order DFB
Operating Mode	CW
Measurement Temp	45-48k
Lasing Frequency	Single-mode at 3.099THz (see below)
CW Power	2.3 mW (V = 12.55V, I = 247mA)
Absolute Max Current	**255mA (at >12.7 V)**

Current vs Voltage

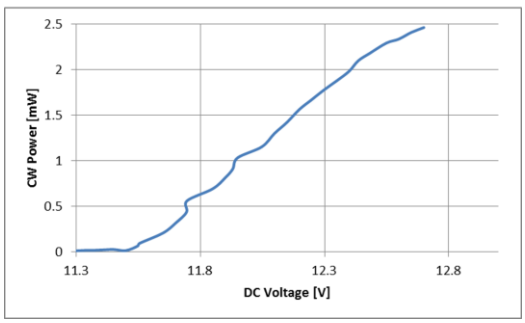


Spectral Characteristics

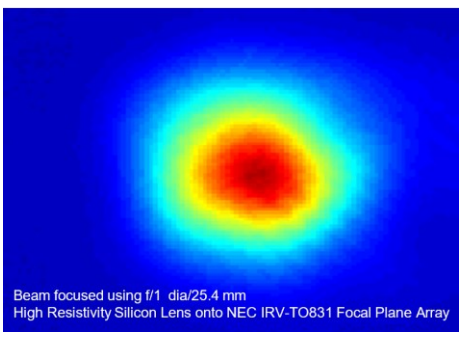


Pulse spectrum taken at 45K (V=12.4 V, I=238 mA)

Power vs Voltage



Typical Focused Beam



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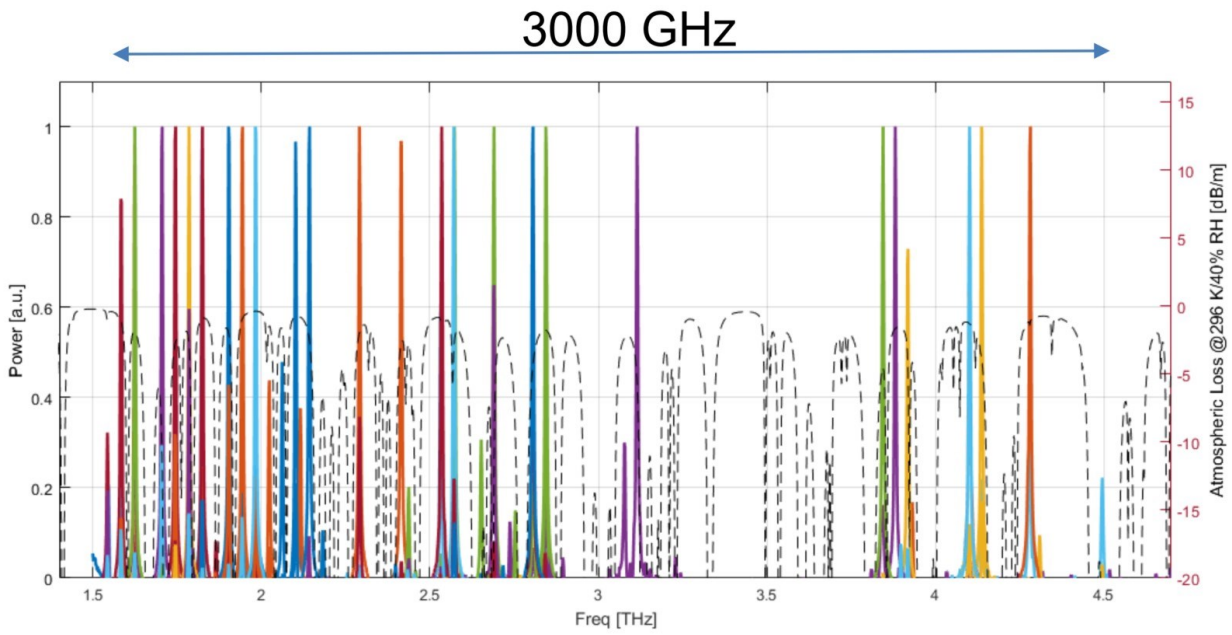
Technical Specification for Tunable THz QCL Chip

Device Type	Electronically Controlled Tunable QCL
Operating Mode	Pulsed (2 µs 100 kHz)
Measurement Temp	55K on QCL Housing-200 system
Lasing Frequency	Electronically Controlled Tuning from -1.5THz to 4.5 THz
Power	**0.1 to 1 mW peak power in QCL Housing-200**



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