

MIRcat-QT™

RAPID-SCAN, ULTRA-BROADLY TUNABLE MID-IR CW/ PULSED LASER SYSTEM

Demanding Mid-IR spectroscopy applications such as nanoscale and microscale chemical imaging benefit greatly from rapid, high-SNR data acquisition. However, until now, Mid-IR laser sources required compromises in beam quality and wavelength fidelity to achieve high scan speeds. With the introduction of the new MIRcat-QT, you can now have superior beam quality, wavelength fidelity, and fast continuous scanning ($>1,000 \text{ cm}^{-1}$ at 5 Hz) all in one ultra-broadly tunable, CW/pulsed Mid-IR laser.

Incorporating the next generation of Daylight's field-proven Quantum Cascade Laser (QCL) technology, MIRcat-QT delivers uncompromised performance in application-critical areas. This includes: tuning speeds to $>30,000 \text{ cm}^{-1}/\text{s}$, tuning ranges to $>1,000 \text{ cm}^{-1}$, CW RIN as low as $-145 \text{ dBc}/\text{Hz}$, peak power output up to 1W, average power output up to 0.5W, and wavelength repeatability as low as $<0.1 \text{ cm}^{-1}$. In addition, MIRcat-QT provides a single TEM_{00} output beam, which enables high-efficiency fiber coupling.

MIRcat-QT's flexible, modular design allows users to factory-configure their system for up to four pulsed or CW/pulsed modules, upgrade it later, or add a visible aiming beam. With Daylight's proprietary HFQD™ (High-Fidelity QCL Drive) circuitry, your QCL chips are protected. With a GUI and SDK command set included as standard, MIRcat-QT users can control wavelength set-points, scans, power, triggering, pulse width, duty cycle, and repetition rate in pulsed operation. MIRcat-QT brings new capabilities and agility to a wide range of molecular sensing applications including: process and quality control, remote sensing, imaging, and spectroscopy. Please contact us today to learn how MIRcat-QT, and our highly experienced team, can help you.

FOR SPECTROSCOPY AT SPEED, WITHOUT COMPROMISE.

HIGHLIGHTS

- Continuous periodic tuning @ 5 Hz (>1,000 cm^{-1} in < 200 msec)
- Pulsed AND CW operation modes
- Lowest relative intensity noise (RIN)
- Pulse repetition rates up to 5 MHz
- Pulse widths down to 50 nsec

MIRcat-QT SPECIFICATIONS

PERFORMANCE SPECIFICATIONS

Wavelength Availability	Center wavelengths from <4 μm to >13 μm
Modes of Operation	Pulsed or CW
Available Configurations	Select 1, 2, 3, or 4 standard or custom laser modules
Standard Configurations	MIRcat-2400-PX-A (Pulsed, 6.5—12.4 μm) MIRcat-2400-PX-B (Pulsed, 5.5—11 μm) MIRcat-2400-PCX-B (CW/Pulsed, 6—11 μm)
Tuning Modes	Set λ , Step & Measure, Continuous Scans
Max. Tuning Speed (Step)	250 ms step-and-settle time to arbitrary λ
Max. Tuning Speed (Scan)	Slew rates to >30,000 cm^{-1}/s
Wavelength Accuracy	$\leq 1 \text{ cm}^{-1}$
Average Power Stability	< 3% (1 hr)
Spatial Mode	TEM ₀₀ (nominal)
Beam Divergence	< 4 mrad (full angle, 1/e ² intensity width)
Beam Pointing Stability	< 2mrad (beam centroid change)
Spot Size	< 2.5 mm (1/e ² intensity radius)
Polarization	Linear, vertical, >100:1

PULSED OPERATION

Peak Power	Up to 1W (depends on module)
Energy Stability	< 3%, standard deviation
Linewidth	$\leq 1 \text{ cm}^{-1}$ (FWHM)
Pulse Width	40 to 500 ns, 20-ns increments
Repetition Rate	0.1 kHz to 1 MHz, 0.1 kHz increments
Maximum Duty Cycle	10% (custom up to 30%)

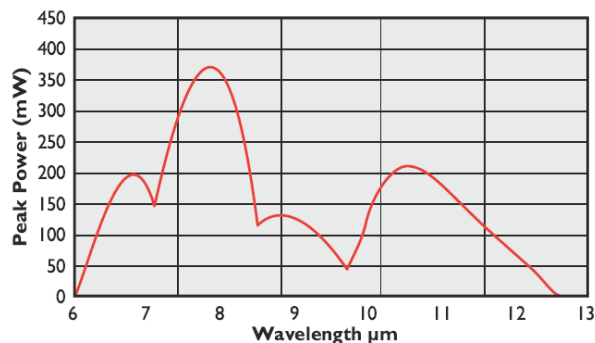
CW OPERATION

Average Power	Up to 500mW (depends on module)
Linewidth	$\leq 100 \text{ MHz}$ (FWHM, over 1s)

OTHER PARAMETERS

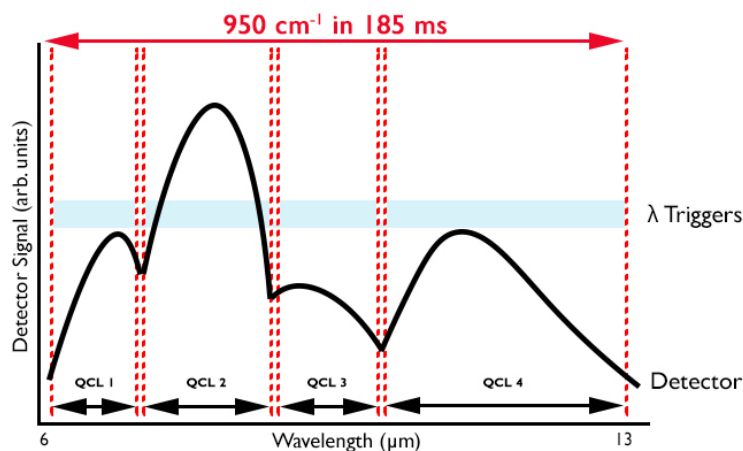
Triggering (Pulsed)	Internal/external, external pulse input
Triggering (Scans)	External wavelength step, scan start
External Control Interface	USB 2.0
Temperature Range (°C)	15 to 30 °C (operating)
Humidity	0—80% RH, non-condensing
Cooling	Passive Air (pulsed, up to 5% duty cycle) Water (CW, or >5% duty cycle pulsed)
Power Requirements	$\leq 2 \text{ A}$, 90 to 264VAC, 47 to 63Hz, single phase
Dimensions (L x W x H)	17.9 x 9.8 x 6.3 in. (45.5 x 24.9 x 16 cm)

TYPICAL TUNING CURVE



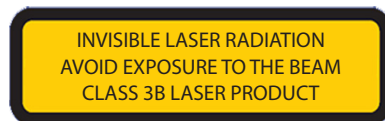
Example Shown: MIRcat-2400-PX-A

HIGH-SPEED TUNING



Tuning speeds up to >30,000 cm^{-1}/s across four QCL chips

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