



SCANLIGHT

## MIRCAT

### 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. 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, you can now have superior beam quality, wavelength fidelity, and fast continuous scanning ( $>1,000\text{ cm}^{-1}$  at  $10\text{ Hz}$ ) 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 delivers uncompromised performance in application-critical areas. This includes peak tuning speeds to  $>30,000\text{ cm}^{-1}/\text{s}$ , tuning ranges approaching  $1400\text{ cm}^{-1}$  ( $> 5\text{ }\mu\text{m}$ ), CW RIN as low as  $140\text{ dBc/Hz}$ , peak power output up to  $1\text{ W}^{[2]}$ , average power output up to  $0.5\text{ W}$ , and wavelength repeatability as high as

$<0.1\text{ cm}^{-1[1, 2]}$ . In addition, MIRcat provides a single  $\text{TEM}_{00}$  output beam, which enables high-efficiency fiber coupling.

MIRcat's flexible, modular design allows user to factory-configure their system for up to four pulsed or CW/pulsed modules, upgrade it later, or add a visible aiming beam<sup>6</sup>. 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 users can control wavelength set-points, scans, power, triggering, pulse width duty cycle, and repetition rates in pulsed operation. MIRcat 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, and our highly experience team, can help you.

# FOR SPECTROSCOPY AT SPEED, WITHOUT COMPROMISE.

## HIGHLIGHTS

- Tuning sweeps @ 10 Hz ( $> 1,000 \text{ cm}^{-1}$  in  $< 100 \text{ ms}$ )
- Pulsed AND CW operation modes
- Low relative intensity noise (RIN)
- Pulse repetition rates up to 3 MHz
- Pulse widths down to 40 ns

## PERFORMANCE SPECIFICATIONS

Wavelength Availability	Center wavelengths from $< 4 \mu\text{m}$ to $> 13 \mu\text{m}$			
Modes of Operation	Pulsed or CW			
Available Configurations	1, 2, 3, 4, or 8 standard or custom laser modules			
Example Configurations (Pulsed Only)	Range in Wavelength		Range in Wavenumber	# of Modules
	MIRcat-2300-PX-A	5.4 to 12.99 $\mu\text{m}$	1835 to 770 $\text{cm}^{-1}$	3
	MIRcat-2400-PX-A	5.03 to 12.99 $\mu\text{m}$	1990 to 770 $\text{cm}^{-1}$	4
	MIRcat-2400-PX-B	3.36 to 3.72 $\mu\text{m}$ , 5.4 to 12.99 $\mu\text{m}$	2975 to 2690 $\text{cm}^{-1}$ , 1835 to 770 $\text{cm}^{-1}$	4
	MIRcat-2400-PX-C	4.28 to 4.99 $\mu\text{m}$ , 5.4 to 12.99 $\mu\text{m}$	2299 to 2151 $\text{cm}^{-1}$ , 1835 to 770 $\text{cm}^{-1}$	4
Example Configurations (CW)	MIRcat-2400-PCX-A	5.9 to 10.6 $\mu\text{m}$	1695 to 940 $\text{cm}^{-1}$	4

Tuning Modes	Set $\lambda$ , Step & Measure, Continuous Scans
Max. Tuning Speeds (Step)	250 ms step-and-settle time to arbitrary $\lambda$
Max. Tuning Speed (Scan)	Peak velocity to $> 30,000 \text{ cm}^{-1}/\text{s}$
Wavelength Accuracy	$\leq 1 \text{ cm}^{-1}$
Average Power Stability	$< 3\%$ (1 hr)
Spatial Mode	TEM <sub>00</sub> (nominal)
Beam Divergence width) <sup>2,5</sup>	$< 4 \text{ mrad}$ at $4 \mu\text{m}$ (full angle, $1/e^2$ intensity)
Beam Pointing Stability	$< 2 \text{ mrad}$ (beam centroid change) <sup>2</sup>
Spot Size	$< 2.5 \text{ mm}$ ( $1/e^2$ intensity diameter) <sup>5</sup>

## PULSED OPERATION

Peak Power	50 to 800 mW (depends on module) <sup>3</sup>
Energy Stability	$< 3\%$ , standard deviation
Linewidth	$\leq 1 \text{ cm}^{-1}$ (FWHM)
Pulse Width <sup>7</sup>	40 to 1 $\mu\text{s}$

## CW OPERATION

CW Average Power	100 to 450 mW (depends on module) <sup>3</sup>
Linewidth	$\leq 100 \text{ MHz}$ (FWHM, over 1 s) <sup>8</sup>

COMPLIES WITH 21 CFR 1040.10 AND 1040.11 EXCEPT FOR DEVIATIONS PURSUANT TO LASER NOTICE NO. 50, DATED JUNE 24, 2007. COMPLIES WITH IEC 60825-01

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## UPGRADE OPTIONS

Red Aiming Beam	Provides visible ('red', Class 1) aiming beam co-boresighted with mid-IR beams
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## OTHER PARAMETERS

Triggering (Pulsed)	Internal/external, external pulse input
Triggering (Scans)	External wavelength step, scan start
External Control Interface <sup>9</sup>	15 to 30 °C (operating)
Humidity	0–80% RH, non-condensing
Cooling	Passive Air (Pulsed, up to 5% duty cycle) Water (CW, fast scans or $> 5\%$ duty cycle pulsed)

<sup>1</sup>All specifications are: subject to change without notice; defined at the tuning peak of each gain module; after a 10-min warm-up; at the factory-recommended operating current.

<sup>2</sup>Depends on chip(s) selected. CW requires CW-capable chip. Specifications to be agreed at time of order.

<sup>3</sup>Typical value. To request a specified value, please inquire.

<sup>4</sup>Fastest inter-module switching speeds may require water cooling—please inquire.

<sup>5</sup>Specification scales with wavelength—please inquire.

<sup>6</sup>Requires return to factory.

<sup>7</sup>Some chips can support pulses up to 1  $\mu\text{s}$ , PRF up to 3 MHz, and duty cycles up to 30%—please inquire.

<sup>8</sup>If laser is tuned for single longitudinal mode operation.

<sup>9</sup>GUI compatible with Windows © 10. Please inquire for other OS.

<sup>10</sup>Does not include acceleration and deceleration time.



INVISIBLE LASER RADIATION  
AVOID EXPOSURE TO THE BEAM  
CLASS 3B LASER PRODUCT

