QUBE QCL SYSTEM

THE MODULAR SYSTEM FOR SEMICONDUCTOR LASERS

ppq SENSE

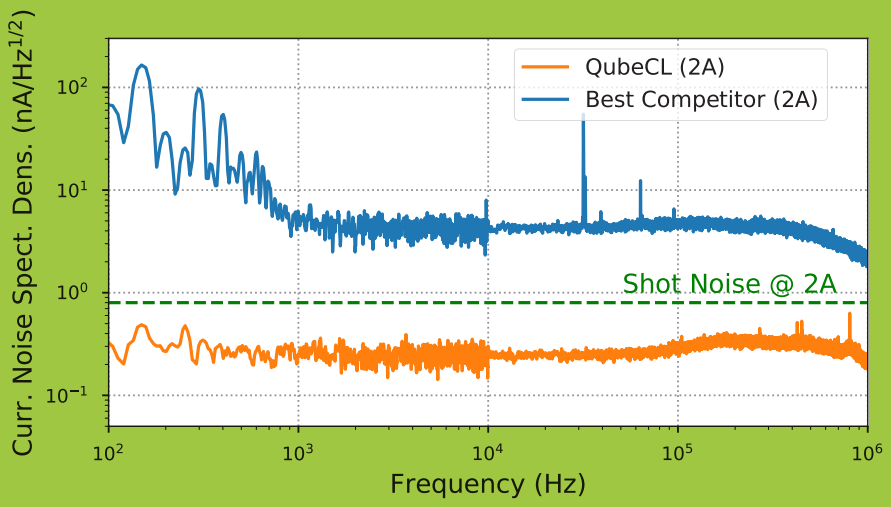
THE RIGHT MODULE FOR ANY NEED

QUBE CL is a modular platform that provides all the tools for driving and controlling semiconductor lasers, and in particular quantum cascade lasers (QCLs) at unprecedented levels of precision and simplicity. QCLs are among the most resource-demanding devices, in terms of voltage compliance, maximum current ratings, current noise and temperature stability.

The QUBE CL system includes, in an ultra-compact 10x10 cm^2 footprint, the following instruments, each providing top-level performances in its category:

- An ultra-low-noise current driver providing up to 2.5 A DC currents with a noise density always lower than 500 pA/√Hz and with compliance voltages up to 18 V.
- Two indipendent fast analog modulators that can drive up to ±100 mA from DC to 2 MHz.
- Two indipendent internal digital modulators that can generate both sine and triangular waveform and can drive up to ±75 mA from 250 mHz to 2 MHz.
- A temperature controller for Peltier-based stabilization ensuring a temperature stability better than 1 mK.
- A phase-locked loop module for metrological-grade stabilization of the QCL phase/frequency.
- A Pound-Drever-Hall module to lock your laser to an high-finesse cavity.
- A Lock-In module for lock your source to a narrow molecular transition.
- Expansion modules for housing the laser source inside the instrument itself.

The patented design, developed in a research laboratory, provides the lowest current-noise compared to any commercially available instrument. By using the QUBE QCL the current noise does not contribute to the broadening of the laser emission, thus ensuring the narrowest linewidth and the highest phase/frequency stability.



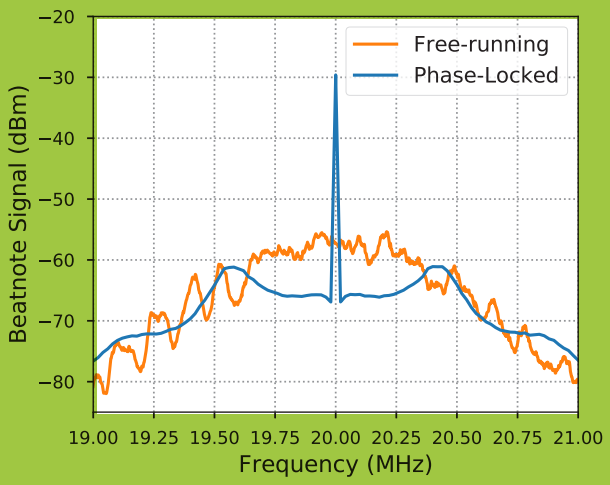
THE LOWEST CURRENT NOISE ON THE MARKET

Flat current noise level:
current noise density < 400 pA/√Hz
integrated current noise: ~0.5 μA_{RMS}

ADD-ON MODULES ALLOW A GREAT VARIETY OF APPLICATIONS

PHASE-LOCK FOR ULTRA-NARROW LASERS

Seamless phase-lock any laser diode as well as mid-IR and THz QCLs, Stabilize QCL combs.



EMBED YOUR LASER INTO THE QUBE QCL FOR REDUCING NOISE AND MAXIMIZING PERFORMANCES

Available for both HHL and Butterfly packages.

TECHNICAL SPECIFICATIONS OF THE MAIN MODULES:

Current Driver module - CD05, CD10, CD15, CD20, CD25

Laser Configuration[1]	AnodeGND, CathodeGND
Max Current Ranges	0.5 A, 1 A, 1.5 A, 2 A, 2.5 A
RMS Current Noise [10 Hz - 1 MHz]	<1 µA RMS
Current Noise Spectral Density	<400 pA/√Hz
Current Stability (1 h)	10 ppm FS
Compliance Voltage	18 V
Analog Modulation Channels	2
Frequency Range	DC - 2 MHz (-3 dB)
Gain	10 mA/V, 500 µA/V
Max Input Signal	±10 V
Analog+Digital Modulation Channels[2]	2
Frequency Range	250 mHz - 2 MHz (-3 dB)
Max Current	±75 mA, ±2.5 mA

Temperature Controller - TC

Temperature Resolution	<500 µK
Temperature Coefficient	<10 ppm/K
TEC Current Range	±3 A
Compliance Voltage	20 V
NTC thermistor	1-10 kΩ

Phase-Locked Loop module - PLL

RF Frequency Range	10 - 250 MHz
LO Frequency Range	10 - 100 MHz
Inputs Dynamic Range	[-30, 0] dBm
Input Stage Gain	30 dB
Max Lock Bandwidth	800 kHz

Pound Drever Hall Lock module - PDH

RF Frequency Range	1 - 100 MHz
LO Frequency Range	1 - 100 MHz
RF Dynamic Range	[-30, 0] dBm
LO Input Level	+5dBm
Max Lock Bandwidth	800 kHz

Lock-In Lock module - LKN

Modulation Frequency	32768 Hz (fixed)
Scanning Ramp Frequency	1 Hz - 1 kHz
Input Voltage Noise [1 Hz - 1 MHz]	<30 µV RMS
Input Stage Gain	0-60 dB
Phase regulation	0-360 deg in 1.5 mdeg steps
Integration time	1 ms - 10 s
Max Lock Bandwidth	1 kHz

1.Noise performance are guaranteed for Anode Ground configuration only 2.Optional feature

LS
LH
MOD1 IN
MOD2 IN
PLL
PHASE MON
LO IN
RF IN
DIVIDER MON (TTL)
QM10
TC
USB
CURRENT
CUR ON
PWR ON
MOD ON
SLOWLY THOUGHT AND HANDCRAFTED IN ITALY
S/N
POWER

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