

Wavelength Swept Pulsed Quantum Cascade Laser L14890-09

■ Features

- Installed MEMS grating
- Realize high speed and broad wavelength sweeping
- Built-in collimation lens
- Broadband QCL based on DAU structure

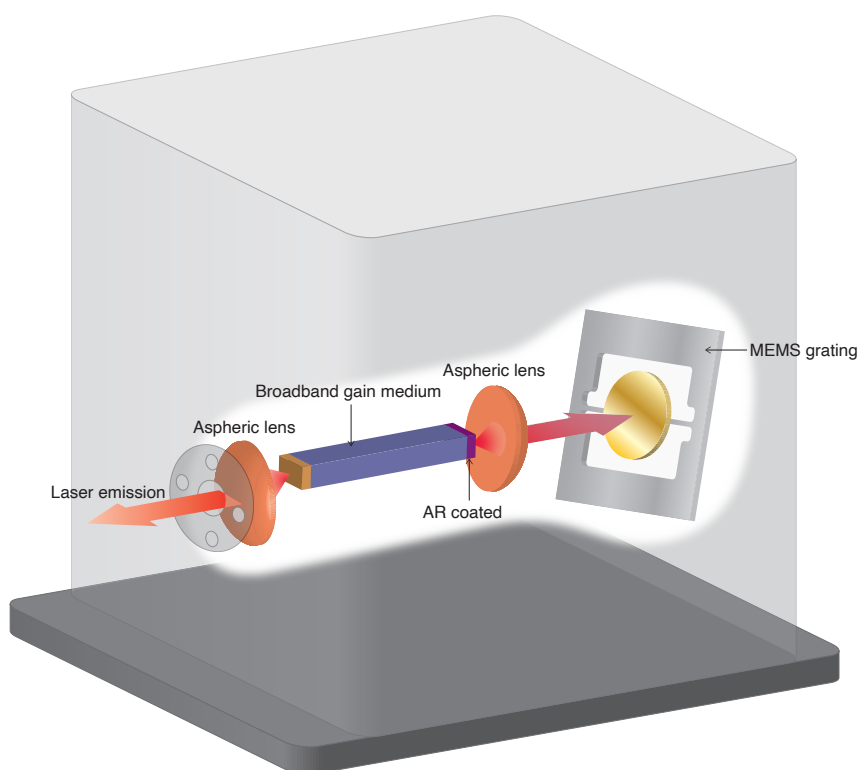
**Anticross
DAUTM
structure**



■ Outline

It is a pulse quantum cascade laser that realized broadly wavelength sweeping by external cavity configuration. It can carry out the measurement of mid-infrared spectrum remotely, contactless and with high throughput. This product offers new value to the mid-infrared spectroscopy, which was traditionally carried out with FT-IR, by utilizing features of laser; high output and high wavelength resolution.

■ External cavity



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Characteristics

Unless otherwise specified, the repetition rate of the MEMS operation signals $F(\text{mems})=1.8$ kHz, The repetition frequency $F(\text{qcl})$ of the QCL operation signal is 180 kHz, and the QCL operation temperature $T_{\text{op}(\text{qcl})}$ is 20 °C.

Characteristic	Condition	Min.	Typ.	Max.	Unit
Wavenumber sweep frequency	External control ^{*1} (MEMS operation signal)	—	1.8 ^{*2}	—	kHz
Pulsed output power	MEMS stop	200	600	900	mW
Optical pulse width	Fixed before shipment from the factory	80	100	120	ns
Optical pulse repetition frequency	External control ^{*1} (QCL operation signal)	—	180 ^{*3}	—	kHz
Spectrum linewidth ^{*4}	MEMS stop	—	2.0	3.0	cm ⁻¹
Beam diameter ^{*5}	Distance ^{*6} 800 mm ± 20 mm MEMS stop	3	5	7	mm
Beam divergency ^{*7}	Distance ^{*6} 800 mm ± 20 mm MEMS stop	—	—	5	mrad
Polarization	Vertical to the bottom				
Center wavenumber	Calculated from wavenumber sweep width	1020	1075	1140	cm ⁻¹
Wavenumber sweep width	Pulsed output power > 10 mW	180	200	—	cm ⁻¹

^{*1}: Controlled by a signal source such as a separate function generator. ^{*2}: $F(\text{mems})$: Repetition frequency of the MEMS operation signal.

^{*3}: $F(\text{qcl})$: Repetition frequency and rise edge of the QCL operation signal. ^{*4}: Full width at half maximum of the spectrum. ^{*5}: $1/e^2$

^{*6}: Distance from the outgoing window ^{*7}: Half angle

Recommended operating conditions

Characteristic		Symbol	Value	Unit
Power input	Voltage	V_{in}	DC24	V
	Current	I_{in}	0.05	A
QCL operation signal ^{*1}	Waveform	—	Positive pulse square wave ^{*2}	—
	Repetition frequency	$F(\text{qcl})$	180	kHz
	Signalling voltage	$V_{\text{pk}(\text{qcl})}$	4.0 ^{*3}	V_{pk} ^{*3}
	Duty ratio	DR	1.8	%
MEMS operation signals ^{*4}	Waveform	—	Sine wave	—
	Repetition frequency	$F(\text{mems})$	1.8	kHz
	Signalling voltage	$V_{\text{pp}(\text{mems})}$	4.0	V_{pp}
Peltier current ^{*5}	I_{c}	±1.6	A	
Peltier voltage ^{*5}	V_{c}	±2.2	V	
QCL operation temperature ^{*5}	$T_{\text{op}(\text{qcl})}$	+20	°C	

^{*1}: External control. A signal source such as a separate function generator is needed. ^{*2}: Positive pulse with a pulse base voltage of 0 V.

^{*3}: V_{pk} : Pulse stop voltage value when the pulse base voltage is set to 0 V.

^{*4}: External control. A signal source such as a separate function generator that is different from ^{*1} is needed.

^{*5}: External control. Operation temperature of the laser element (QCL) controlled by a separate peltier controller.

General specifications

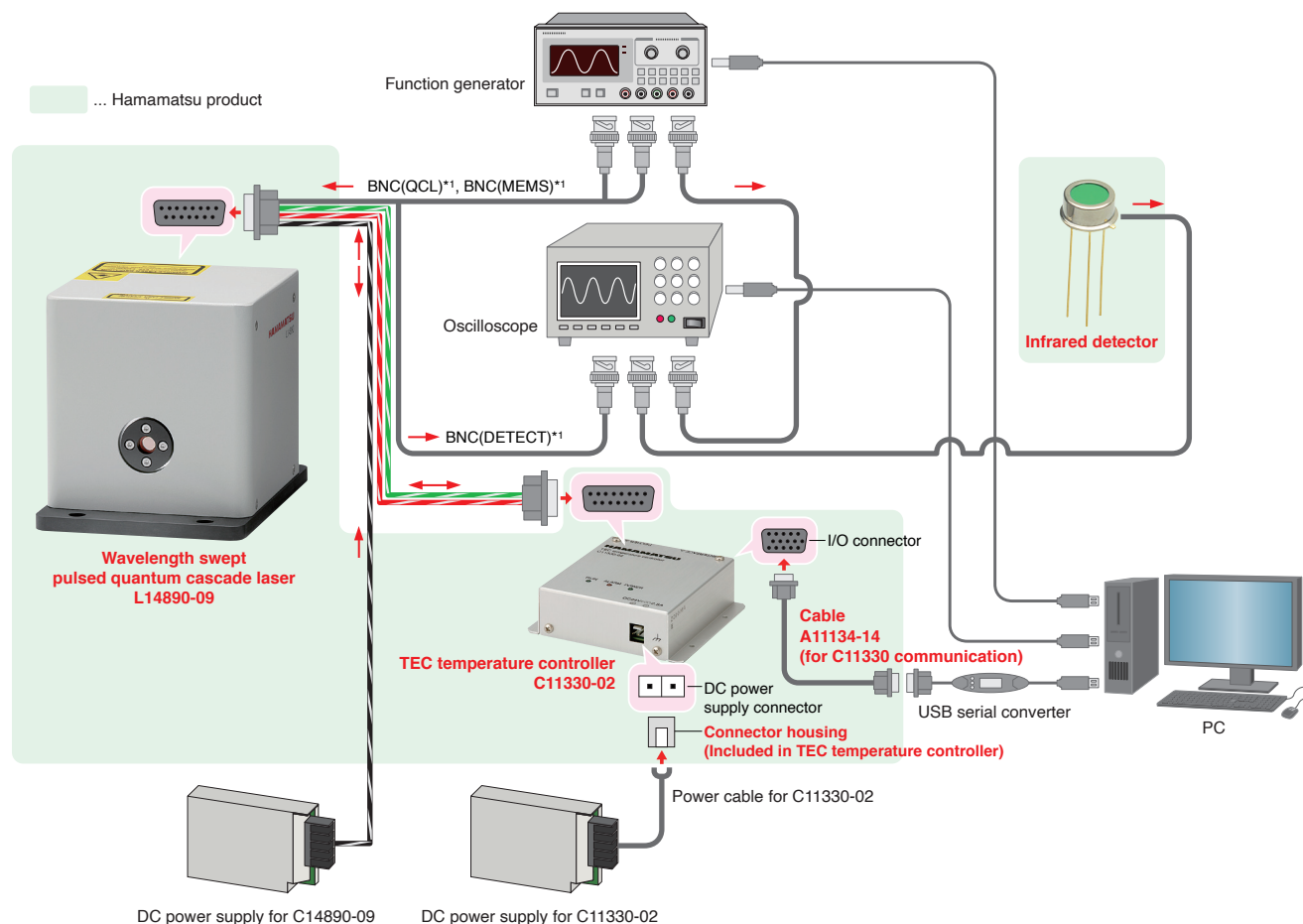
Characteristic	Value	Unit
Operation temperature (ambient)	+10 to +40	°C
Storage temperature (ambient)	+5 to +55	°C
Relative operation humidity (ambient)	30 to +60 ^{*1}	%
Relative storage humidity (ambient)	20 to +60 ^{*1}	%
Startup time	5 or less	Second
Place of use	Indoor place	—
Operation altitude	2000 or less	m
Dimensions (W × H × D) ^{*2}	82 × 88 × 112	mm
Weight	1.2	kg

^{*1}: No condensation ^{*2}: Excluding projections

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■ Configuration

● Connection example



- *1: The name printed on the power cable attached to the product. Refer to "Power connector specifications" on page 4 for the functions.
 * The cable connected to the power connector is attached with the product. The cables connected to the DC power supply and the TEC temperature controller have to be manipulated by the user.
 * This configuration is recommended for working the sample software properly. Refer to the table of the required equipment for the model number of the recommended equipment.

● Accessories included product

Content	Quantity
Power cable (2 m)	1
Sample software (CD-R)	1
Instruction manual	1

● Necessary items for normal operation excluded product

Equipment	Manufacturer	Type No.
2-ch function generator	NF Corporation	WF1974
Oscilloscope	Keysight Technologies	DSOX2024A
DC Power supply	TDK lambda	HWS30A-24/A
TEC temperature controller	Hamamatsu Photonics K.K.	C11330-02 *1*2
PC	—	Windows 10 (64-bit) USB 2.0

*1: A PC and an external DC power supply (24 V) are needed to control.

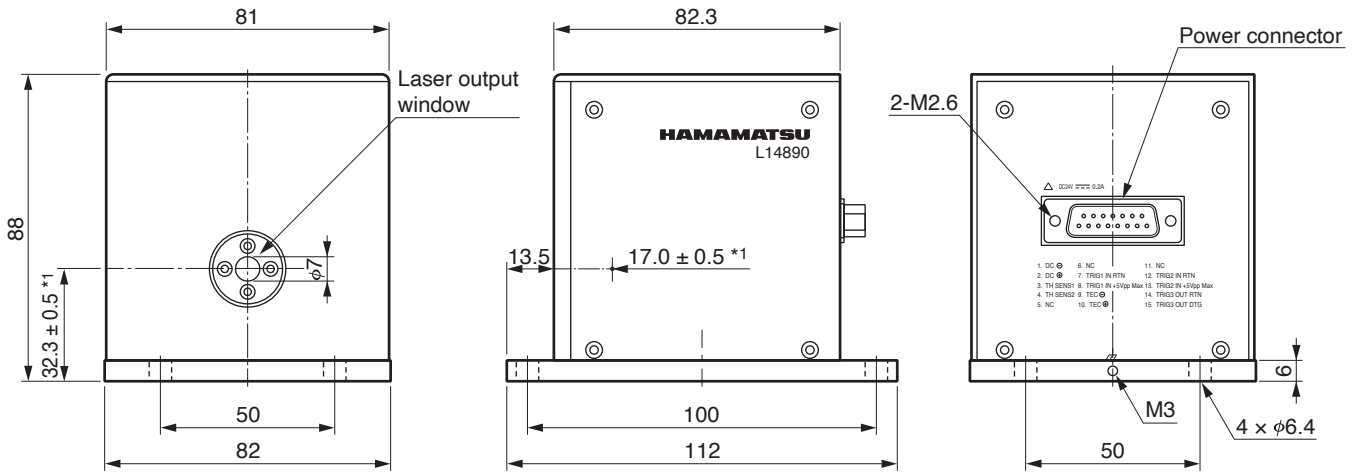
*2: Recommended DC Power Supply: TDK lambda HWS50A-24/A

■ Thermistor

Characteristic	Symbol	Condition	Value	Unit
R25 resistance	R25	25 °C	10 ± 2.5 %	kΩ
Beta value	B	0 °C / 100 °C	3450	K

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Dimensional outline (unit: mm)



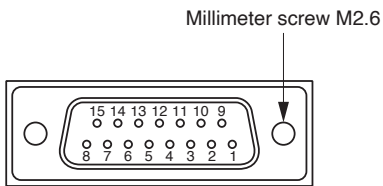
*1: Emitter

* Tolerance: ±0.3 mm unless specified

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Power connector specifications

15-pin D-sub connector (male)



Power connector			Power cable
Pin No.	Symbol	Function	Wire color/name
1	24 V (-)	External power input	Black
2	24 V (+)	External power input	Black/White
3	Thermistor A	Temperature sensor output	Red
4	Thermistor B	Temperature sensor output	Red/White
5	N.C.	—	—
6	N.C.	—	—
7	QCL trig (-)	QCL operation signal input (Rtn)	BNC (QCL)
8	QCL trig (+)	QCL operation signal input (Sig)	
9	Peltier (-)	Peltier power input *1	Green
10	Peltier (+)	Peltier power input *1	Green/White
11	N.C.	—	—
12	MEMS (-)	MEMS operation signal input(Rtn)	BNC (MEMS)
13	MEMS (+)	MEMS operation signal input (Sig)	
14	DETECT (-)	MEMS detection signal input (Rtn)	BNC (DETECT)
15	DETECT (+)	MEMS detection signal input (Sig)	

*1: The forward direction shows the cooling mode.

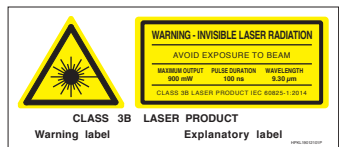
* The cable connected to the power connector is attached with the product.

The cables connected to the DC power supply and the TEC temperature controller have to be manipulated by the user.

CLASS 3B LASER

Invisible Laser Radiation: Avoid Exposure to Beam

●The Laser emits invisible laser radiation. The instrument which used the LASER, operated under ordinary conditions, is classified as Class 3B according to the laser product classification code IEC 60825-1. See IEC 60825-1 for more details and safety operation concerning the above countermeasures.



* AnticrossDAU(EU,China) is registered trademark of Hamamatsu Photonics K.K.

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