

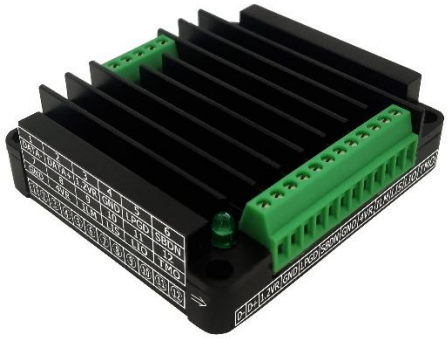




Figure 1. AQCL1A410SE

FEATURES

Input Voltage Range: 10V~28V

Output Voltage Range: 1V ~ V_{VPS} – 4V

Maximum Output Current: 1A

Ultra Low Noise: 1.25μA_{P-P}@0.1Hz ~ 10Hz

Input Voltage Polarity Reverse Protection

Under-Voltage Protection

Current Limit

Over-Temperature Protection

High Absolute Accuracy: <0.1% @ 0°C~50°C ambient temperature

High Stability: <20ppm/°C

Control Loop Good Indication: LPGD

Output Current Real Time Monitoring: LIO

Complete Shielding

Compact Size: 49.4mm(L)×45mm(W)×14mm(H)

100 % Lead (Pb)-Free and RoHS Compliant

APPLICATIONS

This QCL driver can be used to drive QCLs (Quantum Cascade Laser) for radar, medical diagnostics, spectroscopy, chemical analysis, general measurement systems, etc.

DESCRIPTION

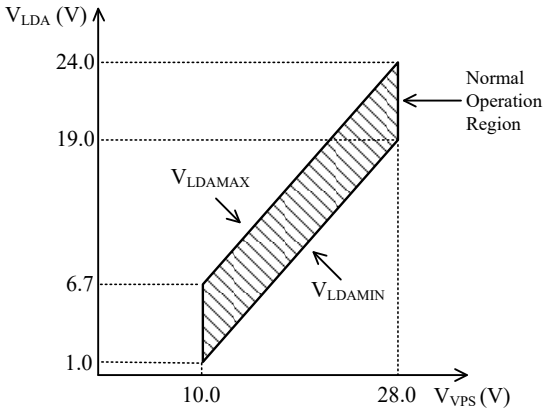
AQCL1A410SE is a quantum cascade laser driver with single ended input control.

The AQCL1A410SE is a chassis mount electronic module designed for driving QCLs. It delivers ultra-low noise current and still preserves a wide modulation bandwidth. The AQCL1A410SE comes with protections for over-voltage, under-voltage, over current, and over temperature.

To monitor the working status of the laser driver, there is a control loop good indication pin, LPGD; and the output current monitor pin, LIO.

Figure 1 shows the physical photo of AQCL1A410SE. The output voltage can swing from 0.5V to V_{VPS} – 4V, where $V_{VPS} = V_{OUT} + 5V$, V_{VPS} is the power supply voltage and can be from 10V~28V.

Figure 2 shows the relationship between the output voltage and power supply voltage.



Note: I_{MAX} = 1A

Figure 2. V_{VPS} vs. V_{LDA}

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Table 1. Terminal Block Connector 1 Pin Function Descriptions

Pin #	Pin Name	Port Type	Description
1	DATA−	Analog input	NC
2	DATA+	Analog input	NC
3	1.2VR	Analog output	NC
4	GND	Signal ground	Signal ground. Connect this pin to the signal ground of ADCs, DACs, and the signal sources.
5	LPGD	Digital output	Loop good indication. When outputting a high logic level 5V, it indicates the control loop works properly, i.e. the output current equals the set-point value; outputting a logic low level indicates there is something wrong in the control loop, such as open circuit, output current equals zero, etc.
6	SBDN	Digital input	This is a duplex pin: when it is pulled down <0.4V, the controller is put into Shut-down Mode; when setting this pin to between 1.2V to 2.5V, the controller is set to Stand-by Mode. In this mode, the voltage reference is still working; when setting it to >2.64V to VPS voltage, the controller goes to On Mode. There is an internal 20MΩ pull up resistor tied to VPS.
7	GND	Signal ground	Signal ground. Connect this pin to the signal ground of ADCs, DACs, and the signal sources.
8	4VR	Analog output	Voltage Reference 4.096V output. It can be used by external POTs (Potentiometer), DACs and/or ADCs for setting the LIS. Under Stand-by Mode, this pin is still working.
9	ILM	Analog input	Laser current limit set. 0V to 4.096 V sets the laser current limit from 0 to 1A linearly. The internal input impedance is 1M.
10	LIS	Analog input	Laser current setting indication. 0V to 4.096 V indicates the laser current is set from 0 to 1A linearly.
11	LIO	Analog output	Laser current output indication. 0V to 4.096 V indicates the laser current from 0 to 1A linearly.
12	TMO	Analog output	The controller internal temperature indication output. It can be used for sensing the actual temperature of the controller to avoid over-heating. 0V to 4V represents the controller temperature from –55°C to 125°C.

Table 2. Terminal Block Connector 4 Pin Function Descriptions

Pin #	Pin Name	Port Type	Description
1	LDA	Analog output	Laser diode anode. Connect it to the anode of the laser diode.
2	LDC	Analog output	Laser diode cathode. Connect it to the cathode of the laser diode. This pin is internally connected to PGND and GND, thus its voltage potential is zero.
3	GND	Signal ground	Signal ground. Connect this pin to the signal ground of ADCs, DACs, and the signal sources.
4	PGND	Power ground	Power ground pin. Connect it directly to power supply return rail.
5	VPS	Power input	Power supply voltage. The driver works from 10V to 28V.

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Table 3. Competition Comparison

Parameter	Competition QCL driver	ATI QCL driver
Number of power supplies required	2	1
Input voltage range	25V	10~28V
Output voltage range	5V	1V~V_{VPS}−4V
Over current protection	No	Yes
Polarity reverse protection	No	Yes
Size	140×166×58 (mm)	50×45×14 (mm)
Weight	1,000g	45g

SPECIFICATIONS

Table 4. Characteristics (T_A= 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Control SBDN Pin (# 6 of Terminal Block Connector 1)						
SBDN Voltage	$V_{SBDN-ON}$		2.64		V_{VPS}	V
	$V_{SBDN-STANDBY}$		1.2		2.5	V
	$V_{SBDN-OFF}$		0		0.4	V
	$V_{SBDN-SB-HI}$ Going up from Standby to On threshold voltage		2.508		2.64	V
	$V_{SBDN-SB-LOW}$ Going down from On to Standby threshold voltage		2.5		2.6	V
	$V_{SBDN-OFF-HI}$ Going up from Off to Standby threshold voltage				1.2	V
	$V_{SBDN-OFF-LOW}$ Going down from Standby to Off threshold voltage		0.4			V
Pull-up Resistor to VPS				20		MΩ
Current Setting LIS Pin (# 10 of Terminal Block Connector 1)						
Current Set Voltage			0		4.096	V
Output LDA Pin (# 1 of Terminal Block Connector 2)						
Output Voltage	V_{LDA}		1		V_{VPS}−4	V
Output Current	I_{LDA}		0		1	A
Output Current Noise	I_{NLDA}	Peak-to-peak value, 0.1Hz to 10Hz		0.5		μA_{P-P}
Minimum Dropout Voltage	$V_{VPS} - V_{LDA}$			4		V

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Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output LDA Pin (# 1 of Terminal Block Connector 2)						
Operating Ambient Temperature Range	T_A		–40		65	°C
Large Signal Bandwidth	f_{lg}			1		MHz
Small Signal Bandwidth	f_{sm}			1		MHz
Small Signal Rise and Fall Times	t_{smr}, t_{smf}			350		ns
Large Signal Rise and Fall Times	t_{lgr}, t_{lgf}			350		ns
Power Supply Input VPS Pin (# 5 of Terminal Block Connector 2)						
Input Voltage Range	V_{VPS}		10		28	V
Input Current	I_{VPS}		0		600	mA

Table 5. V_{LIS} & I_{OUT}

V_{LIS}	I_{OUT}
4.096V	1A
2.048V	0.5A
0V	0A

$$I_{OUT} = \frac{V_{LIS}}{4.096V} \times 1A$$

V_{LIS}: The voltage for setting the laser current.

I_{OUT}: The output current.

Insert the screwdriver into the upper card slot, and the lower card slot should be inserted with a power cord with a bare core (φ=1.5mm±0.2mm; L=7.5mm±0.2mm).

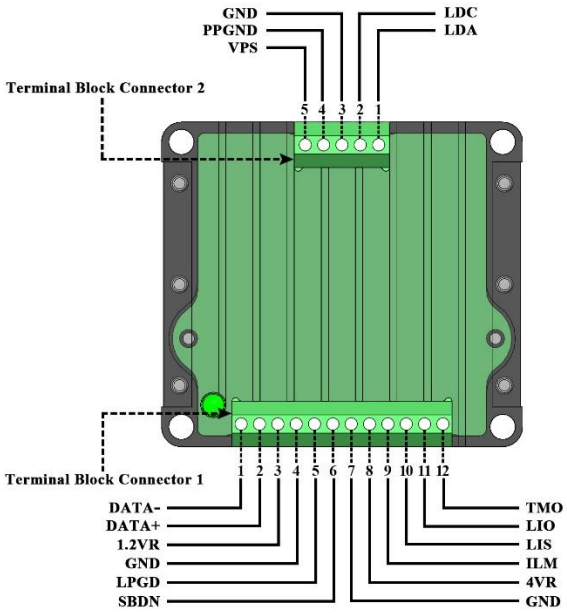


Figure 3. Top View of AQCL1A410SE

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MECHANICAL DIMENSIONS

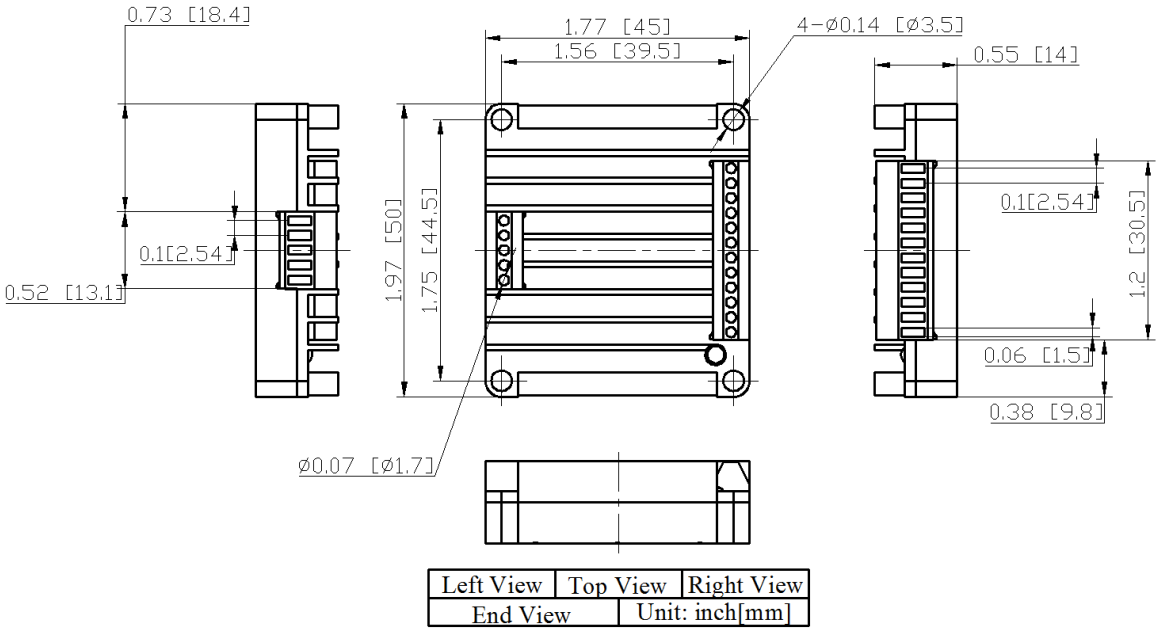


Figure 6. Dimensions of AQCL1A410SE

RELATED PRODUCTS

Table 6. Unit Price

Part #	Datasheet	Output Voltage (V)	Output Current (mA)	Description	Buy Now
AQCL100MA410SE		10~28	100	100mA module with single ended input control	
AQCL200MA410SE		10~28	200	200mA module with single ended input control	
AQCL500MA410SE		10~28	500	500mA module with single ended input control	
AQCL1A410SE		10~28	1000	1A module with single ended input control	
AQCL2A410SE		10~28	2000	2A module with single ended input control	
AQCL3A410SE		10~28	3000	3A module with single ended input control	
AQCL100MA410DF		10~28	100	100mA module with differential analog input control	
AQCL200MA410DF		10~28	200	200mA module with differential analog input control	
AQCL500MA410DF		10~28	500	500mA module with differential analog input control	

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