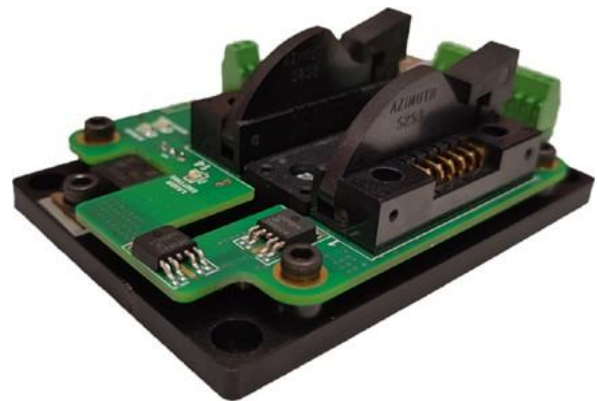


PLD-CW-2000 PLD-CW-2000-ZIF

CONSTANT CURRENT LASER DIODE DRIVER



Key Features

- Special Design for 10/14 pin Butterfly Laser Diode
- Constant Current Mode
- Output Current up to 2000 mA
- Compliance voltage up to 3 V
- Low current ripple
- High current stability
- Control interfaces USB, RS-232, CAN
- LabView compatible
- Python libraries
- Analog and Digital full current amplitude modulation
- Optical power stabilization mode
- On-Board TEC Controller
- 5Vdc Input Power
- Completed by Heatsink
- Compact Size 85 mm × 60 mm × 21 mm

PLD-NS RS232 Protocol Description

RS232 configuration

Baud rate	57600 baud/sec
Data bits	8 bit
Parity	no parity
Stop bits	1 bit

Command format description

Command and response is a text string that has the following structure:
 <Message header><data><crc16><CR> ... 100 milliseconds timeout ...

Where:

- Message header is “t0018” for command and “t0228” for response
- Data – is a packet of Ascii characters with hexadecimal values; For example “01000000ffefdfc”. Numbers of characters must be equal to 16 (8 pairs of characters).
- Crc16 – checksum value represented by 4 Ascii characters.
- <CR> – carriage return byte

NOTE: 100 milliseconds timeout between commands is necessary to provide stable device work.

Data format description

<cmd><id><res><res><value_4><value_3><value_2><value_1><CRC_2><CRC_1>

Where:

- <cmd> – set/get command byte (HEX) or response byte (HEX)
- <id> – device ID if response data, if command – “00”
- <res> – reserved byte (HEX)
- <value_4> – value byte 4 (HEX)
- <value_3> – value byte 3 (HEX)
- <value_2> – value byte 2 (HEX)
- <value_1> – value byte 1 (HEX)
- <CRC_2> – checksum byte 2 (HEX)
- <CRC_1> – checksum byte 1 (HEX)

CRC16 description

The MODBUS algorithm is used to calculate the packet checksum.

CRC16 algorithm parameters

Poly	0x8005
Init	0xffff
Reflect In	true
Reflect Out	true
XorOut	0xffff

CRC16 example:

“t0028a122000000000000088f9\r”

Where:

0x88f9 is a checksum for packet (“t0028a122000000000000”)

NOTE: If the command does not contain any checksum characters

(“t0028a122000000000000\r”) command will be executed without check.

Response description

Most of the commands has two types. The SET type and GET type. GET type forms from SET type <cmd> byte plus 0x80. For example if SET type <cmd>=0x10, then same GET type <cmd+0x80>=0x90.

If device received SET command type <cmd>, it will send ACK response with the same <cmd> byte with empty value bytes.

If device received GET command type <cmd+0x80>, it will send ACK response with the same <cmd+0x80> with corresponding value bytes.

Command description

1. On/Off laser emitting command

<cmd> = 0x10 SET command byte
 <value_1> = 0x00 to turn emitting off
 <value_1> = 0x01 to turn emitting on

Example:

Turn on laser emitting command:

“t00181000000000000001\r” - SET command

“t02281001000000000000D7B\r” - ACK response

Get on/off laser emitting state command:

“t0018900000000000000\r” - GET command

“t02289001000000000010BBD\r” - ACK response with value 1;

Get on/off laser emitting state command with checksum:

“t0018900000000000000B6F7\r” - GET command

“t02289001000000000010BBD\r” - ACK response with value 1;

2. Laser current command

<cmd> = 0x11 SET command byte
 <value_4><value_3><value_2><value_1> - current value bytes multiplied with 10;

Example:

Set laser current 1500 mA command
 (value = 1500*10 = 15000 = 0x00003A98):

“t00181100000000003A98\r” - SET command

“t02281101000000000000DBA\r” - ACK response

Set laser current 1500 mA command with checksum:

“t00181100000000003A98B966\r” - GET command

“t02281101000000000000DBA\r” - ACK response

Get laser current value command:

“t0018910000000000000\r” - GET command

“t02289101000000003A9802EA\r” - ACK response with value 0x3A98;

NOTE: In GET command the response value 0x00003A98 (15000) is multiplied with 10, so the result value is 15000/10 = 1500 mA.

3. Laser temperature command

<cmd> = 0x12 SET command byte
 <value_4><value_3><value_2><value_1> - temperature value bytes multiplied with 10;

Example:

Set laser current 32°C command
 (value = $32 \times 10 = 320 = 0x00000140$):

“t0018120000000000140\r” - SET command

“t02281201000000000000CF9\r” - ACK response

Get laser temperature command:

“t0018920000000000000\r” - GET command

“t0228920100000000140CAAD\r” - ACK response with value 0x140

Value 0x0000140 (320) is multiplied with 10, so the result value is $320/10 = 32^\circ\text{C}$.

4. Get current output power

This command is only for GET type
 <cmd> = 0x94 GET command byte
 <value_4><value_3><value_2><value_1> - power value bytes multiplied with 10;

Example:

Get output power command:

“t0018940000000000000\r” - GET command

“t022894010000000004f3A846\r” - ACK response with value 0x04f3;

NOTE: Value 0x00004f3 (1267) is multiplied with 10, so the result value is $1267/10 = 126.7 \text{ mW}$

5. Thermistor beta command

<cmd> = 0x15 SET command byte
 <value_4><value_3><value_2><value_1> - thermistor beta value bytes;

Example:

Set thermistor beta 3984 (0x0F90) command

“t0018150000000000F90\r” - SET command

“t02281501000000000000EBE\r” - ACK response

Get thermistor beta value command:

“t0018950000000000000\r” - GET command

“t0228950100000000F90425E\r” - ACK response with value 0x0F90;

6. Thermistor resistance command

<cmd> = 0x16 SET command byte
 <value_4><value_3><value_2><value_1> - thermistor resistance at 25°C value bytes;

Example:

Set thermistor resistance 10000 Ohm (0x2710) command

“t00181600000000002710\r” - SET command

“t02281601000000000000FFD\r” - ACK response

Get thermistor resistance value command:

“t0018960000000000000\r” - GET command

“t02289601000000002710204B\r” - ACK response with value 0x2710;

7. Monitor responsivity command

<cmd> = 0x17 SET command byte

<value_4><value_3><value_2><value_1> - monitor responsivity value bytes multiplied with 100;

Example:

Set monitor responsivity 47,5uA/mW (0x128E) command

(value = $47,5 * 100 = 4750 = 0x0000128E$):

“t0018170000000000128E\r” - SET command

“t02281701000000000000F3C\r” - ACK response

Get monitor responsivity value command:

“t00189700000000000000\r” - GET command

“t0228970100000000128ED25D\r” - ACK response with value 0x128E;

NOTE: Value 0x0000128E (4750) is multiplied with 100, so the result value is $4750/100 = 47,5$ uA/mW.

8. TEC on/off command

TEC on/off command works only if laser diode has TEC.

<cmd> = 0x21 SET command byte

<value_1> = 0x00 to turn TEC off

<value_1> = 0x01 to turn TEC on

Example:

Turn on TEC command:

“t00182100000000000001\r” - SET command

“t02282101000000000000FCFA\r” - ACK response

Get on/off TEC state command:

“t0018A100000000000000\r” - GET command

“t0228A10100000000001295E\r” - ACK response with value 1;

9. Mode command

<cmd> = 0x24 SET command byte

<value_1> = 0x00 CW mode

<value_1> = 0x01 ANALOG mode

<value_1> = 0x02 TTL mode

Example:

Set TTL mode command:

“t00182400000000000002\r” - SET command

“t02282401000000000000FF3F\r” - ACK response

Get current mode command:

“t0018A400000000000000\r” - GET command

“t0228A401000000000002BDB\r” - ACK response with value 2 – TTL mode;

NOTE: In ANALOG mode, the current value is set from an external analog signal; the measured value should be obtained using the current GET command (see Chapter 2.).

NOTE: in TTL mode, the current value must be set using the current SET command (see Chapter 2.). and the laser emission is activated from an external TTL signal.

10. Maximum current command

<cmd> = 0x25 SET command byte

<value_4><value_3><value_2><value_1> - maximum current value bytes multiplied with 10;

Example:

Set laser current 2000 mA command

(value = $2000 \cdot 10 = 20000 = 0x00004E20$):

“t00182500000000004E20\r” - SET command

“t02282501000000000000FFFE\r” - ACK response

Get maximum laser current value command:

“t0018A500000000000000\r” - GET command

“t0228A501000000004E20608A\r” - ACK response with value 0x4E20;

NOTE: Value 0x00004E20 (20000) is multiplied with 10, so the result value is $20000/10 = 2000$ mA.

11. Minimum current command

<cmd> = 0x26 SET command byte

<value_4><value_3><value_2><value_1> - minimum current value bytes multiplied with 10;

Example:

Set laser current 10 mA command

(value = $10 \cdot 10 = 100 = 0x00000064$):

“t00182600000000000064\r” - SET command

“t02282601000000000000FEBD\r” - ACK response

Get minimum laser current value command:

“t0018A600000000000000\r” - GET command

“t0228A60100000000006488DA\r” - ACK response with value 0x0064;

NOTE: Value 0x00000064 (100) is multiplied with 10, so the result value is $100/10 = 10$ mA.

12. Maximum TEC current command

<cmd> = 0x33 SET command byte

<value_4><value_3><value_2><value_1> - maximum TEC current value bytes multiplied with 10;

Example:

Set maximum TEC current 4 A command

(value = $4 \cdot 10 = 40 = 0x00000028$):

“t00183300000000000028\r” - SET command

“t02283301000000000006DB9\r” - ACK response

Get maximum TEC current value command:

“t0018B300000000000000\r” - GET command

“t0228B30100000000028BF5D\r” - ACK response with value 0x0028;

NOTE: Value 0x00000028 (40) is multiplied with 10, so the result value is $40/10 = 4$ A.

13. Minimum temperature command

<cmd> = 0x36 SET command byte

<value_4><value_3><value_2><value_1> - minimum temperature value bytes multiplied with 10;

Example:

Set minimum temperature 20°C command

(value = $20 \cdot 10 = 200 = 0x000000C8$):

“t001836000000000000C8\r” - SET command

“t02283601000000000006E7C\r” - ACK response

Get minimum temperature value command:

“t0018B600000000000000\r” - GET command

“t0228B6010000000000C8ECBC\r” - ACK response with value 0x00C8;

NOTE: Value 0x000000C8 (200) is multiplied with 10, so the result value is $200/10 = 20$ °C.

14. Maximum temperature command

<cmd> = 0x37 SET command byte

<value_4><value_3><value_2><value_1> - maximum temperature value bytes multiplied with 10;

Example:

Set maximum temperature 50,5°C command

(value = $50,5 * 10 = 505 = 0x000001F9$):

"t001837000000000001F9\r" - SET command

"t02283701000000000006EBD\r" - ACK response

Get maximum temperature value command:

"t0018B700000000000000\r" - GET command

"t0228B7010000000001F9BCEE\r" - ACK response with value 0x01F9;

NOTE: Value 0x000001F9 (505) is multiplied with 10, so the result value is $505/10 = 50,5^\circ\text{C}$.

15. Maximum power command

<cmd> = 0x42 SET command byte

<value_4><value_3><value_2><value_1> - maximum power value bytes multiplied with 10;

Example:

Set maximum power 1000 mW command

(value = $1000 * 10 = 10000 = 0x00002710$):

"t001842000000000002710\r" - SET command

"t02284201000000000005F3A\r" - ACK response

Get maximum power value command:

"t0018C200000000000000\r" - GET command

"t0228C201000000000271060EC\r" - ACK response with value 0x2710;

NOTE: Value 0x00002710 (10000) is multiplied with 10, so the result value is $10000/10 = 1000 \text{ mW}$.

16. Minimum power command

<cmd> = 0x43 SET command byte

<value_4><value_3><value_2><value_1> - minimum power value bytes multiplied with 10;

Example:

Set minimum power 10 mW command

(value = $10 * 10 = 100 = 0x00000064$):

"t00184300000000000064\r" - SET command

"t02284301000000000005FFB\r" - ACK response

Get minimum power value command:

"t0018C300000000000000\r" - GET command

"t0228C301000000000064EA9E\r" - ACK response with value 0x0064;

NOTE: Value 0x00000064 (100) is multiplied with 10, so the result value is $100/10 = 10 \text{ mW}$.

17. Coefficient P command

<cmd> = 0x44 SET command byte
 <value_4><value_3><value_2><value_1> - coefficient P value bytes multiplied with 10000;

Example:

Set coefficient P 10000 command
 (value = 10000*10000 = 100000000 = 0x05F5E100):
 "t001844000000005F5E100\r" - SET command
 "t022844010000000000005DBC\r" - ACK response

Get coefficient P value command:

"t0018C40000000000000\r" - GET command
 "t0228C401000005F5E1001102\r" - ACK response with value 0x05F5E100;

NOTE: Value 0x05F5E100 (100000000) is multiplied with 10000, so the result value is 100000000/10000 = 10000.

18. Coefficient I command

<cmd> = 0x45 SET command byte
 <value_4><value_3><value_2><value_1> - coefficient I value bytes multiplied with 10000;

Example:

Set coefficient I 1000 command
 (value = 1000*10000 = 10000000 = 0x989680):
 "t00184500000000989680\r" - SET command
 "t02284501000000000005D7D\r" - ACK response

Get coefficient I value command:

"t0018C50000000000000\r" - GET command
 "t0228C501000009896808E1F\r" - ACK response with value 0x00989680;

NOTE: Value 0x00989680 (10000000) is multiplied with 10000, so the result value is 10000000/10000 = 1000.

19. Coefficient D command

<cmd> = 0x46 SET command byte
 <value_4><value_3><value_2><value_1> - coefficient D value bytes multiplied with 10000;

Example:

Set coefficient D 2000 command
 (value = 2000*10000 = 20000000 = 0x01312D00):
 "t00184600000001312D00\r" - SET command
 "t02284601000000000005C3E\r" - ACK response

Get coefficient D value command:

"t0018C60000000000000\r" - GET command
 "t0228C601000001312D001B35\r" - ACK response with value 0x01312D00;

NOTE: Value 0x01312D00 (20000000) is multiplied with 10000, so the result value is 20000000/10000 = 2000.

20. Device type command

<cmd> = 0xD0 GET command byte

Example:

Get device type command:
 "t0018D00000000000000\r" - GET command
 "t0228D0010000000000E5D5C\r" - ACK response with value 0x0E

NOTE: Value 0x0000000E (14), so device type is PLD-CW-2000.

21. CAN identifier command

<cmd> = 0x51 SET command byte
 <value_4><value_3><value_2><value_1> - bytes of CAN ID value;

Example:

Command to set base ID using BROADCAST ID
 (value = 0x01):

“t00185100000000000001\r” - SET command

“t02285101000000000000CEB8\r” - ACK response

Get CAN ID command:

“t0018D10000000000000\r” - GET command

“t0228D101000000000017A9D\r” - ACK response with value 0x01.

22. Save parameters command

<cmd> = 0x52 SET command byte

Example:

Command to save parameters in FLASH memory

“t00185200000000000000\r” - SET command

“t02285201000000000000CFFB\r” - ACK response