evolase

PLD-CW-2000H-ZIF

PRECISION CONSTANT CURRENT LASER DIODE DRIVER

Key Features

- Special Design for 10/14 pin Butterfly Laser Diode
- High Precision Constant Current Mode
- Output Current up to 2000 mA
- High Current Stability: 0.01 mA
- 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
- Regulated Maximum TEC Current
- Hi precision temperature stability: 0.01 deg
- 5Vdc Input Power
- Completed by Heatsink
- Compact Size 100 mm × 85 mm × 31 mm

PLD-CW-2000(H)-ZIF 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, "01000000fffefdfc". 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:
"t0028a12200000000000088f9\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;

CRC16 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 format 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
"t022810010000000000000D7B\r" - ACK response

Get on/off laser emitting state command:
"t00189000000000000000\r"   - GET command
"t022890010000000000010BBD\r" - ACK response with value 1;

Get on/off laser emitting state command with checksum:
"t00189000000000000000B6F7\r" - GET command
"t022890010000000000010BBD\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 100;
NOTE: ANSWER for GET command is multiplied with 10000

Example:

Set laser current 150 mA command
(value = 150*100 = 15000 = 0x00003A98):
"t00181100000000003A98\r"   - SET command
"t022811010000000000000DBA\r" - ACK response

Set laser current 150 mA command with checksum:
"t00181100000000003A98B966\r" - GET command
"t022811010000000000000DBA\r" - ACK response

Get laser current value command:
"t00189100000000000000\r"   - GET command
"t0228910100000016E36086DD\r" - ACK response with value 0x16E360;

NOTE: In GET command the response value 0x0016E360 (1500000) is multiplied with <u>10000</u>, so the result value is
1500000/10000 = 150 mA.

3. Laser temperature command

<cmd> = 0x12 SET command byte
<value_4><value_3><value_2><value_1> - temperature value bytes multiplied with 10;
NOTE: ANSWER for GET command is multiplied with 10000

Example:

Set laser current 32°C command
(value = 32*100 = 3200 = 0x00000C80):
"t00181200000000000C80\r"   - SET command
"t0228120100000000000000CF9\r" - ACK response

Get laser temperature command:
"t00189200000000000000\r"   - GET command
"t0228920100000004E200C6B4\r" - ACK response with value 0x4E200
Value 0x0004E200 (320000) is multiplied with 10000, so the result value is 320000/10000 = 32°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 100;

Example:

Get output power command:
"t00189400000000000000\r"   - GET command
"t0228940100000000317E9BEA\r" - ACK response with value 0x317E;
NOTE: Value 0x0000317E (12670) is multiplied with 100, so the result value is 12670/100 = 126.7 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
"t00181500000000000F90\r"   - SET command
"t0228150100000000000000EBE\r" - ACK response

Get thermistor beta value command:
"t00189500000000000000\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
"t022816010000000000000FFD\r" - ACK response

Get thermistor resistance value command:
"t00189600000000000000\r"   - GET command
"t0228960100000000002710204B\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
"t0228170100000000000000F3C\r" - ACK response

Get monitor responsivity value command:
"t00189700000000000000\r"   - GET command
"t022897010000000000128ED25D\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
"t022821010000000000000FCFA\r"   - ACK response

Get on/off TEC state command:
"t0018A100000000000000\r"   - GET command
"t0228A10100000000000011295E\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
\<value_1\> = 0x03 COP (constant optical power) mode

Example:

Set TTL mode command:
"t00182400000000000002\r"   - SET command
"t02282401000000000000FF3F\r" - ACK response

Get current mode command:
"t0018A400000000000000\r"   - GET command
"t0228A4010000000000022BDB\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 100;

Example:

Set laser current 200 mA command
(value = 200*100 = 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 100, so the result value is 20000/100 = 200 mA.

11.   Minimum current command

\<cmd\> = 0x26 SET command byte
\<value_4\>\<value_3\>\<value_2\>\<value_1\> - minimum current value bytes multiplied with 100;

Example:

Set laser current 1 mA command
(value = 1*100 = 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 100, so the result value is 100/100 = 1 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*10 = 40 = 0x00000028):
"t00183300000000000028\r"   - SET command
"t0228330100000000000006DB9\r" - ACK response

Get maximum TEC current value command:
"t0018B300000000000000\r"   - GET command
"t0228B301000000000028BF5D\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 100;

Example:

Set minimum temperature 20°C command
(value = 20*100 = 2000 = 0x000007D0):
"t00183600000000007D0\r"   - SET command
"t0228360100000000000006E7C\r" - ACK response

Get minimum temperature value command:
"t0018B600000000000000\r"   - GET command
"t0228B6010000000007D0DB0E\r" - ACK response with value 0x07D0;
NOTE: Value 0x000007D0 (2000) is multiplied with 100, so the result value is 2000/100 = 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 100;

Example:

Set maximum temperature 50,5°C command
(value = 50,5*100 = 5050 = 0x000013BA):
"t00183700000000013BA\r"   - SET command
"t0228370100000000000006EBD\r" - ACK response

Get maximum temperature value command:
"t0018B700000000000000\r"   - GET command
"t0228B7010000000013BA624C\r" - ACK response with value 0x13BA;
NOTE: Value 0x000013BA (5050) is multiplied with 100, so the result value is 5050/100 = 50,5°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):
"t0018420000000002710\r"   - SET command
"t022842010000000000005F3A\r" - ACK response

Get maximum power value command:
"t0018C200000000000000\r"   - GET command
"t0228C20100000000271060EC\r" - ACK response with value 0x2710;
NOTE: Value 0x00002710 (10000) is multiplied with 10, so the result value is 10000/10 = 1000 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):
"t0018430000000000000064\r"   - SET command
"t022843010000000000005FFB\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 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):
"t00184400000005F5E100\r"   - SET command
"t022844010000000000005DBC\r" - ACK response

Get coefficient P value command:
"t0018C400000000000000\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):
"t0018450000000989680\r"   - SET command
"t0228450100000000000005D7D\r" - ACK response

Get coefficient I value command:
"t0018C500000000000000\r"   - GET command
"t0228C5010000009896808E1F\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):
"t0018460000001312D00\r"   - SET command
"t0228460100000000000005C3E\r" - ACK response

Get coefficient D value command:
"t0018C600000000000000\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:
"t0018D000000000000000\r"   - GET command
"t0228D00100000000000E5D5C\r" - ACK response with value 0x0E
NOTE: Value 0x0000000E (14), so device type is PLD-CW-2000.

21.   CAN identificator 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):
"t0018510000000000000001\r"   - SET command
"t0228510100000000000000CEB8\r" - ACK response

Get CAN ID command:
"t0018D100000000000000\r"   - GET command
"t0228D101000000000000017A9D\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