

PLD-NS

SHORT PULSE LASER DIODE DRIVER



Key Features

- Special Design for 10/14 pin Butterfly Laser Diode
- Output current up to 2000 mA
- Compliance current up to 3V
- Adjustable pulse width 1–100 ns
- Repetition rate up to 10 MHz
- External trigger option
- USB, RS-232, CAN, UART interfaces
- LabView and Python libraries
- On-Board TEC Controller
- 5Vdc Input Power
- Completed by Heatsink
- Compact size 85 × 60 × 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:

“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.

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. 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 25,2°C command
 (value = 25,2*10 = 252 = 0x000000FC):

“t00181200000000000000FC\r” - SET command
 “t02281201000000000000CF9\r” - ACK response

Get laser temperature command:

“t00189200000000000000\r” - GET command
 “t022892010000000000FC4F99\r” - ACK response with value 0xFC
 Value 0x000000FC (252) is multiplied with 10, so the result value is 252/10 = 25,2°C.

2. 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

“t00181500000000000000F90\r” - SET command
 “t02281501000000000000EBE\r” - ACK response

Get thermistor beta value command:

“t00189500000000000000\r” - GET command
 “t022895010000000000F90425E\r” - ACK response with value 0x0F90;

3. 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

“t0018160000000000002710\r” - SET command
 “t02281601000000000000FFD\r” - ACK response

Get thermistor resistance value command:

“t00189600000000000000\r” - GET command
 “t02289601000000002710204B\r” - ACK response with value 0x2710;

4. Laser current command

<cmd> = 0x18 SET command byte

<value_4><value_3><value_2><value_1> - laser current value bytes multiplied with 100;

Example:

Set laser current 1.7 V command

(value = $1.7 * 100 = 170 = 0x00004E20$):

“t001818000000000000AA\r” - SET command

“t02281801000000000000B73\r” - ACK response

Get laser current value command:

“t00189800000000000000\r” - GET command

“t022898010000000000AAB990\r” - ACK response with value 0xAA;

NOTE: Value 0x000000AA (170) is multiplied with 100, so the result value is $170/100 = 1.7$ A.

5. Output frequency for internal generation command

<cmd> = 0x19 SET command byte

<value_4><value_3><value_2><value_1> - output frequency value bytes;

Note: the frequency should be set in increments corresponding to the following ranges

- 1 Hz increment for frequencies from range 1...1000 Hz
- 1000 Hz increment for frequencies from range 1kHz ... 1MHz
- 100000 Hz increment for frequencies from range 1MHz ... 30MHz

Example:

Set frequency value 20.1 MH command

(value = $20100000 = 0x0132B3A0$):

“t00181900000000132B3A0\r” - SET command

“t02281901000000000000BB2\r” - ACK response

Get frequency value command:

“t00189900000000000000\r” - GET command

“t02289901000000132B3AD613\r” - ACK response with value 0x0132B3A0;

NOTE: Value 0x0132B3A0 (20100000), so the result value is 20100000 Hz.

6. Laser diode voltage on/off command

<cmd> = 0x20 SET command byte

<value_1> = 0x00 to turn laser diode voltage off

<value_1> = 0x01 to turn laser diode voltage on

Example:

Turn on laser diode voltage command:

“t00182000000000000001\r” - SET command

“t02282001000000000000FC3B\r” - ACK response

Get on/off laser diode voltage state command:

“t0018A000000000000000\r” - GET command

“t0228A001000000000001299F\r” - ACK response with value 1;

7. 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

“t0228A101000000000001295E\r” - ACK response with value 1;

8. On/off laser pulse emitting command

<cmd> = 0x22 SET command byte
 <value_1> = 0x00 to turn laser pulse emitting off
 <value_1> = 0x01 to turn laser pulse emitting on

Example:

Turn on laser pulse emitting command command:

“t00182200000000000001\r” - SET command
 “t02282201000000000000FDB9\r” - ACK response

Get on/off laser pulse emitting command state command:

“t0018A200000000000000\r” - GET command
 “t0228A201000000000001281D\r” - ACK response with value 1;

9. Output pulse duration command

<cmd> = 0x23 SET command byte
 <value_4><value_3><value_2><value_1> output pulse duration value bytes (1ns – 100ns) multiplied with 10;
Note: the output maximum duty cycle should be 2%

Example:

Set duration 68,1 ns command

(value = 68,1*10 = 681 = 0x000002A9):

“t00182300000000000002A9\r” - SET command
 “t02282301000000000000FD78\r” - ACK response

Get duration value command:

“t0018A300000000000000\r” - GET command
 “t0228A30100000000002A97E58\r” - ACK response with value 0x02A9;

NOTE: Value 0x000002A9 (681) is multiplied with 10, so the result value is 681/10 = 68,1 ns.

10. Mode command

<cmd> = 0x24 SET command byte
 <value_1> = 0x00 Internal generation
 <value_1> = 0x01 Pulse on demand mode
 <value_1> = 0x02 External generation mode

Example:

Set pulse on demand mode command:

“t00182400000000000001\r” - SET command
 “t02282401000000000000FF3F\r” - ACK response

Get mode command:

“t0018A400000000000000\r” - GET command
 “t0228A4010000000000012A9B\r” - ACK response with value 1 – Pulse on demand mode;

11. 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 maximum current 2 A command

(value = 2*100 = 200 = 0x000000C8):

“t0018250000000000000C8\r” - SET command
 “t02282501000000000000FFFE\r” - ACK response

Get maximum laser current value command:

“t0018A500000000000000\r” - GET command
 “t0228A50100000000000C81CBF\r” - ACK response with value 0x82;

NOTE: Value 0x000000C8 (200) is multiplied with 100, so the result value is 200/100 = 2 A.

12. 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 minimum current 0,1 A command

(value = $0,1 * 100 = 10 = 0x0000000A$):

“t00182600000000000000A\r” - SET command

“t02282601000000000000FEBD\r” - ACK response

Get minimum laser current value command:

“t0018A600000000000000\r” - GET command

“t0228A60100000000000ACF18\r” - ACK response with value 0x0A;

NOTE: Value 0x0000000A (10) is multiplied with 100, so the result value is $10/100 = 0,1$ A.

13. Gated pulses for burst generation command

<cmd> = 0x34 SET command byte

<value_4><value_3><value_2><value_1> - count of gated value bytes;

Example:

Set 10 gated pulses (0x0A) command:

“t00183400000000000000A\r” - SET command

“t022834010000000000006FFE\r” - ACK response

Get gated pulses value command:

“t0018B400000000000000\r” - GET command

“t0228B40100000000000A3FDA\r” - ACK response with value 0x0A;

NOTE: Value 0x0000000A (10), so the result value is 10 gated pulses.

14. Blocked pulses for burst generation command

<cmd> = 0x35 SET command byte

<value_4><value_3><value_2><value_1> - count of blocked value bytes;

Example:

Set 15 blocked pulses (0x0A) command:

“t00183500000000000000A\r” - SET command

“t022835010000000000006F3F\r” - ACK response

Get blocked pulses value command:

“t0018B500000000000000\r” - GET command

“t0228B50100000000000FFD5A\r” - ACK response with value 0x0F;

NOTE: Value 0x0000000F (15), so the result value is 15 blocked pulses.

15. 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 = $20 * 10 = 200 = 0x000000C8$):

“t0018360000000000000C8\r” - SET command

“t022836010000000000006E7C\r” - ACK response

Get minimum temperature value command:

“t0018B600000000000000\r” - GET command

“t0228B60100000000000C8ECBC\r” - ACK response with value 0x00C8;

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

16. 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 $505/10 = 50,5^\circ\text{C}$.

17. Nominal voltage command

<cmd> = 0x38 SET command byte

<value_4><value_3><value_2><value_1> - nominal voltage value bytes multiplied with 100;

Example:

Set nominal voltage 20 V command

(value = $20 * 100 = 2000 = 0x000007D0$):

"t0018380000000000007D0\r" - SET command

"t02283801000000000006AF2\r" - ACK response

Get maximum temperature value command:

"t0018B800000000000000\r" - GET command

"t0228B8010000000007D0B8A1\r" - ACK response with value 0x07D0;

NOTE: Value 0x000007D0 (2000) is multiplied with 100, so the result value is $2000/100 = 20\text{ V}$.

18. 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

"t02284401000000000005DBC\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 $100000000/10000 = 10000$.

19. 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:

"t0018C500000000000000\r" - GET command

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

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

20. 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

"t022846010000000000005C3E\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.

21. Device type command

<cmd> = 0xD0 GET command byte

Example:

Get device type command:

"t0018D0000000000000000\r" - GET command

"t0228D00100000000017E8DD\r" - ACK response with value 0x17

NOTE: Value 0x00000017 (23), so device type is PLD-NS.

22. 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:

"t0018D1000000000000000\r" - GET command

"t0228D101000000000017A9D\r" - ACK response with value 0x01.

23. Save parameters command

<cmd> = 0x52 SET command byte

Example:

Command to save parameters in FLASH memory

"t00185200000000000000\r" - SET command

"t02285201000000000000CFFB\r" - ACK response