

1. Serial Communication Protocol

1.1 Introduction

Info

This section uses the following notation:

<>: One byte.

[]: Optional fields.

Numbers in Serial Commands are in hexadecimal format.

For simplicity, the CRC field is omitted in the Serial Commands in the following sections.

DWIN LCM is composed of 5 commands:

- 0x80: Write Control Registers
- 0x81: Read Control Registers
- 0x82: Write VPs (RAM)
- 0x83: Read VPs (RAM)
- 0x84: Write Trend Curve Buffer

A Frame (or packet) structure follows this format:

<Frame Header H> <Frame Header L> <Byte Count> <Command> [<Data>...] [<CRC H>
<CRC L>]

Or, in abbreviated notation:

<FHH> <FHL> <BC> <CMD> [<DATA>...] [<CRCH> <CRCL>]

- **Frame Header:** Identifies the start of a new Proculus Protocol packet. Can be used to uniquely identify a LCM on a communication bus. Fixed value (unchangeable) = 0x5AA5.
- **Byte Count:** Counts the number of bytes in the packet, excluding the Frame Header and this byte, i.e., counts all the bytes starting from the Command byte.
- **Command:** Defines the Command to be executed.
- **Data:** Includes addresses, lengths and values.
- **CRC:** Optional error detection value.

1.2 VP (RAM) Commands

1.2.1 Write VPs (0x82)

This Command writes one or more VPs. You can write multiple VPS at once, if they are sequential

• Format

<FHH> <FHL> <BC> 82 <VP><VP> <VL1><VL1> [<VL2><VL2> <VL3><VL3> ...]

<VP><VP>: RAM Address.

<VL#><VL#>: Value(s) written.

• Examples

Write the value 1234 in VP 0x1000:

```
5A A5 05 82 1000 04D2
```

Write values on 4 sequential VPs, starting from VP 0x1000:

```
5A A5 0B 82 1000 0022 0071 0006 0031
```

Info

The address of the DGUS LCM read-write address is understood as the start address, and the maximum data length is 0xFF: For example, the effect of the following a and b instructions is equal to c, and the unit of the address is word

a: 5A A5 05 05 82 1000 000A

b: 5A A5 05 82 1002 000B

c: 5A A5 07 07 82 1000 000A 000B

1.2.2 Read VPs (0x83)

This Command reads one or more VPs. You can read multiple VPs at once, if they are sequential.

• Format

```
<FHH> <FHL> <BC> 83 <VP><VP> <LEN>
```

<VP><VP>: RAM Address.

<LEN>: Number of VPs (words) to read.

Answer from LCM:

```
<FHH> <FHL> <BC> 83 <VP><VP> <LEN> <VL1><VL1> [<VL2><VL2> <VL3><VL3> ...]
```

<VL#><VL#>: Value(s) read.

• Examples

Read the value in VP 0x1000:

```
5A A5 04 83 1000 01
```

Answer from LCM:

```
5A A5 06 83 1000 01 04D2
```

Read values on 4 sequential VPs, starting from VP 0x1000:

```
5A A5 04 83 1000 04
```

Answer from LCM:

```
5AA5 0C 83 0000 04 0022 0071 0006 0031
```

Info

The Command of "Answer from LCM" is Same format as the data format returned to the serial port after touching the touch button.

1.3 Control Register Commands

1.3.1 Write Registers (0x80)

This Command writes one or more Control Registers. You can write multiple Registers at once, if they are sequential.

- **Format**

<FHH> <FHL> <BC> **80** <RG> <VL1> [<VL2> <VL3> ...]

<RG>: Register Address.

<VL#>: Value(s) to write.

- **Examples**

Write the value 3 in Register 0x01 (same as setting the backlight level):

5AA5 03 80 01 03

Write values on 2 sequential Registers, starting from Register 0x03 (same as jumping to PicId):

5AA5 04 80 03 00 01

Info

It is good practice to wait at least one Operation Cycle before writing to the same Control Register again.

1.3.2 Read Registers (0x81)

This Command reads one or more Control Registers. You can read multiple Registers at once, if they are sequential.

- **Format**

<FHH> <FHL> <BC> **81** <RG> <LEN>

<RG>: Register Address.

<LEN>: Number of Registers (bytes) to read.

Answer from LCM:

<FHH> <FHL> <BC> **81** <RG> <LEN> <VL1> [<VL2> <VL3> ...]

<VL#>: Value(s) read;

- **Examples**

Read the value in Register 0x01 (same as reading the backlight level):

5A A5 03 81 01 01

Answer from LCM:

5A A5 04 81 01 01 3F

Read values on 2 sequential Registers, starting from Register 0x03 (same as reading current PicId):

5A A5 03 81 03 02

Answer from LCM:

5A A5 0581 03 02 0001