Protocol for interaction with power supplies Antminer S17 / T17 / S17 +

Introduction

Interaction between the control board and the unit power is supplied through the I2C bus and one control pin. The control board acts as the I2C master and the power supply acts as the slave.

Requirements for the power supply The

control of the voltage supply to the hash board should be implemented in the form of a TTL control signal of 3.3 volts?

- ❏ low level - power on
- ❏ high - power off

I2C power supply address must be **0x10**
The power supply must support reading / writing the following registers:

I2C register	R / W	Byte	Purpose
0x00	RO	1	Protocol type supported by the block
0x11	R / W	1	Register write / read one command / response byte

Sequence of work with the block

When the power supply is connected to the network, a 12 volt supply voltage is immediately supplied to the control board of the miner. Hash cards are powered off.

After loading the control board, initialization and control of the power supply is performed in the following sequence:

1. Determine the protocol of the power supply by reading the I2C register of the slave device
2. Reading the current firmware version of the power supplypower supply
3. Reading thetypepower supply
4. Setting theoutput voltage
5. Turning on the voltage supply to the miner hash boards
6. Change the output voltage if there is a need for this

Definition of the block protocol

Bitmain currently supports a single protocol for interaction with power supplies. The check is carried out at the time of the start of the miner.
The protocol type is determined by reading the value of the I2C register of the device.

I2C address	I2C register	Value
0x10	0x0	0xF5

Value 0xF5 - means that the block supports the "packet" communication protocol. If the register value contains a value other than 0xF5, then further initialization of the miner stops and reports an error.

Sending Commands to a Block

Sending a command to a block and receiving the execution result is carried out by reading / writing the I2C register of the device. Write and read operations are performed on a byte basis.

I2C address	I2C register	Meaning
0x10	0x11	command / response bytes

Commands and responses of the block have a single common structure and consist of a header, an optional body and a checksum.

The header has the following structure:

Field name	Byte	Value
magic	2 bytes	0xAA55
len	1 byte	length of command / response
cmd	1 byte	command code

Length is calculated as the sum of the length of the header and the body of the command / response, excluding the checksum. The checksum is calculated by byte addition of the header starting with the len field and the command / response body. The checksum field size is 2 bytes.
The byte order of all fields is **little**-**endian**.
List of all supported commands by the block:

Command code	Description
0x01	Request for the current firmware version of the block
0x02	Request for determining the type of power supply
0x03	Request for reading the current output voltage of the block
0x83	Request for setting the output voltage of the block

Determining the block firmware version

Command code: 0x01
The firmware version is returned as a 2-byte number.

Request:

magic	len	cmd	crc
0xAA55	0x04	0x01	0x0005

Example:

```
PWR REQ: 55 AA 04 01 05 00
```

Reply:

magic	len	cmd	ver	crc
0xAA55	0x06	0x01	firmware version	checksum

Example:

```
PWR RESP: 55 AA 06 01 06 00 0D 00
```

Type definition power supply unit Power supply

units for different miner models differ by the power supply type
code Command code: 0x02
The power supply type is returned as a 2-byte number.

Request:

magic	len	cmd	crc
0xAA55	0x04	0x02	0x0006

Example:

```
PWR REQ: 55 AA 04 02 06 00
```

Reply:

magic	len	cmd	type	crc
0xAA55	0x06	0x01	power supply type	checksum

Example:

```
PWR RESP: 55 AA 06 02 41 00 49 00
```

Setting block output voltage

The output voltage value is set in internal block units. Converting the voltage in millivolts to an internal value is carried out by the formula:

int_volt = *round*((21360.0 - **volt**) * 253.0 / (21360.0 - 14300.0))

The minimum value of int_volt = 0 corresponds to the maximum output voltage of 21.36 volts, the maximum value of int_volt = 255 corresponds to the minimum output voltage 14.25 volts. The output voltage is specified as a 2-byte number.
Command code: 0x83

Request:

magic	len	cmd	volt	crc
0xAA55	0x06	0x83	output voltage	checksum

Example of setting the output voltage 21.0v:

```
PWR REQ: 55 AA 06 83 0D 00 96 00
```

Reply:

magic	len	cmd	volt	crc
0xAA55	0x06	0x83	output voltage	checksum

Example:

```
PWR RESP: 55 AA 06 83 0D 00 96 00
```

Determining the current output voltage of the block.

The output voltage value is returned as a 2-byte number in internal block units. To convert internal units to millivolts, use the formula:

volt = 21360.0 - (21360.0 - 14300.0) * **int_volt** / 253.0 Command

code: 0x03

Request:

magic	len	cmd	crc
0xAA55	0x04	0x03	0x0007

Example:

```
PWR REQ: 55 AA 04 03 07 00
```

Reply:

magic	len	cmd	volt	crc
0xAA55	0x06	0x03	output voltage	checksum

Example of reading output voltage 21.0v:

```
PWR RESP: 55 AA 06 03 0D 00 16 00
```