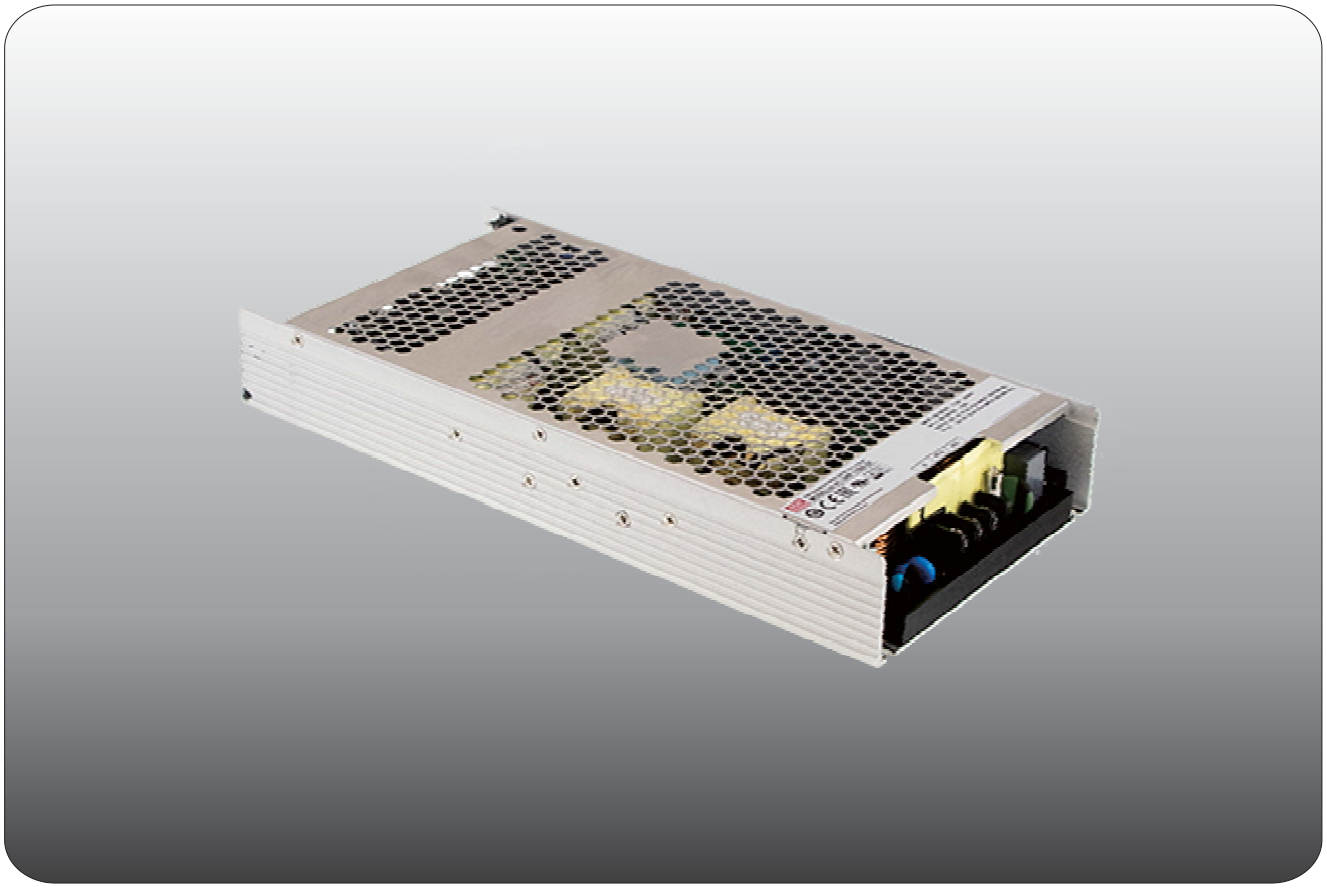
MEAN WELL



UHP-1500
Communication Note

UHP-1500 Communication Note

A.PMBus Communication Interface

◎UHP-1500 is compliant with PMBus Rev.1.1, the maximum communication speed is 100KHz and up to 8 device addresses available.

◎PMBus communication interface is able to provide the current operating status ad information as followings:

1.Output voltage, current and internal temperature.

2.Alarm and status.

3.Manufacture and model data.

1.Addressing

◎Each UHP-1500 unit should have their unique and own device address to communicate over the bus. 7-bit addressing method is used to assign a device address for a UHP-1500 unit, as shown below.

MSB						LSB
1	0	0	0	A2	A1	A0

A0-A2 allow users to designate an address for the supply; these three bits are defined through a 3-pole DIP switch on the output end. There are up to 8 different device addresses are available to be assigned. When DIP switch in the “ON” position means logic “0”; when it is in the “OFF” position, meaning logic “1”. For example, position 3 in “OFF”, the corresponding bit, A2, is set at logic “1”. Please refer to Table 1-1 for the detailed setup advice.

Module No.	Device address		
	A0	A1	A2
	DIP switch position		
	1	2	3
0	ON	ON	ON
1	OFF	ON	ON
2	ON	OFF	ON
3	OFF	OFF	ON
4	ON	ON	OFF
5	OFF	ON	OFF
6	ON	OFF	OFF
7	OFF	OFF	OFF

Table1-1

2.Control Setting

◎There are two means to control the power supply, analog signals and digital communication. Analog is the default setting for the supply, signals including PV, PC and SVR can be used immediately once receiving the supply. The digital communication of PMBus is initially uncontrollable but readable. To activate the adjustment commands of OPEREATION(01h, regarding remote ON-OFF function), VOUT_TRIM(22h, regarding output voltage programming function) and IOUT_OC_FAULT_LIMIT(46h, regarding output current programming function), set PM_CTRL of SYSTEM_CONFIG(BEh) at "1" and then reboot the supply. Once the digital communication dominates the supply, the analog signals become invalid.

NOTE: 1. At default setting of analog, the following commands are invalid but can be written while other PMBus commands are effective: OPEREATION(01h), VOUT_TRIM(22h) and IOUT_OC_FAULT_LIMIT(46h).

2. All written parameters of commands: 01h, 22h and 46h are saved into EEPROM and take effect after the digital is activated.

3.Factory Resetting

◎Users can follow the steps below to restore factory settings for commands: 01h, 22h, 46h and BEh.

1.Set DIP switch all in the "ON" position.

2.Turn on the AC without remote on, there should be no voltage at the output.

3.Within 15 seconds, set DIP switch all in the "OFF" position and all back in the "ON" again.

4.The green LED flashing 3 times means the process is successfully done.

5.Restart the supply to load factory settings.

4.Initial Operational Behavior Setting

◎Initial behavior of the power supply can be changed by setting OPERATION_INIT of SYSTEM_CONFIG(BEh), for example: power on without output. For detailed information, please refer to 5. Command List.

5.Command List

◎The command list of the UPH-1500 is shown in Table 5-1. It is compliant with the standard protocol of PMBus Rev 1.1. For more detailed information, please refer to PMBus official website (http://pmbus.org/specs.html)

Command Code	Command Name	Transaction Type	# of data Bytes	Description
01h	OPERATION	R/W Byte	1	Remote ON/OFF control
02h	ON_OFF_CONFIG	Read Byte	1	ON/OFF function configuration
19h	CAPABILITY	Read Byte	1	Capabilities of a PMBus device
20h	VOUT_MODE	R Byte	1	Define data format for output voltage (format: Linear, N= -9)
21h	VOUT_COMMAND	R Word	2	Output voltage setting value (format: Linear, N= -9)
22h	VOUT_TRIM	R/W Word	2	Output voltage trimmed value (format: Linear, N= -9)
46h	IOUT_OC_FAULT_LIMIT	R/W Word	2	Output overcurrent setting value (format: Linear, N= -3)
47h	IOUT_OC_FAULT_RESPONSE	R Byte	1	Define protection and response when an output overcurrent fault occurred
79h	STATUS_WORD	R Word	2	Summary status reporting
7Ah	STATUS_VOUT	R Byte	1	Output voltage status reporting
7Bh	STATUS_IOUT	R Byte	1	Output current status reporting
7Ch	STATUS_INPUT	R Byte	1	AC input voltage status reporting
7Dh	STATUS_TEMPERATURE	R Byte	1	Temperature status reporting
7Eh	STATUS_CML	R Byte	1	Communication, logic, Memory status reporting
80h	STATUS_MFR_SPECIFIC	R Byte	1	Manufacture specific status reporting
88h	READ_VIN	R Word	2	AC input voltage reading value (format: Linear, N=-1)
8Bh	READ_VOUT	R Word	2	Output voltage reading value (format: Linear, N= -9)
8Ch	READ_IOUT	R Word	2	Output current reading value (format: Linear, N= -3)
8Dh	READ_TEMPERATURE_1	R Word	2	Temperature 1 reading value (format: Linear, N= -3)
98h	PMBUS_REVISION	R Byte	1	The compliant revision of the PMBus (default: 11h for Rev. 1.1)
99h	MFR_ID	Block Read	12	Manufacturer's name
9Ah	MFR_MODEL	Block Read	12	Manufacturer's model name
9Bh	MFR_REVISION	Block Read	24	Firmware revision
9Ch	MFR_LOCATION	Block R/W	3	Manufacturer's factory location
9Dh	MFR_DATE	Block R/W	6	Manufacture date. (format: YYMMDD)
9Eh	MFR_SERIAL	Block R/W	12	Product serial number
BEh	SYSTEM_CONFIG	R/W Word	2	System setting
BFh	SYSTEM_STATUS	Read Word	2	System status

Table 5-1

◎Definition of Command BEh SYSTEM_CONFIG:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	-	-	-	-	-	-	-	-
Low byte	-	-	-	-	-	OPERATION_INIT		PM_CTRL

Low byte
Bit 0 PM_CTRL: PMBus Control Selecting
0＝Output voltage and current controlled by SVR/PV/PC(default)
1＝Output voltage, current and remote ON/OFF controlled by PMBus (VOUT_TRIM, IOUT_FAULT_LIMIT, OPERATION)

Bit 1: 2 OPERATION_INIT: Initial Operational Behavior
0b00＝Power on with 0x00: OFF
0b01＝Power on with 0x80: ON (default)
0b10＝Power on with the last setting
0b11＝Not used
Note: Unsupported settings display with "0"

◎Definition of Command BFh SYSTEM_STATUS:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	-	-	-	-	-	-	-	-
Low byte	-	EEPER	INITIAL_ STATE	ADL_ON	-	-	DC_OK	-

Low byte
Bit 1: DC_OK: The DC Output Status
0＝DC output too low
1＝DC output at a normal range

Bit 4 ADL_ON：Active Dummy Load Status
0＝Active dummy load NOT activate
1＝Active dummy load activating

Bit 5 INITIAL_STATE: Initial State Indication
0＝The unit NOT in an initial state
1＝The unit in an initial state
Note: Unsupported settings display with "0"

Bit 6 EEPER: EEPROM Access Error
0 = EEPROM accessing normally
1 = EEPROM access error
Note:
EEPER: When EEPROM Access Error occurs, the supply stops working and the LED indicator turns off. The supply needs to re-power on to recover after the error condition is removed.

6.Data Range and Tolerance

◎Display parameters

PMBus command		Model	Range	Tolerance
88h	READ_VIN	ALL	80 ~ 264V	±10V
8Bh	READ_VOUT	24V	0 ~ 28.8V	±0.24V
		48V	0 ~ 57.6V	±0.48V
8Ch	READ_IOUT (Note. 1)	24V	0 ~ 75A	±1.5A
		48V	0 ~ 38A	±0.75A
8Dh	READ_TEMPERATURE_1	ALL	-40 ~ 110℃	±5℃

Table 6-1

◎Control parameters

PMBus command		Model	Range	Tolerance	Default
01h	OPERATION	ALL	00h(OFF) / 80h(ON)	N/A	80h(ON)
21h	VOUT_COMMAND (Note. 2)	24V	24V	N/A	24V
		48V	48V	N/A	48V
22h	VOUT_TRIM (Note. 2)	24V	-12 ~ 4.8V	±0.24V	0V
		48V	-24 ~ 9.6V	±0.48V	0V
46h	IOUT_OC_FAULT_LIMIT	24V	12.5 ~ 68.75A	±1.5A	68.75A
		48V	6.37 ~ 34.62A	±0.75A	34.62A
BEh	SYSTEM_CONFIG	ALL	N/A	N/A	02h

Table 6-2

Note:

1.READ_IOUT will display ZERO amp when output current is less than the values in the table below.

Model	Minimum readable current
24V	2.5A±1A
48V	1.6A±1A

Table 6-3

2.When using PMBus to adjust output voltage, VOUT_COMMAND only can be used to display the rated voltage of the unit and cannot be written. It is VOUT_ TRIM that provides voltage trimming function. Take UPH-1500-24 as an example, to get a 12V output, please set value of VOUT_TRIM to -12V. Adjustable voltage range for each model is shown as below.

Model	Adjustable voltage range
24V	12 ~ 28.8V
48V	24 ~ 57.6V

Table 6-4

3.Insert a at least 35msec delay between commands.

4.Data format of IOUT_OC_FAULT_LIMIT(46h) is as below: (Please refer to PMBus_Specification_Part_II_Rev_1-1 for detailed information).

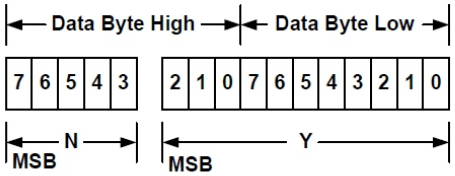


Figure 4. Linear Data Format Data Bytes

The relation between *Y*, *N* and the "real world" value is:

$X = Y \cdot 2^N$

Where, as described above:

X is the "real world" value;

Y is an 11 bit, two's complement integer; and

N is a 5 bit, two's complement integer.

Devices that use the Linear format must accept and be able to process any value of *N*.

5.Data format of VOUT_MODE, VOUT_COMMAND, VOUT_TRIM, READ_VIN, READ_VOUT, READ_IOUT, READ_TEMPERATURE_1 is as below:(Please refer to PMBus_Specification_Part_II_Rev_1-1 for detailed information)

(1)DIRECT Data Format

DIRECT format data is a two byte, two's complement binary integer. IRECT format data may be used with any command that sends or reads a arametric value. If a PMBus device uses DIRECT form data, this shall be clearly described in the product literature.

a.Interpreting Received Values

The host system uses the following equation to convert the value received from the PMBus device into a reading of volts, amperes, degrees Celsius or other units as appropriate:

$$X = \frac{1}{m}(Y \bullet 10^{-R} - b)$$

Where:

X, is the calculated, "real world" value in the appropriate units (A, V, °C, etc.);

m, the slope coefficient, is a two byte, two's complement integer;

Y, is a two byte two's complement integer received from the PMBus device;

b, the offset, is a two byte, two's complement integer; and

R, the exponent, is a one byte, two's complement integer.

b.Sending A Value

To send a value, the host must use the equation in Section 7.2.1 solved for *Y*:

$$Y = (mX + b) \bullet 10^{R}$$

Where:

Y is the two byte two's complement integer to be sent to the unit;

m, the slope coefficient, is the two byte, two's complement integer;

X, a "real world" value, in units such as amperes or volts, to be converted for transmission;

b, the offset, is the two byte, two's complement integer; and

R, the exponent, is the decimal value equivalent to the one byte, two's complement integer.

◎Please refer to the specification about PV/PC or SVR function.

B.CANBus Communication Interface

◎For further CAN bus information, please contact MEAN WELL.

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