TUXS200-I
PMBus communication manual

 ver1.0. 5/29 2017

TUXS200-I series

For TUXS200-I series

The PMBus can be used to control and monitor the TUXS200 converter.
For details, refer to PMBus standard spec manual : PMBus Power System Management Protocol Specification Part I (Revision1.2) and Part II (Revision1.2).
（URL : http://pmbus.org/Specifications/OlderSpecifications）

1. PMBus communication cabling and connection

1.1 Terminal function

The figure and the table below show terminal function and name of pins on TUXS200-I.

Figure 1-1 pin assignment in TUXS200-I (top view)

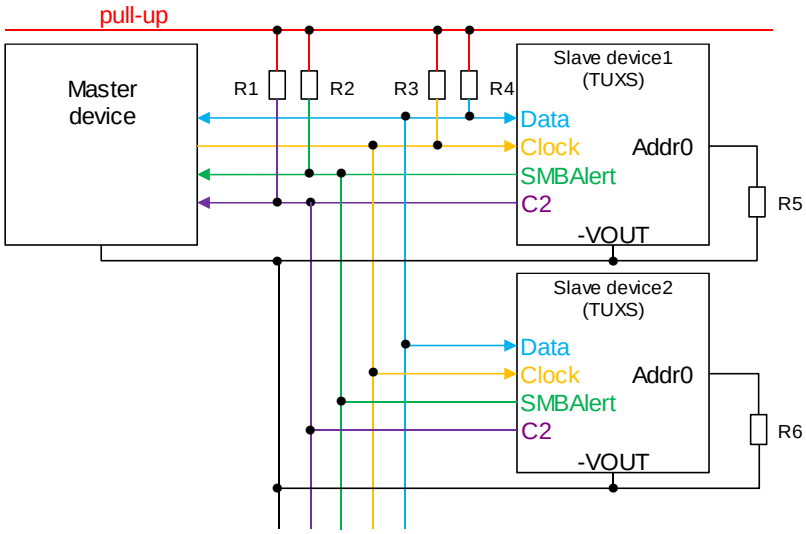
Table 1-1 Pin Descriptions on TUXS200-I

#	name	function	Note
1	AC1	AC input	
2	AC2		
3	BCR	+BC output	
4	+BC	+BC output	
5	-BC	-BC output	
6	+VOUT	+DC output	
7	TRM	Adjustment of output voltage	*1
8	-VOUT	-DC output	
9	SMBAlert	Alarm output	
10	C2	Power_Good	
11	AUX	AUX output	
12	Clock	PMBus communication clock input	
13	Data	PMBus communication data input&output	
14	Addr0	Address setting	

*1: Do not use when adjusting output voltage with PMBus communication.

1.2 PMBus communication connection methods

The figure and table below show recommended resistors value for hard wiring PMBus addresses.



#	component	Setting value
1	R1	10kΩ (recommend) *1
2	R2	10kΩ (recommend)
3	R3	*2
4	R4	*2
5	R5,R6	*3

*1: Connecting C2 as Power-Good function

*2: Refer to clause 1.4 PMBus communication pull-up resistor

*3: Refer to clause 1.5 address setting

Figure 1-2 PMBus interface cable chart

1.3 PMBus communication cable pattern example

When connecting the PMBus communication cable, please make sure the design minimizes noise from outside and crosstalk by positioning -VOUT between Data bus and Clock bus as shown figure 1-3.
Also, correctly set the pull-up resistor as parasitic capacitance can happen due to shielding and length of cabling. (refer to clause 1.4)

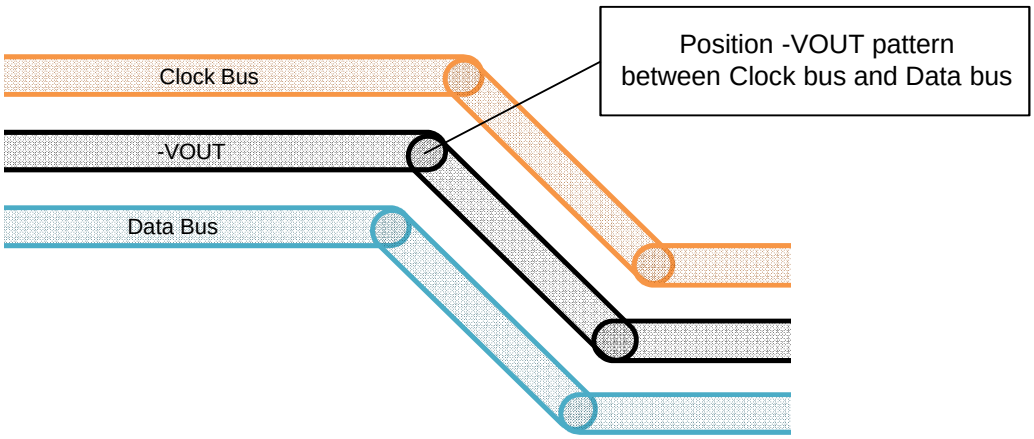


Figure 1-3 Pattern example

1.4 PMBus communication pull-up resistor value

It is necessary to connect pull-up resistor on Data bus and Clock bus terminal of PMBus .
Recommended value of resistor(maximum value) is shown at figure 1-4.

Note1: Do not exceed the rated output current of converter's terminal (clause 8-1).

Note2: Total of parasitic capacitance and input capacitance should be less than 400pF.

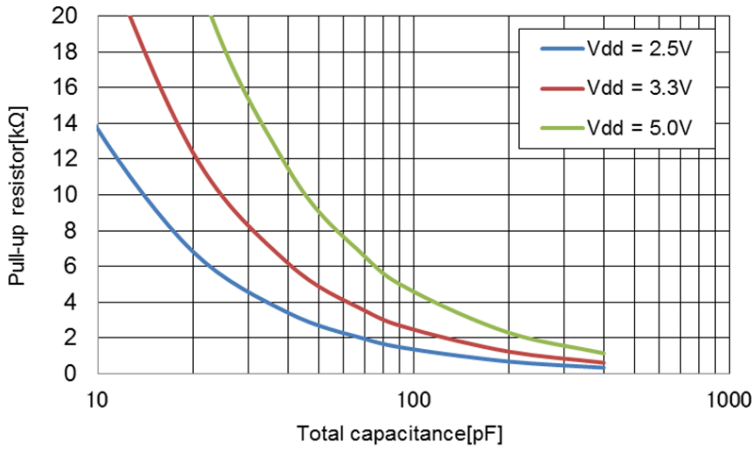


Figure 1-4 Recommended value of pull-up resistor

1.5 Address setting

The figure and table below show recommended resistors value for hard wiring PMBus addresses.
Resistors with 1% tolerance are recommended. *1
Take 0-7 on Addr0 per value of resistor and address could be assigned 16-23 per the below formula.

*1: Address setting cannot be changed after input voltage is applied .
Be sure to verify setting before input voltage is applied.

The formula for TUXS200-I

Address =	16	+ Value(Addr0)

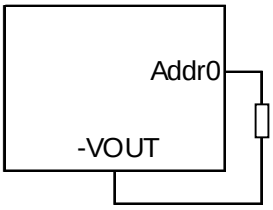


Figure 1-5 Address setting

Table 1-2 Resistor value

#	Resistor value [kΩ]	Value
1	10	0
2	15	1
3	24	2
4	36	3
5	56	4
6	82	5
7	130	6
8	220	7

2. PMBus communication control

2.1 Overview of Control block

This product has built-in RAM and ROM.
Based on the memory parameter, controlling power supply and PMBus communication are implemented. Conceptual diagram shown in figure 2-1.

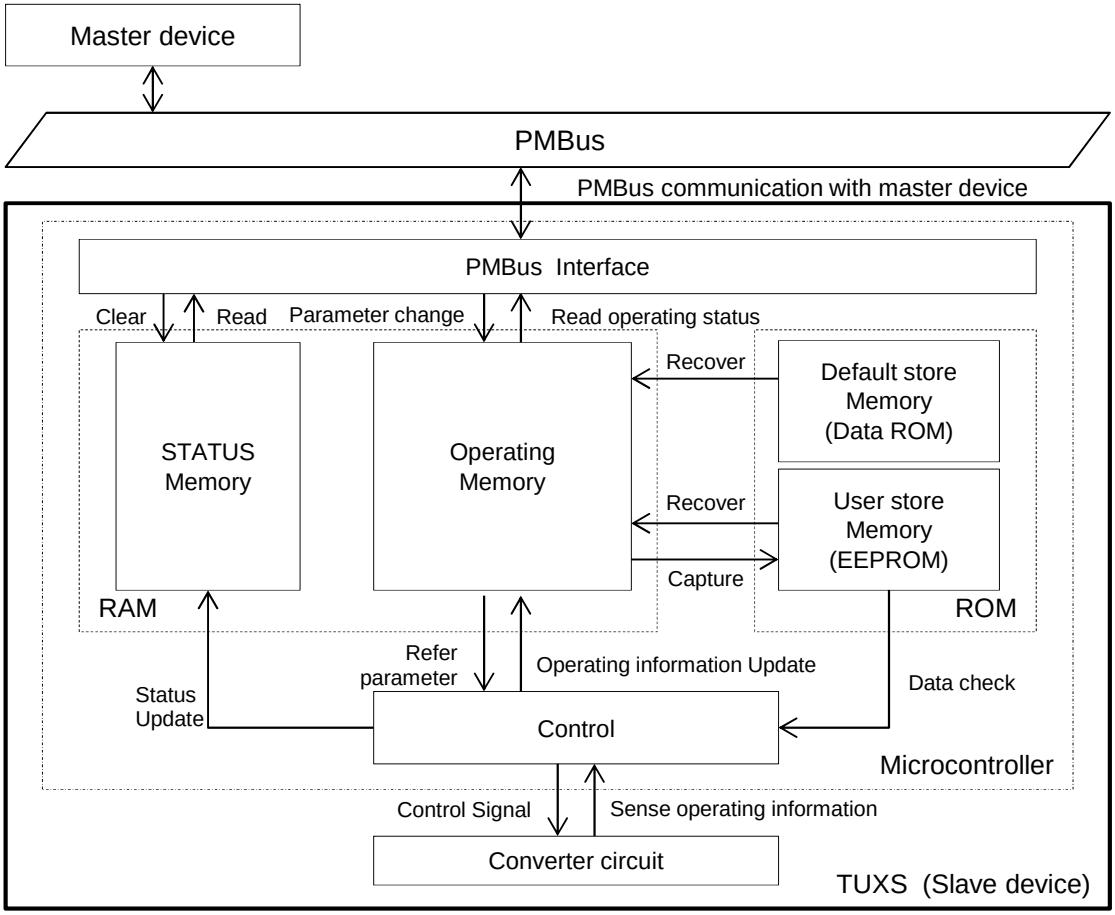


Figure 2-1 Conceptual diagram of communication control

2.2 RAM (Random Access Memory)

2.2.1 Operating memory

When power supply is being operated, it refers to the setting value of the operating memory with RAM and controls it. Since setting change by PMBus communication command is preserved in the operating memory, any settings will be lost after a reset unless they are stored to data flash.

2.2.2 STATUS memory

You can check the status of the power supply by reading status memory(command [78h]-[80h]
Corresponding bit on Status memory is set to 1 when power supply is abnormal.
This can be cleared by implementing command of CLEAR_FAULTS [03h], blocking input voltag

2.3 ROM (Read Only Memory)

2.3.1 DEFAULT STORE MEMORY

Default store memory preserves initial factory parameters.
Restoring information to operating memory is done by implementing RESTORE_DEFAULT_ALL [12h] command.

2.3.2 USER STORE MEMORY

This preserves the content of the operating memory rewritten by the master device after input voltage is insulated. Information is restored by implementing RESTORE_USER_ALL [16h] command and when power supply is started-up. Information within operating memory is preserved in user store memory by implementing STORE_USER_ALL [15h] command. *1

*1: Please do not insulate input voltage over 3 seconds when command is being implemented.

Figure 2-2 Restore and preserving operation for command and parameter

2.4 Retaining the number of protecting operation

When each protective function is operating, the number of information(0-31times) is preserved in ROM. Commands shown in table 2-1 can read the number of protective operations and delete the number of counts.

Table 2-1 Reading command for the number for stopping abnormal power supply

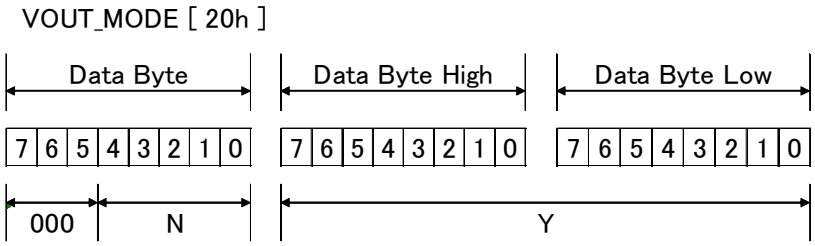
#	Command	Code	Note
1	MFR_VOUT_OV_FAULT_COUNT	F0h	Read the number of output overvoltage protective operation.
2	MFR_VOUT_UV_FAULT_COUNT	F1h	Read the number of output lowvoltage protective operation.
3	MFR_OT_FAULT_COUNT	F2h	Read the number of overheating protective operation.
4	MFR_UT_FAULT_COUNT	F3h	Read the number of lowtemperature protective operation.
5	MFR_VIN_OV_FAULT_COUNT	F8h	Read the number of input overvoltage protective operation.
6	MFR_VIN_UV_FAULT_COUNT	F9h	Read the number of input lowvoltage protective operation.
7	MFR_PIN_OP_FAULT_COUNT	FAh	Read the number of input overpower protective operation.
8	MFR_CLEAR_FAULTS_COUNT	F5h	Reset the number of operation at F0h～FAh to "00h".

Note: In case response of protective operation is auto recovery, it is counted every time this function is operated after recovery.

3. Data format

3.1 Data format for output voltage

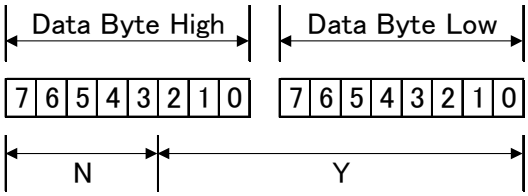
Please set output voltage and read per shown linear format below.
Data byte Low 5 bit of VOUT MODE [20h] is complement notation by 2 and represents index part N with code and is fixed -10.
Mantissa part Y is represented 16 bit data without code.



$$VALUE = Y \cdot 2^{N}$$

3.2 Data format for other parameters

In compliance with below linear format, please make setting and reading.
Date byte High 5 bit is complement notation by 2 and represents index part N with code and varies with data. Mantissa part Y is complement notation by 2 with code and represents 11 bit data. *1



$$VALUE = Y \cdot 2^{N}$$

Table 3-1 Index part N value

#	Item	Data format	N(5bit)	Characteristics N (*1)	Unit
1	Output voltage	Linear(Vo)	10110	-10	V
2	Input voltage	Linear(Vin)	11111	-1	V
3	Input current	Linear(Iin)	11001	-7	A
4	Input power	Linear(Pin)	11111	-1	W
5	Temperature	Linear(Temp)	11110	-2	℃
6	Count	Linear(Count)	00000	0	times

*1: Index part N value is fixed.

4. C2 Terminal function

C2 terminal is output terminal of Power_Good function.

4.1 Power_Good function

Power_Good terminal output is open drain. When you use Power_Good function, please connect C2 terminal with pull-up resistor. Initial setting of Power_Good signal is negative. (Please make logic setting by MFR_PGOOD_POLARITY [E2h])
If output voltage is beyond setting value of POWER_GOOD_ON [5Eh] , C2 terminal will be low.
If output voltage is lower than the setting value of POWER_GOOD_OFF [5Fh] , C2 terminal will be high.
Also, during 10ms in charging input voltage, voltage level on C2 terminal is unstable.

5. Explanation for terminal function of SMBAlert

SMBAlert protocol is also supported by the module. This means the module can alert the PMBus maste that it has an active status or alarm condition.
(Standard manual of SMBus for the details : System Management Bus(SMBus) Specification Ver 2.0)
(URL: http://smbus.org/specs/)

5.1 Connecting SMBAlert terminal

Output terminal of SMBAlert is open drain. When you use function of SMBAlert, connect pull-up resistor with SMBAlert terminal.

When something abnormal happens in the slave device, the slave device will make SMBAlert low level.

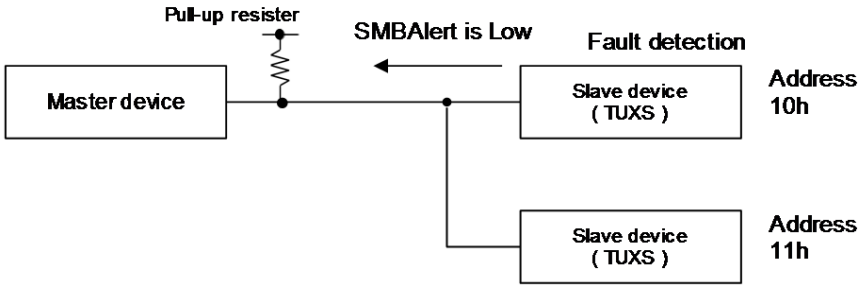


Figure 5-1 Example of operation on SMBAlert

5.2 Identifying slave device issuing SMBAlert signal

Master-device can identify which slave device is abnormal.
By receiving READ communication (*1) using ARA from master device, power supply with something abnormal sends original address.

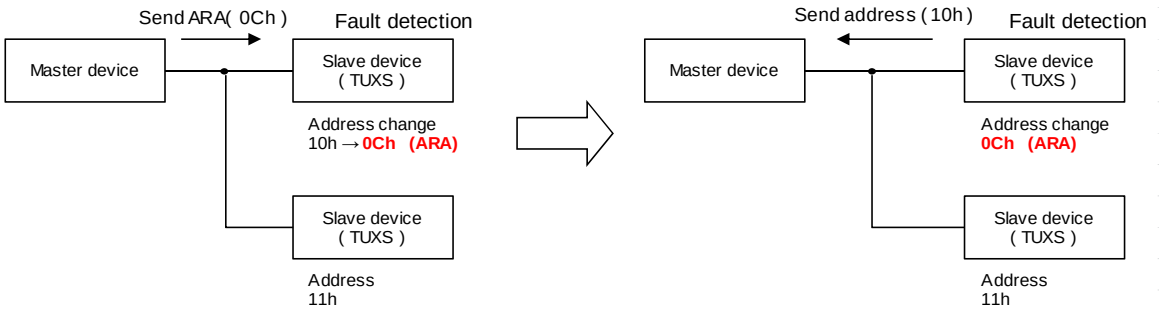


Figure 5-2 Identifying Slave using ARA

*1: When receiving READ communication using ARA, SMBAlert will be cancelled .
In order to enable the SMBAlert signal, it is necessary to send CLEAR_FAULTS [03h].

5.3 If multiple slave devices issue SMBAlert signal

When multiple slave devices issue SMBAlert single at the same time, it is not possible to judge slave address by ARA. When you restore, please communicate by ARA and release with SMBAlert.

6. Explanation of several functions

6.1 Output voltage setting

You can set output voltage of power supply by command as shown in Table 6-1.

Table 6-1 Function of output voltage setting

#	Output voltage setting	Note
1	VOUT_COMMAND [21h]	*1
2	VOUT_MARGIN_HIGH [25h]	*1
3	VOUT_MARGIN_LOW [26h]	*1
4	VOUT_TRIM [22h]	Please use this as slight adjustment for output voltage.

*1: Switching by OPERATION [01h] command. Initial value is VOUT_COMMAND [21h].

Output voltage becomes value shown in below format.

Output voltage of power supply = VOUT_TRIM [22h] value of setting + { VOUT_COMMAND [21h] Value of setting / or VOUT_MARGIN_HIGH [25h] Value of setting / or VOUT_MARGIN_LOW [26h] Value of setting }

6.2 Protective operation for output overvoltage

Output overvoltage protection function is operated when the output voltage becomes high.
The operation threshold and the output over voltage protection function can be changed respectively at VOUT_OV_FAULT_LIMIT [40h] and VOUT_OV_FAULT_RESPONSE [41h] . If stopping latch stops,
Power Supply will not restore until restored operation is done by reinvert after insulating input.
When the automatic recovery is set from 1-6 times, the unit will not automatically recover unless the abnormal condition is removed.

6.3 Protective operation for output undervoltage

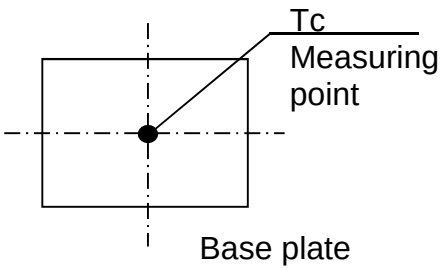
Output undervoltage protection function is operated when the output voltage becomes low.
The operation threshold and the way of the output under voltage protection function can be changed respectively by VOUT_UV_FAULT_LIMIT [44h] and VOUT_UV_FAULT_RESPONSE [45h]. In case the way of stopping latch stop,
Power Supply does not restore until restored operation is done by reinvert after insulating input.
When the automatic recovery is set from 1-6 times, the unit will not automatically recover unless the abnormal condition is removed.

6.4 Protective operation for overtemperature

The overtemperature protection feature works when the Base plate temperature which is becomes high.
The operation threshold and the way of stopping overheating are changed by OT_FAULT_LIMIT [4Fh] and OT_FAULT_RESPONSE[50h] respectively.
In case the way of stopping latch stop, Power Supply does not restore until restored operation is done by reinvert after insulating input.
When the number of automatic recovery is set by 1-6 times, latch stop will be happened without situation of abnormal power supply is recovered during restarting up by specific number of times.

6.5 Protective operation for undertemperature

The undertemperature protection feature works when the Base plate temperature is low.
The operation threshold and the way of stopping the low temperature protection are changed by UT_FAULT_LIMIT [53h] and UT_FAULT_RESPONSE [54h] respectively.



6.6 Protective operation for input overvoltage

Input overvoltage protection function is operated when the input voltage becomes too high.
The operation threshold and the input overvoltage protection are changed by
VIN_OV_FAULT_LIMIT [55h] and VIN_OV_FAULT_RESPONSE [56h] respectively.

6.7 Protective operation for input overpower

Input overpower protection function is operated when the input power becomes too high.
The operation threshold and the input overpower protection are changed by
MFR_PIN_OP_FAULT_LIMIT [E5h] and MFR_PIN_OP_FAULT_RESPONSE [E6h] respectively.

6.8 Prohibiting rewriting parameters

WRITE_PROTECT [10h] command communication can limit the command communication. (*1)
This can be set up to prevent any unintentional setting changes.
Writing in all of the command to be supported is possible at setting default.

*1: Reading (the READ communication) of the set value and rewriting WRITE_PROTECT [10h] are not limited.

7. Packet error checking (PEC)

This product supports packet error checking(PEC).
We recommend using PEC when you implement PMBus communication.
(SMBus standard manual for the details : System Management Bus(SMBus) Specification Ver 2.0)

8. PMBus hardware specifications

8.1 Maximum rated on communication terminal

PMBus maximum rate of communication terminal(*1) is shown at table 8-1.

*1: Data / Clock / Addr0 / C2 / SMBAlert are terminal.

Table 8-1 Spec of maximum rate

#	Parameter	Min	Max	Unit	Note
1	Input voltage	-0.3	5.2	V	
2	Maximum output current	-12	-	mA	only sink

8.2 Spec of electrical characteristics on communication terminal

Spec of electrical characters on this product is shown at Table 8-2.

Table 8-2 Spec of electrical characteristics

#	Parameter	Condition of measurement	Min	Max	Unit	Note
1	Input pull-up voltage (Clock, Data)		2.5	5	V	
2	Input High level voltage (Clock, Data)		2.1	-	V	
3	Input Low level voltage (Clock, Data)		-	0.8	V	
4	Input High level current (Clock, Data)		-1.0	+1.0	μA	
5	Input Low level current (Clock, Data)		-1.0	+1.0	μA	
6	Output Low level voltage (Clock, Data, SMBAlert)	IOUT=8mA	-	0.6	V	
7	Output High level open drain Leak current (Data, SMBAlert)		-	1	μA	
8	PMBus communication frequency range		10	400	kHz	
9	Communication interval		400	-	us	*2

*2: Bus free time between Stop and Start Condition

9. PMBus software specifications

9.1 List of supported PMBus commands

The following shows the list of PMBus commands to be supported.

Table 9-1 Supported command and setting

#	PMBus command	Code (*1)	Type (*2)	Data length (*3)	Data format	Initial setting	Unit	Note
1	OPERATION	01 h	R/W	Byte	-	80 h	-	
2	CLEAR_FAULTS	03 h	Send	-	-	-	-	
3	WRITE_PROTECT	10 h	R/W	Byte	-	00 h	-	
4	RESTORE_DEFAULT_ALL	12 h	Send	-	-	-	-	
5	STORE_USER_ALL	15 h	Send	-	-	-	-	
6	RESTORE_USER_ALL	16 h	Send	-	-	-	-	
7	CAPABILITY	19 h	Read	Byte	-	B0 h	-	
8	SMBALERT_MASK	1B h	R/W	-	-	-	-	
	STATUS_BYTE			Byte	-	02 h	-	
	STATUS_WORD (High 8bit)			Byte	-	08 h	-	
	STATUS_VOUT			Byte	-	00 h	-	
	STATUS_INPUT			Byte	-	00 h	-	
	STATUS_TEMPERATURE			Byte	-	00 h	-	
	STATUS_CML			Byte	-	FF h	-	
	STATUS_MFR_SPECIFIC			Byte	-	00 h	-	
9	VOUT_MODE	20 h	Read	Byte	-	16 h	-	
10	VOUT_COMMAND	21 h	R/W	Word	Linear(Vo)	*4	[V]	
11	VOUT_TRIM	22 h	R/W	Word	Linear(Vo)	0	[V]	
12	VOUT_MAX	24 h	R/W	Word	Linear(Vo)	*4	[V]	
13	VOUT_MARGIN_HIGH	25 h	R/W	Word	Linear(Vo)	*4	[V]	
14	VOUT_MARGIN_LOW	26 h	R/W	Word	Linear(Vo)	*4	[V]	
15	VOUT_OV_FAULT_LIMIT	40 h	R/W	Word	Linear(Vo)	*4	[V]	
16	VOUT_OV_FAULT_RESPONSE	41 h	R/W	Byte	-	80 h	-	
17	VOUT_OV_WARN_LIMIT	42 h	R/W	Word	Linear(Vo)	*4	[V]	
18	VOUT_UV_WARN_LIMIT	43 h	R/W	Word	Linear(Vo)	*4	[V]	
19	VOUT_UV_FAULT_LIMIT	44 h	R/W	Word	Linear(Vo)	*4	[V]	
20	VOUT_UV_FAULT_RESPONSE	45 h	R/W	Byte	-	B8 h	-	
21	OT_FAULT_LIMIT	4F h	R/W	Word	Linear(Temp)	110	[℃]	
22	OT_FAULT_RESPONSE	50 h	R/W	Byte	-	80 h	-	
23	OT_WARN_LIMIT	51 h	R/W	Word	Linear(Temp)	100	[℃]	
24	UT_WARN_LIMIT	52 h	R/W	Word	Linear(Temp)	-40	[℃]	
25	UT_FAULT_LIMIT	53 h	R/W	Word	Linear(Temp)	-45	[℃]	
26	UT_FAULT_RESPONSE	54 h	R/W	Byte	-	B8 h	-	
27	VIN_OV_FAULT_LIMIT	55 h	R/W	Word	Linear(Vin)	270	[V]	
28	VIN_OV_FAULT_RESPONSE	56 h	R/W	Byte	-	B8 h	-	
29	VIN_OV_WARN_LIMIT	57 h	R/W	Word	Linear(Vin)	270	[V]	

Table 9-1 Supported command and setting (sequel)

#	PMBus command	Code (*1)	Type (*2)	Data length (*3)	Data format	Initial setting	Unit	Note
30	POWER_GOOD_ON	5E h	R/W	Word	Linear(Vo)	*4	[V]	
31	POWER_GOOD_OFF	5F h	R/W	Word	Linear(Vo)	*4	[V]	
32	PIN_OP_WARN_LIMIT	6B h	R/W	Word	Linear(Pin)	300	[W]	
33	STATUS_BYTE	78 h	R/W	Byte	-	00 h	-	
34	STATUS_WORD	79 h	R/W	Word	-	00 h	-	
35	STATUS_VOUT	7A h	R/W	Byte	-	00 h	-	
36	STATUS_INPUT	7C h	R/W	Byte	-	00 h	-	
37	STATUS_TEMPERATURE	7D h	R/W	Byte	-	00 h	-	
38	STATUS_CML	7E h	R/W	Byte	-	00 h	-	
39	STATUS_MFR_SPECIFIC	80 h	R/W	Byte	-	00 h	-	
40	READ_VIN	88 h	Read	Word	Linear(Vin)	-	[V]	
41	READ_IIN	89 h	Read	Word	Linear(Iin)	-	[A]	
42	READ_VOUT	8B h	Read	Word	Linear(Vo)	-	[V]	
43	READ_TEMPERATURE_1	8D h	Read	Word	Linear(Temp)	-	[°C]	
44	READ_PIN	97 h	Read	Word	Linear(Pin)	-	[W]	
45	PMBUS_REVISION	98 h	Read	Byte	-	22 h	-	
46	MFR_MODEL	9A h	Read	Block	-	-	-	
47	MFR_REVISION	9B h	Read	Block	-	-	-	
48	MFR_LOCATION	9C h	Read	Block	-	-	-	
49	MFR_SERIAL	9E h	Read	Block	-	-	-	
50	MFR_C2_ARA_CONFIG	E0 h	R/W	Byte	-	01 h	-	
51	MFR_PGOOD_POLARITY	E2 h	R/W	Byte	-	00 h	-	
52	MFR_PIN_OP_FAULT_LIMIT	E5 h	R/W	Word	Linear(Pin)	300	[W]	
53	MFR_PIN_OP_FAULT_RESPONSE	E6 h	R/W	Byte	-	B8 h	-	
54	MFR_VOUT_OV_FAULT_COUNT	F0 h	Read	Word	Linear(Count)	0	[times]	
55	MFR_VOUT_UV_FAULT_COUNT	F1 h	Read	Word	Linear(Count)	0	[times]	
56	MFR_OT_FAULT_COUNT	F2 h	Read	Word	Linear(Count)	0	[times]	
57	MFR_UT_FAULT_COUNT	F3 h	Read	Word	Linear(Count)	0	[times]	
58	MFR_CLEAR_FAULTS_COUNT	F5 h	Send	-	-	-	-	
59	MFR_VIN_OV_FAULT_COUNT	F8 h	Read	Word	Linear(Count)	0	[times]	
60	MFR_VIN_UV_FAULT_COUNT	F9 h	Read	Word	Linear(Count)	0	[times]	
61	MFR_PIN_OP_FAULT_COUNT	FA h	Read	Word	Linear(Count)	0	[times]	

*1: It shows being a numeric-representation in the hexadecimal number when end "h" is added.
*2: The setting notation corresponds to the contents of Table 9-1.1.
*3: It shows that "Byte" is 1 byte data and it shows that "Word" is 2 byte data.
*4: Refer to『10. PMBus commands』.

Table 9-1.1

#	notation	Note
1	R/W	It corresponds both for reading and writing in.
2	Send	It corresponds only for sending a command
3	Read	It corresponds only for reading.

9.2 Setting and reading value for PMBus command

Possible range and accuracy on setting and reading each PMBus command to be supported is shown at Table 9-2.

Table 9-2 Setting range and accuracy by command

#	PMBus command	Code (*1)	Setting / Reading range (*2)			Setting / Reading accuracy	Note
			Min	Max	Unit		
1	VOUT_COMMAND	21 h	*3	*3	[V]	±2% Vo	
2	VOUT_TRIM	22 h	*3	*3	[V]	±2% Vo	
3	VOUT_MAX	24 h	*3	*3	[V]	±2% Vo	
4	VOUT_MARGIN_HIGH	25 h	*3	*3	[V]	±2% Vo	
5	VOUT_MARGIN_LOW	26 h	*3	*3	[V]	±2% Vo	
6	VOUT_OV_FAULT_LIMIT	40 h	*3	*3	[V]	±2% Vo	
7	VOUT_OV_WARN_LIMIT	42 h	*3	*3	[V]	±2% Vo	
8	VOUT_UV_WARN_LIMIT	43 h	*3	*3	[V]	±2% Vo	
9	VOUT_UV_FAULT_LIMIT	44 h	*3	*3	[V]	±2% Vo	
10	OT_FAULT_LIMIT	4F h	-45	110	[℃]	±5℃	
11	OT_WARN_LIMIT	51 h	-45	110	[℃]	±5℃	
12	UT_WARN_LIMIT	52 h	-45	20	[℃]	±5℃	
13	UT_FAULT_LIMIT	53 h	-45	20	[℃]	±5℃	
14	VIN_OV_FAULT_LIMIT	55 h	80	270	[V]	±4.5% Vin	
15	VIN_OV_WARN_LIMIT	57 h	80	270	[V]	±4.5% Vin	
16	POWER_GOOD_ON	5E h	*3	*3	[V]	±2% Vo	
17	POWER_GOOD_OFF	5F h	*3	*3	[V]	±2% Vo	
18	PIN_OP_WARN_LIMIT	6B h	0	300	[W]	*	See Figure 9-2
19	READ_VIN	88 h	85	264	[V]	±4.5% Vin	
20	READ_IIN	89 h	0	2.7	[A]	*	See Figure 9-1
21	READ_VOUT	8B h	*3	*3	[V]	±2% Vo	
22	READ_TEMPERATURE_1	8D h	-45	139	[℃]	±5℃	
23	READ_PIN	97 h	0	223	[W]	*	See Figure 9-2
24	MFR_PIN_OP_FAULT_LIMIT	E5 h	0	300	[W]	*	See Figure 9-2
25	MFR_VOUT_OV_FAULT_COUNT	F0 h	0	31	[times]	-	
26	MFR_VOUT_UV_FAULT_COUNT	F1 h	0	31	[times]	-	
27	MFR_OT_FAULT_COUNT	F2 h	0	31	[times]	-	
28	MFR_UT_FAULT_COUNT	F3 h	0	31	[times]	-	
29	MFR_VIN_OV_FAULT_COUNT	F8 h	0	31	[times]	-	
30	MFR_VIN_UV_FAULT_COUNT	F9 h	0	31	[times]	-	
31	MFR_PIN_OP_FAULT_COUNT	FA h	0	31	[times]	-	

*1: It shows being a numeric-representation in the hexadecimal number when end "h" is added.
*2: It is communication error when setting a value is out of the setting range in value setting. and corresponding bit 6 of STATUS_CML is set.
*3: Refer to『10. PMBus commands set』.

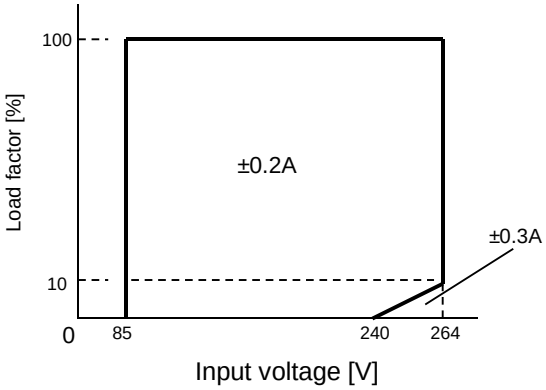


Figure 9-1 Input current reading accuracy

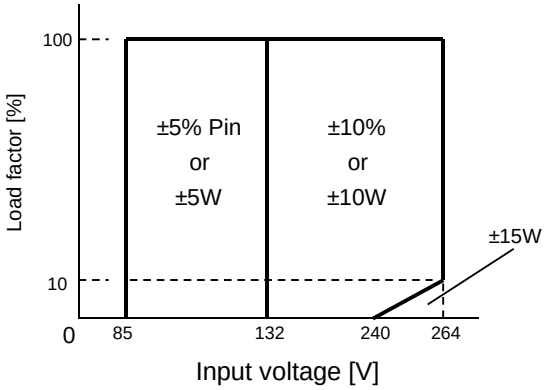


Figure 9-2 Input power reading and setting accuracy

10. PMBus commands

In the following sections of this document, each of the commands that are used in the TUXS200-I converter are described in detail.

OPERATION [01h] R/W Byte

This command is used to set the margin state (margin high, margin low, no margin) of the output voltage.

Display format : -
Initial setting : 80 h
Range of setting and reading : -

bit	7	6	5	4	3	2	1	0
Initial setting	1	0	0	0	0	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	setting				Output	Overview
	bit7-6	bit5-4	bit3-2	bit1-0		
1	00	XX	XX	XX	OFF	Power supply stops . (not supported)
2	01	XX	XX	XX	OFF	Stop by sequence TOFF_DELAY [64h], TOFF_FALL [65h]. (not supported)
3	10	00	XX	XX	ON	Set output voltage value of VOUT_COMMAND [21h].
4	10	01	01	XX	ON	Set output voltage value of VOUT_MARGIN_LOW [26h]. (LVP invalid) (not supported)
5	10	01	10	XX	ON	Set output voltage value of VOUT_MARGIN_LOW [26h].
6	10	10	01	XX	ON	Set output voltage value of VOUT_MARGIN_HIGH [25h]. (OVP invalid) (not supported)
7	10	10	10	XX	ON	Set output voltage value of VOUT_MARGIN_HIGH [25h].

XX: Ignore

CLEAR_FAULTS [03h] Send

This command is used to clear the" STATUS Register" after any fault occurs and reset the SMBAlert signal.

Display format : -
Initial setting : -
Range of setting and reading : -

#	STATUS command	Code	Data
1	STATUS_BYTE	78h	Byte
2	STATUS_WORD	79h	Word
3	STATUS_VOUT	7Ah	Byte
4	STATUS_INPUT	7Ch	Byte
5	STATUS_TEMPERATURE	7Dh	Byte
6	STATUS_CML	7Eh	Byte
7	STATUS_MFR_SPECIFIC	80h	Byte

WRITE_PROTECT [10h] R/W Byte

This command provides an alternative way to globally write protecting commands.
It is used with data according to Table below.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

bit	7	6	5	4	3	2	1	0
Initial setting	0	0	0	0	0	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	Value	Overview
1	bit7-0	10000000	Writing is impossible except WRITE_PROTECT [10h].
2		01000000	Writing is impossible except the above + OPERATION [01h].
3		00100000	Writing is impossible except the above + VOUT_COMMAND [21h].
4		00000000	Writing in all command to be supported is possible.

RESTORE_DEFAULT_ALL [12h] Send

Restores the Operating Memory to the default settings.

Display format	: -
Initial setting	: -
Range of setting and reading	: -

STORE_USER_ALL [15h] Send

The Operating Memory data is written to the EEPROM.

Display format	: -
Initial setting	: -
Range of setting and reading	: -

Note1: To avoid the risk of the data damage, during STORE_USER_ALL [15h] command is implemented, a delay of 3 seconds should be allowed while the device is busy before the next command is transmitted to this device.
Note2: During STORE_USER_ALL [15h] command execution, it isn't possible to communicate with PMBus.
Note3: It is possible to rewrite up to 1000 times.

RESTORE_USER_ALL [16h] Send

Restores the Operating Memory to the user settings(EEPROM).
This command is automatically performed at power up.

Display format	: -
Initial setting	: -
Range of setting and reading	: -

CAPABILITY [19h] Read Byte

It reads the support status of the communication.

Display format : -
Initial setting : B0 h
Range of setting and reading : -

bit	7	6	5	4	3	2	1	0
Initial setting	1	0	1	1	0	0	0	0
Access	R	R	R	R	R	R	R	R

#	bit	Value	Overview
1	bit7	0	Packet error checking is not supported.
2		1	Packet error checking is supported.
3	bit6-5	00	Supported Maximum Bus speed is 100kHz.
		01	Supported Maximum Bus speed is 400kHz.
		10	Reserved
		11	Reserved
4	bit4	0	SMBAlert is not supported.
		1	SMBAlert is supported.
5	bit3-0	0000	Reserved

SMBALERT_MASK [1Bh] Write Word ,Block Write/ Read Process Call

It sets a mask to the Alert signal of the SMBAlert terminal.
After command sending, it sets "1" to the corresponding command of STATUS and the bit of the mask.

Display format : -
Initial setting : -
Range of setting and reading : -

#	Status command of possible mask setting	Code	Data	Initial value
1	STATUS_BYTE	78h	Byte	02 h
2	STATUS_WORD	79h	Byte	08 h
3	STATUS_VOUT	7Ah	Byte	00 h
4	STATUS_INPUT	7Ch	Byte	00 h
5	STATUS_TEMPERATURE	7Dh	Byte	00 h
6	STATUS_CML	7Eh	Byte	FF h
7	STATUS_MFR_SPECIFIC	80h	Byte	00 h

VOUT_MODE [20h] Read Byte

It reads an output voltage format form.
The characteristic N (bit4-0) of the Linear mode becomes a fixation at -10.

Display format : -
Initial setting : 16 h
Range of setting and reading : -

bit	7	6	5	4	3	2	1	0
Initial setting	0	0	0	1	0	1	1	0
Access	R	R	R	R	R	R	R	R

#	bit	Value	Overview
1	bit7-5	000	Vo format is linear mode.
2		001	Vo format is VID mode. (not supported)
3		010	Vo format is Direct mode. (not supported)
4	bit4-0	10110	It shows the index parts N of the Linear mode by 2 of complement.

VOUT_COMMAND [21h] R/W Word

The output voltage can be programmed within the setting range.

Display format : Linear(Vo)
Initial setting, : 50.0 [V] , 45.0 - 55.0 [V] (TUXS200F50-I) *1
Range of setting and reading

*1: The value which added VOUT_TRIM [22h] becomes the upper limit.
Also, the value which exceeds VOUT_MAX [24h] can not be set.

VOUT_TRIM [22h] R/W Word

Sets output voltage trim value. The two bytes are formatted as a two's complement binary mantissa, sets in conjunction with the exponent set in VOUT_MODE.

Display format : Linear(Vo)
Initial setting : 0.0 [V]
Range of setting and reading : ±10.0 [V] (TUXS200F50-I) *1

*1: When either VOUT_COMMAND [21h], VOUT_MARGIN_HIGH [25h], VOUT_MARGIN_LOW [26h] adds on VOUT_TRIM [22h] becomes out of the range, it is not possible to be set.

VOUT_MAX [24h] R/W Word

Sets the maximum possible value setting of the output voltage.
It isn't possible to change the maximum setting value.

Display format : Linear(Vo)
Initial setting, : 58.32 [V] , 45.0 - 58.32 [V] (TUXS200F50-I)
Range of setting and reading

VOUT_MARGIN_HIGH [25h] R/W Word

Sets the value of the output voltage during the margin high operation state.
To change the operation to output margin high, please refer to the operation command.

Display format : Linear(Vo)
Initial setting, : 55.0 [V] , 45.0 - 55.0 [V] (TUXS200F50-I) *1
Range of setting and reading

*1: The value added VOUT_TRIM [22h] becomes the upper limit.
Also, the value which exceeds VOUT_MAX [24h] can not be set.

VOUT_MARGIN_LOW [26h] R/W Word

Sets the value of the output voltage during the margin low operation state.
To change the operation to output margin low, please refer to the OPERATION [01h] command.

Display format : Linear(Vo)
Initial setting, : 45.0 [V] , 45.0 - 55.0 [V] (TUXS200F50-I) *1
Range of setting and reading

*1: The value added VOUT_TRIM [22h] becomes the upper limit.
Also, the value which exceeds VOUT_MAX [24h] can not be set.

VOUT_OV_FAULT_LIMIT [40h] R/W Byte

Sets the output overvoltage fault threshold.
Set higher than VOUT_COMMAND [21h].
When the output voltage exceeds this threshold, it does the operation to specify at VOUT_OV_FAULT_RESPONSE [41h].

Display format : Linear(Vo)
Initial setting, : 58.32 [V] , 42.5 - 58.32 [V] (TUXS200F50-I)
Range of setting and reading

VOUT_OV_FAULT_RESPONSE [41h] R/W Byte

Configures the output overvoltage fault response.

Display format : -
Initial setting : 80 h
Range of setting and reading : -
Delay time for automatic recovery : 5s

bit	7	6	5	4	3	2	1	0
Initial setting	1	0	0	0	0	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	Value	Overview
1	bit7-6	00	It continues operation. (not supported)
2		01	It continues operation to the delay time which is prescribed in bit2-0 and in case of being an abnormal condition behind the delay time, too, it does the return processing to specify in bit5-3. (not supported)
3		10	It does the return processing to specify in bit5-3 after stop.
4		11	In case of the extraordinary continuation, it stops output and it resumes operation by the abnormal cancellation. (not supported)
5	bit5-3	000	It stops output.
6		110 - 001	It stops if an automatic-reset is worked in the number of times (1 - 6 times) of bit5-3 and a malfunction isn't canceled.*1
7		111	Until off operation is done, an automatic-reset is worked.
8	bit2-0	111 - 000	It sets the delay time of the automatic-reset. (not supported)

*1: When continuing normal operation of equal to or more than another 30 seconds of automatic-resets about the number of times of the automatic-reset operation, it is reset.

VOUT_OV_WARN_LIMIT [42h] R/W Word

Sets the output overvoltage warning threshold.
When the output voltage exceeds this threshold, it outputs an alarm.

Display format : Linear(Vo)
Initial setting, : 58.32 [V] , 42.5 - 58.32 [V] (TUXS200F50-I)
Range of setting and reading

VOUT_UV_WARN_LIMIT [43h] R/W Word

Sets the output undervoltage warning threshold.
When the output voltage is below this threshold, it outputs an alarm.

Display format : Linear(Vo)
Initial setting, : 42.5 [V] , 42.5 - 58.32 [V] (TUXS200F50-I)
Range of setting and reading

VOUT_UV_FAULT_LIMIT [44h] R/W Word

Sets the output undervoltage fault threshold.
When the output voltage is below this threshold, it does the operation to specify at VOUT_UV_FAULT_RESPONSE [45h].

Display format : Linear(Vo)
Initial setting, : 42.5 [V] , 42.5 - 58.32 [V] (TUXS200F50-I)
Range of setting and reading

VOUT_UV_FAULT_RESPONSE [45h] R/W Byte

Configures the output undervoltage fault response.

Display format : -
Initial setting : B8 h
Range of setting and reading : -
Delay time for automatic recovery : 5s

bit	7	6	5	4	3	2	1	0
Initial setting	1	0	1	1	1	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	Value	Overview
1	bit7-6	00	It continues operation. (not supported)
2		01	It continues operation to the delay time which is prescribed in bit2-0 and in case of being an abnormal condition behind the delay time, too, it does the return processing to specify in bit5-3. (not supported)
3		10	It does the return processing to specify in bit5-3 after stop.
4		11	In case of the extraordinary continuation, it stops output and it resumes operation by the abnormal cancellation. (not supported)
5	bit5-3	000	It stops output.
6		110 - 001	It stops if an automatic-reset is worked in the number of times (1 - 6 times) of bit5-3 and a malfunction isn't canceled.*1
7		111	Until off operation is done, an automatic-reset is worked.
8	bit2-0	111 - 000	It sets the delay time of the automatic-reset. (not supported)

*1: When continuing normal operation of equal to or more than another 30 seconds of automatic-resets about the number of times of the automatic-reset operation, it is reset.

OT_FAULT_LIMIT [4Fh] R/W Word

Sets the over-temperature fault threshold.
When the base plate temperature exceeds this threshold,
setting of OT_FAULT_RESPONSE [50h] is activated.

Display format : Linear(Temp)
Initial setting : 110 [℃]
Range of setting and reading : -45 - 110 [℃]

OT_FAULT_RESPONSE [50h] R/W Byte

Configures the over-temperature fault response.

Display format : -
Initial setting : 80 h
Range of setting and reading : -
Delay time for automatic recovery : 5s

bit	7	6	5	4	3	2	1	0
Initial setting	1	0	0	0	0	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	Value	Overview
1	bit7-6	00	It continues operation. (not supported)
2		01	It continues operation to the delay time which is prescribed in bit2-0 and in case of being an abnormal condition behind the delay time, too, it does the return processing to specify in bit5-3. (not supported)
3		10	It does the return processing to specify in bit5-3 after stop.
4		11	In case of the extraordinary continuation, it stops output and it resumes operation by the abnormal cancellation. (not supported)
5	bit5-3	000	It stops output.
6		110 - 001	It stops if an automatic-reset is worked in the number of times (1 - 6 times) of bit5-3 and a malfunction isn't canceled.*1
7		111	Until off operation is done, an automatic-reset is worked.
8	bit2-0	111 - 000	It sets the delay time of the automatic-reset. (not supported)

*1: When continuing normal operation of equal to or more than another 30 seconds of automatic-resets about the number of times of the automatic-reset operation, it is reset.

OT_WARN_LIMIT [51h] R/W Word

Sets the over-temperature warning threshold.
When the base plate temperature exceeds this threshold, it outputs an alarm.

Display format : Linear(Temp)
Initial setting : 100 [℃]
Range of setting and reading : -45 - 110 [℃]

UT_WARN_LIMIT [52h] R/W Word

Sets the under-temperature warning threshold.
When the base plate temperature falls below this threshold, it outputs an alarm.

Display format	: Linear(Temp)
Initial setting	: -40 [℃]
Range of setting and reading	: -45 - 20 [℃]

UT_FAULT_LIMIT [53h] R/W Word

Sets the undertemperature fault threshold.
When the base platet temperature is below this threshold,
it does the operation to specify at UT_FAULT_RESPONSE [54h].

Display format	: Linear(Temp)
Initial setting	: -45 [℃]
Range of setting and reading	: -45 - 20 [℃]

UT_FAULT_RESPONSE [54h] R/W Byte

Configures the undertemperature fault response.

Display format	: -
Initial setting	: B8 h
Range of setting and reading	: -
Delaying time for auto recovery	: 5s

bit	7	6	5	4	3	2	1	0
Initial value	1	0	1	1	1	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	value	overview
1	bit7-6	00	It continues operation.
2		01	It continues operation to the delay time which is prescribed in bit2-0 and in case of being an abnormal condition behind the delay time, too, it does the return processing to specify in bit5-3. (not supported)
3		10	It does the return processing to specify in bit5-3 after stop.
4		11	In case of the extraordinary continuation, it stops output and it resumes operation by the abnormal cancellation. (not supported)
5	bit5-3	000	It stops output. (not supported)
6		110 - 001	It stops if an automatic-reset is worked in the number of times (1 - 6 times) of bit5-3 and a malfunction isn't canceled. (not supported)
7		111	Until off operation is done, an automatic-reset is worked.
8	bit2-0	111 - 000	It sets the delay time of the automatic-reset. (not supported)

VIN_OV_FAULT_LIMIT [55h] R/W Word

Sets the VIN overvoltage fault threshold.

Display format : Linear(Vin)
Initial setting : 270 [V]
Range of setting and reading : 80 - 270 [V]

VIN_OV_FAULT_RESPONSE [56h] R/W Byte

Configures the VIN overvoltage fault response.

Display format : -
Initial setting : B8 h
Range of setting and reading : -
Delaying time for auto recovery : 5s

bit	7	6	5	4	3	2	1	0
Initial value	1	0	1	1	1	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	value	overview
1	bit7-6	00	It continues operation.
2		01	It continues operation to the delay time which is prescribed in bit2-0 and in case of being an abnormal condition behind the delay time, too, it does the return processing to specify in bit5-3. (not supported)
3		10	It does the return processing to specify in bit5-3 after stop.
4		11	In case of the extraordinary continuation, it stops output and it resumes operation by the abnormal cancellation. (not supported)
5	bit5-3	000	It stops output. (not supported)
6		110 - 001	It stops if an automatic-reset is worked in the number of times (1 - 6 times) of bit5-3 and a malfunction isn't canceled. (not supported)
7		111	Until off operation is done, an automatic-reset is worked.
8	bit2-0	111 - 000	It sets the delay time of the automatic-reset. (not supported)

VIN_OV_WARN_LIMIT [57h] R/W Word

Sets the VIN overvoltage warning threshold.

Display format : Linear(Vin)
Initial setting : 270 [V]
Range of setting and reading : 80 - 270 [V]

POWER_GOOD_ON [5Eh] R/W Word

This command sets the voltage threshold for Power-Good indication.
Power-Good asserts when the output voltage exceeds POWER_GOOD_ON, if the C2 terminal is used as Power-Good.

Display format	: Linear(Vo)
Initial setting,	: 45.0 [V] , 40.0 - 57.5 [V] (TUXS200F50-I)
Range of setting and reading *1	

*1: It can not be set to a value lower than POWER_GOOD_OFF [5Fh]

POWER_GOOD_OFF [5Fh] R/W Word

This command sets the voltage threshold for de-assertion of Power-Good indication.
Power-Good de-asserts when the output voltage is less than POWER_GOOD_OFF, if the C2 terminal is used as Power-Good.

Display format	: Linear(Vo)
Initial setting,	: 40.0 [V] , 40.0 - 57.5 [V] (TUXS200F50-I)
Range of setting and reading *1	

*1: It can not be set to a value higher than POWER_GOOD_ON [5Eh]

PIN_OP_WARN_LIMIT [6Bh] R/W Word

Sets the input over power warning threshold.

Display format	: Linear(Pin)
Initial setting	: 300 [W]
Range of setting and reading	: 0 - 300 [W]

STATUS_BYTE [78h] R/W Byte

This command returns an abbreviated status for fast reads.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

#	bit	Value	Overview
1	bit7	0	It sets when the device can not reply in use. (not supported)
2	bit6	0	It sets by output OFF status. (not supported)
3	bit5	0	It sets by VOUT_OV_FAULT_LIMIT [40h].
4	bit4	0	It sets by IOUT_OC_FAULT_LIMIT [4Ah]. (not supported)
5	bit3	0	It sets by VIN_UV_FAULT_LIMIT [59h]. *1
6	bit2	0	Either of STATUS_TEMPERATURE [7Dh] sets at 1.
7	bit1	0	Either of STATUS_CML [7Eh] sets at 1.
8	bit0	0	It sets in the error, the warning except bit7-1.

*1: The input undervoltage protection threshold is fixed at 60 V.

STATUS_WORD [79h] R/W Word

This command returns the general status information used to indicate subsequent status to be read for more detail.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

#	bit	Value	Overview
1	bit15	0	Either of STATUS_VOUT [7Ah] sets at 1.
2	bit14	0	Either of STATUS_IOUT [7Bh] sets at 1. (not supported)
3	bit13	0	Either of STATUS_INPUT [7Ch] sets at 1.
4	bit12	0	Either of STATUS_MFR_SPECIFIC sets in at 1.
5	bit11	0	It sets in the range that the output voltage is Power_Good.
6	bit10	0	Either of STATUS_FUNS [81h],[82h] sets in at 1. (not supported)
7	bit9	0	Either of STATUS_OTHER [7Fh] sets at 1. (not supported)
8	bit8	0	It sets when detecting the malfunction which doesn't apply to bit15-1. (not supported)
9	bit7-0	-	It becomes the contents which are the same as STATUS_BYTE [78h].

STATUS_VOUT [7Ah] R/W Byte

This command returns the output voltage related status.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

#	bit	Value	Overview
1	bit7	0	It sets when output voltage is over VOUT_OV_FAULT_LIMIT [40h].
2	bit6	0	It sets when output voltage is over VOUT_OV_WARN_LIMIT [42h].
3	bit5	0	It sets when output voltage is less VOUT_UV_WARN_LIMIT [43h].
4	bit4	0	It sets when output voltage is less VOUT_UV_FAULT_LIMIT [44h].
5	bit3	0	It sets when output voltage set value is over VOUT_MAX [24h]. *1 (not supported)
6	bit2	0	It sets when Start-up time is over TON_MAX_FAULT_LIMIT [62h]. (not supported)
7	bit1	0	It sets when stop time is over TOFF_MAX_WARN_LIMIT [66h]. (not supported)
8	bit0	0	It sets with the VOUT Tracking Error. (not supported)

*1: Bit6 of STATUS_CML [7Eh] sets at 1.

STATUS_INPUT [7Ch] R/W Byte

This command returns specific status specific to the input.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

#	bit	Value	Overview
1	bit7	0	It sets when input voltage is over VIN_OV_FAULT_LIMIT [55h].
2	bit6	0	It sets when input voltage is over VIN_OV_WARN_LIMIT [57h].
3	bit5	0	It sets when input voltage is less VIN_UV_WARN_LIMIT [58h]. (not supported)
4	bit4	0	It sets when input voltage is less VIN_UV_FAULT_LIMIT [59h]. *1
5	bit3	0	It sets when the input voltage is not good enough and power supply is stopped. (not supported)
6	bit2	0	It sets when input current is over IIN_OC_FAULT_LIMIT [5Bh]. (not supported)
7	bit1	0	It sets when input current is over IIN_OC_WARN_LIMIT [5Dh]. (not supported)
8	bit0	0	It sets when input power is over PIN_OP_WARN_LIMIT [6Bh].

*1: The input undervoltage protection threshold is fixed at 60 V.

STATUS_TEMPERATURE [7Dh] R/W Byte

This command returns the temperature specific status.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

#	bit	Value	Overview
1	bit7	0	It sets when temperature is over OT_FAULT_LIMIT [4Fh].
2	bit6	0	It sets when temperature is over OT_WARN_LIMIT [51h].
3	bit5	0	It sets when temperature is less UT_WARN_LIMIT [52h].
4	bit4	0	It sets when temperature is less UT_FAULT_LIMIT [53h] .
5	bit3	0	Reserved
6	bit2	0	Reserved
7	bit1	0	Reserved
8	bit0	0	Reserved

STATUS_CML [7Eh] R/W Byte

This command returns the Communication, Logic and Memory specific status.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

#	bit	Value	Overview
1	bit7	0	It sets when receiving the command not to be supporting. *1
2	bit6	0	It sets when receiving the data not to be supporting.
3	bit5	0	It sets with the malfunction-detection of the packet error checking.
4	bit4	0	It sets with the malfunction-detection of the internal-memory.
5	bit3	0	It sets with the malfunction-detection of the inner controller. (not supported)
6	bit2	0	Reserved
7	bit1	0	It sets with the communication error except the above.
8	bit0	0	-

*1: It is also set when it is sent the command protected in WRITE_PROTECT [10h].

STATUS_MFR_SPECIFIC [80h] R/W Byte

This command returns the other specific status.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

#	bit	Value	Overview
1	bit7	0	-
2	bit6	0	-
3	bit5	0	-
4	bit4	0	-
5	bit3	0	-
6	bit2	0	-
7	bit1	0	-
8	bit0	0	It sets when input power is over MFR_PIN_OP_FAULT_LIMIT [E5h].

READ_VIN [88h] Read Word

This command returns the measured value of the input voltage.

Display format : Linear(Vin)
Initial setting : -
Range of setting and reading : 85 - 264 [V]

READ_IIN [89h] Read Word

This command returns the measured value of the input current.

Display format : Linear(Iin)
Initial setting : -
Range of setting and reading : 0 - 2.7 [A]

READ_VOUT [8Bh] Read Word

This command returns the measured value of the output voltage.

Display format : Linear(Vo)
Initial setting : -
Range of setting and reading : 45 - 55 [V] (TUXS200F50-I)

READ_TEMPERTURE_1 [8Dh] Read Word

This command returns the measured value of the base plate temperature.

Display format : Linear(Temp)
Initial setting : -
Range of setting and reading : -45 - 139 [℃]

READ_PIN [97h] Read_Word

It reads the present input-power.

Display format : Linear(Pin)
Initial setting : -
Range of setting and reading : 0 - 223 [W]

PMBus_REVISION [98h] Read Byte

This command returns the revision of the PMBus implemented in the converter.

Display format : -
Initial setting : 22h
Range of setting and reading : -

bit	7	6	5	4	3	2	1	0
Initial value	0	0	1	0	0	0	1	0
Access	R	R	R	R	R	R	R	R

#	bit	Value	Overview
1	bit7-4	0000	Part Ⅰ Revision 1.0
2		0001	Part Ⅰ Revision 1.1
3		0010	Part Ⅰ Revision 1.2
4	bit3-0	0000	Part Ⅱ Revision 1.0
5		0001	Part Ⅱ Revision 1.1
6		0010	Part Ⅱ Revision 1.2

MFR_MODEL [9Ah] Block Read

This command returns the model number of the converter.

Display format	: ASCII code
Initial setting	: -
Setting and range of reading	: -
Display example	: "TUXS200F50-I"

MFR_REVISION [9Bh] Block Read

This command returns the name of the configuration file used at the factory to program the device.

Display format	: ASCII code (2 letter)
Initial setting	: -
Range of setting and reading	: "00" - "99"

MFR_LOCATION [9Ch] Block Read

This command returns COSEL's identification for the location where the converter was manufactured.

Display format	: ASCII code (20 letter)
Initial setting	: -
Range of setting and reading	: -
Display example	: "COSEL CO.,LTD.TOYAMA"

MFR_SERIAL [9Eh] Block Read

This command returns a string of 8 numbers that provides a serial number.

Display format	: ASCII code (8 letter)
Initial setting	: -
Range of setting and reading	: -
Display example	: "9D3FFE80"

MFR_C2_ARA_CONFIG [E0h] R/W Byte

It does the setting of C2 terminal feature and SMBAlert feature and a reading.
By the setting of bit4, the ARA change existence or non-existence at the time of SMBAlert can be chosen.

Display format : -
Initial setting : 01 h
Range of setting and reading : -

bit	7	6	5	4	3	2	1	0
Initial value	0	0	0	0	0	0	0	1
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	Value	Overview
1	bit7-5	000	Reserved
2	bit4	0	At the time of SMBAlert, it replies to both of ARA and the setting address.
3		1	It uses ARA and at the time of SMBAlert, it replies only to ARA.
4	bit3-0	0001	It uses C2 terminal as the Power_Good output terminal.

MFR_PGOOD_POLARITY [E2h] R/W Byte

It does the setting of the polarity of the Power_Good signal and a reading.

Display format : -
Initial setting : 00 h
Range of setting and reading : -

bit	7	6	5	4	3	2	1	0
Initial value	0	0	0	0	0	0	0	0
Access	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

#	bit	value	Overview
1	bit7-1	0000000	Reserved
2	bit0	0	Power_Good signal is negative logic. (when output voltage is normal: Low)
3		1	Power_Good signal is positive logic. (when output voltage is normal: High)

MFR_VOUT_OV_FAULT_COUNT [F0h] Read Word

It reads the stop number of times by the overvoltage protection feature.

Note1: For clear the count, use MFR_CLEAR_FAULTS_COUNT [F5h].

Note2: For saving count, don't block the input voltage, between 100ms output voltage is stopped.

Display format	: Linear(Count)
Initial setting	: 0 [times]
Range of setting and reading	: 0 - 31 [times]

MFR_VOUT_UV_FAULT_COUNT [F1h] Read Word

It reads the number of times stooping by the low voltage protection feature.

Note1: For clear the count, use MFR_CLEAR_FAULTS_COUNT [F5h].

Note2: For saving count, don't block the input voltage, between 100ms output voltage is stopped.

Display format	: Linear(Count)
Initial setting	: 0 [times]
Range of setting and reading	: 0 - 31 [times]

MFR_OT_FAULT_COUNT [F2h] Read Word

It reads the number of times stopping by the overheating protection feature.

Note1: For clear the count, use MFR_CLEAR_FAULTS_COUNT [F5h].

Note2: For saving count, don't block the input voltage, between 100ms output voltage is stopped.

Display format	: Linear(Count)
Initial setting	: 0 [times]
Range of setting and reading	: 0 - 31 [times]

MFR_UT_FAULT_COUNT [F3h] Read Word

It reads the number of times stopping by the undertemperature feature.

Note1: For clear the count, use MFR_CLEAR_FAULTS_COUNT [F5h].

Note2: For saving count, don't block the input voltage, between 100ms output voltage is stopped.

Display format	: Linear(Count)
Initial setting	: 0 [times]
Range of setting and reading	: 0 - 31 [times]

MFR_CLEAR_FAULTS_COUNT [F5h] Send

It resets the number of times stopping by the protective function.

Note1: After command transmission, do not shutdown the input voltage for more than 1 second.

Display format	: -
Initial setting	: -
Range of setting and reading	: -

MFR_VIN_OV_FAULT_COUNT [F8h] Read Word

It reads the number of times stopping by the input overvoltage protection feature.

Note1: For clear the count, use MFR_CLEAR_FAULTS_COUNT [F5h].

Note2: For saving count, don't block the input voltage, between 100ms output voltage is stopped.

Display format	: Linear(Count)
Initial setting	: 0 [times]
Range of setting and reading	: 0 - 31 [times]

MFR_VIN_UV_FAULT_COUNT [F9h] Read Word

It reads the number of times stopping by low input voltage protection feature.

The input undervoltage protection threshold is fixed at 60 V.

Note1: For clear the count, use MFR_CLEAR_FAULTS_COUNT [F5h].

Note2: For saving count, don't block the input voltage, between 100ms output voltage is stopped.

Display format	: Linear(Count)
Initial setting	: 0 [times]
Range of setting and reading	: 0 - 31 [times]

MFR_PIN_OP_FAULT_COUNT [FAh] Read Word

It reads the number of times stopping by the input over power protection feature.

Note1: For clear the count, use MFR_CLEAR_FAULTS_COUNT [F5h].

Note2: For saving count, don't block the input voltage, between 100ms output voltage is stopped.

Display format	: Linear(Count)
Initial setting	: 0 [times]
Range of setting and reading	: 0 - 31 [times]