Technical Reference PMBus BMR473

This appendix contains a detailed reference of the PMBus commands supported by the product.

Data Formats

The products make use of a few standardized numerical formats, along with custom data formats. A detailed walkthrough of the above formats is provided in AN304, as well as in sections 7 and 8 of the PMBus Specification Part II. The custom data formats vary depending on the command and are detailed in the command description.

Standard Commands

The functionality of commands with code 0x00 to 0xCF is usually based on the corresponding command specification provided in the PMBus Standard Specification Part II (see Power System Management Bus Protocol Documents below). However there might be different interpretations of the PMBus Standard Specification or only parts of the Standard Specification applied, thus the detailed command description below should always be consulted.

Forum Websites

The System Management Interface Forum (SMIF)
http://www.powersig.org/
The System Management Interface Forum (SMIF) supports the rapid advancement of an efficient and compatible technology base that promotes power management and systems technology implementations. The SMIF provides a membership path for any company or individual to be active participants in any or all of the various working groups established by the implementer forums.

Power Management Bus Implementers Forum
(PMBUS-IF)
http://pmbus.org/
The PMBus-IF supports the advancement and early adoption of the PMBus protocol for power management. This website offers recent PMBus specification documents, PMBus articles, as well as upcoming PMBus presentations and seminars, PMBus Document Review Board (DRB) meeting notes, and other PMBus related news.

PMBus – Power System Management Bus Protocol Documents

These specification documents may be obtained from the PMBus-IF website described above. These are required reading for complete understanding of the PMBus implementation. This appendix will not re-address all of the details contained within the two PMBus Specification documents.

Specification Part I – General Requirements Transport And Electrical Interface
Includes the general requirements, defines the transport and electrical interface and timing requirements of hard wired signals.

Specification Part II – Command Language
Describes the operation of commands, data formats, fault management and defines the command language used with the PMBus.

SMBus – System Management Bus Documents

System Management Bus Specification, Version 2.0, August 3, 2000
This specification specifies the version of the SMBus on which Revision 1.2 of the PMBus Specification is based. This specification is freely available from the System Management Interface Forum Web site at:
http://www.smbus.org/specs/

PMBus Command Summary and Factory Default Values of Standard Configuration

The factory default values provided in the table below are valid for the Standard configuration. Factory default values for other configurations can be found using the Flex Power Designer tool.

Code	Name	Data Format	Factory Default Value Standard Configuration BMR473XX01/001 R1	
0x01	OPERATION	R/W Byte	0x04	
0x02	ON_OFF_CONFIG	R/W Byte	0x17	
0x03	CLEAR_FAULTS	Send Byte		
0x04	PHASE	R/W Byte		
0x10	WRITE_PROTECT	R/W Byte	0x00	
0x15	STORE_USER_ALL (Phase 0xFF)	Send Byte		
0x16	RESTORE_USER_ALL (Phase 0xFF)	Send Byte		
0x19	CAPABILITY	Read Byte		
0x1B	SMBALERT_MASK (STATUS_VOUT)	SMBAlert Mask	0x00	
0x1B	SMBALERT_MASK (STATUS_IOUT)	SMBAlert Mask	0x00	
0x1B	SMBALERT_MASK (STATUS_INPUT)	SMBAlert Mask	0x00	
0x1B	SMBALERT_MASK (STATUS_TEMPERATURE)	SMBAlert Mask	0x00	
0x1B	SMBALERT_MASK (STATUS_CML)	SMBAlert Mask	0x00	
0x1B	SMBALERT_MASK (STATUS_OTHER)	SMBAlert Mask	0x00	
0x1B	SMBALERT_MASK (STATUS_MFR_SPECIFIC)	SMBAlert Mask	0x00	
0x1B	SMBALERT_MASK (Phase 0xFF)	SMBAlert Mask	0x00	
0x20	VOUT_MODE	Read Byte	0x97	
0x21	VOUT_COMMAND	R/W Word	1 x Vout by pin-strap	
0x22	VOUT_TRIM	R/W Word	Unit Specific	
0x24	VOUT_MAX	R/W Word	Configured by pin-strap	
0x25	VOUT_MARGIN_HIGH	R/W Word	0x021A	1.05 * Vout
0x26	VOUT_MARGIN_LOW	R/W Word	0x01E6	0.95 * Vout
0x27	VOUT_TRANSITION_RATE	R/W Word	0xE010	1.00 V/ms
0x29	VOUT_SCALE_LOOP	R/W Word	Configured by pin-strap	
0x2B	VOUT_MIN	R/W Word	Configured by pin-strap	
0x33	FREQUENCY_SWITCH	R/W Word	0x01C2	450.00 kHz
0x35	VIN_ON	R/W Word	0xF016	5.50 V
0x36	VIN_OFF	R/W Word	0xF012	4.50 V
0x37	INTERLEAVE	R/W Word		
0x38	IOUT_CAL_GAIN	R/W Word	Unit Specific	
0x39	IOUT_CAL_OFFSET (Phase 0)	R/W Word	Unit Specific	
0x39	IOUT_CAL_OFFSET (Phase 1)	R/W Word	Unit Specific	
0x39	IOUT_CAL_OFFSET (Phase 2)	R/W Word	Unit Specific	
0x39	IOUT_CAL_OFFSET (Phase 3)	R/W Word	Unit Specific	
0x40	VOUT_OV_FAULT_LIMIT	R/W Word	0x024C	1.15 * Vout
0x41	VOUT_OV_FAULT_RESPONSE	R/W Byte	0xBF	
0x42	VOUT_OV_WARN_LIMIT	R/W Word	0x0233	1.10 * Vout
0x43	VOUT_UV_WARN_LIMIT	R/W Word	0x01CC	0.90 * Vout
0x44	VOUT_UV_FAULT_LIMIT	R/W Word	0x01B3	0.85 * Vout
0x45	VOUT_UV_FAULT_RESPONSE	R/W Byte	0xBF	
0x46	IOUT_OC_FAULT_LIMIT (Phase 0)	R/W Word	0xF0D0	52.00 A
0x46	IOUT_OC_FAULT_LIMIT (Phase 1)	R/W Word	0xF0D0	52.00 A
0x46	IOUT_OC_FAULT_LIMIT (Phase 2)	R/W Word	0xF0D0	52.00 A
0x46	IOUT_OC_FAULT_LIMIT (Phase 3)	R/W Word	0xF0D0	52.00 A
0x47	IOUT_OC_FAULT_RESPONSE	R/W Byte	0xBF	
0x4A	IOUT_OC_WARN_LIMIT (Phase 0)	R/W Word	0xF0A0	40.00 A

Code	Name	Data Format	Factory Default Value Standard Configuration BMR473XX01/001 R1	
0x4A	IOUT_OC_WARN_LIMIT (Phase 1)	R/W Word	0xF0A0	40.00 A
0x4A	IOUT_OC_WARN_LIMIT (Phase 2)	R/W Word	0xF0A0	40.00 A
0x4A	IOUT_OC_WARN_LIMIT (Phase 3)	R/W Word	0xF0A0	40.00 A
0x4F	OT_FAULT_LIMIT (Phase 0)	R/W Word	0x0087	135.00 °C
0x4F	OT_FAULT_LIMIT (Phase 1)	R/W Word	0x0087	135.00 °C
0x4F	OT_FAULT_LIMIT (Phase 2)	R/W Word	0x0087	135.00 °C
0x4F	OT_FAULT_LIMIT (Phase 3)	R/W Word	0x0087	135.00 °C
0x50	OT_FAULT_RESPONSE	R/W Byte	0xBF	
0x51	OT_WARN_LIMIT (Phase 0)	R/W Word	0x007D	125.00 °C
0x51	OT_WARN_LIMIT (Phase 1)	R/W Word	0x007D	125.00 °C
0x51	OT_WARN_LIMIT (Phase 2)	R/W Word	0x007D	125.00 °C
0x51	OT_WARN_LIMIT (Phase 3)	R/W Word	0x007D	125.00 °C
0x55	VIN_OV_FAULT_LIMIT	R/W Word	0x0010	16.00 V
0x56	VIN_OV_FAULT_RESPONSE	R/W Byte	0xBF	
0x58	VIN_UV_WARN_LIMIT (Phase 0)	R/W Word	0xF016	5.50 V
0x58	VIN_UV_WARN_LIMIT (Phase 1)	R/W Word	0xF016	5.50 V
0x58	VIN_UV_WARN_LIMIT (Phase 2)	R/W Word	0xF016	5.50 V
0x58	VIN_UV_WARN_LIMIT (Phase 3)	R/W Word	0xF016	5.50 V
0x60	TON_DELAY	R/W Word	0xF814	10.00 ms
0x61	TON_RISE	R/W Word	0xF028	10.00 ms
0x62	TON_MAX_FAULT_LIMIT	R/W Word	0xF800	0.00 ms
0x63	TON_MAX_FAULT_RESPONSE	R/W Byte	0x3B	
0x64	TOFF_DELAY	R/W Word	0xF800	0.00 ms
0x65	TOFF_FALL	R/W Word	0xF002	0.50 ms
0x78	STATUS_BYTE (Phase 0)	Read Byte		
0x78	STATUS_BYTE (Phase 1)	Read Byte		
0x78	STATUS_BYTE (Phase 2)	Read Byte		
0x78	STATUS_BYTE (Phase 3)	Read Byte		
0x79	STATUS_WORD (Phase 0)	R/W Word		
0x79	STATUS_WORD (Phase 1)	R/W Word		
0x79	STATUS_WORD (Phase 2)	R/W Word		
0x79	STATUS_WORD (Phase 3)	R/W Word		
0x7A	STATUS_VOUT	R/W Byte		
0x7B	STATUS_IOUT (Phase 0)	R/W Byte		
0x7B	STATUS_IOUT (Phase 1)	R/W Byte		
0x7B	STATUS_IOUT (Phase 2)	R/W Byte		
0x7B	STATUS_IOUT (Phase 3)	R/W Byte		
0x7C	STATUS_INPUT (Phase 0)	R/W Byte		
0x7C	STATUS_INPUT (Phase 1)	R/W Byte		
0x7C	STATUS_INPUT (Phase 2)	R/W Byte		
0x7C	STATUS_INPUT (Phase 3)	R/W Byte		
0x7D	STATUS_TEMPERATURE (Phase 0)	R/W Byte		
0x7D	STATUS_TEMPERATURE (Phase 1)	R/W Byte		
0x7D	STATUS_TEMPERATURE (Phase 2)	R/W Byte		
0x7D	STATUS_TEMPERATURE (Phase 3)	R/W Byte		
0x7E	STATUS_CML (Phase 0)	R/W Byte		
0x7E	STATUS_CML (Phase 1)	R/W Byte		
0x7E	STATUS_CML (Phase 2)	R/W Byte		
0x7E	STATUS_CML (Phase 3)	R/W Byte		
0x7F	STATUS_OTHER	Read Byte		
0x80	STATUS_MFR_SPECIFIC (Phase 0)	R/W Byte		
0x80	STATUS_MFR_SPECIFIC (Phase 1)	R/W Byte		

Code	Name	Data Format	Factory Default Value Standard Configuration BMR473XX01/001 R1	
0x80	STATUS_MFR_SPECIFIC (Phase 2)	R/W Byte		
0x80	STATUS_MFR_SPECIFIC (Phase 3)	R/W Byte		
0x88	READ_VIN (Phase 0)	Read Word		
0x88	READ_VIN (Phase 1)	Read Word		
0x88	READ_VIN (Phase 2)	Read Word		
0x88	READ_VIN (Phase 3)	Read Word		
0x8B	READ_VOUT (Phase 0)	Read Word		
0x8B	READ_VOUT (Phase 1)	Read Word		
0x8B	READ_VOUT (Phase 2)	Read Word		
0x8B	READ_VOUT (Phase 3)	Read Word		
0x8C	READ_IOUT (Phase 0)	Read Word		
0x8C	READ_IOUT (Phase 1)	Read Word		
0x8C	READ_IOUT (Phase 2)	Read Word		
0x8C	READ_IOUT (Phase 3)	Read Word		
0x8C	READ_IOUT (Per Rail)	Read Word		
0x8D	READ_TEMPERATURE_1 (Phase 0)	Read Word		
0x8D	READ_TEMPERATURE_1 (Phase 1)	Read Word		
0x8D	READ_TEMPERATURE_1 (Phase 2)	Read Word		
0x8D	READ_TEMPERATURE_1 (Phase 3)	Read Word		
0x8D	READ_TEMPERATURE_1 (Per Rail)	Read Word		
0x98	PMBUS_REVISION	Read Byte		
0x99	MFR_ID	R/W Block3	Unit Specific	
0x9A	MFR_MODEL	R/W Block3	Unit Specific	
0x9B	MFR_REVISION	R/W Block3	Unit Specific	
0x9E	MFR_SERIAL	R/W Block3	Unit Specific	
0xAD	IC_DEVICE_ID	Read Block6		
0xAE	IC_DEVICE_REV	Read Block2		
0xB1	USER_DATA_01 (Phase 0xFF)	R/W Block5	0xC43FF82311	
0xB5	USER_DATA_05	R/W Block1	0x70	
0xD0	TELEMETRY_CONFIG	R/W Block6	0x030003030303	
0xDA	READ_ALL	Read Block14		
0xDB	STATUS_ALL	Read Block7		
0xDC	STATUS_PHASE (Phase 0xFF)	Read Word		
0xE3	PGOOD_CONFIG	R/W Word	0x006A	
0xE4	SYNC_CONFIG	R/W Byte	0xF0	
0xEC	STACK_CONFIG	R/W Word	0x0000	
0xED	MISC_OPTIONS	R/W Word	0x0000	
0xEE	PIN_DETECT_OVERRIDE	R/W Word	0x192D	
0xEF	SLAVE_ADDRESS	R/W Byte	0x14	
0xF0	NVM_CHECKSUM	R/W Word		
0xF1	SIMULATE_FAULT	R/W Word	0x0000	

PMBus Command Details

OPERATION (0x01)
Description: Sets the desired PMBus enable and margin operations.

Bit	Function	Description	Value	Function	Description
7:6	Enable	Make the device enable or disable.	00	Immediate Off	Disable immediately without controlled ramp-down or sequencing.
			01	Soft Off	Disable by controlled ramp-down timings or sequencing.
			10	Enable	Enable device to the set voltage or margin state, using ramp up timings / sequencing.
5:4	Margin	Select between margin high/low states or nominal output.	00	Nominal	Operate at nominal output voltage.
			01	Margin Low	Operate at margin low voltage set in VOUT_MARGIN_LOW.
			10	Margin High	Operate at margin high voltage set in VOUT_MARGIN_HIGH.
3:2	Act on Fault	Set 10b to act on fault or set to 01b to ignore fault.	01	Ignore Faults	Ignore Faults when in a margined state. The overvoltage/undervoltage warnings and faults are ignored and do not trigger shutdown or STATUS updates.
			10	Act on Faults	Act on Faults when in a margined state. The device will handle appropriate overvoltage/undervoltage warnings and faults and respond as programmed by the warning limit or fault response command.

ON_OFF_CONFIG (0x02)
Description: Configures how the device is controlled by the CTRL pin and the PMBus.

Bit	Function	Description	Value	Function	Description
4	Powerup Operation		0	Ignore CTRL pin or PMBus	Unit starts power conversion any time the input power is present regardless of the state of the CTRL pin.
			1	CTRL pin or PMBus	Device does not power up until commanded by the CTRL pin or OPERATION command.
3	PMBus Enable Mode	Controls how the device responds to the PMBus command OPERATION.	0	Ignore PMBus command	Ignores the on/off portion of the OPERATION command.
			1	Use PMBus command	Device requires on by OPERATION command to enable the output voltage.

Bit	Function	Description	Value	Function	Description
2	Enable Pin Mode	Controls how the device responds to the CTRL pin.	0	Ignore CTRL pin	Device ignores the CTRL pin.
			1	Use CTRL pin	Device requires the CTRL pin to be asserted to enable the output voltage.
1	Enable Pin Polarity	Polarity of the CTRL pin.	0	Active Low	CTRL pin will cause device to enable when driven low.
			1	Active High	CTRL pin will cause device to enable when driven high.
0	Disable Action	CTRL pin action when commanding the output to turn off.	0	Soft Off	Use the configured turn off delay and fall time.
			1	Immediate Off	Turn off the output and stop transferring energy to the output as fast as possible. The device's product literature shall specify whether or not the device sinks current to decrease the output voltage fall time.

CLEAR_FAULTS (0x03)
Description: Clears all fault status bits

PHASE (0x04)
Description: Used to configure, control, and monitor individual phases. The phase configuration needs to be established before any phase-dependent command can be successfully excuted.

Bit	Description	Format
7:0	Selects a specific phase on a multi-phase output rail. Listed values for phase selection: 0x00 PHASE, 0X01 PHASE, 0x02 PHASE, 0X03 and 0XFF TOTAL PHASE (all phases as a single entity).	Integer Unsigned

WRITE_PROTECT (0x10)
Description: The WRITE_PROTECT command is used to control writing to the PMBus device. The intent of this command is to provide protection against accidental changes. This command is not intended to provide protection against deliberate or malicious changes to a device's configuration or operation.

Bit	Description	Value	Function	Description
7:0		0x80	Disable all writes	Disable all writes except to the WRITE_PROTECT command.
		0x40	Enable operation	Disable all writes except to the WRITE_PROTECT, OPERATION and PAGE commands.
		0x20	Enable control and Vout commands	Disable all writes except to the WRITE_PROTECT, OPERATION, PAGE, ON_OFF_CONFIG and VOUT_COMMAND commands.
		0x00	Enable all commands	Enable writes to all commands.

STORE_USER_ALL (0x15)
Addressing: Phase
Description: Commands the device to copy the entire contents of the operating memory to the matching locations in the non-volatile user store memory.

RESTORE_USER_ALL (0x16)
Addressing: Phase
Description: Commands the device to copy the entire contents of the non-volatile User Store Memory to the matching locations in the operating memory.

CAPABILITY (0x19)
Description: This command provides a way for a host system to determine some key capabilities of a PMBus device.

Bit	Function	Description	Value	Function	Description
7	Packet Error Checking	Packet error checking.	00	Not Supported	Packet Error Checking not supported.
			01	Supported	Packet Error Checking is supported.
6:5	Maximum Bus Speed	Maximum bus speed.	00	100kHz	Maximum supported bus speed is 100 kHz.
			01	400kHz	Maximum supported bus speed is 400 kHz.
			10	1MHz	Maximum supported bus speed is 1 MHz.
4	Smbalert	SMBALERT	00	No Smbalert	The device does not have a SMBALERT# pin and does not support the SMBus Alert Response protocol.
			01	Have Smbalert	The device does have a SMBALERT# pin and does support the SMBus Alert Response protocol.
3	Numeric Format	Numeric format.	0	LINEAR or DIRECT Format	Numeric data is in LINEAR or DIRECT format.
			1	IEEE Half Precision Floating Point Format	Numeric data is in IEEE half precision floating point format.
2	AVSBus Support	AVSBus support.	0	AVSBus Not Supported	AVSBus not supported.
			1	AVSBus Supported	AVSBus supported.

SMBALERT_MASK (0x1B)
Status Registers: STATUS_VOUT (0x7A), STATUS_IOUT (0x7B), STATUS_INPUT (0x7C), STATUS_TEMPERATURE (0x7D), STATUS_CML (0x7E), STATUS_OTHER (0x7F), STATUS_MFR_SPECIFIC (0x80)
Description: The SMBALERT_MASK command may be used to prevent a warning or fault condition from asserting the SALERT output signal.

Bit	Function	Description	Value	Function	Description
7	Mask Bit 7		0	Pull SALERT	
			1	Ignore	
6	Mask Bit 6		0	Pull SALERT	
			1	Ignore	
5	Mask Bit 5		0	Pull SALERT	

Bit	Function	Description	Value	Function	Description
			1	Ignore	
4	Mask Bit 4		0	Pull SALERT	
			1	Ignore	
3	Mask Bit 3		0	Pull SALERT	
			1	Ignore	
2	Mask Bit 2		0	Pull SALERT	
			1	Ignore	
1	Mask Bit 1		0	Pull SALERT	
			1	Ignore	
0	Mask Bit 0		0	Pull SALERT	
			1	Ignore	

VOUT_MODE (0x20)
Description: Controls how future VOUT-related commands parameters will be interpreted.

Bit	Function	Description	Format
4:0	Parameter	Five bit two's complement EXPONENT for the MANTISSA delivered as the data bytes for VOUT_COMMAND in VOUT_LINEAR Mode.	Integer Signed

Bit	Function	Description	Value	Function	Description
6:5	Mode	Selection of mode for representation of output voltage parameters.	00	Linear	Linear Mode Format.

VOUT_COMMAND (0x21)
Description: Sets the nominal value of the output voltage from 0.6V to 5V.

Bit	Description	Format	Unit
15:0	Sets the nominal value of the output voltage.	Vout Mode Unsigned	V

VOUT_TRIM (0x22)
Description: Configures a fixed offset to be applied to the output voltage when enabled.

Bit	Description	Format	Unit
15:0	Sets VOUT trim value. The range is limited to +/-150 mV.	Vout Mode Signed	V

VOUT_MAX (0x24)
Description: Configures the maximum allowed output voltage.

Bit	Description	Format	Unit
15:0	If the device is commanded to a Vout value higher than this level, the output voltage will be clamped to this level.	Vout Mode Unsigned	V

VOUT_MARGIN_HIGH (0x25)
Description: Configures the target for margin-up commands.

Bit	Description	Format	Unit
15:0	Sets the output voltage value during a margin high.	Vout Mode Unsigned	* Vout

VOUT_MARGIN_LOW (0x26)
Description: Configures the target for margin-down commands.

Bit	Description	Format	Unit
15:0	Sets the output voltage value during a margin low.	Vout Mode Unsigned	* Vout

VOUT_TRANSITION_RATE (0x27)
Description: Sets the transition rate when changing output voltage.

Bit	Description	Format	Unit
15:0	Configures the transition time for margining and on-the-fly VOUT_COMMAND changes.	Linear	V/ms

VOUT_SCALE_LOOP (0x29)
Description: Allows PMBus devices to map between the commanded voltage, and the voltage at the control circuit.

Bit	Description	Format
15:0	Choose scaling factor.	Linear

VOUT_MIN (0x2B)
Description: Configures the minimum allowed output voltage.

Bit	Description	Format	Unit
15:0	If the device is commanded to a Vout value lower than this level, the output voltage will be clamped to this level.	Vout Mode Unsigned	V

FREQUENCY_SWITCH (0x33)
Description: Controls the switching frequency.

Bit	Description	Format	Unit
15:0	Sets the switching frequency in kHz. The specified range is 450 - 900 kHz. The effective switching frequency is limited to a limited set of values: 450 kHz, 550 kHz, 650 kHz, 750 kHz, 900 kHz	Linear	kHz

VIN_ON (0x35)
Description: Input voltage must be above this level before the output can be enabled.

Bit	Description	Format	Unit
15:0	Sets the VIN ON threshold in 0.25 V steps. The specified range is 2.5 - 18.25 V.	Linear	V

VIN_OFF (0x36)
Description: Sets the value of the PVIN input voltage, in Volts, at which the unit should stop power conversion.

Bit	Description	Format	Unit
15:0	Sets the VIN OFF threshold in 0.25 V steps. The specified range is 2.25 - 18.25 V.	Linear	V

INTERLEAVE (0x37)
Description: Configures the phase offset with respect to a common SYNC clock.

Bit	Function	Description	Format
11:8	Group ID Number	Value 0-15. Sets an ID number to a group of interleaved rails.	Integer Unsigned
7:4	Number in Group	Value 1 to 4. Sets the number of phases positions and the phase shift for each value of ORDER.	Integer Unsigned
3:0	Order within the group	Value 0 to NUM_GROUP - 1. Each value of ORDER adds a phase shift equal to 360° / NUM_GROUP.	Integer Unsigned

IOUT_CAL_GAIN (0x38)
Description: Sets the current sense resistance.

Bit	Description	Format	Unit
15:0	Sets the effective impedance for current sensing at +25°C.	Linear	mΩ

IOUT_CAL_OFFSET (0x39)
Addressing: Phase
Description: Sets the current-sense offset.

Bit	Description	Format	Unit
15:0	Sets an offset to IOUT readings. Use to compensate for delayed measurements of current ramp.	Linear	A

VOUT_OV_FAULT_LIMIT (0x40)
Description: Sets the overvoltage fault threshold relative to the current VOUT_COMMAND.

Bit	Description	Format	Unit
15:0	Sets the VOUT overvoltage fault threshold, which is a fixed percentage of the current output voltage target.	Vout Mode Unsigned	* Vout

VOUT_OV_FAULT_RESPONSE (0x41)
Description: Sets the VOUT OV fault response.

Bit	Function	Description	Value	Function	Description
7:6	Response	Describes the device interruption operation. For all modes set by bits [7:6], the device pulls SALERT low and sets the related fault bit in the status registers.	00	Ignore Fault	The PMBus device continues operation without interruption.
			01	Shutdown After Delay	The PMBus device continues operation for the delay time specified by bits [2:0].
			10	Shutdown Immediately	The device shuts down immediately.
5:3	Retry Setting	The device attempts to restart the number of times set by these bits.	000	Latch Off	A zero value for the Retry Setting means that the unit does not attempt to restart. The output remains disabled until the fault is cleared.

Bit	Function	Description	Value	Function	Description
			001	Retry Once	The PMBus device attempts to restart 1 time. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			010	Retry Twice	The PMBus device attempts to restart 2 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			011	Retry 3 times	The PMBus device attempts to restart 3 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			100	Retry 4 times	The PMBus device attempts to restart 4 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			101	Retry 5 times	The PMBus device attempts to restart 5 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			110	Retry 6 times	The PMBus device attempts to restart 6 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			111	Retry Continuously	The PMBus device attempts to restart continuously, without limitation, until output is DISABLED, bias power is removed, or another fault condition causes the output to shut down.
2:0	Retry Time and Delay Time	Sets the output undervoltage delay time for respond after delay and HICCUP.	0	0	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.
			1	1	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.

Bit	Function	Description	Value	Function	Description
			2	2	Shutdown delay of 3 PWM_CLK, HICCUP equal to 2 times TON_RISE.
			3	3	Shutdown delay of 3 PWM_CLK, HICCUP equal to 3 times TON_RISE.
			4	4	Shutdown delay of 3 PWM_CLK, HICCUP equal to 4 times TON_RISE.
			5	5	Shutdown delay of 7 PWM_CLK, HICCUP equal to 5 times TON_RISE.
			6	6	Shutdown delay of 7 PWM_CLK, HICCUP equal to 6 times TON_RISE.
			7	7	Shutdown delay of 7 PWM_CLK, HICCUP equal to 7 times TON_RISE.

VOUT_OV_WARN_LIMIT (0x42)
Description: Sets the overvoltage warning threshold relative to the current VOUT_COMMAND.

Bit	Description	Format	Unit
15:0	Sets the VOUT overvoltage warning threshold, which is a fixed percentage of the current output voltage target.	Vout Mode Unsigned	* Vout

VOUT_UV_WARN_LIMIT (0x43)
Description: Sets the undervoltage warning threshold relative to the current VOUT_COMMAND.

Bit	Description	Format	Unit
15:0	Sets the VOUT undervoltage warning threshold, which is a fixed percentage of the current output voltage target.	Vout Mode Unsigned	* Vout

VOUT_UV_FAULT_LIMIT (0x44)
Description: Sets the undervoltage fault threshold relative to the current VOUT_COMMAND.

Bit	Description	Format	Unit
15:0	Sets the VOUT undervoltage fault threshold, which is a fixed percentage of the current output voltage target.	Vout Mode Unsigned	* Vout

VOUT_UV_FAULT_RESPONSE (0x45)
Description: Sets the VOUT UV fault response.

Bit	Function	Description	Value	Function	Description
7:6	Response	Describes the device interruption operation. For all modes set by bits [7:6], the device pulls SALERT low and sets the related fault bit in the status registers.	00	Ignore Fault	The PMBus device continues operation without interruption.
			01	Shutdown After Delay	The PMBus device continues operation for the delay time specified by bits [2:0].
			10	Shutdown Immediately	The device shuts down immediately.

Bit	Function	Description	Value	Function	Description
5:3	Retry Setting	The device attempts to restart the number of times set by these bits.	000	Latch Off	A zero value for the Retry Setting means that the unit does not attempt to restart. The output remains disabled until the fault is cleared.
			001	Retry Once	The PMBus device attempts to restart 1 time. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			010	Retry Twice	The PMBus device attempts to restart 2 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			011	Retry 3 times	The PMBus device attempts to restart 3 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			100	Retry 4 times	The PMBus device attempts to restart 4 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			101	Retry 5 times	The PMBus device attempts to restart 5 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			110	Retry 6 times	The PMBus device attempts to restart 6 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			111	Retry Continuously	The PMBus device attempts to restart continuously, without limitation, until output is DISABLED, bias power is removed, or another fault condition causes the output to shut down.

Bit	Function	Description	Value	Function	Description
2:0	Retry Time and Delay Time	Sets the output undervoltage delay time for respond after delay and HICCUP.	0	0	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.
			1	1	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.
			2	2	Shutdown delay of 3 PWM_CLK, HICCUP equal to 2 times TON_RISE.
			3	3	Shutdown delay of 3 PWM_CLK, HICCUP equal to 3 times TON_RISE.
			4	4	Shutdown delay of 3 PWM_CLK, HICCUP equal to 4 times TON_RISE.
			5	5	Shutdown delay of 7 PWM_CLK, HICCUP equal to 5 times TON_RISE.
			6	6	Shutdown delay of 7 PWM_CLK, HICCUP equal to 6 times TON_RISE.
			7	7	Shutdown delay of 7 PWM_CLK, HICCUP equal to 7 times TON_RISE.

IOUT_OC_FAULT_LIMIT (0x46)
Addressing: Phase
Description: Sets the output over-current peak limit for per phase.

Bit	Description	Format	Unit
15:0	Sets the IOUT overcurrent peak fault threshold for each phase with PHASE command set to 0x00 - 0x03. Sets the IOUT overcurrent peak fault threshold for all phases with PHASE command set to 0xFF. The analog hardware supports values from 8 A to 62 A in 2 A steps. Adjustable range from 0-62A. Linear format with LSB=0.25A. Note that the effective current limit of the multi-phase stack is equal to the lowest IOUT_OC_FAULT_LIMIT setting times the number of phases in the stack.	Linear	A

IOUT_OC_FAULT_RESPONSE (0x47)
Description: Sets the output total over-current fault response.

Bit	Function	Description	Value	Function	Description
7:6	Response	Describes the device interruption operation. For all modes set by bits [7:6], the device pulls SALERT low and sets the related fault bit in the status registers.	00	Ignore Fault	The PMBus device continues operation without interruption.
			10	Shutdown After Delay	The PMBus device continues operation for the delay time specified by bits [2:0].
			11	Shutdown Immediately	The device shuts down immediately.
5:3	Retry Setting	The device attempts to restart the number of times set by these bits.	000	Latch Off	A zero value for the Retry Setting means that the unit does not attempt to restart. The output remains disabled until the fault is cleared.

Bit	Function	Description	Value	Function	Description
			001	Retry Once	The PMBus device attempts to restart 1 time. If the device fails to restart, it disables the output and remains off until the fault is cleared as described in Section 10.7. The time between the start of each attempt to restart is set by the value in bits [2:] along with the delay time unit specified for that particular fault.
			010	Retry Twice	The PMBus device attempts to restart 2 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			011	Retry 3 times	The PMBus device attempts to restart 3 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			100	Retry 4 times	The PMBus device attempts to restart 4 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			101	Retry 5 times	The PMBus device attempts to restart 5 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			110	Retry 6 times	The PMBus device attempts to restart 6 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			111	Retry Continuously	The PMBus device attempts to restart continuously, without limitation, until output is DISABLED, bias power is removed, or another fault condition causes the output to shut down.

Bit	Function	Description	Value	Function	Description
2:0	Retry Time and Delay Time	Sets the output overcurrent delay time for respond after delay and HICCUP.	0	0	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.
			1	1	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.
			2	2	Shutdown delay of 3 PWM_CLK, HICCUP equal to 2 times TON_RISE.
			3	3	Shutdown delay of 3 PWM_CLK, HICCUP equal to 3 times TON_RISE.
			4	4	Shutdown delay of 3 PWM_CLK, HICCUP equal to 4 times TON_RISE.
			5	5	Shutdown delay of 7 PWM_CLK, HICCUP equal to 5 times TON_RISE.
			6	6	Shutdown delay of 7 PWM_CLK, HICCUP equal to 6 times TON_RISE.
			7	7	Shutdown delay of 7 PWM_CLK, HICCUP equal to 7 times TON_RISE.

IOUT_OC_WARN_LIMIT (0x4A)

Addressing: Phase
Description: Sets the value of the output current that causes the overcurrent detector to indicate an overcurrent warning condition. IOUT_OC_WARN_LIMIT is a phased command. Each phase will report an output current overcurrent warning independently.

Bit	Description	Format	Unit
15:0	Sets the value of the overcurrent warning threshold for each phase with PHASE command set to 0x00 - 0x03. The analog hardware supports values from 8 A to 62 A in 2 A steps. Adjustable range from 0-62A. Linear format with LSB=0.25A.	Linear	A

OT_FAULT_LIMIT (0x4F)

Addressing: Phase
Description: Sets the over-temperature fault limit.

Bit	Description	Format	Unit
15:0	Sets the over-temperature fault threshold. Adjustable range from 0-160°C in 1°C steps. Setting 255°C value will disable the over-temperature fault limit without disabling the on-die Bandgap thermal shutdown.	Linear	°C

OT_FAULT_RESPONSE (0x50)

Description: Sets the over-temperature fault response.

Bit	Function	Description	Value	Function	Description
7:6	Response		00	Ignore Fault	The PMBus device continues operation without interruption.

Bit	Function	Description	Value	Function	Description
		Describes the device interruption operation. For all modes set by bits [7:6], the device pulls SALERT low and sets the related fault bit in the status registers.	01	Perform Retries while Operating	The PMBus device continues operation for the delay time specified by bits [2:0] and the delay time unit specified for that particular fault. If the fault condition is still present at the end of the delay time, the unit responds as programmed in the Retry Setting (bits [5:3]).
			10	Disable and Retry	The device shuts down (disables the output) and responds according to the retry setting in bits [5:3].
			11	Disable, Resume When OK	The device shuts down (disables the output) until the temperature is below the over-temperature warn limit, then restarts according to the retry setting in bits [5:3].
5:3	Retry Setting	The device attempts to restart the number of times set by these bits.	000	Latch Off	A zero value for the Retry Setting means that the unit does not attempt to restart. The output remains disabled until the fault is cleared.
			001	Retry Once	The PMBus device attempts to restart 1 time. If the device fails to restart, it disables the output and remains off until the fault is cleared as described in Section 10.7. The time between the start of each attempt to restart is set by the value in bits [2:] along with the delay time unit specified for that particular fault.
			010	Retry Twice	The PMBus device attempts to restart 2 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			011	Retry 3 times	The PMBus device attempts to restart 3 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.

Bit	Function	Description	Value	Function	Description
			100	Retry 4 times	The PMBus device attempts to restart 4 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			101	Retry 5 times	The PMBus device attempts to restart 5 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			110	Retry 6 times	The PMBus device attempts to restart 6 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			111	Retry Continuously	The PMBus device attempts to restart continuously, without limitation, until output is DISABLED, bias power is removed, or another fault condition causes the output to shut down.
2:0	Retry Time and Delay Time	Sets the over-temperature delay time for respond after delay and HICCUP.	0	10 ms	Shutdown delay of 10 ms, HICCUP equal to TON_RISE, HICCUP delay equal to TON_RISE.
			1	1 ms	
			2	2 ms	
			3	3 ms	
			4	4 ms	
			5	5 ms	
			6	6 ms	
			7	7 ms	

OT_WARN_LIMIT (0x51)
Addressing: Phase
Description: Sets the over-temperature warn limit.

Bit	Description	Format	Unit
15:0	Sets the over-temperature warning threshold. Adjustable range from 0-160°C in 1°C steps. Setting 255°C value will disable disable the OT_WARN_LIMIT function.	Linear	°C

VIN_OV_FAULT_LIMIT (0x55)
Description: Sets the input over-voltage fault limit.

Bit	Description	Format	Unit
15:0	Sets the VIN overvoltage fault threshold. Values 4 - 20 V in 1 V steps.	Linear	V

VIN_OV_FAULT_RESPONSE (0x56)

Description: Sets the input over-voltage fault response.

Bit	Function	Description	Value	Function	Description
7:6	Response	Describes the device interruption operation. For all modes set by bits [7:6], the device pulls SALERT low and sets the related fault bit in the status registers.	00	Ignore Fault	The PMBus device continues operation without interruption.
			01	Perform Retries while Operating	The PMBus device continues operation for the delay time specified by bits [2:0] and the delay time unit specified for that particular fault. If the fault condition is still present at the end of the delay time, the unit responds as programmed in the Retry Setting (bits [5:3]).
			10	Disable and Retry	The device shuts down (disables the output) and responds according to the retry setting in bits [5:3].
5:3	Retry Setting	The device attempts to restart the number of times set by these bits.	000	Latch Off	A zero value for the Retry Setting means that the unit does not attempt to restart. The output remains disabled until the fault is cleared.
			001	Retry Once	The PMBus device attempts to restart 1 time. If the device fails to restart, it disables the output and remains off until the fault is cleared as described in Section 10.7. The time between the start of each attempt to restart is set by the value in bits [2:] along with the delay time unit specified for that particular fault.
			010	Retry Twice	The PMBus device attempts to restart 2 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			011	Retry 3 times	The PMBus device attempts to restart 3 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.

Bit	Function	Description	Value	Function	Description
			100	Retry 4 times	The PMBus device attempts to restart 4 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			101	Retry 5 times	The PMBus device attempts to restart 5 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			110	Retry 6 times	The PMBus device attempts to restart 6 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			111	Retry Continuously	The PMBus device attempts to restart continuously, without limitation, until output is DISABLED, bias power is removed, or another fault condition causes the output to shut down.
2:0	Retry Time and Delay Time	Sets the output over-voltage delay time for respond after delay and HICCUP.	0	0	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.
			1	1	Shutdown delay of 1 PWM_CLK, HICCUP equal to TON_RISE.
			2	2	Shutdown delay of 3 PWM_CLK, HICCUP equal to 2 times TON_RISE.
			3	3	Shutdown delay of 3 PWM_CLK, HICCUP equal to 3 times TON_RISE.
			4	4	Shutdown delay of 3 PWM_CLK, HICCUP equal to 4 times TON_RISE.
			5	5	Shutdown delay of 7 PWM_CLK, HICCUP equal to 5 times TON_RISE.
			6	6	Shutdown delay of 7 PWM_CLK, HICCUP equal to 6 times TON_RISE.
			7	7	Shutdown delay of 7 PWM_CLK, HICCUP equal to 7 times TON_RISE.

VIN_UV_WARN_LIMIT (0x58)
Addressing: Phase
Description: Sets the input under-voltage warning limit.

Bit	Description	Format	Unit
15:0	Sets the VIN undervoltage warning threshold.	Linear	V

TON_DELAY (0x60)
Description: Sets the turn-on delay time

Bit	Description	Format	Unit
15:0	Sets the time, from when a start condition is received (as programmed by the ON_OFF_CONFIG command) until the output voltage starts to rise.	Linear	ms

TON_RISE (0x61)
Description: Sets the turn-on ramp-up time.

Bit	Description	Format	Unit
15:0	Sets the rise time of VOUT after ENABLE and On Delay. The time can range from 0 ms to 31.75 ms in 0.25 ms steps.	Linear	ms

TON_MAX_FAULT_LIMIT (0x62)
Description: Sets an upper limit on how long the unit can attempt to power up the output without reaching the target voltage.

Bit	Description	Format	Unit
15:0	Sets the upper limit time. The time can range from 0 ms to 127 ms in 0.5 ms steps. Value 0 ms disables the TON_MAX functionality.	Linear	ms

TON_MAX_FAULT_RESPONSE (0x63)
Description: Instructs the device on what action to take in response to TON_MAX fault.

Bit	Function	Description	Value	Function	Description
7:6	Response	Describes the device interruption operation. For all modes set by bits [7:6], the device pulls SALERT low and sets the related fault bit in the status registers.	00	Ignore Fault	The PMBus device continues operation without interruption.
			01	Perform Retries while Operating	The PMBus device continues operation for the delay time specified by bits [2:0] and the delay time unit specified for that particular fault. If the fault condition is still present at the end of the delay time, the unit responds as programmed in the Retry Setting (bits [5:3]).
			10	Disable and Retry	The device shuts down (disables the output) and responds according to the retry setting in bits [5:3].
5:3	Retry Setting	The device attempts to restart the number of times set by these bits.	000	Latch Off	A zero value for the Retry Setting means that the unit does not attempt to restart. The output remains disabled until the fault is cleared.

Bit	Function	Description	Value	Function	Description
			001	Retry Once	The PMBus device attempts to restart 1 time. If the device fails to restart, it disables the output and remains off until the fault is cleared as described in Section 10.7. The time between the start of each attempt to restart is set by the value in bits [2:] along with the delay time unit specified for that particular fault.
			010	Retry Twice	The PMBus device attempts to restart 2 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			011	Retry 3 times	The PMBus device attempts to restart 3 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			100	Retry 4 times	The PMBus device attempts to restart 4 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			101	Retry 5 times	The PMBus device attempts to restart 5 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			110	Retry 6 times	The PMBus device attempts to restart 6 times. If the device fails to restart, it disables the output and remains off until either: a reset signal is asserted, or a bias power is removed from the device.
			111	Retry Continuously	The PMBus device attempts to restart continuously, without limitation, until output is DISABLED, bias power is removed, or another fault condition causes the output to shut down.
2:0			0	1 ms	Shutdown delay of 1 ms, HICCUP equal to TON_RISE.

Bit	Function	Description	Value	Function	Description
	Retry Time and Delay Time	Sets the output over-voltage delay time for respond after delay and HICCUP.	1	1 ms	Shutdown delay of 1 ms, HICCUP equal to 1 times TON_RISE.
			2	2 ms	Shutdown delay of 2 ms, HICCUP equal to 2 times TON_RISE.
			3	3 ms	Shutdown delay of 3 ms, HICCUP equal to 3 times TON_RISE.
			4	4 ms	Shutdown delay of 4 ms, HICCUP equal to 4 times TON_RISE.
			5	5 ms	Shutdown delay of 5 ms, HICCUP equal to 5 times TON_RISE.
			6	6 ms	Shutdown delay of 6 ms, HICCUP equal to 6 times TON_RISE.
			7	7 ms	Shutdown delay of 7 ms, HICCUP equal to 7 times TON_RISE.

TOFF_DELAY (0x64)
Description: Sets the turn-off delay.

Bit	Description	Format	Unit
15:0	Sets the delay time from DISABLE to start of the fall of the output voltage. Normally the time can range from 0 ms up to 127.5 ms in 0.5 ms steps. An internal delay of up to 50 µs will be added to TOFF_DELAY, even if TOFF_DELAY is equal to 0 ms.	Linear	ms

TOFF_FALL (0x65)
Description: Sets the turn-off ramp-down time.

Bit	Description	Format	Unit
15:0	Sets the fall time for VOUT after DISABLE and Off Delay. The time can range from 0 ms to 31.75 ms in 0.25 ms steps.	Linear	ms

STATUS_BYTE (0x78)
Addressing: Phase
Description: Returns a brief fault/warning status byte. Setting and clearing of supported bits must be done in the individual status registers. For example, Clearing VOUT_OVF in STATUS_VOUT also clears VOUT_OV in STATUS_BYTE.

Bit	Function	Description	Value	Description
7	Busy	A fault was declared because the device was busy and unable to respond.	0	No fault
			1	Fault
6	Off	This bit is asserted if the unit is not providing power to the output due to not being enabled, i.e. not set when output shut down due to fault.	0	No fault
			1	Fault
5	Vout Overvoltage Fault	An output overvoltage fault has occurred.	0	No fault
			1	Fault
4	Iout Overcurrent Fault	An output overcurrent fault has occurred.	0	No fault
			1	Fault
3		An input undervoltage fault has occurred.	0	No fault

Bit	Function	Description	Value	Description
	Vin Undervoltage Fault		1	Fault
2	Temperature	A temperature fault or warning has occurred.	0	No fault
			1	Fault
1	Communication/Logic	A communications, memory or logic fault has occurred.	0	No fault
			1	Fault

STATUS_WORD (0x79)

Addressing: Phase
Description: Returns an extended fault/warning status byte. Writing 0080h to STATUS_WORD will clear the BUSY bit, if set. Writing 0180h to STATUS_WORD will clear both the BUSY bit and UNKNOWN bit, if set.

Bit	Function	Description	Value	Description
15	Vout	An output voltage fault or warning has occurred.	0	No fault
			1	Fault
14	Iout	An output current fault or warning has occurred.	0	No Fault.
			1	Fault.
13	Input	An input voltage, input current, or input power fault or warning has occurred.	0	No Fault.
			1	Fault.
12	Mfr	A manufacturer specific fault or warning has occurred.	0	No Fault.
			1	Fault.
11	Power-Good	The Power-Good signal, if present, is negated.	0	No Fault.
			1	Fault.
9	Other	An other fault has occurred.	0	No Fault.
			1	Fault.
7	Busy	A fault was declared because the device was busy and unable to respond.	0	No Fault.
			1	Fault.
6	Off	This bit is asserted if the unit is not providing power to the output due to not being enabled, i.e. not set when output shut down due to fault.	0	No Fault.
			1	Fault.
5	Vout Overvoltage Fault	An output overvoltage fault has occurred.	0	No Fault.
			1	Fault.
4	Iout Overcurrent Fault	An output overcurrent fault has occurred.	0	No Fault.
			1	Fault.
3	Vin Undervoltage Fault	An input undervoltage fault has occurred.	0	No Fault.
			1	Fault.
2	Temperature	A temperature fault or warning has occurred.	0	No Fault.
			1	Fault.
1	Communication/Logic	A communications, memory or logic fault has occurred.	0	No fault.
			1	Fault.

STATUS_VOUT (0x7A)

Description: Returns Vout-related fault/warning status bits. All supported bits can be cleared either by CLEAR_FAULTS, or individually by writing 1b to the STATUS_VOUT (0x7A) register in their position.

Bit	Function	Description	Value	Description
7	Vout OV Fault	Latched flag of Vout over-voltage fault has occurred .	0	No Fault.
			1	Fault.
6	Vout OV Warn	Latched flag of Vout over-voltage warning has occurred .	0	No Fault.
			1	Fault.
5	Vout UV Warn	Latched flag of Vout under-voltage warning has occurred .	0	No Fault.
			1	Fault.
4	Vout UV Fault		0	No Fault.

Bit	Function	Description	Value	Description
		Latched flag of Vout under-voltage fault has occurred .	1	Fault.
3	Vout Min/Max Fault	Latched flag of Vout min/max fault or warning has occurred .	0	No Fault.
			1	Fault.
2	Ton Max Fault	Latched flag of Ton max fault or warning has occurred .	0	No Fault.
			1	Fault.

STATUS_IOUT (0x7B)

Addressing: Phase
Description: Returns Iout-related fault/warning status bits. All supported bits can be cleared either by CLEAR_FAULTS, or individually by writing 1b to the STATUS_IOUT (0x7B) register in their position.

Bit	Function	Description	Value	Description
7	Iout OC Fault	Latched flag of Iout over-current fault has occurred.	0	No Fault.
			1	Fault.
5	Iout OC Warn	Latched flag of Iout over-current warning has occurred.	0	No Fault.
			1	Fault.
4	Iout UC Fault	Latched flag of Iout under-current fault has occurred.	0	No Fault.
			1	Fault.
3	Current Share Fault	Latched flag of current share fault has occurred.	0	No Fault.
			1	Fault.

STATUS_INPUT (0x7C)

Addressing: Phase
Description: Returns VIN/IIN-related fault/warning status bits. All supported bits can cleared either by CLEAR_FAULTS, or individually by writing 1b to the STATUS_INPUT register (0x7C) in their position.

Bit	Function	Description	Value	Description
7	Vin Overvoltage Fault	Latched flag of input over-voltage fault has occurred.	0	No Fault.
			1	Fault.
6	Vin OV Warn	Latched flag of input over-voltage warning has occurred.	0	No Fault.
			1	Fault.
5	Vin UV Warn	Latched flag of input under-voltage warning has occurred.	0	No Fault.
			1	Fault.
4	Vin UV Fault	Latched flag of input under-voltage fault has occurred.	0	No Fault.
			1	Fault.
3	Low Vin Fault	Latched flag of shutdown unit due to insufficient VIN .	0	No Fault.
			1	Fault.
2	Iin Oc Fault	Latched flag of input over-current fault has occurred.	0	No Fault.
			1	Fault.
1	Iin Oc Warn	Latched flag of input over-current warning has occurred.	0	No Fault.
			1	Fault.
0	Pin Op Warn	Latched flag of input over-power warning has occurred.	0	No Fault.
			1	Fault.

STATUS_TEMPERATURE (0x7D)

Addressing: Phase
Description: Returns the temperature-related fault/warning status bits. All supported bits can be cleared either by CLEAR_FAULTS, or individually by writing 1b to the STATUS_TEMPERATURE (0x7D) register in their position.

Bit	Function	Description	Value	Description
7	Overtemperature Fault	Latched flag of over-temperature fault has occurred.	0	No Fault.
			1	Fault.
6			0	No Fault.

Bit	Function	Description	Value	Description
	Overtemperature Warn	Latched flag of over-temperature warn has occurred.	1	Fault.

STATUS_CML (0x7E)

Addressing: Phase

Description: Returns Communication/Logic/Memory-related fault/warning status bits. All supported bits can be cleared either by CLEAR_FAULTS, or individually by writing 1b to the STATUS_CML (0x7E) register in their position.

Bit	Function	Description	Value	Description
7	Invalid Or Unsupported Command Received	Invalid Or Unsupported Command Received.	0	No Invalid Command Received.
			1	Invalid Command Received.
6	Invalid Or Unsupported Data Received	Invalid Or Unsupported Data Received.	0	No Invalid Data Received.
			1	Invalid Data Received.
5	Packet Error Check Failed	Packet Error Check (PEC) Failed.	0	No Failure.
			1	Failure.
4	Memory Error	A memory error was detected.	0	No Fault.
			1	Fault.
1	Other Communication Fault	A PMBus command tried to write to a read-only or protected command, or a communication fault other than the ones listed in this table has occurred.	0	No Fault.
			1	Fault.

STATUS_OTHER (0x7F)

Description: Returns one data byte with information not specified in the other STATUS_BYTE.

Bit	Description	Value	Description
0	The device was the first to assert SMBALERT.	1	First to assert SMBALERT.
		0	The device was not the first to assert SMBALERT. This could mean either that the SMBALERT signal is not asserted (or has since been cleared), or that it is asserted, but this device was not the first on the bus to assert it.

STATUS_MFR_SPECIFIC (0x80)

Addressing: Phase

Description: Returns manufacturer specific status information. All supported bits may be cleared either by CLEAR_FAULTS, or individually by writing 1b to the STATUS_MFR_SPECIFIC (0x80) register in their position.

Bit	Function	Description	Value	Description
7	Power-On Reset Fault	Power-on reset fault has occurred.	0	No Fault.
			1	Fault.
6	Power-On Self-Check	Showing the status of the Power-On Self-Check.	0	Power On Self-Check is complete. All expected BCX slaves have responded.

Bit	Function	Description	Value	Description
			1	Power-On Self-Check is in progress. One or more BCX slaves have not responded.
3	Reset	VOUT_COMMAND has been reset without PMBus commands.	0	RESET_VOUT event has not occurred.
			1	RESET_VOUT event has occurred.
2	BCX fault	Back-channel communications fault has occurred.	0	No Fault.
			1	Fault.
1	Sync fault	Sync fault has occurred.	0	No Fault.
			1	Fault.

READ_VIN (0x88)
Addressing: Phase
Description: Returns the measured input voltage.

Bit	Description	Format	Unit
15:0	Returns the input voltage reading. When PHASE = FFh, READ_VIN returns the input voltage of the master device.	Linear	V

READ_VOUT (0x8B)
Addressing: Phase
Description: Returns the measured output voltage.

Bit	Description	Format	Unit
15:0	Returns the output voltage reading.	Vout Mode Unsigned	V

READ_IOUT (0x8C)
Addressing: Phase
Description: Returns the measured output current.

Bit	Description	Format	Unit
15:0	Returns the output current reading. When PHASE = FFh, READ_IOUT returns the total current for the stack of devices.	Linear	A

READ_TEMPERATURE_1 (0x8D)
Addressing: Phase
Description: Returns the maximum power stage temperature.

Bit	Description	Format	Unit
15:0	When PHASE = FFh, READ_TEMPERATURE_1 returns the temperature of the hottest of device in the stack of devices.	Linear	°C

PMBUS_REVISION (0x98)
Description: Returns the PMBus revision number for this device.

Bit	Function	Description	Value	Function	Description
7:4	Part I Revision	Part I Revision.	0011	1.3	Part I Revision 1.3.
3:0	Part II Revision	Part II Revision.	0011	1.3	Part II Revision 1.3.

MFR_ID (0x99)
Description: Sets the manufacturer ID String.

Bit	Description	Format
23:0	Maximum of 3 bytes.	Byte Array

MFR_MODEL (0x9A)
Description: Sets the manufacturer model string.

Bit	Description	Format
23:0	Maximum of 3 bytes.	Byte Array

MFR_REVISION (0x9B)
Description: Sets the manufacturer revision string.

Bit	Description	Format
23:0	Maximum of 3 bytes.	Byte Array

MFR_SERIAL (0x9E)
Description: Sets the manufacturer serial number.

Bit	Description	Format
23:0	3-byte serial number assigned by manufacturer.	Byte Array

IC_DEVICE_ID (0xAD)
Description: Reports identification information.

Bit	Description	Format
47:0	Reports identification information.	Byte Array

IC_DEVICE_REV (0xAE)
Description: Reports revision information.

Bit	Description	Format
15:0	Reports revision information.	Byte Array

USER_DATA_01 (0xB1)
Addressing: Phase
Description: Configures the control loop compensation settings.

Bit	Function	Description	Format
39:38	SEL_CZI High	High bits component of CZI scalar.	Byte Array
25:24	SEL_CZI Low	Low bits component of CZI scalar.	Byte Array
23:22	SEL_CZV High	High bits component of CZV scalar.	Byte Array
9:8	SEL_CZV Low	Low bits component of CZV scalar.	Byte Array

Bit	Function	Description	Value	Function	Description
37:33	CPI	Selects the value of current loop filter capacitor.	00000	0 pF	
			00001	3.2 pF	
			00010	6.4 pF	
			00011	9.6 pF	
			00100	12.8 pF	
			00101	16 pF	
			00110	19.2 pF	
			00111	22.4 pF	

Bit	Function	Description	Value	Function	Description
			01000	25.6 pF	
			01001	28.8 pF	
			01010	32 pF	
			01011	35.2 pF	
			01100	38.4 pF	
			01101	41.6 pF	
			01110	44.8 pF	
			01111	48 pF	
			10000	51.2 pF	
			10001	54.4 pF	
			10010	57.6 pF	
			10011	60.8 pF	
			10100	64 pF	
			10101	67.2 pF	
			10110	70.4 pF	
			10111	73.6 pF	
			11000	76.8 pF	
			11001	80 pF	
			11010	83.2 pF	
			11011	86.4 pF	
			11100	89.6 pF	
			11101	92.8 pF	
			11110	96 pF	
			11111	99.2 pF	
32	CZI multiplier	Selects the value of current loop integrating capacitor multiplier.	0	1	
			1	2	
31:26	RVI	Selects the value of current loop mid-band gain resistor.	000000	0 kΩ	
			000001	5 kΩ	
			000010	10 kΩ	
			000011	15 kΩ	
			000100	20 kΩ	
			000101	25 kΩ	
			000110	30 kΩ	
			000111	35 kΩ	
			001000	40 kΩ	
			001001	45 kΩ	
			001010	50 kΩ	
			001011	55 kΩ	
			001100	60 kΩ	
			001101	65 kΩ	
			001110	70 kΩ	
			001111	75 kΩ	
			010000	80 kΩ	
			010001	85 kΩ	
			010010	90 kΩ	
			010011	95 kΩ	
			010100	100 kΩ	
			010101	105 kΩ	
			010110	110 kΩ	
			010111	115 kΩ	
			011000	120 kΩ	
			011001	125 kΩ	
			011010	130 kΩ	

Bit	Function	Description	Value	Function	Description
			011011	135 kΩ	
			011100	140 kΩ	
			011101	145 kΩ	
			011110	150 kΩ	
			011111	155 kΩ	
			100000	160 kΩ	
			100001	165 kΩ	
			100010	170 kΩ	
			100011	175 kΩ	
			100100	180 kΩ	
			100101	185 kΩ	
			100110	190 kΩ	
			100111	195 kΩ	
			101000	200 kΩ	
			101001	205 kΩ	
			101010	210 kΩ	
			101011	215 kΩ	
			101100	220 kΩ	
			101101	225 kΩ	
			101110	230 kΩ	
			101111	235 kΩ	
			110000	240 kΩ	
			110001	245 kΩ	
			110010	250 kΩ	
			110011	255 kΩ	
			110100	260 kΩ	
			110101	265 kΩ	
			110110	270 kΩ	
			110111	275 kΩ	
			111000	280 kΩ	
			111001	285 kΩ	
			111010	290 kΩ	
			111011	295 kΩ	
			111100	300 kΩ	
			111101	305 kΩ	
			111110	310 kΩ	
			111111	315 kΩ	
21:17	CPV	Selects the value of voltage loop filter capacitor.	00000	0 pF	
			00001	6.25 pF	
			00010	12.5 pF	
			00011	18.75 pF	
			00100	25 pF	
			00101	31.25 pF	
			00110	37.5 pF	
			00111	43.75 pF	
			01000	50 pF	
			01001	56.25 pF	
			01010	62.5 pF	
			01011	68.75 pF	
			01100	75 pF	
			01101	81.25 pF	
			01110	87.5 pF	
			01111	93.75 pF	
			10000	100 pF	

Bit	Function	Description	Value	Function	Description
			10001	106.25 pF	
			10010	112.5 pF	
			10011	118.75 pF	
			10100	125 pF	
			10101	131.25 pF	
			10110	137.5 pF	
			10111	143.75 pF	
			11000	150 pF	
			11001	156.25 pF	
			11010	162.5 pF	
			11011	168.75 pF	
			11100	175 pF	
			11101	181.25 pF	
			11110	187.5 pF	
			11111	193.75 pF	
15:10	RVV	Selects the value of voltage loop mid-band gain resistor.	000000	0 kΩ	
			000001	5 kΩ	
			000010	10 kΩ	
			000011	15 kΩ	
			000100	20 kΩ	
			000101	25 kΩ	
			000110	30 kΩ	
			000111	35 kΩ	
			001000	40 kΩ	
			001001	45 kΩ	
			001010	50 kΩ	
			001011	55 kΩ	
			001100	60 kΩ	
			001101	65 kΩ	
			001110	70 kΩ	
			001111	75 kΩ	
			010000	80 kΩ	
			010001	85 kΩ	
			010010	90 kΩ	
			010011	95 kΩ	
			010100	100 kΩ	
			010101	105 kΩ	
			010110	110 kΩ	
			010111	115 kΩ	
			011000	120 kΩ	
			011001	125 kΩ	
			011010	130 kΩ	
			011011	135 kΩ	
			011100	140 kΩ	
			011101	145 kΩ	
			011110	150 kΩ	
			011111	155 kΩ	
			100000	160 kΩ	
			100001	165 kΩ	
			100010	170 kΩ	
			100011	175 kΩ	
			100100	180 kΩ	
			100101	185 kΩ	
			100110	190 kΩ	

Bit	Function	Description	Value	Function	Description
			100111	195 kΩ	
			101000	200 kΩ	
			101001	205 kΩ	
			101010	210 kΩ	
			101011	215 kΩ	
			101100	220 kΩ	
			101101	225 kΩ	
			101110	230 kΩ	
			101111	235 kΩ	
			110000	240 kΩ	
			110001	245 kΩ	
			110010	250 kΩ	
			110011	255 kΩ	
			110100	260 kΩ	
			110101	265 kΩ	
			110110	270 kΩ	
			110111	275 kΩ	
			111000	280 kΩ	
			111001	285 kΩ	
			111010	290 kΩ	
			111011	295 kΩ	
			111100	300 kΩ	
			111101	305 kΩ	
			111110	310 kΩ	
			111111	315 kΩ	
5:4	GMV	Selects the value of voltage error transconductance.	00	25 µS	
			01	50 µS	
			10	100 µS	
			11	200 µS	
1:0	GMI	Selects the value of current error transconductance.	00	25 µS	
			01	50 µS	
			10	100 µS	
			11	200 µS	

USER_DATA_05 (0xB5)
Description: Adjusts the VDD5 regulator voltage.

Bit	Description	Value	Function	Description
7:4	Adjusts the VDD5 regulator voltage. Value 3.9 V is not recommended for production.	0011	3.9 V	
		0100	4.1 V	
		0101	4.3 V	
		0110	4.5 V	
		0111	4.7 V	
		1000	4.9 V	
		1001	5.1 V	
		1010	5.3 V	

TELEMETRY_CONFIG (0xD0)
Description: Configures the priority and averaging for each channel of the internal telemetry system. The internal telemetry system shares a single ADC across each measurement. The priority setting allows the user to adjust the relative rate of measurement of each telemetry value. The ADC will first measure each value with a priority A value.With each pass through all priority A measurements, one priority B measurement will be taken. With each pass through all priority B measurements, one priority C measurement will be taken.

Bit	Function	Description	Value	Function	Description
31:30	READ_VIN Priority	Assigns priority A-C to input voltage telemetry.	00	A priority	
			01	B priority	
			010	C priority	
			11	Disable input voltage telemetry.	
26:24	READ_VIN Rolling Avg	READ_VIN Rolling average of 2^N samples.	000	1 sample (N=0)	
			001	2 samples (N=1)	
			010	4 samples (N=2)	
			011	8 samples (N=3)	
			100	16 samples (N=4)	
			101	32 samples (N=5)	
23:22	READ_TEMPERATURE_1 Priority	Assigns priority A-C to output temperature telemetry. The temperature telemetry cannot be disabled because it is used for Over-temperature Protection.	00	A priority	
			01	B priority	
			010	C priority	
18:16	READ_TEMPERATURE_1 Rolling Avg	READ_TEMPERATURE_1 Rolling average of 2^N samples.	000	1 sample (N=0)	
			001	2 samples (N=1)	
			010	4 samples (N=2)	
			011	8 samples (N=3)	
			100	16 samples (N=4)	
			101	32 samples (N=5)	
15:14	READ_IOUT Priority	Assigns priority A-C to output current telemetry.	00	A priority	
			01	B priority	
			010	C priority	
			11	Disable output current telemetry.	
10:8	READ_IOUT Rolling Avg	READ_IOUT Rolling average of 2^N samples.	000	1 sample (N=0)	
			001	2 samples (N=1)	
			010	4 samples (N=2)	
			011	8 samples (N=3)	
			100	16 samples (N=4)	
			101	32 samples (N=5)	

Bit	Function	Description	Value	Function	Description
7:6	READ_VOUT Priority	Assigns priority A-C to output voltage telemetry.	00	A priority	
			01	B priority	
			010	C priority	
			11	Disable output voltage telemetry.	
2:0	READ_VOUT Rolling Avg	READ_VOUT Rolling average of 2^N samples.	000	1 sample (N=0)	
			001	2 samples (N=1)	
			010	4 samples (N=2)	
			011	8 samples (N=3)	
			100	16 samples (N=4)	
			101	32 samples (N=5)	

READ_ALL (0xDA)

Description: Returns a 14-byte block of STATUS_WORD and telemetry values. This can reduce bus utilization by combining multiple read functions into a single command.

Bit	Function	Description	Format	Unit
79:64	Read Vin	Returns the input voltage reading. When PHASE = FFh, READ_VIN returns the input voltage of the master device.	Linear	V
63:48	Read Temperature 1	When PHASE = FFh, READ_TEMPERATURE_1 returns the temperature of the hottest of device in the stack of devices.	Linear	°C
47:32	Read Iout	Returns the output current reading. When PHASE = FFh, READ_IOUT returns the total current for the stack of devices.	Linear	A
31:16	Read Vout	Returns the output voltage reading.	Vout Mode Unsigned	V

Bit	Function	Description	Value	Description
15	Vout	An output voltage fault or warning has occurred.	0	No fault
			1	Fault
14	Iout	An output current fault or warning has occurred.	0	No Fault.
			1	Fault.
13	Input	An input voltage, input current, or input power fault or warning has occurred.	0	No Fault.
			1	Fault.
12	Mfr	A manufacturer specific fault or warning has occurred.	0	No Fault.
			1	Fault.
11	Power-Good	The Power-Good signal, if present, is negated.	0	No Fault.
			1	Fault.
9	Other	An other fault has occurred.	0	No Fault.
			1	Fault.
7	Busy	A fault was declared because the device was busy and unable to respond.	0	No Fault.
			1	Fault.
6	Off	This bit is asserted if the unit is not providing power to the output due to not being enabled, i.e. not set when output shut down due to fault.	0	No Fault.
			1	Fault.

Bit	Function	Description	Value	Description
5	Vout Overvoltage Fault	An output overvoltage fault has occurred.	0	No Fault.
			1	Fault.
4	Iout Overcurrent Fault	An output overcurrent fault has occurred.	0	No Fault.
			1	Fault.
3	Vin Undervoltage Fault	An input undervoltage fault has occurred.	0	No Fault.
			1	Fault.
2	Temperature	A temperature fault or warning has occurred.	0	No Fault.
			1	Fault.
1	Communication/Logic	A communications, memory or logic fault has occurred.	0	No fault.
			1	Fault.

STATUS_ALL (0xDB)
Description: Returns 7-byte block of STATUS command codes. This can reduce bus utilization to read multiple faults.

Bit	Function	Description	Value	Description
55	Power-On Reset Fault	Power-on reset fault has occurred.	0	No Fault.
			1	Fault.
54	Power-On Self-Check	Showing the status of the Power-On Self-Check.	0	Power On Self-Check is complete. All expected BCX slaves have responded.
			1	Power-On Self-Check is in progress. One or more BCX slaves have not responded.
51	Reset	VOUT_COMMAND has been reset without PMBus commands.	0	RESET_VOUT event has not occurred.
			1	RESET_VOUT event has occurred.
50	BCX fault	Back-channel communications fault has occurred.	0	No Fault.
			1	Fault.
49	Sync fault	Sync fault has occurred.	0	No Fault.
			1	Fault.
40	First to Alert	The device was the first to assert SMBALERT.	1	First to assert SMBALERT.
			0	The device was not the first to assert SMBALERT. This could mean either that the SMBALERT signal is not asserted (or has since been cleared), or that it is asserted, but this device was not the first on the bus to assert it.
39	Invalid Or Unsupported Command Received	Invalid Or Unsupported Command Received.	0	No Invalid Command Received.
			1	Invalid Command Received.
38	Invalid Or Unsupported Data Received	Invalid Or Unsupported Data Received.	0	No Invalid Data Received.
			1	Invalid Data Received.
37	Packet Error Check Failed	Packet Error Check (PEC) Failed.	0	No Failure.
			1	Failure.
36	Memory Error	A memory error was detected.	0	No Fault.

Bit	Function	Description	Value	Description
			1	Fault.
33	Other Communication Fault	A PMBus command tried to write to a read-only or protected command, or a communication fault other than the ones listed in this table has occurred.	0	No Fault.
			1	Fault.
31	Overtemperature Fault	Latched flag of over-temperature fault has occurred.	0	No Fault.
			1	Fault.
30	Overtemperature Warn	Latched flag of over-temperature warn has occurred.	0	No Fault.
			1	Fault.
23	Vin Overvoltage Fault	Latched flag of input over-voltage fault has occurred.	0	No Fault.
			1	Fault.
22	Vin OV Warn	Latched flag of input over-voltage warning has occurred.	0	No Fault.
			1	Fault.
21	Vin UV Warn	Latched flag of input under-voltage warning has occurred.	0	No Fault.
			1	Fault.
20	Vin UV Fault	Latched flag of input under-voltage fault has occurred.	0	No Fault.
			1	Fault.
19	Low Vin Fault	Latched flag of shutdown unit due to insufficient VIN .	0	No Fault.
			1	Fault.
18	Iin Oc Fault	Latched flag of input over-current fault has occurred.	0	No Fault.
			1	Fault.
17	Iin Oc Warn	Latched flag of input over-current warning has occurred.	0	No Fault.
			1	Fault.
16	Pin Op Warn	Latched flag of input over-power warning has occurred.	0	No Fault.
			1	Fault.
15	Iout OC Fault	Latched flag of Iout over-current fault has occurred.	0	No Fault.
			1	Fault.
13	Iout OC Warn	Latched flag of Iout over-current warning has occurred.	0	No Fault.
			1	Fault.
12	Iout UC Fault	Latched flag of Iout under-current fault has occurred.	0	No Fault.
			1	Fault.
11	Current Share Fault	Latched flag of current share fault has occurred.	0	No Fault.
			1	Fault.
7	Vout OV Fault	Latched flag of Vout over-voltage fault has occurred .	0	No Fault.
			1	Fault.
6	Vout OV Warn	Latched flag of Vout over-voltage warning has occurred .	0	No Fault.
			1	Fault.
5	Vout UV Warn	Latched flag of Vout under-voltage warning has occurred .	0	No Fault.
			1	Fault.
4	Vout UV Fault	Latched flag of Vout under-voltage fault has occurred .	0	No Fault.
			1	Fault.
3	Vout Min/Max Fault	Latched flag of Vout min/max fault or warning has occurred .	0	No Fault.
			1	Fault.
2	Ton Max Fault	Latched flag of Ton max fault or warning has occurred .	0	No Fault.
			1	Fault.

STATUS_PHASE (0xDC)
Addressing: Phase
Description: When PHASE = FFh or 80h, reads to this command return a data word detailing which phases have experienced fault conditions. When PHASE != FFh, reads to this command return a data word detailing which fault(s) the current PHASE has experienced. PHASE number assignment is per PHASE_CONFIG.

Bit	Function	Description	Value	Description
3	Phase 4 Fault		0	

Bit	Function	Description	Value	Description
		The module assigned to PHASE=3 has experienced a fault. Set PHASE = 3, and read STATUS_WORD or STATUS_ALL for more information.	1	
2	Phase 3 Fault	The module assigned to PHASE=2 has experienced a fault. Set PHASE = 2, and read STATUS_WORD or STATUS_ALL for more information.	0	
			1	
1	Phase 2 Fault	The module assigned to PHASE=1 has experienced a fault. Set PHASE = 1, and read STATUS_WORD or STATUS_ALL for more information.	0	
			1	
0	Phase 1 Fault	The module assigned to PHASE=0 has experienced a fault. Set PHASE = 0, and read STATUS_WORD or STATUS_ALL for more information.	0	
			1	

PGOOD_CONFIG (0xE3)
Description: Provides control of the delays asserting and releasing PGOOD.

Bit	Function	Description	Format
15:12	PGOOD Off Delay	Sets Delay from the detection of an unmasked Fault or Warning event to the assertion of PGOOD low. 0d: Delay PGOOD high-low: 1 PWM CLK 1d-15d: Delay PGOOD high-low: 2N+1 PWM CLKs	Integer Unsigned
11:8	PGOOD On Delay	Sets Delay from the detection of no unmasked Fault or Warning events to the release of PGOOD low. 0d: Delay PGOOD low-high: 1 PWM CLK 1d-15d: Delay PGOOD low-high: 2^N+1 PWM CLKs	Integer Unsigned

Bit	Function	Description	Value	Function	Description
7	PGOOD Output Overvoltage Fault	Controls if Output Overvoltage Fault should assert PGOOD low.	0	True	PGOOD asserted low by Output Overvoltage Fault
			1	False	PGOOD not asserted low by Output Overvoltage Fault
6	PGOOD Output Overvoltage Warning	Controls if Output Overvoltage Warning should assert PGOOD low.	0	True	PGOOD asserted low by Output Overvoltage Warning
			1	False	PGOOD not asserted low by Output Overvoltage Warning
5	PGOOD Output Undervoltage Fault	Controls if Output Undervoltage Fault should assert PGOOD low.	0	True	PGOOD asserted low by Output Undervoltage Fault
			1	False	PGOOD not asserted low by Output Undervoltage Fault
4	PGOOD Output Undervoltage Warning	Controls if Output Undervoltage Warning should assert PGOOD low.	0	True	PGOOD asserted low by Output Undervoltage Warning
			1	False	PGOOD not asserted low by Output Undervoltage Warning
3	PGOOD Output Overcurrent Warning	Controls if Output Overcurrent Warning should assert PGOOD low.	0	True	PGOOD asserted low by Output Overcurrent Warning
			1	False	PGOOD not asserted low by Output Overcurrent Warning
2	PGOOD Output Overcurrent Fault	Controls if Output Overcurrent Fault should assert PGOOD low.	0	True	PGOOD asserted low by Output Overcurrent Fault
			1	False	PGOOD not asserted low by Output Overcurrent Fault

Bit	Function	Description	Value	Function	Description
1	PGOOD Input Overvoltage Warning	Controls if Input Overvoltage Warning should assert PGOOD low.	0	True	PGOOD asserted low by Input Overvoltage Warning
			1	False	PGOOD not asserted low by Input Overvoltage Warning
0	PGOOD Input Overvoltage Fault	Controls if Input Overvoltage Fault should assert PGOOD low.	0	True	PGOOD asserted low by Input Overvoltage Fault
			1	False	PGOOD not asserted low by Input Overvoltage Fault

SYNC_CONFIG (0xE4)
Description: Configures synchronization options.

Bit	Function	Description	Value	Function	Description
7:6	Sync Dir	When SYNC_DIR = 11b - Enable Auto Detect, the SYNC_IN or SYNC_OUT will be selected based on the state of the SYNC pin when the enable Condition, as defined by ON_OFF_CONFIG is met.	00	SYNC Disabled	
			01	Sync out	
			10	Sync in	
			11	Auto Detect Sync	
5	Sync Edge	Synchronizes to falling or rising edge of SYNC.	0	Falling Edge	
			1	Rising Edge	

STACK_CONFIG (0xEC)
Description: Configures multi-phase stack settings.

Bit	Function	Description	Format
7:4	BCX Start	BCX address for stack master.	Integer Unsigned

Bit	Function	Description	Value	Function	Description
3:0	BCX Stop	Configures multi-phase stack settings.	0000	Stand Alone, 1 Phase	
			0001	1 Slave, 2 Phases	
			0010	2 Slaves, 3 Phases	
			0011	3 Slaves, 4 Phases	

MISC_OPTIONS (0xED)
Description: Configures miscellaneous settings.

Bit	Function	Description	Value	Function	Description
15	Require Packet Error Check	Enables/Disables Packet Error Check.	0		Disabled
			1		Enabled
14	Reset on Shutdown	Resets VOUT_COMMAND to VBOOT on shutdown.	0		VOUT_COMMAND will be unchanged following a shutdown.
			1		VOUT_COMMAND will be changed to VBOOT on a Control or OPERATION shutdown.

Bit	Function	Description	Value	Function	Description
13	Reset on Fault	Resets VOUT_COMMAND to VBOOT on fault restart.	0		VOUT_COMMAND will be unchanged following a Fault Restart.
			1		VOUT_COMMAND will be changed to VBOOT on Restart from a Fault when Fault Retry is set to Retry after Fault.
12	Reset	Sets the function of the PGOOD/RESET pin.	0	PGOOD	
			1	RESET	
3	Pull-up	Sets the pull-up of the PGD/RESET_B pin when RESET# = 1b.	0		Disabled
			1		Enabled
2	Fault Count	Fault count.	0	Counts down 1 cycle	Fault Counter counts down one cycle on PWM cycle without fault.
			1	Resets to 0	Fault Counter resets counter to 0 on PWM cycle without fault.
1:0	ADC Resolution	Sets the ADC resolution.	00	12-bit	
			01	10-bit	
			10	8-bit	
			11	6-bit	

PIN_DETECT_OVERRIDE (0xEE)
Description: Prevents the Default or User Store values from over-writing the pin-programmed value.

Bit	Function	Description	Value	Function	Description
12	STACK_CONFIG	Decides if STACK_CONFIG will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	
11	SYNC_CONFIG	Decides if SYNC_CONFIG will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	
9	COMPENSATION_CONFIG	Decides if COMPENSATION_CONFIG will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	
8	SLAVE_ADDRESS	Decides if SLAVE_ADDRESS will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	
5	INTERLEAVE	Decides if INTERLEAVE will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	
3	TON_RISE	Decides if TON_RISE will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	
2			0	NVM	

Bit	Function	Description	Value	Function	Description
	IOUT_OC_FAULT/WARN_LIMIT	Decides if IOUT_OC_FAULT_LIMIT and IOUT_OC_WARN_LIMIT will be restored from NVM or pin detection at power-up or RESTORE.	1	Pin Detection	
1	FREQUENCY_SWITCH	Decides if FREQUENCY_SWITCH will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	
0	Vout Related Commands	Decides if VOUT_COMMAND, VOUT_SCALE_LOOP, VOUT_MAX, and VOUT_MIN will be restored from NVM or pin detection at power-up or RESTORE.	0	NVM	
			1	Pin Detection	

SLAVE_ADDRESS (0xEF)
Description: Used to program or read-back the slave address of digital communication. When a slave address is updated, the device starts responding to the new address immediately.

Bit	Description	Format
6:0	Sets or retrieves the PMBus slave address. There are a number of slave address values which are reserved in the SMBus specification. The following reserved addresses are invalid and can not be programmed: 0x0C, 0x28, 0x37 and 0x61.	Integer Unsigned

NVM_CHECKSUM (0xF0)
Description: Reports the CRC-16 (polynomial 0x8005) checksum for the current NVM settings.

Bit	Description	Format
15:0	CRC16 for EEPROM settings.	Integer Unsigned

SIMULATE_FAULT (0xF1)
Description: Simulates fault and warning conditions by triggering the output of the detection circuit for that controls it. Multiple faults and/or warnings can be simulated at once.

Bit	Function	Description	Value	Description
15	Fault Persist	Persist simulated faults.	0	Simulated faults are automatically removed after one Fault response.
			1	Simulated faults persist until SIMULATE_FAULT is written again.
14	Sim Temp OTF	Simulate over-temperature fault	0	
			1	
12	Sim IOUT OCF	Simulate output current over-current fault.	0	
			1	
11	Sim VIN UVLO	Simulate VIN undervoltage lockout.	0	
			1	
10	Sim VIN OVF	Simulate VIN over-voltage fault.	0	
			1	
9	Sim VOUT UVF	Simulate VOUT under-voltage fault.	0	
			1	
8	Sim VOUT OVF	Simulate VOUT over-voltage fault.	0	

Bit	Function	Description	Value	Description
			1	
7	Warn Persist	Persist simulated warnings.	0	Simulated warnings are automatically removed after one Fault response.
			1	Simulated warnings persist until SIMULATE_FAULT is written again.
4	Sim IOUT OCW	Simulate output current over-current warning.	0	
			1	
3	Sim VIN UVW	Simulate VIN under-voltage warning.	0	
			1	
1	Sim VOUT UVW	Simulate VOUT under-voltage warning.	0	
			1	
0	Sim VOUT OVW	Simulate VOUT over-voltage warning.	0	
			1	

Revision Information

Rev	Date	By	Generated from definition file	Comment
A	2022-7-1	Jonas Malmberg		First edition