
BT Serial Communication Protocol User Guide

Introduction

This document describes the communication protocol developed by Microchip for its Power over Ethernet (PoE) integrated solution, serving modules, and PoE devices. This protocol facilitates serial communications between a Host CPU (a PoE-enabled, Layer 2 Ethernet switch or power source equipment or PSE) and the PoE controller. By using the communication protocol, the programmer can write control commands to power ports, read their statuses, and manage PoE parameters. The protocol supports systems having up to 48 logical 2-pair and 4-pair ports.

The BT Serial Communication Protocol specifications are:

- BT S.C.P. revision 3.31
- Document version 1.0
- Supports up to firmware 3.55

Following is the list of supported PoE devices:

- IEEE® 802.3bt standard: PD692x0_BT Firmware—single signature PDs, classes 0 to 8, and future dual signature PDs classes 1 to 5.
- Out of IEEE 802.3bt standard: PD692x0_BT Firmware—class4, 60 W PDs or class4 Power over HDBaseT (PoH) PDs (90 W limitation).
- Non-IEEE compliant PDs: PD692x0_BT Firmware—Legacy detection class0, 15.4 W and 30 W PDs.

This firmware can be used with the PD692x0 family of PoE controllers (PD69210, PD69220, and PD69200) and the PD69200M architecture.

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1. Basic Communication Information

The communication protocol is a bidirectional Host/Client protocol type. The Host is the Ethernet PSE Host CPU and the Client is the PoE unit controller (see Figure 1-1). Figure 1-2 shows a simplified representation of the protocol. The Host CPU can utilize a TTL-level asynchronous serial communication (UART) or I²C protocol. The PoE controller communicates with PoE devices through an SPI bus. The Client replies with 15-byte message to any 15-byte transaction from the Host or when it is out of reset. In all other cases, the Client does not generate communication messages.

Figure 1-1. Basic Communication Information

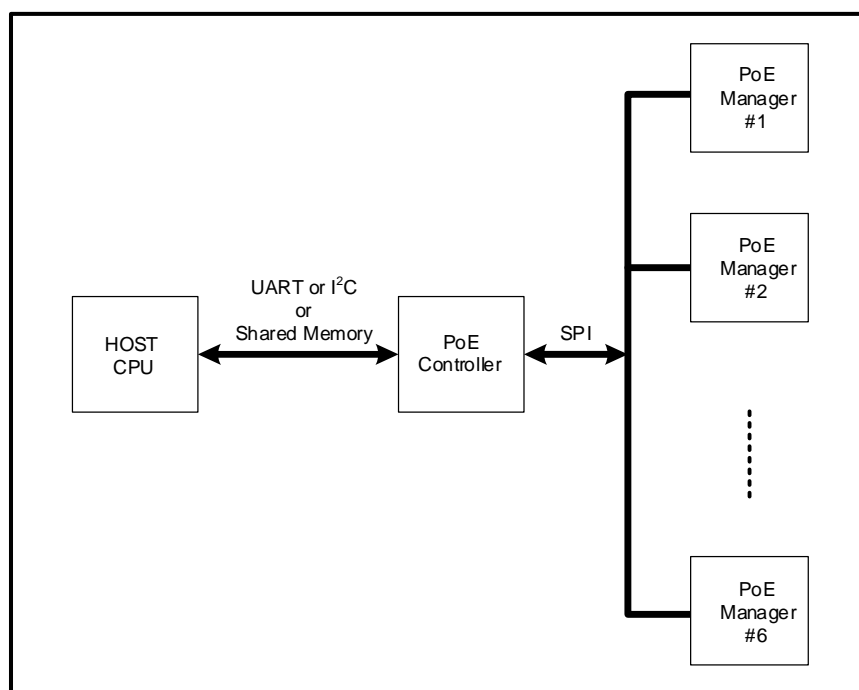
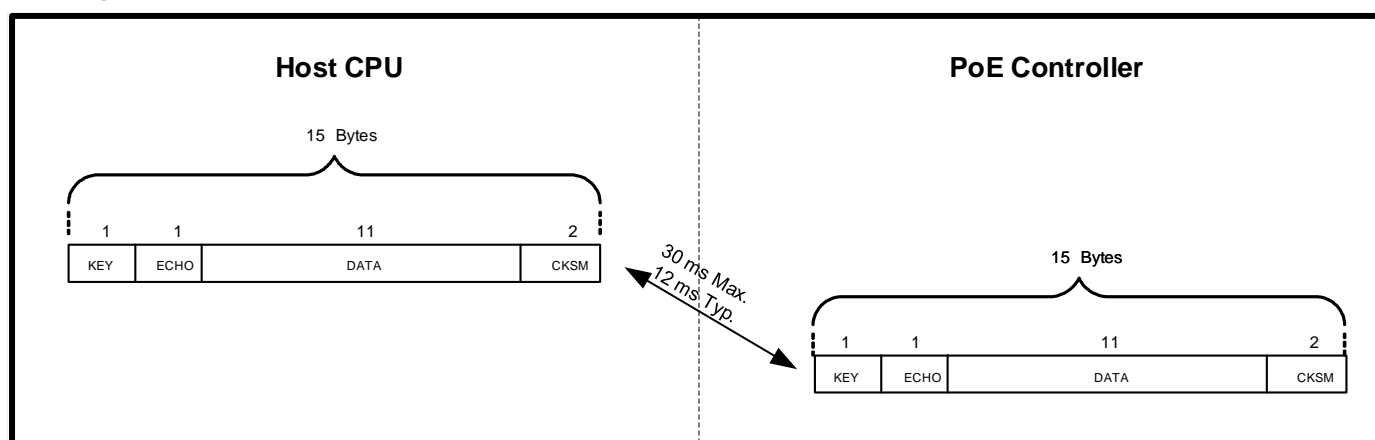


Figure 1-2. Protocol Representation



Communication parameters are transferred in big-endian format (MSB is transmitted first). The following table lists the communication options.

Table 1-1. Communication Options

RS-232/UART	I ² C	Shared Memory
Bits per second: 19200 bps	Speed: 400 kHz (max)	Special memory based physical layer, which can share full message structure between the host and the PoE controller. Used in PD69200M.
Data bits: 8	7-bit address	
Parity: None	I ² C address range is defined in AN3361	
Stop bits: 1	—	
Flow control: None	—	
—	Clock Stretching: Yes	

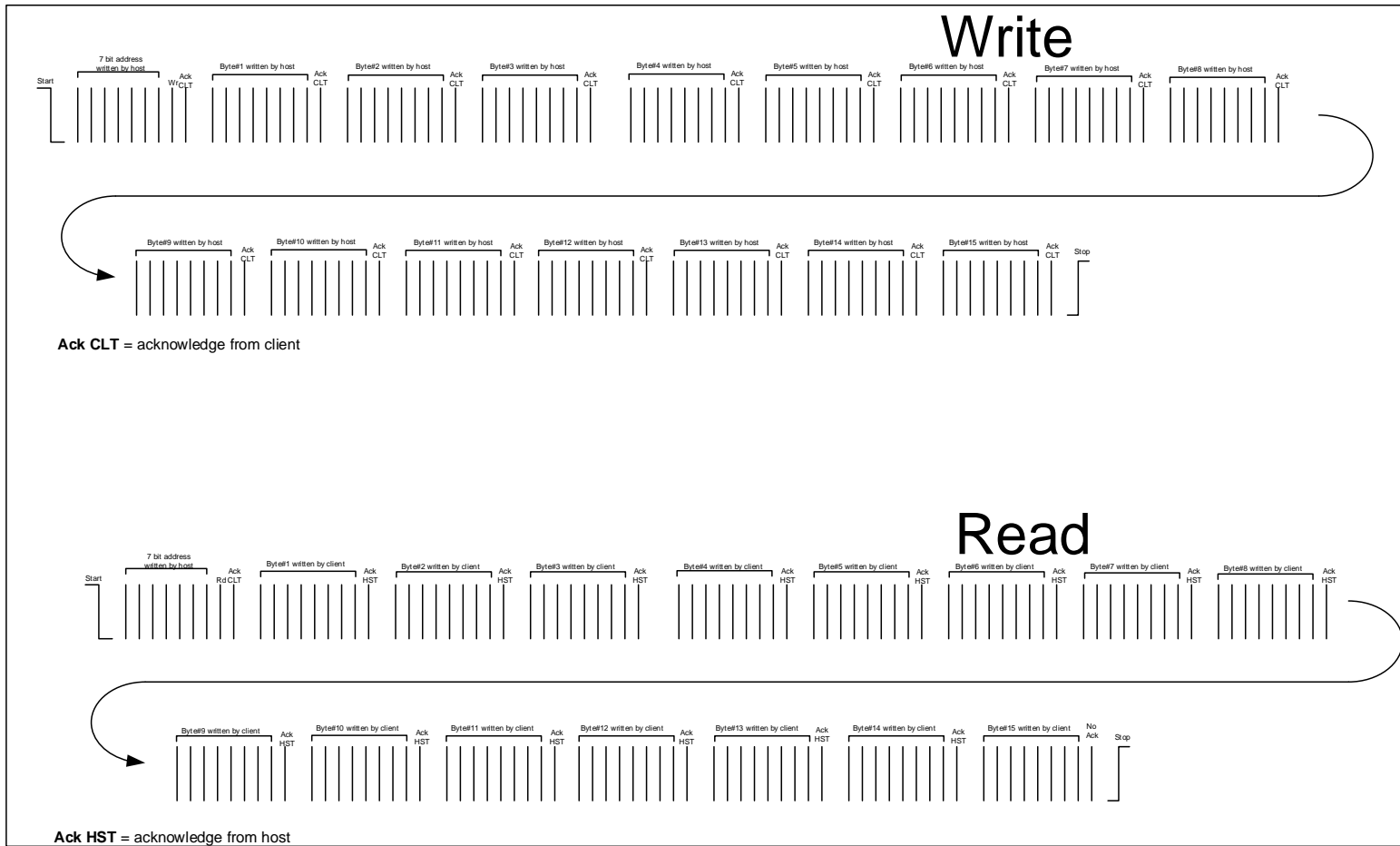
Notes:

1. When I²C is used, clock stretching must be supported by the Host CPU.
2. Shared memory physical layer requires special Host device. See the PD69200M documentation explaining the architecture and the physical layer message transfer.
3. All protocol commands are supported by shared memory architecture except **Save System Settings** (section 3.1.3 [Save System Settings](#)), **Restore Factory Default** (section 3.1.2 [Restore Factory Default](#)) and **Software Download** (section 4. [Software Download](#)). For more details, see the *PD69200M documentation*.

Table 1-2. Communication Information

Time Criteria	Description	Value
Read back time	Minimum waiting time since last 15 bytes transmission and before reading back the telemetry or report from the PoE controller.	30 ms Exceptions: Save = 50 ms Restore = 100 ms
Read back time using message ready I/O	When using I ² C, it is recommended to use the Message_Ready I/O for faster response time. The Host must poll this I/O, before reading back the telemetry, instead of waiting for 30 ms. To activate the Message_Ready I/O, see mask 0x1E at 7.2 BT MASK Registers List .	11 ms to 30 ms Average = 12 ms
Time between commands (Key = 0x00)	Minimum waiting time since last command report and before sending a new command to the PoE controller.	30 ms
I ² C buffer clear timeout	Time limit for clearing the PoE controller's internal I ² C receive buffer, if it does not contain 15 bytes.	500 ms
Shared memory messages	<ul style="list-style-type: none"> • Message transport timing between command and reply. • Time between commands. 	11 ms to 30 ms Average = 12 ms

Figure 1-3. Read Write



Note: The 15-byte message in I²C is sent as (15 x single) data bytes transactions.

2. Messages Structure

The following sections detail the message structure. The message length is constant 15-byte using 1 byte key header and 2 bytes of message CHECKSUM at the end.

2.1 Definitions

The following are the message key types.

- **Command and Program:** Transmitted by the Host to configure the PoE unit. No data is required in response, except a success or failure report.
- **Report:** Transmitted back from the PoE controller in response to commands and programs.
- **Request:** Transmitted by the Host as a request for information from the PoE unit. Telemetry is sent back in response. In case of message error, detected by the PoE controller, a failure report is sent back instead of telemetry.
- **Telemetry:** Transmitted back from the controller in response to Host requests or when PoE unit is out of reset.

Note: Numeric Base: Unless otherwise specified, all numeric parameters are in hex-base format. If a decimal value is expected (for example power level), the user should convert bases before or after sending or retrieving data.

The following table lists the packet structure for messages sent from the Host CPU to the PoE controller.

[0] KEY	[1] ECHO	[2] Subject	[3] Subject1	[4] Subject2	[5] DATA	[6] DATA	[7] DATA
Command/ Program/ Request	—	—	—	—	—	—	—
[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA	[13] CSumH	[14] CSumL	
—	—	—	—	—	—	—	

The following table lists the packet structure for messages received by the Host CPU from the PoE controller.

[0] KEY	[1] ECHO	[2] Subject	[3] Subject1	[4] Subject2	[5] DATA	[6] DATA	[7] DATA
Telemetry/ Report	—	—	—	—	—	—	—
[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA	[13] CSumH	[14] CSumL	
—	—	—	—	—	—	—	

2.1.1 Byte 1: KEY

The Key field defines the type of message sent or received. When the Host CPU transmits a message, the PoE controller acknowledges it by sending a response or telemetry, according to the sent Key type or detected error.

KEY (Hex)	Description	Traffic Flow
0x00	Command	Host CPU→PoE controller
0x01	Program	Host CPU→PoE controller
0x02	Request	Host CPU→PoE controller
0x03	Telemetry	Host CPU←PoE controller
0x04	Test	Host CPU→PoE controller
0x52	Report	Host CPU←PoE controller

Note: Upon PoE out of reset, the Host CPU receives a system status *Telemetry* packet, sent by the PoE controller. When using I²C interface, a read transaction message must be performed by the Host.

2.1.2 Byte 2: ECHO

The ECHO field must be used by the Host to synchronize the sent and received messages. The Host inserts a number between 0x00 to 0xFE and the corresponding response echoes this number. The Host can use any sequence, if two consecutive messages do not use the same ECHO number.

Note: Using the same ECHO number for two consecutive messages causes communication loss.

2.1.3 Byte 3 to 5: SUBJECT, SUBJECT1, SUBJECT2

The SUBJECT fields define the sent message character. The actual values are specific to each message and are detailed at each command.

Note: SUBJECT2 can serve as a DATA field.

2.1.4 Byte 6 to 13: DATA

The DATA fields hold the data transmitted or received by the Host. The actual values are specific to each message and are detailed at each command.

2.1.5 Byte 14 to 15: CHECKSUM

The CHECKSUM data confirms message integrity and it is part of each message, regardless of the message type. The CHECKSUM is a 16-bit word, containing the arithmetic sum of the first 13 message bytes (without CHECKSUM bytes). The Host CPU must calculate this sum before sending it as part of the message. The PoE controller performs the same calculation for the data received and compares the result with the received CHECKSUM. If the received data does not match the CHECKSUM sent, the PoE controller sends a report message containing a CHECKSUM error indication. It is the Host's responsibility to decide how to act in case of an error.

Note: The CHECKSUM fields are shown in the detailed protocol description.

2.2 Port Number Identification

Identify one or more port numbers when creating the messages. This is true when setting various parameters (Set commands) or when requesting a port status (Get or Request commands):

PoE Devices	System	Port Number
Up to 12 PoE devices	<ul style="list-style-type: none"> Up to 48 logical ports Up to 96 physical ports 	<ul style="list-style-type: none"> [0x00–0x2F] for individual logical ports [0x00–0x5F] for physical matrix ports [0x80] for all ports

2.3 Unused Fields “N”

Unused fields that are represented as character “N” with value of 0x4E, are reserved for future use by Microchip.

Notes:

- When sending commands, requests, or program keys, the Host must send 0x4E in the “N” fields. Any other value that is sent instead may be operational in future versions.
- The Host or any user must ignore the Telemetry “N” fields. Telemetry “N” fields are subject to be modified by Microchip without any notice. If any user adds any logic that checks the “N” field, Microchip is not responsible for the result.

Examples: 0x4E and N.

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x3D	0x01 to 0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	System Status	Private Label	N	N	N	N	N	N	N	N

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x60	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Supply	Total Power	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		Val		Val	0x4E	0x4E
Telemetry		Power Consumption		Calculated Power		Available Power		Power Limit		Power Bank	N	N

3. Protocol Messages Description

The following sections describe the various protocol messages.

3.1 System messages

3.1.1 Reset Command

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x55	0x00	0x55	0x00	0x55	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	Reset	—	Reset	—	Reset	N	N	N	N	N

This command resets the PoE controller. Due to this reset, the PoE devices reset themselves. All ports shut down and the PoE controller reboots. As a part of rebooting, a System Status Telemetry message is transmitted back to the Host within $*T_{WAKEUP}$ (see [Get System Status](#) command for more details). If communication between the PoE controller and the Host CPU is I²C bus, then the Host CPU must read this status telemetry. The self-telemetry message echo number is 0xFF for easy Host recognition.

Note: The PoE controller performs reset only when all 15-byte response messages were transmitted out from the communication buffer.

$*T_{WAKEUP}$ = 300 ms typical depending on system architecture.

3.1.2 Restore Factory Default

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x2D	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Program	—	RestoreFact	N	N	N	N	N	N	N	N	N	N

This command restores modified values to factory default values that are part of the firmware release version. Ports shut down after sending this command.

Notes:

1. After sending this command, the Host must not access the MCU controller using I²C or UART for at least 100 ms. After waiting for 100 ms, the command response must be read back (when I²C is being used).
2. A restore action is performed automatically, if after reset, corrupted information is detected.
3. This command is not supported by PD69200M.

System status telemetry is not sent back by the PoE MCU, after the restore operation ends.

3.1.3 Save System Settings

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x06	0x0F	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Program	—	E2	SaveConfig	N	N	N	N	N	N	N	N	N

This command saves the current user value to the non-volatile memory and the user value turns default after any reset. To change the default back to the initial factory values, use the `Restore Factory Defaults` command.

For example, if the Host sets the power limit to 400 to be a default value, then save.

Notes:

1. After sending this command, the Host must not access the MCU controller using I²C or UART for at least 50 ms. After waiting for 50 ms, the command response must be read back (when I²C is being used).
2. This command is not supported by PD69200M.

3.1.4 Set User Byte to Save

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x41	0x00 to 0xFE	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Program	—	UserByte	NVM User Byte	N	N	N	N	N	N	N	N	N

This command assists in verifying that a restore factory default has occurred. The Host sets the User-Byte and then saves this value as part of the new defaults, by using the [Save System Setting](#) command.

If the defaults are restored back to factory defaults, the User Byte value becomes 0xFF. To read the User Byte value, see the [Get BT System Status](#) command.

NVM User Byte: Use any value between 0x00 to 0xFE.

Note: This command is not practical to use at PD69200M, as the save operation is not supported by PD69200M.

3.1.5 Set Private Label

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x3D	0x01 to 0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	SystemStatus	RAM Private Label	N	N	N	N	N	N	N	N

This command assists in verifying that a reset has occurred.

RAM Private label: The private label value is 0x00 after reset. It is recommended that any value higher than 0x00 is used when the Host wants to use this field.

The Private Label value can be read by using **Get BT System Status** request (see section [3.1.6 Get BT System Status](#)).

3.1.6 Get BT System Status

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD0	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	BT System Status	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	Val
Telemetry	—	0x00	CPU Status2 Error Codes	Factory Default	0x00	RAM Private Label	NVM User Byte	Found Devices	N	N	N	Event Exist

This telemetry indicates the actual system status information of the PoE controller. This response is the only response initiated by the MCU, regardless of a request after start-up or after reset.

- **0x00 Fields:** When the 0x00 fields return different values, it means Boot Up error (see section [3.1.6.1 Telemetry at Boot Up Error](#)).
- **CPU status2 Err codes:**
0x00 = No error.
0x01 = Reserved for future use.
0x02 = SPI bus timeout error. (When this value is set, only Host communication operates).
- **Factory default:**
Bit 0 = '1' indicates that factory default parameters are currently set.
- **RAM Private Label:** Saved in the RAM. Equals 0x00 after reset. See the [Set Private Label](#) command.
- **NVM User Byte:** Saved in nonvolatile memory. Equals 0xFF at factory default.
- **Found Devices:**
Bit [7..4] = The number of active devices (range from 0x0 to 0xB).
Bit [3..0] = The number of found devices after boot up (range from 0x0 to 0xB).
- **Event Exist:**
Bit [7..1] = Reserved for future use (must be ignored by the Host).
Bit [0] = When set to 1 indicates that an event occurred. The Host must continue and read section [3.1.7 Get BT Event Cause](#). This bit is cleared when all events are cleared.

3.1.6.1 Telemetry at Boot Up Error

When CPU_Status1_Err field reports on firmware error (bit 1 = '1'), the telemetry structure changes to the following:

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x03	0xFF	Val	0x4E	0x4E	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E
Telemetry	—	CPU Status1 Err	N	N	Err Code	Err Info1	Err Info2	Download Type	N	N	N	N

To distinguish between PD69200, PD69210, or PD69220 firmware errors and to identify the correct error, the following table lists all the error options. Each error can report the described different internal parameter, in addition to the returned value.

Err Name	Err Code	Err Info1	Err Info2	Download Type
Application CRC error Download is required for PD69200	0x4E	0x4E	0x4E	0x4E
Application CRC error Download is required for PD69210/ PD69220	0x4E	0x4E	0x4E	0x33
HW error from Boot Try to program a PD69200 firmware into PD69210/PD69220 device	0x02	CPU Type Boot 0x33	CPU Type App 0x2C	0x33
HW error from Boot Try to program a PD69210/PD69220 firmware into PD69200 device	0x02	CPU Type Boot 0x2C	CPU Type App 0x33	0x4E
Sys Type error from APP Try to program a PD69220 firmware into PD69210 device	0x03	Boot Sys Type 0x40	App Sys Type 0x41	0x4E
Sys Type error from APP Try to program a PD69210 firmware into PD69220 device	0x03	Boot Sys Type 0x41	App Sys Type 0x40	0x4E

The following tables list the internal Boot/Application value options that are being checked for matching during firmware boot up:

Table 3-1. Sys Type Values Option

System type	Product	Value
PD69200 and PD69210	Enhanced PD69208	0x40
PD69220	Enhanced PD69208	0x41

Table 3-2. CPU Type Values Option

CPU type	Value
PD69200	0x2C
PD69210 and PD69220	0x33

3.1.7 Get BT Event Cause

In case of a Boot Up error, the system keeps sending this message every second and only enables initiation of software download protocol, as described in section [4.2 Download Process \(Invalid or Non-Existing Firmware\)](#).

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD1	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	BT Event	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	0x4E	Val	Val	
Telemetry	—	Port Cause Event bits [7..0]	Port Cause Event bits [15..8]	Port Cause Event bits [23..16]	Port Cause Event bits [31..24]	Port Cause Event bits [39..32]	Port Cause Event bits [47..40]	System Event	N	System OkReg	Device event	

This command retrieves the following information:

- **Port cause event bits:** 48 per port event bits telemetry, indicating that an event happened on a port. An event on a port means that the port status was changed. To understand what the event type was, the Host reads the relative port information, by reading port status. Use “**Get BT Port Status**” telemetry information to analyze the exact port event. The event bits are cleared when the correlated event register of the port is read by the user.
- **System Event:** The following table lists the system events. The events are clear on read.

System Event	Bit	Description
Reset or Restore	0	Reset or Restore occurred. The Reset sources are: POR, Reset pin, Reset command, and PD692x0 watchdog.
Vmain Fault	1	When Vmain is out of the range, this bit is set to ‘1’. This bit returns to be 1 after clear on read, if Vmain remain out of range.
System spare events	2 to 7	Future use

- **SystemOkReg:** This register reflecting system OK bits for Host usage, instead of using the xSystem OK pin.
 - **Bit 0**—Vmain is in range:
 - 1 = Vmain is in the defined PoE operational voltage range.
 - 0 = Vmain is outside from the defined PoE operational voltage range (ports status changes to 0x06 and 0x07).
 - **Bit 1**—Over power indication in % (based on [Set BT Power Indication LED](#) settings):
 - 1 = If the system power is above the % value that is defined in the “% Indication ON”.
 - 0 = If the system power is below the % value that is defined in the “% Indication OFF”, set in [Set BT Power Indication LED](#) or if the indication is not operational.
 - **Bit 2**—Over power indication in Watts (based on [Set BT Power Indication LED](#) settings):
 - 1 = If the system power is above the watt value that was defined in the “Indication ON”.
 - 0 = If the system power is below the watt value that was defined in the “Indication OFF”, set in [Set BT Power Indication LED](#) or if the indication is not operational.
- **Device Event:** This field reflects a PD69208 device error event (bit per device, up to 12 bits).
 - **Bit 0**—‘1’ means an event on device 0.
 - **Bit 1**—‘1’ means an event on device 1.
 - || ...
 - || ...
 - **Bit 11**— ‘1’ means an event on device 11.
 - **Bits [15..12]** —Reserved for future use.

The correlated event bit is cleared when the device event register is read by the user.

The actual device event reason is read through **Get BT PoE Device Status** command (see section [3.2.2 Get BT PoE Device Status](#)), by analyzing the device status field.

3.1.8 Get System Status2

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x84	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	System Status2	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	0x00	0x00	0x00	0x00	0x00	Val	Val	
Telemetry	—	SRS	GIE1	Reset Info	GIE3	DB Recovery	Rsrvd	Rsrvd	Rsrvd	Save Command Counter	0x0000	

SRS – System Reset Status:

This byte is formatted from KL15 reset causes register to be protocol backwards compatible.

- **Bit 0**—Always '0'
- **Bit 1**—LVD—Low Voltage Detect—(not supported at this point in time). The CPU supply drops below the LVD trip voltage and LVD reset occurs.
 - 1 = Reset caused by LVD trip or POR.
 - 0 = Reset not caused by LVD trip or POR.
- **Bit 2**—Reserved for internal use.
- **Bit 3**—Lockup-Unrecoverable exception.
- **Bit 4**—IOP—Illegal Opcode Reset caused by an attempt to execute an unimplemented or illegal opcode.
 - 1 = Reset caused by an illegal opcode.
 - 0 = Reset not caused by an illegal opcode.
- **Bit 5**—COP—Computer Operation Properly (COP) Watchdog Reset was caused by the COP watchdog timer timing out.
 - 1 = Reset caused by COP timeout.
 - 0 = Reset not caused by COP timeout.
- **Bit 6**—PIN—External Reset Pin. Reset was caused by an active-low level on the external reset pin.
 - 1 = Reset caused from external reset pin.
 - 0 = Reset not caused by external reset pin.
- **Bit 7**—Power On Reset (POR). Reset caused by the power-on detection logic because the internal supply voltage was ramping up at the time. If supported, the low-voltage reset (LVD) status bit is also set to indicate that the reset occurred while the internal supply was below the LVD threshold.
 - 1 = POR caused reset.
 - 0 = Reset not caused by POR.
- **GIE1—General Internal Error 1:** When different than 0x00, it indicates a general internal error. The flags are cleared after read or power-up. The flags retain their status after a reset that is not caused by power-up. Bit 0 - Clock Loss IRQ occurred.
 - Bit 1—UART IRQ occurred at I²C mode.
 - Bit 2—Unauthorized IRQ occurred.
 - Bit 3—I²C Arbitration loss occurred.
 - Bit 4—External clock recovery failed (not supported MCU runs on Internal clock only).
 - Bit 5—POE Vmain out of range flag.
 - Bit 6—CPU voltage warning flag (not supported CPU can operate from 2 V).
 - Bit 7—UART error IRQ occurred.
- **Reset Information**—This byte indicates information about the reason for software reset. The flags are cleared after read or power up. The flags retain their status after reset that is not caused by power-up.
 - Bit 0—If '1', the software reset occurred due to communication reset command.
 - Bit 1—If '1', the software reset occurred due to clock recovery failure for more than 5 s (not supported MCU runs on Internal clock only).
 - Bit 2—If '1', the software reset occurred due to PoE device failure.
 - Bit 3—If '1', I²C module was restarted.
 - Bit 4—If '1', the software reset occurred due to self-reset.
 - Bit 5–7—Always '0'.
- **GIE3**—Reserved.
- **DB Recovery**—This field reports the system recovery flow results.
 - 0—Field clear.
 - 1—No recovery activity was performed.
 - 2—System recovered successfully from valid structure.
 - 3—Recovery structure CRC error.
 - 4—Recovery structure version error.

- 5—Reserved for internal usage.
- 6—PoE manager was reset during crash event.
- 7—Entered to recovery mode, wait for Host reset (this value stays till Reset).
- 8—For internal usage: Recovery structure is valid with correct timestamp.
- 9—Reserved for internal usage.
- 10—Number of detected PoE managers ICs before crash is different from the number detected after crash.
- 11—Recovery cannot be executed because the recovery mask is disabled.
- 12—Recovery CRC calculation is in reversed order than the expected value.
- 13—Recovery structure is valid but has a mismatch with the age stamp stored in the PD69208 register.

The reported value is clear on read.

- **Save Command Counter**—This byte indicates the number of times the **Save** command was used. It is a 1-byte cyclic counter.

3.1.9 Set BT Events Interrupt Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x64	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	BT IRQ Mask	System Events Mask Register	Device Events Mask Register	Port Events Mask Register	N	N	N	N	N	N

This command sets the interrupt mask, which enables or disables interrupt function events.

Each Event Mask register bit defines whether an event, represented in its corresponding bit of the Event register, is to be masked or unmasked. This masking affects the Interrupt pin output and does not affect the Event register itself.

0 = masked, interrupt is not generated when the event happens.

1 = unmasked, interrupt is generated when the event happens.

- **System Events Mask Register:** The following table lists the events description.

System Event	Bit	Description
Reset or Restore	0	Reset or Restore occurred. The Reset sources are: POR, Reset pin, Reset command, and PD692x0 watchdog.
Vmain Fault	1	When Vmain is out of range, this bit is set to '1'. This bit returns to be 1 after clear on read, if Vmain remain out of range.
System spare events	2 to 7	Future use

- **Device Events Mask Register:** The following table lists the events description.

Event	Bit	Description
Disconnection temperature	0	When the PoE device exceeded the safe operation temperature (ports status changes to 0x36), this bit is set to '1'.
User defined temperature	1	When the PoE device exceeded the predefined user temperature limit, this bit is set to '1'.
PoE device fault	2	When the PoE device is faulty, this bit is set to '1'. (Device lost, refresh in progress).
PoE device refreshed	3	The PD692x0 managed to recover a lost device.
Reserved	4 to 7	—

- **Port Events Mask Register:** The following table lists the events description.

Event	Bit	Description
Port turned on	0	When any port turns on (its status changes to "0x80 up to 0x9F"), this bit is set to '1'.
Port turned off by user	1	When Port delivers power, and turns off by disabling the port (status changed from delivering statuses "0x80 up to 0x9F" to 0x08 or 0x1A).
Counters Related Event	2	<ul style="list-style-type: none"> • UDL: When port turns off due to under-load (its updated status is 0x1E) • OVL: When port is overloaded (its updated status is 0x1F) • SC: When port turns off due to short circuit (its updated status is 0x34) • POWER DENIED: When port turns off due to power management (its updated status is 0x3C or 0x3D) • INVALID SIG: When port failed in connection check or detection (its updated status is 0x1C, 0x25, or 0xA7) • CLASS ERROR: When port failed in classification (its updated status is 0x43)
Open Event	3	Port status was changed from any status to 0xA8 (port is not connected).
Port fault (other)	4	When Port delivers power, and turns off due to port thermal protection, external voltage injection, internal hardware fault or Vmain out of range Low/High (its status changes to 0x35, 0x24, 0x12, 0x07, and 0x06 accordingly) this bit is set to '1'.

3.1.10 Get BT Events Interrupt Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x63	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	IRQMask	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	System Events Mask Register	Device Events Mask Register	Port Events Mask Register	N	N	N	N	N	N	N	N

This command retrieves the register mask value that enables each event of the interrupt function.

0 = masked: Interrupt is not generated when the event happens.

1 = unmasked: Interrupt is generated when the event happens.

3.1.11 Set Individual Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x56	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	Individual_Mask	Mask Key Number	En/Dis	N	N	N	N	N	N	N

This command sets the individual mask bits. Each mask determines various aspects of the PoE system behavior.

The masks are ordered according to Mask Key Numbers from low to high. The list can be found in [Appendix 7.2 BT MASK Registers List](#).

3.1.12 Get Individual Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x56	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Individual_Mask	Mask Key Number	N	N	N	N	N	N	N	N
0x03	##	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	En/Dis	N	N	N	N	N	N	N	N	N	N

Telemetry of “Individual_Mask” value settings. See section [7.2 BT MASK Registers List](#).

3.1.13 Set BT Power Indication LED

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x05	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	BT Power Indication	Indication Type	%/Watts Indication ON	%/Watts Indication OFF	Indication OFF Delay	N	N	N	N	N

This command sets the percentage levels or watt levels to indicate that the power consumption is getting closer to the limit.

Indication Type:

This field selects the type of information to be configured in the set command: % or Watts.

0x00 = %

0x01 = Watts

The entire command is ignored, if other values are used in this field.

Percentage Use %:

%IndicationOn—Any value from 10 to 100. If the system power consumption is greater than this (% * Budget), the LED indication is ON.

%IndicationOff – Any value from 10 to 100 (< %IndicationOn). If the system power consumption is below this (% * Budget), the LED indication is OFF.

The difference between the %IndicationOn and the %IndicationOff is used as hysteresis.

This indication is assigned to the System_OK pin when individual mask 0x28 value = 2. (Appendix [7.2 BT MASK Registers List](#)).

Limitations for %:

Any value less than 10 is considered as 10% and any value greater than 100 is considered as 100%.

The command assumes that On% > Off%. Otherwise, the maximum between the values will be treated as On% and the minimum will be considered as Off%.

Watts Use:

IndicationOn—Any value between 0x00 to 0xFF, in Watts. If the system available power is lower than this value, the LED indication is ON.

IndicationOff—Any value between 0x00 to 0xFF, in Watts (> IndicationOn). If the system available power is higher than this value, the LED indication is OFF.

The difference between the IndicationOn and the IndicationOff is used as hysteresis.

This indication is assigned to the System_OK pin when individual mask 0x40 value = 4 (Appendix [7.2 BT MASK Registers List](#)).

Limitations for Watts:

- The command assumes that $\text{On}[w] \leq \text{Off}[w]$. Otherwise, the new settings are ignored.
- When On value = Off value, then an inherent gap of 1 W occurs between on and off, due to the resolution steps of 1 W.

Indication OFF Delay (Can be used for % or Watts):

When the value is set above 0x00, if the indication was ON and indication OFF conditions are met, the indication starts blinking during the delay and turns off only after the defined delay ends. The delay steps are 5 seconds per LSB, up to 0x1F. Any value above 0x1F is ignored (0x00 = No delay).

The led blinks in 1 Hz (0.5 seconds ON, 0.5 seconds OFF).

3.1.14 Get BT Power Indication LED

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x08	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	BT Power Indication	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	% Indication ON	% Indication OFF	Watts Indication ON	Watts Indication OFF	Indication OFF Delay	N	N	N	N	N	N

Telemetry for power indication LED settings, see [Set Private Label](#) explanation.

3.1.15 Set BT Class Additional Power

KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x07	0xBB	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	BT Class Power	Class Type	Added Class Power Value	N	N	N	N	N	N	N

This command sets the class power according to user definition, overrides the default value.

The new values settings are added to the initial system defaults and can be saved when using the save command.

Class Type:

- 1—Select Class1
- 2—Select Class2
- 3—Select Class3
- 4—Select Class4
- 5—Select Class5
- 6—Select Class6
- 7—Select Class7
- 8—Select Class8

Note: Other Class Type values are not allowed and are replied with communication error.

Added Class Power Value:

This field sets the new class power value. The LSB step is 0.1 W. For example, to set class 4 power from default of 30 W to 32 W, the required add class power value = 20 decimal (0x14).

Notes:

- It is recommended to use this command as part of system initialization.
- The maximum values that can be set through the protocol are predefined, and guarantee that the class power order value is from low to high. $1 < 2 < 3 < 4 < 5 < 6 < 7 < 8$.
Added class power values above the predefined maximum are clamped.

3.1.16 Get BT Class Power

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD2	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	BT Class Power	Class Type	N	N	N	N	N	N	N	N
0x03	##	Val		Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	Class Power Value		Added Class Power Value	Max Added Class Power	N	N	N	N	N	N	N

This command reads the class power with the added power (if added power is different from 0) of a specific class.

Class Type:

- 1—Select Class1
- 2—Select Class2
- 3—Select Class3
- 4—Select Class4
- 5—Select Class5
- 6—Select Class6
- 7—Select Class7
- 8—Select Class8

Note: Class Type value above 8 is replied with communication error.

Class Power Value (in 0.1 W per bit):

Class power value = Initial class power value + added class power value.

For example: Class power value of 32 W returns 0x140 (320 decimal).

Added Class Power Value (in 0.1 W per bit):

The field represents the added class power value that was configured by the user.

Max Added Class Power (in 0.1 W per bit):

The field represents the maximum possible added class power that can be configured.

An attempt to configure added class power above this value is clamped to this value.

3.1.17 Get Software Version

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x1E	0x21	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Versionz	SW Version	N	N	N	N	N	N	N	N
0x03	##	Val	0x4E	Val	Val		Val	Val	Val		Val	

.....continued												
[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
Telemetry	—	HW Version	N	Prod#	SW_Version		Param#	Build#	Internal SW#		0x0000	

This command retrieves the PoE controller hardware and software versions.

- **H.W. Version:** Identifies the PCB version according to Microchip's internal conversion table (usually 0x00 is return).
- **Prod #:** Product number representing the product that this firmware is aimed for. 22d for PD69200 PoE controller.
- **S.W. Version:** Identifies the software version by a decimal representation value and extracting the digits as follows: Ma (fourth and third digits) Mi (second digit), and Pa (first digit).
 - **Ma** = SW_Version/100
 - **Mi** = (SW_Version/10) Modulo 10
 - **Pa** = (SW_Version) Modulo 10
- Ma: Major revision, Mi: Minor revision, Pa: Patch revision.
- **Param #:** Parameters code number. 0x00 means that the default factory parameters are as published in this document. Any other number represents other factory defaults. The following is the list of the available parameter code numbers.
Available:

- 00 = Resistor and Legacy.
- 01 = Reserved. (old products).
- 02 = Reserved. (old products).
- 03 = Resistor detection, no Legacy.
- 04 = Reserved. (old products).
- 05 and up = customized.

- **Build Num:** Incremental number.
- **Internal SW #:** Operation number used for production line.

Note: The Internal_SW# and the Build# together are unique.

- **Example:** SW Ver = 0410d -> Ma =04, Mi =1, Pa =0
Software version = 04.1.0
Full software version is: Prod#. SW Version. Build#. Param#
Example: 22.0410.03

3.1.18 Recovery Command

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x04	##	0x07	0xC2	Val		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Test	—	Global	Recovery	Code		N	N	N	N	N	N	N

This command initiates a recovery activity, correlated to “Host recovery functionality for Dragonite”.

Code: 0x909B—Recovery request. This code enabled Host crash without PoE information loss. By receiving this code, the KL15 firmware prepares a recovery structure. The reply for the command is used as ACK for entering recovery mode (MCU enters to communication loop). After receiving the ACK, the Host can pull the MCU reset pin once. When reset is released, all PoE ports information is recovered.

Note: After KL15 recovery, the recovery DB CRC is deliberately damaged so that it is used only once.

3.1.19 Log Sector Clear and Stamp (The Command is Ignored)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x07	0x01	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Test	—	Sector	Clear_Log	N	N	N	N	N	N	N	N	N

The command replies OK and does nothing.

3.1.20 UART2 Tunneling Command (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0xAB	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Command Tunnel	—	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data

This command is proprietary for the usage of Microchip Midspans NMS card. Other customer Hosts or GUI implementers should not use this command.

Data contains the information that is transmitted to the other Microchip Midspans NMS card through UART2.

A Reply is transmitted back to the Microchip Midspans NMS card after the message is sent on UART2.

3.1.21 UART2 to UART1 Telemetry Tunneling (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0xAC	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Telemetry Tunnel	0xFF	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data

This telemetry is proprietary for the usage of Microchip Midspans NMS card. Other customer Hosts or GUI implementers should not use this command. This message is received through UART2 from another midspan. It is sent, as is, through UART1, to the Host.

The echo number—0xFF tells the Host that this message is not an ordinary reply to one of the Hosts' messages.

3.1.22 Get Product Serial Number (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x13	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Product Info	N	N	N	N	N	N	N	N	N
0x03	##	0x30	Val	Val	Val	Val	Val	Val	Val	Val	Val	0x4E
Telemetry	—	Maximum PD692x0_BT Logical Ports	Product serial number string									N

3.2 PoE Device messages

3.2.1 Set PoE Device Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x87	Val	0x4E	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	Device Params	CSNum	N	TSH [Celsius]	N	N	N	N	N	N

- **CS Num:** PoE device address number can be 0x00 to 0x0B, according to PoE devices address settings.
- **Temperature Alarm (TSH):** The upper temperature alarm limit per PoE device.

Whenever the PoE device temperature exceeds the TSH limit, an event is indicated in the device event field, user defined temperature event (bit 1). The possible configuration range is 0 to 150 in 1 °C step. Out of range values lead to communication error report.

3.2.2 Get BT PoE Device Status

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD3	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	BT Device Info	CSNum	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Telemetry	—	CSNum	PoE Device—Version	Device Status	Device Event	Device Found	MCHP Use8	Temperature [Celsius]	TSH [Celsius]	Reset/POR Counters	N	N

The auto PoE device detection procedure is executed during the system initialization stage, when the PoE controller is reset or powered-up. The purpose of this procedure is to assign port numbers per PoE device without any interference from the Host side. It is essential to maintain port numbering, even if one or more PoE devices do not operate or do not communicate.

- **CS-Num:** PoE device number can be 0x00 to 0x0B, according to PoE devices address settings.
- **PoE Device Version:** PoE device revision received from PoE device internal register. If the device does not respond, 0xFFFF is returned. The PoE Device Version fields are for internal usage.
- **Device Status:** The value is determined according to the following table:

ASIC Status	Status Description
0x00	No PoE device found
0x01	OK—Expected PoE device found (Zone1)
0x02	Device is currently refreshed
0x03	Reserved
0x04	Device lost or different from expected
0x05	Device error 1 (Zone2)—Not in use
0x06	Device error 2 (Zone2)—Not in use
0x07	Device error 3 (Zone2)—Not in use

.....continued	
ASIC Status	Status Description
0x08	Device Vmain error
0x09	Device Vmain < System AVG Vmain by 2 V or more. This error, if exists, takes precedence over 0x05 to 0x08.
0x0A	OK—Expected PoE device Found (Zone3)—Not in use

Device Event: Clear on read bits.

Event Reason	bit	Description
Disconnection temperature	0	When the PoE device exceeds the safe operation temperature (ports status changes to 0x36), this bit is set to '1'.
User defined temperature	1	When the PoE device exceeds the predefined user temperature limit, this bit is set to '1'. Note: When this bit is being set, the host is recommended to increase POE ventilation.
PoE device fault	2	When the PoE device is faulty, this bit is set to '1'. (Device lost, refresh in progress).
PoE device refreshed	3	The PD692x0 managed to recover a lost device.
Reserved	4 to 7	—

- **Device Found:** The device type that was found during system initialization scan function (after reset or powered-up):
Upper nibble [7..4]

- Bits [7..6] are reserved for future use.
- Bit 5 represent a PD6920x device or PD39208 device
 - 0—PD6920x device was found
 - 1—PD39208 device was found
- Bit 4 represents an M device or T4 device
 - 0—T4
 - 1—M

Lower nibble [3..0]

- **0**—Invalid/non-existing PoE device
 - **4**—4-port PoE device.
 - **8**—8-port PoE device.
- **MCHP Use8:** This field returns internal VCAL Counter. The counter is advanced every time that internal calibration voltage is out of the pre-defined tolerance. The counter is clear on read and does not wrap around when it reaches 0xFF value. When VCAL is out of specifications, its value is not used for calibrating voltage measurements.
 - **Temperature:** Temperature telemetry measured by the PoE device. If PoE device does not exist, the response is 0xFF. This field returns negative temperature down to –40 °C. If (Reported_temperature_value > 205), the real temperature is (256–Reported_temperature_value). Units are in Celsius.
 - **Temperature Alarm (TSH):** Temperature Switch High is the upper temperature limit per PoE device. (1 LSB = 1 °C). Whenever the PoE device temperature exceeds the TSH limit, an event is indicated in the device event field, user defined temperature event (bit 1).
 - **Reset/POR Counters:**

- **Reset/POR Counters Reset Count Bits [7..4]:** This field counts the number of times that the PD69208 device was reset by command, external pin, or internal communication watchdog. The counter is clear on read and does not wrap around when it reaches 0xFF value.
- **POR Count Bits [3..0]:** This field counts the amount of time that the any POE device got a POR condition while the PD692x0 manager continues to work without being reset. The counter is clear on read and does not wrap around when it reaches 0xFF value.

3.2.3 Set PoE Device Register

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x04	##	0x04	0x53	Val		Val		Val	0x4E	0x4E	0x4E	0x4E
Test	—	Test	WriteAsicReg	Register Address		Register Data		Device #	N	N	N	N

This command writes a value to a specific register inside the selected PoE device chip.

Register Address: A 16-bit register address based on PoE device register map.

Register Data: The data to be set for the selected register, based on register fields.

Device #: The device number to access, starts from 0x00 up to 0x0B, depending on the number of devices in the system.

3.2.4 Get PoE Device Register

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x04	0x52	Val		Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Test	ReadAsicReg	Register Address		Device #	N	N	N	N	N	N
0x03	##	Val		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	Register Data		N	N	N	N	N	N	N	N	N

This command returns a value from a specific register inside selected PoE device chip.

Register Address: A 16-bit register address based on PoE device register map.

Device #: The device number to access, starts from 0x00 up to 0x0B, depending on the number of devices in the system.

Register Data: The data that is read from the register of the defined device.

3.2.5 Get PoE Device Error Log (Return 0 Telemetry)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xC3	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Device Log	CS_Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	0x00	0x00	N	N	N	N	N	N	N	N	N

This command is not supported and returns 0 in the relevant fields to avoid the Host errors.

3.2.6 Get Log Sector Status (Return 0 Telemetry)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xC4	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Log Sector Status	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	0x00	0x00		N	N	N	N	N	N	N	N

This command is not supported and returns 0 in the relevant fields to avoid the Host errors.

3.3 PoE Port Messages

3.3.1 Set Temporary Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x43	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Channel	TmpMatrix	CH Num	Physical Number A	Physical Number B	N	N	N	N	N	N

This command sets values in the port conversion matrix. Programming this matrix map sets the physical port numbering arrangement with respect to the Host system port numbering. This matrix feature gives the designer flexibility in laying out PCB traces. The command supports only 2-pair configuration. The command supports up to 48 logical ports (0 to 47) and up to 96 physical ports (0 to 95). The command supports a mix of 4-Pair/2-Pair configurations.

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Device numbering is based on SPI address settings. (The lowest address that responds to MCU messaging is treated as the first device). Automatic device search is performed after any MCU Reset. Physical port numbering should be calculated based on the number of valid PoE device addressing and the number of supported ports on each device.

In a system that is structured from devices of 8 ports (device ports 0 to 7):

Physical port#11 = Second device port #3 (device port is counted from 0, n = 3).

Equation: Physical port # = ((Device – 1) x 8) + n

For example, if Ethernet 4-Pair PSE port, logical number 5 is connected to second PoE device port#0 (Alt-A) and port#1 (ALT-B), then CH Num 5 must be programmed to Physical Number A: 8, Physical Number B: 9.

If Ethernet 2-pair PSE port, logical number 5 is connected to the third PoE device port#0, then CH Num 5 must be programmed to Physical Number A: 16, Physical Number B: 255.

When Physical Number B = 255 (0xFF), the port B is undefined.

Steps for configuring a matrix:

1. Configure the temporary matrix using `Set Temporary Matrix` command.
2. Once all ports have been set on the temporary matrix, the `Program Global Matrix` command must be sent to activate the new matrix. During the activation, the new matrix is validated. Only the valid matrix is activated. If validation fails, an error message is reported and the old matrix is used. If validation passes, a successful message is reported, and the new matrix is used.
3. If port A is configured and not found, the logical port status returns 0x37 (unknown device, see section [7.1 Port Status](#)). The port is not functional.

Notes:

- 4-Pair configured port can be activated as 2-pair according to other commands settings (Future).
- If port A is set to existing physical port and port B is undefined (0xFF), the logical port is treated as 2-pair port with no back-off activation.
- If port B is set to existing physical port and port A is undefined (0xFF), the logical port is treated as 2-pair port with automatic back-off activation.
- If port A or B are configured with non-existing physical port number (example: physical port 36 in 3 devices system), the logical port status returns 0x11 (port is yet undefined, see section 7.1 Port Status).
- **CH Num:** The logical port number, as referred to by the host CPU and shown on the PSE's front panel. See section 2.2 Port Number Identification.
- **Physical Number A:** The first physical port number, according to the output pins of the integrated solution (for example, PD69208/PD69204 device), expected as ALT-A. Valid values 0x00 to 0x5F, 0xFF.
- **Physical Number B:** The second physical port number, according to the output pins of the integrated solution (for example, PD69208/PD69204 device), expected as ALT-B. Valid values 0x00 to 0x5F, 0xFF.

3.3.2 Get Physical Port Number from Temporary Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x43	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	TmpMatrix	CH Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val or 0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	Physical Number A	Physical Number B or 'N'	N	N	N	N	N	N	N	N	N

Telemetry for temporary matrix data.

- **CH Num:** The logical port number, as referred to by the host CPU and shown on the PSE's front panel. See section 2.2 Port Number Identification.
- **Physical Number A:** The first physical port number, according to the output pins of the integrated solution (for example, PD69208/PD69204 device), that supports 2-pair or 4-pair.
- **Physical Number B:** The second physical port number, according to the output pins of the integrated solution (for example, PD69208/PD69204 device), supports 4-pair only. The configured value is returned, if individual mask 0x34 is set to '1'. 0x4E is returned, if individual mask 0x34 is set to '0'.

3.3.3 Program Global Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x43	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Global	TmpMatrix	N	N	N	N	N	N	N	N	N

This command causes temporary matrix values to be copied to the active working matrix. Upon completion of this command and successful matrix validation, the active matrix is updated, PD69200 software is restarted, and the status of PoE ports is refreshed according to the new matrix. During this flow, ports are disconnected.

3.3.4 Get Physical Port Number from Active Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x44	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	ChannelMatrix	CH Num	N	N	N	N	N	N	N	N

.....continued												
[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x03	##	Val	Val or 0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	Physical Number A	Physical Number B OR 'N'	N	N	N	N	N	N	N	N	N

Telemetry for active matrix data.

- **CH Num:** The logical port number, as referred to by the Host CPU and shown on the PSE's front panel. See section 2.2 [Port Number Identification](#).
- **Physical Number A:** The first physical port number, according to the output pins of the integrated solution (for example, PD69208/PD69204 device), that supports 2-pair or 4-pair.
- **Physical Number B:** The second physical port number, according to the output pins of the integrated solution (for example, PD69208/PD69204 device), supports 4-pair only. The configured value is returned, if individual mask 0x34 is set to '1'. 0x4E is returned, if individual mask 0x34 is set to '0'.

3.3.5 Get All Ports Delivering Power State

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xC0	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	AllPorts Delivering	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	Ports [7..0]	Ports[15..8]	Ports [23..16]	Ports [31..24]	Ports [39..32]	Ports [47..40]	N	N	N	N	N

The above commands retrieve bit value of '1' for each logical port that delivers power and the same bit value 0 for each logical port that is not delivering power. Each byte is structured from MSB (high port count) to LSB (low port count). The command supports up to 48 logical ports.

3.3.6 Set BT Port Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0xC0	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E
Command	—	Channel	BT Port Config1	Port Num	Port Mode CFG1	Port Mode CFG2	Port Operation Mode	Add Power for Port Mode	Priority	N	N	N

This command can set various configuration parameters of a single port or apply the configuration to all system ports. The command can enable/disable port operation, disable legacy capacitor support, set the power limit, set the priority, and set the PM mode of the BT port.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F, AllChannels = 0x80).
- **Port Mode CFG1:** This field enables/disables the port, to enable or disable recovery feature per port or to enter force power mode.
Setting this field to 0xF leaves the port with the last configuration untouched. Any other value is reserved for future use and is ignored without generating an error.

Bits [3..0]—Port Enable Modes:

0x0: Port Disable

0x1: Port Enable

0x2: Port Enable with ignored inrush check. At the end of port power up flow, ILIM state is ignored and the port continues to regular ON state.

0x3: Port Force Power 4 P–60 W/2 P–30 W

0x4: Port Force Power 4 P–90 W/2 P–45 W

0xF: Do not change settings

Changing **Port Mode CFG1** field causes port shutdown. It continues to behave according to the new configuration after the shutdown.

Note: Force power has its own pre-defined behavior, regardless of the selected **Port Operation Mode** field.

Bits[7..4]—Special Port Configuration Bits

Bit [4]—Ignore PD Auto-Class Request: When this bit is set, if a PD request for auto-class is found during the LCE finger, the auto-class power measurement is not performed after port inrush. Instead, a regular assigned class power is performed, like auto-class is never requested. The PD request bit that is found will be reported in the **Auto class support:** Bits[15..12] field, at [Get BT Port Class](#) telemetry.

Bits[7..5]—Reserved for future use (must be kept at 0 when not used).

- **Port Mode CFG2:**

Bits [3..0]—BT port PM mode

0x0: The port power that is used for power management purposes is dynamic (I_{port} x V_{main}).

0x1: The port power that is used for power management purposes is port TPPL_BT.

0x2: The port power that is used for power management purposes is dynamic for non LLDP/CDP/Autoclass ports and TPPL_BT for LLDP/CDP/Autoclass ports.

0xF: Do not change settings.

Note: Other values are reserved for future use and are ignored.

Bits [7..4]—Class Error Operation Select

0x0: Class error configuration is disabled; class error handling is according to port operation mode description only.

0x1: Request class: SSPD = 3, DSPD = 3

0x2: Request class: SSPD = 4, DSPD = 3

0x3: Request class: SSPD = 6, DSPD = 4

0x4: Request class: SSPD = 8, DSPD = 5

0x5 to 0xE: Reserved for future usage

0xF: Do not change selection

Note: If this field is set to value 0x1 to 0x4 and special modes with defined class error are selected (like mode 0x21), the specific class error in the mode takes precedence and the rest of the classification errors are according to the above field selection.

- **Port Operation Mode**

This parameter sets a combination of various port behaviors: Legacy detection, port power, classification fingers, and 4-pair operation.

Notes:

- Values that are not listed are reserved for future use, not recommended, and are ignored.
- Changing operation mode causes port disable and enable automatically with relevant event and status report.
- A 4P port of SSPD type with assigned class 1 to 4 is powered-up as 2P primary.

Table 3-3. 4-Pair/2-Pair BT Compliant Modes

Value Set	Configuration Name	Port Operation Description
0x00	4P BT 90 W (4P Matrix)	This mode is Type4 BT compliant up to 90 W Maximum logical port power = 90 W Legacy detection = Disable
	2P BT 30 W (2P Matrix)	This mode is Type3 BT compliant up to 30 W Maximum logical port power = 30 W Legacy detection = Disable
0x01	4P BT 60 W (4P Matrix)	This mode is Type3 BT compliant up to 60 W Maximum logical port power = 60 W Legacy detection = Disable
	2P BT 30 W (2P Matrix)	This mode is Type3 BT compliant up to 30 W Maximum logical port power = 30 W Legacy detection = Disable
0x02	4P BT 30 W (4P Matrix)	This mode is Type3 BT compliant up to 30 W Maximum logical port power = 30 W Legacy detection = Disable
	2P BT 30 W (2P Matrix)	This mode is Type3 BT compliant up to 30 W Maximum logical port Power = 30 W Legacy detection = Disable
0x03	4P BT 15 W (4P Matrix)	This mode is Type3 BT compliant up to 15 W Maximum logical port power = 15 W Legacy detection = Disable
	2P BT 15 W (2P Matrix)	This mode is Type3 BT compliant up to 15 W Maximum logical port power = 15 W Legacy detection = Disable
Note: In all the above modes, port power allocation is class based.		

Table 3-4. 2-Pair AT Compliant Modes

Value Set	Configuration Name	Port Operation Description
0x09	4P as 2P-AT 30 W (4P Matrix)	<p>This mode is Type2 AT/AF compliant up to 30 W with class-based power, delivers power over 2P-Primary only.</p> <p>The generated number of fingers is class dependent:</p> <p>Classes 0 to 3 = Single narrow finger + Mark till power-up.</p> <p>Class 4 = 2x narrow fingers that must report identical class value.</p> <p>Class power is per PD Type:</p> <p>Classes 0 to 3 are treated as requested class 3 = 15 W (Type 1), Class4 = 30 W (Type2).</p> <p>Demotion is not supported.</p> <p>Maximum logical port power = 30 W</p> <p>Legacy detection = Disable</p> <p>Note: Primary pair-set must be valid detected and Secondary pair-set must be valid detected or open (other values are considered as logical port detection failure with no powering). All PDs are treated as SSPD.</p>
	2P AT 30W (2P Matrix)	<p>This mode is Type2 AT/AF compliant up to 30 W with class-based power.</p> <p>The generated number of fingers is class dependent:</p> <p>Classes 0 to 3 = 1 narrow finger,</p> <p>Class 4 = 2x narrow fingers that must report identical class.</p> <p>Class power is per PD Type:</p> <p>Classes 0 to 3 are treated as requested class 3 = 15 W (Type 1), Class4 = 30 W (Type2).</p> <p>Demotion is not supported.</p> <p>Maximum logical port power = 30 W</p> <p>Legacy detection = Disable</p>

Table 3-5. 4-Pair/2-Pair Non-Compliant Modes

Value Set	Configuration Name	Port Operation Description
0x10	4P BT 90 W + Legacy detection (4P Matrix)	<p>This mode is Type4 BT up to 90 W</p> <p>Maximum logical port power = 90 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p>
	2P BT 30 W + Legacy detection (2P Matrix)	<p>This mode is Type3 BT up to 30 W</p> <p>Maximum logical port power = 30 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p>

.....continued

Value Set	Configuration Name	Port Operation Description
0x11	4P BT 60 W + Legacy detection (4P Matrix)	This mode is Type3 BT up to 60 W Maximum logical port power = 60 W Legacy detection = Enable (Legacy detected PD is treated as SSPD)
	2P BT 30 W + Legacy detection (2P Matrix)	This mode is Type3 BT up to 30 W Maximum logical port power = 30 W Legacy detection = Enable (Legacy detected PD is treated as SSPD)
0x12	4P BT 30 W + Legacy detection (4P Matrix)	This mode is Type3 BT up to 30 W Maximum logical port power = 30 W Legacy detection = Enable (Legacy detected PD is treated as SSPD)
	2P BT 30 W + Legacy detection (2P Matrix)	This mode is Type3 BT up to 30 W Maximum logical port power = 30 W Legacy detection = Enable (Legacy detected PD is treated as SSPD)
0x13	4P BT 15 W + Legacy detection (4P Matrix)	This mode is Type3 BT up to 15 W Maximum logical port power = 15 W Legacy detection = Enable (Legacy detected PD is treated as SSPD)
	2P BT 15 W + Legacy detection (2P Matrix)	This mode is Type3 BT up to 15 W Maximum logical port power = 15 W Legacy detection = Enable (Legacy detected PD is treated as SSPD)
0x14	4P BT 90 W + Legacy detection Special Class0 (4P Matrix)	This mode is Type4 BT up to 90 W Maximum logical port power = 90 W Legacy detection = Enable (Legacy detected PD is treated as SSPD) Class0 = Class4 All treated as Class4 or detected class4, power-up as 4-pair simultaneously with 30 W allocation.
	2P BT 30 W + Legacy detection Special Class0 (2P Matrix)	This mode is Type3 BT up to 30 W Maximum logical port power = 30 W Legacy detection = Enable (Legacy detected PD is treated as SSPD) Class0 = Class4

.....continued

Value Set	Configuration Name	Port Operation Description
0x15	4P BT 60 W + Legacy detection Special Class0 (4P Matrix)	This mode is Type3 BT up to 60 W Maximum logical port power = 60 W Legacy detection = Enable (Legacy detected PD is treated as SSPD) Class0 = Class4 All treated as Class4 or detected Class4, power-up as 4-pair simultaneously with 30 W allocation.
	2P BT 30 W + Legacy detection Special Class0 (2P Matrix)	This mode is Type3 BT up to 30 W Maximum logical port power = 30 W Legacy detection = Enable (Legacy detected PD is treated as SSPD) Class0 = Class4
Note: In all the above modes, port power allocation is class based.		

Table 3-6. 4-Pair/2-Pair Non-Compliant Special Modes

Value Set	Configuration Name	Port Operation Description
0x20	4P 90 W PoH_Like On all classes + IEEE detection (4P Matrix)	This mode is 90 W PoH like on all classes Maximum logical port power = 90 W Legacy detection = Disable Note: PD autotclass request is cleared and ignored.
	2P 45 W PoH_Like On all classes + IEEE detection (2P Matrix)	This mode is 45 W PoH like on all classes Maximum logical port power = 45 W Legacy detection = Disable Note: PD autotclass request is cleared and ignored.
0x21	4P Pre-BT 60 W (Like MCHP 4P AT 60 W) + Legacy detection (4P Matrix)	This mode is Type2 non-standard BT up to 60 W with special 4P AT behavior Maximum logical port power = 60 W Legacy detection = Enable (Legacy detected PD is treated as SSPD) All measured classes are assigned to class6 with power allocation of 60 W.
	2P Pre-BT 30 W + Legacy detection (2P Matrix)	This mode is Type2 nonstandard BT up to 30 W with special 2P AT behavior Maximum logical port power = 30 W Legacy detection = Enable (Legacy detected PD is treated as SSPD) All measured classes are assigned to class4 with power allocation of 30 W.

.....continued

Value Set	Configuration Name	Port Operation Description
0x22	Mode 4P 60 W + Legacy detection + Proprietary Power up sequence (4P Matrix)	<p>This mode is Type3 nonstandard BT up to 60 W with special 4P CDP power-up flow (Start as 2P 15 W)</p> <p>Maximum logical port power = 60 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p> <p>All measured classes are assigned to class3 power at power-up, with the ability to rise the power up to class6.</p> <p>Note: PD autotoclass request is cleared and ignored.</p>
	Mode 2P 30 W + Legacy detection + Proprietary Power up sequence (2P Matrix)	<p>This mode is Type3 nonstandard BT up to 30 W with special 2P CDP power up flow (Start as 15 W)</p> <p>Maximum logical port power = 30 W</p> <p>Legacy detection = Enable (All detected PDs are treated as SSPD)</p> <p>All measured classes are assigned to class3 power at power-up, with the ability to rise the power up to class4.</p> <p>Note: PD autotoclass request is cleared and ignored.</p>
0x23	4P Pre-BT 60 W (Like MCHP 4P AT 60 W) + IEEE detection (4P Matrix)	<p>This mode is Type2 nonstandard BT up to 60 W with special 4P AT behavior on all classes</p> <p>Maximum logical port power = 60 W</p> <p>Legacy detection = Disable</p>
	2P Pre-BT 30 W + IEEE detection (2P Matrix)	<p>This mode is Type2 nonstandard BT up to 30 W with special 2P AT behavior on all classes</p> <p>Maximum logical port power = 30 W</p> <p>Legacy detection = Disable</p>
0x24	4P 4-finger 60 W + Legacy detection (4P Matrix)	<p>This mode is Type3 nonstandard BT up to 60 W with special 4P AT behavior on all classes. Maximum logical port Power = 60 W Legacy detection = Enable. (Legacy detected PD will be treated as SSPD)</p> <p>Maximum logical port power = 60 W</p> <p>Legacy detection = Enable (All detected PDs are treated as SSPD)</p> <p>Demotion is not supported. If power is not available, the port does not power-up.</p> <p>Note: PD autotoclass request is cleared and ignored.</p>
	2P 3-finger 30 W + Legacy detection (2P Matrix)	<p>This mode is Type3 nonstandard BT up to 30 W with special 2P AT behavior on all classes. Maximum logical port Power = 30 W Legacy detection = Enable.</p> <p>Maximum logical port power = 30 W</p> <p>Legacy detection = Enable</p> <p>Demotion is not supported. If power is not available, the port does not power-up.</p> <p>Note: PD autotoclass request is cleared and ignored.</p>

.....continued

Value Set	Configuration Name	Port Operation Description
0x25	4P BT + PoH_Like 90 W + Legacy detection (4P Matrix)	<p>This mode is special Type4 BT up to 90 W combined with POH type2. Maximum logical Port Power = 90 W Legacy detection = Enable (Legacy detected PD will be treated as SSPD).</p> <p>Maximum logical port power = 90 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p> <p>Class4 SSPD: 6 fingers (3A + shift + 3B), no demotion</p> <p>Class 5 to 8 SSPD: As BT, with BT demotion</p> <p>Class 4 to 5 DSPD (new codes): As BT</p> <p>Class4 DSPD old code 4, 4, 4 – (3 + 3 + parallel power up + 2x45 W)</p> <p>Class 0 is treated as class3 (BT behavior)</p> <p>Classes 1 to 3 behaves as BT</p> <p>Any classification error is not powered-up (BT behavior).</p>
	2P BT + PoH_Like 45 W + Legacy detection (2P Matrix)	<p>This mode is special Type3 BT up to 45 W combined with POH type2</p> <p>Maximum logical port power = 45 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p> <p>Class4 SSPD: 3 fingers (45 W), no demotion</p> <p>Classes 5 to 8 SSPD are demoted to Class4 BT (30 W)</p>
0x26	4P 90 W PoH_Like On all classes + Legacy detection (4P Matrix)	<p>This mode is 90 W PoH like on all classes</p> <p>Maximum logical port power = 90 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p> <p>Note: PD autotclass request is cleared and ignored.</p>
	2P 45 W PoH_Like On all classes + Legacy detection (2P Matrix)	<p>This mode is 45 W PoH like on all classes</p> <p>Maximum logical port power = 45 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p> <p>Note: PD autotclass request is cleared and ignored.</p>

.....continued		
Value Set	Configuration Name	Port Operation Description
0x27	4P BT 60 W + Legacy detection + Special Class4 60 W (4P Matrix)	<p>This mode is Type3 BT up to 60 W, with the exception that class4 SSDP is treated as class6 to support class4 60 W (4 fingers are generated). Maximum logical port Power = 60w Legacy detection = Enable (Legacy detected PD will be treated as SSPD)</p> <p>Maximum logical port power = 60 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p> <p>The special Class 4 SSPD is not demoted (if power is not available, the port does not power-up).</p> <p>Classes 7 and 8 are demoted to class6.</p> <p>Other BT classes are demoted when power is not available, based on the BT Behavior. (For example: Classes 5 and 6 are demoted to BT class4 30 W).</p> <p>Regular DSPD BT operation, no demotion at class4 old code— if we see class 4 old code on one pairset, the entire logical port is not demoted</p> <p>Any classification error is not powered-up (BT behavior). Class0 is treated as class3 (BT Behavior).</p>
	2P BT 30 W + Legacy detection + Special Class4 30 W (2P Matrix)	<p>This mode is Type3 BT up to 30 W, with no demotion at class4</p> <p>Any classification error is not powered-up (BT behavior)</p> <p>Class0 is treated as class3 (BT Behavior)</p>
0x30	4P BT 90 W + Legacy detection (4P Matrix)	<p>This mode is Type4 BT up to 90 W</p> <p>Maximum logical port power = 90 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p>
	2P BT-Special 45 W (Up to SSPD Class5) + Legacy detection (2P Matrix)	<p>This mode is Type3 BT up to 45 W with special class5 behavior</p> <p>Maximum logical port power = 45 W</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD)</p> <p>Class5 is allocated with power of 45 W</p>
0x50	4P 90 W	Microchip midspan proprietary mode
	2P 45 W	Microchip midspan proprietary mode
0x51	4P 60 W	Microchip midspan proprietary mode
	2P 35 W	Microchip midspan proprietary mode
0xFF	No change	This value is used when modifying other fields in the command maintaining latest field configuration.

- **Add Power for Port Mode**

This field enables the user to add more power for the selected operation mode (for example, if 30 W mode was selected and additional 6 W is needed to get 36 W). The values are in steps of 0.1 W. To add 2 W, the value = 20 decimal (0x14). The maximum allowed value for any mode is based on the single signature maximum allowed class power, correlated to the mode power.

- 15 W is correlated to class3
- 30 W is correlated to class4
- 45 W is correlated to class5

- 60 W is correlated to class6
- 90 W is correlated to class8

The maximum allowed power value can be read through [Get BT Class Power](#), Max Added Class Power field. Added power values above the predefined maximum are clamped.

The user must set this value every time that Port Operation mode is different from 0xFF. This field automatically clears to 0x00 when Matrix is configured using the [Program Global Matrix](#).

Matrix Change leads to the following:

Port Operation Mode	Add Power for Port Mode	Port Re-Init
Same value	0x00	Yes

The port behaves according to the following table:

Port Operation Mode	Add Power for Port Mode	Port Re-Init
0xFF	Don't care	No
Same value	Same value	No
New value	Same value	Yes
Same value	New value	Yes
New value	New value	Yes

- **Priority:**

0x01—Critical

0x02—High

0x03—Low

0xFF—Do not change settings

For the ports with the same priority, the PoE Controller sets the sub-priority according to the logic port number (lower number gets higher priority).

Note: Setting 0xFF or other values is ignored, maintaining the latest configuration.

Port priority affects:

- **Power-up order:** After a reset, the ports are powered-up according to their priority—highest to lowest. Highest priority powers-up first.
- **Shutdown order:** When exceeding the power budget, lowest priority ports turns off first.

3.3.7 Get BT Port Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC0	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	BT Port Config1	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	Val	Val
Telemetry	—	Port Status	Port Mode CFG1	Port Mode CFG2	Port Operation Mode	Add Power for Port Mode	Priority	N	N	N	Other	MCHP Use12

Following is the request report telemetry of various BT port configurations from the [Set BT Port Parameters](#).

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **Port Status:** Indicates the actual port status as defined in the [7.1 Port Status](#) section.
- **Port Mode CFG1:** This field reflects the configuration value field.
- **Port Mode CFG2:** This field reflects the configuration value field.
- **Port Operation Mode:** This field reflects the configuration value field.
- **Add Power for Port Mode:** This field reflects the configuration value.
- **Priority:** This field reflects the configuration value field.
- **Other:** This field contains port related internal parameters that the user cannot configure and need to be reflected through communication.
 - **Bits [0]: M device limitation.**
 - 0: The port is allocated to a T4 device with maximum power capabilities.
 - 1: The port is allocated to an M device causing the port power to be limited to 4P–60 W, 2P–30 W.
- **Bits [7..1]: Reserved for future use.**
- **MCHP Use12:** This field returns port internal status values for customer care support purposes. The values are not explained in this document and can vary between firmware versions.

3.3.8 Get BT Port Status

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC1	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	BT Port Status	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val		0x4E	0x4E	Val	Val	0x4E	Val
Telemetry	—	Port Status	Port Mode CFG1	Assigned Class	Measured Port Power		N	N	Last Shutdown Error Status	Port Event	N	MCHP Use12

This request reports telemetry of various BT port configurations.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel (value range 0x00 to 0x2F).
- **Port Status#:** Indicates the actual port status as defined in the [7.1 Port Status](#) section.
- **Port Mode CFG1:** This field represents the user configuration value that was set using the [Set BT Port Parameters](#) command. Following is the list of options:

Bits [3..0]—Port Enable Modes:

0x0: Port Disable

0x1: Port Enable

0x2: Port Enable with ignored inrush check. At the end of port power up flow, ILIM state is ignored and the port continues to regular ON state.

0x3: Port Force Power 4P–60 W/2P–30 W

0x4: Port Force Power 4P–90 W/2P–45 W

Bits [7..4]—Reserved for future use:

Additional BT Statuses for BT delivering ports can be found on the appendix.

- **Assigned Class:** The assigned classification depends on the requested class and the available power. An 0xC value means that classification was not assigned and power was not allocated to this port. Requested class 0 is converted to Requested class 3 (IEEE BT compliant modes), or

Requested class 4 to 8 (Non-IEEE and Pre-BT) when allocated.

Bits [7..4]: The allocated class of the Primary alternative ranging from 1–8. If class is not assigned, this field returns 0xC.

Bits [3..0]: The allocated class of the Secondary alternative, ranging from 1–5. In case of SSPD or when class was not assigned, this field returns 0xC.

- **Measured Port Power:** The actual momentary measured port power consumption ($I_{port} * V_{main}$) [0.1 W]
- **Last Shutdown Error Status:** This field holds the last port status that was causing a delivering port to be shutdown with reported event. For more information, see [Table 7-1](#). If the “Port Event” field contains a value greater than 0x01, it means that the reported error was not yet read by the Host. If the “Port Event” field contains a value of 0x00 or 0x01, it means that the “Last Shutdown Error Status” was already read by the Host and no new error occurred. At system initialization this field returns 0x1B (port is off: detection is in process).
- **Port Event:** This bit field describes event(s) that happen on a specific port. The field is clear on read.

Event	Bit	Description
Port turned on	0	When any port turns on (its status changes to “0x80 up to 0x9F”), this bit is set to ‘1’.
Port turned off by user	1	When port is delivering power and turns off due to configuration change or by disable all ports pin (status changed from delivering statuses “0x80 up to 0x9F “ to 0x08 or 0x22).
Counters Related Event	2	<ul style="list-style-type: none"> • UDL: When port turns off due to under-load (updated status is 0x1E) • OVL: When port is overloaded (updated status is 0x1F) • SC: When port turns off due to short circuit (updated status is 0x34) • POWER DENIED: When port turns off due to power management or port was not turned on due to any power limit (updated status is 0x3C, 0x3D, or 0x41) • INVALID SIG: When port failed in connection check or detection (updated status is 0x1C, 0x25, or 0xA7) • CLASS ERROR: When port failed in classification (updated status is 0x43)
Open Event	3	Port status is changed from any status to 0xA8 (port is not connected)
Port fault (other)	4	When Port is delivering power and turns off due to port thermal protection, external voltage injection, internal hardware fault, or Vmain out of range Low/High (its status changes to 0x35, 0x24, 0x12, 0x07, and 0x06 accordingly) this bit is set to ‘1’.

Note: Based on new individual mask 0x46, the user can request only single port event interrupt due to consecutive detection failure events at the same port. For example, if port changes to “Detection Fail – 0x1C or 0x25” and from this point the port detection continues to fail, only single event will happen with single detection failure increment and interrupt will be generated only once.

- **MCHP Use12:** This field returns port internal status values for customer care support purposes. The values are not explained in this document and can vary between firmware versions.

3.3.9 Get BT Port Counters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC2	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	BT Port Counters	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	Val	Val
Telemetry		Port Status	UDL count	OVL count	SC count	Invalid Signature count	Power Denied count	N	N	N	MCHP Use11	MCHP Use12

- **Port Status:** Indicates the actual port status, as defined in the [7.1 Port Status](#) section.
- **Port Counters:** Five counters based on IEEE 802.3at. Each counter can count to 255 events. The counters are clear on read. The Host must advance its own internal counters with the reported values.
- **MCHP Use11:** This field returns internal classification error counter value for customer care support purposes. The value is not explained in this document and can vary between firmware versions.
- **MCHP Use12:** This field returns port internal status values for customer care support purposes. The values are not explained in this document and can vary between firmware versions.

3.3.10 Set Temporary Power Limits for BT Port (Not Supported)

This command is not supported and will not be supported.

To change TPPL, the LLDP commands must be used.

3.3.11 Get BT Port Class

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC4	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	BT Port Class	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Telemetry	—	Port Status#	Port PHY Info	Measured Class	Requested Class	Requested Power		Assigned Class	Assigned Power (TPPL_BT)		Auto Class Measurement + Support Result	

- **Port Status#:** Indicates the actual port status, as defined in the [7.1 Port Status](#) section.
 - **Port PHY Info:** This field returns the connection check function results and the decided PD structure that the PoE manager continues with.
- CC Result:** Bits [7..4] return the detected result value of the connection check function.

Return Value	Name	Return Value Conditions
0x0	Not yet performed	<ol style="list-style-type: none"> 1. During system initialization 2. 2-Pair configured port 3. 2P/4P disabled port
0x1	Open	Port is configured as 4-pair and detection result is open
0x2	Other	<ol style="list-style-type: none"> 1. Port is configured as 4-pair and detection result is IEEE on both pairsets and connection check error 2. Port is configured as 4-pair and detection result is Legacy or Failure
0x3	Single signature PD	IEEE detected on both pairsets and connection check function return "Single"
0x4	Dual signature PD	IEEE detected on both pairsets and connection check function return "Dual"
0x5	Unexpected	Unexpected logic error result (must not be reported in regular conditions)
0x6 to 0xF	Reserved	Reserved for future use and must be ignored

Decided PD Structure: Bits [3..0] return the decided PD front end structure, based on the line detection result, connection check result, and internal decision logic.

Return Value	Name	Return Value Conditions
0x0	Not performed	CC result = 0x0
0x1	Open	Detection result = Open
0x2	Invalid Signature	Detection result = Failure or connection check error
0x3	4P SSPD IEEE	1. Detection result = IEEE and connection check = Single signature PD (0x3) 2. Detection result = IEEE and Mode = 0x22
0x4	4P SSPD Legacy	1. Detection result = Legacy on one of the pairsets while the other is pass 2. Detection result = Legacy on both pairsets.
0x5	4P DSPD IEEE	Detection result = IEEE on both the pairsets
0x6	2P DSPD 4P CANDIDATE FALSE	DSPD staggered power-up or DSPD 4P candidate failure
0x7	2P IEEE	2P Port configuration and detection result = IEEE
0x8	2P Legacy	1. 4P Port configuration and Detection result = (IEEE or Legacy on ALT_A) and (Open or Res Fail Low on ALT_B) 2. 2P Port configuration and detection result = Legacy
0x9 to 0xF	Reserved	Reserved for future use and must be ignored.

- **Measured Class:** The measured classification result of each pair set in a PSE logical port.
 - Bits [7..4]—The measured class of the Primary alternative.
Classification values range from 0 to 8.
If class was not performed, this field returns 0xC.
 - Bits [3..0]—The measured class of the Secondary alternative.
Classification values range from 0 to 5.
In case of SSPD or if class was not performed, this field returns 0xC.
 - 3 classification errors can be returned on both fields:
 - 0x9: Class overcurrent
 - 0xA: 2 fingers mismatch
 - 0xB: Invalid class code
- **Requested Class:** The requested port class value is determined by the measured class result and internal logic configuration of the port.
 - Bits [7..4]—The requested class of the Primary alternative.
Classification values range from 0 to 8.
If class was not performed, this field returns 0xC.
 - Bits [3..0]—The requested class of the Secondary alternative.
Classification values range from 0 to 5.
In case of SSPD or if class is not performed, this field returns 0xC.
- **Requested Power:** The requested power of the logical port, related to the requested class. In case of DSPD, it is the sum of the related class power for each pair-set. The value is in steps of 0.1 W.
- **Assigned Class:** The assigned classification depends on the requested class and the available power. An 0xC value means that classification was not assigned and power was not allocated to this port.
 - Bits [7..4]—The allocated class of the Primary alternative, range from 1 to 8.
If class was not assigned, this field returns 0xC.

- Bits [3..0]—The allocated class of the Secondary alternative, range from 1 to 5.

In case of SSPD or when class is not assigned, this field returns 0xC.

In case of DSPD, primary delivering and secondary wait for second cycle, this field returns 0xD.

- **Assigned Power (TPPL_BT):** The power limit of a working port referring to a specific PD, during ongoing power delivery. If port power exceeds the assigned power level, the port is disconnected. The value is in steps of 0.1 W.

In addition, the field value may be used for system power management function, according to “BT Port PM Mode” settings (section 3.3.6 [Set BT Port Parameters Port Mode CFG2](#) field).

- **AutoClass Measurement + Support Result:** The power measurement results of the auto class function in steps of 0.1 W, based on the IEEE 802.3BT auto class measurement algorithm and the results of Auto class support function.

AutoClass Measurement: Bits [11..0] return the power measurement results of the auto class function in steps of 0.1 W, based on the IEEE 802.3BT auto class measurement algorithm.

AutoClass Support: Bits [15..12] return the PD identification result of auto class support. The BT PSE checks if the connected PD supports auto classification, as part of the first long classification finger analysis (related to IEEE BT operation modes).

Possible values are:

- 0x0: Auto class check was not performed
- 0x1: The PD does not support physical auto class
- 0x2: The PD supports physical auto class

Note: If after port power up the Host reads value 0x2, the Host is required to read the entire [Get BT Port Class](#) telemetry again after 3 seconds from the last read, for updated measurements of auto class power and TPPL.

3.3.12 Set BT Port Reserve Power Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x55	Val	Val		Val	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Channel	Reserve Power	Port Num	Reserve Power Request		PSE Port Type	N	N	N	N	N

This command sets the values of a reserved port, if the port mode was previously configured to 0x31 using the [Set BT Port Parameters](#).

If the port is not configured to mode 0x31, then the request is not processed and the last approved value is kept.

Note: Values are not being saved.

- **Reserve Power Request:** Port power value [0.1 W LSB] is reserved from the main power budget if it is approved, to be used by the defined logical port.
- **PSE Port Type:** This port type defines the logical port power and current limits.

Value	Logical Port 2P Matrix	Logical Port 4P Matrix
0	PSE port Type3 TPPL Clamp to about 38 W, defined by relevant default parameters. ICUT = 705 mA ILIM = 850 mA	PSE port Type3 TPPL Clamp to about 65 W, defined by relevant default parameters. ICUT per pair-set = 705 mA ILIM per pair-set= 850 mA

.....continued		
Value	Logical Port 2P Matrix	Logical Port 4P Matrix
1	PSE port Type4 TPPL Clamp to about 48.7 W, defined by relevant default parameters. ICUT = 976 mA ILIM = 1150 mA	PSE port Type4 TPPL Clamp to about 97.5 W, defined by relevant default parameters. ICUT per pair-set = 976 mA ILIM per pair-set = 1150 mA

Other values are reserved for future use and will be ignored.

When the Reserve mode is set, the default is 0.

3.4 Power Management Related Messages

3.4.1 Get Total Power

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x60	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Supply	Total Power	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		Val		Val	Val	
Telemetry	—	Power Consumption		Calculated Power		Available Power		Power Limit		Power Bank	Vmain Voltage	

This telemetry indicates the system power condition.

Condition	Description
Power Consumption	The sum of measured consumed power (Iport x Vmain), from all logical ports that are delivering power. If the value exceeds Power Budget limit, ports are disconnected. The units are in Watts.
Calculated Power	The sum of all logical ports reflected power, that are delivering power, based on the PM1 and PM2 settings (combination of TPPL_BT values and measured port power). If the value exceeds Power Budget limit, ports are disconnected. The units are in Watts.
Available Power	How much calculated power is available in the system till it reaches to the power limit. Available power = (Power limit – Calculated power consumption). The units are in Watts.
Power Limit	The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports are disconnected due to over power. The disconnection is priority based. These values are to be set from 0 W to 6000 W depending on the capability of the power supply. If power consumption exceeds this level, lowest priority ports are disconnected. The power units in this field are in Watts. Example: 380 W = 380 = 0x17C
Power Bank	The current active power bank that was read from the first PD69208 device.
Vmain Voltage	Actual momentary measured system main voltage in 0.1 V step.

3.4.2 Set Power Banks

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x0B	0x57	0x00 to 0x0F	Val		Val		Val		Val
Command	—	Global	Supply	Power Budget	Bank	Power Limit		Max Shutdown Voltage		Min Shutdown Voltage		Guard Band

This command sets the power limits to be used by the Power Management function. The power budget value is the maximum total power consumption permitted before port disconnection due to system over power consumption. The power management function purpose is to protect the system main power supply from reaching power levels that causes it to crash. Disconnection of ports due to overpower, starts from the lowest priority port.

Condition	Description
Bank	<p>Specifies the power bank number to be configured (0x00 to 0x0F).</p> <p>When using a single power supply, use the Get Power Supply Parameters command, to identify the bank number and then set the required power limit for the relevant bank/s.</p> <p>When utilizing more than a single power supply, verify which power supply corresponds to each bank, and then utilize the Set Power Bank command to set the power limit per each bank.</p> <p>Values above 0x0F are ignored.</p>
Power Limit	<p>The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports will be disconnected due to over power. The disconnection is priority based. These values are to be set from 0 W to 6000 W depending on the capability of the power supply. If power consumption exceeds this level, lowest priority ports will be disconnected. The power units in this field are in Watts.</p> <p>Example: 380 W = 380 = 0x17C</p>
Max Shutdown Voltage	<p>Maximum voltage level: If Vmain is above this level, all PoE ports shut down. The voltage units in this field are in 0.1 V step.</p> <p>Example: 58.5 V = 585 = 0x249</p> <p>Note: Maximum shutdown voltage value must be greater by 3 V from minimum shutdown voltage value. Otherwise, the command values are ignored and a communication error is reported. (Maximum Shutdown Voltage > Minimum Shutdown Voltage + 0x1E). Maximum configuration voltage is pre-defined, as part of the parameters of the firmware release. Out of range value leads to communication error.</p>
Min Shutdown Voltage	<p>Minimum voltage level: If Vmain is below this level, all PoE ports shut down. The voltage units in this field are in 0.1 V step.</p> <p>Example: 52.2 V = 522 = 0x20A</p> <p>Note: Max shutdown voltage value must be greater by 3 V from minimum shutdown voltage value. Otherwise, the command values are ignored and a communication error is reported. (Max Shutdown Voltage > Min Shutdown Voltage + 0x1E). Minimum configuration voltage is pre-defined, as part of the parameters of the firmware release. Out of range value leads to communication error.</p>
Guard Band	<p>This parameter is ignored in BT and treated as Auto (0x0A = 1 W)</p> <p>Note: Guard Band area is only compared to the Calculated Power value.</p>

Selecting Power Banks: The power good pins are selecting the Power Bank. There are four power good pins, located in the PD69208. The pins state of the first PD69208 device is being read through internal communication by the PD692x0 software. The read value is used for active bank definition and report. To have a proper power bank operation, all power good lines of the PD69208 devices in the system must be connected or set by hardware with the same configuration. The four power good lines are utilized (PG3, PG2, PG1, and PG0).

Table 3-7. Power Banks Definition—PD692x0 and PD69208

Power Bank#	Power Good Pins Settings at PD69208 Devices				Power Bank Set Values in PD692x0_BT			
	PG3	PG2	PG1	PG0	Power Limit	Max Shutdown Voltage	Min Shutdown Voltage	Guard Band
PB0	0	0	0	0				Auto
PB1	0	0	0	1				Auto
PB2	0	0	1	0				Auto
PB3	0	0	1	1				Auto
PB4	0	1	0	0				Auto
PB5	0	1	0	1				Auto
PB6	0	1	1	0				Auto
PB7	0	1	1	1				Auto
PB8	1	0	0	0				Auto
PB9	1	0	0	1				Auto
PB10	1	0	1	0				Auto
PB11	1	0	1	1				Auto
PB12	1	1	0	0				Auto
PB13	1	1	0	1				Auto
PB14	1	1	1	0				Auto
PB15	1	1	1	1				Auto

To make the preceding parameters as reset default, use the [Save System Settings](#) command. To read the power management parameters and status, see section [3.4.3 Get Power Banks](#).

3.4.3 Get Power Banks

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x57	0x00 to 0x0F	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Supply	Power Budget	Bank	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		Val	Val	Val	0x4E	0x4E
Telemetry	—	Power Limit		Max Shutdown Voltage		Min Shutdown Voltage		Guard Band	Source Type	Rmode	N	N

This telemetry indicates power bank settings, to be used by power management functions.

Parameter	Description
Bank	<p>Specifies the power bank number to be configured (0x00 to 0x0F).</p> <p>When using a single power supply, use the Get Power Supply Parameters command to identify the bank number and then set the required power limit for the relevant banks.</p> <p>When utilizing more than a single power supply, verify which power supply corresponds to each bank and then utilize the Set Power Bank command to set the power limit per each bank.</p>
Power Limit	<p>The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports will be disconnected due to over power. The disconnection is priority based. These values are to be set from 0 W to 6000 W depending on the power supplies capability. If power consumption exceeds this level, lowest priority ports will be disconnected. The power units in this field are in Watts.</p> <p>Example: 380 W = 380 = 0x17C</p>
Max Shutdown Voltage	<p>Maximum voltage level: If Vmain is above this level, all PoE ports shut down. The voltage units in this field are in 0.1 V step.</p> <p>Example: 58.5 V = 585 = 0x249</p> <p>Note: Maximum shutdown voltage value must be greater by 3 V from minimum shutdown voltage value, otherwise the command values are ignored and a communication error will be reported.</p> <p>(Max Shutdown Voltage > Min Shutdown Voltage + 0x1E).</p>
Min Shutdown Voltage	<p>Minimum voltage level: If Vmain is below this level, all PoE ports shut down.</p> <p>The voltage units in this field are in 0.1 V step.</p> <p>Example: 52.2 V = 522 = 0x20A</p> <p>Note: Maximum shutdown voltage value must be greater by 3 V from minimum shutdown voltage value, otherwise the command values are ignored and a communication error is reported.</p> <p>(Max Shutdown Voltage > Min Shutdown Voltage + 0x1E).</p>
Guard Band	<p>This value is irrelevant in BT.</p> <p>The return value is constant 0x0A (Indication for Auto Guard band).</p>
Source Type	Returns 0x00 in BT (Unknown source).
Rmode	Reserved for Microchip internal use.

3.4.4 Get Power Supply Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x17	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Supply	Main	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		0x4E	0x4E	Val	Val	0x4E
Telemetry	—	Power Consumption		Max Shutdown Voltage		Min Shutdown Voltage		N	Power Bank	Power Limit		N

Telemetry for main power supply parameters (within the active power budget):

Parameter	Description
Power Consumption	The sum of measured consumed power, from all logical ports that are delivering power (in Watts).
Max Shutdown Voltage	Maximum voltage level: If Vmain is above this level, then all the PoE ports shut down. The voltage units in this field are in 0.1 V step. Example: 58.5 V = 585 = 0x249
Min Shutdown Voltage	Minimum voltage level: If Vmain is below this level, then all the PoE ports shut down. The voltage units in this field are in 0.1 V step. Example: 52.2 V = 522 = 0x20A Note: Max shutdown voltage value must be greater by 3 V from minimum shutdown voltage value, otherwise the command values are ignored and a communication error is reported. (Max Shutdown Voltage > Min Shutdown Voltage + 0x1E)
Power Bank	The current active power bank that was read from the first PD69208 device.
Power Limit	The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports are disconnected due to over power. The disconnection is priority based. These values are to be set from 0 W–6000 W, depending on the power supplies capability. If power consumption exceeds this level, lowest priority ports are disconnected. The power units in this field are in Watts. Example: 380 W = 380 = 0x17C

3.4.5 Get BT Port Measurements

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC5	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	BT Port Measurement	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		0x4E	Val		0x4E	0x4E
Telemetry	—	Vmain Voltage		Calculated Current		Measured Port Power		N	Port Voltage		N	N

Telemetry for momentary port electrical parameters:

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **Vmain Voltage:** Actual momentary measured system main voltage in 0.1 V step.

- **Calculated Current:** Port momentary calculated current (in milliamps) = Port Power Consumption/Vmain.
- **Measured Port Power:** Actual momentary measured power consumption of a logical port, in 1 W.
- **Port Voltage:** Actual momentary voltage on the port, in 0.1 V steps.

3.5 Layer2 Related Messages

3.5.1 Set BT Port Layer2 LLDP PD Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x50	Val	Val		Val		Val		Val	Val
Command	—	Channel	Layer2 BT LLDP_PD	Port Num	PD Request Power Single		PD Request Power Dual A		PD Request Power Dual B		Cable Length Req + AutoClass	L2 CFG

This command supports LLDP information configuration, based on the information that the Host was receiving from PD advertisement message and another Host information. Part of the information is structured the same as LLDP TLV for easy Host operation.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
Note: All ports value is ignored in this command.
- **PD Request Power Single:** PD requested power value [0.1 W LSB] at the PD input. Value ranges are:
 - 2-pair/4-pair: From 1 to maximum power limit based on cable length.
 - This field must be used by the Host when SSPD was detected and a new LLDP BT frame is being used or when Type1 and Type2 LLDP frames are being used.
 - The value is expected to be a copy of the LLDP frame field defined in IEEE 802.3bt, 79.3.2.5 PD requested power value.
- **PD Request Power Dual A:** PD requested power value [0.1 W LSB] at the PD input. Value ranges are:
 - 2-pair: From 1 to maximum power limit based on cable length.
 - This field must be used by the Host when DSPD was detected and a new LLDP BT frame is being used. When Type1 and Type2 LLDP frames are being used, this value must be set to 0.
 - The value is expected to be a copy of the LLDP frame field defined in IEEE 802.3bt, 79.3.2.6a dual-signature PD requested power value for mode A.
- **PD Request Power Dual B:** PD requested power value [0.1 W LSB] at the PD input. Value ranges are:
 - 2-pair: from 1 to maximum power limit based on cable length.
 - This field must be used by the Host when DSPD is detected and a new LLDP BT frame is being used. When Type1 and Type2 LLDP frames are being used, this value must be set to 0.
 - The value is expected to be a copy of the LLDP frame field defined in IEEE 802.3bt, 79.3.2.6a dual-signature PD requested power value for mode B.
- **Cable Length Req + AutoClass:** This value calculates the cable resistance or initiate Autoclass. When Autoclass is in use, the cable length is irrelevant and the channel resistance losses become part of the Autoclass power measurement. There are 11 selection values for the cable length, in steps of 10 meters, starting from 0. The initial value is 10 = 100 meters and the corresponding resistance for 100 meters is 12.5 Ω for 2-pair and 6.25 Ω for 4-pair (the TPPL value is updated according to the cable length to compensate on the power losses).
The field structure is:
 - **Bits [7..4]—Autoclass operation:**
0x0—Power negotiation by requested power fields (The PSE does not use Autoclass).

0x1—Power negotiation by Autoclass request. The request is internally latched until autoclass execution. The Autoclass flow for this specific port can be monitored using the Layer2 execution field in section [3.5.2 Get BT Port Layer2 LLDP PSE Data](#), Layer2 Status.

All other values are reserved for future use, should not be sent by the Host and are ignored.

- Bits [3..0]—Cable length options:
10 meters LSB, valid value range 0x0 to 0xA.

0x0 = 0 meters.

Note: The command is executed automatically, after it is received. If several commands are received prior to LLDP execution, they are automatically executed based on port priority and port number (lowest port number with same priority executes first).

- **L2 CFG:** This field configures port parameters that are required to be configured when Layer2 is being used, to reduce communication protocol transactions.

- **Bits [3..0]—Priority**

- 0x1—Critical
- 0x2—High
- 0x3—Low
- 0xF—Do not change settings

All other values are ignored.

For ports with the same priority, the PoE Controller sets the sub-priority according to the logic port number. (lower number gets higher priority).

Note: Setting 0xF or other values is ignored, maintaining the latest configuration.

Port priority affects:

1. **Power-up order:** After a reset, the ports are powered-up according to their priority, highest to lowest, highest priority powers-up first.
 2. **Shutdown order:** When exceeding the power budget, lowest priority ports turns-off first.
- **Bits [7..4]—Reserved for future use.** Any set will be ignored.

Additional LLDP Definition notes and considerations: Will be moved later to specific document.

Additional LLDP Definition notes and considerations: Will be moved later to specific document.

1. Value of 0 in the operational power is ignored, maintaining the latest configuration.
2. Host Requirement: Dual/Single operation must be matched by the Host prior to LLDP usage. In case of conflict, the Host must not use LLDP.
3. Values above 499 for 2-pair or 999 for 4-pair are ignored, maintaining the latest configuration.
4. Rejected LLDP request maintains the latest approved LLDP configuration.
5. In a 2-pair matrix configuration, the PD type cannot be defined by the detection. Due to that, the LLDP values are scanned as follows: Single first follow by Dual A and Dual B. The first value that is different from 0 is used. The reply for Get PD Request clears the unused values.
6. In a 4-pair matrix configuration, DSPD only Dual A, and Dual B set/request fields are used.
7. Host Requirement: In Dual 4-pair operation, the Host must match the ALT-A, ALT-B to Mod-A, and Mod-B requests. Otherwise, in case of crossed cable, the physical classification may not match with the LLDP request, causing wrong power allocation.
8. LLDP command is ignored, if the port status is not in the range of 0x80 to 0x86, 0x88, 0x89.
9. In case of 2-pair legacy operation due to the connection check failure, the LLDP values are scanned as follows: Single first follow by Dual A and Dual B. The first value that is different from 0 is used.
10. In case of 4-pair legacy operation, the port is treated as SSPD and only LLDP single field is used.
11. LLDP/CDP set (if executed), upgrades the port priority by ½ step or higher in the same group, like in Pre_BT firmware.
12. If new LLDP command cannot be executed due to un-available power (PM limitation or such execution may cause other ports to be disconnected), or not executed due to error, the port remains with the last configuration, including stay in dynamic mode.

13. LLDP power limit can be selected by Mask 0x2C to be up to Requested class or min (Requested class, Operation Mode). M-Devices are limited to Type3—class6 4P, class4 2P.
14. If operation mode 0x22 is not selected, port powers-up with regular flow. If operation mode 0x22 is selected, the port powers- up on the basis of the special proprietary power-up sequence according to the mode.
15. If Autoclass is pending or in process, new LLDP request overrides the Autoclass process.
16. New Autoclass request on Autoclass pending or Autoclass Layer1 pending reinitiates the Autoclass process, without Layer1 Autoclass delay.
17. Autoclass port power is treated as static, such as LLDP/CDP (when port CFG2 is configured to value 0x2).

3.5.2 Get BT Port Layer2 LLDP PSE Data

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x51	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	Layer2 BT LLDP_PSE	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Telemetry	—	PSE Allocated Power Single/ALT-A	PSE Allocated Power ALT-B	PSE Max Power	Assigned Class	Layer2 Status	IEEE BT Power bits	Cable Length in Use	L2 CFG			

This request returns the port Layer2 data. for more information, see section [3.5.1 Set BT Port Layer2 LLDP PD Request](#).

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PSE Allocated Power Single/ALT-A:** PSE allocated power value [0.1 W LSB] at the PD input. Value ranges from 0 to 999 in single or 0 to 499 in ALT-A ('0' means inactive value or port). If the power allocation was done by Autoclass process (Layer1 or Layer2), the value is 0xACAC.
- **PSE Allocated Power ALT-B:** PSE allocated power value [0.1 W LSB] at the PD input. Value ranges from 0 to 499 ('0' means inactive value or port).
- **PSE MAX Power:** The maximum power [0.1 W LSB] that can be allocated to this port, when the command was executed.
 - Value = min (Requested class, (PSE power budget + Port allocated power).
- **Assigned Class:** The assigned classification depends on the requested class and the available power. An 0xC value means that the classification is not assigned and power is not allocated to this port.

Bits [7..4]—The allocated class of the Primary alternative, range from 1 to 8. If class is not assigned, this field returns 0xC.

Bits [3..0]—The allocated class of the Secondary alternative, range from 1 to 5. In case of SSPD or when class is not assigned, this field returns 0xC. In case of DSPD, primary delivering and secondary wait for second cycle, this field returns 0xD.

- **Layer2 Status:** This field is structured from two information types:
 - If and how power is delivered
 - How the latest Layer2 command was executed

Layer2 execution: Bits [7..4]—This field contain the following values:

0x0—Layer2 Idle (no message received yet or port is not delivering power)

0x1—Layer2 LLDP/CDP request pending

0x2—Layer2 LLDP/CDP request is executed

0x3— Layer2 LLDP/CDP last request is rejected due to lack of power

0x4—Layer2 LLDP/CDP last request is rejected due to error

0x5—Layer2 LLDP/CDP last request is rejected due to mismatch

0x6—Autoclass request pending

0x7—Autoclass measurement completed

0x8—Autoclass error (timeout)

Layer2 usage: Bits [3..0]

0x0—Port is not deliver power

0x1—Port deliver power, using Layer1 (Assigned Class)

0x2—Port deliver power, Using Layer1 Autoclass

0x3— Port deliver power, using LLDP

0x4—Port deliver power, using LLDP Autoclass

0x5—Port deliver power, using CDP over 2P

0x6—Port deliver power, using CDP over 4P

0x7—Port is not deliver power and at reserve mode

0x8—Port deliver power, using reserve mode power

- **IEEE BT power bits:** This field contains the bit values that the Host must copy to the relevant PSE bits in the LLDP BT message, according to IEEE 802.3 BT standard **Table 79–6e—Power status field**.
 - Bits [7..4] are reserved for future use and must be ignored.
 - Bits [3..2] IEEE PSE powering status 15:14.

3	2	
1	1	4-pair powering dual-signature PD
1	0	4-pair powering single-signature PD
0	1	2-pair powering
0	0	Reserved/Ignore, port is not operational

- Bits [1..0] IEEE PSE power pairs ext bits 11:10.

1	0	
1	1	Both alternatives
1	0	Alternative B
0	1	Alternative A
0	0	Reserved/Ignore, port is not operational

- **Cable Length in use:** This value represents the cable length that is being used with the PSE allocated power. When Autoclass is in use, the cable length is irrelevant and the return value is 0x0. There are 11 values options for the cable length, in steps of 10 meters, start from 0. The initial value is 10 = 100 meters and the corresponding resistance for 100 meters is 12.5 Ω for 2-pair, 6.25 Ω for 4-pair. (The TPPL value is updated according to the cable length to compensate on the power losses).
The field structure is:
 - Bits [7..4]—Reserved and must be ignored by the Host (0x0).
 - Bits [3..0]—Cable length options: 10 meters LSB, valid value range 0x0 to 0xA. 0x0 = 0 meters.
- **L2 CFG:** This field returns the value that is set by L2 CFG or by other configuration command related to the port.
 - **Bits [3..0]—Port Priority defined value**
 - 0x1—Critical
 - 0x2—High
 - 0x3—Low

- **Bits [7..4]—Reserved for future use**
Return value = 0x0

3.5.3 Get BT Port Layer2 LLDP PD Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x50	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	Layer2 BT LLDP_PD	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val	Val	Val	0x4E	0x4E	0x4E	0x4E
Telemetry	—	PD Request Power Single		PD Request Power Dual A		PD Request Power Dual B		Cable Length Req	N	N	N	N

This request returns the port Layer2 request information for sanity check purposes. The returned values are based on the PD detected load type, the received values, and the used values.

PD detected load type and received values	PD Request Power Single	PD Request Power Dual A	PD Request Power Dual B
SSPD 4P	Value	0	0
DSPD 4P	0	Value	Value
2P	Value	0	0
2P	0	Value	0
2P	0	0	Value

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PD Request Power Single:** PD requested power value [0.1 W LSB] at the PD input. Value ranges are: 0 to 999 or 0xACAC in case of Autoclass.
- **PD Request Power Dual A:** PD requested power value [0.1 W LSB] at the PD input. Value ranges are:
 - 2-pair: from 1 to maximum power limit based on cable length.
 - This field must be used by the Host when DSPD was detected and a new LLDP BT frame is being used. When Type1 and Type2 LLDP frames is being used, this value should be set to 0.
 - The value is expected to be a copy of the LLDP frame field defined in IEEE 802.3bt, 79.3.2.6a dual-signature PD requested power value for Mode A.
- **PD Request Power Dual B:** PD requested power value [0.1 W LSB] at the PD input. Value ranges are:
 - 2-pair: from 1 to maximum power limit based on cable length.
 - This field must be used by the Host when DSPD was detected and a new LLDP BT frame is being used. When Type1, Type2 LLDP frame is being used, this value must be set to 0.
 - The value is expected to be a copy of the LLDP frame field defined in IEEE 802.3bt, 79.3.2.6a dual-signature PD requested power value for mode B.

- **Cable Length Request:**

- Bits [7..4]—Reserved and should be ignored by the Host.
- Bits [3..0]—When Autoclass is in use, the cable length is irrelevant and the channel resistance losses become part of the Autoclass power measurement. There are 11 selection values for the cable length, in steps of 10 meters, starting from 0. The initial value is 10 = 100 meters and the corresponding resistance for 100 meters is 12.5 Ω for 2-pair and 6.25 Ω for 4-pair (the TPPL value is updated according to the cable length to compensate on the power losses).

3.5.4 Set Layer2 CDP Port PowerUp ALT-B

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x52	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Channel	CDP PowerUp ALT-B	Port Num	PuP CMD	N	N	N	N	N	N	N

This command enables the user to configure the port behavior, according to the Host definitions. The command is built from the configuration register field that enables the Host power-up sequence behavior and a command byte to request ALT_B power up. Before enabling `PowerUp ALT-B` command, the port must be configured to 4-pair with valid matrix.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
Note: All ports value is ignored in this command.
- **PuP CMD:** This command field powers-up ALT_B according to the CDP flow:
 - When CDP mode is activated on this port and the value is set to 0x01, ALT_B turns on.
 - When CDP mode is activated on this port and the value is set to 0x00, ALT_B turns off.
 - When CDP mode is not activated this command is ignored, maintaining latest configuration.

Port status alternates between SSPD 2P to SSPD 4P, based on the usage of this command.

Notes:

- `PowerUp ALT-B` command is relevant for 4-pair port only.
- When ALT_B turns off, the allocated power is automatically limited to Class4 power.

3.5.5 Get Layer2 CDP Port PowerUp ALT-B

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x52	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	CDP PowerUp ALT-B	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry	—	PuP CMD	N	N	N	N	N	N	N	N	N	N

This request returns the port PowerUp ALT-B settings.

See section [3.5.4 Set Layer2 CDP Port PowerUp ALT-B](#) for **PuP CMD** description.

3.5.6 Set Port Layer2 CDP PD Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x53	Val	Val	Val	Val	Val	Val	Val	Val	Val
Command	—	Channel	Layer2 CDP_PD_Req	Port Num	Reserved	PD Request Power0	PD Request Power1	PD Request Power2	PD Request Power3	PD Request Power4	Pw4	Pw[3..0]

This command supports CDP information configuration, based on the information that the Host was receiving from PD advertisement message. The power value range supports 2P and 4P configurations. This command can be used in CDP operation mode or any other mode with SSPD load (CDP mode treats the PD as SSPD).

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PD Request Power 0, 1, 2, 3, 4:** There are 5 options for 8-LSB PD requested power values at the PSE side. The upper 2-bit MSB are located in Pw[3..0] and Pw4. Power = Value of the full 10 bits [0.1 W LSB].
Value ranges from 0 to 999 (such as BTSSPD).

Note: Cable Length is considered as zero and cannot be set when using this command. (The power is at the port input of the PSE side).

- **Pw4:**
 - Bits [1..0] : Two upper MSB of the PD power information request, bits 10, 9 respectively, for PD Request Power4.
 - Bits [7..2]: Reserved bits for future use. Must be set to '0'.
- **Pw[3..0]:** Two upper MSB of the PD power information request, bits 10,9 respectively, for PD Request Power 3, 2, 1, 0.

3.5.7 Get Port Layer2 CDP PSE Data

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x54	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	Layer2 CDP_PSE	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		PSE Allocated Power		PD Requested Power		Assigned Class	Layer2 Status	N	N	N	N	N

This request returns the port Layer2 CDP data. This command can be used in CDP operation mode or any other mode with SSPD load. In all other cases, PSE Allocated Power and PD Requested Power returns zero and assigned class returns 0xCC. CDP mode treats the PD as SSPD.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PSE Allocated Power:** PSE allocated power value [0.1 W LSB] at the PSE output. Value ranges from 0 to 999 (such as BTSSPD).
- **PD Request Power:** PD requested power value at the PSE output. Value ranges from 0 to 999 (such as BTSSPD).
- **Assigned Class:** The assigned classification depends on the requested class and the available power. An 0xC value means that classification is not assigned and power is not allocated to this port.

Bits [7..4]—The allocated class of the Primary alternative, range from 1 to 6 when CDP mode is activated or 1 to 8 in other modes. If class was not assigned, this field returns 0xC.

Bits [3..0]—The allocated class of the Secondary alternative, range from 1 to 5. In case of SSPD or when class was not assigned, this field will return 0xC. In case of DSPD, primary delivering and secondary wait for the second cycle, this field will return 0xD.

- **Layer2 Status:** This field is structured from 2 information types: 1. If and how power is delivered, 2. How the latest Layer2 command was executed.

Layer2 execution:

Bits [7..4]—This field contains the following values:

0x0—Layer2 Idle (no message received yet or port is not delivering power)

0x1—Layer2 LLDP/CDP request pending

0x2—Layer2 LLDP/CDP request is executed

0x3—Layer2 LLDP/CDP last request is rejected due to lack of power

0x4—Layer2 LLDP/CDP last request is rejected due to error

0x5—Layer2 LLDP/CDP last request is rejected due mismatch

0x6—Autoclass request pending

0x7—Autoclass measurement completed

0x8—Autoclass error (timeout)

Layer2 usage: Bits [3..0]

0x0—Port is not deliver power

0x1—Port deliver power, Using Layer1 (Assigned Class)

0x2—Port deliver power, Using Layer1 Autoclass

0x3—Port deliver power, using LLDP

0x4—Port deliver power, using LLDP Autoclass

0x5—Port deliver power, using CDP over 2P

0x6—Port deliver power, using CDP over 4P

0x7—Port is not deliver power and at reserve mode

0x8—Port deliver power, using reserve mode power

3.6 Report Key

Each message containing a command, TEST, or Program key transmitted from the Host to the PoE controller is followed by a Report message sent back from the PoE controller.

3.6.1 Command Received/Correctly Executed

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0x00	0x00	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report	—	—	—	N	N	N	N	N	N	N	N	N

This report indicates that the PoE controller received the command/program message and that it was properly executed.

3.6.2 Command Received/Wrong CHECKSUM

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0xFF	0xFF	0xFF	0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report	—	—	—	—	—	N	N	N	N	N	N	N

This report indicates that the controller received the command/program message, but its CHECKSUM was incorrect. Therefore, the command/program is not executed.

3.6.3 Failed Execution or Conflict in Subject Bytes

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0x0001 to 0x7FFF		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report	—	—	—	N	N	N	N	N	N	N	N	N

This report indicates that the controller received the command or program message but the subject fields did not match. Therefore, the command or program is not executed. Any value between 0x0001 to 0x7FFF in byte 3 and byte 4 indicates this type of error.

3.6.4 Failed Execution/Wrong Data Byte Value

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0x8001 to 0x8FFF		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report	—	—	—	N	N	N	N	N	N	N	N	N

This report indicates that the controller received the command/program message, but the data fields did not match. Therefore, the command/program is not executed. Any value between 0x8001 to 0x8FFF in byte 3 and byte 4 indicates this type of error.

3.6.5 Failed Execution/Undefined Key Value

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0xFF	0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report	—	—	—	N	N	N	N	N	N	N	N	N

This report indicates that the controller received the command or program message, but the KEY fields did not match. Therefore, the command or program is not executed.

4. Software Download

Following are the two methods to initiate a new firmware download:

- From an external PC, by implementing a “software bridge” on the Host and using a windows application on the PC. This option is explained in Microchip’s [AN3497 Software Download Algorithm for PSE Controllers](#).
- Directly from the Host CPU, utilizing a series of protocol commands, detailed in the [4.1 Download Process \(Valid Firmware Exists\)](#) and [4.2 Download Process \(Invalid or Non-Existing Firmware\)](#) sections. When utilizing the I²C communication for the download process, see section [4.4 I2C Download Process](#).

Notes:

- A PD69200/PD69210/PD69220 controller only accepts the PD69200/PD69210/PD69220 firmware. If other firmware types, such as PD69100 or PD69000 are downloaded, the controller does not run and an error is reported after reset.
- It is the user’s or hosts’ responsibility to use the correct file.

4.1 Download Process (Valid Firmware Exists)

The following process specifies the download process for a controller that has valid firmware.

In case of an “empty” controller or invalid firmware, use the process as described in section [4.2 Download Process \(Invalid or Non-Existing Firmware\)](#).

All letters signed with “” must be sent as characters or strings (ASCII value). “\r” and “\n” represent “carriage return” and “new line” ASCII codes.

Step	Action	Host Command	Controller Response		Comment
			OK	Error	
1	Enter program mode	Send the Download command.	OK report	Error report	Immediate response. Report types shown in section 3.6 Report Key .
2	Wait for boot section response	—	“TPE\r\n”	—	Response within 100 ms.
3	Erase memory	“E”	“TOE\r\n”	None	Response within 100 ms.
4	Wait for erasure	—	“TE\r\n” and then “TPE\r\n” (Within 100 ms).	“TNE\r\n” or “TNV\r\n” or none.	Erase may last up to 5 seconds.
5	Program memory	“P”	“TOP\r\n”	None	Response within 100 ms.
6	Send all lines of S19 file.	Send S19 lines, one by one, till EOF. Lines begin with “S0” must not be read.	“T*\r\n”	“TNP\r\n” or “TNV\r\n” or none.	Response within 100 ms per line.
7	End of file	—	“TP\r\n”	None	Response within 100 ms.
8	Await	—	—	—	Wait at least 400 ms.
9	Reset Controller	“RST”	System status telemetry	—	Response within 10 s.

Download Command

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0xFF	0x99	0x15	0x16	0x16	0x99	0x4E	0x4E	0x4E	0x4E	0x4E
Program	—	Flash	—	—	—	—	—	N	N	N	N	N

This command initiates the download process. Once the process is initiated, the above steps need to be accomplished.

4.2 Download Process (Invalid or Non-Existing Firmware)

When the controller is “empty” (was not burnt in factory), or its firmware is invalid (for example, after a download process interrupted in the middle), follow the same process as in section [4.1 Download Process \(Valid Firmware Exists\)](#), except for the step 1. Substitute this step with the following entry.

Step	Action	Host Command	Controller Response		Comment
			OK	Error	
1	Enter program mode	"E", "N", "T", "R"	"TPE\r\n"	None	Keep at least 10 ms delay between each transmitted character. Response within 100 ms (maximum).

Note: Invalid or non-existing firmware can be monitored by a continuous System Status telemetry. For more information, see the [Get BT System Status](#) command with byte 3 bit 1 set to '1' (programming required), in less than 5 s.

4.3 Download File: S19

The “*.S19” is the download file containing data in lines beginning with “S”.

- Lines beginning with "S0" are remarks and should not be written to the controller.
- Lines beginning with "S3" contain the data to be sent.
- "S7" designates the last line.

The S19 file example is shown as follows:

[illegible]

4.4 I²C Download Process

When utilizing the I²C communication for the download process, data is transmitted and received as single bytes.

Single byte includes: Start bit, address, R/W bit, data byte, and Stop bit.

Perform the following:

- Send 'Get System Status' message (in single byte) to check firmware validity (CPU status-1 Bit 1 = 1 indicates invalid firmware).
 - If valid firmware is detected, perform the downloading process, as described in section [4.1 Download Process \(Valid Firmware Exists\)](#).
 - If invalid firmware is detected, perform the downloading process, as described in section [4.2 Download Process \(Invalid or Non-Existing Firmware\)](#).

Note: For more details on I²C firmware download, see *AN3497 Software Download Algorithm*.

4.5 Shared Memory Download Process

The PD692x0 download process is completely different from the above, due to the shared memory system structure. See the *PD692x0 documentation*.

5. Synchronization During Communication Loss

As described in section 1. [Basic Communication Information](#), each communication Command or Request is echoed to the Host with a Report or Telemetry, respectively. The echo packet is designed to be transmitted back typically within 15 ms from the original packet sent from the Host (55 ms maximum). It is recommended that the Host receive the echo packet and use it as a command acknowledgement, or as verification for the communication feedback. It is recommended that the Host timeout is configured to 100 ms.

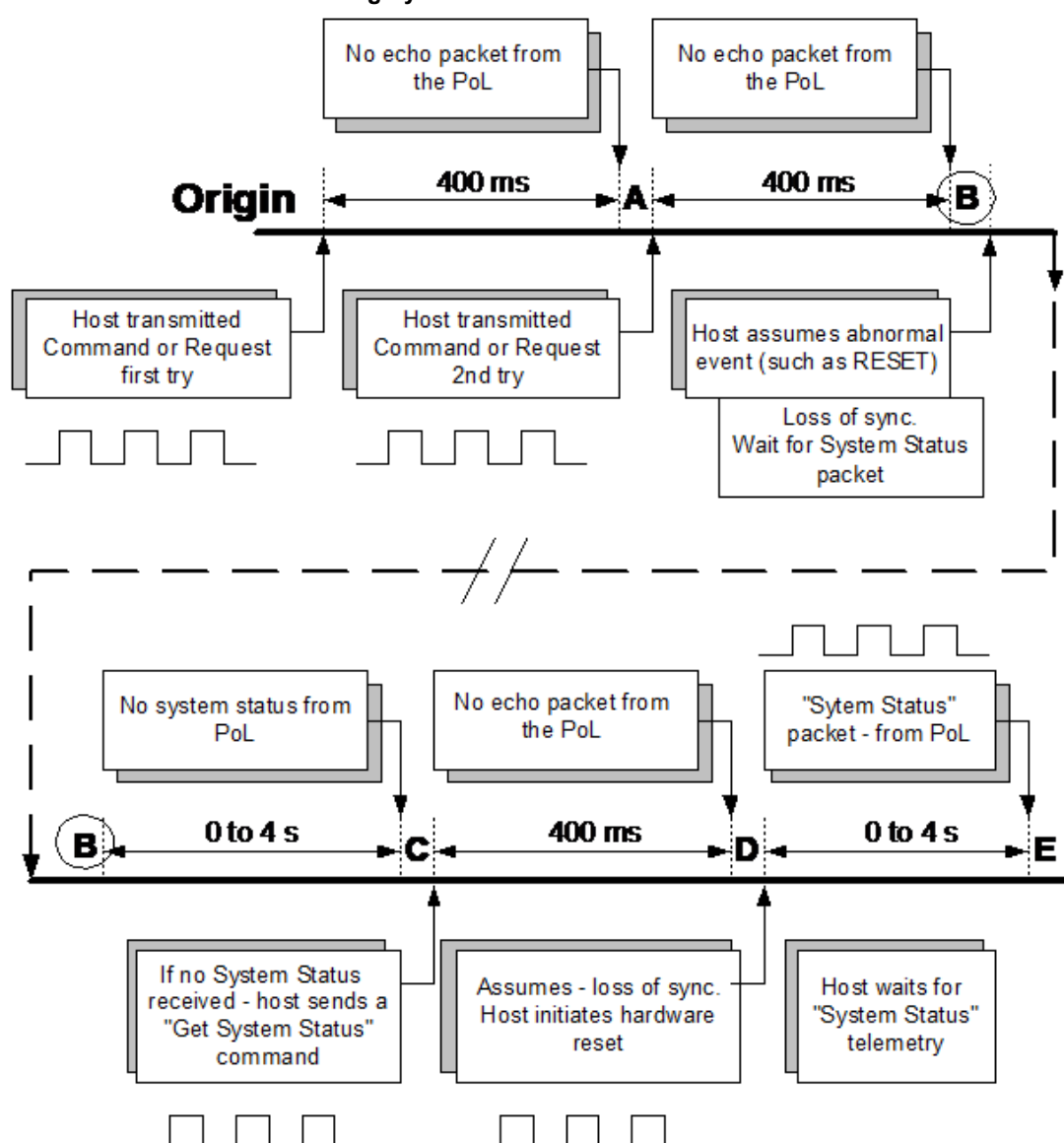
In cases where the echo packet was not received by the Host within 100 ms from the last transmitted packet, it is recommended that the Host communication be set to follow the command flow shown in [Figure 5-1](#).

- If a "System Status" packet or other echo packet is correctly received during each one of the flow stages, the Host assumes a communication re-sync and return to normal operation.
- 15-byte packet Host transmission time must not exceed 20 ms (from the first byte to the last byte).

Note: The actual bytes transaction time need to be added to the above timing. For example, in UART (19200 bps), it takes 15.6125 ms minimum for TX/RX transmittion. $[1/(19200 \times 10^3) \text{sec}] \times 2$.

Synchronization During Communication Loss

Figure 5-1. Host Communication During Sync Loss



	Case	Assumption	Action
Origin to A	400 ms with no reply from the PoL module	Host assumes—packet loss	Host re-transmits the command
A to B	400 ms with no reply from the PoL module for the second time.	Host assumes—abnormal event, such as, RESET or communication loss	Host must wait up to 4 s, expecting to receive a "System Status" packet from the PoL module
B to C	4 s with no reply from the PoL module	Host assumes—communication loss or possible PoL module hardware failure	Host must send a request for "System Status" command
C to D	400 ms with no reply from the PoL module		Host must initiate PoL Controller hardware reset
D to E	4 s with no reply from the PoL module	PoL module hardware failure	Host must stop communication activity with the PoL

Table 5-2. I²C Communication in Use

Host Steps	PoE Response
Reply Timeout (100 ms)	No response (any)
Retransmit with different Echo number	—
—	No response (any)
Reply Timeout (100 ms)	—
Wait 10 s for arbitration loss recovery and retransmit	I ² C Reinit Peripheral module or WD after 2.5 s
Wait for reply	No response (any)
Reply Timeout (100 ms)	—
Reset PoE	—
—	System status

Table 5-3. Non I²C Communication in Use

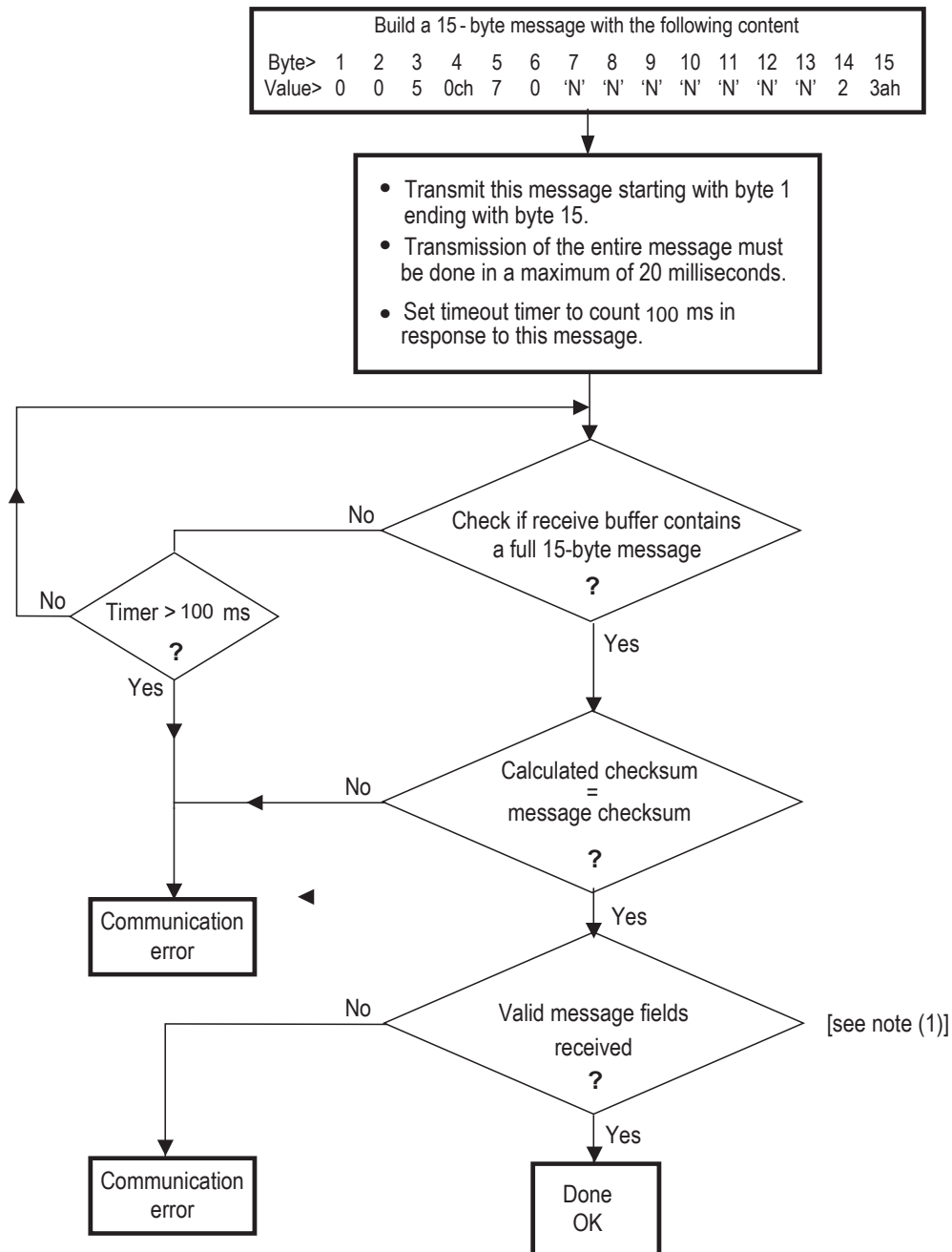
Host Steps	PoE Response
Reply Timeout (100 ms)	No response (any)
Retransmit with different Echo number	—
—	No response (any)
Reply Timeout (100 ms)	—
Wait 2.5 s for PoE watchdog function	WD reset
Retransmit with different Echo number	No response (any)
Reply Timeout (100 ms)	—
Reset PoE	—
—	System status

Note: The Host must handle unexpected system status reply, indicating PoE out of reset.

6. Communication Example

The following figure shows an example message sent by the Host CPU (PSE side) to the controller. This message turns off Port 7. It shows the transmission from the Host and the CPU.

Figure 6-1. Typical Communication Flow



(1) The following response message is to be received and considered legal.

Byte>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value>	'R'	0	0	0	'N'	'N'	'N'	'N'	'N'	'N'	'N'	'N'	'N'	3	10h

7. Appendix A

This appendix contains the port statuses and the Mask registers list.

7.1 Port Status

The following table lists the port statuses that the user receives as telemetry.

Table 7-1. Actual Port Status

Value	Status	Comments
0x06	Port is off: Main supply voltage is high.	Mains voltage is higher than the maximum voltage limit.
0x07	Port is off: Main supply voltage is low.	Mains voltage is lower than the minimum voltage limit.
0x08	Port is off: 'Disable all ports' pin is active.	Hardware pin disables all ports.
0x0C	Port is off: Non-existing port number.	Fewer ports are available than the maximum number of ports that the Controller can support. Unavailable ports are considered 'off'. Currently not used.
0x11	Port is yet undefined.	Port is not mapped to physical port, port is in unknown state, or PD692x0 fails to communicate with PD69208 device allocated for this port.
0x12	Port is off: Internal hardware fault.	Port does not respond. Hardware fault, system initialization, or PD692x0 lost communication with PD69208 device allocated for this port. (part of the Refresh function).
0x1A	Port is off: User setting.	User command set port to off.
0x1B	Port is off: Detection is in process.	Interim state during line detection. Status changes after detection process is completed.
0x1C	Port is off: Non-802.3AF/AT powered device.	Non-Standard PD connected.
0x1E	Port is off: Underload state.	Underload state according to 802.3AF/AT (current is below I _{min}).
0x1F	Port is off: Overload state.	Overload state according to 802.3AF/AT (current is above I _{cut}) or (PM3 != 0 and (PD class report > user predefined power value)).
0x20	Port is off: Power budget exceeded.	Power Management function shuts down port due to lack of power. Port is shut down or remains off.
0x21	Port is off: Internal hardware routing error	The 4P matrix configuration of PD69208 combined with PD39208 is not allowed and prevents port operation. The PD39208 devices can support only 2P ports.
0x22	Port is off: Configuration change.	Port configuration was changed or port mode was changed, causing the port to turn off. This status is momentary (2 s delay). After the delay, the port status is updated according to the new configuration/mode.
0x24	Port is off: Voltage injection into the port.	Port fails due to voltage being applied to the port from external source.

.....continued

Value	Status	Comments
0x25	Port is off: Improper Capacitor Detection results or Detection values indicating short.	Fail due to out-of-range capacitor value or Fail due to detected short value (when mask 0x04 is set).
0x26	Port is off: Discharged load.	Port fails due to system voltage supply through other port. Check other port for status 0x24. This error is linked with mask 0x1F enable.
0x34	Port is off: Short condition.	Short condition was detected.
0x35	Port is off: Over temperature at the port.	Port temperature protection mechanism was activated.
0x36	Port is off: Device is too hot.	The die temperature is above safe operating value.
0x37	Unknown device port status.	The device returns an unknown port status for the software. Currently not used.
0x3C	Power Management-Static.	Calculated power > power limit.
0x3D	Power Management-Static—OVL.	Port power-up was denied due to (PD class report power > user predefined power value). Note: Power denied counter will advance.
0x41	Power denied: Hardware power limit.	Port was not turned on due to hardware power limit (PD class power > Hardware class limit) For example, PoH PD over M device port.
0x43	Port is off: Class error.	Illegal class.
0x44	Port turn off during Host crash. Reserved.	Port is off—after the Host crash, the port is off and waits for Host command to proceed with the new detection cycles. This status appears due to OVL, UDL, or Short events during the Host crash.
0x45	Delivered power port was forced to be shut down at host crash. Reserved.	Port is off —after the Host crash, the port is off and waits for the Host command to proceed with new detection cycles. The port was delivering power before the Host crash but was configured to be forced-shut when Host crashed.
0x46	An enabled port was forced to be shut down at Host crash. Reserved.	Port is off—after the Host crash, the port is off and waits for the Host command to proceed with the new detection cycles. The port was enabled and not delivering power before the Host crash and was configured to be forced-shut when Host crashed.
0x47	Force Power Crash Error. Reserved.	Port is at force power error, according to the IEEE test mode error. The port was forced power and Host crash occurred.
0x48	Port is off: Recovery UDL. Reserved.	During crash, a recovery port delivering power was disconnected due to UDL.
0x49	Port is off: Recovery PG Event. Reserved.	During crash, a recovery port delivering power was disconnected due to PG event.

.....continued

Value	Status	Comments
0x4A	Port is off: Recovery OVL. Reserved.	During crash, a recovery port delivering power was disconnected due to OVL.
0x4B	Port is off: Recovery SC. Reserved.	During crash, a recovery port delivering power was disconnected due to SC.
0x4C	Port is off: Recovery Voltage injection. Reserved.	Voltage was applied to the port from external source during or before crash.
New Port Statuses for BT Ports		
0x80	2P Port delivering non-IEEE.	Non-IEEE PD was detected using 2P matrix in the BT mode.
0x81	2P Port delivering IEEE.	802.3BT-compliant PD was detected using 2P matrix.
0x82	4P Port that deliver only 2 Pair non-IEEE.	Signature failure on Alt-B, allowing power only on Alt-A (Non-IEEE or Legacy PD).
0x83	4P Port delivering 2P non-IEEE.	Non-IEEE PD was detected using 4P matrix in BT mode and power as 2-pair.
0x84	4P Port delivering 4P non-IEEE.	Non-IEEE PD was detected using 4P matrix in BT mode and power as 4-pair.
0x85	4P Port delivering 2P IEEE SSPD.	802.3BT-SSPD was detected using 4P matrix and operate as 2P, if requested class ≤ 4 .
0x86	4P Port delivering 4P IEEE SSPD.	802.3BT-SSPD was detected using 4P matrix and operate as 4P, if requested class > 4 .
0x87	4P Port delivering 2P IEEE DSPD in the first phase.	802.3BT-DSPD was detected using 4P matrix and operate as 2P due to 4-pair candidate validation in two cycles.
0x88	4P Port delivering 2P IEEE DSPD.	802.3BT-DSPD was detected using 4P matrix and operate as 2P.
0x89	4P Port delivering 4P IEEE DSPD.	802.3BT-DSPD was detected using 4P matrix and operate as 4P.
0x90	Force Power BT 2P.	Port matrix 2P and delivers power due to the <code>Force Power</code> command.
0x91	Force Power BT 4P.	Port matrix 4P and delivers power on both pair sets due to the <code>Force Power</code> command.
0xA0	Force Power BT error.	The <code>Force Power</code> was set, one of the port pair sets stop delivering power, from at least one reason out of various reasons (system related, device related, port related, or Pair set related).
0xA7	Connection Check error.	This error is reported only in 4-pair port when invalid connection check signature was detected. In such a case, detection fail counter is incremented.
0xA8	Open	Port is not connected.

7.2 BT MASK Registers List

This list describes the individual mask registers that can be used in the PD692x0 BT product.

Num	Name	Val	Description
0x00	Ignore higher priority	'0'	The allocation logic before classification sums the delivering power ports with lower priority and adds the result to the available power. After classification, the disconnection function executes and may disconnect lower priority ports to free power for the higher priority port.
		'1'	If power is not available for powering-up any port, any new connected port power-up is denied, regardless of its priority.
0x09	Recovery support Note: Set is ignored at this point	0	BT systems Default Recovery feature is disabled in the system, and ports do not continue delivering power during crash (the Host Recovery request is ignored).
		1	Recovery feature is enabled in the system, and ports that where set to crash mode continue to deliver power during the crash (the Host Recovery request initiates recovery activity).
0x10	Support High res detection	'0'	Resistor detection range at normal range, according to the IEEE 802.3bt.
		'1'	Open the upper range to 55 KΩ at 2-pair logical port only. Notes: <ul style="list-style-type: none"> This feature will not operate on any 4-pair logical port. When this mask is set, the capability of PSE Connected to PSE Protection function is reduced.
0x14	Hardware reset on ASIC error	'0'	If ASIC fails (stops functioning), then mark it as 'disabled' and continue working with other ASICs.
		'1'	If ASIC fails, then perform HW reset.
0x1B	I ² C restart enable	'0'	Do not initialize the I ² C module in case of inactivity.
		'1'	Initializes the I ² C module system after 10 seconds of inactivity.
0x1F	PSE powering PSE checking	'0'	PSE powering PSE condition does not deny powering new valid ports.
		'1'	In case PSE powering PSE condition occurs, no additional ports are powered-up, until this problem is resolved.

.....continued

Num	Name	Val	Description
0x20	LED stream type	0	LED stream is disabled.
		1	LED stream supports unicolor BT.
		2	LED stream supports Bicolor BT.
		3	For Microchip internal use only (NTGR).
		4	For Microchip internal use only (Direct).
		5	Reserved for future: Direct led function (for 1 port Midspan products). Vmain LED is driven from the PD692x0 (xSYS_OK, pin 32), and Port LED is driven from the PD69208 LED port (PD69200 BT LED definitions internal document).
		6	Direct led function from PD69208 LED ports (for 1 port Midspan products). 3 LEDs in the same package.
0x2A	Enable ASIC Refresh	'0'	If ASIC fails, do not try to refresh it and proceed according to mask 0x14 (HW reset on ASIC error).
		'1'	If ASIC fails, try to refresh it. If refresh fails, refresh operation repeats till it succeeds. The related port status during refresh operation is "chip error" (0x12). The refresh operation is being performed every 60 ms.
0x2C	Layer2 Power Allocation Limit	'0'	Power allocation limit up to requested class (non-BT compliant).
		'1'	Power allocation limit up to minimum between the requested class and the operation mode (BT compliant).
0x30	Port LED Blinks at invalid signature or connection-check error	'0'	When port detects invalid signature or connection-check error, LED stays off.
		'1'	When port detects invalid signature or connection-check error, LED blinks.
0x32	Temperature Derating enable Midspan BT	'0'	This mask is not in use and will be ignored.
0x33	Temperature Derating Midspan BT	'0'	This mask is not in use and will be ignored.

.....continued			
Num	Name	Val	Description
0x40	xSystem OK pin behavior	0	Pin indicates if Vmain is in valid range or out of range. See the <i>PD692x0 datasheet</i> .
		1	Midspan main LED behavior (Microchip internal usage). Led is ON when: Vmain is within the range, AND actual bank is even number (0,2,4,...). In any other condition, LED blinks.
		2	Pin behavior is according to power indication in %.
		3	Reserved.
		4	Pin behavior is according to power indication in Watt.
0x46	Single detection fail event	'0'	When port detection consecutively fails, counter related event (Get BT Port Status , Port Event field bit 2) and the correlated invalid signature counter advances on every unsuccessful detection cycle.
		'1'	When port detection consecutively fails, counter related event bit (section Get BT Port Status , Port Event field bit 2) is set only at the first failure. The correlated invalid signature counter continues to advance on every unsuccessful detection cycle.
0x49	Auto Zone2 port activation	'0'	From firmware 3.54, this mask is not in use and will be ignored.
0x4F	Support_adding lldp_half_priority	'0'	Port at LLDP does not have additional half priority.
		'1'	Port at LLDP has additional half priority compared to non LLDP port at the same priority settings.
0x50	HOCPP - High Over Current Pulse Protection	0	Internal port startup check duration is 500 ms and HOCPP is enabled immediately (0 ms) after port power-up.
		1	Internal port startup check duration is 500 ms and HOCPP is enabled at the end of this time duration.
		2	Internal port startup check duration is 1000 ms and HOCPP is enabled at the end of this time duration.
		3	Internal port startup check duration is 1500 ms and HOCPP is enabled at the end of this time duration.
		4	Internal port startup check duration is 2000 ms and HOCPP is enabled at the end of this time duration.
		Notes: <ul style="list-style-type: none"> For DSPD staggered power up, any selection above #1 is treated as #1. HOCPP is enabled according to the HOCPP protection policy. 	
0x53	LER – Long Error Recovery	'0'	Systems with regular error recovery requirements.
		'1'	High energy systems that requires long error recovery sets this mask to '1'.

7.3 Internal Testing Commands

7.3.1 Set Test Command

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x04	##	0x08	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Test	—	ATE Commands	Test Code	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data

This command is used for Microchip testing purposes.

7.3.2 Get Test Command

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x08	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Request	—	ATE Commands	Test Code	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data	Test Data
0x03	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Telemetry	—	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data

This command is used for Microchip testing purposes.

7.3.2.1 Get Total Power

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x60	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Global	Supply	Total Power	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Telemetry	—	Power Consumption	Calculated Power	Available Power	Power Limit	Power Bank	Vmain Voltage					

This telemetry indicates the system power condition.

Condition	Description
Power Consumption	The sum of measured consumed power (I _{port} x V _{main}), from all logical ports that are delivering power. If the value exceeds Power Budget limit, ports are disconnected. The units are in Watts.
Calculated Power	The sum of all logical ports reflected power, that are delivering power, based on the PM1 and PM2 settings (combination of TPPL_BT values and measured port power). If the value exceeds Power Budget limit, ports are disconnected. The units are in Watts.
Available Power	How much calculated power is available in the system till it reaches to the power limit. Available power = (Power limit – Calculated power consumption). The units are in Watts.

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Condition	Description
Power Limit	<p>The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports are disconnected due to over power. The disconnection is priority based. These values are to be set from 0 W to 6000 W depending on the capability of the power supply. If power consumption exceeds this level, lowest priority ports are disconnected. The power units in this field are in Watts.</p> <p>Example: 380 W = 380 = 0x17C</p>
Power Bank	The current active power bank that was read from the first PD69208 device.
Vmain Voltage	Actual momentary measured system main voltage in 0.1 V step.

8. Appendix B—Reserved Power

This appendix describes the Reserved Power mode.

8.1 Set BT Port Reserve Power Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x55	Val	Val		Val	0x4E	0x4E	0x4E	0x4E	0x4E
Command	—	Channel	Reserve Power	Port Num	Reserve Power Request		PSE Port Type	N	N	N	N	N

This command sets the values of a reserved port, if the port mode was previously configured to 0x31 using the [Set BT Port Parameters](#).

If the port is not configured to mode 0x31, then the request is not processed and the last approved value is kept.

Note: Values are not being saved.

- **Reserve Power Request:** Port power value [0.1 W LSB] is reserved from the main power budget if it is approved, to be used by the defined logical port.
- **PSE Port Type:** This port type defines the logical port power and current limits.

Value	Logical Port 2P Matrix	Logical Port 4P Matrix
0	PSE port Type3 TPPL Clamp to about 38 W, defined by relevant default parameters. ICUT = 705 mA ILIM = 850 mA	PSE port Type3 TPPL Clamp to about 65 W, defined by relevant default parameters. ICUT per pair-set = 705 mA ILIM per pair-set= 850 mA
1	PSE port Type4 TPPL Clamp to about 48.7 W, defined by relevant default parameters. ICUT = 976 mA ILIM = 1150 mA	PSE port Type4 TPPL Clamp to about 97.5 W, defined by relevant default parameters. ICUT per pair-set = 976 mA ILIM per pair-set = 1150 mA

Other values are reserved for future use and will be ignored.

When the Reserve mode is set, the default is 0.

8.2 Get BT Port Reserve Power Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x55	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request	—	Channel	Reserve Power	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val	Val	Val	0x4E	0x4E	0x4E	0x4E

.....continued												
[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
Telemetry	—	Reserve Power Request		Reserve Power Allocated (TPPL_BT)		Reserve Status	Priority	PSE Port Type	N	N	N	N

- **Reserve Power Request:** The reserve power that was requested in the set command [0.1 W LSB].

Reserve Power Allocated: The power that was allocated to the port and set in the TPPL internal table [0.1 W LSB].

- **Reserve Status:** This field contains two nibbles reporting the feature status.
 - **Reserve Status:** Bits [3..0]
 - 0x0—Port is not in reserve mode
 - 0x1—Port is in reserve mode and not deliver power
 - 0x2—Port is in reserve mode and not deliver power, after PM event
 - 0x3—Port is in reserve mode and deliver power
 - **Reserve Execution:** Bits [7..4]. This field contain the following values:
 - 0x0—Reserve Idle (no message received yet or port is not in reserve mode)
 - 0x1—Reserve request pending
 - 0x2—Reserve request was successfully executed
 - 0x3—Reserve last request was rejected due to lack of power
- **Priority:** This field reflects the configuration value field.
- **PSE Port Type:** This field returns the PSE Port Type settings.

8.3 Set BT Port Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0xC0	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E
Command	—	Channel	BT Port Config1	Port Num	Port Mode CFG1	Port Mode CFG2	Port Operation Mode	Add Power for Port Mode	Priority	N	N	N

To set the port to Reserved Power mode, the “Port Operation Mode” must be set to 0x31.

0x31	4P BT Reserve power, 97.5 W + Legacy Detection (4P Matrix)	<p>This mode is Type4 BT up to 97.5 W using reserve power configuration only.</p> <p>Note: When the mode is set, the default reserve power before power configuration is 0 W.</p> <p>Maximum logical port power = 97.5 W.</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD).</p> <p>M-Device is clamped by ICUT/ILIM.</p> <p>Default ICUT and ILIM are set according to the PSE Port Type and the M/T device bit.</p>
	2P BT Reserve power, 48.7 W + Legacy Detection (2P Matrix)	<p>This mode is Type3 BT up to 48.7 W using reserve power configuration only.</p> <p>Note: When the mode is set, the default reserve power before power configuration is 0 W.</p> <p>Maximum logical port power = 48.7 W (with TPPL clamping function).</p> <p>Legacy detection = Enable (Legacy detected PD is treated as SSPD).</p> <p>M-Device is clamped by ICUT/ILIM.</p> <p>Default ICUT and ILIM are set according to the PSE Port Type and the M/T device bit.</p>

9. Revision History

Revision	Date	Description
A	07/2021	<p>The following changes are made in this revision:</p> <ul style="list-style-type: none"> • Made updates regarding BT S.C.P. revision 3.31 and firmware 3.55 in the Introduction section. • Updated the 3.3.6 Set BT Port Parameters section. • Updated and added notes to Table 3-6. • Removed the Power Derating and Related Messages (Midspan Only not Supported) section.

History of the previous firmware releases is as follows:

Revision	Date	Description
DS00003821B	02/2021	<p>The following changes are made in this revision:</p> <ul style="list-style-type: none"> • Made updates regarding BT S.C.P. revision 3.30 and firmware 3.54 in the Introduction section. • Updated the 3.1.6 Get BT System Status section. • Edited the 3.1.6.1 Telemetry at Boot Up Error section. • Edited the 3.1.19 Log Sector Clear and Stamp (The Command is Ignored) section. • Edited the 3.2.2 Get BT PoE Device Status section. • Edited the 3.2.5 Get PoE Device Error Log (Return 0 Telemetry) section. • Edited the 3.2.6 Get Log Sector Status (Return 0 Telemetry) section. • Added Table 3-4 and edited Table 3-6. • Edited 3.4.2 Set Power Banks and 3.4.4 Get Power Supply Parameters sections. • Added the 3.3.12 Set BT Port Reserve Power Request and 8.2 Get BT Port Reserve Power Request sections. • Edited Power Derating and Related Messages (Midspan Only not Supported), Edited the Set Derating Data (Midspan Only not Applicable), Get Derating Data (Midspan Only not Applicable), Get Derating User Temperature (Midspan Only not Applicable), and Get Derating System Measurements (Midspan Only not Applicable) sections. • Edited the 3.5.2 Get BT Port Layer2 LLDP PSE Data section. • Updated heading of the 7. Appendix A section. • Updated Table 7-1. • Updated the 7.2 BT MASK Registers List section. • Added the 7.3 Internal Testing Commands section. • Added the 8. Appendix B—Reserved Power section. • Edited tables in 3.3.2 Get Physical Port Number from Temporary Matrix, 3.3.7 Get BT Port Parameters, and 3.5.5 Get Layer2 CDP Port PowerUp ALT-B sections.

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Revision	Date	Description
DS00003821A	01/2021	<p>The following changes are made in this revision:</p> <ul style="list-style-type: none"> Updated the document as per Microchip standards. Made updates regarding BT S.C.P. revision 3.29 and firmware 3.52 in the Introduction section. Updated Figure 1-1. Updated document number in Table 1-1. Edited the 2.3 Unused Fields "N" section. Updated links in the 3.1.7 Get BT Event Cause section. Changed Microsemi references to Microchip references throughout the document. Edited the 3.3.2 Get Physical Port Number from Temporary Matrix section. Updated link in the 3.5.5 Get Layer2 CDP Port PowerUp ALT-B section. Updated link in the 4. Software Download section. Edited Figure 5-1.
3.29	02/2020	<ul style="list-style-type: none"> New mask—LER (0x53) in Appendix section. Sections Set PoE Device Parameters and Get BT PoE Device Status: Fixed TSH description errors and added a note to the device error register in bit 1.
3.28	11/2019	<ul style="list-style-type: none"> Set BT Port Parameters, Port Mode CFG1: Added force power 90 W option. Set BT Port Parameters, New Port Operation Mode: Dedicated for Microchip Midspans only. Mask 0x50 FIVE. Set BT Power Indication LED: <ul style="list-style-type: none"> Added new field for "Indication OFF Delay" selection. Notes description update. Mask 0x20, new selecting option #3, dedicated for NTGR LED stream. Pages numbering update. Set BT Port Parameters, Port Operation Mode table: Fixed configuration name fields description mistakes, due to copy paste errors.
3.27	05/2019	<ul style="list-style-type: none"> Set BT Port Parameters: Added modes 0x25,0x26,0x27. Updated modes 0x14, 0x15. Updated port mode CFG1 with new 0x2 enable mode. Get BT Port Status, Port Mode CFG1 field updated with 0x2 description. Set BT Port Layer2 LLDP PD Request: Added L2 CFG Field with Priority nibble. Get BT Port Layer2 LLDP PSE Data: Added L2 CFG Field with Priority nibble. Masks table: Added new 0x4F Mask "Support_adding_lldp_half_priority".
3.26	04/2019	<ul style="list-style-type: none"> Set BT Port Parameters: <ul style="list-style-type: none"> Added modes 0x14, 0x15. Added "Class Error Operation Select" to CFG2 reserved bits.
3.25	03/2019	<ul style="list-style-type: none"> Set BT Port Parameters: Added mode 0x24. Download Process (Valid Firmware Exists): Timing improvement. I²C download process updated. BT MASK Registers list: Added new individual mask 0x50.
3.24	02/2019	Telemetry at Boot Up error updated with download type field.

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Revision	Date	Description
3.23	11/2018	<ul style="list-style-type: none"> Get BT Port Class telemetry update on the CC result field and Decided PD Structure field. Get BT Port Class: Added note for auto class. Status 0xA7 description updated.
3.22	08/2018	Set BT Port Parameters command, Operation Mode field: updated description in mode 0x20 and added mode 0x23.
3.21		<ul style="list-style-type: none"> Command 4.3.10 Set Temporary Power Limits for BT Port was removed from the document as it was not supported and not planned to be supported. Mask 0x2B Check inrush was removed as it is not operational in BT. Port status table was updated and unused strike through lines were deleted.
3.20	06/2018	<ul style="list-style-type: none"> Get BT Port Status description update: CH Num changed to Port Num. Get BT Port Class: Field Autoclass support description update. Added Commands for Autoclass in LLDP. Layer2 Status field was modified with additional values and existing values change. Set BT Port Layer2 LLDP PD Request, Cable Length field was modified with nibble for 10 meter LSB length and AutoClass nibble. Get BT Port Layer2 LLDP PSE Data: Update in Layer2 Status field and added field "Cable Length in Use". Get BT Port Layer2 LLDP PD Request: Cable length was changed to Cable Length Req and the field values were updated. Get Port Layer2 CDP PSE Data: Update in Layer2 Status field. CH Num field was changed to Port Num in all Layer2 commands for protocol consistency. Made Layer2 description updates in all commands, light blue marked. Value of 0xACAC was added to "PSE Allocated Power Single / ALT-A" field and to "PD Request Power Single" field. (To report on Autoclass usage). Set Port Layer2 CDP PD Request description update. Get BT Port Measurements description update, CH Num changed to Port Num. Set BT Port Parameters, Port Mode CFG2 field, and BT port PM mode: added Autoclass to 0x2 value.
3.10—Modifications by Customer Support	05/2018	<ul style="list-style-type: none"> Mask 0x19 was removed. Mask 0x30 "Pot LED blinks at invalid signature or connection-check error" was added. Mask 0x20, LED stream type: Updated fields 5,6,7 description from single field description.
3.10	04/2018	<ul style="list-style-type: none"> Added port status 0x22 "Port is off: Configuration change", 0x41 – "Power denied: Hardware power limit". Get BT PoE Device Status: "Device Event" changed to "Device Event Reason". Set BT Power Indication LED: Description update Get BT Port Status, Port Event field: Bit 1 and bit 2 description change. Field MSCC Use11 was removed. Recovery mentioning was removed.

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Revision	Date	Description
3.09	04/2018	<ul style="list-style-type: none"> • Get BT Event Cause: Added system event bit 1 “Vmain Fault”. • Get BT PoE Device Status: Added device event bit, “PoE device refreshed” bit 3. • Get BT Port Status: Description update in field “Last Shutdown Error Status”. • Set Interrupt Mask was changed to “Set BT Event Interrupt Mask” using correlated new BT events. • Get Interrupt Mask was changed to “Get BT Event Interrupt Mask” using correlated new BT events. • Get BT System Status: Interrupt register field was removed, due to the use of new BT events registers. A single event bit was added. • Set/Get System OK LED Mask Registers were removed. • Mask 0x40 value #3 was removed and reserved due to the removal of the LED blink/light IRQ reflection commands. • Added note to Get BT Port Status, Port Event field description. • Set/Get BT power indication LED updated command instead of pre_BT commands. • Mask 0x46 description updated due to the old Interrupt register removal.
3.08	03/2018	<ul style="list-style-type: none"> • Modifications for Dual signature. • Set/Get BT Port Parameters commands update, using modes instead of flags + Fields order change + New fields. • Get BT Port Status description update + New field. • Get BT Port Class, New fields update + fields shift + description updates. • Added port statuses. • Masks table description update for 0x20, 0x40 • Get BT System Status, Interrupt Register, Event Table description update with new statuses numbers.
3.07	01/2018	<ul style="list-style-type: none"> • Get BT System Status—Field name “Device Found” was changed to “Found Devices”. • Get System Measurements: Name changed to “Get Derating System Measurements”. • Power Derating, Related Messages (Midspan Only): Added (Midspan only) to all the commands. • Get BT Port Class, field Port PHY Information—CC Result was modified with “Open”, that was split from “Other” and description update. • Mask 0x00 description update. • Set System OK LED Mask Registers command: Description update, Mask 0x28 was changed to 0x40 to follow the mask change. • Set BT Port Parameters—Description corrections in fields numbering. • Status 0x87 was updated and status 0x88 was added to replace the previous 0x87. • Set Temporary Matrix: Description update, 0x37 was changed to 0x11. • Test commands updates made.

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Revision	Date	Description
3.06	01/2018	<ul style="list-style-type: none"> Minor description updates for clarification. Colors marking removal. Force power status numbers update. Assigned class description was copied from Get BT Port Class to Get BT Port Status. Note about class 0 was added.
3.05	01/2018	<ul style="list-style-type: none"> Get BT Port Status: Port Event field description updated by removing unnecessary statuses numbers. Get Total Power: Calculated Power field description updated. Document references link errors were fixed.
3.04	01/2018	<ul style="list-style-type: none"> Set BT Port Parameters: Field Port Mode CFG1 was updated by removing Legacy enable bit. The bit was moved to Field—Port Mode CFG2. Set BT Port Parameters: Field Port Mode CFG2 was updated with Legacy bit. The bit name was changed to “Non-IEEE Enable”. “BT Port PM mode” Field was updated with additional option 2 selection, to enable the removal of system BT PM Mode. Get BT Class Power: Updated with “Added Class Power Value” field as part of existing telemetry. Get BT Port Parameters: “Actual BT Port Mode” field was removed. Get BT Port Status: “Port Event” field was added. Port Mode CFG1 was updated. Set/Get BT PM Mode was removed as it can be configured per port. Get Total Power number was changed from Get Power Banks to Get Total Power and “Vmain Voltage” field was added. Get BT Power Supply measurement was removed as all the information is already exists in Get Total Power telemetry. Get BT Port Measurement number was changed from 4.4.8 to 4.4.5 and thefield “Port Power Consumption” was changed to “Measured Port Power” with 0.1 W LSB instead of 5 mW LSB. Recovery Mask 0x09 default = 0 and set to ‘1’ is ignored. Recovery statuses are reserved. Get BT Event Cause Telemetry Update. Interrupt register was removed and system event field was added. Get BT PoE Device Status update: Expected Device field was removed and replaced with Device Event field. “Vcal Counter” name was changed to “4.2.2 MSCC Use8”. Reset/POR Counter field was added to DATA[11]. Returned the interrupt register field to Get BT System Status and updated the status numbers that caused an event.
3.03	12/2017	<ul style="list-style-type: none"> General description updated. Removed backwards compatibility chapter. Port statuses updated. Get BT Port Parameters: BT PortCFG1 (0xC1) was removed and changed to BT PortConfig1 (0xC0). Added Midspan tunneling command and telemetry. Added Midspan serial number telemetry request description. Get BT Port Measurements changed.

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Revision	Date	Description
3.02	12/2017	<ul style="list-style-type: none">• Mask 0x28 was changed to Mask 0x40.• Mask 0x16 was changed to Mask 0x20.• Added section How to Treat Unused “N” fields.
3.01	12/2017	<ul style="list-style-type: none">• Subject values changed in various commands.• Added control bits to BT Port Configuration command.• Descriptions updated in various commands.
Beta 3.00	12/2017	Initial Revision.

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