

## Release Note for AIC SAS 12G 2MS Expander

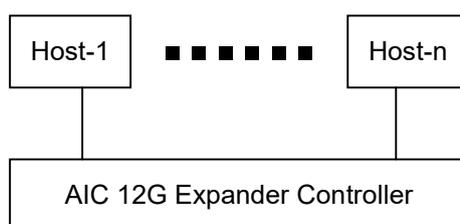
May 22, 2025

### Changelog

05/22/2025 (FW 1.12.64.3 + MFG 1.64.0.6) - Part Number(SEE-00126403\_A01 + SEG-0064C006\_A01)

1. Built with SDK 25.00
2. Initial revision

### 1. Support Multiple Host/Path Access



To have multiple host/path access support (the host number can be up to the number of wide ports on each AIC 12G Expander Controller), only the following drives are supported for shared access:

- (A) SAS drive / Nearline SAS drive
- (B) SATA drive with an interposer which provides SATA-to-SAS conversion

### 2. SES Inband Features

#### 2.1. SES Pages

- 00h - List of supported diagnostic pages
- 01h - SES configuration
- 02h - SES enclosure control / enclosure status
- 07h - SES element descriptor

0Ah - SES additional element

0Eh - SES download microcode control / SES download microcode status

## 2.2. SES Elements

04h - Temperature Sensor

0Eh - Enclosure

12h - Voltage

17h - Array Device

## 2.3. Implementation on SES Elements

### 2.3.1. Temperature Sensor Element

#### 2.3.1.1. Temperature Sensor Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	RQST FAIL	Reserved					
2	Reserved							
3	Reserved							

#### 2.3.1.2. Temperature Sensor Status Element

BYTE/BIT	7	6	5	4	3	2	1	0	
0	COMMON STATUS								
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE				
1	IDENT	FAIL	Reserved						
2	TEMPERATURE								
3	Reserved				OT FAILURE	OT WARNING	UT FAILURE	UT WARNING	

Field	Value
ELEMENT STATUS CODE	OK: Everything is Ok NON-CRITICAL: If either warning limit is exceeded CRITICAL: If either failure limit is exceeded
FAIL	A warning or failure condition is detected

TEMPERATURE	Temperature reading
OT FAILURE	Temperature has exceeded the failure high threshold value
OT WARNING	Temperature has exceeded the warning high threshold value
UT FAILURE	Temperature is below the failure low threshold value
UT WARNING	Temperature is below the warning low threshold value

### 2.3.2. Enclosure Element

#### 2.3.2.1. Enclosure Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	POWER CYCLE REQUEST		POWER CYCLE DELAY					
3	POWER OFF DURATION						REQUEST	REQUEST
							FAILURE	WARNING

Field	Value
RQST IDENT	Please refer to section "SES Element Control Functions" for details.
REQUEST FAILURE	Please refer to section "SES Element Control Functions" for details.
REQUEST WARNING	Please refer to section "SES Element Control Functions" for details.

Server Storage does not support this control element.

#### 2.3.2.2. Enclosure Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	IDENT	Reserved						
2	TIME UNTIL POWER CYCLE						FAILURE	WARNING
							INDICATION	INDICATION
3	REQUEST POWER OFF DURATION						FAILURE	WARNING
							REQUESTED	REQUESTED

Field	Value
ELEMENT STATUS CODE	OK
IDENT	0: Power LED is solid on 1: Power LED is blinking
FAILURE REQUESTED	Set by the REQUEST FAILURE on Enclosure Control Element
WARNING REQUESTED	Set by the REQUEST WARNING on Enclosure Control Element

Server Storage does not support this status element.

### 2.3.3. Voltage Element

#### 2.3.3.1. Voltage Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	RQST FAIL	Reserved					
2	Reserved							
3	Reserved							

#### 2.3.4.2. Voltage Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	IDENT	FAIL	Reserved		WARN OVER	WARN UNDER	CRIT OVER	CRIT UNDER
2	VOLTAGE							
3								

Field	Value
ELEMENT STATUS CODE	OK
FAIL	A warning or failure condition is detected
WARN OVER	Voltage has exceeded the warning high threshold value
WARN UNDER	Voltage is below the warning low threshold value
CRIT OVER	Voltage has exceeded the failure high threshold value
CRIT UNDER	Voltage is below the failure low threshold value
VOLTAGE	Voltage reading

### 2.3.5. Array Device Element

#### 2.3.5.1. Array Device Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST OK	RQST RSVD DEVICE	RQST HOT SPARE	RQST CONS CHECK	RQST IN CRIT ARRAY	RQST IN FAILED ARRAY	RQST REBUILD/REMAP	RQST R/R ABORT
2	RQST ACTIVE	DO NOT REMOVE	Reserved	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved
3	Reserved		RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved	

Field	Value
PRDFAIL	Please refer to section “SES Element Control Functions” for details.
RQST OK	Please refer to section “SES Element Control Functions” for details.
RQST RSVD DEVICE	Please refer to section “SES Element Control Functions” for details.
RQST HOT SPARE	Please refer to section “SES Element Control Functions” for details.
RQST CONS CHECK	Please refer to section “SES Element Control Functions” for details.
RQST IN CRIT ARRAY	Please refer to section “SES Element Control Functions” for details.
RQST IN FAILED ARRAY	Please refer to section “SES Element Control Functions” for details.
RQST REBUILD/REMAP	Please refer to section “SES Element Control Functions” for details.
RQST R/R ABORT	Please refer to section “SES Element Control Functions” for details.
RQST ACTIVE	Please refer to section “SES Element Control Functions” for details.
DO NOT REMOVE	Please refer to section “SES Element Control Functions” for details.

RQST MISSING	Please refer to section “SES Element Control Functions” for details.
RQST INSERT	Please refer to section “SES Element Control Functions” for details.
RQST REMOVE	Please refer to section “SES Element Control Functions” for details.
RQST IDENT	Please refer to section “SES Element Control Functions” for details.
RQST FAULT	Please refer to section “SES Element Control Functions” for details.
DEVICE OFF	Please refer to section “SES Element Control Functions” for details.

### 2.3.5.2. Array Device Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	OK	RSVD DEVICE	HOT SPARE	CONS CHK	IN CRIT ARRAY	IN FAILED ARRAY	REBUILD/ REMAP	R/R ABORT
2	APP CLIENT BYPASSED A	DO NOT REMOVE	ENCLOSURE BYPASSED A	ENCLOSURE BYPASSED B	READY TO INSERT	RMV	IDENT	REPORT
3	APP CLIENT BYPASSED B	FAULT SENSED	FAULT REQSTD	DEVICE OFF	BYPASSED A	BYPASSED B	DEVICE BYPASSED A	DEVICE BYPASSED B

Field	Value
PRDFAIL	Set by the PRDFAIL on Array Device Control Element
ELEMENT STATUS CODE	OK: A drive is detected in the slot NOT INSTALLED: No drive is installed in the slot
OK	Set by the RQST OK on Array Device Control Element
RSVD DEVICE	Set by the RQST RSVD DEVICE on Array Device Control Element
HOT SPARE	Set by the RQST HOT SPARE on Array Device Control Element
CONS CHK	Set by the RQST CONS CHECK on Array Device Control Element
IN CRIT ARRAY	Set by the RQST IN CRIT ARRAY on Array Device Control Element

	Element
IN FAILED ARRAY	Set by the RQST IN FAILED ARRAY on Array Device Control Element
REBUILD/REMAP	Set by the RQST REBUILD/REMAP on Array Device Control Element
R/R ABORT	Set by the RQST R/R ABORT on Array Device Control Element
DO NOT REMOVE	Set by the DO NOT REMOVE on Array Device Control Element
READY TO INSERT	Set by the RQST INSERT on Array Device Control Element
RMV	Set by the RQST REMOVE on Array Device Control Element
IDENT	Set by the RQST IDENT on Array Device Control Element
FAULT REQSTD	Set by the RQST FAULT on Array Device Control Element
DEVICE OFF	Set by the DEVICE OFF on Array Device Control Element

## 2.4. SES Element Control Functions

### 2.4.1. LED indicators (blue and red) associated with an attached disk drive

#### Array Device Slot control element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST OK	RQST RSVD DEVICE	RQST HOT SPARE	RQST CONS CHECK	RQST IN CRIT ARRAY	RQST IN FAILED ARRAY	RQST REBULD/REMAP	RQST R/R ABORT
2	RQST ACTIVE	DO NOT REMOVE	Reserved	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved
3	Reserved		RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved	

The default behavior for blue LED is "LED is on when the disk is not busy, and off when the disk is executing a command". When the "RQST IDENT" bit is set, the blue LED overwrites its default behavior with a slow blink while the red LED is off. The blue LED is set "Activity" for not overwriting its default behavior.

Slot Control Bit	Blue LED	Red LED
RQST OK	Activity	OFF
RQST RSVD DEVICE	Activity	OFF

RQST HOT SPARE	Activity	OFF
RQST CONS CHECK	Activity	Fast blink
RQST IN CRIT ARRAY	Activity	Slow blink
RQST IN FAILED ARRAY	Activity	Slow blink
RQST REBUILD/REMAP	Activity	Fast blink
RQST R/R ABORT	Activity	Slow blink
RQST ACTIVE	Activity	OFF
DO NOT REMOVE	Activity	OFF
RQST MISSING	Activity	ON
RQST INSERT	Activity	Slow blink
RQST REMOVE	Activity	Slow blink
RQST IDENT	Activity	OFF
RQST FAULT	Activity	ON
DEVICE OFF	OFF	OFF
PRDFAIL	Activity	Slow blink

#### 2.4.2. How to turn on/off the power of a drive slot

**Array Device Slot control element**

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST OK	RQST RSVD DEVICE	RQST HOT SPARE	RQST CONS CHECK	RQST IN CRIT ARRAY	RQST IN FAILED ARRAY	RQST REBULD/REMAP	RQST R/R ABORT
2	RQST ACTIVE	DO NOT REMOVE	Reserved	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved
3	Reserved		RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved	

The "DEVICE OFF" for a drive slot is defined in the bit4, byte3 of the "Array Device Slot control element" in the SES specification. Set the bit to turn off a slot power, and vice versa. We use the software package "sg3\_utils" on Linux for example, and have a SAS HBA and a cable to connect your host with the expander.

(A) Show the device for AIC Expander Controller (canister)

```
$ sg_map -i
```

```
/dev/sg2 AIC 12G 2U24SAS3EOB 0c01
```

(B) Get the current state of a slot power. The "Device off=0" means the slot power is on.

```
$ sg_ses --page=2 /dev/sg2
```

Element 0 descriptor:

```
App client bypass B=0, Fault sensed=0, Fault reqstd=0, Device off=0
```

(C) Get the descriptor of a slot power

```
$ sg_ses --page=7 /dev/sg2
```

Element 0 descriptor: Disk001

(D) Turn off a slot power

```
$ sg_ses --descriptor=Disk001 --set=3:4:1 /dev/sg2
```

(E) Turn on a slot power

```
$ sg_ses --descriptor=Disk001 --clear=3:4:1 /dev/sg2
```

### 3. Serial Command Line Interface Functions

The RS232 setting - baud rate: 38400 bps, data bits: 8, parity: none, stop bits: 1, flow control: none

#### 3.1. How to enable/disable T10 zoning

The default T10 zoning configuration is off.

(A) Check the current zoning state

```
cmd> phyzone state
```

```
Zoning is OFF
```

(B) Enable zoning

```
cmd> phyzone on
```

(C) Disable zoning

```
cmd> phyzone off
```

### 3.2. How to configure T10 zoning

After enabling T10 zoning, five predefined groups are Group1, Group8, Group9, Group10, and Group11. Each PHY should be in one of the five groups, and all PHYs in a wide port should be in the same group. Each PHY in Group1 can access any PHY in other groups, and vice versa. Each PHY in Group8 cannot access any PHY in Group9, and vice versa.

The command syntax is "phyzone phy\_index group". The following example shows how to setup one drive accessed only by the first port and another drive accessed only by the second port.

The configuration for the example is

- (A) PHY0 - PHY3 for the first wide port
- (B) PHY4 - PHY7 for the second wide port
- (C) PHY12 - PHY35 for drive

Step 1: Read the current group for PHY4

```
cmd> phyzone 4
Phy 4 for Zone Group 1
```

Step 2: Assign the second port (PHY4 - PHY7) for Group9

```
cmd> phyzone 4 9
cmd> phyzone 5 9
cmd> phyzone 6 9
cmd> phyzone 7 9
```

Step 3: Assign the first port (PHY0 - PHY3) for Group8

```
cmd> phyzone 0 8
cmd> phyzone 1 8
cmd> phyzone 2 8
cmd> phyzone 3 8
```

Step 4: Assign the drive on PHY12 to be accessed only by the first port instead of the second port

```
cmd> phyzone 12 8
```

Step 5: Assign the drive on PHY13 to be accessed only by the second port instead of the

first port

```
cmd> phyzone 13 9
```

Step 6: Reset for taking effect with the new settings

```
cmd> reset
```

3.3. How to get all revisions in AIC SAS 12G Expander

(A) Expander firmware revision

```
cmd> rev
```

(B) Expander configuration revision

```
cmd> showmfg
```

(C) MCU firmware for managing sensors

```
cmd> sensor
```

3.4. How to configure enclosure address

(A) Get the current enclosure address

```
cmd> enclosure_addr
```

```
Enclosure Address: 0x500605B0000272BF
```

(B) Set the enclosure address with 0x500605B0000272BF. The new setting will take effect after reset.

```
cmd> enclosure_addr 500605B0000272BF
```

```
cmd> reset
```

3.5. How to configure EDFB

The default EDFB configuration is off.

(A) Check the current configuration

```
cmd> edfb
```

```
EDFB is OFF
```

(B) Enable EDFB

```
cmd> edfb on
```

(C) Disable EDFB

```
cmd> edfb off
```