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Hanlin Liu 2024-07-30 6:30 am

Release Note for AIC SAS 12G EOB35-2 Expander

July 30, 2024

Changelog

07/30/2024

Standard with version B (FW 1.12.60.9 + MFG 1.60.1.3) –

Part Number (SEE-00126009_A01 + SEG-0060C103_A01)

Old Part Number SEG-0060C102_A01 is replaced by SEG-0060C103_A01

One wide port with downstream port (FW 1.12.60.9 + MFG 1.60.2.3) –

Part Number (SEE-00126009_A01 + SEG-0060C203_A01)

Old Part Number SEG-0060C202_A01 is replaced by SEG-0060C203_A01

Two wide port with downstream port (FW 1.12.60.9 + MFG 1.60.3.3) –

Part Number (SEE-00126009_A01 + SEG-0060C303_A01)

Old Part Number SEG-0060C302_A01 is replaced by SEG-0060C303_A01

4U24 EOB + 2U12 EOB (FW 1.12.60.9 + MFG 1.60.4.3) –

Part Number (SEE-00126009_A01 + SEG-0060C403_A01)

Old Part Number SEG-0060C402_A01 is replaced by SEG-0060C403_A01

1. Bug fix: lower the priority of the slot LED control bit "DO NOT REMOVE" on Broadcom HBA 9600

06/24/2024

Standard with version B (FW 1.12.60.9 + MFG 1.60.1.2) –

Part Number (SEE-00126009_A01 + SEG-0060C102_A01)

One wide port with downstream port (FW 1.12.60.9 + MFG 1.60.2.2) –

Part Number (SEE-00126009_A01 + SEG-0060C202_A01)

Two wide port with downstream port (FW 1.12.60.9 + MFG 1.60.3.2) –

Part Number (SEE-00126009_A01 + SEG-0060C302_A01)

4U24 EOB + 2U12 EOB (FW 1.12.60.9 + MFG 1.60.4.2) –

Part Number (SEE-00126009_A01 + SEG-0060C402_A01)

1. Read firmware and MFG version by in-band
2. Support Broadcom 9600 series card
3. One wide port with downstream port (MFG 1.60.2.x)
    4U24 -> SASHD1
    2U12 -> SASHD1
    3U16 -> SASHD2
    2U24 -> SASHD2
4. Two wide port with downstream port (MFG 1.60.3.x)
    4U24 -> SASHD1, SASHD2
    2U12 -> SASHD1, SASHD2
    3U16 -> SASHD2, SASHD3
    2U24 -> SASHD2, SASHD4

03/21/2024

VER B (FW 1.12.60.8 + MFG 1.60.1.1) –
Part Number (SEE-00126008_A01 + SEG-0060C101_A01)

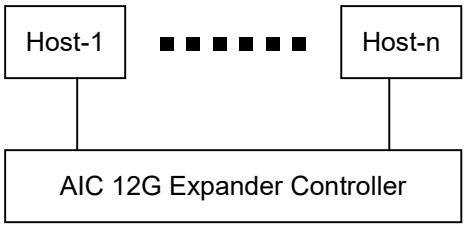
VER B with 4Drive (FW 1.12.60.8 + MFG 1.60.2.1) –
Part Number (SEE-00126008_A01 + SEG-0060C201_A01)

VER B with 8Drive (FW 1.12.60.8 + MFG 1.60.3.1) –
Part Number (SEE-00126008_A01 + SEG-0060C301_A01)

VER B with SB402VG (FW 1.12.60.8 + MFG 1.60.4.1) –
Part Number (SEE-00126008_A01 + SEG-0060C401_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 FAILURE	REQUEST 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 INDICATION	WARNING INDICATION
3	REQUEST POWER OFF DURATION						FAILURE REQUESTED	WARNING 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 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	

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
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	ON	ON
RQST INSERT	Activity	Slow blink
RQST REMOVE	Activity	Slow blink
RQST IDENT	Slow blink	OFF
RQST FAULT	ON	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

2.4.3. How to power off/on all disk drives manually

Power Supply 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	Reserved							
3	Reserved	RQST FAIL	RQST ON	Reserved				

The "RQST ON" for Power Supply is defined in the bit5, byte3 of the "Power Supply control element" in the SES specification. Clear the bit on Power Supply Element “DiskPowerSupply” to power off all disk drives. Set the bit on Power Supply Element “DiskPowerSupply” to power on all disk drives. 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 0c02

(B) Power off all disk drives

$ sg_ses --descriptor=DiskPowerSupply --clear=3:5:1 /dev/sg2

(C) Power on all disk drives

$ sg_ses --descriptor=DiskPowerSupply --set=3:5:1 /dev/sg2

2.4.4. How to power off the entire enclosure

(Storage Server does not support this function)

Power Supply 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	Reserved							
3	Reserved	RQST FAIL	RQST ON	Reserved				

The "RQST ON" for Power Supply is defined in the bit5, byte3 of the "Power Supply control element" in the SES specification. Clear the bit on Power Supply Element “PowerSupply01” to power off the entire enclosure. 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 0c02

(B) Power off the entire enclosure

$ sg_ses --descriptor=PowerSupply01 --clear=3:5:1 /dev/sg2

2.4.5. How to identify the enclosure

(Storage Server does not support this function)

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 FAILURE	REQUEST WARNING

The power LED is used for the identity. When the power LED is solid on, the identity is disabled. When blinking, the identity is enabled. The "RQST IDENT" for Enclosure is defined in the bit7, byte1 of the "Enclosure control element" in the SES specification. Set the bit to enable the identity. Clear the bit to disable the identity. 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          0c02
```

(B) Enable the identity

```
$ sg_ses --descriptor=EnclosureElement01 --set=1:7:1 /dev/sg2
```

(C) Disable the identity

```
$ sg_ses --descriptor=EnclosureElement01 --clear=1:7:1 /dev/sg2
```

2.4.6. How to enable/disable the enclosure alarm by your software
(Storage Server does not support this function)

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 FAILURE	REQUEST WARNING

The system alarm LED is used for the enclosure alarm and power alarm. The "REQUEST FAILURE" and “REQUEST WARNING” for Enclosure are defined in the bit1, byte3 and bit0, byte3 of the "Enclosure control element" in the SES specification. Setting either bit can enable the enclosure alarm. Clearing both bits disables the enclosure alarm. 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 0c02

(B) Enable the enclosure alarm

$ sg_ses --descriptor=EnclosureElement01 --set=3:1:1 /dev/sg2

or

$ sg_ses --descriptor=EnclosureElement01 --set=3:0:1 /dev/sg2

(C) Disable the enclosure alarm

$ sg_ses --descriptor=EnclosureElement01 --clear=3:1:1 /dev/sg2

or

$ sg_ses --descriptor=EnclosureElement01 --clear=3:0:1 /dev/sg2

2. Serial Command Line Interface Functions

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

4.1. 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

4.2. 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

4.3. 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

4.4. How to configure temperature sensor

(Storage Server does not support this function)

Four temperature settings in Celsius are T1, T2, warning threshold, and alarm (critical) threshold. The T1, T2 and alarm (critical) threshold are applied to the smart fan function.

(A) Get the current temperature settings

cmd> temperature

Temperature in Celsius (t1=20 C, t2=55 C, warning=50 C, alarm=55 C)

(B) Set temperature with new T1=18 C, T2=52 C, warning threshold=48 C, and alarm threshold=54 C. The new setting will take effect after reset.

```
cmd> temperature 18 52 48 54
cmd> reset
```

(C) We also take expander temperature into consideration, and the temperature parameters for expander are non-changeable. Expander temperature parameters: T1=40, T2=86 (max 115*0.75), and no warning and alarm. The smart fan function will use the highest PWM output which is calculated from system and expander temperature parameters.

4.5. 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
```

4.6. How to configure standby timer for all disk drives

This feature is applicable for SAS/SATA drives. Standby timer is in units of minutes. Setting standby timer with 0 minute disables this feature.

(A) Get current standby timer

```
cmd> standby_timer
Standby Timer : 0 minutes
```

(B) Set the standby timer with 10 minutes. The new setting will take effect after reset.

```
cmd> standby_timer 10
cmd> reset
```

4.7. 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