HYBRID BACKPLANE with EXPANDER (CUB)

USER'S MANUAL

P/N : 2RAKVI014800

Model：RS212-07 HYBRID-SLIMSAS EXP-BP MODULE

Version : V1.0

Revision History

Version	Changes	Date
V1.0	Official Release	2022/10/30

TABLE OF CONTENTS

- **Overview 4**
  - Physical Outlook 5
  - Mechanical 6
- **Connectors and Components 7**
  - Connector and Component Locations 7
  - Connector Pin Definitions. 7
  - Connector Locations and LED Indicators 9
  - Connector Locations. 9
  - LED Indicators. 10
- **Hardware Specification 11**
- **LED Behavior 12**
  - Disk Bay LED 12
  - System Alarm 15
- **Smart Fan Control 16**
- **Firmware Upgrade 18**
  - Expander Chipset SAS35x36R Firmware Upgrade Description 18
  - Out-Of-Band through serial console 18
  - M058 Micro-controller Firmware Upgrade Description 21
- **Management 22**
  - Useful Console Commands 23

Overview

INWIN's 12G SAS3 Backplanes equipped with Broadcom 35x36R Expander provide an industry leading high performance and high stability of data transfer for storage server solution.

The backplanes support state-of-the art SAS3 12Gbps HDD/SSD and also backward compatible with SAS 6Gbps, SATA 6Gps and SATA 3Gps HDD/SSD. The backplane has 4 * SlimSAS (SFF-8654) connectors and 4* U.2 (SFF-8639) connectors to accommodate 4 * 2.5"NVMe SSDs per each backplane.

There are 3 MiniSAS HD (SFF-8643) wide ports on each backplane. one of them are defined as host ports for connecting to RAID/HBA cards and the other is defined as the cascade port for connecting to another backplane and/or storage enclosure (JBOD) by extending it to the rear panel of the chassis through a SFF-8643 to SFF8644 cable.

1 piece of 2*3-Pin 5V and 1 piece of 2*4-Pin 12V power receptacles support up to 5V(24A)/12V(32A) current to satisfy the power needs of fully loaded HDDs (12 HDDs depends on backplane model).

The backplane implemented with smart fan control feature to support wide variety of fan modules by auto-calibrating the installed fan modules at system boot. This feature provides an efficient way to control the thermal heat exhaustion by sensing the temperature on the backplane. The fan module speeds up and down upon the temperature rises and falls in the enclosure. Further, the backplane reserves a connector for adapting Fan PWM from motherboard so backplane can leverage PWM request from motherboard and behave according to the higher RPM number between MB and backplane.

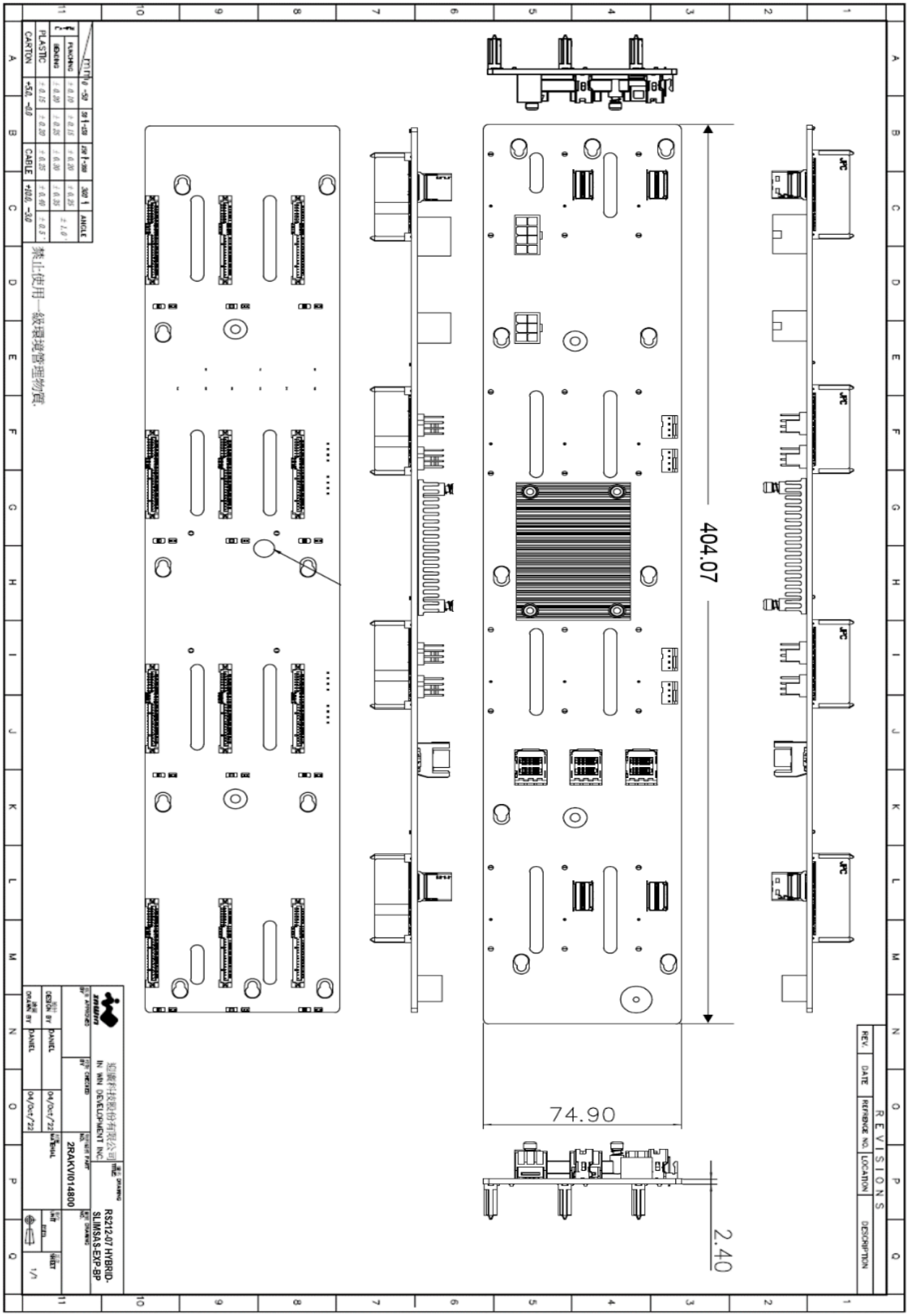
Along with the smart fan control feature, a system alarming feature is also implemented to alert users in case Fan module failure and/or system overheat occurs by illuminating the LED indicator. Users can then informed of issue and take corresponding actions to resolve the issue according to the failure type.

Physical Outlook

BOTTOM VIEW

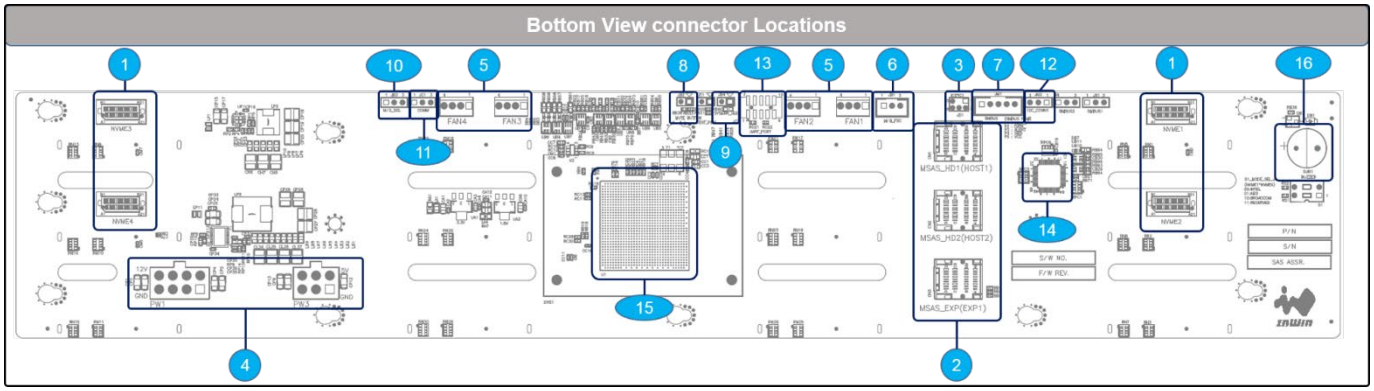
TOP VIEW

Mechanical


404.07
74.90
2.40
REVISIONS
REV.
DATE
REFERENCE NO.
LOCATION
DESCRIPTION
RS212-07 HYBRID-SLIMSAS-EXP-BP
2RAKV0140800
04/Oct/22
PANEL
禁止使用一般環境管理物質.

Connectors and Components

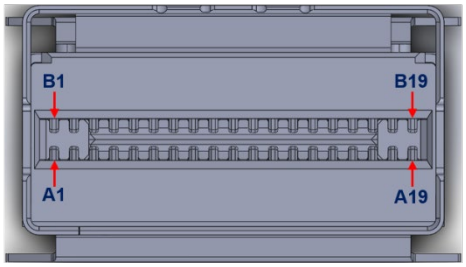
Connector and Component Locations



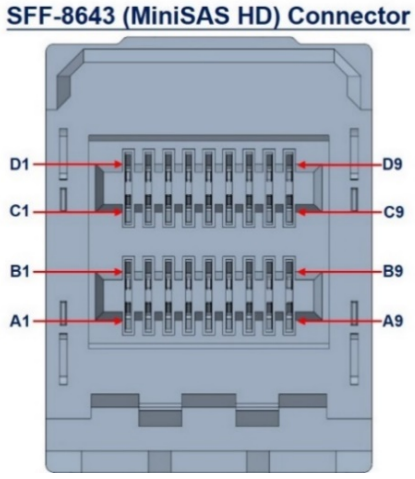
No	Description	No	Description
1	Host facing interface : NVME1~NVME4	9	System_Fail LED: JB4
2	Host facing interface (SAS3) : CN1/CN2/CN3	10	M/S Communication Connector : JC1
3	Firmware Programming Header ： JD1	11	M/S BP Selection Header : JB3
4	Main Power Connector ： PW1/2,PW3/4	12	I2C Header : JM2
5	FAN Connector : FAN1~FAN4	13	Firmware Programming Header ： JC2
6	M/B Fan Speed Control : JB1	14	M058 Micro-controller : IC1
7	SMBUS Connector : JM1	15	SAS35x36R Expander chip : U1
8	Mute_Button : JB2	16	Buzzer: SUB1

Connector Pin Definitions.

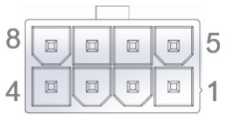
SFF-8654 (SlimSAS 38Pin) Connector



NVME1~NVME4			
Signal Name	Pin No.	Signal Name	Pin No.
PET0_[p/n]	B2/B3	PER0_[p/n]	A2/A3
PET1_[p/n]	B5/B6	PER1_[p/n]	A5/A6
PET2_[p/n]	B14/B15	PER2_[p/n]	A14/A15
PET3_[p/n]	B17/B18	PER3_[p/n]	B17/B18
GND : B1/B4/B7/B13/B16/B19/A1/A4/A7/A13/A16/A19			
Signal Name	Pin No.	Signal Name	Pin No.
BP_Type/Wake#	B8/B9	PERST#	A11
RefClk[p/n]	B11/B12	SMB_CLK/DAT	A8/A9
Sideband_GND : A10/B10			



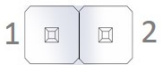
CN1/CN2/CN3			
Signal Name	Pin No.	Signal Name	Pin No.
SAS_TX0_[p/n]	D4/D5	SAS_RX0_[p/n]	B4/B5
SAS_TX1_[p/n]	C4/C5	SAS_RX1_[p/n]	A4/A5
SAS_TX2_[p/n]	D7/D8	SAS_RX2_[p/n]	B7/B8
SAS_TX3_[p/n]	C7/C8	SAS_RX3_[p/n]	A7/A8
SAS_GND	D3/D6/D9	SAS_GND	B3/B6/B9
SAS_GND	C3/C6/C9	SAS_GND	A3/A6/A9
Sideband Definition :			
S0_SClock: A1, S1_SLoad: B1, S4_DataOut: C2,			
S5_DataIn: D2,S6/S7 Reserved: A2/D1,			
S2_GND: C1, S3_GND: B2,			

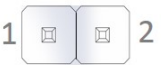
PW1	Power 2*4-Pin Connector	
	PIN #	Definition
	1~4	Ground
	5~8	+12V

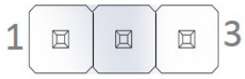
PW3	Power 2*3-Pin Connector	
	PIN #	Definition
	1~3	Ground
	4~6	+5V

JS1~JS4	VPP over I2C Header	
	PIN #	Definition
	1	SMB_Clock
	2	SMB_Data
	3	Ground

JM2	EXT-I2C. 3-Pin Header	
	PIN #	Definition
	1	I2C_Clock
	2	I2C_Data
	3	Ground

JB2	MUTE_BUTTON Header	
	PIN #	Definition
	1	MUTE_BUTTON_+
	2	MUTE_BUTTON_-

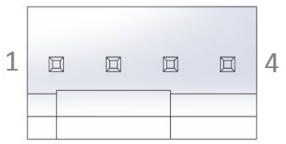
JB4	SYS_ERR_LED Header	
	PIN #	Definition
	1	SYS_ERR_LED _+
	2	SYS_ERR_LED _-

JB3	M/S Selection-Header	
	PIN #	Definition
	1	Master_BP
	2	SEL_COM
	3	Slave_BP

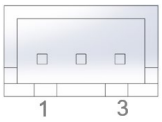
JB3 Function Description:

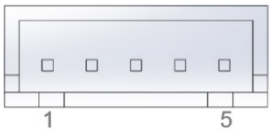
[JB3 Function]

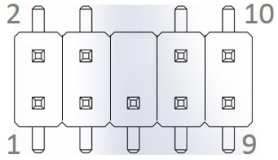
Setting	Function
1-2 Short	Master BP
2-3 Short	Slave BP

FAN1~FAN4	FAN 4-Pin Connector	
	PIN #	Definition
	1	Ground
	2	+12V
	3	Tachometer
	4	PWM Output

JC1	M/S Comm. 3-Pin Header	
	PIN #	Definition
	1	LINK_Clock
	2	LINK_Data
	3	Ground
For Master & Salve BP Communication		

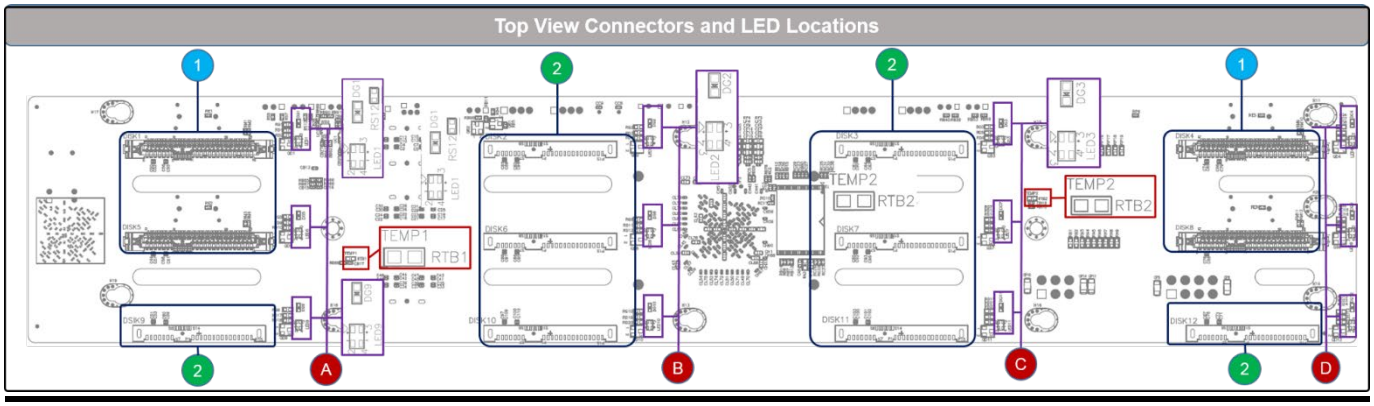
JB1	M/B FSC 3-Pin Connector	
	PIN #	Definition
	1	PWM_FROM_MB
	2	TACH_TO_MB
	3	Ground
	For Motherboard FAN Speed Control.	

JM1	SMBUS Connector	
	PIN #	Definition
	1	Clock
	2	Data
	3	Alert
	4	Ground
	5	Vcc

JC2	LSI35X36R Firmware Programming Connector			
	PIN #	Definition	PIN #	Definition
	1	SDB_TX	2	+1.8V
	3	SDB_RX	4	Ground
	5	UART_TX	6	#KEY
	7	UART_RX	8	Ground
	9	Ground	10	+3.3V

JD1	MCU Firmware Programming Connector			
	PIN #	Definition	PIN No#	Definition
	2	ICE_CLK	1	VCC
	4	ICE_DATA	3	#Key
	6	ICE_RST	5	Ground

Connector Locations and LED Indicators

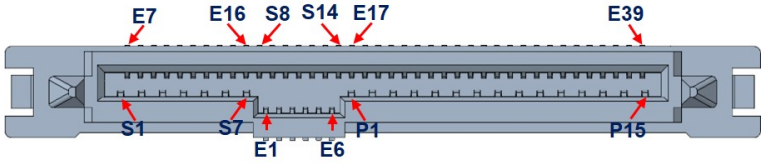


Connector Locations.

No	Location	Description
1	DISK1/5, DISK4/8	NVMe SSD or SATA/SAS Disk #1/#2
2	DISK2/3/6/7,DISK9~DISK12	SATA/SAS Disk #2/#3#6/#7, #9/#10#11/#12

DISK1/5,DISK4/8

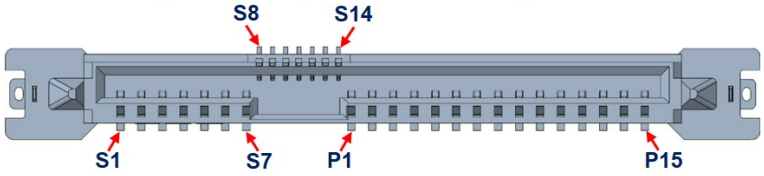
SFF-8639 (U.2) Connector



Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.
SAS0Tx[p/n]	S2/S3	SAS0Rx[p/n]	S5/S6	SAS1Tx[p/n]	S9/S10	SAS1Rx[p/n]	S12/S13
PET0_[p/n]	E10/E11	PET1_[p/n]	S17/S18	PET2_[p/n]	S23/S24	PET3_[p/n]	E17/E18
PER0_[p/n]	E13/E14	PER1_[p/n]	S20/S21	PER2_[p/n]	S26/S27	PER3_[p/n]	E20/E21
PCEI_GND	E9/E12/E15/S16/S19/S22/S25/S28/E19/E22			SAS_GND	S1/S4/S7/S8/S11/S14/P5/P6/P12		
RefClk1[p/n]	E1/E2	3.3V_AUX	E3	EPERST#1/2	E4/E5	RefClk0[p/n]	E7/E8
HPT0/HPT1	E16/S15	SMB_Clock	E23	SMB_Data	E24	DualPortEn	E25
WAKE#	P1	SPCIE_RST	P2	CLK_REQ#	P3	IFDET#1/2	P4/E6
+5V&Charge	P7~P9	12V&Charge	P13~P15	PRSNT	P10	READ_LED	P11

DISK2/3,DISK/6/7,DISK9~DISK12

SFF-8680 (SAS) Connector



Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.
SAS0Tx[p/n]	S2/S3	SAS0Rx[p/n]	S5/S6	SAS1Tx[p/n]	S9/S10	SAS1Rx[p/n]	S12/S13
SAS_GND	S1/S4/S7/S8/S11/S14			Power_GND	P4/P5/P6/P10/P12		
+3.3V&Charge	P1~P3	+5V&Charge	P7~P9	12V&Charge	P13~P15	READ_LED	P11

LED Indicators.

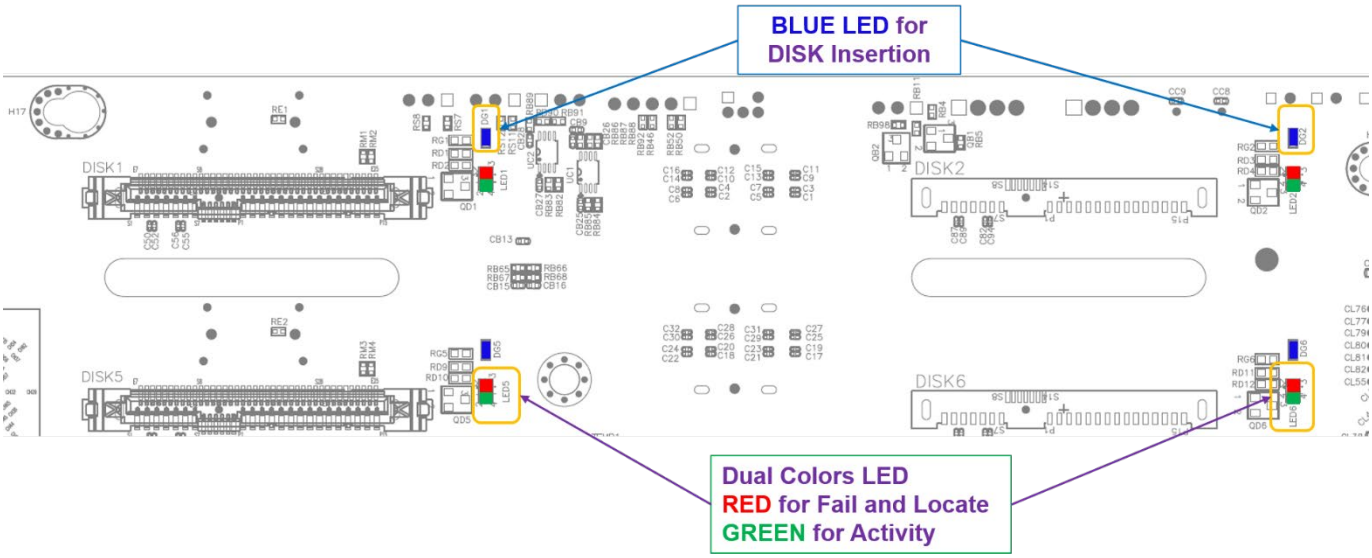
No	Location	Description	Location	Description
A	DG1/5/9	DISK1/5/9 Power LED	LED1/5/9	DISK1/5/9 Activity/Failure LED
B	DG2/6/10	DISK2/6/10 Power LED	LED2/6/10	DISK2/6/10 Activity/Failure LED
C	DG3/7/11	DISK3/7/11 Power LED	LED3/7/11	DISK3/7/11 Activity/Failure LED
D	DG4/8/12	DISK4/8/12 Power LED	LED4/8/12	DISK4/8/12 Activity/Failure LED

Hardware Specification

- HOST Interface ：MiniSAS HD/ SlimSAS
- Hard Disk (SSD) Interface ：SATA/SAS3/NVMe
- Indicator ：
  - Power LED *12 (DG1~DG12): Steady Blue (When HDD is resent)
  - Dual color(Green/Red) LED *12 (LED1~LED12) for HDD Status (Activity/Fail/Locate)
    - Activity LED: Blinking Green (When HDD is Access)
    - Locate LED : Blinking Red (When HDD Fail or Locate)
    - Fail LED : Steady Red (When HDD Fail or Locate)
- Environment Control :
  - PWM FAN Connector (FAN1~FAN4) for Cooling system.
  - Temperature Sensor (RTB1/RTB2) Monitor HDD bay inside temperature.
  - Buzzer (SUB1) for Over-temperature and FAN fail alerting.
- High Speed Connector
  - SFF-8643 MiniSAS HD Connector *3 (Host *2, Extension *1)
  - SFF-8621 SlimSAS 38PIN Connector *4 (NVME1~NVME4)
  - SFF-8680 SAS29Pin Connector *8 for (DISK2/3/6/7/9/10/11/12) SATA/SAS3 Disk.
  - SFF-8639 U.2 68Pin Connector *4 (DISK1/5/DISK4/8) for SATA/SAS3 Disk or NVMe SSD.
- Power/Signal Connector
  - P4.2mm Disk Drive Power Connector*4 (PW1/2[+12V]*2/PW3/4[+5V]*2).
  - JB1 connector for Fan speed control connected between Motherboard and backplane.
  - MUTE_BUTTON (JB2) to mute the warning beeping.
  - M/S_SEL(JB3) set BP to master or slave.
  - SYS_ERR_LED (JB4) Turn on when system Fan fails or system over temperature.
  - JC1 M/S Link Connector for Synchronous signal connection between two backplane.
  - DBG/UART (JC2) Use for firmware upgrade and debugging purpose.
  - JD1/JD2 Header for Programming MCU Firmware.
  - JM1 SMBUS Connector for external SMBUS control function.
  - I2C Header (JM2) for external I2C control function.
  - VPP over I2C (JS1~JS4) Header for NVMe status LED indication.

LED Behavior

Disk Bay LED



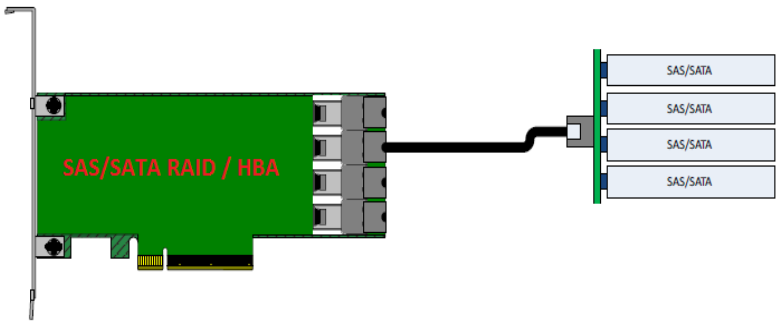
Blue LED:
Disk Insertion Indicator –
Turned on whenever disk drive is properly installed.

Green LED:
Activity indicator –
Stay off when idle and blinking (~8 Hz) whenever disk drive is being accessed.

RED LED:
Fail and Locate indicator –
Turned steady on when disk failure occurs. Blinking (1 Hz) when locating Disk, RAID rebuild and RAID consistent check.

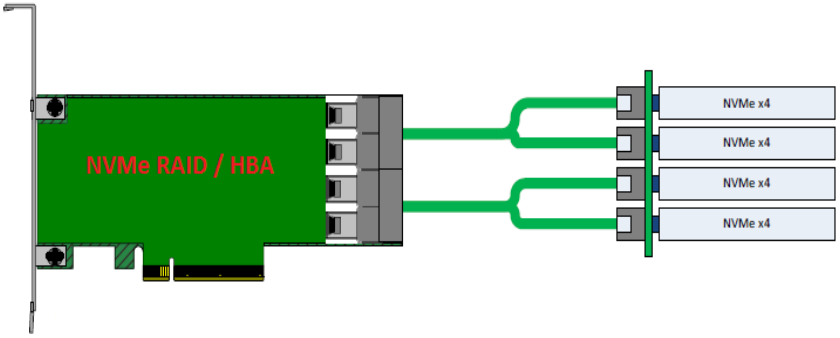
There are 2 parts of LED Management on the backplane. One is for SAS and another is for NVMe. Please note that the disk slots can only accommodate SAS/SATA or NVMe disk at a time since they share the same disk connector.

For SAS application, The LEDs behave by following SGPIO signal coming through sideband bus inside the SFF-8643 cables. Please refer to Section 2 for SGPIO settings. When SGPIO Jumper setting is enabled the LEDs behave according to the SGPIO signals. When SGPIO is disabled, the RED LEDs (for Locate and Fail) do not behave while the GREEN LEDs (for Activity) behave according to the signal from P11 (READY LED) of the disk connectors.



For NVMe application, The LEDs behave according to the VPP over I2C signals from NVMe host controllers through sideband bus of OCulink or SlimSAS cables. Whenever the NVMe host controller support VPP over I2C, the RED LEDs behave Locate, Fail and Rebuild signals following VPP signals on the I2C bus. The Green LEDs (for Activity) behave according to the signal from P11 (Activity) of the disk connectors.

Examples of NVMe connections to Broadcom RAID/HBA controller. Each pair of VPP over I2C signal supports 2 pieces of NVMe disks LED management. The I2C bus is leaded to odd-number NVMe connector (OCulink or SlimSAS) to manage its corresponding and the following NVMe disks. For example, NVMe1 and NVMe2 LED management signal is form NVMe1 connector's sideband I2C bus, NVMe3 and NVMe4 LED management signal is from NVMe3 connector's sideband I2C bus and …etc.



Basically, The LEDs behave following the SES control signal from RAID card when working in SAS/SATA mode. Below is the design SPEC of the Disk indicators.

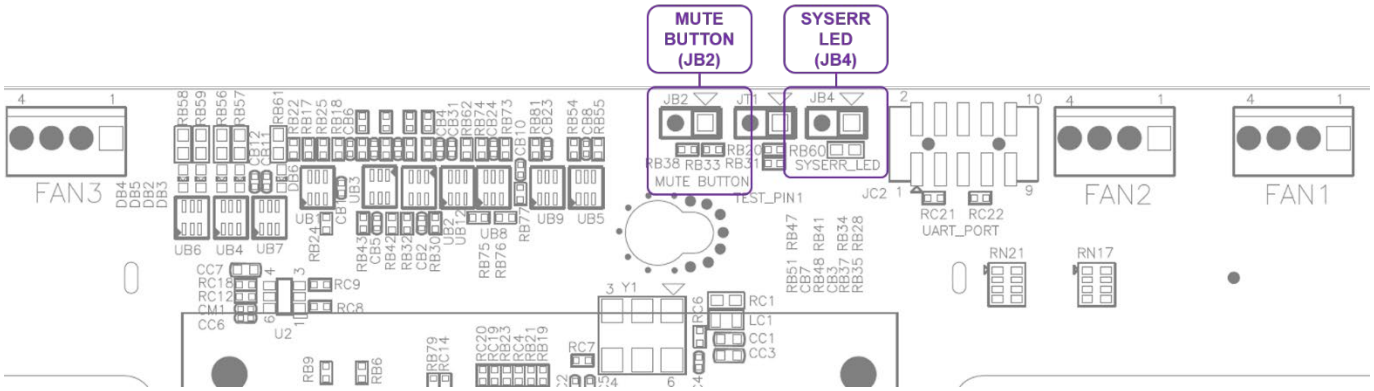
SES Status	Status Description	Red LED (Error)	Green LED (Activity)	Priority (Hex)	SES Control
Power-On State (before SES client intervening)					
Forced Condition Cleared	Empty slot or disk unplugged	Off	Off	10	N/A (SEP internal)
Condition Cleared	Disk loaded or inserting	Off	ActFlash	12	N/A (SEP internal)
Informative					
OK		Off	ActFlash	11	RQST OK
Device Off	Power down phy or bay	Off	Off	10	RQST DEVICE OFF
Reserved Device Hot Spare Do Not Remove	Usually for RAID members	Off	ActFlash	0E	RQST RSVD DEVICE RQST HOT SPARE DO NOT REMOVE
Activity					
Consistence Check (Cons Chk)	Check RAID consistence	**Blink_1**	ActFlash	03	RQST CONS CHECK
Rebuild/Remap (disk array)	Spare disk summoned for critical RAID rebuild	**Blink_1**	ActFlash	03	RQST REBUILD/REMAP
Active (Activity)		Off	ActFlash	10	RQST ACTIVITY
Warning & Error					
In Critical Array	Members in degraded RAID	Off	ActFlash	06	RQST IN CRIT ARRAY
In Failed Array	Members in broken RAID	**On**	ActFlash	07	RQST IN FAILED ARRAY
Rebuild/Remap Aborted (R/R Abort)	Spare disk summoned for RAID rebuild yet aborted	**On**	ActFlash	05	RQST R/R ABORT
Fault		**On**	ActFlash	04	RQST FAULT
Missing		**On**	ActFlash	04	RQST MISSING
Predict Failing (Fault Sensed)	Dying disk detected by enclosure	**On**	ActFlash	05	COMMON CONTROL PRDFAIL
Identify & Prompt					
Identify/Locate		**Slow_Blink_1**	ActFlash	00	RQST IDENT
Ready to Insert		Off	ActFlash	0B	RQST INSERT
Ready to Remove (RMV)	Disk spun down	Off	ActFlash	0C	RQST REMOVE

Note:

- **Blink_1** : 50% On and then Off in a one second circle
- **Slow_Blink_1** : 50% On and then Off in a 2 seconds circle
- **ActFlash** : Stay off while idle and fast flash upon I/O load

System Alarm

There is a system error LEDs designed on the Backplane to indicate system Error including system Fan Fail and Over-Temperature.



System Fail Indicator:

JB3 is the jumper for system Fail Indicator. The System Fail indicator on the front panel connect to this jumper to indicate system fan fails or system overheat when it occurs.

Fan Fail:

When the Fan RPM is lower than 50% of the expected speed the indicator goes ON. And it would go off when the issue is resolved or not existed.

Overheat:

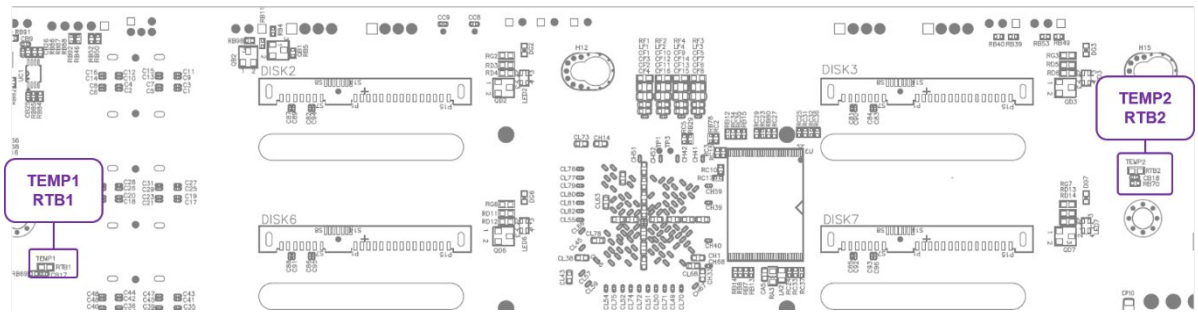
When the system temperature at the backplane area is going beyond 45°*C* the System Fail LED is turned ON. And would be turned off when temperature is going under 44°*C*

Note:

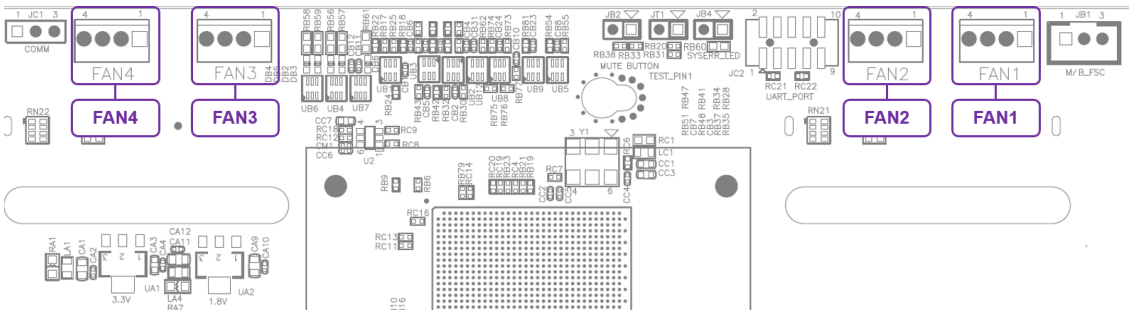
- When the system alarm is triggered, the Buzzer beeps along with it and stops beeping when alarm is disappear.
- 1 short beep stands for Fan Fails
- 2 short beeps stand for Over-Temperature
- Press Mute Button to disable buzzer beeps and will be retriggered when either system error occurs again.

Smart Fan Control

IN WIN's Backplane is implemented Smart Fan Control feature by automatically detecting the existences of the Fan Modules and intelligently control the Fan RPM per the system temperature being detected by two thermal sensors (RTB1/RTB2) on the backplane.



Thanks to Smart Fan Control feature the Fan connectors (FAN1/FAN2/FAN3/FAN4) on backplane support wide variety of PWM driven Fan modules being used in the enclosure.



How it works?

1. Fan module auto-calibration triggered in every system boot. The thermal profile would then be recorded and used until next reboot.
2. Backplane starts fan calibration and calculates the corresponding PWM duty cycle for each level. There are totally 8 speed levels to be sensed and used until next system boot.
3. The 8 levels of fan speed are mapped to the temperature readings detected by thermistor spreading from 25 to 45 °C in 3.75 degree C step.
4. In normal operation, when the system temperature changes to next level, the fan module would change speed accordingly. And, the Fan failure alarm would be triggered when the RPM of the Fan module is dropped lower than 75% of its expected speed.
5. The fan module calibration and thermal profile are as below.
6. When an external PWM source joins, the output PWM duty is determined by comparing the internal calculated PWM and external PWM and then select whichever is higher as the output PWM to the fan modules.

Fan Speed Measurement

R_{diff} = Maximum RPM – Minimum RPM

PWM Duty: 10
PWM Duty: 20
PWM Duty: 30
PWM Duty: 40
PWM Duty: 50
PWM Duty: 60
PWM Duty: 70
PWM Duty: 80
PWM Duty: 100

Minimum RPM
RPM1
RPM2
RPM3
RPM4
RPM5
RPM6
RPM7
Maximum RPM

Fan Speed Table

Minimum RPM + R_{diff} x20%
Minimum RPM + R_{diff} x30%
Minimum RPM + R_{diff} x40%
Minimum RPM + R_{diff} x50%
Minimum RPM + R_{diff} x60%
Minimum RPM + R_{diff} x70%
Minimum RPM + R_{diff} x80%
Maximum RPM

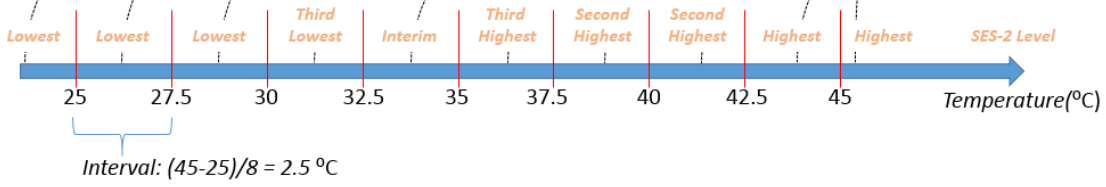
PWM Level Table

PWM Duty0
PWM Duty1
PWM Duty2
PWM Duty3
PWM Duty4
PWM Duty5
PWM Duty6
PWM 100

Cooling Control Policy – 45 Celsius

Fan Speed Table

Minimum RPM + R_{diff} x20%
Minimum RPM + R_{diff} x30%
Minimum RPM + R_{diff} x40%
Minimum RPM + R_{diff} x50%
Minimum RPM + R_{diff} x60%
Minimum RPM + R_{diff} x70%
Minimum RPM + R_{diff} x80%
Maximum RPM



Interval: (45-25)/8 = 2.5 °C

Firmware Upgrade

Expander Chipset SAS35x36R Firmware Upgrade Description

The SAS3 backplane equipped with firmware upgrade feature through serial console in case it is required. There are 2 firmware to be upgraded. One is Expander system firmware and another is system configuration data. They are not necessarily to be upgraded at the same time. Ether one can be upgraded independently when required.

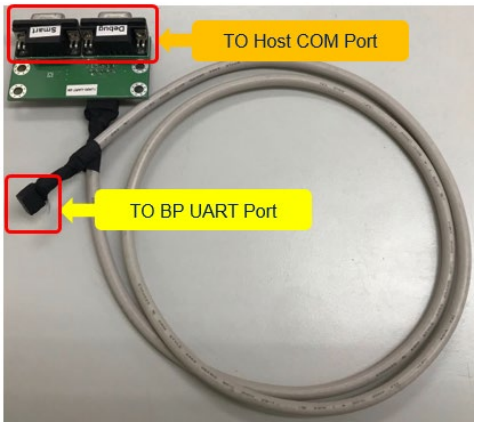
How to upgrade firmware?

1. Out-Of-Band through serial console
2. In Band through SCSI Command

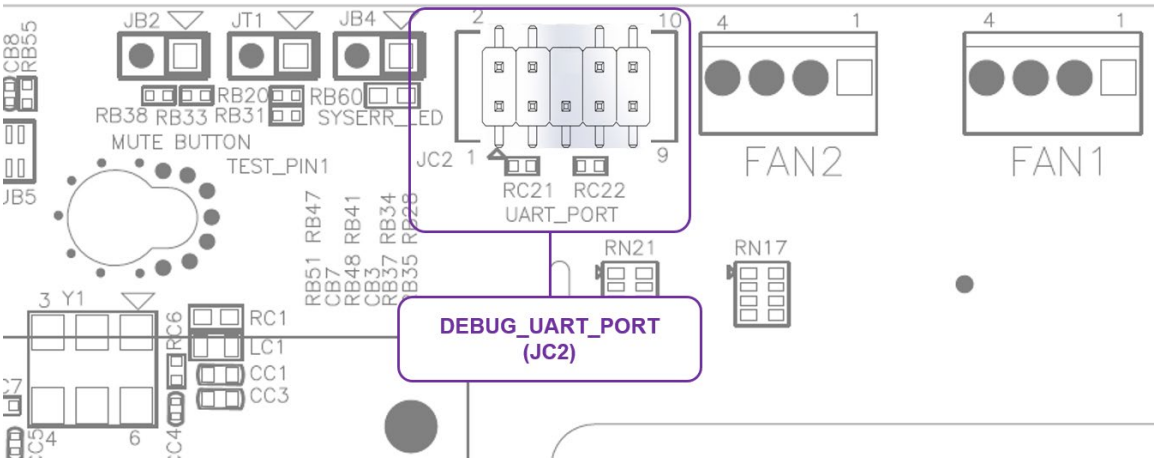
Out-Of-Band through serial console

IN WIN's SAS-3 12Gps Backplane implements a serial UART port allowing users to conduct firmware upgrade through it.

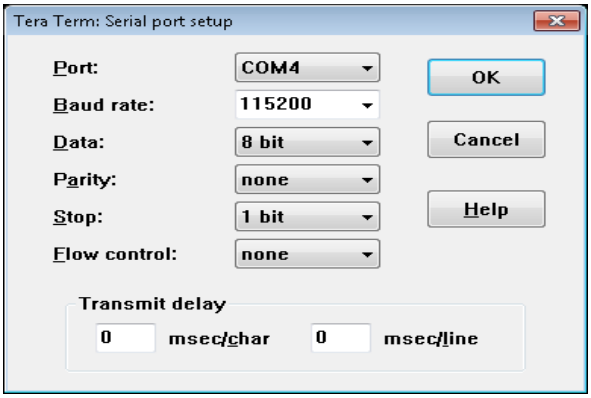
1. Require a proprietary serial cable IN WIN made.
   Please note that the connector to Backplane varies depends on the backplane. The 07 series backplane UART port is redesigned with smaller form factor.



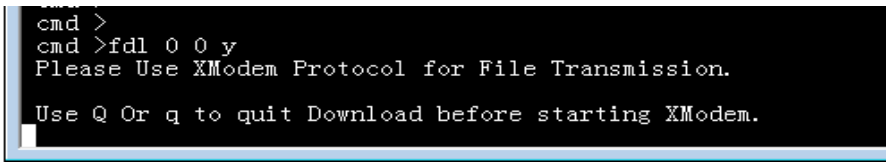
2. Require a host with a serial COM port.
3. Connect serial cable between Backplane and host.

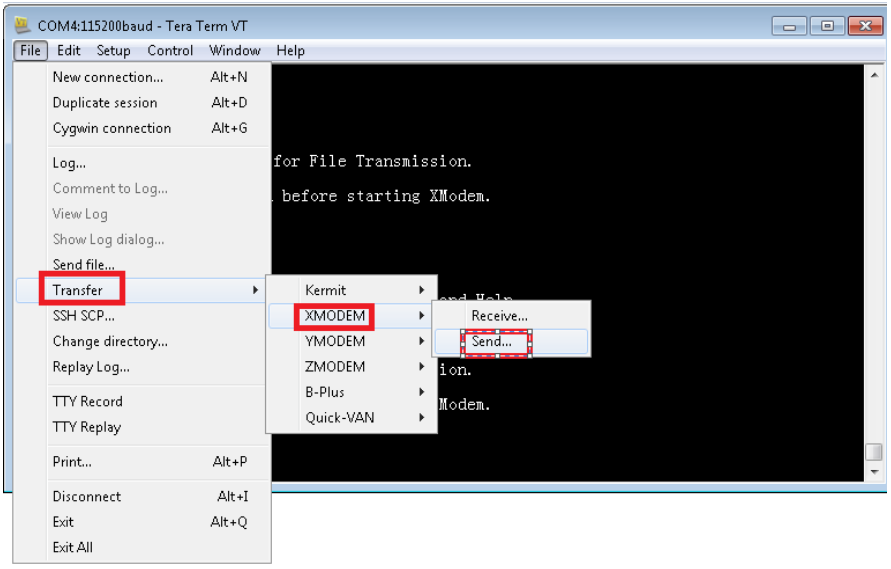


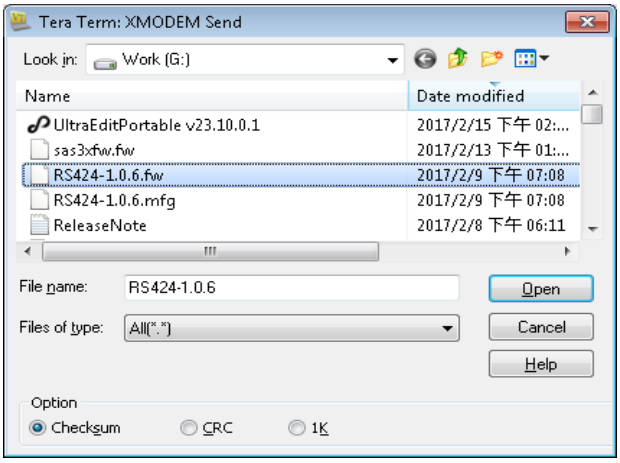
4. Configure serial port setting as 115200, N, 8, 1.



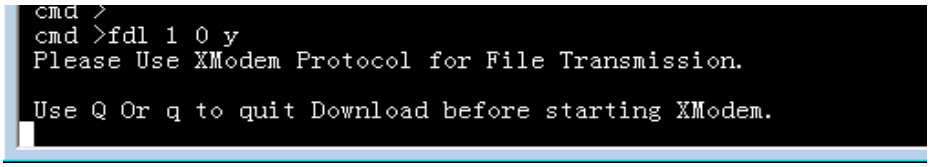
5. Command “fdl 0 0 y” for system firmware upgrade in serial console. Sending system firmware through Xmodem.

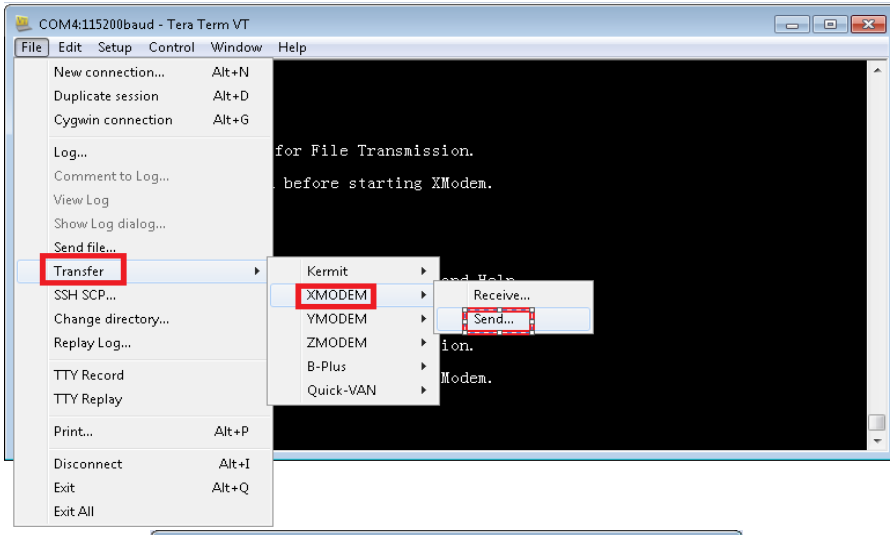


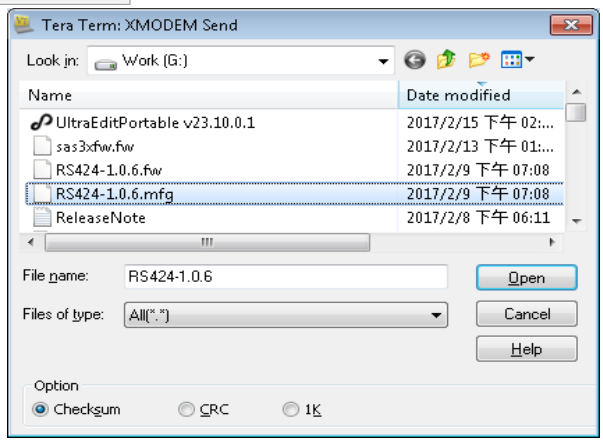




6. Command “fdl 1 0 y” in serial console for system configuration data upgrade. Sending system firmware through Xmodem.







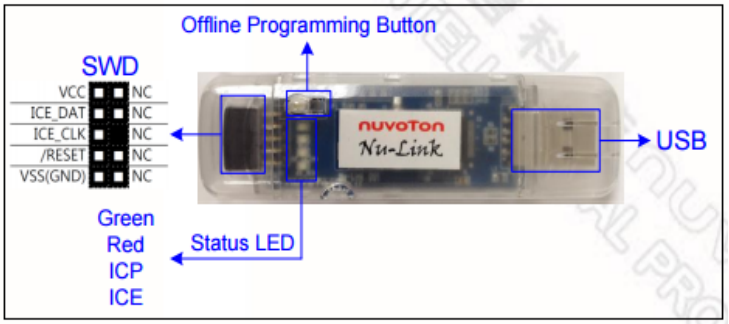
7. Reset system by typing “reset” command in serial console or power cycle to make new firmware take effect.

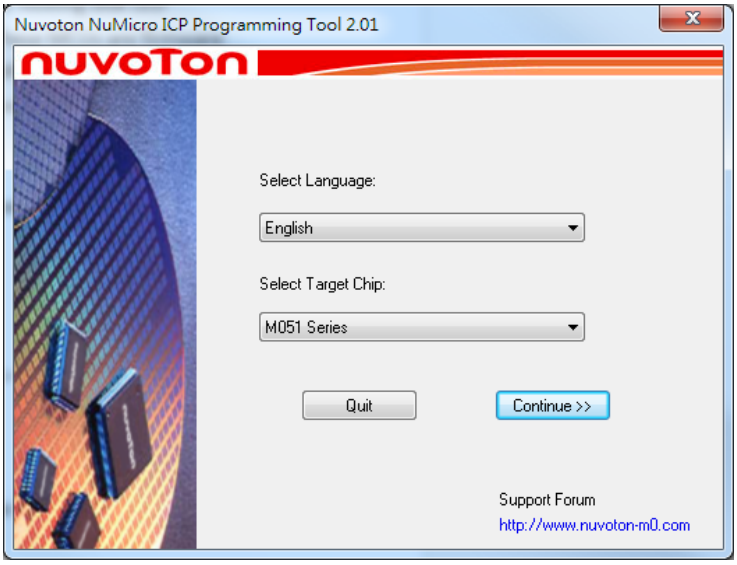
M058 Micro-controller Firmware Upgrade Description

The passive backplanes are planted Nuvoton M058 series MCUs for hosting disk LED indication, Fan speed control and system fail alarm. These MCUs are preprogrammed in manufacturing. In most cases, the MCUs are not required to reprogram unless there is issue needed to fix.

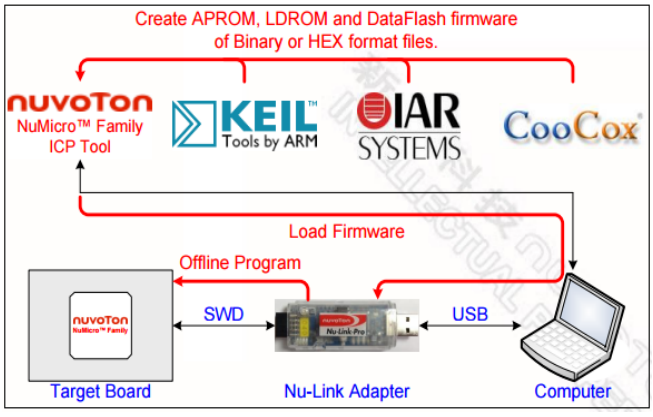
How to upgrade firmware?

1. Require Nuvoton ARM Cortex-M0 programming tool. Nu-Me or Nu-Link and install Nuvoton ICP Programming tool software.

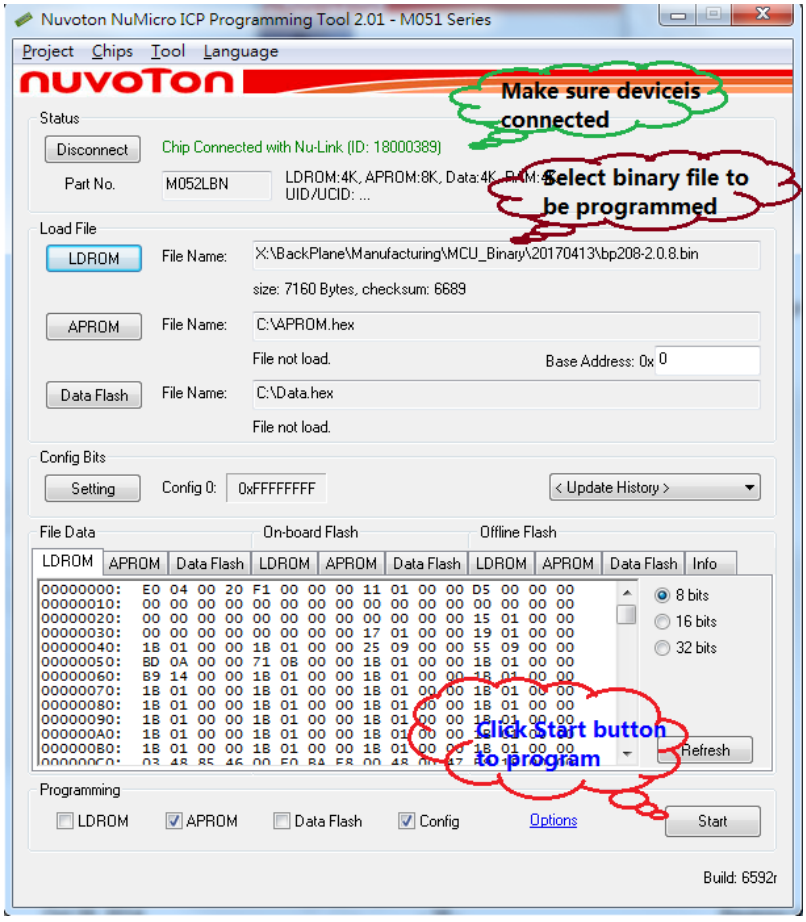




2. Connect Nu-Link USB end to a host and the SWD end to Backplane ICE connector for each MCU.



3. Make sure device is connected and select the binary file being programmed and then click on Start button to program firmware.



4. Please refer to http://www.nuvoton.com/resource-files/NuLink_Adapter_User_Manual_EN_V1.01.pdf for more details.

Management

To manage backplane, users can connect a serial console cable to backplane or expander UART through RS232 COM port on system host. Refer to **Out-Of-Band through serial console** (Page14) for the details of the serial console cable and the console terminal setting.
There are some useful commands for users to check expander status, conduct firmware update and debug issue when required.

Useful Console Commands

Function	Command
help	To list the usage of the CLI commands
Show/Set the current	date [set <newdate(*)>]
Reset the expander	reset [watchdog]
Display phy info.	phyinfox [-i [(1 .. NumBpc]] | -s -i : show phy info of BPC expander -s : show SES Array Device info of CSE BRC (bridge console only)
Configuration update	fdl 1 0 y Download and Update MFG configuration. (feed it with 'MFG image file')
Firmware Update	Fdl 0 0 y Download and update firmware
Display info for all phys	phyinfo [help|edfb|power|cable] [up|<PhyNum(D)>] - no arguments displays default output - 'help' displays detailed help information - 'edfb' subcommand displays EDFB info - 'power' subcommand displays power mgmt info - 'up' filters to display connected phys only - 'cable' subcommand displays cable mgmt info - <PhyNum> is a valid phy index and filters the output to display info about that phy
Display or reset all phy counters	counters [config|event|reset] - no arguments displays phy error counters and generic broadcast counters - 'config' subcommand displays phy event configuration - 'event' subcommand displays phy event counters - 'reset' subcommand resets all phy counters
Display expander SAS address	sasaddr [-d] ('-d': also show virtural ports address)
Show POST info	showpost
Show MFG revision	showmfg
Show firmware revision	rev