

RS112-08 12G PASSIVE BP USER'S MANUAL

P/N : 2RAKVI011501

Model : RS112-08 12G PASSIVE BP MODULE

Version : V1.0

Revision History

Version	Changes	Date
V1.0	Official Release	2022/07/05

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Overview

The backplane is a high performance economical solution for users who has sufficient SAS host ports on MB or RAID/HBA to accommodate 12 disks in the system. The passive backplane is a 1U in height designed supporting state-of-the-art SAS3 12Gbps HDD/SSD and backward compatible with SAS 6Gbps, SATA 6Gps and SATA 3Gps HDD/SSD.

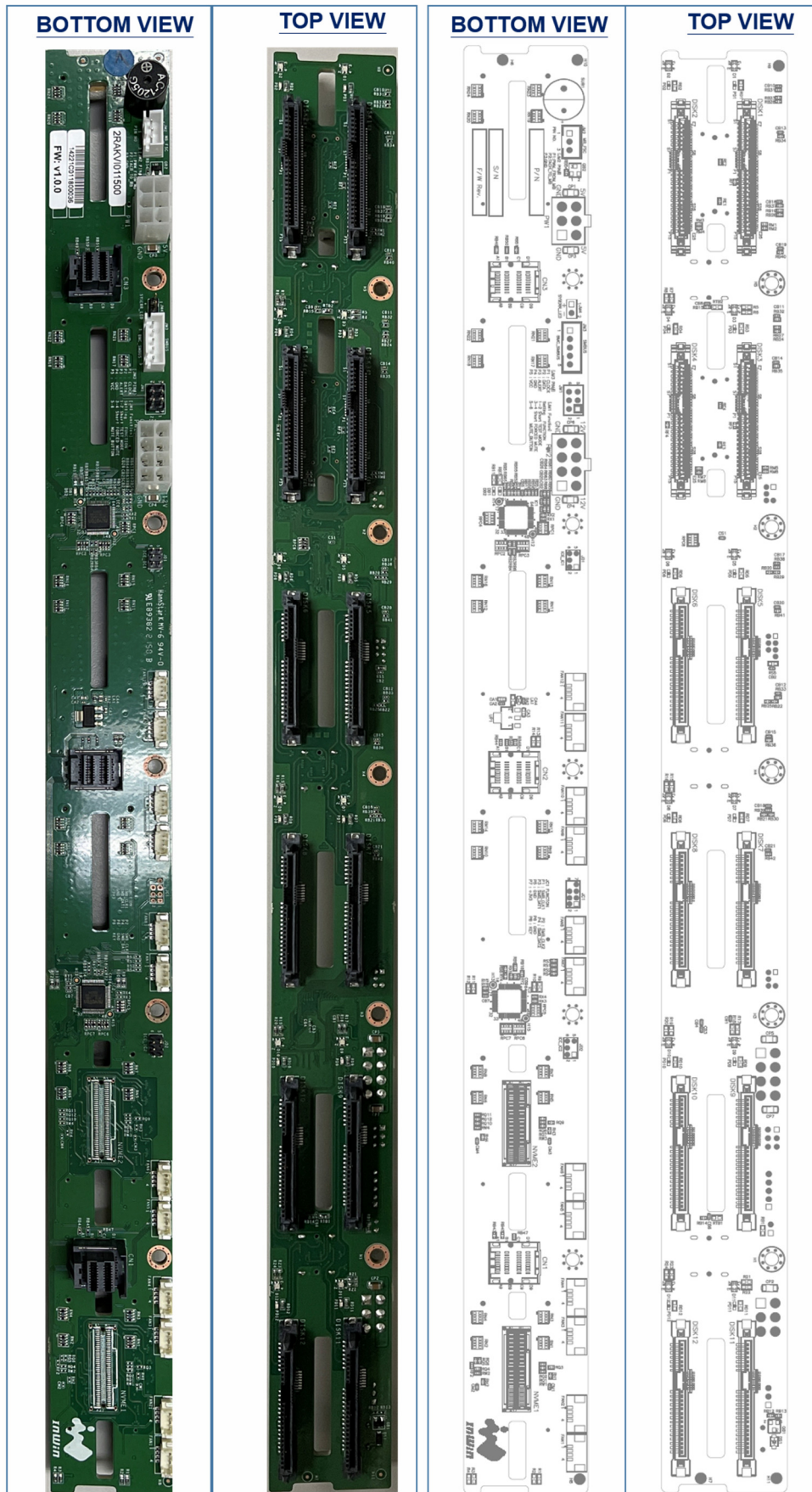
Basically, the 3 pcs of SFF-8643 MiniSAS HD connectors can support up to 12 SAS/SATA disks. There are several MiniSAS HD connectors and SFF-8680 SAS29-pin disk connectors on the backplanes depends on the product model.

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).

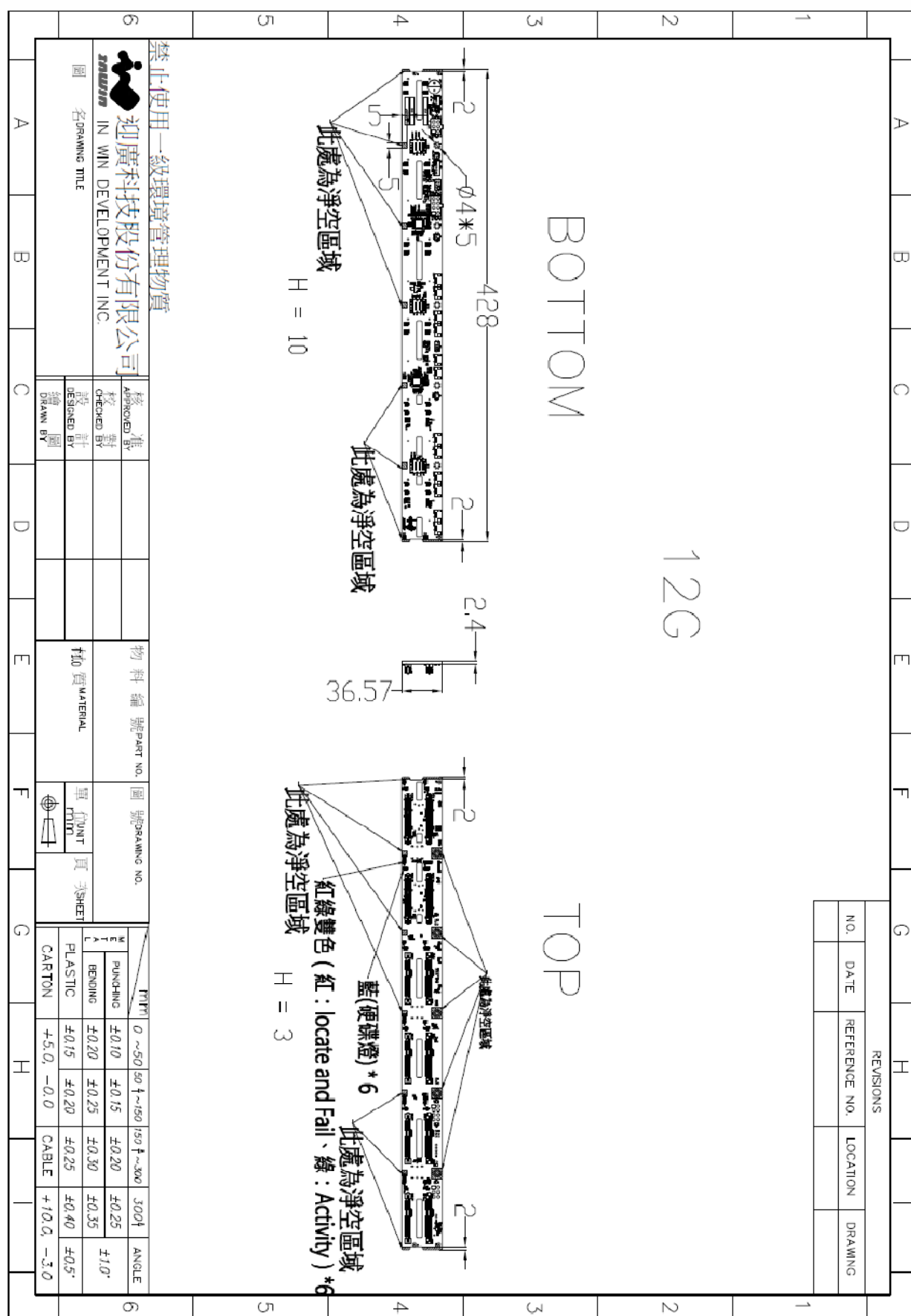
The backplane is implemented with smart fan control feature to support wide variety of fan modules by auto-calibrating the installed fan modules at system boot. This feature provides an efficient way to control the thermal heat exhaustion by sensing the temperature in the enclosure. The fan module speeds 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 and sounding the buzzer at the same time. Users can then detect issue and take corresponding actions to resolve the issue according to the failure type. As soon the issue disappears the alarm stops.

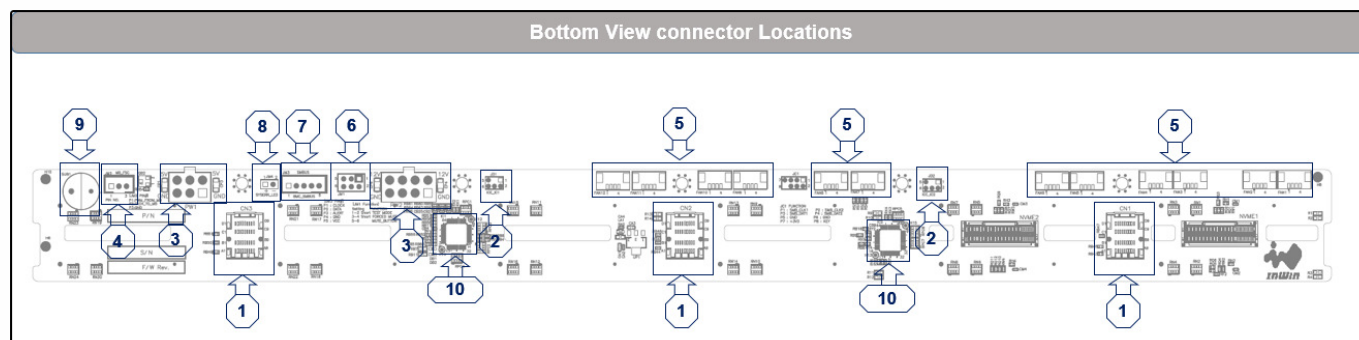
Physical Outlook & Diagram



Mechanical

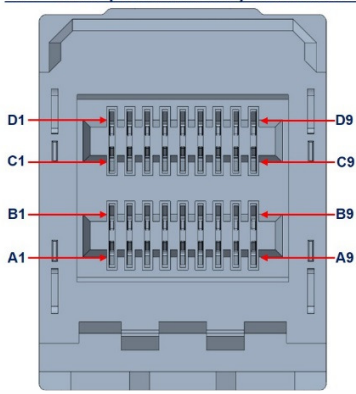


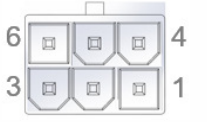
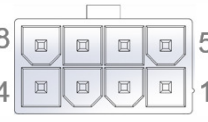
Connector Locations and LED Indicators

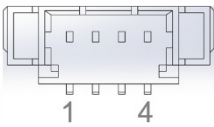


No	Description	No	Description
1	Host facing interface (SAS3) : CN1/CN2/CN3	6	Multi-Function Header : JM1
2	Firmware Programming Header : JD1/JD2	7	BMC_SMBUS Connector : JM3
3	Main Power Connector : PW1/PW2	8	System_Fail_LED Header : JM4
4	M/B Fan Speed Control : JM2	9	Buzzer: SUB1
5	FAN Connector : FAN1~FAN12	10	M058SSAN Micro-controller : IC1/IC2

Connector Pin Definitions.

SFF-8643 (MiniSAS HD) Connector	U63/U76/U62			
	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*3-Pin Connector		PW2	Power 2*4-Pin Connector	
	PIN #	Definition		PIN #	Definition
	1~3	+5V		1~4	Ground
	4~6	Ground		5~8	+12V

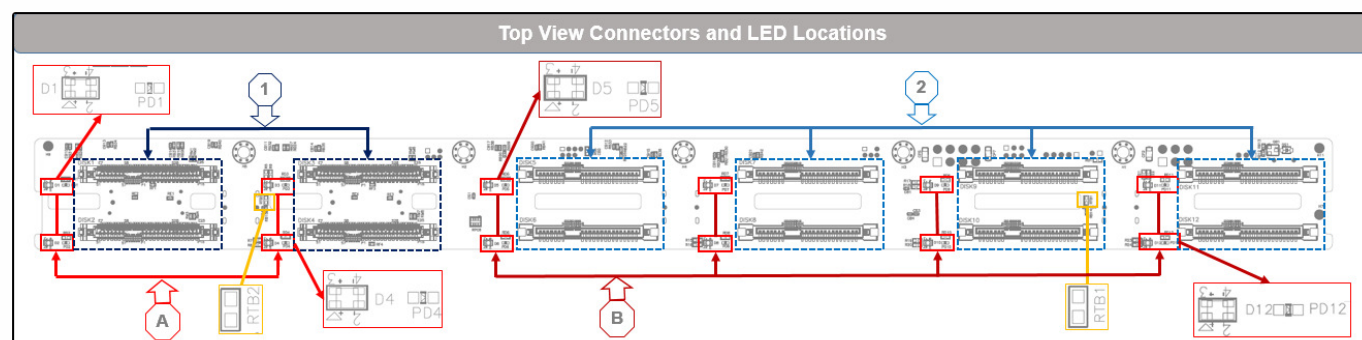
FAN1~FAN12	PWM FAN Connector		JM3	BMC_SMBUS Connector	
	PIN #	Definition		PIN #	Definition
	1	Tachometer		1	Clock
	2	PWM Output		2	Data
	3	+12V		3	Alert
	4	Ground		4	Ground
				5	VCC

JM1		Multi-Function Header			
		PIN #	Definition	PIN No#	Definition
		1	TEST_P+	2	TEST_P-
		3	BUZ_EN+	4	BUZ_EN-
		5	MUTE_SW+	6	MUTE_SW-
JB3 Function Description:			Pin#3-Pin#4 Short for Forced Mute.		
Pin#1-Pin#2 Short for Test Mode.			Pin#5-Pin#6 for External Mute Switch.		

JD1~JD2		Firmware Programming Header			
		PIN #	Definition	PIN No#	Definition
		1	VCC	2	ICE_CLK
		3	#Key	4	ICE_DATA
		5	Ground	6	ICE_RST

JM4		System_Fail_LED Header		JM2		M/B FSC 3-Pin Connector	
		PIN #	Definition			PIN #	Definition
		+	LED +			1	PWM_FROM_MB
		-	LED -			2	TACH_TO_MB
						3	Ground

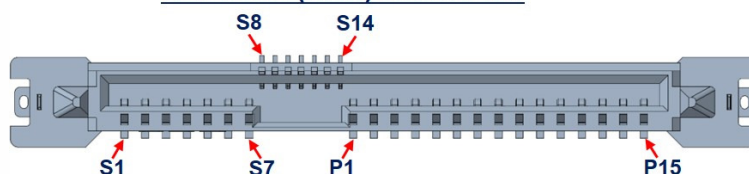
Connector/ LED Indicators.



No	Location	Description	No	Location	Description
1	DISK1~DISK4	SATA/SAS Disk #1~#4	2	DISK5~DISK12	SATA/SAS Disk #5~#12

DISK1 ~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

No	Location	Description	Location	Description
A/B	PD1~PD12	DISK1~DISK12 Power LED	D1~D12	DISK1~DISK12 Activity/Failure LED

Hardware Specification

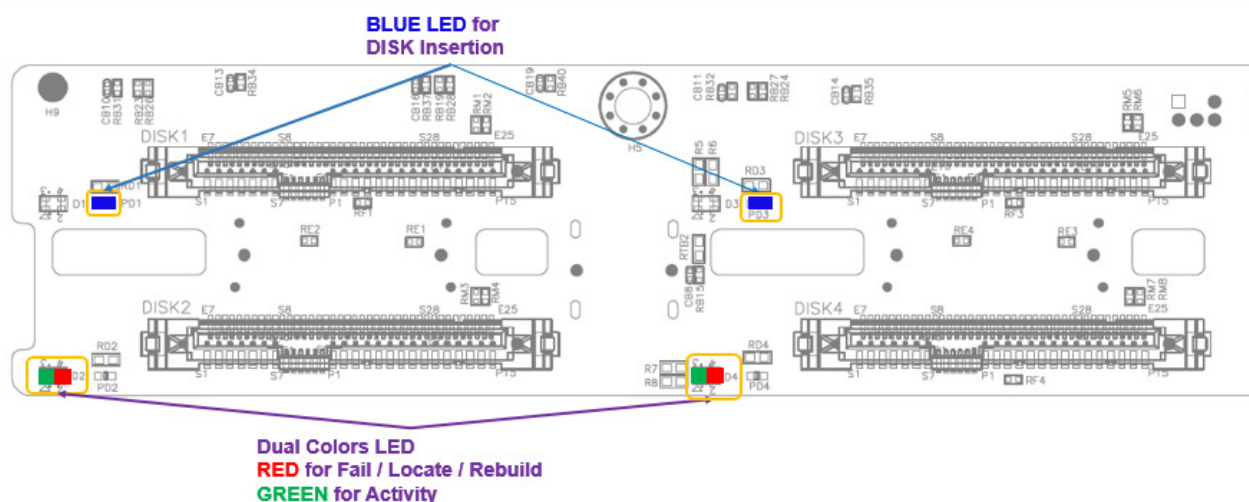
HOST Interface : MiniSAS HD(SFF-8643)

Hard Disk (SSD) Interface : SAS29Pin (SFF-8680)/U.2 (SFF-8639)

- Indicator :
 - Power LED (PD1~PD12) : Blue –(When HDD is resent)
 - Dual color(Green/Red) LED D1~D12 for Hard Disk Drive Status (Activity/Fail/Locate)
 - Activity LED: Green (When HDD is Access)
 - Fail/Locate LED : Red (When HDD Fail or Locate)
- Environment Control :
 - PWM FAN Connector (FAN1~FAN12) 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 (CN1/CN2/CN3)
 - ◆ One MiniSAS HD connector can support up to 4 SAS3 disk bays. All the connectors are directly wired to the 29-pin disk connectors.
 - CN1 directly wired to DISK1~DISK4.
 - CN2 directly wired to DISK5~DISK8.
 - CN3 directly wired to DISK9~DISK12.
 - SFF-8639 68Pin Connector *4 (DISK1~DISK4) for SATA/SAS3 Disk.
 - SFF-8680 SAS29Pin Connector *8 (DISK5~DISK12) for SATA/SAS3 Disk.
- Power Connector/Signal Control Header:
 - JM1 Header for Test_Mode/Buzzer Alarm Enable/Disable selection and Mute_SW.
 - JM2 connector for Fan speed control connected between Motherboard and backplane.
 - JM3 SMBUS Connector for external BMC SMBUS control function.
 - SYS_ERR_LED (JM4) Turn on when system Fan fails or system over temperature.
 - JD1/JD2 Header for Programming MCU Firmware.

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:

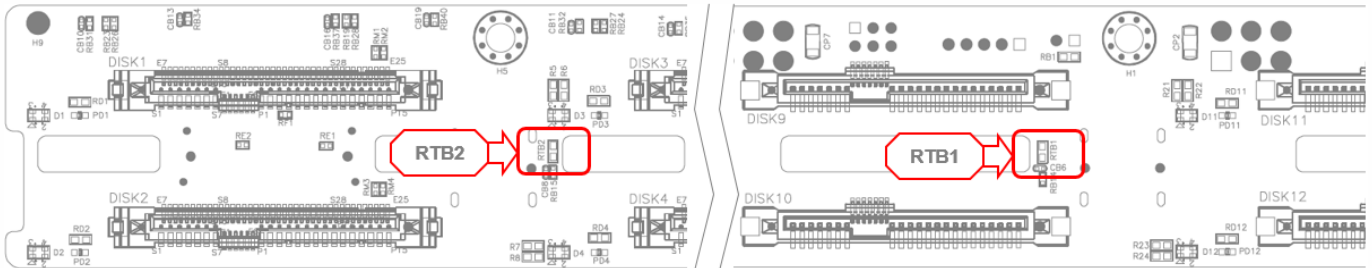
Fail and Locate indicator –

Turned steady on when disk failure occurs. Blinking (1 Hz) when locating Disk, RAID rebuild and RAID consistent check.

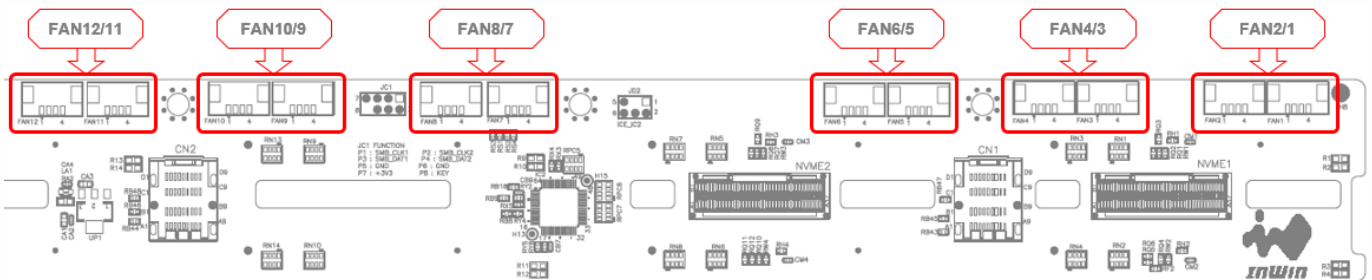
For SAS application, The LEDs behave by following SGPIO signal coming through sideband bus inside the SFF-8643 cables. Please refer to Section 2 for SGPIO settings. When SGPIO Jumper setting is enabled the LEDs behave according to the SGPIO signals. When SGPIO is disabled, the RED LEDs (for Locate and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

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.

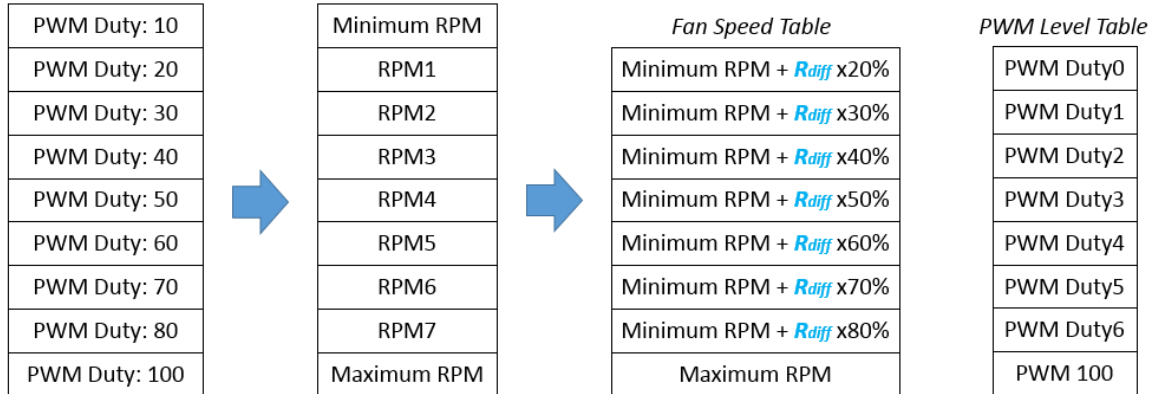


How it works?

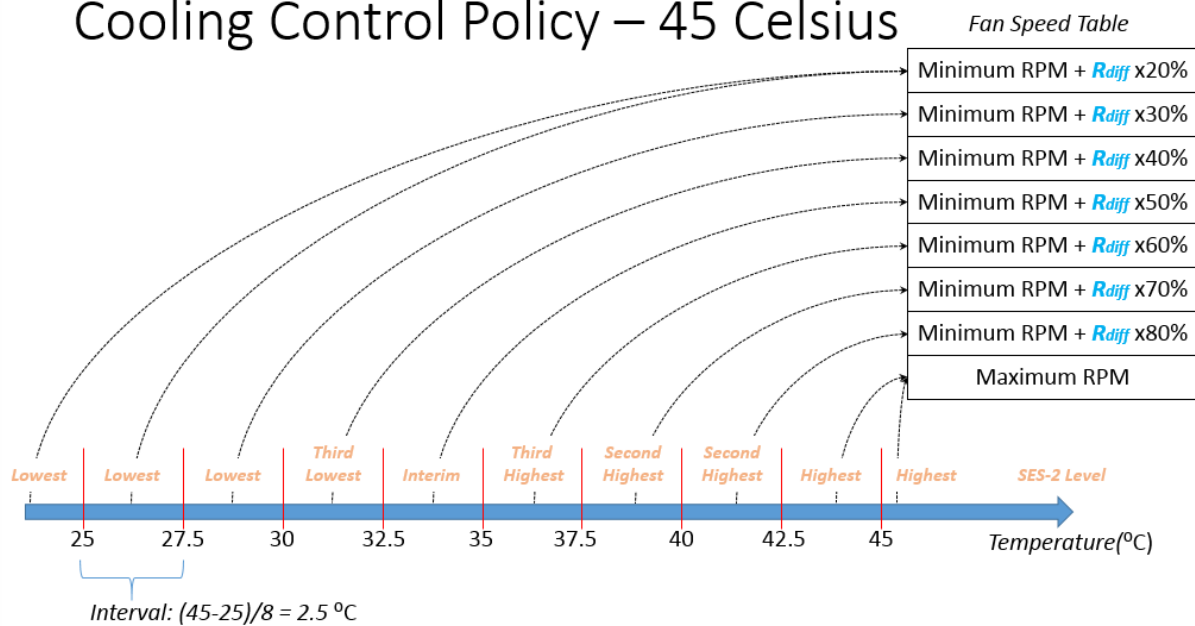
1. Fan module auto-calibration triggered in every system boot. The thermal profile would then be recorded and used until next reboot.
2. Backplane starts fan calibration and calculates the corresponding PWM duty cycle for each level. There are totally 8 speed levels to be sensed and used until next system 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

$$R_{diff} = \text{Maximum RPM} - \text{Minimum RPM}$$



Cooling Control Policy – 45 Celsius

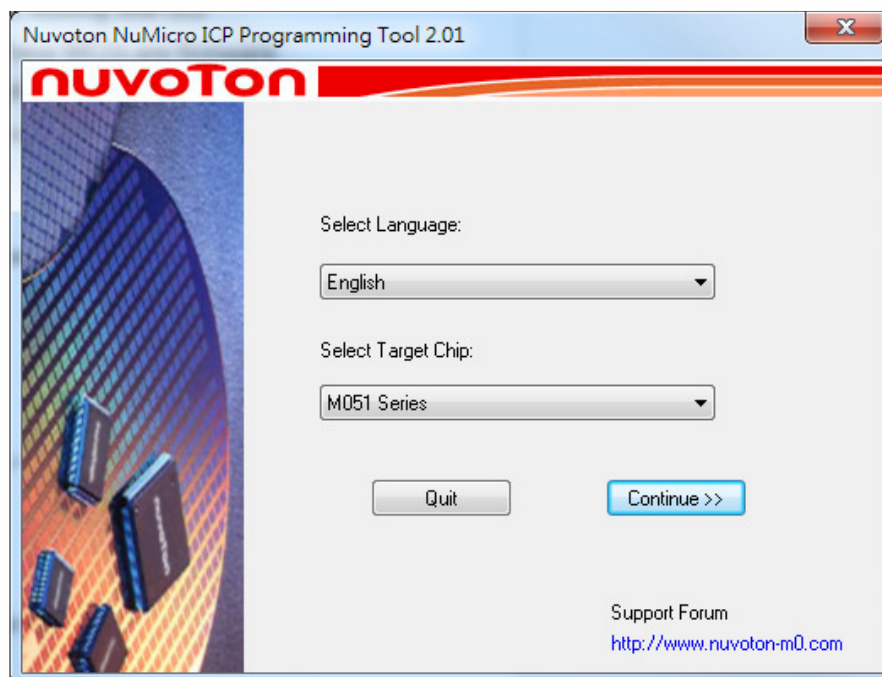


Firmware Upgrade

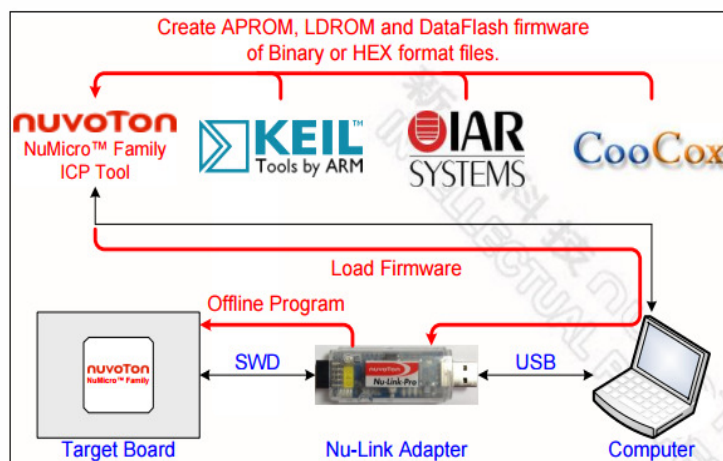
The passive backplanes are planted Nuvoton M058 series MCUs for hosting disk LED indication, Fan speed control and system fail alarm. These MCUs are preprogrammed in manufacturing. In most cases, the MCUs are not required to reprogram unless there is issue needed to fix.

How to upgrade firmware?

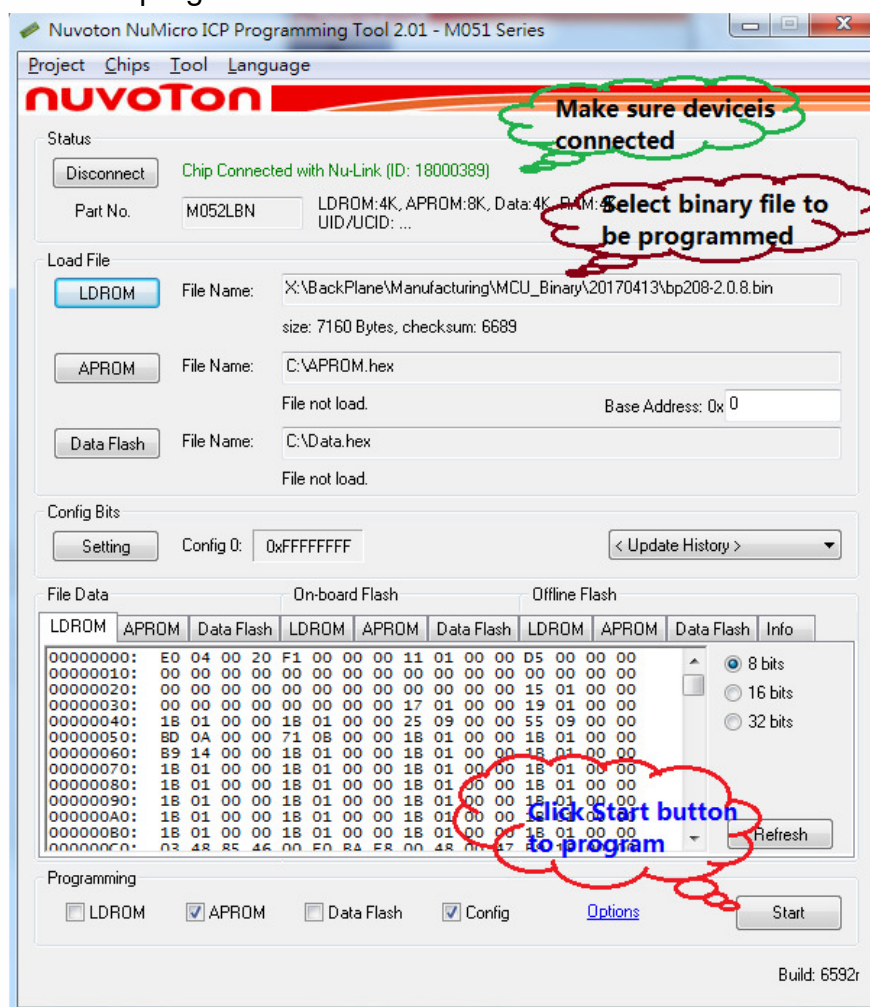
1. Require Nuvoton ARM Cortex-M0 programming tool. Nu-Me or Nu-Link and install Nuvoton ICP Programming tool software.



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



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



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