

SATA PASSIVE BACKPLANE

USER'S MANUAL

P/N : 2RAKVI012000

Model : 3TO4 4BAY SATA BP MODULE

Version : V1.0

Revision History

Version	Changes	Date
V1.0	Official Release	2022/03/08

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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 4 disks in the system.

The passive backplanes support state-of-the-art SAS 6Gbps HDD/SSD and also backward compatible with SATA 6Gps and SATA 3Gps HDD/SSD.

Basically, 4 SATA7P connector can support up to 4 disk bays.

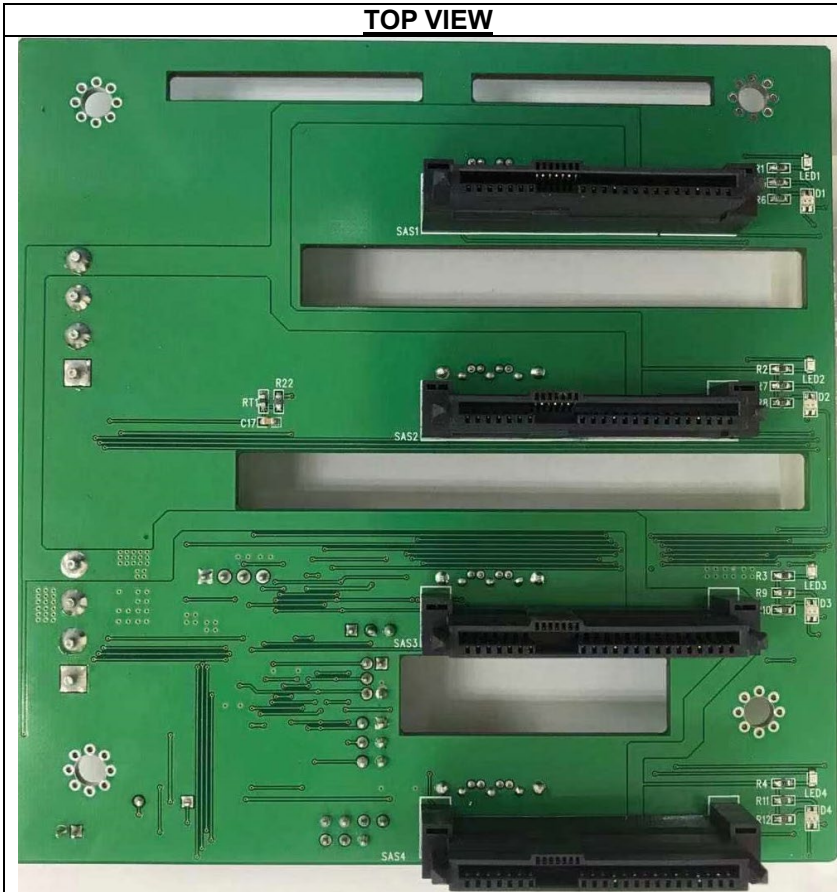
The 2pcs of 1*4Pin-P5.08 power receptacles support up to 5V(10A)/12V(10A) current to satisfy the power needs of fully loaded disk drives

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.

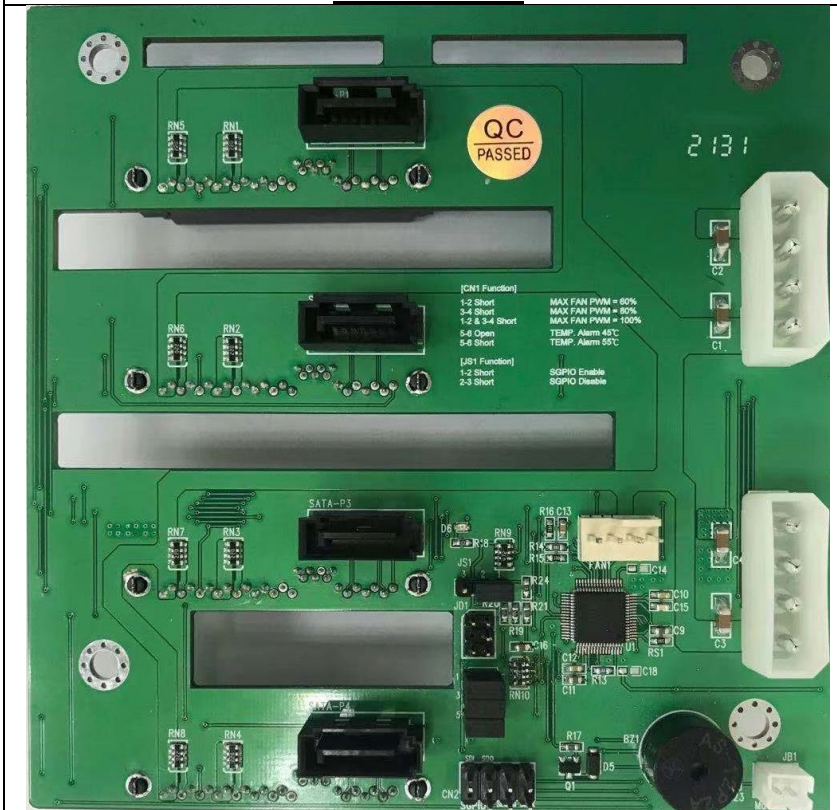
Along with the smart fan control feature, a system alarming feature is also implemented to alert users in case Fan module failure and/or system overheat occurs by sounding the buzzer at the same time. Users can then detect issue and take corresponding actions to resolve the issue according to the failure type. As soon the issue disappears the alarm stops.

Physical Outlook

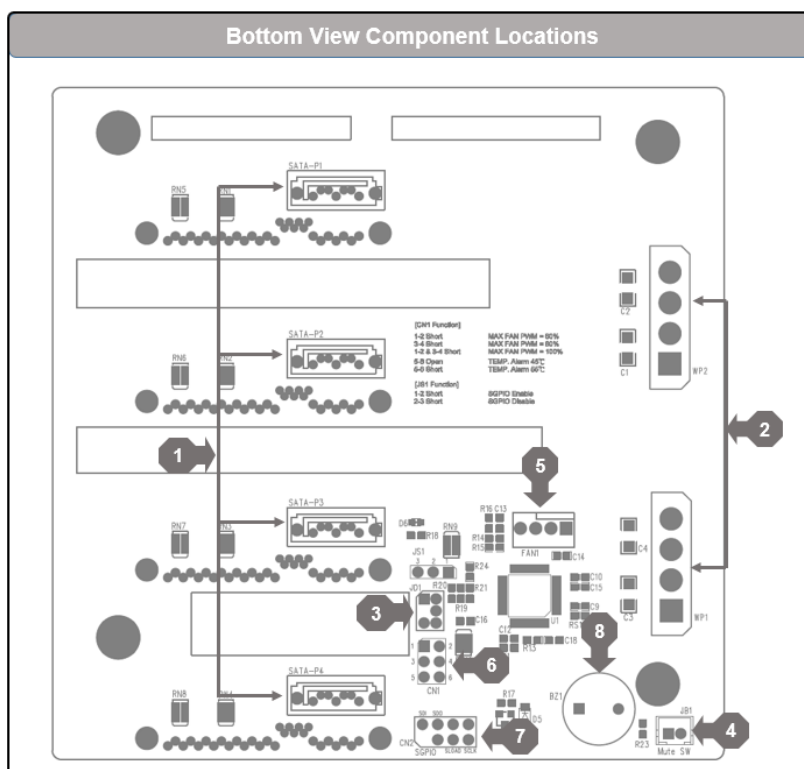
TOP VIEW



BOTTOM VIEW



Connector Locations and LED Indicators



No	Description	No	Description
1	Host facing interface (SATA):SAS1~SAS4	5	FAN Connector:FAN1
2	Main Power Connector: WP1/WP2	6	FAN/TEMP Setting Header:CN1
3	Firmware Programming Header:JD1	7	SGPIO header:CN2
4	Mute_SW Connector:JB1	8	Alarm Buzzer:SUB1

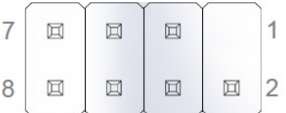
Bottom Connector and Pin Definitions

 SATA-7P Connector	SAS1~SAS4	
	Signal Name	Pin No.
	SAS_RX_[p/n]	2/3
	SAS_TX_[p/n]	5/6
	SAS_GND	1/4/7

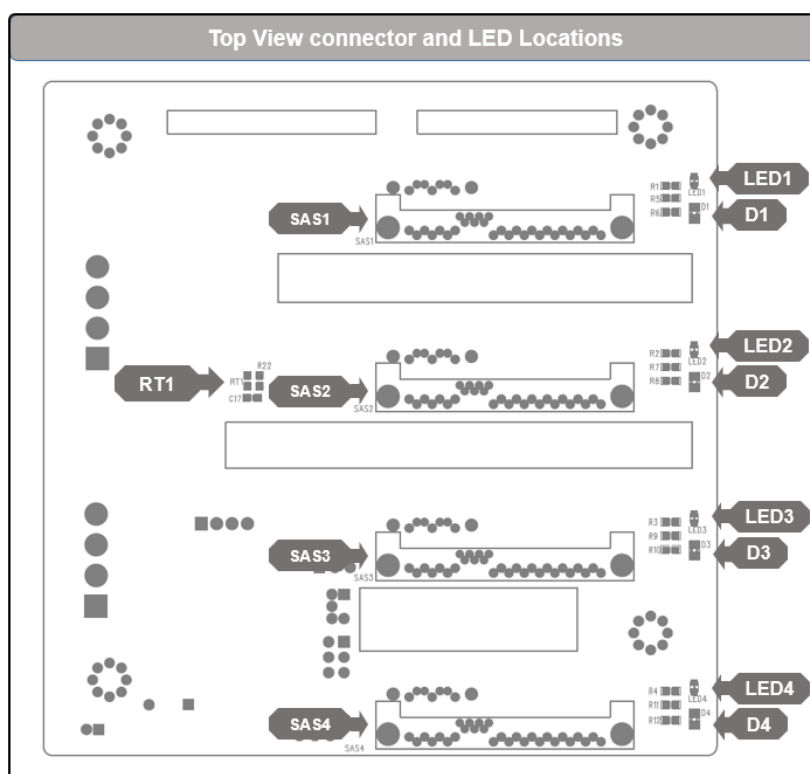
WP1/WP2		Power 4-Pin Connector		FAN1		FAN 4-Pin Connector	
	PIN #	Definition			PIN #	Definition	
	1	+12V			1	Ground	
	2	Ground			2	+12V	
	3	Ground			3	Tachometer	
	4	+5V			4	PWM Output	

JD1	Firmware Programming Connector				JB1	Mute Button Connector	
	PIN #	Definition	PIN #	Definition		PIN #	Definition
	2	ICE_CLK	1	VCC		1	Mute_Button +
	4	ICE_DATA	3	#Key		2	Mute_Button -
	6	ICE_RST	5	Ground			

CN1	FAN/TEMP Setting Header			
	PIN #	Definition	PIN No#	Definition
	2	PWM_SET1_-	1	PWM_SET1_+
	4	PWM_SET2_-	3	PWM_SET2_+
	6	TEMP_SET_-	5	TEMP_SET_+
[CN1 Function] Setting		Function	[CN1 Function] Setting	
1-2 Short		MAX. FAN RPM = 60%	5-6 Open	
3-4 Short		MAX. FAN RPM = 80%	TEMP. ALARM < = 45°C	
2-4 & 3-4 Short		MAX. FAN RPM = 100%	5-6 Short	
			TEMP. ALARM < = 55°C	

CN2	SGPIO 8Pin-Key#1 Header			
	PIN #	Definition	PIN No#	Definition
	2	NC	1	#Key
	4	SData_Out	3	Ground
	6	Ground	5	SLoad
	8	NC	7	SClock

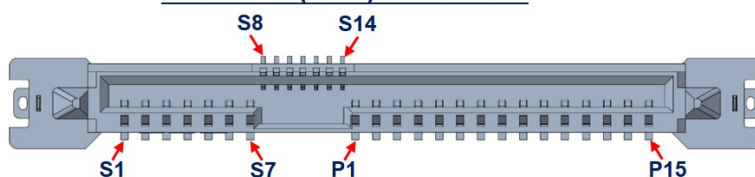
Top Connectors and LED Indicators



Location	SATA Drive Number
SAS1~SAS4	SATA Disk #1~#4

SAS1~SAS4

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

Location	Hard Drive Power/Activity/Failure/Locate LEDs
LED1~LED4	SAS1~SAS4 Power LED
D1/D2/D3/D4	SAS1~SAS4 Activity/Failure/Locate LED

Hardware Specification

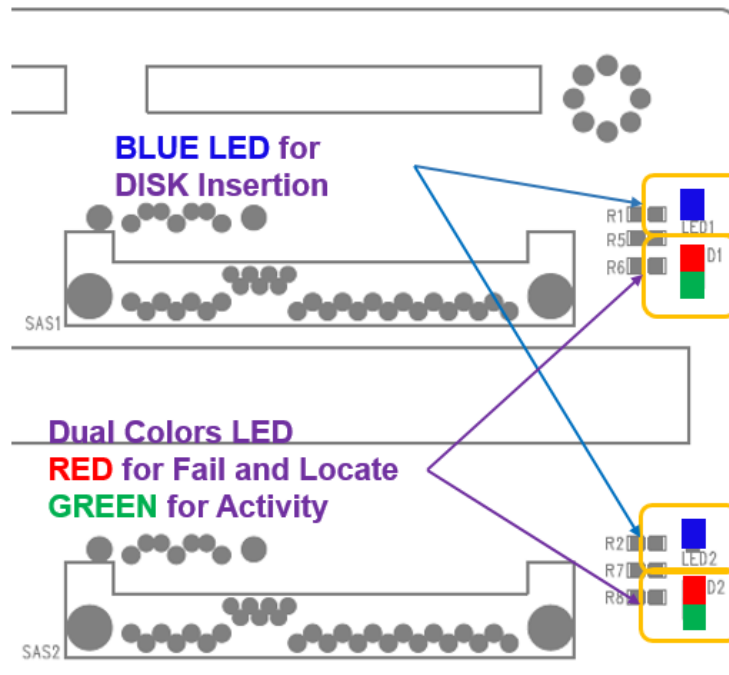
HOST Interface : SATA-7P

Hard Disk (SSD) Interface : SATA/SAS

- Indicator :
 - Power LED (LED1~LED4) : Blue –(When HDD is resent)
 - Dual color(Green/Red) LED D1~D4 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) for Cooling system.
 - Temperature Sensor (RT1) Monitor HDD bay inside temperature.
 - Buzzer (BZ1) for Over-temperature and FAN fail alerting.
- High Speed Connector
 - SATA7P Connector *4 (SATA-P1~SATA-P4)
 - ◆ 4 SATA connector connectors are directly wired to the 29-pin disk (SAS1~SAS4) connectors.
 - SFF-8680 SAS29PIN Connector *4 (SAS1~SAS4) for SATA/SAS Disk.
- Power Connector/Signal Control Header:
 - P5.08mm Disk Drive Power Connector*2 (WP1~WP2).
 - CN1 Header for FAN Speed and overheat temperature alarm configuration.
 - CN2 Header for SGPIO Cable connection from Mother Board to Backplane.
 - JB1 Connector for Mute SW cable connection from Front Panel to Backplane.
 - JD1 Header for Programming MCU Firmware.
 - JS1 Header for SGPIO Enable/Disable Selection.

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.

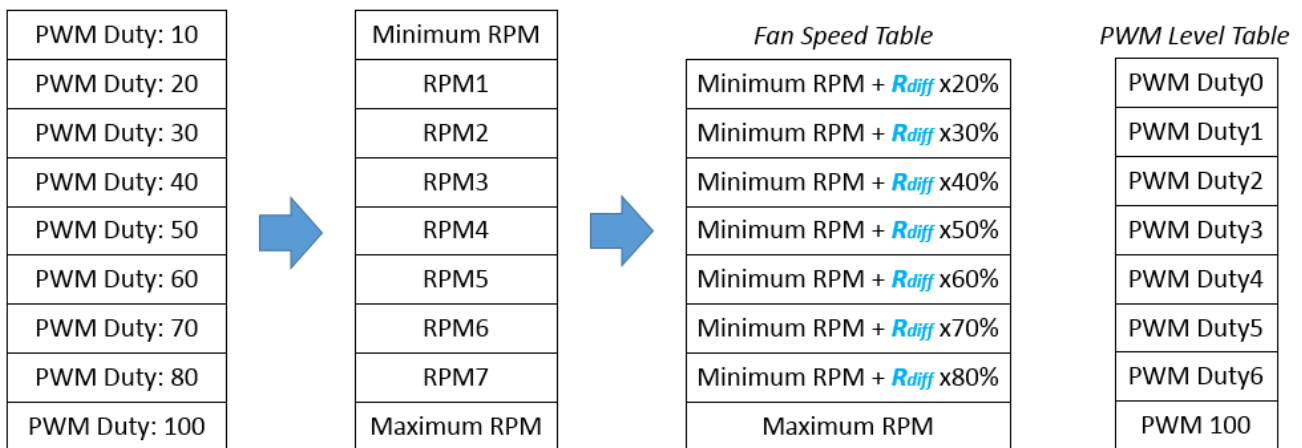
The LEDs behave by following SGPIO signal coming through customized cable. When SGPIO Jumper setting is enabled the LEDs behave according to the SGPIO signals. When SGPIO is disabled, the RED LEDs (for Locate and Fail) do not behave while the GREEN LEDs (for Activity) behave according to the signal from P11 (READY LED) of the disk connectors.

Smart FAN Speed Control

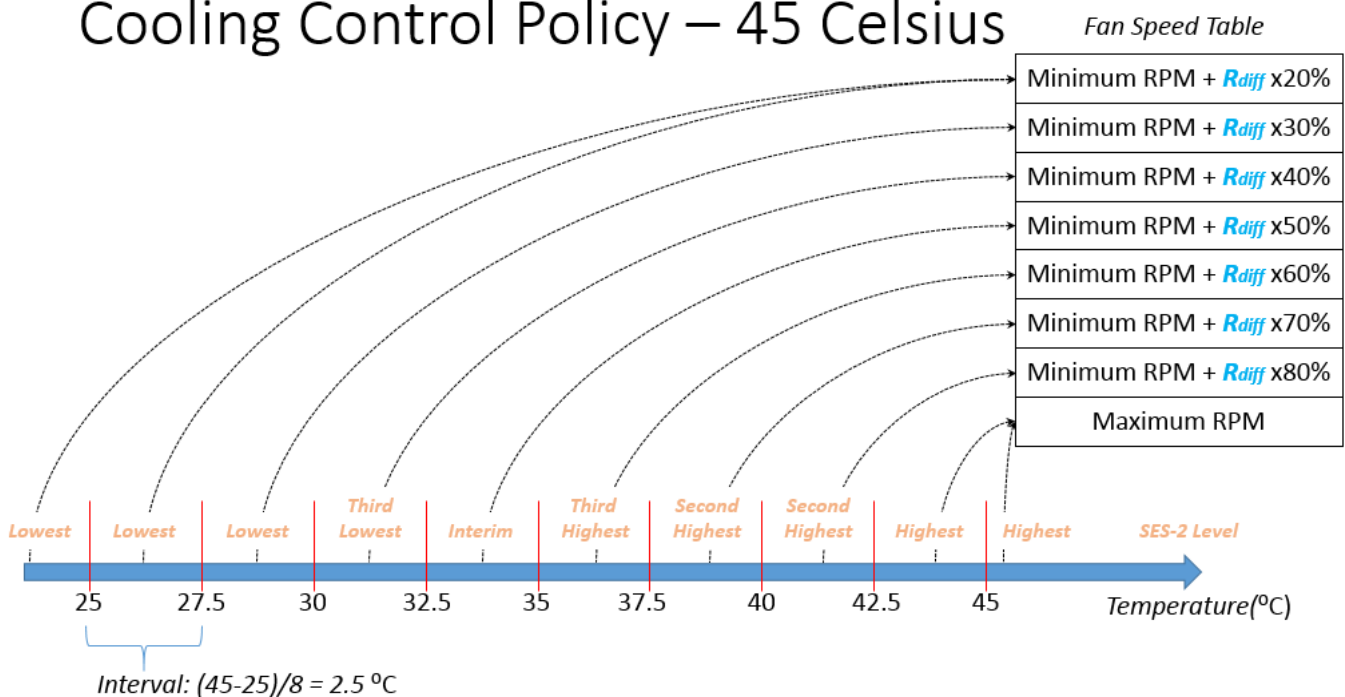
IN WIN's Backplane is designed with Smart Fan Control feature by automatically detecting the existences of the Fan Modules and intelligently control the Fan RPM per the system temperature being detected by single thermal sensor on the backplane.

Fan Speed Measurement

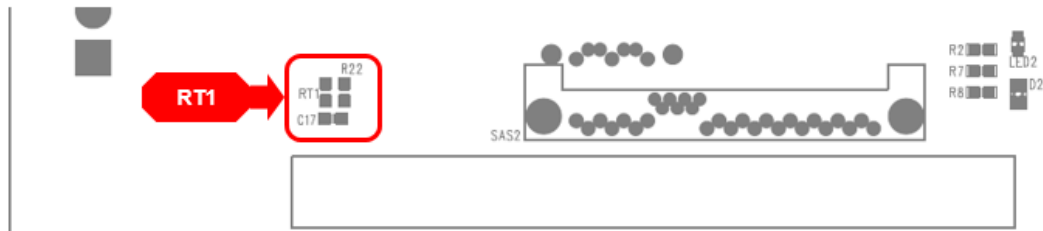
$$R_{diff} = \text{Maximum RPM} - \text{Minimum RPM}$$



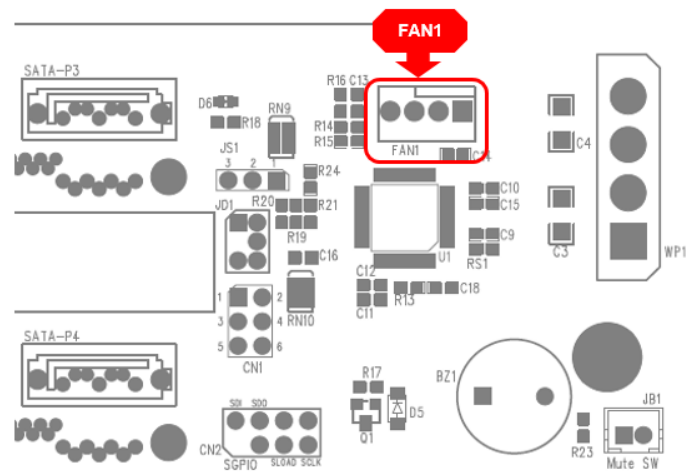
Cooling Control Policy – 45 Celsius



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 a thermal sensor (RT1) on the backplane.



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



System Alarm

Fan Fail:

When the Fan RPM is lower than 75% of the expected speed the Fan Fail alarm goes ON. And it would go off when the issue is resolved or disappeared.

Overheat:

When the system temperature at the backplane area is going beyond 45°C or 55°C (according to TEMP ALARM setting) the Temp Fail alarm would be turned ON. And would be turned off when temperature is going under 44°C or 54°C.

Note:

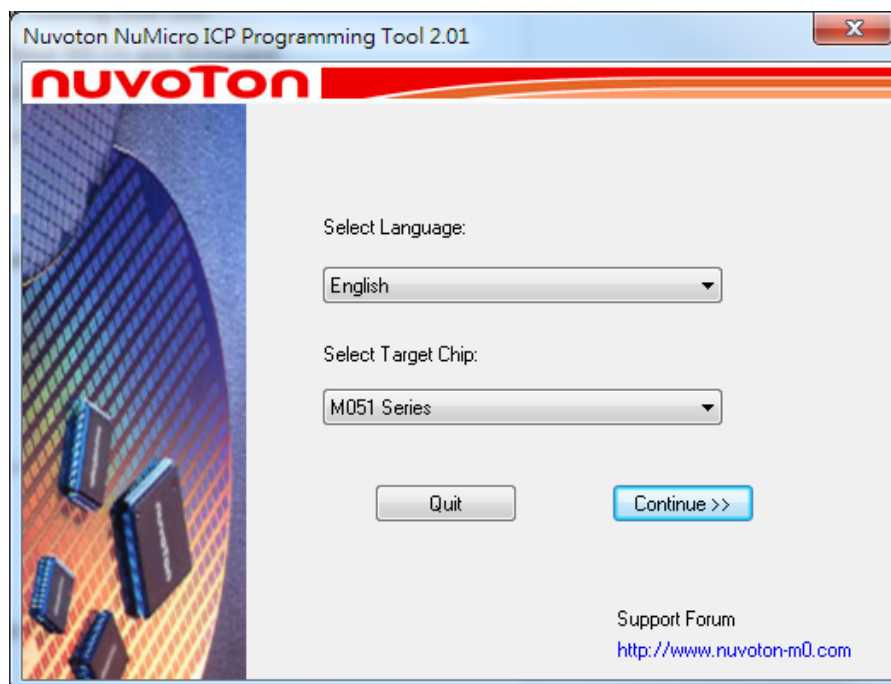
- ◆ When the system alarm is triggered, the Buzzer beeps along with it and stops beeping when alarm is disappeared.
- ◆ 1 short beep(B—B—B) stands for Fan Fails
- ◆ 2 short beeps(BB—BB—BB) stand for Over-Temperature
- ◆ Press Mute Button to disable buzzer beeping and will be retrigged when either failure occurs again.

Firmware Upgrade

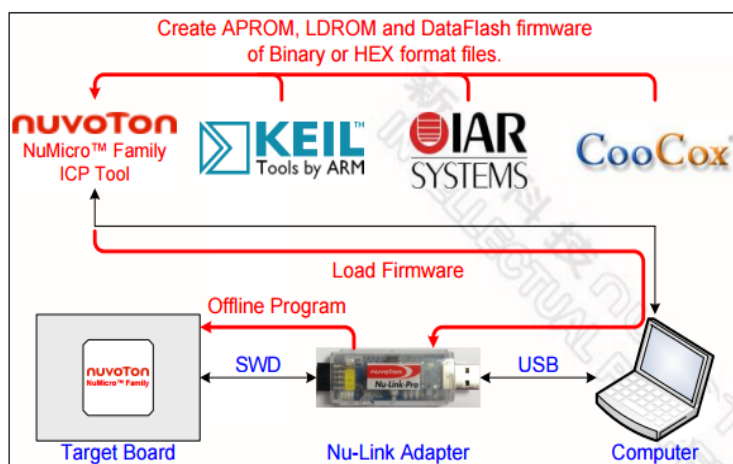
The passive backplanes are planted Nuvoton M058 series MCUs for hosting disk LED indication, Fan speed control and system fail alarm. These MCUs are preprogrammed in manufacturing. In most cases, the MCUs are not required to reprogram unless there is issue needed to fix.

How to upgrade firmware?

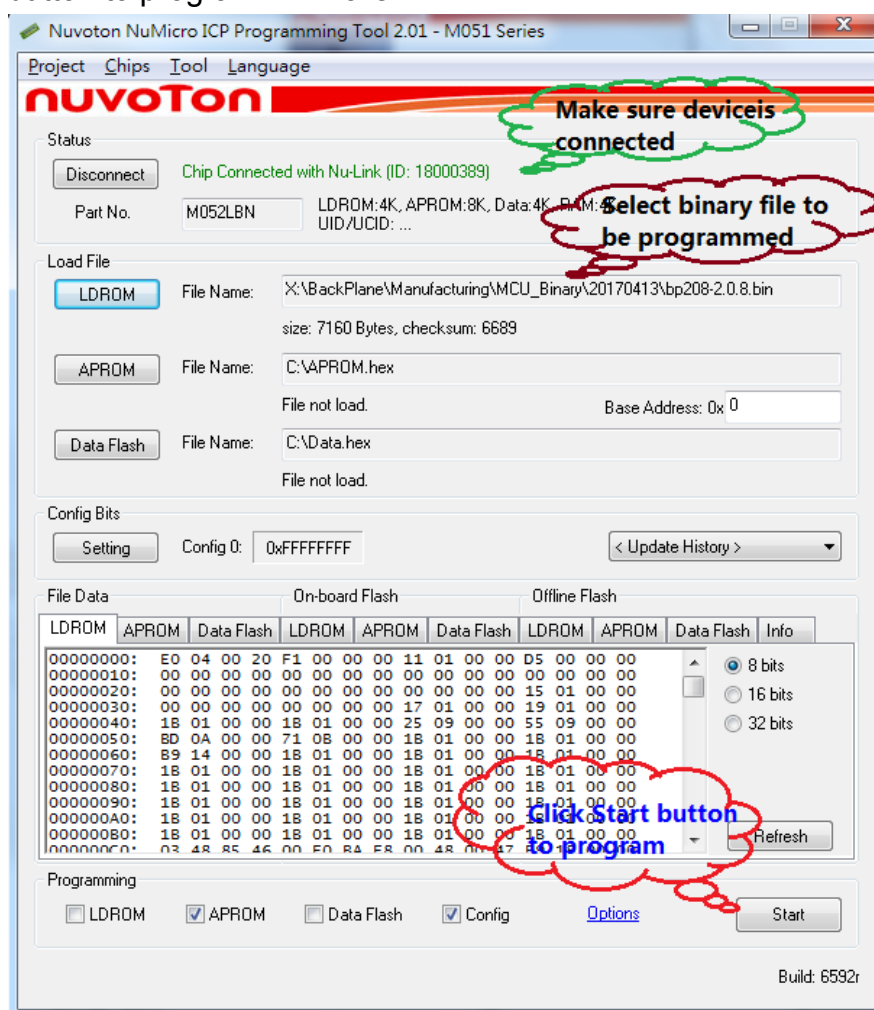
1. Require Nuvoton ARM Cortex-M0 programming tool. Nu-Me or Nu-Link and install Nuvoton ICP Programming tool software.



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



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.