CUBIEBOARD

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HDD-RAID Hardware Development Guide

For HDD-RAID V1.1

Version	Author	Modification	Check
V-1.0 20160117	Suke	Init version	Aaron

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1.1. Application Scope

You can use this HDD-RAID with Cubietruck or Cubietruck Plus , you also can use this board on PC by USB or SATA interface . This is a guide based on HDD-RAID V1.1 .

1.2. Purpose

This a hardware development guide for HDD-RAID Board . You can find product overview and mechanical properties in this document , then ,I will tell you how to check you board is worked ,and how to switch HDD SATA work mode .

1.3. Abbreviations

RAID	Redundant Array of Inexpensive Disks
JBOD	Just a Bunch Of Disks
PM	Port Multiplier

2. Product Overview

This is a hard disk multiplexing board from USB3.0 or SATA III to Dual SATA III interface , which also can provide 5V DC power output . Dual hard disk array is supported by 4 mode : RAID0 ,RAID1,JOBD,PM . On the other hand , this is also a expanding board for Cubietruck and Cubietruck Plus, which meet the needs of capacity and security .
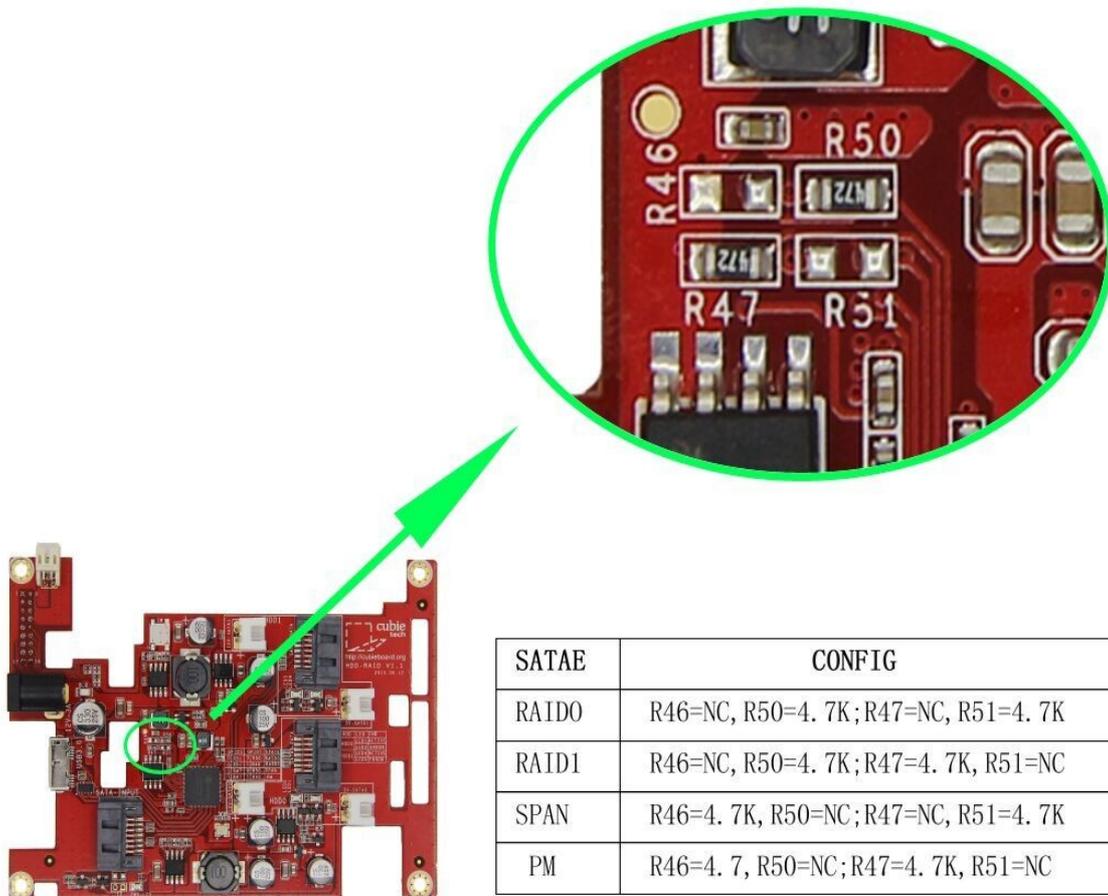
2.1. Mechanical Properties
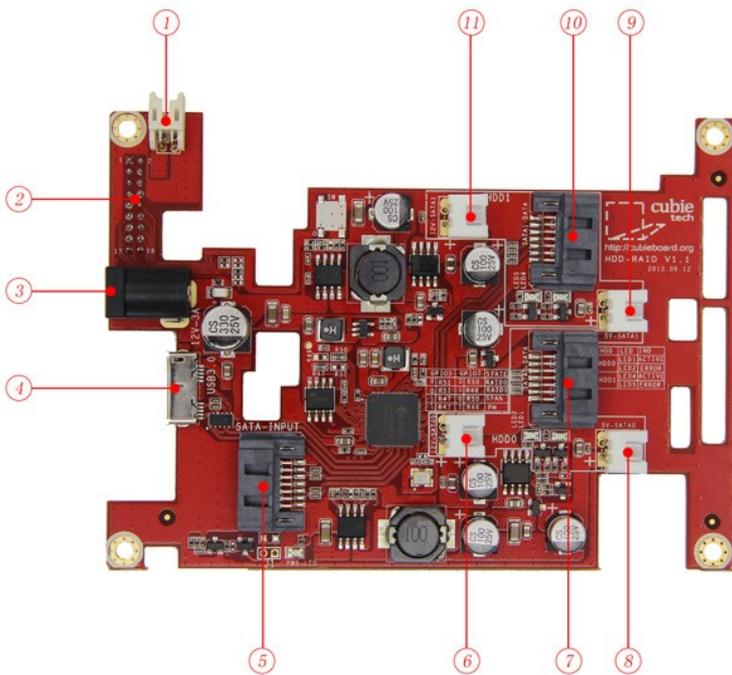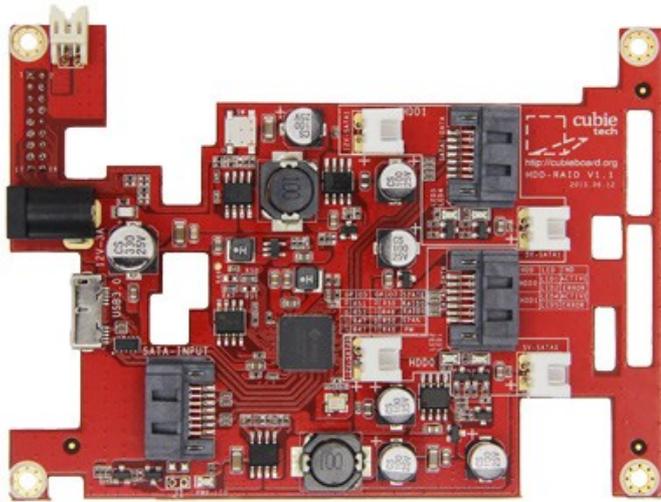
①	DC5V TO CT/CT+
②	CT/CT+ I/O
③	DC12V
④	USB 3.0
⑤	SATA To CT/CT+
⑥	DC12V TO HDD0
⑦	SATA TO HDD0
⑧	5V TO HDD0
⑨	5V TO HDD1
⑩	SATA TO HDD1
⑪	12V TO HDD1

2.2. Indicator LED

| Disks	LED	Status	Details
HDD0	LED1	ACTIVE	ON : SATA0 is connected
			Flash: SATA0 is Write/Read data
			OFF: SATA0 Suspend
	LED2	ERROR	ON: SATA0 is ERROR
			OFF: SATA0 is on other mode
HDD1	LED4	ACTIVE	ON : SATA1 is connected
			Flash: SATA1 is Write/Read data
			OFF: SATA1 Suspend
	LED5	ERROR	ON: SATA1 is ERROR
			OFF: SATA1is on other mode

3. Configuration And Working Mode

There are 4 work mode for this board , you can switch mode by jumping resistance, software can not switch the mode. Before you jumping resistance ,please power off your board ,new configuration is enabled when next booting , the default array mode is RAID1.

SATAE	CONFIG
RAID0	R46=NC, R50=4.7K;R47=NC,R51=4.7K
RAID1	R46=NC, R50=4.7K;R47=4.7K, R51=NC
SPAN	R46=4.7K, R50=NC;R47=NC, R51=4.7K
PM	R46=4.7, R50=NC;R47=4.7K, R51=NC

| Mode	Description
RAID0	Block-level striping without parity or mirroring,Virtual one disk
RAID1	Mirroring without parity or striping,data security mode ,Virtual one disk
JOBD	Just a Bunch Of Disks,Virtual one disk
PM	Port Multiplier ,SATA Hub,Virtual several disks

3.1. RAID0

RAID 0 consists of striping, without mirroring or parity. The capacity of a RAID 0 volume is the sum of the capacities of the disks in the set, the same as with a spanned volume. There is no added redundancy for handling disk failures, just as with a spanned volume. Thus, failure of one disk causes the loss of the entire RAID 0 volume, with reduced possibilities of data recovery when compared to a broken spanned volume. Striping distributes the contents of files roughly equally among all disks in the set, which makes concurrent read or write operations on the multiple disks almost inevitable and results in performance improvements. The concurrent operations make the throughput of most read and write operations equal to the throughput of one disk multiplied by the number of disks. Increased throughput is the big benefit of RAID 0 versus spanned volume, at the cost of increased vulnerability to drive failures.
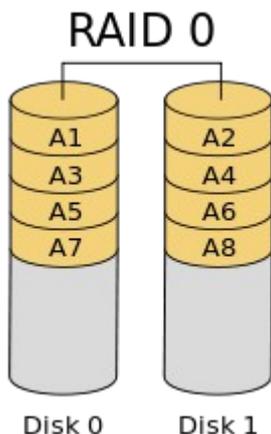
3.2. RAID1

RAID 1 consists of data mirroring, without parity or striping. Data is written identically to two (or more) drives, thereby producing a "mirrored set" of drives. Thus, any read request can be serviced by any drive in the set. If a request is broadcast to every drive in the set, it can be serviced by the drive that accesses the data first (depending on its seek time and rotational latency), improving performance. Sustained read throughput, if the controller or software is optimized for it, approaches the sum of throughputs of every drive in the set, just as for RAID 0. Actual read throughput of most RAID 1 implementations is slower than the fastest drive. Write throughput is always slower because every drive must be updated, and the slowest drive limits the write performance. The array continues to operate as long as at least one drive is functioning


3.3. JOBD
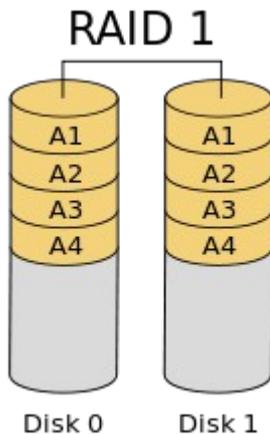
Just a Bunch Of Disks,Virtual one disk
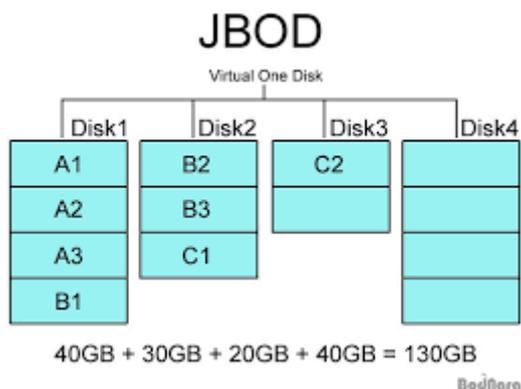
3.4. PM

A Serial ATA port multiplier is a unidirectional splitting device. While it allows one equipped port to connect up to 15 disks, the bandwidth available is limited to the bandwidth of the link to the controller, as of 2012 1.5, 3, or 6 Gbit/s.While the controller is aware that there are multiple drives connected, the service is transparent to the disks attached. Because they believe they are communicating directly with the controller, any drive that holds to the SATA standard can be connected to a port multiplier.
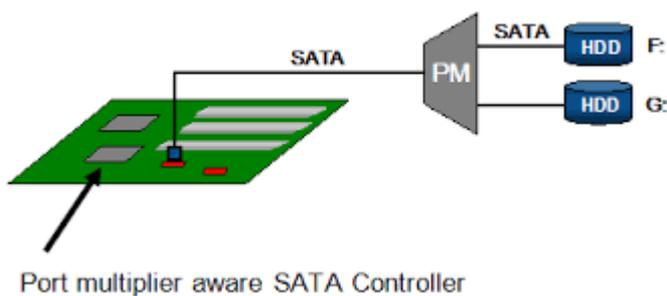
3.5. Warning

- Check you HDD/SDD format when connected to HDD-RAID

- When you conect HDD-RAID to PC by USB3.0 and SATA ,SATA data channel will be preferred.

- When you switch to any array mode ,in order to clean chip data ,please config PM mode first , restart clean chip data ,and config your array mode .

4. Work On Cubieboards

For power supply , HDD RAID is power by DC12V/4A adapter , HDD RAID also can provide DC5V power for Cubietruck or Cubietruck Plus .
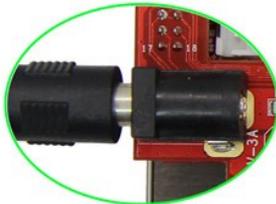
2 SDD/HDD can be arrayed as virtual disk connected to Cubietruck or Cubietruck Plus by "SATA INPUT" port .There are some picture to show details .
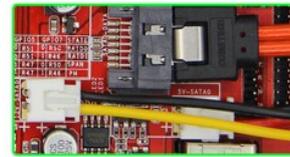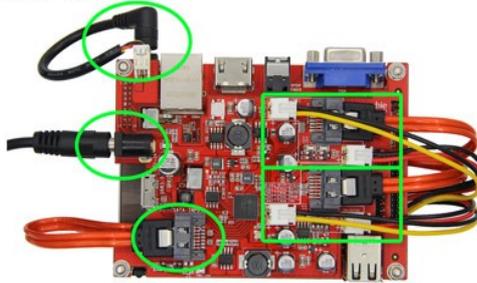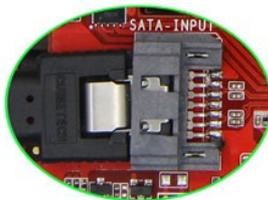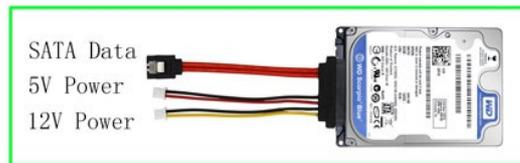
Power Adapter Cable

SATA1 Transit Line

DC12V/4A Adapter

SATA0 Transit Line

SATA Data Line

SATA Data
5V Power
12V Power

HDD/SDD Connection Description