



**MA6116A<sup>TM</sup>**  
**USB2.0 to SATA Bridge Controller**

**2010/6/03**

## Revision History

Revision	Date	Summary of Changes
1.00	2010/06/03	➤ Preliminary draft
1.05	2010/10/10	➤ Add Neutral string display (MA6116A2) ➤ Add extra read only disk for data pre-load
		➤
		➤
		➤
		➤
		➤
		➤
		➤
		➤
		➤

## Ordering Information

Product Name	Type	Function
MA6116A1	28SSOP	
MA6116A2	28SSOP	Neutral String Display "Mass Storage Class Device"

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## 2. Introduction

### 2.1 MA6116A General Description

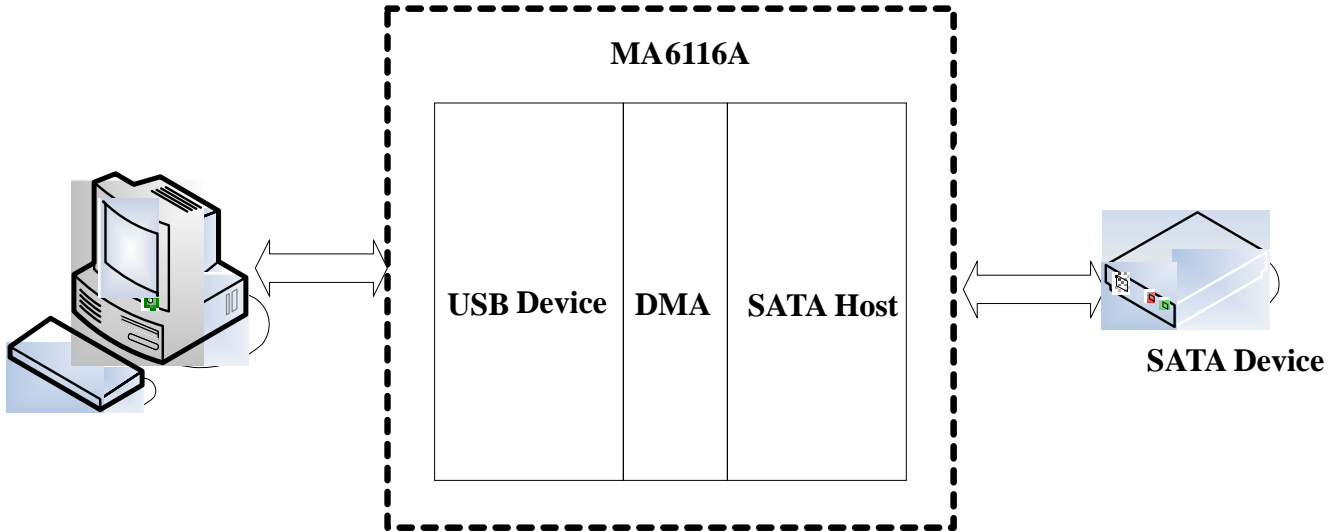
MOAI MA6116A is a bridge chip for USB to SATA interface, translating the host SCSI command to ATA/ATAPI command of SATA device, targeting the external HDD application. MA6116A complies with the USB Storage Class specifications ver.1.0 Bulk mode protocol and compatible with Windows 98/2000/XP/Vista/Win7, Mac OS 9, Linux Redhat. With the in-house DMA and Transceiver capability, MA6116A provides the market most outstanding read/write performance and BOM cost.

### 2.2 Feature

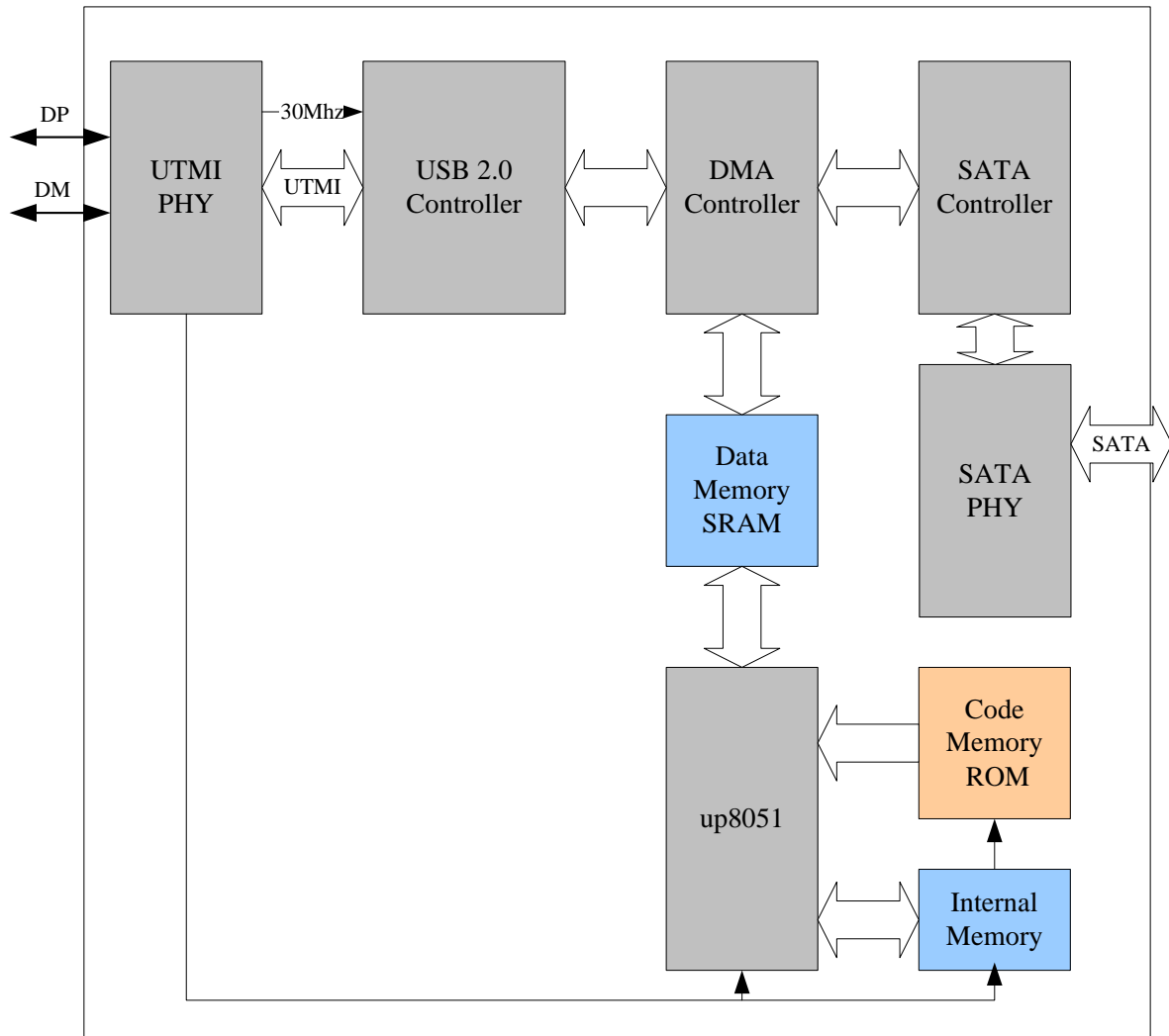
#### USB Specification Reversion 2.0

- ✓ Mass storage
- ✓ USB Bus-powered
- ✓ Support Suspend
- ✓ Integrated USB 2.0 UTMI transceiver and Serial Interface Engine (SIE)
- ✓ Endpoint:
  - Endpoint 0: 64 bytes control transfer.
  - Endpoint 1/2: 512 bytes x 2 bulk transfer for IN /OUT transaction.
- Integrated MCU compatible 8-bit micro-controller
- Support IIC Bus EEPROM
- SATA PM-Aware Function
- SATA PHY LINK IDLE MODE
- Support Pass through S.M.A.R.T Command
- Support HDD power saving (Stand-by) mode, setting by MP Tool
- Support over 2TB HDD
- Support Watch Dog Function
- SATA Specification
  - ✓ Compliance with GenIi of Serial ATA II Electronic Specification 1.0
- Embedded 5V to 3.3V/1.8V Voltage Regulator
- High System ESD performance
- Proprietary OTB (One Button Backup) and EZ-Secure (Pass word Partition) AP support.
- Extra “Read Only Disk” support for data Pre-load , and enabled by MP Tool.
- Neutral “Mass Storage Class Device” string support. (MA6116A2)

### 3. Main Application

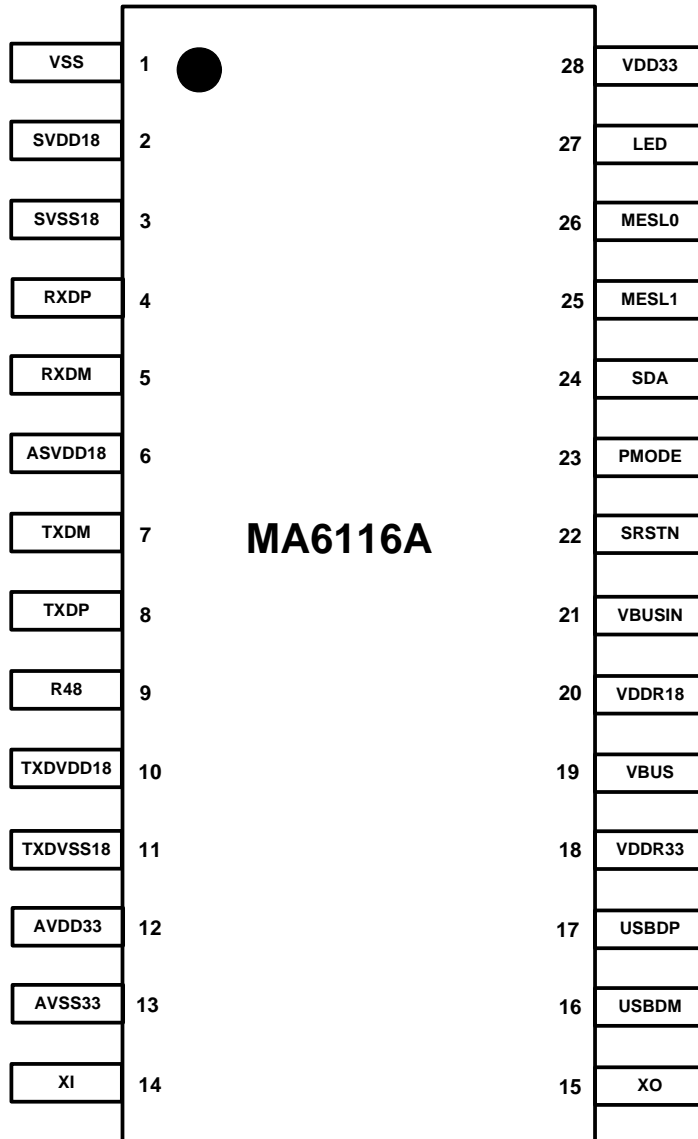


## 4. Block Diagram



## 5. Pin Function Description

### 5.1 Pin Assignment Diagram



Pin	Pin Name	Description
1	VSS	GND
2	SVDD18	SATA PHY 1.8V power (digital)
3	SVSS18	SATA PHY GND
4	RXDP	SATA Rx +
5	RXDM	SATA Rx -
6	ASVDD18	SATA PHY 1.8V power (analog)
7	TXDM	SATA Tx +
8	TXDP	SATA Tx -
9	R48	SATA PHY external resistor
10	TXDVDD18	SATA PHY Driver 1.8V power
11	TXDVSS18	SATA PHY Driver GND
12	AVDD33	USB 3.3V power
13	AVSS33	USB GND
14	XI	12Mhz Crystal input
15	XO	12Mhz Crystal output
16	USBDM	USB D -
17	USBDP	USB D +
18	VDDR33	Regulator 3.3V output
19	VBUS	5V power input
20	VDDR18	Regulator 1.8V output
21	VBUSIN	USB Bus Power Valid
22	SRSTN	System Reset
23	PMODE	HDD Suspend enable (default disable) 0 : Disable 1 : HDD power saving mode. (R8 10K resistor needed)
24	Backup	Multi-Functional pin. Normal mode is for One Button Backup, but acting as SDA pin when read PID/VID from EEPROM. (reset is needed)
25	MSEL1	Mode Select bit 1 00 : Normal mode 01 : MEM/PHY Bist mode 10 : Wafer Probing mode 11 : ATPG mode
26	MSEL0	Mode Select bit 0 00 : Normal mode 01 : MEM/PHY Bist mode 10 : Wafer Probing mode 11 : ATPG mode
27	LED	Multi-Functional pin. Normal mode is for device situation indication, but acting as SCL pin when read PID/VID from EEPROM. (reset is needed)
28	VDD33	3.3V power pad



## 5.2 Pin List in Numeric Order

Pin #	Pin Name	Type	Pin #	Pin Name	Type
1	VSS	G	15	XO	O
2	SVDD18	P	16	USBDM	B
3	SVSS18	G	17	USBDP	B
4	RXDP	I	18	VDDR33	P
5	RXDM	I	19	VBUS	P
6	ASVDD18	P	20	VDDR18	P
7	TXDM	O	21	VBUSIN	I
8	TXDP	O	22	SRSTN	I
9	R48	I	23	PMODE	I
10	TXDVDD18	P	24	BACKUP	B
11	TXDVSS18	G	25	MSEL1	I
12	AVDD33	P	26	MSEL0	I
13	AVSS33	G	27	LED	O
14	XI	I	28	VDD33	P

### I/O Type Define

- O** : Output  
**I** : Input  
**B** : Bi-directional  
**P** : Power  
**G** : Ground

## 6 Electrical Characteristics

### 6.1 Absolute Maximum Rating

Parameter	Pin Number	Symbol	Operating Voltage			Unit
			Min	Typical	Max	
Digital I/O Power	28	VDD33	3	3.3	3.6	V
Core Power	20	VDDR18	1.62	1.8	1.98	V
USB PHY Power	12	AVDD33	3	3.3	3.6	V
SATA PHY Driver Power	10	TXDVDD18	1.62	1.8	1.98	V
SATA PHY Analog Power	6	ASVDD18	1.62	1.8	1.98	V
SATA PHY Digital Power	2	SVDD18	1.62	1.8	1.98	V

## 6.2 Regulator Power Supply

Parameter	Value
VBUS(5V input)	Min.= 4.2 V; Max.= 5.8V
VDDR33(3.3V output)	3.3V +- 10%
VDDR18(1.8V output)	1.8V +-10%

## 6.3 Power DC Characteristics

Parameter	Pin Number	Symbol	Standard	Operating Voltage			Unit
				Min	Typical	Max	
Digital I/O Power	28	VDD33	3.3V	2	3	4	mA
Core Power	20	VDDR18	1.8V	29	30	31	mA
USB PHY Power	12	AVDD33	3.3V	28	30	34	mA
SATA PHY Driver Power	10	TXDVDD18	1.8V	17	18	21	mA
SATA PHY Analog Power	6	ASVDD18	1.8V	42	40	47	mA
SATA PHY Digital Power	2	SVDD18	1.8V	8	9	9	mA
Total Power				126	130	145	mA

## 7. Package Information

