JM20339
Hi-Speed USB to SATA Bridge

Datasheet

Rev. 2.3

Revision History

Version	Date	Revision Description
2.0	2006/5/3	Initialization of this document for JM20339 version 2. Pin assignment
2.1	2006/07/27	1. Modify for 2 different package. 2. Modify the power pin description. 3. Add the support for SATA pass through function.
2.2	2006/08/30	Add support of new package type
2.3	2006/10/12	1. Separate and remove the pass through description the new package to another SPEC. 2. Modify the resistor for VBUS.

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1. General Description

The JM20339 is single chip solution to bridge between USB host and SATA device. The highly integrated Hi-Speed USB and SATA Phys technology provides a cost-effective solution to apply USB to SATA device enclosure. The USB adheres the Mass Storage Class Bulk-Only Transport Specification. The embedded command parser supports both ATA and ATAPI command set with LBA48 addressing capability.

This chip is designed by 0.18um CMOS technology with 64 LQFP package.

2. Features

- Compliance with Gen1i of Serial ATA II Electrical Specification 1.0
- Support SATA Spread-Spectrum Clock
- Support SATA II Asynchronous Signal Recovery (Hot Plug) feature
- Compliance with USB 2.0 electrical specification
- Support USB High-Speed and Full-Speed Operation
- Compliance with USB Mass Storage Class, Bulk-Only Transport Specification
- Support ATA/ATAPI PACKET command set
- Support ATA/ATAPI LBA48 addressing mode
- Support 12MHz external crystal
- Support external NVRAM for Vender Specific VID/PID of USB Device Controller
- Embedded 3.3V to 1.8V voltage regulator
- Single power 3.3V power supply
- 0.18um CMOS technology
- 64 LQFP package
- Support hardware data protection
- Support interface with fingerprint sensor
- Support on line USB firmware update (e.g. ISP)
- Support USB to SATA Port Multiplier function
- Up to 24 GPIO

3. Main Applications

- Hi-Speed USB to SATA Device

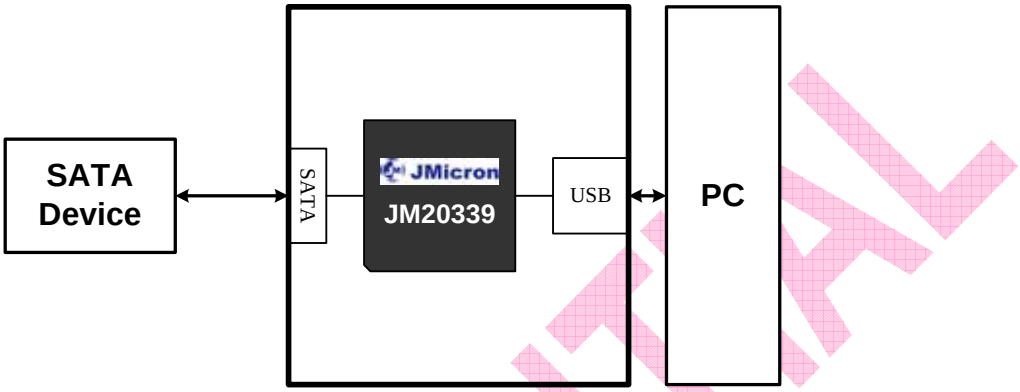


Figure 1 High-Speed USB to SATA Bridge

4. Block Diagram

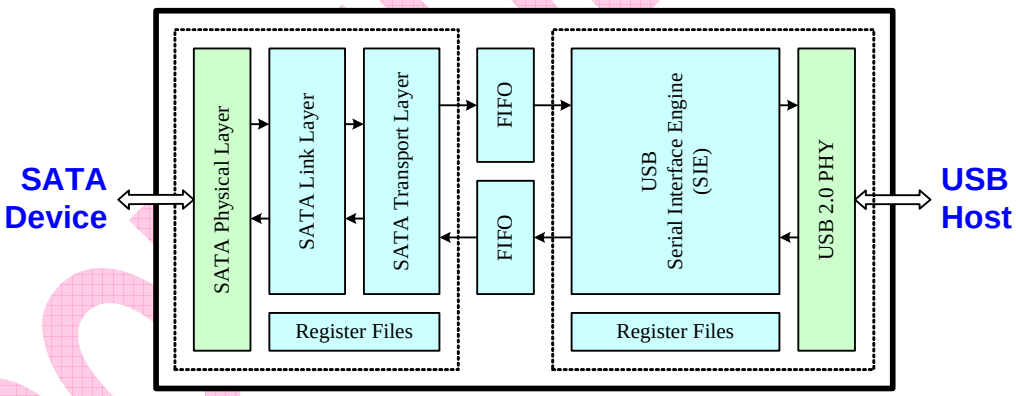


Figure 2 Block Diagram

5. Package and Pin Assignments

5.1 Package Pin Out

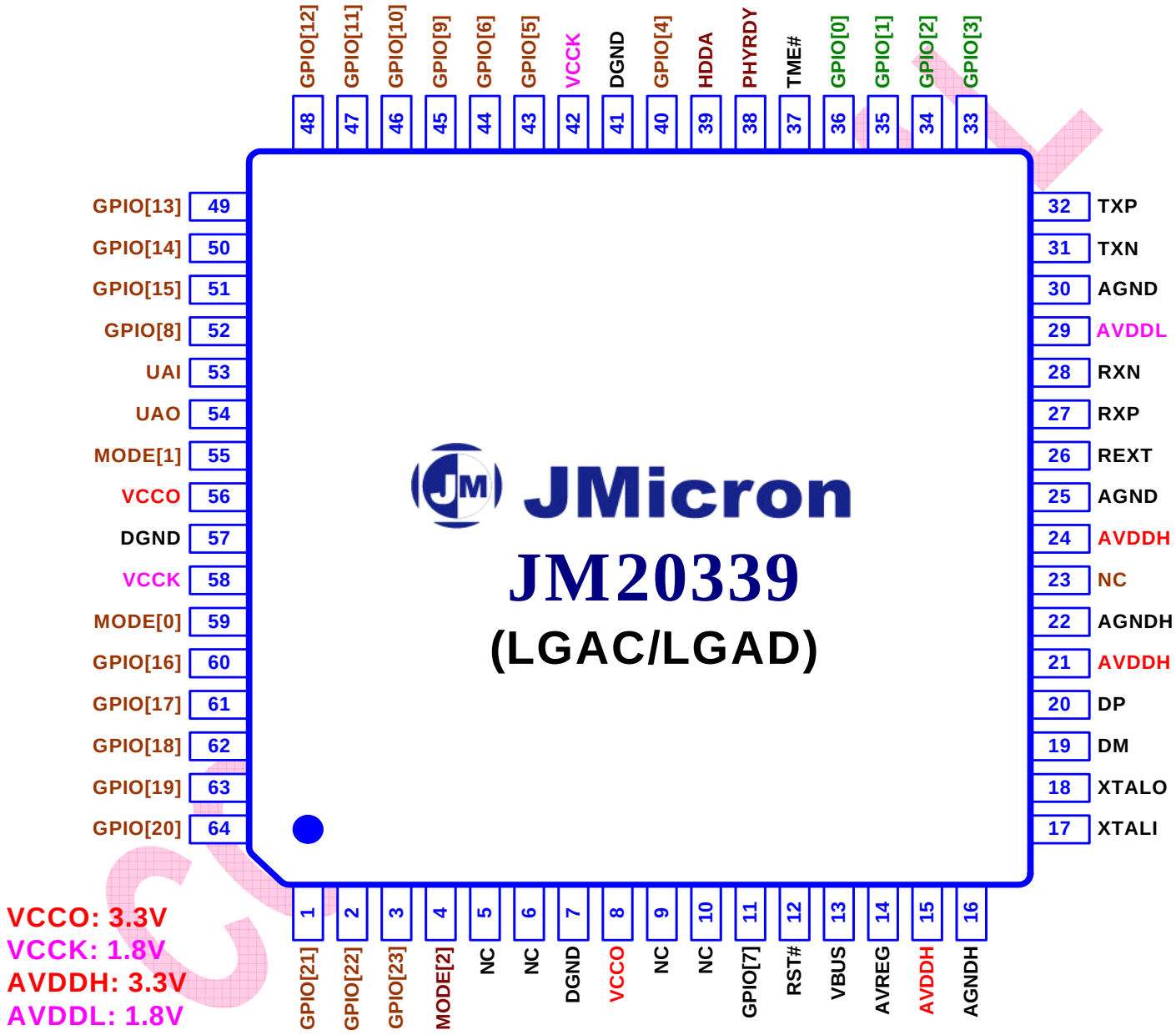
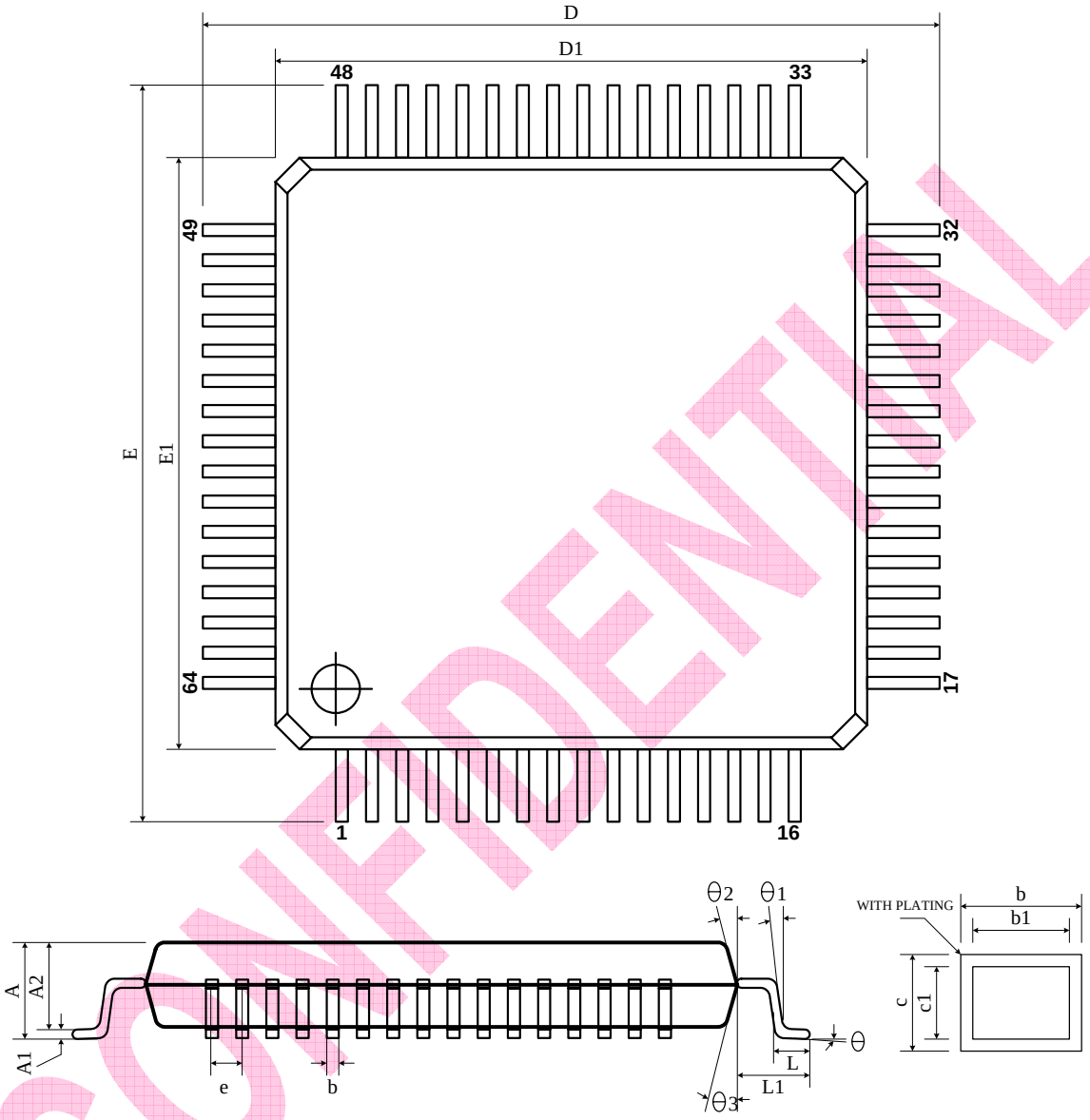


Figure 3 Package Pin Assignment for LGAC/LGAD

5.2 Package Outline



Symbol	Dimension in mm			Dimension in inch			Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max		Min	Nom	Max	Min	Nom	Max
A	---	---	1.60	---	---	0.063	E	12.00 BSC			0.472 BSC		
A1	0.05	---	0.15	0.002	---	0.006	E1	10.00 BSC			0.394 BSC		
A2	1.35	1.40	1.45	0.053	0.055	0.057	e	0.05 BSC			0.020 BSC		
b	0.17	0.22	0.27	0.007	0.009	0.011	L	0.45	0.60	0.75	0.018	0.024	0.030
b1	0.17	0.20	0.23	0.007	0.008	0.009	L1	1.00 REF			0.039 REF		
c	0.09	---	0.20	0.004	---	0.008	Θ	0°	3.5°	7°	0°	3.5°	7°
c1	0.09	---	0.16	0.004	---	0.006	Θ1	0°	---	---	0°	---	---
D	12.00 BSC			0.472 BSC			Θ2	12° TYP			12° TYP		
D1	10.00 BSC			0.394 BSC			Θ3	12° TYP			12° TYP		

6. Pin Descriptions

6.1 Pin Type Definition

Pin Type	Definition
A	Analog
D	Digital
I	Input
O	Output
IO	Bi-directional
L	Internal week pull-low (Typical 31KΩ)
H	Internal week pull-high (Typical 31KΩ)

6.2 Serial ATA Interface

Signal Name	Pin No.	Type	Description
RXP	27	AI	**Serial ATA RX+ signal.** A 10nF CAP should be connected between this pin and SATA connector.
RXN	28	AI	**Serial ATA RX- signal.** A 10nF CAP should be connected between this pin and SATA connector.
TXP	32	AO	**Serial ATA TX+ signal.** A 10nF CAP should be connected between this pin and SATA connector.
TXN	31	AO	**Serial ATA TX- signal.** A 10nF CAP should be connected between this pin and SATA connector.
REXT	26	AI	**External Reference Resistance.** A 12KΩ±1% external resistor should be connected to this pin.
AVDDL	29	AI	**SATA Analog 1.8V Power Supply.** This power could be sourced from internal 1.8V voltage regulator through AVREG pin.
AGND	30	AI	**SATA Analog Ground.**
AVDDH	24	AI	**SATA Analog 3.3V Power Supply.**
AGNDH	25	AI	**SATA Analog Ground.**

6.3 USB Interface

Signal Name	Pin No.	Type	Description
DM	19	AIO	**USB Bus D- Signal.**
DP	20	AIO	**USB Bus D+ Signal.**
VBUS	13	DIL	**USB Cable Power Detector.** The 4.7KΩ and 10KΩ resistances should be connected to divide the 5V cable power into 3.3V.
AVDDH	21	AI	**USB Analog 3.3V Power Supply.**
AGNDH	22	AI	**USB Analog Ground.**

6.4 Crystal Interface

Signal Name	Pin No.	Type	Description

Signal Name	Pin No.	Type	Description
XTALI	17	AI	**Crystal Input/Oscillator Input.** It is connected to a 12MHz crystal or crystal oscillator.
XTALO	18	AO	**Crystal Output.** It is connected to a crystal. While crystal oscillator is applied, this pin should be reserved as No Connection (NC).

6.5 Voltage Regulator

Signal Name	Pin No.	Type	Description
AVREG	14	AO	**Voltage Regulator 1.8V Output.**
AVDDH	15	AI	**Voltage Regulator 3.3V Power Supply.**
AGNDH	16	AI	**Voltage Regulator Ground.**

6.6 Digital Power Supply and System Control Interface

Signal Name	Pin No.	Type	Description
VCCO	8,56	DI	**Digital 3.3V Power Supply.**
VCCK	42,58	DI	**Digital 1.8V Core Power.**
DGND	7,41,57	DI	**Digital Ground.**
RST#	12	DIH	**System Global Reset Input.** Active-low to reset the entire chip. An external 10msec RC should be connected to this pin.
TME#	37	DIH	**Test Mode Enable.** This pin is reserved for IC mass production testing. Keep this pin to logic "1" in normal operation.
HDDA	39	DO	**SATA Device Active**. "1" IDLE "0" Device active.
MODE[2:0]	4,55,59	DIL DIL DIL	**Chip Operation Mode Selection.** 000: Internal Firmware 001: External Firmware, If external Serial Flash is connected to GIP[3:0], and firmware is correctly built in the flash, setting MODE[1:0]=001 will enable JM20339 to run external firmware 1xx: Test mode
GPIO[0]		DIOH	**ATA/ATAPI Power Down Mode Enable/EEPROM 9346 Data Output (DO)/ Serial Flash(SO)/GPIO0** (1) After power on status detecting, this pin becomes Data Output of serial EEPROM 9346/Serial Flash. (2) While EEPROM detection is complete, this pin is default set to input, and could act as GPIO pin by SCSI-2 vender command.
GPIO[1]		DIOH	**EEPROM 9346 Data Input (DI)/Serial Flash(SI)/GPIO1** (1) After power on status detecting, this pin becomes Data Input of serial EEPROM 9346/Serial flash (PM25LV512). (2) While EEPROM detection is complete, this pin is default set to input, and could act as GPIO pin by SCSI-2 vender command.

Signal Name	Pin No.	Type	Description
GPIO[2]		DIOH	**USB Attach Sequence/EEPROM 9346 Serial Clock (SK)/Serial Flash(SCK)/GPIO2** (1) The internal controller will detect the pin status after power on. The functionality of power on initial state determines the USB attach sequence of JM20339 0: Attached USB first. 1: Check SATA device first. (2) This pin is Serial Clock of serial EEPROM 9346/Serial flash (PM25LV512). (3) While EEPROM detection is complete, this pin is default set to input, and could act as GPIO pin by SCSI-2 vender command.
GPIO[3]		DIOH	**EEPROM 9346 Chip Select (CS) /Serial Flash(CE#)/GPIO3** (1) This pin functions as Chip Select of EEPROM 9346/Serial Flash(PM25LV512) in EEPRM detection. (2) While EEPROM detection is complete, this pin is default set to input, and could act as GPIO pin by SCSI-2 vender command. Note that it only supports 9346 with 64x16-bit mode.
GPIO[7]	11	DIO	**GPIO 7: USB Bus State.** This pin will go high while the USB Vbus is applied. It will go low only in (1) Vbus is detached. (2) Vbus is attached and USB is configured and enter suspend state.
GPIO[4]	40	DIO	1. Can be configured by customer firmware. 2. Be set to ADC_DAT when interface with LTT-SS500.
GPIO[5]	43	DIO	1. Can be configured by customer firmware. 2. Be set to ADC_SYN when interface with LTT-SS500.
GPIO[6]	44	DIO	1. Can be configured by customer firmware. 2. Be set to F_SYN when interface with LTT-SS500.
GPIO[8]	52	DIO	1. Can be configured by customer firmware. 2. Be set to P_SYN when interface with LTT-SS500.
GPIO[9]	45	DIO	1. Can be configured by customer firmware. 2. Be set to ADC_CLK when interface with LTT-SS500.
GPIO[10]	46	DIO	1. Can be configured by customer firmware. 2. Be set to RST when interface with LTT-SS500.
GPIO[11]	47	DIO	1. Can be configured by customer firmware. 2. Be set to SCK when interface with LTT-SS500.
GPIO[12]	48	DIO	1. Can be configured by customer firmware. 2. Be set to SDA when interface with LTT-SS500.
GPIO[13]	49	DIO	Can be configured by customer firmware.
GPIO[23:14]	3,2,1,64, 63,62,61 ,60,51, 50	DIO	Can be configured by customer firmware.
UAI	53	DIH	8051 UART interface.
UAO	54	DO	8051 UART interface.
PHYRDY	38	DO	SATA PHY is ready.

7. Electrical Characteristics

7.1 Absolute Maximum Rating

Parameter	Symbol	Condition	Min	Max	Unit
Analog power supply	AVDDH		-0.5	6	V
Digital I/O power supply	DVDD		-0.5	6	V
Digital I/O input voltage	$V_{I(D)}$		-0.4	DVDD+0.4	V
Storage temperature	$T_{STORAGE}$		-55	85	°C

7.2 Recommended Power Supply Operation Conditions

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Operation digital power supply	DVDD					V
Operation analog power supply	AVDDH					V
Ambient operation temperature	T_A					°C
Junction temperature	T_J					°C

7.3 Recommended External Clock Source Conditions

Parameter	Symbol	Condition	Min	Typical	Max	Unit
External reference clock				12		MHz
Clock Duty Cycle			45	50	55	%

7.4 Power Supply DC Characteristics

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Digital I/O power supply	I_{DVDD}	3.3v		1		mA
Internal digital Power Supply	I_{DDH_VR}	1.8v		47		mA
USB Analog Power Supply	I_{AVDDH_USB}	3.3v		27		mA
SATA Analog Power Supply	I_{AVDDH_SATA}	3.3v		36		mA
SATA Analog Power Supply	I_{AVDDL_SATA}	1.8v		62		mA

8. External Serial EEPROM Configuration

The external EEPROM only support 9346 at 64x16 mode. The vender could store the Vender specific USB Device Descriptor, Manufacture String (Index 0x0A), and Product String (Index 0x0B) according to the below table.

Address	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x00	**USB Device Descriptor**							
	bLength	***bDescriptorType***	***bcdUSB***		***bDeviceClass***	***bDeviceSubClass***	***bDeviceProtocol***	***bMaxPacketSize0***
	12	01	00	02	00	00	00	40
0x08	**USB Device Descriptor**							
	idVender		***idProduct***		***bcdDevice***		***iManufacture***	***iProduct***
	user	user	user	user	user	user	0A	0B
0x10	**USB Device Descriptor**		Reserved	Reserved	**String Descriptor – Index 0x0A**			
	iSerialNumber	***bNumConfig***	-	-	***bLength***	***bDescriptorType***	***bString[0]***	***bString[1]***
	05	01	00	00	user	03	user	00
0x18	**String Descriptor – Index 0x0A**							
	bString[2]	***bString[3]***	***bString[4]***	***bString[5]***	***bString[6]***	***bString[7]***	***bString[8]***	***bString[9]***
	user	00	user	00	user	00	user	00
0x20	**String Descriptor – Index 0x0A**							
	bString[10]	***bString[11]***	***bString[12]***	***bString[13]***	***bString[14]***	***bString[15]***	***bString[16]***	***bString[17]***
	user	00	user	00	user	00	user	00
0x28	**String Descriptor – Index 0x0A**							
	bString[18]	***bString[19]***	***bString[20]***	***bString[21]***	***bString[22]***	***bString[23]***	***bString[24]***	***bString[25]***
	user	00	user	00	user	00	user	00
0x30	**String Descriptor – Index 0x0A**							
	bString[26]	***bString[27]***	***bString[28]***	***bString[29]***	***bString[30]***	***bString[31]***	***bString[32]***	***bString[33]***
	user	00	user	00	user	00	user	00
0x38	**String Descriptor – Index 0x0A**							
	bString[34]	***bString[35]***	***bString[36]***	***bString[37]***	***bString[38]***	***bString[39]***	***bString[40]***	***bString[41]***
	user	00	user	00	user	00	user	00
0x40	**String Descriptor – Index 0x0B**							
	bLength	***bDescriptorType***	***bString[0]***	***bString[1]***	***bString[2]***	***bString[3]***	***bString[4]***	***bString[5]***
	user	03	user	00	user	00	user	00
0x48	**String Descriptor – Index 0x0B**							
	bString[6]	***bString[7]***	***bString[8]***	***bString[9]***	***bString[10]***	***bString[11]***	***bString[12]***	***bString[13]***
	user	00	user	00	user	00	user	00
0x50	**String Descriptor – Index 0x0B**							
	bString[14]	***bString[15]***	***bString[16]***	***bString[17]***	***bString[18]***	***bString[19]***	***bString[20]***	***bString[21]***
	user	00	user	00	user	00	user	00
0x58	**String Descriptor – Index 0x0B**							
	bString[22]	***bString[23]***	***bString[24]***	***bString[25]***	***bString[26]***	***bString[27]***	***bString[28]***	***bString[29]***
	user	00	user	00	user	00	user	00
0x60	**String Descriptor – Index 0x0B**							
	bString[30]	***bString[31]***	***bString[32]***	***bString[33]***	***bString[34]***	***bString[35]***	***bString[36]***	***bString[37]***
	user	00	user	00	user	00	user	00
0x68	**String Descriptor – Index 0x0B**				Reserved	Reserved	Reserved	Reserved
	bString[38]	***bString[39]***	***bString[40]***	***bString[41]***	-	-	-	-
	user	00	user	00	00	00	00	00
0x70	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
	-	-	-	-	-	-	-	-
	00	00	00	00	00	00	00	00
0x78	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	**EEPROM Identifier**	
	-	-	-	-	-	-	-	-
	00	00	00	00	00	00	'J'	'M'