

MA112

Data Sheet

Version: 0.32

Features

- USB to Interface
 - Standard USB Virtual COM Port device
 - USB Full speed (12Mbps) operation and USB specification 2.0 compliant
 - Built-in USB transceiver and 3.3V regulator
 - Integrated clock recovery, no external crystal required
 - USB suspend states reported via UPD/nUPD pins
 - Windows standard driver
 - * Support Windows 7, Windows 8.1, Windows 10
- UART Interface
 - 8-bit data format
 - Parity: odd, even, mark, space and no parity
 - Stop bits: 1 and 2
 - Baud Rate: 110, 300, 600, 1200, 2400, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 115200 and 230400
 - Line Break detection and transmission
 - Support multi-processor communication
- Operating voltage range: 4.2V – 5.5V or 3.0V – 3.6V
- Operating Temperature:
 - Industrial (-40°C to +85°C)*
- Package Types:
 - SOP16: MA112AS16
 - QFN16 (4x4): MA112AY16

*: Tested by sampling.

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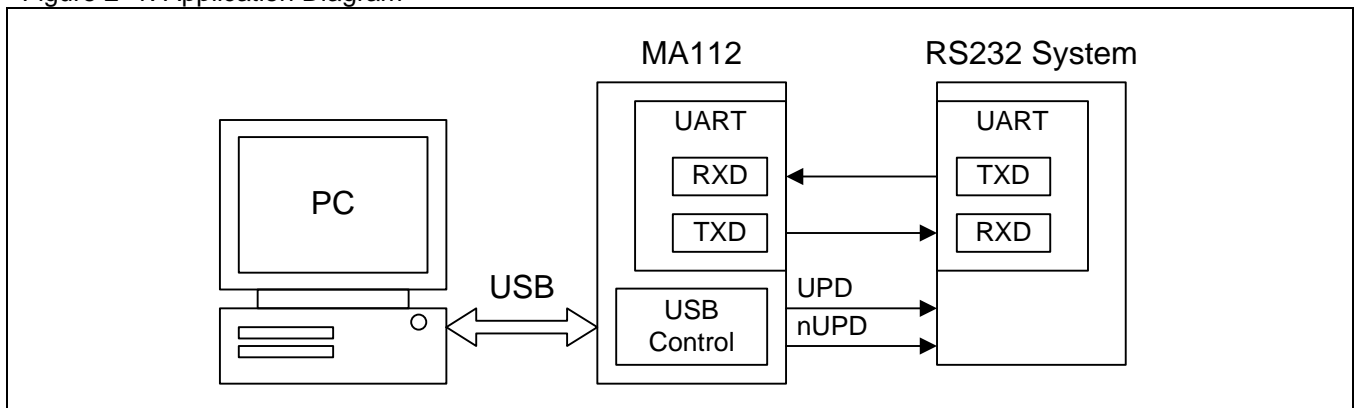
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1. General Description

The MA112 is a USB to UART Data Bridge controller. It includes a USB 2.0 full-speed function controller, USB transceiver and 5V to 3.3V regulator. The UART function only supports the TXD and RXD on RS-232 connection.

2. Application Diagram

Figure 2–1. Application Diagram



3. Pin Configurations

3.1. Package Instruction

Figure 3–1. MA112 SOP16 Top View

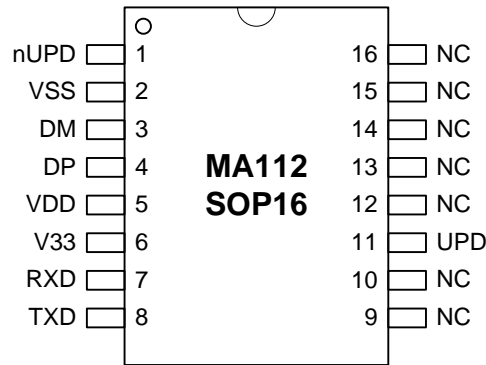
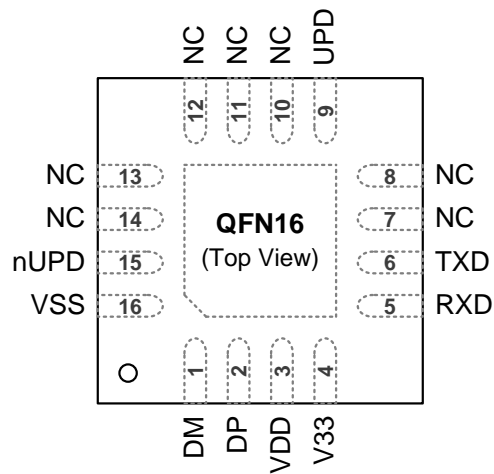


Figure 3–2. MA112 QFN16 (4x4) Top View



3.2. Pin Description

Table 3–1. Pin Description

MNEMONIC	PIN NUMBER		I/O TYPE	DESCRIPTION	I/O Configuration
	16-Pin SOP	16-Pin QFN			
RXD	7	5	I	* RXD: UART receive data output.	The IO configuration is same as Megawin MCU input pin with on-chip pull-up resistor.
TXD	8	6	O	* TXD: UART transmit data output.	The IO configuration is same as Megawin MCU quasi-bidirectional output with on-chip pull-up resistor.
UPD	11	9	O	* UPD. USB bus power down (suspend) indicator, High active output.	The IO configuration is same as Megawin MCU quasi-bidirectional output with on-chip pull-up resistor.
nUPD	1	15	O	* nUPD. USB bus power down (suspend) indicator, Low active output.	The IO configuration is same as Megawin MCU quasi-bidirectional output with on-chip pull-up resistor.
NC	9, 10, 12, 13, 14, 15, 16	7, 8, 10, 11, 12, 13, 14	--	* NC : No Connection.	
DP	4	2	I/O	* DP: USB DP(D+) pin.	
DM	3	1	I/O	* DM: USB DM(D-) pin.	
VDD	5	3	P	Power supply input.	
VSS	2	16	G	Ground, 0 V reference.	
V33	6	4	P	On-chip 3.3V regulator output.	

4. MA112 USB Function

The USB function controller in the MA112 is a USB 2.0 compliant full-speed device that integrates transceiver and 5V to 3.3V regulator. The USB function controller manages all data transfer between the USB and UART data transmitting and data receiving.

The MA112 can report the USB power down (suspend) event on UPD pin and nUPD pin to indicate the USB host status. UPD is high active output and nUPD is low active output. If MA112 in power-on reset state, these two outputs are floating.

5. MA112 UART Function

The UART function in MA112 only supports the TXD and RXD for USB to UART data transfer. It provide the parity options on: none, even, odd, mark and space. It provides the baud rate selections as 110, 300, 600, 1200, 2400, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 115200 and 230400. It also provide the break output and break detection.

[Table 5–1](#) lists the UART data format and baud rates available in MA112.

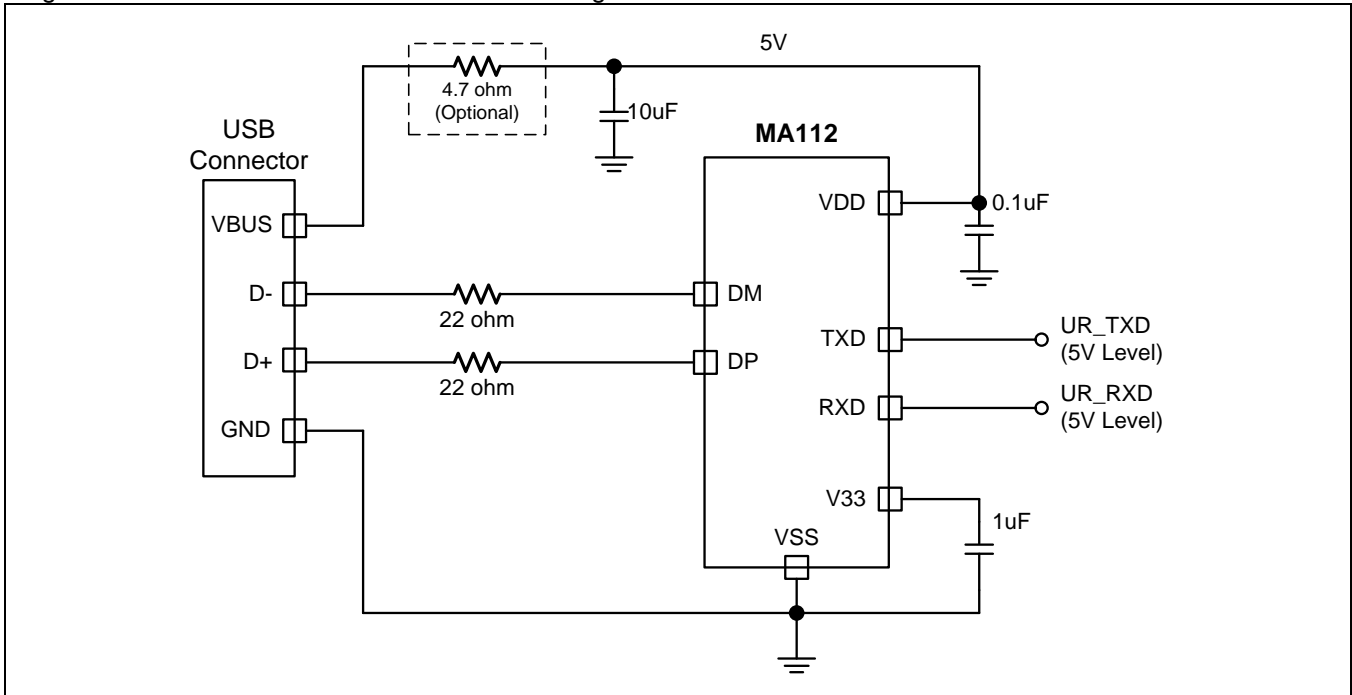
Table 5–1. Data Formats and Buad Rates

Pin Name	Default Configuration
Data Bits	8
Stop Bits	1 and 2
Parity Type	None, Even, Odd, Mark and Space
Baud Rates	110 bps to 230400 bps

6. Application Notes

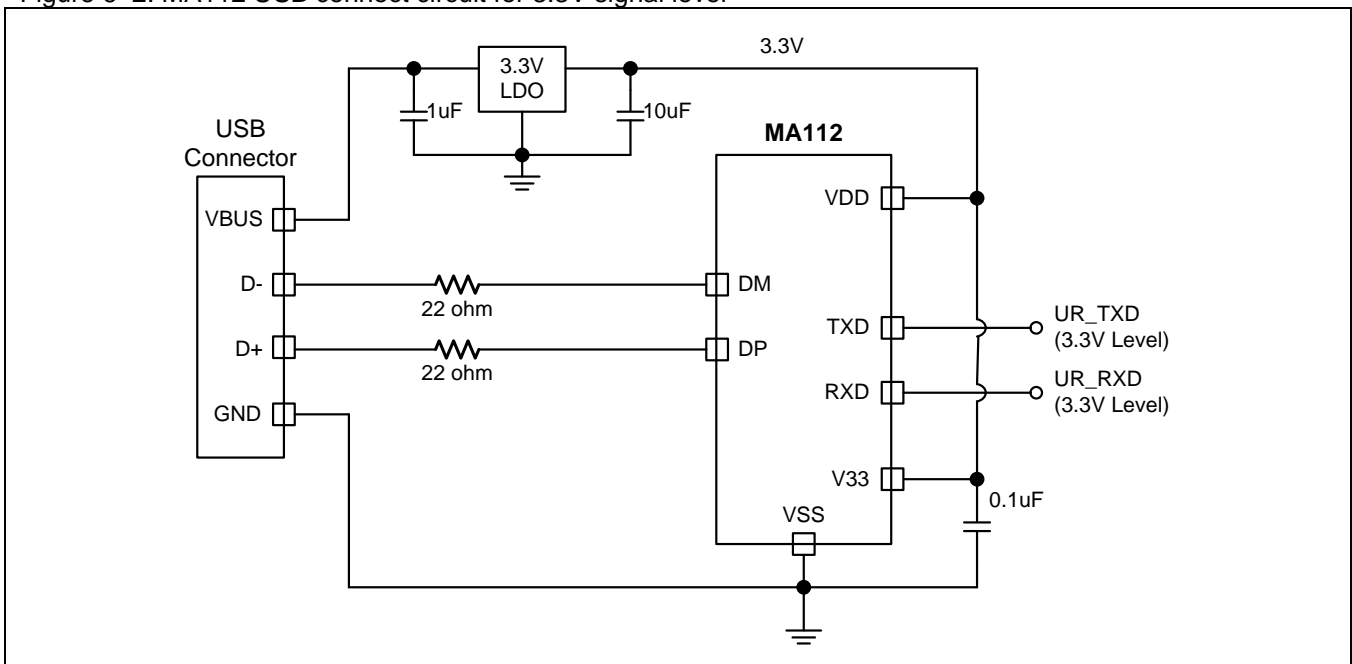
6.1. MA112 Connect for 5V Signal Level

Figure 6–1. MA112 USB connect circuit for 5V signal level



6.2. MA112 Connect for 3.3V Signal Level

Figure 6–2. MA112 USB connect circuit for 3.3V signal level



7. Electrical Characteristics

7.1. Absolute Maximum Rating

Parameter	Rating	Unit
Ambient temperature under bias	-40 ~ +85	°C
Storage temperature	-65 ~ + 150	°C
Voltage on any Port I/O Pin or RST with respect to VSS	-0.5 ~ VDD + 0.5	V
Voltage on VDD with respect to VSS	-0.5 ~ +6.0	V
Maximum total current through VDD and VSS	100	mA
Maximum output current sunk by any Port pin	40	mA

*Note: stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the devices at those or any other conditions above those indicated in the operation listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

7.2. DC Characteristics

VDD = 5.0V±10%, VSS = 0V, T_A = 25°C, unless otherwise specified

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
Input/Output Characteristics						
V _{IH}	Input High voltage	@RXD pin	0.6			VDD
V _{IL}	Input Low voltage	@RXD pin			0.15	VDD
I _{IH}	Logic 1 input current	V _{PIN} = VDD @RXD		0	10	µA
I _{IL}	Logic 0 input current	V _{PIN} = 0.4V @RXD		20	50	µA
I _{H2L}	Logic 1 to 0 transition current	V _{PIN} = V _{H2L} @RXD		330	500	µA
I _{OH}	Output High current	V _{PIN} = 2.4V @TXD, UPD, nUPD	0.1			mA
I _{OL}	Output Low current	V _{PIN} = 0.4V @TXD, UPD, nUPD	12			mA
Power Consumption						
I _{OP1}	Normal mode operating current	No load on all IO pins		4.5		mA
I _{PD1}	Power down mode current	USB Connected		256	500	µA
Operating Condition						
V _{PSR}	Power-on Slop Rate	T _A = -40°C to +85°C	0.05			V/ms
V _{POR}	Power-on Reset Valid Voltage	T _A = -40°C to +85°C			0.1	V

⁽¹⁾ Data based on characterization results, not tested in production.

7.3. USB Transceiver Electrical Characteristics

VDD = 4.0V ~ 5.5V, VSS = 0V, T_A = 25°C, unless otherwise specified

Symbol	Parameter	Test Condition	Limits			Unit
			min	typ	max	
V _{V33}	3.3V regulator output voltage	T _A = 25°C	3.0	3.3	3.6	V
I _{V33}	Regulator Output drive current	T _A = 25°C			35	mA
R _{PU}	Pull-Up Resistance	On DP	0.95	1.1	1.3	Kohm
R _{PD}	Pull-Down Resistance	On DP & DM		500		Kohm
R _{PU2}	Pull-Up Resistance for PS/2 mode	On DP & DM		7		Kohm
Transmitter						
V _{OH}	Output High Voltage		2.8			V
V _{OL}	Output Low Voltage				0.8	V
V _{CRS}	Output Cross Over point		1.3		2.0	V
Z _{DRVH}	Output Impedance on Driving High		28		44	Ohm
Z _{DRVL}	Output Impedance on Driving Low		28		44	Ohm
T _R	Output Rise Time		4		20	ns
T _F	Output Fall Time		4		20	ns
Receiver						
V _{DI}	Differential Input Sensitivity	DP – DM	0.2			V
V _{CM}	Differential Input Common Mode Range		0.8		2.5	V
I _L	Input Leakage current	Pull-up Disabled		<1.0		µA

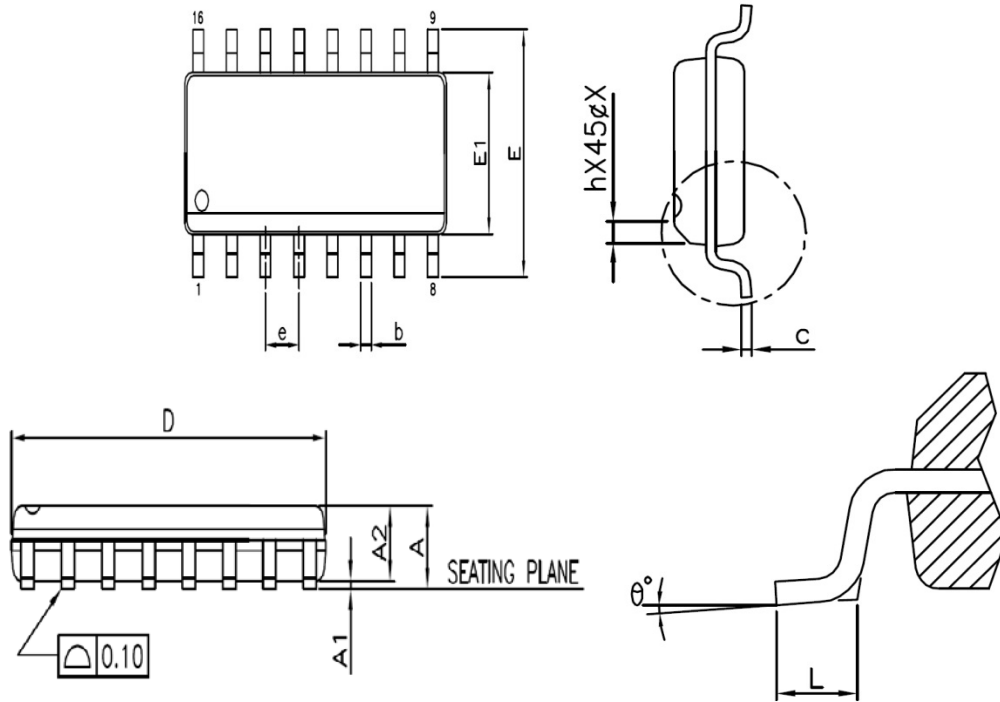
⁽¹⁾ Data based on characterization results, not tested in production.

8. Package Dimension

8.1. SOP-16

Figure 8-1. SOP-16

SOP16P (150 mil) package dimension

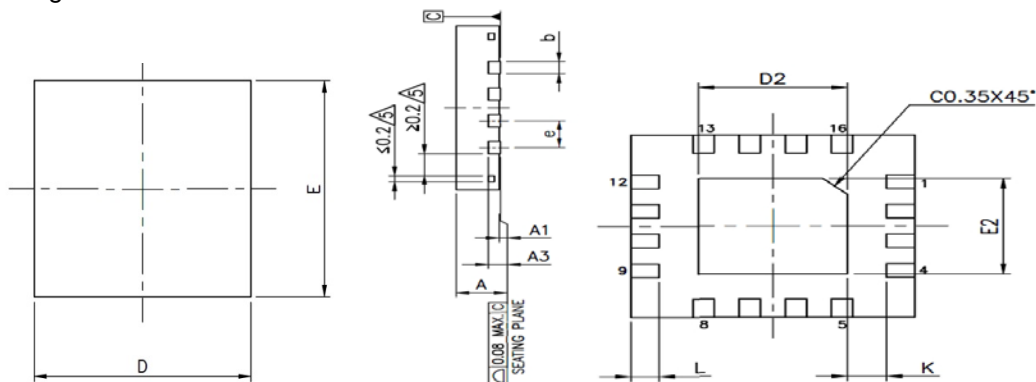


Dimensions in mm		
Symbols	Min.	Max.
A	----	1.75
A1	0.10	0.25
A2	1.25	----
b	0.31	0.51
c	0.10	0.25
D	9.90 BSC	
E	6.00 BSC	
E1	3.90 BSC	
e	1.27 BSC	
L	0.40	1.27
h	0.25	0.50
e	0	8

8.2. QFN-16 (4x4)

Figure 8–2. QFN-16 (4x4)

QFN 16P(4x4) package dimension



Dimensions in mm						
JEDEC	MO-220			MO-220		
PKG	WQFN(X416)			VQFN(Y416)		
Symbols	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.70	0.75	0.80	0.80	0.85	0.90
A1	0.00	0.02	0.05	0.00	0.02	0.05
A3	0.20 REF.			0.20 REF.		
b	0.25	0.30	0.35	0.25	0.30	0.35
D	4.00 BSC			4.00 BSC		
E	4.00 BSC			4.00 BSC		
e	0.65 BSC			0.65 BSC		
K	0.20	---	----	0.20	----	---

PAD SIZE	E2			D2			L			LEAD FINISH		JEDEC CIDE
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Pure	PPF	
98x98MIL	2.00	2.10	2.15	2.00	2.10	2.15	0.35	0.40	0.45	V	X	W(V)GGC
102x102MIL	2.00	2.10	2.15	2.00	2.10	2.15	0.50	0.55	0.60	V	X	W(V)GGC

9. Revision History

Table 9–1. Revision History

Rev	Descriptions	Date
v0.30	Initial version release.	2017/12/28
	-----	-----
v0.31	1. Add QFN16 pin definition and package dimension.	2018/05/15
	-----	-----
v0.32	1. Update Baud Rate list.	2018/08/20
	2. Update Figure 2-1.	2018/08/20

10. Disclaimers

Herein, Megawin stands for "*Megawin Technology Co., Ltd.*"

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Right to Make Changes — Megawin reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in mass production, relevant changes will be communicated via an Engineering Change Notification (ECN).