Version: 1.02

Megawin

USB HID Terminal

Datasheet

USB Vendor ID : 0x0E6A
USB Product ID : 0x0109 (Low Power)
USB Product ID : 0x010F (High Power)

Table of Contents

List of Tables

List of Figures

1 Description

The MA104 is a USB 2.0 low-speed bridge to UART. MA104 follows USB HID protocol, which is driver free and compatible with Windows XP, Vista and Windows 7. MA104 supports keyboard, mouse, consumer, joystick and user defined data in only one device. Moreover, MA104 can transfer data between backend device by UART RX/TX, and transfer data to PC by USB.

2 Features

- USB 2.0 low speed device.
  - Human Interface Device
    - ✧ Keyboard
    - ✧ Generic Desktop Controls
    - ✧ Consumer
    - ✧ Mouse (X, Y, Z, 8 Buttons)
    - ✧ Joystick (X, Y, Z, Rz, Hat Switch, 12 Buttons)
    - ✧ User defined data
  - Supports USB suspend/resume and remote wake-up event.
  - Support USB Low-Power Mode (100mA from USB VBUS)
  - Support USB High-Power Mode (500mA from USB VBUS)
- Support UART TX/RX with baud rate 19200, only support 8N1 format.
- Built-in 5V to 3.3V regulator for USB interface.
- Built-in 6MHz±1.5% oscillator with temperature 0℃ ~ 70℃.
- Operating condition:
  - Operating voltage: 4.0V ~ 5.5V with USB on-line application
  - Operating speed range: DC to 6MHz @VDD>2.7V
  - Operating ambient temperature: 0℃ ~ 70℃ for internal oscillator mode
- Support Windows XP / Vista / Windows 7
- Package:
  - SSOP16 : MA104AL16

3 Block Diagram

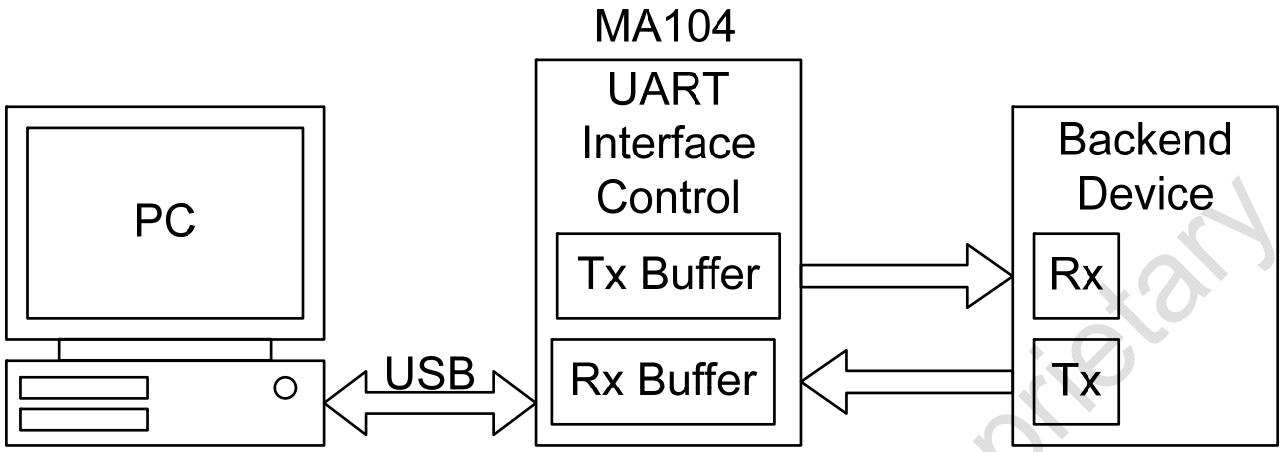

Figure 3-1 System Block Diagram

4 Application Circuit

4.1 Bus Power

4.1.1 Low Power Mode (Max Power 100mA from VBUS)

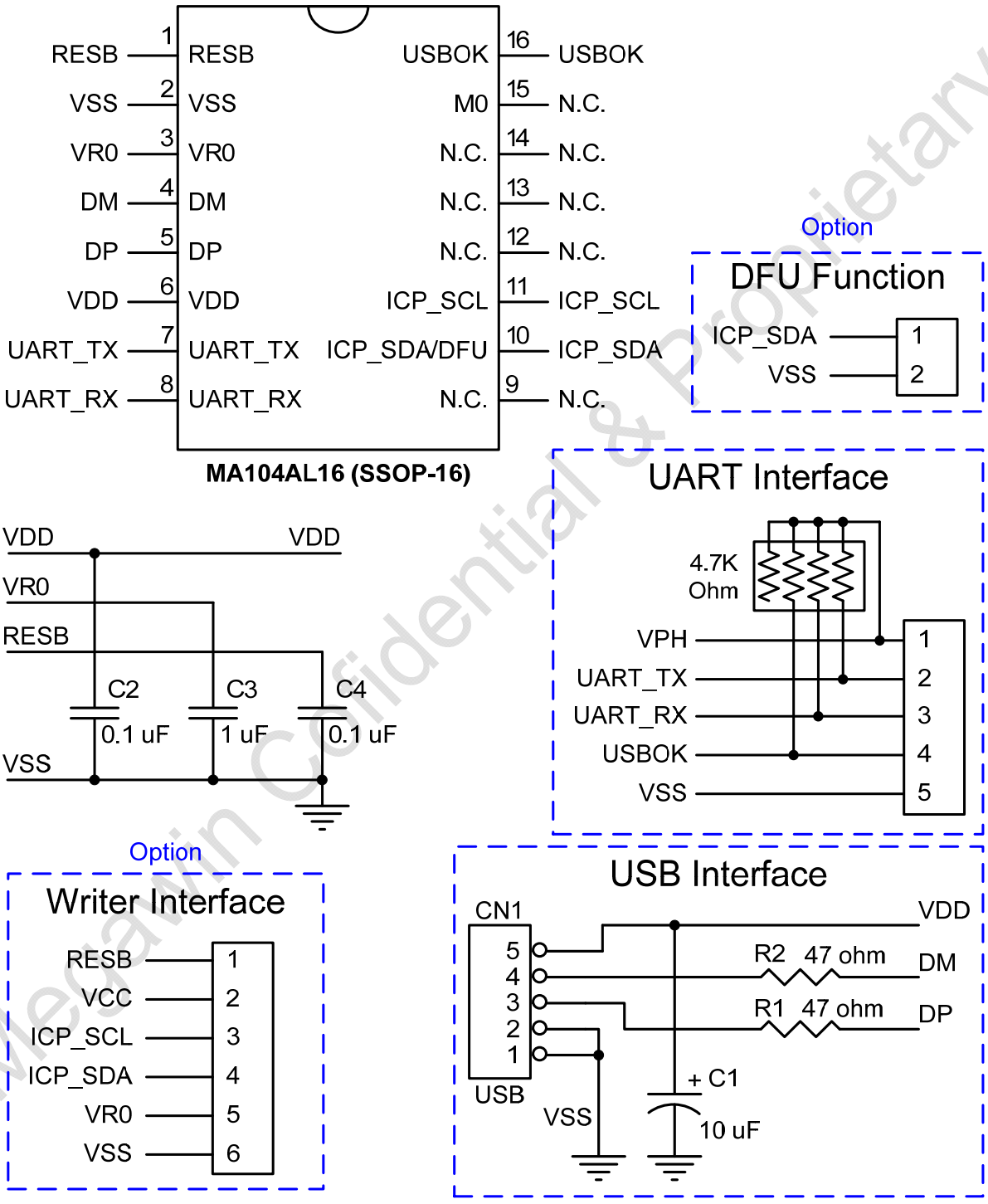

Figure 4-1 USB Low Power Application Circuit

VPH: Backend Device inputs voltage which can only be adapted to UART TX/RX Pull High resistor.

4.1.2 High Power Mode (Max Power 500mA from VBUS)

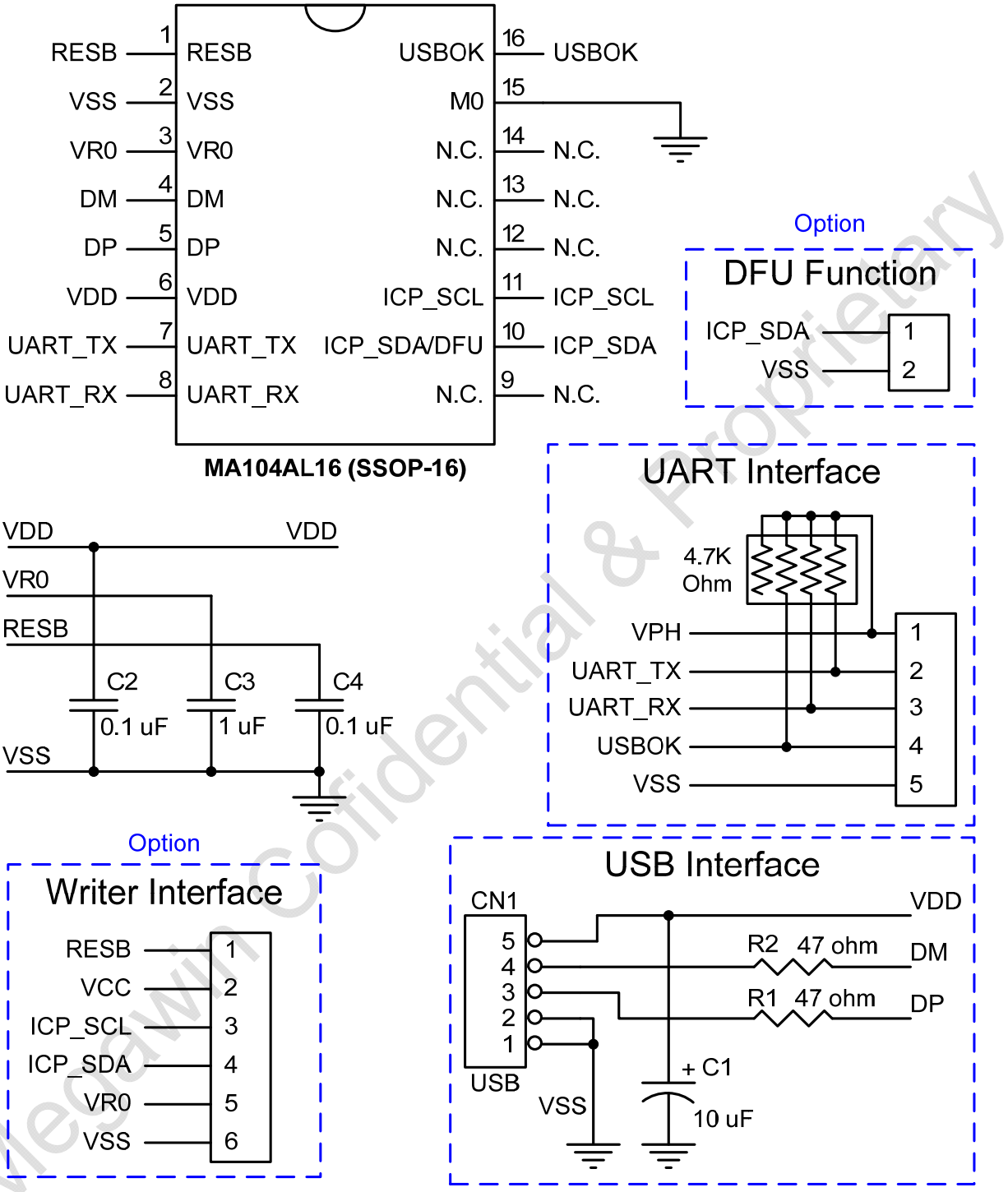

Figure 4-2 USB High Power Application Circuit

VPH: Backend Device inputs voltage which can only be adapted to UART TX/RX Pull High resistor.

4.2 Self Power

1. Use Power-MOS to cut MA104 VDD input.
2. Drive low on UART TX/RX/USBOK pad.

5 Pin Configurations

5.1 Pin-out for SSOP16-pin Package

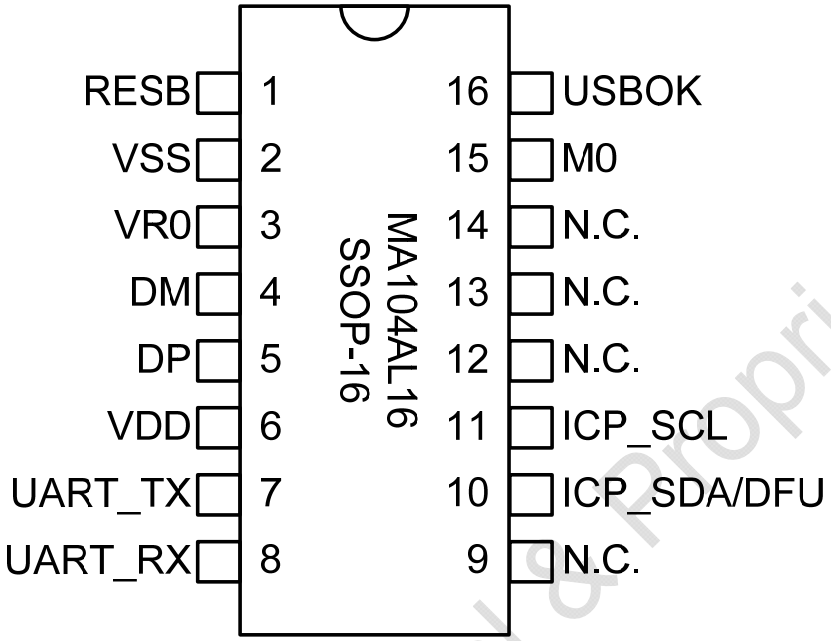

Figure 5-1 SSOP16 Package Pin out

Please visit MEGAWIN website to download package dimension.
http://www.megawin.com.tw/Ref.asp?BigClassName=Package%20Dimension

5.2 Pin Description

Table 5-1 Pin Description

Pad	Name	Type	Description
1	RESB	I	Reset pin, low action, have internal weak pull high resistor.
2	VSS	G	Ground for others
3	VR0	P	Built-in 5V to 3.3V regulator capacitor pin. (Capacitor 1uF needed)
4	DM	B	USB DM I/O, USB LS transceiver.
5	DP	B	USB DP I/O, USB LS transceiver.
6	VDD	P	5V Power
7	UART_TX	O	UART TX function with baud rate 19200.
8	UART_RX	I	UART RX function with baud rate 19200.
9	N.C.	O	Reserve and output low.
10	ICP_SDA	O	Reserve and output low, combine with writer interface and DFU pin option.
11	ICP_SCL	O	Reserve and output low, combine with writer interface.
12	N.C.	O	Reserve and output low.
13	N.C.	O	Reserve and output low.
14	N.C.	O	Reserve and output low.
15	M0	I	Pin option for USB Low-Power and High-Power.
16	USBOK	O	Indicate MA104 is ready to receive UART RX data. Low active.

Note: In the “Type” field,
“I” means input only.
“O” means output only.
“B” means bi-direction.
“P” means Power, G means Ground.

6 UART Function

6.1 UART RX Protocol Format

MA104 only supports UART baud rate 19200 8N1 format. 1 bit time of start bit, 8 bits data and 1 bit time of stop bit. MA104 does not support odd or even parity check.

6.2 UART Packet Data Format

M104 supports keyboard, mouse, consumer device, and generic desktop controls HID command. The Table 6-1 lists all type of data format for each function.

Table 6-1 Data Format Summary

Header : 1 Byte	Packet Type : 1 Byte	Payload	Checksum
0x02	0x01 : Keyboard / Key Pad	7 Bytes	1 Byte
0x02	0x02 : Generic Desktop Controls	1 Byte	1 Byte
0x02	0x03 : Consumer	2 Bytes	1 Byte
0x02	0x04 : Mouse	6 Bytes	1 Byte
0x02	0x05 : Free Data Transfer	7 Bytes	1 Byte
0x02	0x06 : Joystick	6 Bytes	1 Byte

Payload format for each packet type is described in the following section (6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5 and 6.2.6).

Checksum is calculated by XOR-ing packet type and payload. Checksum error will ignore all data in this transfer.

Each data transfer of MA104 must be completed in 8ms. If not, MA104 will clear all data received and wait for next transfer.

6.2.1 Keyboard data format

The 7-byte payload for keyboard data is illustrated as Table 6-2.

Table 6-2 Keyboard 7 Bytes Data Payload Format

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Modifier Key	Keyboard Code	Keyboard Code	Keyboard Code	Keyboard Code	Keyboard Code	Keyboard Code

There is 1 byte of modifier payload which is shown as Table 6-3.

Table 6-3 Modifier Key Data Format

Key function	**Bit**	**Format**	
Left Ctrl	0	1 : Press	0 : Release
Left Shift	1	1 : Press	0 : Release
Left Alt	2	1 : Press	0 : Release
Left GUI	3	1 : Press	0 : Release
Right Ctrl	4	1 : Press	0 : Release
Right Shift	5	1 : Press	0 : Release
Right Alt	6	1 : Press	0 : Release
Right GUI	7	1 : Press	0 : Release

There are 6 bytes of payload. Press key codes are tabled as Table 6-4 and Table 6-5, while release key code is set to be “0x00.” Maximum 6 keys can be sent at one time.

Table 6-4 Keyboard Code

Function	Esc		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Code(Hex)	29		3A	3B	3C	3D	3E	3F	40	41	42	43	44	45
Function	`~	1!	2@	3#	4$	5%	6^	7&	8*	9(	0)	-_	+=	Back←
Code(Hex)	35	1E	1F	20	21	22	23	24	25	26	27	2D	2E	2A
Function	TAB	Q	W	E	R	T	Y	U	I	O	P	{[	}]	|
Code(Hex)	2B	14	1A	08	15	17	1C	18	0C	12	13	2F	30	31
Function	Caps		A	S	D	F	G	H	J	K	L	:;	"	Enter
Code(Hex)	39		04	16	07	09	0A	0B	0D	0E	0F	33	34	28
Function			Z	X	C	V	B	N	M	,<	.>		/?	
Code(Hex)			1D	1B	06	19	05	11	10	36	37		38	
Function							Space						App	
Code(Hex)							2C						65	

Table 6-5 Keyboard Code(Continue)

Function	Print	Scroll	Pause	Num	/	*	-
Code(Hex)	46	47	48	53	54	55	56
Function	Insert	Home	PageUp	7 Home	8 ↑	9 PgUp	+
Code(Hex)	49	4A	4B	5F	60	61	57
Function	Delete	End	PageDn	4 ←	5	6 →	
Code(Hex)	4C	4D	4E	5C	5D	5E	
Function		↑		1 End	2 ↓	3 PgDn	nEnter
Code(Hex)		52		59	5A	5B	58
Function	←	↓	→	0 Ins		. Del	
Code(Hex)	50	51	4F	62		63	

6.2.2 Generic Desktop Controls data format

There is only 1 byte of data. Press key codes are listed as Table 6-6 and release key code is fixed to be “0x00.”

Table 6-6 Generic Desktop Controls Codes

Usage ID	Usage Name	Usage ID	Usage Name
0x00	Undefined	0x82	System Sleep
0x01	Pointer	0x83	System Wake Up
0x02	Mouse	0x84	System Context Menu
0x03	Reserved	0x85	System Main Menu
0x04	Joystick	0x86	System App Menu
0x05	Game Pad	0x87	System Menu Help
0x06	Keyboard	0x88	System Menu Exit
0x07	Keypad	0x89	System Menu Select
0x08	Multi-axis Controller	0x8A	System Menu Right
0x09	Tablet PC System Controls	0x8B	System Menu Left
0x0A~0x2F	Reserved	0x8C	System Menu Up
0x30	X	0x8D	System Menu Down
0x31	Y	0x8E	System Cold Restart
0x32	Z	0x8F	System Warm Restart
0x33	Rx	0x90	D-pad Up
0x34	Ry	0x91	D-pad Down
0x35	Rz	0x92	D-pad Right
0x36	Slider	0x93	D-pad Left
0x37	Dial	0x94~0x9F	Reserved
0x38	Wheel	0xA0	System Dock
0x39	Hat switch	0xA1	System Undock
0x3A	Counted Buffer	0xA2	System Setup
0x3B	Byte Count	0xA3	System Break
0x3C	Motion Wakeup	0xA4	System Debugger Break
0x3D	Start	0xA5	Application Break
0x3E	Select	0xA6	Application Debugger Break
0x3F	Reserved	0xA7	System Speaker Mute
0x40	Vx	0xA8	System Hibernate
0x41	Vy	0xA9~0xAF	Reserved
0x42	Vz	0xB0	System Display Invert
0x43	Vbrx	0xB1	System Display Internal
0x44	Vbry	0xB2	System Display External
0x45	Vbrz	0xB3	System Display Both
0x46	Vno	0xB4	System Display Dual
0x47	Feature Notification	0xB5	System Display Toggle Int/Ext
0x48	Resolution Multiplier	0xB6	System Display Swap Primary/Secondary
0x49~0x7F	Reserved	0xB7	System Display LCD Autoscale
0x80	System Control	0xB8~0xFF	Reserved
0x81	System Power Down		

6.2.3 Consumer code data format

There are 2 bytes of data. Press key codes are listed in Table 6-7, Table 6-8, Table 6-9, Table 6-10 and Table 6-11. Release key code is “0x0000.”

Table 6-7 Consumer Codes : 0x0000 ~ 0x00C3

Usage ID	Usage Name	Usage ID	Usage Name
0x0000	Unassigned	0x008A	Media Select WWW
0x0001	Consumer Control	0x008B	Media Select DVD
0x0002	Numeric Key Pad	0x008C	Media Select Telephone
0x0003	Programmable Buttons	0x008D	Media Select Program Guide
0x0004	Microphone	0x008E	Media Select Video Phone
0x0005	Headphone	0x008F	Media Select Games
0x0006	Graphic Equalizer	0x0090	Media Select Messages
0x0007~0x001F	Reserved	0x0091	Media Select CD
0x0020	+10	0x0092	Media Select VCR
0x0021	+100	0x0093	Media Select Tuner
0x0022	AM/PM	0x0094	Quit
0x0023~0x003F	Reserved	0x0095	Help
0x0030	Power	0x0096	Media Select Tape
0x0031	Reset	0x0097	Media Select Cable
0x0032	Sleep	0x0098	Media Select Satellite
0x0033	Sleep After	0x0099	Media Select Security
0x0034	Sleep Mode	0x009A	Media Select Home
0x0035	Illumination	0x009B	Media Select Call
0x0036	Function Buttons	0x009C	Channel Increment
0x0037~0x003F	Reserved	0x009D	Channel Decrement
0x0040	Menu	0x009E	Media Select SAP
0x0041	Menu Pick	0x009F	Reserved
0x0042	Menu Up	0x00A0	VCR Plus
0x0043	Menu Down	0x00A1	Once
0x0044	Menu Left	0x00A2	Daily
0x0045	Menu Right	0x00A3	Weekly
0x0046	Menu Escape	0x00A4	Monthly
0x0047	Menu Value Increase	0x00A5~0x00AF	Reserved
0x0048	Menu Value Decrease	0x00B0	Play
0x0049~0x005F	Reserved	0x00B1	Pause
0x0060	Data On Screen	0x00B2	Record
0x0061	Closed Caption	0x00B3	Fast Forward
0x0062	Closed Caption Select	0x00B4	Rewind
0x0063	VCR/TV	0x00B5	Scan Next Track
0x0064	Broadcast Mode	0x00B6	Scan Previous Track
0x0065	Snapshot	0x00B7	Stop
0x0066	Still	0x00B8	Eject
0x0067~0x007F	Reserved	0x00B9	Random Play
0x0080	Selection	0x00BA	Select Disc
0x0081	Assign Selection	0x00BB	Enter Disc
0x0082	Mode Step	0x00BC	Repeat
0x0083	Recall Last	0x00BD	Tracking
0x0084	Enter Channel	0x00BE	Track Normal
0x0085	Order Movie	0x00BF	Slow Tracking
0x0086	Channel	0x00C0	Frame Forward
0x0087	Media Selection	0x00C1	Frame Back
0x0088	Media Select Computer	0x00C2	Mark
0x0089	Media Select TV	0x00C3	Clear Mark

Table 6-8 Consumer Codes : 0x00C4 ~ 0x01A4

Usage ID	Usage Name	Usage ID	Usage Name
0x00C4	Repeat From Mark	0x0161	Channel Left
0x00C5	Return To Mark	0x0162	Channel Right
0x00C6	Search Mark Forward	0x0163	Channel Center
0x00C7	Search Mark Backwards	0x0164	Channel Front
0x00C8	Counter Reset	0x0165	Channel Center Front
0x00C9	Show Counter	0x0166	Channel Side
0x00CA	Tracking Increment	0x0167	Channel Surround
0x00CB	Tracking Decrement	0x0168	Channel Low Frequency Enhancement
0x00CC	Stop/Eject	0x0169	Channel Top
0x00CD	Play/Pause	0x016A	Channel Unknown
0x00CE	Play/Skip	0x016B~0x016F	Reserved
0x00CF~0x00DF	Reserved	0x0170	Sub-channel
0x00E0	Volume	0x0171	Sub-channel Increment
0x00E1	Balance	0x0172	Sub-channel Decrement
0x00E2	Mute	0x0173	Alternate Audio Increment
0x00E3	Bass	0x0174	Alternate Audio Decrement
0x00E4	Treble	0x0175~0x017F	Reserved
0x00E5	Bass Boost	0x0180	Application Launch Buttons
0x00E6	Surround Mode	0x0181	AL Launch Button Configuration Tool
0x00E7	Loudness	0x0182	AL Programmable Button Configuration
0x00E8	MPX	0x0183	AL Consumer Control Configuration
0x00E9	Volume Increment	0x0184	AL Word Processor
0x00EA	Volume Decrement	0x0185	AL Text Editor
0x00EB~0x00EF	Reserved	0x0186	AL Spreadsheet
0x00F0	Speed Select	0x0187	AL Graphics Editor
0x00F1	Playback Speed	0x0188	AL Presentation App
0x00F2	Standard Play	0x0189	AL Database App
0x00F3	Long Play	0x018A	AL Email Reader
0x00F4	Extended Play	0x018B	AL Newsreader
0x00F5	Slow	0x018C	AL Voicemail
0x00F6~0x00FF	Reserved	0x018D	AL Contacts/Address Book
0x0100	Fan Enable	0x018E	AL Calendar/Schedule
0x0101	Fan Speed	0x018F	AL Task/Project Manager
0x0102	Light Enable	0x0190	AL Log/Journal/Timecard
0x0103	Light Illumination Level	0x0191	AL Checkbook/Finance
0x0104	Climate Control Enable	0x0192	AL Calculator
0x0105	Room Temperature	0x0193	AL A/V Capture/Playback
0x0106	Security Enable	0x0194	AL Local Machine Browser
0x0107	Fire Alarm	0x0195	AL LAN/WAN Browser
0x0108	Police Alarm	0x0196	AL Internet Browser
0x0109	Proximity	0x0197	AL Remote Networking/ISP Connect
0x010A	Motion	0x0198	AL Network Conference
0x010B	Duress Alarm	0x0199	AL Network Chat
0x010C	Holdup Alarm	0x019A	AL Telephony/Dialer
0x010D	Medical Alarm	0x019B	AL Logon
0x010E~0x014F	Reserved	0x019C	AL Logoff
0x0150	Balance Right	0x019D	AL Logon/Logoff
0x0151	Balance Left	0x019E	AL Terminal Lock/Screensaver
0x0152	Bass Increment	0x019F	AL Control Panel
0x0153	Bass Decrement	0x01A0	AL Command Line Processor/Run
0x0154	Treble Increment	0x01A1	AL Process/Task Manager
0x0155	Treble Decrement	0x01A2	AL Select Task/Application
0x0156~0x015F	Reserved	0x01A3	AL Next Task/Application
0x0160	Speaker System	0x01A4	AL Previous Task/Application

Table 6-9 Consumer Codes : 0x01A5 ~ 0x0257

Usage ID	Usage Name	Usage ID	Usage Name
0x01A5	AL Preemptive Halt Task/Application	0x0222	AC Go To
0x01A6	AL Integrated Help Center	0x0223	AC Home
0x01A7	AL Documents	0x0224	AC Back
0x01A8	AL Thesaurus	0x0225	AC Forward
0x01A9	AL Dictionary	0x0226	AC Stop
0x01AA	AL Desktop	0x0227	AC Refresh
0x01AB	AL Spell Check	0x0228	AC Previous Link
0x01AC	AL Grammar Check	0x0229	AC Next Link
0x01AD	AL Wireless Status	0x022A	AC Bookmarks
0x01AE	AL Keyboard Layout	0x022B	AC History
0x01AF	AL Virus Protection	0x022C	AC Subscriptions
0x01B0	AL Encryption	0x022D	AC Zoom In
0x01B1	AL Screen Saver	0x022E	AC Zoom Out
0x01B2	AL Alarms	0x022F	AC Zoom
0x01B3	AL Clock	0x0230	AC Full Screen View
0x01B4	AL File Browser	0x0231	AC Normal View
0x01B5	AL Power Status	0x0232	AC View Toggle
0x01B6	AL Image Browser	0x0233	AC Scroll Up
0x01B7	AL Audio Browser	0x0234	AC Scroll Down
0x01B8	AL Movie Browser	0x0235	AC Scroll
0x01B9	AL Digital Rights Manager	0x0236	AC Pan Left
0x01BA	AL Digital Wallet	0x0237	AC Pan Right
0x01BB	Reserved	0x0238	AC Pan
0x01BC	AL Instant Messaging	0x0239	AC New Window
0x01BD	AL OEM Features/ Tips/Tutorial Browser	0x023A	AC Tile Horizontally
0x01BE	AL OEM Help	0x023B	AC Tile Vertically
0x01BF	AL Online Community	0x023C	AC Format
0x01C0	AL Entertainment Content Browser	0x023D	AC Edit
0x01C1	AL Online Shopping Browser	0x023E	AC Bold
0x01C2	AL SmartCard Information/Help	0x023F	AC Italics
0x01C3	AL Market Monitor/Finance Browser	0x0240	AC Underline
0x01C4	AL Customized Corporate News Browser	0x0241	AC Strikethrough
0x01C5	AL Online Activity Browser	0x0242	AC Subscript
0x01C6	AL Research/Search Browser	0x0243	AC Superscript
0x01C7	AL Audio Player	0x0244	AC All Caps
0x01C8~0x01FF	Reserved	0x0245	AC Rotate
0x0200	Generic GUI Application Controls	0x0246	AC Resize
0x0201	AC New	0x0247	AC Flip horizontal
0x0202	AC Open	0x0248	AC Flip Vertical
0x0203	AC Close	0x0249	AC Mirror Horizontal
0x0204	AC Exit	0x024A	AC Mirror Vertical
0x0205	AC Maximize	0x024B	AC Font Select
0x0206	AC Minimize	0x024C	AC Font Color
0x0207	AC Save	0x024D	AC Font Size
0x0208	AC Print	0x024E	AC Justify Left
0x0209	AC Properties	0x024F	AC Justify Center H
0x021A	AC Undo	0x0250	AC Justify Right
0x021B	AC Copy	0x0251	AC Justify Block H
0x021C	AC Cut	0x0252	AC Justify Top
0x021D	AC Paste	0x0253	AC Justify Center V
0x021E	AC Select All	0x0254	AC Justify Bottom
0x021F	AC Find	0x0255	AC Justify Block V
0x0220	AC Find and Replace	0x0256	AC Indent Decrease
0x0221	AC Search	0x0257	AC Indent Increase

Table 6-10 Consumer Codes : 0x0258 ~ 0xFFFF

Usage ID	Usage Name	Usage ID	Usage Name
0x0258	AC Numbered List	0x027B	AC Sort Ascending
0x0259	AC Restart Numbering	0x027C	AC Sort Descending
0x025A	AC Bulleted List	0x027D	AC Filter
0x025B	AC Promote	0x027E	AC Set Clock
0x025C	AC Demote	0x027F	AC View Clock
0x025D	AC Yes	0x0280	AC Select Time Zone
0x025E	AC No	0x0281	AC Edit Time Zones
0x025F	AC Cancel	0x0282	AC Set Alarm
0x0260	AC Catalog	0x0283	AC Clear Alarm
0x0261	AC Buy/Checkout	0x0284	AC Snooze Alarm
0x0262	AC Add to Cart	0x0285	AC Reset Alarm
0x0263	AC Expand	0x0286	AC Synchronize
0x0264	AC Expand All	0x0287	AC Send/Receive
0x0265	AC Collapse	0x0288	AC Send To
0x0266	AC Collapse All	0x0289	AC Reply
0x0267	AC Print Preview	0x028A	AC Reply All
0x0268	AC Paste Special	0x028B	AC Forward Msg
0x0269	AC Insert Mode	0x028C	AC Send
0x026A	AC Delete	0x028D	AC Attach File
0x026B	AC Lock	0x028E	AC Upload
0x026C	AC Unlock	0x028F	AC Download (Save Target As)
0x026D	AC Protect	0x0290	AC Set Borders
0x026E	AC Unprotect	0x0291	AC Insert Row
0x026F	AC Attach Comment	0x0292	AC Insert Column
0x0270	AC Delete Comment	0x0293	AC Insert File
0x0271	AC View Comment	0x0294	AC Insert Picture
0x0272	AC Select Word	0x0295	AC Insert Object
0x0273	AC Select Sentence	0x0296	AC Insert Symbol
0x0274	AC Select Paragraph	0x0297	AC Save and Close
0x0275	AC Select Column	0x0298	AC Rename
0x0276	AC Select Row	0x0299	AC Merge
0x0277	AC Select Table	0x029A	AC Split
0x0278	AC Select Object	0x029B	AC Distribute Horizontally
0x0279	AC Redo/Repeat	0x029C	AC Distribute Vertically
0x027A	AC Sort	0x029D~0xFFFF	Reserved

6.2.4 Mouse code data format

There are 4 bytes for mouse data listed as Table 6-11.

Table 6-11 Mouse Data Payload Format

	Function Name	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	Button	B8	B7	B6	B5	B4	B3	B2	B1
Byte 2	X Axis (Low)	X7	X6	X5	X4	X3	X2	X1	X0
Byte 3	X Axis (High)	X15	X14	X13	X12	X11	X10	X9	X8
Byte 4	Y Axis (Low)	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
Byte 5	Y Axis (High)	Y15	Y14	Y13	Y12	Y11	Y10	Y9	Y8
Byte 6	Z Axis	Z7	Z6	Z5	Z4	Z3	Z2	Z1	Z0

Button : B1 ~ B8. : Button 1 ~ Button 8
Button 1 : Mouse left button. Set 1 to press and clear 0 to release.
Button 2 : Mouse right button. Set 1 to press and clear 0 to release.
Button 3 : Mouse middle button. Set 1 to press and clear 0 to release.

X Axis : X15 ~ X0 : 16 bits signed integer. Represent the relative displacement of device in the X direction. The data range is +32767 ~ -32767.

Y Axis : Y15 ~ Y0 : 16 bits signed integer. Represent the relative displacement of device in the Y direction. The data range is +32767 ~ -32767.

Z Axis : Z7 ~ Z0 : Z-wheel is 8 bits signed integer. The data range is +127 ~ -128.

6.2.5 Joystick code data format

There are 6 bytes for mouse data listed as Table 6-12 .

Table 6-12 Joystick Data Payload Format

	Function Name	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	X Axis	X7	X6	X5	X4	X3	X2	X1	X0
Byte 2	Y Axis	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
Byte 3	Z Axis	Z7	Z6	Z5	Z4	Z3	Z2	Z1	Z0
Byte 4	Rz Axis	Rz7	Rz6	Rz5	Rz4	Rz3	Rz2	Rz1	Rz0
Byte 5	Button / Hat switch	B4	B3	B2	B1	Hat switch			
Byte 6	Button	B12	B11	B10	B9	B8	B7	B6	B5

X Axis : X7 ~ X0 : 8 bits unsigned integer. Represent the relative displacement of device in the X direction.
The data range is 0 ~ 255, shown as Figure 6-1.
Y Axis : Y7 ~ Y0 : 8 bits unsigned integer. Represent the relative displacement of device in the Y direction.
The data range is 0 ~ 255, shown as Figure 6-1.
Z Axis : Z7 ~ Z0 : 8 bits unsigned integer. Represent the relative displacement of device in the Z direction.
The data range is 0 ~ 255, shown as Figure 6-1.
Rz Axis : Rz7 ~ Rz0 : 8 bits unsigned integer. Represent the relative displacement of device in the Rz direction.
The data range is 0 ~ 255, shown as Figure 6-1.
Hat switch : 4 bits value, value is shown as Figure 6-1.
Button :B12 ~ B1 : Set 1 to press and clear 0 to release.

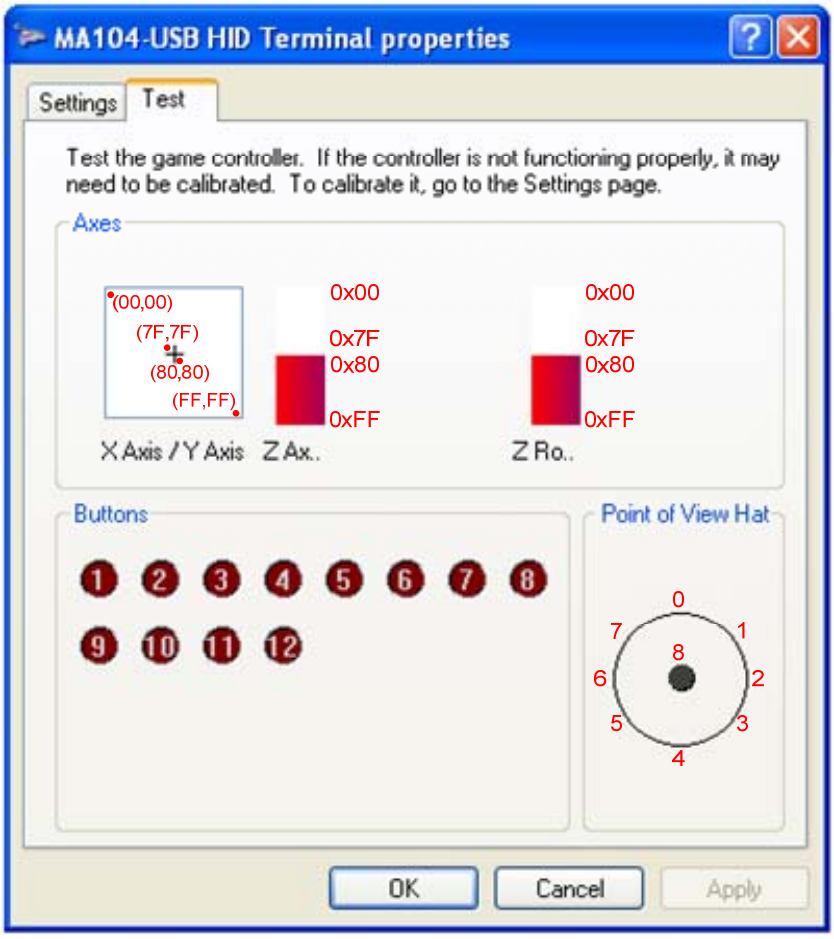

Figure 6-1 Joystick Report Value

6.2.6 User Defined UART RX Input Data Transfer Format

MA104 only supports UART baud rate 19200 8N1 format. 1 bit time of start bit, 8 bits data and 1 bit time of stop bit. MA104 does not support odd or even parity check. There are 7 bytes for user to define data transfer format, which are tabled as Table 6-13. There is 1 byte for length and 6 bytes for data.

Table 6-13 User Defined UART RX Input Data Payload Format

Packet Type	Payload : 7 Bytes						
0x05	Length	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6

6.2.7 User Defined UART TX Output Data Transfer Format

MA104 only supports UART baud rate 19200 8N1 format. 1 bit time of start bit, 8 bits data and 1 bit time of stop bit. MA104 does not support odd or even parity check.

Use USB feature report, data format as follow Table 6-14.

Table 6-14 User Defined UART TX Output Data Transfer Format

Command ID	Data Length	Data
0x55	1 Byte	6 Bytes

7 Demo Board Hardware Guide

7.1 Demo Board Circuit

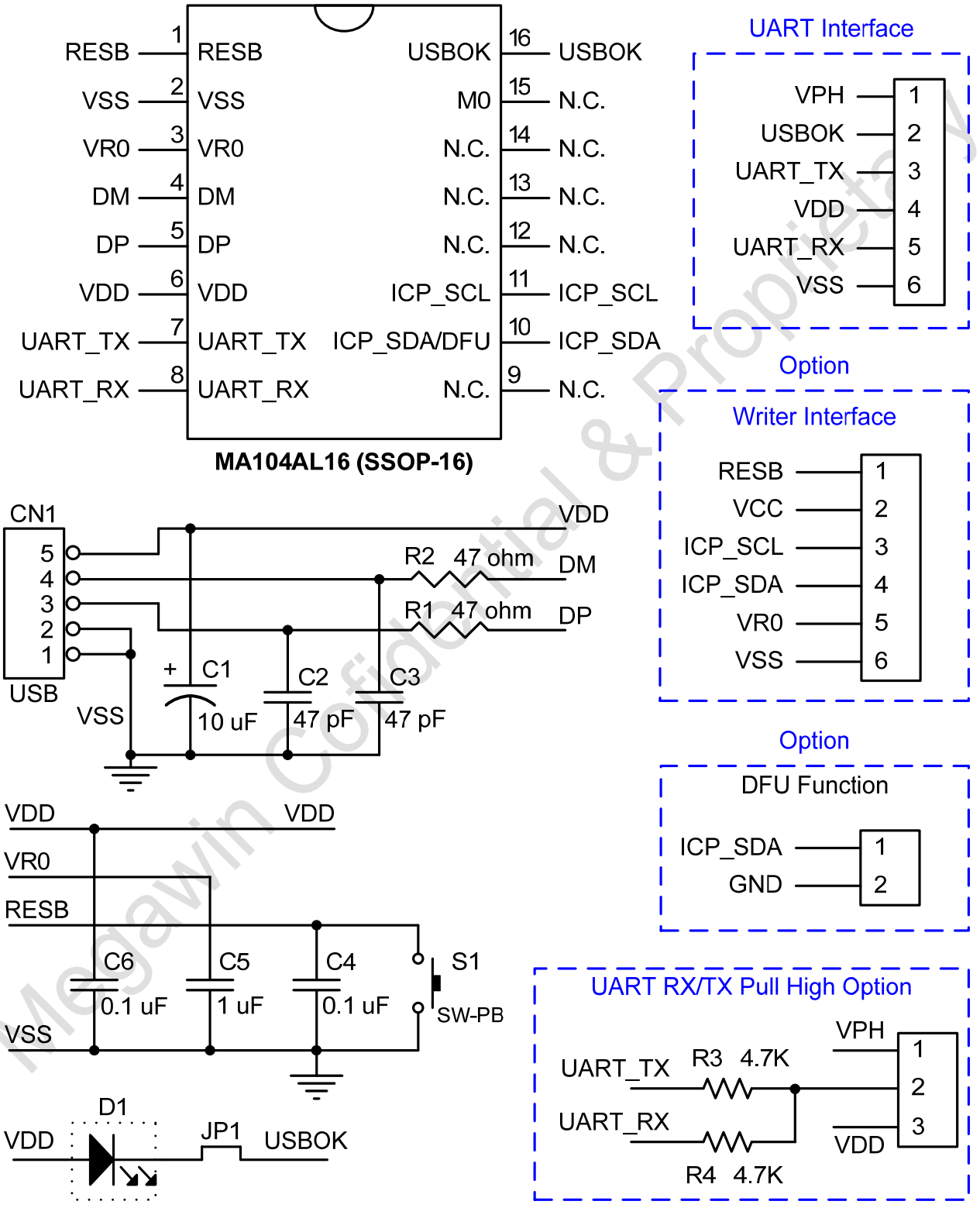

Figure 7-1 Demo Board Circuit

7.2 Demo Board PCB Description

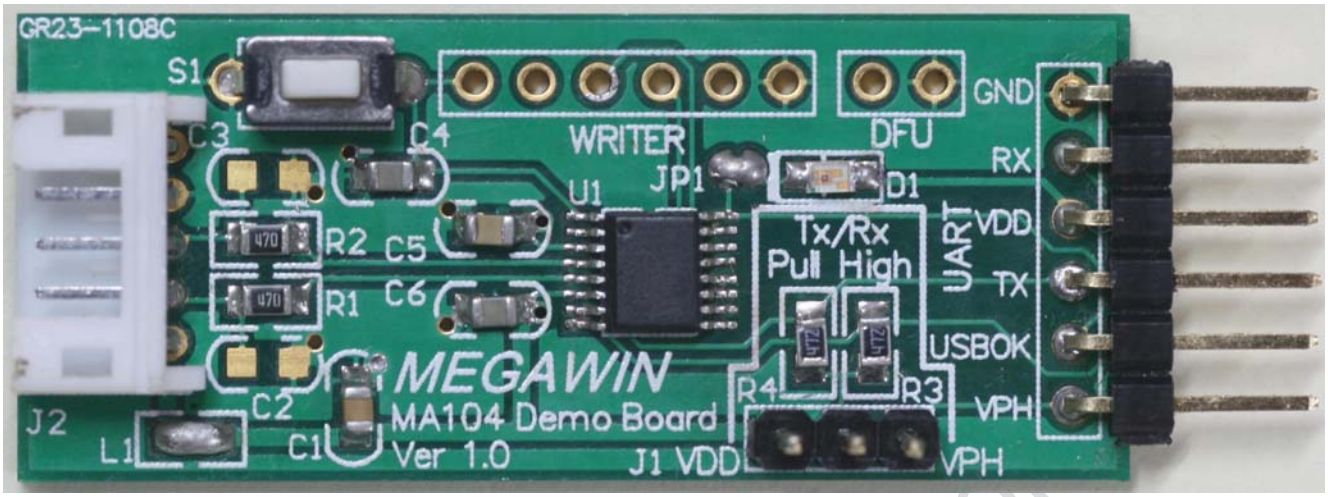

Figure 7-2 Demo Board PCB

J2 : USB Cable.
UART : UART Interface.
S1 : Reset.
D1 : USBOK LED.
JP1 : Option, Disconnect USBOK pad to LED path.
J1 : Set VDD or VPH Pull High Voltage.

7.2.1 UART Interface

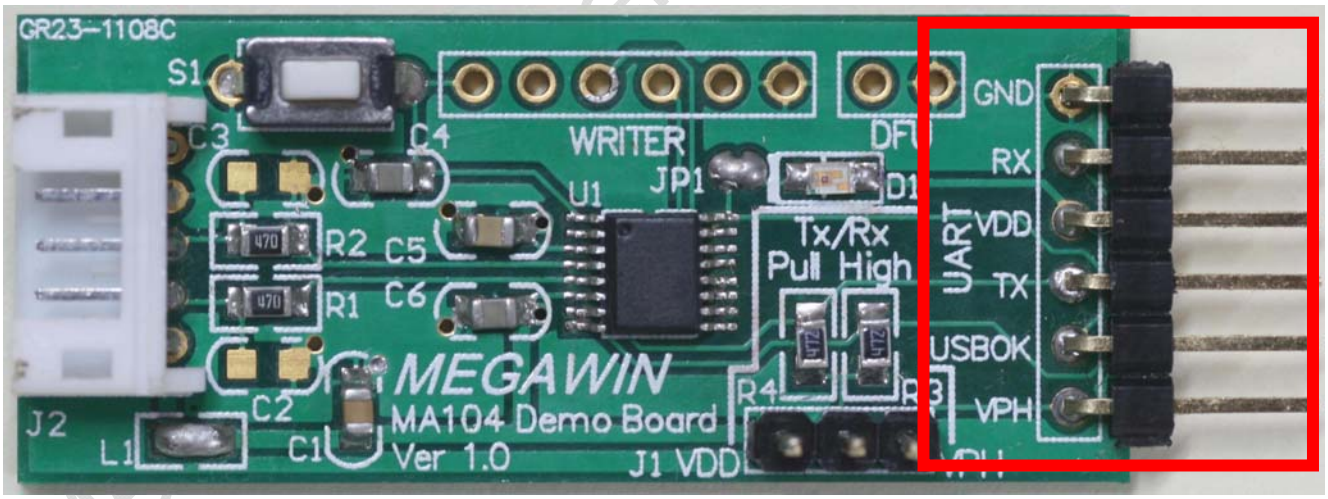

Figure 7-3 Demo Board UART Interface

VSS : VSS from USB host.
VDD : VBUS power from USB host.
TX : MA104 UART TX data output pad.
RX : MA104 UART RX data input pad.
USBOK : Indicate USBOK pass or fail. Low active.
VPH : UART TX/RX pull high resistor voltage input from backend device.

7.2.2 Writer Interface

Only For Megawin 6502 Series Programmer.

Figure 7-4 Demo Board Writer Interface

7.2.3 USB Interface

For USB cable, connect to PC USB host.

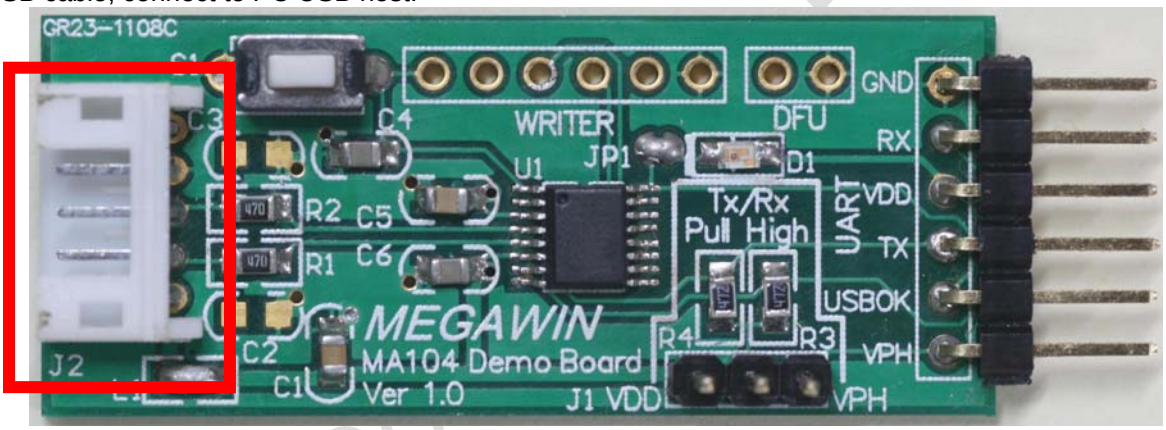

Figure 7-5 Demo Board USB Connecter

7.2.4 UART TX/RX Pull High Resistor Option

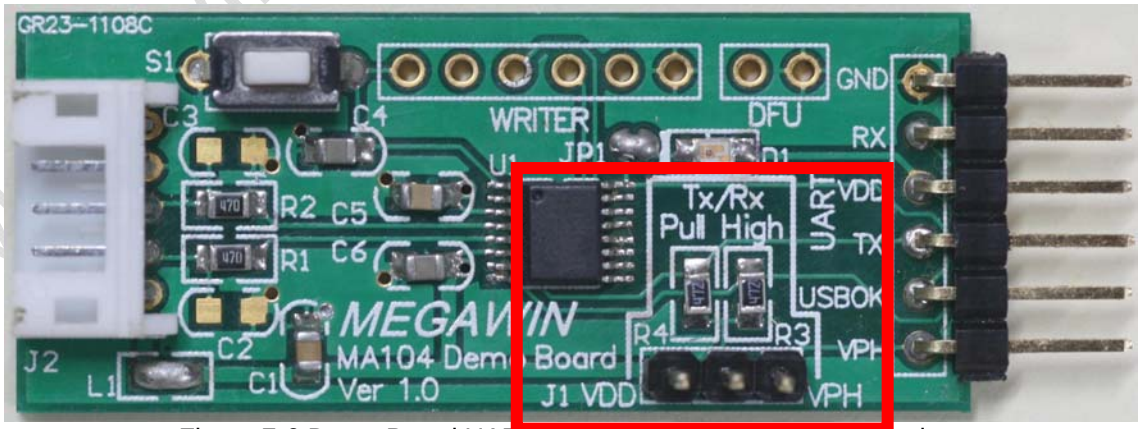

Figure 7-6 Demo Board UART TX/RX pull high and voltage option.

VPH : UART TX/RX pull high resistor voltage input from backend device.
VDD : VBUS from USB Host, 5V.

7.2.5 USB enumeration LED

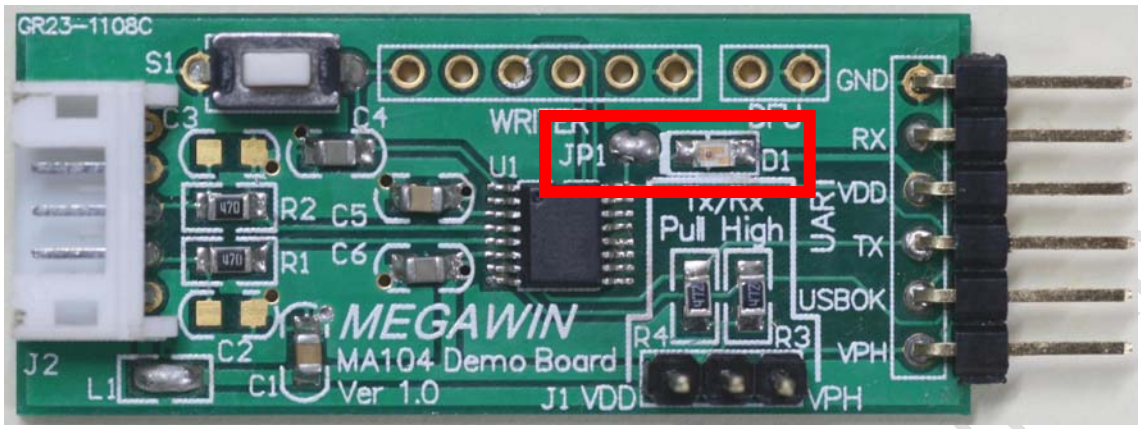

Figure 7-7 Demo Board LED description.

JP1 : Short JP1 for show USBOK status by on/off LED(D1).
Open JP1 for backend device to read USBOK status on USBOK pin.

7.2.6 DFU Update Pin Option

Only for Megawin DFU firmware update flow. (Reserve)

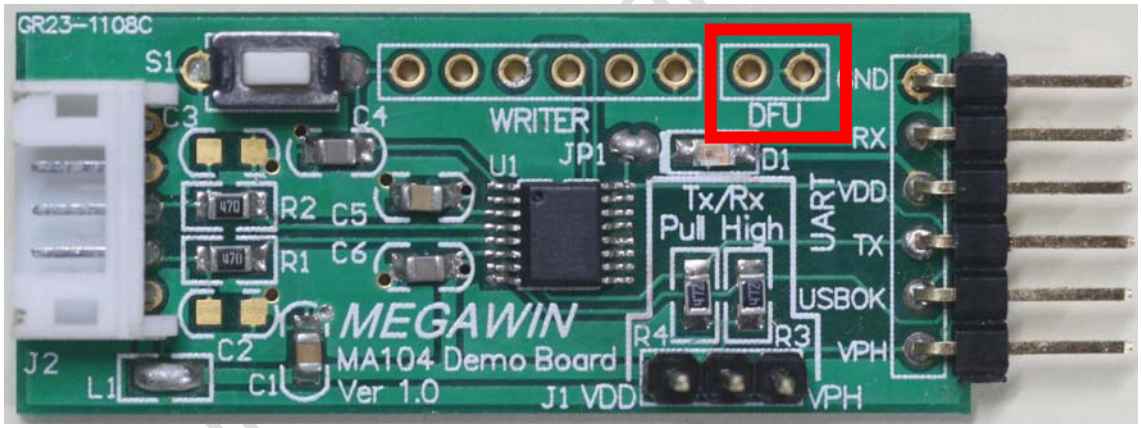

Figure 7-8 Demo Board DFU Option.

8 Demo Board Software Guide

8.1 Demo Application Description

Demo application start window as Figure 8-1.

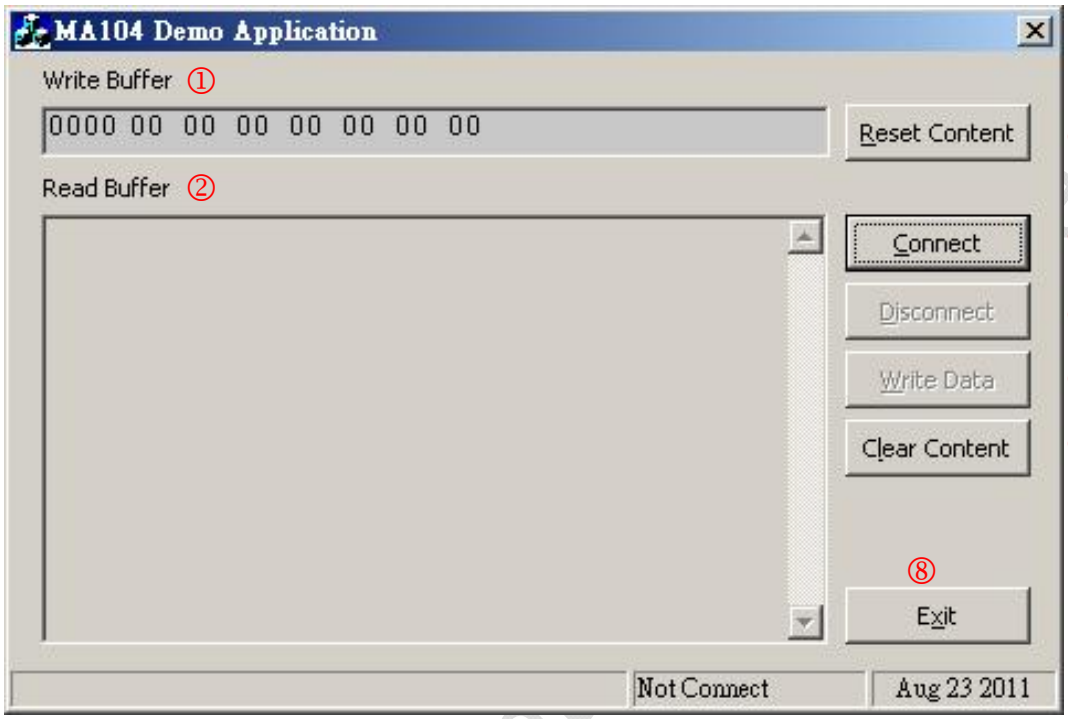

Figure 8-1 Demo AP Operation Window

Function buttons descriptions:

1. Write Buffer：User can write user defined data in this column. Press “Write Data” to start the sending flow.
2. Read Buffer：Show USB data received from backend device.
3. Reset Content：Clear the data in the “Write Buffer” column.
4. Connect：Connect to MA104.
5. Disconnect：Disconnect from MA104.
6. Write Data：Start to transfer user defined data to backend device.
7. Clear Content：Clear all received data in “Read Buffer” column.
8. Exit：Exit from this demo application.

Operation control flow:

Step 1: Execute DemoAp.exe (shown as Figure 8-1).
Step 2: Click “Connect” button to connect MA104. If the connection works, the “Connect” button will be disabled. The “Disconnect” and “Write Data” buttons will become enabled. Any data being uploaded at this time will be shown in “Read Buffer” column.
Step 3: Key in device data in “Write Buffer” column in hexadecimal.
Step 4: Click “Write Data” to send data.
Step 5: Click “Disconnect” to break the connection off.
Step 6: Click “Exit” to exit from this application program.

8.2 DLL Function Description

8.2.1 Introduction

This section explains how to use MA104.DLL for the MA104 device in the Visual C++ 6.0 environment.

8.2.2 Files Needed

Add following files, MA104.DLL, .lib, and .H, to your program, and make sure they are in the searching path.

MA104.DLL
MA104.lib
MA104.H

For example:
Project →Setting →Link

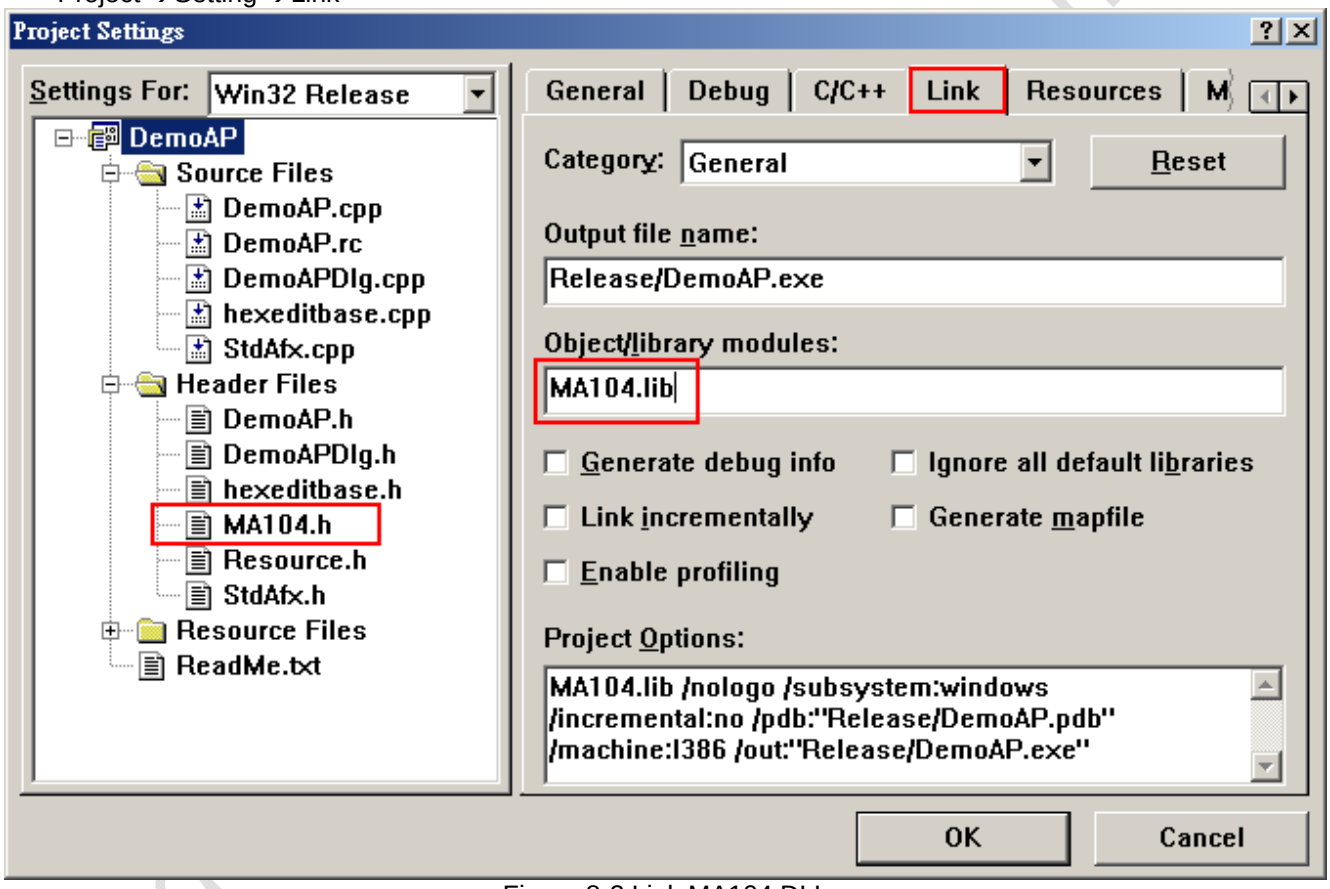

Figure 8-2 Link MA104.DLL

8.2.3 _MW_MA104 structure

```
typedef struct _MW_MA014
{
   DWORD VID;
   DWORD PID;
   DWORD ReadTimeOut;
   DWORD WriteTimeOut;
   HANDLE Handle;
} MA104;
```

Parameter:

VID : Megawin's Vendor ID is **0x0E6A**;

PID : MA104's Product ID is **0x0109 / 0x010F**;

ReadTimeOut :
Specifies the time-out interval, in milliseconds.
Within this given timer interval, read activity should be finished;
otherwise, it will be considered as an error.

WriteTimeOut :
Specifies the time-out interval, in milliseconds.
Within this given time interval, Write activity should be finished;
otherwise, it will be considered as an error.

Handle :
DLL will save a valid handle in this variable, and caller is responsible for protecting this value from being modified.

8.2.4 MA104_Connect

MA104_Connect() sets up the software relation between user application and MA104 device. It pairs up with MA104_Disconnect().

```
MA104_API
DWORD MA104_Connect( MA104 * pMA104,
                     DWORD Index );
```

Parameter:

pMA104 : Caller-supplied pointer to a MA104 structure.

Index : Device index of a MA104, and it starts from one.

8.2.5 MA104_Disconnect

MA104_Disconnect() closes the connection between user application and MA104 device. It pairs up with MA104_Connect().

```
MA104_API
DWORD MA104_Disconnect( MA104 * pMA104);
```

Parameter:

pMA104 : Caller-supplied pointer to a MA104 structure.

Remark:

It is necessary to call disconnect after each call of connect.

8.2.6 MA104_WriteData

The MA104_WriteData function writes data to MA104 device.

```
MA104_API
DWORD MA104_WriteData( MA104 * pMA104,
                       LPBYTE lpBuffer,
                       DWORD nNumberOfBytesToWrite,
                       LPDWORD lpNumberOfBytesWritten );
```

Parameter:

pMA104 : Caller-supplied pointer to MA104 structure.

lpBuffer : Pointer to the buffer containing the data to be written to the MA104 device.

nNumberOfBytesToWrite : It is the length of lpBuffer.

lpNumberOfBytesWritten : It is the actually written length.

8.2.7 MA104_ReadData

The MA104_ReadData function reads data from the MA104 device.

```
MA104_API
DWORD MA104_ReadData( MA104 * pMA104,
                      LPBYTE lpBuffer,
                      DWORD nNumberOfBytesToRead,
                      LPDWORD lpNumberOfBytesRead );
```

Parameter:

pMA104 : Caller-supplied pointer to MA104 structure.

lpBuffer : Pointer to the buffer that receives the data from the MA104 device.

nNumberOfBytesToRead : It is the length to be read.

lpNumberOfBytesRead : It is the actually read length.

8.2.8 MA104_ClearBuffer

The MA104_ClearBuffer() cleans up DLL internal buffer.

```
MA104_API
DWORD MA104_ClearBuffer( MA104 * pMA104 );
```

Parameter:

pMA104 : Caller-supplied pointer to a MA104 structure.

9 Revision History

Revision	Page	Descriptions	Date
V0.01	-	Preliminary Version	2011/06/07
V0.02	16	Add free data transfer command and format description.	2011/07/04
V1.01		Add application circuit. Modify package to SSOP16, delete Dice form. Modify Pin description. Delete DFU update firmware flow. Add demo board hardware/software guide.	2011/09/07
V1.02	5	Add USB High-Power Mode.	2012/04/06
	8	Add Application Circuit for USB High-Power mode.	
	11	Modify Pin Descriptor.	
	20	Modify Mouse data format.	
	21	Add Joystick Function.	
	29	_MW_MA104 structure add PID 0x010F	
	29	MA104_Connect delete Remark description.	