

# **MG32F02U128 Evaluation Board**

## **Explanation Manual**

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## 1. Introduction

The **MG32F02U** is a single-chip 32-bit microcontroller based on a high performance Core ARM 32-bit Cortex™-M0 CPU with embedded Nested Vectored Interrupt Controller (NVIC).

The **MG32F02U** has up to **128K** bytes of embedded main flash memory for code and data, programmable memory size of embedded system flash memory for boot load code and 64 bytes of embedded option-byte flash memory for chip configuration. The all flash memory can be programmed either in serial writer mode (ICP, In-Circuit-Programming). Also, the main flash memory can be programmed in ISP (In-System Programming) mode or SRAM (Boot on SRAM) mode. ICP and ISP allow the user to download new code without removing the microcontroller from the actual end product; IAP means that the device can write non-volatile data in the flash memory while the application program is running. There needs no external high voltage for programming due to its built-in charge-pumping circuitry.

The **MG32F02U** retains all features of the ARM 32-bit Cortex™-M0 with **16K** bytes of SRAM, **5** I/O ports, **32** external interrupts source with 4-level interrupt controller and seven 8/16-bits timer/counters. In addition, the **MG32F02U** has a System Tick Timer, two Watchdog Timers, three Advance timer modules with IC/OC, four Basic timer modules for universal using, on-chip crystal oscillator for 32.768 KHz to 25MHz, two high precision internal oscillators IHRCO for 11.059/12MHz and ILRCO for 32 KHz, one 12-bit ADC with one temperature sensor, two programmable threshold comparators and one 12-bit voltage mode DAC.

Also, the **MG32F02U** support multiple and flexible communicate interface for production application. It provides alternate function pins those are including of GPIO, I2C, SPI, UART, Timer with IC/PWM, ADC, Analog Comparator, DAC, EMB, NCO, CCL, SDT and SWD(on chip debug). It has maximum 73 GPIO pins and provides programmable IO type - quasi-bidirectional, push-pull output, open-drain output, input only(Hi-z) with optional pull-high. In addition, it is built-in internal de-bounce circuit to deglitch noise for worse signals.

One direct memory access (DMA) controller is used to improve data transfer between peripherals and memory and memory to memory. The data can be transfer by DMA controller and does not cost any CPU time.

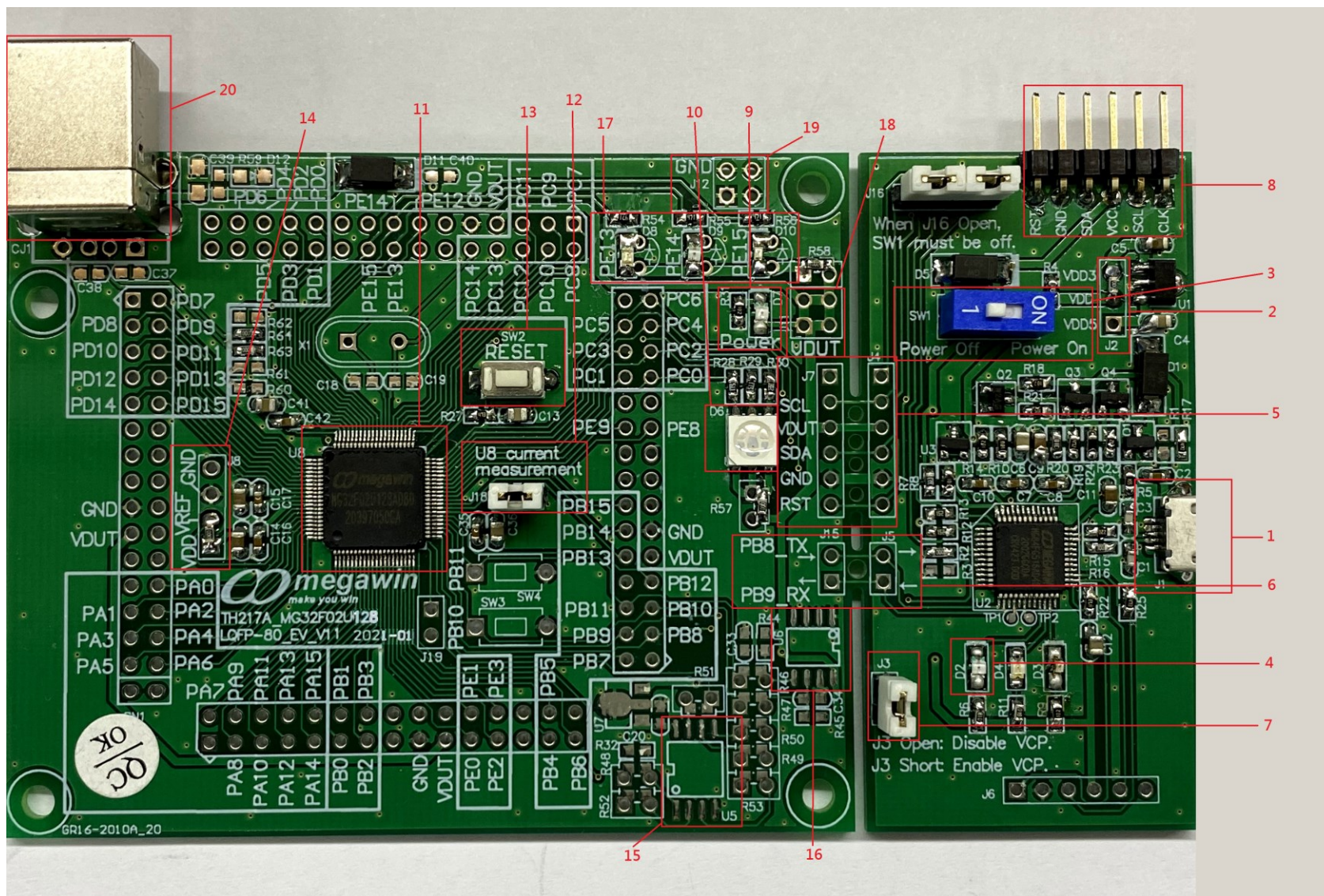
One external memory bus (EMB) controller is used to access external SRAM, NOR/NAND flash or 8080 interface LCD display panel. It supports multiple address bus and data bus multiplex modes. Also it supports synchronous or asynchronous timing with programmable cycle time for external devices.

For **MG32F02U** series, the chip provides a USB (Universal Serial Bus) full-speed device with relocated endpoint addresses. It is fully compliable with USB specification 2.0 and 1.1 to support various USB applications. The USB block contains an on-chip 3.3V regulator, a USB transceiver which transmits and receives differential USB signal, a USB Core to perform NRZI encoding and decoding, bit stuffing, CRC generation and checking, serial-parallel data transforming, data flow between USB data buffer and CPU.

For power management and reset control, the **MG32F02U** is built-in a power supervisor including of a Low Voltage Detector(LVD), two Brown-out Detectors(BOD0/BOD1), a Power-On Reset(POR), a Low-voltage Reset(LVR). The **MG32F02U** has multiple power-down modes to reduce the power consumption: Sleep mode and Stop mode.

In the Sleep mode the CPU is frozen while the peripherals and the interrupt system are still operating. In the Stop mode the RAM and SFRs' value are saved and all other functions are inoperative; most importantly, in the Sleep mode the chip can be waked up by many interrupt or reset sources(POR/LVR/BOD0/BOD1)

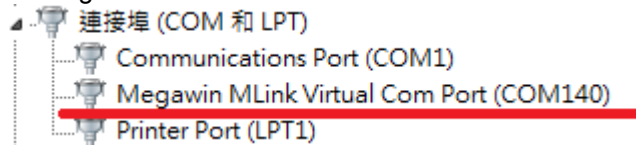
## 1.1 Whole Picture





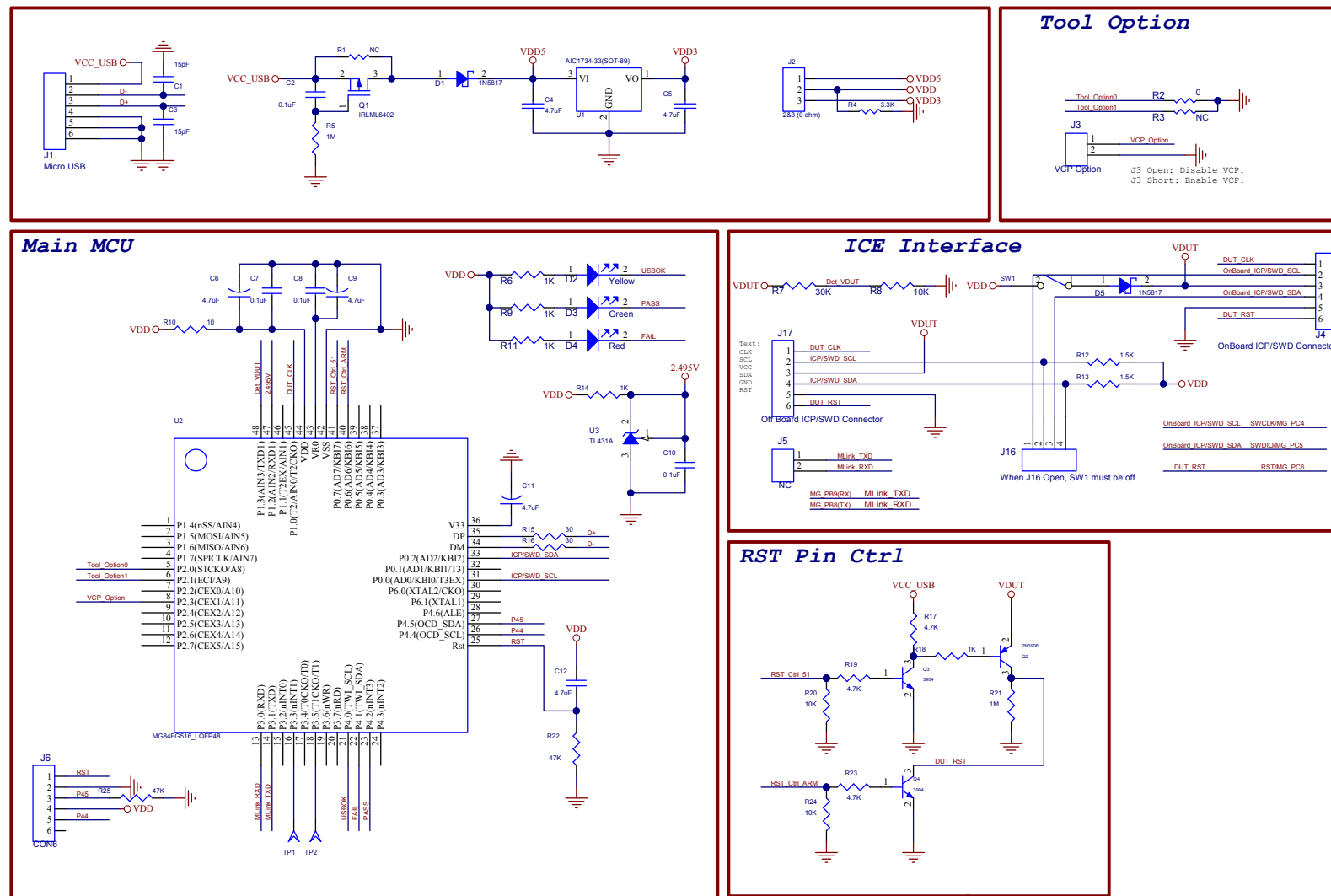
## 1.2 Ev Board Hardware Instruction

1. J1: Micro USB Connector.
2. J2: Power select.
  - a. VDD5 – USB 5V Output.
  - b. VDD – Select 5V or 3.3V to MG32F02U serial.
  - c. VDD3 -- On Board LDO 3.3V Output(U1).
3. SW1: Control U8 power on/off.
4. D2: PC identify MLink successful when D2 turn ON, but only programming turn ON at Win10.
5. J4: Connector in ICE adaptor(MLink) for connecting with EV board to program MG32F02U serial.  
J7: Connector in EV board for connecting with ICE adaptor(MLink).
6. J5: Connector in ICE adaptor(MLink) for connecting with EV board to transfer UART data.  
J15: Connector in EV board for connecting with ICE adaptor(MLink).
7. J3: Virtual Com Port function selection, when J3 open and plug out → plug in PC, VCP function is disable. when J3 short and plug out → plug in PC, VCP function is enabled. After installing driver(how to install driver, refer the [2. Driver Install](#)), Device Manager will appear “Megawin MLink Virtual Com Port” as below figure.

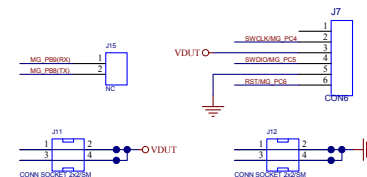
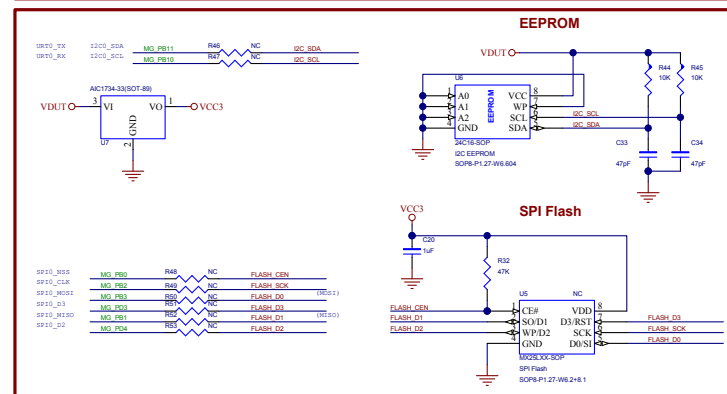
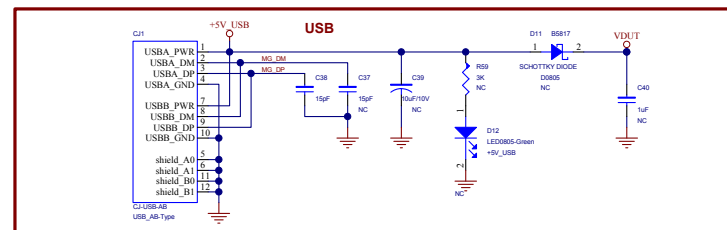
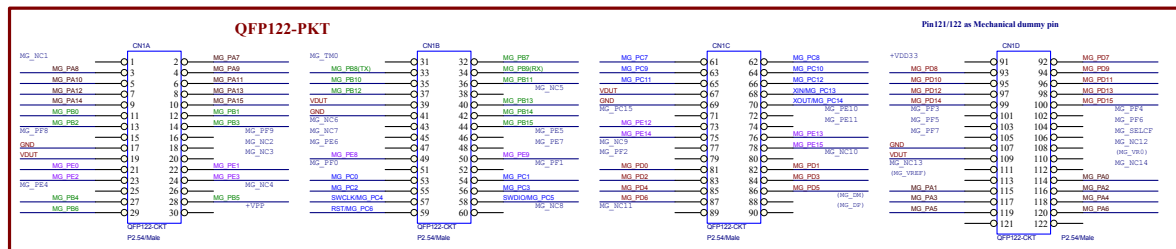
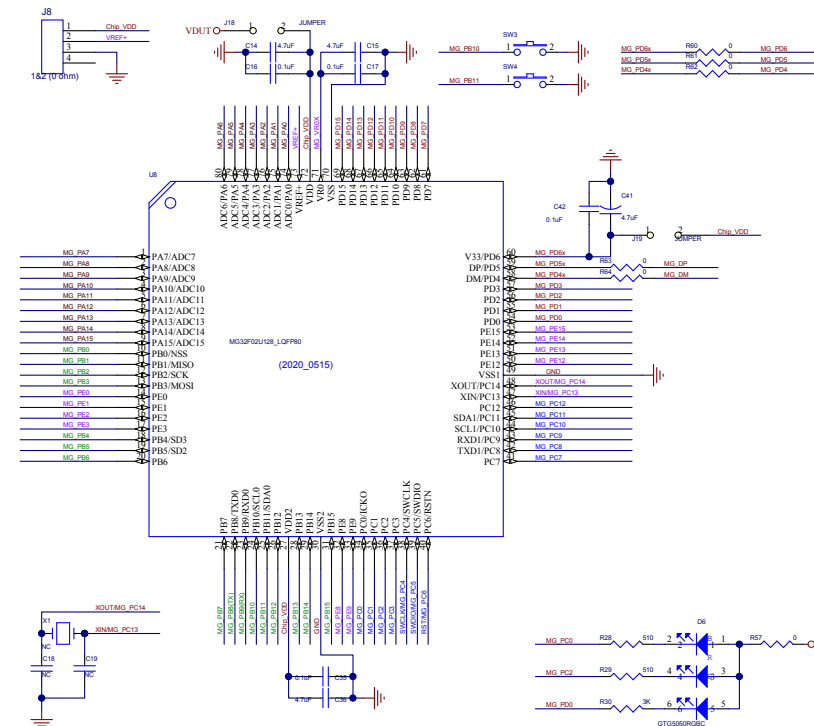


8. J17: When J16 open and SW1 off, MLink can program other DUT board through J17 connector.
9. D7: EV board power indicator LED.
10. D6: RGB LED.
11. U8: MG32F02U128 LQFP-80 package.
12. J18: User can measure MG32F02U128 operating current by connecting an ammeter.
13. SW2: Pressing the button will trigger external reset signal to U8(MG32F02U128).
14. J8: MG32F02U128 VREF input pin, it is tied to VDD default.
15. U5: SPI flash, user can choose a SPI flash then place on the position. It is NC default.
16. U6: I<sup>2</sup>C EEPROM, user can choose a I<sup>2</sup>C EEPROM then place on position. It is NC default.
17. D8, D9, D10: IO LED.
18. J11: EV board VDUT connector.
19. J12: EV board GND connector.
20. CJ1: MG32F02U128 USB Serial “B” Receptacle.

### **1.3.1 MLink Circuit**

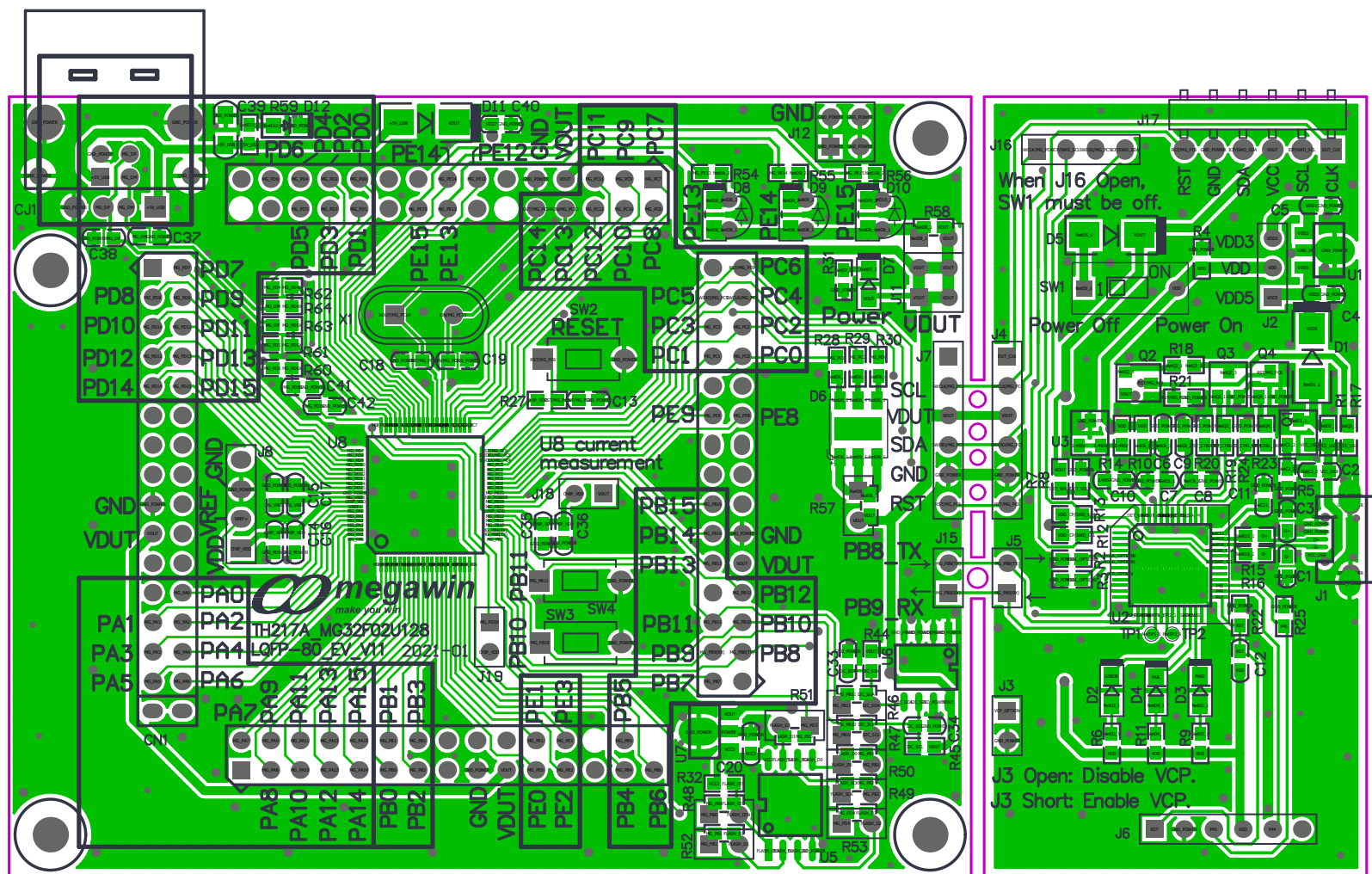


### **1.3.2 MG32F02U128 Circuit**



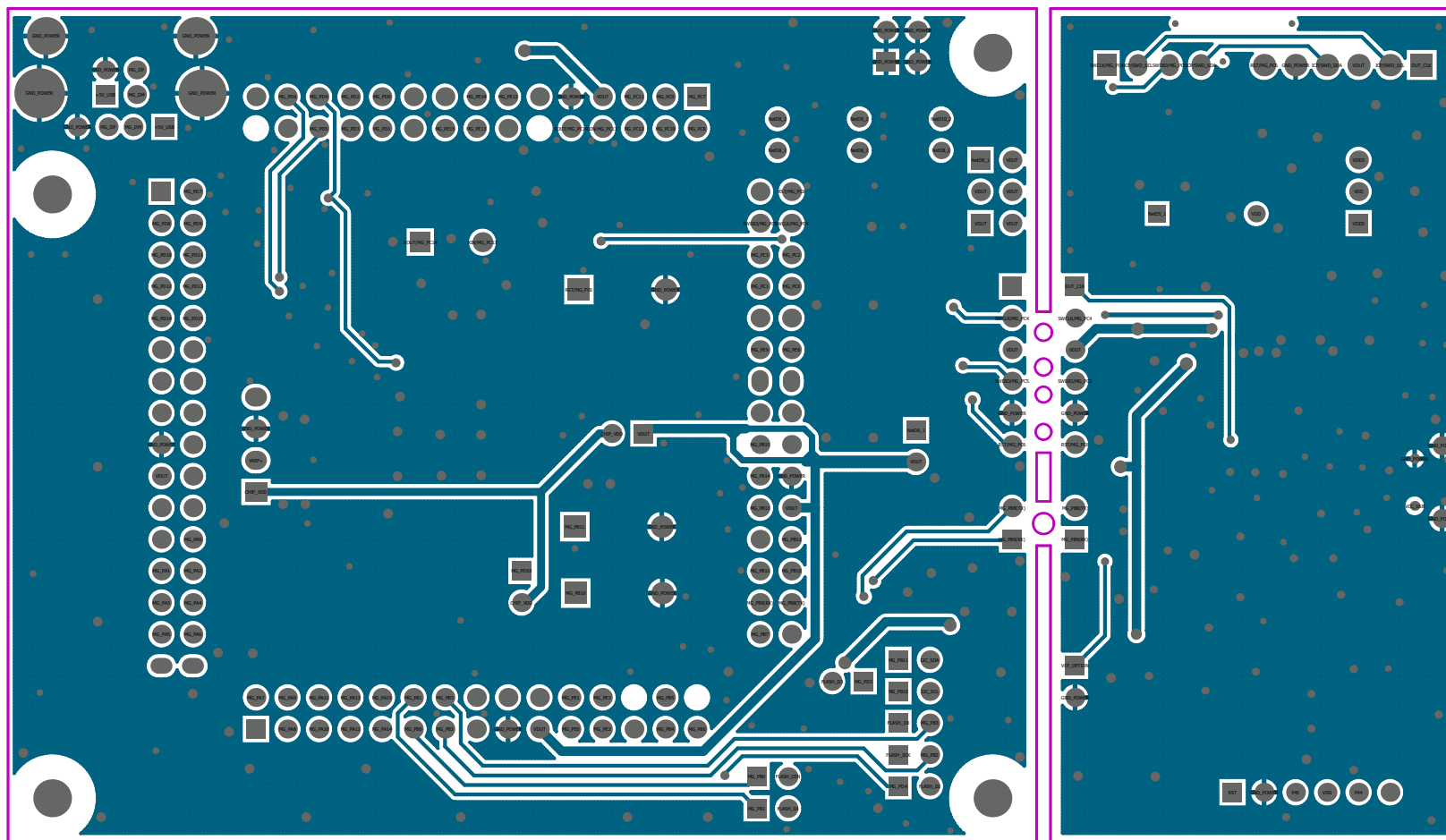
## 1.4 Ev Board PCB

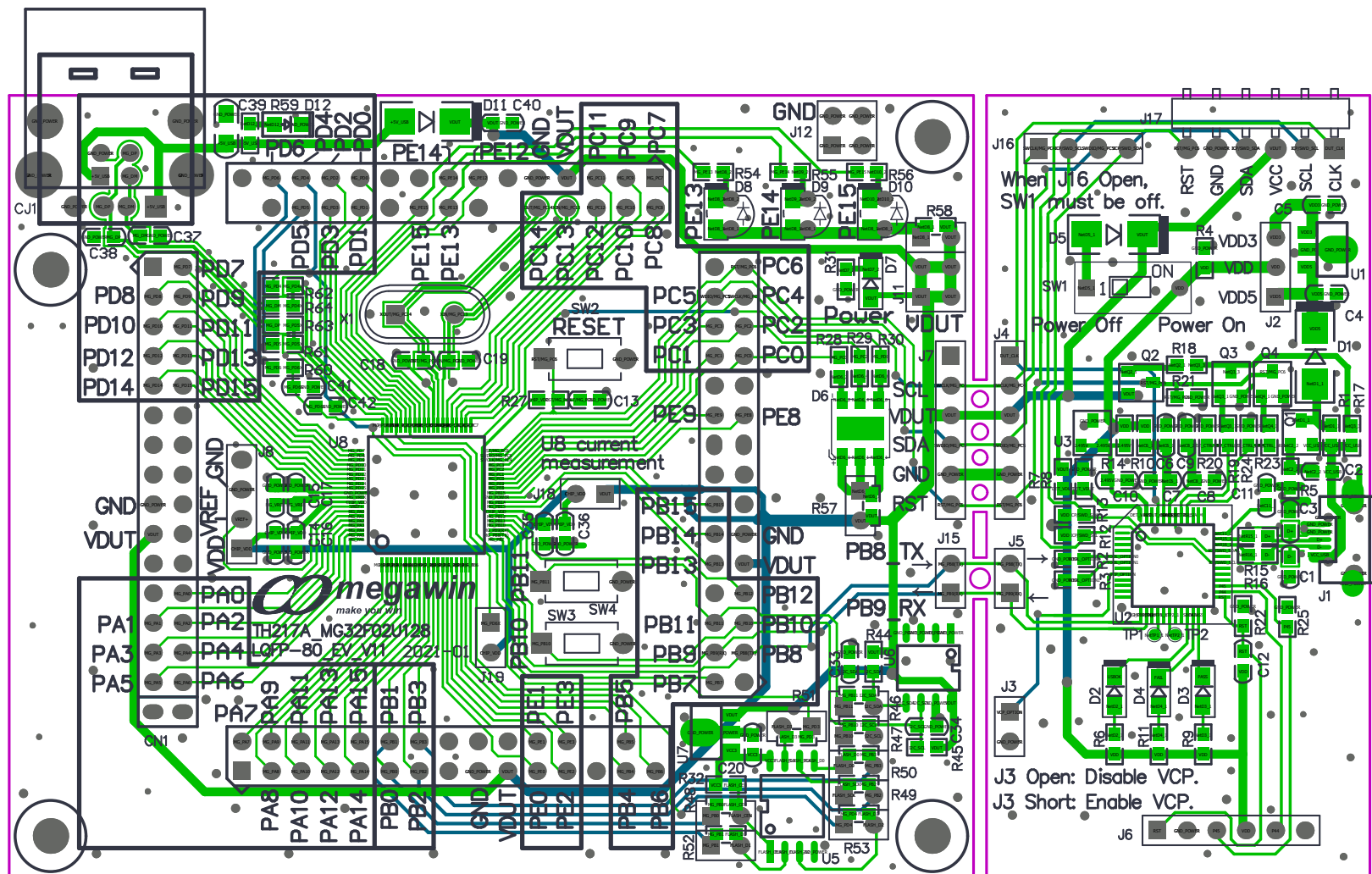
### Top





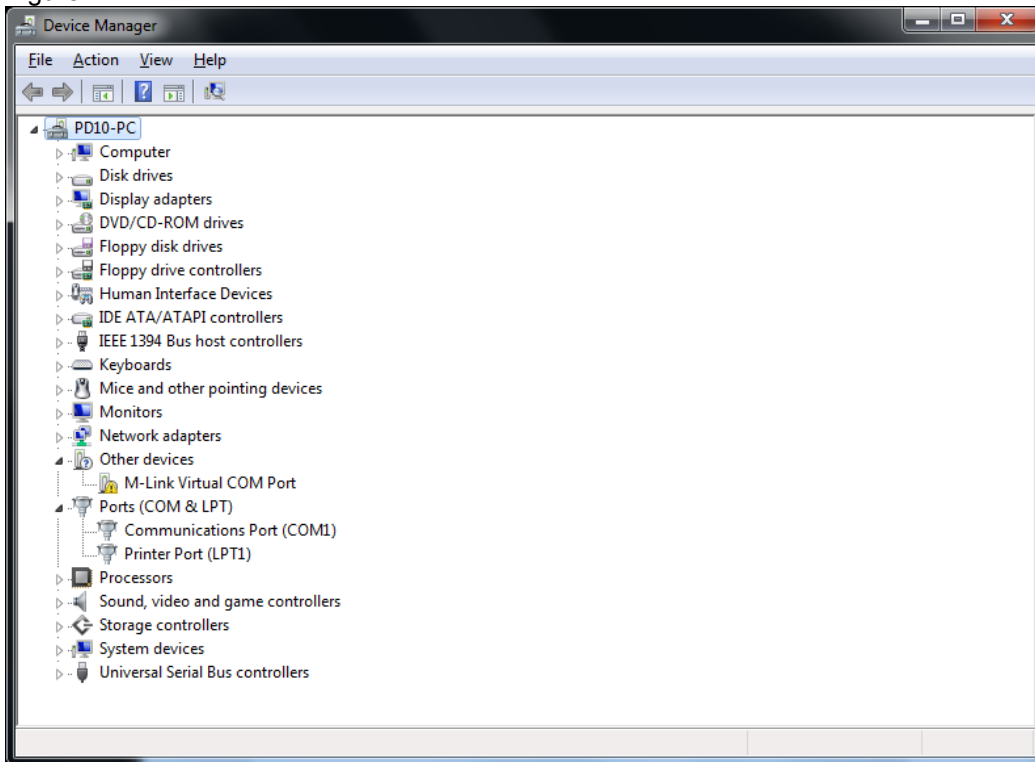
**Bottom**



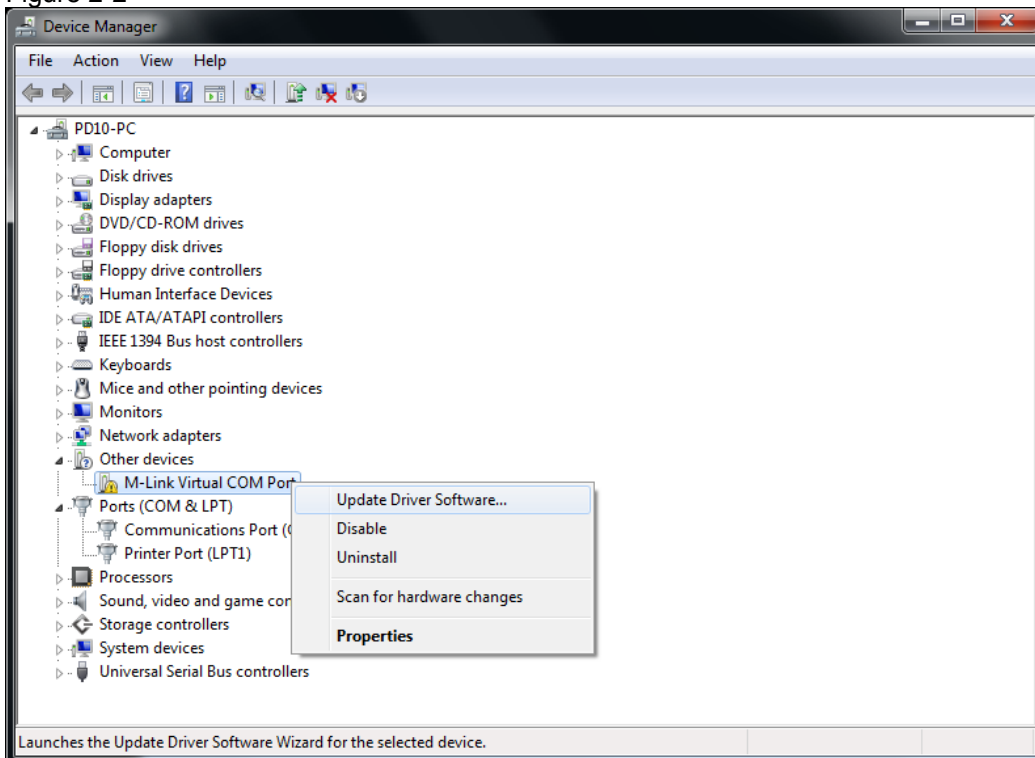


## 2. Driver Install

Step 1: The user short J3 plug MG32F02U128 EV board into any USB port in a PC, then open Device Manager.  
Figure 2-1

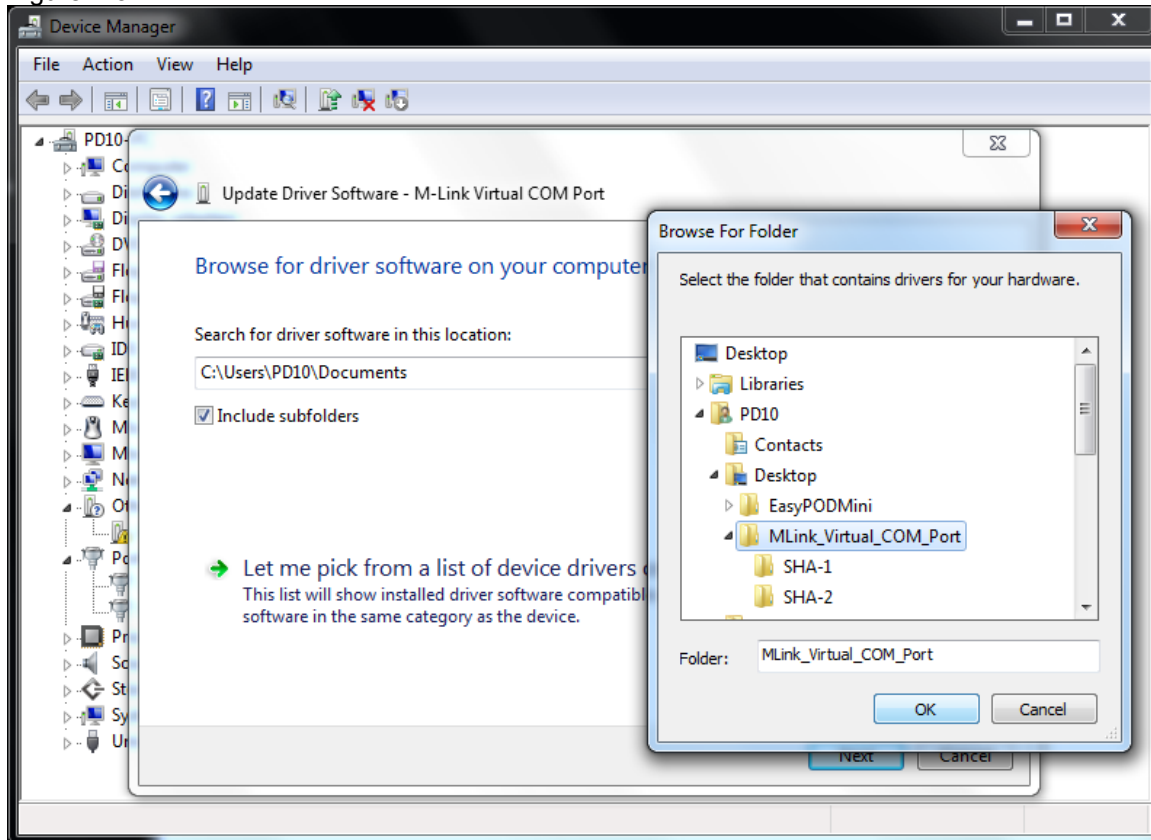


Step 2: Click “Right” key on Megawin MLink Virtual Com Port and “Update Driver Software”...  
Figure 2-2



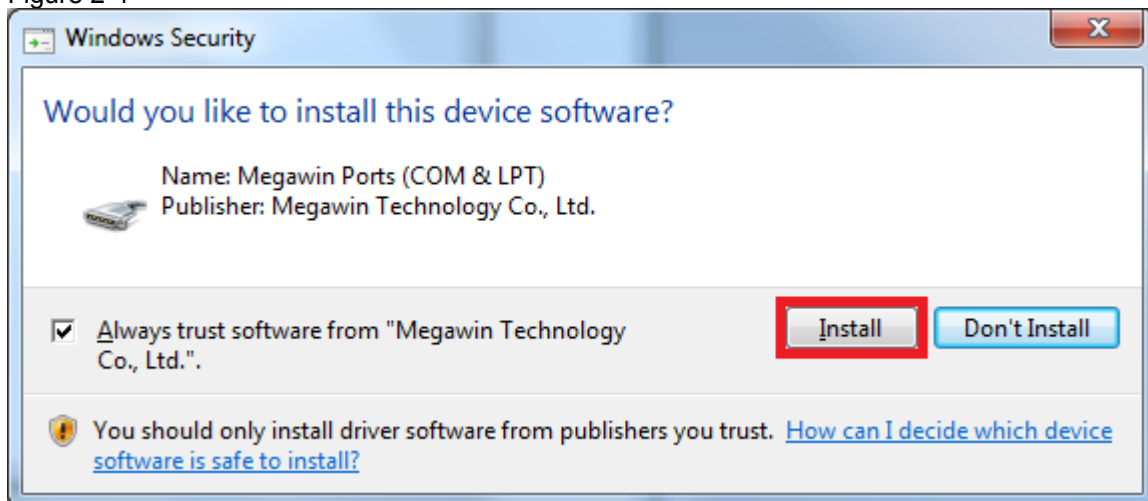
Step 3: Indicate Megawin MLink Virtual Com Port Driver path in the user's PC, OS will select SHA-1 or SHA-2 automatic.

Figure 2-3



Step 4: Click "Install" and wait a while.

Figure 2-4



Step 5: The user install driver successfully...

Figure 2-5

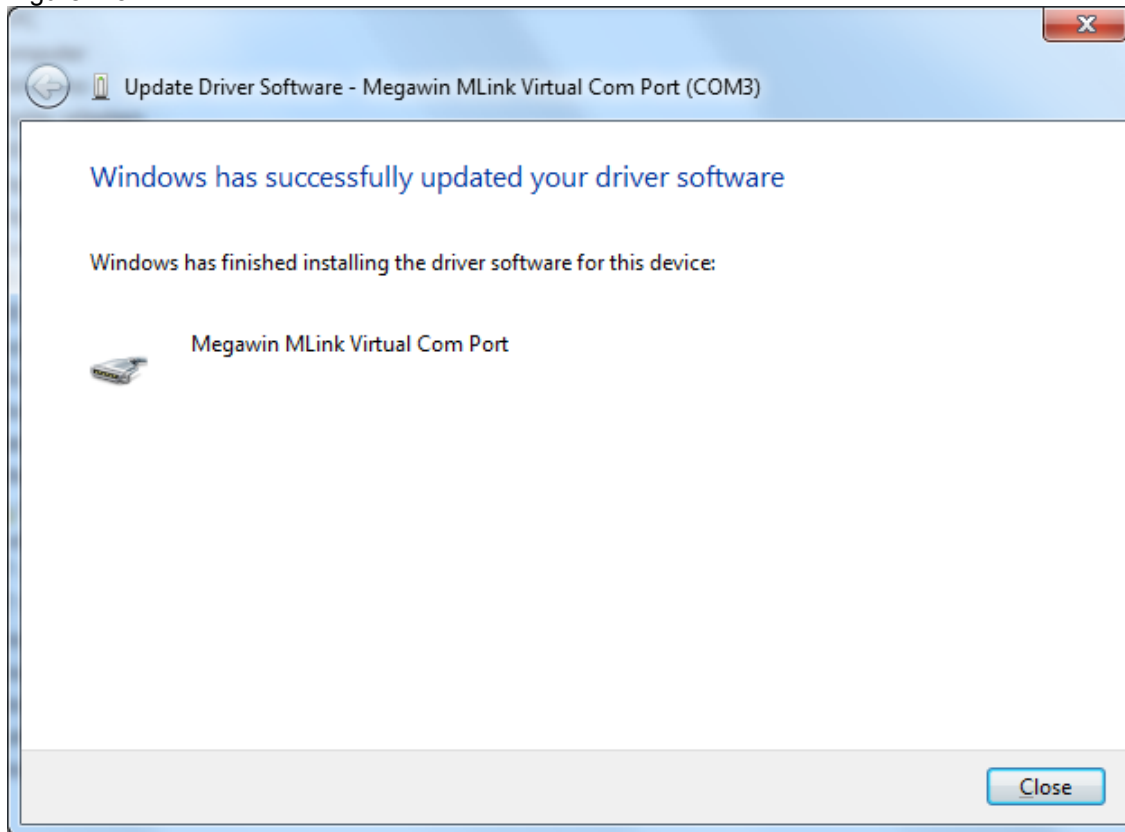
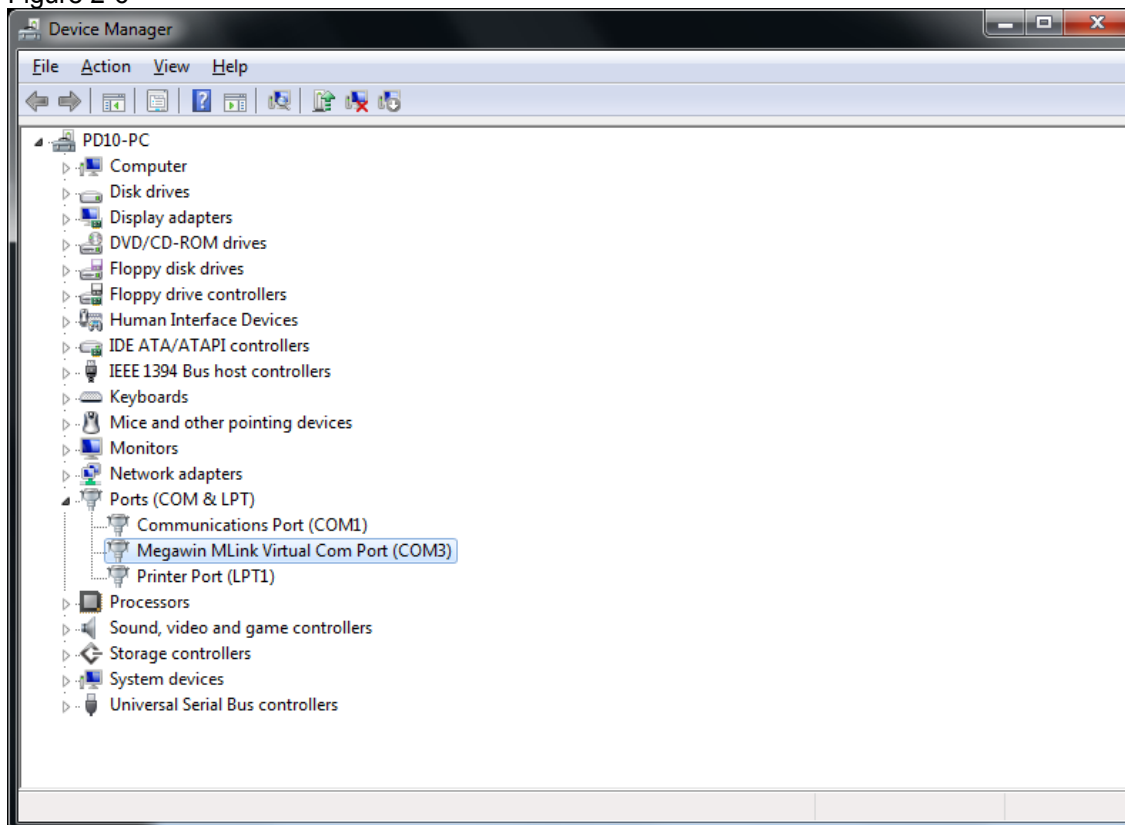


Figure 2-6





### 3. Revision History

Revision	Description	Date
V1.00	(1) New Create.	2021/02/18

## 4. Disclaimers

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**Life Support** — This product is not designed for use in medical, life-saving or life-sustaining applications, or systems where malfunction of this product can reasonably be expected to result in personal injury. Customers using or selling this product for use in such applications do so at their own risk and agree to fully indemnify Megawin for any damages resulting from such improper use or sale.

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