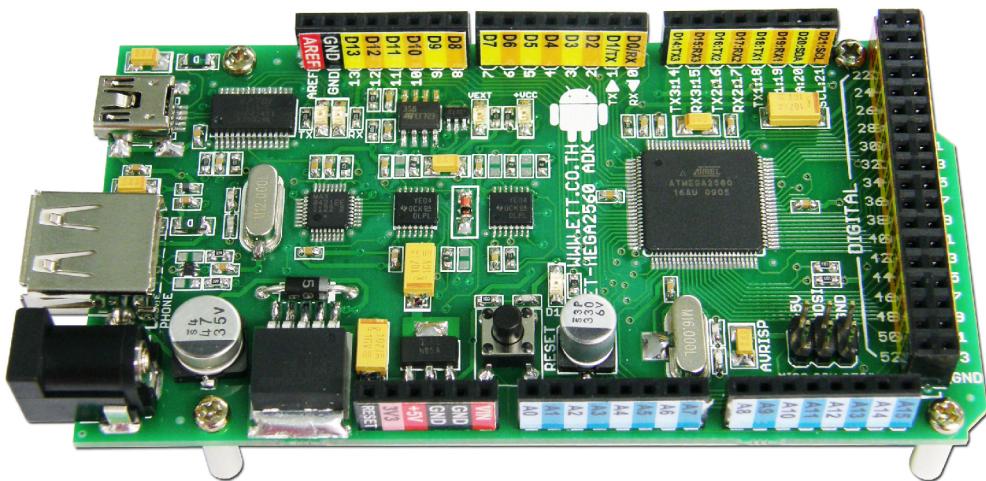


## ET-MEGA2560-ADK



Because Arduino that is the development project on AVR MCU as Open Source has been published, it is popular and widespread shortly. For Software, it has been continued developing; and nowadays (September, 2011) Program Arduino has been improved to be version "arduino-0022". For Hardware, it has been continued improving as same as Software. In the past, it only supports in developing program with small Chip MCU 28PIN such as ATMEGA8/ATMEGA88/ATMEGA168/ATMEGA328; and nowadays it can support in developing program with larger Chip MCU 100PIN such as ATMEGA1280/ATMEGA2560, respectively.

Recently, it has developed capabilities of Arduino on AVR to connect with USB Host devices, so Arduino can be modified to connect with various types of USB Device such as USB HID Keyboard or USB HID Mouse. Moreover, it is more interesting because this Arduino can be modified to interface with smart phones that use Operating System of Android. This Operating System is Open Source from Google, a large web browser of the world, called *Android Phone*. In this case, user can communicate and command Board Arduino through *Android Phone* well. This is a step of developing Arduino on AVR that makes this Arduino more interesting and outstanding.

Now, ETT has developed Chip AVR MCU No.ATMEGA2560 and MAX3421 to make Board Arduino called "**ET-MEGA2560-ADK**"; it has USB Host that supports the connection between USB Device and *Android Phone*. It has designed I/O Pins, including size according to the standard of Board "**Arduino Mega**"; moreover, it adds USB Host and improves some restrictions better. So, it is more convenient for user to use this device.

## Specifications of Board ET-MEGA2560-ADK

- Use ATMEGA2560 as MCU on Board; RUN by 16 MHz Frequency from Crystal Oscillator
- Has 256 Kbyte(4 KByte is reserved for Bootloader) / 8 KByte SRAM/ 4 KByte EEPROM
- 100% Support for developing program by C++ Language of Arduino according to Arduino MEGA
- Use USB Bridge No.FT232RL from FTDI and Over Current Protection to communicate and download Code from computer into board without using any external Programmer Device
- Use On Board USB Host(MAX3421) to interface with USB Device or Android ADK device
  - Support ADK (Android Open Accessories development Kit) to develop program; it uses Google Open Accessories API with Android device that has been installed Android Operating Systems V2.3.4 or higher.
  - Support [Android Debug Bridge](#) (ADB) to develop program; it uses Library of Microbridge with Android device that has been installed Android Operating Systems V1.5 or higher.
- Has 54Pin Digital I/O as follows;
  - 16 Pin Analog Input (10BIT 16-CH ADC)
  - 14 PWM outputs
  - 4 UART(Hardware Serial Port) as TTL Logic
  - 1 Hardware TWI (I2C)
  - 1 Hardware SPI (up to 8Mbps)
- Size of PCB Board and position of Pin Connectors accord with Arduino MEGA, so it can be used with all Board Shields that are made to support Board Arduino Mega. This PCB Board size is 5.3cm. x 10.2cm.
- Support External Supply that is both 7-12V AC and DC. It uses 1A Switching Regulate (LM2575-5V) to reduce heat when using very high current. It can use Power Supply from Port USB if using current is not higher than 500mA. In this case, there is circuit to choose Power Supply automatically; it disables Power Supply from USB automatically when it is connected with external Power Supply.

## Structure of Board ET-MEGA2560-ADK

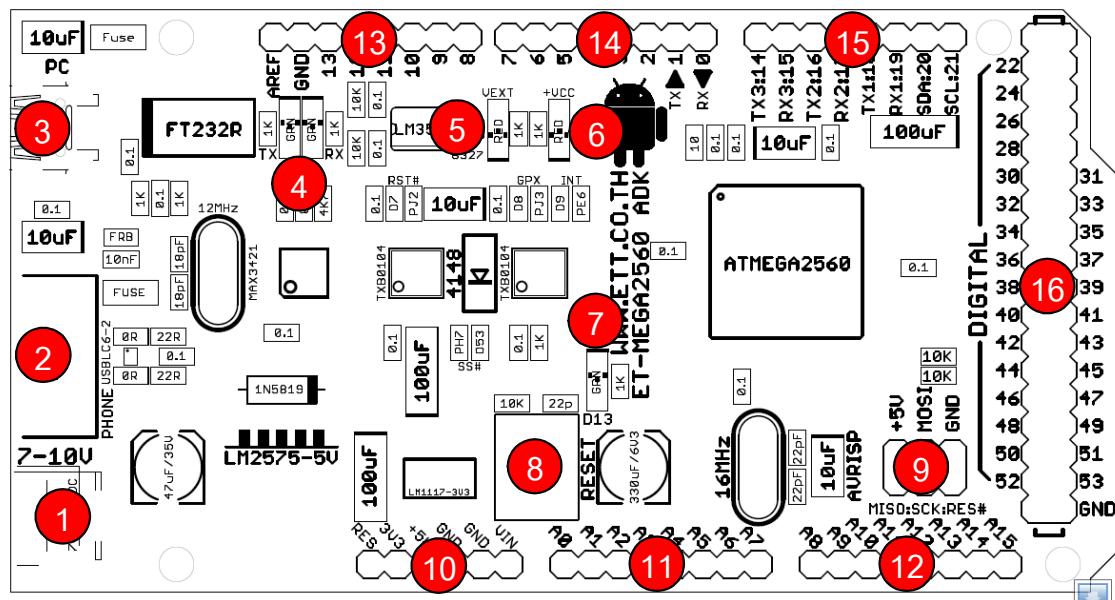
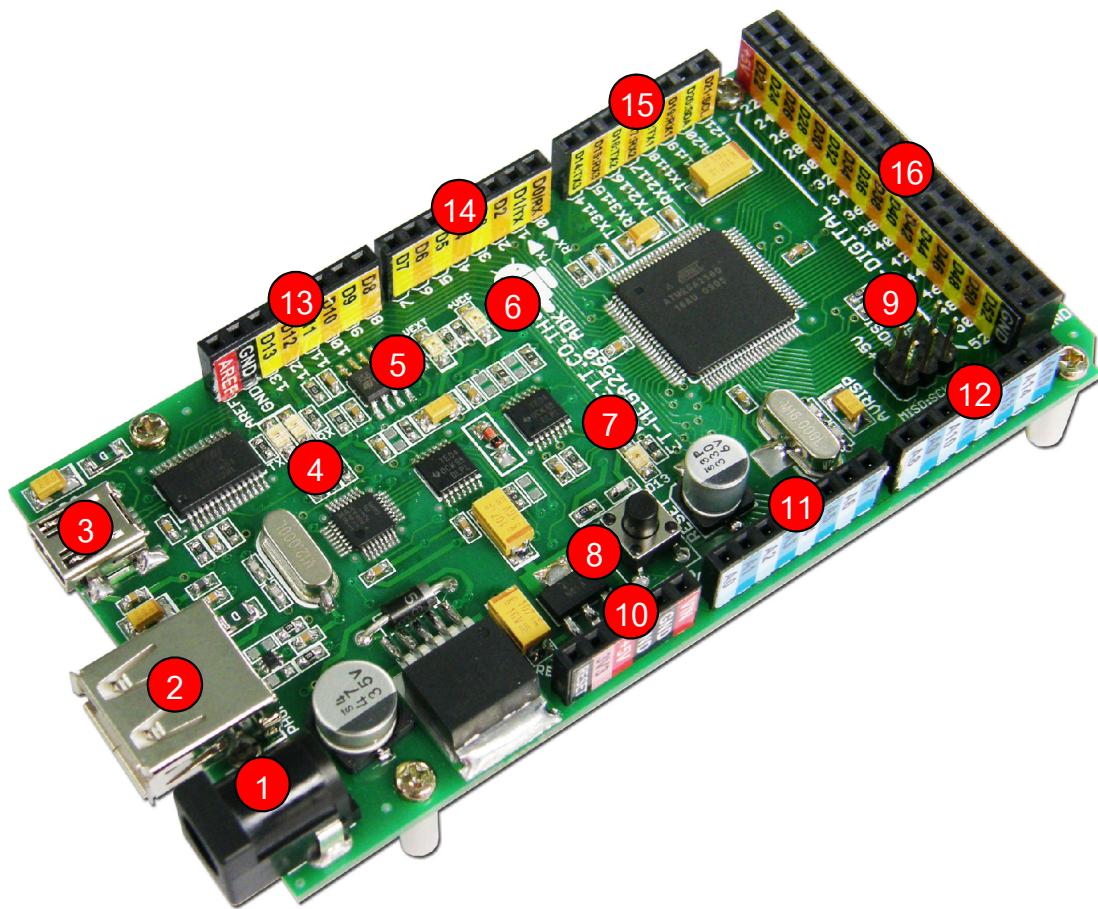


Figure shows the structure of Board ET-MEGA2560 ADK.

- **No.1:** It is Connector External Power Supply. It is compatible with both AC and DC; moreover, there is Circuit Bridge Rectifier and Switching Regulate to reduce heat of IC Regulate when it is pulled very high current. It can be used with 7-12V Input.
- **No.2:** It is Connector USB Host to interface with USB devices.
- **No.3:** It is Connector USB Device to communicate with computer PC; it uses FT232RL as USB Bridge to connect between computer PC and MCU on board. Moreover, it can use Power Supply from Port USB. There is 500mA Poly Fuse to protect Port USB from overload. It is more special because there is circuit to check source of Power Supply, it can alternate source of Power Supply between Port USB and External Power Supply automatically. If board is not interfaced with External Power Supply, board starts using power from Port USB instantly; on the other hand, if it interfaces with External Power Supply, it alternate to use power from External Power Supply automatically.
  - **LED +VCC:** It shows operating status when it is supplying power into board.
  - **LED VEXT:** It shows operating status when it is supplying power from External Power Supply.
- **No.4:** It is LED VEXT to display operating status when it is supplying power from External Power Supply.
- **No.5:** It is LEC +VCC to display operating status of Power Supply (+VCC) of board. When board uses Power Supply from External Power Supply, it makes both of LED VEXT and LED +VCC bright(ON); on the other hand, if board uses Power Supply from Port USB, only +VCC is bright (ON).
- **No.6:** It is LED to display the operating status of RX and TX. It shows the process of transmitting-receiving data between Board ET-MEGA2560-ADK and computer PC through Port USB.
- **No.7:** It is LED D13 to test the operation of BootLoader and test the operation of Board that is controlled by Pin Digital-13. It runs by Logic "1" and stops running by Logic "0"
- **No.8:** It is Switch RESET to reset the operation of Board.
- **No.9:** It is Connector AVRISP to program BootLoader into MCU.
- **No.10:** It is Connector Power.
- **No.11,12:** It is Connector Analog A[0..7] and Analog A[8..15], respectively.
- **No.13,14,15:** It is Connector Digital D[0..7], D[8..13] and D[14..21], respectively.
- **No.16:** It is Connector Digital D[22..53].

## Specification of signals of Board ET-MEGA2560-ADK

- **RESET#:** It is Signal Input Reset of MCU; it runs when it is Logic Low. This Signal RESET# is controlled by 2 sources; Switch RESET internal board and Signal DTR of FT232RL.
- **+3V3:** It is +3.3V Power Supply from Circuit Regulate of LM1117-3V3, it can supply the maximum current of 500mA.
- **+5V:** It is connecting point of Board for interfacing with external Power Supply; there are 2 sources; Port USB and External Supply. If board is interfaced with External Power Supply through Jack VIN; this +5V comes from Switching Regulate (LM2575-5V) and it can supply the maximum current at 1A. If board uses Power Supply from Port USB, this +5V comes from Port USB directly; there is 500mA Poly Fuse to protect Port USB from overload. In this case, it can supply the maximum current of 500mA, depending on setting Configuration for FT232RL.
- **+VIN:** It is DC from Jack VIN(External Supply) but it has already processed Rectifier and Filter as DC completely. The average of voltage depends on voltage that has supplied to the board through Jack VIN.
- **A0-A15:** It is Pin Analog Input that is 16Pin 10BIT ADC; it can receive Analog Input as 0-5VDC.
- **D0-D53:** It is Pin TTL Digital Input/Output; there are 54 pins that can be used either Input or Output according to the setting program. Moreover, some pins can be used as special function.
  - **D0-D1:** It is reserved for function RS232 Serial Port Communication (UART0). It interfaces with USB Bridge of FT232RL to upload Code into board; moreover, it can be used to transmit/receive data between board and computer PC.
  - **D2-D13:** It can be programmed as function 8BIT PWM; in this case, there are 14Pins.
  - **D14:** It can be programmed as function TX3 for transmitting-receiving data of UART3.
  - **D15:** It can be programmed as function RX3 to receive data of UART3.
  - **D16:** It can be programmed as function TX2 to transmit data of UART2.
  - **D17:** It can be programmed as function RX2 to receive data of UART2.
  - **D18:** It can be programmed as function RX1 to transmit data of UART1.
  - **D19:** It can be programmed as function RX1 to receive data of UART1.
  - **D20,D21:** It can be programmed as function SDA, SCL of I2C Bus of I2C.

- **AREF:** It is external Signal Analog Reference that supplies to MCU. Normally, ATMEGA2560 can be programmed to choose internal Reference Voltage; it can be 1.1V or 2.56V or AVCC(+5V) without supplying any external Reference Voltage into the board. If user requires supplying different Reference Voltage, user can supply external Reference Voltage in the range of 0-5V through this Pin AREF.
- **USB Host:** It interfaces with USB Device or Android Phone; it uses Chip USB Host No.MAX3421 to be intermediate between USB device and MCU ATMEGA2560. Nowadays, it creates Library free without any charge to support the connection; it can be modified to use with USB Host and Android Phone. If it uses Android Phone that has been installed the Operating System V2.3.4 or higher, it can be developed by Google ADK; on the other hand, if Android Phone does not support ADK, it can use ADB of Microbridge instead.
  - **USB Host Program Development:** It uses the format of developing program as same as general Board Arduino. In this case, it has modified MAX3421 to be USB Host device to interface with general USB Device such as USB HID Keyboard, USB HID Mouse, and so on.
  - **Android Program Development:** There are 2 methods to develop program as follows;
    - It develops program through Google Open Accessories API; this ADK (Android Open Accessories development Kit) puts emphasizes on developing and improving capabilities of Android Phone such as screen, Touch screen, or sensor devices that are contained in Android Phone. These capabilities can be used with Android Phone that has been installed the Operating System of Android version 2.3.4 and higher.
    - It develops program by ADB (Android Debug Bridge) through Library of Microbridge; it puts emphasizes on the communication between external I/O devices and Android device. If it interfaces with Arduino, it can use Android Phone to send instruction or receive data from Arduino such as Digital I/O, PWM, I2C Bus or Analog Input(ADC) as required. These capabilities can be used with all Android Phone versions that have been installed the Operating System of Android version V1.5 and higher.

The connection between MAX3421E and ATMEGA2560 of Board ET-MEGA2560-ADK uses 7 Cables as follows;

- MAX3421E RESET interfaces with PJ2 of ATMEGA2560.
- MAX3421E GPX interfaces with PJ3 of ATMEGA2560.
- MAX3421E SS interfaces with PH7 of ATMEGA2560.
- MAX3421E INT interfaces with PE6 of ATMEGA2560.
- MAX3421E MISO interfaces with PB3 (D50) of ATMEGA2560.
- MAX3421E MOSI interfaces with PB2 (D51) of ATMEGA2560.
- MAX3421E SCK interfaces with PB1 (D52) of ATMEGA2560.

