# FEZ Cobra Board

FEZ Cobra is based on the EMX Module, providing a more robust foundation. The benefits include 16 MB of RAM, 4.5 MB of flash memory, Ethernet and graphics support. Build your next project in minutes by connecting FEZ Cobra to one of the many shields or components.

Many libraries are included, such as FAT file system, threading, UART, SPI, I2C, GPIO, PWM, ADC, DAC and more.

## Powering FEZ Cobra

The easiest way to power FEZ Cobra is through the USB cable. In case the board is powered through USB, the voltage on the 5V pins will be sourced directly from the PC USB 5 volts, which is in most cases less than 5volts (4.5 to 5 volts).
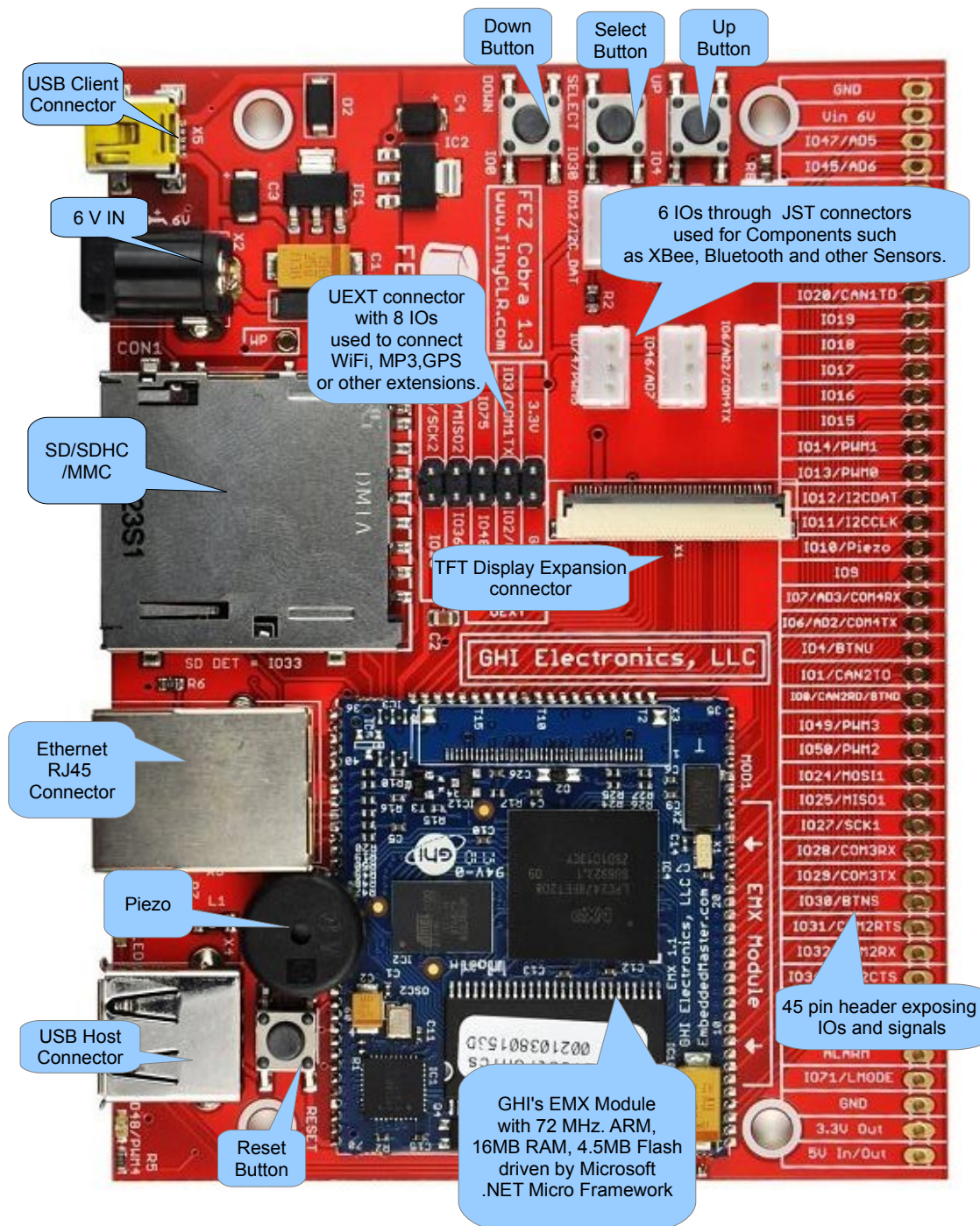
Optionally, the power connector can be used as well. Using either power source will efficiently supply power to the 3.3V and 5V pins. The regulators on cobra are capable of high voltages (over 12V) but, since FEZ Cobra draws a lot of power, the regulators will heat up especially when the TFT display is connected. Overheating will damage the regulators.
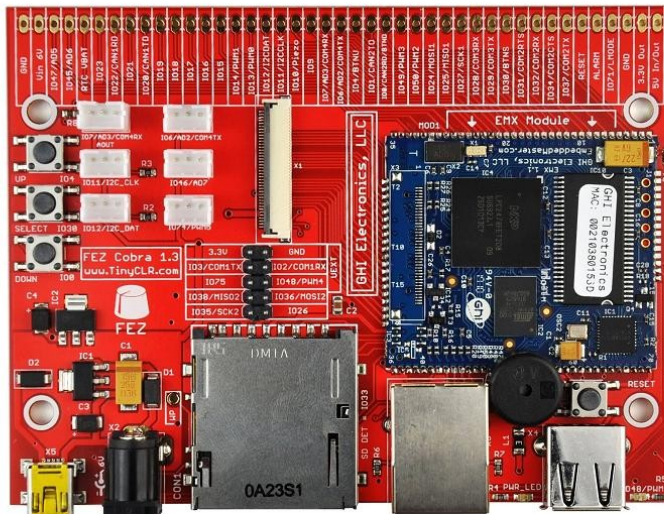
So this is what you should know when using external power source:

1. If you are not connecting any display then you can get away with up to 9V. We still recommend 6V. You do not need regulated 6V so any transformer should work.
2. If you are connecting a TFT display then definitely 6V only. You do not need regulated 6V so any transformer should work.
3. If you have REGULATED 5V and want to use that then solder a wire between VIN and 5V on the expansion header. Again, REGULATED 5V.

# A Glance on the Cobra

Down Button

Select Button

Up Button

USB Client Connector

6 V IN

UEXT connector with 8 IOs used to connect WiFi, MP3, GPS or other extensions.

6 IOs through JST connectors used for Components such as XBee, Bluetooth and other Sensors.

SD/SDHC /MMC

TFT Display Expansion connector

Ethernet RJ45 Connector

Piezo

USB Host Connector

45 pin header exposing IOs and signals

Reset Button

GHI's EMX Module with 72 MHz. ARM, 16MB RAM, 4.5MB Flash driven by Microsoft .NET Micro Framework

GHI Electronics, LLC

* IO11 and IO12 are open drain pins with 2.2K pull up resistors.

| GND |
| Vin 6-12V |
| IO47 |
| IO45 |
| RTC VBAT |
| IO23 |
| IO22 |
| IO21 |
| IO20 |
| IO19 |
| IO18 |
| IO17 |
| IO16 |
| IO15 |
| IO14 |
| IO13 |
| IO12 |
| IO11 |
| IO10 |
| IO9 |
| IO7 |
| IO6 |
| IO4 |
| IO1 |
| IO0 |
| IO49 |
| IO50 |
| IO24 |
| IO25 |
| IO27 |
| IO28 |
| IO29 |
| IO30 |
| IO31 |
| IO32 |
| IO34 |
| IO37 |
| RESET |
| ALARM |
| IO71 |
| GND |
| 3.3V Out |
| 5V In/Out |

## FEZ Cobra Pins Features

All pins on the 0.1" headers and extension headers can be used as digital input/output. Some pins have secondary features. Do not attempt to use a pin as digital and as a secondary feature simultaneously. For example, when using Di5 as PWM, do not use Di5 as a digital I/O until you release the PWM feature (in code).

| Pin | Secondary Features | Pin | Secondary Features | |
|-----|--------------------|-----|--------------------|---|
| IO47 | Analog Input 5 | IO6* | Analog Input2 | COM4 OUT |
| IO45* | Analog Input 6 | IO4* | Up Button | |
| IO23* | None | IO1* | CAN Channel 2 OUT | |
| IO22* | CAN Channel 1 IN | IO0* | CAN2 IN | Down Button |
| IO21* | None | IO49 | PWM3 | |
| IO20* | CAN Channel 1 OUT | IO50 | PWM2 | |
| IO19* | None | IO24* | SPI1 MOSI (OUT) | |
| IO18* | None | IO25* | SPI1 MISO (IN) | |
| IO17* | None | IO27* | SPI1 SCK (Clock) | |
| IO16 | None | IO28 | COM3 IN | |
| IO15 | None | IO29 | COM3 OUT | |
| IO14 | PWM1 | IO30* | Select Button | |
| IO13 | PWM0 | IO31 | COM2 RTS H/W handshaking | |
| IO12* | (Open Drain Pin) I2C SDA | IO32* | COM2 IN | |
| IO11* | (Open Drain Pin) I2C SCL | IO34 | COM2CTS H/W handshaking | |
| IO10 | Piezo | IO37* | COM2 OUT | |
| IO9 | None | IO71 | Loader MODE (COM1 or USB) | |
| IO7* | Analog Input 3  COM4 IN  Analog Output | IO33* | Connected to SD Detect | |

\* These pins can work as interrupt inputs
COM = USART = Serial Port

## UEXT Connector

UEXT connector is made to be compatible with extensions such as MP3 decoder, GPS or 3-axis accelerometer. Many extensions are already available on www.tinyclr.com
Also, this Connector is used to attach GHI's NETMF WiFi Expansion which is supported by EMX Modules.

| Pin | Secondary Features | Pin | Secondary Features |
|-----|--------------------|-----|--------------------|
| | 3.3V Out | | Ground |
| IO3* | COM1 OUT | IO2* | COM1 IN |
| IO75 | None | IO48 | PWM4 (connected LED) |
| IO38* | SPI2 MISO (IN) | IO36* | SPI2 MOSI (OUT) |
| IO35* | SPI2 SCK (Clock) | IO26* | None |

\* These pins can work as interrupt inputs
COM = USART = Serial Port

## JST Connectors

With these connectors you can plug directly many of components available on www.tinyclr.com such as Wireless XBee expansion, Bluetooth, or the many available sensors. that can plug directly onto FEZ. For example, to have some light indicators, we will need the LED component.
These JST female headers include 3 pins each. The middle pin is the signal which is connected directly to the relative pin on FEZ board, as marked on the header.

| Pin | Secondary Features | | Pin | Secondary Features | |
|-----|--------------------|---|-----|--------------------|---|
| IO7* | Analog Input 3  COM4 IN  Analog Output | | IO6* | Analog Input2 | COM4 OUT |
| IO11* | (Open Drain Pin) I2C SCL | | IO12* | (Open Drain Pin) I2C SDA | |
| IO46* | Analog Input 7 | | IO74 | PWM5 | |

\* These pins can work as interrupt inputs
COM = USART = Serial Port

## TFT Display Expansion

Provides the ability to connect TFT displays to FEZ Cobra and do color graphics! Made to work with both the 3.5" and 4.3" displays. Both displays have touch screens. This expansion is sold separately.
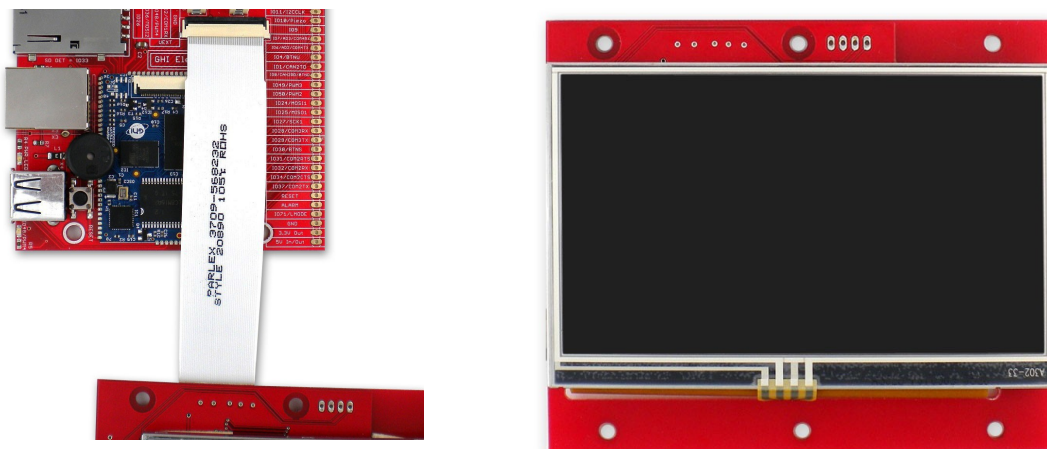
## An optional enclosure for your project with FEZ Cobra

This optional plastic enclosure is custom made for FEZ Cobra. The opening on one side exposes all the connectors and the opening on top side is ready for the TFT display. The other side of the enclosure is made for the user to add any additional components.

## USB Host Connector

USB host allows FEZ Cobra to access most USB devices. Reading a mouse, keyboard or joystick? How about reading and writing files on your thumb drive? Or controlling your printer? No problem, FEZ Domino can do it.

## SD card Connector

Developers can read/write files on SD cards directly with FEZ Domino with an on-board SD socket and FAT file system library.

## Networking with Fez Cobra (Ethernet, WiFi or GPRS)

Connect your FEZ Cobra to a wired network though **Ethernet**.

Your network is wireless?! No Problem.

Attach GHI's NETMF-WiFi expansion (not included) to UEXT connector! Your Cobra now is accessing your **wireless network**.

You prefer **GPRS or 3G** access? Also, not a big deal for FEZ Cobra. Attach any modem you like to serial interface and use the PPP feature provided with FEZ Cobra to connect to the Internet through your cellular provider.
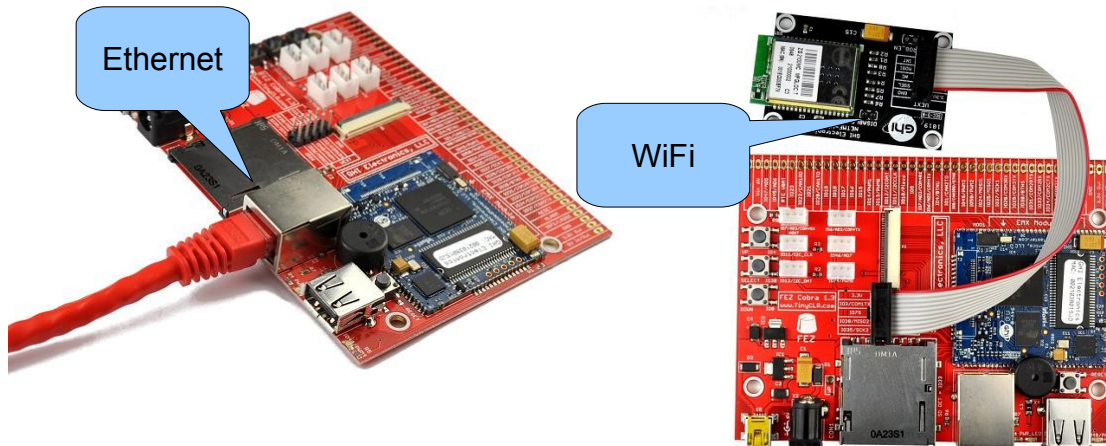


For detailed information about networking with FEZ Cobra, like setting IP addresses or DHCP please consult *EMX Module user manual* and GHIElectronics.NETMF.Net name space in *GHI SDK library documentation*.

## And More...

Your options with FEZ Cobra are nearly unlimited. Own one and discover the possibilities.  Do not forget to check our website www.tinyclr.com for all the information you need. Also your questions are always welcomed and appreciated on www.tinyclr.com/forum.

*For more details on EMX Module Consult EMX Module User Manual*