



# **EMX**<sup>™</sup> Development System



The EMX™ Development System is the official kit from GHI Electronics for the EMX module. EMX offers high performance and provides extensive capabilities. This kit exposes the various peripherals and interfaces that make it an ideal starting point for any .NET Micro Framework project. Furthermore, most of EMX module signals such as GPIO, SPI and UART are accessible on a 0.1" header for rapid prototyping.

#### What is Microsoft .NET Micro Framework?

Microsoft's .NET Micro Framework extends the advantages of .NET and Visual Studio to a class of smaller, less expensive, and more resource-constrained devices than the .NET Compact Framework or the standard .NET framework.

## What is the EMX Module?

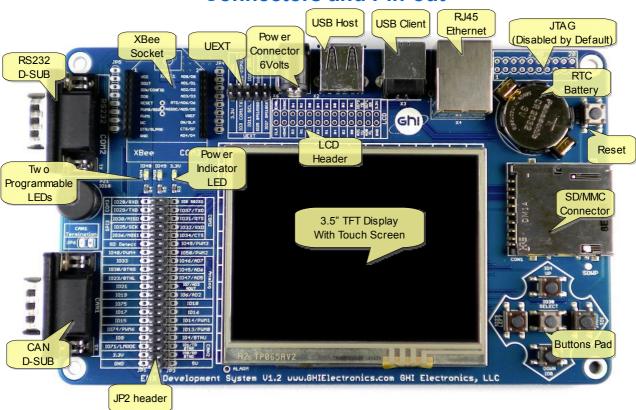
The EMX™ Module implements Microsoft's .NET Micro Framework on a very small (1.55"x1.8") OEM board. On top of the many benefits that .NET Micro Framework has, EMX™ adds many other exclusive software and hardware features such as USB host, and Runtime Loadable Procedure (allowing advanced users to run compiled C/assembly right in C# code). EMX supports WiFi through ZeroG ZG2100 modules. Refer to the EMX Module brochure for full features.

### **Key Features**

- EMX Module with .NET Micro Framework
  - 72 MHz 32-bit ARM 7 Processor
  - 16MB RAM and 4.5MB FLASH
- 320 x 240 3.5" TFT Display with touch screen.
- RJ-45 Ethernet connector.
- GHI NETMF WiFi Expansion compatible.
- Standard JTAG connector (only available for GHI partners).
- TFT signals exposed.
- GPIO signals with interrupts exposed on 0.1" header pins with on-board pin descriptions.
- 2 SPI Master bus (8/16bit).
- I2C interface.
- 4 exposed UART (serial ports), one RS232 interface with hardware handshaking.
- 7 analog inputs (ADC), 2 are used with touch screen.
- 1 analog output (DAC).
- 2 CAN interfaces, CAN 1 is connected to CAN PHY with 9-DSUB interface.
- 6 PWM signals.
- One-wire interface support
- SD/MMC card connector with spring.
- USB Device port
- USB Host port
- XBee module socket.
- UEXT interface for easy expansions such as GPS, MP3 decoder or 3-axis accelerometer.
- Real Time Clock backup battery.
- LEDs and push buttons.
- On-board Piezo.
- Powered by USB or DC power (input 6 volts through 2.1mm power connector).
- RoHS Lead Free

GHI Electronics,LLC EMX Development System

# **Connectors and Pin-out**





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	Ρ1	JP2 J	P	2
JI	_	JPZ J	г,	a

Note	$\overline{}$	i		r —			
IO29/TXD(OUT)   3   4   IO37*/TXD(OUT)   SO   IO38*/MISO   5   6   IO31*/RTS   IO35*/SCK   7   8   IO32*/RXD(IN)   IO36*/MOSI   9   10   IO34*/CTS   IO49/PWM3   IO48*/PWM4   13   14   IO50/PWM2   IO33*   15   16   IO46*/Analog Input7   IO30*/Select Button   17   18   IO45*/Analog Input6   IO23*/Left Button   19   20   IO47/Analog Input5   IO19*   21   22   IO7*/Analog Input3/Analog Output   IO19*   23   24   IO6*/Analog Input2   IO75   25   26   IO18*   IO17*   27   28   IO16   IO15   29   30   IO14/PWM1   IO74/PWM5   31   32   IO13/PWM0   IO9   33   34   IO4*/Up Button   IO71/Loader Mode   35   36   IO1*/TD/Right Button   3.3Volts OUT   37   38   IO0*/RD/Down Button   OVER TOTAL POWN   IO9   IO1*/TD/Right Button   IO71/Loader Mode   35   36   IO1*/TD/Right Button   IO71/Loader Mode   35   36   IO1*/TD/Right Button   IO71/Loader Mode   37   38   IO0*/RD/Down Button   IO71/Loader Mode   37   IO0*/RD/Down Button   IO71/Loader Mode   37   IO0*/RD/Down Button   IO71/Loader Mode   37   IO0*/RD/Down Button   IO0*/RD/Down Button   IO0*/RD/Down Button   IO0*/RD/Down III   IO0*/RD/Down	COM3	IO28/RXD(IN)	1	2	Disable (disabled		
No.   No.			3	4	IO37*/TXD(OUT)	)M2	
IO36*/MOSI   9   10   IO34*/CTS     SD Detect (from SD socket)   11   12   IO49/PWM3     IO48*/PWM4   13   14   IO50/PWM2     IO33*   15   16   IO46*/Analog Input7     IO30*/Select Button   17   18   IO45*/Analog Input6     IO23*/Left Button   19   20   IO47/Analog Input5     IO21*   21   22   IO7*/Analog Input5     IO19*   23   24   IO6*/Analog Input2     IO75   25   26   IO18*     IO17*   27   28   IO16     IO15   29   30   IO14/PWM1     IO74/PWM5   31   32   IO13/PWM0     IO9   33   34   IO4*/Up Button     IO71/Loader Mode   35   36   IO1*/TD/Right Button     3.3Volts OUT   37   38   IO0*/RD/Down Button		IO38*/MISO		6	IO31*/RTS	8	
IO36*/MOSI   9   10   IO34*/CTS     SD Detect (from SD socket)   11   12   IO49/PWM3     IO48*/PWM4   13   14   IO50/PWM2     IO33*   15   16   IO46*/Analog Input7     IO30*/Select Button   17   18   IO45*/Analog Input6     IO23*/Left Button   19   20   IO47/Analog Input5     IO21*   21   22   IO7*/Analog Input5     IO19*   23   24   IO6*/Analog Input2     IO75   25   26   IO18*     IO17*   27   28   IO16     IO15   29   30   IO14/PWM1     IO74/PWM5   31   32   IO13/PWM0     IO9   33   34   IO4*/Up Button     IO71/Loader Mode   35   36   IO1*/TD/Right Button     3.3Volts OUT   37   38   IO0*/RD/Down Button	SPIZ	IO35*/SCK		8	IO32*/RXD(IN)		
Socket   11   12   1049/PWWM3   1048*/PWWM4   13   14   1050/PWM2   1033*   15   16   1046*/Analog Input7   1030*/Select Button   17   18   1045*/Analog Input6   1023*/Left Button   19   20   1047/Analog Input5   1021*   21   22   107*/Analog Input3/Analog Output   1019*   23   24   106*/Analog Input2   1075   25   26   1018*   1017*   27   28   1016   1015   29   30   1014/PWM1   1074/PWM5   31   32   1013/PWM0   109   33   34   104*/Up Button   1071/Loader Mode   35   36   101*/TD/Right Button   3.3Volts OUT   37   38   100*/RD/Down		IO36*/MOSI		10	IO34*/CTS		
IO33*				12	IO49/PWM3		
IO30*/Select Button		IO48*/PWM4	13	14	IO50/PWM2		
IO23*/Left Button		IO33*	15	16	IO46*/Analog Input7		
1021   21   22   Input3/Analog Output   1019*   23   24   IO6*/Analog Input2   1075   25   26   IO18*   1017*   27   28   IO16   1015   29   30   IO14/PWM1   1074/PWM5   31   32   IO13/PWM0   109   33   34   IO4*/Up Button   1071/Loader Mode   35   36   IO1*/TD/Right Button   3.3Volts OUT   37   38   IO0*/RD/Down Button   37   38   IO0*/RD/Down Button   37   38   IO0*/RD/Down Button   37   38   I		IO30*/Select Button			IO45*/Analog Input6		
1021   21   22   Input3/Analog Output   1019*   23   24   IO6*/Analog Input2   1075   25   26   IO18*   1017*   27   28   IO16   1015   29   30   IO14/PWM1   1074/PWM5   31   32   IO13/PWM0   109   33   34   IO4*/Up Button   1071/Loader Mode   35   36   IO1*/TD/Right Button   3.3Volts OUT   37   38   IO0*/RD/Down Button   37   38   IO0*/RD/Down Button   37   38   IO0*/RD/Down Button   37   38   I	IO23*/Left Button			20	IO47/Analog Input5	alog	
IO75	IO21*			22		Ā	
IO17*   27   28   IO16     IO15   29   30   IO14/PWM1   IO74/PWM5   31   32   IO13/PWM0   IO9   33   34   IO4*/Up Button   IO71/Loader Mode   35   36   IO1*/TD/Right Button   3.3Volts OUT   37   38   IO0*/RD/Down Button   Over the second	IO19*			24	IO6*/Analog Input2		
IO15   29   30   IO14/PWM1   IO74/PWM5   31   32   IO13/PWM0   IO9   33   34   IO4*/Up Button   IO71/Loader Mode   35   36   IO1*/TD/Right Button   3.3Volts OUT   37   38   IO0*/RD/Down Button   OVER DISTRIBUTION   OVER DIS		IO75	25	26	IO18*		
IO74/PWM5   31   32   IO13/PWM0   IO9   33   34   IO4*/Up Button   IO71/Loader Mode   35   36   IO1*/TD/Right Button   States   3.3Volts OUT   37   38   IO0*/RD/Down Button   38   38   38   38   38   38   38   3		IO17*	27	28	IO16		
IO9   33   34   IO4*/Up Button   IO71/Loader Mode   35   36   IO1*/TD/Right Button   State of the state of	IO15			30	IO14/PWM1		
IO71/Loader Mode 35 36 IO1*/TD/Right Button 3.3Volts OUT 37 38 IO0*/RD/Down Button	IO74/PWM5			32	IO13/PWM0		
	IO9			34	IO4*/Up Button		
		IO71/Loader Mode		36	IO1*/TD/Right Button	Z .	
Ground 39 40 5Volts OUT	3.3Volts OUT			38	IO0*/RD/Down Button	S	
Ground Go 10 Grone GG1	Ground			40	5Volts OUT		

# **UEXT**

3.3Volts OUT	1	2	Ground
IO3*/ COM1_TX	3	4	IO2*/ COM1_RX
IO11*/ I2C_SCL	5	6	IO12*/ I2C_SDA
IO25*/ SPI1_MISO	7	8	IO24*/ SPI1_MOSI
IO27*/ SPI1_SCK	9	10	IO26*

<sup>\*</sup> Interrupt capable input.

JP5 and JP4 pins are connected directly to XBee socket pins. Consult EMX Development System schematic for more details about connections.

# **LCD**

	IO63*/ Enable	IO62*/ Vertical Sync	IO68*/Red4	IO66*/Red2	IO69*/Red0	IO55/Green4	IO53/Green2	IO51/Green0	IO59/Blue3	IO57/Blue1	IO73/ Touch Screen Y-Down	IO72/ Touch Screen X-Right	3.3Volts
-	7	4	9	∞	10	12	4	16	9	20	73	24	26
	_	ဗ	5	7	9	7	13	15	17	19	21	23	25
	1061*/ Clock	IO64*/ Horizontal Sync	IO67*/Red3	IO65*/Red1	IO56/Green5	IO54/Green3	IO52/Green1	IO60/Blue4	IO58/Blue2	IO70*/Blue0	Analog Input1/ Touch Screen Y-Up	Analog Input0/ Touch Screen X-Left	Ground

#### **LEDs**

LED name	LED1	LED2	3.3V	
Connection	IO48	IO49	3.3 Volt supply	

#### **Push Buttons**

Button name	UP	DOWN	LEFT	RIGHT	SELECT	RESET
Connection	IO4	IO0	IO23	IO1	IO30	System Hard Reset

#### **EMX Development System Kit Includes:**

- **EMX Development System Main Board**
- **EMX Module**
- 3.5" TFT Display with Touch Screen
- **RTC Battery**
- **USB** Cable

Important Note1: WiFi-Expansion is not included with the kit.

http://www.ghielectronics.com/product/126

**Important Note2:** XBee module is not included with the kit.

XBee modules are available from Digi:

http://www.digi.com/products/embeddedsolutions/zigbeesolutions

#### For more information:

# **Related Documents**

**EMX Module Brochure and Pin out** 

**EMX User Manual** 

#### Websites

http://www.ghielectronics.com

# **Customer Technical Support**

http://www.ghielectronics.com/forum



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