# G120 Module

premium hardware
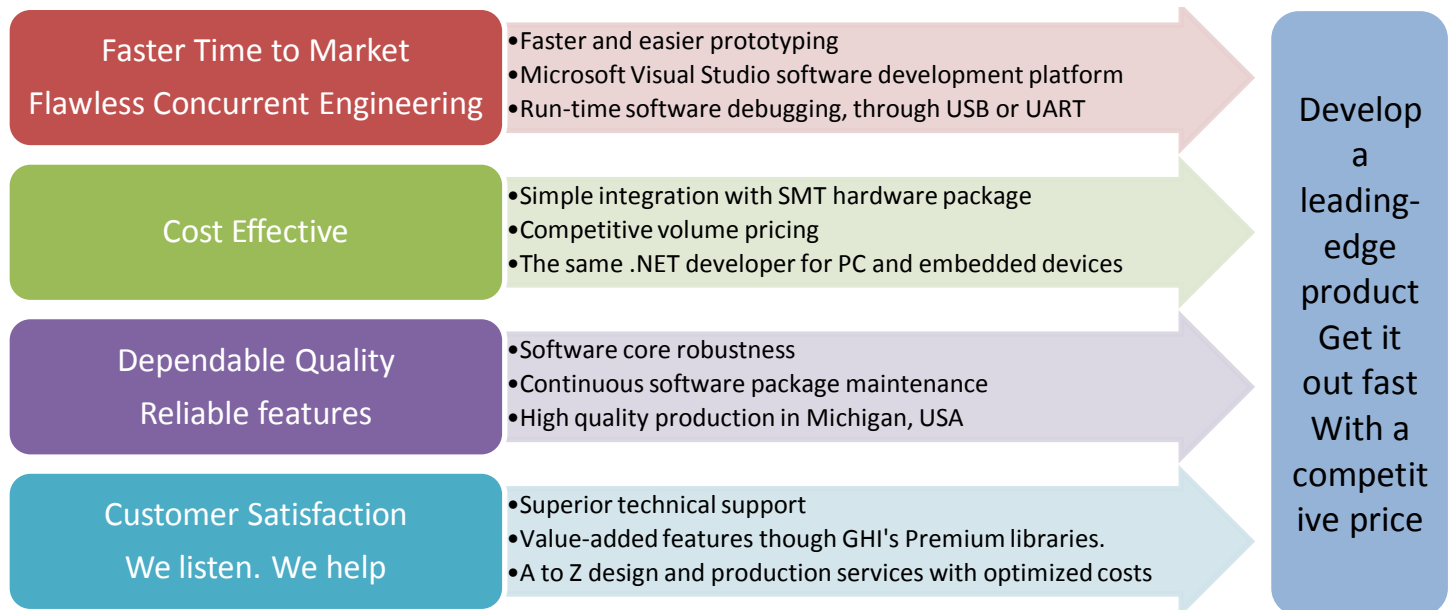
G120 Module is a surface-mount System on Module (SoM) that runs .NET Micro Framework software platform; a tiny version of Microsoft .NET framework. The value of G120 Module is not only in the hardware capabilities such as the Cortex-M3 processor, memory and peripherals, but also is in the integration between the hardware and the embedded software. This provides high level features such as FAT file system, TCP/IP stack, Graphics and Threading to the developer through .NET APIs. Furthermore, the embedded software includes GHI Electronics' Premium .NET Micro Framework Libraries that adds support to important features such as WiFi, USB Host, PPP, SQLite, and In-Field Update. All are provided royalty-free with G120 Module.

## Benefits

| | |
|---|---|
| **Faster Time to Market** / Flawless Concurrent Engineering | • Faster and easier prototyping<br>• Microsoft Visual Studio software development platform<br>• Run-time software debugging, through USB or UART |
| **Cost Effective** | • Simple integration with SMT hardware package<br>• Competitive volume pricing<br>• The same .NET developer for PC and embedded devices |
| **Dependable Quality** / Reliable features | • Software core robustness<br>• Continuous software package maintenance<br>• High quality production in Michigan, USA |
| **Customer Satisfaction** / We listen. We help | • Superior technical support<br>• Value-added features though GHI's Premium libraries.<br>• A to Z design and production services with optimized costs |

Develop a leading-edge product Get it out fast With a competitive price

## Key Features

NXP LPC17xx Cortex-M3 120MHz Processor
16Mbytes of RAM
4.5Mbytes of Flash
Embedded LCD Controller
USB Host/Device with drivers
4-bit SD card interface

Plenty of essential peripherals such as GPIO, SPI, UART, I2C, CAN, ADC, DAC and PWM.
High level features such as file system, networking (Ethernet, WiFi, PPP), SQLite database, and Graphics.
Low profile SMT SoM
Supports Visual C# and Visual Basic programming languages

## Applications

- Graphical Human Machine Interface
- Data Logger
- Hand held testers
- Internet of things applications
- Networked alarm systems
- Automation applications
- Controllers, Robotics

| Specifications | |
|---|---|
| Package | SMT Module 91 pins |
| Dimensions WxLxH mm | 26.67 x 38.1 x TBA |
| Processor | 120MHz 32-bit ARM Cortex-M3 |
| FLASH Available/Free | 4.5MB/3.5MB |
| RAM Available/Free | 16MB/14MB |
| Color TFT Display Controller | Available |
| Graphics (font/controls) | Complete |
| Image Decoder | BMP, GIF, JPG |
| Native Networking Support | Ethernet/WiFi/PPP with SSL |
| Programmable IOs | 72 |
| PWM | 12 |
| Analog Input | 8 |
| Analog Output | 1 |
| UART (COM) | 5 |
| SPI | 3 |
| I2C | Available |
| CAN | 2 |
| One-wire | Supported on all IOs |
| USB Host | HID, Mass Storage, CDC, Webcam, Raw |
| USB Client | HID, Mass Storage, CDC, Raw |
| 4bit SDHC/SD/MMC | Supported |
| Real Time Clock | Available |
| Piracy Protection | Available |
| In-Field Update | Available |
| Operating Temperature | -40° to +85° |
| Lead Free | Yes |
| RoHS Compliant | Yes |
| Extended Library | Premium Library |
| Load native C/assembly | Runtime Loadable Procedures |
| Power Consumption | TBD |
| Sleep/Hibernate | TBD/TBD |

## Getting Starter Tools

GHI Electronics' FEZ (Fast and Easy) product line offers a wide variety of open-source products that use GHI's Premium SoMs.

FEZ products are an excellent starting point to evaluate any of GHI's SoMs. FEZ provides a wide variety of Mainboards and peripherals in a standard modular platform that help accelerate your next product's design process, such as WiFi, Ethernet, Motor Drivers, MEMS modules and sensors.
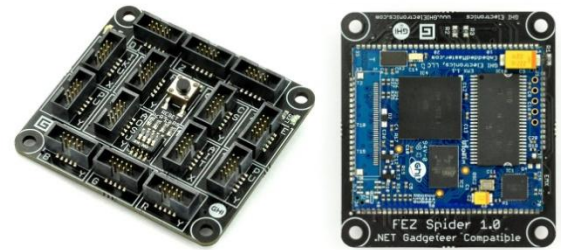


**Main Board (with SoM)**



**WiFi Module**



**7" Display with Multi-touch Capacitive Screen**

# G120 Module

## Pin-out



**Top connector (pins 91–73):**

| Pin | Port | Function |
|---|---|---|
| 91 | P1_5 | PWM2 |
| 90 | P2_3 | VSync / PWM9 |
| 89 | P2_6 | LCD Red1 |
| 88 | P2_9 | Red4 / RXD5 |
| 87 | P2_7 | LCD Red2 |
| 86 | P2_2 | LCD CLK |
| 85 | P2_5 | HSync / PWM11 |
| 84 | P2_12 | LCD Red0 |
| 83 | P2_13 | LCD Blue0 |
| 82 | P1_27 | LCD Blue2 |
| 81 | | Ground |
| 80 | P1_29 | Blue4 / TXD5 |
| 79 | P1_28 | LCD Blue3 |
| 78 | P1_26 | LCD Blue1 |
| 77 | P1_25 | LCD Green5 |
| 76 | P1_20 | LCD Green0 |
| 75 | P1_24 | LCD Green4 |
| 74 | P1_23 | LCD Green3 |
| 73 | P1_19 | COM3 OE |

**Left side (pins 01–27):**

| Function | | Port | Pin |
|---|---|---|---|
| Ground | | | 01 |
| VCC 3.3V | | | 02 |
| PWM10 | LCD Enable | P2_4 | 03 |
| LCD Red3 | | P2_8 | 04 |
| CAN1 RD | | P0_0 | 05 |
| COM3 TXD | | P0_10 | 06 |
| ENT1# | | P2_11 | 07 |
| LDR0 | | P2_10 | 08 |
| COM3 RXD | | P0_11 | 09 |
| CAN1 TD | | P0_1 | 10 |
| SPI1 MOSI | | P0_18 | 11 |
| COM2 RXD | | P0_16 | 12 |
| SPI1 SCK | | P0_15 | 13 |
| LDR1 | | P0_22 | 14 |
| COM2 CTS | SPI1 MISO | P0_17 | 15 |
| MODE (USB/COM1#) | | P2_1 | 16 |
| COM2 RTS/OE | | P0_6 | 17 |
| COM2 TXD | | P2_0 | 18 |
| SPI2 SCK | | | 19 |
| SPI2 MISO | | | 20 |
| SPI2 MOSI | | | 21 |
| SD D3 | | P1_12 | 22 |
| PWM5 | SD D2 | P1_11 | 23 |
| PWM4 | SD D1 | P1_7 | 24 |
| PWM0 | SD CLK | P1_2 | 25 |
| PWM3 | SD D0 | P1_6 | 26 |
| Ground | | | 27 |

**Right side (pins 72–46):**

| Pin | Port | Function |
|---|---|---|
| 72 | P1_21 | LCD Green1 |
| 71 | P1_22 | LCD Green2 |
| 70 | P2_21 | |
| 69 | | USB Host D+ |
| 68 | | USB Host D- |
| 67 | | USB Client D- |
| 66 | | USB Client D+ |
| 65 | P3_24 | PWM6 |
| 64 | P3_25 | PWM7 |
| 63 | P0_27 | I2C SDA* |
| 62 | P1_31 | AD5 |
| 61 | P0_28 | I2C SCL* |
| 60 | | RTC VBAT |
| 59 | P1_30 | AD4 / COM4 OE |
| 58 | | RTC Crystal 2 |
| 57 | | RTC Crystal 1 |
| 56 | P0_12 | AD6 |
| 55 | P0_13 | AD7 |
| 54 | P3_26 | PWM8 |
| 53 | | Reset# |
| 52 | P0_23 | AD0 |
| 51 | P0_25 | AD2 |
| 50 | P0_24 | AD1 |
| 49 | P0_26 | AD3/AOUT0 |
| 48 | P0_2 | COM1 TXD |
| 47 | P0_3 | COM1 RXD |
| 46 | | VCC 3.3V |

\* Open drain ports

**Bottom connector (pins 28–45):**

| Pin | Port | Function |
|---|---|---|
| 28 | P1_3 | SD CMD / PWM1 |
| 29 | P0_5 | CAN2 TD |
| 30 | P0_4 | CAN2 RD |
| 31 | P4_28 | COM4 TXD |
| 32 | P4_29 | COM4 RXD |
| 33 | P1_14 | |
| 34 | P1_17 | |
| 35 | P1_16 | |
| 36 | P1_15 | |
| 37 | P1_9 | |
| 38 | P1_10 | |
| 39 | P1_4 | SPI3 MISO |
| 40 | P1_8 | |
| 41 | P1_1 | SPI3 MOSI |
| 42 | P1_0 | SPI3 SCK |
| 43 | | SWD CLK (inaccessible) |
| 44 | | SWD IO (inaccessible) |
| 45 | | Ground |

**LDR0 LDR1 Boot Access**

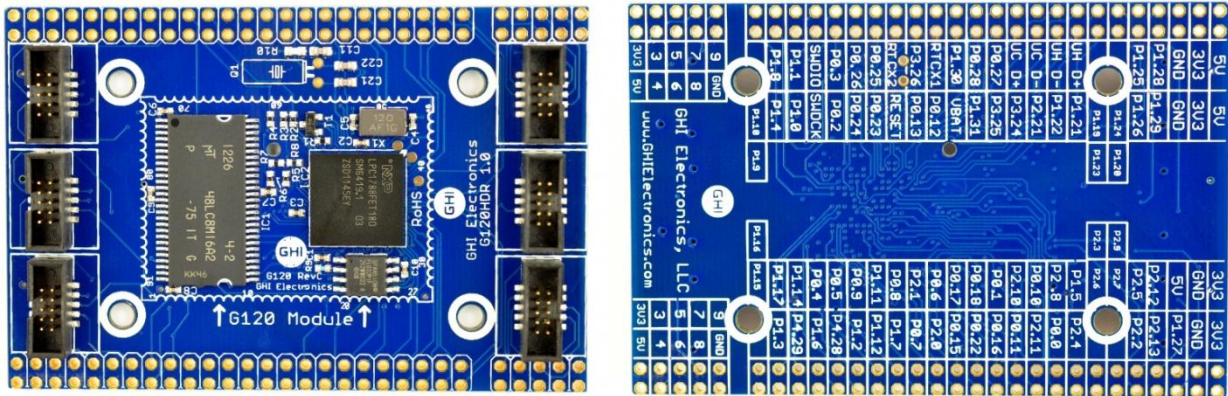| LDR0 | LDR1 | Boot Access |
|---|---|---|
| X | High | Firmware |
| High | Low | Tinybooter |
| Low | Low | GHI Bootloader |

GPIOs P0_x and P2_x are Interrupt Capable. All pins are 5 volt tolerant.

premium hardware

## G120HDR Module

For convenience, G120 module is offered in a through hole version. All signals are exposed on header placements, including display signals. The module only needs 3.3V to operate.



The module also brings the display signals and USB Client to .NET Gadgeteer sockets. This provides an easy way to add one of the Gadgeteer displays and also makes an easy way to add power supply and USB connector through one of the USB client power modules.
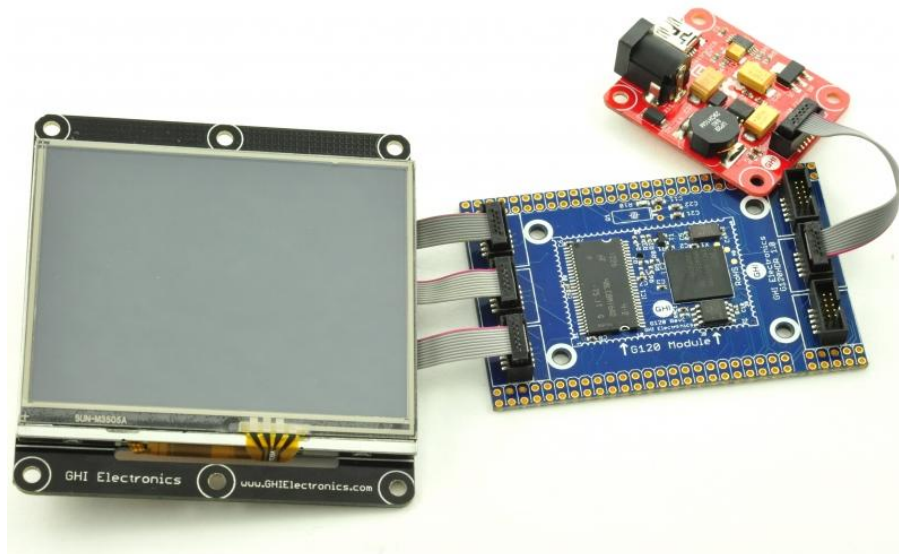


For additional flexibility, two .NET Gadgeteer sockets are exposed to pads allowing developers to wire these sockets to any signal which in turn allow the use of one or more for the ever expanding list of .NET Gadgeteer modules.

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