

# **ECU16RC “Mercury”**

## **Robotics Control Platform**

### **Hardware Version G1A**

## **Specifications**

**16-bit 40MHz DSP • Motor Control • Flexible & Expandable • Small Form Factor • 6-Axis IMU On-Board • Matlab/Simulink Support**

- Microchip dsPIC33FJ256MC710A 16-bit DSP, 40MHz, 30KB RAM, fast floating-point math
- Dual microcontroller system
  - “Master Node” dedicated to user code
  - “MCN” (Motor Control Node), dedicated to motor control and on-board firmware
- Supports motor control of up to 4 independent axes, using Maxon Motors EPOS2 high performance motor controllers (CANbus version) via Robotic Elements Firmware on MCN
- Support for EPOS4 planned in future firmware release
- On-board Bluetooth (Classic) module for wireless capability, e.g., wireless re-programming, data logging, signal injection. Interfaced via UART and available on a PC using simple COM port interface (SPP)
- Rapid prototyping with MATLAB/Simulink<sup>1</sup>, Matlab Tools blockset from Microchip<sup>2</sup>
- Completely integrated, build executable code with the push of one button
- Optimized for robotic applications
- Optimized design, very small form factor: 38x64x10mm (1.50x2.52x0.39in)
- Input voltage 12 – 36V, all power supplies on-board
- Easy expansion with other Robotic Elements modules, e.g. Micro Encoder Module, EPOS Plug-In Module, User Interface Module. No custom cables needed.
- Expand with your own modules using the various connectors and ample headroom on power supply (100mA @ 5.5V)
- Simulink API and quick-start Simulink models available upon request, free of charge

---

<sup>1</sup> Matlab/Simulink separately available from Mathworks Inc. At a minimum the following toolboxes are required: Matlab Coder, Simulink Coder, Embedded Coder.

<sup>2</sup> Matlab Tools separately available from Microchip Inc. At the time of writing of this reference this software is available free of charge as a Matlab “Add-on” tool.

# 1 ELECTRICAL SPECIFICATIONS

## 1.1 Functions and Interfaces

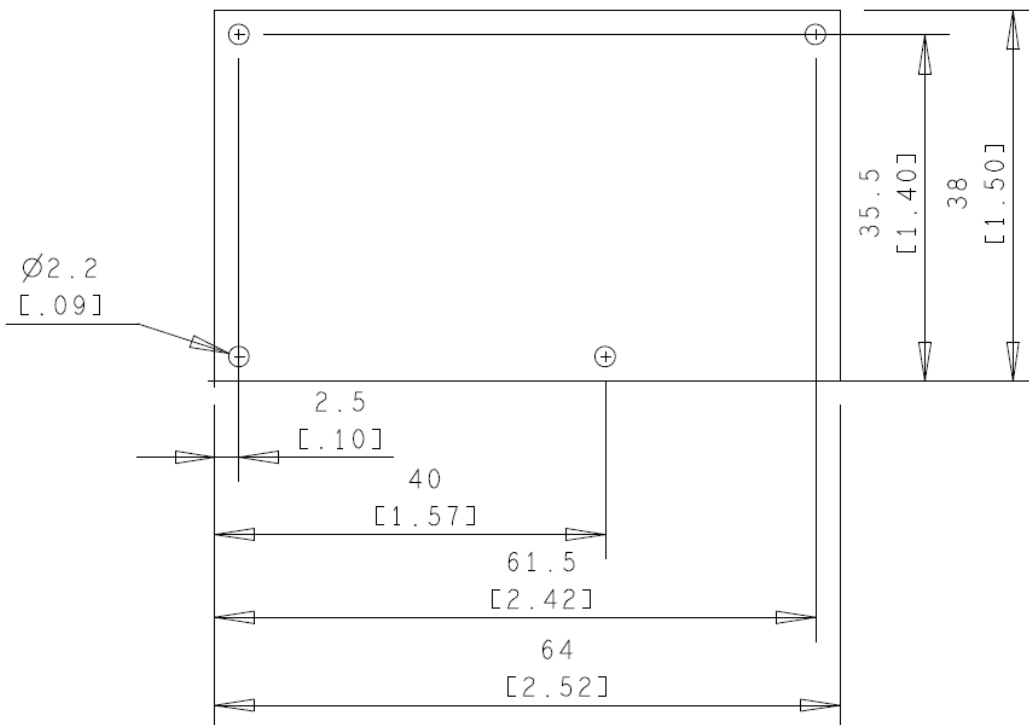
- Input Voltage: 12-36VDC
- Input Current: Depends on processor load, connected sensors, input voltage, etc. up to 300mA @ 12V, up to 100mA @ 36V.
- Output Current:
  - Combined 30mA on all external 3.3V (linear LDO) connectors
  - Combined 30mA on all external 5V (linear LDO) connectors
  - Combined 100mA on all external 5.5V connectors
- Specifications of the “Master” microcontroller, for the full specs please see the datasheet:
  - Modified Harvard, 16-bit Architecture
  - Up to 40MIPS
  - 256KB program memory
  - 30KB RAM
  - 12-bit ADC
- On-board sensors and I/O:
  - LSM6DSO 6-axis digital IMU (gyroscope, accelerometer) and temperature sensor
  - RTCC (real-time clock & calendar) incl. battery
  - Master status LED (RGB), user programmable
  - MCN status LED (RGB), tricolor
  - 2 push buttons, user programmable
  - 1 push button, Master Reset
- Highly networked and expandable with all major communication interfaces of the Master accessible:
  - Analog: 0 – 3.3V (4 inputs), 0 – 5V (2 inputs)
  - Digital: 4 GPIO, 2 PWM (L/H), 2 IC
  - UART: UART1 via connector, UART2 via Bluetooth
  - I2C: I2C1, I2C2
  - SPI: SPI2
  - QEI: Quadrature incremental encoder interface via MCN
  - CANbus (incl. transceiver ISO 11898 1MBit)
- Programmed via one of two options:
  - Wirelessly over Bluetooth using bootloader (default).
  - Microchip ICD 4 or similar interface, see FIGURE 1.



**Figure 1: Microchip ICD 4 Debugger/Programmer.**

## 2 MECHANICAL SPECIFICATIONS

All dimensions are in mm [inches].



**Figure 2: Mechanical Dimensions.**

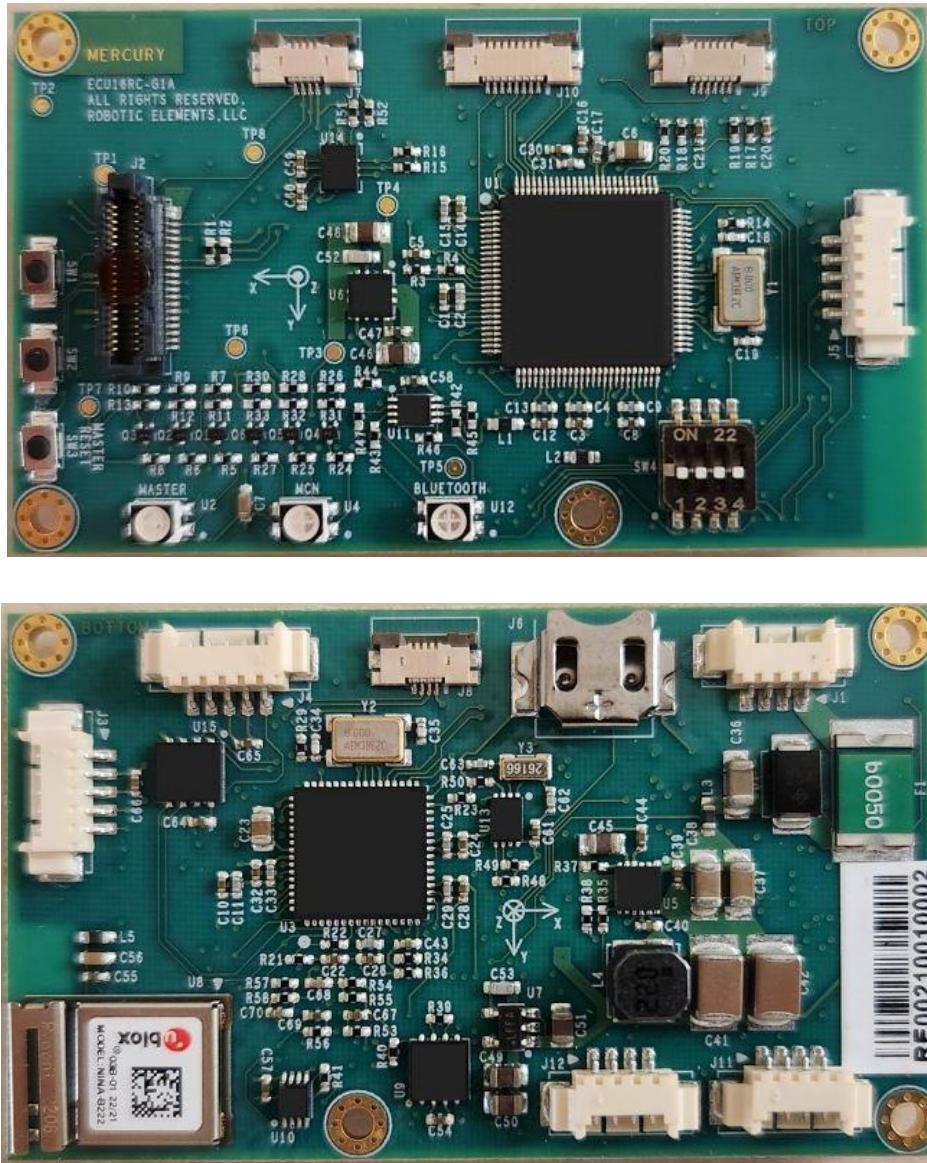


Figure 3: 3D Model, Top and Bottom View.

### 3 ENVIRONMENTAL SPECIFICATIONS

- Max. Ambient Temperature: 45 degrees Celsius (113 degrees Fahrenheit)  
Prorate/derate depending on functions used in the application

#### 4 DOCUMENT REVISION HISTORY

Version	Description of Changes	Author	Approval
1.0	Document first created.	AB	AB