



## Data Sheet

# 10mW "Hunter" form factor RF module

Document Version 2.2

Date: 21 July 2010

Applies to Cyan part numbers:

mCOG-RF-1X-M2c-433

mCOG-RF-1X-M2c-915

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## Revision History

Version	Date	Notes
V1.0	20/10/2009	Document created.
V1.1	04/11/2009	Updated following review
V1.2	24/05/2010	868MHz variant now superseded by SPA1 module
V1.3	16/06/2010	Document name and header changed
V2.0	18/06/2010	Reissue
V2.1	06/07/2010	Added FCC and IC Approval for 915 part
V2.2	21/07/2010	Updated following review for approval

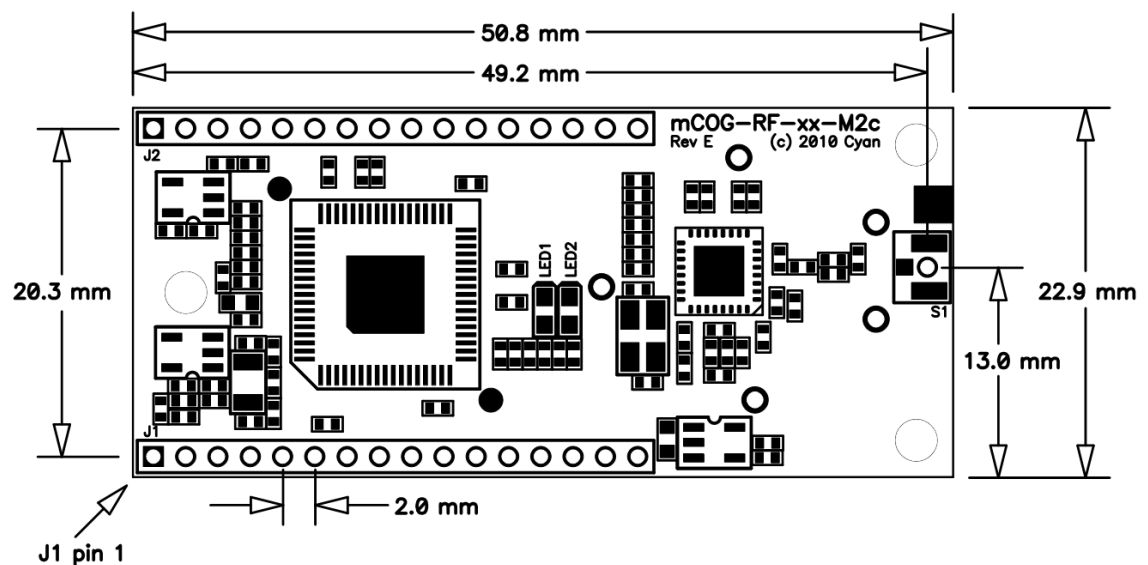
# 1 Introduction

This document provides a hardware and electrical description of Cyan's family of mCOG-RF-1X-M2c modules. These are based on a common PCB form factor, with the following frequency variants:

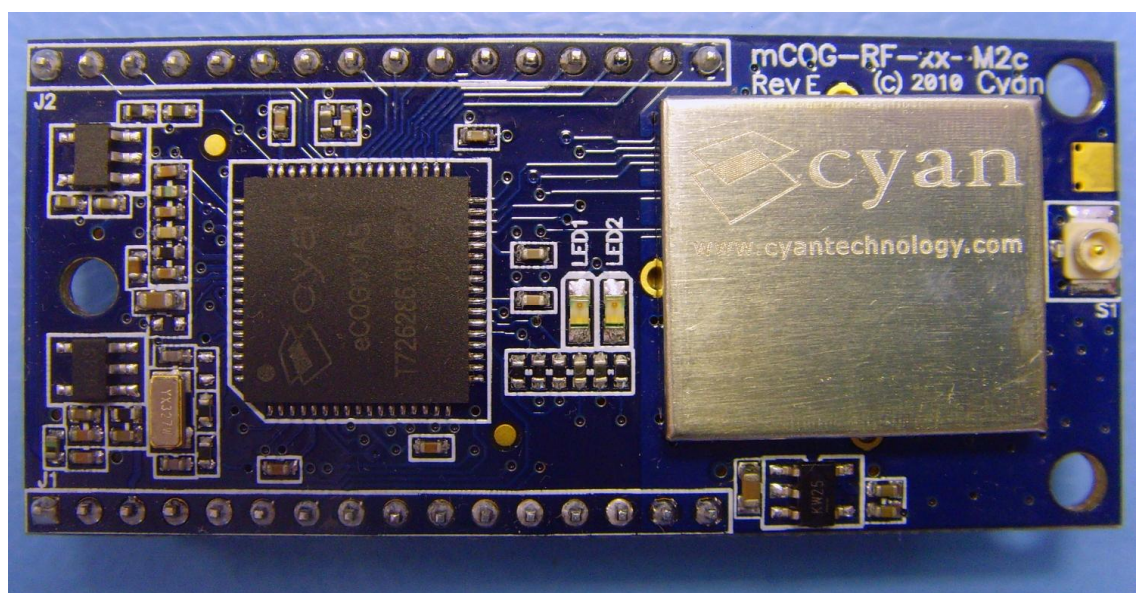
- The mCOG-RF-1X-M2c-433: 433 MHz ISM Band.
- The mCOG-RF-1X-M2c-915: 902 – 928 MHz ISM Band.

The mCOG-RF-1X-M2c modules offer a high functionality 70 MHz eCOG1X microcontroller, with 512 Kbytes of FLASH memory, and 24 Kbytes of SRAM. Combined with a high performance RF interface with a maximum of +10dBm (10mW) power output.

Figure 1 shows the mechanical form of the mCOG-RF-1X-M2c module (top side). Note that J1 and J2 headers are attached to the bottom side of the PCB.



**Fig 1. Top Silk and Dimensions of mCOG-RF-1X-M2c Module**



**Fig 2. Image of mCOG-RF-1X-M2c Module**

## 2 Related Documents

Further details of the characteristics of the module can be found in the eCOG1X user manual.

- eCOG1X user manual V2 (provided with CyanIDE 2)

## 3 Glossary

A table of abbreviations used in this document.

ADC	Analogue to Digital Converter
eCOG1	Cyan Technology target micro controller
GPIO	General Purpose Input/Output
LCD_COM	Common Signal for a Multiplexed LCD Display
LCD_SEG	Segment Signal for a Multiplexed LCD Display
MCPWM	Multi Channel Pulse Width Modulation
PWM	Pulse Width Modulation
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver/Transmitter

## 4 Pin Arrangements

### 4.1 J1 and J2 Headers

16 Way 2mm Pitch Pin Headers

Pin	J1	J2
1	3.3V Digital Supply	3.3V Digital Supply
2	GND	PortD1: GPIO / I2C_SDA
3	5V Battery Supply	PortD0: GPIO / I2C_SDL
4	GND	PortA2: GPIO / UART1B_TX / LCD_COM_2
5	EICE_MISO	PortA3: GPIO / UART1B_RX / LCD_COM_3
6	EICE_MOSI	PortA0: GPIO / UART1A_TX / LCD_COM_0
7	EICE_CLOCK	PortA1: GPIO / UART1A_RX / LCD_COM_1
8	EICE_LOADB	PortE7: GPIO / PWM / LCD_SEG_23
9	VOUT: DAC output	PortE6: GPIO / PWM / LCD_SEG_22
10	AVDD analogue supply output	PortE5: GPIO / MCPWM / LCD_SEG_21
11	VIN2: ADC input	PortE4: GPIO / MCPWM / LCD_SEG_20
12	VIN3: ADC input	PortE3: GPIO / SPI_CS / MCPWM / LCD_SEG_19
13	VIN4: ADC input	PortE2: GPIO / SPI_MISO / MCPWM / LCD_SEG_18
14	CPU reset	PortE1: GPIO / SPI_MOSI / MCPWM / LCD_SEG_17
15	GND	PortE0: GPIO / SPI_SCLK / MCPWM / LCD_SEG_16
16	GND	GND

### 4.2 Connector S1

U.FL RF Antenna Connector.

- Centre Contact – Antenna RF Connection
- Outer Contact – GND

## 5 Electrical Characteristics

Parameter	Condition	Min	Typ	Max	Units
Power Supply 1	VDD	3.0	3.3	3.6	V
Power Supply 2	5V Battery Supply	3.8	5.0	6.0	V
Analogue Power Supply Output	AVDD	1.62	1.8	1.98	V
Operating Temperature Range		-20		+70	°C
Storage Temperature Range		-40		+85	°C
Standby Current:	Radio Powered Down – Sleep		10.0		µA
<b>RF Transmit Section</b>					
Output Power	Max Power Amp setting			10	dBm
TX current consumption	eCOG1X running at 50MHz Max Power Amp setting		38		mA
<b>RF Receive Section</b>					
RX current consumption	eCOG1X running at 50MHz		30.0		mA
<b>Digital/Analogue I/O (to/from Microcontroller)</b>					
Input voltage on any digital pin	Relative to GND	-0.3		VDD +0.3	V
Digital Input Low Level	Relative to GND	-0.3		+0.8	V
Digital Input High Level	Relative to GND	+2.0		VDD +0.3	V
Digital Output Low Level	Relative to GND Sinking +2mA			+0.2V	V
Digital Output High Level	Relative to GND Sourcing -2mA	VDD -0.2			V
ADC channel input range ADC results 0x000 to 0xFFFF	Relative to GND	0		1.22	V

## 6 Notes

The module only needs to be supplied with either the 5 V Battery Input or the 3.3 V VDD. If the 5 V Input is provided then a 3.3 V regulator on the module provides the VDD supply. AVDD is also generated by the module.

The RESET\_IN pin should to be driven with an open collector driver. To connect the eICE Programming Adaptor Pin 10 to this, it should be connected to the anode of a diode, where the cathode is connected to eICE programming connector.

### 6.1 Antenna Selection

This device has been designed to operate with the antennas listed below, and having a maximum gain of 0dB<sup>1</sup>. Antennas not included in this list or having a gain greater than 0dB<sup>1</sup> are strictly prohibited for use with this device. The required antenna impedance is 50ohms.

Antenna Factor ANT-916-CW-HWR half wave dipole antenna

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

<sup>1</sup> dBd

## 7 Approvals Information for 915MHz Variant

See also the Antenna Selection section above.

### 7.1 FCC Approval

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter within a host device, except in accordance with FCC multi-transmitter product procedures.

Installation of the mCOG-RF-1X-M2c-915 into an end product requires that the end product must be externally labelled with the following detail: "Contains FCC ID: YHZM1XM2C915"

### 7.2 Industry Canada Approval

Operation is subject to the following two conditions:

- (1) this device may not cause interference
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Installation of the mCOG-RF-1X-M2c-915 into an end product requires that the end product must be externally labelled with the following detail: "Contains transmitter module IC Certification Number: 9063A-M1XM2C915"

## 8 Contact Information

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