



OPERATIONAL DESCRIPTION

General Platform Features

The xTag2, with a -40°C to $+85^{\circ}\text{C}$ temperature range, is a 802.15.4 Standard compliant on-chip transceiver/modem, using 2.4GHz, with sixteen (16) selectable channels and a programmable output power. It has a low external component count and a 9mm x 9mm x 1mm 71-pin LGA.

The device has multiple power saving modes, with an operating voltage of 2V to 3.4V with on-chip regulators for modem. It can support single 16MHz crystal clock source operation or a dual crystal operation, as well as being a support for SMAC, 802.15.4 and ZigBee software.

Microcontroller Features

The xTag2 has a low voltage MCU with 40 MHz low power HCS08 CPU core, up to 60K flash memory with block protection and security and 4K RAM.

- MC13211 : 16 KB Flash, 1 KB RAM
- MC13212 : 32 KB Flash, 2 KB RAM
- MC13213 : 60 KB Flash, 4 KB RAM

The device has a low power modes (wait, plus three Stop modes) and a dedicated serial peripheral interface (SPI) connected internally to the 802.15.4 modem.

It has one external 4-channel (5-channel internal) 16-bit timer/pulse width modulator (TPM) module and one (1) external 1-channel (3-channel internal) 16-bit timer/pulse width modulator module, each with selectable input capture, output capture and PWM capability. It has a 8-bit port keyboard interrupt (KBI), a 8-channel 0-10-bit ADC and two (2) independent serial communication interfaces (SCI).

It has multiple clock source options:

- Internal clock generator (ICG) with 243 kHz oscillator that has $\pm 0.2\%$ trimming resolution and $\pm 0.5\%$



deviation across voltage.

- Start-up oscillator of approximately 8 MHz.
- External crystal or resonator
- External source from modem clock for very high accuracy source or system.

The xTag2 has a low-cost option Inter-integrated circuit (IIC) interface with 100 kbps operation. It has an in-circuit debug and a flash programming available via on-chip background debug module (BDM). It has two (2) comparators and nine (9) trigger modes. The device has eight (8) deep FIFO for storing change-of-flow addresses and event-only data, a tag and force breakpoints, an in-circuit debugging with single break-point, some system protection features and a programmable low voltage interrupt (LVI). Finally, it also has an optional watchdog timer (COP) and illegal opcode detection up to 32 MCU GPIO with programmable pullups.

RF Modem Features

The RF modem is a fully compliant 802.15.4 Standard transceiver that supports 250 kbps O-QPSK data in 5.0 MHz channels and full spread-spectrum encode and decode. It operates on one of the sixteen (16) selectable channels in the 2.4 GHz ISM band. It has -1 to 0 dBm nominal output power and is programmable from -27 dBm to +3 dBm. It can receive sensitivity of <-92 dBm (typical) at 1% PER, 20-byte packet, which is much better than the 802.15.4 standard of -85 dBm.

It has an integrated transmit/receive switch and a dual PA output pairs, which can be programmed for full differential single port or dual port operation that supports an external LNA and/or PA. It has also three (3) low power modes for an increased battery lifetime.

The device has a programmable frequency clock output for use by MCU, with four internal timer comparators available to supplement MCU timer resources. It has an onboard trim capacity for 16 MHz crystal reference oscillator, which eliminates the need for external variable capacitors and allows for automated production frequency calibration. It can also support both Packet Mode and Streaming Mode and has seven GPIO to supplement MCU GPIO.



Operational Frequency Range

The device has sixteen (16) selectable channels, going from 2405 MHz (channel 1) to 2475 MHz (channel 15).

See figure 1 for details.

Power Requirements

The xTag2 has to be alimented between 6V and 20V, with a 1-ampere maximum.

Antenna Type and Gain

The Pulse antenna, part number W1030, is designed for the WLAN devices using WiFi (802.11 b/g) Bluetooth and ZigBee. It is an omni-directional radiation pattern providing broad 360° coverage and has a one-quarter wavelength dipole configuration. It works for frequencies between 2.4 and 2.5 GHz and has a 2.0 dBi gain.



Figure 1. Operational frequency range

802.15.4 Channel #	Frequency (MHz)
1	2405
2	2410
3	2415
4	2420
5	2425
6	2430
7	2435
8	2440
9	2445
10	2450
11	2455
12	2460
13	2465
14	2470
15	2475
16	2480