

## Theory of Operation/Technical Description – FCC ID: 2AAGG-YODA2P1

### - RF circuit function:

YODA is a complete 2.4 GHz IEEE Std. 802.15.4™ compliant surface mount module with integrated crystal, matching circuitry, Power Amplifier, Low Noise Amplifier and PCB antenna. The module is based on the Microchip Technology MRF24J40 IEEE 802.15.4™ 2.4 GHz RF Transceiver IC and microchip PIC24 series micro controller

### - RF signal flow:

From Transceiver the differential RF signal goes to a balun. The single ended output of balun goes to a SOC which has integrated Power amplifier, Low noise amplifier and multiplexers.

### - Description of Antenna system (Baluns, Multiplexers)

Has differential to single ended 50E balun and RF front end SOC which has integrated PA, LAN and multiplexers

### - Show compliance with 15.203 antenna requirements:

Has PCB antenna compliance with 15.203 antenna requirements

### - Description of all modulation schemes used in the product:

The module uses Offset quadrature phase-shift keying (OQPSK) modulation. The OQPSK Modulator Baseband block modulates using the offset quadrature phase shift keying method. The block outputs a baseband representation of the modulated signal. Taking four values of the phase (two bits) at a time to construct a QPSK symbol can allow the phase of the signal to jump by as much as 180° at a time. When the signal is low-pass filtered (as is typical in a transmitter), these phase-shifts result in large amplitude fluctuations, an undesirable quality in communication systems. By offsetting the timing of the odd and even bits by one bit-period, or half a symbol-period, the in-phase and quadrature components will never change at the same time. In the constellation diagram shown on the right, it can be seen that this will limit the phase-shift to no more than 90° at a time. This yields much lower amplitude fluctuations than non-offset QPSK and is sometimes preferred in practice.

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