ZMN2430 Series Radio Module

ZMN2430HP, High Power

Manual

Preliminary

Cirronet, Inc.

Important Regulatory Information

Cirronet Zigbee High Power - FCC ID: HSW-Z2430HP
IC: 4492A-Z2430HP

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.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

FCC User Information

"NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help."

Warning: Changes or modifications to this device not expressly approved by Cirronet Inc. could void the user's authority to operate the equipment.

RF Exposure

The transmitter module may not be co-located with any other transmitter or antenna.

In accordance with FCC requirements of human exposure to radiofrequency fields, the radiating element shall be installed such that a minimum separation distance of 20cm shall be maintained from the user and/or general population.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. 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.
Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

Hardware Specifications

Radio Specifications

Operating Band	2400-2475 MHz
Radio Type	Direct Sequence (DTS), IEEE 802.15.4 PHY layer
Channel Bit Rate	250 Kbps
Channel Chipping Rate	2 Mcps
Modulation	MSK with Raised Cosine Filtering
Certification Type	DTS device per FCC 15.247 and ETS 300-328
RF power	+18 dBm typical, +15 dBm minimum
Receiver Sensitivity	-98 dBm typical, -95 dBm minimum
Link Margin	110 dB (approximately 3 Km Line of Sight propagation)
Adjacent Ch. Rejection	>39 dB with jammer @ 5 MHz offset
Spurious Output	Per FCC 15.247 and ETS 300-328

General

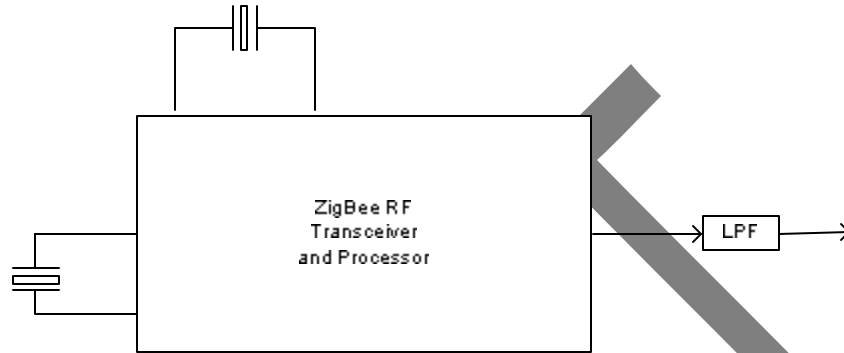|	
Input Voltage	5.5 volts minimum, 6 volts nominal, 15 volts maximum
Current Consumption	70 mA typical operating, 180 mA peak (transmit)
Operating Temp Range	-40 C to + 70 C
Humidity	95% Non-condensing
RF Connector	Reverse SMA
Host Connector	Male DB-9 (Amp 747840-3)
Power Connector	CUI Stack PJ-002A

Theory of Operation

The Cirronet ZMN2430 Series radio modules utilizes the IEEE 802.15.4 standard ZigBee Physical layer hardware for wireless low data rate monitoring and control applications. The application of the ZMN2430 Series in a wireless network for data collection in industrial monitoring and control.

Block Diagram in Figure 1

The ZMN2430 Series radio modules consist of an RF transceiver and a microprocessor in one chip.

The RF transceiver receives data and commands from the microprocessor as well as the clock required by the RF transceiver.

The Block diagrams in Figure 1 shows both the ZMN2430 (Low Power) and the ZMN2430HP (High Power). They are the same with the exception of T/R switches and a PA (Power Amp) and a LNA (Low Noise Amp) in the high power version. The output power is +16 dBm for the high power and 0 dBm for the low power ZigBee Transceivers.

ZigBee RF
Transceiver
and Processor

LPF

ZigBee ZMN2400
Module

PA

ZigBee RF
Transceiver
and Processor

SP$_{DT}$

SP$_{DT}$

LPF

BPF

LNA
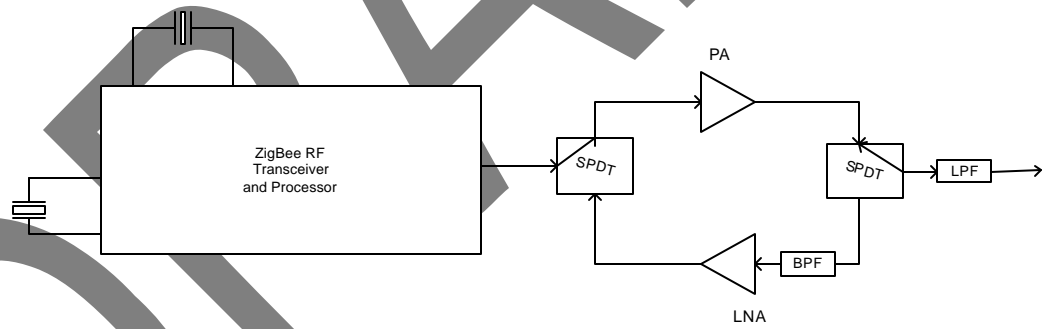
ZigBee ZMN2400HP
High Power Module

Figure 1

DRAFT

ZMN2430 Frequency Selection

The ZMN2430 is not frequency agile during run-time, but it can select an unoccupied portion of the spectrum at startup.

The ZMN-2400 series uses a set of channels as defined by the IEEE 802.15.4 / ZigBee standards which span a range from 2405 to 2480 MHz with 5 MHz spacing between channels:

Center Frequency (MHz)	Nominal Occupied BW	ZigBee Channel Designator
2405	2402.5-2407.5	11
2410	2407.5-2412.5	12
2415	2412.5-2417.5	13
2420	2417.5-2422.5	14
2425 (default)	2422.5-2427.5	15
2430	2427.5-2432.5	16
2435	2432.5-2437.5	17
2440	2437.5-2442.5	18
2445	2442.5-2447.5	19
2450	2447.5-2452.5	20
2455	2452.5-2457.5	21
2460	2457.5-2462.5	22
2465	2462.5-2467.5	23
2470	2467.5-2472.5	24
2475	2472.5-2477.5	25
2480 NOT USED	2477.5-2482.5	26

The *channel mask* is the name used to describe the list of frequency channels that a ZMN-2400 can use. The default channel mask for client radios allows them to operate on any frequency from 2405 to 2475 (channel 2480 is reserved for manufacturing test purposes and therefore not included).