



# *CSM2400FH*

## *User Manual*


Revision	Modified		Checked		Module Name
	Date	By	Date	By	
					CSM2400FH
					<b>Description</b>
					2400 MHz RF Module with Frequency Hopping
					<b>Remarks</b>
					<b>Item Number</b>

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## 2. GENERAL DESCRIPTION

The CSM2400 module from Hetric is a Frequency Hopping Spread Spectrum transmitter. It transmits data in the 2.4GHz spectrum in a transparent manner. To ensure a reliable connection, the radio link is fully redundant, with two distinct radios. Once the modules are paired, they will send data through a pseudo random channel sequence utilizing packet-based encryption.

### 2.1.2 Band Plan

- Channel spacing: 405 kHz (precise 405,456.543)
- 204 channels possible
- To protect band borders, only 200 channels are in use (#1 ... #200)



**Radio channels**

<b>Start Frequency (Hz):</b>	902175000
<b>Middle Frequency (Hz):</b>	915000000
<b>Stop Frequency (Hz):</b>	927825000

### **3. FCC COMPLIANCE NOTIFICATIONS**

#### **FCC Part 15 Notice**

“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.”

#### **ISED RSS-Gen Notice**

“This device complies with Industry Canada’s licence-exempt RSSs. Operation is subject to the following two conditions:

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

“Le présent appareil est conforme aux CNR d’Industrie Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes :

- 1) l’appareil ne doit pas produire de brouillage;
- 2) l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.”

#### **For Canadian User**

CAN ICES-3 (B)/NMB-3(B)”

**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 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.

“Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment”

**WARNING:** The OEM must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Hetricon FCC identifier for this product below.

**“Contains FCC ID: LW9-CSM2400FH”**

**“Contains IC: 2119B-CSM2400FH”**


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**RF Exposure**

The Hetronic CSM2400FH meets the RF exposure requirement of low power devices under portable operation. This device should be operated with a minimum distance of 20mm (2 cm) between the antenna and your body. Do not touch or move antenna while the unit is transmitting or receiving.

Le Hetronic CSM2400FH répond aux exigences d'exposition aux RF des appareils à faible puissance en fonctionnement portable. Cet appareil doit être utilisé avec une distance minimale de 20 mm (2 cm) entre l'antenne et votre corps. Ne touchez pas et ne déplacez pas l'antenne pendant que l'unité émet ou reçoit.

**NOTE:** FCC/IC warnings are to be incorporated into the manuals as provided to the end user.

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#### 4. Setup and Adjustment Procedure

The CSM2400FH is factory tested and setup during the approved end control process. Any settings and adjustments are performed by factory trained personnel. No final adjustments are required by the end user.

#### 5. Approved Antenna List

Item	Part Number	Mgf.	Type	Gain (dB)
1	56506605	Hetronic	Omnidirectional	Unity
2	ANT-2450-3-0	Doodle Labs	Omnidirectional	3 bBi


Table 2 – Approved Antenna List

#### 6. Label Placement

The actual labeled and assembled unit will look similar to the one pictured below:



Figure 1

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## 2. Microcontroller Interface

### Pin Layout

CSM FH uses a pin layout compatible with legacy Hetricon radio modules. This layout allows the CSM FH to be used in devices that accept direct installation of the legacy module. Please note, however, that the pins are not utilized the same way as the legacy radios, and software modification of devices is required to make use of the CSM FH radio module.

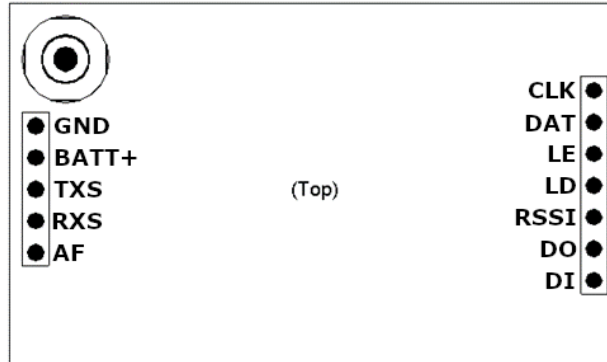


Figure 2 - CSM FH Pin Layout

### Pin Description

Pin Label	Type	FH Pin Description
GND	S	Negative Supply Input, 0 V DC (Ground)
BATT+	S	Positive Supply Input, 2.9-5.5 V DC
TXS	IPU	Not Used <sup>1</sup>
RXS	IPU	Not Used <sup>1</sup>
AF	O	Not Used <sup>3</sup>
CLK	IPU	Not Used <sup>1</sup>
DAT	I	Not Used <sup>1</sup>
LE	I	Not Used <sup>1</sup>
LD	O	Not Used <sup>2</sup>
RSSI	O	Not Used <sup>3</sup>
DO	O	UART command data out (CSM -> Host)
DI	IPU	UART command data in (Host -> CSM)

(S = Supply, I = Input, O = Output, B = Bi-Directional, PU = Pullup, PD = Pulldown)

#### Table 1 - CSM FH Pin Descriptions

Notes:

1 – These unused pins are pulled to BATT+ internally.


2 – The LD pin is driven LOW under CSM FH operation.

3 – The RSSI and AF pins are used for diagnostic output for the FHSS sub-system.

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### 3. TECHNICAL SPECIFICATION

POWER	VALUE	
Supply Voltage	2.8 to 4.2 VDC	
Transmit mode Supply Current	90 mA	Vcc= 4V, 20 bBm output, 50 ohm load.
Receiver Mode	40 mA	Vcc= 4V
PROTOCOL		
Data Rate	≥25 kbps	
Buffered	≥1024 Bytes	
PTP	Yes	
RF		
Diversity	Full	
Encryption	Yes	
RSSI and/or LQI available to all nodes	Yes	
Channels available	200	
Proprietary communications protocol	Yes	
Circular Antenna Polarization (external), PCB RF connector only	RHCP, RF connector SMB type	
Adjustable RF power	≤ 20 dBm	
Class 1 receiver blocking	Complies to ETSI 300 328 V2.2.1 (2019-04), clause: Page 26: 4.3.1.12 Receiver Blocking Page 27: 4.3.1.12.4.2 Receiver Category 1	
Receive Noise Figure	TI LNA: 4,8 dB incl. antenna switch	
Robust front-end filtering	Yes	
Frequency Hopping - zero application configuration	Yes	
OPERATING ENVIRONMENT		
Operating Temperature	-40° to +85° C	

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Storage Temperature	-40° to +105° C	
Operating Humidity	20% to 70%, non-condensing	
Storage Humidity	95%, non-condensing	
<b>MECHANICAL</b>		
PCB Material	FR-4 (Prepreg 7628 AT05 47% Resin)	
Connections	<ul style="list-style-type: none"> <li>• Power</li> <li>• Ground, RF connector(s) for external antennas, SMB</li> </ul>	
	<ul style="list-style-type: none"> <li>• Data</li> <li>• Config, Pairing</li> </ul>	