Instructions Manual For:

Digital Wireless Audio Module

Model: WH4711

FCC ID: LDL-7X01DA11

IC ID: 7322A-7X01DA11

Watkins Manufacturing Corp.

1280 park Center Drive

Vista CA, 92081

800-999-4688

Important Product Information

This Important Product Information Guide contains safety and handling, regulatory and warranty information for the Digital Wireless Audio Module model WH4711.

User Warnings

The WH4711 Digital Wireless Audio Module is designed for use in wireless audio systems. Only the approved antenna and gains are allowed with this device. The module shall only be integrated into to audio devices. The devices shall be constructed and manufactured in accordance with all applicable standards and regulations.

FCC Rules and Industry Canada (IC) regulatory information

Compliance Statement (Part 15.19)

The enclosed hardware 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.

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Warning (Part 15.21)

Changes or modifications not expressly approved by Watkins Mfg. Corp. could void the user's authority to operate the equipment. Manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment.

Compliance Statement (Part 15.105(b))

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

RF Exposure Guidance so that the user/integrator knows that:

For Mobile usage, the device should not be used closer than 20 cm from the human body. If the device is used at a distance of more than 2 cm from the human body, and usage at 2 cm can be assured by the portable host usage/configuration, then for portable exposure purposes the device meets the FCC and Industry Canada SAR Exemption requirements.

This equipment complies with FCC and Industry Canada radiation exposure limits set forth for an uncontrolled environment. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

OEM Guidance so that the user/integrator knows that:

The OEM integrator is responsible for ensuring that their end-product complies with additional compliance requirements required with this module installed, such as digital device emissions, PC Peripheral requirements and any additional potential RF Exposure requirements.

Antenna guidance mandated in RSS-210:
Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. 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 necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Instructions to integrators on the host labelling requirements:
To meet the FCC & Industry Canada host device labelling requirements, any host equipment incorporating this module must include the FCC ID/IC ID on the host label as follows:

“Contains FCC ID: LDL-7X01DA11”

“Contains transmitter module IC: 7322A-7X01DA11”

This device complies with Industry Canada license-exempt RSS standard(s). 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Class B digital device notice
*“*CAN ICES-3 (B)/NMB-3(B)*”*

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Module Specifications:

Parameter	Conditions	Min	Typical	Max	Unit
RF CHARACTERISTICS					
Transmission Method		FHSS with adaptive frequency selection and ARQ			
Raw Data Rate				1.536	Mbps
Channel Width			<2		MHz
Total Channels				38	Ch
Hopping Channels			20		Ch
RF Coexistence	In Specified Radius			4	sets
TX Output Power		14	16	18	dBm
DETAILED BANDWIDTH CHARACTERISTICS					
Hopping Rate			197		Hz
Frequency Dwell Time			5.052		ms
Audio TX: RF Transmit Time	Tx Node		3.844		ms
Audio RX: RF Transmit Time	Per Each Rx Node		0.219		ms
Frequency Range (Total)	FCC Test Method	2.40197		2.48002	GHz
20 dB Channel BW			78.057		MHz
Distance to upper ISM band limit	FCC Test Method		1.94		MHz
Distance to lower ISM band limit			3.476		MHz
Distance to lower ISM band limit			1.967		MHz
Antenna Impedance	ZAnt		50		Ω
RF RANGE					
Indoor Range*				50	m
Open Field Range**				600	m

Table 5 – RF Characteristics

Digital Wireless Audio Module System Description:

Frequency Hopping Spread Spectrum (FHSS)

A frequency hopping spread spectrum (FHSS) system works by hopping from one frequency channel to another in a known sequence out of a select group of channels. The MR system frequency hops between 20 channels. The group of 20 channels is selected out of a total of 38 hopping channels in the ISM band. If it is determined that one of the 20 hopping channels is found to be noisy or poor due to other RF interference, then a new channel is selected from the 18 unused channels (i.e. 38 - 20 = 18) and the one noisy channel is released to the unused group. This repeats whenever a noisy or poor channel is detected. The master dwells on a single hopping channel and transmits a data packet to the slave Rx. When the slave Rx receives a good data packet from a Tx, the Rx sends an acknowledgment back to the Tx. Once the slave Rx has responded to the master Tx, then both the Tx and Rx units each hop to the next frequency channel and the process is repeated. However, when the Rx receives a corrupted data packet from a Tx, the Rx transmits a resend request back to the Tx. The Tx responds by re-transmitting

the last packet of audio data. In this way the Rx can maintain a high quality of service (QoS) by replacing bad audio data with good audio data before the data is decoded and output to the speaker. This technique is known as data buffering. A large data buffer size provides higher QoS than with a low buffer size, however a large data buffer size has higher system latency (i.e. up to 64 ms) compared to the latency of a small 20 ms buffer. If a Tx and Rx receive channel interference from another Tx-Rx system, or from other RF interference on the same hopping channel, then the Tx and Rx units have an opportunity to request for the data to be re-transmitted. This re-transmission scheme provides a time delay for the interfering Tx and Rx to change channels again before the re-transmission occurs. Thus a Tx-Rx audio data packet would have a higher probability to get successfully transmitted and received when a re-transmission occurs. FHSS frequency hopping allows multiple systems and other RF devices to coexist in the same area, since each system selects a different pseudo random group of 20 hopping channels. Also, each system hops from channel to channel in a different 20 channel sequence from other systems. This allows multiple systems to coexist with minimal channel contention and interruption from nearby RF interference.