

# Model 420128RM Wireless Link Module

## External Interface Specification

2016/6/13

### Introduction

Model 420128RM Wireless Link Module is for the low latency wireless link between console and bass box or rear surround speaker or both.

This document shows how to connect the wireless module.

### Features and Functions

- 2.4GHz, 5.2GHz, 5.8GHz, 5.2/5.8GHz dual band, 2.4/5.2/5.8GHz tri band
  - **All band usage is under active software control according to each regional and country band plan assignments. Where the use of any band conflicts with local regulations, the radio will be locked out of that band.**
- 22Mbps data rate (15 MHz nominal channel bandwidth).
- Modulation - QPSK
- Antenna types –Inverted F with following gains:

	2.4 GHz	5.2GHz	5.8GHz
Antenna-A	1.98 dBi	4.18 dBi	4.98 dBi
Antenna-B	2.2 dBi	5.02 dBi	5.56 dBi

- Target Power –

Band (GHz)	Target Power
2.4	3.08 dBm + 2dB
5.2	8.83 dBm + 2dB
5.8	9.31 dBm + 2dB

- One module design can be used for both source and sink
  - Source : Central Unit (CU)
  - Sink : Mobile Unit (MU)
- Bi-directional audio and data
- Up to four uncompressed stereo audio channels (max 7.1ch configuration)
- I2S for audio
  - Input (Source) : 44.1kHz, 48kHz
  - Output (Sink) : 48kHz
- I2C for control

## Connection

Wireless (Module to Module)

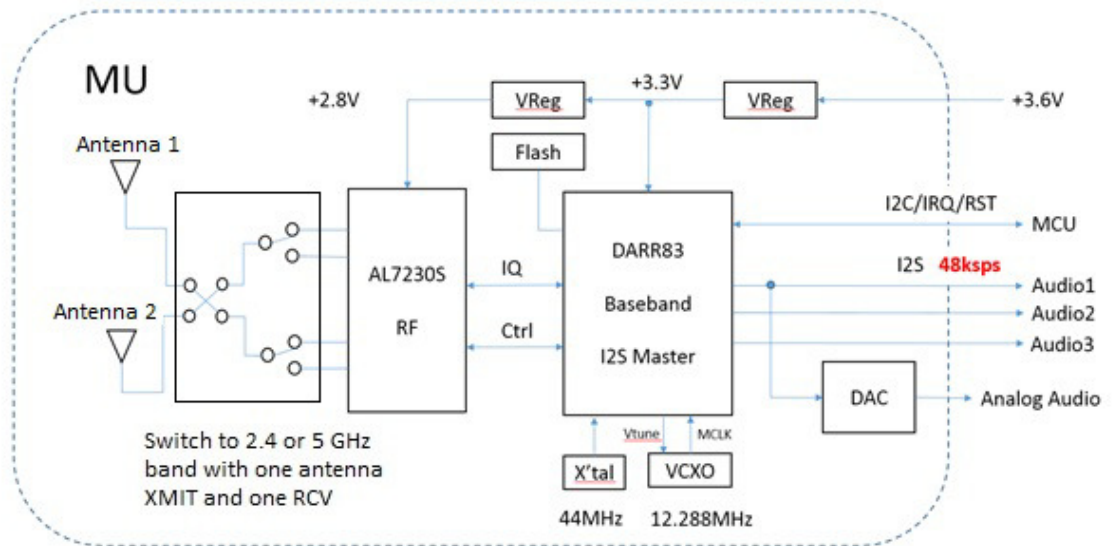
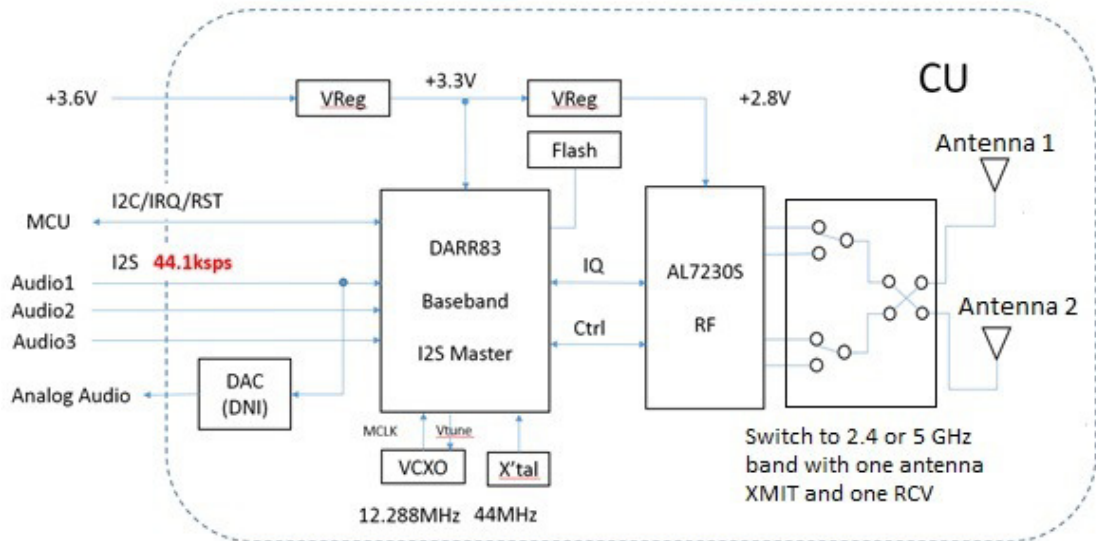
- Point to point
- Point to multi point

Module to PCB

- 26 pin FFC

# Block diagram

## Bose module



Radio Output (MHz)
2412.0
2438.0
2464.0
5180.0
5210.0
5240.0
5736.0
5762.0
5814.0

## FFC Connector pin assignment

Bose module

Pin#	Wireless Module	Console Main	Bassbox	Rear Right	Rear Left	Header
1	+3.6V to +5V	+3.6V	+3.6V	+3.6V	+3.6V	1
2	GND	GND	GND	GND	GND	2
3	MCLK 12.288MHz	AUDIO_MCLK	MCLK 12.288MHz	MCLK 12.288MHz	MCLK 12.288MHz	3
4	nc	nc	nc	nc	nc	
5	DAC_LEFT_P	nc	Analog_In_P	Analog_In_P	Analog_In_P	4
6	DAC_LEFT_N	nc	Analog_In_N	Analog_In_N	Analog_In_N	5
7	nc	nc	nc	nc	nc	
8	nc	nc	nc	nc	nc	
9	DARR83_GPIO_3	SYNC_LED	SYNC_LED	SYNC_LED	SYNC_LED	6
10	GND	GND	GND	GND	GND	
11	GND	GND	GND	GND	GND	7
12	GND	GND	GND	GND	GND	
13	DARR83_GPIO_24	MON_TXD	MON_TXD	MON_TXD	MON_TXD	8
14	DARR83_GPIO_14	RADIO_IRQ	RADIO_IRQ	RADIO_IRQ	RADIO_IRQ	9
15	GND	nc	nc	nc	nc	
16	DAC_RST_L	nc	DAC_RST_L	DAC_RST_L	DAC_RST_L	10
17	DARR_RST_L	RADIO_RST_L	RADIO_RST_L	RADIO_RST_L	RADIO_RST_L	11
18	I2C_SCL_Slave	RADIO_SCL	RADIO_SCL	RADIO_SCL	RADIO_SCL	12
19	I2C_SDA_Slave	RADIO_SDA	RADIO_SDA	RADIO_SDA	RADIO_SDA	13
20	DARR83_GPIO_12	nc	nc	nc	nc	14
21	DARR83_GPIO_11	RADIO_DATA1	nc	RADIO_DATA1	RADIO_DATA1	15
22	DARR83_GPIO_10	AUDIO_LRCLK	AUDIO_LRCLK	AUDIO_LRCLK	AUDIO_LRCLK	16
23	GND	GND	GND	GND	GND	17
24	DARR83_GPIO_8	AUDIO_BCLK	AUDIO_BCLK	AUDIO_BCLK	AUDIO_BCLK	18
25	DARR83_GPIO_6	RADIO_DATA2	nc	nc	nc	19
26	DARR83_GPIO_5	RADIO_DATA3	RADIO_DATA3	nc	nc	20

- Pin# is for Flat Flex Cable connector
  - Bose part # : 715435-26S2
  - Hirose FH12-26S-0.5SH
  - Side entry
  - Bottom contact
- Console/BB/Rear board must use same connector and FFC must be opposite side contact.
- Header is dual row

## Specification

### System specification

Parameter	Value	Unit	Remarks
<b>RF Characteristics</b>			
RF Frequency Range	2400 – 2483.5 5150 – 5250 5725 – 5875	MHz MHz MHz	2412, 2438, 2464 MHz 5180, 5210(5200 in Japan), 5240 MHz 5736, 5762, 5814 MHz
RF Bandwidth	22	MHz	
RF TX power	3 9 9	dBm dBm dBm	2.4GHz 5.2GHz 5.8GHz
RF RX sensitivity	-83 -81 -81	dBm dBm dBm	2.4GHz 5.2GHz 5.8GHz
RF Antenna	2 Dual Band Etched F		2.4G/5G dual band etched antenna and jumper and RF connector for external antenna option
RF Connector	u.FL		
<b>Air Framing</b>			
Addressing	24	Bit	
Data message size	32	Byte	Application dependent
CRC	16, 24 and 32	Bit	
<b>Control</b>			
Control interface	I <sup>2</sup> C		
<b>Data</b>			
Data Bandwidth	100	Kbps	Bi-directional wireless data channel
Data latency	5	ms	
<b>Audio</b>			
Audio interface	I <sup>2</sup> S		Standard, left, right justified selectable
Master clock	12.288	MHz	48kHz x 256
Number of stereo audio output channels on Mobile Unit	1, 2, 3 or 4		Max 4, only use 1 in MU(Receiver) SW configure appropriate wireless burst to single channel output
Number of stereo audio output channels on Central Unit	1, 2, 3 or 4		Max 4, only use 2 in CU(Console) Rear L/R and Bass
Input Sample rate	44.1, 48 or 96	ksps	DARR83 must be slave mode to use SRC
Output Sample rate	48	ksps	
Sample width	16 or 24	Bit	
Latency	20	ms	Configurable from 10 to 23.6ms, depending on the application.
Dynamic range	98 146	dB dB	16bit 48ksps, A-weighted 24bit 48ksps, A-weighted
THD+N	-96 -143	dB dB	16bit 48ksps 24bit 48ksps

### Absolute Maximum Rating

Symbol	Parameter	Min	Max	Unit	Remarks
Vcc	Supply Voltage		3.8	V	DP0.1
		3.5	5.2	V	DP1 or later

### Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Unit	Remarks
Vcc	Supply Voltage	3.1	3.3	3.5	V	DP0.1
			3.6		V	DP1 or later
Vcc ripple	Peak to Peak ripple		0	100	mV	DP0.1
Tamb	Operating Temp	-10	25	60	°C	

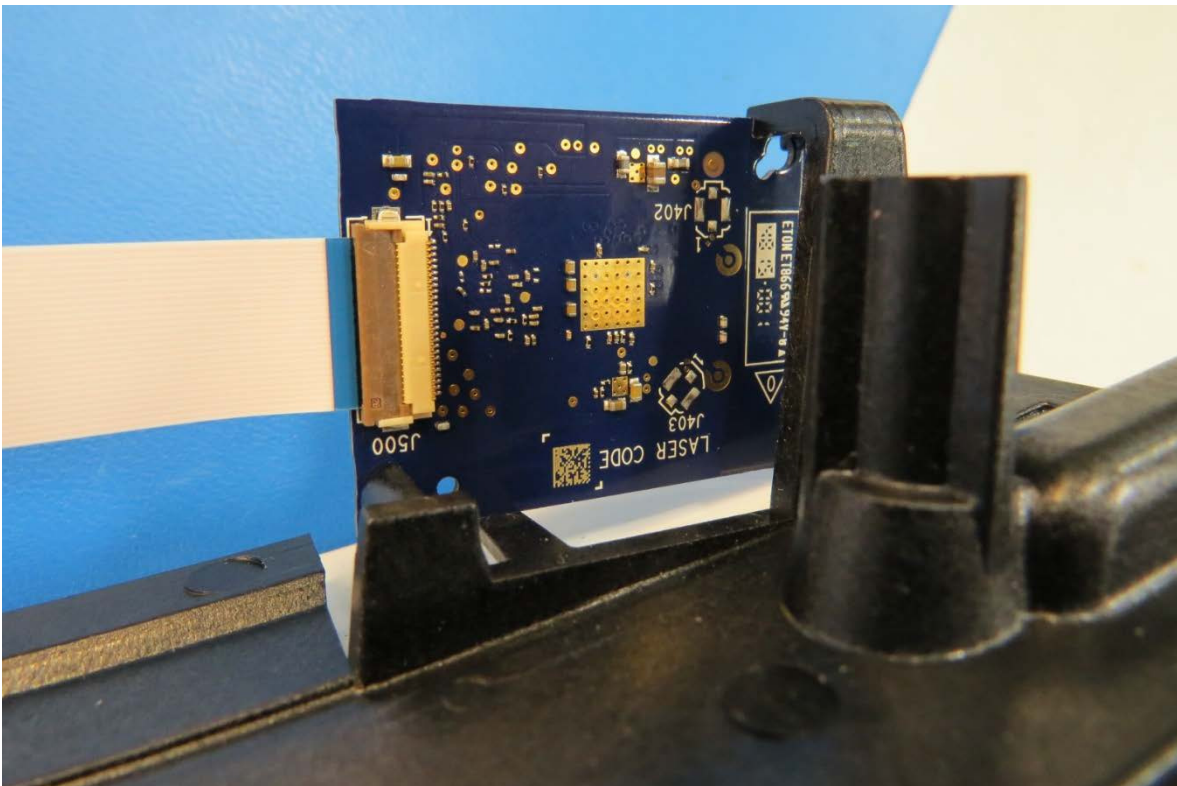
### Reset timing characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Remarks
Tr	Rise time of Vcc			10	ms	
Tf	Fall time of Vcc			10	ms	
Treset	Reset signal pulse width	1			ms	

### Power consumption (Vcc=3.3V, 25°C)

Application	2.4GHz		5.2GHz		5.8GHz		Unit
	MU	CU	MU	CU	MU	CU	
Standby mode	21	21	21	21	21	21	mA
2 Stereo NACK	81	140	82	124	82	127	mA
TX continuous (Test)		390		300		300	mA

### Module Photo



For 2.4G Device

#### NCC 警語

低功率電波輻射性電機管理辦法

第十二條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾

For 2.4G Device

## NCC Warning Statement

#### Article 12

Without permission, any company, firm or user shall not alter the frequency, increase the power, or change the characteristics and functions of the original design of the certified lower power frequency electric machinery.

#### Article 14

The application of low power frequency electric machineries shall not affect the navigation safety nor interfere a legal communication, if an interference is found, the service will be suspended until improvement is made and the interference no longer exists

To reduce any potential for harmful interference to co-channel MSS operations

For 5G Device

NCC 警語

低功率電波輻射性電機管理辦法

第十二條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

在 5.25-5.35 赫茲頻帶內操作之無線資訊傳輸設備，限於室內使用。

前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾

For 5G Device

## NCC Warning Statement

Article 12

Without permission, any company, firm or user shall not alter the frequency, increase the power, or change the characteristics and functions of the original design of the certified lower power frequency electric machinery.

Article 14

The application of low power frequency electric machineries shall not affect the navigation safety nor interfere a legal communication, if an interference is found, the service will be suspended until improvement is made and the interference no longer exists

Within the 5.25-5.35GHz band, U-NII devices will be restricted to indoor operations to reduce any potential for harmful interference to co-channel MSS operations

**CAUTION:** Changes or modifications not expressly approved could void your authority to use this equipment



## **FCC STATEMENT**

This device complies with Part 15 of the FCC Rules. Operation 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

## **INDUSTRY CANADA STATEMENT**

This device complies with Industry Canada licence-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.

RF Exposure - Min. 20 cm separation distance required for this module.

2.4 GHz statement – The radio module only supports Channels 2412, 2438, 2464 MHz and does not support Channel frequencies 2467 MHz or 2472 MHz.

5 GHz UNII statement – This module supports automatic discontinue transmission as described in 15.407(c):

“The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals.”

When the module is configured as a “Master” device, it will transmit digitally encoded audio data as fed from the host system via an I2C data bus. If this data is malformed as indicated by an incorrect data checksum. Transmission ceases. When configured as a “Slave” device, the only transmissions occur after the reception of a data packet from the Master. Lack proper data reception, a single transmission of “Not Acknowledge” to inform the master of the failure. Lacking pairing with a Master device, the module is in receive only mode.

Frequency stability 15.407(g).

“Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.”

This is accomplished by through the use of a crystal controlled oscillator having a frequency tolerance of 20 parts per million in accuracy. This frequency is verified at manufacture to be within these tolerances.

Labeling - For a host manufacture's using this certified modular, an additional permanent label referring to the enclosed module: “Contains Transmitter Module FCC ID: A94410128RM and IC: 3232A-420128RM” or “Contains FCC ID: A94410128RM and IC: 3232A-420128RM” must be used. The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.