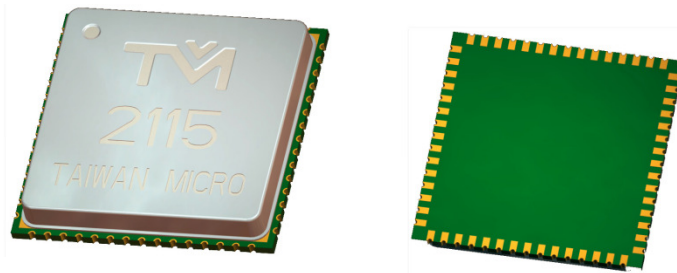


TM2115 2.4GHz Audio SiP with 24bits/48K sampling rate

Introduction

The SiP is an Audio IC including 2.4 GHz RF transceiver, Codec, and MCU with one I2S interface. It supports 2Mbps or 5Mbps data rate over air and bandwidth efficient modulation format. Its output power is up to +10/16dBm and -87/-90 dBm sensitivity. Its dimension is 20x20mm with 48 pins package with shielding can.

Photo



Features:

RF section

- 5 or 2 Mbps over-the-air data rate
- Bandwidth-efficient modulation format
- Excellent link budget with programmable output power up to +11/17dBm and -87/-90dBm sensitivity

Applications:

- Wireless Sound bar
- Wireless earphone
- Wireless speaker 2.1
- 1 to 4 wireless Audio
- USB dongle ready

Absolute Maximum Ratings

Parameters	Test Conditions	Min	max	Unit
Supply Voltage	All supply pins must have the same voltage	-0.3	3.9	V
Voltage on any digital pin		-0.3	Min(VDD+0.3,3.9)	V
Input RF level				dBm
Storage temperature range		-40	125	°C

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Specification Summary

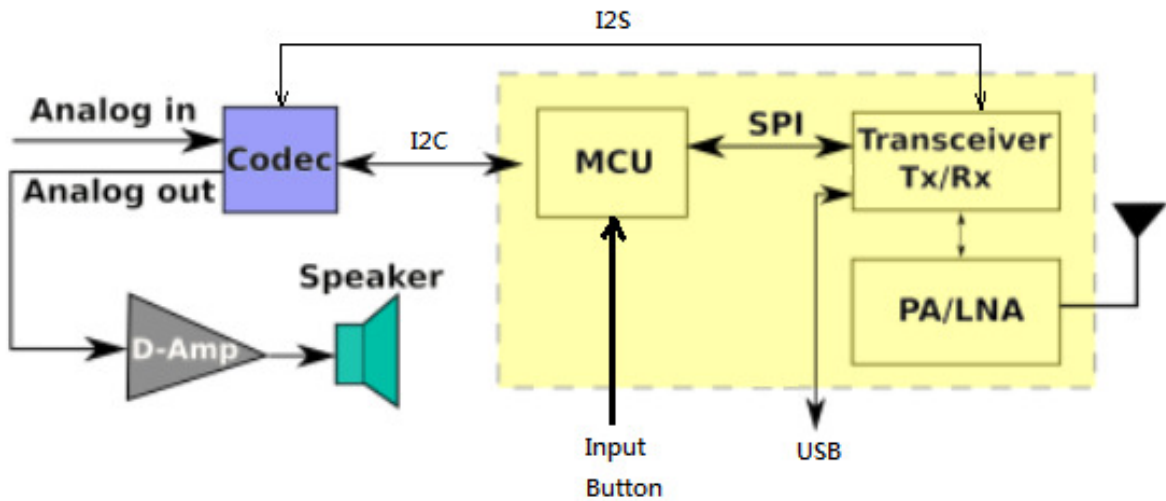
Vdd=+3.3V at 25C

parameters	MIN	TYP	MAX	Unit	Test Conditions
RF frequency Range	2400		2483.5	MHz	
Data rate		5 2		Mbps	Shaped 8FSK Shaped 2FSK
Audio latency	640		2048	samples	13.33ms ~ 42.667ms
Audio sample rate		48 44.1 40.275 32		KHz	Audio sampling rate is programmable using the pure path wireless configuration
Output power		10/16		dBm	Max out power setting
Sensitivity @10 dBm		-87			5Mbps
Sensitivity @ 16dBm		-90			2Mbps
		-92			5Mbps
		-95			2Mbps
Saturation (max input level)		-12		dBm	5Mbps
Selectivity		9		dB	Adjacent channel +/- 4MHz wanted 3 dB above sensitivity. 5Mbps
		34			Alternate channel, +/-8Mhz, wanted 3 dB above sensitivity. 5Mbps

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System Diagram



- Frequency Hopping
- Idle / sleep mode
- Receiving mode / Transmitting mode
- Re-transmit
- Mute and CRC
- UI customizing
- Codec selectable

Pin assignments and Pin Description

TM2115 PIN			
Pin No.	IO	Pin Name	Description
1	DI	RESET	External reset input: active LOW, with an internal pull-up. Set this pin low reset to initial state
2	IO	IO	General purpose digital I/O pin
3	DO	LED_TS2	TEST LED
4		RF_MISO	
5	I2C	I2C_SCL	I2C1 clock pin
6	IO	IO	General purpose digital I/O pin
7	SD	SD_CMD	SD/SDH mode - command/response.
8	SD	SD_CLK	SD/SDH mode - clock.
9	SD	SD_CDN	SD_nCD I MFP1
10	USB	UD_ID	OTG mode
11	SD	SD_D0	SD/SDH mode data line bit 0.
12	SD	SD_D1	SD/SDH mode data line bit 1.
13	POWER	GND	Ground.
14	SD	SD_D2	SD/SDH mode data line bit 2.
15	xtal	XIN	External 12 MHz (high speed) crystal input pin.
16	xtal	XOUT	External 12 MHz (high speed) crystal output pin.
17	POWER	GND	Ground.
18	USB	UD_DM	USB differential signal D-.
19	xtal	RF_XIN	External 16 MHz (high speed) crystal input pin.
20	xtal	RF_XOUT	External 16 MHz (high speed) crystal output pin.
21	USB	UD_DP	USB differential signal D+.
22	POWER	V33	Power supply, DC 3.3V
23	POWER	V33	Power supply, DC 3.3V
24	DI	RTC_RPWR	Enable external power control source when active high.
25	DI	RTC_RWAKEN	System power enable trigger when active low.
26	xtal	X32_IN	External 32.768 kHz (low speed) crystal input pin.
27	xtal	X32_OUT	External 32.768 kHz (low speed) crystal output pin.
28	DO	LED_TS1	TEST LED
29	IO	IO	General purpose digital I/O pin
30		DM_RX0_ON	
31	I2C	I2C_DATA	I2C1 data input/output pin.
32	DO	LED_TS3	TEST LED
33		DM_TX0_ON	
34		AUDIO_SCL	
35		AUDIO_SDA	
36	SD	SD_D3	SD/SDH mode data line bit 3.
37	IO	IO	General purpose digital I/O pin
38	DO	PWM_1	PWM output
39	IO	IO	General purpose digital I/O pin
40	POWER	V33	Power supply, DC 3.3V
41		TX0	
42		RX0	
43	SPI	SPI_EN	SPI0 slave select pin.

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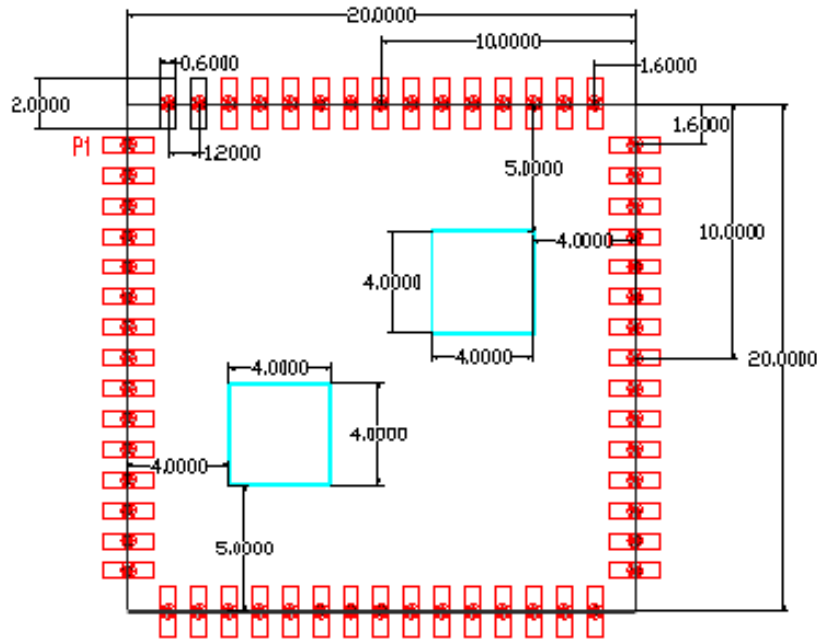
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44	SPI	SPI_CLK	SPI0 serial clock pin.
45	SPI	SPI_MOSI	SPI0 MOSI (Master Out, Slave In) pin.
46	SPI	SPI_MISO	SPI0 MISO (Master In, Slave Out) pin.
47	UART1	TX1	UART1
48	UART1	RX1	UART1
49	USB	UD_CDET	Detect power from USB host or HUB
50	IO	IO	General purpose digital I/O pin
51	IO	IO	General purpose digital I/O pin
52	POWER	V33	Power supply, DC 3.3V
53	POWER	AVDD33	Power supply for analog CODEC headphone, DC 3.3V.
54	Audio	LHPOUT	Headphone left channel output pin.
55	POWER	VCMBF	VCM buffer output pin for headphone driver capless application.
56	Audio	RHPOUT	Headphone right channel output pin.
57	POWER	AVSS	Ground for analog CODEC headphone.
58	POWER	VMID	Headphone reference power.
59	POWER	AVDD33	Power supply for analog CODEC headphone, DC 3.3V.
60	Audio	MICIP	Microphone positive input.
61	Audio	MICIN	Microphone negative input.
62	Audio	MICBIAS_LIN	CODEC left line-in channel or Microphone bias
63	POWER	GND	Ground.
64		AUDIO_RST	
65		AUDIO_PWRDN	
66	AUDIO	RIN	Right Input
67	POWER	AVDD33	Power supply for analog CODEC headphone, DC 3.3V.
68	POWER	AVSS	Ground pin for analog SAR-ADC.
69	AI	ADC_1	ADC channel 1 analog input.
70	AI	ADC_2	ADC channel 2 analog input.
71		AUDIO_MCLK	
72		DM_MISO_ON	
73		AUDIO_SDII	
74	AI	ADC_3	ADC channel 3 analog input.
75		RF_CE	
76		RF_RXEN	
77	POWER	GND	Ground.
78		RF_CSN	
79		RF_SCK	
80		RF_MOSI	
81	POWER	V33	Power supply, DC 3.3V
82		AUDIO_LRCKI	
83		AUDIO_BICKI	
84	RF	RF_INOUT	2.4GHz RF in/out port
85	IO	IO	General purpose digital I/O pin
86	POWER	AVDD33	Power supply for analog CODEC headphone, DC 3.3V.
87	POWER	LDO_VOUT	LDO output pin
88	POWER	AVSS	Ground pin for analog SAR-ADC.

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Top View Thru Bottom



TM2115 FOOTPRINT

Firmware Architecture

It is an audio system in ISM band 2.4GHz. It supports 24 bits/48K sampling rate with low latency <34ms better than Bluetooth. It supports the distance more than 30m.

The applications are wireless earphone, wireless speaker, and wireless sound bar. One transmitter can support and pair 4 receivers, which is build up for small home, sharing with good friends, good couples to enjoy good wireless quality-music.

Its audio quality is better than Bluetooth, which reaches 24 bits/48KHz. The users can enjoy the high audio quality, low latency <34ms (meet European Broadcasting Union EBU requirements <40ms). And it supports distance up to 30 meters.

Scenarios

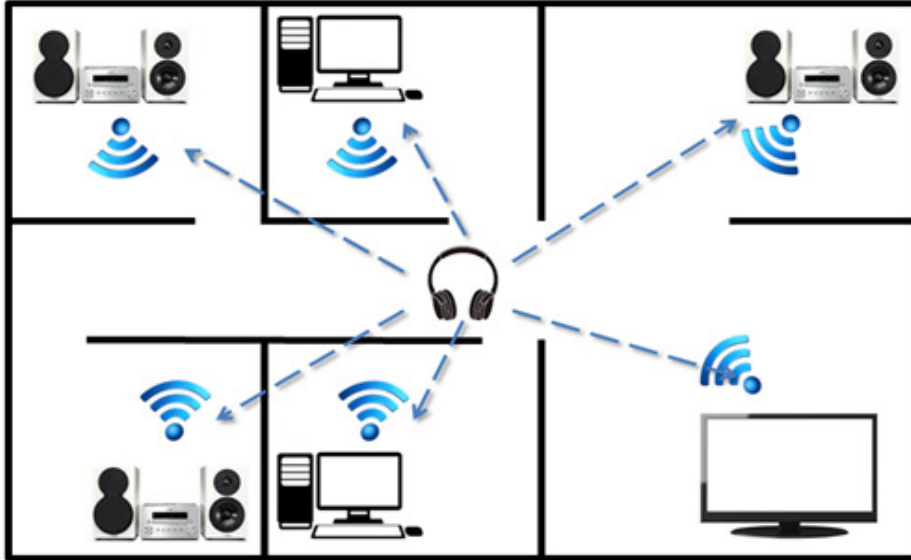
In scenario 1, we offer a receiver can registers in 10 transmitters and pairing. That means we can switch to any transmitter registered in (one of 10) and receiving different music (in scenario 2). We built up the audio for variety system platforms. Ex: game, meeting room, mobile phone, computer and audio/video equipments.

We also prepare I2S interface to service different customer's requirements. We strength the external codec applications used in "Bluetooth & RF" co-existing environments. And we prepare UART for external MCU for customized functions.

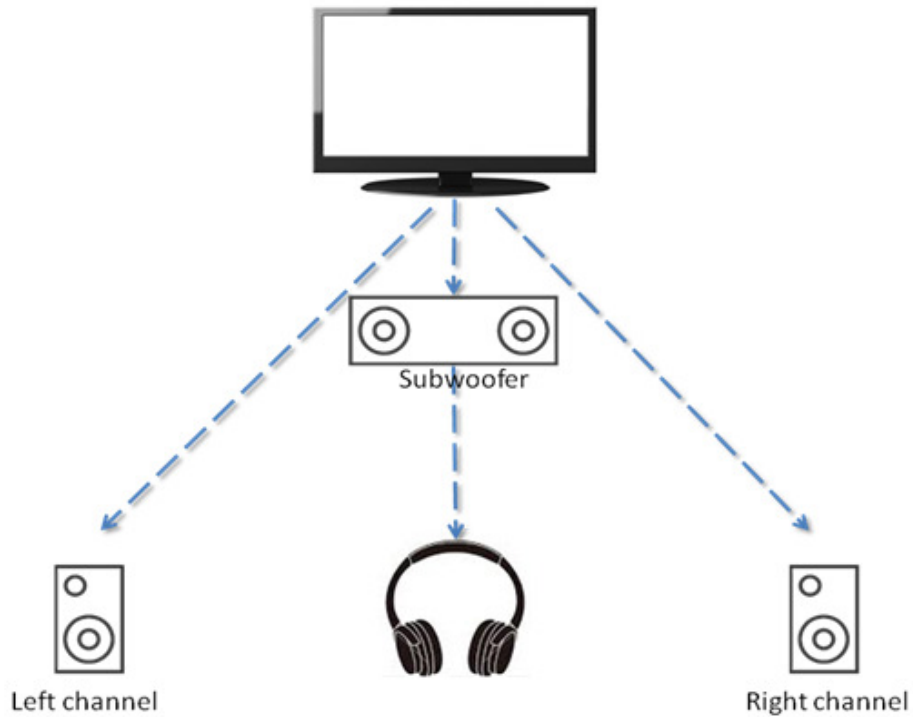
Scenario 1 One Transmitter to Four receivers



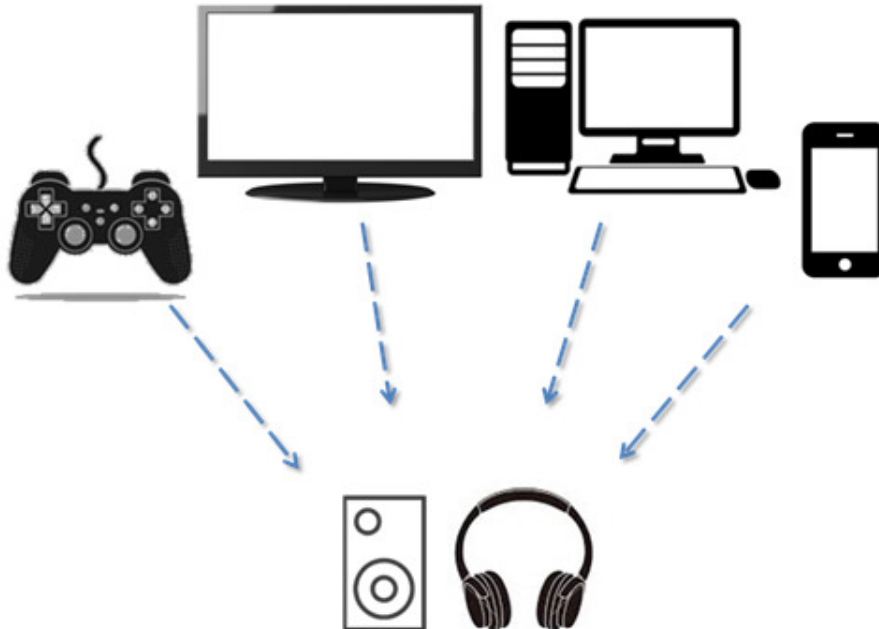
Scenario 2 One Receiver can select up 10 Transmitters in multi-room environment



Scenario 3 2.1 Home theater system



Scenario 4 Low latency good for Gaming and Audio/Video system



Revision History

- 1. V1.1 Page2 added System diagram