



FSD02

DAB+FM Radio Module Specification

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Top view



Bottom view

Module Name: FSD02	
Module Type: DAB+FM Radio Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
BL-link Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date
V0.1	Internal release	2022-01-20
V0.1	Internal release	2022-03-17
V1.0	Official release	2022-04-20

1. Introduction

The FSD02 is a digital&FM radio broadcast module designed base on Kino 4 FS1445 of frontier.

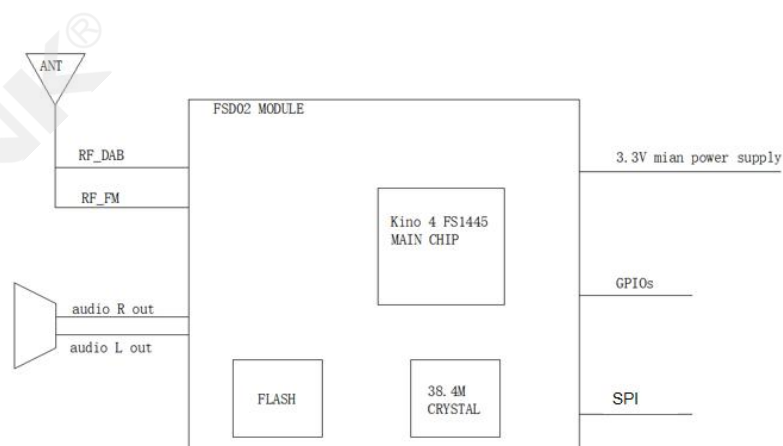
This module has a fully integrated radio receiver SoC containing RF tuner, baseband, application processor, audio decode and DAC functionality. It support multi-band RF tuner and processor operate in the following RF bands; FM, DAB-III, Cable DAB are supported

This module' s DAB conductive sensitivity can reach -98dBm and FM conductive sensitivity can reach -108dBm.

1.1 Module Features

- SPI interface
- Main Input voltage range : DC 3.3V +/-5% 300mA peak;
- Support DAB/DAB+/FM modulation,
- DAB frequency: 174.928MHz~239.200MHz; FM frequency: 87.5MHz~108MHz
- Conductive sensitivity: DAB/DAB+ -98dBm ; FM -108dBm.

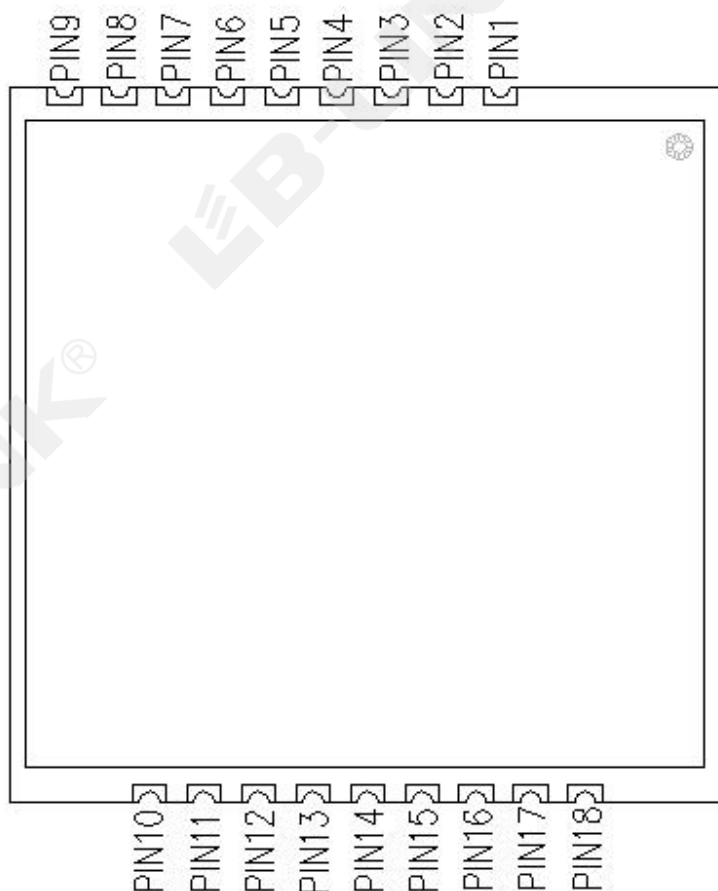
1.2 Module Block Diagram



1.3 General Specifications

Module Name	FSD02
Chipset	Kino 4 FS1445
Modulation Standards	DAB/DAB+/FM
Antenna	Solder antenna through half hole pads
Dimension	21*21*3.6mm (L*W*H)
Power Supply	Main Input voltage range DC: DC 3.3V+/-5% (Default: 3.3V) ; 300mA.
Host Interface	SPI
Operation Temperature	0°C to +70°C
Storage temperature	-45°C to +85°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



Top view

2.1 Pin Definition

No	Pin Name	Type	Description	I/o Supply
1	GND	P	Ground	
2	NC	NC	Not connected	
3	NC	NC	Not connected	
4	GND	RF	Ground	
5	RF_ANT	RF	DAB&DAB+&FM RF port	
6	GND	RF	Ground	
7	AUD_L_OUT	O	Left audio trace output pin	
8	AUD_R_OUT	O	Right audio trace output pin	
9	GND	P	Ground	
10	GND	P	Ground	
11	VDD33	P	3.3V Main power supply	
12	SPIS0_CS	I	UART RX signal(MFIO9 customer can use as SPI function)	VDD33
13	SPIS0_SCLK	O	UART TX signal(MFIO10 customer can use as SPI function)	VDD33
14	SPIS0_TXD	O	UART CTS signal(MFIO7 customer can use as SPI function)	VDD33
15	SPIS0_RXD	I	UART RTS signal(MFIO8 customer can use as SPI function)	VDD33
16	POR_N	I/O	Hard reset ,active low	
17	NC	NC	Not connected	
18	GND	P	Ground	

P: Power, I: Input, O: Output, I/O: In/Output, RF: Analog RF Port. IPU: keep high Power-up

NC: No Connection, GPIO: If not used keep Floating.

The NC foot is suspended without grounding.

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters	Min	Typ	Max	Units
Ambient Operating Temperature	0	25	70	°C
Supply Voltage VDD33	3.14	3.3	3.47	V

3.2 Current Consumption

Conditions: VDD33=3.3V, Ta = 25 °C, unit: mA			
Supply current	VDD33 Current(average)		
	Typ	Max	Units
Conductive Transmission test(RX 174.928MHz)	101	110	mA
Conductive Transmission test(RX 206.352MHz)	103	111	mA
Conductive Transmission test(RX 235.776MHz)	104	111	mA

4. RF Specifications

Conditions : VDD=3.3V ; Ta:25°C		
Features	Description	
Modulation Standards	DAB/DAB+/FM	
Frequency Range	DAB/DAB+:174.928MHz~239.200MHz;FM:87.5MHz~108MHz	
Modulation	Band III FM	
Conductive Receiver Specifications <i>(RF PORT)</i>		
RX channel	Min Input Level (dBm)	Max Input Level (dBm)
5A(174.928MHz) @DAB/DAB+	-99	-10
9C(206.352MHz) @DAB/DAB+	-99	-10
23F(239.200MHz) @DAB/DAB+	-99	-10
87.5MHz@FM	-108	-10
108MHz@FM	-108	-10

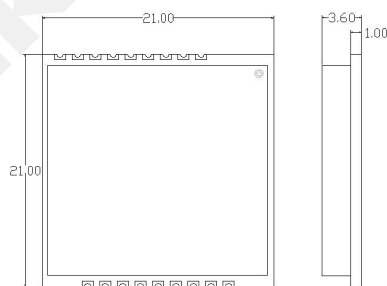
4.1 DAB FM Specification

Temperature: 25 / Relative Humidity: 75%					
Signal Generator: Leader VP-8194D, Audio Analyzer: Kenwood VA-2230A					
Parameter	Condition	Min	Typical	Max	Unit

DAB					
Mode 1 / UEP3/ Tone 1KHz /192Kbps, Criterion: No pop audio for 30 sec.					
RF frequency range		174		240	MHz
Adjacent Channel rejection	EN50248 / N+1 / N-1 RF input power: -70dBm	-	45	-	dBc
Far-off selectivity	EN50248 RF input power: -70dBm	-	60	-	dBc
Sensitivity	EN50248	-100	-99	-98	dBm
Maximum input power	EN50248		0		dBm
Audio output	Tone 1KHz,0db without loading		0.56		Vrms
FM					
Dev: 67.5KHz / Tone 1KHz / 60dBuV,					
Parameter	Condition	Min	Typical	Max	Unit
RF frequency range		87.5		108.1	MHz
RF sensitivity	SINAD = 40dB	-106	-108	-	dbm
Separation	Dev: 53% / Pilot: 9%	30	37		dB
			-		
SNR		60	65	68	dB
THD+N	Dev. 67.5K / Tone 1KHz		0.15		%
Frequency grid			50		KHz
Audio output	Dev. 67.5K / Tone 1KHz without loading		0.31		Vrms

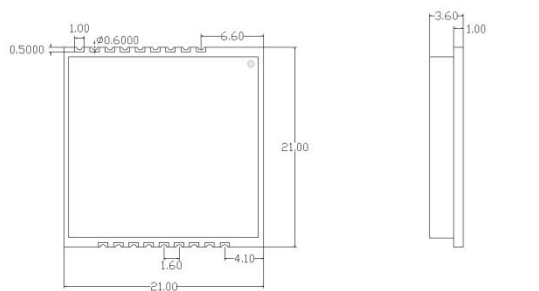
5.Mechanical Specifications

5.1 Module Outline Drawing (Unit: mm)



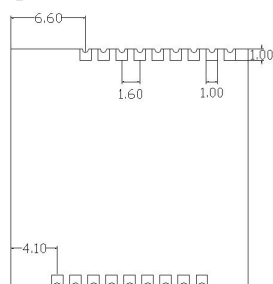
Module dimension: 21*21*3.6mm (L*W*H; Tolerance: ±0.2mm)

5.2 Mechanical Dimensions (Unit: mm)

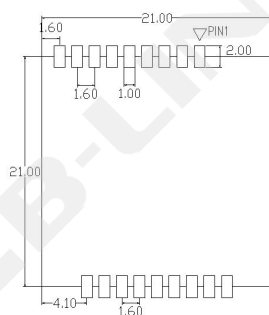


Top view

Side view

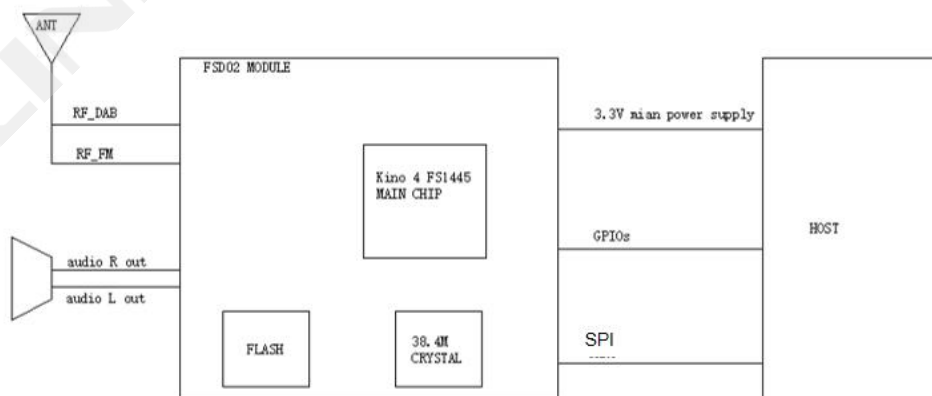


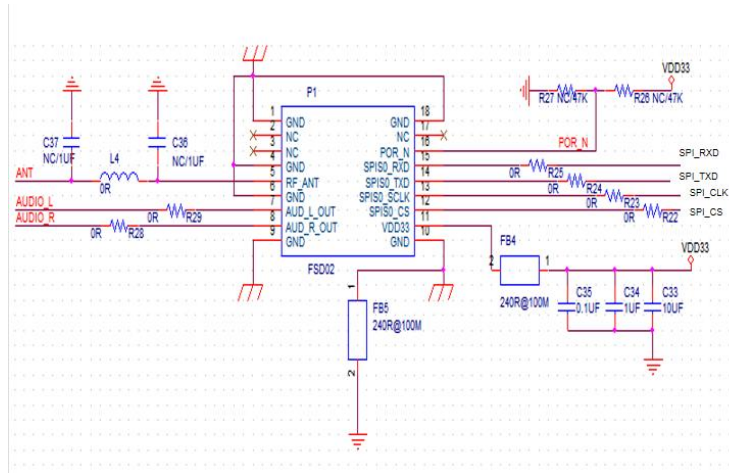
Bottom view



Customer PCB reference design(top view)

6. Application Information





NOTE:Power supply use LDO converter and make sure Frequency <1MHz, needs add Ferrite Beads at power pin,also needs add Ferrite Beads at GND pin.

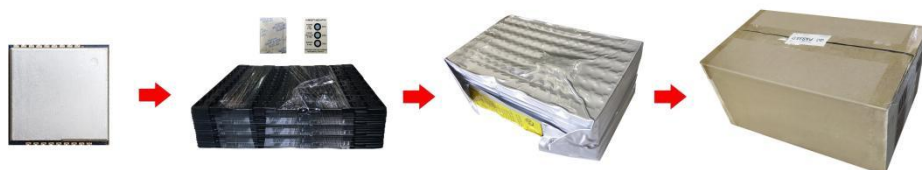
7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	Kino 4 FS1445	FRONTIER	
2	PCB	FSD02-V1.0-21.0*21.0 *1.0	Shen Zhen Tie Fa Technology	
			Guangdong KINGSHINE ELECTRONICS CO., LTD	
			MILLION SOURCE PRINTED CIRCUIT BOARD CO., LTD	
			Quzhou Sunlord Electronics Co., Ltd	
3	Crystal	38.4MHZ-10PPM-10p F-3.2*2.5mm-40~85 °C	Chengde oscillator Electronic Technology Co.,Ltd.	
			LUCKI CM ELECTRONICS CO,LTD	

8. Package and Storage Information

Package Dimensions

Packaging:



Package specification:

1. 70 modules per blister plate and 1,600 modules per box.
2. The blister is bound with wire membrane and put into anti-static vacuum bag.
3. Put 1 bag of dry beads (20g) in each anti-static vacuum bag. 1 pcs 3 point humidity card.
4. The outer box size is 35.2*21.5*15.5cm.

Storage Conditions

Absolute Maximum Ratings:

- Storage temperature: -45°C to +85°C,
- Storage humidity: 10% to 95 (Non-Condensing)

Recommended Storage Conditions:

- Storage temperature: 5°C to +40°C,
- Storage humidity: 20% to 90% RH

Please use this Module within 12month after vacuum-packaged.

The Module shall be stored without opening the packing.

After the packing opened, the Module shall be used within 72hours.

When the color of the humidity indicator in the packing changed, the Module shall be baked before soldering.

Baking condition: 60°C, 24hours, 1time.

ESD Sensitivity:

- ESD Protection: +-2KV(HBM ,Maximum rating)
- The Module is a static-sensitive electronic device.
- Do not operate or store near strong electrostatic fields.
- Take proper ESD precautions!