

# DF1201S Datasheet

**DFROBOT**

**Version: V1.0**

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## 1. Introduction

DF1201S is a stereo sound chip with serial port. It integrates the hardware decoding that supports MP3, WAV, WMA, FLAC, ACC, APE. Besides, the chip also supports TF card driving, FAT16, and FAT32 file system. Through a simple serial port, you can play the designated music without any other tedious underlying operations.

### Power Supply

- VBAT is 2.2V to 5.5V
- VDDIO is 2.2V to 3.6V
- RTCVDD is 2.2V to 3.6V

### Packages

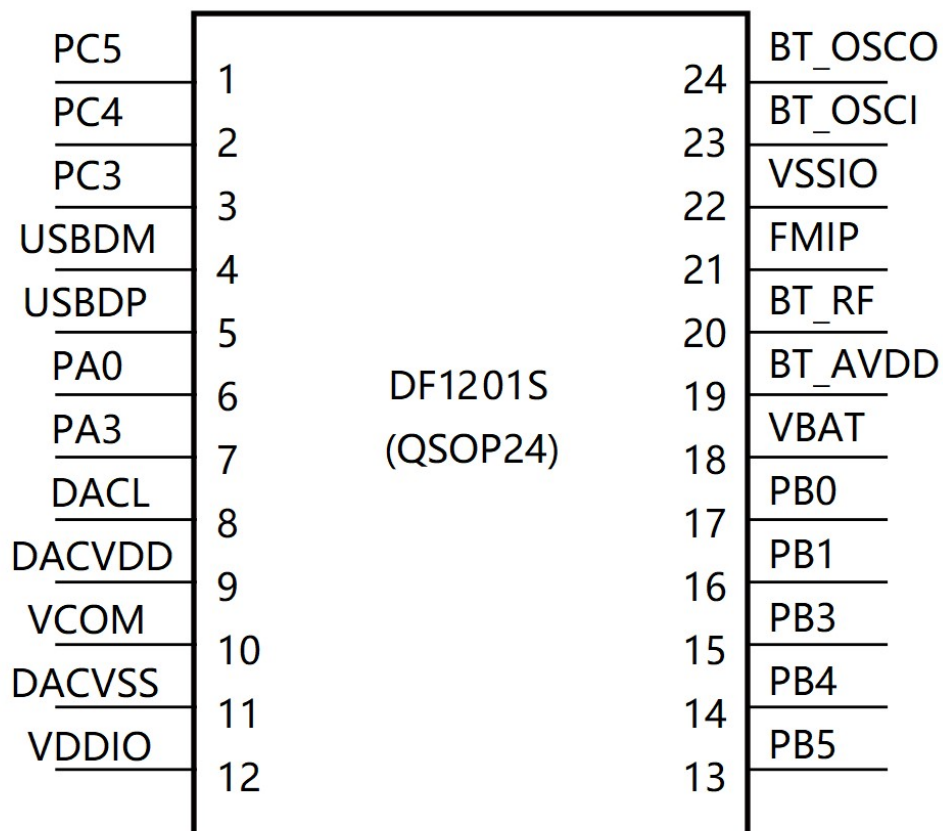
- QSOP24

### Temperature

- Operating temperature: -20°C to +70°C
- Storage temperature: -65°C to +150°C

## 2. Pin Description

### 2.1 Pin Assignment



## 2.2 Pin Description

PIN NO.	Name	I/O Type	High Drive	Function
1	PC5	I/O	24	SPI Data Out
2	PC4	I/O	24	SPI Clock
3	PC3	I/O	24	SPI Data In
4	USBDM	I/O	4	USB Negative Data (pull down)
5	USBDP	I/O	4	USB Positive Data (pull down)
6	PA0	I/O	24	MIC Input Channel
7	PA3	O	24	DAC Right Channel
8	DACL	O	/	DAC Left Channel
9	DACVDD	P	/	DAC Power
10	VCOM	P	/	DAC Reference
11	DACVSS	P	/	Ground
12	VDDIO	P	/	IO Power 3.3v
13	PB5	I/O	8	Playing Status Indicator
14	PB4	I/O	8	ADKEY
15	PB3	I/O	8	Amplifier Enable Pin
16	PB1	I/O	8	UART Data In
17	PB0	I/O	8	UART Data Out
18	VBAT	P	/	LDO Power
19	BT_AVDD	P	/	BT Power 1.3V
20	BT_RF	P	/	
21	FMIP	I	/	
22	VSSIO	P	/	Ground
23	BT_OSCI	I	/	BT OSC In
24	BT_OSCO	O	/	BT OSC Out

## 3. Electrical Characteristics

### 3.1 PMU Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$V_{BAT}$	Voltage Input	2.2	3.7	5.5	V	
$V_{3.3}$	Voltage output	-	3.3	-	V	LDO5V = 5V, 100mA loading
$V_{1.2}$		-	1.2	-	V	LDO5V = 5V, 50mA loading
$V_{1.3}$	Voltage output		1.3		V	LDO5V = 5V, 100mA loading
$V_{DACVDD}$	DAC Voltage	-	3.1	-	V	LDO5V = 5V, 10mA loading
$I_{L3.3}$	Loading current	-	-	150	mA	LDO5V = 5V

### 3.2 IO Input/Output Electrical Logical Characteristics

IO input characteristics						
Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V <sub>IL</sub>	Low-Level Input Voltage	-0.3	-	0.3*V <sub>DDIO</sub>	V	V <sub>DDIO</sub> = 3.3V
V <sub>IH</sub>	High-Level Input Voltage	0.7*V <sub>DDIO</sub>	-	V <sub>DDIO</sub> +0.3	V	V <sub>DDIO</sub> = 3.3V
IO output characteristics						
V <sub>OL</sub>	Low-Level Output Voltage	-	-	0.33	V	V <sub>DDIO</sub> = 3.3V
V <sub>OH</sub>	High-Level Output Voltage	2.7	-	-	V	V <sub>DDIO</sub> = 3.3V

### 3.3 Internal Resistor Characteristics

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PA0 PA4 PC3~PC5	8mA	24mA	10K	10K	1:USBDM & USBDP default pull down 2:internal pull-up/pull-down resistance   accuracy ±20%
PB0 PB1 PB3~PB5	4mA	8mA	10K	10K	
USBDM USBDP	4mA	-	1.5K	1.5K	

### 3.4 DAC Characteristics

Parameter	Min	Typ	Max	Unit	Test Conditions
Frequency Response	20	-	20K	Hz	1KHz/0dB 10Kohm loading With A-Weighted Filter
THD+N	-	-69	-	dB	
S/N	-	95	-	dB	
Crosstalk	-	-80	-	dB	
Output Swing		1		V <sub>rms</sub>	
Dynamic Range		90		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power	11		-	mW	32ohm loading

### 3.5 ADC Characteristics

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		85		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
THD+N	-	90	-	dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
S/N	-	-72	-	dB	
Crosstalk	-	-80	-	dB	

## 4. Communication Command

### 4.1 Command Format

UART Communication Default Baud Rate: 115200bps (can be set by AT commands) Data bit: 8 Stop bit: 1 Parity bit: none Flow control: none	
Control command format: AT+ <CMD>=[param]\r\n ---all the commands are chars instead of hexadecimal numbers.	
Data Feedback Format: [param]\r\n	
Data Features	Description
AT	Command Head
<CMD>	Command
[param]	Parameter
\r\n	\r\n End
eg: AT+VOL=5\r\n ---Designate volume to 5	

## 4.2 Command

Command	Function	Description
AT\r\n	Test Connection	No command and parameter required
AT+VOL=5\r\n	Set/Query Volume (Volume: 0-30)	param -n: Volume-n +n: Volume+n n: Designate volume to n ?: Query volume
AT+PLAYMODE=1\r\n	Control playback mode	param 1: repeat one song 2: repeat all 3:play one song and pause 4: Play randomly 5: Repeat all in the folder ?:query the current playback mode
AT+PLAY=NEXT\r\n	Control playing	param PP: Play & Pause NEXT: next LAST: last
AT+TIME=-5\r\n	Fast Rewind 5S	param -n: Fast Rewind n S +n: Fast Forward n S n: Start playing from the Nth second
AT+QUERY=1\r\n	Query the file number of the currently-playing file	param 1: Query the file number of the currently-playing file 2: Query the total number of the files 3: Query the time length the song has played. 4: Query the total time of the currently-playing file. 5: Query the file name of the currently-playing file.
AT+PLAYNUM=5\r\n	Play the file No.5	param

		File number(Play the first file if there is no such file )
AT+PLAYFILE=/test/test.mp3\r\n	Play the specific file	File path
AT+DEL\r\n	Delete currently-playing file	No parameter required
AT+AMP=ON\r\n	Amplifier On/OFF command	param ON,OFF
AT+REC=SAVE\r\n	Recording control	param RP: Record & Pause SAVE: Save the recorded voice
AT+BAUDRATE=115200\r\n	Set baud rate (power-down save, valid after re-powering on)	Param 9600,19200,38400,57600,115200
AT+PROMPT=ON\r\n	Prompt tone ON/OFF command (Power-down save)	param ON,OFF
AT+LED=ON\r\n	LED Prompt ON/OFF command (Power-down save)	param ON,OFF



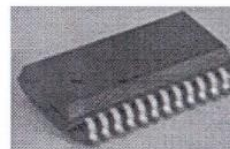
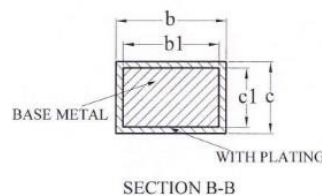
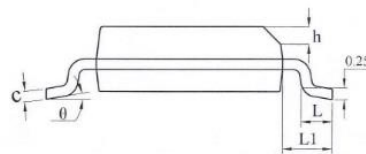
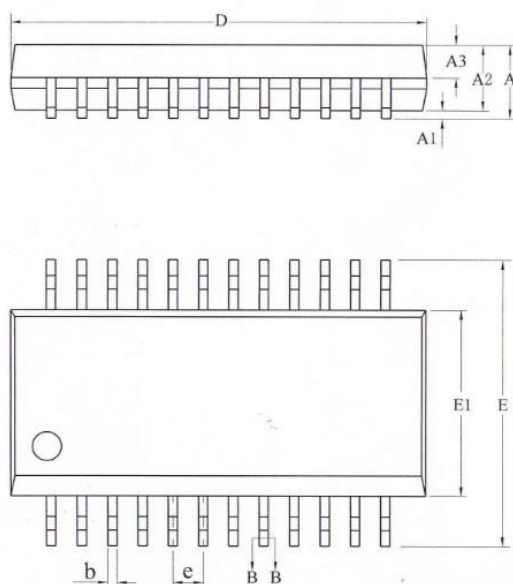
### 5. ADKEY

Connect ADKEY to the chip's PB4, and add a 22k pull-up resistor whether it is used. The accuracy of 1% is best for the ADKEY, and the accuracy error is recommended to be no more than 5% .

Please refer to the actual test when using.

Key	Resistance in Series	Function
K1	0R	Play & Pause
K2	3K	Hit: last Long-press: volume+
K3	6.2K	Hit: next Long-press: volume-
K4	9.1K	Playback mode switch
K5	15K	Fast Forward 10S
K6	24K	Hit:Play & Pause Long-press:last
K7	33K	Volume-
K8	51K	Volume+
K9	100K	Fast Rewind 10S
K10	220K	Play the first song, set volume to 10

### 6. Package



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	0.15	0.25
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.23	—	0.31
b1	0.22	0.25	0.28
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	0.635BSC		
h	0.30	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°