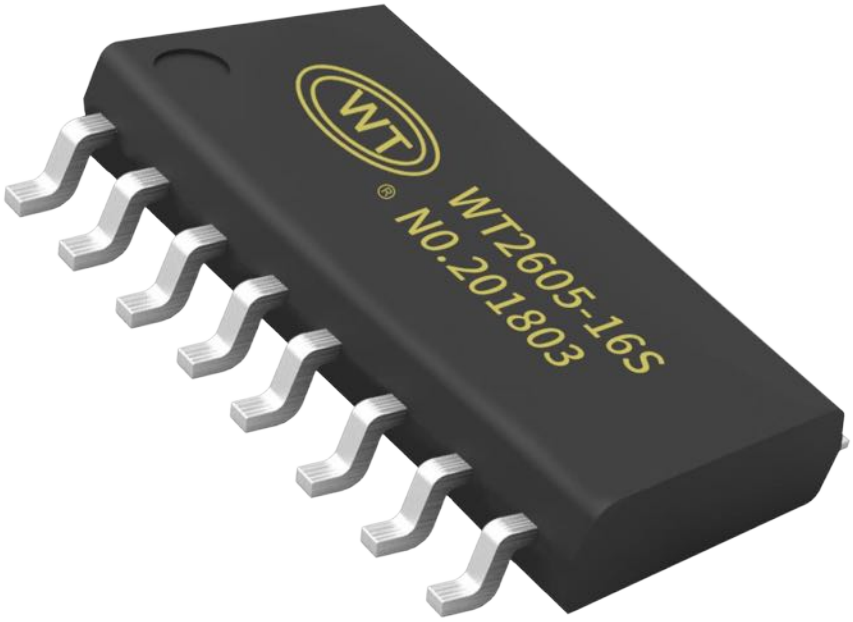
WT2605 Bluetooth Voice Chip Specification

Version: V1.02



Note :

CONTENT

1.Overview

1.1. Description

WT2605 chip is specially designed for audio Bluetooth applications. It is a high-quality MP3 audio codec Bluetooth chip developed by Shenzhen Waytronic Electronics Co., Ltd. It contains a powerful DSP (Digital Signal Processor) core, which can access and interact with external devices through UART interface, and is easy to operate. The built-in analog interface of the chip provides users with high-quality audio input and output, and the peripheral interfaces are abundant, which can meet the needs of different users.

1.2. MCU and Advanced Feature

1.2.1. CPU Feature

- 32-bit high-performance CPU with DSP instruction, clocked at 120MHz.

1.2.2. Clock and Crystal Oscillator

- External 26MHz crystal oscillator.
- Three 32-bit universal timers.
- 1 main system watchdog.

1.2.3. Advanced Peripheral Interface

- GPIO has built-in pull-up and pull-down resistors, which can be mapped to functIOnal io.
- GPIO supports wake-up interrupts.
- 1 full duplex UART.
- 1 SPI.
- 1 IR controller.
- 1 SD card host controller.

- 1 full-speed USB2.0 HOST/DEVICE controller.
- Built-in PMU power management unit.

1.2.4. Audio Feature

- GPIO has built-in pull-up and pull-down resistors, which can be mapped to functIOnal io.
- GPIO supports wake-up interrupts.
- 1 full duplex UART.
- 1 SPI.
- 1 IR controller.
- 1 SD card host controller.
- 1 full-speed USB2.0 HOST/DEVICE controller.
- Built-in PMU power management unit.

1.2.5. Bluetooth Radio Frequency Characteristics

Transmitting Terminal	Unit	Minimum	Typical Value	Maximum	Bluetooth Specification
Radio Frequency Output Power	dBm	0	3	5	-6~5
Frequency Range	GHz	2.4	-	2.4835	2.4~2.5
Initial Carrier Frequency Tolerance	KHz	-50	-20	50	-75~75
Carrier Frequency Drift	KHz/50us	-	2	20	<=20

Receiving Terminal	Unit	Minimum	Typical Value	Maximum	Bluetooth Specification
Sensitivity	dBm	-80	-75	-70	<=-70
Maximum Received Signal	dBm	-20	-10	-	>=-20

1.3. Dedicated Solution

1.3.1 Standard Audio Bluetooth Scheme

WT2605 chip supports standard audio Bluetooth function. As an outstanding audio chip in the industry, WT2605 has ADC and DAC peripherals with high signal-to-noise ratio, and the resolution is as high as 16bit. At the same time, it has the functions of standard UART, key-controlled playback, etc., and can store audio files by external memory such as U disk, TF card, SPI Flash, etc. SPI FLash supports file management, and can realize the functions of file index playback and file name playback, etc. Support standard MP3, WAV audio file playback and Bluetooth playback, and can also decode and play APE, FLAC and other audio files (customized). Please refer to the scheme specification and schematic diagram for details.

1.3.2 Standard Recording Scheme

WT2605 chip supports recording function, which can realize MIC recording, AUX recording and audio Bluetooth recording. The recorded data can be stored in U disk, TF card or SPI Flash. SPI Flash supports file management, and can realize functions such as file index recording and file name recording. Access and interact with external devices through UART interface, and the format of recording file is MP3 format. Customizable key recording and other functions. Please refer to the scheme specification and schematic diagram for details.

1.3.3 Remote Download Scheme

WT2605 chip supports remote download function. By supporting 4G or WiFi module, audio data on the server can be transmitted to the local memory, so as to realize the audio file upgrade function and facilitate users to change and play voice conveniently. 4G/WiFi module and WT2605 chip use UART as data transmission and interactive interface. Audio files can be upgraded to SPI Flash or TF card. Audio file formats support MP3 and WAV. Please refer to the scheme specification and schematic diagram for details.

1.3.4 Recording Upload Scheme

WT2605 chip supports recording upload function, and recording data can be output in real time through UART interface, which is convenient for users to operate audio data (such as uploading to server or voice recognition and other applications). At the same time, the recording data can also be stored in the local memory, which can be selected as SPI Flash or TF card, and U disk is used as the memory. Audio file format supports MP3 or WAV. Please refer to the program specification for details.

1.3.5 Streaming Media Scheme

WT2605 chip supports streaming media function. MP3 audio data can be decoded and played by UART. Audio decoding supports 32~320kbps, with built-in 8KB buffer space. The data sent each time cannot exceed 8KB, and the next packet of data will be sent after the audio data is decoded. Please refer to the scheme specification and schematic diagram for details.

1.3.6 Real-time Intercom Scheme

WT2605 chip supports real-time intercom function. It can encode the sound collected by MIC into MP3 audio data and output it through UART, or receive MP3 audio data for decoding and playing through UART. The communication mode is half duplex, that is, the audio data collected by MIC cannot be decoded and played (decoding and encoding cannot work at the same time). Please refer to the scheme specification and schematic diagram for details.

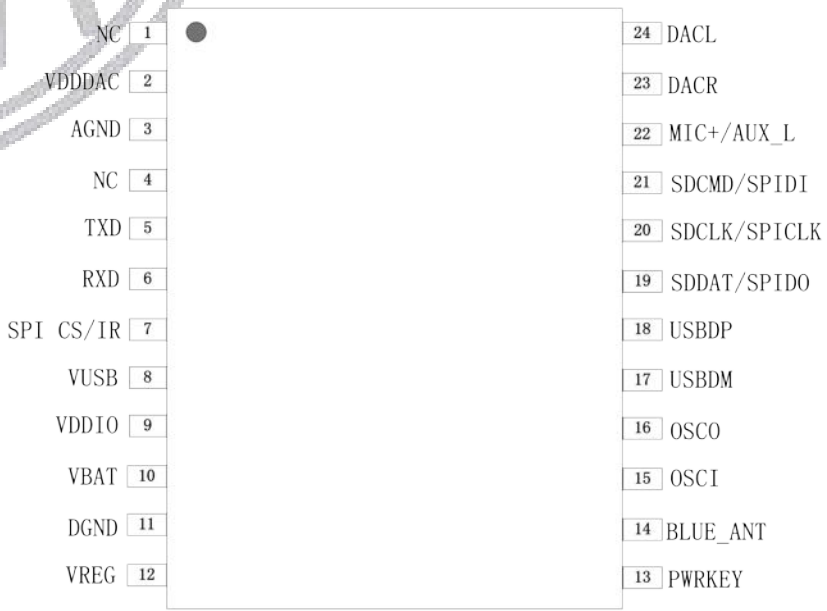
1.4. Application(some examples)

- Wireless broadcast equipment-real-time -Real-time intercom scheme
- Multimedia teaching equipment -Real-time intercom scheme
- Internet Radio -Streaming media solution
- Electronic navigation system -Streaming media solution

- Acoustic medical equipment
  -Streaming media solution
- Elevator floor report, voice prompt and other peripheral products.
  -Remote download scheme
- Smart home, smart city, smart animal husbandry, etc.
  -Remote download scheme
- Traffic, underground positioning and alarm.
  -Remote download scheme
- Intelligent charging equipment (charging treasure, charging pile, etc.)
  -Remote download scheme
- Pen Recorder
  -Recording scheme
- Recording Intercom
  -Recording scheme
- Bluetooth Speaker
  -Audio Bluetooth scheme
- Bluetooth Headset
  -Audio Bluetooth scheme

2. Definition of PIN

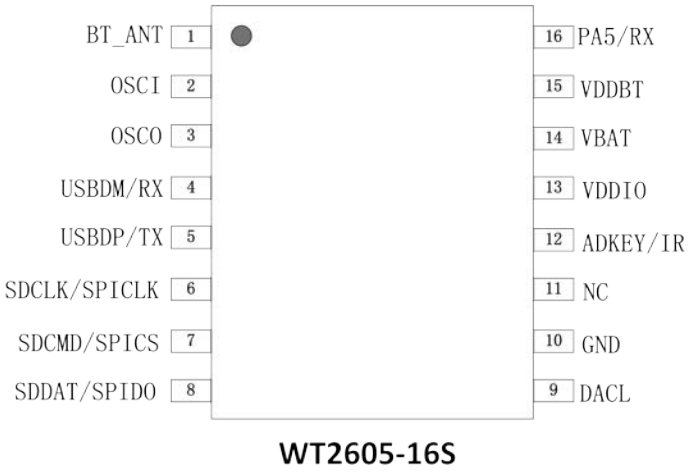
2.1. Package SSOP24-Description of PIN



WT2605-24SS

PIN	Name	Type	Description
1	NC	NC	Empty foot
2	VDDDAC	PWR	DAC power supply, connect 0.1uf capacitor to ground
3	AGND	GND	Analog ground
4	NC	NC	Empty foot
5	TXD	I/O	UART asynchronous serial port data output
6	RXD	I/O	UART asynchronous serial port data input
7	SPI CS/IR	I/O	SPI CS
		I/O	IR input
8	VUSB	PWR	VUSB power input, which is not turned on by default, connect 0.22uf capacitor to ground.
9	VDDIO	PWR	3.3V power output
10	VBAT	PWR	VBAT power input
11	DGND	GND	Digital land
12	VREG	PWR	Decoupling pin, connect 1uf capacitor to ground.
13	PWRKEY	A	Key input
14	BLUE_ANT	BT	Bluetooth antenna
15	OSCI	A	26M OSC input
16	OSCO	A	26M OSC output
17	USBDM	I/O	USB DM
18	USBDP	I/O	USB DP
19	SDDAT/SPIDO	I/O	SD card data
		I/O	SPI DO
20	SDCLK/SPICLK	I/O	SD card clock
		I/O	SPI CLK
21	SDCMD/SPIDI	I/O	SD card selection
		I/O	SPI DI
22	MIC+/AUX_L	I	MIC positive input
		I	AUX line input
23	DACR	O	DAC right channel output
24	DACL	O	DAC left channel output

2.2. Package SSP16-Description of PIN



WT2605-16S

PIN	Name	Type	Description
1	BT_ANT	BT	Bluetooth antenna
2	OSCI	A	26M OSC input
3	OSCO	A	26M OSC output
4	USBDM/RX	I/O	USB DM
		I/O	UART RX
5	USBDP/TX	I/O	USB DP
			UART TX
6	SDCLK/SPICLK	I/O	SD card clock
		I/O	SPI Flash clock
7	SDCMD/SPICS	I/O	SD card selection
		I/O	SPI Flash chip selection
8	MIC+/AUX_L/ SDDAT/SPIDO	I/O	MIC positive input
		I/O	AUX line input
		I/O	SD card data
		I/O	SPI Flash data
9	DACL	O	DAC left channel output
10	GND	GND	earth wire
11	NC	NC	Empty foot
12	ADKEY/IR	I	Key input
		I	IR input
13	VDDIO	PWR	3.3V power output
14	VBAT	PWR	VBAT power input
15	VDDBT	I/O	Connect 1uf capacitor to ground.
16	RX/PA5	I/O	UART1 RX
			GPIO

3. Electrical Parameter

3.1. Working Condition

Symbol	Description	Minimum	Typical Value	Maximum	Unit
VBAT	Power supply pin voltage	3.0	3.7	5.0	V
I_{VBAT}	External power supply current, no load	25	--	--	mA
T	Working temperature	-40	--	+85	℃

3.2. IO Characteristics

Symbol	Description	Minimum	Typical Value	Maximum	Unit	Condition
V_{IL}	Input low level	-0.3	--	1.27	V	VDDIO=3.3V
V_{IH}	Input high level	2.03	--	3.6	V	VDDIO=3.3V
Driver	Output drive capability	--	8	--	mA	VDDIO=3.3V

3.3. Audio DAC Characteristics

Symbol	Description	Minimum	Typical Value	Maximum	Unit	Condition
SNR	SNR	--	96	--	dB	VCM cap = 1uF VDDDAC cap = 1uF With A-WT Filter Output -3dBV Fin = 1KHz
THD+N	total harmonic distortion	--	-86	--	dB	VCM cap = 1uF VDDDAC cap = 1uF With A-WT Filter Output -3dBV, 10K loading Fin = 1KHz
Output	maximum output voltage	--	2.6	--	$V_{peak-peak}$	32ohm loading

3.4. BT Parameter

name	Minimum	Typical Value	Maximum	Unit	Condition
Maximum transmission power	-	2	-	dBm	
Root mean square deviation	-	5.5	-	%	Max TX power 2-DH5 packet
Peak deviation	-	12.5		%	
EDR relative transmission power		-0.2		dB	

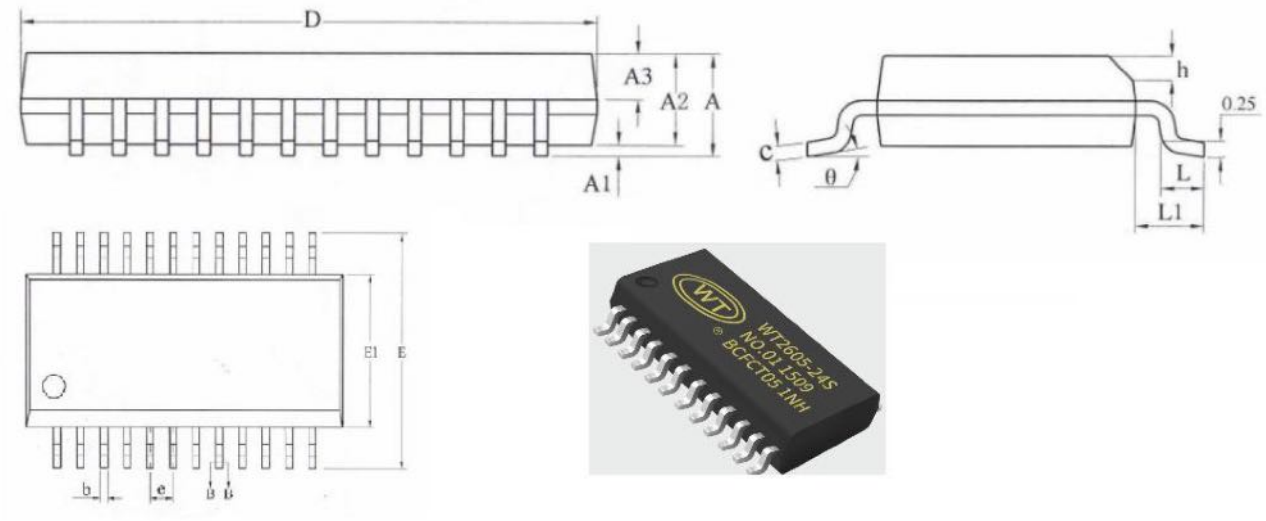
3.5. Audio ADC Characteristics

Symbol	Description	Minimum	Typical Value	Maximum	Unit	Condition
SNR	SNR	--	90	--	dB	VCM cap = 1uF VDDDAC cap = 1uF With A-WT Filter Output -3dBV Fin = 1KHz
THD+N	total harmonic distortion	--	-87	--	dB	VCM cap = 1uF VDDDAC cap = 1uF With A-WT Filter Output -3dBV, 10K loading Fin = 1KHz
Input Range	Input sine wave peak amplitude	0	--	VCM	V	Aux input, aux 0db gain

4. Package Information

4.1. SSOP24 Package Information

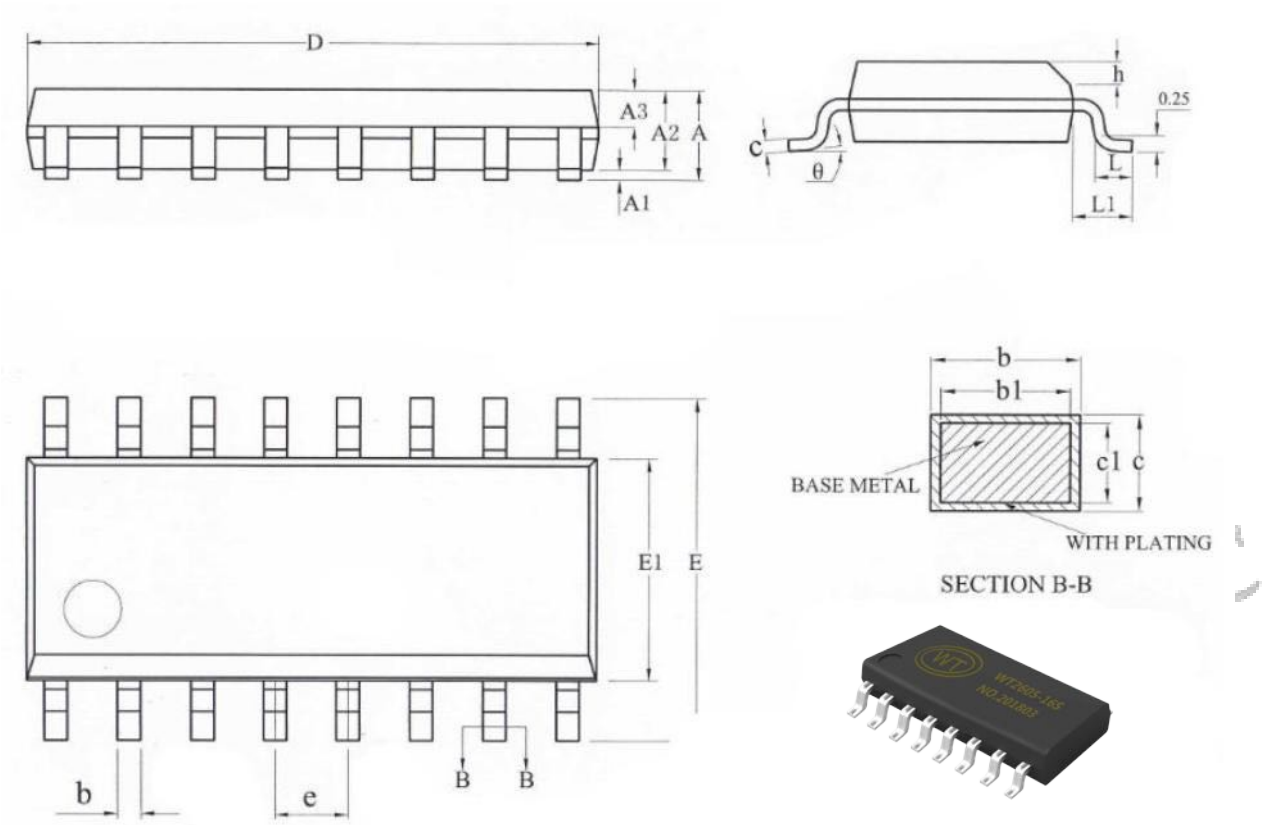
Unit: mm



Name	Minimum	Typical Value	Maximum
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°

4.2. SOP16 Package Information

Unit: mm



Name	Minimum	Typical Value	Maximum
A	-	-	1.75
A1	0.10	0.15	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.47
b1	0.38	0.41	0.44
c	0.20	-	0.24
c1	0.19	0.20	0.21
D	9.80	9.99	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	-	0.50
L	0.50	-	0.80
L1	1.05REF		
θ	0	-	8°