科大讯飞®
iFLYTEK

XFS5152CE Speech synthesis chip

User Development Gui

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Version History

version	date	Modify records
V0.1	2013-4-15	First draft
V0.2	2013-4-23	Referring to FIG circuit details such amendments
V0.3	2013-4-24	increase 12.1 Methods of using the markup detailed description, other details revision pin definitions.
V1.0	2013-5-6	Officially released version
V1.1	2013-5-13	Revise 5 Chapter table identifies the pin definitions, revision 8.3.4.1 form, 8.4.3 chapter, 8.4.4 chapter, 13.2 Relevant content sections.
V1.2	2013-5-14	The revised text tone, recognize the command word custom instructions.

statement

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1 Outline

XFS5152CE Is a highly integrated speech synthesis chip, enabling Chinese, English speech synthesis; and integrates voice encoding and decoding functions, enabling users to record and play back; in addition, also integrates innovative lightweight voice recognition, support 30 Command word recognition, and supports the user's command word custom needs.

2 The main application areas

- Vehicle dispatch terminal
- Information Machine
- Attendance
- Queue
- Meteorological early warning aircraft
- Intelligent instruments
- Fixed telephone
- Tax control machine
- Bus voice announcer
- vending machine
- POS machine
- Smart Meter

3 Ordering Information

Chip model	Package Information	
	Package Name	Package Description
XFS5152CE	LQFP64	64 Foot chip 10mmx10mmx1.4mm

form 1 Ordering Information

4 Functional Description

- Support any Chinese text, the English text synthesis, and support Chinese and English mixed reading

  Chip support any Chinese, English text synthesis, can be used GB2312 , GBK , BIG5 with UNICODE Four coding mode. Each time the amount of text synthesis up to 4K byte.

  Chip text analysis, text common digital, number, time, date, metrology symbol format, the chip can be correctly identified and processed according to the embedded text matching rule; may be correct in general more than one pronunciation depending on its context Analyzing reading method; while additional text for Chinese and English, the English mixed reading can be achieved.

- Support voice codec, users can directly use the chip to record and playback

  Chip integrates the speech encoding unit and the decoding unit can perform speech coding and decoding, can record and playback. Speech codec chip have the characteristics of high compression ratio, low distortion, low latency, and can support a variety of voice codec rate. These features make it well suited to digital voice communications, voice storage and other needs of the voice digital processing applications. Such as: vehicle micro-channel, the command center.

- Support voice recognition

  Support 30 A command recognition word. The default setting is to chip out 30 A car, early warning and other industries to identify common command words. If you need to change into other customer identification command word, the word order can be customized.

- An on-chip 80 Tips commonly used sound

  Tips for information, ring tones, alarm and other functions for different occasions.

- stand by UART , I2C , SPI Kinds of Communication

  UART Serial support 4 Kind of communication baud rate can be set: 4800 bps , 9600 bps , 57600 bps , 115200 bps, Users can choose depending on the situation by the hardware configuration they need baud rate.

- It supports a variety of control commands

  Such as synthetic text, stop synthesis, synthesis pause, resume synthesis, state inquiry into the power-saving mode, wake-up.

  You can control the chip corresponding control commands transmitted via the communication interface. Chip control command is very simple to use, such as: the chip can be unified through "synthetic command" interface to play tones and Chinese text, the text can also be achieved by labeling synthesis parameter settings.

- Support multi-mode chip working status query

  They include: Check status pin level, by reading the chip automatically return to work status word, send a query command to get the returned data chip operating conditions.

5 Pin definitions

Numbering	Pin	Explanation	Numbering	Pin	Explanation
1	VDD12	1.2V power input digital 33		NC	- -
2	UVCC	3.3V power input analog 34		NC	- -
3	RREF	The reference voltage, then 10K pull-down resistor	35	NC	- -
4	GND	Digital Ground	36	VDD33	3.3V power input digital
5	NC	- -	37	GND	Digital Ground
6	NC	- -	38	NC	- -
7	AVCC	3.3V power input analog 39		RXD	Serial reception
8	AO_P	The audio output	40	RDY	Low chip is in the ready state
9	AO_N	Audio output negative	41	TXD	Serial port
10	AGND	Analog ground	42	SPI_CLK	SPI clock input
11	VCM	The analog reference voltage	43	SPI_SSEL	SPI chip select, 10K pull-up resistor connected
12	Mic_Bias	Microphone bias voltage	44	SPI_SI	SPI data input
13	MIC_N	Mic negative, when not suspended	45	SPI_SO	SPI data output
14	AGND	Analog ground	46	VDD33	3.3V power input digital
15	MIC_P	Mike positive input, when not suspended	47	IIC_SCL	IIC clock input
16	F_D0	A signal pin connected to the pin 57	48	IIC_SDA	IIC data interface
17	AVCC	3.3V Analog Power Input 49		M_D2	A signal pin connected to the pin 50, the pull-10K plus
18	VREF	A reference voltage, external 0.1uF capacitor to ground	50	F_D2	A signal pin connected to the pin 49, the pull-10K plus
19	NC	- -	51	F_D3	A signal pin connected to the pin 59
20	PWR_IN	Chip power supply, 3.3V	52	GND	Digital Ground
twenty one	F_D1	A signal pin connected to the pin 60	53	A1	Pin 54 is connected to
twenty two	VDD33_O	3.3V power output	54	A2	Connected with 53 feet
twenty three	VDD12_O	1.2V power output	55	BAUD2	Baud rate select pin

twenty four	AVDD12	1.2V analog supply output 56		BAUD1	Baud rate select pin
25	GND	Digital Ground	57	M_D0	A signal pin connected to the pin 16
26	XTALI	Crystal Input	58	NC	- -
27	XTALO	Oscillator output	59	M_D3	It is connected to the signal pin, and the pin 51
28	RESET	Reset pin, active low 60		M_D1	A signal pin connected to the pin 21
29	A4	10K pull-up resistor is applied 61		NC	- -
30	NC	- -	62	A3	Plus a 10K pull-down resistor
31	NC	- -	63	NC	- -
32	NC	- -	64	GND	Digital Ground

form 2 XFS5152CE The pin definition table

6 Communication Interface Description

XFS5152CE Chip support UART interface, I2C interface, SPI Interface Kinds of Communication, by UART interface, I2C or SPI Receiving commands and data interface PC to send, the maximum allowed length of the transmission data is 4k byte.

6.1 UART Communication mode

6.1.1. Hardware connection

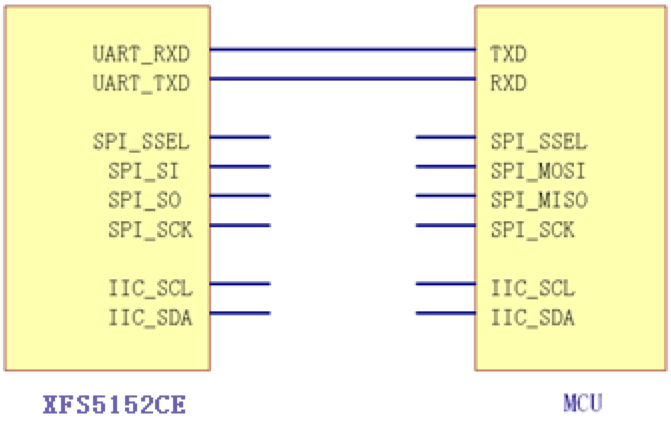

UART_RXD
UART_TXD
SPI_SSEL
SPI_SI
SPI_SO
SPI_SCK
IIC_SCL
IIC_SDA
TXD
RXD
SPI_SSEL
SPI_MOSI
SPI_MISO
SPI_SCK
IIC_SCL
IIC_SDA
XFS5152CE
MCU

chart 1 XFS5152CE chip UART Interface connection diagram

6.1.2. Communications transmission byte format

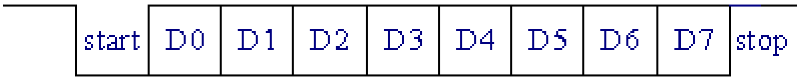

start
D0
D1
D2
D3
D4
D5
D6
D7
stop

chart 2 UART Interface Communication transfer byte format

1) Communication Standard: UART 2) Baud rate: 4800 bps , 9600 bps , 57600 bps , 115200 bps 3) Start bit: 1bit 4) Data bits: 8 bits 5) Stop bits: 1 bit 6) Parity: none

6.1.3 Baud rate configuration

XFS5152CE Chip UART Communication Interface Support 4 Kinds of communication baud rate: 4800 bps , 9600 bps , 57600 bps , 115200 bps ,able to pass XFS5152CE Two pins on the chip BAUD1 (56 Pin), BAUD2 (55 Level on pins) for hardware configuration.

Baud Rate	BAUD1	BAUD2
4800 bps	0	0
9600 bps	0	1
57600 bps	1	0
115200 bps	1	1

form 3 Baud rate configuration table

6.2 I2C Communication mode

6.2.1. Hardware connection

XFS5152CE Standard I 2 C Bus interface, arranged to Slave Identity. I 2 C A bus is to simplify the mutual transmission of information between a plurality of intelligent devices designed for two-wire, two-way network.

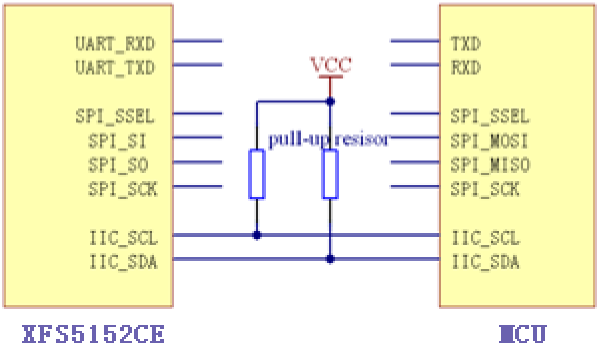

UART_RXD
UART_TXD
SPI_SSEL
SPI_SI
SPI_SO
SPI_SCK
IIC_SCL
IIC_SDA
VCC
pull-up resisor
TXD
RXD
SPI_SSEL
SPI_MOSI
SPI_MISO
SPI_SCK
IIC_SCL
IIC_SDA
XFS5152CE
MCU

chart 3 XFS5152CE chip I2C Interface connection diagram

6.2.2. Communications transmission byte format

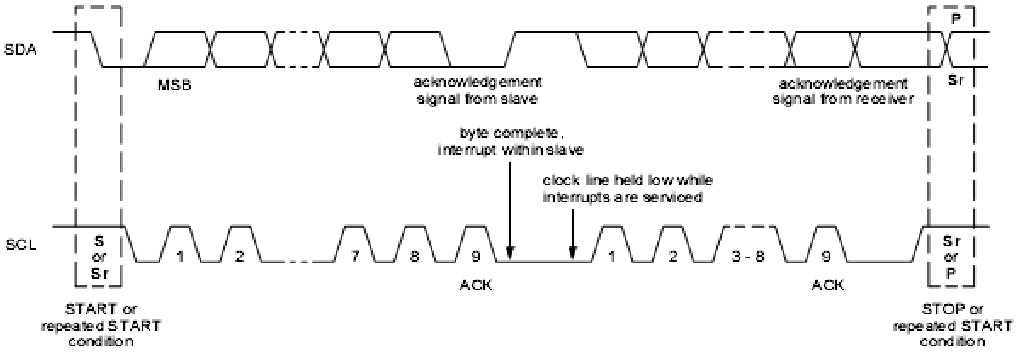

SDA
SCL
P
MSB
acknowledgement signal from slave
byte complete, interrupt within slave
clock line held low while interrupts are serviced
acknowledgement signal from receiver
Sr
S or Sr
1
2
7
8
9
ACK
1
2
3 - 8
9
ACK
Sr or P
START or repeated START condition
STOP or repeated START condition

chart 4 I$_2$C Bus Timing Figure

XFS5152CE As a I2C Interface slaves, **Device address: 0x80** . To ensure the stability of communication, XFS5152CE of I2C Interface communication speed in less demanding 15KHZ .

XFS5152CE The use of standard I$_2$C Bus interface, on I$_2$C Details of bus communication, **Please refer to " The I$_2$C-bus specification . "**

6.3 SPI Communication mode

6.3.1. Hardware connection

XFS5152CE Chip SPI Interface is 4 Wire full-duplex synchronous serial communication interface, a host computer SPI Communication in Master Identity, XFS5152CE in SPI Communication set Slave Identity, SPI It corresponds required clock signals provided by the host computer.

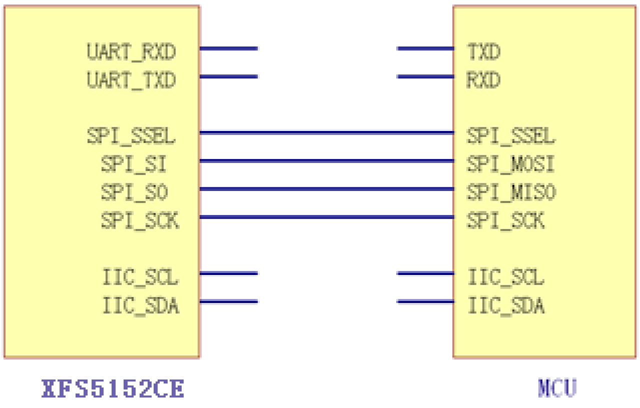

UART_RXD
UART_TXD
SPI_SSEL
SPI_SI
SPI_SO
SPI_SCK
IIC_SCL
IIC_SDA
TXD
RXD
SPI_SSEL
SPI_MOSI
SPI_MISO
SPI_SCK
IIC_SCL
IIC_SDA
XFS5152CE
MCU

chart 5 XFS5152CE chip SPI Interface connection diagram

6.3.2. Communications transmission byte format

SPI Synchronous serial communications belong to communication, to ensure the stability of communication, XFS5152CE of SPI Interface communication speed in less demanding 25KHZ . In the PC and XFS5152CE Communication is provided by the host computer synchronization clock signal, the rising edge of the synchronization clock XFS5152CE Latch 1bit Data per transmission 8bits Transmission of a complete data byte of data. The figure is XFS5152CE of SPI Communication interface timing diagram.

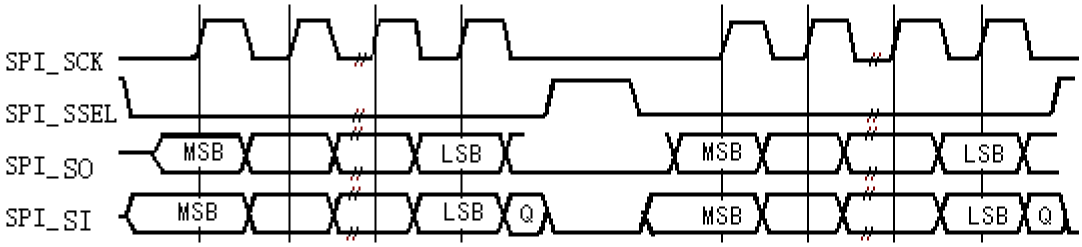


chart 6 SPI Communication timing diagram

Note: after sending a byte, SPI_SCK Remain low for some time, a wait must be inserted between each two bytes, No less than 105 us .

7 Chip control

7.1 control commands

XFS5152CE It supports a variety of control commands, listed below:

Command Function		**Explanation**
Speech synthesis related	Synthesis of command	The command transmitted Synthesis
	Stop synthesis command	Synthesis stop the current action
	Synthesis pause command	Suspend the ongoing synthesis
	Synthesis of recovery command	The synthesis continues to be suspended text
Text cache coherency	Send text commands cache	Transmitting the text needs to be cached to the cache chip cache specific segment play command
	text Playout	buffer zone stored multiple pieces of text
Voice codec related	Start voice coding command	Setting the parameters of speech coding, speech coding and start the speech
	decoding start command	Setting parameters of speech decoding, and speech decoding start sending data to
	the chip decode command	A playback decoding data transmitted to the chip according to the specified compression level
	Stop voice codec command	Stop performing speech encoding or decoding operation
Speech recognition-related	Start Speech Recognition commands	Start speech recognition
	Stop speech recognition command	Stop the current recognition
	Status command	Query the current operating state of the chip
	Power saving mode	The chip enters the power saving mode from the normal operation mode
	Wake-up command	The chip from the power saving mode into the normal operating mode

form 4 Control Commands List

7.2 Chip return

When initialization is successful or if the power control command received frame host computer, XFS5152CE It is transmitted to the upper computer chip 1 Byte return, the current state of the PC can be determined based on this chip came back.

name	**Return letter interest**	**Triggering conditions**
Initialization successful return	0x4A	After power chip initialization is successful, the chip automatically sent back to pass
Receive the correct command frame return	0x41	Receive the correct command frame

It does not recognize the received command frame return	0x45	Receive an incorrect command frame
Chip busy return	0x4E	Chip being synthesized in the state, receive a state query command frame
Chip idle return	0x4F	Chips in the idle state, receive a status inquiry command frame; end of the data or a synthesized form the chip in an idle state

5 Chip return list

8 Protocol

8.1 Query command and control mode

8.1.1 Status command

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td>Command word</td><td>0x21</td><td>Obtaining the corresponding command parameters to determine TTS Chip is in the synthesized state, returns 0x4E It shows that the chip is still in synthesis, the return 0x4F It shows that the chip is idle</td></tr>
<tr><td>parameter list</td><td>no</td><td></td></tr>
<tr><td>Command frame format structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low byte</td><td>Command</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x21</td></tr>
</table></td></tr>
</table>

form 6 Status command

8.1.2 Power saving mode command

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td>Command word</td><td>0x88</td><td>Power saving mode</td></tr>
<tr><td>parameter list</td><td>no</td><td></td></tr>
<tr><td>Command frame format structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x88</td></tr>
</table></td></tr>
</table>

form 7 Power saving mode command

8.1.3 Wake-up command

name	Data transmission	Explanation
Command word	0xFF	Return to normal operating mode from the power saving mode
parameter list	no	

Command frame format structure	Header	Data Mayor degree		Data Area
	0xFD	High Byte	Low Byte	Command word
		0x00	0x01	0xFF

form 8 Wake-up command

note: The chip enters the power saving mode, wake-up command needs to be sent to the communication interface on the chip, to wake up from the power saving mode into the normal operating mode (to be synthesized state), Operation can be synthesized.

8.2 Voice synthesis support control commands

Sent to the host computer XFS5152CE All speech synthesis chip command need to be packaged after transmission "frame" mode. Header flag is set by frame configuration, three of the data area and the data length region.

Header	The length of the data area	Data Area
0xFD	0xXX , 0xXX	Data

form 9 Command frame encapsulation format

name	length	Explanation
Header	1 Byte	Defined as hexadecimal " 0xFD "
The length of the data area	2 Bytes	Is two bytes, high byte first, followed by the low byte
Data Area	Less than 4k Bytes	Command word and command parameters, and the length of "data field length"

match table 10 Description command frame

The data area is composed of the command word and command parameters, the command word using the PC to implement the various functions of the speech synthesis chip.

name	Data transmission	Explanation
Command word	0x01	Speech synthesis command
	0x02	Stop synthesis command, no arguments
	0x03	Synthesis pause command, no arguments
	0x04	Restore synthesis command, no arguments
	0x21	Chip status inquiry command
	0x88	The chip into power-saving mode
	0xFF	Chip returns to normal operation from the power saving mode
Command parameters	Different command words have different parameter lists, see the explanation of each command word	

form 11 Data area and command parameters command word

8.2.1 Speech synthesis command

<table>
<tr><th>name</th><th>Data transmission</th><th colspan="6">Explanation</th></tr>
<tr><td>Command word</td><td>0x01</td><td colspan="6">Text with text encoding settings of the play command</td></tr>
<tr><td rowspan="2">parameter list 0Xxx</td><td></td><td colspan="6">1Byte Text encoding format.
The value is 0 ~ 3
<table>
<tr><th>Parameter Value</th><th>Text encoding format</th></tr>
<tr><td>0x00</td><td>GB2312</td></tr>
<tr><td>0x01</td><td>GBK</td></tr>
<tr><td>0x02</td><td>BIG5</td></tr>
<tr><td>0x03</td><td>UNICODE</td></tr>
</table></td></tr>
<tr><td>Data</td><td colspan="6">Binary content of the text to be synthesized</td></tr>
<tr><td>Command
frame format structure</td><td colspan="7">
<table>
<tr><th>Header</th><th colspan="2">Data Mayor degree</th><th colspan="3">Data Area</th></tr>
<tr><td></td><td>High Byte</td><td>Low byte</td><td>Command</td><td>text encoding format</td><td>Text to be synthesized</td></tr>
<tr><td>0xFD</td><td>0xHH</td><td>0xLL</td><td>0x01</td><td>0x00 ~ 0x03</td><td>.... ....</td></tr>
</table></td></tr>
<tr><td>Examples</td><td colspan="7">
Speech Synthesis Life Order exemplary frame, text encoding format for the transmission " GB2312 " Text " HKUST fly"
<table>
<tr><td>0xFD 0x00</td><td></td><td>0x0A 0x01</td><td></td><td>0x00</td><td>0xBF</td><td>0xC6</td><td>0xB4</td><td>0xF3</td></tr>
<tr><td>0xD1</td><td>0xB6</td><td>0xB7</td><td>0xC9</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Speech Synthesis Life Frame order shown example ,send Culture This coding format " GBK " of text" Family Iflytek "
<table>
<tr><td>0xFD 0x00</td><td></td><td>0x0A 0x01</td><td></td><td>0x01</td><td>0xBF</td><td>0xC6</td><td>0xB4</td><td>0xF3</td></tr>
<tr><td>0xD3</td><td>0x8D 0xEF</td><td></td><td>0x77</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Speech synthesis command frame Show Cases, hair give away Text Code code The format " BIG5 " of text" Family Iflytek "
<table>
<tr><td>0xFD 0x00</td><td></td><td>0x0A</td><td>0x01</td><td>0x02</td><td>0xAC 0xEC 0xA4</td><td></td><td>0x6A</td></tr>
<tr><td>0xB0</td><td>0x54</td><td>0xAD 0xB8</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Speech Synthesis Life Frame order shown example ,send Culture This coding grid Formula " UNICOD E "Wen this "HKUST News fly"
<table>
<tr><td>0xFD</td><td>0x00</td><td>0x0A</td><td>0x01</td><td>0x03</td><td>0xD1</td><td>0x79</td><td>0x27</td><td>0x59</td></tr>
<tr><td>0xAF</td><td>0x8B</td><td>0xDE</td><td>0x98</td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Special note when</td><td colspan="7">XFS5152CE Chip being synthesized when the text, and if there is received a valid command frame synthesis, The chip will stop the text currently being synthesized immediately in favor of the new synthetic text received.</td></tr>
</table>

form 12 Speech synthesis command

8.2.2 Stop synthesis command

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td>Command word</td><td>0x02</td><td>Stop the current synthesis</td></tr>
<tr><td>parameter list</td><td>no</td><td></td></tr>
<tr><td>Command frame format
structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x02</td></tr>
</table></td></tr>
</table>

form 13 Stop synthesis command

8.2.3 Synthesis pause command

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td>Command word</td><td>0x03</td><td>Pause the current synthesis</td></tr>
<tr><td>parameter list</td><td>no</td><td></td></tr>
<tr><td>Command frame format
structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x03</td></tr>
</table></td></tr>
</table>

form 14 Synthesis pause command

8.2.4 Synthesis of recovery command

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td>Command word</td><td>0x04</td><td>Resuming the suspended synthesis</td></tr>
<tr><td>parameter list</td><td>no</td><td></td></tr>
<tr><td>Command frame format
structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x04</td></tr>
</table></td></tr>
</table>

form 15 Synthesis of recovery command

8.2.5 Chip state return

XFS5152CE The chip will send a byte up crew at the time of initial power success "initialization success" return, successfully initialized when not to send the return.

XFS5152CE After the chip receives a command frame will judge this command frame is correct or not, if the command frame correctly returns "receive the correct command frame" return, an error is returned if the command frame "error command frame." Backhaul.

XFS5152CE When the chips receive a state query command, if the chip is in a state of synthesis returns "Chip busy" return, if the chip is in an idle state "idle chip" is returned return.

XFS5152CE After a data chip synthesis is completed, automatically returns a "chip free" return.

Return data type Return data		Triggering conditions
Initialization successful	0x4A	Chip initialization successful
Receive the correct command frame	0x41	Receive the correct command frame
Receive an error command frame	0x45	Receive an incorrect command frame
Chip busy	0x4E	Receive a "status inquiry command", the chip is synthesized text state return 0x4E
Chip idle	0x4F	When a data combining finished, return to the idle state chip 0x4F ; When the chip receive a "status inquiry command", the chip is idle return 0x4F

form 16 Chip return

8.2.6 Speech synthesis method using

8.2.6.1 Simple way to call

Simple call means users do not care about XFS5152CE The current work status, just send a text to XFS5152CE Synthesized speech output.

In simple call, the host computer as long as XFS5152CE Established between UART , SPI ,or I2C A communication mode, and can send commands to achieve the synthesis of synthetic text, the host computer need not determined XFS5152CE The return output data or status pin.

note: As a synthetic text has not finished, the text is sent again to XFS5152CE **It will break the previous synthesis, and implementation of the new synthesis.**

8.2.6.2 Standard call mode

If the host is required to ensure that after the last text is a complete synthesis, synthesis and then send a text under the command frame synthesis, the need to return the chip to determine the working status. Specific methods for example as follows: The synthesis is required for the text 5k Bytes, more than

XFS5152CE Chip command frame can accommodate a maximum length of text (4k Bytes), then the need to twice XFS5152CE Chip send a text message. Procedure is as follows:

1 , Give the host computer XFS5152CE Synthesis chip sends a text command frame, carrying not more than 4k Bytes of text;

2 , PC wait XFS5152CE Chip automatically returns the return message until it receives " 0x4F "Return, preceding text has described the synthesis is completed; or status pin chips using a query, the query method of transmitting a command to confirm the completion of the synthesis of a text.

3 , The host again sends a text command frame to the synthesis chip, the rest of the text transmission.

8.2.6.3 Method to query the chip working condition

Hardware and software are two ways to query XFS5152CE Working status of the chip.

Hardware: The query output pin $\overline{RDY}$ Level, to determine the working status of the chip. when $\overline{RDY}$ Is at high level, indicating that the text being synthesized chip; when $\overline{RDY}$ At a low level, indicating that the chip is in an idle state.

By software: to query the operating state of the chip by sending a status query command frame. After receiving the status of the host sends a query command frame, the higher-level device automatically sends the status of the current return chip. The PC chip return data to determine the current state of the chip is in idle state synthesis or text.

8.3 Text caching capabilities to support control command

Chip features 16 Paragraph text buffer, were Dan 0 - 15 , The user may present multiple provisions (≤ 16 Article) to the cache area of the chip, and stored at designated transmission Dan. After storage can be "cached text playback command" by sending a text buffer to play, and you can set the number of broadcast.

8.3.1 Command frame definitions

name	length	Explanation
Header	1 Byte	Defined as hexadecimal " 0xFD "
The length of the data area	2 Bytes	Is two bytes, high byte first, followed by the low byte
Data Area	Less than 4k + 2 Bytes	Command word and command parameters, and the length of "data field length" consistency

form 17 Description command frame

The data area is a command frame and command parameters command word composed of the host computer to realize the function using the command words and the text buffer playback.

name	Data transmission	Explanation
Command word	0x31	Send text commands cache
	0x32	Play cache text commands
Command parameters	Different command words have different parameter lists, see the explanation of each command word	

form 18 Data area and command parameters command word

8.3.2 Send text commands cache

name	Data transmission	Explanation
Command word	0x31	Send text commands cache
parameter list	1 Bytes of data The initial cache segment set to be stored as text X	
Data	Cache text	The binary content cached text (text set length = Y) (Y ≤ (16-X) * 256)
Command frame format structure	Header Data Mayor degree | Data Area High Byte Low byte Command buffer area To cached text 0xFD | 0x00 | 0x01 | 0x31 | 0Xxx | ……	

form 19 Send text commands cache

note :

- **Buffer space for a total of 4K , Divided 16 Districts, each district is space 256 byte.**
- **The set command to set the starting buffer section = X (0 ≤ X ≤ 15), Then the current transmission can not exceed the length of the text (16- X) * 256 byte. Redundant text will be discarded.**
- **[Play users to send text commands cache 0x32 Prior to], [send buffer can send multiple text commands 0x31 Any arrangements content section. But remember the text before sending the text later partially covered or not fully covered, otherwise it does not guarantee the correctness of the play.**

8.3.3 Play cache text commands

name	Data transmission	Explanation
Command word	0x32	Play cache text commands
parameter list	1 byte	high 4 Bit value 1 to 15 Low, set the number of repeat 4 Bits, the text encoding format 0x0 GB2312 0x1 GBK 0x2 BIG5 0x3 UNICODE
Command frame format structure	Header Data Mayor degree | Data Area High Byte Low byte Command Parameter 1 byte | high 4 Place | low 4 Place 0xFD | 0x00 | 0x01 | 0x32 | 0xX | 0xX	

form 20 Cache text play command

NOTE: Text command transmission buffer playout buffer Yaoan text command execution order, among other commands do not insert, when inserted

It commands the contents of the text buffer may be cleared.

8.3.4 For example send text and playout buffer

8.3.4.1 Send text commands cache

The text " After playing with the segment cache. 'The first player stored in the cache 3 Section: header Data

Mayor degree			Data Area		
0xFD	High Byte	Low byte	Command word	in the buffer area	After the text buffer (cache segments together Play.)
	0x00	0x14	0x31	0x03	0xB6 0xCE 0xBB 0xBA 0xB4 0xE6 0xBA 0xF3 0xD2 0xBB 0xC6 0xF0 0xB2 0xA5 0xB7 0xC5 0xA1 0xA3

form twenty one Text cache example (1)

The text " Disrupt the order of some text " The first cache stored in the player 1 Section: header Data

Mayor degree			Data Area		
0xFD	High Byte	Low byte	Command word	in the buffer area	To buffer the text (of the order of a disrupted Duan)
	0x00	0x12	0x31	0x01	0xB4 0xF2 0xC2 0xD2 0xCB 0xB3 0xD0 0xF2 0xB5 0xC4 0xD2 0xBB 0xB6 0xCE 0xCE 0xC4

form twenty two Text cache example (2)

The text " This feature can be "saved The first player stored in the cache 0 Section: header Data

Mayor degree			Data Area		
0xFD	High Byte	Low byte	Command word	in the buffer area	Text to be cached (this feature can be Is)
	0x00	0x10	0x31	0x03	0xB4 0xCB 0xB9 0xA6 0xC4 0xDC 0xBF 0xC9 0xD2 0xD4 0xBD 0xAB 0xB1 0xBB

form twenty three Text cache example (3)

The text " This customer wish cis Sequence points "of the cache stored in the player 2 Section: header Data

Mayor degree			Data Area		
0xFD	High Byte	Low byte Command	buffer area	Text to be cached	(this according to customer's wish Order minutes)

	0x00	0x16	0x31	0x03	0xB1 0xBE 0xB0 0xB4 0xBF 0xCD 0xBB 0xA7 0xCF 0xA3 0xCD 0xFB 0xB5 0xC4 0xCB 0xB7 0xD0 0xF2 0xB7 0xD6

form twenty four Text cache example (4)

8.3.4.2 Text Cache play command

The encoding format " GBK "The text of the cache contents "This feature will be disrupted for a text of the order according to customer desired order Slow segments Deposit After playing together. "repeat Broadcast 3 Times.

Header	Data Mayor degree		Data Area		
0xFD	High Byte	Low byte	Command	Parameter 1 byte	
				high 4 Place	low 4 Place
	0x00	0x01	0x32	0x3	0x1

form 25 Play For example text cache

8.4 Speech codec support function control command

8.4.1 Command frame definitions

name	length	Explanation
Header	1 Byte	Defined as hexadecimal " 0xFD "
The length of the data area	2 Bytes	Is two bytes, high byte first, followed by the low byte
Data Area	Less than 4k Bytes	Command word and command parameters, and the length of "data field length"

match table 26 Description command frame

By PC UART Interface and XFS5152CE Chip are connected, and set the baud rate 115200bps , You can implement voice codec function.

The data area is composed of the command word and command parameters, the command word using the PC to implement the various functions of the speech synthesis chip.

	Command word		Command parameters
	Command word	Explanation	
Data Area	0x41	Start speech coding command	3 Bytes Parameters. parameter 1 : Sampling rate; Parameters 2 : Set the bit rate levels; Parameters 3 : Set the volume.
	0x42	Start voice command decoding	3 Bytes Parameters. parameter 1 : Sampling rate; Parameters 2 : Set the bit rate levels; Parameters 3 : Set the volume.
	0x43	Decoded frame data transmission	Host sends data according to a specified compression level to the speech decoding chip

	0x44	Stop recording or decoding command has	no parameter table 27 Illustrates

the data area and command parameters of the command word

8.4.2 Start speech coding command

name	Data transmission	Explanation	
Command word 0x41		Start coding command	
parameter list(3 Parameter)	parameter 1 (1 Byte) Set sample rate		Set as: 00 ,Sampling Rate 8k
			Set as: 01 ,Sampling Rate 16k
	parameter 2 (1 Byte)	Level to set the bit rate: 00 The bit rate level 0 level	
			Set as: 01 The bit rate level 1 Class is set to: 02 The
			bit rate level 2 Class is set to: 03 The bit rate
			level 3 Class is set to: 04 The bit rate level 4 Class
			is set to: 05 The bit rate level 5 level
	parameter 3 (1 Byte)	Set the volume	Set as: 00 ,volume 0 Class is set to: 01 ,volume
			1 Class is set to: 02 ,volume 2 Class is
			set to: 03 ,volume 3 Class is set to: 04 ,volume
			4 Class is set to: 05 ,volume 5 Class is
			set to: 06 ,volume 6 Class is set to: 07 ,volume
			7 Class is set to: 08 , AGC

Command frame format structure	Header	Data Area length			number According to district		
	0xFD	High Byte	Low Byte	Command word	parameters 1	parameter 2	parameter 3
		0x00	0x04	0x41	0xXX	0xXX	0x XX
Examples	Such as setting 16k Collection Sample rate, 5 level Bit Rate , Automatic volume gain control System, send of The data frame under:						
	0xFD	0x00	0x04	0x41	0x01	0x05	0x 08

form 28 Start encoding instructions

8.4.3 Start voice command decoding

name	Data transmission	Explanation

Command word 0x42		Command to start decoding	
parameter list(3 Parameter)	parameter 1 (1 Byte) Set sample rate		Set as: 00 ,Sampling Rate 8k Set as: 01 ,Sampling Rate 16k
	parameter 2 (1 Byte)	Level to set the bit rate: 00 The bit rate level 0 level	Set as: 01 The bit rate level 1 Class is set to: 02 The bit rate level 2 Class is set to: 03 The bit rate level 3 Class is set to: 04 The bit rate level 4 Class is set to: 05 The bit rate level 5 level
	parameter 3 (1 Byte)	Set the volume	Set as: 00 ,volume 0 Class is set to: 01 ,volume 1 Class is set to: 02 ,volume 2 Class is set to: 03 ,volume 3 Class is set to: 04 ,volume 4 Class is set to: 05 ,volume 5 Class is set to: 06 ,volume 6 Class is set to: 07 ,volume 7 level

Command frame format structure

Header	Data Area length		Data Area			
	High Byte	Low Byte	Command word	parameters 1	parameter 2	parameter 3
0xFD	0x00	0x04	0x41	0xXX	0xXX	0x XX

Examples

Such as setting 16k Sampling Rate, 5 Level bit rate , 5 Volume level , Sent number According to frame such under:

0xFD	0x00	0x04	0x41	0x01	0x05	0x 05

form 29 The command to start decoding instructions

The bit rate class table 0 (Lowest level), 3 (Intermediate level), 5 (Highest level) three cases, for example, described in the case where a specific audio sample rate and bit rate levels, corresponding to the data amount of audio samples per minute, the compression ratio and encoding audio Number encoded According amount.

Sampling rate / sampling accuracy	**Bit-rate levels**	**Audio sample amount of data (PCM Format, per minute)**	**than the encoded audio data compression ratio**	**According MB (every minute)**
8K / 16Bit	0 (lowest level)	0.9MB	30	0.03
	3	0.9MB	13	0.07MB
	5 (highest rating)	0.9MB	10	0.09MB
16K / 16Bit	0 (lowest level)	1.8MB	45	0.04MB
	3	1.8MB	22.5	0.08MB
	5 (highest rating)	1.8MB	14	0.13MB

form 30 Sample rate and the bit rate level and the amount of data compression ratio table

For example: Select a sampling rate setting 8k , Sampling accuracy 16bit, bit rate levels 05 When the chip is a sampled data per minute

0.9MB , Chip 10 Times the compression ratio encoding, the encoded data amount per minute 0.09MB , I.e., data transfer per minutes per minute chip data output in this case is 0.09MB . Customer can choose to determine the appropriate communication rate or storage space is required.

8.4.4 Decoding the transmission data to chip

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td colspan="2">Command word 0x43</td><td>Transmitting data according to a specified compression level to the decoder chip; the application data frames (0xFC 0x00 0x01 0x23)With the use of</td></tr>
<tr><td>Command frame format structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">The length of the data area</td><td colspan="3">Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td><td colspan="2">data to be decoded</td></tr>
<tr><td>0xXX</td><td>0xXX</td><td>0x43</td><td></td><td>… …</td></tr>
</table></td></tr>
<tr><td>Examples</td><td colspan="2">Such as: Sending a sample rate 8k The bit rate level 05 Data, corresponding to the number of bytes 62 (16 Hex is 3F) ,
Send number according to Frame as follows:<table>
<tr><td>0xFD</td><td>0x00</td><td>0x3F</td><td>0x43 … …</td><td></td></tr>
</table></td></tr>
</table>

form 31 Decoded data transmission frame format

8.4.5 Stop speech codec command

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td colspan="2">Command word 0x44</td><td>Stop speech encoding or decoding</td></tr>
<tr><td>Command frame format structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Area length</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x44</td></tr>
</table></td></tr>
</table>

form 32 Stop codec Command Description

8.4.6 Codec-related state return

<table>
<tr><th>Return data type</th><th>Return data</th><th>Triggering conditions</th></tr>
<tr><td>After return encoded data to the host</td><td><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td colspan="2">Data Area</td></tr>
<tr><td>0xFC</td><td>High Byte (0Xxx)</td><td>Low byte (0xXX)</td><td>Command word (0x20)</td><td>Encoded data</td></tr>
</table></td><td>PC sends a command to start coding</td></tr>
</table>

Recording error	0xFC	0X00	0X01	0X21	
When finished recording	0xFC	0X00	0X01	0X22	
Application Data	0xFC	0X00	0X01	0X23	Data request to the host to be decoded (Note 1)

form 33 Codec-related state return

Note: basis having decoded data frame, the master transmits a data request received application data.

8.4.7 Codec delay time parameter

Sampling Rate	Buffer time(ms)	Coding delay (ms)	Decoding delay (ms)
8K	80	16	10
16K	40	16	10

form 34 Codec delay time parameter

8.5 Voice recognition support for control commands

8.5.1 Command frame definitions

name	length	Explanation
Header	1 Byte	Defined as hexadecimal " 0xFD "
The length of the data area	2 Bytes	Is two bytes, high byte first, followed by the low byte
Data Area	Less than 4k Bytes	Command word and command parameters, and the length of "data field length"

match table 35 Description command frame

Command frame data region is composed of the command word and the command parameters, the command word to the host computer using the voice recognition function.

name	Data transmission	Explanation
Command word	0x10	Start Speech Recognition commands
	0x1F	Stop speech recognition commands, no argument
Command parameters	Different command words have different parameter lists, see the explanation of each command word	

form 36 Data area and command parameters command word

8.5.1 Start Speech Recognition commands

name	Data transmission	Explanation

<table>
<tr><td>Command word</td><td>0x10</td><td>Start speech recognition</td></tr>
<tr><td>parameter list</td><td>no</td><td></td></tr>
<tr><td>Command frame format structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x10</td></tr>
</table></td></tr>
</table>

form 37 Start Speech Recognition commands

8.5.2 Stop speech recognition command

<table>
<tr><th>name</th><th>Data transmission</th><th>Explanation</th></tr>
<tr><td>Command word</td><td>0x1F</td><td>Stops the current speech recognition</td></tr>
<tr><td>parameter list</td><td>no</td><td></td></tr>
<tr><td>Command frame format structure</td><td colspan="2"><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td>Data Area</td></tr>
<tr><td rowspan="2">0xFD</td><td>High Byte</td><td>Low Byte</td><td>Command word</td></tr>
<tr><td>0x00</td><td>0x01</td><td>0x1F</td></tr>
</table></td></tr>
</table>

form 38 Stop speech recognition command

8.5.3 Chip speech recognition results return

<table>
<tr><th>Return data type</th><th>Return data</th><th>Triggering conditions</th></tr>
<tr><td>Return recognition results ID</td><td><table>
<tr><td>Header</td><td colspan="2">Data Mayor degree</td><td colspan="2">Data Area</td></tr>
<tr><td>0xFC</td><td>High Byte (0Xxx)</td><td>Low byte (0xXX)</td><td>Command word (0x01)</td><td>Recognition results (0xXX)</td></tr>
</table></td><td>After identifying the host computer start command when the identification result, the longest speech is detected 4 Seconds will refuse to generate recognition results or</td></tr>
<tr><td>Speech recognition system timeout</td><td><table><tr><td>0xFC</td><td>0X00</td><td>0X01</td><td>0X02</td></tr></table></td><td>After starting the host computer recognize the command, detecting no speak, 5 second</td></tr>
<tr><td>Speech recognition systems appear rejection</td><td><table><tr><td>0xFC</td><td>0X00</td><td>0X01</td><td>0X03</td></tr></table></td><td>After identification command to start the host computer, no result</td></tr>
<tr><td>Speech recognition system has an internal error</td><td><table><tr><td>0xFC</td><td>0X00</td><td>0X01</td><td>0X04</td></tr></table></td><td>After starting the PC recognize the command, a resource error</td></tr>
</table>

form 39 Chip return recognition results

9 Voice chip architecture of FIG.

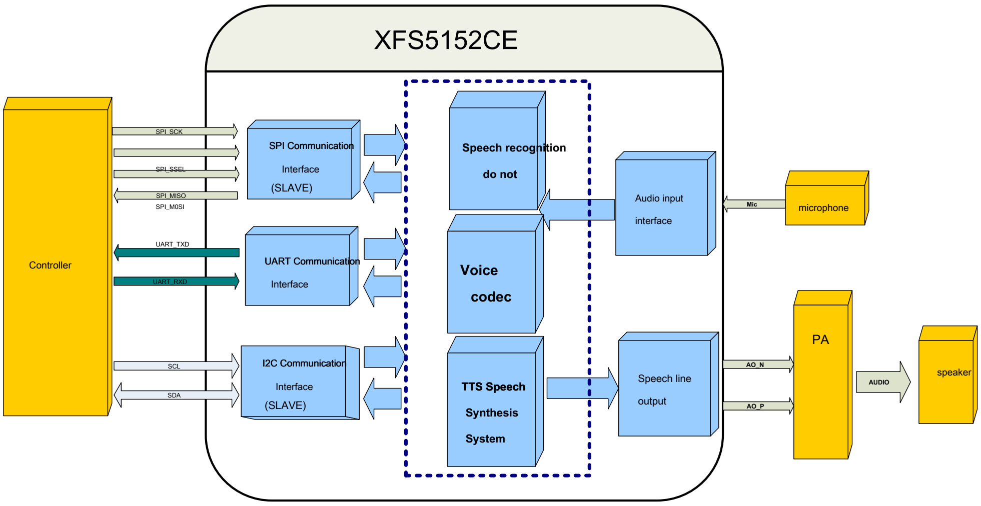

XFS5152CE
Controller
SPI_SCK
SPI_SSEL
SPI_MISO
SPI_M0SI
UART_TXD
UART_RXD
SCL
SDA
SPI Communication Interface (SLAVE)
UART Communication Interface
I2C Communication Interface (SLAVE)
Speech recognition do not
Voice codec
TTS Speech Synthesis System
Audio input interface
Speech line output
Mic
microphone
AO_N
AO_P
PA
AUDIO
speaker

chart 7 XFS5152CE A block diagram of a speech synthesis system

General applications require minimum system speech synthesis system comprising: a controller module, XFS5152CE Chip, power amplifier module, a horn. If you need to use speech recognition, or speech codec function, the system also need to increase microphone.

Speech synthesis system, the master controller, and XFS5152CE Can pass between the chip UART Interface, or I2C Interface, or SPI Interface, via the communication controller may interface to a XFS5152CE Chip sends control commands and text,

XFS5152CE After the signal is amplified synthesized voice signal output from the power amplifier, the output of the chip is connected to the horn receiving the text for playback.

When the user using a voice recognition function, the host sends a command to start a voice to the voice recognition function, chip collected from the microphone to the speech data corresponding to a recognition result converted by the interior of the identification module, via the communication interface to pass back controller.

Users in the use of speech encoding and decoding functions (communication interface must be selected UART Interface, and set the baud rate 115200bps), The host sends a command to start speech codec chip, the chip's internal voice codec module to the collected audio data is encoded by UART Interfaces real-time transmission to the host computer, or transmitted to the PC audio data is decoded and played back in real time.

10 Reference circuit

10.1 Typical application circuit

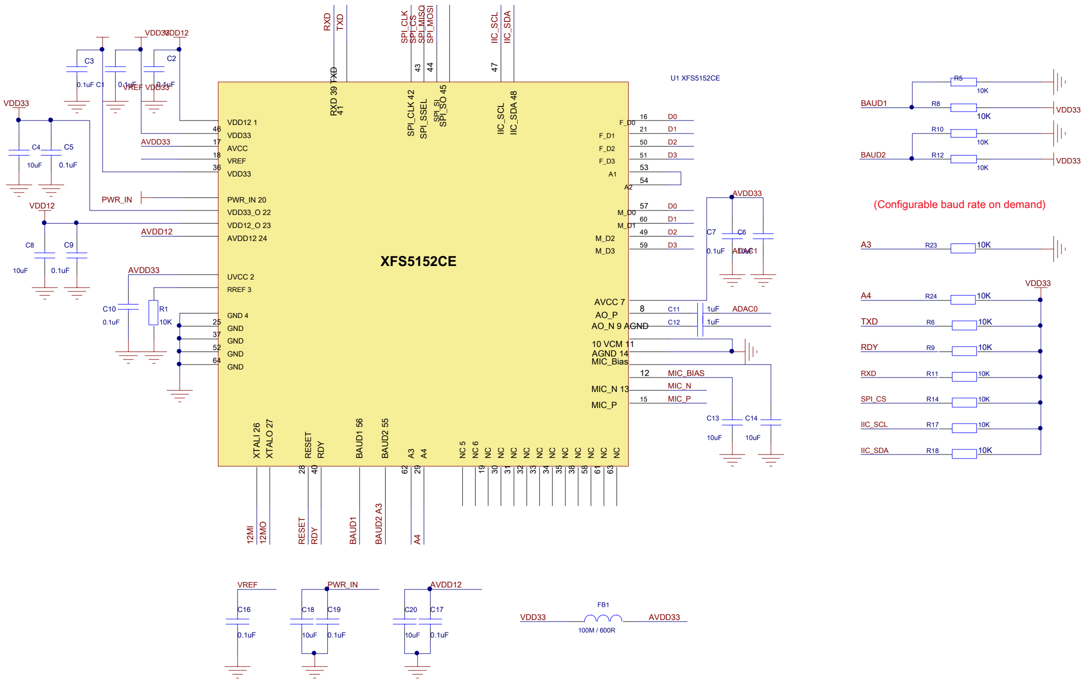

XFS5152CE
U1 XFS5152CE
VDD12 1
VDD33
AVCC
VREF
VDD33
PWR_IN 20
VDD33_O 22
VDD12_O 23
AVDD12 24
UVCC 2
RREF 3
GND 4
GND
GND
GND
GND
RXD 39
TXD 41
SPI_CLK 42
SPI_SSEL 43
SPI_SI 44
SPI_SO 45
IIC_SCL 47
IIC_SDA 48
F_D0
F_D1
F_D2
F_D3
A1
A2
M_D0
M_D1
M_D2
M_D3
AVCC 7
AO_P
AO_N 9 AGND
10 VCM 11
AGND 14
MIC_Bias
MIC_N 13
MIC_P
XTALI 26
XTALO 27
RESET
RDY
BAUD1 56
BAUD2 55
A3
A4
NC 5
NC 6
NC
RXD
TXD
SPI_CLK
SPI_CS
SPI_MISO
SPI_MOSI
IIC_SCL
IIC_SDA
VDD33
VDD12
AVDD33
AVDD12
PWR_IN
VREF
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C16
C17
C18
C19
C20
R1
0.1uF
10uF
1uF
10K
D0
D1
D2
D3
ADAC0
ADAC1
MIC_BIAS
MIC_N
MIC_P
12MI
12MO
BAUD1
BAUD2
A3
A4
R5
R8
R10
R12
R23
R24
R6
R9
R11
R14
R17
R18
(Configurable baud rate on demand)
FB1
100M / 600R

chart 8 Typical application circuit

10.2 Reference circuit power supply module

Users only need to chip 20 foot(PWR_IN)for 3.3V Voltage. Inside the chip will output 3.3V (twenty two Feet) and 1.2V (twenty three Pin) voltage, other corresponding pin supplied with power can be connected to this feet. chip 18 Feet and twenty four Pin power supply is also provided by the chip, the design of the external circuit is simply connected to a capacitor to ground.

The following figure is 5V An external power source as an input to obtain 3.3V A reference voltage circuit.

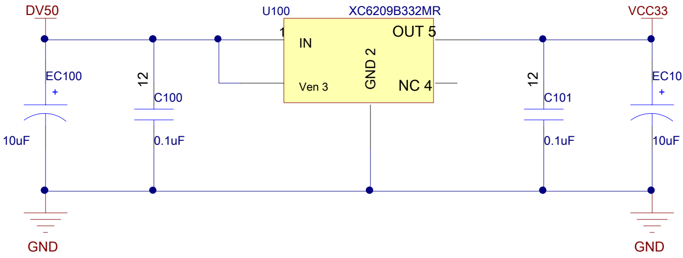

DV50
U100
XC6209B332MR
VCC33
1
IN
OUT 5
GND 2
Ven 3
NC 4
EC100
+
12
C100
10uF
0.1uF
12
C101
0.1uF
EC101
+
10uF
GND
GND

chart 9 Reference circuit power supply module

10.3 Crystal oscillator circuit

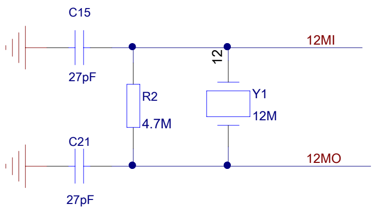

C15
27pF
12
R2
4.7M
Y1
12M
12MI
C21
27pF
12MO

chart 10 Reference oscillator circuit

10.4 Reset circuit

XFS5152CE Chip reset condition is: $\overline{RESET}$ Pin is set low, the time duration 40ms the above. able to pass RC The reset circuit RC (R = 100K , C = 2.2uF),or CAT811 Reset chip XFS5152CE Reset. The figure is CAT811 Reset circuit diagram of the module.

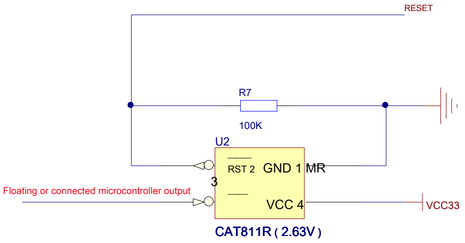

RESET
R7
100K
U2
RST 2
GND 1
MR
3
VCC 4
Floating or connected microcontroller output
VCC33
CAT811R (2.63V)

chart 11 Reset reference circuit

10.5 PC connected to the communication circuit

Below for PC Machine, two kinds of the microcontroller chip connection method and the host computer will be described separately:

1. PC As a host computer

XFS5152CE Chip PC by UART Serial port, need MAX3221 Level conversion module for converting an electrical level, as shown in FIG.

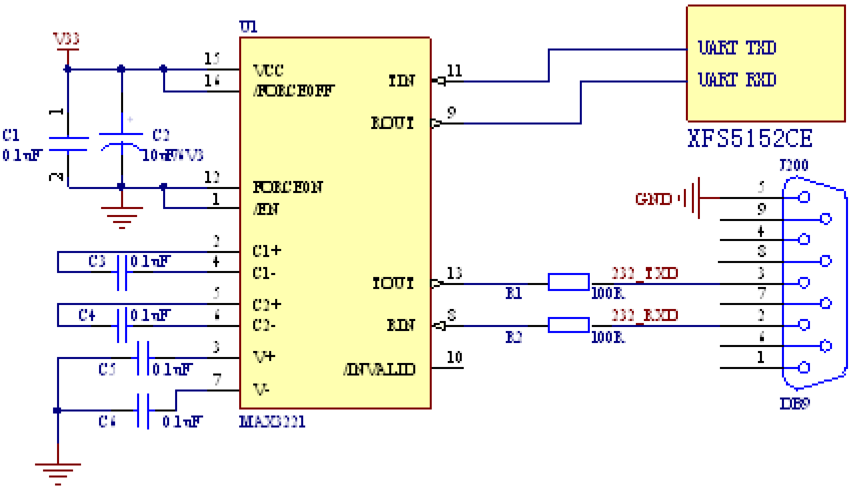

U1
V33
VCC
/FORCEOFF
FORCEON
/EN
C1+
C1-
C2+
C2-
V+
V-
TIN
ROUT
TOUT
RIN
/INVALID
MAX3221
C1
0.1uF
C2
10uF/6V3
C3
C4
C5
C6
0.1uF
UART TXD
UART RXD
XFS5152CE
J200
GND
R1
R2
100R
232_TXD
232_RXD
DB9

chart 12 versus PC Connect the reference circuit

2. As a single-chip PC

accessible UART interface, I2C interface, SPI Interface is connected. Connection method, see chart 1 ,chart 3 And charts 5 .

10.6 Recording module circuit

When the application needs to use the recording function, the microphone module may refer to the following circuit design, the MIC MIC_BIAS bias voltage output from the 12-foot chip. FIG circuit at the network access at the reference microphone MIC, MIC_N, MIC_P legs 13, 15 connected to the chip, the two network designated MIC_VCC connected to each other.

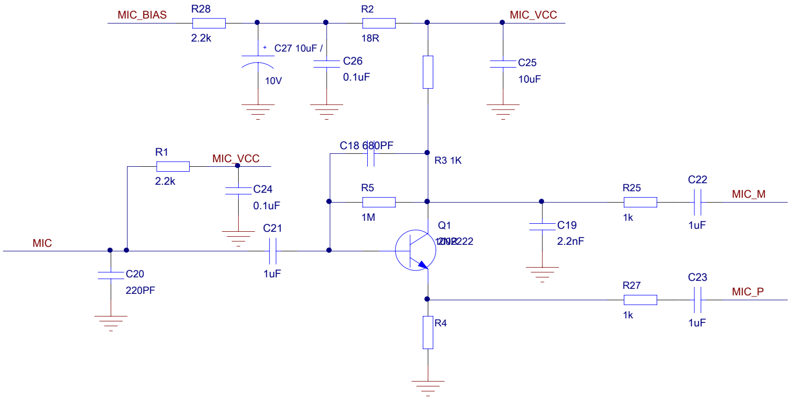

MIC_BIAS
R28
2.2k
C27 10uF /
10V
C26
0.1uF
R2
18R
MIC_VCC
C25
10uF
R1
2.2k
MIC_VCC
C24
0.1uF
C21
1uF
C18 680PF
R3 1K
R5
1M
Q1
2N2222
C19
2.2nF
R25
1k
C22
1uF
MIC_M
MIC
C20
220PF
R27
1k
C23
1uF
MIC_P
R4

chart 13 Recording reference circuit module

10.7 An audio output amplifier circuit

This article provides three audio amplifier chip TPA3123D2 , TPA3110D1 , TPA2005D1 The connection method for reference, with regard to the specific characteristics of the amplifier chip, please refer to its data sheet provided by the official.

10.7.1 TPA3123D2

TPA3123D2 The operating voltage range 10V ~ 30V The maximum output power 25W . The figure below shows TPA3123D2 Reference circuit.

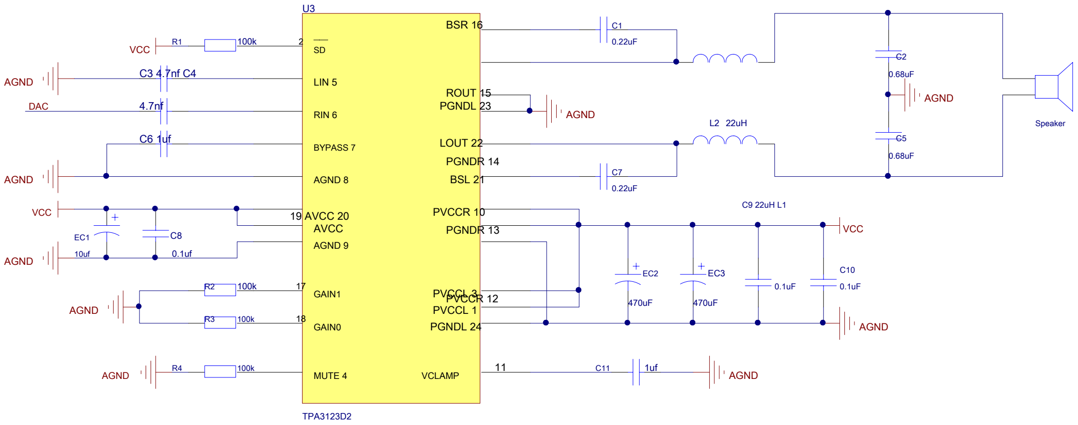

U3
VCC
R1
100k
AGND
C3 4.7nf C4
DAC
4.7nf
C6 1uf
EC1
10uf
C8
0.1uf
R2
100k
R3
100k
R4
100k
SD
LIN 5
RIN 6
BYPASS 7
AGND 8
19 AVCC 20
AVCC
AGND 9
GAIN1
GAIN0
MUTE 4
BSR 16
ROUT 15
PGNDL 23
LOUT 22
PGNDR 14
BSL 21
PVCCR 10
PGNDR 13
PVCCL 3
PVCCR 12
PVCCL 1
PGNDL 24
VCLAMP
11
C1
0.22uF
C7
0.22uF
L2 22uH
C9 22uH L1
C2
0.68uF
C5
0.68uF
EC2
470uF
EC3
470uF
0.1uF
C10
0.1uF
C11
1uf
Speaker
TPA3123D2

chart 14 TPA3123D2 With reference to a circuit diagram of the power amplifier module

10.7.2 TPA3110D1

TPA3110D1 The operating voltage range 8V ~ 26V The maximum output power 15W . The figure below shows TPA3110D1 The reference circuit.

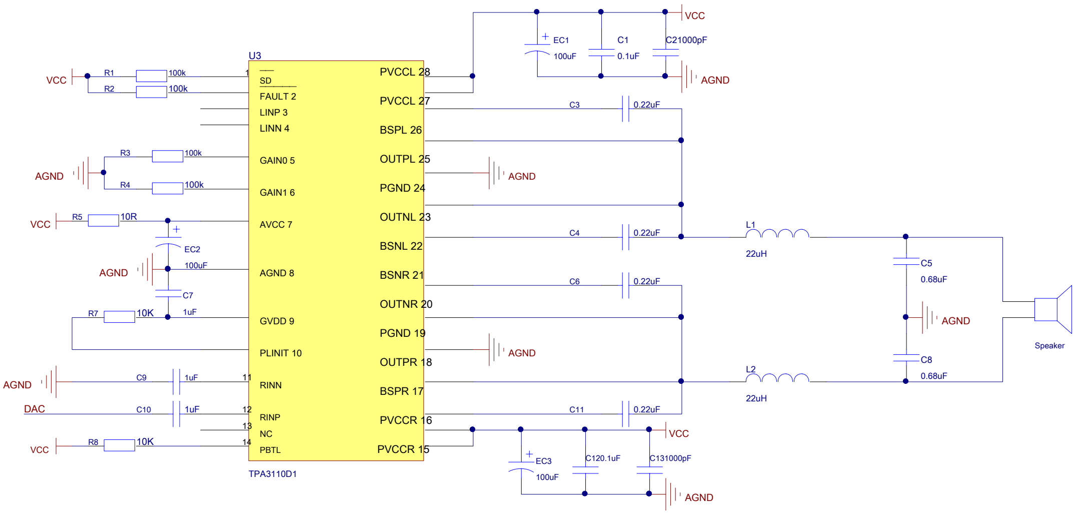

U3
VCC
R1
100k
R2
100k
AGND
R3
100k
R4
100k
R5
10R
EC2
100uF
C7
1uF
R7
10K
C9
1uF
DAC
C10
1uF
R8
10K
SD
FAULT 2
LINP 3
LINN 4
GAIN0 5
GAIN1 6
AVCC 7
AGND 8
GVDD 9
PLINIT 10
RINN
RINP
NC
PBTL
PVCCL 28
PVCCL 27
BSPL 26
OUTPL 25
PGND 24
OUTNL 23
BSNL 22
BSNR 21
OUTNR 20
PGND 19
OUTPR 18
BSPR 17
PVCCR 16
PVCCR 15
EC1
100uF
C1
0.1uF
C21000pF
C3
0.22uF
C4
0.22uF
C6
0.22uF
C11
0.22uF
L1
22uH
L2
22uH
C5
0.68uF
C8
0.68uF
EC3
100uF
C120.1uF
C131000pF
Speaker
TPA3110D1

chart 15 TPA3110D1 With reference to a circuit diagram of the power amplifier module

10.7.3 TPA2005D1

VCC voltage range 2.5 ~ 5.5V The maximum output power 1.4W . The figure below shows TPA2005D1 The reference circuit.

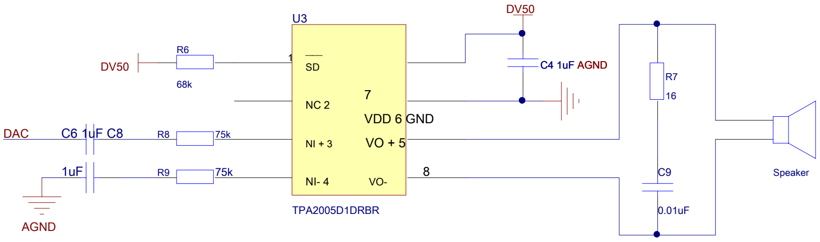

U3
DV50
R6
68k
1
SD
NC 2
7
VDD 6 GND
DAC
C6 1uF C8
R8
75k
NI + 3
VO + 5
1uF
R9
75k
NI- 4
VO-
8
AGND
TPA2005D1DRBR
DV50
C4 1uF AGND
R7
16
C9
0.01uF
Speaker

chart 16 TPA2005D1 With reference to a circuit diagram of the power amplifier module

11 The sample program

11.1 Sending a speech synthesis program text sample

Below 51 MCU as a host computer, for example, with C51 An example of a piece of text language program synthesis, assuming that the content of the text to be synthesized as follows:. "Welcome IFLYTEK speech synthesis chip"

```
#include <reg51.h>
#include <string.h>

void main (void) {

        / ************************ ************************************************************ need to send text /
        char code szText [] = { " Welcome IFLYTEK speech synthesis chip. "};
        unsigned int nLength = 0; int i =
        0;

        / *********************** ************************************************************ serial port initialization /
        TL1         = 0xFA;             // in 11.0592MHz Next, set the baud rate 9600bps ,Way of working 2
        TH1         = 0xFA;
        TMOD = 0x20; SCON
        = 0x50;                         // Serial port work 1 , Allows the receiver
        PCON = 0x80; EA
                    = 0;
        REN         = 1;
        TI          = 0;                // Transmit interrupt flag is zero
        RI          = 0;                // Receive interrupt flag is zero
        TR1         = 1;                // Timer 1 As a Baud Rate Generator

        / *********************** ********************************* process of sending /
        nLength = strlen (szText);           // The length of the text to be sent
        SBUF = 0xFD;                         // To the serial port header logo
        while (TI == 0);                     // Waiting to be sent interrupt flag bit
        TI = 0;                              // Transmit interrupt flag is cleared
        SBUF = 0x00;                         // Transmitting the text to be synthesized in high byte length
        while (TI == 0); TI =
        0;
        SBUF = nLength + 2;                  // Transmitting the text to be synthesized low byte length
        while (TI == 0); TI =
        0;
        SBUF = 0x01;                          // Send Text command word Synthesis
        while (TI == 0); TI =
        0;
        SBUF = 0x00;                          // Send text encoding formats
        while (TI == 0); TI =
        0;
        for (i = 0; i <nLength; i ++) // Sequentially transmitting the text data to be synthesized
        {
              SBUF = szText [i];
            while (TI == 0); TI = 0;}



        while (1);                            // Infinite loop, stop the program exits
}
```

To transmit one or more TTS Text data program module. It can be received after sending voice back sent automatically chip, if has received " 41 "with" 4F ", Then the text is received correctly, and show the synthesis is completed, the chip is in an idle state; If you have received" 45 " , The data of frame error, a reset or re send.

NOTE: The above Demo The main problem illustrates the process of sending the protocol to be followed, the system also need to have the actual baud rate setting procedures; after sending the statement to be sent to join determine whether the program is completed, the chip can be judged by the current query or interruption of two ways working condition before sending the next data.

11.2 Speech codec sample program

```
#include "StdAfx.h"

#include "Codec.h"



static FILE * Fp;

static CODECMODEID g_systate;

static VOLUMEID g_volume;



// Data stored callback

// When storing compressed audio data coding

bool app_savedata (

        void *                  pSrcBuffer,
        int                     nBufferBytes
        )
{
        // windows File storage platform
        fwrite (pSrcBuffer, 1, nBufferBytes, Fp);


        return 0;
}
// Read data callback
// Decoding the read compressed data broadcasting time
bool app_loadsave (
        void *                  pDstBuffer,
        int *           pnBufferBytes
        )
{
        // windows Platform reading file
        * pnBufferBytes = fwrite (pDstBuffer, 1, * pnBufferBytes, Fp);
        return 0;
}
// Send command callback
// Responsible for encoding and decoding commands sent through the serial port
bool app_sendcommand (
        void *                  pSrcBuffer,
        int                     nBufferBytes
        )
{
        // Depending on the platform, buf Data sent by the serial
        return 0;
```

```
}

// Obtaining serial port to receive data

char UART_Get_byte (void)

{

        char ch;

        // Received from serial port buf A data fetch

        return ch;

}

// Start recording coding

void StartEncode (void)

{

        VOLUMEID volume = BR_volume7;

        g_systate = Codec_encode;

        g_volume = BR_volume7;

        Fp = fopen ( "codec.bts", "wb");

        // Start coding, set the sample rate 16k , The bit rate 5 ,volume 7

        Codec_Start (g_systate, SR_16000, BR_bitrate5,                    g_volume, NULL, app_savedata,
app_sendcommand);

        while (1)

        {

                // If the data processing returns non-byte 0 , There is an error, quit

                if (Codec_Byte_Proc (UART_Get_byte ()))

                {

                        Codec_Stop ();

                }

                // The need to exit

                if (g_systate! = Codec_encode)

                {
                    Codec_Stop ();

                }

                // Whether to reset the volume

                if (g_volume! = volume)

                {

                    g_volume = volume;

                    Codec_SetVolume (g_volume);

                }

        }

        fclose (Fp);

}

void StartDecode (void)

{

        VOLUMEID volume = BR_volume7;

        // Decoding broadcast Sample

        g_systate = Codec_decode;

        g_volume = BR_volume7;

        Fp = fopen ( "codec.bts", "rb");

        Codec_Start (g_systate, SR_16000, BR_bitrate5,                  g_volume,        app_loadsave, NULL,
app_sendcommand);

        while (1)

        {

                // If the data processing returns non-byte 0 , Error or broadcast is complete, exit

                if (Codec_Byte_Proc (UART_Get_byte ()))

                {

                    Codec_Stop ();

                }
        // The need to exit
        if (g_systate! = Codec_encode)
        {
            Codec_Stop ();
        }
        // Whether to reset the volume
        if (g_volume! = volume)
        {
            g_volume = volume;
            Codec_SetVolume (g_volume);
        }
    }
    fclose (Fp);
}
```

Note: encoded internal function codec.c Achieved not included in the above reference procedure, it has been additionally provided to the user as reference procedures.

12 Text control mark

12.1 Text control method using labeled

XFS5152CE Speech synthesis chip supports a variety of text control mark, set by the user to meet the synthetic human voice pronunciation, volume, speed, tone, etc.

Text format control flag is typically half-angle brackets (i.e., "[]") within a lowercase letter, a digit, such as: [M3] , To use exactly the same numerals and synthetic text. Communication protocol detailed in the Developer's Guide. " 8.2.1 Speech synthesis command "section.

Users can send as text tag to a single chip, such as: send only "[v3] "Chip set to the volume of synthesis 3 Level, or to mark the text to be synthesized and the other is transmitted together to put on the chip, such as: "[v3] I whisper, [v10] I speak loudly. "

Tag is to achieve a function as a control flag set, will not be synthesized to the sound output. Such as:"[s1] I slowly. [s8] I made fast fast language ", after setting the mark, before a very slow rate of speech synthesis, a synthesis of the Speed quickly, but do not read." s1 "with" s8 . "

12.2 Text Control list of tags

<table>
<tr><th>effect</th><th>Control logo</th><th colspan="2">Detailed description</th><th>Chip default</th></tr>
<tr><td rowspan="2">Synthesis of style settings</td><td rowspan="2">[F?]</td><td colspan="2">? for 0 , Stressing each syllable style</td><td rowspan="2">[F1]</td></tr>
<tr><td colspan="2">? for 1 Normal synthesis</td></tr>
<tr><td rowspan="3">Synthetic language settings</td><td rowspan="3">[g?]</td><td colspan="2">? for 0 Automatically determine the language</td><td rowspan="3">[G1]</td></tr>
<tr><td colspan="2">? for 1 , Arabic numerals, units of measure, special symbols, such as synthetic as Chinese</td></tr>
<tr><td colspan="2">? for 2 , Arabic numerals, units of measure, special symbols, English synthesis</td></tr>
<tr><td rowspan="3">Set word pronunciation way</td><td rowspan="3">[H?]</td><td colspan="2">? for 0 Automatically determine the pronunciation of the word</td><td rowspan="3">[H1]</td></tr>
<tr><td colspan="2">? for 1 Letters pronunciation way</td></tr>
<tr><td colspan="2">? for 2 , Word pronunciation way</td></tr>
<tr><td rowspan="2">Set of identification of pinyin</td><td rowspan="2">[I?]</td><td colspan="2">? for 0 , Does not recognize Pinyin</td><td rowspan="2">[I0]</td></tr>
<tr><td colspan="2">? for 1 , The "alphabet + 1 Digits (tones) "as the Pinyin, for example: hao3</td></tr>
<tr><td rowspan="4">Select speakers</td><td rowspan="4">[M?]</td><td rowspan="4">Chinese-English Speakers</td><td>? for 3 Set pronunciation artificial Xiaoyan (female, recommended speakers)</td><td rowspan="4">[M3]</td></tr>
<tr><td>? for 51 Set pronunciation man for a long time (male, recommended speakers)</td></tr>
<tr><td>? for 52 Set pronunciation of many people (male)</td></tr>
<tr><td>? for 53 Provided pronunciation Madeleine human (female)</td></tr>
</table>

		? for 54 , Donald create artificial pronunciation (effect)	
		? for 55 Provided pronunciation artificial Xu Andy (girls sound)	
Setting the digital processing policy	[N?]	? for 0 Automatically determine	[N0]
		? for 1 , For the number of digital processing	
		? for 2 Digital value for processing	
digital" 0 "In the read as English, when the number of readings	[O?]	? for 0 , Read " zero "	[O0]
		? for 1 , Read as "European" sound	
Synthesis process stalled for some time	[P?]	? Unsigned integer indicating the length of a pause time in milliseconds (ms)	
Setting name pronunciation Policy	[R?]	? for 0 Automatically determine the pronunciation of surnames	[R0]
		? for 1 , Mandatory use of surnames pronunciation rules	
Setting Speed	[S?]	? Speed to value, value: 0 ~ 10	[S5]
Setting the tone	[T?]	? For the tone value, the value of: 0 ~ 10	[T5]
Set the volume	[V?]	? Value for the volume, value: 0 ~ 10	[V5]
Setting the tone processing policy	[X?]	? for 0 Do not use tone	[X1]
		? for 1 Use of tone	
Setting numbers " 1 "Readings	[Y?]	? for 0 Synthesis number " 1 "When read as" unitary "	[Y0]
		? for 1 Synthesis number " 1 "When read as" one "	
Whether to use the rhythm marked "*" and "#" [z?]		? for 0 "*" And "#" sign read	[Z0]
		? for 1 Processing into a rhythm, "*" is used to break the word, "#" is used to pause	
Enforce the single Chinese character alphabet	[=?]	? A front mark tone Phonetic + (1 ~ 5 Respectively, IA, Hinata, rising tone, falling tone and softly) 5 A tone. For example: "a [= zhuo2] Hand "," a "word pronounced" zhu ó "	
To restore the default parameters of synthesis	[D]	All settings (pronounced than human setting, outside the language setting) to the default values	

form 40 Control list of tags

note:

i. All control logo are half-width characters.

ii. Identifier control command needs to send speech synthesis in accordance with the format, control indicia as a text synthesis, i.e. a synthesis command "frame head + The length of the data area + Synthesis of command words + Text encoding format + Tagged text format control "of.

iii. Global control identifier identifying the control, i.e. as long as once, does not reset the chip, or off, or using [d] The default setting recovery conditions, the chip thereafter sent to all of the text will be under its control.

iv. When the chip is powered down or reset the original settings through identity will be invalid, the chip will be restored to all of the defaults.

12.3 Example of use flag control

12.3.1 [f?] Use markers

Sample text	Chip explanation
[F0] IFLYTEK	Synthesized as follows: "Section - big - News - fly"
[F1] IFLYTEK	Synthesized as follows: "IFLYTEK"

form 41 [f?] Use markers

12.3.2 [g?] Use markers

Sample text	Chip explanation
[G0] 123km	Synthesized as: "one hundred twenty-three km"
[G1] 123km	Synthesized as: "one hundred twenty-three km"
[H0] [g2] 123km	Synthesized as follows: " one hundred and twenty three kilometres "

form 42 [g?] Use markers

12.3.3 [h?] Use markers

Sample text	Chip explanation
[H0] Your English is " you "	Synthesized as follows: "Your English is you "
[H1] Your English is " you "	Synthesized as follows: "Your English is you "
[H2] Your English is " you "	Synthesized as follows: "Your English is you "

form 43 [h?] Use markers

12.3.4 [i?] Use markers

Sample text	Chip explanation
[I0] HKUST fei1	Chip does not recognize phonetic format. Synthesized as follows: "HKUST FEI "
[I1] HKUST fei1	Phonetic recognition chip format. Synthesized as follows: "IFLYTEK" form 44

[i?] Use markers

note:[i?] Flag set to [i1] After synthesis, the English words will, initials, tone, etc. affect the recommended

Timely use [d] Mark revert to the default settings.

12.3.5 [m?] Use markers

Sample text	Chip explanation
[M3] I was Xiaoyan.	Synthetic female voice: "I am Xiaoyan"
[M51] I am a long time.	Male voice synthesis: "I am a long time."
[M52] I'm a lot.	Male voice synthesis: "I am a lot"
[M53] I'm Xiaoping.	Synthetic female voice: "I am Xiaoping"
[M54] I'm Donald Duck.	Donald analog sound synthesis: "I'm Donald Duck."
[M55] I promised Andy.	Girls sound synthesis: "I promised Andy" form 45

[m?] Use markers

12.3.6 [n?] Use markers

Sample text	Chip explanation
[N0] 234343545	Automatically determine the chip. Read: 234,343,545
[N1] 234343545	Chip forced manner resultant digital sequence numbers. Read: 234,343,545
[N2] 234343545	Synthesis chip forced manner numeric string value. Read: 234 343 545 table 46 [n?] Use markers

12.3.7 [o?] Use markers

Sample text	Chip explanation
[G2] [h0] [n1] [o0] 8016700	read: eight o (Sound "Europe") one, six seven oo (Sound "Europe")
[G2] [h0] [n1] [o1] 8016700	read: eight zero one, six seven zero zero

form 47 [o?] Use markers

12.3.8 [p?] Use markers

Sample text	Chip explanation
welcome[p500] IFLYTEK [p1000] Speech synthesis chip	Chip after the "Welcome" synthetic complete silence 500 Msec after "iFlyTek" synthetic complete mute 1000 millisecond. " p "Brought back integer greater, the longer the mute period, the maximum length of silence 268 second.

form 48 [p?] Use markers

12.3.9 [r?] Use markers

Sample text	Chip explanation
[R0] Charles Li	Synthesis chip in the default manner. read: chá lì
[R1] Charles Li	First character of the text of the forced chip synthesized according to the pronunciation of surnames. read: zhā lì

form 49 [r?] Use markers

12.3.10 [s?] Use markers

Sample text	Chip explanation
Hello,[s9] Welcome IFLYTEK [s5] Speech synthesis chip	Speed adjustment function chip providing 11 Speed adjustment stage, the chip defaults to the speech rate 5 . When this sentence synthesis "hello" as 5 Speed Class, "Welcome IFLYTEK" as 9 Speed Class, "a voice synthesis chip" for the 5 Speed level. form 50 [s?] Use markers

12.3.11 [t?] Use markers

Sample text	Chip explanation
Hello,[t10] Welcome IFLYTEK [t0] Speech synthesis chip	Chip tone adjustment function is provided 11 Adjusting the tone level, the chip size of the default tone 5 A minimum of 0 A maximum of 10 . When this sentence synthesis "hello" as 5 Level tone, "Welcome IFLYTEK" as 10 Level tone, "speech synthesis chip" for the 0 Level tone. form 51 [t?] Use markers

12.3.12 [v?] Use markers

Sample text	Chip explanation
welcome[v3] use[v8] IFLYTEK speech synthesis chip	Chip volume adjustment function, provided 11 Volume level adjustment, the minimum 0 Mute, The default size of the chip volume 5 . When synthesis of this sentence "Welcome" as 5 Volume level, "use" is 3 Volume level, "IFLYTEK speech synthesis chip" for the 8 The volume level. form 52 [v?] Use markers

12.3.13 [x?] Use markers

Sample text	Chip explanation
Tone Ringtones [x0] sound101 A sound corresponding to [x1] sound101	[X0] with[x1] All play a role. Read: pre-established tone ringtone sound101 Is (beep sound101 Ringtones) form 53 [x?] Use markers

12.3.14 [y?] Use markers

Sample text	Chip explanation
[Y0] 010-58301005-8016	Chip according to "unitary" Synthesis reading number text " 1 "Read: Zero unitary Lingwu eight hundred thirty unitary unitary dated turn five eighty six
[Y1] 010-58301005-8016	Chip according to "a" reading synthesis number text " 1 "Read: Zero 1,058,301,005 turn eight thousand and sixteen table 54 [y?] Use markers

Note: This tag must be valid at the time of synthesis number type text.

12.3.15 [z?] Use markers

Sample text	Chip explanation
[Z0] Anhui USTC * # Iflytek	Chip read as "Anhui USTC pound sign asterisk Iflytek"
[Z1] Anhui USTC * # Iflytek	Chip read as "Anhui USTC News fly ", #, and * where it is processed into short pause table 55 [z?] Use markers

12.3.16 [=?] Use markers

Sample text	Chip explanation
Zeng [= deng1] Guofan	The chip will be mandatory "has been" in accordance " d ē ng "Tone synthesis broadcast table 56 [=?] Use markers

12.3.17 [d] Use markers

Sample text	Chip explanation
[S2] [v3] [t10] IFLYTEK, [d] IFLYTEK	Previous "IFLYTEK" in accordance with 2 Class Speed, 3 Volume level, 10 Synthesis tone level;

	After a "IFLYTEK" revert to the default rate of speech, volume, tone of voice synthesis. form 57 [d] Use markers

13 Tone

13.1 Chip integrated tone

The chip integrates 80 The first voice tone, the choice can be based on using the occasion as an information tone.

13.1.1 Message tone list

Message tone (a total of 25 first)				
sound101	sound102	sound103	sound104	sound105
sound106	sound107	sound108	sound109	sound110
sound111	sound112	sound113	sound114	sound115
sound116	sound117	sound118	sound119	sound120
sound121	sound122	sound123	sound124	sound125

form 58 Message tone list

13.1.2 Ringing tone list

Ringing tone (a total of 25 first)				
sound201	sound202	sound203	sound204	sound205
sound206	sound207	sound208	sound209	Sound210
sound211	sound212	Sound213	sound214	sound215
sound216	sound217	sound218	sound219	Sound220
Sound221	sound222	sound223	sound224	sound225

form 59 Ringing tone list

13.1.3 Alarm tone list

Alarm tone (a total of 30 first)				
sound301	sound303	sound303	sound304	sound305
sound306	sound307	sound308	sound309	sound310
sound311	sound312	sound313	sound314	sound315
sound316	sound317	sound318	sound319	sound320
sound321	sound322	sound323	sound324	sound325

sound326	sound327	sound328	sound329	sound330

form 60 Alarm tone list

note: Beep no particularity in the use of the same command and synthetic synthetic plain text. However, it should be noted that: before or after the tone name is followed by letters or numbers, you need to use punctuation, spaces, carriage returns, and so separated from the other letters, the chip will be able to identify the tone.

13.2 Tone customization

XFS5152CE Chip set aside 200K Space, bulk purchase customers can provide tone added, customized services.

To provide users with an audio file of requirements:

1 , The user may add accuracy sampling rates were 16K16bit , wav Format audio file, not the file formats need to be converted.

2 Users can add 16K16bit , wav The total amount of audio file formats up 4M (Since the tone when stored in the chip will format conversion, the compression ratio is 20 : 1 , 200K x 20 That is 4M).

If you need to add a total of more than 4M Tone, can support the internal tone delete part to get more storage space.

Note: If the tone of the added demand, need to submit to communicate with business people, providing audio and fill in the appropriate information, and to increase the tone of the name can not overlap with the existing tone.

14 Voice recognition command word

14.1 Command word list

Command word (a total of 30 A)				
I eat	I'm in the car	I Come	resting	agree
disagree	I go	what time is it now	Today, a few numbers	Reading information
Started reading	This is where	Open Broadcast	Turn off the radio	Open Music
Turn off the music	Hear it again	Read it again	louder please	Keep it down
Read SMS	Read the warning information	Weather tomorrow how to start	an emergency warning information	
stop	time out	Continue reading	OK to start	cancel

form 61 Alarm tone list

14.2 Custom Note command word

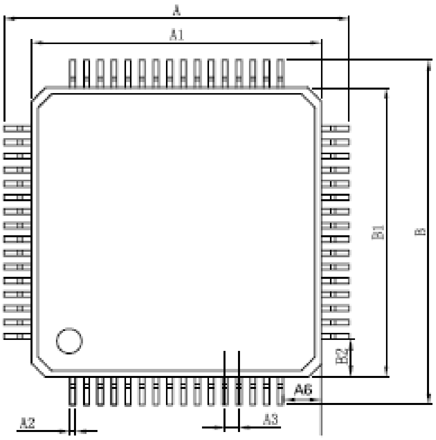
XFS5152CE Chip support 30 A command recognition word. The default setting is to chip out 30 A car, early warning and other industries to identify common command words. If you need to change into other customer identification command word, the word order can be customized.

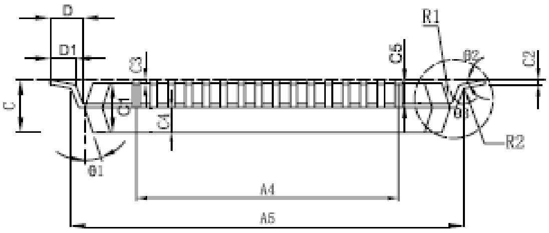
Note: If you need a custom command word chip, please pre-ordering and business people contacted for confirmation in voice chip. Ensure that you meet the conditions of the chip custom user, you need to submit the completed single command word custom needs. In order to ensure good recognition rate, try to choose a relatively large degree of distinction between each identification command words.

15 Specifications

15.1 Package

XFS5152CE Chip package as LQFP64 . Specific information is as follows:





Dimensions	Minimum (mm)	Maximum (mm)	Dimensions	Minimum (mm)	Maximum (mm)
A	11.80	12.20	C2	0.09	0.18
A1	9.9	10.10	C3	0.05	0.15
A2	0.17	0.25	C4	0.6365TYP	
A3	0.5TYP		C5	0.6365TYP	
A4	7.5TYP		D	0.9	1.1
A5	11.0TYP		D1	0.45	0.6
A6	1.15TYP		R1	0.15	
B	11.80	12.20	R2	0.15	
B1	9.90	10.10	Θ1	12 ° TYP	
B2	1.15TYP		Θ2	0 ° TYP	7 ° TYP
C	1.30	1.60	Θ3	4 ° TYP	
C1	1.35	1.45			

chart 17 The chip package of FIG.

15.2 Parameters

15.2.1 Limit

parameter	symbol	Minimum	Maximum	unit
Operating Voltage	PWR_IN	3.1	4.5	V
Pin input voltage	V_{IN}	-0.3	3.6	V
range storage temperature	T_{STO}	- 55	125	℃
Operating temperature	T_A	- 40	85	℃

form 62 Chip electrical parameters limit

Note: If the limit exceeds the parameters listed in the table, will likely result in damage to the device.

15.2.2 DC Characteristics

parameter	symbol	condition	Min Typ Max Units		
Operating Voltage	PWR_IN		3.1		4.5	V
3.3V Input low V_{IL}					0.3VDDIO V	
Input High V_{IH}			0.7VDDIO			V
Output low V_{OL}		Depending on the load			0.4	V
Output high V_{OH}		Depending on the load	2.4			V
Working current	I_{op1}	Composing text	29		32	mA
	I_{op1}	coding		38.2		
	I_{op1}	decoding		32.3		
Input leakage current I_I		V_I = 3.3V or 0V -1			1	uA
Output current	I_{OH}			8.2		mA
Absorption current	I_{OL}			13.2		mA
Reset time	T_{RST}			40		ms
Initialization time T_{INI}				240		ms

form 63 DC electrical characteristic parameter

15.2.3 Audio frequency DAC characteristic

Load Resistance Ω	The maximum peak to peak voltage V	Output Power mW

600	1.1	1.07
10K	1.1	0.064

form 64 Audio frequency DAC Parameters

15.2.4 Power consumption parameters synthesized state non-text

After synthesis idle	Encoded idle	After decoding idle	Power
34mA	35.5mA	35.5 mA	5mA

form 65 Power consumption parameters corresponding to the non-text synthesis state table

15.3 Synthesis of the received command to the broadcasting start time interval

Accepts text size	Typical values
4096 Byte text	530ms

form 66 Synthesis of the received command to the broadcasting start time interval

15.4 Welding process

15.4.1 Baking temperature and time

XFS5152CE Min tide level is 3 Level, at ≤ 30 ℃ / 60% RH Under ambient conditions, landing life of 168 hour.

product name	Chao Min Level	Floor life (After unpacking, at ≤ 30 ℃ / 60% RH Under humidity conditions)
XFS5152CE	3	168 H

form 67 Chao Min Classification and floor life

When the removable floor life longer than the chip after baking is required in accordance with the following table use, re-entering the reflow soldering process. Specified baking time is as follows:

Chip over the life of the floor time	> 72 H ≤ 72	H > 72 H ≤ 72	H > 72 H ≤ 72 H			
Baking temperature	125 ℃		90 ℃ ≤ 5% RH		40 ℃ ≤ 5% RH	
Baking time requirements	9 H	7 H	33 H	23 H	312H	216H

form 68 Baked chip reference conditions

note:

1) On the table: RH It represents the relative humidity; H The hour;

2) When the baking temperature resistance trays should meet the requirements.

15.4.2 Reflow peak temperature

The lowest peak temperature	Maximum peak temperature
240 ℃	260 ℃

form 69 Reflow peak temperature

Note: The melting point of the flux, typical temperature values may require a higher temperature, solder paste: paste solder is 220 ± 5 ℃; SnAgCu pastes of 245 ± 5 ℃, need specific instructions based on the manufacturer's specifications.

16 appendix

16.1 GB2312 About coding

GB 2312 Code is the national standard Chinese character encoding information exchange People's Republic of China, the full name "information exchange with Chinese character set encoding basic set", the standard number is GB 2312 - 80 (GB Yes " GB " The word of the pinyin abbreviation), released by the General Administration of People's Republic of China national standard, 1981 year 5 month 1 The date of implementation. Customarily known as GB code, GB Code, or area code. It is a Simplified Chinese character coding, spoken in mainland China. Singapore also use this code.

GB 2312-80 Included simplified Chinese characters and general symbols, numbers, numbers, Latin letters, Japanese kana, Greek letters, Russian letters, symbols Pinyin, the Chinese phonetic alphabet, a total of 7445 Graphic characters. Which graphic characters other than the characters 682 A Chinese characters 6763 A.

GB 2312-80 Regulations, " A character graphic for any two bytes are used (Byte) Represents. Each byte are used GB 1988 - 80 and GB 2311 - 80 The seven encoded representation. Two bytes preceding the first byte is a byte, a second byte is the following byte. " Traditionally known as the first byte " High Byte " The second byte " Low byte " .

16.2 UNICODE About coding

In the creation UNICODE Before, there are hundreds of kinds of encoding systems. But no one code can contain enough characters. For example, only the European Community will need several different encodings to cover all languages. Even a single language, such as English, and not a single coding can be applied to all the letters, punctuation, and technical symbols in common.

These encoding systems also conflict with each other. That is, two encodings can use the same numbers represent two different characters, or use the same characters in different figures represent. Any particular computer (especially servers) needs to support many different encodings, however, no matter what time of data passed between different encodings or platforms, that data will always be the risk of damage.

In the UNICODE Standard, provided 1,114,112 Code points, can contain not only all of today's language and other symbols used in the world, enough to accommodate the vast majority of historic ancient text and symbols. and, UNICODE Provides a unique number for every character, no matter what the platform, no matter what the program, no matter what the language.

UNICODE Industry standard has been adopted by leaders, such as: Apple, HP, IBM, JustSystem, Microsoft, Oracle, SAP, Sun, Sybase, Unisys and many more. The latest standard is required UNICODE ,E.g XML, Java, ECMAScript, LDAP, CORBA 3.0, WML And so on, and UNICODE It is to achieve ISO / IEC 10646 Formal way. Many operating systems, all the latest browsers and many other products support it. UNICODE The emergence and existence of its tools to support the standard, is the most significant recent global software technology trends.

16.3 GBK About coding

GB2312-80 Received only Chinese characters 6763 Months, which considerably less than existing characters, with the passage of time and continue to extend the promotion of culture of Chinese characters, and some had rarely used the word, has now become a commonly used word, for example: Zhu Rongji's "rong" character, not income GB2312-80 Now the continent's issue of the newspaper had to use (gold + capacity), (Kim Yong), (left and right receiving gold) used to express, and different forms of the same, which makes the representation, storage, input, process is very inconvenient to for construction software for search engines is not good news, and this means that no uniform standard.

To address these issues, as well as with the UNICODE The implementation of the National Technical Committee on Information Technology 1995 year 12 month 1 Day "Chinese Internal Code Specification." GBK Down and GB2312 Fully compatible and up ISO-10646 International standards, has played a role in connecting the former to the latter during the transition.

GBK Yes GB2312-80 The expansion is upward compatible. It contains 20902 Chinese characters, which is encoding range 0x8140-0xfefe , Excluding high 0x80 The word bit. All characters can be mapped to one UNICODE 2.0 .

GBK Also uses double-byte, overall coding range 8140-FEFE Between, at first byte 81-FE Between the tail bytes 40-FE Between, excluding XX7F a line.

Since Microsoft Windows 95 Simplified Chinese version began to support GBK Code, it is called standard Windows codepage 936 ,aka GBK (GB extension), it is also 8-bit Variable-length coding.

16.4 BIG5 About coding

BIG5 Taiwan's computer industry is the implementation of Chinese character set encoding. It contains 420 Graphic symbols and 13070 A traditional Chinese characters (simplified characters not included). Coding range 0x8140-0xFE7E , 0x81A1-0xFEFE ,among them 0xA140-0xA17E , 0xA1A1-0xA1FE It is a graphical symbol area, 0xA440-0xF97E , 0xA4A1-0xF9FE Chinese characters area.