



## SYN6988 Chinese and English Speech Synthesis

## Chip User Manual

Beijing Yuyin Tianxia Technology Co., Ltd.



010-62986600



010-62969399



[www.voicetx.com](http://www.voicetx.com)



Yuyin Tianxia Official Subscription Number



Yuyin Tianxia pre-sale consultation

SYN6988 Chinese-English audio synthesis chip user manual correction record		
Version	release date	content description
1.0	2021/4/12	First release version
1.1	2021/5/10	Add [k?] control mark, see 12.1 and 12.2.2 for details. Add examples of [h?] control mark, see 12.2.4 for details. Add Chapter 14:
1.2	Presentation Text	2022/04/15 Modify company website
1.3	2022/04/22	Modify some pin descriptions
1.4	2022/10/19	Fix [g2] control tag description inaccurate

## important statement

### Copyright

statement The copyright belongs to Beijing Yuyin Tianxia Technology Co., Ltd., all rights reserved.

### Trademark

Statement The products of Beijing Yuyin Tianxia Technology Co., Ltd. are proprietary to Beijing Yuyin Tianxia Technology Co., Ltd. When referring to other companies and their products, trademarks owned by the respective companies are used for the purpose of citation only. This document may involve patents (or pending patents), trademarks, copyrights or other intellectual property rights of Beijing Yuyintianxia Technology Co., Ltd., unless express written permission agreement has been obtained from Beijing Yuyintianxia Technology Co., Ltd., this document does not authorize the use of these Any license agreements under patents (or patents pending), trademarks, copyrights, or other intellectual property rights.

### Disclaimer of Warranty

Beijing Yuyin Tianxia Technology Co., Ltd. makes no representations or warranties, express or implied, about any content in this document, and shall not be liable for any indirect, special or consequential damages of merchantability and fitness for a particular purpose. The contents of this manual are subject to change without prior notice. Unless otherwise stated, the names of companies, people and data used in examples in this brochure are fictitious. No part of this manual may be reproduced or transmitted in any form or by any means (electronic or mechanical) for any purpose without the express written permission of Beijing Yuyin Tianxia Technology Co., Ltd.

### Confidentiality

Statement The information contained in this document (including any attachments) is confidential. The recipient understands that this document is confidential and shall not be used for any purpose other than the stated purpose, nor shall this document be disclosed to any third

party. This software product is subject to the terms and conditions stated in the End User License Agreement (EULA), located in the product documentation and/or online documentation for the software product, use of this product indicates that you have read and accepted the terms of

the EULA. Copyright: Beijing Yuyin Tianxia Technology Co., Ltd.

<b>1</b>	<b>Overview.....</b>	<b>6</b>
<b>2</b>	<b>Instructions for chip selection in different languages.....</b>	<b>6</b>
<b>3</b>	<b>Main fields of application.....</b>	<b>7</b>
<b>4</b>	<b>Product function description.....</b>	<b>7</b>
<b>5</b>	<b>Ordering Information.....</b>	<b>8</b>
<b>6</b>	<b>System structure block diagram.....</b>	<b>9</b>
<b>7</b>	<b>Pin definition.....</b>	<b>9</b>
<b>8</b>	<b>Chip control mode.....</b>	<b>10</b>
8.1	control commands.....	11 Chip
8.2	backhaul .....	11
<b>9</b>	<b>Communication methods.....</b>	<b>11</b>
9.1	Asynchronous serial communication mode (UART) .....	12 9.1.1
	Hardware connection.....	12 9.1.2
	Communication transmission byte format.....	12
9.1.3	Baud rate configuration method.....	12 SPI
	communication mode.....	13 9.2 9.2.1 Hardware
	connection.. ..	13 9.2.2 Communication
	transfer bytes Format.....	13
<b>10</b>	<b>Communication frame definition and communication control.....</b>	<b>14</b>
10.1	Command frame format .....	14
10.2	Chip Supported Controls Order.....	14 10.3
	Special instructions related to command frames.....	15
10.3.1	Sleep and wake-up instructions.....	15
10.3.2	Other special instructions .....	15
10.4	Command frame example.....	16
10.4.1	Speech Synthesis Playback Command.....	16
10.4.2	Stop Compositing Command.....	18
10.4.3	Pause synthesis command.....	18
10.4.4	Restoring composite commands.....	18
10.4.5	Chip status query command.....	19 10.4.6
	The chip enters the Standby mode command.....	19 10.4.7
	Chip wake-up command.....	19
<b>11</b>	<b>Product Specifications.....</b>	<b>twenty one</b>
11.1	Package.....	21
<b>22</b>	<b>Characteristic parameters.....</b>	
11.2	11.2.1 Limit values.....	22
	11.2.2 Recommended operating voltage range.....	22
	11.2.3 DC electrical characteristics.. ..	23
	11.2.4 Audio DAC Characteristics.....	23
	11.2.5 Power Consumption Parameters in Each State of the Chip.....	twenty

chip_User Manual 11.2.6 Interval time between receiving synthesis commands and starting broadcasting .....	24	11.3 Welding process requirements.....	24	11.3.1 Baking temperature and time.....	24	11.3.2 The peak temperature of reflow soldering.....	
<b>12</b>	<b>appendix.....</b>					<b>25</b>	
12.1 Text control tags.....	25	12.2 Examples of text control tag usage.....	27	12.2.1 Mark [o*] – pronunciation of 0 in English.....	27	12.2.2 Mark [k*] – Prosodic pauses in English sentences are lengthened.....	28
12.2.3 Mark [g*] – language setting.....	29	12.2.4 Mark [h*] – the way English words are pronounced.....	30	12.2.5 Mark [m*] – speaker selection.....	30	12.2.6 Token[n*] – number processing strategy .....	31
12.2.7 Marking [p *] – Mute for a period of time .....	31	12.2.8 Mark [s*] – Speech rate adjustment.....	31	12.2.9 Marking [t*] – Intonation Regulation.....	32	12.2.10 Mark [v*] – volume adjustment.....	32
12.2.11 Mark [x*] – Prompt Tone Policy. ....	32	12.2.12 Mark [i*] – Chinese Pinyin recognition.....	32	12.2.13 Marking [r*] – Pronunciation strategy for Chinese surnames.....	33	12.2.14 Mark [y*] – the pronunciation of Chinese number 1.....	33
12.2.15 Mark [z*] – Chinese prosodic label processing strategy.....	33	12.2.16 Mark [=] – Chinese Mandatory pinyin for a single Chinese character.....	34	12.2.17 Mark [f*] – Chinese Pronunciation Style .....	34	12.2.18 Mark [b*] – Chinese reading punctuation strategy.....	34
12.2.19 Marking [d] -reset.....	34	Prompt Sound .....	34	12.3 Effects .....	35	12.3.1 List of voice prompts.....	35
12.4 How the upper computer calls the SYN6988 chip.....	36	12.4.1 Simple calling .....	36	12.4.2 Standard call .....	36	12.5 How to query the working status of the chip.....	37
12.6 The coding system and scope of chip identification.....	37	12.6.1 GB2312 coding .....	37	12.6.2 GBK coding .....	37	12.6.3 Unicode encoding .....	38
13	<b>Example program for sending synthesized text.....</b>					<b>39</b>	
C language sample program.....	39	13.1 13.2 Assembly language sample program.....	40				
<b>14</b>	<b>Presentation text.....</b>					<b>42</b>	



# 1 Overview

The SYN6988 chip is a high-end Chinese-English speech synthesis chip newly launched by Beijing Yuyin Tianxia Technology Co., Ltd. in 2021.

SYN6988 receives text data to be synthesized through UART interface or SPI interface communication mode, and realizes text-to-speech (or TTS voice) conversion

Change.

The company's latest SYN6988 Chinese speech synthesis chip inherits the excellent features of the SY6658 high-end Chinese speech synthesis chip: small size

SMD package, simple hardware interface, low power consumption, clear and mellow sound, close to human voice, high price/performance ratio; in addition, SYN6988 has added English text analysis and English sound library, it is a real oriented Chinese and English speech synthesis chips for high-end industrial applications. SYN6988 chip is fully compatible with SYN6658 chip in terms of hardware and communication interface.

The birth of the SYN6988 Chinese-English speech synthesis chip will promote the industrial application of TTS speech synthesis technology to the world and better support customers in developing Expand foreign markets!

# 2 Instructions for chip selection in different languages

Our SYN6988 chip and SYN6658 chip are both high-end chips. The hardware is exactly the same, but the software core is different. SYN6658 chip supports Chinese speech synthesis. The SYN6988 chip supports both English and Chinese speech synthesis, but mainly focuses on English speech synthesis. When the user's product needs Chinese speech synthesis, please choose the SYN6658 Chinese speech synthesis chip (for Chinese synthesis, the SYN6658 chip

Chip than SYN6988 chip Chinese synthesis effect is better, better stability)

When the user's product needs English speech synthesis, please select the SYN6988 speech synthesis chip, and initialize the synthesis "[g1]" when the product is powered on

Set the language as English (see 12.1, 12.2.2 Language Setting section for details).

Users are requested not to synthesize both Chinese and English on the SYN6988 chip. If the user wants to use the SYN6988 chip to achieve mixed broadcasting of Chinese and English on the same product, please consult our customer service, submit the application scenario and playback text, and our company will give the final suggestion after evaluation.

In order to facilitate users of SYN6658 Chinese speech synthesis chip to quickly develop and use SYN6988 chip, the differences between the two software cores are described as follows:

	SYN6988 Chinese and English audio synthesis chip	SYN6658 Chinese Speech Synthesis Chip Chinese
Support languages English,	Chinese Chinese	Chinese
polyphonic characters Chinese	polyphonic characters have a higher error	polyphonic word error rate is very low
rate Chinese synthesis effect	Chinese synthesis effect is slightly worse	Chinese synthesis effect is good
Traditional Chinese is not	supported	Support
The text encoding method	supports 3 encoding methods: GB2312, GBK, Unicode;	4 encoding methods: GB2312, GBK, Unicode, BIG5;
speaker	Supporting main speaker: Xiaoling	Support main speaker: Xiaoling, also supports other 5 kinds of virtual speakers



control flag	<p>On the basis of the SYN6658 chip, add the following three control flags: (see 12.1 and 12.2 text control flags for details) <math>\ddot{y}</math></p> <p>[g*]: Language setting <math>\ddot{y}</math></p> <p>[o*]: English 0 pronunciation <math>\ddot{y}</math></p> <p>[h*] : Set the English word pronunciation method</p> <p>For the newly added control flags above, restoring the default control flag "[d]" can restore "[o*]" "[h*]" to default, but cannot restore "[g*]" to default</p>	
beep	<p>Based on the SYN6658 chip, the following prompts are reduced:</p> <p>msg*, sound210-sound219, sound319, sound5**, sound6**</p>	

3 main application fields

- Car GPS scheduling terminal • Fixed telephone • Information machine • Tax control machine • Attendance machine • Bus voice station announcement device • Queuing machine • Automatic vending machine • Weather warning machine • POS machine • Smart instrument • Smart instrument • Smart toy • Audio guide

4 Product Function Description

**$\ddot{y}$ Text** synthesis function

Clear, natural and accurate Chinese-English sound synthesis effect. The chip supports the synthesis of Chinese and English text, and can use GB2312, GBK and Unicode kind of encoding. The amount of text synthesized each time can reach 4K bytes.

**$\ddot{y}$ Text** intelligent analysis and processing

The chip has the function of intelligent analysis and processing of text.

Fragments can be correctly identified and processed according to the built-in text matching rules.

For example, in English synthesis: "call 13811002200" is read as "call one three eight one one zero zero two two zero zero", "http://www.tts168.com.cn" is read as "www dot tts one six eight dot com dot cn"

For example, in Chinese synthesis: "2012-05-01 10:36:28" is read as "10:36:28 on May 1, 2012", "The speed of the train is 622km/h" Read as "the speed of the train is 622 kilometers per hour", read "-12°C" as "minus twelve degrees Celsius", and so on.



**Support** 10-level volume adjustment, 10-level speech rate adjustment and 10-level intonation adjustment

The chip can realize 10-level digital volume control, the volume is louder and wider. Support the adjustment of speech rate and intonation to meet various application requirements.

**Prompt** sound

The chip integrates multiple sound prompts, which can be used for information reminders and alarms in different industries and occasions.

**Support** multiple text control tags

The chip supports a variety of text control tags. Text control marks can be sent by sending "synthetic commands" to adjust speech rate, intonation, and volume. You can also use control tags to improve the accuracy of text processing, such as: set the language, set the reading method of numbers, and set whether English words are alphabetized

Read, set the reading method of "1" in Chinese numbers, etc.

**Support** multiple control commands

Control commands include: synthesize text, stop synthesis, pause synthesis, resume synthesis, status query, and enter Power Down mode. controller

Control the chip by sending control commands through the communication interface.

**Query** the working status of the chip

It supports multiple ways to query the working status of the chip, including: querying the status pin level, automatically returning the feedback by reading the chip, and sending a query command to obtain the feedback of the working status of the chip.

**Communication** mode

Two communication modes: the chip supports two communication modes of UART and SPI. When the user UART serial port resource has been occupied, you can choose to use the SPI interface

**Support** low power consumption mode

The chip supports Standby mode. Use the control command to make the chip enter the Standby mode.

**Support** 4 communication baud rates The

communication baud rates supported by the chip: 4800bps, 9600bps, 57600bps, 115200bps.

5 ordering information

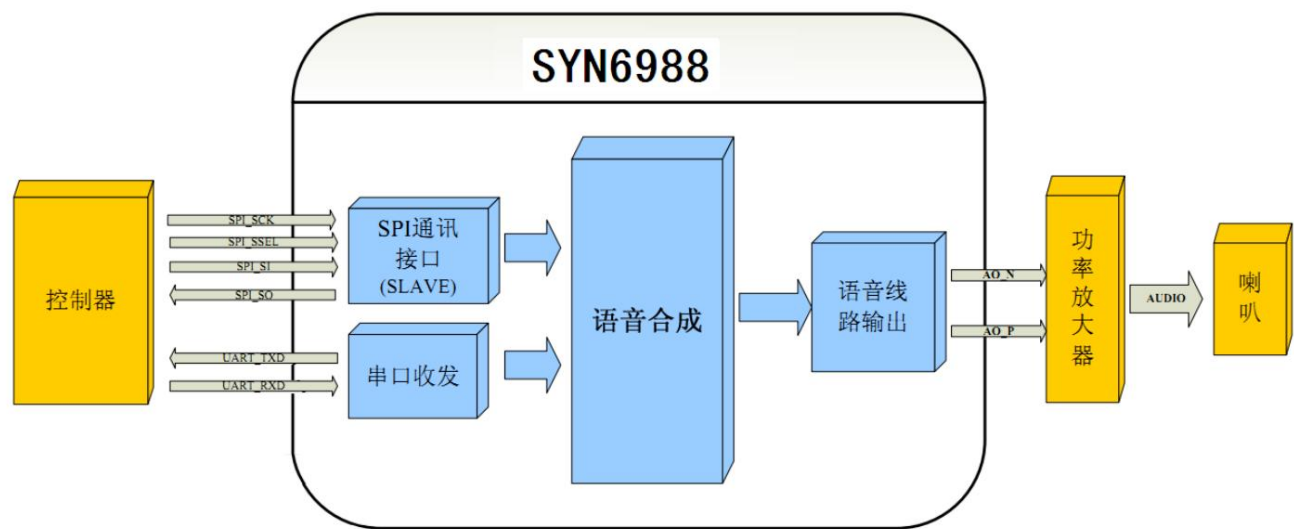
Chip model	Package information		
SYN6988	chip name	package name	Package Description
	SYN6988	LQFP64	64 pins, chip size 10mm×10mm×1.4mm



6 System structure block diagram

The minimum system includes: controller module, SYN6988 speech synthesis chip, power amplifier module and speakers.

The main controller and the SYN6988 speech synthesis chip are connected through the UART interface or the SPI interface. The controller can send control commands and texts to the SYN6988 speech synthesis chip through the communication interface. The SYN6988 speech synthesis chip synthesizes the received text into a speech signal output. The output signal is amplified by the power amplifier and then connected to the speaker for playback.



7 pin definition

numbered pins	illustrate	numbered pins	illustrate
1	VDD1 1.2V digital power input 33		NC
2	UVDD 3.3V analog power input 34		Undefined
3	RREF Reference voltage, 10K pull-down resistor 35		Undefined
4	UVSS digitally	36	SVDD 3.3V digital power input
5	NC	37	VSSIO2 Digitally
6	NC	38	NC
7	HPVDD 3.3V Analog Power Input 39		RXD/WakeUP2 When the serial port receiving/ WakeUP2 is not in use, connect an external 10k pull-up resistor to indicate the busy status of the chip, and a low level means idle
8	AO_P Audio Out - Positive	40	R/B
9	AO_N Audio Out - Negative	41	TXD/WakeUP3 serial port send/WakeUP3

10	HPVSS	Simulated	42	SCLK#	SPI_SCLK
11	VCM2	External 10uF filter capacitor 43		SSEL#	SPI_SSEL
12	VCM3	External 10uF filter capacitor 44		SDI#	SPI_MOSI
13	NC		45	SDO#	SPI_MISO
14	AVSS	Simulated	46	VDDIO2	3.3V digital power input
15		Undefined	47	WakeUp1	wakeup pin 1
16	DAT7#	digital signal line	48	WakeUp0	wakeup pin 0
17	AVDD	3.3V Analog Power Input 49		DAT1#	digital signal line
18	VREF	Reference voltage, 100nF filter capacitor	50	DAT2#	digital signal line
19	NC		51	DAT3#	digital signal line
20	VDD_I2	Chip power supply, POWER_IN	52	VSSIO3	Digitally
	DAT0#	Digital signal line	53	SOP2#	External 100K pull-up resistor
	VDDIO1_O	3.3V output, maximum drive current 100mA (power supply for AVDD of PIN17 and VDDIO2 of PIN46)	54		Undefined
	VDD2_O	1.2V output, supply power to VDD1 of PIN1	55	BAUD1	Baud Rate Configuration Port 1
	PLL_V12 External filter capacitor 0.1~1uF		56	BAUD0	Baud Rate Configuration Port 0
25	VSSIO1	digitally	57	DAT4#	digital signal line
26	XTAL12MI	12M crystal oscillator input	58		Undefined
27	XTAL12MO	12M crystal oscillator output	59	DAT5#	digital signal line
28	#RST	Reset (active low) 60		DAT6#	digital signal line
29	SOP1#	External 100K pull-up resistor 61			Undefined
30	NC		62	TEST	External 10K pull-up resistor
31	NC		63		Undefined
32		Undefined	64	SVSS	Digitally

## 8 chip control mode

## 8.1 Control commands

The host computer sends commands to the SYN6988 chip in the format of command frames. The SYN6988 chip performs corresponding operations according to the command frame, and returns

Return the result of the command operation. The SYN6988 chip provides a variety of control commands, the list is as follows:

command function	illustrate
Speech synthesis play command	Synthesize and play the text sent this time
stop compositing command	Stop the current compositing action
Pause compositing command	Pause an ongoing composition
restore compositing command	Continue compositing paused text
Chip status query command	Query the working status of the current chip
The command to enter the Standby mode causes the chip to enter the Standby mode from the normal working mode, and resumes after receiving any command	
wake up command	Make the chip enter normal working mode from Standby mode

## 8.2 Chip Backhaul

After receiving the control command frame, the chip will send a 1-byte status feedback to the host computer, and the host computer can judge the current state of the chip according to the feedback.  
working status.

When the SYN6988 chip is successfully initialized, it will send a one-byte "initialization successful" return.

After receiving the command frame, the SYN6988 chip will judge whether the command frame is correct or not. If the command frame is correct, it will return a "successfully received" return; such as  
If the command frame is wrong, it will return a "receive failure" return.

When the SYN6988 chip receives the status query command, if the chip is in the working state of broadcasting, it will return the "is broadcasting" return, and if the chip is in the idle state, it will return the  
"chip idle" return. After a frame of data is synthesized, the chip will automatically return a "chip idle" return.

Return type name	return data	Triggering conditions
Init successful return	0x4A	The chip is initialized successfully
Received the correct command frame back	0x41	The reception is successful and the correct command frame is received
0x45 is returned when an unrecognized command frame is received		Receive failed, received wrong command frame
chip broadcast status return	0x4E	After receiving the "Status Query Command Frame", the chip is in the broadcasting state. When a
Chip idle state feedback	0x4F	frame of data is synthesized, the chip enters the idle state and returns 0x4F; or receives the "Status Query Command Frame", the chip is in the idle state and returns 0x4F

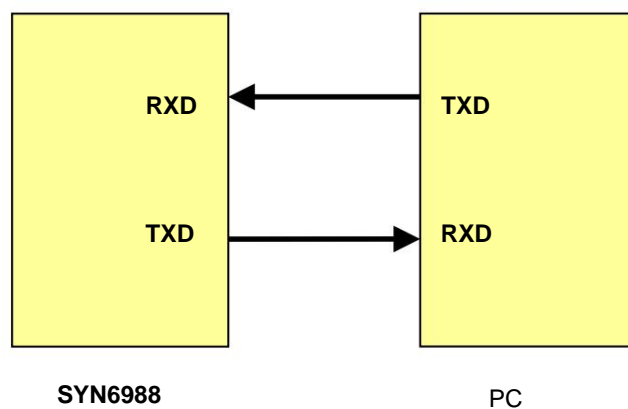
## 9 Communication methods

The SYN6988 chip supports two communication methods, UART interface and SPI interface, and can receive the host computer through the UART interface or SPI interface. The maximum length of data sent is 4k bytes.

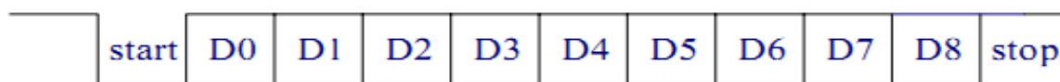
## 9.1 Asynchronous serial communication mode (UART)

### 9.1.1 Hardware connection

SYN6988 provides a set of full-duplex asynchronous serial communication (UART) interface to realize data transmission with microprocessor or PC. SYN6988 Use TxD, RxD and GND to realize serial communication. Among them, GND is used as signal ground. The SYN6988 chip supports UART interface communication mode, and receives commands and data sent by the host computer through the UART interface.



### 9.1.2 Communication transmission byte format



1. Communication

standard: UART 2. Baud rate: 4800bps, 9600bps, 57600bps,

115200bps 3. Start

bit: 1bit 4. Data bits:

8bits 5. Stop bit: 1bit

6. Calibration: None

### 9.1.3 Baud rate configuration method

The UART communication interface of the SYN6988 chip supports 4 communication baud rates: 4800 bps, 9600 bps, 57600 bps, 115200 bps,

The hardware configuration can be performed through the level on the two pins BAUD0 and BAUD1 on the chip.

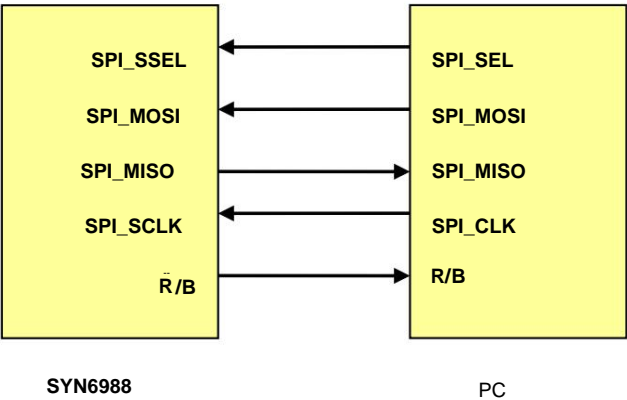
baud rate	BAUD0	BAUD1
4800bps	0	0
9600 bps	0	1
57600 bps	1	0
115200 bps	1	1

9.2 SPI communication mode

The following is only the most basic description of the SPI communication mode. If the customer needs to use the SPI communication mode, please follow the "SYN6988 Chinese-English Synthesis Chip\_Additional Manual (SPI Communication).pdf" for development.

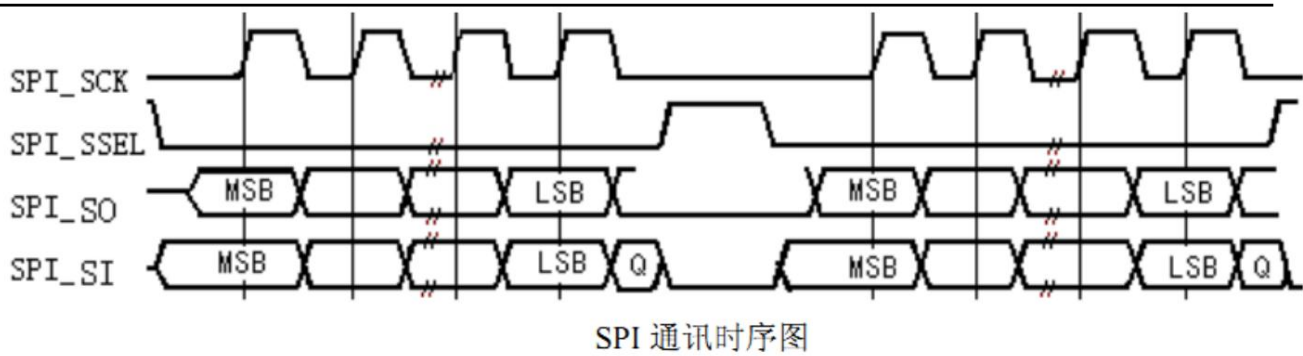
9.2.1 Hardware connection

The SPI interface of the SYN6988 chip is a 4-wire full-duplex synchronous serial communication interface. The upper computer is used as the Master status in the SPI communication. The SYN6988 chip is set as the Slave status in the SPI communication. The clock signal required for the SPI communication is provided by the upper computer.



9.2.2 Communication transmission byte format

SPI communication belongs to synchronous serial communication. When the upper computer communicates with SYN6988, the upper computer provides a synchronous clock signal. Rising edge SYN6988 latches 1bit data, every 8bits of data is transmitted to complete the transmission of a byte of data.



10 Communication frame definition and communication control

10.1 Command frame format

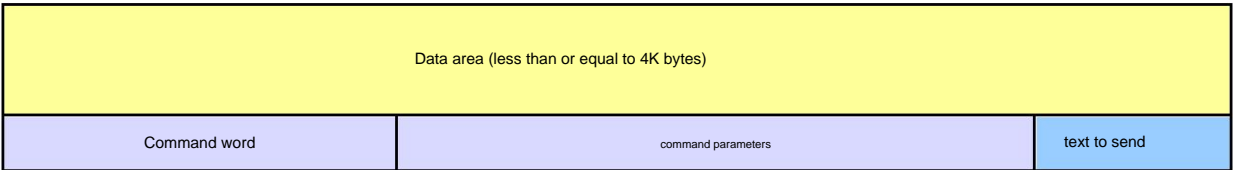
The chip supports the following command frame format: "frame header FD + data area length + data area" format. All commands and data sent by the host computer to the SYN6988 chip need to be encapsulated and transmitted in the form of "frame".

frame structure	Frame header (1 byte)	Data area length (2 bytes)	data area (less than or equal to 4K+2 bytes)		
			Command word 1 byte	Command parameter 1 byte	Text to be sent <= 4k bytes
data	0xFD	0XX 0XX	0XX	0XX	0XX.....
illustrate	Defined as hexadecimal "0xFD"	high byte before low byte	The total number of bytes must be consistent with the previous "data area length"		

Note: The actual number of bytes in the data area (including command words, command parameters, and text to be sent) must be strictly consistent with the length of the data area defined after the frame header, otherwise the chip will report receiving failure.

10.2 Control commands supported by the chip

The host computer can use the command words and command parameters in the data area to realize various functions of the speech synthesis chip.





1 byte		1 byte		<= 4K bytes
value	corresponding function	value	corresponding function	
0x01	Speech synthesis playback command	0x00	Set the text to: GB2312 encoding format	text to be synthesized binary content
		0x01	Set the text to: GBK encoding format	
		0x02	Set the text to: BIG5 encoding format	
		0x03	Set the text to: UNICODE encoding format (small header storage)	
		0x04	Set the text to: UNICODE encoding format (bulk storage)	
0x02	stop synthesis command	no parameters		no text
0x03	Pause synthesis command			
0x04	restore synthesis command			
0x21	Chip status query command			
0x22	The chip enters Standby mode			
0x88	chip enters Standby mode			
0xFF	chip wake-up command			

10.3 Special instructions related to command frames

10.3.1 Sleep and wake-up instructions

•The chip will not sleep actively, it will sleep only after receiving the sleep command frame sent by the host computer.

•After the chip enters sleep mode, the host computer first needs to wake up the chip (it can be woken up by sending a wake-up command, or by sending other commands Wake up), and then send command frame data to the chip; (Note: After waking up, send command data at an interval of 1 millisecond)

10.3.2 Other special instructions

- 1. In the same frame of data, the sending interval between each byte cannot exceed 15ms; the sending interval between frames must exceed 20ms.
- 2. When the SYN6988 chip is synthesizing text, if it receives another effective synthesis command frame, the chip will immediately stop the current The text being synthesized is then synthesized to the newly received text.
- 3. The length of the text to be sent must be less than or equal to 4096 bytes. When the actual sent length is greater than 4096, the chip will report receiving failure.
- 4. When the user is continuously playing text content, after receiving the "chip idle" byte (ie 0x4F) after the previous frame of data has been played, it is best to delay about 1ms before sending the next frame of data.

## 10.4 Example of command frame

## 10.4.1 Speech synthesis play command

frame structure	header	data area length	data area		
			command word	command parameter	text to send
Data 0xFD	0x00 0x07		0x01	0x00	hello 0x68 0x65 0x6C 0x6C 0x6F
Data frame 0xFD 0x00 0x07 0x01 0x00 0x68 0x65 0x6C 0x6C 0x6F					
Description Play the text "hello" whose text encoding format is "GB2312"					
frame structure	header	data area length	data area		
			command word	command parameter	text to send
Data 0xFD	0x00 0x07		0x01	0x01	hello 0x68 0x65 0x6C 0x6C 0x6F
Data frame 0xFD 0x00 0x07 0x01 0x01 0x68 0x65 0x6C 0x6C 0x6F					
Description Play the text "hello" whose text encoding format is "GBK"					
frame structure	header	data area length	data area		
			command word	command parameter	text to send
Data 0xFD	0x00 0x0C		0x01	0x03	hello 0x68 0x00 0x65 0x00 0x6C 0x00 0x6C 0x00 0x6F 0x00
Data frame 0xFD 0x00 0x0C 0x01 0x03 0x68 0x00 0x65 0x00 0x6C 0x00 0x6C 0x00 0x6F 0x00					
Instructions to play the text "hello" whose text encoding format is "Unicode" (small header storage method)					
frame structure	header	data area length	data area		
			command word	command parameter	text to send
Data 0xFD	0x00 0x0C		0x01	0x04	hello 0x00 0x68 0x00 0x65 0x00 0x6C 0x00 0x6C 0x00 0x6F
Data frame 0xFD 0x00 0x0C 0x01 0x04 0x00 0x68 0x00 0x65 0x00 0x6C 0x00 0x6C 0x00 0x6F					
Instructions to play the text "hello" whose text encoding format is "Unicode" (big header storage method)					



frame structure	header	data area	data area		
		length	command word	command parameter	text to send
Data 0xFD	0x00 0x0A		0x01	0x00	Yuyin Tianxia 0xD3 0xEE 0xD2 0xF4 0xCC 0xEC 0xCF 0xC2
Data frame	0xFD 0x00 0x0A 0x01 0x00 0xD3 0xEE 0xD2 0xF4 0xCC 0xEC 0xCF 0xC2				
Instructions	to play the text "Yuyin Tianxia" whose text encoding format is "GB2312"				
frame structure	header	data area	data area		
		length	command word	command parameter	text to send
Data 0xFD	0x00 0x0A		0x01	0x01	Yuyin Tianxia 0xD3 0xEE 0xD2 0xF4 0xCC 0xEC 0xCF 0xC2
Data frame	0xFD 0x00 0x0A 0x01 0x01 0xD3 0xEE 0xD2 0xF4 0xCC 0xEC 0xCF 0xC2				
Instructions	to play the text "Yuyin Tianxia" whose text encoding format is "GBK"				
frame structure	header	data area	data area		
		length	command word	command parameter	text to send
Data 0xFD	0x00 0x0A		0x01	0x03	Yuyin Tianxia 0x87 0x5B 0xF3 0x97 0x29 0x59 0x0B 0x4E
Data frame	0xFD 0x00 0x0A 0x01 0x03 0x87 0x5B 0xF3 0x97 0x29 0x59 0x0B 0x4E				
Instructions	to play the text "Yuyin Tianxia" whose text encoding format is "Unicode" (small header storage method)				
frame structure	header	data area	data area		
		length	command word	command parameter	text to send
Data 0xFD	0x00 0x0A		0x01	0x04	Yuyin Tianxia 0x5B 0x87 0x97 0xF3 0x59 0x29 0x4E 0x0B
Data frame	0xFD 0x00 0x0A 0x01 0x04 0x5B 0x87 0x97 0xF3 0x59 0x29 0x4E 0x0B				
Instructions	to play the text "Yuyin Tianxia" whose text encoding format is "Unicode" (big head storage method)				
frame structure	header	data area	data area		
		length	command word	command parameter	text to send
Data 0xFD	0x00 0x06		0x01	0x01	[v8] 0x5B 0x76 0x38 0x5D

Data frame	0xFD 0x00 0x06 0x01 0x01 0x5B 0x76 0x38 0x5D
Instructions	Play the text "[v8]", the chip will recognize it as: set the volume to level 8

#### 10.4.2 Stop synthesis command

Frame structure	frame header data	area length	data area		
			command word	command parameter	text to send
data	0xFD	0x00 0x01	0x02		
Data frame	0xFD 0x00 0x01 0x02				
illustrate	stop compositing command				

#### 10.4.3 Pause Synthesis Command

Frame structure	frame header data	area length	data area		
			command word	command parameter	text to send
data	0xFD	0x00 0x01	0x03		
Data frame	0xFD 0x00 0x01 0x03				
illustrate	Pause compositing command				

#### 10.4.4 Restoring Composition Commands

Frame structure	frame header data	area length	data area		
			command word	command parameter	text to send
data	0xFD	0x00 0x01	0x04		
Data frame	0xFD 0x00 0x01 0x04				
illustrate	restore compositing command				

### 10.4.5 Chip status query command

Frame structure	frame header data	area length	data area		
			command word	command parameter	text to send
data	0xFD	0x00 0x01	0x21		
Data frame	0xFD 0x00 0x01 0x21				
illustrate	Use this command to judge whether the TTS module is working normally, and obtain the corresponding return parameters. Returning 0x4E indicates that the chip is still synthesizing broadcasting, and returning 0x4F indicates that the chip is in an idle state.				

### 10.4.6 Chip enters **Standby** mode command

Note: The following two commands are to enter the Standby mode

Frame structure	frame header data	area length	data area		
			command word	command parameter	text to send
data	0xFD	0x00 0x01	0x22		
Data frame	0xFD 0x00 0x01 0x22				
illustrate	Enter Standby mode state command, resume after receiving any command				

Frame structure	frame header data	area length	data area		
			command word	command parameter	text to send
data	0xFD	0x00 0x01	0x88		
Data frame	0xFD 0x00 0x01 0x88				
illustrate	Enter Standby mode state command, resume after receiving any command				

### 10.4.7 Chip wake-up command

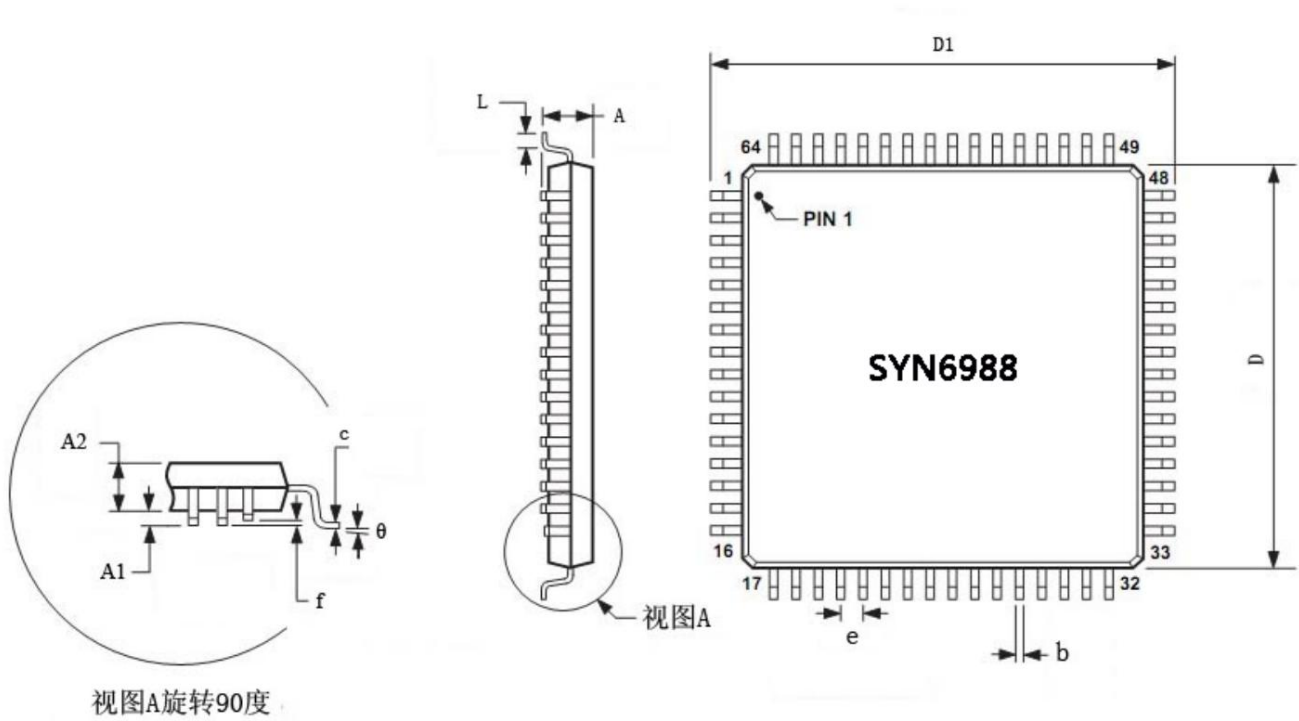
Frame structure	frame header data	area length	data area		
			command word	command parameter	text to send
data	0xFD	0x00 0x01	0xFF		
Data frame	0xFD 0x00 0x01 0xFF				



illustrate	Chip wake-up command
------------	----------------------

11 Product Specifications

11.1 Packaging



SYN6988 appearance form and size:

label	ruler inch	Minimum (mm) Maximum (mm)	label	ruler inch	Minimum (mm) Maximum (mm)
A		1.6	D1		11.80 12.20
A1		0.05 0.15	e		0.50(BSC)
A2		1.35 1.45	L		0.45 0.75
b		0.17 0.27	θ		0° 7°
c		0.09 0.20	f		0.08
D.		9.80 10.20			

## 11.2 Characteristic parameters

## 11.2.1 Limit values

parameter	symbol	min	max	unit
Operating Voltage	VDD_I1/VDD_I2	-0.3	4.5	V
Digital supply voltage	VDD1	-0.3	1.32	V
Digital input and output voltage	VDDIO2	-0.3	3.63	V
	SVDD	-0.5	4.00	V
Analog supply voltage	UVDD	-0.3	3.63	V
	AVDD	-0.3	3.63	V
	HPVDD	-0.3	3.40	V
Maximum operating temperature range	To	-40	85	°C
storage temperature	Ts	-55	125	°C

## 11.2.2 Recommended Voltage Operating Range

parameter	symbol	Min	Typ	Max	Unit
Operating Voltage	VDD_I1/VDD_I2	3.1	3.6	4.5	V
Digital supply voltage	VDD1	1.08	1.20	1.32	V
Digital input and output voltage	VDDIO2	2.97	3.30	3.63	V
	SVDD	3.00	3.30	3.63	V
Analog supply voltage	UVDD	3.00	3.30	3.63	V
	AVDD	3.15	3.30	3.63	V
	HPVDD	3.15	3.30	3.63	V

### 11.2.3 DC electrical characteristics

parameter	Symbol	Min	Typ	Max		unit
input high voltage	VIH		2.0	-	VDDIO+0.3	V
input low voltage	VIL		-0.3	-	0.8	V
output high voltage	VOH		2.4	-	-	V
output low voltage	VOL		-	-	0.4	V
input leakage current	IL		-	-	±1	uA
Three-state output leakage current IOZ			-	-	±1	uA
input capacitance	CI		-	-	TBD	pF
output capacitance	CO		-	-	TBD	pF
Stereo output load resistance Rlineout			10	-	-	Kohm
Headphone output load resistance RHP			-	32	-	ohm

### 11.2.4 Audio DAC Characteristics

parameter	Min	Typ	Max	unit
Operating Voltage	3.0	3.3	3.6	V
HP minimum load resistance $\bar{y}$		32		$\bar{y}$
Maximum output voltage V		0.8		Vrms
Maximum output power		20		mW

### 11.2.5 Power consumption parameters in each state of the chip

normal working condition		Standby
Composite Text Status	idle	
53mA	15mA	3mA

### 11.2.6 Interval time between receiving synthesis command and starting broadcasting

received text size	minimum value	maximum value
4096 bytes of text	137ms	700ms

## 11.3 Welding process requirements

### 11.3.1 Baking temperature and time

The moisture sensitivity level of SYN6988 is level 3, and under the environmental conditions of  $\pm 30^{\circ}\text{C}/60\%\text{RH}$ , the landing life is 168 hours.

Product Name	Moisture Sensitivity Grade	Landing Life (After unpacking, under the humidity condition of $\pm 30^{\circ}\text{C}/60\%\text{RH}$ )
SYN6988	3	168H

Moisture sensitivity classification level and landing life

When it is found that the disassembled chip exceeds the landing life during use, it needs to be baked according to the regulations in the table below, and then enter the reflow soldering process. Baking times are specified as follows:

The chip exceeds the landing life	time > 72 H	$\pm 72^{\circ}\text{C}$	H > 72 H	$\pm 72^{\circ}\text{C}$	H > 72 H	$\pm 72^{\circ}\text{C}$	H
baking temperature	125°C		90 $\pm 5\%$ RH		40 $\pm 5\%$ RH		
Baking Time Requirements	9 h	7 h	33H	23 h	312H	216H	

Reference conditions for chip baking

Note: 1)

In the above table: RH means relative humidity; H means hour; 2) The

temperature resistance of the tray during baking should meet the requirements.



11.3.2 Peak temperature of reflow soldering

Product number	encapsulation	Minimum peak temperature	Maximum peak temperature
baking temperature	LQFP64	240°C	260°C

Reference conditions for chip baking

Note: Depending on the melting point of the flux, a higher temperature may be required. The typical temperature of solder paste: 220±5°C for lead solder paste; 245±5°C for tin-silver-copper paste, according to the manufacturer's specifications.

12 Appendix

Because of the extensive and profound cultural background of the text and the limitations of current technological development, speech synthesis cannot be 100% accurate. To satisfy To meet the individual needs of customers in various complex environments, the following text control tags are specially introduced to flexibly control the changes in the pronunciation of Chinese characters.

Special note: For some users with display screens, when a piece of text is used for both synthetic broadcast and screen display, in order to prevent the control marks from being displayed on the screen, the following two methods can be used: 1. Use The text field used for broadcasting and the text field used for display are stored and managed separately. 2. The text field used for broadcasting deletes the control mark and then displays it on the display screen.

12.1 Text control tags

effect	Control ID	default setting	Support languages	Detailed description
English pronunciation of 0	[o*] [o0]	English		(*=0/1) 0 - read "zero" by default 1 - force to read the English letter "o" sound
Prosodic Pause Length in English Sentences	[k*] [k0]	English		(*=0/unsigned integer) 0 - default, pause time at prosodic places in English sentences: unchanged (not lengthened) 1 - pause time at prosodic places in English sentences: lengthen by 50 milliseconds (ms) 2 - pause time at prosodic places in English sentences: lengthen by 100 milliseconds (ms) 3 - Prosodic pause time in English sentences: lengthen by 150 milliseconds (ms) and so on...
language settings	[g*] [g0]		Chinese English	(*=0/1/2) 0 - automatic judgment 1 - set to Chinese (composite Chinese for numbers, units of measurement, symbols, etc.)

				2 - Set to English (numbers, measurement units, symbols, etc. synthesized in English)
Pronunciation of English words [h*] [h0]			Chinese English	(*=0/1) 0 - default automatic judgment 1 - read the word one by one
select speaker	[m*] [m3]		Chinese English	(*= 3) 3 - Xiaoling (female voice)—currently only supports 1 speaker
set number processing strategy [n*] [n0]			Chinese English	(*=0/1/2) 0 - Automatic judgment 1 - Number processing as number 2 - Number processing as value
silence for a while	[p*]		Chinese English	(*=unsigned integer) * - the length of time to insert silence, unit: milliseconds (ms) (*=0~10)
set speech rate	[s*] [s5]		Chinese English	* - Speech rate value (0 to 10) Explanation: The smaller the speech rate value, the slower the speech
set tone	[t*] [t5]		Chinese English	rate (*=0~10) * - Intonation value (0 to 10) Note: The smaller the tone value, the lower the
set volume	[v*] [v5]		Chinese English	fundamental frequency value (*=0~10) * - Volume value (0 to 10) Note: The volume adjustment range is from mute to the maximum
Set the tone processing strategy [x*] [x1]			Chinese English	value supported by the audio device (*=0/1) 0 - don't use beep 1 - use
Chinese Pinyin [i*] [i0] Chinese				beep automatically (*=0/1) 0 - does not recognize Hanyu Pinyin 1 - recognizes Hanyu Pinyin  Description: 1) The pinyin mode is: 1 to 6 letters + 1 number 2) Tones are represented by 1 digit (1: Yinping 2: Yangping 3: Upper tone 4: Qu tone 5: Soft tone)
Chinese name pronunciation strategy [r*] [r0] Chinese				(*=0/1/2) 0 - automatically determine the pronunciation of the name 1 - force the beginning of each subsequent sentence to be pronounced according to the surname 2 - force the beginning of the next sentence to be pronounced according to the surname
The pronunciation of "1" in Chinese numbers [y*] [y0] Chinese				(*=0/1) 0 - When synthesizing numbers, "1" is pronounced as "unit" 1 - When synthesizing numbers, "1" is
Chinese setting prosodic annotation [z*] [z0] Chinese				pronounced as "one" (*=0/1) 0 - Do not process prosodic markings 1 - Process prosody Labeling description: Rhythmic labeling

				Use "#" to mark the prosodic phrase division position. Use "*" to mark the division position of prosodic
Chinese is mandatory pinyin for Chinese characters [=]			Chinese	words. (*Pinyin) * - Pinyin description for the previous Chinese character: 1) The pinyin mode is: 1 to 6 letters + 1 number 2) The sound is represented by a 1-digit number (1: Yinping 2: Yangping 3: Upper tone 4: Qu tone 5: Soft tone) 3) When it appears consecutively, the first one shall
Chinese setting pronunciation style [f] [f1] Chinese				prevail. (*=0/1) 0 - Word for word 1 - Straightforward
Chinese setting punctuation reading [b] [b0] Chinese				(*=0/1) 0 - do not read punctuation 1 - read punctuation

restore default compositing parameters [d]			Chinese English	All settings are restored to default values (such as volume, speech rate, intonation, etc.), except for these 2 settings (pronouncer [m] settings, language [g] settings)
--	--	--	--------------------	---

Remarks:

**ŷAll** control marks are half-width characters. **ŷThe** control

flag needs to be sent in the format of the speech synthesis command, and the special control mark is synthesized as text. **ŷThose** that

do not conform to the above recognizable "control logo" or the format is wrong, shall be treated as ordinary characters and numbers

**ŷThe** control flag is a global control flag, that is, as long as it is used once, it will not reset the chip, or power off, or use [d] to restore the default

Under the conditions set, all text sent to the chip will be under its control. Note: Selecting the speaker [m] is not controlled by [d],

To restore the default speaker, it must be restored with [m3].

**ŷWhen** the chip is powered off or reset, the original set logo will lose its effect, and the chip will restore to all default values. **ŷ** If the number in the

control flag exceeds the range, it will be processed as the default value **ŷ** [r001] is a

valid control command, which is equivalent to [r1]; others are similar.

## 12.2 Examples of Text Control Tag Usage

### 12.2.1 Notation [o\*] – pronunciation of 0 in English

sample text	synthetic interpretation
[o0]call 13811002200[d]	Synthesize "0" in the number text according to the pronunciation of "zero".  Read: call one three eight one one zero zero two two  zero zero

[o1]call 13811002200[d]	Manual Synthesize the "o" in the number text according to the pronunciation of the letter "o". Read: call one three eight one one oo two two oo
-------------------------	---

## 12.2.2 Marker [k\*] – Prosodic Pause Lengthening in English Sentences

sample text	synthetic interpretation
[k0]The subscriber you dialed can not be connected for the moment.[d]	Pause time at the prosody part in the sentence: the default is unchanged (not lengthened), read as: "The subscriber", after a natural pause at the prosody part, read "you dialed can not be connected", after a natural pause at the prosody part, read "for the moment", the pause time of the
[k12]The subscriber you dialed can not be connected for the moment.[d]	prosody in the sentence: lengthen 600 milliseconds (=12*50ms) and read: "The subscriber", pause 600 milliseconds more at the prosody, then read "you dialed can not be connected" and pause 600 milliseconds more at the prosody, then read "for the moment"
Note: [p?] mute mark can also play the function of lengthening the pause time of the prosody in the sentence, but the intonation of the prosody pause will be slightly different, the user can compare the two control marks to test and choose to use. [k?] Mark users need to set it at the beginning of the sentence, the chip will automatically lengthen the pause at the rhythm; [p?] Mark users can add it anywhere in the sentence	
The subscriber[p600]you dialed can not be connected[p600]for the moment.	Read: "The subscriber", silence for 600 milliseconds, then read "you dialed can not be connected" silence for 600 milliseconds, then read "for the moment"

Solution to broadcast stuttering:

Some English sentences may appear stuck (it sounds like a loud pop) when playing. This situation mainly occurs when playing at the fastest speed or

When the English sentence is too long, the user can refer to the following examples and strategies to test and solve the problem by themselves:

[s10]The subscriber you dialed can not be connected for the moment.[d]	Problem: There is a big pop at the "for" Solution 1:
[k6][s10]The subscriber you dialed can not be connected for the moment.[d]	Use [k?] to mark the pause at the lengthened rhythm
[s10]The subscriber[p300]you dialed can not be connected[p300]for the moment.[d]	Solution 2: Use [p?] to mark the pause at the lengthened rhythm
[s8]The subscriber you dialed can not be connected for the moment.[d]	Solution 3: Reduce the speaking speed

[s10]Here's a pie made by Uncle Jim. [d]	Problem: There is a small pop sound stuttering at the
[s10]Here's a pie [p50]made by Uncle Jim. [d]	"pie" Solution 1: Use [p?] to mark the pause at the lengthened rhythm

[s10] Please insert the RTK positioning module [d]	Question: Out of "RTK" Now the small pop sound
[s10] Please insert [p50] RTK positioning module [d]	stuttering solution 1: use [p?] to mark the pause at the lengthened rhythm

### 12.2.3 Flags [g\*] – language settings

sample text	synthetic interpretation
[g0]http://www.tts168.com.cn[d]	Automatically determine the language. Read as: httpwww dot tts one six eight dot com dot cn
[g1]http://www.tts168.com.cn[d]	Read in Chinese language. Read as: http three wtts unit six eight point com point cn read
[g2]http://www.tts168.com.cn[d]	according to the English language. Read as: httpwww dot tts one six eight dot com dot cn

Note: **ÿ**

The default language of the SYN6988 chip is automatically judged. When the user's product is powered on, the language must be initialized. When the user product is an English product, please initialize the synthesis "[g2]" to set the language to English.

**ÿMarking** [d] will not restore the language to the default automatic judgment. To restore the language to the default, you must use [g0] to restore it.

**ÿWhen** it is set to Chinese language (apply "[g1]"): Please do not synthesize English sentences, otherwise it will not read or misread or even crash the computer.

[g1] Hello. I'll go now. Do what you enjoy. Wrong. Will not read or misread or even crash correctly. Please use this	
[g1] Hello. [g2]I'll go now	method to manually set the language when switching languages. correct.
[g1] Hello. [g0]I'll go now [g0] Hello. I'll go	Not recommended to use
now	correctly. Not recommended for use

**ÿWhen** the language is set to English (apply "[g2]"): Please do not synthesize Chinese sentences, otherwise it will not read or misread or even crash the computer.

[g2] hello. This is the emTTS system.	mistake. Will not read or misread or even crash
[g2] hello. [g1] This is the emTTS system.	correctly. Please use this method to manually set the language when switching languages.
[g2] hello. [g0] This is the emTTS system. [g0]	correct. Not recommended to
hello. This is the emTTS system.	use correctly. Not recommended for use

### 12.2.4 Marker [h\*] – the way English words are pronounced

sample text	synthetic interpretation
this is [h0]Windows[d] system. This is [h0] Windows [d] system.	Automatically judge the pronunciation of the word as: this is Windows system. This is Windows
this is [h1]Windows[d] system. This is [h1]Windows[d]system.	system. Force words to be read as letters: this is windows system. This is windows system.

Notice:

Ÿ The [h?] control mark can also solve the following problems of inaccurate intelligent judgment. When the user's text encounters similar problems, it can be used as a reference:

Points AB are too close to each other. The AC points are too close together.	Problem: People who read letters and Chinese characters are not the same
[h1] Points AB are too close to each other. The AC points are too close together. [d]	speaker. Solution 1: Use the [h1] mark to force reading letters

The EC points are too close together.	Problem: "EC" should be read as
[h1] EC points are too close together. [h0]	letters Solve 1: Use [h1] mark to force read letters

### 12.2.5 Mark [m\*] – speaker selection

sample text	synthetic interpretation
[m3]I am Xiaoling[m3]	Synthesize with the voice of the speaker "Xiaoling": "I am Xiaoling"

Note: Marking [d] will not restore the speaker to the default, to restore the default speaker, you must use [m3] to restore.

### 12.2.6 Token[n\*] – number processing strategy

sample text	synthetic interpretation
[n0] call 62986600, call 62986600[d]	Automatic judgment. Read as: dial 62986600. call six two nine eight six six zero zero.
[n1] call 62986600, call 62986600[d]	Compulsorily compose a string of digits as a number. Read as: dial 62986600. call six two nine eight six six zero zero.
[n2] call 62986600, call 62986600[d]	Forces the number string to be composed numerically. Read as: six thousand two hundred and ninety-eight thousand and six thousand six hundred. call sixty two million nine hundred and eighty six thousand six hundreds

### 12.2.7 mark[p\*] – silence for a period of time

sample text	synthetic interpretation
please get off [p300] from the right side [p300] of the door.	Play "please get off", mute 300ms, then play "from the right side", mute 300ms, then play "of the door" play "please from", mute 300ms,
Please get off at [p300] on the right side of the [p300] door	then play "right side of the door", Mute for 300 milliseconds, then play "get off"

### 12.2.8 Flags[s\*] – Speech Rate Regulation

sample text	synthetic interpretation
[s5] Welcome to [s2] Embedded Speech Synthesis System [d] developed by [s8] Yuyintianxia	Play "Welcome" at a speed of 5, "Developed by Yuyin Tianxia" at a speed of 8, "Embedded Speech Synthesis System" at a speed of 2,
[s5]please get off[s8]from the right side[s2]of the door.	and "please get off" at a speed of 5. Play "from the right side" at speed level 8 and "of the door" at speed level 2

### 12.2.9 Token[t\*] – intonation regulation

sample text	synthetic interpretation
[t5] Welcome to [t2] Embedded Speech Synthesis System [d] developed by [t8] Yuyintianxia	Play "Welcome" in the 5th tone, "developed by Yuyin Tianxia" in the 8th tone, and "Embedded Speech Synthesis System" in the 2nd tone. Play "please get
[t5]please get off[t8]from the right side[t2]of the door.	off" in the 5th tone, and 8th tone Play "from the right side" and "of the door"

### 12.2.10 Flags [v\*] – volume adjustment

sample text	synthetic interpretation
[v5] Welcome to [v2] Embedded Speech Synthesis System [d] developed by [v8] Yuyintianxia	Play "Welcome" at volume level 5, play "Developed by Yuyin Tianxia" at volume level 8, play "Embedded Speech Synthesis System" at volume level 2, play
[v5]please get off[v8]from the right side[v2]of the door.	"please get off" at volume level 5, and play "please get off" at volume level 8 Play "from the right side" and "of the door"

### 12.2.11 Mark [x\*] – Tone Policy

sample text	synthetic interpretation
[x0]sounda sound101[d]	Do not follow the prompt tone. Read directly into English letters: sounda sound-1-0-1
[x1] sounda sound101[d]	Process according to the prompt tone. Play the information prompt sounda, play the information prompt sound101.

### 12.2.12 Mark [i\*] – Chinese Pinyin for Chinese recognition

sample text	synthetic interpretation
[i0] Welcome shi3yong4 my gong1si1de5 system [d]	Does not recognize the Chinese pinyin, according to the Chinese characters, letters and numbers, pronounce it one by one: welcome shi three yong four I gong one si one de five system
[i1] welcome shi3yong4 my gong1si1de5 system [d]	Recognize Chinese Pinyin, read as: welcome to use our company's system



### 12.2.13 Mark [r\*] – Chinese Surname Pronunciation Strategy

sample text	synthetic interpretation
[r0] Jiefang Tao's younger sister is here, and so is Shan Xiaohu from the unit [d]	Automatically judge the pronunciation of the name: Xie (jie3) Fangtao's younger sister is here, and Dan (dan1)'s Shan4 Xiaohu is also here
[r1] Jiefang Tao's younger sister is here, and so is Shan Xiaohu from the unit [d]	It is mandatory to pronounce the beginning of each sentence according to the pronunciation of the surname: Jie (xie4) Fangtao's younger sister is here, and
[r2] Jiefang Tao's younger sister is here, and so is Shan Xiaohu from the unit [d]	Shan (shan4) Xiaohu is also here. ) Fang Tao's younger sister is here, and Dan (dan1)'s Shan4 Xiaohu is also here

### 12.2.14 Mark [y\*] – the pronunciation of Chinese number 1

sample text	synthetic interpretation
[y0]010-62986600[d]	The chip synthesizes "1" in the number text according to the reading method of "unit". Read as: zero one zero, 62986600 The chip
[y1]010-62986600[d]	synthesizes the "1" in the number text according to the reading method of "one". Read as: zero one zero, six two nine eight six six zero zero

Note: This flag is valid only when synthesizing number type text.

### 12.2.15 Token [z\*] – Chinese prosodic annotation processing strategy

sample text	synthetic interpretation
[z0] The U.S. Senate passed the financial regulatory reform bill with a vote of 59 to 39[d]	Does not handle prosodic notation: Rhythmic division and reading: The U.S. Senate passed the Financial Regulatory Reform Act by a vote of 59 to 39.
[z1] The U.S. Senate passed the #FinancialRegulatoryReformAct by a vote of 59 #to 39[d]	Dealing with Rhythmic Labeling: Rhythmic division and reading: The U.S. Senate passed the Financial Regulatory Reform Act by a vote of 59 to 39.

### 12.2.16 Mark [=\*] – Chinese enforces the pinyin of a single Chinese character

sample text	synthetic interpretation
Welcome them, welcome them[=ni3], welcome them[=wo3]	Read: welcome them, welcome you, welcome us

### 12.2.17 Mark [f\*] – Chinese Pronunciation Style

sample text	synthetic interpretation
[f0>Welcome to the demo of speech synthesis system[d]	Read aloud according to the "one word, one meal" pronunciation style
[f1>Welcome to the demo of speech synthesis system[d]	Read aloud in a "straightforward" pronunciation style

### 12.2.18 Mark [b\*] – Chinese reading punctuation strategy

sample text	synthetic interpretation
[b0] Welcome, come in! [d]	If the punctuation mark is not read out, read it as: "Welcome, please come in"
[b1] Welcome, come in! [d]	Read out the punctuation mark, read it as: "Welcome to the comma, please enter the exclamation mark"

### 12.2.19 Mark [d] – restore default

sample text	synthetic interpretation
[s0][t10]this is the demo.[d]this is the demo	Read "this is the demo" according to the intonation of level 0 and level 10, then restore the default intonation of level 5 and level 5, and then read "this is the demo"
[g2] [n2] 62986600 [d] 62986600.	First read according to the value, read as "sixty two million nine hundred and eighty six thousand six hundred", and then read according to the number, read as "six two nine eight six six zero zero"

Note: Marking [d] restores all settings to default values (such as volume, speech rate, intonation, etc.), except for these 2 settings (pronouncer [m\*] settings, language [g\*] settings)



12.3 Prompt sound effect

12.3.1 Sound Prompt List

The system provides the following sound prompts, which can be selected as information prompts according to the application occasion. The following list is the current system built-in

The name and sound type of the prompt tone, etc.:

beep type							
Serial Number	Name	Playing Time	Compatible Name	Serial Number	Name	playtime	compatible name
1	sound101	0.38 seconds	sounda	13	sound113	0.75 seconds	soundm
2	sound102	0.41 seconds	soundb	14	sound114	0.77 seconds	sound
3	sound103	0.43 seconds	soundc	15	sound115	0.79 seconds	sound
4	sound104	0.46 seconds	soundd	16	sound116	0.82 seconds	soundp
5	sound105	0.47 seconds	sounde	17	sound117	0.84 seconds	soundq
6	sound106	0.47 seconds	soundf	18	sound118	0.89 seconds	soundr
7	sound107	0.53 seconds	soundg	19	sound119	0.99 seconds	soundt
8	sound108	0.60 seconds	soundh	20	sound120	1.00 seconds	soundu
9	sound109	0.62 seconds	soundi		sound121	1.08 seconds	soundv
10	sound110	0.64 seconds	soundj		sound122	1.20 seconds	soundw
11	sound111	0.65 seconds	soundk		sound123	1.82 seconds	soundx
12	sound112	0.67 seconds	soundl		sound124	2.27 seconds	soundy

ringtone type			
Serial number	name	Sound type	Playing time
1	sound201	phone ringtone	0.6 seconds
2	sound202	phone ringtone	1.0 seconds
3	sound203	phone ringtone	1.0 seconds
4	sound204	phone rings	1.2 seconds
5	sound205	phone ringtone	1.6 seconds
6	sound206	door bell	0.3 seconds
7	sound207	door bell	0.8 seconds
8	sound208	door bell	1.2 seconds

alert type			
		Sound Type	Playing Time
1	sound301	alarm	0.6 seconds
2	sound302	alarm	0.7 seconds
3	sound303	alarm	0.8 seconds
4	sound304	alarm	0.8 seconds
5	sound305	alarm	0.9 seconds
6	sound306	alarm	1.0 seconds
7	sound307	alarm	1.0 seconds
8	sound308	alarm	1.1 seconds

9	sound209 door bell	1.4 seconds	
---	--------------------	-------------	--

Type of credit card success			
No. Name	Sound type	Playing time	12
1	sound401 credit card successful	0.09 seconds	
2	sound402 credit card successful	0.11 seconds	
3	sound403 credit card successful	0.11 seconds	
4	sound404 credit card successful	0.16 seconds	
5	sound405 credit card successful	0.41 seconds	
6	sound406 credit card successful	0.41 seconds	
7	sound407 credit card successful	0.46 seconds	
8	sound408 successfully swiped the card in	0.59 seconds	

9	sound309	alarm	1.2 seconds
10	sound310	alarm	1.2 seconds
11	sound311	alarm	1.2 seconds
	sound312	alarm	1.8 seconds
13	sound313	alarm	1.9 seconds
14	sound314	alarm	2.1 seconds
15	sound315 alert-emergency		0.8 seconds
16	sound316 alert-emergency		1.1 seconds
17	sound317 alert-emergency		1.4 seconds
18	sound318 alert-emergency		2.9 seconds

**ŸNote 1:** There is no particularity in the use of the prompt sound, it is the same as the synthesis command for synthesizing ordinary text. However, it should be noted that when the name of the prompt sound is preceded or followed by a string of English letters and numbers, it needs to be separated from other letters by using punctuation marks, spaces, carriage returns, etc., so that the system can automatically recognize them. For example: Send the text "sound1, hello!", sound1 can synthesize the corresponding SMS prompt tone, but if the text "sound1hello!" is sent, sounda cannot synthesize the prompt tone, but directly reads the letter "SOUNDA".

**ŸNote 2:** If it is not the above-mentioned effective prompt tone, it will only be pronounced according to the

normal text: **ŸNote 3:** We can play the same prompt tone multiple times to achieve the effect of a longer prompt tone, adding [p in the middle of the prompt tone ?] to control the pause time, for example:

```
Ÿ sound202[p400]sound202[p400]sound202
Ÿ sound303[p300]sound303[p300]sound303 Ÿ
sound312[p200]sound312[p200]sound312 Ÿ
sound317[p300]sound317[p300]sound317
```

## 12.4 How the upper computer calls the SYN6988 chip

### 12.4.1 Simple calling method

The simple call is for the case where the application is relatively simple. Users don't need to care about the working status of SYN6988, only need to send text, and SYN6988 will synthesize the received text into voice output.

In the case of a simple call, as long as the upper computer establishes one of the two communication methods of UART or SPI with the SYN6988, it can send Synthesis command to achieve text synthesis, the host computer does not need to pay attention to the return data of SYN6988 or the output of the status pin.

Tips: If the text of the previous frame has not been synthesized, sending text to SYN6988 will interrupt the previous synthesis and execute a new synthesis.

## 12.4.2 Standard calling method

For general situations, the host computer needs to determine the working status of SYN6988 to more precisely control the work of the SYN6988 chip: for example, it is necessary to confirm Make sure that the next piece of text is synthesized after the last text is completely synthesized.

The application example is as follows: Assume that the text to be synthesized is 5k bytes, which exceeds the maximum text length of 4k bytes that a command frame of the chip can hold. At this time, send text information to the chip twice. The program process is as follows: 1.

The host computer first sends a text synthesis command frame to the SYN6988 chip, carrying no more than 4k bytes of text; 2. The host computer waits for the SYN6988 chip to return the playback information until it receives the chip feedback "0x4F", indicating that the previous text has been merged or use the method of querying the status pin of the chip and sending a query command to confirm whether the previous frame of text has been synthesized through the queried information. 3. The host computer

sends a text synthesis command frame to the SYN6988 chip again, and sends out the rest of the text.

## 12.5 How to query the working status of the chip

The working status of the SYN6988 chip can be queried through hardware and software.

**Hardware** method: by querying the output pin Ready \_\_\_\_\_ /Busy level to judge the working status of the chip. When Ready \_\_\_\_\_ /Busy is high,

It indicates that the chip is synthesizing and playing text; when Ready \_\_\_\_\_ /Busy is low, it indicates that the chip is idle.

**Software** mode: Query the working status of the chip through the chip status query command frame. When the host computer sends a status query command frame to the chip,

The chip will immediately send the current chip status feedback to the host computer. The upper computer judges whether the current chip is in the idle state or the broadcast state according to the returned data of the chip state.

## 12.6 The coding system and scope of chip identification

SYN6988 supports the following 3 encoding systems: GB2312, GBK, Unicode.

### 12.6.1 GB2312 coding system

The GB2312 code is the code for the exchange of Chinese character information in the national standard of the People's Republic of China. Published by the National Bureau of Standards of the Republic, 1981

Implemented on May 1. It is customarily called the national standard code, GB code, or area code. It is a code for simplified Chinese characters, which is popular in mainland China. new Singapore and other places also use this code.

GB2312-80 includes simplified Chinese characters and general symbols, serial numbers, numbers, Latin letters, Japanese kana, Greek letters, Russian letters, Chinese Pinyin symbols, Chinese Zhuyin letters, a total of 7445 graphic characters. Among them, there are 682 graphic characters other than Chinese characters, and 6763 Chinese characters.

GB2312-80 stipulates that "any graphic character shall be represented by two bytes (Byte).

recognition type	Identify code range	Remark
Half-width ASCII symbol area 0x00	--- 0x7F	
Full-width symbol area 0xA0	A0 --- 0xA3FE	
Chinese character area	0xB0A1 --- 0xF7FE A total of 6768 Chinese characters	

### 12.6.2 GBK coding system

GB2312-80 only accepts 6763 Chinese characters, which is much less than the existing Chinese characters. With the passage of time and the continuous extension and promotion of Chinese character culture, some original Rarely used words have now become commonly used words, which makes representation, storage, input, and processing very inconvenient. In order to

solve these problems and cooperate with the implementation of UNICODE, the National Information Technology Technology Committee issued "Chinese Character Internal Code" on December 1, 1995. Extension Specification". GBK is fully compatible with GB2312 downwards and supports ISO-10646 international standard upwards.

GBK is an extension of GB2312-80 and is upwardly compatible. It contains 20902 Chinese characters, and its coding range is 0x8140-0xfefe. All its characters can be mapped one-to-one to UNICODE 2.0. GBK also uses double-byte representation.

recognition type	Identify code range	Remark
Half-width ASCII symbol area 0x00	--- 0x7F	
Full-width symbol area 0xA0	A0 --- 0xA3FE	
Chinese character area	0x8140 --- 0xA0FE 0xAA40 --- 0xFEFE	A total of 21003 Chinese characters

### 12.6.3 Unicode encoding system

Before UNICODE was created, there were hundreds of encoding systems. However, no single encoding can contain enough characters. reality

The problem is: use the same number to represent two different characters, or use different numbers to represent the same character. Any given computer (especially a server) needs to support many different encodings, but whenever data passes between different encodings or platforms, there is always a risk of corruption of that data. In the UNICODE standard, 1,114,112 code

points are provided, which can not only contain all languages and other symbols used in the world today, but also enough to accommodate most ancient characters and symbols with historical significance. And UNICODE provides a unique number for each character, no matter what platform, no matter what program, no matter what language. The UNICODE standard has been adopted by industry, it is supported by many operating systems, all latest browsers and many other products. The emergence of the UNICODE standard and the existence of tools supporting it are the most important development trend of global software technology recently.

recognition type	Identify code range	Remark
Full-width symbol area	0x00 area, 0x30 area, 0xFF area,	



Chinese character area	0x4E00 ---- 0x9FFF A total of 20902 Chinese characters
------------------------	--

## 13 Sample program to send synthesized text

### 13.1 C language sample program

Next, take 51 single-chip microcomputer as the host computer as an example, use C51 language to realize a program example of text synthesis, assuming that the content of the text to be synthesized  
The content is: "Welcome to Yuyintianxia SYN6988 Chinese-English audio synthesis chip", the following is the program module for sending a frame of TTS text data.

```

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

void main(void) { /

*****text to be sent*****
char code text[ ] = {"Welcome to Yuyintianxia SNY6988 Chinese-English sound synthesis chip"};
unsigned char headOfFrame[5]; unsigned
char length ; unsigned int i = 0;
length = strlen(text);

//Need to send the length of the text

/*****Initialization of the serial port*****/ // At 11.0592MHz,
TMOD = 0x20;          set the baud rate to 9600bps, working mode 2 TL1 = 0xFA; TH1 = 0xFA;
SCON = 0x50;
PCON = 0x80;
EA = 0; REN =          // Serial port working mode 1, allowing to receive
1 ; TI = 0; RI =
0; TR1 = 1;

//Transmit interrupt flag position
zero //Receive interrupt flag position
zero //Timer 1 is used as baud rate generation

/*****Sending process*****/ headOfFrame[0] =
0xFD ; // Construct frame header FD headOfFrame[1] = 0x00 ; //
Construct high byte of data area length // Construct low byte of data area length
headOfFrame[3] = 0x01 ; //Construction          headOfFrame [2] = length + 2;
command word: synthetic playback command headOfFrame[4] = 0x01 ; //Construction
command parameter: encoding format is GBK

for(i = 0; i<5; i++) { //Send the constructed 5 header bytes sequentially

    SBUF = headOfFrame[i]; while
    (TI== 0) {} //Waiting for the send interrupt flag to
    TI = 0; be set //Clear the send interrupt flag
}

for(i = 0; i<length; i++) { //Send the text data to be synthesized in sequence

    SBUF = text[i]; while
    (TI== 0) {}
    TI = 0;
}
// while(1);
}

```

## 13.2 Assembly language sample program

The following is an example of the assembly language used by the 51 single-chip microcomputer to control the upper computer, and demonstrates sending the text "Yuyin Tianxia" to the chip for synthesis.





The GBK code of "Yuyin Tianxia" is:

"Yu": 0xd3ee "Sound":  
0xd2f4 "Sky": 0xccec  
"Down": 0xcfc2

```

;Crystal 11.0592MHz

ORG 0030H
TABLE: DB 0xD3,0xEE,0xD2,0xF4,0xCC,0xEC,0xCF,0xC2 ; GBK code of "Yuyin Tianxia"

ORG 0000H
LJMP MAIN

ORG 0200H
MAIN:
CLR EA ; Serial port initialization

MOV TMOD, #20H ; Timer 1 works in mode 2
MOV TH1, #0FAH ; load timer initial value, baud rate 9600
MOV TL1, #00H
SETB TR1 ;Start timer 1

MOV SCON, #50H ;Serial port working mode 1, allowing to receive
MOV PCON, #80H ; Baud rate doubled; send
CLR TI ; interrupt flag position zero
CLR RI Receive interrupt flag bit zero

MOV A, #0FDh ;Frame header
MOV SBUF, A FD ;serial port send
JNB TI, $
CLR TI

MOV A,#00h ;High byte of data area length
MOV SBUF, A
JNB TI, $
CLR TI
```

```

MOV A,#0Ah          ;Low byte of data area length
MOV SBUF, A
JNB TI, $
CLR TI

MOV A,#01h          ;command word: synthetic playback command
MOV SBUF, A
JNB TI, $
CLR TI

MOV A,#01h          ;Command parameters: encoding format is GBK
MOV SBUF, A
JNB TI, $
CLR TI

MOV R7,#8            ;The total number of bytes of the text to
MOV R6,#0            be played;Sent byte count
MOV DPTR,#TABLE
LOOP: MOV A, R6
    MOVC A,@A+DPTR
    MOV SBUF, A      ;Play "Yuyin Tianxia"
    JNB TI, $
    CLR TI
    INC R6
    DJNZ R7, LOOP

    SJMP$

END

```

#### Notice:

1. After sending, you can receive the feedback signal from the chip. If it is "41" and "4F", it means that the text is received correctly and the synthesized broadcast is completed, and the chip is in an idle state; if you receive "45", it means that the text is not received or synthesized correctly, it needs to be resent or reset. 2. The above Demo mainly explains the protocol issues that need to be followed in the sending process; after sending the statement, it is necessary to add the judgment program of whether the sending is completed, and the working status of the current chip can be judged by query or interrupt, and then the next one can be sent data.

## 14 Demo text

Hello, this is the demo for SYN6988 TTS chip. Hello, this is the demo for SYN6988 TTS chip.

----- Industry text presentation -----

[Bus smart station announcement]

Arrived at the destination, please get off from the right side of the door

Driving on the way, please don't hand out of the window The next station Beijing station, please get ready to get off

We hope you enjoyed your flight and hope to see you again soon.

Weather Forecast

Beijing: Tonight to tomorrow, Cloudy with showers to 19 °C

~ 12°C

Navigation GPS signal is not available now.

GPS signal is abnormal You have arrived your destination. You have arrived at your destination. Take the second right. Turn right at the first exit at the second intersection. Reach the first exit in 1.6 kilometers. There are 1.6 kilometers left

remote control

Please restart the remote control. Please restart the remote control Reset factory setting. Restore factory settings Remote control low battery. Please exit smart mode. Please exit smart mode. Currently autonomous driving.

----- Control Flags Demo -----

[[g\*]Language

setting] Default automatic judgment, such as: [g0]http://www.tts168.com.cn[g0] set to Chinese, such as: [g1]http://www.tts168.com.cn[g0] is set to English, such as: [g2]http://www.tts168.com.cn[g0]

[[o\*] English 0 pronunciation]

The default reading is zero, such as: [o0]call 13811002200[d]. Mandatory reading "Europe", such as: [o1]call 13811002200[d].

[[h\*] English word pronunciation method]

It is automatically judged by default, such as: this is [h0]Windows[d] system. This is [h0]Windows[d] system. Read it in letters, such as: this is [h1]Windows[d] system. This is [h1]Windows[d] system.

[[k\*] Prolonged pause time in rhythm]

Default is not extended, such as: [k0]The subscriber you dialed can not be connected for the moment.[d] Extended by 600ms, such as: [k12]The subscriber you dialed can not be connected for the moment.[d]

[[n\*] digital judgment]

[n0] Default automatic judgment, such as 62986600, call 62986600[d] [n1] Read by number, such as 62986600, call 62986600[d] [n2] Read by value, such as 62986600, call 62986600[d]

ÿ[p\*]Pause controlÿ

please get off from the right side of the door. please get off [p300] from the right side [p300] of the door. car

ÿ[d\*]Restore defaultÿ

[s0][t10]this is the demo.[d] After restoring the default: this is the demo [n2] Call: 62986600 [d] After restoring the default: Call: 62986600.

ÿ[x\*] Prompt Sound

Processingÿ [x1]sounda, this is a sound. [x0]sounda, this isn't a sound.[d] [x1]sound401, this is the prompt sound. [x0]sounda, this Not a beep.[d]

[[v\*]Volume adjustment]

[v1] This is the effect of the smallest volume.  
[d] [v5] This is the effect of the default volume.  
[d][v10] This is the loudest effect. [d]

ÿ[s\*] Speech rate

adjustmentÿ [s0] This is the effect of the slowest speech rate; [d] [s5] This is the effect of normal speech rate. [d] [s10] This is the fastest speaking effect; [d]

[[t\*]: Intonation adjustment]

[t0] This is the effect of the lowest tone [=diao4]; [d] [t5] This is the effect of the default tone. [d] [t10] This is the highest effect of intonation [=diao4]; [d]

[Chinese special control mark]

[i\*]: Mandatory Pinyin. Welcome Lu Xiaodong. [i0] Welcome to lu4 Xiaodong. [i1] Welcome lu4xiao3dong1. [d] [r\*]: Surname mandatory. Na Ying. That Xiaodong. [r1] Na Ying. [r1] That Xiaodong. [d] [y\*]: The pronunciation of Chinese 1. 010-62986600. [y1]010-62986600[d]. [z\*]: Rhythmic coercion. I even remember something I saw under the garden tree the day before yesterday. [z1] I even remember one thing I saw the day before yesterday #ÿÿÿÿ# [d] [=\*]: Mandatory pinyin. bank governor. Bank line[=xing2]long[=chang2]. [b\*]: Read punctuation switch. Welcome, come in! . [b1] Welcome, please come in! [d]

Welcome to emTTS Speech Synthesis System.

Please select the help key to enter the self-test  
mode. Please click the finish button to complete this  
operation. 10% of users choose MSN.

Tom and Hellen are good friends.

They are using Windows XP system.

Rose is a very nice leader. I don't care  
about this matter.