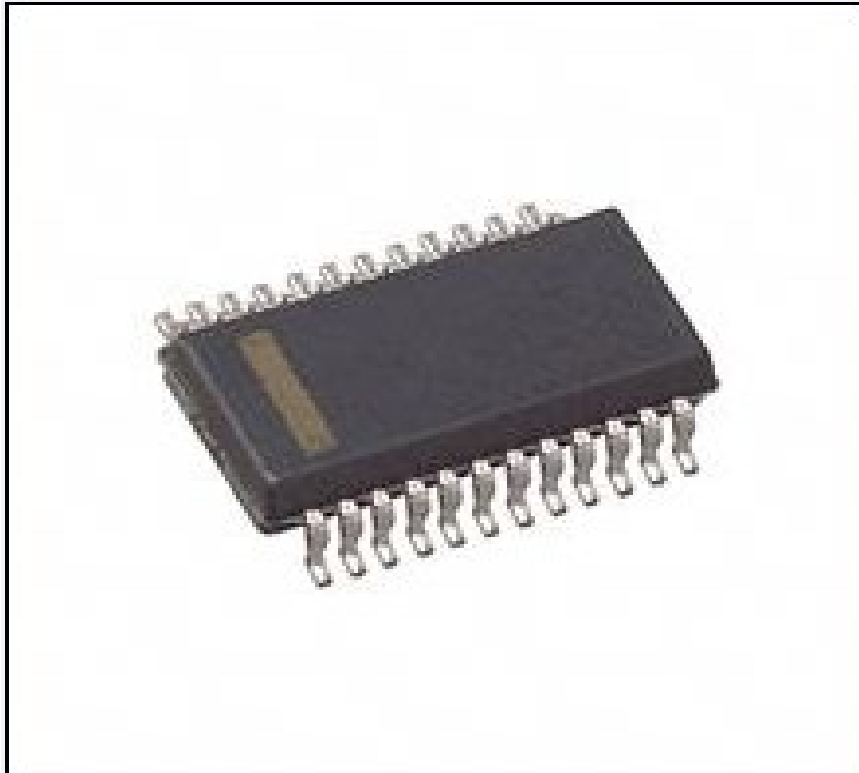


KT403A Datasheet(Part)

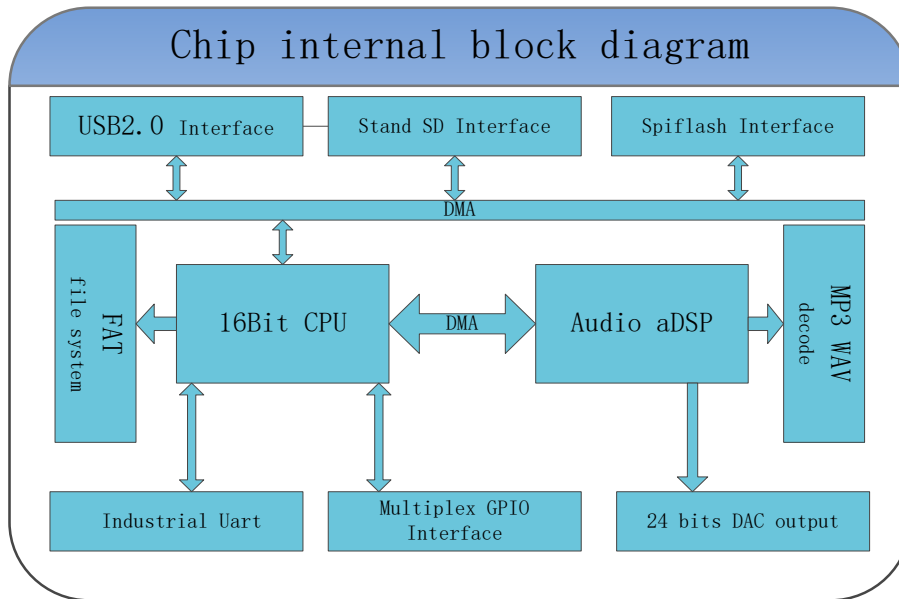


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This document is recompiled, adapted, translated from our supplier’s datasheet which contain only part of original datasheet, but it will be sufficient for using this product.

1. Chip Instruction



It is a SOC chip which integrate 16-bit MCU, and audio decoder, a DSP especial for decoding. This chip integrate hardware decoding to guarantee good stability and tone quality.

1.1 Hardware parameters

Parameters	Values
The MP3 file format	1.Support 11172-3 and ISO13813-3 layer3 audio decoding 2.Sampling rate support (KHZ) : 8/11.025/12/16/22 05/24/32/44.1/48 3.Supports Normal, Jazz, Classic, Pop, Rock sound effects
USB interface	2.0
UART interface	Standard serial port, TTL level, baud rate can be configured manually
input voltage	3.3V-5V
Rated current	15 mA(Without TF card inserted)
size	23(L) × 20(W) mm
Working temperature	-40°C – 80°C
ESD	Contact discharge, 4000 v. Air discharge, 6000 v
Humidity(working environment)	5% ~ 95%

1.2 Pin description

Pin number	Pin symbol	Function description	Note
1	DACL	The left channel	
2	DACR	The right channel	
3	3V3	3.3V Output	
4	VIN	Power In	
5	GND	Ground	
6	TX	UART-TX	TTL-3.3V
7	RX	UART-RX	TTL-3.3V
8	X1	General I/o port	
9	X2	General I/o port	
10	INT/GPIOA0	General I/o port	
11	GPIOA1	General I/o port	
12	GPIOA2	General I/o port	
13	GPIOA3	General I/o port	
14	GPIOA4	General I/o port	
15	GPIOA5	General I/o port	
16	GPIOA6	General I/o port	
17	GPIOB4	General I/o port	SDCLK
18	GPIOB3	General I/o port	SDCMD
19	GPIOB2	General I/o port	SDDAT
20	GPIOB1	General I/o port	USB-
21	GPIOB0	General I/o port	USB+
22	RST	reset	
23	VCOM	DAC reference voltage	
24	DACVSS	The DAC output ground	

2. Serial communication

This part shows how to use serial communication to do diverse operations with music files.

2.1 The communication format

Support asynchronous serial communication mode, through a serial port to accept PC to send commands.

Baud rate	9600 bps(default, customizable)
Data bits	8
Check digit	none
Flow control	None

Format: \$\$ VER Len CMD Feedback para1 para2 \$o		
\$\$	Start[0x7E]	Each command all begin with \$, namely, 0x7E
VER	Version(firmware version)	Version information [defaults 0xFF]
Len	Command length	Start, end and checking commands not be counted.
CMD	Command word	File operation, such as play/pause, and so on
Feedback	Feedback flag	If you need feedback, 1 feedback, 0 no feedback
para1	DataH	High byte of specific data (such as song name) File name bits could be as much as 16 bits.
para2	DataL	Low byte of specific data (such as song name)
\$o	Stop(0xEF)	Stop

2.2 Commands(CMD)

Command	Function description	DataH	DataL
0x01	Play the next song	00	00
0x02	Play the previous song	00	00
0x03	Play specific track*		
0x04	Volume up	00	00

0x05	Volume down	00	00
0x06	The specified volume	00	0x00 ~ 0x1E
0x07	Choose an equalizer	00	0(Normal)/1(Pop)/2(Rock) /3(Jazz)/4(Classic)/5(Bass)
0x08	Repeat current track	00	
0x09	Choose specified device to play music file on it.	00	02(microSD)
0x0A	Enter standby mode, low power consumption	00	00
0x0C	RESET chip	00	00
0x0D	Play	00	00
0x0E	Pause	00	00
0x0F	Specify the folder to play track under the file		
0x11	Looping for all music	00	00(stop looping)/01(start looping)
0x12	Specify a song in a folder named MP3		
0x13	Insert and play another track		
0x14	Specify a file for looping tracks inside (as much as 15 folders supported and as much as 1000 tracks supported)		
0x15	Stop playing inserted songs and resume playing the track being interested.	00	00
0x16	Stop playing music	00	00
0x17	Specify a folder for looping		
0x19	Repeat(a single track)	00	00
0x28	Specify a folder for shuffle	00	00

*These two commands will play the tracks with the order of pasting operation, that is, if a track is the first one be pasted into device, it will be played at first, nothing do with a track's name. For other commands (parameter CMD), the controller will only play the track with a track's name matched.

Note that the empty filed need to be filled with specific numbers. You can get details later and refer to https://github.com/Seeed-Studio/Grove_Serial_MP3_Player_V2.0/blob/master/MP3Player_KT403A.cpp

to learn how to fill them.

2.3 Serial communication instructions detailed in category

This section show detailed description for some general music manipulation.

2.3.1 Instructions for specifying a track to play [0x03]

The number of music files in a specific file can varies between 0-2999, although this chip can support more files, since to use more fi

- choose the first piece of music, for example, a serial port to send part 7E FF 06 03 00 00 01 FF E6 EF
 7E --- Starting command
 FF --- Version information
 06 --- Data length (does not include checking command)
 03 --- Command
 00 --- Require no reply (0x00 indicate no reply required and 0x01 indicate a reply required)
 00 --- High byte (DH)
 01 --- Track low byte (DL), represent the first song playing here
 FF --- Check the high byte
 E6 --- Check the low byte
 EF --- end command
- For specifying a certain track, if you choose 100th track to play, the first 100 can be converted to hexadecimal, that is, double byte (DataH and DataL) 0x0064.
 DH = 0x00, DL = 0x64.
- If you choose 1000th first play, the 1000th track can be converted to hexadecimal, that is, double byte 0x03e8
 DH = 0x03; DL = 0xe8

2.3.2 Specify the volume play instruction

- The default volume for factory settings is 30 grades, set commands to adjust the volume. For example, to specify the volume grade is 15, you can achieve this with command: 7E FF 06 06 00 00 0 f FF D5 EF
 DH = 0x00; DL = 0x0f

2.3.3 Specify a device play tracks inside [0x09]

- This chip support four kinds of device. You can choose suitable data(DataH & DataL) to choose appropriate device.
- It will need 200 ms for the process of change devices. So wait for 200 ms at least and then send another command.
- Following table shows the data to change devices.

Device to choose	Command example(no checking	Notes
------------------	-----------------------------	-------

	code)	
microSD card	7E FF 06 09 00 00 02 EF	

2.3.4 Specify a certain folder and play tracks inside [0x0F]

Serial command example:

Specify folder name <i>01</i> and track name <i>001xxx.mp3</i>	7E FF 06 0F 00 01 01 EF
Specify folder name <i>11</i> and track name <i>100xxx.mp3</i>	7E FF 06 0F 00 0B 64 EF
Specify folder name <i>99</i> and track name <i>001xxx.mp3</i>	7E FF 06 0F 00 63 FF EF

1. For convenience, you need to change all name of music file in all devices to 0001xxx.yyy, xxx indicates original name of tracks, yyy indicate file extension supported.
2. For convenience, the folder index range is 01-99, so the folders' name will only be any number 1 between 99. And indexing range for tracks under each folder can only be 0-255.

Note *001* is identical to *1* for folders' and tracks' name.

3. For convenience, you need to specify a folder and specify a track at the same time.

2.3.5 Specify a folder named *MP3* (case insensitive) and paly tracks inside [0x12]

Play track <i>0001</i> (track's name) in folder <i>MP3</i>	7E FF 06 12 00 00 01 FE E8 EF
Play track <i>0002</i> (track's name) in folder <i>MP3</i>	7E FF 06 12 00 00 02 FE E7 EF
Play track <i>0255</i> (track's name) in folder <i>MP3</i>	7E FF 06 12 00 00 FF FD EA EF
Play track <i>1999</i> (track's name) in folder <i>MP3</i>	7E FF 06 12 00 07 CF FE 13 EF
Play track <i>3000</i> (track's name) in folder <i>MP3</i>	7E FF 06 12 00 0B B8 FE 26 EF

1. The folder name must be *MP3* and case insensitive.
2. In folder *MP3*, you can place as much as 65535 tracks inside. But for convenience, you need to place less than that much tracks inside, since too much files will take longer time to search which will increase track-switching time. We recommend that as much as 3000 tracks is exactly fine in which situations you don't have to considerate the delay caused switching music.

2.3.6 Insert a song in file named *ADVERT* as another tracks being played [0x13]

Play track <i>0001</i> (track's name) in folder <i>ADVERT</i>	7E FF 06 13 00 00 01 FE E7 EF
Play track <i>0002</i> (track's name) in folder <i>ADVERT</i>	7E FF 06 13 00 00 02 FE E6 EF
Play track <i>0255</i> (track's name) in folder <i>ADVERT</i>	7E FF 06 13 00 00 FF FD E9 EF
Play track <i>1999</i> (track's name) in folder <i>ADVERT</i>	7E FF 06 13 00 07 CF FE 12 EF
Play track <i>3000</i> (track's name) in folder <i>ADVERT</i>	7E FF 06 13 00 0B B8 FE 25 EF

1. This is convenient for some specific event happens. For example, you want to insert an ads track.
2. The folder's name must be *ADVERT*.

3. As another song inserted, states of current song will be stored. After inserting track ends, the controller will resume playing. If you insert another song before former inserting song ends, after post-inserting track ends, the controller will recover the states of first song inserted.
4. As the controller stop playing music (CMD 0X16) or pauses (CMD 0X0E), send CMD [0x13] will get no response.

2.3.7 Specify a file to play tracks inside [0x14]

Given that many user need to as much as 1000 tracks available in one file, so we add this particular instructions to do that.

Note that only as much as ten folders are allowed to be indexed in this circumstance.

Play track 0255 (track's name) in folder 0001	7E FF 06 14 00 10 FF FD D8 EF
Play track 1999 (track's name) in folder 0001	7E FF 06 14 00 17 CF FE 01 EF
Play track 0001 (track's name) in folder 0012	7E FF 06 14 00 C0 01 FE 26 EF
Play track 0255(track's name) in folder 0012	7E FF 06 14 00 C0 FF FD 28 EF
Play track 1999 (track's name) in folder 0012	7E FF 06 14 00 C7 CF FD 51 EF

Only as much as 15 folder and as much as 1000 tracks in each folder are supported.

2.3.8 Instruction to Looping-play all tracks [0x11]

Looping start	7E FF 06 11 00 00 01 EF
Looping stop	7E FF 06 11 00 00 00 EF

Note that, in default, controller only play all tracks which are right under root directory.

1. You can still do other operations in looping process such as Play/Pause, Playing next song, and so on.
2. This looping process will not stop until termination or Pause instruction sent to controller.

2.3.9 Instruction to repeat single song [0x08]

To meet the demand of repeating single song, we add this instructions.

Loop for the first pasted track	7E FF 06 08 00 00 01 EF
Loop for the second pasted track	7E FF 06 08 00 00 02 EF

1. If you are going to repeat another single song, the former repeating process of single song will be terminated.
2. You can still do other operations in looping process such as Play/Pause, Playing next song, and so on.

3. You can specify a particular track to play to exit this repeating process of single song.

2.3.10 Terminate a playing process [0x15] [0x16]

Stop playing inserted songs and resume playing the track being interested.	7E FF 06 15 00 00 00 FE E6 EF
Stop playing any tracks	7E FF 06 16 00 00 00 FE E5 EF

1. There are two forms of termination. For instruction [0x15], it is used to stop playing the song inserted and resume playing the song being inserted by another song. For instruction [0x16], it is used to terminate all playing operations.

2.3.11 Specify a folder for looping tracks inside [0x17]

Specify the 02 folder looping	7E FF 06 17 00 00 02 FE E2 EF
Specify the 01 folder looping	7E FF 06 17 00 00 01 FE E3 EF

1. It will looping-play tracks in the order of file pasted.
2. The indexing range can only between 0 and 99 for folder names.
3. It will loop forever until you send an instruction to stop it or other instructions can stop it (those instructions contain specifying a particular song to play and inserting another songs).

2.3.12 Repeat a current song [0x19]

Start repeating a current song	7E FF 06 19 00 00 00 FE E2 EF
Stop repeating a current song	7E FF 06 19 00 00 01 FE E1 EF

1. This instruction works only as a song is being played.
2. To stop repeating current song.

2.3.13 Specify a file name and shuffle tracks inside [0x28]

7E FF 06 28 00 00 01 FE D2 EF	Specify folder 01 and shuffle tracks inside
7E FF 06 28 00 00 02 FE D1 EF	Specify folder 02 and shuffle tracks inside

1. The indexing range can only between 0 and 99 for folder names.
2. It will not stop until you send instructions to terminate playing.