

WCDMA Audio Player

Application Note

UMTS/HSPA Module Series

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About the Document

History

Revision	Date	Author	Description
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1 Introduction

This document describes the functions of audio playback and audio recording of Quectel modules. The related AT commands are listed in this document.

This document is applicable to Quectel UC15 and UC20 modules.

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2 Overview

Audio could be recorded from microphone or uplink/downlink speech, and stored in the form of file into memory, such as flash and SD card. These recorded audio files can also be played back with modules' DAC.

The functions related to file operation, such as recording, audio file playback, are available on Quectel modules with UFS, RAM and SD card.

AT+QAUDRD, AT+QAUDPLAY, AT+QAUDSTOP and AT+QPSND are supported on the modules.

The following table lists the detailed supported modules.

Table 1: Supported Modules

AT Commands	UC15	UC20
AT+QAUDRD	YES	YES
AT+QAUDPLAY	YES	YES
AT+QAUDSTOP	YES	YES
AT+QPSND	YES	YES

These functions will be described in the next few chapters.

3 Audio Recording

3.1. Record from Microphone

Use the AT+QAUDRD (details in section 5.2.1) can record the sound from microphone. Several media formats are supported, such as WAV_PCM16, WAV_ALAW, WAV_ULAW and AMR. For details, please refer to *Table 2: Recording Format*.

3.2. Record from Voice Call

Downlink and uplink speech could be recorded during voice call. You can use AT+QAUDRD command to record after call is established.

3.3. Supported Recording Format

Table 2: Recording Format

Format	Encoding	Sampling Rate	Sampling Resolution	Encoding Digit	Encode Speed	File Size
3	AMR	8KHz	16 bit			
13	WAV_PCM16	8KHz	16 bit	16 bit	128kbps	960KB/min
14	WAV_ALAW	8KHz	16 bit	8 bit	64kbps	480KB/min
15	WAV_ULAW	8KHz	16 bit	8 bit	64kbps	480KB/min

4 Audio Playback

Audio can be played back to far-end or local in the voice call state and idle state. Different commands should be used for different types of playback. The source of the playback is also different.

See the following figure and table to get an overview of the audio playback.

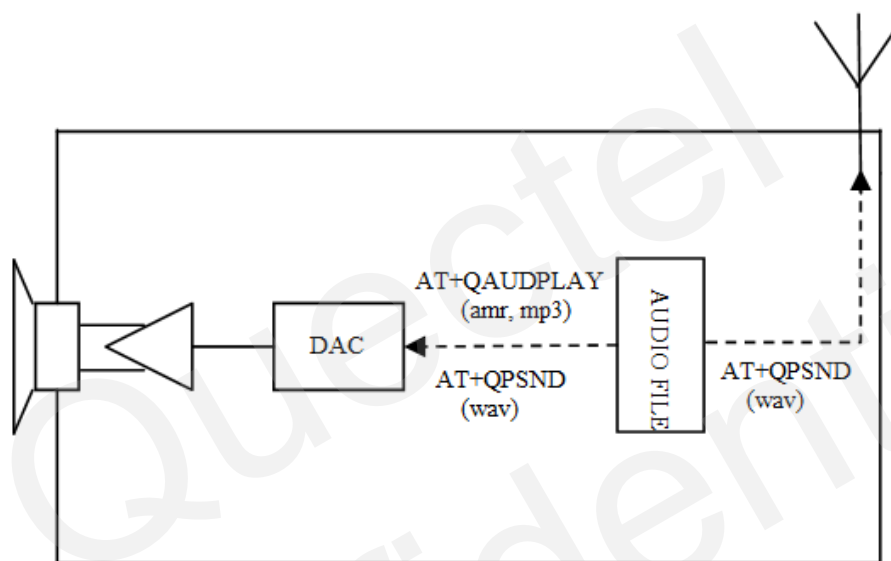


Figure 1: Audio Playback Overview

Table 3: AT Commands Matrix

Direction	File type	Command
Local	Wav	QPSND
Local	Amr, mp3	QAUDPLAY
Far-end	Amr, mp3	NULL
Far-end	Wav	QPSND

4.1. Source of Playback

Audio data (digital form) to be played back can come from several sources and files are stored in the file system or SD card.

4.1.1. Playback from File System

Audio files stored in module's file system could be played back, either in flash or in SD card. In idle state (no call), AT+QAUDPLAY is used to play the audio files. During voice call, AT+QPSND is used to play the audio files to the other side of the call.

4.2. Type of Playback

The type mentioned here is to play in idle or voice call state. Different types support different audio playback formats. In general, playback in idle state can support more formats than in voice call state.

4.2.1. Playback in Idle State

Idle state means no call exists. Sound will output to local speakers. AT+QAUDPLAY and AT+QPSND belong to such category.

4.2.2. Playback in Voice Call State

The played sound will be send to the far end of voice call, and mic is mute. AT+QPSND belongs to such category.

4.3. Supported Audio Formats

The table below shows the formats supported in each command.

Table 4: Supported Audio Formats

Commands	Supported Formats
AT+QAUDPLAY	AMR, MP3
AT+QPSND	8 KHz sampling rate WAV

5 Related AT Command Description

5.1. AT Command Syntax

Test Command	AT+<x>=?	This command returns the list of parameters and value ranges set by the corresponding Write Command or internal processes.
Read Command	AT+<x>?	This command returns the currently set value of the parameter or parameters.
Write Command	AT+<x>=<...>	This command sets the user-definable parameter values.
Execution Command	AT+<x>	This command reads non-variable parameters affected by internal processes in the GSM engine.

5.2. Description of AT Command

5.2.1. AT+QAUDRD Record Media File

Record the uplink and downlink speech during voice call or record sound from local microphone in idle state and save it to files.

AT+QAUDRD Record Media File

Test Command AT+QAUDRD=?	Response +QAUDRD: (0,1),<file_name>,(3,13-15),(0,1) OK
Read Command AT+QAUDRD?	Response +QAUDRD: <state> OK
Write Command AT+QAUDRD=<control>[,<file_name> [,<format>[,<dlink>]]]	Response OK +CME ERROR: <err>

Parameter

<state>	0	Module is not in recording
	1	Module is in recording
<control>	0	Stop the recording
	1	Start to record
<file_name>	Name of the file to record	
<format>	Format of the file	
	3	AMR
	13	WAV_PCM16
	14	WAV_ALAW
	15	WAV_ULAW
<dlink>	Record down-link sound	
	0	Record up-link sound
	1	Record down-link sound
<err>	901	Audio unknown error
	902	Audio invalid parameters
	903	Audio operation not supported
	904	Audio device busy

NOTES

1. <file_name> includes file path, file name and file suffix. File path must be UFS, RAM or SD root directory. Corresponding examples, "Example.wav", "RAM:Example.wav", "SD:Example.wav", "UFS:Example.amr", "SD:Example.wav". File suffix can be "wav" or "amr" when the <format> is omitted. For "amr" suffix, file is stored in AMR coding format. For "wav" suffix, file is stored in WAV_PCM16 coding format.
2. When the file suffix is "amr", the format can only be "3" (AMR). When the file suffix is "wav", the format can be "13" (WAV_PCM16), "14" (WAV_ALAW), "15" (WAV_ULAW).
3. If the recording file's name and format is same with an existed file or an unknown error occur, module will report **+QAUDRIND: 0,1**.
4. If current recording is interrupted by other audio task, module will report URC **+QAUDRIND: 0,6**.
5. If there is no space to record, module will report URC **+QAUDRIND: 0,3**.

Table 5: +QAUDRIND Code

<code>	Meaning
0	Reserved
1	Unknown error
3	No space to record

6 Interrupted by other audio task

5.2.2. AT+QAUDPLAY Play Media File

Play the audio files in idle state and output to speakers.

AT+QAUDPLAY Play Media File

Test Command AT+QAUDPLAY=?	Response +QAUDPLAY: <file_name>,(0,1),(0-7) OK
Read Command AT+QAUDPLAY?	Response +QAUDPLAY: <state> OK
Write Command AT+QAUDPLAY=<file_name>,<repeat>,<volume>	Response OK +CME ERROR: <err> Play completed report: +QAUDPLAY: 0

Parameter

<state>	0	Module is not in playing
	1	Module is in playing
<file_name>	Name of the file to play	
<repeat>	Repeating play or not	
	0	Play only once
	1	Repeat
<volume>	Integer type, value: 0-7	
<err>	901	Audio unknown error
	902	Audio invalid parameters
	903	Audio operation not supported
	904	Audio device busy

NOTES

1. <file_name> includes file path, file name and file suffix. File path must be UFS, RAM or SD root directory. File suffix can be "mp3" or "amr", such as: "UFS:A.mp3", "SD:B.amr".
2. If there is an unknown error occurred, module will report URC **+QAUDPIND: 0,1**.
3. If current playing is interrupted by other audio task, module will report URC **+QAUDPIND: 0,6**.

Table 6: +QAUDPIND Code

<code>	Meaning
0	Reserved
1	Unknown error
6	Interrupted by other audio task

5.2.3. AT+QAUDSTOP Stop Playing Media File

Stop the audio file playback triggered by AT+QAUDPLAY.

AT+QAUDSTOP Stop Media File Play

Test Command AT+QAUDSTOP=?	Response OK
Write Command AT+QAUDSTOP	Response OK +CME ERROR: <err>

Parameter

<err>	901	Audio unknown error
	902	Audio invalid parameters
	903	Audio operation not supported
	904	Audio device busy

Example

```

AT+QAUDRD=1,"A.amr",3 //Record a media file in AMR format, stored in UFS.
OK //Name it as "A".
AT+QAUDRD=0
OK //Stop recording.
AT+QAUDRD=1,"RAM:B.wav" //Record a media file in WAV_PCM16 format, stored in RAM and
                           named as "B".
OK
AT+QAUDRD=0 //Stop recording.
OK
AT+QAUDRD=1,"SD:C.wav" //Record a media file, and stored in SD card, named as "C".
OK
AT+QAUDRD=0 //Stop recording.
OK

```

```

AT+QAUDPLAY="A.amr",0,7      //Play the "A" media file, not repeat, volume is 7, through headset.
OK
+QAUDPLAY: 0                  //After playing is finished, URC report is output.
AT+QAUDPLAY="RAM:B.wav",0,7  //Play the "B" media file, not repeat, volume is 7, through headset.
OK
+QAUDPLAY: 0                  //After playing is finished, URC report is output.
AT+QAUDPLAY="SD:C.wav",1,3    //Play the "C" media file, repeat, volume is 3, through headset.
OK
AT+QAUDSTOP                    //Stop playing.
OK

```

5.2.4. AT+QPSND Play Audio File and Send it to the Remote in Call

Play the audio files during voice call. The audio will be mixed to the uplink and downlink speech.

AT+QPSND Play Wave File

Test Command AT+QPSND=?	Response +QPSND: (0,1),<file_name>,(0,1),(0,1),(0,1) OK
Read Command AT+QPSND?	Response +QPSND: <state> OK
Write Command AT+QPSND=<control>,<file_name>,<repeat>[,<ulmute>[,<dlmute>]]	Response OK +CME ERROR: <err> Playing completed report: +QPSND: 0

Parameter

<state>	0	Module is not playing
	1	Module is playing
<control>	0	Stop playing
	1	Start playing
<file_name>	Name of the file to be played	
<repeat>	Repeat play or not	
	0	Play only once
	1	Repeat play
<ulmute>	Numeric type, mute uplink or not	

	0	Mute
	1	Not mute
<dlmute>	Numeric type, mute downlink or not	
	0	Mute
	1	Not mute
<err>	901	Audio unknown error
	902	Audio invalid parameters
	903	Audio operation not supported
	904	Audio device busy

NOTES

1. **<file_name>** includes file path, file name and file suffix. File path must be UFS, RAM or SD root directory. File suffix must be ".wav", such as: "UFS:A.wav".
2. We only support 8K, 16bit liner, mono wave format.

Example

```
AT+QPSND=1,"A.wav",0 //Play a wave file which is stored in UFS.
OK
+QPSND: 0
AT+QPSND=1,"A.wav",0,1 //Play a wave file to far-end when a call is ongoing.
OK
+QPSND: 0
```


6 Appendix A Reference

Table 7: Related Documents

SN	Document Name	Remark
[1]	Quectel_UC15_AT_Commands_Manual	UC15 AT Commands Manual
[2]	Quectel_UC20_AT_Commands_Manual	UC20 AT Commands Manual

Table 8: Terms and Abbreviations

Abbreviation	Description
ME	Mobile Equipment
TA	Terminal Adapter
MS	Mobile Station
UFS	User File Storage
NV	Non-volatile

7 Appendix B Error Codes

Table 9: Description of Error Code

Code of <err>	Description of Error Code
901	Audio unknown error
902	Audio invalid parameters
903	Audio operation not supported
904	Audio device busy