EG06xK&Ex120K&EM060K Series SLIC Application Note

LTE-A Module Series

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About the Document

Revision History

Version	Date	Author	Description
-	2022-05-23	Shaun DUAN	Creation of the document
1.0	2022-07-12	Shaun DUAN	First official release
1.1	2023-12-21	Jone WANG	1. Updated the chapter structure. 2. Added applicable modules: EG065K series, EM120K-GL and EM060K series. 3. Added a note about the requirement for supporting data + voice functionality (Chapter 1). 4. Added SLIC extended function list (Chapter 3). 5. Added SLIC related AT commands (Chapter 4): ● AT+QAUDCFG="slic/AudLoop" ● AT+QAUDCFG="slic/LF_Ring" ● AT+QAUDCFG="slic_IndRep" ● AT+QAUDCFG="slic_cid_cfg" ● AT+QAUDCFG="slic_cid" ● AT+QAUDCFG="slic_hook_time" 6. Updated <SLIC_type> information of AT+QSLIC (Chapter 4.3).

Contents

About the Document **3**
Contents **4**
Table Index **5**

1 Introduction **6**
1.1 Applicable Modules 6

2 Design Scheme **7**
2.1 Block Diagram 7
2.1.1 Modem 8
2.1.2 AP 8
2.2 Main Functions of SLIC 8
2.2.1 Voice Data Transmission and Control 8
2.2.2 Phone Control 8
2.2.3 Call State Control 9

3 SLIC Function List **10**

4 Description of AT Commands **15**
4.1 AT Command Introduction 15
4.1.1 Definitions 15
4.1.2 AT Command Syntax 15
4.2 Declaration of AT Command Examples 16
4.3 AT+QSLIC Enable/Disable SLIC 16
4.4 AT+QAUDCFG="slic/AudLoop" Enable/Disable Dial Tone of Analog Phone 17
4.5 AT+QAUDCFG="slic/LF_Ring" Enable/Disable Ring Tone of Analog Phone 18
4.6 AT+QAUDCFG="slic_IndRep" Enable/Disable Event Report of SLIC Analog Phone 19
4.7 AT+QAUDCFG="slic_cid_cfg" Configure Caller ID Display Mode of SLIC 20
4.8 AT+QAUDCFG="slic_cid" Configure Caller ID of Analog Phone 22
4.9 AT+QAUDCFG="slic_hook_time" Configure Time of Detection for Hook and Flash Changes of Analog Phone 23

5 Appendix References **25**

Table Index

Table 1: Applicable Modules 6
Table 2: SLIC Basic Function List 10
Table 3: SLIC Extended Function List 11
Table 4: Type of AT Commands 15
Table 5: Terms and Abbreviations 25

1 Introduction

This document introduces the SLIC function of Quectel EG06xK, Ex120K and EM060K series modules, including design scheme, function list and related AT commands.

1.1 Applicable Modules

Table 1: Applicable Modules

Module Family	Module
EG06xK	EG060K Series
	EG065K Series
Ex120K	EM120K-GL
	EG120K Series
-	EM060K Series

NOTE

This document is only applicable to modules that support data + voice. To confirm whether a module supports data + voice, please refer to the corresponding module specification.

2 Design Scheme

2.1 Block Diagram

The software framework design of the SLIC function of the module is shown in the following figure:

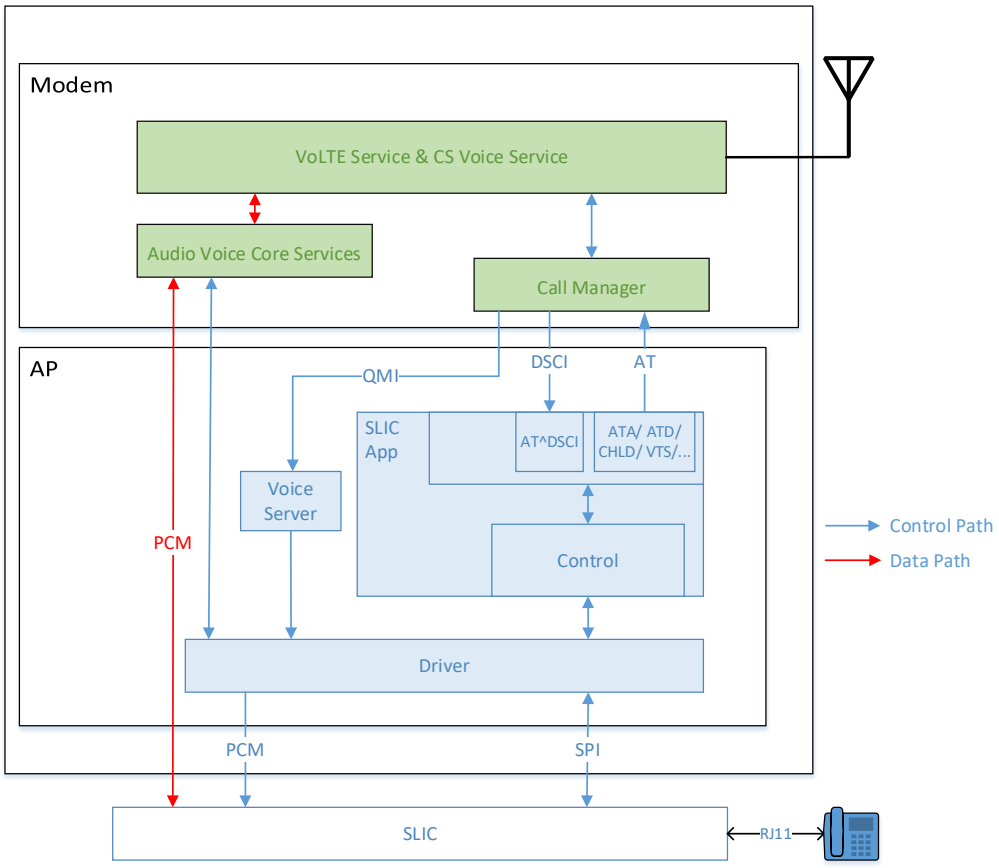

Figure 1: Block Diagram SLIC Function

NOTE

Please refer to the AT Commands Manual of the module for details of the AT commands in this chapter.

2.1.1 Modem

The module provides AT commands on the Modem to implement call functions, including that for originating a call (**ATD**), answering an incoming call (**ATA**), hanging up a call (**ATH**), reporting call status (**AT^DSCI**), managing call related supplementary services (**AT+CHLD**), and DTMF (**AT+VTS**), etc. These commands directly control the Modem to implement call related services.

2.1.2 AP

SLIC application and Voice Sever application are developed on the AP of the module based on AT commands mentioned above.

SLIC application supports the following functions: controlling the call status of the Modem through the phone state machine and AT commands, interacting with SLIC devices through SPI, and obtaining the operation information and controlling the line status of the phone.

Voice Server application supports the following functions: controlling the voice link switch and the voice data transmission, controlling the PCM clock switch, providing a local ringtone scheme, and outputting the standard busy, waiting, and end tones of different countries or regions.

2.2 Main Functions of SLIC

SLIC supports three functions: voice data transmission and control, phone control, and call state control.

2.2.1 Voice Data Transmission and Control

Based on VoLTE protocol stack and audio management components, the module implements the call function based on voice link and SLIC device.

The module transmits the downlink voice data to SLIC chip through a sound card, the SLIC chip decodes the voice data into analog signal, and transmits the signal to the phone through RJ11 (phone wire). After that, the phone plays the voice through a speaker. At the same time, the voice analog signal collected by the microphone of the phone is transmitted to the SLIC chip that encodes the analog signal into digital signal, namely the voice data, and then transmits it to the voice uplink through the sound card.

2.2.2 Phone Control

The operations supported by the phone include: the DTMF key, off-hook, on-hook, and the flash button. When you do the above operations on the phone, the SLIC chip obtains the phone signal through RJ11, analyses the phone actions, and writes them to the register of the SLIC chip. Then the module reads the relevant registers of the SLIC chip through SPI driver to obtain the phone operations. Besides, the module can configure the SLIC register through the SPI driver to make the SLIC chip generate a signal to the phone, and then the phone can achieve functions such as ringing and displaying caller ID.

2.2.3 Call State Control

Based on the VoLTE protocol stack, the Modem reports the call status to an SMD channel after **AT^DSCI=1** is executed. The SLIC application on the AP obtains the call status through the SMD channel. At the same time, the SLIC application on the AP can send AT commands to the Modem through the SMD channel to realize functions such as answering an incoming call (**ATA**), hanging up a call (**ATH**), managing call-related supplementary services such as call holding and conference call (**AT+CHLD**).

3 SLIC Function List

This chapter introduces the detailed SLIC functions of the module. It is divided into two main sections:

a) Basic functions: This section explains the features related to fundamental SLIC operations.
b) Extended functions: This section expands on the basic SLIC operations by adding additional capabilities for production line verification, parameter configuration, and voice services.

Table 2: SLIC Basic Function List

Function	Detailed Description
Power Management	1. After SLIC is enabled, the phone is powered on and the its screen lights up. 2. After SLIC is disabled, the phone is powered off and its screen is turned off.
Off-Hook	In the on-hook state, if there is no incoming call, the phone plays dial tone after off-hook.
On-Hook	1. In a call, it hangs up the current call. 2. During dialling, it terminates the dialling and clear the dialled number.
Dialing	In the on-hook state, you will hear the dial tone after the off-hook until pressing the DTMF key to input the expected numbers. The call is dialed 5 seconds after you press the last number.
Caller ID	In the on-hook state, when there is an incoming call, the incoming call number is displayed on the phone screen.
Ringing	In the on-hook state, the phone will ring when there is an incoming call.
Answering a Call	In the on-hook state, when there is an incoming call, the phone can be answered after off-hook.
Originating a Call	After dialing, the phone starts the voice call.
Out-of-Band DTMF	During a voice call, the phone can send the corresponding signal after pressing the keys "**0**"~"**9**", "#", or "*****".
Call Switching (Call on Hold)	When you converse with a party (e.g., A), press the flash button on the phone, and the call to A is on hold after about 4 seconds, and then the dial tone starts. You can call another party (e.g., B) after dialling again. Then when you press the flash button again, the call to B is on hold, and the phone will switch back to the call to A. By repeatedly pressing the flash button, you can switch between the calls to A and B.
3-Way Calling	1. When you converse with a party (e.g., A), press the flash button on the

(Conference Call)	phone, and the call to A is on hold after about 4 seconds, and then the dial tone starts. You can call another party (e.g., B) after dialling again. Then if you press key “3” within 500 milliseconds to 2 seconds after pressing the flash button, the calls to A and B will be merged, and the 3-way calling is realized. 2. If you need to add more parties into the current call, perform the following steps: a) Press the flash button again to hold the merged call to A and B, the dial tone starts again. b) Dial the number of a third party (e.g., C) to originate a new call. After that, the flash button can be pressed to switch between the merged call to A and B and the call to C. c) Press the flash button, and then press key “3” within 500 milliseconds to 2 seconds to merge the calls. After that, the call to A and B and that to C are merged. 3. If you need to add more parties, repeat a) to c) above. The module supports conference calls with up to 6 callees.
Dial Tone	In the on-hook state and there is no incoming call, after off-hook, the phone plays the dial tone.
Busy Tone	When the module originates a call and the callee rejects the call, the phone plays the busy tone (or ring tone of the operator).
Waiting Tone	When the module is in a voice call, and another party calls the module, the phone plays the waiting tone (or ring tone of the operator).
End Tone	When the module is in a voice call, and the other party hangs up, the phone plays the end tone.

Table 3: SLIC Extended Function List

Function	Detailed Description
Audio loopback for product testing	Product testing functionality. It allows testing the device's recording and playback functions without the need to make a phone call. **Step 1:** Execute **AT+QAUDCFG="slic/AudLoop",1** to disable dialing tone. **Step 2:** Execute **AT+QSIDET=65535** to increase sidetone gain. **Step 3:** Speak into the handset microphone; if the sound is heard from the earpiece, it indicates the device's recording/playback function is normal. **Step 4:** Execute **AT+QAUDCFG="slic/AudLoop",0** to enable dialing tone. Note: After completing **Step 1–3** of the test, it's necessary to follow **Step 4** to

	enable dialing tone.
Ring tone for product testing	Product testing functionality. It allows testing the device's ring tone without the need for an actual incoming call. **Step 1:** Execute **AT+QAUDCFG="slic/LF_Ring",1** to enable analog phone ringing. **Step 2:** Execute **AT+QAUDCFG="slic/LF_Ring",0** to disable analog phone ringing.
Event report for product testing	Product testing functionality. It tests the phone event detection function. **Step 1:** Execute **AT+QAUDCFG="slic_IndRep",1** to enable phone event reporting. **Step 2:** Perform actions on the phone such as off-hook, on-hook, pressing the Flash key, pressing **0–9**, *****, #. The module will report the current phone event via URC. **Step 3:** Execute **AT+QAUDCFG="slic_IndRep",0** to disable phone event reporting.
Configure Caller ID display mode for product testing	Product testing functionality. It allows configuring the caller ID display mode corresponding to **<type>** in **AT+QAUDCFG="slic_cid_cfg"**. - 0: DTMF mode, displays the caller ID. - 1: FSK SDMF mode, displays the caller ID and calibrates time. - 2: FSK MDMF mode, displays the caller ID, calibrates time, and displays caller's name. - 3: Enable the feature of voicemail, calibrates time and displays voicemail information. - 4: Disable the feature of voicemail, calibrates time and hides voicemail information. **Step 1:** Execute **AT+QAUDCFG="slic_cid_cfg",<type>** to set the SLIC caller ID display mode. **Step 2:** Execute **AT+QAUDCFG="slic_cid",<num>** to set the caller ID display and make the display mode effective. Note: 1. Time calibration requires a network connection. 2. To use specific caller ID display modes, the phone must support related functions. 3. After product testing, set the caller ID display mode to 4 (**AT+QAUDCFG="slic_cid_cfg",4**) and execute the command of configuring caller ID (**AT+QAUDCFG="slic_cid",<num>**) to make the setting effective. Then configure the caller ID display mode to **0**, **1**, or **2** (default is **2**) to restore product caller ID display functionality. 4. During product testing of caller ID display, the caller's name of mode **2** is preset as **QUECTEL**.

Test caller ID display for product testing	Product testing functionality. It allows testing the device's caller ID display function without the need for an actual incoming call. **Step 1:** Execute **AT+QAUDCFG="slic_cid",<num>** for the incoming call display of analog phone. **Step 2:** The device rings and displays caller ID information according to the current caller ID display mode.
Configure time of detection for hook and Flash changes of analog phone for product testing	Product testing functionality. It adjusts the sensitivity of the Flash key and on-hook operations. When the Flash key is pressed, the SLIC determines whether the current action is a Flash key operation or an on-hook action based on the duration of the press. You can configure the detection time via **AT+QAUDCFG="slic_hook_time"[,<breakMin>,<breakMax>,<makeMin>,<makeMax>,<interDigitMin>,<flashMin>,<flashMax>,<minHook>]**. Unit: millisecond. When the duration of the press is between **<flashMin>** and **<flashMax>**, it is considered a Flash key operation. When the duration of the press is greater than **<minHook>**, it's considered an on-hook operation.
Voice mail	**Step 1:** Phone A configures the no-answer call forwarding number to the voicemail number. **Step 2:** Phone B calls Phone A. If there's no answer, the server plays a voicemail prompt to B, who can start leaving a message. **Step 3:** After B finishes leaving the message, the server sends a text message to A, notifying that there's a voice message in the voicemail. A reports voicemail-related information via URC. **Step 4:** When A has voice messages in the voicemail, the voicemail dial tone is heard at off-hook. If supported, the screen of the phone may also display voicemail information. **Step 5:** A dials the voicemail number to listen to the voicemail. Note: This feature requires support from the service provider.
Call supplementary service	In off-hook state, corresponding call supplementary services are executed by pressing specific keys (service code) on the phone: 1. *31#[number]: When no number is specified, set all calls to show caller number. When number is specified, dial out the number and display caller number during current call. 1. #31#[number]: When no number is specified, set all calls to hide caller number. When number is specified, call the number and hide caller number during current call. 2. *43#: Enable call waiting. 3. #43#: Disable call waiting. 4. *21*[number]#: Set unconditional call forwarding.

	5. #21#: Disable unconditional call forwarding. 6. *61*[number]#: Set no-answer call forwarding. 7. #61#: Disable no-answer call forwarding. 8. *67*[number]#: Set busy call forwarding. 9. #67#: Disable busy call forwarding. 10. #002#: Cancel all call forwarding. Note: 1. This feature requires support from the service provider. 2. For options 1 and 2, when the number is specified, pressing the key manually and waiting for 5 seconds initiate the call. If no number is specified, pressing the key manually and waiting for 5 seconds initiate the call. A single ring tone indicates success and three ring tones indicates failure. 3. For options 3–11, pressing the keys manually executes the corresponding configuration immediately. A single ring tone indicates success and three ring tones indicate failure. 4. The response time for call supplementary service depends on the network environment. In good network conditions, it responds immediately. In poor network conditions, it may take up to 20 seconds to respond. After dialing the service code, other operations can only proceed after receiving a response.
Quick dialing	When the phone is in on-hook state, after picking up the handset and hearing the dial tone, pressing a DTMF key will stop the dial tone. Then, press the number, and finally press # to initiate the call.

NOTE

1. When making a call using the hands-free mode, after the callee hangs up, you need to press the hands-free button again to return the phone to the on-hook state.
2. Setting specific caller ID display modes requires the phone to support corresponding functions. If you need to show the caller's name in FSK MDMF mode, please preset the caller's name.
3. The module supports conference call with up to 6 callees. If the number of call parties supported by the operator is fewer than 7, the maximum number for the conference call is the number of call parties supported by the operator.
4. See ***Chapter 4*** for detailed AT commands.

4 Description of AT Commands

4.1 AT Command Introduction

4.1.1 Definitions

- **<CR>** Carriage return character.
- **<LF>** Line feed character.
- **<...>** Parameter name. Angle brackets do not appear on the command line.
- **[...]** Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on the command line. When an optional parameter is not given in a command, the new value equals its previous value or the default settings, unless otherwise specified.
- **Underline** Default setting of a parameter.

4.1.2 AT Command Syntax

All command lines must start with **AT** or **at** and end with **<CR>**. Information responses and result codes always start and end with a carriage return character and a line feed character: **<CR><LF><response><CR><LF>**. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and **<CR>** and **<LF>** are deliberately omitted.

Table 4: Type of AT Commands

Command Type	Syntax	Description
Test Command	**AT+<cmd>=?**	Test the existence of the corresponding command and return information about the type, value, or range of its parameter.
Read Command	**AT+<cmd>?**	Check the current parameter value of the corresponding command.
Write Command	**AT+<cmd>=<p1>[,<p2>[,<p3>[...]]]**	Set user-definable parameter value.
Execution Command	**AT+<cmd>**	Return a specific information parameter or perform a specific action.

4.2 Declaration of AT Command Examples

The AT command examples in this document are provided to help you learn about the use of the AT commands introduced herein. The examples, however, should not be taken as Quectel's recommendations or suggestions about how to design a program flow or what status to set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there is a correlation among these examples, or that they should be executed in a given sequence.

4.3 AT+QSLIC Enable/Disable SLIC

This command enables or disables the SLIC.

AT+QSLIC Enable/Disable SLIC	
Test Command **AT+QSLIC=?**	Response **+QSLIC: (**list of supported **<enable>**s**),(**range of supported **<SLIC_type>**s**)** **OK**
Read Command **AT+QSLIC?**	Response **+QSLIC: <enable>[,<SLIC_type>]** **OK**
Write Command **AT+QSLIC=<enable>,<SLIC_type>**	Response **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<enable>	Integer type. Enable or disable SLIC. 0 Disable 1 Enable
<SLIC_type>	Integer type. Set SLIC type. 0 Reserved 1 LE9641 (not supported currently)

2	SI32185
3	LE9643 Inverting Boost
4	LE9643 Buck Boost (not supported currently)
5	SI32178 Buck Boost (not supported currently)
6	DXS101 IB12

Example

```
AT+QSLIC=?                  //Test command.
+QSLIC: (0,1),(0-3)

OK
AT+QSLIC=0,3                //Disable SLIC.
OK
AT+QSLIC=1,3                //Enable SLIC and set the SLIC platform type to LE9643 Inverting Boost.
OK
AT+QSLIC?                   //Query the current configurations.
+QSLIC: 1,3

OK
```

4.4 AT+QAUDCFG="slic/AudLoop" Enable/Disable Dial Tone of Analog Phone

This command enables or disables the dial tone of an analog phone.

AT+QAUDCFG="slic/AudLoop"	Enable/Disable Dial Tone of Analog Phone
Write Command **AT+QAUDCFG="slic/AudLoop"[,<enable>]**	Response If the optional parameter is omitted, query the current setting: **+QAUDCFG: "slic/AudLoop",<enable>** **OK** If the optional parameter is specified, enable or disable the dial tone of an analog phone: **OK** Or **ERROR**
Maximum Response Time	300 ms

Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<enable>	Integer type. Enable or disable the dial tone of an analog phone. 0 Enable 1 Disable

NOTE

1. The dial tone refers to the prompt tone of an analog phone after picking up the phone and before dialing, which is used to prompt the user to dial.
2. The audio loop tone is used to test whether the audio playback and recording functions are normal.

Example

```
AT+QAUDCFG="slic/AudLoop",1          //Disable the dial tone of the analog phone.
OK
AT+QAUDCFG="slic/AudLoop"            //Query the current configuration.
+QAUDCFG: "slic/AudLoop",1

OK
```

4.5 AT+QAUDCFG="slic/LF_Ring" Enable/Disable Ring Tone of Analog Phone

This command enables or disables the ring tone of an analog phone.

AT+QAUDCFG="slic/LF_Ring"	Enable/Disable Ring Tone of Analog Phone
Write Command **AT+QAUDCFG="slic/LF_Ring"[,<enable>]**	Response If the optional parameter is omitted, query the current setting: **AT+QAUDCFG="slic/LF_Ring",<enable>** **OK** If the optional parameter is specified, enables or disables the ring tone of an analog phone: **OK**

	Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<enable>	Integer type. Enable or disable the ring tone of an analog phone.	
	0	Disable
	1	Enable

Example

```
AT+QAUDCFG="slic/LF_Ring",1          //Set the ring tone.
OK
AT+QAUDCFG="slic/LF_Ring"            //Query the current configuration.
+QAUDCFG: "slic/LF_Ring",1

OK
```

4.6 AT+QAUDCFG="slic_IndRep" Enable/Disable Event Report of Analog Phone

This command enables or disables the reporting of analog phone event.

AT+QAUDCFG="slic_IndRep" Enable/Disable Event Report of Analog Phone	
Write Command **AT+QAUDCFG="slic_IndRep"[,<op>]**	Response If the optional parameter is omitted, query the current setting: **+QAUDCFG: "slic_IndRep",<op>** **OK** If the optional parameter is specified, enables or disables the reporting of analog phone event: **OK**
Maximum Response Time	300 ms

Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<op>	Integer type. Enable or disable the reporting of analog phone event. 0 Disable 1 Enable

Example

```
AT+QAUDCFG="slic_IndRep",1          //Enable the reporting of analog phone event.
OK
AT+QAUDCFG="slic_IndRep"            //Query the current configuration.
+QAUDCFG: "slic_IndRep",1

OK

+QIND: "SLIC Hook off"              //Pick up the phone, the URC of off-hook event is received.

+QIND: "SLIC DTMF",1                //Press key 1, the URC of DTMF 1 event is received.

+QIND: "SLIC Hook on"               //Hook on the phone, the URC of on-hook event is received.
```

4.7 AT+QAUDCFG="slic_cid_cfg" Configure Caller ID Display Mode of SLIC

This command configures caller ID display mode of SLIC.

AT+QAUDCFG="slic_cid_cfg"	Configure Caller ID Display Mode of SLIC
Write Command **AT+QAUDCFG="slic_cid_cfg"[,<type>]**	Response If the optional parameter is omitted, query the current setting: **+QAUDCFG: "slic_cid_cfg",<type>** **OK** If the optional parameter is specified, configure caller ID

	display mode of SLIC: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<type>	Integer type. The caller ID display mode of SLIC. 0 DTMF 1 FSK SDMF 2 FSK MDMF 3 Enable the voice mail 4 Disable the voice mail

NOTE

After configuring this command, you need to use it together with **AT+QAUDCFG="slic_cid"**.

- If **<type>** is 0–2, you should execute **AT+QAUDCFG="slic_cid"** to display the caller ID on the analog phone and make it ring;
- If **<type>** is 3, you should execute **AT+QAUDCFG="slic_cid"** to display "mailbox" on the analog phone (if the phone supports the function of mailbox display);
- If **<type>** is 4, you should execute **AT+QAUDCFG="slic_cid"** will remove the "mailbox" displayed on the analog phone (if the phone supports the function of mailbox display).

Example

```
AT+QAUDCFG="slic_cid_cfg",2          //Configure the caller ID display mode to FSK MDMF.
OK
AT+QAUDCFG="slic_cid_cfg"            //Query the current configuration.
+QAUDCFG: "slic_cid_cfg",2

OK
```

4.8 AT+QAUDCFG="slic_cid" Configure Caller ID of Analog Phone

This command configures the caller ID of analog phone.

AT+QAUDCFG="slic_cid" Configure Caller ID of SLIC Analog Phone	
Write Command **AT+QAUDCFG="slic_cid",<num>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<num>	String type. The phone number of caller ID. Maximum length: 15; Unit: byte.

NOTE

1. During the test and before the caller ID is displayed, the SLIC will be forced to ring once.
2. The command takes effect only when SLIC analog phone is working.

Example

```
AT+QAUDCFG="slic_cid","0123456789"
OK
```

4.9 AT+QAUDCFG="slic_hook_time" Configure Time of Detection for Hook and Flash Changes of Analog Phone

This command configures time of detection for hook and Flash changes of analog phone.

AT+QAUDCFG="slic_hook_time"	Configure Time of Detection for Hook and Flash Changes of Analog Phone
Write Command **AT+QAUDCFG="slic_hook_time"[,<breakMin>,<breakMax>,<makeMin>,<makeMax>,<interDigitMin>,<flashMin>,<flashMax>,<minHook>]**	Response If the optional parameters are omitted, query the current setting: **+QAUDCFG: "slic_hook_time",<breakMin>,<breakMax>,<makeMin>,<makeMax>,<interDigitMin>,<flashMin>,<flashMax>,<minHook>** **OK** If the optional parameters are specified, configure time of detection for hook and Flash changes of analog phone : **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<breakMin>	Integer type. Minimum pulse break time. Range: 0–2000. Unit: Millisecond.
<breakMax>	Integer type. Maximum pulse break time. Range: 0–2000. Unit: Millisecond.
<makeMin>	Integer type. Minimum pulse on time. Range: 0–2000. Unit: Millisecond.
<makeMax>	Integer type. Maximum pulse on time. Range: 0–2000. Unit: Millisecond.
<interDigitMin>	Integer type. Minimum pulse interval time. Range: 0–2000. Unit: Millisecond.
<flashMin>	Integer type. Minimum flash break time. Range: 0–2000. Unit: Millisecond.
<flashMax>	Integer type. Maximum flash break time. Range: 0–2000. Unit: Millisecond.
<minHook>	Integer type. Minimum hook detection time. It should be greater than the maximum flash break time. Range: 0–2000. Unit: Millisecond.

NOTE

1. When you execute this command to query time of detection for hook and Flash changes of analog phone, the default values of different SLICs may be different.
2. It is recommended to set the time limit in accordance with the following relationship:

- **<breakMin>** < **<breakMax>** < **<flashMin>** < **<flashMax>** < **<minHook>**
- **<makeMin>** < **<makeMax>** < **<interDigitMin>**

Example

```
AT+QAUDCFG="slic_hook_time",20,80,20,80,90,100,630,680    //Set the time of detection for hook and Flash changes.

OK
AT+QAUDCFG="slic_hook_time"                               //Query the current configuration.
+QAUDCFG: "slic_hook_time",20,80,20,80,90,100,630,680

OK
```

5 Appendix References

Table 5: Terms and Abbreviations

Abbreviation	Description
AP	Access Point
CS	Circuit Switched
DTMF	Dual-Tone Multifrequency
FSK	Frequency-shift Keying
MDMF	Multiple Data Message Format
PCM	Pulse Code Modulation
QMI	Qualcomm Message Interface
SDMF	Single Date Message Format
SLIC	Subscriber Line Interface Circuit
SMD	Shared Memory Driver
SPI	Serial Peripheral Interface
TA	Terminal Adapter
URC	Unsolicited Result Code
VoLTE	Voice over Long-Term Evolution