# AG35 Audio User Guide

**LTE Module Series**

Rev. AG35_Audio_User_Guide_V1.0

Date: 2018-01-25

Status: Preliminary

**Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:**

**Quectel Wireless Solutions Co., Ltd.**
7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Tel: +86 21 5108 6236
Email: info@quectel.com

**Or our local office. For more information, please visit:**
http://quectel.com/support/sales.htm

**For technical support, or to report documentation errors, please visit:**
http://quectel.com/support/technical.htm
Or email to: support@quectel.com

## GENERAL NOTES

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

## COPYRIGHT

# About the Document

## History

| Revision | Date | Author | Description |
|---|---|---|---|
| 1.0 | 2018-01-25 | Thirty XU | Initial |

# Contents

# Table Index

# Figure Index

# 1 Introduction

This document mainly introduces how to use the audio function of Quectel AG35 module.

# 2 Topology of Voice

## 2.1. Topology of Voice

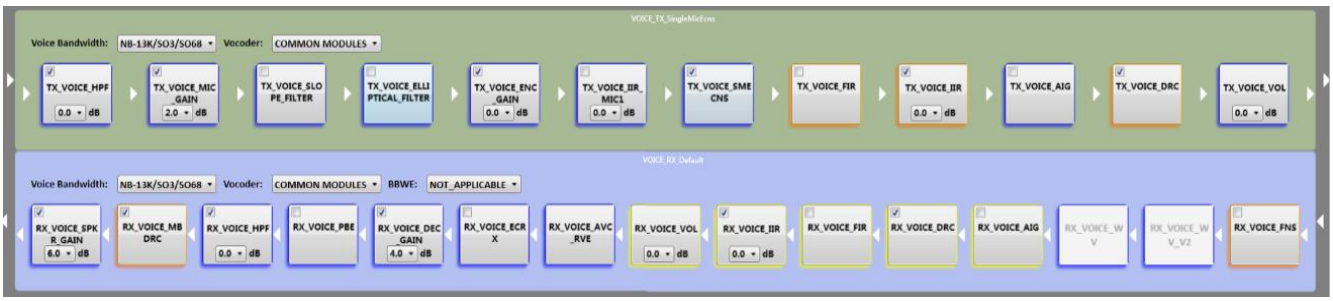



**Figure 1: Voice Topology**

# 3 Audio Function Modules

## 3.1. Tx Path Function Modules

### 3.1.1. TX_VOICE_HPF


- Recommendation: Enable
- High-Pass Filter (HPF) - 200Hz cut-off frequency for Narrowband (NB) voice calls, and 50Hz cut-off frequency for Wideband (WB) voice calls are recommended.

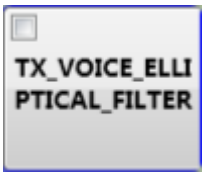
### 3.1.2. TX_VOICE_MIC_GAIN


- Recommendation: Enable
- Tx voice MIC gain linearly modifies uplink (MIC) signal level, i.e., increasing or decreasing the uplink volume increase to desired SLR. It can be set with the second parameter of **AT+QMIC**. (Gain range -∞ to 18dB)

### 3.1.3. TX_VOICE_SLOPE_FILTER

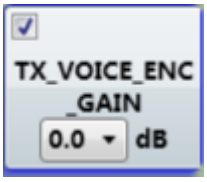

- Recommendation: Disable
- Slope Filter - Applied to Tx voice signal, and is only used for Narrowband (NB) voice calls, i.e., at 8kHz sampling rate.

### 3.1.4. TX_VOICE_ ELLIPTICAL_FILTER




- Recommendation: Disable
- Elliptical Filter - Applied to Tx voice signal, and is only used for Narrowband (NB) voice calls, i.e., at 8kHz sampling rate.

### 3.1.5. TX_VOICE_ENC_GAIN

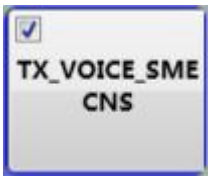



- Recommendation: Enable
- It linearly modifies uplink (MIC) signal level, i.e., increasing or decreasing uplink volume to desired SLR. (Gain range -∞ to 18dB)

### 3.1.6. TX_VOICE_IIR_MIC1

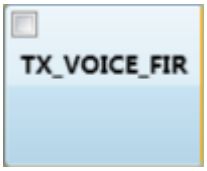

- Recommendation: Disable
- Front-End PCM Filter - Allows tuning of sending frequency response (SFR) before ECNS; mainly useful for matching microphone response for multi-microphone ECNS.

### 3.1.7. TX_VOICE _SMECNS




- Recommendation: Enable
- Single Microphone Echo Cancellation and Noise Suppression- echo cancellation and noise suppression for NB and WB voice on single-microphone topologies. It can be set with **AT+QEEC** command. (Please refer to *Enhanced_Echo_Canceller_and_Noise_Suppression_Tuning* for more information.)

### 3.1.8. TX_VOICE _FIR




- Recommendation: Disable
- This will help the module to pass frequency-response tests and allows improvement of overall intelligibility. It can be used simultaneously with the IIR PCM filter.

### 3.1.9. TX_VOICE _IIR


- Recommendation: Enable
- This will help the module to pass frequency-response tests and allows improvement of overall intelligibility. It can be used simultaneously with the FIR PCM filter.

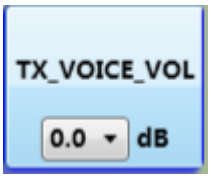
### 3.1.10. TX_VOICE _AIG


- Recommendation: Disable
- Adaptive Input Gain - Performs slow gain adaptation prior to DRC, based on desired RMS level. (Refer to *80-N2736-1* for more information.)

### 3.1.11. TX_VOICE _DRC


- Recommendation: Enable
- Dynamic Range Control - Allows automatic gain control for signal levels outside of a desired range. (Refer to *80-N2719-1* for more information.)

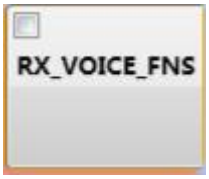
### 3.1.12. TX_VOICE _VOL




- Recommendation: Enable
- This increases or decreases the uplink volume to desired SLR. It can be set with the first parameter of **AT+QMIC**. (Gain range -∞ to 18dB)

## 3.2. Rx Path Function Modules

### 3.2.1. RX_VOICE _FNS




- Recommendation: Disable
- Far-End Noise Suppression - Performs suppression of noise from the far end contained in the Rx path voice. (Refer to *80-VU805-1* for more information.)

### 3.2.2. RX_VOICE _WV(_V2)


- Recommendation: Enable
- Wide Voice Enhancement - Performs blind bandwidth extension to provide WB data (16kHz sampling rate) and improve the speech intelligibility.

### 3.2.3. RX_VOICE _AIG


- Recommendation: Disable
- Adaptive Input Gain - Performs slow gain adaptation prior to DRC, based on desired RMS level. (Refer to *80-N2736-1* for more information)

### 3.2.4. RX_VOICE _DRC


- Recommendation: Enable
- Dynamic Range Control - Allows automatic gain control for signal levels outside of a desired range. (Refer to *80-N2719-1* for more information)

### 3.2.5. RX_VOICE _FIR


- Recommendation: Disable
- This will help the module to pass frequency-response tests and allows improvement of overall intelligibility. It can be used simultaneously with the IIR PCM filter.

### 3.2.6. RX_VOICE _IIR


- Recommendation: Enable
- This will help the module to pass frequency-response tests and allows improvement of overall intelligibility. It can be used simultaneously with the FIR PCM filter.

### 3.2.7. RX_VOICE _VOL

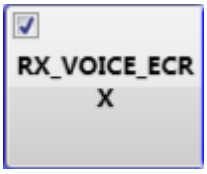

| | | | |
|---|---|---|---|
| Volume_Step_0_Volume | 0x2000 | 0 | dB |
| Volume_Step_1_Volume | 0x16A7 | -3 | dB |
| Volume_Step_2_Volume | 0x1009 | -6 | dB |
| Volume_Step_3_Volume | 0x0B5A | -9 | dB |
| Volume_Step_4_Volume | 0x0809 | -12 | dB |
| Volume_Step_5_Volume | 0x05B0 | -15 | dB |

- Recommendation: Enable
- Rx Volume Step Control - It can be set with **AT+CLVL** command.

### 3.2.8. RX_VOICE _AVC_RVE


- Recommendation: Enable
- AVC (Automatic Volume Control) - Increases Rx volume based on the ambient noise level at the near-end device.
- RVE (Receiving Voice Enhancement) - Uses sub-band processing to improve the Signal-to-Noise Ratio (SNR) of Rx voice. (Refer to *80-VM323-1* for more information)
- RVE and AVC cannot be used synchronously.

### 3.2.9. RX_VOICE _ECRX

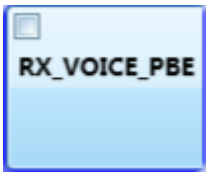



- Recommendation: Enable
- Echo Canceler Rx Module - It can be set with AT+QEEC command. (Refer to *Enhanced_Echo_Canceller_and_Noise_Suppression_Tuning* for more information.)

### 3.2.10. RX_VOICE _DEC_GAIN

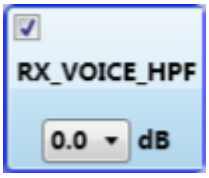

- Recommendation: Enable
- Linearly modifies Rx signal level, i.e., increasing or decreasing volume to desired RLR. (Gain range -∞ to 18dB)

### 3.2.11. RX_VOICE _PBE




- Recommendation: Disable
- Psychoacoustic Bass Enhancement (PBE) is implemented in the Rx path, before Multi-Band Dynamic Range Compressor (MBDRC). This feature is part of the audio post-processing set of features that are intended to provide audio enhancement for better user experience. (Refer to *80-N0488-1* for more information.)

### 3.2.12. RX_VOICE _HPF




- Recommendation: Enable
- High-Pass Filter - 200Hz cut-off frequency for Narrowband (NB) voice calls, and 50Hz cut-off frequency for Wideband (WB) voice calls are recommended.

### 3.2.13. RX_VOICE _MBDRC


- Recommendation: Enable
- Multiband Dynamic Range Control - Allows automatic gain control for desired frequency bands along with low-distortion limiter after the sub-band processing. (Refer to *80-N2719-2* for more information.)

### 3.2.14. RX_VOICE _SPKR_GAIN


- Recommendation: Enable
- Linearly modifies Rx signal level, i.e., increasing or decreasing volume to desired RLR. It can be set with **AT+QRXGAIN** command. (Gain range -∞ to 18dB)

# 4 Voice Call Tuning Process

The following is a flowchart of the tuning process for voice call quality conformance testing. The flowchart does not have a stop point, because some modules may need to be revisited several times. This flowchart is intended only to show a possible procedure but not the only way for tuning.

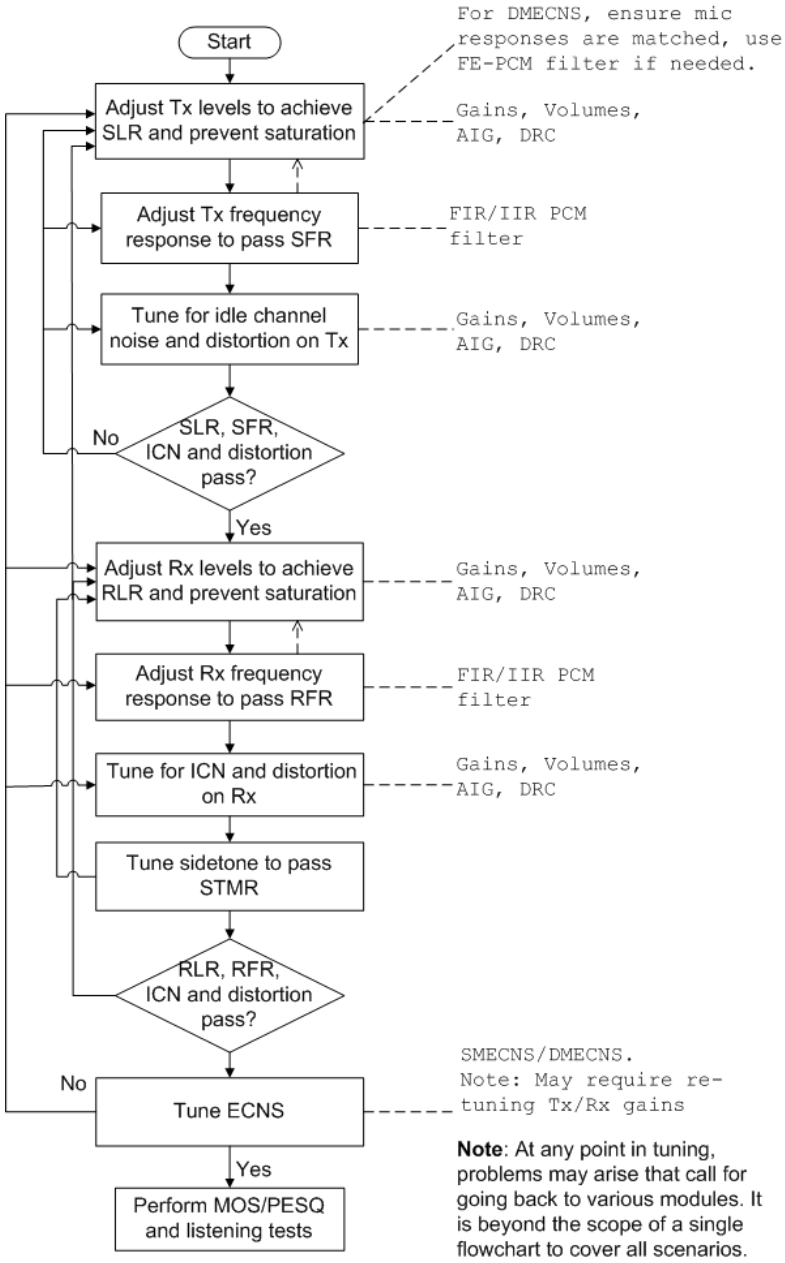



**Figure 2: Voice Tuning Process**

# 5 Appendix A References

**Table 1: Related Document**

| SN | Document Name | Remark |
|---|---|---|
| [1] | 80-n7634-6_a | 80-n7634-6_a_amss_8960_voice_tuning_guide |

**Table 2: Terms and Abbreviations**

| Abbreviation | Description |
|---|---|
| AIG | Adaptive Input Gain |
| AVC | Automatic Volume Control |
| DRC | Dynamic Range Control |
| ECNS | Echo Cancellation and Noise Suppression |
| FENS | Far-End Noise Suppression |
| FIR | Finite Impulse Response |
| HPF | High Pass Filter |
| IIR | Infinite Impulse Response |
| MBDRC | Multiband Dynamic Range Control |
| PCM | Pulse Code Modulation |
| RFR | Receiving Frequency Response |
| RLR | Receiving Loudness Rating |
| RMS | Root-Mean-Square |
| Rx | Receiving |
| RVE | Receiving Voice Enhancement |
| SFR | Sending Frequency Response |

| | |
|---|---|
| SLR | Sending Loudness Rating |
| SMECNS | Single Microphone Echo Cancellation and Noise Suppression |
| Tx | Transmit |