Specifications of MEMS Microphone

（ RoHs Compliance &Halogen Free Material）

Customer Name：

Model：SY6224D-D30-Module

bond	Drawing	Investigation	Approval
	Jenny	Tiger	Simon
Customer Approval			

Contents

1. VERSIONHISTORY:

Version	Description	Date
1.0	Initial release	2017.5
1.1	Add electronic part specification	2018.9
1.2	Perfect English version	2018.11
1.3	Increase horn position distance	2019.5
1.4	Increase distance specification	2019.10
1.5	Add the PCBA icon	2019.12

2. Introduction

Introduction:

1 ➢The MAC array system uses industry high performance DSP audio application processor，Ultra-low power consumption, high performance 32-bit RISC core，The highest frequency 240MHz，Instruction, integrated FPU floating point algorithm.

2 ➢ Audio ADC 4 channel Digital microphone, Supports 4 channels of high quality digital microphone.

3 ➢support 2 channel Line output and input Audio-DAC， SNR≥105dB 。

4 ➢Audio performance; Maximum bit width: 16 Bits， sampling rate support: 8kHz-48K /(11.0125kHz / 12kHz / 16kHz / 22.025kHz / 24kHz / 32kHz / 44.1kHz / 48kHz)。

5 ➢Uplink and downlink signal noise reduction.

6 ➢Highly integrated mixed-signal chip，Includes on-chip ROM code and RAM voice processing function.

7 ➢On-chip DSP Includes hardware calculus accelerator.

8 ➢LINE-IN and LINE-OUT digital signals using digital interfaces (PCM or I2S).

9 ➢ USB 2.0 Standard protocol transmission，Six endpoints are supported，Built-in PHY protocol for data transmission, can synchronously collect and transmit 4-channel digital audio signals.

function:

1. Digital MAC array supports 4 channels of noiseless audio signal, with a distance of 1-5m.

2. In order to ensure the requirement of array signal processing, the input signals of four channels are collected with the same clock to ensure the strict synchronization between channels.

3. sound: ➢Dynamic range compression (DRC)、Echo cancellation (AEC)、Noise suppression, frequency shift (anti-noise)、Detection and suppression of noise.

4. Sampling rate, 8kHz to 48kHz, 16 bit wide, can meet the signal input requirements of most speech recognition engines.

Audio Microphone Performance @44.1KHz:

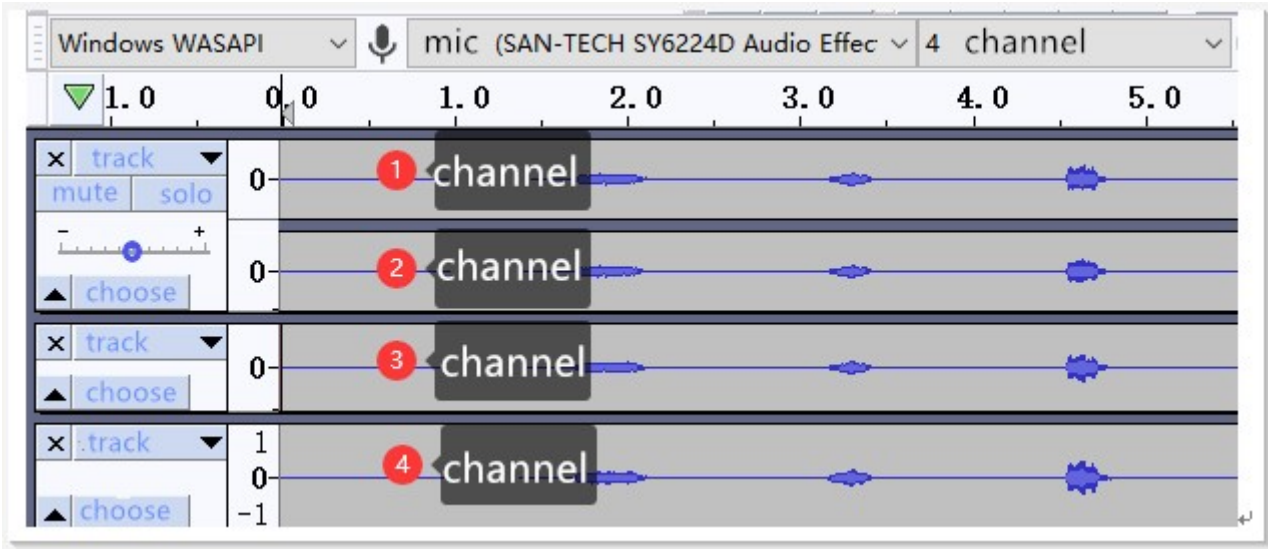
parameter	test conditions	mini	type	max	unit
A wide				16	Bits
Sampling rate		8		48	kHz
Gain control range	not use GainBoost	-20		39.6	dB
	Using GainBoost	-20		59.6	dB
input impedance			4		kΩ
Dynamic range	No Filter		92		dB
	A-Weighted		94		dB
SNR	No Filter		91		dB
	A-Weighted		93		dB
THD+N	not use GainBoost		-85		dB

5. MAC array data transmission adopts USB2.0 protocol, which is compatible with all kinds of host devices and terminal devices supporting OTG function.

6. Echo cancellation for linear and exclusive nonlinear filters.
7. -39 ~ -65 dB Noise suppression.
8. Fidelity soundtrack.
9. Dynamic range control.
10. Based on noise reduction and beamwave orientation algorithm, SY6224D USB outputs independent 4-channel digital microphone to pick up audio in digital audio PCM format, which can open noise reduction and DMIC gain setting，Support secondary development，In order to Android/Windows/Linux corresponding array signal processing algorithm module on the host side is provided，Based on signal azimuth estimation，Signal denoising and enhancement。

3.Test Setup Drawing

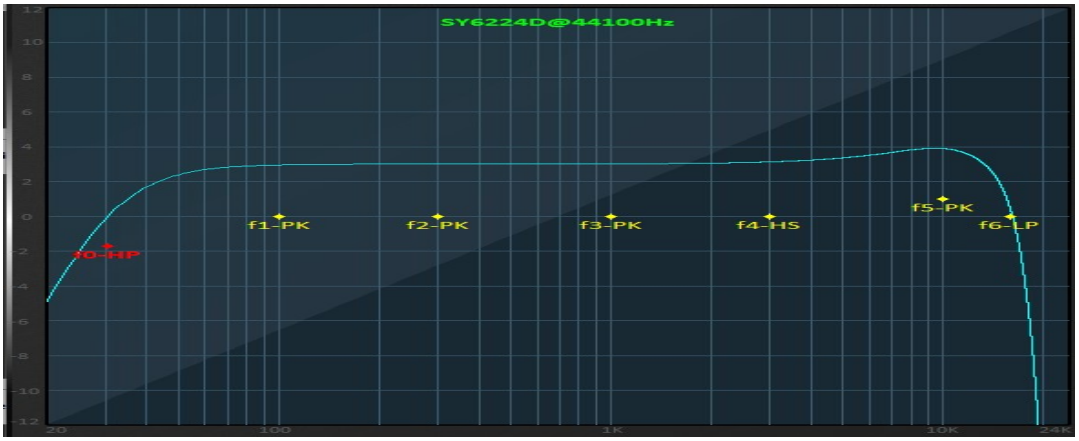
1.Windows @GY6224A 4 channel recording effect drawing：



2. DSP noise reduction, suppression and noise prevention modes can be set dynamically：

3. DSP MIC gain and MIC offset gain can be set dynamically :

4. Diagram of frequency loudness of digital microphone:

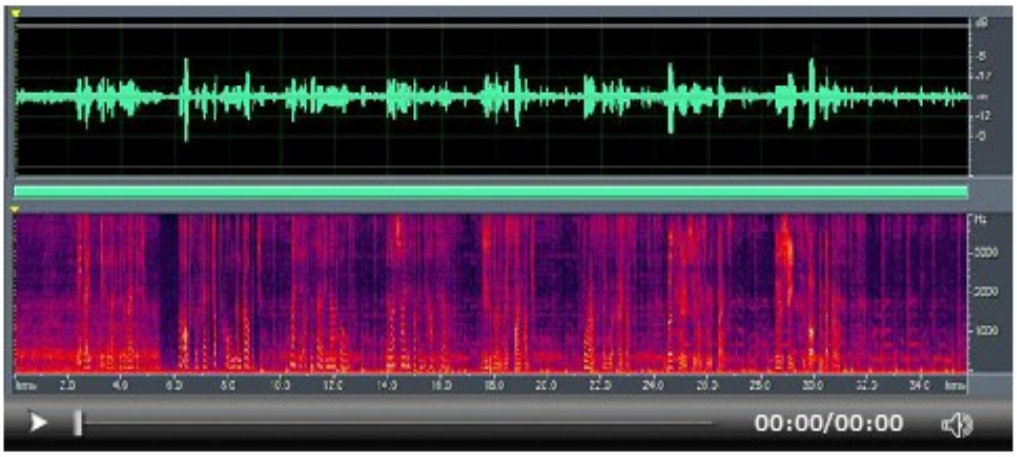


5. **Noise suppression effect:**

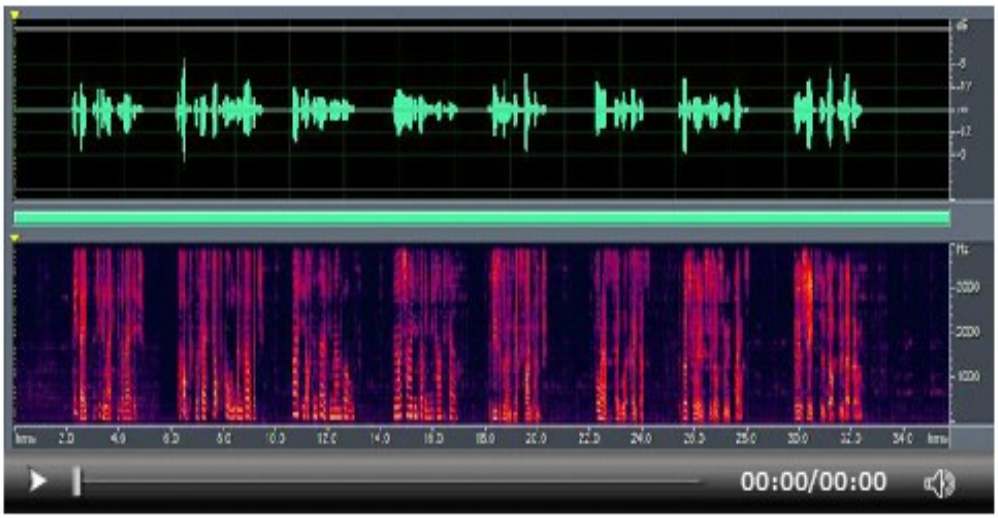
Suppress static and non-static background noise received by the microphone, so that the other side can easily understand what you say, Microphone array technology, Effectively deal with directional and diffuse noise.

Below, in an example of voice processing without San-Tech, All kinds of pretty noisy backgrounds, It obscures the voice picked up by the microphone. After the use of San-Tech technology noise suppression technology, Background noise is reduced, Natural, clear voices could be heard.

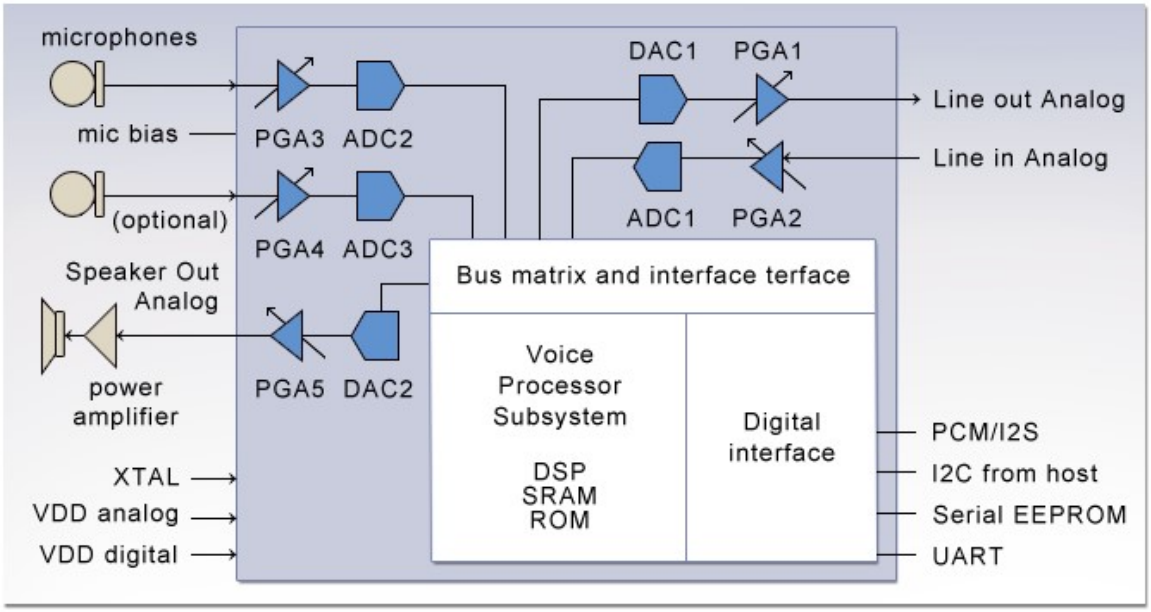
As shown below, before noise suppression:



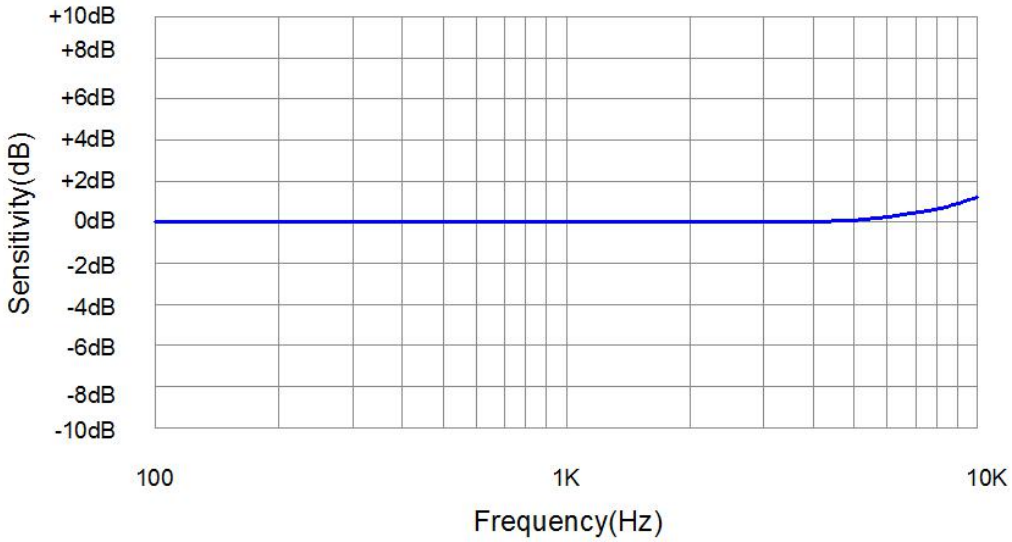
After noise suppression:



4. DSP block diagram

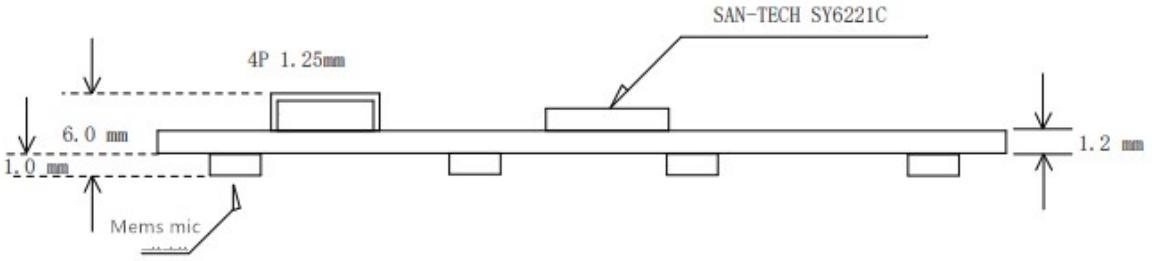


5. Frequency Response Curve

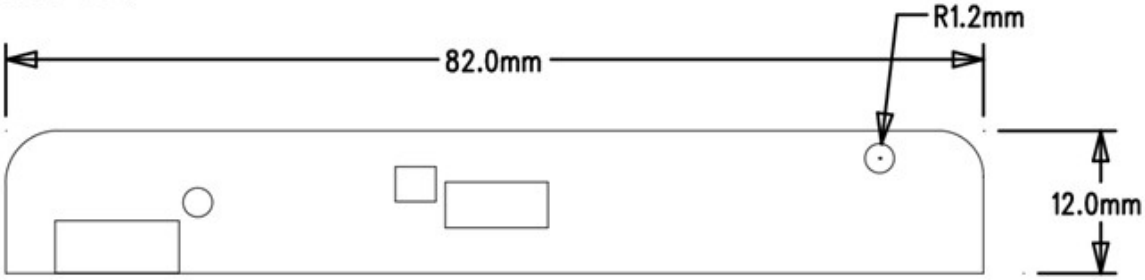


6. Mechanical Specifications

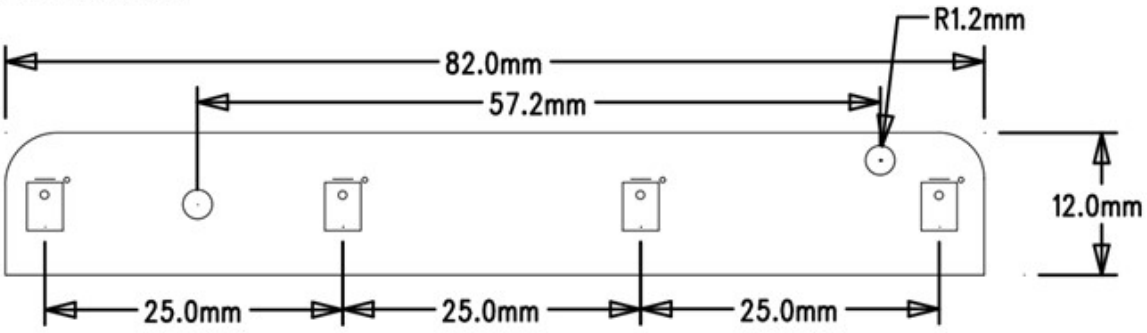
PCB Mechanical :



PCBA TOP:



PCBA BOTTOM:

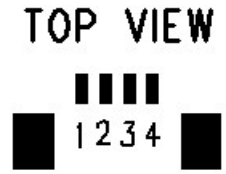


7. Port definition with PCBA physical diagram

1.Port definitions:

Port definitions

Pin	define	
1	5V	
2	DM	
3	DP	
4	GND	



2. PCBA Packaging Specifications

PCBA--B surface

PCBA--B surface

8. Acoustic and Electrical Characteristics product design:

Because the acoustics of the product structure will affect the best effect of the mike array, the position of the microphone, the equipment loudspeaker and the radiator fan should be taken into account in the design of the product structure, and the location should be reasonable and scientific. The following points are for your reference:

1) The positive direction of the microphone should not be placed opposite to the speaker, and should be placed as far away from the speaker as possible.

2) Microphones should be kept away from internal cooling fans.

3) There should be no gap between the microphone and the panel to avoid the shield between the microphone and the device in order to prevent cross-interference between the internal sound of the device.

4) The opening size of the microphone panel is suggested to be between 0.8-1.5mm.

5) It is better to use EVA to paste cotton or special silica gel to seal and position the microphone and the panel.

9. Reliability Specifications

Note:Themicrophonesensitivityafterstressmustdeviateby nomorethan±3dBfromtheinitialvalue.

TestItem	Detail
Thermal Shock	100 cycles of air-air thermal shock from -40℃ to +100℃with 15 minute soaks
High Temperature Bias	+125℃environment while under bias for 240 hours
Low Temperature Bias	-40℃environment while under bias for240 hours
Temperature/Humidity Bias	+85℃/85% R.H. environment while under bias for 240 hours
Mechanical Shock	3 pulses of 10000g in the X,Y and Z direction
Vibration Test	10～60Hz ： 0.35mm；60～500Hz:5g 1 oct/min Duration:15 minutes per plane
Drop Test	1.5-meter height onto a concrete surface each time at three directions in state of packaging
Reflow	5 reflow cycles with peak temperature of +260℃
ESD	150pF,330Ohm,contact discharge ±2KV/air discharge ±4KV,10 times,apply voltage to I/O pins