Specification of Electret Condenser Microphone
(RoHS Compliance & Halogen-Free)

Customer Name:
Customer Model:
GoerTek Model: B4013AM423-008

<table>
<thead>
<tr>
<th>Goer Tek</th>
<th>CUSTOMER APPROVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN</td>
<td>Archie.Kong/Apr.12.2013</td>
</tr>
<tr>
<td>CHKD</td>
<td>Dave.Zhao/Apr.12.2013</td>
</tr>
<tr>
<td>STANDARD</td>
<td>Lina.Zhao/Apr.12.2013</td>
</tr>
</tbody>
</table>

Tel: +86 536 8525015
Fax: +86 536 8525000
E-Mail: goertek@goertek.com
Website: http://www.goertekacoustics.com
Address: No.268 Dongfang Road, High-Tech Industry Development District, Weifang, Shandong, P.R.C.
1 Security warning

The information contained in this document is the exclusive property of GoerTek Inc. and should not be disclosed to any third party without the written consent of GoerTek Inc.

2 Publication history

<table>
<thead>
<tr>
<th>Version</th>
<th>Modified P/O No.</th>
<th>Date</th>
<th>Description</th>
<th>Design</th>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>/</td>
<td>2013.04.12</td>
<td>New Design</td>
<td>Archie</td>
<td>Worden</td>
</tr>
</tbody>
</table>

3 Symbols Show

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Show</th>
</tr>
</thead>
<tbody>
<tr>
<td>☀️</td>
<td>Signify Customer's Special Characteristic.</td>
</tr>
<tr>
<td>☮️</td>
<td>Signify GoerTek Special Characteristic.</td>
</tr>
</tbody>
</table>
Contents

1 Test Condition ......................................................... 4
2 Electrical Characteristics ........................................... 4
3 Frequency Response Curve and Limits ............................ 4
4 Measurement Circuit .................................................. 5
5 Test Setup Drawing .................................................... 5
6 Mechanical Characteristics .......................................... 6
   6.1 Appearance Drawing ........................................... 6
   6.2 Weight ......................................................... 6
7 Reliability Test ....................................................... 7
   7.1 Vibration Test .................................................. 7
   7.2 Drop Test ...................................................... 7
   7.3 Temperature Test .............................................. 7
   7.4 Humidity Test .................................................. 7
   7.5 Temperature Cycle Test ....................................... 7
   7.6 Temperature Shock Test ...................................... 7
   7.7 ESD Shock Test ................................................ 7
   7.8 Reflow Test .................................................... 7
8 Package ............................................................... 8
   8.1 Taping Specification .......................................... 8
   8.2 Reel Dimension ................................................ 9
   8.3 The Content of Box (13” reel) ............................... 9
   8.4 Packing Explain ................................................ 10
9 Stock and Transportation ............................................. 10
10 Land Pattern Recommendation ..................................... 11
   10.1 Soldering Surface - Land Pattern .......................... 11
   10.2 Metal Mask Pattern .......................................... 11
11 Recommend Soldering ............................................... 12
   11.1 Soldering Machine Condition ................................ 12
   11.2 The Pattern of the Nozzle ................................... 12
   11.3 Reflow Profile ................................................ 13
12 Cautions when Using SMD MIC .................................. 14
   12.1 X-ray Inspection ............................................. 14
   12.2 Board Wash Restrictions .................................... 14
   12.3 Nozzle Restrictions ......................................... 14
13 Output Inspection Standard ........................................ 14
PRODUCT SPECIFICATIONS

Type: Electret Condenser Microphone
Number: B4013AM423-008

1 Test Condition (Vs=2.0V, RL=2.2kΩ, L=50cm)

<table>
<thead>
<tr>
<th>Environment Conditions</th>
<th>Temperature</th>
<th>Humidity</th>
<th>Air pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Conditions (As IEC 60268-4)</td>
<td>+15°C～+35°C</td>
<td>45%RH～75%RH</td>
<td>86kPa～106kPa</td>
</tr>
<tr>
<td>Basic Test Conditions</td>
<td>+20°C±2°C</td>
<td>60%RH～70%RH</td>
<td>86kPa～106kPa</td>
</tr>
</tbody>
</table>

2 Electrical Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol/Item</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Standard</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>S</td>
<td>f=1kHz, Pin=1Pa</td>
<td>-45</td>
<td>-42</td>
<td>-39</td>
<td>dB 0dB=1V/Pa</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>Zout</td>
<td>f=1kHz, Pin=1Pa</td>
<td>2.2kΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directivity</td>
<td>D(θ)</td>
<td>Omnidirectional</td>
<td>500μA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Consumption</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S/N Ratio</td>
<td>S/N(A)</td>
<td>f=1kHz, Pin=1Pa A-Weighted Curve</td>
<td>60</td>
<td>dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreasing Voltage Characteristic</td>
<td>ΔS</td>
<td>f=1kHz, Pin=1Pa Vs=2.0--1.5V</td>
<td>-3</td>
<td>dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Voltage Range</td>
<td>Vs</td>
<td>1.0--10.0V</td>
<td>3</td>
<td>%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 Frequency Response Curve and Limits

![Frequency Response Graph](chart)

The graph shows the frequency response of the microphone with various frequency bands and corresponding decibel levels. The response ranges from 100Hz to 10kHz, with specific values marked at key frequencies such as 1kHz and 1.1kHz. The graph visually represents the sensitivity of the microphone across the frequency spectrum.
4 Measurement Circuit

![Circuit diagram of the microphone](image)

- **Term.1**: FET, 390 Ω, 10 nF, RL=2.2K
- **Term.2**: Vs 2.0V, C=10μF, OUTPUT, GND

5 Test setup Drawing

![Test setup diagram](image)

- **Power Amplifier**
- **Audio Analyzer**
- **Input**, **Output**, **Power&Load**, **Remote Control**
- **Free-field 1/2” Microphone**
- **50cm**
- **Speaker**
- **MIC**
- **Turn Table**
- **Anechoic Room**
6 Mechanical Characteristics

6.1 Appearance Drawing (Unit: mm)

Tolerance: ±0.1mm

6.2 Weight

Less than 0.2g
# 7 Reliability Test

## 7.1 Vibration Test

To be no interference in operation after vibrations, 10Hz to 55 Hz for 1 minute full amplitude 1.52mm, for 2 hours at three axes in state of standard packing, sensitivity to be within ±3dB from initial sensitivity.

(The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

## 7.2 Drop Test

To be no interference in operation after dropped to steel plate each one time from 1.5 meter height, 12 times, sensitivity to be within ±3dB from initial sensitivity.

(The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

## 7.3 Temperature Test

- **a)** After exposure at +85 °C for 200 hours, sensitivity to be within ±3dB from initial sensitivity.
  
  (The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

- **b)** After exposure at -40 °C for 200 hours, sensitivity to be within ±3dB from initial sensitivity.
  
  (The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

## 7.4 Humidity Test

After exposure at 60 °C and 90~95% relative humidity for 200 hours, sensitivity to be within ±3dB from initial sensitivity.

(The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

## 7.5 Temperature Cycle Test

After exposure at -40 °C for 30 minutes, at 20 °C for 10 minutes, at +85 °C for 30 minutes, at 20 °C for 10 minutes, 5 cycles, sensitivity to be within ±3dB from initial sensitivity.

(The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

## 7.6 Temperature Shock Test

After exposure at -40 °C for 60 minutes, at +85 °C for 60 minutes (change time 20 seconds), 32 cycles, sensitivity to be within ±3dB from initial sensitivity.

(The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

## 7.7 ESD Shock Test

The microphone under test must be discharged between each ESD exposure without ground. (Contact: ±8kV; Air: ±15kV)

There is no interference in operation after 10 times exposure.

## 7.8 Reflow Test

Adopt the reflow curve of item 11.3, after two reflows, sensitivity to be within -42 ± 3dB.

(The measurement to be done after 2 hours of conditioning at +15 °C ~ +35 °C, R.H 45% ~ 75%)

---

have sound, will travel
8 Package

8.1 Taping Specification

The dimensions as follows:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DIM(mm)</th>
<th>W</th>
<th>E</th>
<th>F</th>
<th>ØD0</th>
<th>ØD1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM</td>
<td>P0</td>
<td>10P0</td>
<td>P1</td>
<td>A0</td>
<td>B0</td>
<td></td>
</tr>
<tr>
<td>DIM(mm)</td>
<td>4.00±0.10</td>
<td>40.00±0.20</td>
<td>8.00±0.10</td>
<td>4.30±0.10</td>
<td>4.30±0.10</td>
<td></td>
</tr>
<tr>
<td>ITEM</td>
<td>K0</td>
<td>P2</td>
<td>T</td>
<td>M0</td>
<td>N0</td>
<td></td>
</tr>
<tr>
<td>DIM(mm)</td>
<td>1.70±0.10</td>
<td>2.00±0.05</td>
<td>0.35±0.05</td>
<td>3.30±0.05</td>
<td>1.50±0.05</td>
<td></td>
</tr>
</tbody>
</table>
8.2 Reel Dimension

7” reel for sample stage
13” reel will be provided for the mass production stage

The following is 13” reel dimensions (unit:mm)

8.3 The content of box(13” reel)

Packing (4000PCS)
5 pcs reels
Plastic Bag (20000PCS)
(336mm*115mm*450mm)
Plastic Bag (20000PCS)
(336mm*115mm*450mm)
Inner Box (20000PCS)
(340mm*135mm*355mm)
9 Stock and Transportation

9.1 Keep ECM in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field.

9.2 The ECM with normal pack can be transported by ordinary conveyances. Please protect products against moist, shock, sunburn and pressure during transportation.

9.3 Storage Temperature Range: -40 °C ~ +85 °C

9.4 Operating Temperature Range: -30 °C ~ +70 °C
10 Land Pattern Recommendation  (Unit: mm)

10.1 Soldering Surface - Land Pattern

![Diagram showing land pattern dimensions]

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø2.7</td>
<td>±0.05</td>
</tr>
<tr>
<td>Ø1.8</td>
<td>±0.05</td>
</tr>
<tr>
<td>Ø0.9</td>
<td>±0.05</td>
</tr>
</tbody>
</table>

10.2 Metal Mask Pattern

![Diagram showing metal mask pattern dimensions]

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1.8</td>
<td>±0.05</td>
</tr>
<tr>
<td>Ø2.7</td>
<td>±0.05</td>
</tr>
<tr>
<td>Ø0.9</td>
<td>±0.05</td>
</tr>
<tr>
<td>3-0.8</td>
<td>±0.05</td>
</tr>
</tbody>
</table>

- Opening for solder cream

- Thickness of metal mask: 0.1mm
11 Recommend Soldering

11.1 Soldering Machine Condition

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature control</td>
<td>8 zones</td>
</tr>
<tr>
<td>Heater Type</td>
<td>Hot Air</td>
</tr>
<tr>
<td>Solder Type</td>
<td>Lead-free</td>
</tr>
</tbody>
</table>

11.2 The pattern of the nozzle

Dimension of nozzle: 504
External diameter: 1.5mm
Inside diameter: 1.0mm
Pick up position: bottom center of microphone
11.3 Reflow Profile

Pb-free reflow profile requirements for soldering heat resistance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reference</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Temperature Gradient in Preheating</td>
<td>---</td>
<td>2.5°C/s</td>
</tr>
<tr>
<td>Soak Time</td>
<td>t&lt;sub&gt;soak&lt;/sub&gt;</td>
<td>2-3 Minutes</td>
</tr>
<tr>
<td>Time Above 217 °C</td>
<td>t&lt;sub&gt;1&lt;/sub&gt;</td>
<td>Max 60s</td>
</tr>
<tr>
<td>Time Above 230 °C</td>
<td>t&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Max 50s</td>
</tr>
<tr>
<td>Time Above 250 °C</td>
<td>t&lt;sub&gt;3&lt;/sub&gt;</td>
<td>Max 10s</td>
</tr>
<tr>
<td>Peak Temperature In Reflow</td>
<td>T&lt;sub&gt;peak&lt;/sub&gt;</td>
<td>255 °C (-0/+5 °C)</td>
</tr>
<tr>
<td>Temperature Gradient In Cooling</td>
<td>---</td>
<td>Max -5 °C/s</td>
</tr>
</tbody>
</table>

When SMD MIC is soldered on PCB, the reflow profile is set according to solder paste and the thickness of PCB etc.
12 Cautions when using SMD MIC

12.1 X-ray inspection

The microphone should not be subjected to X-ray inspection. If it is absolutely necessary to do inspection using X-ray, the setting conditions with the following conditions:
- Distance: >0.08 meter;
- Current: <0.080 mA;
- Time: <30 s;
- Voltage: <80 kV.

12.2 Board wash restrictions

It is very important not to wash the PCB after reflow process, or this could damage the microphone.

12.3 Nozzle restrictions

It is very important not to pull a nozzle over the post hole of the microphone. Or this could damage the microphone.

13 Output Inspection standard

Output inspection standard is executed according to <<ISO2859-1:1999>>.