



**Dynamic loudspeaker  
With solder pad  
& waterproof 5ATM  
13.6×6.6×3.0 mm**

**GR1407S030YN8WP**

**Revision**

<b>Date</b>	<b>Version</b>	<b>Status</b>	<b>Changes</b>	<b>Approver</b>
2020/6/19	V0.1	Draft	First release	AX
2020/07/01	V0.2	Draft	Add material BOM and print code	AX

## 1. Scope

This document is the technical specification of a Micro Dynamic Speaker.

## 2. Product Type

**Product number:** GR1407S030YN8WP

**Product description:** 14\*7\*3.0mm speaker

**Water proof level:** IPx8 (50m,10min)

## 3. Electro-Acoustic Specifications

**Table 3-1 Electro-Acoustic Specifications**

Test Condition: +25°C ±2, 63%~67% RH, 86~106Kpa, unless specified differently.

No.	Parameter	Technical Specifications	Conditions	Unit
3.1	Sound Pressure Level	85 $\pm$ 3	2Vrms, 0.1m at 2kHz in 3cc back cavity, on baffle	dB
3.2	Maximum Continuous noise Power	0.5	in 3cc back cavity	W
3.3	Maximum Short Term Power	0.7	in 3cc back cavity	W
3.4	Rated Impedance	8	@2kHz, 2Vrms	$\Omega$
3.5	Rdc	6.5 $\pm$ 7		$\Omega$
3.6	Resonance Frequency in 3cc back cavity	950 $\pm$ 20%	2Vrms	Hz
3.7	Typical Frequency Response	See Fig 4-1	2Vrms	
3.8	Total Harmonic Distortion	See Fig. 4-2	2Vrms	
3.9	Overshoot	No overshoot		
3.10	Rub& Buzz	See Fig 4-3	2VrmsVrms, in 3cc back cavity	
3.11	Listening condition	No noise	2Vrms,300-3.4kHz,2sec,2 circles in 3cc back cavity,10-15cm	
3.12	Polarity	When a DC source's "+"polarity is attached to speaker's "+"polarity,"-"polarity is attached speaker's "-"polarity, the		

## 4. Typical Frequency Response , Total Harmonic Distortion, Rub& Buzz

### 4.1 Typical Frequency Response

Test conditions: sine wave 100~20kHz、1/12 Oct、2Vrms、10cm with baffle

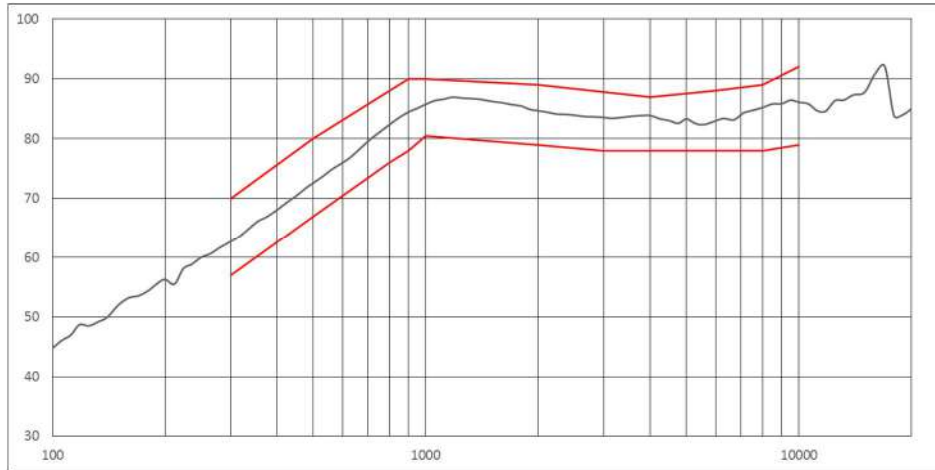


Fig. 4-1 Typical Frequency Response

Fr eq. / Hz	300	500	800	900	1000	2000	4000	6000	8000	10000
upper / dB	70	80	88	90	90	89	87	88	89	92
Fr eq. / Hz	300	500	800	900	1000	2000	3000	4000	8000	10000
l ower / dB	57	67	76	78	80.5	79	78	78	78	79

### 4.2 Total Harmonic Distortion

Test conditions: sine wave 100~20kHz、1/12 Oct、2Vrms、10cm with baffle, 2-5 harmonic distortion

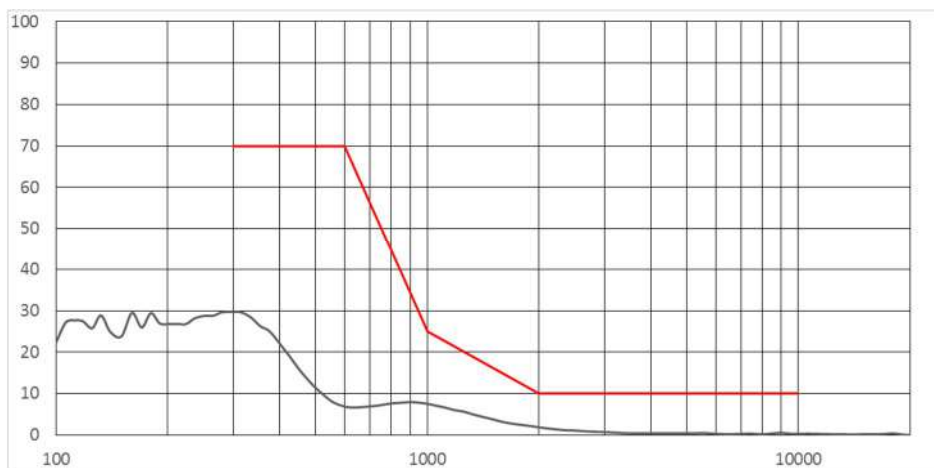


Fig. 4-2 Total Harmonic Distortion

Fr eq. / Hz	300	600	1000	2000	10000
Li mi t % (bef ore FEL t est)	70	70	25	10	10

### 4.3 Rub&Buzz

Test conditions: sine wave 100~20kHz、1/12 Oct、2Vrms、10cm with baffle, 10-35 harmonic distortion

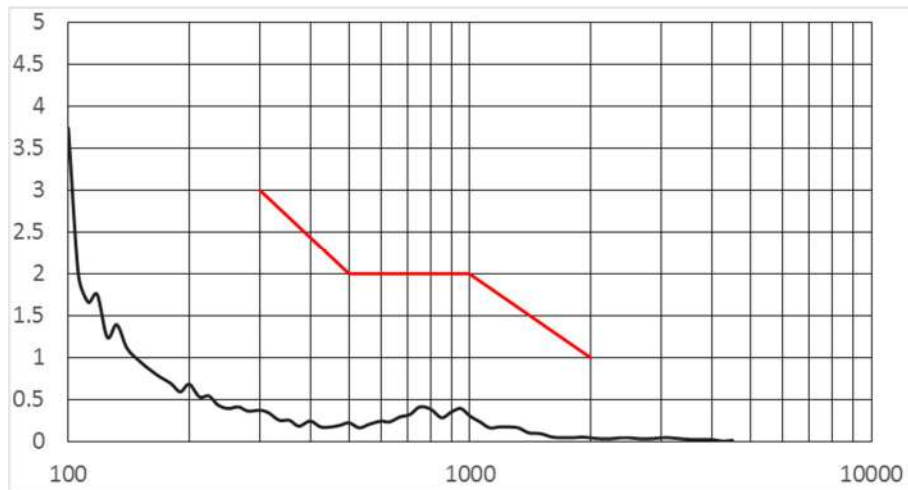


Fig. 4-3 Rub& Buzz

Table 4-3 Rub&Buzz at Rated Power Limit

Fr eq. / Hz	300	500	1000	2000
R&B/ %2V)	3	2	2	1

## 5. Measurement System Setup

**Test signal:** Sine wave, Sweep,

**Frequency Range:** 100Hz-20kHz

**Step:** 1/12 octave

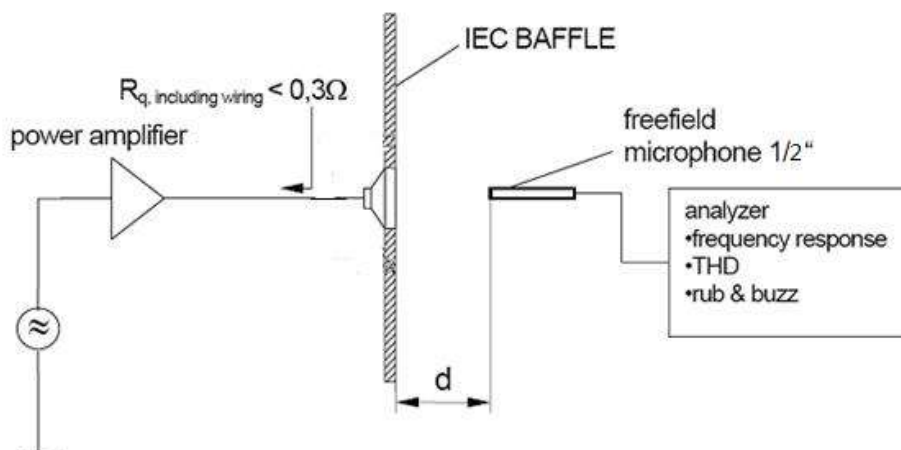
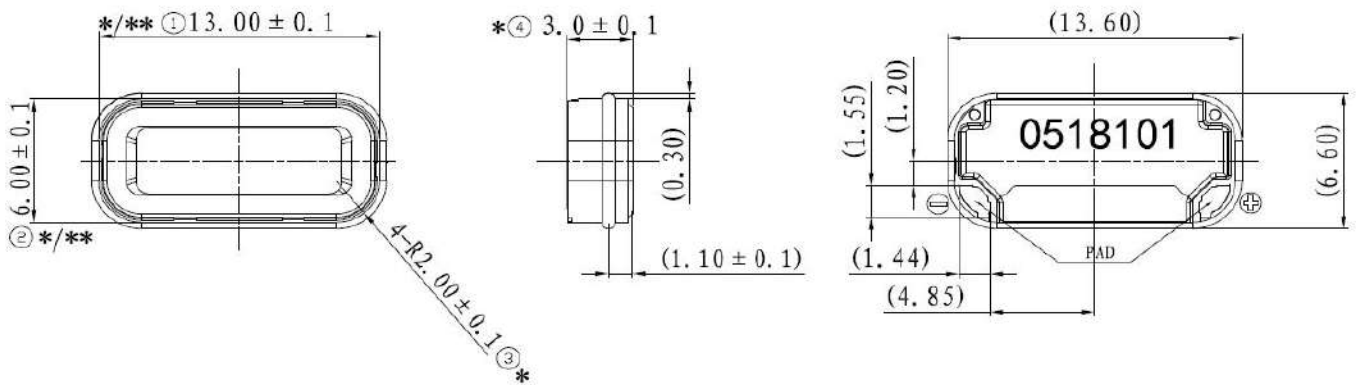


Fig. 5-1 Measurement System Setup

## 6. Mechanical Specifications



Remark:

- 1、 “\*” Critical Dimension
- 2、 “\*\*” CPK Dimension,  $CPK \geq 1.33$
- 3、 Unit: mm, Unmarked tolerance:  $\pm 0.1$ mm
- 4、 Dimensions with ( ) are reference dimension

Fig. 6-1 Dimension

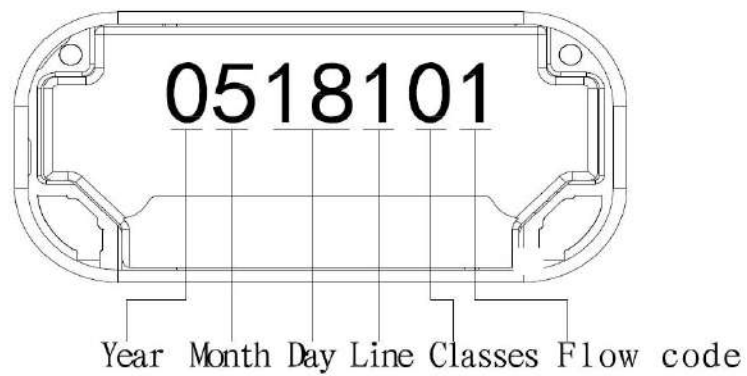
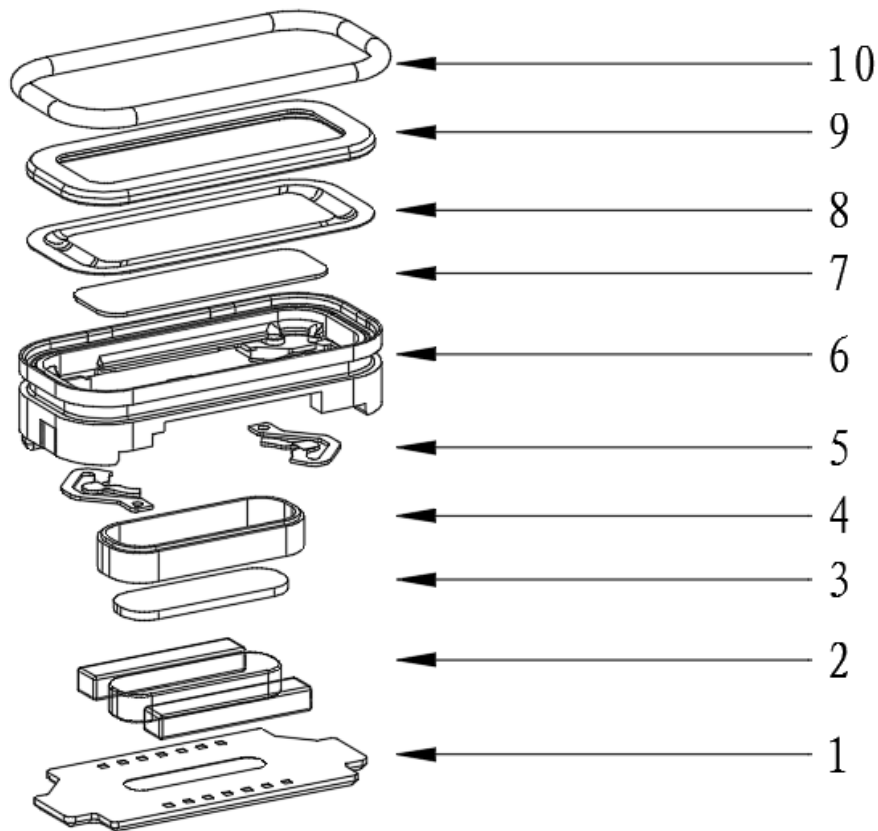


Fig. 6-2 Inkjet Printing

7. BOM



No.	Part Name	Material	Quantity
1	Yoke	Steel	
2	Magnet	NdFeB	
3	Plate	Steel	
4	Voice Coil	Copper	
5	FPC	Copper+PI	
6	Frame	Plastic+Steel	
7	Dome	PEN	
8	Diaphragm	Compound	
9	Cover	Copper	
10	O-Ring	Silicone Rubber	

## 8. Air Leak Test

- (1) Fill the positive air pressure with a pressure of 500kPa;
- (2) Inflate for 15s, balance for 5s and detect for 5s;
- (3) If the differential pressure method is used, it is qualified if the leakage is within 200Pa;
- (4) Front cavity volume of air leak test tooling (inner cavity pipe of device inner cavity tooling): the unified standard of  $10 \pm 1$ ml shall be implemented;

## 9. Reliability Tests

After reliability test, the samples shall be stored under normal conditions such as in ordinary rooms or laboratories. Unless otherwise noted, the recovery period shall be 3 hours at least before performance testing.

### 9.1 High temperature storage test

#### 1. Test objective

The main purpose of this test is to determine that there is no apparent structural damage or functional degradation of the product under the climatic conditions that may be encountered during transportation and storage.

#### 2. Test condition

Sample quantity: 10pcs

Keep at 85°C for 96 hours.

#### 3. Test procedure

(1) Inspect the appearance and electroacoustic performance of the samples before the test to meet the specifications;

(2) Put the samples to be tested without power into the temperature and humidity test chamber (RCV/SPK monomer diaphragm is placed downward, BOX does not require), pay attention to the distance between the test samples and the distance between the test samples and the inner wall of the temperature chamber is no less than 3cm;

(3) At normal temperature, the temperature was raised to 85°C at 1°C/min, stored for 96 hours after the temperature was stable, then cooled to room temperature at a rate of 1°C/min and kept at room temperature for 4 hours before taking out.

(4) Check appearance and electroacoustic performance after taking out the sample.

#### 4. Qualified criterion

After the test, the appearance structure of the sample is normal, and the subjective and objective indicators meet the requirements of the specification.

## 9.2Cryogenic storage test

### 1. Test objective

The main purpose of this test is to determine that there is no apparent structural damage or functional degradation of the product under the climatic conditions that may be encountered during transportation and storage.

### 2. Test condition

Sample quantity: 10pcs

Keep at -40°C for 96 hours.

### 3. Test procedure

(1) Inspect the appearance and electroacoustic performance of the samples before the test to meet the specifications;

(2) Put the samples to be tested without power into the temperature and humidity test chamber (RCV/SPK monomer diaphragm is placed downward, BOX does not require), pay attention to the distance between the test samples and the distance between the test samples and the inner wall of the temperature chamber is no less than 3cm;

(3) At normal temperature, the temperature was lowered to -40 ° c /min at 1 ° c /min. After the temperature was stabilized, it was stored for 96 hours. Then the temperature was raised to normal temperature at a rate of 1 ° c /min.

(4) Check appearance and electroacoustic performance after taking out the sample.

### 4. Qualified criterion

After the test, the appearance structure of the sample is normal, and the subjective and objective indicators meet the requirements of the specification.

## 9.3Thermal shock test

### 1. Test objective

The main purpose of this test is to determine that the product can withstand sudden changes in weather conditions without mechanical damage and functional degradation.

### 2. Test condition

Sample quantity: 10pcs

The two-box method was adopted, which was placed in -40°C for 0.5 hours, and taken out and placed in 85°C for 0.5 hours. The maximum conversion time was less than 5min, and the cycle was repeated 100 times.

### 3. Test procedure

(1) Inspect the appearance and electroacoustic performance of the samples before the test to meet the specifications;



(2) Adjust the temperature of the impact box to  $-40^{\circ}\text{C}$  for the cold box and  $85^{\circ}\text{C}$  for the hot box until the temperature is stable.

(3) The sample diaphragm is placed in the cold box of the warm impact box with no electricity (note that the distance from the test sample to the wall of the warm box and between the samples should not be less than 3cm, and the diaphragm should be placed downward) Keep 0.5, then it was transferred to the hot box (transfer time  $<5\text{min}$ ) and kept for 0.5 hours. This process was carried out for 100 cycles in 1 cycle.

(4) After the test, take it out and leave it at room temperature for 2 hours. Check the appearance and electro-acoustic performance.

#### 4. Qualified criterion

After the test, the appearance of the sample structure is normal, electroacoustic performance indicators meet the requirements of the specification.

### 9.4 Salt spray test

#### 1. Test objective

Test the anti - erosion ability of shrapnel and PAD key contact parts, and verify coating process.

#### 2. Test condition

Sample quantity: 10pcs

Microscope requirement: observation with 50 times microscope, observation with 200 times microscope when auxiliary judgment

NaCl solution with a concentration of 5% mass ratio was sprayed at  $35^{\circ}\text{C}$  for 48 hours, then removed, washed and dried.

#### 3. Test procedure

##### (1) Salt fog configuration

a. Materials required for solution (including sodium chloride, distilled water, electronic scale, dilute NaOH, dilute hydrochloric acid, etc.)

b. Please wear gloves and mask before putting in the solution. The mass percentage concentration of the salt solution is  $5\%\pm 1\%$

c. Put 19kg of distilled water in a bucket and subtract the weight of the bucket from the total weight by using the electronic weighing method. Then NaCl with a purity greater than 95% (with a mass of 1kg) was poured into the bucket until the total weight was 20Kg. The mixed solution was fully stirred and the NaCl crystal and distilled water were fully dissolved (NaCl solution with a concentration of 5% salt spray).

d. A small amount of dilute NaOH solution was taken out with a syringe and put into NaCl solution for repeated stirring. Then the PH meter probe was inserted into the brine to detect the PH value of the brine (if too much NaOH will lead to a PH value greater than 7.2, dilute HCl should be injected to adjust the PH value) until the PH value was between

6.5 and 7.2. The PH meter needs to be calibrated before use.

e. After the PH value meets the requirements, use the measuring cylinder with a measuring range of 2000ml to pour the configured brine into the solution storage tank of the salt spray tank, and the salt spray test can be carried out.

(2) The appearance of the sample was checked before the test, and the shrapnel was observed without wear by microscope.

(3) The shrapnel of the sample to be tested should be placed on the test bracket in the salt spray box at a tilt Angle of 30-40 degrees with the vertical direction (a distance of at least 2-5cm between the samples), and the door of the salt spray box should be closed (during the whole installation process, liquid should be avoided from the top and side wall of the equipment to drop on the shrapnel).

(4) Enter the test standby interface, set the spray environment temperature at 35 ° c and NaCl solution with 5% salt spray concentration, and spray continuously at 35 ° c (salt spray requirement: continuously collect atomized deposition solution with a vessel with an area of 80 square centimeters, up to 1ml-2ml /h).

(5) After 48h operation of the equipment, stop the equipment and remove the salt water on the surface of the sample (including the shrapnel) with a dust free cloth.

(6) After the experiment, the sample was washed with flowing warm water at no more than 35°C to remove the residual salt spray solution on the surface of the sample and dried. Then, the corrosion in the key area of the shrapnel was observed with a microscope. After the corrosion point was found, the corrosion point should be measured.

#### 4. Qualified criterion

The surface of the contact area (shrapnel /BTB/PAD) was observed with a microscope.

The coating did not fall off, crack, wrinkle, separation and other phenomena, and the surface corrosion product area was less than 5% of the area of the shrapnel contact key area: OK;

The maximum diameter of the corrosion point is less than 0.05mm.

##### 1、 Contact terminal for shrapnel:

The area of the key region where the shrapnel touches: if there is a convex hull, the key region is the whole convex hull. If there is no convex hull, the critical area includes the entire shrapnel width, at least twice the length. (area of key area of shrapnel contact: the width of shrapnel contact area is the circular area of diameter)

##### 2、 In view of the PAD

(1) The maximum diameter of a single corrosion point is greater than 0.3mm: NG;

(2) The maximum diameter of the corrosion point is between 0.15mm and 0.3mm, and the total number is more than or equal to 2 :NG

(3) The maximum diameter of the corrosion point is between 0.15mm and 0.3mm, and the total number is more than or equal to 8 :NG

## 9.5 Long-term load test with rate power

### 1. Test objective

The test is mainly to test whether the sample can work normally in the specified high and low temperature environment.

Verify the device's ability to function at rated power.

### 2. Test condition

Powder dry - 20°C/24 hours

Powder dry t 65°C/144 hours

### 3. Test procedure

(1) Before the test, check the appearance and electroacoustic performance of the audio device to meet the specifications;

(2) Install the device in the specified power on tooling (the pink noise signal is provided by the device engineer, use the aging instrument to play the sound source, set the sound source voltage and time), put 10 PCS in the temperature box at -20°C, pay attention to the distance between the power on tooling and the distance between the power on tooling and the inner wall of the temperature box is not less than 3cm, and work continuously for 48 hours;

(3) 10pcs were placed in a temperature box at 65°C and worked continuously for 144 hours.

(4) Check the electroacoustic performance of the samples after no less than 4 hours of power failure recovery.

### 4. Qualified criterion

After the test, the appearance structure of the sample is normal, and the subjective and objective indicators meet the requirements of the specification. After the completion of subjective and objective testing, disassemble 5pcs of samples for device observation of glue, coil and diaphragm. If there is any abnormal phenomenon, please record it. No judgment will be made.

## 9.6 High temperature and high humidity storage test

### 1. Test objective

The test mainly USES high temperature and high humidity stress to verify the aging effect of temperature and humidity on device materials.

### 2. Test condition

Test temperature 65°C, humidity 95%RH, no electricity, 120 hours.

### 3. Test procedure

(1) Check the appearance and magnet of the sample before the test, and there should be no abnormalities.

(2) Put the samples to be tested without power into the temperature and humidity test chamber (the diaphragm is placed downward), and pay attention to the distance between the test samples and the distance between the test samples and the inner wall of the temperature chamber is no less than 3cm;

(3) At the end of the test, after the receiver recovers for 2 hours at 25°C and 50%RH, remove the device from the test box and check the appearance and magnet of the receiver.

#### 4. Qualified criterion

The appearance structure has no obvious abnormal phenomena such as deformation and cracking, and the edge magnetic is not biased or detached.

### 9.7 Drop test

#### 1. Test objective

Test the product's ability to withstand free fall in daily life.

#### 2. Test condition

(180±10) g dropping fixture is adopted, and the height is 1.5 meters. According to the sequence of 6 sides and 4 angles, each side and each Angle falls once, there are 4 rounds of falling, and the granite falling surface.

#### 3. Test procedure

(1) Check the appearance and electroacoustic performance of the samples to be tested in accordance with specifications;

#### (2) Drop mode selection of drop machine

##### a. Manual drop mode

① Set the height of the device to the specified height, and start the device to automatically rise to the specified height (falling height: the height from the bottom of the falling surface of the phone to the height of the falling platform);

② Install the sample in the falling fixture and place it in the falling fixture. The falling surface should be in the same plane as the bottom of the fixture.

③ Clamping dropping fixture, release, that is, complete 1 drop.

##### b. Automatic drop mode

① Turn on the power switch of the dropping device and wait for the device to start and enter the operation interface.

② Set the compensation height and release time gain after the drop device is started(required: the release time gain is 200 MS);

Confirm compensation for height: Drop until the drop fixture does not drop (due to the lowest limit sensor), at which point the distance from the bottom of the drop fixture to the fall surface is the device's compensation height;

③ The distance from the bottom of the fixture to the drop surface is consistent with the

test height needed to drop when the measured height is confirmed to rise to the test height.

④ Drop fixture is placed in the drop fixture, and the drop surface is required to be in the same plane as the bottom of the fixture, and the test is started (the fixture will automatically grip the sample for drop test).

(3) Set the drop height according to the requirements of the experiment, place the sample in the drop tooling (if there is an air hole in the tooling, stick the dust net on the air hole outside the tooling), then clamp the drop tooling and start the test.

(4) Drop according to the sequence of surface, edge and Angle. Check whether the drop fixture is loose at any time during drop. If it is loose, stop the test in time.

(5) Disassemble the tooling at the end of the test to check the appearance and electroacoustic performance of the sample

#### 4. Qualified criterion

After the test, the samples have no appearance damage, and the electroacoustic performance parameters meet the specifications.

### 9.8 Drum drop

#### 1. Test objective

Check whether the product can be dropped repeatedly.

#### 2. Test condition

Adopt (180±10) g drop fixture, height 1 m, 300 times.

#### 3. Test procedure

(1) Check the appearance and electroacoustic performance of the samples to be tested in accordance with specifications;

(2) Clean up the inside of the drum testing machine, the bottom plate can not have sundries and concave and raised parts;

(3) Install the sample to be tested in the dropping fixture (if there is an air hole in the fixture, the dust net should be pasted on the air hole outside the fixture), and then put the dropping fixture on the bottom plate of the drum. Only one falling fixture can be placed in one drum space for testing.

(4) Set the falling times and adjust the speed of the equipment. The setting of the speed must ensure that the sample falls near the middle of the bottom surface every time (recommended speed, 10-11 times falling /min).

(5) During falling, check whether the tooling is loose at any time. If it is found loose during the test, the test should be suspended, and the test should be continued after repairing the tooling.

(6) Disassemble the tooling at the end of the test to check the appearance and electroacoustic performance of the sample.

#### 4. Qualified criterion

After the test, the samples have no appearance damage and the electroacoustic performance parameters meet the specifications.

### **9.9 Water proof**

#### 1. Test objective

This test is used to find if the product can meet IPx8 level..

#### 2. Test condition

The tooling is completely immersed in water  $\geq 2\text{mm}$ , and the volume of rear chamber is 3cc.

#### 3. Test procedure

(1) Inspect the appearance and electroacoustic performance of the samples before the test to meet the specifications;

(2) Use waterproof foam to stick the loudspeaker on the surface a of waterproof tooling, and fasten the surface a and B of tooling with fastening screws;

Before the test, make sure that the tooling is covered with sealing ring and waterproof rubber pad (the rubber pad is double-sided) and the rubber pad cannot tilt or be missed; put the sample steel plate face down into the base tooling; then cover the cover tooling and align it with the nut points, tighten the tooling screws, and no leakage occurs. Conduct the test under the condition of complete sealing

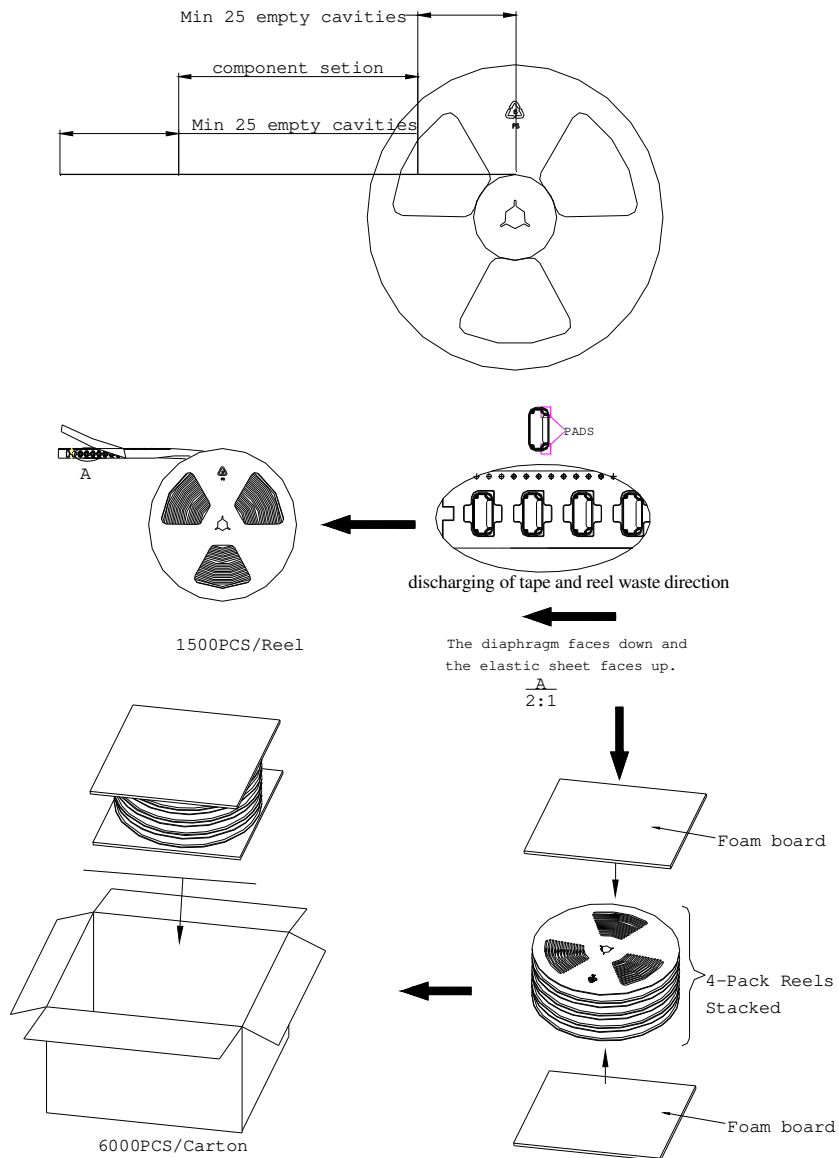
(3) Place the fixed tooling in waterproof environment for 10 minutes, and pressurize it to 500kPa;

(4) After the test, take out the loudspeaker and wipe the water drop on the product surface with a dust-free cloth;

(5) 10 pcs samples shall be disassembled and inspected immediately;

(6) after the surface of 10pcs sample returns to normal, the performance inspection shall be carried out;

# 10. Package



package	Material	Color	Qty
Tray	PS	/	1500pcs/Reel
Reel	PS	/	
Foam layer	Foam	White	/
Box	Double wall corrugated board	Brown	6000pcs/Carton