



# Elektrotechnik Karl-Heinz Mauz GmbH

LSF-S2010A (Artikel-Nr. 106121)

**EKULIT**

1. Product Outline	
1-1. Scope	This specification is a typical speaker unit for telephone handset & tablet pc
1-2. Dimensions	As shown in figure 1
1-3. Net Weight	Approx 2.1 grams
1-4. Operating Temperature Range	-20°C to +70°C without loss of function
1-5. Storage Temperature Range	-40 °C to +85 °C (Note: Return to ambient room temperature before using)
2. Electroacoustic Characteristics	
2-1. Test Setup	Measuring instrument as shown in Figure 5
2-2. Impedance	$8 \pm 15\%$ ohm ( at 2.0 KHz, 1V input )
2-3. Sound Pressure Level	91± 3 dB SPL /1W/10cm at 1kHz in 1.5cc box Speaker shall be mounted in a baffle with minimum dimensions of 80cm x 100cm. See Figure 6.
2-4. Frequency Response	See Figure 7, Table 1 Test at 2.83 Vrms/10 cm with the speaker mounted in 1.5cc measure box in a baffle.
2-5. Bass Resonance Frequency	600±20% Hz in 1.5cc box
2-6. Input Power (Rated./Max.)	Rated Power: 1W (in 1.5cc box) Maximum Power: 1.5W (in 1.5cc box)
2-7. Rub and Buzz:	The input power shall be set at 1W. Using an audio oscillator, sweep from 300 to 5000 Hz with the speaker mounted in 1.5cc measure box and in a baffle. There shall be no buzzes, rattles, nor spurious noises.
2-8. THD	See Figure 8, Table 2 Test at 2.83Vrms/10 cm with the speaker mounted in 1.5cc measure box in a baffle.
2-9. Polarity	When a DC source's "+" polarity is attached to speaker's "+" polarity, "-" polarity is attached speaker's "-" polarity, the membrane will move forward.

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3. General Reliability	
3-1 General	After any following tests the response at 1 KHz shall not deviate more than $\pm 3$ dB from the initial value
3-1 Temperature Shock Test	Temperature: $-40^{\circ}\pm 3^{\circ}\text{C}$ $\longleftrightarrow$ $+85^{\circ}\pm 3^{\circ}\text{C}$ Cycle: 10 cycles Duration: 1 hour 1 hour (recovery 2 hours)  (30minutes) (5minutes) 1 cycle (5minutes)
3-2 Static Humidity Test	Precondition at $+25^{\circ}\text{C}$ for 1 hour. Next expose samples to $+55^{\circ}\text{C}$ with 95% relative humidity for 96 hours with no bias. Finally allow test samples to dry at room ambient temperature for $3 \pm 1$ hour before taking final measurements.
3-3 Vibration Test	Secure device using a fixture appropriate for this test. Fixture shall be capable of mounting on vibration table. Vibrate from 10Hz to 2000Hz, 1 octave per minute, 0.06" double amplitude, 2mm displacement $\pm x$ , $\pm y$ , $\pm z$ directions with 15 g's force for 2 hrs per each plane.
3-4 Drop Test	Drop samples 1.5 meters three times in each direction along each of the three mutually perpendicular axes for a total of 18 shocks. (Samples shall be mounted in a 100g fixture)
3-5 Operating Life Test	1.5cc box; $25^{\circ}\text{C}$ ; Pink noise; 20Hz-20kHz; 1W; Crest factor 3-4; 96 H
3-6. Rated Sweep Power Test	1.5cc box; $25^{\circ}\text{C}$ ; Rated Power(1W); 600-1000Hz; 1 sec; 12 H
3-7 Max Power Test	1.5cc box; $25^{\circ}\text{C}$ ; Pink noise; 20Hz-20kHz; 1.5W; 1 sec on/60 sec off; 60 cycles
3-8. High Temperature Test	$85 \pm 2^{\circ}\text{C}$ ; 96H; 2H Recovery time
3-9. Low Temperature Test	$-40 \pm 2^{\circ}\text{C}$ ; 96H; 2H Recovery time

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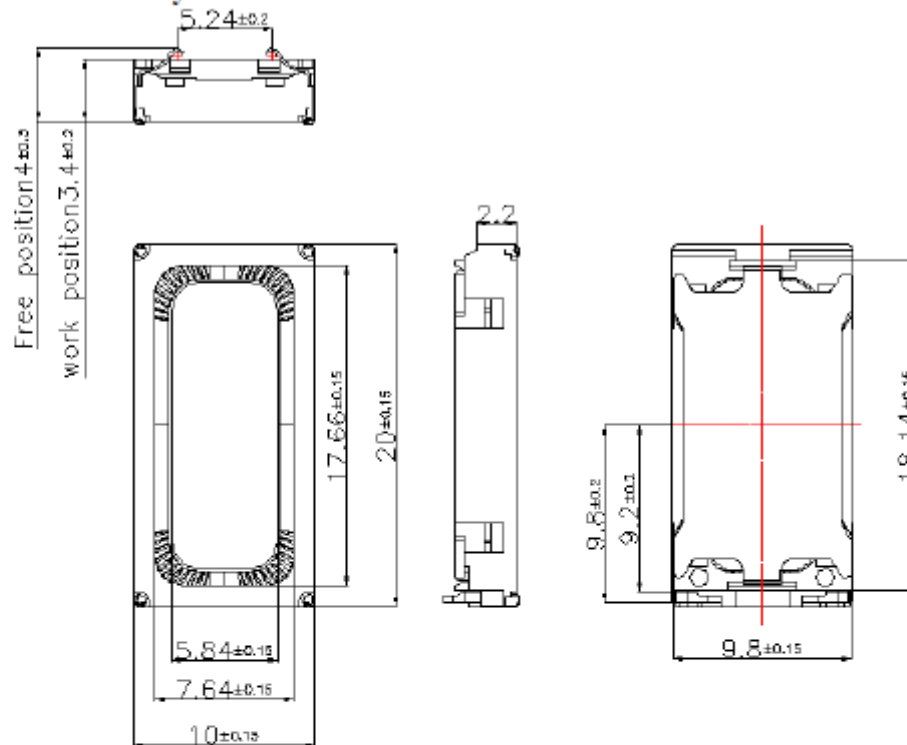
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## 4. Mechanical Layout and Dimensions

### 4.1 Mechanical Layout



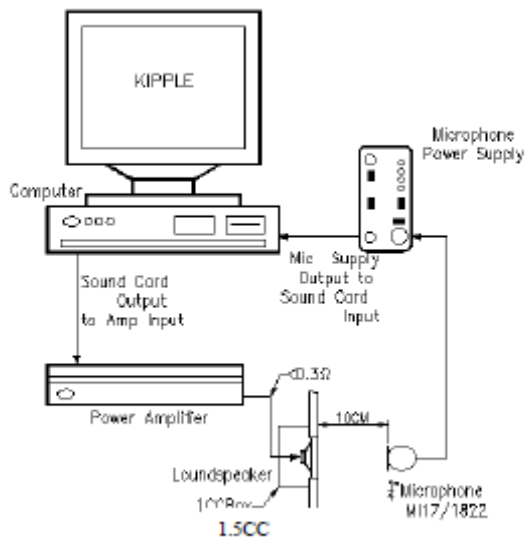
**Notes:**

1. General unless otherwise noted  $\pm 0.15$ mm.

(Figure 1)

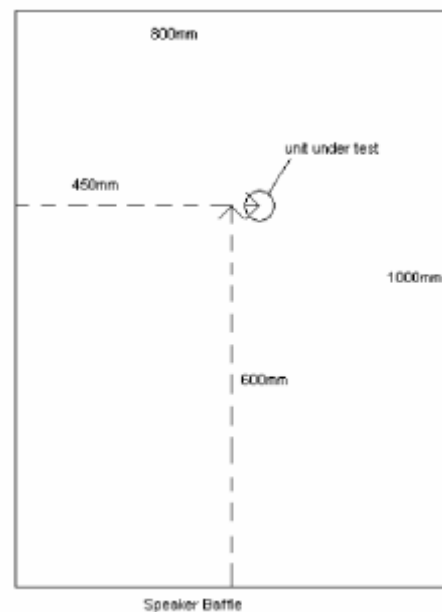
8	PAD	Stainless Steel	2	
7	Cover	Plastic	1	
6	Voice Coil	Copper	1	
5	Diaphragm	Polymer	1	
4	Pole Piece	Iron	3	
3	Magnet	NdFeB	3	
2	Yoke	Iron	1	
1	Frame	Plastic	1	
No.	Part Name	Material	Q'TY	Remark

### 5. Measuring Setup



(Figure 5)

### Baffle



(Figure 6)



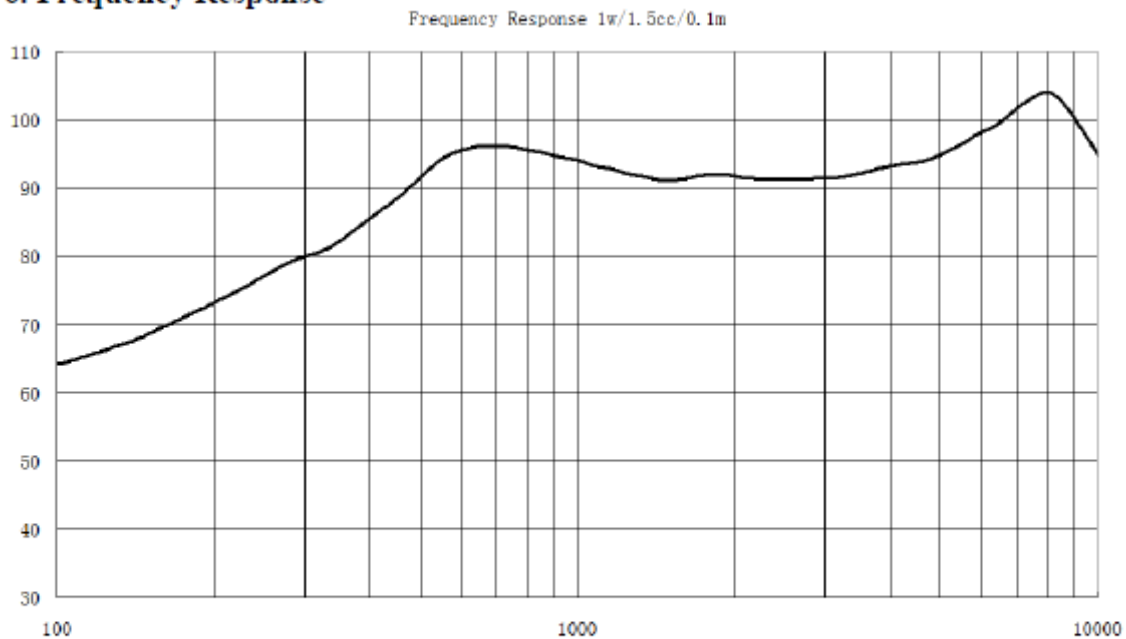
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## 6. Frequency Response



(Figure 7)

Table 1: Tolerance Limits Date for FR



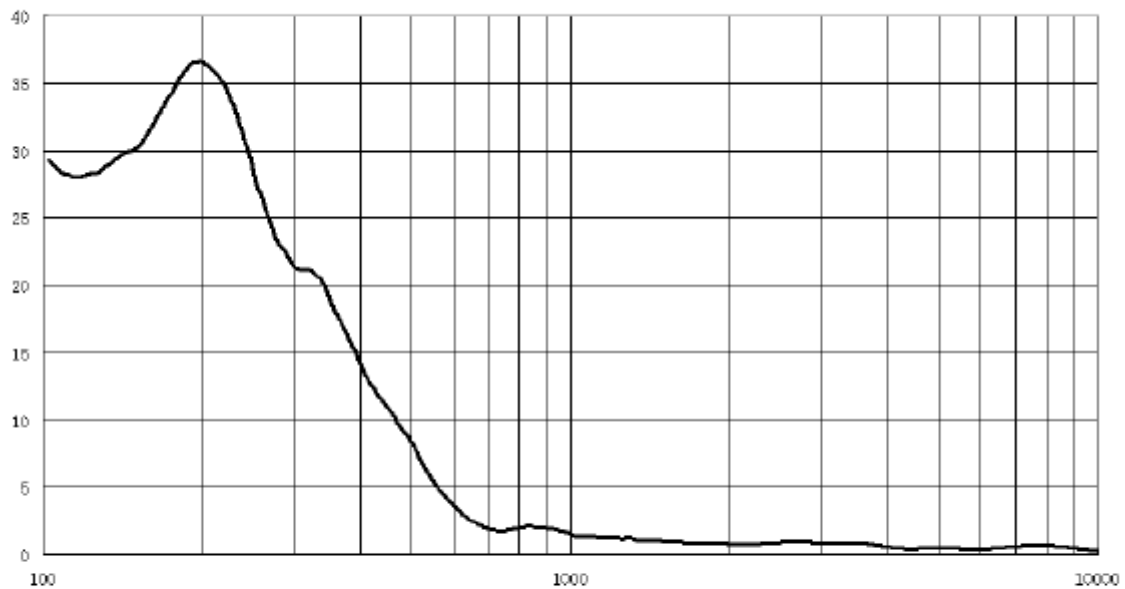
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## 7. Total Harmonic Distortion

THD 1w/1.5cc/0.1m



(Figure 8)

Table 2: Limits Date for THD

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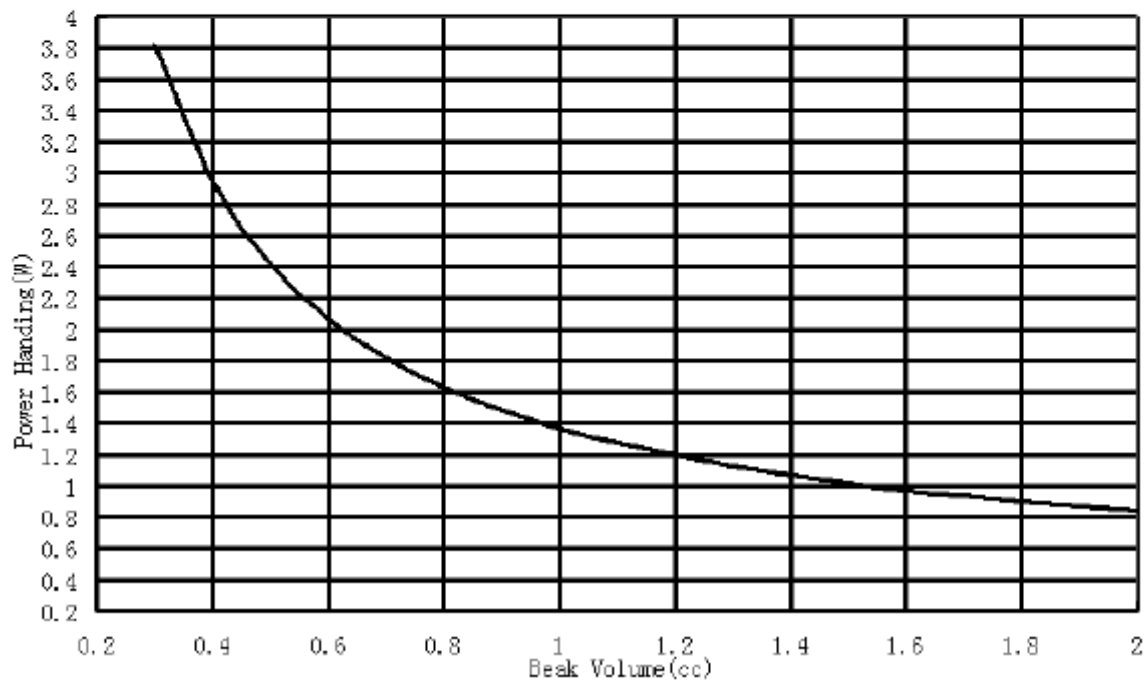
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### 8. Application Note

1. Air tight is needed between front cover of speaker and housing, otherwise cause audio performance's losing, such as higher THD, lower sensitivity;
2. Tiny air leakage in back of speaker is permitted to keep balance of air pressure;
3. For this speaker, the standard power is 1W in 1.5cc back cavity, when the back cavity is less or more than the standard volume of back cavity, the handling power also will be changed. See below figure about the relationship between power handling and back volume, here the power is excursion limited power; the thermal power should be evaluated, especially in small back cavity, such as 0.5cc. And the recommend minimum back volume is 0.5cc.
4. If the power higher than 1W input the speaker in standard back cavity, there is the risk of damaging speaker. In case of the back volume larger than 1.5cc, i.e. 2cc, the power handing of the speaker is pretty low. To maintain the rated power as 1W, we suggest adding thicker mesh with more acoustic resistance on the cover to reduce the vibration amplitude, or using electric filter to attenuate the maximum vibration amplitude.



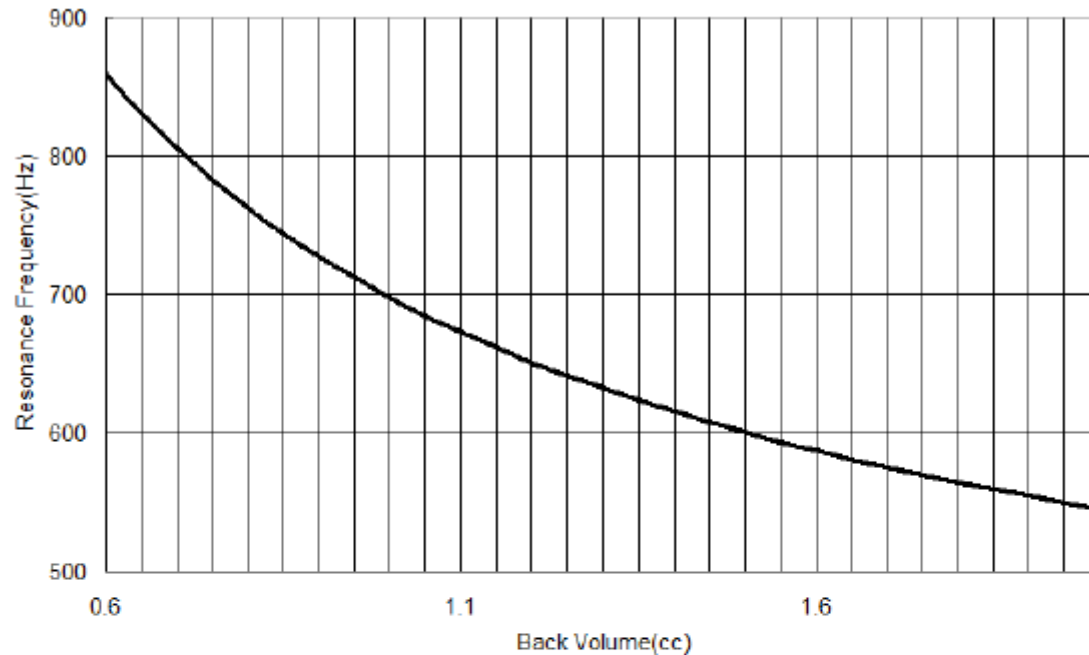
(Figure 9)

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## 5. Resonance frequency VS sealed back volume

The resonance frequency of the speaker box will vary with different sealed back volume.



(Figure 10)

## 6. T/S parameters

Thiele-Small Parameters: The following Thiele-Small Parameters are guidelines from a speaker exhibiting good audio performance.

F <sub>s</sub>	350	Hz
R <sub>e</sub>	7.2	ohm
S <sub>d</sub>	1.27	cm <sup>2</sup>
B <sub>l</sub>	1.02	T.m
V <sub>as</sub>	3.4	cc
C <sub>ms</sub>	1.648	mm/N
M <sub>ms</sub>	139	mg
Q <sub>ms</sub>	2.25	
Q <sub>es</sub>	1.86	
Q <sub>t</sub>	1.1	





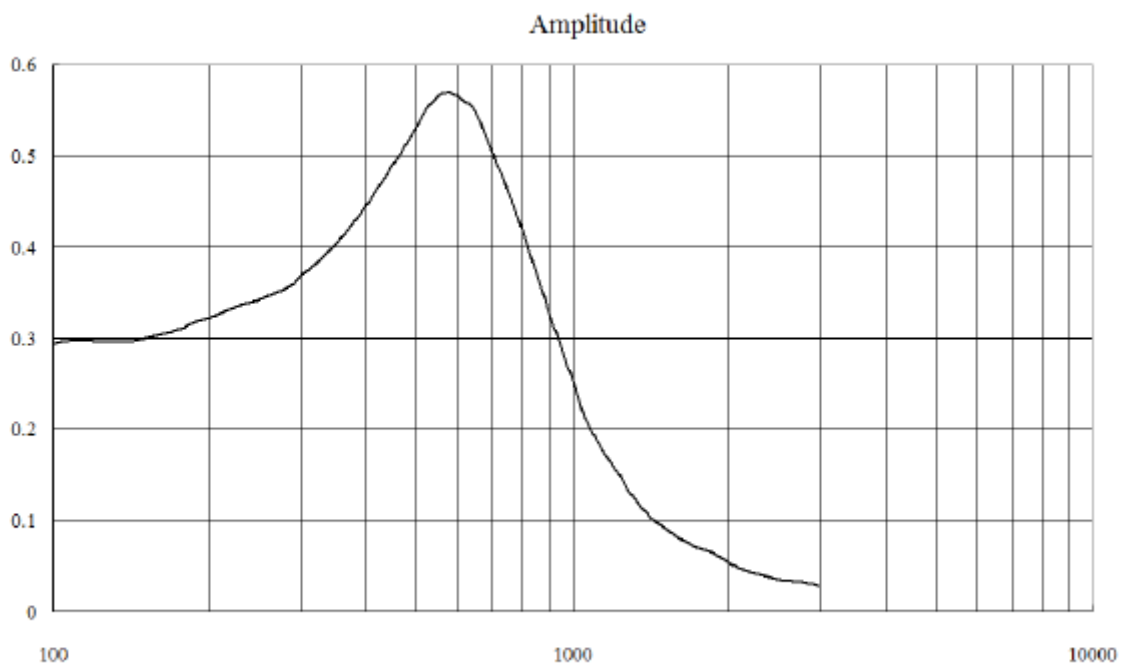
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**6. Peak to peak excursion**  
Xp-p (mm) at different Frequency



(Figure 11)

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## 9. Package

- 1、 100pcs of speaker in each tray
- 2、 20 trays in one carton
- 3、 Total:2000 pcs / 1 carton
- 4、 Gross Weight:6.2KGS
- 5、 Net Weight: 4.2KGS

