



BSWA Technology

BSWA MICROPHONES



Established in 1998, BSWA Technology Co., Ltd is becoming a preferred microphone supplier in China and the world. With the high quality and low price strategy, many OEMs and system integrators have selected BSWA microphones for their applications.

The microphone research project was originated by Dr. Maa Dah You, the professor of the Institute of Acoustics (IOA) in 1963. The project was to investigate the new electret material in making measurement microphones. With the lead of Professor Tao Zhongda, the

research group developed the first 1/2" prepolarized microphone in 1982. The paper was presented in the First National Acoustics Conference in 1984 and two patents were filed with Chinese Patent Office in 1986.

The manufacture of microphones was started in 1986 by the IOA. The production volume reached several thousands by 1998. At the meantime, a small group led by Dr. Wu Qunli in Singapore was involved in the research of the diamond-coated diaphragm and ICP powered preamplifiers. The joint-venture company - BSWA Technology, was established by the two research groups from Beijing and Singapore.

As the technology orientated company, BSWA invested heavily in new product developments. The ICP preamplifier was introduced to the market in 1998, the USB soundcard with ICP inputs was developed in 2001 and the phase calibrated array microphone is launched in 2003. The diamond-coated outdoor microphone is expected in 2004.

BSWA business covers many aspects in acoustics and vibration, including Instrument, Consulting, Anechoic Chamber, and Training. The instrument division provides precision measurement equipment from the world leading acoustic companies, Mueller BBM, Casella-CEL, Lochard, SoundPlan and AutoSEA. The consulting services cover Auditorium Design, Quiet Product Design, Automotive NVH and Environmental Noise Impact Studies. The company also designs and builds Anechoic Chambers for industries. More than 20 chambers were built by BSWA in last four years.



Microphone Cartridge Model: MP201

Main Features:

MP201 ½ inch prepolarized condenser microphones are developed based on 25 years of experience in design, manufacturing, calibration and field use of microphones. All microphones are individually calibrated in accordance with IEC standards and environmentally tested for long-term stability. Its stability and versatility has been proven in all fields of acoustic measurements.

For years, BSWA TECH has developed innovative techniques to manufacture the quality microphones. The patented diaphragm manufacturing technology eliminates the high frequency diffraction and ensure the flat frequency responses. With nickel alloy housing and diaphragm, MP201 microphones are capable to withstand rugged and corrosive environments.

Technical Specifications:

Diameter	1/2 inch
Response	Free Field
Open-Circuit Sensitivity (250 Hz)	50 mV/Pa [1]
Frequency Response	20 – 20 kHz [2]
Polarization Voltage	0 V [3]
Dynamic Range –3% Distortion Limit	> 146 dB
Cartridge Thermal Noise	< 10.0 dBA
Capacitor (Typical)	16.0 pF
Pressure Equalization Vent	Rear Vented
Operating Temperature	-35 to 80°C
Operating Humidity:	0 to 98% RH
Temperature Coefficient (250 Hz)	- 0.005 dB/°C [4]
Ambient Pressure Coefficient (250 Hz)	:-0.02 dB/kPa
Dimensions	IEC 1094-4 Type WS 2

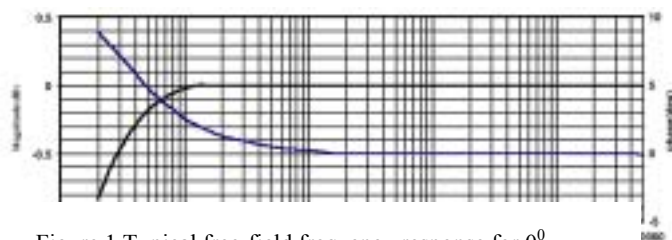


Figure 1 Typical free-field frequency response for 0°



Notes:

- [1] The manufacturing tolerance: 50.0 -8.0/+5.0 mV/Pa
- [2] The manufacturing tolerance: half of Tolerance Limit of IEC 651 Type I. The more information can be obtained in BSWA Hardware Technical Specification for MP201.
- [3] Prepolarized microphone: It can be driven by ICP preamplifier.
- [4] Temperature Coefficient: Aged at 80 °C and tested for temperature ranges from –10 to 50 °C.

Applications:

Traditionally, BSWA TECH supplies microphones to Sound Level Meter manufacturers. The microphones are also very popular in secondary market as replacement microphones. The main applications:

- ☼ Type 1 or Class 1 Sound Level Meter
- ☼ High quality microphone array
- ☼ Multichannel analysers

With ICP Microphone Preamplifier (MA201) and Current Source (MC102), the microphones can be easily connected to data acquisition systems. With the standard BNC connectors from the Current Source, the microphone signal can be connected to virtually any existing equipment, such as signal and audio analysers, oscilloscopes or data recorders.

The microphone systems (MP201 with MA201) comply with IEC 651 Type I Standard, and especially suitable to develop acoustic measurement and array systems.

ICP[®] Preamplifier Model: MA201

Main Features

MA201 current drive microphone preamplifier is specially developed for ½ inch Prepolarized microphones. It is a high-performance preamplifier with low inherent noise and high input impedance. The excellent frequency response ensure that the microphone with MA201 complies with IEC 651 Type I requirements. MA201 preamplifier can be directly connected to any ICP inputs.

Technical Specifications

Frequency Response (Ref: 250 Hz, ± 0.2 dB)	10 Hz – 200 kHz
Attenuation (10 Hz – 100 kHz)	< 0.2 dB
Phase Linearity	Refer to Figure 1
Input Impedance	> 50 GΩ
Output Impedance	< 100 Ω
Electrical Noise	A-weighting < 2.0 μV 20 Hz - 20 kHz < 3.0 μV
Max Output Voltage	5.0 Vrms
Power Requirement	ICP (2 – 20 mA)
Temperature	-20°C to +80°C
Humidity	0 to 98% RH
Output Connector	BNC



Applications:

MA201 is used for general purposes sound measurements. Comparing with traditional microphones preamplifiers, the advantages of the ICP type are low cost, easy to use and long cable option. The dynamic range can be achieved with MP201 from 15 dBA to 130 dBA. (the low sensitivity microphone is required for noise level exceeded 130dBA) The main applications:

- ☼ Multichannel Systems
- ☼ Automotive NVH
- ☼ Microphone array
- ☼ General Purpose Measurements

Two versions of MA201 are available with different length. MA201 is 98 mm long and MA211 is only 69 mm long.

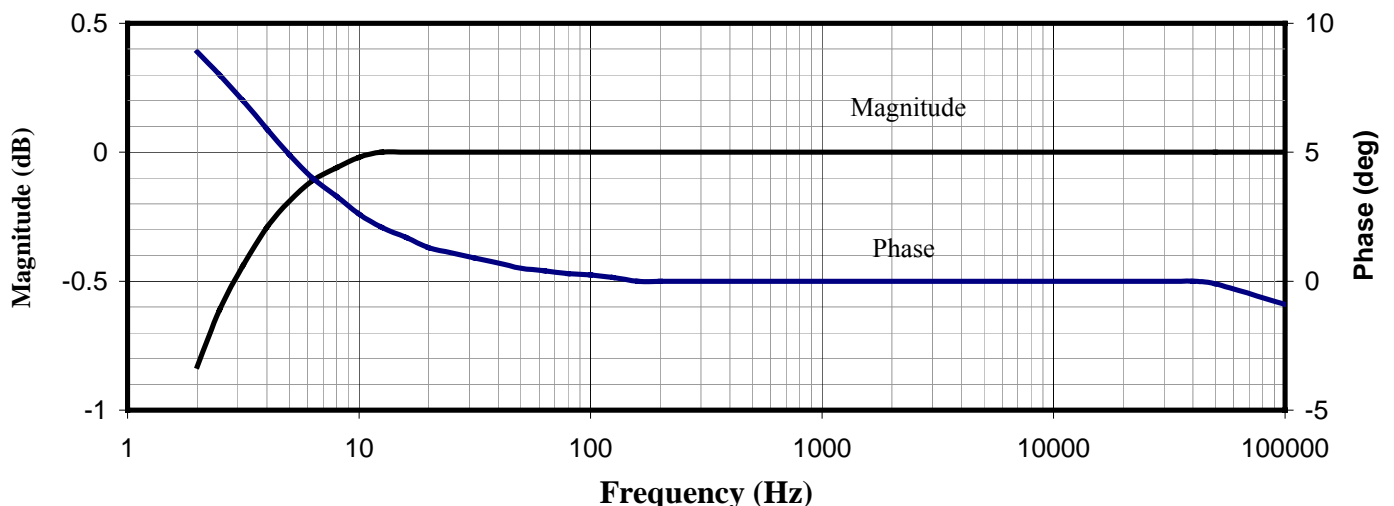


Figure 2 Typical frequency response curves (magnitude and phase) for ICP Preamplifier.

Microphone Cartridge Model: MP206

Main Features

MP206 ½ inch prepolarized condenser microphones are specially developed for the need of high quality and low cost Type 2 microphones. All microphones are tested for long-term stability and reliability.



For years, BSWA TECH has developed innovative techniques to manufacture the quality microphones. **MP206** has unique design features to ensure the quality. Specially designed protection grids reduce the directivity factors in high frequencies

MC102 is a 2-channel ICP power supplier which provide 4.0 mA to MA201 preamplifiers or other ICP sensors. The output signals can be directly connected to other equipment or data acquisition boards with BNC connectors.

Technical Specifications

No. of Channels	2
Constant Current	4.0 mA
Battery	9 V, PP3
Low Battery Indicator	Yes
Input Connector	BNC
Output Connector	BNC
Battery Life	> 6 hrs
Size	

Technical Specifications

Diameter	1/2 inch
Response	Free Field
Open-Circuit Sensitivity (250 Hz)	30 mV/Pa
Frequency Response	20 – 10 kHz [1]
Polarization Voltage	0 V [3]
Dynamic Range –3% Distortion Limit	> 140 dB
Cartridge Thermal Noise	< 25.0 dBA
Capacitor (Typical)	17.0 pF
Pressure Equalization Vent	Rear Vented
Operating Temperature	-10 to 50°C
Operating Humidity:	0 to 98% RH
Temperature Coefficient (250 Hz)	- 0.02 dB/°C
Ambient Pressure Coefficient (250 Hz)	: -0.01 dB/kPa
Dimensions	IEC 1094-4 Type WS 2 [2]

[1] Complying with IEC Class II requirements

[2] Protection Grid is not removable

ICP[®] Power Model: MC102



USB Soundcard – ICP® Inputs Model: MC3022

Main Features

MC3022 is a USB Soundcard with two ICP input channels and one signal output channel. The ICP input channels can be directly connected to ICP type of sensors, such as microphones and accelerometers. The output channel provides the signal output to loudspeaker or other devices. With this hardware it is easy to build your own two-channel sound and vibration measurement systems.

MC3022 is based 24 bit A/C converters with two channel simultaneous sampling frequency of 44.1 kHz. The frequency response ranges from 20 Hz to 20 kHz with accuracy of +0.5/-1.0 dB. The cross talk between channels is better than 80 dB. Special designed circuits reduce the high frequency noise from USB power supply and reduce the system noise floor. With microphones and preamplifiers from BSWA, the MC3022 is capable to measure noise from 29 dBA to 125 dBA without gain change.

MC3022 is USB powered plus&play device. It does not require driver software under Window2000 and XP. The MC3022 supports all data acquisition and measurement software and systems based on soundcard technology.

Applications

MC3022 is a soundcard with USB and ICP. It is specially developed for OEM and DIY markets for acoustic measurements. The main applications:

- ⊗ Audio Acoustic Testing
- ⊗ Two-Channel Analysers
- ⊗ Environmental Noise Measurements
- ⊗ Building Acoustics Testing

MA201 with MP201 can be directly connected to MC3022 to convert acoustic signal into computer. To develop a two-channel analyser, one will need

- ⊗ MC3022 – 1 unit
- ⊗ MP201 - 2 units
- ⊗ MA201 – 2 units
- ⊗ BNC cable – 2 units
- ⊗ Software from the third party or to develop your own applications.



Technical Specifications

Input Channel	2
Input Channel Type	ICP (4 mA)
Input Connector	BNC
A/D Converter	24 bits
Max. Sampling Frequency	44.1kHz
Cross Talk	> 80 dB
Frequency Response (Ref: 250 Hz, + 0.5 dB/-1.0 dB)	20 Hz – 20 kHz
Total Harmonic Distortion	< 0.01%
Measurement Range (with MP201 and MA201)	29 – 125 dBA
Max. Input Voltage	1.0 Vrms
Output Channel	1
Output Frequency Range	20 Hz – 20 kHz Achievable Sine, Pink, White noise.
Max Output Voltage	1.0 Vrms
Power Requirement	USB power
Temperature	-10°C to +40°C
Humidity	0 to 98% RH
Size(mm)	156 × 117 × 36
Weight (g)	550

Microphone Array Model: MS4015

Main Features

MS4015 is fifteen-microphone linear array for the measurements requiring a large number of measurement points. Such measurements include phased array, acoustic holography or other acoustic measurements requiring amplitude and phase matches between the channels. BSWA understands the needs for the measurements and developed MS 4015 for the applications. MS4015 array uses high quality microphones and preamplifiers to reduce the temperature and humidity effects on sensitivities and phases. The main features:

- ☼ IEC 651 Type 1 Microphones and ICP preamplifiers
- ☼ Sensitivities match within $\pm 0.8\text{dB}$ (20Hz – 12.5kHz)
- ☼ Phase match within ± 1.0 degree (100 – 3000 Hz)
- ☼ Stable with temperature and humidity with temperature coefficient $< 0.005\text{dB}/^\circ\text{C}$
- ☼ Easy to Use with BNC connectors
- ☼ Competitive price

MS4015 consists of three components: microphones, preamplifiers and array fixture. The microphone spacing can be adjusted to 75 mm, 150mm, 225mm or 300mm. Microphones use MP201 with sensitivities and phase calibrations. Preamplifiers use MA211 or MA201. The Array Fixture made of metal with BNC plugs at 75 mm apart. MA211 can be directly connected to the fixture and output uses individual BNC cable to the analyser.

The fifteen microphones and preamplifiers are individually labelled. The calibrations of fifteen microphones and preamplifiers are performed in specially developed plane-wave tube, where the loudspeaker was installed in one end and the fifteen microphones are fixed in the other end. A reference microphone was selected (labelled as No. 8). All calibrations are referred to the reference microphone. The amplitudes and phases information is provided as function of frequencies up to 3000 Hz.

Applications

MS4015 is fifteen-microphone array. It can be arranged as linear, plane, cross or triangle arrays. The number of channels can be altered to meet the application needs. The main applications:

- ☼ Linear Array
- ☼ Cross Array
- ☼ Plane or Triangle Arrays
- ☼ Multipoint measurements.



Technical Specifications

No. of Microphone Channels	15
Microphone Type	MP201
Preamplifier Type	MA211
Channel Sensitivity Match	45 ± 5 mV/Pa
Frequency Response ($\pm 0.8\text{dB}$)	20 Hz – 12.5 kHz
Phase Mismatch	
100 Hz – 3000 Hz	$< \pm 1.0$ degree
3000 Hz – 8000 Hz	$< \pm 3.0$ degree
Measurement Range	20 – 130 dBA
Temperature Coefficient (250 Hz)	0.005 dB/ $^\circ\text{C}$
Ambient Pressure Coefficient (250 Hz)	0.02 dB/kPa
Power Requirement	ICP,
Microphone Spacing (mm)	75, 150, 225 or 300
Preamplifier Connector	BNC
Signal Output Connector	BNC
Temperature	-30°C to $+80^\circ\text{C}$
Humidity	0 to 98% RH
Length (with 75 mm Mic Spacing)	1150 mm
Weight(g)	2000



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