



Silicon Microphone

BM51ABB

Bestow Mascot

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1. Description

1.1 General Description

The BM51ABB is a miniature, high- performance, low power, bottom port silicon microphone. Using BM's proven high performance Silicon MEMS technology, the BM51ABB consists of an acoustic sensor, a low noise input buffer, and an output amplifier. These devices are suitable for portable electronic devices where excellent wideband audio performance and RF immunity are required.

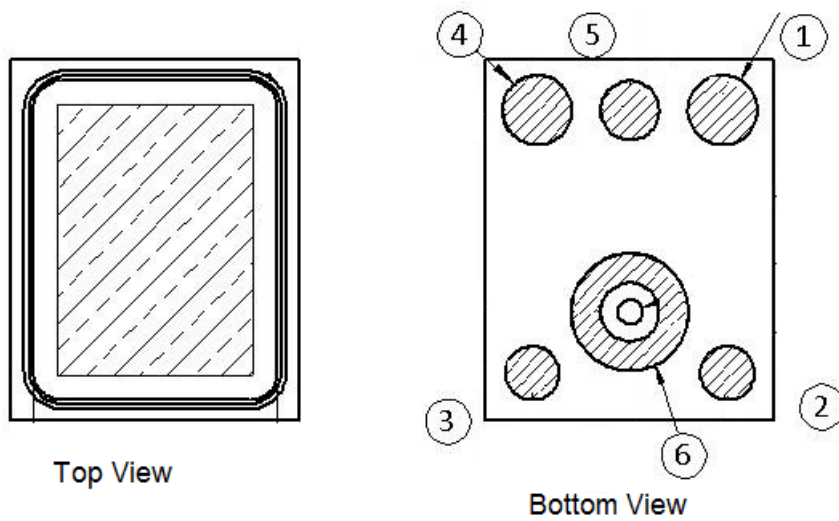
1.2 Features

- Matched Sensitivity
- Flat Frequency Response
- Low Current
- Small Package
- MaxRF Protection
- Ultra-Stable Performance
- Standard SMD Reflow
- Omnidirectional

1.3 Applications

- Mobile terminals
- Laptop and notebook computers
- Portable media players
- VoIP
- Speech recognition
- A/V eLearning devices
- Gaming and virtual reality input devices
- Digital still and video cameras
- Antitheft systems

2. Pin Description



Pin #	Pin Name	Type	Description
1	OUTPUT	Signal	Output Signal
2	GROUND	Power	Ground
3	GROUND	Power	Ground
4	V_{DD}	Power	Power Supply
5	GROUND	Power	Ground
6	GROUND	Power	Ground

3. Characteristics

3.1 Absolute Maximum Ratings

Parameter	Absolute Maximum Rating	Units
V_{DD} to Ground	-0.5, +5.0	V
OUT to Ground	-0.3, $V_{DD} + 0.3$	V
Input Current to Any Pin	± 5	mA
Temperature Range	-40 to +100	°C

Notes: Stresses exceeding these “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation at these or any other conditions beyond those indicated under “Acoustic & Electrical Specifications” is not implied. Exposure beyond those indicated under “Acoustic & Electrical Specifications” for extended periods may affect device reliability.

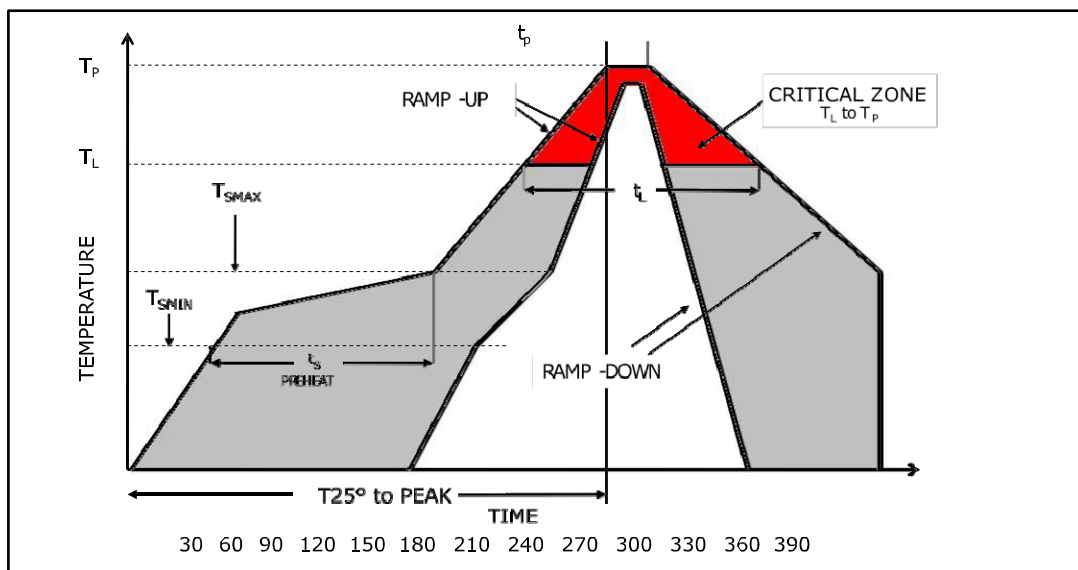
3.2 Acoustic & Electrical Specifications

Parameter	Symbol	Condition	Limits			Unit
			Min	Nom.	Max	
Sensitivity	S	f=1kHz, Pin=1Pa, 0dB=1V/Pa	-41	-38	-35	dB
Directivity	-	-	Omni-directional			-
Output Impedance	ZOUT	f=1kHz	-	-	400	Ω
Current Consumption	I	1.6V to 3.6V	-	-	250	μ A
S/N Ratio	S/N	f=1kHz, Pin=1Pa, (A-Weighted)	-	62	-	dB
Operating Voltage	-	-	1.6	2	3.6	V
Sensitivity vs. Voltage	ΔS	Vs= 3.6V to 1.6V	<0.5			dB
Total Harmonic Distortion	THD	100dB SPL @1KHz	-	-	1	%
		115dB SPL @1KHz	-	-	5	

Test condition: +20°C, 45%-75%RH, 86-106Kpa, V_{DD} =2V, unless specified differently.

4.Package Information

4.1 Recommended Reflow Profile

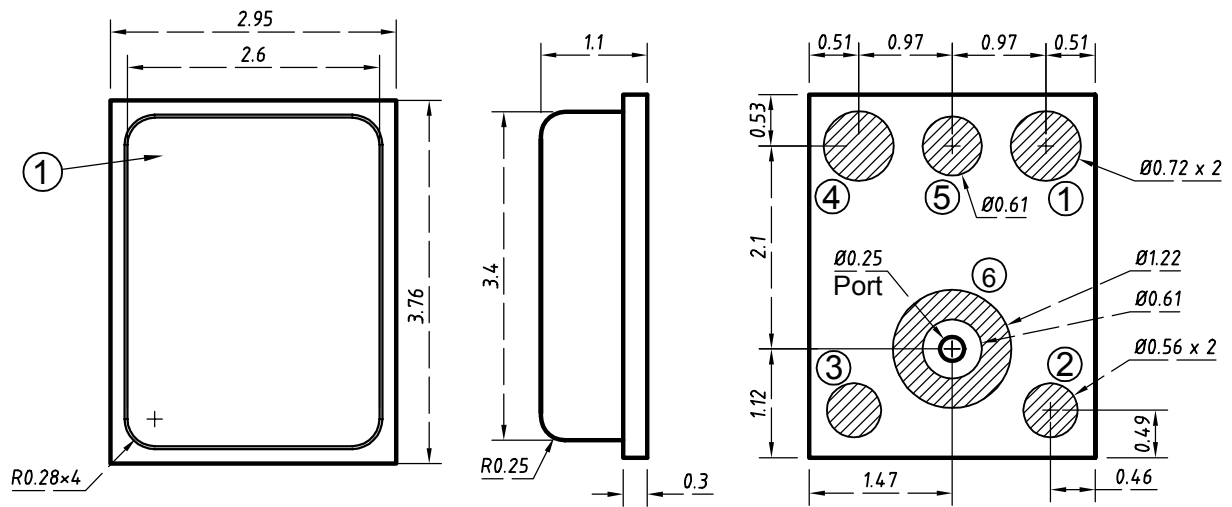


Profile Feature	Pb-Free
Average Ramp-up rate (T_{SMAX} to T_P)	3°C/second max.
Preheat	
Temperature Min (T_{SMIN})	150°C
Temperature Max (T_{SMAX})	200°C
Time (T_{SMIN} to T_{SMAX}) (t_S)	60-180 seconds
Time maintained above:	
Temperature (T_L)	217°C
Time (t_L)	60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20-40 seconds
Ramp-down rate (T_P to T_{SMAX})	6°C/second max
Time 25°C to Peak Temperature	8 minutes max

Notes: Based on IPC/JDEC J-STD-020 Revision C.

All temperatures refer to topside of the package, measured on the package body surface.

4.2 Package Outline Information



TOP VIEW

SIDE VIEW

BOTTOM VIEW

Item	Dimension (mm)	Tolerance (mm)
Length (L)	3.76	±0.10
Width (W)	2.95	±0.10
Height (H)	1.10	±0.10
Acoustic Port (AP)	Ø0.25	±0.08

Note: Tolerance is ±0.15mm unless otherwise specified.

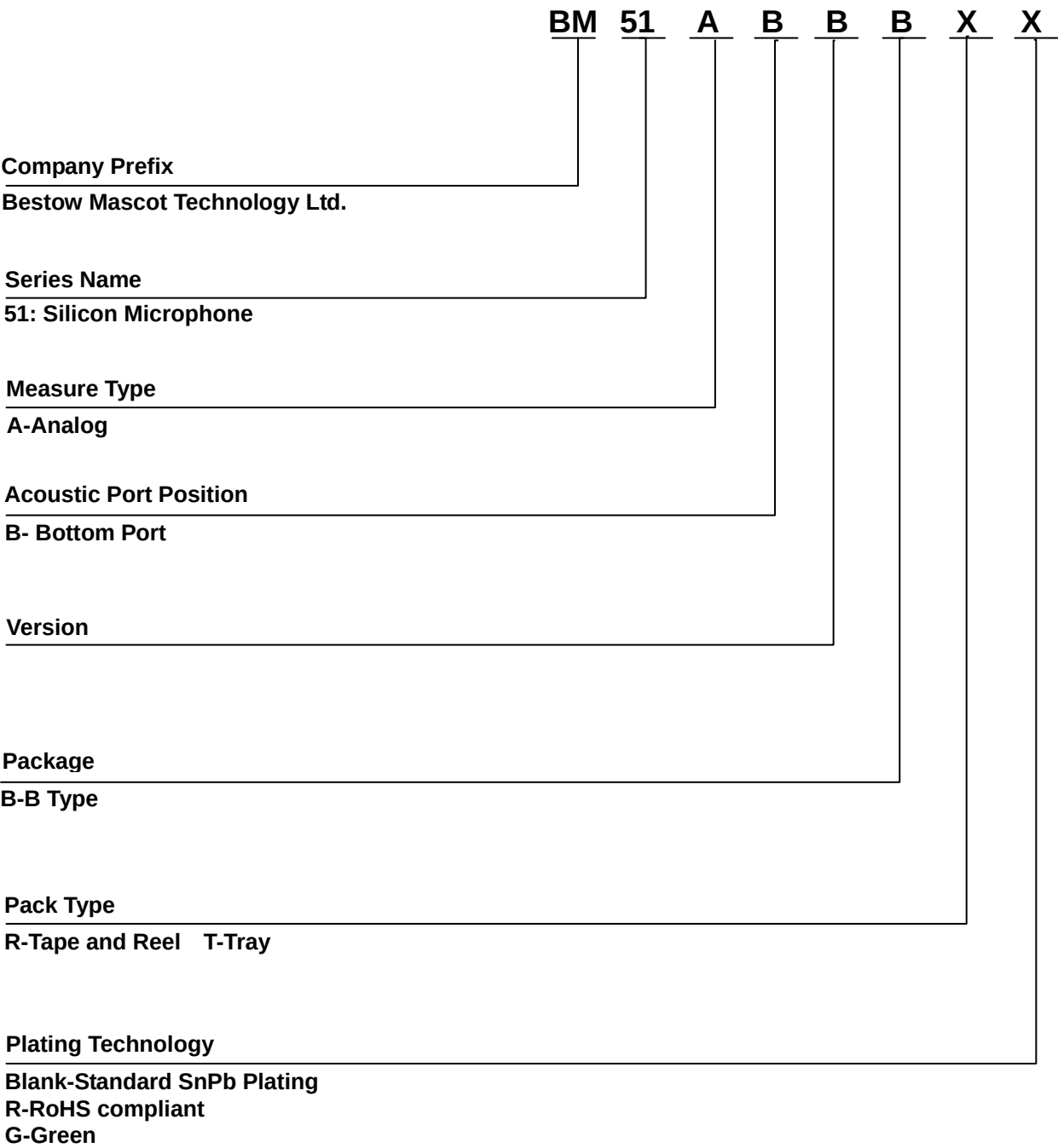
4.3 Reliability Specifications

Test	Description
Thermal Shock	100 cycles air-to-air thermal shock from -40°C to +125°C with 15 minute soaks. (IEC 68-2-4)
High Temperature Storage	1,000 hours at +105°C environment (IEC 68-2-2 Test Ba)
Low Temperature Storage	1,000 hours at -40°C environment (IEC 68-2-2 Test Aa)
High Temperature Bias	1,000 hours at +105°C under bias (IEC 68-2-2 Test Ba)
Low Temperature Bias	1,000 hours at -40°C under bias (IEC 68-2-2 Test Aa)
Temperature / Humidity Bias	1,000 hours at +85°C/85% R.H. under bias. (JESD22-A101A-B)
Vibration	3 cycles of 20 to 2,000 Hz sinusoidal sweep with 20 G peak acceleration lasting 12 minutes in X, Y, and Z directions. (Mil-Std-883E, method 2007.2 A)
ESD-HBM	3 discharges of ±2 kV direct contact to I/O pins. (ESD STM5.2)
ESD-MM	3 discharges of ±2 kV direct contact to I/O pins. (MIL 883E, Method 3015.7)
Reflow	3 reflow cycles with peak temperature of +260°C
Mechanical Shock	3 pulses of 10,000 G in the X, Y, and Z direction (IEC 68-2-27, Test Ea)

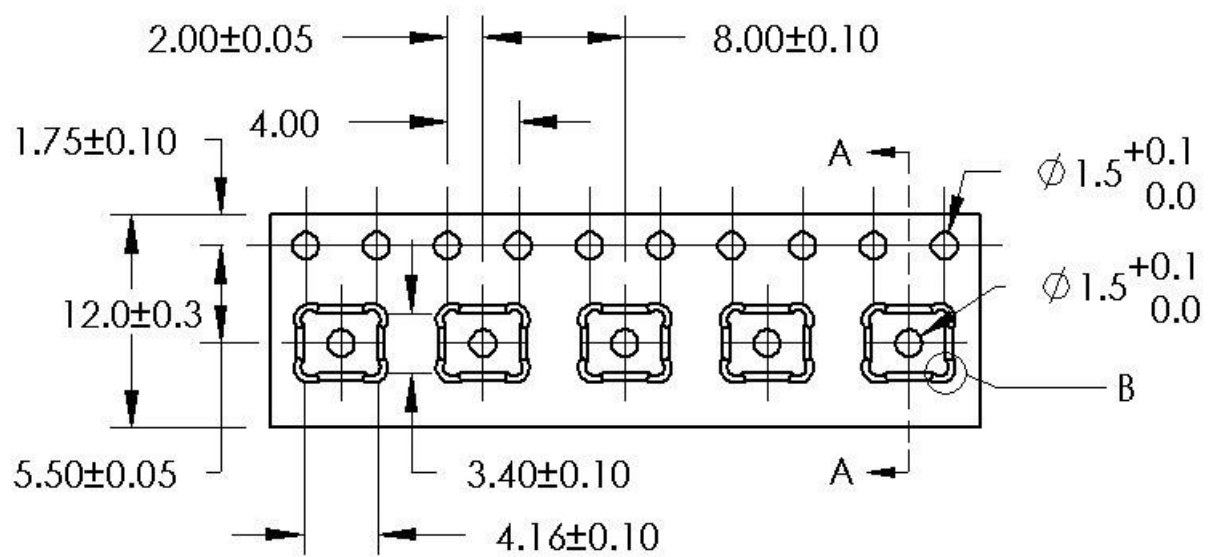
Note: After reliability tests are performed, the sensitivity of the microphones shall not deviate more than 3 dB from its initial value.

5 Ordering Information

5.1 Part Numbering



5.2 Tape and Reel Information



Container	Tape and reel
Reel Diameter	13"
Quantity Per Reel	5000 pcs

6. Notice

●General Precaution

- 1) Before you use our Products, you are requested to carefully read this document and fully understand its contents. BM shall not be in any way responsible or liable for failure, malfunction or accident arising from the use of any BM's Products against warning, caution or note contained in this document.
- 2) All information contained in this document is current as of the issuing date and subject to change without any prior notice. Before purchasing or using BM's Products, please confirm the latest information with a BM sales representative.

●Precaution on using BM Products

- 1) Our Products are designed and manufactured for application in ordinary electronic equipments (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment, transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the BM sales representative in advance. Unless otherwise agreed in writing by BM in advance, BM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any BM's Products for Specific Applications.
- 2) BM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
 - [a] Installation of protection circuits or other protective devices to improve system safety
 - [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure
- 3) Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, BM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any BM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
 - [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
 - [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust

[c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂

[d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves

[e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items

[f] Sealing or coating our Products with resin or other coating materials

[g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering

[h] Use of the Products in places subject to dew condensation

4) The Products are not subject to radiation-proof design.

5) Please verify and confirm characteristics of the final or mounted products in using the Products.

6) In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse) is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

7) De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.

8) Confirm that operation temperature is within the specified range described in the product specification.

9) BM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

●Precaution for Mounting / Circuit board design

1) When a highly active halogen us (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

2) In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the BM representative in advance. For details, please refer to BM Mounting specification

●Precautions Regarding Application Examples and External Circuits

1) If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.

2) You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own

independent verification and judgment in the use of such information contained in this document. BM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

●Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

●Precaution for Storage / Transportation

1) Product performance and soldered connections may deteriorate if the Products are stored in the places where:

- [a] the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
- [b] the temperature or humidity exceeds those recommended by BM
- [c] the Products are exposed to direct sunshine or condensation
- [d] the Products are exposed to high Electrostatic

2) Even under BM recommended storage condition, solder ability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solder ability before using Products of which storage time is exceeding the recommended storage time period.

3) Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

4) Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

●Precaution for Product Label

QR code printed on BM Products label is for BM's internal use only.

●Precaution for Disposition

When disposing Products please dispose them properly using an authorized industry waste company.

●Precaution for Foreign Exchange and Foreign Trade act

Since our Products might fall under controlled goods prescribed by the applicable foreign exchange and foreign trade act, please consult with BM representative in case of export.

●Precaution Regarding Intellectual Property Rights

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7. Revision History

Version	Publication date	Pages	Revise Description
1.0	Mar.2016	15	Initial Document Release
1.1	Oct.2016	14	Update Package Information