



**THE DATASHEET OF
MP23AB02BTR**



MEMS audio sensor high-performance analog bottom-port microphone

Datasheet - production data



Description

The MP23AB02B is a compact, low-power microphone built with a low-profile sensing element.

The sensing element, capable of detecting acoustic waves, is manufactured using a specialized silicon micromachining process to produce audio sensors.

The MP23AB02B has an acoustic overload point of 125 dB SPL with a 64 dB signal-to-noise ratio.

The MP23AB02B is available in a package compliant with reflow soldering and is guaranteed to operate over an extended temperature range from -40 °C to +85 °C.

Features

- Single supply voltage operation
- Low power consumption
- Omnidirectional sensitivity
- High signal-to-noise ratio
- High bandwidth
- Package compliant with reflow soldering

Table 1. Device summary

| Order code | Temperature range (°C) | Package | Packing |
|-------------|------------------------|------------------------|---------------|
| MP23AB02B | -40 to +85 | (3.35 x 2.5 x 0.98) mm | Tray |
| MP23AB02BTR | -40 to +85 | (3.35 x 2.5 x 0.98) mm | Tape and reel |

1 Pin description

Figure 1. Pin connections

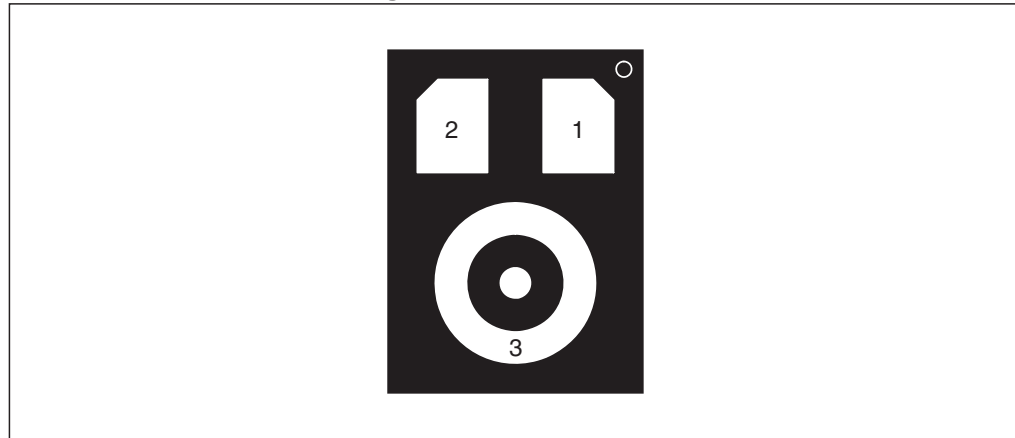


Table 2. Pin description

| Pin n° | Pin name | Function |
|--------|----------|---------------|
| 1 | Out | Analog output |
| 2 | Vdd | Power supply |
| 3 | GND | Ground |

2 Acoustic and electrical specifications

2.1 Acoustic and electrical characteristics

The values listed in the table below are specified for $V_{dd} = 1.8\text{ V}$, $T_{amb} = 25\text{ °C}$ unless otherwise specified.

Table 3. Acoustic and electrical characteristics

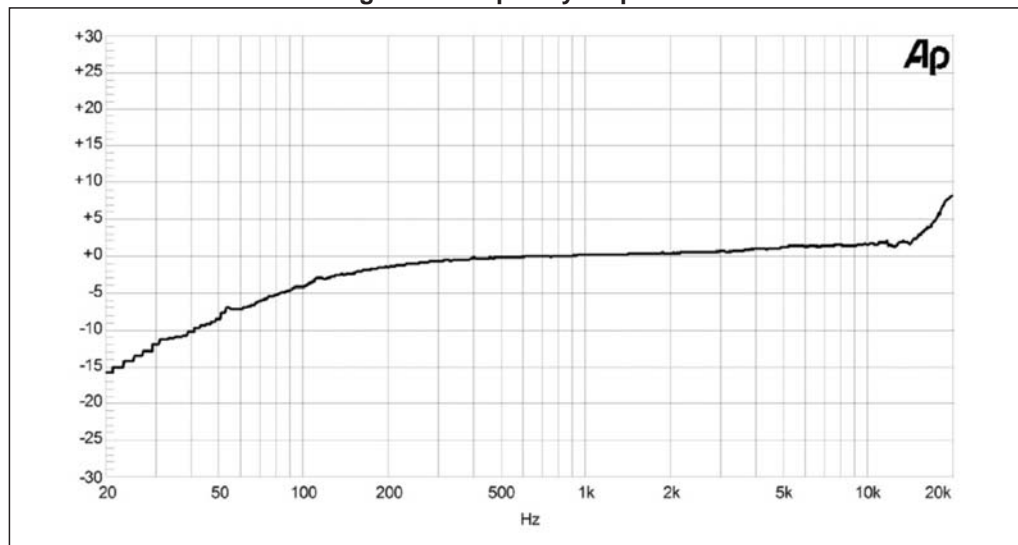
| Symbol | Parameter | Test condition | Min. | Typ. ⁽¹⁾ | Max. | Unit |
|--------|-----------------------------|--------------------------------------|------|---------------------|------|--------|
| Vdd | Supply voltage | | 1.6 | 1.8 | 3.6 | V |
| Idd | Current consumption | mean value = 2 V | | 150 | 220 | μA |
| So | Sensitivity | 1 kHz (0 dB = 1 V/Pa) | -41 | -38 | -35 | dBV/PA |
| SNR | Signal-to-noise ratio | A-weighted, 1 kHz (0 dB = 1 V/Pa) | | 64 | | dBa |
| Top | Operating temperature range | | -40 | | +85 | °C |

1. Typical specifications are not guaranteed

Table 4. Distortion specifications at 1 kHz

| Parameter | Test condition | Value |
|------------|----------------|--------|
| Distortion | 94 | < 0.5% |
| Distortion | 120 | < 2% |
| Distortion | 124 | = 10% |

Figure 2. Frequency response



3 Absolute maximum ratings

Stresses above those listed as “Absolute maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device under these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Table 5. Absolute maximum ratings

| Symbol | Ratings | Maximum value | Unit |
|------------------|---------------------------|---------------|------|
| V _{dd} | Supply voltage | -0.5 to 4 | V |
| T _{STG} | Storage temperature range | -40 to +125 | °C |



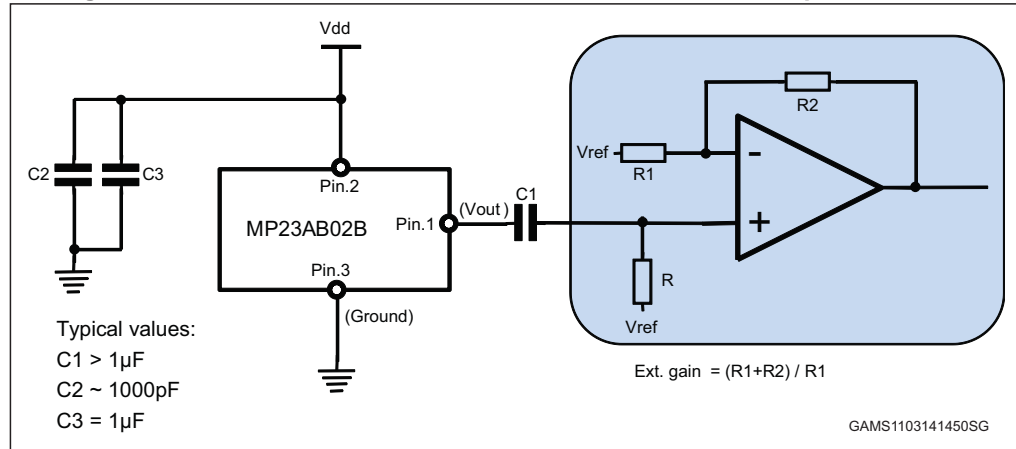
This device is sensitive to mechanical shock, improper handling can cause permanent damage to the part.



This device is sensitive to electrostatic discharge (ESD), improper handling can cause permanent damage to the part.

4 Application recommendations

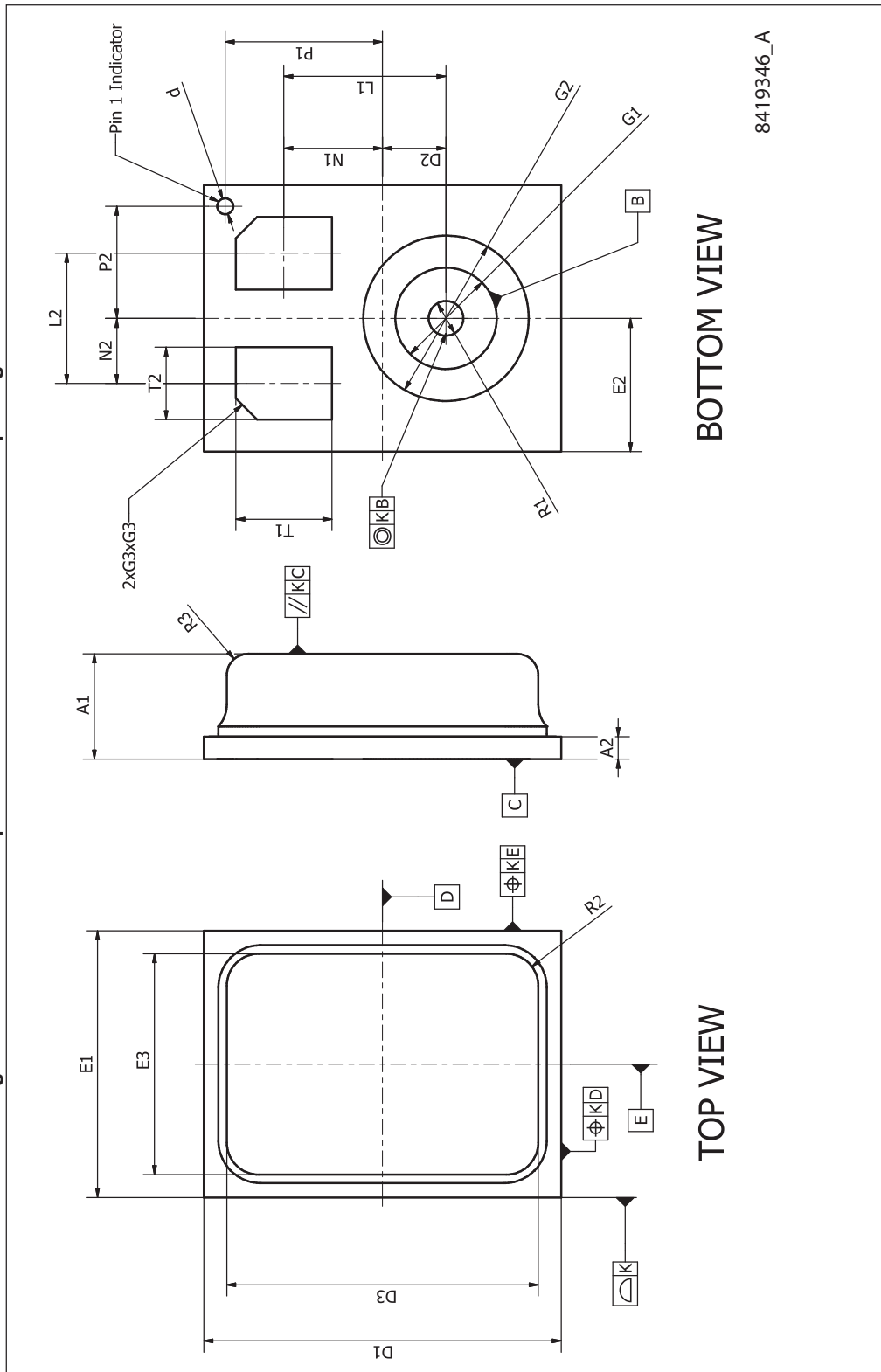
Figure 3. MP23AB02B electrical connections and external component values



5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Figure 4. RHLGA metal cap 3-lead 3.35 mm x 2.5 mm x 0.98 mm package outline



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Table 6. RHLGA metal cap 3-lead (3.35 x 2.5 x 0.98 mm) package dimensions

| Reference | Dimensions (mm) | | |
|-----------|-----------------|-------|-------|
| | Min. | Typ. | Max. |
| A1 | 0.880 | 0.980 | 1.080 |
| A2 | 0.200 | 0.250 | 0.300 |
| D1 | 3.250 | 3.350 | 3.450 |
| D2 | 0.495 | 0.595 | 0.695 |
| D3 | 2.770 | 2.920 | 3.070 |
| R1 | 0.275 | 0.325 | 0.375 |
| R2 | | 0.28 | |
| R3 | | 0.25 | |
| E1 | 2.400 | 2.500 | 2.600 |
| E2 | 1.150 | 1.250 | 1.350 |
| E3 | 1.920 | 2.070 | 2.220 |
| L1 | 1.480 | 1.520 | 1.560 |
| L2 | 1.180 | 1.220 | 1.260 |
| N1 | 0.885 | 0.925 | 0.965 |
| N2 | 0.570 | 0.610 | 0.650 |
| T1 | 0.860 | 0.900 | 0.940 |
| T2 | 0.640 | 0.680 | 0.720 |
| G1 | 0.900 | 0.950 | 1.000 |
| G2 | 1.400 | 1.550 | 1.600 |
| G3 | 0.100 | 0.150 | 0.200 |
| P1 | 1.425 | 1.475 | 1.525 |
| P2 | 1.000 | 1.050 | 1.100 |
| d | | 0.150 | |
| K | | 0.050 | |

6 Soldering information

Figure 6. Recommended soldering profile limits

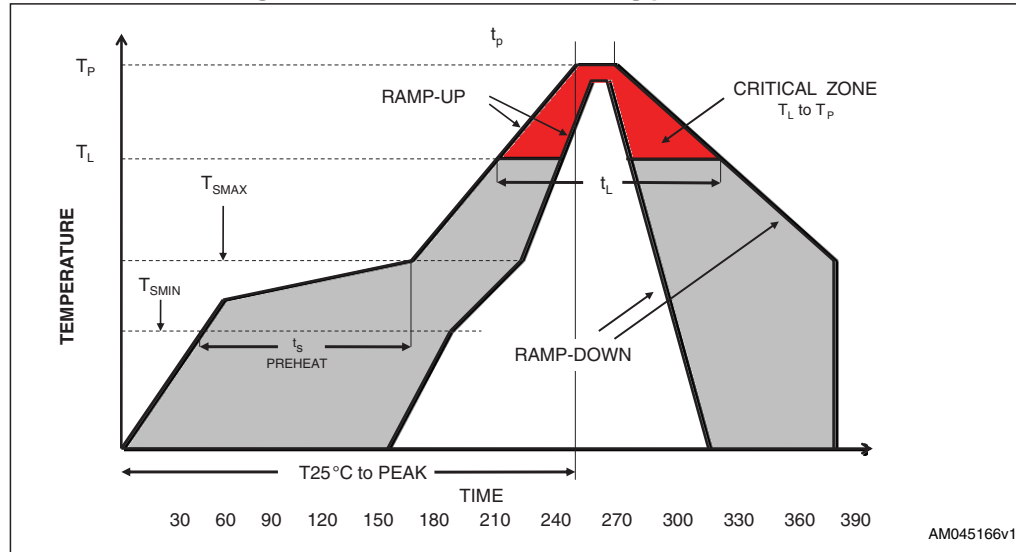


Table 7. Recommended soldering profile limits

| Description | Parameter | Pb free |
|---|---------------------|-------------------|
| Average ramp rate | T_L to T_P | 3 °C/sec max |
| Preheat | | |
| Minimum temperature | T_{SMIN} | 150 °C |
| Maximum temperature | T_{SMAX} | 200 °C |
| Time (T_{SMIN} to T_{SMAX}) | t_s | 60 sec to 120 sec |
| Ramp-up rate | T_{SMAX} to T_L | |
| Time maintained above liquidus temperature | t_L | 60 sec to 150 sec |
| Liquidus temperature | T_L | 217 °C |
| Peak temperature | T_P | 260 °C max |
| Time within 5 °C of actual peak temperature | | 20 sec to 40 sec |
| Ramp-down rate | | 6 °C/sec max |
| Time 25 °C ($t = 25$ °C) to peak temperature | | 8 minutes max |

7 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 21-Mar-2014 | 1 | Initial release. |
| 16-Jun-2014 | 2 | Updated <i>Figure 5 on page 9</i> . |
| 22-Sep-2014 | 3 | Updated acoustic overload point in <i>Description</i> . |

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