

ACOUSTICS
2015/16



Innovative Products for Intelligent Applications

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 **BOSAN HITECH**

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KOTL

VECO

BSE 



Dongguang RuiSheng

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endrich – Your partner for acoustic components

Acoustic components like sound generators, loudspeakers, microphones and vibration motors are widely used in numerous fields of industry, e. g. telecommunication industry, automotive industry, home appliances industry and many other applications. Increasing demands for sound (wide band, polyphonic sound spectrum), power performance, quality and reliability (zero-defect policy) as well as miniaturization are the current trends. In close collaboration with our excellent partners and certified suppliers VANSONIC, DONGGUAN RUICHENG, BSE, BOSAN, CHINASOUND, and KOTL, we provide solutions for any challenge.

The following pages list a major portion of our most popular acoustic components. In case of interest in other versions, modifications, and additional assemblies as well as detailed technical information, please contact us. It's our pleasure to serve you with our wide experience in automotive and non-automotive designs.

1 | SOUND GENERATORS



endrich provides piezoelectric and electromagnetic sound generators of the suppliers CHINASOUND, BOSAN and DONGGUAN RS. Sound generators are divided into transducers (AC signal) and buzzers with own electric circuit (DC).

BOSAN Hitech Co. Ltd. was established in January 1997 and is located in Incheon, South Korea. BOSAN is specialized in micro electromagnetic SMD transducers. The BOSAN production technology is unique and fully automated. All production machines are developed by BOSAN. All parts are lead-free reflow solderable. The advantages of the automated production methods are: stable costs, stable quality, stable delivery. The production capacity is 5 million pcs./month with just 30 employees.

Changzhou CHINASOUND Electronics Co., Ltd. is an ISO9001, TS16949 certified and well experienced company, continuously focusing on research, development and production of acoustic components since 1999. Main products are sound generators, especially piezo sound generators and alarm devices for many kind of applications like home appliances, medical equipment, smoke detectors and automotive applications. The factory is 3500 m² big, has 200 employees and is located in Changzhou. Certifications: ISO 9001, QS9000 and TS 16949. Production capacity 1,5 Mio pcs per month.

Chinasound

1.1 PIEZOELECTRIC TRANSDUCERS AND BUZZERS



The heart of all piezoelectric sound generators is a simple piezoceramic disc, covered with a silver layer and glued together with a metal carrier plate. If the disc is driven by an external oscillating circuit, the piezo sound generator is called piezoelectric transducer. If the disc is driven by a built-in oscillating circuit it's called piezoelectric buzzer.

The advantage of these simple structured acoustic components is their robustness and cost-efficient sound solution.

Piezo sound generators are the ideal choice for applications which need a simple sound signal within a small frequency range, e. g. warning and control sound signals of household appliances, medical and health care products. The dimension range of piezo sound generators starts from the miniaturized size of 9 mm × 9 mm × 1.8 mm up to ø 60 mm and covers sounds in a range from low soft sound to aggressive noisy sound. The design of almost all piezoelectric sound generators is adjusted to meet the most popular frequencies in the range between 2000 Hz and 5000 Hz.

Operation temperature range is available from - 40 °C to +120°C. Standard voltage range is between 3 V and 12 V, in special cases, according to customer's demand, higher voltages are possible. Piezoelectric sound generators are available with pins, wires or SMD pads.

APPEARANCE

PART NUMBER

DIMENSION [mm]

RATED VOLTAGE [Vp-p]

OPERATING VOLTAGE [Vp-p]

MAX. RATED CURRENT [mA]

SOUND OUTPUT AT 10 cm [dB]

OPERATING TEMPERATURE [°C]



RESONANT FREQUENCY [Hz]

Piezoelectric Transducers



| | | | | | | | | |
|---|----------------|---------------|----|--------------|---|-----|----------------|------------|
|  | CSPT09A03-2.1F | 9.0×9.0×1.8 | 3 | 20 Vp-p max. | 1 | 75 | - 40 ... + 105 | 2100 ± 500 |
|  | CSPT09A03-4.0F | 9.0×9.0×1.8 | 3 | 20 Vp-p max. | 1 | 75 | - 40 ... + 105 | 4000 ± 500 |
|  | CSPT11A05 | 11.0×9.00×1.7 | 5 | 1 ... 20 | 1 | 73 | - 20 ... + 85 | 4100 ± 500 |
| | CSPT13A03 | 12.8×12.8×3.0 | 3 | 1 ... 20 | 1 | 75 | - 40 ... + 105 | 4000 ± 500 |
| | CSPT16B03 | 16.0×16.0×2.5 | 3 | 1 ... 25 | 1 | 80 | - 40 ... + 120 | 4000 ± 500 |
|  | CSPT11B05 | 11.0×9.00×1.7 | 5 | 1 ... 20 | 1 | 75 | - 40 ... + 105 | 4000 ± 500 |
|  | CSPT12A03 | 12.0×12.0×3.0 | 3 | 1 ... 20 | 1 | 75 | - 40 ... + 105 | 4000 ± 500 |
| | CSPT12B03 | 12.0×12.0×2.7 | 3 | 1 ... 20 | 1 | 72 | - 40 ... + 105 | 4000 ± 500 |
| | CSPT12C05 | 12.0×12.0×2.3 | 5 | 1 ... 20 | 1 | 80 | - 40 ... + 105 | 4000 ± 500 |
|  | CSPT17D12 | ∅ 17 × 6 | 12 | 1 ... 25 | 3 | 90 | - 30 ... + 85 | 4000 ± 500 |
| | CSPT22A12-4 | ∅ 22 × 7 | 12 | 1 ... 30 | 3 | 90 | - 30 ... + 85 | 4000 ± 500 |
| | CSPT23B09-4 | ∅ 22 × 11 | 9 | 1 ... 30 | 5 | 100 | - 30 ... + 85 | 4000 ± 500 |
| | CSPT23C09-3.2 | ∅ 23 × 22 | 9 | 1 ... 30 | 5 | 102 | - 30 ... + 85 | 3200 ± 500 |
|  | CSPT15A03 | 14.3×14.3×7.4 | 3 | 1 ... 20 | 2 | 80 | - 40 ... + 105 | 4000 ± 500 |
| | CSPT15A05 | 14.3×14.3×7.4 | 5 | 1 ... 20 | 2 | 80 | - 40 ... + 105 | 4000 ± 500 |
|  | CPT12A03 | ∅ 12 × 7 | 3 | 1 ... 20 | 1 | 75 | - 30 ... + 80 | 4500 ± 500 |
| | CPT13B03 | ∅ 12.5 × 6.2 | 3 | 1 ... 20 | 1 | 75 | - 40 ... + 85 | 4000 ± 500 |

Please ask for minimum order quantities!

| APPEARANCE | PART NUMBER | DIMENSION [mm] | RATED VOLTAGE [VDC] | OPERATING VOLTAGE [VDC] | MAX. RATED CURRENT [mA] | MIN. SOUND OUTPUT AT 10 cm [dB] | OPERATING TEMPERATURE [°C] | RESONANT FREQUENCY [Hz] |
|---|---------------|----------------|---------------------|-------------------------|-------------------------|---------------------------------|----------------------------|-------------------------|
| Piezoelectric Buzzers | | | | | | | | |
|  | CSPB15A05-4.0 | 11.0×9.50×8.0 | 5 | 3... 16 | 8 | 85 | -40 ... +85 | 4000 ± 500 |
|  | CPB14A09 | ∅ 14.0×7.8 | 9 | 3... 16 | 8 | 85 | --40 ... +85 | 4400 ± 500 |
| | CPB40A09 | ∅ 40.0×20 | 9 | 3... 20 | 50 | 100 | -20 ... +70 | 2800 ± 500 |



Please ask for minimum order quantities!




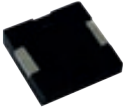
1.2 PIEZOELECTRIC SPEAKERS



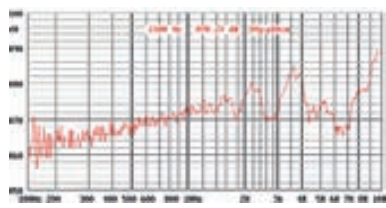
A piezoelectric speaker is a smart combination of a flexible sound supporting plastic diaphragm and a piezoceramic disc. This simple structured and lightweight component is capable of providing a wider frequency range than standard piezo sound generators and achieves aggressively loud Sound Pressure Levels (SPL). Combined with a clever designed housing, SPL over 110 dB at 2 m are possible. This performance makes the piezoelectric speaker the perfect choice for alarm and siren devices.

| APPEARANCE | PART NUMBER | DIMENSION [mm] | RATED VOLTAGE [Vp-p] | OPERATING VOLTAGE [Vp-p] | MAX. RATED CURRENT [mA] | MIN. SOUND OUTPUT AT 10 cm [dB] | OPERATING TEMPERATURE [°C] | RESONANT FREQUENCY [Hz] |
|---|--------------|----------------|----------------------|--------------------------|-------------------------|---------------------------------|----------------------------|-------------------------|
| Piezoelectric Speakers | | | | | | | | |
|  | CPT45A12-2.5 | ∅ 46×13.5 | 12 | 3... 50 | 20 | 95 | -30 ... +95 | 2500 ± 500 |
|  | PK32W28A | ∅ 48×10.5 | 9 | max. 30 | 20 | 105 | -20 ... +80 | 2800 ± 500 |

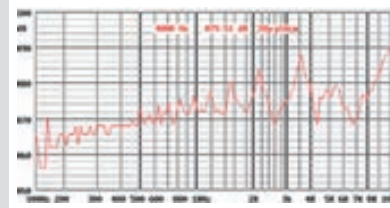
1.3 SMALLEST PIEZO SMD TRANSDUCER 9 x 9 x 1.8 mm

| APPEARANCE | PART NUMBER | DIMENSION [mm] | RATED VOLTAGE [VDC] | OPERATING VOLTAGE [VDC] | MAX. RATED CURRENT [mA] | MIN. SOUND OUTPUT AT 10 cm [dB] | OPERATING TEMPERATURE [°C] | RESONANT FREQUENCY [Hz] |
|---|----------------|----------------|---------------------|-------------------------|-------------------------|---------------------------------|----------------------------|-------------------------|
|  | CSPT09A03-2.1F | 9.0×9.0×1.8 | 3 | 20 Vp-p max. | 1 | 75 | - 40 ... + 105 | 2100 ± 500 |
|  | CSPT09A03-4.0F | 9.0×9.0×1.8 | 3 | 20 Vp-p max. | 1 | 75 | - 40 ... + 105 | 4000 ± 500 |

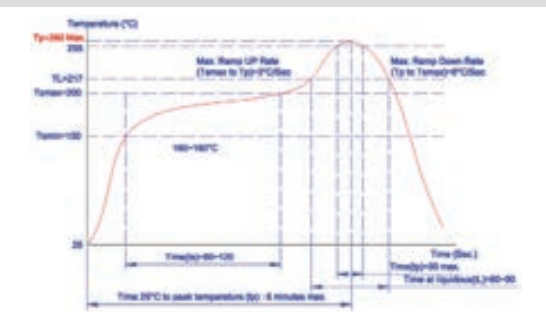
Please ask for minimum order quantities!



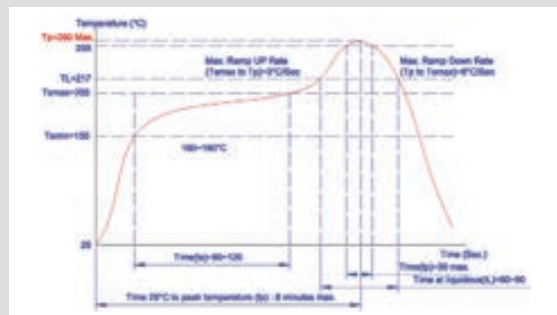
Characteristics



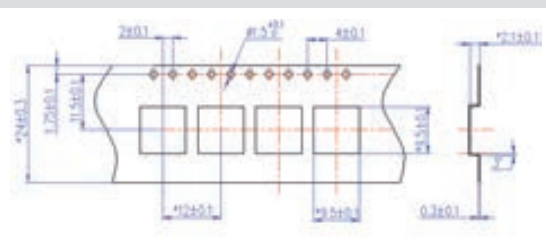
Characteristics



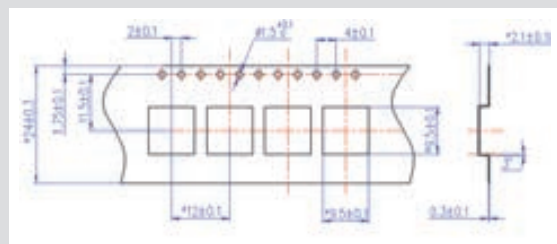
Recommended Reflowing Profile



Recommended Reflowing Profile



Tape & Reel Dimensions



Tape & Reel Dimensions

1.4 ELECTROMAGNETIC TRANSDUCERS

Electromagnetic sound generators consist of a swinging metal diaphragm driven by an electromagnetic circuit. These transducers are small and provide a wider frequency range compared with piezoelectric sound generators. They are the right choice for applications, where different frequencies are used to create different sounds.

Typical applications are kitchen devices, medical and health care accessories, cellular phones, PDS, etc. In general, electromagnetic sound generators have a higher current consumption than piezo sound generators but they need lower voltage to achieve their maximum SPL output.

SELECTION GUIDE

| STYLE/DIMENSIONS [mm] | MODEL NUMBER | OPERATING VOLTAGE [V] | DCR [Ω] | MAX. CURRENT [mA] | FREQUENCY [Hz] | MIN. SPL [dB] | TEMPERATURE RANGE [°C] | HOUSING MATERIAL/ SOUND EXIT | PACKAGING |
|--|--------------|-----------------------|------------------|-------------------|----------------|---------------|---|---------------------------------|------------------------------|
|  5.0×5.0×2.0 | BST-5523SA | 3.0 (2.0...4.0) | 12 | 100 | 4000 | 78 | T_{OP} : -30...+70 T_{STG} : -45...+85 | Nylon #46/ at the top | T&R / 2,000 pcs. per reel |
|  5.0×5.0×3.0 | BST-5533S | 3.0 (2.0...4.0) | 12 | 100 | 4000 | 78 | T_{OP} : -30...+70 T_{STG} : -45...+85 | Nylon #46/ at the top | T&R / 2,000 pcs. per reel |
|  8.5×8.5×3.0 | BST-0833A | 3.6 (2.5...4.5) | 16 | 100 | 2700 | 88 | T_{OP} : -30...+70 T_{STG} : -40...+85 | Nylon #46/ sideways | T&R / 1,000 pcs. per reel |
|  8.5×8.5×3.0 | BST-0833D | 3.6 (2.5...4.5) | 16 | 100 | 3000 | 85 | T_{OP} : -30...+70 T_{STG} : -40...+85 | Nylon #46/ sideways | T&R / 1,000 pcs. per reel |
|  8.5×8.5×3.0 | BST-0835A | 5.0 (4.0...6.0) | 30 | 100 | 2700 | 90 | T_{OP} : -30...+75 T_{STG} : -40...+85 | Nylon #46/ sideways | T&R / 1,000 pcs. per reel |


SELECTION GUIDE

| STYLE/DIMENSIONS [mm] | MODEL NUMBER | OPERATING VOLTAGE [V] | DCR [Ω] | MAX. CURRENT [mA] | FREQUENCY [Hz] | MIN. SPL [dB] | TEMPERATURE RANGE [°C] | HOUSING MATERIAL/ SOUND EXIT | PACKAGING |
|--|--------------|-----------------------|------------------|-------------------|----------------|-----------------|---|---------------------------------|------------------------------|
|  8.5×8.5×4.0 | BST-0843A | 3.6 (2.5...4.0) | 16 | 100 | 2700 | 88 | T _{OP} : -30...+70 T _{STG} : -40...+85 | Nylon #46/ sideways | T&R / 1,000 pcs. per reel |
|  8.5×8.5×4.0 | BST-0845A | 5.0 (4.0...6.0) | 30 | 80 | 2700 | 90 | T _{OP} : -20...+60 T _{STG} : -40...+85 | Nylon #46/ sideways | T&R / 1,000 pcs. per reel |
|  8.5×8.5×4.0 | BST-0845B | 5.0 (4.0...6.0) | 30 | 80 | 2350 | 88 | T _{OP} : -20...+60 T _{STG} : -40...+85 | Nylon #46/ sideways | T&R / 1,000 pcs. per reel |
|  10.2×10.2×5.0 | BST-1053A | 3.6 (2.5...4.5) | 16 | 100 | 2700 | 88 | T _{OP} : -30...+70 T _{STG} : -45...+85 | LCP/ sideways | T&R / 750 pcs. per reel |
|  10.2×10.2×5.0 | BST-10512B | 12.0 (8.0...16.0) | 140 | 40 | 2000 | 90 (typ. 93) | T _{OP} : -30...+70 T _{STG} : -45...+85 | LCP/ at the top | T&R / 750 pcs. per reel |
|  11.2×11.2×7.0 | BST-11712B | 12.0 (8.0...16.0) | 140 | 40 | 2000 | 90 (typ. 93) | T _{OP} : -30...+70 T _{STG} : -45...+85 | LCP/ at the top | T&R / 750 pcs. per reel |

1.5 PIEZOCERAMIC ELEMENTS



The **piezoceramic element** is the heart of every piezo-electric sound generator. In general, it consists of a piezoceramic layer, glued together with a flexible metal plate. An alternating electric signal, connected between metal plate and ceramic layer, causes the vibration of the piezo element by means of the piezo effect. Different diameters and frequencies are available upon request.

| PART NUMBER* | DIMENSION [mm] | INPUT VOLTAGE [Vp-p] | MAX. RESONANT IMPEDANCE [Ω] | CAPACITANCE at 100 Hz [nF] | OPERATING TEMPERATURE [°C] | RESONANT FREQUENCY [Hz] |
|--|----------------|----------------------|-----------------------------|----------------------------|----------------------------|-------------------------|
| Piezoceramic Discs  | | | | | | |
| CPE20N-3.6A1-S-2.2ER | ∅ 20 × 0.22 | 30 | 1500 | 20 | -20...+60 | 3600 ± 500 |

Please ask for minimum order quantities!



2 | DYNAMIC LOUDSPEAKERS

endrich provides the universal solution for all higher acoustic wide frequency sound demands with an extensive selection of dynamic loudspeakers. Our portfolio meets all needs for high quality speakers or low cost series for sound reproduction in various electronic products, e. g. automotive park distance control/dashboard and alarm sound, cellular phones, telephones, laptops, PDAs, MP3 players, household devices and general electronics. endrich cooperates with a few selected excellent and certified chinese suppliers, which are introduced in this catalogue.

VANSONIC ENTERPRISE Co., LTD. (V E C O)

With more than 30 years of experience in the field of acoustics, VANSONIC is a micro-loudspeaker manufacturer of worldwide prestige for manifold applications. The variety of different available micro speakers is one of the biggest worldwide and the application scope ranges from medical

appliances via home appliance, notebooks, telephones to automotive area. VECO is a taiwanese company and was founded in 1981. Today, there are 4 factories in China, in Foshan, Shanghai, He-fei and Ching-Quing with a total labour force of 5300 employees. Veco is certified according TS16949, ISO14001, QC80000 and ISO 9001:2000. The production capacity is 230 Mio pcs/year.

DONGGUAN CITY RUICHENG ELECTRONICS Co., Ltd. (Donguan RS)













was established in 2010 in Dongguan City/China, where they develop and produce with a labour force of 600 employees around 5 Mio products/month for notebook-, home appliance- and automotive applications. The product range consists mainly of dynamic speakers, but also electromagnetic buzzers are available. The production area is 15.000 m². Dongguan RS is certified acc. ISO9001 und TS16949.

ChinaSound

VECO



endrich provides a big variety of dynamic speakers with surface mount, lead, pin and spring terminals with or without custom designed connectors. The product range comprehends several round (\varnothing 15 mm to 57mm) and rectangular shapes (25 mm \times 10 mm to 50 mm \times 50 mm) which are assembled according to custom design. These loudspeakers are available with impedances from 4 Ω to 150 Ω , rated input power from 0.1 W to 5 W with frequency ranges from 200 Hz to 20 kHz for an operation temperature range of - 40 $^{\circ}$ C up to + 85 $^{\circ}$ C (special designs up to + 120 $^{\circ}$ C).

| APPEARANCE | PART NUMBER | DIMENSION [mm] | | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_N [mW] | SPL (@ P_N / 0.5 m) [dB] | OPERATING TEMPERATURE [°C] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|--------------------------|---|-----------------------------------|-------------------------|----------------------------|----------------------------|--------------------------------------|---------------------------------|
|  | 15CS08FL | \varnothing 15.0 × 2.2 | 8 | 100 | 70 | -20 ... +60 | 760 | 500 ... 5000 | |
|  | 15CR08FL | \varnothing 15.0 × 2.6 | 8 | 300 | 75 | -20 ... +60 | 870 | 750 ... 18000 | |
|  | 15CR08GL | \varnothing 15.0 × 3.8 | 8 | 500 | 84 | -20 ... +60 | 850 | 500 ... 20000 | |
|  | 15CS08F | \varnothing 15.0 × 3.5 | 8 | 300 | 78 | -20 ... +60 | 830 | 600 ... 8000 | |
|  | 15CR08FLQ | \varnothing 15.0 × 3.5 | 8 | 300 | 75 | -20 ... +60 | 1000 | 600 ... 20000 | |
|  | 15CR08F | \varnothing 15.0 × 3.5 | 8 | 300 | 78 | -20 ... +60 | 780 | 500 ... 5000 | |
|  | 16CR08G | \varnothing 16.0 × 3.2 | 8 | 500 | 86 | -20 ... +60 | 900 | 500 ... 20000 | |
|  | 16CR08F-1 | \varnothing 16.0 × 3.6 | 8 | 500 | 78 | -20 ... +60 | 800 | 400 ... 20000 | |
|  | 18CUG08L | \varnothing 18.0 × 5.8 | 8 | 1000 | 80 | -20 ... +60 | 450 | 250 ... 20000 | |
|  | 20VSG080Q-1 | 19.5×13.5×6.5 | 8 | 500 | 86 | -20 ... +60 | 750 | 500 ... 20000 | |
|  | 20VS08PL | 19.5×13.5×4.0 | 8 | 1000 | 80 | -20 ... +60 | 900 | 500 ... 20000 | |
|  | 20VS08P-3 | 19.5×13.5×5.0 | 8 | 1000 | 80 | -20 ... +60 | 700 | 500 ... 20000 | |





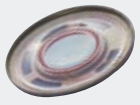







| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_w [mW] | SPL (@ $P_w / 0.5 \text{ m}$) [dB] | OPERATING TEMPERATURE [$^{\circ}\text{C}$] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|-------------------------------|-----------------------------------|-------------------------|-------------------------------------|--|--------------------------------------|---------------------------------|
|  | 2014VS08-2 | 20.0×14.0×4.4 | 8 | 300 | 80 | -20 ... +60 | 700 | 500 ... 20000 |
|  | 2010VRG08LQ | 20.0×10.0×4.0 | 8 | 500 | 88 | -40 ... +85 | 1300 | 800 ... 20000 |
|  | 20CR08FL | $\varnothing 20.0 \times 2.4$ | 8 | 300 | 76 | -20 ... +60 | 490 | 400 ... 6000 |
| | 20CS08FS | $\varnothing 20.0 \times 3.0$ | 8 | 500 | 77 | -20 ... +60 | 900 | 500 ... 7000 |
|  | 20CS08FLH | $\varnothing 20.0 \times 3.0$ | 8 | 500 | 78 | -20 ... +60 | 570 | 500 ... 20000 |
|  | 20CL08GS | $\varnothing 20.0 \times 3.0$ | 8 | 100 | 76 | -20 ... +60 | 820 | 550 ... 5000 |
|  | 20CS08F | $\varnothing 20.0 \times 3.2$ | 8 | 500 | 78 | -20 ... +60 | 650 | 400 ... 20000 |
|  | 20CR08F | $\varnothing 20.0 \times 3.2$ | 8 | 500 | 81 | -20 ... +60 | 530 | 300 ... 6000 |
|  | 20CS08G | $\varnothing 20.0 \times 4.2$ | 8 | 100 | 73 | -20 ... +60 | 950 | 300 ... 5500 |
|  | 20RM08 | $\varnothing 20.0 \times 5.3$ | 8 | 1500 | 83 | -20 ... +60 | 700 | 500 ... 20000 |
|  | 23CS08F | $\varnothing 23.0 \times 4.4$ | 8 | 200 | 81 | -20 ... +60 | 780 | 600 ... 8000 |
|  | 23CR08FH | $\varnothing 23.0 \times 5.3$ | 8 | 500 | 82 | -20 ... +60 | 670 | 400 ... 20000 |

Please ask for minimum order quantities!

| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_w [mW] | SPL (@ $P_w / 0.5$ m) [dB] | OPERATING TEMPERATURE [$^{\circ}\text{C}$] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|---------------------------------|-----------------------------------|-------------------------|----------------------------|--|--------------------------------------|---------------------------------|
|  | 23CS08FH | \emptyset 23.0 \times 5.4 | 8 | 500 | 82 | -20 ... +60 | 900 | 600 ... 20000 |
|  | 2512VM08S | 24.5 \times 12.0 \times 4.9 | 8 | 1000 | 81 | -20 ... +60 | 850 | 400 ... 20000 |
|  | 26CR08F | \emptyset 26.0 \times 4.4 | 8 | 500 | 83 | -20 ... +60 | 540 | 450 ... 20000 |
|  | 26CS08F | \emptyset 26.0 \times 4.4 | 8 | 500 | 81 | -20 ... +60 | 470 | 250 ... 5500 |
|  | 26CRF04E-1 | \emptyset 26.0 \times 4.3 | 4 | 1500 | 83 | -20 ... +60 | 740 | 400 ... 20000 |
|  | 26CR08FE | \emptyset 26.0 \times 4.4 | 8 | 500 | 85 | -40 ... +85 | 670 | 450 ... 20000 |
|  | 26CS08G | \emptyset 26.0 \times 4.4 | 8 | 500 | 83 | -20 ... +60 | 520 | 400 ... 8000 |
|  | 28CS08FL | \emptyset 28.0 \times 3.9 | 8 | 1000 | 85 | -20 ... +60 | 620 | 400 ... 6500 |
|  | 28CS08FN-2 | \emptyset 28.0 \times 4.2 | 8 | 500 | 85 | -20 ... +60 | 680 | 400 ... 7000 |
|  | 28CS08G | \emptyset 28.0 \times 4.3 | 8 | 200 | 82 | -20 ... +60 | 850 | 600 ... 5600 |
|  | 28CS08GQ-1 | \emptyset 28.0 \times 5.0 | 8 | 200 | 82 | -20 ... +60 | 850 | 600 ... 5600 |
|  | 28CR08FH | \emptyset 28.0 \times 5.5 | 8 | 500 | 80 | -40 ... +85 | 350 | 200 ... 20000 |





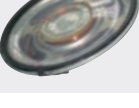








Dynamic Speakers – Round/Oval Type with Fabric/Mylar/Titanium Cone









| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P _N [mW] | SPL (@ P _N / 0.5 m) [dB] | OPERATING TEMPERATURE [°C] | LOWEST RESONANT FREQUENCY f ₀ [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|----------------|-----------------------------------|----------------------------------|-------------------------------------|----------------------------|---|---------------------------------|
|  | 28CR08FB-1 | ∅ 28.0 × 5.4 | 8 | 1500 | 82 | -20 ... +60 | 470 | 300 ... 20000 |
|  | 28CL08G | ∅ 28.0 × 7.2 | 8 | 500 | 88 | -20 ... +60 | 680 | 550 ... 5500 |
|  | 30CS08F | ∅ 30.0 × 3.0 | 8 | 100 | 78 | -20 ... +60 | 500 | 350 ... 6500 |
|  | 30CS08FH | ∅ 30.0 × 4.0 | 8 | 500 | 87 | -20 ... +60 | 650 | 400 ... 3000 |
|  | 30CS08G | ∅ 30.0 × 4.0 | 8 | 200 | 80 | -20 ... +60 | 530 | 300 ... 5600 |
|  | 30CS08FE-1 | ∅ 30.0 × 5.0 | 8 | 500 | 87 | -20 ... +60 | 620 | 400 ... 6000 |
|  | 32CS08F | ∅ 32.0 × 4.6 | 8 | 500 | 87 | -20 ... +60 | 600 | 350 ... 5000 |
|  | 32CE04H-1 | ∅ 32.0 × 18.0 | 4 | 2000 | 84 | -20 ... +60 | 180 | 100 ... 20000 |
|  | 34CS08G | ∅ 34.0 × 4.6 | 8 | 200 | 80 | -20 ... +60 | 330 | 170 ... 12000 |
|  | 34RC08-1 | ∅ 34.0 × 14.7 | 8 | 3000 | 82 | -20 ... +60 | 170 | 120 ... 20000 |

Please ask for minimum order quantities!

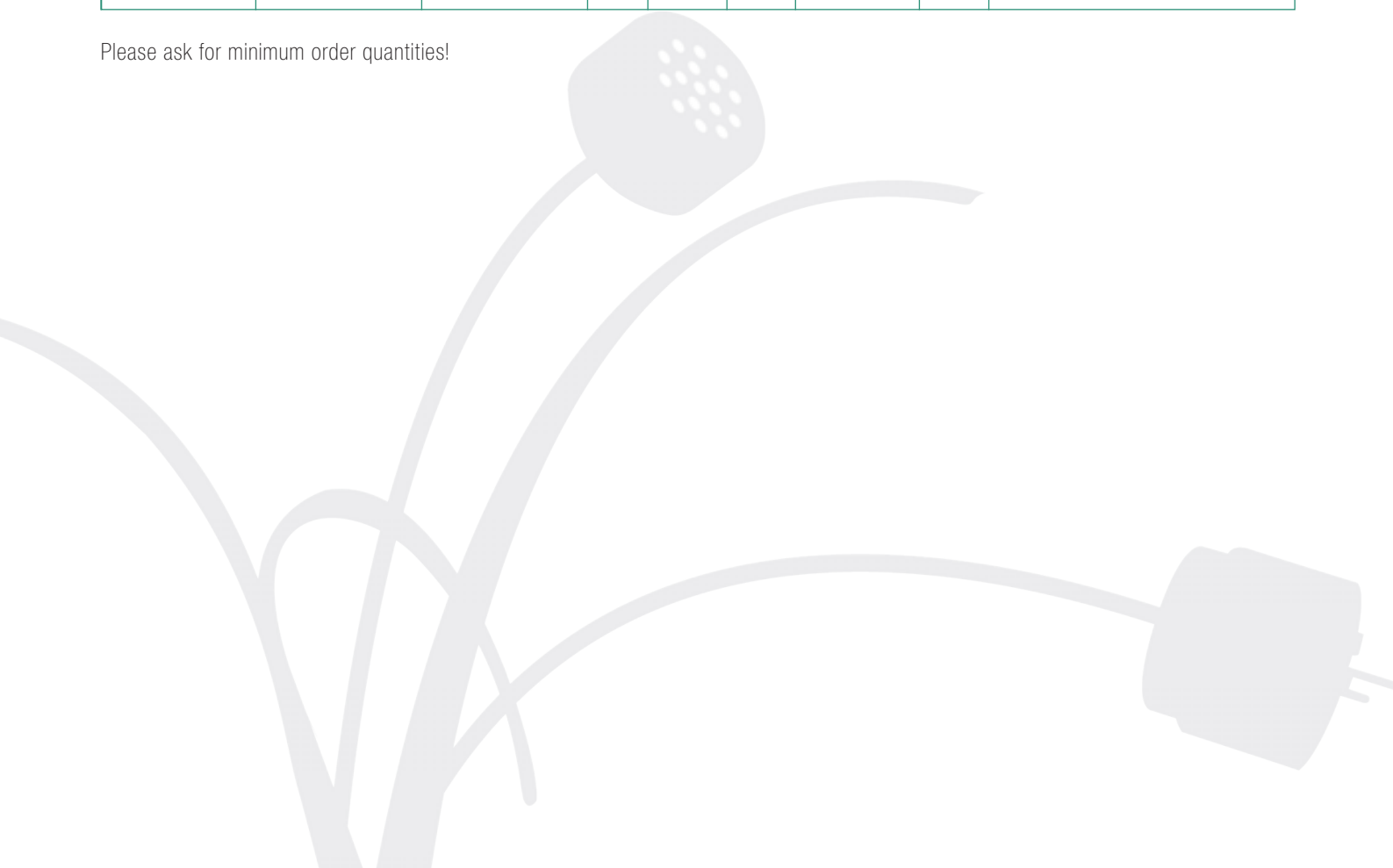


| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_N [mW] | SPL (@ $P_N / 0.5$ m) [dB] | OPERATING TEMPERATURE [$^{\circ}$ C] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|--------------------------------|-----------------------------------|-------------------------|----------------------------|---------------------------------------|--------------------------------------|---------------------------------|
|  | 36CS08G-3 | $\varnothing 36.0 \times 4.0$ | 8 | 200 | 83 | -40 ... +85 | 650 | 450 ... 5300 |
|  | 36CS50G-2 | $\varnothing 36.0 \times 4.0$ | 50 | 200 | 81 | -40 ... +85 | 600 | 350 ... 10000 |
|  | 36CS08G | $\varnothing 36.0 \times 4.6$ | 8 | 100 | 76 | -20 ... +60 | 420 | 250 ... 6000 |
|  | 36CR08FN | $\varnothing 36.0 \times 4.8$ | 8 | 500 | 79 | -20 ... +60 | 370 | 200 ... 20000 |
|  | 36CS08FN-3* | $\varnothing 36.0 \times 4.8$ | 8 | 1000 | 92 | -40 ... +85 | 570 | 300 ... 5000 |
|  | 36CSF08-1 | $\varnothing 36.0 \times 4.8$ | 8 | 1000 | 89 | -40 ... +85 | 580 | 350 ... 6500 |
|  | 36CS08FN-18 | $\varnothing 36.0 \times 4.8$ | 8 | 1000 | 92 | -40 ... +85 | 600 | 500 ... 14000 |
|  | 38CS08G-3 | $\varnothing 38.0 \times 4.2$ | 8 | 300 | 80 | -20 ... +60 | 330 | 150 ... 5000 |
|  | 38CR08G | $\varnothing 38.0 \times 4.2$ | 8 | 300 | 80 | -20 ... +60 | 380 | 200 ... 20000 |
|  | 40CS08GS | $\varnothing 40.0 \times 4.3$ | 8 | 100 | 80 | -20 ... +60 | 390 | 200 ... 3000 |
|  | 40DS08G | $\varnothing 40.0 \times 4.4$ | 8 | 300 | 84 | -20 ... +60 | 420 | 300 ... 5000 |
|  | 40DS08GE-1 | $\varnothing 40.0 \times 5.3$ | 8 | 500 | 87 | -20 ... +60 | 420 | 250 ... 5500 |
|  | 40CS08FN | $\varnothing 40.0 \times 4.9$ | 8 | 200 | 83 | -20 ... +60 | 350 | 200 ... 6000 |
| | 40CS08FN-5 | $\varnothing 40.0 \times 4.9$ | 8 | 500 | 83 | -20 ... +60 | 380 | 200 ... 10000 |
| | 40CS08FN* | $\varnothing 40.0 \times 4.9$ | 8 | 1000 | 84 | -40 ... +85 | 430 | 200 ... 5000 |
| | 40CMG16 | $\varnothing 40.0 \times 14.0$ | 16 | 3000 | 93 | -20 ... +60 | 1400 | 800 ... 20000 |



| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_N [mW] | SPL (@ $P_N / 0.5\text{ m}$) [dB] | OPERATING TEMPERATURE [$^{\circ}\text{C}$] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|--------------------------------|-----------------------------------|-------------------------|------------------------------------|--|--------------------------------------|---------------------------------|
|  | 45CS08G | $\varnothing 45.0 \times 7.60$ | 8 | 200 | 82 | -20 ... +60 | 200 | 200 ... 8000 |
|  | 45RW04-2 | $\varnothing 45.0 \times 10.2$ | 4 | 1500 | 84 | -20 ... +60 | 150 | 90 ... 4000 |
|  | 50CS08FH-1 | $\varnothing 50.0 \times 7.50$ | 8 | 300 | 85 | -20 ... +60 | 400 | 200 ... 5000 |
|  | 50CS08G | $\varnothing 50.0 \times 8.00$ | 8 | 200 | 80 | -20 ... +60 | 350 | 190 ... 10000 |
|  | 50FL25GP | $\varnothing 50.0 \times 18.4$ | 25 | 400 | 87 | -20 ... +60 | 400 | 200 ... 10000 |
|  | 57CSF08-1 | $\varnothing 57.0 \times 8.30$ | 8 | 1000 | 90 | -20 ... +60 | 480 | 300 ... 13000 |







Please ask for minimum order quantities!



| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_N [mW] | SPL (@ $P_N / 0.5$ m) [dB] | OPERATING TEMPERATURE [$^{\circ}\text{C}$] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|--------------------------------|-----------------------------------|-------------------------|----------------------------|--|--------------------------------------|---------------------------------|
|  | 18RE08-3-1 | $\varnothing 18.0 \times 8.8$ | 8 | 2000 | 80 | -20 ... +60 | 550 | 350 ... 20000 |
|  | 19RE08 | $\varnothing 19.0 \times 7.8$ | 8 | 2000 | 78 | -20 ... +60 | 450 | 250 ... 15000 |
|  | 23RE08 | $\varnothing 23.0 \times 9.0$ | 8 | 2000 | 82 | -20 ... +60 | 350 | 250 ... 20000 |
|  | 26CCG08HX | $\varnothing 26.0 \times 8.0$ | 8 | 1500 | 78 | -20 ... +60 | 300 | 300 ... 20000 |
|  | 28RE08 | $\varnothing 28.0 \times 11.2$ | 8 | 2000 | 84 | -20 ... +60 | 280 | 200 ... 20000 |
|  | 30CS08FEP | $\varnothing 30.0 \times 5.0$ | 8 | 1000 | 85 | -20 ... +60 | 450 | 200 ... 20000 |
|  | 30CS08FP-1 | $\varnothing 30.0 \times 6.5$ | 8 | 1000 | 82 | -20 ... +60 | 450 | 200 ... 20000 |
|  | 34RE08 | $\varnothing 34.0 \times 13.0$ | 8 | 3000 | 81 | -20 ... +60 | 180 | 120 ... 15000 |
|  | 36AF08 | $\varnothing 36.0 \times 17.0$ | 8 | 2000 | 83 | -20 ... +60 | 350 | 160 ... 20000 |
|  | 36AFS08H | $\varnothing 36.0 \times 19.1$ | 8 | 2000 | 82 | -20 ... +60 | 350 | 180 ... 20000 |

Please ask for minimum order quantities!



| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_N [mW] | SPL (@ $P_N / 0.5\text{ m}$) [dB] | OPERATING TEMPERATURE [$^{\circ}\text{C}$] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|------------------------------|-----------------------------------|-------------------------|------------------------------------|--|--------------------------------------|---------------------------------|
|  | 40AS08-2 | $\emptyset 40.0 \times 17.5$ | 8 | 3000 | 85 | -20 ... +60 | 190 | 100 ... 20000 |
|  | 40RE08-1 | $\emptyset 40.0 \times 18.6$ | 8 | 3000 | 85 | -20 ... +60 | 190 | 100 ... 20000 |
|  | 45RW04-1 | $\emptyset 45.0 \times 10.2$ | 4 | 5000 | 87 | -20 ... +60 | 260 | 100 ... 5000 |
|  | 50AS08 | $\emptyset 50.0 \times 17.5$ | 8 | 4000 | 88 | -20 ... +60 | 160 | 100 ... 20000 |
|  | 50CCF08H | $\emptyset 50.0 \times 19.4$ | 8 | 3000 | 86 | -20 ... +60 | 230 | 110 ... 20000 |
|  | 50DMF08H-1 | $\emptyset 50.0 \times 19.4$ | 8 | 2000 | 86 | -20 ... +60 | 230 | 110 ... 20000 |

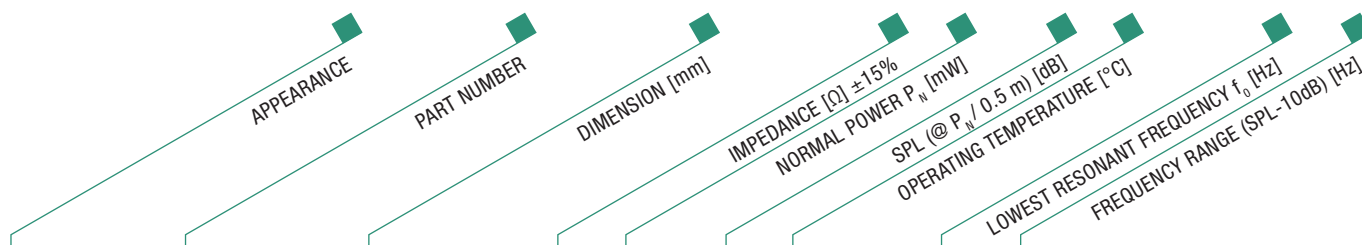
Dynamic Speakers – Round Type with Paper Cone



Please ask for minimum order quantities!

| APPEARANCE | PART NUMBER | DIMENSION [mm] | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_N [mW] | SPL (@ P_N / 0.5 m) [dB] | OPERATING TEMPERATURE [$^{\circ}\text{C}$] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL-10dB) [Hz] |
|---|-------------|----------------|-----------------------------------|-------------------------|----------------------------|--|--------------------------------------|---------------------------------|
|  | 2510KMG04CX | 25.0×10.0×7.0 | 4 | 1500 | 80 | -20 ... +60 | 680 | 400 ... 7000 |
|  | 25KC08-N | 25.0×14.0×5.2 | 8 | 1000 | 79 | -20 ... +60 | 600 | 350 ... 20000 |
|  | 25KP08 | 25.0×14.0×7.3 | 8 | 1000 | 82 | -20 ... +60 | 630 | 335 ... 5300 |
|  | 2514KN04 | 25.0×14.0×7.8 | 4 | 2000 | 82 | -20 ... +60 | 600 | 400 ... 20000 |
|  | 25KE08 | 25.0×25.0×8.8 | 8 | 2000 | 80 | -20 ... +60 | 350 | 200 ... 20000 |
|  | 27CS08FK-6 | 27.0×23.0×3.7 | 8 | 500 | 78 | -20 ... +60 | 650 | 400 ... 20000 |
|  | 28KC08-1-A | 28.0×28.0×10.8 | 8 | 2000 | 82 | -20 ... +60 | 270 | 150 ... 20000 |
|  | 28AF08K | 28.0×28.0×11.2 | 8 | 2000 | 82 | -20 ... +60 | 280 | 180 ... 20000 |
|  | 28KE08 | 28.0×28.0×11.2 | 8 | 2000 | 84 | -20 ... +60 | 280 | 180 ... 20000 |
|  | 3010KMG04 | 30.0×10.0×5.0 | 4 | 1000 | 81 | -20 ... +60 | 900 | 450 ... 20000 |
|  | 30KM08 | 30.0×16.0×5.0 | 8 | 500 | 77 | -20 ... +60 | 500 | 300 ... 4000 |

Please ask for minimum order quantities!



Dynamic Speakers – Square Type 

| | | | | | | | | |
|---|--------------|----------------|---|------|----|------------|-----|---------------|
|  | 32KEG08HX-2 | 32.0×32.0×14.5 | 8 | 3000 | 82 | -20 ...+60 | 250 | 100 ... 20000 |
|  | 32KC08-1 | 32.0×32.0×14.7 | 8 | 3000 | 82 | -20 ...+60 | 170 | 120... 20000 |
|  | 35KN08-1 | 35.0×16.0×4.2 | 8 | 1000 | 80 | -20 ...+60 | 700 | 300... 20000 |
|  | 35KM08 | 35.0×16.0×5.0 | 8 | 1000 | 81 | -20 ...+60 | 650 | 400... 20000 |
|  | 35KT08-1 | 35.0×20.0×5.5 | 8 | 1000 | 86 | -20 ...+60 | 590 | 400 ... 20000 |
|  | 3512KMG04X-1 | 35.0×12.0×7.0 | 4 | 1500 | 83 | -20 ...+60 | 630 | 400 ... 20000 |
| | 3516KMG04HX | 35.0×16.0×7.8 | 4 | 2000 | 83 | -20 ...+60 | 520 | 380 ... 20000 |
|  | 35KP08 | 35.0×16.0×8.0 | 8 | 1000 | 84 | -20 ...+60 | 550 | 380... 13000 |
|  | 35KS08 | 35.0×20.0×8.0 | 8 | 1000 | 86 | -20 ...+60 | 550 | 300... 11000 |
|  | 40KM08 | 40.0×14.0×6.0 | 8 | 1000 | 85 | -20 ...+60 | 550 | 300... 20000 |
|  | 4014KMG04CX | 40.0×14.0×9.9 | 4 | 2000 | 84 | -20 ...+60 | 450 | 280 ... 20000 |
|  | 4017KP08 | 40.0×17.0×9.0 | 8 | 2000 | 88 | -20 ...+60 | 480 | 350... 20000 |
| | 4017KP08-2 | 40.0×17.0×6.7 | 8 | 2000 | 88 | -20 ...+60 | 700 | 450... 18000 |

Please ask for minimum order quantities!

| APPEARANCE | PART NUMBER | DIMENSIONS [mm] | | | IMPEDANCE [Ω] $\pm 15\%$ | NORMAL POWER P_N [mW] | SPL (@ $P_N / 0.5$ m) [db] | OPERATING TEMPERATURE [°C] | LOWEST RESONANT FREQUENCY f_0 [Hz] | FREQUENCY RANGE (SPL -10dB) [Hz] |
|---|-------------|-----------------|---|------|-----------------------------------|-------------------------|----------------------------|----------------------------|--------------------------------------|----------------------------------|
|  | 40KT08 | 40.0×20.0×5.3 | 8 | 500 | 85 | -20 ... +60 | 500 | | 300 ... 20000 | |
|  | 40KS08-1 | 40.0×20.0×8.0 | 8 | 1000 | 87 | -20 ... +60 | 550 | | 300 ... 15000 | |
|  | 40KS08P-1 | 40.0×20.0×8.0 | 8 | 2000 | 87 | -20 ... +60 | 540 | | 300 ... 15000 | |
| | 40KS08PN | 40.0×20.0×9.0 | 8 | 2000 | 89 | -20 ... +60 | 480 | | 350 ... 20000 | |
|  | 4020KMG04HX | 40.0×20.0×9.0 | 4 | 2000 | 84 | -20 ... +60 | 460 | | 250 ... 18000 | |
|  | 40KS08PE | 40.0×20.0×9.6 | 8 | 1500 | 87 | -20 ... +60 | 560 | | 350 ... 15000 | |
|  | 40KC08-3 | 40.0×28.5×11.3 | 8 | 3000 | 82 | -20 ... +60 | 420 | | 200 ... 20000 | |
|  | 40KLS08 | 40.0×22.0×13.0 | 8 | 2000 | 87 | -20 ... +60 | 370 | | 180 ... 12500 | |
|  | 40KL08-2 | 40.0×28.5×13.0 | 8 | 2000 | 86 | -20 ... +60 | 430 | | 200 ... 20000 | |
|  | 40CS08K | 40.0×40.0×4.5 | 8 | 200 | 82 | -20 ... +60 | 550 | | 400 ... 8000 | |
| | 40CS08KS | 40.0×40.0×4.5 | 8 | 200 | 75 | -20 ... +60 | 550 | | 300 ... 9500 | |
| | 40CS08FNK | 40.0×40.0×5.5 | 8 | 500 | 85 | -20 ... +60 | 570 | | 300 ... 10000 | |
|  | 50CP08K | 50.0×50.0×10.0 | 8 | 300 | 81 | -20 ... +60 | 480 | | 250 ... 6000 | |

Please ask for minimum order quantities!

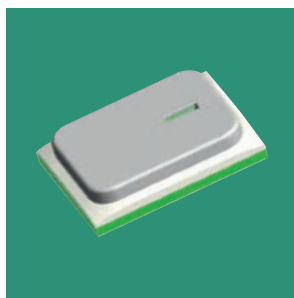
3 | MICROPHONES



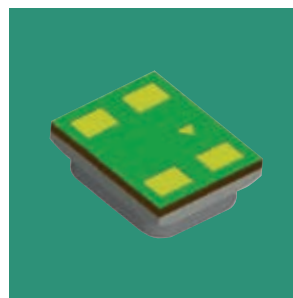
endrich provides a wide range of microphones from 2 suppliers: BSE and VANSONIC. Two kind of microphones can be offered: MEMS (MicroElectroMechanical Systems) microphones and ELECTRET condenser microphones. MEMS microphones have omnidirectional character and features with high resistance against mechanical shock, high/low temperature and vibration. MEMS mics are leadfree reflow solderable. The ELECTRET condenser microphones (ECM) are characterized by high sensitivities and efficiency (high-tone quality) and are available with the following characteristics: Omnidirectional, bidirectional (noise cancelling) or unidirectional. Electret condenser microphones are equipped with SMD solder pads or conventional solder connections (pins, pads, wire).



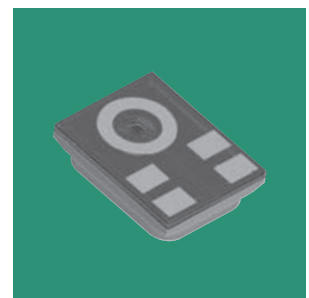
MOE-C110R38-K1



MOE-C110T42-K1



CMOE-I100TM42-4P



HMOE-J098R38-5P



DMO-D100R-K1



SOB-413S42-VRC



SOB-413S42-EM



DSMO-431-P5-25

3.1 MEMS-MICROPHONES (SMD)

BOSUNG ELECTRONICS Co., Ltd. (B S E) was founded in 1987 in Incheon, South Korea. Later renamed into BSE (Best Sound Electronics). BSE develops and produces acoustic solutions, consisting of ECM&MEMS microphones, speakers, receivers, vibrators and software, mainly utilized in the leading consumer mobile devices, but also in MP3,

computers and automotive applications (microphone modules). Nowadays, BSE is one of the market leaders and have facilities in South Korea, China and Vietnam, total labour force of 5000 employees. Production capacity over 1 Billion/year. Certification ISO 9001 and 14001.

| APPEARANCE | PART NUMBER | DIMENSION [mm] | SENSITIVITY (0 dB = 1V/Pa, 1kHz) [dB ±3] | SNR | REMARKS |
|--------------------------------|------------------|-------------------|--|---------|---------------------------|
| Analog MEMS Microphones | | | | | |
| | MOE-C110R38-K1 | 3.76 x 2.95 x 1.1 | - 38.0 dB | 62.0 dB | General Type Rear Port |
| | MOE-C110T42-K1 | 3.76 x 2.95 x 1.1 | - 42.0 dB | 59.0 dB | General Type Rear Port |
| | CMOE-I100TM42-4P | 3.1 x 2.5 x 1.1 | - 42.0 dB | 59.0 dB | Top Port |
| | HMOE-J098R38-5P | 4.0 x 3.0 x 1.0 | - 38.0 dB | 65.0 dB | Rear Port |

Analog MEMS microphones Stable electro-acoustic properties after reflow process. Superior reliability for high temperatures. Excellent signal to noise ratio.

| APPEARANCE | PART NUMBER | DIMENSION [mm] | SENSITIVITY (0 dB = 1V/Pa, 1kHz) [dB ±3] | SNR | REMARKS |
|---------------------------------|--------------|-----------------|--|---------|-----------|
| Digital MEMS Microphones | | | | | |
| | DMO-D100R-K1 | 4.0 x 3.0 x 1.0 | - 29 dB | 60.5 dB | Rear Port |

Digital MEMS microphones Significant RF noise reduction. Excellent signal to noise ratio. High sensitivity and extremely low distortion at high input level maintain high SNR and low distortion after signal processing.

Please ask for minimum order quantities!

3.2 SMD ECM (REFLOW SOLDERABLE SMD ELECTRET CONDENSER MICROPHONES)

SMD Electret Condenser Microphones are the cheaper alternative to MEMS, while requirements to robustness are lower. Like MEMS, they are delivered packed tape&reel and recommended for fully automated reflow processing.

| APPEARANCE | PART NUMBER | DIMENSION [mm] | SENSITIVITY (0 dB = 1V/Pa, 1kHz) [dB ±3] | | SNR | REMARKS |
|-----------------------|----------------|----------------|--|---------|-----|----------|
| Analog SMD ECM | | | | | | |
| | SOB-413S42-VRC | ∅ 4.0 x 1.3 | - 42.0 dB | 58.0 dB | | Top Port |
| | SOB-413S42-EM | ∅ 4.0 x 1.3 | - 42 dB | 58.0 dB | | Top Port |

Analog SMD ECM Stable sensitivity characteristics and consistent frequency response curve after reflow process. Maintain superior reliability for high temperature.

| APPEARANCE | PART NUMBER | DIMENSION [mm] | SENSITIVITY (0 dB = 1V/Pa, 1kHz) [dB ±3] | | SNR | REMARKS |
|------------------------|----------------|-----------------|--|---------|-----|----------|
| Digital SMD ECM | | | | | | |
| | DSMO-431-P5-25 | 4.0 x 3.0 x 1.0 | - 25 dB | 60.5 dB | | Top Port |

Digital SMD ECM Significant RF noise reduction. Excellent signal to noise ratio. High sensitivity and extremely low distortion at high input level. Maintain high SNR and low distortion after signal processing.

Please ask for minimum order quantities!

3.3 ECM (STANDARD ELECTRET CONDENSOR MICROPHONES)

All round standard sizes and performances of ECM are available with diameters between 4 mm and 9.7 mm. They are suited for operating temperatures between - 20 °C and + 70 °C. Electret condenser microphones are available omni- or uni-directional with different capabilities of connecting

like pins, wire/connector assemblies, surface mountable or on customer's demand. Electret condenser microphones are used for telecommunication applications, e. g. cellular phones, cordless and corded phones, pagers, fax, audio equipment and in all kinds of other applications, e. g. computer, cars, etc.

| APPEARANCE | PART NUMBER | DIMENSION [mm] | CONTACT VERSION | SENSITIVITY (0 dB = 1V/Pa, 1kHz) [dB ±3] | TYP. OPERATING VOLTAGE [V] | MAX. CURRENT CONSUMPTION [mA] | DIRECTIVITY | FREQUENCY RANGE [Hz] |
|---|-------------|----------------|------------------|--|----------------------------|-------------------------------|------------------|----------------------|
|  | VM-4020-1P | ∅ 4.0 × 2.0 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 50 ... 20000 |
|  | VM-4530-2P | ∅ 4.5 × 3.0 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 50 ... 20000 |
|  | VM-6012-1PC | ∅ 6.0 × 1.2 | Pins | -36, -38, -40, -42, -44, -46 | 2.0 | 0.5 | Omni-directional | 20 ... 16000 |
|  | VM-6015-1PC | ∅ 6.0 × 1.5 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 50 ... 16000 |
|  | VM-6022-1P | ∅ 6.0 × 2.2 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20 ... 16000 |
|  | VM-6027-2P | ∅ 6.0 × 2.7 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20 ... 16000 |
|  | VM-6027B-9 | ∅ 6.0 × 2.7 | Soldering points | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20 ... 16000 |
|  | VM-6035-1P | ∅ 6.0 × 3.5 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 50 ... 16000 |
|  | VM-6050-1 | ∅ 6.0 × 5.0 | Soldering points | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20 ... 20000 |
|  | VM-6052-2P | ∅ 6.0 × 5.2 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20 ... 20000 |

APPEARANCE

PART NUMBER

TYP. OPERATING VOLTAGE [V]

CONTACT VERSION

SENSITIVITY (0 dB = 1V/Pa, 1 kHz) [dB]

MAX. CURRENT CONSUMPTION [mA]

DIRECTIVITY

FREQUENCY RANGE [Hz]

Electret Condenser Microphones



| | | | | | | | | |
|--|-------------|-------------|------------------|------------------------------|-----|-----|-----------------------------------|--------------|
| | VM-9745-1 | ∅ 9.7 × 4.5 | Soldering points | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20... 16000 |
| | VM-9745-3P | ∅ 9.7 × 4.5 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20... 16000 |
| | VM-9752-3P | ∅ 9.7 × 5.2 | Pins | -36, -38, -40, -42, -44, -46 | 1.5 | 0.5 | Omni-directional | 50... 16000 |
| | VM-9767-1 | ∅ 9.7 × 6.7 | Soldering points | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20... 16000 |
| | VM-9767-4P | ∅ 9.7 × 6.7 | Pins | -36, -38, -40, -42, -44, -46 | 3.0 | 0.5 | Omni-directional | 20... 16000 |
| | VM-6030U-2P | ∅ 6.0 × 3.0 | Pins | -42±3 | 3.0 | 0.5 | Uni(cardioid)-directional | 100... 12000 |
| | VM-6050U-1 | ∅ 6.0 × 5.0 | Soldering points | -50±4 | 3.0 | 0.5 | Uni(cardioid)-directional | 100... 12000 |
| | VM-8050U-1 | ∅ 8.0 × 5.0 | Soldering points | -50±4 | 1.5 | 0.5 | Uni(cardioid)-directional | 100... 16000 |
| | VM-9745U-3 | ∅ 9.7 × 4.5 | Soldering points | -30±3 | 5.0 | 0.5 | Uni(cardioid)-directional | 100... 16000 |
| | VM-9752U-1 | ∅ 9.7 × 5.2 | Soldering points | -47±4 | 1.5 | 0.5 | Uni(cardioid)-directional | 100... 16000 |
| | VM-9752U-5P | ∅ 9.7 × 5.2 | Pins | -47±4 | 1.5 | 0.5 | Uni(cardioid)-directional | 100... 16000 |
| | VM-6027N-2 | ∅ 6.0 × 2.7 | Soldering points | -51±4 | 3.0 | 0.5 | Bi-directional (noise-cancelling) | 100... 10000 |
| | VM-9752N-1 | ∅ 9.7 × 5.2 | Soldering points | -54±4 | 1.5 | 0.5 | Bi-directional (noise-cancelling) | 100... 10000 |

Please ask for minimum order quantities!

4 | VIBRATION MOTORS

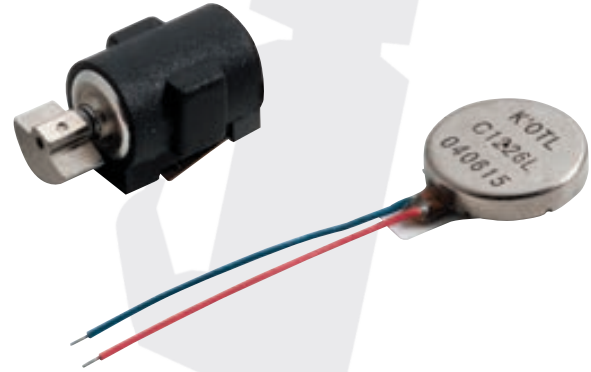


JINLONG MACHINERY & ELECTRONICS CO., LTD.

(KOTL) was established in 1993 and is located in Wenshou. Under the brand label KOTL, it is well-known as a manufacturer of micro vibration motors, ISO 9001:2000, ISO 14001, OHSAS and QC80000 certified. The labour force consists of 1800 employees. Production capacity over 22 Mio pcs/month. Production area: 66000 m².

KOTL is able to provide coreless cylindrical DC vibration motors and coin type vibration motors. Cylindrical type motors are also available for SMD reflow solder process.

All this motors feature stable construction, excellent performance, lightweight and compact size, power conserving mechanism, and stronger vibration function as applicable in the mobile phone industry. Moreover, these products can also be applied to the automatic focusing and control system of



video cameras, digital cameras, precision medical devices, shavers and toothbrushes. It can be surface mountable or be equipped with spring contact or lead wire. We also offer rubber boot or bracket versions as well as custom designs on request.

KOTL

4.1 COIN TYPE VIBRATION MOTORS

Coin type vibration motors are flat and a space saving solution. The diameter is from 8 mm to 12 mm. The thickness is between 2 mm and 3,4 mm. The counterweight is rotating around the middle thickness axis. They are available

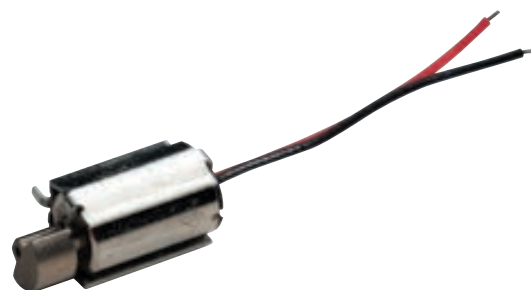
with lead wire, connector, solder pads and spring terminal. An ideal place to mount a coin type vibration motor is in the plastic shell of your product's housings.

| APPEARANCE | PART NUMBER | DIMENSION [mm] | RATED VOLTAGE [V] | OPERATING VOLTAGE [V] | MIN. RATED SPEED [rpm] | MAX. RATED CURRENT [mA] | OPERATING TEMPERATURE [°C] |
|------------|-------------|----------------|-------------------|-----------------------|------------------------|-------------------------|----------------------------|
| | C1026B | ∅ 10 × 2.7 | 3.0 | 2.5 ... 4.0 | 9,000 | 90 | -20 ... +60 |
| | C1030B | ∅ 10 × 3.0 | 3.0 | 2.5 ... 4.0 | 10,000 | 100 | -20 ... +60 |

Please ask for minimum order quantities!

4.2 CYLINDRICAL TYPE VIBRATION MOTORS

The diameter is from 4 mm to 7 mm. The overall length is between 10,9 mm and 24,9 mm. The counterweight is rotating the middle length axis. They are available with lead wire, connector and spring terminal. An ideal place to mount a coin type vibration motor is in the plastic shell of your product housings, either directly or wrapped with a rubber holder. Alternatively you can fix it with a solderable mounting bracket PCB through hole wise.

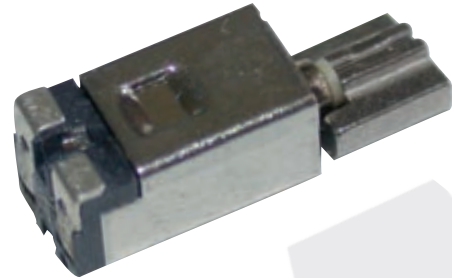


| APPEARANCE | PART NUMBER | DIMENSION [mm] | RATED VOLTAGE [V] | OPERATING VOLTAGE [V] | MIN. RATED SPEED [rpm] | MAX. RATED CURRENT [mA] | OPERATING TEMPERATURE [°C] |
|---|-------------|----------------|-------------------|-----------------------|------------------------|-------------------------|----------------------------|
|  | Z4SJ1B | ∅ 4 × 15.6 | 3.0 | 2.2 ... 3.6 | 8,500 | 80 | -30 ... +70 |
|  | Z4TH1B | ∅ 4 × 12.7 | 3.0 | 2.2 ... 3.6 | 9,000 | 105 | -30 ... +70 |
|  | Z4TH7B | ∅ 4 × 13.6 | 3.0 | 2.2 ... 3.6 | 8,500 | 100 | -30 ... +70 |
|  | Q6DL2A | ∅ 6 × 16.0 | 1.3 | 0.9 ... 1.6 | 23,000 non-load | 65 non-load | -20 ... +60 |
|  | Z6CL2A | ∅ 6 × 20.5 | 1.3 | 0.9 ... 1.6 | 5,500 | 80 | -30 ... +70 |
|  | Z6SC3A | ∅ 6 × 12.5 | 1.3 | 0.9 ... 1.6 | 8,500 | 80 | -30 ... +70 |
|  | Q6DC3A | ∅ 6 × 16.8 | 1.3 | 0.9 ... 1.6 | 19,500 non-load | 55 non-load | -20 ... +60 |

Please ask for minimum order quantities!

4.3 SMD CYLINDRICAL TYPE VIBRATION MOTORS

The diameter is from 3 mm to 4 mm. The overall length is between 10,9 mm and 24,9 mm. The counterweight is rotating around the middle length axis. This SMD version is reflow solderable and recommended for fully automated processing. Packaging in tape&reel. The mounting place is the PCB.



APPEARANCE

PART NUMBER

DIMENSION [mm]

RATED VOLTAGE [V]

OPERATING VOLTAGE [V]




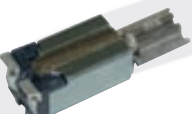
MIN. RATED SPEED [rpm]

MAX. RATED CURRENT [mA]

OPERATING TEMPERATURE [°C]

SMD Types



| | | | | | | | |
|---|-------------------|--------------|-----|-------------|--------|-----|-------------|
|  | Z30C1T 8219651 | ∅ 3.5 × 10.8 | 2.7 | 2.3 ... 3.2 | 14,000 | 75 | -20 ... +70 |
|  | Z4FC1B130 1781 | ∅ 4.5 × 11.1 | 3.0 | 2.6 ... 3.6 | 10,000 | 110 | -10 ... +60 |
|  | Z4NC1A159 1901 | ∅ 4.5 × 12.8 | 1.3 | 1.1 ... 1.5 | 10,000 | 125 | -10 ... +60 |
|  | Z4PC3B812 9521 | ∅ 4.5 × 14.3 | 3.0 | 2.6 ... 3.6 | 11,000 | 100 | -20 ... +70 |

Please ask for minimum order quantities!

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