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ACOUSTICS

Innovative Products for Intelligent Applications

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ARIO

ZHEJIANG BAOLONG M&E CO.,LTD.

ChinaSound

BSE

VECO

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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, automotive, home appliances and other applications. Increasing demands for sound (band width, 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, BAOLONG, BSE, ARIOSE and CHINASOUND, we provide solutions for all kind of applications, even challenging ones.

The following pages show the majority of our most popular acoustic components. If you need other versions, modifications, additional assemblies or more detailed technical information, please contact us. We will help you with our wide experience in automotive and nonautomotive 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).

Ariose Electronic Co. Ltd. was established 1996 and has already been operating in the acoustics sector for 20 years.

Ariose is specialized in the production of electronic acoustic products, such as buzzers, loudspeakers, microphones or piezoelectric ceramic elements. Quality in combination with a continuous improvement process to satisfy customer needs are the top priorities of the company. The products of Ariose are all manufactured under high quality control standards. The company is also certified according to ISO9001:2015.

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 3.500 m² big, has 200 employees and is located in Changzhou. Certifications: ISO 9001, QS9000 and TS 16949. Production capacity 1,5 mill. pcs per month.

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.

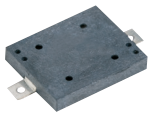
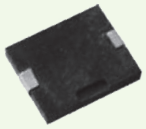
The advantage of these simple structured acoustic components is their robustness and cost-efficient sound solution.

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.

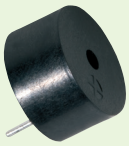
1.1 PIEZOELECTRIC TRANSDUCERS AND BUZZERS

ChinaSound

APPEARANCE	PART NUMBER	DIMENSIONS [MM]	RATED VOLTAGE [VP-P]	OPERATING VOLTAGE [VP-P]	MAX. RATED CURRENT [MA]	SOUND OUTPUT AT 10 CM [DB]	OPERATING TEMPERATURE [°C]	RESONANCE 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 CSPT13A03 CSPT16B03	11.0×9.00×1.7 12.8×12.8×3.0 16.0×16.0×2.5	5 3 3	1 ... 20 1 ... 20 1 ... 25	1 1 1	73 75 80	- 20 ... + 85 - 40 ... + 105 - 40 ... + 120	4100 ± 500 4000 ± 500 4000 ± 500
	CSPT11B05	11.0×9.00×1.7	5	1 ... 20	1	75	- 40 ... + 105	4000 ± 500
	CSPT12A03 CSPT12B03 CSPT12C05	12.0×12.0×3.0 12.0×12.0×2.7 12.0×12.0×2.3	3 3 5	1 ... 20 1 ... 20 1 ... 20	1 1 1	75 72 80	- 40 ... + 105 - 40 ... + 105 - 40 ... + 105	4000 ± 500 4000 ± 500 4000 ± 500
 	CSPT17D12 CSPT22A12-4 CSPT23B09-4 CSPT23C09-3.2	ø 17 × 6 ø 22 × 7 ø 22 × 11 ø 23 × 22	12 12 9 9	1 ... 25 1 ... 30 1 ... 30 1 ... 30	3 3 5 5	90 90 100 102	- 30 ... + 85 - 30 ... + 85 - 30 ... + 85 - 30 ... + 85	4000 ± 500 4000 ± 500 4000 ± 500 3200 ± 500
	CSPT15A03 CSPT15A05	14.3×14.3×7.4 14.3×14.3×7.4	3 5	1 ... 20 1 ... 20	2 2	80 80	- 40 ... + 105 - 40 ... + 105	4000 ± 500 4000 ± 500
	CPT12A03 CPT13B03	ø 12 × 7 ø 12.5 × 6.2	3 3	1 ... 20 1 ... 20	1 1	75 75	- 30 ... + 80 - 40 ... + 85	4500 ± 500 4000 ± 500

1.1 PIEZOELECTRIC TRANSDUCERS AND BUZZERS

ChinaSound

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

1.2 PIEZOELECTRIC SPEAKERS

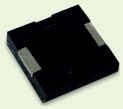
ChinaSound

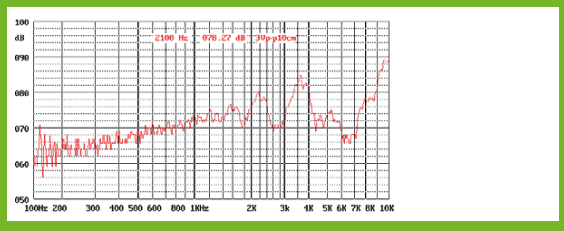
A piezoelectric speaker is a smart combination of a flexible sound supporting plastic diaphragm and a piezoceramic disc. This simple structured and lightweight component is capable of providing a wider frequency range than standard piezo sound generators and achieves aggressively loud Sound Pressure 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	DIMENSIONS [mm]	RATED VOLTAGE [VDC]	OPERATING VOLTAGE [VDC]	MAX. RATED CURRENT [mA]	MIN. SOUND OUTPUT AT 10 cm [dB]	OPERATING TEMPERATURE [°C]	RESONANCE FREQUENCY [Hz]
PIEZOELECTRIC SPEAKERS								
	CPT45A12-2.5	ø 46 × 13.5	12	3 ... 50	20	95	-30 ... +95	2500 ± 500
	PK32W28A	ø 48 × 10.5	9	max. 30	20	105	-20 ... +80	2800 ± 500

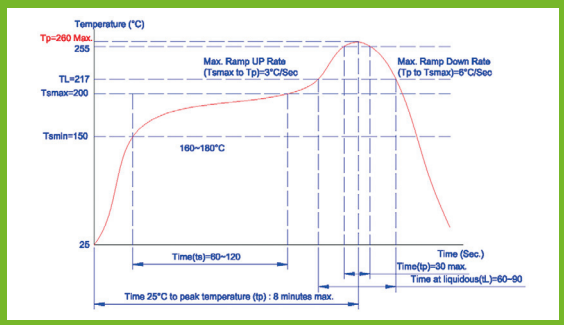
1.3 SMALLEST PIEZO SMD TRANSDUCER

ChinaSound

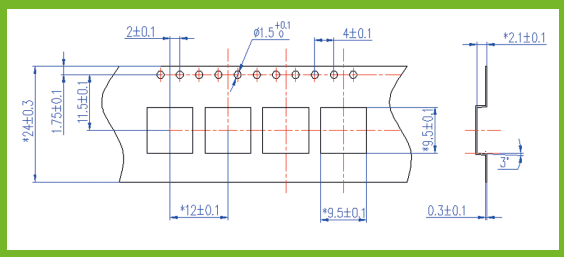
APPEARANCE	PART NUMBER	DIMENSIONS [mm]	RATED VOLTAGE [VDC]	OPERATING VOLTAGE [VDC]	MAX. RATED CURRENT [mA]	MIN. SOUND OUTPUT AT 10 cm [dB]	OPERATING TEMPERATURE [°C]	RESONANCE FREQUENCY [Hz]
PIEZOELECTRIC BUZZERS								
	CSPT09A03-2.1F	9.0 × 9.0 × 1.8	3	20 Vp-p max.	1	75	- 40 … + 105	2100 ± 500
	CSPT09A03-4.0F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



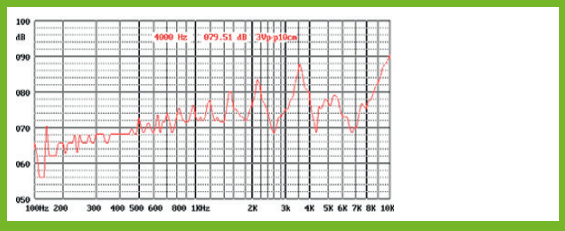
Characteristics



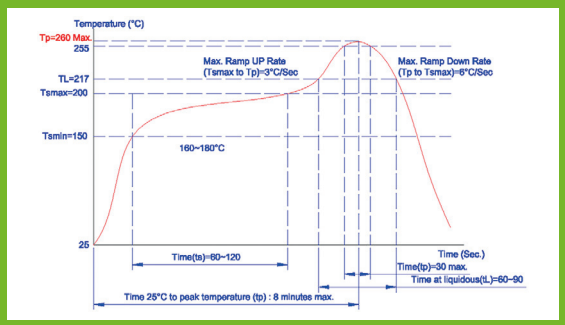
Recommended Reflowing Profile



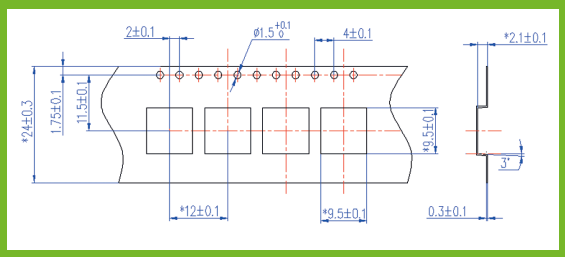
Tape & Reel Dimensions



Characteristics



Recommended Reflowing Profile



Tape & Reel Dimensions

1.4 ELECTROMAGNETIC TRANSDUCERS AND BUZZER

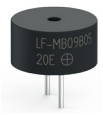
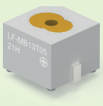
Electromagnetic sound generators consist of a swinging metal diaphragm driven by an electromagnetic circuit. These transducers are small and provide a wider frequency range compared with piezoelectric sound generators. They are the right choice for applications, where different frequencies are used to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

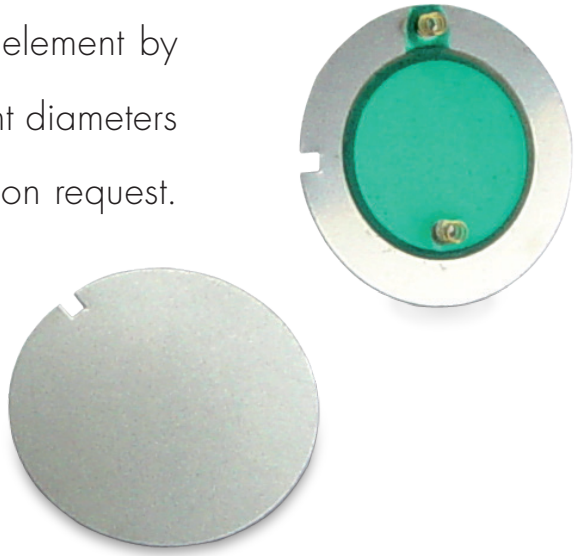
STYLE/DIMENSIONS [MM]	MODEL NUMBER	OPERATING VOLTAGE [V]	DCR [Ω]	MAX. CURRENT [MA]	FREQUENCY [Hz]	MIN. SPL [DB]	TEMPERATURE RANGE [°C]	SOUND EXIT	PACKAGING
 5.0×5.0×2.0	LF-MT05A03	3.6 (2.5...4.5)	12	130	4000	73	T_{OP}:-40 ... +85 T_{STG}:-40 ... +85	Sideways	T&R / 2,500 pcs. per reel
 5.0×5.0×3.0	LF-MT05B01	3.0 (2.0...4.0)	12	110	4000	75	T_{OP}:-40 ... +85 T_{STG}:-40 ... +85	Sideways	T&R / 2,500 pcs. per reel
 8.5×8.5×3.0	FDYX-801S-0327	3.0 (2.0...4.5)	18		2731	85	T_{OP}:-30 ... +70 T_{STG}:-40 ... +85	Sideways	T&R / 1,000 pcs. per reel
 8.5×8.5×3.0	FDYX-801S-0330	3.0 (2.0...4.5)	18		3000	85	T_{OP}:-30 ... +70 T_{STG}:-40 ... +85	Sideways	T&R / 1,000 pcs. per reel
 8.5×8.5×3.0	FDYX-801S-0527	5.0 (3.0...7.0)	30		2731	85	T_{OP}:-30 ... +70 T_{STG}:-40 ... +85	Sideways	T&R / 1,000 pcs. per reel

1.4 ELECTROMAGNETIC TRANSDUCERS AND BUZZER

STYLE/DIMENSIONS [MM]	MODEL NUMBER	OPERATING VOLTAGE [V]	DCR [Ω]	MAX. CURRENT [MA]	FREQUENCY [HZ]	MIN. SPL [DB]	TEMPERATURE RANGE [°C]	SOUND EXIT	PACKAGING
SELECTION GUIDE									
 8.5×8.5×4.0	LF-MT08SB36	3.6 (2.5...4.0)	16	100	2700	85	T_{OP}:-40 ... +85 T_{STG}:-40 ... +85	Sideways	T&R / 1,000 pcs. per reel
 8.5×8.5×4.0	LF-MT08SB6	5.0 (4.0...6.0)	30	80	2700	88	T_{OP}:-20 ... +70 T_{STG}:-30 ... +80	Sideways	T&R / 1,000 pcs. per reel
 Ø9.6×5.0	LF-MB09B05	5.0 (3.0...8.0)		30	2700	85	T_{OP}:-20 ... +70 T_{STG}:-30 ... +80	On top	
 Ø12.0×9.5	LF-MB12B06	5.0 (3.0...7.0)		30	2300	90	T_{OP}:-25 ... +80 T_{STG}:-30 ... +80	On top	
 Ø12.0×9.5	LF-MB12B12	12.0 (8.0...15.0)		30	2300	85	T_{OP}:-20 ... +70 T_{STG}:-30 ... +80	On top	
 12.8×12.8×10	LF-MB13T05	5.0 (4.0...7.0)		30	2400	90	T_{OP}:-20 ... +70 T_{STG}:-30 ... +80	On top	T&R / 320 pcs. per reel
 Ø16.0×14.0	LF-MB16A12-A	12.0 (8.0...15.0)		30	2300	85	T_{OP}:-20 ... +70 T_{STG}:-30 ... +80	On top	

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 avail-able upon request.



PIEZOCERAMIC DISCS	
PART NUMBER	CPE20N-3.6A1-S-2.2ER
DIMENSIONS [mm]	⌀ 20 × 0.22
INPUT VOLTAGE [Vp-p]	30
MAX. RESONANCE IMPEDANCE [Ω]	1500
CAPACITANCE AT 100 HZ [nF]	20
OPERATING TEMPERATURE [°c]	-20 … +60
RESONANCE FREQUENCY [Hz]	3600 ± 500

2. DYNAMIC LOUDSPEAKERS

endrich provides solutions for all sophisticated acoustic wide frequency sound demands with an extensive selection of dynamic loudspeakers. Our portfolio meets all needs for high quality speakers as well as low cost series for sound reproduction in various electronic products, e. g. automotive park distance control/dashboard and alarm sound, home applications, as well as smart home, smart industry, smart buildings and general electronics. endrich cooperates with excellent and certified Chinese suppliers, which are introduced in this catalogue.

VANSONIC ENTERPRISE Co., LTD. (VECO)
With more than 30 years of experience in the field of acoustics, VANSONIC is a micro-loudspeaker manufacturer. The variety of different available micro speakers is one of the biggest worldwide and the application scope ranges from medical appliances to home appliances, notebooks, telephones to automotive. VECO is a Taiwanese company and was founded in 1981. Today, there are 4 factories in China with a total labour force of 5.300 employees. Veco is certified according TS 16949, ISO 14001, QC 80000 and ISO 9001. The production capacity is 230 mill. pcs/year.

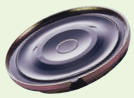
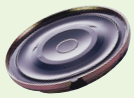
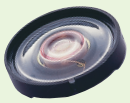
Changzhou CHINASOUND Electronics Co., Ltd. is an ISO9001, TS16949 certified and well experienced company, continuously focusing on research, development and production of acoustic components since 1999.
Main products are sound generators, especially piezo sound generators and alarm devices for many kind of applications like home appliances, medical equipment, smoke detectors and automotive applications.
The factory is 3.500 m² big, has 200 employees and is located in Changzhou. Certifications: ISO 9001, QS9000 and TS 16949. Production capacity 1,5 mill. pcs per month.

2.1 DYNAMIC LOUDSPEAKERS

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 includes several round (ø 15 to 57 mm) and rectangular shapes (25 × 10 to 50 × 50 mm) which are assembled according to custom design. These loudspeakers are availabe with impedances between 4 to 150 Ω, rated input power from 0.1 to 5 W and frequency ranges from 200 Hz to 20 kHz for an operation temperature range of - 40 up to + 85 °C (special designs up to + 120 °C).

2.1 DYNAMIC LOUDSPEAKERS

ChinaSound VECO

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL [@ P_N / 0.5 m] [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_0 [Hz]	FREQUENCY RANGE [SPL-10dB] [Hz]
DYNAMIC SPEAKERS – ROUND/OVAL TYPES WITH FABRIC/MYLAR/TITANIUM CONE								
	15CR08GL	ø 15.0 × 3.8	8	500	84	-20 … +60	850	500 … 20000
	15CR08F	ø 15.0 × 3.5	8	300	78	-20 … +60	780	500 … 5000
	20VS08PL	19.5×13.5×4.0	8	1000	80	-20 … +60	900	500 … 20000
	20CS08FLH	ø 20.0 × 3.0	8	500	78	-20 … +60	570	500 … 20000
	20CL08GS	ø 20.0 × 3.0	8	100	76	-20 … +60	820	550 … 5000
	20CS08F	ø 20.0 × 3.2	8	500	78	-20 … +60	650	400 … 20000
	20CR08F	ø 20.0 × 3.2	8	500	81	-20 … +60	530	300 … 6000
	20CS08G	ø 20.0 × 4.2	8	100	73	-20 … +60	950	300 … 5500
	23CS08F	ø 23.0 × 4.4	8	200	81	-20 … +60	780	600 … 8000
	23CR08FH	ø 23.0 × 5.3	8	500	82	-20 … +60	670	400 … 20000
	23CS08FH	ø 23.0 × 5.4	8	500	82	-20 … +60	900	600 … 20000
	26CR08F	ø 26.0 × 4.4	8	500	83	-20 … +60	540	450 … 20000

2.1 DYNAMIC LOUDSPEAKERS

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL (@ P_N / 0.5 m) [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_o [Hz]	FREQUENCY RANGE (SPL-10dB) [Hz]
DYNAMIC SPEAKERS – ROUND/OVAL TYPES WITH FABRIC/MYLAR/TITANIUM CONE								
	26CS08F	ø 26.0 × 4.4	8	500	81	-20 ... +60	470	250 ... 5500
	26CRF04E-1	ø 26.0 × 4.3	4	1500	83	-20 ... +60	740	400 ... 20000
	26CR08FE	ø 26.0 × 4.4	8	500	85	-40 ... +85	670	450 ... 20000
	28CS08FL	ø 28.0 × 3.9	8	1000	85	-20 ... +60	620	400 ... 6500
	28CS08FN-2	ø 28.0 × 4.2	8	500	85	-20 ... +60	680	400 ... 7000
	28CS08G	ø 28.0 × 4.3	8	200	82	-20 ... +60	850	600 ... 5600
	28CR08FH	ø 28.0 × 5.5	8	500	80	-40 ... +85	350	200 ... 20000
	28CR08FB-1	ø 28.0 × 5.4	8	1500	82	-20 ... +60	470	300 ... 20000
	30CS08FH	ø 30.0 × 4.0	8	500	87	-20 ... +60	650	400 ... 3000
	30CS08G	ø 30.0 × 4.0	8	200	80	-20 ... +60	530	300 ... 5600
	32CS08F	ø 32.0 × 4.6	8	500	87	-20 ... +60	600	350 ... 5000
	34CS08G	ø 34.0 × 4.6	8	200	80	-20 ... +60	330	170 ... 12000

2.1 DYNAMIC LOUDSPEAKERS

ChinaSound VECO

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL (@ P_N / 0.5 m) [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_0 [Hz]	FREQUENCY RANGE (SPL-10dB) [Hz]
DYNAMIC SPEAKERS – ROUND/OVAL TYPES WITH FABRIC/MYLAR/TITANIUM CONE								
	34RC08-1	ø 34.0 × 14.7	8	3000	82	-20 ... +60	170	120 ... 20000
	36CS08G	ø 36.0 × 4.6	8	100	76	-20 ... +60	420	250 ... 6000
	36CR08FN	ø 36.0 × 4.8	8	500	79	-20 ... +60	370	200 ... 20000
	36CS08FN-3* 36CSF08-1	ø 36.0 × 4.8 ø 36.0 × 4.8	8 8	1000 1000	92 89	-40 ... +85 -40 ... +85	570 580	300 ... 5000 350 ... 6500
	36CS08FN-18	ø 36.0 × 4.8	8	1000	92	-40 ... +85	600	500 ... 14000
	38CR08G	ø 38.0 × 4.2	8	300	80	-20 ... +60	380	200 ... 20000
	40CS08GS	ø 40.0 × 4.3	8	100	80	-20 ... +60	390	200 ... 3000
	40DS08G	ø 40.0 × 4.4	8	300	84	-20 ... +60	420	300 ... 5000
	40CS08FN 40CS08FN-5 40CS08FN*	ø 40.0 × 4.9 ø 40.0 × 4.9 ø 40.0 × 4.9	8 8 8	200 500 1000	83 83 84	-20 ... +60 -20 ... +60 -40 ... +85	350 380 430	200 ... 6000 200 ... 10000 200 ... 5000
	45RW04-1	ø 45.0 × 10.2	4	5000	84	-20 ... +60	340	90 ... 4000
	50CS08FH-1	ø 50.0 × 7.50	8	300	85	-20 ... +60	400	FO ... 4000

DYNAMIC SPEAKERS – ROUND/OVAL TYPES WITH FABRIC/MYLAR/TITANIUM CONE

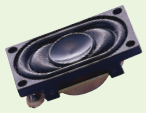
APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL (@ P_N / 0.5 m) [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_0 [Hz]	FREQUENCY RANGE (SPL-10dB) [Hz]
	50CS08G	⌀ 50.0 × 8.00	8	200	80	-20 … +60	350	190 … 10000
	57CSF08-1	⌀ 57.0 × 8.30	8	1000	90	-20 … +60	480	300 … 13000
	50CUG04HXE-3-D3	⌀ 50.0 x 24.90	4	5000	86	-10 … +50	200	200 … 5000

DYNAMIC SPEAKERS – ROUND TYPES WITH PAPER CONE

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL (@ P_N / 0.5 m) [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_0 [Hz]	FREQUENCY RANGE (SPL-10dB) [Hz]
	18RE08-3-1	⌀ 18.0 × 8.8	8	2000	80	-20 … +60	550	350 … 20000
	40AS08	⌀ 40.0 × 17.5	8	3000	86	-20 … +60	180	100 … 20000
	45RW04-1	⌀ 45.0 × 10.2	4	5000	87	-20 … +60	260	100 … 5000

2.1 DYNAMIC LOUDSPEAKERS

ChinaSound VECO

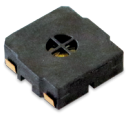
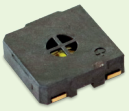
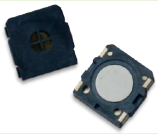
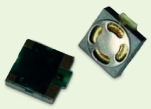
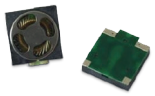
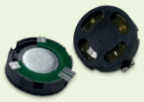
APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL (@ P_N / 0.5 m) [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_0 [Hz]	FREQUENCY RANGE (SPL-10dB) [Hz]
DYNAMIC SPEAKERS – SQUARE TYPES								
	25KC08-N	25.0×14.0×5.2	8	1000	79	-20 … +60	600	350 … 20000
	25KP08	25.0×14.0×7.3	8	1000	82	-20 … +60	630	335 … 5300
	25KE08	25.0×25.0×8.8	8	2000	80	-20 … +60	350	200 … 20000
	30KM08	30.0×16.0×5.0	8	500	77	-20 … +60	500	300 … 4000
	32KC08-1	32.0×32.0×14.7	8	3000	82	-20 … +60	170	120 … 20000
	32KUG-08XNT-W	32.7x32.7x16.5	8	3000	85	-25 … +70	200	200 … 20000
	35KN08	35.0×16.0×4.2	8	1000	82	-20 … +60	650	300 … 20000
	35KM08	35.0×16.0×5.0	8	1000	81	-20 … +60	650	400 … 4000
	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

2.1 DYNAMIC LOUDSPEAKERS

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL (@ P_N / 0.5 m) [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_0 [Hz]	FREQUENCY RANGE (SPL-10dB) [Hz]
DYNAMIC SPEAKERS – SQUARE TYPES								
	4017KP08	40.0×17.0×9.0	8	2000	88	-20 ... +60	480	350 ... 20000
	40KT08	40.0×20.0×5.3	8	500	85	-20 ... +60	500	300 ... 20000
	40KC08-3	40.0×28.5×11.3	8	3000	82	-20 ... +60	420	200 ... 20000
	40KL08	40.0×28.5×13.0	8	2000	86	-20 ... +60	370	200 ... 20000
	40CS08K	40.0×40.0×4.5	8	200	82	-20 ... +60	550	400 ... 8000
	40CS08FNK	40.0×40.0×5.5	8	500	85	-20 ... +60	570	300 ... 10000

2.1 DYNAMIC LOUDSPEAKERS

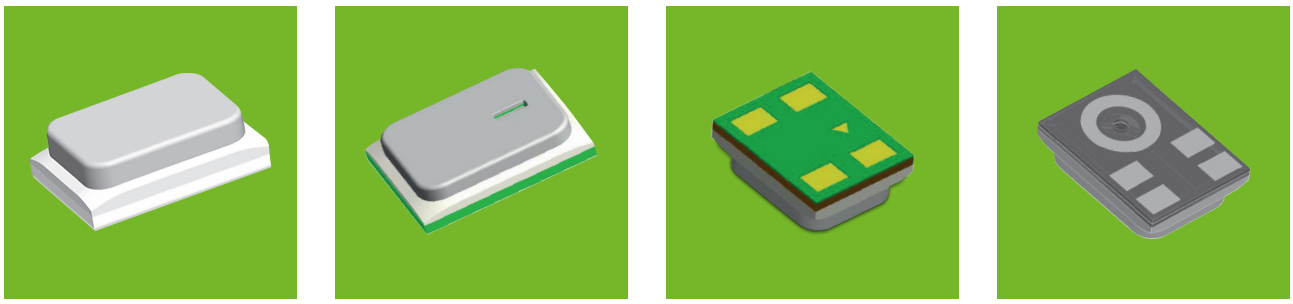
ChinaSound VECO

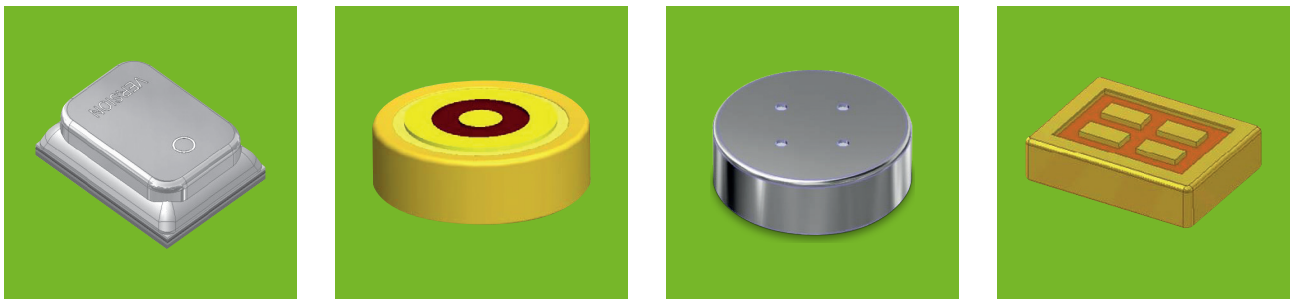
APPEARANCE	PART NUMBER	DIMENSIONS [mm]	IMPEDANCE [Ω] ±15%	NORMAL POWER P_N [mW]	SPL (@ P_N / 0.5 m) [dB]	OPERATING TEMPERATURE [°C]	LOWEST RESONANCE FREQUENCY f_0 [Hz]	FREQUENCY RANGE (SPL-10dB) [Hz]
DYNAMIC SPEAKERS – SMD TYPE								
	PCXS1313040-R08W0 7-A-SM-266	13x13x4	8	700	90	-40 ~+105	1000	F0~20000
	PCXS1515040-R08W0 5-A-SM-187	15x15x4	8	500	87	-30 ~+85	850	F0~20000
	CSMS13S4-8S0.3-P950F	13x13x4	8	300	87	-40 ~+85	950	F0~20000
	CSMS15S4.3-4S0.3-P950F	15x15x4,3	4	300	89	-40 ~+85	950	F0~20000
	CSMS18S4.8-8S0.3-P580F	18x18x4,8	8	300	89	-40 ~+85	580	F0~20000
	CSMS29R8-8S0.6-P700F	28,8x8	8	600	97	-40 ~+85	700	F0~20000

3. MICROPHONES

endrich provides a wide range of microphones from two suppliers: BSE and VANSONIC. The microphones can be offered as MEMS (MicroElectroMechanical Systems) microphones and ELECTRET condenser microphones. MEMS microphones have omnidirectional character and features like high resistance against mechanical shock, high/low temperature and vibration.

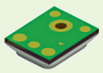
MEMS microphones are leadfree reflow solderable. The ELECTRET condenser microphones (ECM) are characterized by high sensitivities and efficiency (high-tone quality) and are available with the following characteristics: Omnidirectional, bidirectional (noise cancelling) or unidirectional. Electret condenser microphones are equipped with SMD solder pads or conventional solder connections (pins, pads, wire).



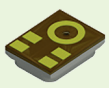


3.1 MEMS-MICROPHONES (SMD)

BOSUNG ELECTRONICS Co., Ltd. (BSE) 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 computers and automotive applications (microphone modules). Nowadays, BSE is one of the market leaders and has facilities in South Korea, China and Vietnam, with a total labour force of 5.000 employees. Their production capacity is over 1 billion/year. Certification ISO 9001 and 14001.

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	SENSITIVITY (0 dB = 1V/ Pa, 1kHz) [dB ±3]	SNR	REMARKS
ANALOG MEMS MICROPHONES					
	F4-(A)MOE-C110R38-6P	3.76 x 2.95 x 1.10	- 38.0 dB	62.0 dB	Bottom Port
	F4-(S)MOE-N090R38-3P	2.75 x 1.85 x 0.90	- 38.0 dB	62.0 dB	Bottom Port
	F1-(A)MOE-N090R38-3P	2.75 x 1.85 x 0.90	- 38.0 dB	63.0 dB	Bottom Port

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

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	SENSITIVITY (0 dB = 1V/ Pa, 1kHz) [dB ±3]	SNR	REMARKS
DIGITAL MEMS MICROPHONES					
	F4-(A)HDMO-D100R26-5P	4.0 x 3.0 x 1.0	- 26 dB	64,6 dB	Bottom Port
	F4-(A)HDMOE-J098R26-5P	3.50 x 2.65 x 0.98	- 26 dB	64,5 dB	Bottom Port
	A5-(S)DE-J098R26-M2180	3.50 x 2.65 x 0.98	- 26 dB	64.0 dB	Bottom 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.

3.2 SMD ECM

(REFLOW SOLDERABLE SMD ELECTRET CONDENSER MICROPHONES)

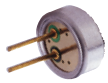
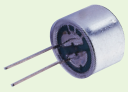
SMD Electret Condenser Microphones are the cheaper alternative to MEMS, while requirements to robustness are lower like MEMS, they are delivered packed tape&reel and recommended for fully automated reflow processing.

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	SENSITIVITY (0 dB = 1V/Pa, 1kHz) [dB ±3]	SNR	REMARKS
SMD ECM					
	(R)SOB-413S42-FM	Ø4.0 x 1.3	-42 ± 3 dB	58 dB	Top Port
	VM-4013B-DSR443GT	ø4.0 x 1.3	-44 dB	58 dB	Top Port
	VM4013B-YRCQ423G	ø4.0 x 1.3	-42 dB	58 dB	Top Port
	VM-4015B-2C423G	ø4.0 x 1.5	-42 dB	58 dB	Top Port
	VM-6022B-2C454G-T	ø6.0 x 2.2	-45 dB	58 dB	Top Port

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

3.3 ECM
(STANDARD ELECTRET CONDENSOR MICROPHONES)

All round standard sizes and performances of ECM are available with diameters between 4 and 9.7 mm. They are suited for operating temperatures between -20 and +70 °C. Electret condenser microphones are obtainable as omni-, bi- or uni-directional with different options of connectivty like pins, wire/connector assemblies, surface mountable or cutom designed.

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	CONTACT VERSION	SENSITIVITY (0 dB = 1V/Pa, 1kHz) [dB ±3] TYP.	OPERATING VOLTAGE [V]	MAX. CURRENT CONSUMPTION [mA]	DIRECTIVITY	FREQUENCY RANGE [Hz]
ELECTRET CONDENSER MICROPHONES								
	VM-4020-1P	ø 4.0 × 2.0	Pins	-36, -38, -40, -42, -44, -46	3.0	0.5	Omni-directional	50 ... 20000
	VM4530B-4P	ø 4.5 × 3.0	Pins	-45, -42, -39	3.0	0.5	Omni-directional	50 ... 10000
	VM6012B-1PC	ø 6.0 × 1.2	Pins	-45, -42, -39	3.0 2.0	0.5	Omni-directional	50 ... 10000
	VM6015B-1PC	ø 6.0 × 1.2	Pins	-45, -42, -39	3.0	0.5	Omni-directional	50 ... 10000
	VM6022B-4PC	ø 6.0 × 2.2	Pins	-45, -42, -39	3.0	0.5	Omni-directional	50 ... 10000
	VM6027B-2P	ø 6.0 × 2.7	Pins	-45, -42, -39	3.0	0.5	Omni-directional	50 ... 10000
	VM-6027B-9	ø 6.0 × 2.7	Solder-ring points	-36, -38, -40, -42, -44, -46	3.0	0.5	Omni-directional	20 ... 16000
	VM-6030U-2P	ø 6.0 × 3.0	Pins	-42±3	3.0	0.5	Uni(cardio-id)-directional	100 ... 12000
	VM6050UB-5C	ø 6.0 × 5.0		-54, -50, -46	3.0	0.5	Unidirectio-nal	100 ... 10000
	VM8050UB-3	ø 8.0 × 5.0		-54, -50, -46	3.0	0.5	Unidirectio-nal	100 ... 10000

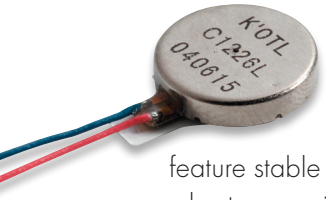
3.3 ECM
(STANDARD ELECTRET CONDENSOR MICROPHONES)

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	DIMENSIONS [mm]	CONTACT VERSION	SENSITIVITY (0 dB = 1V/ Pa, 1kHz) [dB ±3]	TYP. OPERATING VOLTAGE [V]	MAX. CURRENT CONSUMPTION [mA]	DIRECTIVITY	FREQUENCY RANGE [Hz]
ELECTRET CONDENSER MICROPHONES								
	VM9750UB-AC	ø 9.7 x 5.0		-51, -47, -43	1.5	0.5	Unidirectional	100 ... 10000
	VM9750UB-BCP	ø 9.7 x 5.0	Pins	-51, -47, -43	1.5	0.5	Unidirectional	100 ... 10000
	VM-6027NB-DC	ø 6.0 x 2.7		-55, -51, -47	2.0	0.5	Bi-directional (noise-cancelling)	200 ... 10000
	VM9750N-7	ø 9.7 x 5.0		-58, -54, -50	3.0	0.5	Bi-directional (noise-cancelling)	200 ... 10000

4. VIBRATION MOTORS

Baolong Zhikong Electric Co. Ltd. was established in October 1986 and is located in Zhejiang, China. Baolong is specialized in manufacturing and selling micro-vibration motors and they are also engaged in research and development (R&D). In total the company has around 900 employees. They have a total labour force of 665 people. Baolong established a safe and developed supply chain over the years. All components and parts are manufactured and assembled by themself which supports the flexibility. Furthermore Baolong is certified according to ISO9001, ISO14001 and OHSAS18001.

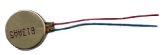
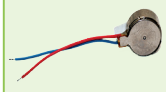
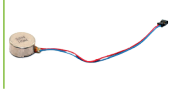


The labour force consists of 1.800 employees. Production capacity over 22 mill. pcs/month. Production area: 66.000 m². KOTL is able to provide coreless cylindrical DC and coin type vibration motors. Cylindrical type motors are also available for SMD reflow solder process. These motors feature stable construction, excellent performance, lightweight and compact size, power conserving mechanism, and a stronger vibration function which is necessary in the mobile phone industry. More-over, these products can also be used for the automatic focusing and control system of video cameras, digital cameras, precision medical devices, shavers and tooth-brushes. They are surface mountable or equipped with a spring contact or lead wire. endrich offers rubber boot or bracket versions as well as custom designs on request.

4.1 COIN TYPE VIBRATION MOTORS

ZHEJIANG BAOLONG M&E CO.,LTD.

Coin type vibration motors are flat and appropriateas a space saving solution. The diameter varies from 8 to 12 mm. The thickness has between 2 and 3.4 mm. The counterweight is rotating arround 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 housing.

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	RATED VOLTAGE [V]	OPERATING VOLTAGE [V]	MIN. RATED SPEED [rpm]	MAX. RATED CURRENT [mA]	OPERATING TEMPERATURE [°C]
COIN TYPES							
	BVM1018-X100-1TU	ø 10 x 1.8	3.0	2.5 ... 3.5	10,000	85	-30...+70
	BVM0834-X25-0TU-MF	ø 8 x 2.7	3.0	2.5 ... 3.5	13,500	85	-30...+70
	BVM0720-X8-0SU	ø 7 x 2.0	3.0	2.5 ... 3.5	8,000	85	-30...+70
	BVM0625H-X10-U	ø 6 x 2.5	3.0	2.5 ... 3.5	10,000	100	-30...+70
	BVM1034-C4701X50-1TU	ø 10 x 3.4	3.0	2.5 ... 3.5	11,500	85	-30...+70

4.1 Coin type vibration motors

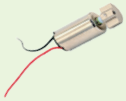
ZHEJIANG BAOLONG M&E CO.,LTD.

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	RATED VOLTAGE [V]	OPERATING VOLTAGE [V]	MIN. RATED SPEED [rpm]	MAX. RATED CURRENT [mA]	OPERATING TEMPERATURE [°C]
COIN TYPES							
	BVM1027H-X11-1T03U	ø 10 x 2.7	3.0	2.5 ... 3.5	15,000	75	-30...+70
	BVM0827-X10-1T03U	ø 8 x 2.7	3.0	2.5 ... 3.5	13,500	85	-30...+70
	BVM0820R-X7-1S05U	ø 8 x 2.1	3.0	2.7 ... 4.0	9,000	35	-30...+70

4.2 CYLINDRICAL TYPE VIBRATION MOTORS

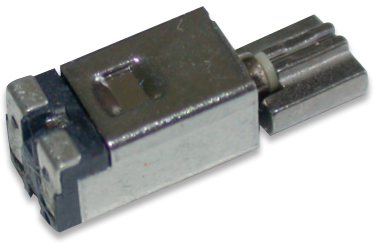
ZHEJIANG BAOLONG M&E CO.,LTD.

The diameter ranges from 4 to 7 mm. The overall length lies between 10.9 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	DIMENSIONS [mm]	RATED VOLTAGE [V]	OPERATING VOLTAGE [V]	MIN. RATED SPEED [rpm]	MAX. RATED CURRENT [mA]	OPERATING TEMPERATURE [°C]
CYLINDER TYPES							
	BL4I2V3-X9N	ø 4 x 13.2	3.0	2.4 ... 3.6	14,000	85	-30 ... +70
	BL6C1KW2-X15N	ø 6 x 16.3	3.0	2.4 ... 3.6	11,000	85	-30 ... +70
	BL6C1KT-X45N	ø 6 x 17.63	3.0	2.4 ... 3.6	14,500	150	-20 ... +60
	BL4I2G6-PF6	11.9 x 6.5 x 4.9	3.0	2.5 ... 3.6	14,000	85	-30 ... +70
	BL4I2S-GF	13.2 x 6.5 x 5.8	3.0	2.0 ... 4.0	11,000	100	-30 ... +70

4.3 SMD CYLINDRICAL TYPE VIBRATION MOTORS

ZHEJIANG BAOLONG M&E CO.,LTD.



The diameter varies from 3 to 4 mm. The overall length lies between 10.9 and 24.9 mm. The counterweight is rotating arround the middle length axis. This SMD version is reflow solderable and recommended for fully automated processing. Packaging in tape&reel. The mounting place is on the PCB.

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	RATED VOLTAGE [V]	OPERATING VOLTAGE [V]	MIN. RATED SPEED [rpm]	MAX. RATED CURRENT [mA]	OPERATING TEMPERATURE [°C]
SMD TYPES							
	BLT-3211H	ø 2.5 x 9.5	1.6	1.5 ... 2.0	16,000	80	-40...+85
	BLT-5513	ø 4.2 x 12.0	1.3	1.3 ... 1.6	9,000	110	-30...+70
	BLT-4311	ø 3.4 x 10.5	2.7	2.3 ... 3.2	14,000	75	-30...+70
	BLT-4315B	ø 4.1 x 12.7	2.3	2.1 ... 3.2	8,500	130	-30...+70
	BLT-5412	12 x 4 x 3.8	3.0	2.3 ... 3.4	11,000	100	-30...+70
	BLP-4311A	10.8 x 4.96 x 3.6	2.7	2.3 ... 3.5	13,500	80	-30...+70
	BLP-3211-H	11 x 3.8 x 2.9	2.7	2.3 ... 3.3	13,000	100	-30...+70

Linear vibration motors have a with width of 2.8 to 3.25 mm and a length between 8 to 19 mm. They meet the requirements of thinner thickness and big vibration intensity. Through its quick response, less accelerating time, directional vibration and strong human-computer interaction induction effect it is very suitable for haptic feedback devices.

APPEARANCE	PART NUMBER	DIMENSIONS [mm]	RATED VOLTAGE [V]	OPERATING VOLTAGE [V]	MIN. RATED SPEED [rpm]	MAX. RATED CURRENT [mA]	OPERATING TEMPERATURE [°C]
LINEAR TYPES							
	BLM0412G-FP192-UBU	12 x 4 x 3.5	1.8	0.1 ... 1.85	240 Hz ± 10	60	-20 ... +60
	BLM0312G-FP203-U	12 x 4.5 x 3	1.8	0.1 ... 1.85	240 Hz ± 10	100	-20 ... +60
	BLM-0512GA-FP181-0SU	12 x 4 x 4.5	1.8	0.1 ... 1.85	235 Hz ± 10	60	-20 ... +60
	BLM0832-X10-U	ø8x3.2	1.8	0.1 ... 1.85	235 Hz ± 7	90	-20 ... +60

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