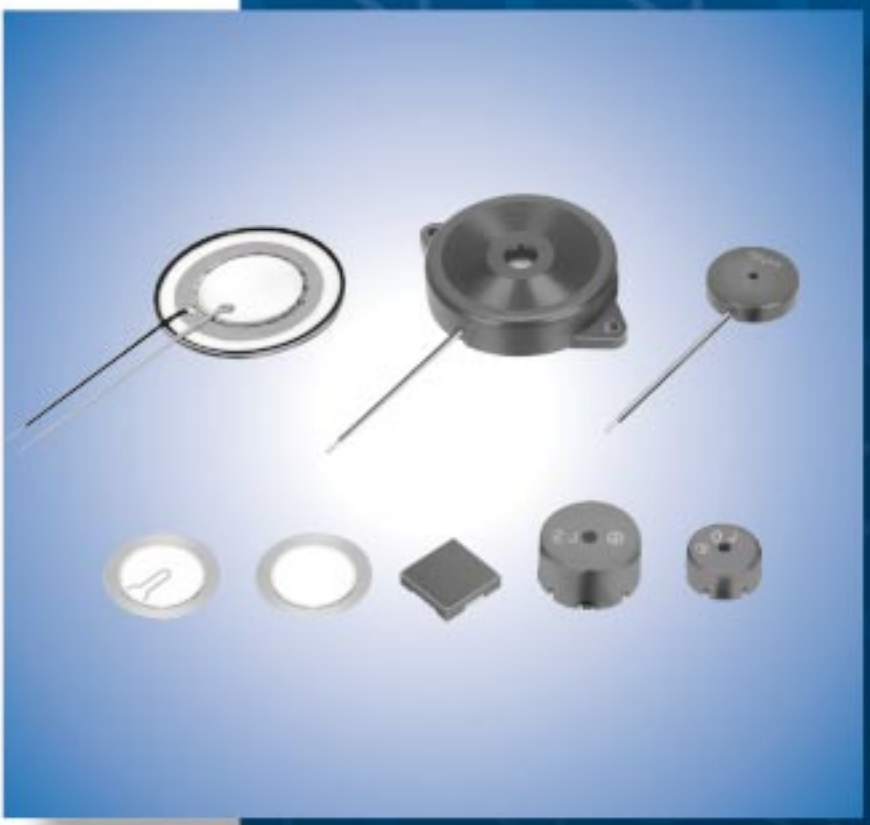
Piezoelectric Sound Components



muRata Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.P37E-19

CONTENTS

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- The RoHS compliance means that we judge from EU Directive 2002/95/EC the products do not contain lead, cadmium, mercury, hexavalent chromium, PBB and PBDE, except exemptions stated in EU Directive 2002/95/EC annex and impurities existing in natural world.
- This statement does not insure the compliance of any of the listed parts with any laws or legal imperatives developed by any EU members individually with regards to the RoHS Directive.

● Part Numbering

Piezoelectric Sounders/Piezoelectric Buzzers/Piezoelectric Ringers (PIEZORINGER®)

(Part Number)

PK	M	13	E	P	YH	40	00	P	-A0
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿

❶Product ID

Product ID	
PK	Piezoelectric Sound Components

❷Product

Code	Product
M	Sounder, Ringer
B	Buzzer

❸Outer Dimensions

Expressed by two figures in mm.

Ex.)

Code	Outer Dimensions
13	ø12.6mm

❹Drive

Code	Drive
E	External-Drive
S	Self-Drive

❺Outer Electrode Style

Code	Outer Electrode Style
P	Pin Type
W	Lead Wire Type

❻Structure

Code	Structure
T☐	Standing Type
P☐	Flat Type Auto-assemble
Y☐	Flat Type/Available for Taping
C☐	Flat Type/Semi-auto-assemble
☐	Exclude above mentioned

☐ means specification of outer electrode.

❼Oscillating Frequency Type

Code	Oscillating Frequency Type
40	Two digits figures express Oscillating Frequency type.

If there is no decimal point, the decimal point is omitted.

❽Individual Specification Code

Code	Individual Specification Code
00	Two digits express specific specification in characteristics.

❾Special Quality Guarantee

Code	Special Quality Guarantee
P	Post Plated Terminal
—	Blank

❿Packaging

Code	Packaging
-B0	Bulk
-A0	Radial Taping
-M0	Magazine

Radial taping or magazines are not available for all types.
Please contact us.
Packaging Code is blank in the case of types that radial taping or magazines are not available.

SMD Piezoelectric Sounder

(Part Number) **PK** ❶ **LCS** ❷ **1212** ❸ **E** ❹ **40** ❺ **01** ❻ **-R1** ❼

❶Product ID

Product ID	
PK	Piezoelectric Sound Components

❷Product

Code	Product
LCS	SMD Sounder

❸Dimensions

Code	Outer Dimensions
1212	□12mm

❹Drive

Code	Drive
E	External Drive

❺Oscillating Frequency Type

Code	Oscillating Frequency Type
40	Two digits figures express Oscillating Frequency type.

❻Individual Specification Code

Code	Individual Specification Code
01	Two digits express specific specification in characteristics.

❼Packaging

Code	Packaging
-R1	Plastic taping

SMD Piezoelectric Receiver (CERAMIPHONE®)

(Part Number) **PK** ❶ **LCD** ❷ **1212** ❸ **R** ❹ **10** ❺ **00** ❻ **-R1** ❼

❶Product ID

Product ID	
PK	Piezoelectric Sound Components

❷Product

Code	Product
LCD	SMD Receiver

❸Dimensions

Code	Outer Dimensions
1212	□12mm

❹Drive

Code	Drive
R	Receiver

❺Oscillating Frequency Type

Code	Oscillating Frequency Type
10	Two digits figures express Oscillating Frequency type.

❻Individual Specification Code

Code	Individual Specification Code
00	Two digits express specific specification in characteristics.

❼Packaging

Code	Packaging
-R1	Plastic taping

Piezoelectric Speakers (CERAMITONE®)

(Part Number) VS B 35 E W H 07 01 B
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾

❶Product ID

Product ID	
VS	Piezoelectric Speakers

❷Product

Code	Product
B	Piezoelectric Diaphragms

❸Outer Dimensions

Code	Outer Dimensions
35	ø35mm
50	ø50mm

❹Drive

Code	Drive
E	External Drive

❺Outer Electrode Style

Code	Outer Electrode Style
W	Lead Wire Type

❻Specification of Outer Electrode

Code	Specification of Outer Electrode
H	available for RoHS
—	non-compliant with the EU RoHS Directive

❼Resonant Frequency Type

Code	Resonant Frequency
03	1st Resonant Frequency : 300Hz
07	1st Resonant Frequency : 700Hz

❽Individual Specification Code

Code	Individual Specification Code
01	Characteristics, Style, others

❾Numbers of Ceramic

Code	Numbers of Ceramic
B	Two Elements (The code is omitted when there is only one element.)

Piezoelectric Diaphragms

(Part Number) 7 N B -31R2 DM -1R5 A 10
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾

❶Product ID

Product ID	
7	Ceramic Material

❷Product (1)

Code	Metal Plate Material
B	Brass
N	Nickel Alloy
M	Ni Plated Iron
S	SUS

❸Product (2)

Code	Product
B	Piezoelectric Diaphragms

❹Metal Plate Diameter

Code	Metal Plate Diameter
-31R2	A hyphen (-) plus four digits alphanumerics express metal plate outer dimensions. A decimal point is expressed by the capital letter "**R**".

If there is no decimal point, the decimal point code is omitted.

❺Form of Piezoelectric Style

Code	Form of Piezoelectric Style
DM	Two digits express shape of ceramics.

For an Ag electrode, this digit remains blank, the corresponding code is omitted.

❻Resonant Frequency Type

Code	Resonant Frequency (kHz)
-1R5	A hyphen (-) and three digits alphanumerics express resonant frequency. A decimal point is expressed by the capital letter "**R**".

If there is no decimal point, the decimal point is omitted.

❼With Feedback Electrode

Code	With Feedback Electrode
C	With Feedback Electrode
—	Without Feedback Electrode

❽Product Specification

Code	Product Specification
A	With lead (non-compliant with the EU RoHS Directive)
L	With lead (available for RoHS)
—	No lead (omitted)

❾Individual Specification Code

Code	Individual Specification Code
10	These digits express a lead length, lead number, and presence/absence of a connector.

If the product has no individual specification, the corresponding code is omitted.

Application Matrix

		Part Number \ Application	Tele-phone	Watch	Clock	Medical Equip-ment	Gas Alarm	Digital Camera	Toy	Bar Code Scanner	Printer	Note-PC PDA	DVD-Player	Micro-wave Oven	Air Condi-tioner	Fan Heater	Instru-ment Cluster
Piezoelectric Diaphragm	External Drive Type	7BB-12-9		●	●	●		●	●			●					
		7BB-15-6			●	●		●	●			●					
		7BB-20-3	●	●	●	●			●	●							
		7BB-20-6			●	●		●	●			●					
		7BB-20-6L0			●	●			●			●					
		7BB-27-4	●		●	●			●	●							
		7BB-27-4L0	●		●	●			●	●							
		7BB-35-3	●		●				●	●							
		7BB-35-3L0	●		●				●	●							
		7BB-41-2	●														
		7BB-41-2L0	●														
		7NB-31R2-1				●	●										
	Self Drive Type	7BB-20-6C	●					●	●								
		7BB-20-6CL0	●					●	●								
		7BB-27-4C	●				●		●	●							
		7BB-27-4CL0	●				●		●	●							
		7BB-35-3C	●				●			●							
		7BB-35-3CL0	●				●			●							
		7BB-41-2C	●														
		7BB-41-2CL0	●														
		7SB-34R7-3C					●										
Piezoelectric Sounder	External Drive Type	PKM13EPYH4000-A0	●		●	●		●	●	●	●	●	●		●	●	●
		PKM13EPYH4002-B0	●		●	●		●	●	●	●	●	●	●	●	●	●
		PKM17EPP-2002-B0	●		●	●			●	●	●		●	●	●	●	●
		PKM17EPPH4001-B0	●		●	●			●	●	●		●	●	●	●	●
		PKM17EWH2001	●		●	●		●	●	●	●	●	●		●		
		PKM22EPH2001							●		●		●	●	●	●	●
		PKM22EPPH2001-B0	●		●	●			●		●		●	●	●	●	●
		PKM22EPPH4001-B0	●		●	●			●		●		●	●	●	●	●
		PKM22EPPH4005-B0	●		●	●			●		●		●	●	●	●	
		PKM22EPPH4007-B0	●		●	●			●		●		●	●	●	●	●
		PKM22EPTH2001-B0							●		●		●	●	●	●	
		PKM17EWH4000	●		●	●		●	●	●	●	●	●		●		
		PKLCS1212E4001-R1	●			●		●	●	●	●	●			●		
		PKLCS1212E40A1-R1															●
	Self Drive Type	PKM24SPH3805	●				●		●					●	●	●	
		PKM30SPTH2001-B0							●		●	●		●			
		PKM30SPTH2501-B0							●		●	●					
Piezoelectric Buzzer		PKB24SPCH3601-B0	●			●			●		●	●	●		●	●	
		PKB24SWH3301	●		●				●		●	●		●	●	●	
		PKB30SPCH2001-B0	●				●		●		●	●		●	●	●	
		PKB30SPCH3001-B0	●				●		●		●	●		●	●	●	
Piezoelectric Ringer		PKM33EPH1201C	●														
		PKM34EWH1101C	●														
		PKM34EWH1201C	●														
		PKM44EWH1001C	●														
Piezoelectric Receiver		PKLCD1212R1000-R1	●														
Piezoelectric Speaker		VSB35EWH0701B	●						●								
		VSB50EWH0301B	●						●								

There are various applications besides those listed in the above table, including:
Fire Alarm, Burglar Alarm, Laundry Machine, Bath, Interphone, Chime, Pager, Back Buzzer, ME Instruments, Measuring Instruments, Vending Machine, Calculator, Automobile, Communication Radio, Hemadynamometer, Thermometer, Running Meter, Facsimile, Audio Timer, Automatic Controlling Devices.

Piezoelectric Sound Components

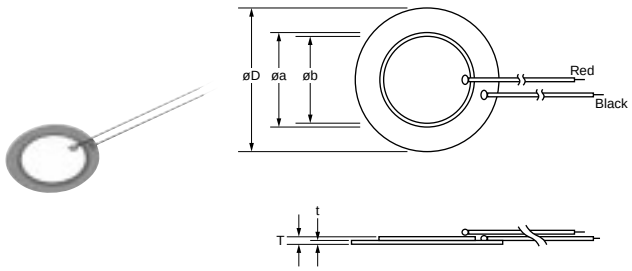
Piezoelectric Diaphragms

■ Features

1. Extremely clear sound
2. Ultra thin and light weight
3. No contacts: therefore, no noise and highly reliable
4. Low power consumption for voltage type

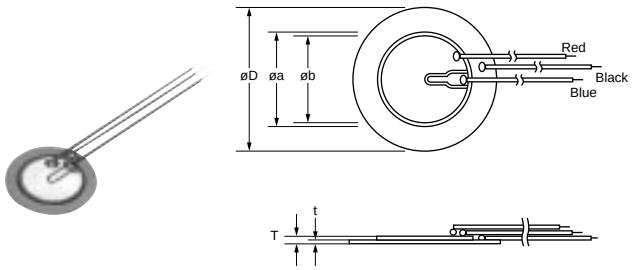
■ Applications

Clocks/Pagers/Calculators/Washing machine/
Various alarms (Burglar alarms, etc.)



External Drive Type

Part Number	Resonant Frequency (kHz)	Resonant Impedance (ohm)	Capacitance (nF)	Plate Size dia. D (mm)	Element Size dia. a (mm)	Electrode Size dia. b (mm)	Thickness T (mm)	Plate Thickness t (mm)	Plate Material
7BB-12-9	9.0 ±1.0kHz	1000 max.	8 ±30% [1kHz]	12.0	9.0	8.0	0.22	0.10	Brass
7BB-15-6	6.0 ±1.0kHz	350 max.	10 ±30% [1kHz]	15.0	10.0	9.0	0.22	0.10	Brass
7BB-20-3	3.6 ±0.6kHz	500 max.	20 ±30% [1kHz]	20.0	14.0	12.8	0.22	0.10	Brass
7BB-20-6	6.3 ±0.6kHz	350 max.	10 ±30% [1kHz]	20.0	14.0	12.8	0.42	0.20	Brass
7BB-20-6L0	6.3 ±0.6kHz	1000 max.	10 ±30% [1kHz]	20.0	14.0	12.8	0.42	0.20	Brass (with Lead Wire :AWG32 Length 50mm)
7BB-27-4	4.6 ±0.5kHz	200 max.	20 ±30% [1kHz]	27.0	19.7	18.2	0.54	0.30	Brass
7BB-27-4L0	4.6 ±0.5kHz	300 max.	20 ±30% [1kHz]	27.0	19.7	18.2	0.54	0.30	Brass (with Lead Wire :AWG32 Length 50mm)
7BB-35-3	2.8 ±0.5kHz	200 max.	30 ±30% [1kHz]	35.0	25.0	23.0	0.53	0.30	Brass
7BB-35-3L0	2.8 ±0.5kHz	200 max.	30 ±30% [1kHz]	35.0	25.0	23.0	0.53	0.30	Brass (with Lead Wire :AWG32 Length 50mm)
7BB-41-2	2.2 ±0.3kHz	250 max.	30 ±30% [1kHz]	41.0	25.0	23.0	0.63	0.40	Brass
7BB-41-2L0	2.2 ±0.3kHz	300 max.	30 ±30% [1kHz]	41.0	25.0	23.0	0.63	0.40	Brass (with Lead Wire :AWG32 Length 50mm)
7NB-31R2-1	1.3 ±0.5kHz	300 max.	40 ±30% [120Hz]	31.2	19.7	18.2	0.22	0.10	Iron Nickel Alloy



Self Drive Type

Part Number	Resonant Frequency (kHz)	Resonant Impedance (ohm)	Capacitance (nF)	Plate Size dia. D (mm)	Element Size dia. a (mm)	Electrode Size dia. b (mm)	Thickness T (mm)	Plate Thickness t (mm)	Plate Material
7BB-20-6C	6.3 ±0.6kHz	500 max.	8.5 ±30% [1kHz]	20.0	14.0	12.8	0.42	0.20	Brass
7BB-20-6CL0	6.3 ±0.6kHz	800 max.	8.5 ±30% [1kHz]	20.0	14.0	12.8	0.42	0.20	Brass (with Lead Wire :AWG32 Length 50mm)
7BB-27-4C	4.6 ±0.5kHz	200 max.	18 ±30% [1kHz]	27.0	19.7	18.2	0.54	0.30	Brass
7BB-27-4CL0	4.6 ±0.5kHz	350 max.	18 ±30% [1kHz]	27.0	19.7	18.2	0.54	0.30	Brass (with Lead Wire :AWG32 Length 50mm)
7BB-35-3C	2.8 ±0.5kHz	200 max.	26 ±30% [1kHz]	35.0	25.0	23.0	0.53	0.30	Brass
7BB-35-3CL0	2.8 ±0.5kHz	200 max.	26 ±30% [1kHz]	35.0	25.0	23.0	0.53	0.30	Brass (with Lead Wire :AWG32 Length 50mm)
7BB-41-2C	2.2 ±0.3kHz	250 max.	24 ±30% [1kHz]	41.0	25.0	23.0	0.63	0.40	Brass
7BB-41-2CL0	2.2 ±0.3kHz	350 max.	24 ±30% [1kHz]	41.0	25.0	23.0	0.63	0.40	Brass (with Lead Wire :AWG32 Length 50mm)
7SB-34R7-3C	3.1 ±0.3kHz	150 max.	24 ±30% [1kHz]	34.7	25.0	23.4	0.50	0.25	Stainless

■ Node Diameter

Part Number	Node Diameter (mm)
7BB-20-6C	ϕ13.5
7BB-27-4C	ϕ17.5
7BB-35-3C	ϕ22.5
7BB-41-2C	ϕ26.5

• Sound diaphragms without feedback electrode also have the same node diameters.

Piezoelectric Diaphragms Notice

■ Notice (Soldering and Mounting)

1. Applying load on the center area of the diaphragm may cause cracking in the ceramic element. When the diaphragm is supported by the edge, the load should be only applied around the edge.
2. Please consult with Murata or Murata representative, if soldering of the component is needed.

■ Notice (Handling)

1. Please do not touch the component with bare hand because electrode may be corroded.
2. The component may be damaged if mechanical stress exceeding specifications is applied.
3. Take care to protect operating circuit from surge voltage resulting from excessive force, falling, shock or temperature change.
4. If DC voltage is applied to the component, silver migration may occur. Please pay full attention to avoid subjecting the component to DC voltage for long periods.
5. The resistor should be used as shown in Fig. A.
   A suitable resistance value should be chosen, preferably 1kΩ to 2kΩ. Instead of this measure, a diode may also be applied as shown in Fig. B.

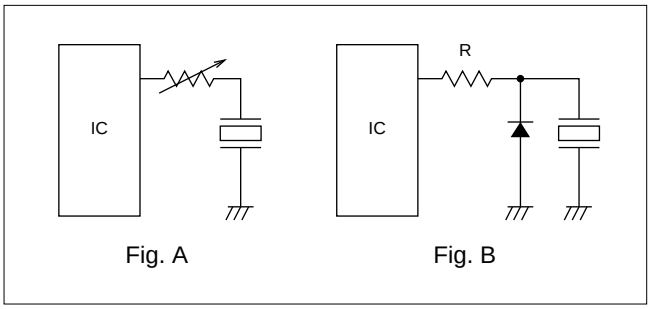


Fig. A Fig. B

6. Avoid excessive pulling of lead wire because wire may break or soldering point may come off.

Piezoelectric Sound Components

Piezoelectric Sounders External Drive Pin Type

Now microcomputers are widely used for microwave ovens, air conditioners, cars, toys, timers, and other alarm equipment. Externally driven piezoelectric sounders are used in digital watches, electronic calculators, telephones and other equipment. They are driven by a signal (ex.: 2048Hz or 4096Hz) from an LSI and provide melodious sound.

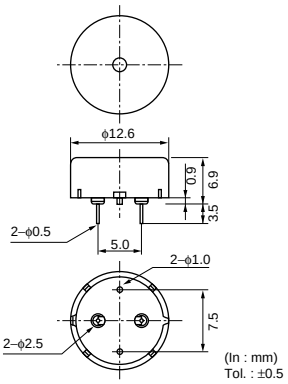
■ Features

1. Low power consumption
2. No contacts therefore, no noise and highly reliable

■ Applications

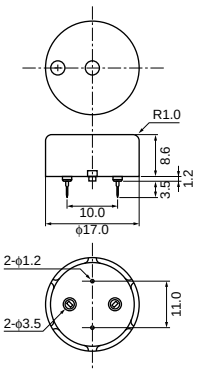
1. Telephone ringers
2. Various office equipment such as PPCs, printers and keyboards
3. Various home appliances such as microwave ovens
4. Confirmation sound of various audio equipment

PKM13EPYH4002-B0



(In : mm)
Tol. : ±0.5

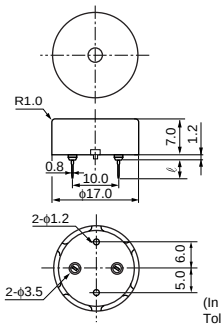
PKM17EPP-2002-B0



Terminal of ⊕ marking side should be connected to hot side of D.C.

(in mm)
Tol. : ±0.5

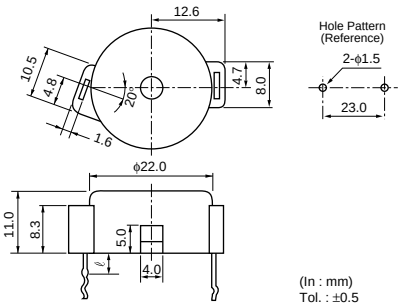
PKM17EPPH4001-B0



(In : mm)
Tol. : ±0.5

Part Number	ℓ
PKM17EPPH4001-B0	6.5
PKM17EPPH4002-B0	3.5

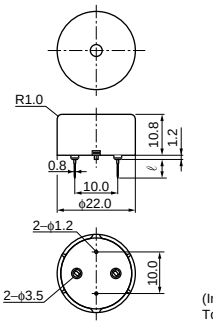
PKM22EPH2001



(In : mm)
Tol. : ±0.5

Part Number	ℓ
PKM22EPH2001	4.0
PKM22EPH2002	8.0
PKM22EPH2003	12.0

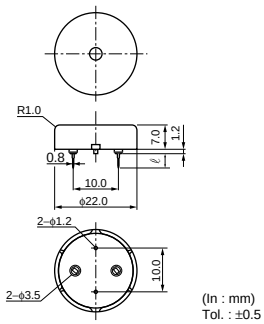
PKM22EPPH2001-B0



(In : mm)
Tol. : ±0.5

Part Number	ℓ
PKM22EPPH2001-B0	6.5
PKM22EPPH2002-B0	3.5

PKM22EPPH4001-B0



(In : mm)
Tol. : ±0.5

Part Number	ℓ
PKM22EPPH4001-B0	6.5
PKM22EPPH4002-B0	3.5

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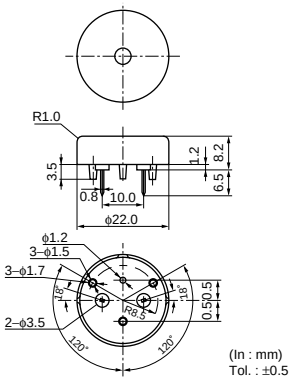
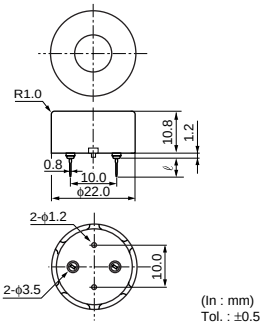
2

PKM22EPPH4005-B0



(In : mm)
Tol. : ±0.5

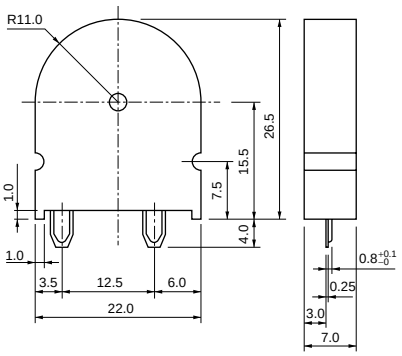
PKM22EPPH4007-B0



(In : mm)
Tol. : ±0.5

Part Number	ℓ
PKM22EPPH4007-B0	6.5
PKM22EPPH4012-B0	3.5

PKM22EPTH2001-B0

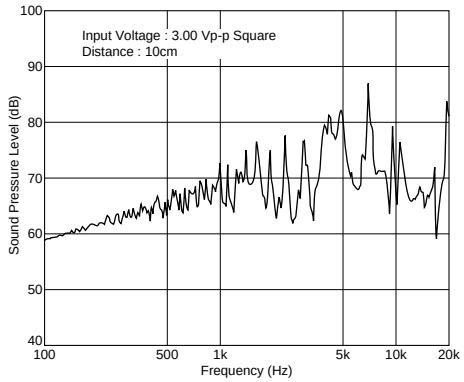


(in mm)
Tol.:±0.5

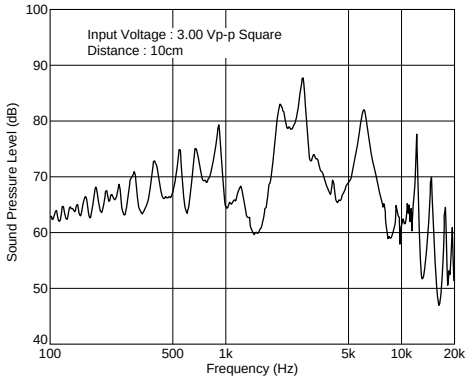
Part Number	Sound Pressure Level (dB)	Sound Pressure Level (Ref. only) (dB)	Operating Voltage Range	Capacitance (nF)	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKM13EPYH4002-B0	70 min. [3Vp-p,4kHz,square wave,10cm]	70 min. [1Vrms,4kHz,sine wave,10cm]	30 Vp-p max.	5.5 ±30% [1kHz]	-20 to +70	-30 to +80
PKM17EPP-2002-B0	70 min. [3Vo-p,2kHz,square wave,10cm]	70 min. [1Vrms,2kHz,sine wave,10cm]	25 Vo-p max. [with polarity]	34 ±30% [120Hz]	-20 to +70	-30 to +80
PKM17EPPH4001-B0	72 min. [3Vp-p,4kHz,square wave,10cm]	72 min. [1Vrms,4kHz,sine wave,10cm]	25 Vp-p max.	7 ±30% [1kHz]	-20 to +70	-30 to +80
PKM22EPH2001	75 min. [3Vp-p,2kHz,square wave,10cm]	75 min. [1Vrms,2kHz,sine wave,10cm]	25 Vp-p max.	17 ±30% [120Hz]	-20 to +70	-30 to +80
PKM22EPPH2001-B0	70 min. [3Vp-p,2kHz,square wave,10cm]	70 min. [1Vrms,2kHz,sine wave,10cm]	25 Vp-p max.	19 ±30% [120Hz]	-20 to +70	-30 to +80
PKM22EPPH4001-B0	75 min. [3Vp-p,4kHz,square wave,10cm]	75 min. [1Vrms,4kHz,sine wave,10cm]	25 Vp-p max.	12 ±30% [1kHz]	-20 to +70	-30 to +80
PKM22EPPH4005-B0	75 min. [3Vp-p,4kHz,square wave,10cm]	75 min. [1Vrms,4kHz,sine wave,10cm]	25 Vp-p max.	12 ±30% [1kHz]	-20 to +70	-30 to +80
PKM22EPPH4007-B0	85 min. [3Vp-p,4kHz,square wave,10cm]	85 min. [1Vrms,4kHz,sine wave,10cm]	25 Vp-p max.	12 ±30% [1kHz]	-20 to +70	-30 to +80
PKM22EPTH2001-B0	70 min. [3Vp-p,2kHz,square wave,10cm]	70 min. [1Vrms,2kHz,sine wave,10cm]	25 Vp-p max.	19 ±30% [120Hz]	-20 to +70	-30 to +80

■ Freq. Response (Square Wave 3Vp-p, 10cm)

PKM13EPYH4002-B0



PKM17EPP-2002-B0



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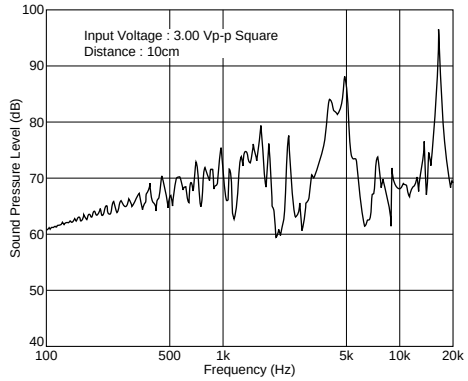

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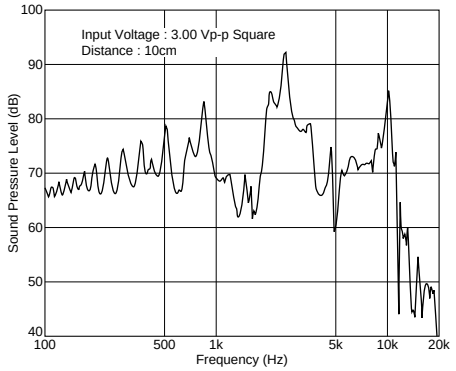

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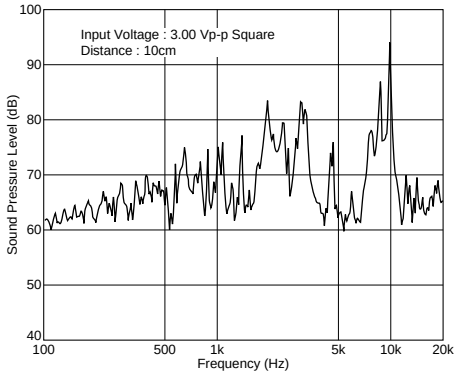

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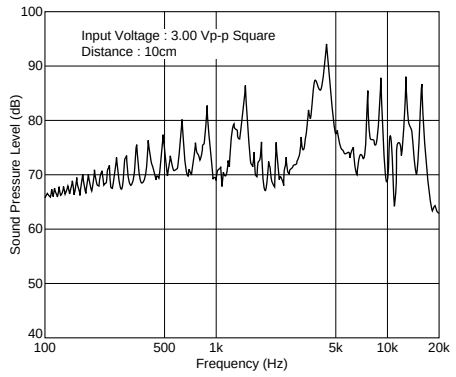

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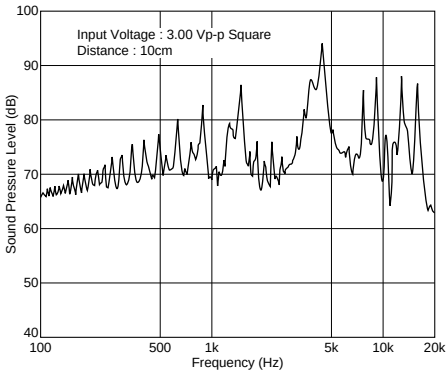
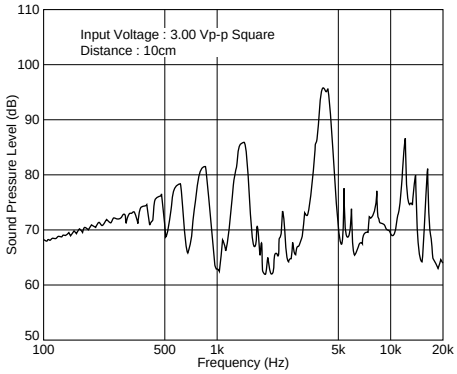


PKM22EPPH4007-B0



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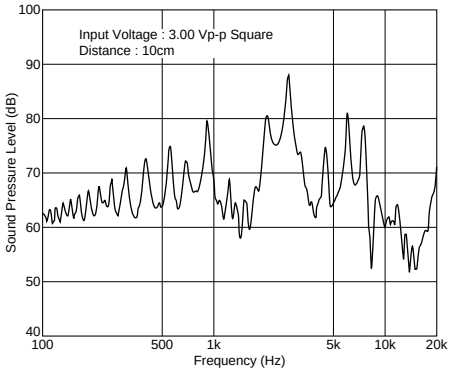
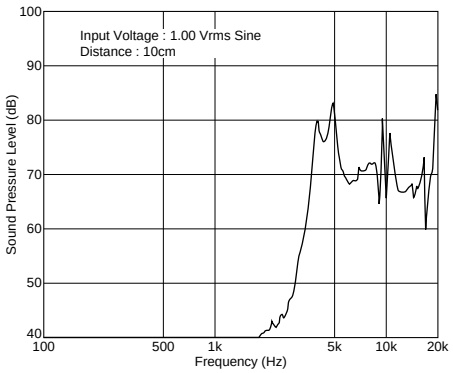
■ Freq. Response (Square Wave 3Vp-p, 10cm)

PKM22EPTH2001-B0

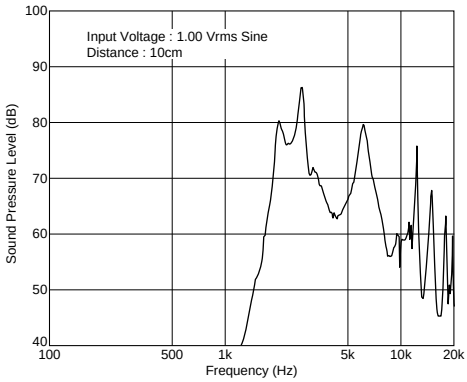


■ Freq. Response (Sine Wave 1Vrms, 10cm)

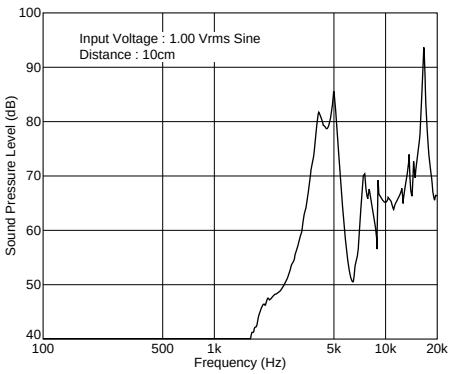
PKM13EPYH4002-B0



PKM17EPP-2002-B0



PKM17EPPH4001-B0



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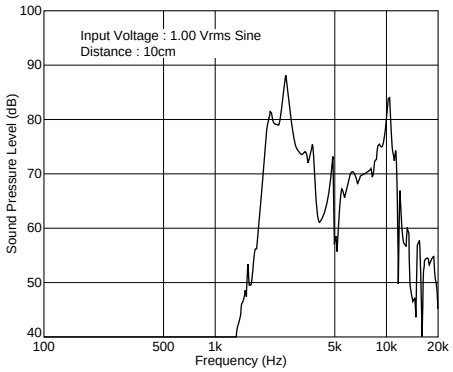

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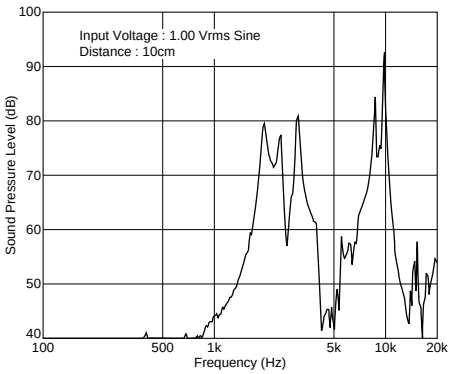
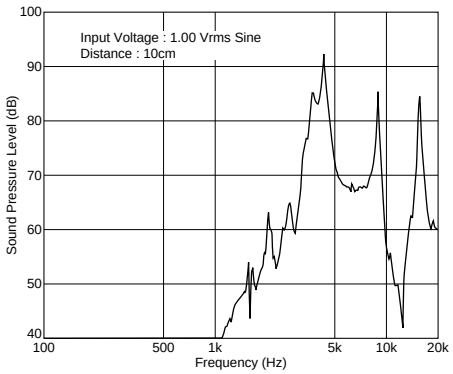


PKM22EPPH4001-B0



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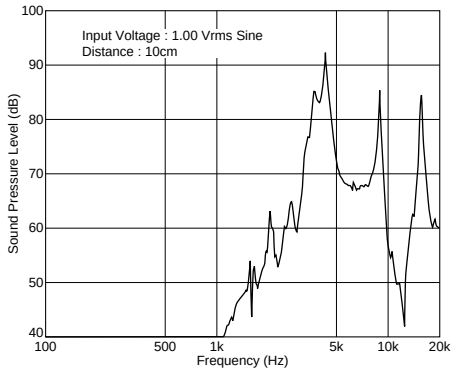
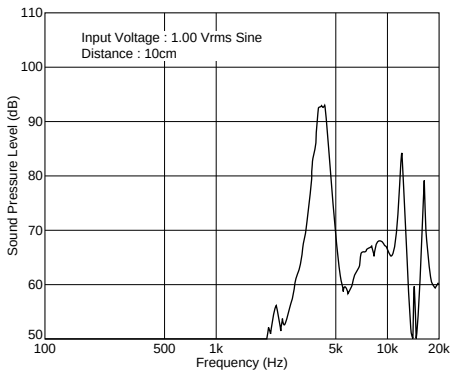
■ Freq. Response (Sine Wave 1Vrms, 10cm)

PKM22EPPH4005-B0



PKM22EPPH4007-B0



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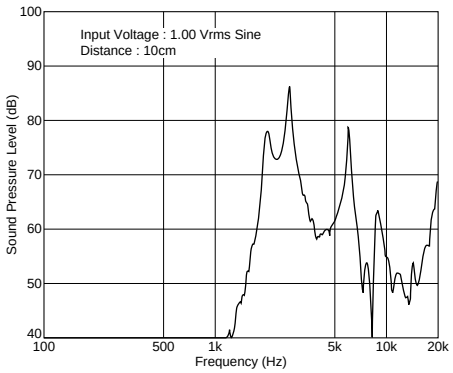
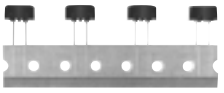


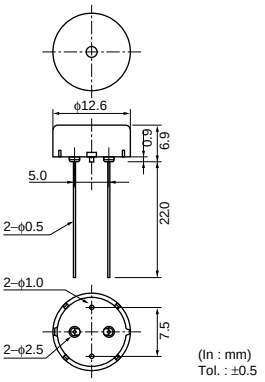
2

Piezoelectric Sound Components

Piezoelectric Sounders External Drive Pin Type Taping

Taking advantage of extensive automatic insertion design technology and materials experience, Murata has developed standard taping type piezoelectric sounder.
This Murata technology supports labor and cost saving activities.



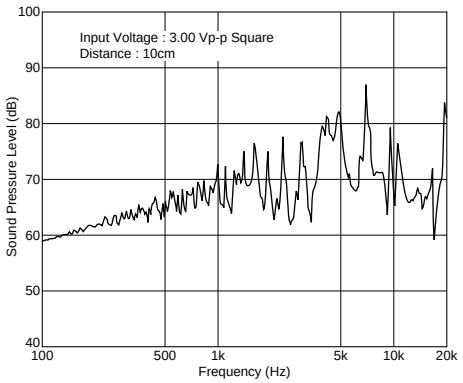


■ Features

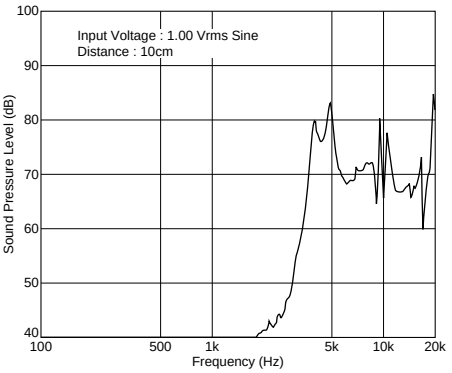
1. High and stable mountability
2. Ammo packaging
3. Minimum quantity (order in sets only): 500 pcs.

Part Number	Sound Pressure Level (dB)	Sound Pressure Level (Ref. only) (dB)	Operating Voltage Range	Capacitance (nF)	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKM13EPYH4000-A0	70 min. [3Vp-p,4kHz,square wave,10cm]	70 min. [1Vrms,4kHz,sine wave,10cm]	30 Vp-p max.	5.5 ±30% [1kHz]	-20 to +70	-30 to +80

■ Freq. Response (Square Wave 3Vp-p, 10cm)



■ Freq. Response (Sine Wave 1Vrms, 10cm)



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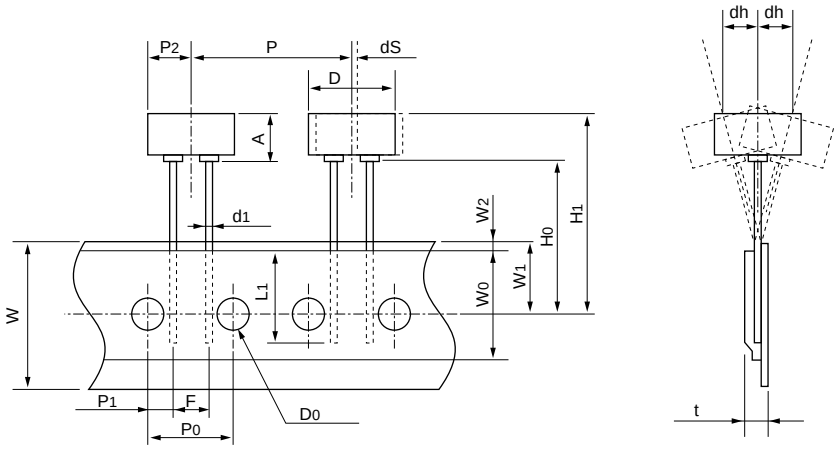
■ Taping Dimension



Item	Code	Nominal Value	Tol.	Remarks
Width of diameter	D	ø12.6	±0.5	
Height of component	A	6.9	±0.5	
Dimensions of terminal	d_1	ø0.5	±0.1	
Lead length under the hold down tape	L_1	8.0 min.	—	
Pitch of component	P	25.4	±0.5	
Pitch of sprocket	P_0	12.7	±0.2	Tolerance for Pitches 10×P_0=127±2mm
Length from hole center to lead	P_1	3.85	±0.7	
Length from hole center to component center	P_2	6.35	±0.7	
Lead spacing	F	5.0	±0.5	
Slant forward or backward	dh	0	±1.0	360° : 1mm max.
Width of carrier tape	W	18.0	±0.5	
Width of hold down tape	W_0	12.5 min.	—	Hold down tape does not exceed the carrier tape.
Position of sprocket hole	W_1	9.0	±0.5	
Gap of hold down tape and carrier tape	W_2	2.0 max.	—	
Distance between the center of sprocket hole and lead stopper	H_0	18.0	±0.5	
Total height of component	H_1	26.0 max.	—	
Diameter of sprocket hole	D_0	ø4.0	±0.2	
Total thickness of tape	t	0.6	±0.2	
Body tilt	dS	0	±1.0	

(in mm)

Piezoelectric Sound Components

Piezoelectric Sounders External Drive Lead Wire Type

Now microcomputers are widely used for microwave ovens, air conditioners, cars, toys, timers, and other alarm equipment. Externally driven piezoelectric sounders are used in digital watches, electronic calculators, telephones and other equipment. They are driven by a signal (ex.: 2048Hz or 4096Hz) from an LSI and provide melodious sound.

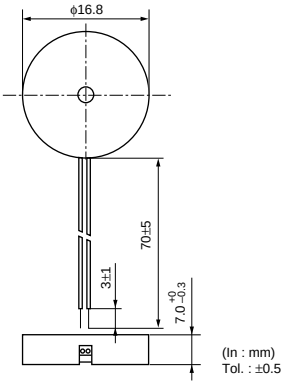
■ Features

1. Low power consumption
2. No contacts therefore, no noise and highly reliable

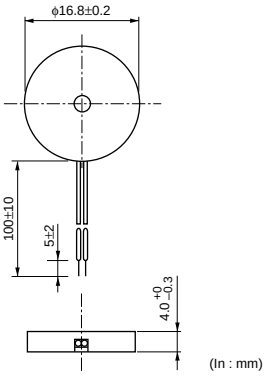
■ Applications

1. Telephone ringers
2. Various office equipment such as PPCs, printers and keyboards
3. Various home appliances such as microwave ovens
4. Confirmation sound of various audio equipment

PKM17EWH2001



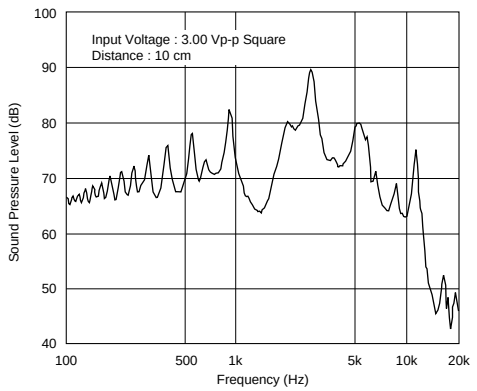
PKM17EWH4000



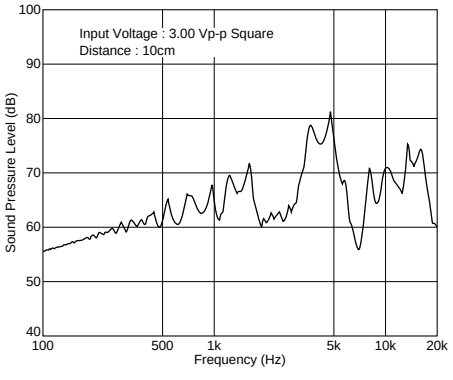
Part Number	Sound Pressure Level (dB)	Sound Pressure Level (Ref. only) (dB)	Operating Voltage Range	Capacitance (nF)	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKM17EWH2001	72 min. [3Vp-p,2kHz,square wave,10cm]	70 min. [1Vrms,2kHz,sine wave,10cm]	7 Vp-p max.	40 ±30% [120Hz]	-20 to +70	-30 to +80
PKM17EWH4000	75 min. [3Vp-p,4kHz,square wave,10cm]	70 min. [1Vrms,4kHz,sine wave,10cm]	25 Vp-p max.	9.5 ±30% [1kHz]	-20 to +70	-30 to +80

■ Freq. Response (Square Wave 3Vp-p, 10cm)

PKM17EWH2001



PKM17EWH4000



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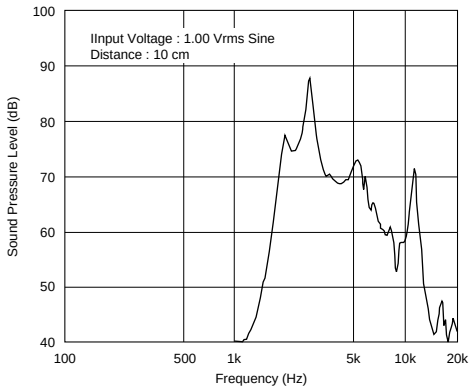
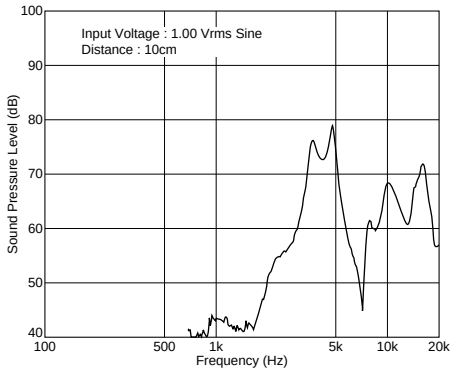
■ Freq. Response (Sine Wave 1Vrms, 10cm)

PKM17EWH2001



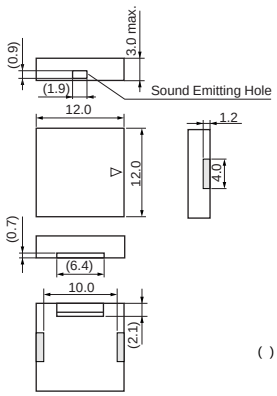
PKM17EWH4000



Piezoelectric Sound Components

Piezoelectric Sounders External Drive SMD Type

Taking advantage of extensive acoustic and mechanical design technology and high performance ceramics, Murata has developed SMD piezoelectric sounders that suit the thin, high-density design of electronic equipment.



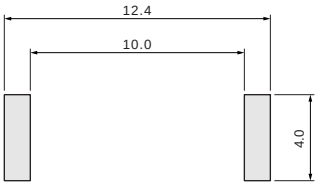
■ Features

1. High S.P.L. and clear sound
2. Reflowable
3. Tape & Reel supply
4. Minimum quantity (order in sets only): 1,000 pcs.

Part Number	Sound Pressure Level (dB)	Max. of Operating Voltage Range (Vp-p)	Operating Temp. Range (°C)	Storage Temp. Range (°C)	Use
PKLCS1212E4001-R1	75 min.[3Vp-p,4kHz,square wave,10cm]	25 max.	-20 to +70	-30 to +80	For consumer electronics
PKLCS1212E40A1-R1	75 min.[3Vp-p,4kHz,square wave,10cm]	25 max.	-40 to +85	-40 to +85	For automotive electronics

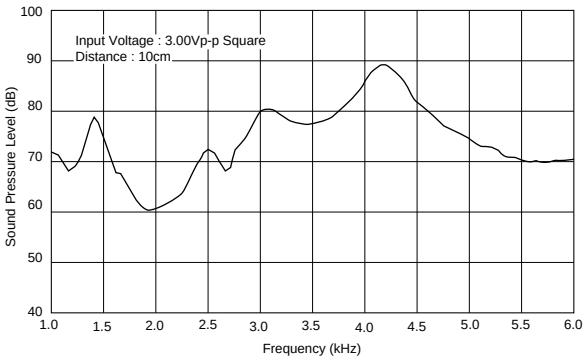
5

■ Standard Land Pattern Dimensions



(in mm)

■ Freq. Response (Square Wave 3Vp-p, 10cm)



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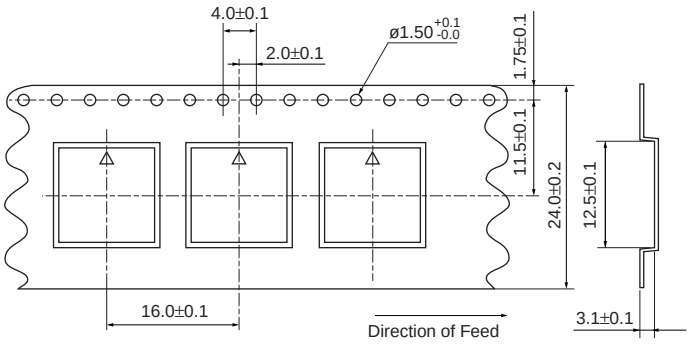
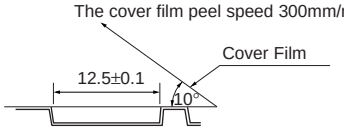
■ Taping Dimension

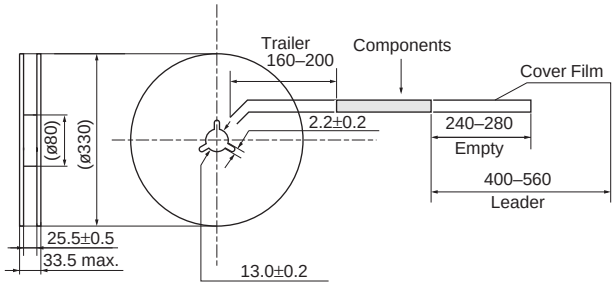
Dimensions of Carrier Tape



The cover film peel strength force 0.1–0.7N
The cover film peel speed 300mm/min.



Dimensions of Reel



(in mm)

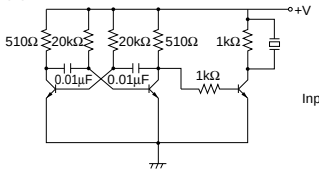
5

Piezoelectric Sounders (External Drive) Circuit/Notice

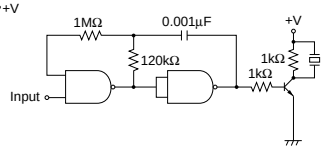
■ Circuit

The following are examples of externally driven circuits.
(1) Unstable multi-vibrator using Tr.
(2) Circuits using inverters or NAND gates.

(1)



(2)



■ Notice (Soldering and Mounting)

Washing of the component is not acceptable, because it is not sealed.

■ Notice (Handling)

1. The component may be damaged if mechanical stress exceeding specifications is applied.
2. Take care to protect operating circuit from surge voltage resulting from excessive force, falling, shock or temperature change.
3. If DC voltage is applied to the component, silver migration may occur. Please pay full attention to avoid subjecting the component to DC voltage for long periods.
4. The resistor should be used as shown in Fig. A.
   A suitable resistance value should be chosen, preferably 1kΩ to 2kΩ. Instead of this measure, a diode may also be applied as shown in Fig. B.

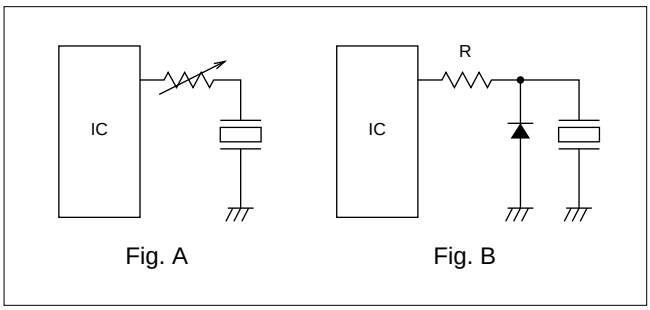


Fig. A Fig. B

5. Avoid excessive pulling of lead wire because wire may break or soldering point may come off.

Piezoelectric Sound Components

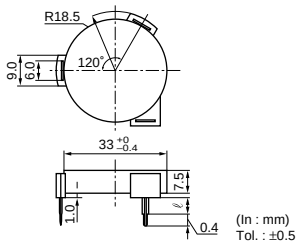
Piezoelectric Ringers (PIEZORINGER®)

As the result of rapid development of ICs in telephones, demand for piezoelectric sounders as telephone ringers has also rapidly increased. To effectively satisfy this rising demand, Murata provides a suitable piezoelectric sounder called "PIEZORINGER" with the following features.

■ Features

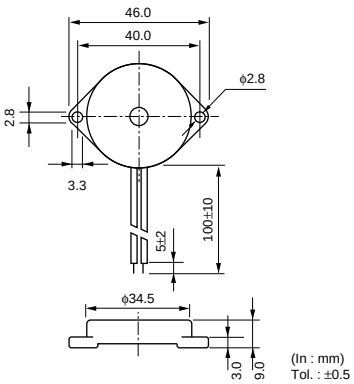
1. Extremely clear sound
2. Since it is voltage driven, the power consumption is quite negligible.
3. It can be driven directly from ICs.
4. Extremely thin and light

PKM33EPH1201C

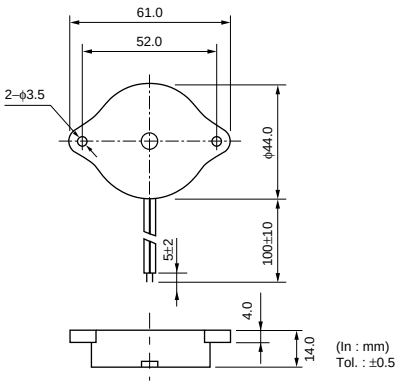


Part Number	ℓ
PKM33EPH1201C	5.0
PKM33EPH1202C	0

PKM34EWH1101C/1201C



PKM44EWH1001C



6

Pin Type

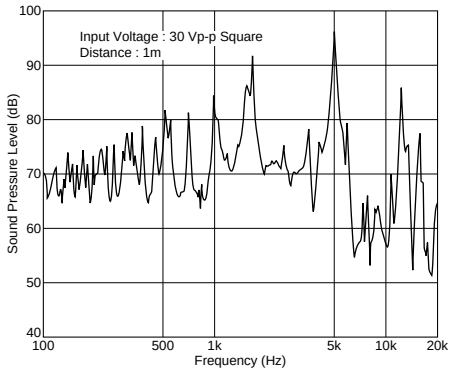
Part Number	Sound Pressure Level (dB)	Sound Pressure Level (Ref. only) (dB)	Operating Voltage Range	Capacitance (nF)	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKM33EPH1201C	68 min. [30Vp-p,1.2kHz,square wave,1m]	65 min. [1Vrms,1.2kHz,sine wave,10cm]	40 Vp-p max.	40 ±30% [120Hz]	-20 to +70	-30 to +80

Lead Wire Type

Part Number	Sound Pressure Level (dB)	Sound Pressure Level (Ref. only) (dB)	Operating Voltage Range	Capacitance (nF)	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKM34EWH1101C	70 min. [30Vp-p,1.1kHz,square wave,1m]	60 min. [1Vrms,1.1kHz,sine wave,10cm]	40 Vp-p max.	40 ±30% [120Hz]	-20 to +70	-30 to +80
PKM34EWH1201C	70 min. [30Vp-p,1.2kHz,square wave,1m]	60 min. [1Vrms,1.2kHz,sine wave,10cm]	60 Vp-p max.	32 ±30% [120Hz]	-20 to +70	-30 to +80
PKM44EWH1001C	75 min. [30Vp-p,1kHz,square wave,1m]	70 min. [1Vrms,1kHz,sine wave,10cm]	30 Vp-p max.	68 ±30% [120Hz]	-20 to +70	-30 to +80

■ Freq. Response (Square Wave 30Vp-p, 1m)

PKM33EPH1201C



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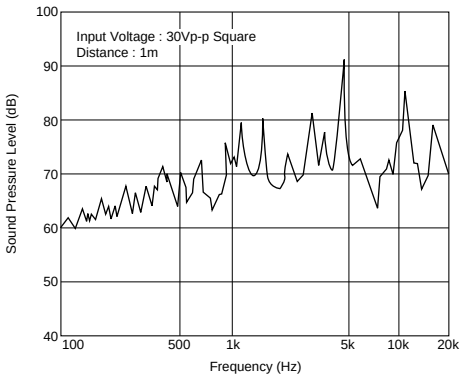
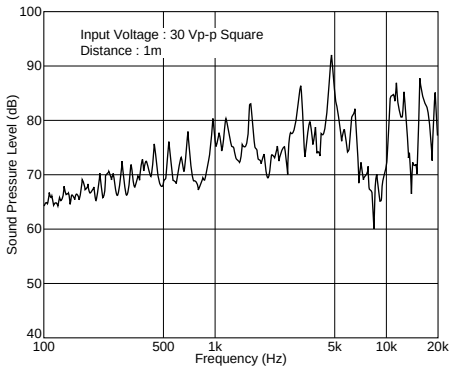


PKM34EWH1201C



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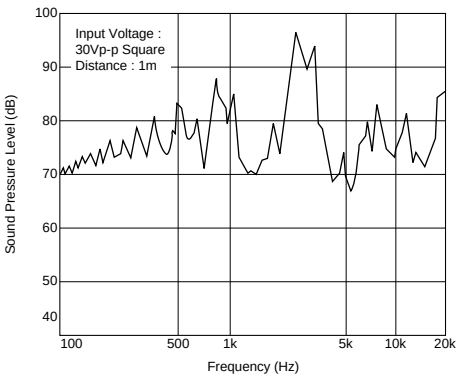
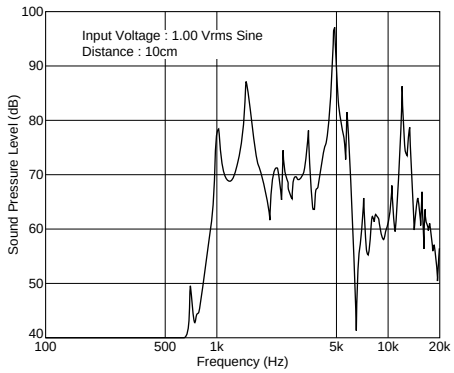


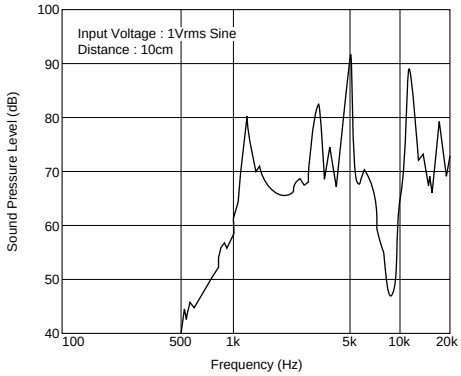
6

■ Freq. Response (Sine Wave 1Vrms, 10cm)

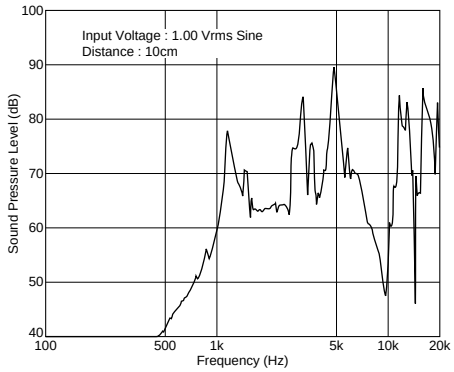
PKM33EPH1201C



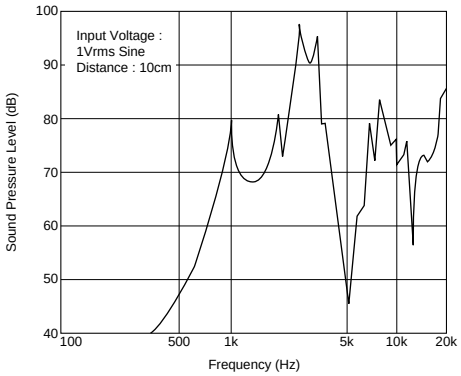
PKM34EWH1101C



PKM34EWH1201C



PKM44EWH1001C



6

Piezoelectric Ringers (PIEZORINGER®) Notice

■ Notice (Soldering and Mounting)

Washing of the component is not acceptable, because it is not sealed.

■ Notice (Handling)

1. The component may be damaged if mechanical stress exceeding specifications is applied.
2. Take care to protect operating circuit from surge voltage resulting from excessive force, falling, shock or temperature change.
3. If DC voltage is applied to the component, silver migration may occur. Please pay full attention to avoid subjecting the component to DC voltage for long periods.
4. The resistor should be used as shown in Fig. A.
   A suitable resistance value should be chosen, preferably 1kΩ to 2kΩ. Instead of this measure, a diode may also be applied as shown in Fig. B.

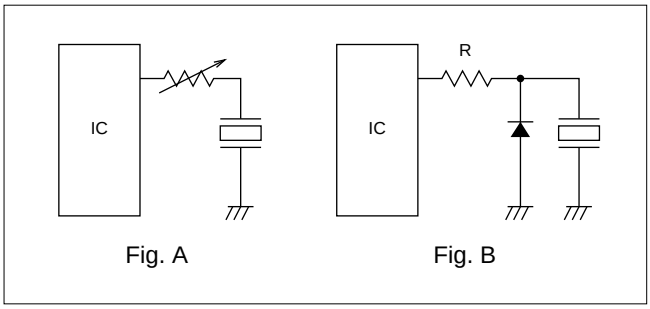


Fig. A Fig. B

5. Avoid excessive pulling of lead wire because wire may break or soldering point may come off.

6

Piezoelectric Sound Components

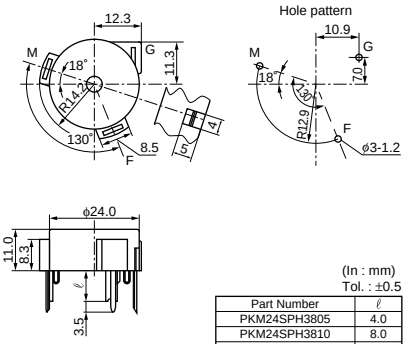
Piezoelectric Sounders Self Drive Pin Type

Piezoelectric sounder self drive type requires only simple circuit and DC power supply. Since this type uses resonant system, it is also available for alarms which need large sound volume.

■ Applications

1. Gas alarms, burglar alarms, smoke detectors
2. Air conditioners, microwave ovens, washing machines and other home-electronic appliances controlled by microcomputers
3. Bicycles, toys, game machines

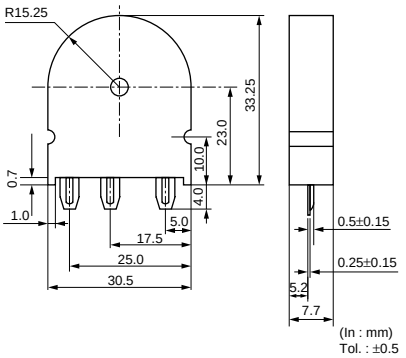
PKM24SPH3805



(In : mm)
Tol. : ±0.5

Part Number	ℓ
PKM24SPH3805	4.0
PKM24SPH3810	8.0
PKM24SPH3807	12.0
PKM24SPH3801	14.0

PKM30SPTH2001/2501-B0



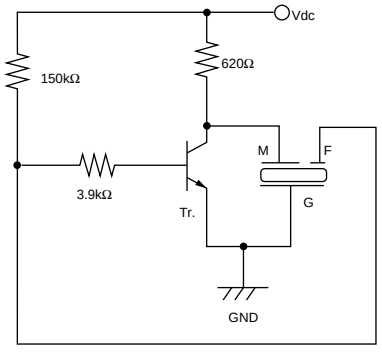
(In : mm)
Tol. : ±0.5

Part Number	Sound Pressure Level (dB)	Oscillating Frequency (kHz)	Current Consumption (mA)	Operating Voltage Range	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKM24SPH3805	90 min. [12Vdc,10cm]	3.8 ±0.4kHz [12Vdc]	12 max. [12Vdc]	3.0Vdc to 20.0 Vdc	-20 to +70	-30 to +80
PKM30SPTH2001-B0	75 min. [12Vdc,10cm]	2.0 ±0.3kHz [12Vdc]	20 max. [12Vdc]	3.0Vdc to 20.0 Vdc	-20 to +70	-30 to +80
PKM30SPTH2501-B0	75 min. [12Vdc,10cm]	2.5 ±0.3kHz [12Vdc]	20 max. [12Vdc]	3.0Vdc to 20.0 Vdc	-20 to +70	-30 to +80

7

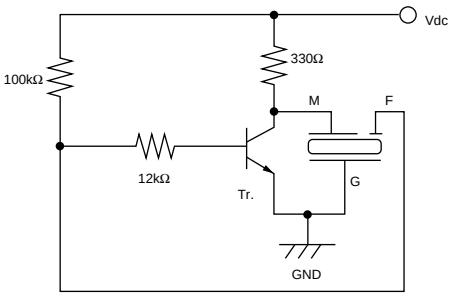
■ Standard Circuit Examples

PKM24SPH3805



Tr: 2SC1815Y or equivalent

PKM30SPTH2001/2501-B0



Tr: 2SC1815Y or equivalent

Piezoelectric Sounders (Self Drive) Notice

■ Notice (Soldering and Mounting)

1. Washing of the component is not acceptable, because it is not sealed.
2. Please do not cover the hole with tape or other obstacle as this will produce irregular oscillation.
3. There should not be any obstacle within 15mm from top of the component as this will produce irregular oscillation.

■ Notice (Handling)

1. The component may be damaged if mechanical stress exceeding specifications is applied.
2. Take care to protect operating circuit from surge voltage resulting from excessive force, falling, shock or temperature change.
3. If DC voltage is applied to the component, silver migration may occur. Please pay full attention to avoid subjecting the component to DC voltage for long periods.
4. The standard self-driven circuits utilizes transistor switching. The circuit constants for hfe of the transistor are optimally chosen to maintain stable oscillation. So please follow it when you design a circuit.

Piezoelectric Sound Components

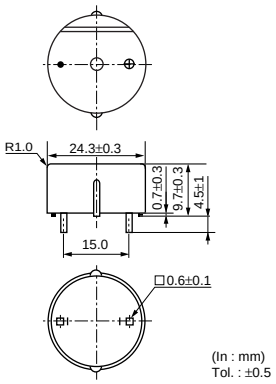
Piezoelectric Buzzers

This is a unified piezoelectric sounder which has a piezoelectric diaphragm of 3 terminals connected to a self drive circuit, and it easily generates sound with only a DC power supply (DC3.0-20V). Using suitably designed resonant system, this type can be used where large sound volumes are needed.

■ Applications

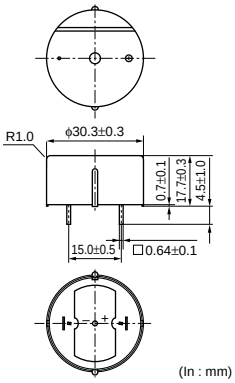
1. Gas alarms, burglar alarms
2. Air conditioners, microwave ovens and various types of microcomputer controlled home-electronic appliances
3. Automobile speed alarms, navigators, car stereos and other automobile equipment
4. Toys, games, and other simple electronic devices such as teaching aids

PKB24SPCH3601-B0



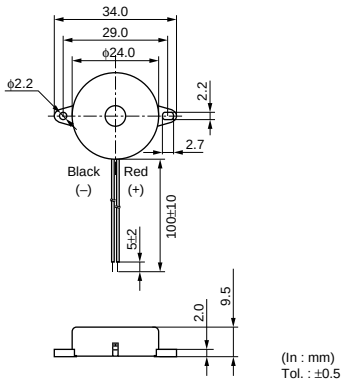
(In : mm)
Tol. : ±0.5

PKB30SPCH2001/3001-B0



(In : mm)

PKB24SWH3301



(In : mm)
Tol. : ±0.5

8

Pin Type

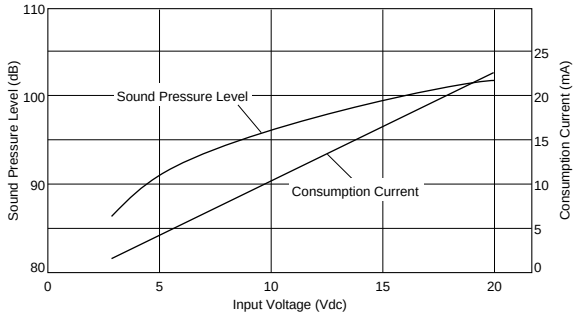
Part Number	Sound Pressure Level (dB)	Oscillating Frequency (kHz)	Current Consumption (mA)	Operating Voltage Range	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKB24SPCH3601-B0	90 min. [12Vdc,10cm]	3.6 ±0.5kHz [12Vdc]	16 max. [12Vdc]	3.0Vdc to 15.0 Vdc	-20 to +70	-30 to +80
PKB30SPCH2001-B0	92 min. [12Vdc,10cm]	2.0 ±0.4kHz [12Vdc]	15 max. [12Vdc]	3.0Vdc to 15.0 Vdc	-20 to +70	-30 to +80
PKB30SPCH3001-B0	92 min. [12Vdc,10cm]	2.7 ±0.4kHz [12Vdc]	15 max. [12Vdc]	3.0Vdc to 15.0 Vdc	-20 to +70	-30 to +80

Lead Wire Type

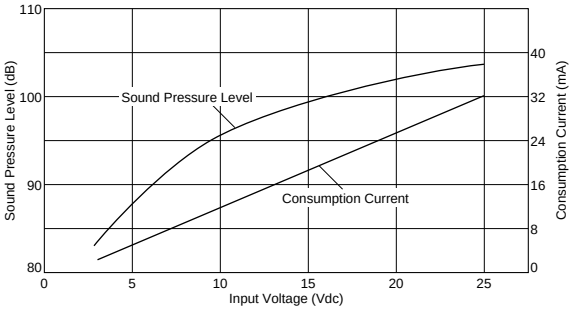
Part Number	Sound Pressure Level (dB)	Oscillating Frequency (kHz)	Current Consumption (mA)	Operating Voltage Range	Operating Temp. Range (°C)	Storage Temp. Range (°C)
PKB24SWH3301	80 min. [12Vdc,10cm]	3.3 ±0.5kHz [12Vdc]	12 max. [12Vdc]	3.0Vdc to 20.0 Vdc	-20 to +70	-30 to +80

■ Voltage-Sound Pressure Level/Voltage-Consumption Current

PKB24SPCH3601-B0



PKB30SPCH2001-B0



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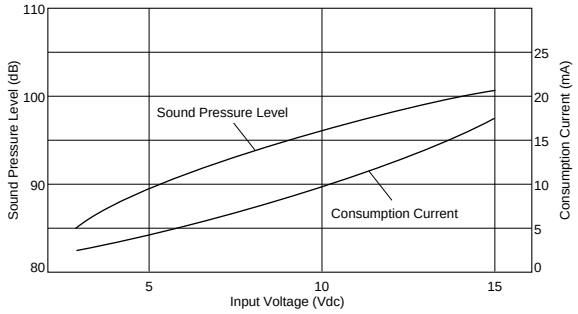
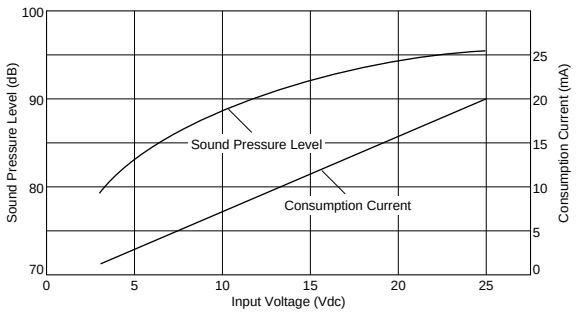


PKB24SW-3301



8

Piezoelectric Buzzers Notice

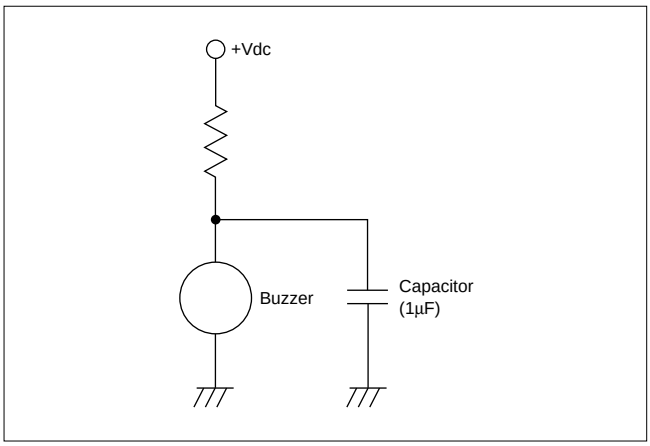
■ Notice (Soldering and Mounting)

1. Washing of the component is not acceptable, because it is not sealed.
2. Please do not cover the hole with tape or other obstacle as this will produce irregular oscillation.
3. There should not be any obstacle within 15mm from top of the component as this will produce irregular oscillation.

■ Notice (Handling)

1. The component may be damaged if mechanical stress over this specification is applied.

2. Resistors should not be connected in series to the power supply as this will produce irregular oscillation. When resistor is necessary to control sound volume, use capacitor (1μF) parallel with the buzzer together.

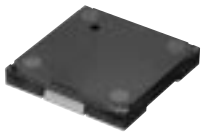


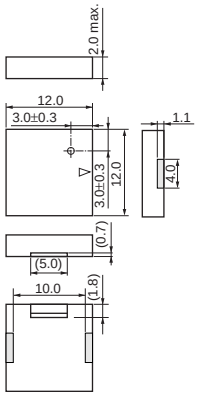
3. Please pay enough attention not to pull lead wire too much because wire may be broken or soldering point may come off.

Piezoelectric Sound Components

Piezoelectric Receiver (CERAMIPHONE®)

Taking advantage of extensive acoustic, mechanical designing technology and high performance ceramics, Murata has developed the SMD piezoelectric receiver. This Murata technology supports labor and cost saving activities.





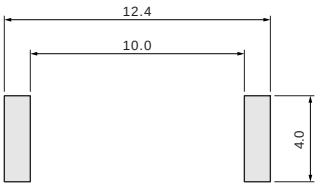
( ) : Ref. only
(in mm)
Tol. ±0.2

■ Features

1. Thin shape, lightweight
2. Low current consumption and good matching impedance for a voltage drive
3. Reflowable
4. Tape & Reel supply
5. Minimum quantity (order in sets only): 1,500 pcs.

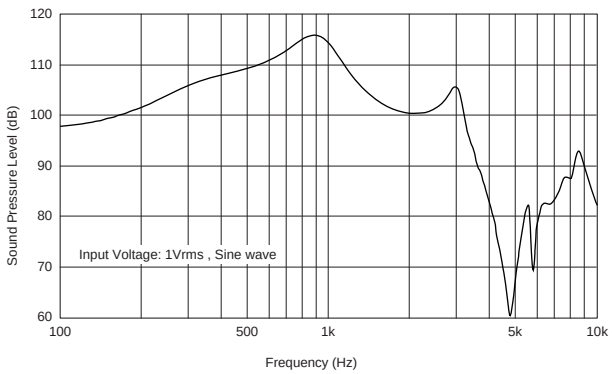
Part Number	Sound Pressure Level (1) (dB)	Sound Pressure Level (2) (dB)	Operating Voltage Range (Vp-p)	Operating Temperature Range (°C)	Storage Temperature Range (°C)
PKLCD1212R1000-R1	106.0 +4.0/-2.5 [at 300Hz]	114.0 +2.5/-4.0 [at 1kHz]	7 max.	-20 to +70	-30 to +80

■ Standard Land Pattern Dimensions



(in mm)

■ Freq. Response (Sine Wave 1Vrms)



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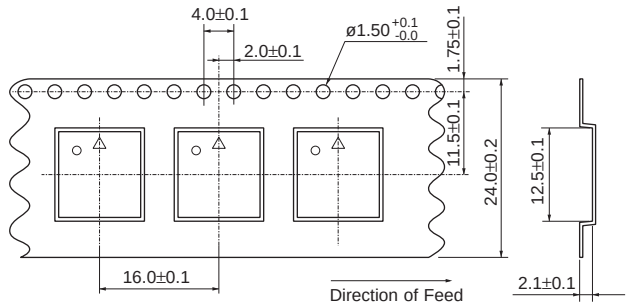
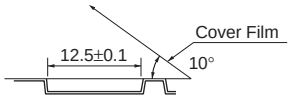
■ Taping Dimension

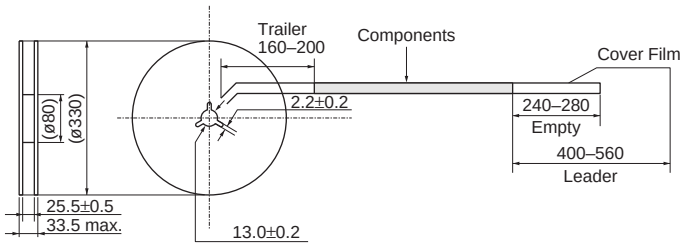
Dimensions of Carrier Tape



The cover film peel strength force 0.1–0.7N
The cover film peel speed 300mm/min.



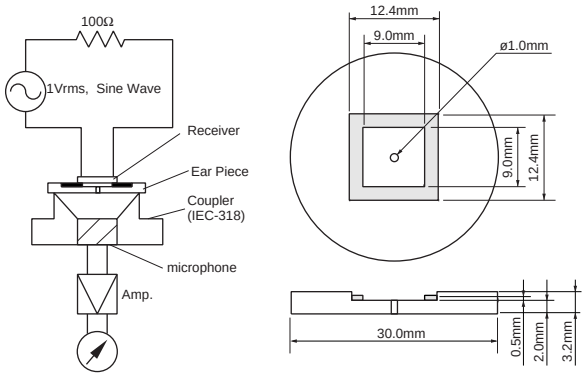
Dimensions of Reel



(in mm)

Piezoelectric Receiver Circuit/Notice

■ Circuit



■ Notice (Soldering and Mounting)

Washing of the component is not acceptable, because it is not sealed.

■ Notice (Handling)

1. The component may be damaged if mechanical stress exceeding specifications is applied.
2. Take care to protect operating circuit from surge voltage resulting from excessive force, falling, shock or temperature change.
3. If DC voltage is applied to the component, silver migration may occur. Please pay full attention to avoid subjecting the component to DC voltage for long periods.
4. Please pay attention to the hand set design. Sound pressure level - frequency characteristics are affected by the hand set design. (Blocking the sound emitting hole or air dumping hole may degrade S.P.L.-frequency characteristics. Placing other components or obstacles close to the holes may also affect the characteristics.)

Piezoelectric Sound Components

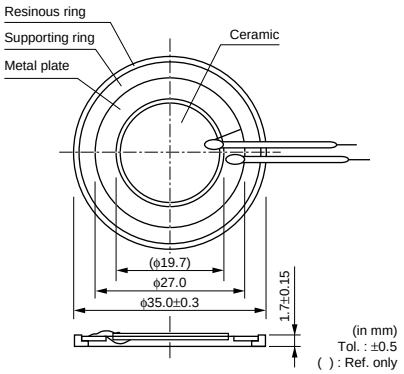
Piezoelectric Speakers (CERAMITONE®)

As voice synthesizing techniques with ICs and LSIs are rapidly progressing, human voice synthesizing devices are put into practical use for portable calculators, clocks, vending machines, translating machines and so forth. In order to meet the demand, Murata has developed Piezoelectric Speakers best suited for making synthesized voices or melodies.

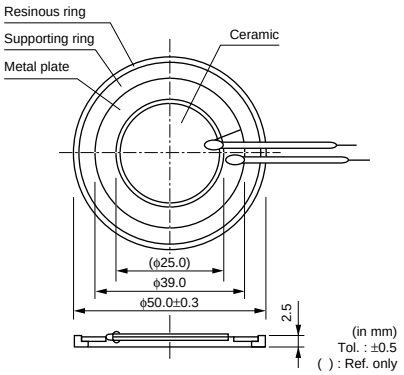
■ Features

1. High efficiency compared with conventional electromagnetic type speakers
2. Ultra-thin and lightweight
3. High impedance with less power consumption
4. No electric noise, because they have no mechanical contacts.
5. Direct drive by IC is available.

VSB35EWH0701B



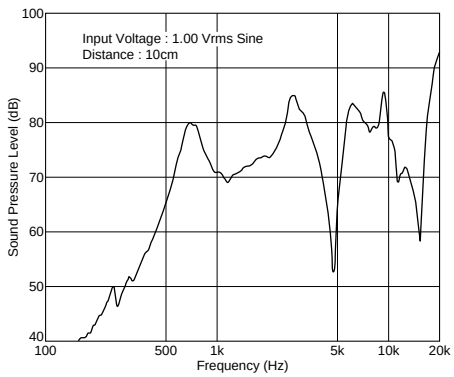
VSB50EWH0301B



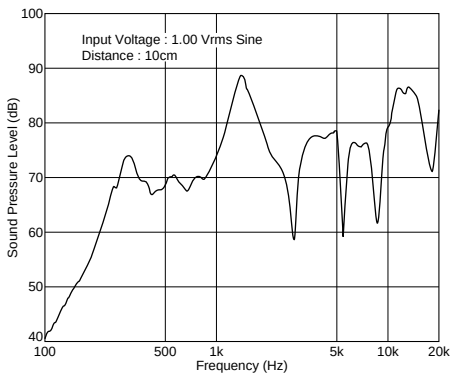
Part Number	Oscillating Frequency Range	Resonant Frequency (Hz) [Lowest]	Impedance (ohm)	Capacitance (nF)	Maximum Input (mW)	Operating Temp. Range (°C)	Storage Temp. Range (°C)
VSB35EWH0701B	600Hz to 20kHz	950 ±150Hz	600[1kHz]	340 ±35%[120Hz]	75	-20 to +70	-30 to +80
VSB50EWH0301B	250Hz to 20kHz	400 ±150Hz	300[1kHz]	600 ±35%[120Hz]	150	-20 to +70	-30 to +80

■ Freq. Response (Sine Wave 1Vrms, 10cm)

VSB35EWH0701B



VSB50EWH0301B



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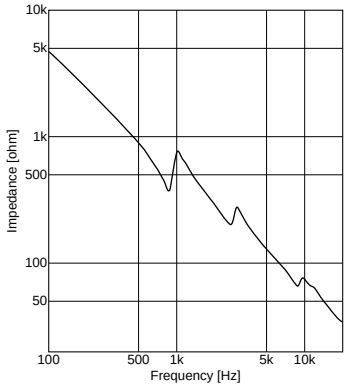
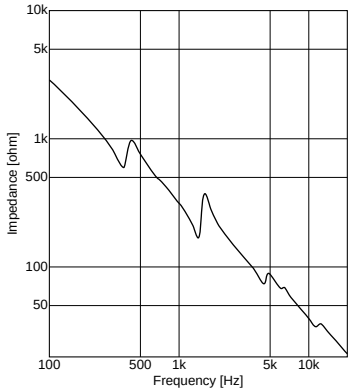
■ Impedance-Frequency Characteristics

VSB35EWH0701B



VSB50EWH0301B



Piezoelectric Speakers (CERAMITONE®) Notice

■ Notice (Soldering and Mounting)

1. Applying load on the center area of the speaker may cause cracking in the ceramic element. When the speaker is supported by the edge, the load should be only applied around the edge.
2. Washing of the component is not acceptable, because it is not sealed.

■ Notice (Handling)

1. Please do not touch the component with bare hand because electrode may be corroded.
2. The component may be damaged if mechanical stress exceeding specifications is applied.
3. Take care to protect operating circuit from surge voltage resulting from excessive force, falling, shock or temperature change.
4. If DC voltage is applied to the component, silver migration may occur. Please pay full attention to avoid subjecting the component to DC voltage for long periods.
5. The resistor should be used as shown in Fig. A.
   A suitable resistance value should be chosen, preferably 1kΩ to 2kΩ. Instead of this measure, a diode may also be applied as shown in Fig. B.

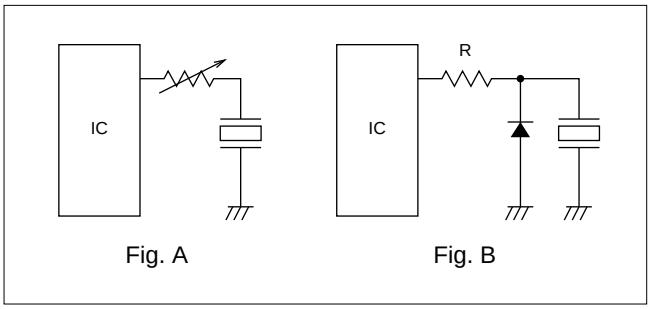


Fig. A Fig. B

6. Avoid excessive pulling of lead wire because wire may break or soldering point may come off.

Package

■ Minimum Quantity (pcs.)

Product Names	Part Number	Minimum Quantity			
		Ø330mm Reel	Bulk (Box)	Ammo Pack	Magazine
● Piezoelectric Diaphragms*					
External - Drive Types	**7BB-12-9**		5120		
	7BB-15-6		8000		
	7BB-20-3		3000		
	7BB-20-6		1800		
	7BB-20-6L0		600		
	7BB-27-4		1500		
	7BB-27-4L0		600		
	7BB-35-3		800		
	7BB-35-3L0		400		
	7BB-41-2		400		
	7BB-41-2L0		250		
	7NB-31R2-1		3000		
Self - Drive Types	**7BB-20-6C**		1800		
	7BB-20-6CL0		600		
	7BB-27-4C		1500		
	7BB-27-4CL0		600		
	7BB-35-3C		800		
	7BB-35-3CL0		400		
	7BB-41-2C		600		
	7BB-41-2CL0		250		
	7SB-34R7-3C		1600		
● Piezoelectric Sounders*					
External - Drive Types	**PKM13EPYH4000-A0**			500	
	PKM13EPYH4002-B0		330		
	PKM17EPP-2002-B0		200		
	PKM17EPPH4001-B0		200		
	PKM17EPPH4002-B0		200		
	PKM17EWH2001		250		
	PKM22EPH2001		360		
	PKM22EPH2002		270		
	PKM22EPH2003		270		
	PKM22EPPH2001-B0		750		
	PKM22EPPH2002-B0		750		
	PKM22EPPH4001-B0		900		
	PKM22EPPH4002-B0		900		
	PKM22EPPH4005-B0		750		
	PKM22EPPH4007-B0		750		
	PKM22EPPH4012-B0		750		
	PKM22EPTH2001-B0		300		75 [1)]
	PKM17EWH4000		500		
	PKLCS1212E4001-R1	1000			
	PKLCS1212E40A1-R1	1000			

1) The last two digits are changed to M0.

Continued on the following page.

"Minimum Quantity" means the number of units of each delivery or order. The quantity should be an integral multiple of the "Minimum Quantity". (As for products series with ★mark, bulk (bag) quantities shown here differ from actual delivery quantities in a package.)
Please contact nearest sales office for details and for any other products not listed above.

Package

Continued from the preceding page.

Product Names	Part Number	Minimum Quantity			
		Ø330mm Reel	Bulk (Box)	Ammo Pack	Magazine
Self - Drive Types	**PKM24SPH3801**		270		
	PKM24SPH3805		360		
	PKM24SPH3807		270		
	PKM24SPH3810		270		
	PKM30SPTH2001-B0		70		
	PKM30SPTH2501-B0		70		
● Piezoelectric Buzzers*	**PKB24SPCH3601-B0**		650		
	PKB24SWH3301		200		
	PKB30SPCH2001-B0		80		
	PKB30SPCH3001-B0		80		
● Piezoelectric Ringers (PIEZORINGER®)*	**PKM33EPH1201C**		300		
	PKM33EPH1202C		60		
	PKM34EWH1101C		25		
	PKM34EWH1201C		25		
	PKM44EWH1001C		25		
● Piezoelectric Receiver (CERAMIPHONE®)	**PKLCD1212R1000-R1**	1500			
● Piezoelectric Speakers (CERAMITONE®)*	**VSB35EWH0701B**		160		
	VSB50EWH0301B		80		

⚠Note:

1. Export Control
   〈For customers outside Japan〉
   Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.
   〈For customers in Japan〉
   For products which are controlled items subject to the “Foreign Exchange and Foreign Trade Law” of Japan, the export license specified by the law is required for export.
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   ① Aircraft equipment ② Aerospace equipment
   ③ Undersea equipment ④ Power plant equipment
   ⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.)
   ⑦ Traffic signal equipment ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above
3. Product specifications in this catalog are as of July 2004. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
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5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.
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7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

Murata Manufacturing Co., Ltd.

http://www.murata.com/

Head Office
2-26-10, Tenjin Nagaokakyo-shi, Kyoto 617-8555, Japan Phone: 81-75-951-9111
As of October 12, 2004, Murata's contact information will be changed as follows
1-10-1, Higashi Kotari, Nagaokakyo-shi, Kyoto 617-8555, Japan

International Division
3-29-12, Shibuya, Shibuya-ku, Tokyo 150-0002, Japan
Phone: 81-3-5469-6123 Fax: 81-3-5469-6155 E-mail: intl@murata.co.jp