March, 2002

projects® unlimited

Sound Solutions for 50 Years

Audio Products Guide

- *Alerts*
- *Speakers*
- *Microphones*
- *Piezo Benders*
- *Vibration Motors*
- *Multi Function Devices*

projects® unlimited

Audio Products Guide

Contents by Category

Contents by Product

Series AI-155 and AI-165

Products in photo are shown larger than actual size.

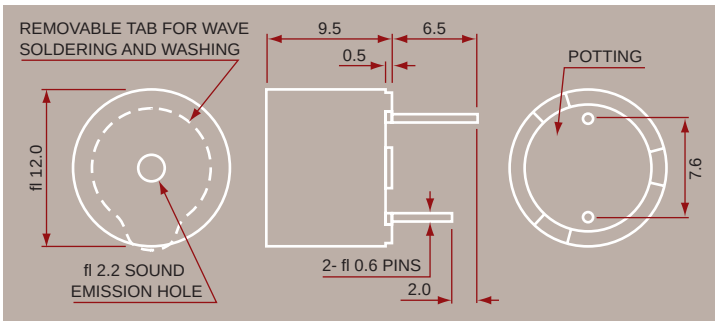
Case: *SEI-GFN2J*
Weight: *0.25 oz. (7 grams)*
P.C. Pins: *Tin-plated copper*
Both units supplied with potted base and removable tab for wave soldering and washing.

Features

- *Continuous tone*
- *P.C. mounting*
- *Two voltages available (4-7VDC and 8-16VDC)*
- *2300 Hz frequency*
- *Wave solderable and washable*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



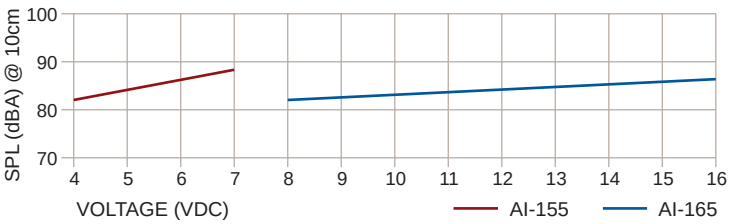
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-155	AI-165	Units
Rated Voltage	5	12	VDC
Operating Voltage	4-7	8-16	VDC
Rated Current (max.)	30	30	mA
Resonant Frequency	2300	2300	Hz
Sound Pressure Level @ 10cm (typ.)	85	85	dBA
Temperature Range: • Operating • Storage	-40° to +85° -40° to +85°	-40° to +85° -40° to +85°	°C

Performance

Typical SPL vs. Volts



Series AI-185 and AI-195

Products in photo are shown larger than actual size.

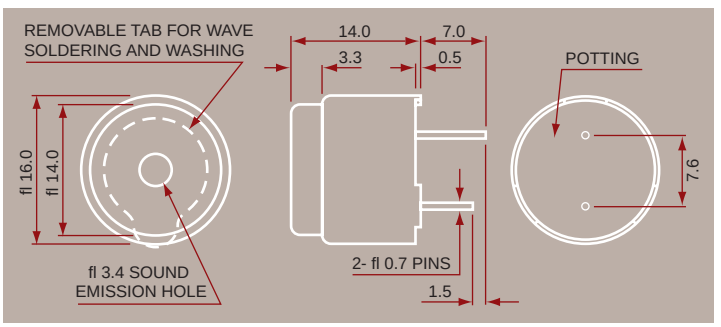
Case: *SEI-GFN2J*
Weight: *0.25 oz. (7 grams)*
P.C. Pins: *Tin-plated copper*
Both units have potted base and removable tab for wave soldering and washing.

Features

- *Continuous tone*
- *P.C. mounting*
- *Two voltages available (4-7VDC and 8-16VDC)*
- *2200 Hz frequency*
- *Wave solderable and washable*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



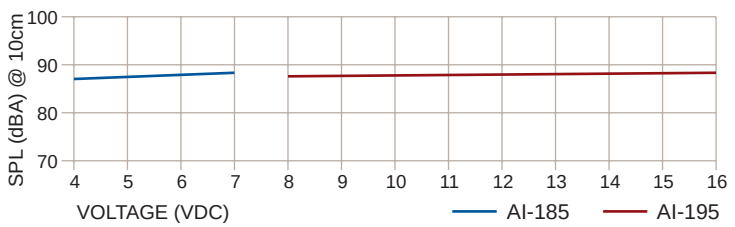
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-185	AI-195	Units
Rated Voltage	5	12	VDC
Operating Voltage	4-7	8-16	VDC
Rated Current (max.)	30	30	mA
Resonant Frequency	2200	2200	Hz
Sound Pressure Level @ 10cm (typ.)	85	85	dBA
Temperature Range: • Operating • Storage	-30° to +85° -40° to +85°	-30° to +85° -40° to +85°	°C

Performance

Typical SPL vs. Volts



Miniature Electro-mechanical Buzzers

Series AI-221, AI-222/227 and AI-223/228

Features

- *Continuous tone*
- *Flange and p.c. mounting*
- *Three voltages available: 3-6, 8-16 and 20-28 VDC*
- *400 Hz frequency*

Case: *Nylon, Gray*
Weight: *0.353 oz. (10 grams)*
P.C. Pins: *Tin-plated brass*
Wire: *AWG No. 26, stranded*
Wire Color Code: *Red (+), Black (-)*

Product in photo is shown at approx. size.

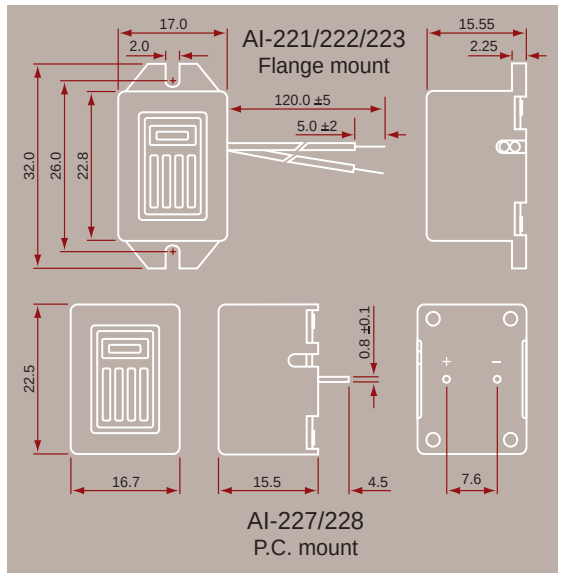
Electrical

		AI-221			AI-222/227			AI-223/228			
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Units**
Supply Voltage		3	4.5	6	8	12	16	20	24	28	VDC
Rated Current	Vcc = 3V Vcc = 6V Vcc = 8V Vcc = 16V Vcc = 20V Vcc = 28V		17 30			15 30			15 22		mA
Fundamental Frequency	Vcc = 4.5V Vcc = 12V Vcc = 24V		400			400			400		Hz
Sound Pressure Level @ 10cm	Vcc = 4.5V Vcc = 12V Vcc = 24V	76			76			76			dBA
Temperature Range: • Operating • Storage		-20° -30°		+60° +70°	-20° -30°		+60° +70°	-20° -30°		+60° +70°	°C
Termination		**AI-221/222/223** - Wires			**AI-227/228** - P.C. Pins						

All data at 25°C unless otherwise specified.

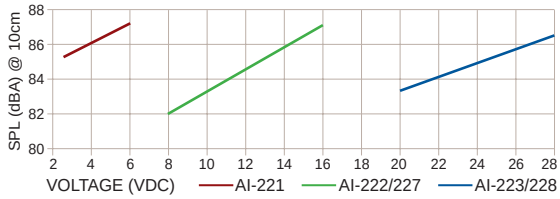
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Volts



Electro-mechanical Buzzers

Series AI-290

Products in photo are shown smaller than actual size.

Features

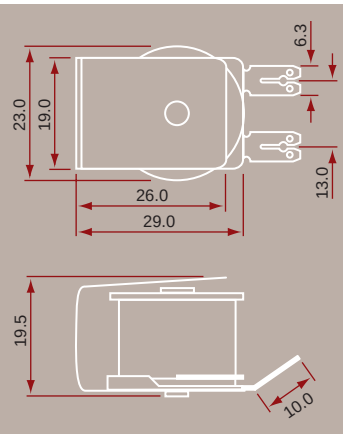
- *Continuous tone*
- *Flange and surface mountings*
- *Variety of AC voltages*
- *Open and enclosed configurations*

Mechanical

AI-291, AI-292, AI-293, AI-294

Weight: *0.81 oz. (23 grams)*
Tabs: *0.250" (6.3mm) quick disconnect*

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Electrical

All data at 25°C unless otherwise specified.

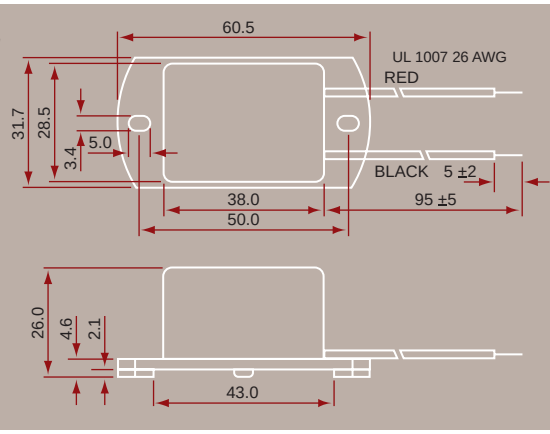
Model No.	**Supply Voltage AC**			**Sound Pressure Level @ 10cm**
Open Type	Min.	Typ.	Max.	Typical
AI-291	8	12	18	90
AI-292	19	24	32	90
AI-293	60	110	150	102
AI-294	160	220	260	102
Enclosed Type	Min.	Typ.	Max.	Typical
AI-295	4	6	11	83
AI-296	8	12	18	90
AI-297	19	24	32	90
AI-298	60	110	150	92
AI-299	160	220	260	92

AI-295, AI-296, AI-297, AI-298 & AI-299

Case and base: *ABS, black, enclosed type*

Weight: *1.12 oz. (32 grams)*

Wire: *AWG No. 26, stranded. Wire color code: Red (+), Black (-).*



Electronic High Output Alarms

Series XL-501 and XL-502

Features

- *Continuous, slow, medium, or fast pulsing tones*
- *Flush mounting*
- *Two voltage ranges: 9-28 VDC and 110-240VAC*
- *Multiple frequencies available*

Installation

- *Two mounting holes in the back plate molding.*
- *Rear cable entry capability.*
- *Optional deep base for side cable entry.*
- *All units come with an O-ring seal.*
- *A terminal block of flame retardant polyamide.*

Showing shallow base *Showing deep base*

Products in photo are shown smaller than actual size.

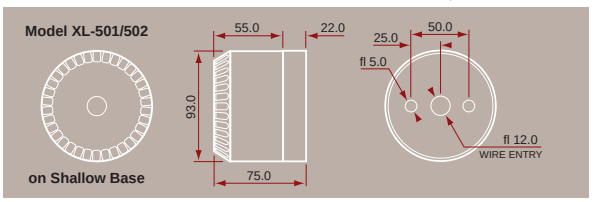
Case: *ABS, white or red*
Weight: *10 oz. (284 grams)*

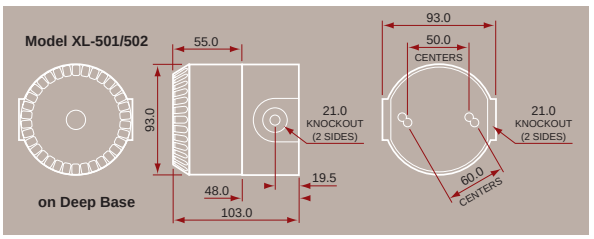
Model	Supply Voltage
XL-501	9-28VDC
XL-502	110-240VAC

The chart below *shows sound outputs and frequencies which can be selected on the internal dip switch.*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5.





Electrical

All data at 25°C unless otherwise specified. Frequency tolerance: ± 15%.

No.	Tones	2nd Tone	Dip Switch Setting		Typical 1 mA 12V	Typical 1 mA 24V	Typ. Output dBA at 10cm 12V	Typ. Output dBA at 10cm 24V
1	Alt tones 800/970 Hz @ 1/4 Hz	14	11111		9	18	115	120
2	Sweeping 800/970 Hz @ 7 Hz	14	11110	Fast Sweep (LF)	9	19	110	115
3	Sweeping 800/970 Hz @ 1 Hz	14	11101	Medium Sweep (LF)	8	18	113	118
4	Continuous @ 2850 Hz	14	11100		14	29	119	126
5	Sweeping 2400-2850 Hz @ 7 Hz	4	11011	Fast Sweep	10	23	116	123
6	Sweeping 2400-2850 Hz @ 1 Hz	4	11010		10	23	118	124
7	Slow Whoop	14	11001	Slow Whoop	7	15	110	115
8	Sweep 1200-500 Hz @ 1 Hz	14	11000	Din Tone	8	16	111	117
9	Alt Tones 2400/2850 Hz @ 2 Hz	4	10111		12	27	119	125
10	Int Tone at 970 Hz @ 1 Hz	14	10110	Back-Up Alarm (LF)	5	12	115	120
11	Alt Tones 800/970 Hz @ 1 Hz	14	10101		9	18	114	120
12	Int Tone at 2850 Hz @ 1 Hz	4	10100	Back-Up Alarm (HF)	8	20	118	124
13	970 Hz at 1/4 Sec. On, 1 Sec. Off	14	10011		3	7	114	120
14	Continuous @ 970 Hz	14	10010		9	20	114	120
15	554 for 100ms and 440 Hz for 400ms	14	10001	French Fire Sound	5	12	105	112
16	Int 660 Hz 150ms On, 150ms Off	16	10000	Swedish Fire Alarm	4	9	104	109
17	Int 660 Hz 1.8s On, 1.8s Off	17	01111	Swedish Fire Alarm	5	12	102	109
18	Int 660 Hz 6.5s On, 13s Off	18	01110	Swedish Fire Alarm	4	10	105	110
19	Continuous 660 Hz	19	01101	Swedish Fire Alarm	6	14	105	110
20	Alt 554/440 Hz @ 1 Hz	20	01100	Swedish Fire Alarm	6	13	106	111
21	Int 660 Hz 1 Hz	21	01011	Swedish Fire Alarm	4	9	105	110
22	Int 2850 Hz 150ms On, 100ms Off	14	01010	Pelican Crossing	9	19	118	125
23	Sweep 800/970 Hz @ 50 Hz	14	01001	Low Frequency Buzz	9	18	109	115
24	Sweep 2400/2850 Hz @ 50 Hz	4	01000	High Frequency Buzz	12	22	116	123

Electro-mechanical Audio Indicators

Series XL-600 and XL-601

Products in photo are shown smaller than actual size.

Features

- *Continuous and pulsing tone*
- *Voltage range: 9-28VDC*
- *2700 to 3100 Hz frequency*
- *Sealed construction*
- *Model XL-600 offers flange mounting with wire leads*
- *Model XL-601 offers panel mounting with wire leads and fits a 25.4mm (1 inch) opening*

Case: *ABS, white or red.*

Wiring

Wire: *AWG No. 24, tinned copper, stranded*
Wire Color Code:

Tone	+ Pos.	- Neg.
Continuous	Red	Blue
Pulsing	Red	Black

Weight

Model	Weight
Flange mount	3.63 oz. (103 grams)
Panel mount	2.82 oz. (80 grams)

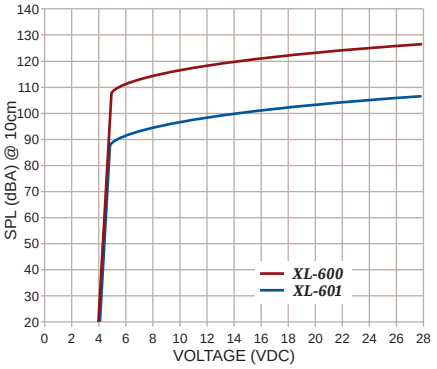
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	Min.	Typ.	Max.	Units
Supply Voltage		9	12	28	VDC
Rated Current	Vcc = 12V		15		mA
Frequency Range	Vcc = 12V		2700-3100		Hz
Sound Pressure Level @ 10cm • XL-600 • XL-601	 Vcc = 12V Vcc = 12V		 118 106		 dBA dBA
Sweep Rate			4		Hz
Temperature Range: • Operating		-40°		+ 80°	°C

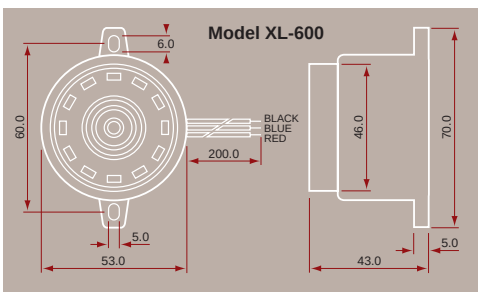
Performance

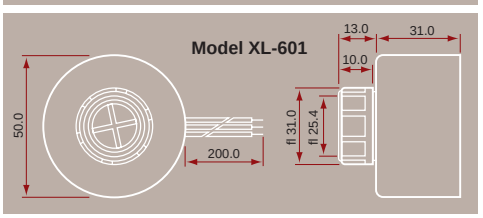
Typical SPL vs. Volts



Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.





Electro-mechanical Audio Indicators

Series AI-606, AI-612 and AI-624

Features

- *Continuous tone*
- *Flange mounting with wire leads*
- *Three voltages available: 4-8VDC, 8-16VDC and 20-28VDC*
- *400 Hz frequency*

Case: *ABS, gray*
Weight: *0.353 oz. (10 grams)*
Wire: *AWG No. 26, stranded*
Wire Color Code: *Red (+), Black (-)*
Product in photo is approximate size.

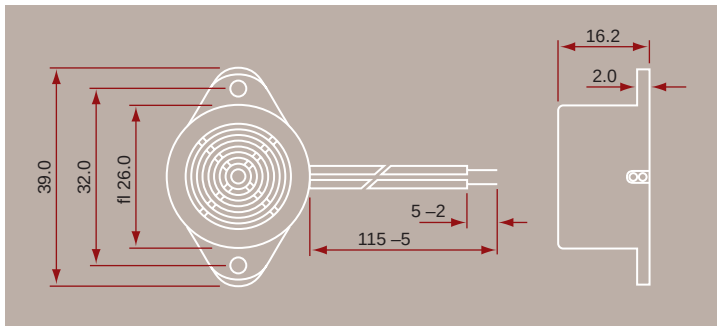
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-606	AI-612	AI-624	Units
Supply Voltage	4-8	8-16	20-28	VDC
Rated Voltage	6	12	24	VDC
Rated Current (typ.)	20	25	20	mA
Sound Pressure Level @ 10cm (typ.)	90			dBA
Operating Frequency	400 ± 100			Hz
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°			°C

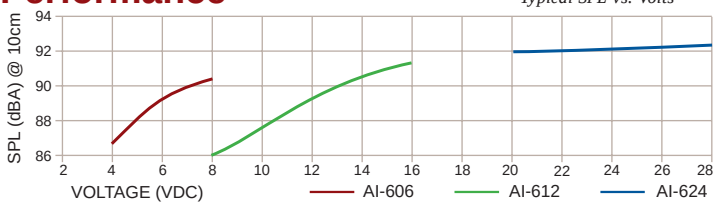
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Volts



Miniature Piezo Audio Indicators

Series AI-175

Products in photo are shown larger than actual size.

Features

- *Continuous tone*
- *P.C. mounting*
- *3-16 VDC*
- *4000 Hz frequency*
- *Wave solderable and washable*
- *Low current consumption*

Case: *ABS, black*
Weight: *0.035 oz. (1 gram)*
P.C. Pins: *Copper covered iron with tin plating.*
P.C. Pin Length: *Positive pin: 5.5mm, negative pin: 4.0mm*
Unit has potted base and removable tab for wave soldering and washing.

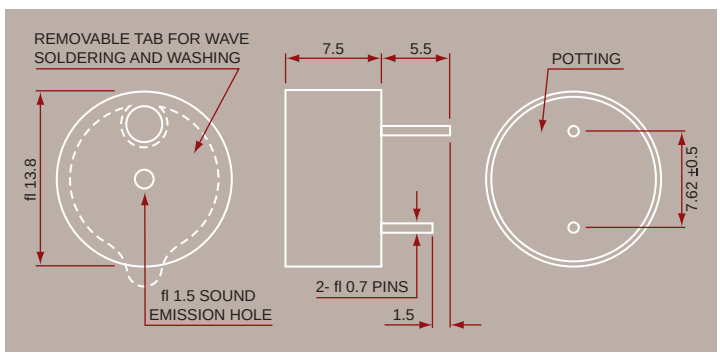
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	AI-175	Units
Supply Voltage		3-16	VDC
Rated Current (typ.)	Vcc = 3V Vcc = 6V Vcc = 12V	1.3 3.0 5.8	mA
Fundamental Frequency (typ.)		4000	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 3V Vcc = 6V Vcc = 12V	75 80 86	dBA
Temperature Range: • Operating • Storage		-20° to +70° -30° to +80°	°C

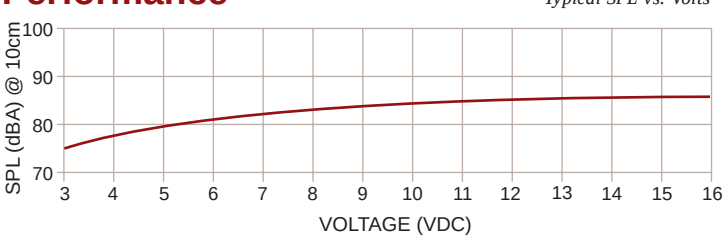
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Volts



Miniature Piezo Audio Indicators

Series AI-250 and AI-250H

Product in photo is shown at approx. actual size.

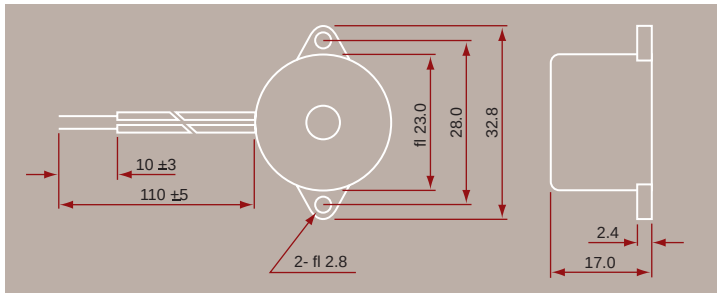
Features

- *Continuous tone*
- *Flange mounting with wire leads*
- *Two voltages available (3-16VDC and 8-18VDC)*
- *3500 and 3700 Hz frequency*
- *Low current consumption*

Case: *ABS, black*
Weight: *0.18 oz. (5 grams)*
Wire: *AWG No. 28, stranded, Red (+), Black (-)*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



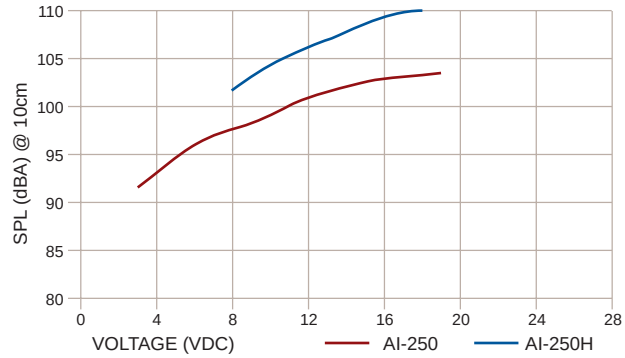
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	AI-250	AI-250H	Units
Operating Voltage		3-16	8-18	VDC
Rated Current (max.)	Vcc = 12V	5	12	mA
Fundamental Frequency (typ.)		3700	3500	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	100	106	dBA
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°	-30° to +80° -40° to +80°	°C

Performance

Typical SPL vs. Volts



Miniature Piezo Audio Indicators

Series AI-251

Features

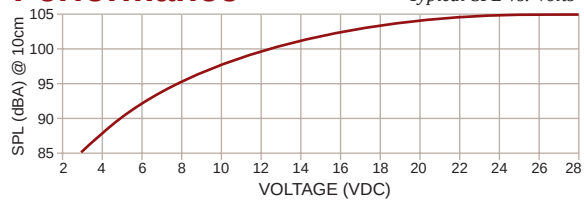
- *Continuous tone*
- *Flange mounting with wire leads*
- *3-28VDC*
- *4500 Hz frequency*
- *Low current consumption*

Product in photo is shown larger than actual size.

Case: *ABS, black*
Weight: *0.18 oz. (5 grams)*
Wire: *AWG No. 26, stranded*
Wire Color Code: *Red (+), Black (-)*

Performance

Typical SPL vs. Volts



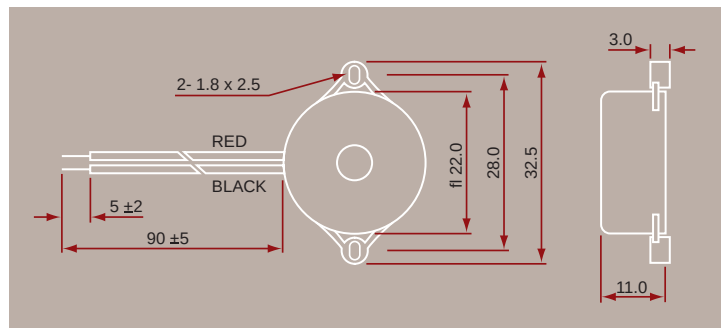
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	AI-251	Units
Supply Voltage		3-28	VDC
Rated Current (typ.)	Vcc = 12V	3	mA
Fundamental Frequency (typ.)		4500	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	95	dBA
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°	°C

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Miniature Piezo Audio Indicators

Series AI-254, AI-254H, and AI-254S

Features

- *Continuous tone*
- *P.C. mounting*
- *3600 and 3700 Hz frequency*
- *Sealed and unsealed configurations*
- *Two voltages available: 3-16 and 8-18VDC*
- *Low current consumption*

Products in photo are shown smaller than actual size.

Case: *ABS, black* ***Weight:*** *0.18 oz. (5 grams)*
P.C. Pins: *Tin-plated brass* ***Polarity Mark:*** *On top of case.*
Note: *The Model* ***AI-254S*** *comes with a protective, removable tab over the sound aperture and an epoxy sealed base for wave soldering and washing.*

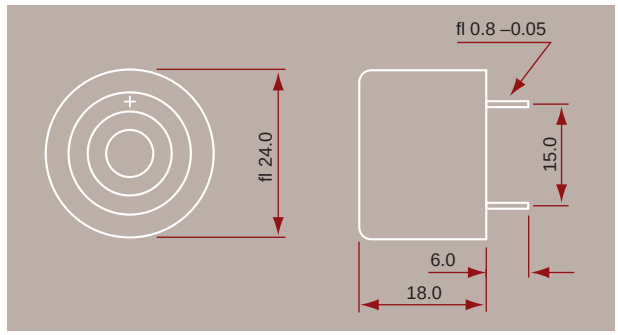
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-254	AI-254H	AI-254S	Units
Supply Voltage	3-16	8-18	3-16	VDC
Rated Current (max.) Vcc = 12V	5	6	5	mA
Fundamental Frequency (typ.)	3700	3600	3600	Hz
Sound Pressure Level @ 10cm (typical) Vcc = 12V	101	105	101	dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	-30° to +80° -40° to +80°	-20° to +60° -30° to +70°	°C

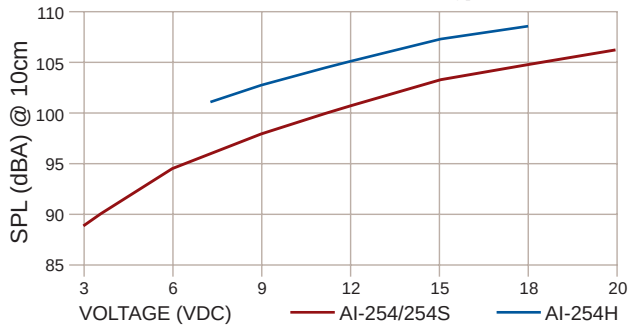
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Volts



Miniature Piezo Audio Indicators

Series AI-256, AI-257, AI-258 and AI-259

Products in photo are shown approximate size.

AI-257/259 ***AI-256/258***

Features

- *Continuous tone*
- *P.C. mounting*
- *3-20 VDC*
- *3100 Hz frequency*
- *Sealed configuration*
- *Two pin spacings available*
- *High temperature versions available*

Case, AI-256/258: *ABS, black*
Case, AI-257/259: *Polycarbonate, gray*
Weight: *0.18 oz. (5 grams)*
P.C. Pins: *Tin-plated brass*
Polarity Mark: *On top & bottom of case.*
Note: Units have protective, removable tab over sound aperture. Bases are not sealed unless noted.

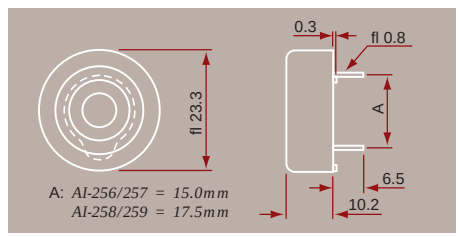
Electrical

Parameter	Conditions	AI-256/258 Min.	AI-256/258 Typ.	AI-256/258 Max.	AI-257/259 Min.	AI-257/259 Typ.	AI-257/259 Max.	Units
Supply Voltage		3	12	20	3	12	20	VDC
Rated Current	Vcc = 12V		12			12		mA
Fundamental Frequency	Vcc = 12V		3100			3100		Hz
Sound Pressure Level @ 10cm	Vcc = 12V		90			90		dBA
Temperature Range: • Operating • Storage		-20° -30°		+60° +70°	-30° -40°		+100° +120°	°C

All data at 25°C unless otherwise specified.

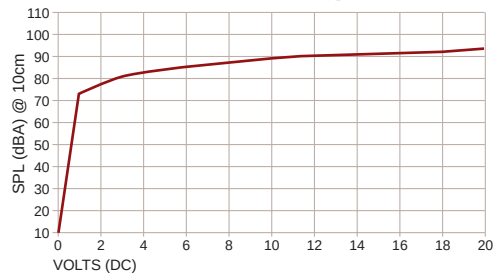
Mechanical

Dimensions are in millimeters, tolerance is ±0.5.

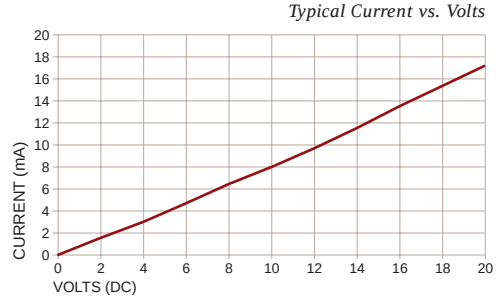


Performance

Typical SPL vs. Volts



Typical Current vs. Volts



Miniature Piezo Audio Indicators

Series AI-278

Products in photo are shown smaller than actual size.

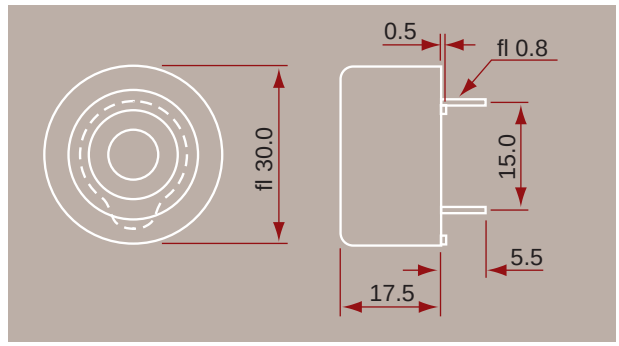
Case: *ABS, black*
Weight: *0.25 oz. (7 grams)*
P.C. Pins: *Tin-plated brass*
The unit is supplied with protective, removable tab over sound aperture. The base is sealed.

Features

- *Continuous tone*
- *P.C. mounting*
- *3-28 VDC*
- *1800 Hz frequency*
- *Wave solderable*
- *Comparable to PKB9-2A0*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



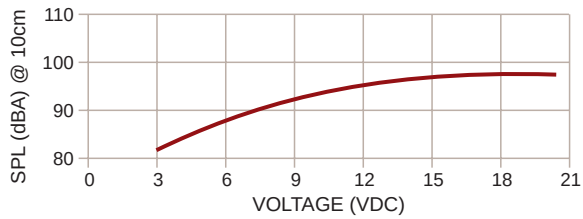
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	Min.	Typ.	Max.	Units
Supply Voltage		3	12	28	VDC
Rated Current	Vcc = 12V		12		mA
Fundamental Frequency	Vcc = 12V		1800		Hz
Sound Pressure Level @ 10cm	Vcc = 12V		95		dBA
Temperature Range: • Operating • Storage		-20° -30°		+60° +70°	°C

Performance

Typical SPL vs. Volts



Panel Mount Piezo Audio Indicators

Series AI-3120S and AI-3120D

Features

- *Continuous and pulsing tones*
- *Panel mounting- fits 1-1/8" dia. opening*
- *Two voltages available: 1-16 and 4-16VDC*
- *3200 Hz frequency*
- *105 to 110 dBA at 10cm*

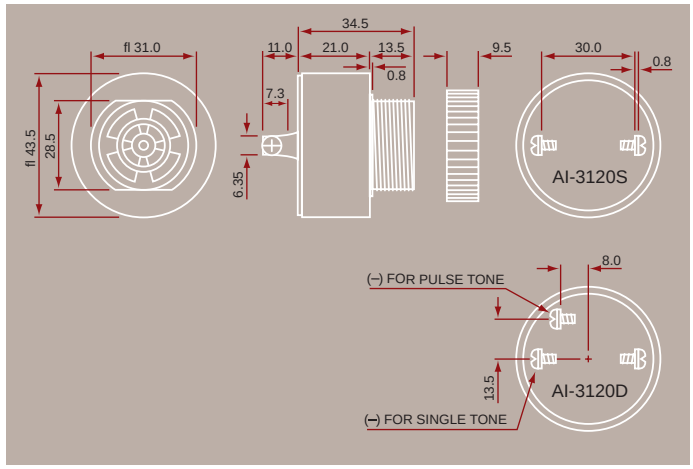
Case: *ABS, black*
Terminals: *Tin-plated brass*
Screws: *Phillips head*

Product in photo is shown smaller than actual size.

Model No.	DC Volts	Tone
AI-3120S	1-16VDC	Continuous
AI-3120D	4-16VDC	Continuous and Pulsing

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Electrical

Parameter	Conditions	AI-3120S Min.	AI-3120S Typ.	AI-3120S Max.	AI-3120D Min.	AI-3120D Typ.	AI-3120D Max.	Units
Supply Voltage		1	12	16	4	12	16	VDC
Rated Current	16V			30		20	25	mA
Fundamental Frequency			3200			3200		Hz
Sound Pressure Level @ 10cm (typ.)	12V		110			105		dBA
Pulse Rate						5		Hz
Temperature Range: • Operating • Storage		-20° -30°		+60° +70°	-20° -30°		+60° +70°	°C

All data at 25°C unless otherwise specified.

Piezo Ceramic Audio Indicators

Series AI-380, AI-381, AI-381P, AI-382, AI-383, and AI-384

Case: ABS, black
Terminals: Nickel plated, also available with 0.250" (6.35mm) quick disconnect tab terminals.

Weight	(Grams)
AI-380	32
AI-381	37
AI-381P	34.6
AI-382	35.3
AI-383	33.8
AI-384	58.8

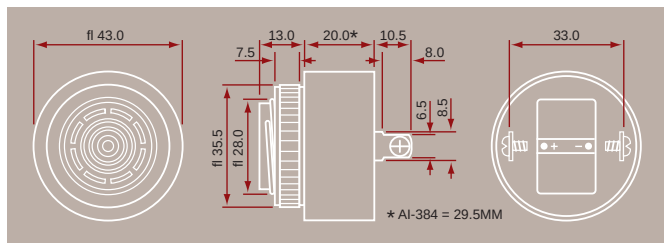
Features

- *Continuous or slow and fast pulsing tones*
- *Panel mounting (fits 1-1/8" dia. opening and up to 1/4" thick)*
- *Four voltages available*
- *Special non-standard configurations are available (two tone versions)*

Products in photo are shown smaller than actual size.

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-380	AI-381	AI-381P	AI-382	AI-383	AI-384
Operating Voltage	4-28VDC	6-28VDC	6-28VDC	30-120VAC/DC Non-polar	4-28VAC/DC Non-polar	60-250VAC/DC Non-polar
Rated Consumption (max.)	8 @12VDC	6 @12VDC	6 @12VDC	17 @110VAC/DC	7 @12VAC/DC	16 @220VAC/DC
Resonant Frequency	2.8 ±0.5KHz	2.9 ±0.5KHz	2.9 ±0.5KHz	2.8 ±0.5KHz	2.8 ±0.5KHz	2.8 ±0.5KHz
Sound Pressure Level @ 10cm	97 12VDC	88 12VDC	92 12VDC	98 110VAC/DC	91 12VAC/DC	91 220VAC/DC
Tone	Continuous	Fast Pulse 3.2Hz ±20%	Slow Pulse 1.2Hz ±20%	Continuous	Continuous	Fast Pulse 3.0Hz ±20%
Temperature Range: • Operating • Storage	-30°C to +85°C -40°C to +95°C					

Snap-in Panel Mount Audio Indicators

Series AI-390

Products in photo are shown smaller than actual size.

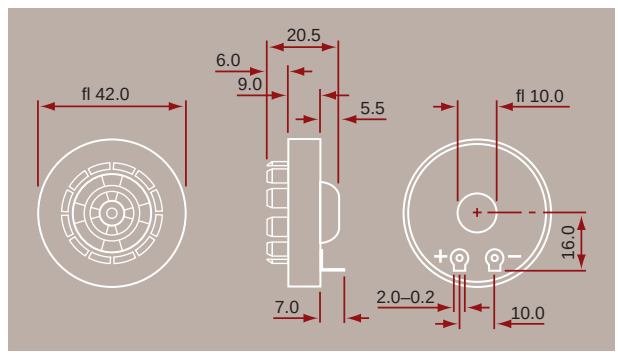
Case: *ABS, black*
Weight: *0.5 oz. (14 grams)*
P.C. Pins: *Tin-plated brass*

Features

- *Continuous tone*
- *Snap-in panel mounting (fits 1.063" dia. opening)*
- *1-28 VDC*
- *3000 Hz frequency*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



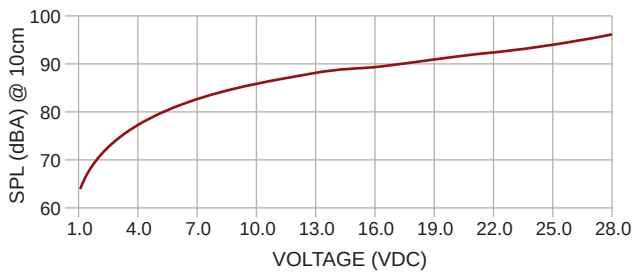
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-175	Units
Operating Voltage	1-28	VDC
Rated Voltage	24	VDC
Rated Current (typ.)	12	mA
Resonant Frequency	3000	Hz
Sound Pressure Level @ 10cm (typical)	95	dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Volts



Piezo Ceramic Audio Indicators

Series AI-400

Products in photo are shown smaller than actual size.

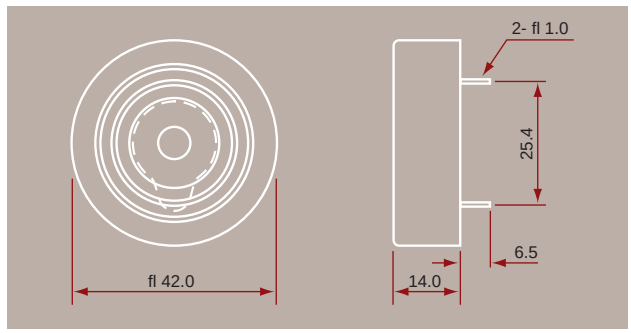
Features

- *Continuous tone*
- *P.C. mounting*
- *3-28VDC*
- *2800 Hz frequency*
- *Wave solderable*

Case: *ABS, black*
Weight: *0.71 oz. (20 grams)*
P.C. Pins: *Tin-plated brass*
Polarity Mark: *On top of case.*
Unit is supplied with protective, removable tab over sound aperture. Bases are not sealed unless noted.

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



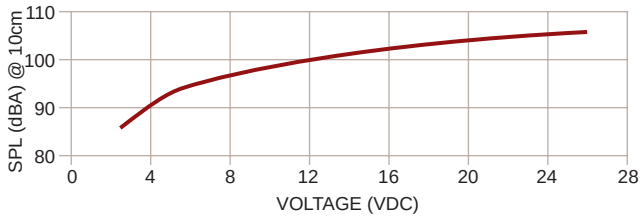
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	AI-400	Units
Supply Voltage		3-28	VDC
Rated Current (typ.)	Vcc = 12V	8	mA
Fundamental Frequency (typ.)		2800	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	100	dBA
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Volts



Piezo Audio Indicators

Series AI-420A

Product in photo is shown smaller than actual size.

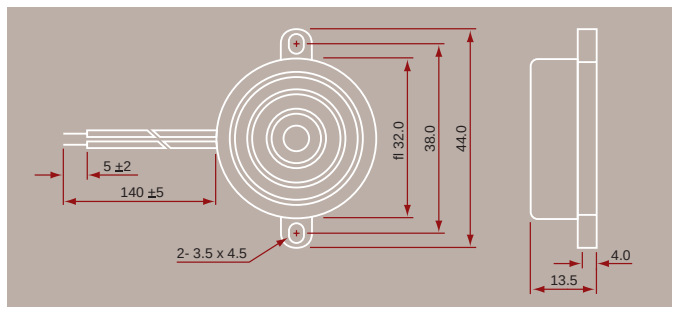
Features

- *Continuous tone*
- *Flange mounting with wire leads*
- *Voltage range: 3-28VDC*
- *3500 Hz frequency*
- *Low current consumption*

Case: *ABS, black*
Weight: *0.282 oz. (8 grams)*
Wire: *AWG No. 28, stranded*
Wire Color Code: *Red (+), Black (-)*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



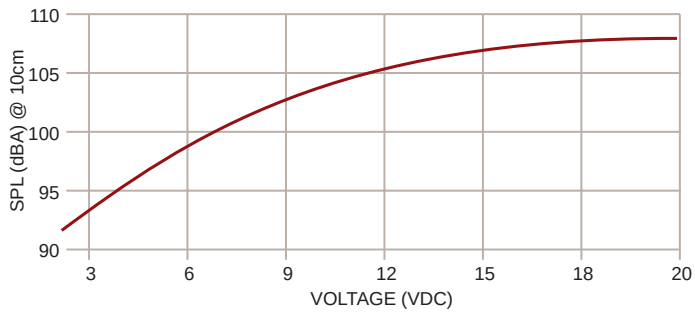
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-420A	Units
Rated Voltage	12	VDC
Operating Voltage	3-28	VDC
Rated Current (typ.)	5	mA
Resonant Frequency	3500	Hz
Sound Pressure Level @ 10cm (typ.)	105	dBA
Temperature Range: • Operating • Storage	-30° to +85° -40° to +95°	°C

Performance

Typical SPL vs. Volts



Piezo Ceramic Audio Indicators

Series AI-430, AI-431, AI-431H, AI-433

Features

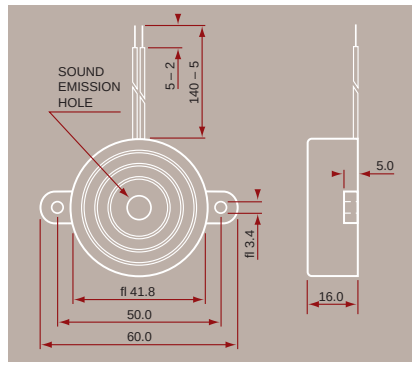
- *Continuous and fast pulsing tones*
- *Flange mounting with wire leads*
- *Three voltage ranges: 3-20, 3-28 and 8-18VDC*
- *2800 Hz frequency*

Product in photo is shown smaller than actual size.

Case: *ABS, black*
Weight: *0.71 oz. (20 grams)*
Wire: *AWG No. 24, stranded*
Wire Color Code: *Red (+), Black (-).*

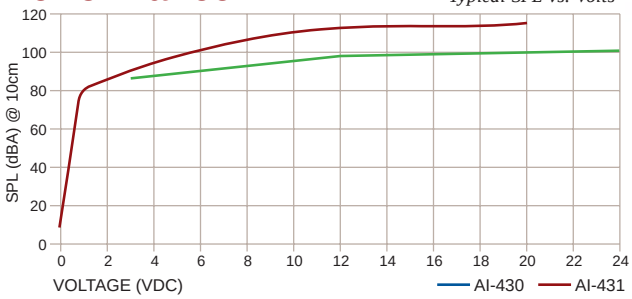
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.

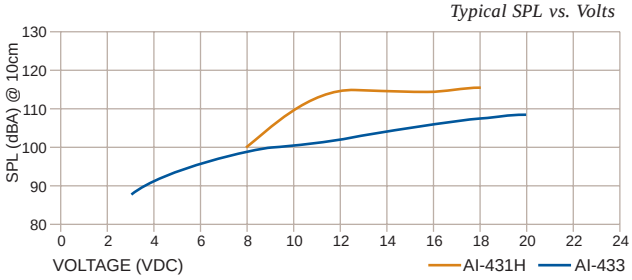


Performance

Typical SPL vs. Volts



Typical SPL vs. Volts



Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	AI-430	AI-431	AI-433	AI-431H	Units
Supply Voltage		3-28	3-20	3-20	8-18	VDC
Rated Current (max.)	Vcc = 12V	7	10	10	15	mA
Fundamental Frequency	Vcc = 12V	2800	2800	2800	2800	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	100	110	100	115	dBA
Pulse Rate				3.5 ±20%		Hz
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°			-30° to +80° -40° to +80°	°C

High Output Audio Alarms

Series AI-500

Features

- *Continuous tone*
- *Flush mounting*
- *5-13VDC*
- *2500 Hz frequency*
- *120 dBA at 10cm*
- *Interchangeable with Star PDB-09**

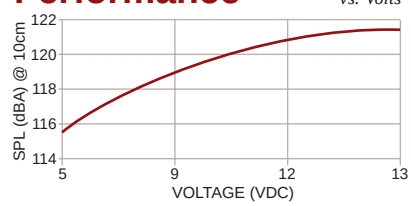
**Trademark of Star-Micronics Inc.*

Products in photo are shown smaller than actual size.

Trigger: *2 mA max @ 12VDC*
Housing: *ABS, black*
Weight: *1.4 oz. (40 grams)*

Performance

Typical SPL vs. Volts



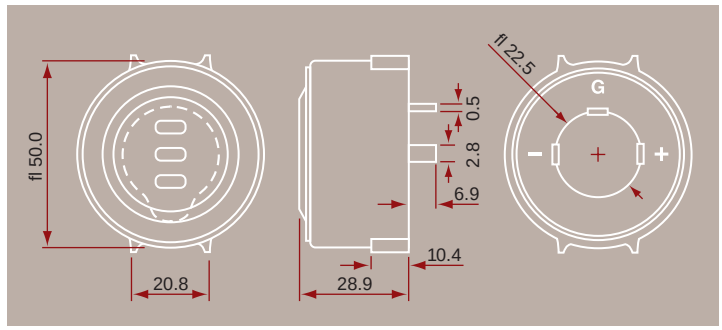
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	AI-500	Units
Supply Voltage		5-13	VDC
Rated Current (typ.)	Vcc = 12V	70	mA
Fundamental Frequency (typ.)		2500	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	120	dBA
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°	°C

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Miniature Piezo Audio Indicators

Series AI-550, AI-550S, AI-550A, AI-550AS, AI-550H and AI-550HS

Products in photo are shown smaller than actual size.

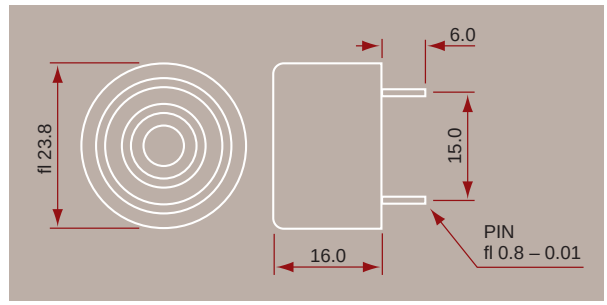
Features

- *Continuous tone*
- *P.C. mounting*
- *3-20VDC*
- *2900 Hz frequency*
- *Sealed and unsealed configurations*
- *Low current consumption*

Case: *ABS, black*
Weight: *0.21 oz. (6 grams)*
P.C. Pins: *Tin-plated brass*
Polarity Marks: *On top of case.*
AI-550S/AS *and* ***AI-550HS*** *have potted base and removable tab for wave soldering and washing.*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



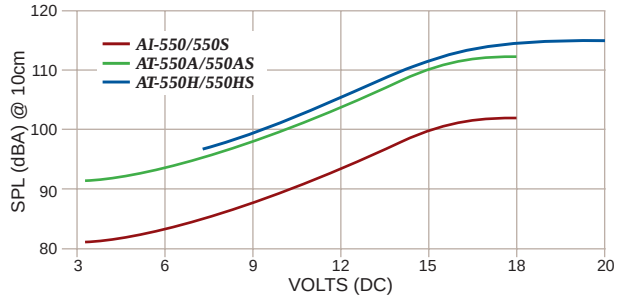
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	AI-550 AI-550S	AI-550A AI-550AS	AI-550H AI-550HS	Units
Supply Voltage		3-20	3-20	8-18	VDC
Rated Current (typ.)	Vcc = 12V	6	8	6	mA
Fundamental Frequency (typ.)		2900	2900	2900	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	95	105	105	dBA
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°			°C

Performance

Typical SPL vs. Volts



Piezo Ceramic Audio Indicator

Series AI-750S

Products in photo are shown smaller than actual size.

Features

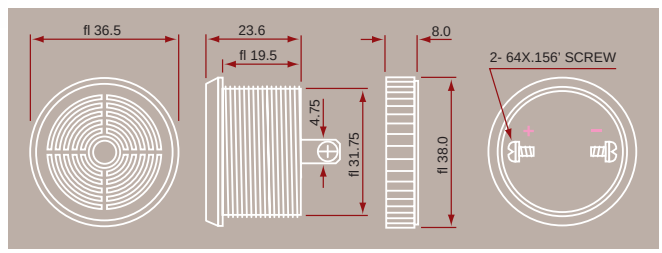
- *Continuous tone*
- *3600 Hz frequency*
- *Panel mounting- fits 1.25" dia. opening*
- *Voltage range: 4-28 VDC*

Case: *ABS, gray*
Weight: *0.38 oz. (10.8 grams)*
Terminals: *Tin-plated brass**
Screws: *2 Phillips head*

**Also available with 0.187" (4.75mm) quick disconnect tab terminals.*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



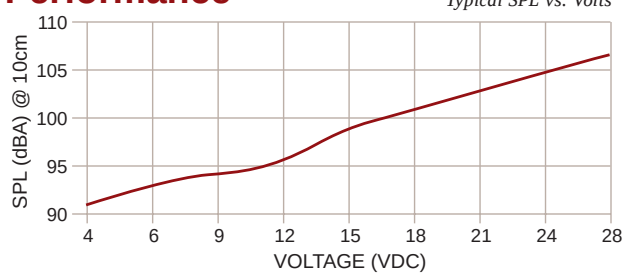
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	Min.	Typ.	Max.	Units
Supply Voltage		4		28	VDC
Rated Current	Vcc = 4 = 12 = 24 = 28		2.2 6.8 14 16.6		mA
Fundamental Frequency			3600		Hz
Sound Pressure Level @ 10cm	Vcc = 4 = 12 = 28		90 99 106		dBA
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°			C°

Performance

Typical SPL vs. Volts



Piezo Ceramic Audio Indicators

Series X-10P and X-10W

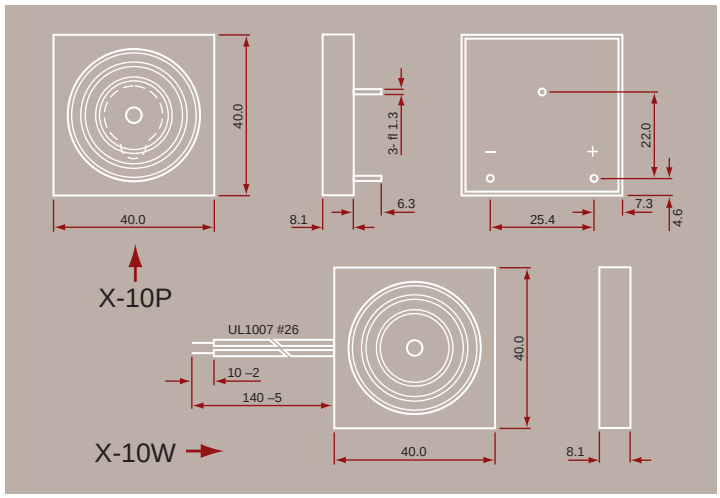
Products in photo are shown smaller than actual size.

Features

- *Continuous tone*
- *P.C. and flush mounting*
- *3-20VDC*
- *3300 and 3500 Hz frequency*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Electrical

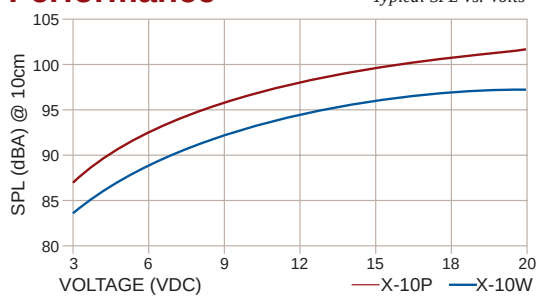
All data at 25°C unless otherwise specified.

Parameter	X-10P	X-10W	Units
Operating Voltage	3-20	3-20	VDC
Resonant Frequency	3300 ±500	3500 ±500	Hz
Rated Current @ 12VDC (max.)	8	8	mA
Sound Pressure Level @ 10cm (typ.)	100	99	dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°		°C

Case: *ABS, black*
Weight: X-10P *- 8 grams*
X-10W *- 9 grams*
P.C. Pins: *Nickel-plated brass*
Wire: *AWG No. 26, stranded*
Wire Color Code: *Red (+), Black (-)*
The X-10P is supplied with removable tab for wave soldering and washing.

Performance

Typical SPL vs. Volts



Piezo Ceramic Audio Indicators

Series X-20, X-21 and X-23

Case: *ABS, black*
Weight: *X-20: 15 grams, X-21 & X-23: 17 grams*
Tabs: *X-20:Tin plated brass, X-21 & X-23: Nickel-plated brass*

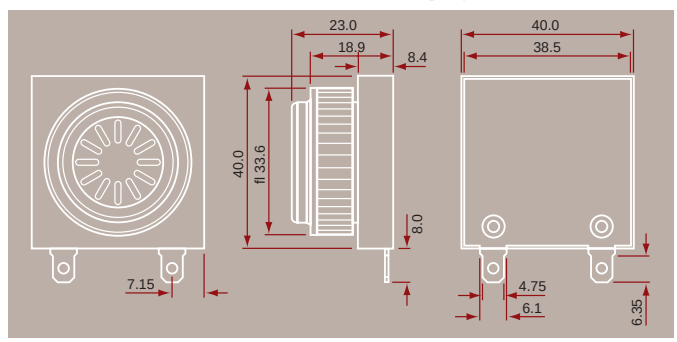
Products in photo are shown smaller than actual size.

Features

- *Continuous, slow or fast pulsing tones*
- *Panel mounting (fits 1.125" dia. opening up to 0.25" thick)*
- *3-32 and 6-32 voltage range*
- *2800 Hz frequency*
- *Quick disconnect tabs (0.187", 1.75mm)*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



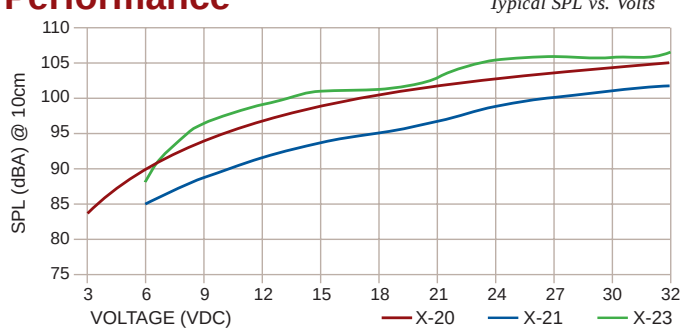
Electrical

All data at 25°C unless otherwise specified.

Parameter	X-20	X-21	X-23	Units
Operating Voltage	2-32	6-32	6-32	VDC
Rated Voltage	32	32	32	VDC
Rated Current	18	18	18	mA
Resonant Frequency	2800	2800	2800	Hz
Sound Pressure Level @ 10cm (typ.)	105	105	103	dBA
Tone	Continuous	Fast Pulse 3.0Hz ± 20% @ 32VDC	Slow Pulse 1.5Hz ± 30% @ 12VDC	
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	-20° to +60° -30° to +60°	-20° to +60° -30° to +60°	°C

Performance

Typical SPL vs. Volts



Piezo Ceramic Audio Indicators

Series X-30 and X-30AC

Product in photo is shown smaller than actual size.

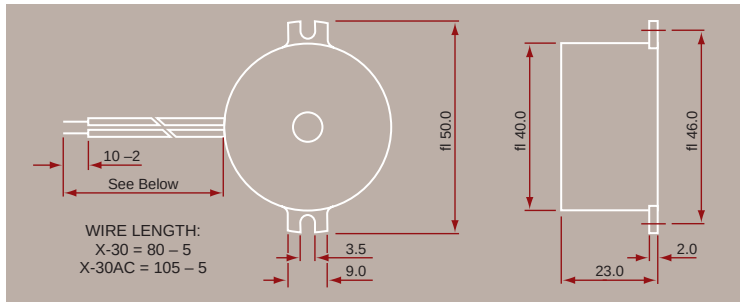
Case: *ABS, black*
Weight: *0.42 oz. (12 grams)*
Wire: *AWG No. 26, stranded (X-30)*
AWG No. 20, stranded (X-30AC)
Wire Color Code: *Red (+), Black (-)*

Features

- *Continuous tone*
- *Flange mounting with wire leads*
- *Two voltage ranges available: 1.5-6VDC and 15-130VDC/90-120VAC*
- *2900 and 3200 Hz frequencies*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



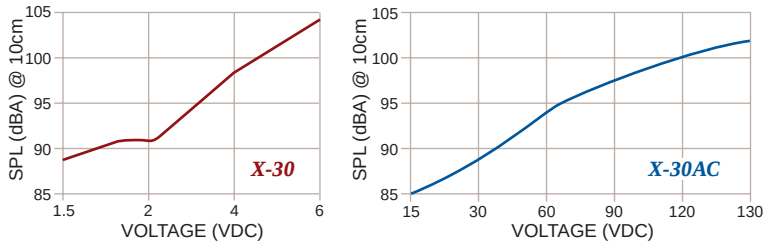
Electrical

All data at 25°C unless otherwise specified.

Parameter	X-30	X-30AC	Units
Operating Voltage	1.5-6	15-130 (90-120VAC)	VDC
Rated Voltage	6	90	VDC
Rated Current (typ.)	6	9	mA
Resonant Frequency	3200	2900	Hz
Sound Pressure Level @ 10cm (typical)	106	97	dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°		°C

Performance

Typical SPL vs. Volts



High Output Piezo Audio Indicators

Series X-70

Product in photo is shown smaller than actual size.

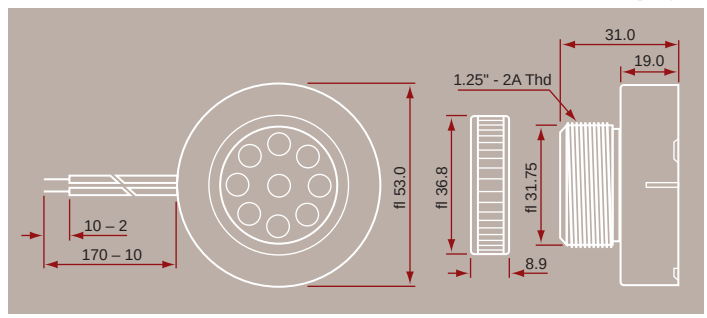
Case: *ABS, black*
Weight: *1.48 oz. (42 grams)*
Wire: *UL 1007, AWG No. 26, tinned*
Wire Color Code: *Red (+), Black (-)*

Features

- *Continuous tone*
- *Panel mounting with wire leads (fits 1.25" dia. opening)*
- *3-12 VDC*
- *2800 Hz frequency*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



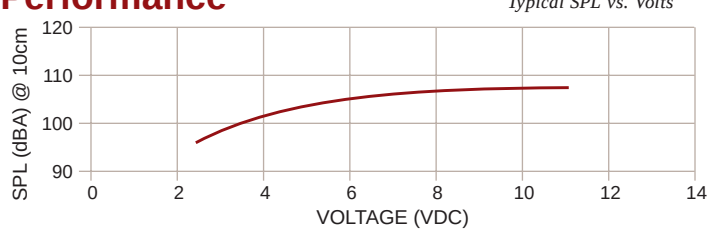
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	X-70	Units
Supply Voltage		3-12	VDC
Rated Current (typ.)	Vcc = 6V	7	mA
Fundamental Frequency (typ.)		2800	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 6V	103	dBA
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Volts



Miniature Piezo Audio Indicator Siren

Series XL-1200

Features

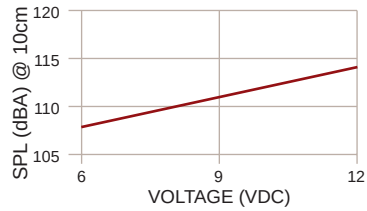
- *Siren tone*
- *Adjustable mounting bracket*
- *6-12VDC*
- *1500-3500 Hz frequency*
- *120 dBA at 10cm*

Product in photo is shown smaller than actual size.

Case: *ABS, black*
Weight: *2.82 oz. (80 grams)*
Wire: *AWG No. 22*
Wire Color Code: *Red (+), Black (-)*
Bracket: *Cold-rolled steel, black*

Performance

Typical SPL vs. Volts



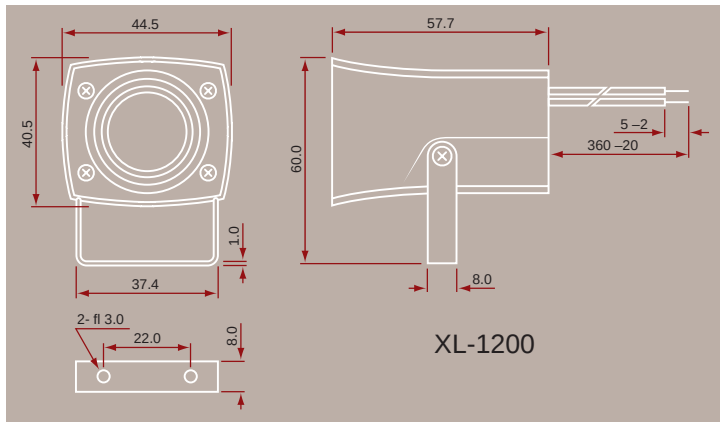
Electrical

All data at 25°C unless otherwise specified.

Parameter	Condition	XL-1200	Units
Supply Voltage		6-12V	VDC
Rated Current (max.)	Vcc = 12V	200	mA
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	120	dBA
Frequency Sweep		1500-3500	Hz
Frequency Sweep Rate	Vcc = 12V	4.5 ± 20%	Hz
Temperature Range: • Operating • Storage		-20° to +60° -30° to +70°	°C

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Extremely Loud Piezo Siren

Series XL-1600 and XL-1600L

Product in photo is shown smaller than actual size.

Case: *ABS, black, red, and white*
Weight: *4 oz.*
Wire: *AWG No. 22, stranded*

Mounting Bracket

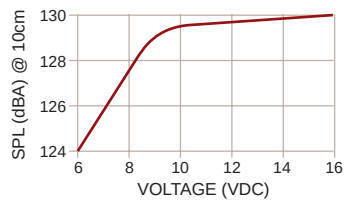
The two units are identical except that the XL-1600 has a flat mounting bracket, and the XL-1600L has a 90° angle mounting bracket.

Features

- *Siren tone*
- *6-16VDC*
- *1500-4000 Hz frequency*
- *130 dBA at 10cm*
- *Two types of metal mounting brackets*

Performance

Typical SPL vs. Volts



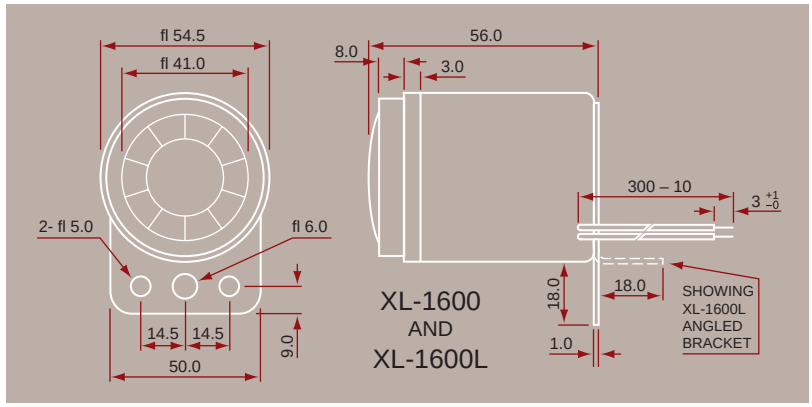
Electrical

All data at 25°C unless otherwise specified.

Parameter	XL-1600 & XL-1600L	Units
Rated Voltage	12	VDC
Operating Voltage	6-16	VDC
Supply Current (max.)	250	mA
Resonant Frequency	1500-4000	Hz
Sound Pressure Level @ 10cm	130	dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Piezo Ceramic Audio Indicator

Series XL-450, XL-451 and XL-453

Features

- *Continuous, slow or fast pulsing tones*
- *Flange and panel mounting (fits .75" dia. opening)*
- *Two voltages available: 3-28 and 4-28VDC*
- *3500 Hz frequency*

Case: *ABS, black*
Weight: *0.353 oz. (10 grams)*
Wire: *AWG No. 26, stranded*
Wire Color Code: *Red (+), Black (-)*

Product in photo is shown approximate size.

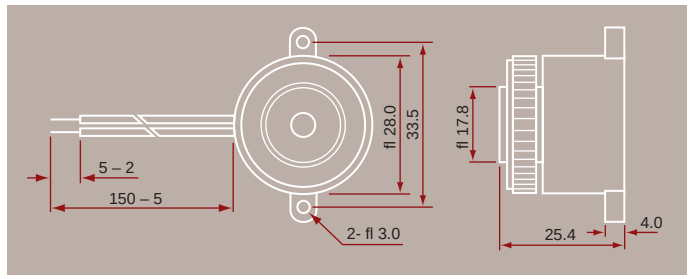
Electrical

All data at 25°C unless otherwise specified.

Parameter	Conditions	XL-450	XL-451	XL-453	Units
Supply Voltage		3-28	4-28	4-28	VDC
Rated Current (typ.)	Vcc = 12V	5	5	5	mA
Fundamental Frequency	Vcc = 12V	3500 ± 500	3500 ± 500	3500 ± 500	Hz
Sound Pressure Level @ 10cm (typ.)	Vcc = 12V	95	95	95	dBA
Pulse Rate (typ.)	Vcc = 12V		3.0	1.2	Hz
Temperature Range: • Operating • Storage		-20° to + 60° -30° to + 70°			°C

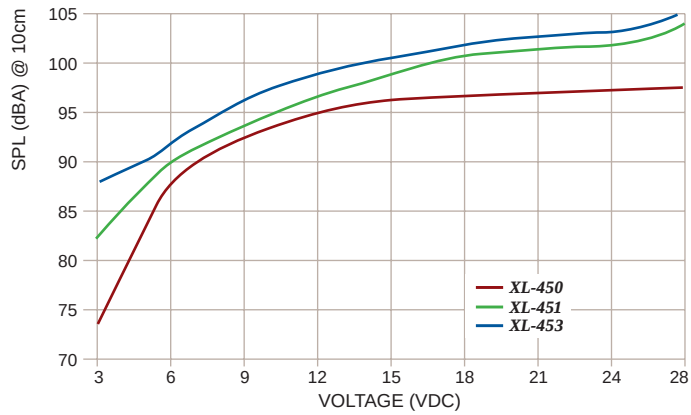
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Piezo Ceramic Audio Indicators

Series XL-960 and XL-980

Features

- *Very clear continuous and high-low tones*
- *2500 Hz Frequency*
- *Flange mounting with wire leads*
- *Vane volume control**

**Volume level can be changed up to 15 dBA between "open" and "closed" positions.*

Product in photo is shown smaller than actual size.

Case: *ABS, black*
Weight: ***XL-960:*** *1.23 oz. (35 grams),* ***XL-980:*** *1.69 oz. (48 grams)*
Wire: *AWG No. 24, stranded*
Wire Color Code: *Red (+), Black (-)*

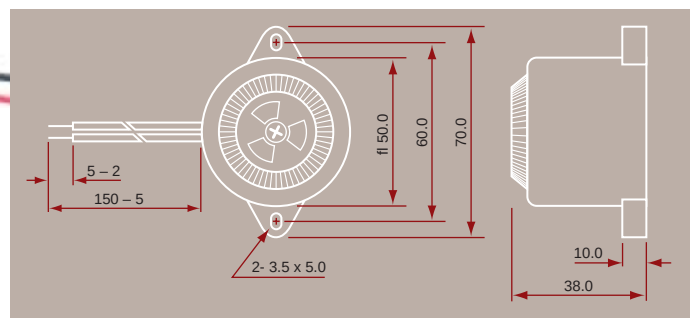
Electrical

All data at 25°C unless otherwise specified.

Parameter	XL-960	XL-980	Units
Supply Voltage	3-16	3-16	VDC
Rated Voltage	12	12	VDC
Current Consumption (max.)	58	120	mA
Resonant Frequency	2500 ± 500	1100-2800	Hz
Sound Pressure Level @ 10cm (typ.) (Volume control open)	110	110	dBA
Tone	Continuous	High/Low	
Temperature Range: • Operating • Storage	-20° to + 60° -30° to + 70°	-20° to + 60° -30° to + 70°	°C

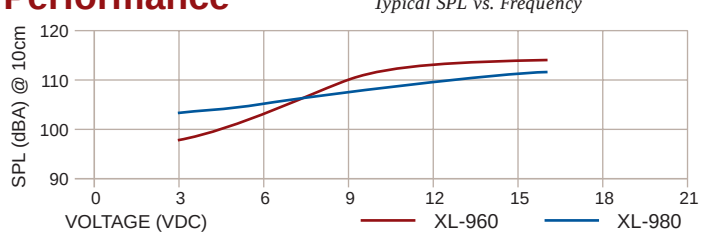
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Buzzers

Series SMI-158 and SMI-168

Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *6.5mm low profile case configuration*
- *Compatible with convection, IR and vapor phase*
- *Sealed for washing*
- *2400 Hz frequency*
- *Two voltages available: 5 and 12 VDC*
- *Available in tubes of 40 pieces or reels of 500 pieces*

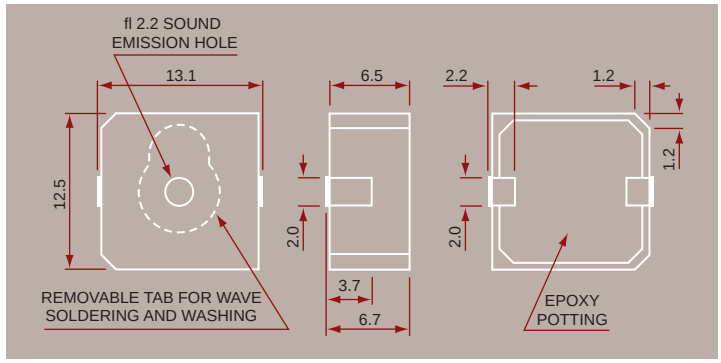
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMI-158	SMI-168	Units
Rated Voltage	5	12	VDC
Operating Voltage	4-7	8-15	VDC
Rated Current (typ.)	20	15	mA
Resonant Frequency	2400		Hz
Sound Pressure Level @ 10cm (typ.)	90		dBA
Temperature Range: • Operating • Storage	-20° to +70° -30° to +80°		°C

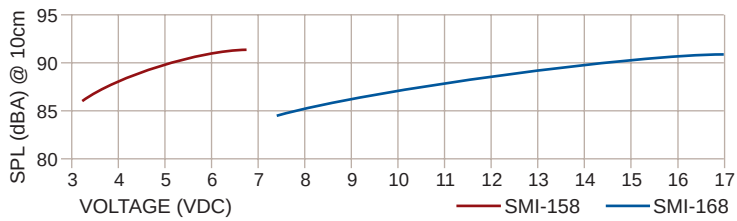
Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



Performance

Typical SPL vs. Volts



Miniature Electro-mechanical Transducers

Series AT-02 and AT-03

Products in photo are approx. size.

Case: *ABS, black*
Weight: *0.16 oz. (4.5 grams)*
P.C. Pins: *Tin-plated brass*
Unit has potted base and removable tab for wave soldering and washing.

Features

- *P.C. board mounting*
- *Wave solderable and washable*
- *2048 Hz resonant frequency*
- *6 and 12 voltage ratings available.*

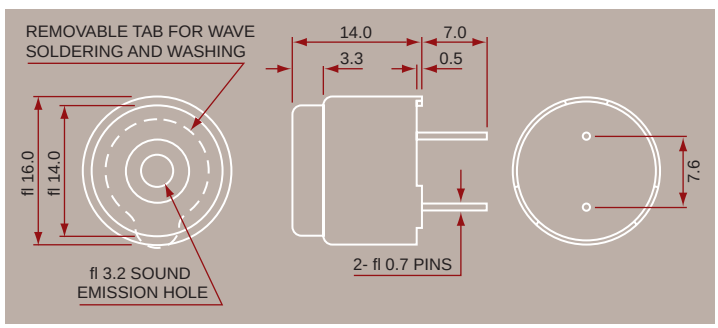
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-02	AT-03	Units
Rated Voltage	6	12	Vp-p
Operating Voltage	3-12	6-18	Vp-p
Rated Current (typ.)	40		mA
Frequency Range	1000-5000		Hz
Resonant Frequency	2048		Hz
Sound Pressure Level @ 10cm (typ.)	85		dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°		°C

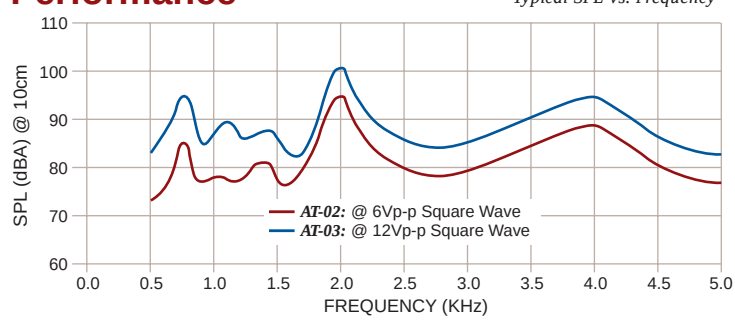
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Electro-mechanical Audio Transducers

Series AT-08 and AT-09

Products in photo are shown approximate size.

Features

- *P.C. board mounting*
- *Wave solderable and washable*
- *2400 Hz resonant frequency*
- *Two voltages available: 5V and 12V*

Electrical

All data at 25°C unless otherwise specified.

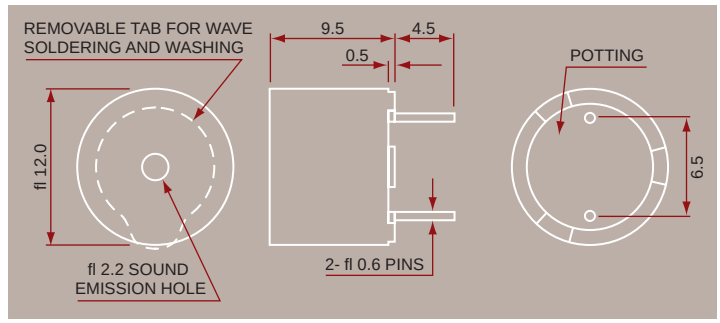
Parameter	AT-08	AT-09	Units
Rated Voltage	5	12	Vp-p
Operating Voltage	3-8	6-15	Vp-p
Rated Current* (typ.)	40	40	mA
Coil Resistance ±20%	47	140	Ohm
Resonant Frequency	2400		Hz
Sound Pressure Level @ 10cm (typ.)	85		dBA
Temperature Range: • Operating • Storage	-40° to +85° -40° to +85°		°C

*Value at rated voltage (2400 Hz, 1/2 duty, Square Wave)

Case: *Noryl SE1-GFN2J*
Weight: *0.07 oz. (2 grams)*
P.C. Pins: *Tin-plated copper*

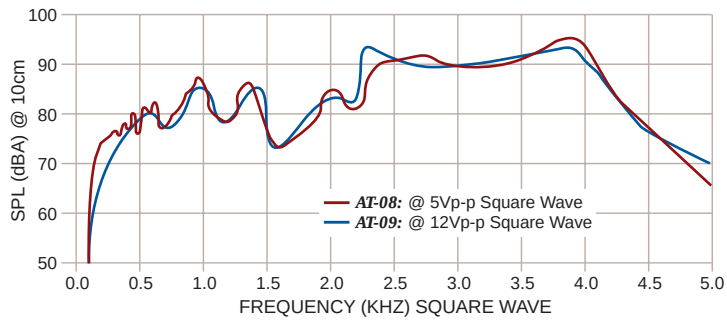
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Electro-mechanical Audio Transducers

Series AT-101Z

Products in photo are shown larger than actual size.

Features

- *P.C. board mountable*
- *2048 Hz resonant frequency*
- *Voltage range (1-2V)*
- *Low profile/compact configuration*

Electrical

All data at 25°C unless otherwise specified.

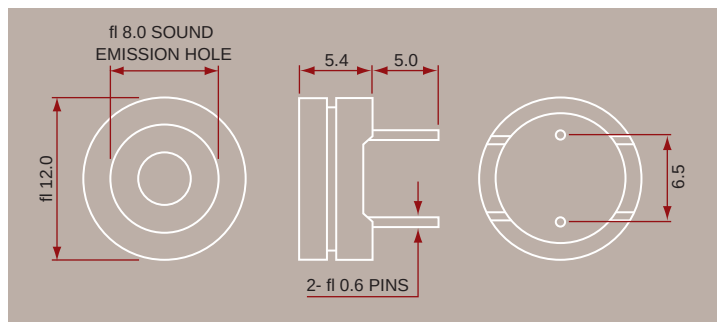
Parameter	AT-101Z	Units
Rated Voltage	1.5	Vp-p
Operating Voltage	1-2	Vp-p
Rated Current* (typ.)	10	mA
Coil Resistance ±30%	50	Ohm
Coil Impedance**	140	Ohm
Resonant Frequency	2048	Hz
Sound Pressure Level @ 10cm (typ.)	80	dBA
Temperature Range: • Operating • Storage	-40° to +85° -40° to +85°	°C

*Value applying rated voltage (2,048 Hz, 1/2 duty, Square Wave)
**Value applying (2,048 Hz Sine Wave, measuring current 60 Micro A.)

Case: *Noryl SEI-J*
Weight: *0.07 oz. (2 grams)*
P.C. Pins: *Tin-plated copper*

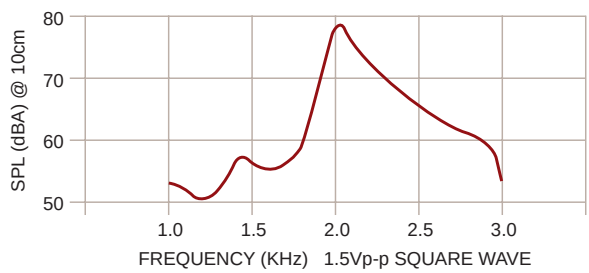
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Series AT-10SI and AT-10Z

Products in photo are shown approximate size.

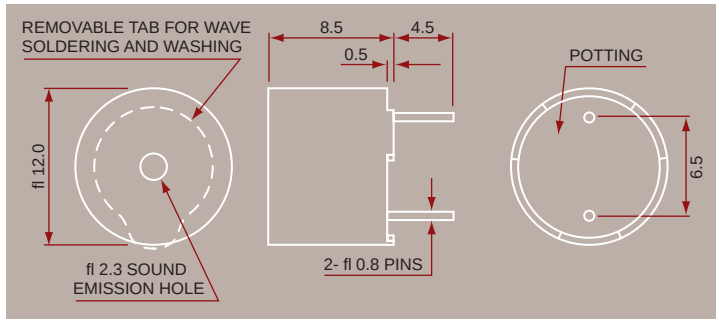
Case: *Noryl SEI-J*
Weight: *0.07 oz. (2 grams)*
P.C. Pins: *Tin-plated copper*

Features

- *P.C. board mounting*
- *Wave solderable and washable (AT-10SI only)*
- *Removable tab and epoxy sealed base (AT-10SI only)*
- *Two frequencies available (2048 Hz and 2600 Hz)*
- *Voltage range: 1-2V*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Electrical

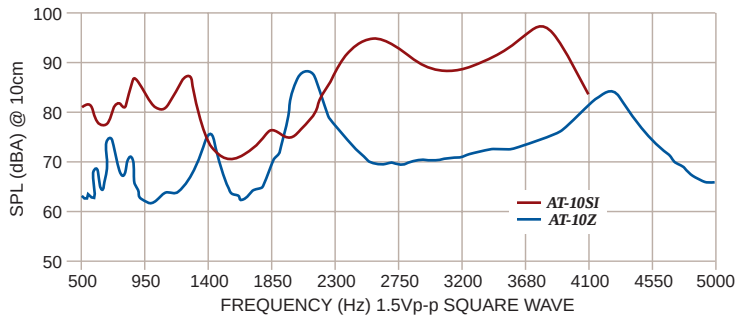
All data at 25°C unless otherwise specified.

Parameter	AT-10SI	AT-10Z	Units
Rated Voltage	1.5	1.5	Vp-p
Operating Voltage	1-2	1-2	Vp-p
Rated Current (typ.)	40	10*	mA
Coil Resistance ±30%	15	42	Ohm
Coil Impedance**		140	Ohm
Resonant Frequency	2600	2048	Hz
Sound Pressure Level @ 10cm (typ.)	85		dBA
Temperature Range: • Operating • Storage	-40° to +85° -40° to +85°		°C

*Value rated voltage (2,048 Hz, 1/2 duty, Square Wave)
**Value applying (2,048 Hz Sine Wave, measuring current 60 Micro A.)

Performance

Typical SPL vs. Frequency



Electro-mechanical Audio Transducers

Series AT-201, AT-202 and AT-203

Products in photo are shown smaller than actual size.

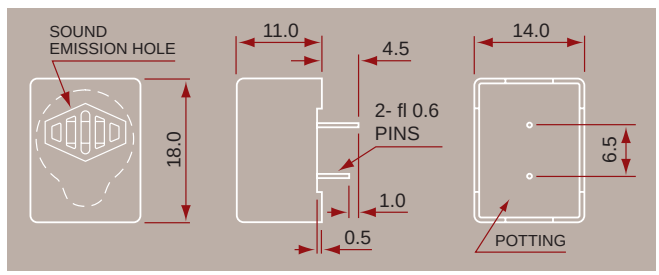
Case: *SEI-GFN2J*
Weight: *0.14 oz. (4 grams)*
P.C. Pins: *Tin-plated copper*

Features

- *P.C. board mounting*
- *Removable tab and epoxy sealed base*
- *Three voltages available: 1.5V, 6V and 12V*
- *2100 Hz resonant frequency*
- *Wave solderable and washable*
- *Magazine packaged*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Electrical

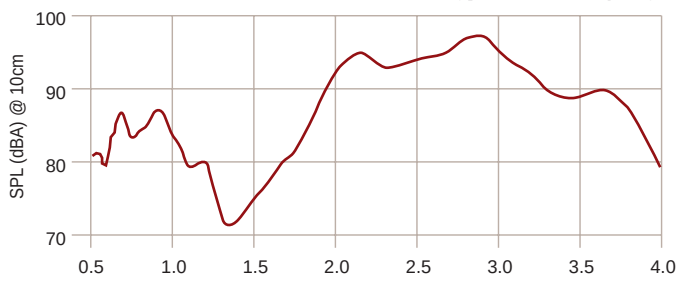
All data at 25°C unless otherwise specified.

Parameter	AT-201	AT-202	AT-203	Units
Rated Voltage	1.5	6	12	Vp-p
Operating Voltage	1-2	3-10	6-15	Vp-p
Sound Pressure Level* @ 10cm (typ.)	80	85	85	dBA
Rated Current* (typ.)	40			mA
Resonant Frequency	2000-2500			Hz
Temperature Range: • Operating • Storage	-40° to +85° -40° to +85°			°C

*Value rated voltage (2,100 Hz, 1/2 duty, Square Wave).

Performance

Typical SPL vs. Frequency



Miniature Electro-mechanical Audio Transducers

Series MAT-001

Product in photo is shown larger than actual size.

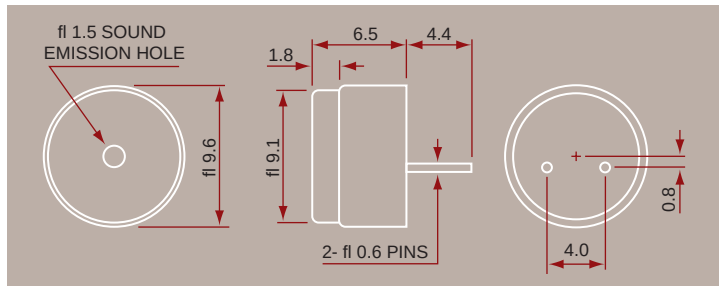
Case: *SEI-GFN2J*
Weight: *0.04 oz. (1 gram)*
P.C. Pins: *Tin-plated copper*

Features

- *P.C. board mounting*
- *Wave solderable*
- *Voltage range: 1-2V*
- *3100 Hz resonant frequency*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



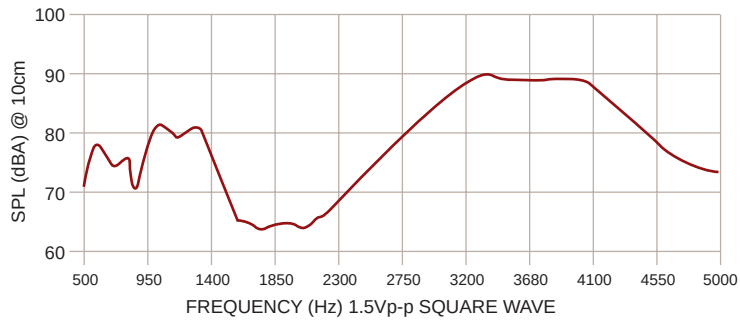
Electrical

All data at 25°C unless otherwise specified.

Parameter	MAT-001	Units
Rated Voltage	1.5	Vp-p
Operating Voltage	1-2	Vp-p
Rated Current (typ.)	60	mA
Coil Resistance	5.5 ± 1	Ohm
Resonant Frequency	3100	Hz
Sound Pressure Level @ 10cm (typ.)	85	dBA
Temperature Range: • Operating • Storage	-40° to +85° -40° to +85°	°C

Performance

Typical SPL vs. Frequency



Piezo Ceramic Audio Transducers

Series AT-12

Product in photo is shown larger than actual size.

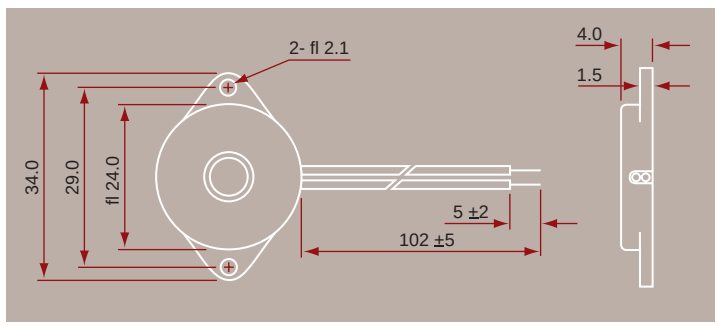
Case: *ABS, black*
Weight: *0.11 oz. (3 grams)*
Wire: *AWG No.28, stranded*

Features

- *Flange mounting with wire leads*
- *5500 Hz resonant frequency*
- *Voltage range (1-30V)*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



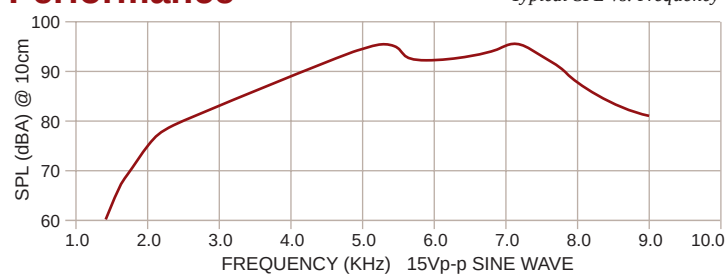
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-12	Units
Voltage Range	1-30	Vp-p
Frequency Range	2000-6000	Hz
Sound Pressure Level @ 10cm (typ.)	95	dBA
Resonant Frequency	5500	Hz
Resonant Impedance	600 (min.)/1000 (typ.)	Ohm
Capacitance	12,000 (±30%)	pF
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Piezo Ceramic Audio Transducers

Series AT-132

Product in photo is shown smaller than actual size.

Case: *ABS, black*
Weight: *0.123 oz. (3.5 grams)*
P.C. Pins: *Tin plated brass*

Features

- *P.C. board mounting*
- *Wave solderable and washable*
- *4600 Hz frequency*

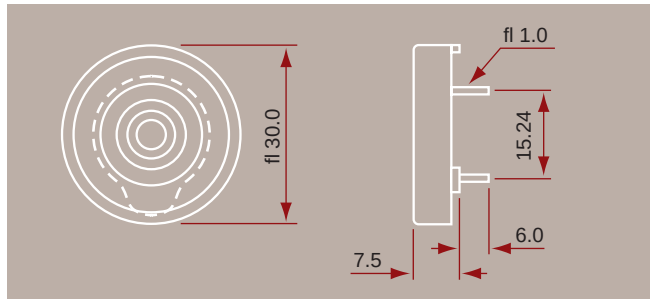
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-132	Units
Input Voltage (max.)	30	Vp-p
Frequency Range	2000-6000	Hz
Resonant Frequency	4600 ±500	Hz
Sound Pressure Level @ 10cm (typ.)	94 @ 4.6KHz ±0.5 (5V pulse wave)	dBA
Current Consumption (typ.)	1.8	mA
Capacitance	18,000 ±30%	pF
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

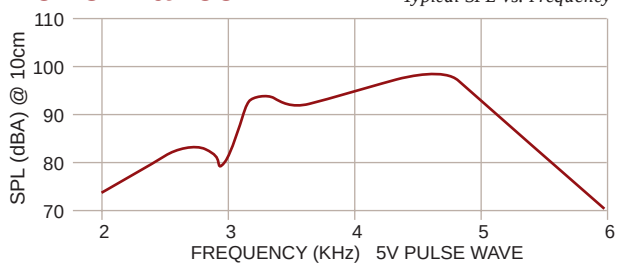
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency

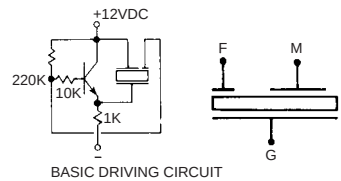


Piezo Ceramic Audio Transducers

Series AT-138

Product in photo is shown smaller than actual size.

Case: *ABS, black*
Weight: *0.35 oz. (10 grams)*
P.C. Pins: *Tin plated brass*



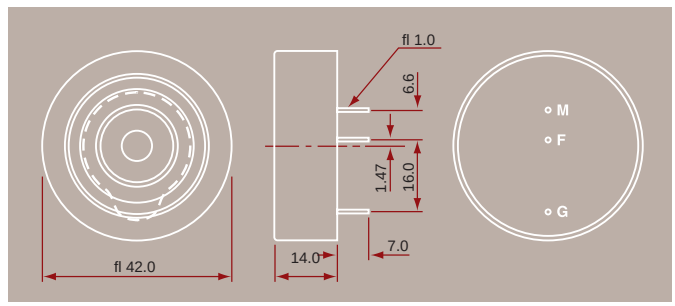
BASIC DRIVING CIRCUIT

Features

- *P.C. board mounting*
- *Wave solderable and washable*
- *2800 Hz frequency*
- *Voltage range: 3-28V*
- *Replaces Molex ATM-7373 holder and bender assembly*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



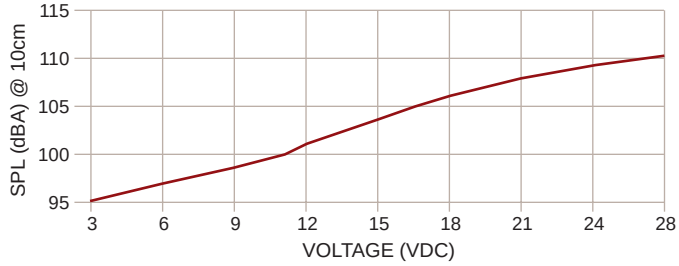
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-138	Units
Rated Voltage	12	Vp-p
Operating Voltage	3-28	Vp-p
Resonant Frequency	2800 ±500	Hz
Rated Current (max.)	8	mA
Sound Pressure Level @ 10cm (typ.)	100	dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Volts



Piezo Ceramic Audio Transducers

Series AT-15

Product in photo is shown approximate size.

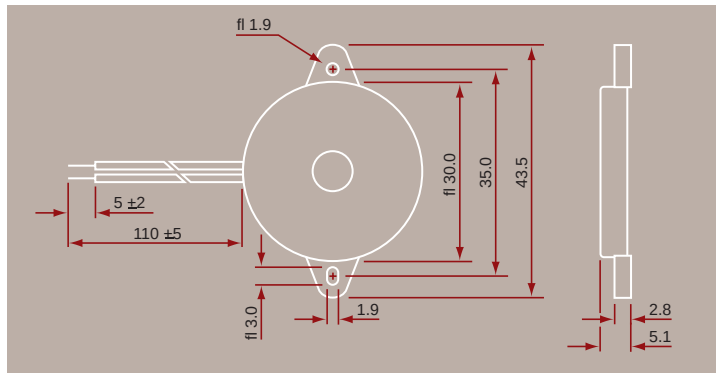
Case: *ABS, black*
Weight: *0.166 oz. (4.7 grams)*
Wire: *AWG No.28, stranded*

Features

- *Flange mounting with wire leads*
- *3900 Hz resonant frequency*
- *Voltage range (1-30V)*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



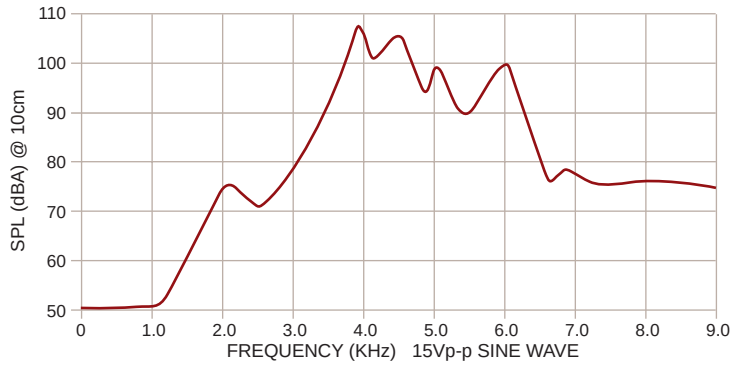
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-15	Units
Voltage Range	1-30	Vp-p
Frequency Range	1800-6000	Hz
Sound Pressure Level @ 10cm (typ.)	105	dBA
Resonant Frequency	3900	Hz
Capacitance	16,500 (±30%)	pF
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Piezo Ceramic Audio Transducers

Series AT-150 and AT-152

Product in photo is shown larger than actual size.

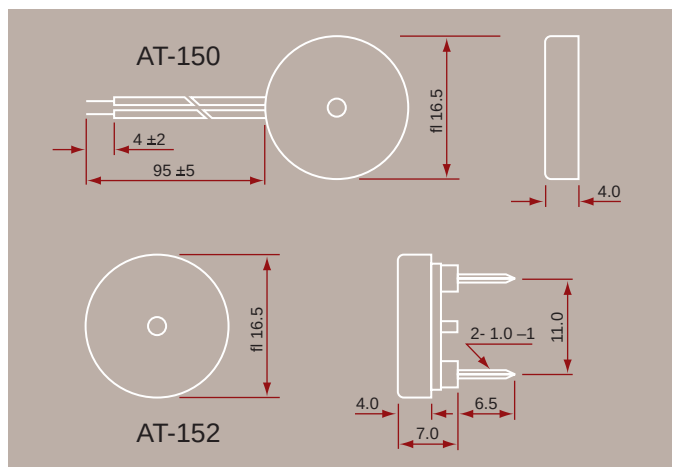
Case: *ABS, black*
Weight: *0.04 oz. (1 gram)*
P.C. Pins: *Tin plated brass*
Wire: *AWG No. 30*
Wire Color Code: *Red (+), Black (-)*

Features

- *P.C. board or surface mounting with wire leads*
- *Wave solderable*
- *4000 Hz resonant frequency*
- *Voltage range: 1-15V*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



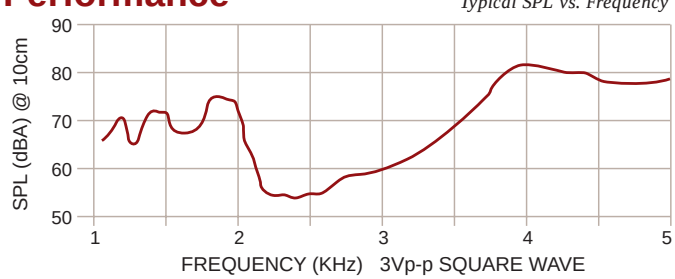
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-150 and AT-152	Units
Input Voltage (max.)	15	Vp-p
Rated Current (max.)	11	mA
Frequency Range	3000-5000	Hz
Sound Pressure Level @ 10cm (typ.)	80 @ 4KHz (3 Vp-p square wave)	dBA
Capacitance	21,000	
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Sub-miniature Piezo Ceramic Audio Transducer

Series AT-17

Products in photo are shown larger than actual size.

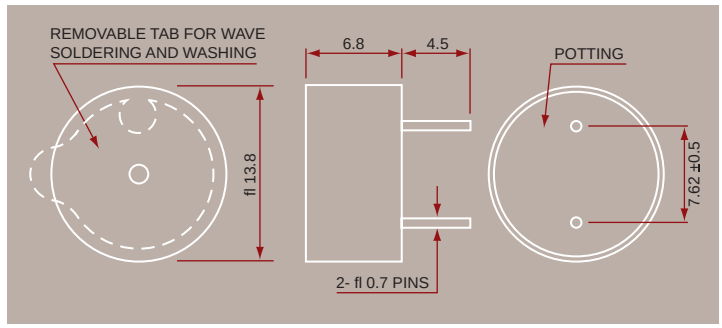
Features

- *3800 Hz resonant frequency*
- *Voltage range: 1-20V*
- *P.C. board mounting*
- *Wave solderable and washable*

Case: *Noryl SEI, gray*
Weight: *0.0353 oz. (1 gram)*
P.C. Pins: *Copper covered iron with tin plating*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



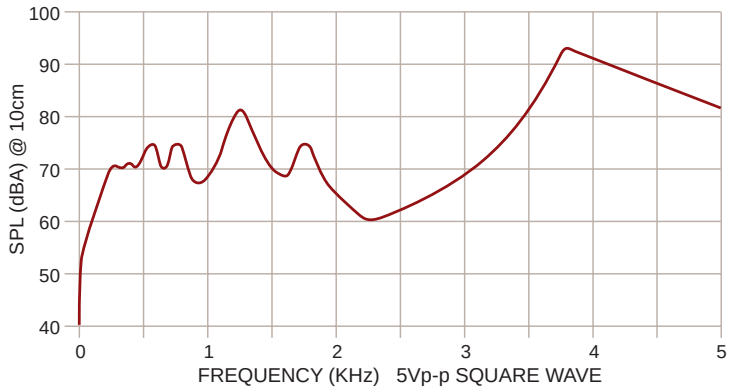
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-17	Units
Operating Voltage	1-20	Vp-p
Rated Current (max.)	1	mA
Capacitance	13,000 ±30%	pF
Sound Pressure Level @ 10cm (typ.)	85	dBA
Resonant Frequency	3800	Hz
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Piezo Ceramic Audio Transducer

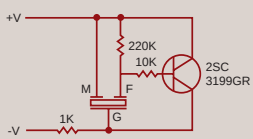
Series AT-173

Product in photo is shown smaller than actual size.

Features

- *Flange mounting*
- *3500 Hz frequency*
- *Low power consumption*
- *Feedback connection*

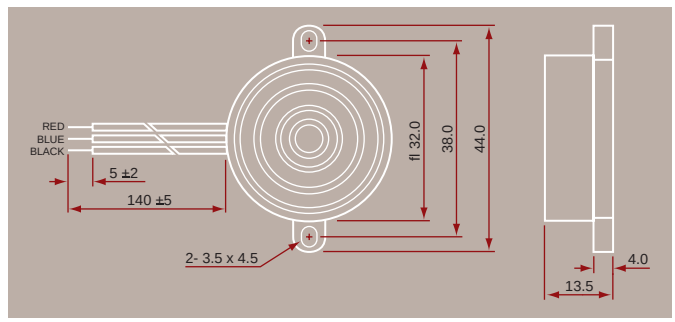
The current consumption and the sound pressure level are measured by using the recommended driving circuit shown.



Case: *ABS, black*
Weight: *0.261 oz. (7.4 grams)*
Wire: *AWG No. 28*
Wire Color Code: *Red (+), Black (-), Blue (feedback connection)*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



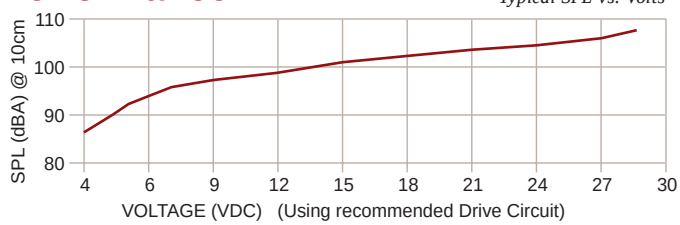
Electrical

All data at 25°C unless otherwise specified.

Parameter	AI-173	Units
Rated Voltage	12	VDC
Operating Voltage	3-28	VDC
Resonant Frequency	3500 ±500	Hz
Rated Current (typ.)	8	mA
Sound Pressure Level @ 10cm (typ.)	100	dBA
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Volts



Miniature Piezo Ceramic Audio Transducers

Series AT-20

Products in photo are approx. actual size.

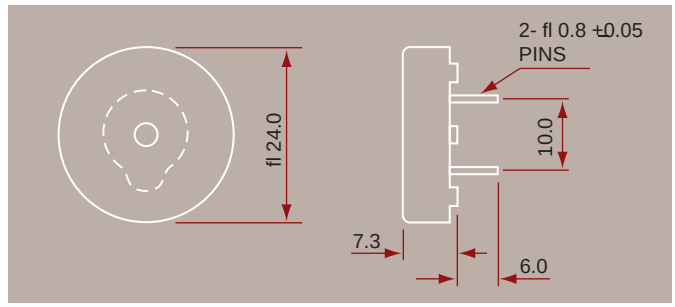
Features

- *P.C. board mounting*
- *Wave solderable and washable*
- *4000 Hz frequency*
- *Voltages range: 1-30V*

Case: *ABS, black*
Weight: *0.11 oz. (3.2 grams)*
P.C. Pins: *Tin-plated brass*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



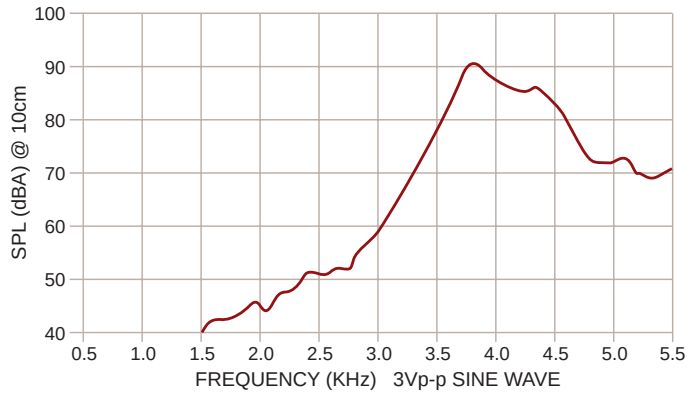
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-20	Units
Resonant Frequency	4.0 ±0.5	KHz
Sound Pressure Level @ 10cm (typical)	85 @ 4 KHz (3 Vp-p sine wave)	dBA
Rated Current (typ.)	1.0 max.	mA
Capacitance	21,000 ± 30%	pF
Maximum Input	30	Vp-p
Temperature Range: • Operating • Storage	 -20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Piezo Ceramic Audio Transducers

Series AT-23

Products in photo are shown smaller than actual size.

Features

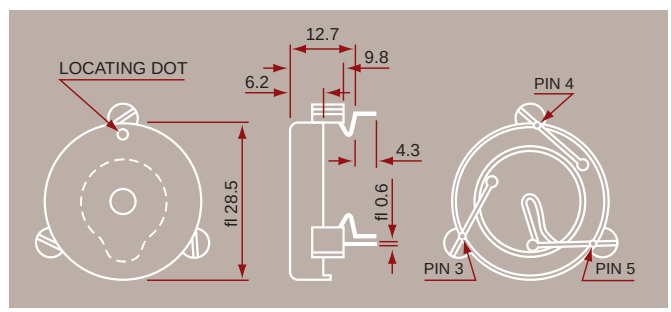
- *P.C. board mounting*
- *Wave solderable and washable*
- *3100 Hz frequency*
- *Voltages range: 1-30V*

The AT-23 has a feedback connection for use in oscillator circuits. (See Pin 5 in mechanical drawing.) If feedback is not utilized, Pin 5 can be jumpered to the ceramic element designated as Pin 3.

Case: *ABS, black*
Weight: *0.113 oz. (3.2 grams)*
P.C. Pins: *Tin-plated copper*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



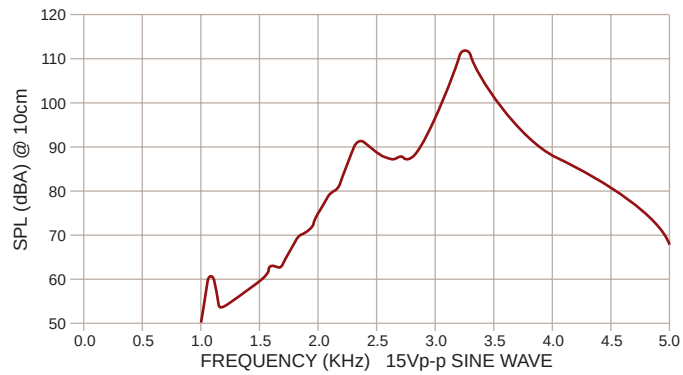
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-23	Units
Frequency Range	1800-4500	Hz
Maximum Voltage	30	Vp-p
Temperature Range: • Operating • Storage	 -20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Miniature Piezo Ceramic Audio Transducers

Series AT-24

Products in photo are shown approximate size.

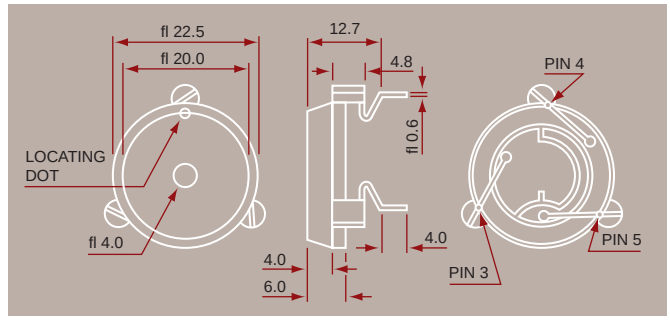
Features

- *P.C. board mounting*
- *Wave solderable and washable*
- *3600 Hz resonant frequency*
- *Voltages range: 1-50V*
- *Feedback connection*

Case: *ABS, black*
Weight: *0.06 oz. (1.7 grams)*
P.C. Pins: *Tin-plated PBW*

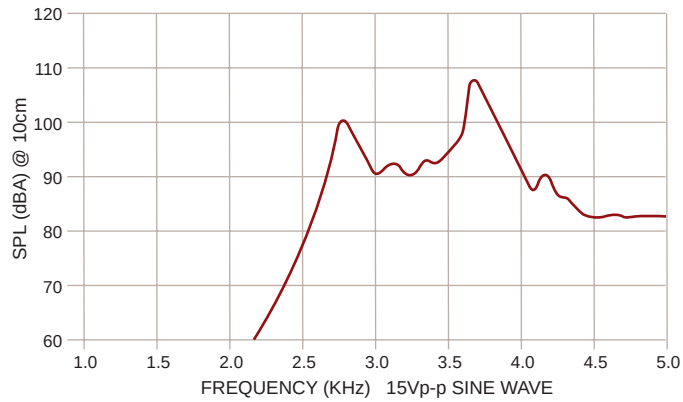
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-24	Units
Rated Voltage	15	Vp-p
Operating Voltage	1-50	Vp-p
Resonant Frequency	3600	Hz
Sound Pressure Level @ 10cm (typ.)	105	dBA
Temperature Range: • Operating • Storage	 -20° to +60° -30° to +70°	°C

Piezo Ceramic Audio Transducer

Series AT-33

Products in photo are shown smaller than actual size.

Features

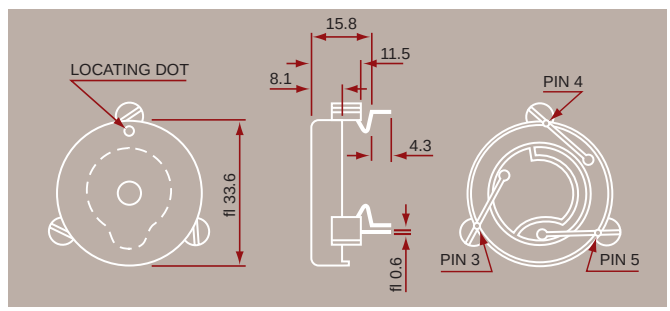
- *P.C. board mounting*
- *Wave solderable and washable*
- *2700 Hz frequency*
- *Voltages range: 1-30V*

The AT-33 has a feedback connection for use in oscillator circuits. (See Pin 5 in mechanical drawing.) If feedback is not utilized, Pin 5 can be jumpered to the ceramic element designated as Pin 3.

Case: *ABS, black*
Weight: *0.247 oz. (7.0 grams)*
P.C. Pins: *Tin-plated copper*

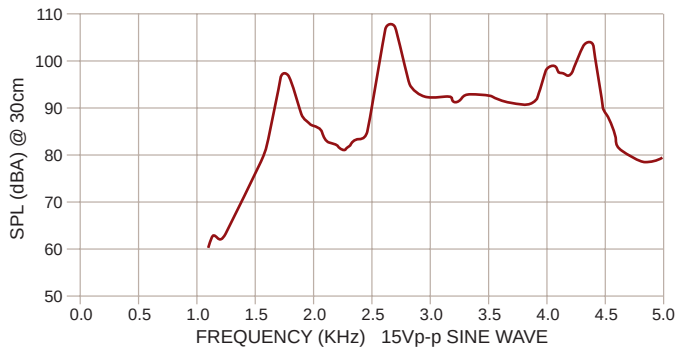
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-33	Units
Frequency Range	1000-5000	Hz
Maximum Voltage	30	Vp-p
Temperature Range: • Operating • Storage	 -20° to +60° -30° to +70°	°C

Piezo Ceramic Audio Transducers

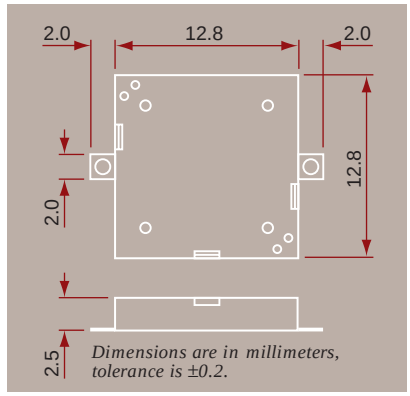
Series SMT-1325

Product in photo is shown larger than actual size.

Features

- *Surface mounting*
- *Compatible with convection, IR and vapor phase*
- *4100 Hz resonant frequency*
- *2.5mm low profile miniature case configuration*

Mechanical



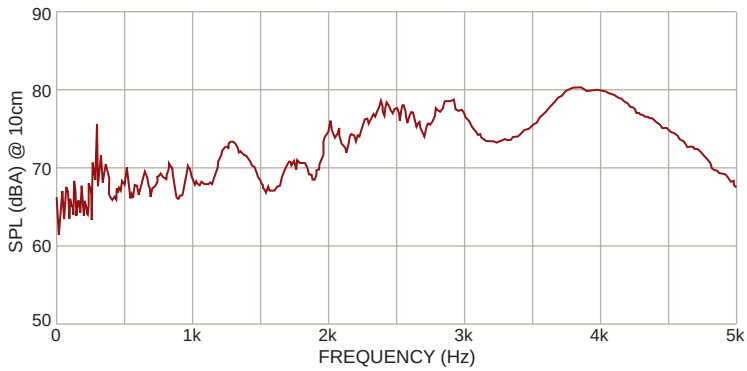
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-1325	Units
Operating Voltage (max.)	25	Vp-p
Rated Voltage	5	Vp-p
Rated Current (max.)	3	mA
Resonant Frequency	4100	Hz
Sound Pressure Level @ 10cm (typ.)	80	dBA
Capacitance @ 1KHz	16 ± 30%	nF
Temperature Range: • Operating • Storage	-20° to +70° -30° to +80°	°C

Performance

Typical SPL vs. Frequency



Piezo Ceramic Audio Transducers

Series SMT-1625

Products in photo are shown larger than actual size.

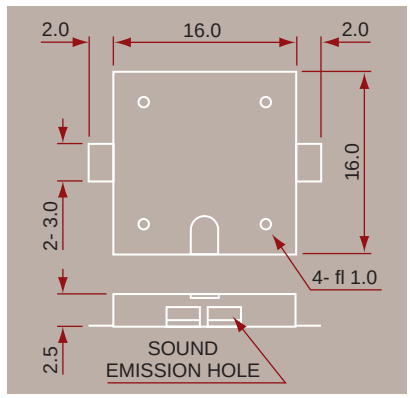
Features

- *Surface mounting*
- *Compatible with convection, IR and vapor phase*
- *4000 Hz resonant frequency*
- *2.5mm low profile miniature case configuration*

Case: *LCP, black*
Weight: *1 gram*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5.



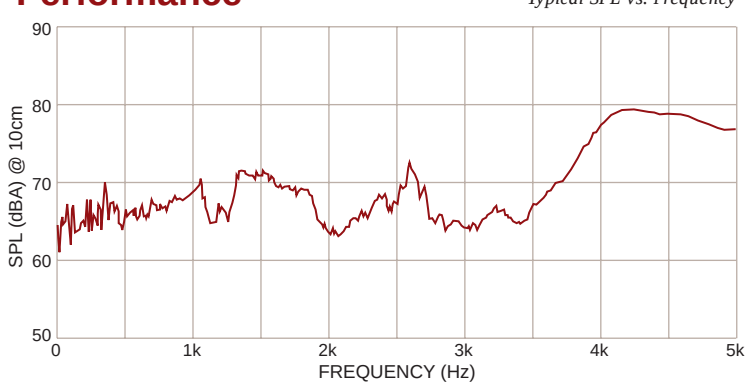
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-1325	Units
Operating Voltage (max.)	25	Vp-p
Rated Voltage	5	Vp-p
Rated Current (max.)	3	mA
Resonant Frequency	4000	Hz
Sound Pressure Level @ 10cm (typ.)	70	dBA
Capacitance @ 1KHz	14 ± 30%	nF
Temperature Range: • Operating • Storage	-20° to +70° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Transducers

Series SMT-11, SMT-12 and SMT-13

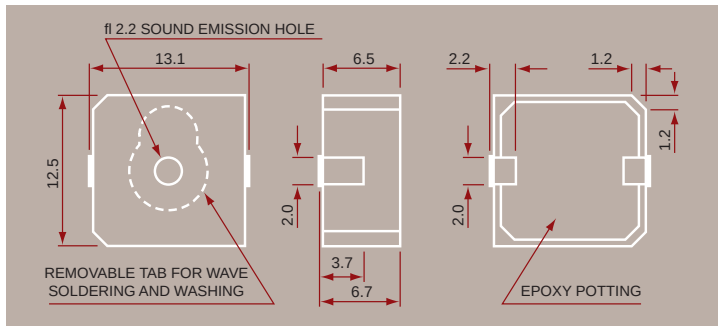
Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *6.5mm low profile case configuration*
- *Compatible with convection, IR and vapor phase*
- *Sealed for washing*
- *2400 Hz frequency*
- *Three voltages available: 1.5, 5 and 12 Vp-p*
- *Available in tubes of 40 pieces or reels of 500 pieces*

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



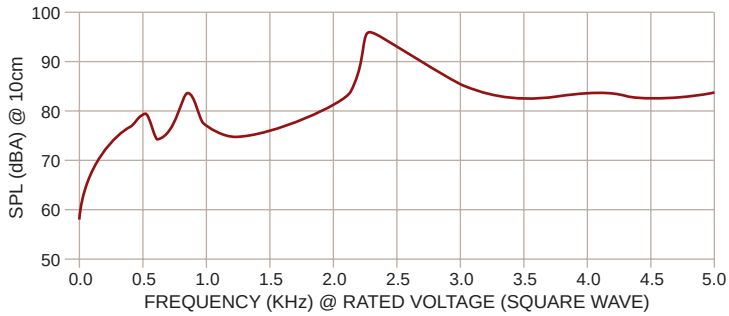
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-11	SMT-12	SMT-13	Units
Rated Voltage	1.5	5	12	Vp-p
Operating Voltage	1-3	4-7	8-16	Vp-p
Rated Current	30	40	40	mA
Coil Resistance ±30%	15	47	140	Ohm
Coil Impedance	40	80	240	Ohm
Resonant Frequency	2400	2400	2400	Hz
Sound Pressure Level @ 10cm (typ.)	85	90	90	dBA
Temperature Range: • Operating • Storage	-20° to +70° -30° to +80°			°C

Performance

Typical SPL vs. Frequency



Piezo Ceramic SMD Transducers

Series SMT-2114A, and SMT-2118

Features

Products in photo are shown approx. actual size.

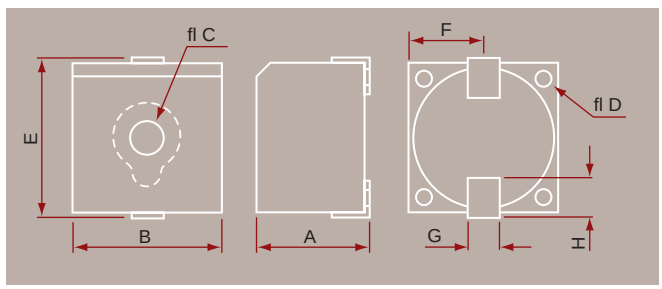
- *SMD mounting*
- *Compatible with convection, IR and vapor phase*
- *Sealed for washing*
- *3300 Hz and 3700 Hz frequencies*
- *Two voltages available: 3-20 and 3-30 Vp-p*
- *Available in tubes of 35 pieces (SMT-2114A) and 25 pieces (SMT-2118)*

Dimensional

Dimensions are in millimeters, tolerance is ±0.3.

UNIT	A	B	C	D	E	F	G	H
SMT-2114A	10.7	14.2	3.0	1.5	14.8	7.1	3.0	4.2
SMT-2118	11.9	17.9	2.7	1.5	18.4	9.0	3.0	4.2

Mechanical



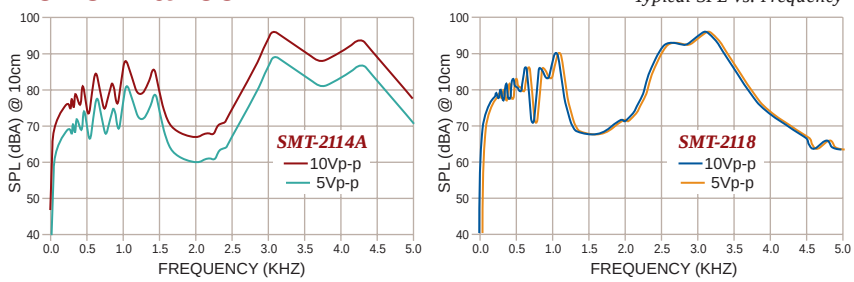
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-2114A	SMT-2118	Units
Rated Voltage	5	5	Vp-p
Operating Voltage	3-20	3-30	Vp-p
Rated Current (max.)	8	7	mA
Resonant Frequency	3300	3700	Hz
Sound Pressure Level @ 10cm (typ.)	90		dBA
Temperature Range: • Operating • Storage	-20° to +70° -30° to +80°		°C

Performance

Typical SPL vs. Frequency



Series SMT-5253D

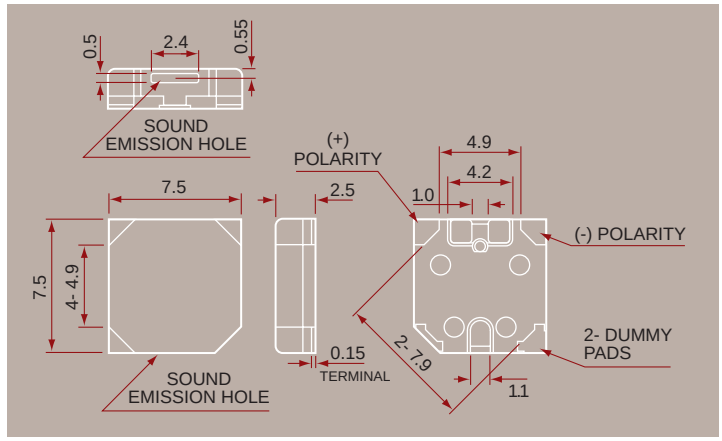
Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *2.5mm low profile ultra miniature case configuration*
- *Compatible with convection, IR and vapor phase*
- *2700 Hz frequency*
- *Voltages range: 2.5 to 4.5 Vp-p*
- *Available in reels of 1K pieces*

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



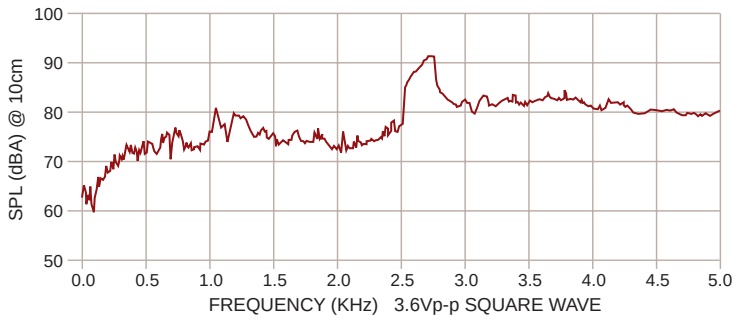
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-5253D	Units
Rated Voltage	3.6	Vp-p
Operating Voltage	2.5 to 4.5	Vp-p
Rated Current (max.)	100	mA
Coil Resistance	15 ± 3	Ohm
Resonant Frequency	2700	Hz
Sound Pressure Level @ 10cm (min.)	85	dBA
Temperature Range: • Operating • Storage	-40° to +85° -40° to +85°	°C

Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Transducers

Series SMT-6303D

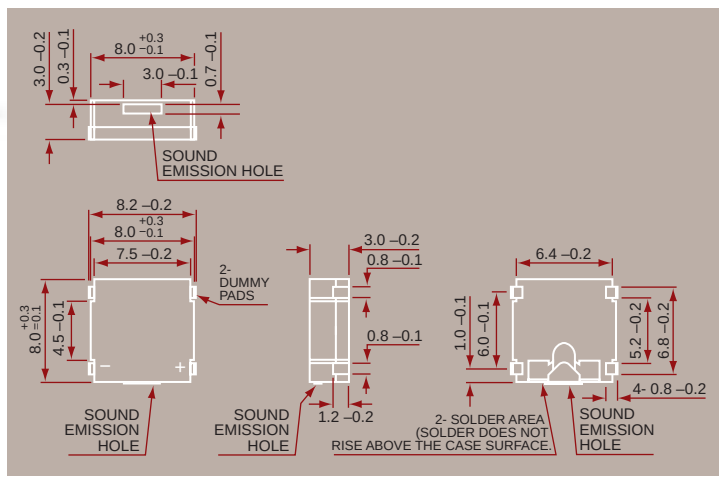
Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *3.0mm low profile ultra miniature case configuration*
- *Compatible with convection, IR and vapor phase*
- *2630 Hz frequency*
- *Voltage range: 2.5 to 4.5 Vp-p*
- *Available in reels of 1K pieces*

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



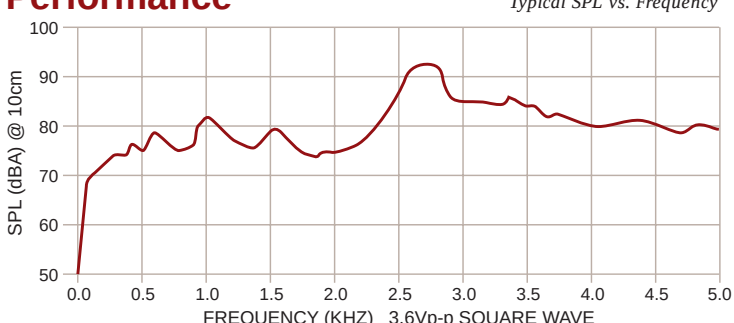
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-6303D	Units
Rated Voltage	3.6	Vp-p
Operating Voltage	2.5 to 4.5	Vp-p
Rated Current (max.)	90	mA
Coil Resistance	16 ±3	Ohm
Resonant Frequency	2630	Hz
Sound Pressure Level @ 10cm (min.)	90	dBA
Temperature Range: • Operating • Storage	-20° to +70° -40° to +80°	°C

Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Transducers

Series SMT-731, SMT-733 and SMT-735

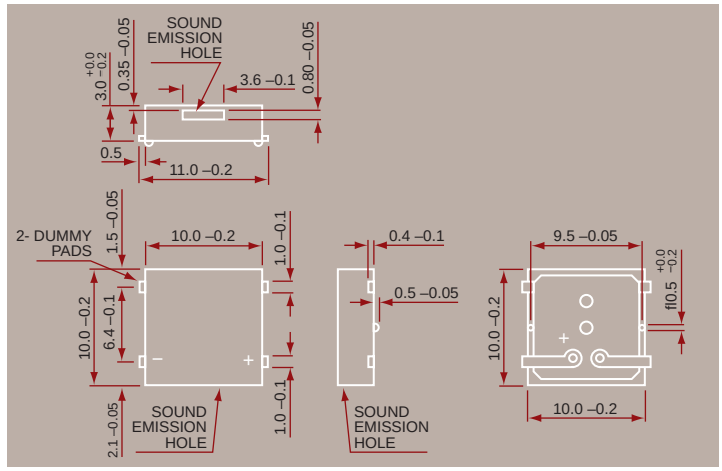
Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *3.0mm low profile configuration*
- *Compatible with convection, IR and vapor phase*
- *2700 Hz standard frequency (3200 Hz available)*
- *Three voltages available: 1.5, 3 and 5V*
- *Available in reels of 1K pieces*
- *High sound output*

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



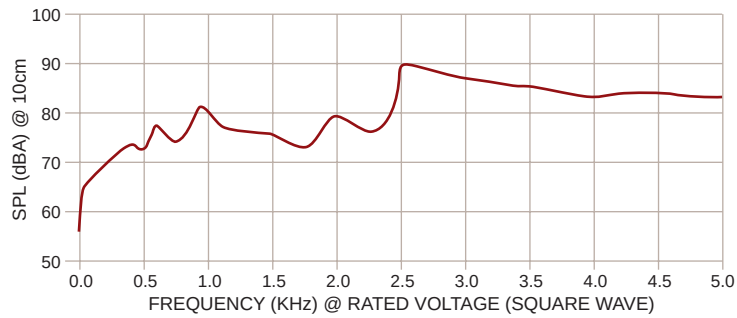
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-731	SMT-733	SMT-735	Units
Rated Voltage	1.5	3.0	5	Vp-p
Operating Voltage	1-2	2-4	4-6	Vp-p
Rated Current (max.)	80	60	60	mA
Neg. Coil Resistance	6 ±2	25 ±3	45 ±5	Ohm
Resonant Frequency	2700			Hz
Sound Pressure Level @ 10cm	90 (typ.) / 84 (min.)			dBA
Temperature Range: • Operating • Storage	-20° to +70° -40° to +85°			°C

Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Transducers

Series SMT-753

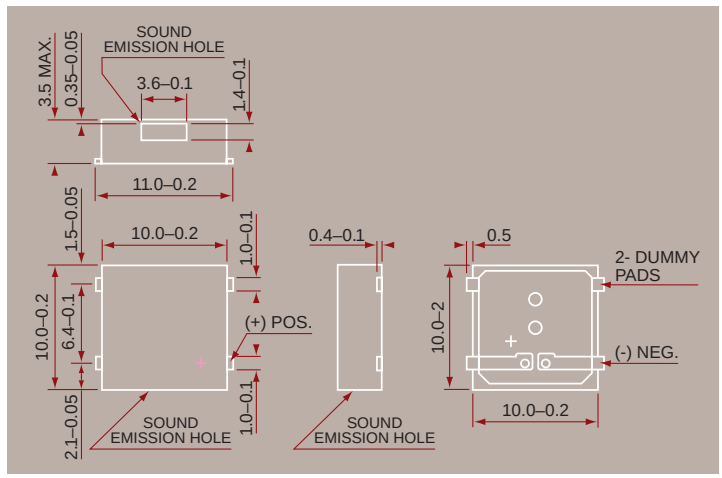
Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *3.5mm low profile miniature case configuration*
- *Compatible with convection, IR and vapor phase*
- *2830 Hz frequency*
- *Voltage range: 3.0 to 4.6 Vp-p*
- *Available in reels of 1K pieces*

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



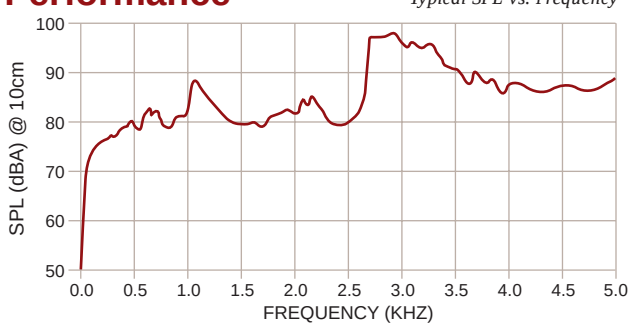
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-753	Units
Rated Voltage	3.6	Vp-p
Operating Voltage	3.0 to 4.6	Vp-p
Rated Current max.	100	mA
Coil Resistance	18 ±3	Ohms
Resonant Frequency	2830	Hz
Sound Pressure Level dBA @ 10cm	98 typ./93 min.	dBA
Temperature Range: • Operating • Storage	-20° to +70° -40° to +85°	°C

Performance

Typical SPL vs. Frequency



Series SMT-831, SMT-833 and SMT-835

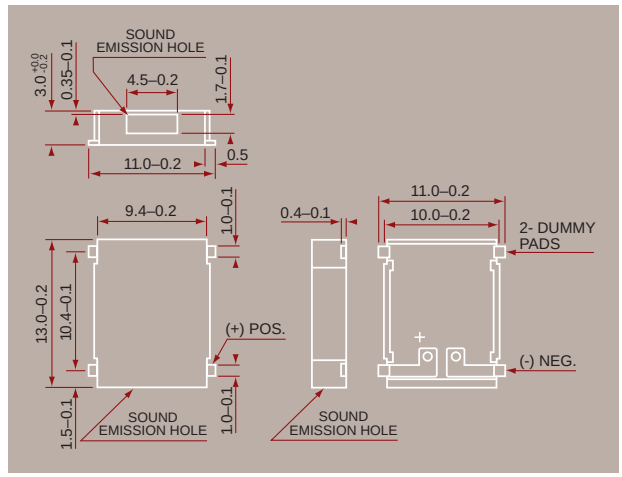
Features

- *SMD mounting*
- *3.0mm low profile configuration*
- *High sound output*
- *Three voltages: 1.5, 3 and 5V*
- *2700 Hz frequency (3200 Hz available)*
- *Compatible with convection, IR and vapor phase*
- *Available in reels of 1K pieces*

Products in photo are shown larger than actual size.

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



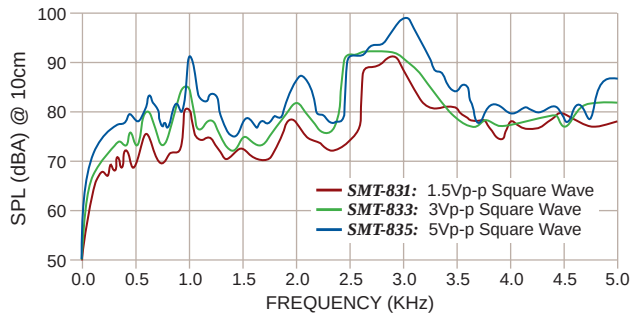
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-831	SMT-833	SMT-835	Units
Rated Voltage	1.5	3	5	Vp-p
Operating Voltage	1-2	2-4	4-6	Vp-p
Rated Current (max.)	80	60	60	mA
Coil Resistance	6 ± 2	25 ± 3	45 ± 5	Ohm
Resonant Frequency	2700			Hz
Sound Pressure Level @ 10cm	92 (typ.)/86 (min.)			dBA
Temperature Range: • Operating • Storage	-20° to +70° -40° to +85°			°C

Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Transducers

Series SMT-916 and SMT-917

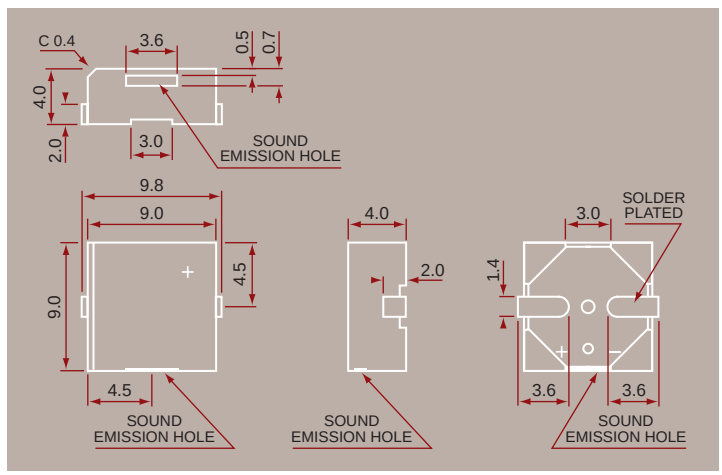
Features

- *SMD mounting*
- *2730 Hz frequency*
- *Side firing sound port*
- *4.0mm low profile configuration*
- *Two voltages available: 3 and 5Vp-p*
- *Compatible with convection, IR and vapor phase*
- *Available in tubes of 50 pcs. and reels of 1K pieces*

Products in photo are shown larger than actual size.

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



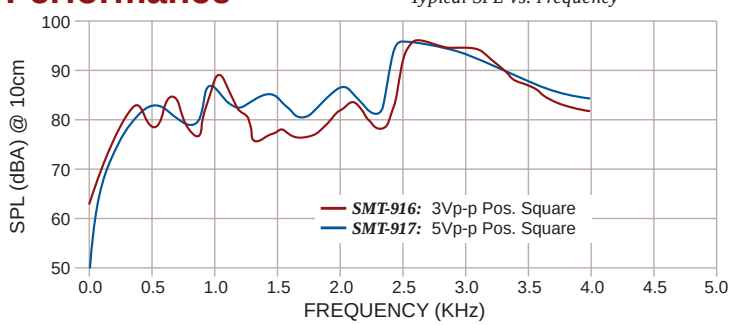
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-916	SMT-917	Units
Rated Voltage	3	5	Vp-p
Operating Voltage	1-4	3-8	Vp-p
Rated Current (max.)	70	70	mA
Coil Resistance	15	30	Ohm
Resonant Frequency	2730		Hz
Sound Pressure Level @ 10cm (typ.)	95		dBA
Temperature Range: • Operating • Storage	-30° to +60° -40° to +80°		°C

Performance

Typical SPL vs. Frequency



Series SMT-9303A, SMT-9303C, and SMT-9303D

Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *3.0mm low profile miniature case configuration*
- *Voltage range: 2.5 to 4.5 Vp-p*
- *Compatible with convection, IR and vapor phase*
- *2100 Hz, 2500 Hz and 2700 Hz frequencies*
- *Available in tubes of 50 pieces and reels of 1K pieces*

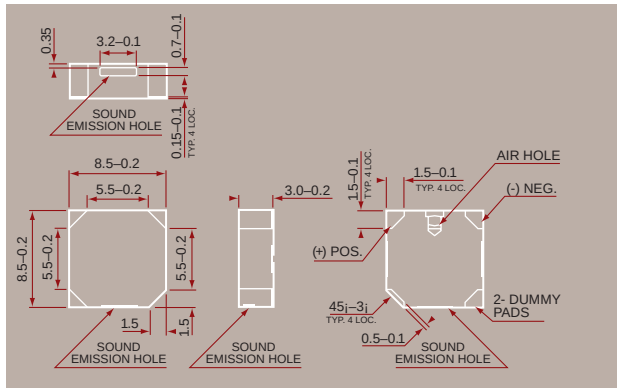
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-9303A	SMT-9303C	SMT-9303D	Units
Rated Voltage	3.6			Vp-p
Operating Voltage	2.5-4.5			Vp-p
Rated Current (max.)	90			mA
Coil Resistance	15 ± 3			Ohm
Resonant Frequency	2100	2500	2700	Hz
Sound Pressure Level @ 10cm (min.)	85			dBA
Temperature Range: • Operating • Storage	-30° to +70° -40° to +85°			°C

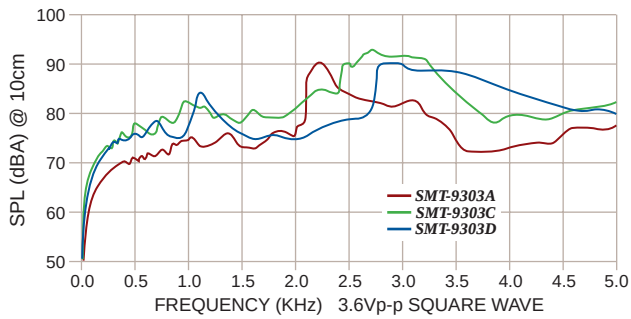
Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Transducers

Series SMT-9303CP and SMT-9303DP

Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *3.0mm low profile miniature case configuration*
- *Voltage range: 2.5 to 4.5 Vp-p*
- *2500 Hz and 2700 Hz frequencies*
- *Compatible with convection, IR and vapor phase*
- *Available in reels of 1K pieces*

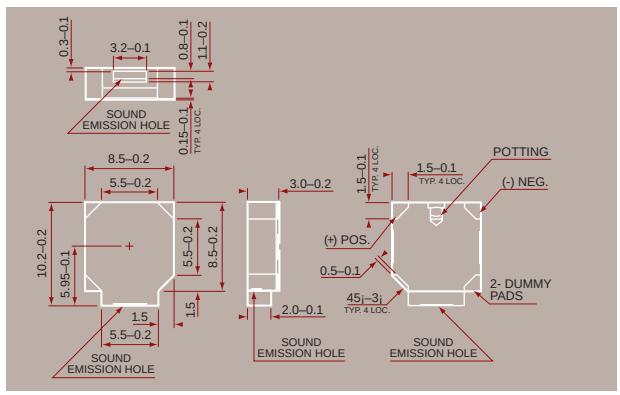
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-9303CP	SMT-9303DP	Units
Rated Voltage	3.6		Vp-p
Operating Voltage	2.5-4.5		Vp-p
Rated Current (max.)	90		mA
Coil Resistance	15 ± 3		Ohm
Resonant Frequency	2500	2700	Hz
Sound Pressure Level @ 10cm (typ.)	85	87	dBA
Temperature Range: • Operating • Storage	-30° to +70° -40° to +85°		°C

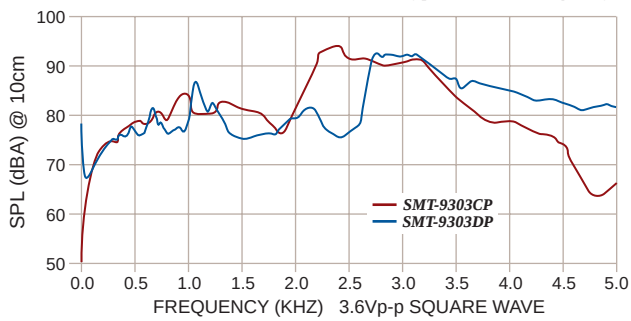
Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Series SMT-9403A, SMT-9403C, and SMT-9403D

Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *4.0mm low profile miniature case configuration*
- *Voltage range: 2.5 to 4.5 Vp-p*
- *2100 Hz, 2500 Hz and 2700 Hz frequencies*
- *Compatible with convection, IR and vapor phase*
- *Available in tubes of 50 pieces and reels of 1K pieces*

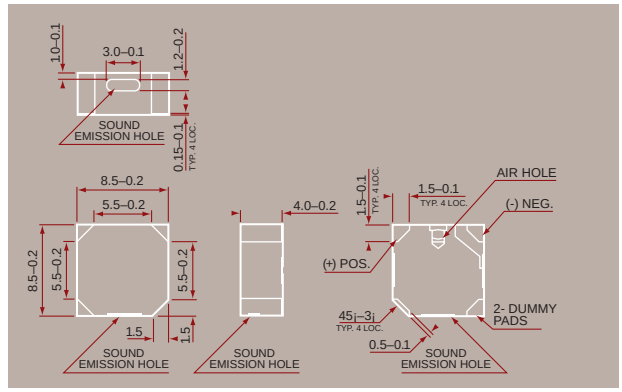
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-9403A	SMT-9403C	SMT-9403D	Units
Rated Voltage	3.6			Vp-p
Operating Voltage	2.5-4.5			Vp-p
Rated Current (max.)	90			mA
Coil Resistance	15 ± 3			Ohm
Resonant Frequency	2100	2500	2700	Hz
Sound Pressure Level @ 10cm (min.)	87			dBA
Temperature Range: • Operating • Storage	-30° to +70° -40° to +85°			°C

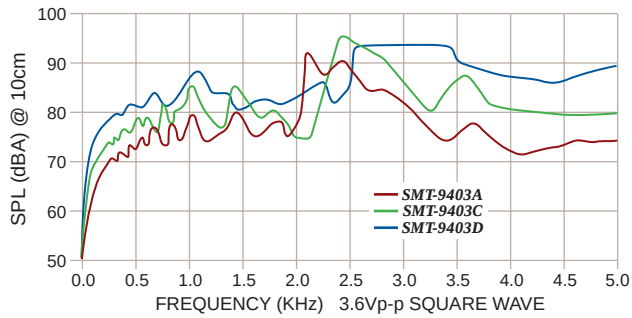
Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Electro-mechanical SMD Transducers

Series SMT-9403CT

Products in photo are shown larger than actual size.

Features

- *SMD mounting*
- *2700 Hz frequency*
- *4.0mm low profile miniature case configuration*
- *Voltage range: 2.5 to 4.5 Vp-p*
- *Compatible with convection, IR and vapor phase*
- *Available in tubes of 50 pieces and reels of 1K pieces*

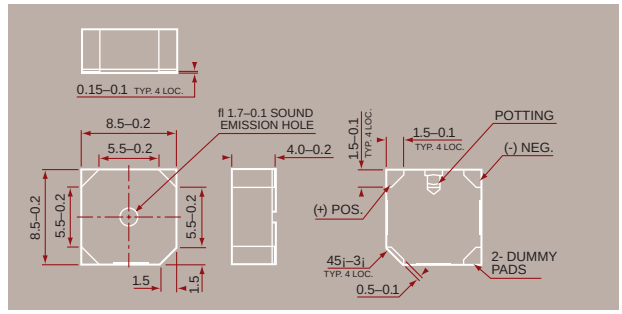
Electrical

All data at 25°C unless otherwise specified.

Parameter	SMT-9403CT	Units
Rated Voltage	3.6	Vp-p
Operating Voltage	2.5-4.5	Vp-p
Rated Current max.	90	mA
Coil Resistance	15 ±3	Ohm
Resonant Frequency	2700	Hz
Sound Pressure Level @ 10cm (min.)	87	dBA
Temperature Range: • Operating • Storage	-30° to +70° -40° to +85°	°C

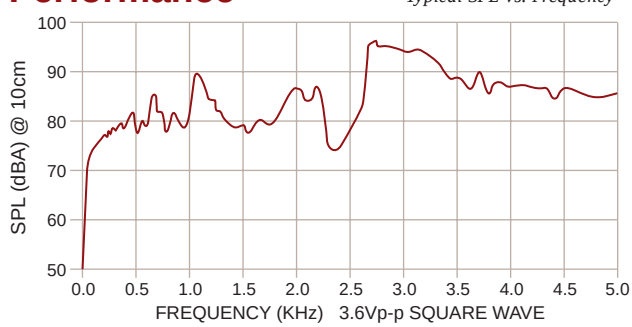
Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Piezo Ceramic Benders

Features

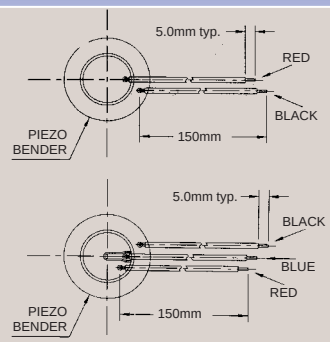
- *Low power consumption*
- *Reliable and lightweight*
- *Direct TTL or CMOS drive*
- *Can be supplied with leads or in housing*
- *Operating temperature range: -20° to +60°C*

Standard Shape (A)

Feedback Shape (B)

Custom Bender Assemblies

Special benders with 32 AWG wire leads are available in 50, 100 and 150mm lengths. For other non-standard wire lead lengths or wire gauges please contact Projects Unlimited with your custom bender requirements.



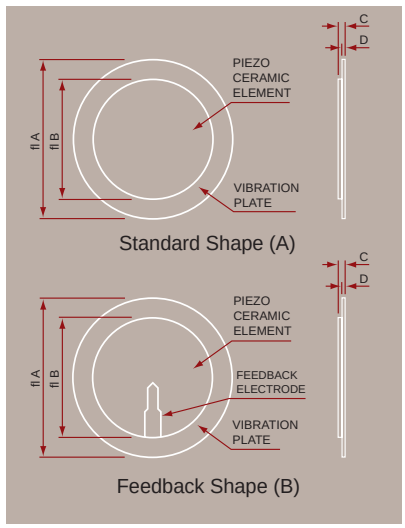
Electrical

All data at 25°C unless otherwise specified.

Model No.	Resonant Frequency (KHz)	Resonant Resistance (Ohm max.)	Electrostatic Capacitance (nF) (±30%)	Shape	Dimensions in Millimeters A	B	C	D
AB1548B	4.8 ± 0.5	2000	0.0075	A	15.0 ± 0.1	8.9 ± 0.1	0.21 ± 0.05	0.09 ± 0.02
AB2020A	2.0 ± 0.5	300	90	A	20.0 ± 0.1	15.0 ± 0.3	0.13 ± 0.05	0.05 ± 0.03
AB2036AF	3.7 ± 0.5	500	20	B	20.0 ± 0.1	15.0 ± 0.3	0.21 ± 0.05	0.10 ± 0.02
AB2038BF	3.8 ± 0.5	350	17	B	20.0 ± 0.1	15.0 ± 0.5	0.28 ± 0.10	0.15 ± 0.03
AB2040B	4.0 ± 0.5	350	25	A	20.0 ± 0.1	14.6 ± 0.5	0.28 ± 0.10	0.15 ± 0.10
AB2065B	6.5 ± 1.0	300	12	A	20.0 ± 0.1	15.0 ± 0.3	0.41 ± 0.07	0.20 ± 0.02
AB2720B	2.0 ± 0.5	300	45	A	27.0 ± 0.1	20.0 ± 0.5	0.23 ± 0.10	0.10 ± 0.03
AB2720BF	2.0 ± 0.5	500	35	B	27.0 ± 0.1	20.0 ± 0.3	0.23 ± 0.10	0.10 ± 0.05
AB2728B	2.8 ± 0.5	300	30	A	27.0 ± 0.1	20.0 ± 0.5	0.33 ± 0.10	0.15 ± 0.03
AB2734B	3.4 ± 0.5	1000	13	A	27.0 ± 0.1	14.6 ± 0.5	0.53 ± 0.10	0.30 ± 0.05
AB2737BF	3.7 ± 0.5	400	20	B	27.0 ± 0.1	20.0 ± 0.4	0.41 ± 0.05	0.20 ± 0.02
AB2745BF	4.5 ± 0.5	500	16	B	27.0 ± 0.1	20.0 ± 0.4	0.51 ± 0.07	0.25 ± 0.02
AB2746B	4.6 ± 0.5	250	16	A	27.0 ± 0.1	20.0 ± 0.3	0.51 ± 0.07	0.25 ± 0.02
AB3526B	2.6 ± 0.5	300	30	A	35.0 ± 0.1	25.0 ± 0.5	0.53 ± 0.10	0.25 ± 0.05
AB3529BF	2.9 ± 0.5	500	25	B	35.0 ± 0.1	25.0 ± 0.5	0.58 ± 0.10	0.30 ± 0.05
AB4406B	0.6 ± 0.3	1000	70	A	44.0 ± 0.1	25.0 ± 0.4	0.23 ± 0.10	0.10 ± 0.03

Dimensional

Mechanical



Speaker Audio Transducers

www.projectsunlimited.com
Up-to-date Product Info

Series AT-41

Case: *ABS, black*
Weight: *0.35 oz. (10 grams)*
P.C. Pins: *Tin-plated copper*
Products in photo are shown smaller than actual size.

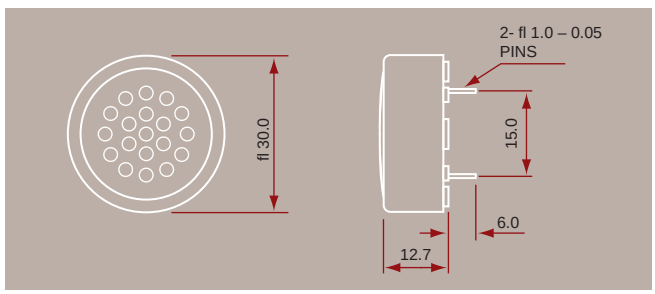
Features

- *P.C. board mounting*
- *8 Ohms impedance - 32 and 100 Ohms available*
- *1200 Hz frequency - 800 and 1400 available*

*The **AT-41** was designed to satisfy the need for a small, P.C. board-mountable speaker transducer for use in keyboards. It has a low profile and a sound output suitable for an office-type environment. Additional impedance and frequency outputs are available. Contact Projects Unlimited for details.*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



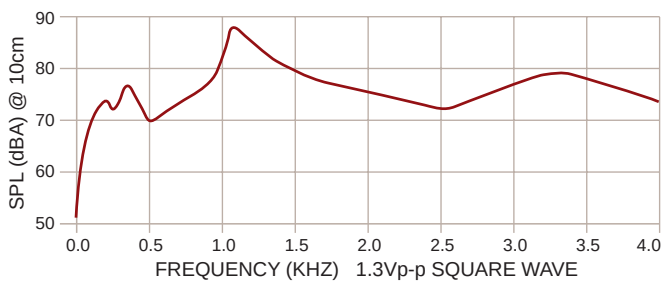
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-41	Units
Power Input (nom.)	0.15	Watt
Power Input (max.)	0.20	Watt
Impedance	8	Ohm
Operating Temperature Range	-40° to +70°	°C

Performance

Typical SPL vs. Frequency



Miniature Speaker Transducers

Series ADS-2008 and ADS-2908

ADS-2008
Case: *ABS, black*
Weight: *0.053 oz. (1.5 grams)*
Mylar cone, nickel finish

Products in photo are shown smaller than actual size.

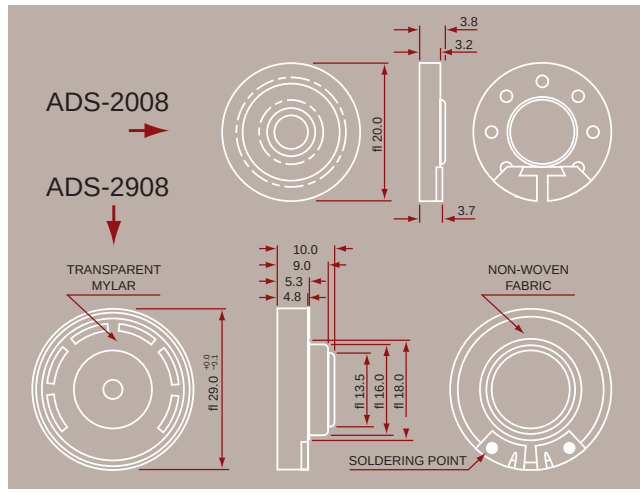
ADS-2908
Case: *ABS, black*
Weight: *0.282 oz. (8 grams)*
Mylar Cone

Features

- *Small size*
- *Very low profile*
- *Broad frequency range*
- *High reliability*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



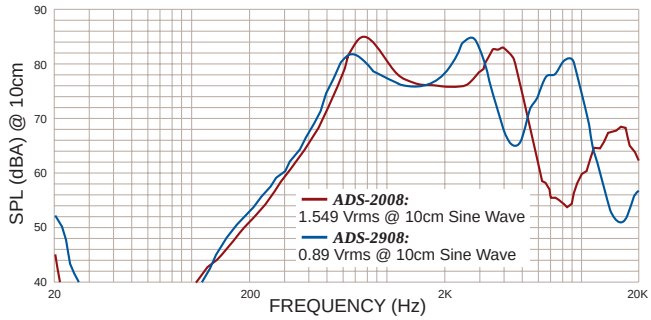
Electrical

All data at 25°C unless otherwise specified.

Parameter	ADS-2008	ADS-2908	Units
Rated Input	0.08	0.1	Watt
Maximum Input	0.15	0.2	Watt
Frequency Range	850-4000	750-4000	Hz
Lowest Resonant Frequency	850 ±150	750 ±150	Hz
Impedance	8 ±20%	8 ±15%	Ohm
Operating Temperature Range:	-20° to +60°	-20° to +60°	°C

Performance

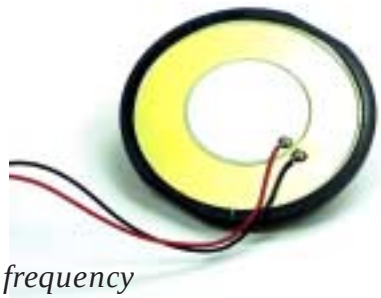
Typical SPL vs. Frequency



Piezo Ceramic Speaker

Series APS-100

Product in photo is shown smaller than actual size.

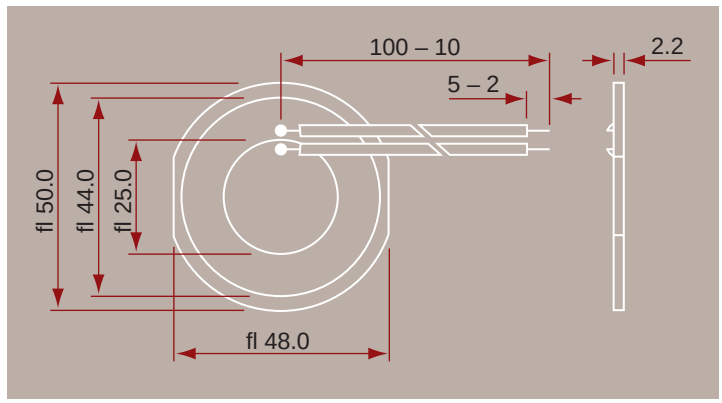


Features

- *Surface or flush mounting with wire leads*
- *900 Hz resonant frequency*
- *Voltage range: 1-30V*
- *Weight: 3.0 grams*

Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



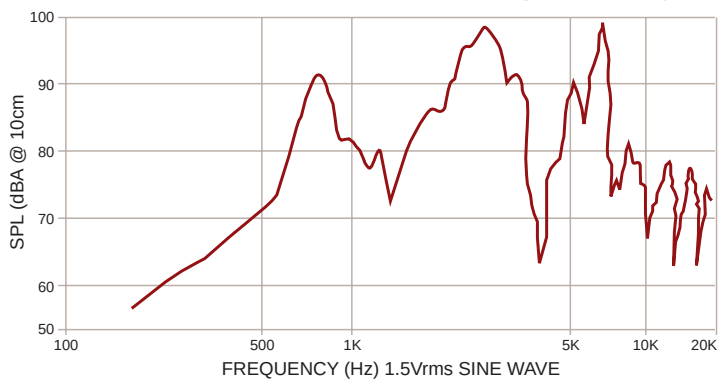
Electrical

All data at 25°C unless otherwise specified.

Parameter	APS-100	Units
Rated Voltage	5	Vp-p
Operating Voltage	1-30	Vp-p
Supply Current (typ.)	3	mA
Frequency Range	500-20K	Hz
Lowest Resonant Frequency	900	Hz
Sound Pressure Level @ 10cm (typ.)	85	dBA
Temperature Range: • Operating • Storage	 -20° to +60° -30° to +70°	°C

Performance

Typical SPL vs. Frequency



Micro Speakers

Series AS1308-02, AS1508-PS04, and AS1808-09

AS1308-02

Products in photo are shown larger than actual size.

Features

- *Flat design*
- *Spring contact and lead wire type*
- *High output level*

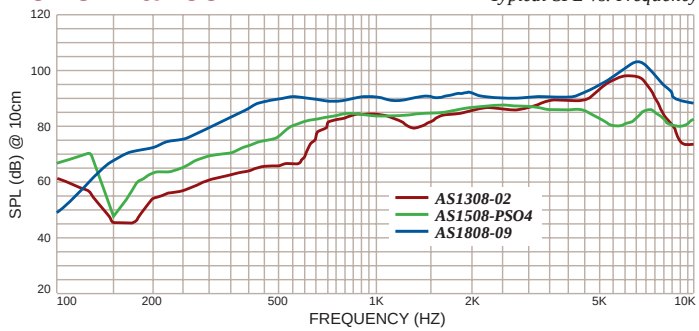
Electrical

All data at 25°C unless otherwise specified.

Parameter	AS1308-02	AS1508-PS04	AS1808-09	Units
Input Power (max.)	0.3	0.5	0.5	Watt
Input Power (nom.)	0.2	0.25	0.3	Watt
Impedance	8 ± 15%	8 ± 15%	8 ± 15%	Ohm
Resonant Frequency	650 ± 20%	600 ± 20%	450 ± 20%	Hz
Frequency Range	800-5000	600-5000	450-5000	Hz
Sound Pressure Level @ 10cm (typ.)	84 ± 3	84 ± 3	88 ± 3	dB

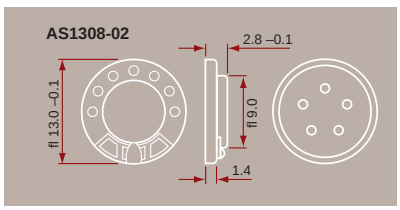
Performance

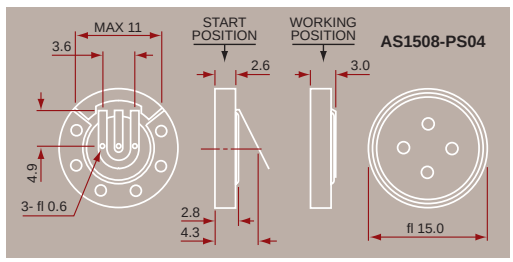
Typical SPL vs. Frequency

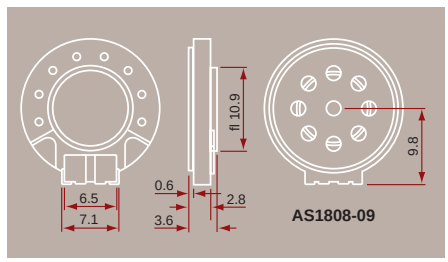


Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.







Speaker Audio Transducers

Series AT-2308

Products in photo are shown approximate size.

Features

- *P.C. board mounting*
- *Mylar cone*
- *8 Ohm standard impedance*
- *Wave solderable*
- *Low Profile*

*The **AT-2308** has been designed for a wide variety of applications where small size is important. Its low profile and broad frequency range make it an ideal choice for keyboards, hand-held devices, and other miniaturized systems.*

***Case:** ABS, black*
***Weight:** 0.11 oz. (3.2 grams)*
***P.C. Pins:** Tin-plated copper*

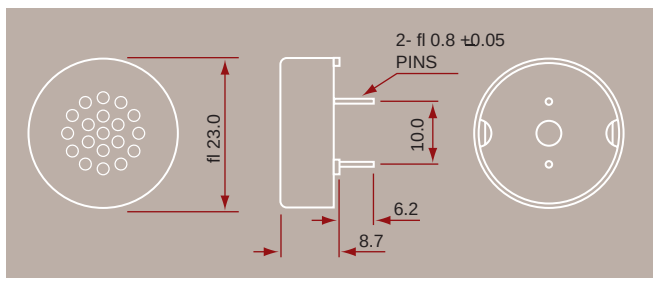
Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-2308	Units
Rated Input	.08	Watt
Maximum Input	0.15	Watt
Frequency Range	500-4000	Hz
Resonant Frequency	1500	Hz
Impedance	8 ±20%	Ohm
Operating Temperature Range	-20° to +60°	°C

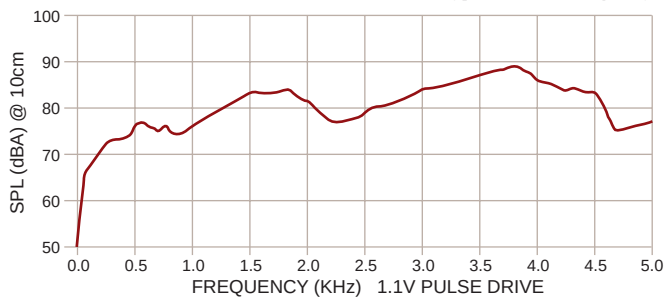
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Speaker Audio Transducers
Series AT-261 and 262

Products in photo are shown smaller than actual size.

Features

- *P.C. board mounting*
- *Two impedances available: 8 and 100 Ohms*
- *Suitable for voice synthesizing*

*The **AT-261** and **AT-262** are designed to serve the growing tone and synthesized voice industry. These new speaker transducers provide circuit designers with excellent flexibility in frequency and sound output (SPL).*

Electrical

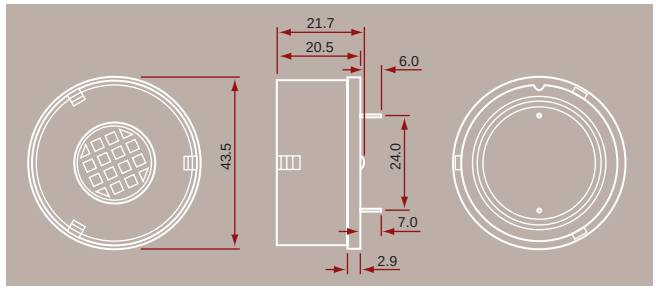
All data at 25°C unless otherwise specified.

Parameter	AT-261	AT-262	Units
Power Input (max.)	0.12	0.12	Watt
Frequency Range	fo-10,000	fo-10,000	Hz
Resonant Frequency	700	700	Hz
Impedance	8	100	Ohm
Operating Temperature Range	-50° to +70°	-50° to +70°	°C

Case: *Nylon 66*
Weight: *88 oz. (25 grams)*

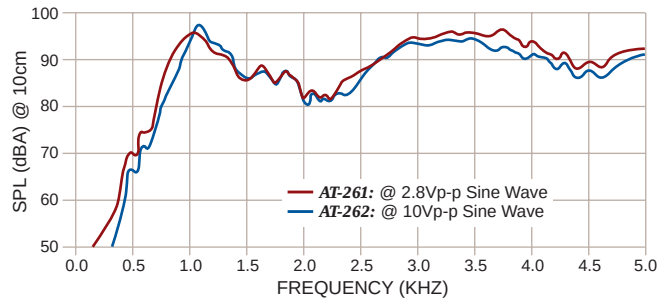
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Speaker Audio Transducers
Series AT-3108

Products in photo are shown smaller than actual size.

Features

- *P.C. board mounting*
- *Mylar cone*
- *8 Ohm standard impedance*
- *Wave solderable*
- *Low Profile*

*The **AT-3108** has been designed for a wide variety of applications where small size is important. Its low profile and broad frequency range make it an ideal choice for keyboards, hand-held devices, and other miniaturized systems.*

Electrical

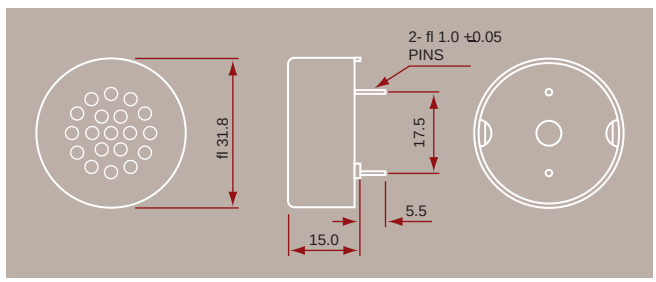
All data at 25°C unless otherwise specified.

Parameter	AT-3108	Units
Rated Input	.10	Watts
Maximum Input	0.20	Watts
Frequency Range	500-4000	Hz
Resonant Frequency	1250	Hz
Impedance	8 ±20%	Ohms
Operating Temperature Range	-20° to +60°	°C

Case: *ABS, black*
Weight: *0.35 oz. (9.9 grams)*
P.C. Pins: *Tin-plated copper*

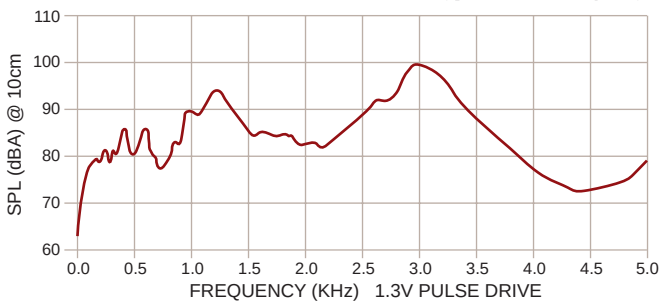
Mechanical

Dimensions are in millimeters, tolerance is ±0.5 unless otherwise specified.



Performance

Typical SPL vs. Frequency



Thin Dynamic Speakers

Series AT-38008

Includes AT-38008/AT-38008M, AT-40008/AT-40008M AT-45008/AT-45008M, AT-50008/AT-50008M, AT-57008/AT-57008M

Paper Cone

Both units have metal case

Mylar Cone

Products in photo are shown smaller than actual size.

Features

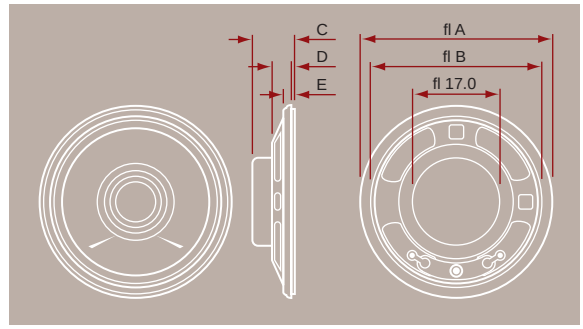
- *Variety of sizes*
- *Variety of impedances*
- *Low profile*
- *Paper or mylar cone*
- *Light weight*

Dimensions

Dimensions are in millimeters, tolerance is ±0.3.

Model Number	A	B	C	D	E
AT-38008/AT-38008M	38.0	34.0	8.0	5.0	2.0
AT-40008/AT-40008M	40.0	36.0	8.0	5.5	2.0
AT-45008/AT-45008M	45.0	40.0	8.3	5.8	2.5
AT-50008/AT-50008M	50.0	45.0	9.0	6.5	2.5
AT-57008/AT-57008M	57.0	52.0	9.6	7.3	2.5

Mechanical



Electrical

All data at 25°C unless otherwise specified.

Parameter	AT-38008 AT-38008M	AT-40008 AT-40008M	AT-45008 AT-45008M	AT-50008 AT-50008M	AT-57008 AT-57008M	Units
Rated Input	0.1			0.2	0.25	Watt
Frequency Range			F_0-4000			Hz
Lowest Resonant Frequency (F_0)	700 ± 50	700 ± 50	500 ± 80	450 ± 80	400 ± 60	Hz
Impedance	8 ± 15% @ 1KHz					Ohm
Temperature Range: • Operating • Storage	-20° to +60° -30° to +70°					°C

Other Impedances

Model numbers ending in 08 have an impedance of 8 Ohms. All units, with either paper or mylar (M) cones, are available with special impedances of 16, 32, 50, and 100 Ohms. Changes in impedances from the standard 8 Ohms do not effect the dimensions of the units. When ordering, incorporate the required impedances into the catalog number as per the following example:

Basic Model	*Impedance*	*Order*
AT-38008	*32*	*AT-38032*
AT-57008M	*100*	*AT-57100M*

Super Thin Flat Speakers

Series FS-30, FS-40 and FS-50

Features

- *Super thin profile*
- *Stainless steel diaphragm*
- *Broad frequency range*
- *Excellent temperature and humidity characteristics*

Products shown smaller than actual size.

Electrical

All data at 25°C unless otherwise specified.

Parameter	All Models, except as noted
Rated Input, Watt	0.4
Maximum Input, Watt	0.8
Impedance Ohm @ 1 KHz	8*
Sound Pressure Level @ 10cm, dB	70
Frequency Response, KHz	**FS-30R(S):** 1.3-8 **FS-40R(S):** .6-6 **FS-50R(S):** .5-4
Distortion, KHz	**FS-30R(S):**10% max./4 **FS-40R(S):**10% max./3 **FS-50R(S):**10% max./2
Temperature Range: • Operating • Storage	-20° to +55°C -40° to +80°C
Humidity @ 40°C	90% RH

** For non-standard impedances, contact Projects Unlimited Inc. Lead wires of various gauges and length with or without connectors are a few of the non-standard applications offered.*

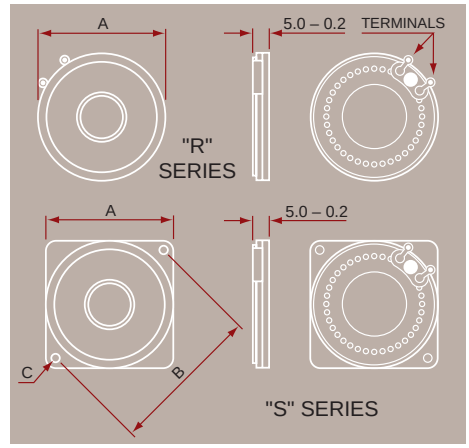
Dimensional

Dimensions are in millimeters.

Model	A	B	C	Weight
FS-30R	$30^{+0.3}_{-0}$			7 grams
FS-40R	$40^{+0.4}_{-0}$			9 grams
FS-50R	$50^{+0.5}_{-0}$			12 grams
FS-30S	$30^{+0.3}_{-0}$	$36^{+0}_{-0.3}$	2.5	7 grams
FS-40S	$40^{+0.4}_{-0}$	$47^{+0}_{-0.3}$	3.0	10 grams
FS-50S	$50^{+0.5}_{-0}$	$59^{+0}_{-0.3}$	3.5	13 grams

NOTES: *Square speakers can be mounted by conventional methods, taking care not to distort the speaker frame. If resonation occurs, the unit should be mounted on rubber or similar material. Round speakers can be mounted by using double-faced tape or an adhesive. Care should be taken not to deform the diaphragm when handling as this can effect performance.*

Mechanical



Multifunction Devices

Series AM1508-SC-06 and AM1808-85-16

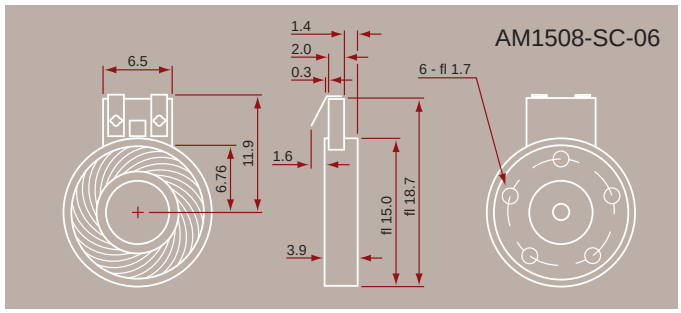
AM1508-SC-06

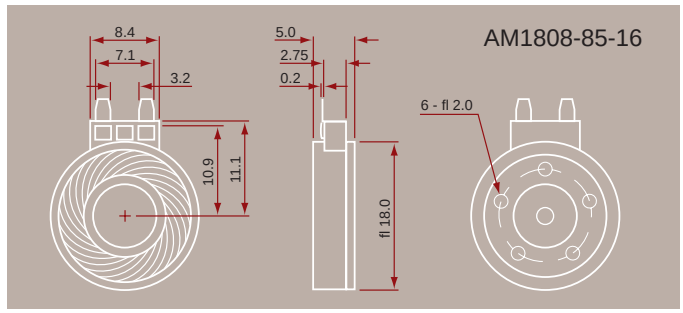
AM1808-85-16

Products in photo are shown larger than actual size.

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.





Electrical

	AM-1508-SC-06				AM-1808-85-16			
Parameter	**Receiver**	**Speaker**	**Buzzer**	**Vibration**	**Receiver**	**Speaker**	**Buzzer**	**Vibration**
Rated Input			5Vp-p				5Vp-p	
Continuous Rating	10mW	0.3Wrms		0.85Vp-p	10mW	0.3Wrms		0.85Vp-p
Maximum Rating	30mW	0.5Wrms		1.0Vp-p	30mW	0.5Wrms		1.7Vp-p
Sensitivity	120±3dB (IEC318)	96±3dB @ 10cm, 0.3W			122±3dB (IEC318)	100±3dB @ 10cm, 0.1W		
Total Harmonic Distortion	< 2% @ 1KHz	< 10% @ 1KHz			< 2% @ 1KHz	< 7% @ 1KHz		
Resonant Frequency		850Hz ± 20% @ 1V	2850Hz	149 ± 2Hz		600Hz	2850Hz	150 ± 2Hz
Frequency Range		fo-5000Hz				fo-5000Hz		
Sound Pressure Level (dBA @ 10cm)			87 dB Min.				95 dB Min.	
Acceleration (100g test jig, 1.0Vrms)				1.5G				1.6G

All data at 25°C unless otherwise specified.

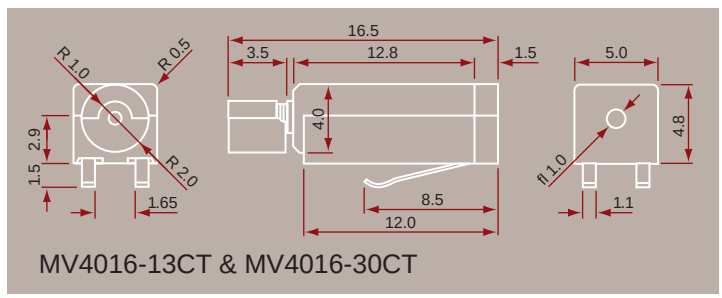
Vibration Motors

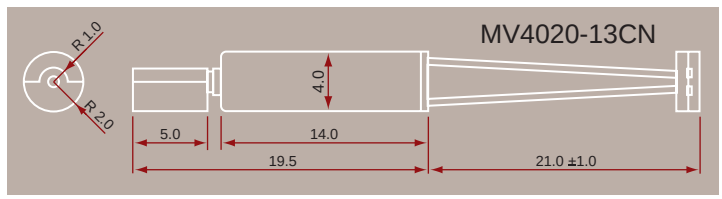
Series MV4016-13CT, MV4016-30CT and MV4020-13CN

Products in photo are shown larger than actual size.

Mechanical

Dimensions are in millimeters, tolerance is ±0.2 unless otherwise specified.





Features

- *Coreless motor*
- *Low electronic noise*
- *Spring contact or sub miniature connector*

Electrical

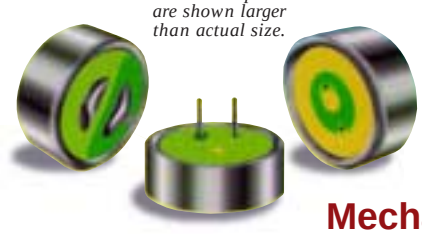
All data at 25°C unless otherwise specified.

Parameter	**MV4016-13CT**	**MV4016-30CT**	**MV4020-13CN**	**Units**
Rated Voltage	1.3	3.0	1.3	VDC
Rated Current (max.)	90	90	90	mA
Rated Speed	12000 ± 2000	12000 ± 2000	9000 ± 2000	RPM
Starting Voltage (min.)	1.1	2.4	0.9	VDC
Stall Current	120	120	120	mA

Back Electret Condenser Microphones

Series POM-2244, POM-2744 and SOM-1844

Products in photo are shown larger than actual size.

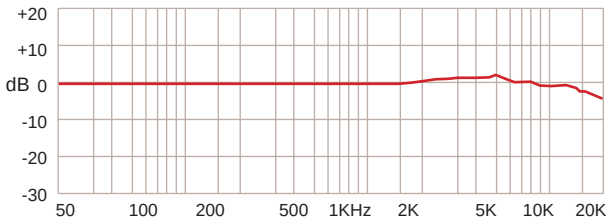


Features

- *Omni-directional*
- *Super clarity, distortion-free response*
- *Available with lead wire (L), solderless (S), and pin (P) type mounting*

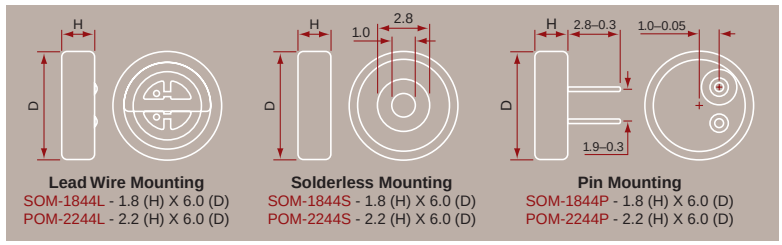
Performance

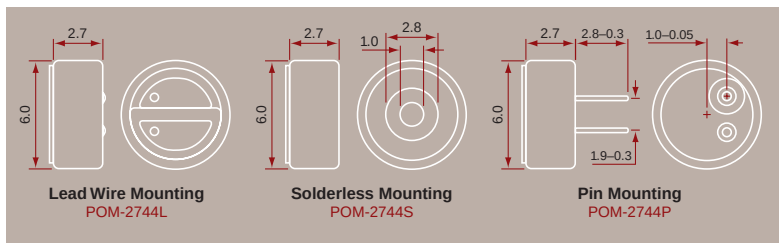
Typical SPL vs. Frequency



Mechanical

Dimensions are in millimeters, tolerance is ±0.3 unless otherwise specified.





Electrical

Parameter	All Models
Impedance (max.)	2.2 K Ohm
Standard Power Supply	2.0VDC
Current Consumption	0.5 mA max.
Sensitivity Reduction	Within -3dB @ 1.5V
Signal to Noise Ratio	> 58 dB

Warranty Statement

Projects Unlimited, Inc. warrants that its audio devices will be as described herein. If, within one (1) year from date of manufacture or 100 operational hours, whichever occurs first, this unit not having been subjected to abnormal use or unauthorized repairs and not exposed to an abnormal environment is shown to Project's satisfaction to have failed through faulty workmanship or materials, its repair or replacement will be effected free of charge, provided return is made prepaid to Projects Unlimited, Inc. There are no warranties that extend beyond the description herein, either as to merchantablility or fitness for a particular purpose. Projects sole and exclusive obligation is to repair or replace the unit that has failed through faulty workmanship or materials. Projects Unlimited assumes no liability for damage to persons or property or consequential damages for loss of goodwill or production, resulting from the failure of the audio device.

SPL Conversion from One Distance to Another:

From	To	Add
20 cm	10 cm	6 cm
30 cm	10 cm	10 cm
60 cm	10 cm	16 cm
100 cm	10 cm	20 cm

To convert from 10cm to any of the above distances, subtract the indicated value instead of adding.

Because Projects Unlimited, Inc. is constantly developing and improving its products, we reserve the right to change or withdraw specifications without notice.

General Information

Notes

1. DC voltage should not be applied directly to piezoceramic AT for a prolonged period. This may cause silver migration between the ceramic and the brass and may lower the insulation resistance of the ceramic.
2. Operating voltages beyond the recommended voltage range in the catalog should not be applied.
3. Operate or store under temperature conditions specified in the catalog for maximum performance.
4. To adjust the sound pressure level of the piezoceramic transducers, a capacitor should be connected in parallel with the device. Connecting a series resistor, between the power supply and the transducer, will cause an abnormal oscillation and will produce undesirable results.

Installation

1. Make sure that the sound emission hole is not blocked in any way.
2. When installing panel mount AI or AT devices, apply the right amount of torque to the screws. Tightening the screws beyond the torque limit can deform the case and abnormal sound output may result.
3. Avoid bending or applying excessive force to the pins when mounting onto printed circuit boards.
4. Follow the recommended Reflow Soldering Process for the Surface Mountable Transducers or Indicators (SMT or SMI), which can be found in the catalog.
5. When soldering wires on benders, use S/N 62 Kester solder, a 50-60 watt soldering iron with a tip temperature of 700*F and a Kester liquid flux Number 154. A 32-AWG wire is also recommended.

Apply a small pool of liquid flux on the feedback terminal near the outer edge. If there is no feedback, start at a similar point on the ceramic side. Lay the tinned wire on the solder dot and position the wire so it is approximately tangential to the outer diameter of the ceramic surface.

Apply the soldering iron to the wire and solder connection for not more than 5 seconds and reflow the solder onto the wire to complete the solder joint. Do not add additional solder unless the wire strands are not adequately covered with a film of solder.

Repeat this procedure for all other connections including the brass substrate of the bender. Try to keep all connections close together and observe the same lead lay. Clean the flux off all connections with standard alcohol or freon solvents.

Washing

1. Electromechanical audio transducers and indicators areusually washable (refer to the catalog to find out which). The washables are sealed at the bottom end and at the emission hole to protect the electromechanical components such as the coil, magnet, etc. Both seals also protect the components of the driver circuits in the AI.
2. For piezoceramic AI and AT, the washables are also sealed the same way as the electromechanical. However some of the AT, even if only sealed at the emission hole, can still be washed (refer to the catalog). A drying method, such as blow-drying or air-drying, is recommended for this type of transducer to operate efficiently.
3. For Surface Mountable Transducers or Indicators, washable pieces are also sealed as above. Please refer to the catalog to find out which can be washed.
4. The PUI speakers are not washable. Water can easily damage the voice coils, especially the type with paper cones. Unavoidable water splashes of minimal quantity in an application will not hurt the speaker with a mylar cone but immersion and exposure to excessive amounts of water will.

Signal Input Polarity

In general it is very important to observe the polarity of all AI products when connecting input signals. The Audio products have internal circuits for which the correct current flow is critical.

The piezoceramic AT products, because they do not have internal driver circuits, do not necessarily require the correct polarity of input signals. Technically, the ceramic is considered to be positive and the brass is considered to be negative. However, the crystal will still flex up, when it detects a positive peak and down when it detects a negative peak or vice versa.

If the crystal senses a unipolar wave it flexes only at one side, either upward or downward. PUI chooses to use a positive unipolar wave, when performing the standard SPL test, to ensure better performance from the transducer. The piezoceramic transducers with feedback loop can operate the same as the regular piezoceramic transducers (without feedback loop) if the feedback is not being used. Note that feedback is not used when it is not connected to the circuit or when the lead wire of the ceramic and feedback are connected together. However, if the application requires for the feedback to be used, correct polarity connections should be maintained.

Electromechanical AT products require correct polarity of input signals when positive unipolar waveform is applied. The fluctuating magnetic flux that causes the diaphragm to produce sound necessitates the proper direction of current so that the diaphragm may not shift from its original position. The shifted diaphragm will produce variations in the sound pressure level that could very well be an undesirable output.