



Challenge Electronics

Short Form Component Catalog

Powering Production Through Innovation



Revision B

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95 E. Jeffry Boulevard
Deer Park, NY 11729



(800) 722-8197



sales@challelec.com



challengeelectronics.com



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ABOUT US

Challenge Electronics specializes in the design and manufacturing of **high-performance** audio components and battery assemblies, engineered to precise customer specifications. With advanced manufacturing capabilities, our products are meticulously crafted to deliver **optimal performance**, catering to the diverse operational demands across sectors including medical, consumer electronics, automotive, marine instrumentation, and more.



Engineering Evolution

From initial concept design to Mass Production (MP), our engineers assess **customer specifications** to create **efficient concept designs**, then use high quality components to ensure optimal performance.

Streamline Supply Chain

Challenge Electronics ships from regions including Asia, Europe, and the Americas, with **distributors** such as Digikey, Future Electronics, and Hughes Peters. Our manufacturing facilities are in China, Korea, Thailand and Indonesia, with **additional** locations in development.



Challenge Electronics Website Overview

WWW.



The Challenge Electronics website includes detailed technical information about the **products** available at Challenge Electronics. Including news about our newest **innovative products**, detailed **product descriptions** and elaborate information and resources regarding the **engineering** involved in creating these products.

Product Highlights

A selected range of **product short lists**, organized by product type or application to support specific engineering requirements.

White Notes

In-depth **guidance** designed to address specific technical questions. including technical **breakdowns** of technologies, **summaries** of requirements and standards, and **explanations** of best design practices.

Technical Resources

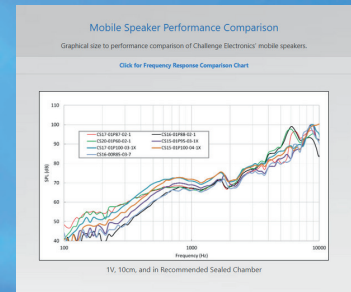
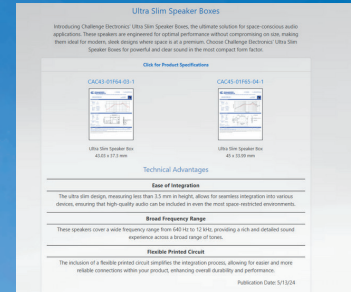
Converters and calculators to assist in the **computation, analysis, and design** of a product's acoustic, electrical, and mechanical properties.

Parametric Search

Filter down to specific products by defining precise **technical requirements**.

Downloads

Access to up-to-date **product literature**, showcasing our most advanced and competitive offerings.



PRODUCT SEARCH: SPEAKERS			
Nominal Input	Termination Type	IP Capable	Form Factor
≥ 20 W	Solder Tab	No	Round
10-20 W	Solder Point	Yes	Square
1-10 W	Spring		Oval
0.5-1 W	Surface Mount		Mobile
≤ 0.5 W	Through Hole		Receiver
	Wire Lead		Planar
	Fpc		



USPTO Patented PinPoint Alert Technology

Challenge Electronics PinPoint Alert System Technology provides a listener the precise ability to determine the source of an acoustic alarm via the acoustic cues alone. No tactile or visual cues necessary.

The alert has been Patented under US Patent No. 10,522,008 B1.

Q: What is Sound Localization?

A: Sound Localization is when listeners are able to accurately identify the location of a sound via the sound alone.

Through the human auditory system, listeners register the **direction of sound** due to the "bending" of audio signals in relation to:

- Human Aural and Acoustic Cues
- Direction of Generated Sound
- Distance between Listener & Generated Sound

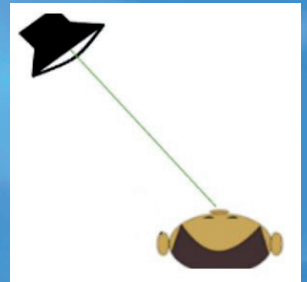
These "bent" signals create a **crisp and distinguishable** acoustic tone when compared to standard acoustic tones.



Q: Can I purchase an audio component that has PinPoint Technology already installed?

A: Yes! PinPoint Technology is available in nearly all standard housings.

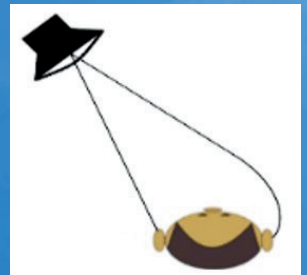
Nearly all Challenge Electronics' Piezoelectric Indicators can be **retrofitted** with PinPoint Technology.



Q: Could you provide an example optimizing this technology?

Ex: A fire spreads in a manufacturing facility, causing electrical blackouts, and producing large quantities of smoke.

PinPoint Technology creates a **natural** understanding of where the sound is **generated**. If the alarm is placed at the entrance of the building, personnel can evacuate the facility safely and efficiently.



For more information regarding our PinPoint Technology, visit our website at:

www.challengeelectronics.com/PinpointAlert

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sales@challelec.com



challengeelectronics.com





Where Sound Meets Decibels

Do you Hear the Decibel?

The human ear can perceive a change in sound levels in **3 decibel increments**. If the Sound Pressure Level (SPL) increases by 3 decibels, the listener will **notice a difference** in sound level.

▶▶▶▶ *Ex: A change from 90 dB to 93 dB WILL register a change in sound level to the human ear.*

When the change in SPL is less than 3 dB, the listener will **not notice** a change in sound level.

▶▶▶▶ *Ex: A change from 90 to 91 dB will NOT register a change in sound level to the human ear.*

When the sound level increases by 10 dB, the generated sound will be **twice as loud** to the human ear.

▶▶▶▶ *Ex: A change from 90 dB to 100 dB will sound TWICE as loud.*

Doubling Down on Decibel!

A common misunderstanding regarding audio amplification is the idea that doubling the wattage will cause the amplified sound to be “twice as loud.” To **increase** the audio output by the minimum noticeable amount of 3 dB, **twice** the rated power is required, while **reducing** the decibel output by 3 dB only requires **half** the rated power.

To increase the desired decibel output, the Decibel-Watt Law is applied:

2.0 x Rated Power (watts) = +3dB

4.0 x Rated Power (watts) = +6 dB

10 x Rated Power (watts) = +10 dB



To decrease the desired decibel output, the Inverse Decibel-Watt Law is applied:

0.50 x Rated Power (watts) = -3dB

0.25 x Rated Power (watts) = -6dB

0.10 x Rated Power (watts) = -10dB



Sound Propagation

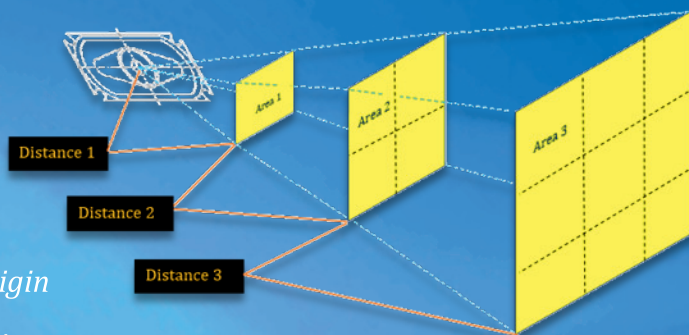
As the distance from the sound source increases, the area covered by the sound wave increases. The same amount of energy is spread over a greater area, resulting in the intensity and **loudness** of the sound **decreasing** the **farther** the sound wave travels from the source.

Sound Propagation is calculated using the

Inverse Square Law:

$$SPL_2 = SPL_1 - 20 * \log (R_2 / R_1)$$

- SPL_1 : The Sound Pressure Level at the Origin
- SPL_2 : The Sound Pressure Level at End-Distance
- R_1 : The Distance from the Sound Source to the Origin
- R_2 : The Distance from the Sound Source to End-Distance



No Need to Freq Out!

One of the most critical design components is the frequency of the audio signal. An audio frequency is how often a **sound wave fluctuates** over a given time-frame. These fluctuations are measured in Hertz (Hz), which identifies the **number of cycles** the audio signal oscillates and travels through a medium (air, plastic, water, etc....) per second.

➤➤➤ *Example: A smoke alarm rated for 3000 Hz oscillates at a rate of 3000 times per second.*

For the audio signal to be received, it must **travel through a medium**. These materials are all around us; the most easily recognizable medium is air. As the audio signal is created, the surrounding air begins to **compress** and **expand** in correlation with the frequency of the audio signal.

All in Harmony

When an electrical signal is inputted, an exact copy of the signal should be acoustically recreated, however this is only the case in an ideal world. Signals known as Harmonic Distortion can distort the sound. They are added frequency peaks at harmonic multiples of the primary signal. A common metric to quantify the harmonic distortion along the full frequency spectrum is denoted **Total Harmonic Distortion (THD)** and is a measure of the overall impact of all harmonic distortion summed together.

➤➤➤ *Example: Harmonics of a 3,000 Hz signal would be located at 6,000 Hz and 9,000 Hz.*

Intermodulation Distortion (IMD) is the addition of unwanted audio signals at sums or differences of multiple input signals. IMD is **more noticeable** to the human auditory system than Total Harmonic Distortion.

➤➤➤ *Example: An input signal of 2,000 Hz and 3,000 Hz would create IMD distortion at 1,000 Hz and 5,000 Hz.*



Know Your Tone!

At Challenge Electronics, we incorporate both our **patented** and **proprietary** audio signals as well as **industry-standard tones** into all our audio alarm systems. Whether for home security, or emergency response equipment, our components are calibrated and designed to meet all applications.

Continuous Tone

Single output tone at a defined frequency

Allows user to control rate of signal by pulsing overall power

Multi-Tone

A single device with multiple user selected output tones

Multiple use environments included within a single device

Pulsating Tone

Repeated output tone at a defined frequency and rate

Ensure user attention by creating an intermittent interruption

Sweeping Tone

Increases or decreases at a defined rate over a defined range of frequencies

Customize to indicate urgency in response

PinPoint Tone

Provides Sound Localization

Creates a crisp, distinguishable acoustic tone

Electrical Connectivity Options

At Challenge, we incorporate innovative as well as industry standard Connection Options. Almost all connection types can be **customized** at a customer request to utilize a design which better fits the **customer's end application**.

Solder Point/Tab

Customizable connectivity options

Proprietary "Quick Connect Front Panel Mount" technology

Surface Mount

Reflow Oven, Wave Solderable and more

Easily integrated into PCBAs through Pick and Place

Spring Mount

Direct deployment onto PCBA without added solder

Minimal footprint

Through Hole

Utilizes Industry Standard PCBA Connectivity

Easily integrated into pre-fabricated vias on PCBA

Wire-Leaded/FPC

Optimized for far distances between mounting location and PCBA

Customizable wire gauge, wire length, FPC design and connector

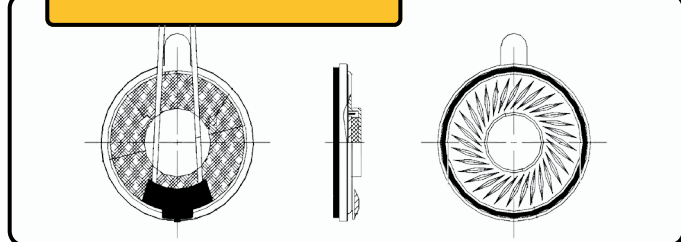


Round/Square Speakers

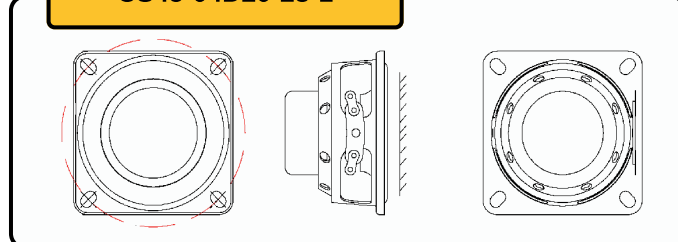
Round Speakers are one of the most popular audio components, **optimizing space** without affecting the audio signal. As a result of the symmetrical cone design, the projected audio signal generates a **flat frequency response** across the frequency spectrum. Some materials used for diaphragms include: Polypropylene (PP), Polyetheretherketone (PEEK), and Polyethylene (PET).

Square Speakers are designed to be directly mounted to the customers' housing, providing **less requirements** during the design-phase while obtaining the **same audio benefits** of a round speaker.

CS28-02W220-05-1X



CS45-04D20-28-1



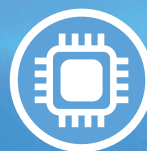
Power to the Speaker!

Round and Square Speakers provide the greatest power handling over all speaker types, meaning the **greatest efficiency** of input signal to loudness.



Even Audio Flex!

Our Round and Square Speakers are calibrated to distribute an **evenly balanced audio signal**, resulting in a flat frequency response curve with minimal distortion.



Surfs Up!

Our Surface Mounted Technology (SMT) Speakers are designed to require **minimal PCBA space**, while maintaining the Even Audio Flex of our popular Round Speaker products.



Sample Serving!

We stock Ready-to-Ship product-samples of almost every Round and Square Speaker with **little to no wait**.



Round/Square Speakers

Product List

Part Number	Product Type	Dimensions (mm)	Rated/Max Power (W)	Resonant Frequency (Hz)	SPL Rated Power/10cm* (dB)	Impedance(Ω)	Termination	IP Rating
CS13-00P20-03-1X	Round Receiver	Ø13x3.5	0.01/0.02	200	120 IEC Coupler	32	Solder Pads	IP67 Front Face
CS14-00P100-04-1	Planar Round	Ø14.55x4.88	0.005/0.01	1,000	114 IEC Coupler	30	Solder Pads	No
CS28-02W190-05-1X	Round	Ø28x5.5	2/2.5	1,900	109	8	Wire Leaded with Connector	IP67
CS28-02W220-05-1X	Round	Ø28x5.6	0.5/1	2,200	103	8	Wire Leaded with Connector	IP67
CS28-01W75-06-1X	Round	Ø28x6.3	1.5/2	750	103	8	Wire Leaded with Connector	IP67
CS28-02W57-07-1X	Round	Ø28x7.9	2/4	570	103	4	Wire Leaded	IP67 Front Face
CS30-02P65-04-1X	Round	Ø30x4.5	2/2.2	650	103	4	Solder Pads	IPX7 Front face
CS32-01W130-10-1X	Round	Ø32.4x10.35	1.5/2	1,300	103	8	Wire Leaded with Connector	IP67
CS45-05D13-24-1X	Round	Ø45x24	5/6	130	104	4	Solder Tabs	IP67 Front Face
CS53-00P24-07-1	Planar Round	Ø53x7.3	0.02/0.04	240	127	32	Solder Pads	No
CS72-00P17-08-1	Planar Round	Ø72.5x8.3	0.05/0.1	170	115	12	Solder Pads	No
CS13-00S85-04-6	Square	13x13x4.1	0.7/1	850	90	8	Surface Mount	No
CS15-00S80-04-1	Square	15x15x4	0.8/1	800	92	8	Surface Mount	No
CS18-01S100-05-1	Square	18x18x5.1	1/1.5	1,000	97	8	Surface Mount	No
CS32-03W23-16-1X	Square	32.7x31.7x16.5	3/4	230	102	8	Wire Leaded with Connector	IP65
CS45-04D20-28-1	Square	45.2x45.2x28.1	5/6	200	111	4	Solder Tabs	No
CS52-05D12-31-1	Square	52x52x31.6	5/8	120	109	4	Solder Tabs	No
CS134-15D07-55-1	Coaxial Square	135x135x57	15/30	150	120	4	Solder Tabs	No

For additional Round/Square Speakers, please visit our website at:

www.challengeelectronics.com/speakers

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Deer Park, NY 11729



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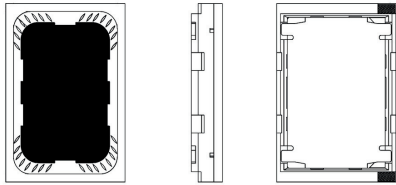


Mobile/Oval Speakers

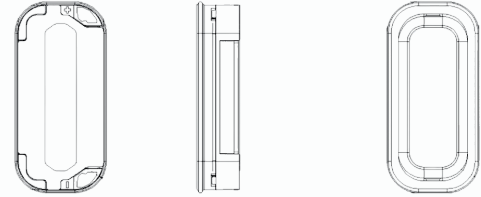
Mobile Speakers are engineered with symmetric alignment between the voice coil and magnet, reducing the Total Harmonic Distortion (THD) for **enhanced sound clarity** within the vocal range of human speech. Their compact design allows **easy integration** into confined spaces, while strategically positioned side or top ports allow for your sound to reach where it needs to go. Just remember, in general, mobile speakers **must be chambered** for proper performance.

Oval Speakers provide our customers an ideal alternative to **space-limited designs**, incorporating form factors from **both mobile & round speakers**. If only a rectangular space is available and you want loud, Oval Speakers are right for you!

CS20-02P105-03-1X



CS13-00P90-03-1X



No Peaking!

Our Mobile Speakers are designed with a unique shaped voice coil and diaphragm that **minimizes THD, IMD**, and provides a flat frequency response.



Mobile Speaker Design Capability!

Mobile Speakers **remove major design constraints** from speaker implementation into rectangular spaces with a symmetrical voice coil and frame.



Think Inside the Chamber!

Our Mobile Speakers are designed and calibrated to **optimize** the benefits of one of the Challenge Electronics proprietary **Chamber Assembly** designs for ultra thin solutions and side porting.



Sample Serving!

We stock Ready-to-Ship samples of almost every Mobile/Oval Speaker product, with little to no wait.



Mobile/Oval Speakers

Product List

Part Number	Product Type	Dimensions (mm)	Rated/Max Power (W)	Resonant Frequency (Hz)	SPL Rated Power/10cm *	Impedance(Ω)	Termination	IP Rating
CS12-00P43-02-1X	Mobile	12x8x2.5	0.7/1	430	89	8	Solder Pads	IP67 Front Face
CS13-00P90-03-1X	Mobile/Oval	13.5x6.5x3	0.8/1	900	88.5	7	Solder Pads	IP67
CS15-01P280-02-1	Mobile	15x7x2	1/1.2	2,800	89	10.2	Solder Pads	No
CS15-01P95-03-1X	Mobile	15x11x3.5	1/1.3	950	97	8	Solder Pads	IP67 Front Face
CS15-01R95-03-2X	Mobile	15x11x3.5	1/1.2	950	99	8	Spring	IP67 Front Face
CS15-01P100-04-1X	Mobile	15x11x4	1/1.2	1,000	99	8	Solder Pads	IPX7 Front Face
CS17-01P100-03-1X	Mobile	17x12x3.3	1/1.2	1,000	99	8	Solder Pads	IP67 Front Face
CS18-01P95-04-1X	Mobile	18x13x4.5	1/1.2	950	100	8	Solder Pads	IP67 Front Face
CS18-02P110-03-1X	Mobile	18x16x3.7	2/2.2	1,100	104	4	Solder Pads	IP67 Front Face
CS19-02W100-03-1	Mobile	19x14x3.7	2/2.2	1,000	105	8	Wire Leaded	No
CS20-00P27-03-1	Mobile	20x8x3.1	0.1/0.12	270	79	25	Solder Pads	No
CS20-02P105-03-1X	Mobile	20x14x3.7	2/2.2	1,050	104	4	Solder Pads	IPX8 Front Face
CS20-01P63-02-1	Mobile	20x16x2.35	1/1.5	630	94.5	8	Solder Pads	No
CS23-01P100-03-1X	Mobile	23x11x3.7	1.5/1.7	1,000	103	8	Solder Pads	IP67 Front Face
CS23-02P100-03-1X	Mobile	23x14x3.7	2.5/2.7	1,000	105.5	4	Solder Pads	IPX8 Front Face
CS25-02P95-05-1X	Mobile	25x14x5	2/2.2	950	106	4	Solder Pads	IP67 Front Face
CS27-01P60-02-1X	Mobile	27x12x2.55	1/1.5	600	94	8	Solder Pads	IPX7 Front Face
CS34-01P70-03-1	Mobile	34x11x3.8	1.5/2	700	97	8	Solder Pads	IP67 Front Face
CS38-02P50-02-1	Mobile	38x13x2.25	2/3	500	93	4	Solder Pads	No
CS40-01P60-05-3X	Mobile	40x13x4.5	1/1.2	600	98	8	Solder Pads	IP67 Front Face

For additional Mobile/Oval Speakers, please visit our website at:

www.challengeelectronics.com/speakers

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Chamber Assemblies

Our Engineering Team utilizes innovative composite materials, industry-leading chamber designs, and unique acoustic insulation methods to provide the **maximum desired audio tone** in a **minimal chamber footprint**. We design our Chamber Assemblies in direct correlation to customer requirements through multiple design reviews at **no additional expense** to the customer. Final products can include a plug and play assembly with all mounting features integrated into the design including all gasketing material, subassemblies and custom defined wires/connector for **easy integration**. Best of all, all Chamber Assemblies are fully acoustically tested prior to shipment so you can rest easy knowing each unit is 100% reliable for your voice to the end user.

Q: What is the purpose of a Chamber Assembly?

A: Chamber Assemblies handle the dynamic nature of a speaker effectively to produce as accurate a **reproduction** of the **input signal** as possible.

As the speaker diaphragm oscillates, the sound generated from each side of the diaphragm are out of phase. If the out of phase signals interact **interference** can occur.

Placing the speaker into a **Chamber Assembly** isolates the front and rear waveforms ensuring **no unintentional** cancelation or distortion.



Q: What is "Acoustic Prioritization?"

A: **Acoustic Prioritization** is the design of a speaker chamber to reinforce only specific desired ranges of the acoustic signal.

Through precise calculations, innovative materials, and calibration, Acoustic Prioritization can boost certain frequency ranges, while dampening unwanted ranges simply through the **mechanical design** of the chamber.

This natural cancelation of sound within certain frequency bands is known as **Mechanical Filtering**.



Ported Assembly

Low-Frequency Boosting



Aperiodic Assembly

Smallest Dimensional Footprint



Passive Radiator Assembly

Low-Frequency Boosting & Improved Dimensional Footprint



Sealed Assembly

Flattest Response & Small Dimensional Footprint



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Deer Park, NY 11729



(800) 722-8197



sales@challelec.com



challengeelectronics.com



Chamber Assemblies

Product List

Part Number	Product Type	Dimensions (mm)	Rated/Max Power (W)	Resonant Frequency (Hz)	SPL Rated Power/10cm *	Impedance(Ω)	Termination	IP Rating
CAC22-01W150-07-1X	Round	$\varnothing 22 \times 7.3$	1/1.5	1,500	95	8	Wire Leaded with Connector	IP67
CAC32-02W110-13-1X	Round	32x20x13.79	2/2.2	1,100	105	8	Wire Leaded with Connector	IPX7 Front Face
CAC44-01W85-15-1X	Round	$\varnothing 44 \times 15$	1.5/2	850	105	4	Wire Leaded with Connector	IP67 Front Face
CAC24-01W120-05-1X	Oval	24x15x5.8	1/1.3	1,200	95	8	Wire Leaded with Connector	IPX7 Front Face
CAC42-03W42-28-2X	Oval	42.7x34x28	3/4	420	100	4	Wire Leaded	IP67
CAC20-01W95-07-1X	Square	20x20x7.15	1/1.3	950	94	8	Wire Leaded	IP67 Front Face
CAC25-01W75-07-1X	Square	25x25x7	1/1.2	800	93	6	Wire Leaded	IPX7
CAC32-02W90-16-1X	Square	32x32x16	2/3	900	104	4	Wire Leaded with Connector	IPX8 Front Face
CAC25-02W100-10-1	Rectangle	25x19x10.8	2/2.2	1,000	102	4	Wire Leaded with Connector	No
CAC35-01W110-05-2	Rectangle	35x20x5.8	1.5/1.7	1,100	100	8	Wire Leaded with Connector	No
CAC36-02W80-09-1	Rectangle	36x26x9.5	2/2.5	800	111	4	Wire Leaded with Connector	No
CAC40-02W100-09-1	Rectangle	40x26x9	2/2.2	1,000	102	4	Wire Leaded with Connector	No
CAC40-02W90-15-1X	Rectangle	40x34x15.6	2/3	900	104	4	Wire Leaded with Connector	IPX8 Front Face
CAC43-01F64-03-1	Rectangle	43.03x37.3x3.45	1/1.5	640	93.5	8	FPC	No
CAC45-02W70-06-1	Rectangle	45.3x20.41x6.75	2/2.2	700	92	4	Wire Leaded with Connector	No

For additional Chamber Assemblies products, please visit our website at:

www.challengeelectronics.com/assembly

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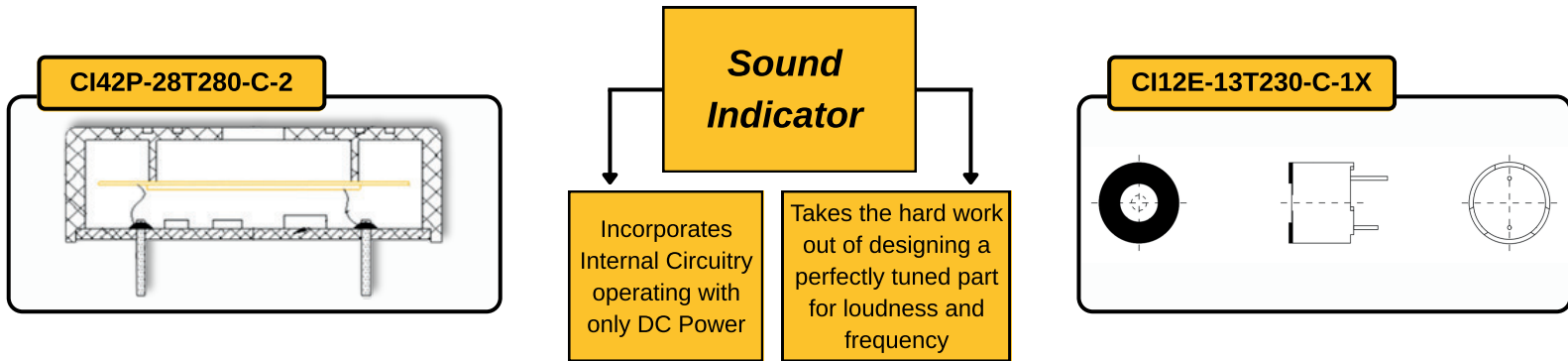


Indicators

Piezoelectric Sound Indicators integrate a piezoelectric element with precisely **engineered internal circuitry** to maximize loudness.

Electromagnetic Sound Indicators incorporate a stationary magnet, voice coil, and floating disk to produce a **low-frequency output** and reduced footprint.

Mechanical Sound Indicators feature a vibrating membrane to physically interfere with another medium for the **lowest resonant frequency**.



Patent Product

Our Piezoelectric Sound Indicators are optimized to use our patented **PinPoint Alert & Alarm Technology**.



Tune In

Our Sound Indicators utilize a vast array of patented and **industry leading tones**, including: Pinpoint, Continuous, Pulsating, Sweeping and Multi-Tone.



Front Panel Mount Design

Our Indicator Product Lines incorporate the Challenge Electronics proprietary **Front Panel Mount technology** allowing an assembler to easily press fit a unit into a mounting panel.



Sample Serving

We stock Ready-to-Ship product samples of all our Sound Indicators with little to no wait.



Indicators Product List

Part Number	Product Type	Dimensions (mm)	Rated/Max Input Voltage (VDC)	Resonant Frequency (Hz)	Min SPL at Vrated/10 cm* (dB)	Tone	Termination
CI08E-05S270-C-1	Electromagnetic	8.5x8.5x3.6	3/5	2,700	82	Continuous	Surface Mount
CI12E-05T230-C-6	Electromagnetic	Ø12x9.5	3/5	2,300	90	Continuous	PC Pins
CI12E-07T230-C-5	Electromagnetic	Ø12x9.5	5/7	2,300	85	Continuous	PC Pins
CI12E-07T230-C-6	Electromagnetic	Ø12x9.5	5/7	2,300	95	Continuous	PC Pins
CI12E-13T230-C-1X	Electromagnetic	Ø12x9.5	12/13	2,300	88	Continuous	PC Pins
CI25P-16T290-C-1X	Piezoelectric	Ø25.4x21.8	12/16	2,900	114	Continuous	PC Pins
CI25P-16T290-T-1X	Piezoelectric	Ø25.4x21.8	12/16	2,900	101	PinPoint	PC Pins
CI26P-16T40-C-1X	Piezoelectric	26x26x19.7	12/16	400	95	Continuous	PC Pins
CI35P-30E240-P-23X	Piezoelectric	Ø35.2x41.8	12/30	2,400	101	Pulsating	Panel Mount
CI35P-30E240-C-10X	Piezoelectric	Ø35.2x41.8	12/30	2,400	94	Continuous	Panel Mount
CI35P-28E210-C-1X	Piezoelectric	Ø35.8x34.5	24/28	2,100	116	Continuous	Panel Mount
CI36P-30E290-P-5X	Piezoelectric	Ø36x35.5	24/30	2,900	110	Pulsating	Panel Mount
CI41P-20T280-C-1X	Piezoelectric	Ø41.8x16	12/20	2,800	110	Continuous	PC Pins
CI44S-15W45-M-1	Speaker	Ø44x22	10/15	450	85	Multiple	Wire Leaded
CI41M-08W40-C-2	Mechanical	Ø26.4x17.6	6/8	400	95	Continuous	Wire Leaded

For additional Indicator products, please visit our website at:

www.challengelectronics.com/indicators

* SPL values are standardized to a consistent distance and rated wattage. For production values, please reference the corresponding specification sheet.

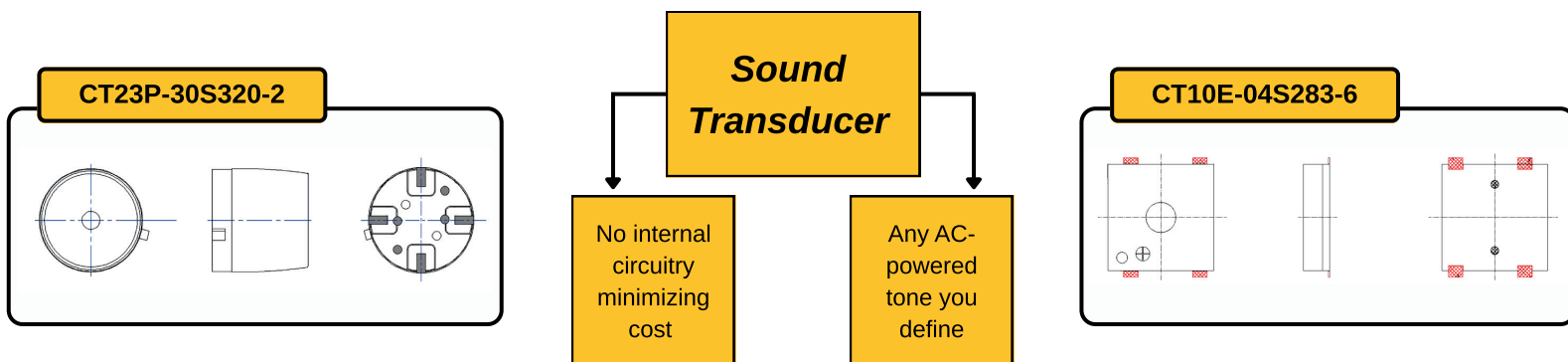


Piezoelectric/Electromagnetic Sound Transducers

Piezoelectric Sound Transducers feature externally driven piezoelectric elements encased in a finely tuned Helmholtz Resonator to ensure **peak performance**.

Electromagnetic Sound Transducers are an externally driven stationary magnet, voice coil and floating disk for **lower frequency** output and **minimized footprint**.

Worried about designing the end circuitry? No problem! Challenge Electronics will provide free consultations and application circuits to make sure you get the best sound!



Surfs Up!

Our Piezoelectric and Electromagnetic products offer the **largest dimensional** variety of transducers incorporating Surface Mount Technology.



Simplicity is Key

Our Sound Transducers use **no internal circuitry** for a low cost, high performance component.



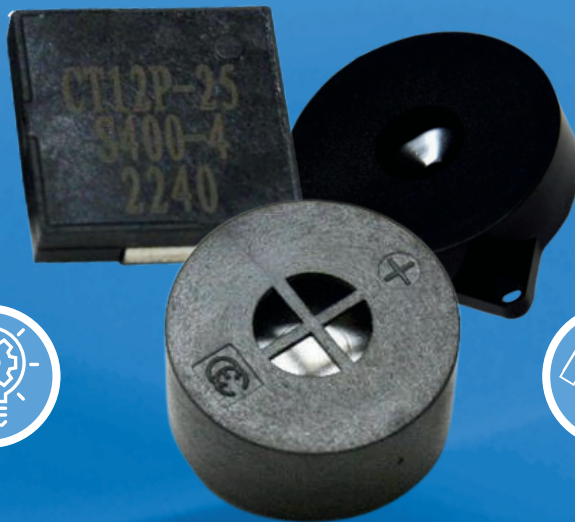
Full Automation

Many of the Challenge Electronics Transducers are manufactured with no human interaction from initial assembly to quality control and end packaging for the **highest reliability** and **lowest cost**.



Sample Serving

We stock Ready-to-Ship product-samples of almost every Piezoelectric and Electromagnetic Transducer with little to no wait.



Piezoelectric/Electromagnetic Sound Transducers

Product List

Part Number	Product Type	Dimension (mm)	Resonant Frequency (Hz)	Min SPL at Vrated/ 10cm * (dB)	Rated/Max Input Voltage (V)	Termination
CT03E-04S400-1	Electromagnetic	3.2x3.2x2	4,000	72	3/4 Vo-p	Surface Mount
CT05E-04S310-1	Electromagnetic	5.5x5.5x2.5	3,100	80	3/4.5 Vo-p	Surface Mount
CT06E-05T273-2	Electromagnetic	Ø6.5x3.5	2,731	75	3/5 Vo-p	PC Pins
CT08E-04S273-9	Electromagnetic	8.5x8.5x3	2,730	88	3.6/4.5 Vo-p	Surface Mount
CT08E-04S270-5	Electromagnetic	8.5x8.5x4	2,700	97	3.6/4.5 Vo-p	Surface Mount
CT08E-06S300-2	Electromagnetic	8.5x8.5x4	3,000	88	5/6 Vo-p	Surface Mount
CT09E-04T273-5	Electromagnetic	Ø9x4.3	2,730	86	3/4 Vo-p	PC Pins
CT10E-04S283-4	Electromagnetic	10x10x3.5	2,830	93	3.6/4.6 Vo-p	Surface Mount
CT10E-04S283-6	Electromagnetic	10x10x3.5	2,830	90	3.6/4.5 Vo-p	Surface Mount
CT12E-04S200-1	Electromagnetic	Ø12x3.7	2,000	80	3/4 Vo-p	Surface Mount
CT12E-06T204-1	Electromagnetic	Ø12x9	2,048	85	5/6 Vo-p	PC Pins
CT12E-07T240-1X	Electromagnetic	Ø12x9.55	2,400	85	5/7 Vo-p	PC Pins
CT25E-16T75-1	Electromagnetic	Ø25x12.5	750	97	12/16 Vo-p	PC Pins
CT25E-16T150-1	Electromagnetic	Ø25x12.5	1,500	104	12/16 Vo-p	PC Pins
CT11P-25S410-2	Piezoelectric	11x9x1.7	4,100	70	5/25 Vp-p	Surface Mount
CT12P-25S400-4	Piezoelectric	12.2x12x2.8	4,000	78	3/25 Vp-p	Surface Mount
CT18P-18S200-1	Piezoelectric	18x18x8	2,000	90	12/18 Vp-p	Surface Mount
CT23P-30S320-2	Piezoelectric	Ø23.3x22	3,200	115	12/15 VDC	Surface Mount
CT30P-50T400-1	Piezoelectric	Ø30x8.2	4,000	120	18/50 Vp-p	PC Pins
CT30P-30T260-1X	Piezoelectric	Ø30x14	2,600	103	12/30 Vp-p	PC Pins
CT31P-30W520-1	Piezoelectric	Ø31.6x8.5	5,200	120	18/30 Vp-p	Wire Leaded with Connector
CT43P-35W300-1	Piezoelectric	Ø43x18	3,000	120	30/35 Vp-p	Wire Leaded

For additional Transducer products, please visit our website at:

www.challengeelectronics.com/sound_transducers

* SPL values are standardized to a consistent distance and rated wattage. For production values, please reference the corresponding specification sheet.

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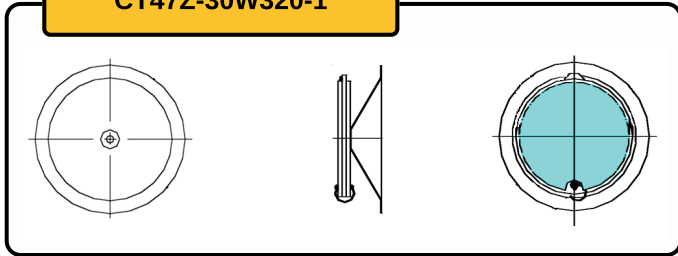


Piezoelectric Elements

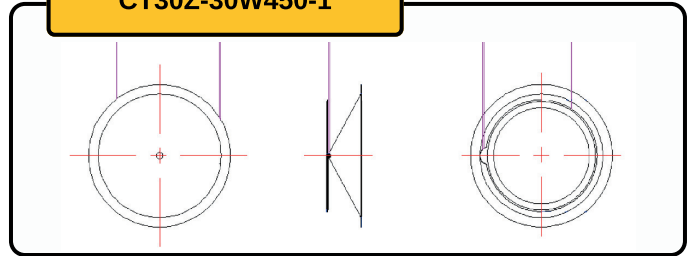
Piezoelectric Elements are components that translate an electrical signal to a physical vibration yielding a change in air pressure otherwise known as **sound**. These lightweight, small-footprint units are ideal for audio signal generation in space-sensitive systems and can even provide an IP Rated end application. A piezoelectric element can be used both as a **transmitter** and **receiver** of audio signals.

Worried about designing the perfect mounting chamber? No problem! Challenge Electronics will provide free consultations and mounting constraints to make sure you get the best sound!

CT47Z-30W320-1



CT30Z-30W450-1



Mounted Mylar Magic

Our Piezoelectric Elements can be optimized with a **Mounted Mylar Diaphragm**, reaching over 110 dB in an IP rated, small footprint enclosure.



Creative Compact Capability

We optimize the advantageous dimensions of our Piezoelectric Elements to provide a low-cost, **high performance** product from as small as 0.1mm.



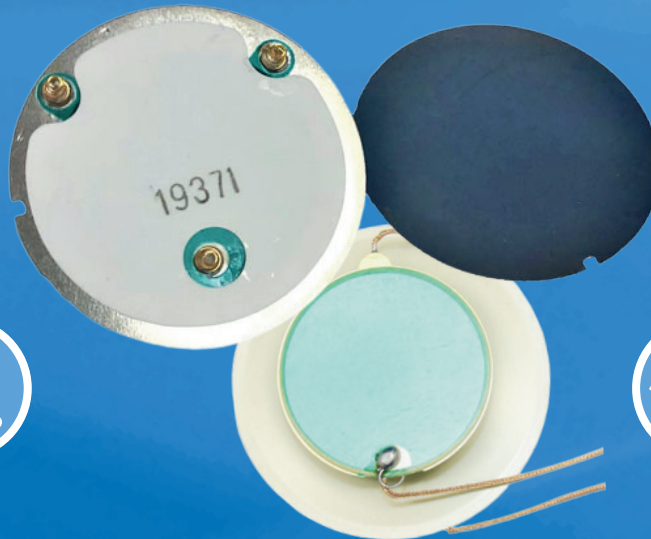
Electrical Output Options

Challenge Electronics' Piezoelectric Elements incorporate almost all our **Electrical Output Connections**.



Sample Serving

We stock Ready-to-Ship product-samples of almost every Piezoelectric Element with little to no wait.



Piezoelectric Elements

Product List

Part Number	Dimensions (mm)	Resonant Frequency (Hz)	Max Input Voltage (Vp-p)	Material	Termination
CT09Z-30N800-1	Ø9x0.11	8,000	30	Brass	Non-Terminated
CT10Z-30N420-1	10x10x0.1	4,200	30	Nickel Alloy	Non-Terminated
CT12Z-30N900-1	Ø12x0.5	9,000	30	Brass	Non-Terminated
CT15Z-30W410-1	Ø15x0.4	4,100	30	Brass	Wire Leaded with Connector
CT19Z-30R360-2	Ø19.9x0.2	3,600	30	Nickel Alloy	Spring
CT27Z-30N320-1	Ø27x0.3	3,200	30	Stainless Steel	Non-Terminated
CT35Z-35R280-3	Ø35x0.53	2,800	35	Stainless Steel	Spring
CT47Z-30W320-1	Ø47.7x0.68	3,200	30	Brass	Wire Leaded

For additional Piezoelectric Elements, please visit our website at:

www.challengeelectronics.com/sound_transducers

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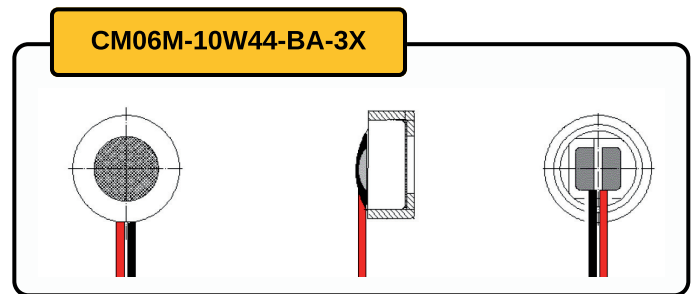
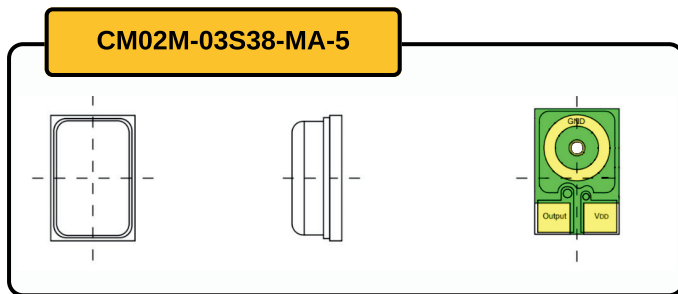
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ECM & MEMS Microphones

Electric Condenser Microphones (ECM) are a cornerstone of audio technology, featuring a capacitive plate paired with a diaphragm. When sound enters the acoustic port, the diaphragm vibrates, causing changes in the capacitance that mirror the sound waves, transforming them into an **electrical signal**.

Micro-Electromechanical-Systems (MEMS) represent the smallest microphone form factor offered by Challenge Electronics. Incorporating an **ASIC** (Application-Specific-Integrated Circuit) and a transducer with a silicon diaphragm, our MEMS microphones are engineered for **optimal performance** in compact geometries.



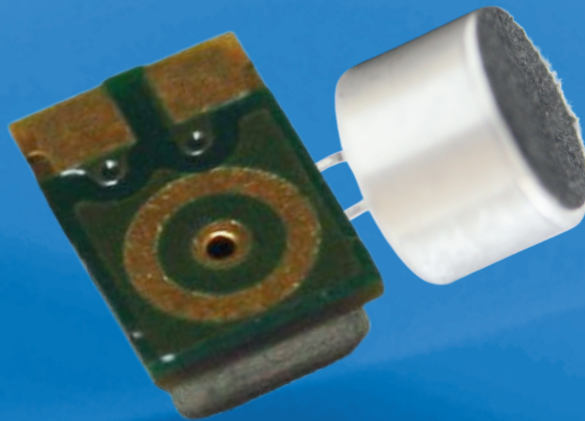
Electrical Output Options

Our ECM and MEMS microphones incorporate all **Electrical Connectivity Options** utilized by Challenge Electronics and can be customized for an IP Rated application.



Small-Scale Footprint

Smallest MEMS:
2.75mm x 1.85mm x
0.95mm.



Precision Phase and Sensitivity Control

All our MEMS microphones are perfect for high sensitivity **beamforming** applications.



Sample Serving!

We stock Ready-to-Ship product samples of almost every ECM and MEMS Microphone with little to no wait.



ECM & MEMS Microphones

Product List

Part Number	Product Type	Dimensions (mm)	Directivity	Sensitivity	Min. S/N (dB)	Communication Format	Termination
CM02M-03S38-MA-6	MEMS	2.75x1.85x0.95	Omnidirectional	-38 (dBV/Pa)	60	Analog	Surface Mount
CM03M-03S42-MA-9	MEMS	3.76X2.24X1.1	Omnidirectional	-42 (dBV/Pa)	58	Analog	Surface Mount
CM04M-03S26-MD-9	MEMS	4x3x1.1	Omnidirectional	-26 (dBFS)	58	Digital	Surface Mount
CM07U-10W45-BA-1	ECM	Ø7.2x3.1	Unidirectional	-45 (dBV/Pa)	58	Analog	Wire Leaded
CM08M-10W38-BA-1	ECM	Ø8x4.6	Omnidirectional	-38 (dBV/Pa)	58	Analog	Wire Leaded with Connector
CM10M-10P32-BA-1	ECM	Ø10x5	Omnidirectional	-32 (dBV/Pa)	60	Analog	Solder Pads

For additional ECM and MEMS Microphones, please visit our website at:

www.challengeelectronics.com/microphones

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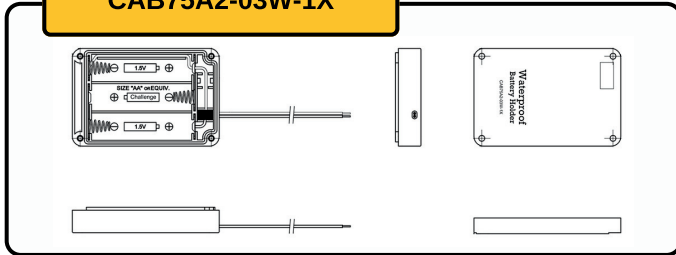
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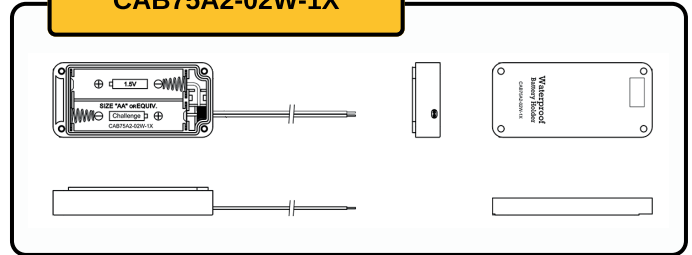
Battery/Wire Assemblies

Challenge Electronics offers battery assemblies with **diverse electric output** connections for standard cells like 9V, AA, Half AA, and AAA. Beyond our extensive inventory, we design **custom assemblies** for any battery holder application, providing innovative battery placement, easy installation, and much more.

CAB75A2-03W-1X



CAB75A2-02W-1X



Custom Creation

We provide our customers with innovative & custom Battery Assemblies designed to fit **any power application**.



Safety First!

Our Battery Assemblies can be **waterproof** and rated from -20 °C to over 100 °C!

Wild World of Wires!

Challenge Electronics provides low cost, high reliability wire assemblies, custom designed with **any wire type and connector** for all your signal routing needs!



Sample Serving!

We stock Ready-to-Ship product samples of almost every Battery & Wire Assembly, with little to no wait!



Battery/Wire Assemblies Product List

Part Number	Battery Type	Battery Quantity	Dimensions (mm)	Termination	IP
CAB25V9-01W-1	9 V	1	25.5x12.7x7.2	Wire Leaded	No
CAB75A2-02W-1X	AA	2	75x35x13	Wire Leaded	IP65
CAB75A2-03W-1X	AA	3	75x50x13	Wire Leaded	IP65
CAB34HA-01T-1	Half AA	1	34.4x17.5x15	Through Hole	No
CAB72A3-02W-2X	AAA	2	72.5x26.4x11.5	Wire Leaded	IP65
CAB97A3-08W-1	AAA	8	97x24.4x23.8	Wire Leaded	No
CAB62CC-02D-1	C Cell	2	62.5x55.8x23.5	Solder Tab	No
CAB110DC-03W-1X	D Cell	3	110x90x32.5	Wire Leaded	IP65
CAB75LA-01W-1	18650	1	75x21x21	Wire Leaded	No
CAB52LB-01S-1	CR123A	1	52x18x15.4	Surface Mount	No
CAB07LC-01S-1	Coin Cell	1	7.87x5x2.25	Surface Mount	No

For additional Battery Assemblies, please visit our website at:

www.challengeelectronics.com/assembly

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Company Promise

From sketch to sales order, our customers enjoy our technical support from both our engineering & sales teams. Whether it's swapping a speaker with a piezoelectric element for space-to-sound benefits, achieving an ideal SPL, or incorporating a custom chamber for clarity, our team will help every step of the way.

Quality is Key

Challenge Electronics prides itself on **world class innovation** and continue to incorporate innovative thinking, engineering skills, and sales knowledge to enhance our Customer Experience and Satisfaction in the end product.

Sample Serving

Challenge Electronics stocks sample products of our **top performing components** on ready to ship Distribution platforms such as **Digikey**.

MORE INFO >>

For more information on any topic, contact your local Challenge Electronics Sales Representative.

Thank you for taking the time reviewing what Challenge Electronics has to offer. We look forward to hearing from you.

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