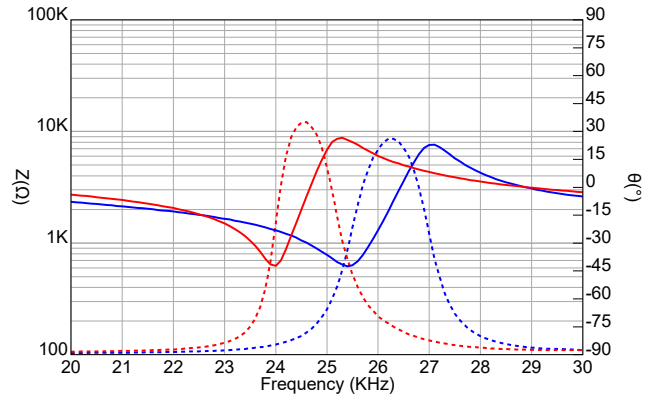




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level.

250SR160 Impedance —————  
 250SR160 Phase - - - - -  
 250ST160 Impedance —————  
 250ST160 Phase - - - - -



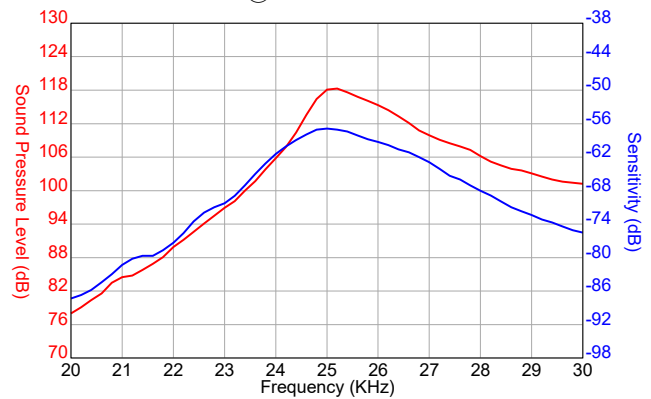
**Specification**

250ST160	Transmitter
250SR160	Receiver
Center Frequency	25.0±1.0KHz
Bandwidth (-6dB)	2.0KHz
Transmitting Sound Pressure Level at 25.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm	112dB min.
Receiving Sensitivity at 25.0KHz 0dB = 1 volt/μbar	-62dB min.
Capacitance at 1KHz ±20%	250ST 3000 pF 250SR 2600 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle (-6dB)	85° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

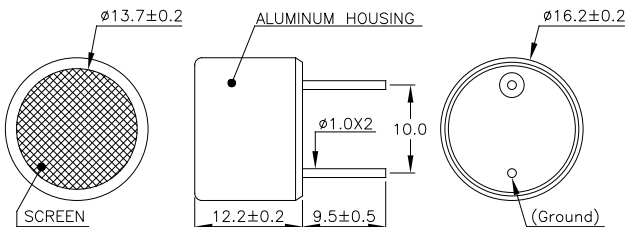


Model available:

1	250ST/R160	Aluminum Housing
2	250ST/R16B	Black Aluminum Housing
3	250ST/R16P	Plastic Housing

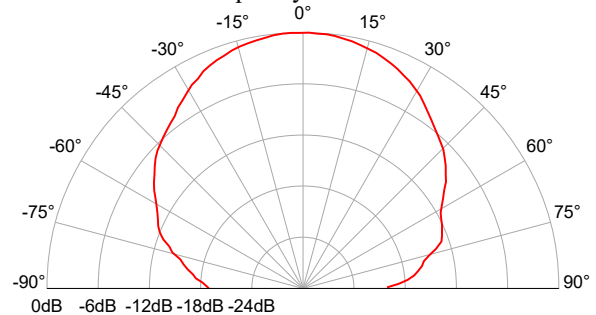
**Dimensions**

dimensions are in mm



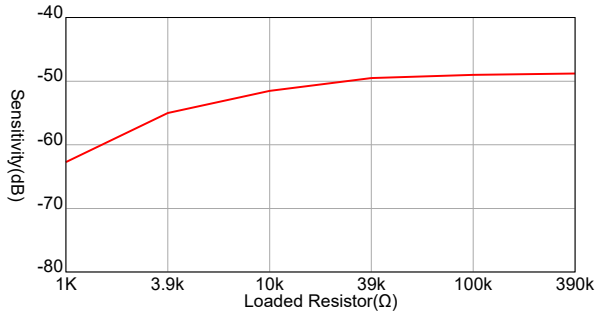
**Beam Angle**

Tested at 25.0KHz Frequency

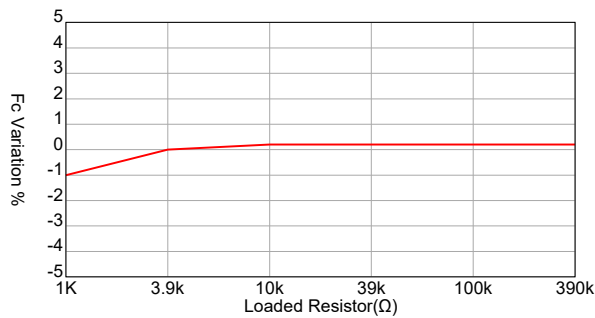


**250SR160 Receiver**

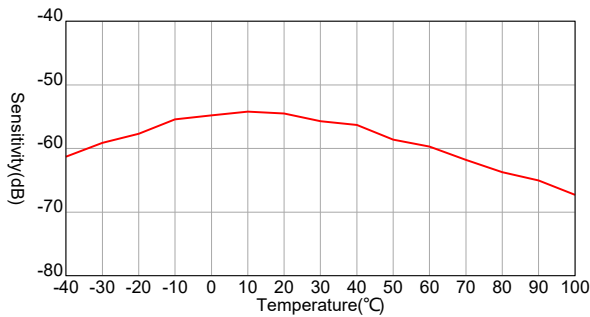
**Sensitivity Variation vs. Loaded Resistor**



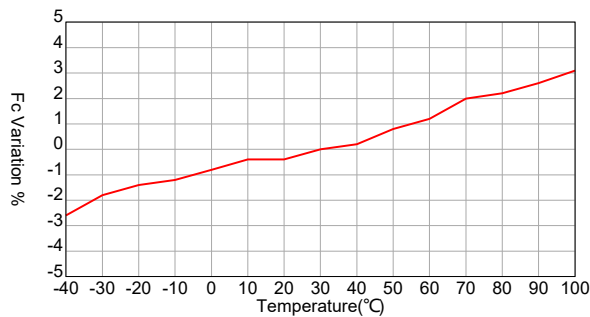
**Center Frequency Shift vs. Loaded Resistor**



**Sensitivity Variation vs. Temperature**

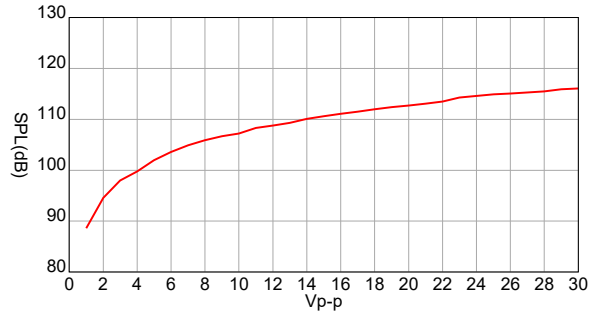


**Center Frequency Shift vs. Temperature**

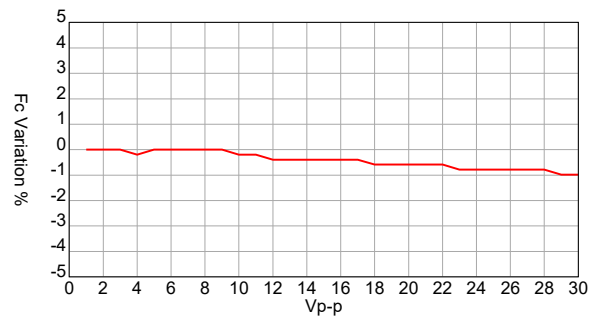


**250ST160 Transmitter**

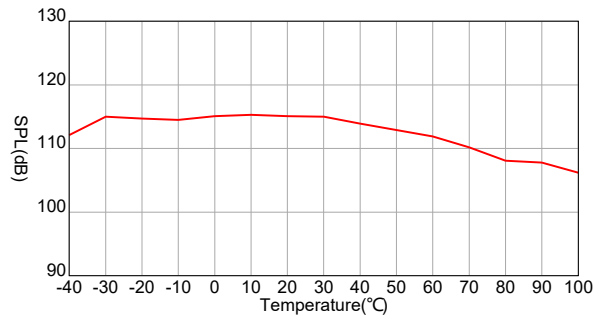
**SPL Variation vs. Driving Voltage**



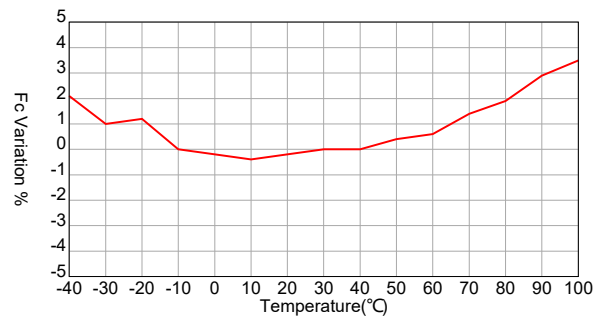
**Center Frequency Shift vs. Driving Voltage**



**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



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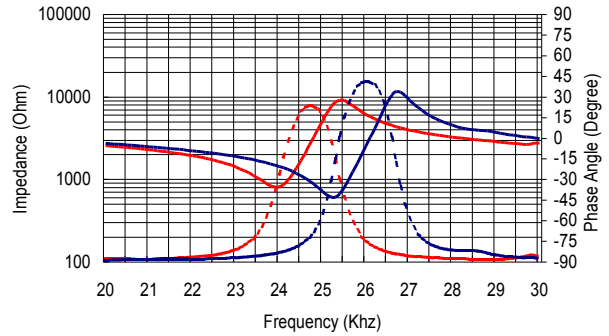
[Http://www.pro-wave.com.tw](http://www.pro-wave.com.tw) ; E-mail: [sales@pro-wave.com.tw](mailto:sales@pro-wave.com.tw) ; Tel: 886-2-22465101 ; Fax: 886-2-22465105



**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

250SR180 Impedance ————  
 250SR180 Phase - - - - -  
 250ST180 Impedance ————  
 250ST180 Phase - - - - -



**Specification**

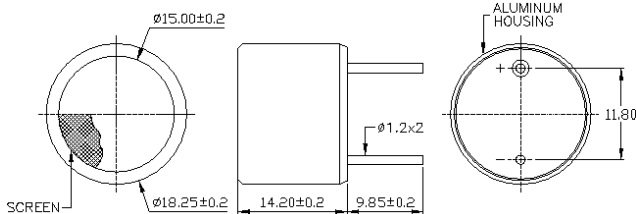
250ST180	Transmitter
250SR180	Receiver
Center Frequency	25.0±1.0KHz
Bandwidth (-6dB)	250ST180 1.5KHz 250SR180 1.8KHz
Transmitting Sound Pressure Level at 25.0KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	112dB min.
Receiving Sensitivity at 25.0KHz 0dB = 1 volt/µbar	-62dB min.
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle -6dB	95° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

Model available:

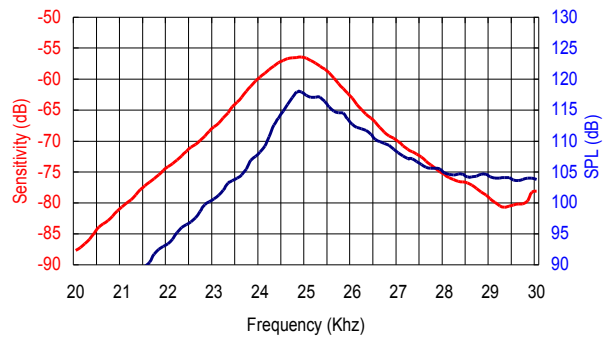
1	250ST/R180	Aluminum Housing
2	250ST/R18B	Black Al. Housing

**Dimensions:** dimensions are in mm



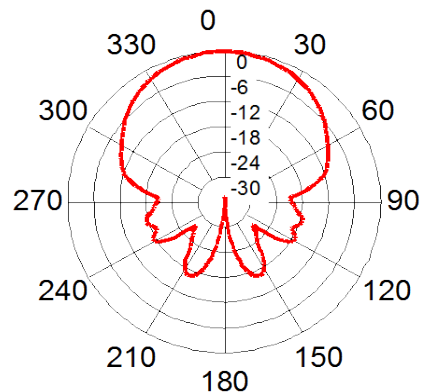
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



**Beam Angle**

Tested at 25.0KHz frequency

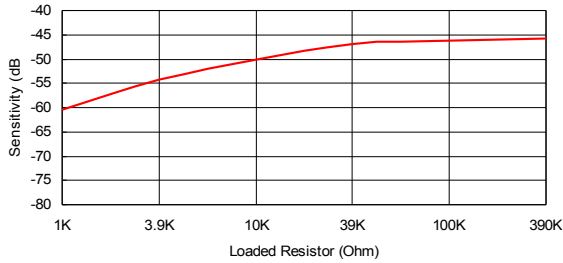


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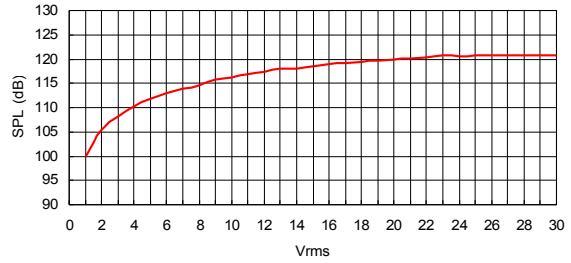
**250SR180 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

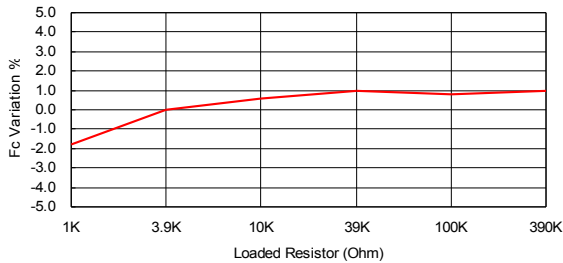


**250ST180 Transmitter**

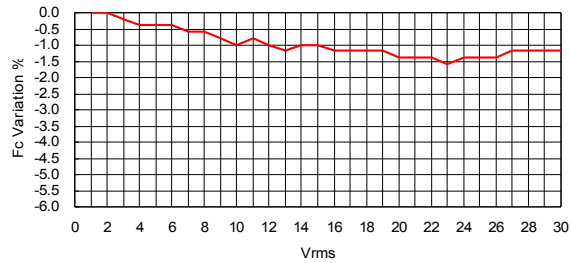
**SPL Variation vs. Driving Voltage**



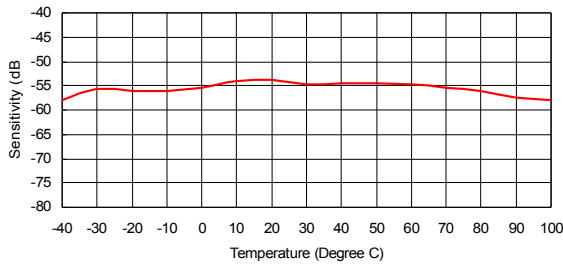
**Center Frequency Shift vs. Loaded Resistor**



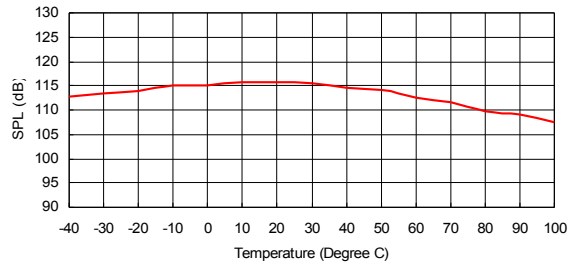
**Center Frequency Shift vs. Driving Voltage**



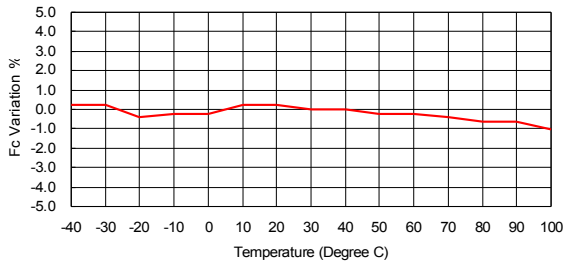
**Sensitivity Variation vs. Temperature**



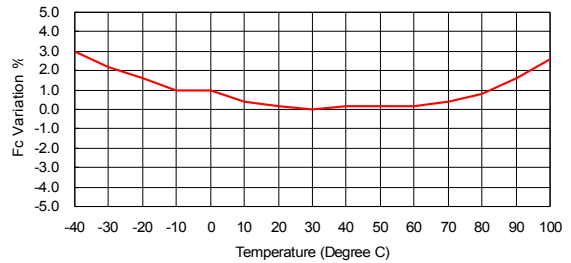
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



**Center Frequency Shift vs. Temperature**

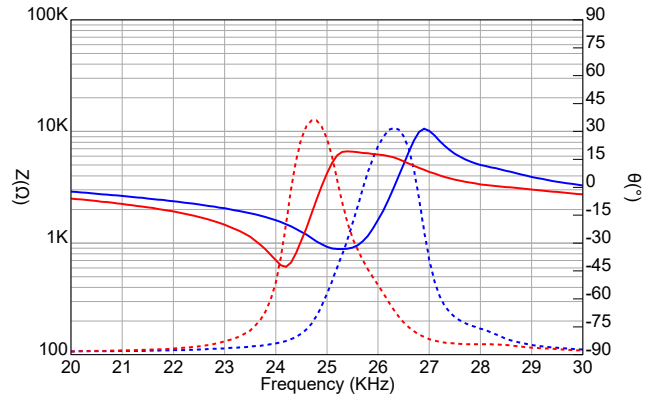




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

250SR240 Impedance ————  
 250SR240 Phase - - - - -  
 250ST240 Impedance ————  
 250ST240 Phase - - - - -



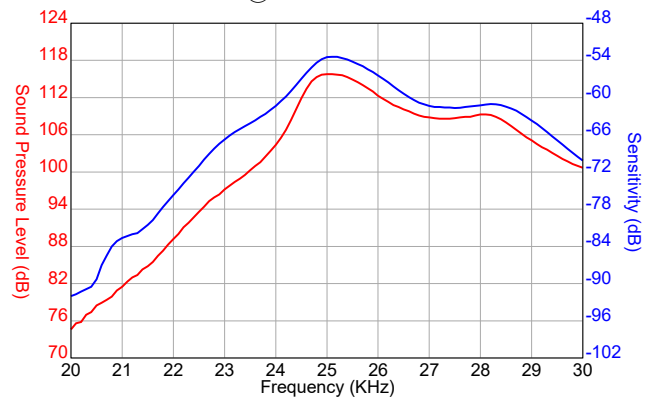
**Specification**

250ST240	Transmitter
250SR240	Receiver
Center Frequency	25.0±1.0KHz
Bandwidth (-6dB)	250ST 1.5KHz
	250SR 1.8KHz
Transmitting Sound Pressure Level at 25.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm	115dB min.
Receiving Sensitivity at 25.0KHz 0dB = 1 volt/μbar	-60dB min.
Capacitance at 1KHz ±20%	250ST 3000 pF
	250SR 2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle (-6dB)	55° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

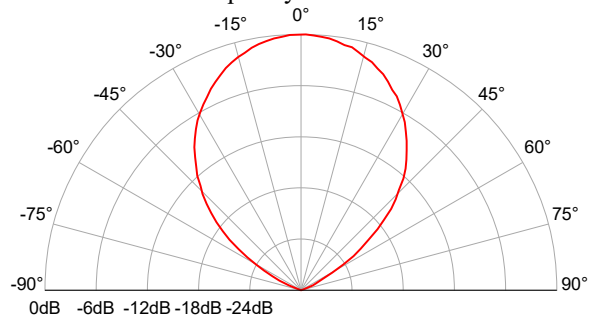
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



**Beam Angle**

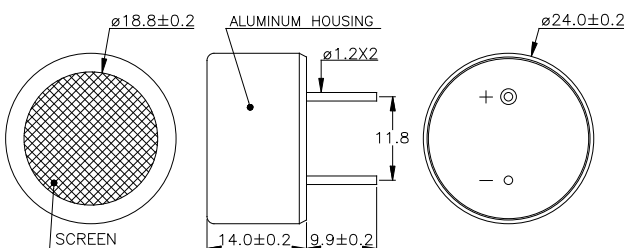
Tested at 25.0KHz frequency



Model available:

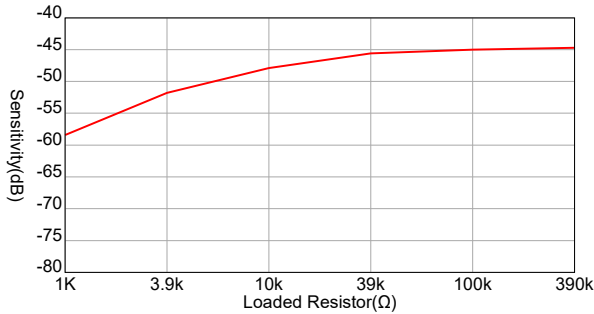
1	250ST/R240	Aluminum Housing
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**Dimensions:** dimensions are in mm

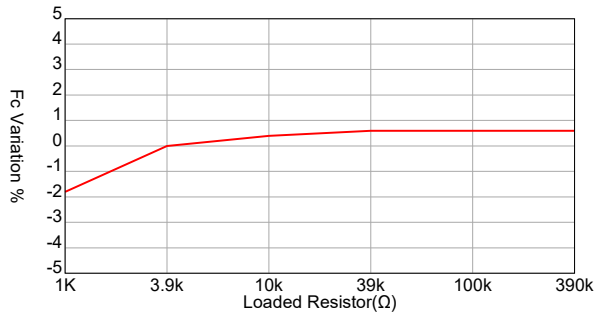


**250SR240 Receiver**

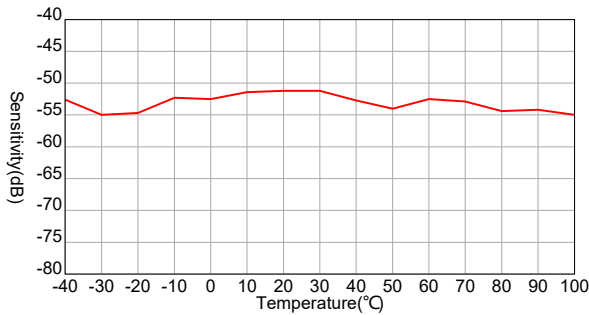
**Sensitivity Variation vs. Loaded Resistor**



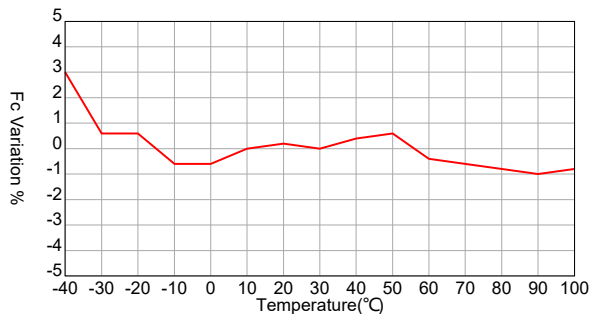
**Center Frequency Shift vs. Loaded Resistor**



**Sensitivity Variation vs. Temperature**

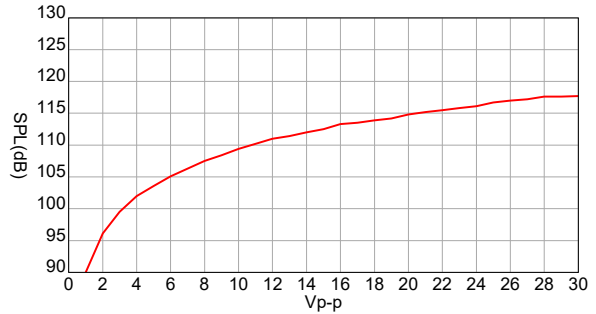


**Center Frequency Shift vs. Temperature**

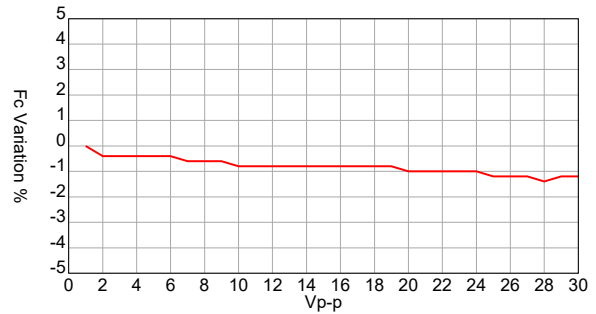


**250ST240 Transmitter**

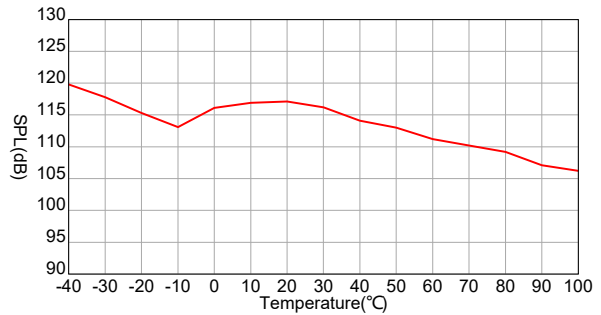
**SPL Variation vs. Driving Voltage**



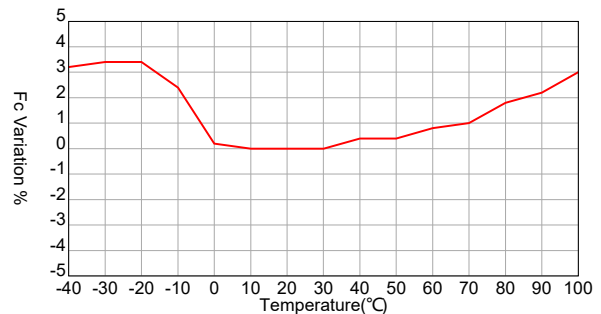
**Center Frequency Shift vs. Driving Voltage**



**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**

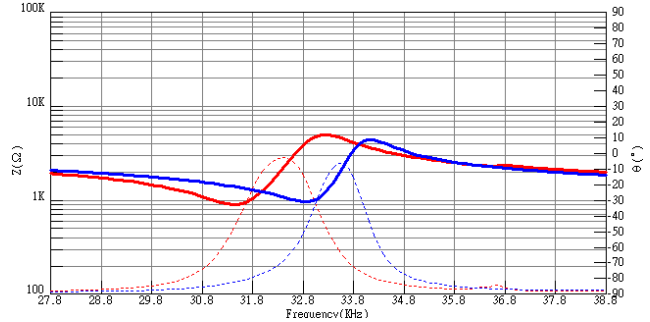




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

328SR160 Impedance ————  
 328SR160 Phase - - - - -  
 328ST160 Impedance ————  
 328ST160 Phase - - - - -



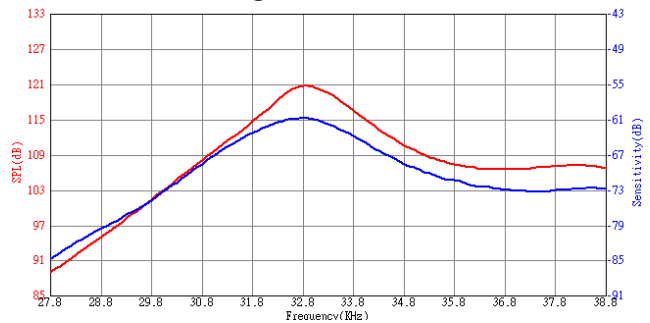
**Specification**

328ST160	Transmitter
328SR160	Receiver
Center Frequency	32.8±1.0KHz
Bandwidth (-6dB)	328ST160 2.0KHz
	328SR160 2.5KHz
Transmitting Sound Pressure Level at 32.8KHz; 0dB re 0.0002μbar per 10Vrms at 30cm	115dB min.
Receiving Sensitivity at 32.8KHz 0dB = 1 volt/μbar	-67dB min.
Capacitance at 1KHz ±20%	2600 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle -6dB	75° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

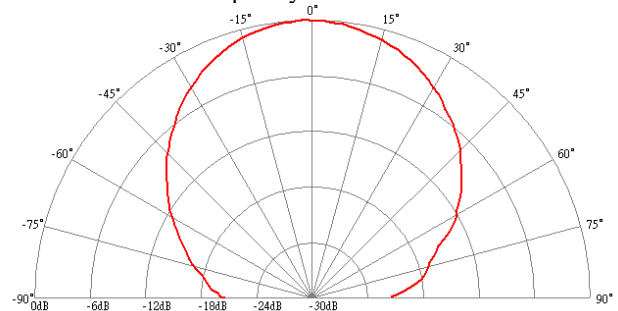
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



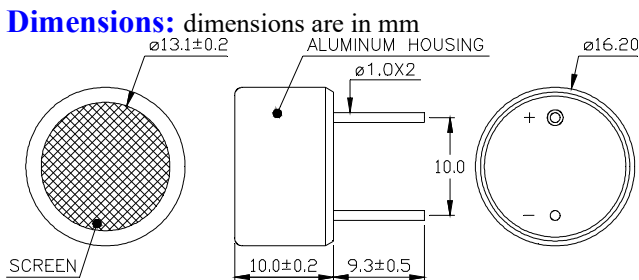
**Beam Angle**

Tested at 32.8KHz frequency



Model available:

1	328ST/R160	Aluminum Housing
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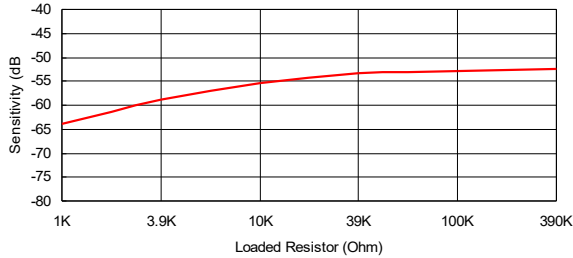


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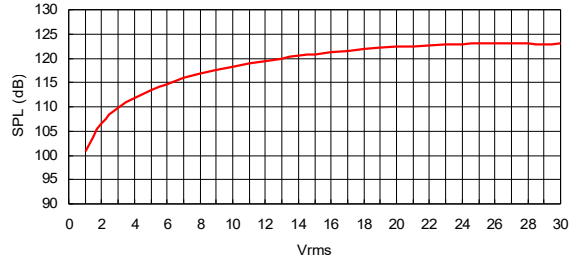
**328SR160 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

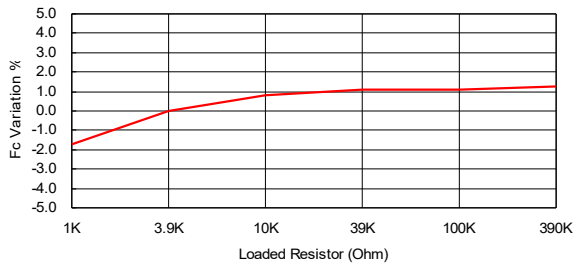


**328ST160 Transmitter**

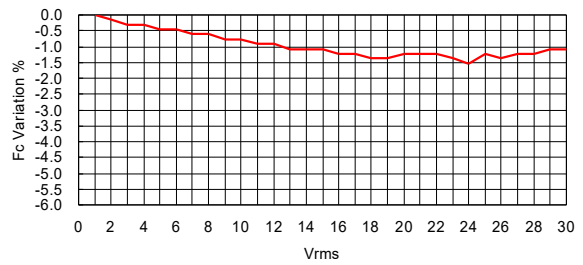
**SPL Variation vs. Driving Voltage**



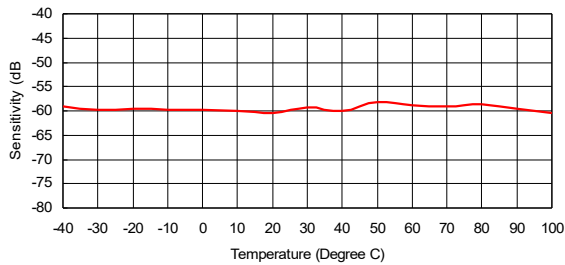
**Center Frequency Shift vs. Loaded Resistor**



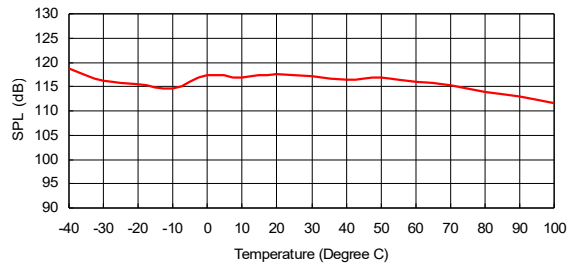
**Center Frequency Shift vs. Driving Voltage**



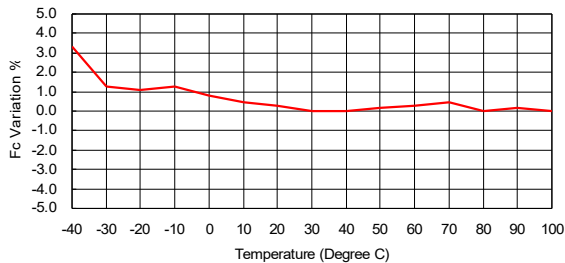
**Sensitivity Variation vs. Temperature**



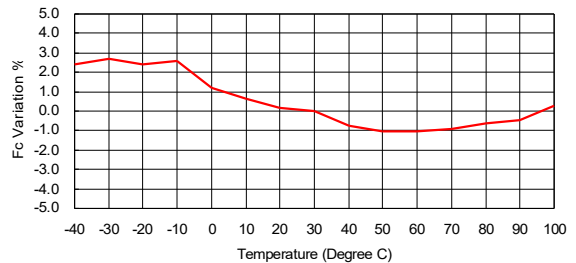
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



**Center Frequency Shift vs. Temperature**



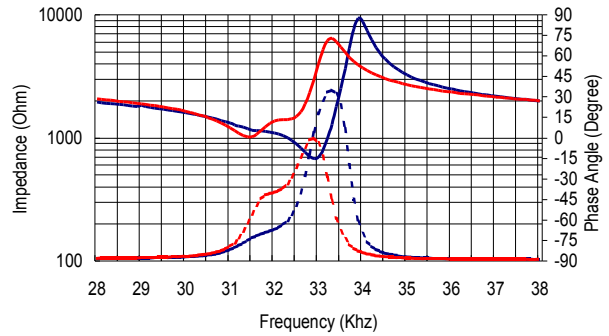




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

- 328SR180 Impedance —————
- 328SR180 Phase - - - - -
- 328ST180 Impedance —————
- 328ST180 Phase - - - - -



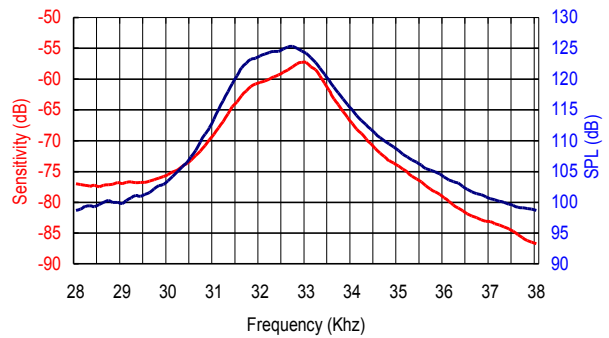
**Specification**

328ST180	Transmitter
328SR180	Receiver
Center Frequency	32.8±1.0KHz
Bandwidth (-6dB)	328ST180 2KHz
	328SR180 2KHz
Transmitting Sound Pressure Level at 32.8KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	117dB min.
Receiving Sensitivity at 32.8KHz 0dB = 1 volt/µbar	-64dB min.
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle -6dB	45° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
Closer frequency tolerance can be supplied upon request.

**Sensitivity/Sound Pressure Level**

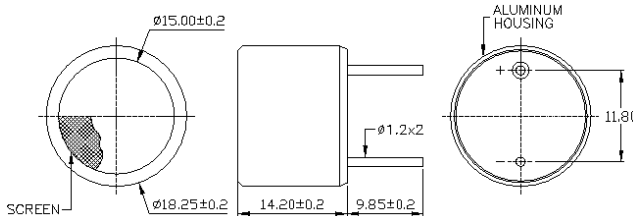
Tested under 10Vrms @30cm



Model available:

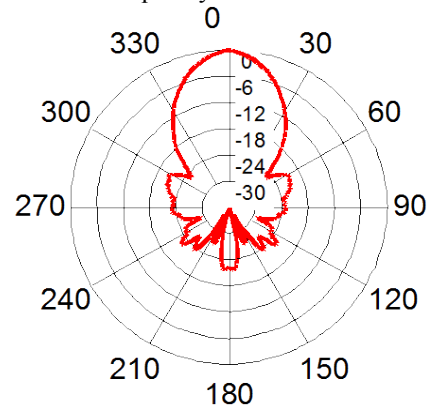
1	328ST/R180	Aluminum Housing
2	328ST/R18B	Black Al. Housing

**Dimensions:** dimensions are in mm



**Beam Angle**

Tested at 32.8KHz frequency

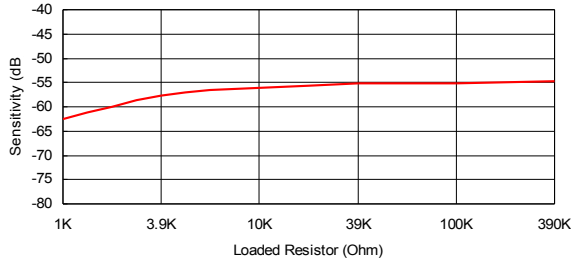


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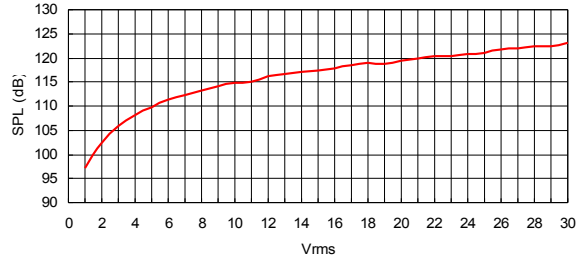
**328SR180 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

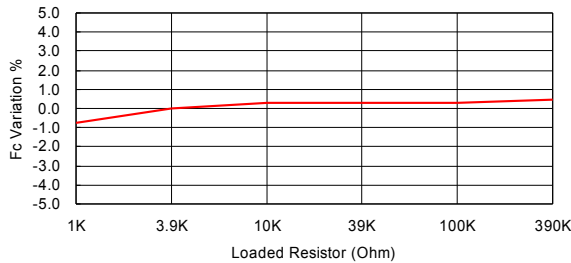


**328ST180 Transmitter**

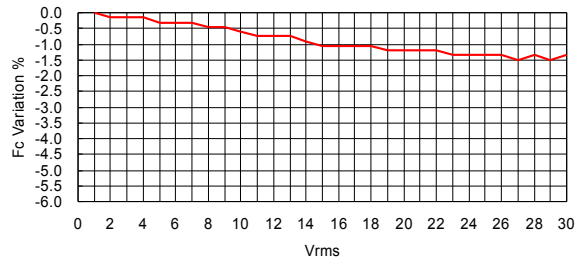
**SPL Variation vs. Driving Voltage**



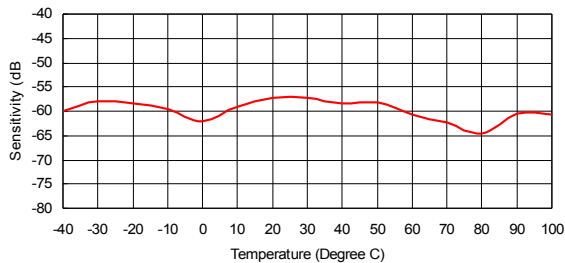
**Center Frequency Shift vs. Loaded Resistor**



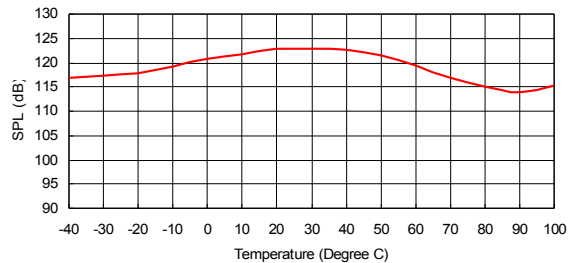
**Center Frequency Shift vs. Driving Voltage**



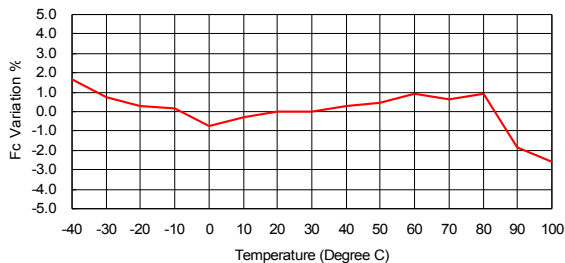
**Sensitivity Variation vs. Temperature**



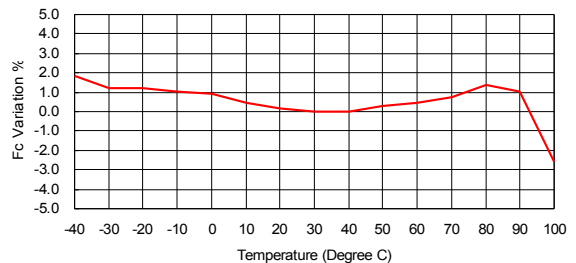
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



**Center Frequency Shift vs. Temperature**

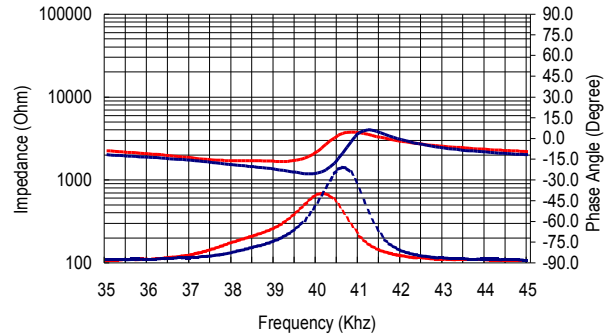




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

400SR100 Impedance ————  
 400SR100 Phase - - - - -  
 400ST100 Impedance ————  
 400ST100 Phase - - - - -



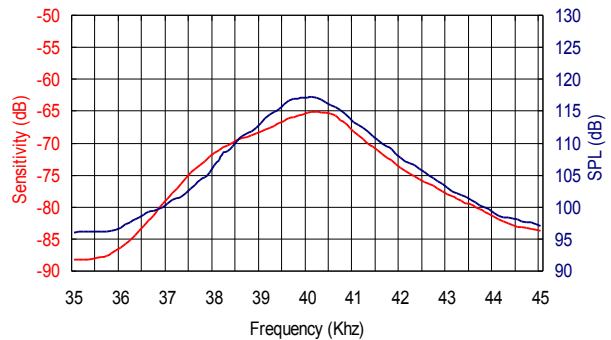
**Specification**

400ST100	Transmitter
400SR100	Receiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400ST10P 2.5KHz 400SR10P 3.0KHz
Transmitting Sound Pressure Level at 40.0KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	112dB min.
Receiving Sensitivity at 40.0KHz 0dB = 1 volt/µbar	-67dB min.
Capacitance at 1KHz	±20% 1900 pF
Max. Driving Voltage (cont.)	10Vrms
Total Beam Angle	-6dB 72° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

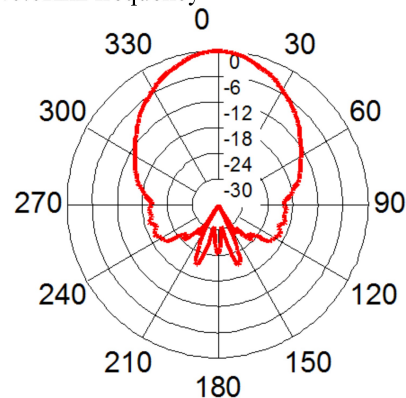


Model available:

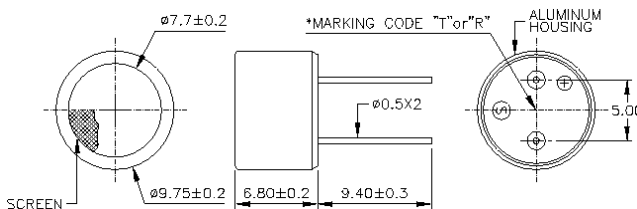
1	400ST/R100	Aluminum Housing
2	400ST/R10P	Plastic Housing

**Beam Angle**

Tested at 40.0KHz frequency



**Dimensions:** Dimensions are in mm

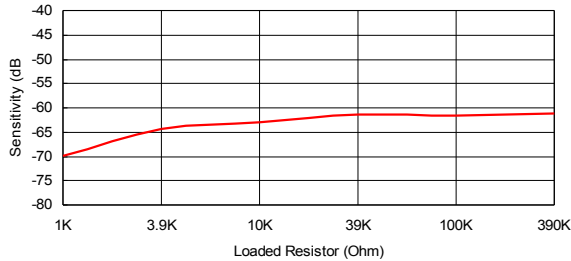


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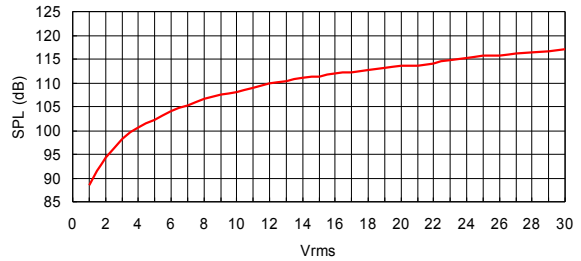
**400SR100 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

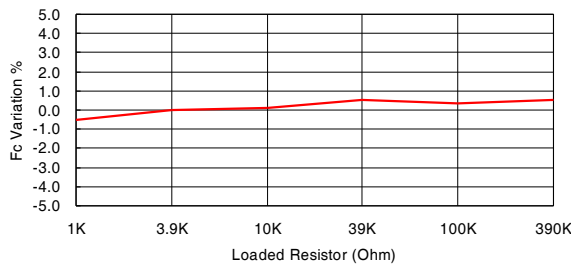


**400ST100 Transmitter**

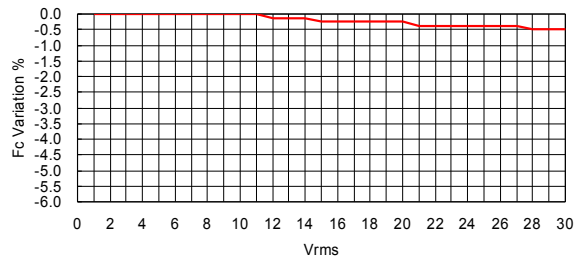
**SPL Variation vs. Driving Voltage**



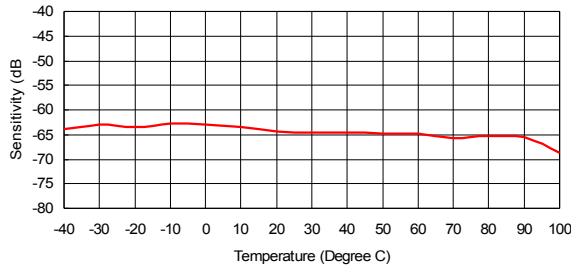
**Center Frequency Shift vs. Loaded Resistor**



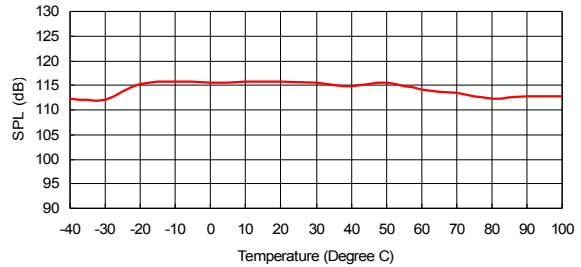
**Center Frequency Shift vs. Driving Voltage**



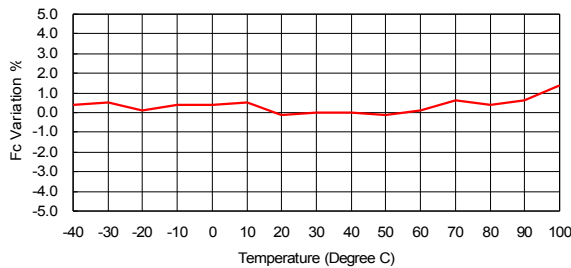
**Sensitivity Variation vs. Temperature**



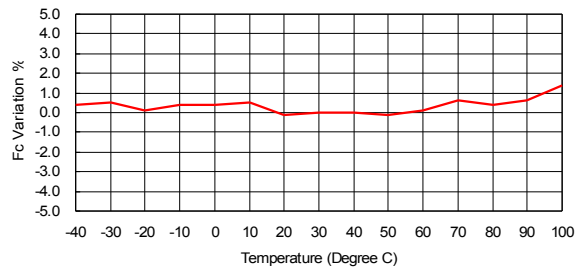
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



**Center Frequency Shift vs. Temperature**

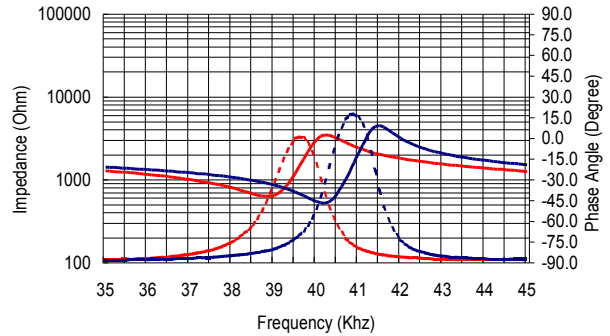




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

400SR120 Impedance ————  
 400SR120 Phase - - - - -  
 400ST120 Impedance ————  
 400ST120 Phase - - - - -



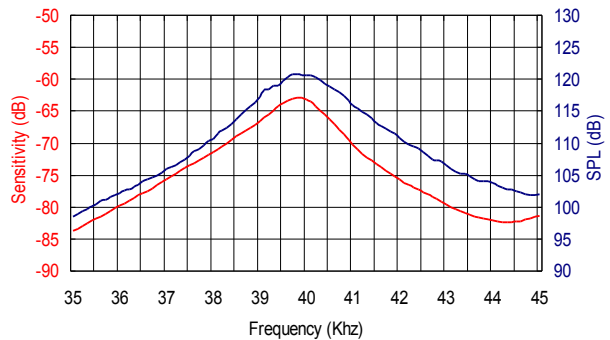
**Specification**

400ST120	Transmitter
400SR120	Receiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400ST120 2.0KHz 400SR120 2.0KHz
Transmitting Sound Pressure Level at 40.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm	115dB min.
Receiving Sensitivity at 40.0KHz 0dB = 1 volt/μbar	-67dB min.
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle -6dB	85° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

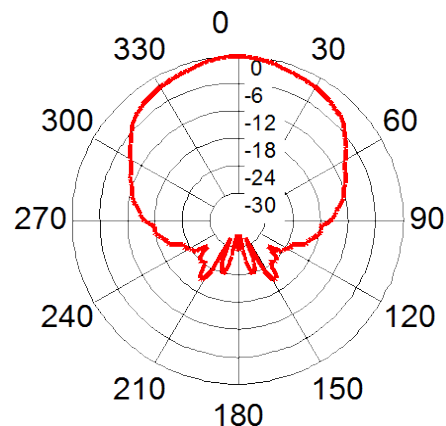


Model available:

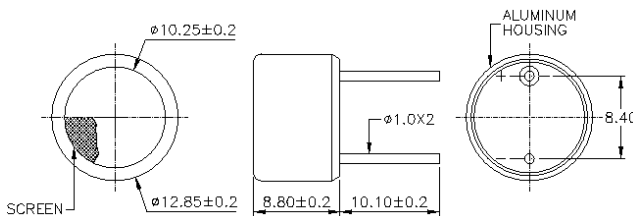
1	400ST/R120	Aluminum Housing
2	400ST/R12B	Black Al. Housing

**Beam Angle**

Tested at 40.0KHz frequency



**Dimensions:** dimensions are in mm

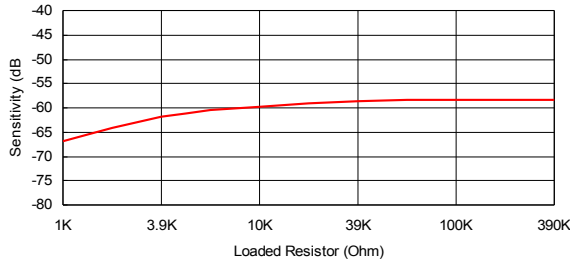


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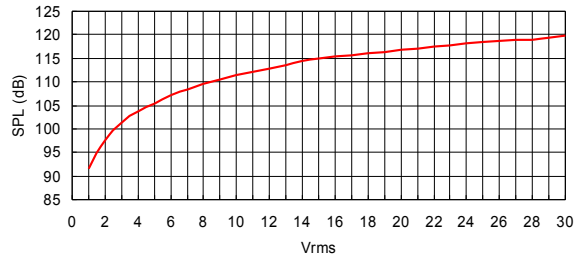
**400SR120 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

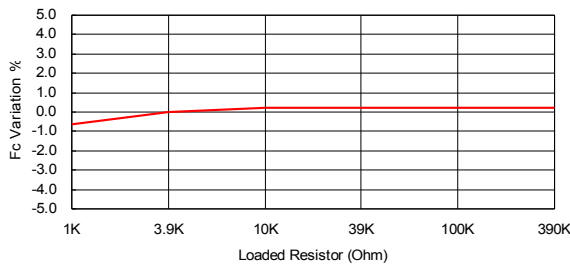


**400ST120 Transmitter**

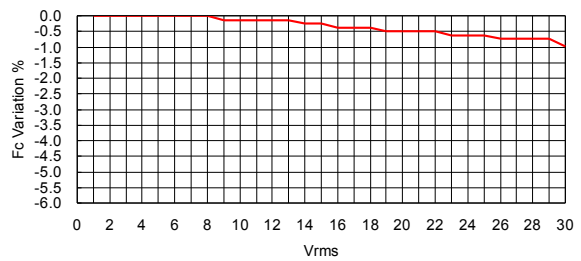
**SPL Variation vs. Driving Voltage**



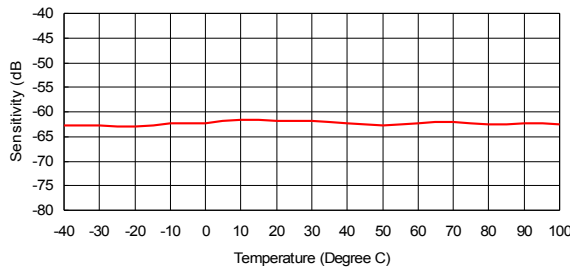
**Center Frequency Shift vs. Loaded Resistor**



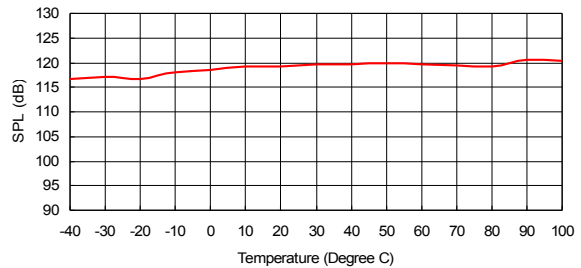
**Center Frequency Shift vs. Driving Voltage**



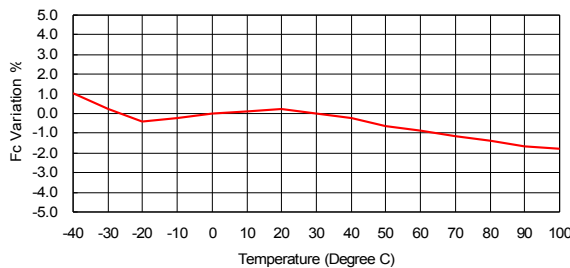
**Sensitivity Variation vs. Temperature**



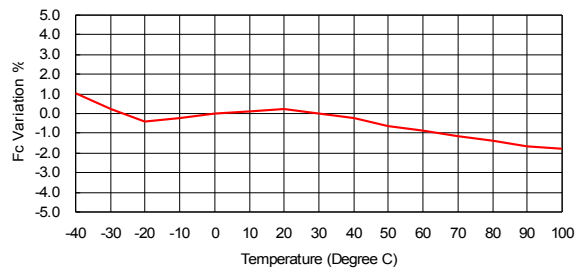
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



**Center Frequency Shift vs. Temperature**

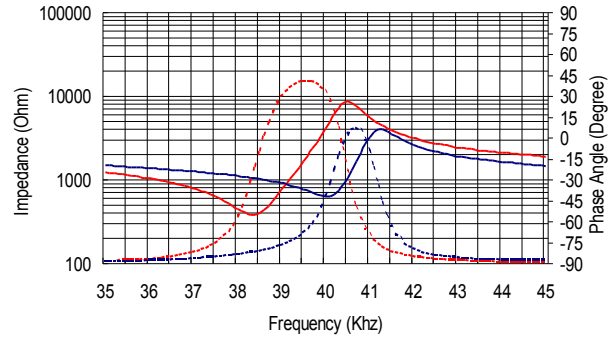




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

400SR160 Impedance ————  
 400SR160 Phase - - - - -  
 400ST160 Impedance ————  
 400ST160 Phase - - - - -



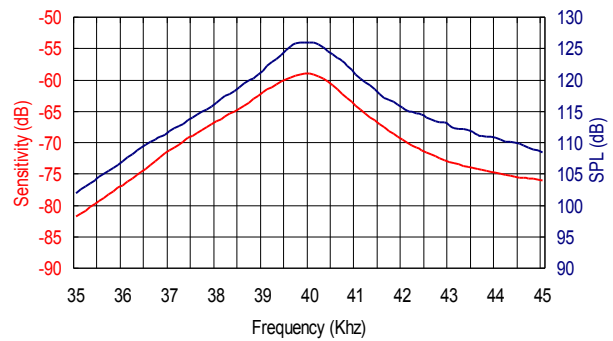
**Specification**

400ST160	Transmitter
400SR160	Receiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400ST160: 2.0KHz 400SR160: 2.5KHz
Transmitting Sound Pressure Level at 40.0KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	120dB min.
Receiving Sensitivity at 40.0KHz 0dB = 1 volt/µbar	-61dB min.
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle -6dB	55° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

**Sensitivity/Sound Pressure Level**

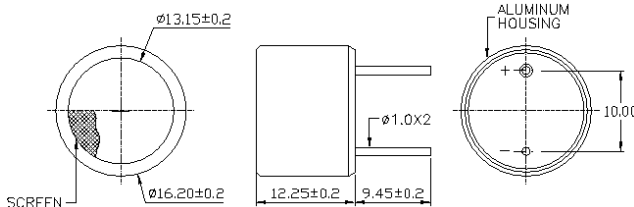
Tested under 10Vrms @30cm



Models available:

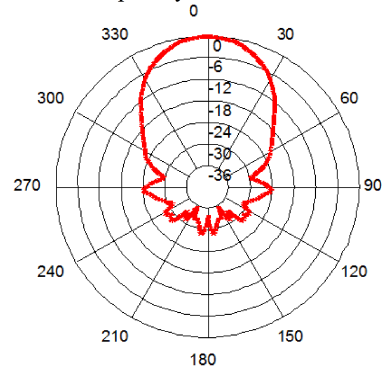
1	400ST/R160	Aluminum Housing
2	400ST/R16B	Black Al. Housing
3	400ST/R16P	Plastic Housing

**Dimensions:** dimensions are in mm



**Beam Angle**

Tested at 40.0KHz frequency

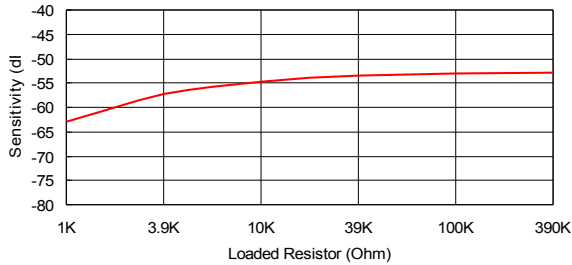


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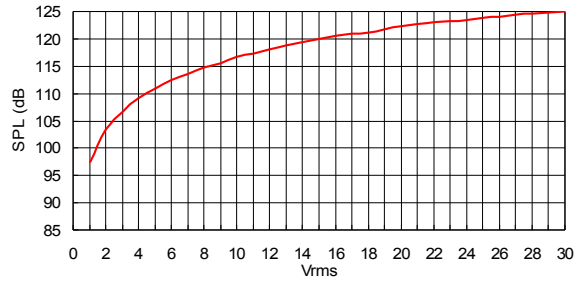
**400SR160 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

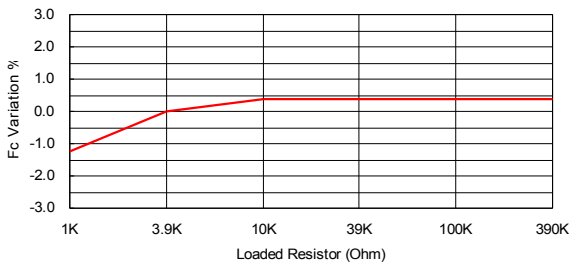


**400ST160 Transmitter**

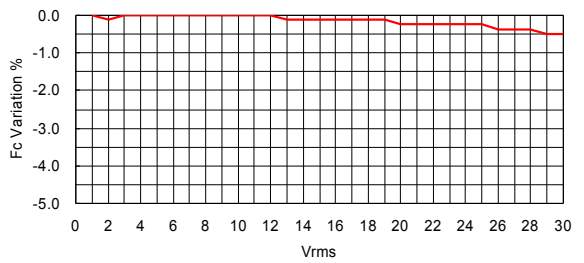
**SPL Variation vs. Driving Voltage**



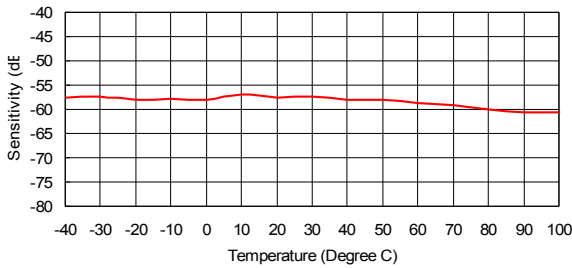
**Center Frequency Shift vs. Loaded Resistor**



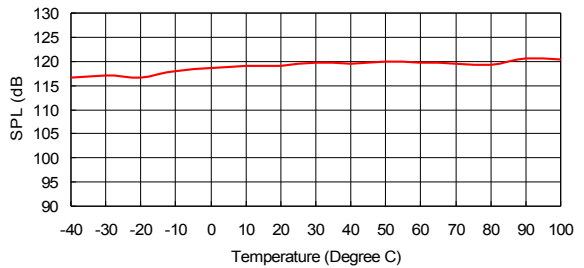
**Center Frequency Shift vs. Driving Voltage**



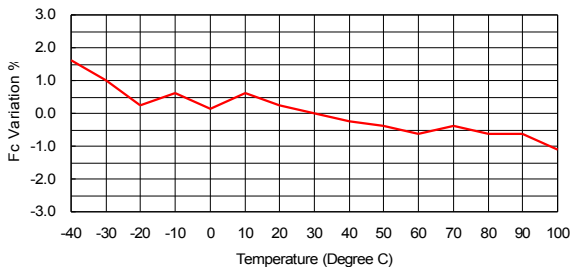
**Sensitivity Variation vs. Temperature**



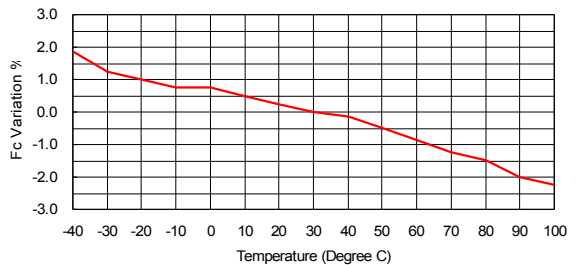
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



**Center Frequency Shift vs. Temperature**



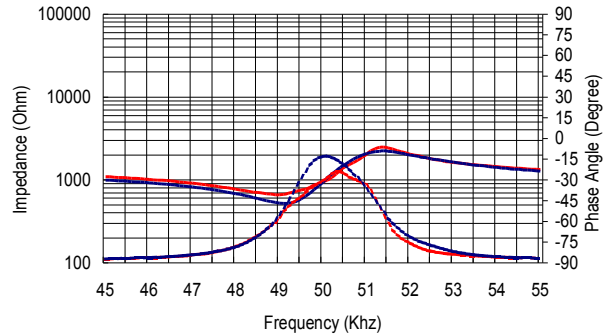




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

Receiver Impedance —————  
 Receiver Phase - - - - -  
 Transmitter Impedance —————  
 Transmitter Phase - - - - -



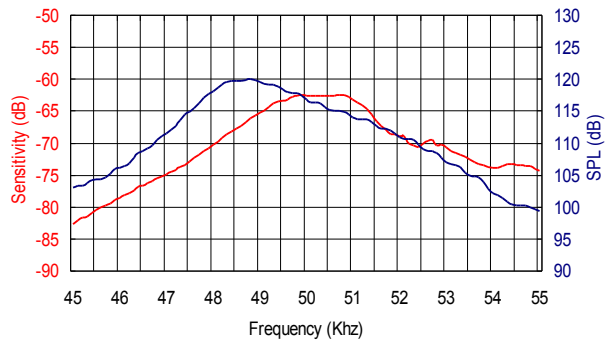
**Specification**

<b>500MB120</b>	<b>Dual Transducer</b>
<b>Center Frequency</b>	<b>50.0±1.0KHz</b>
<b>Bandwidth (-6dB)</b>	<b>3KHz</b>
<b>Transmitting Sound Pressure Level</b> at 50.0KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	<b>113dB min.</b>
<b>Receiving Sensitivity</b> at 50.0KHz 0dB = 1 volt/µbar	<b>-67dB min.</b>
<b>Sensitivity/Cross Talk Ratio</b>	<b>15 dB</b>
<b>Nominal Impedance (Trans.)</b>	<b>800 Ohm</b>
<b>Capacitance at 1KHz ±20%</b>	<b>2400 pF</b>
<b>Max. Driving Voltage (cont.)</b>	<b>20Vrms</b>
<b>Total Beam Angle -6dB</b>	<b>30° typical</b>
<b>Operation Temperature</b>	<b>-30 to 70°C</b>
<b>Storage Temperature</b>	<b>-40 to 80°C</b>

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

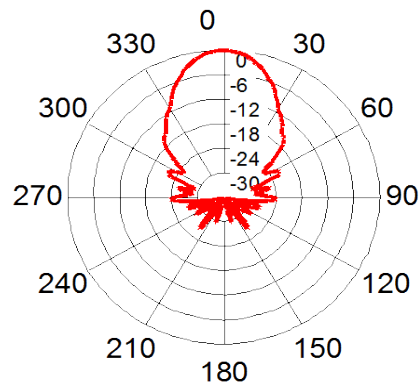
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

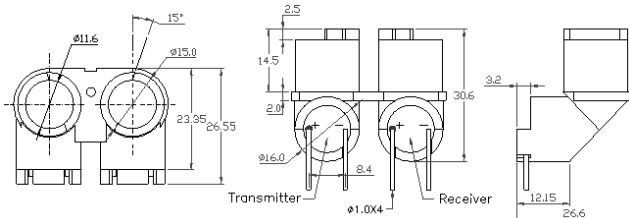


**Beam Angle**

Tested at 50.0KHz frequency



**Dimensions:** dimensions are in mm



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**Specification**

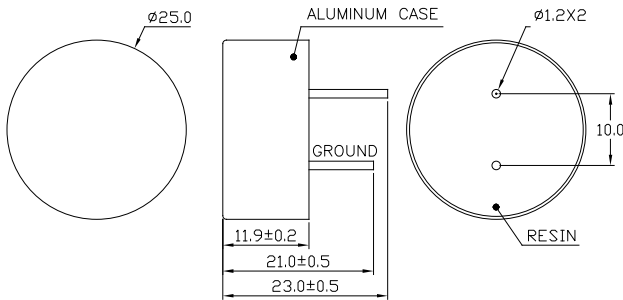
250ET250	Transmitter
250ER250	Receiver
Center Frequency	25.0±1.0KHz
Bandwidth (-6dB)	250ET250 1.0KHz 250ER250 1.0KHz
Transmitting Sound Pressure Level at 25.0KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	113dB min.
Receiving Sensitivity at 25.0KHz 0dB = 1 volt/µbar	-63dB min.
Capacitance at 1KHz ±20%	2800 pF
Max. Driving Voltage (cont.)	15Vrms
Total Beam Angle -6dB	40° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
Closer frequency tolerance can be supplied upon request.

Model available:

1	250ET/R250	Aluminum Housing
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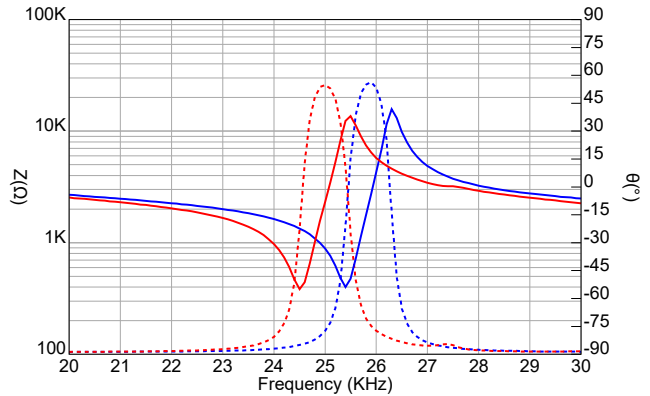
**Dimensions:** dimensions are in mm



**Impedance/Phase Angle vs. Frequency**

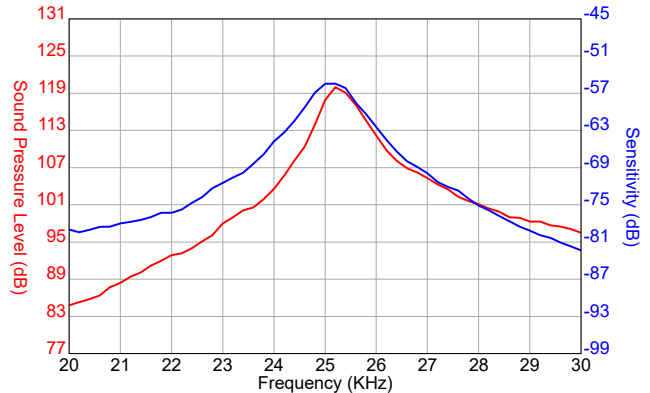
Tested under 1Vrms Oscillation Level

250ER250 Impedance (Red solid line)  
 250ER250 Phase (Red dashed line)  
 250ET250 Impedance (Blue solid line)  
 250ET250 Phase (Blue dashed line)



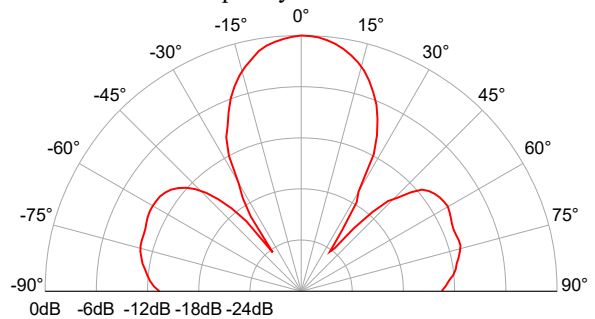
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



**Beam Angle**

Tested at 25.0Khz frequency

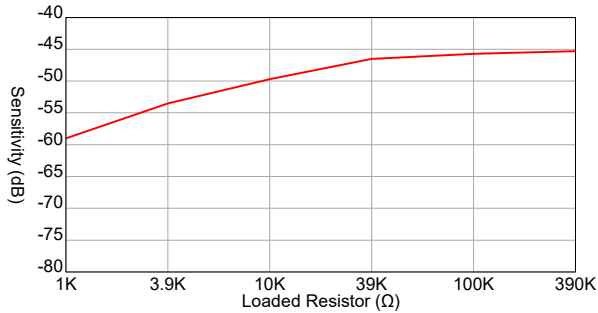


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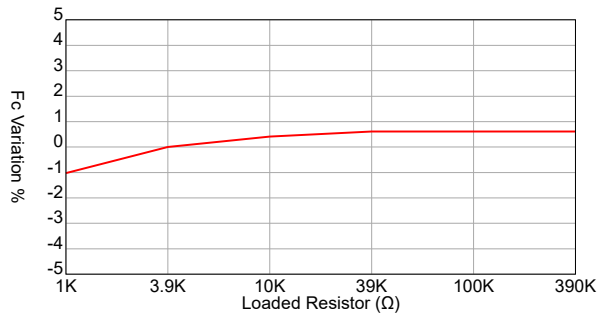
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**250ER250 Receiver**

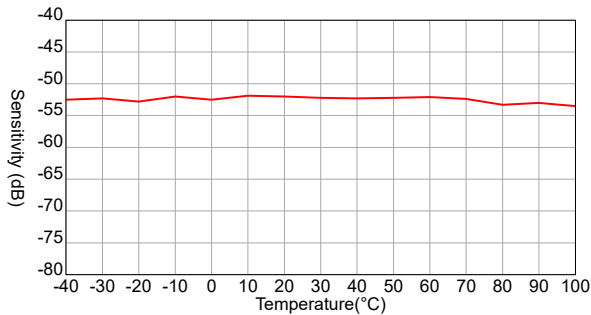
**Sensitivity Variation vs. Loaded Resistor**



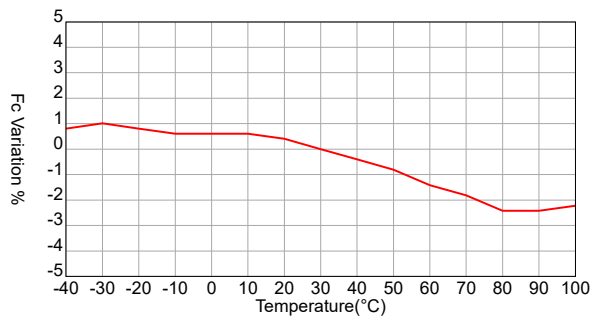
**Center Frequency Shift vs. Loaded Resistor**



**Sensitivity Variation vs. Temperature**

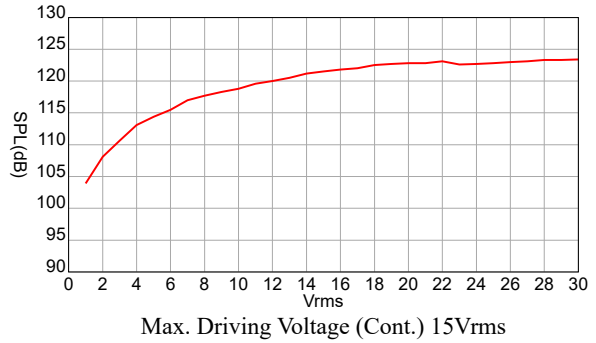


**Center Frequency Shift vs. Temperature**

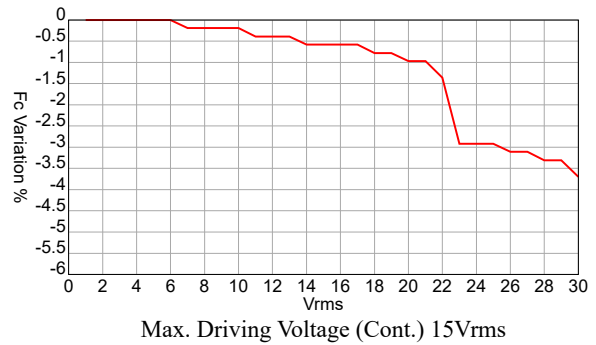


**250ET250 Transmitter**

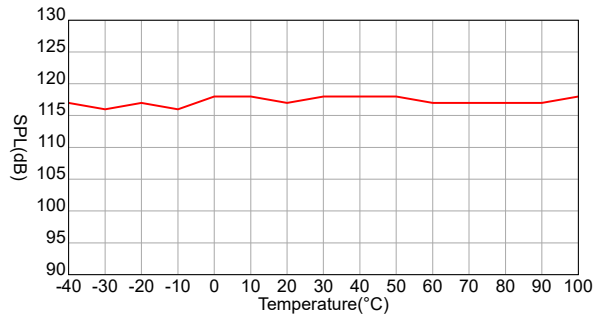
**SPL Variation vs. Driving Voltage**



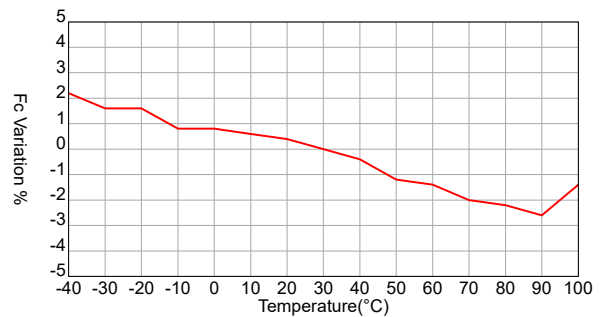
**Center Frequency Shift vs. Driving Voltage**



**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**

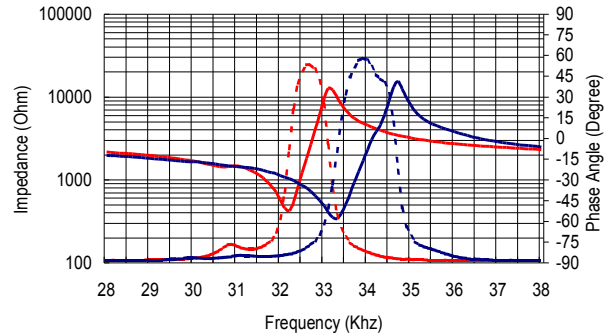




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

328ER250 Impedance ————  
 328ER250 Phase - - - - -  
 328ET250 Impedance ————  
 328ET250 Phase - - - - -



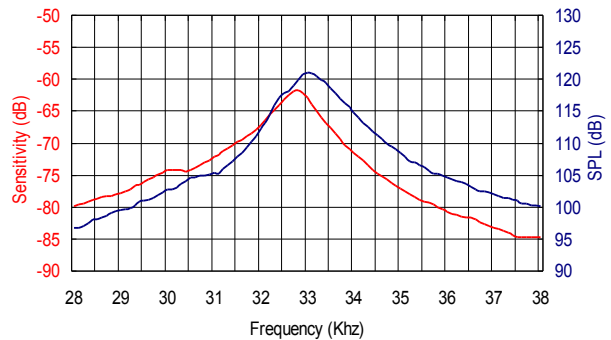
**Specification**

328ET250	Transmitter
328ER250	Receiver
Center Frequency	32.8±1.0KHz
Bandwidth (-6dB)	328ET250 1.0KHz 328ER250 1.0KHz
Transmitting Sound Pressure Level at 32.8KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	113dB min. 107dB min. SUS 316
Receiving Sensitivity at 32.8KHz 0dB = 1 volt/µbar	-67dB min. -70dB min. SUS 316
Capacitance at 1KHz	±20% 2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle	-6dB 33° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

**Sensitivity/Sound Pressure Level**

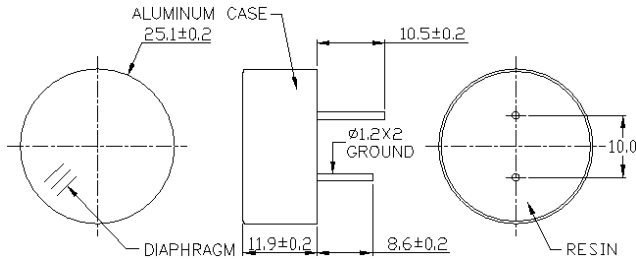
Tested under 10Vrms @30cm



Model available:

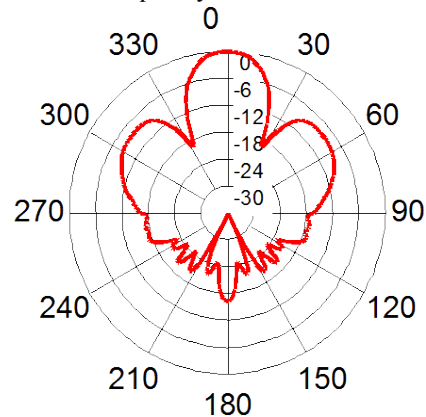
1	328ET/R250	Aluminum Housing
2	328ET/R250B	Black Alum. Housing
3	328ET/R25S	SUS 316 Housing

**Dimensions:** dimensions are in mm



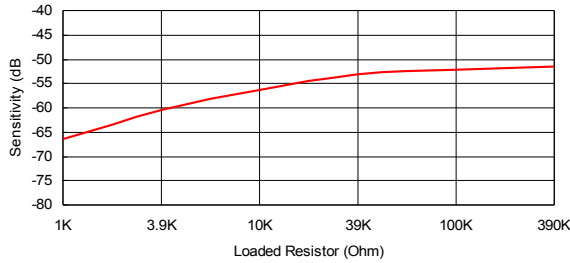
**Beam Angle**

Tested at 32.8KHz frequency



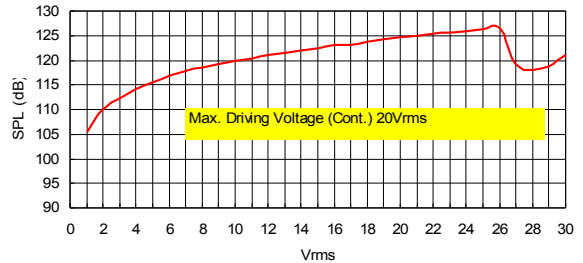
**328ER250 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

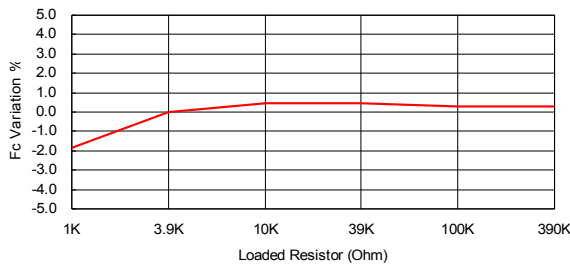


**328ET250 Transmitter**

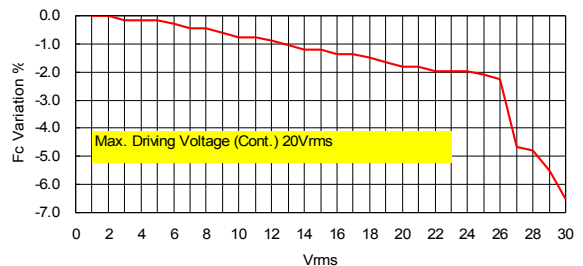
**SPL Variation vs. Driving Voltage**



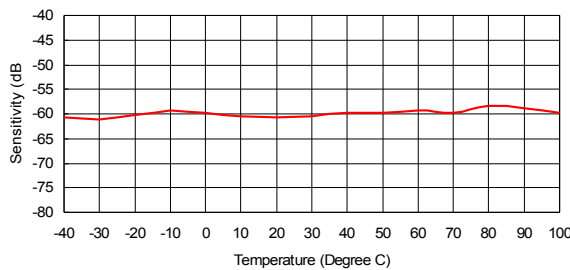
**Center Frequency Shift vs. Loaded Resistor**



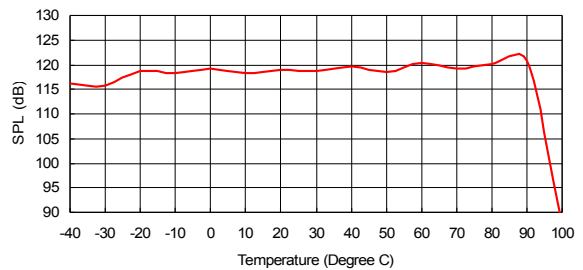
**Center Frequency Shift vs. Driving Voltage**



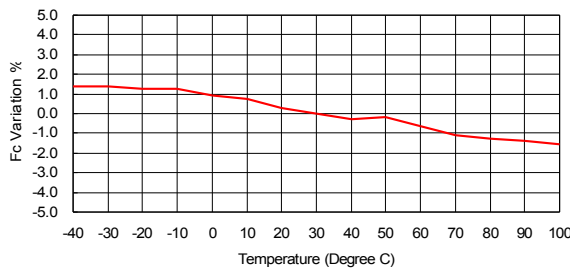
**Sensitivity Variation vs. Temperature**



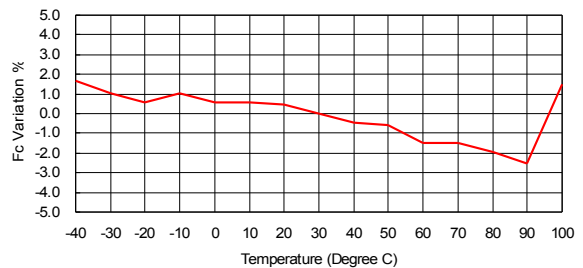
**SPL Variation vs. Temperature**

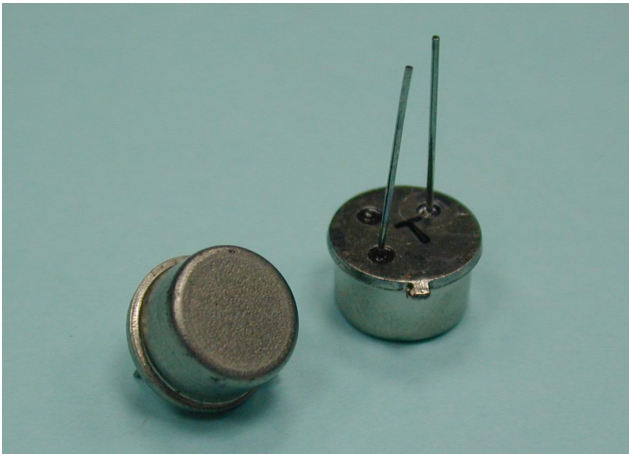


**Center Frequency Shift vs. Temperature**



**Center Frequency Shift vs. Temperature**

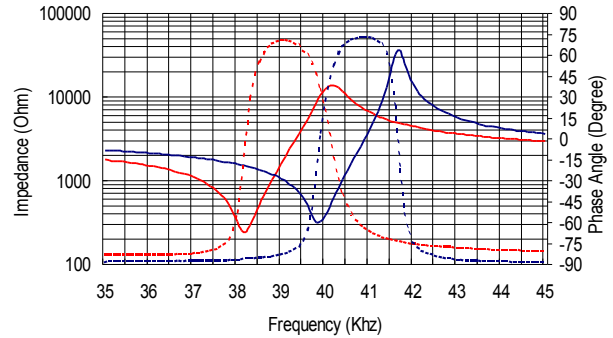




**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

400ER080 Impedance ————  
 400ER080 Phase - - - - -  
 400ET080 Impedance ————  
 400ET080 Phase - - - - -



**Specification**

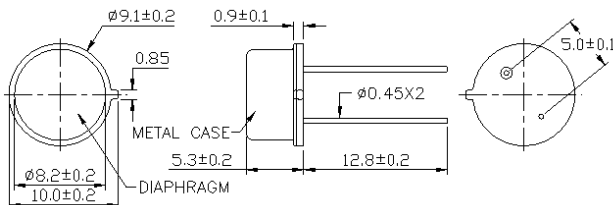
400ET080	Transmitter
400ER080	Receiver
Center Frequency	40.0±3.0KHz
Bandwidth (-6dB)	400ET080 1.5KHz 400ER080 2.0KHz
Transmitting Sound Pressure Level at 40.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm	100dB min.
Receiving Sensitivity at 40.0KHz 0dB = 1 volt/μbar	-80dB min.
Capacitance at 1KHz ±20%	1700 pF
Max. Driving Voltage (cont.)	15Vrms
Total Beam Angle -6dB	125° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

Model available:

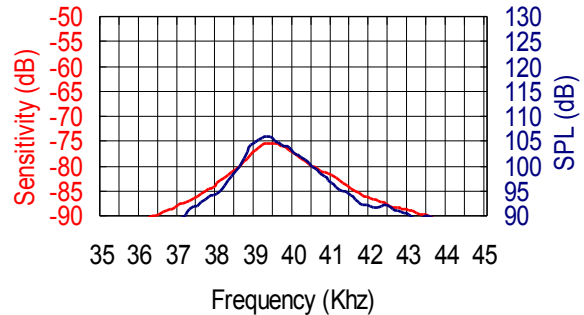
1	400ET/R080	Nickel Plated Steel Housing
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**Dimensions:** dimensions are in mm



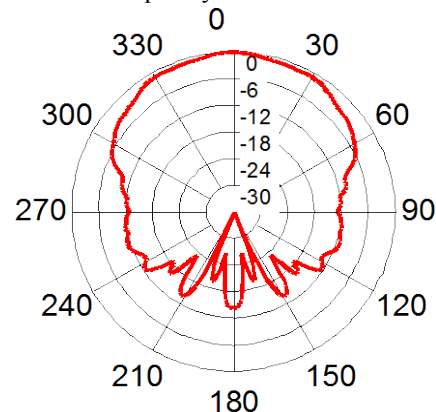
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



**Beam Angle**

Tested at 40.0KHz frequency

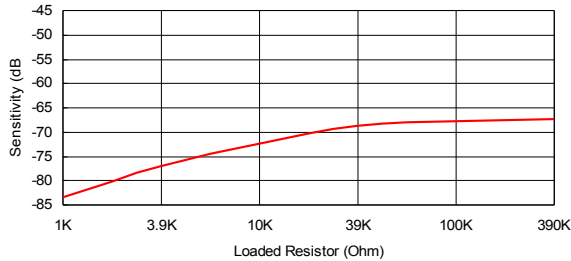


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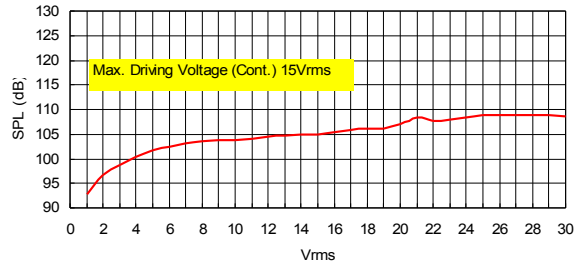
**400ER080 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

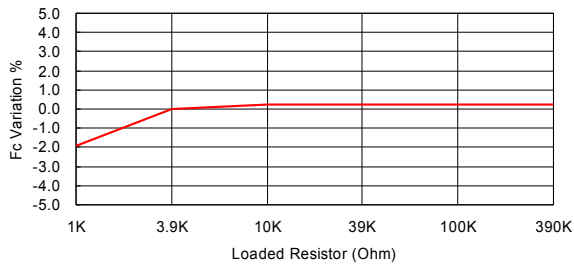


**400ET080 Transmitter**

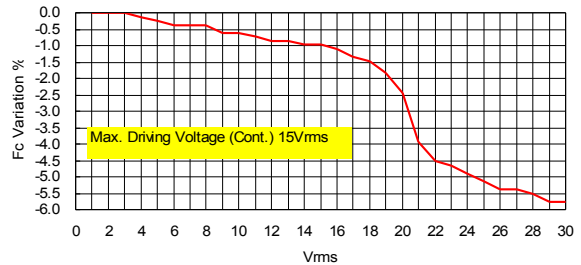
**SPL Variation vs. Driving Voltage**



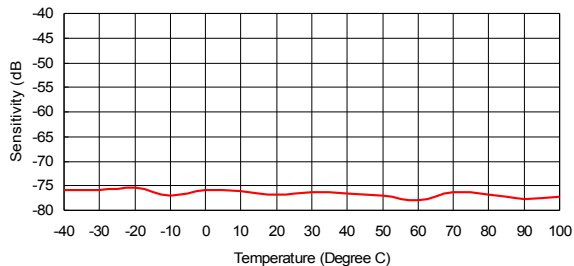
**Center Frequency Shift vs. Loaded Resistor**



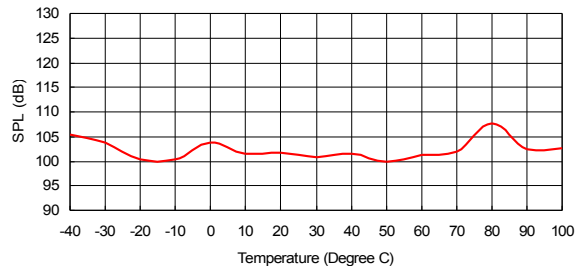
**Center Frequency Shift vs. Driving Voltage**



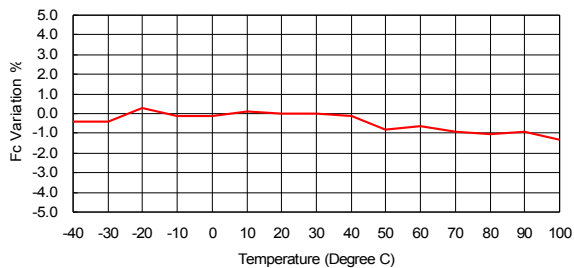
**Sensitivity Variation vs. Temperature**



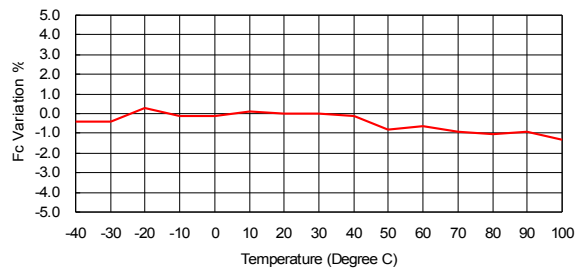
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



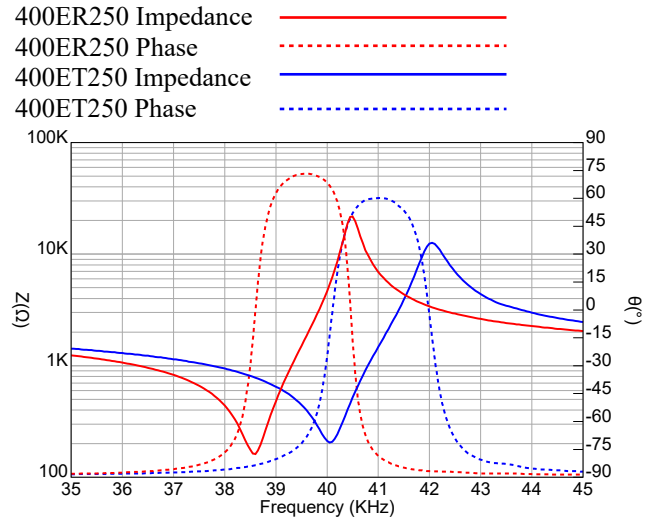
**Center Frequency Shift vs. Temperature**





**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



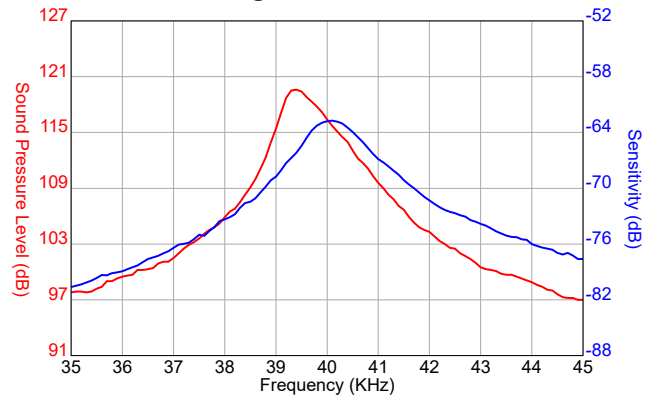
**Specification**

400ET250	Transmitter
400ER250	Receiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400ET250 1.0KHz 400ER250
Transmitting Sound Pressure Level at 40.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm	115dB min. 107 dB min. for SUS316
Receiving Sensitivity at 40.0KHz 0dB = 1 volt/μbar	-70dB min. -72 dB min. for SUS316
Capacitance at 1KHz	±20% 2800 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle	-6dB 30° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
Closer frequency tolerance can be supplied upon request.

**Sensitivity/Sound Pressure Level**

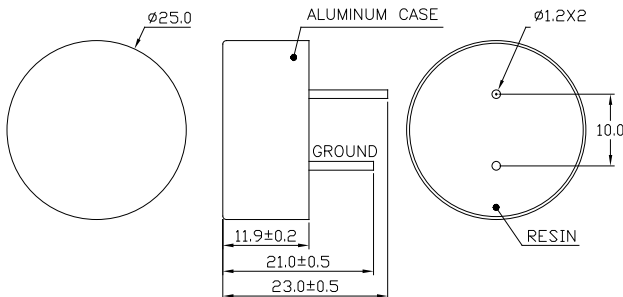
Tested under 10Vrms @30cm



Model available:

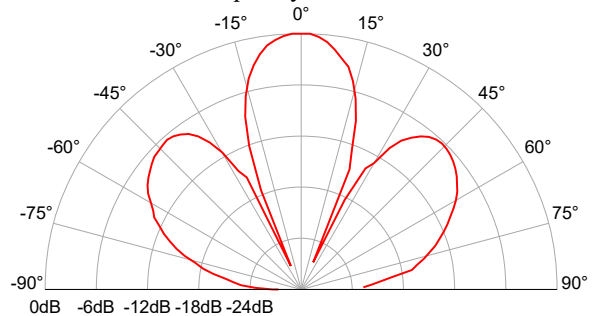
1	400ET/R250	Aluminum Housing
2	400ET/R25B	Black Alum. Housing
3	400ET/R25S	SUS316 Housing

**Dimensions:** dimensions are in mm



**Beam Angle**

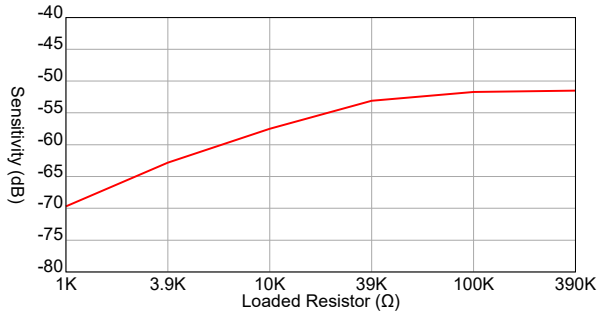
Tested at 40.0KHz Frequency



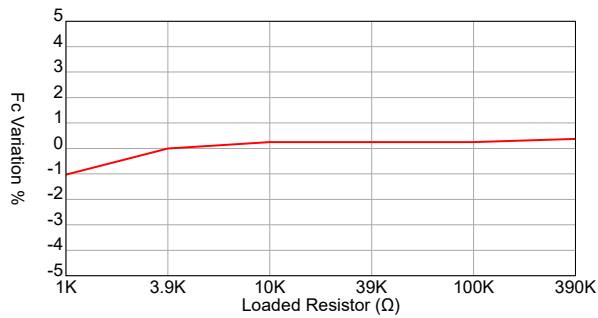


**400ER250 Receiver**

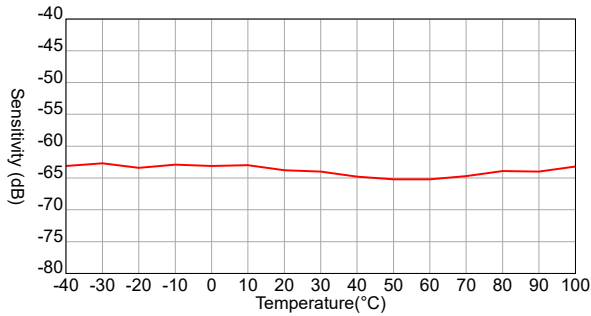
**Sensitivity Variation vs. Loaded Resistor**



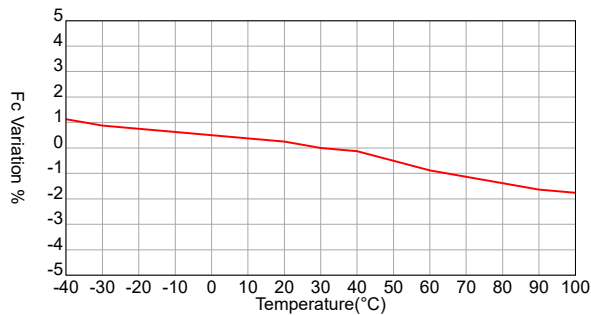
**Center Frequency Shift vs. Loaded Resistor**



**Sensitivity Variation vs. Temperature**

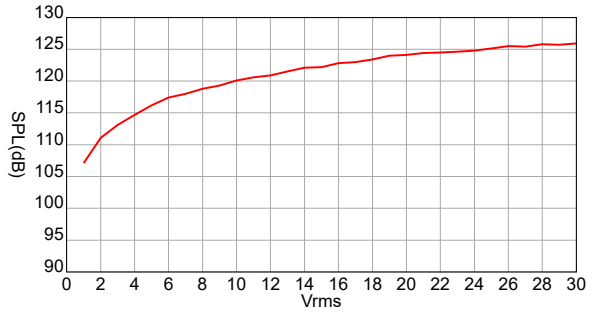


**Center Frequency Shift vs. Temperature**

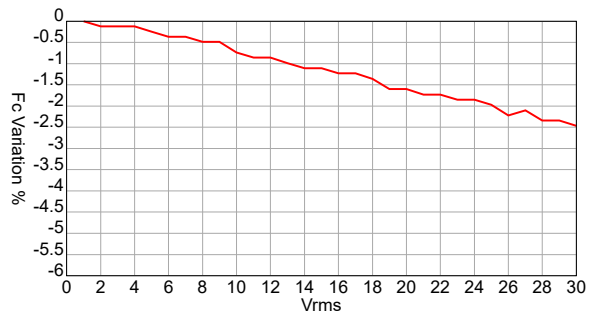


**400ET250 Transmitter**

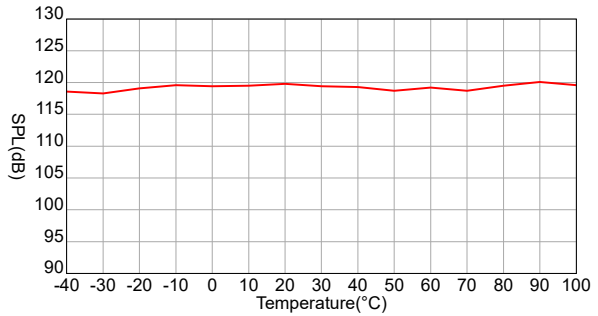
**SPL Variation vs. Driving Voltage**



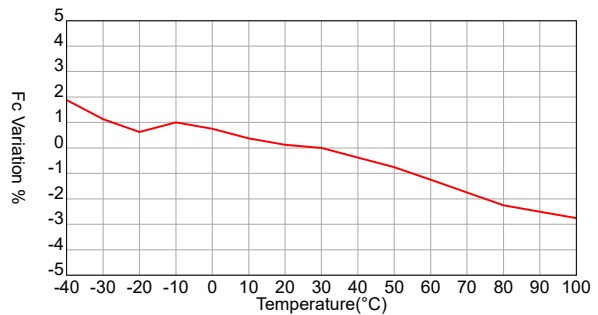
**Center Frequency Shift vs. Driving Voltage**



**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



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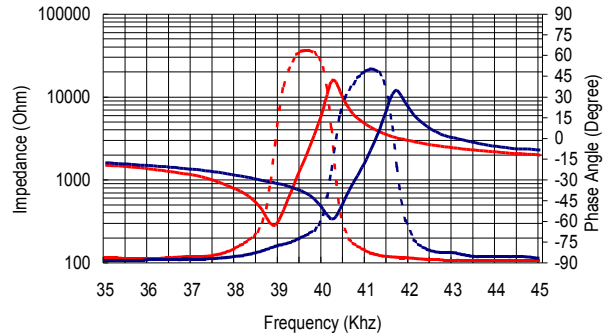
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**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

400ER180 Impedance ————  
 400ER180 Phase - - - - -  
 400ET180 Impedance ————  
 400ET180 Phase - - - - -



**Specification**

400ET180	Transmitter
400ER180	Receiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400ET180 1.5KHz 400ER180 1.5KHz
Transmitting Sound Pressure Level at 40.0KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	115dB min.
Receiving Sensitivity at 40.0KHz 0dB = 1 volt/µbar	-70dB min.
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage (cont.)	15Vrms
Total Beam Angle -6dB	30° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

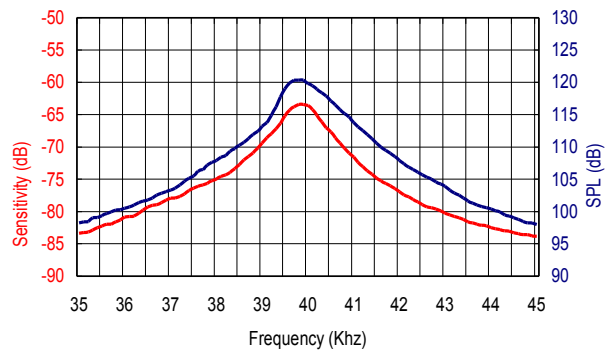
All specification taken typical at 25°C  
 Closer frequency tolerance can be supplied upon request.

Model available:

1	400ET/R180	Aluminum Housing
2	400ET/R18B	Black Alum. Housing

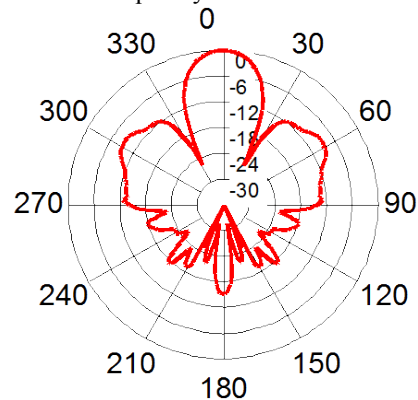
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

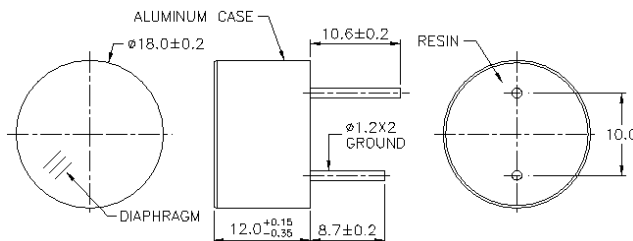


**Beam Angle**

Tested at 40.0KHz frequency



**Dimensions:** dimensions are in mm

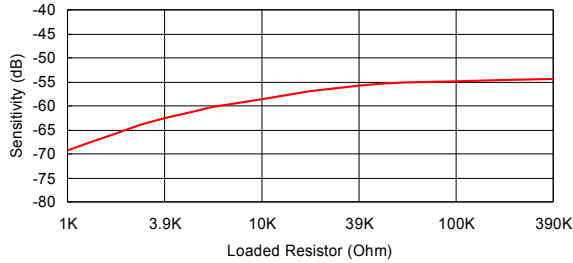


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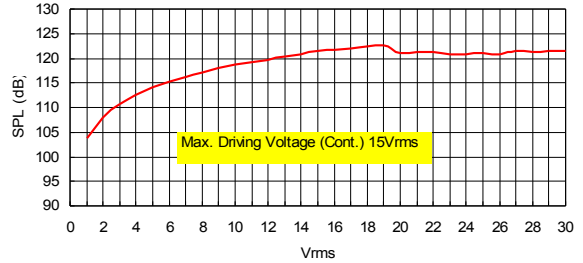
**400ER180 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

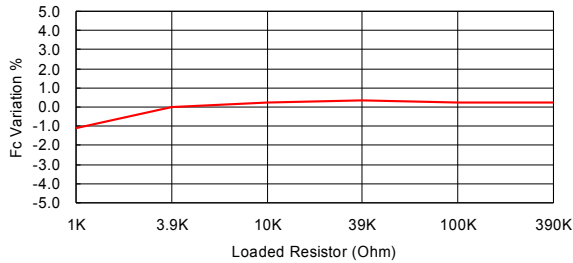


**400ET180 Transmitter**

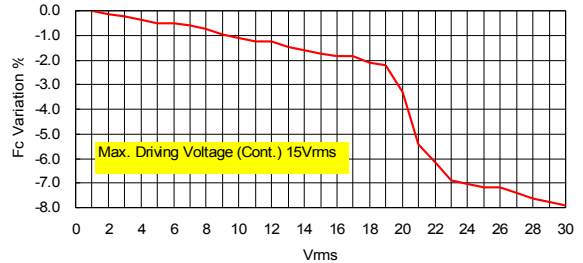
**SPL Variation vs. Driving Voltage**



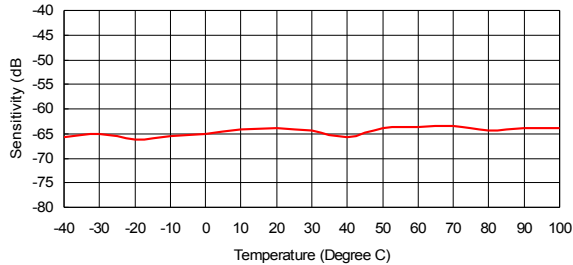
**Center Frequency Shift vs. Loaded Resistor**



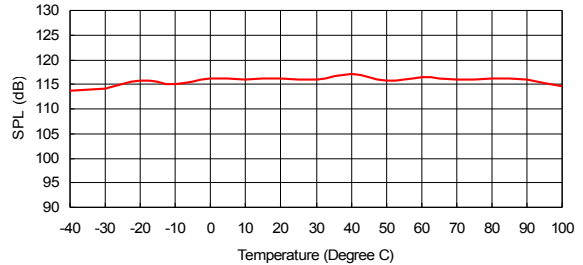
**Center Frequency Shift vs. Driving Voltage**



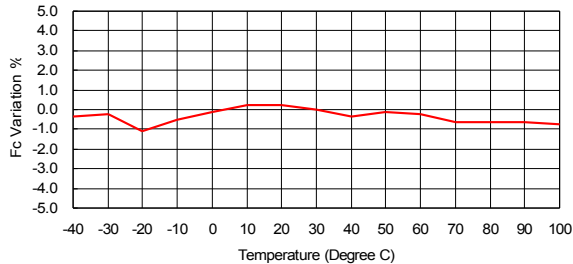
**Sensitivity Variation vs. Temperature**



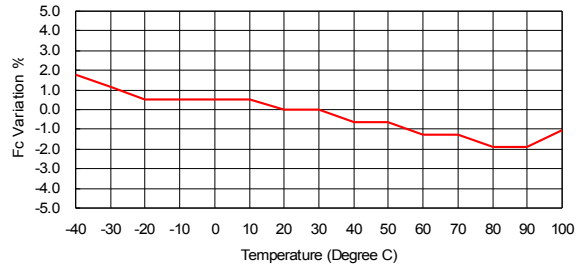
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



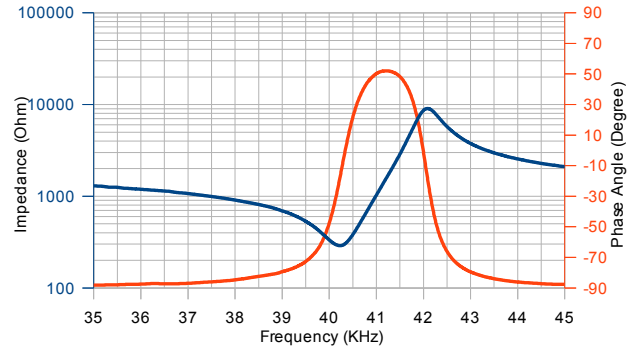
**Center Frequency Shift vs. Temperature**



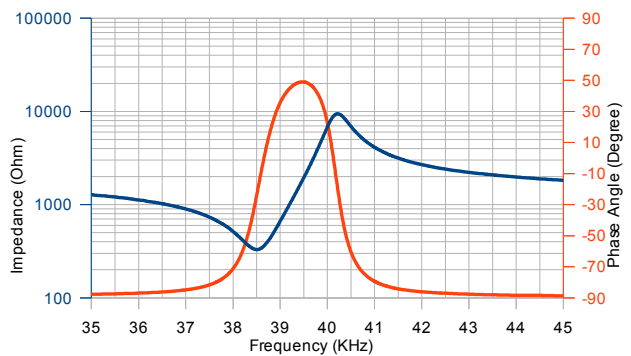


**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level  
400ET18S



400ER18S



**Specification**

400ET18S	Transmitter
400ER18S	Receiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400ET18S 1.5KHz 400ER18S 1.5KHz
Transmitting Sound Pressure Level at 40.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm	110dB min.
Receiving Sensitivity at 40.0KHz 0dB = 1 volt/μbar	-70dB min.
Capacitance at 1KHz ±20%	2900 pF
Max. Driving Voltage (cont.)	15Vrms
Total Beam Angle (-6dB Main Beam)	35° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

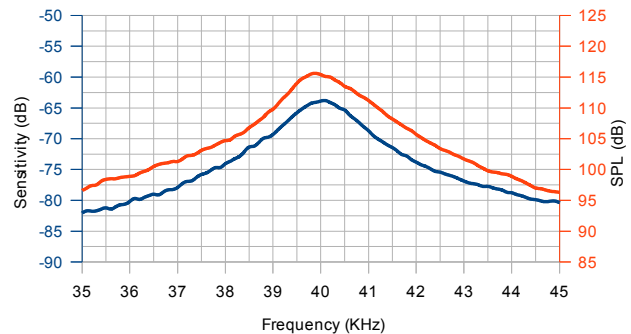
All specification taken typical at 25°C  
Closer frequency tolerance can be supplied upon request.

Model available:

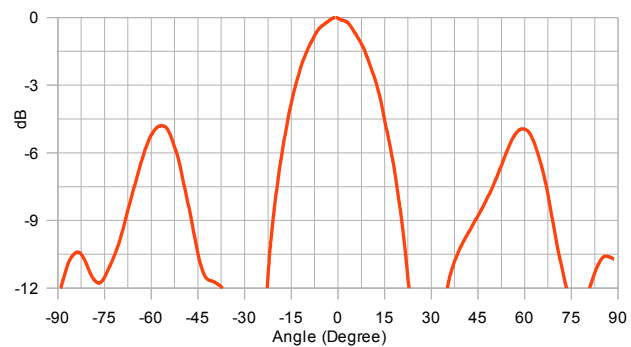
1	400ET/R18S	Aluminum Housing
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**Sensitivity/Sound Pressure Level**

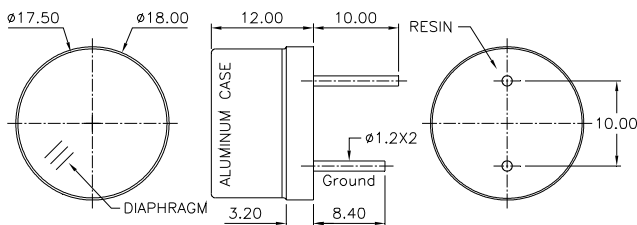
Tested under 10Vrms @30cm



**Beam Angle** Tested at 40.0KHz frequency



**Dimensions:** dimensions are in mm

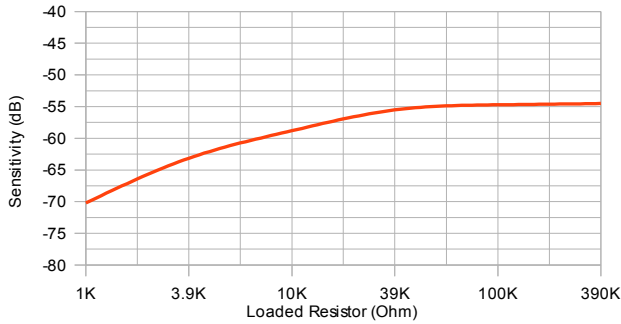


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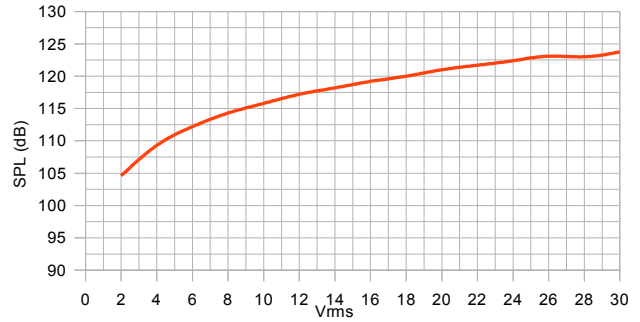
**400ER180 Receiver**

**Sensitivity Variation vs. Loaded Resistor**

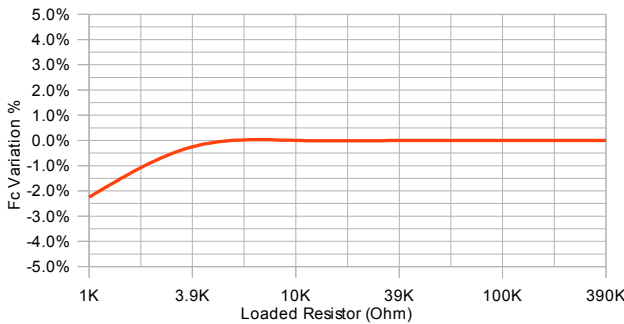


**400ET180 Transmitter**

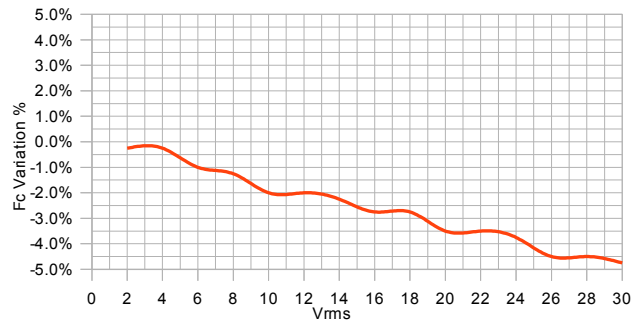
**SPL Variation vs. Driving Voltage**



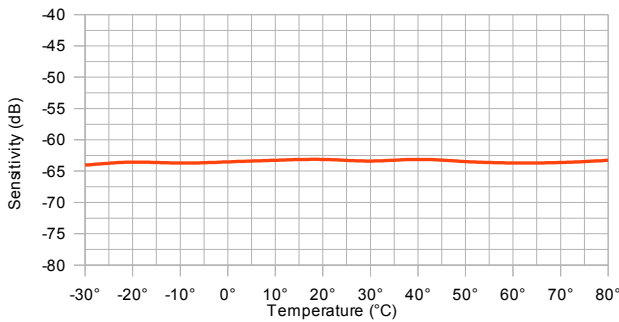
**Center Frequency Shift vs. Loaded Resistor**



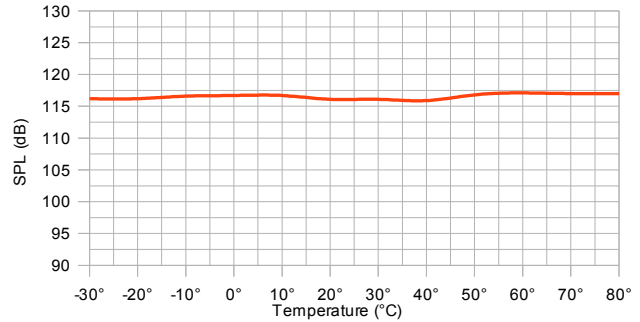
**Center Frequency Shift vs. Driving Voltage**



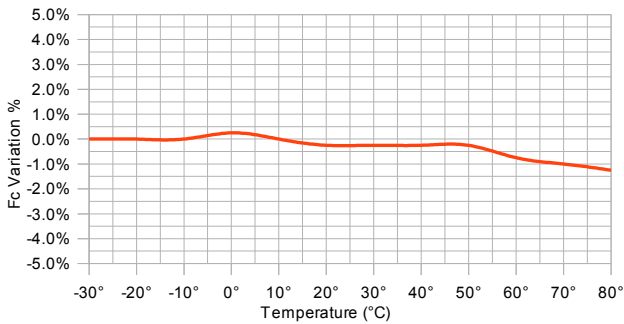
**Sensitivity Variation vs. Temperature**



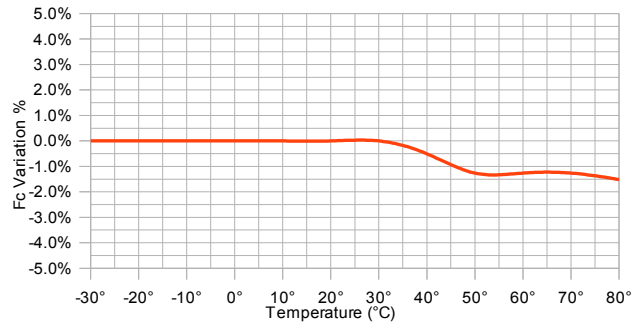
**SPL Variation vs. Temperature**



**Center Frequency Shift vs. Temperature**



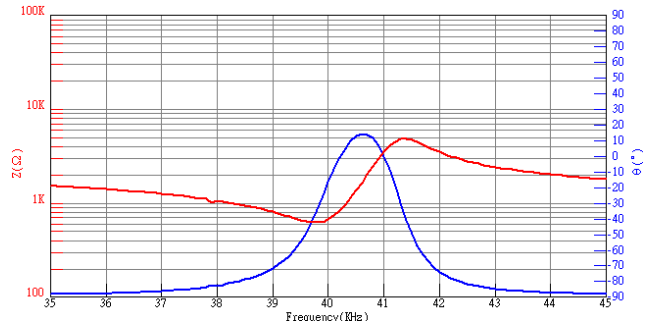
**Center Frequency Shift vs. Temperature**





**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

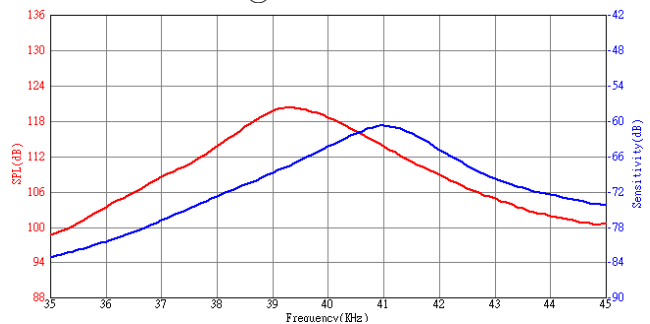


**Specification**

400PT120	Transceiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400PT120 2.0KHz
Transmitting Sound Pressure Level at resonant frequency ; 0dB re 0.0002µbar per 10Vrms at 30cm	115dB min.
Receiving Sensitivity at resonant frequency ; 0dB = 1 volt/µbar	-68dB min.
Nominal Impedance (Ω)	1000
Ringling (ms)	1.2 max.
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle	400PT120 85° typical
	400PT12P 120° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

**Sensitivity/Sound Pressure Level**

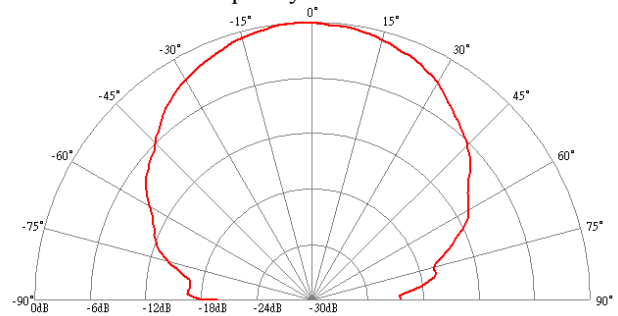
Tested under 10Vrms @30cm



All specification taken typical at 25°C  
Closer frequency tolerance, shorter ringing and wider bandwidth models can be supplied upon request.

**Beam Angle**

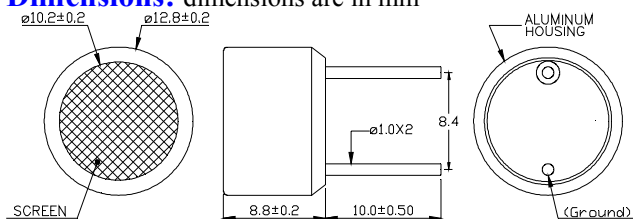
Tested at 40.0KHz frequency



Model available:

1	400PT120	Aluminum Housing
2	400PT12B	Black Al. Housing
3	400PT12P	Plastic Housing

**Dimensions:** dimensions are in mm

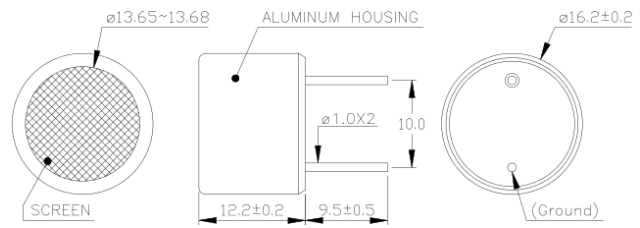


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**Dimensions:** dimensions are in mm



**Specification**

400PT160	Transceiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400PT160 2.0KHz
Transmitting Sound Pressure Level at resonant frequency; 0dB re 0.0002μbar per 10Vrms at 30cm	117dB min.
Receiving Sensitivity at resonant frequency 0dB = 1 volt/μbar	-65dB min.
Nominal Impedance (Ohm)	1000
Ringling (ms) max.	1.2 – PT160 1.5 – PT16P
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage (cont.)	20Vrms
Total Beam Angle -6dB	40° typical
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

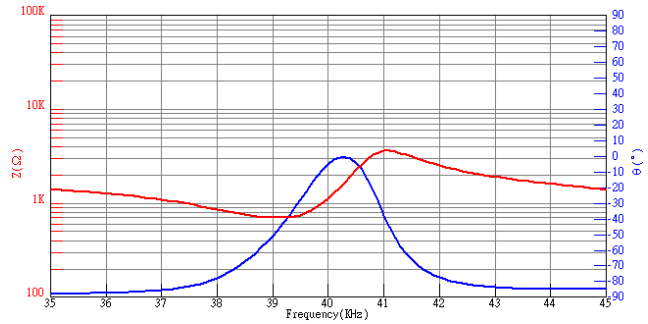
All specification taken typical at 25°C  
Closer frequency tolerance, shorter ringling and wider bandwidth models can be supplied upon request.

Model available:

1	400PT160	Aluminum Housing
2	400PT16P	Plastic Housing

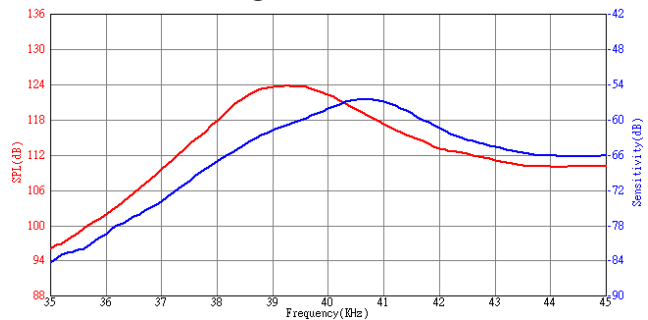
**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



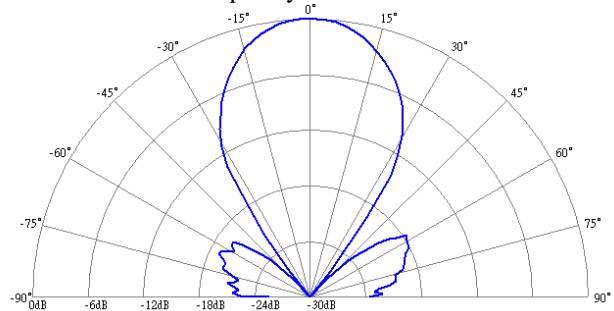
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



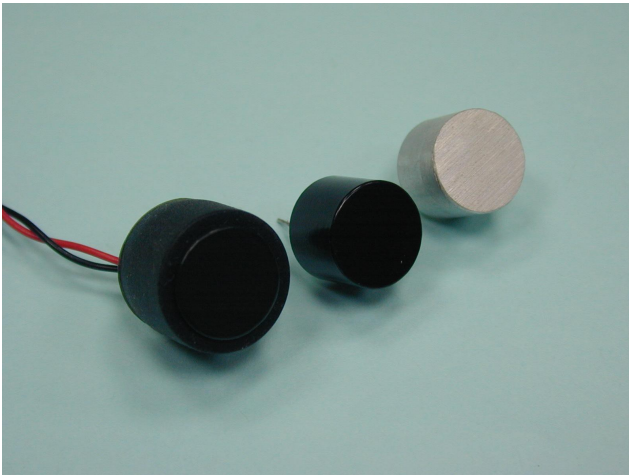
**Beam Angle**

Tested at 40.0Khz frequency

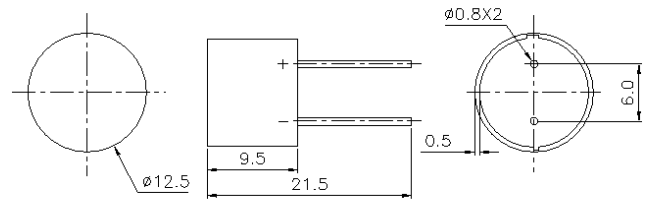


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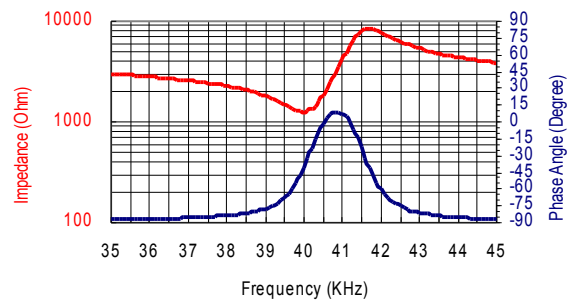
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**Dimensions:** dimensions are in mm



**Impedance/Phase Angle vs. Frequency**  
Tested under 1Vrms Oscillation Level



**Specification**

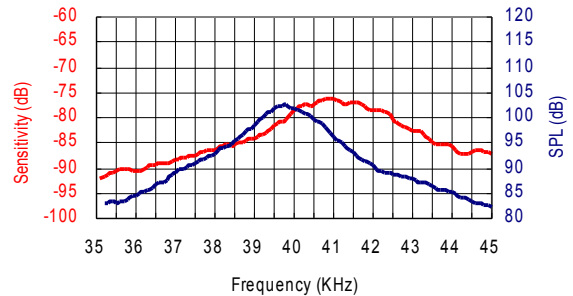
400EP125	Transceiver
Center Frequency	40.0±1.0Khz
Bandwidth (-6dB)	400EP125 1.5Khz
Transmitting Sound Pressure Level (with rubber sleeve)	100dB min.
at resonant frequency;0dB re 0.0002μbar per 10Vrms at 30cm	
Receiving Sensitivity (with rubber sleeve)	-78dB min.
at resonant frequency 0dB = 1 volt/μbar	
Nominal Impedance (Ohm)	1000
Ringing (ms) @25°C	1.2 max.
Capacitance at 1Khz	±20% 1600 pF
Max. Driving Voltage	100Vpp
20 bursts, 25ms repetition rate	
Total Beam Angle	-6dB 108°
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
Models of less ringing are available

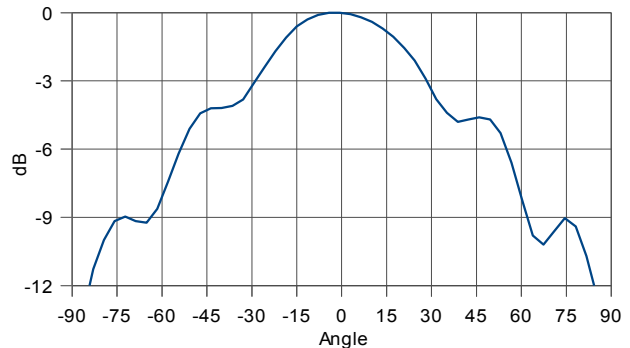
Models available:

1	400EP125	Natural Aluminum Housing
2	400EP125B	Black Painted Housing
3	400EP125BR	Black Housing+Rubber Sleeve

**Sensitivity/Sound Pressure Level**  
SPL Tested under 10Vrms@30cm



**Beam Angle:** Tested at 40.0Khz frequency



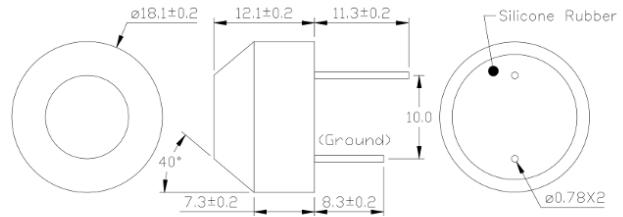
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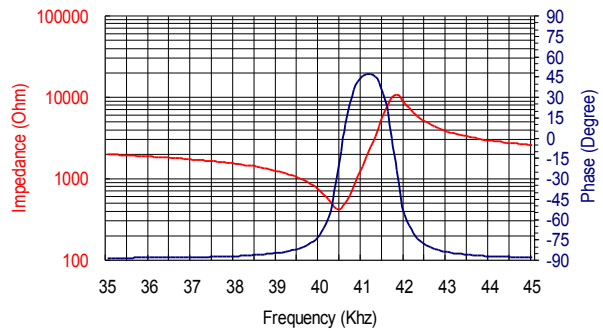


**Dimensions:** dimensions are in mm



**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

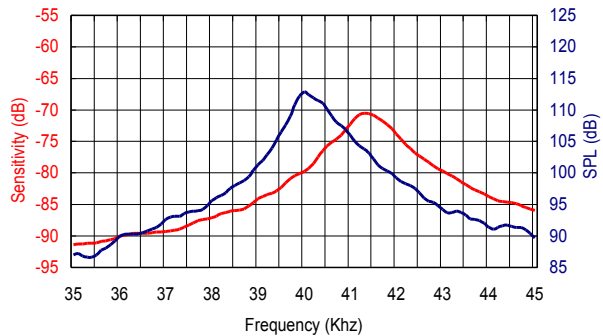


**Specification**

400EP18A	Transceiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB)	400EP18A 1.5KHz
Transmitting Sound Pressure Level at resonant frequency; 0dB re 0.0002μbar per 10Vrms at 30cm	108dB min.
Receiving Sensitivity at resonant frequency 0dB = 1 volt/μbar	-75dB min.
Nominal Impedance (Ohm)	750
Ringing (ms)	1.2 max.
Capacitance at 1KHz ±20%	2600 pF
Temperature Compensated Type	5200 pF
Max. Driving Voltage (Cont.)	20Vrms
20 bursts, 25ms repetition rate	100Vpp
Total Beam Angle	-6dB 85°
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

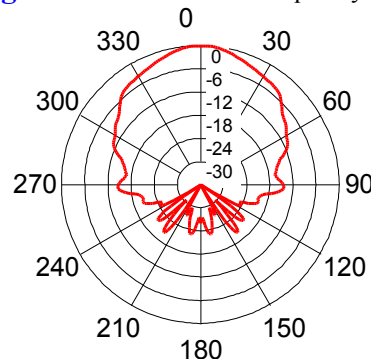


All specification taken typical at 25°C  
Both lead pins and lead wires output are available.  
Temperature compensated type is available upon request.

Models available:

1	400EP18A	Black Al. Housing
2	400EP18A0	Natural Al. Housing
3	400EP18AC	Temp. Compensated

**Beam Angle:** Tested at 40.0KHz frequency



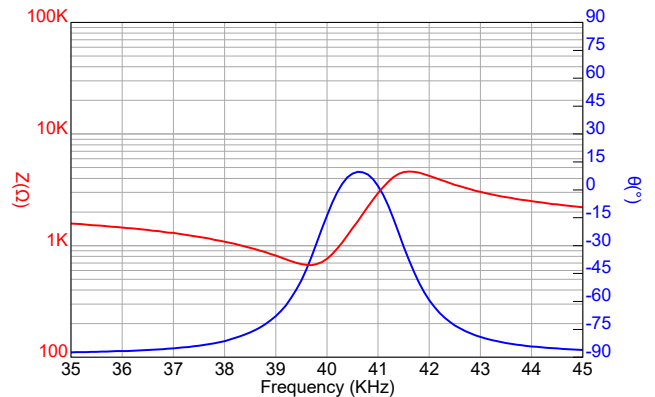
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**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



**Specification**

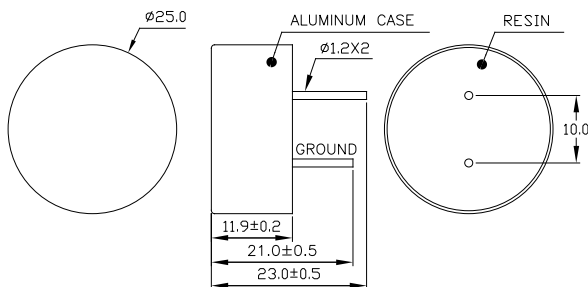
<b>400EP250</b>	<b>Transceiver</b>
<b>Center Frequency</b>	<b>40.0±1.0KHz</b>
<b>Bandwidth (-6dB)</b>	<b>2.0KHz(FOM)</b>
<b>Transmitting Sound Pressure Level</b> at resonant frequency; 0dB re 0.0002μbar per 10Vrms at 30cm	<b>110dB min.</b>
<b>Receiving Sensitivity</b> at resonant frequency 0dB = 1 volt/μbar	<b>-72dB min.</b>
<b>Capacitance at 1KHz ±20%</b>	<b>2700 pF</b>
<b>Max. Driving Voltage</b> at 20 bursts, 25 ms repetition rate	<b>100 Vp-p</b>
<b>Total Beam Angle(-6dB)</b>	<b>30° typical</b>
<b>Operation Temperature</b>	<b>-30 to 70°C</b>
<b>Storage Temperature</b>	<b>-40 to 80°C</b>

All specification taken typical at 25°C;  
Closer frequency tolerance, shorter ringing, wider bandwidth and temperature compensated models can be supplied upon request.

Model available:

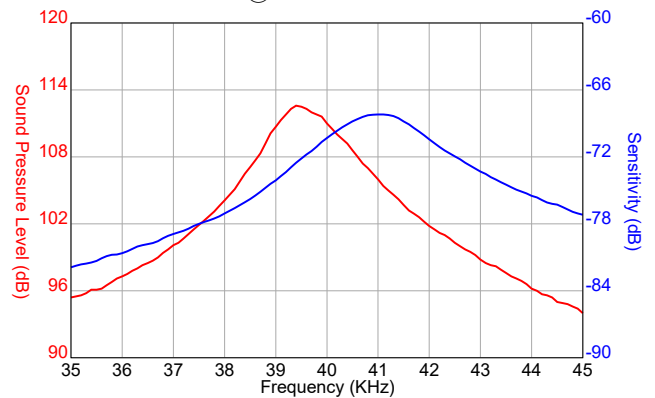
1	400EP250	Aluminum Housing
2	400EP25B	Black Al. Housing

**Dimensions:** dimensions are in mm

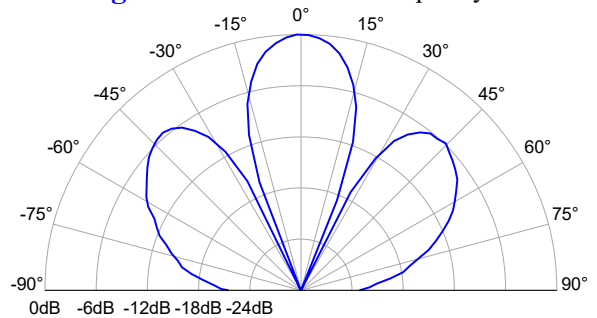


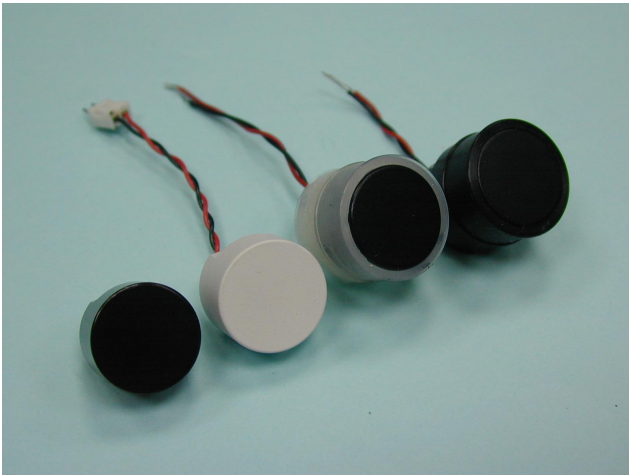
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

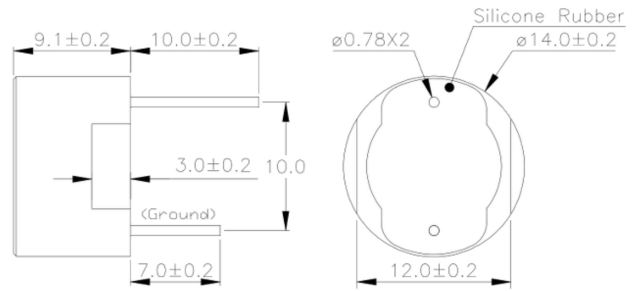


**Beam Angle:** Tested at 40.0KHz Frequency





**Dimensions:** dimensions are in mm



**Asymmetric Beam Patterns Specification**

400EP14D	Transceiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB FOM)	1.0KHz
Transmitting Sound Pressure Level at resonant frequency;0dB re 0.0002µbar per 10Vrms at 30cm	103dB min. (Transducer alone)
Receiving Sensitivity at resonant frequency 0dB = 1 volt/µbar	-78dB min. (Transducer alone)
Nominal Impedance (Ohm)	1000
Ringing (ms)	1.2 max.
Capacitance at 1KHz ±20%	1600 pF
Temperature Compensated Type	3200 pF
Max. Driving Voltage (cont.)	20Vrms
20 bursts, 25ms repetition rate	100Vpp
Total Beam Angle -6dB	Wide 135° typ. Narrow 85° typ.
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

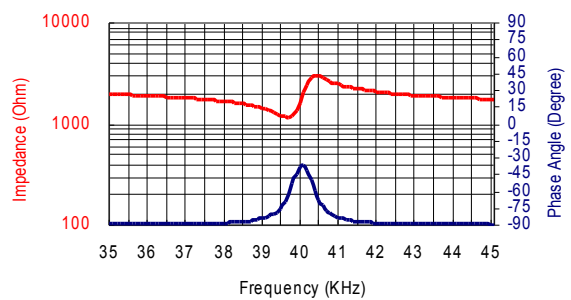
All specification taken typical at 25°C  
Both lead pins and lead wires output are available

Models available:

1	400EP14D	Black Painted Housing
2	400EP14DC	Temperature compensated (TC)
3	400EP14DCR	T.C. + Rubber Sleeve

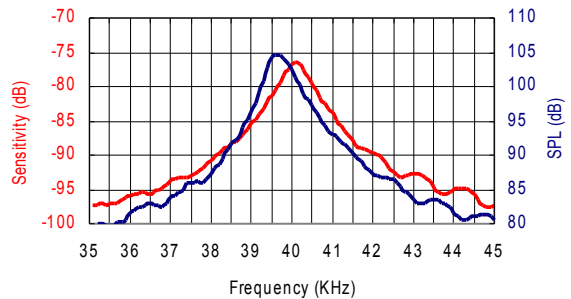
**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



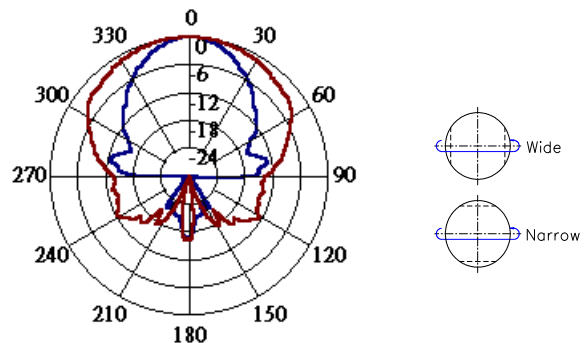
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



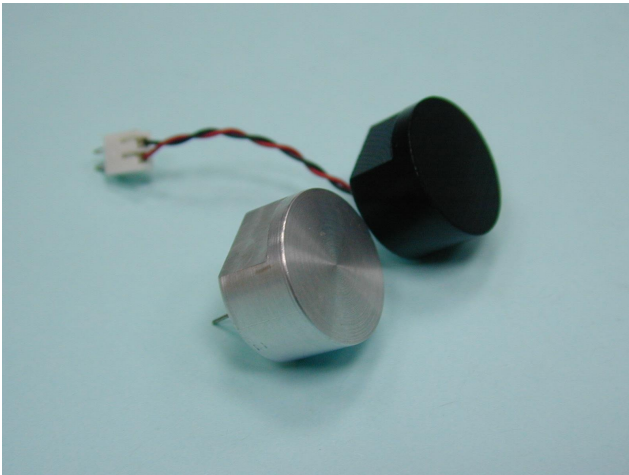
**Beam Angle:** Tested at 40.0Khz frequency

Wide Angle \_\_\_\_\_ Narrow Angle \_\_\_\_\_



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**Asymmetric Beam Patterns Specification**

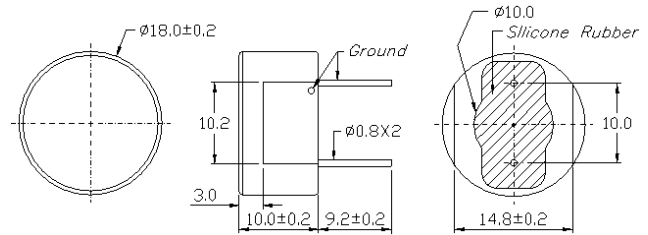
400EP18D	Transceiver
Center Frequency	40.0±1.0KHz
Bandwidth (-6dB) F.O.M.	2.0KHz
Transmitting Sound Pressure Level at resonant frequency; 0dB re 0.0002μbar per 10Vrms at 30cm	100dB min.
Receiving Sensitivity at resonant frequency 0dB = 1 volt/μbar	-80dB min.
Nominal Impedance (Ohm)	1000
Ringing	1.2ms max.
Capacitance at 1KHz ±20%	1800 pF
Temperature Compensated Type	3600 pF
Max. Driving Voltage (Cont.)	20Vrms
20 bursts, 25ms repetition rate	100Vpp
Total Beam Angle -6dB	Wide* 135° typ. Narrow* 75° typ.
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

All specification taken typical at 25°C  
Both lead pins and lead wires output are available

Models available:

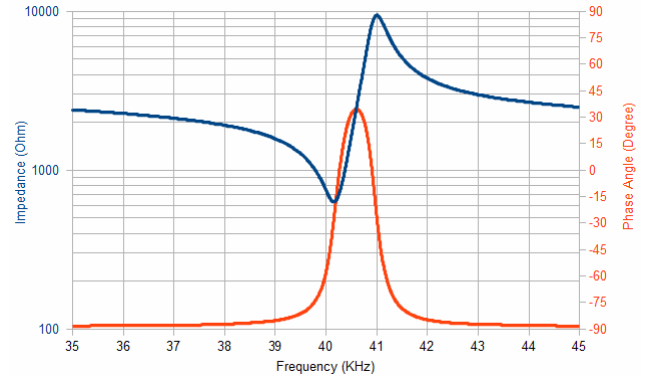
1	400EP18D	Black Al. Housing
2	400EP18DC	Temp. Compensated
3	400EP18DCR	T.C. with Rubber Sleeve

**Dimensions:** dimensions are in mm



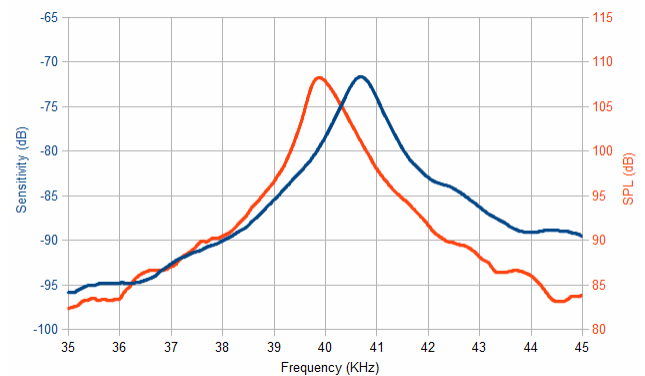
**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



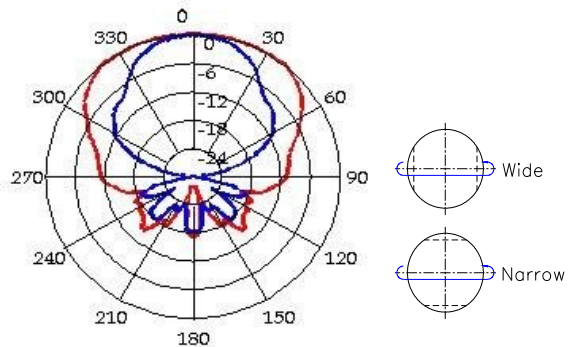
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



**Beam Angle:** Tested at 40.0Khz frequency

Wide Angle \_\_\_\_\_ Narrow Angle \_\_\_\_\_



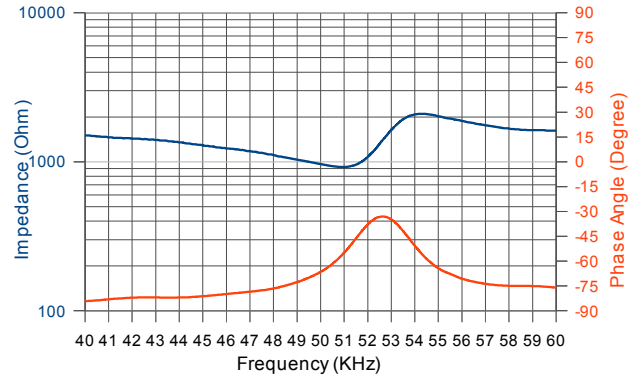
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**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



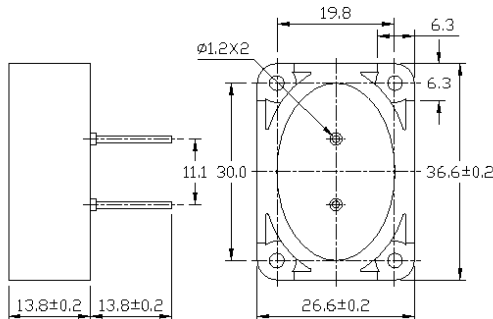
**Asymmetric Beam Patterns**

**Specification**

480EP900	Transceiver
Center Frequency	48.0±1.0KHz
Bandwidth (97dB) Transmitter	15.0KHz
(-80dB) Receiver	15.0KHz
Transmitting Sound Pressure Level at 48KHz; 0dB re 0.0002µbar per 10Vrms at 30cm	100dB min.
Receiving Sensitivity at 48KHz; 0dB = 1 volt/µbar	-80dB min.
Nominal Impedance (Ohm)	1000
Ringing (ms)	1.2 max.
Capacitance at 1KHz ±20%	2400 pF
Max. Driving Voltage @20 bursts, 25 ms repetition rate	100 Vp-p
Total Beam Angle -6dB @ 48KHz	Long Axis 19° typ. Short Axis 38° typ.
Operation Temperature	-30 to 70°C
Storage Temperature	-40 to 80°C

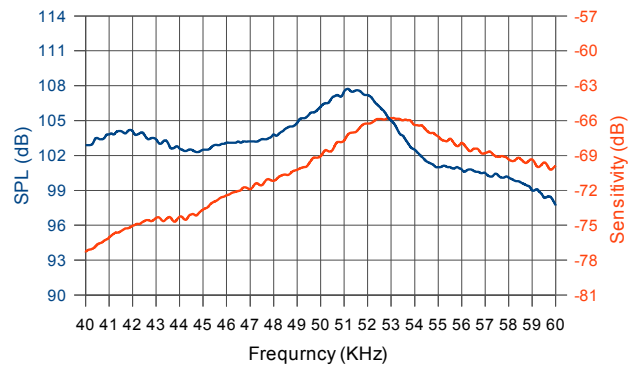
All specification taken typical at 25°C  
Closer frequency tolerance, shorter ringing and wider bandwidth models can be supplied upon request.

**Dimensions:** dimensions are in mm



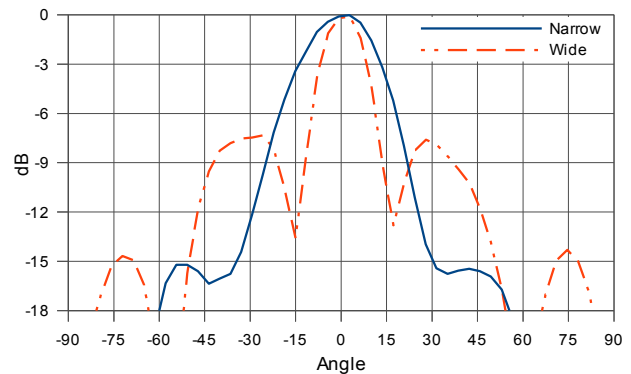
**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm



**Beam Angle**

Tested at 48.0KHz



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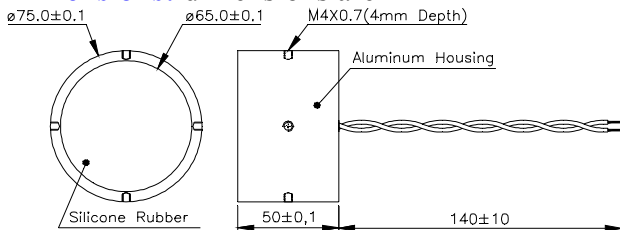


**Specification**

<b>043SR750</b>	Transceiver
Center Frequency	43.0±4.0 KHz
Bandwidth (Echo Sensitivity)	2 KHz
Echo Sensitivity	-55 dB min.
0dB re 20Vp-p,40 bursts @ 100cm	
Nominal Impedance	700 Ω
Capacitance at 1KHz	5700 pF ±20%
Max. Driving Voltage (Pulse)	1500 Vpp 2% duty cycle tone burst
Total Beam Angle	-3dB 7.5° typical -6dB 11.0° typical
Matching Window	Silicone Rubber
Operation Temperature	-20 to 70°C
Storage Temperature	-30 to 80°C

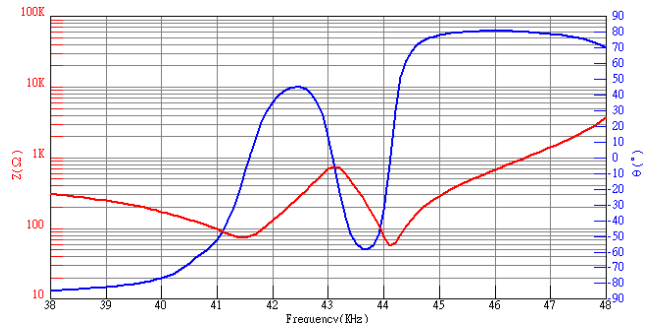
All specification taken typical at 25°C  
Low ringing model can be arranged

**Dimensions:** dimensions are in mm



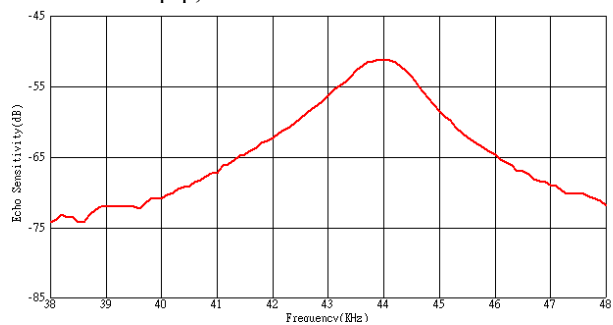
**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



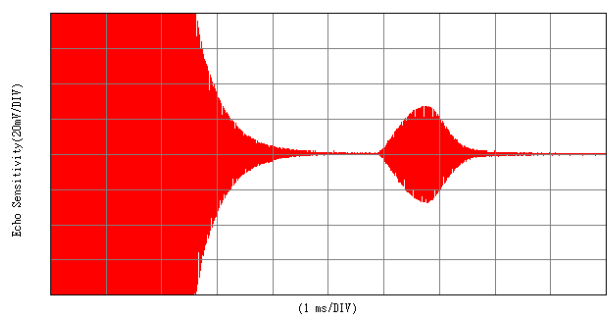
**Echo Sensitivity vs. Frequency**

Tested at 20Vp-p, 40 bursts

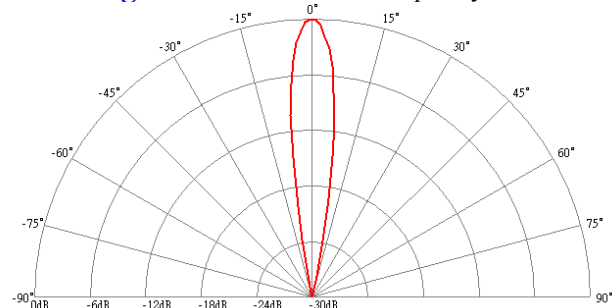


**Echo Sensitivity/Ringing**

Tested under 20Vp-p, 40 bursts, 100cm



**Beam Angle:** Tested at 43.0Khz frequency



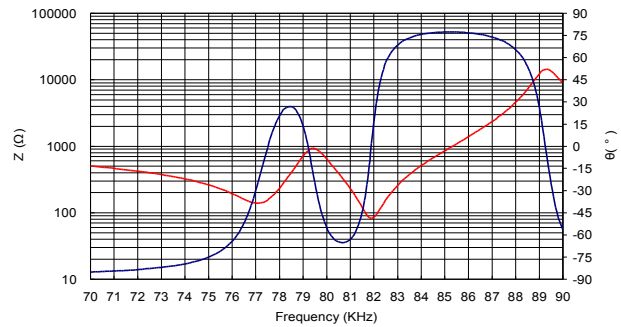
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**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

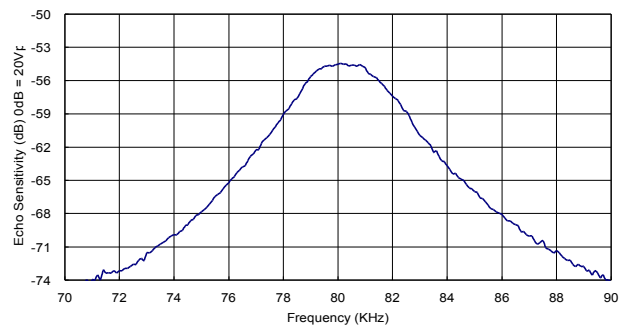


**Specification**

080SR365	Transceiver
Center Frequency (KHz)	80.0±5.0
Echo Sensitivity 0dB = 20Vp-p @ 50 cm	-57 dB min.
Dead Zone	35 cm
Bandwidth (Echo Sensitivity)	4.5 KHz
Nominal Impedance (Ohm)	700
Capacitance at 1KHz ±20%	2800 pF
Max. Driving Voltage (Pulse)	700Vpp 2% duty cycle
Total Beam Angle	-3dB 8.0° typical -6dB 11.0° typical
Matching Window	Silicone Rubber
Operation Temperature	-20 to 70°C
Storage Temperature	-30 to 80°C

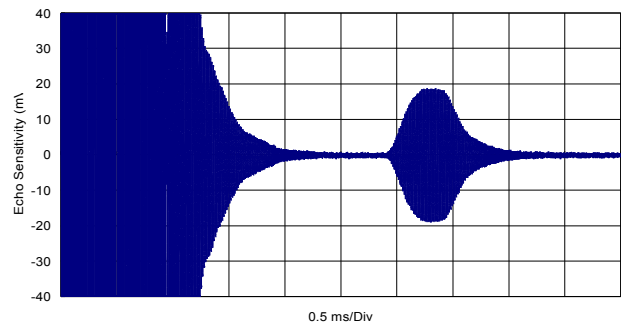
**Echo Sensitivity vs. Frequency**

Tested at distance of 50cm, 20Vp-p, 40 bursts



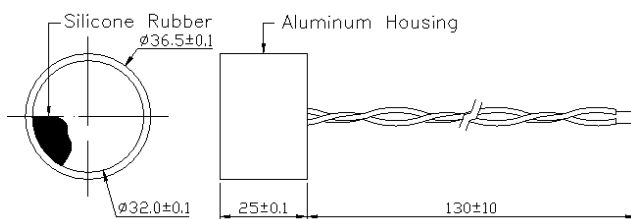
**Echo Sensitivity/Ringing**

Tested under 20Vp-p, 40 bursts, 50cm

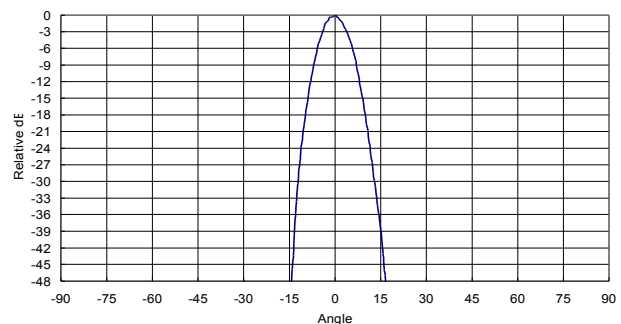


All specification taken typical at 25°C  
Low ringing model can be arranged

**Dimensions:** dimensions are in mm

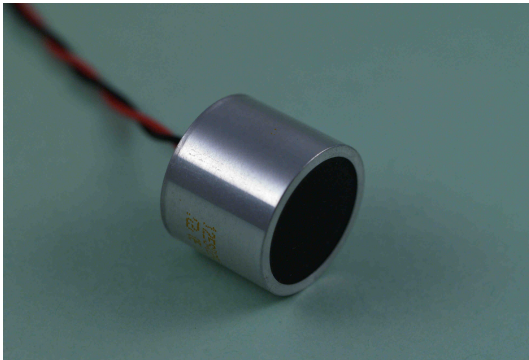


**Beam Angle:** Tested at 80 KHz frequency



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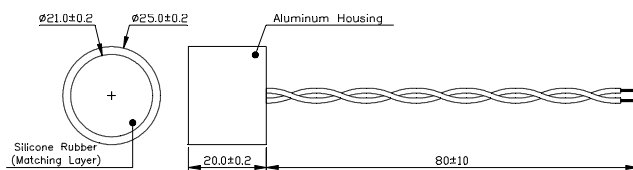


**Specification**

125SR250	Transceiver
Center Frequency (KHz)	125.0±10.0
Echo Sensitivity 0dB = 20Vp-p @ 25 cm (40 bursts)	-55 dB min.
Dead Zone (10burst)	20 cm
Bandwidth (Echo Sensitivity)	8 KHz
Nominal Impedance (Ohm)	200
Capacitance at 1KHz ±20%	1250 pF
Max. Driving Voltage (Pulse) 2% duty cycle tone burst	200Vpp
Total Beam Angle -3dB	8.0° typical
-6dB	11.0° typical
Matching Window	Silicone Rubber
Operation Temperature	-20 to 60° C
Storage Temperature	-30 to 70° C

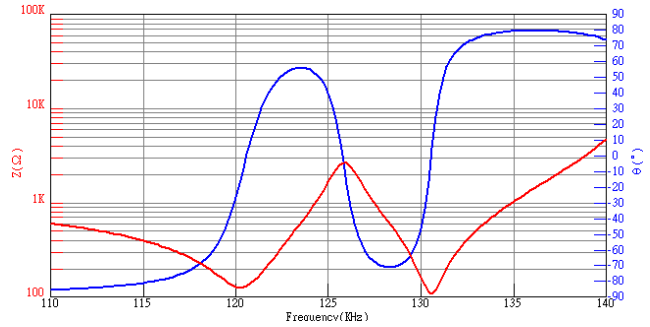
All specification taken typical at 25°C  
Low ringing model can be arranged

**Dimensions:** dimensions are in mm



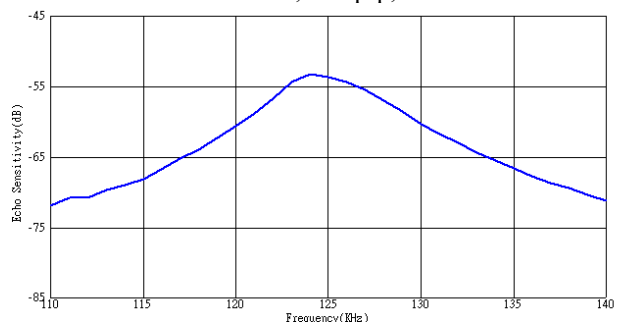
**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



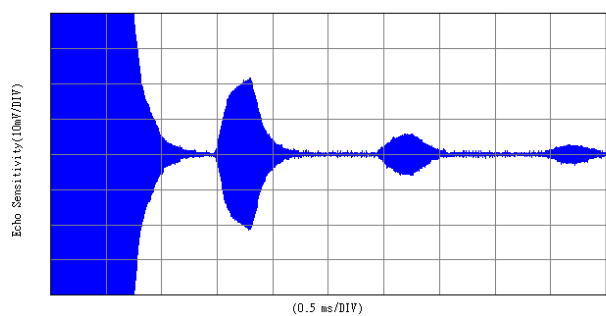
**Echo Sensitivity vs. Frequency**

Tested at distance of 25cm, 20Vp-p, 40 bursts

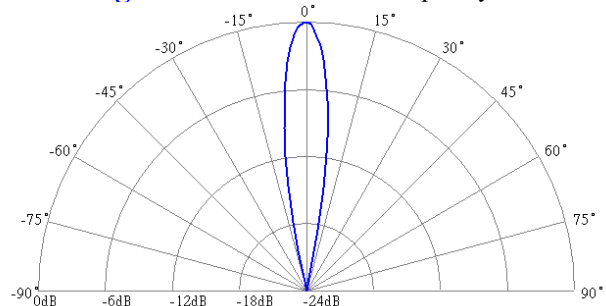


**Echo Sensitivity/Ringing**

Tested under 20Vp-p, 40 bursts, 25cm



**Beam Angle:** Tested at 125.0KHz frequency



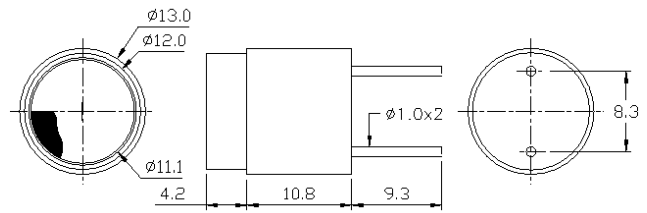
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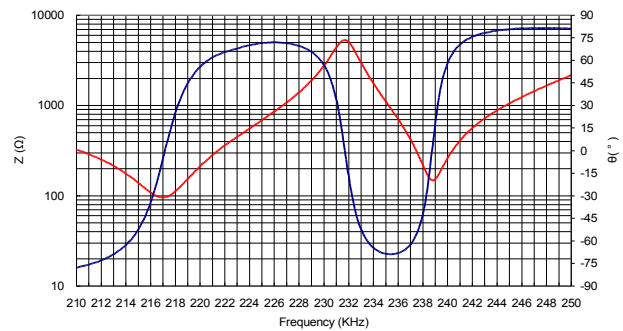


**Dimensions:** dimensions are in mm



**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



**Specification**

235SR130	Transceiver
Center Frequency (KHz)	235.0±10.0
Overall Echo Sensitivity 0dB = 20Vp-p @ 25 cm	-61 dB min. (40 bursts)
Bandwidth (Echo Sensitivity)	10KHz
Capacitance at 1KHz ±20%	540 pF
Max. Driving Voltage (Pulse)	80Vpp 10% duty cycle tone burst
Total Beam Angle	-3dB 7.0° typical
	-6dB 10.0° typical
Matching Window	Silicone Rubber
Operation Temperature	-20 to 60°C
Storage Temperature	-30 to 70°C

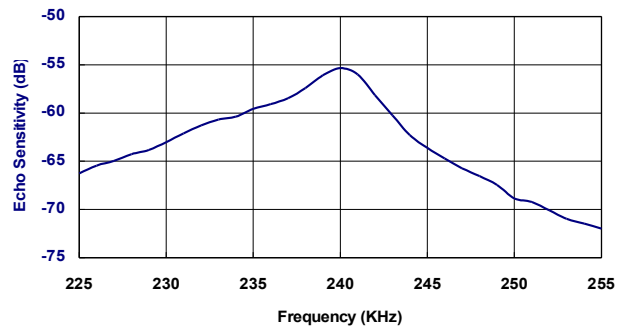
All specification taken typical at 25°C  
Closer frequency tolerance, shorter ringing and wider bandwidth models can be supplied upon request.

**Model available:**

1	235SR013	Aluminum Housing
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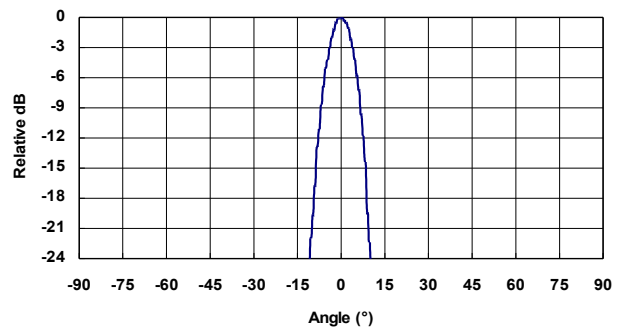
**Echo Sensitivity**

Tested under 20Vp-p @25cm; 0dB=20Vp-p



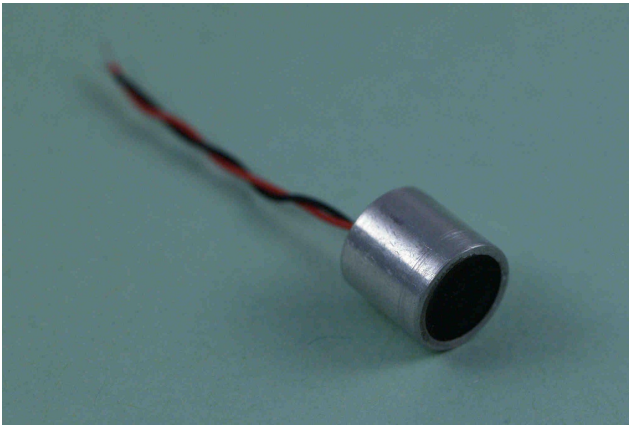
**Beam Angle:** Tested at 235.0KHz frequency

Reflector: Aluminum Plate L75×W75×T10 (mm)



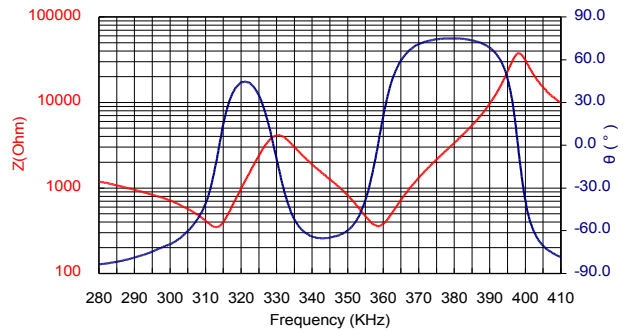
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**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

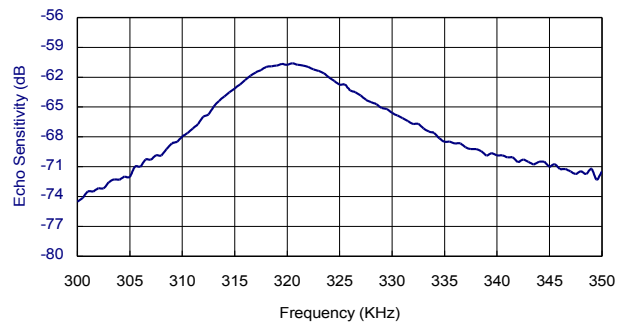


**Specification**

320SR093	Transceiver
Center Frequency (KHz)	320.0±10.0
Echo Sensitivity 0dB = 20Vp-p, 50 Bursts @ 10 cm	-65 dB min.
Dead Zone	8 cm
Bandwidth (Echo Sensitivity)	10KHz
Nominal Impedance (Ohm)	1200
Capacitance at 1Khz ±20%	270 pF
Max. Driving Voltage (Pulse)	50Vpp 10% duty cycle
Total Beam Angle	-3dB 9.5° typical -6dB 12.5° typical
Matching Window	Silicone Rubber
Operation Temperature	0 to 70°C
Storage Temperature	-20 to 80°C

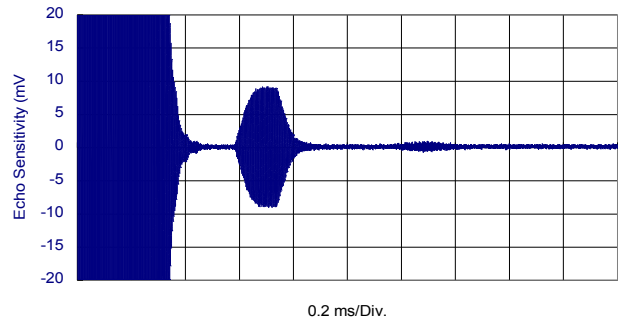
**Echo Sensitivity vs. Frequency**

Tested at distance of 10cm, 20Vp-p, 50 bursts



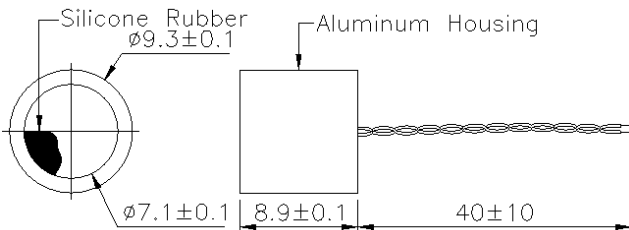
**Echo Sensitivity/Ringing**

Tested under 20Vp-p, 50 bursts, 10cm

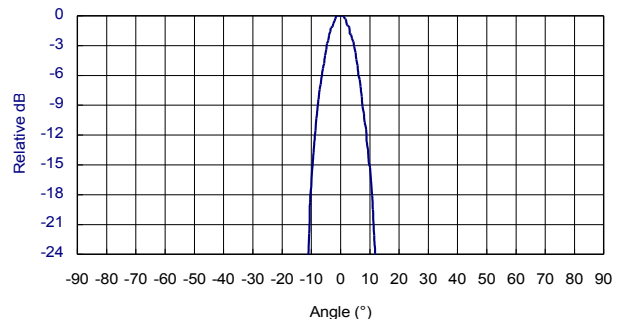


All specification taken typical at 25°C  
Low ringing model can be arranged

**Dimensions:** dimensions are in mm



**Beam Angle:** Tested at 314.0 KHz frequency



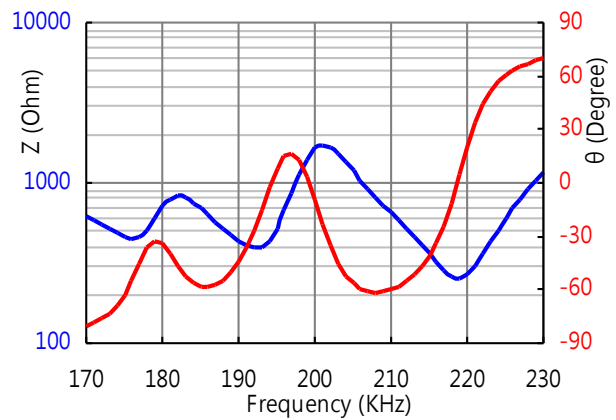
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**Impedance/Phase Angle vs. Frequency:**

Tested under 1Vrms Oscillation Level

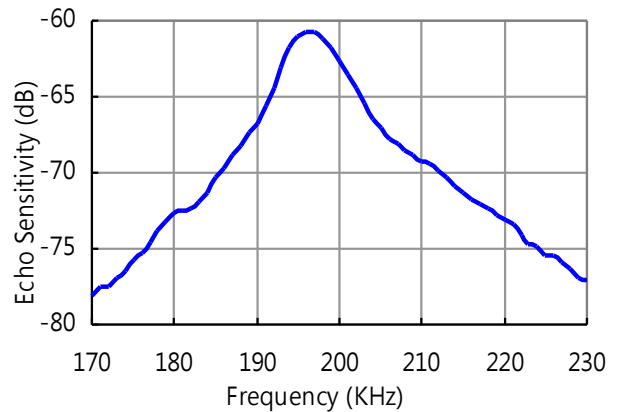


**Specification**

200GE180	Transceiver
Center Frequency	200.0±10KHz
Echo Sensitivity	-61dB
0dB = 20Vp-p , 30 Bursts Square wave	
Bandwidth (FOM)	10KHz
Nominal Impedance (Ohm)	600
Capacitance at 1Khz ±20%	600 pF
Max. Driving Voltage (Pulse)	50Vpp 10% duty cycle
Total Beam Angle	-6dB 10° typical
Matching Window	Resin with filler
Operation Temperature	-20 to 60°C
Storage Temperature	-30 to 70°C

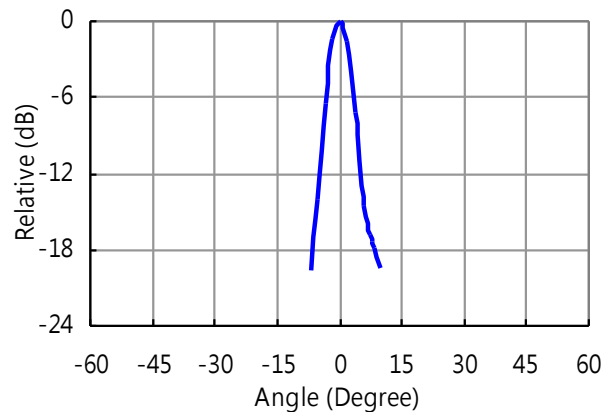
**Echo Sensitivity:**

Tested under 20Vp-p @25cm ; 0dB=20Vp-p



All specification taken typical at 25°C  
 Closer frequency tolerance, shorter ringing and wider bandwidth models can be supplied upon request.

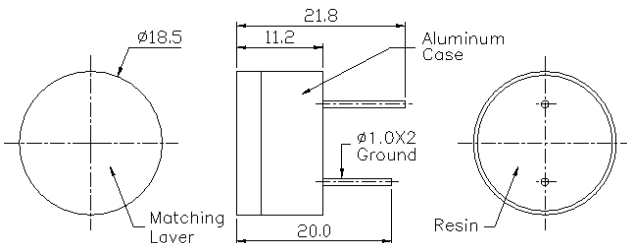
**Beam Angle: Tested at 200.0Khz frequency**



**Model available:**

1	200GE180	Aluminum Housing
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**Dimensions:** dimensions are in mm



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**Ultrasonic Transducer Assembled Units**

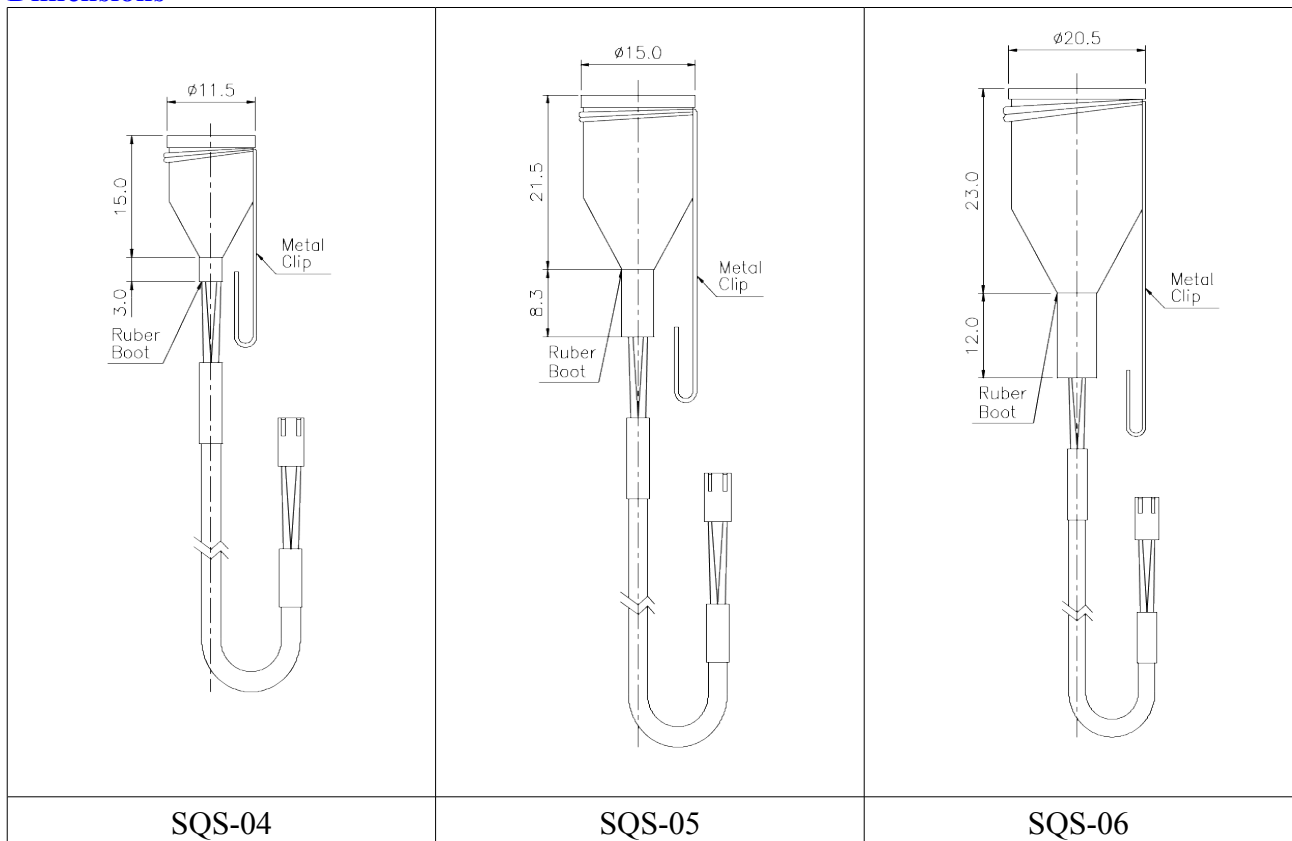
Transducers equip with a 2.5 meters shield cable and covered by a rubber boot with a metal clip for easy installation are very suitable for most of vehicle alarms.

RCA, Amp or Molex type connector at the other cable end is available upon request.

**Specification**

Model Number	SQS-04	SQS-05	SQS-06
Transducer used	400ST/R100 or 10P	400ST/R120	400ST/R160 or 16P
Cable length	2.5 meters		
Connector used	RCA/Amp/Molex type or others upon request		

**Dimensions**

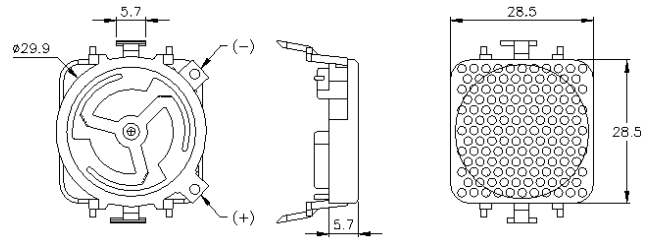


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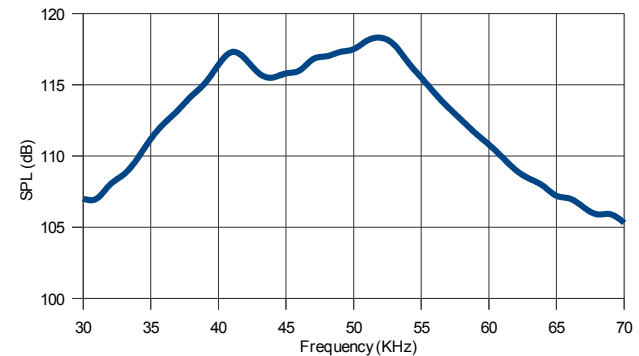


**Dimensions:** dimensions are in mm

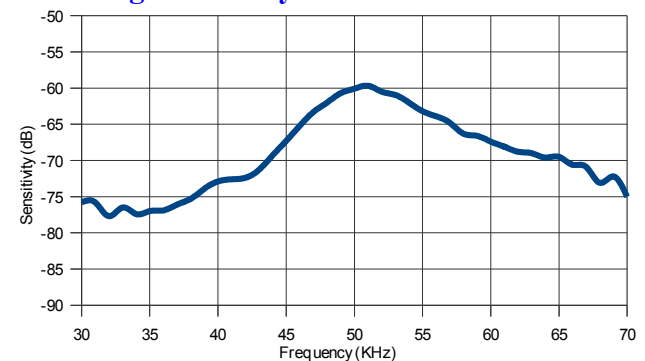


**Transmitting Sound Pressure Level**

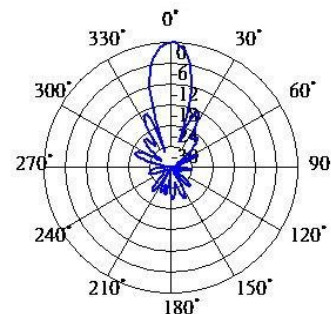
Tested under 300Vac pk-pk, 200Vdc bias @50 cm



**Receiving Sensitivity:** Tested under 200Vdc bias



**Beam Angle:** Tested at 50.0Khz frequency



**Specification**

500ES290	Transceiver
Center Frequency	50.0±1.0KHz
Transmitting Sound Pressure Level at 50.0KHz; 0dB re 20µPa per 300Vac pk-pk, 200Vdc bias at 50 cm	116.0 dB min.
Receiving Sensitivity at 50.0KHz, 200Vdc bias, 0dB = 1 volt/µbar (0dB = 1 volt/Pa)	-65.0 dB (-45.0 dB)
Capacitance at 1KHz ±20%	600 - 700 pF
Suggested DC Bias Voltage	200 V
Suggested AC Driving Voltage	300V pk-pk
Maximum Combined Voltage	400V
Total Beam Angle	-6dB 13° typical
Operation Temperature	0 to 60°C
Standard Finish	
Foil (Diaphragm):	
1. 500ES290-G	Gold
2. 500ES290-A	Aluminum
Housing	ABS

All specification taken typical at 25°C

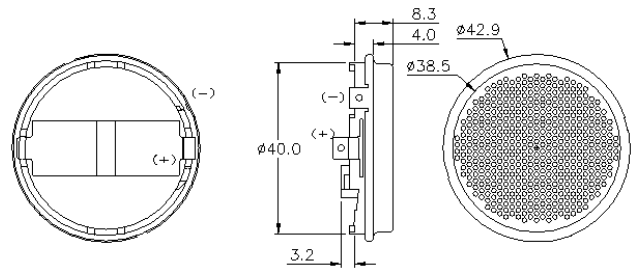


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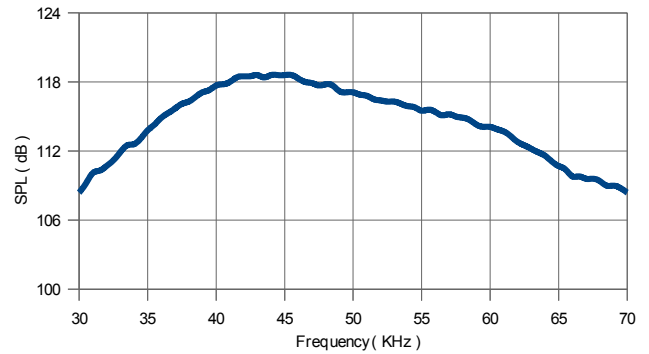


**Dimensions:** dimensions are in mm



**Transmitting Sound Pressure Level**

Tested under 300Vac pk-pk, 200Vdc bias @50 cm



**Specification**

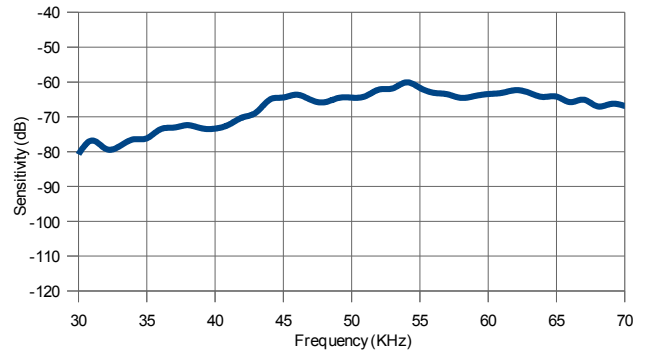
500ES430	Transceiver
Center Frequency	50.0±1.0KHz
Transmitting Sound Pressure Level at 50.0KHz; 0dB re 20µPa per 300Vac pk-pk, 200Vdc bias at 50 cm	116 dB min.
Receiving Sensitivity at 50.0KHz, 200Vdc bias, 0dB = 1 volt/Pa (0dB =1 volt/µbar)	-43 dB min. (-63 dB) min.
Capacitance at 1KHz ±20%	400 - 500 pF
Suggested DC Bias Voltage	200 V
Suggested AC Driving Voltage	300V pk-pk
Maximum Combined Voltage	400V
Total Beam Angle	-6dB 13° typical
Operation Temperature	0 to 60°C
Standard Finish	
Foil (Diaphragm)	See below
Housing	See below

All specification taken typical at 25°C

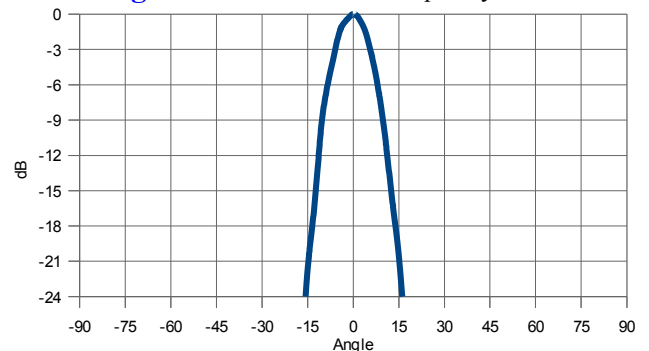
**Models available**

Model	Foil	Housing
500ES43AB	Aluminum	Black Painted Steel
500ES43AS	Aluminum	SUS 304
500ES43GB	Gold	Black Painted Steel
500ES43GS	Gold	SUS 304

**Receiving Sensitivity:** Tested under 200Vdc bias



**Beam Angle:** Tested at 50.0Khz frequency



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# Bolt Clamped High Power Transducers



## Features

- High efficiency & high output
- Large amplitude
- Low heat generation
- Durability & stability
- Easy connection

## Applications

- Ultrasonic cleaners
- Ultrasonic welders
- Ultrasonic processing machines: bonding, drilling, etching, engraving and etc.

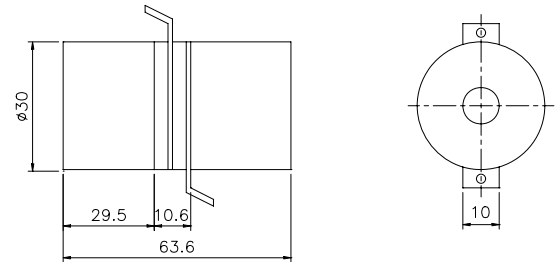
## Specification

	30402S	45402H	45282H	60282H
Resonant frequency (KHz)	37.5	40.0	28.2	28
Motion Admittance (mMho)	35	15	50	40
Mechanic Q (Qm)	500	500	500	500
Capacitance (pF)	2700	4000	4000	4000
Allowable vibration rate (cm/sec.)	50	50	50	25

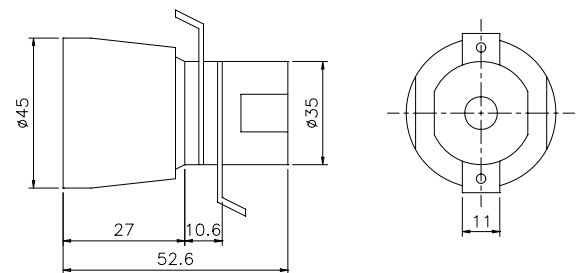
All specification taken typical at 25°C

## Dimensions

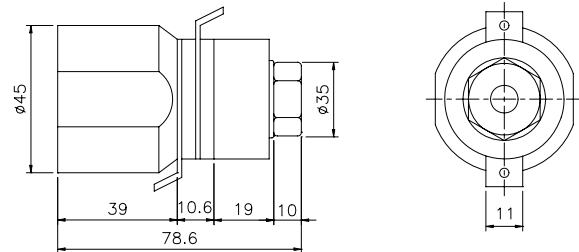
### Model: 30402S



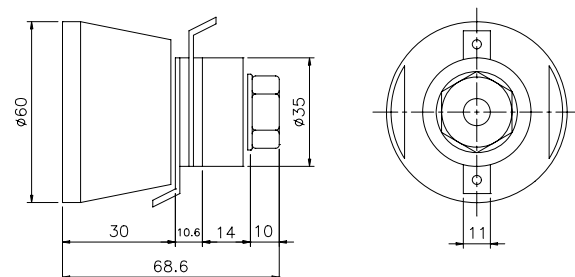
### Model: 45402H



### Model: 45282H

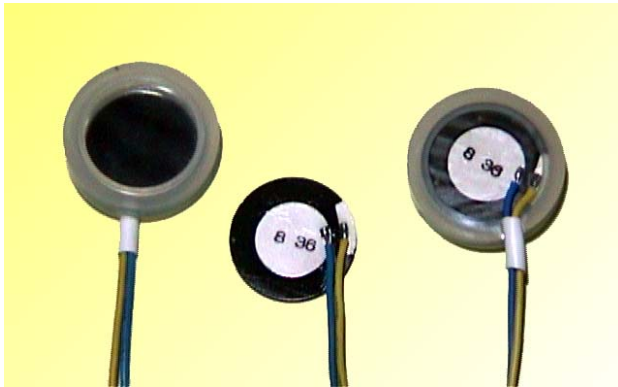


### Model: 60282H



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# Ultrasonic Atomizing Transducers



The ultrasonic atomizing transducers using our factory made high Q hard type piezoelectric ceramic element is ideal for atomizing liquids. A very fine mist having a particle diameter of only a few microns can be generated. We are not only supply atomizing element but also entire assembled transducer unit with silicone rubber holder.

## Features

- Piezoelectric ceramic element clad with stainless steel for erosion resistance.
- Fine and consistent particle size of less than 3 $\mu$ m
- High atomizing efficiency >400 cc/hour
- Less power consumption
- High stability and durability

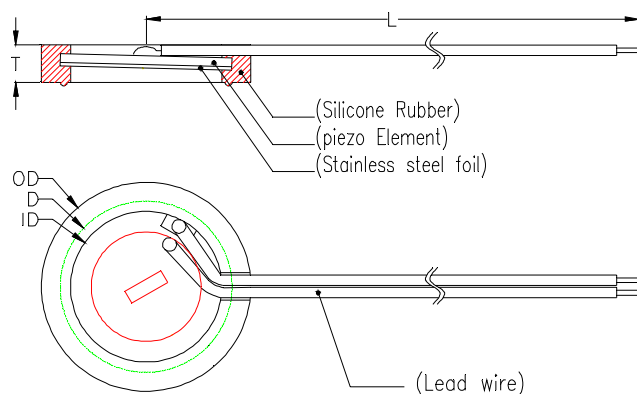
## Applications

- Humidification in refrigerated food displays and storage, living environments, and air conditioning plants.
- Inhalation and disinfecting equipment
- Humidification in industrial process control for lubrication, coating and etc.

## Specification:

Model Number	M165D20	M165D25
Resonance Frequency (MHz)	1.65 $\pm$ 0.05	1.65 $\pm$ 0.05
Resonance Impedance (Ohm)	<2.0	<2.0
Capacitance at 1KHz (pF)	2,000 $\pm$ 20%	2,000 $\pm$ 20%
Dissipation Factor at 1KHz	<0.5%	<0.5%
Operation Duration (hour)	>5,000	>5,000
Atomizing Quantity (cc/Hour)	300	400
Input Power (maximum)	25	30
Operation Temperature	0 to 45°C	0 to 45°C
Dimensions	L	110
	T	5
	OD	25
	D	20
Dimensions	OD	30.5
	D	25
Dimensions	OD	25
	ID	17.4

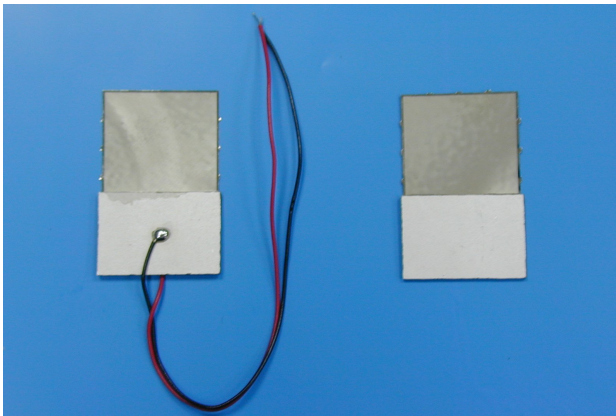
## Dimensions dimensions are in mm



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The ultrasonic vibration micro nozzle consists a piezoelectric ceramic and a metal foil, on which over thousands micro nozzles formed. Using the same principle as inkjet printer, this transducer atomizes water or liquids through a matrix of micro holes of around 7-10  $\mu\text{m}$ .

The micro nozzles ultrasonic atomizing transducer can use siphon to draw small amount liquids to the surface of metal foil and then to atomize, which is much efficiency than the conventional ultrasonic atomizer for which a liquid tank with high level liquid has to be always loaded on the surface of ultrasonic transducers.

**Features**

- Fine and consistent misted particle size
- Adjustable misted particle size
- No loaded liquids require as comparing with conventional atomizers
- High atomizing efficiency
- Less power consumption
- High stability and durability

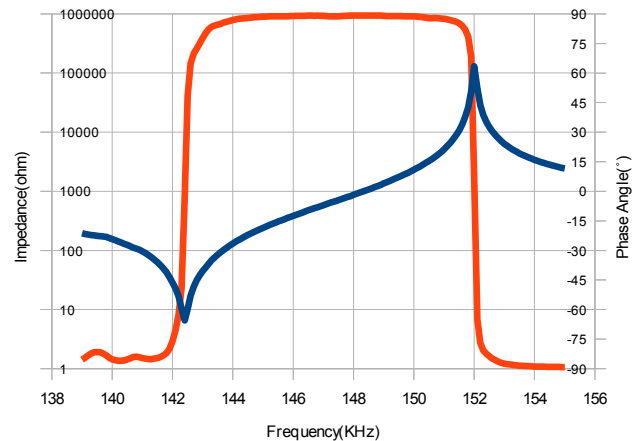
**Applications**

- Humidification in refrigerated food displays and storage, living environments, and air conditioning plants.
- Inhalation and disinfecting equipment
- Humidification in industrial process control for lubrication, coating and etc.
- Liquids dispensing systems

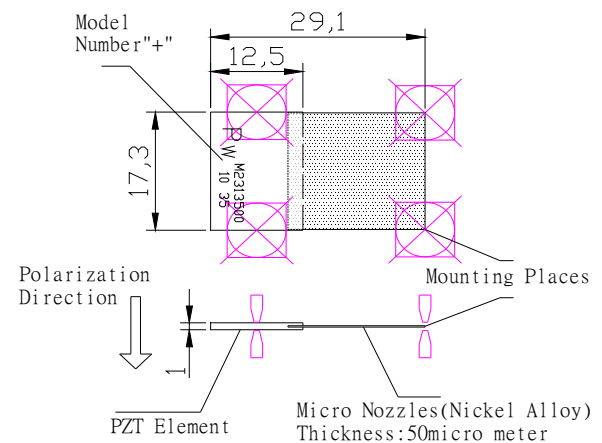
**Specification:**

Resonant Frequency	143 $\pm$ 5	KHz	
Impedance	10	ohm	typ
Capacitance	2300 $\pm$ 20%	pF	@1KHz , 20°C
Dimensions	L	29.1 $\pm$ 0.2	mm
	W	17.3 $\pm$ 0.1	mm
	T	1.0 $\pm$ 0.1	mm
Metal Material	50	$\mu\text{m}$	PZT Element Ni-Co Alloy
Nozzle size	7 $\pm$ 3	$\mu\text{m}$	

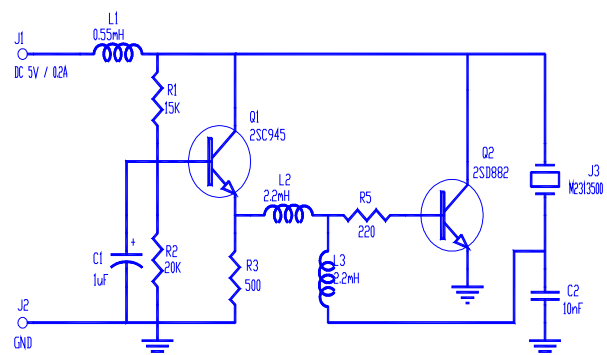
**Impedance/Phase Angle:**



**Construction**



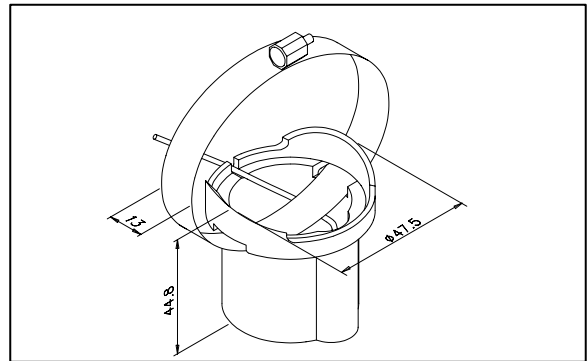
**Driving Circuit**



Remark: The negative side faces to the opening, the positive side faces to the liquid source, if driving circuit uses NPN transistor.



**Dimensions:** dimensions are in mm



**Specification**

<b>200LM450</b>	Transceiver
<b>Center Frequency</b>	200±10.0Khz
<b>Bandwidth (FOM -6dB)</b>	25Khz
<b>Transmitting Sound Pressure Level</b>	160dB min.
0dB re 1µPa per 1Vrms at 100cm	
<b>Receiving Sensitivity</b>	-180dB min.
0dB = 1 volt/µPa	
<b>Submerged Impedance (Ohm)</b>	200
<b>Capacitance at 1Khz</b>	±20% 2000 pF
<b>Input Power (Pulse Drive)</b>	50 Watts
<b>Total Beam Angle</b>	-6dB 20°
<b>Cable Length</b>	4.5 m
<b>Molded Connector</b>	RCA Phono plug 90°
<b>Housing Material</b>	Plastic resin

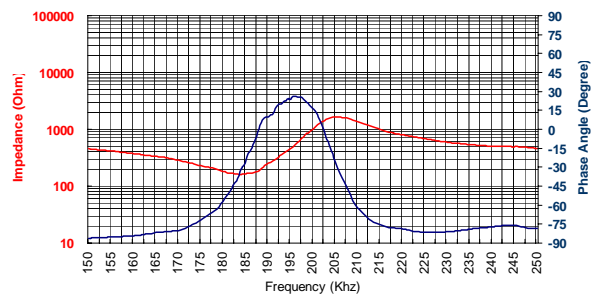
Closer frequency tolerance, shorter ringing and wider bandwidth models can be supplied upon request.

Model available:

1	200LM450	Plastic Housing
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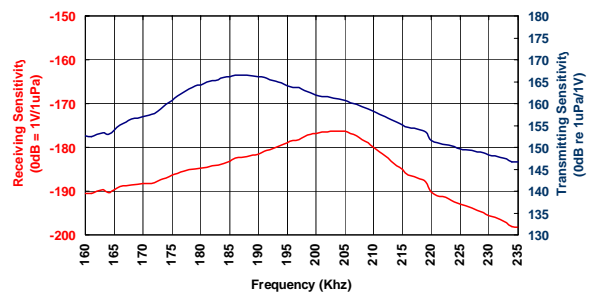
**Submerged Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level



**Receiving /Transmitting Sensitivity**

Tested at distance of 100cm



**Figure of Merit**

(Receiving Sensitivity + Transmitting Sensitivity)

