**Specification**

250ST160
250SR160

Center Frequency
- Transmitter: 25.0±1.0KHz
- Receiver: 2.0KHz

Bandwidth (-6dB)
- Transmitter: 112dB min.
- Receiver: -62dB min.

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
- 250ST: 3000 pF
- 250SR: 2600 pF

Max. Driving Voltage (cont.)
- 250ST: 20Vrms
- 250SR: 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.

Model available:
1. 250ST/R160 Aluminum Housing
2. 250ST/R16B Black Aluminum Housing
3. 250ST/R16P Plastic Housing

**Dimensions**

Dimensions are in mm

---

**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level.
- 250SR160 Impedance
- 250SR160 Phase
- 250ST160 Impedance
- 250ST160 Phase

**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

**Beam Angle**

Tested at 25.0KHz Frequency

---

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**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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Air Ultrasonic Ceramic Transducers

Specification

| 250ST180  | Transmitter Center Frequency 25.0±1.0KHz |
| 250SR180  | Receiver Center Frequency 25.0±1.0KHz |
| Bandwidth (-6dB)  | 250ST180 1.5KHz |
|             | 250SR180 1.8KHz |
| Transmitting Sound Pressure Level at 25.0KHz; dB re 0.0002μbar per 10Vrms at 30cm |
| Receiving Sensitivity at 25.0KHz 0dB = 1 volt/μbar |
| 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:

<table>
<thead>
<tr>
<th></th>
<th>250ST/R180</th>
<th>Aluminum Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>250ST/R18B</td>
<td>Black Al. Housing</td>
</tr>
</tbody>
</table>

Dimensions: dimensions are in mm

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

<table>
<thead>
<tr>
<th>250SR180 Impedance</th>
<th>250SR180 Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>250ST180 Impedance</td>
<td>250ST180 Phase</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Frequency (Khz)</th>
<th>Sensitivity (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>-90</td>
</tr>
<tr>
<td>21</td>
<td>-85</td>
</tr>
<tr>
<td>22</td>
<td>-80</td>
</tr>
<tr>
<td>23</td>
<td>-75</td>
</tr>
<tr>
<td>24</td>
<td>-70</td>
</tr>
<tr>
<td>25</td>
<td>-65</td>
</tr>
<tr>
<td>26</td>
<td>-60</td>
</tr>
<tr>
<td>27</td>
<td>-55</td>
</tr>
<tr>
<td>28</td>
<td>-50</td>
</tr>
<tr>
<td>29</td>
<td>-45</td>
</tr>
<tr>
<td>30</td>
<td>-40</td>
</tr>
</tbody>
</table>

### Beam Angle
Tested at 25.0KHz frequency

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Air Ultrasonic Ceramic Transducers

250ST/R180

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

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Air Ultrasonic Ceramic Transducers

250ST/R240

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.

Model available:
1 250ST/R240 Aluminum Housing

Dimensions: dimensions are in mm

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250SR240 Receiver

Sensitivity Variation vs. Loaded Resistor

Center Frequency Shift vs. Loaded Resistor

Sensitivity Variation vs. Temperature

Center Frequency Shift vs. Temperature

SPL Variation vs. Driving Voltage

Center Frequency Shift vs. Driving Voltage

SPL Variation vs. Temperature

Center Frequency Shift vs. Temperature
Air Ultrasonic Ceramic Transducers

328ST/R160

Specification

328ST160
328SR160
Center Frequency
Bandwidth (-6dB)
Transmitting Sound Pressure Level
Receiving Sensitivity
Capacitance at 1KHz
Max. Driving Voltage (cont.)
Total Beam Angle
Operation Temperature
Storage Temperature

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

Model available:

1 328ST/R160 Aluminum Housing

Dimensions: dimensions are in mm

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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

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**Specification**

| 328ST180 | Transmitter | Center Frequency | 32.8±1.0KHz |
| 328SR180 | Receiver | Bandwidth (-6dB) | 2KHz |

Transmitting Sound Pressure Level
- 117dB min. at 32.8KHz
- 2400 pF at 1KHz
- 45° typical at 32.8KHz
- -60 to 70°C
- -40 to 80°C

Receiving Sensitivity
- -64dB min. at 32.8KHz
- 20Vrms at 1Vrms
- 45° typical at 32.8KHz
- -30 to 70°C
- -40 to 80°C

All specification taken typical at 25°C

Closer frequency tolerance can be supplied upon request.

Model available:

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

**Dimensions:** dimensions are in mm

---

**Impedance/Phase Angle vs. Frequency**
Tested under 1Vrms Oscillation Level
- 328SR180 Impedance
- 328SR180 Phase
- 328ST180 Impedance
- 328ST180 Phase

---

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

---

**Beam Angle**
Tested at 32.8Khz frequency

---

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Air Ultrasonic Ceramic Transducers

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

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

Model available:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>400ST/R100 Aluminum Housing</td>
</tr>
<tr>
<td>2</td>
<td>400ST/R10P Plastic Housing</td>
</tr>
</tbody>
</table>

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

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

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

**Beam Angle**
Tested at 40.0Khz frequency

---

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1 of 2
Air Ultrasonic Ceramic Transducers

400SR100 Receiver
Sensitivity Variation vs. Loaded Resistor

400ST100 Transmitter
SPL Variation vs. Driving Voltage

Center Frequency Shift vs. Loaded Resistor

Sensitivity Variation vs. Temperature

Center Frequency Shift vs. Driving Voltage

SPL Variation vs. Temperature

Center Frequency Shift vs. Temperature

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Air Ultrasonic Ceramic Transducers

**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>400ST120</td>
<td>Transmitter Center Frequency</td>
<td>40.0 ± 1.0KHz</td>
</tr>
<tr>
<td>400SR120</td>
<td>Receiver Center Frequency</td>
<td>2.0KHz</td>
</tr>
<tr>
<td></td>
<td>Bandwidth (-6dB)</td>
<td>400ST120 2.0KHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400SR120 2.0KHz</td>
</tr>
<tr>
<td></td>
<td>Transmitting Sound Pressure Level at 40KHz</td>
<td>0.0002µbar per 10Vrms at 30cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>115dB min.</td>
</tr>
<tr>
<td></td>
<td>Receiving Sensitivity at 40KHz</td>
<td>-67dB min.</td>
</tr>
<tr>
<td></td>
<td>Capacitance at 1KHz ±20%</td>
<td>2400 pF</td>
</tr>
<tr>
<td></td>
<td>Max. Driving Voltage (cont.)</td>
<td>20Vrms</td>
</tr>
<tr>
<td></td>
<td>Total Beam Angle -6dB</td>
<td>85° typical</td>
</tr>
<tr>
<td></td>
<td>Operation Temperature</td>
<td>-30 to 70°C</td>
</tr>
<tr>
<td></td>
<td>Storage Temperature</td>
<td>-40 to 80°C</td>
</tr>
</tbody>
</table>

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

**Model available:**

<table>
<thead>
<tr>
<th></th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>400ST/R120</td>
<td>Aluminum Housing</td>
</tr>
<tr>
<td>2</td>
<td>400ST/R12B</td>
<td>Black Al. Housing</td>
</tr>
</tbody>
</table>

**Dimensions:** dimensions are in mm

---

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1 of 2
Air Ultrasonic Ceramic Transducers

400ST/R120

400SR120 Receiver
Sensitivity Variation vs. Loaded Resistor

400ST120 Transmitter
SPL Variation vs. Driving Voltage

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2 of 2
## Specification

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

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

### Models available:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 400ST/R160</td>
<td>Aluminum Housing</td>
</tr>
<tr>
<td>2 400ST/R16B</td>
<td>Black Al. Housing</td>
</tr>
<tr>
<td>3 400ST/R16P</td>
<td>Plastic Housing</td>
</tr>
</tbody>
</table>

### Dimensions: dimensions are in mm

![Dimensions Diagram](image)

---

**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

<table>
<thead>
<tr>
<th>Impedance/Phase Angle vs. Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>400SR160 Impedance</td>
</tr>
<tr>
<td>400SR160 Phase</td>
</tr>
<tr>
<td>400ST160 Impedance</td>
</tr>
<tr>
<td>400ST160 Phase</td>
</tr>
</tbody>
</table>

![Impedance/Phase Angle Graph](image)

**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

<table>
<thead>
<tr>
<th>Sensitivity/Sound Pressure Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

![Sensitivity/Sound Pressure Graph](image)

**Beam Angle**

Tested at 40.0KHz frequency

![Beam Angle Graph](image)

---

### Closer frequency tolerance can be supplied upon request.

### Dimensions: dimensions are in mm

![Dimensions Diagram](image)

---

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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

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Air Ultrasonic Ceramic Transducers

500MB120

Specification

500MB120

Center Frequency
50.0±1.0KHz

Bandwidth (-6dB)
3KHz

Transmitting Sound Pressure Level
at 50.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm
113dB min.

Receiving Sensitivity
at 50.0KHz 0dB = 1 volt/μbar
-67dB min.

Sensitivity/Cross Talk Ratio
15 dB

Nominal Impedance (Trans.)
800 Ohm

Capacitance at 1KHz
2400 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.

Dimensions: dimensions are in mm

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Air Ultrasonic Ceramic Transducers

250ET/R250

Specification

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>250ET250</td>
<td>Transmitter</td>
<td>Center Frequency: 25.0±1.0KHz</td>
</tr>
<tr>
<td>250ER250</td>
<td>Receiver</td>
<td>Bandwidth (-6dB): 250ET250 1.0KHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transmitting Sound Pressure Level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiving Sensitivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacitance at 1KHz ±20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. Driving Voltage (cont.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Beam Angle -6dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operation Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Storage Temperature</td>
</tr>
</tbody>
</table>

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

Model available:

1. 250ET/R250 Aluminum Housing

Dimensions: dimensions are in mm

---

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Air Ultrasonic Ceramic Transducers

250ET/R250

250ER250 Receiver
Sensitivity Variation vs. Loaded Resistor

-40 -50 -60 -70 -80
Sensitivity (dB)

1K 3.9K 10K 30K 100K 390K
Loaded Resistor (Ω)

SPL Variation vs. Driving Voltage

250ET250 Transmitter

Max. Driving Voltage (Cont.) 15Vrms

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Vrms

Center Frequency Shift vs. Loaded Resistor

-5 -4 -3 -2 -1 0 1 2 3 4 5
Fc Variation %

1K 3.9K 10K 30K 100K 390K
Loaded Resistor (Ω)

Center Frequency Shift vs. Driving Voltage

250ET250 Max. Driving Voltage (Cont.) 15Vrms

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Vrms

Sensitivity Variation vs. Temperature

-80 -70 -60 -50 -40
Sensitivity (dB)

-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature(°C)

SPL Variation vs. Temperature

-90 -100 -110 -120 -130
SPL (dB)

-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature(°C)

Center Frequency Shift vs. Temperature

-5 -4 -3 -2 -1 0 1 2 3 4 5
Fc Variation %

-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature(°C)

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Air Ultrasonic Ceramic Transducers

**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>328ET250</td>
<td>Transmitter</td>
</tr>
<tr>
<td>328ER250</td>
<td>Receiver</td>
</tr>
<tr>
<td></td>
<td>Center Frequency</td>
</tr>
<tr>
<td></td>
<td>Bandwidth (-6dB)</td>
</tr>
<tr>
<td></td>
<td>Transmitting Sound Pressure Level</td>
</tr>
<tr>
<td></td>
<td>at 32.8KHz; 0dB re 0.0002μbar per 10Vrms at 30cm</td>
</tr>
<tr>
<td></td>
<td>Receiving Sensitivity</td>
</tr>
<tr>
<td></td>
<td>at 32.8KHz 0dB = 1 volt/μbar</td>
</tr>
<tr>
<td></td>
<td>Capacitance at 1KHz</td>
</tr>
<tr>
<td></td>
<td>Max. Driving Voltage (cont.)</td>
</tr>
<tr>
<td></td>
<td>Total Beam Angle</td>
</tr>
<tr>
<td></td>
<td>Operation Temperature</td>
</tr>
<tr>
<td></td>
<td>Storage Temperature</td>
</tr>
</tbody>
</table>

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

Model available:

1. 328ET/R250 Aluminum Housing
2. 328ET/R25B Black Alum. Housing
3. 328ET/R25S SUS 316 Housing

Dimensions: dimensions are in mm

---

**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

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

**Sensitivity/Sound Pressure Level**

Tested under 10Vrms @30cm

**Beam Angle**

Tested at 32.8Khz frequency

---

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1 of 2
Air Ultrasonic Ceramic Transducers

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
**Air Ultrasonic Ceramic Transducers**

**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Center Frequency</th>
<th>Bandwidth (-6dB)</th>
<th>Transmitting Sound Pressure Level</th>
<th>Receiving Sensitivity</th>
<th>Capacitance at 1KHz</th>
<th>Max. Driving Voltage (cont.)</th>
<th>Total Beam Angle</th>
<th>Operation Temperature</th>
<th>Storage Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>400ET080</td>
<td>Transmitter</td>
<td>40.0±3.0KHz</td>
<td>1.5KHz</td>
<td>100dB min.</td>
<td>-80dB min.</td>
<td>1700 pF</td>
<td>15Vrms</td>
<td>-6dB</td>
<td>-30 to 70°C</td>
<td>-40 to 80°C</td>
</tr>
<tr>
<td>400ER080</td>
<td>Receiver</td>
<td>40.0±3.0KHz</td>
<td>2.0KHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Model available:

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>400ET/R080</td>
<td></td>
<td>Nickel Plated Steel Housing</td>
</tr>
</tbody>
</table>

**Dimensions**: dimensions in mm

- **Impedance/Phase Angle vs. Frequency**
  - Tested under 1Vrms Oscillation Level
    - 400ER080 Impedance
    - 400ER080 Phase
    - 400ET080 Impedance
    - 400ET080 Phase

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

**Beam Angle**
- Tested at 40KHz 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

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Air Ultrasonic Ceramic Transducers

**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Transmitter</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>400ET250</td>
<td>40.0±1.0KHz</td>
<td>1.0KHz</td>
</tr>
<tr>
<td>400ER250</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Center Frequency**

- **Bandwidth (-6dB)**: 400ET250 1.0KHz
- **Transmitting Sound Pressure Level**
  - at 40.0KHz; 0dB re 0.0002μbar per 10Vrms at 30cm: 115dB min.
  - for SUS316: 107 dB min.
- **Receiving Sensitivity**
  - at 40.0KHz 0dB = 1 volt/2800 pF
  - -70dB min.
  - for SUS316: -72 dB min.
- **Capacitance at 1KHz** ±20%
- **Max. Driving Voltage (cont.)**: 20Vrms
- **Total Beam Angle -6dB**
- **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/R250 Aluminum Housing
2. 400ET/R25B Black Alum. Housing
3. 400ET/R25S SUS316 Housing

**Dimensions:** dimensions are in mm

---

Impedance/Phase Angle vs. Frequency

Tested under 1Vrms Oscillation Level

- 400ER250 Impedance
- 400ER250 Phase
- 400ET250 Impedance
- 400ET250 Phase

Sensitivity/Sound Pressure Level

Tested under 10Vrms @30cm

Beam Angle

Tested at 40.0KHz Frequency

---

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400ER250 Receiver
Sensitivity Variation vs. Loaded Resistor

400ET250 Transmitter
SPL Variation vs. Driving Voltage

Center Frequency Shift vs. Loaded Resistor

Sensitivity Variation vs. Temperature

Center Frequency Shift vs. Driving Voltage

SPL Variation vs. Driving Voltage

Center Frequency Shift vs. Temperature

Center Frequency Shift vs. Temperature

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Air Ultrasonic Ceramic Transducers

400ET/R180

Specification

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

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

Dimensions: dimensions are in mm

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400ET/R180

400ER180 Receiver
Sensitivity Variation vs. Loaded Resistor

400ET180 Transmitter
SPL Variation vs. Driving Voltage

Center Frequency Shift vs. Loaded Resistor

Sensitivity Variation vs. Temperature

Center Frequency Shift vs. Driving Voltage

SPL Variation vs. Temperature

Center Frequency Shift vs. Temperature

---

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Air Ultrasonic Ceramic Transducers

Specification

400ET18S
400ER18S

Center Frequency
40.0 ± 1.0 KHz
1.5 KHz

Transmitting Sound Pressure Level
at 40.0 KHz; 0 dB re 0.0002 pbar per 10 Vrms at 30 cm

Receiving Sensitivity
at 40.0 KHz 0 dB = 1 volt/μbar

Capacitance at 1 KHz ± 20%
2900 pF

Max. Driving Voltage (cont.)
15 Vrms

Total Beam Angle (-6 dB Main Beam)
35° typical

Operation Temperature
-30 to 70°C
-40 to 80°C

Storage Temperature
-40 to 80°C

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

Model available:

| 400ET/R18S | Aluminum Housing |

Dimensions: dimensions are in mm

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Air Ultrasonic Ceramic Transducers

400ER180 Receiver
Sensitivity Variation vs. Loaded Resistor

400ET180 Transmitter
SPL Variation vs. Driving Voltage

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2 of 2
**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>400PT120</td>
<td>Transceiver</td>
</tr>
<tr>
<td>Center Frequency</td>
<td>40.0±1.0KHz</td>
</tr>
<tr>
<td>Bandwidth (-6dB)</td>
<td>2.0KHz</td>
</tr>
<tr>
<td>Transmitting Sound Pressure Level</td>
<td>115dB min.</td>
</tr>
<tr>
<td>Receiving Sensitivity at resonant frequency</td>
<td>-68dB min.</td>
</tr>
<tr>
<td>Nominal Impedance (Ω)</td>
<td>1000</td>
</tr>
<tr>
<td>Ringing (ms)</td>
<td>1.2 max.</td>
</tr>
<tr>
<td>Capacitance at 1KHz</td>
<td>±20%</td>
</tr>
<tr>
<td>Max. Driving Voltage (cont.)</td>
<td>20Vrms</td>
</tr>
<tr>
<td>Total Beam Angle</td>
<td>400PT120 85° typical</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>400PT12P 120° typical</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-30 to 70°C</td>
</tr>
<tr>
<td></td>
<td>-40 to 80°C</td>
</tr>
</tbody>
</table>

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

Model available:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 400PT120</td>
<td>Aluminum Housing</td>
</tr>
<tr>
<td>2 400PT12B</td>
<td>Black Al. Housing</td>
</tr>
<tr>
<td>3 400PT12P</td>
<td>Plastic Housing</td>
</tr>
</tbody>
</table>

**Dimensions:** dimensions are in mm

---

**Beam Angle**
Tested at 40.0Khz frequency

---

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

---

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

---

**Dimensions:**

---

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### Specification

**400PT160**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transceiver</strong></td>
<td>400PT160</td>
</tr>
<tr>
<td><strong>Center Frequency</strong></td>
<td>40.0 ± 1.0KHz</td>
</tr>
<tr>
<td><strong>Bandwidth (-6dB)</strong></td>
<td>2.0KHz</td>
</tr>
<tr>
<td><strong>Transmitting Sound Pressure Level</strong></td>
<td>117dB min.</td>
</tr>
<tr>
<td><strong>Receiving Sensitivity</strong></td>
<td>-65dB min.</td>
</tr>
<tr>
<td><strong>Nominal Impedance (Ohm)</strong></td>
<td>1000</td>
</tr>
<tr>
<td><strong>Ringing (ms) max.</strong></td>
<td>1.2 – PT160</td>
</tr>
<tr>
<td><strong>Capacitance at 1KHz ±20%</strong></td>
<td>2400 pF</td>
</tr>
<tr>
<td><strong>Max. Driving Voltage (cont.)</strong></td>
<td>20Vrms</td>
</tr>
<tr>
<td><strong>Total Beam Angle</strong> -6dB</td>
<td>40° typical</td>
</tr>
<tr>
<td><strong>Operation Temperature</strong></td>
<td>-30 to 70°C</td>
</tr>
<tr>
<td><strong>Storage Temperature</strong></td>
<td>-40 to 80°C</td>
</tr>
</tbody>
</table>

All specifications are taken typical at 25°C.

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

<table>
<thead>
<tr>
<th>Model available:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 400PT160</td>
<td>Aluminum Housing</td>
</tr>
<tr>
<td>2 400PT16P</td>
<td>Plastic Housing</td>
</tr>
</tbody>
</table>

---

**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

---

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Air Ultrasonic Ceramic Transducers

**Specification**

<table>
<thead>
<tr>
<th>Transceiver</th>
<th>400EP125 Transceiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Frequency</td>
<td>40.0±1.0Khz</td>
</tr>
<tr>
<td>Bandwidth (-6dB)</td>
<td>400EP125</td>
</tr>
<tr>
<td>Transmitting Sound Pressure Level (with rubber sleeve)</td>
<td>1.5Khz</td>
</tr>
<tr>
<td>100dB min.</td>
<td></td>
</tr>
<tr>
<td>Receiving Sensitivity (with rubber sleeve) at resonant frequency</td>
<td>-78dB min.</td>
</tr>
<tr>
<td>Nominal Impedance (Ohm)</td>
<td>1000</td>
</tr>
<tr>
<td>Ringing (ms) @25°C</td>
<td>1.2 max.</td>
</tr>
<tr>
<td>Capacitance at 1Khz ±20%</td>
<td>1600 pF</td>
</tr>
<tr>
<td>Max. Driving Voltage</td>
<td>100Vpp</td>
</tr>
<tr>
<td>20 bursts, 25ms repetition rate</td>
<td></td>
</tr>
<tr>
<td>Total Beam Angle</td>
<td>-6dB 108°</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>-30 to 70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to 80°C</td>
</tr>
</tbody>
</table>

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

**Dimensions:** dimensions are in mm

**Impedance/Phase Angle vs. Frequency**

Tested under 1Vrms Oscillation Level

**Sensitivity/Sound Pressure Level**

SPL Tested under 10Vrms@30cm

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

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## Specification

**400EP18A**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transceiver</td>
<td>400EP18A</td>
</tr>
<tr>
<td>Center Frequency</td>
<td>40.0±1.0KHz</td>
</tr>
<tr>
<td>Bandwidth (-6dB)</td>
<td>1.5KHz</td>
</tr>
<tr>
<td>Transmitting Sound Pressure Level</td>
<td>108dB min.</td>
</tr>
<tr>
<td>Receiving Sensitivity</td>
<td>-75dB min.</td>
</tr>
<tr>
<td>Nominal Impedance (Ohm)</td>
<td>750</td>
</tr>
<tr>
<td>Ringing (ms)</td>
<td>1.2 max.</td>
</tr>
<tr>
<td>Capacitance at 1KHz ±20%</td>
<td>2600 pF</td>
</tr>
<tr>
<td>Temperature Compensated Type</td>
<td>5200 pF</td>
</tr>
<tr>
<td>Max. Driving Voltage (Cont.)</td>
<td>20Vrms</td>
</tr>
<tr>
<td>20 bursts, 25ms repetition rate</td>
<td>100Vpp</td>
</tr>
<tr>
<td>Total Beam Angle -6dB</td>
<td>85°</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>-30 to 70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to 80°C</td>
</tr>
<tr>
<td>All specification taken typical at 25°C</td>
<td></td>
</tr>
<tr>
<td>Both lead pins and lead wires output are available.</td>
<td></td>
</tr>
<tr>
<td>Temperature compensated type is available upon request.</td>
<td></td>
</tr>
</tbody>
</table>

### Models available:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>400EP18A Black Al. Housing</td>
</tr>
<tr>
<td>2</td>
<td>400EP18A0 Natural Al. Housing</td>
</tr>
<tr>
<td>3</td>
<td>400EP18AC Temp. Compensated</td>
</tr>
</tbody>
</table>

## Dimensions:

Dimensions: dimensions are in mm

![Dimensions diagram]

## Impedance/Phase Angle vs. Frequency

Tested under 1Vrms Oscillation Level

![Impedance/Phase Angle vs. Frequency graph]

## Sensitivity/Sound Pressure Level

Tested under 10Vrms @30cm

![Sensitivity/Sound Pressure Level graph]

## Beam Angle:

Tested at 40.0Khz frequency

![Beam Angle graph]

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---

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**Air Ultrasonic Ceramic Transducers**

**400EP250**

**Specification**

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

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

---

**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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Air Ultrasonic Ceramic Transducers

**400EP14D**

**Transceiver**

<table>
<thead>
<tr>
<th>Specification</th>
<th>400EP14D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Frequency</td>
<td>40.0±1.0KHz</td>
</tr>
<tr>
<td>Bandwidth (-6dB FOM)</td>
<td>1.0KHz</td>
</tr>
<tr>
<td>Transmitting Sound Pressure Level</td>
<td>0.0002μbar per 10Vrms at 30cm</td>
</tr>
<tr>
<td>Receiving Sensitivity</td>
<td>103dB min.</td>
</tr>
<tr>
<td>Nominal Impedance (Ohm)</td>
<td>1000</td>
</tr>
<tr>
<td>Ringing (ms)</td>
<td>1.2 max.</td>
</tr>
<tr>
<td>Capacitance at 1KHz ±20%</td>
<td>1600 pF</td>
</tr>
<tr>
<td>Temperature Compensated Type</td>
<td>3200 pF</td>
</tr>
<tr>
<td>Max. Driving Voltage (cont.)</td>
<td>20 Vrms</td>
</tr>
<tr>
<td>20 bursts, 25ms repetition rate</td>
<td>100 Vpp</td>
</tr>
<tr>
<td>Total Beam Angle -6dB</td>
<td>135° typ.</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>-30 to 70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to 80°C</td>
</tr>
</tbody>
</table>

**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

---

**S. Square Enterprise Company Limited**

**Pro-Wave Electronics Corporation**

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

**Asymmetric Beam Patterns**

**Specification**

<table>
<thead>
<tr>
<th>400EP18D</th>
<th>Transceiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Frequency</td>
<td>40.0±1.0KHz</td>
</tr>
<tr>
<td>Bandwidth (-6dB) F.O.M.</td>
<td>2.0KHz</td>
</tr>
</tbody>
</table>

Transmitting Sound Pressure Level at resonant frequency; 0dB re 0.0002µbar per 10Vrms at 30cm

Receiving Sensitivity at resonant frequency 0dB = 1 volt/µbar

Nominal Impedance (Ohm)

Ringing

Capacitance at 1KHz ±20%

Temperature Compensated Type

Max. Driving Voltage (Cont.) 20 bursts, 25ms repetition rate

Total Beam Angle -6dB Wide* Narrow*

Operation Temperature

Storage Temperature

All specification taken typical at 25°C

Both lead pins and lead wires output are available

Models available:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>400EP18D</td>
</tr>
<tr>
<td>2</td>
<td>400EP18DC</td>
</tr>
<tr>
<td>3</td>
<td>400EP18DCR</td>
</tr>
</tbody>
</table>

**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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Pro-Wave Electronics Corporation

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1 of 1
Air Ultrasonic Ceramic Transducers

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 |
| 100dB min. |
| Receiving Sensitivity |
| -80dB min. |
| Nominal Impedance (Ohm) |
| 1000 |
| Ringing (ms) |
| 1.2 max. |
| Capacitance at 1KHz ±20% |
| 2400 pF |
| Max. Driving Voltage |
| 100 Vp-p |
| @20 bursts, 25 ms repetition rate |
| Total Beam Angle -6dB |
| 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

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation

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Air Ultrasonic Ceramic Transducers

**Specification**

<table>
<thead>
<tr>
<th>043SR750</th>
<th>Transceiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Frequency</td>
<td>43.0±4.0 KHz</td>
</tr>
<tr>
<td>Bandwidth (Echo Sensitivity)</td>
<td>2 KHz</td>
</tr>
<tr>
<td>Echo Sensitivity</td>
<td>60dB re 20Vp-p, 40 bursts @ 100cm</td>
</tr>
<tr>
<td>Nominal Impedance</td>
<td>700 Ω</td>
</tr>
<tr>
<td>Capacitance at 1KHz</td>
<td>5700 pF ±20%</td>
</tr>
<tr>
<td>Max. Driving Voltage (Pulse)</td>
<td>1500 Vpp, 2% duty cycle tone burst</td>
</tr>
<tr>
<td>Total Beam Angle</td>
<td>-3dB</td>
</tr>
<tr>
<td>Matching Window</td>
<td>Silicone Rubber</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>-20 to 70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-30 to 80°C</td>
</tr>
</tbody>
</table>

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

**Dimensions:** dimensions are in mm

- Diameter: 140 ± 10 mm
- Thickness: 50 ± 10 mm
- Depth: 80 ± 10 mm

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

**Echo Sensitivity vs. Frequency**
Tested at 20Vp-p, 40 bursts, 100cm

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

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation

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

Specification

080SR365 Transceiver
- Center Frequency (KHz): 80.0±5.0
- Echo Sensitivity: 0dB = 20Vp-p @ 50 cm
- 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

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 50cm, 20Vp-p, 40 bursts

Echo Sensitivity/Ringing
Tested under 20Vp-p, 40 bursts, 50cm

Beam Angle: Tested at 80 Khz frequency

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation
Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
Specification

125SR250
Center Frequency (KHz) 125.0±10.0
Echo Sensitivity
-55 dB min. 0dB = 20Vp-p @ 25 cm (40 bursts)
Dead Zone (10burst) 20 cm
Bandwidth (Echo Sensitivity) 8 KHz
Nominal Impedance (Ohm) 200
Capacitance at 1KHz ±20% 1250 pF
Max. Driving Voltage (Pulse) 200Vpp
2% duty cycle tone burst
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

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Pro-Wave Electronics Corporation
Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
## Specification

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

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

Model available:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>235SR013</td>
<td>Aluminum Housing</td>
</tr>
</tbody>
</table>

### Dimensions:
Dimensions are in mm

![Dimensions Diagram]

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

![Impedance/Phase Angle vs. Frequency Graph]

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

![Echo Sensitivity Graph]

### Beam Angle:
Tested at 235.0Khz frequency
Reflector: Aluminum Plate L75×W75×T10 (mm)

![Beam Angle Graph]
Specifcation

320SR093 Transceiver
Center Frequency (KHz) 320.0±10.0
Echo Sensitivity 0dB = 20Vp-p, 50 Bursts @ 10 cm
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
Matching Window -6dB 12.5° typical
Operation Temperature 0 to 70°C
Storage Temperature -20 to 80°C

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

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation
Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
Air Ultrasonic Ceramic Transducers

200GE180

Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>200GE180</td>
<td>Transceiver</td>
</tr>
<tr>
<td>Center Frequency</td>
<td>200.0±10KHz</td>
</tr>
<tr>
<td>Echo Sensitivity</td>
<td>-61dB</td>
</tr>
<tr>
<td>0dB = 20Vp-p , 30 Bursts Square wave</td>
<td></td>
</tr>
<tr>
<td>Bandwidth (FOM)</td>
<td>10KHz</td>
</tr>
<tr>
<td>Nominal Impedance (Ohm)</td>
<td>600</td>
</tr>
<tr>
<td>Capacitance at 1Khz ±20%</td>
<td>600 pF</td>
</tr>
<tr>
<td>Max. Driving Voltage (Pulse)</td>
<td>50Vpp 10% duty cycle</td>
</tr>
<tr>
<td>Total Beam Angle</td>
<td>-6dB</td>
</tr>
<tr>
<td>10° typical</td>
<td></td>
</tr>
<tr>
<td>Matching Window</td>
<td>Resin with filler</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>-20 to 60°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-30 to 70°C</td>
</tr>
<tr>
<td>Echo Sensitivity:</td>
<td>Tested under 20Vp-p @25cm ; 0dB=20Vp-p</td>
</tr>
<tr>
<td>Beam Angle:</td>
<td>Tested at 200.0Khz frequency</td>
</tr>
</tbody>
</table>

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

Model available:

1 200GE180  Aluminum Housing

Dimensions: dimensions are in mm

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation
Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
Air Ultrasonic Ceramic Transducers

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

<table>
<thead>
<tr>
<th>Model Number</th>
<th>SQS-04</th>
<th>SQS-05</th>
<th>SQS-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transducer used</td>
<td>400ST/R100 or 10P</td>
<td>400ST/R120</td>
<td>400ST/R160 or 16P</td>
</tr>
<tr>
<td>Cable length</td>
<td>2.5 meters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector used</td>
<td>RCA/Amp/Molex type or others upon request</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

<table>
<thead>
<tr>
<th></th>
<th>SQS-04</th>
<th>SQS-05</th>
<th>SQS-06</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation

Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
Electrostatic Ultrasonic Transducers 500ES290

Specification

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

Dimensions: dimensions are in mm

Transmitting Sound Pressure Level
Tested under 300 V Vac pk-pk, 200 Vdc bias @ 50 cm

Receiving Sensitivity: Tested under 200 Vdc bias

Beam Angle: Tested at 50.0 KHz frequency

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation

Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
Electrostatic Ultrasonic Transducers

500ES430

Specification

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

All specification taken typical at 25°C

**Models available**

<table>
<thead>
<tr>
<th>Model</th>
<th>Foil</th>
<th>Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>500ES43AB</td>
<td>Aluminum</td>
<td>Black Painted Steel</td>
</tr>
<tr>
<td>500ES43AS</td>
<td>Aluminum</td>
<td>SUS 304</td>
</tr>
<tr>
<td>500ES43GB</td>
<td>Gold</td>
<td>Black Painted Steel</td>
</tr>
<tr>
<td>500ES43GS</td>
<td>Gold</td>
<td>SUS 304</td>
</tr>
</tbody>
</table>

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

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation

Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
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

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

All specification taken typical at 25°C

Dimensions
Model: 30402S

Model: 45402H

Model: 45282H

Model: 60282H

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation

P.O. Box 1-70 Chung Ho, Taiwan, ROC; E-mail: sales@pro-wave.com.tw; Tel: 886-2-22465101(5 lines), 22459774; Fax: 886-2-22465105
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 3μm
- 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:

<table>
<thead>
<tr>
<th>Model Number</th>
<th>M165D20</th>
<th>M165D25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonance Frequency (MHz)</td>
<td>1.65±0.05</td>
<td>1.65±0.05</td>
</tr>
<tr>
<td>Resonance Impedance (Ohm)</td>
<td>&lt;2.0</td>
<td>&lt;2.0</td>
</tr>
<tr>
<td>Capacitance at 1KHz (pF)</td>
<td>2,000 ±20%</td>
<td>2,000 ±20%</td>
</tr>
<tr>
<td>Dissipation Factor at 1KHz</td>
<td>&lt;0.5%</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>Operation Duration (hour)</td>
<td>&gt;5,000</td>
<td>&gt;5,000</td>
</tr>
<tr>
<td>Atomizing Quantity (cc/Hour)</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>Input Power (maximum)</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>0 to 45°C</td>
<td>0 to 45°C</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td>T</td>
<td>5</td>
<td>5.5</td>
</tr>
<tr>
<td>OD</td>
<td>25</td>
<td>30.5</td>
</tr>
<tr>
<td>D</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>ID</td>
<td>17.4</td>
<td>22</td>
</tr>
</tbody>
</table>

Dimensions dimensions are in mm

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation
Http://www.pro-wave.com.tw ; E-mail: sales@pro-wave.com.tw ; Tel: 886-2-22465101 ; Fax: 886-2-22465105
The ultrasonic vibration micro nozzle consists of 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 μm. 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:**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonant Frequency</td>
<td>143±5 KHz</td>
</tr>
<tr>
<td>Impedance</td>
<td>10 ohm typ</td>
</tr>
<tr>
<td>Capacitance</td>
<td>2300±20% pF @1KHz • 20°C</td>
</tr>
<tr>
<td>Dimensions</td>
<td>L 29.1±0.2 mm, W 17.3±0.1 mm, T 1.0±0.1 mm PZT Element</td>
</tr>
<tr>
<td>Metal Material</td>
<td>50 μm Ni-Co Alloy</td>
</tr>
<tr>
<td>Nozzle size</td>
<td>7±3 μm</td>
</tr>
</tbody>
</table>

**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.

S. Square Enterprise Company Limited
Pro-Wave Electronics Corporation

Http://www.pro-wave.com.tw; E-mail: sales@pro-wave.com.tw; Tel: 886-2-22465101; Fax: 886-2-22465105
Underwater Ultrasonic Transducers

**200LM450**

<table>
<thead>
<tr>
<th>Specification</th>
<th>200LM450</th>
<th>Transceiver</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Center Frequency</strong></td>
<td>200±10.0Khz</td>
<td></td>
</tr>
<tr>
<td><strong>Bandwidth</strong> (FOM -6dB)</td>
<td>25Khz</td>
<td></td>
</tr>
<tr>
<td><strong>Transmitting Sound Pressure Level</strong></td>
<td>160dB min.</td>
<td></td>
</tr>
<tr>
<td><strong>Receiving Sensitivity</strong></td>
<td>-180dB min.</td>
<td></td>
</tr>
<tr>
<td><strong>Submerged Impedance (Ohm)</strong></td>
<td>200</td>
<td></td>
</tr>
<tr>
<td><strong>Capacitance at 1Khz ±20%</strong></td>
<td>2000 pF</td>
<td></td>
</tr>
<tr>
<td><strong>Input Power (Pulse Drive)</strong></td>
<td>50 Watts</td>
<td></td>
</tr>
<tr>
<td><strong>Total Beam Angle -6dB</strong></td>
<td>20°</td>
<td></td>
</tr>
<tr>
<td><strong>Cable Length</strong></td>
<td>4.5 m</td>
<td></td>
</tr>
<tr>
<td><strong>Molded Connector</strong></td>
<td>RCA Phono plug 90°</td>
<td></td>
</tr>
<tr>
<td><strong>Housing Material</strong></td>
<td>Plastic resin</td>
<td></td>
</tr>
</tbody>
</table>

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

Model available:

<table>
<thead>
<tr>
<th></th>
<th>200LM450</th>
<th>Plastic Housing</th>
</tr>
</thead>
</table>

**Dimensions:** dimensions are in mm

**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)