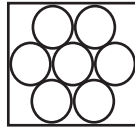


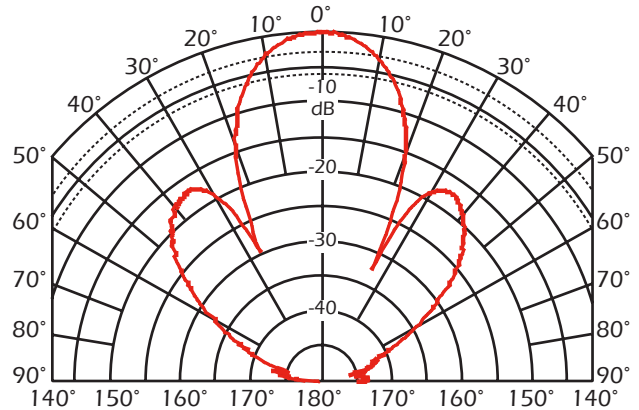
50 kHz-AE

Power Rating: 1kW rms @ 1% duty cycle  
 7 x 28 mm (1.13") PZT/L  
 Active Area: 45 cm<sup>2</sup> (6.97 in<sup>2</sup>)  
 Radiating Surface: Urethane

Array



Transmit Radiation Pattern

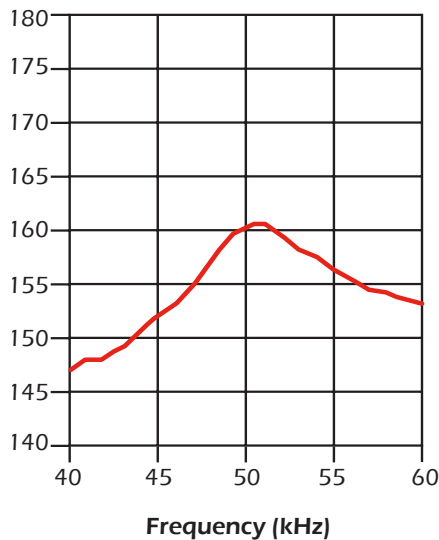


Beamwidth:

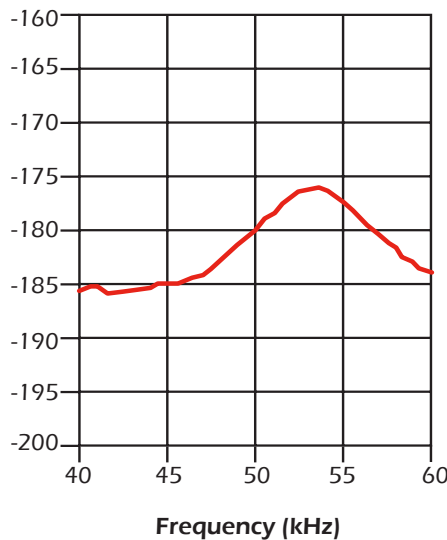
- 3 dB: 19°
- 6 dB: 27°
- 10 dB: 34°

- Directivity Index: 18.9 dB
- Frequency Tolerance: ± 2 kHz
- Peak TVR<sup>(1)</sup>, nominal: 160.7 dB
- Peak TVR<sup>(1)</sup>, minimum: 158.7 dB
- Q (transmit): 9
- Peak Source Level<sup>(4)</sup>: 215 dB
- Peak RVR<sup>(2)</sup>, nominal: -176 dB
- Peak Figure of Merit<sup>(3)</sup>: -17.2 dB

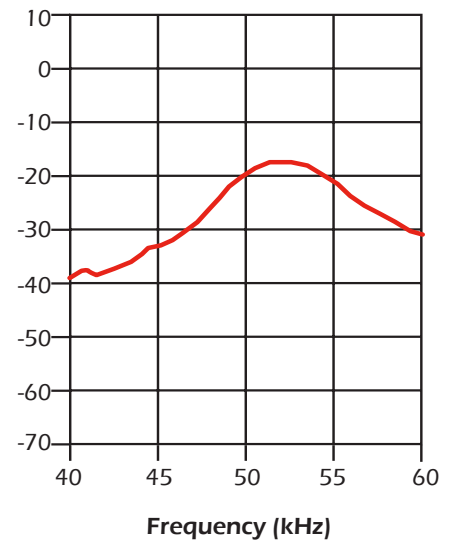
TVR dB<sup>(1)</sup>



RVR dB<sup>(2)</sup>



FOM dB<sup>(3)</sup>



Notes:

- (1) dB re 1 µPa per volt at 1 meter
- (2) dB re 1 volt per µPa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation

# Technical Data Catalog

## 50 kHz-AE

7 x 28 mm (1.13") PZT/L

Cable Type: C332

Cable Length: 10.4 m (34')

Note:

Impedance data includes cable

Impedance Data		
	<i>Balanced</i>	<i>Unbalanced</i>
<b>Parallel: Rp.</b>	300 Ω: -20%, +40%	300 Ω: -20%, +40%
<b>Parallel: Cp. (nominal)</b>	5,850 pF	7,430 pF
<b>Series [R - jX]: (nominal)</b>	240 - j150 Ω	210 - j160 Ω
<b>1 kHz capacitance: (nominal)</b>	8,100 pF	9,620 pF

**Balance Impedance Table**

Test Frequency (kHz)	Impedance Magnitude (Ω)	Phase Angle (°)	Series Resistance (Ω)	Series Reactance (Ω)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (Ω)	Parallel Capacitance (pF)
40.00	583.85	-84.07	60.36	-580.72	0.18	1.70	5647.66	6778.36
40.50	558.21	-84.18	56.62	-555.33	0.18	1.78	5503.00	7003.67
41.00	534.12	-84.19	54.07	-531.38	0.19	1.86	5276.04	7230.36
42.00	487.82	-84.00	51.03	-485.15	0.21	2.04	4663.34	7725.35
42.50	466.79	-83.63	51.82	-463.90	0.24	2.13	4205.12	7973.00
43.00	445.96	-83.11	53.52	-442.73	0.27	2.23	3715.76	8239.66
44.00	407.74	-81.90	57.45	-403.67	0.35	2.43	2893.66	8782.72
44.50	388.90	-80.90	61.52	-384.01	0.41	2.54	2458.52	9080.63
45.00	370.50	-79.69	66.29	-364.52	0.48	2.66	2070.61	9391.90
46.00	335.58	-76.64	77.53	-326.50	0.69	2.90	1452.50	10031.33
46.50	317.44	-74.64	84.10	-306.10	0.83	3.04	1198.22	10396.82
47.00	301.72	-72.14	92.55	-287.18	1.02	3.15	983.64	10682.21
48.00	272.05	-64.54	116.94	-245.64	1.58	3.32	632.93	11004.43
48.50	262.68	-59.79	132.16	-227.01	1.92	3.29	522.11	10796.13
49.00	255.91	-53.29	152.96	-205.17	2.34	3.13	428.17	10175.38
49.50	253.11	-46.44	174.41	-183.43	2.72	2.86	367.32	9205.66
50.00	260.90	-38.85	203.19	-163.65	2.99	2.40	334.99	7652.76
50.50	282.12	-31.58	240.33	-147.75	3.02	1.86	331.17	5850.64
51.00	311.13	-24.83	282.37	-130.66	2.92	1.35	342.83	4211.95
51.50	357.02	-20.43	334.56	-124.64	2.62	0.98	380.99	3021.88
52.00	421.33	-18.63	399.24	-134.61	2.25	0.76	444.63	2320.92
52.50	492.19	-19.47	464.05	-164.05	1.92	0.68	522.04	2052.82
53.00	571.22	-21.77	530.49	-211.83	1.63	0.65	615.08	1949.53
54.00	706.53	-34.07	585.23	-395.85	1.17	0.79	852.98	2337.17
54.50	745.89	-40.07	570.78	-480.17	1.03	0.86	974.73	2520.40
55.00	760.19	-47.11	517.37	-556.98	0.90	0.96	1116.99	2789.00
56.00	740.90	-57.88	393.95	-627.48	0.72	1.14	1393.39	3248.75
56.50	713.58	-62.46	329.97	-632.70	0.65	1.24	1543.15	3500.18
57.00	688.47	-66.22	277.59	-630.03	0.59	1.33	1707.50	3711.37
58.00	635.08	-71.15	205.16	-601.03	0.51	1.49	1965.94	4089.14
58.50	609.86	-73.32	175.04	-584.20	0.47	1.57	2124.82	4273.36
59.00	589.73	-74.91	153.55	-569.39	0.44	1.64	2265.02	4416.40
60.00	546.54	-77.13	121.75	-532.81	0.41	1.78	2453.56	4731.44

### 50 kHz-AE

**Transformed to 70 ohms**

Power rating: 1 kW<sub>rms</sub> @ 2% duty cycle  
 7x28mm (1.13") PZT/L  
 Active Area: 45cm<sup>2</sup>  
 Urethane Window

**Beamwidth:**

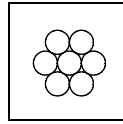
-3 dB: 19°  
 -6 dB: 27°  
 -10 dB: 34°

Directivity Index: 18.9  
 Frequency Tolerance: ±2kHz  
 Peak TVR<sup>(1)</sup>, nominal: 168dB  
 Peak TVR<sup>(1)</sup>, minimum: 165dB  
 Q (transmit): 8  
 Peak Source Level<sup>(4)</sup>: 217dB  
 RVR<sup>(2)</sup>, nominal: -176dB  
 Peak Figure of Merit<sup>(3)</sup>: -14dB

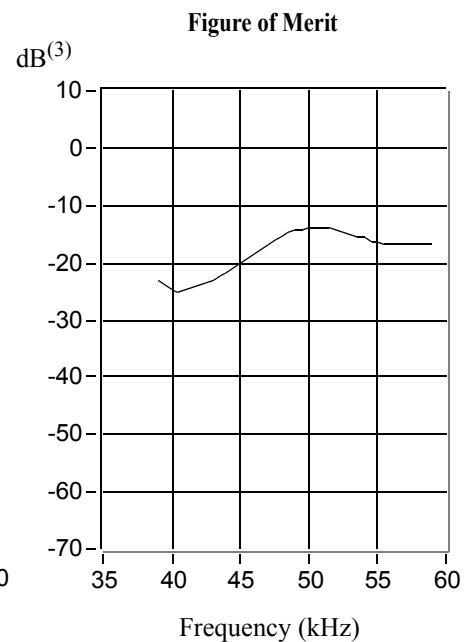
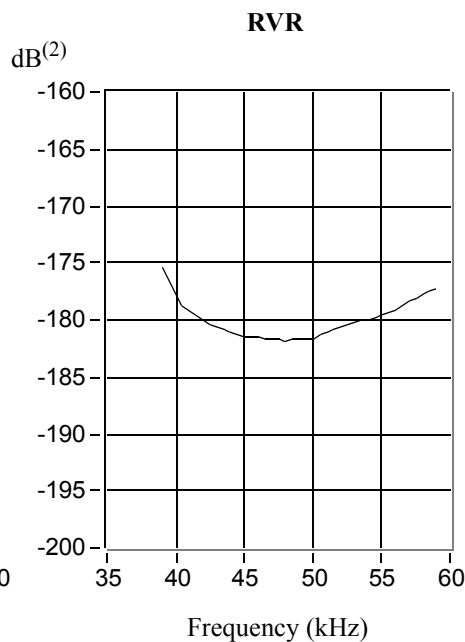
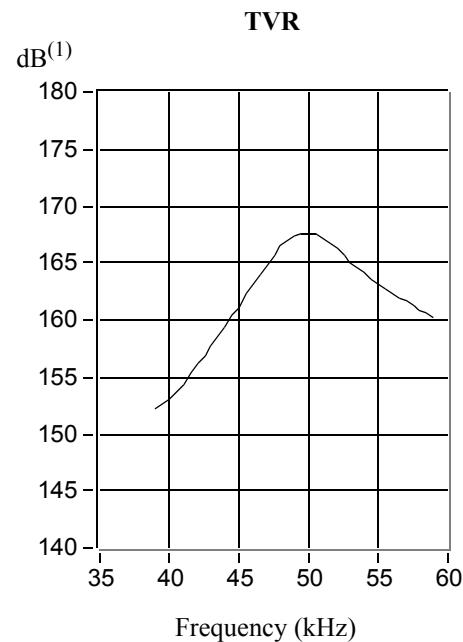
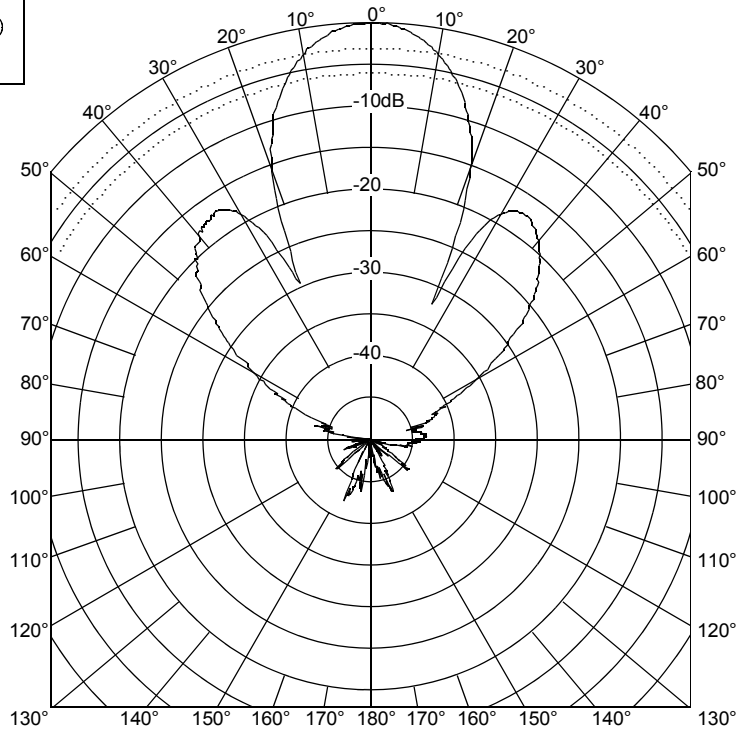
**Notes:**

- (1) dB re 1 μPa per volt at 1 meter
- (2) dB re 1 volt per μPa
- (3) sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation

Array:



**Transmit Radiation Pattern**



# Technical Data Catalog

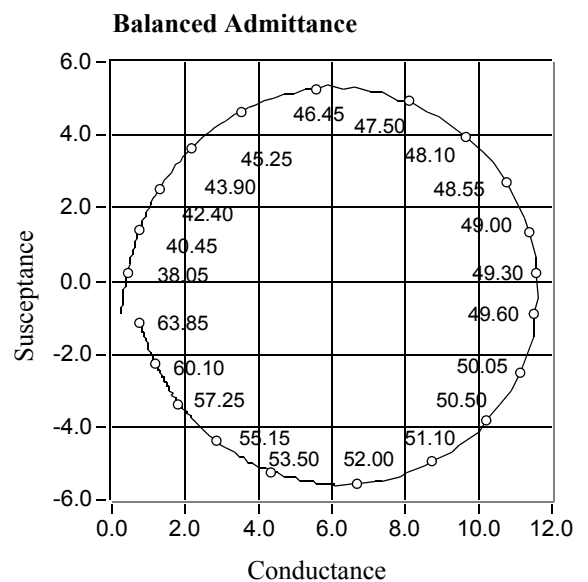
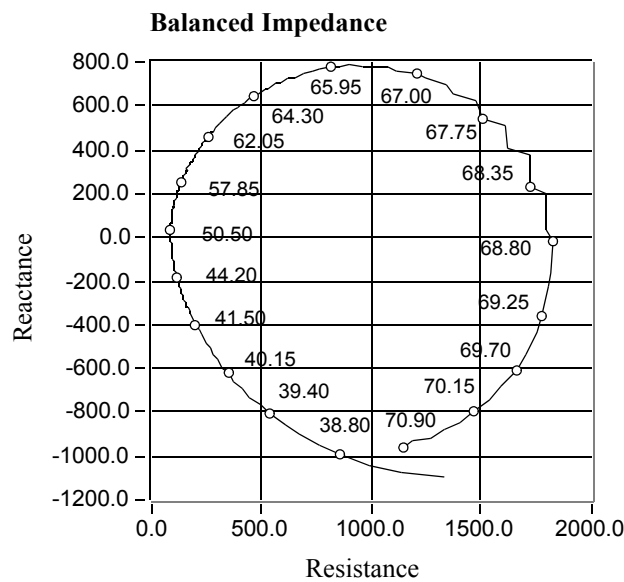
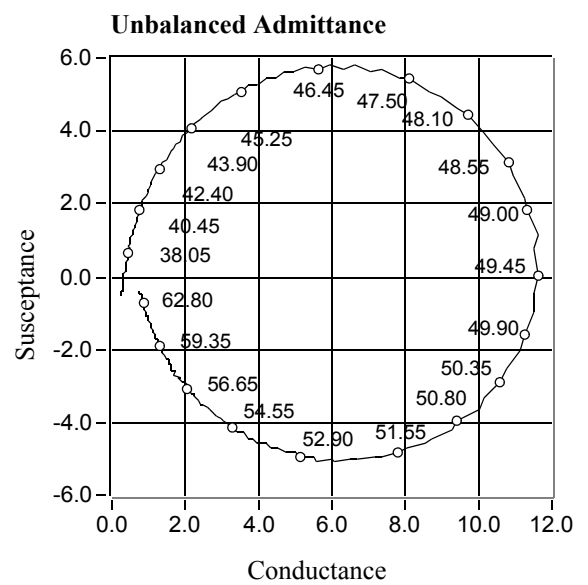
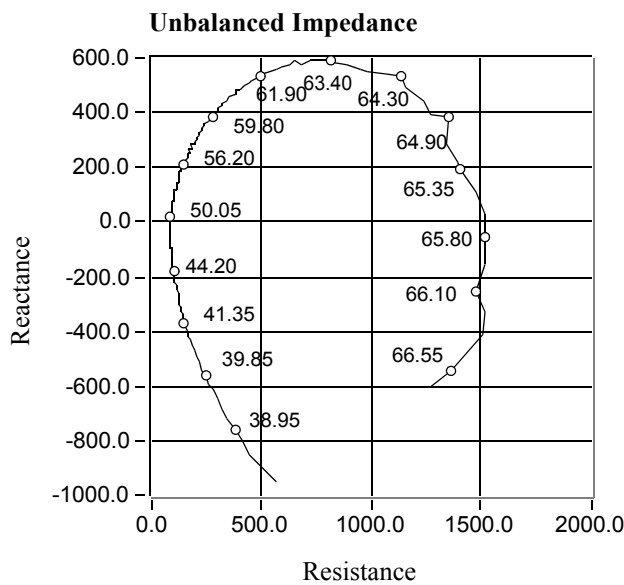
## 50 kHz-AE

7x28mm (1.13") PZT/L

Cable Type: C35

Cable Length: 10.1 m (33.0')

Impedance Data w/transformer		
	Balanced	Unbalanced
Parallel: Rp.	70ohms -20%,+40%	70ohms -20%,+40%
Parallel: Cp. (nominal)	0pF	0pF
Series [R - jX] (nominal)	70 - j0 ohms	70 - j0 ohms
1 kHz Capacitance	n/a	n/a



## 50 kHz-AE

### Transformed to 130 ohms

Power rating: 1 kW<sub>rms</sub> @ 2% duty cycle

7x28mm (1.13") PZT/L

Active Area: 45cm<sup>2</sup>

Urethane Window

Beamwidth:

-3dB: 19°

-6dB: 27°

-10dB: 34°

Directivity Index: 18.9

Frequency Tolerance: ±1.5kHz

Peak TVR<sup>(1)</sup>, nominal: 165dB

Peak TVR<sup>(1)</sup>, minimum: 163dB

Q (transmit): 8

Peak Source Level<sup>(4)</sup>: 216dB

Peak RVR<sup>(2)</sup>, nominal: -169dB

Peak Figure of Merit<sup>(3)</sup>: -14dB

### Notes:

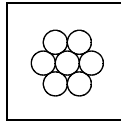
(1) dB re 1 μPa per volt at 1 meter

(2) dB re 1 volt per μPa

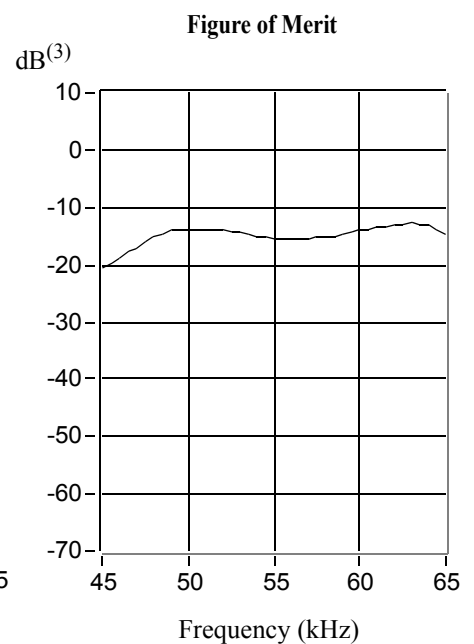
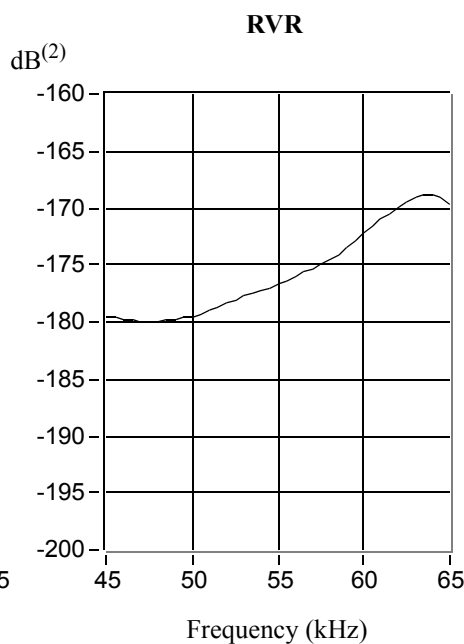
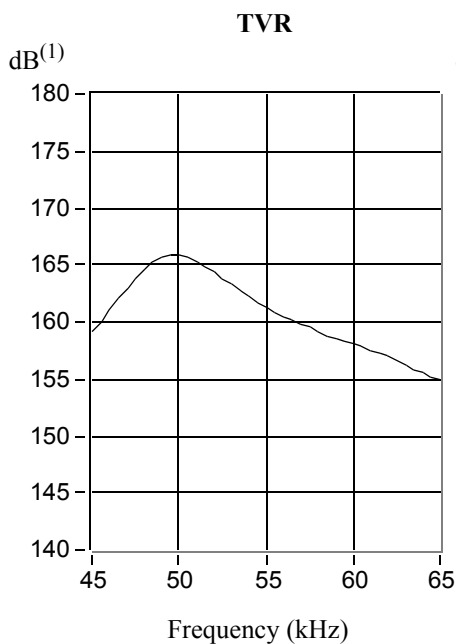
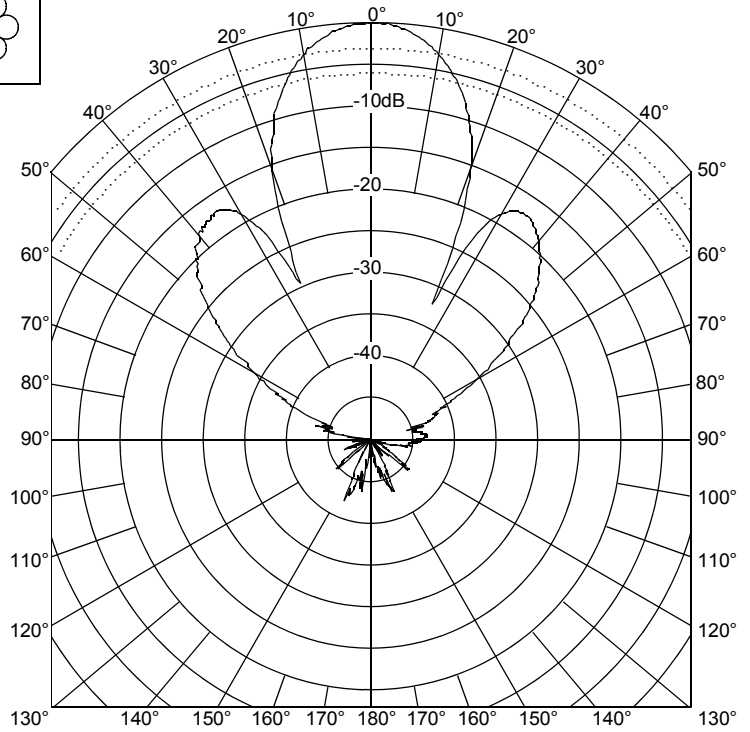
(3) sum of transmitting voltage response and receiving voltage response

(4) Nominal peak TVR, rated power, and no cavitation

Array:



### Transmit Radiation Pattern



# Technical Data Catalog

## 50 kHz-AE

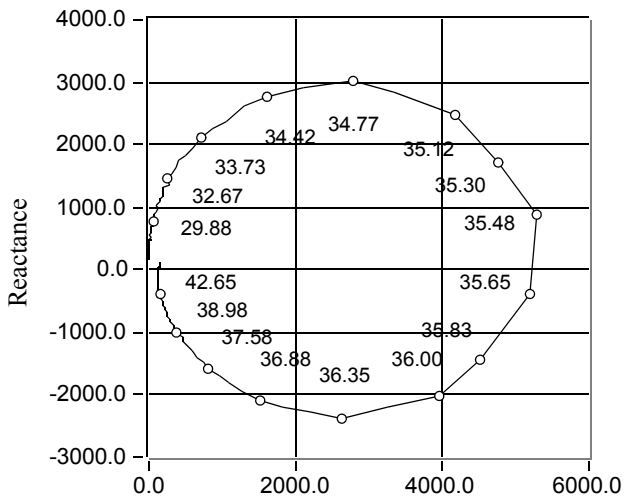
7x28mm (1.13") PZT/L

Cable Type: C44

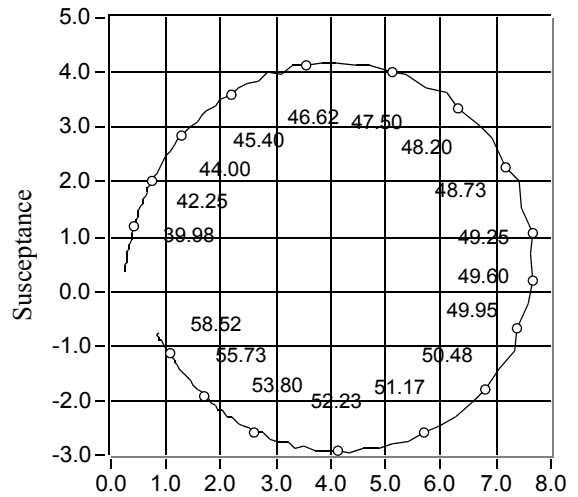
Cable Length: 10.1 m (33.0')

Impedance Data w/transformer		
	Balanced	Unbalanced
Parallel: Rp.	130 ohms-20%, +40%	130 ohms-20%, +40%
Parallel: Cp. (nominal)	0 pF	0 pF
Series [R - jX] (nominal)	130 - j0 ohms	130 - j0 ohms
1 kHz Capacitance	n/a	n/a

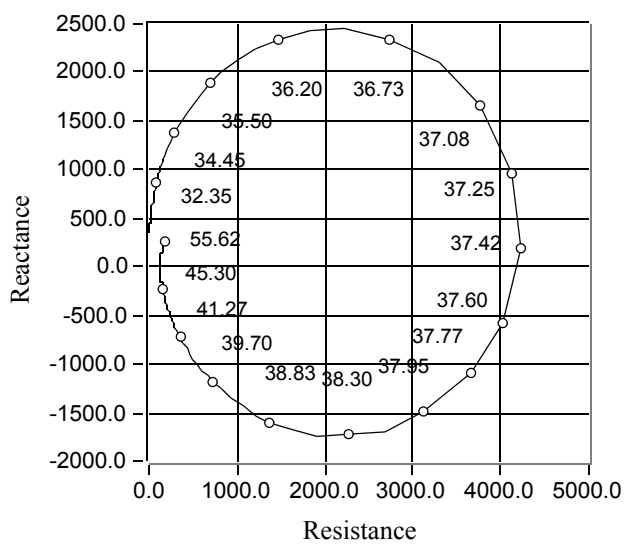
**Unbalanced Impedance**



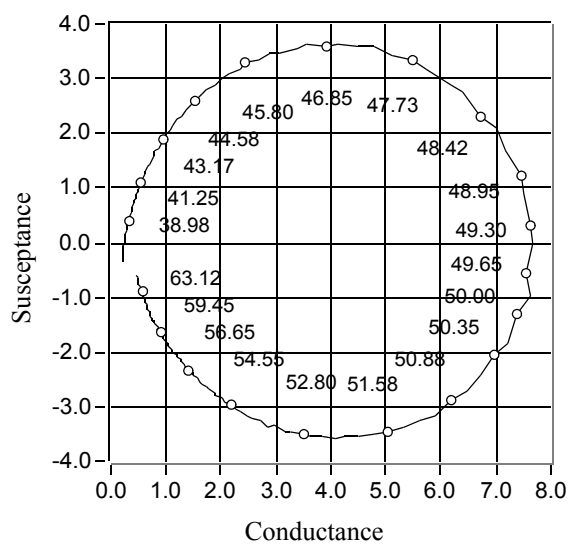
**Unbalanced Admittance**



**Balanced Impedance**



**Balanced Admittance**

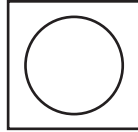


## 200 kHz-AWIq

### Transformed to 60 ohms

Power Rating: 1 kW rms @ 1% duty cycle  
 67 mm (2.65") PZT  
 Active Area: 35.3 cm<sup>2</sup> (5.5 in<sup>2</sup>)  
 Epoxy/Urethane Window

Array

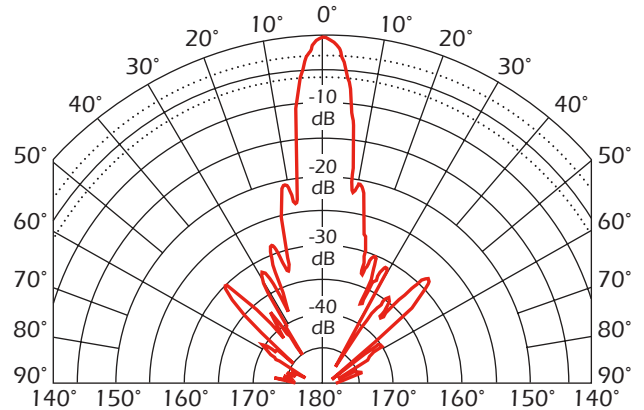


### Beamwidth:

-3 dB: 7°  
 -6 dB: 8°  
 -10 dB: 9°

Directivity Index: 28  
 Frequency Tolerance: ± 5 kHz  
 Peak TVR<sup>(1)</sup>, nominal: 177 dB  
 Peak TVR<sup>(1)</sup>, minimum: 175 dB  
 Q (transmit): 5  
 Peak Source Level<sup>(4)</sup>: 224 dB  
 Peak RVR<sup>(2)</sup>, nominal: -184 dB  
 Peak Figure of Merit<sup>(3)</sup>: -9 dB

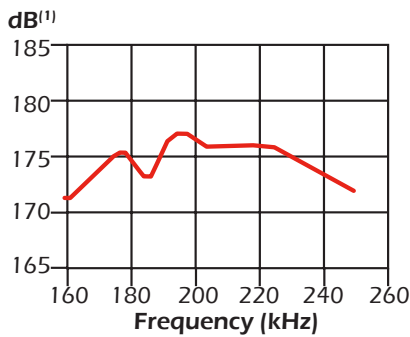
Transmit Radiation Pattern



Notes:

- (1) dB re 1 μPa per volt at 1 meter
- (2) dB re 1 volt per μPa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation

TVR



RVR

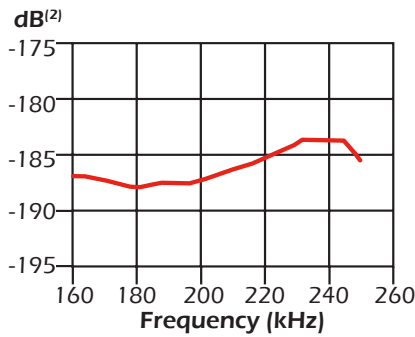
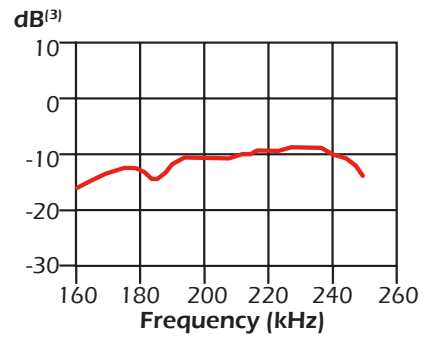


Figure of Merit



# Technical Data Catalog

## 200 kHz-AWIq

67 mm (2.65") PZT

Cable Type: C44-02

Cable Length: 15 m (50')

Note:

Impedance data includes cable

Impedance Data		
	<i>Unbalanced</i>	<i>Balanced</i>
<b>Parallel: Rp.</b>	60 Ω: -20%, +40%	60 Ω: -20%, +40%
<b>Parallel: Cp. (nominal)</b>	0	0
<b>Series [R - jX]: (nominal)</b>	60 - j0 Ω	60 - j0 Ω
<b>1 kHz capacitance: (nominal)</b>		

### Balanced Impedance Table

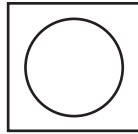
Test Frequency (kHz)	Impedance Magnitude (Ω)	Phase Angle (°)	Series Resistance (Ω)	Series Reactance (Ω)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (Ω)	Parallel Capacitance (pF)
160.00	101.60	-18.00	96.63	-31.40	9.36	3.04	106.83	3025.63
162.00	99.56	-16.66	95.39	-28.54	9.62	2.88	103.93	2828.68
166.00	88.15	-18.61	83.54	-28.13	10.75	3.62	93.01	3470.96
168.00	81.50	-17.39	77.77	-24.36	11.71	3.67	85.40	3474.41
172.00	74.86	-15.43	72.17	-19.91	12.88	3.55	77.66	3287.71
174.00	68.31	-14.04	66.27	-16.57	14.20	3.55	70.41	3248.09
178.00	62.72	-2.65	62.65	-2.90	15.93	0.74	62.79	658.05
180.00	66.42	2.91	66.34	3.38	15.04	-0.77	66.51	-676.37
184.00	81.01	1.80	80.97	2.55	12.34	-0.39	81.05	-335.70
186.00	83.45	-4.90	83.15	-7.13	11.94	1.02	83.76	876.55
190.00	66.62	-11.46	65.29	-13.23	14.71	2.98	67.97	2497.63
192.00	60.74	-7.84	60.18	-8.29	16.31	2.25	61.32	1862.08
196.00	56.53	2.68	56.47	2.64	17.67	-0.83	56.59	-671.72
198.00	57.88	8.18	57.29	8.24	17.10	-2.46	58.48	-1976.03
200.00	61.17	12.51	59.71	13.25	15.96	-3.54	62.65	-2818.20
202.00	65.75	15.03	63.50	17.05	14.69	-3.94	68.08	-3107.74
204.00	70.76	15.49	68.19	18.90	13.62	-3.78	73.42	-2945.12
208.00	76.83	14.11	74.51	18.73	12.62	-3.17	79.22	-2428.73
210.00	78.29	13.62	76.09	18.44	12.41	-3.01	80.56	-2279.82
214.00	81.46	14.70	78.80	20.67	11.87	-3.12	84.22	-2316.83
216.00	84.20	15.59	81.10	22.62	11.44	-3.19	87.41	-2351.34
220.00	91.45	16.06	87.88	25.30	10.51	-3.02	95.16	-2188.28
222.00	94.76	16.18	91.01	26.41	10.13	-2.94	98.67	-2108.67
226.00	105.01	17.62	100.08	31.78	9.08	-2.88	110.17	-2029.52
228.00	112.97	17.44	107.77	33.86	8.44	-2.65	118.41	-1852.26
232.00	131.51	14.21	127.49	32.28	7.37	-1.87	135.66	-1280.24
234.00	139.70	11.79	136.75	28.54	7.01	-1.46	142.71	-994.57
238.00	158.93	7.28	157.65	20.15	6.24	-0.80	160.22	-533.37
240.00	171.75	4.61	171.20	13.81	5.80	-0.47	172.31	-310.52
244.00	209.01	-4.90	208.24	-17.87	4.77	0.41	209.78	266.84
246.00	228.23	-12.87	222.50	-50.84	4.27	0.98	234.12	631.49
250.00	239.63	-34.05	198.54	-134.18	3.46	2.34	289.22	1487.62



### 200 kHz-AWIq

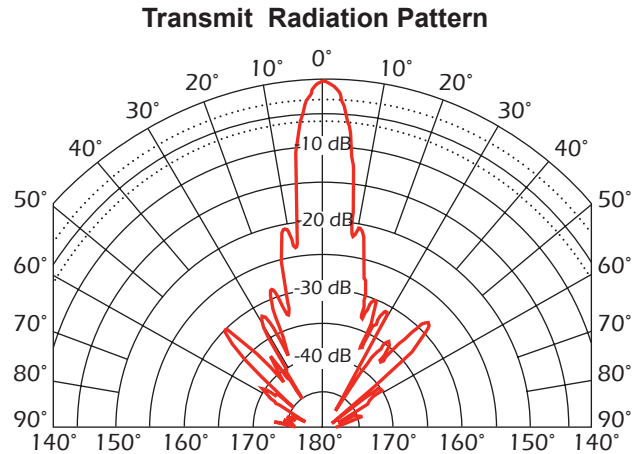
Power Rating: 1 kW rms @ 2% duty cycle  
 67 mm (2.65") PZT  
 Active Area: 35.3 cm<sup>2</sup>  
 Epoxy/Urethane Window

Array

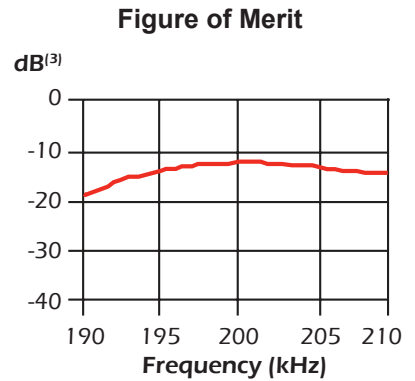
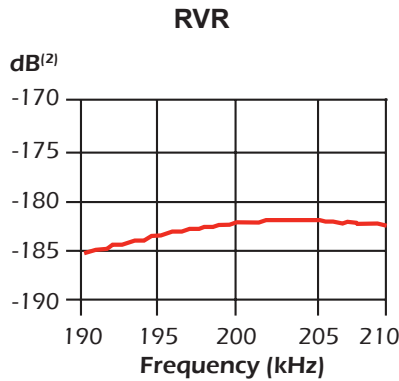
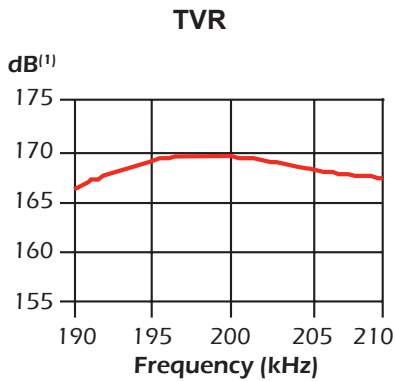


Beamwidth:  
 -3 dB: 7°  
 -6 dB: 8°  
 -10 dB: 9°

Directivity Index: 28.6  
 Frequency Tolerance: ± 5 kHz  
 Peak TVR<sup>(1)</sup>, nominal: 170 dB  
 Peak TVR<sup>(1)</sup>, minimum: 167 dB  
 Q (transmit): 10  
 Peak Source Level<sup>(4)</sup>: 225 dB  
 Peak RVR<sup>(2)</sup>, nominal: -182 dB  
 Peak Figure of Merit<sup>(3)</sup>: -12.7 dB



- Notes:  
 (1) dB re 1 μPa per volt at 1 meter  
 (2) dB re 1 volt per μPa  
 (3) Sum of transmitting voltage response and receiving voltage response  
 (4) Nominal peak TVR, rated power, and no cavitation



# Technical Data Catalog

## 200 kHz-AW1q

67 mm (2.65") PZT

Cable Type: C32

Cable Length: 10.1 m (33')

Note:

Impedance data includes cable

Impedance Data		
	<i>Balanced</i>	<i>Unbalanced</i>
<b>Parallel: Rp.</b>	310 Ω: -20%, +40%	310 Ω: -20%, +40%
<b>Parallel: Cp. (nominal)</b>	2,100 pF	2,100 pF
<b>Series [R - jX]: (nominal)</b>	190 - j150 Ω	190 - j150 Ω
<b>1 kHz capacitance: (nominal)</b>	7,670 pF: ±20%	7,710 pF: ±20%

**Unbalance Impedance Table**

Test Frequency (kHz)	Impedance Magnitude (Ω)	Phase Angle (°)	Series Resistance (Ω)	Series Reactance (Ω)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (Ω)	Parallel Capacitance (pF)
190.00	254.56	-53.93	149.90	-205.75	2.3132	3.1751	432.30	2659.64
190.50	250.90	-53.46	149.37	-201.58	2.3730	3.2024	421.42	2675.44
191.00	245.55	-52.62	149.08	-195.12	2.4724	3.2361	404.46	2696.53
191.50	241.84	-51.81	149.51	-190.08	2.5564	3.2501	391.17	2701.14
192.00	239.75	-50.83	151.41	-185.88	2.6343	3.2339	379.61	2680.72
193.00	235.77	-48.89	155.02	-177.64	2.7888	3.1957	358.57	2635.27
193.50	235.04	-47.31	159.38	-172.75	2.8850	3.1271	346.62	2572.03
194.00	233.47	-46.69	160.14	-169.90	2.9378	3.1169	340.39	2557.02
194.50	235.32	-45.27	165.62	-167.17	2.9908	3.0189	334.36	2470.26
195.00	233.72	-44.18	167.62	-162.87	3.0686	2.9817	325.88	2433.63
196.00	236.76	-41.77	176.58	-157.72	3.1500	2.8136	317.46	2284.68
196.50	238.00	-41.30	178.80	-157.08	3.1567	2.7731	316.79	2246.03
197.00	241.87	-39.92	185.51	-155.20	3.1711	2.6529	315.35	2143.27
197.50	242.01	-39.01	188.05	-152.33	3.2108	2.6010	311.45	2096.01
198.00	247.12	-38.31	193.89	-153.21	3.1750	2.5088	314.96	2016.63
199.00	253.07	-36.72	202.86	-151.30	3.1675	2.3624	315.70	1889.41
199.50	257.40	-35.63	209.22	-149.93	3.1579	2.2630	316.66	1805.33
200.00	261.05	-35.18	213.37	-150.40	3.1310	2.2070	319.39	1756.25
200.50	266.29	-34.63	219.12	-151.33	3.0900	2.1340	323.62	1693.95
201.00	272.09	-34.06	225.40	-152.40	3.0447	2.0586	328.44	1630.01
201.50	276.02	-33.79	229.40	-153.51	3.0109	2.0149	332.12	1591.45
202.00	283.64	-33.68	236.03	-157.29	2.9338	1.9552	340.85	1540.49
202.50	287.73	-33.07	241.12	-157.00	2.9125	1.8964	343.34	1490.44
203.00	293.83	-33.79	244.19	-163.42	2.8284	1.8928	353.56	1484.02
203.50	300.88	-33.15	251.91	-164.53	2.7827	1.8174	359.37	1421.38
204.00	304.01	-33.82	252.58	-169.20	2.7328	1.8307	365.92	1428.24
25.00	315.02	-34.22	260.47	-177.18	2.6247	1.7854	381.00	1386.12
25.50	321.94	-34.98	263.80	-184.55	2.5452	1.7805	392.90	1378.97
206.00	325.95	-35.08	266.74	-187.32	2.5107	1.7632	398.29	1362.24
206.50	329.37	-35.94	266.69	-193.30	2.4583	1.7818	406.79	1373.27
207.00	334.58	-36.24	269.87	-197.78	2.4107	1.7667	414.81	1358.38
208.00	340.44	-37.57	269.84	-207.57	2.3282	1.7909	429.51	1370.37
208.50	341.05	-37.73	269.73	-208.71	2.3190	1.7944	431.22	1369.71
209.00	343.74	-38.80	267.91	-215.36	2.2674	1.8227	441.03	1388.02
209.50	349.19	-38.70	270.18	-216.45	2.2544	1.8060	443.58	1372.02
210.00	346.06	-39.60	266.64	-220.60	2.2265	1.8420	449.14	1396.03