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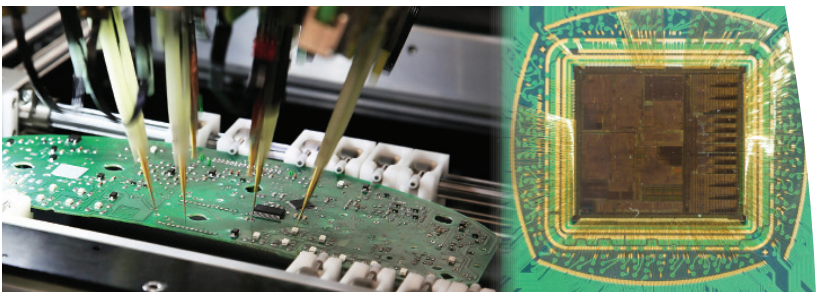
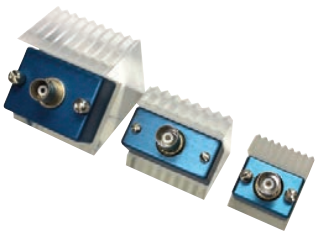


ULTRASONIC TRANSDUCERS



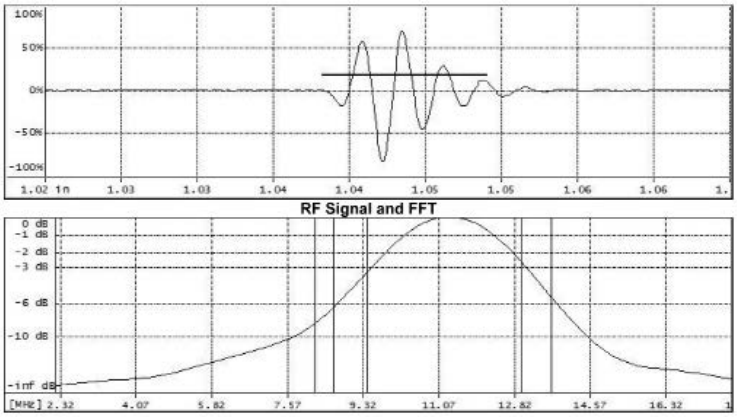
Contact HighFrequency ShearWave DualElement AngleBeam Immersion Pinducers DelayLine

Transducer Types

General Purpose – GP

General purpose transducers are medium damped transducers combining optimum sensitivity without sacrificing near surface resolution.

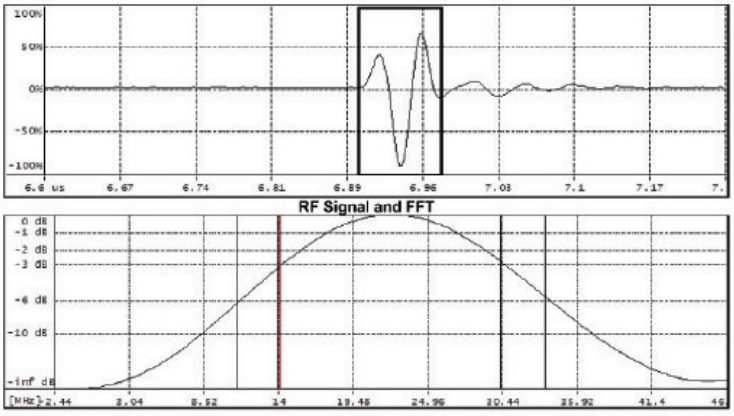
Typical bandwith is 30% to 50% @ -6dB



High Resolution – HR

High resolution transducers are highly damped, broadband transducers usually chosen for improved near surface resolution, and improved signal to noise.

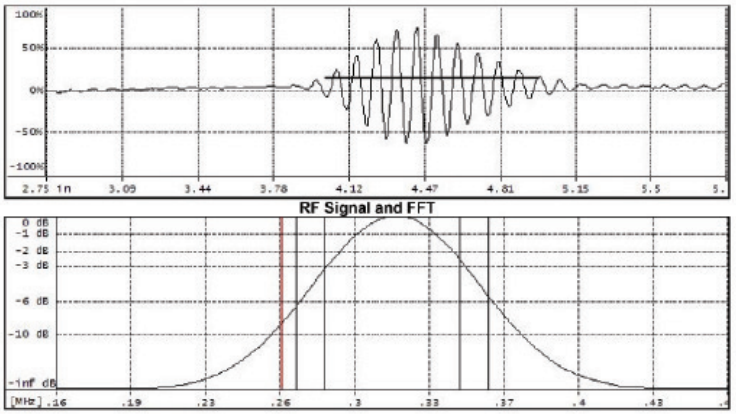
Typical bandwith is 70% to 100% @ -6dB



High Power – HP

High power transducers are lightly damped or air-backed narrowband transducers designed for maximum power & penetration. They can be configured for use with tone burst or CW pulsers.

Typical bandwith is 10% to 40% @ -6dB



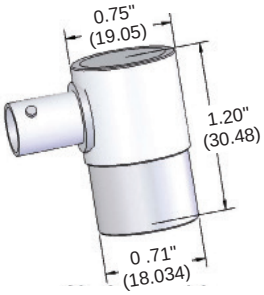
Contact Transducers

Contact Transducers are the most common and frequently used to introduce longitudinal waves into a material. Also, by using special elements, normal incidence shear wave or a combination of longitudinal/shear wave transducers can be made. These types of transducers are used in direct contact with the test material and therefore require a highly durable wearplate.

Contact Transducers are single element transducers designed for general-purpose contact inspection of metal, ceramic, and composite materials. These transducers offer rugged construction and maximum resistance against fracture and rough surfaces.

Advantages:

- Thick walled, case-hardened chrome-plated cases for standard contacts
- Compatible with all commercial flaw detectors
- Delrin sleeves for fingertip styles reduces case noise
- Available in high sensitivity, high resolution and general purpose



Standard Contact Transducers

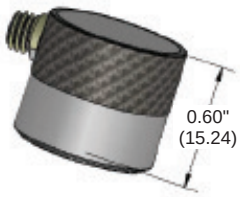
The Standard Contact Transducer case styles offer thicker walled, case for extended life wear. They are offered in side or top BNC mounted connectors.

FREQUENCY (MHz)	DIAMETER INCHES (mm)				
	0.5 (12.7)	0.75 (19.05)	1.00 (25.4)	1.125 (28.575)	1.25 31.75)
TYPE GP: GENERAL PURPOSE					
0.50	CS0.504GP	CS0.506GP	CS0.508GP	CS0.509GP	CS0.510GP
1.00	CS0104GP	CS0106GP	CS0108GP	CS0109GP	CS0110GP
2.25	CS0204GP	CS0206GP	CS0208GP	CS0209GP	CS0210GP
3.50	CS0304GP	CS0306GP	CS0308GP	CS0309GP	CS0310GP
5.00	CS0504GP	CS0506GP	CS0508GP	–	–
TYPE HR: HIGH RESOLUTION					
0.50	CS0.504HR	CS0.506HR	CS0.508HR	CS0.509HR	CS0.510HR
1.00	CS0104HR	CS0106HR	CS0108HR	CS0109HR	CS0110HR
2.25	CS0204HR	CS0206HR	CS0208HR	CS0209HR	CS0210HR
3.50	CS0304HR	CS0306HR	CS0308HR	CS0309HR	CS0310HR
5.00	CS0504HR	CS0506HR	CS0508HR	–	–
TYPE HP: HIGH POWER					
0.50	CS0.504HP	CS0.506HP	CS0.508HP	CS0.509HP	CS0.510HP
1.00	CS0104HP	CS0106HP	CS0108HP	CS0109HP	CS0110HP
2.25	CS0204HP	CS0206HP	CS0208HP	CS0209HP	CS0210HP
3.50	CS0304HP	CS0306HP	CS0308HP	CS0309HP	CS0310HP
5.00	CS0504HP	CS0506HP	CS0508HP	–	–

Contact Transducers

Fingertip Contact Transducers

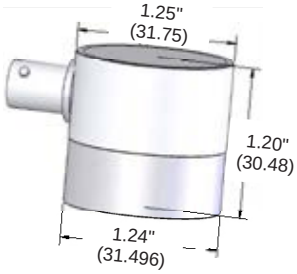
Fingertip Contact Transducers are small diameter contact transducers ideally suited for limited access surface inspections or when higher frequencies are needed. These Fingertip Contact Transducers are offered with right angle microdot connectors.



FREQUENCY (MHz)	DIAMETER INCHES (mm)				
	0.25 (6.35)	0.375 (9.525)	0.5 (12.7)	0.75 (19.05)	1.00 (25.4)
TYPE GP: GENERAL PURPOSE					
1.00	CF0102GP	CF0103GP	CF0104GP	CF0106GP	CF0108GP
2.25	CF0202GP	CF0203GP	CF0204GP	CF0206GP	CF0208GP
3.50	CF0302GP	CF0303GP	CF0304GP	CF0306GP	CF0308GP
5.00	CF0502GP	CF0503GP	CF0504GP	CF0506GP	CF0508GP
7.50	CF0702GP	CF0703GP	CF0704GP	–	–
10.00	CF1002GP	CF1003GP	CF1004GP	–	–
TYPE HR: HIGH RESOLUTION					
1.00	–	–	CF0104HR	CF0106HR	CF0108HR
2.25	CF0202GP	CF0203GP	CF0204GP	CF0206GP	CF0208GP
3.50	CF0302GP	CF0303GP	CF0304GP	CF0306GP	CF0308GP
5.00	CF0502GP	CF0503GP	CF0504GP	CF0506GP	CF0508GP
7.50	CF0702GP	CF0703GP	CF0704GP	–	–
10.00	CF1002GP	CF1003GP	CF1004GP	–	–
TYPE HP: HIGH POWER					
1.00	–	CF0103GP	CF0104GP	CF0106GP	CF0108GP
2.25	CF0202GP	CF0203GP	CF0204GP	CF0206GP	CF0208GP
3.50	CF0302GP	CF0303GP	CF0304GP	CF0306GP	CF0308GP
5.00	CF0502GP	CF0503GP	CF0504GP	CF0506GP	CF0508GP
7.50	CF0702GP	CF0703GP	CF0704GP	–	–
10.00	CF1002GP	CF1003GP	CF1004GP	–	–

Contact Transducers

Protective Face Transducers



Integral replaceable Protective Face Transducers, which combines three different types of wear surfaces: a soft protective membrane, a high temperature delay line (up to 550°F), and an expendable protective wear cap for extremely rough surfaces. All Protective Face Transducers are general purpose (GP).

FREQUENCY (MHz)	SIZE INCHES (mm)			
	0.5 (12.7)	0.75 (19.05)	1.0 (25.4)	1.125 (28.575)
0.5	–	CP0.506	CP0.508	CP0510
1.0	CP0104	CP0106	CP0108	CP0110
2.25	CP0204	CP0206	CP0208	CP0210
3.5	CP0304	CP0306	–	–
5.0	CP0504	CP0506	CP0508	–

Options

DESCRIPTION	SIZE INCHES (mm)			
	0.5 (12.7)	0.75 (19.05)	1.0 (25.4)	1.125 (28.575)
Membranes (Doz)	VPM12-04	VPM12-06	VPM12-08	VPM12-10
High Temp Delay	VHT-04	VHT-06	VHT-08	VHT-10
Wear Cap (Doz)	VWC-04	VWC-06	VWC-08	VWC-10
Delay Ring	VRC-04	VRC-06	VRC-08	VRC-10

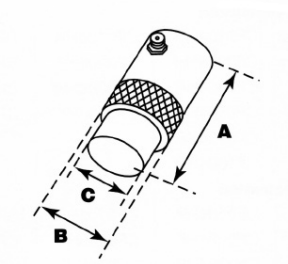
Delay Line Transducers

CTS offers a complete line of High Resolution and highly damped Delay Line Transducers, both with Removable and Permanent Delays. These Delay Line Transducers are recommended for inspection and thickness gauging of thin materials, and near surface flaw detection.

Removable Delay Line Transducers

High resolution (HR) Removable Delay Line Transducers are designed for near surface resolution. The versatility of the transducers provides an economical approach and allows a quick change when the delay tip gets worn. Each part is equipped with a screw-on retaining ring and a room temperature low-attenuation delay line material. Other high temperature delay line materials can also be substituted.

FREQUENCY (MHz)	DIAMETER INCHES (mm)			
	0.125 (3.175)	0.25 (6.35)	0.375 (9.525)	0.5 (12.7)
2.25	–	DR 022	DR 023	DR 024
3.50	–	DR 032	DR 033	DR 034
5.00	–	DR 052	DR 053	DR 054
7.50	–	DR 072	DR 073	DR 074
10.00	DR 101	DR 102	DR 103	–
15.00	DR 151	DR 152	–	–
20.00	DR 201	DR 202	–	–
25.00	DR 251	DR 252	–	–

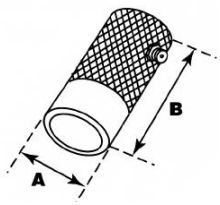


DIAMETER INCHES (mm)	A	B	C
0.125 (3.175)	1.01 (25.654)	0.39 (9.906)	0.19 (4.826)
0.25 (6.35)	1.08 (27.432)	0.56 (14.224)	0.31 (7.874)
0.50 (12.7)	1.36 (34.544)	0.80 (20.32)	0.55 (13.97)

Permanent Delay Line Transducers

High resolution (HR) Permanent Delay Line Transducers designed for near surface resolution with 0.35 inches (8.89 mm) fixed delays built into the housing, which eliminate the need for adding couplant and changing delays. This permanent bond between crystal and delay provides improved performance over Removable Delay Line Transducers. High temperature delay line materials are also available.

FREQUENCY (MHz)	DIAMETER INCHES (mm)			
	0.125 (3.175)	0.25 (6.35)	0.375 (9.525)	0.5 (12.7)
2.25	–	DP 022	DP 023	DP 024
3.50	–	DP 032	DP 033	DP 034
5.00	–	DP 052	DP 053	DP 054
7.50	–	DP 072	DP 073	DP 074
10.00	DP 101	DP 102	DP 103	–
15.00	DP 151	DP 152	–	–
20.00	DP 201	DP 202	–	–
25.00	DP 251	DP 252	–	–



DIAMETER INCHES (MM)	A	B
0.25 (6.35)	0.80 (20.32)	0.43 (10.922)
0.375 (9.525)	0.80 (20.32)	0.55 (13.97)
0.50 (12.7)	0.80 (20.32)	0.70 (17.78)

Angle Beam Transducers

CTS' Angle Beam Transducers and various wedge combinations are typically used to launch refracted shear waves or surface waves in a test material. CTS designed all of its Angle Beam Transducers with high gain and optimum resolution (GP Series). Special broadband, high resolution transducers (HR Series) can be substituted upon request. All replaceable wedges are offered in standard rexolite or polystyrene depending upon frequency. In addition, special high temperature wedges are available up to 500°F. As an option, CTS can contour Angle Beam wedges for axial or circumferential pipe or bar inspection.

Angle Beam Transducers utilize the basic principle of refraction and mode conversion to produce refracted shear or longitudinal waves in the test material. The angle of incidence required to produce the desired refracted wave is calculated from Snell's Law. The following formula may be used to calculate the wedge angle (Q1) required to generate the desired mode and refracted angle (Q2) in the material under test.

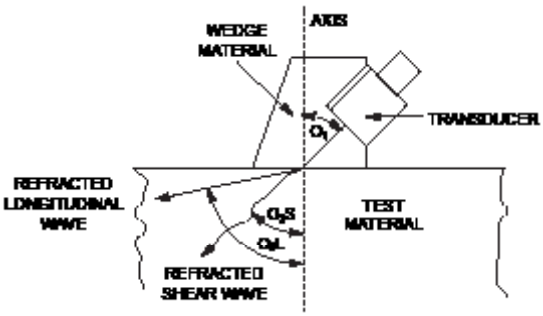
$$\frac{\sin\emptyset_1}{\sin\emptyset_2} = \frac{V_1}{V_2}$$

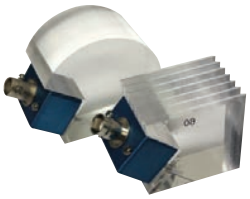
$\emptyset_1$ = Wedge angle

$\emptyset_2$ = Angle of refracted wave in test material

V_1 = Longitudinal velocity of wedge material

V_2 = Velocity of material being inspected for the desired mode





AWS Transducers

AWS Transducers conform to AWS Code D1.1. The AWS wedges are offered in either Serrated or Snail configurations and provide optimum signal to noise ratios.

FREQUENCY (MHz)	SIZE INCHES (mm)		
	0.625 X 0.625 (15.875 X 15.875)	0.625 X 0.75 (15.875 X 19.05)	0.75 X 0.75 (19.05 X 19.05)
2.25	**AW0255**	**AW0256**	**AW0266**

AWS Serrated Wedges

PART NUMBER	REFRACTED ANGLE
AWS45	45º
AWS60	60º
AWS70	70º

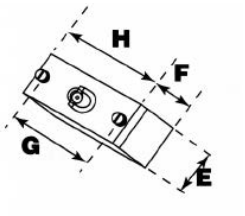
AWS Snail Wedges

PART NUMBER	REFRACTED ANGLE
SAWS45	45º
SAWS60	60º
SAWS70	70º

Angle Beam Transducers

Standard Angle Beam Transducers

Standard Angle Beam Transducers conform to all commercial flaw detectors available. These transducers produce refracted shear waves when coupled to replaceable wedges. Standard Angle Beam Transducers are constructed with anodized aluminum housings for durability.

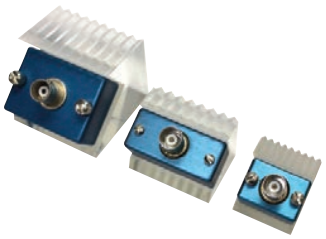


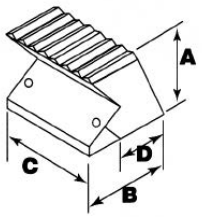
FREQUENCY (MHz)	SIZE INCHES (mm)			
	0.5 X 0.5 (12.7 X 12.7)	0.5 X 1.0 (12.7 X 25.4)	1.0 X 1.0 (25.4 X 25.4)	1.0 (25.4)
0.50	AB0.544	AB0.548	AB0.508	–
1.00	AB0144	AB0148	AB0108	–
2.25	AB0244	AB0248	–	AB0208
3.50	AB0344	AB0348	AB0308	–
5.00	AB0544	AB0548	AB0508	–

NOMINAL SIZE INCHES (mm)	E	F	G	H
1.00 (25.4)	1.25 (31.75)	0.63 (16.002)	1.38 (35.052)	1.65 (41.91)
0.50 x 1.00 (12.7 x 25.4)	0.73 (18.542)	0.63 (16.002)	1.31 (33.274)	1.53 (38.862)
0.50 (12.7)	0.72 (18.288)	0.63 (16.002)	0.81 (20.574)	1.02 (25.908)

Standard Angle Beam Wedges

CTS offers standard replaceable wedges in three different styles: Serrated Type, Snail Type, and High Temperature Type for temperatures up to 500°F.





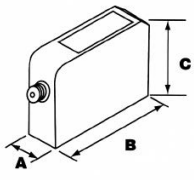
REFRACTED ANGLE	SIZE INCHES (mm)		
	0.5 X 0.5 (12.7 X 12.7)	0.5 X 1.0 (12.7 X 25.4)	1.0 X 1.0 (25.4 X 25.4)
30°	WS443	WS483	WS883
45°	WS444	WS484	WS884
60°	WS446	WS486	WS886
70°	WS447	WS487	WS887
90°	WS779	WS489	WS889

REFRACTED ANGLE	A	B	C	D
SIZE: 1.00 (25.4)				
30°	1.15 (29.21)	2.15 (54.610)	1.62 (41.148)	1.69 (42.926)
45°	0.98 (24.892)	2.00 (50.8)	1.62 (41.148)	1.50 (38.10)
60°	1.00 (25.40)	2.17 (55.118)	1.62 (41.148)	1.50 (38.10)
70°	1.14 (28.956)	2.50 (63.50)	1.62 (41.148)	1.50 (38.10)
90°	1.50 (38.10)	2.50 (63.50)	1.62 (41.148)	—
SIZE: 0.50 x 1.00 (12.7 x 25.4)				
30°	1.30 (3.02)	1.30 (3.02)	1.60 (40.64)	0.75 (9.05)
45°	1.30 (3.02)	1.40 (35.56)	1.60 (40.64)	0.78 (19.812)
60°	1.30 (3.02)	1.50 (38.10)	1.60 (40.64)	0.69 (17.526)
70°	1.35 (34.29)	1.80 (45.72)	1.60 (40.64)	0.68 (17.272)
90°	1.20 (30.48)	1.34 (34.036)	1.60 (40.64)	—
SIZE: 0.50 (12.7)				
30°	1.30 (3.02)	1.36 (34.544)	1.00 (25.40)	0.75 (9.05)
45°	1.20 (30.48)	1.30 (33.02)	1.00 (25.40)	0.71 (18.034)
60°	1.20 (30.48)	1.50 (38.10)	1.00 (25.40)	0.69 (17.526)
70°	1.20 (30.48)	1.60 (40.64)	1.00 (25.40)	0.68 (17.272)
90°	1.20 (30.48)	1.34 (34.036)	1.10 (27.94)	—

Angle Beam Transducers

Potted Angle Beam Transducers

Miniature and Micro-miniature Potted Angle Beam Transducers are designed for angle beam inspection in limited access areas. Both series have durable plastic housings to insure against scratching of critical materials. All transducers are supplied with either side-mounted or top-mounted microdot connectors. Micro-miniature Potted Angle Beam Transducers are designed for small approach distances and for limited access testing.

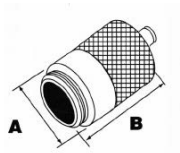


SIZE INCHES (mm)	A	B	C
0.25 x 0.25 (6.35 x 6.35)	0.34 (8.636)	0.75 (19.05)	0.55 (13.97)
0.375 x 0.375 (9.525 x 9.525)	0.48 (12.192)	0.94 (23.876)	0.80 (20.32)
0.50 x 0.50 (12.70 x 12.70)	0.60 (15.24)	1.25 (31.75)	0.90 (22.86)

REFRACTED ANGLE	SIZE INCHES (mm)			
	0.187 (4.75)	0.25 (6.35)	0.375 (9.52)	0.50 (12.7)
FREQUENCY: 2.25MHz				
45°	AP0214	AP0224	AP0234	AP0244
60°	AP0216	AP0226	AP0236	AP0246
70°	AP0217	AP0227	AP0237	AP0247
90°	AP0219	AP0229	AP0239	AP0249
FREQUENCY: 5.0MHz				
45°	AP0514	AP0524	AP0534	AP0544
60°	AP0516	AP0526	AP0536	AP0546
70°	AP0517	AP0527	AP0537	AP0547
90°	AP0519	AP0529	AP0539	AP0549
FREQUENCY: 10.0MHz				
45°	AP1014	AP1024	AP1034	AP1044
60°	AP1016	AP1026	AP1036	AP1046
70°	AP1017	AP1027	AP1037	AP1047
90°	AP1019	AP1029	AP1039	AP1049

Threaded Angle Beam Transducers

Threaded Angle Beam Transducers are miniature screw-in type transducers and wedges that are designed to allow a quick-change option.



DIAMETER INCHES (mm)	A	B	THREAD SIZE INCHES (mm)
0.25 x 0.25 (6.35 x 6.35)	0.48 (12.192)	0.55 (13.97)	0.375 -32 UNEF (9.525)
0.375 x 0.375 (9.525 x 9.525)	0.58 (14.732)	0.59 (14.986)	0.50 -28 UNEF (12.70)
0.50 x 0.50 (12.70 x 12.70)	0.70 (17.78)	0.625 (15.875)	0.625 -24 UNEF (15.875)

FREQUENCY (MHz)	DIAMETER INCHES (mm)		
	0.25 (6.35)	0.375 (9.525)	0.5 (12.7)
1.0	AT012	AT013	AT014
2.25	AT022	AT023	AT024
3.5	AT032	AT033	AT034
5.0	AT052	AT053	AT054
7.5	AT072	AT073	AT074
10.00	AT102	AT103	AT104

Threaded Angle Beam Wedges

The wedges are designed with a special sound absorbent material for minimum internal reflection. In addition, careful consideration has been given to minimize the index to crown distance.

SIZE INCHES (mm)		
0.25 (6.35)	0.375 (9.525)	0.5 (12.7)
WT23	WT33	WT43
WT24	WT34	WT44
WT26	WT36	WT46
WT27	WT37	WT47
WT29	WT39	WT49

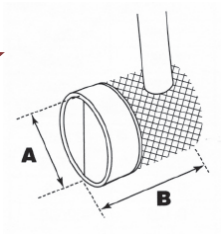
Dual Element Transducers

Dual Element Transducers contain two separate elements within a single housing. These elements, mounted on delays, are acoustically isolated and are slightly angled towards each other to create a pseudo focusing effect in a test material. This tandem arrangement provides superior near surface resolution and improved performance on corroded back walls.

Dual Element Transducers use separate elements to transmit and receive ultra-sound signals. The elements are typically cut at an angle and mounted on delay lines. This helps to improve near surface resolution and the cross-beam design also helps to create a focus which makes Dual Element Transducers more sensitive to echoes from irregular defects caused from corrosion and pitting.

Potted Cable Transducers

Potted Cable Transducers are provided with right angle six foot potted cables terminated in BNC connectors. These transducers are provided with stainless steel knurled cases for improved grip and will operate at temperatures up to 800°F with momentary contact.

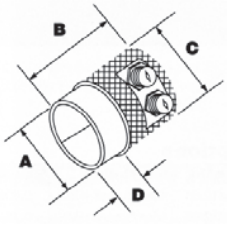


FREQUENCY (MHz)	DIAMETER INCHES (mm)			
	0.25 (6.35)	0.375 (9.525)	0.5 (12.7)	0.75 (19.05)
1.0	–	–	DC 014	DC 016
2.25	DC 022	DC 023	DC 024	DC 026
3.5	DC 032	DC 033	DC 034	DC 036
5.0	DC 052	DC 053	DC 054	DC 056
10.00	DC 102	DC 103	DC 104	–

DIAMETER INCHES (MM)	A	B
0.25 (6.35)	0.46 (11.684)	0.60 (15.24)
0.375 (9.525)	0.59 (14.986)	0.60 (15.24)
0.50 (12.7)	0.72 (18.288)	0.60 (15.24)
0.75 (19.05)	0.99 (25.146)	0.60 (15.24)

Removable Cable Transducers

Removable Cable Transducers are provided with dual microdot connectors, allowing for quick field changes of detective cables. Six-foot dual microdot to BNC cables are recommended as an accessory. These transducers come with knurled stainless steel cases and will operate at temperatures up to 800°F with momentary contact.



FREQUENCY (MHz)	DIAMETER INCHES (mm)			
	0.25 (6.35)	0.375 (9.525)	0.5 (12.7)	0.75 (19.05)
1.0	–	–	DF 014	DF 016
2.25	DF 022	DF 023	DF 024	DF 026
3.5	DF 032	DF 033	DF 034	DF 036
5.0	DF 052	DF 053	DF 054	DF 056
10.00	DF 102	DF 103	DF 104	–

DIAMETER INCHES (mm)	A	B	C	D
0.25 (6.35)	0.38 (9.652)	0.73 (18.542)	0.69 (17.526)	0.25 (6.35)
0.375 (9.525)	0.52 (13.208)	0.75 (19.05)	0.69 (17.526)	0.25 (6.35)
0.50 (12.7)	0.66 (16.764)	0.75 (19.05)	0.75 (19.05)	0.25 (6.35)
0.75 (19.05)	0.80 (20.32)	0.75 (19.05)	0.75 (19.05)	0.25 (6.35)

Immersion Transducers

CTS' Immersion Transducers are specifically designed to operate in an immersion tank or with bubbler and/or squirter systems. They are manufactured with UHF waterproof connectors and can be designed with flat or focused lenses. All Immersion Transducers are offered in High Resolution (HR), General Purpose (GP), or High Performance (HP).

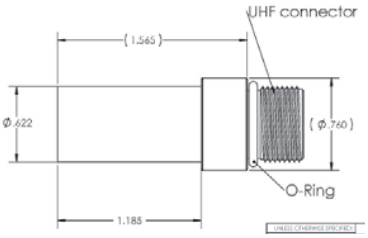
Advantages:

- Immersion Transducers speed up test results with high speed scanning of large surfaces.
- Spherical focusing available for minimizing beam width for improving sensitivity to smaller defects.
- Epoxy quarter wavelength matching layer maximizes sensitivity and resolution.
- Cylindrical focusing available for tube or bar inspection.

Immersion Transducers are available in the following case styles: Standard, Large Diameter, Pencil, and Paintbrush.

Standard Immersion Transducers

Standard Immersion Case Style Transducers (IS) are ideally suited for most immersion testing applications utilizing any element diameter up to 0.50 inches (12.7 mm). IS are offered in frequencies from 500kHz to 25MHz. All transducers feature acoustically matched lenses and corrosion resistant stainless steel housings for optimum performance and rugged use. Three configuration types are available: flat, spherical, and cylindrical.



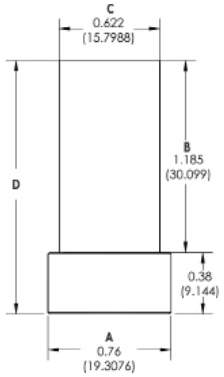
FREQUENCY (MHz)	DIAMETER INCHES (mm)		
	0.25 (6.35)	0.375 (9.525)	0.5 (12.7)
TYPE GP: GENERAL PURPOSE			
1.00	–	–	IS0104GP
2.25	IS0202GP	IS0203GP	IS0204GP
3.50	IS0302GP	IS0303GP	IS0304GP
5.00	IS0502GP	IS0503GP	IS0504GP
7.50	IS0702GP	IS0703GP	IS0704GP
10.00	IS1002GP	IS1003GP	IS1004GP
15.00	IS1502GP	–	–
20.00	IS2002GP	–	–
25.00	IS2502GP	–	–
TYPE HR: HIGH RESOLUTION			
1.00	–	–	IS0104HR
2.25	IS0202HR	IS0203HR	IS0204HR
3.50	IS0302HR	IS0303HR	IS0304HR
5.00	IS0502HR	IS0503HR	IS0504HR
7.50	IS0702HR	IS0703HR	IS0704HR
10.00	IS1002HR	IS1003HR	IS1004HR
15.00	IS1502HR	–	–
20.00	IS2002HR	–	–
25.00	IS2502HR	–	–
TYPE HP: HIGH POWER			
0.50	–	–	IS0.504HP
1.00	–	–	IS0104HP
2.25	IS0202HP	IS0203HP	IS0204HP
3.50	IS0302HP	IS0303HP	IS0304HP
5.00	IS0502HP	IS0503HP	IS0504HP
7.50	IS0702HP	IS0703HP	IS0704HP
10.00	IS1002HP	IS1003HP	IS1004HP
15.00	IS1502HP	–	–

Immersion Transducers

Large Diameter Case Style

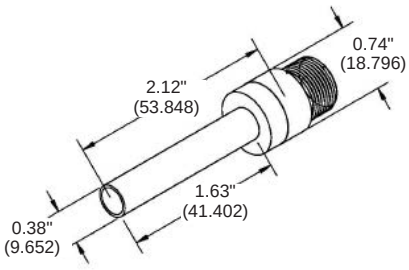
Large Diameter Case Transducers (IL) combine large element diameters and a broad range of frequencies for higher gain and extended near-field applications. In addition, the larger diameter transducers can provide larger indexing for automated scanning applications.

FREQUENCY (MHz)	DIAMETER INCHES (mm)				
	0.75 (19.05)	1.00 (25.4)	1.125 (28.575)	1.25 (31.75)	1.5 (38.1)
TYPE GP: GENERAL PURPOSE					
0.50	IL0.506GP	IL0.508GP	IL0.509GP	IL0.510GP	IL0.512GP
1.00	IL0106GP	IL0108GP	IL0109GP	IL0110GP	IL0112GP
2.25	IL0206GP	IL0208GP	IL0209GP	IL0210GP	IL0212GP
3.50	IL0306GP	IL0308GP	IL0309GP	IL0310GP	IL0312GP
5.00	IL0506GP	IL0508GP	–	–	–
7.50	IL0706GP	–	–	–	–
10.00	IL1006GP	–	–	–	–
TYPE HR: HIGH RESOLUTION					
0.50	IL0.506HR	IL0.508HR	IL0.509HR	IL0.510HR	IL0.512HR
1.00	IL0106HR	IL0108HR	IL0109HR	IL0110HR	IL0112HR
2.25	IL0206HR	IL0208HR	IL0209HR	IL0210HR	IL0212HR
3.50	IL0306HR	IL0308HR	IL0309HR	IL0310HR	IL0312HR
5.00	IL0506HR	IL0508HR	–	–	–
7.50	IL0706HR	–	–	–	–
10.00	IL1006HR	–	–	–	–
TYPE HP: HIGH POWER					
0.50	IL0.506HP	IL0.508HP	IL0.509HP	IL0.510HP	IL0.512HP
1.00	IL0106HP	IL0108HP	IL0109HP	IL0110HP	IL0112HP
2.25	IL0206HP	IL0208HP	IL0209HP	IL0210HP	IL0212HP
3.50	IL0306HP	IL0308HP	IL0309HP	IL0310HP	IL0312HP
5.00	IL0506HP	IL0508HP	–	–	–
7.50	IL0706HP	–	–	–	–
10.00	IL1006HP	–	–	–	–



DIAMETER SIZE INCHES (mm)	DIMENSIONS INCHES (mm)			
	A	B	C	D
0.75 (19.05)	1.00 (25.4)	1.00 (25.4)	1.12 (28.448)	1.37 (34.798)
1.00 (25.4)	1.25 (31.75)	1.00 (25.4)	1.27 (32.258)	1.37 (34.798)
1.125 (28.575)	1.25 (31.75)	1.00 (25.4)	1.37 (34.798)	1.37 (34.798)
1.25 (31.75)	1.5 (38.1)	1.00 (25.4)	1.62 (41.148)	1.37 (34.798)
1.5 (38.1)	1.75 (44.45)	1.15 (29.21)	1.87 (47.498)	1.5 (38.1)

Immersion Transducers



Pencil Case Style Immersion Transducers

Pencil Case Style Immersion Transducers combine small case diameters and extended working length facilitating access where hard to reach areas are encountered. These Pencil Case Styles are offered in P style (UHF connector) and an PM style (microdot connector) with element diameters of 0.125″ and 0.250″. Both spherical and cylindrical focal lengths are available as options.

FREQUENCY (MHz)	DIAMETER INCHES (mm)			
	0.125 (3.175)		0.25 (6.35)	
TYPE GP: GENERAL PURPOSE				
	P Style	PM Style	P Style	PM Style
1.00	IP0101GP	IPM0101GP	IP0102GP	IPM0102GP
2.25	IP0201GP	IPM0201GP	IP0202GP	IPM0202GP
3.50	IP0301GP	IPM0301GP	IP0302GP	IPM0302GP
5.00	IP0501GP	IPM0501GP	IP0502GP	IPM0502GP
7.50	IP0701GP	IPM0701GP	IP0702GP	IPM0702GP
10.0	IP1001GP	IPM1001GP	IP1002GP	IPM1002GP
15.0	IP1501GP	IPM1501GP	IP1502GP	IPM1502GP
20.0	IP2001GP	IPM2001GP	IP2002GP	IPM2002GP
25.0	IP2501GP	IPM2501GP	IP2502GP	IPM2502GP
TYPE HR: HIGH RESOLUTION				
1.00	IP0101HR	IPM0101HR	IP0102HR	IPM0102HR
2.25	IP0201HR	IPM0201HR	IP0202HR	IPM0202HR
3.50	IP0301HR	IPM0301HR	IP0302HR	IPM0302HR
5.00	IP0501HR	IPM0501HR	IP0502HR	IPM0502HR
7.50	IP0701HR	IPM0701HR	IP0702HR	IPM0702HR
10.0	IP1001HR	IPM1001HR	IP1002HR	IPM1002HR
15.0	IP1501HR	IPM1501HR	IP1502HR	IPM1502HR
20.0	IP2001HR	IPM2001HR	IP2002HR	IPM2002HR
25.0	IP2501HR	IPM2501HR	IP2502HR	IPM2502HR

Immersion Transducers

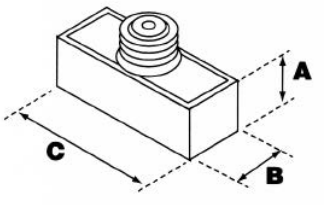
Paintbrush Style

Paintbrush Style Immersion Transducers (PB) are designed to maximize the scan index of ultrasonic immersion testing thus reducing the scan time for large plates such as steel or aluminum. The unique design provides uniform sensitivity across the length to within ±1.5dB. The standard flat PB are up to 3.0 inches or 76.2 milimeters in length. Cylindrically focused PB combine small case diameters and extended working length facilitating access where hard to reach areas are encountered.

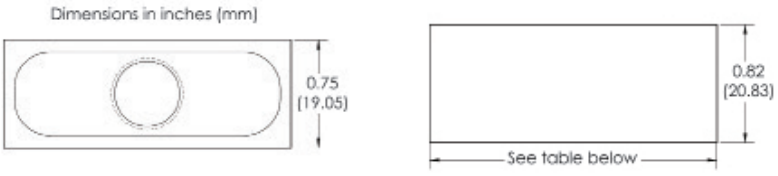
Advantages:

- Large scan indexes to reduce scan time for plate inspection.
- Transverse axis flat within ±1.5dB.
- Length up to 3.0 inches or 76.2 millimeters.
- Cylindrical focusing available.

FREQUENCY (MHz)	SIZE INCHES (mm)		
	1.5 X 0.25 (38.1 X 6.35)	2.0 X 0.25 (50.4 X 6.35)	3.0 X 0.25 (76.2 X 6.35)
2.25	**PB021**	**PB022**	**PB023**
3.50	**PB031**	**PB032**	**PB033**
5.00	**PB051**	**PB052**	**PB053**
7.50	**PB071**	**PB072**	**PB073**
10.00	**PB101**	**PB102**	**PB103**



SIZE INCHES (mm)	A	B	C
3.00 x 0.25 (76.2 x 6.35)	0.82 (20.828)	0.75 (15.24)	3.0 (76.20)
2.0 x 0.25 (50.4 x 6.35)	0.82 (20.828)	0.75 (15.24)	2.5 (63.50)
1.5 x 0.25 (38.1 x 6.35)	0.82 (20.828)	0.75 (15.24)	2.0 (50.40)



SIZE INCHES (mm)	DIMENSIONS INCHES (mm)
3.0 (76.2)	3.0 (76.2)
2.0 (50.8)	2.5 (63.5)
1.5 (38.1)	2.0 (50.8)

High Frequency Transducers

High Frequency Transducers offer frequency ranges from 30MHz to 150MHz. Applications include acoustic microscopy, flaw detection, and characterization of solder bumps in flip-chips in the microelectronics industry, high resolution thickness of meals down to 0.001" (0.0254mm), and high resolution surface wave imaging.

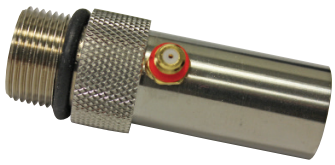
Advantages:

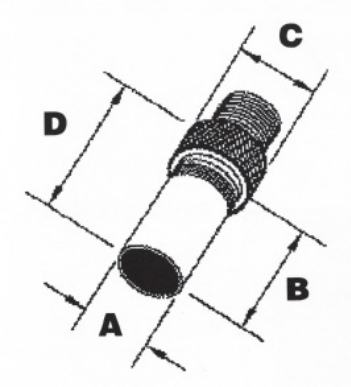
- Broadband, highly damped signals for flaw detection of defects as small as 0.001" (0.0254mm)
- Extremely short wavelengths for thickness gauging
- Available in both Contact and Immersion Delay Styles
- Immersion Transducers available with optically ground lenses

High Frequency Standard Immersion Case Style

High Frequency Standard Immersion Case Style Transducers are available in frequencies from 20MHz to 100MHz. These transducers are all provided with axial UHF connectors for support and either a side-mount or axial-mount microdot for the electrical connector. In addition, they come with an internal fuse silica delay line and are available flat or focused. Epoxy lenses are used for frequencies up to 30MHz. Custom transducers are available above 30MHz and are offered with optically ground lenses.

PART NUMBER	FREQUENCY (MHz)	SIZE INCHES (mm)	DELAY (µS)	FOCAL LENGTH INCHES (mm)
VF 401	20.0	0.25 (6.35)	4.25	flat
VF 402	20.0	0.25 (6.35)	2.5	0.75 (19.05)
VF 403	20.0	0.25 (6.35)	4.25	1.25 (31.75)
VF 404	20.0	0.25 (6.35)	4.25	2.0 (50.8)
VF 405	30.0	0.25 (6.35)	4.25	flat
VF 406	30.0	0.25 (6.35)	2.5	0.75 (19.05)
VF 407	30.0	0.25 (6.35)	4.25	1.25 (31.75)
VF 408	30.0	0.25 (6.35)	4.25	2.0 (50.8)
VF 409	50.0	0.25 (6.35)	4.25	flat
VF 410	50.0	0.25 (6.35)	2.5	0.75 (19.05)
VF 411	50.0	0.25 (6.35)	4.25	1.25 (31.75)
VF 412	50.0	0.25 (6.35)	2.5	0.5 (12.7)
VF 413	75.0	0.25 (6.35)	2.5	0.5 (12.7)
VF 414	100.0	0.25 (6.35)	2.5	0.5 (12.7)





DIMENSIONS INCHES (mm)			
A	B	C	D
0.62 (15.748)	1.2 (30.48)	0.75 (15.24)	1.56 (39.624)

High Frequency Transducers

High Frequency Large Immersion Case Style

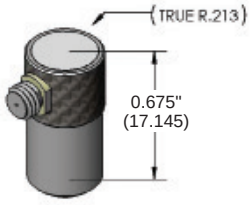
High Frequency Large Immersion Case Style Transducers integrate an optical grade fused silica delay line of approximately 20 microseconds optically ground lenses for precision focusing. Custom buffer rods are also available in sapphire and single crystal silicon. In addition, custom ground lenses are available in aspheric and cylindrical configurations.

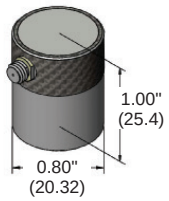
PART NUMBER	FREQUENCY (MHz)	SIZE INCHES (mm)	DELAY (µS)	FOCAL LENGTH INCHES (mm)
VF 601	50.0	0.125 (3.175)	20	0.5 (12.7)
VF 602	50.0	0.25 (6.35)	20	0.5 (12.7)
VF 603	50.0	0.25 (6.35)	20	0.75 (19.05)
VF 604	50.0	0.25 (6.35)	20	1.0 (25.4)
VF 605	50.0	0.25 (6.35)	10	0.2 (5.08)
VF 606	75.0	0.25 (6.35)	20	0.5 (12.7)
VF 607	75.0	0.25 (6.35)	20	0.75 (19.05)
VF 608	90.0	0.25 (6.35)	20	0.5 (12.7)
VF 609	100.0	0.25 (6.35)	20	0.5 (12.7)
VF 610	100.0	0.25 (6.35)	20	1.0 (25.4)
VF 611	100.0	0.25 (6.35)	10	0.2 (5.08)
VF 612	125.0	0.125 (3.175)	20	0.5 (12.7)
VF 613	125.0	0.125 (3.175)	20	0.75 (19.05)
VF 614	150.0	0.125 (3.175)	20	0.5 (12.7)

High Frequency Permanent Delay Line Contact

High Frequency Permanent Delay Line Contact Transducers are designed for extremely thin material thickness gauging and near surface flaw detection. All transducers are broadband, high resolution series with internal fused silica buffers and right-angle microdot connectors.

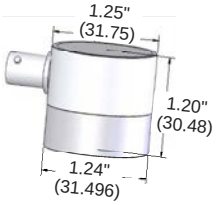
PART NUMBER	FREQUENCY (MHz)	SIZE INCHES (mm)	DELAY (µS)	STYLE
VF 202-FL	20.0	0.25 (6.35)	4.25	FL
VF 202-SL	20.0	0.25 (6.35)	4.25	SL
VF 202-FS	20.0	0.25 (6.35)	2.5	FS
VF 302-FL	30.0	0.25 (6.35)	4.25	FL
VF 302-SL	30.0	0.25 (6.35)	4.25	SL
VF 302-FS	30.0	0.25 (6.35)	2.5	FS
VF 502-FL	50.0	0.25 (6.35)	4.25	FL
VF 502-SL	50.0	0.25 (6.35)	4.25	SL
VF 502-FS	50.0	0.25 (6.35)	2.5	FS
VF 501-FL	50.0	0.125 (3.175)	4.25	FL
VF 501-SL	50.0	0.125 (3.175)	4.25	SL
VF 501-FS	50.0	0.125 (3.175)	2.5	FS
VF 751-FL	75.0	0.125 (3.175)	4.25	FL
VF 751-FS	75.0	0.125 (3.175)	2.5	FS
VF 1001-FL	100.0	0.125 (3.175)	4.25	FL
VF 1001-FS	100.0	0.125 (3.175)	2.5	FS
VF 1251-FS	125.0	0.125 (3.175)	2.5	FS
VF 1501-FS	150.0	0.125 (3.175)	2.5	FS

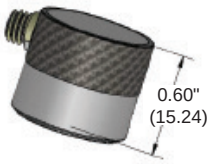




Shear Wave Transducers

Shear Wave Transducers are designed to excite shear waves directly into a material without the use of angle beam wedges. Unique design parameters have been incorporated to minimize the longitudinal component. Applications include direct shear wave velocity, Young's modulus of elasticity and shear measurements. The shear direction on all transducers is parallel to the right angle connector unless otherwise specified. Special longitudinal/shear combinations are available in a single transducer.





Standard Shear Wave Transducers

Standard Shear Wave Transducers are designed with frequency ranging from 50kHz to 5MHz.

PART NUMBER	FREQUENCY (MHz)	SIZE INCHES (mm)
SS 0.058	0.05	1.0 (25.4)
SS 0.18	0.1	1.0 (25.4)
SS 0.28	0.25	1.0 (25.4)
SS 0.58	0.5	1.0 (25.4)
SS 018	1.0	1.0 (25.4)
SS 054	5.0	0.5 (12.7)

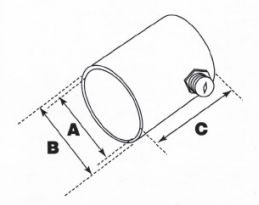
Fingertip Shear Wave Transducers

Fingertip Shear Wave Transducers are small sized style cases with frequency ranging from 1.0MHz to 5.0MHz.

PART NUMBER	FREQUENCY (MHz)	SIZE INCHES (mm)
SF 014	1.0	0.5 (12.7)
SF 024	2.25	0.5 (12.7)
SF 051	5.0	0.125 (3.175)
SF 052	5.0	0.25 (6.35)
SF 054	5.0	0.5 (12.7)

Delay Line Shear Wave Transducers

Delay Line Shear Wave Transducers are direct normal incidence shear waves without angled wedges. Internal fused silica buffers are available for frequencies ranging from 10.0MHz to 30.0MHz.



PART NUMBER	FREQUENCY (MHz)	SIZE INCHES (mm)	DELAY (µS)	STYLE
SD 052-SL	5.0	0.25 (6.35)	7	SL
SD 102-SL	10.0	0.25 (6.35)	7	SL
SD 152-SL	15.0	0.25 (6.35)	7	SL
SD 202-SL	20.0	0.25 (6.35)	7	SL
SD 202-FL	20.0	0.25 (6.35)	7	FL
SD 202-FS	20.0	0.25 (6.35)	4	FS
SD 252-FS	25.0	0.25 (6.35)	4	FS

STYLE	A	B	C
SL	0.72 (18.288)	0.81 (20.574)	1.00 (25.40)
FL	0.34 (8.636)	0.44 (11.176)	0.81 (20.574)
FS	0.34 (8.636)	0.44 (11.176)	0.63 (16.002)

Pinducers™

CTS is the first in its industry to introduce the VP-1093 Pinducer and the VP-1063 MiniPin. These miniature transducers are designed for shock wave applications.

Advantages:

- Direct normal incidence shear waves without angled wedges
- Available in a wide range of frequencies
- Can be utilized with wedges to launch both horizontally or vertically polarized shear waves

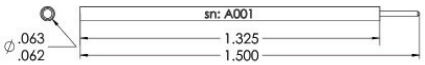
Standard Pinducers

Miniature transducers designed for shock wave applications.

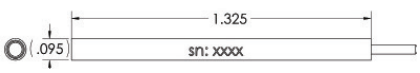
Advantages:

- Economic pricing structure for standard Pinducers
- Bandwidths of 75% at -6dB are achievable
- Selection of piezoceramic elements available
- Standard pin type or potted coaxial cable available

STANDARD	FREQUENCY (MHz)	CRYSTAL DIAMETER INCHES (mm)
VP-1093	0.001-10.0	0.059 (1.5)
VP-1063	0.001-10.0	0.039 (1.0)



VP-1063

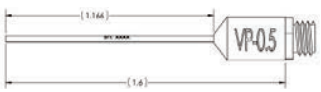


VP-1093

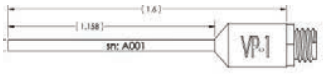
Performance Pinducers

High Performance Pinducers and MiniPins are offered with elements of 0.053 inch and 0.040 inch diameters, respectively, and are designed with quarter-wave matching layers and dense backings for optimum resolution and sensitivity. They are offered in high resolution (HR) and general purpose (GP) with frequencies from 5.0MHz to 20MHz.

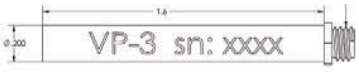
PERFORMANCE	FREQUENCY (MHz)	CRYSTAL DIAMETER INCHES (mm)
VP-0.5	0.001-10.0	0.019 (0.5)
VP-1	0.001-10.0	0.039 (1.0)
VP-1.5	0.001-10.0	0.059 (1.5)
VP-3	0.001-10.0	0.11 (3.0)



VP-0.5



VP-1



VP-3

Accessories

Cable & Connectors

A complete selection of ultrasonic transducer cables and connectors for connection to a variety of ultrasonic flaw detectors and thickness gauges. Custom lengths are also available.

PART NUMBER	LENGTH FEET (M)	CABLE TYPE	DESCRIPTION
VFC-01	6.0 (1.828)	RG 174	BNC/BNC
VFC-02	6.0 (1.828)	RG 58	BNC/BNC
VFC-03	12.0 (3.657)	RG 58	BNC/BNC
VFC-04	6.0 (1.828)	RG 174	BNC/Microdot
VFC-05	6.0 (1.828)	RG 58	BNC/UHF
VFC-06	6.0 (1.828)	RG 174	BNC/Water Proof UHF
VFC-07	6.0 (1.828)	Belden 8218	BNC/Water Proof UHF
VFC-08	6.0 (1.828)	RG 58	BNC/Lemo 1
VFC-09	6.0 (1.828)	RG 174	BNC/Lemo 00
VFC-10	6.0 (1.828)	RG 58	Lemo 1/Lemo 1
VFC-11	6.0 (1.828)	RG 174	Lemo 1/Microdot
VFC-12	6.0 (1.828)	RG 58	Lemo 1/UHF
VFC-13	6.0 (1.828)	Belden 8218	Lemo 1/Water Proof UHF
VFC-14	6.0 (1.828)	RG 174	Lemo 1/Lemo 00
VFC-15	6.0 (1.828)	RG 58	UHF/UHF
VFC-16	12.0 (3.657)	RG 58	UHF/UHF
VFC-17	6.0 (1.828)	RG 174	UHF/Microdot
VFC-18	6.0 (1.828)	Belden 8218	UHF/Water Proof UHF
VFC-19	6.0 (1.828)	RG 174	UHF/Lemo 00
VFC-20	6.0 (1.828)	RG 174	Dual BNC/Microdot
VFC-21	6.0 (1.828)	RG 174	Dual Lemo 1/Microdot
VFC-22	6.0 (1.828)	RG 174	Dual UHF/Microdot
VFC-23	6.0 (1.828)	RG 174	Dual Lemo 00/Microdot
VFC-24	6.0 (1.828)	RG 174	Dual Lemo 00/Lemo 00
VFC-25	6.0 (1.828)	RG 174	Dual BNC/Lemo 00
VFC-26	6.0 (1.828)	RG 174	Dual UHF/Lemo 00

Search Tubes

CTS's Stainless Steel Immersion Search Tubes are 0.75" (19.05mm) in diameter and are used for all Immersion Transducers with UHF connectors.

Angle reflectors are also available to direct the sound beam 90º into hard to reach areas. We offer these reflectors for Standard, Pencil, and Paintbrush Immersion Transducers.

PART NUMBER	SIZE INCHES (mm)	LENGTH INCHES (mm)
US-2	0.74 (18.796)	2.0 (50.8)
US-4	0.74 (18.796)	4.0 (101.6)
US-6	0.74 (18.796)	6.0 (152.4)
US-12	0.74 (18.796)	12.0 (304.8)
US-18	0.74 (18.796)	18.0 (457.2)
US-24	0.74 (18.796)	24.0 (609.6)

Adapters

A complete selection of ultrasonic transducer adapters for connection to a variety of ultrasonic flaw detectors and thickness gauges.

PART NUMBER	SIZE
VFA-01	BNC Male/UHF Female
VFA-02	UHF Male/BNC Female
VFA-03	Lemo 1 Male/BNC Female
VFA-04	Lemo 1 Female/BNC Female
VFA-05	BNC Male/BNC Male
VFA-06	UHF (90) Male/UHF Female
VFA-07	UHF Male/UHF Male
VFA-08	BNC Tee Adapter

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