

Phased Array Probes & Wedges



SIUI



SIUI can Provide a Variety of Probes for Different Kinds of Inspections

Custom Phased Array Probes



Flexible Probe

Low-profile Probe

Matrix Array Probe

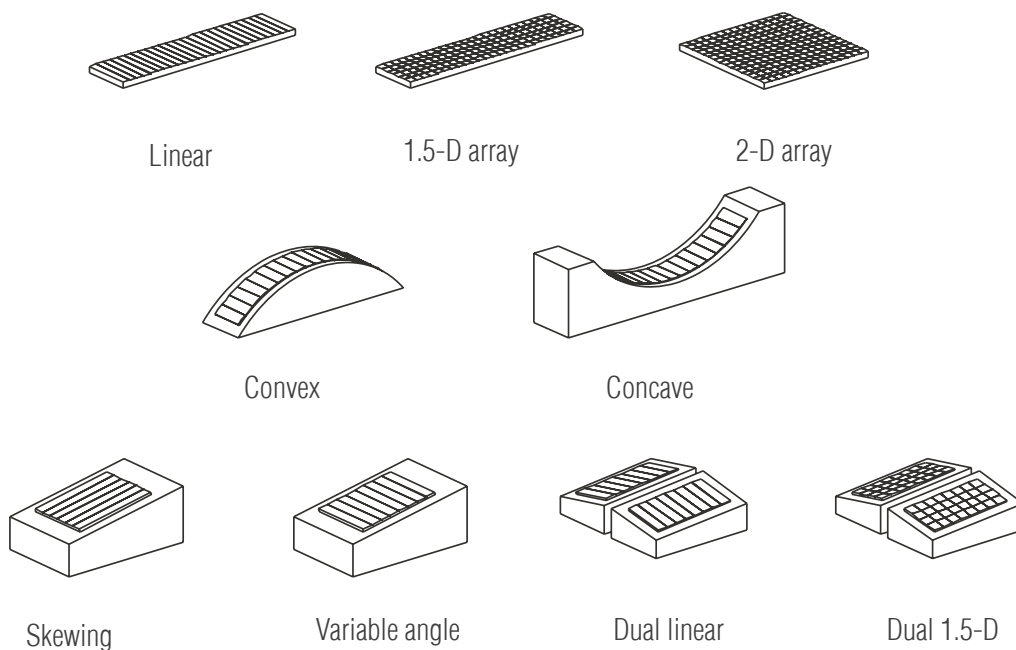
Near-Wall Probe

SIUI can produce custom phased array probes to suit specific applications and geometries.

For custom probe, please provide following info:

- Frequency
- Number of elements, pitch and elevation
- Probe type (angle beam, immersion, integrated wedge, matrix)
- Array shape (flat, curve)
- Cable jacket required
- Cable length
- Connector type
- Housing and/or dimension constraints
- Application
- Comparable UT single element transducer

Standard Phased Array Probes



Linear

1.5-D array

2-D array

Convex

Concave

Skewing

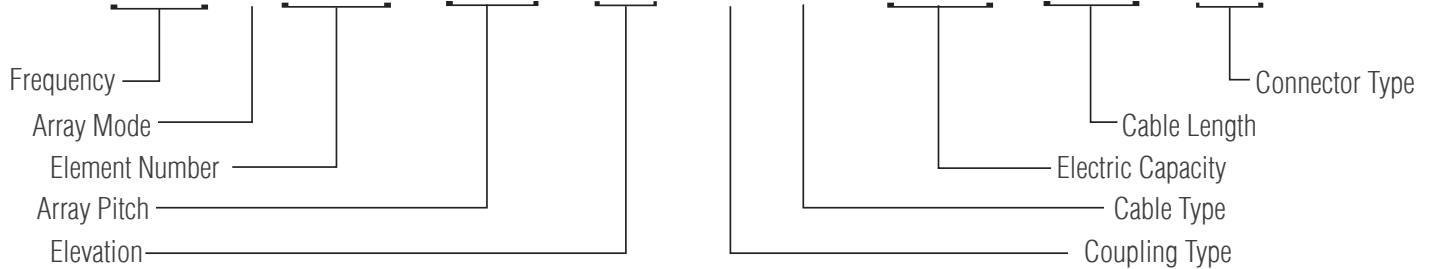
Variable angle

Dual linear

Dual 1.5-D

Ordering Code for Phased Array Probe

7.5L128-0.5-10-N-P-110-2.0-T1



For Example

Frequency

7.5=7.5MHz

Array Mode

L=Linear
C=Convex
V=Concave
M=Matrix

Element Number

128=128 elements

Array Pitch

Unit: mm
0.5=0.5mm

Elevation

Unit: mm
10=10mm

Coupling Type

N is coupled by wedge. **I** is coupled by immersion. **E** is coupled by integrated wedge.

Cable Type

P=PVC wrap
 Metal armor and radiation proof wrap can be provided.

Electric Capacity

Electric capacity each meter.
110=110pF for one meter;
50=50pF for one meter.

Cable Length

Unit: m
2.0=2 meters

Connector Type

T1= Tyco TC ZIF 260P
P1=Omni Connector
H1=Hypertronics
D1=DL-156P
D2=DL-96P
D5=DL-260P
C1=High Density 78 Way D-Type

Other parameters can be added after the model name following the suffix form in “-”.



D5



P1



T1



C1

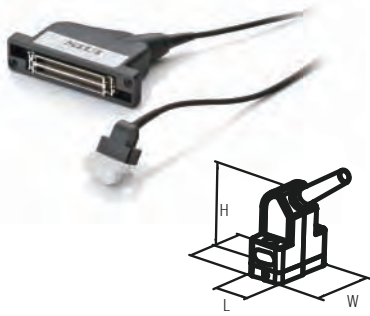


H1

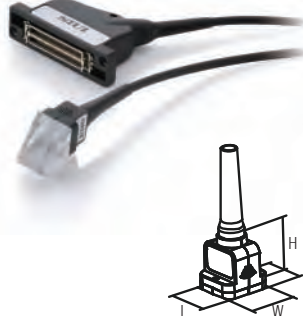
SIUI can provide PA probes with different connectors compatible with PA equipments from other manufacturers.

Universal Probes

Small/ Medium/ Large-Size & Low Frequency Probes



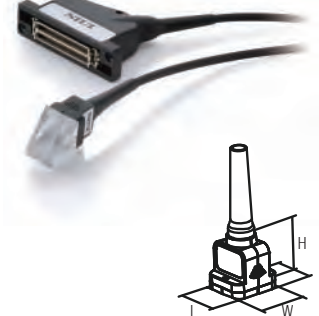
Small-size Linear Array Probe



Medium-size Linear Array Probe



Large-size Linear Array Probe



Low Frequency Probe

Superior Features:

Sound Beam angle, focusing and scan step can be electronically controlled;
Wide scan coverage can be achieved by one single probe;
Replaceable angle wedge and delay block, with customizable surface curvature;
Array pitch and elevation can be customized.

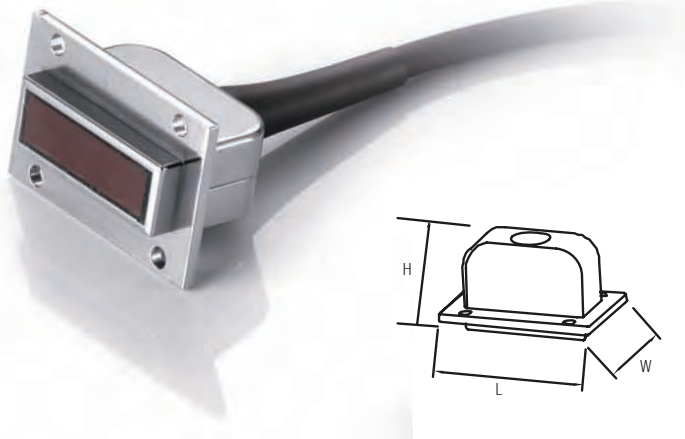
Typical Application

- Small-size Linear Array Probe
--good for inspection on limited space;
- Medium-size Linear Array Probe
--suitable for a wide range of applications;
- Large-size Linear Array Probe
--inspections of cracks on plate-type pieces;
- Low Frequency Probe
--inspection on thick plates or noisy or granular material.

Probe Model	Frequency	Number of elements	Pitch	Active aperture	Housing Dimension (mm)		
	MHz		mm	mm	L	W	H
Small-size Linear Array Probe							
2.5L8-1.0-9	2.5	8	1	8	15	28	28
4.0L16-0.5-9	4	16	0.5	8	15	28	33.5
5.0L16-0.5-9	5	16	0.5	8	15	28	33.5
5.0L16-0.6-10	5	16	0.6	9.6	17	28	33.5
7.5L16-0.5-9	7.5	16	0.5	8	15	28	33.5
10L16-0.5-9	10	16	0.5	8	15	28	33.5
Medium-size Linear Array Probe							
2.5L16-1.0-10	2.5	16	1	16	28	31	33
5.0L32-0.5-10	5	32	0.5	16	28	31	33
5.0L32-0.6-10	5	32	0.6	19.2	32	31	33
7.5L32-0.5-10	7.5	32	0.5	16	28	31	33
Large-size Linear Array Probe							
5.0L64-1.0-10	5	64	1	64	84	36	36
5.0L64-0.5-10	5	64	0.5	32	45	31	33
5.0L64-0.6-10	5	64	0.6	38.4	52	31	33
5.0L128-0.5-10	5	128	0.5	64	84	36	36
7.5L64-1.0-10	7.5	64	1	64	84	36	36
7.5L128-0.5-10	7.5	128	0.5	64	84	36	36
Low Frequency Probe							
2.0L32-1.0-10	2	32	1	32	45	31	33
1.5L16-2.0-10	1.5	16	2	32	45	31	33

The probes are equipped with standard 2m cable.

Immersion Probes



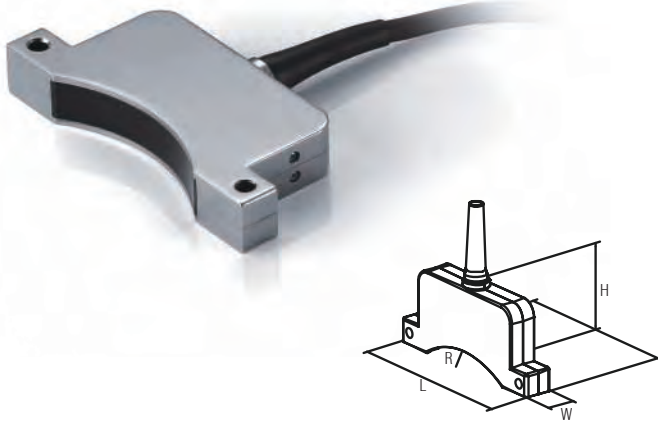
Immersion Linear Array Probe

Superior Features:

Sound Beam angle, focusing and scan step can be electronically controlled;
Wide scan coverage can be achieved by one single probe;
*Probe size and outer housing can be customized.

Typical Application:

Suitable for underwater inspection;
Inspection of thin plate or tubing (steel, aluminum, or other);
Composite inspection for delamination;
Inline thickness gaging;
Automated scanning.



Immersion Curved Array Probe

Superior Features:

Adopt immersion method for inspection;
Sound Beam angle, focusing and scan step can be electronically controlled;
Wide scan coverage can be achieved by one single probe;
The curvature radius of curved probes can be customized;
*Different parameters can be customized.

Typical Application:

Suitable for underwater inspection;
Inspection of tubing;
Inspection of carbon fiber reinforced polymers (CFRP) corners;
Inspection of composite materials for delamination.



Small-size immersion curved array probe

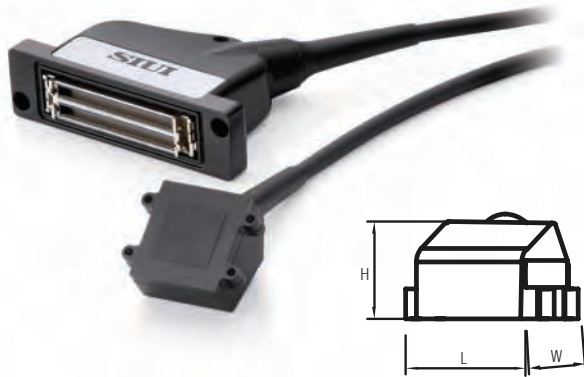


Large-size immersion curved array probe

Probe Model	Frequency	Number of elements	Pitch	Active aperture
	MHz		mm	mm
Immersion Linear Array Probe				
5.0L64-0.6-10-I	5	64	0.6	38
5.0L64-1.0-10-I	5	64	1	64
7.5L128-0.39-6-I	7.5	128	0.39	50
7.5L128-0.6-6-I	7.5	128	0.6	76.8
2.0L64-0.6-10-I	2.0	64	0.6	64
Immersion Curved Array Probe				
3.5V128-0.6-10-R65-I	3.5	128	0.6	/
3.5V64-1.6-12-R65-I	3.5	64	1.6	/
5.0V64-1.0-10-R40-I	5.0	64	1.0	/
10.0V128-0.6-10-R40-I	10.0	128	0.6	/

The probes are equipped with standard 2m cable.
Housing dimension can be customized.

High Penetration Probe & Small Footprint Probe



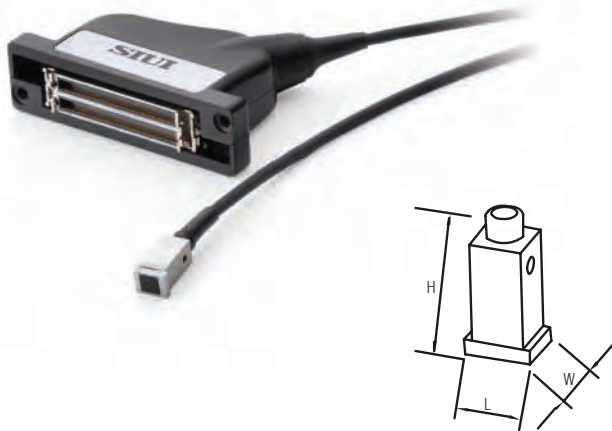
High Penetration Probes

Superior Features:

Good resolution and high penetration;
 Replaceable angle wedge and delay block, with customizable surface curvature;
 Array pitch and elevation can be customized.

Typical Application:

Detection of flaws and sizing;
 Inspections of defects in forgings;
 Inspection on noisy or granular material.



Small Footprint Probe

Superior Features:

Compact size;
 Cable connector can come out from either the side or the top;
 Replaceable angle wedge and delay block, with customizable surface curvature;
 Array pitch and elevation can be customized.

Typical Application:

Inspection on limited space;
 Detection of flaws and sizing;
 Inspection on reduced probe access, or with surfaces with complex geometry.

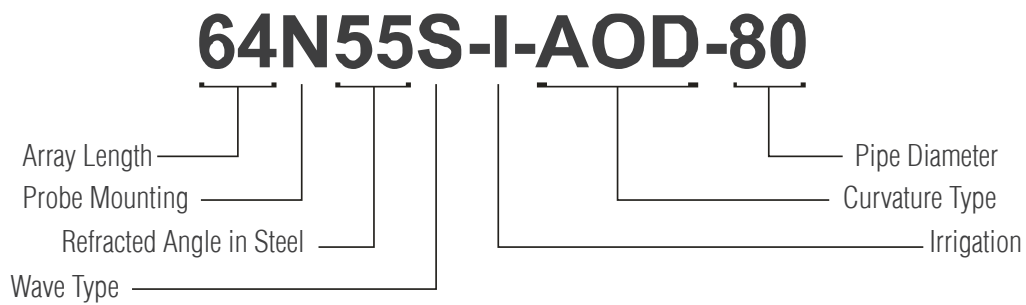
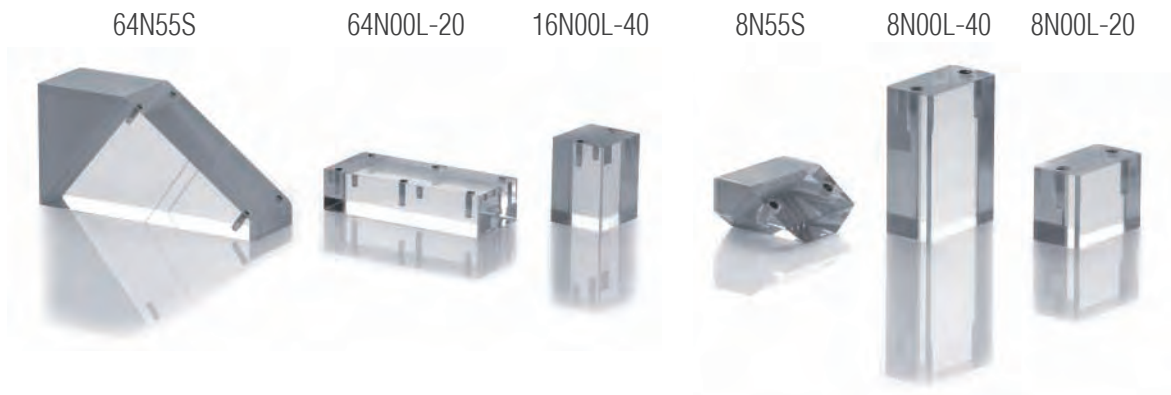
Probe Model	Frequency	Number of elements	Pitch	Active aperture	Housing Dimension (mm)		
	MHz		mm	mm	L	W	H
High Penetration Probe							
2.5L16-1.2-20	2.5	16	1.2	19.2	40	48	29
5.0L32-0.6-20	5	32	0.6	19.2	40	48	29
Small Footprint Probe							
5.0L10-0.6-6	5	10	0.6	6	13	10	23
7.5L10-0.6-6	7.5	10	0.6	6	13	10	23
10.0L10-0.6-6	10.0	10	0.6	6	10	10	23

The probes are equipped with standard 2m cable.

Wedge for Phased Array Probe

Superior Features:

- Variable angles in steel for selection.
- Wedges with different specifications can be made.
- Compatible with crawler.
- Anti-wear structure design are available.
- Wedges with curvature can be made on request.



For Example

Active Aperture

64=Compatible phased array probe is 64mm.

Active Aperture= Pitch × Elements

Probe Mounting

N=Normal

L=Skew (in lateral direction)

Refracted Angle in Steel

55=55°

Wave Type

S=Shear wave in steel

L=longitudinal wave in steel

Irrigation

I=Irrigation

Note: without "I" is non-irrigation

Curvature Type

AOD, COD, AID, CID are available.

AOD=Axial outside diameter

COD=Circumferential outside diameter

AID=Axial inside diameter

CID=Circumferential inside diameter

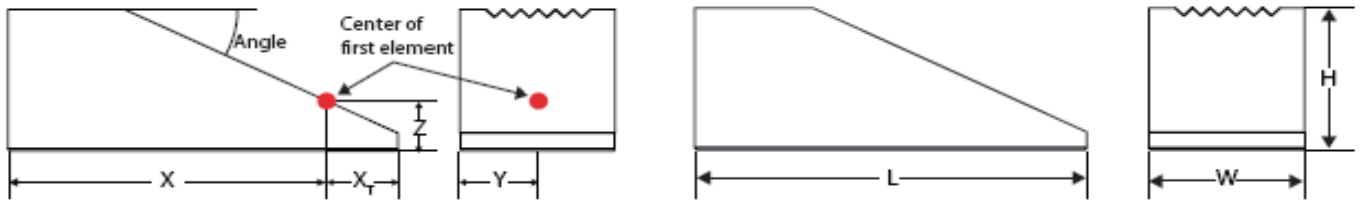
Pipe Diameter

Pipe diameter in mm.

AOD and COD is the outside diameter.

AID and CID is the inside diameter.

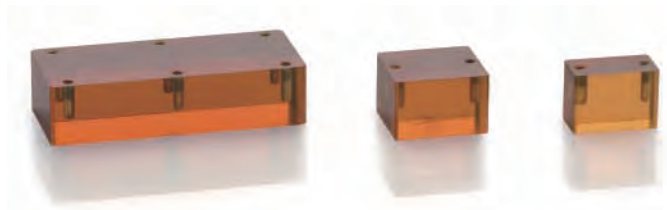
80=80mm



Wedge Model	Description	X	XT	Z	Velocity	Refracted Ang	L	W	H
		mm	mm	mm	m/s		mm	mm	mm
Standard Wedge									
64N00L-20	20mm delay block	73.5	10.5	20	2360	0°	84	35.6	20
64N00L-40	40mm delay block	73.5	10.5	40	2360	0°	84	35.6	40
64N55S	30-70° shear wave angle block	108.67	8.93	14.48	2360	55°	117.6	36	58.5
16N00L-20	20mm delay block	21.75	6.25	20	2360	0°	28	31	20
16N00L-40	40mm delay block	21.75	6.25	40	2360	0°	28	31	40
16N55S	30-70° shear wave angle block	34.94	5.06	9.74	2360	55°	40	31	22.5
8N00L-20	20mm delay block	11.25	3.75	20	2360	0°	15	28	20
8N00L-40	40mm delay block	11.25	3.75	40	2360	0°	15	28	40
8N55S	30-70° shear wave angle block	21.69	3.31	8.4	2360	55°	25	28	15
40N00L-20	20mm delay block	44.9	7.1	20	2360	0°	52	31	20
40N00L-40	40mm delay block	44.9	7.1	40	2360	0°	52	31	40
40N55S	30-70° shear wave angle block	73.24	7.76	13.64	2360	55°	81	31	41.5
32N00L-20	20mm delay block	38	7	20	2360	0°	45	31	20
32N00L-40	40mm delay block	38	7	40	2360	0°	45	31	40
32N55S	30-70° shear wave angle block	64.44	7.56	13.49	2360	55°	72	31	37.5
20N00L-20	20mm delay block	25.3	6.7	20	2360	0°	32	31	20
20N00L-40	40mm delay block	25.3	6.7	40	2360	0°	32	31	40
20N55S	30-70° shear wave angle block	52.58	5.42	18.94	2360	55°	58	31	35.5
10N00L-20	20mm delay block	13	4	20	2360	0°	17	28	20
10N00L-40	40mm delay block	13	4	40	2360	0°	17	28	40
10N55S	30-70° shear wave angle block	27.26	3.24	8.35	2360	55°	30.5	28	17.5

High Temperature Wedge

High temperature wedge enables testing on surface up to 200 °C.
 Maximum contact time is 10 seconds.
 Cool to ambient before reuse.



Wedge Model	Description	X	XT	Z	Velocity m/s	Refracted Ang	L	W	H
		mm	mm	mm			mm	mm	mm
High Temperature Wedge									
64N00L-20-H	20mm Delay Block	73.5	10.5	20	2590	0°	84	35.6	20
64N00L-40-H	40mm Delay Block	73.5	10.5	40	2590	0°	84	35.6	40
16N00L-20-H	20mm Delay Block	21.75	6.25	20	2590	0°	28	31	20
16N00L-40-H	40mm Delay Block	21.75	6.25	40	2590	0°	28	31	40
8N00L-20-H	20mm Delay Block	11.25	3.75	20	2590	0°	15	28	20
8N00L-40-H	40mm Delay Block	11.25	3.75	40	2590	0°	15	28	40
40N00L-20-H	20mm Delay Block	44.9	7.1	20	2590	0°	52	31	20
40N00L-40-H	40mm Delay Block	44.9	7.1	40	2590	0°	52	31	40
32N00L-20-H	20mm Delay Block	38	7	20	2590	0°	45	31	20
32N00L-40-H	40mm Delay Block	38	7	40	2590	0°	45	31	40
20N00L-20-H	20mm Delay Block	25.3	6.7	20	2590	0°	32	31	20
20N00L-40-H	40mm Delay Block	25.3	6.7	40	2590	0°	32	31	40
10N00L-20-H	20mm Delay Block	13	4	20	2590	0°	17	28	20
10N00L-40-H	40mm Delay Block	13	4	40	2590	0°	17	28	40

Curved Wedge

All the wedge models available now can be customized with curvature.



Irrigation Wedge

Water is used as couplant;
 Suitable for automatic inspection.
 Conventional wedges with surface curvature can be made based on requirement.



Wedge Model	Description	X	XT	Z	Velocity	Refracted Ang	L	W	H
		mm	mm	mm	m/s		mm	mm	mm
Irrigation Wedge									
8N55S-I	30-70° shear wave angle block	21.69	3.31	8.4	2360	55°	25	39	15
8N00L-20-I	20mm Delay Block	25.25	9.75	20	2360	0°	35	28	20
8N00L-40-I	40mm Delay Block	25.25	9.75	40	2360	0°	35	28	40
16N55S-I	30-70° shear wave angle block	34.94	5.06	9.67	2360	55°	40	43	22.5
16N00L-20-I	20mm Delay Block	43.5	4.5	20	2360	0°	48	31	20
16N00L-40-I	40mm Delay Block	43.5	4.5	40	2360	0°	48	31	40

Crawler for Phased Array

Different crawlers compatible with PA probes can be provided by SIUI.



Example of Phased Array Probe Test Report

Probe:5.0L64-1.0-10
Serial Number:*****

Probe Information

Frequency: 5.0MHz
Probe Type: Linear Array
Element Count: 64
Cable Length: 2.0M

Active Area Dimension

Length: 64mm
Elevation: 10mm
Pitch: 1.0mm
Matching Medium: Rexolite

Probe Conformance Summary

Overall Vp-p Sensitivity: 2.39dB (≤ 3 dB)
Average Center Frequency: 5.13MHz(5.0MHz $\pm 10\%$)
Average -6dB Bandwidth: 78.46%($\geq 60\%$)

Probe Test Condition

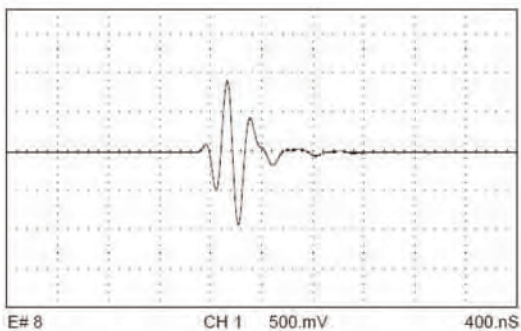
Instrument Model: 5052UA
Pulse Voltage: 120V
Pulse Type: Negative
Dumping: 50ohm
Energy: 1
Target Medium: Rexolite
Target Type: 25.4mm Plate

Probe Test Result

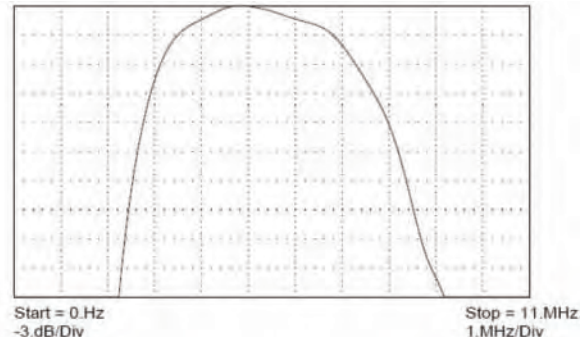
Parameters	Unit	Min	Max	Mean
Peak-Peak Sensitivity	dB	-47.61	-45.22	-46.79
-20dB Pulse Length	nS	582.4	636	605.23
-6dB Center Frequency	MHz	5.07	5.25	5.13
-6dB Bandwidth	%	74.59	80.39	78.46

Probe Test Graph

1. Element Waveform:



2. Element Waveform FFT:



SIUI can Provide

A series of phased array probes compatible with different phased array flaw detectors;
Customization of phased array probes and wedges with different specifications.



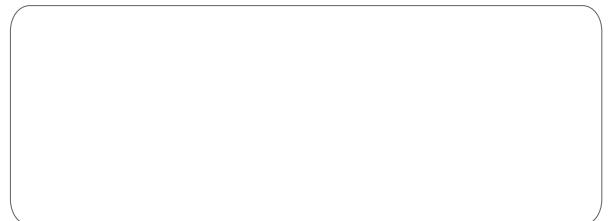
SIUI

Shantou Institute of Ultrasonic Instruments Co., Ltd.

Add: #77, Jinsha Road, Shantou 515041, Guangdong, China

Tel: +86-754-88250150 **Fax:** +86-754-88251499

E-mail: siui@siui.com **Website:** <http://www.siui.com>



Specifications and appearance are subject to change without prior notice.
DCY2.791.PA Probes.CY/7D02