A
SEARCH UNIT PARAMETERS/CERTIFICATES

The search unit documentation is presented on the following pages.

IMASONIC

MEASUREMENT REPORT

1.5 MHz 2 x 16 elts matrix phased array probe

5155 B105

ZETEC QUEBEC

1.5M16x2E32-7

IMASONIC

CERTIFICATE of CONFORMANCE

REFERENCE DOCUMENT	CdC5155-3
PROJECT #	5155B
SERIAL #	5155B105

Checking of Electrical Performance

		Criteria of conformity	Value	Conformity
Inter element coupling between neighbouring elements	dB	< -30	-48.9	OK
Inter element coupling between neighbouring elements	dB	< -35	-54.8	OK

Checking of Acoustical Performance

		Criteria of conformity	Value	Conformity
Central Frequency (-6dB)	MHz	[1.35 ; 1.65]	1.40	OK
Bandwidth (-6dB)	%	> 50	55	OK
Pulse Length (-20dB)	ns	< 3.5	3.16	OK
Sensitivity	(mV)	na	15	OK
Homogeneity (probe to probe, within batch)	dB	± 3 / mean value	-5.8	OK
Homogeneity (between all elements of the probe)	dB	± 4 / mean value	-1.99	OK
Backwall Echo	dB	< -40	-42.2	OK

Checking of Elements Wiring

conformity	OK

Overall Conformity

conformity	OK

Date : 16/11/2006

Signature

Ruch Vincent

Phased Array Probe Specifications
Piezocomposite technology

Zetec reference: 1 5M16x2E32-7
IMASONIC reference: CDC5155-3

Technical characteristics and acceptance level

Acoustical characteristics

Centre frequency (-6dB):	1.5 MHz ± 10 %*
Bandwidth (-6dB):	> 50% *
Pulse length (-20dB):	< 3.5 µs *
Acoustical impedance matching:	rexolite
Electrical matching:	none
Number of channels:	16 x 2
Type:	Matrix
Active area	32 x 7 mm
Mechanical focusing:	none
Elementary pitch in primary axis:	2 mm
Elementary pitch in secondary axis:	3.5mm
Inter element spacing:	0.2 mm in two directions
Homogeneity in sensitivity:	± 4 dB for the whole array*
Homogeneity of probe to probe in sensitivity:	+/-3 dB for a batch which number of probes is agreed between ZETEC and IMASONIC before the order.
Inter element coupling:	≤ -30dB* between adjacent elements
Inter element coupling:	≤ -35dB* between elements separated by one element
Backing echoes:	≤ -40 dB / interface echoes *

**criteria of conformity measured in the conditions below*

Mechanical characteristics

Housing:
Stainless steel
Geometry and dimensions: according to the drawing reference 5155A0110000

Cable:
Cable output: on side (16th, 32nd elts)
Cable gland

Flanges:
Description: According to the drawing reference 5155A0110000

Interconnections

Cable: 50Ω multi-coaxial with overall shielding
Length: 5 m ± 0.1m
Connector: Hypertronics
Protective jacket: halogen free jacket
Pinout diagram: classical.

Phased Array Probe Specifications
Piezocomposite technology

Zetec reference:	1 5M16x2E32-7
IMASONIC reference:	CDC5155-3

Identification

On the top of the probe:	Logo Zetec Identification of the 1st, 16th, 17th and 32nd elements
On side of the probe:	1.5M16X2E32-7 29HBE0029 serial number

*Recommended using conditions**

Chemical constraints:	contact with acoustical gel or water
Pressure:	equivalent to a water column of 1m maximum
Temperature:	-20° to 60°C (storage) 10 to 30°C (functioning)
Excitation:	Negative pulse 200Vpp maximum (measured in 50 Ωenvironments) Max repetition frequency: 10 kHz
Cleaning:	With water or isopropyl alcohol, with soft tissue, taking care of not wearing the front face with particles between the front face and the tissue
Manipulation:	Do not handle the probe by the cable
Nuclear radiation:	none
Normative constraints:	**none**

Particular constraints of shocks and vibrations are not taken into account by IMASONIC

** Other particular using conditions must be validated by IMASONIC*

Control of electro acoustical performances

Electrical Measurements:
1_Impedance measurement for all the elements at the nominal frequency
2_Inter-element coupling measurement on 2 pairs of adjacent elements
3_Inter-element coupling measurement on 2 pairs of non adjacent elements

Measurements conditions:
Performed with HP3577A network analyser (50Ω environment)
Acoustic load on the active part: 1.5 MR
Supplied documents:
Value of impedances
Curves of inter –elements coupling

Acoustical measurements:
1_Temporal response & frequency spectrum measurement for all the elements

Measurements conditions:
Performed on contact on flat steel target with a rexolite delay line in E/R mode
rexolite path: to be determined
steel path: to be determined
couplant: to be defined during the control
Excitation signal: 1 negative pulse
Supplied documents:
Value of central frequency, bandwidth (-6dB), pulse length and sensitivity for all elements
Curves of homogeneity sensitivity
Curves for 8 elements

2_Backing Echo

Measurements conditions:
Performed in water on flat brass target
Excitation signal: 1 negative pulse
Supplied document:
Value of backing Echo

Supplied documentation (paper and mail)

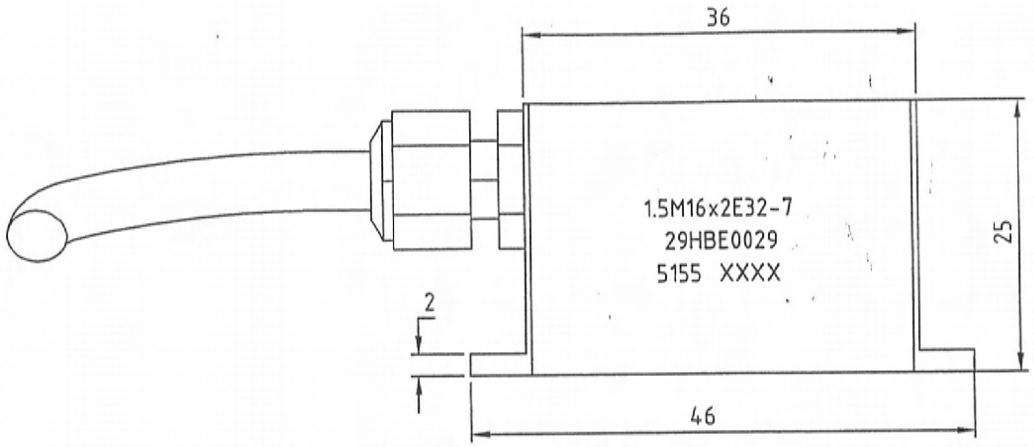
Specifications of the probe
Overall drawing of the probe
Measurement results

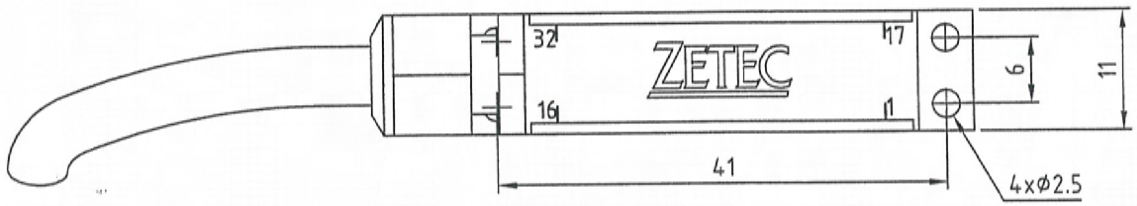
Casing

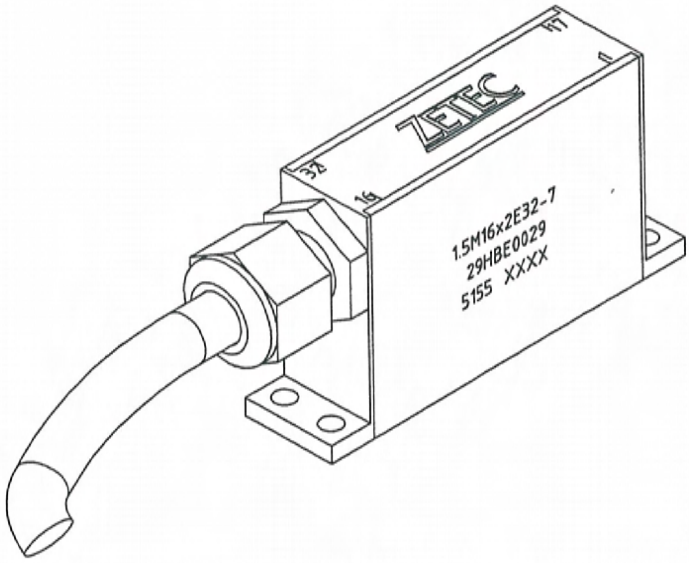
One casing for each probe

Guarantee conditions

One year guarantee against manufacturing defects in the using conditions above
Other conditions: see Imasonic general selling conditions







				Façonnage Général :		Nombre : 1
				Tol gén	Longueurs: js/JS13	Angles: ±1°
				Matière :		
				Traitement thermique :		
Indice	Date	Modifications	par	Protection:		
∼ = brut	▽ = 6.5 à 12.5Ra	▽▽ = 1.6 à 3.2Ra	▽▽▽ = 0.05 à 0.8Ra	N°	5155A0110000	

Etude: Linear array-1.5MHz-2x16elts

S/Ens.:

Pièce: General drawing

IMASONIC transducteurs et dispositifs électroacoustiques

Dess le: 01/06/05 | Vér. le: ..... | A4 | Folio | 15 Rue Alain SAVARY 25000 BESANCON

17/11/2006

Impedance measurement for the transducer n°: **5155 B105** **Operator :** **SA**

(Acoustic load: 1.5 MR. IMASONIC procedure: INP 410)

#	Zr (Ω)	Zi (Ω)	#	Zr (Ω)	Zi (Ω)
1	23.6	-165.3	17	21.7	-165.4
2	22.3	-167.1	18	23.6	-167.4
3	22.8	-164.9	19	23.3	-164.1
4	22.4	-165.9	20	22.3	-165.2
5	21.5	-165.3	21	22.2	-165.2
6	22.9	-165.8	22	22.2	-166.6
7	21.9	-165.1	23	21.4	-168.8
8	20.7	-166.8	24	22.3	-166.0
9	21.5	-166.9	25	22.8	-165.9
10	22.5	-166.7	26	21.8	-168.9
11	21.9	-165.6	27	21.5	-164.5
12	22.4	-166.1	28	22.4	-166.7
13	22.0	-168.2	29	22.0	-165.6
14	20.9	-167.3	30	22.2	-166.6
15	21.7	-168.9	31	22.6	-166.2
16	22.5	-165.4	32	21.6	-167.6

	Zr (Ω)	Zi (Ω)
Minimum :	20.7	-168.9
Maximum :	23.6	-164.1
Standard deviation :	0.7	1.2
Average values :	22.2	-166.3

Inter element coupling measurement :

(Acoustic load: 1.5MR. IMASONIC procedure: INP 412.)

#/#	Coupling (dB)
5/6	-48.9
28/29	-51.9
2/18	-56.2
5/7	-54.8
28/30	-51.3

See measurement results in appendix 2.

Element cabling :

checking cabling for each element YES

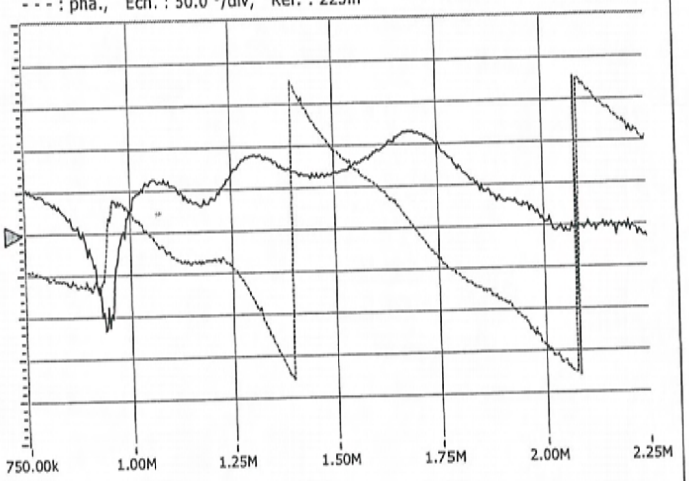
(See values in appendix 4)

IMASONIC S.A.
MESURES ELECTRIQUES
Z V4.2

Date : November 20th 2006 13h54
Operator : SA
Transducer : Matrix phased array probe - 2x16 elements
Serial number : 5155 B105
Nominal frequency : 1.5 MHz
Network Analyzer : HP 8751A, IM : 112/113
Acoustic load : 1.5MR on active area
Cable length : *
Instruction : INP 412
*

Cross coupling measurement

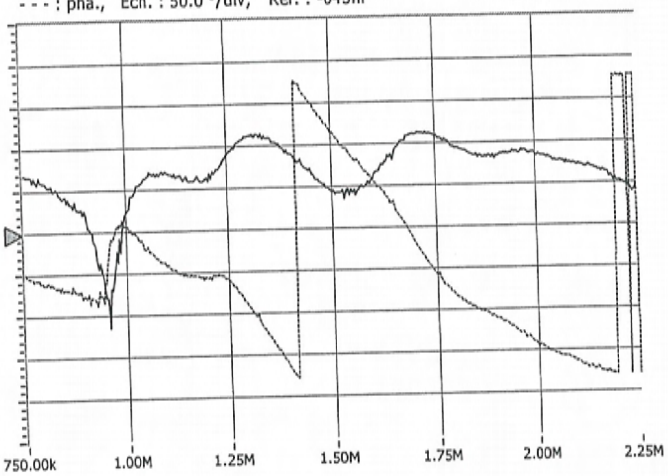
___ : ICI, Ech. : 5.00 dB/div, Ref. : -55.7 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 225m°



Elements n°5/6

Cross coupling measurement

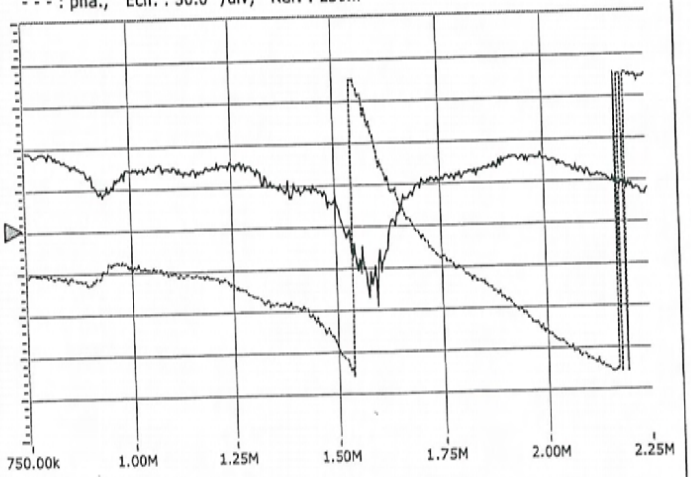
___ : ICI, Ech. : 5.00 dB/div, Ref. : -56.4 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : -645m°



Elements n°28/29

Cross coupling measurement

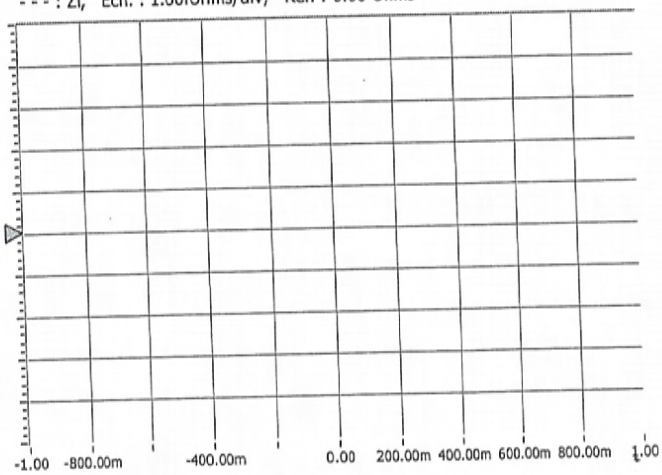
___ : ICI, Ech. : 5.00 dB/div, Ref. : -59.9 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 230m°



Elements n°2/18

Cross coupling measurement

___ : Zr, Ech. : 1.00fOhms/div, Ref. : 0.00 Ohms
- - - : Zi, Ech. : 1.00fOhms/div, Ref. : 0.00 Ohms

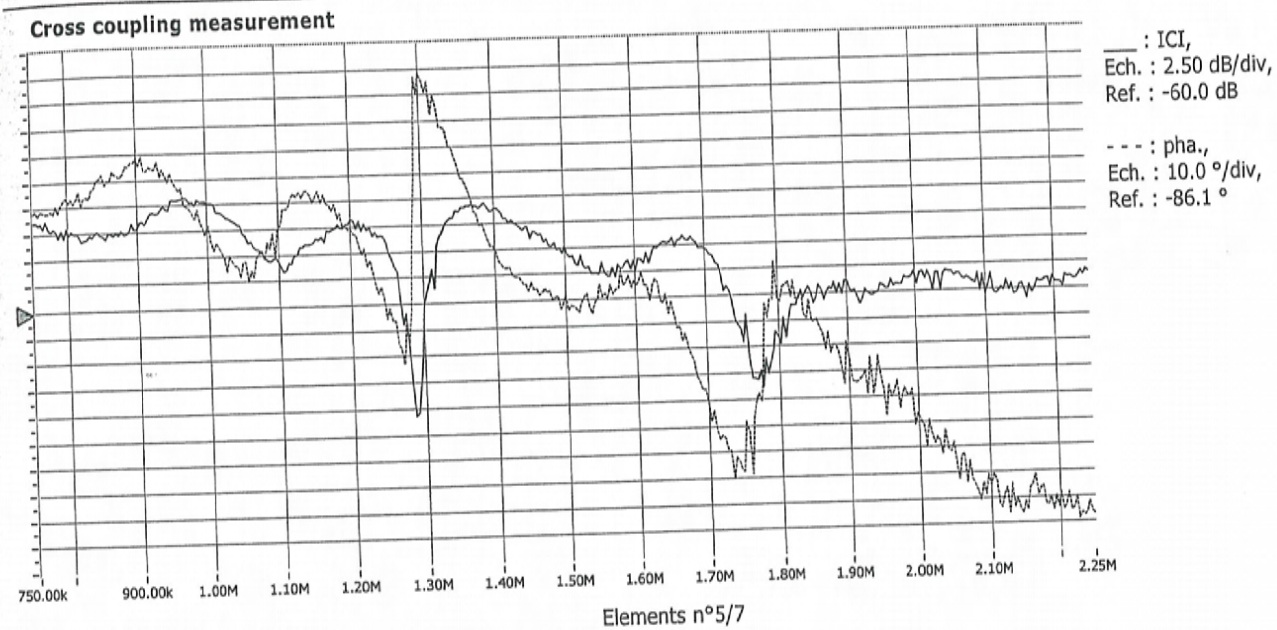


*

IMASONIC S.A.
MESURES ELECTRIQUES
Z V4.2

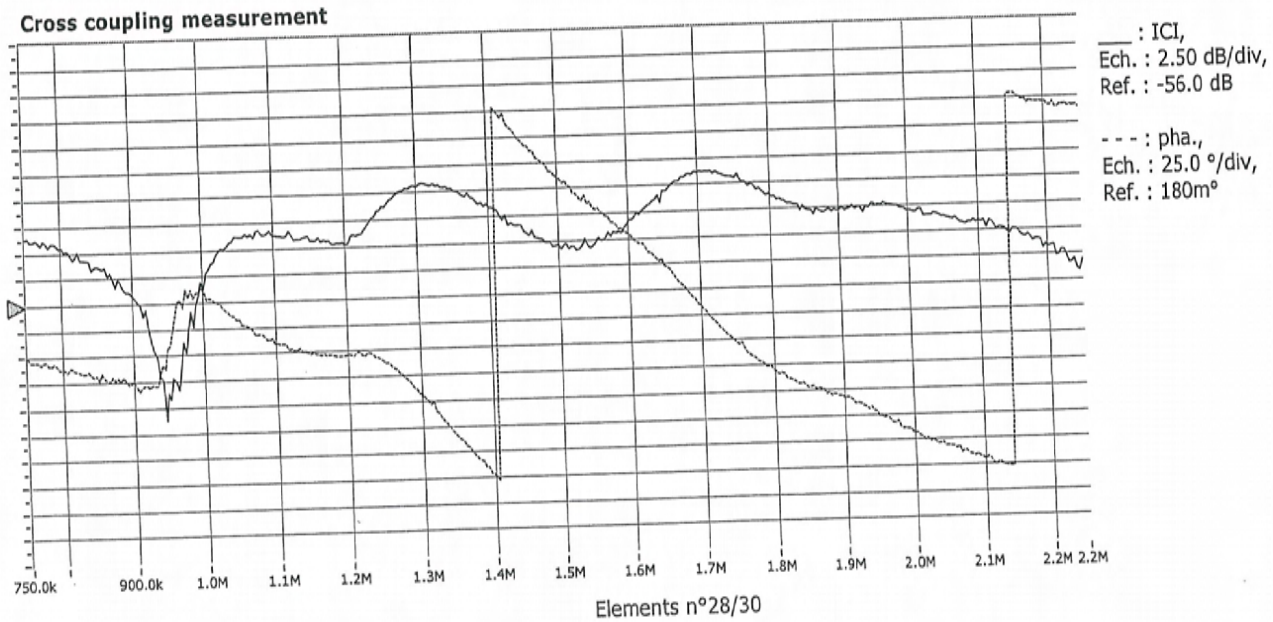
Date : November 20th 2006 13h55
Operator : SA
Transducer : Matrix phased array probe - 2x16 elements
Serial number : 5155 B105
Nominal frequency : 1.5 MHz
Network Analyzer : HP 8751A, IM : 112/113
Acoustic load : 1.5MR on active area
Cable length : *
Instruction : INP 412
*

Cross coupling measurement



Elements n°5/7

Cross coupling measurement



Elements n°28/30

17/11/2006

Electroacoustic measurement for the transducer n°: **5155 B105** **Operator : SA**

(Acoustic load: 2.45 MR. IMASONIC procedure: INP 413.) *Nominal Frequency : 1.50 MHz*

Generator : Multi 2000 V3.4.4, Gain = atten = 70 dB, L. Exc. : 353 ns, U. Exc. : 70 V

Target type : Inox h = 20mm + Rexolite h = 15 mm, Target Positioning : 17.78 mm

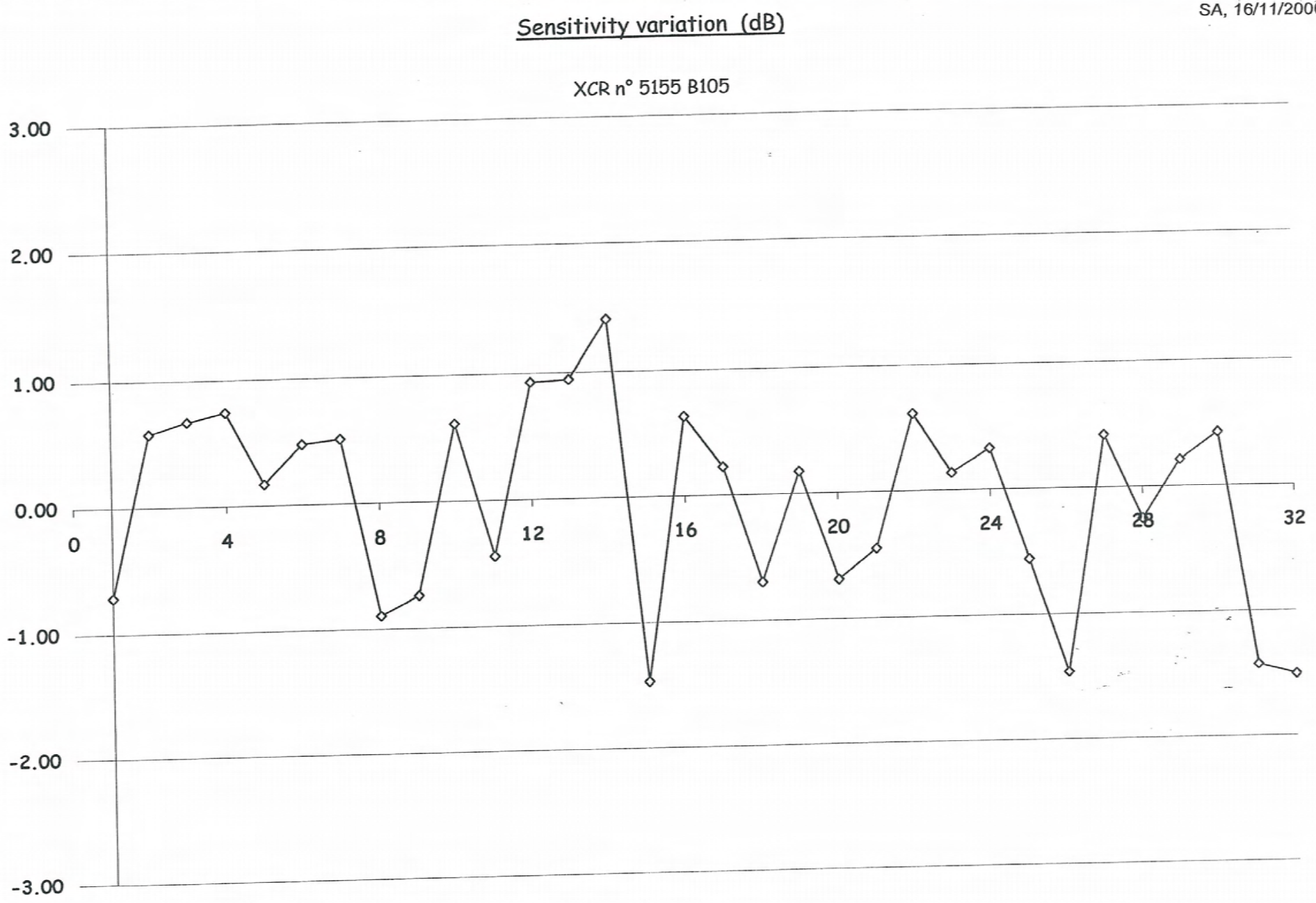
#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)	#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
1	13	1.4	56	2864	17	14	1.4	57	2847
2	15	1.4	57	3197	18	13	1.4	59	3198
3	15	1.4	53	3199	19	14	1.4	53	3198
4	15	1.4	54	3079	20	13	1.4	57	3196
5	14	1.4	54	3198	21	13	1.4	55	3199
6	15	1.4	55	3200	22	15	1.4	55	3200
7	15	1.4	55	3200	23	14	1.4	54	3198
8	12	1.4	55	3199	24	14	1.4	55	3198
9	13	1.4	53	3198	25	13	1.4	56	3200
10	15	1.4	53	3200	26	12	1.4	55	3198
11	13	1.4	53	3198	27	14	1.4	55	3199
12	15	1.4	55	3198	28	13	1.4	54	3198
13	15	1.4	56	3141	29	14	1.4	55	3198
14	16	1.4	55	3199	30	14	1.4	53	3200
15	12	1.4	56	3198	31	12	1.4	57	3200
16	15	1.4	59	2838	32	12	1.4	57	3196

	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
Minimum :	12	1.38	53	2838
Maximum :	16	1.42	59	3200
Standard deviation :	1	0.01	2	104
Average values :	13.7	1.40	55	3160

Homogeneity in sensitivity (dB) : **-2.92**

See measurement results in appendix 3 for the elements n° 2;6;10;14;18;22:26:30

SA, 16/11/2006



ENQ 102 - Final measurements 32 elts

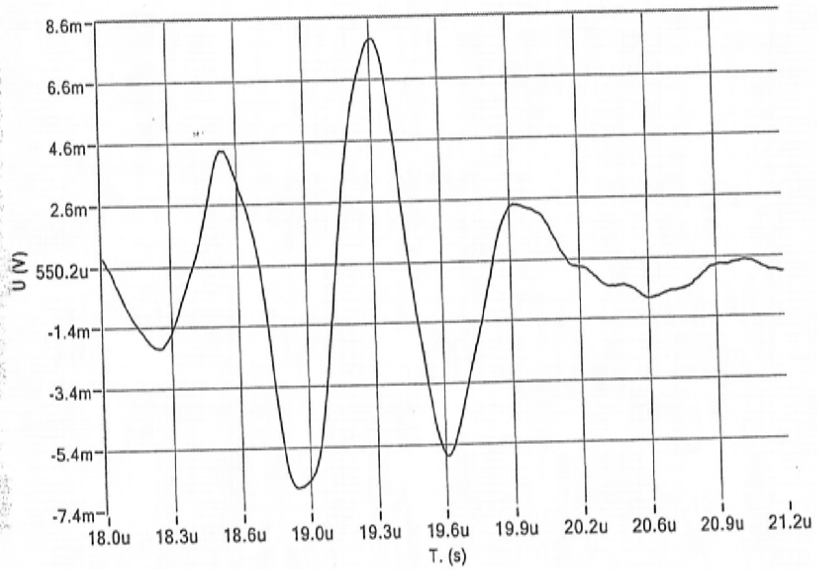
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.57mm
Element : 2

WAVEFORM

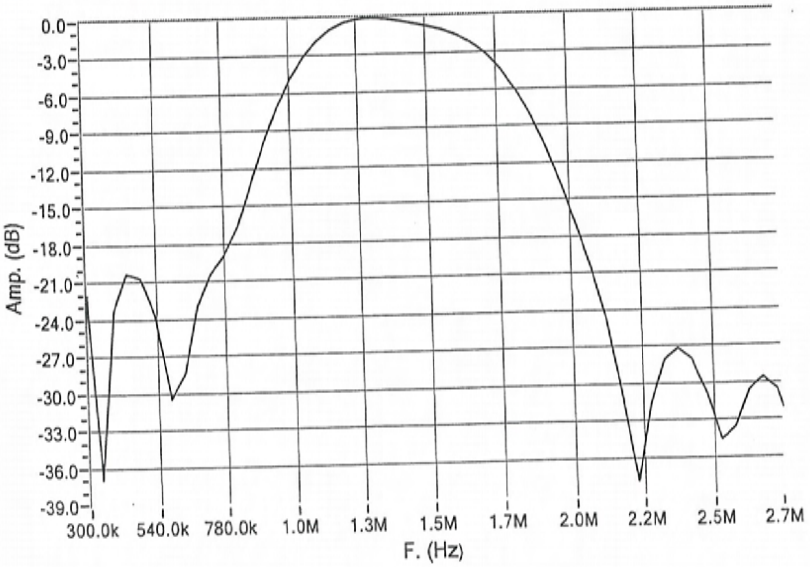
T : 319.0ns/div U : 2.0mV/div



PULSE LENGTH :
-6dB : 1.12µs -20dB : 3.20µs

VOLTAGES :
Vpp = 14.67mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.40MHz
Ratio Bp/Fc : 57%
Bandwidth : 805.18KHz
Lower Frequency : 1.00MHz
Upper Frequency : 1.81MHz

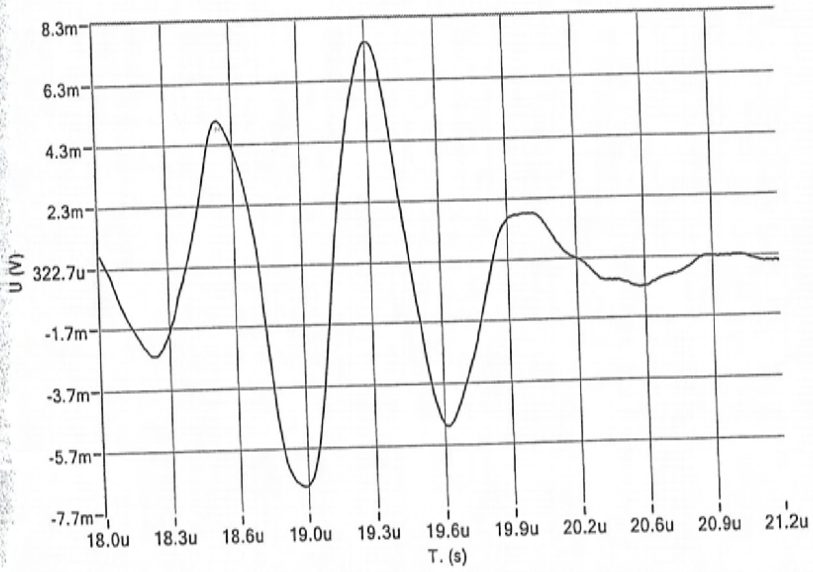
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.55mm
Element : 6

WAVEFORM

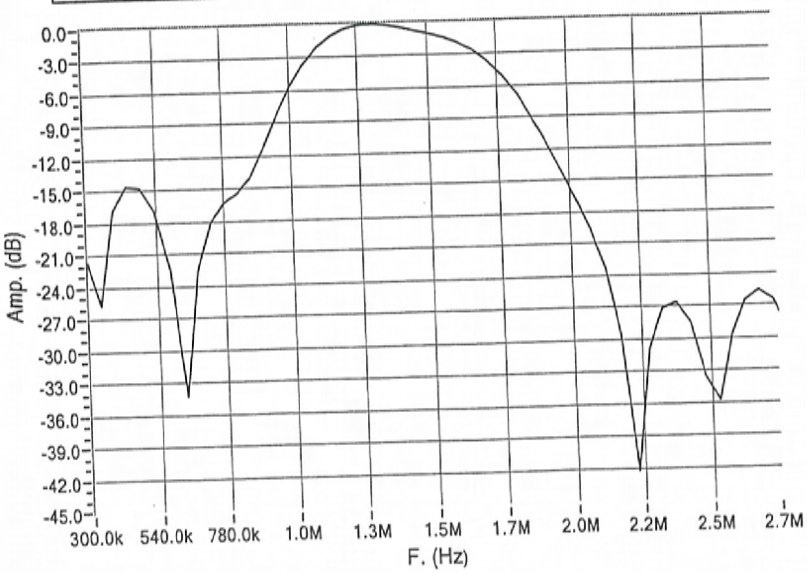
T : 319.0ns/div U : 2.0mV/div



PULSE LENGTH :
-6dB : 911.61ns -20dB : 3.20µs

VOLTAGES :
Vpp = 14.50mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.40MHz
Ratio Bp/Fc : 55%
Bandwidth : 767.95KHz
Lower Frequency : 1.02MHz
Upper Frequency : 1.79MHz

IMASONIC

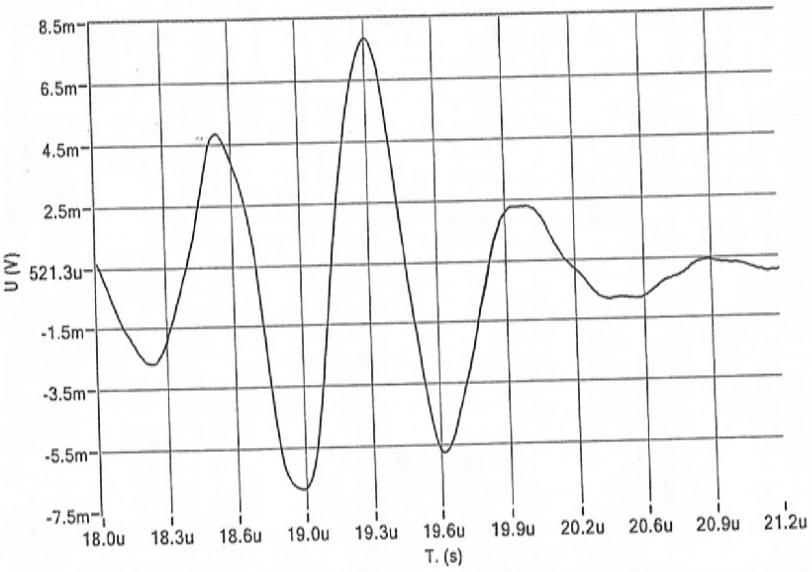
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.56mm
Element : 10

WAVEFORM

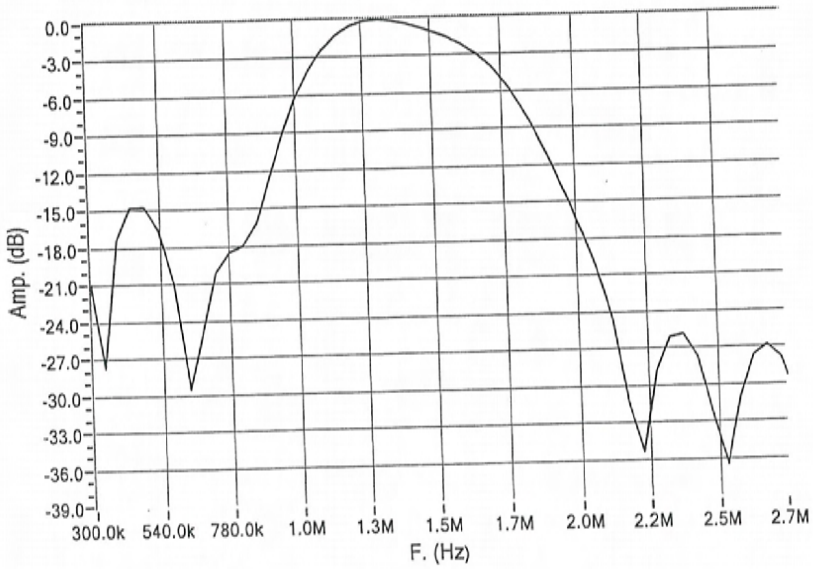
T : 319.0ns/div U : 2.0mV/div



PULSE LENGTH :
-6dB : 903.25ns -20dB : 3.20µs

VOLTAGES :
Vpp = 14.73mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.40MHz
Ratio Bp/Fc : 53%
Bandwidth : 743.85KHz
Lower Frequency : 1.03MHz
Upper Frequency : 1.77MHz

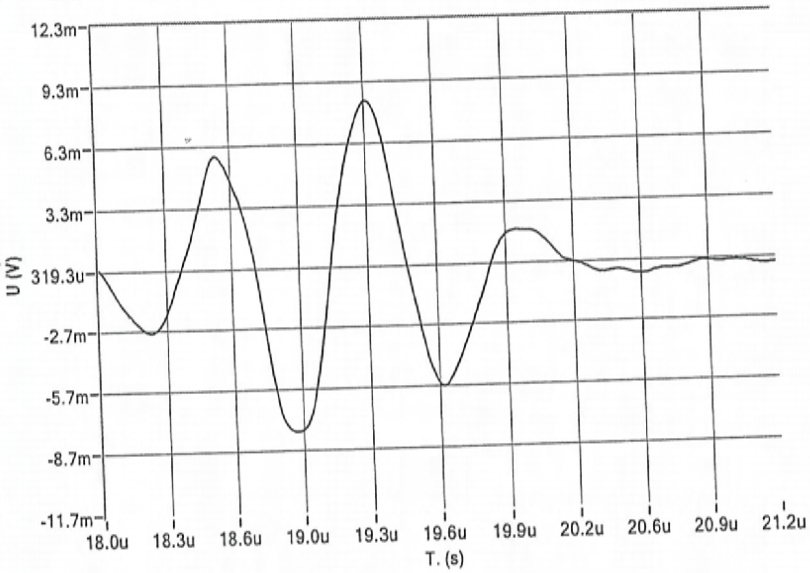
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.57mm
Element : 14

WAVEFORM

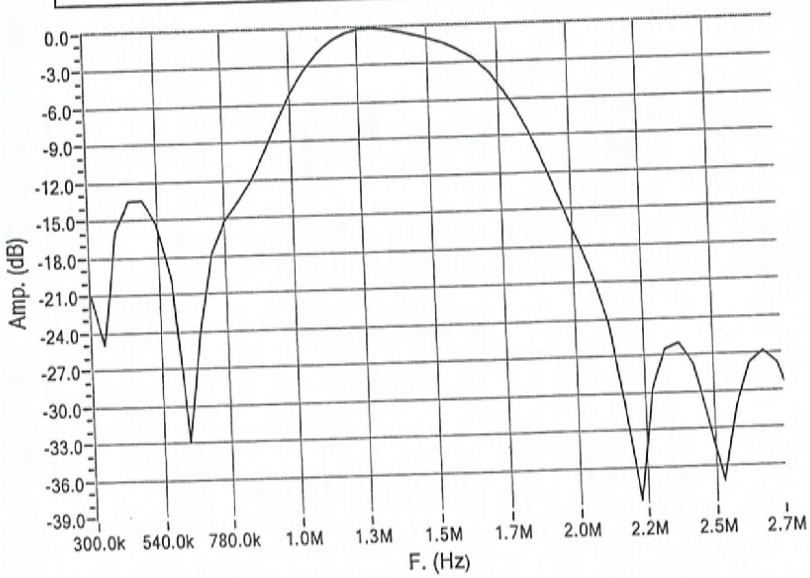
T : 319.0ns/div U : 3.0mV/div



PULSE LENGTH :
-6dB : 923.25ns -20dB : 3.20µs

VOLTAGES :
Vpp = 16.14mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.39MHz
Ratio Bp/Fc : 55%
Bandwidth : 771.07KHz
Lower Frequency : 1.01MHz
Upper Frequency : 1.78MHz

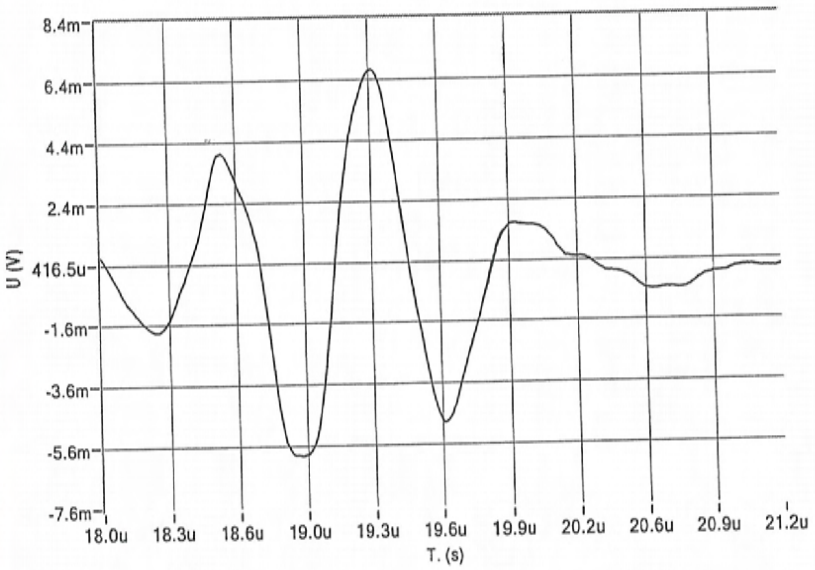
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.59mm
Element : 18

WAVEFORM

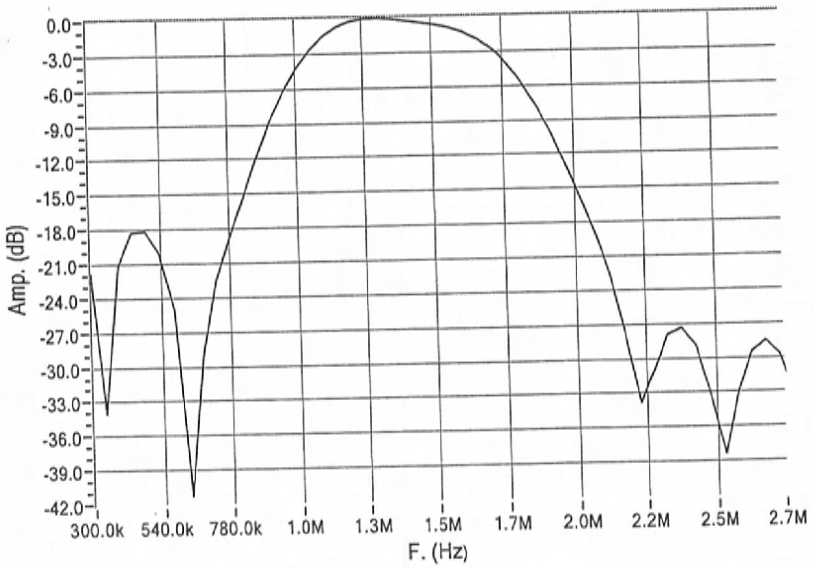
T : 319.0ns/div U : 2.0mV/div



PULSE LENGTH :
-6dB : 1.11µs -20dB : 3.20µs

VOLTAGES :
Vpp = 12.67mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.40MHz
Ratio Bp/Fc : 59%
Bandwidth : 827.91KHz
Lower Frequency : 985.60KHz
Upper Frequency : 1.81MHz

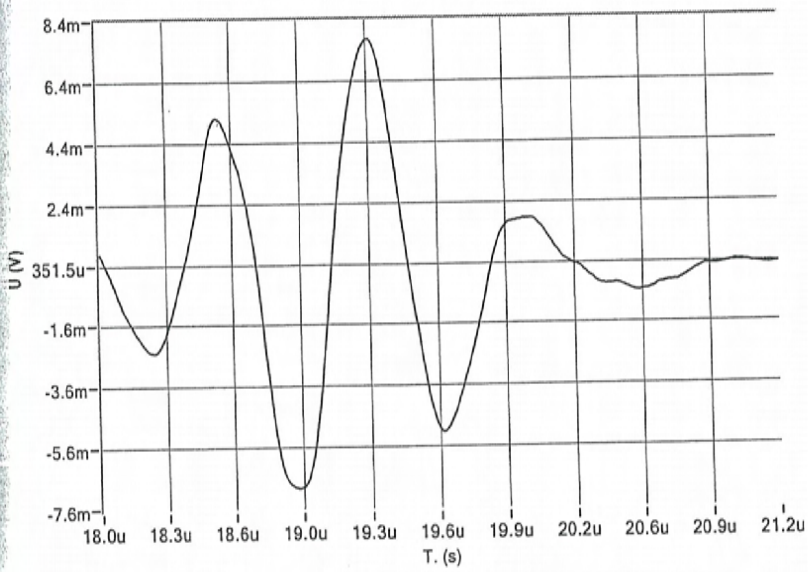
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.56mm
Element : 22

WAVEFORM

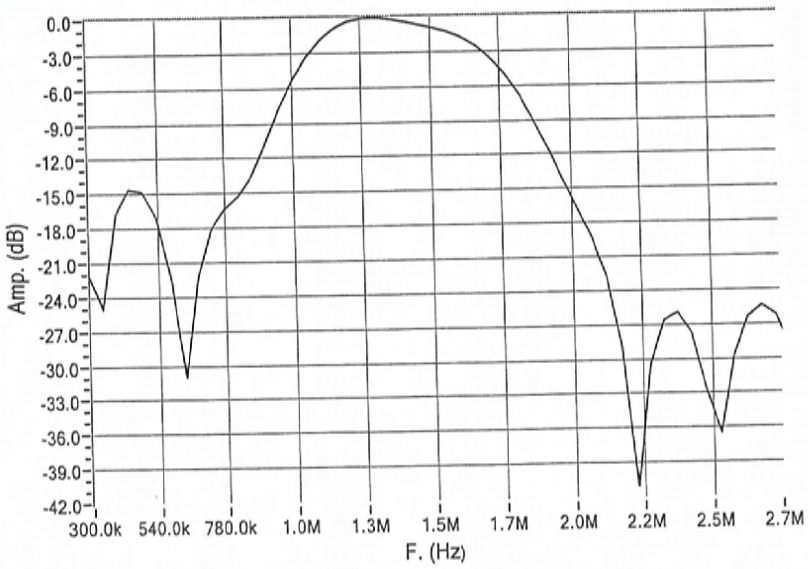
T : 319.0ns/div U : 2.0mV/div



PULSE LENGTH :
-6dB : 911.27ns -20dB : 3.20µs

VOLTAGES :
Vpp = 14.73mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.40MHz
Ratio Bp/Fc : 55%
Bandwidth : 774.42KHz
Lower Frequency : 1.01MHz
Upper Frequency : 1.79MHz

IMASONIC

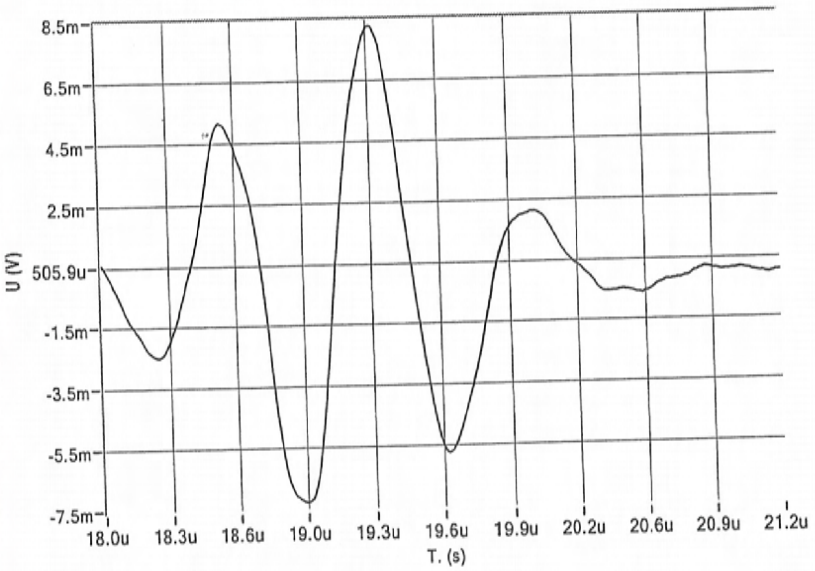
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.58mm
Element : 26

WAVEFORM

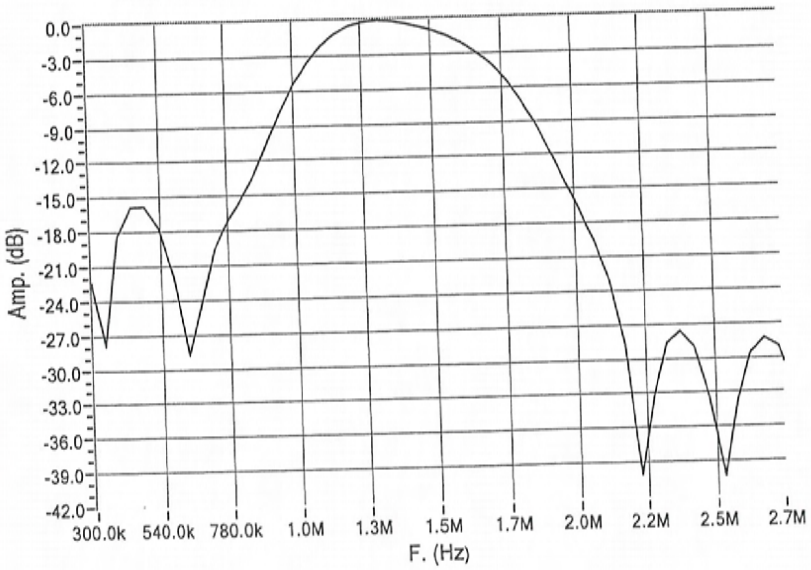
T : 319.0ns/div U : 2.0mV/div



PULSE LENGTH :
-6dB : 903.58ns -20dB : 3.20µs

VOLTAGES :
Vpp = 15.59mV

TRANSMIT-RECEIVE SPECTRUM

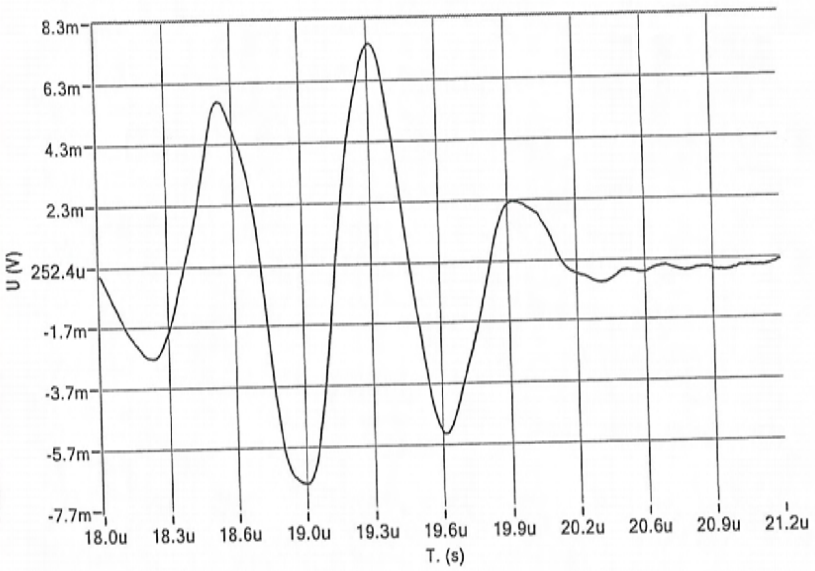


CARACTERISTICS AT -6dB :
Central Frequency : 1.39MHz
Ratio Bp/Fc : 55%
Bandwidth : 760.45KHz
Lower Frequency : 1.01MHz
Upper Frequency : 1.77MHz

Date : November 16th 2006 16h44
Operator : SA
Transducer : Matrix phased array probe - 2x16 elts
Serial number : 5155 B105
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 70 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.57mm
Element : 30

WAVEFORM

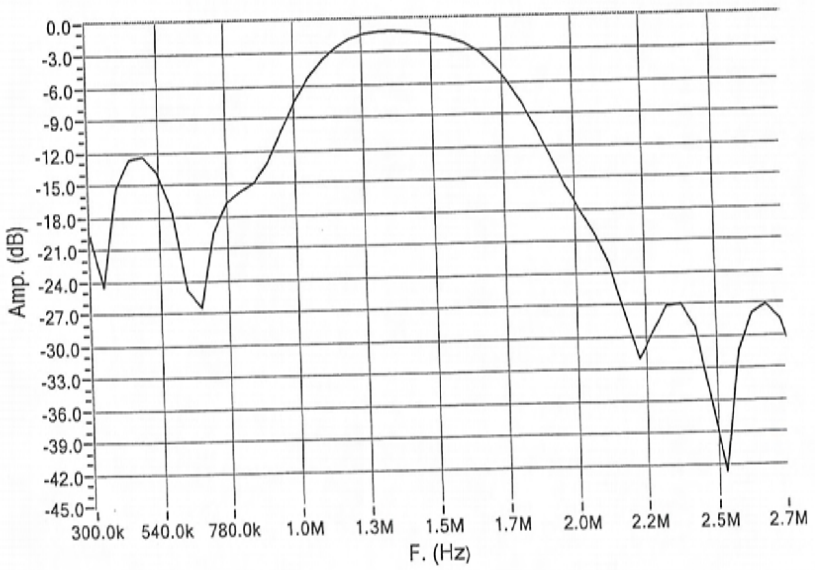
T : 319.0ns/div U : 2.0mV/div



PULSE LENGTH :
-6dB : 926.79ns -20dB : 3.20µs

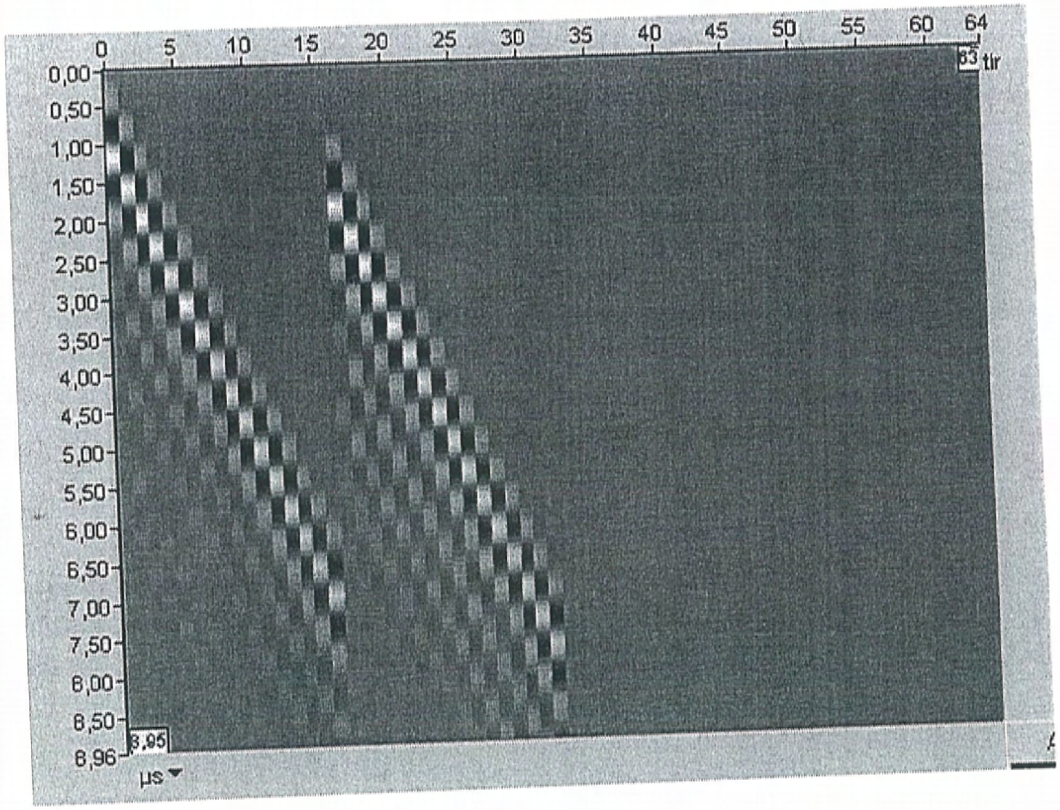
VOLTAGES :
Vpp = 14.41mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.41MHz
Ratio Bp/Fc : 53%
Bandwidth : 752.85KHz
Lower Frequency : 1.03MHz
Upper Frequency : 1.79MHz

Cabling order
Plane matrix 2x16 elements
5155 B105



IMASONIC

MEASUREMENT REPORT

1,5 MHz 2 x 32 elts matrix phased array probe

5154 B101

ZETEC QUEBEC

1.5M32X2E64-15

IMASONIC

CERTIFICATE of CONFORMANCE

REFERENCE DOCUMENT CdC5154-5
PROJECT # 5154B
SERIAL # 5154B101

Checking of Electrical Performance

		Criteria of conformity	Value	Conformity
Inter element coupling between neighbouring elements	dB	< -30	-47.5	OK
Inter element coupling between neighbouring elements	dB	< -35	-54.6	OK

Checking of Acoustical Performance

		Criteria of conformity	Value	Conformity
Central Frequency (-6dB)	MHz	[1.35 ; 1.65]	1.4	OK
Bandwidth (-6dB)	%	> 55	68	OK
Pulse Length (-20dB)	ns	< 3.5	2.82	OK
Sensitivity	(mV)	na	27	OK
Homogeneity (probe to probe, within batch)	dB	± 3 / mean value	-0.4	OK
Homogeneity (between all elements of the probe)	dB	± 3 / mean value	-2.77	OK

Backwall Echo	dB	< -40	-61.6	OK

Checking of Elements Wiring

conformity	OK

Overall Conformity

conformity	OK

Date : 16/11/2006

Signature

Ruch Vincent

Phased Array Probe Specifications
Piezocomposite technology

IMASONIC

Zetec reference: 1.5M32x2E64-15
IMASONIC reference: CDC5154-5

Technical characteristics and acceptance level

Acoustical characteristics

Centre frequency (-6dB): 1.5 MHz ± 10 %*
Bandwidth (-6dB): > 55% *
Pulse length (-20dB): < 3.5 µs *
Acoustical impedance matching: rexolite
Electrical matching: none

Number of channels: 64 (2 rows of 32)
Active area 64x15 mm
Mechanical focusing: none
Elementary pitch in the primary axis: 2 mm
Elementary pitch in the secondary axis: 7.5mm
Inter element spacing: 0.2 mm in two dimensions

Homogeneity in sensitivity: ± 3 dB for the whole array*
Homogeneity of probe to probe in sensitivity: +/-3 dB for a batch which number of probes is agreed between ZETEC and IMASONIC before the order.
Inter element coupling: ≤ -30dB* between adjacent elements
Inter element coupling: ≤ -35dB* between elements separated by one element
Backing echoes: ≤ -40dB / interface echo

**criteria of conformity measured in the conditions below*

Mechanical characteristics

Housing:
Stainless steel
Geometry and dimensions: according to the drawing ref 5154A0110000

Cable:
Cable output: on side, near last element.
Cable gland

Flanges:
Geometry and dimensions: according to the drawing ref 5154A0110000

Interconnections

Cable: 50Ω multi-coaxial with overall shielding
Length: 5 m ± 0.1m
Connector: Hypertronics
Protective jacket: halogen free jacket
Pinout diagram: classical.

Phased Array Probe Specifications
Piezocomposite technology

Zetec reference:	1.5M32x2E64-15
IMASONIC reference:	CDC5154-5

Identification

On the top of the probe:	Logo Zetec Identification of the 1st, 32nd, 33rd and 64th elements
On side of the probe:	1.5M32X2E64-15 29HBE0028 serial number

*Recommended using conditions**

Chemical constraints:	contact with acoustical gel or water
Pressure:	equivalent to a water column of 1m maximum
Temperature:	-20° to 60°C (storage) 10 to 30°C (functioning)
Excitation:	Negative pulse 200Vpp maximum (measured in 50 Ωenvironments) Max repetition frequency: 10 kHz
Cleaning:	With water or isopropyl alcohol, with soft tissue, taking care of not wearing the front face with particles between the front face and the tissue
Manipulation:	Do not handle the probe by the cable
Nuclear radiation:	none
Normative constraints:	**none**

Particular constraints of shocks and vibrations are not taken into account by IMASONIC

** Other particular using conditions must be validated by IMASONIC*

Zetec reference: 1.5M32x2E64-15
IMASONIC reference: CDC5154-5

Control of electro acoustical performances

Electrical Measurements:
1_Impedance measurement for all the elements at the nominal frequency
2_Inter-element coupling measurement on 2 pairs of adjacent elements
3_Inter-element coupling measurement on 2 pairs of non adjacent elements

Measurements conditions:
Performed with HP3577A network analyser (50Ω environment)
Acoustic load on the active part: 1.5 MR
Supplied documents:
Value of impedances
Curves of inter –elements coupling

Acoustical measurements:
1_Temporal response & frequency spectrum measurement for all the elements

Measurements conditions:
Performed on contact on flat steel target with a rexolite delay line in E/R mode
rexolite path: 15mm
steel path: 20mm
coupling: to be defined during the control
Excitation signal: 1 negative pulse
Supplied documents:
Value of central frequency, bandwidth (-6dB), pulse length (-20dB) and sensitivity for all elements
Curves of homogeneity sensitivity
Curves for 8 elements

2_Backing Echo measurement

Measurements conditions:
Performed in water on a flat brass target in E/R mode
Excitation signal: 1 negative pulse
Supplied documents:
Value of backing echo

Supplied documentation (paper and mail)

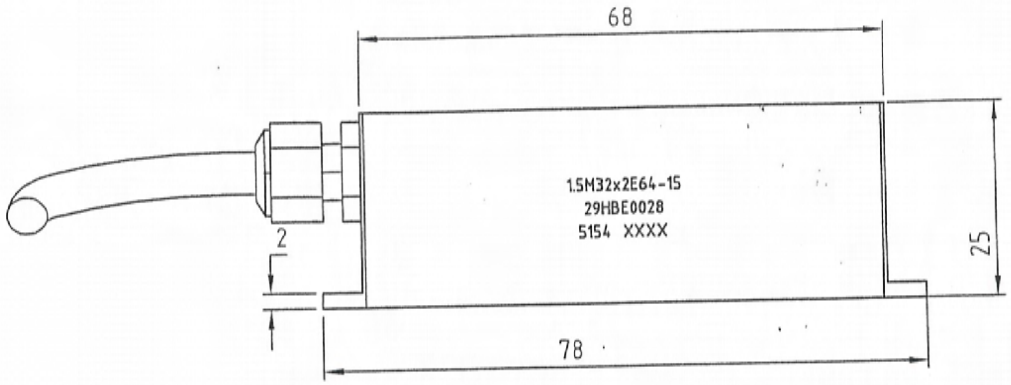
Specifications of the probe
Overall drawing of the probe
Measurement results

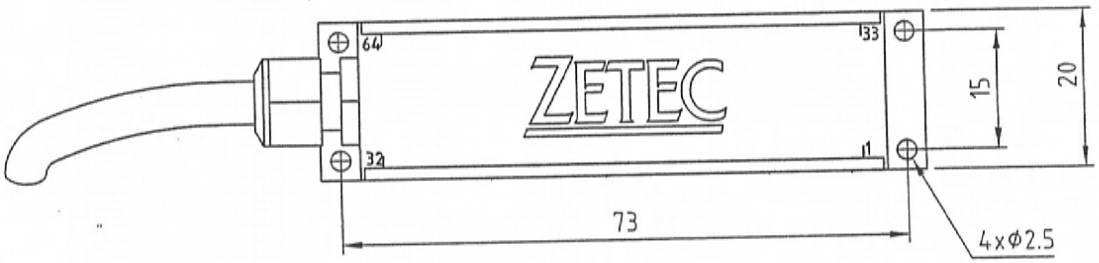
Casing

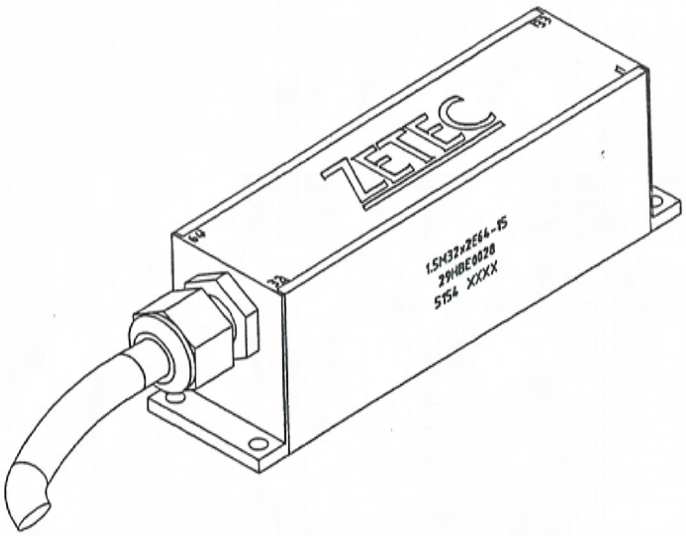
One casing for each probe

Guarantee conditions

One year guarantee against manufacturing defects in the using conditions above
Other conditions: see Imasonic general selling conditions







				Façonnage Général :	Nombre : 1
				Tol gén	Longueurs: js/JS13 — Angles: ±1°
				Matière :	
				Traitement thermique :	
Indice	Date	Modifications	par	Protection:	
			N°	5154 A 0110000	

▽ = brut ▽ = 6.5 à 12.5Ra ▽▽ = 1.6 à 3.2Ra ▽▽▽ = 0.05 à 0.8Ra

Etude: Linear array-1.5MHz-2x32elts

Ens.:

IMASONIC transducteurs et dispositifs électroacoustiques

Impedance measurement for the transducer n°: 5154 B101 Operator : SA

(Acoustic load: 1.5 MR. IMASONIC procedure: INP 410)

#	Zr (Ω)	Zi (Ω)	#	Zr (Ω)	Zi (Ω)
1	21.2	-145.1	33	21.8	-144.0
2	20.4	-142.9	34	21.9	-143.3
3	21.9	-143.4	35	22.1	-142.1
4	23.4	-142.6	36	21.8	-144.2
5	22.2	-140.0	37	21.7	-142.3
6	21.2	-142.5	38	21.7	-141.7
7	21.0	-143.7	39	22.3	-141.5
8	21.2	-142.1	40	22.4	-142.8
9	22.9	-141.6	41	20.9	-141.7
10	23.4	-142.4	42	20.7	-143.8
11	21.4	-141.5	43	21.7	-142.3
12	21.2	-144.5	44	22.9	-141.9
13	20.6	-144.0	45	21.7	-140.4
14	22.0	-142.1	46	21.5	-143.7
15	23.3	-141.1	47	20.5	-144.6
16	23.1	-141.5	48	21.1	-144.0
17	21.2	-143.5	49	23.3	-142.5
18	21.1	-143.7	50	23.5	-142.7
19	22.0	-142.8	51	22.3	-143.1
20	22.4	-141.6	52	21.0	-144.8
21	22.8	-141.7	53	21.1	-144.1
22	22.0	-142.3	54	22.2	-143.5
23	21.8	-142.7	55	23.3	-140.9
24	22.1	-143.5	56	22.8	-141.8
25	22.4	-142.2	57	21.6	-143.7
26	22.0	-142.1	58	21.3	-142.3
27	22.0	-143.0	59	21.7	-142.6
28	21.9	-142.0	60	23.2	-142.6
29	22.2	-142.9	61	23.3	-141.4
30	22.5	-141.7	62	21.8	-141.5
31	22.1	-142.3	63	21.5	-141.7
32	21.2	-144.5	64	22.3	-141.9

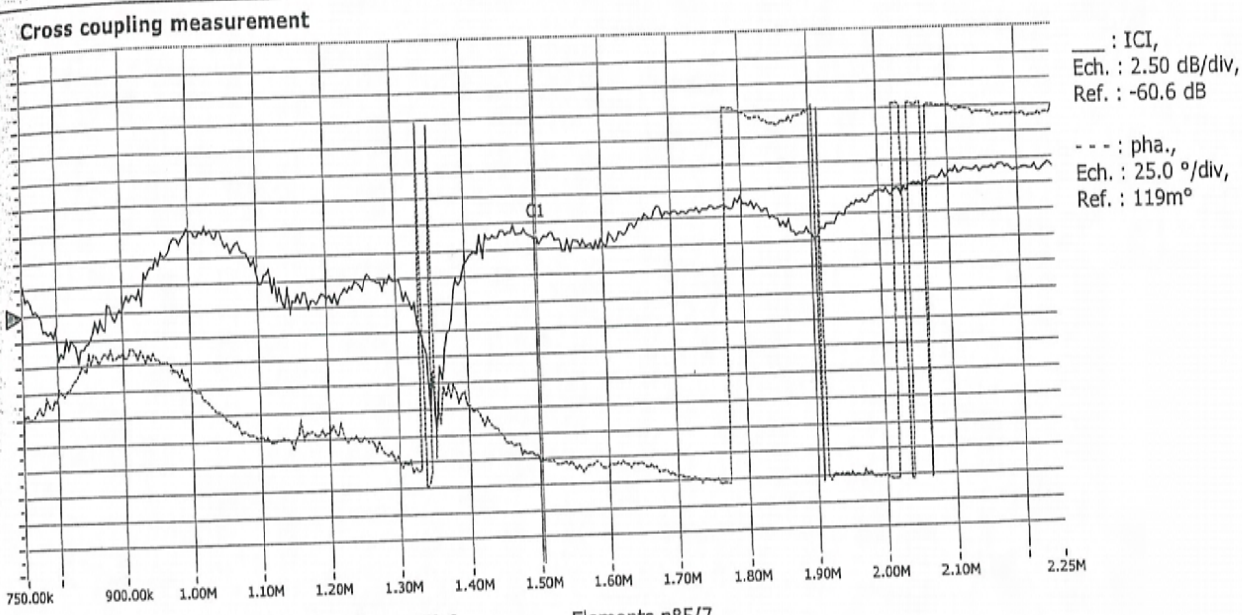
	Zr (Ω)	Zi (Ω)
Minimum :	20.4	-145.1
Maximum :	23.5	-140.0
Standard deviation :	0.8	1.1
Average values :	22.0	-142.6

Inter element coupling measurement :

#/#	Coupling (dB)
5/6	-47.5
28/29	-48.7
2/18	-57.0
5/7	-54.6
28/30	-46.8

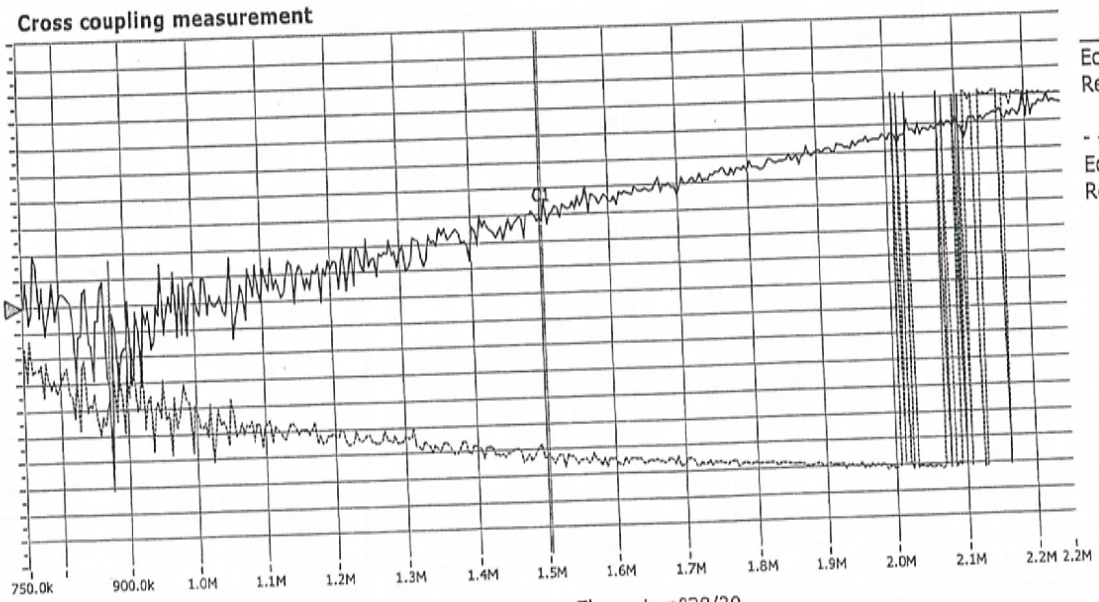
Date : November 15th 2006 14h35
Operator : SA
Transducer : Matrix phased array - 32x2 elements
Serial number : 5154 B101
Nominal frequency : 1.50MHz
Network Analyzer : HP 8751A, IM : 112-113
Acoustic load : 1.5MR on active area
Instruction : INP 412

Cross coupling measurement



C1 : F=1.50MHz ICI=-54.6 dB pha.=-152 ° Elements n°5/7

Cross coupling measurement



C1 : F=1.50MHz ICI=-46.8 dB pha.=-158 ° Elements n°28/30

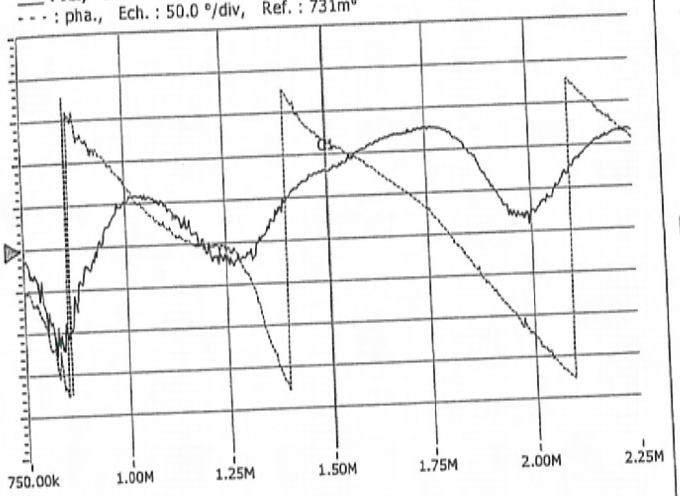
IMASONIC S.A.
MESURES ELECTRIQUES
Z V4.2

IMASONIC

Date : November 15th 2006 14h32
Operator : SA
Transducer : Matrix phased array - 32x2 elements
Serial number : 5154 B101
Nominal frequency : 1.50MHz
Network Analyzer : HP 8751A, IM : 112-113
Acoustic load : 1.5MR on active area
Instruction : INP 412

Cross coupling measurement

___ : ICI, Ech. : 5.00 dB/div, Ref. : -55.6 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 731m°

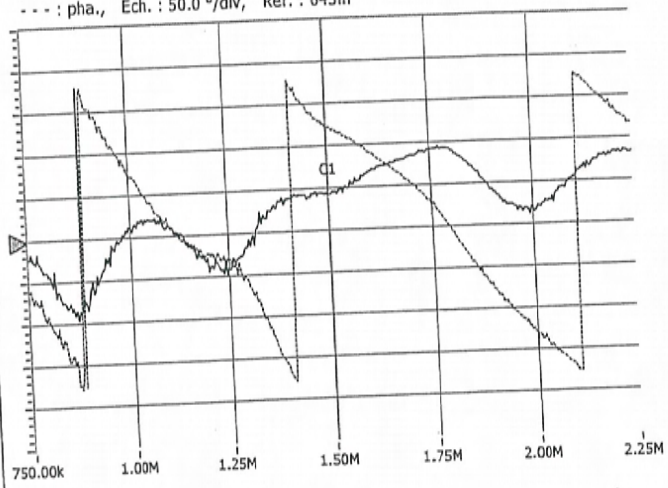


Elements n°5/6

C1 : F=1.50MHz ICI=-47.5 dB pha.=118 °

Cross coupling measurement

___ : ICI, Ech. : 5.00 dB/div, Ref. : -52.9 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 643m°

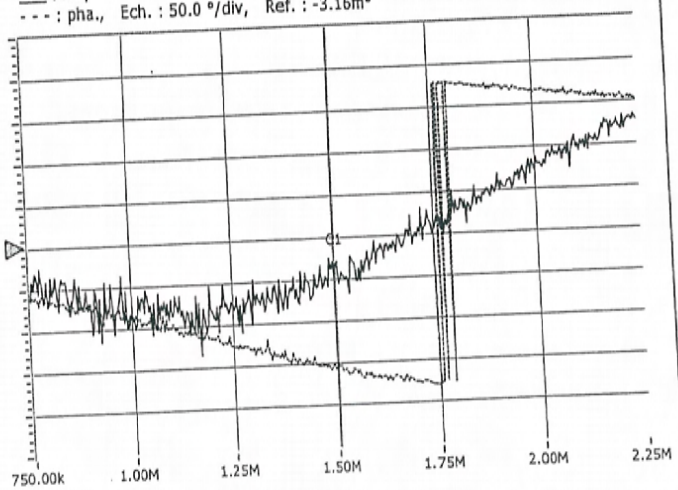


Elements n°28/29

C1 : F=1.50MHz ICI=-48.7 dB pha.=123 °

Cross coupling measurement

___ : ICI, Ech. : 2.00 dB/div, Ref. : -55.1 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : -3.16m°

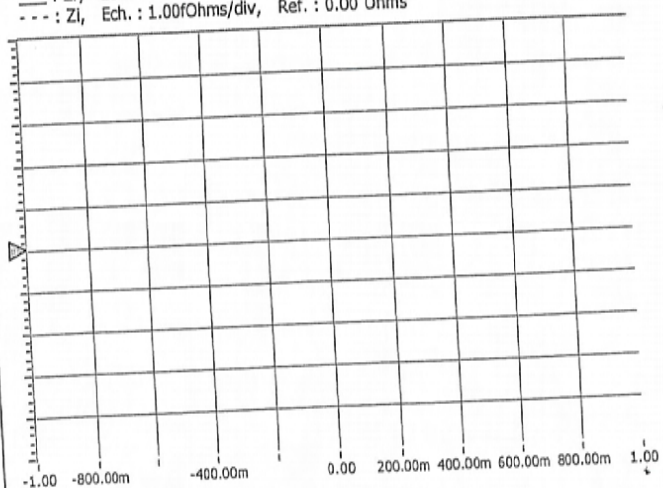


Elements n°2/18

C1 : F=1.50MHz ICI=-57.0 dB pha.=-158 °

Cross coupling measurement

___ : Zr, Ech. : 1.00fOhms/div, Ref. : 0.00 Ohms
- - - : Zi, Ech. : 1.00fOhms/div, Ref. : 0.00 Ohms



Electroacoustic measurement for the transducer n°: 5154 B101 **Operator : SA**

(Acoustic load: 2.45 MR. IMASONIC procedure: INP 413.) *Nominal Frequency : 1.50 MHz*

Generator : Multi 2000 V3.4.4, Gain = atten = 60 dB, L. Exc. : 353 ns, U. Exc. : 70 V

Target type : Inox h = 20 mm + Rexolite h = 15mm

#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)	#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
1	28	1.4	68	3346	33	28	1.5	63	3590
2	24	1.5	69	2593	34	26	1.5	68	2654
3	28	1.4	72	2623	35	28	1.4	73	2610
4	30	1.4	72	2712	36	27	1.4	72	2997
5	28	1.5	69	2696	37	27	1.5	72	2732
6	26	1.5	70	2662	38	27	1.5	69	2584
7	25	1.5	70	2749	39	28	1.5	69	2712
8	25	1.5	69	2821	40	28	1.4	68	2680
9	28	1.5	70	2782	41	25	1.5	70	2670
10	30	1.5	67	2675	42	25	1.5	71	2682
11	26	1.4	68	2655	43	27	1.4	68	2643
12	25	1.4	71	2710	44	30	1.4	70	2733
13	23	1.5	72	2830	45	27	1.4	69	2732
14	27	1.5	67	2697	46	27	1.4	70	2680
15	30	1.5	66	2730	47	24	1.4	69	2601
16	29	1.5	66	2688	48	25	1.4	70	2612
17	26	1.5	70	2753	49	28	1.5	67	2787
18	25	1.5	69	2706	50	30	1.4	67	2681
19	26	1.5	69	2730	51	29	1.4	70	2717
20	28	1.5	66	2668	52	25	1.5	70	2699
21	28	1.4	67	2751	53	24	1.4	71	2705
22	27	1.4	69	2774	54	28	1.4	72	2709
23	27	1.5	69	3559	55	30	1.4	68	2665
24	27	1.4	69	3559	56	29	1.4	68	2689
25	27	1.4	69	2791	57	26	1.5	68	2680
26	28	1.5	66	2711	58	26	1.5	68	2701
27	27	1.5	64	3315	59	27	1.4	68	2726
28	27	1.4	67	2897	60	30	1.4	65	2696
29	28	1.4	67	2688	61	31	1.4	67	2722
30	28	1.4	66	2716	62	28	1.4	69	2691
31	27	1.5	63	3547	63	28	1.5	64	3770
32	26	1.4	65	3467	64	28	1.4	68	3456

	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
Minimum :	23	1.4	63	2584
Maximum :	31	1.5	73	3770
Standard deviation :	2	0.0	2	293
Average values :	27	1.4	68	2822

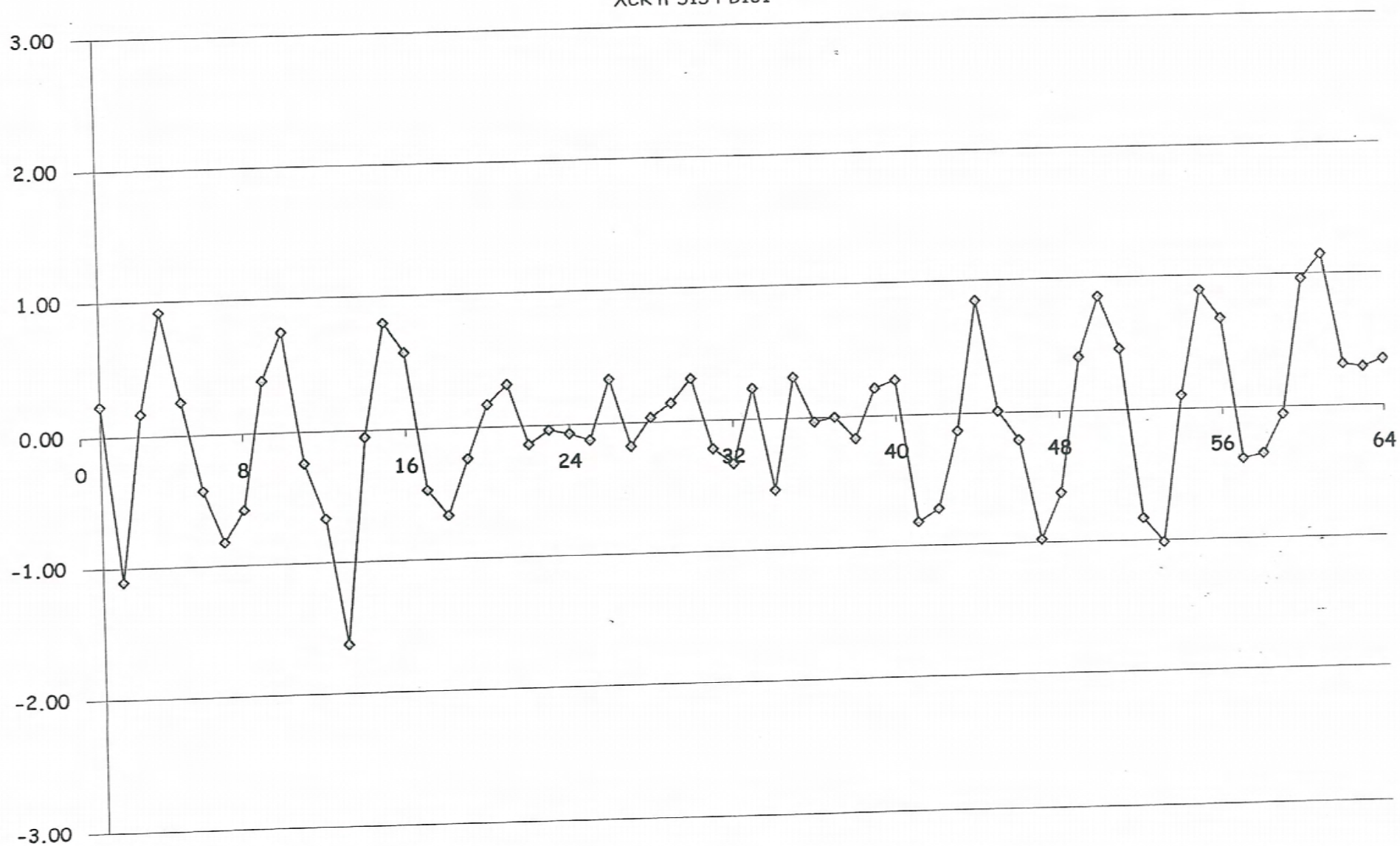
Homogeneity in sensitivity (dB) : **-2.77**

See measurement results in appendix 3 for the elements n° 1, 8, 16, 32, 40, 48, 56 & 64

SA, 16/11/2006

Sensitivity variation (dB)

XCR n°5154 B101



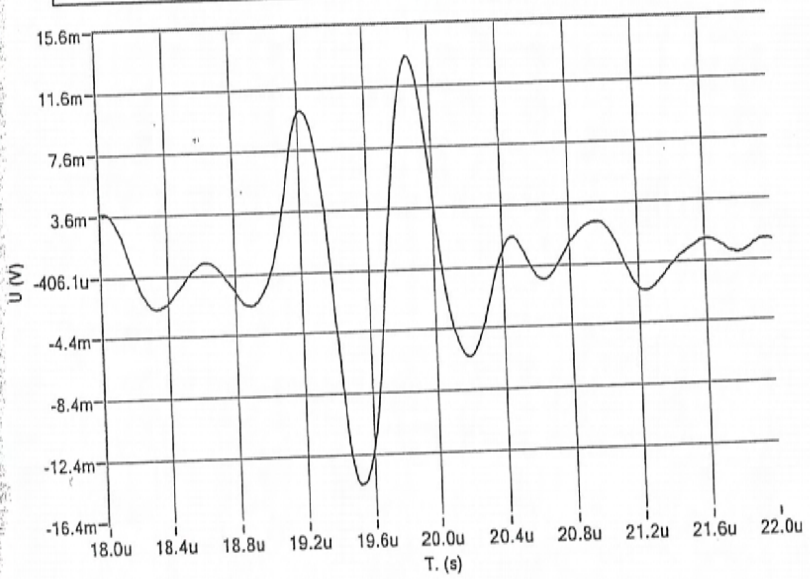
ENQ 102 - Final measurements 64 elts

IMASONIC SA
TRANSDUCER DATA SHEET

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.42mm
Element : 1

WAVEFORM

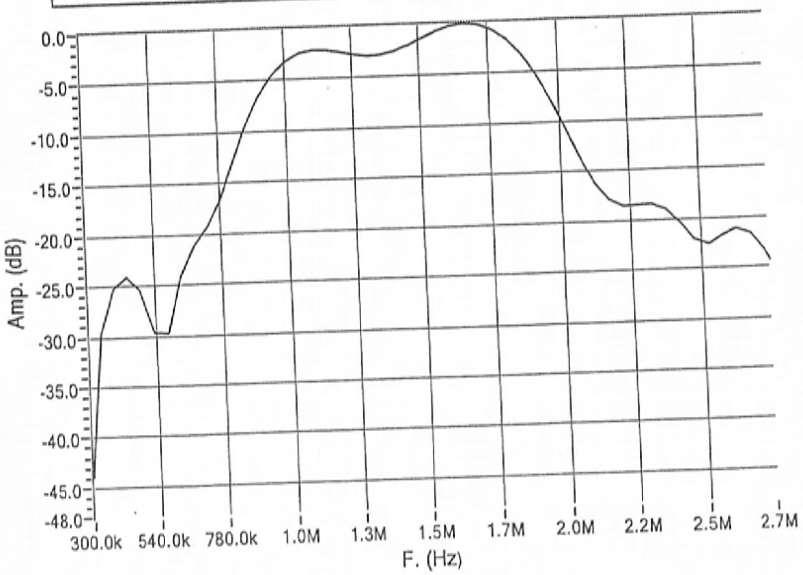
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 824.47ns -20dB : 3.35µs

VOLTAGES :
Vpp = 27.93mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.43MHz
Ratio Bp/Fc : 68%
Bandwidth : 979.39KHz
Lower Frequency : 942.00KHz
Upper Frequency : 1.92MHz

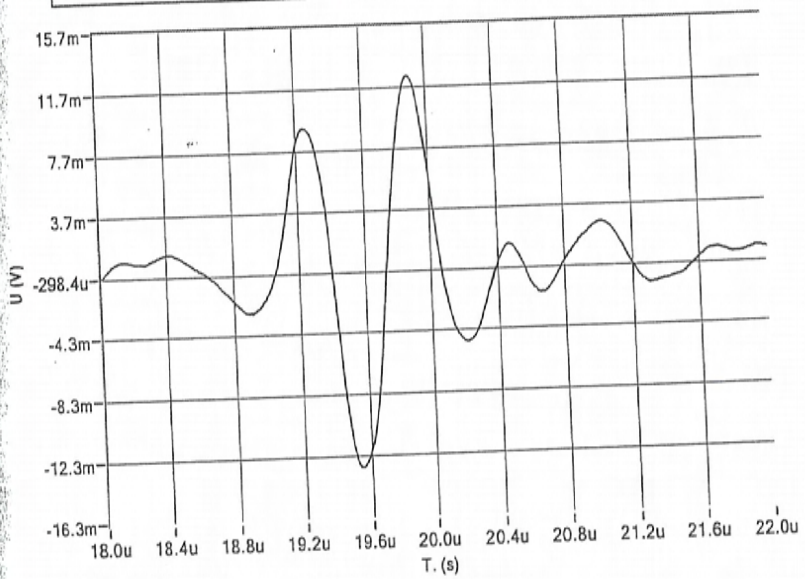
IMASONIC

IMASONIC SA
TRANSDUCER DATA SHEET

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.15mm
Element : 8

WAVEFORM

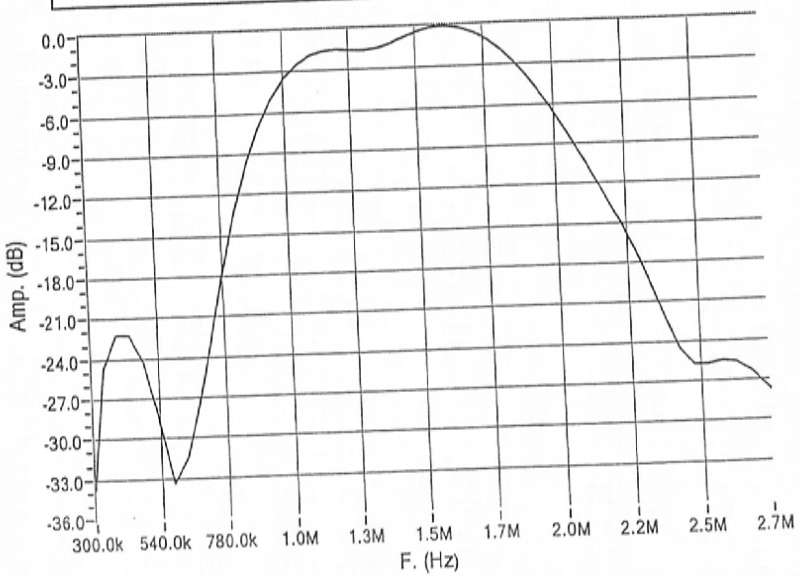
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 798.22ns -20dB : 2.82µs

VOLTAGES :
Vpp = 25.47mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.46MHz
Ratio Bp/Fc : 69%
Bandwidth : 1.01MHz
Lower Frequency : 954.91KHz
Upper Frequency : 1.96MHz

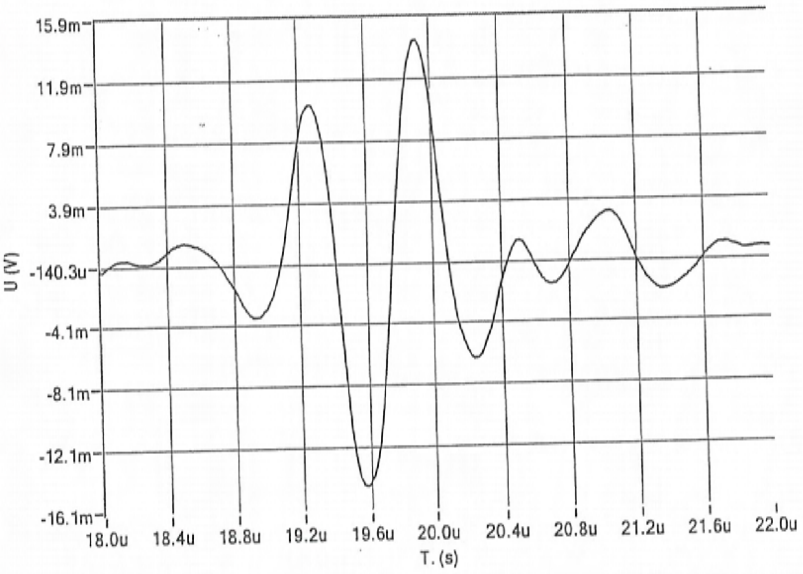
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.24mm
Element : 16

WAVEFORM

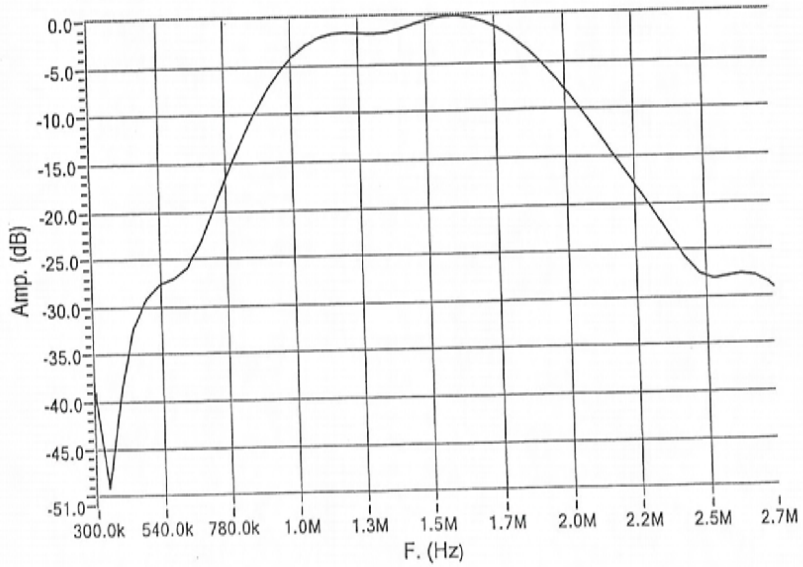
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 829.48ns -20dB : 2.69µs

VOLTAGES :
Vpp = 29.05mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.45MHz
Ratio Bp/Fc : 66%
Bandwidth : 956.29KHz
Lower Frequency : 971.42KHz
Upper Frequency : 1.93MHz

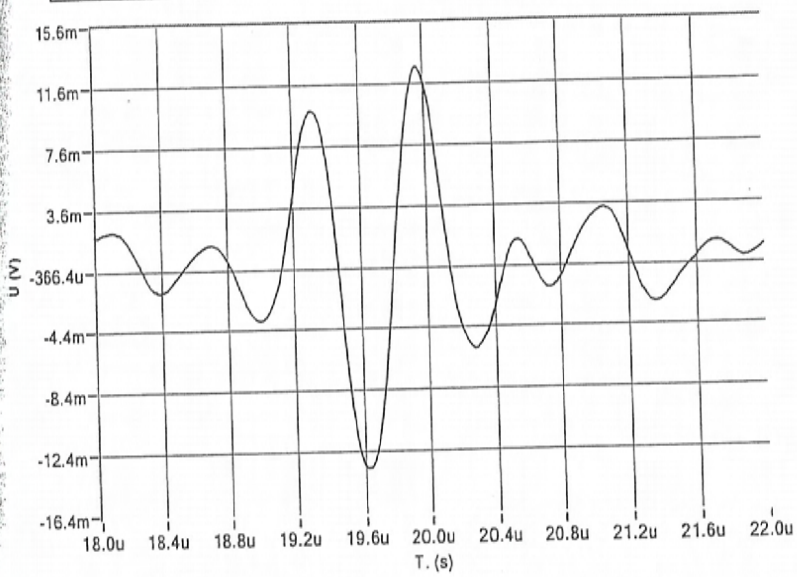
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.39mm
Element : 32

WAVEFORM

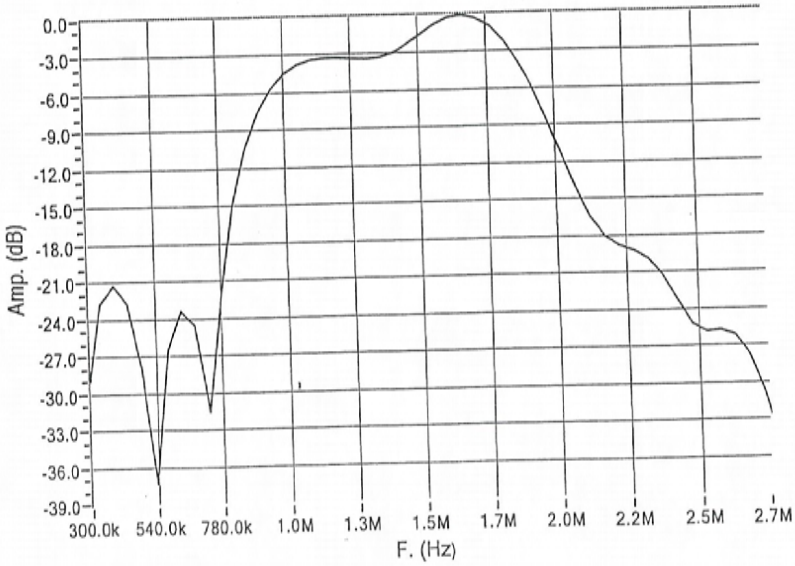
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 803.47ns -20dB : 3.47µs

VOLTAGES :
Vpp = 26.20mV

TRANSMIT-RECEIVE SPECTRUM



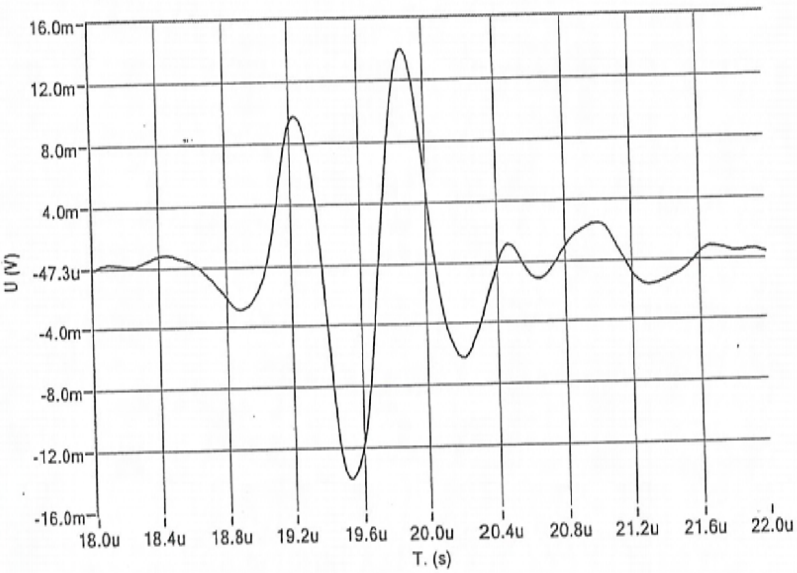
CARACTERISTICS AT -6dB :
Central Frequency : 1.44MHz
Ratio Bp/Fc : 65%
Bandwidth : 935.55KHz
Lower Frequency : 969.65KHz
Upper Frequency : 1.91MHz

TRANSDUCER DATA SHEET

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.29mm
Element : 40

WAVEFORM

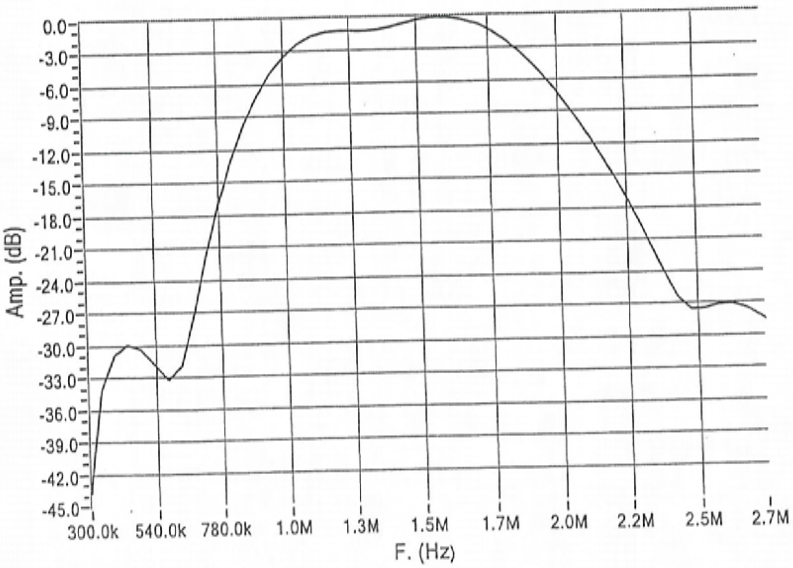
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 823.16ns -20dB : 2.68µs

VOLTAGES :
Vpp = 28.04mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.45MHz
Ratio Bp/Fc : 68%
Bandwidth : 991.08KHz
Lower Frequency : 953.78KHz
Upper Frequency : 1.94MHz

IMASONIC

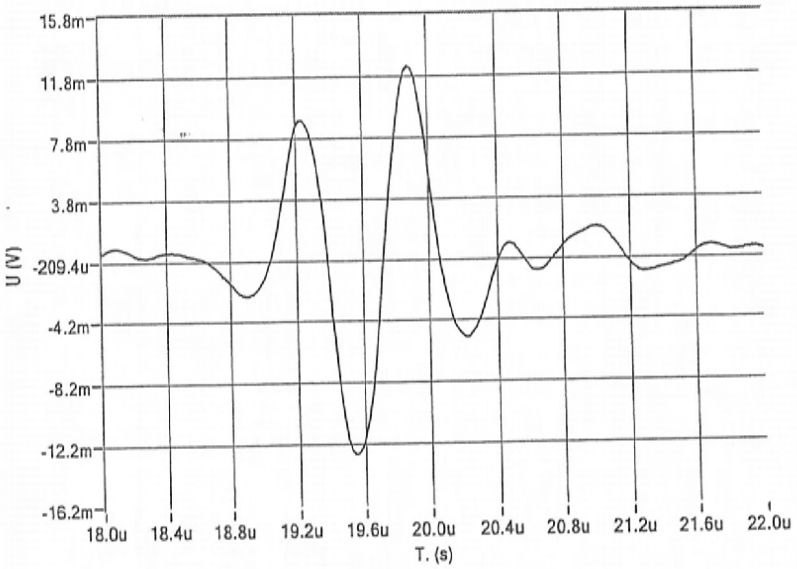
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.32mm
Element : 48

WAVEFORM

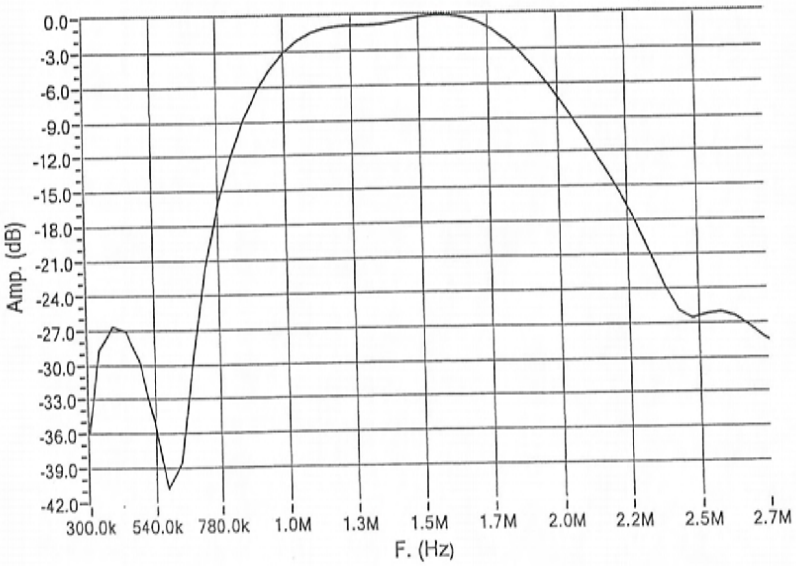
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 818.70ns -20dB : 2.61µs

VOLTAGES :
Vpp = 25.34mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.44MHz
Ratio Bp/Fc : 70%
Bandwidth : 1.01MHz
Lower Frequency : 937.11KHz
Upper Frequency : 1.95MHz

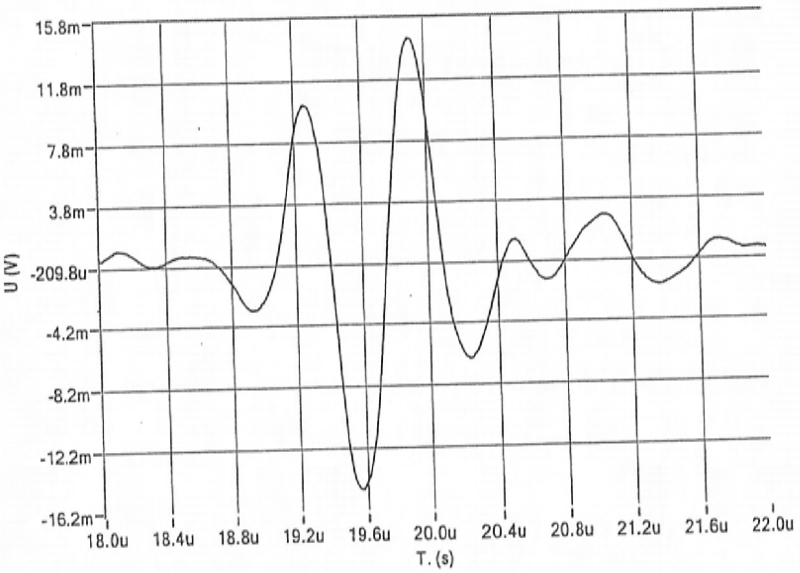
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.37mm
Element : 56

WAVEFORM

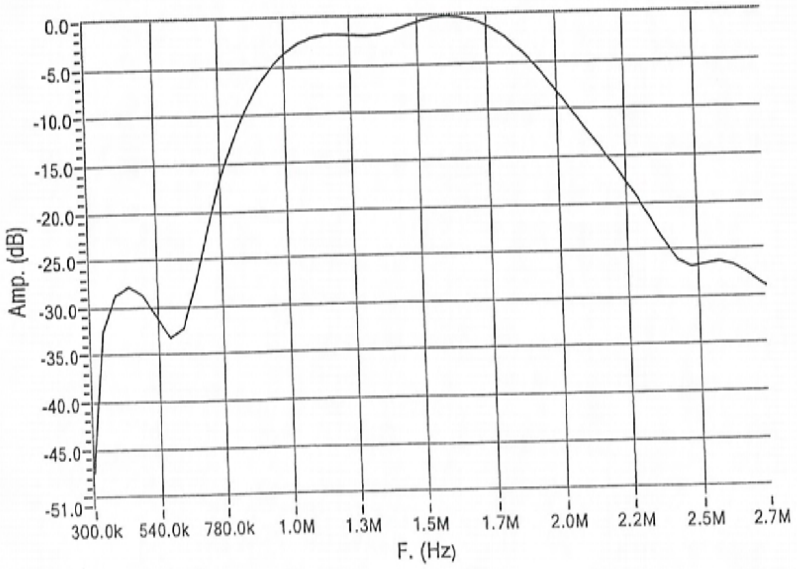
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 818.74ns -20dB : 2.69µs

VOLTAGES :
Vpp = 29.38mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.44MHz
Ratio Bp/Fc : 68%
Bandwidth : 973.03KHz
Lower Frequency : 951.10KHz
Upper Frequency : 1.92MHz

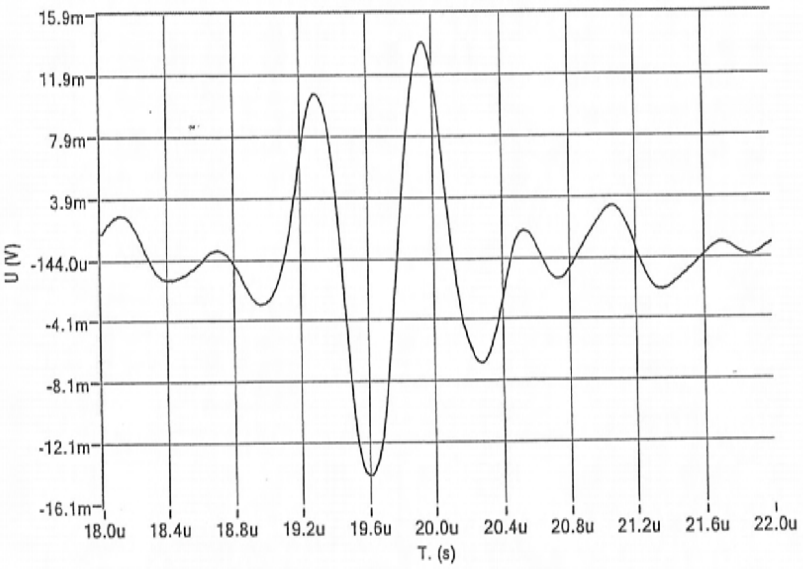
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 09h49
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B101
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.41mm
Element : 64

WAVEFORM

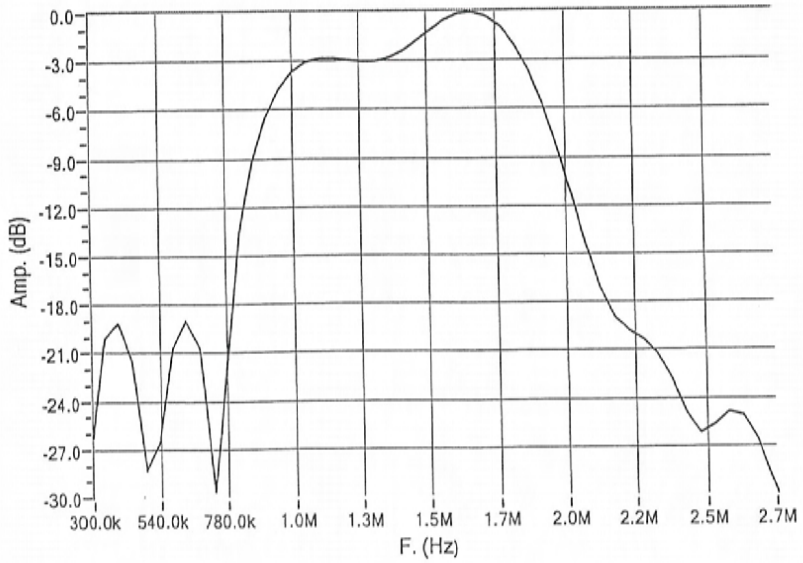
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 1.07µs -20dB : 3.46µs

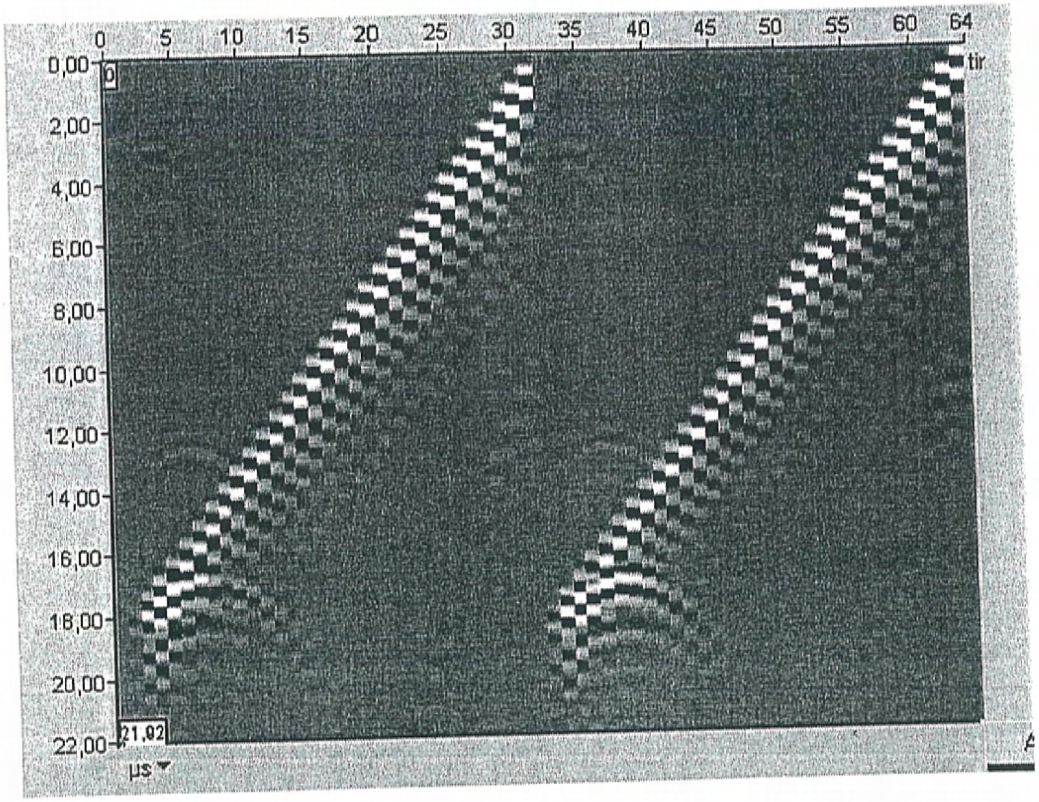
VOLTAGES :
Vpp = 28.31mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.42MHz
Ratio Bp/Fc : 68%
Bandwidth : 968.10KHz
Lower Frequency : 940.94KHz
Upper Frequency : 1.91MHz

Cabling order
Matrix phased array – 2x32 elements
5154 B101



IMASONIC

MEASUREMENT REPORT

1,5 MHz 2 x 32 elts matrix phased array probe

Serial Number : 5155A103

ZETEC QUEBEC

Document ref. R5155A3

IMASONIC

CERTIFICATE of CONFORMANCE

REFERENCE DOCUMENT CdC5155-2
PROJECT # 5155
SERIAL # A103

Checking of Electrical Performance

		Criteria of conformity	Value	Conformity
Inter element coupling between neighbouring elements	dB	-30	-45.3	OK
Inter element coupling between elements separated by one element	dB	-35	-45.3	OK

Checking of Acoustical Performance

		Criteria of conformity	Value	Conformity
Central Frequency (-6dB)	MHz	[1.35;1.65]	1.41	OK
Bandwidth (-6dB)	%	>50 %	57	OK
Pulse Length (-20dB)	ns	/	2601	OK
Sensibility	(mV)	/	7	OK
Homogeneity	dB	8	3	OK
backing Echoes	dB	-40	-56.3	OK

Checking of Elements Wiring

conformity	OK

Overall Conformity

conformity	OK

Date : 26/07/05

Signature

Laurent Fournier

Phased Array Probe Specifications
Piezocomposite technology

IMASONIC

Zetec reference: 1 5M16x2E32-7
IMASONIC reference: CDC5155-2

Technical characteristics and acceptance level

Acoustical characteristics

Centre frequency (-6dB): 1.5 MHz ± 10 %*
Bandwidth (-6dB): > 50% *
Pulse length (-20dB): < 3.5 µs (indicative value)
We issue reserves as for the shape and the length of the signal.
Acoustical impedance matching: rexolite
Electrical matching: none

Homogeneity in sensitivity: ± 4 dB for the whole array*
Probe to probe homogeneity in sensitivity: ± 3 dB* for the same batch
Inter element coupling: ≤ -30dB* between adjacent elements
Inter element coupling: ≤ -35dB* between elements separated by one element
Backing echoes: ≤ -40 dB / interface echoes *

Number of channels: 16 x 2
Type: Matrix
Active area 32 x 7 mm
Mechanical focusing: none
Elementary pitch in primary axis: 2 mm
Elementary pitch in secondary axis: 3.5mm
Inter element spacing: 0.2 mm in two directions

**criteria of conformity measured in the conditions below*

Mechanical characteristics

Housing:
Stainless steel
Geometry and dimensions: according to the document Zetec in the paragraph Annexe

Cable:
Cable output: on side (16th, 32nd elts)
Cable gland

Flanges:
Position: on side (1st, 16th, 17th and 32nd elements)
Description: According to the Zetec in the paragraph Annexe

An overall drawing will be sent before manufacturing for the customer approval

Interconnections

Cable: 50Ω multi-coaxial with overall shielding
Length: 5 m ± 0.1m
Connector: Hypertronics
Protective jacket: halogen free jacket
Pinout diagram: classical.

Phased Array Probe Specifications
Piezocomposite technology

IMASONIC

Zetec reference: 1 5M16x2E32-7
IMASONIC reference: CDC5155-2

Identification

On the top of the probe:	Logo Zetec Identification of the 1st, 16th, 17th and 32nd elements
On side of the probe:	1.5M16X2E32-7 29HBE0029 serial number

*Recommended using conditions**

Chemical constraints:	contact with acoustical gel or water
Pressure:	under 1m of water
Temperature:	-20° to 60°C (storage) 10 to 30°C (functioning)
Excitation:	Negative pulse 200Vpp maximum (measured in 50 Ωenvironments) Max repetition frequency: 10 kHz
Cleaning:	With water or isopropyl alcohol, with soft tissue, taking care of not wearing the front face with particles between the front face and the tissue
Manipulation:	Do not handle the probe by the cable
Nuclear radiation:	none
Normative constraints:	**none**

Particular constraints of chocks and vibrations are not taken into account by IMASONIC

** Other particular using conditions must be validated by IMASONIC*

Control of electro acoustical performances

Electrical Measurements:
1_Impedance measurement for all the elements at the nominal frequency
2_Inter-element coupling measurement on 2 pairs of adjacent elements
3_Inter-element coupling measurement on 2 pairs of non adjacent elements

Measurements conditions:
Performed with HP3577A network analyser (50Ω environment)
Acoustic load on the active part: 1.5 MR
Supplied documents:
Value of impedances
Curves of inter –elements coupling

Acoustical measurements:
1_Temporal response & frequency spectrum measurement for all the elements

Measurements conditions:
Performed on contact on flat steel target with a rexolite delay line in E/R mode
rexolite path: to be determined
steel path: to be determined
couplant: to be defined during the control
Excitation signal: 1 negative pulse
Supplied documents:
Value of central frequency, bandwidth (-6dB), pulse length and sensitivity for all elements
Curves of homogeneity sensitivity
Curves for 8 elements

2_Backing Echo

Measurements conditions:
Performed in water on flat brass target
Excitation signal: 1 negative pulse
Supplied document:
Value of backing Echo

Supplied documentation (paper and mail)

Specifications of the probe
Overall drawing of the probe
Measurement results

Casing

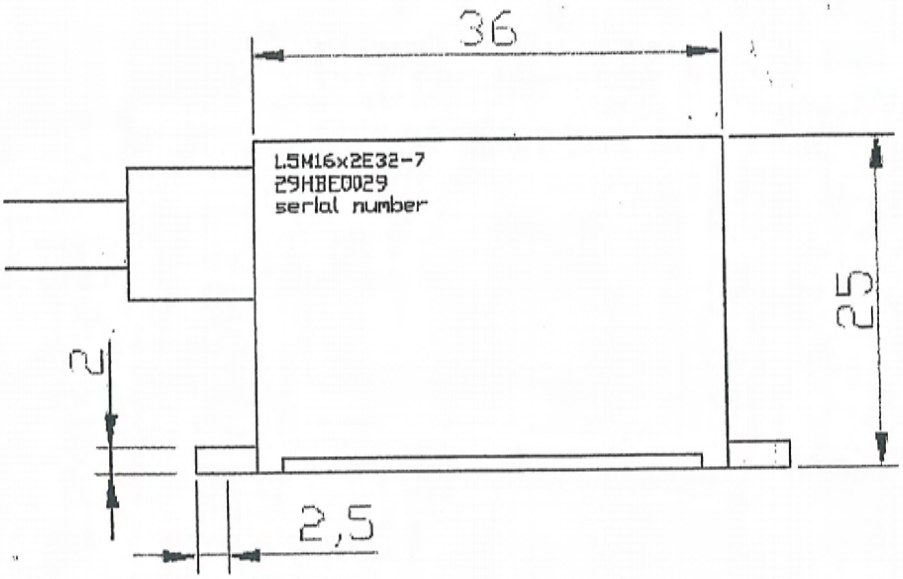
One casing for each probe

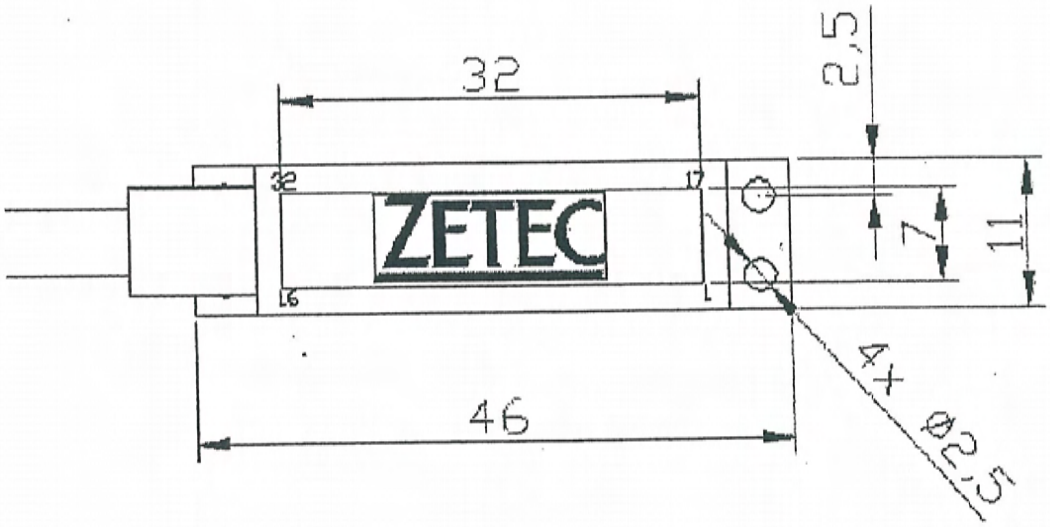
Guarantee conditions

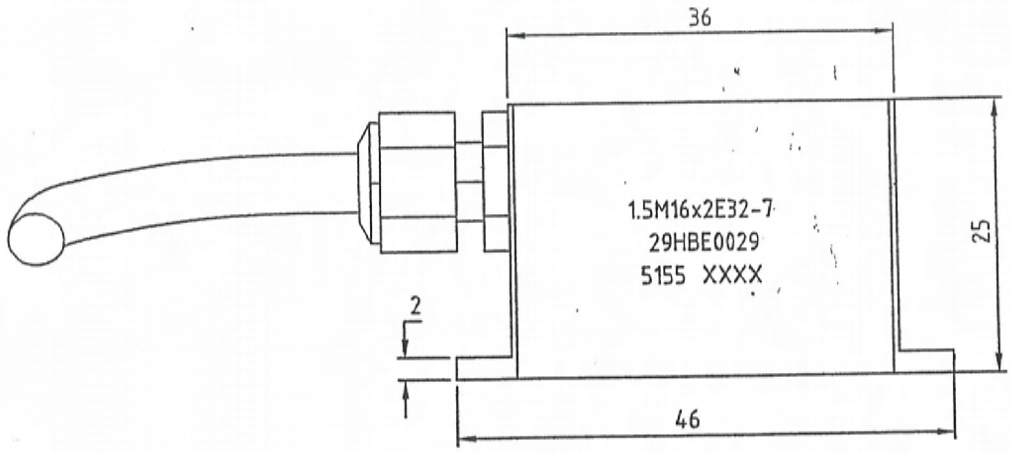
One year guarantee against manufacturing defects in the using conditions above
Other conditions: see Imasonic general selling conditions

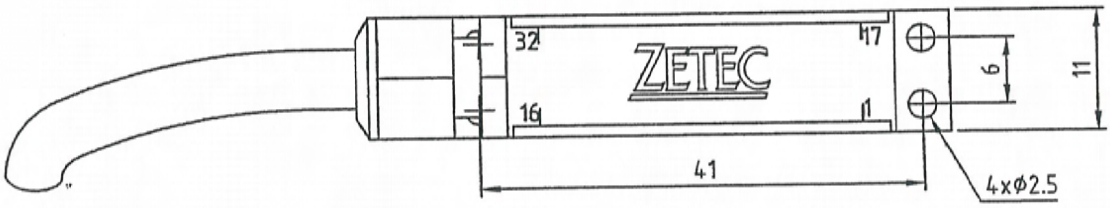
Zetec reference: 1 5M16x2E32-7
IMASONIC reference: CDC5155-2

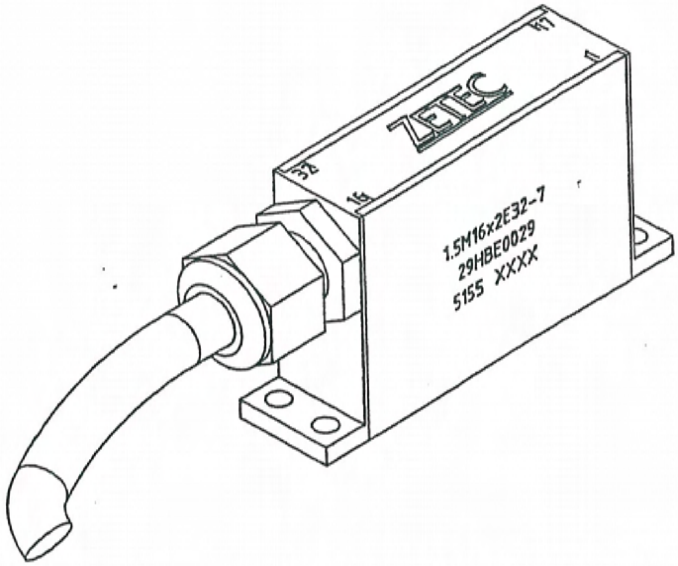
Annexes











				Façonnage Général :	Nombre : 1	
				Tol gén	Longueurs: js/JS13	Angles: ±1°
				Matière :		
				Traitement thermique :		
Indice	Date	Modifications	par	Protection:		
∼ = brut	▽ = 6.5 à 12.5Ra	▽▽ = 1.6 à 3.2Ra	▽▽▽ = 0.05 à 0.8Ra	N°	5155A0110000	

Etude: Linear array-1.5MHz-2x16elts

S/Ens.:

Pièce: General drawing

IMASONIC transducteurs et dispositifs électroacoustiques

26/07/2005

Impedance measurement for the XCR n°: 5155A103 Operator : GD

(Acoustic load: 1.5 MR. IMASONIC procedure: INP 410)

#	Zr (Ω)	Zi (Ω)	#	Zr (Ω)	Zi (Ω)
1	26.0	-164.6	17	24.3	-163.8
2	25.1	-162.1	18	23.5	-165.4
3	23.3	-162.8	19	24.4	-162.3
4	24.5	-164.2	20	25.2	-164.7
5	25.3	-165.3	21	24.0	-164.7
6	24.5	-166.3	22	24.1	-165.3
7	24.8	-165.0	23	24.3	-165.2
8	24.7	-166.1	24	24.1	-166.1
9	22.8	-162.7	25	24.1	-161.9
10	23.5	-164.6	26	24.3	-164.5
11	24.9	-164.8	27	23.3	-164.6
12	24.0	-165.0	28	23.3	-164.8
13	24.0	-165.9	29	24.7	-165.6
14	24.3	-166.1	30	24.3	-165.8
15	23.3	-165.9	31	23.9	-164.7
16	23.7	-164.3	32	24.4	-165.6

	Zr (Ω)	Zi (Ω)
Minimum :	22.8	-166.3
Maximum :	26.0	-161.9
Standard deviation :	0.7	1.2
Average values :	24.2	-164.7

See measurement results in appendix 1 for the elements n°...

Inter element coupling measurement :

(Acoustic load: 1.5MR. IMASONIC procedure: INP 412.)

#/#	Coupling (dB)
5/6	45.3
28/29	-46.4
2/18	-57.4
5/7	-45.3
28/30	-58.4

See measurement results in appendix 2.

Element cabling :

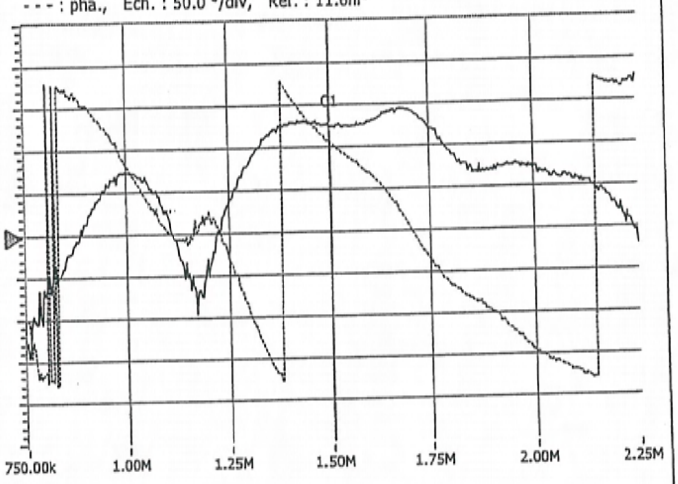
checking cabling for each element Yes

(See values in appendix 4)

Date : July 26th 2005 10h24
Operator : CG
Transducer : Phased array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Network Analyzer : HP 8751A, IM : 105&106
Acoustic load : 1.5MR on active area
Cable length :
Instruction : INP 412

Cross coupling measurement

___ : ICI, Ech. : 5.00 dB/div, Ref. : -58.1 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 11.6m°

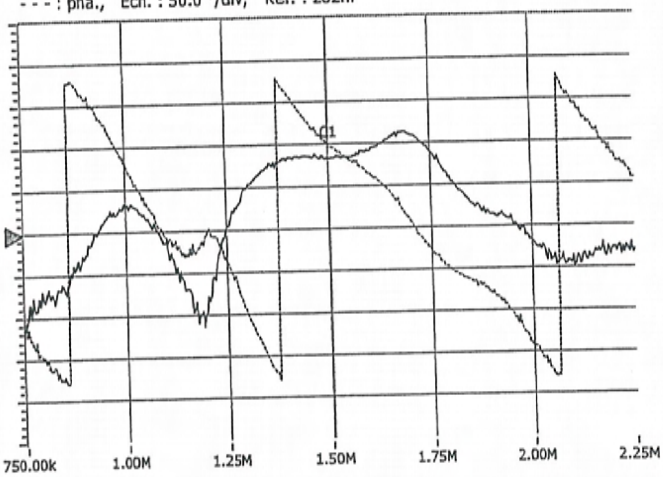


Elements 5/6

C1 : F=1.50MHz ICI=-45.3 dB pha.=108 °

Cross coupling measurement

___ : ICI, Ech. : 5.00 dB/div, Ref. : -54.9 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 282m°

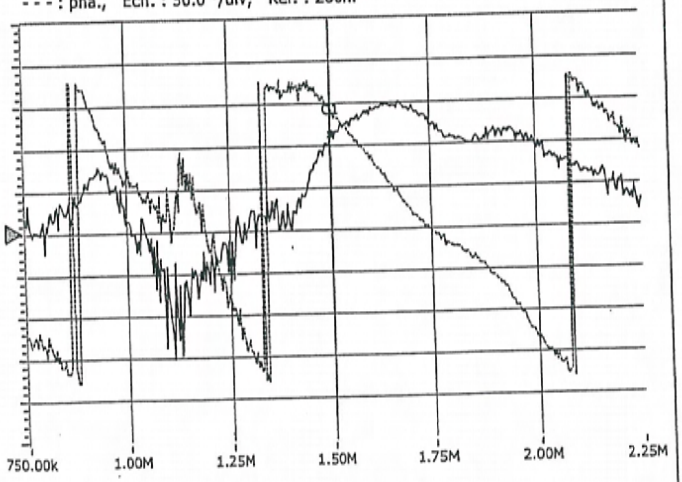


Elements 28/29

C1 : F=1.50MHz ICI=-46.4 dB pha.=102 °

Cross coupling measurement

___ : ICI, Ech. : 5.00 dB/div, Ref. : -67.6 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 268m°



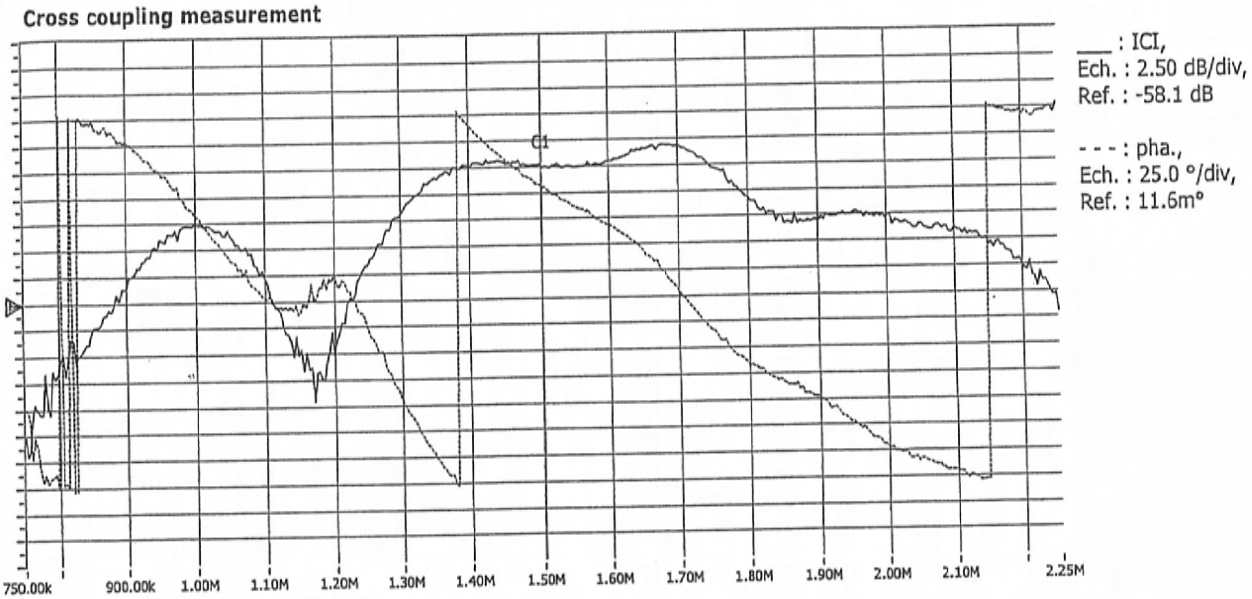
Elemensts 2/18

C1 : F=1.50MHz ICI=-57.4 dB pha.=148 °

IMASONIC S.A.
MESURES ELECTRIQUES
Z V4.1

Date : July 26th 2005 10h24
Operator : CG
Transducer : Phased array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Network Analyzer : HP 8751A, IM : 105&106
Acoustic load : 1.5MR on active area
Cable length :
Instruction : INP 412

Cross coupling measurement

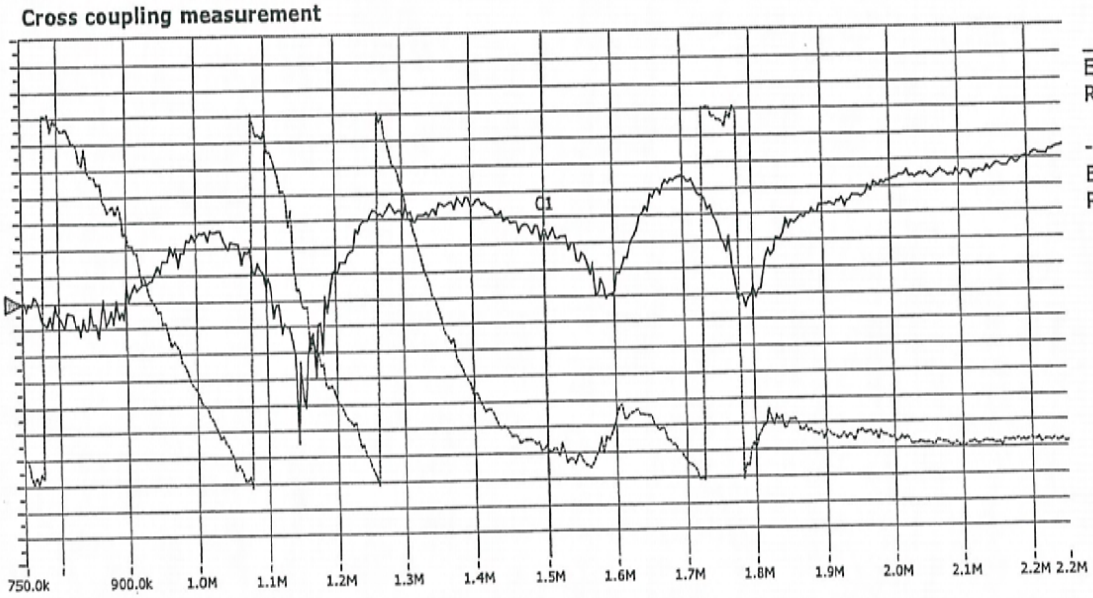


___ : ICI,
Ech. : 2.50 dB/div,
Ref. : -58.1 dB

- - - : pha.,
Ech. : 25.0 °/div,
Ref. : 11.6m°

C1 : F=1.50MHz ICI=-45.3 dB pha.=108 ° Elements 5/7

Cross coupling measurement



___ : ICI,
Ech. : 2.50 dB/div,
Ref. : -64.7 dB

- - - : pha.,
Ech. : 25.0 °/div,
Ref. : 336m°

C1 : F=1.50MHz ICI=-58.4 dB pha.=-142 ° Elements 28/30

26/07/2005

Electroacoustic measurement for the XCR n°: **5155A103** **Operator : GD**

(Acoustic load: 2.45 MR. IMASONIC procedure: I, Nominal Frequency : 1.50 MHz
Generator : Multi 2000 V3.4.4, Gain Exc. : 0 dB, L. Exc. : 71 bin, U. Exc. : 60 V
Target type : , Target Positioning : NaN m

#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)	#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
1	7	1.4	68	2769	17	6	1.4	47	2773
2	7	1.4	53	2676	18	6	1.5	52	2647
3	7	1.5	55	2767	19	6	1.5	45	2659
4	6	1.4	69	2767	20	7	1.4	59	1928
5	7	1.4	53	2768	21	6	1.4	70	2332
6	7	1.4	67	2763	22	7	1.4	66	2772
7	8	1.4	57	2769	23	6	1.4	58	2140
8	6	1.5	48	2765	24	6	1.4	57	2770
9	7	1.4	64	2768	25	6	1.4	53	2313
10	6	1.4	70	2768	26	7	1.4	50	2548
11	7	1.3	71	2369	27	7	1.4	48	2630
12	7	1.5	56	2766	28	6	1.4	56	2328
13	7	1.3	70	2529	29	7	1.4	53	2403
14	8	1.4	49	2769	30	6	1.5	44	2376
15	6	1.5	50	2769	31	6	1.4	63	2517
16	7	1.4	58	2533	32	6	1.3	59	2765

	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
Minimum :	6	1.34	44	1928
Maximum :	8	1.50	71	2773
Standard deviation :	1	0.05	8	221
Average values :	7	1.41	57	2601

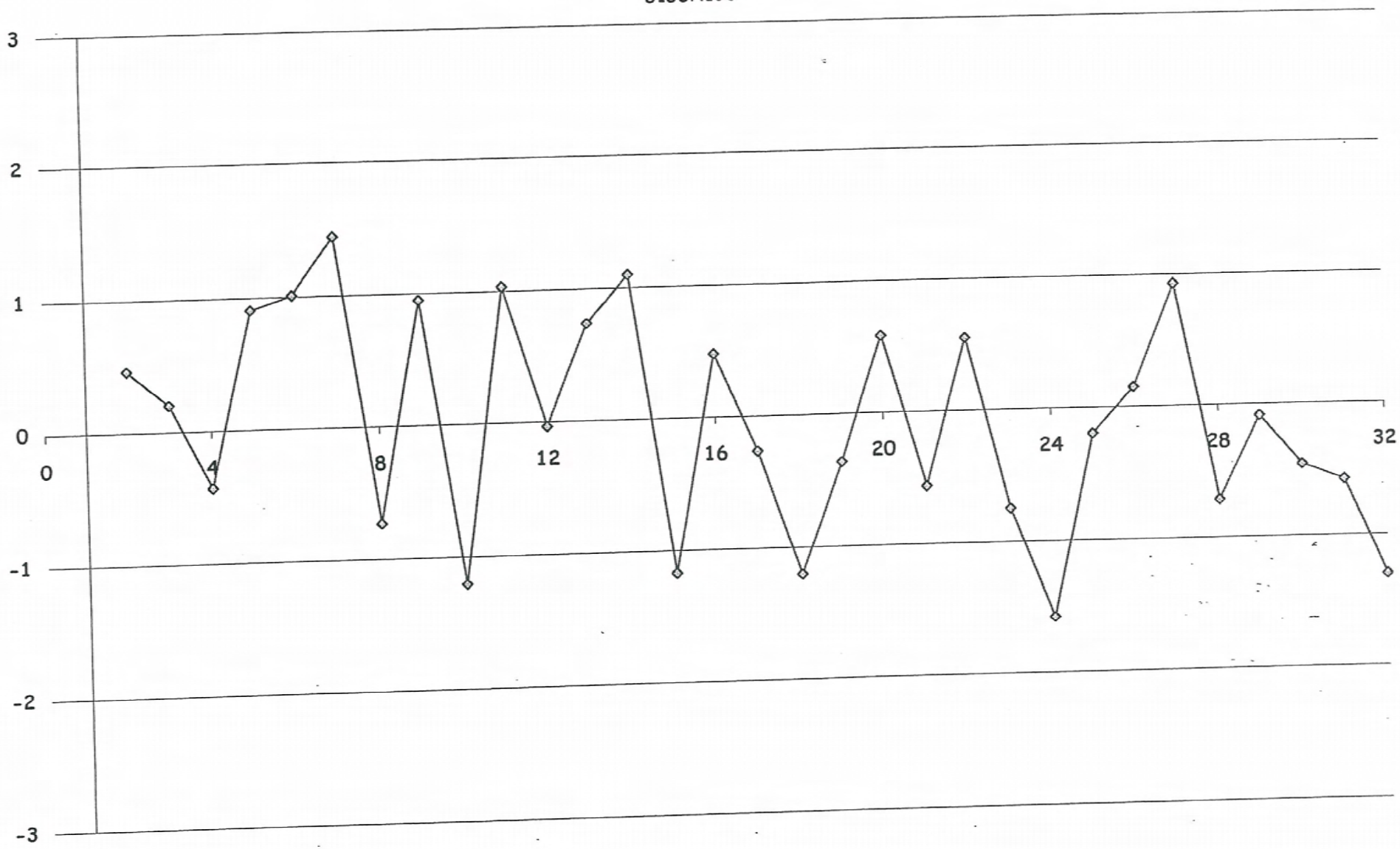
Homogeneity in sensitivity (dB) : **-3.0**

See measurement results in appendix 3 for the elements n° 2;6;10;14;18;22:26:30

GD, 26/07/2005

Sensitivity variation (dB)

5155A103



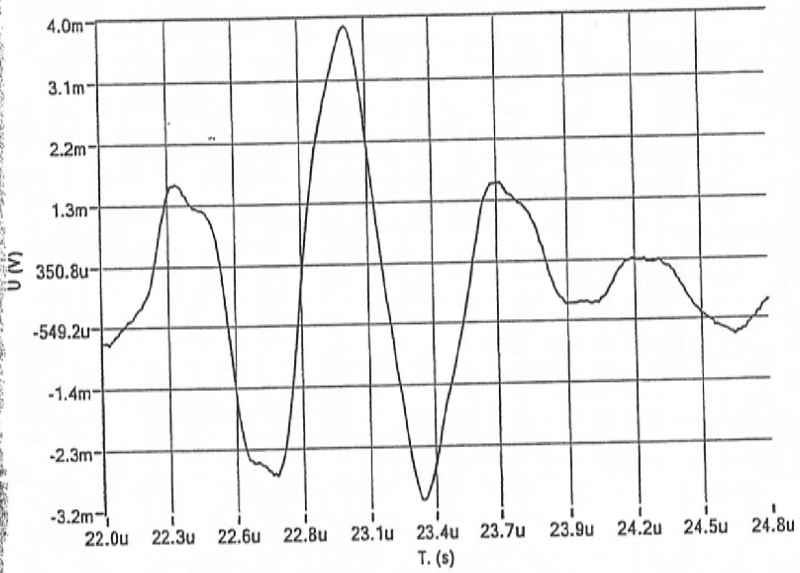
ENQ 102 - Final measurements 32 elts

TRANSDUCER DATA SHEET

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 27.97mm
Element : 2

WAVEFORM

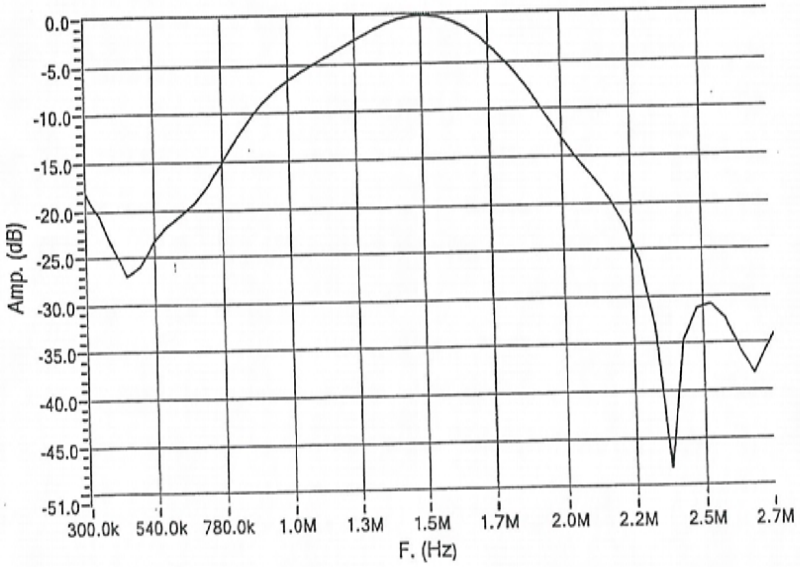
T : 276.0ns/div U : 900.0µV/div



PULSE LENGTH :
-6dB : 825.12ns -20dB : 2.68µs

VOLTAGES :
Vpp = 6.98mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.44MHz
Ratio Bp/Fc : 53%
Bandwidth : 764.87KHz
Lower Frequency : 1.06MHz
Upper Frequency : 1.82MHz

IMASONIC

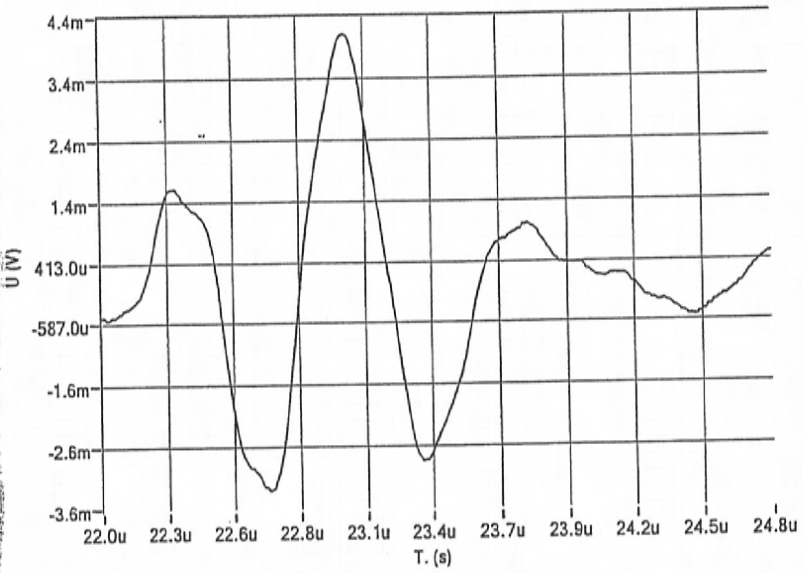
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.2

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 27.97mm
Element : 6

WAVEFORM

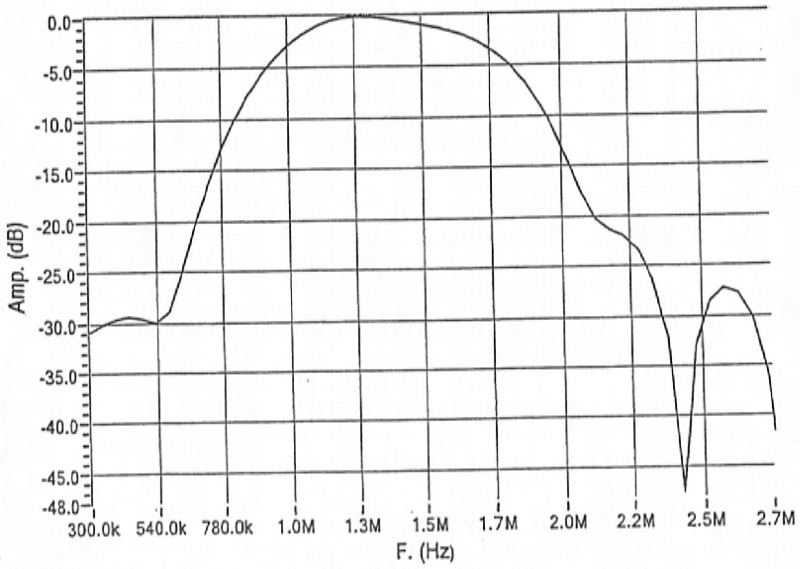
T : 276.0ns/div U : 1.0mV/div



PULSE LENGTH :
-6dB : 886.04ns -20dB : 2.76µs

VOLTAGES :
Vpp = 7.43mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.38MHz
Ratio Bp/Fc : 67%
Bandwidth : 920.18KHz
Lower Frequency : 920.58KHz
Upper Frequency : 1.84MHz

IMASONIC

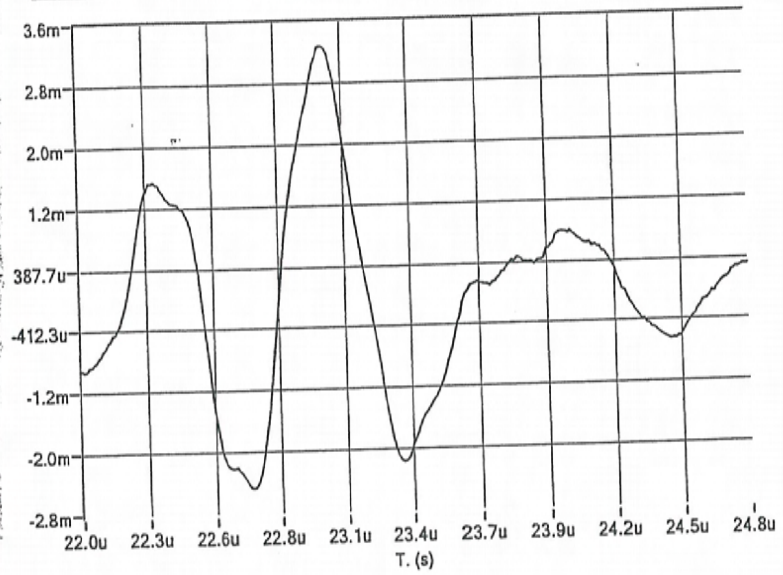
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.2

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 27.97mm
Element : 10

WAVEFORM

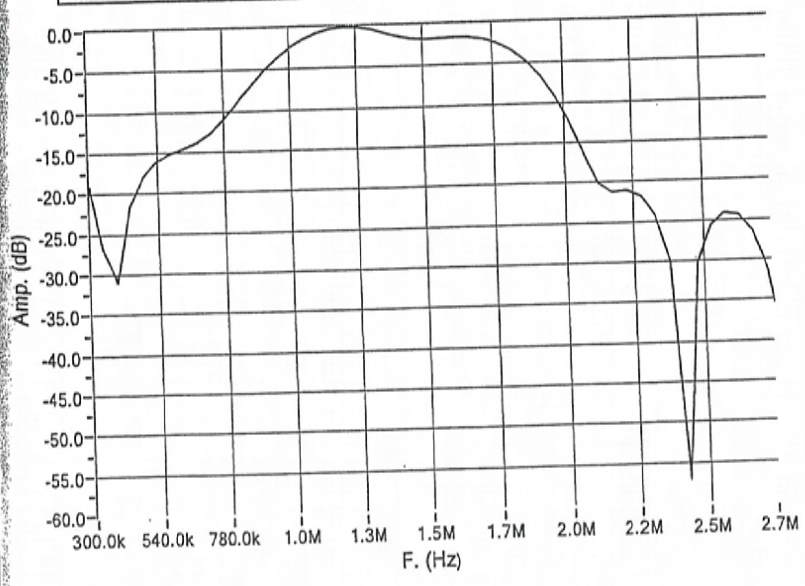
T : 276.0ns/div U : 800.0µV/div



PULSE LENGTH :
-6dB : 1.08µs -20dB : 2.77µs

VOLTAGES :
Vpp = 5.76mV

TRANSMIT-RECEIVE SPECTRUM



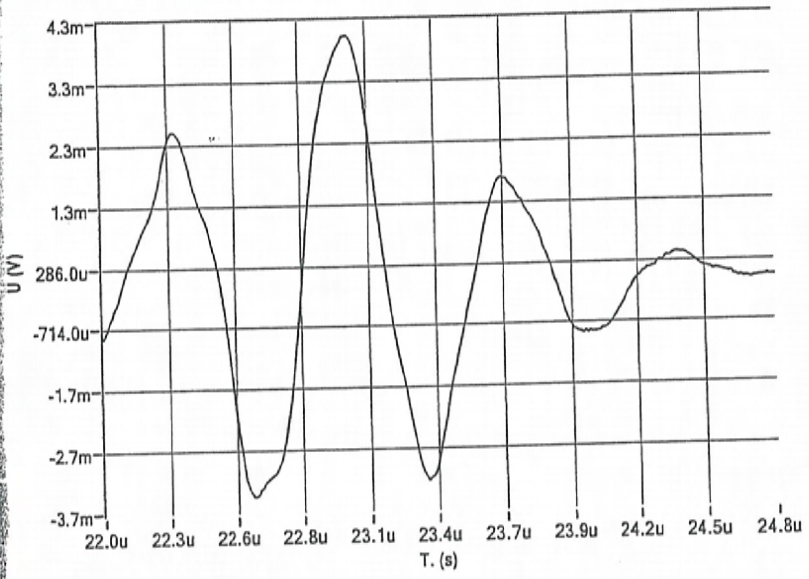
CARACTERISTICS AT -6dB :
Central Frequency : 1.40MHz
Ratio Bp/Fc : 70%
Bandwidth : 980.22KHz
Lower Frequency : 908.69KHz
Upper Frequency : 1.89MHz

IMASONIC SA
TRANSDUCER DATA SHEET

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 27.97mm
Element : 14

WAVEFORM

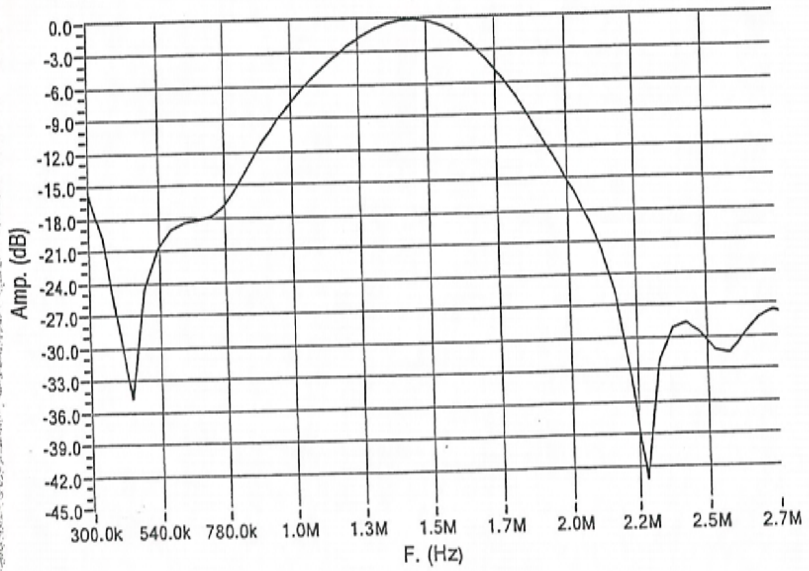
T : 276.0ns/div U : 1.0mV/div



PULSE LENGTH :
-6dB : 1.16µs -20dB : 2.77µs

VOLTAGES :
Vpp = 7.51mV

TRANSMIT-RECEIVE SPECTRUM

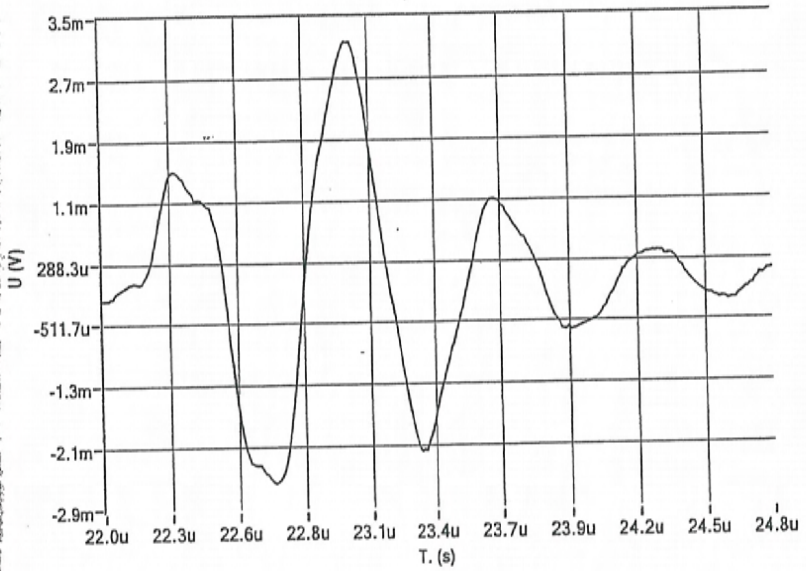


CARACTERISTICS AT -6dB :
Central Frequency : 1.42MHz
Ratio Bp/Fc : 49%
Bandwidth : 699.10KHz
Lower Frequency : 1.07MHz
Upper Frequency : 1.77MHz

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 27.98mm
Element : 18

WAVEFORM

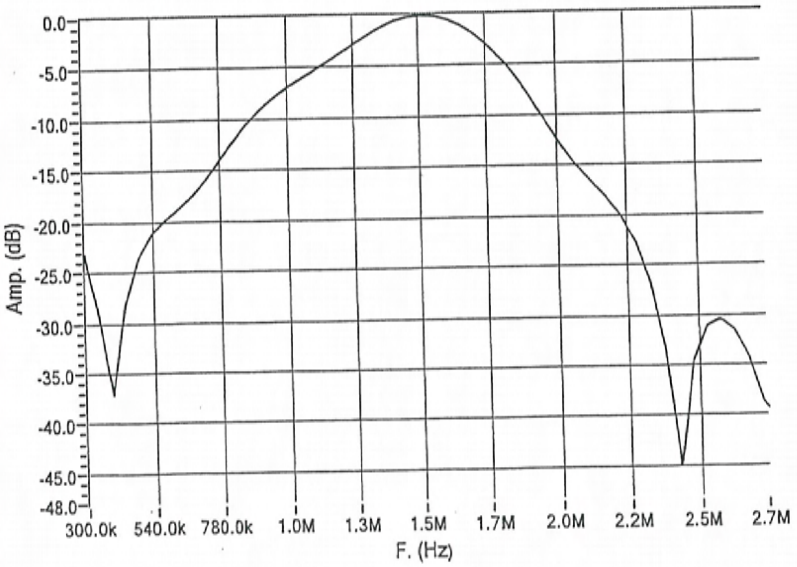
T : 276.0ns/div U : 800.0µV/div



PULSE LENGTH :
-6dB : 870.73ns -20dB : 2.65µs

VOLTAGES :
Vpp = 5.76mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.46MHz
Ratio Bp/Fc : 52%
Bandwidth : 759.18KHz
Lower Frequency : 1.08MHz
Upper Frequency : 1.84MHz

IMASONIC

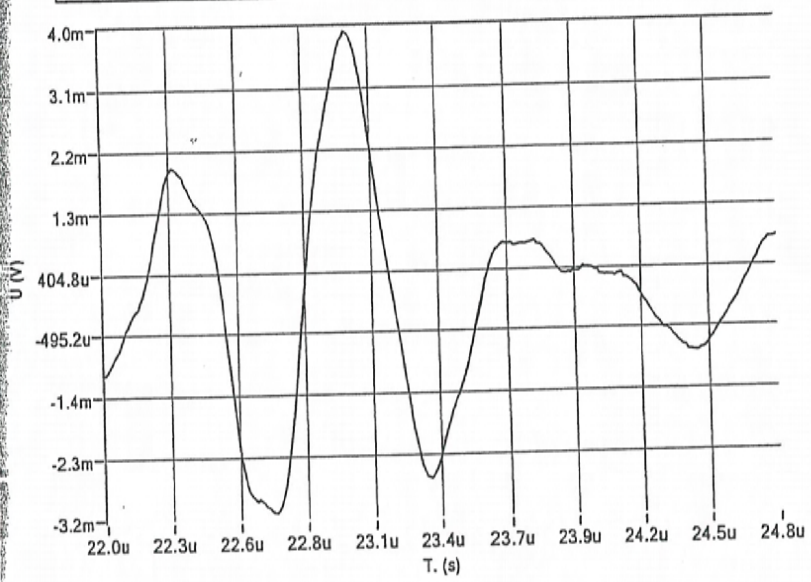
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.2

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 27.97mm
Element : 22

WAVEFORM

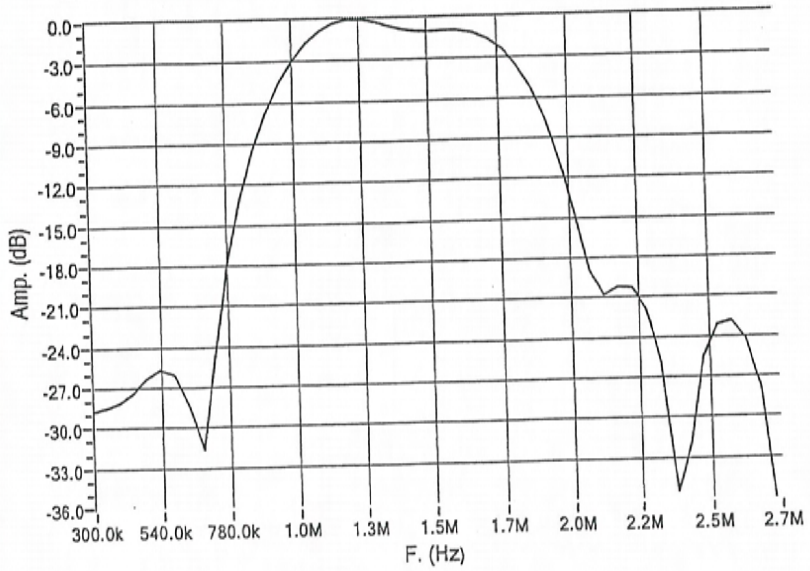
T : 276.0ns/div U : 900.0µV/div



PULSE LENGTH :
-6dB : 861.65ns -20dB : 2.77µs

VOLTAGES :
Vpp = 7.05mV

TRANSMIT-RECEIVE SPECTRUM



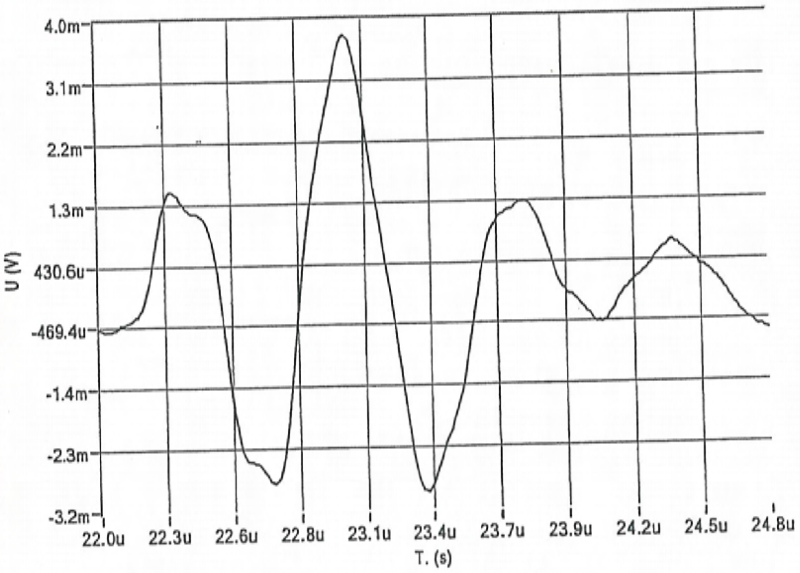
CARACTERISTICS AT -6dB :
Central Frequency : 1.41MHz
Ratio Bp/Fc : 66%
Bandwidth : 924.13KHz
Lower Frequency : 945.97KHz
Upper Frequency : 1.87MHz

TRANSDUCER DATA SHEET

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 28.02mm
Element : 26

WAVEFORM

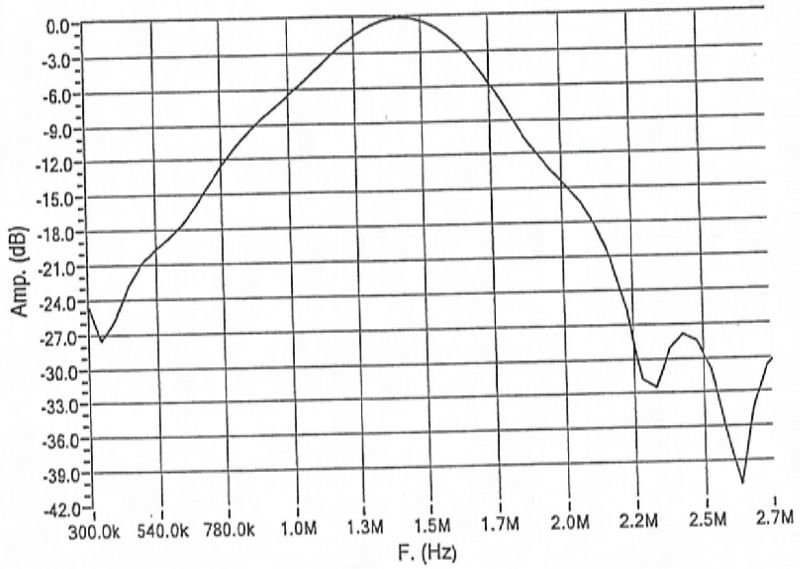
T : 276.0ns/div U : 900.0µV/div



PULSE LENGTH :
-6dB : 867.97ns -20dB : 2.55µs

VOLTAGES :
Vpp = 6.73mV

TRANSMIT-RECEIVE SPECTRUM

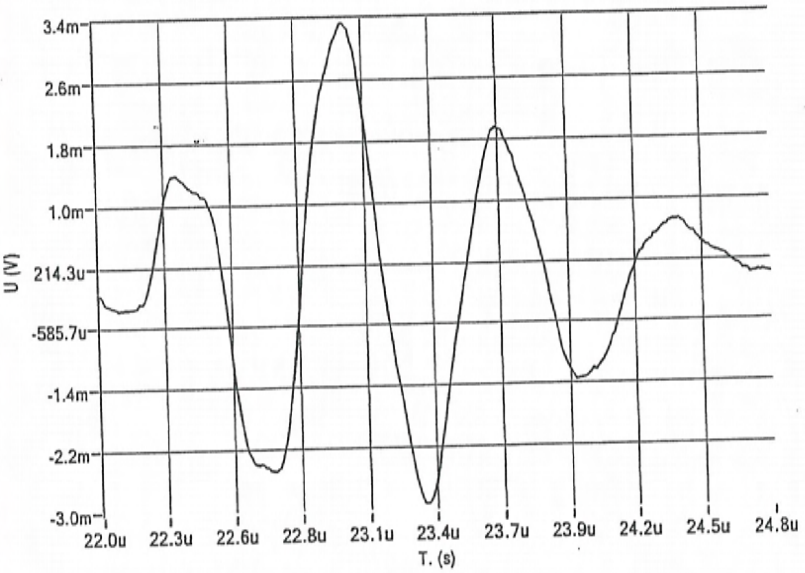


CARACTERISTICS AT -6dB :
Central Frequency : 1.40MHz
Ratio Bp/Fc : 50%
Bandwidth : 695.21KHz
Lower Frequency : 1.05MHz
Upper Frequency : 1.74MHz

Date : July 25th 2005 16h27
Operator : GD
Transducer : matrix phased Array
Serial number : 5155A103
Nominal frequency : 1.50MHz
Generator : MULTI 2000
Input signal : 60.0 Vpp, Gain : 0.0 dB, Largeur : 71 bin.
Scope : MULTI 2000
Instruction : INP 413
Target type : 15 mm rexolite + 30 mm steel
Target Positioning : 28.14mm
Element : 30

WAVEFORM

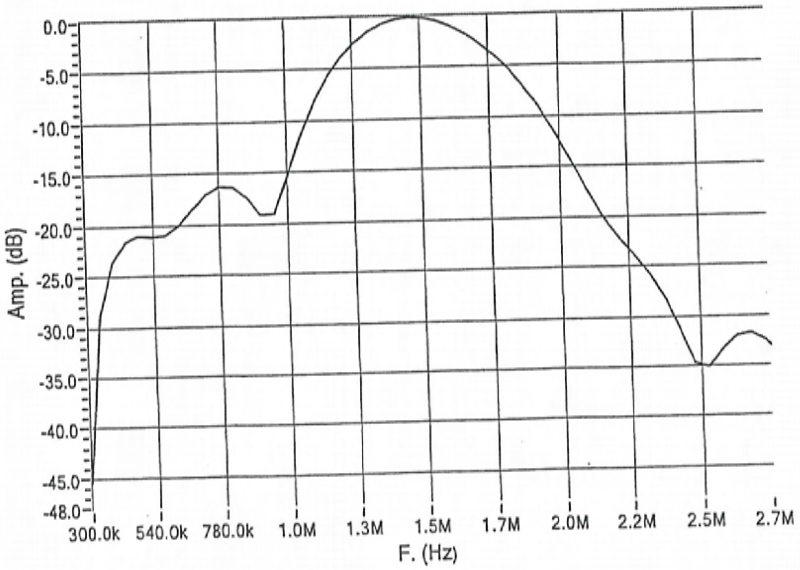
T : 276.0ns/div U : 800.0µV/div



PULSE LENGTH :
-6dB : 1.12µs -20dB : 2.38µs

VOLTAGES :
Vpp = 6.28mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.50MHz
Ratio Bp/Fc : 44%
Bandwidth : 663.08KHz
Lower Frequency : 1.17MHz
Upper Frequency : 1.83MHz

IMASONIC

MEASUREMENT REPORT

1,5 MHz 2 x 32 elts matrix phased array probe

5154 B102

ZETEC QUEBEC

1.5M32X2E64-15

IMASONIC

CERTIFICATE of CONFORMANCE

REFERENCE DOCUMENT CdC5154-5
PROJECT # 5154B
SERIAL # 5154B102

Checking of Electrical Performance

		Criteria of conformity	Value	Conformity
Inter element coupling between neighbouring elements	dB	< -30	-47.6	OK
Inter element coupling between neighbouring elements	dB	< -35	-50.1	OK

Checking of Acoustical Performance

		Criteria of conformity	Value	Conformity
Central Frequency (-6dB)	MHz	[1.35 ; 1.65]	1.4	OK
Bandwidth (-6dB)	%	> 55	69	OK
Pulse Length (-20dB)	ns	< 3.5	2.67	OK
Sensitivity	(mV)	na	26	OK
Homogeneity (probe to probe, within batch)	dB	± 3 / mean value	-0.1	OK
Homogeneity (between all elements of the probe)	dB	± 3 / mean value	-3.17	OK

Backwall Echo	dB	< -40	-64	OK

Checking of Elements Wiring

conformity	OK

Overall Conformity

conformity	OK

Date : 16/11/2006

Signature

Ruch Vincent

Phased Array Probe Specifications
Piezocomposite technology

Zetec reference:	1.5M32x2E64-15
IMASONIC reference:	CDC5154-5

Technical characteristics and acceptance level

Acoustical characteristics

Centre frequency (-6dB):	1.5 MHz ± 10 %*
Bandwidth (-6dB):	> 55% *
Pulse length (-20dB):	< 3.5 µs *
Acoustical impedance matching:	rexolite
Electrical matching:	none
Number of channels:	64 (2 rows of 32)
Active area	64x15 mm
Mechanical focusing:	none
Elementary pitch in the primary axis:	2 mm
Elementary pitch in the secondary axis:	7.5mm
Inter element spacing:	0.2 mm in two dimensions
Homogeneity in sensitivity:	± 3 dB for the whole array*
Homogeneity of probe to probe in sensitivity:	+/-3 dB for a batch which number of probes is agreed between ZETEC and IMASONIC before the order.
Inter element coupling:	≤ -30dB* between adjacent elements
Inter element coupling:	≤ -35dB* between elements separated by one element
Backing echoes:	≤ -40dB / interface echo

**criteria of conformity measured in the conditions below*

Mechanical characteristics

Housing:
Stainless steel
Geometry and dimensions: according to the drawing ref 5154A0110000

Cable:
Cable output: on side, near last element.
Cable gland

Flanges:
Geometry and dimensions: according to the drawing ref 5154A0110000

Interconnections

Cable: 50Ω multi-coaxial with overall shielding
Length: 5 m ± 0.1m
Connector: Hypertronics
Protective jacket: halogen free jacket
Pinout diagram: classical.

Phased Array Probe Specifications
Piezocomposite technology

Zetec reference:	1.5M32x2E64-15
IMASONIC reference:	CDC5154-5

Identification

On the top of the probe:	Logo Zetec Identification of the 1st, 32nd, 33rd and 64th elements
On side of the probe:	1.5M32X2E64-15 29HBE0028 serial number

*Recommended using conditions**

Chemical constraints:	contact with acoustical gel or water
Pressure:	equivalent to a water column of 1m maximum
Temperature:	-20° to 60°C (storage) 10 to 30°C (functioning)
Excitation:	Negative pulse 200Vpp maximum (measured in 50 Ωenvironments) Max repetition frequency: 10 kHz
Cleaning:	With water or isopropyl alcohol, with soft tissue, taking care of not wearing the front face with particles between the front face and the tissue
Manipulation:	Do not handle the probe by the cable
Nuclear radiation:	none
Normative constraints:	**none**

Particular constraints of shocks and vibrations are not taken into account by IMASONIC

** Other particular using conditions must be validated by IMASONIC*

Phased Array Probe Specifications
Piezocomposite technology

Zetec reference: 1.5M32x2E64-15
IMASONIC reference: CDC5154-5

Control of electro acoustical performances

Electrical Measurements:
1_Impedance measurement for all the elements at the nominal frequency
2_Inter-element coupling measurement on 2 pairs of adjacent elements
3_Inter-element coupling measurement on 2 pairs of non adjacent elements

Measurements conditions:
Performed with HP3577A network analyser (50Ω environment)
Acoustic load on the active part: 1.5 MR
Supplied documents:
Value of impedances
Curves of inter –elements coupling

Acoustical measurements:
1_Temporal response & frequency spectrum measurement for all the elements

Measurements conditions:
Performed on contact on flat steel target with a rexolite delay line in E/R mode
rexolite path: 15mm
steel path: 20mm
coupling: to be defined during the control
Excitation signal: 1 negative pulse
Supplied documents:
Value of central frequency, bandwidth (-6dB), pulse length (-20dB) and sensitivity for all elements
Curves of homogeneity sensitivity
Curves for 8 elements

2_Backing Echo measurement

Measurements conditions:
Performed in water on a flat brass target in E/R mode
Excitation signal: 1 negative pulse
Supplied documents:
Value of backing echo

Supplied documentation (paper and mail)

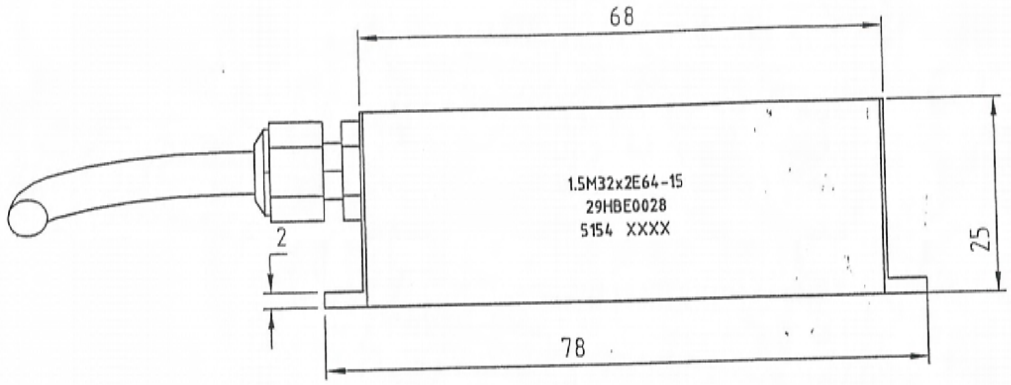
Specifications of the probe
Overall drawing of the probe
Measurement results

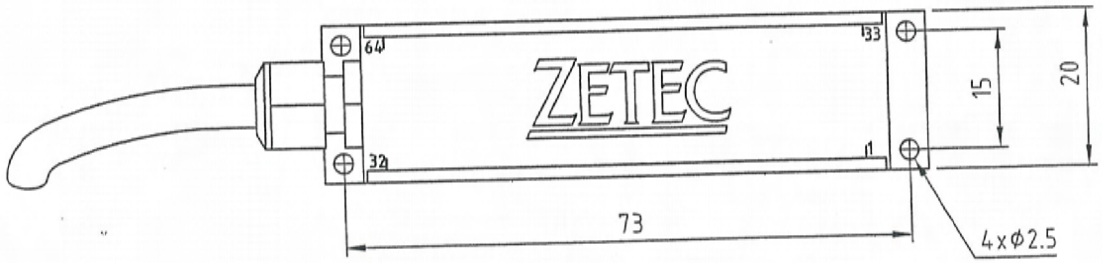
Casing

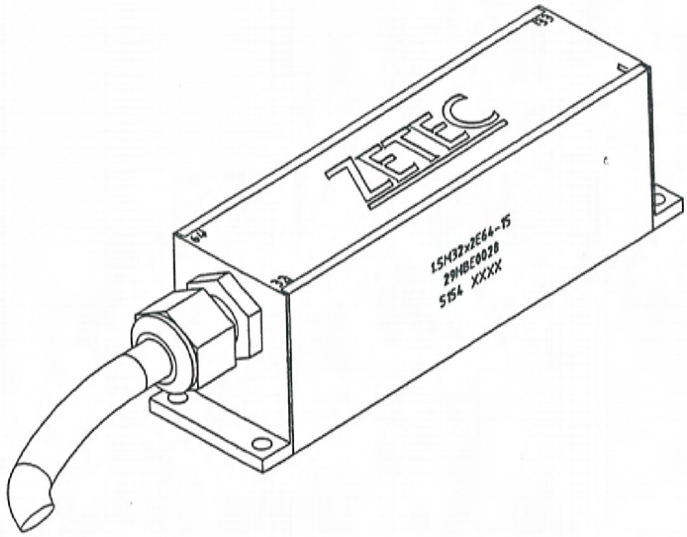
One casing for each probe

Guarantee conditions

One year guarantee against manufacturing defects in the using conditions above
Other conditions: see Imasonic general selling conditions







				Façonnage Général :	Nombre : 1
				Tol gén	Longueurs: js/JS13 — Angles: ±1°
				Matière :	
				Traitement thermique :	
dice	Date	Modifications	par	Protection:	
= brut	▽ = 6.5 à 12.5Ra	▽▽ = 1.6 à 3.2Ra	▽▽▽ = 0.05 à 0.8Ra	N°	5154A0110000

tude: Linear array-1.5MHz-2x32elts

/Ens.:

IMASONIC
transducteurs et dispositifs électroacoustiques

Impedance measurement for the transducer n°: **5154 B102** **Operator : SA**

(Acoustic load: 1.5 MR. IMASONIC procedure: INP 410)

#	Zr (Ω)	Zi (Ω)	#	Zr (Ω)	Zi (Ω)
1	25.1	-142.0	33	22.9	-145.2
2	23.6	-144.2	34	23.9	-144.1
3	23.3	-146.8	35	24.3	-142.8
4	23.5	-146.2	36	24.1	-143.3
5	23.5	-141.4	37	22.8	-144.0
6	24.4	-142.7	38	22.0	-145.4
7	23.9	-144.1	39	22.5	-144.9
8	23.0	-144.6	40	24.4	-143.9
9	23.3	-146.2	41	24.5	-142.3
10	23.4	-144.9	42	23.3	-144.4
11	23.7	-141.9	43	22.3	-143.1
12	24.1	-144.6	44	22.8	-147.3
13	22.9	-144.3	45	22.9	-142.5
14	23.2	-143.6	46	24.6	-142.9
15	23.9	-144.1	47	24.0	-142.6
16	24.0	-144.7	48	22.8	-144.5
17	23.4	-144.8	49	23.3	-145.0
18	23.1	-145.3	50	23.5	-145.0
19	23.3	-144.4	51	23.6	-143.2
20	24.0	-144.6	52	23.9	-142.1
21	23.9	-144.1	53	23.0	-144.2
22	23.1	-144.1	54	23.2	-144.7
23	22.6	-146.0	55	23.8	-143.7
24	22.9	-145.4	56	23.9	-144.4
25	23.9	-143.0	57	24.0	-144.8
26	24.9	-141.2	58	23.8	-144.2
27	24.1	-143.3	59	23.8	-143.7
28	22.9	-143.8	60	23.6	-142.4
29	23.0	-144.0	61	24.3	-141.2
30	23.3	-142.8	62	24.1	-143.1
31	25.1	-140.1	63	23.2	-142.8
32	25.3	-141.0	64	23.6	-142.7

	Zr (Ω)	Zi (Ω)
Minimum :	22.0	-147.3
Maximum :	25.3	-140.1
Standard deviation :	0.7	1.4
Average values :	23.6	-143.8

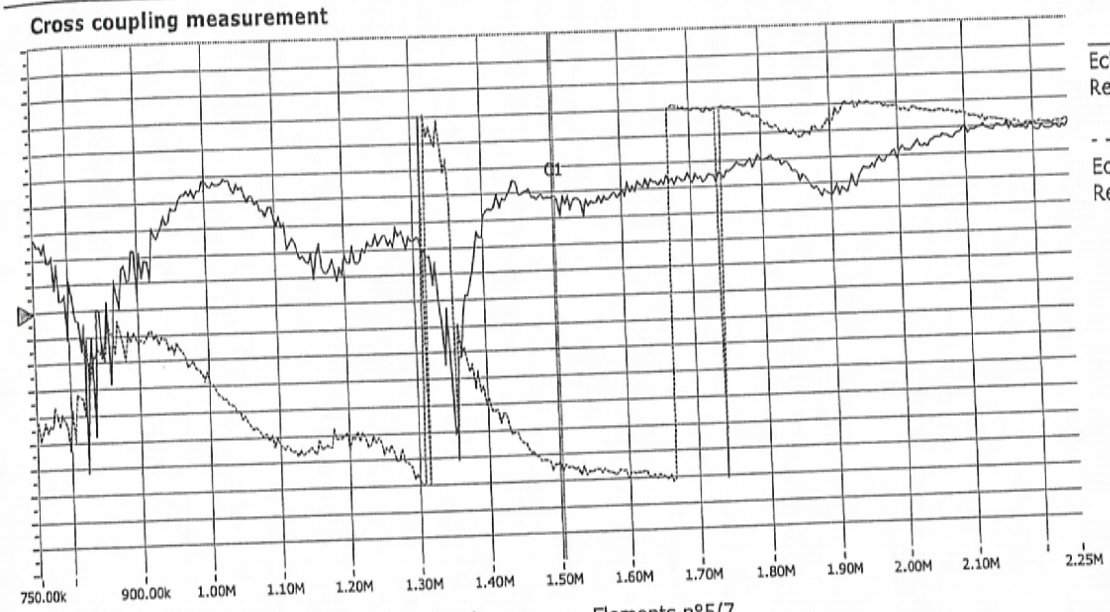
Inter element coupling measurement :

#/#	Coupling (dB)
5/6	-47.6
28/29	-48.3
1/2	-50.1
5/7	-55.9
28/30	-54.3

IMASONIC S.A.
MESURES ELECTRIQUES
Z V4.2

Date : November 15th 2006 15h17
Operator : SA
Transducer : Matrix phased array - 32x2 elements
Serial number : 5154 B102
Nominal frequency : 1.50MHz
Network Analyzer : HP 8751A, IM : 112-113
Acoustic load : 1.5MR on active area
Instruction : INP 412

Cross coupling measurement

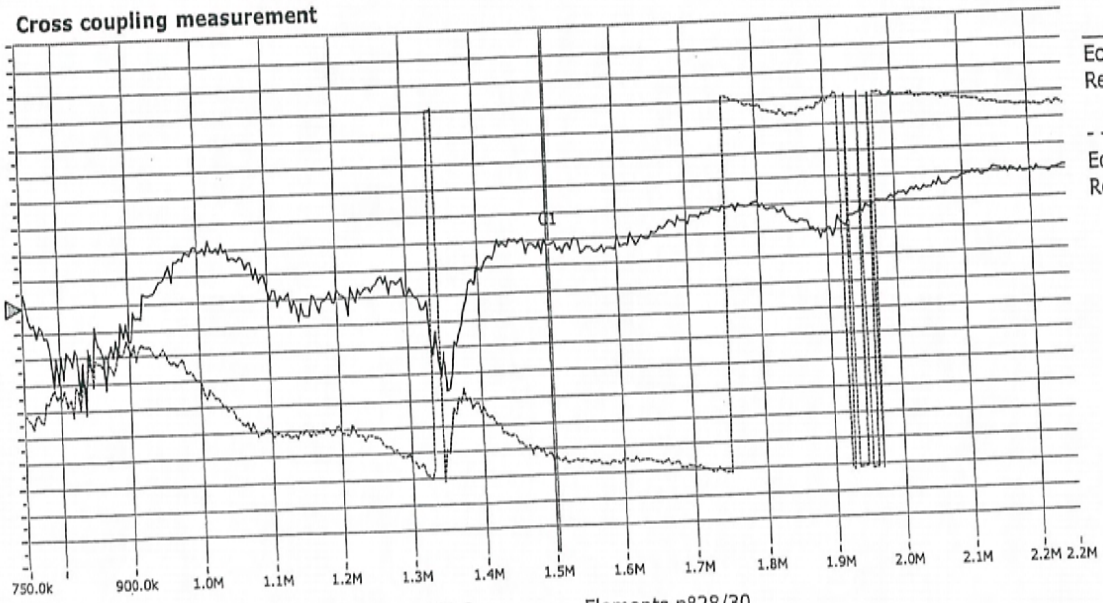


___ : ICI,
Ech. : 2.50 dB/div,
Ref. : -65.5 dB

- - - : pha.,
Ech. : 25.0 °/div,
Ref. : 85.1m°

C1 : F=1.50MHz ICI=-55.9 dB pha.=-157 ° Elements n°5/7

Cross coupling measurement



___ : ICI,
Ech. : 2.50 dB/div,
Ref. : -58.7 dB

- - - : pha.,
Ech. : 25.0 °/div,
Ref. : 29.4m°

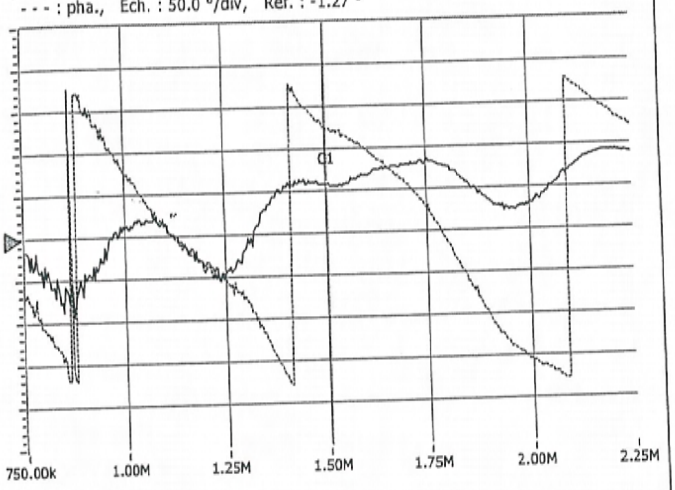
C1 : F=1.50MHz ICI=-54.3 dB pha.=-161 ° Elements n°28/30

IMASONIC S.A.
MESURES ELECTRIQUES
Z V4.2

Date : November 15th 2006 15h16
Operator : SA
Transducer : Matrix phased array - 32x2 elements
Serial number : 5154 B102
Nominal frequency : 1.50MHz
Network Analyzer : HP 8751A, IM : 112-113
Acoustic load : 1.5MR on active area
Instruction : INP 412

Cross coupling measurement

___ : ICI, Ech. : 5.00 dB/div, Ref. : -53.4 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : -1.27 °

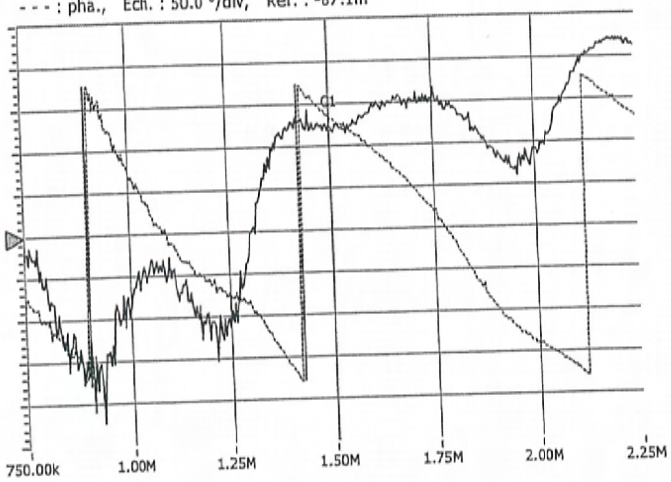


Elements n°5/6

C1 : F=1.50MHz ICI=-47.6 dB pha.=125 °

Cross coupling measurement

___ : ICI, Ech. : 2.00 dB/div, Ref. : -53.4 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : -87.1m°

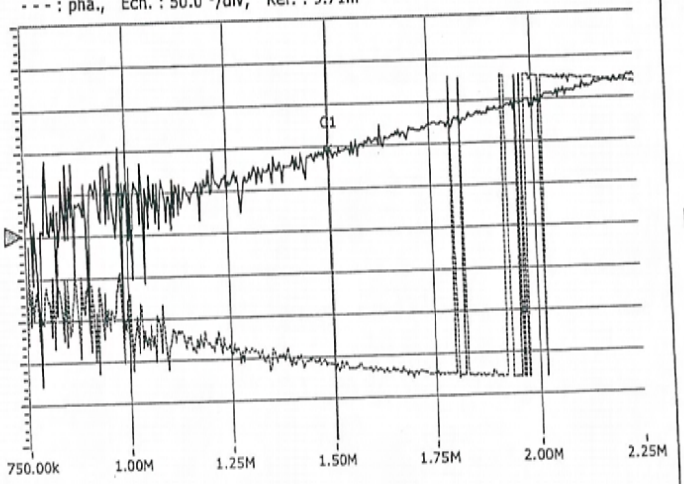


Elements n°28/29

C1 : F=1.50MHz ICI=-48.3 dB pha.=136 °

Cross coupling measurement

___ : ICI, Ech. : 5.00 dB/div, Ref. : -58.8 dB
- - - : pha., Ech. : 50.0 °/div, Ref. : 9.71m°

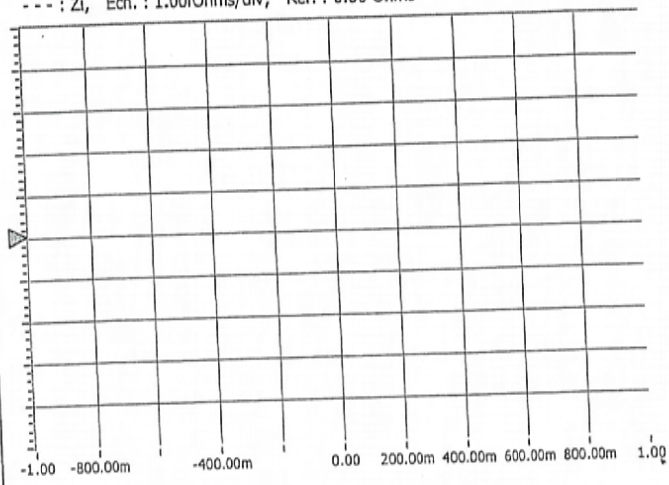


Elements n°2/18

C1 : F=1.50MHz ICI=-50.1 dB pha.=-159 °

Cross coupling measurement

___ : Zr, Ech. : 1.00fOhms/div, Ref. : 0.00 Ohms
- - - : Zi, Ech. : 1.00fOhms/div, Ref. : 0.00 Ohms



Electroacoustic measurement for the transducer n°: 5154 B102 **Operator : SA**

(Acoustic load: 2.45 MR. IMASONIC procedure: INP 413.) *Nominal Frequency : 1.50 MHz*

Generator : Multi 2000 V3.4.4, Gain = atten = 60 dB, L. Exc. : 353 ns, U. Exc. : 70 V

Target type : Inox h = 20mm + Rexolite h = 15mm

#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)	#	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
1	30	1.4	66	3593	33	24	1.4	70	3079
2	25	1.5	65	3590	34	25	1.5	66	3538
3	25	1.4	69	3597	35	29	1.4	68	2761
4	24	1.5	69	3576	36	28	1.4	71	3576
5	26	1.4	67	2823	37	25	1.4	70	2699
6	27	1.5	65	3022	38	22	1.5	69	2608
7	25	1.5	66	2741	39	24	1.4	71	2665
8	25	1.4	68	2697	40	28	1.4	67	2764
9	24	1.5	69	2647	41	29	1.4	67	2729
10	26	1.4	69	2779	42	26	1.4	66	2691
11	27	1.4	69	2682	43	24	1.4	70	2768
12	27	1.4	68	2726	44	23	1.4	70	2654
13	23	1.5	68	2711	45	25	1.4	70	2327
14	25	1.4	70	2788	46	29	1.4	67	2321
15	26	1.4	70	3522	47	28	1.4	67	1664
16	26	1.4	71	2725	48	25	1.5	69	2596
17	25	1.4	71	2808	49	25	1.5	71	2624
18	24	1.4	69	2760	50	25	1.4	69	1675
19	25	1.5	68	2636	51	27	1.4	68	1676
20	27	1.4	70	2598	52	28	1.4	69	1680
21	26	1.4	69	2315	53	25	1.4	69	1648
22	25	1.4	69	2570	54	25	1.4	70	1707
23	23	1.4	69	2606	55	27	1.4	69	1996
24	24	1.4	71	2708	56	28	1.4	68	2645
25	27	1.5	69	2659	57	28	1.5	68	2659
26	30	1.4	69	2676	58	27	1.5	67	2603
27	28	1.4	70	2330	59	27	1.5	67	2705
28	25	1.4	68	2347	60	28	1.4	68	2706
29	24	1.4	73	2677	61	29	1.4	72	2652
30	26	1.4	69	2656	62	28	1.4	69	2557
31	30	1.4	68	2784	63	26	1.5	71	2739
32	32	1.5	63	3030	64	28	1.5	66	2552

	Vpp (mV)	Fc (MHz)	Bw (%)	Lp -20dB (ns)
Minimum :	22	1.4	63	1648
Maximum :	32	1.5	73	3597
Standard deviation :	2	0.0	2	459
Average values :	26	1.4	69	2666

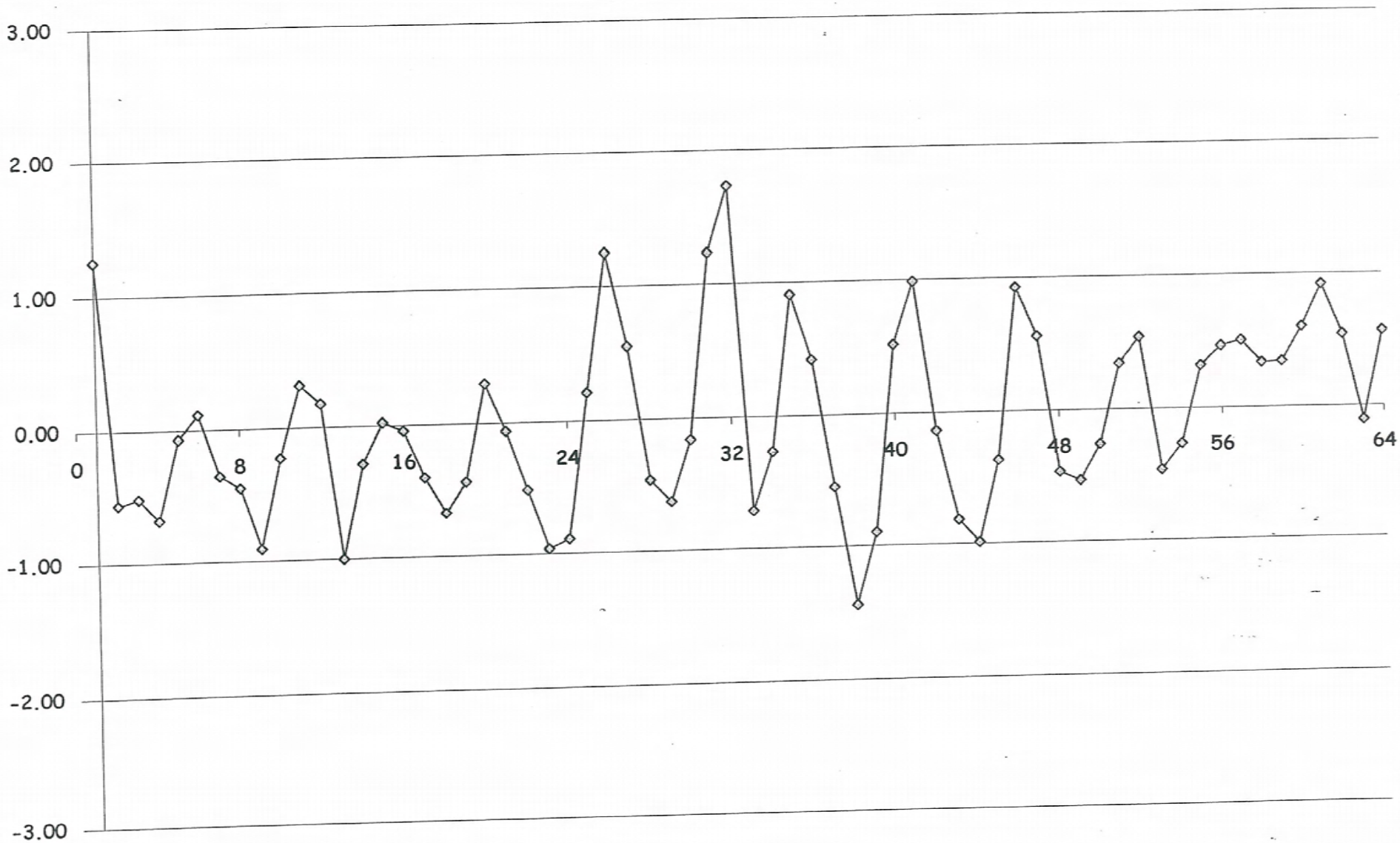
Homogeneity in sensitivity (dB) : **-3.17**

See measurement results in appendix 3 for the elements n°1, 8, 16, 32, 40, 48, 56 & 64

SA, 16/11/2006

Sensitivity variation (dB)

XCR n°5154 B102



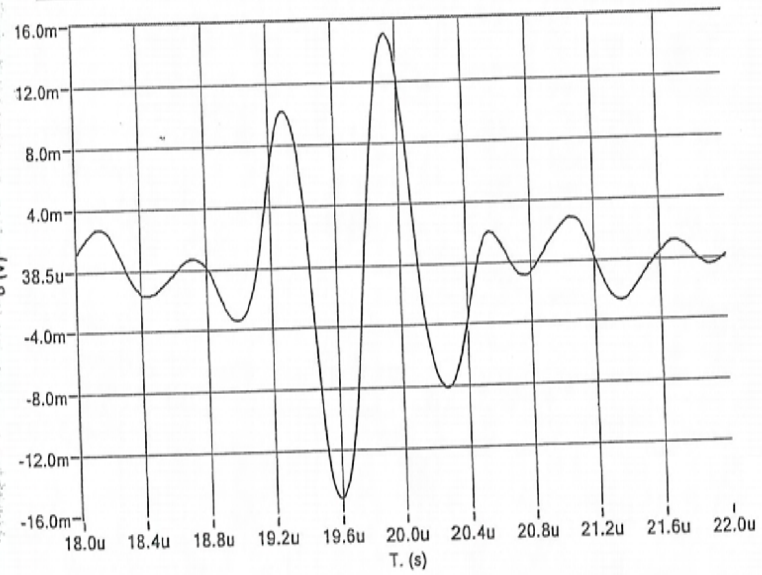
ENQ 102 - Final measurements 64 elts

IMASONIC SA
TRANSDUCER DATA SHEET

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.44mm
Element : 1

WAVEFORM

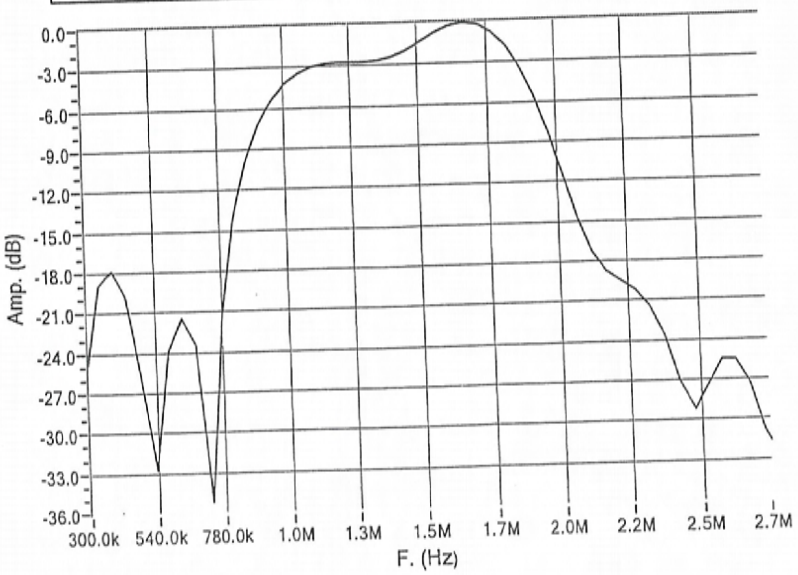
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 1.07µs -20dB : 3.59µs

VOLTAGES :
Vpp = 30.29mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.44MHz
Ratio Bp/Fc : 66%
Bandwidth : 949.19KHz
Lower Frequency : 962.87KHz
Upper Frequency : 1.91MHz

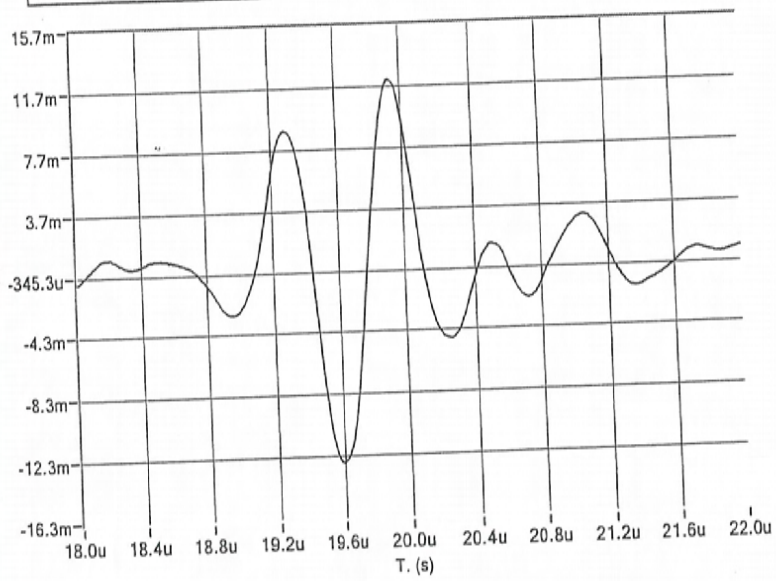
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.34mm
Element : 8

WAVEFORM

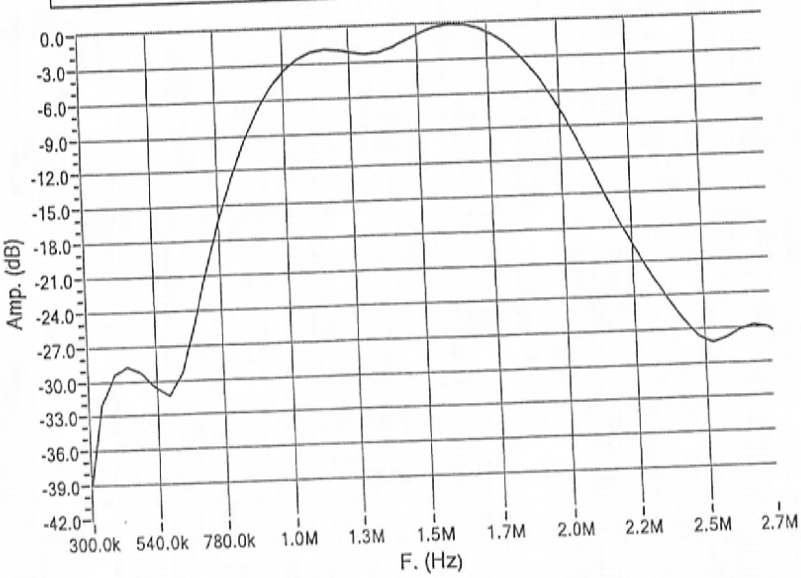
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 819.28ns -20dB : 2.70µs

VOLTAGES :
Vpp = 24.91mV

TRANSMIT-RECEIVE SPECTRUM



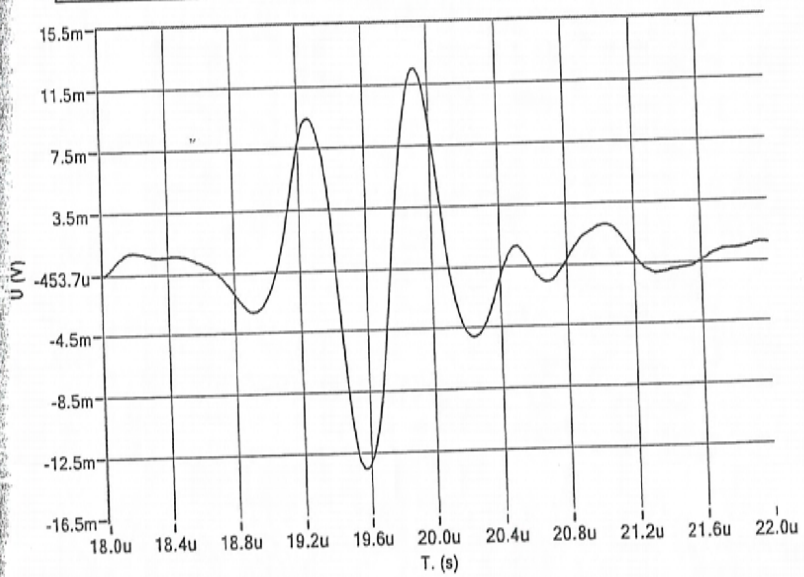
CARACTERISTICS AT -6dB :
Central Frequency : 1.45MHz
Ratio Bp/Fc : 68%
Bandwidth : 990.74KHz
Lower Frequency : 953.55KHz
Upper Frequency : 1.94MHz

IMASONIC SA
TRANSDUCER DATA SHEET

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.25mm
Element : 16

WAVEFORM

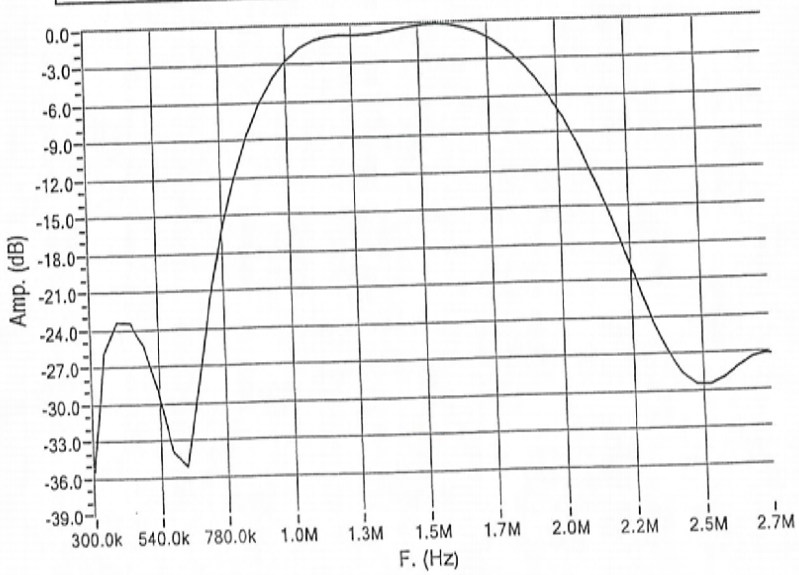
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 816.29ns -20dB : 2.73µs

VOLTAGES :
Vpp = 26.08mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.44MHz
Ratio Bp/Fc : 71%
Bandwidth : 1.02MHz
Lower Frequency : 928.76KHz
Upper Frequency : 1.95MHz

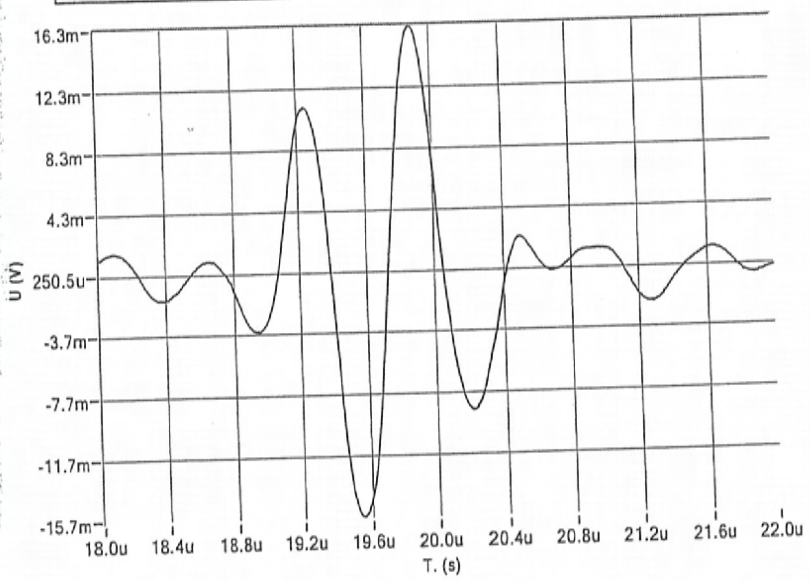
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.40mm
Element : 32

WAVEFORM

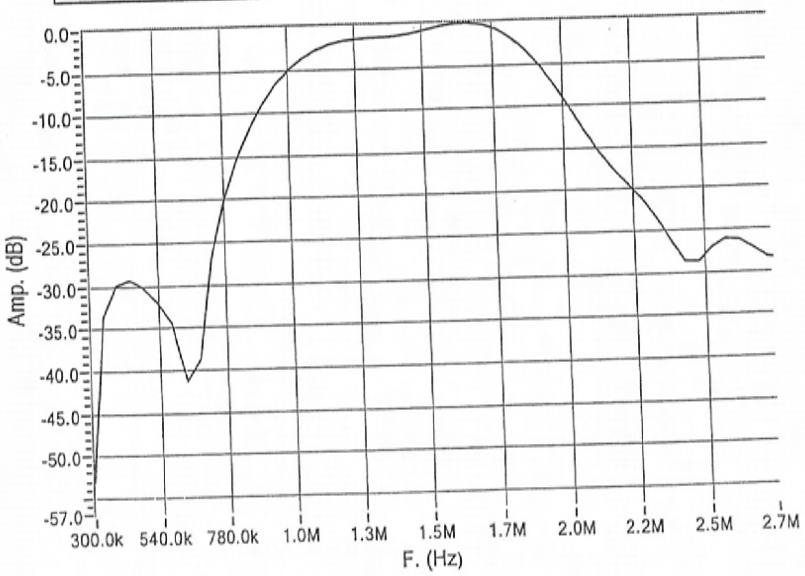
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 1.10µs -20dB : 3.03µs

VOLTAGES :
Vpp = 31.97mV

TRANSMIT-RECEIVE SPECTRUM



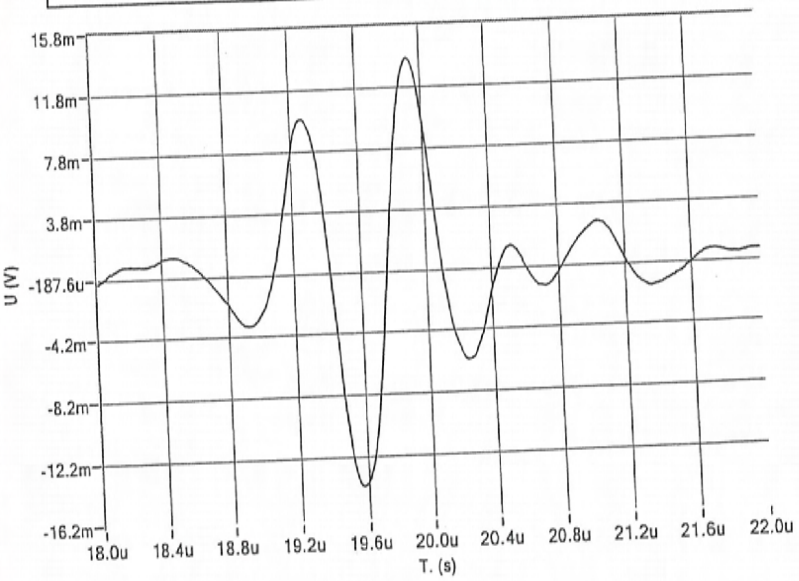
CARACTERISTICS AT -6dB :
Central Frequency : 1.46MHz
Ratio Bp/Fc : 63%
Bandwidth : 923.45KHz
Lower Frequency : 998.39KHz
Upper Frequency : 1.92MHz

IMASONIC SA
TRANSDUCER DATA SHEET

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.19mm
Element : 40

WAVEFORM

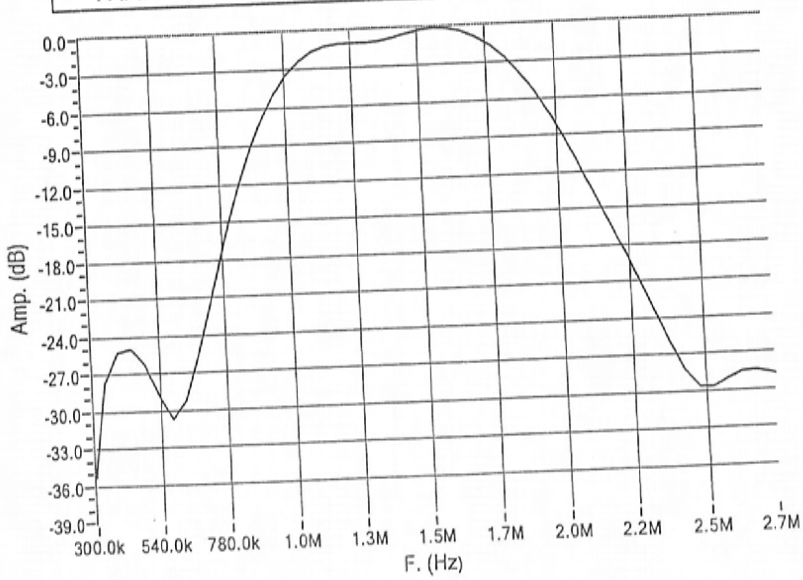
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 826.29ns -20dB : 2.76µs

VOLTAGES :
Vpp = 27.81mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.44MHz
Ratio Bp/Fc : 67%
Bandwidth : 968.98KHz
Lower Frequency : 956.94KHz
Upper Frequency : 1.93MHz

IMASONIC

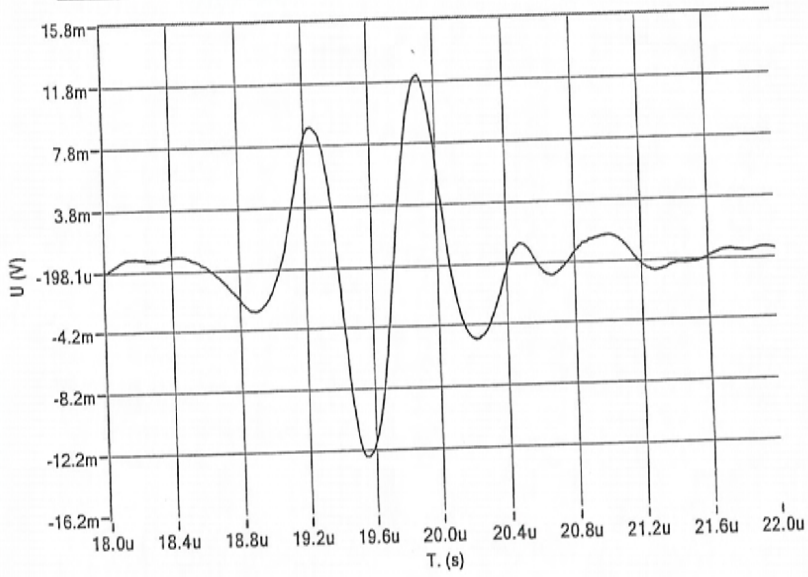
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.21mm
Element : 48

WAVEFORM

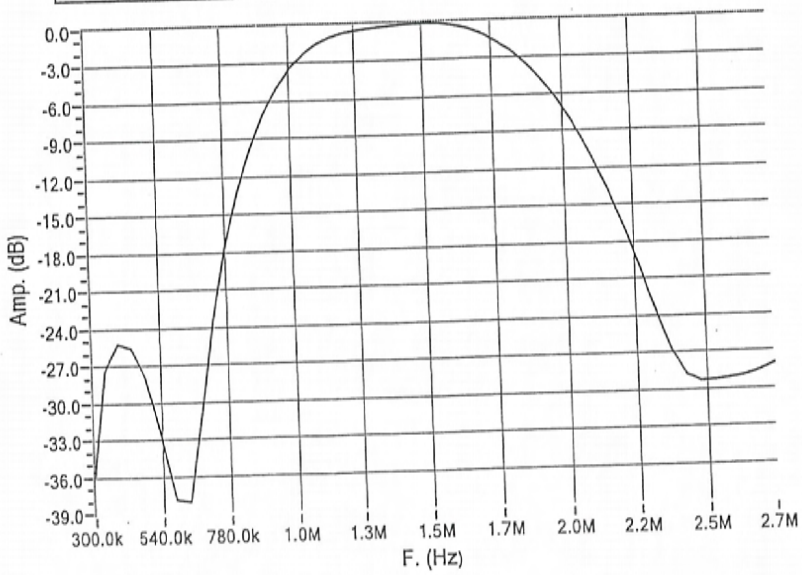
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 820.52ns -20dB : 2.60µs

VOLTAGES :
Vpp = 24.84mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.45MHz
Ratio Bp/Fc : 69%
Bandwidth : 998.97KHz
Lower Frequency : 952.97KHz
Upper Frequency : 1.95MHz

IMASONIC

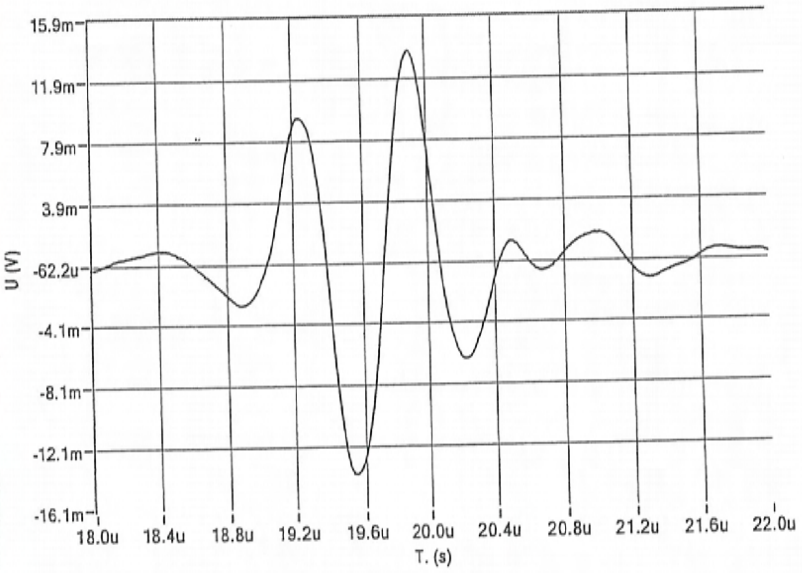
IMASONIC SA
TRANSDUCER DATA SHEET

SPECTRE V5.4

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.22mm
Element : 56

WAVEFORM

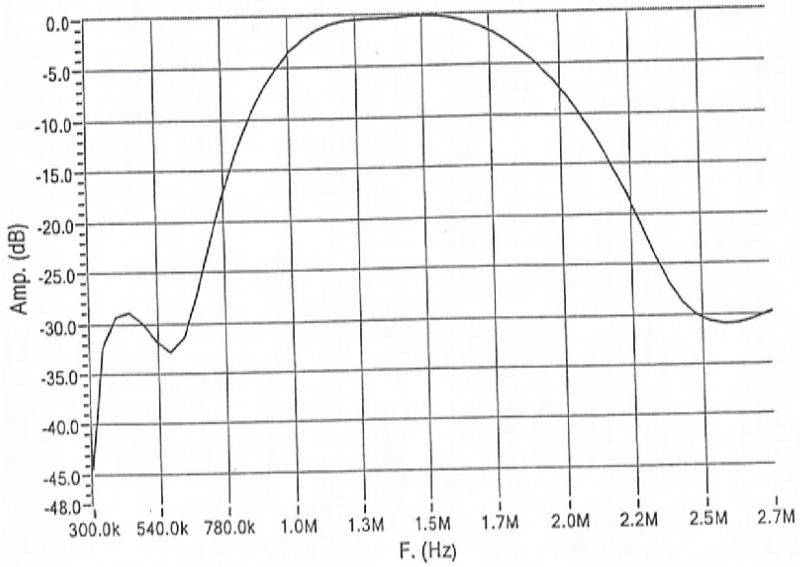
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 828.32ns -20dB : 2.65µs

VOLTAGES :
Vpp = 27.65mV

TRANSMIT-RECEIVE SPECTRUM



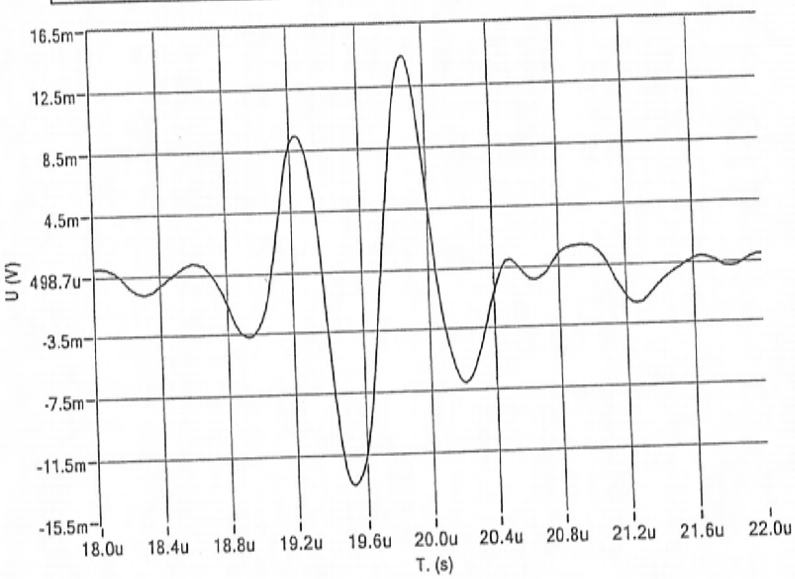
CARACTERISTICS AT -6dB :
Central Frequency : 1.45MHz
Ratio Bp/Fc : 68%
Bandwidth : 983.24KHz
Lower Frequency : 955.19KHz
Upper Frequency : 1.94MHz

IMASONIC SA
TRANSDUCER DATA SHEET

Date : November 16th 2006 08h45
Operator : SA
Transducer : Matrix phased array - 2x32 elements
Serial number : 5154 B102
Nominal frequency : 1.5MHz
Generator : MULTI 2000
Input signal : 70.0 Vpp, Gain = atten = 60 dB, Largeur : 353 ns.
Scope : MULTI 2000
Instruction : INP 413
Target type : Inox h = 20mm + Rexolite h = 15mm
Target Positioning : 24.27mm
Element : 64

WAVEFORM

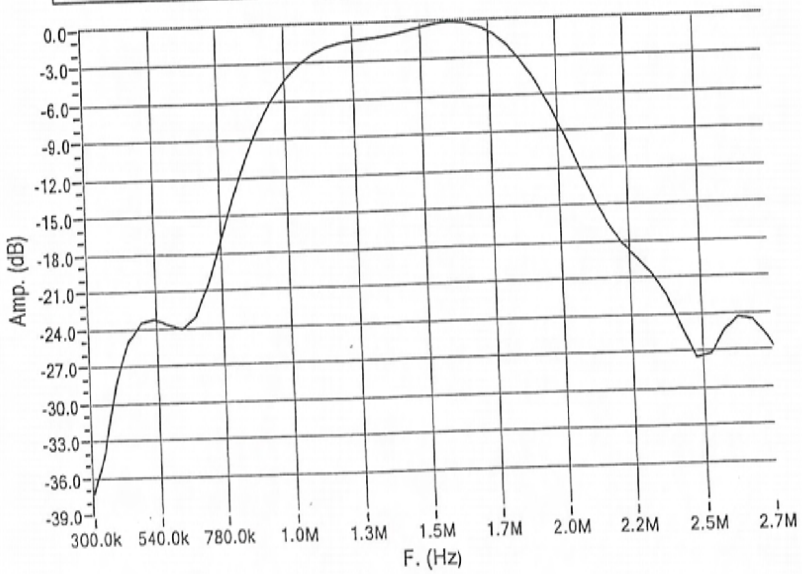
T : 399.0ns/div U : 4.0mV/div



PULSE LENGTH :
-6dB : 817.53ns -20dB : 2.55µs

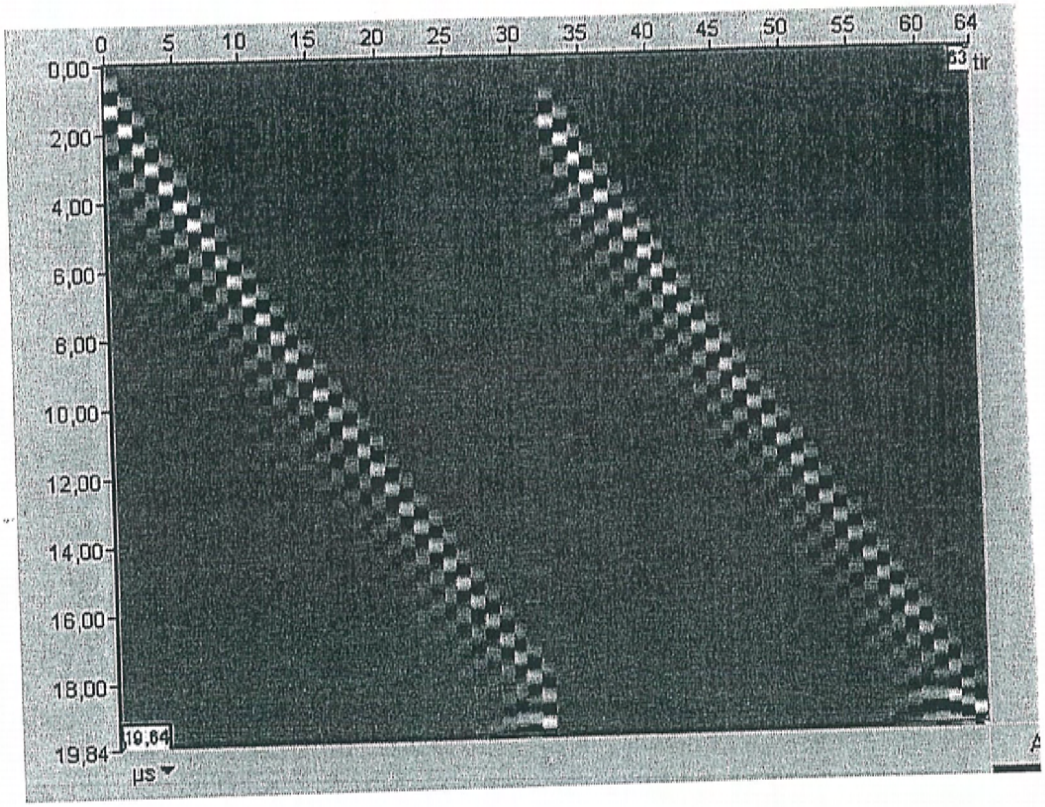
VOLTAGES :
Vpp = 27.96mV

TRANSMIT-RECEIVE SPECTRUM



CARACTERISTICS AT -6dB :
Central Frequency : 1.45MHz
Ratio Bp/Fc : 66%
Bandwidth : 959.37KHz
Lower Frequency : 972.80KHz
Upper Frequency : 1.93MHz

Cabling order
Matrix phased array – 2x32 elements
5154 B102



LINEARITY CHECK DATA SHEET

Equipment / module : **OMNI-MX/OMNI-M-PA32128PR**

Serial number : **OMNI-Z-1012/OMNI-Z-6012**

Calibration Due **11/21/08**

Procedure : **TechDocE_OmniScanPA_SiteLinearityCheck_revA.doc**

Phased array probe: **MODEL-AS SN-5135 G106**

Reference block: **MEUXE005A**

Verification: **PRE EXAMINATION**

Gain Setting	***Gain Value*** (dB)	***EA*** (%FSH)	***EB*** (%FSH)	***EA/2*** (%FSH)
Nominal Gain	7.7	40	20	20
Nominal Gain + 6 dB	13.3	76	37.6	18.8
Nominal Gain - 6 dB	1.7	20	10	10

Test	***OK / NOK***
Vertical Amplification Linearity	OK
Amplitude Control Linearity	OK

Data Analyst : ***Jeff Devers***

Date/Time : ***3/8/2008-1720***

LMT Review ***Todd Blechinger***

Date : ***3/14/08***

EPRI Review

Date : ***3/16/08***

Report # ***EPRI-PA-04***

ANII Review ***N/A***

Date :

LINEARITY CHECK DATA SHEET

Equipment / module : **OMNI-MX/OMNI-M-PA32128PR**

Serial number : **OMNI-Z-1012/OMNI-Z-6012**

Calibration Due **21-Nov-08**

Procedure : **TechDocE_OmniScanPA_SiteLinearityCheck_revA.doc**

Phased array probe: **MODEL-AS SN-5135 G106**

Reference block: **MEUXE005A**

Verification: **POST EXAMINATION**

Gain Setting	***Gain Value*** (dB)	***EA*** (%FSH)	***EB*** (%FSH)	***EA/2*** (%FSH)
Nominal Gain	7.7	40	20	20
Nominal Gain + 6 dB	13.3	76	37.6	18.8
Nominal Gain - 6 dB	1.7	20	10	10

Test	***OK / NOK***
Vertical Amplification Linearity	OK
Amplitude Control Linearity	OK

Data Analyst : ***Jeff Devers***

Date/Time : ***3/13/2008-1700***

LMT Review ***Todd Blechinger***

Date : ***3/14/08***

EPRI Review

Date : ***3/16/08***

Report # ***EPRI-PA-04***

ANII Review ***N/A***

Date :

PHASED ARRAY CALIBRATION DATA SHEET

Procedure : **ZETEC_Omniscan PA_03_revD** ***Plant / Unit :*** **PSL/1**

UT equipment : **OMNI-M-PA32128PR** ***Ser. Number:*** **OMNI-Z-1012/OMNI-Z-6012**

Probe Configuration	*Serial No.*	*Active Channels*	*Wedge assembly*	*Calibration block*	*Reflector*	*Sens.* (dB)	*UT path* (mm)	*Date* (dd/mm/yy)	*Time* (hh:mm)	*Status*	*Operator* (initials)
CS/ CIRCU TRL 270	5155A103 5155B105	ALL	ADUXE 039A	MEUXE015A	1.0"	32.5	35.6	3/12/08	1200	INITIAL	PB
CS/ CIRCU TRL 270	5155A103 5155B105	ALL	ADUXE 039A	MEUXE015A	1.0"	32.5	35.6	3/12/08	1915	FINAL	PB
CS/ CIRCD TRL 90	5155A103 5155B106	ALL	ADUXE 039A	MEUXE015A	1.0"	32.5	35.6	3/12/08	1150	INITIAL	PB
CS/ CIRCD TRL 90	5155A103 5155B106	ALL	ADUXE 039A	MEUXE015A	1.0"	32.5	35.6	3/12/08	1920	FINAL	PB
CS/ CIRCD TRS 90	5155A103 5155B106	ALL	ADUXE 039A	MEUXE015A	1.0"	28.5	35.6	3/13/08	1200	INITIAL	PB
CS/ CIRCD TRS 90	5155A103 5155B106	ALL	ADUXE 039A	MEUXE015A	1.0"	28.5	35.6	3/13/08	1355	FINAL	PB
CS/ CIRCU TRS 270	5155A103 5155B105	ALL	ADUXE 039A	MEUXE015A	1.0"	28.5	35.6	3/13/08	1125	INITIAL	PB
CS/ CIRCU TRS 270	5155A103 5155B105	ALL	ADUXE 039A	MEUXE015A	1.0"	28.5	35.6	3/13/08	1410	FINAL	PB

"Sens. (dB)" = gain setting (in dB) required to obtain echo amplitude of 80% SH on reference reflector

Data Analyst : ***Jeff Devers*** JD
Date : ***3/13/08***

LMT Review ***Todd Blechinger***
Date : ***3/14/08***

EPRI Review
Date : ***3/16/08***

Report # ***EPRI-PA-04***

ANII Review ***N/A***
Date :

OMNISCAN PHASED ARRAY INSTRUMENT SETTINGS
WELD # FPLSTL-SRNZL-D01

Menu item	Setting	Essential / Non-Essential / Not applicable
File		
File		
Destination	Storage Card	Non-Essential
Save Mode	A-Scan	Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ADUXE039A***	Essential
Report		
Template	Complete	Non-Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ADUXE039A***	Essential
Paper Size	Letter	Non-Essential
Format		
User field	Off	Non-Essential
Probe	Off	Non-Essential
Setup	On	Essential
Note	Off	Non-Essential
View	Current Layout	Non-Essential
User field		Not applicable
Notes		Not applicable
Reading		
Result		
Selector	List 1	Essential
Field 1	A% (Peak Amplitude in Gate)	Essential
Field 2	A^ (Half Path position in Gate)	Essential
Field 3	B%	Not applicable
Field 4	B^	Not applicable
Cursors		Not applicable
Table		Not applicable
Export		Not applicable
Utilities		
Pref.		
Units	Millimeters	Essential
Bright (%)	25	Non-Essential
Scheme	Indoor	Non-Essential
System		
Clock Set	*Set to correct time*	Essential
Date Set	*Set to correct date*	Essential
Time Zone	*Set to correct time zone*	Non-Essential
Daylight saving	On	Non-Essential
Select Key	F2	Non-Essential
Assign Key	Gain	Non-Essential
Service		Not applicable

Options			Not applicable
Network	*Only for network saving*		Non-Essential
UT			
General			
Gain	34.5		Essential
Start	0		Essential
Range	113.09mm		Essential
Wedge delay	2.30		Essential
Velocity	5890 m/s		Essential
Pulser			
Pulser	1		Not applicable
Tx/Rx mode	PE		Essential
Freq	1.5		Essential
Voltage	High		Essential
PW	*Imported from LAW file (333 ns)*		Essential
PRF	25		Essential
Receiver			
Receiver	1		Not applicable
Filter	None		Essential
Rectifier	FW		Essential
Video Filter	Off		Essential
Receiver			
Averaging	1		Essential
Reject	0		Essential
Beam			
Gain Offset	*Imported from LAW file*		Essential
Scan Offset	*Imported from LAW file*		Essential
Index Offset	*Imported from LAW file*		Essential
Angle	*Imported from LAW file*		Essential
Skew	*Imported from LAW file*		Essential
Beam Delay	*Imported from LAW file*		Essential
Advanced			
dB Ref	Off		Essential
Points Qty	640		Essential
Scale Factor	6		Essential
Sum Gain	*Imported from LAW file*		Essential
Scan			
Encoder			
Encoder	1 (Scan)	2 (Index)	Essential
Polarity	Normal	Inverse	Essential
Type	Quad		Essential
Resolution	35.38	58.00	Essential
Origin	0		Essential
Synchro			

Source	Both Axes		Essential
Scan	Encoder 1		Essential
Index	Encoder 2		Not applicable
Scan Speed	25 for scan resolution of 1 mm		Not applicable
Area			
Scan Start	0 mm	245 mm	Essential
Scan End	275mm	510 mm	
Scan Resolution	1.0 mm		Essential
Index start	-65.7 mm		Essential
Index end	36.8 mm		Essential
Index resolution	14.6 mm		Essential
Start			
Start Mode	Reset All		Essential
Pause	Off		Non-Essential
Data			
Storage	Last		Essential
Display			
Selection			
Display	A-S-C		Essential
C-Scan 1	A%		Non-Essential
Group	Current		Non-Essential
Projection	On		Not applicable
Rulers			
UT Unit	Sound Path		Essential
% Ruler	Linear(%)		Essential
Grid	Off		Non-Essential
DAC / TCG	Off		Essential
Gate	On		Essential
Cursor	On		Essential
Zoom			Not applicable
Color			
Select	Amplitude		Essential
Start (%)	0.0		Essential
End (%)	100.0		Essential
Properties			Not applicable
Probe/Part			
Select			
Group	1		Not applicable
Group Link	Off		Not applicable
Select	Select Tx/Rx		Essential
Select Probe	Unknown		Not applicable
Select Wedge	Contact / Contact		Not applicable
Auto Detect	Off		Essential
Scan Offset	0		Essential

Index Offset	0			Essential
Skew	0			Essential
Characterize				Not applicable
Parts				Not applicable
Wizard				Not applicable
PGM Probe				
Configuration				
Group	1			Not applicable
Enable	Off			Not applicable
Scan Type	Custom			Essential
Connection P	1			Not applicable
Connection R	1			Not applicable
Aperture				Not applicable
Beam				Not applicable
Laws				
Auto Program	Off			Essential
Wizard				Not applicable
Gate/Alarm				
Gate				
Gate Select	Gate A	B	I	Essential
Gate Start	10	0	0	Essential
Width	End of time base	0	0	Non-Essential
Threshold	25	0	0	Essential
Mode	Positive			Not applicable
Synchro	Pulse			Essential
Alarms				Not applicable
Output				Not applicable
Gate/Alarm (ctd.)				
DAC / TCG				Not applicable
Thickness				Not applicable
Calibration				
Phased Array				Not applicable
Axis				Not applicable
TCG				Not applicable
Code				Not applicable
User				
Gain				Not applicable
Start				Not applicable
Range				Not applicable
Display				Not applicable
Gate				Not applicable

Focal Law Calculator Inputs

Menu item	Setting	Essential / Non-Essential / Not applicable
Probe (CS) 90°		
Name	1.5M16x2E32-7(EWUXE083A)	Essential
Probe Skew Angle	90°	Essential
Probe Frequency	1.5 MHz	Essential
Number of elements on primary axis	16	Essential
Primary axis pitch	2 mm	Essential
Secondary axis width	7 mm	Essential
Pitch and Catch	Checked	Essential
Probe separation		Not applicable
Squint angle	"0.0°"	Essential
Reverse primary axis	Unchecked	Essential
Specimen		
Name	Memphis CS LW	Non-Essential
Specimen Type	"Pipe OD"	Essential
Wave type	"Longitudinal" for TRL	Essential
Sound velocity	90°-5890 m/s	Essential
Thickness	40 mm	Essential
Radius	77 mm	Essential
Wedge		
Name	ADUXE039A	Essential
Footprint	"Curvature along secondary axis"	Essential
Wedge angle	22.3	Essential
Roof angle	6.0	Essential
Sound velocity	"2330 m/s"	Essential
Height at the middle of the first element	"8.17 mm" for ADUXE039A	Essential
Primary axis offset of the middle of the first element	"8.43 mm" for ADUXE039A	Essential
Secondary axis offset of the middle of the first element	"7.74 mm" for ADUXE039A	Essential
Primary axis position of wedge reference	"-50.00 mm"	Essential
Secondary axis position of wedge reference	"-15.00 mm"	Essential
Wedge length	"50.00 mm"	Essential

Distance between contact points (wedge width)	“30.00 mm”	Essential
Scan		
Type	“Linear”	Essential
Beam angles selection		
Primary steering angle		Not applicable
Secondary steering angle		Not applicable
Refracted angle	90°-30°,45°,60°,70°	Essential
Beam skew angle		Not applicable
Focal points selection		
Focusing type	Auto	Essential
Focal plane position		Not applicable
Emission focus position		Not applicable
Reception focus position		Not applicable
Elements selection		
Improved resolution	Checked	Essential
Pulser Start	“ 1 “	Essential
Pulser Stop	9	Essential
Pulser Resolution	“ 1 “	Essential
Receiver Start	“ 1 “	Essential
Primary axis aperture	8	Essential
Pulser connection	“ 1 “	Essential
Receiver connection	“ 65 “	Essential
Hardware selection		
Type	“OmniScan 32/128”	Essential

Menu item	Setting	Essential / Non-Essential / Not applicable
File		
File		
Destination	Storage Card	Non-Essential
Save Mode	A-Scan	Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCUTRL 270_AUTO_CS_ADUXE039A***	Essential
Report		
Template	Complete	Non-Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCUTRL 270_AUTO_CS_ADUXE039A***	Essential
Paper Size	Letter	Non-Essential
Format		
User field	Off	Non-Essential
Probe	Off	Non-Essential
Setup	On	Essential
Note	Off	Non-Essential
View	Current Layout	Non-Essential
User field		Not applicable
Notes		Not applicable
Reading		
Result		
Selector	List 1	Essential
Field 1	A% (Peak Amplitude in Gate)	Essential
Field 2	A^ (Half Path position in Gate)	Essential
Field 3	B%	Not applicable
Field 4	B^	Not applicable
Cursors		Not applicable
Table		Not applicable
Export		Not applicable
Utilities		
Pref.		
Units	Millimeters	Essential
Bright (%)	25	Non-Essential
Scheme	Indoor	Non-Essential
System		
Clock Set	*Set to correct time*	Essential
Date Set	*Set to correct date*	Essential
Time Zone	*Set to correct time zone*	Non-Essential
Daylight saving	On	Non-Essential
Select Key	F2	Non-Essential
Assign Key	Gain	Non-Essential

Service			Not applicable
Options			Not applicable
Network	*Only for network saving*		Non-Essential
UT			
General			
Gain	34.5		Essential
Start	0		Essential
Range	110.78		Essential
Wedge delay	2.30		Essential
Velocity	5770 m/s		Essential
Pulser			
Pulser	1		Not applicable
Tx/Rx mode	PE		Essential
Freq	1.5		Essential
Voltage	High		Essential
PW	*Imported from LAW file (333 ns)*		Essential
PRF	25		Essential
Receiver			
Receiver	1		Not applicable
Filter	None		Essential
Rectifier	FW		Essential
Video Filter	Off		Essential
Receiver			
Averaging	1		Essential
Reject	0		Essential
Beam			
Gain Offset	*Imported from LAW file*		Essential
Scan Offset	*Imported from LAW file*		Essential
Index Offset	*Imported from LAW file*		Essential
Angle	*Imported from LAW file*		Essential
Skew	*Imported from LAW file*		Essential
Beam Delay	*Imported from LAW file*		Essential
Advanced			
dB Ref	Off		Essential
Points Qty	640		Essential
Scale Factor	6		Essential
Sum Gain	*Imported from LAW file*		Essential
Scan			
Encoder			
Encoder	1 (Scan)	2 (Index)	Essential
Polarity	Normal	Inverse	Essential
Type	Quad		Essential
Resolution	35.36	58.00	Essential
Origin	0		Essential

Synchro			
Source	Both Axes		Essential
Scan	Encoder 1		Essential
Index	Encoder 2		Not applicable
Scan Speed	25 for scan resolution of 1 mm		Not applicable
Area			
Scan Start	0 mm	245 mm	Essential
Scan End	275 mm	510 mm	
Scan Resolution	1.0 mm		Essential
Index start	-41.8 mm		Essential
Index end	60.7 mm		Essential
Index resolution	14.6 mm		Essential
Start			
Start Mode	Reset All		Essential
Pause	Off		Non-Essential
Data			
Storage	Last		Essential
Display			
Selection			
Display	A-S-C		Essential
C-Scan 1	A%		Non-Essential
Group	Current		Non-Essential
Projection	On		Not applicable
Rulers			
UT Unit	Sound Path		Essential
% Ruler	Linear(%)		Essential
Grid	Off		Non-Essential
DAC / TCG	Off		Essential
Gate	On		Essential
Cursor	On		Essential
Zoom			Not applicable
Color			
Select	Amplitude		Essential
Start (%)	0.0		Essential
End (%)	100.0		Essential
Properties			Not applicable
Probe/Part			
Select			
Group	1		Not applicable
Group Link	Off		Not applicable
Select	Select Tx/Rx		Essential
Select Probe	Unknown		Not applicable
Select Wedge	Contact / Contact		Not applicable
Auto Detect	Off		Essential

Position				
Scan Offset	0			Essential
Index Offset	0			Essential
Skew	0			Essential
Characterize				Not applicable
Parts				Not applicable
Wizard				Not applicable
PGM Probe				
Configuration				
Group	1			Not applicable
Enable	Off			Not applicable
Scan Type	Custom			Essential
Connection P	1			Not applicable
Connection R	1			Not applicable
Aperture				Not applicable
Beam				Not applicable
Laws				
Auto Program	Off			Essential
Wizard				Not applicable
Gate/Alarm				
Gate				
Gate Select	Gate A	B	I	Essential
Gate Start	10	0	0	Essential
Width	End of time base	0	0	Non-Essential
Threshold	25	0	0	Essential
Mode	Positive			Not applicable
Synchro	Pulse			Essential
Alarms				Not applicable
Output				Not applicable
Gate/Alarm (ctd.)				
DAC / TCG				Not applicable
Thickness				Not applicable
Calibration				
Phased Array				Not applicable
Axis				Not applicable
TCG				Not applicable
Code				Not applicable
User				
Gain				Not applicable
Start				Not applicable
Range				Not applicable
Display				Not applicable
Gate				Not applicable

Focal Law Calculator Inputs

Menu item	Setting	Essential / Non-Essential / Not applicable
Probe (CS) 270°		
Name	1.5M16x2E32-7(EWUXE083A)	Essential
Probe Skew Angle	270°	Essential
Probe Frequency	1.5 MHz	Essential
Number of elements on primary axis	16	Essential
Primary axis pitch	2 mm	Essential
Secondary axis width	7 mm	Essential
Pitch and Catch	Checked	Essential
Probe separation		Not applicable
Squint angle	"0.0°"	Essential
Reverse primary axis	Unchecked	Essential
Specimen		
Name	Memphis SS LW	Non-Essential
Specimen Type	"Pipe OD"	Essential
Wave type	"Longitudinal" for TRL	Essential
Sound velocity	270°-5770 m/s	Essential
Thickness	40 mm	Essential
Radius	77 mm	Essential
Wedge		
Name	ADUXE039A	Essential
Footprint	"Curvature along secondary axis"	Essential
Wedge angle	22.3	Essential
Roof angle	6.0	Essential
Sound velocity	"2330 m/s"	Essential
Height at the middle of the first element	"8.17 mm" for ADUXE039A	Essential
Primary axis offset of the middle of the first element	"8.43 mm" for ADUXE039A	Essential
Secondary axis offset of the middle of the first element	"7.74 mm" for ADUXE039A	Essential
Primary axis position of wedge reference	"-50.00 mm"	Essential
Secondary axis position of wedge reference	"-15.00 mm"	Essential
Wedge length	"50.00 mm"	Essential

Distance between contact points (wedge width)	“30.00 mm”	Essential
Scan		
Type	“Linear”	Essential
Beam angles selection		
Primary steering angle		Not applicable
Secondary steering angle		Not applicable
Refracted angle	270°-30°,45°,60°,70°	Essential
Beam skew angle		Not applicable
Focal points selection		
Focusing type	Auto	Essential
Focal plane position		Not applicable
Emission focus position		Not applicable
Reception focus position		Not applicable
Elements selection		
Improved resolution	Checked	Essential
Pulser Start	“ 1 “	Essential
Pulser Stop	9	Essential
Pulser Resolution	“ 1 “	Essential
Receiver Start	“ 1 “	Essential
Primary axis aperture	8	Essential
Pulser connection	“ 1 “	Essential
Receiver connection	“ 65 “	Essential
Hardware selection		
Type	“OmniScan 32/128”	Essential

OMNISCAN PHASED ARRAY INSTRUMENT SETTINGS
WELD # FPLSTL-SRNZL-D01

Menu item	Setting	Essential / Non-Essential / Not applicable
File		
File		
Destination	Storage Card	Non-Essential
Save Mode	A-Scan	Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCD TRS 90_AUTO_CS_ADUXE039A***	Essential
Report		
Template	Complete	Non-Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCD TRS 90_AUTO_CS_ADUXE039A***	Essential
Paper Size	Letter	Non-Essential
Format		
User field	Off	Non-Essential
Probe	Off	Non-Essential
Setup	On	Essential
Note	Off	Non-Essential
View	Current Layout	Non-Essential
User field		Not applicable
Notes		Not applicable
Reading		
Result		
Selector	List 1	Essential
Field 1	A% (Peak Amplitude in Gate)	Essential
Field 2	A^ (Half Path position in Gate)	Essential
Field 3	B%	Not applicable
Field 4	B^	Not applicable
Cursors		Not applicable
Table		Not applicable
Export		Not applicable
Utilities		
Pref.		
Units	Millimeters	Essential
Bright (%)	25	Non-Essential
Scheme	Indoor	Non-Essential
System		
Clock Set	*Set to correct time*	Essential
Date Set	*Set to correct date*	Essential
Time Zone	*Set to correct time zone*	Non-Essential
Daylight saving	On	Non-Essential
Select Key	F2	Non-Essential
Assign Key	Gain	Non-Essential

Service			Not applicable
Options			Not applicable
Network	*Only for network saving*		Non-Essential
UT			
General			
Gain	28.5		Essential
Start	0		Essential
Range	116.28mm		Essential
Wedge delay	3.30		Essential
Velocity	3230 m/s		Essential
Pulser			
Pulser	1		Not applicable
Tx/Rx mode	PE		Essential
Freq	1.5		Essential
Voltage	High		Essential
PW	*Imported from LAW file (333 ns)*		Essential
PRF	25		Essential
Receiver			
Receiver	1		Not applicable
Filter	None		Essential
Rectifier	FW		Essential
Video Filter	Off		Essential
Receiver			
Averaging	1		Essential
Reject	0		Essential
Beam			
Gain Offset	*Imported from LAW file*		Essential
Scan Offset	*Imported from LAW file*		Essential
Index Offset	*Imported from LAW file*		Essential
Angle	*Imported from LAW file*		Essential
Skew	*Imported from LAW file*		Essential
Beam Delay	*Imported from LAW file*		Essential
Advanced			
dB Ref	Off		Essential
Points Qty	800		Essential
Scale Factor	9		Essential
Sum Gain	*Imported from LAW file*		Essential
Scan			
Encoder			
Encoder	1 (Scan)	2 (Index)	Essential
Polarity	Normal	Inverse	Essential
Type	Quad		Essential
Resolution	35.38	58.00	Essential
Origin	0		Essential

Synchro		
Source	Both Axes	Essential
Scan	Encoder 1	Essential
Index	Encoder 2	Not applicable
Scan Speed	25 for scan resolution of 1 mm	Not applicable
Area		
Scan Start	0 mm	Essential
Scan End	510 mm	
Scan Resolution	1.0 mm	Essential
Index start	-70.2 mm	Essential
Index end	-14.3 mm	Essential
Index resolution	14.0 mm	Essential
Start		
Start Mode	Reset All	Essential
Pause	Off	Non-Essential
Data		
Storage	Last	Essential
Display		
Selection		
Display	A-S-C	Essential
C-Scan 1	A%	Non-Essential
Group	Current	Non-Essential
Projection	On	Not applicable
Rulers		
UT Unit	Sound Path	Essential
% Ruler	Linear(%)	Essential
Grid	Off	Non-Essential
DAC / TCG	Off	Essential
Gate	On	Essential
Cursor	On	Essential
Zoom		Not applicable
Color		
Select	Amplitude	Essential
Start (%)	0.0	Essential
End (%)	100.0	Essential
Properties		Not applicable
Probe/Part		
Select		
Group	1	Not applicable
Group Link	Off	Not applicable
Select	Select Tx/Rx	Essential
Select Probe	Unknown	Not applicable
Select Wedge	Contact / Contact	Not applicable
Auto Detect	Off	Essential

Scan Offset	0			Essential
Index Offset	0			Essential
Skew	0			Essential
Characterize				Not applicable
Parts				Not applicable
Wizard				Not applicable
PGM Probe				
Configuration				
Group	1			Not applicable
Enable	Off			Not applicable
Scan Type	Custom			Essential
Connection P	1			Not applicable
Connection R	1			Not applicable
Aperture				Not applicable
Beam				Not applicable
Laws				
Auto Program	Off			Essential
Wizard				Not applicable
Gate/Alarm				
Gate				
Gate Select	Gate A	B	I	Essential
Gate Start	10	0	0	Essential
Width	End of time base	0	0	Non-Essential
Threshold	25	0	0	Essential
Mode	Positive			Not applicable
Synchro	Pulse			Essential
Alarms				Not applicable
Output				Not applicable
Gate/Alarm (ctd.)				
DAC / TCG				Not applicable
Thickness				Not applicable
Calibration				
Phased Array				Not applicable
Axis				Not applicable
TCG				Not applicable
Code				Not applicable
User				
Gain				Not applicable
Start				Not applicable
Range				Not applicable
Display				Not applicable
Gate				Not applicable

Focal Law Calculator Inputs

Menu item	Setting	Essential / Non-Essential / Not applicable
Probe (CS) 90°		
Name	1.5M16x2E32-7(EWUXE083A)	Essential
Probe Skew Angle	90°	Essential
Probe Frequency	1.5 MHz	Essential
Number of elements on primary axis	16	Essential
Primary axis pitch	2 mm	Essential
Secondary axis width	7 mm	Essential
Pitch and Catch	Checked	Essential
Probe separation		Not applicable
Squint angle	"0.0°"	Essential
Reverse primary axis	Unchecked	Essential
Specimen		
Name	Memphis CS SW	Non-Essential
Specimen Type	"Pipe OD"	Essential
Wave type	"Transverse" for TRL	Essential
Sound velocity	90°-3230 m/s	Essential
Thickness	40 mm	Essential
Radius	77 mm	Essential
Wedge		
Name	ADUXE039A	Essential
Footprint	"Curvature along secondary axis"	Essential
Wedge angle	22.3	Essential
Roof angle	6.0	Essential
Sound velocity	"2330 m/s"	Essential
Height at the middle of the first element	"8.17 mm" for ADUXE039A	Essential
Primary axis offset of the middle of the first element	"8.43 mm" for ADUXE039A	Essential
Secondary axis offset of the middle of the first element	"7.74 mm" for ADUXE039A	Essential
Primary axis position of wedge reference	"-50.00 mm"	Essential
Secondary axis position of wedge reference	"-15.00 mm"	Essential

Wedge length	“50.00 mm”	Essential
Distance between contact points (wedge width)	“30.00 mm”	Essential
Scan		
Type	“Linear”	Essential
Beam angles selection		
Primary steering angle		Not applicable
Secondary steering angle		Not applicable
Refracted angle	90°-45°,60°	Essential
Beam skew angle		Not applicable
Focal points selection		
Focusing type	Auto	Essential
Focal plane position		Not applicable
Emission focus position		Not applicable
Reception focus position		Not applicable
Elements selection		
Improved resolution	Checked	Essential
Pulser Start	“ 1 “	Essential
Pulser Stop	9	Essential
Pulser Resolution	“ 1 “	Essential
Receiver Start	“ 1 “	Essential
Primary axis aperture	8	Essential
Pulser connection	“ 1 “	Essential
Receiver connection	“ 65 “	Essential
Hardware selection		
Type	“OmniScan 32/128”	Essential

OMNISCAN PHASED ARRAY INSTRUMENT SETTINGS
WELD # FPLSTL-SRNZL-D01

Menu item	Setting	Essential / Non-Essential / Not applicable
File		
File		
Destination	Storage Card	Non-Essential
Save Mode	A-Scan	Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCUTRS_270_AUTO_CS_ADUXE039A***	Essential
Report		
Template	Complete	Non-Essential
File Name	***FPLSTL-SRNZL-D01_155MM_CIRCUTRS_270_AUTO_CS_ADUXE039A***	Essential
Paper Size	Letter	Non-Essential
Format		
User field	Off	Non-Essential
Probe	Off	Non-Essential
Setup	On	Essential
Note	Off	Non-Essential
View	Current Layout	Non-Essential
User field		Not applicable
Notes		Not applicable
Reading		
Result		
Selector	List 1	Essential
Field 1	A% (Peak Amplitude in Gate)	Essential
Field 2	A^ (Half Path position in Gate)	Essential
Field 3	B%	Not applicable
Field 4	B^	Not applicable
Cursors		Not applicable
Table		Not applicable
Export		Not applicable
Utilities		
Pref.		
Units	Millimeters	Essential
Bright (%)	25	Non-Essential
Scheme	Indoor	Non-Essential
System		
Clock Set	*Set to correct time*	Essential
Date Set	*Set to correct date*	Essential
Time Zone	*Set to correct time zone*	Non-Essential
Daylight saving	On	Non-Essential
Select Key	F2	Non-Essential
Assign Key	Gain	Non-Essential

Service			Not applicable
Options			Not applicable
Network	*Only for network saving*		Non-Essential
UT			
General			
Gain	28.5		Essential
Start	0		Essential
Range	113.40 mm		Essential
Wedge delay	3.30		Essential
Velocity	3150 m/s		Essential
Pulser			
Pulser	1		Not applicable
Tx/Rx mode	PE		Essential
Freq	1.5		Essential
Voltage	High		Essential
PW	*Imported from LAW file (333 ns)*		Essential
PRF	25		Essential
Receiver			
Receiver	1		Not applicable
Filter	None		Essential
Rectifier	FW		Essential
Video Filter	Off		Essential
Receiver			
Averaging	1		Essential
Reject	0		Essential
Beam			
Gain Offset	*Imported from LAW file*		Essential
Scan Offset	*Imported from LAW file*		Essential
Index Offset	*Imported from LAW file*		Essential
Angle	*Imported from LAW file*		Essential
Skew	*Imported from LAW file*		Essential
Beam Delay	*Imported from LAW file*		Essential
Advanced			
dB Ref	Off		Essential
Points Qty	800		Essential
Scale Factor	9		Essential
Sum Gain	*Imported from LAW file*		Essential
Scan			
Encoder			
Encoder	1 (Scan)	2 (Index)	Essential
Polarity	Normal	Inverse	Essential
Type	Quad		Essential
Resolution	35.38	58.00	Essential
Origin	0		Essential

Synchro		
Source	Both Axes	Essential
Scan	Encoder 1	Essential
Index	Encoder 2	Not applicable
Scan Speed	25 for scan resolution of 1 mm	Not applicable
Area		
Scan Start	0 mm	Essential
Scan End	510 mm	
Scan Resolution	1.0 mm	Essential
Index start	9.3 mm	Essential
Index end	65.2 mm	Essential
Index resolution	14.0 mm	Essential
Start		
Start Mode	Reset All	Essential
Pause	Off	Non-Essential
Data		
Storage	Last	Essential
Display		
Selection		
Display	A-S-C	Essential
C-Scan 1	A%	Non-Essential
Group	Current	Non-Essential
Projection	On	Not applicable
Rulers		
UT Unit	Sound Path	Essential
% Ruler	Linear(%)	Essential
Grid	Off	Non-Essential
DAC / TCG	Off	Essential
Gate	On	Essential
Cursor	On	Essential
Zoom		Not applicable
Color		
Select	Amplitude	Essential
Start (%)	0.0	Essential
End (%)	100.0	Essential
Properties		Not applicable
Probe/Part		
Select		
Group	1	Not applicable
Group Link	Off	Not applicable
Select	Select Tx/Rx	Essential
Select Probe	Unknown	Not applicable
Select Wedge	Contact / Contact	Not applicable
Auto Detect	Off	Essential

Scan Offset	0			Essential
Index Offset	0			Essential
Skew	0			Essential
Characterize				Not applicable
Parts				Not applicable
Wizard				Not applicable
PGM Probe				
Configuration				
Group	1			Not applicable
Enable	Off			Not applicable
Scan Type	Custom			Essential
Connection P	1			Not applicable
Connection R	1			Not applicable
Aperture				Not applicable
Beam				Not applicable
Laws				
Auto Program	Off			Essential
Wizard				Not applicable
Gate/Alarm				
Gate				
Gate Select	Gate A	B	I	Essential
Gate Start	10	0	0	Essential
Width	End of time base	0	0	Non-Essential
Threshold	25	0	0	Essential
Mode	Positive			Not applicable
Synchro	Pulse			Essential
Alarms				Not applicable
Output				Not applicable
Gate/Alarm (ctd.)				
DAC / TCG				Not applicable
Thickness				Not applicable
Calibration				
Phased Array				Not applicable
Axis				Not applicable
TCG				Not applicable
Code				Not applicable
User				
Gain				Not applicable
Start				Not applicable
Range				Not applicable
Display				Not applicable
Gate				Not applicable

Focal Law Calculator Inputs

Menu item	Setting	Essential / Non-Essential / Not applicable
Probe (CS) 270°		
Name	1.5M16x2E32-7(EWUXE083A)	Essential
Probe Skew Angle	270°	Essential
Probe Frequency	1.5 MHz	Essential
Number of elements on primary axis	16	Essential
Primary axis pitch	2 mm	Essential
Secondary axis width	7 mm	Essential
Pitch and Catch	Checked	Essential
Probe separation		Not applicable
Squint angle	"0.0°"	Essential
Reverse primary axis	Unchecked	Essential
Specimen		
Name	Memphis SS SW	Non-Essential
Specimen Type	"Pipe OD"	Essential
Wave type	"Transverse" for TRL	Essential
Sound velocity	270°-3150 m/s	Essential
Thickness	40 mm	Essential
Radius	77 mm	Essential
Wedge		
Name	ADUXE039A	Essential
Footprint	"Curvature along secondary axis"	Essential
Wedge angle	22.3	Essential
Roof angle	6.0	Essential
Sound velocity	"2330 m/s"	Essential
Height at the middle of the first element	"8.17 mm" for ADUXE039A	Essential
Primary axis offset of the middle of the first element	"8.43 mm" for ADUXE039A	Essential
Secondary axis offset of the middle of the first element	"7.74 mm" for ADUXE039A	Essential
Primary axis position of wedge reference	"-50.00 mm"	Essential
Secondary axis position of wedge reference	"-15.00 mm"	Essential

Wedge length	“50.00 mm”	Essential
Distance between contact points (wedge width)	“30.00 mm”	Essential
Scan		
Type	“Linear”	Essential
Beam angles selection		
Primary steering angle		Not applicable
Secondary steering angle		Not applicable
Refracted angle	270°-45°,60°	Essential
Beam skew angle		Not applicable
Focal points selection		
Focusing type	Auto	Essential
Focal plane position		Not applicable
Emission focus position		Not applicable
Reception focus position		Not applicable
Elements selection		
Improved resolution	Checked	Essential
Pulser Start	“ 1 “	Essential
Pulser Stop	9	Essential
Pulser Resolution	“ 1 “	Essential
Receiver Start	“ 1 “	Essential
Primary axis aperture	8	Essential
Pulser connection	“ 1 “	Essential
Receiver connection	“ 65 “	Essential
Hardware selection		
Type	“OmniScan 32/128”	Essential

OmniScan Report

Report Date	Report Version	Setup File name	Date of Inspection	Inspection Version	Save Mode
2008 / 03 / 12	1.4R3	FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ADUXE039A.opd	2008 / 03 / 12	1.4R3	A Scan
OmniScan Type	**OmniScan Serial #**	**Module Type**	**Module Serial #**	**Calibration Due**	**Data File name**
OmniScan MX	OMNI-Z-1012	OMNI-M-PA32128PR	OMNI-Z-6012	2008 / 11 / 21	FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ADUXE039A

Group 1

Setup

A:30.0 Sk:090 L:001

Beam Delay	Start (Half Path)	Range (Half Path)	PRF	Type	Averaging Factor
12.10 us	-0.02 mm	113.09 mm	25	PA	1
Scale Type	**Scale Factor**	**Video Filter**	**Pretrig**	**Rectification**	**Band Pass Filter**
Compression	6	Off	0.00 µs	FW	None (0.52 - 19 MHz)
Voltage	**Gain**	**Mode**	**Wave Type**	**Sound Velocity**	**Pulse Width**
High	34.50 dB	PC (Pitch And Catch)	User Defined	5890.0 m/s	332.50 ns
Scan Offset	**Index Offset**	**Skew**			
0.00 mm	0.00 mm	N/A			

Gate	Start	Width	Threshold	Synchro
I	0.04 mm	1.00 mm	0.00 %	Pulse
A	10.23 mm	122.48 mm	25.00 %	Pulse
B	0.04 mm	1.00 mm	0.00 %	Pulse

Law

Law File name	Scan Type
DM_155_CIRCD TRL 90_AUTO_CS_ADUXE039A.law	Custom

Part

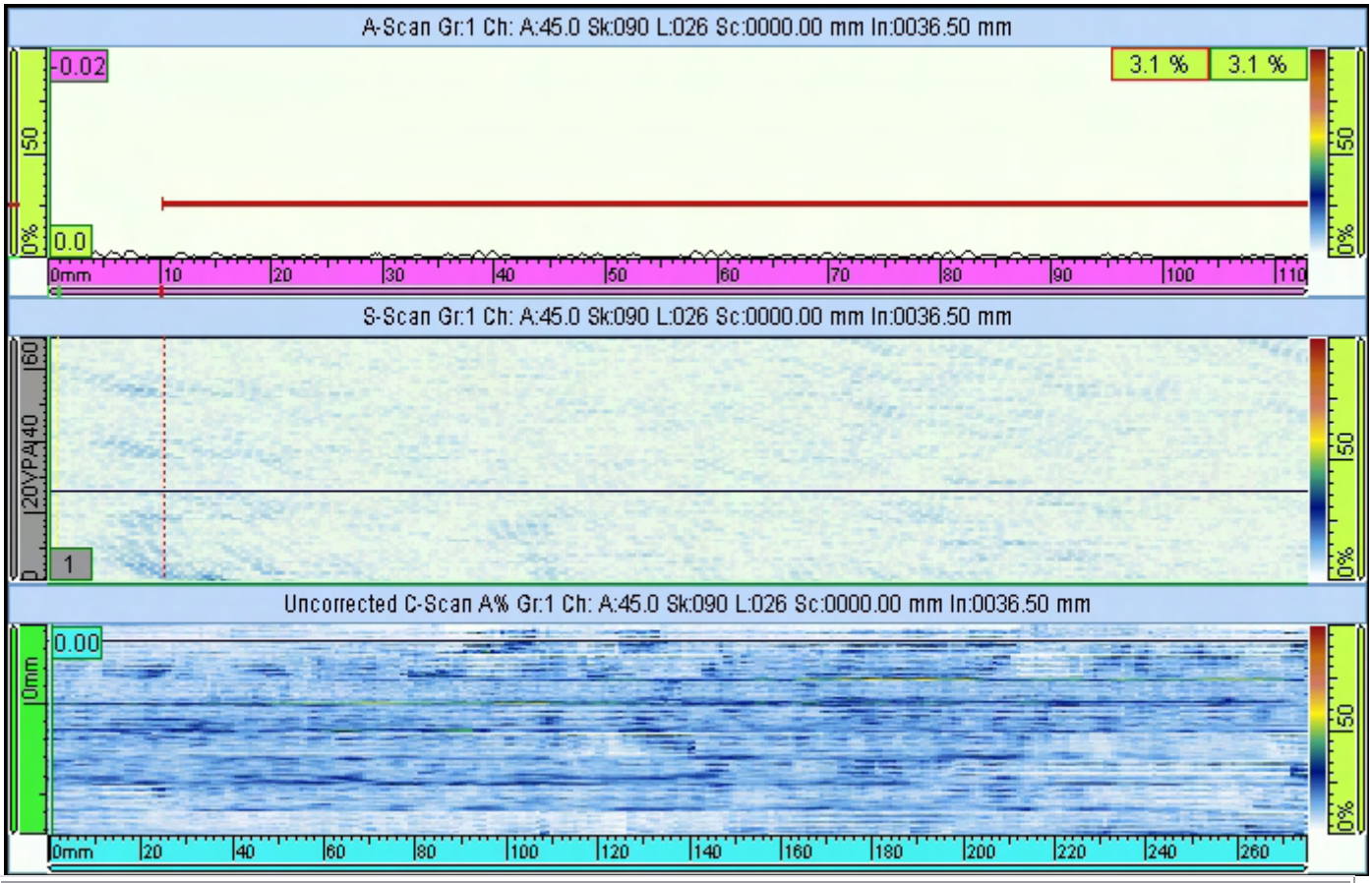
Material	Geometry	Thickness
STEEL MILD	Plate	50.00 mm

Scan Area

Scan Start	Scan Length	Scan Resolution	Index Start	Index Length	Index Resolution
0.00 mm	275.00 mm	1.00 mm	-65.70 mm	102.20 mm	14.60 mm
Synchro	**Max Scan Speed**				
Both Axis	25.00 mm/s				

Axis	Encoder	Encoder Type	Encoder Resolution	Polarity
Scan	1	Quadrature	35.36 step/mm	Normal
Index	2	Quadrature	58.00 step/mm	Inverse

A%	A^	B%	B^	None	None	None	None
4.3 %	--- mm	2.7 %	0.10 mm				



Technician Name Todd P. Blechinger

Technician Signature

Contractor LMTINC.

Date 3/12/08

OmniScan Report

Report Date	Report Version	Setup File name	Date of Inspection	Inspection Version	Save Mode
2008 / 03 / 12	1.4R3	FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ADUXE039A245TO510.opd	2008 / 03 / 12	1.4R3	A Scan
OmniScan Type	**OmniScan Serial #**	**Module Type**	**Module Serial #**	**Calibration Due**	**Data File name**
OmniScan MX	OMNI-Z-1012	OMNI-M-PA32128PR	OMNI-Z-6012	2008 / 11 / 21	FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ADUXE039A245TO510

Group 1

Setup

A:30.0 Sk:090 L:001

Beam Delay	Start (Half Path)	Range (Half Path)	PRF	Type	Averaging Factor
12.10 us	-0.02 mm	113.09 mm	25	PA	1
Scale Type	**Scale Factor**	**Video Filter**	**Pretrig**	**Rectification**	**Band Pass Filter**
Compression	6	Off	0.00 µs	FW	None (0.52 - 19 MHz)
Voltage	**Gain**	**Mode**	**Wave Type**	**Sound Velocity**	**Pulse Width**
High	34.50 dB	PC (Pitch And Catch)	User Defined	5890.0 m/s	332.50 ns
Scan Offset	**Index Offset**	**Skew**			
0.00 mm	0.00 mm	N/A			

Gate	Start	Width	Threshold	Synchro
I	0.04 mm	1.00 mm	0.00 %	Pulse
A	10.23 mm	122.48 mm	25.00 %	Pulse
B	0.04 mm	1.00 mm	0.00 %	Pulse

Law

Law File name	Scan Type
DM_155_CIRCD TRL 90_AUTO_CS_ADUXE039A.law	Custom

Part

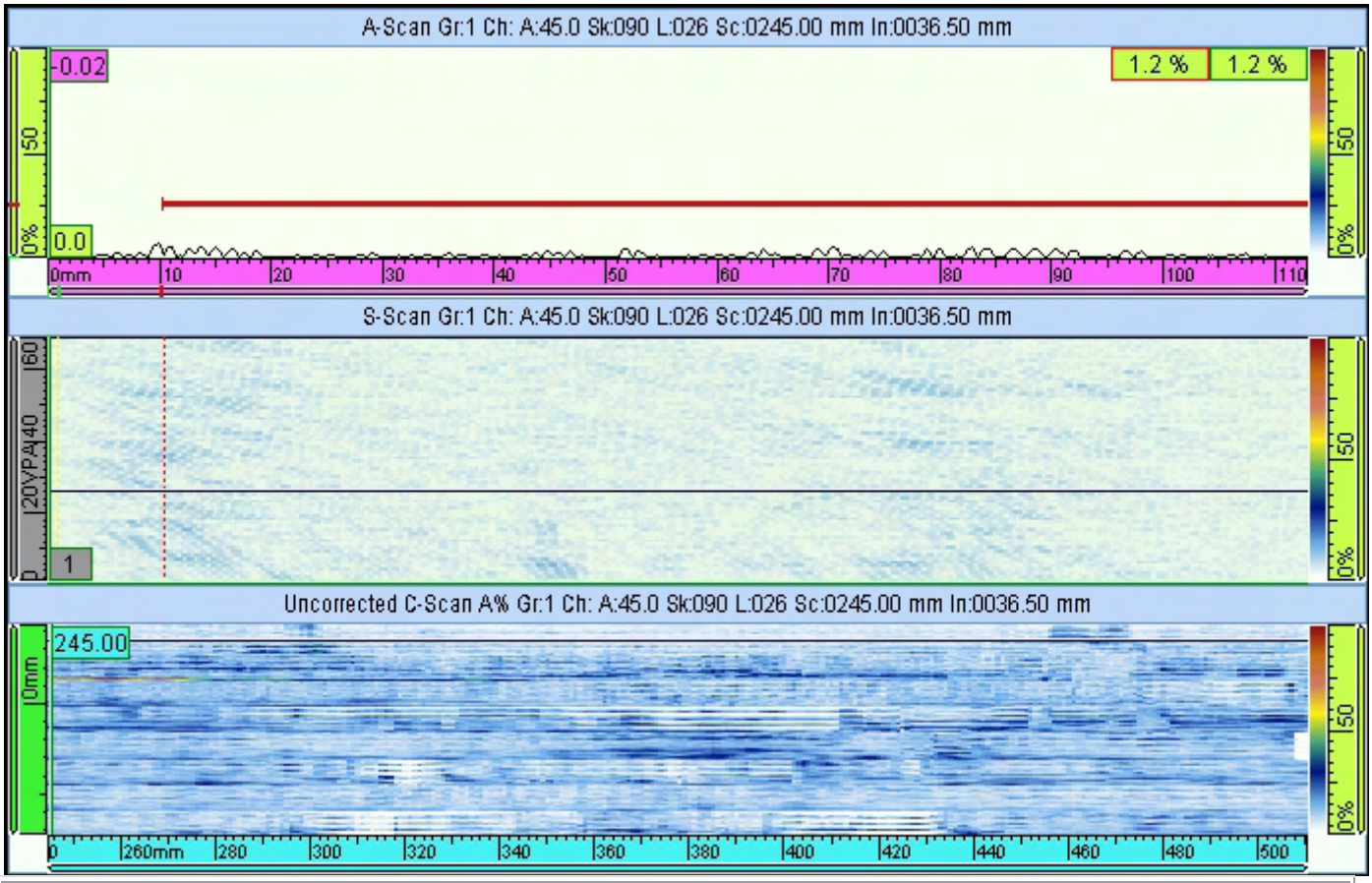
Material	Geometry	Thickness
STEEL MILD	Plate	50.00 mm

Scan Area

Scan Start	Scan Length	Scan Resolution	Index Start	Index Length	Index Resolution
245.00 mm	265.00 mm	1.00 mm	-65.70 mm	102.20 mm	14.60 mm
Synchro	**Max Scan Speed**				
Both Axis	25.00 mm/s				

Axis	Encoder	Encoder Type	Encoder Resolution	Polarity
Scan	1	Quadrature	35.36 step/mm	Normal
Index	2	Quadrature	58.00 step/mm	Inverse

A%	A^	B%	B^	None	None	None	None
6.3 %	--- mm	1.2 %	0.07 mm				



Technician Name	Todd P. Blechinger
Technician Signature	
Contractor	LMT INC.
Date	3/12/08

OmniScan Report

Report Date	Report Version	Setup File name	Date of Inspection	Inspection Version	Save Mode
2008 / 03 / 12	1.4R3	FPLSTL-SRNZL-D01_155MM_CIRCU TRL 270_AUTO_CS_ADUXE039A.opd	2008 / 03 / 12	1.4R3	A Scan
OmniScan Type	**OmniScan Serial #**	**Module Type**	**Module Serial #**	**Calibration Due**	**Data File name**
OmniScan MX	OMNI-Z-1012	OMNI-M-PA32128PR	OMNI-Z-6012	2008 / 11 / 21	FPLSTL-SRNZL-D01_155MM_CIRCU TRL 270_AUTO_CS_ADUXE039A

Group 1

Setup

A:30.0 Sk:270 L:001

Beam Delay	Start (Half Path)	Range (Half Path)	PRF	Type	Averaging Factor
12.08 us	-0.02 mm	110.78 mm	25	PA	1
Scale Type	**Scale Factor**	**Video Filter**	**Pretrig**	**Rectification**	**Band Pass Filter**
Compression	6	Off	0.00 µs	FW	None (0.52 - 19 MHz)
Voltage	**Gain**	**Mode**	**Wave Type**	**Sound Velocity**	**Pulse Width**
High	34.50 dB	PC (Pitch And Catch)	User Defined	5770.0 m/s	332.50 ns
Scan Offset	**Index Offset**	**Skew**			
0.00 mm	0.00 mm	N/A			

Gate	Start	Width	Threshold	Synchro
I	0.02 mm	0.98 mm	0.00 %	Pulse
A	10.00 mm	119.99 mm	25.00 %	Pulse
B	0.02 mm	0.98 mm	0.00 %	Pulse

Law

Law File name	Scan Type
DM_155_CIRCU TRL 270_AUTO_CS_ADUXE039A.law	Custom

Part

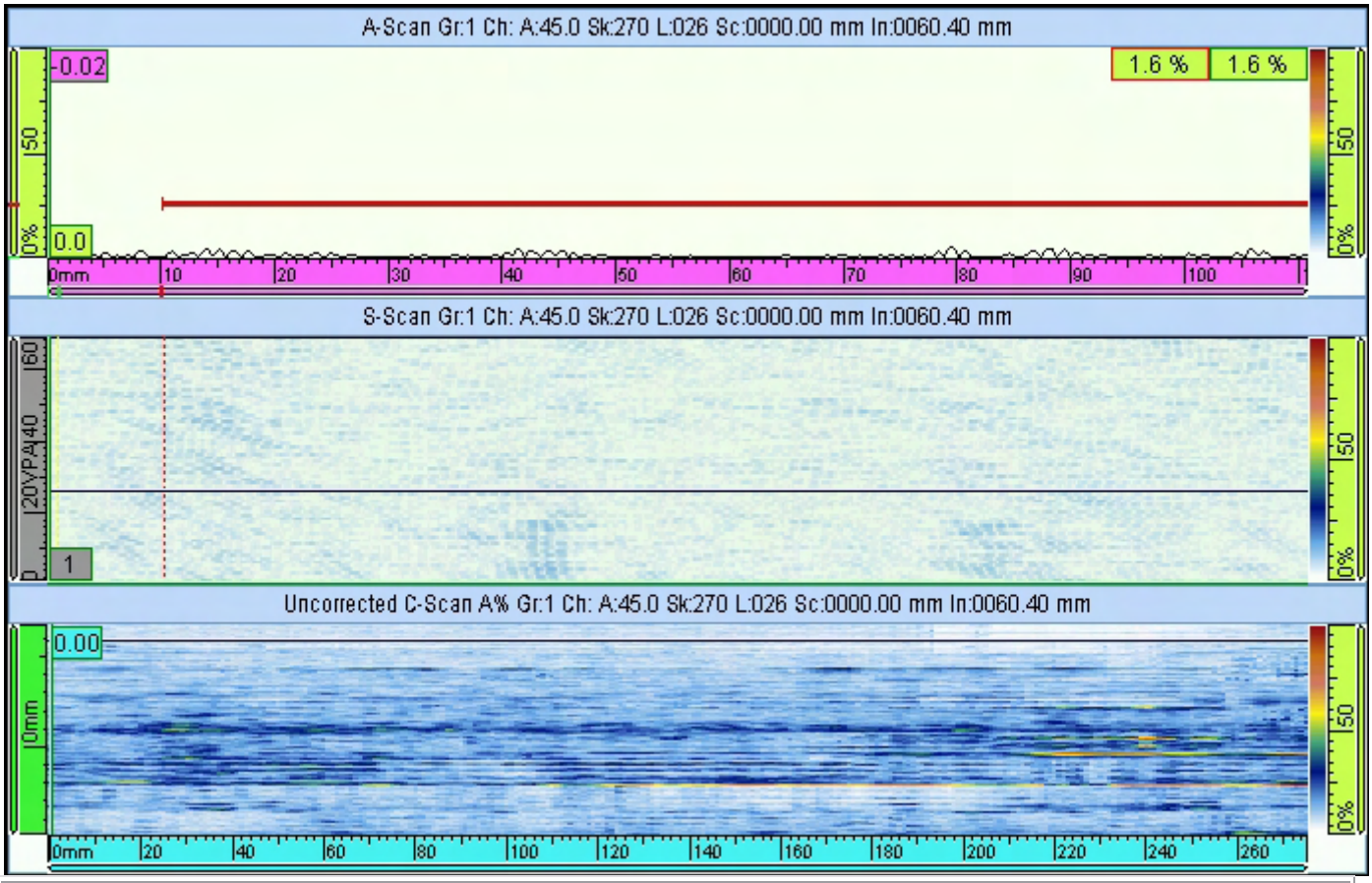
Material	Geometry	Thickness
STEEL MILD	Plate	50.00 mm

Scan Area

Scan Start	Scan Length	Scan Resolution	Index Start	Index Length	Index Resolution
0.00 mm	275.00 mm	1.00 mm	-41.80 mm	102.20 mm	14.60 mm
Synchro	**Max Scan Speed**				
Both Axis	25.00 mm/s				

Axis	Encoder	Encoder Type	Encoder Resolution	Polarity
Scan	1	Quadrature	35.36 step/mm	Normal
Index	2	Quadrature	58.00 step/mm	Inverse

A%	A^	B%	B^	None	None	None	None
6.3 %	--- mm	1.6 %	0.19 mm				



Technician Name Todd P. Blechinger

Technician Signature

Contractor LMT INC.

Date 3/12/08

OmniScan Report

Report Date	Report Version	Setup File name	Date of Inspection	Inspection Version	Save Mode
2008 / 03 / 12	1.4R3	FPLSTL-SRNZL-D01_155MM_CIRCU TRL 270_AUTO_CS_ADUXE039A_245TO510.opd	2008 / 03 / 12	1.4R3	A Scan
OmniScan Type	**OmniScan Serial #**	**Module Type**	**Module Serial #**	**Calibration Due**	**Data File name**
OmniScan MX	OMNI-Z-1012	OMNI-M-PA32128PR	OMNI-Z-6012	2008 / 11 / 21	FPLSTL-SRNZL-D01_155MM_CIRCU TRL 270_AUTO_CS_ADUXE039A_245TO510

Group 1

Setup

A:30.0 Sk:270 L:001

Beam Delay	Start (Half Path)	Range (Half Path)	PRF	Type	Averaging Factor
12.08 us	-0.02 mm	110.78 mm	25	PA	1
Scale Type	**Scale Factor**	**Video Filter**	**Pretrig**	**Rectification**	**Band Pass Filter**
Compression	6	Off	0.00 µs	FW	None (0.52 - 19 MHz)
Voltage	**Gain**	**Mode**	**Wave Type**	**Sound Velocity**	**Pulse Width**
High	34.50 dB	PC (Pitch And Catch)	User Defined	5770.0 m/s	332.50 ns
Scan Offset	**Index Offset**	**Skew**			
0.00 mm	0.00 mm	N/A			

Gate	Start	Width	Threshold	Synchro
I	0.02 mm	0.98 mm	0.00 %	Pulse
A	10.00 mm	119.99 mm	25.00 %	Pulse
B	0.02 mm	0.98 mm	0.00 %	Pulse

Law

Law File name	Scan Type
DM_155_CIRCU TRL 270_AUTO_CS_ADUXE039A.law	Custom

Part

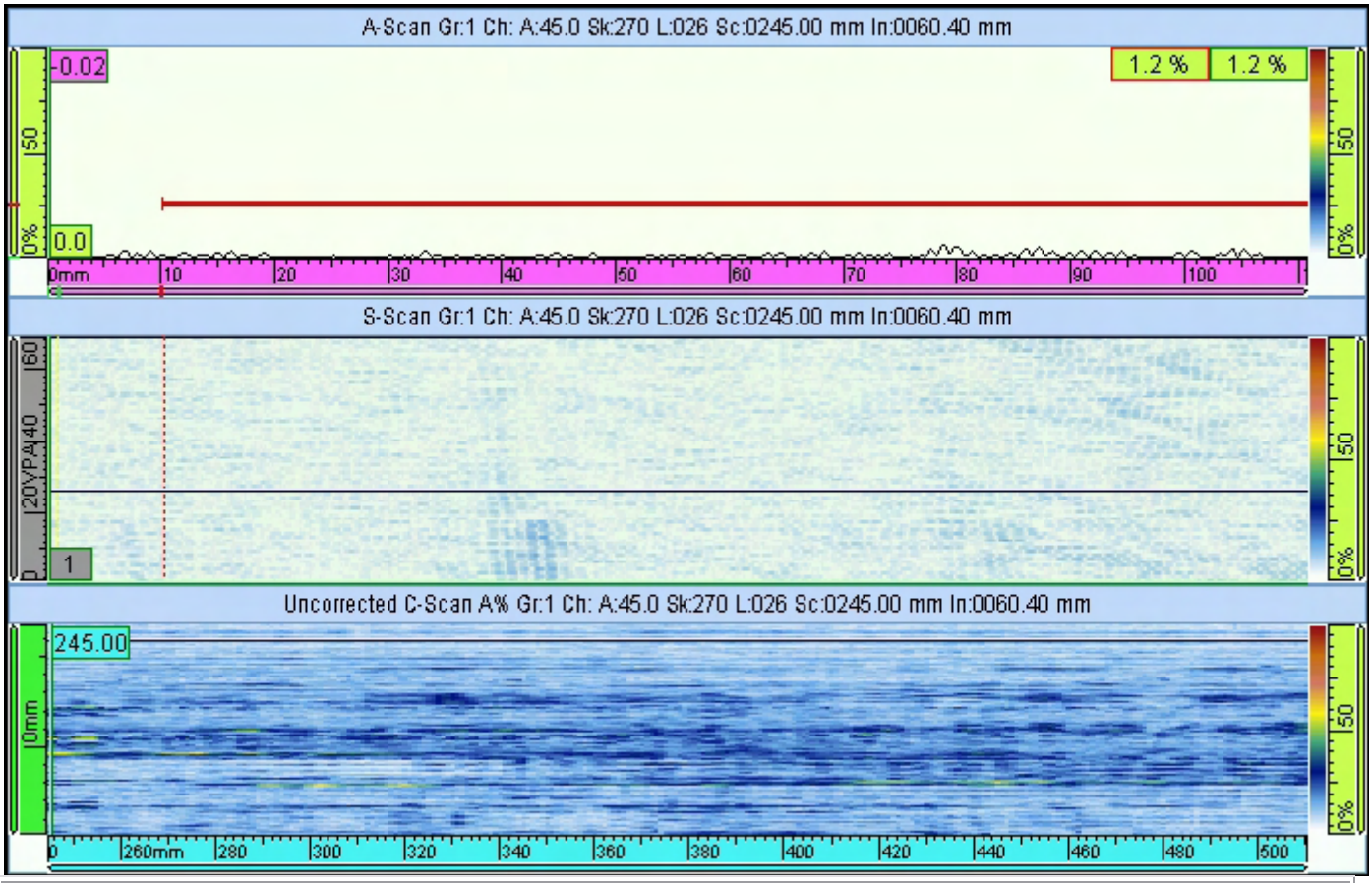
Material	Geometry	Thickness
STEEL MILD	Plate	50.00 mm

Scan Area

Scan Start	Scan Length	Scan Resolution	Index Start	Index Length	Index Resolution
245.00 mm	265.00 mm	1.00 mm	-41.80 mm	102.20 mm	14.60 mm
Synchro	**Max Scan Speed**				
Both Axis	25.00 mm/s				

Axis	Encoder	Encoder Type	Encoder Resolution	Polarity
Scan	1	Quadrature	35.36 step/mm	Normal
Index	2	Quadrature	58.00 step/mm	Inverse

A%	A^	B%	B^	None	None	None	None
6.7 %	--- mm	1.2 %	0.02 mm				



Technician Name	Todd P. Blechinger
Technician Signature	
Contractor	LMT INC.
Date	3/12/08

OmniScan Report

Report Date	Report Version	Setup File name	Date of Inspection	Inspection Version	Save Mode
2008 / 03 / 13	1.4R3	FPLSTL-SRNZL-D01_155MM_CIRCD TRS 90_AUTO_CS_ADUXE039A.opd	2008 / 03 / 13	1.4R3	A Scan
OmniScan Type	**OmniScan Serial #**	**Module Type**	**Module Serial #**	**Calibration Due**	**Data File name**
OmniScan MX	OMNI-Z-1012	OMNI-M-PA32128PR	OMNI-Z-6012	2008 / 11 / 21	FPLSTL-SRNZL-D01_155MM_CIRCD TRS 90_AUTO_CS_ADUXE039A

Group 1

Setup

A:45.0 Sk:090 L:001

Beam Delay	Start (Half Path)	Range (Half Path)	PRF	Type	Averaging Factor
13.96 us	-0.01 mm	116.28 mm	25	PA	1
Scale Type	**Scale Factor**	**Video Filter**	**Pretrig**	**Rectification**	**Band Pass Filter**
Compression	9	Off	0.00 µs	FW	None (0.52 - 19 MHz)
Voltage	**Gain**	**Mode**	**Wave Type**	**Sound Velocity**	**Pulse Width**
High	28.50 dB	PC (Pitch And Catch)	User Defined	3230.0 m/s	332.50 ns
Scan Offset	**Index Offset**	**Skew**			
0.00 mm	0.00 mm	N/A			

Gate	Start	Width	Threshold	Synchro
I	0.02 mm	0.55 mm	0.00 %	Pulse
A	5.61 mm	67.17 mm	25.00 %	Pulse
B	0.02 mm	0.55 mm	0.00 %	Pulse

Law

Law File name	Scan Type
DM_155_CIRCD TRS 90_AUTO_CS_ADUXE039A.law	Custom

Part

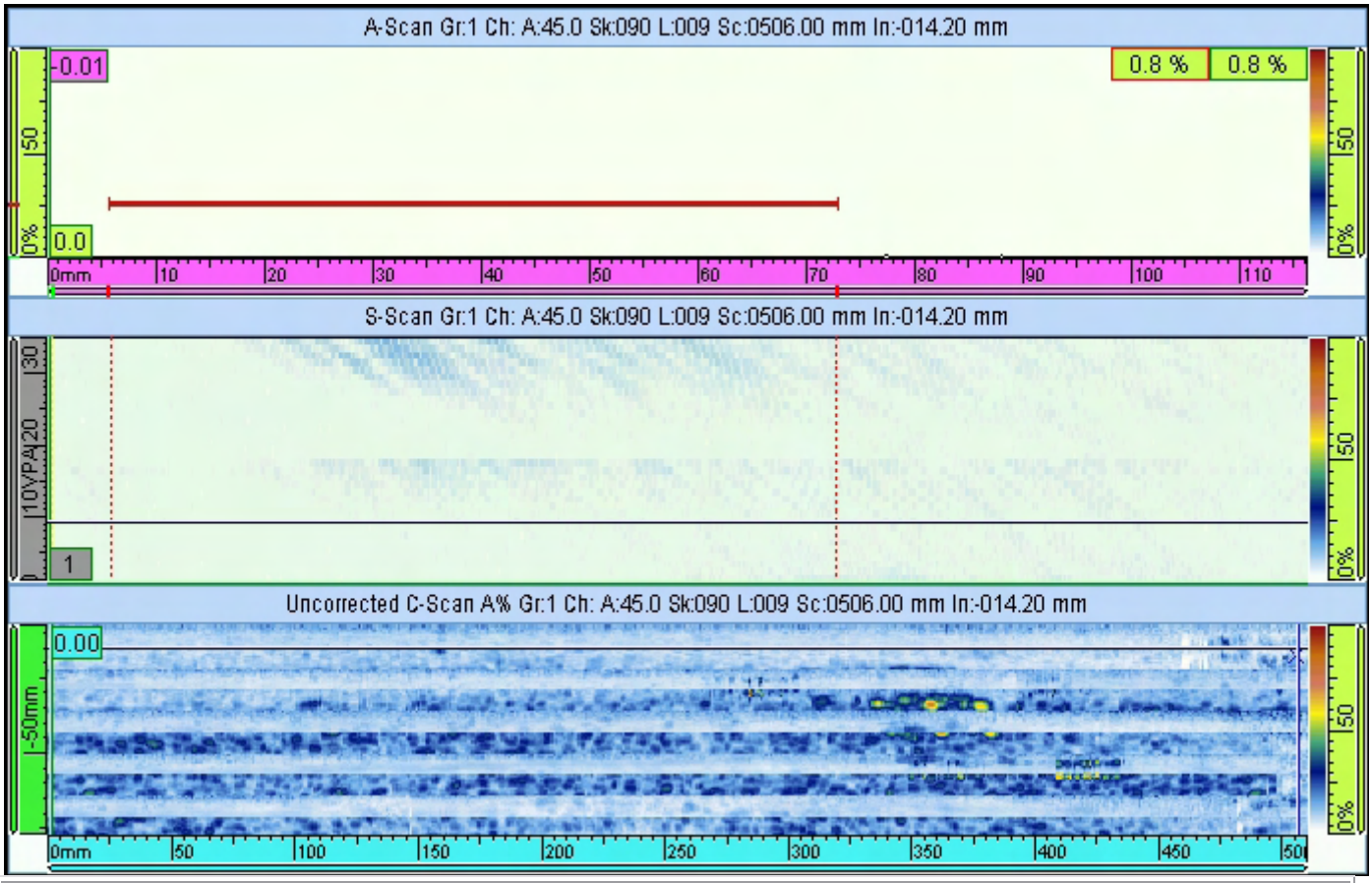
Material	Geometry	Thickness
STEEL MILD	Plate	50.00 mm

Scan Area

Scan Start	Scan Length	Scan Resolution	Index Start	Index Length	Index Resolution
0.00 mm	510.00 mm	1.00 mm	-70.20 mm	56.00 mm	14.00 mm
Synchro	**Max Scan Speed**				
Both Axis	25.00 mm/s				

Axis	Encoder	Encoder Type	Encoder Resolution	Polarity
Scan	1	Quadrature	35.36 step/mm	Normal
Index	2	Quadrature	58.00 step/mm	Inverse

A%	A^	B%	B^	None	None	None	None
1.6 %	--- mm	0.8 %	0.05 mm				



Technician Name	Todd P. Blechinger
Technician Signature	
Contractor	LMT INC.
Date	3/13/08

OmniScan Report

Report Date	Report Version	Setup File name	Date of Inspection	Inspection Version	Save Mode
2008 / 03 / 13	1.4R3	FPLSTL-SRNZL-D01_155MM_CIRCU TRS 270_AUTO_CS_ADUXE039A.opd	2008 / 03 / 13	1.4R3	A Scan
OmniScan Type	**OmniScan Serial #**	**Module Type**	**Module Serial #**	**Calibration Due**	**Data File name**
OmniScan MX	OMNI-Z-1012	OMNI-M-PA32128PR	OMNI-Z-6012	2008 / 11 / 21	FPLSTL-SRNZL-D01_155MM_CIRCU TRS 270_AUTO_CS_ADUXE039A

Group 1

Setup

A:45.0 Sk:270 L:001

Beam Delay	Start (Half Path)	Range (Half Path)	PRF	Type	Averaging Factor
14.14 us	-0.01 mm	113.40 mm	25	PA	1
Scale Type	**Scale Factor**	**Video Filter**	**Pretrig**	**Rectification**	**Band Pass Filter**
Compression	9	Off	0.00 µs	FW	None (0.52 - 19 MHz)
Voltage	**Gain**	**Mode**	**Wave Type**	**Sound Velocity**	**Pulse Width**
High	28.50 dB	PC (Pitch And Catch)	User Defined	3150.0 m/s	332.50 ns
Scan Offset	**Index Offset**	**Skew**			
0.00 mm	0.00 mm	N/A			

Gate	Start	Width	Threshold	Synchro
I	0.02 mm	0.54 mm	0.00 %	Pulse
A	10.01 mm	113.76 mm	25.00 %	Pulse
B	0.02 mm	0.54 mm	0.00 %	Pulse

Law

Law File name	Scan Type
DM_155_CIRCU TRS 270_AUTO_CS_ADUXE039A.law	Custom

Part

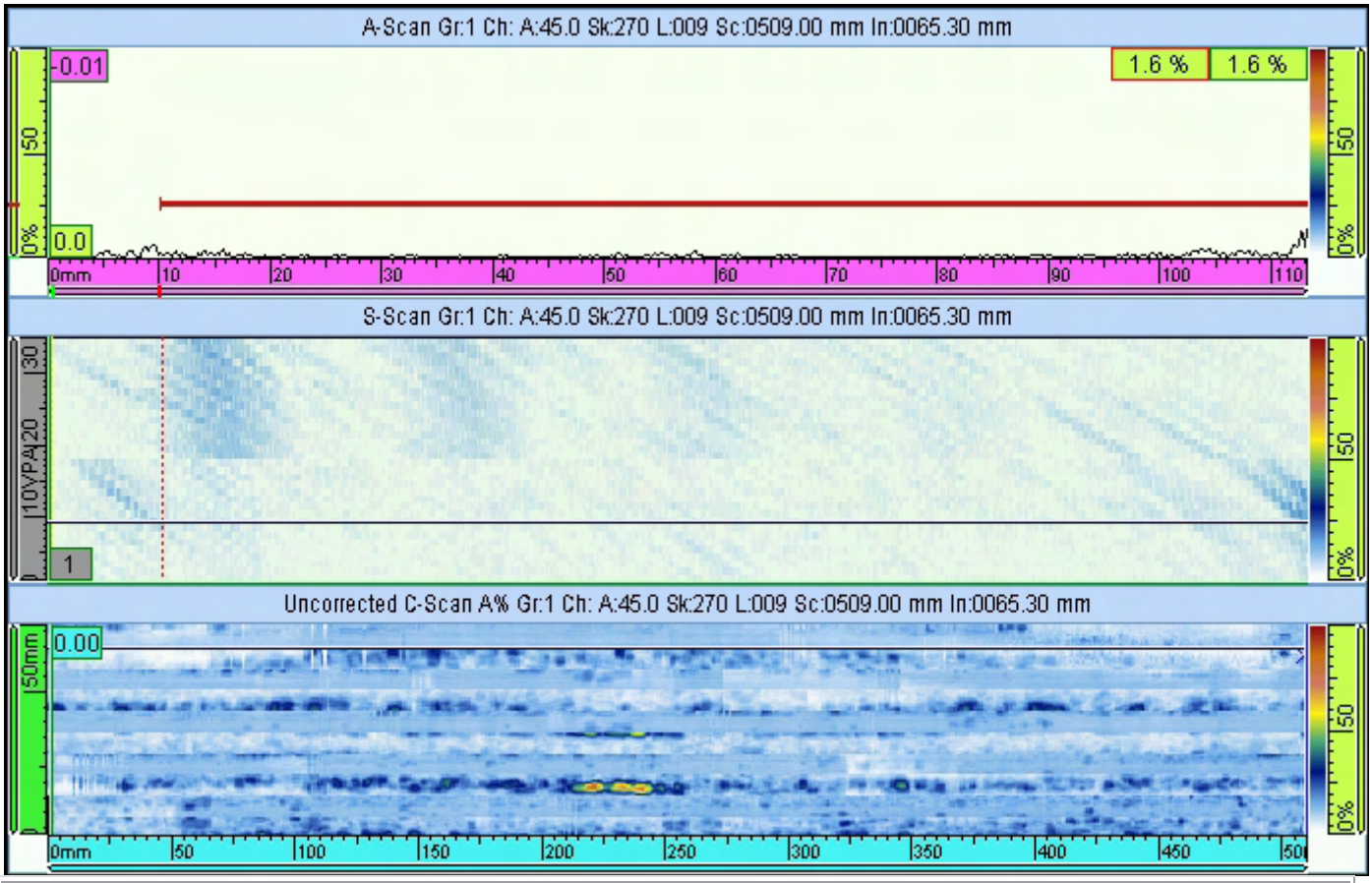
Material	Geometry	Thickness
STEEL MILD	Plate	50.00 mm

Scan Area

Scan Start	Scan Length	Scan Resolution	Index Start	Index Length	Index Resolution
0.00 mm	510.00 mm	1.00 mm	9.30 mm	56.00 mm	14.00 mm
Synchro	**Max Scan Speed**				
Both Axis	25.00 mm/s				

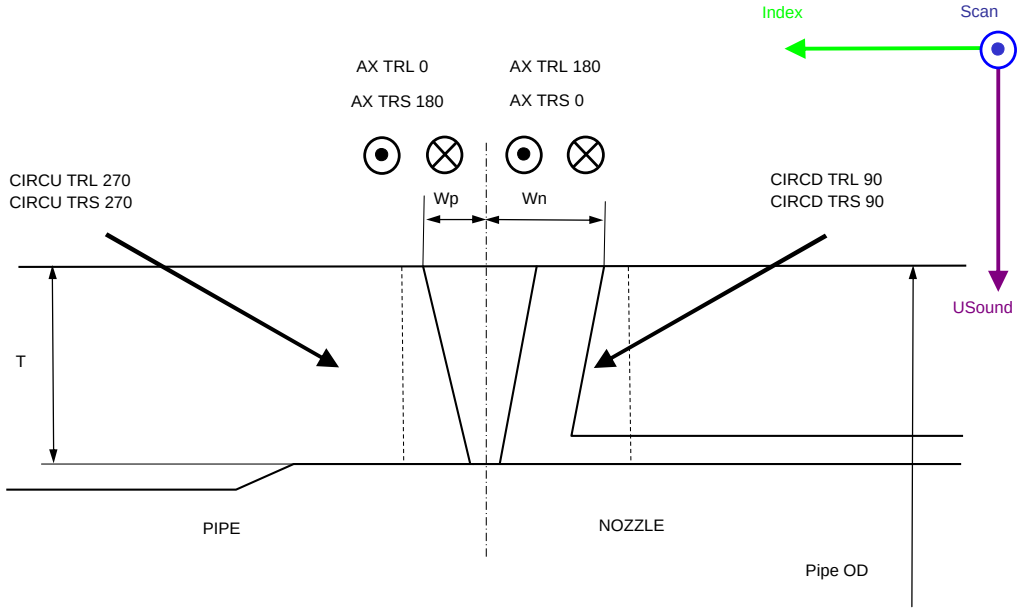
Axis	Encoder	Encoder Type	Encoder Resolution	Polarity
Scan	1	Quadrature	35.36 step/mm	Normal
Index	2	Quadrature	58.00 step/mm	Inverse

A%	A^	B%	B^	None	None	None	None
22.7 %	--- mm	1.6 %	0.03 mm				



Technician Name	Todd P. Blechinger
Technician Signature	
Contractor	LMT INC.
Date	3/13/08

SCAN PLAN



Procedure :	***ZETEC_OmniScanPA_03_revD***	***Pipe Thickness T :***	***40.0*** mm
Plant / Unit :	***Memphis***	***Pipe OD :***	***154.0*** mm
Weld Id. :	***FPLSTL-SRNZL-D01***	***Weld Extent Pipe Side Wp :***	***16.5*** mm
Dual Side Access :	***yes***	***Weld Extent Nozzle Side Wn :***	***21.5*** mm
Complete Pipe:	***yes***	***Access Limitation Pipe Side Lp :***	***118.0*** mm
		Access Limitation Nozzle Side Ln	***127.0*** mm
		Weld Length:	***484.0*** mm

SCANNING SEQUENCES CIRCUMFERENTIAL FLAWS

Focal law group	*Probe Type*	*MinTB* (mm)	*MaxTB* (mm)	*# Data Points*	*Scan* Start (mm)	*Scan* End (mm)	*Scan* Resol. (mm)	*Index* Start (mm)	*Index* End (mm)	*Index* Resol. (mm)	*# Lines*	*Done ?* (OK / NA)
CIRCD TRL 90	*CS*	*100.0*	*125.0*	*640*	*0.0*	*508.8*	*1.0*	*-65.7*	*36.8*	*14.6*	*8*	*OK*
CIRCU TRL 270	*CS*	*100.0*	*125.0*	*640*	*0.0*	*508.8*	*1.0*	*-41.8*	*60.7*	*14.6*	*8*	*OK*
CIRCD TRS 90	*CS*	*100.0*	*125.0*	*800*	*0.0*	*508.8*	*1.0*	*-70.2*	*-14.3*	*14.0*	*5*	*OK*
CIRCU TRS 270	*CS*	*100.0*	*125.0*	*800*	*0.0*	*508.8*	*1.0*	*9.3*	*65.2*	*14.0*	*5*	*OK*

SCANNING SEQUENCES AXIAL FLAWS

Focal law group	*Probe Type*	*MinTB* (mm)	*MaxTB* (mm)	*# Data Points*	*Scan* Start (mm)	*Scan* End (mm)	*Scan* Resol. (mm)	*Index* Start (mm)	*Index* End (mm)	*Index* Resol. (mm)	*# Lines*	
AX TRL 0												*NA*
AX TRL 180												*NA*
AX TRS 0												*NA*
AX TRS 180												*NA*
AX TRL 0												*NA*
AX TRL 180												*NA*

Data Analyst : ***Jeff Devers***
Date : ***3/12/08***

LMT Review ***Todd Blechinger***
Date : ***3/14/08***

EPRI Review
Date : ***3/16/08***

Report # ***EPRI-PA-04***

ANII Review ***N/A***
Date :

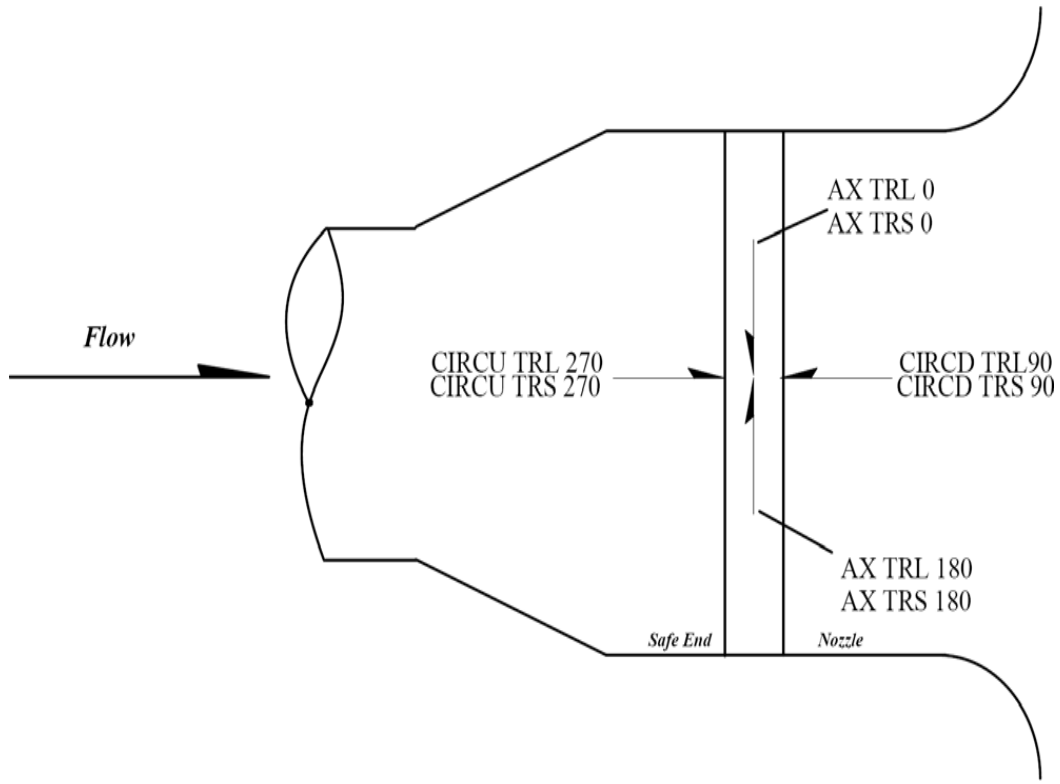
Report # EPRI-PA-04

Ultrasonic Phased Array Examination Report

Plant / Unit	EPRI	OmniScan Software Version	1.4R3	Acquisition Tech. Todd Blechinger	Level III
Comp / System	FPLSTL-SRNZL-D01	OmniScanConverter Software Version	1.7R5	Acquisition Tech. N/A	Level
Component Temp.	64°	UltraVision Software Revision	1.1Q5		
Procedure No.	Zetec_ OmniScanPA_03				
Revision#	rev.D				

Focal Law Group Used	Data File Identification	Results
CIRCD TRL 90	FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ADUXE039A	RI-See Attached
CIRCU TRL 270	FPLSTL-SRNZL-D01_155MM_CIRCU TRL 270_AUTO_CS_ADUXE039A	RI-See Attached
CIRCD TRS 90	FPLSTL-SRNZL-D01_155MM_CIRCU TRS 90_AUTO_CS_ADUXE039A	RI-See Attached
CIRCU TRS 270	FPLSTL-SRNZL-D01_155MM_CIRCU TRS 270_AUTO_CS_ADUXE039A	RI-See Attached

Technique Referencing System



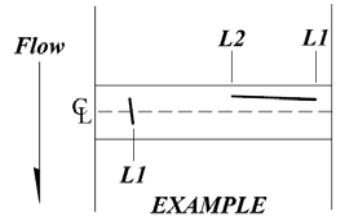
Comments:

See attached Phased Array Indication Data Tabulation Sheet for indication information.

Data Analyst	Jeff Devers	Level III	Date 3/13/2008	LMT Review	Todd Blechinger	Level III	Date 3/14/2008
EPRI REVIEW / DATE		3/16/08		ANII REVIEW / DATE			

Phased Array Indication Tabulation Sheet

Report # EPRI-PA-04



PLANT/ UNIT	EPRI	REFERENCE LOCATION	0 Stamp / Weld Centerline
COMP / SYSTEM	FPLSTL-SRNZL-D01	COMP THICKNESS	1.60"
PROCEDURE NO.	Zetec_ OmniScanPA_03	WELD CROWN WIDTH	1.50"
REV / CHANGE NO.	rev.D	WELD LENGTH	19.05"

DATA ANALYST / LEVEI J.L. Devers / III

LMT REVIEW / LEVEL T.P. Blechinger / III

IND. #	Data File	Merged Data Group Used	Length Sizing Information			Thru Wall Sizing Information			Indication Position		Evaluation / Comments	Printout Page #
			Start (L1)	Stop (L2)	Length	T.W. Depth	Remain. Ligament	T.W. %	Upstream	Dnstream		
1	FPLSTL-SRNZL-D01_155MM_CIRCU TRL 270_AUTO_CS_ ADUXE039A	CIRCU TRL 270	7.9"	9.9"	2.0"	.4"	1.2"	N/A	.25"		Circ. Flaw	43&45 of 50
1	FPLSTL-SRNZL-D01_155MM_CIRCU TRS 270_AUTO_CS_ ADUXE039A	CIRCU TRS 270	8.3"	9.9"	1.6"	.2"	1.4"	N/A	.25"		Circ. Flaw	44&46 of 50
2	FPLSTL-SRNZL-D01_155MM_CIRCD TRL 90_AUTO_CS_ ADUXE039A245to510	CIRCD TRL 90	14.0"	16.0"	2.0"	.3"	1.3"	N/A		.5"	Circ. Flaw	47&49 of 50
2	FPLSTL-SRNZL-D01_155MM_CIRCD TRS 90_AUTO_CS_ ADUXE039A	CIRCD TRS 90	13.0"	15.0"	2.0"	.3"	1.3"	N/A		.5"	Circ. Flaw	48&50 of 50

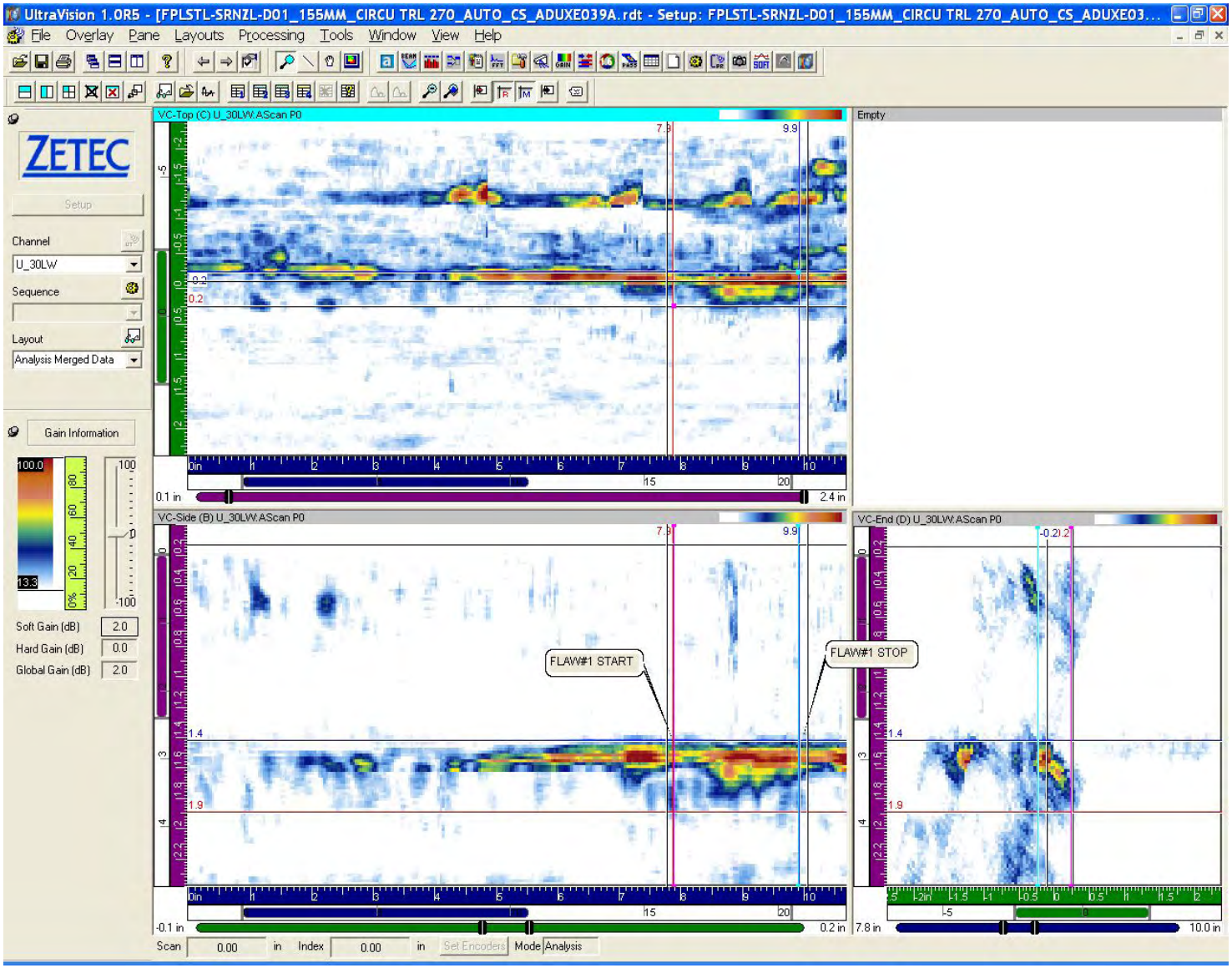
Comments: Used CIRCU TRL 270(Flaw #1), & CIRCD TRL 90(Flaw #2), Focal Law groups for final length and depth sizing results based on flaw locations in weld material.

Data Analyst J.L. Devers Level III Date 3/10/2008

Further Evaluation Required? [ ] Yes [X] No

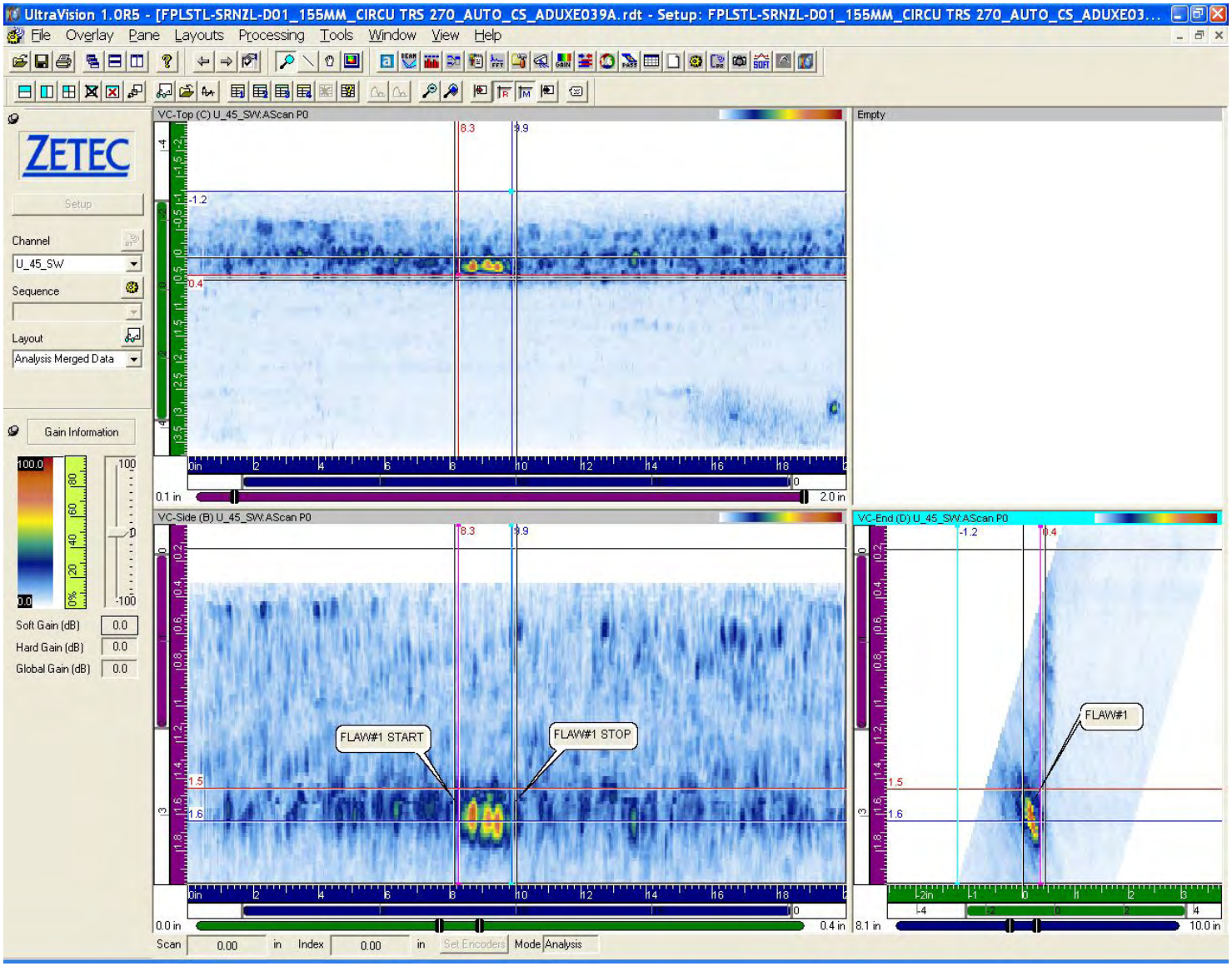
EPRI9i REVIEW / DATE 3/16/08

ANII REVIEW / DATE



Data Analyst J. L. Devers **Level** III **EPRI Review**

LMT Review T.P. Blechinger **Level** III **ANII Review** **Report#** EPRI-PA-04

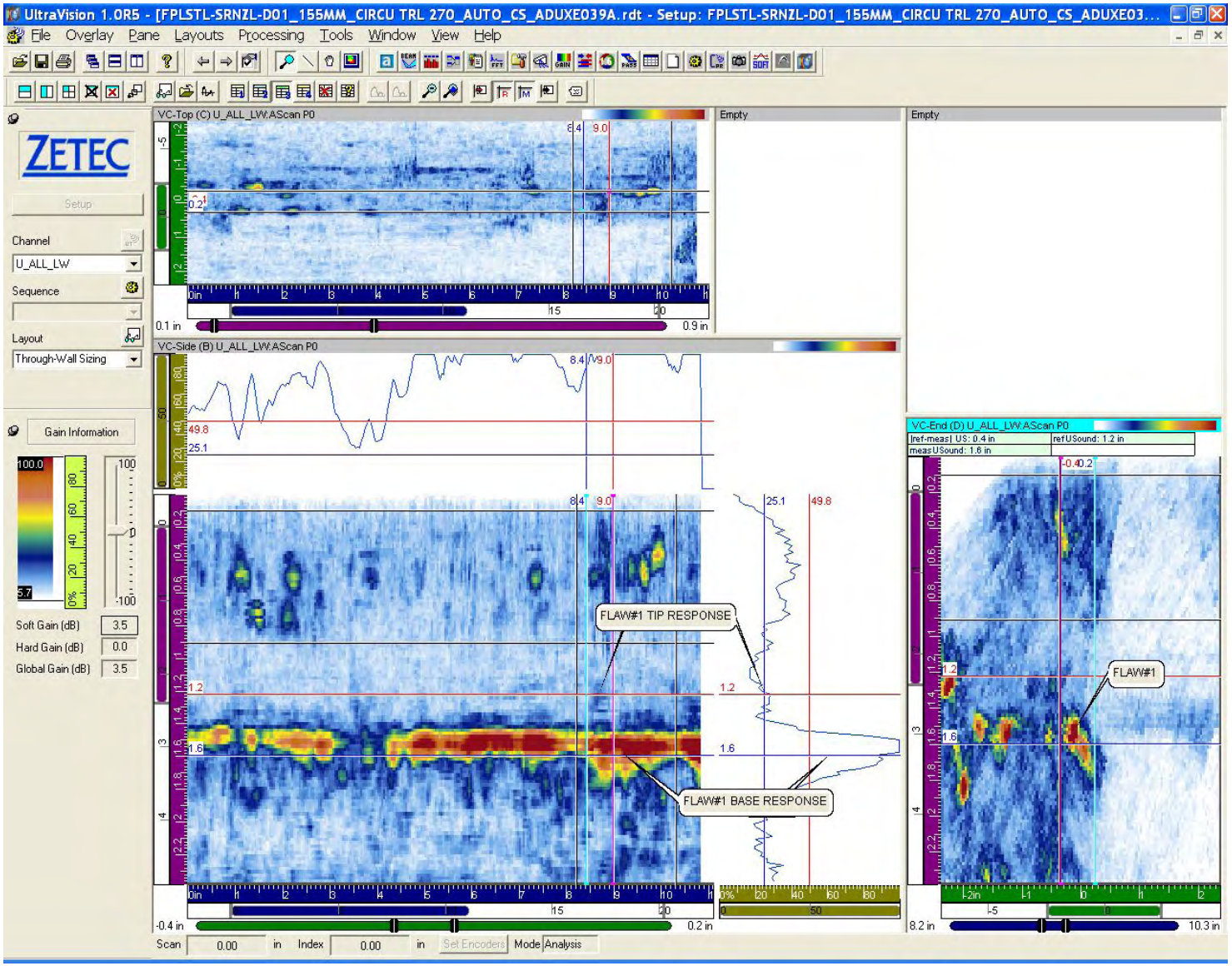


Data Analyst _____ **Level** III **EPRI Review** _____

J. L. Devers

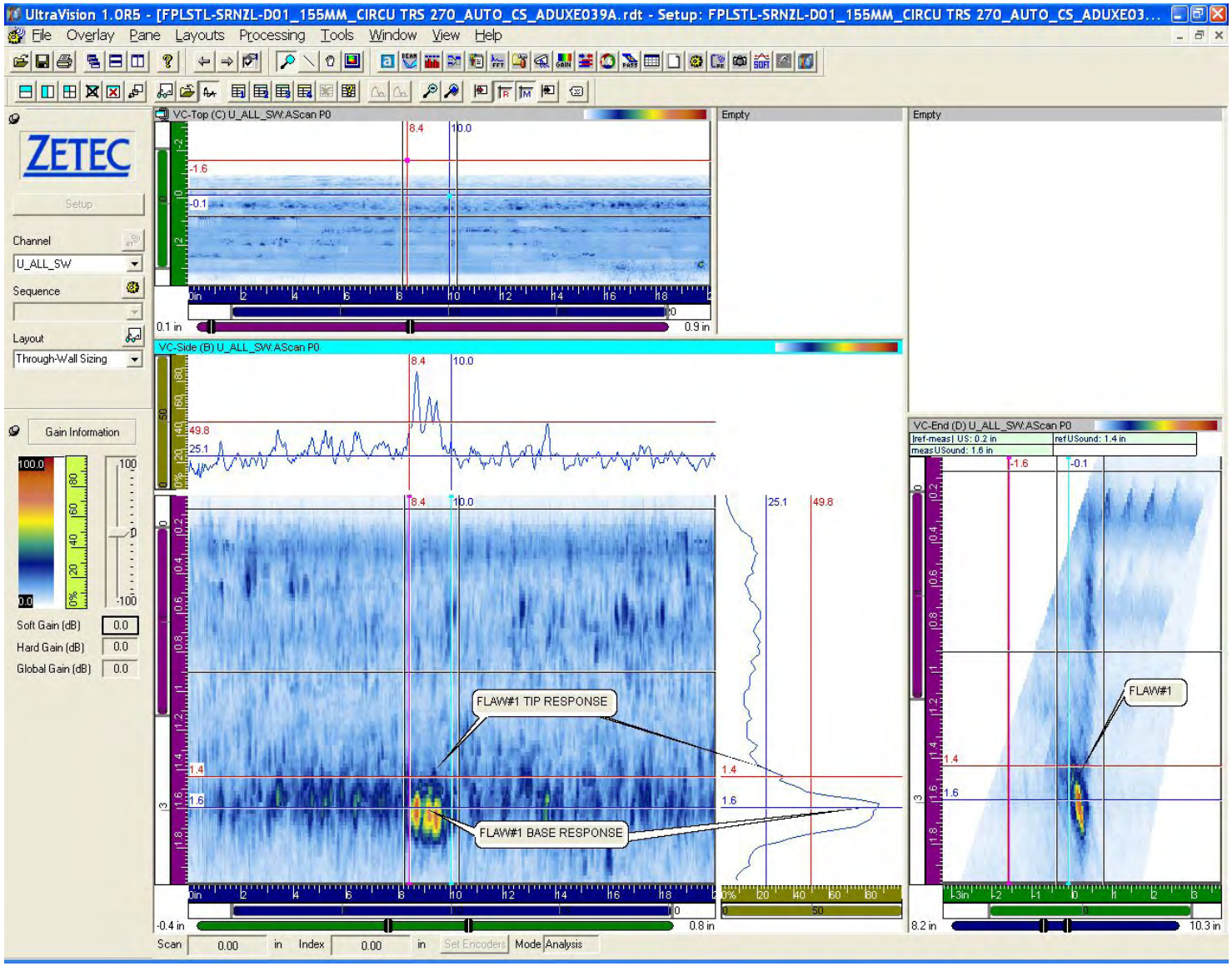
LMT Review _____ **Level** III **ANII Review** _____ **Report#** EPRI-PA-04

T.P. Blechinger



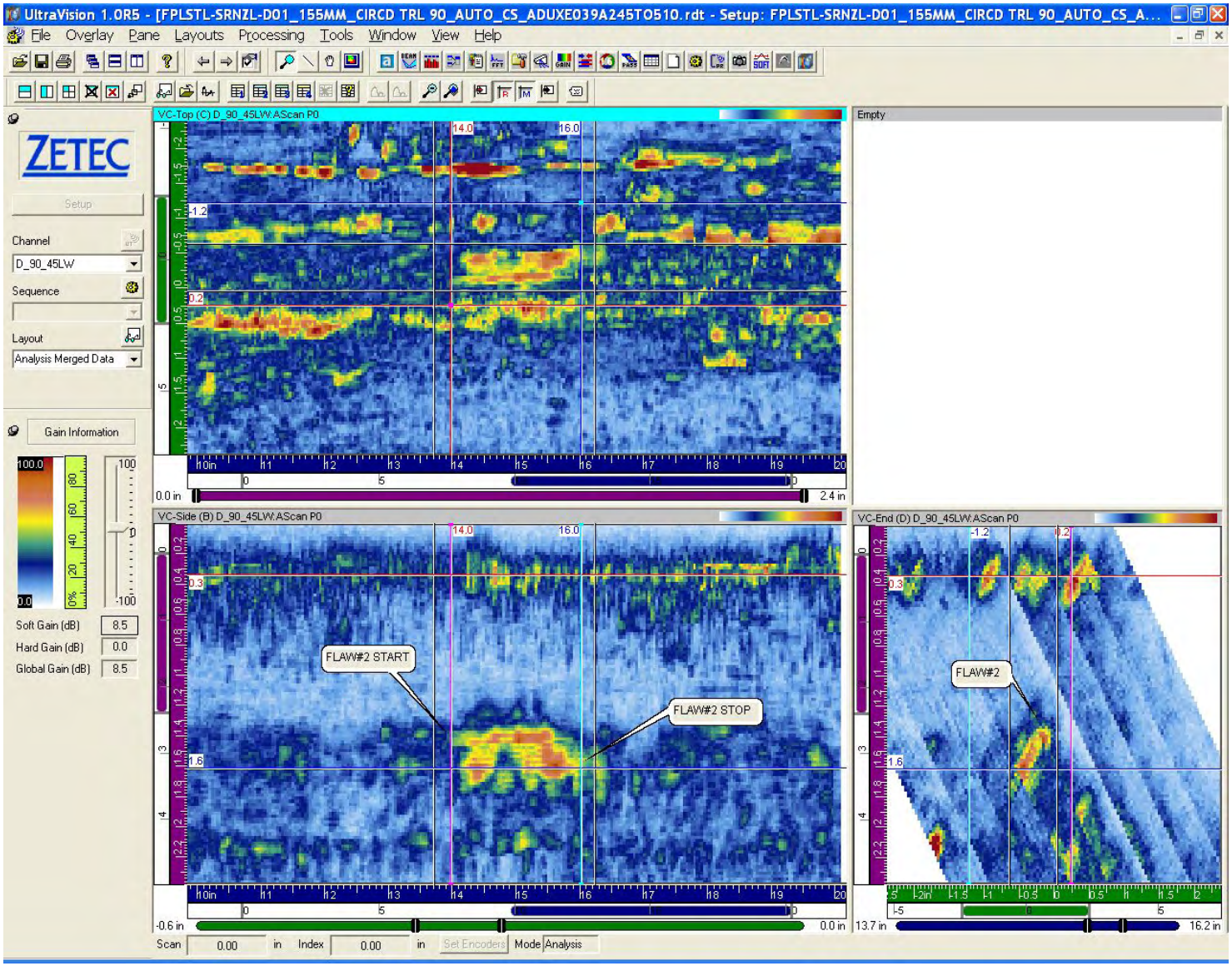
Data Analyst J. L. Devers **Level** III **EPRI Review**

LMT Review T.P. Blechinger **Level** III **ANII Review** **Report#** EPRI-PA-04



Data Analyst J. L. Devers Level III EPRI Review

LMT Review T.P. Blechinger Level III ANII Review Report# EPRI-PA-04



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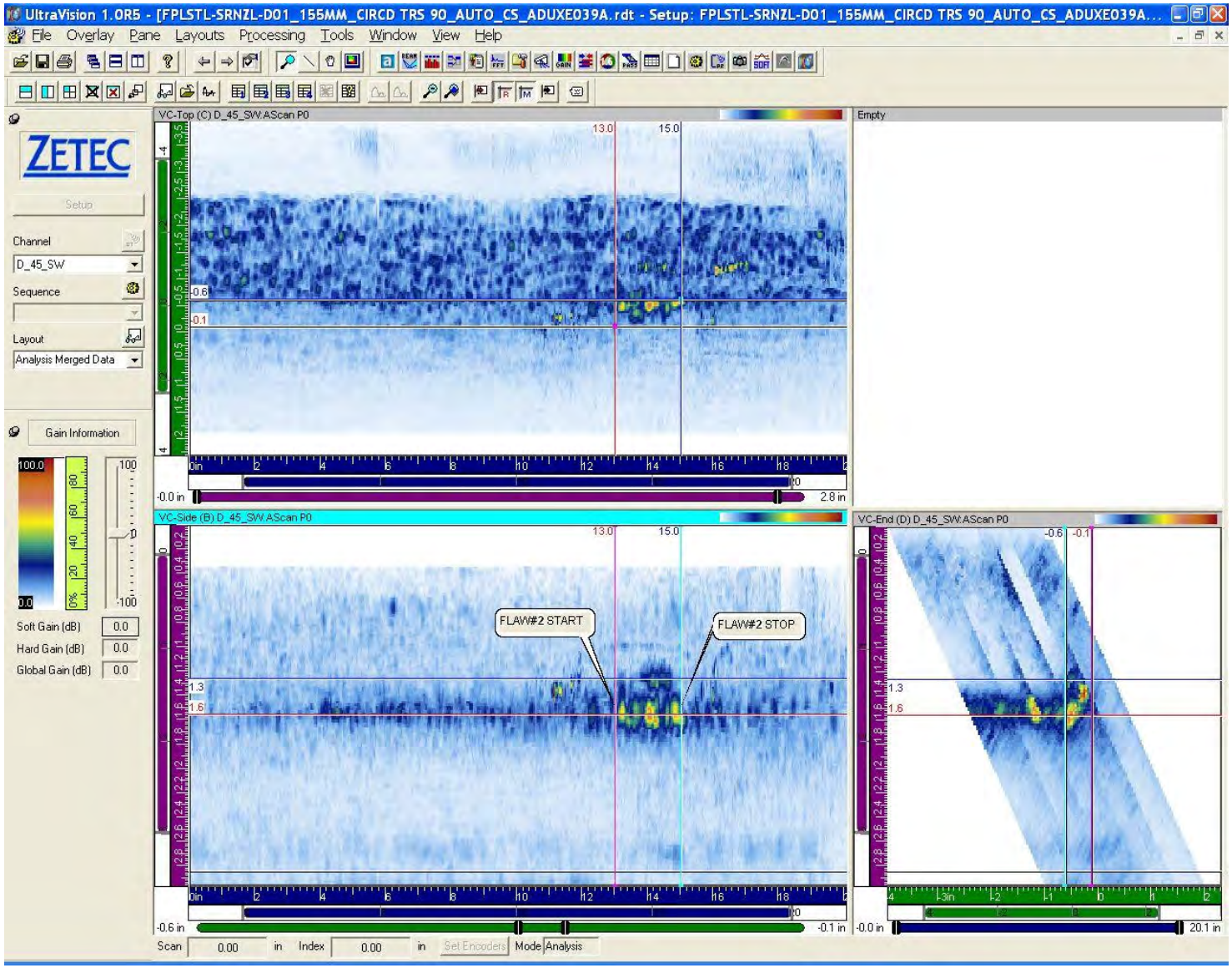

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J. L. Devers

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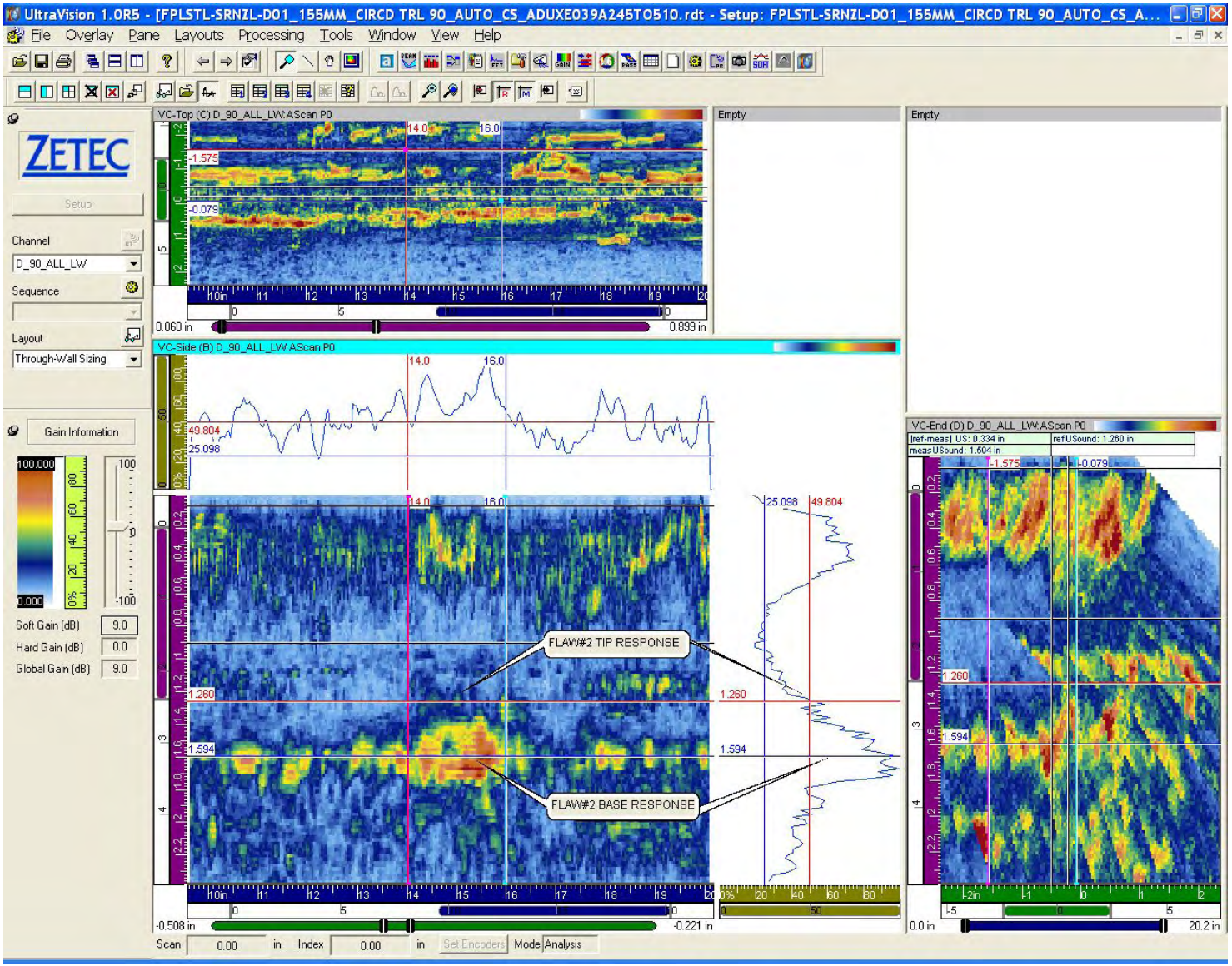
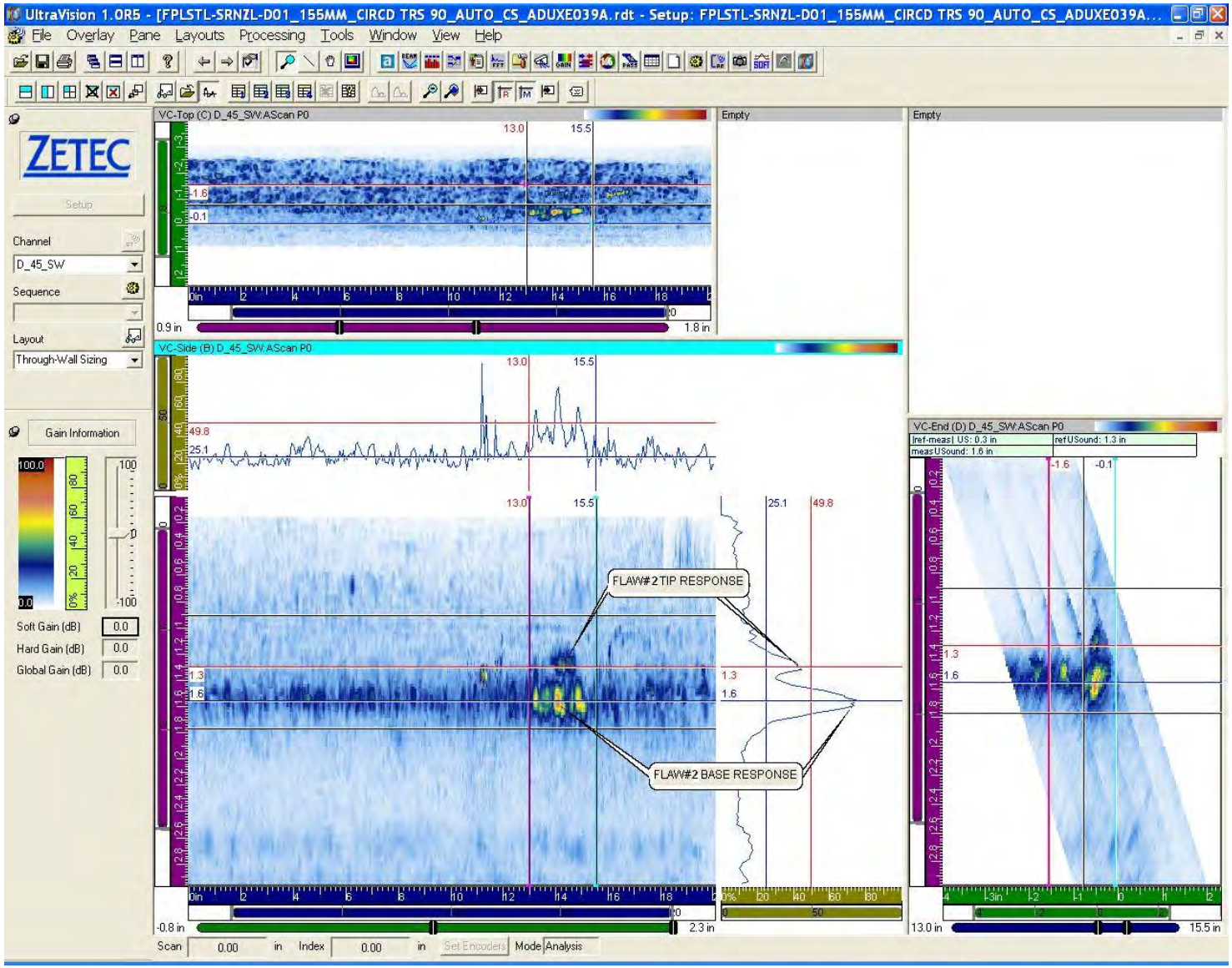
T.P. Blechinger



Data Analyst J. L. Devers **Level** III **EPRI Review**

LMT Review T.P. Blechinger **Level** III **ANII Review** **Report#** EPRI-PA-04



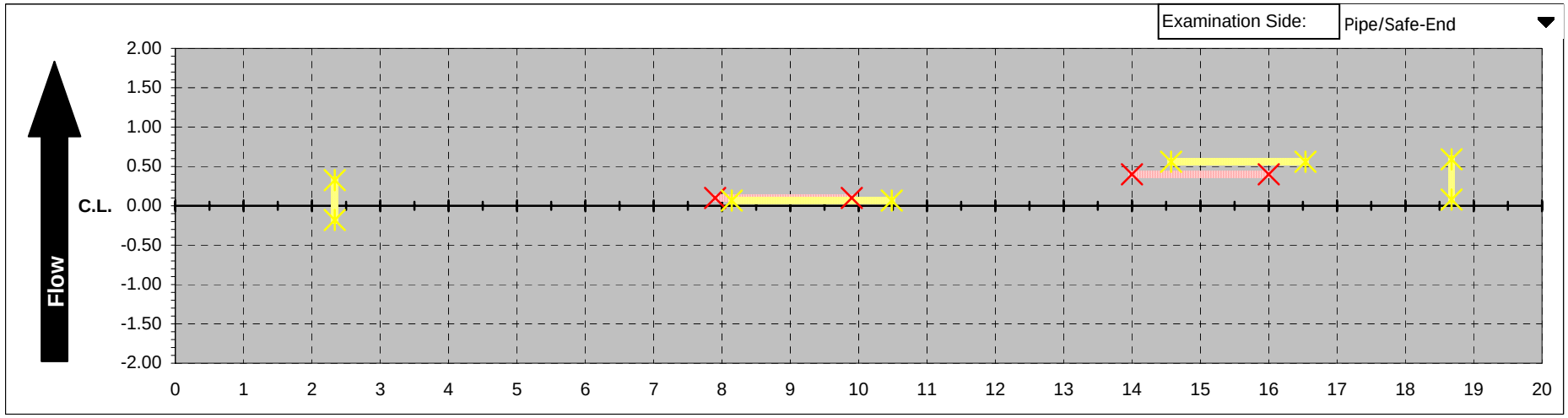
Data Analyst J. L. Devers **Level** III **EPRI Review**

LMT Review T.P. Blechinger **Level** III **ANII Review** **Report#** EPRI-PA-04

J. Devers Indication Report

Sample ID: **FPLSTL-SRZNL-D01**

OD:	ID:	OD Circ.:	ID Circ.:	Nom "T":	Ref. Face to CL DNST Side:	Ref. Face to CL UPST Side:
6.06	**2.94**	**19.04**	**9.22**	**1.56**	**7.08**	**4.31**



J.Devers Information:

	IND# 1	IND# 2	IND# 3	IND# 4	IND# 5	IND# 6	IND# 7
Start(X1)		7.900	14.000				
Stop(X2)		9.900	16.000				
Y Start		0.100	0.400				
Y Stop		0.100	0.400				
Length	0.000	2.000	2.000	0.000			
R.L.		1.200	1.260				

As-Built Information:

Start(X1)	2.333	8.144	14.572	18.677			
Stop(X2)	2.333	10.484	16.539	18.677			
Y Start	-0.181	0.067	0.559	0.079			
Y Stop	0.327	0.067	0.559	0.591			
Length	0.508	2.341	1.967	0.512			
R.L.	1.262	1.252	1.252	1.256			

Deviations:

Length		-0.341	0.033				
R.L.		-0.052	0.008				

Notes: Only axial scans were analyzed looking for circumferential flaws.