Siemens Site
Yearly Performance Evaluation
Siemens Espree 1.5T
6-Jul-08

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MRI Equipment Evaluation Summary & Signature Page

Site Name: Siemens Site **MRAP #** 02362-02

Address: **Survey Date:** 7/6/08

City, State, Zip **Report Date:** 7/8/08

MRI Mfg: Siemens **Model:** Espree **Field:** 1.5T

MRI Scientist: Moriel NessAiver, Ph.D. **Signature:** Moriel NessAiver, Ph.D.

Equipment Evaluation Tests	Pass	Fail *	N/A
1. Magnetic field homogeneity:	☒	☐	☐
2. Slice position accuracy:	☒	☐	☐
3. Table positioning reproducibility:	☒	☐	☐
4. Slice thickness accuracy:	☐	☒	☐
5. RF coils' performance:			
a. Volume QD Coils	☒	☐	☐
b. Phase Array Coils	☒	☐	☐
c. Surface Coils	☒	☐	☐
6. Inter-slice RF interference (Crosstalk):	☒	☐	☐
7. Soft Copy Display	☒	☐	☐
8. Hard Copy (film) Display	☐	☒	☐

Evaluation of Site's Technologist QC Program	Pass	Fail *	N/A
1. Set up and positioning accuracy: (daily)	☒	☐	☐
2. Center frequency: (daily)	☒	☐	☐
3. Transmitter attenuation or gain: (daily)	☒	☐	☐
4. Geometric accuracy measurments: (daily)	☒	☐	☐
5. Spatial resolution measurements: (daily)	☒	☐	☐
6. Low contrast detectability: (daily)	☒	☐	☐
7. Head Coil SNR (daily)	☒	☐	☐
8. Body Coil SNR (weekly)	☒	☐	☐
9. Fast Spin Echo (FSE/TSE) ghosting levels: (daily)	☒	☐	☐
10. Film quality control: (weekly)	☒	☐	☐
11. Visual checklist: (weekly)	☒	☐	☐

*See comments page for description of any failures.

Specific Comments and Recommendations

1. Magnet homogeneity is very good in the axial plane within ± 7cm of isocenter.
2. The LCD response curve is very good.
3. There is VERY poor agreement between what is seen on the screen and what is sent to the laser printers.
4. Cable Ports 1, 3, 4 and 6 all have equivalent SNRs as do Ports 2 and 5.
5. Gradient calibrations are good.
6. The right side of the breast coil has 7% lower SNR than the left side.
7. I tested the Body Coil, CP Flex Small and Head Matrix coils with and without image INTERPOLATION. (I normally never use intepolation.) Using interpolation increases the measured SNR by 30 to 50%. There must be some filtering going on during the interpolation process.
8. There are no problems with any RF coils.
9.
10.
11.
12.
13.

NOTE: Please be sure to read appendix D for an explanation of the format of this document.

MRI Equipment Performance Evaluation Data Form

Site Name: Siemens Site

Contact	Title	Phone	Fax	eMail
	Technologist			
	QC Tech			
	Radiologist			

Equipment Information

MRI Manufacturer: Siemens Model: Espree SN: 30196 Software: B15

Camera Manufacturer: Kodak Drystar 3000 Model: Numaris 4 SN: Software:

PACS Manufacturer: Model: SN: Software:

ACR Phantom Number used: J5480?

1. Table Positioning Reproducibility: **Pass**

Table motion out/in:	IsoCenter	Out/In	Out/In	Out/In
Measured Phantom Center	-0.66	-0.7	-0.96	-0.97

Comment:

2. Magnetic Field Homogeneity See appendix A for field plots. **PASS**

Last Year CF: **63,684,639** This Year CF: **63,683,946** CF Change: **-693**

GRE TR: 500, TE: 10 & 14.76 Flip Angle: 45, FOV: 40

5 mm skip 5 mm, BW: 33.3KHz, 256x128, 2nex

	15 cm	20 cm	25 cm
Axial:	**0.15**	**0.25**	**0.35**
Coronal:	**0.26**	**1.05**	**1.70**
Sagittal:	**0.33**	**0.88**	**1.55**

Comments: Magnet homogeneity is very good in the axial plane within ±7 cm of isocenter. The homogeneity drops rapidly outside of this range.

3. Slice Thickness Accuracy

FOV: 250mm Matrix: 256x256 (Slice #1 from ACR Phantom) All values in mm

Sequence	TR	TE	Flip	NSA	Calc	Target	% Error
SE (ACR)	500	20	90	1	5.21	5	4.2%
SE (Site T1)	500	14	90	1	5.12	5	2.4%
SE (20/80)	2000	20	90	1	5.22	5	4.4%
SE (20/80)	2000	80	90	1	4.61	5	-7.8%
TSE(11)	5000	119	90	1	6.00	5	20.0%

Comments: As is normal for Siemens' equipment, the TSE slice thickness is way too high.

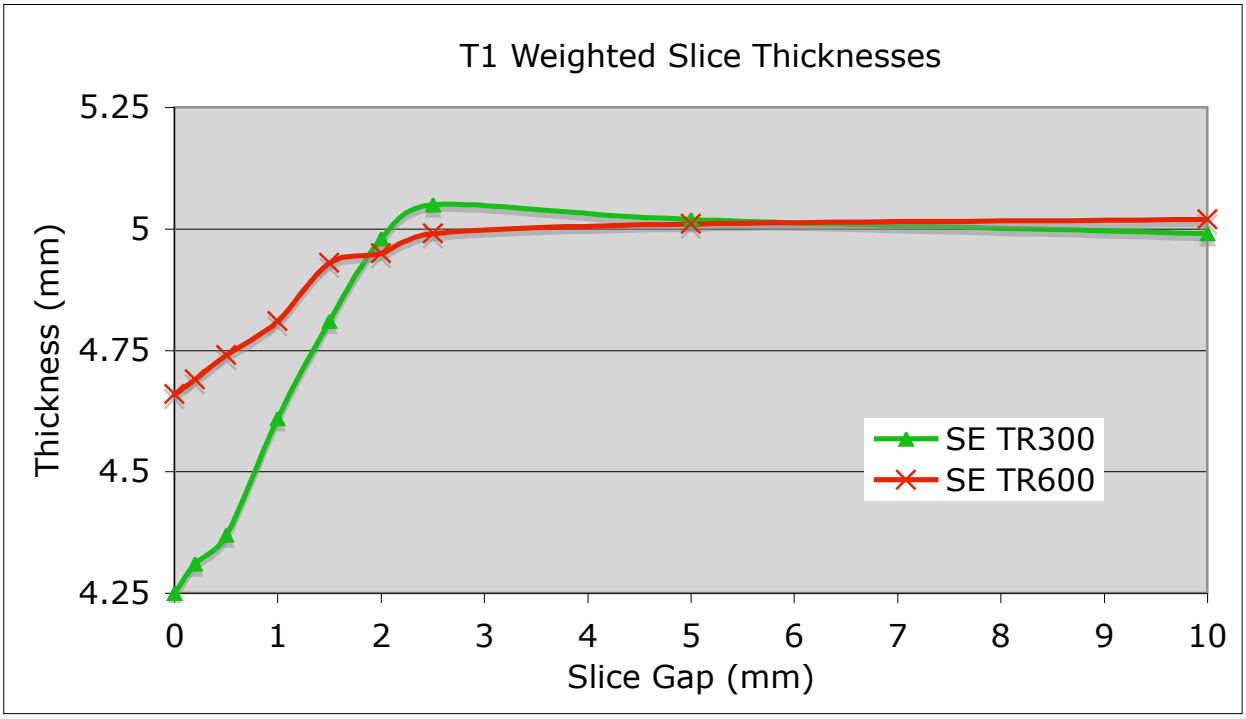
4. Slice Crosstalk (RF interference)

The following data were obtained using the ACR phantom slice thickness wedges to measure the slice profile of two T1 weighted sequences when the slice gap varies from 200% down to 0% (contiguous) As the slices get closer together it is expected that the edges of the slices will overlap causing a deterioration of the slice profile. The data shown below clearly demonstrates this effect. As would be expected, the shorter the TR, the greater the slice-slice interference. This clearly shows that crosstalk can become a problem onse the slice gap of a SE sequence drops below 40%.

All of the slice profiles can be seen in Appendix B. In those plots, it is easy to see that the slice profiles get more and more narrow, almost triangular, as the slice gap drops.

Sequence Type	TR	TE	FOV (cm^2)	Matrix	NSA	Thickness	# of slices	Slice Measured
SE	300	12	25	256x256	1	5	11	6
SE	600	12	25	256x256	2	5	11	6

Skip	SE TR300	SE TR600
0	4.25	4.66
0.2	4.31	4.69
0.5	4.37	4.74
1	4.61	4.81
1.5	4.81	4.93
2	4.98	4.95
2.5	5.05	4.99
5	5.02	5.01
10	4.99	5.02



5. Soft & Hard Copy Displays

Luminance Meter Make/Model: Tektronix J16 Digital Photometer Cal Expires: 4/6/06

Monitor Description: Siemens LCD

Luminance Measured: Ft. lamberts

Measured Data					
Which Monitor	Center of Image Display	Top Left Corner	Top Right Corner	Bottom Left Corner	Bottom Right Corner
Console	39	38.1	39	38.4	36.9

Uniformity		
MAX	MIN	Percent Delta
39	36.9	6%

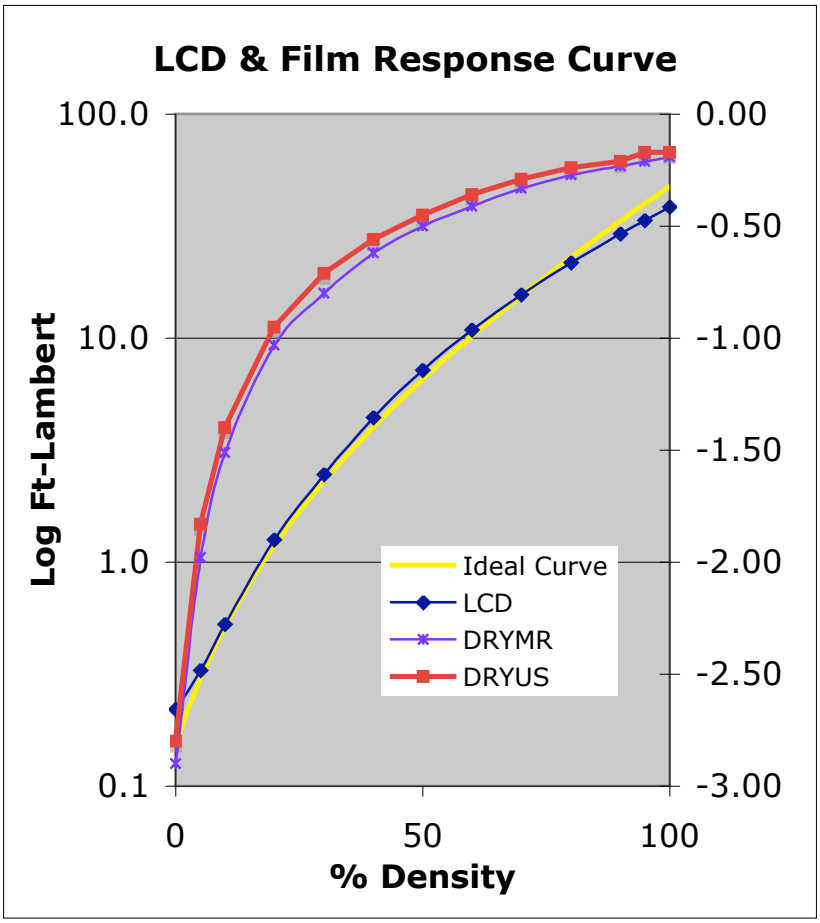
SMPTE
OK?
Y

% delta =200% x (max-min)/(max+center) (>30% is action limit)

Minimum Brightness must be > 26.24 Ft. Lamberts

The LCD display is very good. There is very poor correlation between what is seen on the screen and what is sent to the film. Your service engineer should recalibrate the Look Up Table (LUT).

Density	Ft-Lamber	DRYMR	DRYUS
0	0.22	-2.90	-2.80
5	0.33	-1.98	-1.83
10	0.53	-1.51	-1.40
20	1.26	-1.03	-0.95
30	2.47	-0.80	-0.71
40	4.41	-0.62	-0.56
50	7.18	-0.50	-0.45
60	10.91	-0.41	-0.36
70	15.66	-0.33	-0.29
80	21.70	-0.27	-0.24
90	29.20	-0.23	-0.21
95	33.60	-0.21	-0.17
100	38.50	-0.19	-0.17



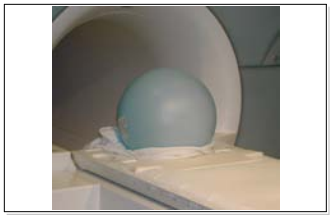
Coil and Other Hardware Inventory List

Site Name Siemens Site

ACR Magnet # 02 Nickname Espree

Active	Coil Description	Manufacturer	Model	Rev.	Mfg. Date	SN	Channels
☐	Body Matrix	Siemens	7579555		Jan, 2005	3005	2
☒	Body Integrated Coil	Siemens					1
☒	Body Matrix	Siemens	7579555		Jan, 2005	2434	2
☒	Breast	Invivo	104461	1	Feb, 2006	U21321	7
☒	CP Flex - Large	Siemens	5512053			5001	1
☒	CP Flex - Small	Siemens	5512038			4915	1
☒	Head Matrix	Siemens	7577732		Jan, 2005	1362	4
☒	Knee - CP Extremity	Siemens	07579472		Jan, 2005	1450	1
☒	Knee/Foot	Medical Advances	474SI-64F		Jun, 2006	503623	1
☒	Neck Matrix	Siemens	75777906		Jan, 2004	2158	4
☒	Periph Angio Matrix	Siemens	7579910			1802	8
☒	Shoulder Array - Large	MRI Devices	100214			05901	4
☒	Shoulder Array - Small	MRI Devices	100213			05668	4
☒	Spine Matrix	Siemens	7579340			2181	8
☐							

RF Coil Performance Evaluation



Coil: Body Integrated Coil

Mfg.: Siemens

Mfg. Date: _____ Coil ID: 689

Phantom: 32 cm sphere

Test Date: 7/6/2008

Model: _____

Revision: _____

SN: _____

# of Channels 1

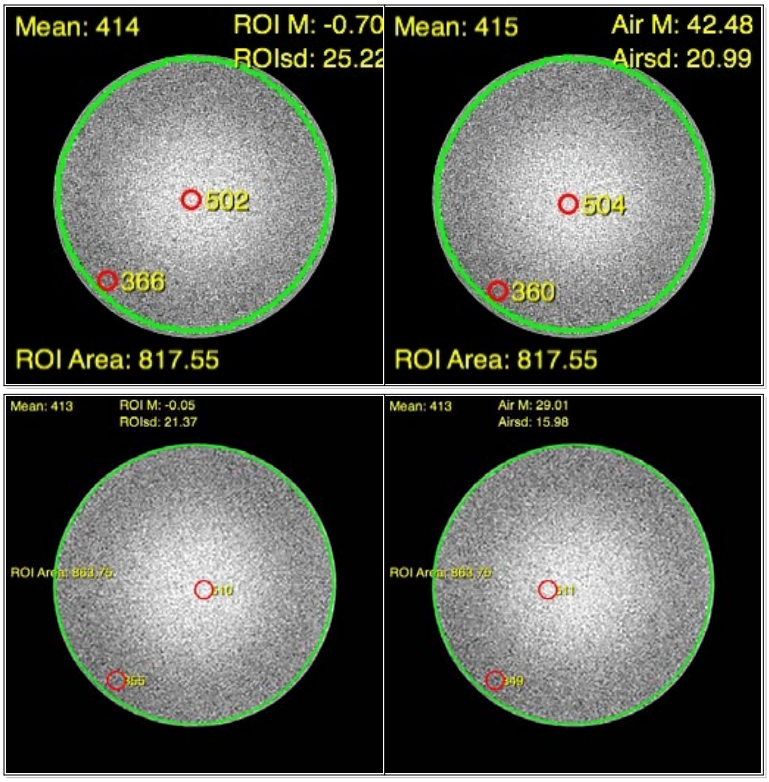
Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	45	256	256	25.6	1	3	-

Coil Mode: Body With and Without Interpolation

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	414	502	366	-0.7	25.22	NEMA	11.6	6.6	14.1	84.3%
A	415	504	360	42.5	20.99	Air	13.0	7.4	15.7	83.3%
N int.	413	510	355	-0.1	21.37	NEMA	13.7	7.8	16.9	82.1%
A int.	413	511	349	29.0	15.98	Air	16.9	9.6	21.0	81.2%

Test Images



RF Coil Performance Evaluation

Coil: Body Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2005 Coil ID: 1718
Phantom: Two long cylinders

Test Date: 7/6/2008
Model: 7579555
Revision:
SN: 2434
# of Channels 2

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	45	256	256	25.6	1	3	-

Coil Mode: a BO12 Port 1

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
NR	354	739	136	0.2	2.93	NEMA
NL	366	721	141	2.7	7.67	NEMA
AR	354	733	136	6.7	2.42	Air
AL	363	699	137	6.7	2.42	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
85.4	48.6	178.4	31.1%
33.7	19.2	66.5	32.7%
95.9	54.6	198.5	31.3%
98.3	56.0	189.3	32.8%

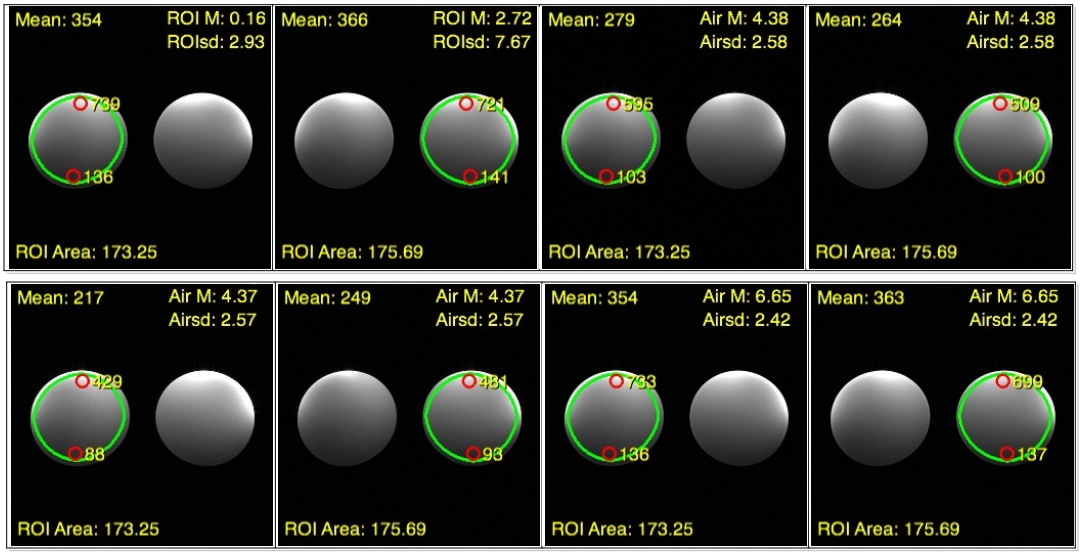
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	217	429	2.57	Air
2	249	481	2.57	Air
3	279	595	2.58	Air
4	264	509	2.58	Air

Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
55.3	78%	109.4	72%
63.5	90%	122.6	81%
70.9	100%	151.1	100%
67.1	95%	129.3	86%



RF Coil Performance Evaluation

Coil: Body Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2005 Coil ID: 1718
Phantom: Two long cylinders

Test Date: 7/6/2008
Model: 7579555
Revision:
SN: 2434
# of Channels 2

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	2	3	-

Coil Mode: BO12 Port 1

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Background	Noise SD	Noise Type
NR	351	423	223	-0.6	1.74	NEMA
NL	368	560	207	-0.1	1.69	NEMA
AR	351	424	224	4.8	2.01	Air
AL	368	561	206	4.8	2.02	Air

Calculated Results

Mean SNR	Normalized	Max SNR	Uniformity
142.7	57.4	171.9	69.0%
154.0	62.0	234.3	54.0%
114.4	46.1	138.2	69.1%
119.4	48.1	182.0	53.7%

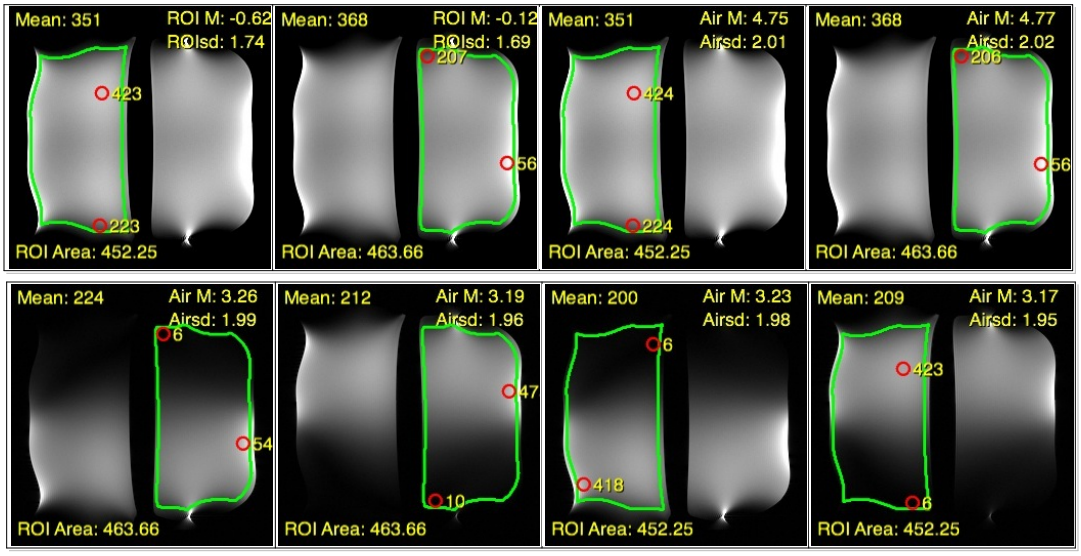
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	224	549	1.99	Air
2	212	475	1.96	Air
3	200	418	1.98	Air
4	209	423	1.95	Air

Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
73.8	100%	180.8	100%
70.9	96%	158.8	88%
66.2	90%	138.3	77%
70.2	95%	142.2	79%



RF Coil Performance Evaluation

Coil: Body Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2005 Coil ID: 1718
Phantom: Two long cylinders

Test Date: 7/6/2008
Model: 7579555
Revision:
SN: 2434
# of Channels 2

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	2	3	-

Coil Mode: BO12 Port 3

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
NR	359	433	223	0.4	1.87	NEMA
NL	378	572	210	0.7	1.82	NEMA
AR	358	432	222	4.9	2.05	Air
AL	377	572	208	5.0	2.06	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
135.8	54.7	163.8	68.0%
146.9	59.1	222.3	53.7%
114.4	46.1	138.1	67.9%
119.9	48.3	182.0	53.3%

Analysis of Uncombined Images

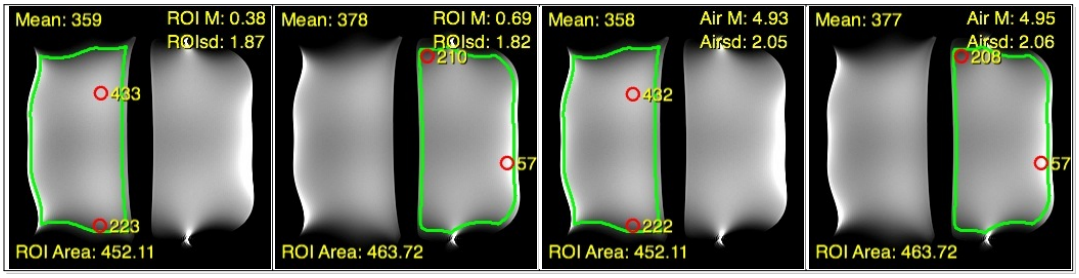
Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	218	492	2.03	Air
2	228	560	2.03	Air
3	214	431	2.02	Air
4	204	426	2.01	Air

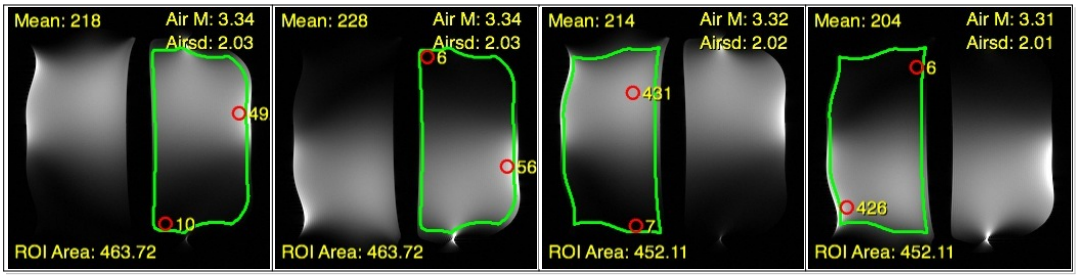
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
70.4	96%	158.8	88%
73.6	100%	180.8	100%
69.4	94%	139.8	77%
66.5	90%	138.9	77%

Composites



Channels



Channel 1 Channel 2 Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Body Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2005 Coil ID: 1718
Phantom: Two long cylinders

Test Date: 7/6/2008
Model: 7579555
Revision:
SN: 2434
# of Channels 2

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	2	3	-

Coil Mode: BO12 Port 4

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
NR	353	432	219	-0.1	1.64	NEMA
NL	372	559	211	-0.1	1.68	NEMA
AR	354	432	218	4.8	2.04	Air
AL	372	559	211	4.9	2.05	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
152.2	61.3	186.3	67.3%
156.6	63.0	235.3	54.8%
113.7	45.8	138.8	67.1%
118.9	47.9	178.7	54.8%

Analysis of Uncombined Images

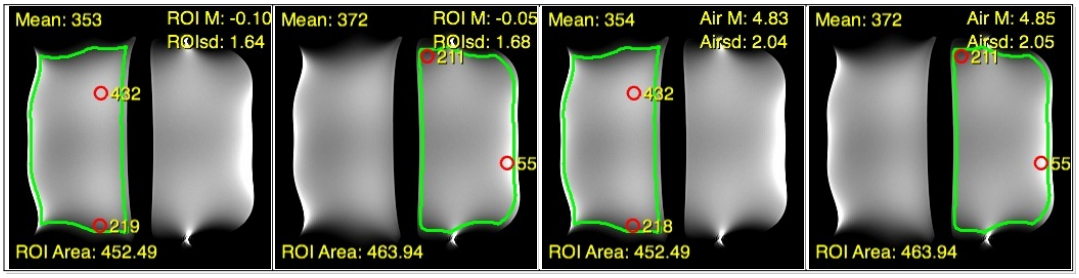
Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	223	546	2.00	Air
2	217	485	2.01	Air
3	199	415	1.99	Air
4	213	431	2.00	Air

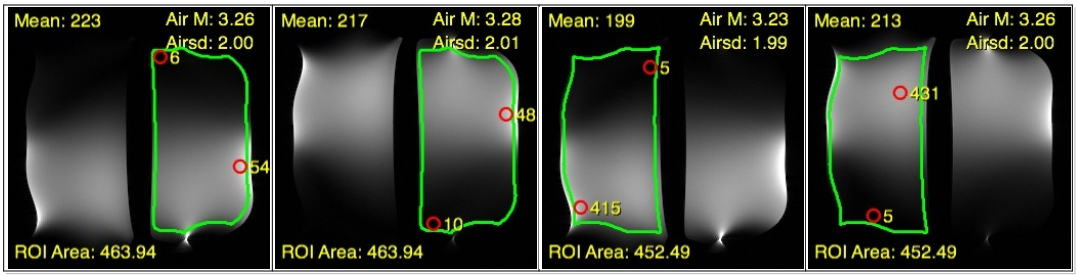
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
73.1	100%	178.9	100%
70.7	97%	158.1	88%
65.5	90%	136.7	76%
69.8	96%	141.2	79%

Composites



Channels



Channel 1 Channel 2 Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Body Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2005 Coil ID: 1718
Phantom: Two long cylinders

Test Date: 7/6/2008
Model: 7579555
Revision:
SN: 2434
# of Channels 2

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	2	3	-

Coil Mode: BO12 Port 6

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
NR	343	418	214	-0.2	1.98	NEMA
NL	361	543	203	-0.5	1.91	NEMA
AR	343	419	215	4.7	1.99	Air
AL	361	542	205	4.7	2.00	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
122.5	49.3	149.3	67.7%
133.7	53.8	201.1	54.4%
113.0	45.5	138.0	67.8%
118.3	47.6	177.6	54.9%

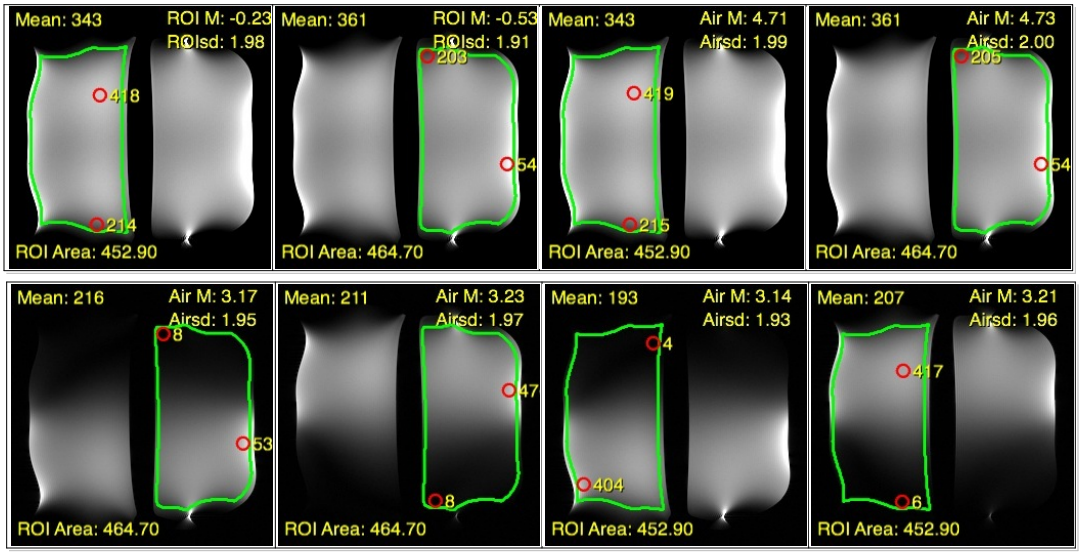
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	216	530	1.95	Air
2	211	476	1.97	Air
3	193	404	1.93	Air
4	207	417	1.96	Air

Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
72.6	100%	178.1	100%
70.2	97%	158.3	89%
65.5	90%	137.2	77%
69.2	95%	139.4	78%



RF Coil Performance Evaluation

Coil: Breast

Mfg.: Invivo

Mfg. Date: 2/01/2006 Coil ID: 691

Phantom: Two bottles in red phantom holders

Test Date: 7/6/2008

Model: 104461

Revision: 1

SN: U21321

# of Channels 7

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	40	256	256	25.6	1	3	-

Coil Mode: BR Left,Right,Middle

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
NR	710	904	614	-0.5	3.11	NEMA
NL	860	990	801	-0.4	3.41	NEMA
AR	711	904	615	17.7	3.46	Air
AL	860	990	802	17.7	3.46	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
161.5	116.3	205.6	80.9%
178.4	128.5	205.3	89.4%
134.7	97.0	171.2	81.0%
162.9	117.4	187.5	89.5%

Analysis of Uncombined Images

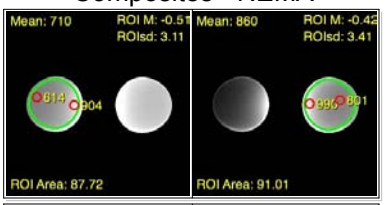
Measured Data

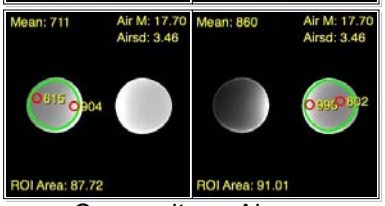
Ch	Mean	Max	Noise SD	Noise Type
1	617	755	3.31	Air
2	283	403	3.53	Air
3	270	292	3.60	Air
4	388	546	3.19	Air
5	220	281	3.45	Air
6	253	502	3.53	Air
7	508	600	3.08	Air
8	277	395	3.18	Air

Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
122.2	100%	149.5	100%
52.5	43%	74.8	50%
49.1	40%	53.2	36%
79.7	65%	112.2	75%
41.8	34%	53.4	36%
47.0	38%	93.2	62%
108.1	88%	127.7	85%
57.1	47%	81.4	54%

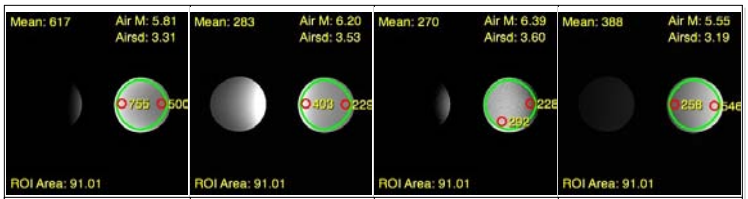
Composites - NEMA

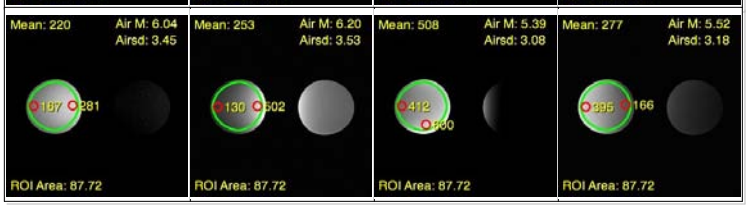




Composites - Air

Channel 1 Channel 2 Channel 3 Channel 4





Channel 5 Channel 6 Channel 7

RF Coil Performance Evaluation

Coil: Breast
Mfg.: Invivo
Mfg. Date: 2/01/2006 Coil ID: 691
Phantom: Two bottles in red phantom holders

Test Date: 7/6/2008
Model: 104461
Revision: 1
SN: U21321
# of Channels 7

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	45	256	256	25.6	1	3	-

Coil Mode: BR Left,Right,Middle

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
NR	649	1,112	192	-0.6	2.66	NEMA
NL	728	1,111	212	0.2	2.44	NEMA
AR	650	1,118	193	13.9	2.88	Air
AL	728	1,110	212	13.9	2.88	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
172.5	98.2	295.6	29.4%
211.0	120.1	322.0	32.0%
147.9	84.2	254.4	29.4%
165.6	94.3	252.6	32.1%

Analysis of Uncombined Images

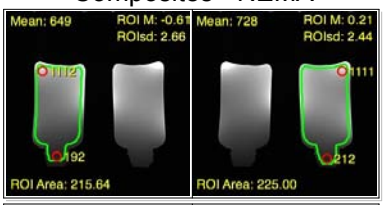
Measured Data

Ch	Mean	Max	Noise SD	Noise Type
R1	330	678	2.53	Air
R2	428	741	2.65	Air
R3	239	746	2.82	Air
R4	295	842	2.87	Air
L4	262	707	2.52	Air
L5	363	582	2.45	Air
L6	221	672	2.82	Air
L7	281	807	2.74	Air

Calculated Results

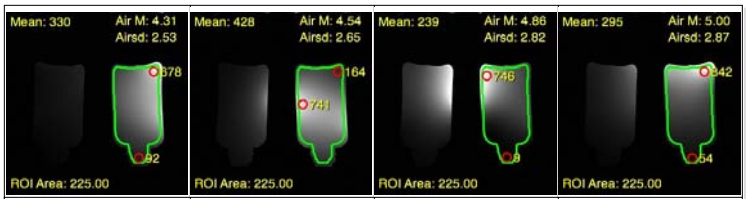
Mean SNR	% of Mean	Max SNR	% of Max
85.5	81%	175.6	91%
105.8	100%	183.2	95%
55.5	52%	173.4	90%
67.4	64%	192.3	100%
68.1	64%	183.9	95%
97.1	92%	155.7	81%
51.4	49%	156.2	81%
67.2	63%	193.0	100%

Composites - NEMA



Composites - Air

Channel 1 Channel 2 Channel 3 Channel 4



Channel 5 Channel 6 Channel 7

RF Coil Performance Evaluation

Coil: Breast
Mfg.: Invivo
Mfg. Date: 2/01/2006 Coil ID: 691
Phantom: Two bottles in red phantom holders

Test Date: 7/6/2008
Model: 104461
Revision: 1
SN: U21321
# of Channels 7

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	45	256	256	25.6	1	3	-

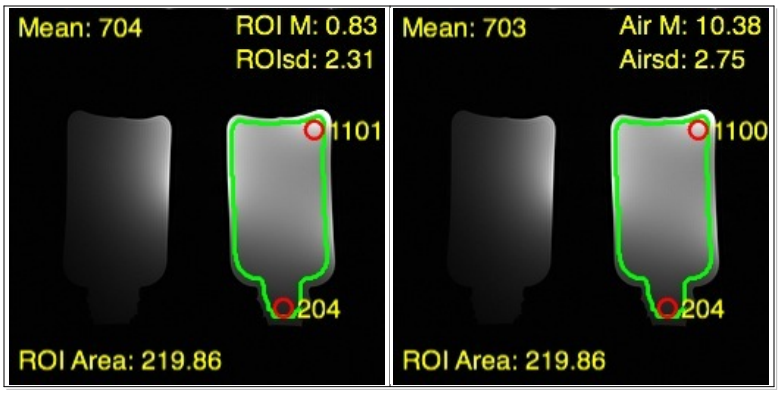
Coil Mode: LBR

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	704	1,101	204	0.8	2.31	NEMA	215.5	122.7	337.1	31.3%
A	703	1,100	204	10.4	2.75	Air	167.5	95.4	262.1	31.3%

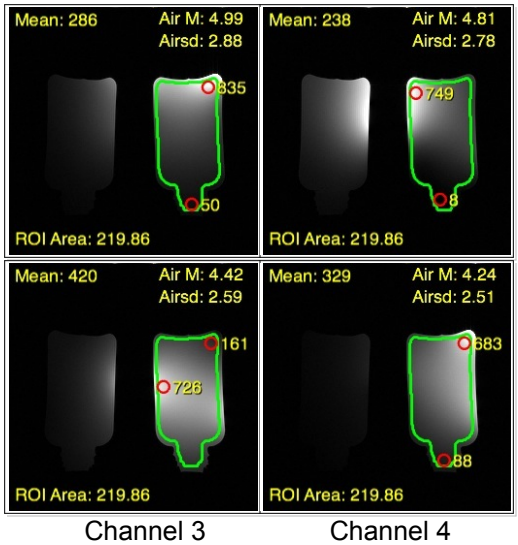
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	286	835	2.88	Air	65.1	61%	190.0	100%
2	238	749	2.78	Air	56.1	53%	176.6	93%
3	420	726	2.59	Air	106.3	100%	183.7	97%
4	329	683	2.51	Air	85.9	81%	178.3	94%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Breast
Mfg.: Invivo
Mfg. Date: 2/01/2006 Coil ID: 691
Phantom: Two bottles in red phantom holders

Test Date: 7/6/2008
Model: 104461
Revision: 1
SN: U21321
# of Channels 7

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	45	256	256	25.6	1	3	-

Coil Mode: RBR

Analysis of Composite Image

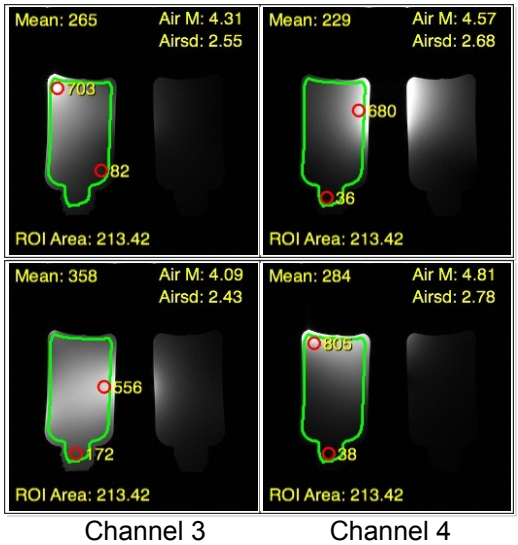
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	626	1,106	202	0.2	2.21	NEMA	200.3	114.1	353.9	30.9%
A	626	1,105	202	10.1	2.63	Air	156.0	88.8	275.3	30.9%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	265	703	2.55	Air	68.1	71%	180.7	95%
2	229	680	2.68	Air	56.0	58%	166.3	88%
3	358	556	2.43	Air	96.5	100%	149.9	79%
4	284	805	2.78	Air	66.9	69%	189.8	100%

Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: CP Flex - Large

Mfg.: Siemens

Mfg. Date: _____ Coil ID: 692

Phantom: Large Cylinder

Test Date: 7/6/2008

Model: 5512053

Revision: _____

SN: 5001

# of Channels 1

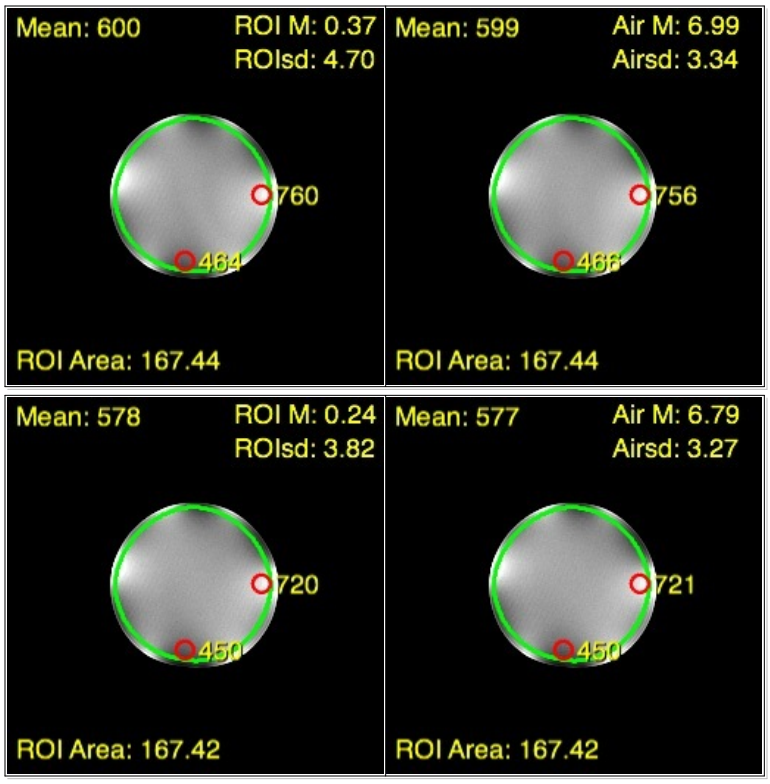
Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	36	256	256	25.6	1	3	-

Coil Mode: FL Ports 2 & 5

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N2	600	760	464	0.4	4.70	NEMA	90.3	80.3	114.4	75.8%
A2	599	756	466	7.0	3.34	Air	117.5	104.5	148.3	76.3%
N5	578	720	450	0.2	3.82	NEMA	107.0	95.2	133.3	76.9%
A5	577	721	450	6.8	3.27	Air	115.6	102.9	144.5	76.9%

Test Images



RF Coil Performance Evaluation

Coil: CP Flex - Small

Mfg.: Siemens

Mfg. Date: _____ Coil ID: 693

Phantom: Small Cylnder

Test Date: 7/6/2008

Model: 5512038

Revision: _____

SN: 4915

# of Channels 1

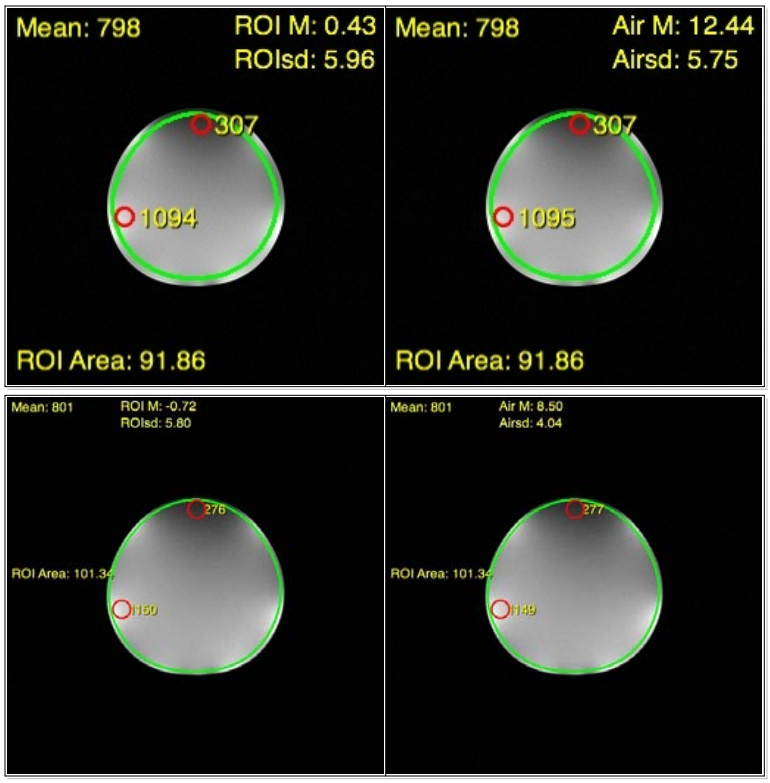
Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	36	256	256	25.6	1	3	-

Coil Mode: FS With and Without Interpolation

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	798	1,094	307	0.4	5.96	NEMA	94.7	84.2	129.8	43.8%
A	798	1,095	307	12.4	5.75	Air	90.9	80.9	124.8	43.8%
N int.	801	1,150	276	-0.7	5.80	NEMA	97.7	86.9	140.2	38.7%
A int.	801	1,149	277	8.5	4.04	Air	129.9	115.6	186.4	38.8%

Test Images



RF Coil Performance Evaluation

Coil: Head Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2005 Coil ID: 695
Phantom: ACR Phantom

Test Date: 7/6/2008
Model: 7577732
Revision:
SN: 1362
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	40	256	256	25.6	1	3	-

Coil Mode: HE1,2,3,4

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Background	Noise SD	Noise Type
N	1,465	1,714	1,288	-0.2	5.17	NEMA
A	1,466	1,715	1,288	20.1	4.98	Air

Calculated Results

Mean SNR	Normalized	Max SNR	Uniformity
200.4	144.4	234.5	85.8%
192.9	139.0	225.7	85.8%

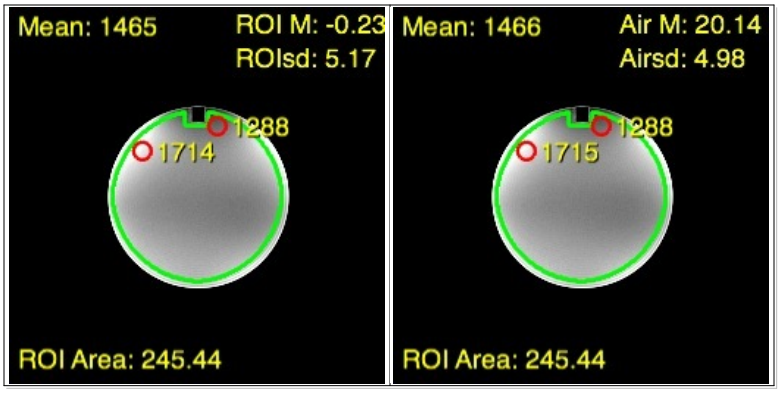
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	588	924	4.35	Air
2	642	1,088	4.69	Air
3	614	1,067	5.30	Air
4	835	1,485	5.50	Air

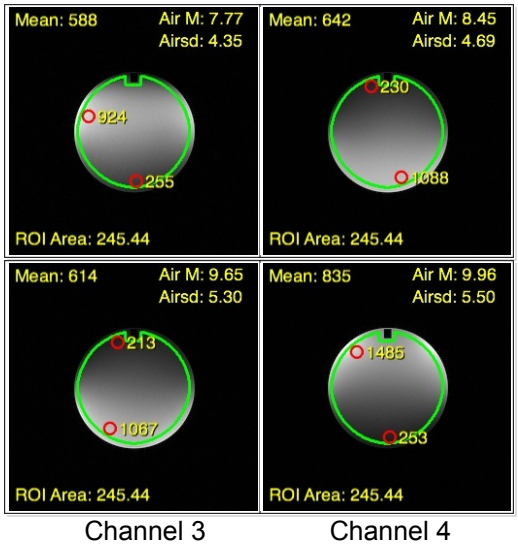
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
88.6	89%	139.2	79%
89.7	90%	152.0	86%
75.9	76%	131.9	75%
99.5	100%	176.9	100%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Head Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2005 Coil ID: 695
Phantom: ACR Phantom

Test Date: 7/6/2008
Model: 7577732
Revision:
SN: 1362
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	40	256	256	25.6	1	3	-

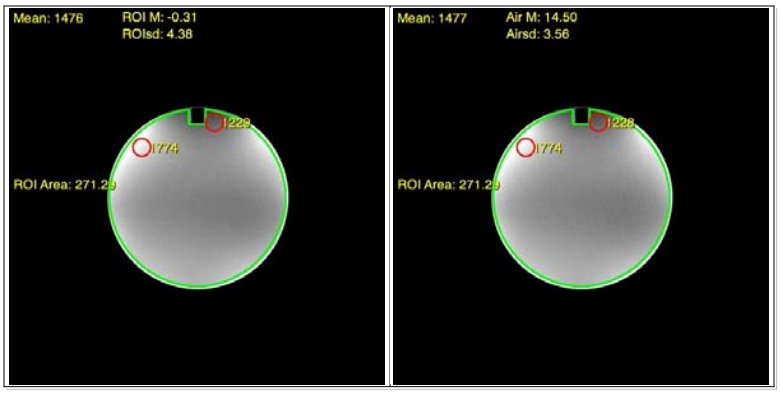
Coil Mode: HE1,2,3,4 Interpolated Image

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,476	1,774	1,229	-0.3	4.38	NEMA	238.3	171.7	286.4	81.9%
A	1,477	1,774	1,228	14.5	3.56	Air	271.9	195.9	326.5	81.8%

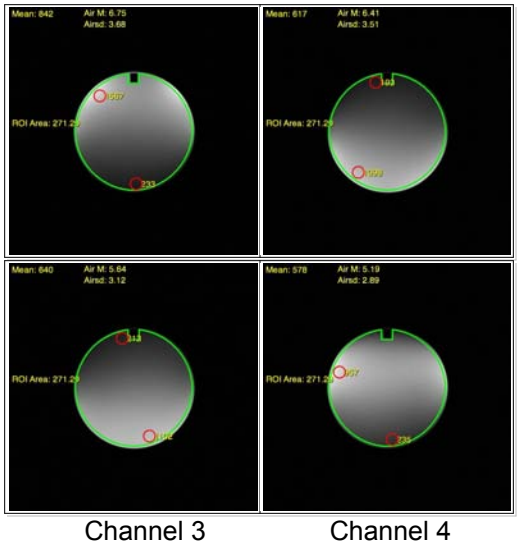
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	842	1,567	3.68	Air	149.9	100%	279.0	100%
2	617	1,098	3.51	Air	115.2	77%	205.0	73%
3	640	1,102	3.12	Air	134.4	90%	231.5	83%
4	578	957	2.89	Air	131.1	87%	217.0	78%



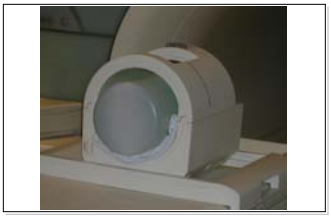
Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation



Coil: Knee - CP Extremity

Mfg.: Siemens

Mfg. Date: 1/1/2005 Coil ID: 697

Phantom: Small Bottle

Test Date: 7/6/2008

Model: 07579472

Revision:

SN: 1450

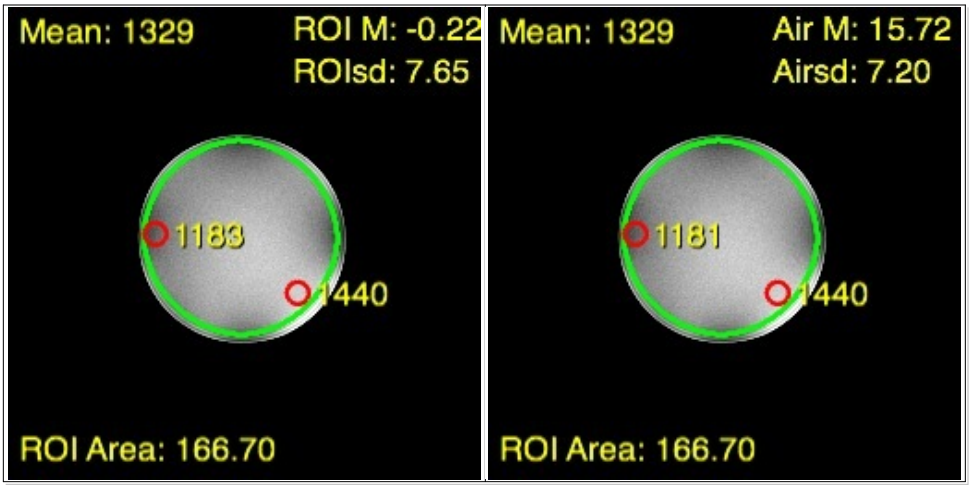
# of Channels 1

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	40	256	256	25.6	1	3	-

Coil Mode: EX

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,329	1,440	1,183	-0.2	7.65	NEMA	122.9	88.5	133.1	90.2%
A	1,329	1,440	1,181	15.7	7.20	Air	121.0	87.2	131.1	90.1%



Test Images

RF Coil Performance Evaluation

Coil: Knee/Foot

Mfg.: Medical Advances

Mfg. Date: 6/1/2006 Coil ID: 1158

Phantom: Small bottle and Wrist in foot.

Test Date: 7/6/2008

Model: 474SI-64F

Revision:

SN: 503623

# of Channels 1

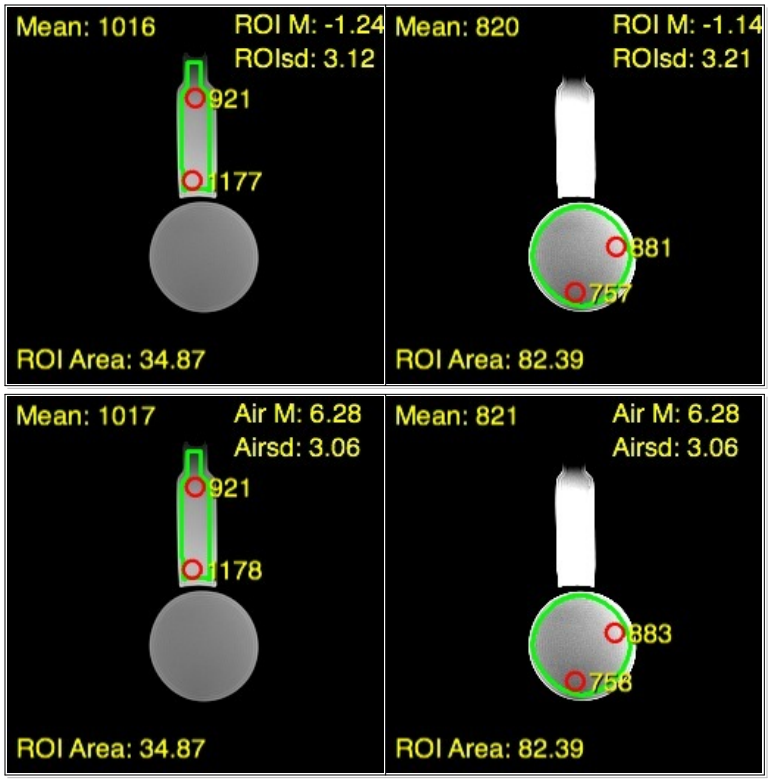
Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	40	256	256	25.6	1	3	-

Coil Mode: EX

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,016	1,177	921	-1.2	3.12	NEMA	230.3	165.9	266.8	87.8%
N	820	881	757	-1.1	3.21	NEMA	180.7	130.2	194.1	92.4%
A	1,017	1,178	921	6.3	3.06	Air	217.8	156.9	252.3	87.8%
A	821	883	758	6.3	3.06	Air	175.8	126.7	189.1	92.4%

Test Images



RF Coil Performance Evaluation

Coil: Knee/Foot

Mfg.: Medical Advances

Mfg. Date: 6/1/2006 Coil ID: 1158

Phantom: Small bottle and Wrist in foot.

Test Date: 7/6/2008

Model: 474SI-64F

Revision:

SN: 503623

# of Channels 1

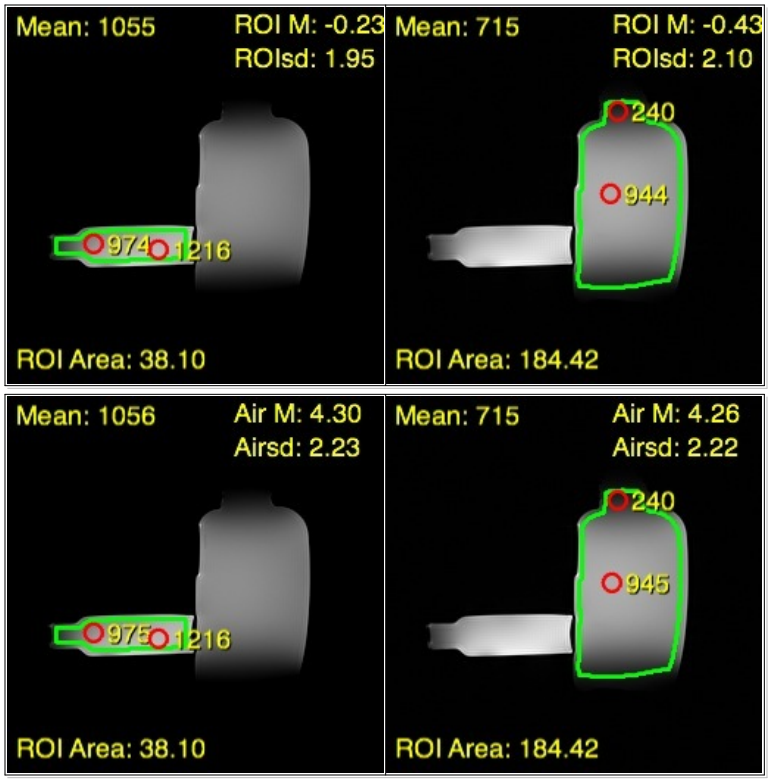
Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	40	256	256	25.6	2.0	3	-

Coil Mode: EX

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,055	1,216	974	-0.2	1.95	NEMA	382.6	195.0	441.0	88.9%
N	715	944	240	-0.4	2.10	NEMA	240.8	122.7	317.9	40.5%
A	1,056	1,216	975	4.3	2.23	Air	310.3	158.1	357.3	89.0%
A	715	945	240	4.3	2.22	Air	211.1	107.5	278.9	40.5%

Test Images



RF Coil Performance Evaluation

Coil: Neck Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2004 Coil ID: 698
Phantom: Long cylinder

Test Date: 7/6/2008
Model: 75777906
Revision:
SN: 2158
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	36	256	256	25.6	1	3	-

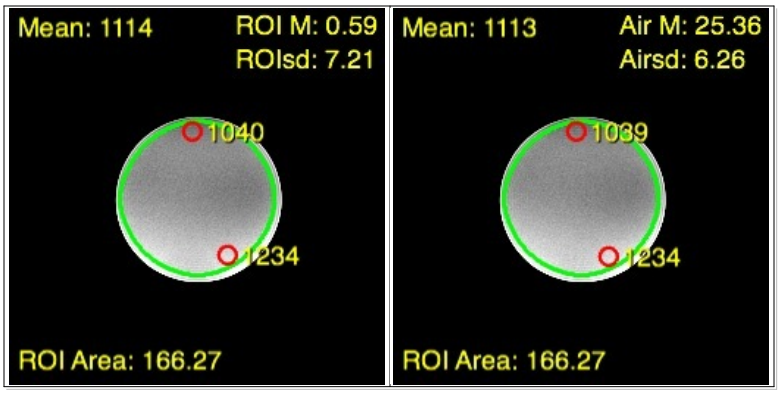
Coil Mode: a He 1,2,3,4

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,114	1,234	1,040	0.6	7.21	NEMA	109.3	97.2	121.0	91.5%
A	1,113	1,234	1,039	25.4	6.26	Air	116.5	103.6	129.2	91.4%

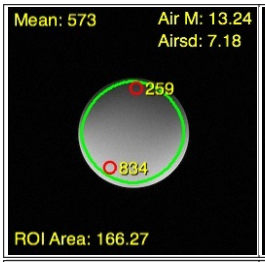
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	573	834	7.18	Air	52.3	79%	76.1	81%
2	408	578	4.98	Air	53.7	81%	76.1	81%
3	487	802	6.47	Air	49.3	74%	81.2	86%
4	619	879	6.11	Air	66.4	100%	94.3	100%

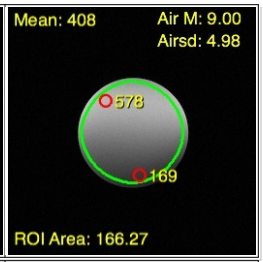


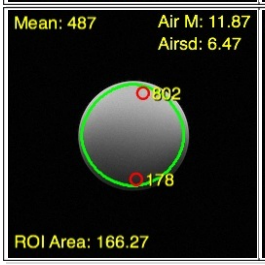
Composites

Channel 1

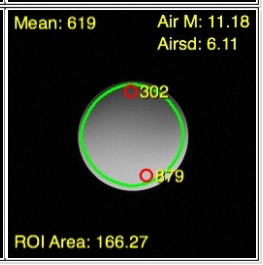


Channel 2





Channel 3



Channel 4

RF Coil Performance Evaluation

Coil: Neck Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2004 Coil ID: 698
Phantom: Long cylinder

Test Date: 7/6/2008
Model: 75777906
Revision:
SN: 2158
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	1	3	-

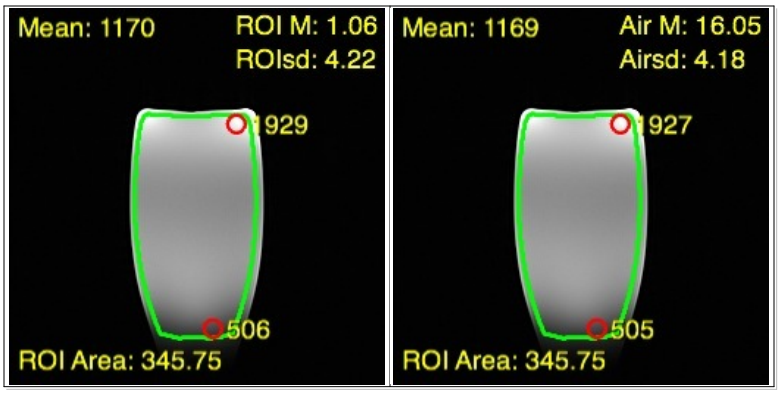
Coil Mode: b HE 1,2,3,4

Analysis of Composite Image

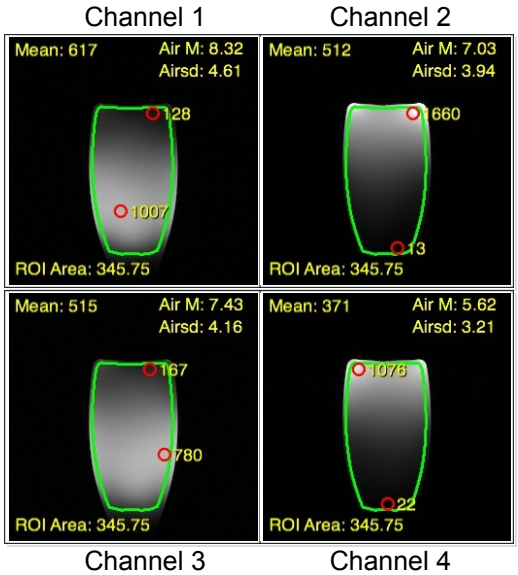
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,170	1,929	506	1.1	4.22	NEMA	196.1	111.6	323.3	41.6%
A	1,169	1,927	505	16.1	4.18	Air	183.3	104.3	302.1	41.5%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	617	1,007	4.61	Air	87.7	100%	143.1	52%
2	512	1,660	3.94	Air	85.2	97%	276.1	100%
3	515	780	4.16	Air	81.1	92%	122.9	45%
4	371	1,076	3.21	Air	75.7	86%	219.7	80%



Composites



RF Coil Performance Evaluation

Coil: Neck Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2004 Coil ID: 698
Phantom: Long cylinder

Test Date: 7/6/2008
Model: 75777906
Revision:
SN: 2158
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	45	256	256	25.6	1	3	-

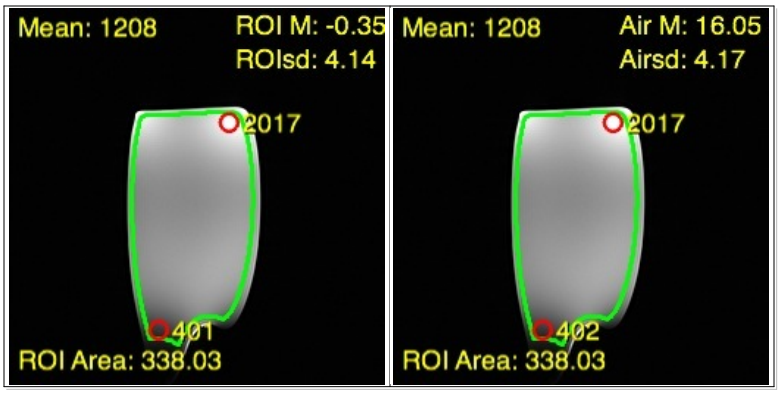
Coil Mode: c He 1,2,3,4

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,208	2,017	401	-0.4	4.14	NEMA	206.4	117.5	344.6	33.2%
A	1,208	2,017	402	16.1	4.17	Air	189.8	108.1	317.0	33.2%

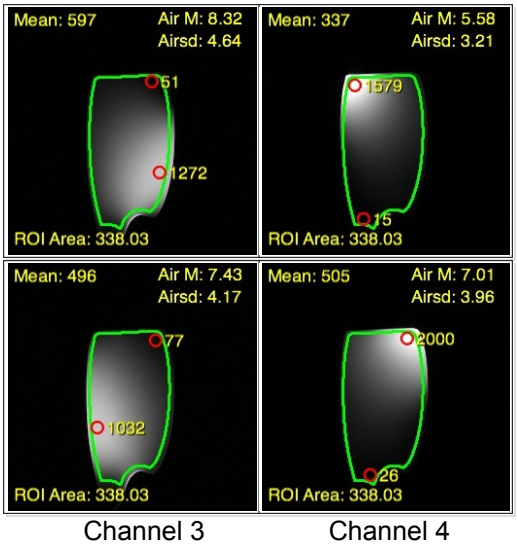
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	597	1,272	4.64	Air	84.3	100%	179.6	54%
2	337	1,579	3.21	Air	68.8	82%	322.3	97%
3	496	1,032	4.17	Air	77.9	92%	162.2	49%
4	505	2,000	3.96	Air	83.6	99%	331.0	100%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Neck Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2004 Coil ID: 698
Phantom: Long cylinder

Test Date: 7/6/2008
Model: 75777906
Revision:
SN: 2158
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	36	256	256	25.6	1	3	-

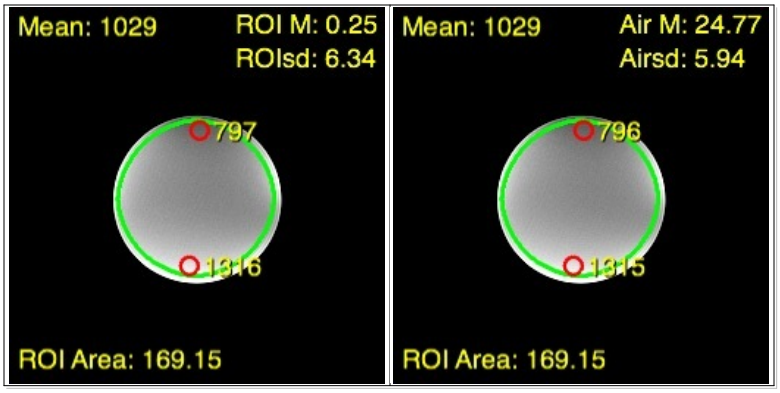
Coil Mode: d He 3,4 NE 1,2

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,029	1,316	797	0.3	6.34	NEMA	114.8	102.1	146.8	75.4%
A	1,029	1,315	796	24.8	5.94	Air	113.5	101.0	145.1	75.4%

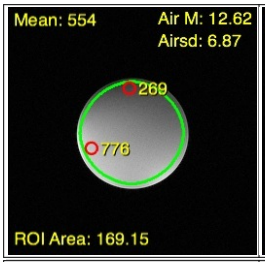
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	554	776	6.87	Air	52.8	81%	74.0	51%
2	412	734	6.08	Air	44.4	68%	79.1	55%
3	473	689	6.36	Air	48.7	75%	71.0	49%
4	480	1,064	4.83	Air	65.1	100%	144.4	100%

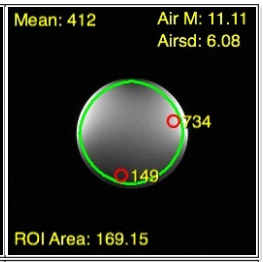


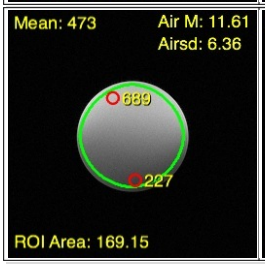
Composites

Channel 1

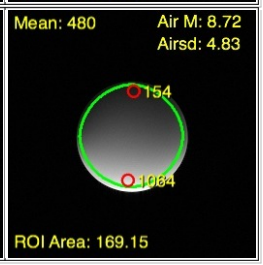


Channel 2





Channel 3



Channel 4

RF Coil Performance Evaluation

Coil: Neck Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2004 Coil ID: 698
Phantom: Long cylinder

Test Date: 7/6/2008
Model: 75777906
Revision:
SN: 2158
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	1	3	-

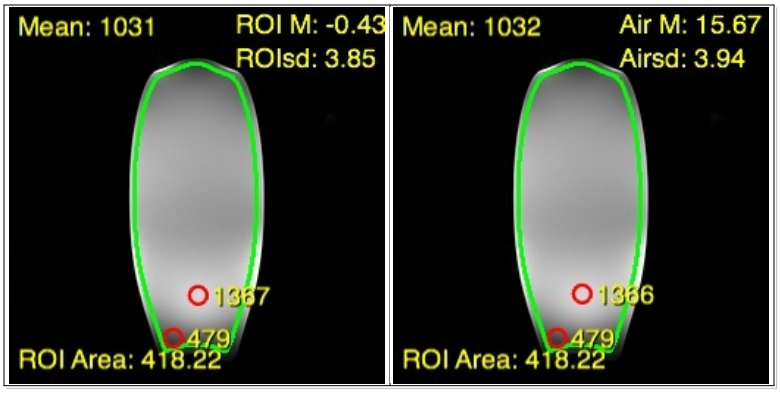
Coil Mode: e He 3,4 NE 1,2

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,031	1,367	479	-0.4	3.85	NEMA	189.4	107.8	251.1	51.9%
A	1,032	1,366	479	15.7	3.94	Air	171.6	97.7	227.2	51.9%

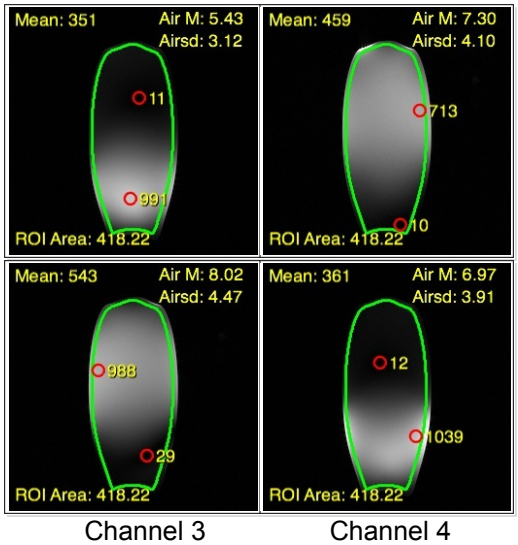
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	351	991	3.12	Air	73.7	93%	208.1	100%
2	459	713	4.10	Air	73.4	92%	114.0	55%
3	543	988	4.47	Air	79.6	100%	144.8	70%
4	361	1,039	3.91	Air	60.5	76%	174.1	84%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Neck Matrix
Mfg.: Siemens
Mfg. Date: 1/1/2004 Coil ID: 698
Phantom: Long cylinder

Test Date: 7/6/2008
Model: 75777906
Revision:
SN: 2158
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	45	256	256	25.6	1	3	-

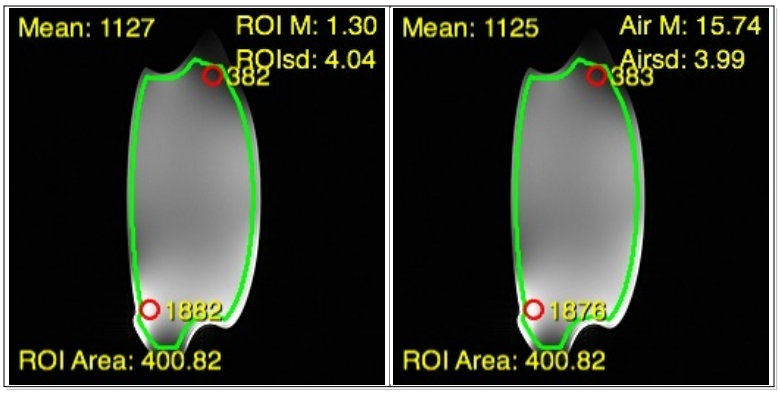
Coil Mode: f He 3,4 NE 1,2

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,127	1,882	382	1.3	4.04	NEMA	197.3	112.3	329.4	33.7%
A	1,125	1,876	383	15.7	3.99	Air	184.8	105.2	308.1	33.9%

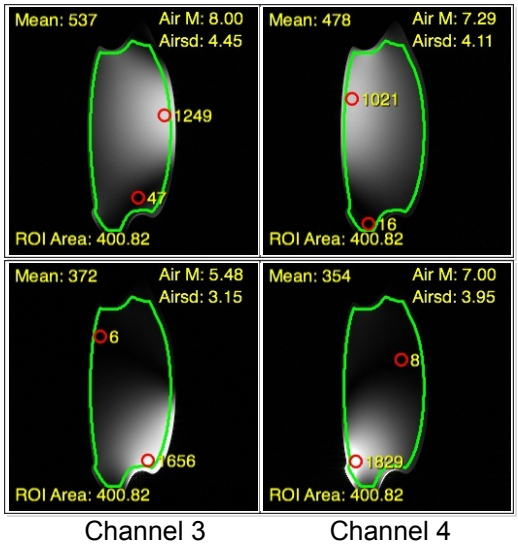
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	537	1,249	4.45	Air	79.1	100%	183.9	53%
2	478	1,021	4.11	Air	76.2	96%	162.8	47%
3	372	1,656	3.15	Air	77.4	98%	344.5	100%
4	354	1,829	3.95	Air	58.7	74%	303.4	88%



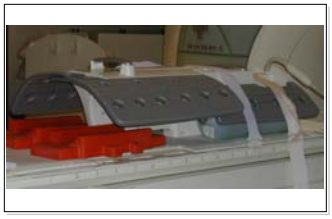
Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation



Coil: Periph Angio Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 699
Phantom: 2 Long cylinders

Test Date: 7/6/2008
Model: 7579910
Revision: _____
SN: 1802
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	45	256	256	25.6	1	3	-

Coil Mode: PVA RL 12 (lower)

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Background	Noise SD	Noise Type
N	516	971	127	-0.3	2.68	NEMA
N	506	940	140	0.1	2.58	NEMA
A	517	969	127	13.2	3.24	Air
A	506	940	139	13.2	3.24	Air

Calculated Results

Mean SNR	Normalized	Max SNR	Uniformity
136.2	77.5	256.2	23.1%
138.7	79.0	257.7	25.9%
104.6	59.5	196.0	23.2%
102.3	58.3	190.1	25.8%

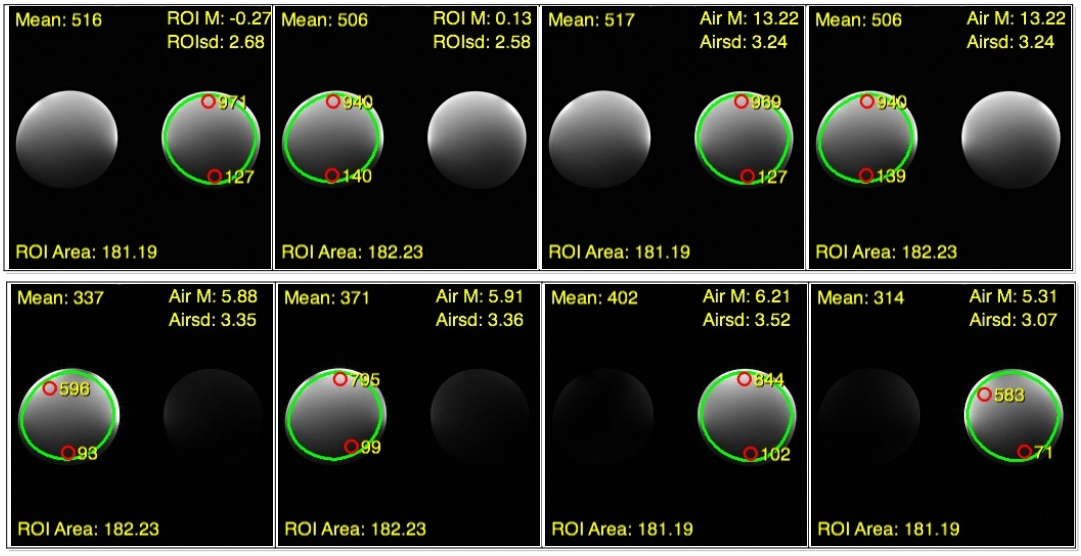
Analysis of Uncombined Images

Measured Data

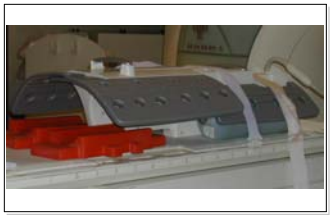
Ch	Mean	Max	Noise SD	Noise Type
1	337	596	3.35	Air
2	371	795	3.36	Air
3	402	844	3.52	Air
4	314	583	3.07	Air

Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
65.9	88%	116.6	74%
72.4	97%	155.1	99%
74.8	100%	157.1	100%
67.0	90%	124.4	79%



RF Coil Performance Evaluation



Coil: Periph Angio Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 699
Phantom: 2 Long cylinders

Test Date: 7/6/2008
Model: 7579910
Revision: _____
SN: 1802
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	2.0	3	-

Coil Mode: PVA RL 12 (lower)

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Background	Noise SD	Noise Type
N	589	1,096	307	0.1	2.00	NEMA
N	599	956	425	0.1	2.08	NEMA
A	589	1,096	307	9.8	2.95	Air
A	599	956	425	10.0	3.04	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
208.3	83.8	387.6	43.8%
203.7	82.0	325.0	61.5%
130.8	52.7	243.5	43.8%
129.1	52.0	206.1	61.5%

Analysis of Uncombined Images

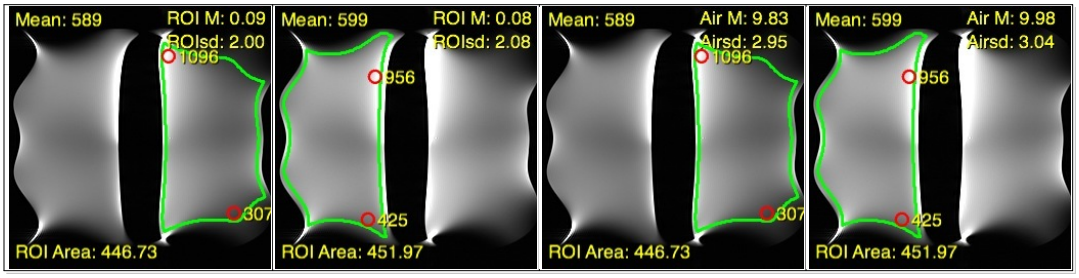
Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	329	710	2.56	Air
2	352	934	2.51	Air
3	322	1,064	2.30	Air
4	356	825	2.66	Air

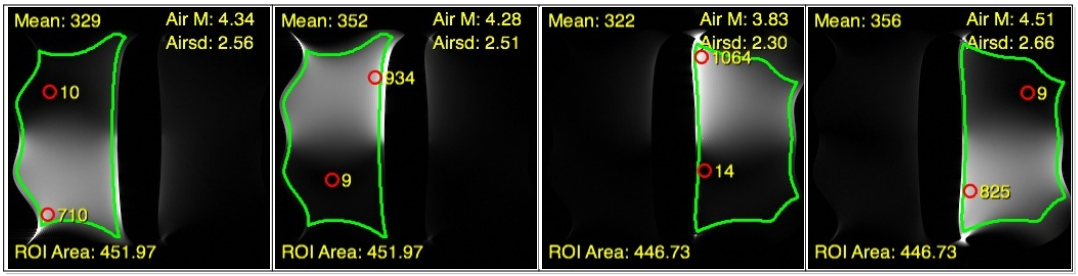
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
84.2	92%	181.7	60%
91.9	100%	243.8	80%
91.7	100%	303.2	100%
87.7	95%	203.2	67%

Composites



Channels



Channel 1 Channel 2 Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Periph Angio Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 699
Phantom: 2 Long cylinders

Test Date: 7/6/2008
Model: 7579910
Revision: _____
SN: 1802
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	45	256	256	25.6	2.0	3	-

Coil Mode: PVA RL 34 (upper)

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Background	Noise SD	Noise Type
N	635	1,477	301	0.3	2.02	NEMA
N	617	1,190	353	-0.1	2.42	NEMA
A	634	1,474	301	7.9	2.47	Air
A	617	1,196	358	8.1	2.64	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
222.3	89.5	517.1	33.9%
180.3	72.6	347.8	45.8%
168.2	67.7	391.1	33.9%
153.2	61.7	296.9	46.1%

Analysis of Uncombined Images

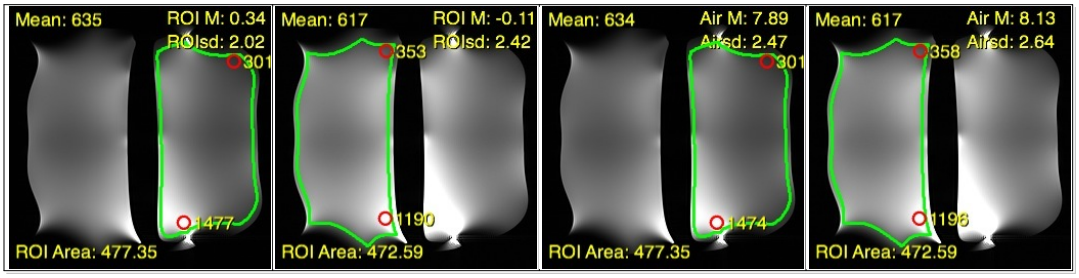
Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	322	781	1.89	Air
2	364	1,158	2.20	Air
3	408	1,464	2.34	Air
4	302	803	1.86	Air

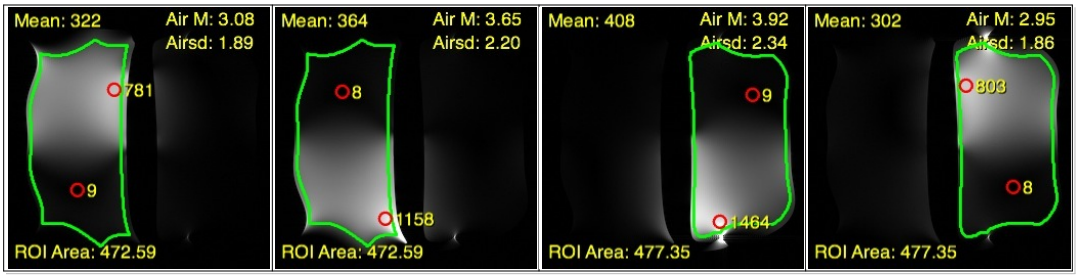
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
111.6	98%	270.8	66%
108.4	95%	344.9	84%
114.3	100%	410.0	100%
106.4	93%	282.9	69%

Composites



Channels



Channel 1 Channel 2 Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Periph Angio Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 699
Phantom: 2 Long cylinders

Test Date: 7/6/2008
Model: 7579910
Revision: _____
SN: 1802
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	45	256	256	25.6	1	3	-

Coil Mode: PVA RL 34 (upper)

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
N	463	741	202	6.3	10.61	NEMA
N	454	777	182	2.3	6.05	NEMA
A	457	716	198	10.4	2.67	Air
A	451	776	180	10.4	2.67	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
30.9	17.6	49.4	42.8%
53.1	30.2	90.8	38.0%
112.2	63.9	175.7	43.3%
110.7	63.0	190.5	37.7%

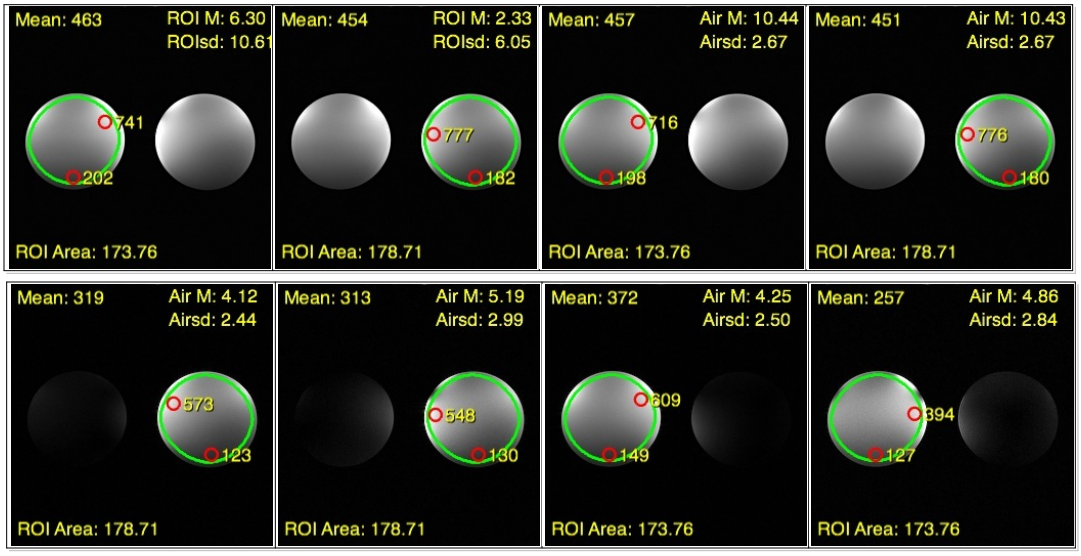
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	319	573	2.44	Air
2	313	548	2.99	Air
3	372	609	2.50	Air
4	257	394	2.84	Air

Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
85.7	88%	153.9	96%
68.6	70%	120.1	75%
97.5	100%	159.6	100%
59.3	61%	90.9	57%



RF Coil Performance Evaluation

Coil: Shoulder Array - Large
Mfg.: MRI Devices
Mfg. Date: _____ Coil ID: 701
Phantom: Small Bottle

Test Date: 7/6/2008
Model: 100214
Revision: _____
SN: 05901
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	36	256	256	25.6	1	3	-

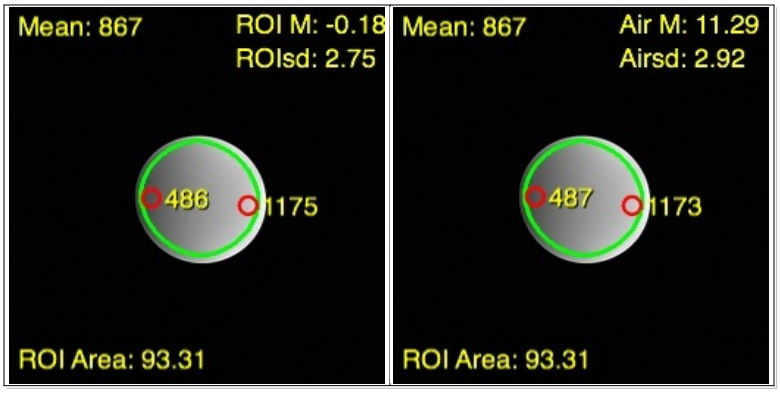
Coil Mode: SH

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	867	1,175	486	-0.2	2.75	NEMA	223.0	198.3	302.2	58.5%
A	867	1,173	487	11.3	2.92	Air	194.6	173.1	263.2	58.7%

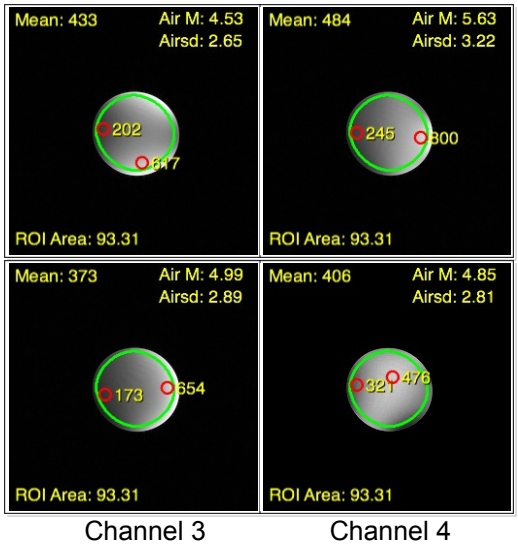
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	433	617	2.65	Air	107.1	100%	152.6	94%
2	484	800	3.22	Air	98.5	92%	162.8	100%
3	373	654	2.89	Air	84.6	79%	148.3	91%
4	406	476	2.81	Air	94.7	88%	111.0	68%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Shoulder Array - Large
Mfg.: MRI Devices
Mfg. Date: _____ Coil ID: 701
Phantom: Small Bottle

Test Date: 7/6/2008
Model: 100214
Revision: _____
SN: 05901
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	36	256	256	25.6	1	3	-

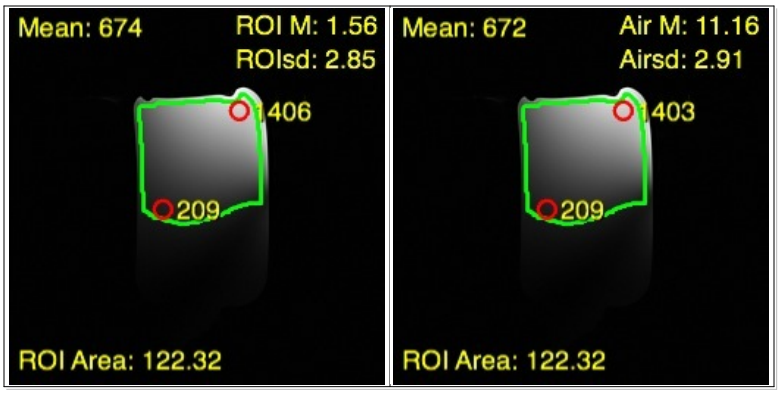
Coil Mode: SH

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	674	1,406	209	1.6	2.85	NEMA	167.2	148.8	348.9	25.9%
A	672	1,403	209	11.2	2.91	Air	151.3	134.6	315.9	25.9%

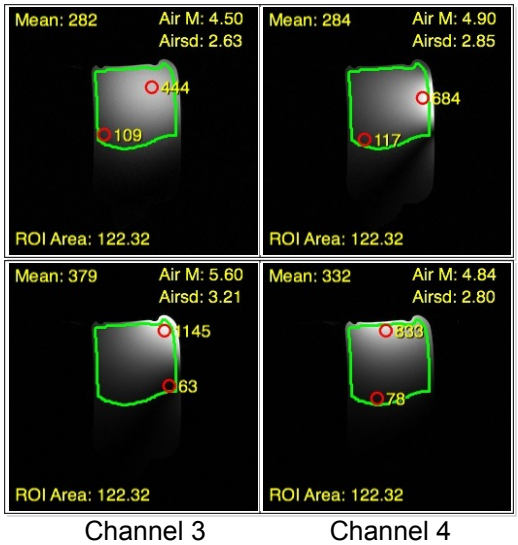
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	282	444	2.63	Air	70.3	90%	110.6	47%
2	284	684	2.85	Air	65.3	84%	157.3	67%
3	379	1,145	3.21	Air	77.4	100%	233.7	100%
4	332	833	2.80	Air	77.7	100%	195.0	83%



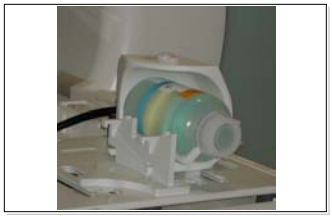
Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation



Coil: Shoulder Array - Small

Mfg.: MRI Devices

Mfg. Date: _____ Coil ID: 706

Phantom: Small Bottle

Test Date: 7/6/2008

Model: 100213

Revision: _____

SN: 05668

# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	36	256	256	25.6	1	3	-

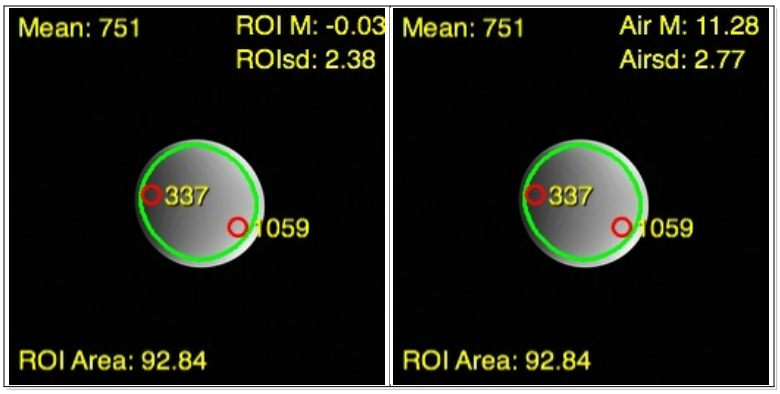
Coil Mode: SH

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	751	1,059	337	-0.0	2.38	NEMA	223.2	198.5	314.7	48.3%
A	751	1,059	337	11.3	2.77	Air	177.7	158.1	250.5	48.3%

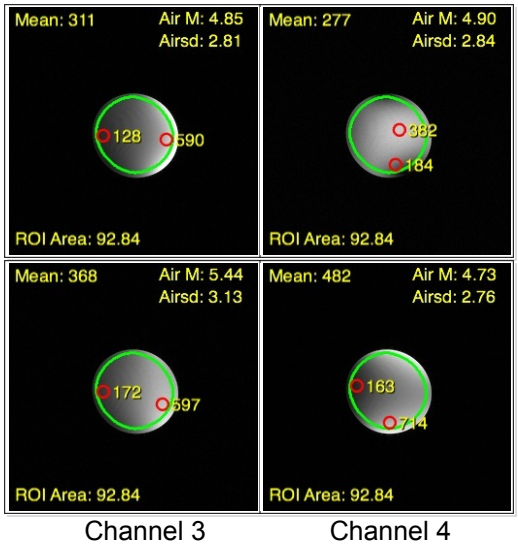
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	311	590	2.81	Air	72.5	63%	137.6	81%
2	277	382	2.84	Air	63.9	56%	88.1	52%
3	368	597	3.13	Air	77.0	67%	125.0	74%
4	482	714	2.76	Air	114.4	100%	169.5	100%



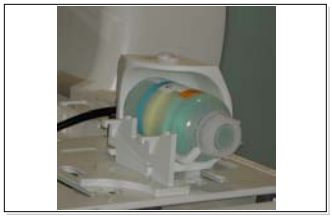
Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation



Coil: Shoulder Array - Small

Mfg.: MRI Devices

Mfg. Date: _____ Coil ID: 706

Phantom: Small Bottle

Test Date: 7/6/2008

Model: 100213

Revision: _____

SN: 05668

# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	36	256	256	25.6	1	3	-

Coil Mode: SH

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Background	Noise SD	Noise Type
N	682	1,726	205	0.5	2.44	NEMA
A	682	1,724	205	11.2	2.79	Air

Calculated Results

Mean SNR	Normalized	Max SNR	Uniformity
197.7	175.8	500.3	21.2%
160.2	142.5	404.9	21.3%

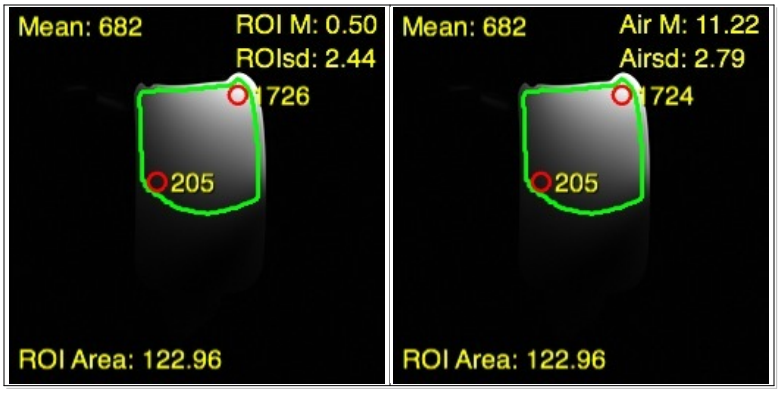
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	351	1,363	3.09	Air
2	312	572	2.73	Air
3	344	1,047	2.87	Air
4	245	654	2.82	Air

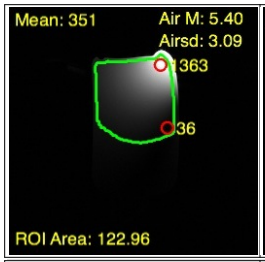
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
74.4	95%	289.1	100%
74.9	95%	137.3	48%
78.5	100%	239.1	83%
56.9	72%	152.0	53%

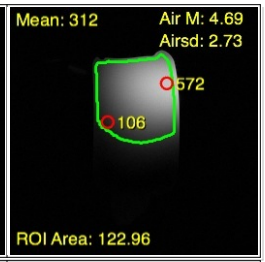


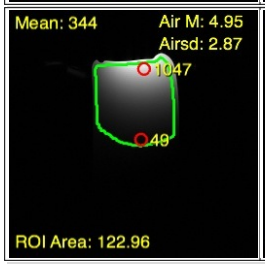
Composites

Channel 1

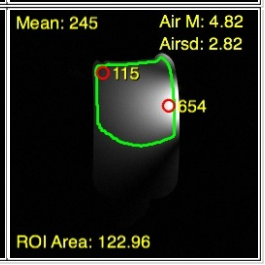


Channel 2





Channel 3



Channel 4

RF Coil Performance Evaluation

Coil: Spine Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 703
Phantom: Large Cylinder

Test Date: 7/6/2008
Model: 7579340
Revision: _____
SN: 2181
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	45	256	256	25.6	1	3	-

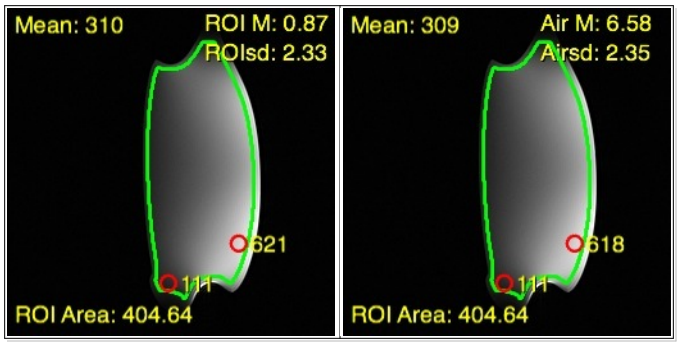
Coil Mode: SP12

Analysis of Composite Image

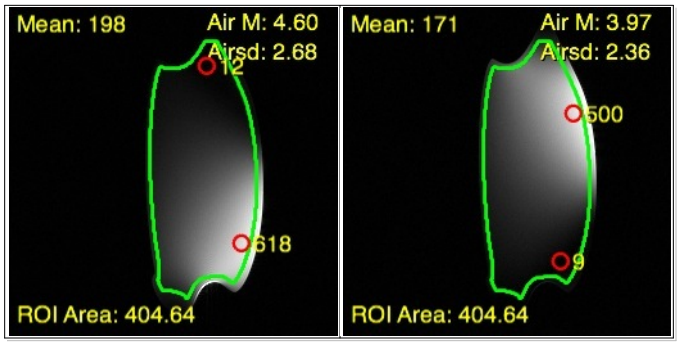
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	310	621	111	0.9	2.33	NEMA	94.1	53.6	188.5	30.3%
A	309	618	111	6.6	2.35	Air	86.2	49.1	172.3	30.5%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	198	618	2.68	Air	48.4	100%	151.1	100%
2	171	500	2.36	Air	47.5	98%	138.8	92%



Composites



Channel 1 Channel 2

RF Coil Performance Evaluation

Coil: Spine Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 703
Phantom: Large Cylinder

Test Date: 7/6/2008
Model: 7579340
Revision: _____
SN: 2181
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	45	256	256	25.6	1	3	-

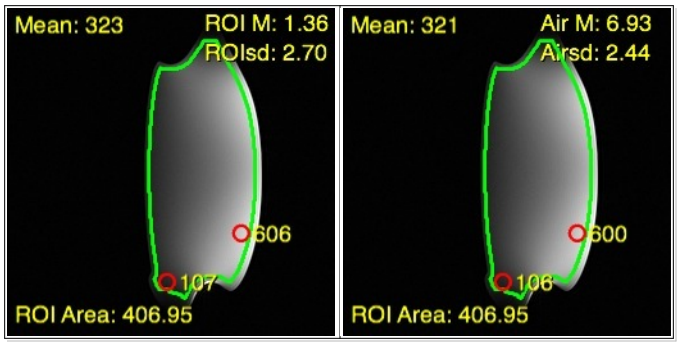
Coil Mode: SP34

Analysis of Composite Image

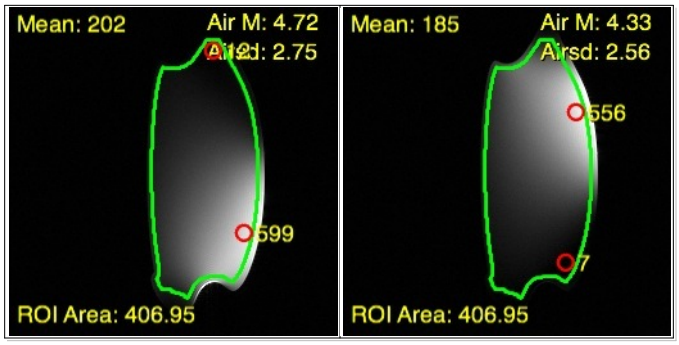
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	323	606	107	1.4	2.70	NEMA	84.6	48.2	158.7	30.0%
A	321	600	106	6.9	2.44	Air	86.2	49.1	161.1	30.0%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	202	599	2.75	Air	48.1	100%	142.7	100%
2	185	556	2.56	Air	47.4	98%	142.3	100%



Composites



Channel 1 Channel 2

RF Coil Performance Evaluation

Coil: Spine Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 703
Phantom: Large Cylinder

Test Date: 7/6/2008
Model: 7579340
Revision: _____
SN: 2181
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	45	256	256	25.6	1	3	-

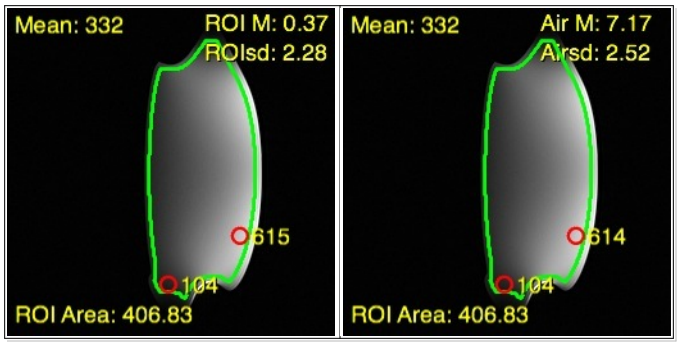
Coil Mode: SP56

Analysis of Composite Image

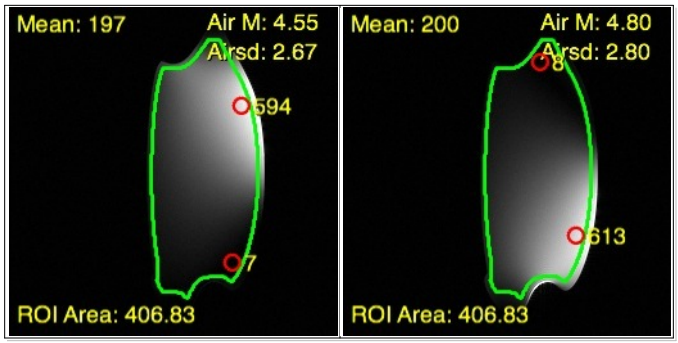
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	332	615	104	0.4	2.28	NEMA	103.0	58.6	190.8	28.9%
A	332	614	104	7.2	2.52	Air	86.3	49.2	159.7	29.0%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	197	594	2.67	Air	48.4	100%	145.8	100%
2	200	613	2.80	Air	46.8	97%	143.5	98%



Composites



Channel 1 Channel 2

RF Coil Performance Evaluation

Coil: Spine Matrix
Mfg.: Siemens
Mfg. Date: _____ Coil ID: 703
Phantom: Large Cylinder

Test Date: 7/6/2008
Model: 7579340
Revision: _____
SN: 2181
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	45	256	256	25.6	1	3	-

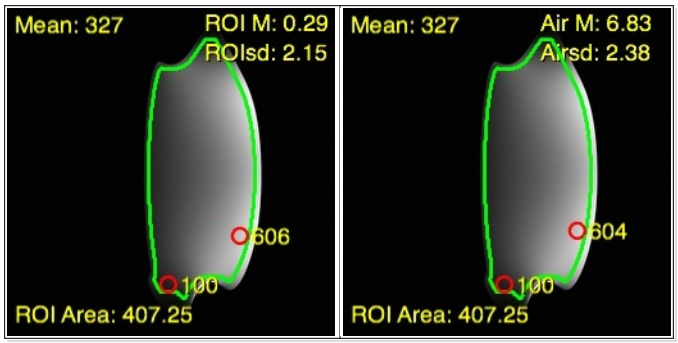
Coil Mode: SP78

Analysis of Composite Image

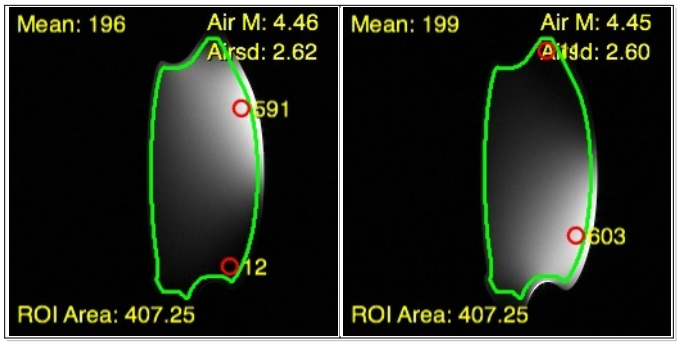
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	327	606	100	0.3	2.15	NEMA	107.6	61.2	199.3	28.3%
A	327	604	100	6.8	2.38	Air	90.0	51.3	166.3	28.4%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	196	591	2.62	Air	49.0	98%	147.8	97%
2	199	603	2.60	Air	50.2	100%	152.0	100%

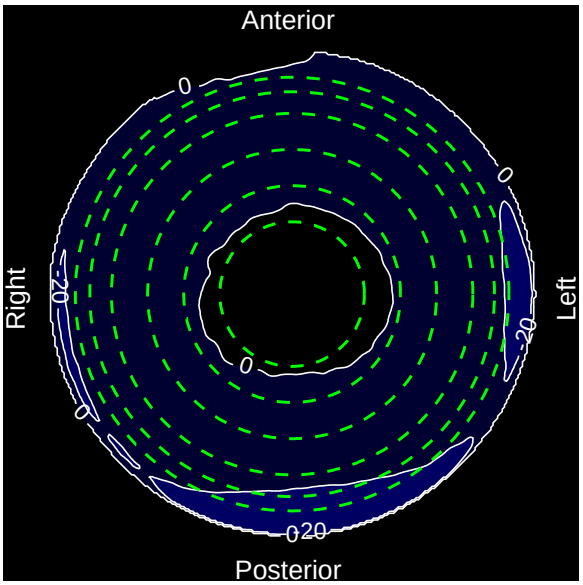


Composites



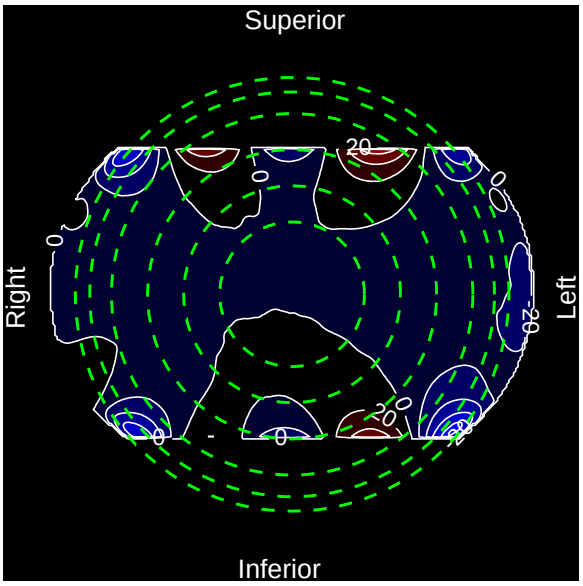
Channel 1 Channel 2

Appendix A: Magnet Homogeneity Field Maps
Siemens Espree 1.5T - 3 central planes
Measured July 6, 2008



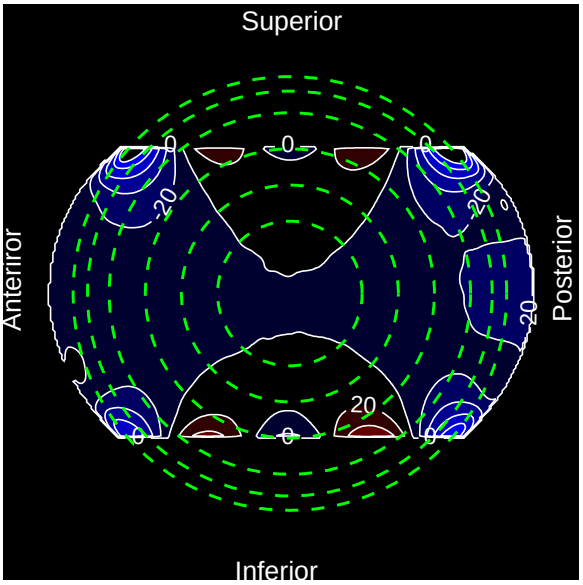
Axial

DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV
10	0.9	5.6	4.7	0.07	3.55	1.2
15	-3.8	5.6	9.5	0.15	1.50	2.2
20	-10.1	5.6	15.7	0.25	-0.96	3.4
25	-16.4	5.6	22.0	0.35	-3.55	4.7
28	-22.9	5.6	28.5	0.45	-5.21	5.7
30	-27.4	5.6	33.1	0.52	-6.37	6.6



Coronal

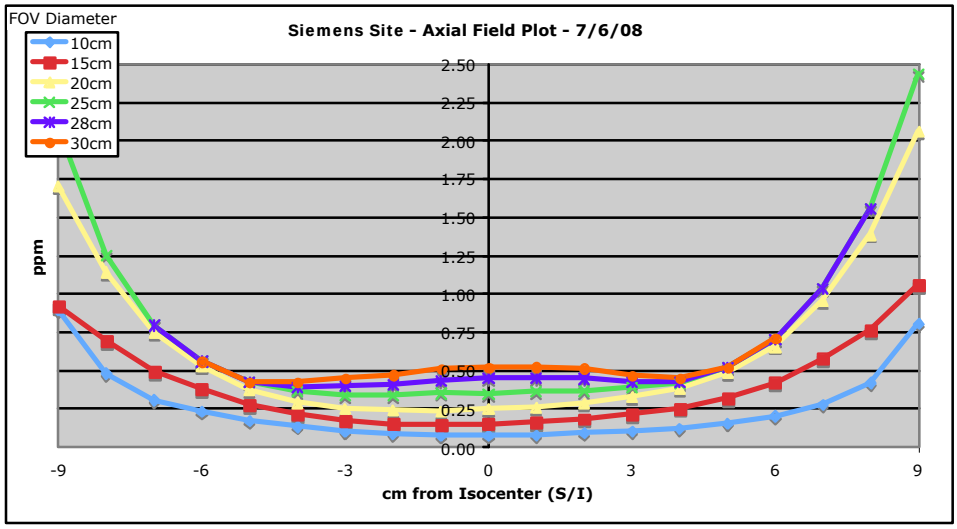
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV
10	-4.3	3.4	7.7	0.12	-0.73	1.3
15	-7.4	9.3	16.6	0.26	-0.57	2.3
20	-35.2	32.0	67.2	1.05	-0.73	6.3
25	-36.9	71.5	108.4	1.70	-0.77	10.7
28	-71.5	71.5	143.1	2.25	-2.61	12.0
30	-85.5	71.5	157.1	2.47	-3.67	13.4

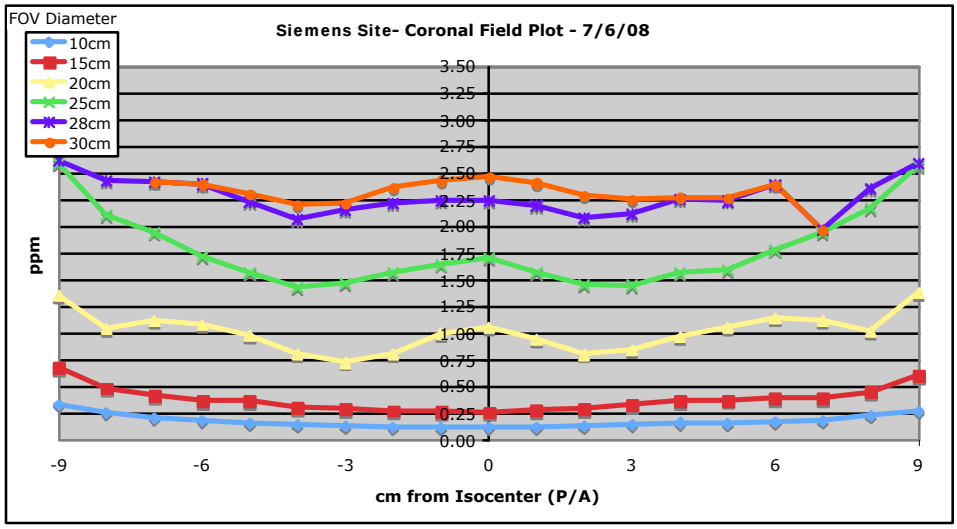


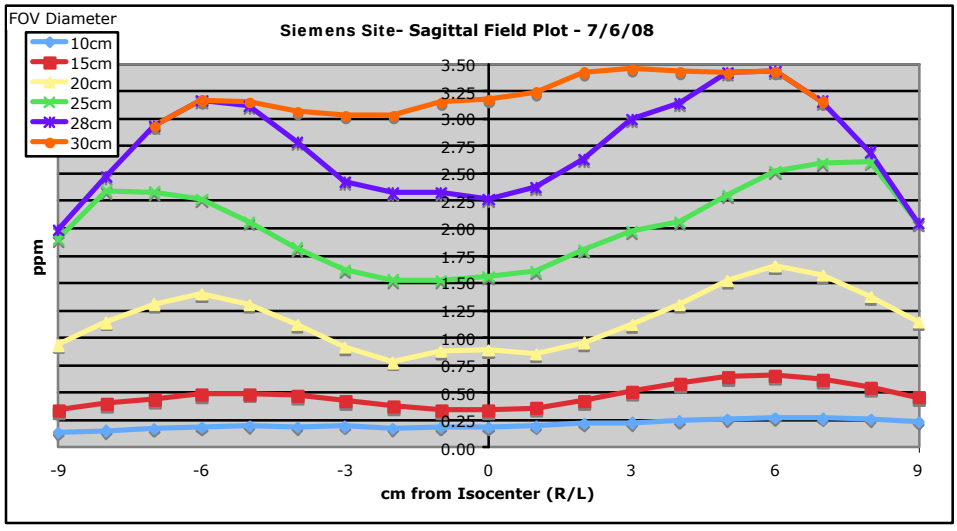
Sagittal

DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV
10	-4.8	6.3	11.2	0.18	-0.41	2.1
15	-9.7	11.4	21.1	0.33	-0.03	4.4
20	-23.7	32.4	56.1	0.88	-0.17	7.7
25	-43.9	54.9	98.7	1.55	-2.15	12.0
28	-89.4	54.9	144.2	2.26	-4.98	14.8
30	-147.6	54.9	202.5	3.18	-6.45	17.3

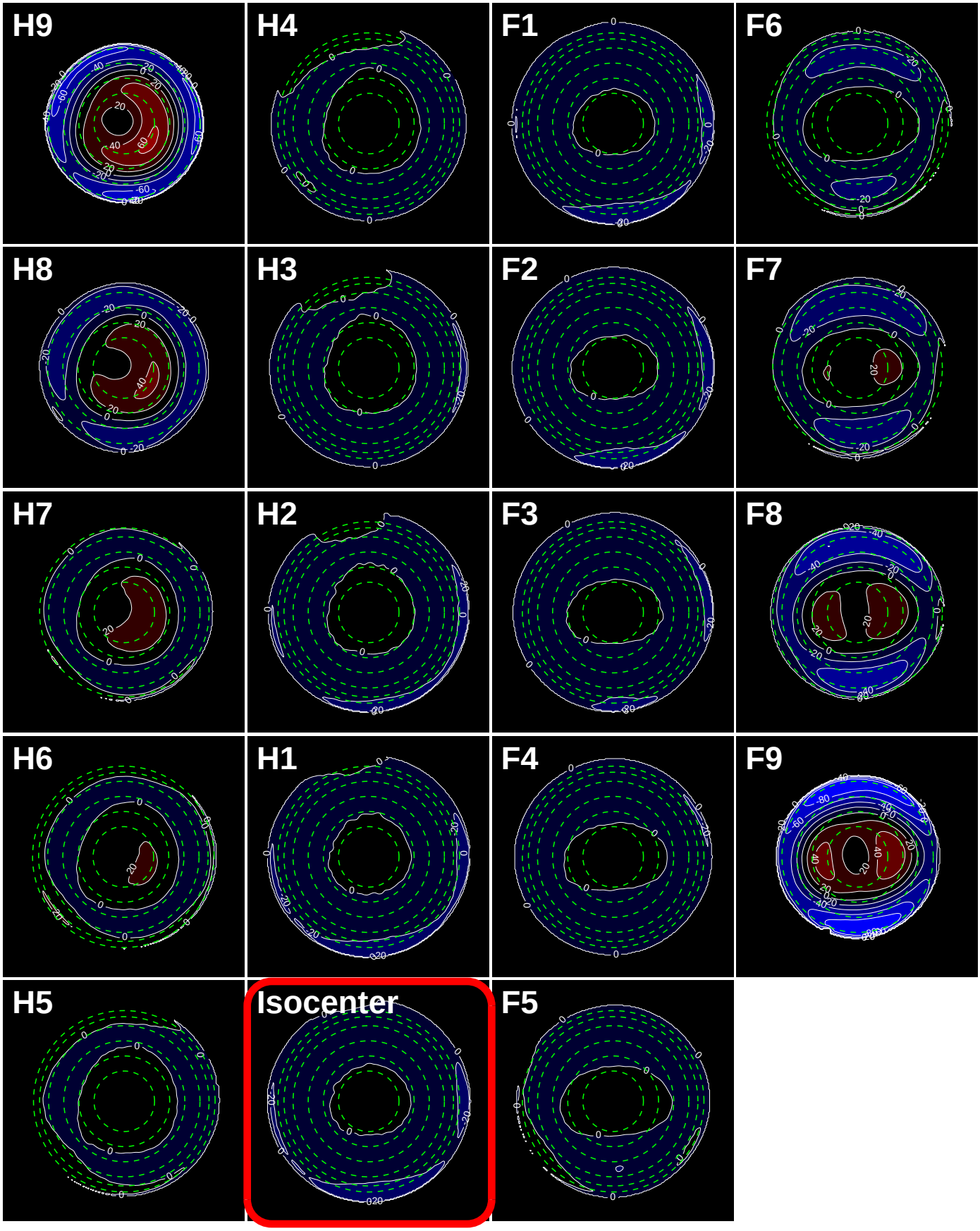
Appendix A: Magnet Homogeneity Field Maps
Siemens Espree 1.5T
Measured July 6, 2008



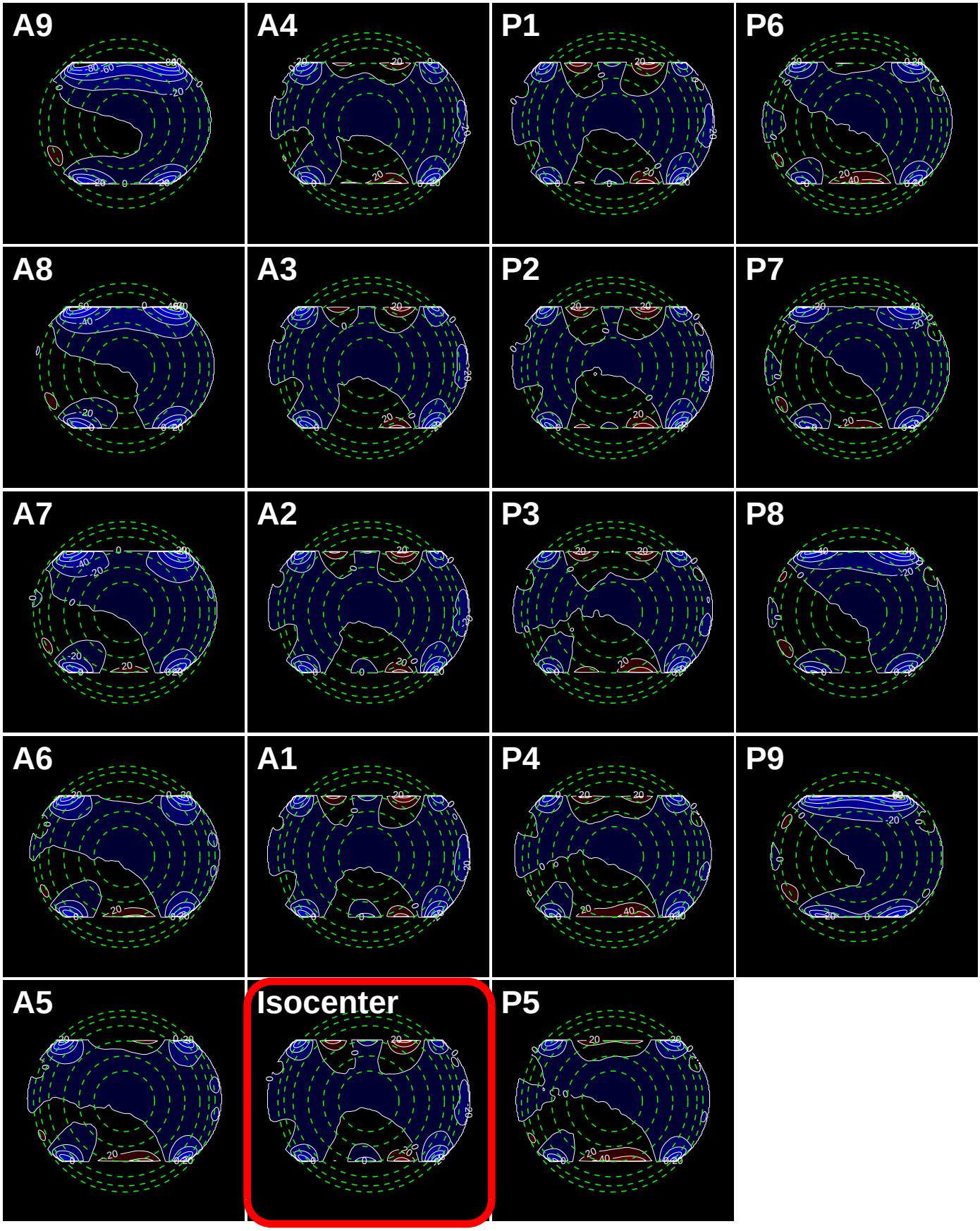




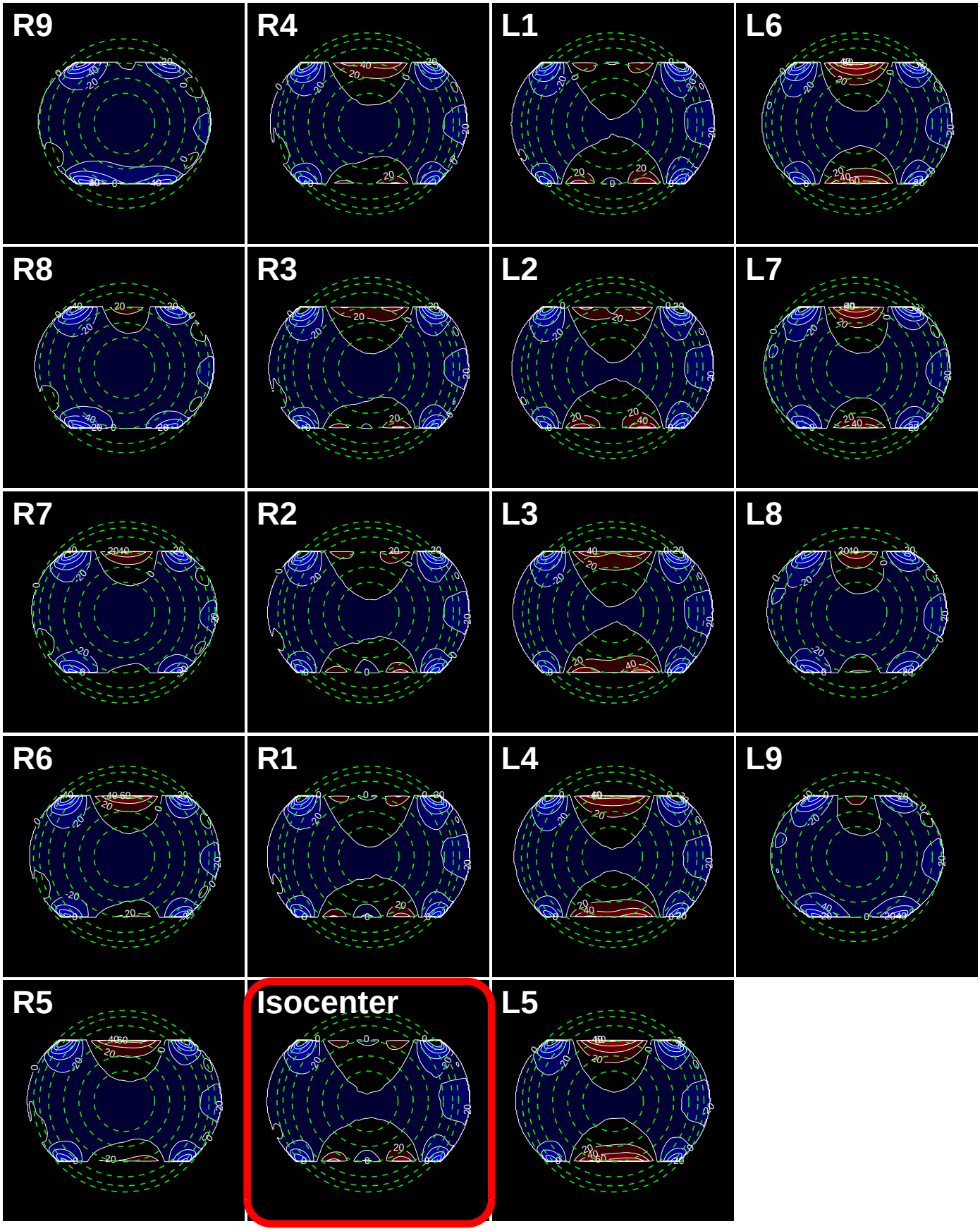
Axial Field Plots



Coronal Field Plots

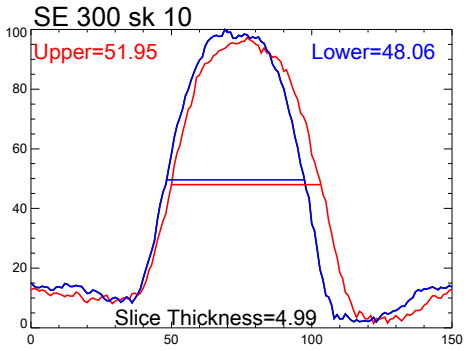


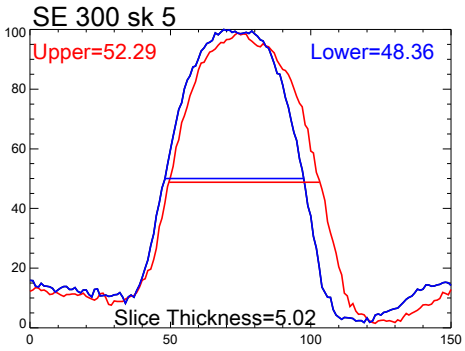
Sagittal Field Plots

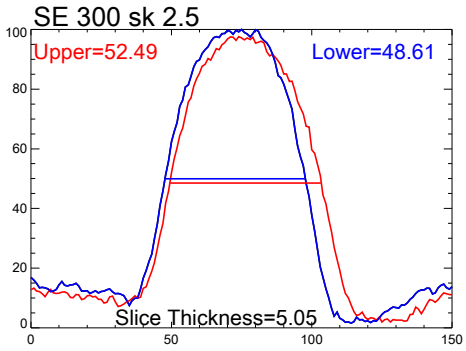


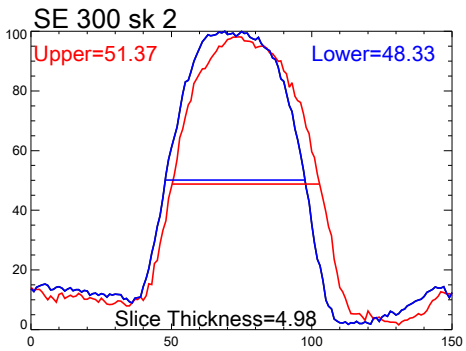
Appendix B: RF Slice Profiles and Crosstalk

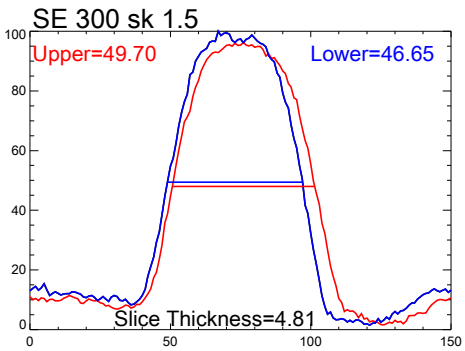
Spin Echo : Minimum
TR/TE = **300**/12
BW = 16.64 KHz
nex = 2
Scan time: 2:34

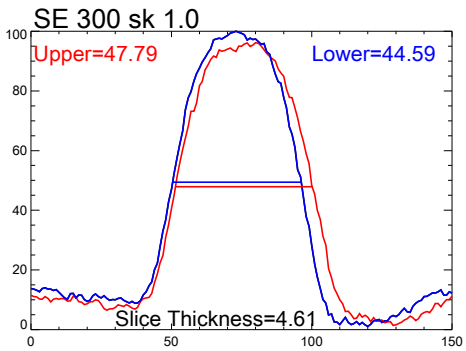


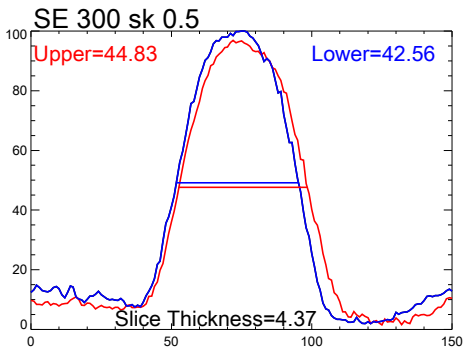


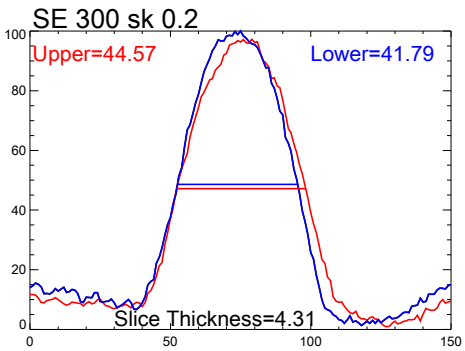


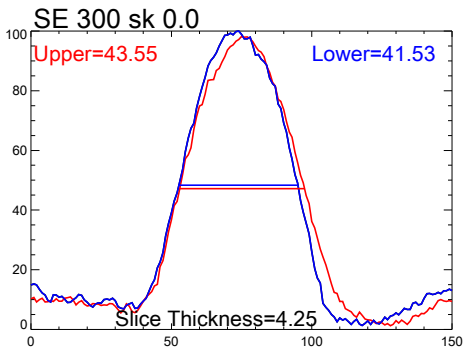


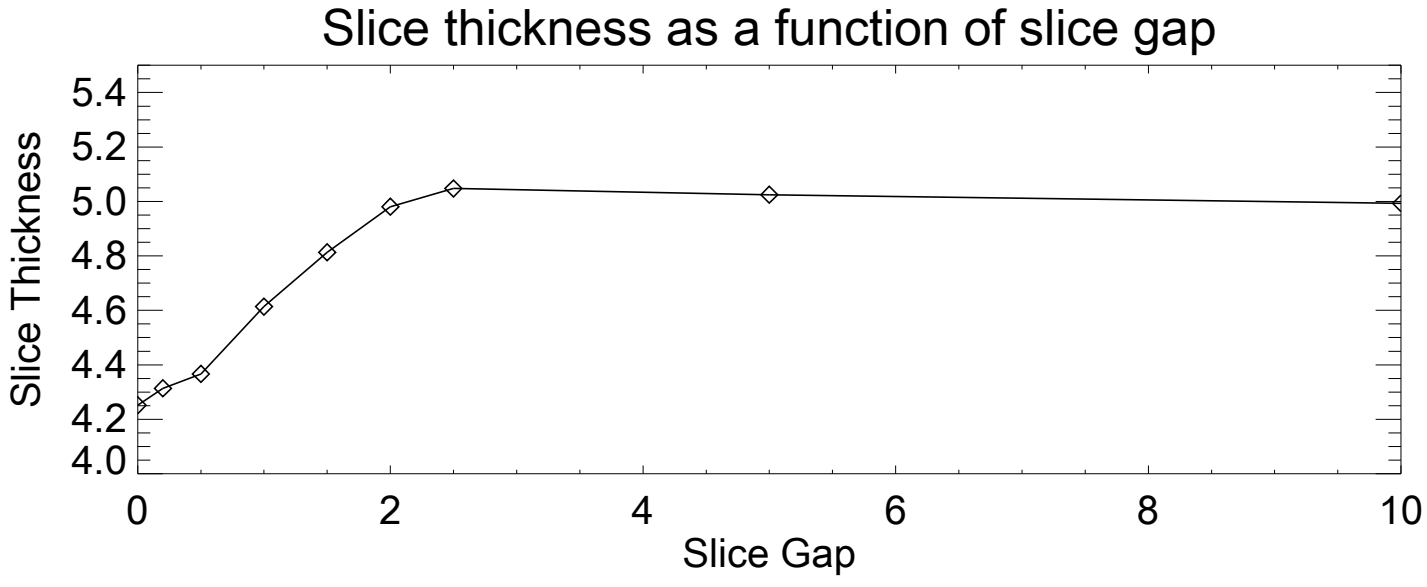






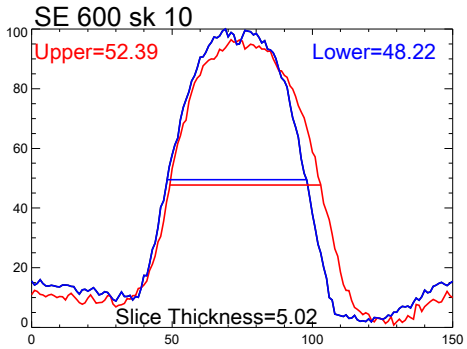


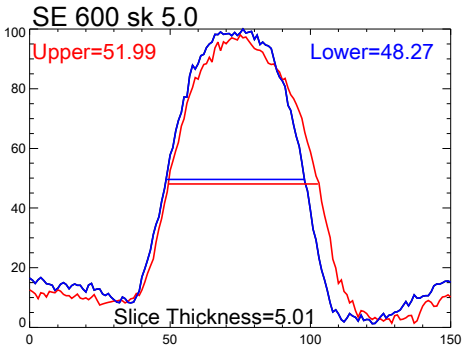


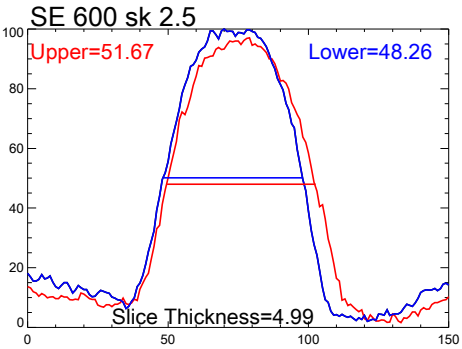


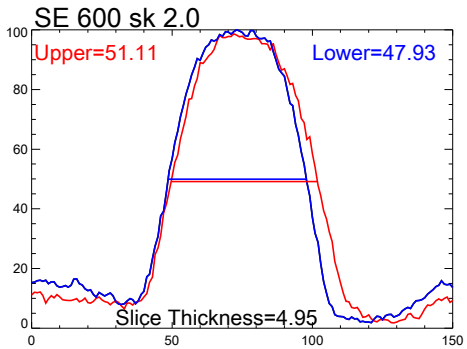
Appendix B: RF Slice Profiles and Crosstalk

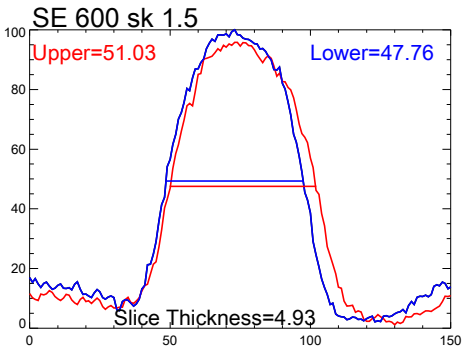
Spin Echo : Minimum
TR/TE = **600**/12
BW = 16.64 KHz
nex = 2
Scan time: 2:34

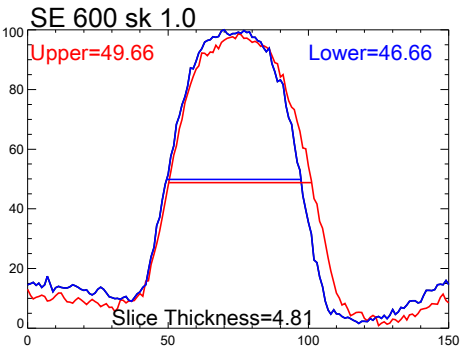


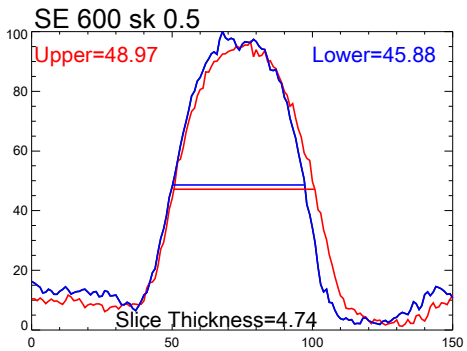


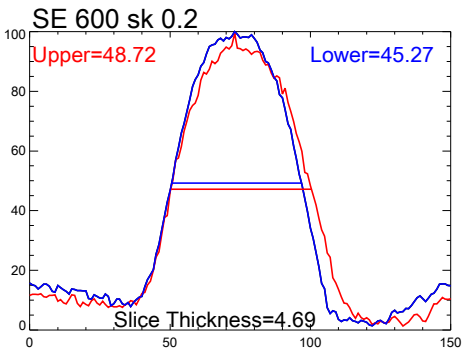


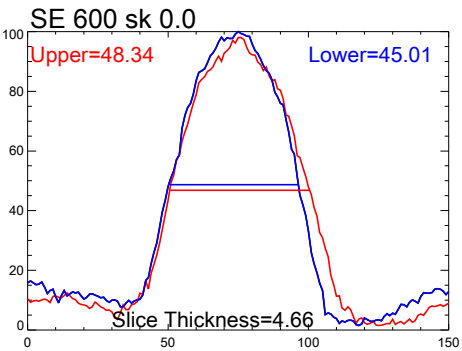


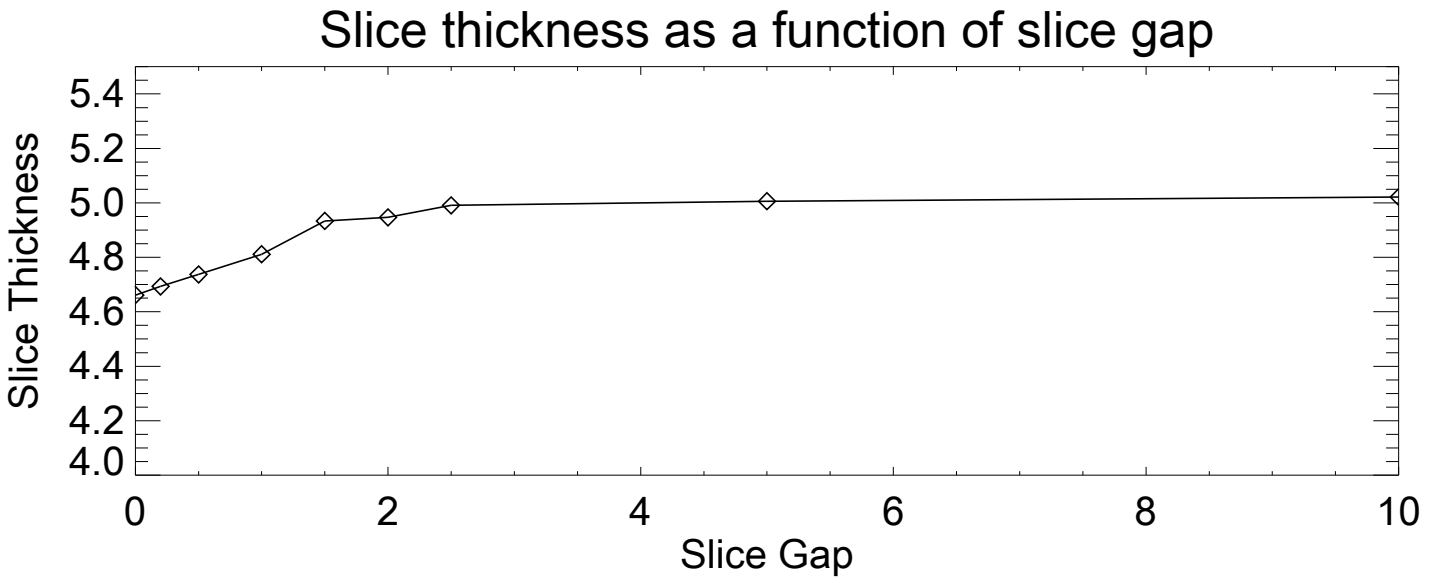












Siemens Site **Espree**

Coil Used: **Head Matrix** Test Date: **7/6/2008**

	Sagittal Locator	
1	Length of phantom, end to end (mn 148± 2)	148.6

= calculated field

		(SE 500/20)	(SE 2000/20)	(SE 2000/80)	(Site T1)	(Site T2)
	Slice Location #1	ACR T1	ACR PD	ACR T2	Site T1	Site T2
2	Resolution (1.10, 1.00, 0.90 mm)	1.0	1.0	1.0	1.0	1.0
3		1.0	1.0	1.0	1.0	1.0
4	Slice Thickness (fwhm in mm) Top	54.2	54.4	47.5	53.2	61.6
5	Bottom	50.3	50.3	44.7	49.4	58.4
6	Calculated value 5.0±0.7	5.21	5.22	4.61	5.12	6.00
7	Wedge (mm) = + = -	1.5	1.3	1.3	1.5	1.9
8	Diameter (mm) (190±2) ⊕	190.5	190.5	190.6	190.4	190.2
9	⊖	189.6	189.6	189.7	189.6	189.9
	Slice Location #5					
10	Diameter (mm) (190±2) ⊕	191.0	191.0	191.0	191.0	190.6
11	⊖	190.0	190.0	190.0	189.9	190.1
12	⊘	190.3	190.3	190.4	190.3	190.1
13	⊘	189.6	189.6	189.7	189.5	189.5
	Slice Location #7					
14	Signal (mean only) Big ROI	1943	2015	1090	2001	1243
15	High	2050	2116	1149	2122	1354
16	Low	1721	1813	963	1619	1030
17	Uniformity (>87.5%)	91.3%	92.3%	91.2%	86.6%	86.4%
18	Background Noise (mean ±std dev) Top	12.2 ± 5.73	12.1 ± 5.64	9.1 ± 4.11	12.9 ± 6.11	11.8 ± 5.59
19	Bottom	12.0 ± 6.17	11.9 ± 6.13	9.2 ± 4.42	14.3 ± 7.60	10.9 ± 5.50
20	Left	15.0 ± 7.83	15.7 ± 8.25	12.4 ± 6.18	15.8 ± 7.41	16.6 ± 8.61
21	Right	14.3 ± 7.44	14.8 ± 8.02	12.4 ± 6.81	15.0 ± 7.72	17.2 ± 8.77
22	Ghosting Ratio (<2.5%)	0.1%	0.2%	0.3%	0.1%	0.4%
23	SNR (no spec)	327	342	256	292	224
	Low Con Detectability					
24	Slice Location #8 1.4%	8	8	4	7	0
25	Slice Location #9 2.5%	10	10	10	10	8
26	Slice Location #10 3.6%	10	10	10	10	9
27	Slice Location #11 5.1%	10	10	10	10	10
28	Total # of Spokes (>=9)	38	38	34	37	27
	Slice Location #11					
29	Wedge (mm) = + = -	1.0	-1.1	-1.1	-0.7	-0.8
30	Slice Position Error	-0.5	-2.4	-2.4	-2.2	-2.7

Siemens Site

Espree

Sequence parameters

Test Date: **7/6/2008**

Coil Used:**Head Matrix**

Test ID **308**

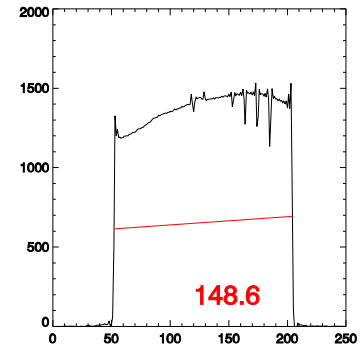
Study Description	Pulse Sequence (ETL)	TR (ms)	TE (ms)	FOV (cm)	Phase Sample Ratio	Number of Slices	Thick-ness (mm)	Slice Gap	NSA (Nex)	Freq Matrix	Phase Matrix	Band Width (kHz)	Scan Time (min:sec)
ACR T1	SE	500	20	25	1	11	5	5	1	256	256	16.64	2:09
ACR PD	Dual Echo SE	2000	20	25	1	11	5	5	1	256	256	16.64	8:32
ACR T2	Dual Echo SE	2000	80	25	1	11	5	5	1	256	256	12.8	8:32
Site T1	SE	400	12	24	1	11	5	5	1	256	256	16.64	1:43
Site T2	FSE(11)	5000	119	24	1	11	5	5	2	256	256	12.8	3:53

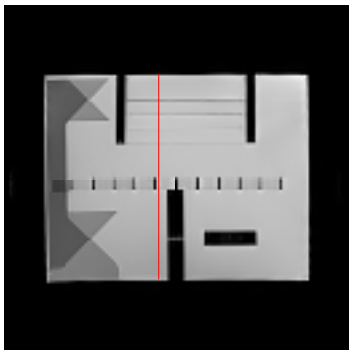
Magnet ID: **68** **Coil ID:** **695** **TestID:** **308**

Appendix C: ACR Phantom Analysis

ACR T1

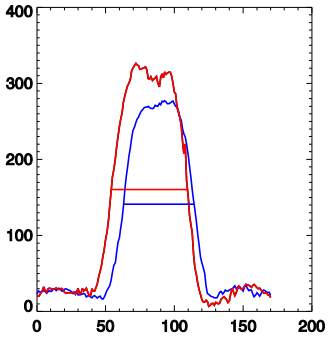
Sagital Length





High Contrast Resolution

Slice Thickness

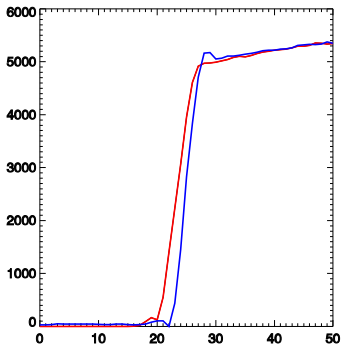


Upper=54.16

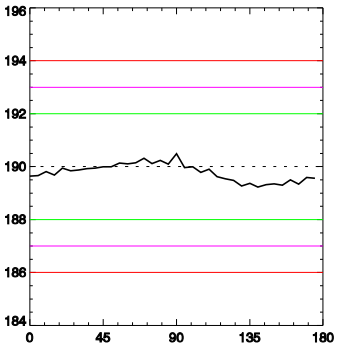
Lower=50.25

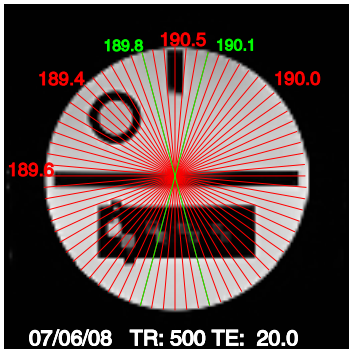
Slice Thickness=5.21

Slice Position - Inferior

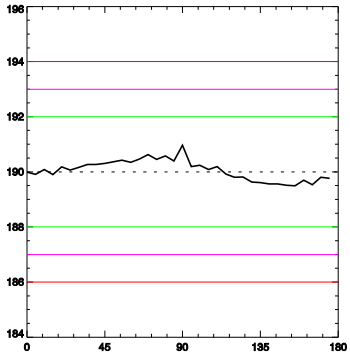


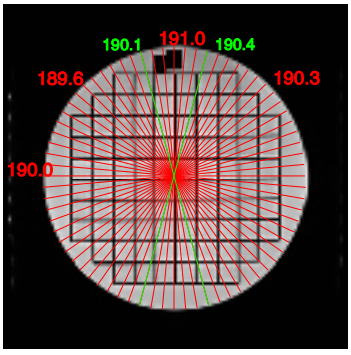
Axial Diameters - #1



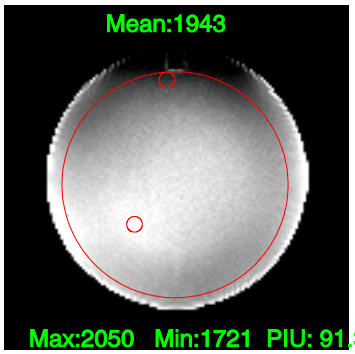


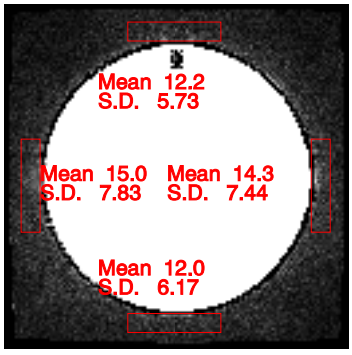
Axial Diameters - #5



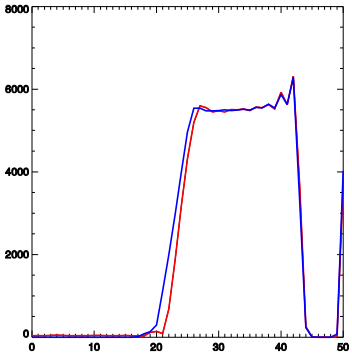


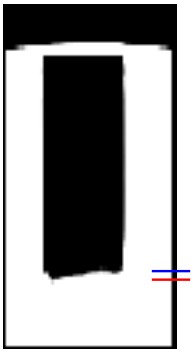
Uniformity & Ghosting - #7



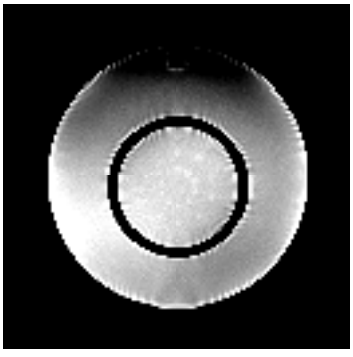


Slice Position - Superior

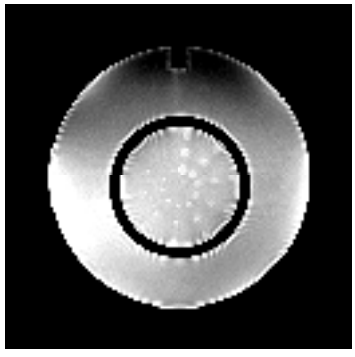




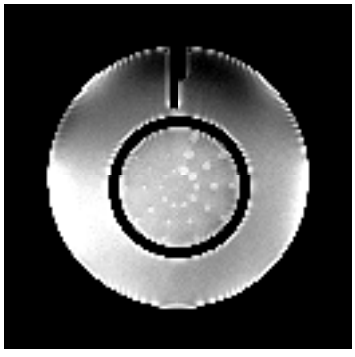
Low Contrast - #8



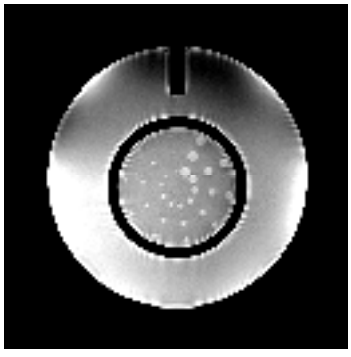
Low Contrast - #9



Low Contrast - #10



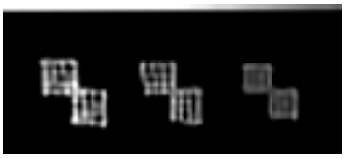
Low Contrast - #11



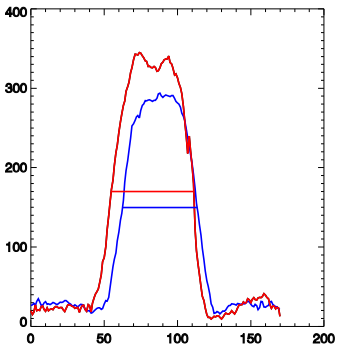
Appendix C: ACR Phantom Analysis

ACR PD

High Contrast Resolution

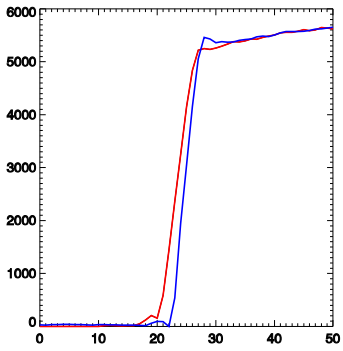


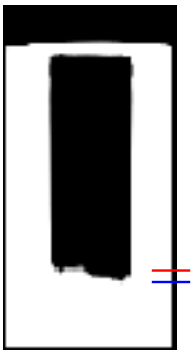
Slice Thickness



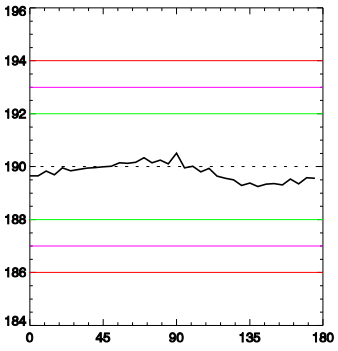
Upper=54.36
Lower=50.29
Slice Thickness=5.22

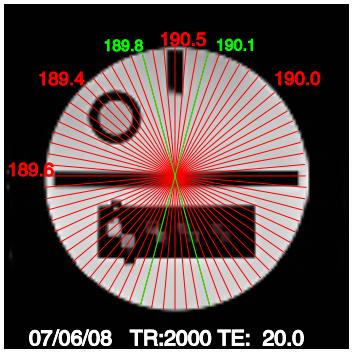
Slice Position - Inferior



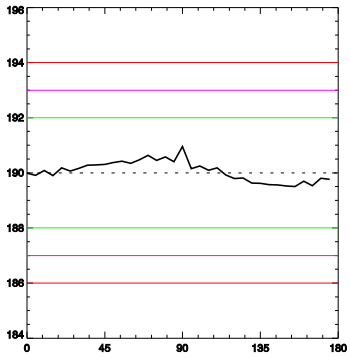


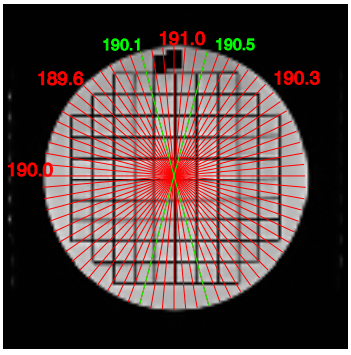
Axial Diameters - #1



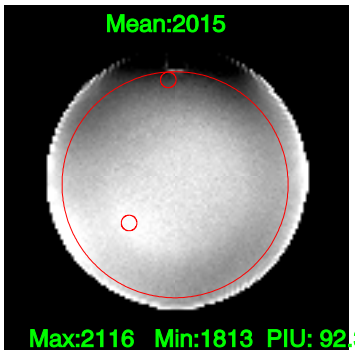


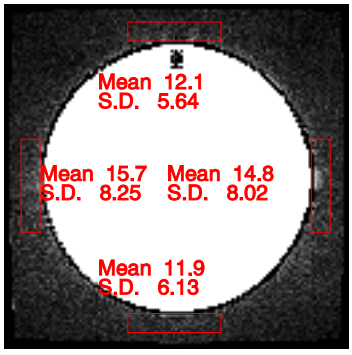
Axial Diameters - #5



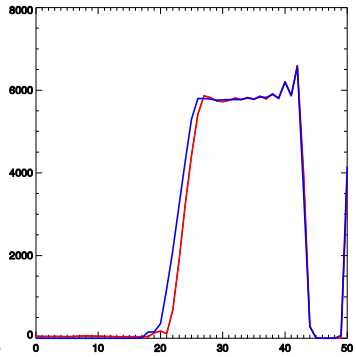


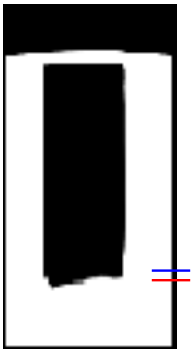
Uniformity & Ghosting - #7



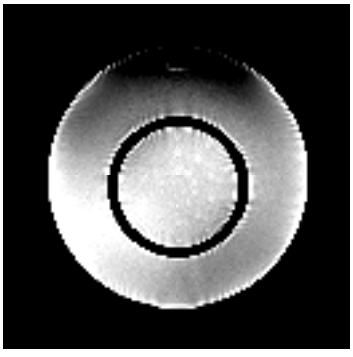


Slice Position - Superior

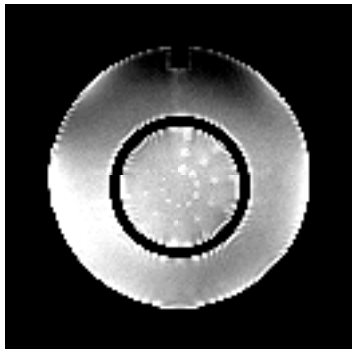




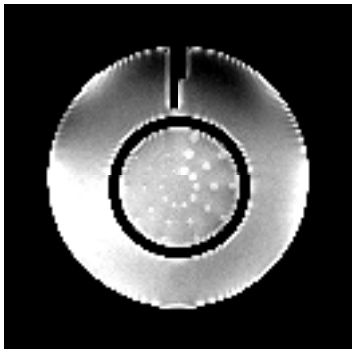
Low Contrast - #8



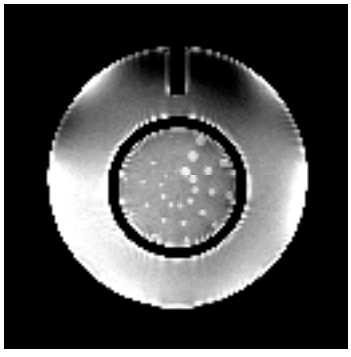
Low Contrast - #9



Low Contrast - #10



Low Contrast - #11

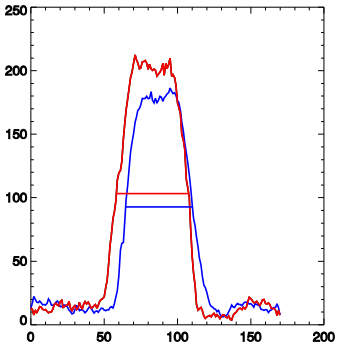


Appendix C: ACR Phantom Analysis

ACR T2

High Contrast Resolution

Slice Thickness

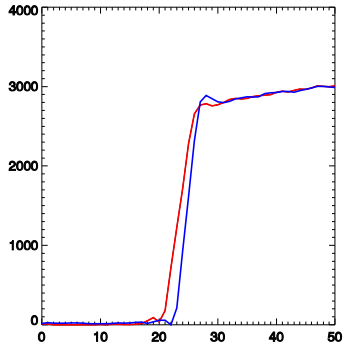


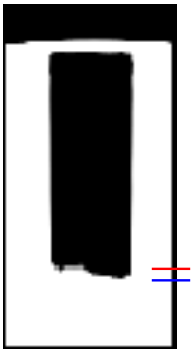
Upper=47.51

Lower=44.74

Slice Thickness=4.61

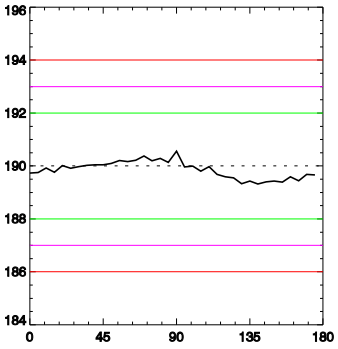
Slice Position - Inferior

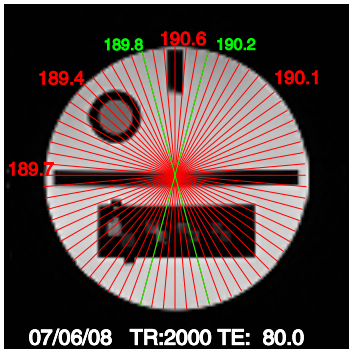




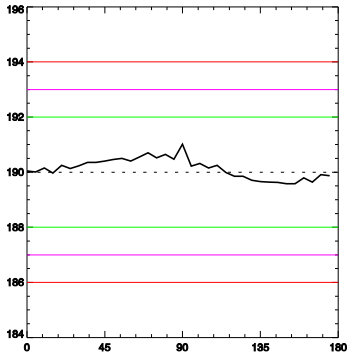
Diff.= 1.27

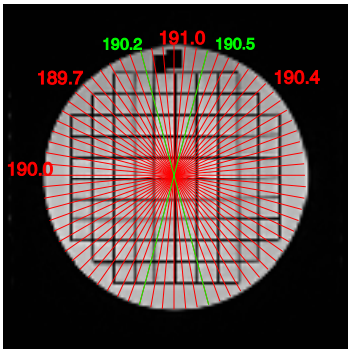
Axial Diameters - #1



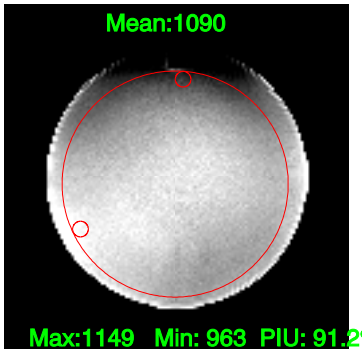


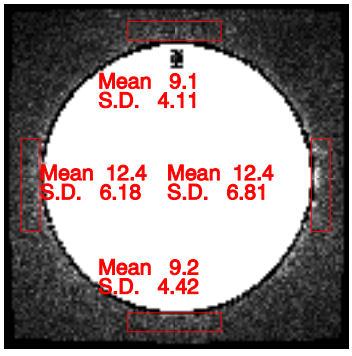
Axial Diameters - #5



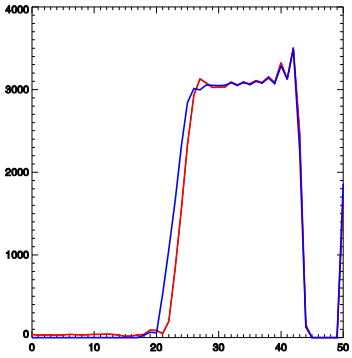


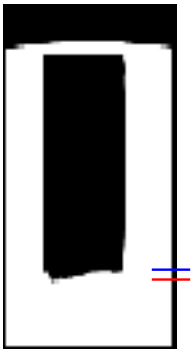
Uniformity & Ghosting - #7





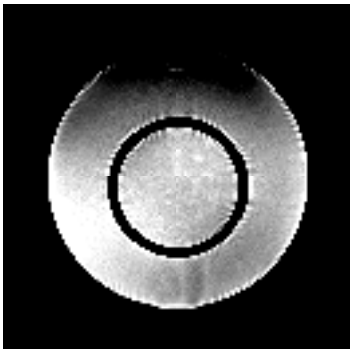
Slice Position - Superior



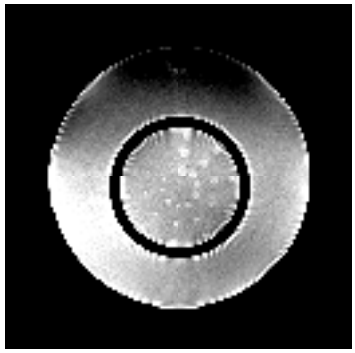


Diff.= -1.14

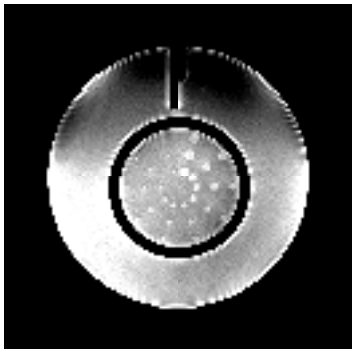
Low Contrast - #8



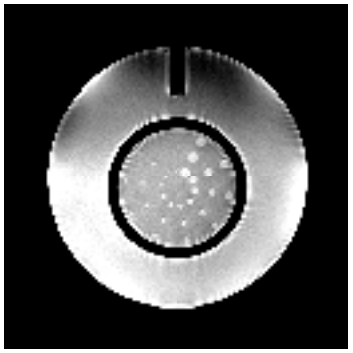
Low Contrast - #9



Low Contrast - #10



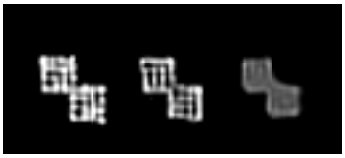
Low Contrast - #11



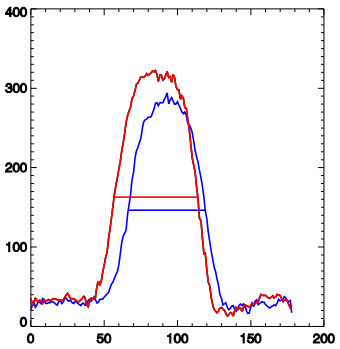
Appendix C: ACR Phantom Analysis

Site T1

High Contrast Resolution



Slice Thickness

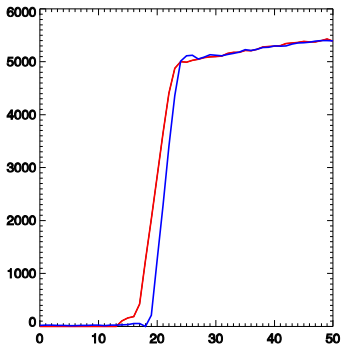


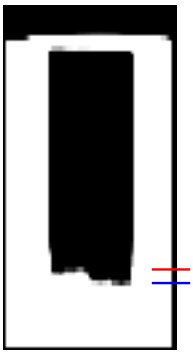
Upper=53.21

Lower=49.44

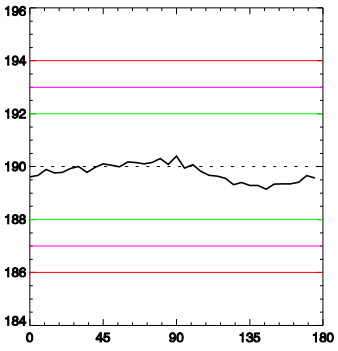
Slice Thickness=5.13

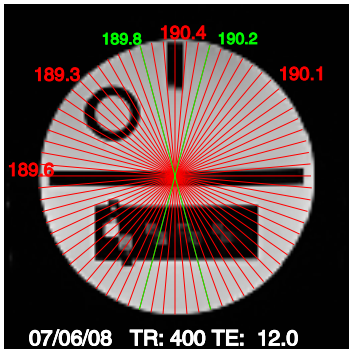
Slice Position - Inferior



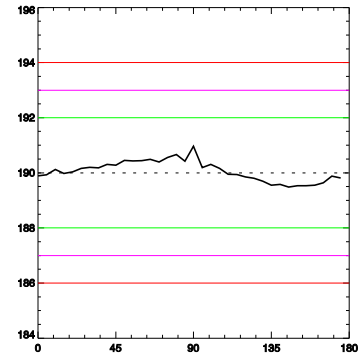


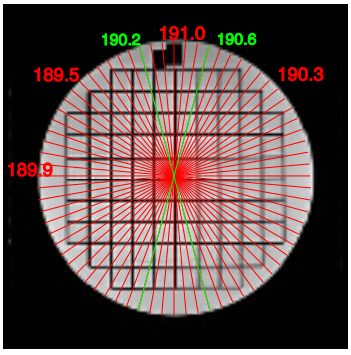
Axial Diameters - #1



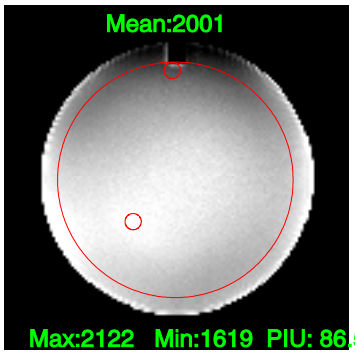


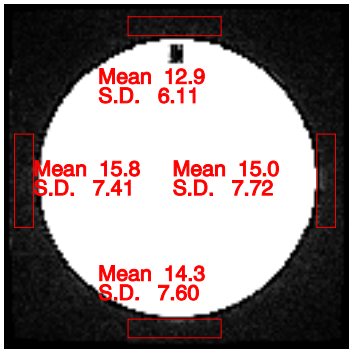
Axial Diameters - #5



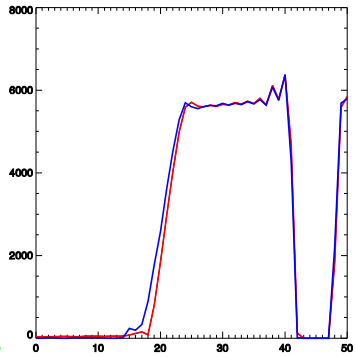


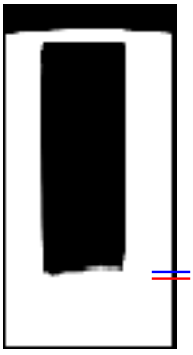
Uniformity & Ghosting - #7



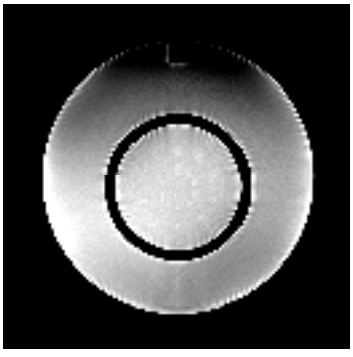


Slice Position - Superior

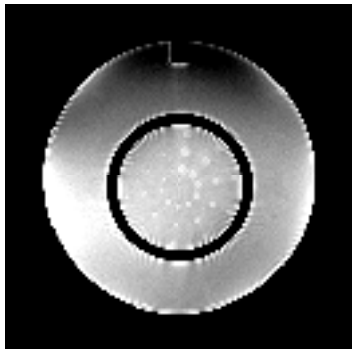




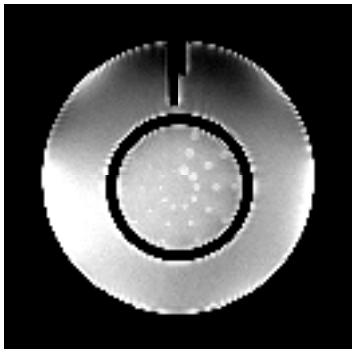
Low Contrast - #8



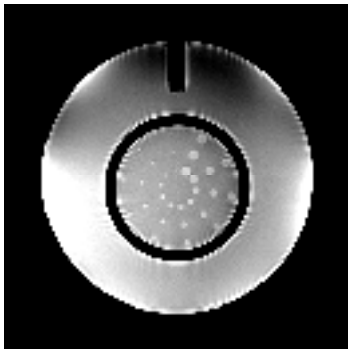
Low Contrast - #9



Low Contrast - #10



Low Contrast - #11

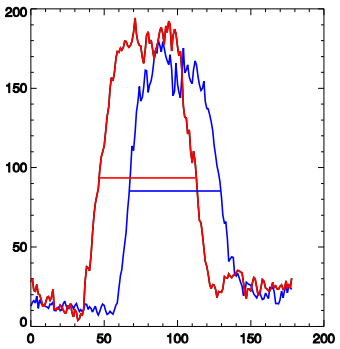


Appendix C: ACR Phantom Analysis

Site T2

High Contrast Resolution

Slice Thickness

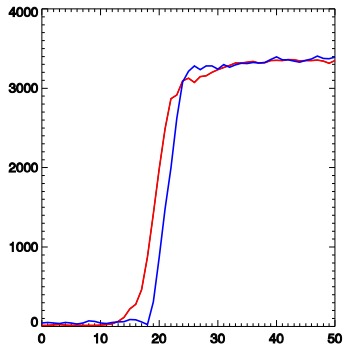


Upper=61.62

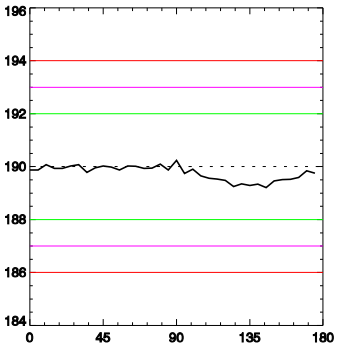
Lower=58.39

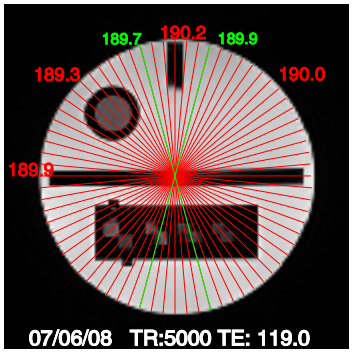
Slice Thickness=6.00

Slice Position - Inferior

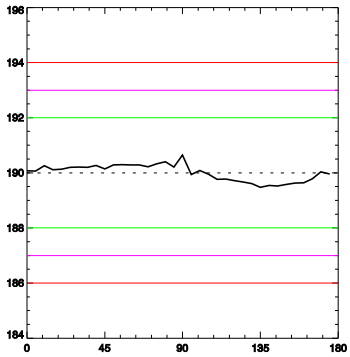


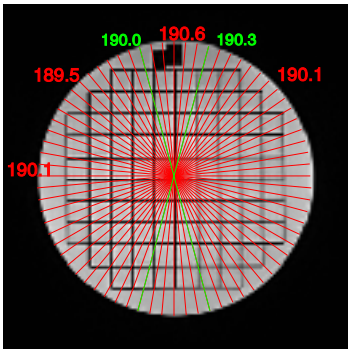
Axial Diameters - #1



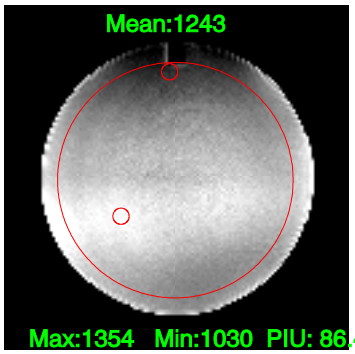


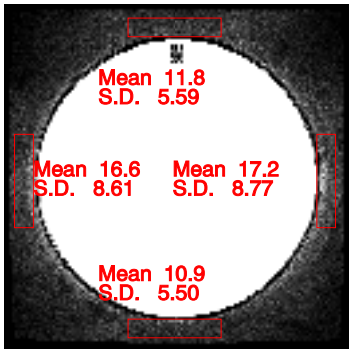
Axial Diameters - #5



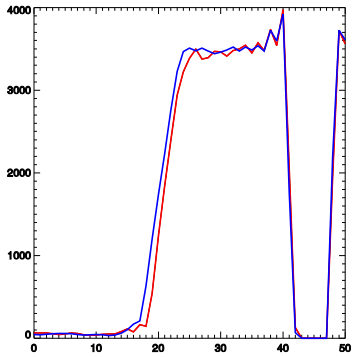


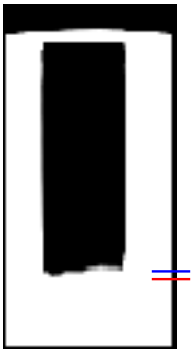
Uniformity & Ghosting - #7



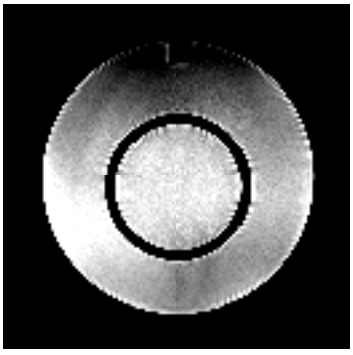


Slice Position - Superior

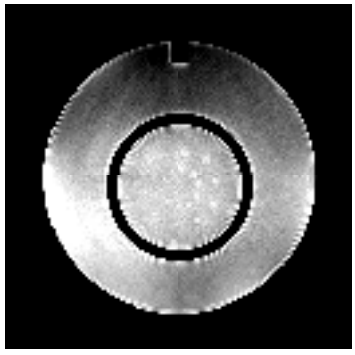




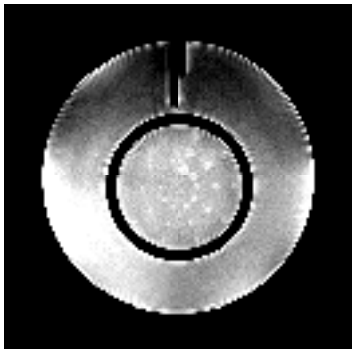
Low Contrast - #8



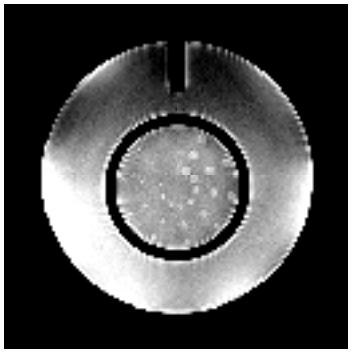
Low Contrast - #9



Low Contrast - #10



Low Contrast - #11



Appendix D:
Explanation of RF Coil Testing Report

Introduction

The primary goal of RF coil testing is to establish some sort of base line for tracking coil performance over time. The most common measure is the Signal to Noise Ratio or SNR. In addition, we can look at overall signal uniformity, ghosting level (or better - lack of ghosting) and in the case of phased array coils we look at the SNR of each and every channel and at symmetry between channels. Unfortunately, there is no single best method for measuring SNR. Below I explain the different methods used and the rationale for each.

SNR

One needs to measure the signal in the phantom (either mean or peak or both) and then divide that by the background noise. Measuring the signal is fairly straightforward, the noise can be more problematic. The simplest method is to measure the standard deviation (SD) in the background 'air'. However, MRI images are the magnitude of complex data. The noise in the underlying complex data is Gaussian but it follows a Rician distribution when the magnitude is used. The true noise can be estimated by multiplying the measured SD by 1.526.

During the reconstruction process, most manufacturers perform various additional operations on the images, This could include geometric distortion correction, low pass filtering of the k-space data resulting in low signal at the edge of the images, RF coil intensity correction (PURE, CLEAR, SCIC, etc), and other processing during the combination of phased array data and parallel imaging techniques. All of these methods distort the background noise making it impossible to obtain an accurate (and reproducible) estimate of the image noise in the air region. The alternative is to use a method which I shall refer to as the NEMA (National Electrical Manufacturers Association) method. The signal in the phantom area is a sum of the proton signal and noise. Once the signal to noise ratio exceeds 5:1, the noise in the magnitude image is effectively Gaussian. To eliminate the proton signal, you acquire an image twice and subtract them. The measured SD in the phantom region should now be the true SD times the square root of 2. When determining the SNR using the NEMA method, calculate the mean signal of the average of the two source images then divide by .7071 x the SD measured in the same area as the mean signal.

Unfortunately, this doesn't always work. It is absolutely imperative that the RF channel scalings, both transmit and receive, be identical with both scans. Any ghosting in the system is not likely to repeat exactly for both scans and will cause a much higher SD. Finally, the phantom needs to be resting in place prior to the scan long enough for motion of the fluid to have died down. Depending on the size and shape of the phantom, this could take any where from 5 to 20 minutes.

One of the most common causes of ghosting is vibration from the helium cold-head. The best way to eliminate this artifact is to turn off the cold head, which will increase helium consumption. Because this vibration is periodic, the ghosting is usually of an N over 2 (N/2) nature. The affect inside the signal region of the phantom can be minimized by using a FOV that is twice the diameter of the phantom (measured in the PE direction.) If the noise is to be measured in the air, then be sure to NOT make measurements to either side of the phantom in the PE direction.

Scan parameters also significantly affect measured SNR. For most of the testing performed in this document I used a simple Spin Echo with a TR of 300, a TE of 20 and a slice thickness of 3mm and a receiver BW of 25.73KHz (200 Hz/pixel). The FOV was varied depending on the size of the coil and the phantom used. All of the parameters used for each test can be found on each page immediately below the coil description.

Report Layout

Each page of this report lists the data from a single test. The top third of the page describes the coil and phantom information, followed by the scan parameters used. The middle third contains the numbers measured and calculated results. This section will contain one table if the coil being tested is a single channel coil (i.e. quadrature or surface coils) and two tables if it is a multi-channel phased array coil. The entries in the table will be described further below. The bottom section contains a few lines of comments (if necessary), a picture of the coil with the phantom as used for the testing and one or more of the images that were used for the measurements.

There is usually one image for each composite image measurement and one image for each separate channel measurement. Each image shows the ROI (red line) where the mean signal was measured and two smaller ROIs (green lines) where the signal minimum and maximum was found. In the top left corner of each image is the mean signal in the large ROI. The bottom left corner contains the large ROI's area (in mm^2). The top right corner contains two numbers a mean and a standard deviation. If the NEMA method was used, then the top right corner will list the mean and SD of the large ROI (labeled ROI M and ROIsd) applied to the subtraction image. If the noise was measured in the background air the the numbers are labeled Air M and AirSD.

Data Tables

The meaning of most of the entries in the data table are should be self evident with a few exceptions. The first column in each table is labeled "Label". In the composite analysis, this field may be empty or contain some sort of abbreviation to identify some aspect of the testing. Some possibilities are the letter N for NEMA, A for Air, L for Left, R for Right, C for CLEAR, NoC for No CLEAR. In the Uncombined Image table, the label usually contains the channel number or similar descriptor. The column labeled "Noise Type" will be either Air or SubSig which stands for Subtracted Signal, *i.e*. the NEMA method. Both tables contain a column for Mean SNR and Max SNR which are the Mean or Max signal divided by the SD of the noise scaled by either 1.526 (Air) or 0.7071 (NEMA).

Composite Image Table: The final two columns in this table are "Normalized" and "Uniformity". It can be rather difficult to compare the performance of different coils particularly if different scan parameters are used. (Of course, it's even more difficult from one scanner to another.) I have standardized most of my testing to use a spin echo with a TR/TE of 300/20msec and a thickness of 3 mm. The FOV changes to depending on the size of the phantom used although I try to use a FOV that is at least twice the diameter of the phantom as measured in the PE direction. For one reason or another, a change may be made in the scan parameters (either accidentally or intentionally such as turning on No Phase Wrap to eliminate aliasing, etc.). In order to make it easier to compare SNR values I calculate a "Normalized" SNR value. This value is theoretically what the SNR would be if a FOV of 30cm, 256x256 matrix, 1 average, receiver BW of 15.6 KHz and slice thickness of 3mm had been used. Obviously, the final number is affected by the T1/T2 values of the phantoms used as well as details of the coil and magnet field strength but it can be useful in certain situations.

The "Uniformity" value is defined by the ACR as 1 - (max-min)/(max+min). This is most important when looking at volume coils or for evaluating the effectiveness of surface coil intensity correction algorithms (such as pre or post Normalization).

Uncombined Image Table: This table has two columns labeled "% of Mean" and "% of Max". When analyzing multi-channel coils it is important to understand the relationship between the different channels, the inherent symmetry that usually exists between channels. In a 8 channel head or 4 channel torso phased array coil, all of the channels are usually have about the same SNR. These two columns list how the SNR (either Mean or Max) of each channel compares to the SNR of the channel with the maximum value.