RDDS1 Status

ISG3

Juwen Wang

January 25, 1999

A Lot of Work Have Been Done for RDDS1 Due to the Great Effort from Everyone

Electrical Design:

- General parameters
- Rough machining table
- Dimensions for five typical cells
- Wakefield and emittance growth calculations
- Tolerance analysis
- Simulation of T-junction and input coupler
- Simulation of HOM coupler

Mechanical Design

- Five-type cells drawings
- Input end, cold test set-up designed
- HOM couplers, cold test set-up designed
- Structure layout and vacuum system

Fabrication

- Fifty of five-type cells fabricated
- Cold test set-ups: input end (completed), HOM (soon)

Microwave measurement

- Single cell QC and tack measurement of f0 and f1
- Input T-junction done
- Input coupler match and tuning in progress

CMM measurement

- All cells measured at KEK
- Two for each type measured at SLAC

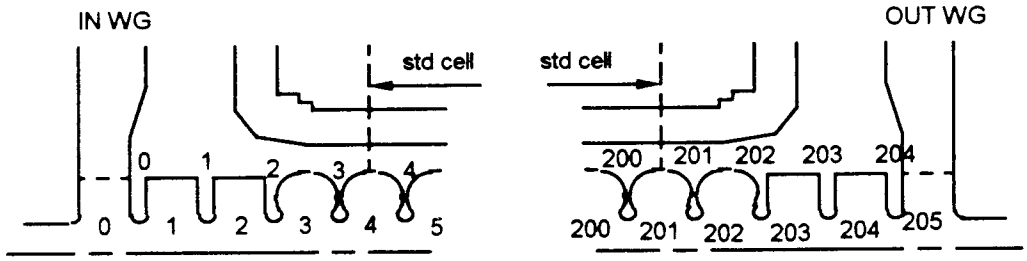
MEMORANDUM December 4, 1998

To: Distribution
From: Toshi Higo and Juwen Wang
Subject: RDDS1 Collaboration

During Higo's visit to SLAC (Nov. 30 – Dec. 4), we have several extensive discussions on the collaboration for RDDS1. The participants of the discussions are R. Miller, G. Bowden, R. Ruth, D. Burke, J. Cornuelle, J. Wang and T. Higo. This memo describes what we discussed based on the two notes of Nov. 6 and Nov. 30.

1. The Task Allocation Between KEK and SLAC

The figure below shows the cell configuration of RDDS1.



Input coupler region Output coupler region

KEK is responsible in the final mechanical design and drawings for standard disks and pumping disks (disk #4 to disk #200), and SLAC participates.

SLAC is responsible in the final mechanical design and drawings for front end (four and half cells) and output end (four and half cells), and KEK participates.

The table below shows a list of responsible parties for the tasks of each cell category:

Parts	ED	MD	RM	FM
Standard disks	S	K	K	K
Pumping disks	S	K	K	K
Front end cells: coupler cell	S	S	S	S
other cells	S	S	K	K
Output end cells: coupler cell	S	S	S	S&K
other cells	S	S	K	K

S = SLAC, K = KEK S&K = KEK diamond turning
ED = electrical design MD = mechanical design
RM = rough machining FM = final machining

2. Design Procedure and Schedule

In order to ensure successful information exchange and quick feedback between two labs, we have set some important time lines as follows.

Standard Disks:

12/11	KEK provides a preliminary mechanical design. ✓
12/18	SLAC feedbacks comments. ✓
End of 1998	KEK finalizes the design. ISG3

Pumping Disks:

12/18	SLAC provides suggested geometries for pumping slots ✓ and brazing joints and drawings for pumping ports.
1/15	KEK provides a preliminary mechanical design.
ISG3	Discussion. ✓
2/3	KEK finalizes the design. Cold Test using HOM testsetup

Front End Cells:

End of 1998	KEK feedbacks comments to SLAC's sketch. ISG3
1/22	SLAC prepares a preliminary design for ISG3. ✓
ISG3	Discussion. ✓
End of Feb.	SLAC provides a modified design.
3/5	KEK feedbacks comments.
3/12	SLAC finalizes the design.

Output End Cells:

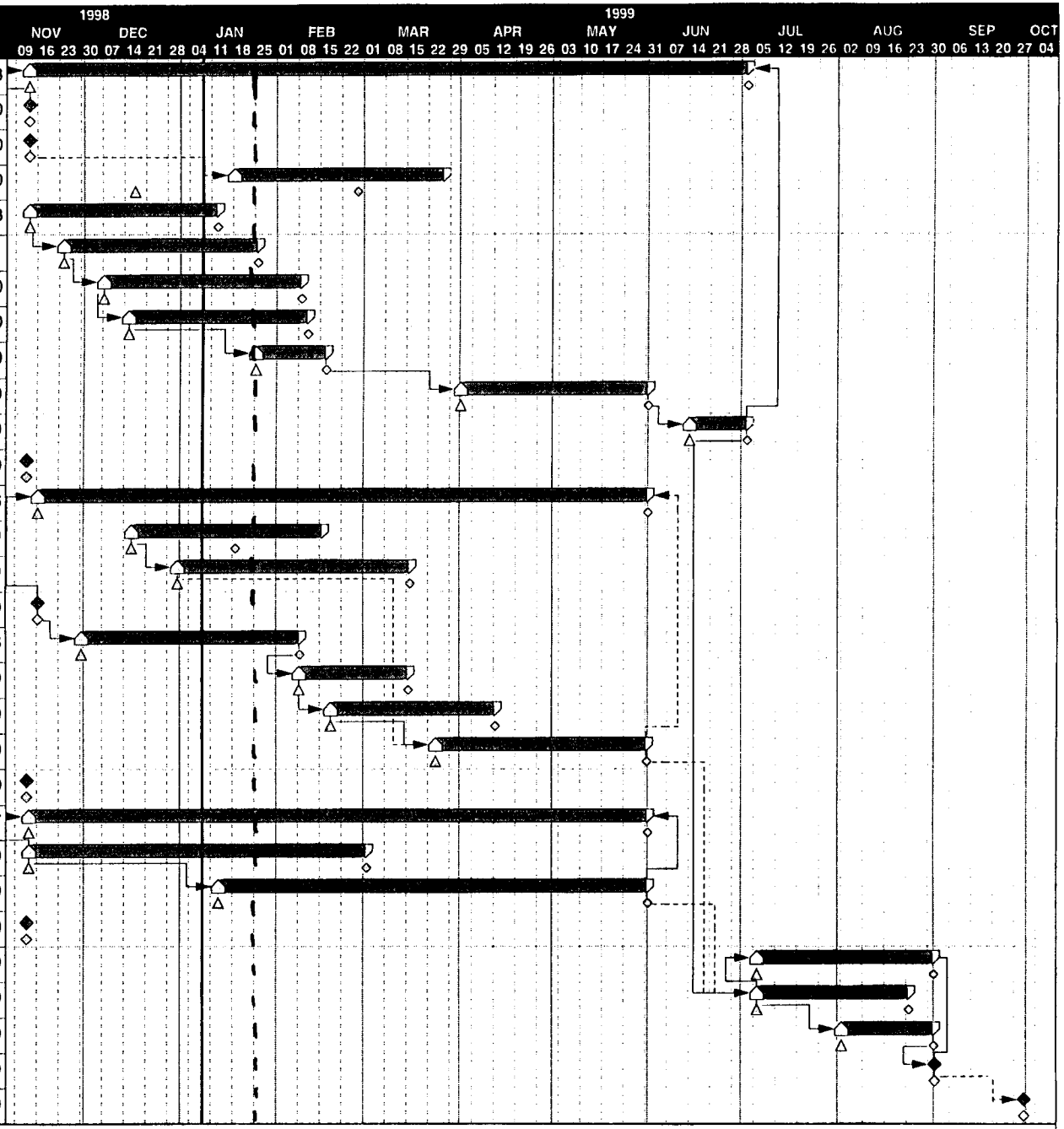
1/15	KEK feedbacks comments to SLAC's sketch. ISG3
ISG3	Discussion. ✓
End of Feb.	SLAC provides a preliminary design.
3/12	KEK feedbacks comments on the preliminary design.
End of March	SLAC provides a modified design.
4/9	KEK feedbacks comments on the modified design.
4/16	SLAC finalizes the design.

3. Predicted Milestones:

If we assume there will not be any setback due to some unforeseen reasons, we predict the following milestones:

Middle of December, 1998	Rough machining starts
April , 1999	Final machining starts
Middle of June, 1999	Diffusion bonding
July – August, 1999	Brazing and final assembly
September, 1999	Ready for ASSET

Act ID	Description	Percent Complete
1000	Cell Design, Fab, and Bonding Phase	23
1010	Five Typical Cell Drawings	✔ 100
1020	Rough Machining Table	✔ 100
1030	Rough Machining	✔ 0
1040	Machining of 6-Cell Stacks	✔ 93
1050	Single Cell and Stack Measurements	✔ 71
1060	CMM of Sample Cells	✔ 50
1070	Calibrate Design Codes	40
1080	Complete Dimensional Table	0
1090	Final Diamond Turning	0
1100	Diffusion Bond Structure	0
1110		100
1120	Coupler Design/Fab Phase	26
1130	Cold Test Input Coupler	39
1140	Mechanical Design of HP Parts	10
1150	HOM Coupler Mech. Design	100
1160	Fabricate Cold Test Parts	56
1170	Cold Test HOM Coupler	0
1180	Mechanical Design of HP Parts	0
1190	Fabricate Coupler Parts	0
1200		100
1202	Other Hardware Phase	27
1204	Design Supports/Vac Ports/Cooling	50
1206	Fabricate Supports/Vac Ports/Cooling	0
1208		100
1210	Structure Completion Phase	0
1220	Measurement and Braze	0
1230	Assembly and Microwave Measurement	0
1240	Ready for Asset Test	0
1250	Ready for High Power Processing	0



Start date	13NOV98
Finish date	29SEP99
Data date	08JAN99
Run date	08JAN99
Page number	1A

NLC
RDDS1 Structure Schedule

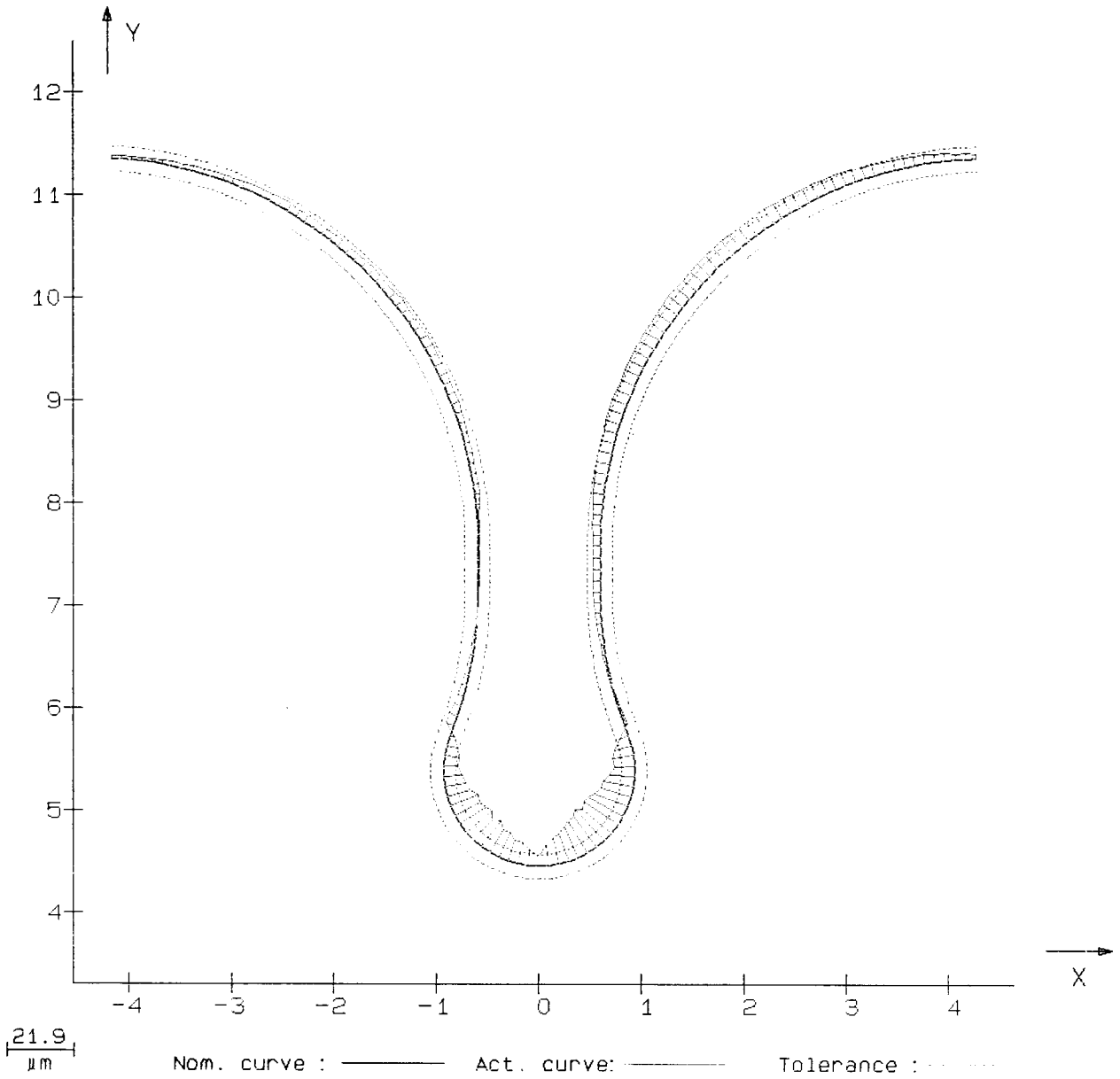
Date	Revision	Checked	Approved
13NOV98	Initial Version	JW/JC	
08DEC98	Revised for ISG3	JW/JC	
08JAN99	Update	JW/JC	

- Early start point
- Early bar
- Early finish point
- Target start point
- Target finish point
- Progress bar
- Critical bar
- Summary bar
- Start milestone point

Summary of QC for Five-Type Cells

Type	Cells Received	CMM Cells	Stack Measurement Cells	f0(2pi/3)
	All of Seven Cells Were Single Cell QCed for f0 (0-mode and pi-mode) f1 (pi-mode)	Two out of Seven Cells were CMM Measured	Six out of Seven Cells Were Stacked for f0 (2pi/3) f1 Measurement	
1	3, 4, 5, 6, 7, 8, 9	3, 6	3, 4, 5, 6, 7, 8	+5.3 MHz
52	2, 3, 4, 5, 6, 7, 8	2, 3	2, 3, 4, 5, 6, 7	+2.4 MHz
102	3, 4, 5, 6, 7, 8, 10	3, 4	3, 4, 5, 6, 7, 8	+6.3 MHz
153	1, 2, 3, 4, 5, 6, 8	1, 6	1, 2, 3, 4, 5, 6	+1.8 MHz
203	2, 3, 4, 6, 7, 8, 9	3, 6	2, 3, 4, 6, 7, 8	-0.8 MHz

Good Consistency



Dscrption:
Ser. No. :
Customer :

File No. :
Draw. No.:

Element : PROFILE_CURV
Department: MET-060

			X	Y	Z	Nr.
Form .....:	0.01678	Min. Deviat.: -0.01408	0.644	4.709	0.000	88
Lower Toler. :	-0.00400	Max. Deviat.: 0.00270	-0.798	5.929	0.000	115
Upper Toler. :	0.00400					
Error Magnif.:	30					
No. of points:	188					

MET
Inspection
Department
- 060 -
Established 1962

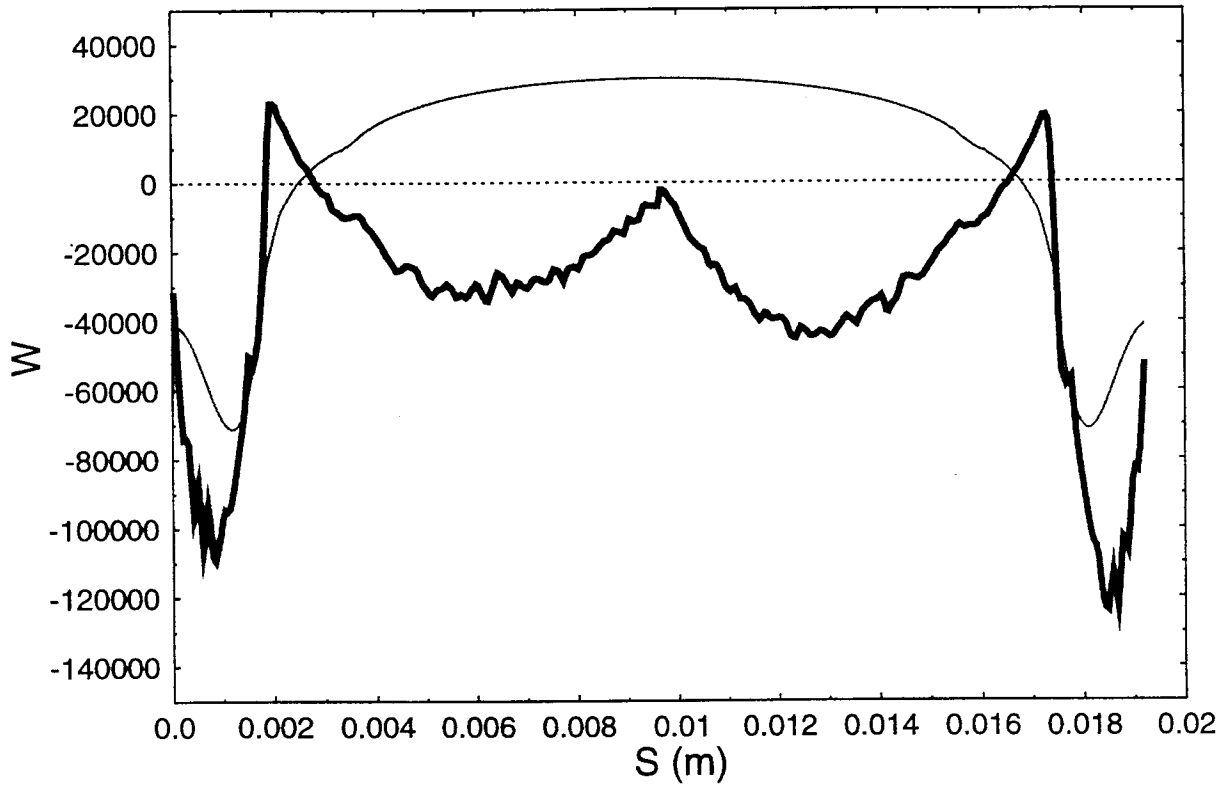
2D - CONTOUR

Inspector.:
Date .....: 12-MAR-98
Time .....: 10: 28: 45

#153 T1

X-Band RDS(c) ΔF Weighting Function & CMM QC(C153-T6)

- $\omega^2 = \omega_0^2(1+W\Delta S\Delta d)$
- Positive Δd : Pushed IN



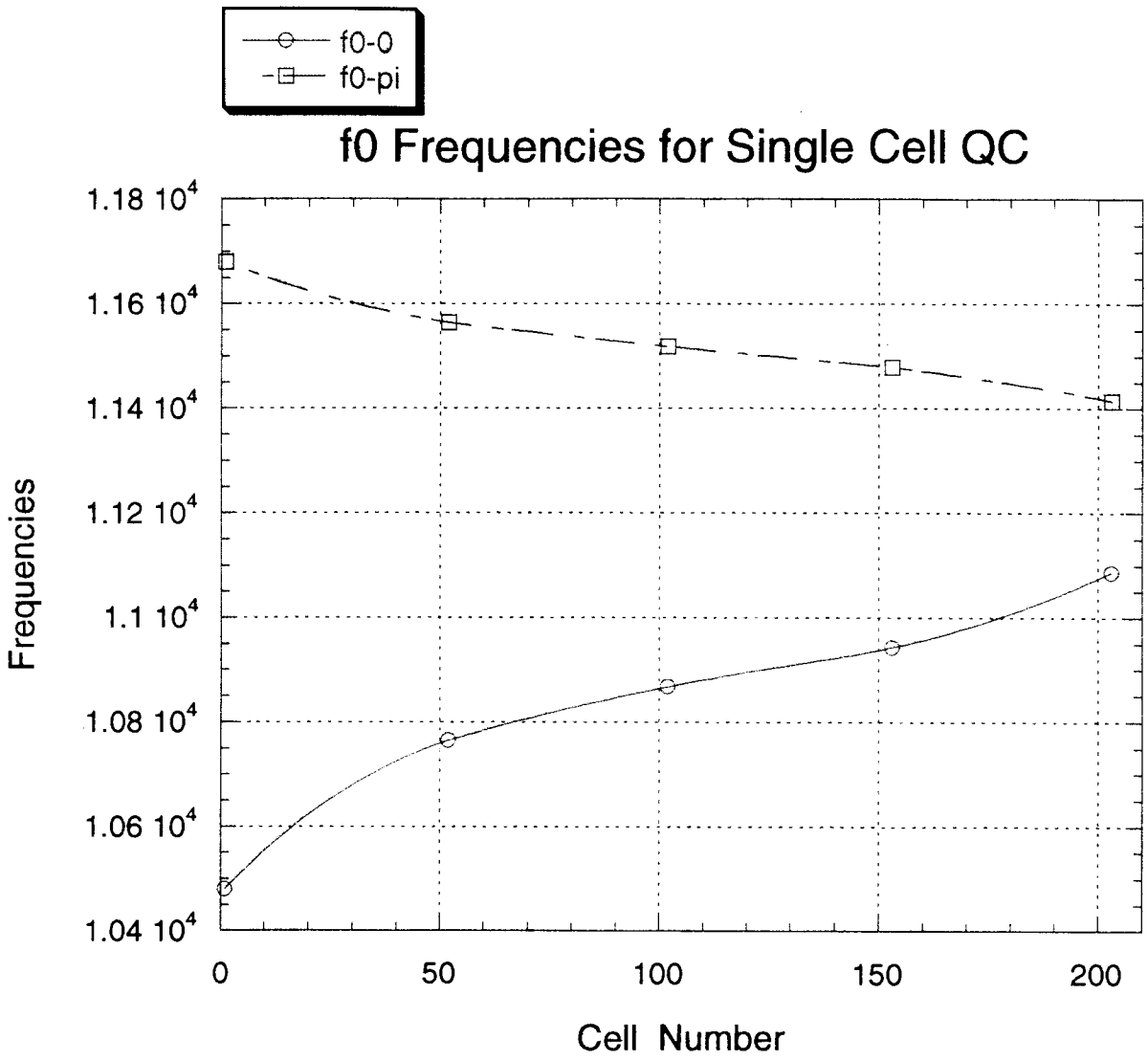
ΔF weighting function
CMM QC data

F_0 = 11424 + 5.0 + other-corrections MHz

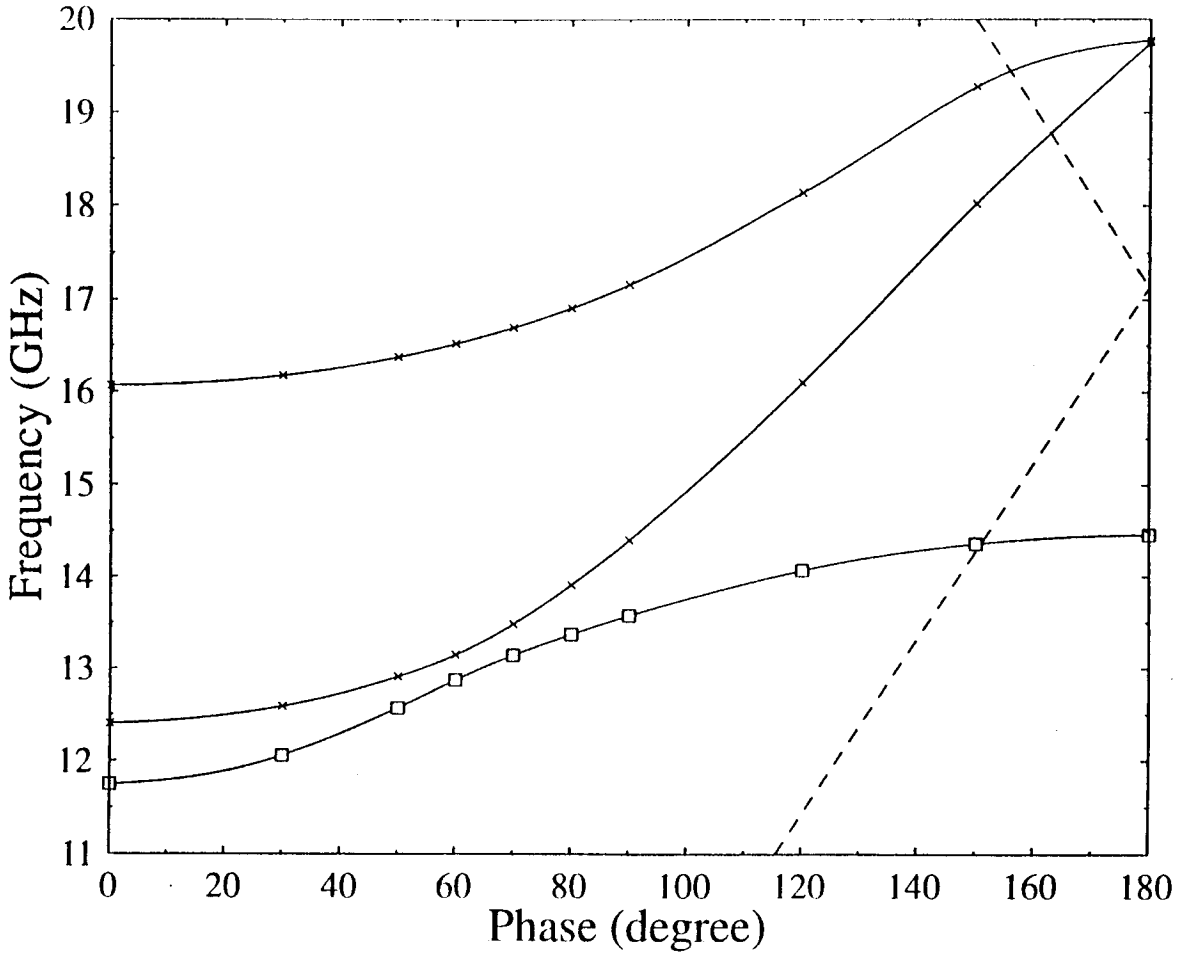
Slots +0.9 , Skin depth 0.9 MHz

Stack Measurement + 1.9 MHz

/afs/slac.stanford.edu/u/ap/lizh/nlc/rds/dds-c/3d-adjust-df-weight/fields2.gle

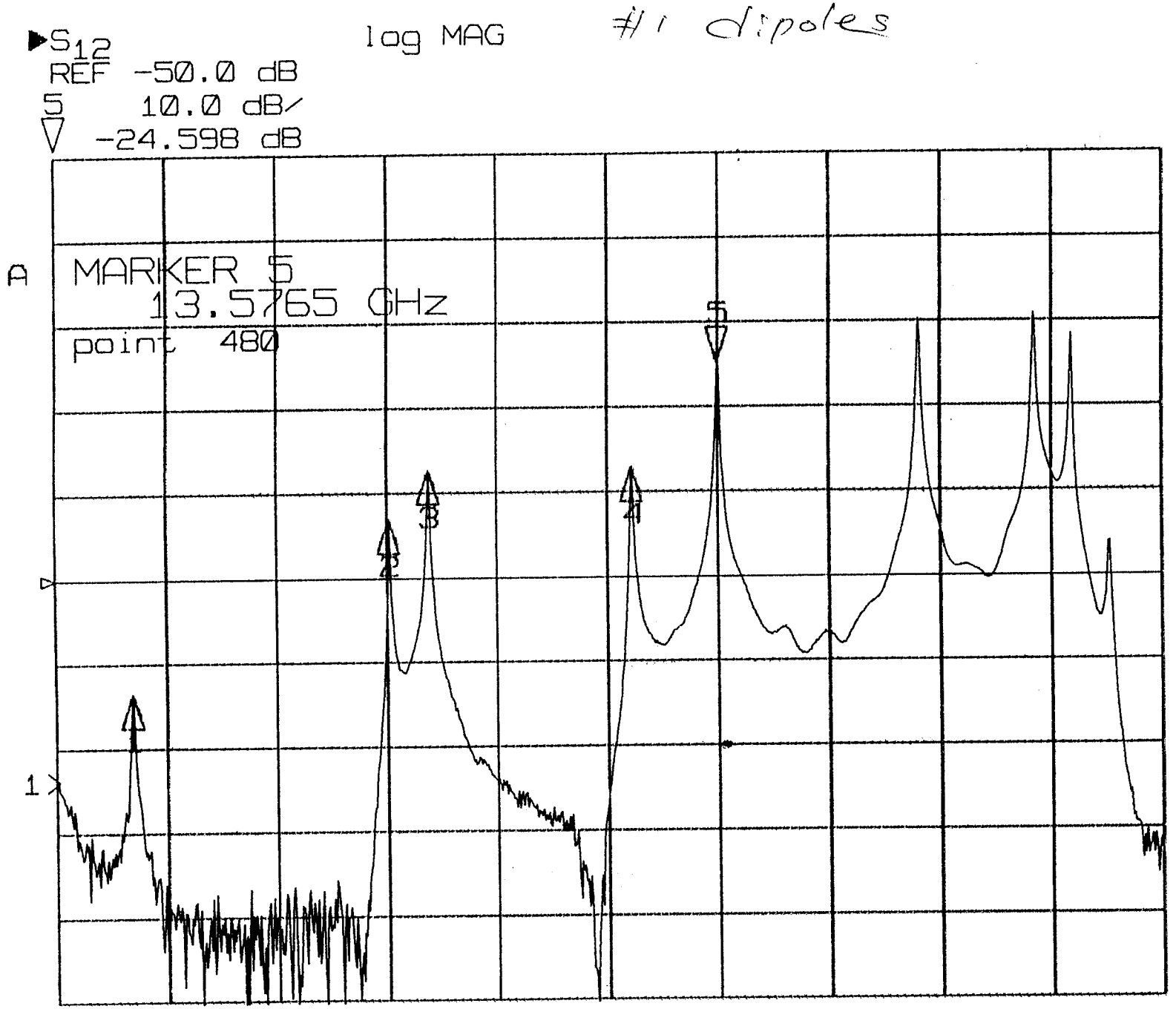

f0-0
f0-pi
f0 Frequencies for Single Cell QC
Frequencies
1.18 10^4
1.16 10^4
1.14 10^4
1.12 10^4
1.1 10^4
1.08 10^4
1.06 10^4
1.04 10^4
0
50
100
150
200
Cell Number

RDS DDS-C: Cell 001 (e)

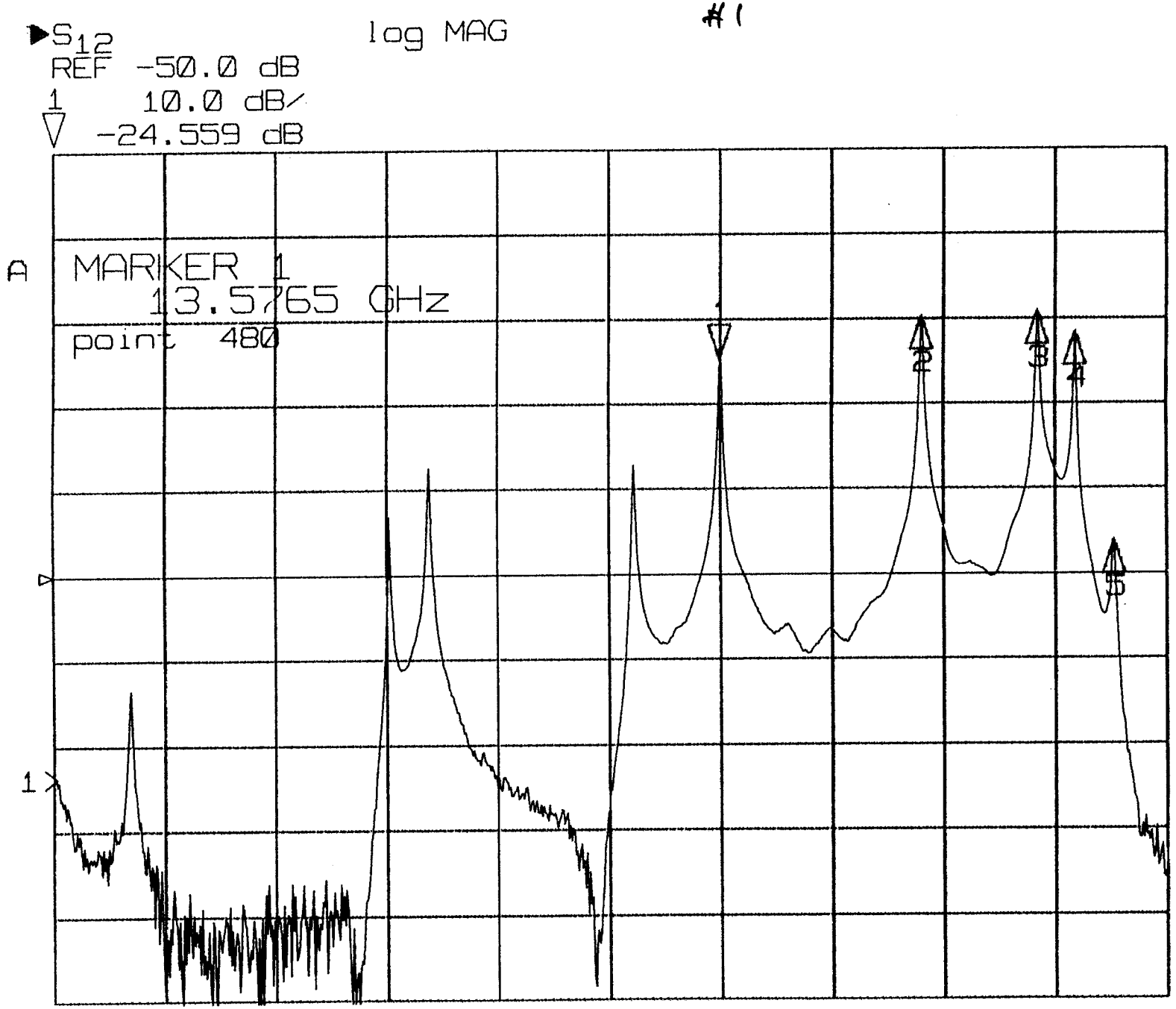


- Narrow slot depth : 1.65 mm
- Wide slot : 3 mm X 6 mm
- Manifold diameter : 9.6 mm

/nfs/neal/u7/lizh/nlc/rds/dds-c/c001e/c001.gle Z. Li


#1 dipoles
▶S12
log MAG
REF -50.0 dB
5 10.0 dB/
-24.598 dB
A MARKER 5
13.5765 GHz
point 480
1
2
3
4
5
MARKER 1
12.092 GHz
-63.549 dB
MARKER 2
12.743 GHz
-43.047 dB
MARKER 3
12.845 GHz
-37.279 dB
MARKER 4
13.359 GHz
-37.111 dB
▶MARKER 5
13.576 GHz
-24.598 dB
14.0645
14.3760
14.4690
14.5655
CENTER 13.300000000 GHz
SPAN 2.800000000 GHz
11 JAN 99
16:32:04

#1



MARKER 1
13.576 GHz
-24.559 dB

MARKER 2
14.084 GHz
-19.54 dB

MARKER 3
14.374 GHz
-18.934 dB

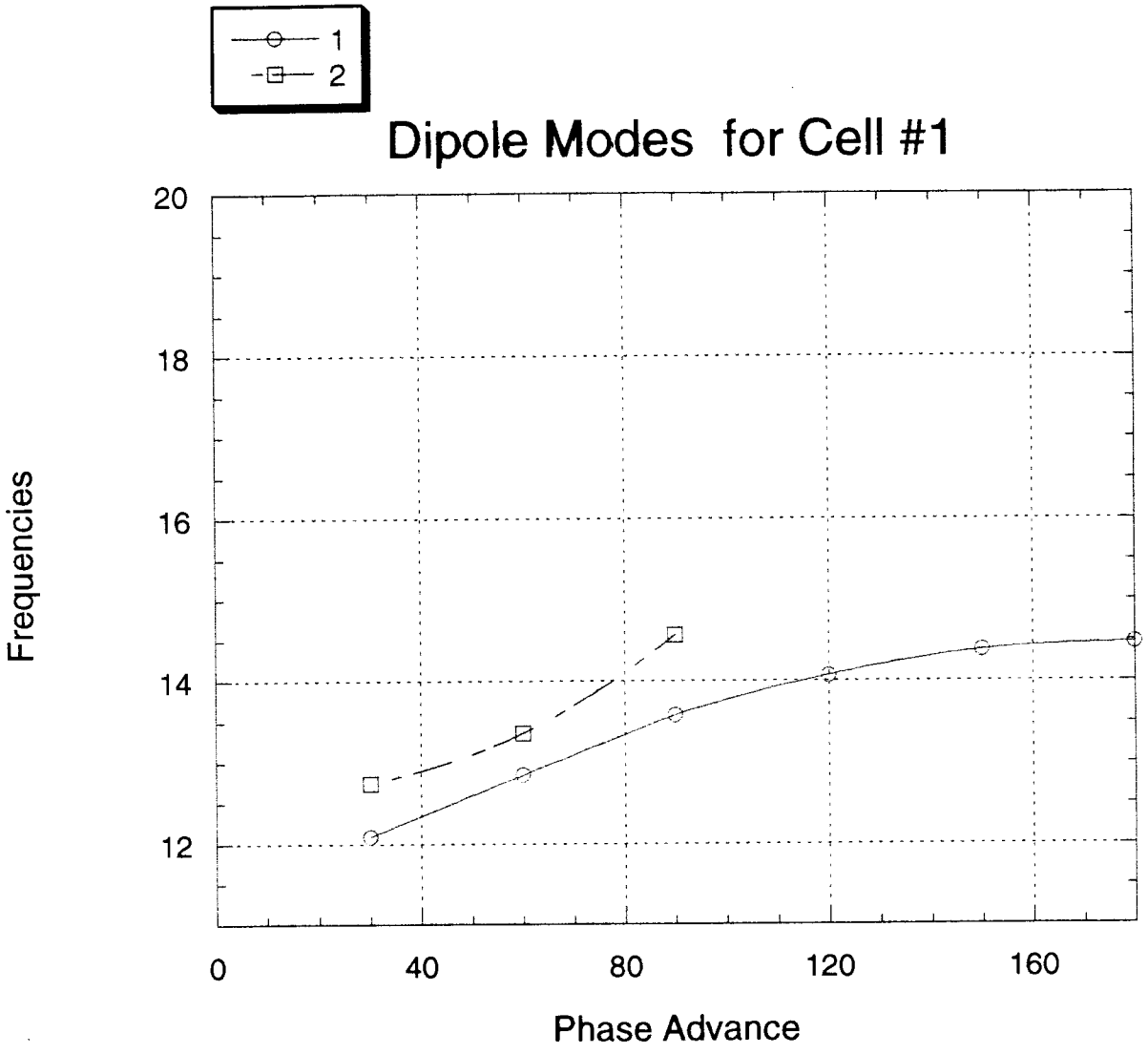
MARKER 4
14.469 GHz
-21.418 dB

MARKER 5
14.567 GHz
-46.02 dB

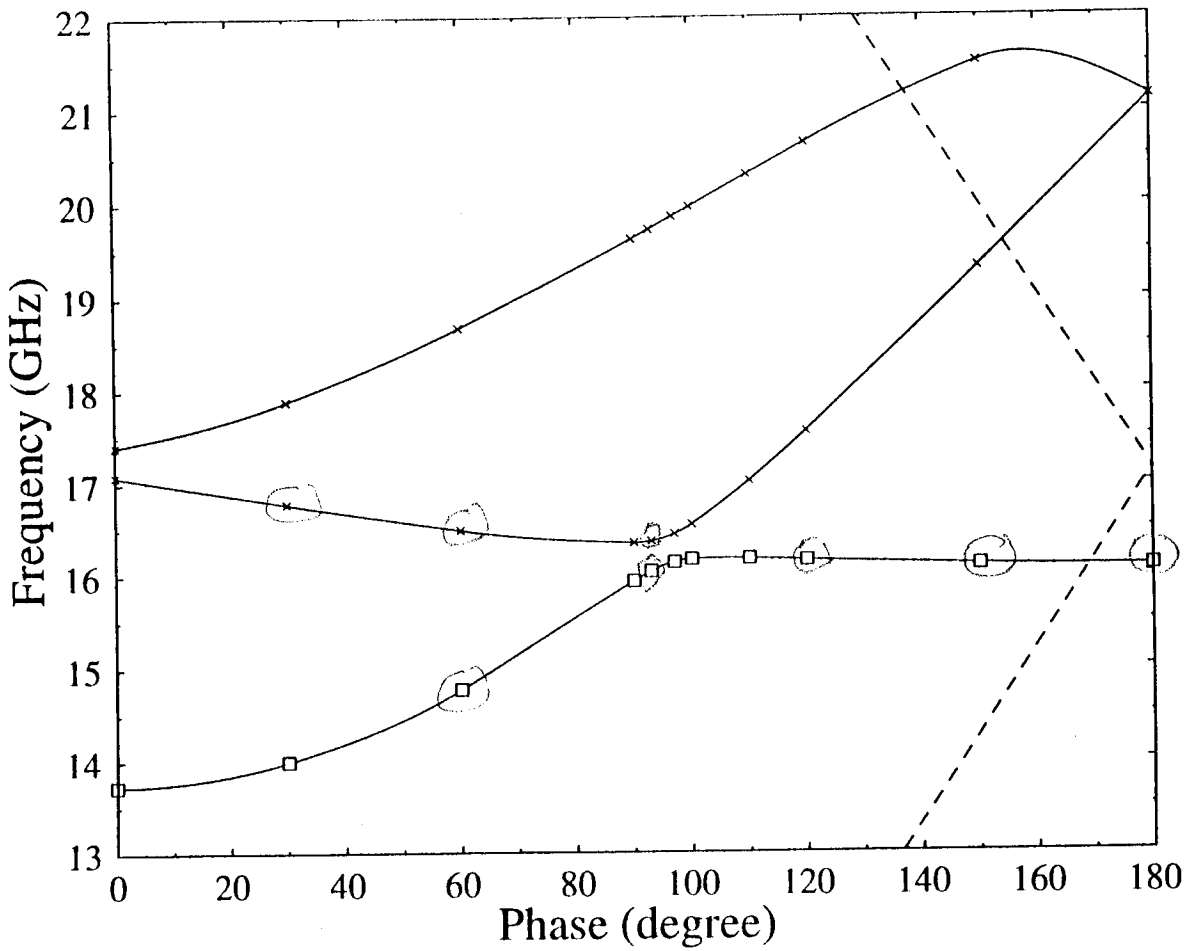
CENTER 13.300000000 GHz
SPAN 2.800000000 GHz

11 JAN 99
16:33:53

Notebook 4
pg 76.

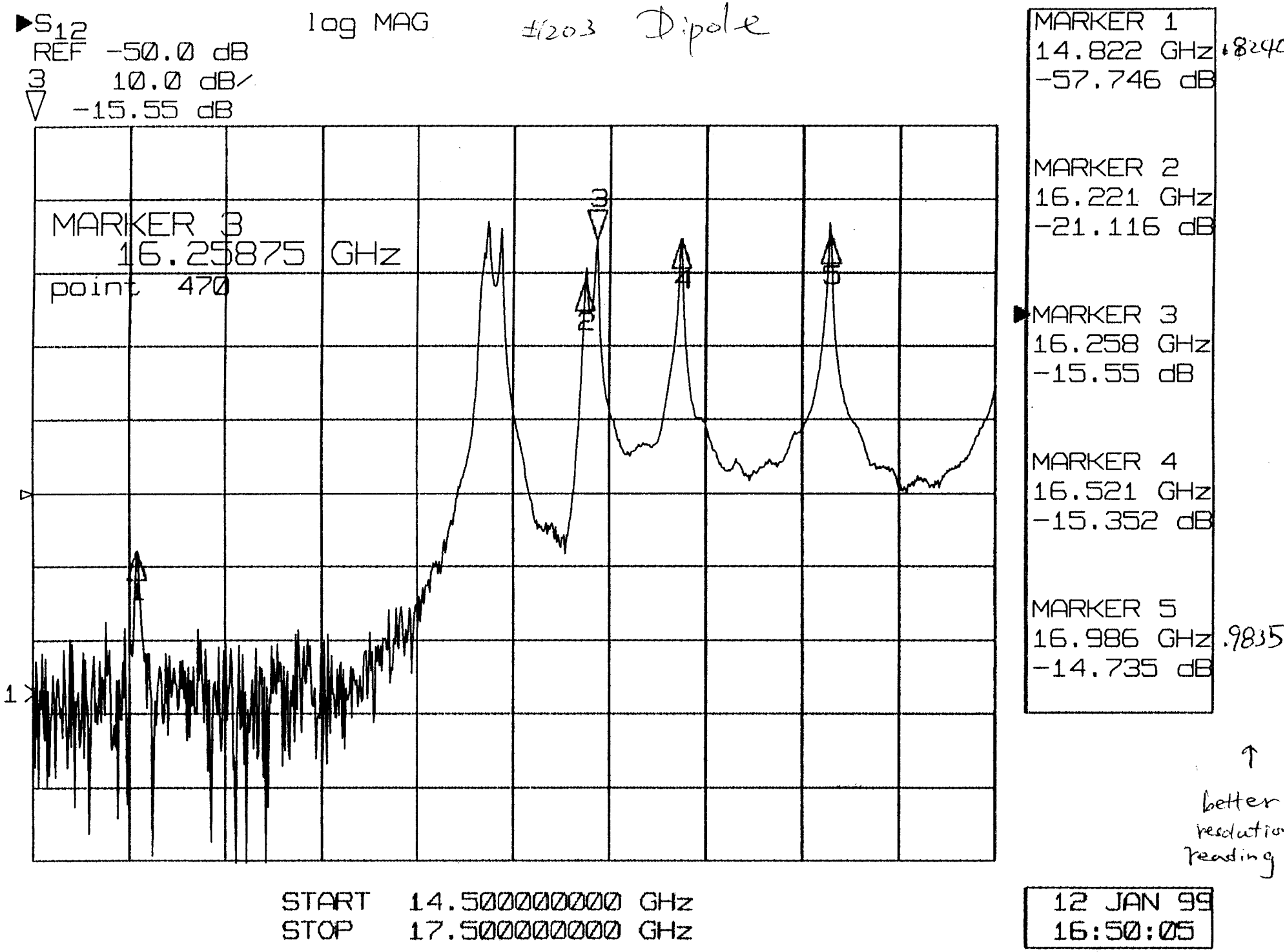

1
2
Dipole Modes for Cell #1
Frequencies
20
18
16
14
12
0
40
80
120
160
Phase Advance

RDS DDS-C: Cell 206 (b)



- Narrow slot depth : 3.0 mm
- Wide slot : 3 mm X 6 mm
- Manifold diameter : 7.3 mm

/nfs/neal/u7/lizh/nlc/rds/dds-c/c206/c206.gle Z. Li

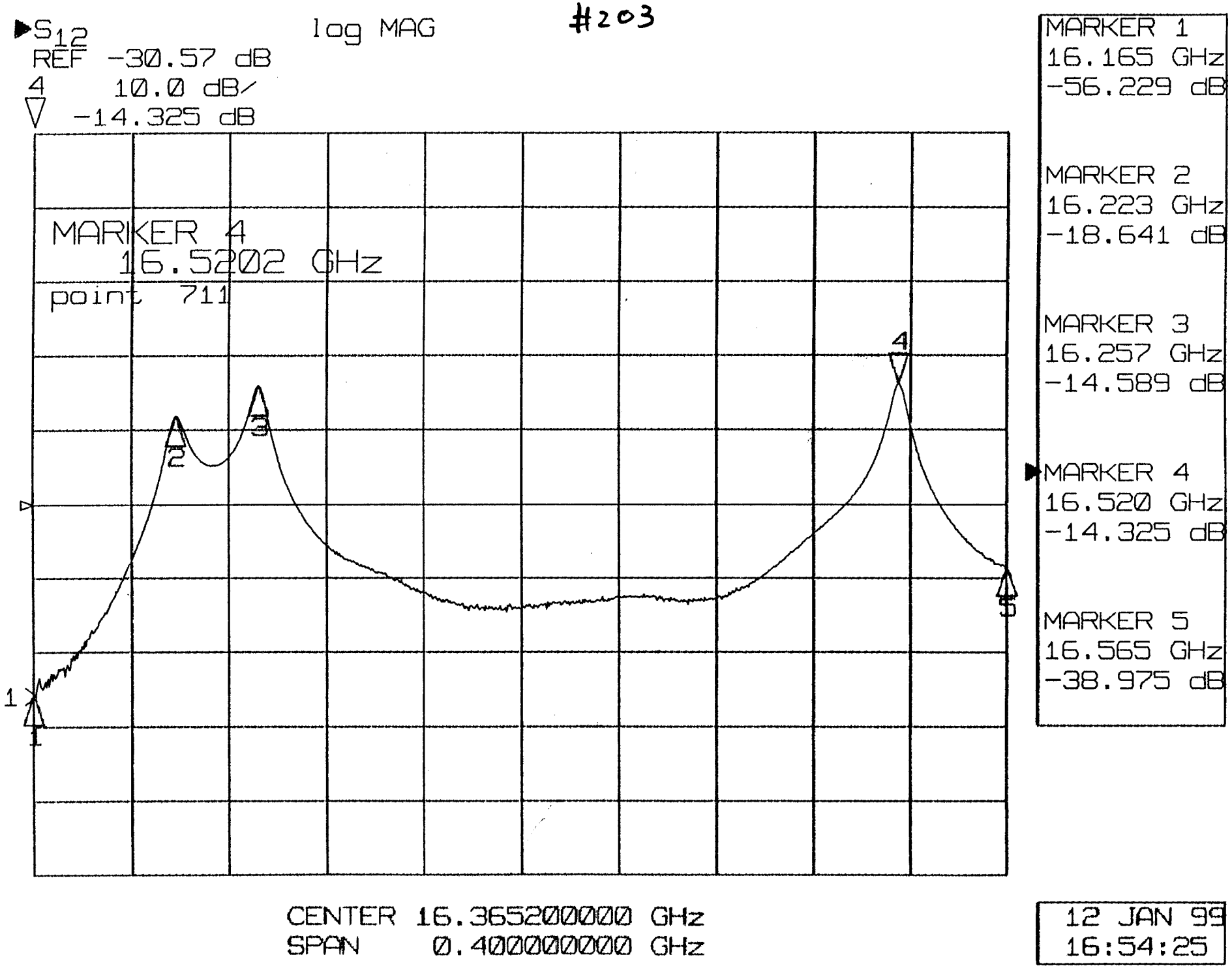


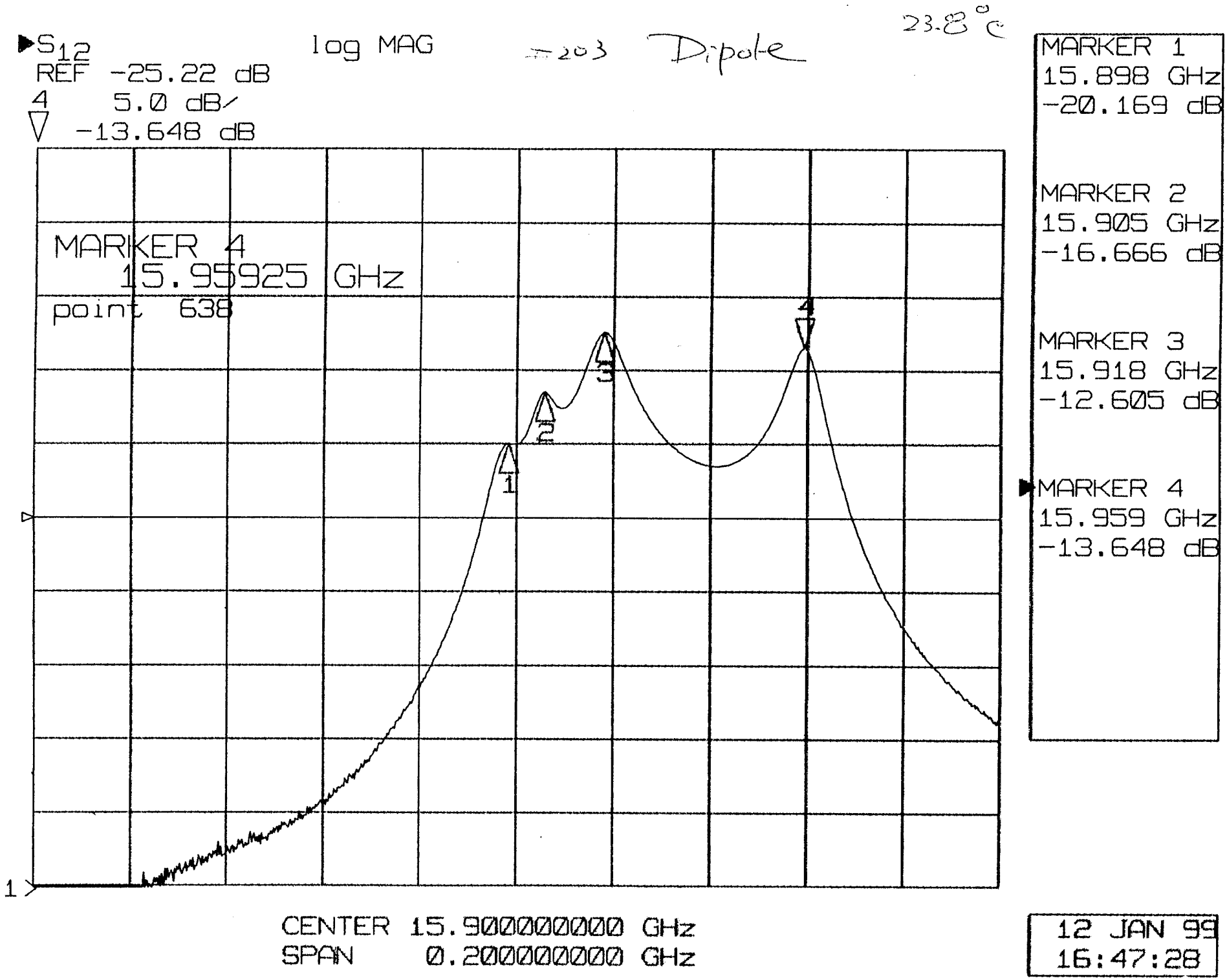
.8240

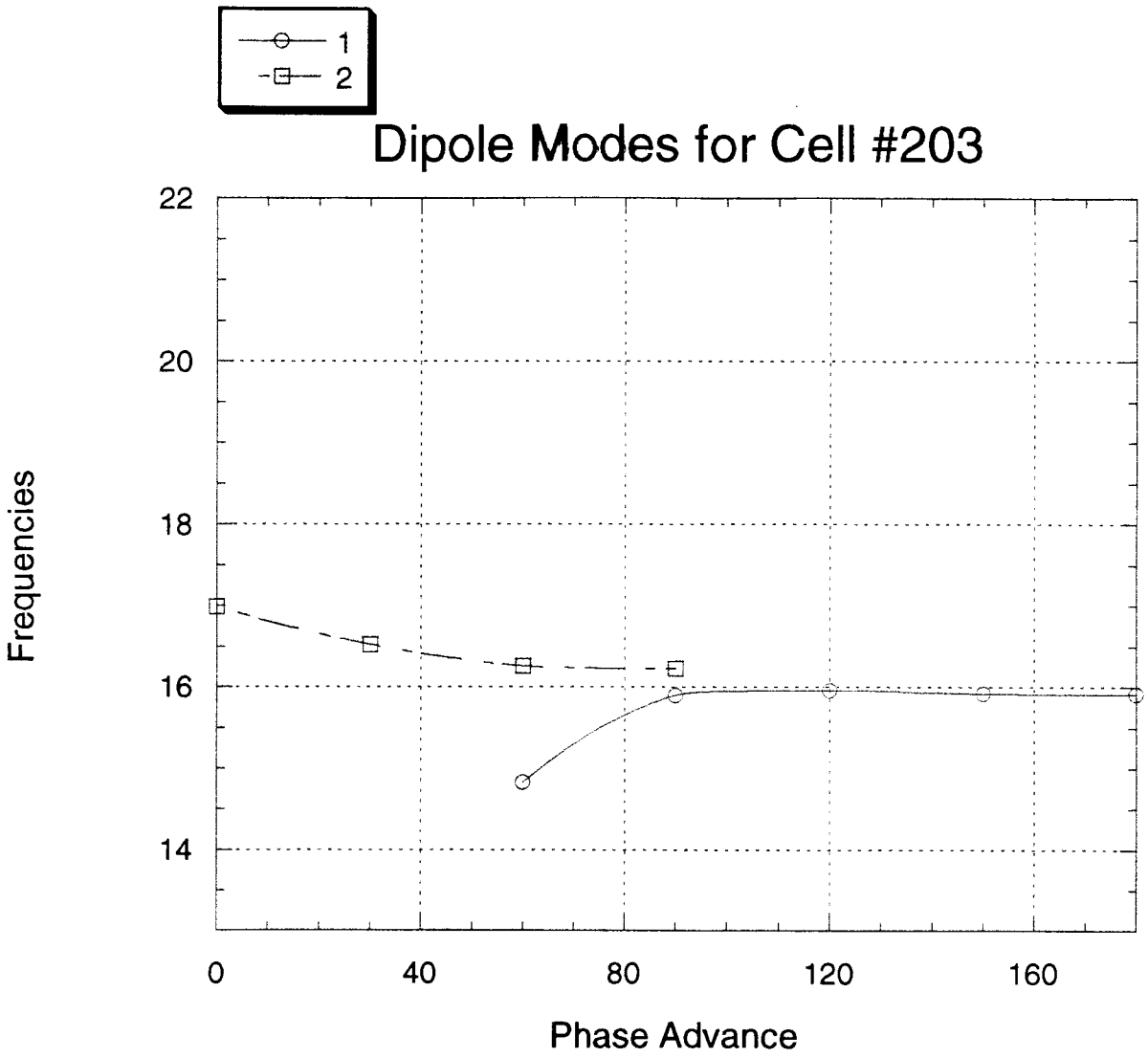
.9835

↑ better resolution reading

#203


▶S12
log MAG
REF -30.57 dB
4 10.0 dB/
-14.325 dB
MARKER 4
16.5202 GHz
point 711
MARKER 1
16.165 GHz
-56.229 dB
MARKER 2
16.223 GHz
-18.641 dB
MARKER 3
16.257 GHz
-14.589 dB
▶MARKER 4
16.520 GHz
-14.325 dB
MARKER 5
16.565 GHz
-38.975 dB
CENTER 16.3652000000 GHz
SPAN 0.4000000000 GHz
12 JAN 99
16:54:25


S12
log MAG
23.8°C
#203 Dipole
REF -25.22 dB
4 5.0 dB/
-13.648 dB
MARKER 4
15.95925 GHz
point 638
MARKER 1
15.898 GHz
-20.169 dB
MARKER 2
15.905 GHz
-16.666 dB
MARKER 3
15.918 GHz
-12.605 dB
MARKER 4
15.959 GHz
-13.648 dB
CENTER 15.900000000 GHz
SPAN 0.200000000 GHz
12 JAN 99
16:47:28


1
2
Dipole Modes for Cell #203
22
20
18
16
14
Frequencies
0
40
80
120
160
Phase Advance