

Injector Group Status

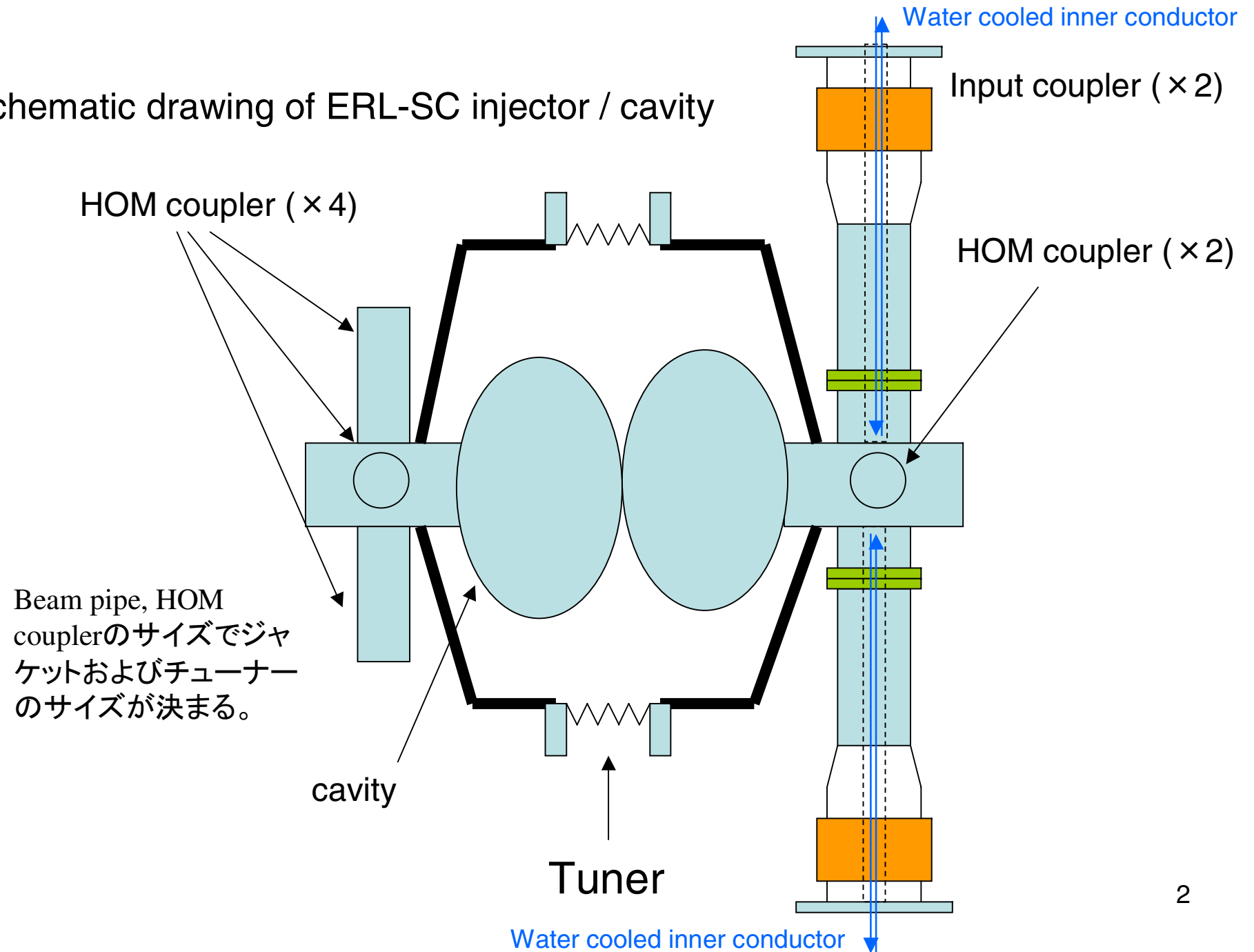
- 2-cell Cavity with 4 HOM Couplers

3月末; 完成

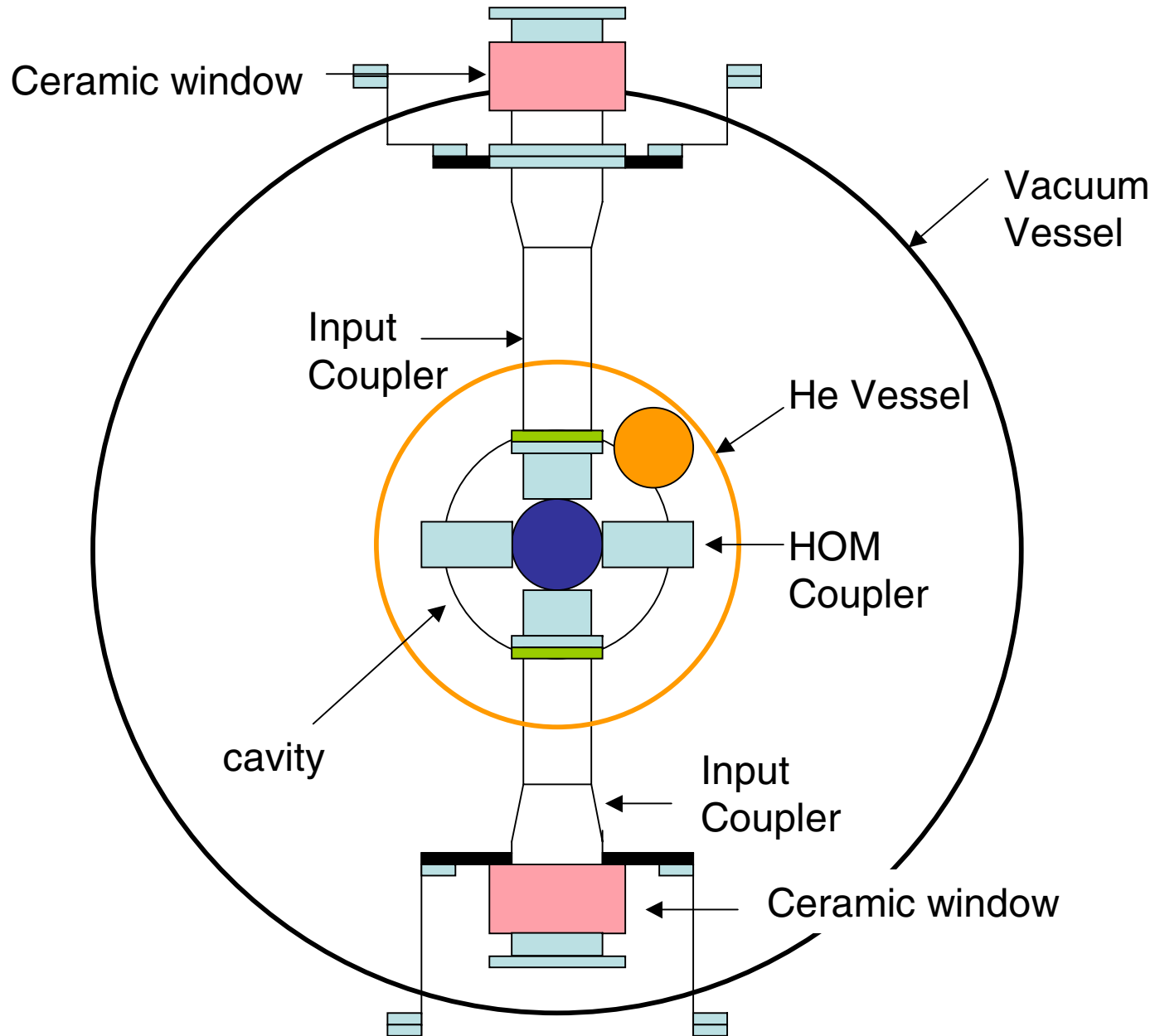
4月; 内面検査、プリチューニング

5月; 最初の縦測定予定

Schematic drawing of ERL-SC injector / cavity

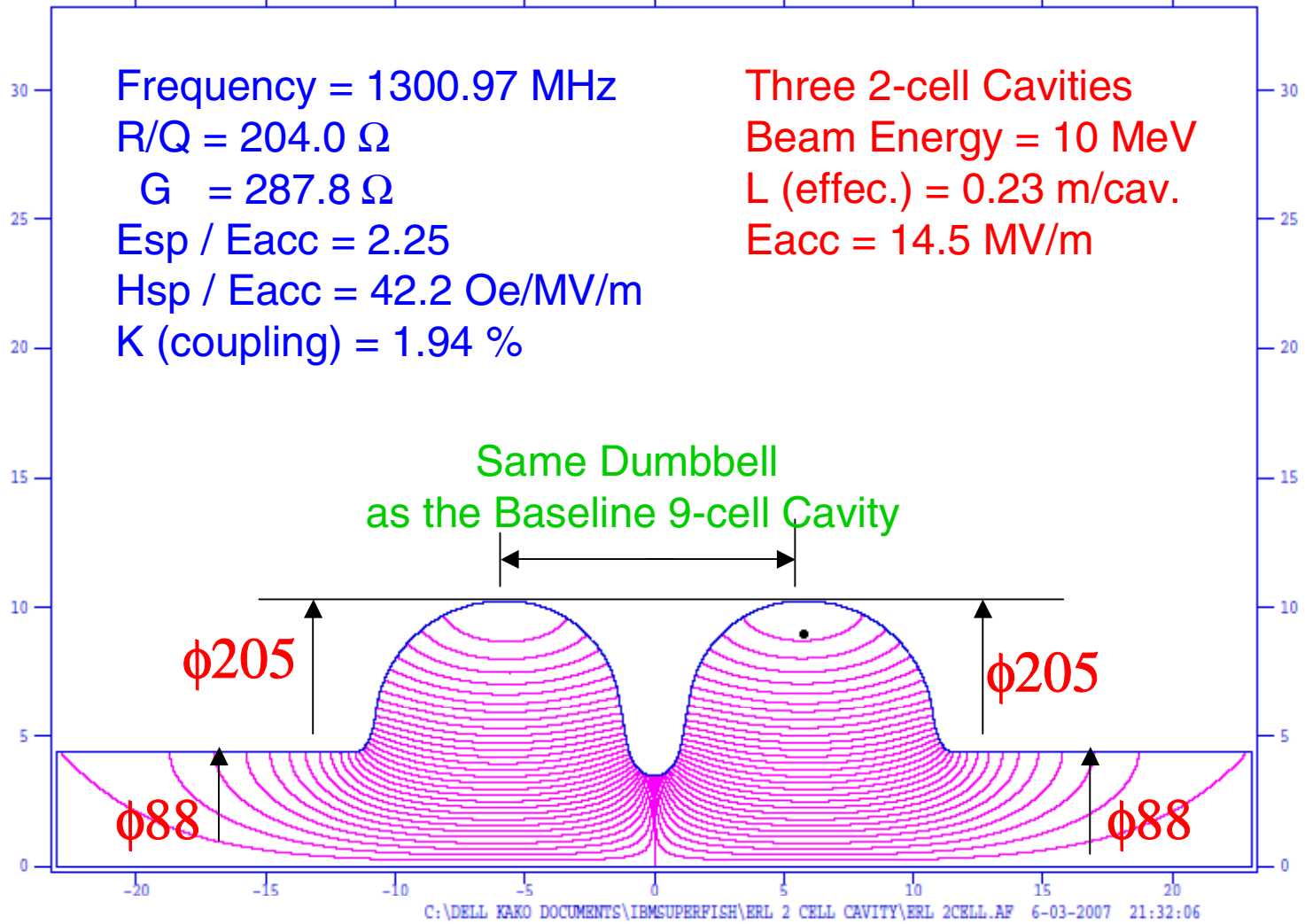


Couplers of ERL-SC injector

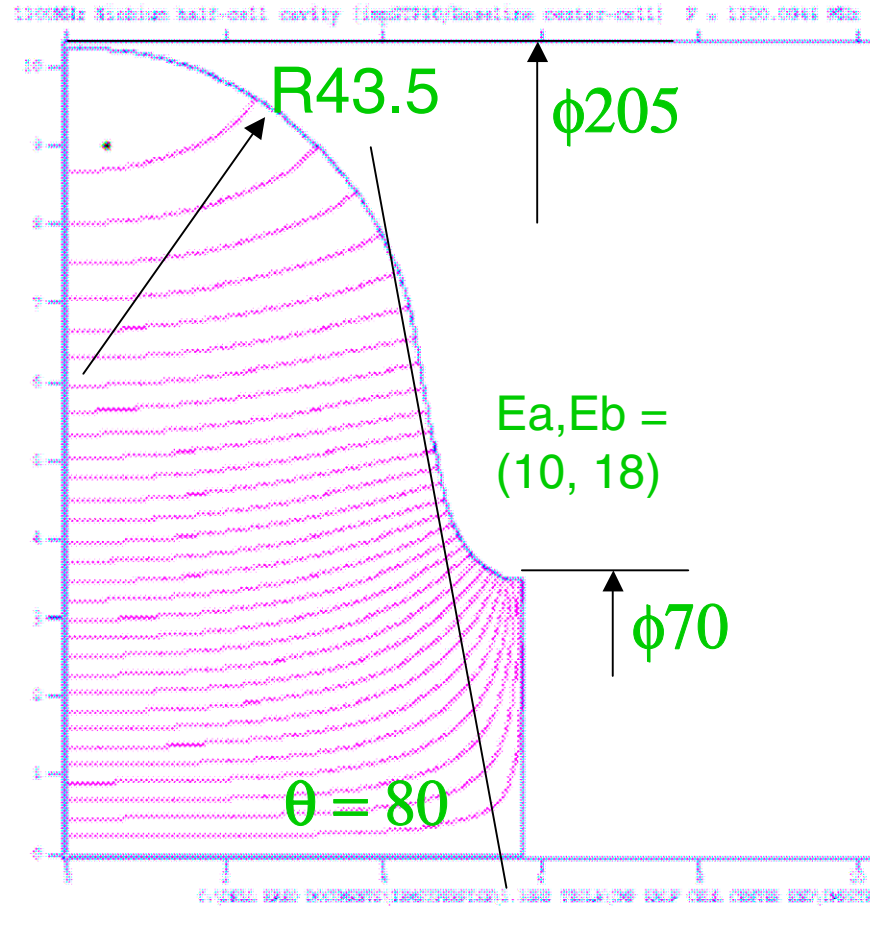


1.3 GHz 2-cell Cavity for ERL Injector Linac

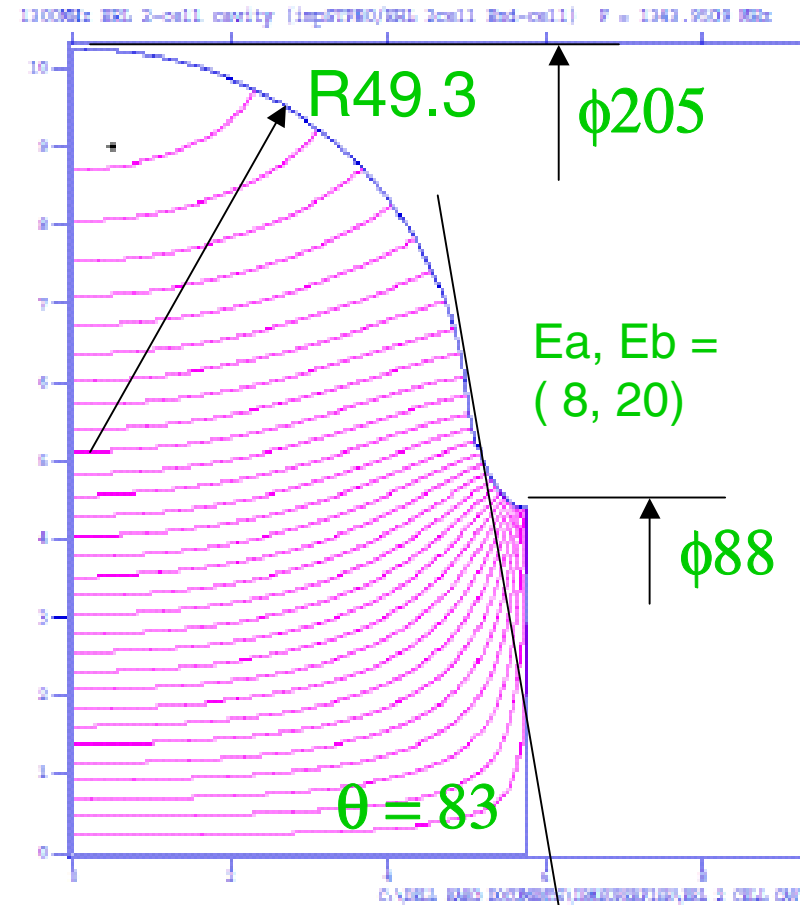
1300MHz ERL 2-cell cavity (ImpSTF80Baseline/End44 -full model) F = 1300.9702 MHz

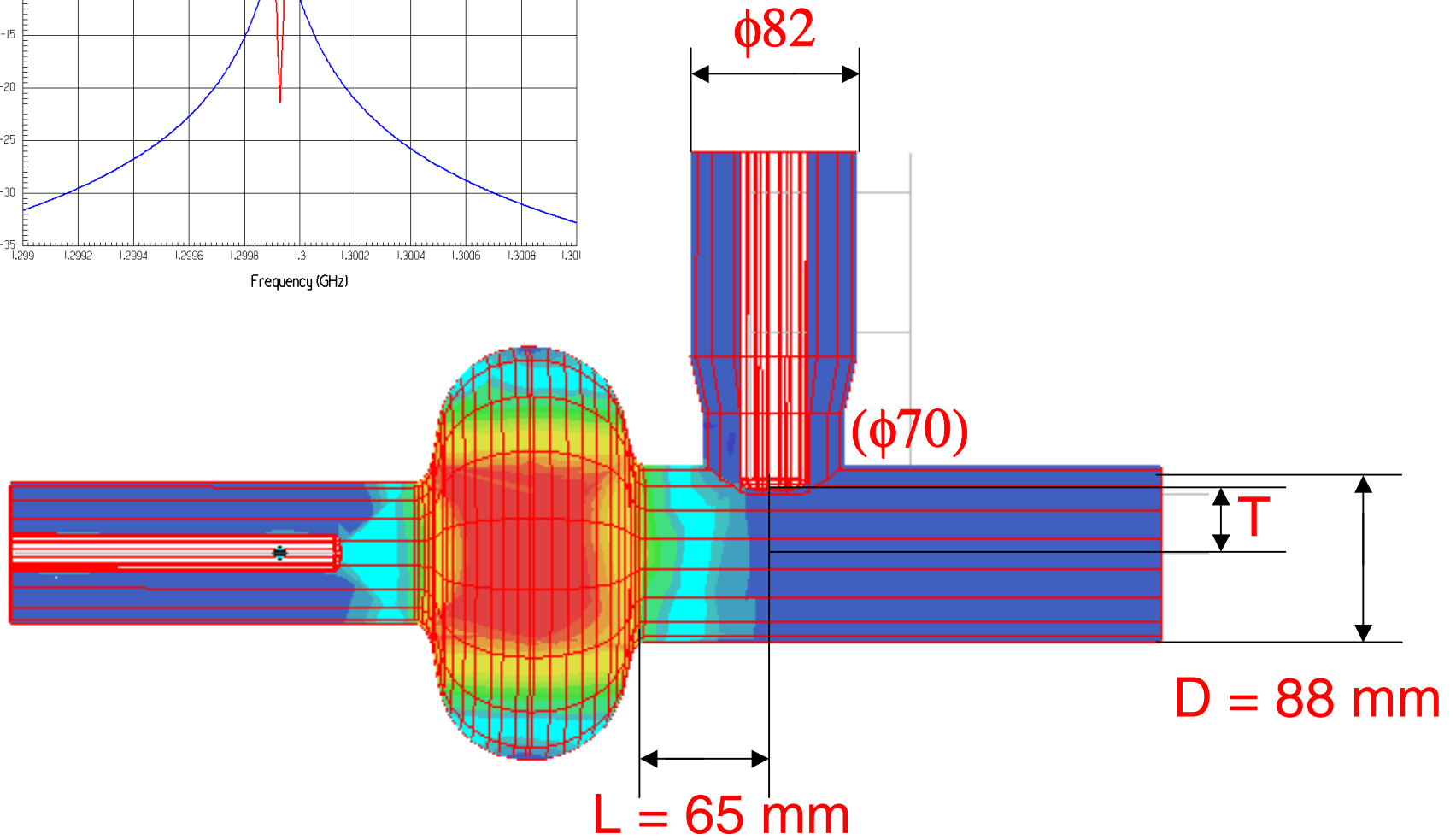
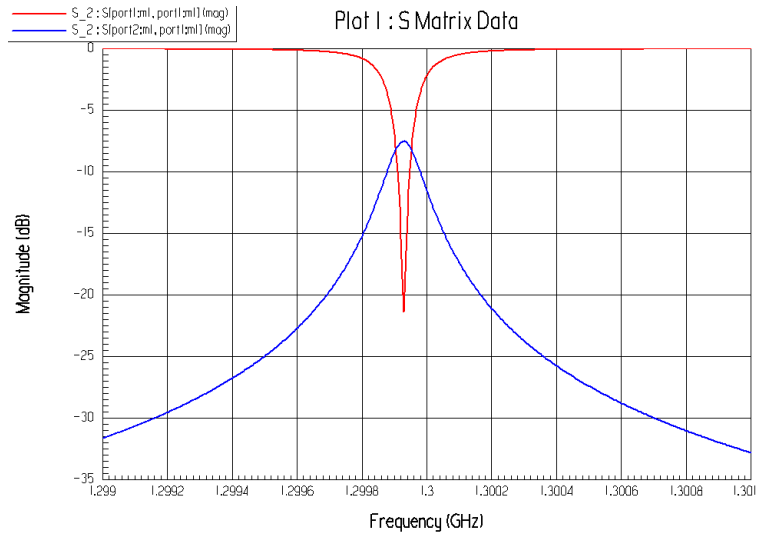


Center-cell Shape



End-cell Shape



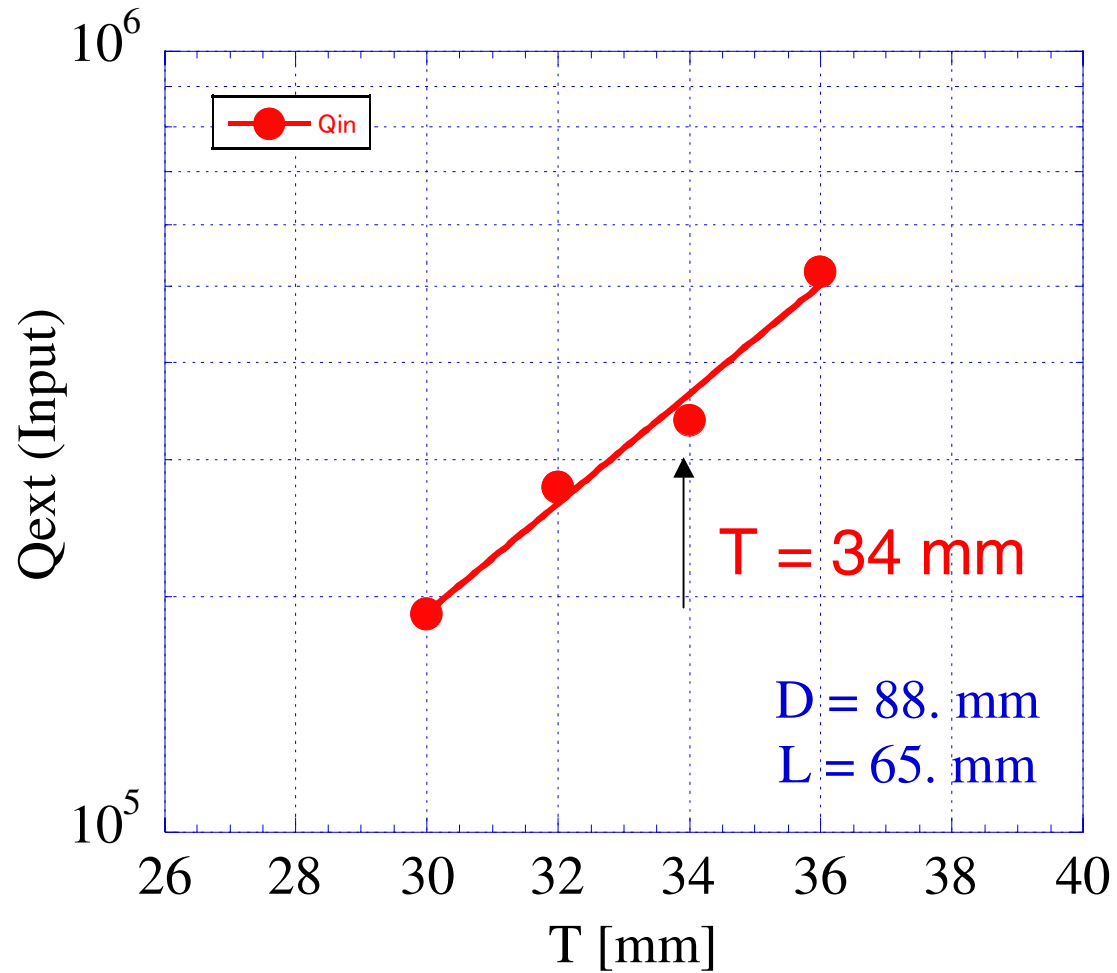


$E_{acc} = 14.7 \text{ MV/m}$, $V_{acc} = 3.4 \text{ MV}$
 $I_b = 100 \text{ mA}$, $P_b = 340 \text{ kW}$
 $R/Q = 204. \Omega$, $Q_{in} \text{ (opt.)} = 1.67 \times 10^5$

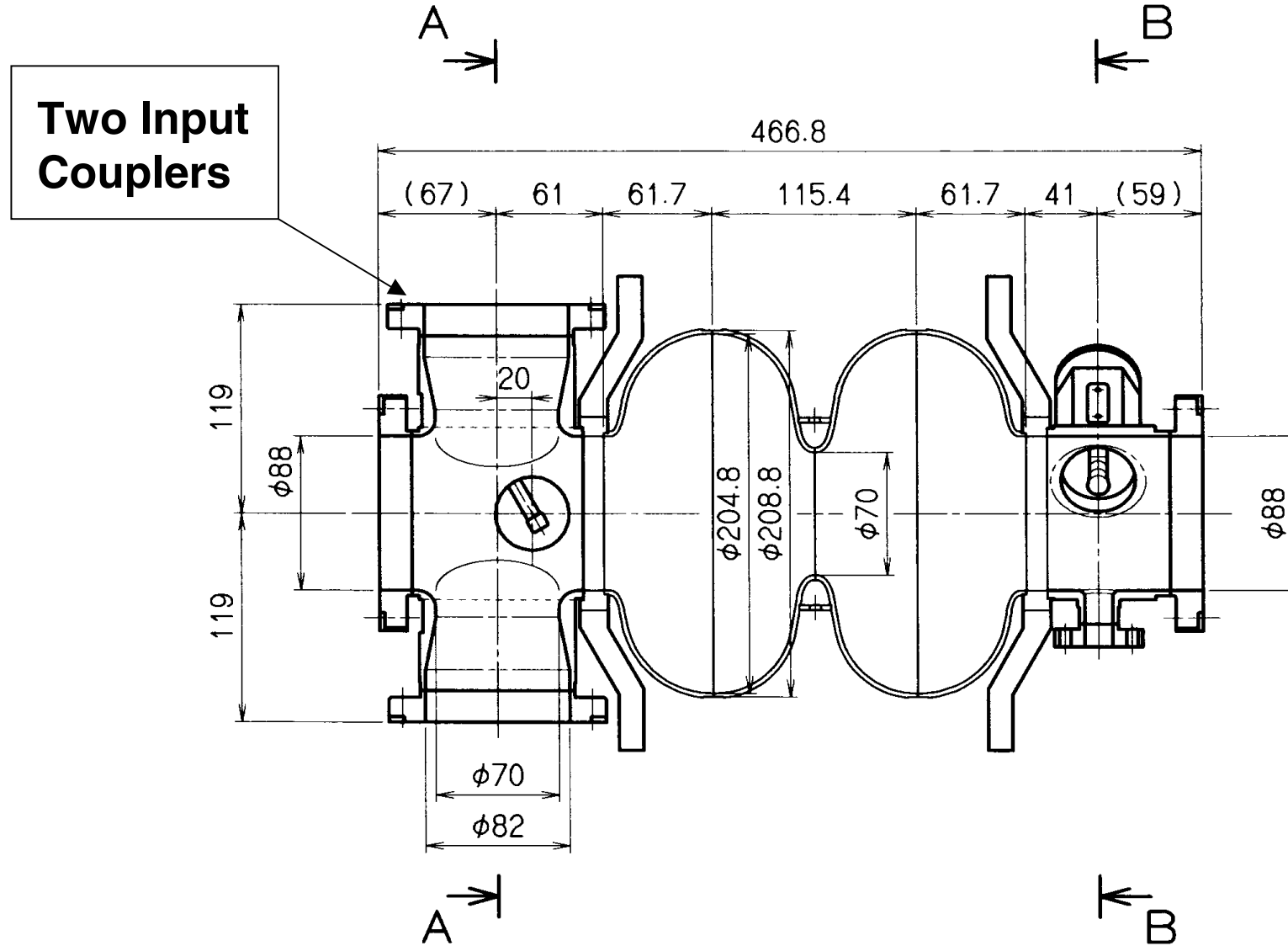
Two Input Couplers

$$Q_{in} = 3.33 \times 10^5$$

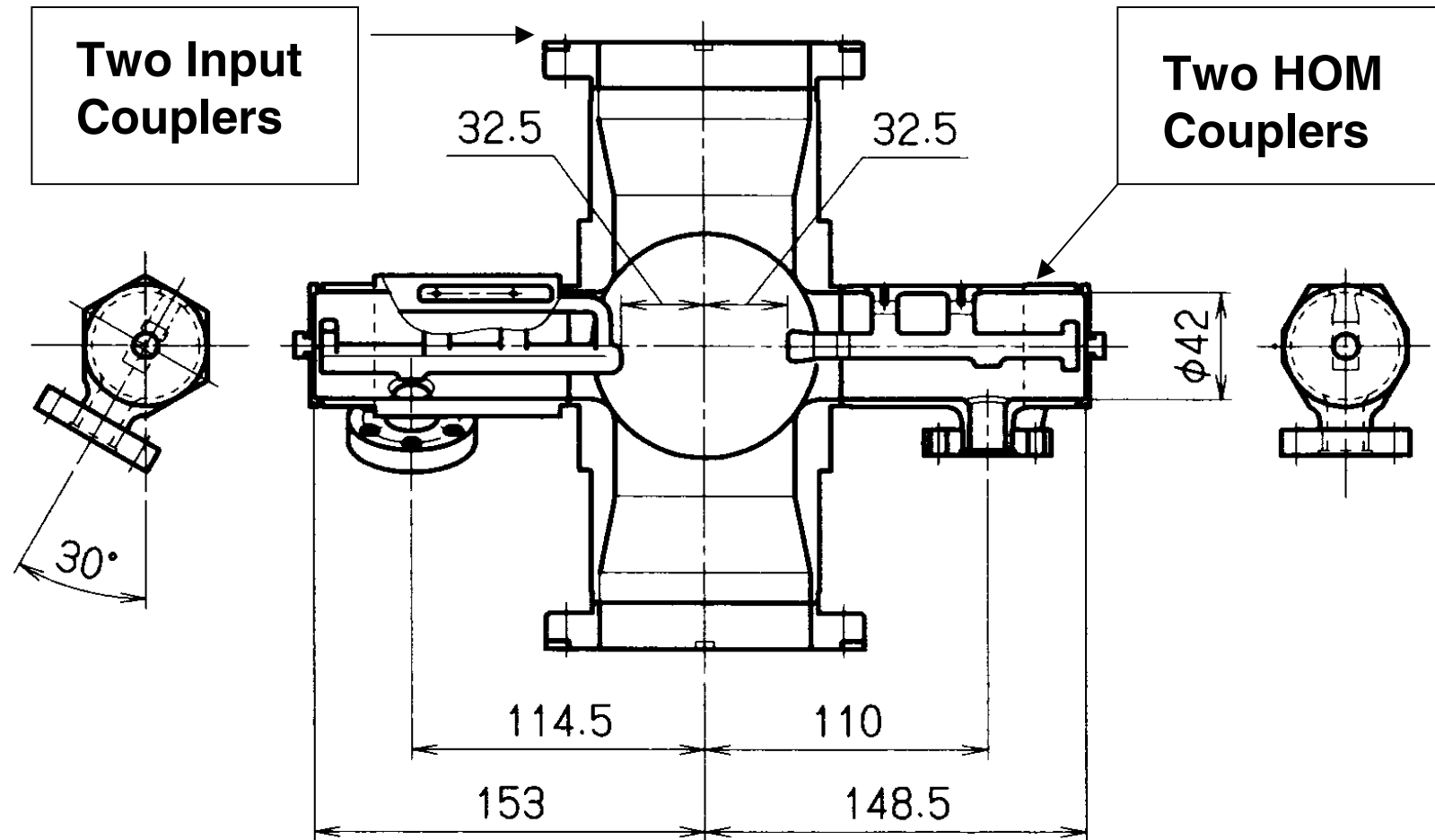
$$P_{in} = 170 \text{ kW / cw}$$



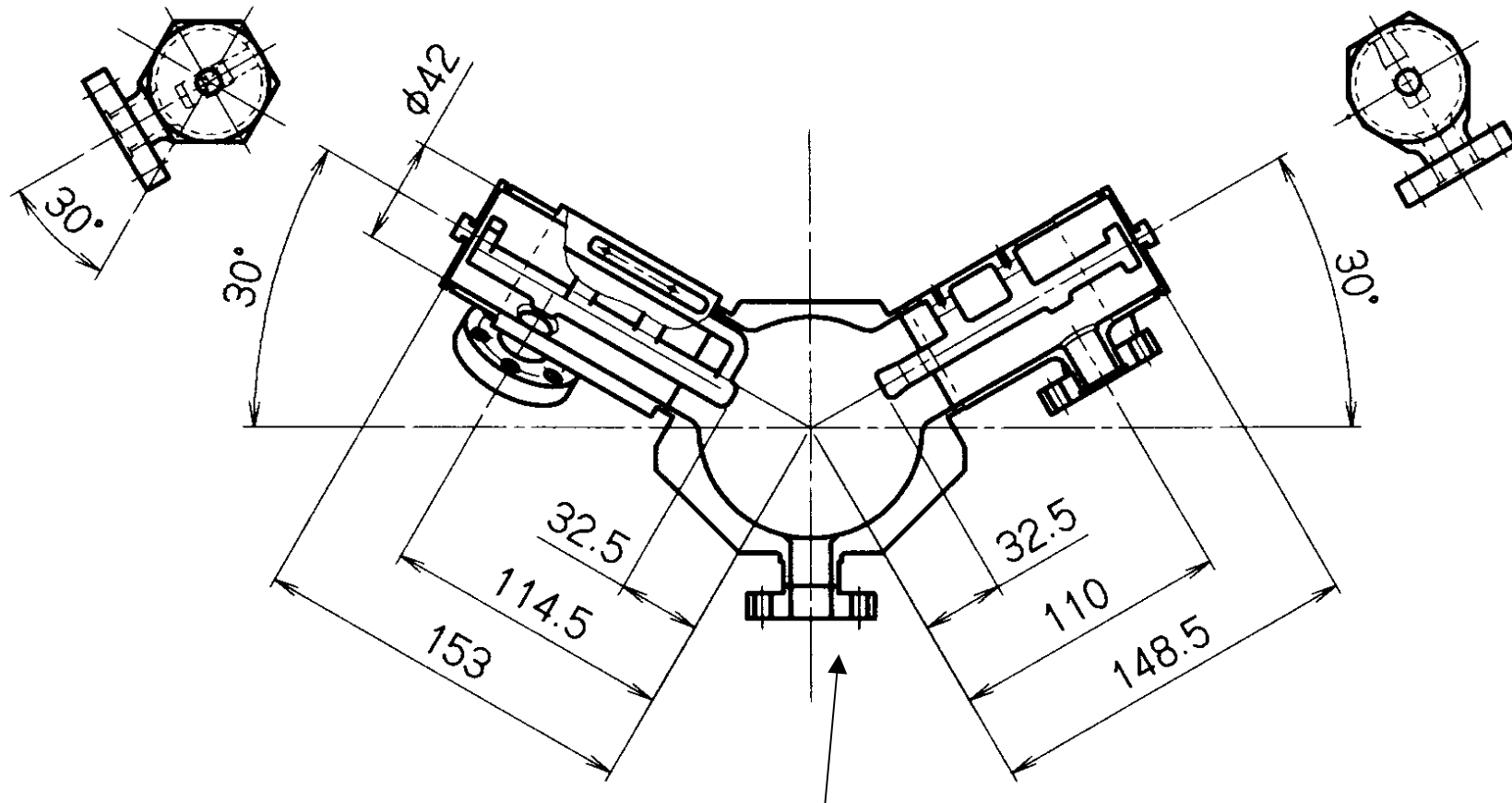
2-cell Cavity



Input Coupler Side



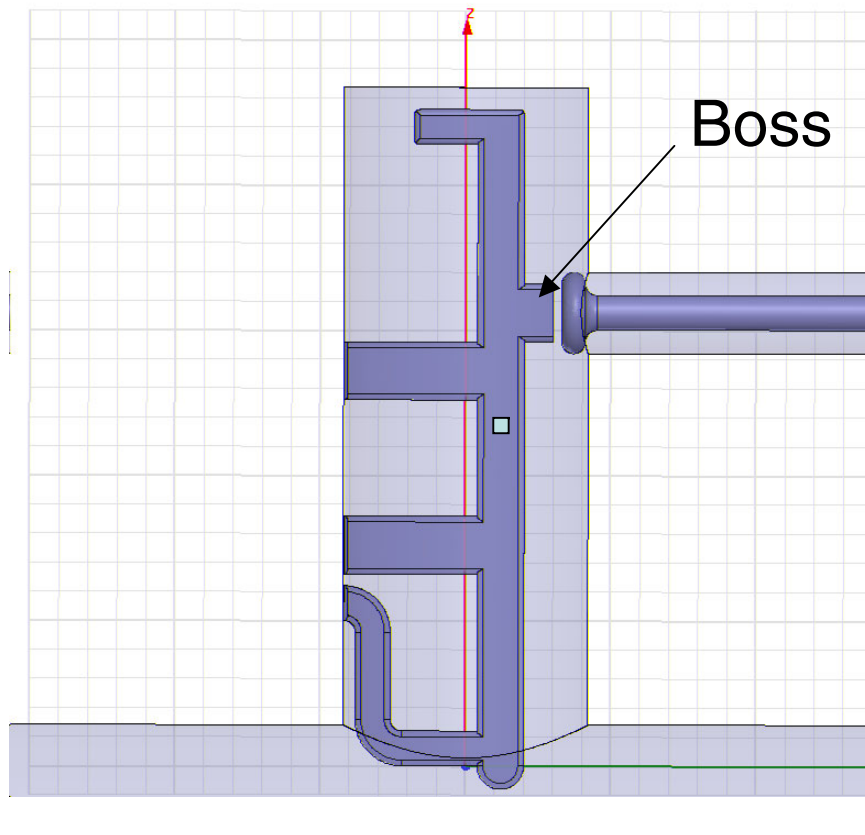
HOM Coupler Side



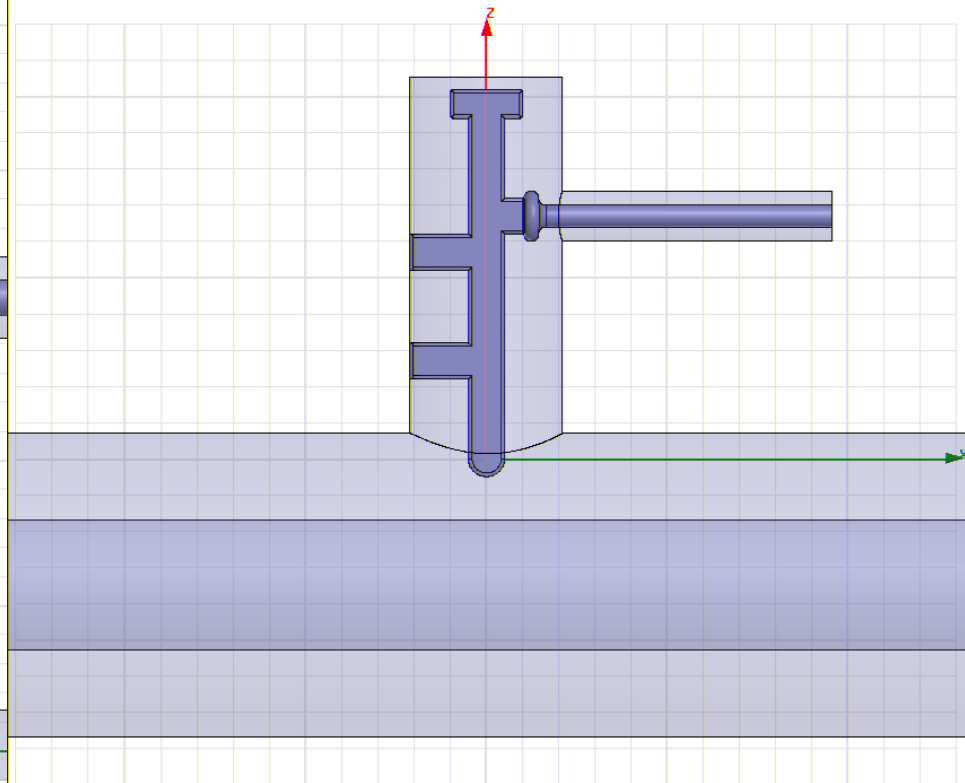
Monitor Coupler

Two Stub HOM Coupler with a Boss

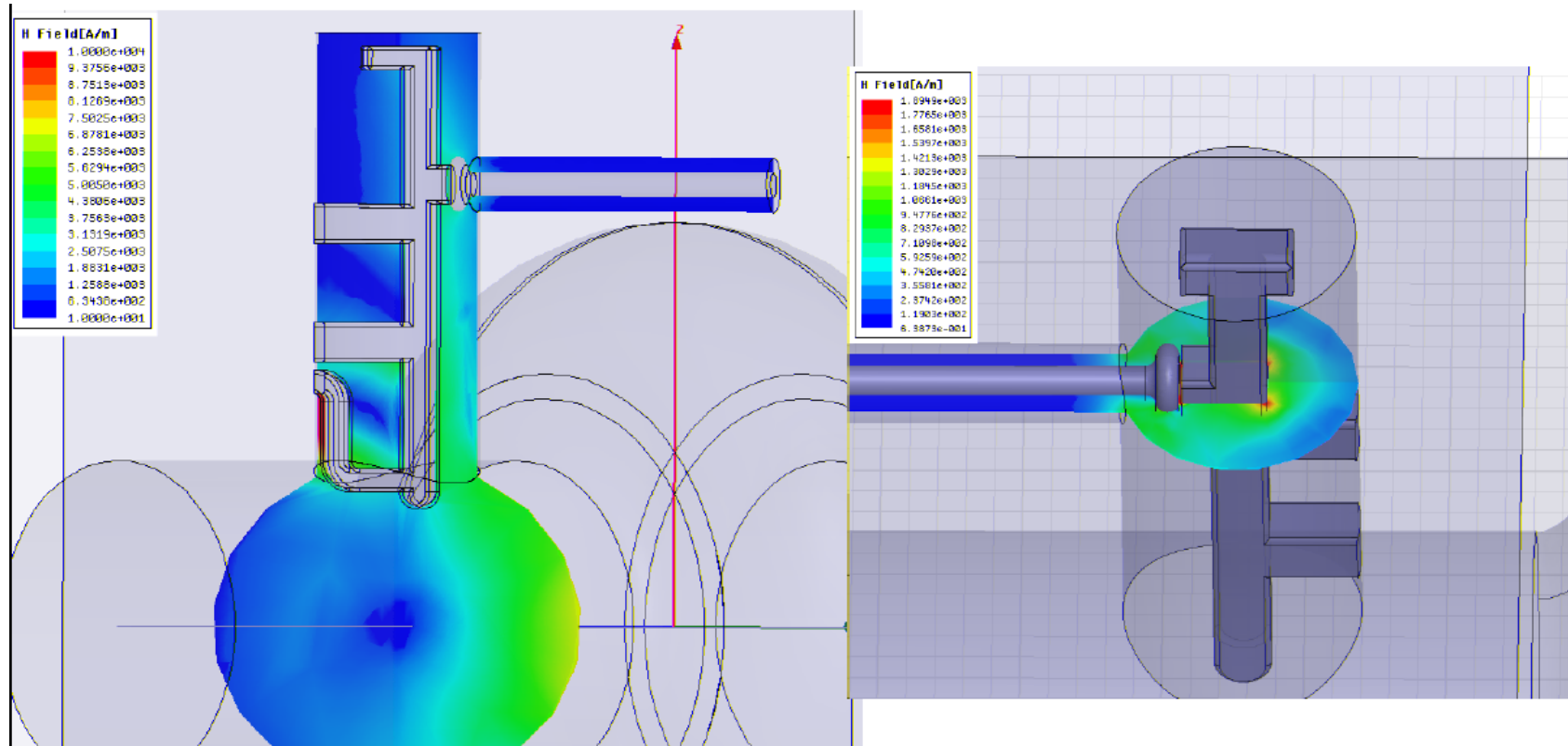
Loop Type



Antenna Type



H-Field Distribution

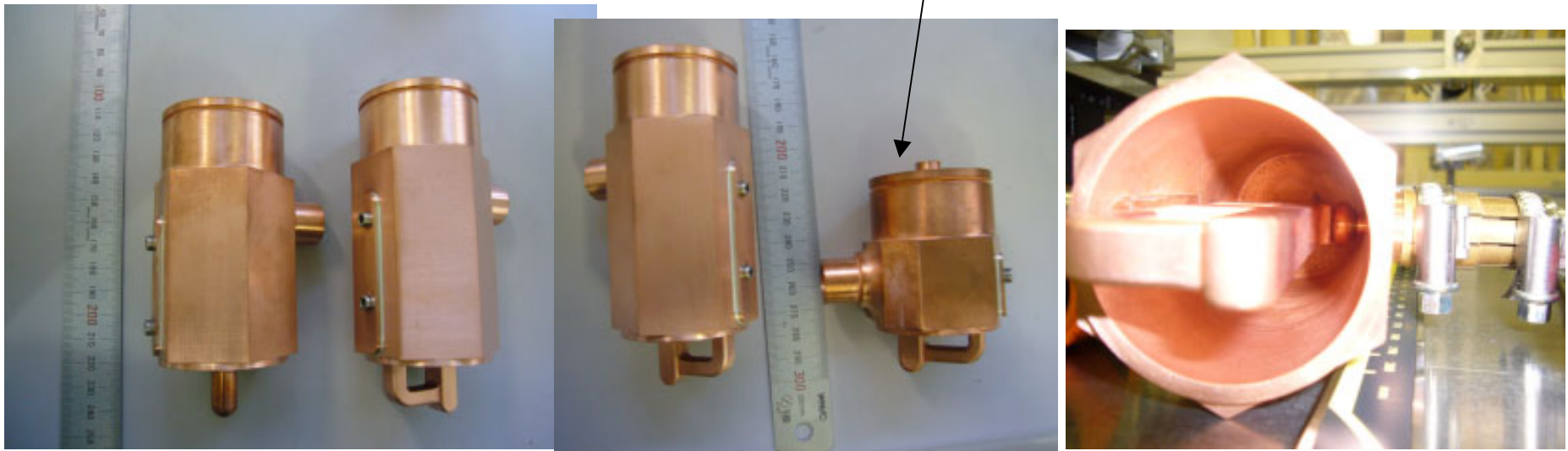


H-field distribution at 1.3 GHz (acceleration load)

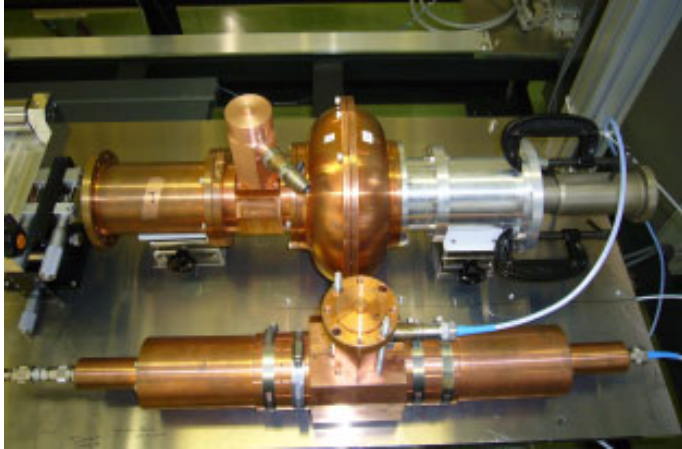
conditions	15MV/m	20MV/m	25MV/m	other
Antenna type : New , improve inner conductor (probe tip = 10 mm from HOM coupler center)				
(1)c=10mm, u=5mm	850~1000 A/m	1150~1350 A/m	1400~1650 A/m	Probe gap=0.5mm Offset = 0mm
Antenna type : old c=0mm, u=0mm (probe tip = 5 mm from HOM coupler center)				
(0)c=0mm, u=0mm	2400~2850 A/m	3000~3500 A/m	3700~4400 A/m	0.5mm Offset = 0mm
loop type : New , improve inner conductor (probe tip = 13 mm from HOM coupler center)				
(1)c=10mm, u=3mm	1800~2050 A/m	2400~2720 A/m	3000~3360 A/m	0.5mm Offset = 6mm
loop type : old c=0mm, u=0mm (probe tip = 10 mm from HOM coupler center)				
(0)c=0mm, u=0mm	2200~2400 A/m	2900~3150 A/m	3500~3850 A/m	0.5mm Offset = 6mm
STF type : New , improve inner conductor (probe tip = 17 mm from HOM coupler center)				
(1)c=10mm, u=2mm	-----	-----	-----	Offset=10 mm
STF model : old c=0mm, u=0mm (probe tip = 13 mm from HOM coupler center, due to cut 2mm inner conductor)				
(0)c=0mm, u=0mm	4000~4250 A/m Heating limit at CW	5200~5600 A/m Not use ? CW operation	6800 ~ 7200 A/m Not use ? CW operation	0.5mm Offset=10 mm

Copper Model

STF Model



Model Measurement Set-up

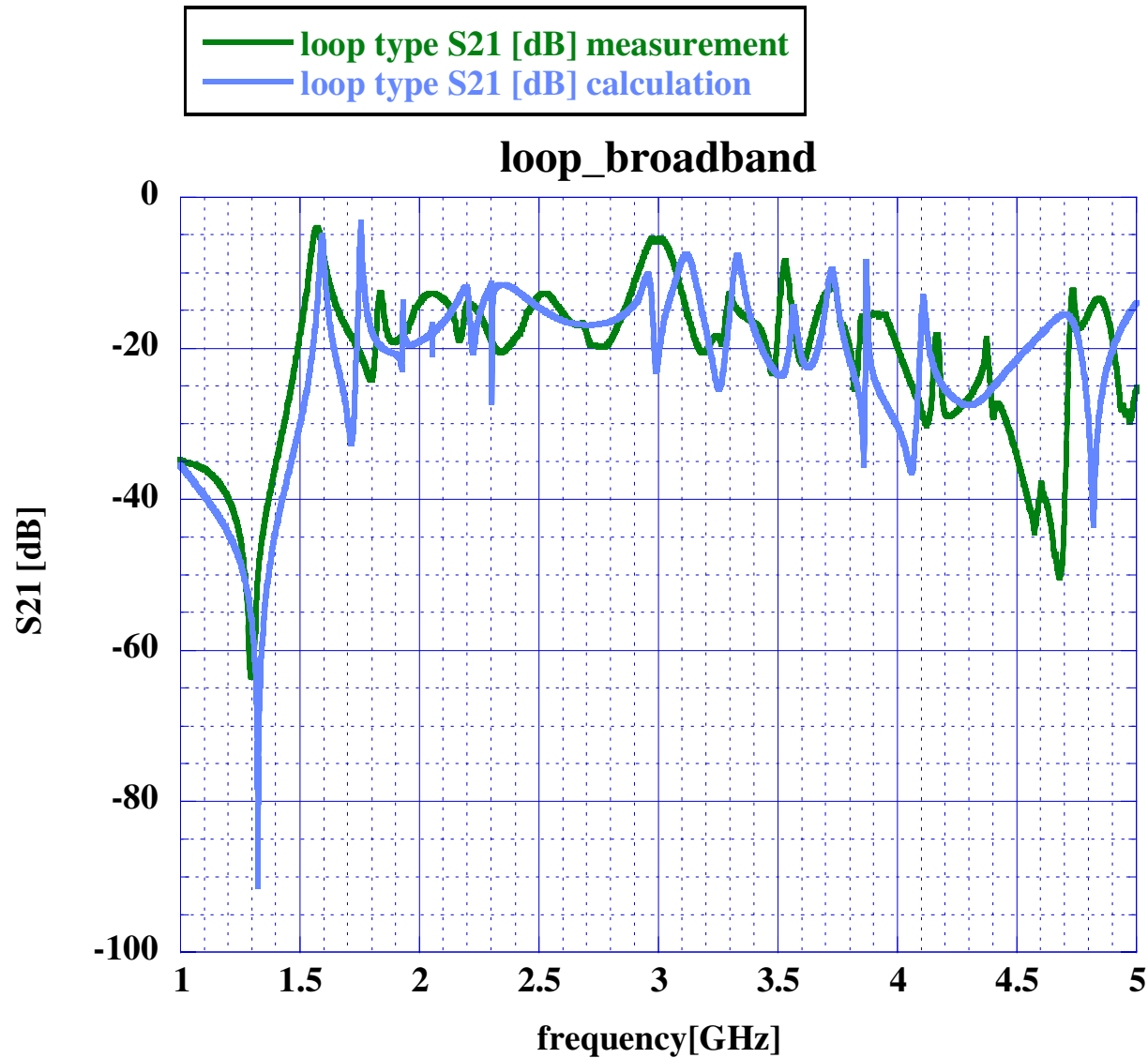


	dipole	Loop
Notch frequency (initial)	1314.463 MHz	1298.820 MHz
After tuning	1300 MHz	1300 MHz
Qext of TM010	5.2×10^{11}	3.6×10^{11}
cavity frequency	1301.477 MHz	

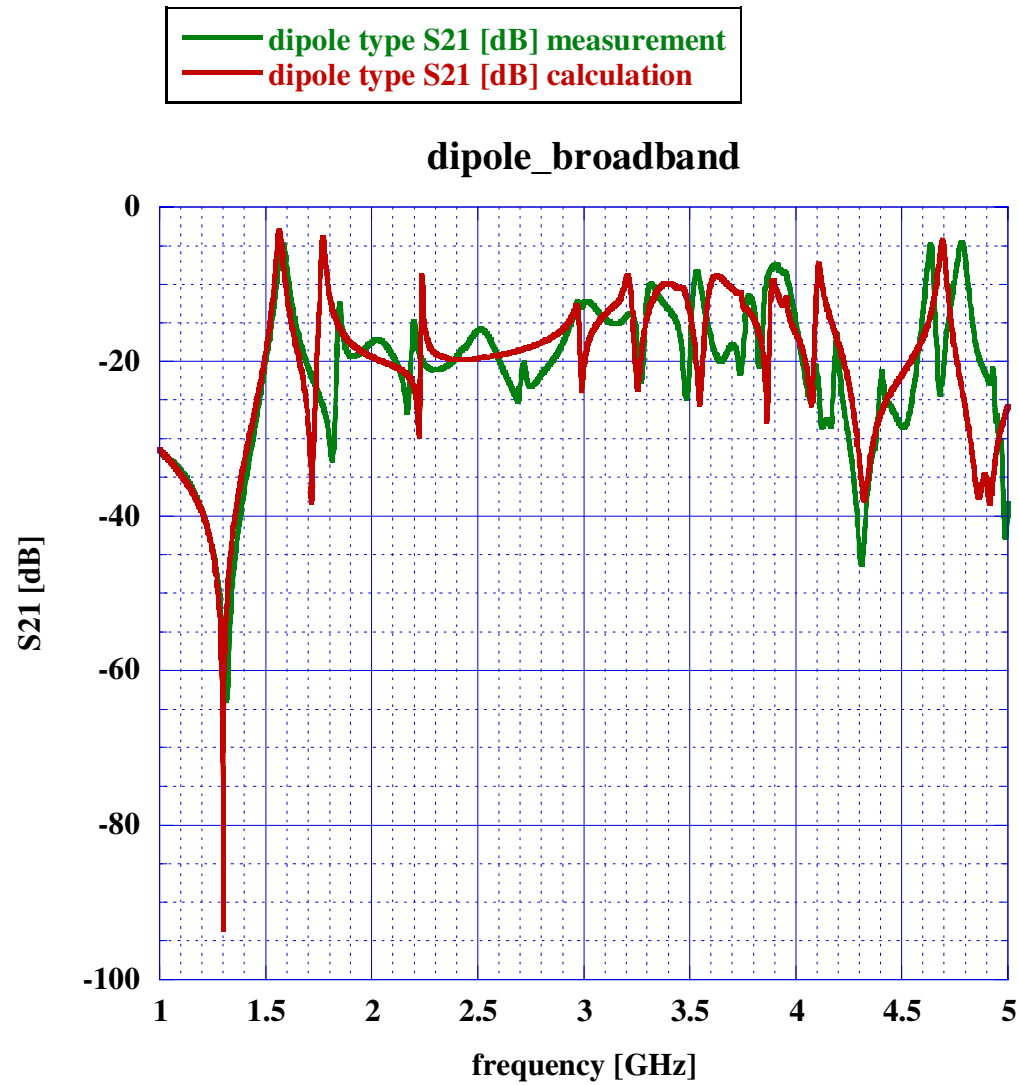
製作直後におけるノッチフィルターの周波数は十分にチューニング可能な値であった。

十分な加速モードのリジェクションを確認した。ノッチフィルターとして機能している。

Loop Type HOM Performance



Antenna Type HOM Performance



Qext of HOMs (one coupler)

measured

mode	Frequency (MHz)	Dipole (Qext)	Loop (Qext) 30° 回転	STF 1.5:L-type
TE111	L:1670.6	5.4×10^4	5.0×10^4	1.8×10^4
	H:1671.6	1.3×10^4	1.5×10^4	-----
TM110	L:1834.9	4.3×10^4	3.9×10^4	1.9×10^4
	H:1835.1	2.2×10^4	1.5×10^4	5.1×10^4
TM011	2426.2	1.6×10^5	3.2×10^4	4.1×10^4
Insert length		28 mm	27.5 mm	29.5 mm

TESLA銅空洞(シングルセル)
HOMのQextの測定を行った。

以下、条件

Cell shape : TESLA

Beam pipe = 78 mm

Probe gap = 0.5 mm

Diameter = 12 mm

calculated

mode	Frequency (MHz)	Dipole (Qext)	Loop (Qext) 30° 回転	STF 1.5:L-type
TE111	L:1599.6	2.9×10^3	2.8×10^4	1.2×10^5
	H:1603.9	1.2×10^4	9.7×10^4	3.1×10^3
TM110	L:1836.7	1.1×10^4	5.4×10^3	2.3×10^3
	H:1837.9	9.9×10^3	6.3×10^3	4.4×10^4
TM011	2328.4	8.3×10^4	8.2×10^3	2.3×10^4
Insert length		30 mm	30 mm	31 mm

HFSSにて計算

以下、条件

Cell shape : STF end cell

Beam pipe = 84 mm

Probe gap = 0.5 mm

Diameter = 12 mm