

# **KNU IPBPM ELECTRONICS**

**13TH ATF2 PROJECT MEETING**

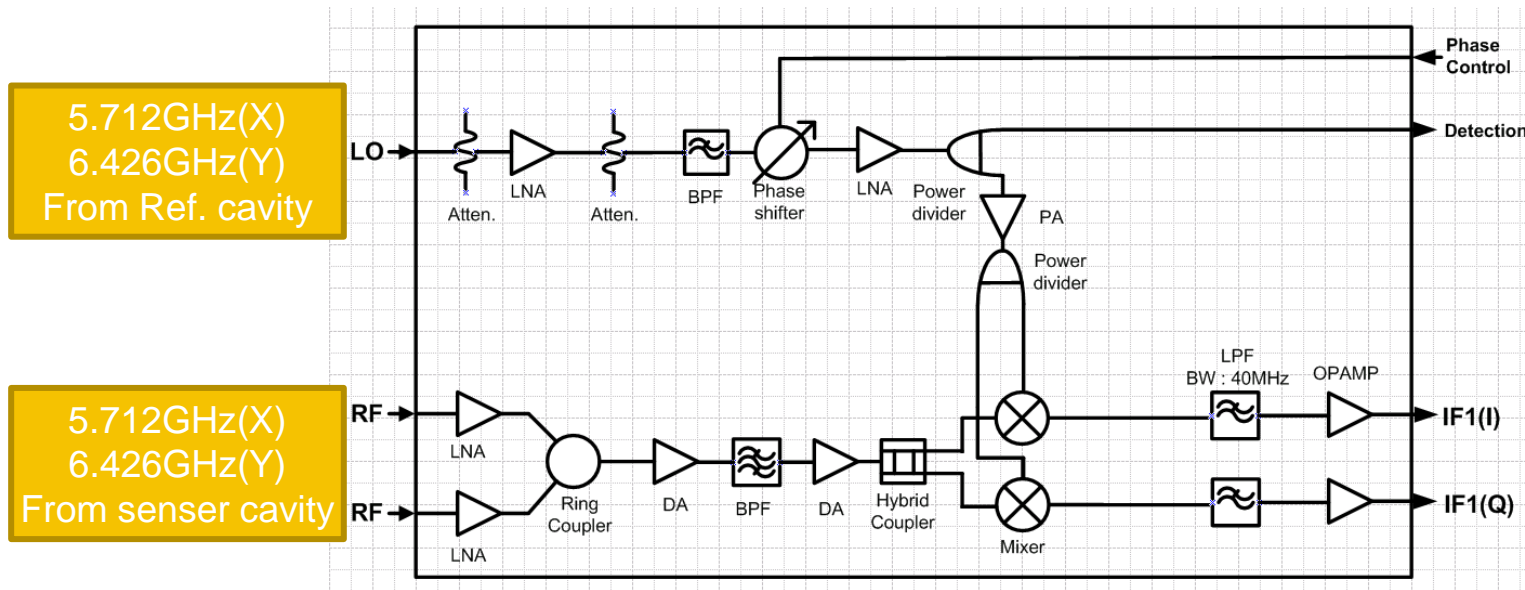
**FRIDAY 13 JANUARY 2012**

**AEYOUNG HEO, SIWON JANG, JIGWANG HWANG, EUNSAN KIM**

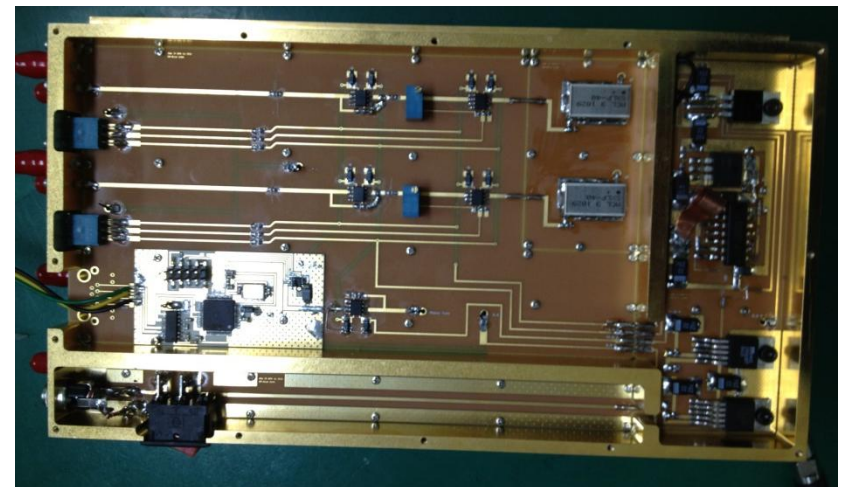
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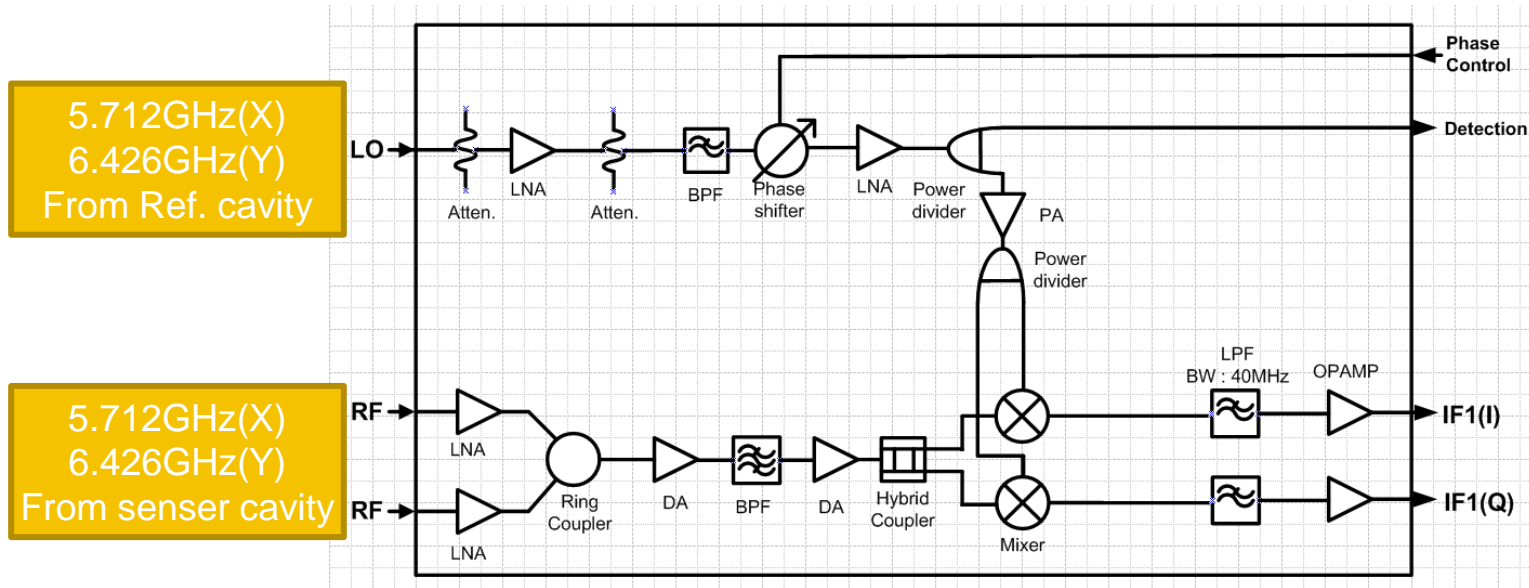
# SIMPLIFIED SCHEMATIC



Simplified schematic of the IP-BPM signal processing electronics.



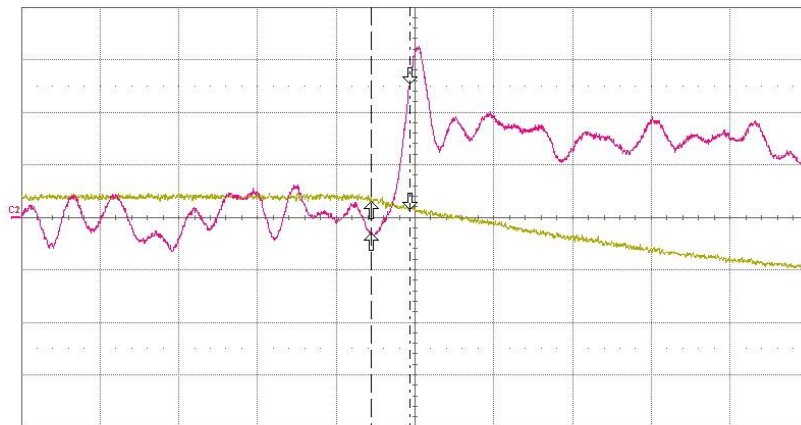
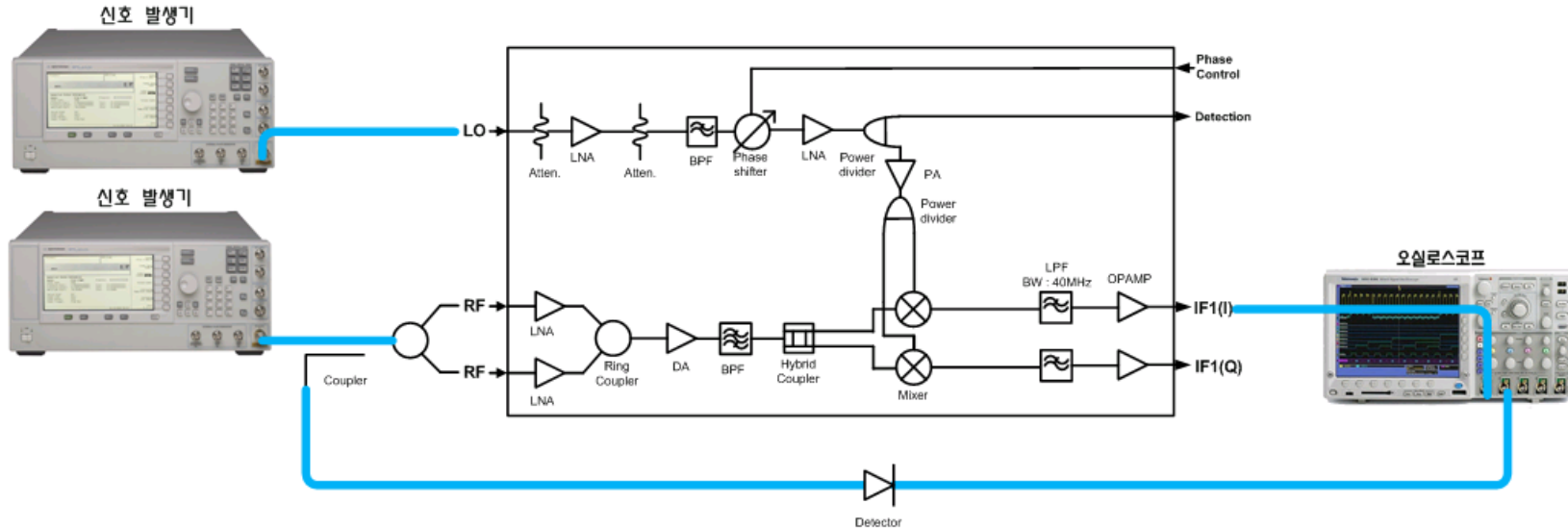
# SIMPLIFIED SCHEMATIC



Simplified schematic of the IP-BPM signal processing electronics.

- Conversion Gain 54dB
- Noise Figure < 1.8dB
- linear Range -57dB ~ -96dB

# LATENCY



Measure	P1:freq(C1)	P2:freq(C2)	P3:phase(F1,F2)	P4:amp(C1)	P5:amp(C2)	P6:---	P7:---	P8:---
value	---	---	---	23.45 mV	30.57 mV	---	---	---
status	---	---	---	✓	✓	---	---	---

C1	C2
20.0 mV/div	20.0 mV/div
0.00 mV offset	0.00 mV offset
3.3 mV	3.11 mV
5.6 mV	-6.3 mV

Timebase	0 ns	Trigger	C2
2.50 ns	50.0 ns/div	Stop	52.0 mV
	5.0 GS/s	Edge	Positive
X1=	-3.4 ns	ΔX=	-24.2 ns
X2=	-27.6 ns	1/ΔX=	-41.3 MHz

24.2ns

24.2ns < 40ns  
(FONT requirement)

# ELECTRONICS PERFORMANCE

$R/Q = 6.981E+05 \times \text{offset}$

$V_{\text{out}}(2\text{nm}) = 8.0445\text{uV}$

Power(2nm) = -88.89dBm

- For the calculation (New BPM)

$V_{\text{out}}(2\text{nm}) = 1\text{uV}$

Power(2nm) = -106.98dBm

- For the measured (old BPM)

**New Electronics Limit**

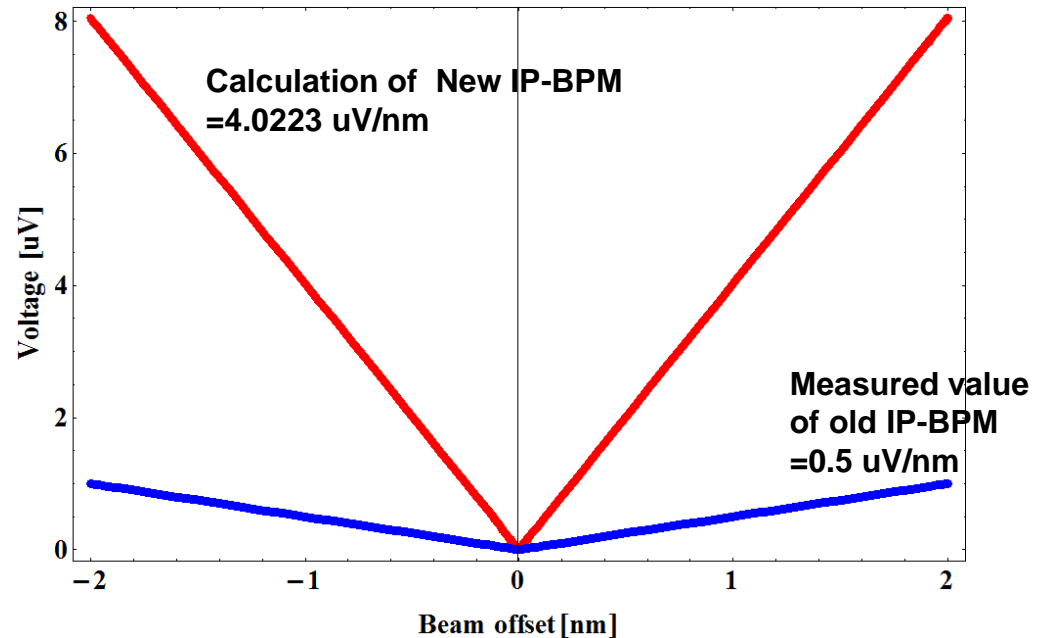
Power = -96dBm

$V_{\text{out}} = 3.54\text{uV}$

Linearity range  $\rightarrow$  -96dBm(3.54uV)  $\sim$  -57dBm(316uV)

- For the New Low-Q IP-BPM: 0.88nm  $\sim$  78.56nm
- For the Old Low-Q IP-BPM: 7nm  $\sim$  632nm

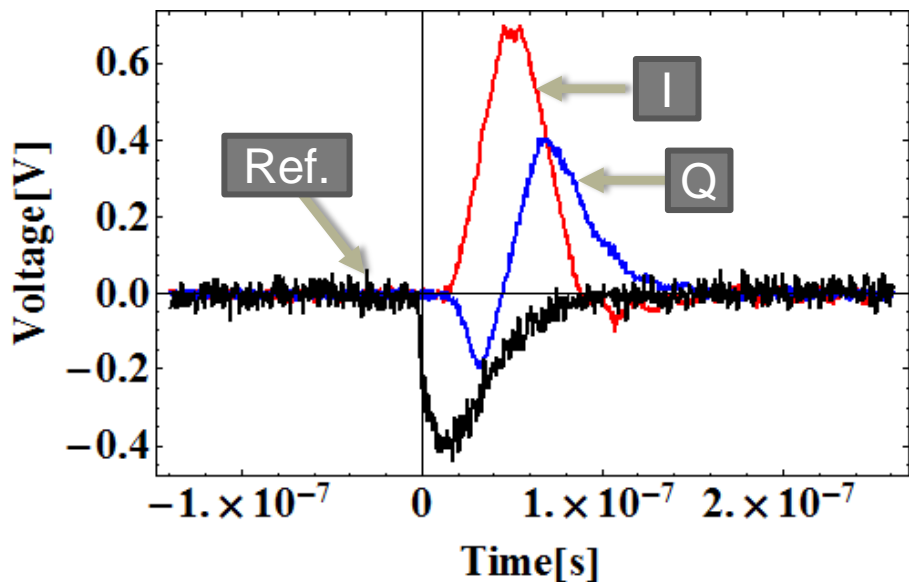
Therefore, we expect our electronics can be detected 2nm beam offset.



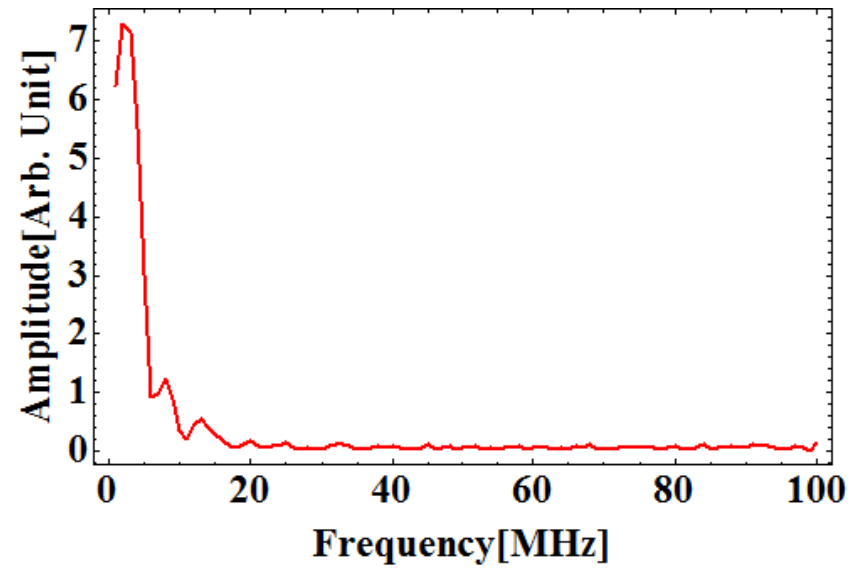
# ELECTRONICS PERFORMANCE

I, Q and Reference signal

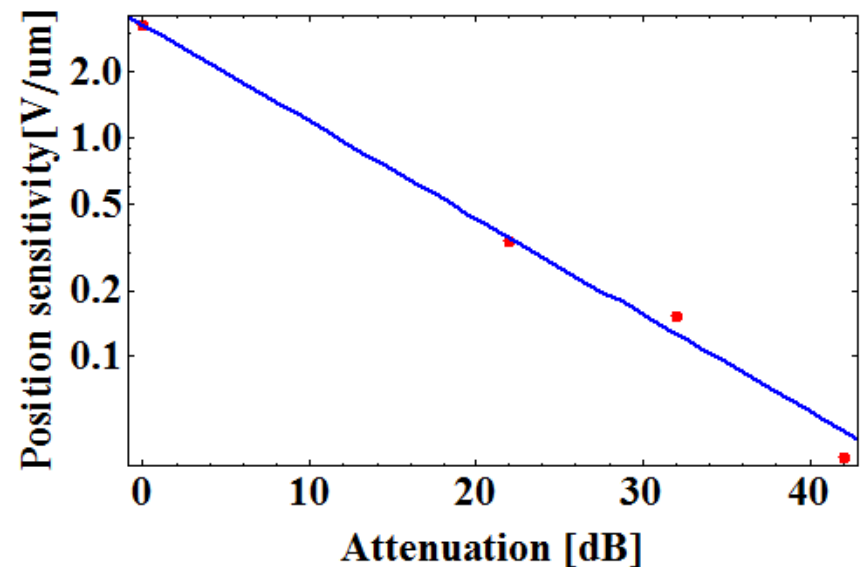
- In-phase signal
- Quadrature phase signal
- Reference signal x100



FFT of I signal



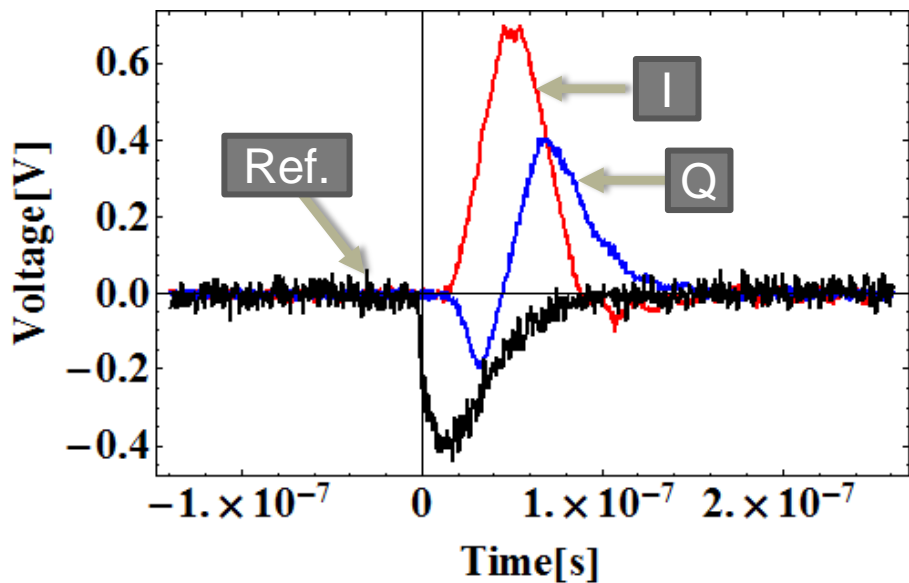
Performance



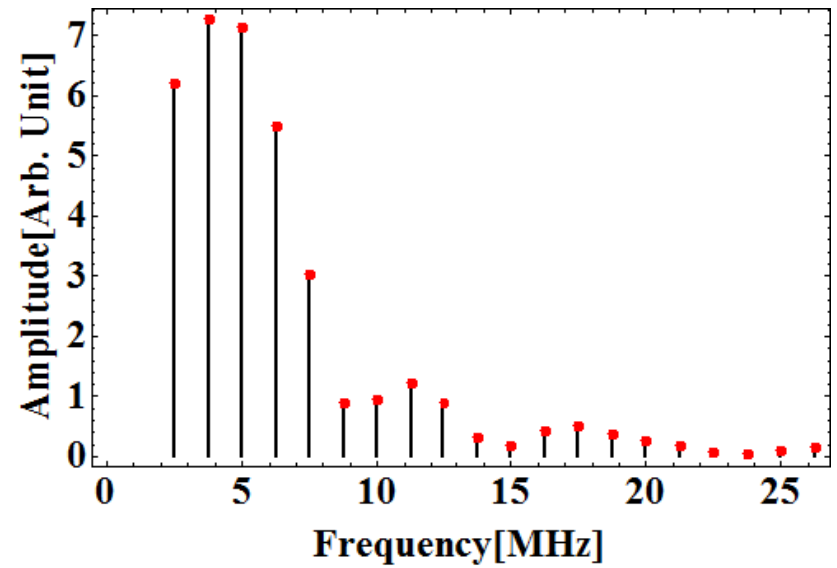
# ELECTRONICS PERFORMANCE

I, Q and Reference signal

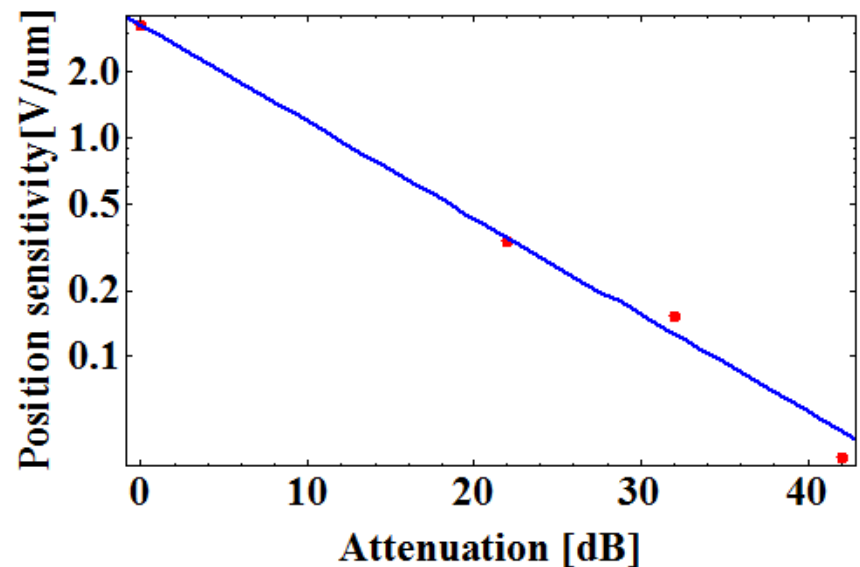
- In-phase signal
- Quadrature phase signal
- Reference signal x100



FFT of I signal



Performance





# FURTHER PLAN

- **Two electronics Ver.2**

- will be tested in Jan.

- **Modification and Fabrication Four more electronics**

- **Then three BPM test**

**More details will be presented by SiWon Jang.**

**THANK YOU  
FOR ATTENTION**