

# APD DETECTOR

## APD DETECTORS IN PROGRESS FOR ID18/22N

*ID18*  
*ID22N*

*Nuclear  
Resonance  
Group*

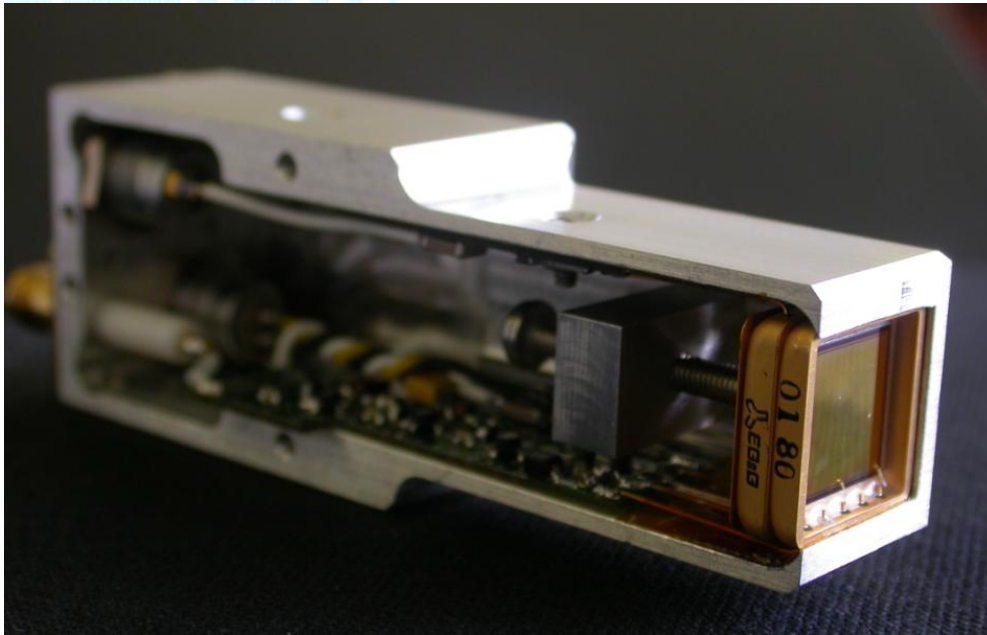
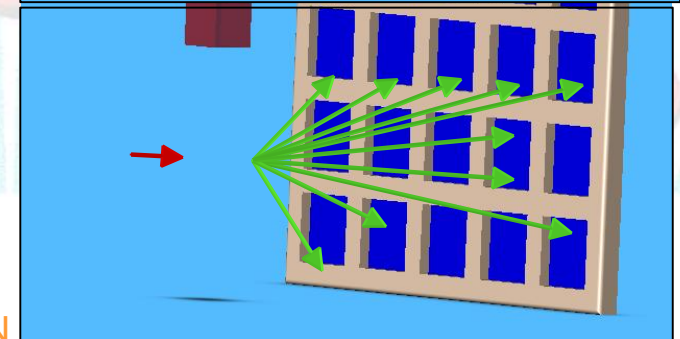
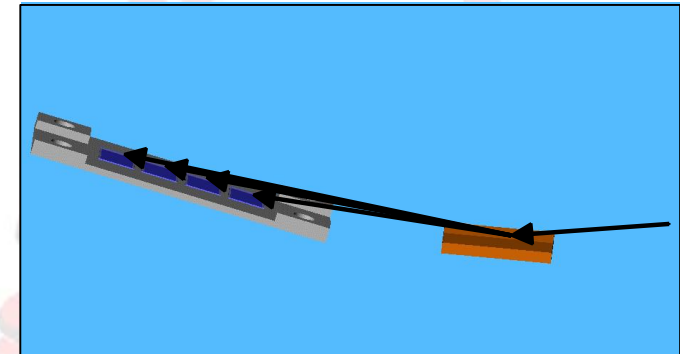
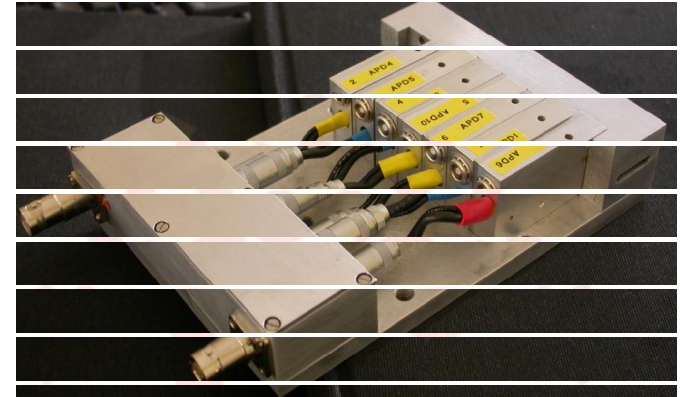
03/09/2005

Thanh DESCHAUX ID18/22N

# APD DETECTOR

## NFS // SAS

## NIS // SR-PAC



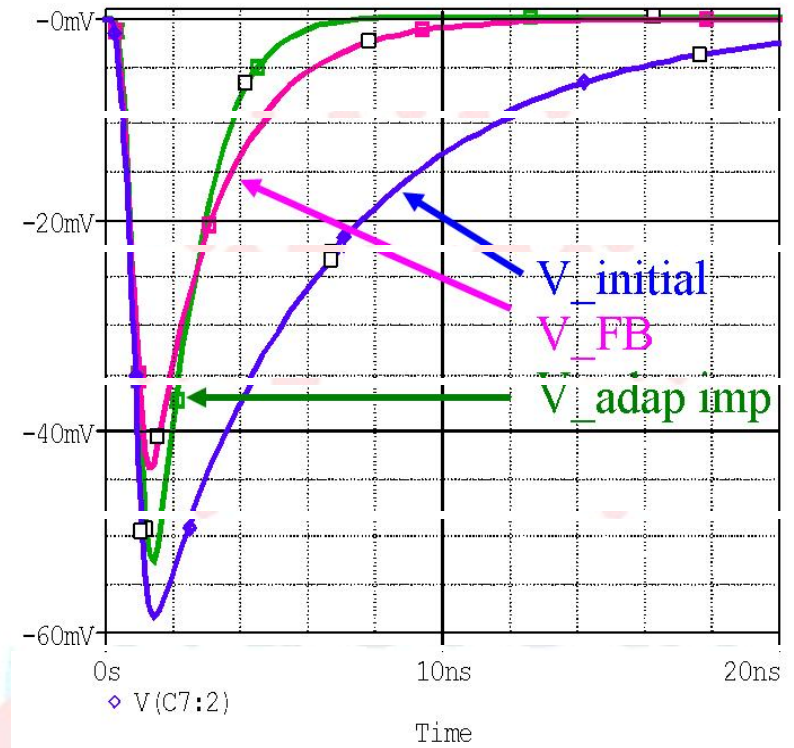
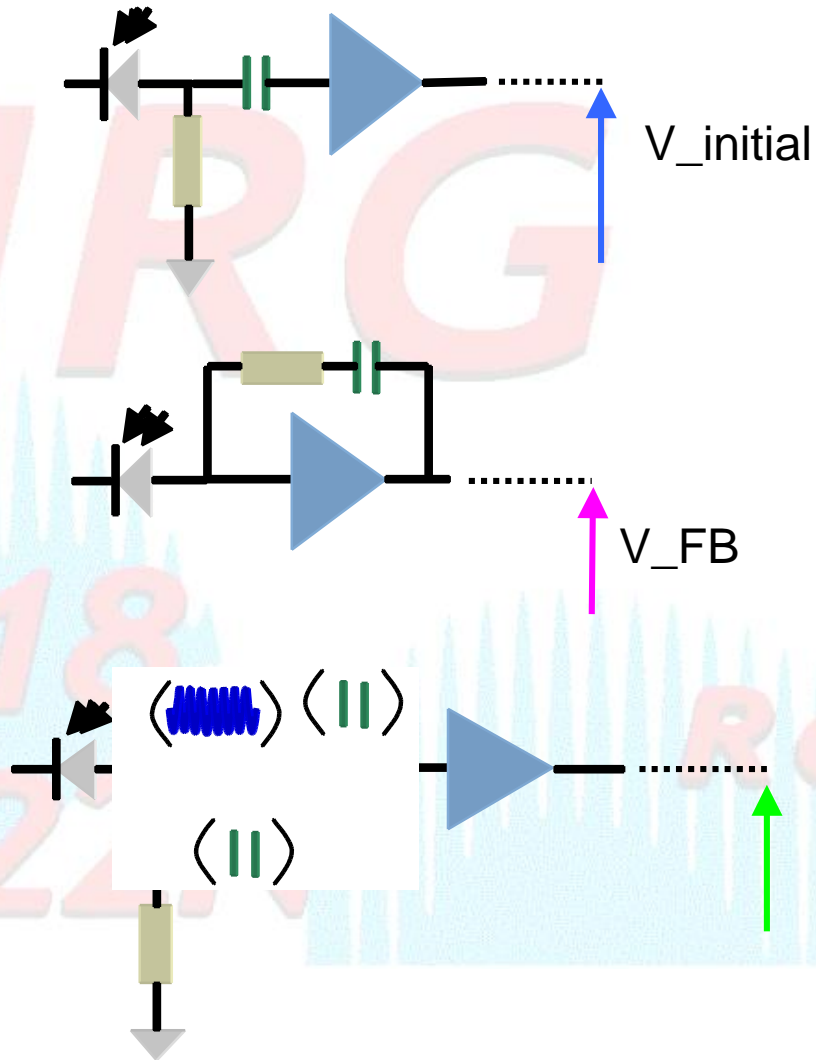
03/09/2005

Thanh DESCHAUX ID18/22N

# APD DETECTOR

## Pulse width

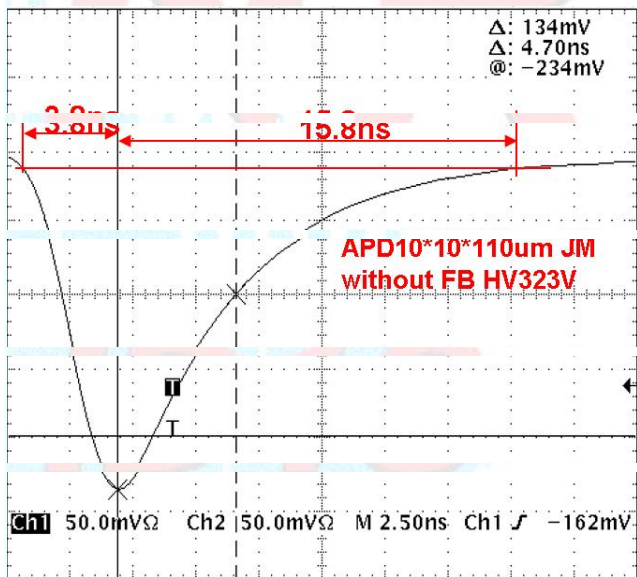
- Dead time
- Prompt tail



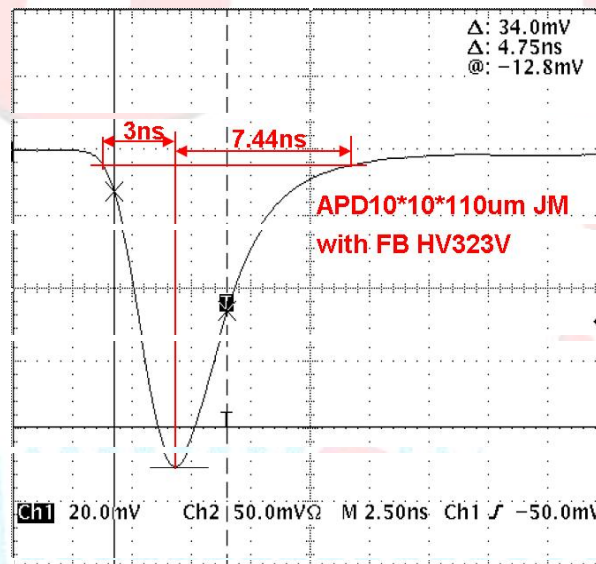
# APD DETECTOR

## Pulse width

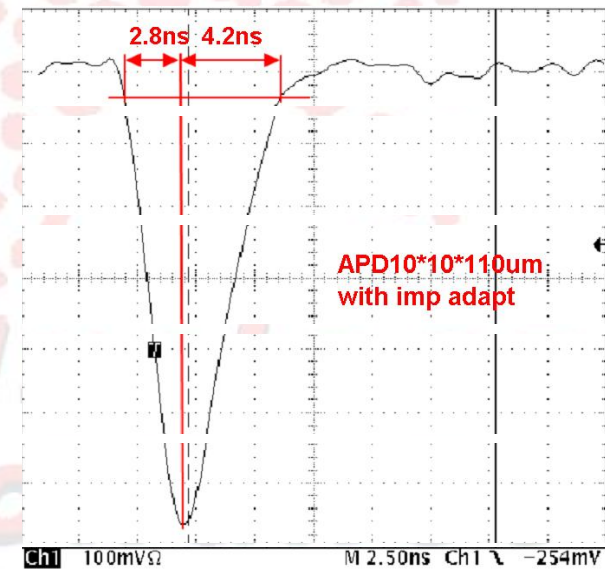
### Standard circuit



### FB circuit

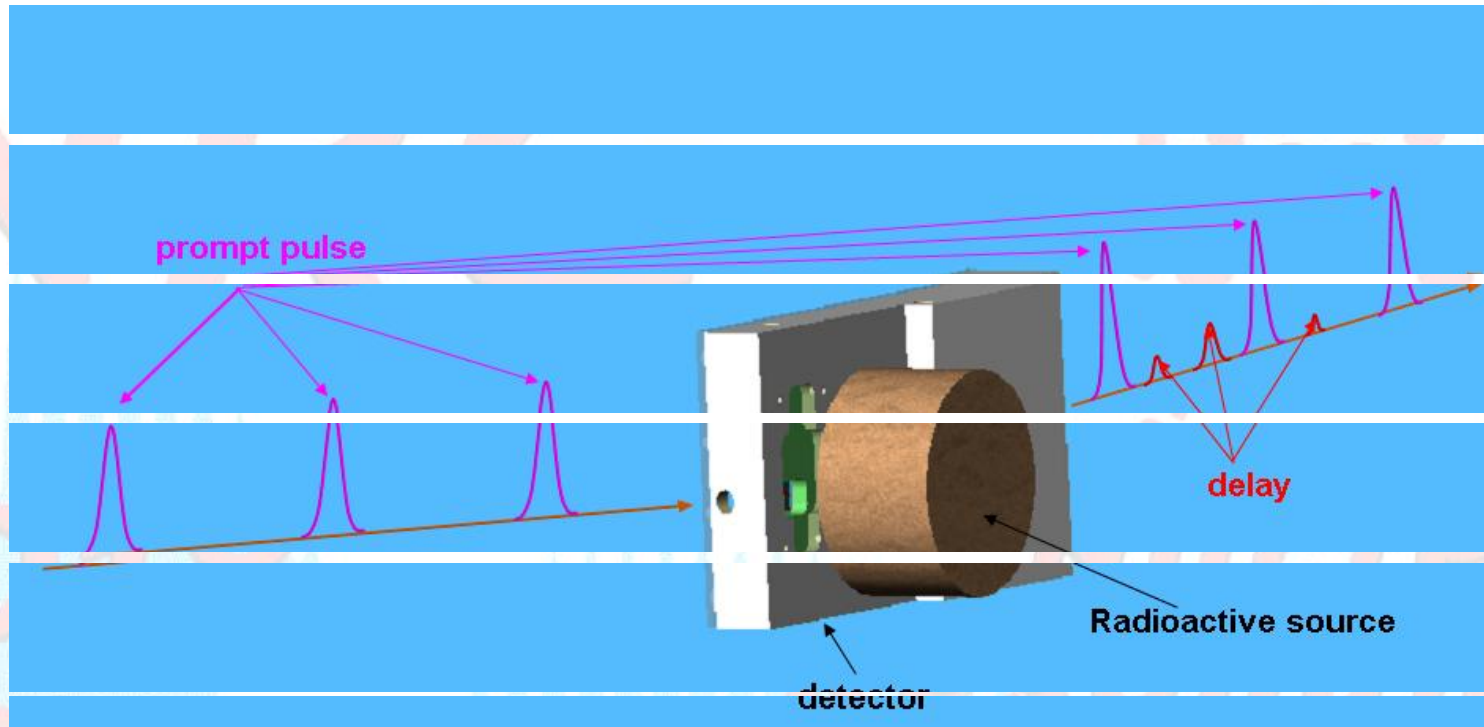


### Imp adapt circuit



# APD DETECTOR

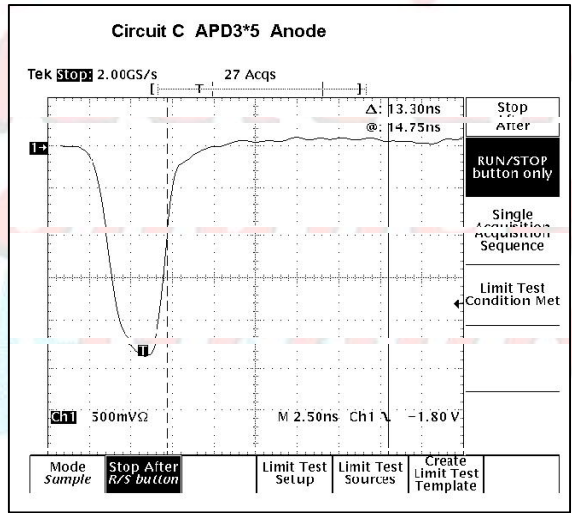
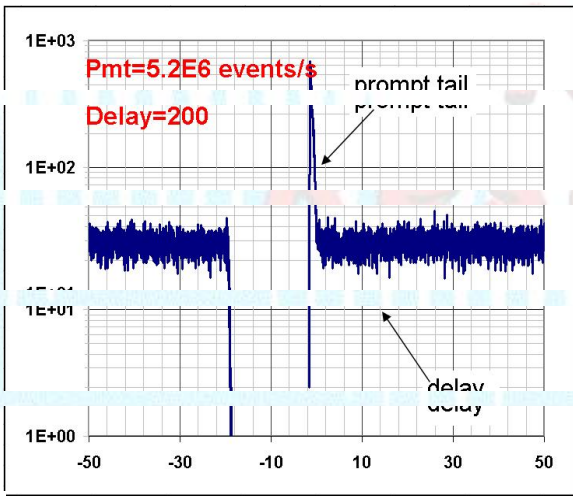
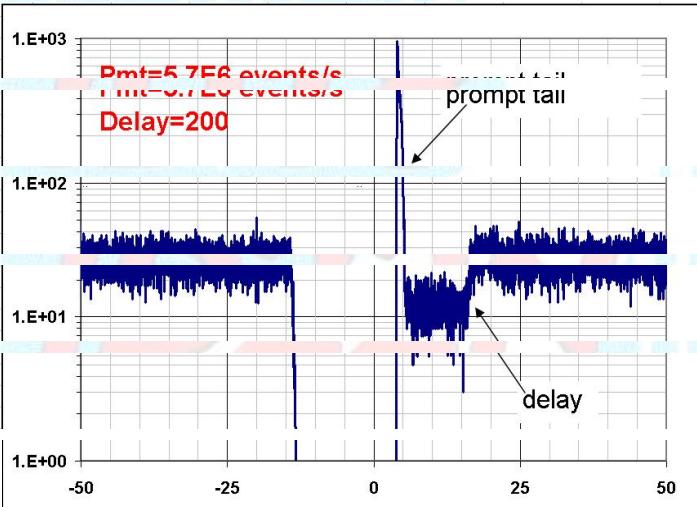
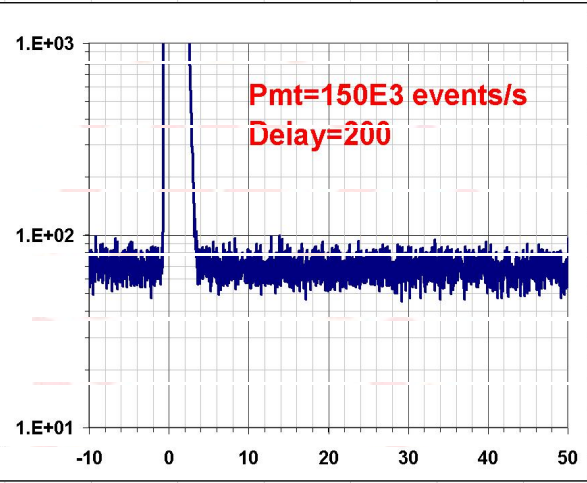
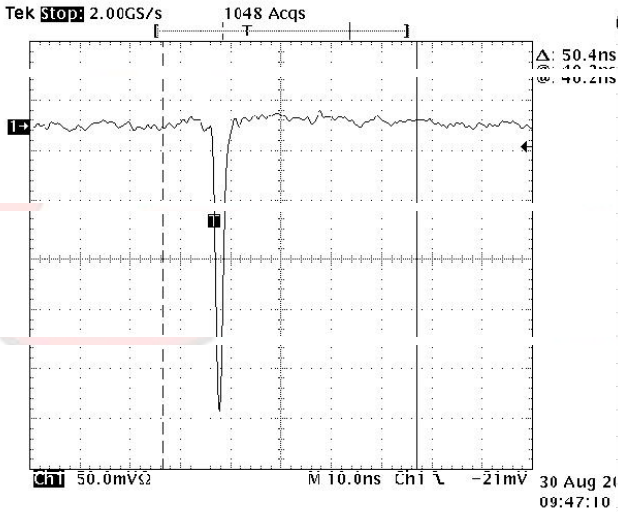
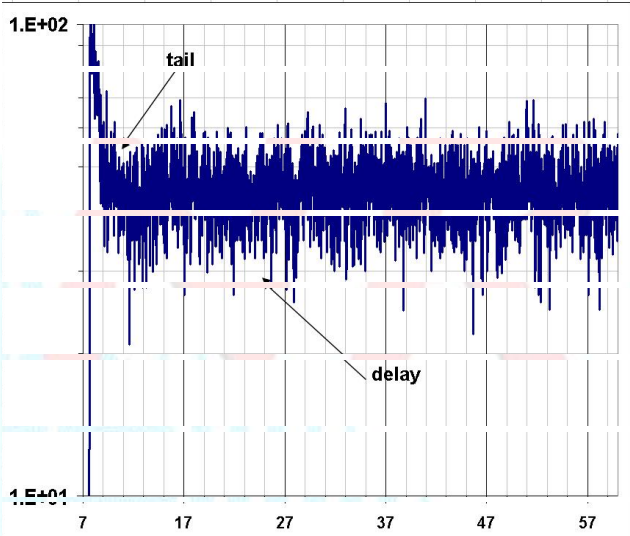
## Measurement // Recovery



**EXPERIMENTAL SETUP**

# APD DETECTOR Measurement // Recovery

Circuit B APD3\*5 Cathode



# APD DETECTOR

## Time resolution (FWHM)

APD's thickness

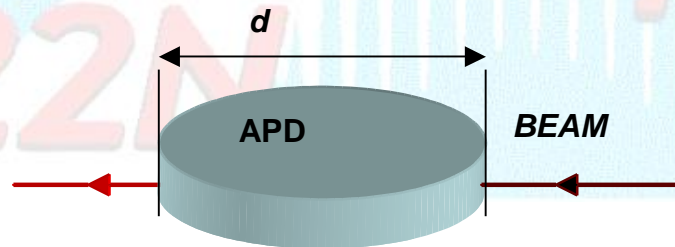
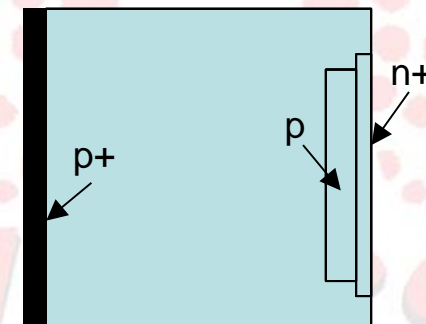
Threshold

Electronic circuit: S/N

Active side

APD	active side	time resolution (FWHM)
10*10 (200um)	anode	1.6 ns
	cathode	1ns
5*5 (110um)	anode	0.7ns
	cathode	0.5ns
SPL 4186/87	anode	1.4ns/1.2ns
	cathode	1ns/0.6ns
	side	0.5ns/0.3ns

Reach Through



# APD DETECTOR Electronic

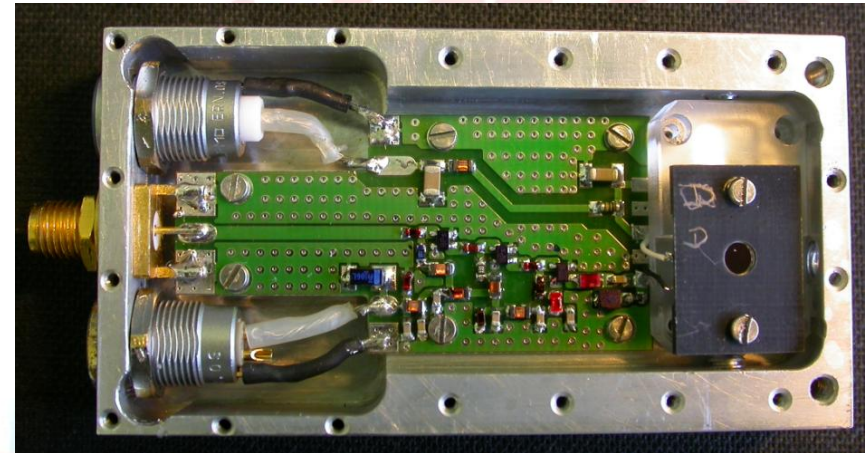
**S/N ratio**

**$G > 55\text{dB}$**

**p-p Noise  $< 10\text{mV}$**

**bandwidth  $> 2.5\text{GHz}$  -> Fast APD**

**small size -> APD array (2 dimensions)**





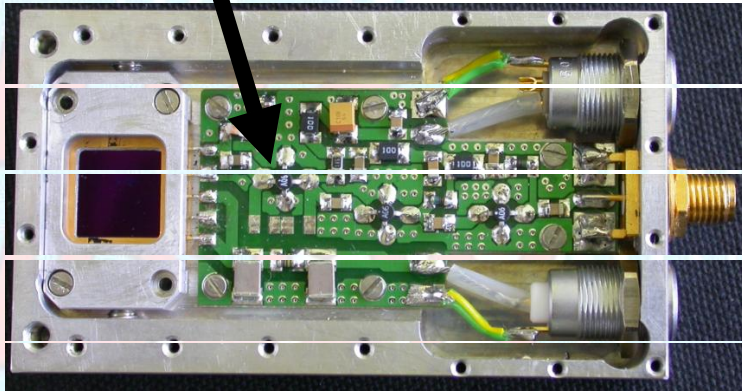
# APD DETECTOR Conclusion

## NIS // SR-PAC

Baron circuit with imp adapt:  
(MSA0686)

Bandwidth (-3dB): 0.8GHz

Gain: 50dB



## NFS // SMALL ANGLE SCATTERING

New circuit:

Large bandwidth (-3dB)>2.5GHz

Gain>55dB

Low noise

Small size

**Future:**

-Tail reduction

-ASIC (APD array)

-New circuit including discriminators (APD array)