Subject: Study of "Large Gain Spread" effect of the dependence on FE Shaper cu
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Y. Ikegami, Y. Tometa, Y. Unno
KEK

We, at KEK, have done the study of dependence on the I_shaper at 10, 20, 30 uA at 0 deg.C and found that the gain spread becomes small to neglible at 20 uA (and 10 uA) at Vcc=3.5 V which chips required Vcc = 3.7 or 3.8 V. A summary is attached in this mail. The other observations are

1) the chips ("large gain spread" at Vcc=3.8V, I_shaper=30uA, Temp=0 degC) generally show "high gain" (though uniform) at Vcc=3.5V and I_shaper=20uA, say 55 mV/fC, while...

2) the other normal chips shows "low gain" at Vcc=3.5V, I_shaper=20 uA, Temp=0 degC, say 45 mV/fC or so

From these, the "normal" chips do need I_shaper=30 uA, to have the gain of 50 mV/fC.

According to my memory,

1) Wafer testing was done with I_shaper = 30 uA (please confirm, Jan K.?), which was one of the reason that the hybrid testing adopted the same I_shaper value

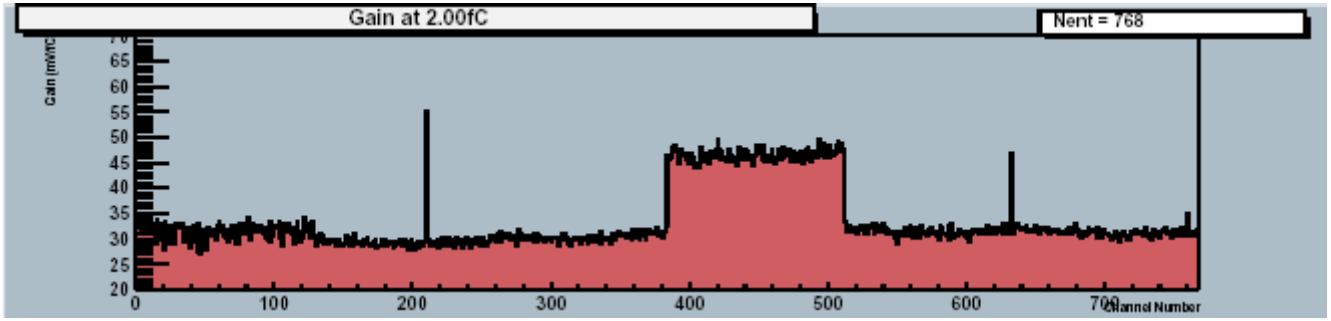
2) Also, I_shaper = 30uA was required to have the gain about 50 mV/fC in the hybrid and module testing

Anyway, the bottom line from the I_shaper study of curing the "large gain spread" seems, we think,

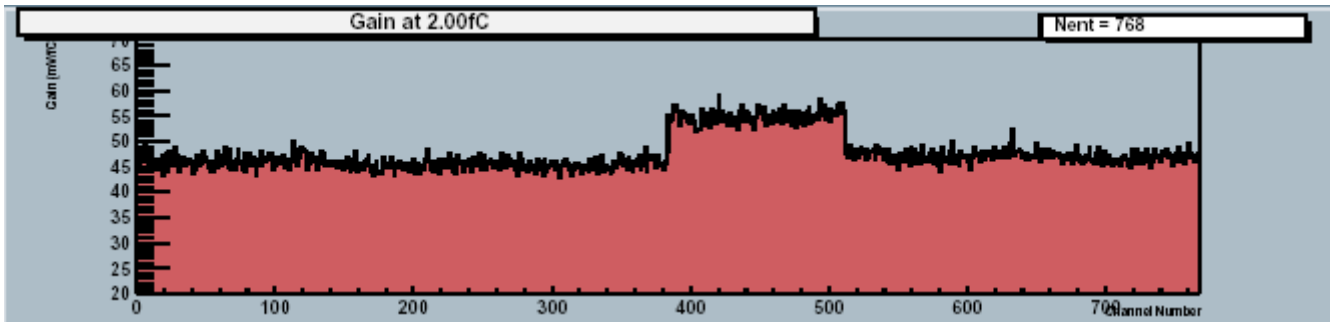
- in order to have the gain about 50 mV/fC
- keep the I_shaper of normal chips to 30 uA
- tune the I_shaper of "large gain spread" chips to a lower value, e.g. 20 uA

ID=749 Temperature=0 degC

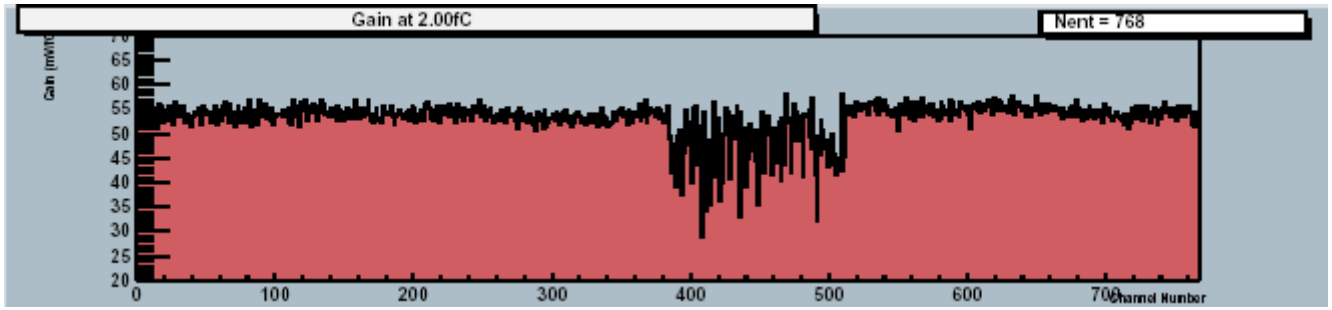
FEShp=10uA



FEShp=20uA



FEShp=30uA



	Hybrid temp = 0 degC							
	I_Shaper = 30 uA				Vcc = 3.5V			
ID/Vcc/IS	3.5	3.6	3.7	3.8	10	20	30	
697	x	x	x	○	○	○	x	LGS
708	x	x	x	x	x	x	x	NO
720	x	x	○	○	○	○	x	LGS
732	x	x	x	x	x	x	x	NO
736	x	x	○	○	○	○	x	LGS
749	x	x	○	○	○	○	x	LGS
753	x	x	○	○	○	○	x	LGS
754	x	x	x	x	x	x	x	NO
763								Abnormal
783								Abnormal
792	x	x	x	x	x	x	x	NO
856	x	x	x	x	LGS	x	x	
868	x	x	x	x	x	x	x	NO
894	x	x	x	x	LGS	x	x	
925	x	x	○	○	○	○	x	LGS
933	x	○	○	○	○	○	x	LGS
949	x	x	x	x	○	○	x	LGS
958	x	x	x	x	○	x	x	LGS
992	x	x	x	○	○	○	x	LGS
1008	x	x	x	○	○	○	x	LGS
1038	x	x	x	x	x	x	x	NO
1062	x	x	x	x	x	x	x	
1080								Abnormal
1152								Abnormal
1155	x	x	x	x	x	x	x	NO
1156	x	x	x	○	○	○	x	LGS
1186	x	x	x	x	x	x	x	LowGain
1207	△	○	○	○	HighGain	HighGain	○	LGS
1216	x	x	○	○	○	○	x	LGS

LGS: Large gain spread
NO: Negative offset
Abnormal: Abnormal cal line
Low Gain: Low gain

O: Good
X: Bad