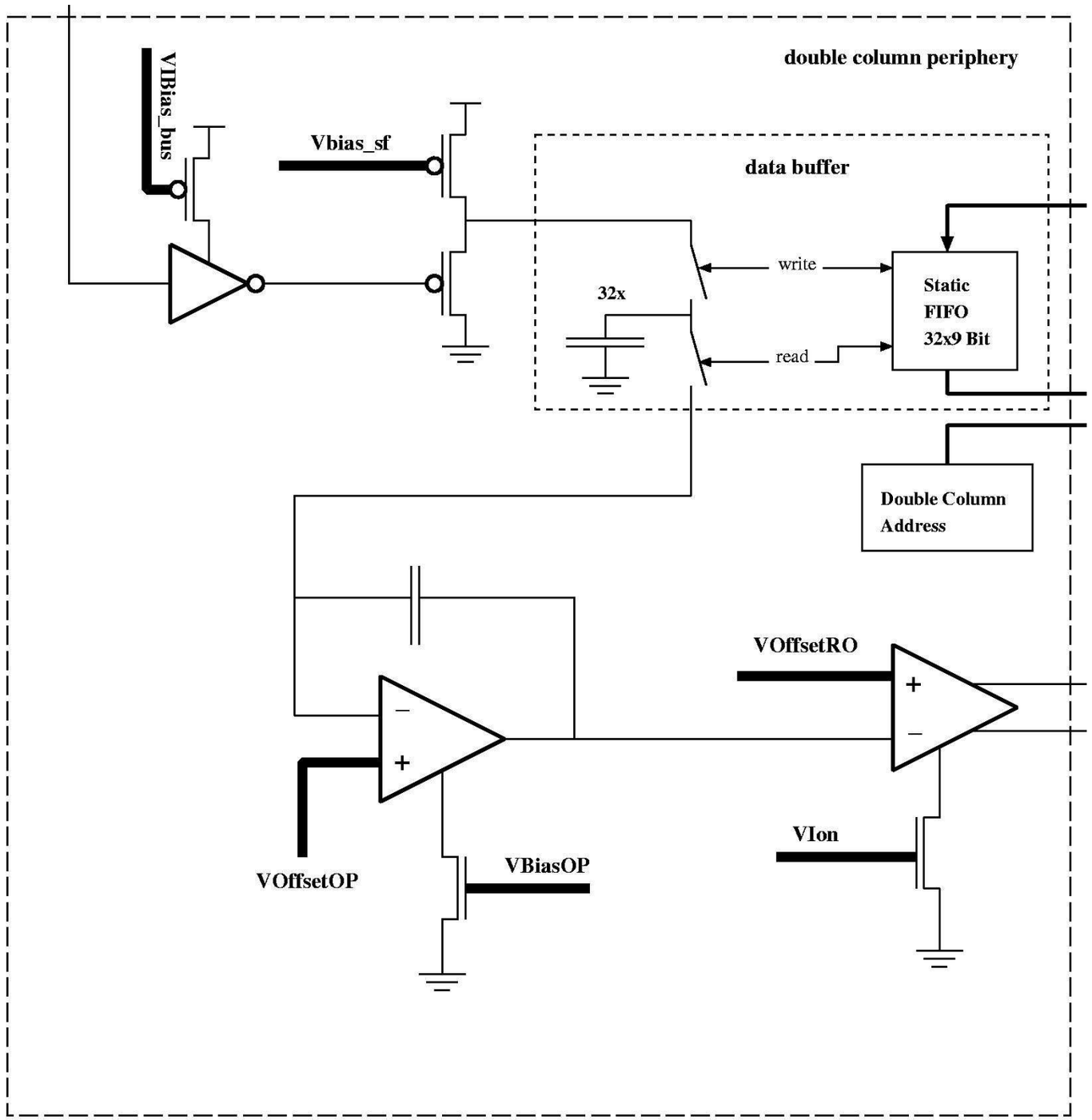
DACs

Behavior of pixel and double column readout on DAC settings

Pixel readout:
- VI_Bias_bus
- Vbias_sf

double column readout:
- VOffsetOP
- VBiasOP
- VOffsetR0
- VIon

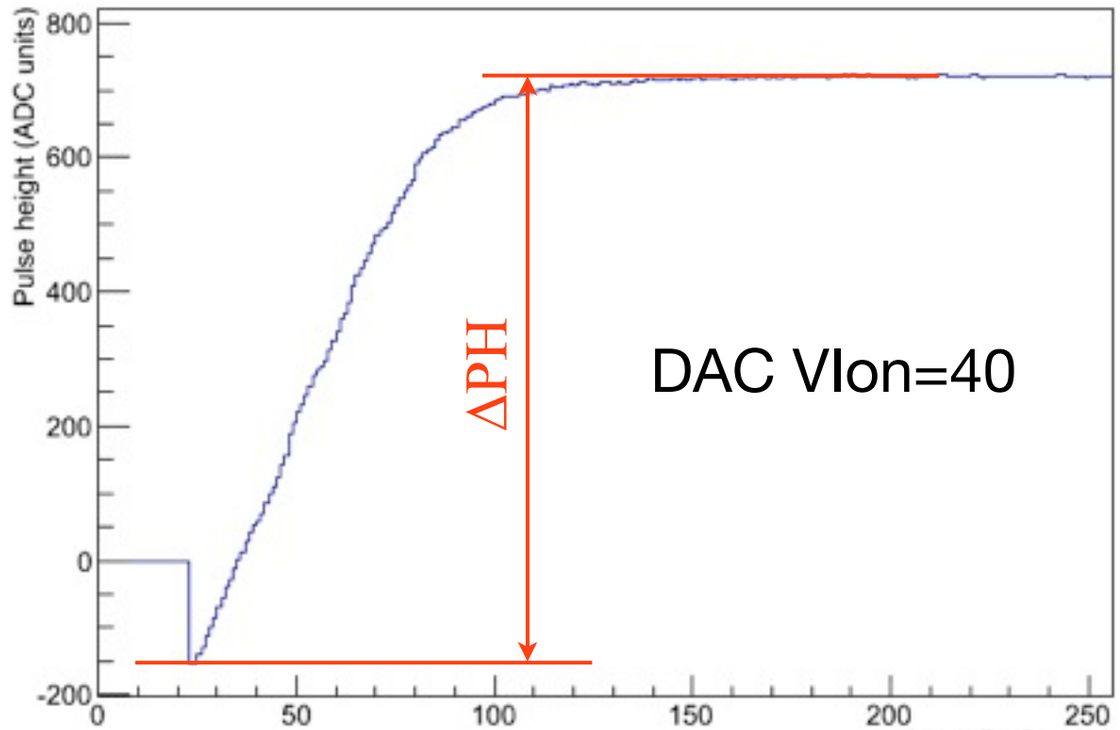


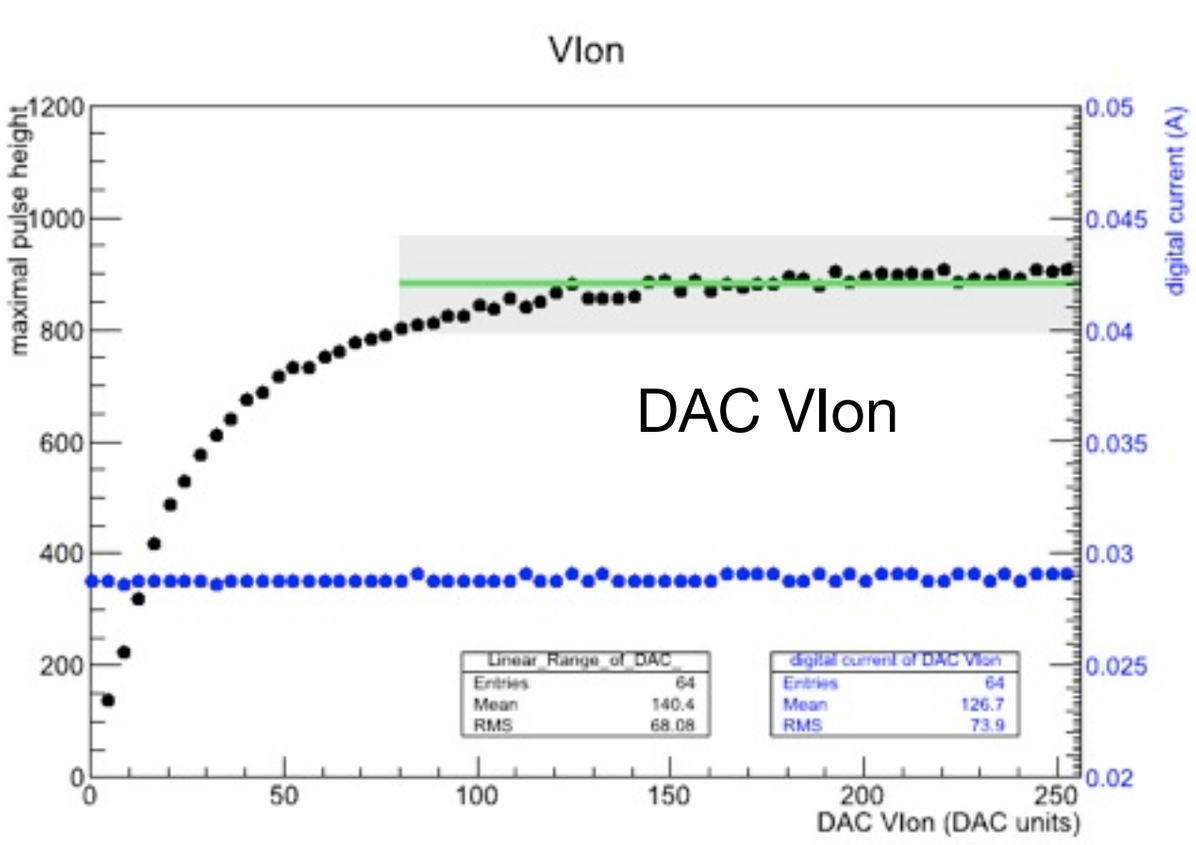
Measurement

- measuring effective maximal pulse height ΔPH in Vcal-PH plot.

- measuring digital current

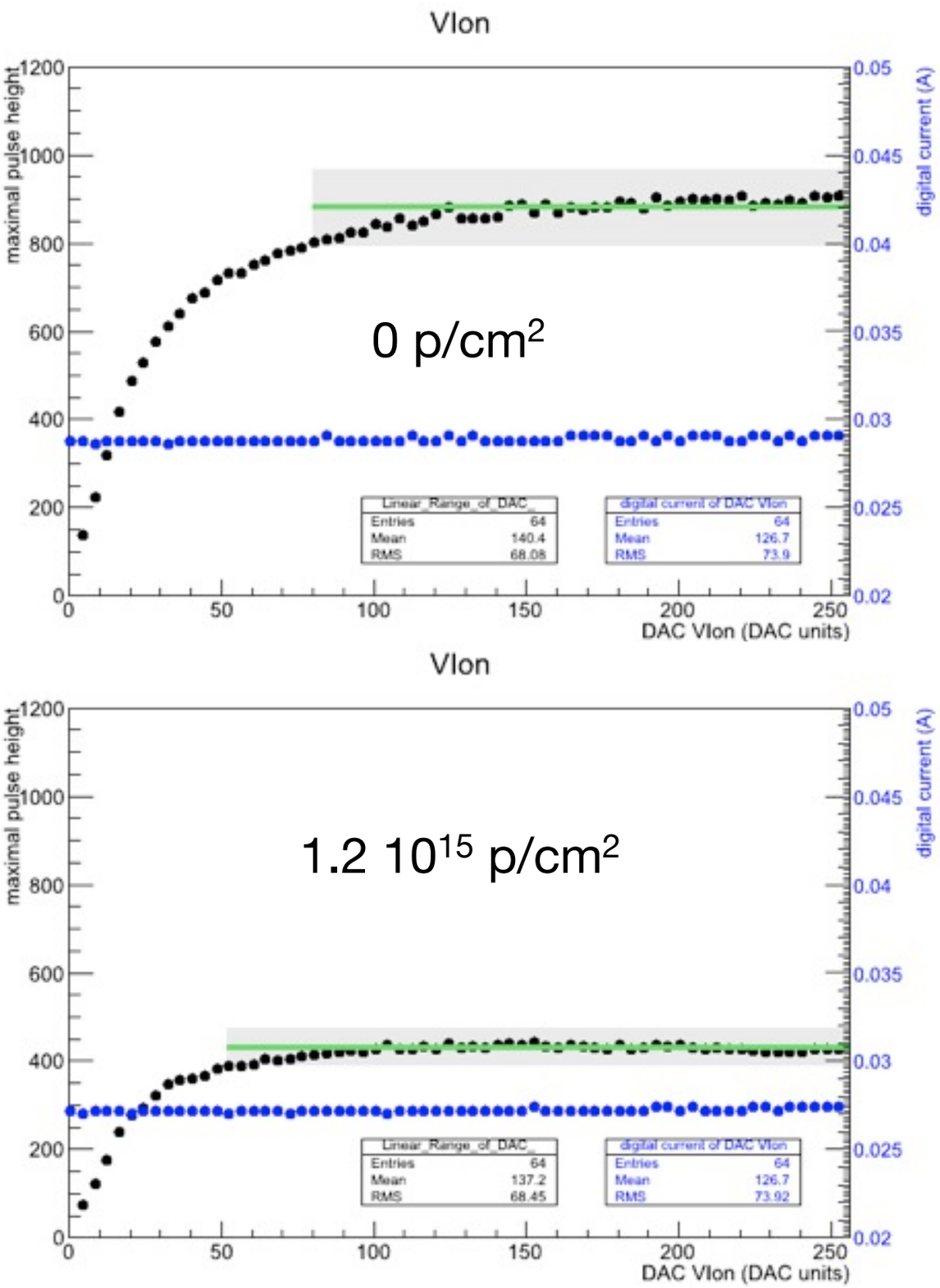
64 measurements for 8-bit and 16 for 4-bit DACs, respectively.

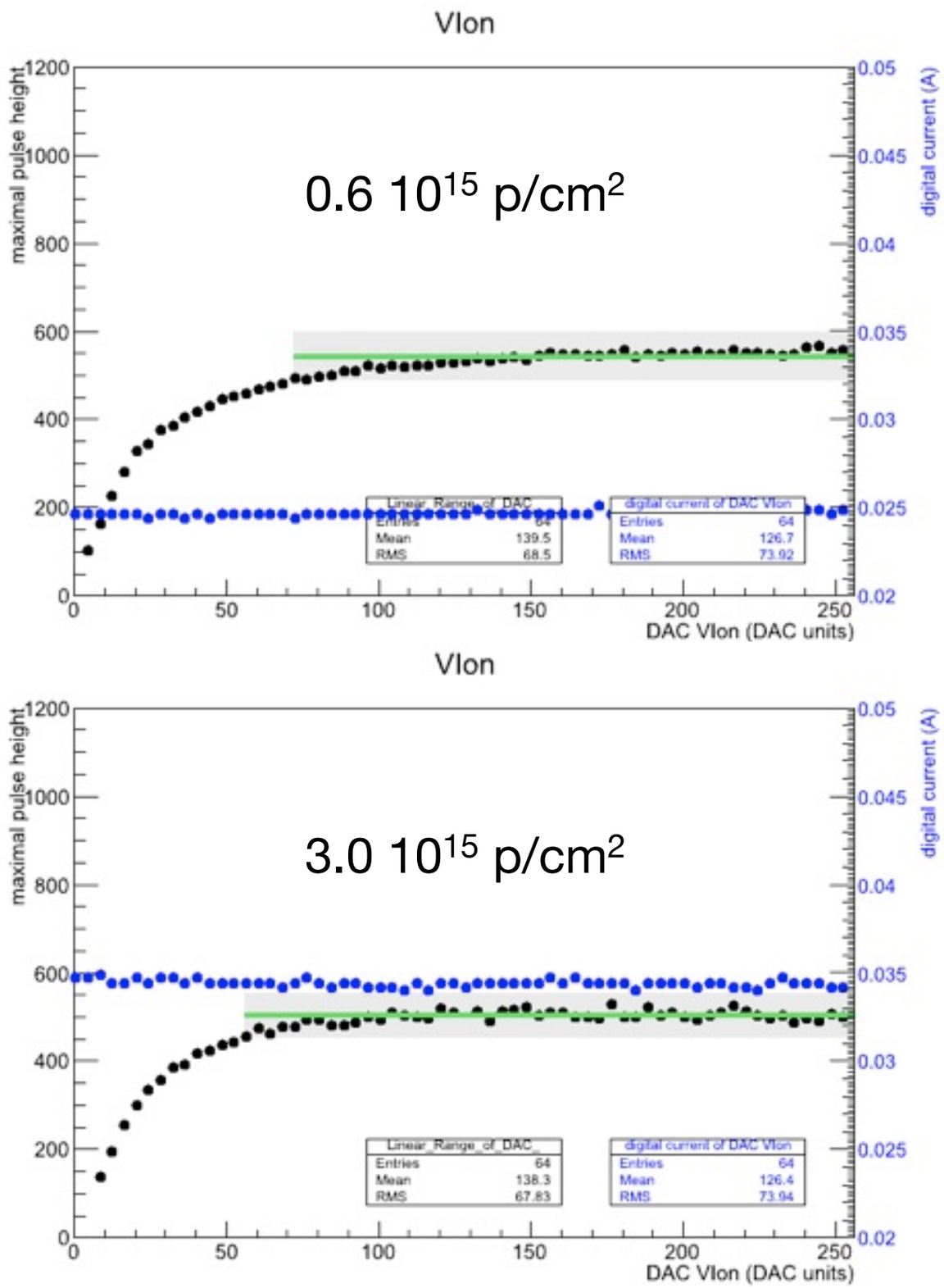




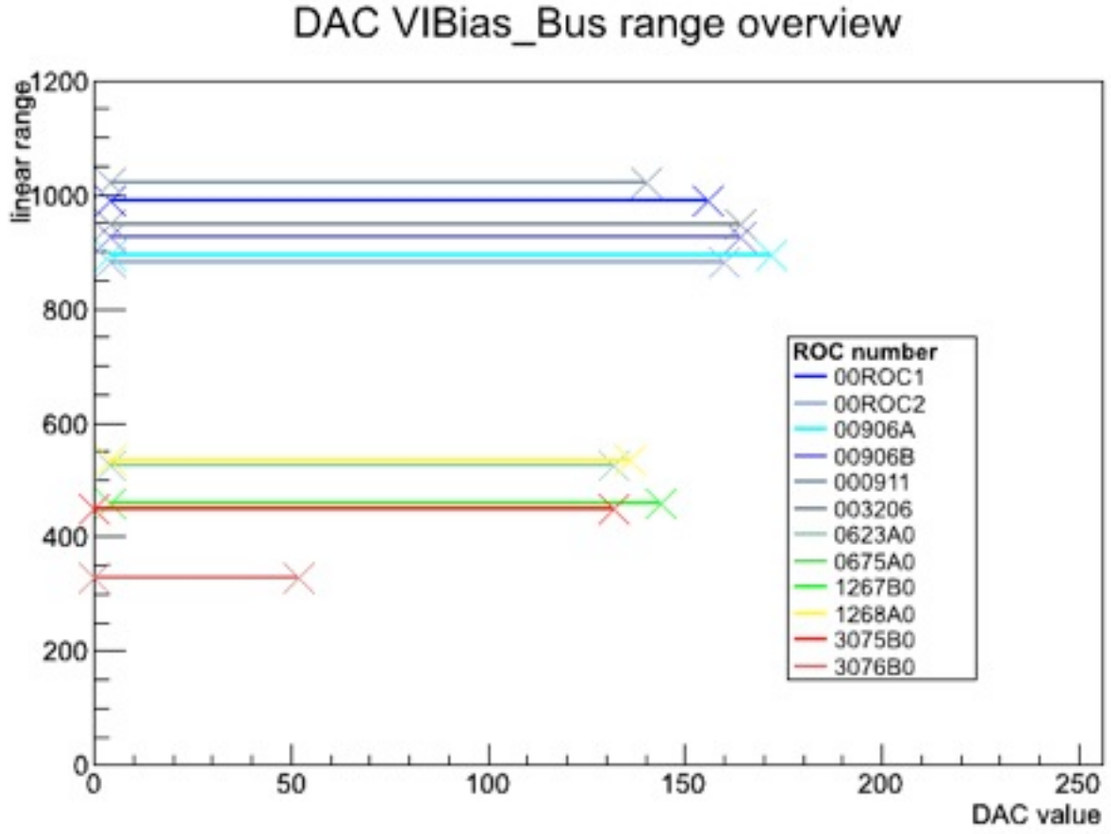
fit a constant and cut range at +/- 10% deviation from fit.

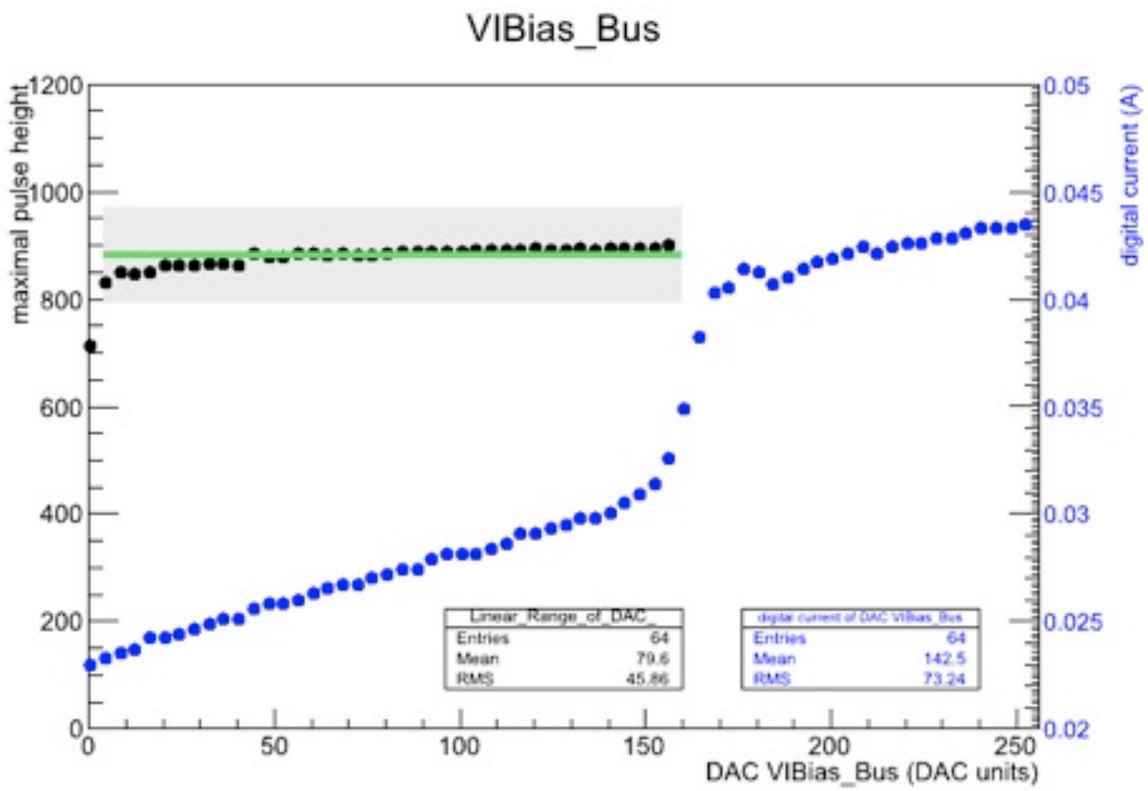
Irradiation effects

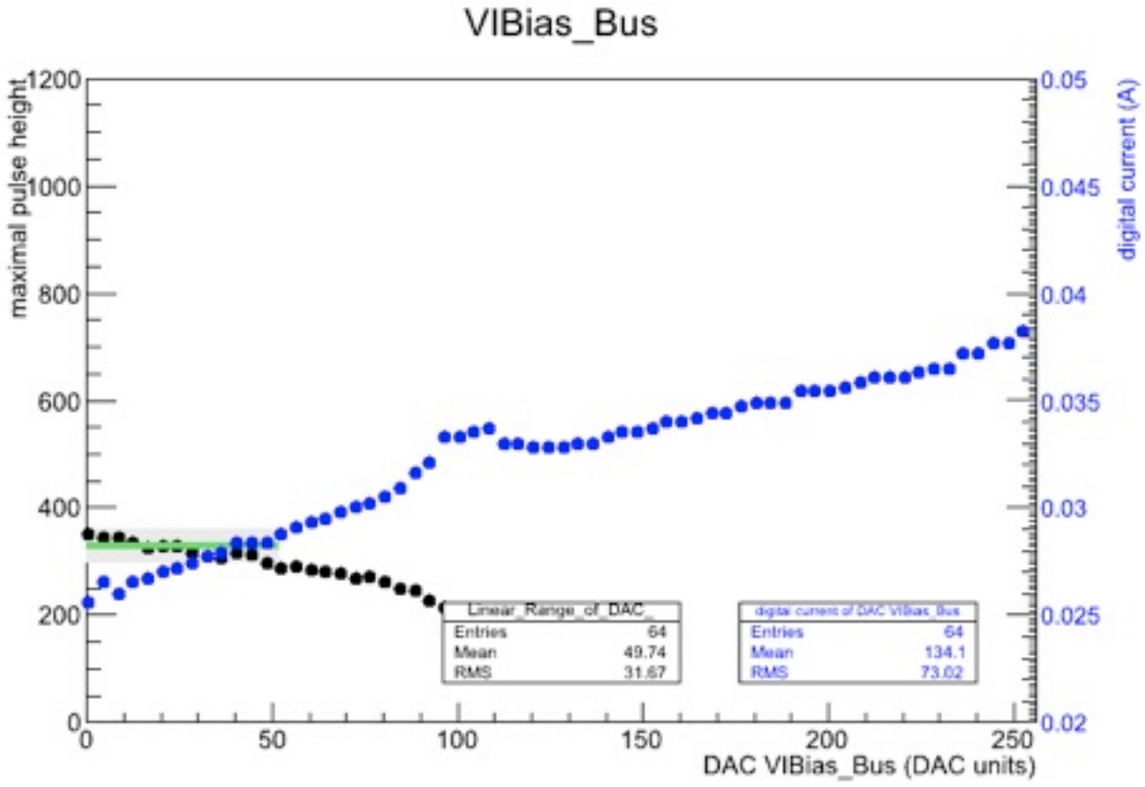




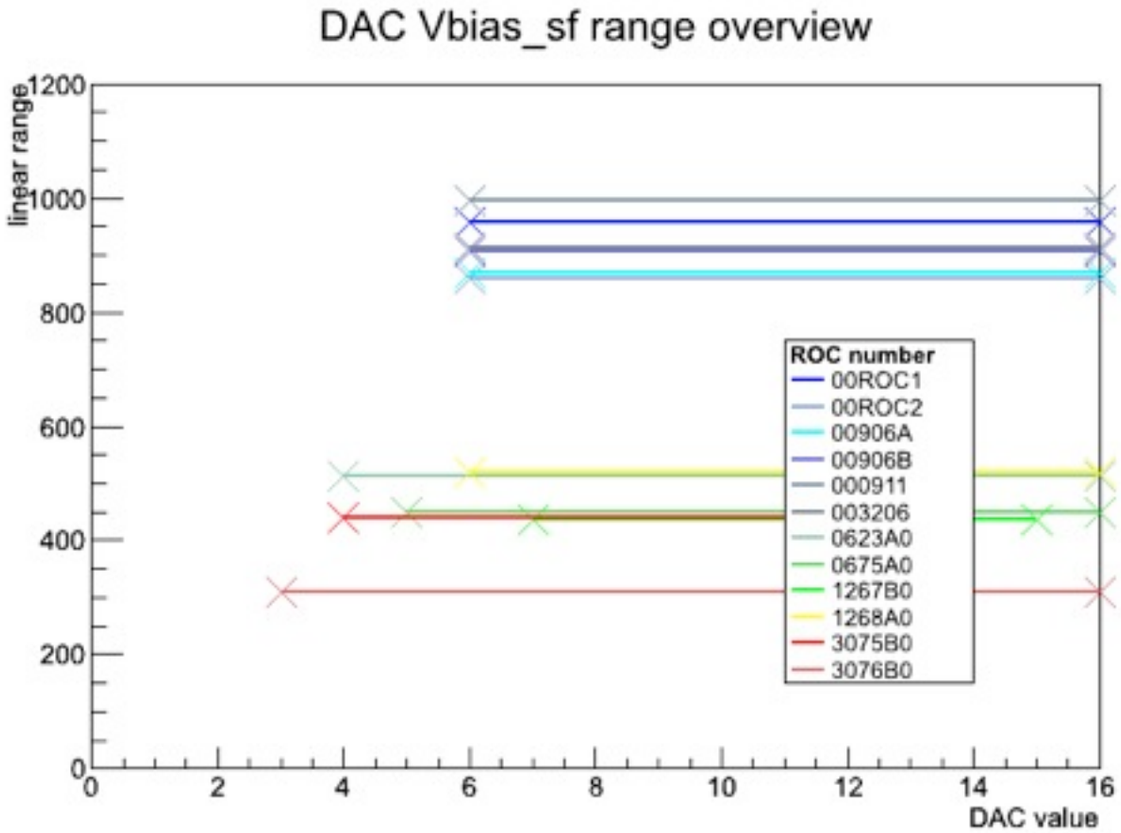
VIBias_bus

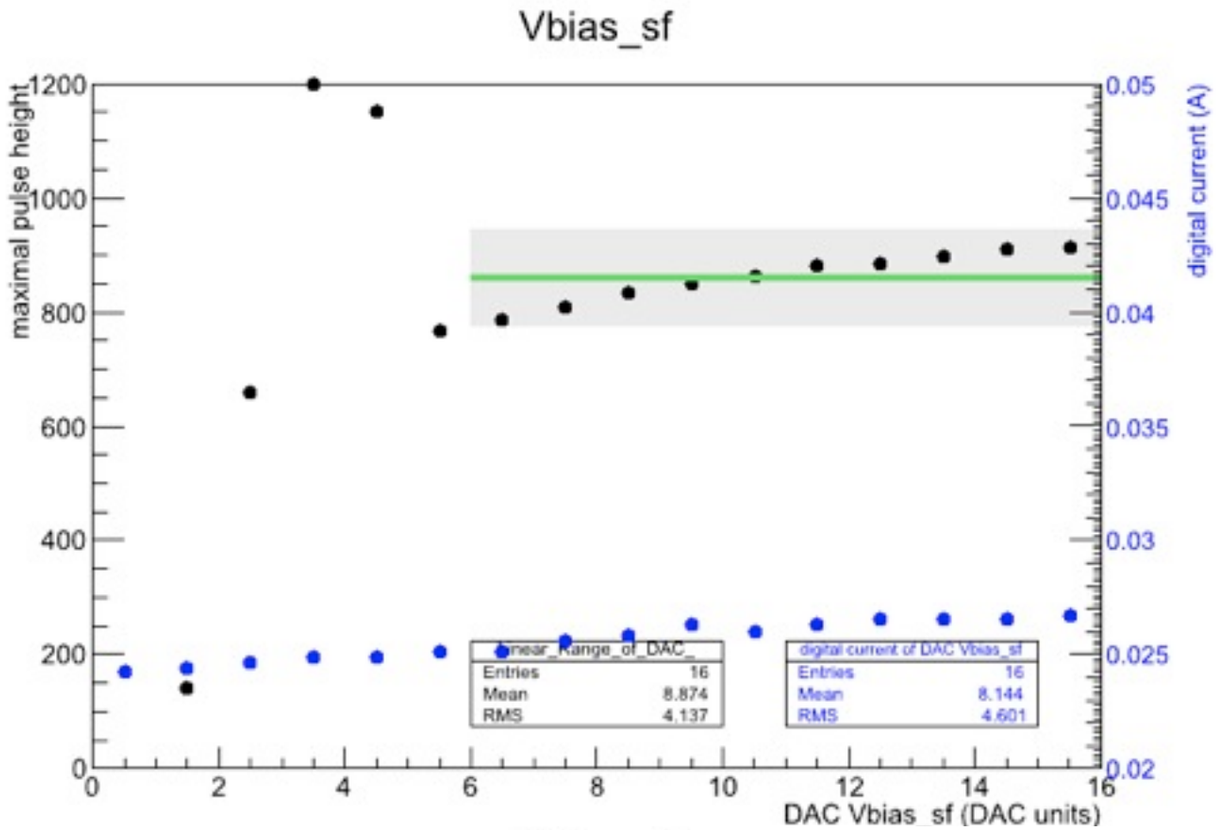

DAC VIBias_Bus range overview
linear range
DAC value
ROC number
00ROC1
00ROC2
00906A
00906B
000911
003206
0623A0
0675A0
1267B0
1268A0
3075B0
3076B0

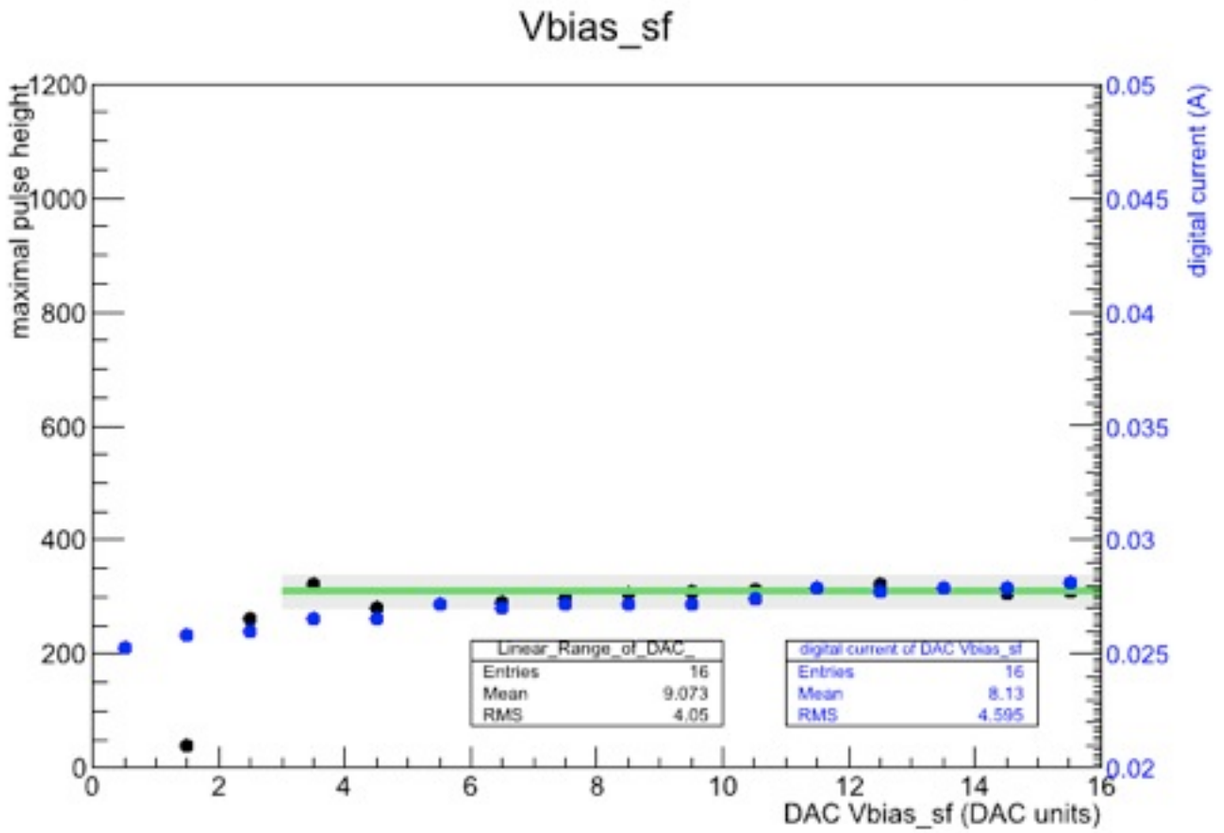

VIBias_Bus
maximal pulse height
digital current (A)
DAC VIBias_Bus (DAC units)
Linear_Range_of_DAC_
Entries 64
Mean 79.6
RMS 45.86
digital current of DAC VIBias_Bus
Entries 64
Mean 142.5
RMS 73.24


VIBias_Bus
maximal pulse height
digital current (A)
DAC VIBias_Bus (DAC units)
Linear_Range_of_DAC_
Entries 64
Mean 49.74
RMS 31.67
digital current of DAC VIBias_Bus
Entries 64
Mean 134.1
RMS 73.02

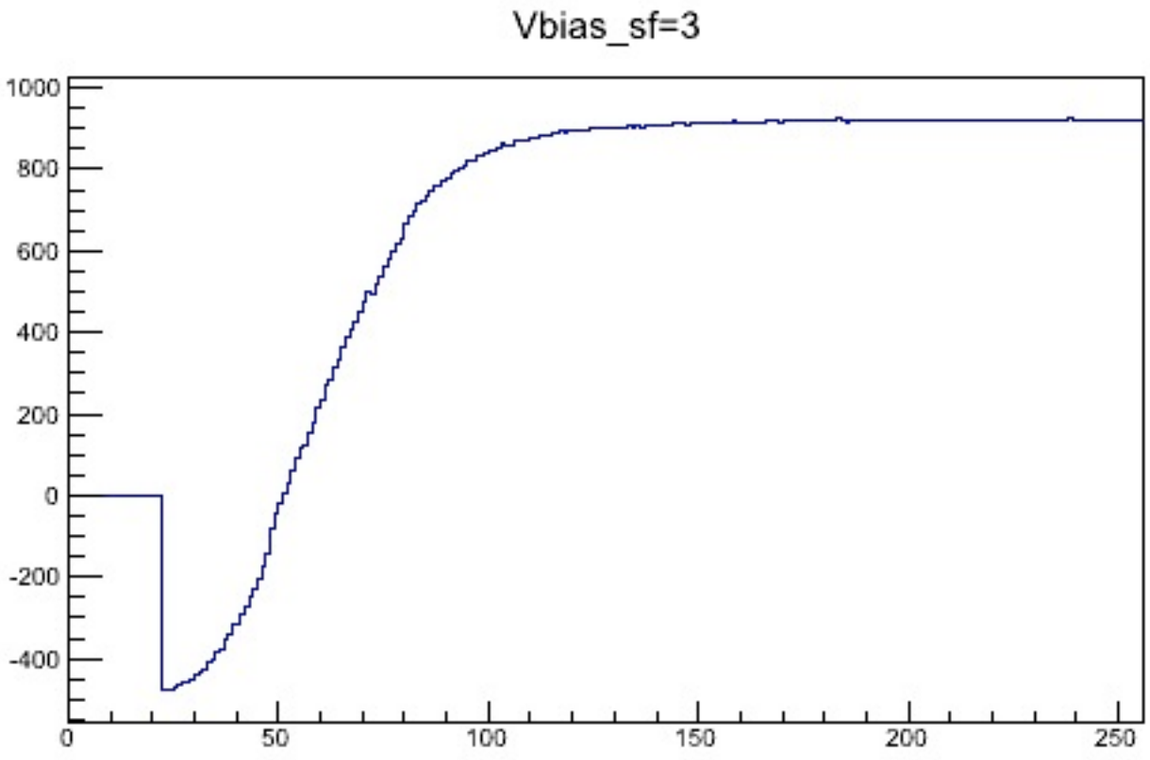
Vbias_sf

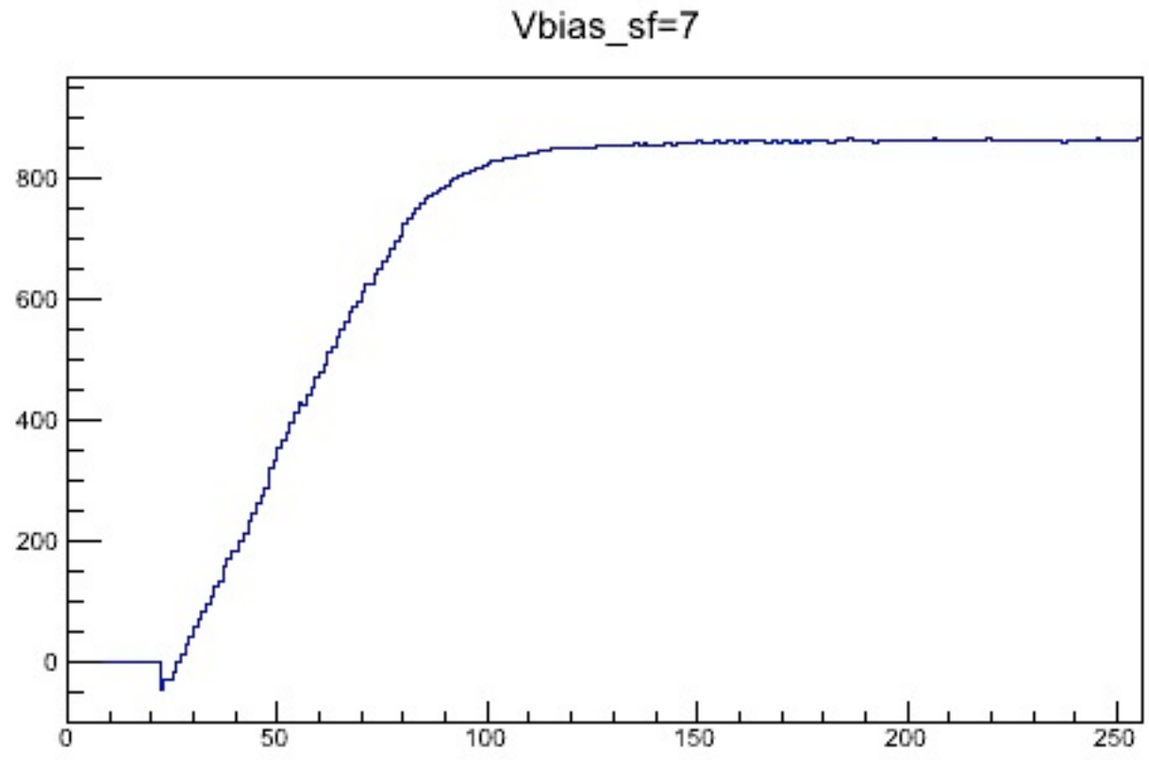

DAC Vbias_sf range overview
linear range
DAC value
ROC number
00ROC1
00ROC2
00906A
00906B
000911
003206
0623A0
0675A0
1267B0
1268A0
3075B0
3076B0


Vbias_sf
maximal pulse height
digital current (A)
DAC Vbias_sf (DAC units)
Linear_Range_of_DAC_
Entries 16
Mean 8.874
RMS 4.137
digital current of DAC Vbias_sf
Entries 16
Mean 8.144
RMS 4.601

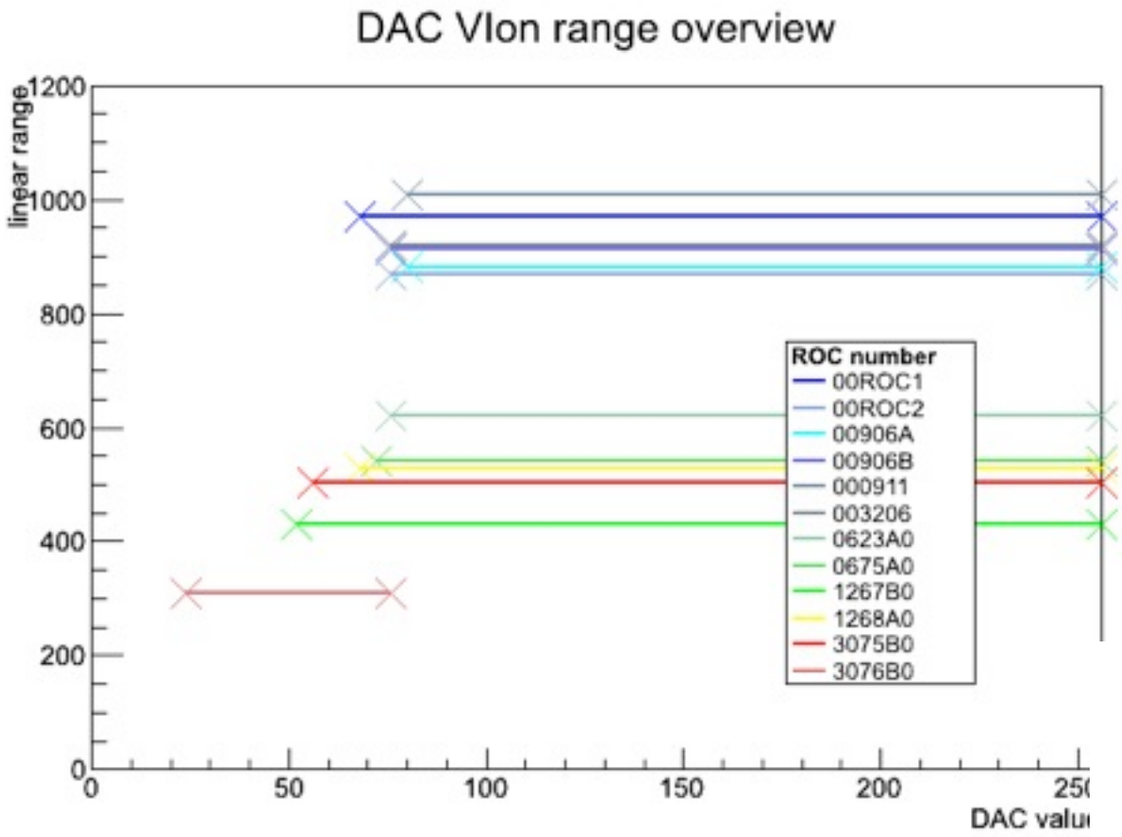

Vbias_sf
maximal pulse height
digital current (A)
DAC Vbias_sf (DAC units)
Linear_Range_of_DAC_
Entries 16
Mean 9.073
RMS 4.05
digital current of DAC Vbias_sf
Entries 16
Mean 8.13
RMS 4.595

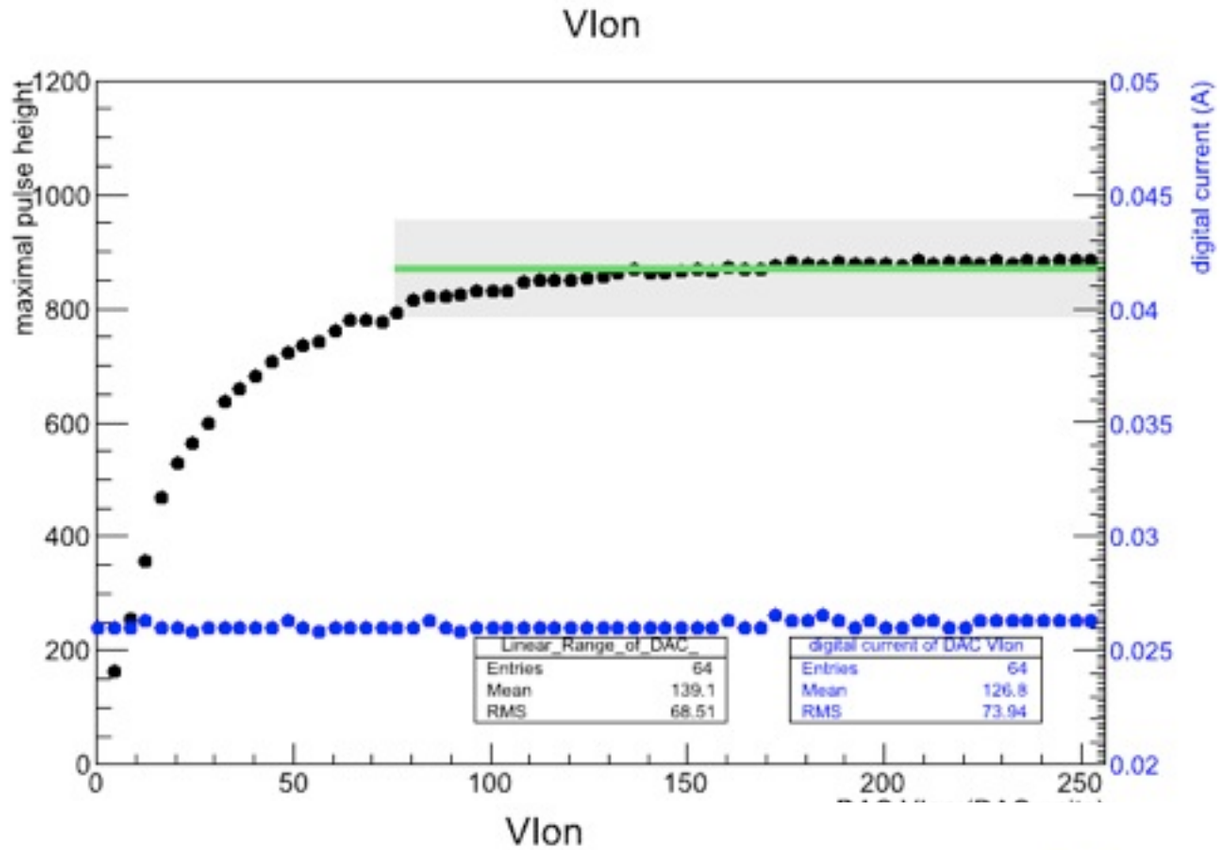
Vbias_sf maximum

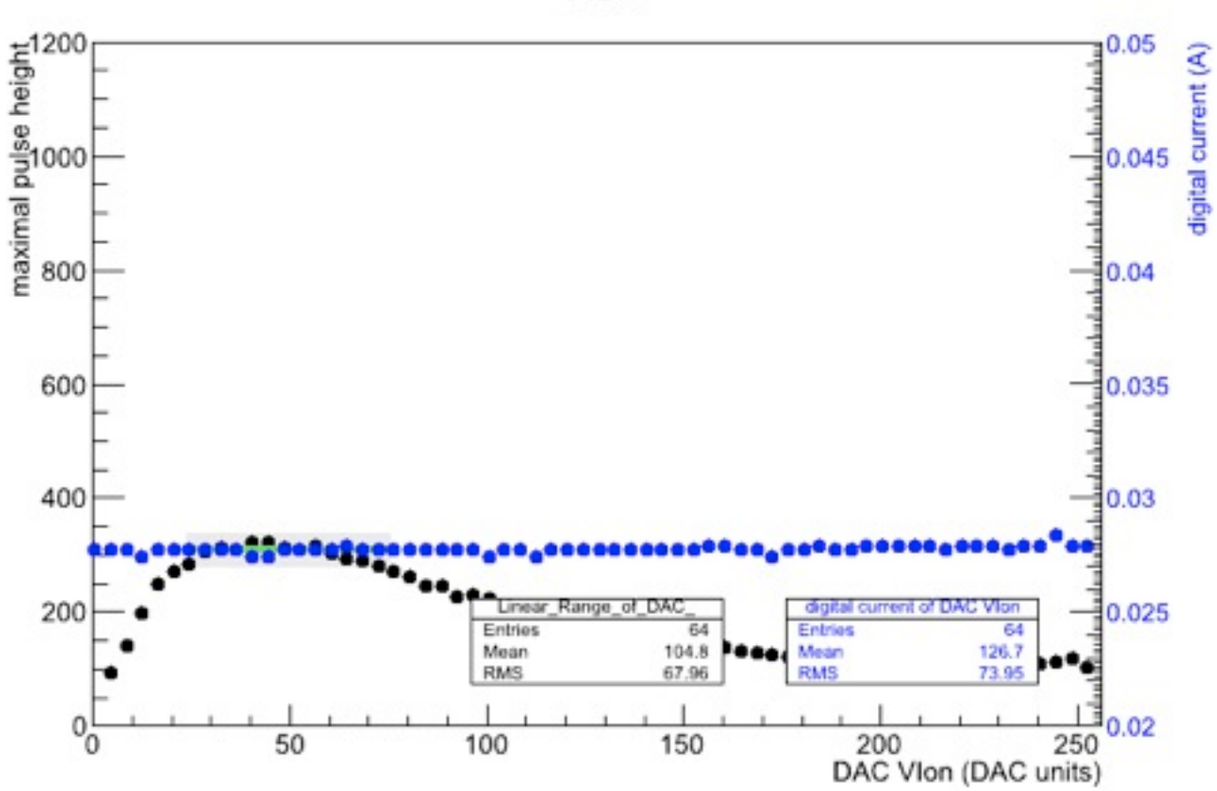




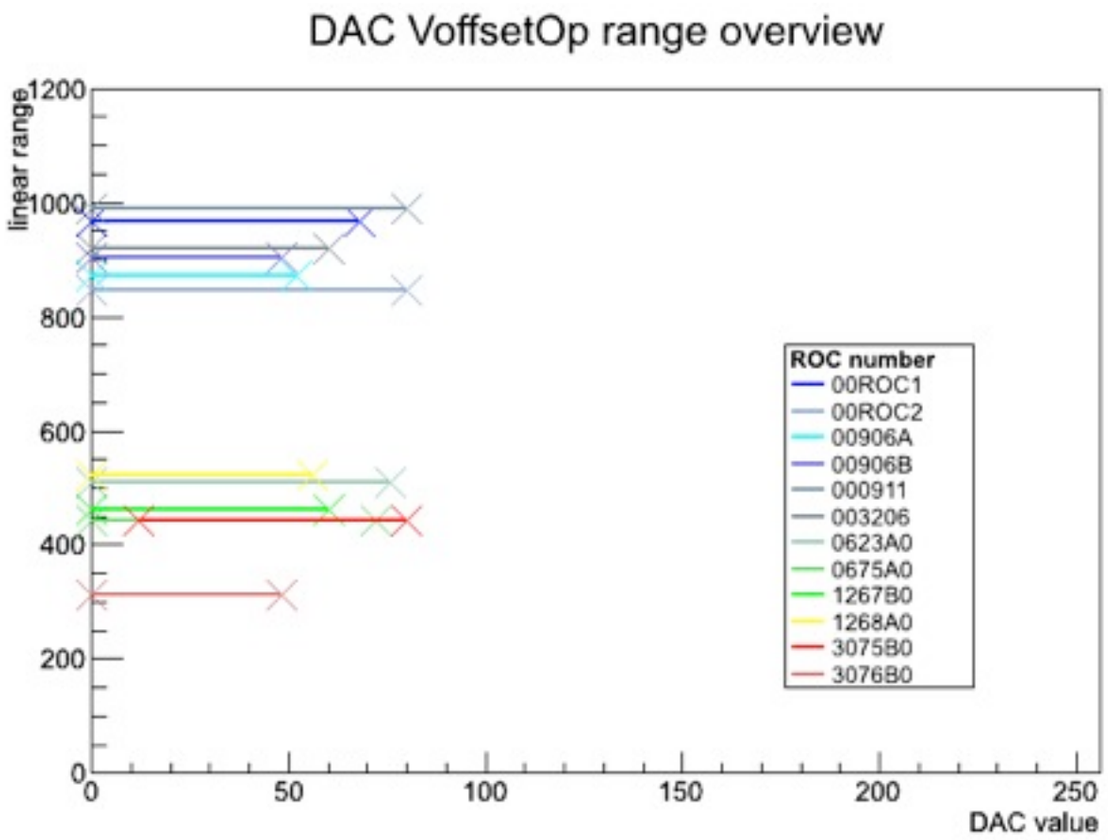
VIon

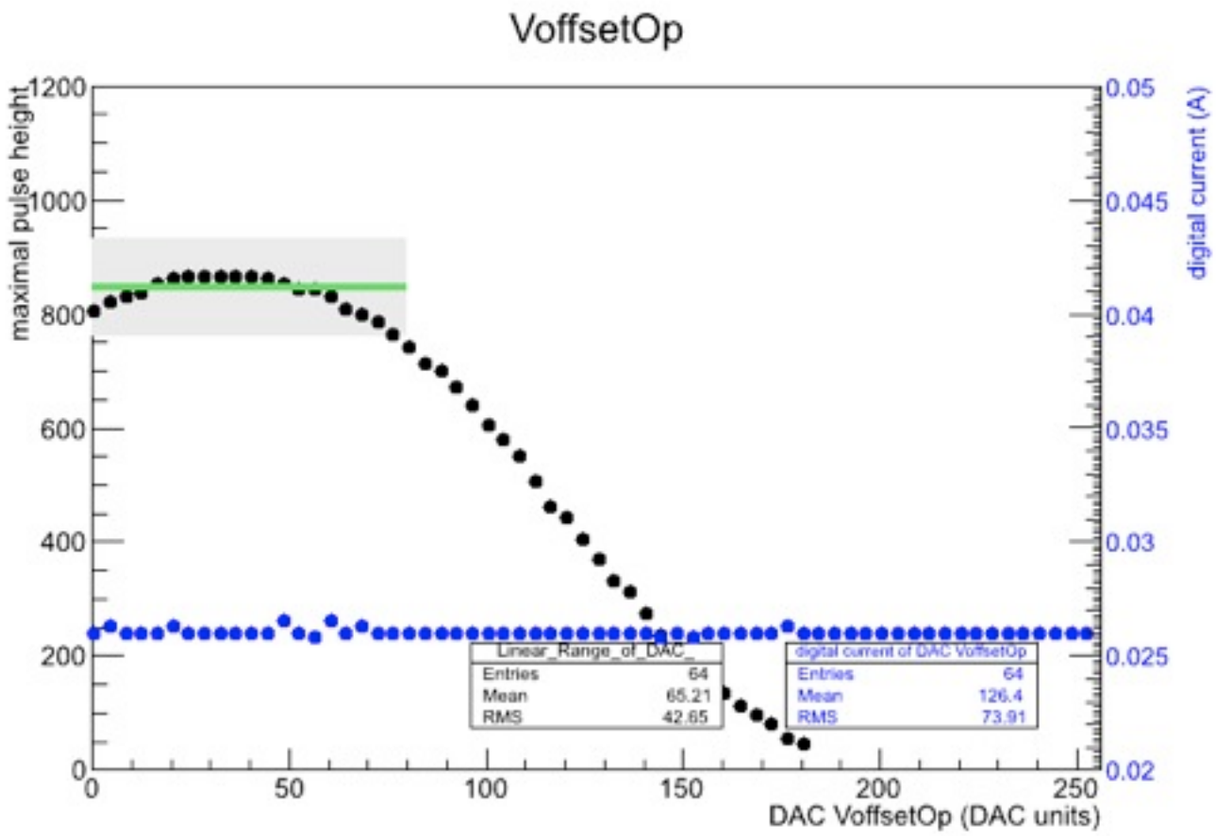

DAC VIon range overview
linear range
ROC number
00ROC1
00ROC2
00906A
00906B
000911
003206
0623A0
0675A0
1267B0
1268A0
3075B0
3076B0
DAC valu

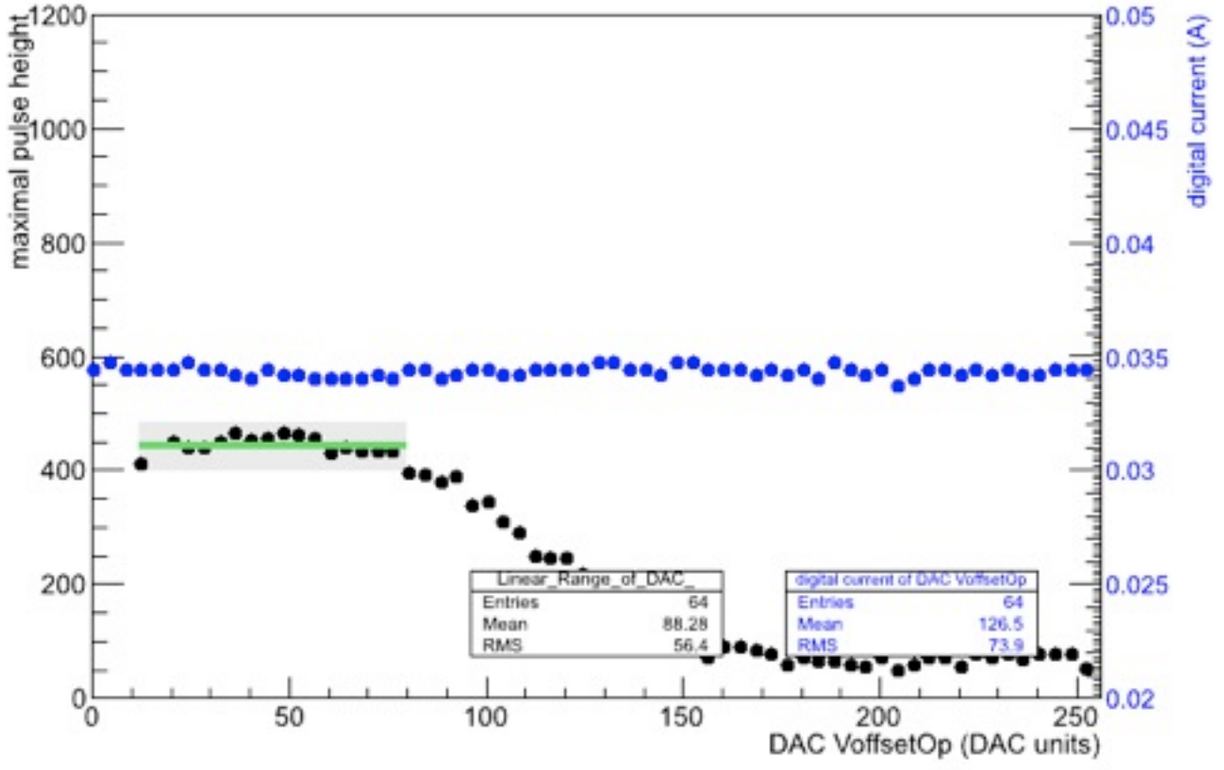

VIon
maximal pulse height
digital current (A)
Linear_Range_of_DAC_
Entries 64
Mean 139.1
RMS 68.51
digital current of DAC VIon
Entries 64
Mean 126.8
RMS 73.94
VIon


maximal pulse height
digital current (A)
Linear_Range_of_DAC_
Entries 64
Mean 104.8
RMS 67.96
digital current of DAC VIon
Entries 64
Mean 126.7
RMS 73.95
DAC VIon (DAC units)

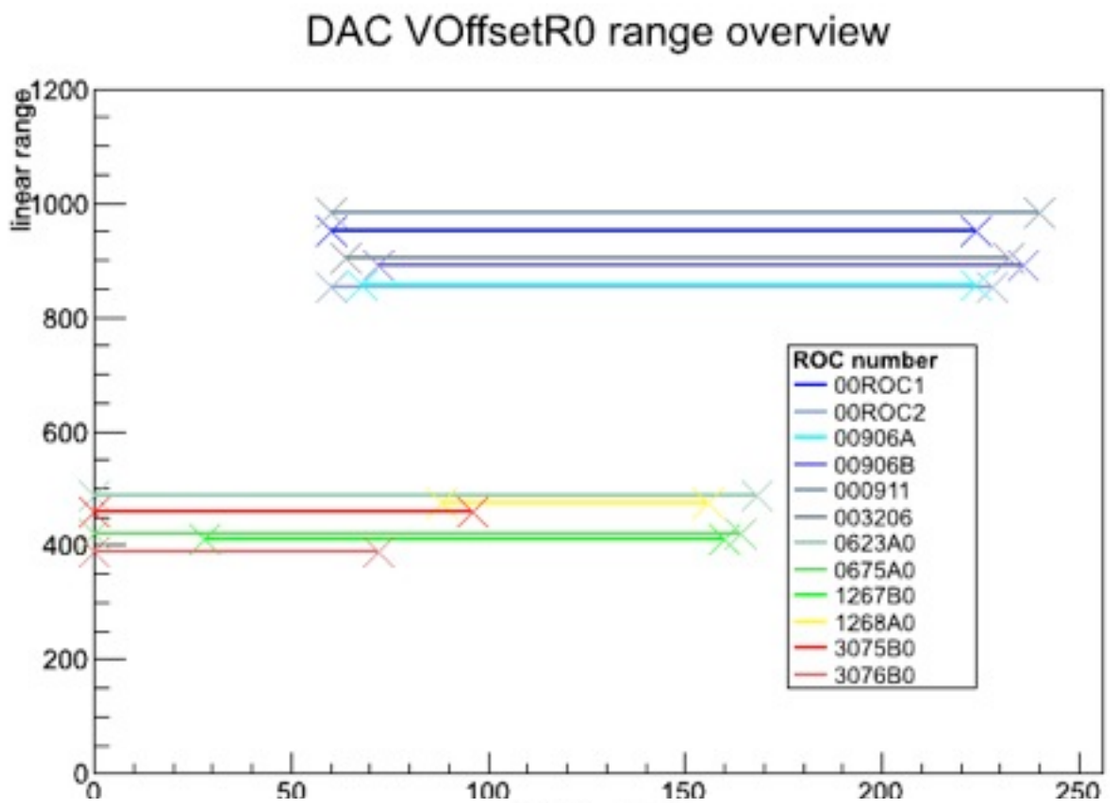
VoffsetOp

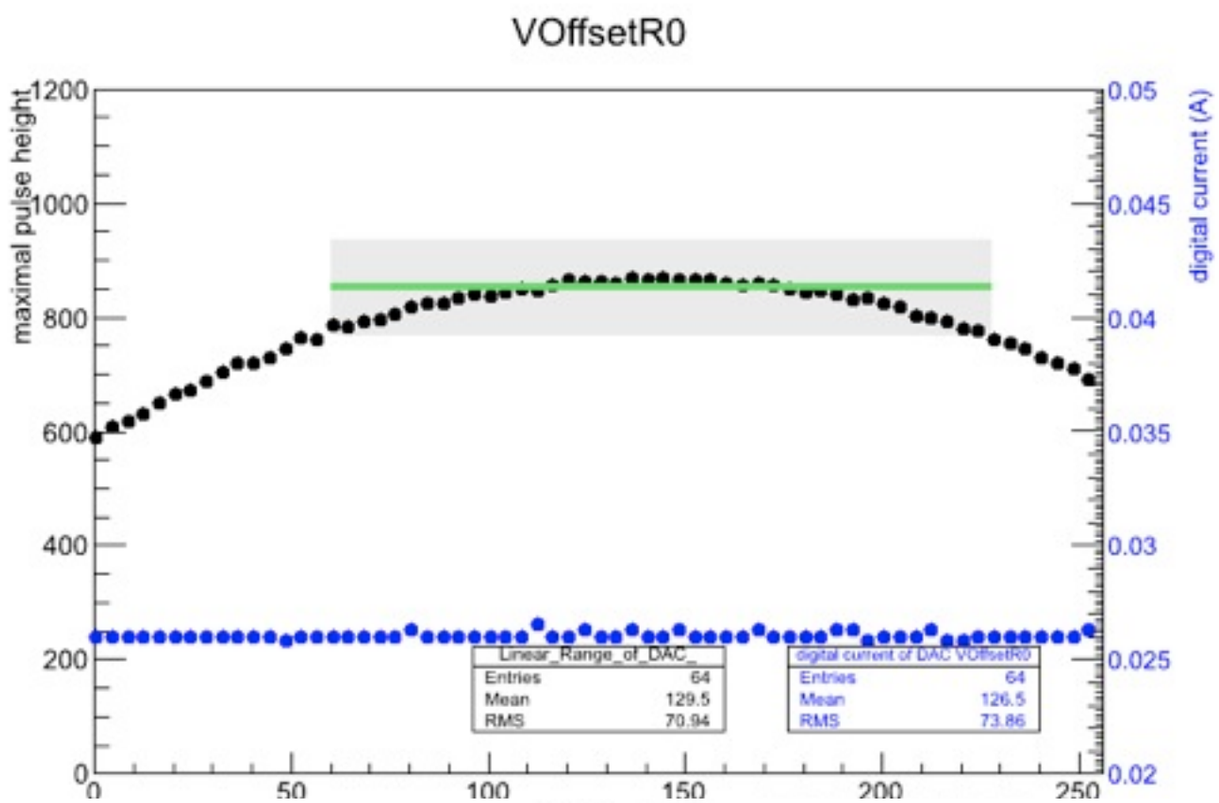

DAC VoffsetOp range overview
linear range
DAC value
ROC number
00ROC1
00ROC2
00906A
00906B
000911
003206
0623A0
0675A0
1267B0
1268A0
3075B0
3076B0

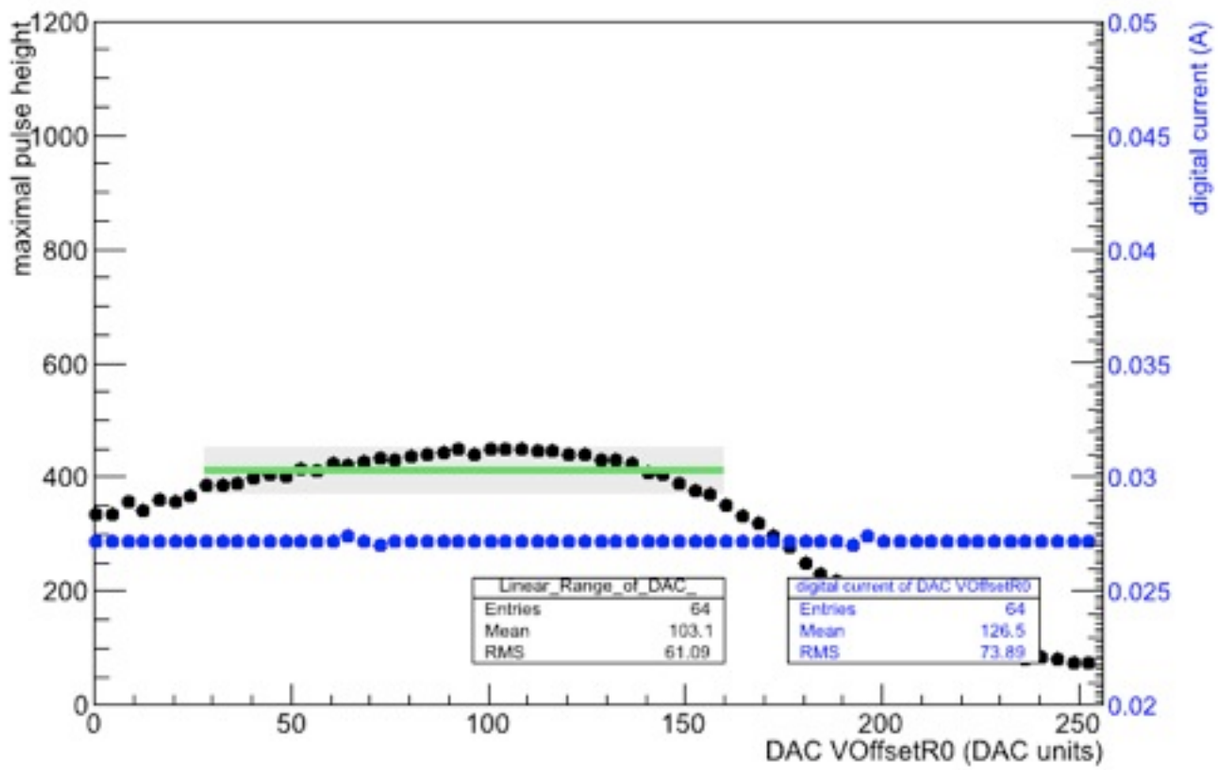

VoffsetOp
maximal pulse height
digital current (A)
DAC VoffsetOp (DAC units)
Linear_Range_of_DAC_
Entries 64
Mean 65.21
RMS 42.65
digital current of DAC VoffsetOp
Entries 64
Mean 126.4
RMS 73.91

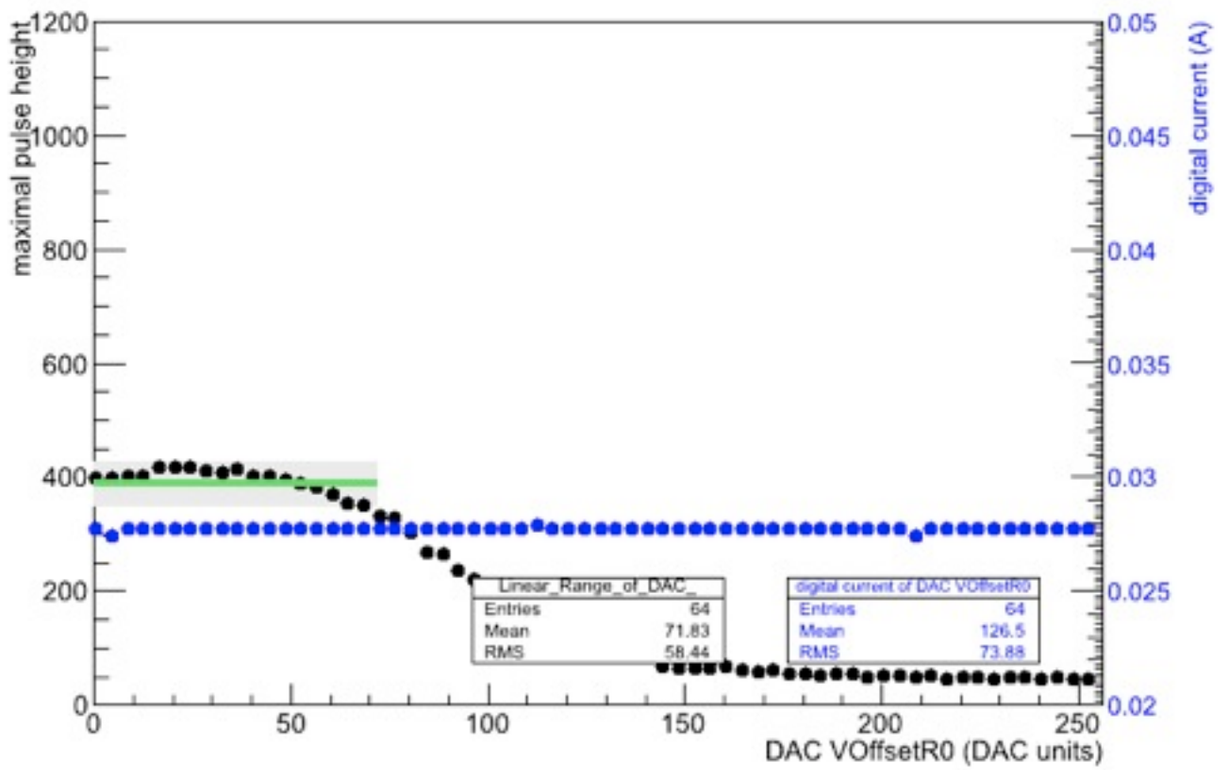

maximal pulse height
digital current (A)
DAC VoffsetOp (DAC units)
Linear_Range_of_DAC_
Entries 64
Mean 88.28
RMS 56.4
digital current of DAC VoffsetOp
Entries 64
Mean 126.5
RMS 73.9

VOffsetRO

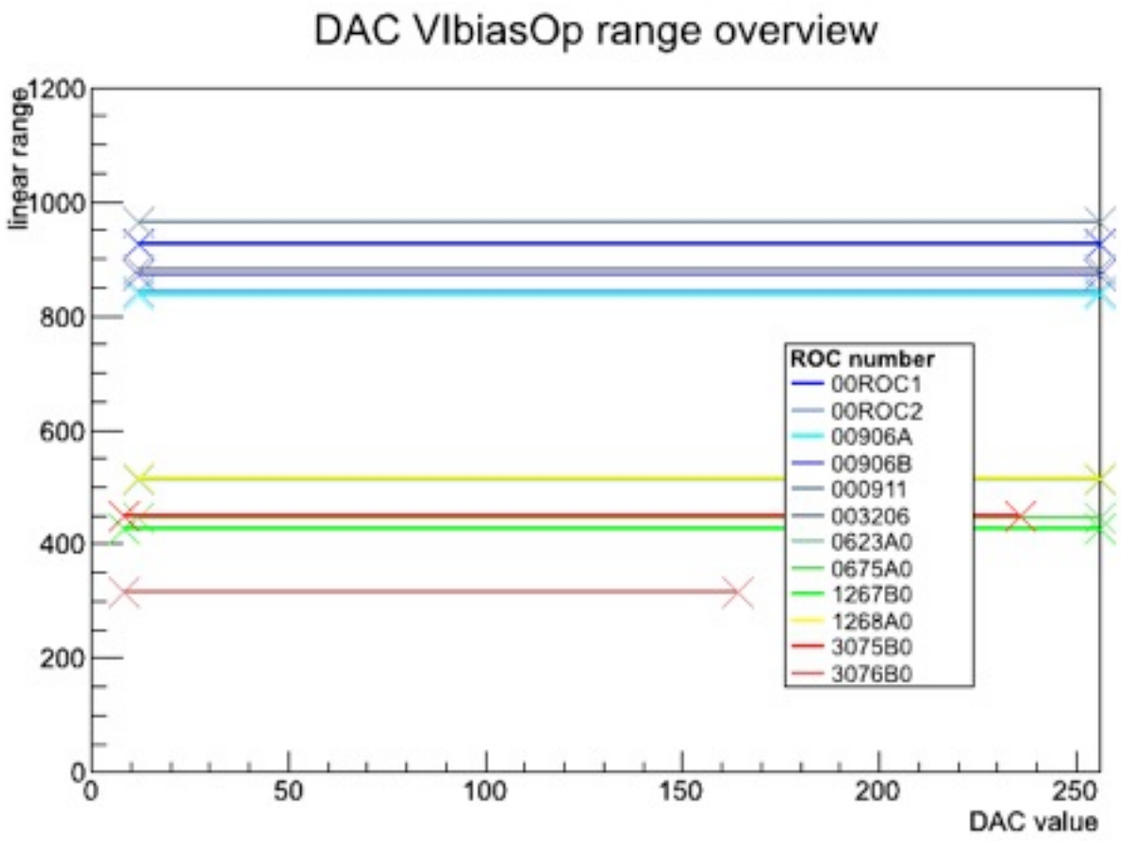

DAC VOffsetR0 range overview
linear range
ROC number
00ROC1
00ROC2
00906A
00906B
000911
003206
0623A0
0675A0
1267B0
1268A0
3075B0
3076B0

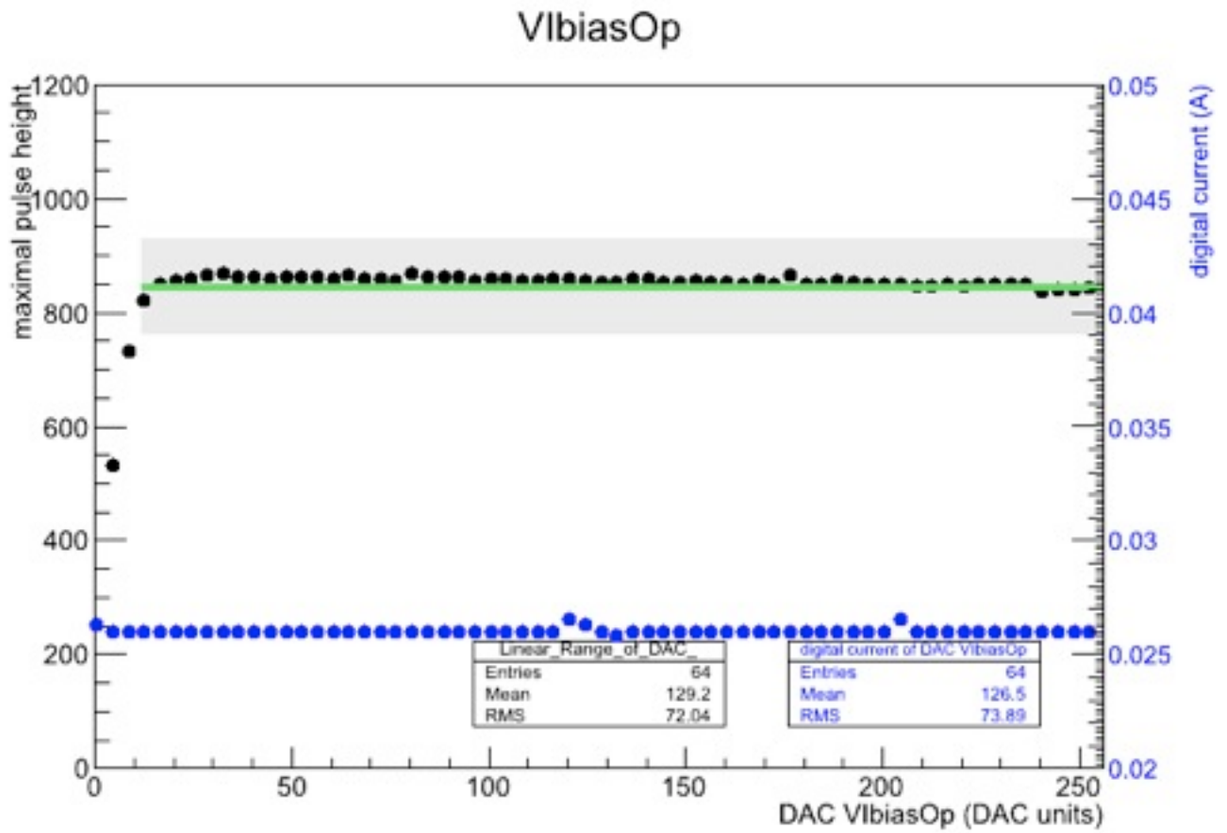

VOffsetR0
maximal pulse height
digital current (A)
Linear_Range_of_DAC_
Entries 64
Mean 129.5
RMS 70.94
digital current of DAC VOffsetR0
Entries 64
Mean 126.5
RMS 73.86

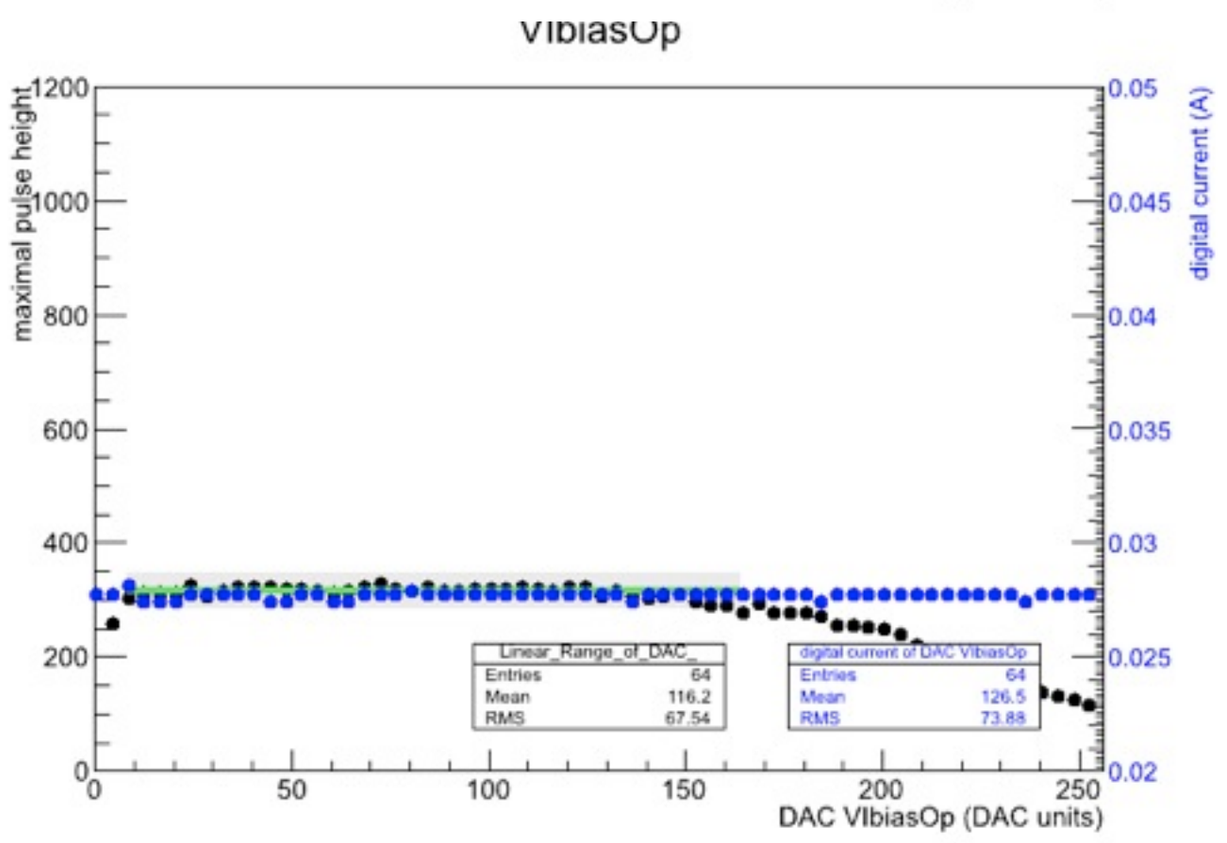

VOffsetR0
maximal pulse height
digital current (A)
Linear_Range_of_DAC_
Entries 64
Mean 103.1
RMS 61.09
digital current of DAC VOffsetR0
Entries 64
Mean 126.5
RMS 73.89
DAC VOffsetR0 (DAC units)


VOffsetR0
maximal pulse height
digital current (A)
Linear_Range_of_DAC_
Entries 64
Mean 71.83
RMS 58.44
digital current of DAC VOffsetR0
Entries 64
Mean 126.5
RMS 73.88
DAC VOffsetR0 (DAC units)

VIbiasOp

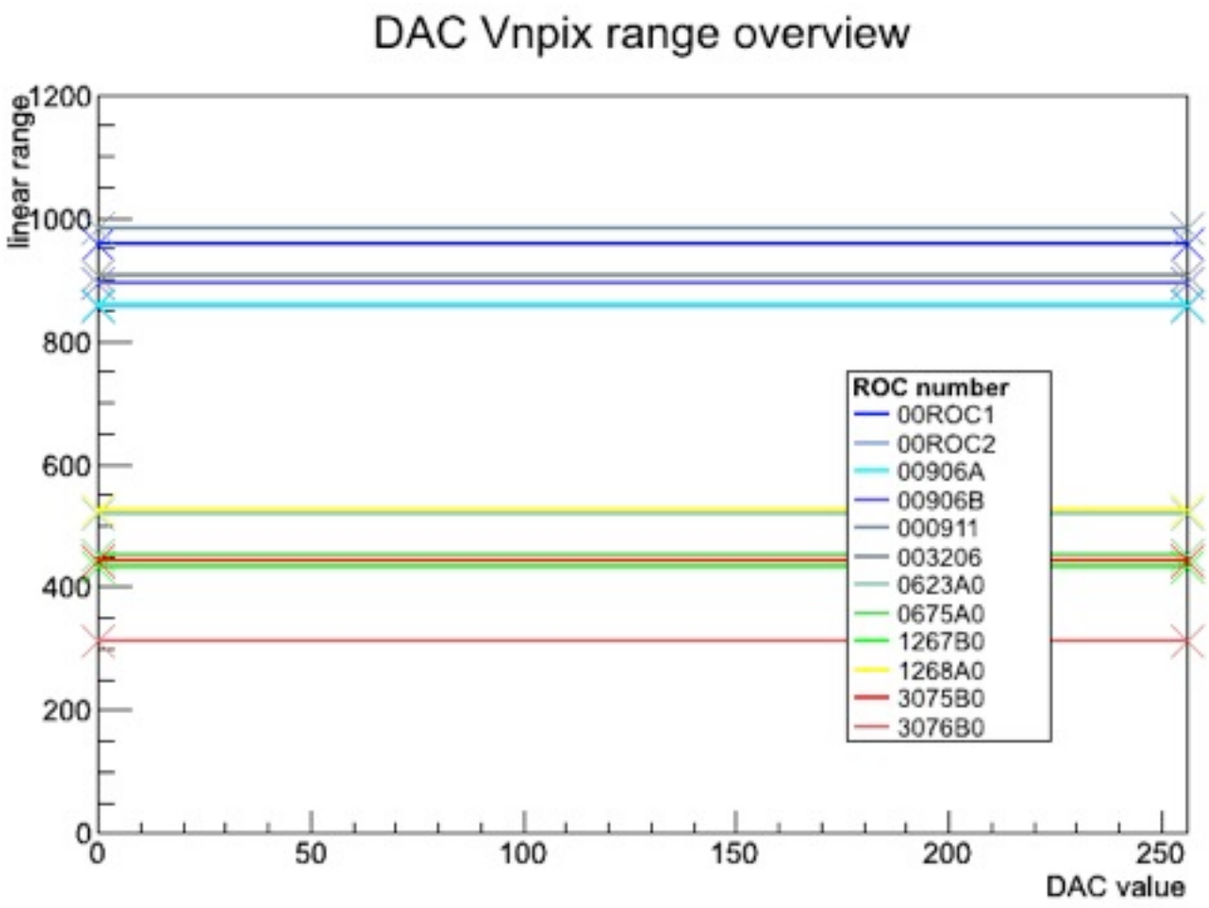

DAC VIbiasOp range overview
linear range
DAC value
ROC number
00ROC1
00ROC2
00906A
00906B
000911
003206
0623A0
0675A0
1267B0
1268A0
3075B0
3076B0

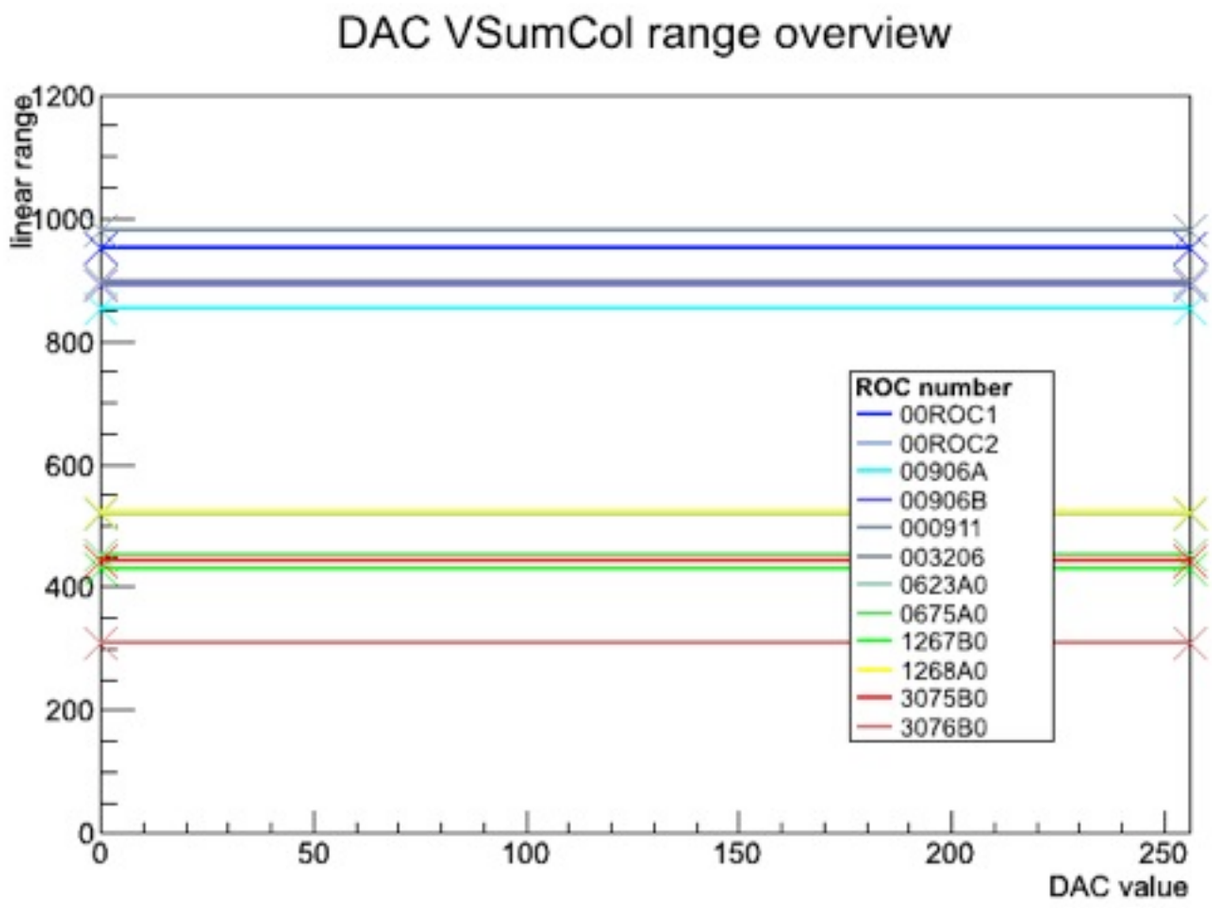

VIbiasOp
maximal pulse height
digital current (A)
DAC VIbiasOp (DAC units)
Linear_Range_of_DAC_
Entries 64
Mean 129.2
RMS 72.04
digital current of DAC VIbiasOp
Entries 64
Mean 126.5
RMS 73.89


VIbiasOp
maximal pulse height
digital current (A)
DAC VIbiasOp (DAC units)
Linear_Range_of_DAC_
Entries 64
Mean 116.2
RMS 67.54
digital current of DAC VIbiasOp
Entries 64
Mean 126.5
RMS 73.88

Crosscheck

DACs that do not affect the readout have flat distributions over the whole range for all ROCs.





Overview

Table with range, PH, digital current for 6 non-irradiated and 6 irradiated ROCs for all readout DACs.

DAC	irrad	range low	range high	max PH	id low	id high
VIBias_Bus	0	4	156	988.042	0.0226	0.0316
VIBias_Bus	0	4	160	881.032	0.0233	0.0326
VIBias_Bus	0	4	172	893.978	0.0272	0.0365
VIBias_Bus	0	4	164	926.022	0.0265	0.0377
VIBias_Bus	0	4	140	1020.56	0.023	0.0302
VIBias_Bus	0	4	164	947.745	0.0279	0.037
VIBias_Bus	0.6	4	132	525.86	0.0244	0.0354
VIBias_Bus	0.6	4	144	459.865	0.023	0.033
VIBias_Bus	1.2	4	144	460.037	0.0256	0.0356
VIBias_Bus	1.2	4	136	533.872	0.026	0.0354
VIBias_Bus	3.0	0	132	449.908	0.0321	0.0414
VIBias_Bus	3.0	0	52	327.744	0.0256	0.0284
Vbias_sf	0	6	16	957.146	0.0246	0.0263
Vbias_sf	0	6	16	860.102	0.0251	0.0267
Vbias_sf	0	6	16	867.282	0.0279	0.0298
Vbias_sf	0	6	16	905.511	0.0309	0.0326
Vbias_sf	0	6	16	994.446	0.0235	0.0251
Vbias_sf	0	6	16	912.448	0.0288	0.0302
Vbias_sf	0.6	4	16	513.528	0.0246	0.0267
Vbias_sf	0.6	5	16	448.597	0.0233	0.0253
Vbias_sf	1.2	7	15	437.051	0.0265	0.0281
Vbias_sf	1.2	6	16	517.664	0.0265	0.0281
Vbias_sf	3.0	4	13	439.838	0.033	0.0349
Vbias_sf	3.0	3	16	308.024	0.026	0.0281
VoffsetOp	0	0	68	968.231	0.0253	0.0258
VoffsetOp	0	0	80	846.438	0.0258	0.0265
VoffsetOp	0	0	52	870.297	0.0286	0.0291
VoffsetOp	0	0	48	903.645	0.0314	0.0319
VoffsetOp	0	0	80	990.438	0.0242	0.0246
VoffsetOp	0	0	60	919.044	0.0295	0.0298
VoffsetOp	0.6	0	76	508.48	0.026	0.0265
VoffsetOp	0.6	0	72	442.691	0.0244	0.0246
VoffsetOp	1.2	0	60	462.107	0.027	0.0272
VoffsetOp	1.2	0	56	520.749	0.0274	0.0279
VoffsetOp	3.0	12	80	441.378	0.034	0.0347
VoffsetOp	3.0	0	48	312.831	0.0272	0.0277