MGPA version 2 first results

packaged chips at CERN ~ 2 weeks ago

only minor changes V1 -> V2

1) pinout: a few pad changes, mainly to help VFE board layout

2) on-chip current reference included
   used to generate programmable pedestal offsets

3) I^2C register default (power-up) settings changed
   chip powers up close to optimum setting and test pulse facility useable without I^2C

   non-zero pedestal offsets
   CAL test mode ON and non-zero CAL DAC setting

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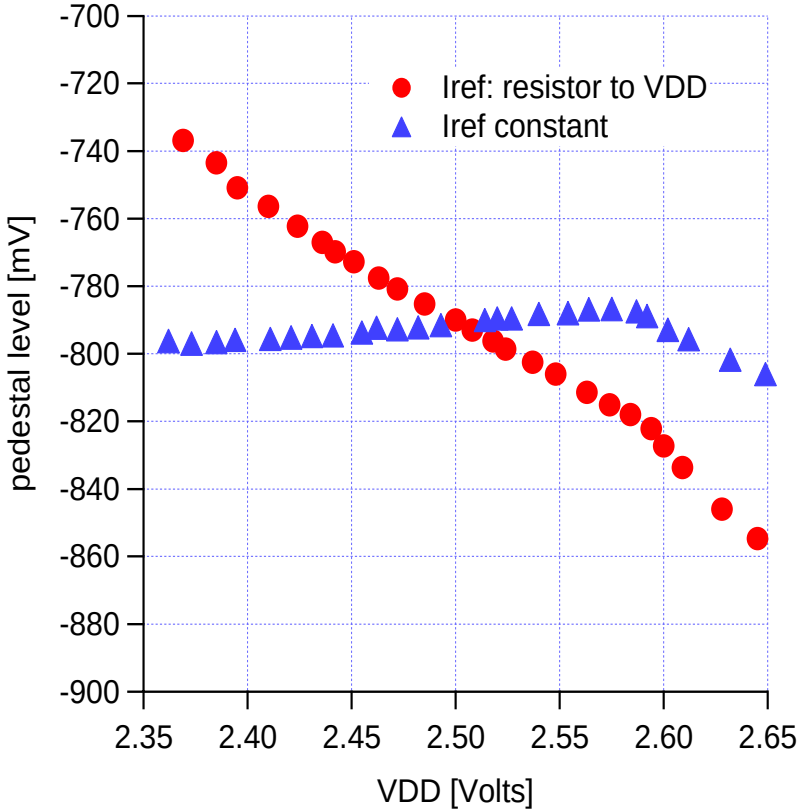
On-chip current reference (1)

measured pedestal dependence on supply voltage – **VERSION 1**

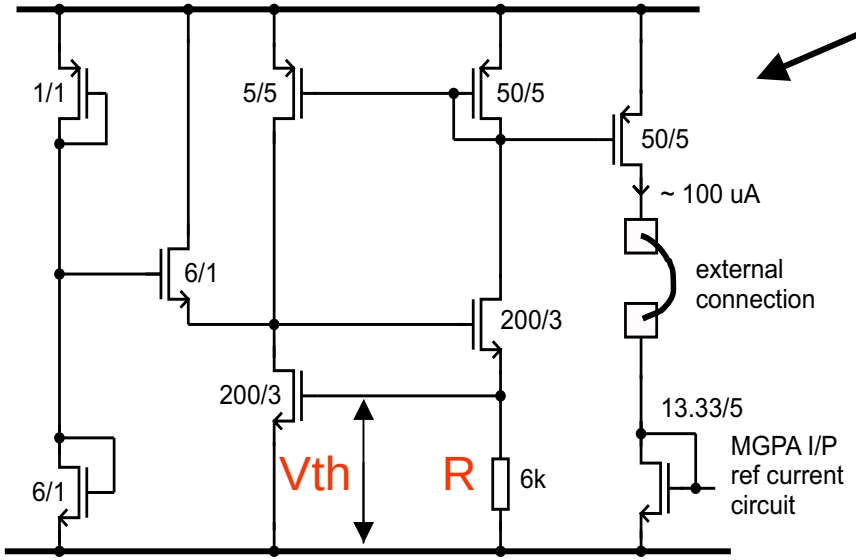


this result presented Nov. 03

big improvement in pedestal stability possible if Iref to offset bias generator made constant

⇒need supply independent current generator on chip

On-chip current reference (2)



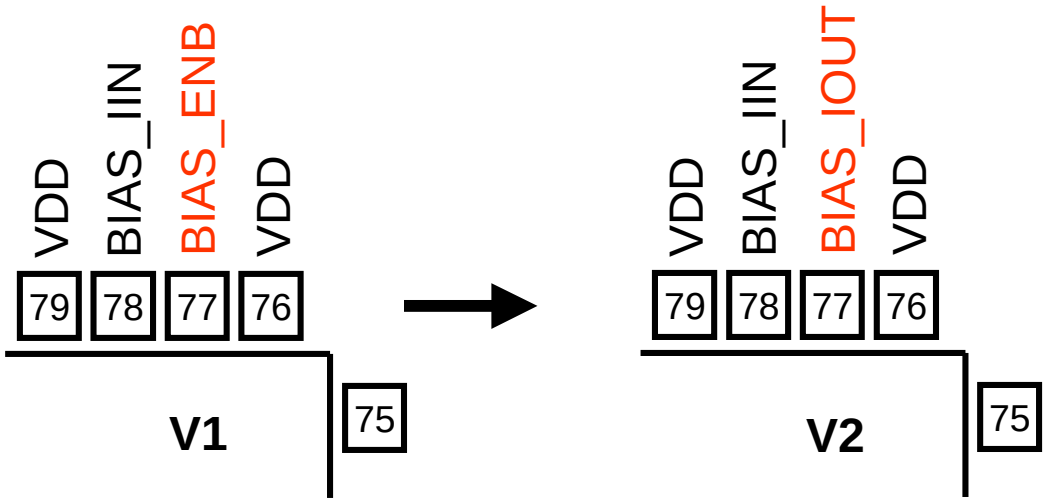
VERSION 2 on-chip current reference

standard circuit (used before)

Iref depends on Vth and R
but **not** on supply voltage

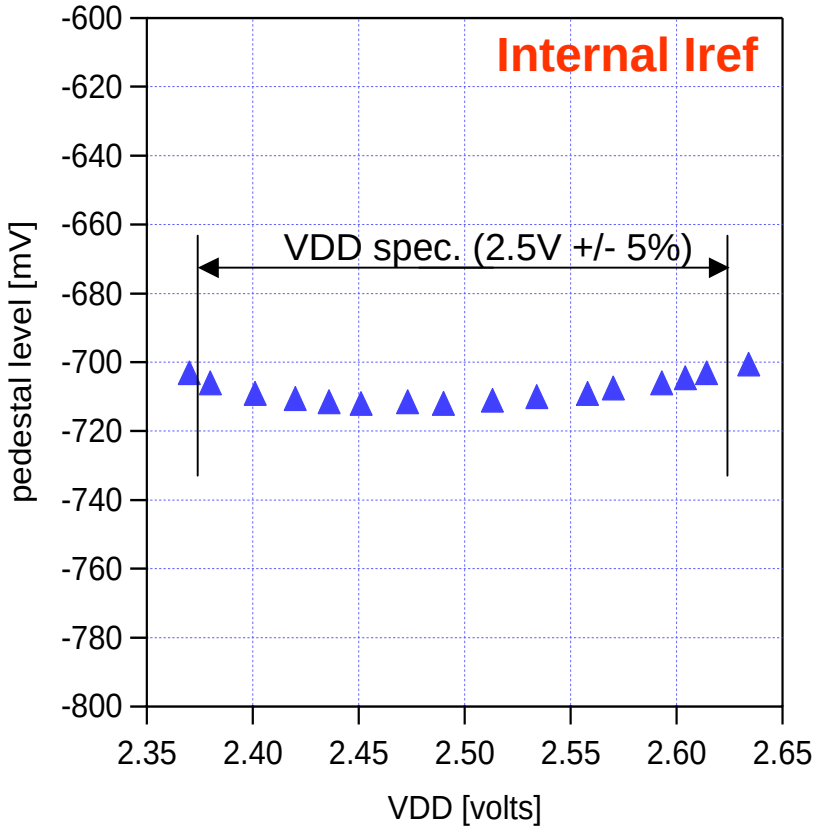
put circuit in corner of chip near BIAS_IIN pad

scrap BIAS_ENB function (not used) and replace by BIAS_IOUT (link on PCB)



On-chip current reference (3)

measured pedestal dependence on supply voltage – **VERSION 2**



high gain range:

~ flat response @ nominal 2.5 V

at extremes of VDD range (2.375, 2.625)

get 1 lsb pedestal drift for ~ 5mV VDD drift

should be no problem for local regulators to achieve this in stable temperature environment

Changes to I²C default settings (1)

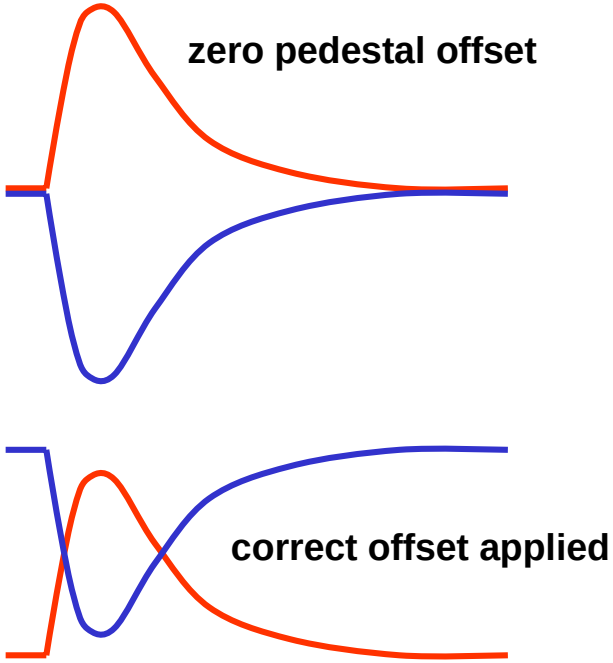
1) non-zero default settings for pedestals

differential output signal naturally bias up to centre of range

=> need to apply offset at diff stage I/P to make full use of dynamic range

programmable offset derived from current reference

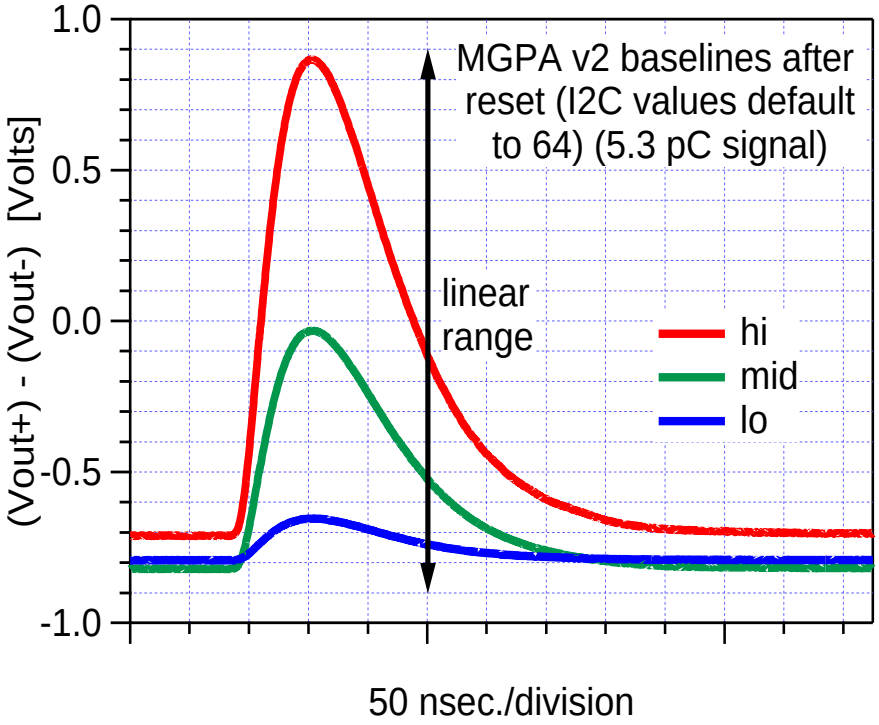
switch on (reset) value now defaults to 64 for MGPA V2



2) cal mode ON and non-zero DAC value

allows use of test pulse without needing I²C to enable and program test pulse amplitude

Changes to I²C default settings (2)

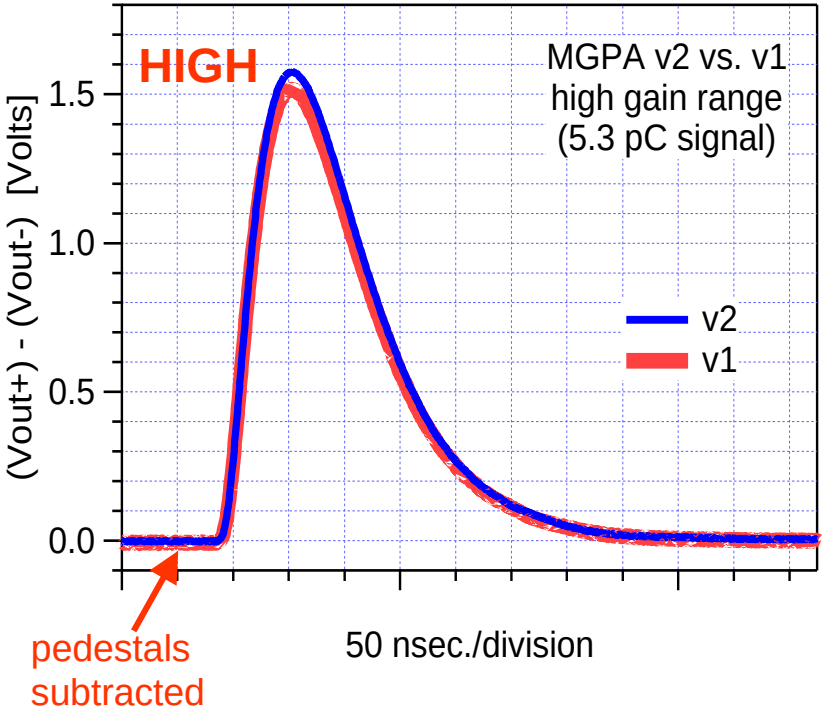


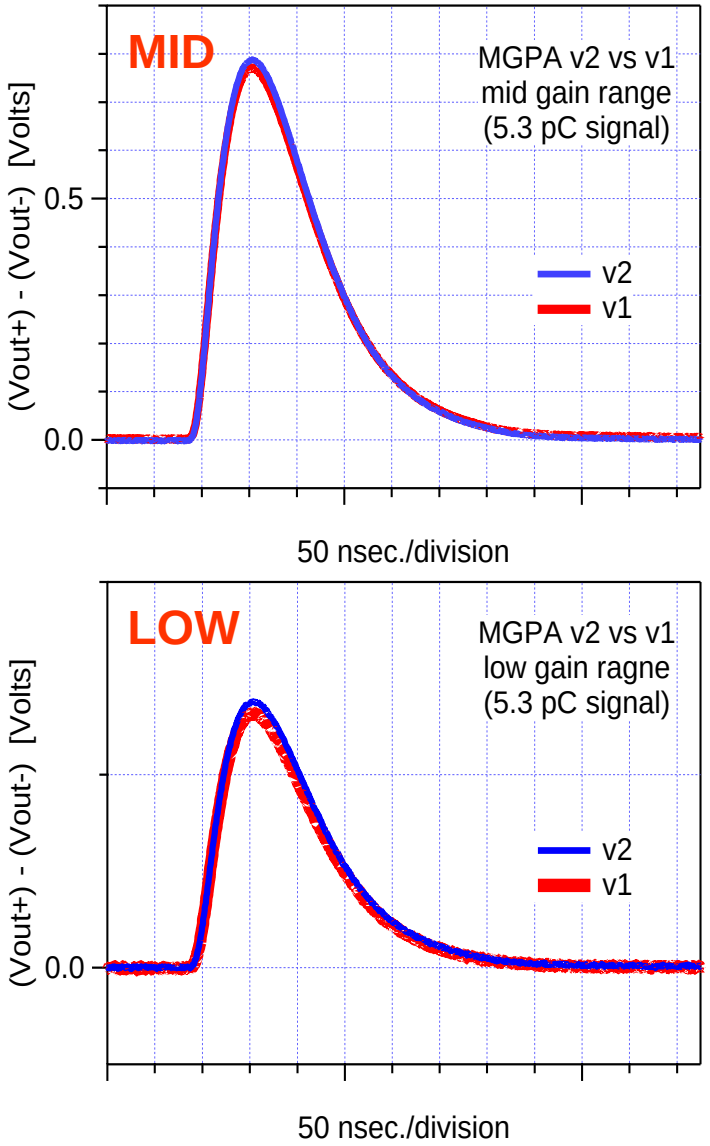
all 3 pedestal offset registers now default to 64

-> close to optimum (can still use I²C to fine tune)

changes to defaults for test pulse settings also check out OK

Pulse shape comparison V1 vs. V2





RAL test board modified (jumpers) so that either version can be plugged in

-> identical performance, gain ratios identical

-> note: absolute gain determined by on-chip resistors (+/- 10% tolerance)

Summary

MGPA – V2 engineering run successful

only significant electronic changes V1 -> V2 are:

1) on-chip current reference
2) changes to I^2C default settings

tests show both changes have worked (no change carries zero risk)

basic performance measurements show identical behaviour to previous version