

## APV25 Power Consumption

The APV power consumption depends on the bias generator settings which are programmable. The power consumption is quoted in the user manual at 2.31 mW / channel in table 11 for an external reference current tuned to 128 uA, and for the bias generator settings in table 10. In the experiment the internal current reference will be used. This has been discussed in:

[http://icva.hep.ph.ic.ac.uk/~dmray/pptfiles/CMStracker11\\_07\\_01.ppt](http://icva.hep.ph.ic.ac.uk/~dmray/pptfiles/CMStracker11_07_01.ppt)

For operational reasons it was decided to power one of the stages in the chip (the preamp output inverter) from the 2.5 V rail via a 100 ohm resistor, instead of the 1.25 V rail. See:

[http://icva.hep.ph.ic.ac.uk/~dmray/pptfiles/CMStracker24\\_01\\_01.ppt](http://icva.hep.ph.ic.ac.uk/~dmray/pptfiles/CMStracker24_01_01.ppt)

This does not change the chip power consumption, but the resistor dissipates power as well. Subsequently, for other reasons, it was decided to reduce the resistor value by a factor of two (to 50 ohms). See for example:

[http://icva.hep.ph.ic.ac.uk/~dmray/pptfiles/CMStrackerhips23\\_01\\_02.ppt](http://icva.hep.ph.ic.ac.uk/~dmray/pptfiles/CMStrackerhips23_01_02.ppt)

The bottom line is that with the reduced value of resistor (one per chip) the APV power consumption increases to 2.56 mW/channel and the resistor power dissipation is effectively an additional .25 mW. This results in a total power / chip (including resistor) of 360 mW. You can then multiply this by the number of APV chips on the hybrid.

The chip pulse shape can be fine tuned depending on the sensor capacitance, leading to small variations in power consumption at the few per cent level. The level of the output analogue baseline is also programmable by the user and affects the power consumption slightly. The effects of radiation at the worst case 10 Mrads lead to a very small increase (at the percent level) to retune the pulse shape.

Without individually tuning the I2C parameters for each chip, a value of +/- 10 % would be a reasonable overall tolerance to place on the final value of 360 mW for overall APV power consumption. This would also take into account the tolerance in the on-chip resistor which sets the master reference current to the bias generator.