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# Spaciroc 3

Photomultiplier Tubes Photon Counting Read-Out-Chip

SPACIROC 3 is a 64-channel chip reading out negative fast input current pulses such as those provided by Multi Anode Photo Multipliers for space-borne and low-power applications. SPACIROC 3 counts photon individually within a Gate Time Unit (GTU).

The 64 inputs from MAPMT Anodes are read-out by a current amplifier followed by a discriminator. Threshold of that discriminator is set by a 10b DAC and an individual 7b DAC to compensate for the non-uniformity between detector channels. Each channel provides a 100% trigger rate for signal greater than 1/3 photoelectron. The digital part operates continuously and handles data conversion of each Photon Counting channel. The digital data are transmitted through a dedicated parallel communication links within the defined Gate Time Unit (GTU). The ASIC data output rate is 40 MHz. Spaciroc is radiation tolerant and its power consumption is lower than 1 mW/channel.



<b>Detector Read-Out</b>	SiPM, MAPMT
<b>Number of Channels</b>	64
<b>Signal Polarity</b>	Negative
<b>Sensitivity</b>	Trigger on 1/3 photo-electron or 50 fC with a $10^6$ PM gain
<b>Timing Resolution</b>	Not relevant
<b>Dynamic Range</b>	Min Gate Time Unit 1.6 $\mu$ s, max count 255 per GTU - Photon counting rate > 100MHz
<b>Packaging &amp; Dimension</b>	TQFP160
<b>Power Consumption</b>	< 1 mW /ch, power supply: 3V
<b>Inputs</b>	64 current inputs
<b>Outputs</b>	8 serial data outputs (8b) for photon counting
<b>Internal Programmable Features</b>	Trigger threshold adjustment (10b), Individual threshold (7b)

## They are using Spaciroc 3

CNES (EUSO Ballon, flight 2014)  
NASA (EUSO-SPB)  
NASA (Mini EUSO)

## More about Spaciroc 3

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