

# CUBE

## ● Charge Sensitive Preamplifier for Radiation Detectors

**CUBE** is a monolithic charge sensitive preamplifier which operates in pulse reset mode. With an external resistor, a continuous reset mode is also possible.

The circuit is designed to offer the best noise performance at short peaking times. It enables low dead time and high count rate measurements with excellent energy resolution.

### Main characteristics

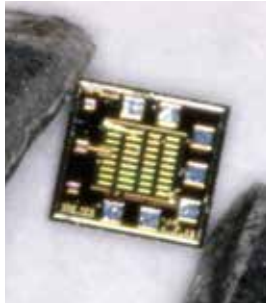
- Physical size:  
750  $\mu\text{m}$  x 750  $\mu\text{m}$  x 250  $\mu\text{m}$
- Input capacitance:  
several CUBE versions available

- Power consumption:  
from 6 mW to 60 mW
- Rise time without detector:  
7 ns

### Advantages of an all-in-one preamplifier

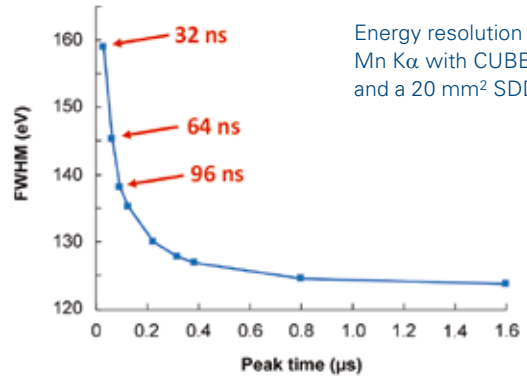
- Superior performance respect to all the front-end JFET available at short shaping time
- Amplified signal level at the output of the detector module
- No sensitive preamplifier loop outside the module
- Possibility to drive "long" connection with the low impedance output.

### CUBE specifications



- Measured noise (with SDD):  $> 2.4 e^-$  (ENC)
- Rise time without / with detector: 7 ns /  $< 30$  ns
- Detector capacitance: up to 10 pF
- Polarity: Electron /holes collection
- Temperature of operation:  $> 50$  K

### Spectroscopic performance



### CUBE Family Details

CUBE Version	Polarity	Detector capacitance [pF]	Feedback capacitance [fF]	ENC (CUBE only, 3.6 eV/e <sup>-</sup> )	Main application
PRE_016	Negative (electrons)	$< 0.25$	about 25	3.3 e <sup>-</sup> at 1 μs	Silicon drift detectors
PRE_031	Negative (electrons)	$< 0.5$	about 25	3.3 e <sup>-</sup> at 1 μs	Small detector capacitance, best energy resolution, smallest dynamic range
PRE_033	Negative (electrons)	$< 0.25$	about 25	2.4 e <sup>-</sup> at 1 μs	Silicon drift detectors
PRE_037	Positive (holes)	$< 0.7$	about 25	4.0 e <sup>-</sup> at 1 μs	Small detector capacitance, best energy resolution, smallest dynamic range
PRE_038	Positive (holes)	0.5 – 3	about 50	12.3 e <sup>-</sup> at 1 μs	Small planar or pixelated detector, good resolution, intermediate dynamic range
PRE_039	Positive (holes)	3 – 10	about 50	20.2 e <sup>-</sup> at 1 μs	Very large planar detector, good resolution, intermediate dynamic range
PRE_040	Negative (electrons)	0.5 – 3	about 50	12.4 e <sup>-</sup> at 1 μs	Small planar or pixelated detector, good resolution, intermediate dynamic range
PRE_041	Both (selectable)	3 – 10	about 500	57.0 e <sup>-</sup> at 1 μs	Cylindrical or 3D detector, lower energy resolution, large dynamic range
PRE_042	Both (selectable)	0.5 – 3	about 500	35.5 e <sup>-</sup> at 1 μs	Cylindrical or 3D detector, lower energy resolution, large dynamic range

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