

Appendix A : AMPTEK CR100XR Efficiency Data

These data were supplied by John Pantazis from AMPTEK, Inc.

In the technical description of the device, the rise-time discrimination circuit is explained:

“Electron-hole pairs created by X-rays which interact with the silicon near the back contact of the detector are collected more slowly than normal events. These events result in smaller than normal charge collection and can increase the background in an energy spectrum and produce false peaks. Such events are characterized by slow risetime, and the PX2CR Amplifier incorporates a Rise Time Discrimination circuit (RTD) which prevents these pulses from being counted by the MCA.”

Because of the use of the RTD the effective detector thickness is only 200 μm . Therefore the correction data are related to the 200 μm silicon chip, although in the experiments a detector with 300 μm chip was used.

Detector thickness 200 μm
Be window thickness 1 mil

Table A-1: Efficiency data for AMPTEK XR100 CR spectrometer with 300 μm Si chip and RTD on.

Energy (keV)	Efficiency	Energy (keV)	Efficiency
0.2	3.55E-120	17.5	2.64E-01
0.3	2.49E-44	18	2.46E-01
0.4	1.66E-21	18.5	2.30E-01
0.5	5.23E-12	19	2.14E-01
0.6	1.47E-07	19.5	2.00E-01
0.8	9.55E-04	20	1.88E-01
1	2.50E-02	20.5	1.76E-01
1.5	3.34E-01	21	1.66E-01
2	6.34E-01	21.5	1.56E-01
3	8.78E-01	22	1.47E-01
4	9.48E-01	22.5	1.39E-01
5	9.74E-01	23	1.31E-01
6	9.84E-01	23.5	1.24E-01
8	9.44E-01	24	1.17E-01
8.5	9.16E-01	24.5	1.11E-01
9	8.79E-01	25	1.05E-01
9.5	8.37E-01	25.5	1.00E-01
10	7.91E-01	26	9.50E-02

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Energy (keV)	Efficiency	Energy (keV)	Efficiency
10.5	7.44E-01	26.5	9.03E-02
11	6.95E-01	27	8.59E-02
11.5	6.48E-01	27.5	8.18E-02
12	6.02E-01	28	7.79E-02
12.5	5.59E-01	28.5	7.43E-02
13	5.18E-01	29	7.09E-02
13.5	4.80E-01	29.5	6.77E-02
14	4.45E-01	30	6.47E-02
14.5	4.12E-01	40	3.21E-02
15	3.82E-01	50	2.02E-02
16	3.29E-01	60	1.48E-02
16.5	3.05E-01	80	1.03E-02
17	2.84E-01	100	8.51E-03