New Detector Dead Layer

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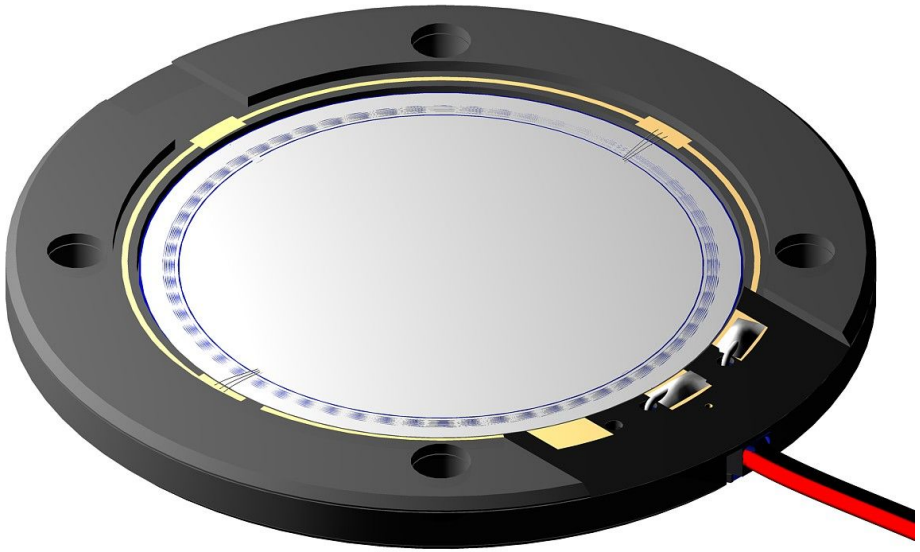
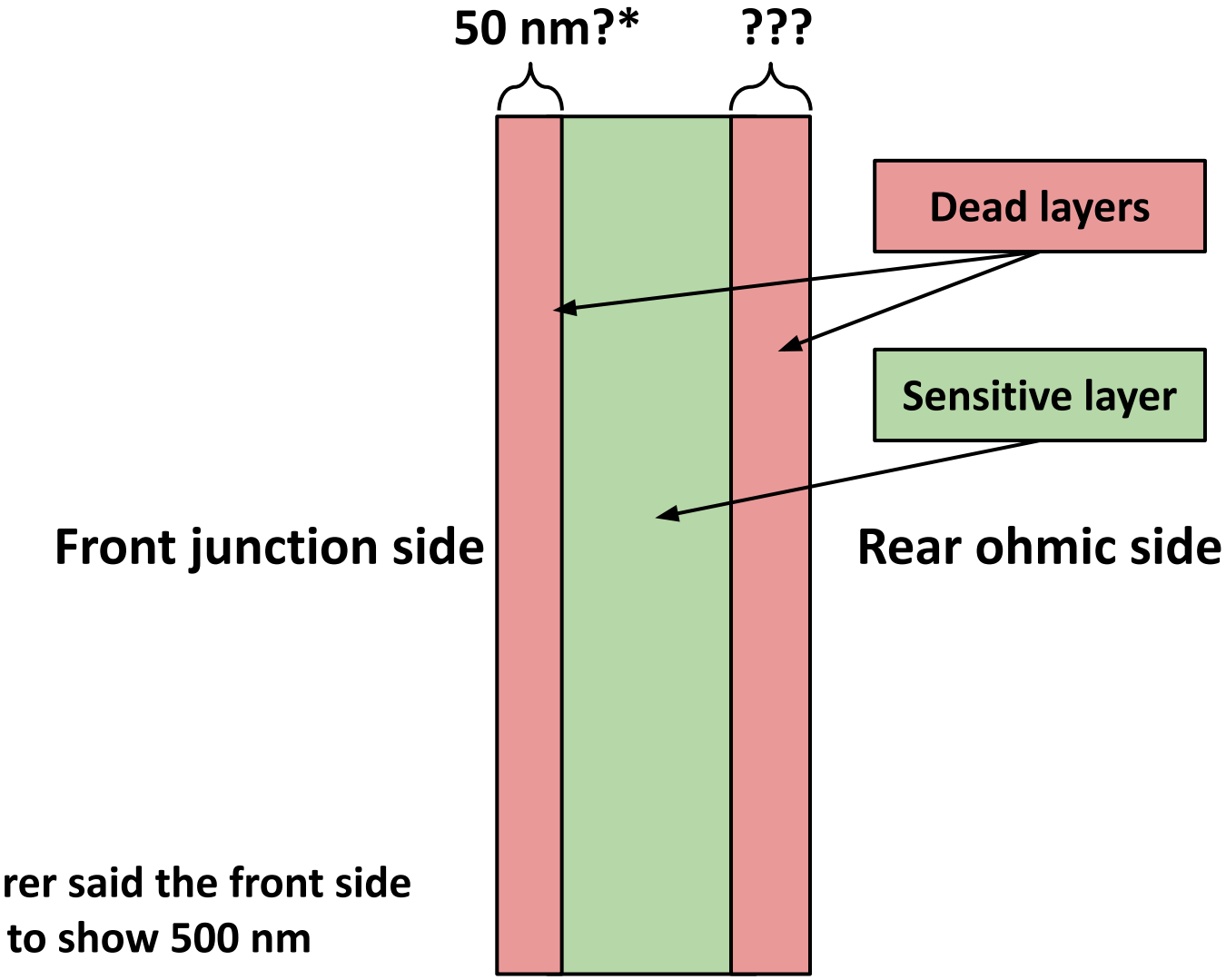
MSD026-1500



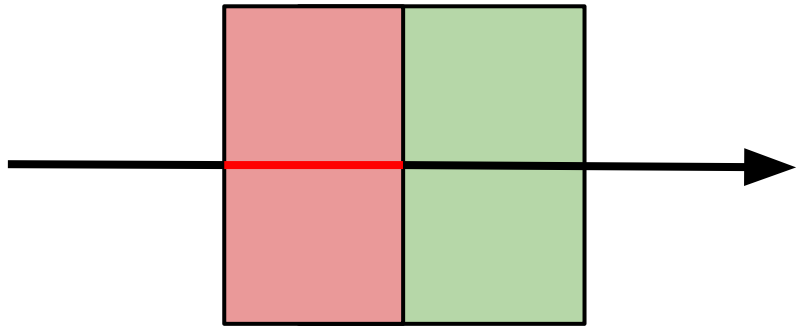


*** I believe that Marina told me that the manufacturer said the front side dead layer was 50 nm, but experiment seems to show 500 nm**

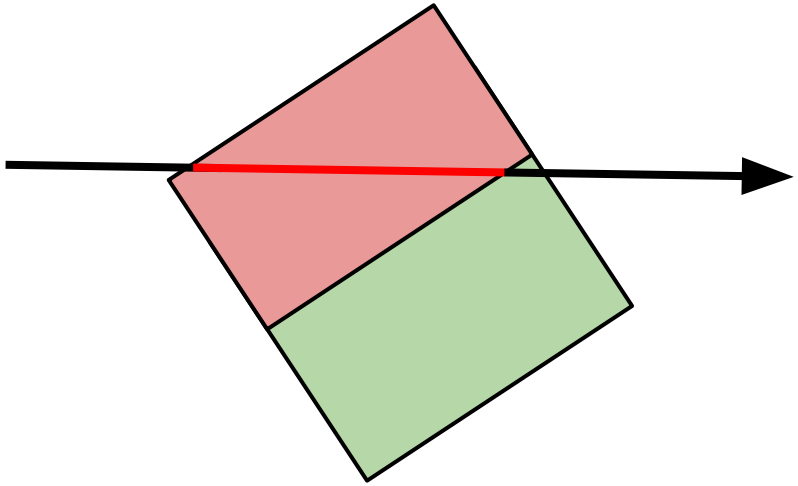
Finding Dead Layer

- Rotating the detector increases the path length through the dead layer, leading to greater energy loss
- We can use the difference in energy measurements at different angles to calculate dead layer

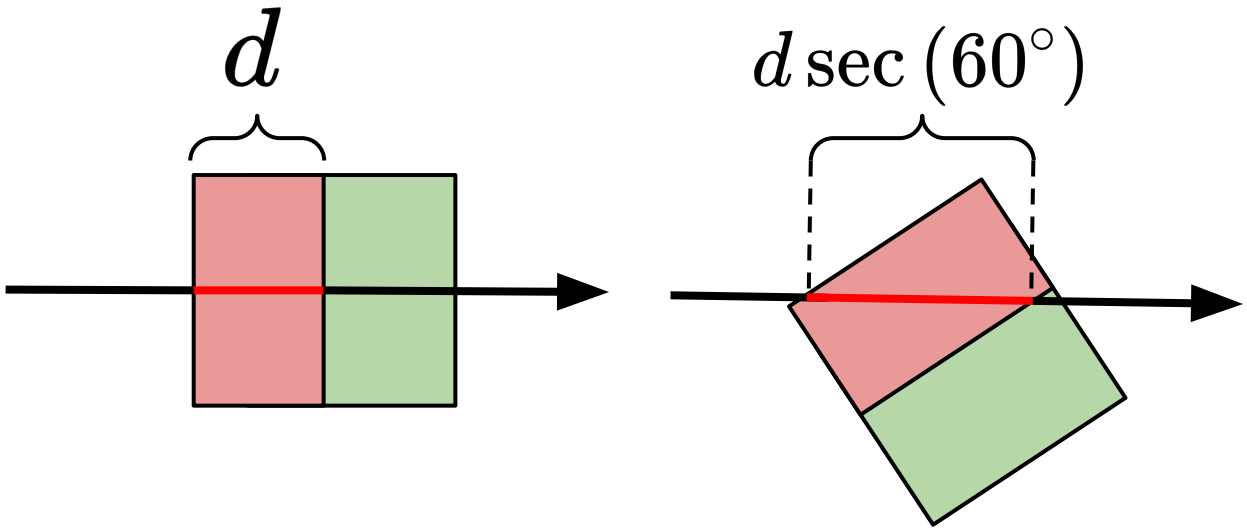
0 degrees



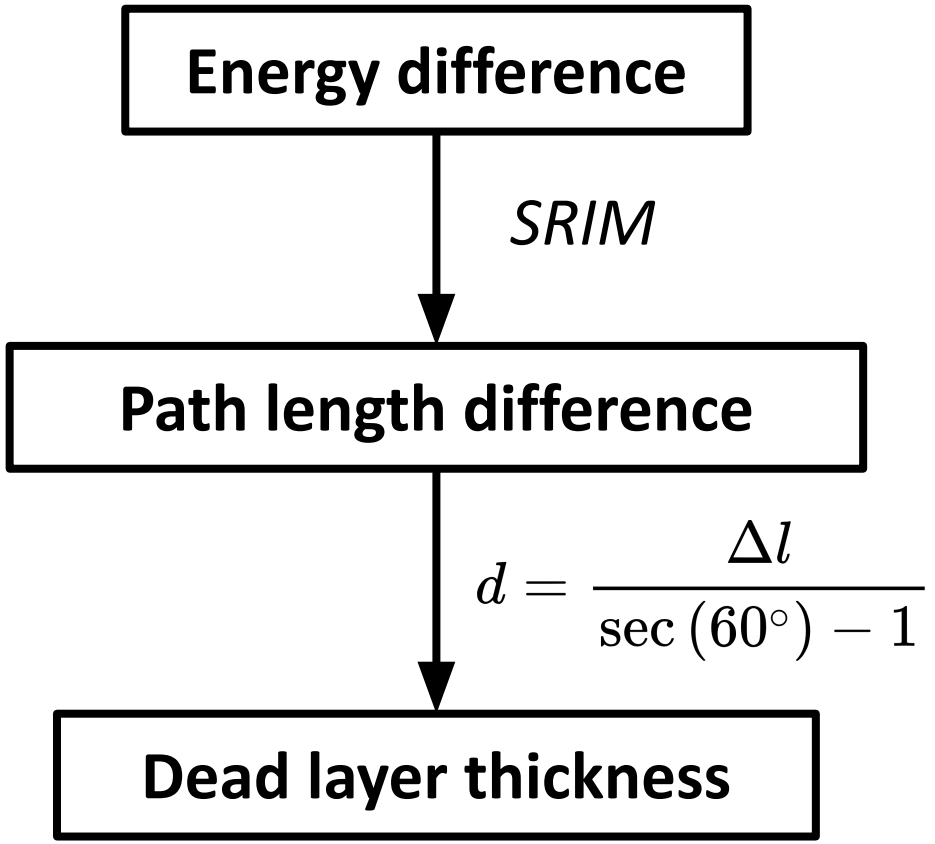
60 degrees



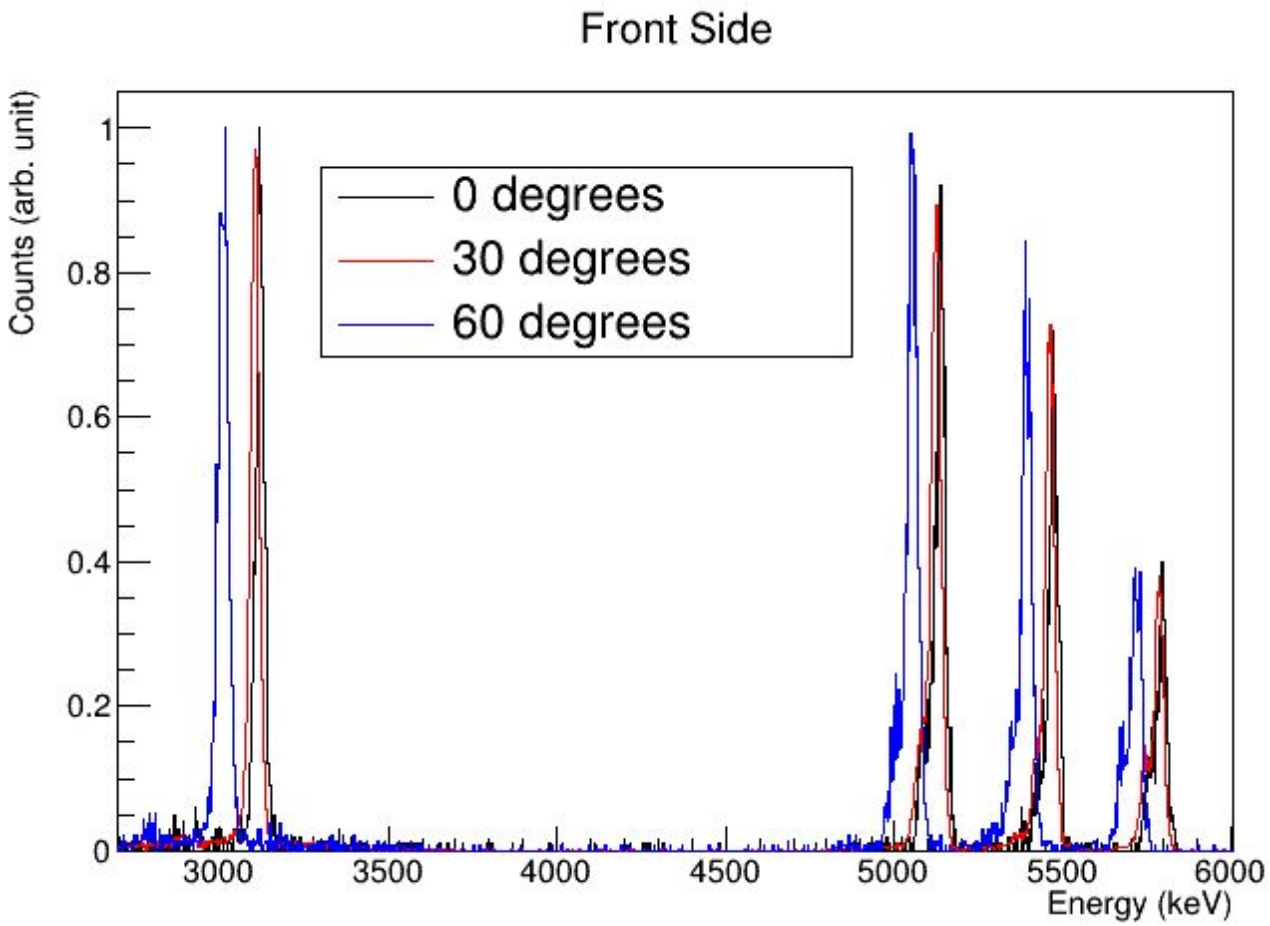
Finding Dead Layer



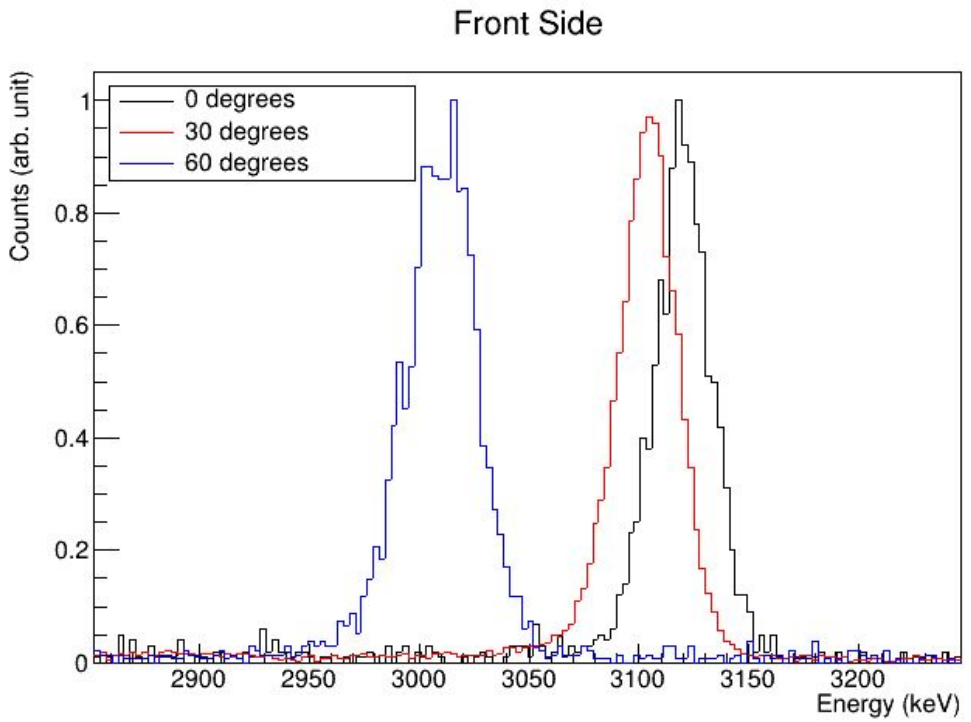
path length difference: $\Delta l = d(\sec(60^\circ) - 1)$



Data



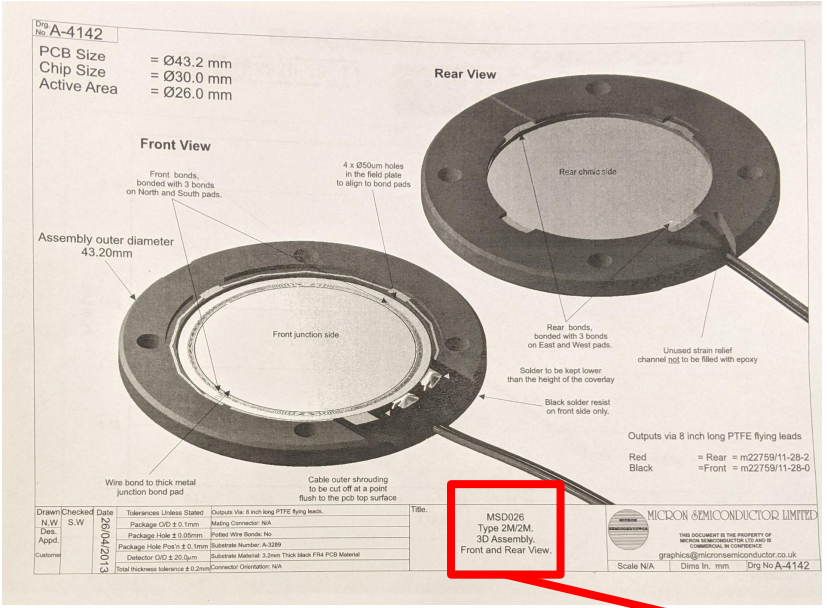
- Multinuclide alpha source
- Detector biased at 200.0V
- 3177.75 keV, 5142.60 keV, 5474.12 keV, 5787.68 keV



Results

Taking the average of the 4 peaks:

Front side	Back side
0/30 degrees: 510 nm	0/30 degrees: 510 nm
0/60 degrees: 585 nm	0/60 degrees: 544 nm



Results seem consistent with front/back window type 2, corresponding to a dead layer of 500 nm (0.5 µm)

WINDOW TYPE	DEAD LAYER (µm)
2	0.5

MSD026
Type 2M/2M.
3D Assembly.
Front and Rear View.

http://www.micronsemiconductor.co.uk/product/msd026/

Numbers, for reference

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Front

0/30

0 degree energy (keV)	30 degree energy (keV)	ΔE (keV)	ΔL (SRIM, μm)	Dead Layer (μm)
3.12E+03	3.10E+03	15.35	0.0810181	0.523
5.14E+03	5.12E+03	12.27	0.0857422	0.554
5.47E+03	5.46E+03	10.79	0.0793945	0.513
5.79E+03	5.78E+03	9.340	0.0695679	0.450

0/60

0 degree energy (keV)	30 degree energy (keV)	ΔE (keV)	ΔL (SRIM, μm)	Dead Layer (μm)
3.12E+03	3.01E+03	109.65	0.577167	0.577
5.14E+03	5.05E+03	83.80	0.593823	0.594
5.47E+03	5.39E+03	78.54	0.577722	0.578
5.79E+03	5.72E+03	77.64	0.590149	0.590

Back

0 degree energy (keV)	30 degree energy (keV)	ΔE (keV)	ΔL (SRIM, μm)	Dead Layer (μm)
3.12E+03	3.10E+03	15.24	0.0810181	0.524
5.13E+03	5.13E+03	8.93	0.0857300	0.554
5.47E+03	5.46E+03	8.71	0.0794434	0.514
5.80E+03	5.79E+03	10.60	0.0696533	0.450

0 degree energy (keV)	30 degree energy (keV)	ΔE (keV)	ΔL (SRIM, μm)	Dead Layer (μm)
3.12E+03	3.01E+03	107.72	0.567126	0.567
5.13E+03	5.06E+03	74.41	0.527246	0.527
5.47E+03	5.40E+03	72.79	0.535596	0.536
5.80E+03	5.73E+03	71.71	0.545276	0.545