

Filtering Tray

Datasheet

Benefits

For inspection of pre-programmed susceptible active electronic components in final or pre-assembly stages for advanced quality control.

Applications

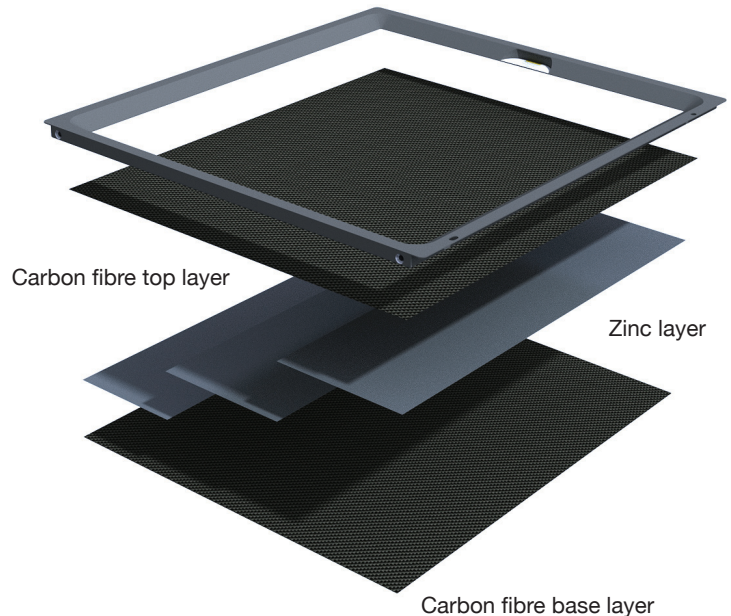
- Military
- Aerospace
- Medical
- PCB
- Semiconductor

Advantages

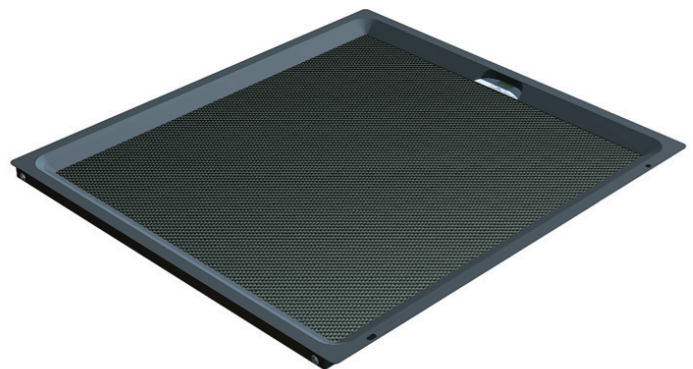
The properties of the tray absorb and filter radiation that can potentially do damage to active silicon components. EG Bit flips, loss of program, erase margin and leakage. Whilst allowing radiation useful to imaging to pass through.

All target based x-ray sources produce a spectrum of high and low energy photons, which enable imaging of devices. However, for radiation sensitive silicon components, low energy photons <12kV can cause problems. This is because they have a >95% probability of being absorbed by the device. This near complete absorption means they play almost no part in the image formation.

The zinc filter layer in the tray preferentially absorbs these low energy photons, preventing them from reaching the silicon device, but leaving higher energy photons for inspection purposes. This reduces the silicon dose typically by a factor of 5x for the same total flux of >10keV photons at the sample.



Zinc layer sandwiched between two carbon fibre sheets
410 x 460 mm view size



Data

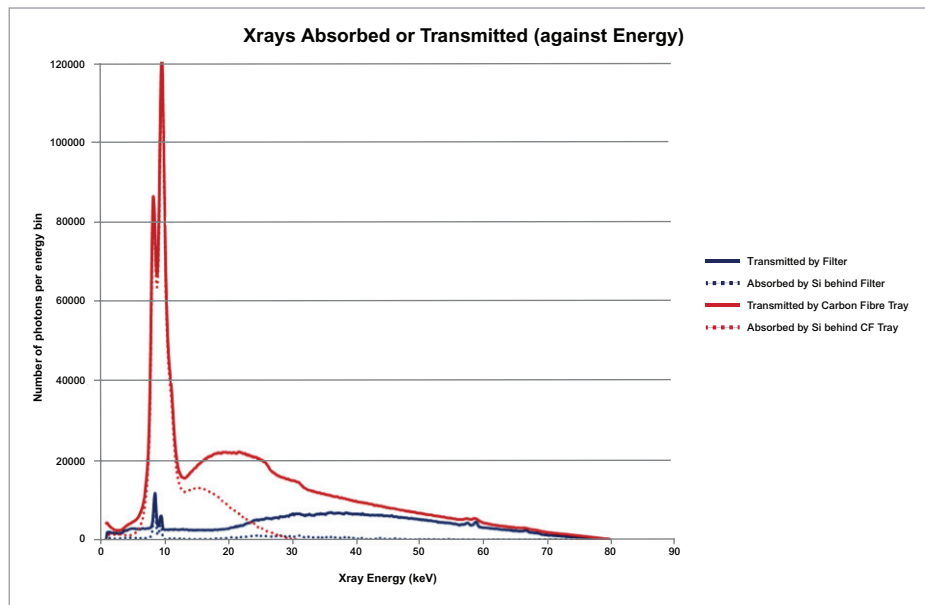


Figure 1: X-ray Energy vs Number of photons per energy bin

Setup

- 800 µm Silicon
- 150 µm filter
- NT100 X-ray tube @ 80kv / 0.5w
- Amptek X-123 spectroscope

The data shows by having a zinc filter the level of absorptions is reduced in the Silicon, especially in the 8 to 25 keV range. Red lines show no filter with our standard carbon fibre tray and blue is with the filter. Naturally with a filter total amount of transmitted energy is reduced and can be compensated by image enhancement software and varying the tube settings.

Notes

- Other factors which can lower any effects of radiation are;
 - Using the Low Dose software feature
 - Reducing the magnification
 - Less frequent re-inspection of the same sample
- Tests should always be carried out to understand the outcome of results, as various factors can have an influence. For example PCB itself can absorb and change the x-ray energy the silicon absorbs.
- Artifacts could potentially be seen by the joins of the zinc layer
- This option is currently available via special request

Further reading: Bernard. D. et al, Considerations for Minimizing Radiation Doses to Components during X-ray Inspection, The proceedings of the 7TH ELECTRONICS PACKAGING TECHNOLOGY CONFERENCE (EPTC 2005) SINGAPORE, 7 – 9 DECEMBER 2005

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