Linear Arrays

Linear arrays based on scintillator are generally used in X-ray baggage security inspection, container scanning, industrial non-destructive testing and other fields. The scintillator used by EPIC Crystal to make linear arrays includes cesium iodide CsI crystals, cadmium tungstate CWO crystals, gadolinium oxysulfide GOS ceramics and GAGG crystals, etc. the size and number of pixels in the array can be customized according to user needs, and commonly used reflection The layer material is titanium dioxide TiO_2. The array has the advantages of high light output, high sensitivity, excellent energy resolution, and reliable consistency between array pixels and between arrays.

Material	CsI(Tl)	CdWO₄	GOS Ceramic	LYSO(Ce)	GAGG(Ce)	BGO
Decay Constant(ns)	1,020	12,700	3,000	40	88	317
Light Output(ph/MeV)	56,000	13,000	28,000	30,000	50,000	8,500
Wavelength of Emission Peak(nm)	550	480	510	420	530	480
Afterglow	0.5-5%@6ms	0.1%@3ms	0.1%@3ms	0.1%@6ms	0.1%@3ms	0.005%@3ms
Number of Elements	8-128	8-128	8-128	8-128	8-128	8-128
Surface Finish	grind/polish	grind/polish	grind/polish	grind/polish	grind/polish	grind/polish
Reflector	TiO_2	TiO_2	TiO_2	BaSO₄ ESR	BaSO₄ ESR	BaSO₄ ESR
Pixel Size(min, mm)	0.5×0.5	0.8×0.8	0.5×0.5	0.5×0.5	0.5×0.5	0.5×0.5
Pixel Gap(min, mm)	0.1	0.1	0.1	0.08	0.08	0.08

Guidelines are NOT hard numbers and can be others depend on specific design

Design Parameters

- **Material:** Type of scintillation crystals.

- **Pixel size:** The X and Y dimensions of each scintillator pixel.

- **Separator/reflector type and thickness:** The type of reflector between the crystal pixel and its overall thickness, Gap(G).

- **Pitch:** The distance between the center of one element to the center of an adjacent element, X+G or Y+G.

- **Radiation thickness:** This is the Z dimension and specifies the thickness of the array in the direction ofincoming radiation.

- **Back reflector thickness:** Usually a white reflector is applied to the radiation entrance side of the array toreflect the light back into the pixel so it can be directed to the light sensor.

- **Material adjacent to the end pixels:** The end crystals need a special reflector thickness or other treatment, e.g. , to keep a constant pitch from array to array if they will be joined together in application.