



Two-dimensional area arrays based on scintillator are generally used in medical imaging positron emission tomography (PET), industrial CT and other fields. The scintillator used by EPIC Crystal to produce two-dimensional area arrays includes bismuth germanate BGO crystal, yttrium lutetium silicate LYSO crystal, cadmium tungstate CWO crystal, gadolinium oxysulfide GOS ceramics and GAGG crystal, etc. The array can be customized according to user needs The size and number of pixels. Commonly used reflective layer materials are barium sulfate (BaSO_4), 3M specular reflective film (ESR), titanium dioxide (TiO_2), etc.; the array has high light output, high sensitivity, excellent energy resolution and array pixel spacing, reliable consistency between arrays and other advantages.

Material	CsI(Tl)	CdWO ₄	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
Array Size	4×4/8×8/16×16	4×4/8×8/16×16	4×4/8×8/16×16	4×4/8×8/16×16	4×4/8×8/16×16	4×4/8×8/16×16
Surface Finish	grind/polish	grind/polish	grind/polish	grind/polish	grind/polish	grind/polish
Reflector	TiO ₂	TiO ₂	TiO ₂	BaSO ₄ ESR	BaSO ₄ ESR	BaSO ₄ 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 of incoming radiation.
- **Back reflector thickness:** Usually a white reflector is applied to the radiation entrance side of the array to reflect 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.

