

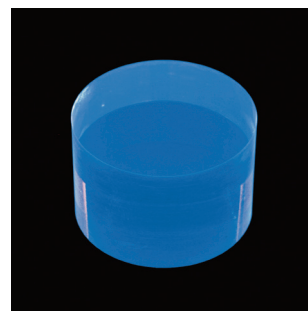
FAST TIMING PLASTIC SCINTILLATOR

EJ-232, EJ-232Q

EJ-232 plastic scintillator is intended for very fast timing applications or when very high pulse pair resolution is required. Due to the small emission wavelength, the optical mean free path of this scintillator is approximately 10 cm. Therefore, to achieve the best light collection and to optimize the timing performance, EJ-232 should be used in a small size with the largest scintillator dimension less than 10 cm to minimize photon scattering effects. The use of light guides is best avoided.

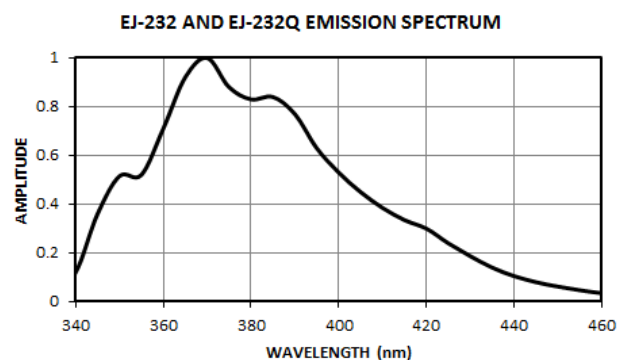
EJ-232Q plastic scintillator is a quenched variant of EJ-232 specifically formulated for ultra-fast counting applications. The introduction of small amounts of benzophenone to EJ-232 significantly shortens the timing properties for purposes of achieving very high counting rates or improved coincidence timing. The

quenching does not affect the emission spectrum but does reduce the scintillation efficiency (see table below). While it is recommended to keep the scintillator size and shape small in order to achieve the best timing performance, it is not recommended to use EJ-232Q in thin films (thicknesses ≤ 3 mm) due to the vapor pressure of benzophenone.



| PROPERTIES | EJ-232 | EJ-232Q (% BENZOPHENONE) | | | | |
|--|--------|--------------------------|-------|-------|-------|-------|
| | | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 |
| Light Output (% Anthracene) | 55 | 19 | 11 | 5 | 4 | 3 |
| Scintillation Efficiency (photons/1 MeV e ⁻) | 8,400 | 2,900 | 1,700 | 770 | 610 | 460 |
| Wavelength of Maximum Emission (nm) | 370 | 370 | 370 | 370 | 370 | 370 |
| Rise Time (ps) | 350 | 110 | 105 | 100 | 100 | 100 |
| Decay Time (ps) | 1,600 | 700 | 700 | 700 | 700 | 700 |
| Pulse Width, FWHM (ps) | 1,300 | 360 | 290 | 260 | 240 | 220 |
| H Atoms per cm ³ ($\times 10^{22}$) | 5.13 | 5.12 | 5.12 | 5.12 | 5.12 | 5.12 |
| C Atoms per cm ³ ($\times 10^{22}$) | 4.66 | 4.66 | 4.66 | 4.66 | 4.66 | 4.66 |
| Electrons per cm ³ ($\times 10^{23}$) | 3.30 | 3.38 | 3.38 | 3.38 | 3.38 | 3.38 |
| Density (g/cm ³) | 1.023 | 1.023 | 1.023 | 1.023 | 1.023 | 1.023 |

| | |
|-------------------------------------|---|
| Polymer Base | Polyvinyltoluene |
| Refractive Index | 1.58 |
| Softening Point | 75°C |
| Vapor Pressure | Vacuum-compatible |
| Coefficient of Linear Expansion | 7.8×10^{-5} below 67°C |
| Temperature Range | -60°C to 60°C |
| Light Output (L.O.) vs. Temperature | At 60°C, L.O. = 95% of that at 20°C No change from -60°C to 20°C |



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