

Preliminary product specification

Low noise, short 8-stage, 13.5mm (1/2") round tube

| | | | |
|-----------------------|--|-------------------------|--------------------|
| Applications : | For high energy physics and scintillation counting under limited dimensional conditions. | | |
| Description : | Window : | Material : | borosilicate glass |
| | | Photocathode : | bi-alkali |
| | | Refr. index at 420 nm : | 1.48 |
| | Multiplier : | Structure : | linear focused |
| | | Nb of stages : | 8 |
| | Mass : | | 15 g |

Photocathode characteristics

| | | | | | |
|---|--------------------------|-----------|----------|---------|--------|
| Spectral range : | | | | 270-650 | nm |
| | Maximum sensitivity at : | | | 420 | nm |
| <input checked="" type="checkbox"/> Sensitivity ① : | Luminous : | | | 80 | μA/lm |
| | Blue : | min.: 8.5 | typ.: 10 | | μA/lmF |
| | Radiant, at 420 nm : | | typ.: 80 | | mA/W |

Characteristics with voltage divider A

| | | | | | |
|--|------------------------------|------------|------------|-------------------|-------|
| Gain slope (vs supp. volt., log/log) : | | | | 5.5 | |
| For an anode blue sensitivity of : | | | | 3 | A/lmF |
| <input checked="" type="checkbox"/> Supply voltage : | | max.: 1200 | typ.: 1050 | | V |
| | | min.: 800 | | | |
| Gain : | | | | 3x10 ⁵ | |
| <input checked="" type="checkbox"/> Anode dark current ② : | | max.: 3 | typ.: 0.5 | | nA |
| <input checked="" type="checkbox"/> Background noise ③ : | | max.: 100 | typ.: 50 | | cps |
| Mean anode sensitivity deviation ④ : | | | | | |
| | long term (16 h) : | | | 1 | % |
| | after change of count rate : | | | 1 | % |
| Gain halved for a magnetic field of | | | | | |
| | perpendicular to axis "n" : | | | 0.3 | mT |
| | parallel to axis "n" : | | | 0.2 | mT |

Characteristics with voltage divider A

A

| | | | | |
|---|---|-------------------|--|----|
| For a supply voltage of : | | 1050 | | V |
| Gain : | | 3x10 ⁵ | | |
| Linearity (2%) of anode current up to : | | 20 | | mA |
| Anode pulse ⑤ : | | | | |
| | Rise time : | 2.7 | | ns |
| | Duration at half height : | 3.8 | | ns |
| | Transit Time : | 24 | | ns |
| | Transit Time Difference centre of photocathode up to 7 mm from it : | 1.6 | | ns |
| Capacitance | anode to all : | 4 | | pF |

Preliminary product specification

Recommended voltage divider

Type A for maximum gain

| | | | | | | | | | | |
|-----------------|----|------------|----|----|----------|----|----|----|---|-------------|
| K | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | A | |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | (total : 9) |
| K: photocathode | | Dn: dynode | | | A: anode | | | | | |

Limiting values

| | | | | | | |
|------------------------------|----------------------------------|-------|------|-------|-----|----|
| Anode luminous sensitivity : | | max.: | 30 | A/lmF | | |
| Supply voltage : | | max.: | 1500 | V | | |
| Continuous anode current : | | max.: | 0.1 | mA | | |
| Voltage between : | | | | | | |
| | D1 and photocathode : | min.: | 60 | max.: | 200 | V |
| | consecutive dynodes : | | | max.: | 150 | V |
| | anode and D8 : | min.: | 30 | max.: | 150 | V |
| Ambient temperature : | | | | | | |
| | short operation (< 30 mn) : | min.: | -30 | max.: | +80 | °C |
| | continuous operation & storage : | min.: | -30 | max.: | +50 | °C |

Notes

- Characteristic measured and mentioned on the test ticket of each tube.
- ① Luminous sensitivity is measured with a tungsten filament lamp with a colour temperature of 2856 ± 5 K. The blue sensitivity, expressed in A/lmF ("F" as in Filtered) is measured with a tungsten filament lamp with a colour temperature of 2856 ± 5 K. Light is transmitted through a blue filter Corning CS no.5-58, polished to half stock thickness. The radiant sensitivity is measured with a tungsten filament lamp with a colour temperature of 2856 ± 5 K. Light is transmitted through an interference filter. Radiant sensitivity at 420 nm, expressed in mA/W, can be estimated by multiplying the blue sensitivity, expressed in μ A/lmF, by 7.5 for this type of tube.
- ② Dark current is measured at ambient temperature, after the tube has been in darkness for approximately 1 min. Lower value can be obtained after a longer stabilisation period in darkness (approx. 30 min.).
- ③ The background noise is measured with an output circuit and electronics with a bandwidth of 3 MHz above a threshold of 0.2 photoelectron..
- ④ The mean pulse amplitude deviation is measured by coupling a NaI(Tl) scintillator to the window of the tube. Long term (16h) deviation is measured by placing a ^{137}Cs source at a distance from the scintillator such that the count rate is $\sim 10^4$ c/s, corresponding to an anode current of ~ 300 nA. The mean pulse amplitude deviation after change of count rate is measured with a ^{137}Cs source at a distance from the scintillator such that the count rate can be changed from 10^4 to 10^3 c/s, corresponding to an anode current of ~ 1 μ A and 0.1 μ A respectively. Both tests are carried out according to ANSI-N42-9-1972 of IEEE recommendations.
- ⑤ Measured with a pulse light source, with a pulse duration (FWHM) of approximately 1 ns., the cathode being completely illuminated. The rise time is determined between 10 % and 90 % of the anode pulse amplitude. The signal transit time is measured between the instant at which the illuminating pulse of the cathode becomes maximum, and the instant at which the anode pulse reaches its maximum. Rise time, pulse duration and transit time vary with respect to high tension supply voltage Vht as $(Vht)^{-1/2}$.

