

ELECTRONIC TUBE REFERENCE

# 100CB

Specialized - Radiation Counter electronic tube

CONSOLIDATED TECHNICAL DATA

## 1 SECTION

CONSTRUCTION

GEIGERMULLERCOUNTER

Permanent-sensitivity argon-filled Geiger-Müller counter with a thin mica window for beta and X-ray detection. The based version operates around 1.2 kV with a broad plateau and approximately 200 µs dead time.

## GENERAL CHARACTERISTICS

|                     |                        |                      |               |
|---------------------|------------------------|----------------------|---------------|
| BASE DESIGNATION    | —                      | BASE PINS            | —             |
| NOMINAL HEATER      | — / —                  | PARALLEL HEATER      | — / —         |
| HEATING             | Indirect; cold cathode | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes      | SECTION CONSTRUCTION | Similar       |

## SECTION RATINGS

|                                                                                     |                     |
|-------------------------------------------------------------------------------------|---------------------|
| SECTION1                                                                            | GeigerMullerCounter |
| No fixed ratings recorded.                                                          |                     |
| Permanent-sensitivity gas-filled radiation counter tube for Beta & X-Ray detection. |                     |

## 100CB — Argon-Filled Radiation Counter Tube

A permanent sensitivity radiation counter tube featuring a thin mica window, designed specifically for the detection and measurement of Beta particles and X-Ray radiation.

### Overview

The **100CB** is a specialized radiation counter tube engineered for stable and reliable detection of Beta particles and X-rays. It is constructed with a stainless steel cathode and a thin mica window that allows low-penetrating radiation to enter the active volume. The tube is filled with an argon gas mixture combined with a quenching admixture to facilitate self-quenching operation and control discharge parameters.

Operating at a nominal potential of 1200 V D.C., the 100CB exhibits a wide operating plateau and a low plateau slope, ensuring consistent counting sensitivity even with minor fluctuations in the high-voltage supply. The tube is housed in a compact envelope with a standard 4-pin base, making it suitable for integration into portable survey meters and laboratory detection systems.

## Mechanical Construction and Physical Dimensions

The physical design of the 100CB is optimized for high detection efficiency and mechanical durability. The cathode is constructed entirely from stainless steel, ensuring resistance to degradation and contributing to the tube's unlimited operational life expectancy.

The tube features a thin mica window at its entry port to allow Beta particles and X-rays to pass into the active volume with minimal attenuation. The physical specifications of the window and electrode structure are detailed below:

| Parameter                        | Specification                                          |
|----------------------------------|--------------------------------------------------------|
| Effective Mica Window Diameter   | 1-3/32 inches                                          |
| Average Mica Window Thickness    | 0.0005 inches (3.5 mg/cm <sup>2</sup> / 12.70 microns) |
| Effective Cathode Length         | 1-1/2 inches                                           |
| Effective Cathode Outer Diameter | 1-3/16 inches                                          |
| Cathode Wall Thickness           | 3/32 inches                                            |
| Maximum Overall Tube Diameter    | 1-3/8 inches                                           |
| Maximum Overall Tube Length      | 4-11/32 inches                                         |
| Base Type                        | 4-Pin Base                                             |

The 100CB is designed to operate reliably under extreme environmental conditions, with a rated operating temperature range spanning from -55°C to +75°C. Its life expectancy is unlimited by use, meaning the gas filling and quenching agent do not deplete significantly during normal operation.

## Electrical and Operating Characteristics

The electrical parameters of the 100CB are tailored for stable pulse counting under high-voltage D.C. bias. The tube relies on an argon gas filling mixed with a quenching admixture to terminate the ionization discharge after each detection event.

The primary electrical and operating limits are as follows:

- **Nominal Operating Voltage:** 1200 V D.C.
- **Plateau Length:** In excess of 300 volts.
- **Plateau Slope:** 5% to 10% per 100 volts.
- **Approximate Dead Time:** 200 microseconds.

- **Maximum Background Count:** 50 counts per minute when shielded by a 2-inch lead enclosure.

The wide plateau (greater than 300 V) provides a generous operating margin, meaning small fluctuations in the high-voltage power supply will not significantly affect the tube's counting sensitivity. The plateau slope of 5% to 10% per 100 V indicates a highly stable counting rate across this voltage range. The approximate dead time of 200 microseconds defines the temporary insensitivity period immediately following a pulse, which is critical for calculating coincidence loss corrections at high count rates.

## Detection Capabilities and Applications

The 100CB is specifically rated for **Beta and X-Ray** detection. The combination of a thin mica window (0.0005 inches or 12.70 microns) and an argon-based gas mixture makes it highly sensitive to these radiation types.

While some tubes in the same family (such as the 200CB) are rated for Alpha, Beta, Gamma, and X-Ray detection, the 100CB's design parameters optimize it specifically for Beta particles and X-rays. The 1-3/32 inch effective window diameter provides a relatively large surface area for capturing incident radiation, making it highly effective for contamination monitoring, laboratory analysis, and X-ray intensity measurements.

## Technical Summary

The **100CB** is a 4-pin, argon-filled radiation counter tube featuring a stainless steel cathode, a 1-3/32 inch mica window, and an unlimited operational lifetime. Operating at 1200 V D.C., it delivers a plateau in excess of 300 V with a slope of 5% to 10% per 100 V, an approximate dead time of 200 microseconds, and a maximum shielded background of 50 counts per minute. It is rated for operation from -55°C to +75°C and is optimized for Beta and X-Ray detection applications.

## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1958 Amperex Industrial

Published test conditions and operating points. Values on this page are preserved as reported by this source.

## 1958 AMPEREX INDUSTRIAL

## Section 1 · GeigerMullerCounter

| OTHER                               |                                    |                  |
|-------------------------------------|------------------------------------|------------------|
| PARAMETER                           | PUBLISHED VALUE                    | CONDITION / NOTE |
| Filling                             | Argon + quenching admixture        | —                |
| Operating voltage                   | 1200 V                             | DC               |
| Window thickness                    | 0.0005 in                          | MicaWindow       |
| Window areal density                | 3.5 mg/cm <sup>2</sup>             | MicaWindow       |
| Effective mica-window diameter      | 1-3/32 in                          | —                |
| Cathode dimensions                  | 1-1/2 long x 1-3/16 OD x 3/32 wall | —                |
| Maximum overall tube dimensions     | 1-3/8 x 4-11/32; 4-pin base        | —                |
| Radiation application               | Beta & X-Ray                       | —                |
| Operating temperature range minimum | -55 degC                           | —                |
| Operating temperature range maximum | 75 degC                            | —                |

| CHARACTERISTIC              |                     |                              |
|-----------------------------|---------------------|------------------------------|
| PARAMETER                   | PUBLISHED VALUE     | CONDITION / NOTE             |
| Plateau length              | in excess of 300 V  | —                            |
| Plateau slope               | 5% to 10% per 100 V | —                            |
| Dead time                   | 200 us              | Approximate                  |
| Maximum shielded background | 50 counts/min       | Shielded by 2 inches of lead |