

ELECTRONIC TUBE REFERENCE

18502

Specialized - Radiation Counter electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

GEIGERMULLERCOUNTER

Philips self-quenching Geiger-Müller radiation counter designed for pulse-counting measurement of ionizing radiation, with published operating plateau, background, timing, lifetime, and construction data.

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.	
Radiation-counter discharge tube.	

18502 — Radiation Counter Tube

A self-quenching, gas-filled radiation counter tube designed for the measurement of gamma and medium-energy beta radiation.

Overview

The **18502** is a specialized gas-filled, self-quenching radiation counter tube designed specifically for detecting and measuring gamma radiation and medium-energy beta radiation. Featuring a cylindrical glass body construction with metal end caps, the 18502 operates within a defined voltage plateau to register ionizing events. Its design provides a robust operating life and low background noise, making it suitable for radiation monitoring and scientific measurement applications.

Physical and Mechanical Construction

The 18502 is constructed as a cylindrical tube featuring a glass body, metal end caps, and terminal connections for integration into detection circuitry. The active length of the tube, located in the middle section of the main body, measures 50 mm.

Its physical dimensions are specified as follows:

- **Maximum overall length:** 118 mm
- **Main body diameter:** 15 ± 0.5 mm
- **End cap diameter:** 16 to 19 mm
- **Anode pin (left terminal):** 1.5 mm diameter, with a minimum length of 12 mm
- **Connection lead (right terminal):** A flexible lead with a length of 25 ± 5 mm

The tube wall is designed to allow the penetration of medium-energy beta particles and gamma rays, featuring a wall thickness of **75 mg/cm²** (equivalent to **100 μ**).

Electrical and Operating Characteristics

The electrical parameters of the 18502 define its performance as a self-quenching detector. The tube exhibits an internal capacitance of **2 pF**.

When high voltage is applied, the tube initiates discharge at a maximum starting voltage of **300 V**. The recommended nominal operating voltage is **350 V**, which positions the operation within the tube's plateau. The plateau characteristics are critical for stable counting:

- **Plateau Length:** Minimum of 100 V, spanning a range from 300 V to 400 V.
- **Plateau Slope:** Less than 15% per 100 V, ensuring that minor fluctuations in the high-voltage supply do not excessively affect the count rate.

The tube's recovery and resolution capabilities are governed by its dead time, which is less than **150 μ s**. Under unshielded conditions, the tube exhibits a low background count rate of less than **40 counts per minute**. The 18502 is designed for long-term service, with an expected operating life exceeding **10⁹ counts**.

Maintenance and Handling Precautions

To ensure reliable operation and prevent the development of parasitic leakage currents across the terminals, specific environmental precautions must be observed. The 18502 must be kept strictly dry and clean. Accumulation of moisture, dust, or other contaminants on the glass envelope or near the metal end caps can degrade the insulation resistance, leading to false counts or leakage currents that disrupt the high-voltage biasing of the tube.

Technical Summary

The **18502** is a self-quenching, gas-filled radiation counter tube optimized for detecting gamma and medium-energy beta radiation. Housed in a cylindrical glass envelope with metal end caps, it features an

active length of 50 mm, a wall thickness of 75 mg/cm² (100 μ), and an overall length of up to 118 mm. Operating at a nominal voltage of 350 V, the tube provides a stable plateau of at least 100 V (from 300 V to 400 V) with a slope of less than 15% per 100 V. With a dead time under 150 μs, an unshielded background below 40 counts per minute, and an expected lifetime exceeding 10⁹ counts, the 18502 offers reliable performance for radiation measurement systems when kept clean and dry.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1957 Philips Receiving and Amplifying Tubes

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

1957 PHILIPS RECEIVING AND AMPLIFYING TUBES

Section 1 · GeigerMullerCounter

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Starting Voltage	300 V	—
Operating Voltage	350 V	—
Capacitance	2 pF	—
Plateau Length	100 V	—
Dead Time	150 us	Maximum
Unshielded Background	40 counts/min	Maximum

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1999 Philips 0-D

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

1999 PHILIPS 0-D

Section 1 · GeigerMullerCounter

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filling	Gas-filled, self-quenching	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Interelectrode capacitance	2 pF	—

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Starting voltage maximum	300 V	—
Plateau length minimum	100 V	—
Plateau slope maximum	15 % per 100 V	—
Dead time maximum	150 usec	—
Unshielded background maximum	40 counts/min	—
Expected count life minimum	1000000000 counts	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Operating voltage	350 V	—