

## 10 STAGE PHOTOMULTIPLIER TUBE

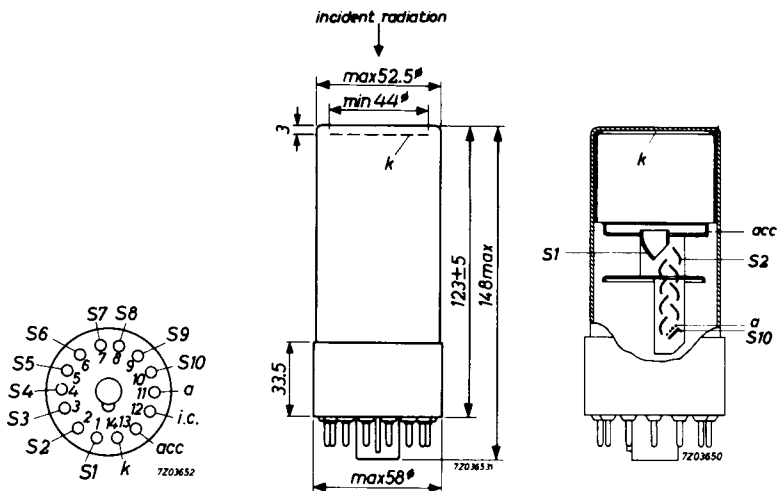
The tube is intended for use in applications such as infra-red telecommunication and ranging and in optical instruments operating in the far red and near infra-red region.

QUICK REFERENCE DATA	
Spectral response	type C (S1)
Useful diameter of the photocathode	44 mm
Anode sensitivity (at 1800 V)	100 A/lm

### DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: 14-pin (Jedec B14-38)



### ACCESSORIES

- Socket type FE1001
- Mu-metal shield type 56128

**GENERAL**

Photocathode

Description	semi-transparent, head-on, flat surface		
Cathode material	Ag-O-Cs		
Minimum useful diameter	44 mm		
Spectral response curve <sup>1)</sup>	type C (S1)		
Wavelength at maximum response	8000 ± 1000 Å		
Luminous sensitivity <sup>2)</sup>	N <sub>k</sub>	av.	20 μA/lm
		min.	15 μA/lm
Infra-red luminous sensitivity <sup>3)</sup>	N <sub>k</sub>	av.	3 μA/lm
		min.	1.4 μA/lm
Radiant sensitivity at 8000 Å	2 mA/W		

Multiplier system

Number of stages	10
Dynode material	Ag-Mg-O-Cs

Capacitances

Anode to final dynode	C <sub>a/S10</sub>	3 pF
Anode to all other electrodes	C <sub>a</sub>	5 pF

**TYPICAL CHARACTERISTICS**

With voltage divider A

Anode sensitivity at V <sub>b</sub> = 1800 V	N <sub>a</sub>	av.	100 A/lm
		min.	20 A/lm
Anode dark current at N <sub>a</sub> = 20 A/lm <sup>4)</sup>	I <sub>a0</sub>	max.	10 μA
Linearity between anode pulse amplitude and input light pulse		up to	5 mA

1) See spectral response curve in front of this section

2) Measured with a tungsten ribbon lamp having a colour temperature of 2854 °K

3) The infra-red lumen is the flux resulting from one lumen yielded by a tungsten ribbon lamp (colour temperature 2854 °K) going through an infra-red filter Corning CS94 No. 2540, fusion 1613 thickness 2.61

4) At an ambient temperature of 25 °C

**TYPICAL CHARACTERISTICS** (continued)

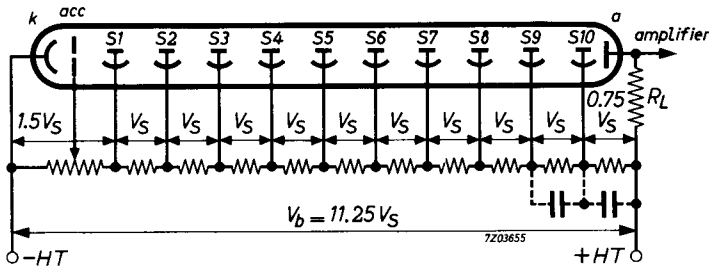
With voltage divider B

Linearity between anode pulse amplitude and input light pulse	up to	10 mA
Anode pulse rise time at $V_b = 1500 \text{ V}^1)$		4 ns
Anode pulse width at half height at $V_b = 1500 \text{ V}^1)$		12 ns
Transit time difference between the centre of the photocathode and the edge at $V_b = 1500 \text{ V}$		4 ns
Total transit time at $V_b = 1500 \text{ V}^1)$		40 ns

**LIMITING VALUES** (Absolute max. rating system)

Supply voltage	$V_b$	max.	1800 V
Continuous anode current	$I_a$	max.	30 $\mu\text{A}$
Voltage between cathode and first dynode	$V_{k/S_1}$	max.	500 V
		min.	120 V
Voltage between consecutive dynodes	$V_{S_n/S_{n+1}}$	max.	300 V
		min.	80 V
Voltage between anode and final dynode <sup>2)</sup>	$V_{a/S_{10}}$	max.	300 V
		min.	80 V

**RECOMMENDED CIRCUITS**

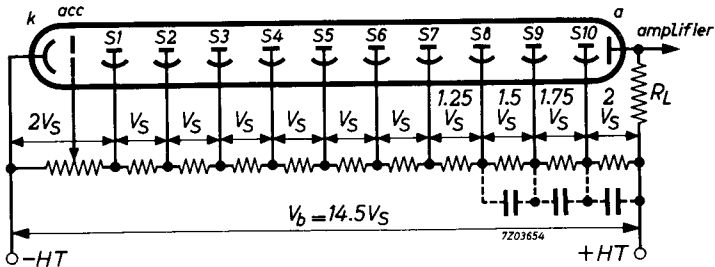


Voltage divider type A

<sup>1)</sup> For an infinitely short light pulse, fully illuminating the photocathode.

<sup>2)</sup> When calculating the anode voltage, the voltage drop in the load resistance should not be overlooked.

RECOMMENDED CIRCUITS (continued)



Voltage divider type B

- k = cathode
- acc = accelerating electrode
- $S_n$  = dynode No. n
- a = anode

OPERATIONAL CONSIDERATIONS

To achieve a stability of about 1% the ratio of the current through the voltage-divider bridge to that through the heaviest loaded stage of the tube should be approx. 100.

For moderate intensities of radiation a bridge current of approx. 0.5 mA will be sufficient.

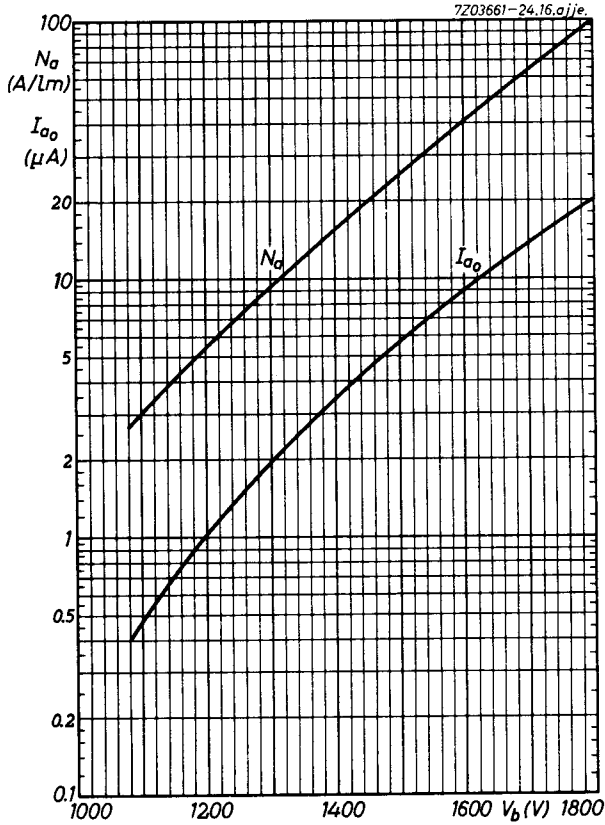
Different kinds of voltage dividers are possible. A circuit of type A results in the highest gain of the tube at a given total voltage; a circuit of type B gives a higher current output with better time characteristics, but the total gain is less at the same total voltage.

The accelerating electrode has a separate external connection to allow adjustment for optimum photoelectron collection on the first dynode.

When pulses with high amplitudes are taken from the anode, it is useful to decouple the last stages as indicated in the circuit by means of capacitors of a few hundred pF, to avoid a voltage drop between these stages.

When the tube has been exposed to full daylight just before mounting, it will probably show an increased dark current, which will be back at its normal value after several hours of operation.

It is advisable to screen the tube with a mu-metal cylinder against the influence of magnetic fields.



# PHILIPS

Data handbook



Electronic  
components  
and materials

## XP1005

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