TRIGGER TUBE

Ruggedized cold cathode trigger tube with pure molybdenum electrodes and very high light-output for use in e.g. shift registers for running-text displays.

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DIMENSIONS AND CONNECTIONS

Glass dot indicates anode lead

Dimensions in mm

MOUNTING

1. Directly soldered connections to the leads must be at least 5 mm from glass and any bending of the leads must be at least 1.5 mm from the glass.

2. When soldering into the circuit the heat conducted to the glass should be kept to a minimum by the use of a thermal shunt on the leads.

3. The leads may be dip-soldered to minimum 5 mm from the glass at a solder temperature of 240°C during maximum 10 s.

4. The primer and starter circuit resistors and capacitors should be mounted close to the tube.

5. The tube should not be mounted close to conductors or components which give rise to strong electrical fields.
CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

Valid over life and full temperature range unless otherwise stated. The tube characteristics are independent of ambient light and assume the presence of a priming discharge.

PRIMING CONDITIONS
Anode to primer supply voltage \( V_{ba-pr} \) \( > 265 \text{ V} \)
Typical max. ignition delay \( 0.3 \text{ s} \)
Anode to primer maintaining voltage \( V_{ma-pr} \) see page 5
Primer current \( I_{pr} \) \( 7.5 \text{ to } 30 \mu\text{A} \)

STAND-BY (main gap non-conducting)
Anode to cathode voltage, positive \( V_a \) \( < 350 \text{ V} \)
    negative \( -V_a \) \( < 100 \text{ V} \)
Anode to starter voltage, positive \( V_{a-st} \) \( < 350 \text{ V} \)
    negative \( -V_{a-st} \) \( < 100 \text{ V} \)
Starter to cathode voltage to ensure non ignition, positive \( V_{st} \) \( < 165 \text{ V} \)
    negative \( -V_{st} \) \( < 100 \text{ V} \)
Primer current \( I_{pr} \) \( < 30 \mu\text{A} \)

IGNITION REQUIREMENTS

a.D.C. triggering
Anode to cathode voltage \( V_a \) \( > 265 \text{ V} \)
Starter to cathode voltage to ensure ignition \( V_{st_{ign}} \) \( > 200 \text{ V} \)
Starter to cathode capacitor to ensure transfer \( C_{st} \) \( > 1 \text{ nF} \)
Starter circuit charging resistance \( R_1 \) \( > 0.5 \text{ M\Omega} \)
b. Bias + pulse triggering

Anode to cathode voltage $V_a > 265 > 220 \text{ V}$ 1)
Starter coupling capacitor $C_{st} > 1 > 1 \text{ nF}$
Starter to cathode voltage $V_{st} > 200 > 220 \text{ V}$
Starter series resistance
at $C_{st} = 1 \text{ nF}$ $R_{st} < 3.3 \text{ kΩ}$
at $C_{st} = 1.5 \text{ nF}$ $R_{st} < 10 \text{ kΩ}$
Pulse duration $T_p > 40 \mu\text{s}$

MAIN GAP CONDUCTING

Anode maintaining voltage $V_{ma}$ see page 6
Cathode current range $I_k$ 1 to 3 mA

EXTINCTION REQUIREMENTS

Anode to cathode voltage at $I_a = 3 \text{ mA}$ $V_a$ see page 7
Anode to starter voltage at $I_a = 3 \text{ mA}$ $V_{a-st}$ see page 7

LIMITING VALUES (Absolute max. rating system)

Anode to cathode voltage, negative $-V_a$ max. 100 V
Starter to cathode voltage, negative $-V_{st}$ max. 100 V
Cathode current
average during any conduction period $I_k$ min. 1 mA
average ($T_{av} = \text{ max. } 20 \text{ ms}$) $I_k$ max. 3 mA
peak $I_{kp}$ max. 10 mA 2)
Envelope temperature $t_{bulb}$ max. 70 °C
Altitude $h$ max. 20 km

LIFE EXPECTANCY

10,000 operating hours.
The tube is deemed to have reached its end of life when the anode to cathode maintaining voltage $V_{ma}$ has reached the maximum value indicated on page 6.

WAVELENGTH OF RADIATED LIGHT

580 to 700 nm

1) To avoid spurious ignition the rate of rise of applied anode voltage shall have a minimum time constant as given on page 7.

2) For higher values the manufacturer should be consulted.
ENIRONMENTAL CONDITIONS

Vibration resistance

These conditions are solely used to assess the mechanical quality of the tube. The tube must not be continuously operated under these conditions.

Vibration resistance 2.5 gpeak

Vibrational forces for a period of 32 hours at a frequency of 50 Hz in each of three directions.

Data based on pilot-production tubes.
Application of the ZC1050 in a shift register

$+320 V \pm 10\%$

$220 V \pm 15\%$

$T_e = 880 \mu s \pm 50$

Extinction pulse

Information input

$0 V$

$110 V \pm 5\%$

$320 V$

$120 V \pm 15\%$

Trigger pulse

$T_e = 60 \mu s \pm 10$

$R_1 = 82 k\Omega \ 5\% \ 0.5 W$

$C_1 = 2.2 \text{ nF} \ 10\%$

$R_2 = 22 k\Omega \ 5\% \ 0.125 W$

$C_2 = 2.2 \text{ nF} \ 10\%$

$R_3 = 1 \text{ M}\Omega \ 5\% \ 0.25 W$

$C_3 = 100 \text{ to } 500 \text{ nF}$

$R_4 = 1 \text{ M}\Omega \ 5\% \ 0.25 W$

$D_1 = \text{BYX10}$

$R_5 = 10 \text{ M}\Omega \ 10\% \ 0.125 W$

$D_2 = \text{BYX10}$

$R_6 = 10 k\Omega \ 5\% \ 0.125 W$

$V = \text{Cold Cathode Trigger tube ZC1050}$

$R_7 = 10 k\Omega \ 5\% \ 0.25 W$

$\text{Max. shift frequency } = 80 \text{ p.p.s.}$