Narragansett imaging

Data Sheet

PLUMBICON IMAGING TUBE: XQ1072N

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Camera Tube: XQ1072N

25.4 mm (1 inch) diameter Plumbicon camera tube with high-resolution lead-oxide photoconductive target; for use in medical equipment with X-ray image intensifiers with P20 output phosphor. This tube is an improved replacement for the Newvicon XQ1440 and XQ1440X tube.

QUICK REFERENCE DATA

Diameter	25.4 mm 1.0 inch	
Length (approx.)	162 mm	
Focusing	Magnetic	
Deflection	Magnetic	
Useful target area (diameter)	15 mm	
Spectral response	See figure 3	
Sensitivity with P20 light source (typical)	500 μA/lm	
Resolution: Modulation depth at 20.3 I_p/mm (typical)	65 %	[8]
Heater requirements	6.3 V 95 mA	

OPTICAL DATA

Dimensions of quality area on photoconductive target circle (diameter)	15 mm	
Faceplate Thickness	1.2 ± 0.1 mm	
Faceplate Refractive Index	1.49	

For correct orientation of the image on the target the vertical scan should be parallel to the plane passing through the tube axis and the mark on the tube base.

ACCESSORIES

Socket	Type 56092	
Deflection and focusing coil unit	Type AT1116S	

ELECTRICAL DATA

Deflection	Magnetic	
Focusing	Magnetic	
Heating	Indirect by a.c. or d.c.	
Heater Voltage V_f	6.3 (±5%) V	

Heater Current (nominal at V_f = 6.3V)	I_f	95 mA	[1]
Capacitance: signal electrode to all	C_{as}	3 – 5 pF	

This capacitance, which is effectively the output impedance, increases when the tube is inserted in the coil unit.

LIMITING VALUES (Absolute maximum rating system)

All voltages are referred to the cathode, unless otherwise stated.

Signal electrode voltage (max)	V_{as}	50 V	
Grid 4 voltage (max)	V_{g4}	1100 V	
Grid 3 voltage (max)	V_{g3}	800 V	
Voltage between grid 4 and grid 3 (max)	$V_{g4/g3}$	450 V	
Grid 2 voltage (max)	V_{g2}	350 V	
Grid 2 dissipation (max)	W_{g2}	1 W	
Grid 1 voltage, positive (max)	V_{g1}	0 V	
Grid 1 voltage, negative (max)	$-V_{g1}$	125 V	
Cathode to heater voltage, positive peak (max)	V_{kfp}	125 V	
Cathode to heater voltage, negative peak (max)	$-V_{kfp}$	50 V	

Cathode heating time before drawing cathode current (min)	t_h	1 min	
External resistance between cathode and heater, at V_{kfp} > 10 V (min)	R_{kf}	2 kΩ	
Ambient temperature, storage and operation (max/min)	T_{amb}	50/-30 °C	
Faceplate temperature, storage and operation (max/min)	T	50/-30 °C	[2]
Faceplate illuminance (max)	E	100 lx	[3]

OPERATING CONDITIONS

Conditions for a scanned circular area with a diameter of 15mm [4]

Cathode voltage	V_k	0 V	
Signal electrode voltage	V_{as}	45 V	
Beam current	I_b		[5]
Grid 4 voltage	V_{g4}	960 V	
Grid 3 voltage	V_{g3}	600 V	
Grid 2 voltage	V_{g2}	300 V	
Grid 1 voltage	V_{g1}		[5]

Blanking voltage on grid 1 (peak to peak)	$V_{g1\ p\text{-}p}$	50 ± 10 V	
Faceplate illuminance (P20 light source)	E	~1 lx	
Faceplate temperature	T	20 – 45 °C	

Electron Gun Characteristics

Grid 1 voltage for cut-off at V_{g2} = 300V without blanking	V_{g1}	-35 – -100 V	
Blanking voltage on grid 1 (peak to peak) at $V_{g2,4}$=300V	$V_{g1\ p\text{-}p}$	50 ± 10 V	
Blanking voltage on cathode (peak to peak) at $V_{g2,4}$=300V	$V_{k\ p\text{-}p}$	25 V	
Grid 2 current at normally required beam currents	I_{g2}	≤0.5 mA	

Performance

Dark current	I_d	<3 nA	
Sensitivity at colour temperature of 2856K (min/typ)		400/485 μA/lm	[6]
Sensitivity with P20 light source (min/typ)		90/115 μA/lm	
Peak signal current with E=1 lx, P20 (min/typ)		160/195 nA	[7]

Camera Tube: XQ1072N

Gamma of transfer characteristic	0.95 ± 0.05	
Spectral response	See figure 3	
Resolution: Modulation depth at 20.3 lp/mm (typ)	65 %	[8]
Decay lag: Residual signal after dark pulse of 50 ms (max/typ)	26/22 %	[9]
Decay Lag: Residual signal after dark pulse of 60 ms (max/typ)	24/20 %	[9]
Decay Lag: Residual signal after dark pulse of 200 ms (max/typ)	21/8 %	[9]
Blemishes		[10]

MECHANICAL DATA

Mounting Position	Any	
Mass (approx)	60 g	
Base	IEC 67-1-33a (JEDEC E8-11)	
Dimensions	See figures 1 and 2	

FIGURES

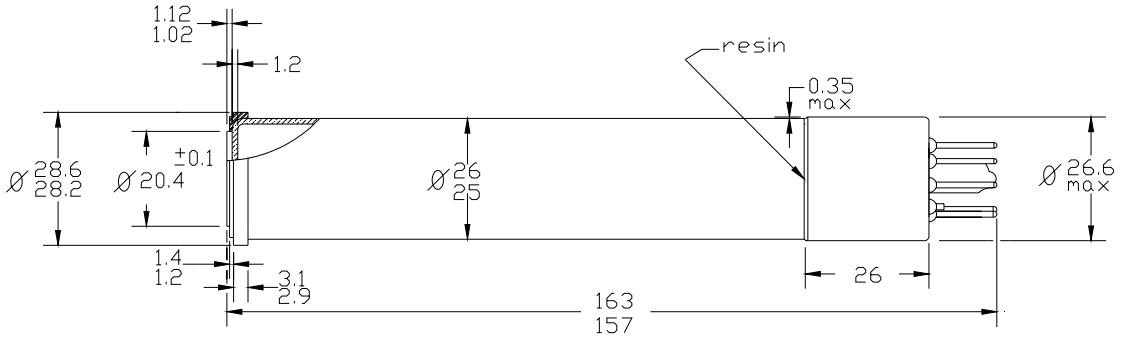
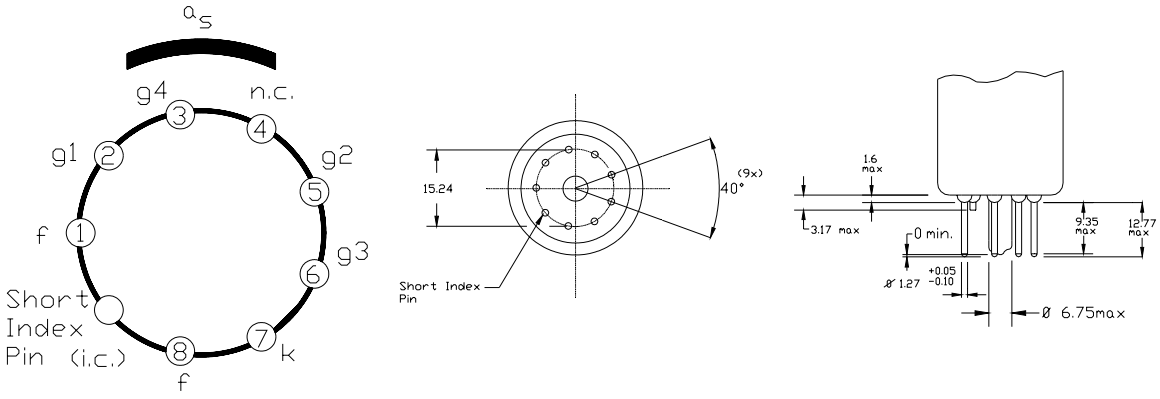


Figure 1. *Mechanical data for XQ1072N camera tube*



(a) (b) (c)

Figure 2. *Mechanical data for XQ1072N camera tube*

Camera Tube: XQ1072N

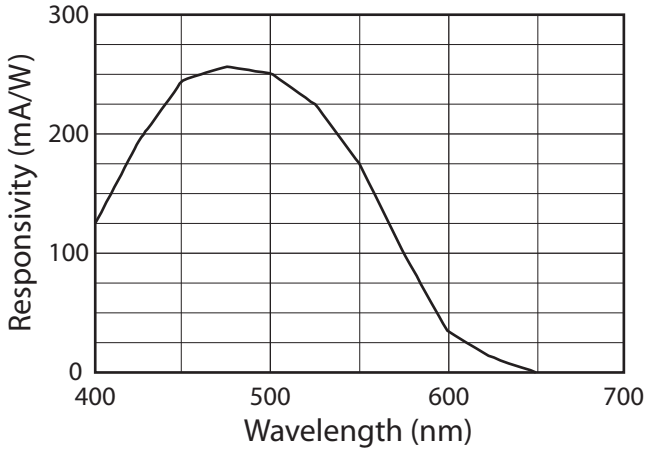


Figure 3. *Typical spectral response curve for XQ1072N camera tube*

NOTES

[1] The heater voltage must not exceed 9.5V r.m.s. For optimum performance stabilization of the heater voltage is recommended.

[2]. The tube can withstand short excursions up to 70°C without any damage or irreversible degradation in performance.

[3] For short intervals. During storage the tube face shall be covered with the plastic hood provided; when the camera is idle the lens shall be capped, in stand-by also the beam will be cut-off

[4] The operating conditions and performance data quoted relate to operation of the tube in coil units AT1116S. See relevant data of deflection/focusing assemblies. Scanning amplitude should be adjusted such that the useful target area of 15mm is displayed on a standard monitor as a circular area with a diameter equal to the raster height.

Camera Tube: XQ1072N

[5] The beam current I_b as obtained by adjusting the control grid voltage (grid 1) is set to max. 400nA. I_b is not the total current available in the scanning beam, but is defined, as the maximum amount of signal current I_s, that can be obtained with this beam. See note 7.

[6] Measuring conditions: illuminance level 4.54lx at a color temperature of 2856K and a filter Schott VG9 inserted in the light path.

[7] The peak signal currents are measured on a waveform oscilloscope and with a uniform illumination on the 18-mm diameter target area. When measured with an integrating instrument connected to the signal-electrode lead the average signal currents will be smaller by:

a) A factor α (α = [100-β]/100), β being the total blanking time in %. For the CCIR system α amounts to 0.75; for the EIA system α amounts to 0.83.

b) A factor δ, where δ is the ratio of the active target area (circle with a diameter of 15mm) to the area which would correspond with the adjusted scanning amplitude (15mm x 20mm). This ratio amounts to δ = 0.59.
The total ratio of integrated signal current, I_s, to the peak signal current, I_{sp}, is $\alpha \times \delta$ = 0.44 for the CCIR system and 0.49 for EIA system.

[8] Modulation depth is defined as the uncompensated amplitude response at 20.3lp/mm (scanned area 9.6mm $\times$ 12.8mm) at the center of the picture (5Mhz, 400 TV lines) with a BG18 filter. As measured with a 50mm Leitz Summicron lens having a sine response of approximately 85% at 400 TV lines at f: 5.6. The published 65% (typical) is uncorrected. Tube resolution is higher. Measured with 100nA signal current and a beam current just sufficient to stabilize a signal current of 400nA. The horizontal amplitude response can

be raised by means of suitable correction circuits, which affect neither the vertical resolution nor the limiting resolution.

[9] Decay lag is defined using a P20 light source, measured with a signal current of 200nA, beam adjusted for correct stabilization after the target has been illuminated for at least 5s.

[10] For details of test procedures for determining blemishes, see Narragansett Imaging document PLUMBICON IMAGING TUBES: TEST SPECIFICATION.