



ELECTRONIC TUBE REFERENCE

1300Z

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Flat-faced rectangular oscilloscope cathode-ray tube with post-deflection acceleration for general-purpose instrument service. Its electrostatic display system operates with several-kilovolt accelerating potentials and is intended to provide a bright, well-defined oscillographic trace.

GENERAL CHARACTERISTICS

BASE DESIGNATION	B12F	BASE PINS	12
NOMINAL HEATER	6.3 V / 300 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 0 Cathode Ray	
MAXIMUM PLATE VOLTAGE	7000 V
Fourth anode absolute maximum 7.0 kV.	

1300Z — Instrument Cathode Ray Tube

The **1300Z** is a 13 cm flat-faced, single-gun, spiral post-deflection acceleration (p.d.a.) cathode ray tube designed for medium bandwidth applications. It features electrostatic focus, electrostatic deflection, and deflection blanking. The scan voltages required for this tube are compatible with transistorised deflection circuits. Additionally, the tube can be configured to operate as a mono-accelerator, which provides a larger scanned area.

Screen and Heater Specifications

The 1300Z is available with different phosphor screens to suit specific display requirements. The two primary standard configurations are designated as **1324Z** and **1346Z**:

Parameter	1324Z	1346Z
Fluorescence	Green	White
Phosphorescence	Green	Yellowish-Green
Persistence	1-5 ms	10-60 s
E.I.A. Phosphor Code	P31	P7
Pro Electron Code	GH	GM
GEC Phosphor Code	24	46

Other screens can be supplied to special order.

The tube's heater is designed for indirect heating with the following nominal electrical characteristics:

- **Heater Voltage:** 6.3 V
- **Heater Current:** 0.3 A

Physical Dimensions, Mounting, and Base Connections

The 1300Z has a nominal face diameter of 13 cm with a flat profile, providing a useful screen diameter of 12 cm. The tube has a maximum overall length of 371 mm and weighs approximately 1 kg (tube alone).

Mounting and Shielding

The tube may be mounted in any position. However, it should not be supported by the base alone. The recommended mounting method is to hold the tube in a suitable rubber mask at the screen and secure it with a clamp around the magnetic shield near the base. The socket should have sufficient freedom of movement to accommodate variations in overall length and base orientation tolerances.

Because the tube is sensitive to magnetic fields, care should be taken not to expose it to strong magnetic fields during either operation or storage. A suitable magnetic shield is recommended for typical installations, and can be obtained from Magnetic Shields Ltd., Headcorn Road, Staplehurst, Tonbridge, Kent.

Base Connections

The tube utilizes a **B12F** base, supplemented by a side contact and a neck contact, both of the **CT8** type. The side contact is connected to the fourth anode (a_4), and the neck contact is connected to the geometry correction electrode (s).

The pin connections, viewed from the base, are as follows:

Pin	Connection
1	Control grid (g_1)

Pin	Connection
2	Cathode (k)
3	Heater (h)
4	Heater (h)
5	Blanking plate (g_2) [internally connected to pin 12 if unused]
6	Focus anode (a_2)
7	Y-deflection plate (y_1)
8	Y-deflection plate (y_2)
9	Third anode (a_3)
10	X-deflection plate (x_1)
11	X-deflection plate (x_2)
12	First anode (a_1)

Note: If any electrode is not used, it must be connected to the pin shown in brackets (for example, connecting g_2 to pin 12).

Electrical Ratings and Capacitances

The absolute maximum and minimum ratings (measured with respect to the cathode unless otherwise specified) are detailed below:

Parameter	Symbol	Minimum	Maximum	Unit
Fourth anode voltage	V_{a4}	1.8	7.0	kV
Third anode voltage	V_{a3}	0.8	2.5	kV
Anode voltage ratio	V_{a4}/V_{a3}	1	4	—
Focus voltage	V_{a2}	0	1.0	kV
First anode voltage	V_{a1}	0.8	2.2	kV
Control grid voltage	$-V_{g1}$	1.0	200	V

Parameter	Symbol	Minimum	Maximum	Unit
Blanking plate to first anode voltage	V_{g2-a1}	-200	+200	V
Y plate to third anode voltage	V_{y-a3}	—	500	V
X plate to third anode voltage	V_{x-a3}	—	500	V
Heater-cathode voltage	V_{h-k}	—	125	V
Grid to cathode circuit resistance	R_{g1-k}	—	1.5	MΩ
Y deflector plate circuit resistance	R_{y-a3}	—	100	kΩ
X deflector plate circuit resistance	R_{x-a3}	—	500	kΩ
Post-deflection accelerator spiral resistance	—	75	—	MΩ

Typical Interelectrode Capacitances

- **Cathode to all other electrodes:** 4 pF
- **Control grid to all other electrodes:** 8 pF
- **Blanking plate to all other electrodes:** 11 pF
- **Deflector plates y_1 to y_2 :** 1.6 pF
- **Deflector plates y_1 to all electrodes except y_2 :** 5.0 pF
- **Deflector plates y_2 to all electrodes except y_1 :** 5.5 pF
- **Deflector plates x_1 to x_2 :** 2.2 pF
- **Deflector plates x_1 to all electrodes except x_2 :** 6.2 pF
- **Deflector plates x_2 to all electrodes except x_1 :** 6.2 pF

Operating Configurations and Typical Performance

The 1300Z can be operated in three distinct configurations depending on the application requirements: two post-deflection acceleration (p.d.a.) modes and a mono-accelerator mode.

Typical Operating Potentials (with respect to cathode)

Parameter	Configuration (i) [3:1 p.d.a.]	Configuration (ii) [4:1 p.d.a.]	Configuration (iii) [Mono-accelerator]
Fourth Anode Voltage (V_{a4})	3 kV	4 kV	2 kV
Third Anode Voltage (V_{a3})	1 kV	1 kV	2 kV
First Anode Voltage (V_{a1})	1 kV	1 kV	2 kV
Focus Voltage (V_{a2})	175–400 V	175–400 V	350–800 V
Control Grid Voltage for Spot Cut-off ($-V_{g1}$)	35–65 V	35–65 V	70–130 V
Nominal Blanking Plate Voltage ($V_{[g2]}/(tubes/G2)$)	1 kV	1 kV	2 kV
Nominal Geometry Correction Voltage (V_s)	1 kV	1 kV	2 kV
Maximum Y Deflection Factor (D_y)	8.7 V/cm	9.2 V/cm	13 V/cm
Maximum X Deflection Factor (D_x)	16.5 V/cm	18.0 V/cm	21 V/cm
Minimum Scanned Area (X-axis)	10.5 cm	10 cm	11.5 cm
Minimum Scanned Area (Y-axis)	8.4 cm	8 cm	10 cm

Mono-accelerator Configuration Details

When operating the 1300Z in the mono-accelerator mode (simple circuit), the two CT8 contacts (side and neck) and pins 5, 9, and 12 must all be connected to each other, unless separate potentials are applied for specific correction requirements. This ties the first anode (a_1), third anode (a_3), fourth anode (a_4), blanking plate (g_2), and geometry correction electrode (s) to a common 2 kV potential.

Beam Control, Correction, and Distortion Limits

Beam Blanking

The 1300Z features a dedicated blanking electrode ($g2$). At a beam current of $10\ \mu\text{A}$, applying a potential of $+65\ \text{V/kV}_{a1}$ with respect to $a1$ to the blanking electrode will completely cut off the electron beam. This electrode is designed strictly for blanking and must not be used as a brightness control.

Astigmatism and Pattern Correction

- **Astigmatism Correction:** Adjusting the potential on the third anode ($a3$) relative to the mean potential of the Y-deflection plates corrects astigmatism. A design adjustment range of $\pm 50\ \text{V/kV}_{a3}$ should be provided.
- **Pattern Correction:** Barrel or pincushion distortion can be minimized by applying an appropriate potential to the geometry correction electrode (s) with respect to the mean potential of the X-deflection plates. An adjustment range of $\pm 50\ \text{V/kV}_{a3}$ is recommended.

These correction potentials are specified for conditions where the mean potential of the X-plates equals the mean potential of the Y-plates. If a difference between these mean potentials is unavoidable, it should be kept to a minimum. In many applications, these correction potentials may not be necessary.

Distortion and Linearity Limits

When pattern correction is applied, the edges of a test raster are constrained to lie between two concentric rectangles measuring $100 \times 60\ \text{mm}$ and $97.5 \times 58.5\ \text{mm}$. The orthogonal angle between the X and Y deflection axes is maintained at $90^\circ \pm 1^\circ$.

Deflection linearity is tightly controlled: the deflection factor for any deflection of less than 75% of the useful scan will not deviate from the deflection factor at 25% of the scan by more than 2%.

Spot Centering

The minimum scanned area is centered on a point within 3 mm of the physical center of the tube face. Under undeflected conditions, the spot is guaranteed to lie within a 14 mm square at the physical center of the tube face.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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Section 0 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Third Anode Voltage Maximum	2500 V	—
First Anode Voltage Maximum	2200 V	—
Typical Fourth Anode Voltage	3000 V	TypicalOperation

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