TH 8205
RECTANGULAR CATHODE RAY TUBE

FOR HIGH FREQUENCY OSCILLOSCOPY (100 TO 150 MHz)
HIGH SENSITIVITY (2 V/cm ON Y AXIS – 5. 5V/cm ON X AXIS)
FINAL ACCELERATOR VOLTAGE 15 kV
SHORT LENGTH (340 mm)
100 mm x 80 mm USEFUL SCREEN
INTERNAL GRATICULE

The TH 8205 is a rectangular flat faceplate electrostatic focus and deflection CRT including a post deflection acceleration system. In spite of a short length, a high deflection sensitivity is achieved by means of amplified deflection design thanks to a unique combination of quadrupolar and slot lenses.

The vertical deflection section of the TH 8205 can operate without loss of sensitivity up to 150 MHz. The high writing speed allows the observation of transient phenomena.



High sensitivity and reduced size make the tube particularly suitable for high performance all transistor compact oscilloscopes.

All deflection plates are fed by means of leads located on the neck of the tube so as to assure shorter connections.

The aluminized screen includes a graticule avoiding parallax distorsion.

The magnetic field created by a coil fitted around the tube bulb permits accurate alignment of x trace with x'x axis of graticule.

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GENERAL CHARACTERISTICS

Mechanical

Overal length	340 mm (13.4")
Faceplate dimensions :	
- width	120 mm (4.8")
-height	100 mm (4")
Graticulated useful area	100 mmx80 mm (4"x3.2")
Neck diameter	50.8 mm
Bulb contact	UTE C8–1 (JEDEC J1-21)
Base (14 pins)	UTE 14C 25
Bulb contact aligns with x'x axis of graticule	± 10°
Deflection plate leads	on the neck
Socket	THOMSON-CSF N° 8103318
Net weight,approx.	1 kg
Mounting position (Note 1)	any

Electrical

Cathode	unipotential indirectly heated oxide coated
Heater voltage	12.6 V
Heater current	0.125 to 0.175 A
Minimum preheating time	60 s
Interelectrode capacitances (without external shield):	
- grid g1 to all other electrodes	max 15 pF
- $2C_{x1x2}+C_x$ to all other electrodes	max 15 pF
- $2C_{y1y2}+C_y$ to all other electrodes	max 10 pF
Focusing method	electrostatic
Deflection method	electrostatic
Operating frequency	up to 150 MHz

Optical

Faceplate	clear	
Screen	aluminized	
Phosphor type*	P11	P31
Fluorescence and phosphorescence	blue	green
Persistence	medium short	medium short
- at 10 %	65 µs	40 µs
- at 1 %	200 µs	250 µs

* Other phosphor on request

OPERATING CONDITIONS

(All potentials are referred to cathode except for modulation)

Maximum ratings (absolute value)

Grid n°6 voltage (post-acceleration) (note 2)	max.	16000	V
	min.	11500	V
Grid n°5 voltage (geometry)	max.	2000	V
Grid n°4 voltage (astigmatism)	max.	2500	V
Grid n°3 voltage (focus)	max.	1000	V
	min.	0	V
Grid n°2 voltage (acceleration)	max.	2000	V
	min.	1500	V
Grid n°1 voltage :			
negative bias value	max.	180	V
positive bias value	max.	0	V
positive peak value	max.	0	V
Peak voltage between grid n°2 and any deflection plate	max.	300	V
1st quadrupole voltage	max.	2500	V
2nd quadrupole voltage	max.	3000	V
Voltage between heater and cathode :			
heater negative with respect to cathode	max.	150	V
heater positive with respect to cathode	max.	150	V
Grid n °1 resistance	max.	1 .5	MΩ
Deflection plate resistance	max.	0 .1	MΩ

Typical operation (note 3)

Grid n°6 voltage	15000	V
Grid n°5 voltage (note4)	1450 to 1550	V
Grid n°4 voltage	1625to 1875	V
Grid n°3 voltage	0 to 300	V
Grid n°2 voltage	1500*	V
Grid n°1 voltage (for cut-off)	-50 to -90	V
1st quadrupole voltage :		
x axis	1250 to 1500	V
y axis	1500*	V
2nd quadrupole voltage (note 4) :		
x axis	1900 to 2150	V
y axis	1250 to 1500	V
Modulation (I g6 = 5µA)	max. 70	V
Resolution (at center) (note 5)	0 .5	mm
Spot position,focused and undeflected (note 6)	12	mm
Deflection characteristics :		
x plate deflection factor	5 .5	V/cm
y plate deflection factor	2	V/cm
deflection factor uniformity (note 7)	2	%
Useful screen area :		
x axis	min. 100	mm
y axis	min. 80	mm
Trace alignment :		
angle between traces	89 to 91	°
angle between x trace and horizontal axis of graticule (note 8)	±4	°
Pattern distortion (note 9)		
Trace rotation coil (note 10)		

* Grid g2 and j1y are connected inside the tube.

NOTES

1 In mounting the tube, following remarks should be noticed :
- When a positive voltage is applied to x1 deflection plates the spot is deviated approximately in the direction shown by pin n° 5.
- When a positive voltage is applied to y1 deflection plates the spot is deviated approximately in the direction shown by pin n° 8.

2 The tube being operated at high post-acceleration voltage in excess of 16 kV, care should be taken to protect the operator from X-radiation, although dose rate is widely inferior to maximum ratings of safety specifications.

3 In most cases, it is advisable to connect grid n° 2 to ground, thereby the deflection plates are maintained at low voltages with respect to the ground.

4 In order to obtain optimum image geometry, grid n° 5 voltage and average quadrupole voltages are to be adjusted within indicated value range.

5 Line width measured for a beam current I g6 = 10 μA by the raster shrinking method. Astigmatism and focusing voltages are to be adjusted within indicated value range so to obtain the optimum resolution.

6 Deflection plates are connected to grid n° 2.
The indicated value corresponds to the side of a square the centre of which coincides with the geometric centre of the screen.

7 The deflection factor (for both pairs separately) for a deflection of 100% of the minimum useful scan will not differ from the deflection factor of 80% of the minimum useful scan by more than the indicated value.

8 Without magnetic correction.

9 A transparent overlay consisting of two concentric rectangles of 100 x 80 mm and 98 x 78 mm is centered on the face of the tube. The edges of a raster should lie between these rectangles with optimum correction voltages applied.

10 The parallelism between x trace and xx' axis on graticule can be obtained by adjusting the current of magnetic flat coil located around the bulb at about 30 mm from faceplate. In the typical operation given above, the angular rotation sensitivity is about 20 At/ °.

GENERAL OPERATIONAL RECOMMENDATIONS

Handling

The tube should be handled carefully so to avoid the risk of implosion.
The precautions taken in manufacture reduce the possibility of spontaneous implosion to a minimum but additional stress due to mishandling increases the risk of implosion that may occur immediately or may be delayed.
It is recommended to take the tube out of its original packing only when it is needed for mounting on the equipment :
- Handle the tube by the bulb near the screen;
- Place the screen downwards on a soft pad free from abrasive material;
- Do not put hands on the anode connector which might be electrically charged even after the tube has been removed from equipment;
- Protect the face and hands by using a mask and gloves.

Mounting

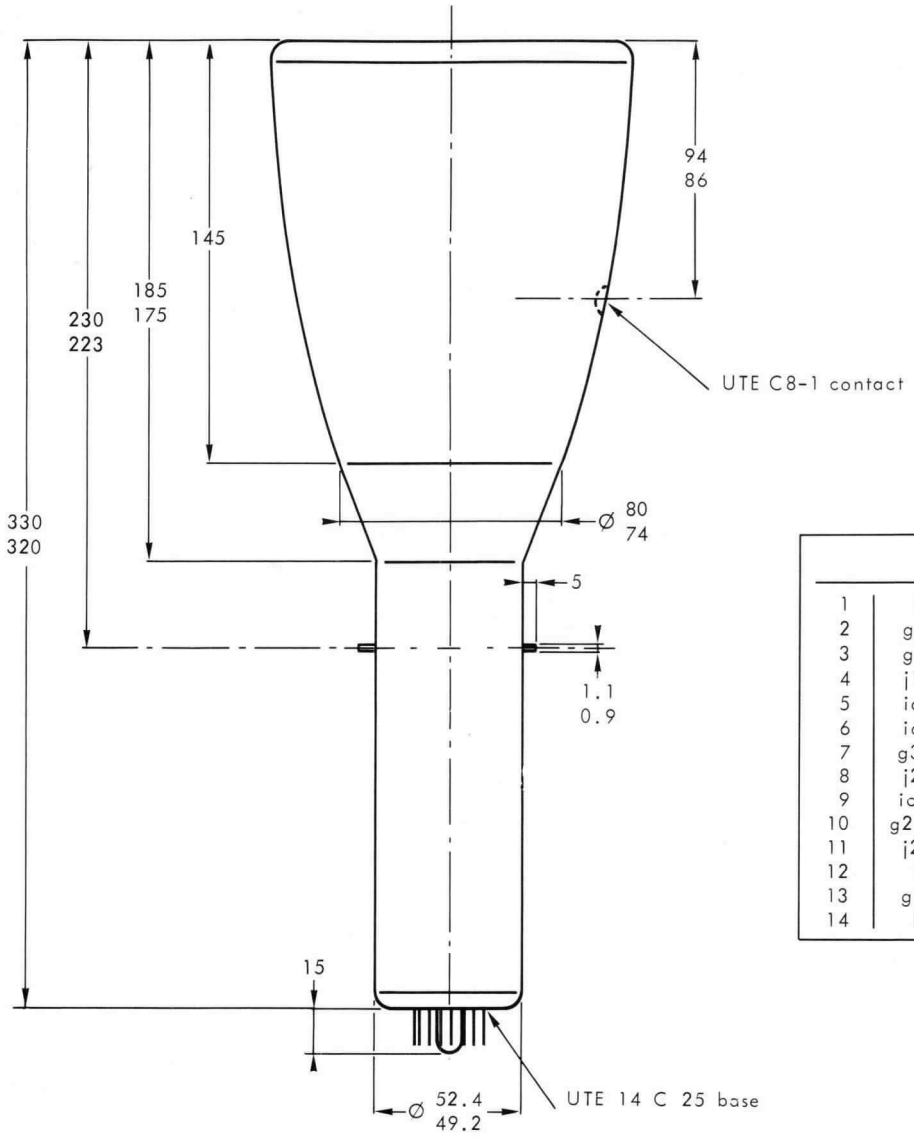
In mounting the tube, supports must be arranged so that no stresses are produced in the glass.
The tube will be maintained at 2 places : near the faceplate by using a shaped support and near the base.
The tube shall not be supported by its base.
Felt or rubber pad must be interposed between the tube and the support so as to avoid direct contact between hard surfaces.
The tube socket should not be rigidly mounted and should have flexible leads and be allowed to move freely. The anode connector should also be flexible in order to avoid stresses in the glass.
In the design of equipment, dimensional tolerances of the tube should be taken into account and reliance should not be placed upon dimensions taken from individual tubes.

Operating

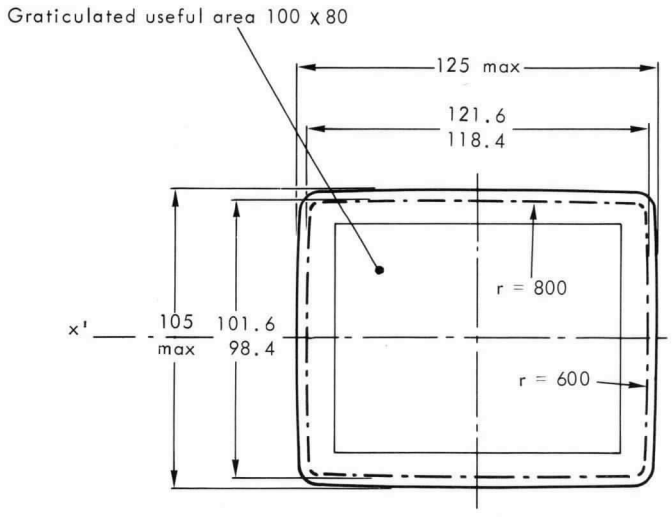
A high permeability shield (mumetal) is necessary to protect the tube against external magnetic fields.
The insulation of the heater transformer should be designed to withstand the operation when the cathode is at a high potential. It is advisable to connect one end or the centre point of the heater transformer to the cathode in order to avoid damaging the heater or the cathode in case of internal breakdown.
When the heater can not be connected to the cathode, the potential difference between heater and cathode cannot be allowed to exceed the absolute ratings specified in "Operating Conditions".
To prevent permanent damage to the screen, tube should not be operated with a stationary or slowly moving spot except at low beam current density. It is advisable to apply scanning voltages before cathode current is established.
Because the anode connector is at very high voltage, particular care should be taken to avoid corona effect and leakage current.

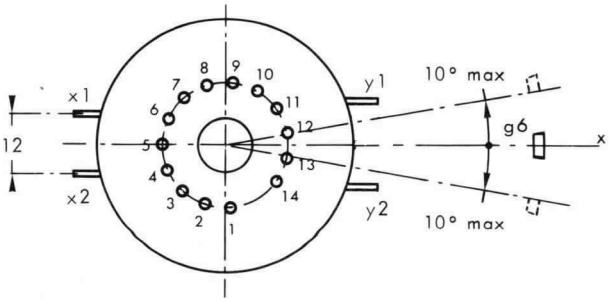
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OUTLINE DRAWING



BASING DIAGRAM		
1	h	heater
2	g5	geometry
3	g4	astigmatism
4	j1 x	1 st quadrupole
5	ic	internal connection
6	ic	internal connection
7	g3	focus
8	j2 x	2 nd duadrupole
9	ic	internal connection
10	g2 + j1 y	acceleration + 1st quadrupole
11	j2y	2 nd quadrupole
12	k	cathode
13	g1	wehnelt
14	h	heater





Imprimé en France