



# 6173

## UHF DIODE

"Pencil-Type" for Pulse-Detection Service

TENTATIVE DATA

RCA-6173 is a "pencil-type", high-perveance, uhf diode intended particularly for use in pulse-detection and pulse-power-measuring service. In such service, it may be operated at frequencies as high as 3300 megacycles per second. Because of its small size and frequency capability, the tube is especially useful in rf probes of electronic voltmeters.



Actual Size

The "pencil-type" design of the 6173 features a coaxial-electrode structure of the double-ended metal-glass type having minimum transit time, low lead inductance, and low interelectrode capacitance. Other desirable features include very low heater wattage (0.85 watt), and a weight of only 1/5 ounce.

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC) . . . . .	6.3 ± 10%	volts	
Current at 6.3 volts . . . . .	0.135	amp	
Resonant Frequency (Approx.) . . . . .	1600	Mc	
Direct Interelectrode Capacitance (Approx.):			
Plate to cathode . . . . .	1.1	μf	

#### Mechanical:

Mounting Position. . . . .	Any
Dimensions and Terminal Connections. . . . .	See Outline Drawing

### PULSE-DETECTION AND PULSE-POWER-MEASURING SERVICE<sup>▲</sup>

#### Maximum Ratings, Absolute Values:

PEAK INVERSE PLATE VOLTAGE . . . . .	1000 max.	volts
PEAK PULSE PLATE VOLTAGE . . . . .	150 max.	volts
PEAK PULSE PLATE CURRENT . . . . .	1.0 max.	amp
AVERAGE PLATE CURRENT. . . . .	1 max.	ma.
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	90 max.	volts
Heater positive with respect to cathode. . . . .	90 max.	volts
SEAL TEMPERATURE (Plate or Cathode). . . . .	175 max.	°C

### HALF-WAVE RECTIFIER

#### Maximum Ratings, Absolute Values:

PEAK INVERSE PLATE VOLTAGE . . . . .	375 max.	volts
PEAK PLATE CURRENT . . . . .	50 max.	ma
HOT-SWITCHING TRANSIENT PLATE CURRENT		
For duration of 0.2 second maximum . . . . .	250 max.	ma
DC OUTPUT CURRENT. . . . .	5.5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	90 max.	volts
Heater positive with respect to cathode. . . . .	90 max.	volts
SEAL TEMPERATURE (Plate or Cathode). . . . .	175 max.	°C

### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current . . . . .	1	0.125	0.145	amp
Plate-to-Cathode Capacitance . . . . .	-	0.8	1.4	μf
Tube Voltage Drop. . . . .	1.2	-	15	volts

Note 1: With 6.3 volts ac or dc on heater.  
Note 2: With peak plate current of 50 milliamperes provided by an applied dc voltage. Tube drop is measured by a voltmeter connected between plate and cathode.

▲ In this class of service, the heater should be allowed to warm up for a minimum of 60 seconds before plate voltage is applied in order to allow the cathode to reach normal operating temperature and to be able to supply the high peak plate currents encountered in this class of service.

### OPERATING CONSIDERATIONS

The *maximum ratings* are limiting values above which the serviceability of the 6173 may be impaired from the viewpoint of life and satisfactory performance. Therefore, in order not to exceed these absolute ratings, the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that rating by an amount such that the absolute values will never be exceeded under any usual conditions of supply-voltage variation, load variation, or manufacturing variation in the equipment itself.

The *temperature* of the plate or cathode seal should not exceed 175°C. The temperature may be measured with temperature sensitive paint, such as Tempilaq. The latter is made by the Tempil Corporation, 132 West 22nd Street, New York 11, N. Y. in the form of liquid and stick, and is stated by the manufacturer to have an accuracy of one per cent.

*Connections* to the cathode cylinder and plate cylinder should be made by flexible spring contacts only. The connectors must make firm, large-surface contact, yet must be sufficiently flexible so that no part of the tube is subjected to strain. Unless this recommendation is observed, the glass-to-metal seals may be damaged.

The *heater* leads of the 6173 fit the Cinch Socket No. 54A16325. They should not be soldered to circuit elements. The heat of the soldering operation may crack the glass seals of the heater leads and damage the tube.

The *cathode* should preferably be connected to one side of the heater. When, in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold



the peak heater-cathode voltage to the maximum values shown in the tabulated data. RF chokes may be used in the heater leads to keep the rf potential between heater and cathode at a low value.

In *rectifier service*, the 6173 requires a minimum plate-load impedance (including the source impedance) of 300 ohms to limit the hot-switching transient plate current and thereby prevent damage to the tube when the plate voltage is applied.

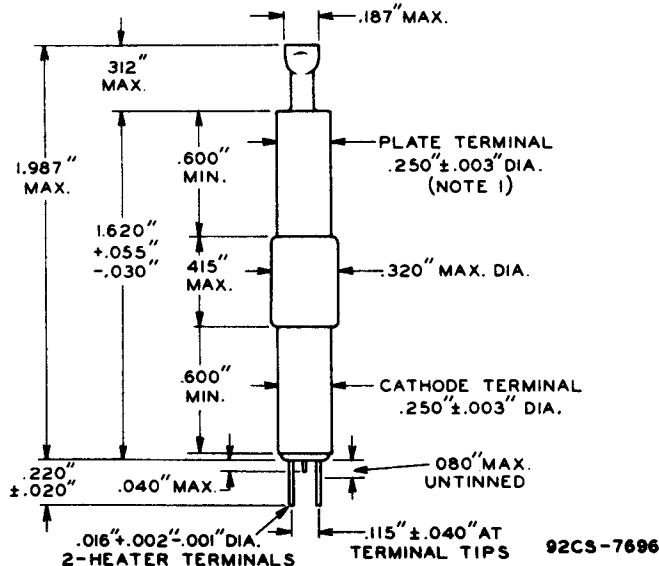
The *resonant frequency* shown in the tabulated data is an approximate value which will change from tube to tube and with mounting arrangement. When the tube is used in rf probes of electronic voltmeters at the resonant frequency or in its vicinity, the output voltage will increase unless suitable compensation is provided.

The *Pulse Rating Chart* given in Fig. 2 represents graphically the relationships between pulse duration, pulse repetition rate, and peak pulse plate current. This Chart gives the equipment designer a wide choice of operating parameters within the tube's ratings.

Dotted boundary line "ABC" is the locus of the maximum peak pulse plate current values for various pulse durations. In most applications, two of the three parameters shown in the Pulse Rating Chart are known. Knowing any two parameters, the equipment designer can select from the Chart the maximum allowable value of the third parameter. For example, if an application requires a 1.0-microsecond pulse and a pulse repetition rate of 1000 per second, the maximum allowable peak pulse plate current is 1.0 ampere. Since the pulse repetition rate of 1000 is a maximum value for a pulse duration of 1.0 microsecond, it follows that any pulse repetition rate up to 1000 may be used under these conditions. If a longer pulse duration is required, e.g., 1.5 microseconds, and the same pulse repetition rate of 1000 is required, the maximum allowable peak pulse plate current is 0.67 ampere.

In applications where groups of pulses are employed, the equipment designer can total the pulse duration of the individual pulses in any one group and then treat the pulse duration of the group as a single wide pulse.

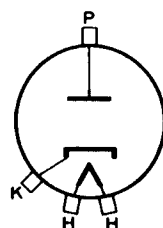
### DIMENSIONAL OUTLINE



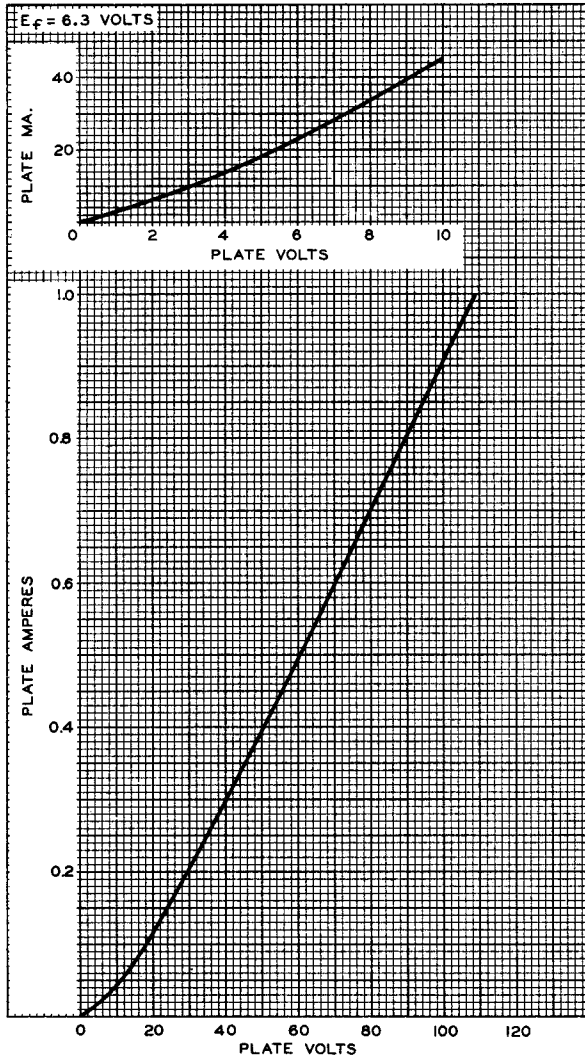
NOTE 1: MAX. ECCENTRICITY OF  $\phi$  (AXIS) OF PLATE TERMINAL WITH RESPECT TO THE  $\phi$  (AXIS) OF THE CATHODE TERMINAL IS 0.008".

### TERMINAL CONNECTIONS

H: HEATER LEADS  
P: PLATE CYLINDER  
(Adjacent to Pinch-off)

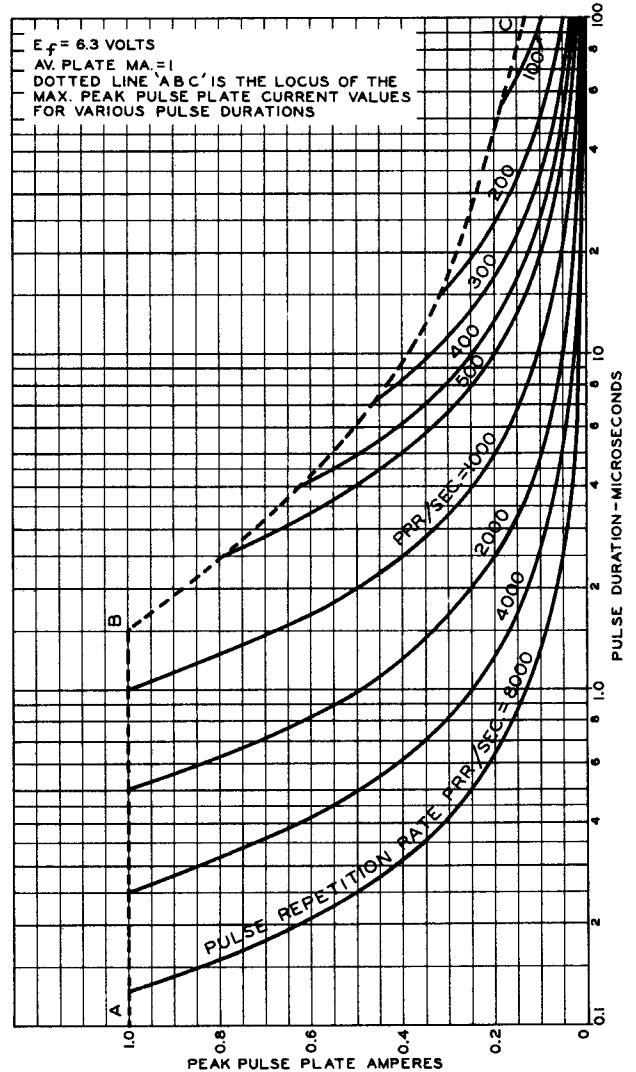


K: CATHODE CYLINDER  
(Adjacent to Heater Leads)



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Fig. 1 - Average Plate Characteristics of Type 6173.



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Fig. 2 - Pulse Rating Chart of Type 6173.

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