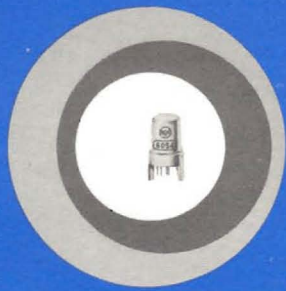


**RCA**

**nuvistor**



**6BS4  
2BS4**

**HIGH-MU TRIODES**

with semiremote-cutoff characteristic

**FOR TV AND FM  
TUNER DESIGNS**



**RADIO CORPORATION OF AMERICA**

ELECTRON TUBE DIVISION

HARRISON, N. J.

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# RCA-2DS4, 6DS4

## High-Mu Nuvistor Triodes

With Semiremote-Cutoff Characteristic

RCA-2DS4 and 6DS4 are high-mu triodes of the nuvistor type intended for use as grounded-cathode, neutralized rf-amplifier tubes in vhf tuners of television and FM receivers. The 2DS4 and 6DS4, in this application, provide exceptional performance in fringe areas and other locations where signal levels are very weak. These nuvistor triodes feature excellent signal power gain and a very low noise factor. In addition, the semiremote-cutoff characteristic of these tubes reduces cross-modulation distortion.



The high-gain and low-noise capabilities of the 2DS4 and 6DS4 are achieved by very high transconductance and excellent transconductance-to-plate-current ratio (12500 micromhos at a plate current of 7 milliamperes and a plate voltage of 70 volts).

The 2DS4 and 6DS4 nuvistor triodes offer extreme reliability, exceptional uniformity of characteristics from tube to tube, very small size, and low heater-power and plate-power requirements. In addition, their all metal-and-ceramic construction insures exceptional ruggedness and long-term stability.

### GENERAL DATA

#### Electrical:

|   | 2DS4      | 6DS4      |       |
|---|-----------|-----------|-------|
| <b>Heater, for Unipotential Cathode:</b>                    |           |           |       |
| Voltage (ac or dc) . . . . .                                | 2.1       | 6.3 ± 10% | volts |
| Current . . . . .   | 0.45 ± 6% | 0.135     | amp   |
| Warm-up time (Average) . . . . .                            | 8         | -         | sec   |
| <b>Direct Interelectrode Capacitances (Approx.):</b>        |           |           |       |
| Grid to plate . . . . .                                     |           | 0.92      | pf    |
| Grid to cathode, shell, and heater . . . . .                |           | 4.3       | pf    |
| Plate to cathode, shell, and heater . . . . .               |           | 1.8       | pf    |
| Plate to cathode . . . . .                                  |           | 0.18      | pf    |
| Heater to cathode . . . . .                                 |           | 1.6       | pf    |
| <b>Characteristics, Class A<sub>1</sub> Amplifier:</b>      |           |           |       |
| Plate Supply Voltage . . . . .                              |           | 110       | volts |
| Grid Supply Voltage . . . . .                               |           | 0         | volts |
| Cathode Resistor . . . . .                                  |           | 130       | ohms  |
| Amplification Factor . . . . .                              |           | 63        |       |
| Plate Resistance (Approx.) . . . . .                        |           | 7000      | ohms  |
| Transconductance . . . . .                                  |           | 9000      | μmhos |
| Plate Current . . . . .                                     |           | 6.5       | ma    |
| Grid Voltage (Approx.) for plate current = 100 μa . . . . . |           | -5        | volts |
| Grid Voltage (Approx.) for plate current = 10 μa . . . . .  |           | -6.8      | volts |

# 2DS4, 6DS4

## Mechanical:

|                                   |   |
|-----------------------------------|---|
| Operating Position . . . . .      | Any   |
| Maximum Over-all Length . . . . . | 0.8"  |
| Maximum Seated Height . . . . .   | 0.625"  |
| Maximum Diameter . . . . .        | 0.440"  |
| Envelope . . . . .                | Metal Shell   |
| Base . . . . .                    | Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65) |

## Maximum Ratings, Design-Maximum Values:

|  |   |       |
|--|---|-------|
| PLATE SUPPLY VOLTAGE . . . . .   | 300 <sup>●</sup> max.                     | volts |
| PLATE VOLTAGE . . . . .  | 135 max.                                  | volts |
| GRID VOLTAGE:  |   |       |
| Negative-bias value . . . . .  | 55 max.                                   | volts |
| Peak positive value . . . . .  | 0 max.                                    | volts |
| PLATE DISSIPATION:   |   |       |
| With a minimum series plate-circuit<br>resistance of 5000 ohms . . . . . | 1.5 max.                                  | watts |
| For lower values of series plate-circuit<br>resistance . . . . .         | See Fig.1 and<br>Operating Considerations |       |
| CATHODE CURRENT . . . . .  | 15 max.                                   | ma    |
| PEAK HEATER-CATHODE VOLTAGE:   |   |       |
| Heater negative with respect to cathode . . . . .                        | 100 max.                                  | volts |
| Heater positive with respect to cathode . . . . .                        | 100 max.                                  | volts |

## Typical Operation:

|                                      |       |           |
|--------------------------------------|-------|-----------|
| Plate Voltage . . . . .              | 70    | volts     |
| Grid Supply Voltage . . . . .        | 0     | volts     |
| Grid Resistor . . . . .              | 47000 | ohms      |
| Amplification Factor . . . . .       | 68    |           |
| Plate Resistance (Approx.) . . . . . | 5440  | ohms      |
| Transconductance . . . . .           | 12500 | $\mu$ hos |
| Plate Current . . . . .              | 7     | ma        |

## Maximum Circuit Values:

### Grid-Circuit Resistance:<sup>★</sup>

|                                      |          |         |
|--------------------------------------|----------|---------|
| For fixed-bias operation . . . . .   | 0.5 max. | megohm  |
| For cathode-bias operation . . . . . | 2.2 max. | megohms |

<sup>●</sup> A plate supply voltage of 300 volts may be used provided sufficient plate-circuit resistance and *agc* voltage are used to limit the voltage at the plate of the tube to 135 volts under conditions of maximum rated plate dissipation (1.5 watts).

<sup>★</sup> For operation at metal-shell temperatures up to 135° C.

## OPERATING CONSIDERATIONS

The *base pins* of the 2DS4 and 6DS4 fit the Cinch Manufacturing Co. socket No.133 65 10 001 and the Industrial Electronic Hardware Co. socket Nos.Nu 5044 and Nu 5060, or their equivalents.

In some previous publications reference has been made to a JEDEC No.E5-65 socket. This number is not a socket designation but is a base designation which defines the JEDEC Medium Ceramic-Wafer Twelvar 5-pin base used in nuvistor tubes.

## Use of Plate-Dissipation Rating Chart

The *Plate-Dissipation Rating Chart* shown in Fig.1 presents graphically the maximum rated plate dissipation of the 2DS4 and 6DS4 for various minimum

values of series plate-circuit resistance. The region of permissible operation is bounded by the lines representing plate dissipation = 1.5 watts, plate voltage = 135 volts, and plate current = 15 milliamperes. In class A<sub>1</sub> amplifier service, because no grid current flows, the plate current rating is equivalent to the cathode current rating.

To determine the required minimum series plate-circuit resistance for a given set of operating conditions:

1. From Fig.2, Average Plate Characteristics, select the desired operating conditions.
2. From Fig.1 determine the corresponding maximum plate dissipation and required minimum value of series plate-circuit resistance.

Example: (a) From Fig.2—for a plate voltage of 110 volts and a grid voltage of -0.5 volt, the corresponding plate current is 10.7 milliamperes.

(b) From Fig.1—the plate dissipation for a plate voltage of 110 volts and a plate current of 10.7 milliamperes is approximately 1.18 watts. The required minimum series plate-circuit resistance for this plate dissipation is 1800 ohms.

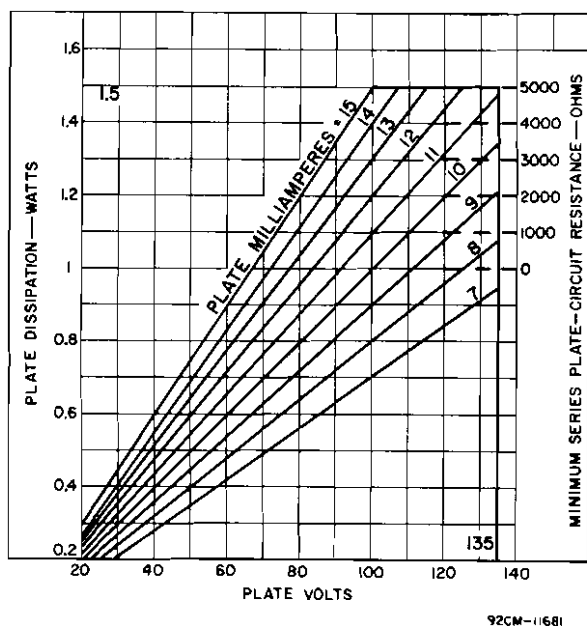


Fig. 1 - Plate Dissipation Rating Chart for Types 2DS4 and 6DS4.

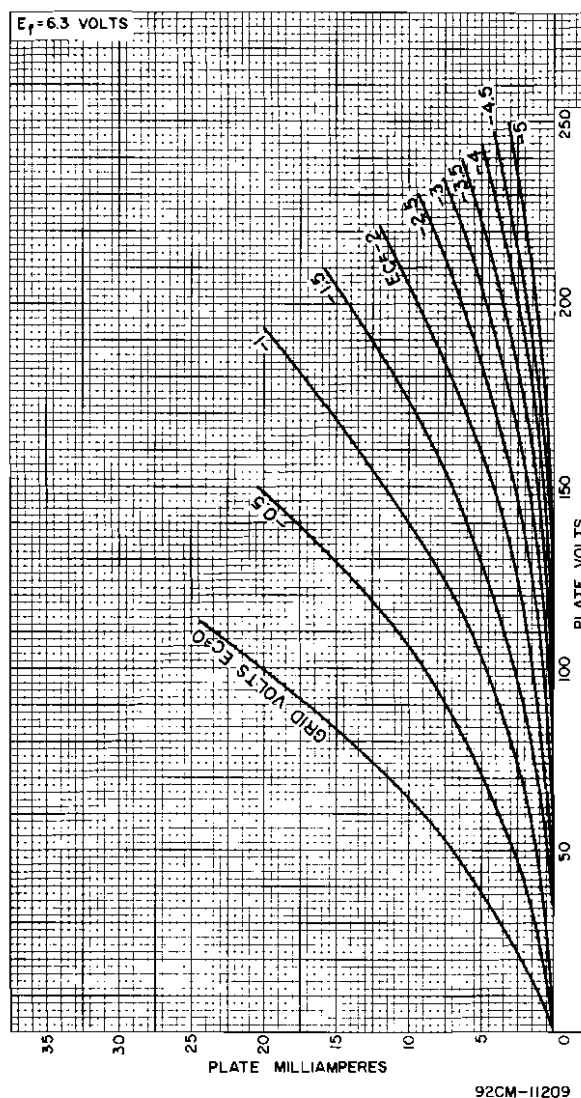
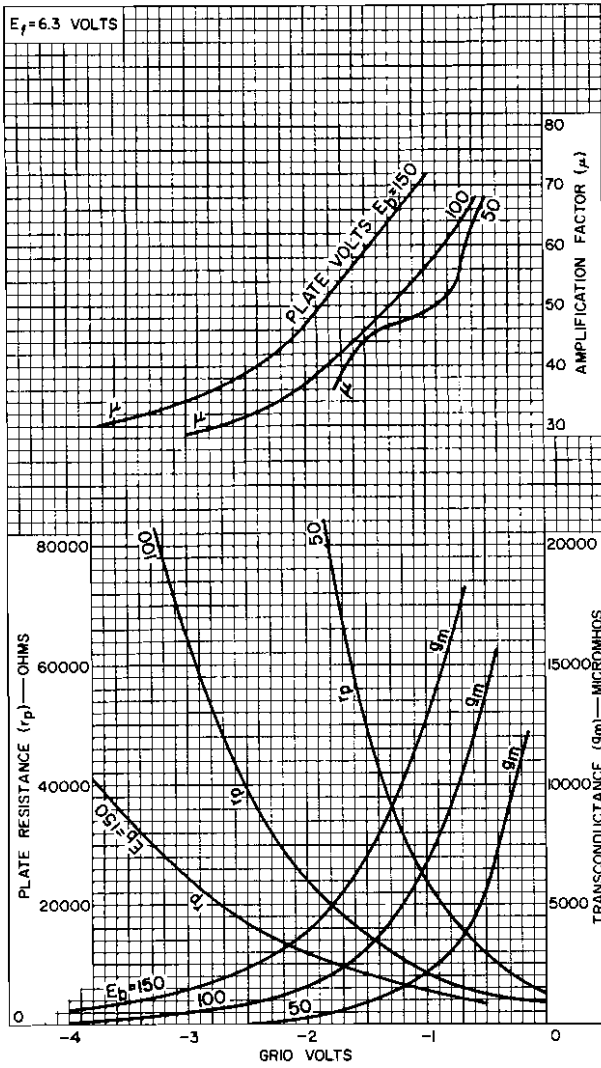


Fig. 2 - Average Plate Characteristics for Type 6DS4 and for Type 2DS4 except for Heater Voltage.

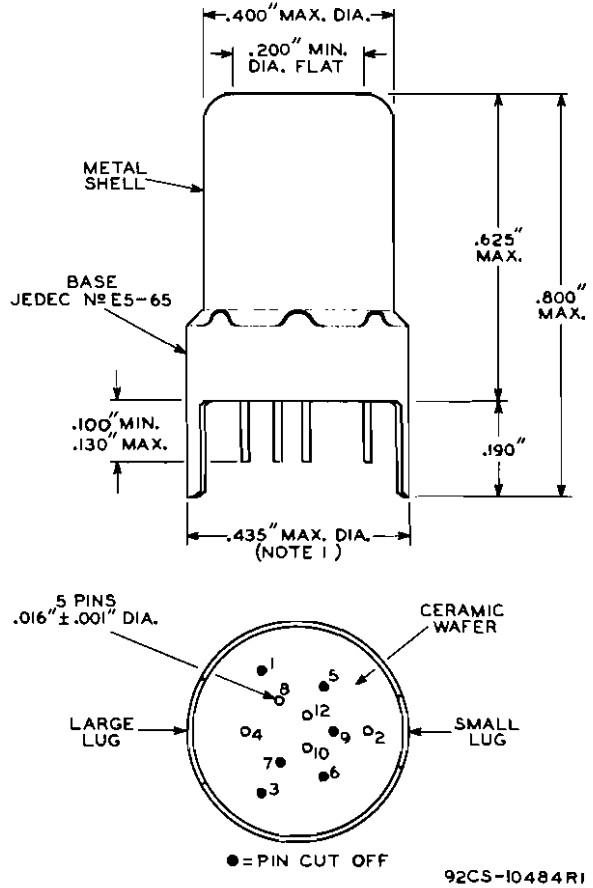
# 2DS4, 6DS4



92CM-11210

Fig.3 - Average Characteristics for Type 6DS4 and for Type 2DS4 except for Heater Voltage.

## DIMENSIONAL OUTLINE

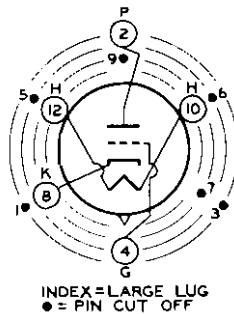


92CS-10484R1

NOTE 1: MAXIMUM O.D. OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

## BASING DIAGRAM (Bottom View)

- PIN 1: ▲
- PIN 2: PLATE
- PIN 3: ▲
- PIN 4: GRID
- PIN 5: ▲
- PIN 6: ▲



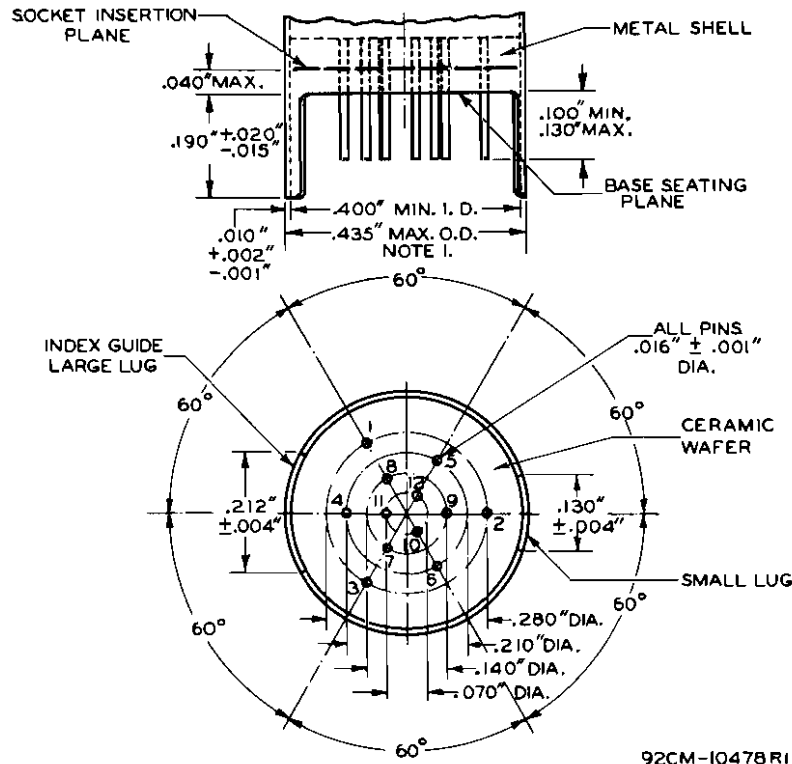
- PIN 7: ▲
- PIN 8: CATHODE
- PIN 9: ▲
- PIN 10: HEATER
- PIN 11: OMITTED
- PIN 12: HEATER

INDEX=LARGE LUG  
● = PIN CUT OFF

12A0

▲ Pin has internal connection and is cut off close to ceramic wafer—Do Not Use.

MEDIUM CERAMIC-WAFER TWELVAR BASE



92CM-10478 R1

| JEDEC No. | NAME        | PINS                                  |
|-----------|-------------|---------------------------------------|
| E12-64    | 12-Pin Base | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 |
| E5-65     | 5-Pin Base  | 2, 4, 8, 10, 12, (Note 2)             |

Note 1: Maximum O.D. of 0.440" is permitted along the 0.190" lug length.

Note 2: Pins 1, 3, 5, 6, 7, and 9 are cut off to a length such that their ends do not touch the socket insertion plane. Pin 11 is omitted.

PIN-ALIGNMENT GAUGE

Base-pin positions and lug positions shall be held to tolerances such that entire length of pins and lugs will without undue force pass into and disengage from flat-plate gauge having thickness of 0.25" and twelve holes of 0.0350" ± 0.0005" diameter located on four concentric circles as follows: Three holes located on 0.2800" ± 0.0005", three holes located on 0.2100" ± 0.0005", three holes located on 0.1400" ± 0.0005", three holes located on 0.0700" ± 0.0005" diameter circles at specified angles with a tolerance of ± 0.08° for each angle. In addition, gauge provides for two curved slots with chordal lengths of 0.2270" ± 0.0005" and 0.1450" ± 0.0005" located on 0.4200" ± 0.0005" diameter circle concentric with pin circles at 180° ± 0.08° and having a width of 0.0230" ± 0.0005".

