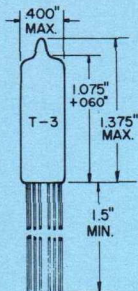


## TUNG-SOL

## PENTODE

## SUBMINIATURE TYPE



**GLASS BULB**  
SUBMINIATURE BUTTON  
8 LEAD BASE EB-10  
OUTLINE DRAWING  
JEDEC 3-1

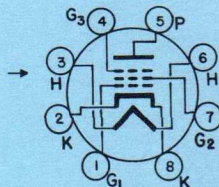
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±5% VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM  
JEDEC 8DC

THE 6205 IS A SHARP-CUTOFF PENTODE IN THE 8 PIN SUBMINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE IN HIGH-FREQUENCY CIRCUITS. IN ON-OFF CONTROL APPLICATIONS, THE TUBE WILL MAINTAIN ITS EMISSION CAPABILITIES AFTER LONG PERIODS OF OPERATION UNDER CUTOFF CONDITIONS. EXCEPT FOR THE INCORPORATION OF AN EXTERNAL CONNECTION FOR THE SUPPRESSOR GRID, THE 6205 IS IDENTICAL TO THE 5840.

## DIRECT INTERELECTRODE CAPACITANCES

|                        | WITH<br>SHIELD <sup>A</sup> | WITHOUT<br>SHIELD |                  |
|------------------------|-----------------------------|-------------------|------------------|
| GRID #1 TO PLATE, MAX. | 0.015                       | 0.03              | $\mu\mu\text{f}$ |
| INPUT                  | 4.2                         | 4.0               | $\mu\mu\text{f}$ |
| OUTPUT                 | 3.4                         | 1.9               | $\mu\mu\text{f}$ |

<sup>A</sup> WITH EXTERNAL SHIELD OF 0.405 INCH INSIDE DIAMETER CONNECTED TO CATHODE

**RATINGS**  
ABSOLUTE MAXIMUM VALUES

|                                           |        |         |
|-------------------------------------------|--------|---------|
| HEATER VOLTAGE                            | 6.3±5% | VOLTS   |
| MAXIMUM PLATE VOLTAGE                     | 165    | VOLTS   |
| MAXIMUM SCREEN VOLTAGE                    | 155    | VOLTS   |
| MAXIMUM SUPPRESSOR VOLTAGE                | 22     | VOLTS   |
| MAXIMUM POSITIVE DC GRID #1 VOLTAGE       | 0      | VOLTS   |
| MAXIMUM NEGATIVE DC GRID #1 VOLTAGE       | 55     | VOLTS   |
| MAXIMUM PLATE DISSIPATION                 | → 1.1  | WATTS   |
| MAXIMUM SCREEN DISSIPATION                | → 0.55 | WATTS   |
| MAXIMUM DC CATHODE CURRENT                | 16.5   | MA.     |
| MAXIMUM HEATER=CATHODE VOLTAGE:           |        |         |
| HEATER POSITIVE WITH RESPECT TO CATHODE   | 200    | VOLTS   |
| HEATER NEGATIVE WITH RESPECT TO CATHODE   | 200    | VOLTS   |
| MAXIMUM GRID #1 CIRCUIT RESISTANCE        | 1.1    | MEGOHMS |
| MAXIMUM BULB TEMPERATURE AT HOTTEST POINT | 220    | C       |

→ INDICATES A CHANGE.

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## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A<sub>1</sub> AMPLIFIER

|                                                      |        |       |
|------------------------------------------------------|--------|-------|
| HEATER VOLTAGE                                       | 6.3±5% | VOLTS |
| HEATER CURRENT                                       | 0.15   | AMP.  |
| PLATE VOLTAGE                                        | 100    | VOLTS |
| SUPPRESSOR, CONNECTED TO CATHODE AT SOCKET           |        |       |
| SCREEN VOLTAGE                                       | 100    | VOLTS |
| CATHODE-BIAS RESISTOR                                | 150    | OHMS  |
| PLATE RESISTANCE, APPROX.                            | 0.26   | MEG.  |
| TRANSCONDUCTANCE                                     | 5000   | μMHOS |
| PLATE CURRENT                                        | 7.5    | MA.   |
| SCREEN CURRENT                                       | 2.4    | MA.   |
| GRID #1 VOLTAGE, APPROX. $I_b = 10 \mu\text{AMPS}$ . | -9.0   | VOLTS |

## CLASS A RESISTANCE COUPLED AMPLIFIER

## LOW IMPEDANCE DRIVE (APPROXIMATELY 200 OHMS)

| $R_L$ | $R_{gf}$ | Ebb = 90 VOLTS |          |       |      | Ebb = 150 VOLTS |          |       |      | Ebb = 225 VOLTS |          |       |      |
|-------|----------|----------------|----------|-------|------|-----------------|----------|-------|------|-----------------|----------|-------|------|
|       |          | $R_k$          | $R_{c2}$ | $E_o$ | Gain | $R_k$           | $R_{c2}$ | $E_o$ | Gain | $R_k$           | $R_{c2}$ | $E_o$ | Gain |
| 0.10  | 0.10     | 1000           | 0.2      | 13    | 50   | 500             | 0.3      | 19    | 83   | 400             | 0.3      | 29    | 110  |
| 0.10  | 0.24     | 1000           | 0.2      | 16    | 73   | 500             | 0.3      | 25    | 120  | 400             | 0.3      | 38    | 160  |
| 0.24  | 0.24     | 1700           | 0.5      | 13    | 72   | 1500            | 0.6      | 20    | 100  | 700             | 0.8      | 29    | 160  |
| 0.24  | 0.51     | 2000           | 0.6      | 15    | 89   | 1500            | 0.7      | 24    | 140  | 700             | 0.9      | 35    | 210  |
| 0.51  | 0.51     | 2500           | 1.3      | 11    | 93   | 2000            | 1.5      | 18    | 140  | 1000            | 1.7      | 28    | 200  |
| 0.51  | 1.0      | 3000           | 1.5      | 13    | 110  | 2000            | 1.7      | 20    | 180  | 1000            | 2.0      | 31    | 260  |

## HIGH IMPEDANCE DRIVE (APPROXIMATELY 100 K OHMS)

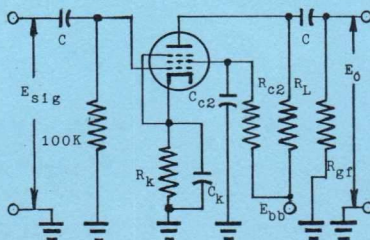
| $R_L$ | $R_{gf}$ | Ebb = 90 VOLTS |          |       |      | Ebb = 150 VOLTS |          |       |      | Ebb = 225 VOLTS |          |       |      |
|-------|----------|----------------|----------|-------|------|-----------------|----------|-------|------|-----------------|----------|-------|------|
|       |          | $R_k$          | $R_{c2}$ | $E_o$ | Gain | $R_k$           | $R_{c2}$ | $E_o$ | Gain | $R_k$           | $R_{c2}$ | $E_o$ | Gain |
| 0.10  | 0.10     | 1200           | 0.2      | 13    | 48   | 700             | 0.2      | 18    | 77   | 500             | 0.3      | 28    | 110  |
| 0.10  | 0.24     | 1300           | 0.2      | 16    | 70   | 800             | 0.3      | 24    | 110  | 500             | 0.3      | 37    | 150  |
| 0.24  | 0.24     | 2800           | 0.4      | 12    | 68   | 1700            | 0.6      | 20    | 100  | 1200            | 0.8      | 29    | 150  |
| 0.24  | 0.51     | 3000           | 0.5      | 15    | 82   | 1800            | 0.7      | 24    | 140  | 1300            | 0.8      | 35    | 190  |
| 0.51  | 0.51     | 5500           | 1.0      | 11    | 76   | 3500            | 1.3      | 18    | 120  | 2400            | 1.6      | 26    | 180  |
| 0.51  | 1.0      | 6200           | 1.2      | 12    | 92   | 3800            | 1.6      | 19    | 160  | 2500            | 1.8      | 31    | 230  |

1.  $E_o$  IS MAXIMUM RMS VOLTAGE OUTPUT FOR APPROXIMATELY 5% TOTAL HARMONIC DISTORTION.

2. GAIN IS MEASURED FOR AN OUTPUT VOLTAGE OF TWO VOLTS RMS.

3.  $R_k$  IS IN OHMS;  $R_{c2}$ ,  $R_L$ , &  $R_{gf}$  ARE IN MEGOHMS.

4. COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE.  $R_k$  &  $R_{c2}$  SHOULD BE ADEQUATELY BY-PASSED.



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## TUNG-SOL

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## CHARACTERISTICS LIMITS

|                                                                                                                                                              |         | MIN.  | MAX.  |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|-------|-------------|
| HEATER CURRENT:                                                                                                                                              |         |       |       |             |
| Ef =6.3 VOLTS                                                                                                                                                | INITIAL | 140   | 160   | MA.         |
|                                                                                                                                                              | 500-HR. | 138   | 164   | MA.         |
| PLATE CURRENT:                                                                                                                                               |         |       |       |             |
| Ef =6.3 VOLTS, Eb = 100 VOLTS, Ec2 = 100 VOLTS, Rk =150 OHMS (BYPASSED), g3 TIED TO k                                                                        | INITIAL | 5.5   | 9.5   | MA.         |
| SCREEN CURRENT:                                                                                                                                              |         |       |       |             |
| Ef =6.3 VOLTS, Eb =100 VOLTS, Ec2 = 100 VOLTS, Rk =150 OHMS (BYPASSED) g3 TIED TO k                                                                          | INITIAL | 1.5   | 3.3   | MA.         |
| TRANSCONDUCTANCE (1):                                                                                                                                        |         |       |       |             |
| Ef =6.3 VOLTS, Eb =100 VOLTS, Ec2 =100 VOLTS, Rk =150 OHMS (BYPASSED), g3 TIED TO k                                                                          | INITIAL | 4200  | 5800  | $\mu$ MHOS  |
| TRANSCONDUCTANCE CHANGE WITH HEATER VOLTAGE                                                                                                                  |         |       |       |             |
| DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) AND TRANSCONDUCTANCE AT Ef=5.7 VOLTS (OTHER CONDITIONS THE SAME) EXPRESSED AS A PERCENTAGE OF TRANS- CONDUCTANCE (1) |         |       |       |             |
|                                                                                                                                                              | INITIAL | ---   | 10    | PERCENT     |
|                                                                                                                                                              | 500-HR. | ---   | 15    | PERCENT     |
| TRANSCONDUCTANCE CHANGE WITH OPERATION:                                                                                                                      |         |       |       |             |
| DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) INITIALLY AND AFTER OPERATION EXPRESSED AS A PERCENTAGE OF INITIAL VALUE                                             |         |       |       |             |
|                                                                                                                                                              | 500-HR. | ---   | 20    | PERCENT     |
| AVERAGE TRANSCONDUCTANCE CHANGE WITH OPERATION:                                                                                                              |         |       |       |             |
| AVERAGE OF VALUES FOR "TRANSCONDUCTANCE CHANGE WITH OPERATION"                                                                                               |         |       |       |             |
|                                                                                                                                                              | 500-HR. | ---   | 15    | PERCENT     |
| PLATE RESISTANCE:                                                                                                                                            |         |       |       |             |
| Ef =6.3 VOLTS, Eb =100 VOLTS, Ec2 = 100 VOLTS, Rk =150 OHMS (BYPASSED), g3 TIED TO k                                                                         | INITIAL | 0.175 | ---   | MEGOHMS     |
| PLATE CURRENT CUTOFF:                                                                                                                                        |         |       |       |             |
| Ef =6.3 VOLTS, Eb =100 VOLTS, Ec2 = 100 VOLTS, Ec1 =-9.0 VOLTS, g3 TIED TO k                                                                                 | INITIAL | ---   | 50    | $\mu$ AMPS. |
| INTERELECTRODE CAPACITANCES:                                                                                                                                 |         |       |       |             |
| GRID #1 TO PLATE (G1 TO P)                                                                                                                                   | INITIAL | ---   | 0.015 | $\mu$ f     |
| INPUT (G1 TO H, K, G2, G3)                                                                                                                                   | INITIAL | 3.5   | 4.9   | $\mu$ f     |
| OUTPUT (P TO H, K, G2, G3)                                                                                                                                   | INITIAL | 2.9   | 3.9   | $\mu$ f     |
| (MEASURED WITH EXTERNAL SHIELD OF 0.405-INCH INSIDE DIAMETER CONNECTED TO CATHODE.)                                                                          |         |       |       |             |
| NEGATIVE GRID #1 CURRENT:                                                                                                                                    |         |       |       |             |
| Ef =6.3 VOLTS, Eb =100 VOLTS, Ec2 = 100 VOLTS, Rk =150 OHMS (BYPASSED) Rg1 =1.0 MEG., g3 TIED TO k                                                           | INITIAL | 0     | 0.3   | $\mu$ AMPS. |
|                                                                                                                                                              | 500-HR. | 0     | 0.8   | $\mu$ AMPS. |

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## TUNG-SOL

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## CHARACTERISTICS LIMITS - cont'd.

|                                                                                                                                                                                                          |         | MIN. |     | MAX. |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------|-----|------|--------|
| HEATER-CATHODE LEAKAGE CURRENT:                                                                                                                                                                          |         |      |     |      |        |
| Ef=6.3 VOLTS, E <sub>hk</sub> =100 VOLTS                                                                                                                                                                 |         |      |     |      |        |
| HEATER POSITIVE WITH RESPECT TO CATHODE                                                                                                                                                                  |         |      |     |      |        |
|                                                                                                                                                                                                          | INITIAL | ---  | 5.0 |      | μAMPS. |
|                                                                                                                                                                                                          | 500+HR. | ---  | 10  |      | μAMPS. |
| HEATER NEGATIVE WITH RESPECT TO CATHODE                                                                                                                                                                  |         |      |     |      |        |
|                                                                                                                                                                                                          | INITIAL | ---  | 5.0 |      | μAMPS. |
|                                                                                                                                                                                                          | 500+HR. | ---  | 10  |      | μAMPS. |
| INTERELECTRODE LEAKAGE RESISTANCE:                                                                                                                                                                       |         |      |     |      |        |
| Ef=6.3 VOLTS. POLARITY OF APPLIED DC INTERELECTRODE VOLTAGE IS SUCH THAT NO CATHODE EMISSION RESULTS.                                                                                                    |         |      |     |      |        |
| GRID #1 TO ALL AT 100 VOLTS DC                                                                                                                                                                           |         |      |     |      |        |
|                                                                                                                                                                                                          | INITIAL | 100  | --- |      | MEG.   |
|                                                                                                                                                                                                          | 500 HR. | 50   | --- |      | MEG.   |
| PLATE TO ALL AT 300 VOLTS DC                                                                                                                                                                             |         |      |     |      |        |
|                                                                                                                                                                                                          | INITIAL | 100  | --- |      | MEG.   |
|                                                                                                                                                                                                          | 500+HR. | 50   | --- |      | MEG.   |
| VIBRATIONAL NOISE OUTPUT VOLTAGE, RMS:                                                                                                                                                                   |         |      |     |      |        |
| Ef=6.3 VOLTS, E <sub>bb</sub> =100 VOLTS, E <sub>c2</sub> =100 VOLTS, R <sub>k</sub> =150 OHMS (BYPASSED) R <sub>L</sub> =10,000 OHMS, g <sub>3</sub> TIED TO k, VIBRATION ACCELERATION = 15 G AT 40 cps |         |      |     |      |        |
|                                                                                                                                                                                                          | INITIAL | ---  | 60  |      | MV.    |
| GRID #1 EMISSION CURRENT:                                                                                                                                                                                |         |      |     |      |        |
| Ef=7.5 VOLTS, E <sub>b</sub> =100 VOLTS, E <sub>c2</sub> =100 VOLTS, E <sub>c1</sub> =-9.0 VOLTS, R <sub>g1</sub> =1.0 MEG., g <sub>3</sub> TIED TO k                                                    |         |      |     |      |        |
|                                                                                                                                                                                                          | INITIAL | 0    | 0.5 |      | μAMPS. |

THE INDICATED 500-HOUR VALUES ARE LIFE-TEST END POINTS FOR THE FOLLOWING CONDITIONS OF OPERATION: Ef=6.3 VOLTS, E<sub>b</sub>=100 VOLTS, E<sub>c2</sub>=100 VOLTS, R<sub>k</sub>=150 OHMS, g<sub>3</sub> TIED TO k, R<sub>g1</sub>=1.0 MEG, E<sub>hk</sub>=200 VOLTS WITH HEATER POSITIVE WITH RESPECT TO CATHODE, AND BULB TEMPERATURE=220 C.

## SPECIAL TESTS AND RATINGS

## STABILITY LIFE TEST

STATISTICAL SAMPLE OPERATED FOR ONE HOUR TO EVALUATE AND CONTROL INITIAL VARIATIONS IN TRANSCONDUCTANCE.

## SURVIVAL RATE LIFE TEST

STATISTICAL SAMPLE OPERATED FOR ONE HUNDRED HOURS TO EVALUATE AND CONTROL EARLY-LIFE ELECTRICAL AND MECHANICAL INOPERATIVES.

## HEATER-CYCLING LIFE TEST

STATISTICAL SAMPLE OPERATED FOR 2000 CYCLES MINIMUM TO EVALUATE AND CONTROL HEATER-CATHODE DEFECTS. CONDITIONS OF TEST INCLUDE Ef=7.0 VOLTS CYCLED FOR ONE MINUTE ON AND FOUR MINUTES OFF, E<sub>b</sub>=E<sub>c3</sub>=E<sub>c2</sub>=E<sub>c1</sub>=0 VOLTS, AND E<sub>hk</sub>=140 VOLTS RMS.

## SHOCK RATING-450 G

STATISTICAL SAMPLE SUBJECTED TO FIVE IMPACT ACCELERATIONS OF 450 G IN EACH OF FOUR DIFFERENT POSITIONS. THE ACCELERATING FORCES ARE APPLIED BY THE NAVY-TYPE HIGH IMPACT (FLYWEIGHT) SHOCK MACHINE FOR ELECTRONIC DEVICES OR ITS EQUIVALENT.

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## TUNG-SOL

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## SPECIAL TESTS AND RATINGS

## FATIGUE RATING-2.5 G

STATISTICAL SAMPLE SUBJECTED TO VIBRATIONAL ACCELERATION OF 2.5 G FOR 32 HOURS MINIMUM IN EACH OF THREE DIFFERENT POSITIONS. THE SINUSOIDAL VIBRATION IS APPLIED AT A FIXED FREQUENCY BETWEEN 25 AND 60 CYCLES PER SECOND.

## ALTITUDE RATING-60,000 FEET

STATISTICAL SAMPLE SUBJECTED TO PRESSURE OF 55 MILLIMETERS OF MERCURY TO EVALUATE AND CONTROL ARCING AND CORONA.

NOTE: THE CONDITIONS FOR SOME OF THE INDICATED TESTS HAVE DELIBERATELY BEEN SELECTED TO AGGRAVATE TUBE FAILURES FOR TEST AND EVALUATION PURPOSES. IN NO SENSE SHOULD THESE CONDITIONS BE INTERPRETED AS SUITABLE CIRCUIT OPERATING CONDITIONS. IN THE DESIGN OF MILITARY EQUIPMENT EMPLOYING THIS TUBE, REFERENCE SHOULD BE MADE TO THE APPROPRIATE MIL-E-1 SPECIFICATION.

