

| Heater Arrangement                            |  | Series          | Parallel       |        |
|-----------------------------------------------|--|-----------------|----------------|--------|
| Heater Voltage (ac/dc)                        |  | 12.6 $\pm 20\%$ | 6.3 $\pm 20\%$ | volts  |
| Heater Current                                |  | 0.15            | 0.3            | ampere |
| Heater-Cathode Voltage:                       |  |                 |                |        |
| Peak value                                    |  |                 | $\pm 200$ max. | volts  |
| Average value                                 |  |                 | 100 max.       | volts  |
| Direct Interelectrode Capacitances (Approx.): |  | Unit No. 1      | Unit No. 2     |        |
| Grid to Plate                                 |  | 1.5             | 1.5            | pF     |
| Grid to Cathode and Heater                    |  | 1.6             | 1.6            | pF     |
| Plate to Cathode and Heater                   |  | 0.4             | 0.32           | pF     |

### Class A<sub>1</sub> Amplifier (Each Unit Unless Otherwise Specified)

#### MAXIMUM RATINGS (Design-Maximum Values)

|                                    |     |       |
|------------------------------------|-----|-------|
| Plate Voltage                      | 330 | volts |
| Grid Voltage, positive-bias value  | 0   | volt  |
| Plate Dissipation:                 |     |       |
| Each Plate                         | 3   | watts |
| Both Plates (Both units operating) | 6   | watts |

#### CHARACTERISTICS

|                                                        |      |      |            |
|--------------------------------------------------------|------|------|------------|
| Plate Voltage                                          | 100  | 250  | volts      |
| Grid Voltage                                           | 0    | -8.5 | volts      |
| Amplification Factor                                   | 20   | 17   |            |
| Plate Resistance (Approx.)                             | 6500 | 7700 | ohms       |
| Transconductance                                       | 3100 | 2200 | $\mu$ mhos |
| Plate Current                                          | 11.8 | 10.5 | mA         |
| Grid Voltage (Approx.) for plate current of 10 $\mu$ A | —    | -24  | volts      |

#### MAXIMUM CIRCUIT VALUES

|                            |      |        |
|----------------------------|------|--------|
| Grid-Circuit Resistance:   |      |        |
| For fixed-bias operation   | 0.25 | megohm |
| For cathode-bias operation | 1    | megohm |

#### TRANSCONDUCTANCE AT REDUCED HEATER VOLTAGE

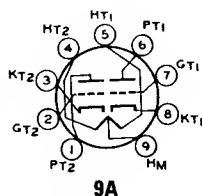
|                                                                                       |      |            |
|---------------------------------------------------------------------------------------|------|------------|
| Average Value (Each unit)                                                             | 1750 | $\mu$ mhos |
| With heater volts = 10 (Series connection), plate volts = 250, and grid volts = -8.5. |      |            |

## 6681/ 12AX7A

INDUSTRIAL  
TYPE

### HIGH-MU TWIN TRIODE

Miniature type used as a phase inverter or twin resistance-coupled amplifier in mobile communications equipment. Outlines section, 6B; requires miniature 9-contact socket. For typical operation as a resistance-coupled amplifier, refer to Resistance-Coupled Amplifier section, type 12AX7A conditions.



| Heater Arrangement                            |  | Series          | Parallel       |        |
|-----------------------------------------------|--|-----------------|----------------|--------|
| Heater Voltage (ac/dc)                        |  | 12.6 $\pm 20\%$ | 6.3 $\pm 20\%$ | volts  |
| Heater Current                                |  | 0.15            | 0.3            | ampere |
| Heater-Cathode Voltage:                       |  |                 |                |        |
| Peak value                                    |  |                 | $\pm 200$ max. | volts  |
| Average value                                 |  |                 | 100 max.       | volts  |
| Direct Interelectrode Capacitances (Approx.): |  | Unit No. 1      | Unit No. 2     |        |
| Grid to Plate                                 |  | 1.7             | 1.7            | pF     |
| Grid to Cathode and Heater                    |  | 1.6             | 1.6            | pF     |
| Plate to Cathode and Heater                   |  | 0.46            | 0.34           | pF     |

### Class A<sub>1</sub> Amplifier (Each Unit)

#### MAXIMUM RATINGS (Design-Maximum Values)

|                     |     |       |
|---------------------|-----|-------|
| Plate Voltage       | 330 | volts |
| Grid Voltage:       |     |       |
| Negative-bias value | 55  | volts |
| Positive-bias value | 0   | volt  |
| Plate Dissipation   | 1.1 | watts |

## CHARACTERISTICS

|                            |       |       |            |
|----------------------------|-------|-------|------------|
| Plate Voltage              | 100   | 250   | volts      |
| Grid Voltage               | —1    | —2    | volts      |
| Amplification Factor       | 100   | 100   |            |
| Plate Resistance (Approx.) | 80000 | 62500 | ohms       |
| Transconductance           | 1250  | 1600  | $\mu$ mhos |
| Plate Current              | 0.5   | 1.2   | mA         |

Refer to chart at end of section.

**6686**

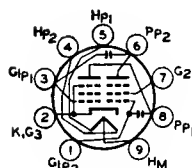
Refer to chart at end of section.

**6688A**

Refer to chart at end of section.

**6887**

Refer to chart at end of section.

**6922/E88CC****9HL**

## TWIN-POWER PENTODE

**6939**INDUSTRIAL  
TYPE

Miniature type twin power-pentode intended for use in communications equipment as a push-pull rf power-amplifier or frequency-multiplier at frequencies up to 500 MHz. Outlines section, 6E; requires miniature 9-contact socket.

|                                                                                                                        | Series         | Parallel       |              |
|------------------------------------------------------------------------------------------------------------------------|----------------|----------------|--------------|
| Heater arrangement                                                                                                     |                |                |              |
| Heater Voltage (ac/dc)                                                                                                 | 12.6 $\pm$ 10% | 6.3 $\pm$ 10%  | volts        |
| Heater Current                                                                                                         | 0.3            | 0.6            | ampere       |
| Peak Heater-Cathode Voltage                                                                                            |                | $\pm$ 100 max. | volts        |
| Bulb Temperature (At hottest point on bulb surface)                                                                    |                | 225 max.       | $^{\circ}$ C |
| Direct Interelectrode Capacitances (Approx., Each Unit):                                                               |                |                |              |
| Grid No.1 to Plate                                                                                                     |                | 0.15           | pF           |
| Grid No.1 to Cathode & Grid No.3, Grid No.2, and Heater                                                                |                | 6.4            | pF           |
| Plate to Cathode & Grid No.3, Grid No.2, and Heater                                                                    |                | 1.6            | pF           |
| Transconductance (Each Unit) for dc plate volts = 150, dc grid-No.2 volts = 150, and dc plate mA = 25                  |                | 10500          | $\mu$ mhos   |
| Mu-Factor, grid No.2 to grid No.1 (Each Unit) for dc plate volts = 150, dc grid No.2 volts = 150, and dc plate mA = 25 |                | 31             |              |

### Push-Pull RF Amplifier & Oscillator—Class C Telegraphy\* and

### Push-Pull RF Power Amplifier—Class C FM Telephony

Values are on a per-tube basis unless otherwise specified

## MAXIMUM RATINGS (Absolute-Maximum Values)

|                                     | Up to 500 MHz |       |       |
|-------------------------------------|---------------|-------|-------|
|                                     | CCS*          | ICAS* |       |
| DC Plate Voltage                    | 250           | 250   | volts |
| DC Grid-No.2 (Screen-Grid) Voltage  | 200           | 200   | volts |
| DC Grid-No.1 (Control-Grid) Voltage | —100          | —100  | volts |
| DC Plate Current                    | 90            | 100   | mA    |
| DC Grid-No.1 Current                | 6             | 8     | mA    |
| DC Cathode Current                  | 190           | 120   | mA    |
| Plate Input                         | 12            | 14    | watts |
| Grid-No.2 Input                     | 3             | 3.5   | watts |
| Grid-No.1 Input                     | 0.2           | 0.24  | watt  |
| Plate Dissipation                   | 6             | 7.5   | watts |

## TYPICAL OPERATION

|                                          | At 500 MHz |       |       |
|------------------------------------------|------------|-------|-------|
| DC Plate Voltage                         | 180        | 200   | volts |
| DC Grid-No.2 Voltage                     | 180        | 200   | volts |
| DC Grid-No.1 Voltage                     | —20        | —20   | volts |
| From grid resistor for each grid No.1 of | 27000      | 27000 | ohms  |
| Peak-to-Peak RF Grid-No.1 Voltage        | 50         | 50    | volts |
| DC Plate Current                         | 55         | 60    | mA    |
| DC Grid-No.2 Current                     | 12.5       | 14    | mA    |
| DC Grid-No.1 Current                     | 1.5        | 1.5   | mA    |
| Driver Power Output (Approx.)            | 1.2        | 1.2   | watts |
| Useful Power Output (Approx.)*           | 5          | 6     | watts |