

## RF POWER TRIODE

Radiation cooled triode of glass construction intended for use as an industrial oscillator

| QUICK REFERENCE DATA                                          |                  |         |     |  |
|---------------------------------------------------------------|------------------|---------|-----|--|
| Oscillator output power ( $W_o - W_{\text{feedb}}$ ), typical | $W_{\text{osc}}$ | 2.73    | kW  |  |
| Frequency for full ratings                                    | f                | max. 50 | MHz |  |

To be read in conjunction with "General Operational Recommendations"

### A. RF CLASS C OSCILLATOR FOR INDUSTRIAL USE

with anode voltage from a three-phase rectifier

#### OPERATING CONDITIONS, continuous service

|                                                                      |                     |          |      |               |      |            |
|----------------------------------------------------------------------|---------------------|----------|------|---------------|------|------------|
| Frequency                                                            | f                   | 50       | 50   | 50            | 50   | MHz        |
| Oscillator output power ( $W_o - W_{\text{feedb}}$ )                 | $W_{\text{osc}}$    | 2.73     | 2.61 | 2.04          | 1.44 | kW         |
| Anode voltage                                                        | $V_a$               | 6        | 5    | 4             | 3    | kV         |
| Anode current                                                        | $I_a$               | 600      | 700  | 700           | 700  | mA         |
| Anode input power                                                    | $W_{ia}$            | 3600     | 3500 | 2800          | 2100 | W          |
| Anode dissipation                                                    | $W_a$               | 760      | 780  | 640           | 540  | W          |
| Anode output power                                                   | $W_o$               | 2840     | 2720 | 2160          | 1560 | W          |
| Anode efficiency                                                     | $\eta_a$            | 79       | 78   | 77            | 74   | %          |
| Oscillator efficiency                                                | $\eta_{\text{osc}}$ | 76       | 75   | 73            | 69   | %          |
| Feedback ratio                                                       | $V_{gp}/V_{ap}$     | 13       | 17   | 20            | 25   | %          |
| Grid resistor                                                        | $R_g$               | 3        | 2.5  | 2             | 1.5  | k $\Omega$ |
| Grid current, on load                                                | $I_g$               | 150      | 160  | 180           | 200  | mA         |
| Grid voltage, negative                                               | $-V_g$              | 450      | 400  | 360           | 300  | V          |
| Grid dissipation                                                     | $W_g$               | 43       | 46   | 55            | 60   | W          |
| Grid resistor dissipation                                            | $W_{Rg}$            | 67       | 64   | 65            | 60   | W          |
| Recommended grid blocking capacitor at high frequencies about 100 pF |                     |          |      |               |      |            |
|                                                                      |                     | at 1 MHz |      | about 1000 pF |      |            |

**LIMITING VALUES** (Absolute max. rating system)

|                            |           |       |      |                    |
|----------------------------|-----------|-------|------|--------------------|
| Frequency for full ratings | $f$       | up to | 50   | MHz                |
| Anode voltage              | $V_a$     | max.  | 7    | kV                 |
| Anode current              | $I_a$     | max.  | 750  | mA                 |
| Anode input power          | $W_{ia}$  | max.  | 4000 | W                  |
| Anode dissipation          | $W_a$     | max.  | 800  | W                  |
| Grid voltage               | $-V_g$    | max.  | 1250 | V                  |
| Grid current, on load      | $I_g$     | max.  | 300  | mA                 |
| off load                   | $I_g$     | max.  | 400  | mA                 |
| Grid dissipation           | $W_g$     | max.  | 150  | W                  |
| Grid circuit resistance    | $R_g$     | max.  | 10   | k $\Omega$         |
| Cathode current, mean      | $I_k$     | max.  | 1.2  | A                  |
| peak                       | $I_{kp}$  | max.  | 4.3  | A                  |
| Envelope temperature       | $T_{env}$ | max.  | 350  | $^{\circ}\text{C}$ |
| Seal temperature           | $t$       | max.  | 220  | $^{\circ}\text{C}$ |

**B. RF CLASS C OSCILLATOR FOR INDUSTRIAL USE**

with anode voltage from a three-phase rectifier

**OPERATING CONDITIONS** , intermittent service

|                                                      |                               |      |      |            |
|------------------------------------------------------|-------------------------------|------|------|------------|
| Frequency                                            | f                             | 50   | 50   | MHz        |
| Oscillator output power ( $W_o - W_{\text{feedb}}$ ) | $W_{\text{osc}}$              | 4.25 | 3.24 | kW         |
| Anode voltage                                        | $V_a$                         | 6    | 5    | kV         |
| Anode current                                        | $I_a$                         | 950  | 900  | mA         |
| Anode input power                                    | $W_{ia}$                      | 5700 | 4500 | W          |
| Anode dissipation                                    | $W_a$                         | 1300 | 1125 | W          |
| Anode output power                                   | $W_o$                         | 4400 | 3375 | W          |
| Anode efficiency                                     | $\eta_a$                      | 77   | 75   | %          |
| Oscillator efficiency                                | $\eta_{\text{osc}}$           | 74   | 72   | %          |
| Feedback ratio                                       | $V_{\text{gp}}/V_{\text{ap}}$ | 17   | 20   | %          |
| Grid resistor                                        | $R_g$                         | 2.5  | 2    | k $\Omega$ |
| Grid current, on load                                | $I_g$                         | 190  | 190  | mA         |
| Grid voltage, negative                               | $-V_g$                        | 475  | 380  | V          |
| Grid dissipation                                     | $W_g$                         | 63   | 63   | W          |
| Grid resistor dissipation                            | $W_{Rg}$                      | 90   | 72   | W          |

**LIMITING VALUES** ( Absolute max. rating system)

|                            |                  |      |            |                    |
|----------------------------|------------------|------|------------|--------------------|
| Frequency for full ratings | f                | max. | 50         | MHz                |
| Anode voltage              | $V_a$            | max. | 7          | kV                 |
| Anode current              | $I_a$            | max. | 1000       | mA                 |
| Anode -input power         | $W_{ia}$         | max. | 7000       | W                  |
| Anode dissipation          | $W_a$            | max. | See Fig. 2 |                    |
| Grid voltage               | $-V_g$           | max. | 1250       | V                  |
| Grid current, on load      | $I_g$            | max. | 300        | mA                 |
| off load                   | $I_g$            | max. | 400        | mA                 |
| Grid dissipation           | $W_g$            | max. | 150        | W                  |
| Grid circuit resistance    | $R_g$            | max. | 10         | k $\Omega$         |
| Cathode current, mean      | $I_k$            | max. | 1.4        | A                  |
| peak                       | $I_{kp}$         | max. | 4.3        | A                  |
| Envelope temperature       | $T_{\text{env}}$ | max. | 350        | $^{\circ}\text{C}$ |
| Seal temperature           | t                | max. | 220        | $^{\circ}\text{C}$ |

**C. RF CLASS C OSCILLATOR FOR INDUSTRIAL USE**

with anode voltage from single-phase rectifier without filter

**OPERATING CONDITIONS** , continuous service

|                                                      |                     |      |      |            |
|------------------------------------------------------|---------------------|------|------|------------|
| Frequency                                            | $f$                 | 50   | 50   | MHz        |
| Oscillator output power ( $W_o - W_{\text{feedb}}$ ) | $W_{\text{osc}}$    | 2655 | 2451 | W          |
| Anode voltage                                        | $V_a$               | 5.4  | 4.5  | kV         |
| Anode current                                        | $I_a$               | 530  | 600  | mA         |
| Anode input power                                    | $W_{ia}$            | 3520 | 3320 | W          |
| Anode dissipation                                    | $W_a$               | 770  | 770  | W          |
| Anode output power                                   | $W_o$               | 2750 | 2550 | W          |
| Anode efficiency                                     | $\eta_a$            | 78   | 77   | %          |
| Oscillator efficiency                                | $\eta_{\text{osc}}$ | 75   | 74   | %          |
| Feedback ratio                                       | $V_{gp}/V_{ap}$     | 13   | 15.5 | %          |
| Grid resistor                                        | $R_g$               | 3    | 2.5  | k $\Omega$ |
| Grid current, on load                                | $I_g$               | 140  | 150  | mA         |
| Grid voltage, negative                               | $-V_g$              | 420  | 375  | V          |
| Grid dissipation                                     | $W_g$               | 36   | 43   | W          |
| Grid resistor dissipation                            | $W_{Rg}$            | 59   | 56   | W          |

**LIMITING VALUES** (Absolute max. rating system)

|                            |                  |       |      |                    |
|----------------------------|------------------|-------|------|--------------------|
| Frequency for full ratings | $f$              | up to | 50   | MHz                |
| Anode voltage              | $V_a$            | max.  | 6.3  | kV                 |
| Anode current              | $I_a$            | max.  | 670  | mA                 |
| Anode input power          | $W_{ia}$         | max.  | 4000 | W                  |
| Anode dissipation          | $W_a$            | max.  | 800  | W                  |
| Grid voltage               | $-V_g$           | max.  | 1250 | V                  |
| Grid current, on load      | $I_g$            | max.  | 270  | mA                 |
| off load                   | $I_g$            | max.  | 400  | mA                 |
| Grid dissipation           | $W_g$            | max.  | 150  | W                  |
| Grid circuit resistance    | $R_g$            | max.  | 10   | k $\Omega$         |
| Cathode current, mean      | $I_k$            | max.  | 1.0  | A                  |
| peak                       | $I_{kp}$         | max.  | 3.3  | A                  |
| Envelope temperature       | $T_{\text{env}}$ | max.  | 350  | $^{\circ}\text{C}$ |
| Seal temperature           | $t$              | max.  | 220  | $^{\circ}\text{C}$ |

**D. RF CLASS C OSCILLATOR FOR INDUSTRIAL USE**

with self rectification

**OPERATING CONDITIONS**

|                                                      |                                                                  |      |                  |
|------------------------------------------------------|------------------------------------------------------------------|------|------------------|
| Frequency                                            | f                                                                | 50   | MHz              |
| Oscillator output power ( $W_o - W_{\text{feedb}}$ ) | $W_{\text{osc}}$                                                 | 1.49 | kW               |
| Transformer voltage, RMS                             | $V_{\text{tr}}$                                                  | 5.2  | kV               |
| Anode current                                        | $I_a$                                                            | 360  | mA <sup>1)</sup> |
| Anode input power                                    | $W_{ia}$                                                         | 2080 | W                |
| Anode dissipation                                    | $W_a$                                                            | 520  | W                |
| Anode output power                                   | $W_o$                                                            | 1560 | W                |
| Anode efficiency                                     | $\eta_a$                                                         | 75   | %                |
| Oscillator efficiency                                | $\eta_{\text{osc}}$                                              | 72   | %                |
| Feedback ratio                                       | $V_{\text{gp}}/V_{\text{ap}}$                                    | 17   | %                |
| Grid resistor                                        | $R_g$                                                            | 1.8  | k $\Omega$       |
| Grid current, on load                                | $I_g$                                                            | 100  | mA <sup>1)</sup> |
| Grid voltage, negative                               | $-V_g$                                                           | 180  | V                |
| Grid dissipation                                     | $W_g$                                                            | 54   | W                |
| Grid resistor dissipation                            | $W_{Rg}$                                                         | 18   | W                |
| Recommended grid blocking capacitor                  | at high frequencies about 100 pF<br>at about 1 MHz about 1000 pF |      |                  |

**LIMITING VALUES** (Absolute max. rating system)

|                                                       |                  |       |      |                    |
|-------------------------------------------------------|------------------|-------|------|--------------------|
| Frequency for full ratings                            | f                | up to | 50   | MHz                |
| Transformer voltage, RMS                              | $V_{\text{tr}}$  | max.  | 5.6  | kV                 |
| Anode current                                         | $I_a$            | max.  | 400  | mA <sup>1)</sup>   |
| Anode input power                                     | $W_{ia}$         | max.  | 2250 | W                  |
| Anode dissipation                                     | $W_a$            | max.  | 800  | W                  |
| Grid voltage, at peak of mains frequency<br>sine wave | $-V_g$           | max.  | 1250 | V                  |
| Grid current, on load                                 | $I_g$            | max.  | 160  | mA <sup>1)</sup>   |
| off load                                              | $I_g$            | max.  | 210  | mA <sup>1)</sup>   |
| Grid dissipation                                      | $W_g$            | max.  | 150  | W                  |
| Grid circuit resistance                               | $R_g$            | max.  | 10   | k $\Omega$         |
| Cathode current, mean                                 | $I_k$            | max.  | 610  | mA <sup>1)</sup>   |
| peak                                                  | $I_{kp}$         | max.  | 4.3  | A                  |
| Envelope temperature                                  | $T_{\text{env}}$ | max.  | 350  | $^{\circ}\text{C}$ |
| Seal temperature                                      | t                | max.  | 220  | $^{\circ}\text{C}$ |

1) Averaged over any mains frequency cycle

**HEATING** : direct; filament thoriated tungsten

|                  |                |      |   |
|------------------|----------------|------|---|
| Filament voltage | V <sub>f</sub> | 6.3  | V |
| Filament current | I <sub>f</sub> | 32.5 | A |

The filament is designed to accept temporary fluctuations of +5 % and -10 %.

**CAPACITANCES**

|                   |                 |      |    |
|-------------------|-----------------|------|----|
| Anode to filament | C <sub>af</sub> | 0.25 | pF |
| Grid to filament  | C <sub>gf</sub> | 10.5 | pF |
| Anode to grid     | C <sub>ag</sub> | 6.2  | pF |

**CHARACTERISTICS** measured at V<sub>a</sub> = 4 kV, I<sub>a</sub> = 190 mA

|                      |   |     |      |
|----------------------|---|-----|------|
| Transconductance     | S | 5.1 | mA/V |
| Amplification factor | μ | 22  |      |

**COOLING**

In general cooling of the tube is not necessary at matched load. When the tube is mounted in a small cabinet adequate ventilation must be provided.

At non-matched load or at high anode voltages, combined with the highest operating frequencies a low-velocity air flow directed on the tube is necessary. A small fan will suffice; it is recommended to mount the fan underneath the tube socket.

**ACCESSORIES**

|                 |               |      |     |       |
|-----------------|---------------|------|-----|-------|
| Socket          | catalogue nr. | 2422 | 511 | 05001 |
| Anode connector | type          |      |     | 40665 |

## MECHANICAL DATA

Mounting positions: vertical

Net weight: approx. 600 g

Dimensions in mm

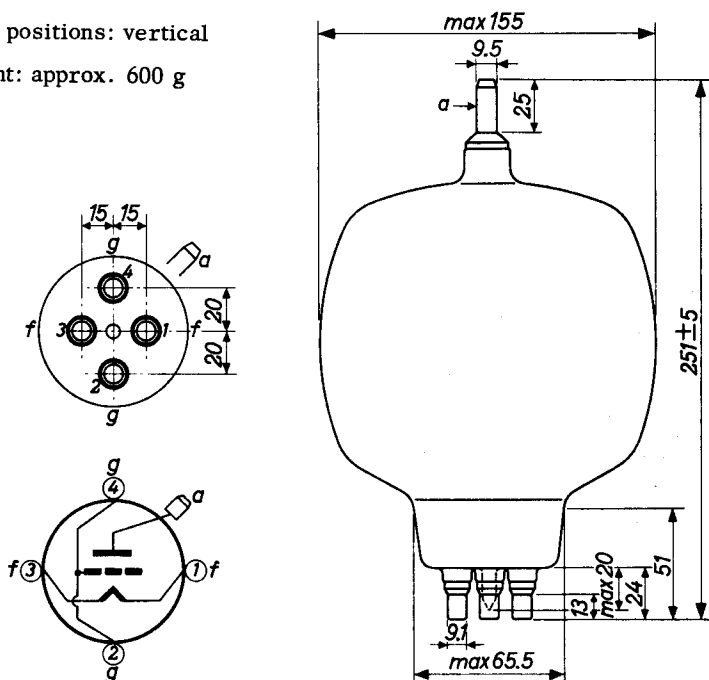
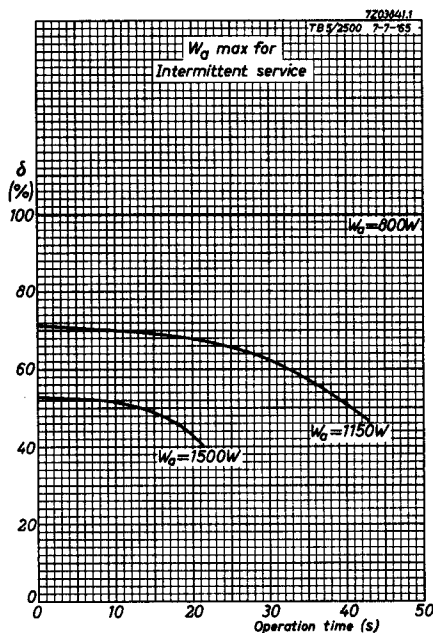


Fig. 1 Mechanical outline.

Fig. 2 Intermittent service.  
Limits of anode dissipation  
and cooling.

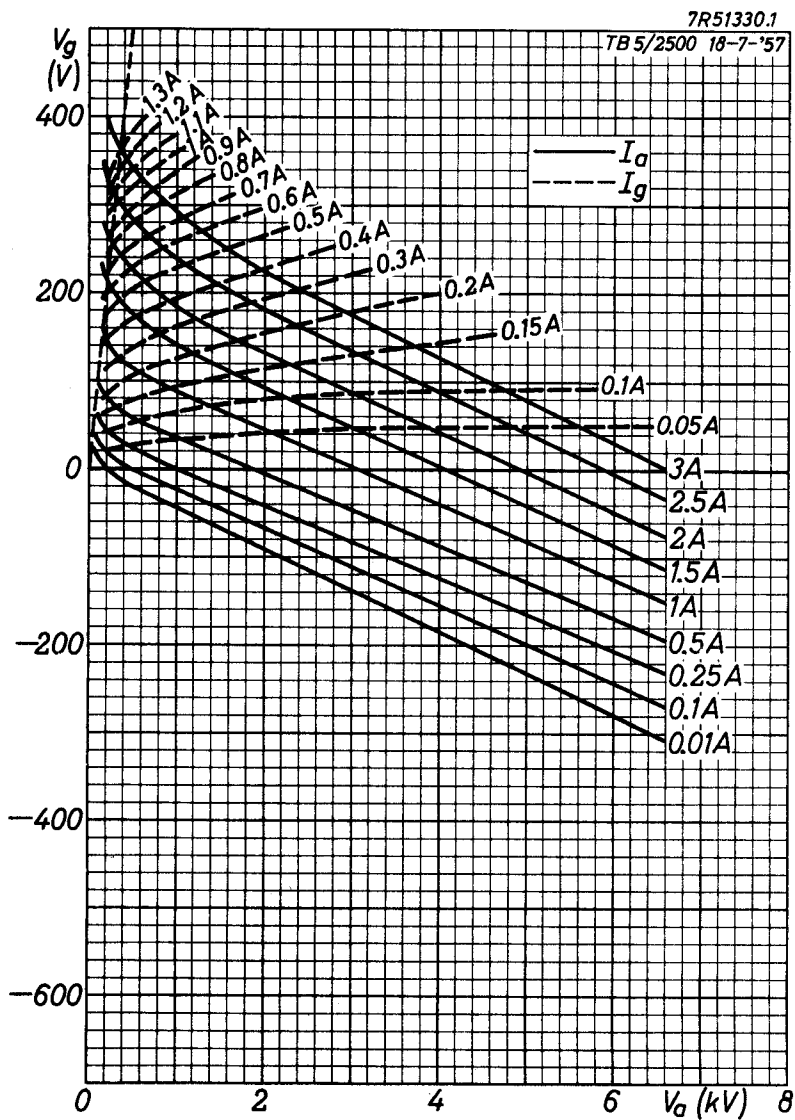


Fig. 3 Constant current characteristics.