# R.F. POWER TRIODE

## QUICK REFERENCE DATA

| | class-C | | | | | | | | | | class-B | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | telegraphy | | grounded grid | | oscillator | | oscillator, industrial | | | | modulator | |
| freq. | | | | | | | ∩∩ | | ∿ | | | |
| | $V_a$ | $W_o$ | $V_a$ | $W_o$* | $V_a$ | $W_o$* | $V_a$ | $W_o$ | $V_a$ | $W_o$ | $V_a$ | $W_o$* |
| MHz | kV | W | kV | W | kV | W | kV | W | kV | W | kV | W |
| 100 | 4 | 1200 | | | 4 | 2320 | | | | | 4 | 1500 |
| | 3 | 840 | 3 | 1936 | 3 | 1626 | | | | | 3 | 1360 |
| | 2,5 | 750 | 2,5 | 1747 | | | | | | | 2,5 | 1140 |
| | 2 | 585 | 2 | 1374 | | | | | | | | |
| | 1,5 | 425 | 1,5 | 1040 | | | | | | | | |
| 50 | | | | | | | 3,5 | 1100 | 4 | 630 | | |
| | | | | | | | 2,25 | 685 | 3 | 415 | | |

**HEATING**: direct, parallel supply; thoriated tungsten filament

| | | | |
|---|---|---|---|
| Filament voltage | $V_f$ | = | 5 V |
| Filament current | $I_f$ | = | 14,1 A |

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

### CAPACITANCES

| | | | |
|---|---|---|---|
| Anode to all other elements except grid | $C_a$ | = | 0,16 pF |
| Grid to all other elements except anode | $C_g$ | = | 6,3 pF |
| Anode to grid | $C_{ag}$ | = | 5,0 pF |

### TYPICAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| Anode voltage | $V_a$ | = | 3 kV |
| Anode current | $I_a$ | = | 90 mA |
| Mutual conductance | S | = | 5 mA/V |
| Amplification factor | $\mu$ | = | 25 |

* Two tubes.

## TEMPERATURE LIMITS

Absolute maximum rating system

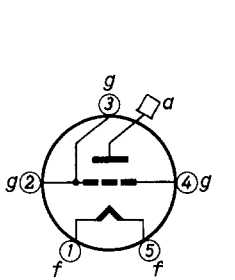
| | | | |
|---|---|---|---|
| Bulb temperature | $T_{bulb}$ | max. | 350 °C |
| Anode seal temperature | $T_a$ | max. | 220 °C |
| Pin temperature | $T_{pin}$ | max. | 180 °C |

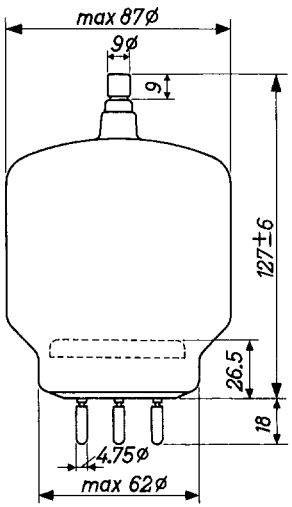
## COOLING

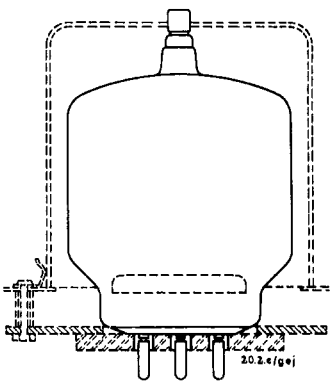
In cases where the maximum permissible temperatures are likely to be exceeded, as would normally be the case at frequencies above 30 MHz with full ratings, a low-velocity air flow has to be directed onto the anode seal and the bottom of the envelope. The cooling will be facilitated by the use of a blower and a glass chimney type 40666.

## MECHANICAL DATA

| | | | |
|---|---|---|---|
| Socket | 2422 512 01001 | Base | Giant 5 p. |
| Anode connector (clip) | 40712 | Net mass | 190 g |
| Chimney | 40666 | | |



Mounting suggestion of tube with chimney.

Mounting position vertical with base up or down

In order to prevent overheating of the grid pins by high-frequency current it is recommended to include the three grid socket connections in the circuit.

## R.F. CLASS C TELEGRAPHY OR F.M. TELEPHONY

**LIMITING VALUES** (Absolute limits)

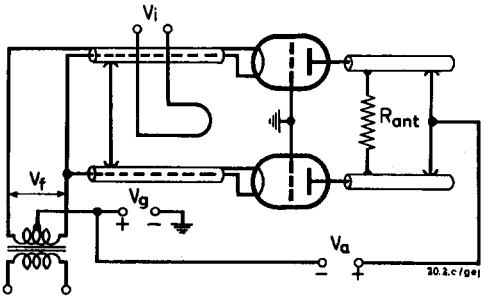
| Frequency | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | f | = | | | | up to | 100 | MHz |
| Anode voltage | $V_a$ | = | | | | max. | 4 | kV |
| Anode input power | $W_{ia}$ | = | | | | max. | 1550 | W |
| Anode dissipation | $W_a$ | = | | | | max. | 350 | W |
| Negative grid voltage | $-V_g$ | = | | | | max. | 500 | V |
| Grid dissipation | $W_g$ | = | | | | max. | 40 | W |
| Grid circuit resistance | $R_g$ | = | | | | max. | 100 | kΩ |
| Cathode current | $I_k$ | = | | | | max. | 500 | mA |

**OPERATING CONDITIONS**

| Frequency | f | = | 100 | 100 | 100 | 100 | 100 | MHz |
|---|---|---|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | 4 | 3 | 2.5 | 2 | 1.5 | kV |
| Grid voltage | $V_g$ | = | -350 | -250 | -200 | -150 | -120 | V |
| Peak grid A.C. voltage | $V_{gp}$ | = | 535 | 430 | 380 | 320 | 295 | V |
| Anode current | $I_a$ | = | 380 | 363 | 400 | 400 | 400 | mA |
| Grid current | $I_g$ | = | 80 | 69 | 69 | 80 | 80 | mA |
| Driving power | $W_{dr}$ | = | 40 | 27 | 23.5 | 23 | 21.5 | W |
| Anode input power | $W_{ia}$ | = | 1520 | 1090 | 1000 | 800 | 600 | W |
| Anode dissipation | $W_a$ | = | 320 | 250 | 250 | 215 | 175 | W |
| Output power | $W_o$ | = | 1200 | 840 | 750 | 585 | 425 | W |
| Efficiency | $\eta$ | = | 79 | 77 | 75 | 73 | 71 | % |

**R.F. CLASS C TELEGRAPHY OR F.M. TELEPHONY** (continued)

**OPERATING CONDITIONS,** grounded grid, two tubes




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency | f | = | 100 | 100 | 100 | 100 | MHz |
| Anode voltage | $V_a$ | = | 3 | 2.5 | 2 | 1.5 | kV |
| Grid voltage | $V_g$ | = | −250 | −200 | −150 | −120 | V |
| Peak grid A.C. voltage | $V_{gp}$ | = | 430 | 380 | 320 | 295 | V |
| Anode current | $I_a$ | = | 726 | 800 | 800 | 800 | mA |
| Grid current | $I_g$ | = | 138 | 138 | 160 | 160 | mA |
| Driving power | $W_{dr}$ | = | 310 | 294 | 250 | 233 | W |
| Anode input power | $W_{ia}$ | = | 2180 | 2000 | 1600 | 1200 | W |
| Anode dissipation | $W_a$ | = | 500 | 500 | 430 | 350 | W |
| Output power | $W_o$ | = | 1680+256 | 1500+247 | 1170+204 | 850+190 | W [1] |
| Efficiency | $\eta$ | = | 77 | 75 | 73 | 71 | % |

[1]) Power transferred from driving stage included

## R.F. CLASS C OSCILLATOR

**LIMITING VALUES** (Absolute limits)

| Frequency | f | | up to | 100 | MHz |
|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | max. | 4 | kV |
| Anode input power | $W_{ia}$ | = | max. | 1550 | W |
| Anode dissipation | $W_a$ | = | max. | 350 | W |
| Negative grid voltage | $-V_g$ | = | max. | 500 | V |
| Grid dissipation | $W_g$ | = | max. | 40 | W |
| Grid circuit resistance | $R_g$ | = | max. | 100 | kΩ |
| Cathode current | $I_k$ | = | max. | 500 | mA |

**OPERATING CONDITIONS,** two tubes

| | | | | | |
|---|---|---|---|---|---|
| Frequency | f | = | 100 | 100 | MHz |
| Anode voltage | $V_a$ | = | 4 | 3 | kV |
| Anode current | $I_a$ | = | 760 | 726 | mA |
| Grid current | $I_g$ | = | 160 | 138 | mA |
| Grid resistor | $R_g$ | = | 2200 | 1800 | Ω |
| Driving power | $W_{dr}$ | = | 80 | 54 | W |
| Anode input power | $W_{ia}$ | = | 3040 | 2180 | W |
| Anode dissipation | $W_a$ | = | 640 | 500 | W |
| Output power | $W_o$ | = | 2320 | 1626 | W |
| Efficiency | $\eta$ | = | 77 | 75 | % |

**R.F. CLASS C OSCILLATOR FOR INDUSTRIAL USE** with anode voltage from single-phase full-wave rectifier without filter

**LIMITING VALUES** (Absolute limits)

| Frequency | f | up to 50 | up to 100 | up to 150 | MHz |
|---|---|---|---|---|---|
| Anode voltage | $V_a$ = | max. 3.8 | max. 2.7 | max. 1.8 | kV |
| Anode input power | $W_{ia}$ = | max. 1500 | max. 975 | max. 650 | W |
| Anode dissipation | $W_a$ = | max. 350 | max. 350 | max. 350 | W |
| Negative grid voltage | $-V_g$ = | max. 500 | max. 500 | max. 500 | V |
| Grid dissipation | $W_g$ = | max. 40 | max. 40 | max. 40 | W |
| Grid circuit resistance | $R_g$ = | max. 100 | max. 100 | max. 100 | kΩ |
| Cathode current | $I_k$ = | max. 450 | max. 450 | max. 450 | mA |

**OPERATING CONDITIONS**

| | | | | |
|---|---|---|---|---|
| Frequency | f = | 50 | 50 | MHz |
| Anode voltage | $V_a$ = | 3.5 | 2.25 | kV |
| Anode current | $I_a$ = | 325 | 340 | mA |
| Grid current | $I_g$ = | 65 | 60 | mA |
| Grid resistor | $R_g$ = | 4500 | 3330 | Ω |
| Anode input power | $W_{ia}$ = | 1400 | 935 | W |
| Anode dissipation | $W_a$ = | 300 | 250 | W |
| Output power | $W_o$ = | 1100 | 685 | W |
| Efficiency | $\eta$ = | 78 | 73 | % |
| Output power in the load | $W_\ell$ = | 900 | 560 | W |

**R.F. CLASS C OSCILLATOR FOR INDUSTRIAL USE** with self rectification, $180^{o}$ phase shift **between** $V_a$ and $V_g$

**LIMITING VALUES** (Absolute limits)

| Frequency | | f | | up to 50 | up to 100 | up to 150 | MHz |
|---|---|---|---|---|---|---|---|
| Transformer voltage | $V_{tr}$ | = | max. | 4.5 | max. 3.5 | max. 2.25 | $kV_{RMS}$ |
| Anode input power | $W_{ia}$ | = | max. | 900 | max. 730 | max. 500 | W |
| Anode dissipation | $W_a$ | = | max. | 350 | max. 350 | max. 350 | W |
| Negative grid voltage | $-V_g$ | = | max. | 500 | max. 500 | max. 500 | V |
| Grid dissipation | $W_g$ | = | max. | 40 | max. 40 | max. 40 | W |
| Grid circuit resistance | $R_g$ | = | max. | 100 | max. 100 | max. 100 | kΩ |
| Cathode current | $I_k$ | = | max. | 285 | max. 285 | max. 285 | mA |

**OPERATING CONDITIONS**

| | | | | | |
|---|---|---|---|---|---|
| Frequency | f | = | 50 | 50 | MHz |
| Transformer voltage | $V_{tr}$ | = | 4 | 3 | $kV_{RMS}$ |
| Anode current | $I_a$ | = | 190 | 180 | mA |
| Driving voltage | $V_g$ | = | 280 | 110 | $V_{RMS}$ |
| Grid current | $I_g$ | = | 35 | 32 | mA |
| Grid resistor | $R_g$ | = | 5500 | 3000 | Ω |
| Anode input power | $W_{ia}$ | = | 840 | 600 | W |
| Anode dissipation | $W_a$ | = | 210 | 185 | W |
| Output power | $W_o$ | = | 630 | 415 | W |
| Efficiency | $\eta$ | = | 75 | 69 | % |
| Output power in the load | $W_\ell$ | = | 515 | 350 | W |

**A.F. CLASS B AMPLIFIER AND MODULATOR,** two tubes in push-pull

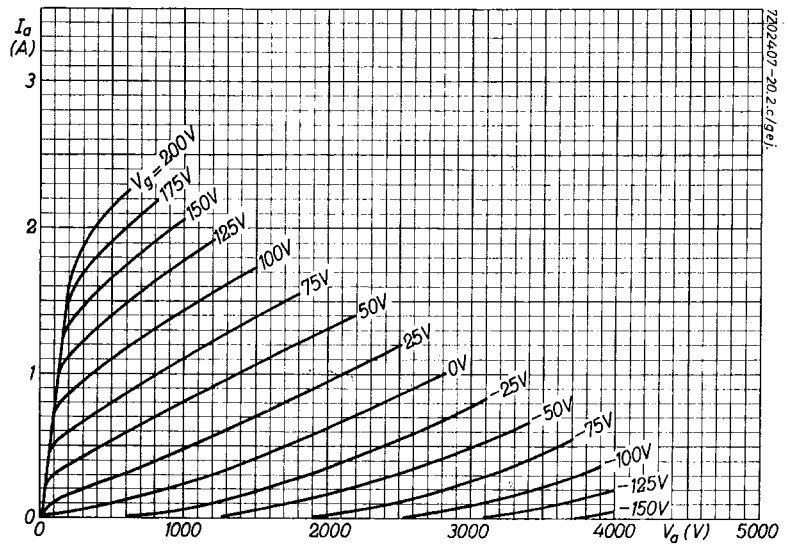
**LIMITING VALUES** (Absolute limits)

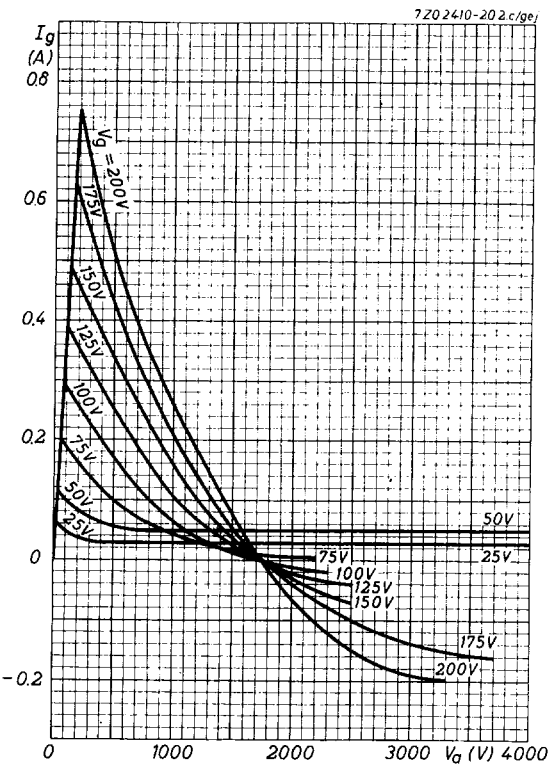
| | | | | |
|---|---|---|---|---|
| Anode voltage | $V_a$ | = max. | 4 | kV |
| Anode input power | $W_{ia}$ | = max. | 1550 | W |
| Anode dissipation | $W_a$ | = max. | 350 | W |
| Negative grid voltage | $-V_g$ | = max. | 500 | V |
| Grid dissipation | $W_g$ | = max. | 40 | W |
| Grid circuit resistance | $R_g$ | = max. | 100 | kΩ |
| Cathode current | $I_k$ | = max. | 500 | mA |

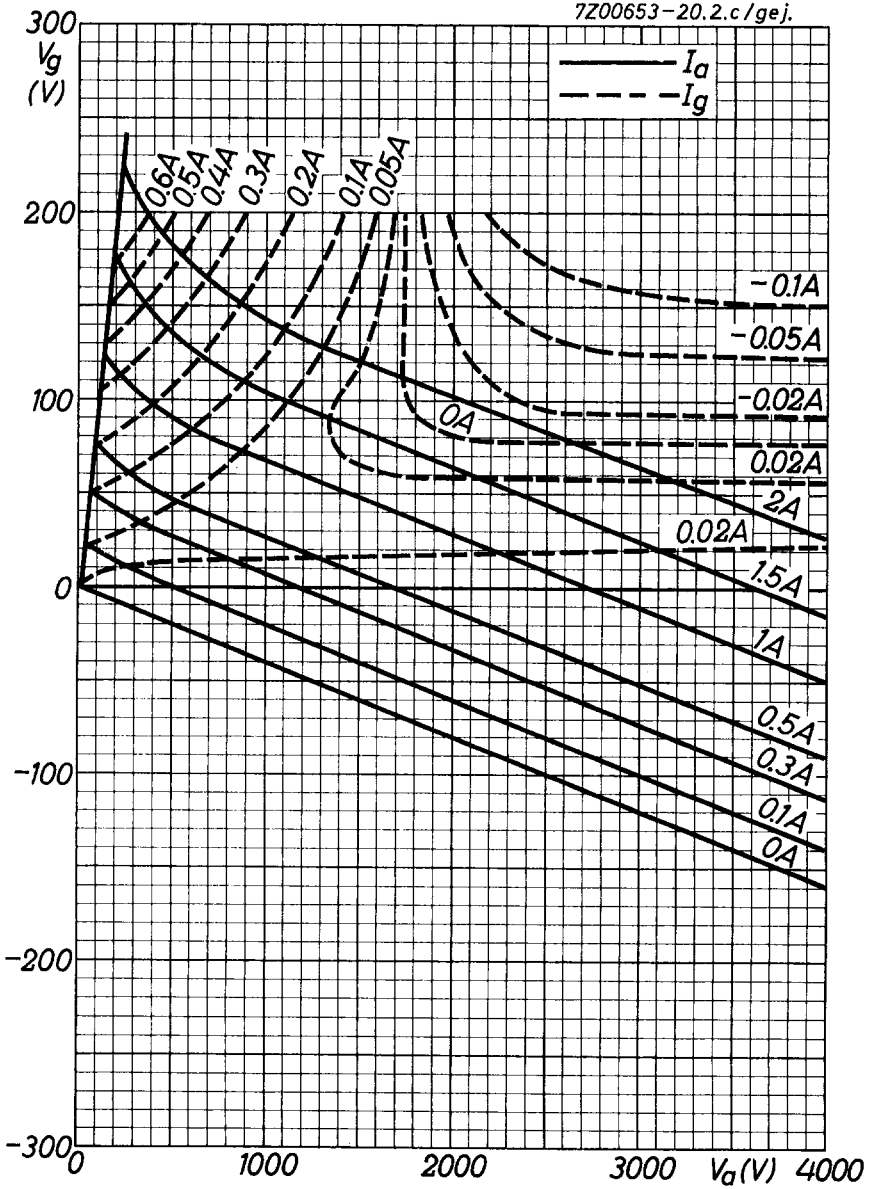
**OPERATING CONDITIONS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $V_a$ | = | 4 | | 3 | | 2.5 | kV |
| $V_g$ | = | -135 | | -102 | | -77.5 | V[1]) |
| $R_{aa\sim}$ | = | 20 | | 14.5 | | 12 | kΩ |
| $V_{gg_p}$ | = | 0 | 485 | 0 | 475 | 0 | 400 | V |
| $I_a$ | = | 2x88 | 2x270 | 2x60 | 2x290 | 2x90 | 2x300 | mA |
| $I_g$ | = | 0 | 2x30 | 0 | 2x60 | 0 | 2x55 | mA |
| $W_{dr}$ | = | 0 | 2x7 | 0 | 2x13 | 0 | 2x10 | W |
| $W_{ia}$ | = | 2x350 | 2x1080 | 2x180 | 2x870 | 2x225 | 2x750 | W |
| $W_a$ | = | 2x350 | 2x305 | 2x180 | 2x190 | 2x225 | 2x180 | W |
| $W_o$ | = | 0 | 1550 | 0 | 1360 | 0 | 1140 | W |
| $d_{tot}$ | = | - | < 2.5 | - | < 2.5 | - | < 2.5 | % |
| $\eta$ | = | - | 71.7 | - | 78.1 | - | 76 | % |

[1]) To be adjusted for zero signal anode current


$I_a$ (A)
3
2
1
0
$V_g$ = 200V
175V
150V
125V
100V
75V
50V
25V
0V
-25V
-50V
-75V
-100V
-125V
-150V
0
1000
2000
3000
4000
$V_a$ (V)
5000
7Z02407-20.2.c/ge


7Z02410-20.2.c/ge
$I_g$ (A)
0.8
0.6
0.4
0.2
0
-0.2
$V_g$ = 200V
175V
150V
125V
100V
75V
50V
25V
50V
25V
75V
100V
125V
150V
175V
200V
0
1000
2000
3000
$V_a$ (V)
4000


7Z00653-20.2.c/gej.
$I_a$
$I_g$
$V_g$ (V)
300
200
100
0
-100
-200
-300
0.6A
0.5A
0.4A
0.3A
0.2A
0.1A
0.05A
-0.1A
-0.05A
-0.02A
0A
0.02A
2A
0.02A
1.5A
1A
0.5A
0.3A
0.1A
0A
0
1000
2000
3000
$V_a$ (V)
4000