# R.F. DOUBLE POWER TETRODE

**QUICK REFERENCE DATA**

| λ (m) | Freq. (Mc/s) | C telegr. C.C.S. $V_a$ (V) | C telegr. C.C.S. $W_o$ (W) | C telegr. I.C.A.S. $V_a$ (V) | C telegr. I.C.A.S. $W_o$ (W) | $C_{ag_2}$ mod. C.C.S. $V_a$ (V) | $C_{ag_2}$ mod. C.C.S. $W_o$ (W) | $C_{ag_2}$ mod. I.C.A.S. $V_a$ (V) | $C_{ag_2}$ mod. I.C.A.S. $W_o$ (W) |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 60 | | | | | 600 | 71 | 600 | 79 |
| 1.5 | 200 | 600 | 90 | | | | | | |
| 1.2 | 250 | 750 | 85 | 750 | 96 | 600 | 64 | 600 | 71 |
| 0.7 | 430 | 520 | 66 | | | | | | |
| 0.6 | 500 | 500 | 60 | | | | | | |

| λ (m) | Freq. (Mc/s) | C fr.mult. $V_a$ (V) | C fr.mult. $W_o$ (W) |
|---|---|---|---|
| 6/2 | 50/150 | 500 | 20 |
| | | 400 | 18 |
| 4/1.3 | 75/225 | 400 | 12 |

| B mod. $V_a$ (V) | B mod. $W_o$ (W) |
|---|---|
| 600 | 86 |
| 450 | 60 |
| 300 | 37 |

**HEATING:** Indirect; cathode oxide-coated

| | | | |
|---|---|---|---|
| Heater voltage | $V_f$ = | 6.3 | 12.6 V |
| Heater current | $I_f$ = | 1.8 | 0.9 A |
| | Pins | 5-(1+7) | 1-7 |

**TYPICAL CHARACTERISTICS**

| | | |
|---|---|---|
| Amplification factor of grid No.2 with respect to grid No.1 | $\mu_{g_2g_1}$ = | 8.2 |
| Mutual conductance (per system) | S ($I_a$ = 30 mA) = | 4.5 mA/V |

**COOLING:** radiation

When the tube is used at frequencies above 150 Mc/s, it may be necessary to direct a low-velocity air flow on the bulb and on the anode seals

7Z2 3017

## CAPACITANCES

| | | | | |
|---|---|---|---|---|
| | | | per system | |
| Anode to all other elements except grid No.1 | $C_a$ | = | 3.2 | pF |
| Grid No.1 to all other elements except anode | $C_{g_1}$ | = | 10.5 | pF |
| Anode to grid No.1 | $C_{ag_1}$ | < | 0.09 | pF |
| | $C_{ag_1} - C_n$ | < | 0.035 | pF |

See electrode arrangement for internal neutralisation by $C_n$ and $C_{n'}$

| | | | | |
|---|---|---|---|---|
| | | | in push-pull | |
| Output capacitance | $C_o$ | = | 2.1 | pF |
| Input capacitance | $C_i$ | = | 6.7 | pF |

## TEMPERATURE LIMITS (Absolute limits)

| | | |
|---|---|---|
| Temperature of bulb and anode seals | max. 250 | °C |
| Temperature of bottom pin seals | max. 180 | °C |

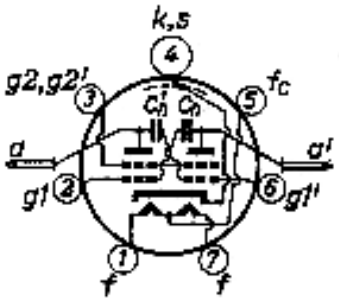
## MECHANICAL DATA

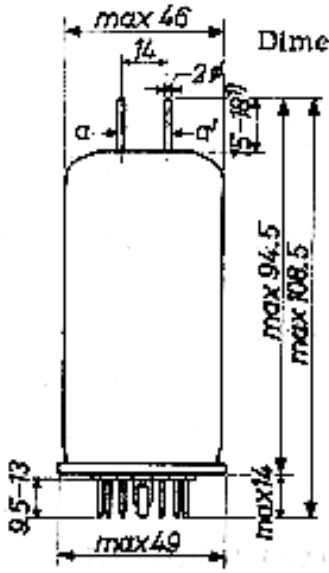
Base : septar

Socket : 40202

Clips : 40623

Net weight: 60 g




Dimensions in mm

Mounting position: vertical with base up or down
horizontal with anode pins in a horizontal plane

[1]) Max. 3 mm glass included

## R.F. CLASS C TELEGRAPHY

### C.C.S. LIMITING VALUES (Absolute limits), continuous service

| Frequency | | | up to 250 | up to 500 | Mc/s |
|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | max. 750 | max. 600 | V |
| Anode input power | $W_{ia}$ | = | max. 2x60 | max. 2x50 | W |
| Anode dissipation | $W_a$ | = | max. 2x20 | | W |
| Anode current | $I_a$ | = | max. 2x110 | | mA |
| Grid No.2 voltage | $V_{g_2}$ | = | max. 300 | | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | max. 2x3.5 | | W |
| Negative grid No.1 voltage | $-V_{g_1}$ | = | max. 175 | | V |
| Grid No.1 current | $I_{g_1}$ | = | max. 2x5 | | mA |
| Grid No.1 circuit resistance | $R_{g_1}$ | = | max. 50 | | kΩ |
| Heater to cathode voltage | $V_{kf}$ | = | max. 100 | | V |

### C.C.S. OPERATING CONDITIONS, continuous service
two systems in push-pull

| Frequency | f | = | 200 | 250 | 430 | 500 | Mc/s |
|---|---|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | 600 | 750 | 520 | 500 | V |
| Grid No.1 voltage | $V_{g_1}$ | = | −80 | −80 | −80 | − | V |
| Grid No.1 resistor | $R_{g_1}$ | = | − | − | − | 20 | kΩ |
| Grid No.2 voltage | $V_{g_2}$ | = | 250 | 250 | 250 | 250 | V |
| Anode current | $I_a$ | = | 2x100 | 2x80 | 2x100 | 2x100 | mA |
| Grid No.1 current | $I_{g_1}$ | = | 2x2.5 | 2x1.5 | 2x2.8 | 2x3 | mA |
| Grid No.2 current | $I_{g_2}$ | = | 16 | 17 | 18 | 20 | mA |
| Input A.C. voltage, peak to peak | $V_{g_1g_1'p}$ | = | 200 | 250 | − | − | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | 4 | 4.25 | 4.5 | 5 | W |
| Anode input power | $W_{ia}$ | = | 2x60 | 2x60 | 2x52 | 2x50 | W |
| Anode dissipation | $W_a$ | = | 2x15 | 2x17.5 | 2x19 | 2x20 | W |
| Output power | $W_o$ | = | 90 | 85 | 66 | 60 | W |
| Efficiency | $\eta$ | = | 75 | 71 | 64 | 60 | % |

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R.F. CLASS C TELEGRAPHY (continued)

I.C.A.S. LIMITING VALUES (Absolute limits), intermittent service

| Frequency | f | | up to 250 | up to 500 | Mc/s |
|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | max. 750 | max. 600 | V |
| Anode input power | $W_{ia}$ | = | max. 2x75 | max. 2x60 | W |
| Anode dissipation | $W_a$ | = | max. 2x22.5 | | W |
| Anode current | $I_a$ | = | max. 2x120 | | mA |
| Grid No.2 voltage | $V_{g_2}$ | = | max. 300 | | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | max. 2x4 | | W |
| Negative grid No.1 voltage | $-V_{g_1}$ | = | max. 175 | | V |
| Grid No.1 current | $I_{g_1}$ | = | max. 2x5 | | mA |
| Grid No.1 circuit resistance | $R_{g_1}$ | = | max. 50 | | kΩ |
| Heater to cathode voltage | $V_{kf}$ | = | max. 100 | | V |

I.C.A.S. OPERATING CONDITIONS, intermittent service
two systems in push-pull

| | | | | |
|---|---|---|---|---|
| Frequency | f | = | 250 | Mc/s |
| Anode voltage | $V_a$ | = | 750 | V |
| Grid No.1 voltage | $V_{g_1}$ | = | −80 | V |
| Grid No.2 voltage | $V_{g_2}$ | = | 250 | V |
| Anode current | $I_a$ | = | 2x90 | mA |
| Grid No.1 current | $I_{g_1}$ | = | 2x1.7 | mA |
| Grid No.2 current | $I_{g_2}$ | = | 14 | mA |
| Input A.C. voltage, peak to peak | $V_{g_1g_1\,p}$ | = | 260 | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | 3.5 | W |
| Anode input power | $W_{ia}$ | = | 2x67.5 | W |
| Anode dissipation | $W_a$ | = | 2x19.5 | W |
| Output power | $W_o$ | = | 96 | W |
| Efficiency | $\eta$ | = | 71 | % |

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## R.F. CLASS C ANODE AND SCREEN GRID MODULATION

**C.C.S. LIMITING VALUES** (Absolute limits), continuous service

| Frequency | f | | up to | 250 | up to | 500 | Mc/s |
|---|---|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | max. | 600 | max. | 480 | V |
| Anode input power | $W_{ia}$ | = | max. | 2x45 | max. | 2x33.5 | W |
| Anode dissipation | $W_a$ | = | max. | 2x14 | max. | 2x14 | W |
| Anode current | $I_a$ | = | max. | 2x92 | max. | 2x92 | mA |
| Grid No.2 voltage | $V_{g_2}$ | = | max. | 300 | max. | 300 | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | max. | 2x3.5 | max. | 2x3.5 | W [1] |
| Negative grid No.1 voltage | $-V_{g_1}$ | = | max. | 175 | max. | 175 | V |
| Grid No.1 current | $I_{g_1}$ | = | max. | 2x5 | max. | 2x5 | mA |
| Grid No.1 circuit resistance | $R_{g_1}$ | = | max. | 50 | max. | 50 | kΩ [2] |
| Heater to cathode voltage | $V_{kf}$ | = | max. | 100 | max. | 100 | V |

**C.C.S. OPERATING CONDITIONS**, continuous service
two systems in push-pull

| Frequency | f | = | 60 | 250 | Mc/s |
|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | 600 | 600 | V |
| Grid No.2 voltage | $V_{g_2}$ | = | 250 | 250 | V |
| Grid No.1 voltage | $V_{g_1}$ | = | −80 | −80 | V |
| Anode current | $I_a$ | = | 2x75 | 2x75 | mA |
| Grid No.2 current | $I_{g_2}$ | = | 20 | 18 | mA |
| Grid No.1 current | $I_{g_1}$ | = | 2x3.8 | 2x1.6 | mA |
| Peak grid No.1 A.C. voltage | $V_{g_{1p}}$ | = | 105 | 130 | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | 5 | 4.5 | W |
| Anode input power | $W_{ia}$ | = | 2x45 | 2x45 | W |
| Anode dissipation | $W_a$ | = | 2x9.5 | 2x13 | W |
| Output power | $W_o$ | = | 71 | 64 | W |
| Efficiency | $\eta$ | = | 79 | 71 | % |
| Modulation factor | m | = | 100 | 100 | % |
| Peak grid No.2 A.C. voltage | $V_{g_{2p}}$ | = | 90 | 90 | V |
| Modulation power | $W_{mod}$ | = | 45 | 45 | W |

1) Screen grid modulated via a choke. For all other modulation methods $W_{g_2}$ = max. 2x2.3 W

2) Per system. When a common grid resistor is used $R_{g_1}$ = max. 25 kΩ

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R.F. CLASS C ANODE AND SCREEN GRID MODULATION (continued)

I.C.A.S. LIMITING VALUES (Absolute limits), intermittent service

| Frequency | f | | up to | 250 | up to | 500 | Mc/s |
|---|---|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | max. | 600 | max. | 480 | V |
| Anode input power | $W_{ia}$ | = | max. | 2x50 | max. | 2x40 | W |
| Anode dissipation | $W_a$ | = | max. | 2x15 | max. | 2x15 | W |
| Anode current | $I_a$ | = | max. | 2x100 | max. | 2x100 | mA |
| Grid No.2 voltage | $V_{g_2}$ | = | max. | 300 | max. | 300 | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | max. | 2x4 | max. | 2x4 | W [1] |
| Negative grid No.1 voltage | $-V_{g_1}$ | = | max. | 175 | max. | 175 | V |
| Grid No.1 current | $I_{g_1}$ | = | max. | 2x5 | max. | 2x5 | mA |
| Grid No.1 circuit resistance | $R_{g_1}$ | = | max. | 50 | max. | 50 | kΩ [2] |
| Heater to cathode voltage | $V_{kf}$ | = | max. | 100 | max. | 100 | V |

I.C.A.S. OPERATING CONDITIONS, intermittent service; two systems in push-pull

| | | | | | |
|---|---|---|---|---|---|
| Frequency | f | = | 60 | 250 | Mc/s |
| Anode voltage | $V_a$ | = | 600 | 600 | V |
| Grid No.2 voltage | $V_{g_2}$ | = | 250 | 250 | V |
| Grid No.1 voltage | $V_{g_1}$ | = | −80 | −80 | V |
| Anode current | $I_a$ | = | 2x83 | 2x83 | mA |
| Grid No.2 current | $I_{g_2}$ | = | 16 | 16 | mA |
| Grid No.1 current | $I_{g_1}$ | = | 2x4 | 2x1.7 | mA |
| Peak grid No.1 A.C. voltage | $V_{g_{1p}}$ | = | 105 | 130 | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | 4 | 4 | W |
| Anode input power | $W_{ia}$ | = | 2x50 | 2x50 | W |
| Anode dissipation | $W_a$ | = | 2x10.5 | 2x14.5 | W |
| Output power | $W_o$ | = | 79 | 71 | W |
| Efficiency | $\eta$ | = | 79 | 71 | % |
| Modulation factor | m | = | 100 | 100 | % |
| Peak grid No.2 A.C. voltage | $V_{g_{2p}}$ | = | 90 | 90 | V |
| Modulation power | $W_{mod}$ | = | 50 | 50 | W |

1) Screen grid modulated via a choke. For all other modulation methods $W_{g_2}$ = max. 2x2.6 W

2) Per system. When a common grid resistor is used $R_{g_1}$ = max. 25 kΩ

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## R.F. CLASS C FREQUENCY TRIPLER

**LIMITING VALUES** (Absolute limits)

| Frequency | f | | up to 250 | up to 500 | Mc/s |
|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | max. 750 | max. 600 | V |
| Anode input power | $W_{ia}$ | = | max. 2x60 | max. 2x50 | W |
| Anode dissipation | $W_a$ | = | max. 2x20 | | W |
| Anode current | $I_a$ | = | max. 2x110 | | mA |
| Grid No.2 voltage | $V_{g_2}$ | = | max. 300 | | V |
| Grid No.2 dissipation | $W_{g_2}$ | = | max. 2x3.5 | | W |
| Negative grid No.1 voltage | $-V_{g_1}$ | = | max. 175 | | V |
| Grid No.1 current | $I_{g_1}$ | = | max. 2x5 | | mA |
| Grid No.1 circuit resistance | $R_{g_1}$ | = | max. 50 | | kΩ |
| Heater to cathode voltage | $V_{kf}$ | = | max. 100 | | V |

**OPERATING CONDITIONS** two systems in push-pull

| | | | | | | |
|---|---|---|---|---|---|---|
| Wavelength | λ | = | 6/2 | 6/2 | 4/1.3 | m |
| Anode voltage | $V_a$ | = | 500 | 400 | 400 | V |
| Grid No.2 voltage | $V_{g_2}$ | = | 250 | 250 | 250 | V |
| Grid No.1 voltage | $V_{g_1}$ | = | −150 | −150 | −150 | V |
| Anode current | $I_a$ | = | 2x60 | 2x73 | 2x65 | mA |
| Grid No.2 current | $I_{g_2}$ | = | 10 | 16 | 20 | mA |
| Grid No.1 current | $I_{g_1}$ | = | 2x3 | 2x2.5 | 2x1.5 | mA |
| Input A.C. voltage, peak to peak | $V_{g_1g_1'p}$ | = | 360 | 360 | 360 | V |
| Grid No.1 input power | $W_{ig_1}$ | = | 2x0.6 | 2x0.5 | 2x0.3 | W |
| Grid No.2 dissipation | $W_{g_2}$ | = | 2.5 | 4 | 5 | W |
| Anode input power | $W_{ia}$ | = | 2x30 | 2x29 | 2x26 | W |
| Anode dissipation | $W_a$ | = | 2x20 | 2x20 | 2x20 | W |
| Output power | $W_o$ | = | 20 | 18 | 12 | W |
| Efficiency | η | = | 33 | 31 | 23 | % |

7Z2 3023

**A.F. CLASS B AMPLIFIER AND MODULATOR** without grid current

**LIMITING VALUES** (Absolute limits)

| | | | | |
|---|---|---|---|---|
| Anode voltage | $V_a$ | = max. | 600 | V |
| Anode input power | $W_{ia}$ | = max. | 2x60 | W |
| Anode dissipation | $W_a$ | = max. | 2x20 | W |
| Anode current | $I_a$ | = max. | 2x110 | mA |
| Grid No.2 voltage | $V_{g_2}$ | = max. | 300 | V |
| Grid No.2 dissipation | $W_{g_2}$ | = max. | 2x3.5 | W |
| Grid No.1 circuit resistance | $R_{g_1}$ | = max. | 50 | kΩ |
| Heater to cathode voltage | $V_{kf}$ | = max. | 100 | V |

**OPERATING CONDITIONS:** two systems in push-pull

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $V_a$ | = | 600 | | 450 | | 300 | | V |
| $V_{g_1}$ [1] | = | -27.5 | | -27.5 | | -26 | | V |
| $V_{g_2}$ | = | 250 | | 250 | | 250 | | V |
| $R_{aa'}$ | = | 12.5 | | 10 | | 6.5 | | kΩ |
| $V_{g_1g_1'p}$ | = | 0 | 55 | 0 | 55 | 0 | 52 | V |
| $I_a$ | = | 2x20 | 2x62 | 2x20 | 2x58 | 2x20 | 2x56 | mA |
| $I_{g_2}$ | = | 0.9 | 23 | 1.4 | 27 | 2.2 | 28 | mA |
| $W_{g_2}$ | = | 0.2 | 5.8 | 0.4 | 6.7 | 0.6 | 7.0 | W |
| $W_{ia}$ | = | 2x12 | 2x37 | 2x9.0 | 2x26 | 2x6.0 | 2x16.8 | W |
| $W_a$ | = | 2x12 | 2x12 | 2x9.0 | 2x8.5 | 2x6.0 | 2x5.6 | W |
| $W_o$ | = | 0 | 50 | 0 | 35 | 0 | 22.5 | W |
| $d_{tot}$ | = | - | 2.4 | - | 3.1 | - | 2.9 | % |
| $\eta$ | = | - | 67.5 | - | 67.5 | - | 67 | % |

1) Individual adjustment of the grid bias of each system is recommended

7Z2 3024

**A.F. CLASS B AMPLIFIER AND MODULATOR** with grid current

**LIMITING VALUES** (Absolute limits)

| | | | | |
|---|---|---|---|---|
| Anode voltage | $V_a$ | = max. | 600 | V |
| Anode input power | $W_{ia}$ | = max. | 2x60 | W |
| Anode dissipation | $W_a$ | = max. | 2x20 | W |
| Anode current | $I_a$ | = max. | 2x110 | mA |
| Grid No.2 voltage | $V_{g_2}$ | = max. | 300 | V |
| Grid No.2 dissipation | $W_{g_2}$ | = max. | 2x3.5 | W |
| Grid No.1 current | $I_{g_1}$ | = max. | 2x5 | mA |
| Grid No.1 circuit resistance | $R_{g_1}$ | = max. | 50 | kΩ |
| Heater to cathode voltage | $V_{kf}$ | = max. | 100 | V |

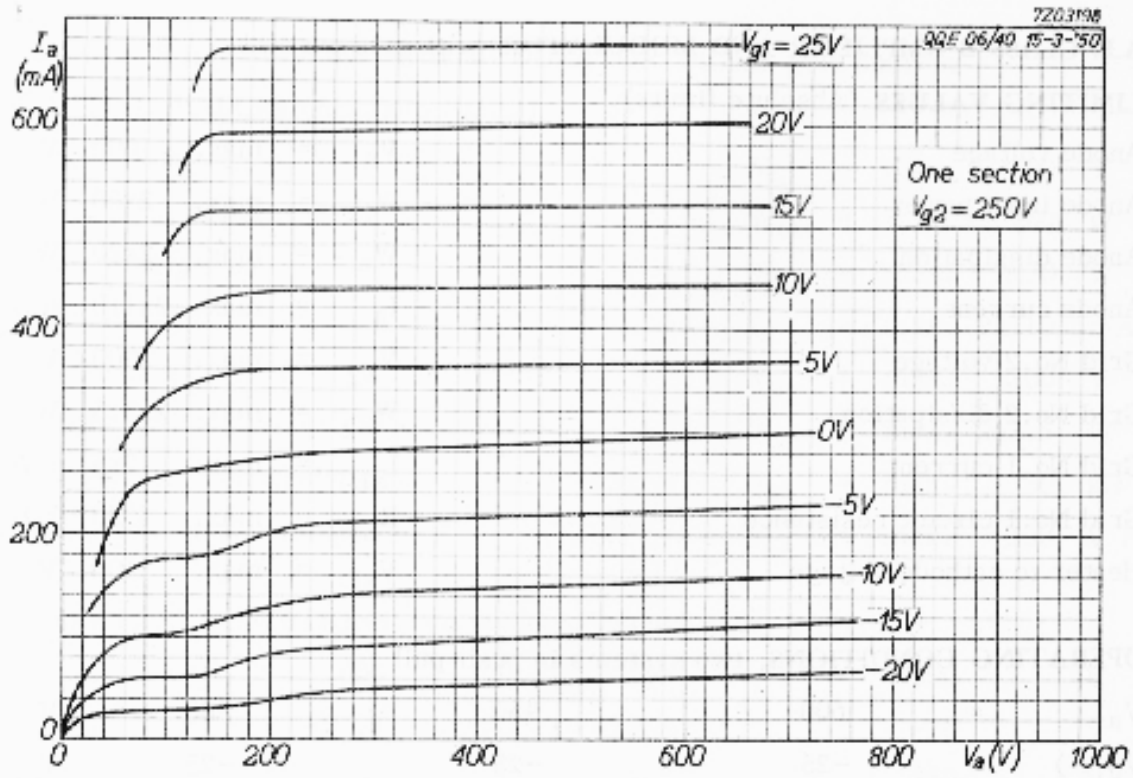
**OPERATING CONDITIONS.** two systems in push-pull

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $V_a$ | = | 600 | | 450 | | 300 | V |
| $V_{g_1}$ [1] | = | −25 | | −25 | | −25 | V |
| $V_{g_2}$ | = | 250 | | 250 | | 250 | V |
| $R_{aa'}$ | = | 8.0 | | 6.0 | | 4.0 | kΩ |
| $V_{g_1g_1'p}$ | = | 0 | 78 | 0 | 76 | 0 | 75 | V |
| $I_a$ | = | 2x25 | 2x100 | 2x25 | 2x97 | 2x25 | 2x94 | mA |
| $I_{g_1}$ | = | 0 | 2x2.6 | 0 | 2x2.6 | 0 | 2x2.6 | mA |
| $I_{g_2}$ | = | 1.2 | 26 | 1.9 | 28 | 2.8 | 28 | mA |
| $W_{ig_1}$ | = | 0 | 2x0.1 | 0 | 2x0.1 | 0 | 2x0.1 | W |
| $W_{g_2}$ | = | 0.3 | 6.5 | 0.5 | 7.0 | 0.7 | 7.0 | W |
| $W_{ia}$ | = | 2x15 | 2x60 | 2x11.2 | 2x43.5 | 2x7.5 | 2x28.2 | W |
| $W_a$ | = | 2x15 | 2x17 | 2x11.2 | 2x13.5 | 2x7.5 | 2x9.7 | W |
| $W_o$ | = | 0 | 86 | 0 | 60 | 0 | 37 | W |
| $d_{tot}$ | = | – | 5 | – | 5 | – | 5 | % |
| $\eta$ | = | – | 71.5 | – | 69 | – | 65.5 | % |

[1] Individual adjustment of the grid bias of each system is recommended

7Z2 3025

# QQE06/40

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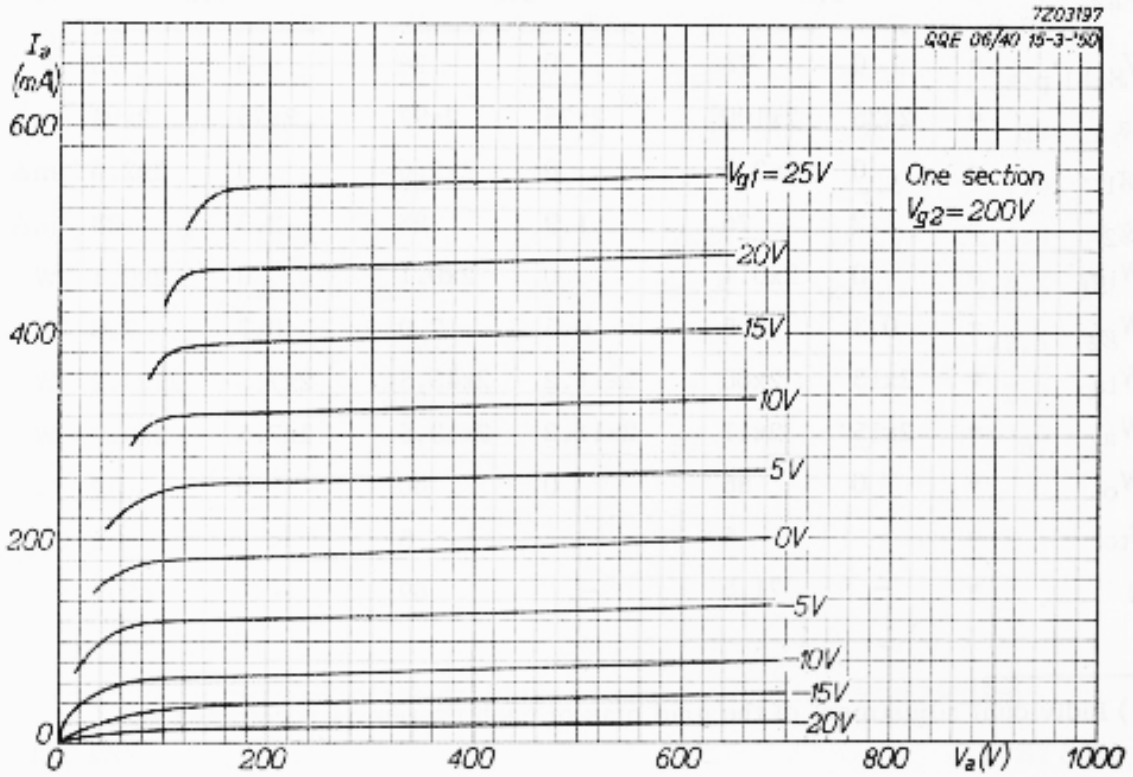
A

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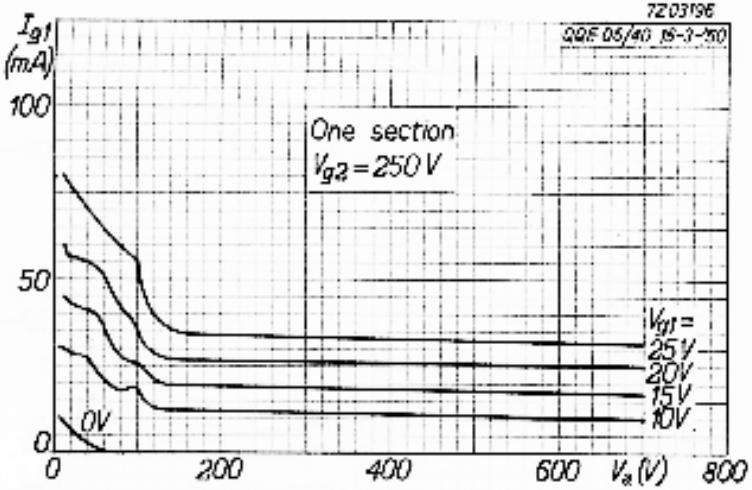
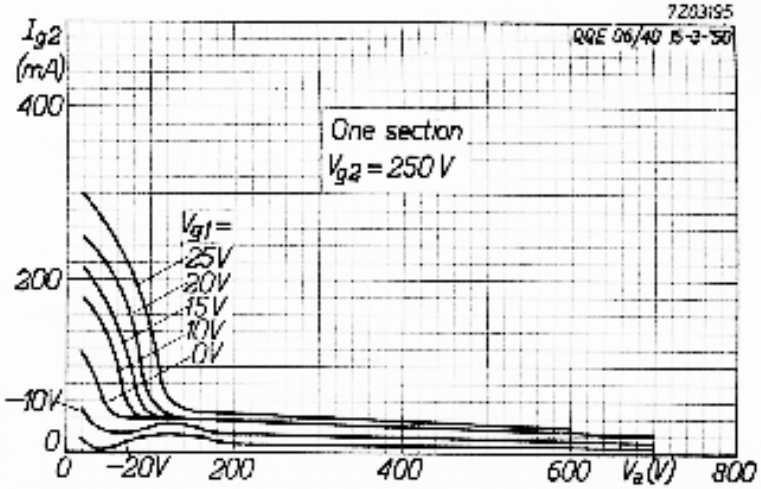
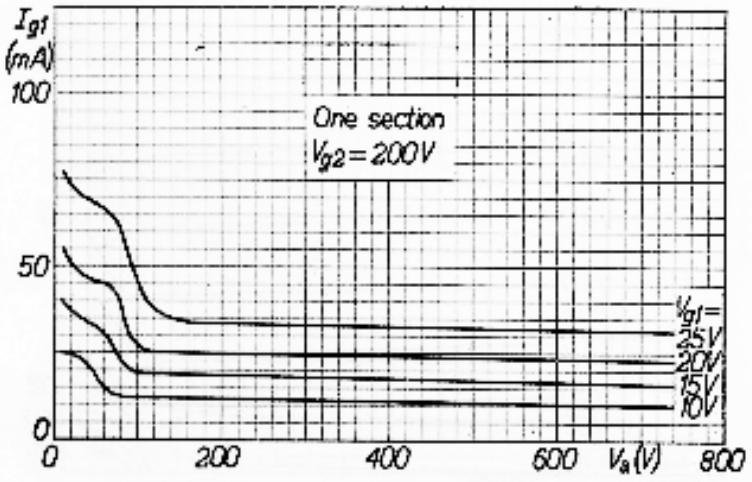
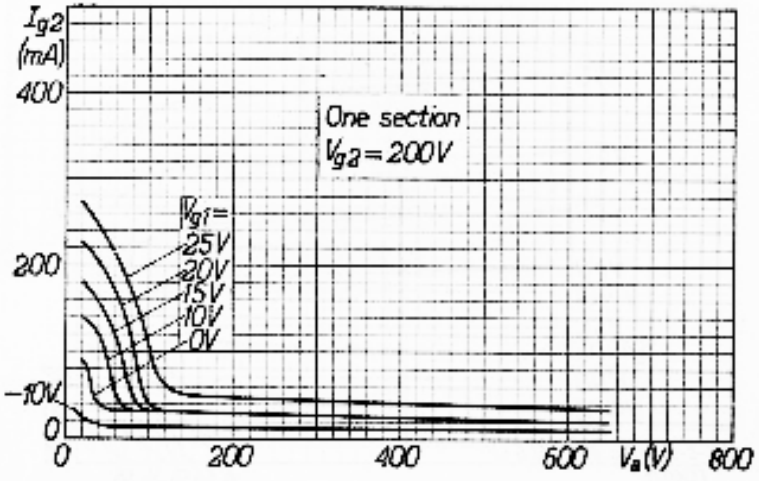

7Z03196
QQE 06/40 15-2-250
$I_{g1}$ (mA)
100
50
0
One section
$V_{g2}$ = 250 V
$V_{g1}$ =
25V
20V
15V
10V
0V
0
200
400
600
$V_a$ (V)
800

D


7Z03195
QQE 06/40 15-2-250
$I_{g2}$ (mA)
400
200
−10V
0
One section
$V_{g2}$ = 250 V
$V_{g1}$ =
25V
20V
15V
10V
0V
0
−20V
200
400
600
$V_a$ (V)
800


$I_{g1}$ (mA)
100
50
0
One section
$V_{g2}$ = 200 V
$V_{g1}$ =
25V
20V
15V
10V
0
200
400
600
$V_a$ (V)
800


$I_{g2}$ (mA)
400
200
−10V
0
One section
$V_{g2}$ = 200 V
$V_{g1}$ =
25V
20V
15V
10V
0V
0
200
400
600
$V_a$ (V)
800

2.2.1965

C