

2B33

Beam Power Tetrode

2B33 is a beam power tetrode having an indirectly heated unipotential cathode.

2B33 is used as a driver or a power amplifier of a transmitter up to a frequency of 60 MHz.

2B33 can also be used with triode connection, so that tube is suitable for an AF Power Amplifier or a Modulator.

Electrical Data:

General Data:

Cathode: Indirectly-Heated Oxide Coated Unipotential

	Min.	Bogie	Max.	Unit
Heater Voltage	5.7	6.3	6.9	V
Heater Current (at 6.3 volts) -	-	0.9	-	A
Transconductance	-	6000	-	μS
(for $E_b=250Vdc$, $E_{c2} 250Vdc$ $E_{c1}=-14Vdc$)				
Direct Interelectrode Capacitances:				
Grid No. 1 to Plate (Note 1) -	-	-	0.2	μF
Input	-	10	-	μF
Output	-	5.3	-	μF
Frequency	-	-	60	MHz

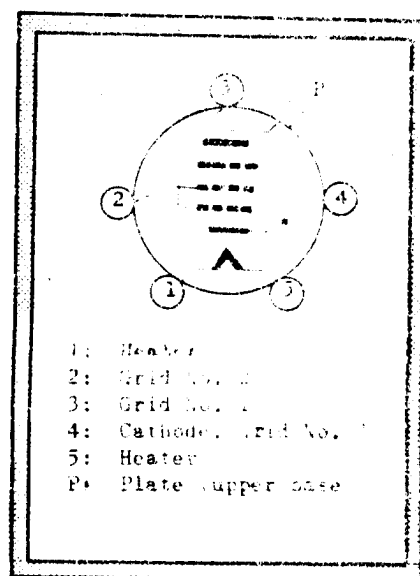
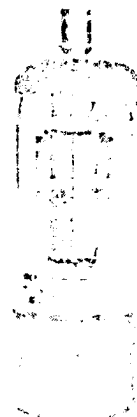
Mechanical Data:

Dimensions:

Overall Length	123	128	133	mm
Maximum Diameter	-	-	39.7	mm
Net Weight (approx.)	-	60	-	gr.

Base:

Upper Part	JIS A9S
Bottom Part	JIS E19S-1



TERMINAL CONNECTIONS

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Components:

Socket	JIS C 7006 Type Y
Cap	A9S
Mounting Position	any

Cooling: Natural Convection and Radiation (Note 2)

Note 1. "No. 312 shielded" (see EIAJET-21) is used.

Note 2. When used in a closed chamber, some means for forced-air cooling should be taken into account in order to prevent the stem temperature rise.

AF Power Amplifier and Modulator-Class AB1 (Note 3)

(Triode-connection, grid No. 2 is connected to plate)

Maximum Ratings:

DC Plate Voltage	400 Vdc
Max-Signal DC Plate Current (Note 4)	125 mAdc
Max-Signal Plate Input (Note 4)	50 W
Plate Dissipation (Note 1)	25 W
Peak Heater to Cathode Voltage	± 135 V

Typical Operation: : (Values are for 2 tubes)

DC Plate Voltage	400 Vdc
DC Grid No. 1 Voltage	-45 Vdc
Peak AF Grid No. 1 to Grid No. 1 Voltage	90 V
Zero-Signal DC Plate Current	64 mAdc
Max-Signal DC Plate Current	140 mAdc
ective Load Resistance (Plate to Plate)	3000 Ω
Max-Signal Driving Power (approx.)	0 W
Max-Signal Plate Power Output (approx.)	15 W
Maximum Grid No. 1 Circuit Resistance:	
In case of fixed bias	100 k Ω
In case of cathode bias	500 k Ω

AF Power Amplifier and Modulator-Class AB1 (Note 3)

Maximum Ratings: Absolute Values:

DC Plate Voltage	600 Vdc
DC Grid No. 2 Voltage	300 Vdc
Max.-Signal DC Plate Current (Note 4)	120 mAdc

Max.-Signal Plate Input (Note 4)	60 W
Max.-Signal Grid No. 2 Input (Note 4)	3.5 W
Plate Dissipation (Note 4)	25 W
Peak Heater to Cathode Voltage	±135 V

Typical Operation: (Values are for 2 tubes)

DC Plate Voltage	400	500	600 Vdc
DC Grid No. 2 Voltage (Note 6)	300	300	300 Vdc
DC Grid No. 1 Voltage (Note 7)	-30	-32	-34 Vdc
Peak AF Grid No. 1 to Grid No. 1 Voltage	60	64	68 V
Zero-Signal DC Plate Current	50	44	35 mAdc
Max-Signal DC Plate Current	143	141	139 mAdc
Zero-Signal DC Grid No. 2 Current	2	1	0.6 mAdc
Max-Signal DC Grid No. 2 Current	16	15	15 mAdc
Effective Load Resistance (Plate to Plate)	6800	8200	10000 Ω
Max-Signal Driving Power (approx.)	0	0	0 W
Max-Signal Plate Power Output (approx.)	36	46	56 W
Grid No. 1 Circuit Resistance			
In case of fixed bias			100 kΩ
In case of cathode bias			Not recommended

AF Power Amplifier and Modulator-Class AB2 (Note 5)

Maximum Ratings: Absolute Values

DC Plate Voltage	600 Vdc
DC Grid No. 2 Voltage	300 Vdc
Max-Signal DC Plate Current (Note 4)	120 mAdc
Max-Signal Plate Input (Note 4)	60 W
Max-Signal Grid No. 2 Input (Note 4)	3.5 W
Plate Dissipation (Note 4)	25 W
Peak Heater to Cathode Voltage	±135 V

Typical Operation: (Values are for 2 tubes)

DC Plate Voltage	400	500	600 Vdc
DC Grid No. 2 Voltage (Note 6)	300	300	300 Vdc
DC Grid No. 1 Voltage (Note 7)	-28	-30	-32 Vdc
Peak AF Grid No. 1 to Grid No. 1 Voltage	80	86	90 V
Zero-Signal DC Plate Current	72	60	48 mAdc

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Max-Signal DC Plate Current	240	240	200 mA _{dc}
Zero-Signal DC Grid No. 2 Current	2	0.9	0.7 mA _{dc}
Max-Signal DC Grid No. 2 Current	20	20	18 mA _{dc}
Effective Load Resistance (Plate to Plate)	3700	4600	6900 Ω
Max-Signal Driving Power (approx.)	0.2	0.2	0.1 W
Max-Signal Power Output (approx.)	55	75	80 W

Maximum Grid No. 1 Circuit Resistance:

In case of fixed bias 30 kΩ

In case of cathode bias Not recommended

Note 3. A suffix "1" means that grid No. 1 current does not flow even at peak condition of maximum input signal. Maximum input signal voltage limit for the operating class of AB₁ will be reached when peak instantaneous grid No. 1 voltage becomes zero volts.

Note 4. Averaged over any audio-frequency cycle of sine-wave form.

Note 5. A suffix "2" means that grid No. 1 current will flow during some part of the input signal cycle.

Note 6. This voltage should be applied by a private source or by a voltage divider from the plate source.

Note 7. This voltage is delivered by a fixed bias.

RF Power Amplifier-Class B Telephony

(Carrier conditions per tube for use with a max. modulation factor of 1.0)

Maximum Ratings: Absolute Values

DC Plate Voltage	600 V _{dc}		
DC Grid No. 2 Voltage	300 V _{dc}		
DC Plate Current	80 mA _{dc}		
Plate Input	37.5 W		
Plate Dissipation	25 W		
Grid No. 2 Dissipation	2.5 W		
Peak Heater to Cathode Voltage	±135 V		

Typical Operation: :

DC Plate Voltage	400	500	600 V _{dc}
DC Grid No. 2 Voltage	300	300	300 V _{dc}
DC Grid No. 1 Voltage (Note 8)	-40	-40	-40 V _{dc}
Peak RF Grid No. 1 Voltage	40	38	36 V
DC Plate Current	75	70	62.5 mA _{dc}

DC Grid No. 2 Current	5	4	4 mAde
DC Grid No. 1 Current (approx.)	9	0	0 mAde
Driving Power (approx.) (Note 9)	0.4	0.3	0.2 W
Plate Power Output (approx.)	9	11	12.5 W
Maximum Grid No. 1 Circuit Resistance			30 k Ω

Note 8. Fixed bias or capacitance by-passed cathode resistance bias should be used.

Note 9. Peak AF condition for use with a modulation factor of 1.0.

Plate Modulated RF Power Amplifier-Class C Telephony

(Carrier condition per tube for use with a max. modulation factor of 1.0)

Maximum Ratings: Absolute Values

DC Plate Voltage	475 Vdc
DC Grid No. 2 Voltage	300 Vdc
DC Grid No. 1 Voltage	-200 Vdc
DC Plate Current	83 mAde
DC Grid No. 1 Current	5 mAde
Plate Input	40 W
Plate Dissipation	16.5 W
Grid No. 2 Dissipation	2.5 W
Peak Heater to Cathode Voltage	\pm 135 V

Typical Operation: :

DC Plate Voltage	325	400	475 Vdc
DC Grid No. 2 Voltage (Note 10)	250	250	250 Vdc
In case of using series resistance	12.5	25	28 k Ω
DC Grid No. 1 Voltage (Note 11)	-75	-75	-25 Vdc
In case of using grid No. 1 resistance	21.4	21.4	21.2 k Ω
Peak RF Grid No. 1 Voltage	95	95	108 V
DC Plate Current	80	80	83 mAde
DC Grid No. 2 Current	6	6	8 mAde
DC Grid No. 1 Current (approx.)	3.5	3.5	4 mAde
Driving Power	0.3	0.3	0.4 W
Plate Power Output (approx.)	17	22	28 W
Maximum Grid No. 1 Circuit Resistance (Note 12)			30 k Ω

Note 10. This voltage should be applied from a private source modulated simultaneously with plate voltage, or from the plate source using

the series resistance shown above.

Note 11. This voltage should be applied by the grid No. 1 resistance shown above, by a combination of the grid No. 1 resistance and fixed bias or by a combination of the grid No. 1 resistance and cathode resistance.

Note 12. When grid No. 1 is driven positive, the total dc grid No. 1 circuit resistance should not exceed 30 k Ω . If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

RF Power Amplifier -Class C Telegraphy and RF Power Amplifier-Class C FM Telephony

maximum Ratings: Absolute Values

DC Plate Voltage	600 Vdc
DC Grid No. 2 Voltage	300 Vdc
DC Grid No. 1 Voltage	-200 Vdc
DC Plate Current	100 mA _{dc}
DC Grid No. 1 Current	5 mA _{dc}
Plate Input	60 W
Plate Dissipation	25 W
Grid No. 2 Dissipation	3.5 W
Peak Heater to Cathode Voltage	<u>\pm135 V</u>

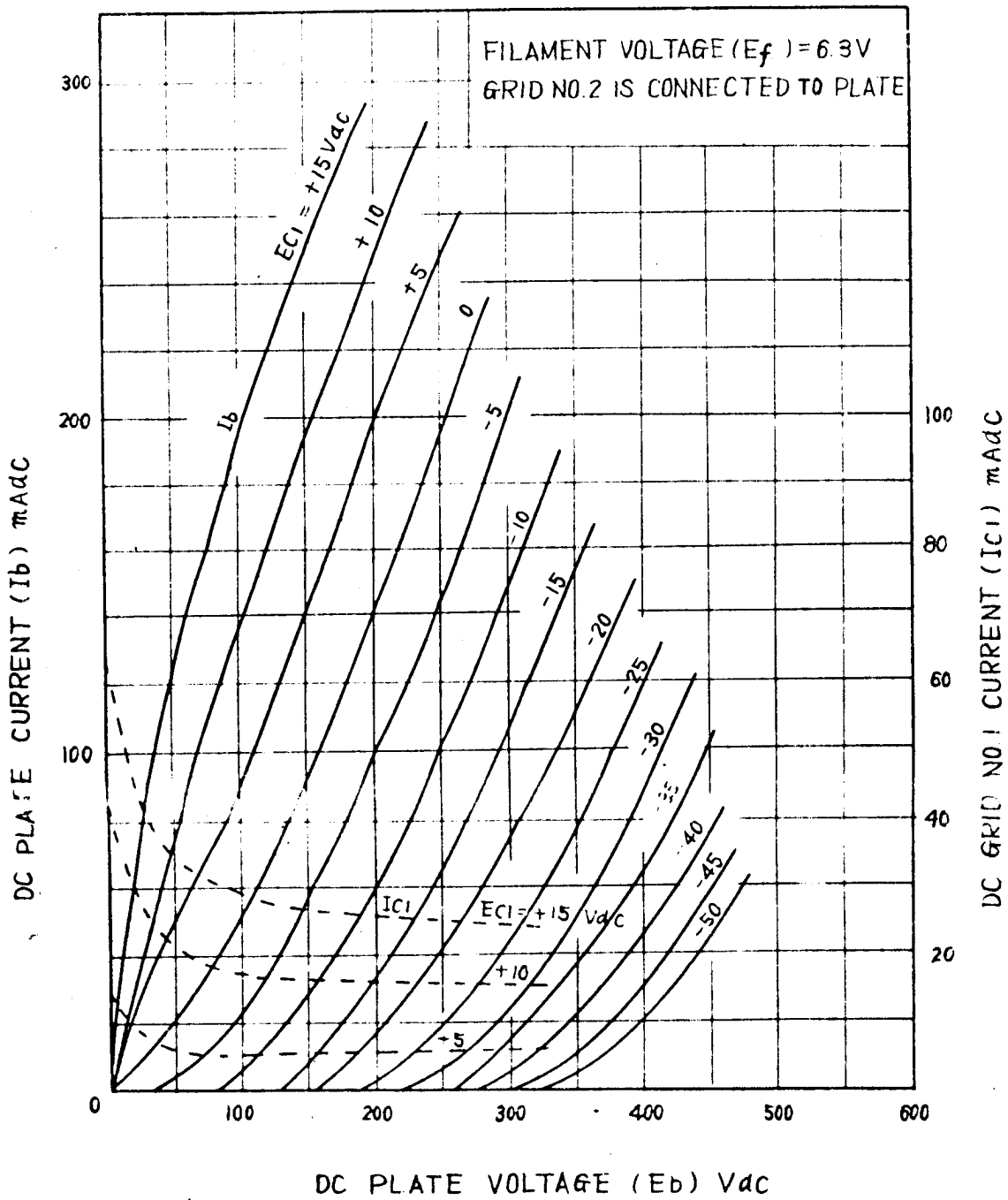
Typical Operation:

DC Plate Voltage	400	500	600 Vdc
DC Grid No. 2 Voltage	250	250	250 Vdc
In case of using series resistance	19	31	44 k Ω
DC Grid No. 1 Voltage	-45	-45	-45 Vdc
In case of using grid No. 1 resistance	11.2	11.2	11.2 k Ω
In case of using cathode resistance	400	400	400 Ω
Peak RF Grid No. 1 Voltage	65	65	65 Vdc
DC Plate Current	100	100	100 mA _{dc}
DC Grid No. 2 Current	8	8	8 mA _{dc}
DC Grid No. 1 Current	4	4	4 mA _{dc}
Driving Power (approx.)	0.3	0.3	0.3 W

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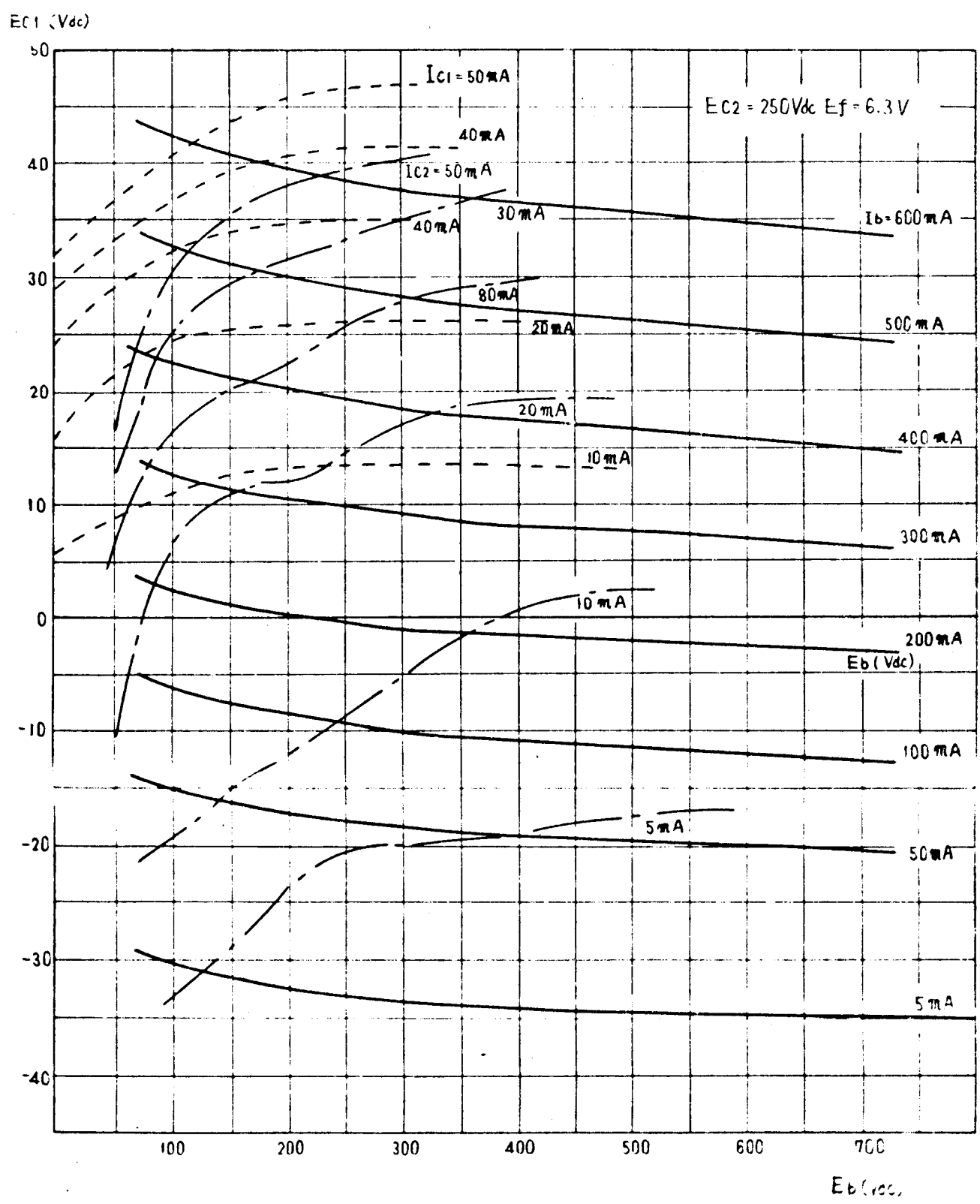
Plate Power Output (approx.)	25	32	40 W
Load Power Output (approx.)	22	28	36 W
Maximum Grid No. 1 Circuit Resistance			30 kΩ

AVERAGE CHARACTERISTICS
(TRIODE CONNECTIONS)



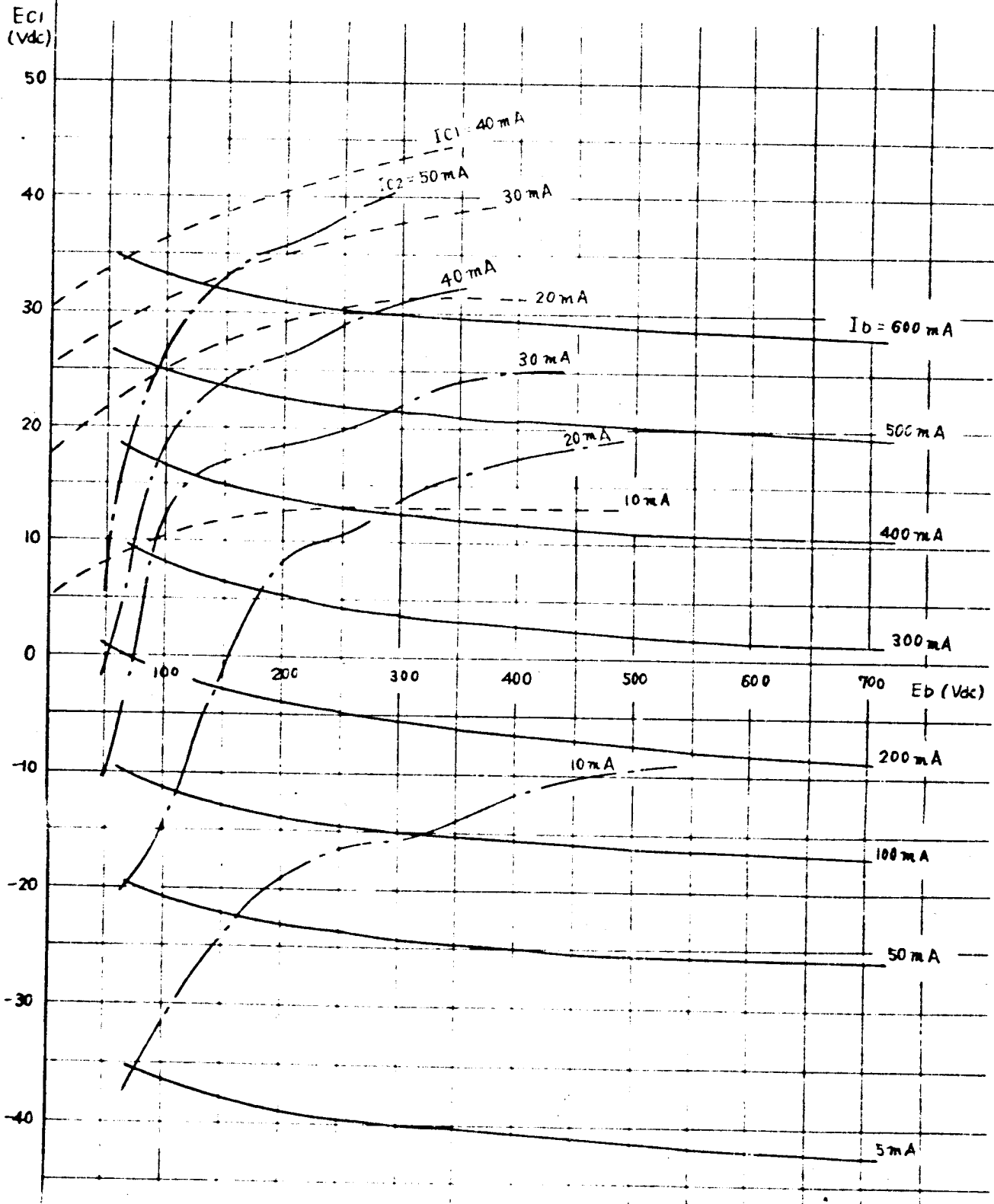
CONSTANT CURRENT CHARACTERISTICS

$E_{c2} = 250V_{dc}$ $E_f = 6.3V$



CONSTANT CURRENT CHARACTERISTICS

$E_{C2} = 300 \text{ Vdc}$ $E_f = 6.3 \text{ V}$



OUTLINE DRAWING

Unit mm

