e2v technologies

BW3300J2
RF Power Triode

The data should be read in conjunction with the Power Triode Preamble.

ABRIDGED DATA

The BW3300J2 is a water cooled power triode of coaxial ceramic/metal construction, intended primarily for industrial service. It has an integral water jacket.

Anode dissipation	200	kW max
Anode voltage	17	kV max
Frequency for full ratings	30	MHz max
Output power (class C oscillator, less drive)	450	kW

GENERAL

Electrical

Filament	thoriated tungsten	
Filament voltage (see note 1)	16	V
Filament current	425	A
Surge filament current (peak) (see note 2)	1600	A max
Filament cold resistance	4.5	mΩ
Peak usable cathode current	250	A max
Amplification factor (V_a = 9.0 kV, I_a = 10 A)	35	
Inter-electrode capacitances:		
grid to anode	92	pF
grid to filament	240	pF
anode to filament	4.5	pF

Mechanical

Overall length	733 mm (28.858 inches) nom
Overall diameter	290 mm (11.417 inches) nom
Net weight	30 kg (66.1 pounds) approx
Mounting position	vertical, anode up or down

COOLING

Anode

The BW3300J2 has an integral water jacket; the water cooling requirements are given in the following table.

Anode + grid dissipation (kW)	Inlet temperature (°C)	Minimum water flow rate l./min	Minimum water flow rate US gal/min	Pressure drop (bar)	Outlet temperature (°C)
200	20	145	38.2	0.60	40
200	50	200	52.8	1.11	65
150	20	110	29.0	0.40	40
150	50	150	39.6	0.60	65
100	20	75	19.8	0.25	40
100	50	100	26.4	0.35	65

The inlet water temperature must not exceed 50 °C.

The pressure in the water jacket must not exceed 6.8 bar.

Seals and Envelope

The temperature of the seals and envelope must not exceed 220 °C. Cooling of the seals by low velocity air flow is required.

e2v technologies (uk) limited, Waterhouse Lane, Chelmsford, Essex CM1 2QU, UK Telephone: +44 (0)1245 493493 Facsimile: +44 (0)1245 492492
e-mail: enquiries@e2v.com Internet: www.e2v.com Holding Company: e2v technologies plc

e2v technologies inc. 4 Westchester Plaza, PO Box 1482, Elmsford, NY10523-1482 USA Telephone: (914) 592-6050 Facsimile: (914) 592-5148
e-mail: enquiries@e2vtechnologies-na.com

ACCESSORIES

Spare water union assembly	MA2653A

Accessory Set Without Spark Gap Protection

Inner filament connector with lead	MA2615A
Cathode connector with lead	MA2616A
Grid connector	MA2617A

Accessory Set With Spark Gap Grid to Filament

Inner filament connector with lead	MA2615A
Cathode connector	MA2688A
Cathode lead	MA3545A
Grid connector	MA2689A

RADIO FREQUENCY OSCILLATOR FOR INDUSTRIAL SERVICE

(Class C conditions, one tube)

MAXIMUM RATINGS (Absolute values)

Frequency	30	MHz
Anode voltage	17	kV max
Anode input power (see note 3)	640	kW max
Anode dissipation	200	kW max
Grid voltage (negative value)	2.5	kV max
Grid current:		
on load	8.5	A max
off load	11	A max
Grid dissipation	4.5	kW max
Grid circuit resistance	3.0	kΩ max
Cathode current (peak)	250	A max
Cathode current (mean)	50	A max

TYPICAL OPERATING CONDITIONS

Frequency	30	30	30	MHz
Anode voltage	12	14	16	kV
Anode current	27	32	36	A
Anode dissipation	67	89	115.4	kW
Grid voltage	−700	−800	−911	V
Grid resistor	120	127	130	Ω
Grid current	5.8	6.3	7.0	A
Grid dissipation	3.1	3.7	4.4	kW
Feedback ratio (see note 4)	11.1	10.8	10.7	%
Peak RF grid voltage	1230	1390	1550	V
Drive power	7.2	8.7	10.8	kW
Oscillator output power (see note 5)	250	350	450	kW
Efficiency	77	78	78	%
Anode load resistance	235	230	228	Ω

NOTES

1. Temporary fluctuations up to +5% or −10% in filament voltage are permissible.
2. The filament current must not exceed 1600 A, even momentarily, at any time.
3. A fast-acting overcurrent cutout, acting on the anode supply, is essential for protecting the tube in the event of an internal flashover. One or both of the following tests on the anode power supply may be used to check that the overcurrent cutout is fast enough. In both tests the applied anode voltage is short-circuited by means of a high voltage switch directly at the tube anode.

   Test 1 In this test the short-circuit current flows through a length of copper wire (approximately 2 to 3 cm/kV of applied anode voltage). A copper wire of 0.4 mm diameter should not fuse.

   Test 2 In this test the short-circuit current flows through a current transformer or a meter shunt of low resistance and is measured with an oscilloscope.

   The integral $\int I^2 dt$ over the time that the current is flowing should not exceed 1500 A^2sec.

4. The feedback ratio is defined as $\frac{V_{g(pk)}}{V_{a(pk)}} \times 100$

   where $V_{g(pk)}$ = peak RF grid voltage in volts
   and $V_{a(pk)}$ = peak RF anode voltage in volts.

5. Oscillator output power = $P_{out} - P_{drive}$

   where P_{out} = output power of tube to anode circuit
   and P_{drive} = drive power fed back to grid circuit.

HEALTH AND SAFETY HAZARDS

e2v technologies electronic devices are safe to handle and operate, provided that the precautions stated are observed. e2v technologies does not accept responsibility for damage or injury resulting from the use of electronic devices it produces. Equipment manufacturers and users must ensure that adequate precautions are taken. Appropriate warning labels and notices must be provided on equipments incorporating e2v technologies devices and in operating manuals.

High Voltage

Equipment must be designed so that personnel cannot come into contact with high voltage circuits. All high voltage circuits and terminals must be enclosed and fail-safe interlock switches must be fitted to disconnect the primary power supply and discharge all high voltage capacitors and other stored energy before allowing access. Interlock switches must not be bypassed to allow operation with access doors open.

RF Radiation

Personnel must not be exposed to excessive RF radiation. A properly designed equipment cabinet with good RF electrical connection between panels will normally provide sufficient protection.

X-Ray Radiation

This device, when operating at voltages above 5 kV, produces progressively more dangerous X-rays as the voltage is increased; the radiation varies greatly during life. The device envelope provides only limited protection and further shielding may be required. A metal equipment cabinet with overlapping joints will usually provide sufficient shielding, but if there is any doubt an expert in this field should perform an X-ray survey of the equipment.

Implosion

This tube stores potential energy by virtue of its vacuum. The energy level is low, but there is some hazard from flying fragments if the tube is dropped or subjected to violent impact. The tube must be stored and transported in its approved pack. During installation or replacement the tube must not be scratched or damaged in any way likely to reduce the strength of the ceramic envelope.

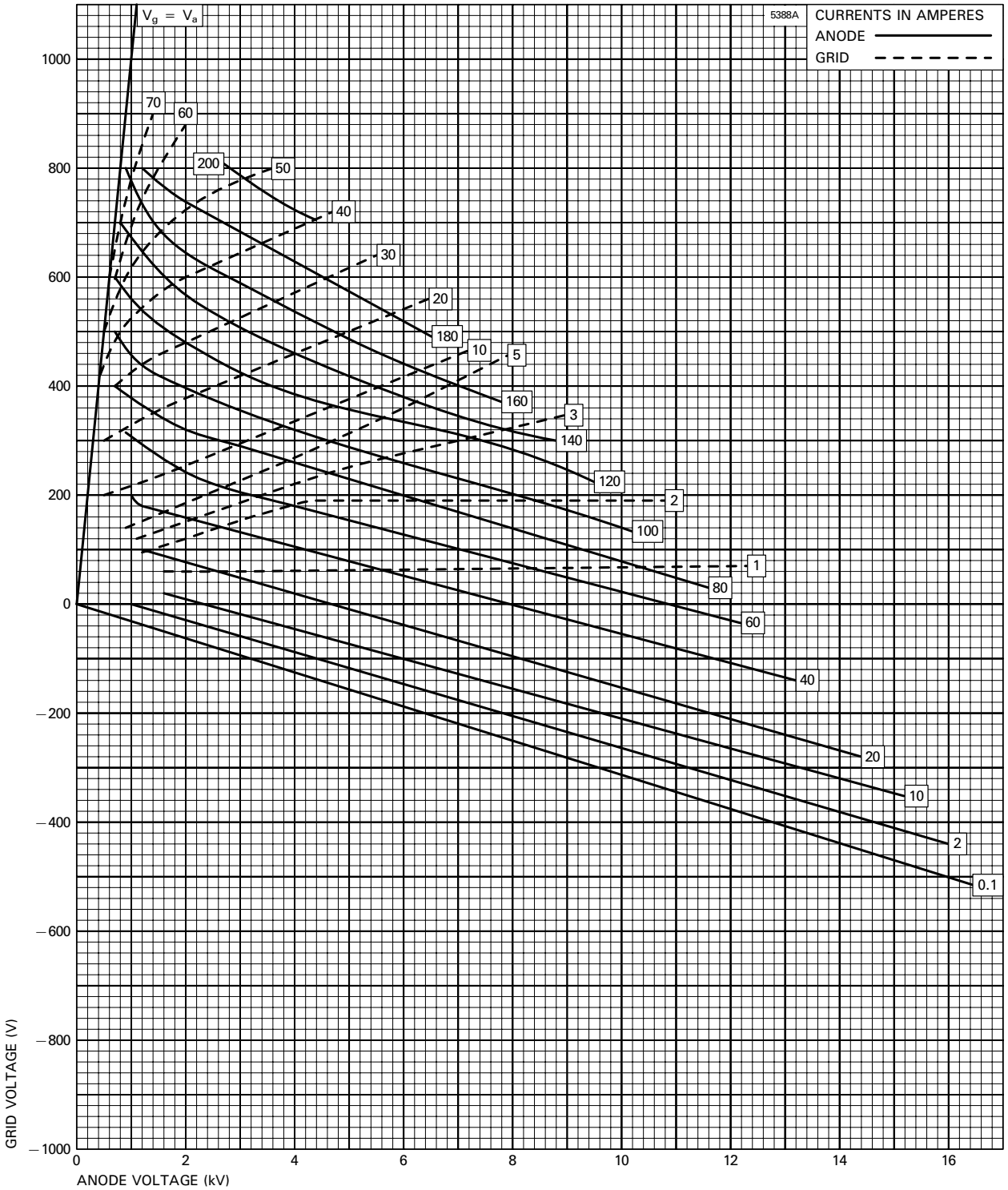
TV INTERFERENCE

This tube is intended for use in conventional RF oscillators. In other circuits TV interference may be caused if anode current is drawn under DC conditions.

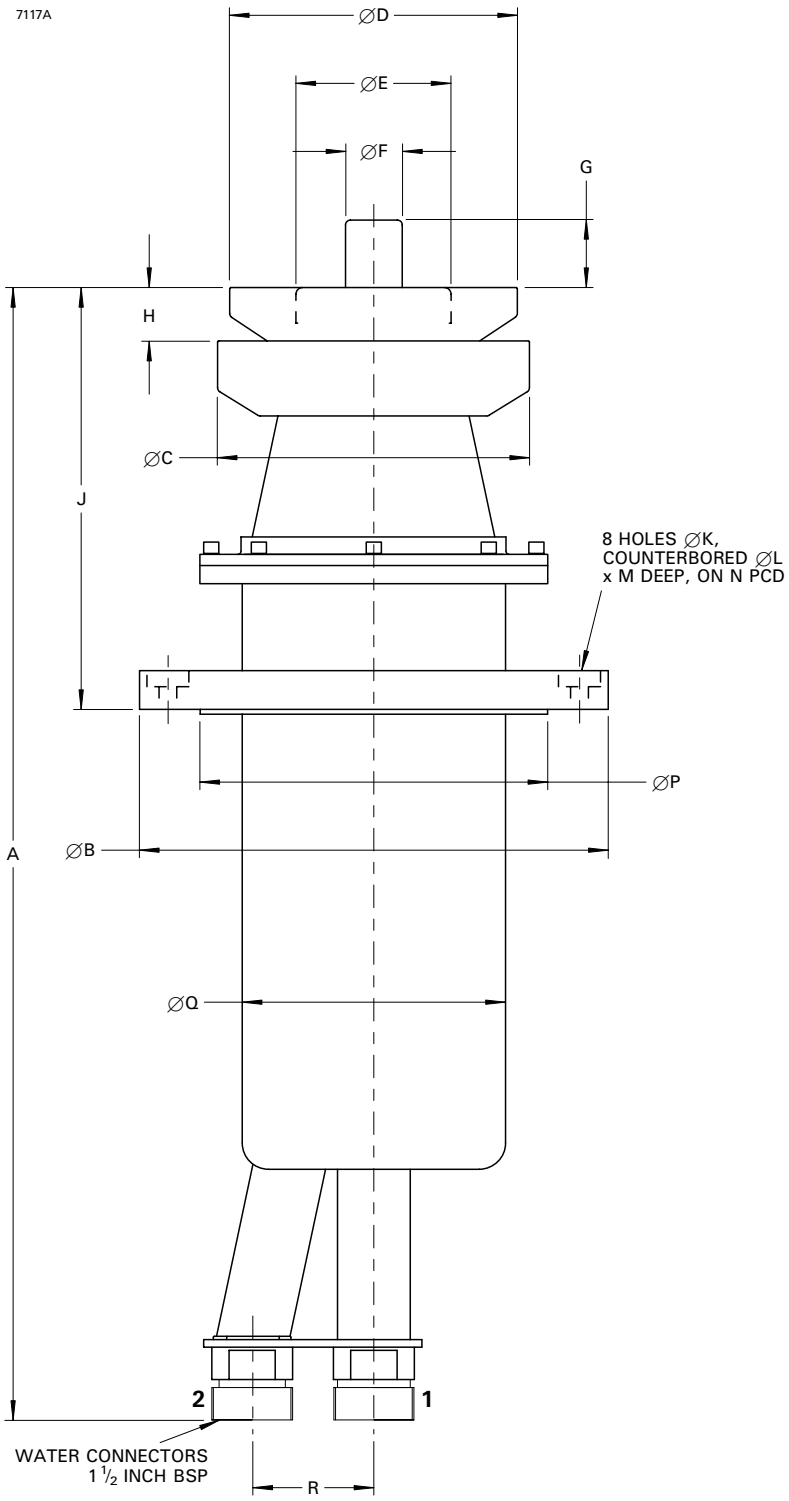
References

1. BS 3192. Specification for safety requirements for radio (including television) transmitting apparatus.
2. TEPAC Publication no. 181. Recommended practice for measurement of X-radiation from power tubes.

TYPICAL CONSTANT CURRENT CHARACTERISTICS



OUTLINE (All dimensions nominal)



Ref	Millimetres	Inches
A	691.0	27.205
B	290.0	11.417
C	193.0	7.598
D	178.0	7.008
E	96.0	3.780
F	36.6	1.441
G	42.0	1.654
H	34.5	1.358
J	261.0	10.276
K	11.0	0.433
L	26.0	1.024
M	10.0	0.394
N	255.0	10.039
P	215.0	8.465
Q	163.0	6.417
R	75.0	2.953

Inch dimensions have been derived from millimetres.

Water Connections

	Anode down	**Anode up**
Inlet	1	2
Outlet	2	1