8403

TECHNICAL DATA

PLANAR TRIODE

The EIMAC Type 8403 is a planar triode featuring frequency stability and an arc resistant cathode of high emission capability assuring stable operation under adverse conditions involving a wide ambient temperature range and varying plate dissipation. This construction, in combination with the proper plate series impedance, reduces to a minimum the possibility of cathode failures due to voltage surges. Other features of this type include high transconductance, high mu, and low interelectrode capacitances coupled with the great mechanical strength of metal/ceramic construction. The cathode is an indirectly heated disc requiring only minimal heater power. The design of the tube permits operation from low frequencies up to 3.0 GHz as a grid-pulsed, plate-pulsed, or CW oscillator, amplifier, or frequency multiplier.

GENERAL CHARACTERISTICS[1]

ELECTRICAL

Cathode: Oxide Coated, Unipotential	
Heater: Voltage	6.3 ± 0.3 V
Current, at 6.3 volts	1.3 A
Transconductance (Average):	
I_b = 160 mA (200 mA/cm^2)	30 mmhos
Amplification Factor (Average):	80
Direct Interelectrode Capacitance (grounded cathode) [2]	
Cin	8.0 pF
Cout (maximum)	0.065 pF
Cgp	3.1 pF
Cut-off Bias (maximum)[3]	-30 V max
Frequency of Maximum Rating:	
CW	2500 MHz
Plate or Grid-Pulsed	3000 MHz

1. Characteristics and operating values are based upon performance tests. These figures may change without notice as the result of additional data or product refinement. EIMAC Division of Varian should be consulted before using this information for final equipment design.
2. Capacitance values are for a cold tube as measured in a special shielded fixture. When the cathode is heated to the proper temperature, the grid-cathode capacitance will increase from the cold value by approximately 1 pF due to thermal expansion of the cathode.
3. Measured with one milliampere plate current and a plate voltage of 1 kVdc.

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MECHANICAL

Maximum Overall Dimensions:	
Length	2.386 in; 60.60 mm
Diameter	1.264 in; 32.11 mm
Net Weight	2.04 oz; 58 gm
Operating Position	Any
Maximum Operating Temperature:	
Ceramic/Metal Seals	250°C
Anode Core	250°C
Cooling	Forced Air
Terminals	Coaxial, special

ENVIRONMENTAL

Shock, 11 ms, non-operating	60 G
Vibration, operating, all axis	10 G
Altitude	60,000 ft.

RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Max.	
Heater: Current at 6.3 volts	1.20	1.40	A
Cathode Warmup Time	60	---	sec.
Interelectrode Capacitance [1]			
Cin	7.5	9.0	pF
Cout	---	0.065	pF
Cgp	2.95	3.25	pF

1. Capacitance value for a cold tube as measured in a special shielded fixture. When the cathode is heated to the proper temperature, the grid-cathode capacitance will increase from the cold value by approximately 1 pF due to thermal expansion of the cathode.

GRID PULSED OR PLATE PULSED AMPLIFIER OR OSCILLATOR

ABSOLUTE MAXIMUM RATINGS

DC PLATE VOLTAGE(grid pulsed)	2500	VOLTS
PEAK PULSE PLATE VOLTAGE (plate pulsed)	3500	VOLTS
DC GRID VOLTAGE	-150	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
Grid negative to cathode	-750	VOLTS
Grid positive to cathode	250	VOLTS
PULSE PLATE CURRENT	5.0	AMPERES
PULSE GRID CURRENT	2.0	AMPERES
AVERAGE PLATE DISSIPATION Forced Air Cooling [1]	100	WATTS
GRID DISSIPATION (Average)	2.0	WATTS
FREQUENCY	3.0	GHz
PULSE DURATION [2]	6.0	μs
DUTY FACTOR [2]	.0033	

OPERATING CONDITIONS for 8403 in Representative Application

GRID PULSED OSCILLATOR

Frequency	1.09	GHz
Heater Voltage	6.3	V
DC Plate Voltage	2000	Vdc
DC Grid Voltage	-150	Vdc
Peak Video Plate Current	4.0	a
Peak Video Grid Current	1.0	a
Useful Power Output (Approx.)	1000	w
Pulse Duration	0.5	μs
Duty Factor	.005	

1. Using EIMAC radiator PN 158601.

2. For applications using longer pulse duration and/or higher duty cycle consult the nearest Varian Electron Tube & Devices Field Office, or the Product Manager, EIMAC Division of Varian, Salt Lake, City, Utah.

CW RF POWER AMPLIFIER OR OSCILLATOR

ABSOLUTE MAXIMUM RATINGS:

DC PLATE VOLTAGE	2500	VOLTS
DC GRID VOLTAGE	-150	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
Grid negative to cathode	-400	VOLTS
Grid positive to cathode	30	VOLTS
DC PLATE CURRENT	150	MILLIAMPERES
DC GRID CURRENT	45	MILLIAMPERES
AVERAGE PLATE DISSIPATION		
Forced air cooling[1]	100	WATTS
GRID DISSIPATION (Average)	2	WATTS
FREQUENCY	2.5	GHz

OPERATING CONDITIONS for 8403 in Representative Application

GROUNDED GRID CW OSCILLATOR

Frequency	2500	GHz
Heater Voltage	6.0	V
DC Plate Voltage	900	Vdc
DC Grid Voltage (Approx.)	-20	Vdc
DC Plate Current	140	mAdc
DC Grid Current	15	mAdc
Useful CW Power Output	25	W

1. Using EIMAC radiator PN 158601.

PULSE MODULATOR AND PULSE AMPLIFIER SERVICE

ABSOLUTE MAXIMUM RATINGS:

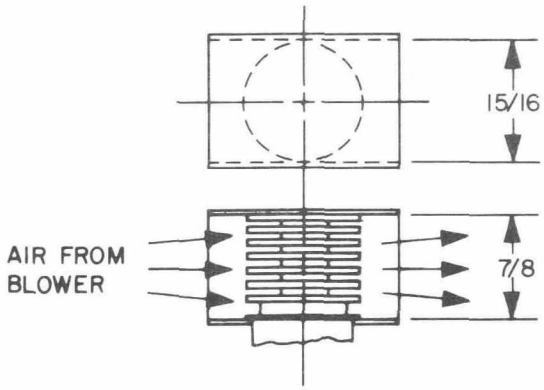
DC PLATE VOLTAGE	3000	VOLTS
PEAK PLATE VOLTAGE	3500	VOLTS
DC GRID VOLTAGE	-150	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
Grid negative to cathode	-750	VOLTS
Grid positive to cathode	+150	VOLTS
PULSE CATHODE CURRENT	7.5	AMPERES
DC PLATE CURRENT	150	MILLIAMPERES
AVERAGE PLATE DISSIPATION		
Forced Air Cooling[1]	100	WATTS
GRID DISSIPATION (average)	1.5	WATTS
PULSE DURATION[2]	6.0	μs
CUT-OFF MU	60	
DUTY	.0033	

1. Using EIMAC radiator PN 158601.
2. For applications using longer pulse duration and/or higher duty cycle consult the nearest Varian Electron Tube & Devices Field Office, or the Product Manager, EIMAC Division of Varian, Salt Lake City, Utah.

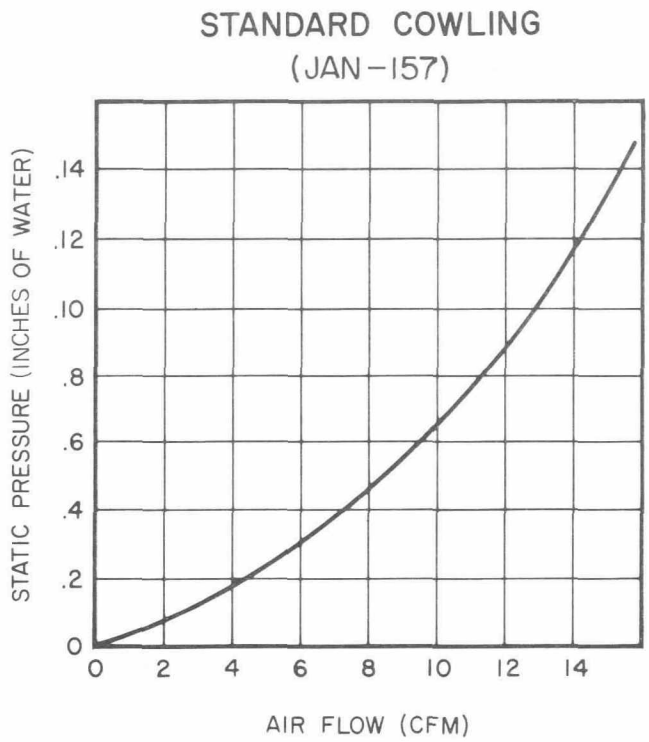
APPLICATION

For general application information please refer to the Planar Triode Operating Instruction Sheet. The operating instructions should be consulted prior to the designing of new requirements around the above tube type. For unusual and special applications consult the nearest Varian Electron Tube Field Office, or the Product Manager, EIMAC Division of Varian, Salt Lake City, Utah.

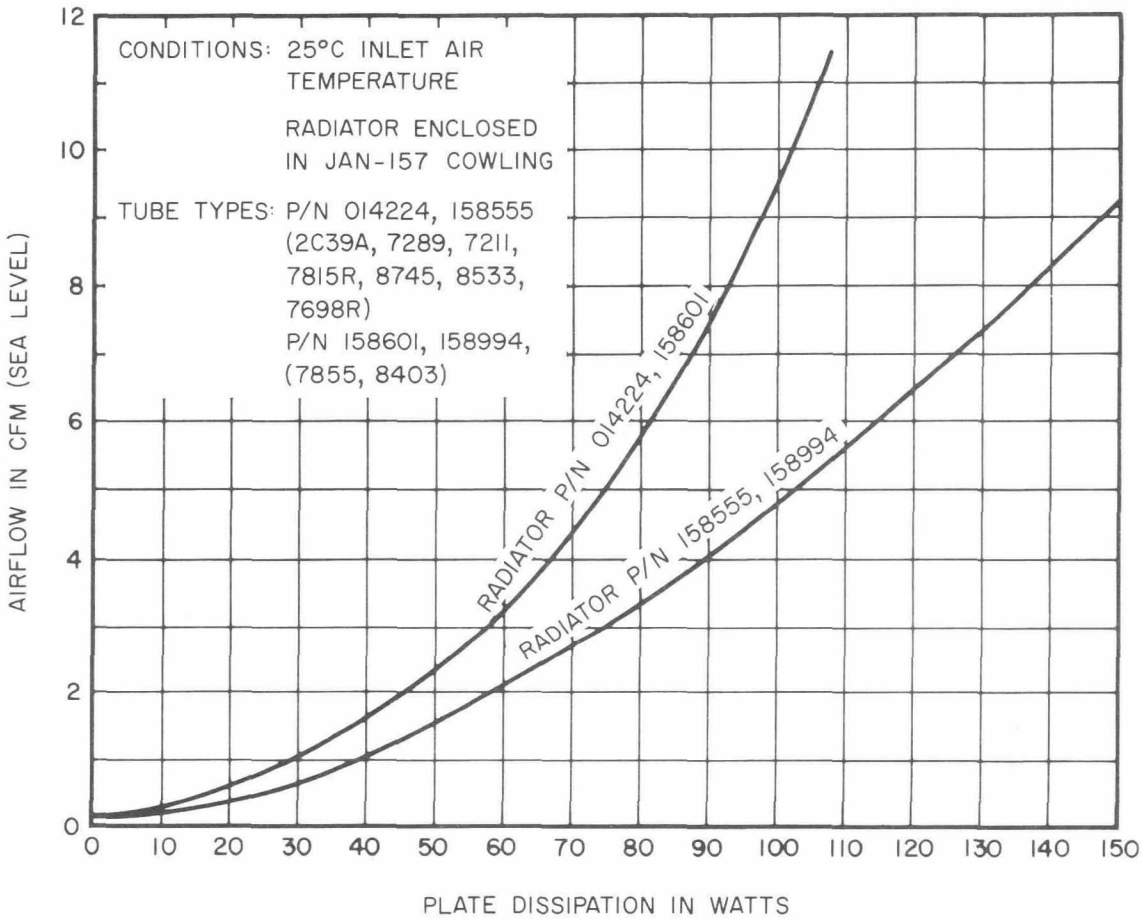
AIRFLOW VS STATIC PRESSURE WITH STANDARD COWLING JAN-157

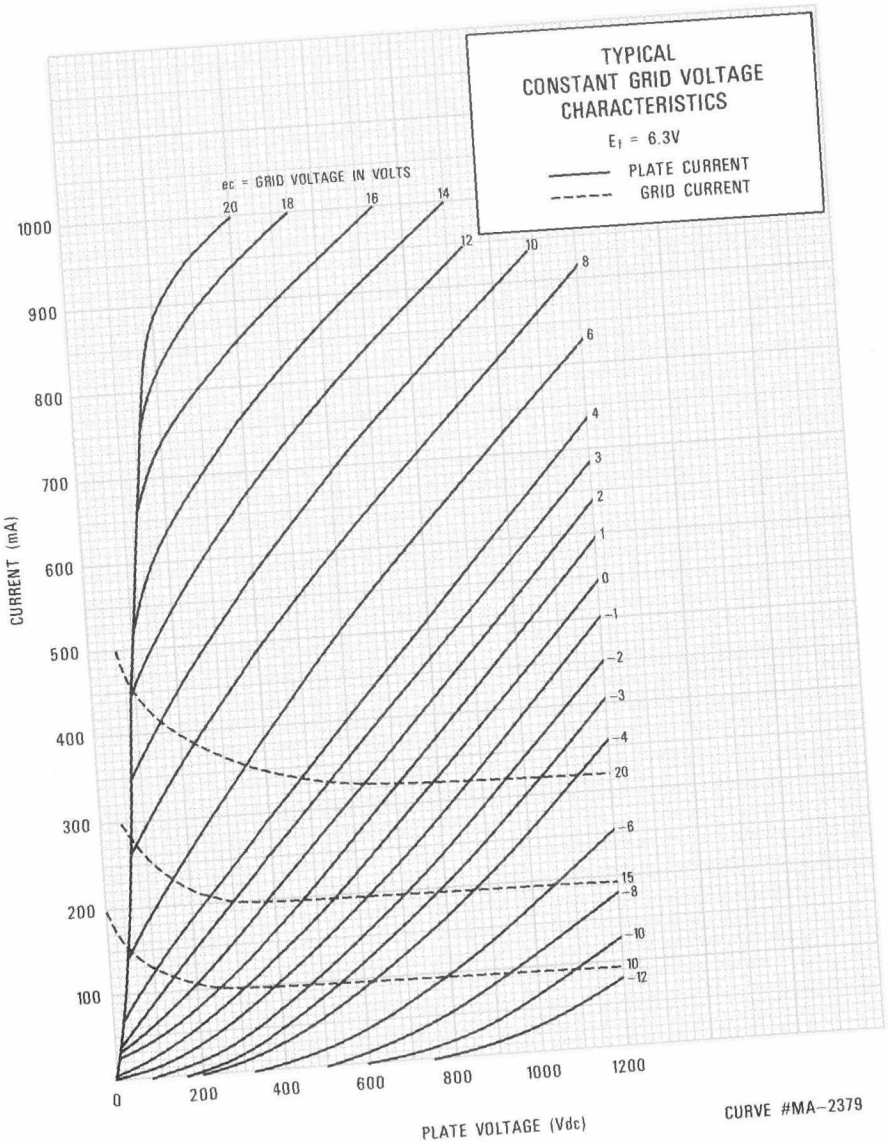


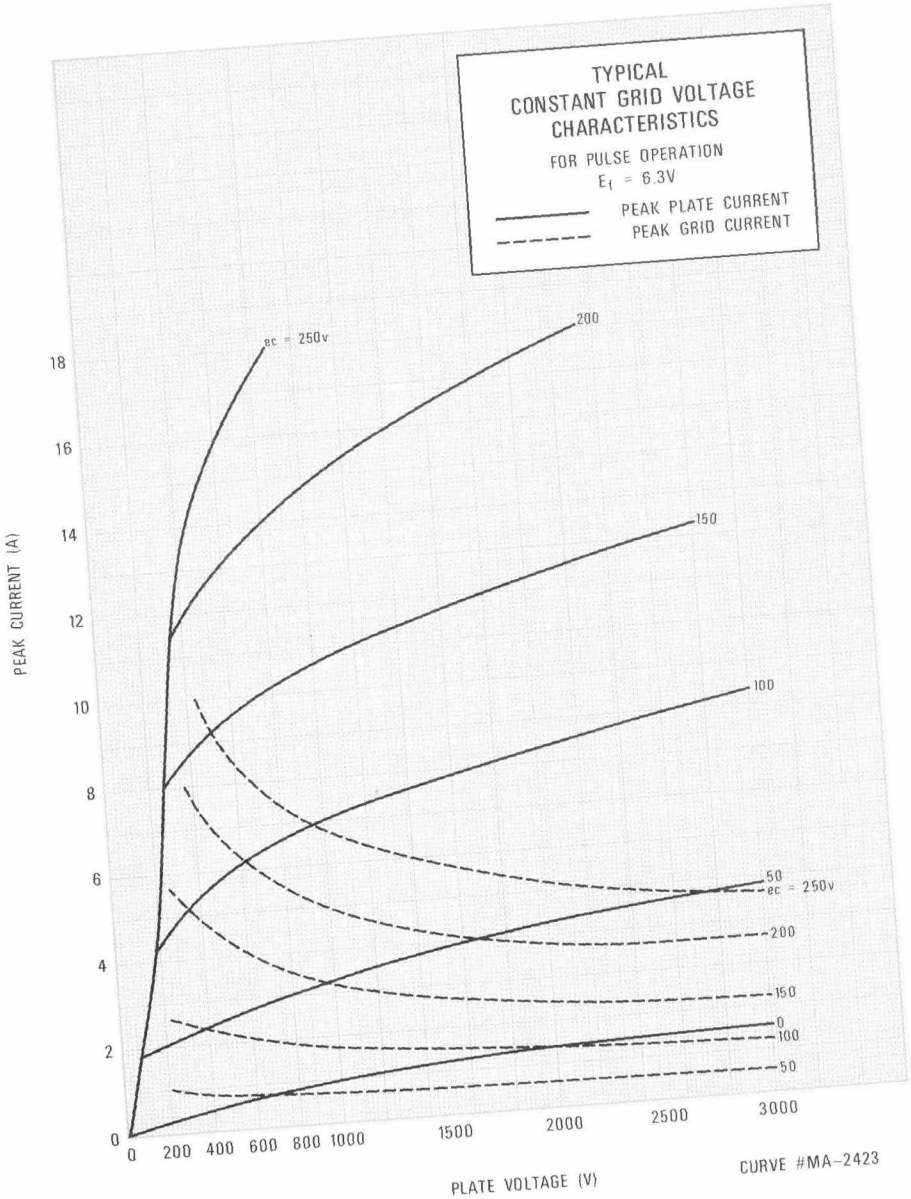
STANDARD COWLING



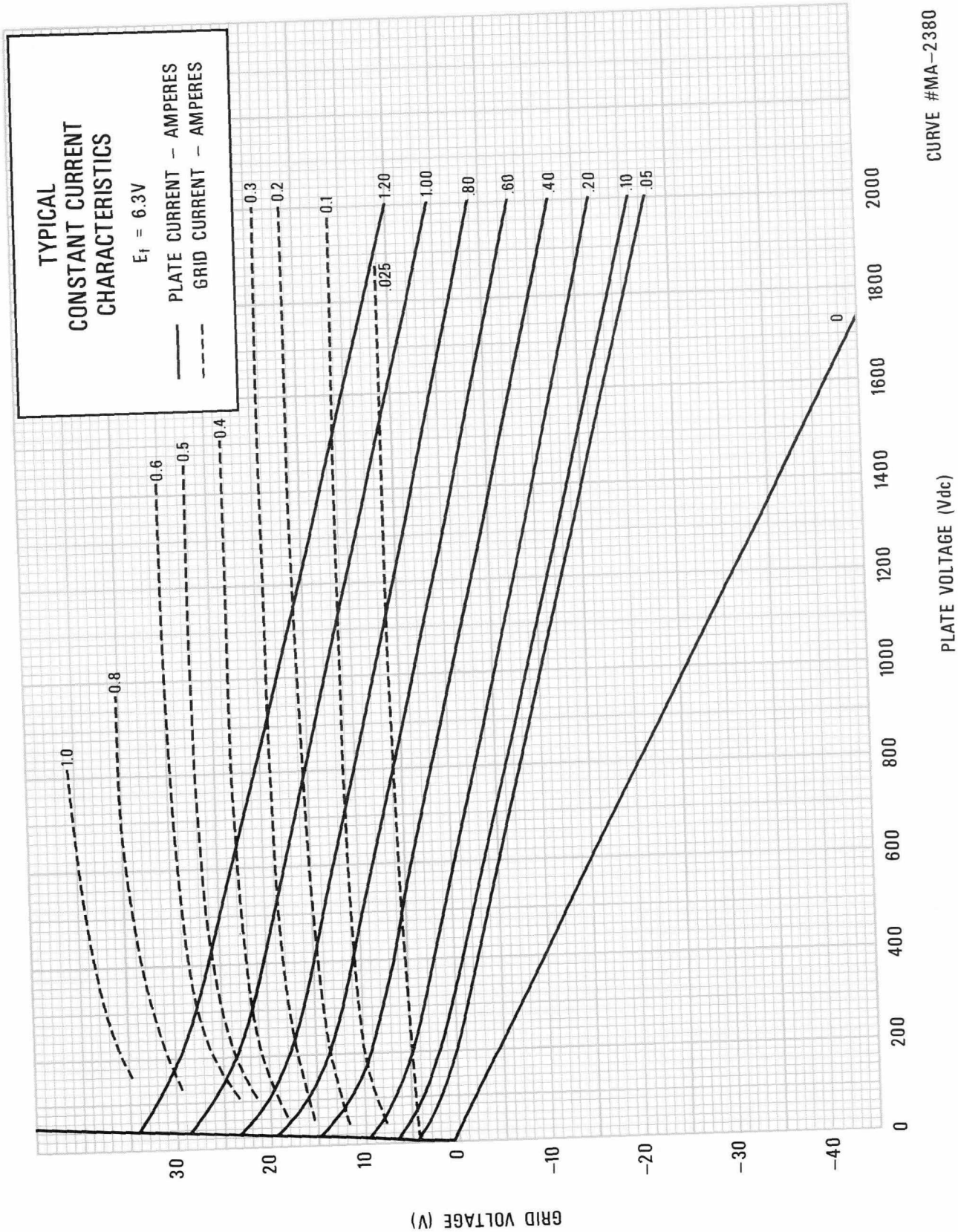
MAXIMUM PLATE DISSIPATION VS COOLING AIRFLOW




TYPICAL
CONSTANT GRID VOLTAGE
CHARACTERISTICS
Ef = 6.3V
PLATE CURRENT
GRID CURRENT
ec = GRID VOLTAGE IN VOLTS
20
18
16
14
12
10
8
6
4
3
2
1
0
-1
-2
-3
-4
20
-6
15
-8
-10
10
-12
CURRENT (mA)
1000
900
800
700
600
500
400
300
200
100
0
200
400
600
800
1000
1200
PLATE VOLTAGE (Vdc)
CURVE #MA-2379


TYPICAL
CONSTANT GRID VOLTAGE
CHARACTERISTICS
FOR PULSE OPERATION
Ef = 6.3V
PEAK PLATE CURRENT
PEAK GRID CURRENT
ec = 250v
200
150
100
50
ec = 250v
200
150
0
100
50
PEAK CURRENT (A)
18
16
14
12
10
8
6
4
2
0
200
400
600
800
1000
1500
2000
2500
3000
PLATE VOLTAGE (V)
CURVE #MA-2423

8403



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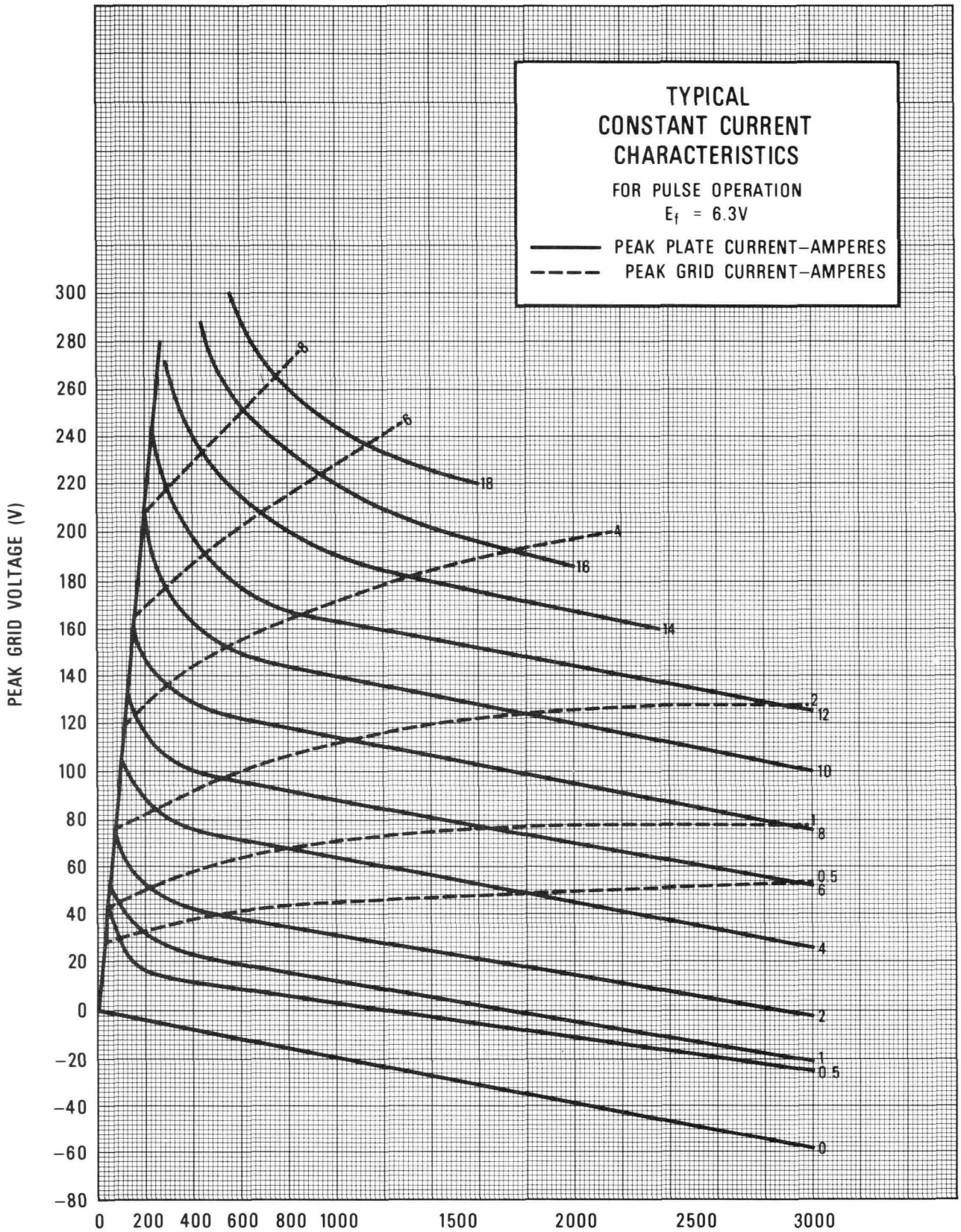

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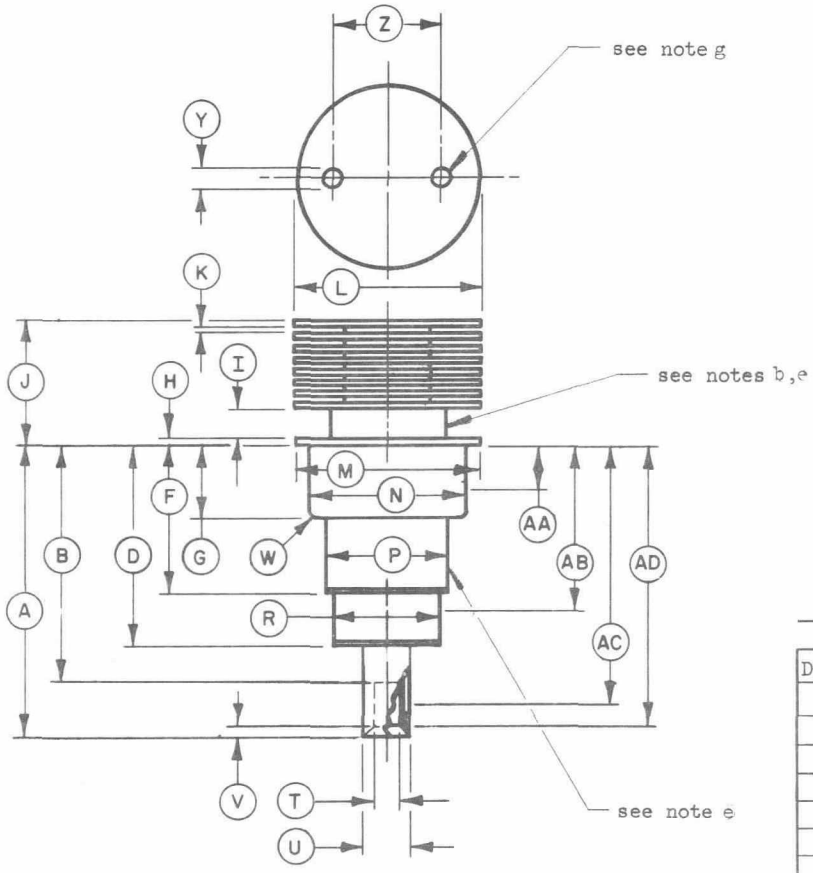

ELECTRODE CONTACT DIMS. (see note a,f)				
Dim. in Inches		Dim.	Dim. in Millim.	
Min.	Max.		Min.	Max.
.035	.361	AA	.89	9.17
1.021	1.101	AB	25.93	27.97
1.219	1.413	AC	30.96	35.89
1.160	1.500	AD	29.46	38.10

DIMENSIONAL DATA (Note a)					
Dim. in Inches			Dim. in Millimeters		
Min.	Max.	Dim.	MIN.	MAX.	
1.500	1.560	A	38.10	39.62	
	1.214	B		30.84	
1.125	1.165	D	28.58	29.59	
.800	.840	F	20.32	21.34	
.462	.477	G	11.73	12.12	
	.040	H		1.02	
.125	.185	I	3.18	4.70	
.766	.826	J	19.46	20.98	
.025	.046	K	.64	1.17	
1.234	1.264	L	31.34	32.11	
1.180	1.195	M	29.97	30.35	
1.025	1.035	N	26.04	26.29	
.752	.792	P	19.10	20.12	
.655	.665	R	16.64	16.89	
.213	.223	T	5.41	5.66	
.315	.325	U	8.00	8.26	
	.086	V		2.18	
	.100	W		2.54	
.105	.145	Y	2.67	3.68	
.650	.850	Z	16.51	21.59	

NOTES:

a. Metric equivalents, to the nearest .01 mm, are given for general information only & are based on 1 inch = 25.4 mm.

b. This surface to be used to measure anode shank temperature.

c. Eccentricity of contact surfaces shall be gaged from center line of reference & shall be as follows:

Contact Surface	TIR Max.	Reference
Anode	.020	Cathode
Grid	.020	Cathode
Heater	.012	Cathode

d. Dias. N,R,T & U shall apply throughout entire lenght as defined by dims. AA,AB,AC,AD respectively.

e. This surface shall not be used for clamping or locating.

f. Electrode Contact dims. are for socket design purposes & are not intended for inspection purposes.

g. Holes for tube extractor thru top fin only