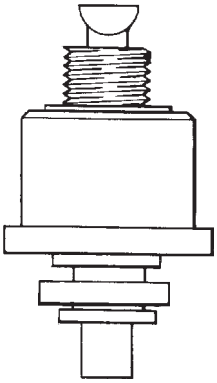


ML-8538B
Planar Triode

The Penta Laboratories ML-8538B is a miniature, ceramic and metal planar triode for advanced airborne and space applications up to 3.0 GHz.

The ML-8538B may be used as an amplifier, oscillator, or frequency multiplier in the grid- or plate-pulsed mode as well as a modulator or regulator tube. In addition to low interelectrode capacitance, high transconductance and amplification factor, the ML-8538B has an arc-resistant cathode, and a spewing shield, assuring stable, reliable, and long-life operation under adverse conditions.

The ML-8538B is supplied without radiator and may be conduction, convection, heat sink, or liquid cooled. Radiators for forced air cooling permitting an anode dissipation up to 150 can be furnished on separate order.

The ML-8538B is especially designed for applications where high RF pulse power is required. It can also be readily used in switch tube applications up to 8 kVdc.

CHARACTERISTICS

Electrical[1]

Cathode		Oxide Coated, Unipotential
Heater Voltage	6.3	Volt
Heater Current	1.3	Ampere
Transconductance(average, Ib = 160 mA)	38	mmho
Amplification Factor(average)	120	
Direct Interelectrode Capacitance (grounded cathode)[2]		
Cin	9.5	pf
Cout	0.06	pf
Cgp	1.40	pf
Cut-off Bias[3]	-30	V max
Frequency of Maximum Rating(grid or plate pulsed)	3.0	GHz

Revised 18 august 2014

P E N T A L A B O R A T O R I E S
9740 COZYCROFT AVENUE * CHATSWORTH * CALIFORNIA 91311
(800) 421-4219 * (818) 882-3872 * FAX: (818) 882-3968

Notes

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.
2. Capacitance values are 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 2 kVdc.

Mechanical Characteristics

Maximum Overall Dimensions		
Length	1.5 (38.10)	inch (mm)
Diameter	0.950 (24.13)	inch (mm)
Net Weight	0.7 (19.30)	ounce (g)
Operating Position		Any
Maximum Operating Temperature	250°	C
Cooling		Conduction, Convection Forced-Air, Liquid

Range Values for Equipment Design

	Min	Max	
Heater Current at 6.3 Volts	1.20	1.40	Ampere
Cathode Warm-up Time	60	---	Second
Interelectrode Capacitance(grounded grid connection)[1]			
Cin	8.5	11.0	pf
Cout	---	0.06	pf
Cgp	1.30	1.55	pf

1. Capacitance values are for a cold tube as measured in a special shielded fixture.

MAXIMUM RATINGS AND TYPICAL OPERATION

Grid Pulsed or Plate Pulsed Amplifier or Oscillator

Absolute Maximum Ratings

DC Plate Voltage(grid pulsed)	8000	Volt
Peak Pulse Plate Voltage(plate pulsed)	10,000	Volt
DC Grid Voltage	-300	Volt
Instantaneous Peak Grid-Cathode Voltage		
Grid Negative to Cathode	-750	Volt
Grid Positive to Cathode	175	Volt
Pulse Plate Current	5.0	Ampere
Pulse Grid Current	2.5	Ampere
Average Plate Dissipation		
Forced Air Cooling[1]	150	Watts
Grid Dissipation(average)	1.5	Watts
Frequency	3.0	GHz
Pulse Duration[2]	6.0	µs
Duty Factor[2]	0.0033	

Typical Operating Conditions as a Grid Pulsed Amplifier

	Driver	Amp	
Frequency	1030	1030	GHz
Heater Voltage	5.8	5.8	Volt
DC Plate Voltage	4700	5000	Vdc
DC Grid Voltage	-70	-70	Vdc
Peak Video Plate Current	1.5	3.3	a
Peak Video Grid Current	0.25	1.1	a
Pulse Drive Power(approx)	300	2000	w
Useful Power Output(approx)	3250	8000	w
Gain	10.4	6.0	dB
Plate Efficiency	46	48	%

1. Using proper radiator.
2. For applications using longer pulse duration and/or higher duty cycle consult Penta Laboratories.

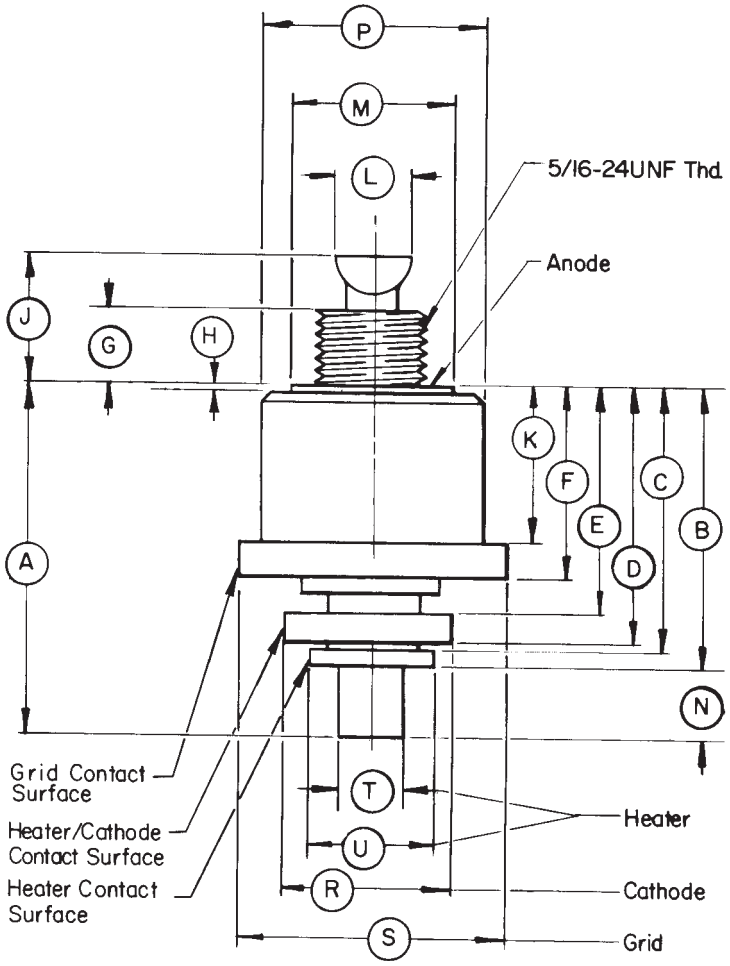
Pulse Modulator and Pulse Amplifier Service

Absolute Maximum Ratings

DC Plate Voltage	8000	Volt
Peak Pulse Plate Voltage	10,000	Volt
DC Grid Voltage	-150	Volt
Instantaneous Peak Grid-Cathode Voltage		
Grid Negative to Cathode	-750	Volt
Grid Positive to Cathode	100	Volt
Pulse Cathode Current	7.5	Ampere
DC Plate Current	150	milliampere
Plate Dissipation(average), Forced Air Cooling[1]	150	Watt
Grid Dissipation(average)	1.5	Watt
Pulse Duration[2]	6.0	µs
Cut-Off Mu	85	

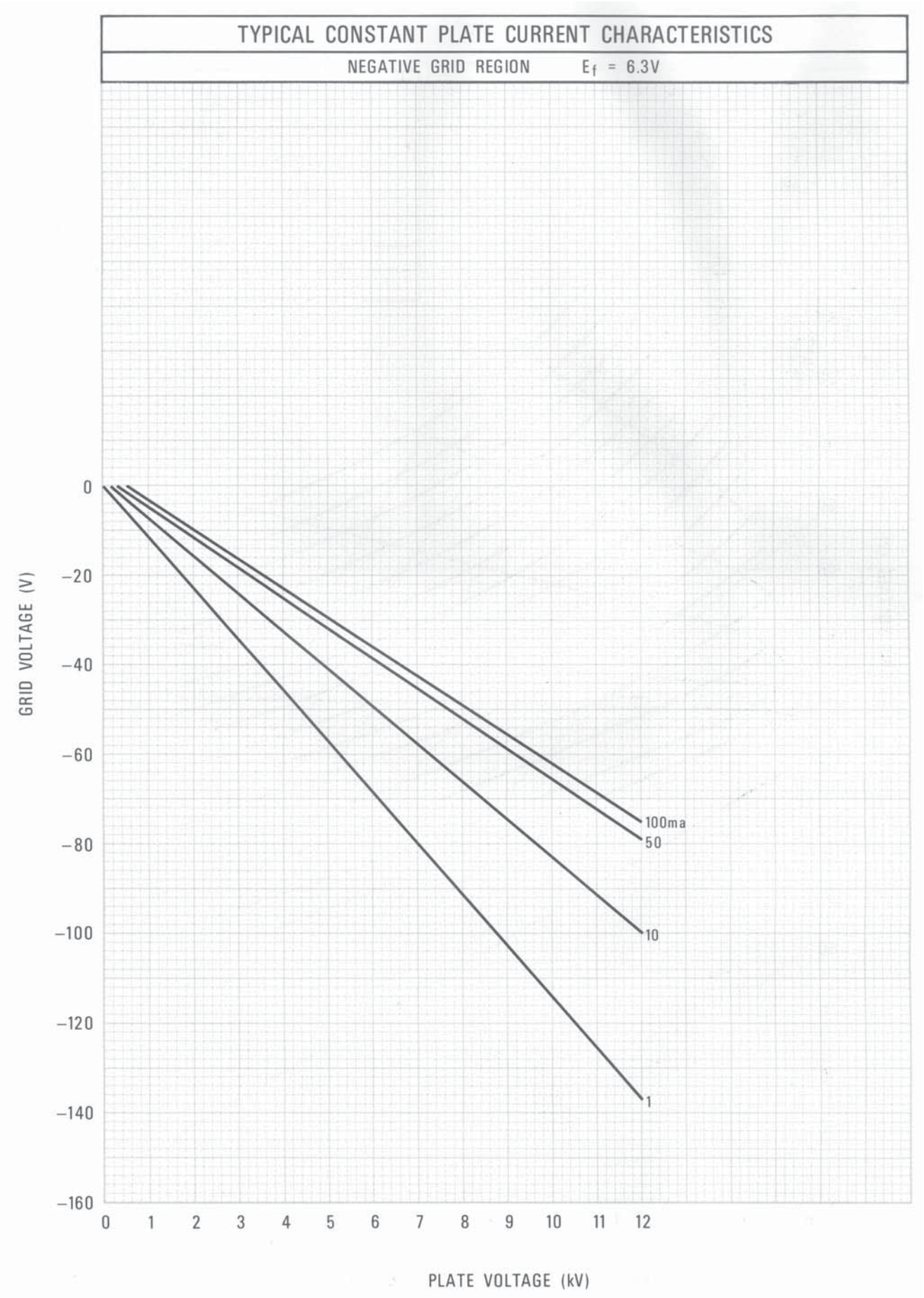
1. Using proper radiator.
2. For applications using longer pulse duration and/or higher duty cycle consult Penta Laboratories.

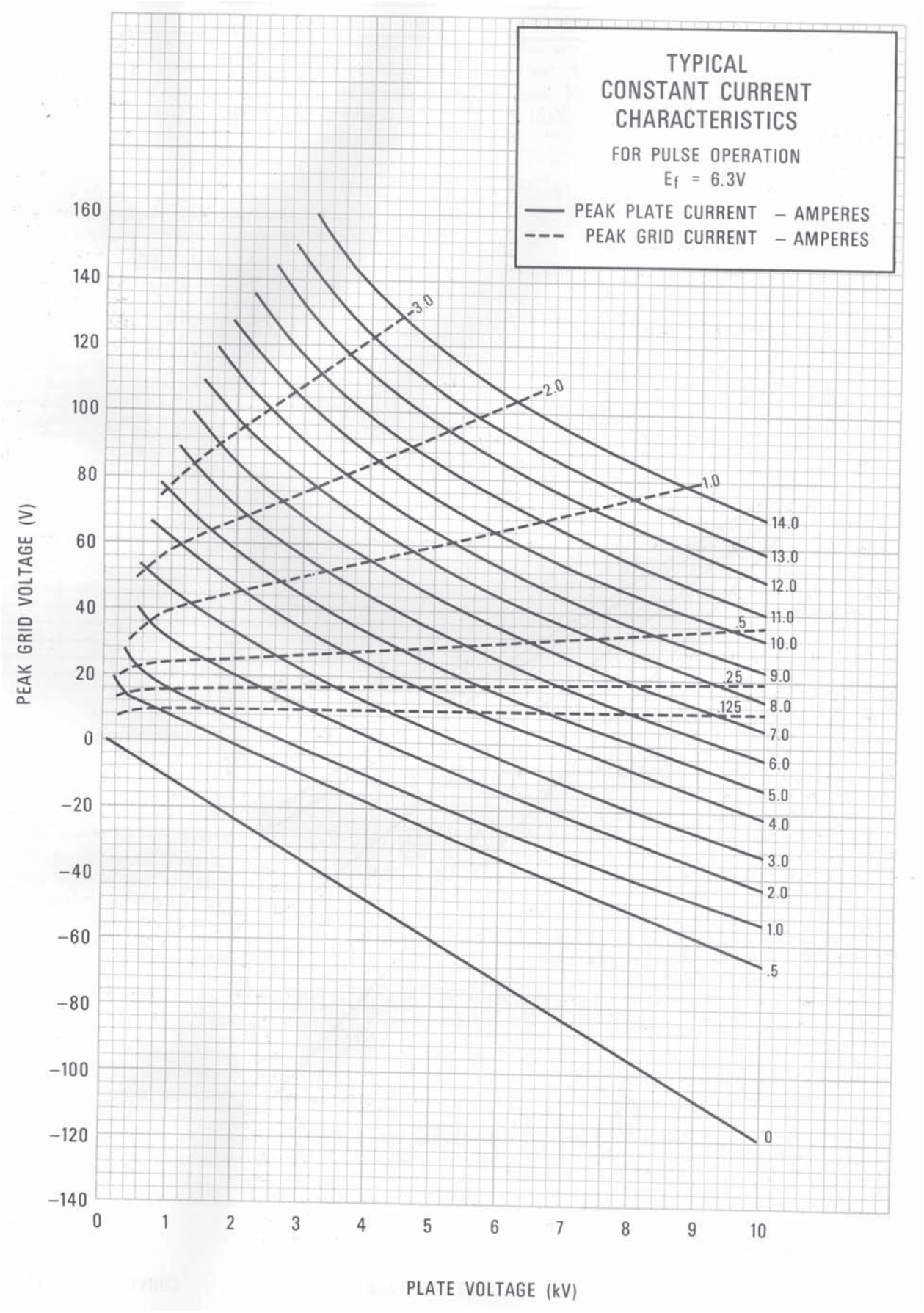
DIMENSIONAL DATA

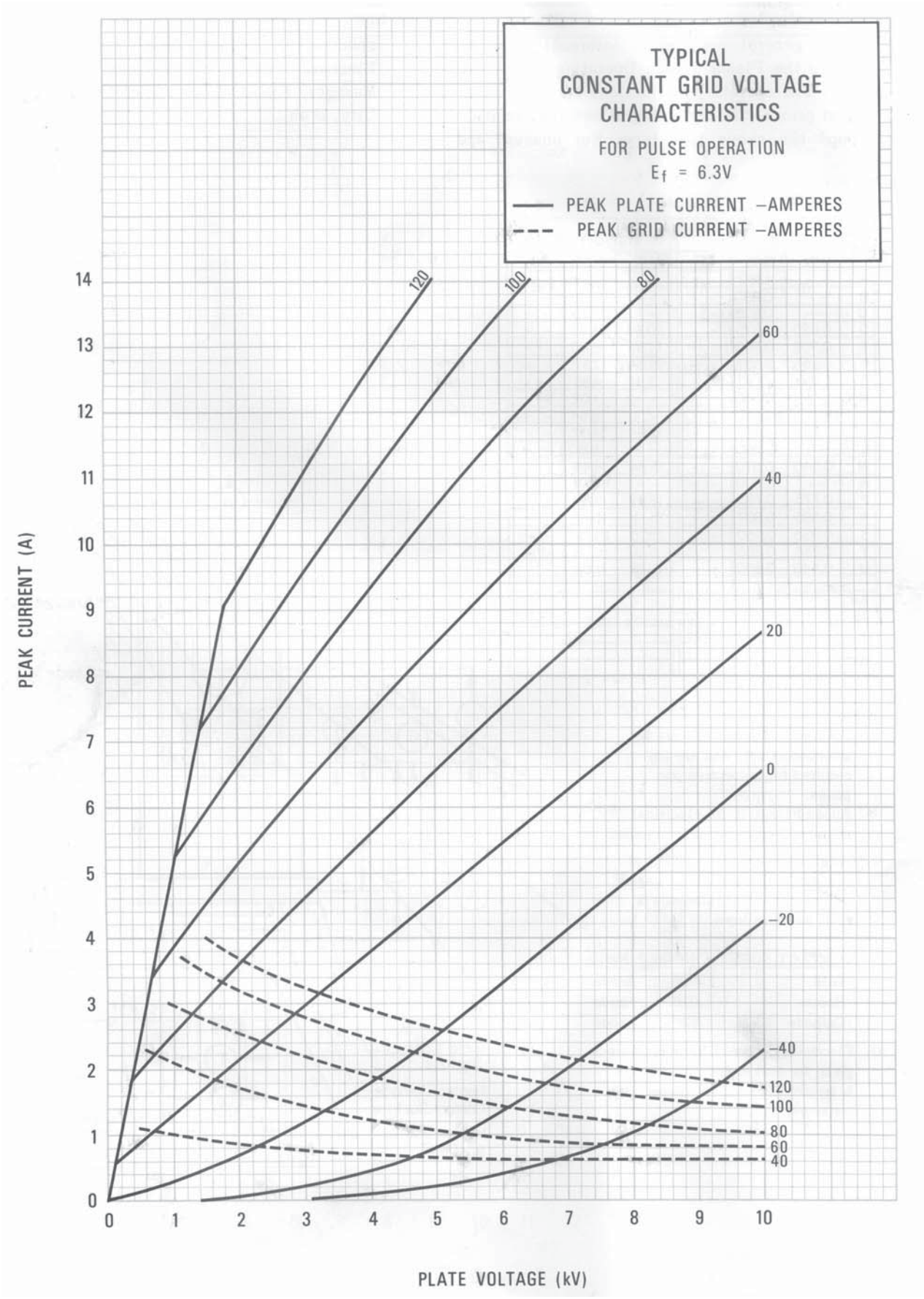


	Inch		Millimeter	
Dim	Min	Max	Min	Max
A	---	1.160	---	29.46
B	---	0.960	---	24.38
C	---	0.895	---	22.73
D	0.825	0.875	20.96	22.23
E	0.702	0.740	17.83	18.80
F	0.655	0.684	16.64	17.37
G	0.150	0.190	3.81	4.83
H	---	0.040	---	1.02
J	---	0.340	---	8.64

	Inch		Millimeter	
Dim	Min	Max	Min	Max
K	0.537	0.554	13.64	14.07
L	---	0.260	---	6.60
M	0.545	0.570	13.84	14.48
N	---	0.200	---	5.08
P	0.775	0.785	19.69	19.94
R	0.595	0.607	15.11	15.42
S	0.935	0.950	23.75	24.13
T	0.235	0.265	5.97	6.73
U	0.440	0.460	11.18	11.68


TYPICAL CONSTANT PLATE CURRENT CHARACTERISTICS
NEGATIVE GRID REGION E_f = 6.3V
GRID VOLTAGE (V)
0
−20
−40
−60
−80
−100
−120
−140
−160
100ma
50
10
1
0 1 2 3 4 5 6 7 8 9 10 11 12
PLATE VOLTAGE (kV)


TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
FOR PULSE OPERATION
E_f = 6.3V
PEAK PLATE CURRENT – AMPERES
PEAK GRID CURRENT – AMPERES
PEAK GRID VOLTAGE (V)
160
140
120
100
80
60
40
20
0
−20
−40
−60
−80
−100
−120
−140
3.0
2.0
1.0
.5
.25
.125
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.5
0
0
1
2
3
4
5
6
7
8
9
10
PLATE VOLTAGE (kV)


TYPICAL
CONSTANT GRID VOLTAGE
CHARACTERISTICS
FOR PULSE OPERATION
E_f = 6.3V
PEAK PLATE CURRENT –AMPERES
PEAK GRID CURRENT –AMPERES
120
100
80
60
40
20
0
–20
–40
120
100
80
60
40
PEAK CURRENT (A)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
PLATE VOLTAGE (kV)
0
1
2
3
4
5
6
7
8
9
10