TECHNICAL DATA

8933

PLANAR TRIODE

The 8933 is a miniature, ceramic/metal, rugged planar triode for advanced airborne and space applications up to 3.0 GHz.

The 8933 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 8933 has an arc-resistant cathode, and a spewing shield, assuring stable, reliable, and long-life operation under adverse conditions.

The 8933 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 watts can be furnished on separate order.

The 8933 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 kV dc.

GENERAL CHARACTERISTICS[1]

ELECTRICAL

Cathode: Oxide Coated, Unipotential		
Heater: Voltage	6.3 ± 0.3	V
Current, at 6.3 volts	1.30	A
Transconductance (Average):		
I_b = 160 mA	38	mmhos
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:		
Plate or Grid-Pulsed	3.0	GHz

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 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	1.50 in; 38.10 mm
Diameter	.950 in; 24.13 mm
Net Weight	0.7 oz; 19.3 gm
Operating Position	Any
Maximum Operating Temperature:	
Ceramic/Metal Seals	250 °C
Cooling	Conduction, convection, forced air, or liquid

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] (grounded cathode connection)			
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.

GRID PULSED OR PLATE PULSED AMPLIFIER OR OSCILLATOR

ABSOLUTE MAXIMUM RATINGS:

DC PLATE VOLTAGE(grid pulsed)	8000	VOLTS
PEAK PULSE PLATE VOLTAGE (plate pulsed)	10,000	VOLTS
DC GRID VOLTAGE	-300	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
Grid negative to cathode	-750	VOLTS
Grid positive to cathode	175	VOLTS
PULSE PLATE CURRENT	5.0	AMPERES
PULSE GRID CURRENT	2.5	AMPERES
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]	.0033	

OPERATING CONDITIONS for 8933 in Representative Application

GRID PULSED AMPLIFIER	Driver	Amp	
Frequency	1030	1030	GHz
Heater Voltage	5.8	5.8	V
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 EIMAC radiator.
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.

PULSE MODULATOR AND PULSE AMPLIFIER SERVICE

ABSOLUTE MAXIMUM RATINGS:

DC PLATE VOLTAGE	8000	VOLTS
PEAK PLATE VOLTAGE	10,000	VOLTS
DC GRID VOLTAGE	-150	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
Grid negative to cathode	-750	VOLTS
Grid positive to cathode	100	VOLTS
PULSE CATHODE CURRENT	7.5	AMPERES
DC PLATE CURRENT	150	MILLIAMPERES
AVERAGE PLATE DISSIPATION		
Forced Air Cooling[1]	150	WATTS
GRID DISSIPATION (Average)	1.5	WATTS
PULSE DURATION[2]	6.0	μs
CUT-OFF MU	85	

1. Using proper EIMAC radiator.
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.

DIMENSIONAL DATA						
DIM	INCHES			MILLIMETERS		
	MIN.	MAX.	REF.	MIN.	MAX.	REF.
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	- -
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	- -
AA	- -	- -	0.925	- -	- -	23.50
AB	- -	- -	0.778	- -	- -	19.76
AC	- -	- -	0.598	- -	- -	15.19

Notes:

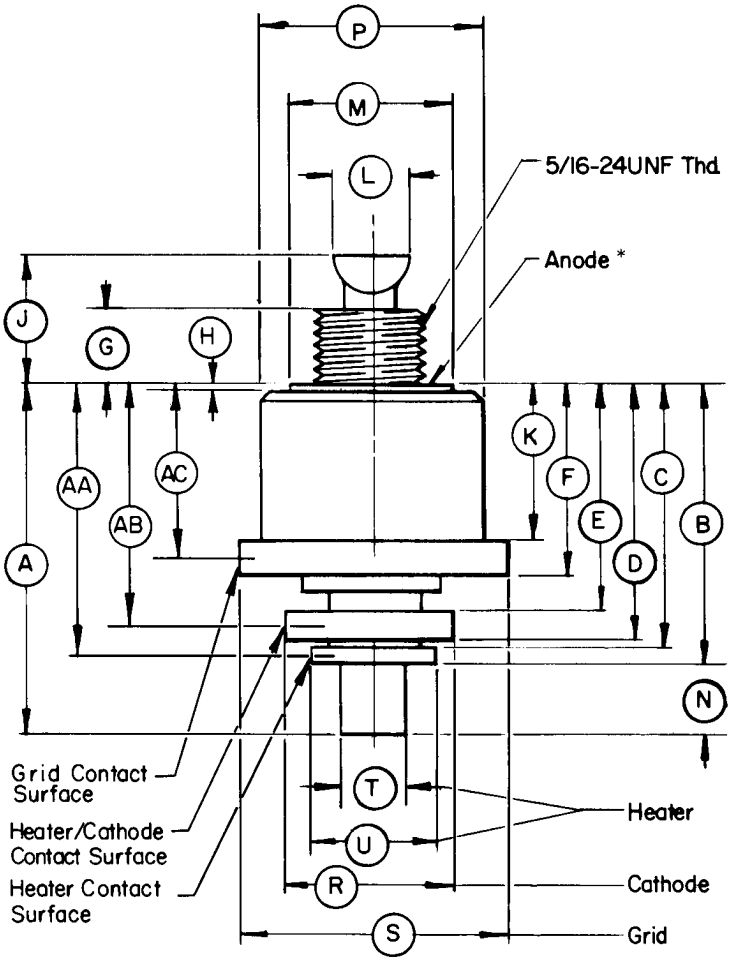
A. Reference Dimensions are for information only and are not required for inspection purposes.

B. Anode Flange is for electrical contact; Stud is for heat transfer.

C.* Total indicated runout (TIR) of Contact Surfaces shall be gaged from centerline of reference & shall be as follows:

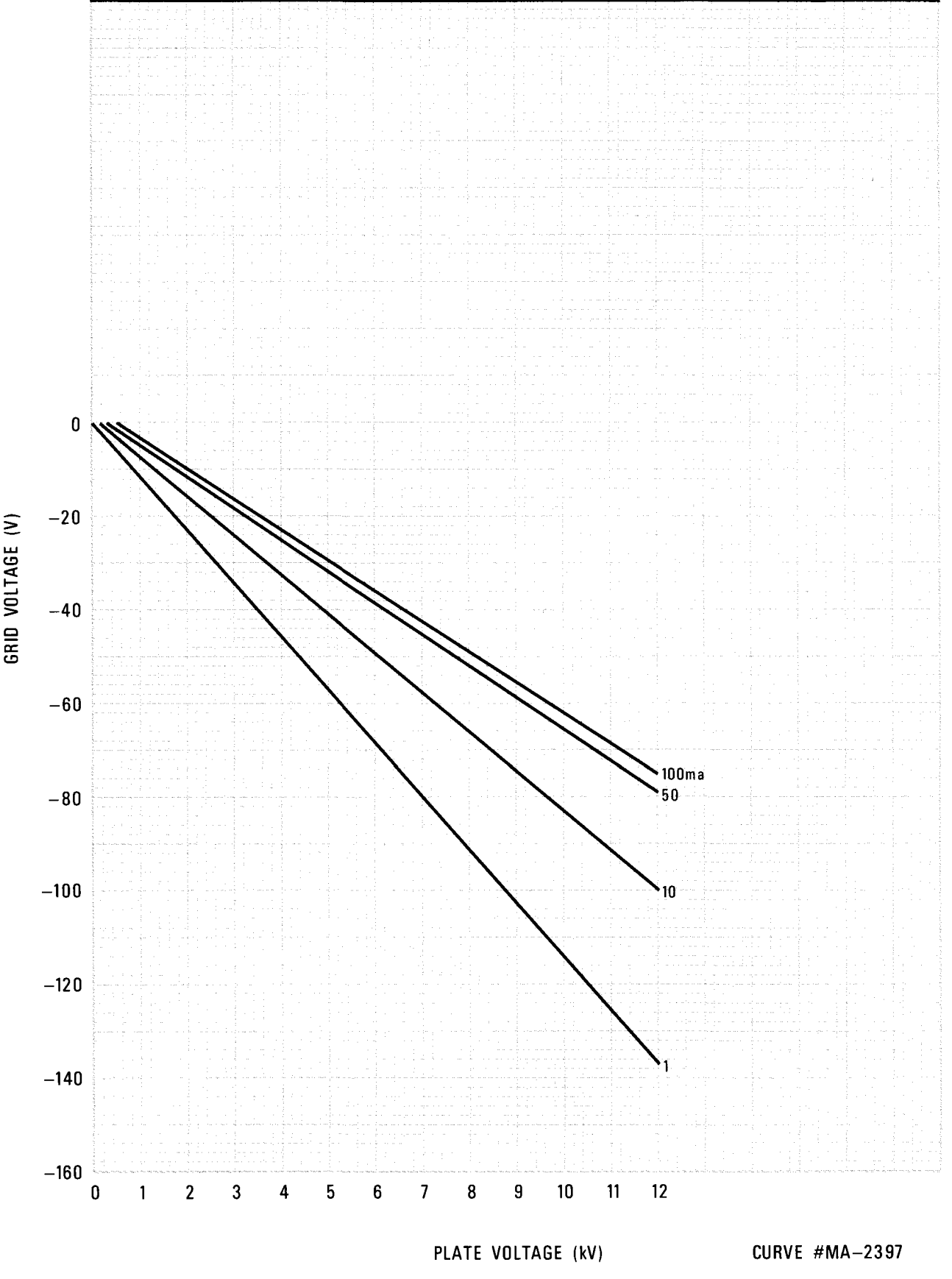
CONTACT SURF.	TIR(Max.)	Ref.
Grid	.020	Anode
Heater	.020	Anode
Cathode	.020	Anode

D. Electrode Contact Dimensions are given for socket design purposes & are not intended for inspection purposes.

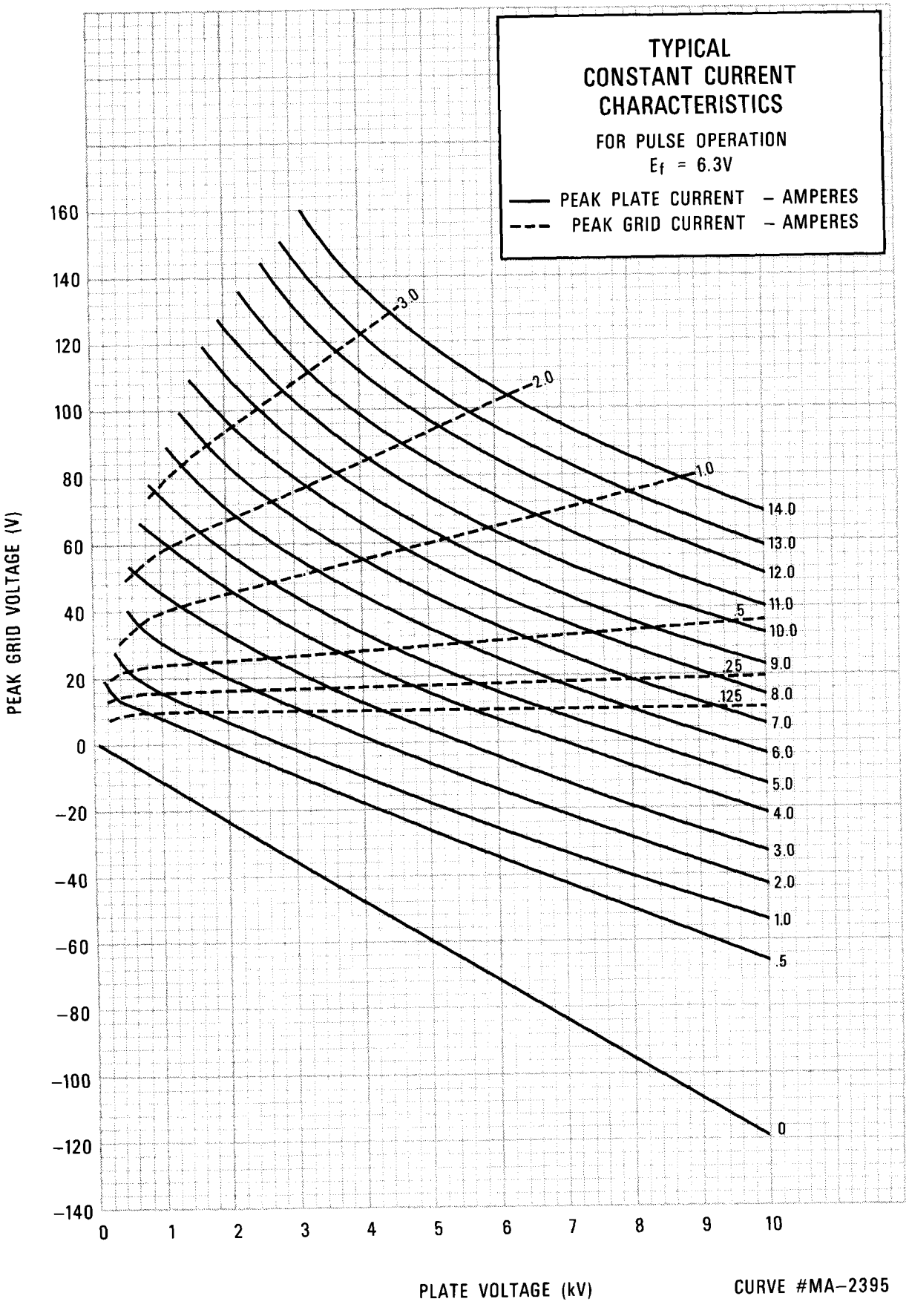


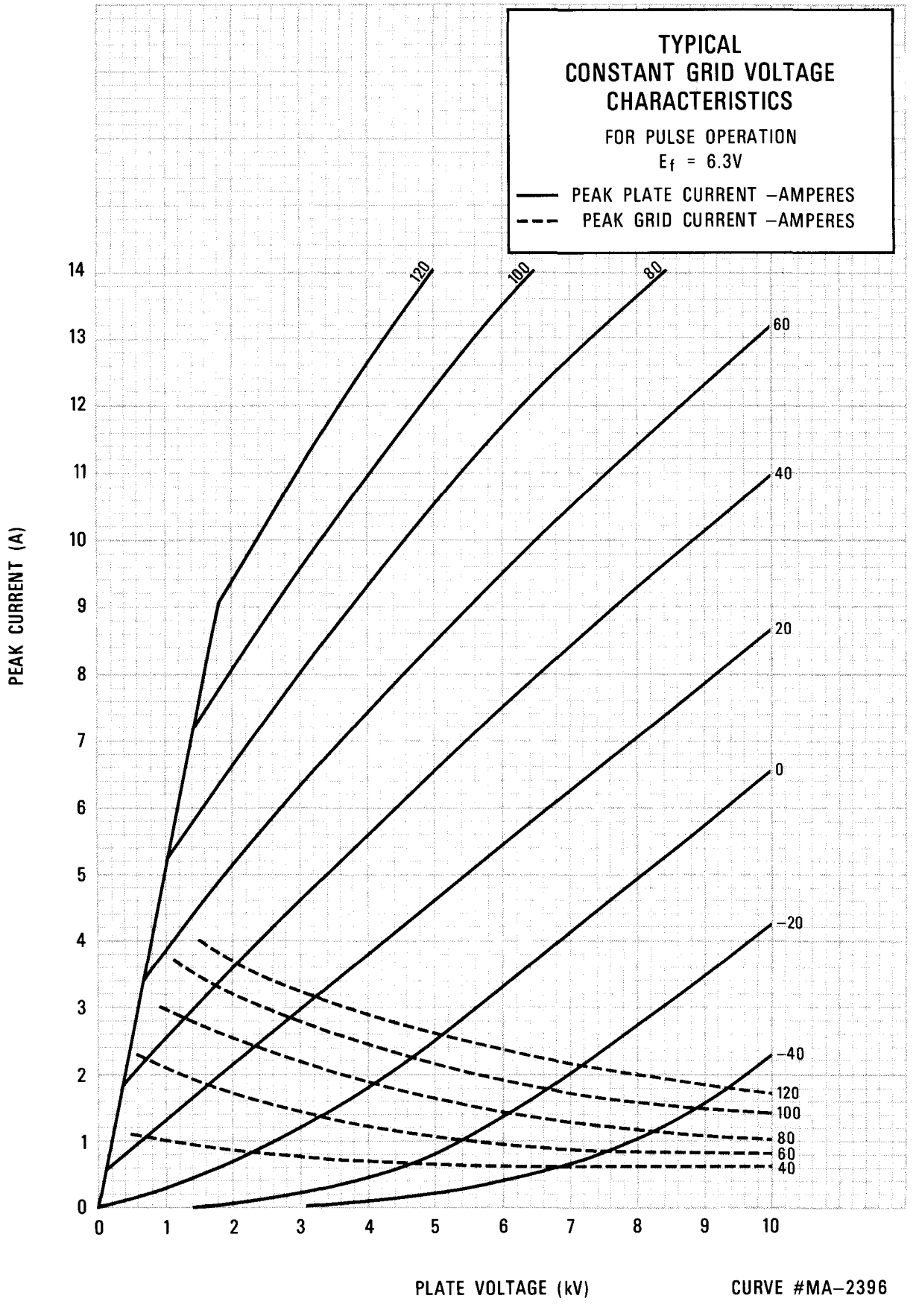
TYPICAL CONSTANT PLATE CURRENT CHARACTERISTICS

NEGATIVE GRID REGION E_f = 6.3V



CURVE #MA-2397


TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
FOR PULSE OPERATION
Ef = 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
0
1
2
3
4
5
6
7
8
9
10
PLATE VOLTAGE (kV)
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
CURVE #MA–2395


TYPICAL
CONSTANT GRID VOLTAGE
CHARACTERISTICS
FOR PULSE OPERATION
Ef = 6.3V
PEAK PLATE CURRENT –AMPERES
PEAK GRID CURRENT –AMPERES
PEAK CURRENT (A)
PLATE VOLTAGE (kV)
CURVE #MA–2396
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
120
100
80
60
40
20
0
–20
–40
120
100
80
60
40