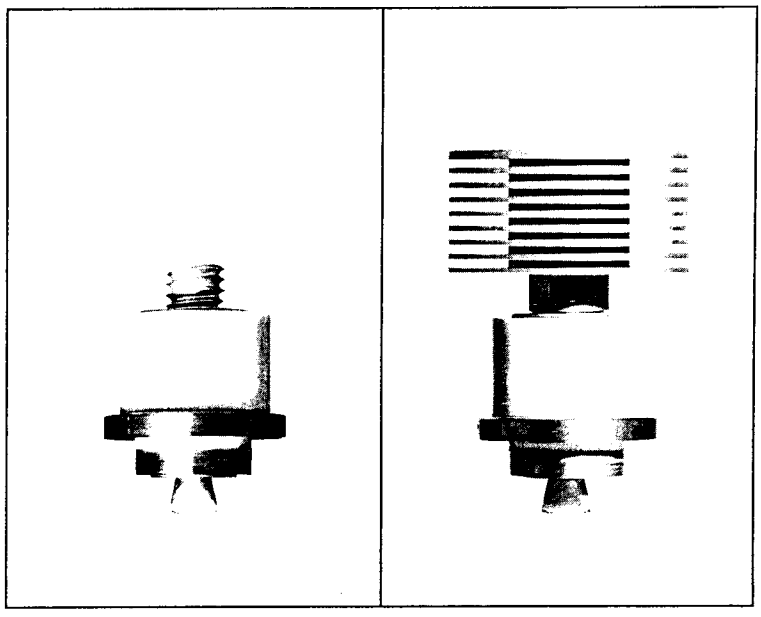
Tubes Shown Actual Size



ISSUED 5-64

ML-8538
ML-8539

Miniature
UHF Planar Triodes
35 kw Pulse Power
5 kw RF Pulse Power
Phormat Cathode

MACHLETT
ELECTRON TUBE SPECIALIST

DESCRIPTION

The ML-8538 and ML-8539 are miniaturized high-mu planar triodes with high cathode-current capability for use as grid-pulsed or plate-pulsed oscillators, power amplifiers, frequency multipliers, or as switch tubes at high plate voltages. The tubes will deliver useful output at frequencies as high as 3 Gc. The ML-8538 is supplied without a radiator for conduction-convection or heat-sink cooling. The ML-8539 is supplied with a radiator for forced-air cooling. Except for plate-dissipation ratings, the characteristics of the two tubes are the same.

Noteworthy differences in these tubes as compared to similar tube types are an extended grid-cathode insulator and a special cathode design, permitting operation with up to 8000 Vdc plate voltage. Other features include low interelectrode capacitance, high transconductance, great mechanical strength and capability for sustained, reliable operation at elevated temperatures.

Compact metal-and-ceramic coaxial construction makes the tubes well suited for operation in line-type circuits at lower frequencies as well as in cavity resonators at the higher frequencies. The cathode of each type is an indirectly heated disc with an oxide coating impregnated in a nickel matrix. The unique matrix construction (in combination with proper plate series impedance) reduces to a minimum failures of the cathode due to voltage surges thereby further increasing the reliability of these tubes.

Note: Data contained herein are based on initial design and test criteria. Before using these data in final equipment designs, consult Machlett for possible revisions.

GENERAL CHARACTERISTICS

Electrical

Heater Voltage (AC or DC)	6.3 ±5%	V
Heater Current at 6.3 volts	1.3	A
Heater Heating Time, minimum	60	sec
Amplification Factor, Cutoff	90	
Amplification Factor, Dynamic	145	
Transconductance	30000	μmhos
Interelectrode Capacitance, without Heater Voltage		
Grid-Plate	1.6	pf
Grid-Cathode	8.0	pf
Plate-Cathode, maximum	.06	pf

Mechanical

Mounting Position	Optional	
Type of Cooling		
With radiator (ML-8539)	Forced-air	
Without radiator (ML-8538)	Conduction & Convection	
Maximum Anode Temperature	250	°C
Net Weight		
Without radiator (ML-8538)	.7	oz
With radiator (ML-8539)	1.6	oz

MAXIMUM RATINGS

Pulse Modulator or Pulse Amplifier

Maximum Ratings, Absolute Values

DC Plate Voltage	8	kV
Peak Plate Voltage	10	kv
DC Grid Voltage	−150	V
Instantaneous Peak Grid-Cathode Voltage		
Grid negative to cathode	−750	v
Grid positive to cathode	250	v
DC Plate Current	150	mA
Peak Plate Current from Pulse Supply	5	a
Average Plate Dissipation		
Forced-air cooling (ML-8539)	100	W
Conduction & convection (ML-8538)	10	W†
Average Grid Dissipation	1.5	W
Pulse Duration	6	μs††
Duty Factor	.0033	††

†Dissipation of 100 W or more might be possible with the ML-8538 when the tube is used with an appropriately designed heat sink.

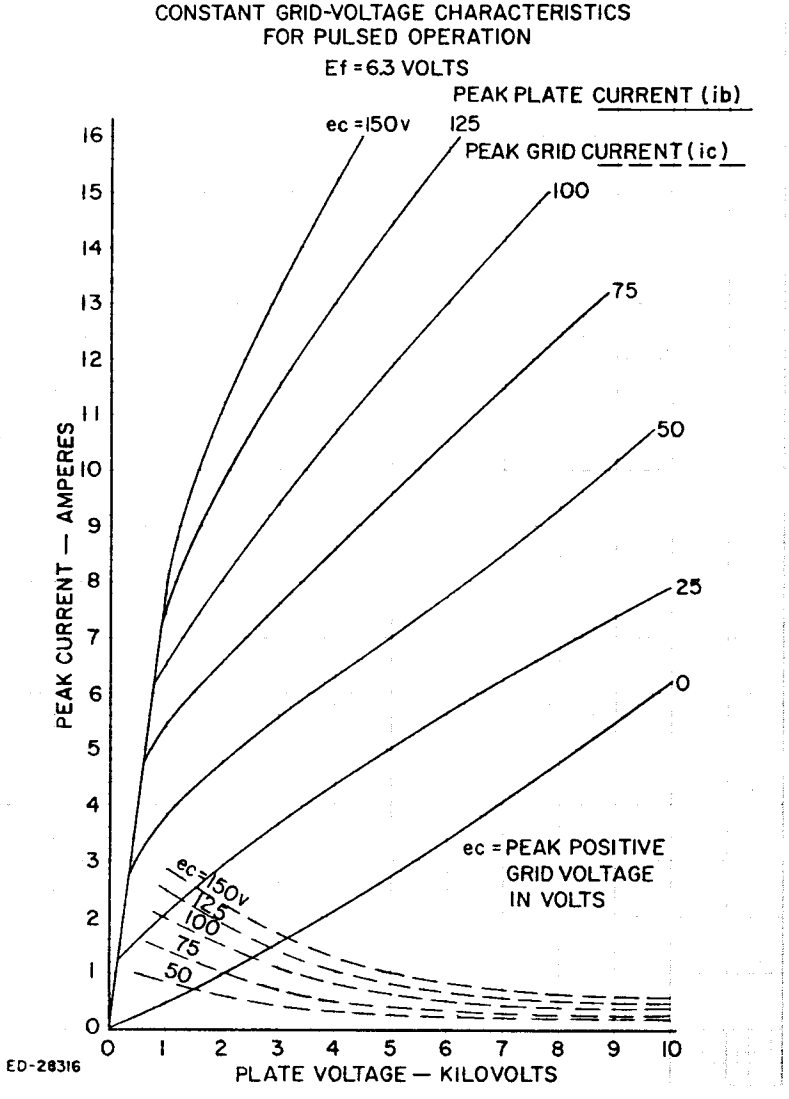
Grid-Pulsed or Plate-Pulsed RF Oscillator and Amplifier — Class C

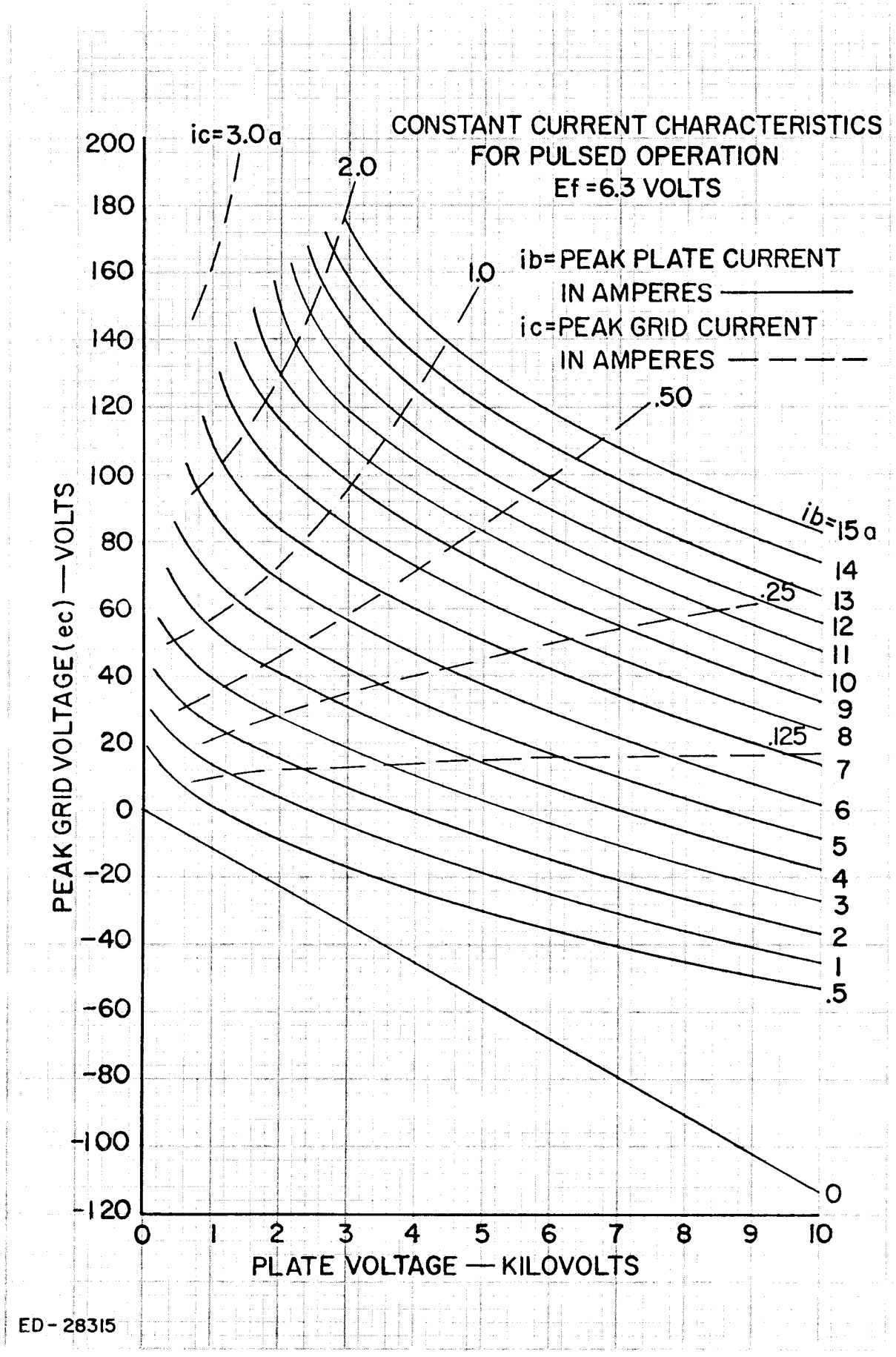
Maximum Ratings, Absolute Values

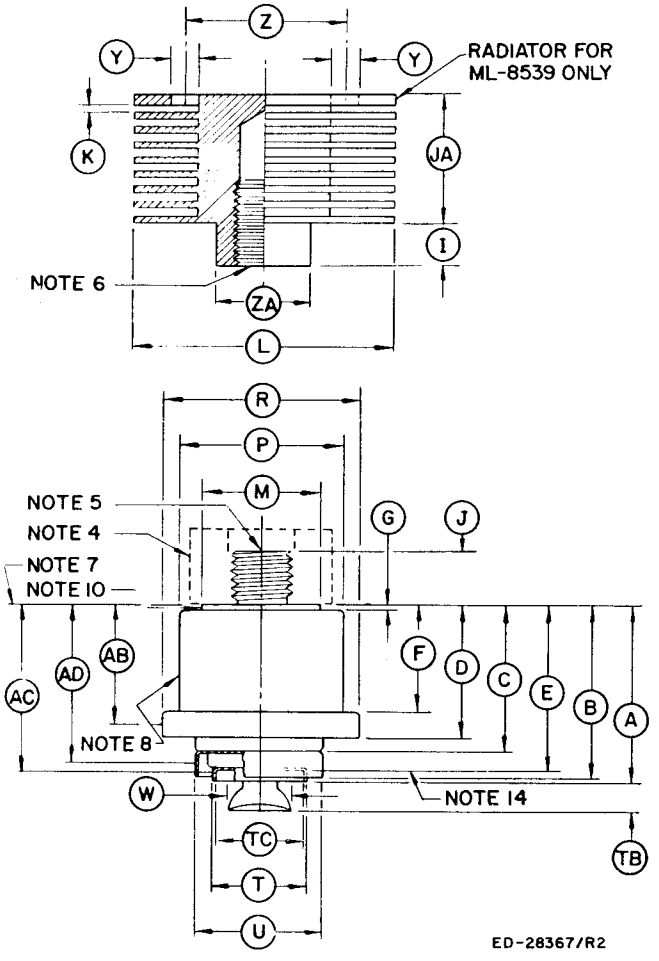
Frequency	3	Gc
DC Plate Voltage	8	kV*
DC Grid Voltage	−150	V
Instantaneous Peak Grid-Cathode Voltage		
Grid negative to cathode	−750	v
Grid positive to cathode	250	v
Average Plate Current	16	mA
Average Grid Current	6	mA
Peak Plate Current from DC Supply	5	a
Average Plate Dissipation		
Forced-air cooling (ML-8539)	100	W
Conduction & convection (ML-8538)	10	W†
Average Grid Dissipation	1.5	W
Pulse Duration	6	μs††
Duty Factor	.0033	††

* Plate pulsed operation — peak plate voltage — to 10 kv.

††For applications requiring longer pulse duration or higher duty factors, consult the Machlett Engineering Department.




CONSTANT CURRENT CHARACTERISTICS
FOR PULSED OPERATION
Ef = 6.3 VOLTS
ib = PEAK PLATE CURRENT IN AMPERES
ic = PEAK GRID CURRENT IN AMPERES
ic=3.0a
2.0
1.0
.50
.25
.125
ib=15a
14
13
12
11
10
9
8
7
6
5
4
3
2
1
.5
0
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
PEAK GRID VOLTAGE (ec) — VOLTS
0 1 2 3 4 5 6 7 8 9 10
PLATE VOLTAGE — KILOVOLTS
ED-28315



DIMENSIONS FOR OUTLINE

Ref.	Inches*			Notes
	Minimum	Nominal	Maximum	
A		.842		
AB	.538	.578	.618	1, 2, 11
AC	.782	.802	.822	3, 13
AD	.727	.767	.807	2, 3, 12
B		.832		
C		.702		
D		.642		
E		.782		
F		.515		
G		.025		
I		.200		
J		.260		
JA		.610		
K		.036		
L		1.250		
M		.570		1
P		.780		
R		.945		1, 2, 11
T		.450		3, 13
TB	—	—	.375	
TC		.420		
U		.600		2, 3, 12
W	—	—	.313	
Y		.125		9
Z		.770		9
ZA		.440		

*Limits to be determined.

NOTES

1. The total indicated runout of the grid-contact surface (Note 11) with respect to the anode diameter (M) will not exceed .040 inch. The gage (Note 4) must screw onto anode thread (Note 5) so that the face of the gage makes full contact with reference surface (Note 7). The eccentricity measurement is then made on the grid-contact surface with the gage chucked on the measurement reference axis.
2. The total indicated runout of the grid-contact surface (Note 11) with respect to the cathode-contact surface (Note 12) will not exceed .030 inch.
3. The total indicated runout of the cathode-contact surface (Note 12) with the heater-contact surface (Note 13) will not exceed .020 inch.
4. See outline. Machlett gage No. S-L5. Details will be supplied upon request.
5. See outline. Anode, $\frac{5}{16}$ — 24 UNF-2A thread.
6. See outline. $\frac{5}{16}$ — 24 UNF-2B thread.
7. See outline. Reference surface. The tube shall be stopped by this surface only when screwed in socket.
8. See outline. Insulating envelope. Do not clamp or locate on this surface.
9. Two holes provided for tube extractor in the top fin only, defined by dimensions (Y) and (Z).
10. See outline. Measure anode temperature on this surface.
11. Grid-contact surface and reference dimension for eccentricity measurement, defined by dimensions (R) and (AB).
12. Cathode or heater-contact surface and reference dimension for eccentricity measurement, defined by dimensions (U) and (AD).
13. Heater-contact surface and reference dimension for eccentricity measurement, defined by dimensions (T) and (AC). See also Note 14.
14. See outline. Alternate heater-contact surface. Heater contact can be made to the bottom of the heater terminal-cup by means of a coil spring having a maximum coil OD of .390 inch and a minimum coil ID of .320 inch, or some similar device.