TUNG-SOL PRODUCT BULLETIN

INDUSTRIAL ELECTRON TUBE
TYPE 1258

JANUARY 1963

MINIATURE HYDROGEN THYRATRON

DESCRIPTION The 1258 is a zero bias miniature hydrogen thyratron designed primarily for use as a pulse modulator tube for low power radar transmitters. This tube can supply peak pulse power of 10 kilowatts and therefore will replace physically larger types in many applications. Because of its close electrode spacing and small size, made possible by hard glass construction, the 1258 is capable of relatively high pulse repetition rates.

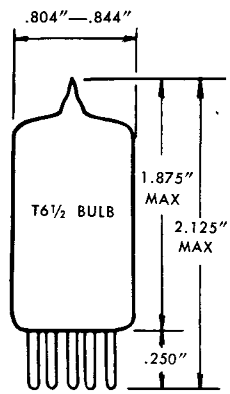
The 1258 has become the industry standard for a small size pulse modulator tube because of its long history of satisfactory service.

ELECTRICAL DATA

	Symbol	Min.	Bogey	Max.
Heater Voltage (When Ip is less than 0.75 Aac, refer to Recommended Heater Voltage Curve on page 3)	Ef	5.7	6.3	6.6 Volts
Heater Current (With bogie heater voltage)	If	1.6	1.8	2.0 Amperes
Cathode Heating Time	tk	60		Seconds
Anode Voltage Drop (At recommended E_f)	etd			175 Volts

MECHANICAL DATA

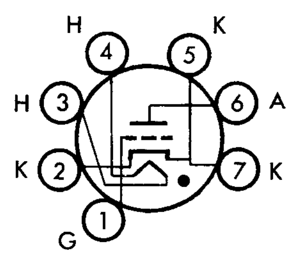
Type of Cooling (Heat dissipating shields may be used. Forced air cooling is not recommended.)	Convection
Altitude	See Application Notes
Mounting Position	Any
Maximum Net Weight	0.5 ounce
Dimensions: See outline drawings	
Vibration Test Conditions	10-50 cps @ 10 G
Maximum Shock Conditions (48° Hammer blow in Navy Fly Weight, High Impact Shock Machine)	720 G/1 millisec.



OUTLINE DRAWING

RATINGS, ABSOLUTE VALUES

	Symbol	Min.	Max.
Peak Anode Voltage			
Inverse (Note 1)	epx	—	1000 Volts
Forward	epy	200	1000 Volts
Cathode Current			
Peak	ib		20.0 Amp.
Average	Ib		50 ma.
RMS (For square pulse applications $I_p = \sqrt{Ib \times ib}$)	I_p		1.0 Amp.
D.C. Anode Voltage	Ebb	300	Volts
Heater-Cathode Voltage	Ehk	−100	+25 Volts
Operating Frequency (This is not necessarily the upper operating frequency limit but represents the highest repetition rate extensively life tested to date.)	prr		5000 Cps.
Peak Grid Voltage . . . See Recommended Grid Pulse Conditions on page 2	egy	175	500 Volts
Peak Inverse Grid Voltage	egx		150 Volts
Heating Factor (epy x ib x prr. See page 4)	Pb		1×10^8
Current Rate of Rise (Note 2)			400 Amp/μ sec.
Anode Delay Time (Note 3)	tad		0.6 μ sec.
Time Jitter (Note 4)	tj		0.01 μ sec.
Ambient Temperature	TA	−60°C	+125° C



BOTTOM VIEW

Small Button 7-Pin Miniature Base (See Application Notes)

Note 1. In pulsed operation, the peak inverse voltage, exclusive of a spike of 0.05 μ sec. maximum duration, shall not exceed 500 volts during the first 25 μ sec. following the anode pulse.

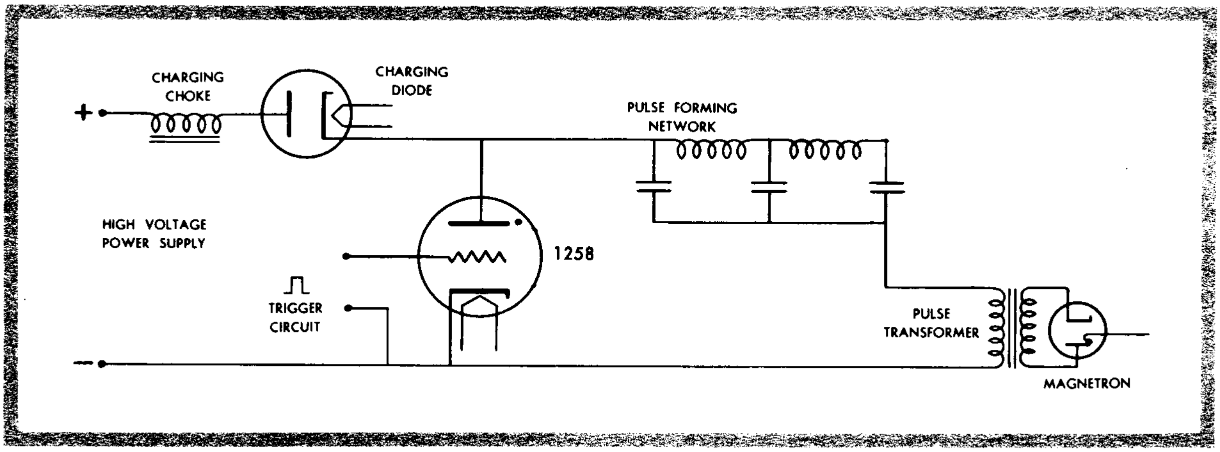
Note 2: Measurement made between 26% and 70.7% points.

Note 3: Anode delay time is defined as the time interval between the point on the rising portion of the grid voltage pulse which is 26 percent of the maximum unloaded pulse amplitude and the point where anode conduction takes place.

Note 4: Time jitter is measured at 50 percent of the pulse amplitude after the tube has been operating for at least 60 seconds. The limit of 0.01 μ sec. shown is the maximum allowable under specified unfavorable operating conditions. With sufficient grid drive and with anode voltages of 600 volts and above, jitter not exceeding 0.005 μ sec. can be easily achieved.

APPLICATION NOTES

The 1258 miniature hydrogen thyratron is designed primarily for use in line type radar modulators. A basic circuit for such service is illustrated below. In such a circuit, the hydrogen thyratron serves as a switch to release into the magnetron or other radio frequency generator, the energy stored in the pulse forming network. This tube is admirably suited for such service by its ability to hold off relatively high voltage, and to pass high peak current with relatively low tube voltage drop. The tube will operate over a wide range of pulse repetition rates, pulse widths and peak currents, thus providing a very flexible circuit element. Triggering requirements are simplified since the tube operates with zero bias.



The 1258 fits a standard 7 pin miniature socket. The tube pins, however, are stiff, and care should be taken to have the socket clips in perfect alignment before attempting to insert a tube. As the tube operates at high temperatures, a ceramic type socket should be employed. Connections to the socket should be made with flexible leads to provide floating action for the socket clips. Pin straighteners should never be used on these tube types, as any attempt to bend the pins will result in cracked button bases!

The nominal altitude rating for the 1258 is 10,000 feet. However, if provision is made to prevent arc-over between pins, these types also will operate at 80,000 feet. One method of preventing arc-over between pins is to pot the base end of the tube. If the entire envelope is to be potted, however, precaution must be taken to keep bulb temperature below 225°C.

Cathode temperature is determined by RMS cathode current as well as by heater power. The bogey heater voltage of 6.3 volts therefore is applicable only near full operating conditions. At light loading it is recommended to operate the heater voltage higher. Recommended figures for various operating conditions are shown on the curves on page 3.

TYPICAL OPERATION

Pulse Repetition Rate	Anode Current			Peak Anode Voltage	Pulse Width	Grid Drive	
	Peak	RMS	Average				
pps	Amps	Amps AC	mAd.c.	Volts	µ sec	µ sec	volts
5,000	20.0	1.0	50.	1,000	0.5	1.0	175
10,000	6.6	0.5	37.	316	0.56	2.0	175
*33,000	3.5	0.46	60.	350	0.5	Blocking Oscillator	200

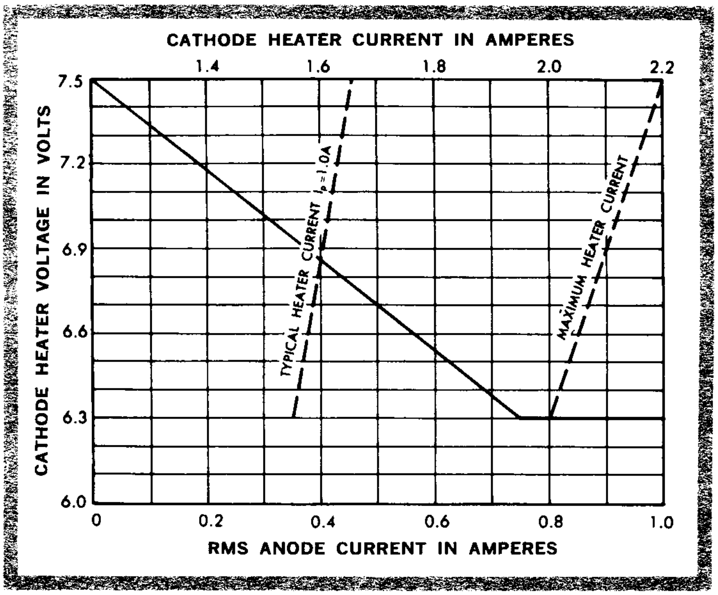
*Limited test information

RECOMMENDED GRID PULSE VALUES

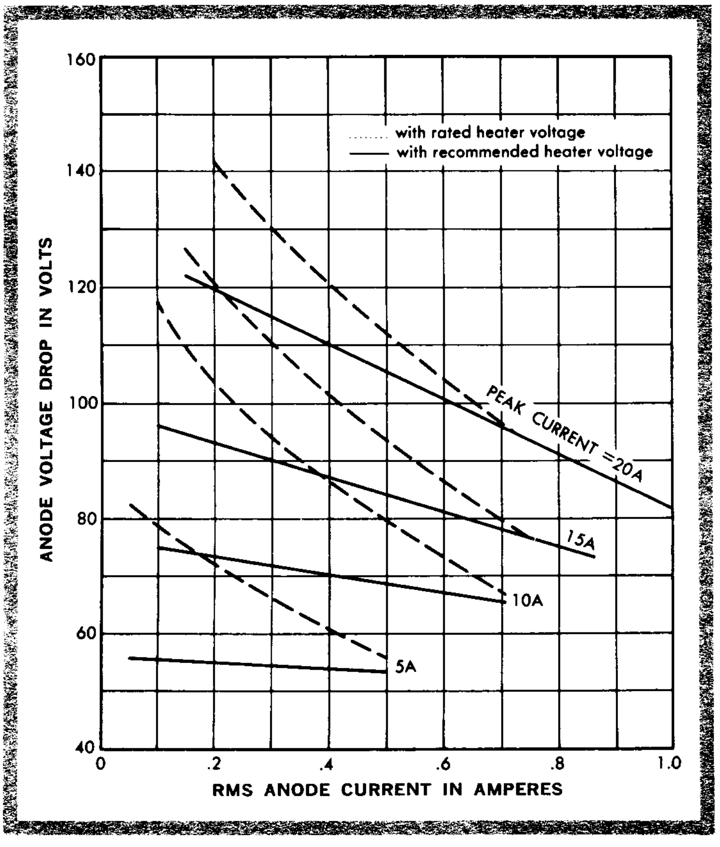
	Min.	Max.	
Peak Voltage	200	500	Volts
Driver Circuit Impedance	200	1000	Ohms
Voltage Rate of Rise	350		Volts/µ sec.

These values are as measured at the tube socket with the thyratron removed. The grid pulse width should not be longer than the anode pulse except in cases where the driver circuit impedance is high. The minimum peak trigger voltage recommended will increase with decreasing trigger pulse width. However, this effect is important only at pulse widths less than 0.5 microseconds.

RECOMMENDED HEATER VOLTAGE CURVE



TYPICAL ANODE VOLTAGE DROP CURVE



GRAPHICAL REPRESENTATION OF HEAT FACTOR