



ELECTRON TUBE DEPARTMENT      COMPONENTS DIVISION

KUTHE  
5949  
HYDROGEN  
THYRATRON

DESCRIPTION:

THE 5949 IS A UNIPOTENTIAL CATHODE, THREE ELEMENT HYDROGEN FILLED THYRATRON DESIGNED FOR NETWORK DISCHARGE SERVICE. IN SUCH SERVICE, IT IS SUITABLE FOR PRODUCING PULSE OUTPUTS OF MORE THAN 6 MEGAWATTS AT AN AVERAGE POWER LEVEL OF MORE THAN 6 KW.

THE SPECIAL FEATURES OF THE 5949 INCLUDE AN INTERNAL HYDROGEN RESERVOIR CAPABLE OF PRODUCING A WIDE RANGE OF HYDROGEN PRESSURE AND MAINTAINING THIS PRESSURE AT THE DESIRED VALUE THROUGHOUT ITS USEFUL LIFE.

ELECTRICAL DATA, GENERAL:

	<u>NOM.</u>	<u>MIN.</u>	<u>MAX.</u>	
HEATER VOLTAGE	6.3	6.0	6.6	VOLTS A.C.
HEATER CURRENT (AT 6.3 VOLTS)		15.0	22.0	AMPERES
HEATER (NOTE 1)				
RESERVOIR VOLTAGE (NOTE 2)		3.0	5.5	VOLTS
RESERVOIR CURRENT AT 4.5 VOLTS		2.0	5.0	AMPERES
MINIMUM HEATING TIME				15 MINUTES

MECHANICAL DATA, GENERAL:

MOUNTING POSITION			ANY
BASE			PER OUTLINE
ANODE CAP			PER OUTLINE
COOLING (NOTE 3)			
NET WEIGHT		1-1/2	POUNDS
DIMENSIONS			SEE OUTLINE

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THYRATRON

- 2 -

RATINGS:

MAX. PEAK ANODE VOLTAGE, FORWARD	25.0	KILOVOLTS
MAX. PEAK ANODE VOLTAGE, INVERSE (NOTE 4)	25.0	KILOVOLTS
MIN. ANODE SUPPLY VOLTAGE	5.0	KILOVOLTS D.C.
MAX. PEAK ANODE CURRENT	500	AMPERES
MAX. AVERAGE ANODE CURRENT	500	MILLIAMPERES
MAX. RMS ANODE CURRENT (NOTE 5)	15.8	AMPERES A.C.
MAX. EPY X IB X PRR	$6.25 \times 10^9$	
MAX. ANODE CURRENT RATE OF RISE	2,500	AMPERES/ USECOND
PEAK TRIGGER VOLTAGE (NOTE 6)		
MAX. ANODE DELAY TIME (NOTE 7)	1.0	MICROSECOND
MAX. ANODE DELAY TIME DRIFT	0.25	MICROSECOND
MAX. TIME JITTER (NOTE 8)	0.01	MICROSECOND (INITIAL)
	0.02	USECOND (END OF LIFE)
AMBIENT TEMPERATURE	-55° TO 75°	CENT.

TYPICAL OPERATION AS PULSE MODULATOR, DC RESONANT CHARGING:

PEAK NETWORK VOLTAGE	25.0	20.0	KILOVOLTS
PULSE REPETITION RATE	500	1200	PULSES/SECOND
PULSE LENGTH	2.0	1.0	MICROSECOND
PULSE FORMING NETWORK IMPEDANCE	26	52	OHMS
TRIGGER VOLTAGE	600	600	VOLTS
PEAK POWER OUTPUT (RESISTIVE LOAD 92% ZN)	5.9	1.9	MEGAWATT
PEAK ANODE CURRENT	500	200	AMPERES
AVERAGE ANODE CURRENT	0.50	0.24	AMPERES D.C.

NOTE 1:

THODE CONNECTED TO CENTER OF CATHODE HEATER.

NOTE 2:

THE OPTIMUM RESERVOIR VOLTAGE FOR OPERATION AT 500 PULSES/SEC. (MAX.) WITH A PEAK FORWARD VOLTAGE (EPY) OF 25 KV (MAX.) IS INSCRIBED ON THE BASE OF THE TUBE. APPLICATIONS INVOLVING OTHER OPERATING CONDITIONS WILL NECESSITATE THE REDETERMINATION OF THE OPTIMUM RESERVOIR VALUE. ANY OPTIMUM VALUE SHOULD BE HELD TO WITHIN  $\pm 5\%$ . EXCESS RESERVOIR VOLTAGE WILL RESULT IN A FAILURE OF THIS THYRATRON TO DEIONIZE BETWEEN PULSES (CONTINUOUS CONDUCTION). INSUFFICIENT RESERVOIR VOLTAGE WILL RESULT IN EXCESS ANODE DISSIPATION AS INDICATED BY VISIBLE HEATING OF THE ANODE.

THE OPTIMUM RESERVOIR VOLTAGE IS THE MIDPOINT BETWEEN THESE TWO EXTREMES. IN CERTAIN APPLICATIONS IT MAY BE NECESSARY TO PROVIDE A REGULATED SOURCE TO ASSURE OPERATION WITHIN THE PERMISSIBLE RANGE OF RESERVOIR VOLTAGES.

NOTE 3:

COOLING OF THE ANODE LEAD IS PERMISSIBLE, BUT THERE SHALL BE NO AIR BLAST DIRECTLY ON THE BULB.

NOTE 4:

DURING THE FIRST 25 MICROSECONDS AFTER CONDUCTION, THE PEAK INVERSE ANODE VOLTAGE SHALL NOT EXCEED 5 KV.

NOTE 5:

THE ROOT MEAN SQUARE ANODE CURRENT SHALL BE COMPUTED AS THE SQUARE ROOT OF THE PRODUCT OF PEAK CURRENT AND THE AVERAGE CURRENT.

NOTE 6:

THE PULSE PRODUCED BY THE DRIVER CIRCUIT SHALL HAVE THE FOLLOWING CHARACTERISTICS WHEN VIEWED AT THE 5949 SOCKET WITH THE TUBE GRID DISCONNECTED:

- |                 |                                |
|-----------------|--------------------------------|
| A. AMPLITUDE    | 550-1000 VOLTS                 |
| B. DURATION     | 2 MICROSECONDS (AT 70% POINTS) |
| C. RATE OF RISE | 1800 VOLTS/MICROSECOND (MIN.)  |
| D. IMPEDANCE    | 50-200 OHMS                    |

THE LIMITS OF ANODE TIME DELAY AND ANODE TIME JITTER ARE BASED ON THE MINIMUM TRIGGER. USING THE HIGHEST PERMISSIBLE TRIGGER VOLTAGE AND LOWEST TRIGGER SOURCE IMPEDANCE MATERIALLY REDUCES THESE VALUES BELOW THE LIMITS SPECIFIED.

NOTE 7:

THE TIME OF ANODE DELAY IS MEASURED BETWEEN THE 26 PERCENT POINT ON THE RISING PORTION OF THE UNLOADED GRID VOLTAGE PULSE AND THE POINT AT WHICH ANODE CONDUCTION FIRST EVIDENCES ITSELF ON THE LOADED GRID PULSE.

NOTE 8:

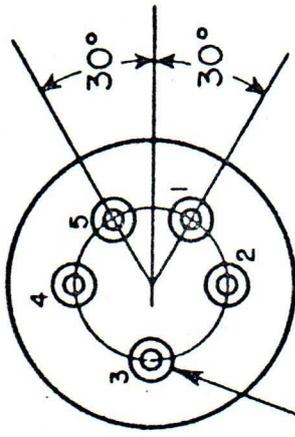
TIME JITTER IS MEASURED AT THE 50 PERCENT POINT ON THE ANODE CURRENT PULSE.

ADDITIONAL INFORMATION FOR SPECIFIC APPLICATIONS CAN BE OBTAINED FROM THE

ELECTRON TUBE APPLICATIONS SECTION  
ITT COMPONENTS DIVISION - P.O. Box 412  
CLIFTON, NEW JERSEY



- 1. CAPSULE-HEATER
- 2. CATHODE
- 3. GRID
- 4. CAPSULE
- 5. HEATER



5 PIN A5-19 SHELL  
 .187 ± .003 DIA. PIN  
 1.250 DIA. PIN CIRCLE

NOTE: CONSULT MFG ON CLAMPING

