



**ELECTRON TUBE DEPARTMENT ■ COMPONENTS DIVISION**  
INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION, CLIFTON, NEW JERSEY

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 |

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:

CATHODE 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:

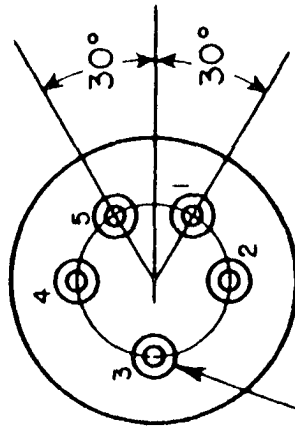
TIME JITTER IS MEASURED AT THE 50 PERCENT POINT ON THE ANODE CURRENT PULSE.

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

