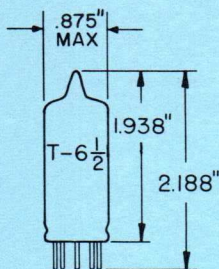


TUNG-SOL**TWIN TRIODE**

MINIATURE TYPE

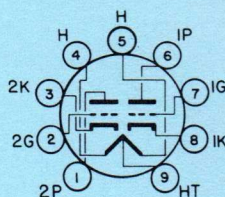


GLASS BULB
SMALL BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-2

COATED UNIPOTENTIAL CATHODE

FOR MOBILE AND
AIRCRAFT APPLICATIONS

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9A

THE 6201 IS A TWIN TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A GROUNDED-GRID AMPLIFIER OR AS A FREQUENCY CONVERTER IN VHF APPLICATIONS. THE TUBE IS DESIGNED TO ASSURE DEPENDABLE LIFE AND RELIABLE SERVICE UNDER CONDITIONS ENCOUNTERED IN MOBILE AND AIRCRAFT APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELD ^A	WITHOUT SHIELD
GRID TO PLATE (EACH SECTION)	1.6	1.6 pf
INPUT (EACH SECTION)	2.5	2.5 pf
OUTPUT (SECTION 1)	1.2	0.45 pf
OUTPUT (SECTION 2)	1.3	0.38 pf
HEATER TO CATHODE (EACH SECTION)	2.8	2.8 pf
PLATE TO PLATE		0.24 pf

	WITH SHIELD ^B	WITHOUT SHIELD
GROUNDED-GRID OPERATION		
PLATE TO CATHODE (SECTION 1)	0.18	0.2 pf
PLATE TO CATHODE (SECTION 2)	0.2	0.24 pf
INPUT (EACH SECTION)	5.0	5.0 pf
OUTPUT (SECTION 1)	2.7	1.9 pf
OUTPUT (SECTION 2)	2.7	1.8 pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	(PARALLEL) 6.3 VOLTS	300	MA.
	(SERIES) 12.6 VOLTS	150	MA.
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION		6.3±0.6	VOLTS
		12.6±1.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		90	VOLTS

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MAXIMUM RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

EACH SECTION

PLATE VOLTAGE	300	VOLTS
NEGATIVE DC GRID VOLTAGE	50	VOLTS
PLATE DISSIPATION	2.5	WATTS
PEAK IMPACT ACCELERATION IN ANY DIRECTION	SEE BELOW	G
BULB TEMPERATURE AT HOTTEST POINT, ABS. MAX.	180	C

TYPICAL OPERATING CHARACTERISTICS

CLASS A₁ AMPLIFIER

EACH SECTION

PLATE VOLTAGE	100	250	VOLTS
CATHODE BIAS RESISTOR	270	200	OHMS
AMPLIFICATION FACTOR	57	60	
PLATE RESISTANCE, APPROXIMATE	14 300	10 900	OHMS
TRANSCONDUCTANCE	4 000	5 500	μMHOS
PLATE CURRENT	3.3	10	MA.
GRID VOLTAGE, APPROXIMATE			
FOR Ib = 10 μAMPS.	-5	-12	VOLTS

^A WITH EXTERNAL SHIELD #315 CONNECTED TO CATHODE OF SECTION UNDER TEST.^B WITH EXTERNAL SHIELD #315 CONNECTED TO GRID OF SECTION UNDER TEST.

SPECIAL RATINGS AND PERFORMANCE DATA

HEATER-CYCLING RATING		
CYCLES OF INTERMITTENT OPERATION, MINIMUM	2000	CYCLES
E _f = 7.5 VOLTS (PARALLEL-HEATER CONNECTION) CYCLED		
FOR ONE MINUTE ON AND ONE MINUTE OFF. E _b = E _c = 0		
VOLTS. E _{hk} = 135 VOLTS WITH HEATER POSITIVE WITH		
RESPECT TO CATHODE.		

SHOCK RATING

IMPACT ACCELERATION (MAX.) 600 G

THIS TEST IS PERFORMED ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN IN A NAVY-TYPE, HIGH-IMPACT (FLY-WEIGHT) SHOCK MACHINE. TUBES ARE HELD RIGID IN FOUR DIFFERENT POSITIONS AND ARE SUBJECTED TO 20 BLOWS AT THE SPECIFIED MAXIMUM IMPACT ACCELERATION. AT THE END OF THIS TEST, TUBES SHALL NOT SHOW PERMANENT OR TEMPORARY SHORTS OR OPEN CIRCUITS, AND ARE REQUIRED TO MEET ESTABLISHED LIMITS FOR VIBRATIONAL ACCELERATION, HEATER-CATHODE LEAKAGE CURRENT, AND TRANSCONDUCTANCE.

FATIGUE RATING

VIBRATIONAL ACCELERATION (MAX.) 2.5 G

THIS TEST IS PERFORMED ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN. TUBES ARE RIGIDLY MOUNTED AND SUBJECTED IN EACH OF THREE POSITIONS AT 2.5 G VIBRATIONAL ACCELERATION AT 25 CYCLES PER SECOND FOR 32 HOURS. AT THE END OF THIS TEST, TUBES SHALL NOT SHOW PERMANENT OR TEMPORARY SHORTS OR OPEN CIRCUITS, AND ARE REQUIRED TO MEET ESTABLISHED LIMITS FOR IMPACT ACCELERATION, HEATER-CATHODE LEAKAGE CURRENT, AND TRANSCONDUCTANCE.

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SPECIAL RATINGS AND PERFORMANCE DATA - CONT'D.

LOW-FREQUENCY VIBRATION PERFORMANCE:

RMS OUTPUT VOLTAGE (MAX.) 100 MV
 THIS TEST IS PERFORMED ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN UNDER THE FOLLOWING CONDITIONS: PLATE OF UNIT #1 TIED TO PLATE OF UNIT #2, GRID OF UNIT #1 TIED TO GRID OF UNIT #2, HEATER VOLTS = 12.6, DC PLATE VOLTS = 250, DC GRID VOLTS = -3, PLATE LOAD RESISTANCE = 2000 OHMS, AND VIBRATIONAL ACCELERATION OF 2.5 G AT 25 CYCLES PER SECOND.

AUDIO-FREQUENCY NOISE AND MICROPHONIC PERFORMANCE:

RMS OUTPUT VOLTAGE (MAX.) 100 MV
 THIS TEST IS PERFORMED ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN UNDER THE FOLLOWING CONDITIONS: PLATE OF UNIT #1 TIED TO PLATE OF UNIT #2, GRID OF UNIT #1 TIED TO GRID OF UNIT #2, DC HEATER VOLTS = 12.6, PLATE-SUPPLY VOLTS = 300, CATHODE RESISTOR (COMMON TO BOTH UNITS) = 200 OHMS, AND PLATE LOAD RESISTANCE = 10000 OHMS.

SHORTS AND CONTINUITY TEST:

THIS TEST IS PERFORMED ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN. IN THIS TEST, A TUBE IS CONSIDERED INOPERATIVE IF IT SHOWS A PERMANENT OR TEMPORARY SHORT ON OPEN CIRCUIT, OR A VALUE OF REVERSE GRID CURRENT IN EXCESS OF 1.4 MICROAMPERES UNDER CONDITIONS SPECIFIED IN THE CHARACTERISTICS RANGE VALUES FOR REVERSE GRID CURRENT.

1-HOUR STABILITY LIFE PERFORMANCE:

THIS TEST IS PERFORMED ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN TO INSURE THAT THE TUBES HAVE BEEN PROPERLY STABILIZED. WITH BOTH UNITS OPERATING, EACH UNIT IS CHECKED FOR VARIATION IN TRANS-CONDUCTANCE UNDER CONDITIONS OF MAXIMUM RATED PLATE DISSIPATION. AT THE END OF 1 HOUR, THE VALUE OF TRANSCONDUCTANCE IS READ. THE VARIATIONS IN TRANSCONDUCTANCE FROM THE 0-HOUR READING SHALL NOT EXCEED 10 PER CENT.

100-HOUR LIFE PERFORMANCE:

THIS TEST IS PERFORMED ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN UNDER THE CONDITIONS OF MAXIMUM RATED PLATE DISSIPATION TO INSURE A LOW PERCENTAGE OF EARLY INOPERATIVES. AT THE END OF 100 HOURS, A TUBE IS CONSIDERED INOPERATIVE IF IT SHOWS A PERMANENT OR TEMPORARY SHORT OR OPEN CIRCUIT, OR A VALUE OF REVERSE GRID CURRENT IN EXCESS OF 1.4 MICROAMPERES UNDER THE CONDITIONS SPECIFIED IN CHARACTERISTICS RANGE VALUES FOR REVERSE GRID CURRENT.

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SPECIAL RATINGS AND PERFORMANCE DATA - CONT'D.

500-HOUR AVERAGE LIFE PERFORMANCE:

THIS TEST IS MADE ON A SAMPLE LOT OF TUBES FROM EACH PRODUCTION RUN TO INSURE HIGH QUALITY OF THE INDIVIDUAL TUBE AND TO GUARD AGAINST EPIDEMIC FAILURES OF ANY OF THE CHARACTERISTICS INDICATED BELOW. WITH BOTH UNITS OPERATING, EACH UNIT IS LIFE TESTED SEPARATELY AT ROOM TEMPERATURE UNDER THE FOLLOWING CONDITIONS: HEATER VOLTS = 12.6 AC OR DC (SERIES CONNECTION), PLATE-SUPPLY VOLTS = 250, CATHODE RESISTOR = 200 OHMS, GRID-CIRCUIT RESISTANCE = 0.5 MEGOHM, HEATER 135 VOLTS POSITIVE WITH RESPECT TO CATHODE, AND BULB TEMPERATURE = 180°C. AT THE END OF 500 HOURS, TUBE SHALL NOT SHOW PERMANENT SHORTS OR OPEN CIRCUITS AND SHALL BE CRITICIZED FOR THE TOTAL NUMBER OF TUBES FAILING TO PASS THE ESTABLISHED INITIAL LIMITS FOR HEATER CURRENT, REVERSE GRID CURRENT, HEATER-CATHODE LEAKAGE CURRENT, AND 500 HOUR LIMITS FOR TRANSCONDUCTANCE (1), TRANSCONDUCTANCE CHANGE, AND LEAKAGE RESISTANCE AS SHOWN UNDER CHARACTERISTICS RANGE VALUES.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

VALUES ARE FOR EACH UNIT AND ARE INITIAL

UNLESS OTHERWISE SPECIFIED

EACH TUBE IS STABILIZED BEFORE CHARACTERISTICS TESTING BY CONTINUOUS OPERATION FOR AT LEAST 45 HOURS AT ROOM TEMPERATURE AND WITH DISSIPATION VALUES EQUIVALENT TO LIFE TEST CONDITIONS.

	NOTE	MIN.	MAX.	
HEATER CURRENT	1	0.138	0.162	AMP.
DIRECT INTERELECTRODE CAPACITANCES:				
GRID TO PLATE	2	1.3	1.9	pf
GRID TO CATHODE AND HEATER	2	2	3	pf
PLATE TO CATHODE AND HEATER (UNIT #1)	2	0.2	0.7	pf
PLATE TO CATHODE AND HEATER (UNIT #2)	2	0.16	0.6	pf
HEATER TO CATHODE	2	2.1	3.5	pf
PLATE TO PLATE	3	0.15	0.33	pf
AMPLIFICATION FACTOR	1,4	50	70	
PLATE CURRENT (1)	1,4	7	14	MA.
PLATE CURRENT DIFFERENCE BETWEEN UNITS	1,4	---	3.2	MA.
PLATE CURRENT (2)	1,5	---	100	μA
TRANSCONDUCTANCE (1)	1,4	4500	6500	μMHOS
TRANSCONDUCTANCE (1) AT 500 HOURS	1,4	3800	6500	μMHOS
TRANSCONDUCTANCE CHANGE: DIFFERENCE BETWEEN AVERAGE TRANSCONDUCTANCE (1) INITIALLY, AND AVERAGE AFTER 500 HOURS, EXPRESSED AS A PERCENTAGE OF THE INITIAL AVERAGE	1,4	---	20	PERCENT
TRANSCONDUCTANCE (2)	6,4	4000	---	μMHOS
REVERSE GRID CURRENT	1,7	---	0.7	μA
GRID EMISSION CURRENT	8,9	---	1.5	μA
HEATER-CATHODE LEAKAGE CURRENT:				
HEATER NEGATIVE WITH RESPECT TO CATHODE	1,10	---	10	μA
HEATER POSITIVE WITH RESPECT TO CATHODE	1,10	---	10	μA

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CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

(CONTINUED)

VALUES ARE FOR EACH UNIT AND ARE INITIAL
UNLESS OTHERWISE SPECIFIED

EACH TUBE IS STABILIZED BEFORE CHARACTERISTICS TESTING BY CONTINUOUS OPERATION FOR AT LEAST 45 HOURS AT ROOM TEMPERATURE AND WITH DISSIPATION VALUES EQUIVALENT TO LIFE TEST CONDITIONS.

	NOTE	MIN.	MAX.	
LEAKAGE RESISTANCE:				
BETWEEN GRID AND ALL OTHER ELECTRODES TIED TOGETHER	1,11	100	---	MEGOHMS
LEAKAGE RESISTANCE:				
BETWEEN PLATE AND ALL OTHER ELECTRODES TIED TOGETHER	1,12	100	---	MEGOHMS
LEAKAGE RESISTANCE AT 500 HOURS:				
BETWEEN GRID AND ALL OTHER ELECTRODES TIED TOGETHER	1,11	50	---	MEGOHMS
BETWEEN PLATE AND ALL OTHER ELECTRODES TIED TOGETHER	1,12	50	---	MEGOHMS

NOTES

¹ WITH 12.6 VOLTS AC OR DC ON HEATER (SERIES CONNECTION).

² WITHOUT EXTERNAL SHIELD AND WITH UNIT NOT UNDER TEST CONNECTED TO GROUND.

³ WITHOUT EXTERNAL SHIELD.

⁴ WITH DC PLATE-SUPPLY VOLTS = 250, CATHODE RESISTOR = 200 OHMS, AND CATHODE BYPASS CAPACITOR OF 1000 μ f. EACH UNIT TESTED SEPARATELY. UNIT NOT UNDER TEST CONNECTED TO GROUND.

⁵ WITH DC PLATE-SUPPLY VOLTS = 250, PLATE LOAD RESISTANCE = 0.1 MEGOHM, AND DC GRID VOLTS = -20. EACH UNIT TESTED SEPARATELY. UNIT NOT UNDER TEST CONNECTED TO GROUND.

⁶ WITH 11.0 VOLTS AC OR DC ON HEATER (SERIES CONNECTION).

⁷ WITH DC PLATE-SUPPLY VOLTS = 250, GRID-CIRCUIT RESISTANCE = 0.5 MEGOHM, CATHODE RESISTOR = 200 OHMS, AND CATHODE BYPASS CAPACITOR OF 1000 μ f. EACH UNIT IS TESTED SEPARATELY. UNIT NOT UNDER TEST CONNECTED TO GROUND.

⁸ WITH 15.0 VOLTS AC OR DC ON HEATER (SERIES CONNECTION).

⁹ WITH DC PLATE VOLTS = 250, GRID-CIRCUIT RESISTANCE = 0.5 MEGOHM, AND DC GRID VOLTS = -20. EACH UNIT TESTED SEPARATELY.

¹⁰ WITH 100 VOLTS DC BETWEEN HEATER AND CATHODE AND UNITS CONNECTED IN PARALLEL.

¹¹ WITH GRID 100 VOLTS NEGATIVE WITH RESPECT TO ALL OTHER ELECTRODES TIED TOGETHER.

¹² WITH PLATE 300 VOLTS NEGATIVE WITH RESPECT TO ALL OTHER ELECTRODES TIED TOGETHER.

