

SPECIFICATION - RM146
X-BAND COAXIAL CAVITY MAGNETRON
8.5 KW PEAK POWER. ADJUSTABLE FREQUENCY
STABLE & INTEGRAL MAGNET. CONDUCTION COOLED

DATE PRINTED

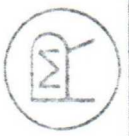
SEE ASSEMBLY

RM-146

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SPECIFICATION

RELMAG, INC.
1740 HIGHWAY 1, WATSONVILLE, CALIFORNIA 95076



MAT'L.

SCALE:

DR:

CH:

DS 2-19-76

RM-146

1.0 DESCRIPTION

X-Band Coaxial Cavity Magnetron. 8.5 Kilowatts peak power. Set frequency 9375 MHz \pm 0.5. Integral magnet, Conduction cooling.

2.0 ABSOLUTE RATINGS

| Parameter | If Surge | Heater | Tpc | Duty | Anode | Cathode | Alt | VSWR |
|-----------|----------|--------|-----------|-------|--------------|--------------|-------|-------|
| | | Volt | | Cycle | Temp | Temp | | |
| Units | Amps | Volts | μ sec | Ratio | $^{\circ}$ C | $^{\circ}$ C | ft | Ratio |
| Maximum | 6.0 | 7.0 | 4.0 | .0012 | 150 | 175 | 65000 | 1.3:1 |
| Minimum | -- | -- | -- | -- | -- | -- | Note | -- |

3.0 DEPENDENT RATINGS

| Parameter | Ef | If | Tk | Tpc | Eb | Ib | TSRV |
|-----------|-----|-----|------|------------|------|-----|------------|
| Units | V. | A. | Secs | μ secs | V | A. | μ secs |
| Maximum | 7.0 | 1.7 | -- | 3.85 | 4700 | 6.0 | .20 |
| Minimum | 5.7 | 1.5 | 45 | -- | 4000 | -- | .125 |

4.0 PHYSICAL CHARACTERISTICS

- 4.1 Dimensions: See RM-146-1
- 4.2 Mounting Position: Any
- 4.3 Support Mounting Plate: See RM-146-1
- 4.4 Cooling: Conduction to Mounting Plate
- 4.5 Coupling - Waveguide. See RM-146-1 Mates with UG 39/U Flange
- 4.6 Weight - 3 lbs. maximum
- 4.7 Specification References Mil Std 1311A See Note 8.2

5.0 ELECTRICAL REQUIREMENTS

5.1 Oscillation Conditions

Spec Refs 4304, 4305

Osc 1

Tpc 3.5 μ sec \pm .25 μ sec
 Du .00093 \pm 15%
 Ib 4.4 MA

265 PPS

Osc 2

Tpc 3.5 μ sec
 Du .00042 \pm 8% \pm .25 μ sec
 Ib 2.0 MA

Osc 3
 Tpc 1.0 μ sec (+.2 -.0 μ sec)
 Du .000126 \pm 15%
 lb 0.6 MA

5.2 Operating Conditions

| Ref | Test | Conditions | Symbol | Limits | | Units |
|-------------------------|----------------------------|--|-------------|--------|--------------------------|-------------------|
| | | | | Min | Max | |
| | Holding Period | Non-Operate | | 168 | | Hrs |
| | Dimensions | Per Outline RM-146-1 | | -- | -- | -- |
| 1301 | Heater Current | Ef=6.3 VDC Note 1 | If | 1.5 | 1.7 | Amps |
| 1369 | Heater Warm-up Time | Ef=6.3 VDC | tk | 45 | | Secs |
| 4306 | Pulse Voltage | Osc 1 | epy | 4.00 | 4.70 | Kv |
| 4218 | Frequency | Osc 1 | f | 9374.5 | 9375.5 | MHz |
| 4307 | Power Output | Osc 1 | Po | 8.0 | | Watts |
| 4310 | Pulling Fig. | VSWR=1.3:1 | f | | 5.0 | MHz |
| 4311 | Pushing Factor | lb=1.60 - 1.90 mADC | f/ib | | 0.50 | MHz/Amp |
| 4315 | Stability | Osc 1 | M.P. | | .25 | % |
| 4308 | Minor Lobes | Osc 1 | Ratio | 8.0 | | db |
| 4308 | Bandwidth | Osc 1 | F | | $\frac{2.5}{\text{TPC}}$ | MHz |
| 6.0 QUALIFICATION TESTS | | | | | | |
| | Temperature Coefficient | Osc 1 T= -55 $^{\circ}$ C +85 $^{\circ}$ C | f | | 45 | KHz/ $^{\circ}$ C |
| | Vibration | 5 - 55 Hz 55 - 2000 Hz | 1.5G 1 G | | | |
| | Shock | 10 ms @ 6 g | f | | | |
| 1026 | High Temp Op | +75 $^{\circ}$ C (+91 $^{\circ}$ C $\frac{1}{2}$ hr.) | MP | -- | .25 | % |
| 1026 | Low Temp Op | -55 $^{\circ}$ C | MP | -- | .25 | % |
| | Open Circuit Test | Ef = 0 Eb = 12 kv | | | 1 min | --- |

| Ref | Test | Conditions | Symbol | Limits | | Units |
|------|--------------|------------|--------|--------|--------|-------|
| | | | | Min | Max | |
| 7.0 | LIFE TEST | Osc 1 | T | 1500 | | Hrs. |
| | End Points | | | | | |
| 4250 | Power Output | Osc 1 | Po | 6.5 | | Watts |
| 4308 | Minor Lobes | | Ratio | | 6.0 | Db |
| 4315 | Stability | | MP | | 1.0 | % |
| 4218 | Frequency | | f | 9374.5 | 9375.5 | MHz |

8.0 NOTES

- 8.1 Prior to the application of high voltage, the cathode shall be heated to the required initial operation temperature. This may be done by applying 6.3 volts $\pm 5\%$ for 45 seconds.
- 8.2 The time of steepest rise of voltage (TSRV) shall be expressed as the time between the 10 and 90 percent points on a line defining the steepest tangent to the leading edge of the voltage pulse above 50 percent amplitude. Any capacitance in the viewing circuit shall not exceed 6.0 PF.
- 8.3 Input capacitance shall be measured between the cathode terminal and a mounting plate 1/4 inch thick with the minimum cut-out required to flush mount the tube.
- 8.4 TA is the operating ambient temperature.
- 8.5 The temperature is to be measured at the point indicated on the outline drawing (Figure 1).
- 8.6 Since pulse width and duty cycle are inter-related, care must be exercised that the duty cycle is correct if other than nominal pulse width is used.
- 8.7 Unless otherwise specified, tests shall be made at standard room ambient conditions.

- Input power (peak)
- Input power (mean) (see note 3)
- Duty cycle
- Pulse duration
- Rate of rise of voltage pulse (see note 4)
- Anode temperature (see note 5)
- V.S.W.R. at the output coupler

X TYPICAL OPERATION

| Operational Conditions | 1 | 2 | |
|-------------------------------|------|------|-------|
| Heater voltage | 6.3 | 6.3 | ✓ |
| Anode current (peak) | 4.77 | 4.77 | a |
| Pulse duration | 3.5 | 3.5 | us |
| Pulse repetition rate | 325 | 150 | PPS |
| Rate of rise of voltage pulse | 40 | 40 | KV/us |
| Typical Performances | | | |
| Anode voltage (peak) | 4.5 | 4.5 | KV |
| Output power (peak) | 8.6 | 8.6 | KW |
| Output power (mean) | 8.0 | 3.6 | W |

TEST CONDITIONS AND LIMITS

The magnetron is tested to comply with the following electrical specification

Test Conditions

- Heater voltage (for test)
- Anode current (mean)
- Duty Cycle
- Pulse duration (see note 6)
- V.S.W.R. at the output coupler
- Rate of rise of voltage pulse (see note 4)

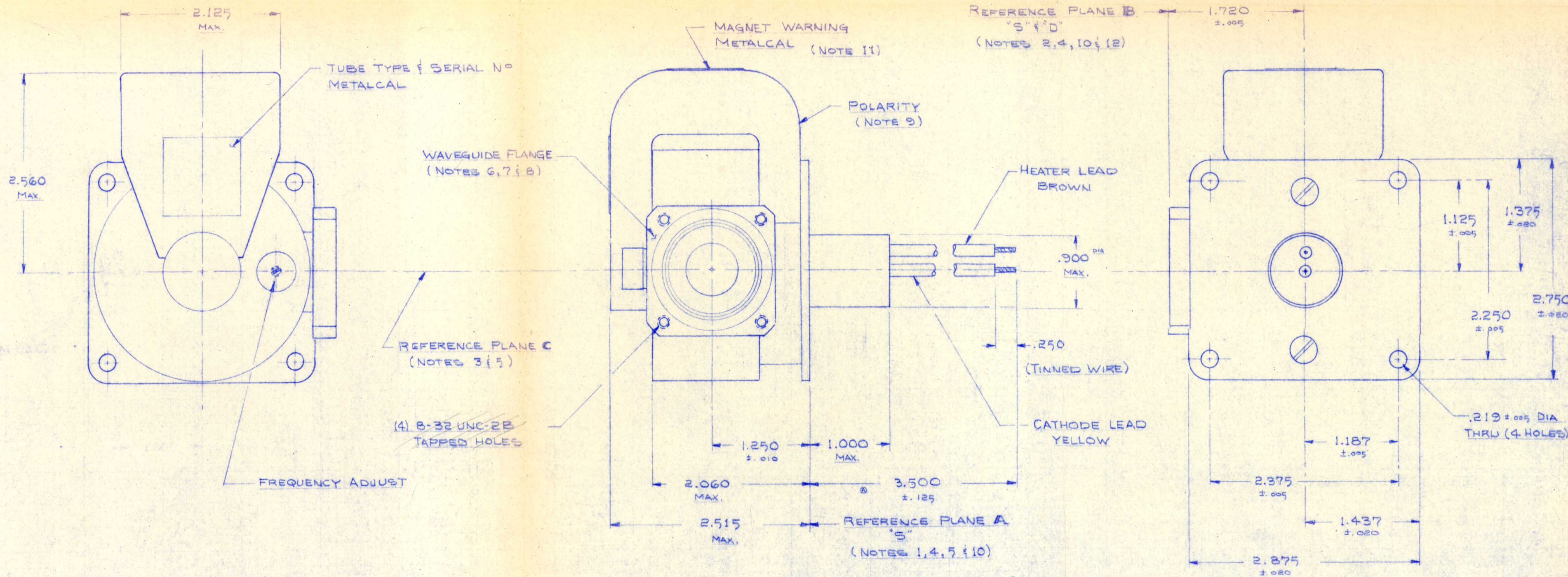
Limits

- Anode voltage (peak)
- Output power (mean)
- Frequency (see note 7)
- R.F. bandwidth at 1/4 power
- Frequency pulling (v.s.w.r. not less than 1.5:1)
- Stability (see note 8)
- Cold impedance
- Heater current
- Temperature coefficient of frequency

NOTE:

- 1) REFERENCE PLANE A IS THE MOUNTING PLANE
- 2) REFERENCE PLANE B IS THE WAVEGUIDE MOUNTING FACE.
- 3) REFERENCE PLANE C IS THE AXIS OF THE TUBE.
- 4) REFERENCE PLANES A & B TO BE PERPENDICULAR WITHIN .010
- 5) REFERENCE PLANE A TO BE FLAT & PERPENDICULAR TO REFERENCE PLANE C WITHIN .005
- 6) THE WAVEGUIDE FLANGE MATES WITH UG-39/U OR EQUIVALENT
- 7) THE OPENING IN THE WAVEGUIDE FLANGE TO BE SUPPLIED WITH A DUST COVER, TUBE SHALL BE STORED WITH DUST COVER IN PLACE.
- 8) THE OPENING IN THE WAVEGUIDE FLANGE TO HAVE A PRESSURE WINDOW CAPABLE OF WITHSTANDING DIFFERENTIAL OF 14 P.S.I.G.
- 9) MAGNET POLARITY - THE NORTH SEEKING POLE OF A COMPASS SHALL BE ATTRACTED TO THIS END OF THE MAGNET.
- 10) ALL METAL SURFACES TO BE COVERED BY BLACK FINISH EXCEPT THOSE MARKED "S" WHICH SHALL BE GOLD, SILVER, NICKEL OR BRIGHT ALLOY PLATED OR ANODIZED.
- 11) WARNING - MAINTAIN MINIMUM 2 INCHES BETWEEN THIS MAGNET AND MAGNETIC MATERIALS (MAGNETS, STEEL PLATES, TOOLS, ETC.)
- 12) HERMETIC CONNECTIONS CAN BE MADE TO SURFACE NOTED "D"
- 13) ALL DIMENSIONS ARE IN INCHES.
- 14) DIMENSIONS WITHOUT LIMITS ARE FOR REFERENCE OR EQUIPMENT DESIGN AND NEED NOT BE CHECKED.

brass plain flange for RC-52 (0.900 x 0.400)



| | | | | | |
|-----------------------------|-------------------|---|--------------------------------|--|--------------|
| RM-146-1 | MAT'L. | | OUTLINE DRAWING (TENTATIVE) | | DATE PRINTED |
| | DR: Shulda 3-1-76 | | SCALE: FULL | | SEE ASSEMBLY |
| | CH: (U) 3-1-76 | | APPROVED: (Signature) 3-1-76 | | RM-146-1 |
| B 2/15/79 JFRATER / ECN-884 | | E.E.V. Inc; Relmag Division 1240 Highway 1 Watsonville, California 95076 | | | |
| A 6/30/76 B.500 WAB 3.250 | | | | | |