

MICROWAVE TUNING ELEMENTS

RoHS COMPLIANT

Description

Economical means of introducing a variable reactance to microwave circuits such as waveguides, filters, cavities and other resonant structures

High resolution tuning

Self-locking constant torque drive mechanism

Excellent tuning stability

Low dynamic noise

One handed adjusting/tuning, no need for locking nut

Available with Gold, Silver plating and chromate finish

Metallic, dielectric, resistive types available

Adjustments in applications from L to Ka band and beyond

High Reliability versions are available on special order

Custom design upon request

ROHS compliant



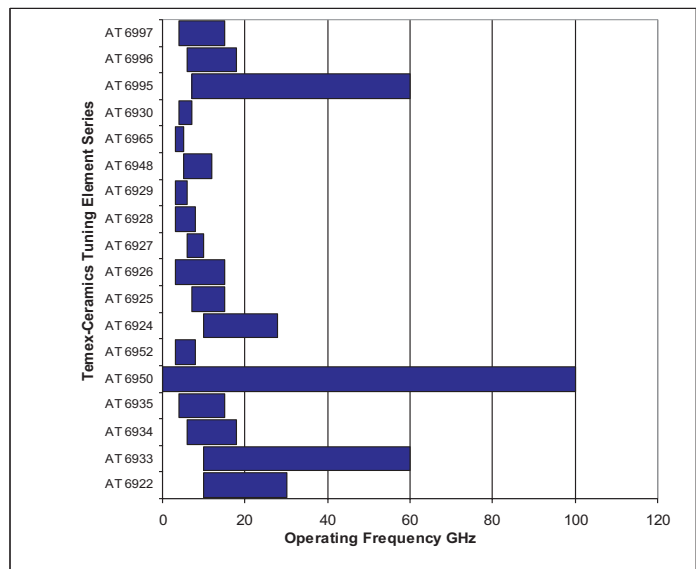
Applications

Comb-line and inter-digital filters

Coaxial structures

Waveguide circuitry

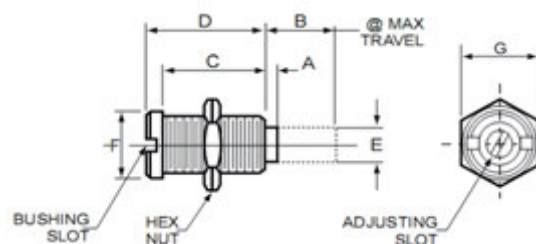
Gunn oscillators



Impedance transformersSpace applications

I. Microwave tuning elements

Tuning Elements consist of a brass mounting bushing with a rotor of the same material including a tuning rod made of metallic or dielectric or absorbent material and a nut.



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I.1 Metallic tuning elements

Metallic Tuning Elements consist of a brass mounting bushing with an integral tuning rotor of the same material and a nut. Bushing is gold plated, rotor and nut are passivated.

Optional materials and plating are available upon request.

Models and dimensions in mm

| P/N | Frequency Band | Bushing Thread UNS | A | B | C | D | Φ E | Φ F | G |
|--------------------|----------------|--------------------|---------|------|------|------|-----|------|------|
| AT 6924-0 SL ROHS | X to K | .120-80 | 0 | 3.8 | 5.1 | 6.0 | 1.8 | 3.4 | 4.0 |
| AT 6924-1 SL ROHS | | | 1.2 | 1.9 | 2.2 | 3.1 | | | |
| AT 6924-2 SL ROHS | | | 0 | 1.9 | 5.1 | 6.0 | | | |
| AT 6924-3 SL ROHS | | | 0 | 0.8 | 2.2 | 3.1 | | | |
| AT 6925-0 SL ROHS | C and X | .190-64 | 0 | 3.8 | 5.4 | 6.4 | 3.2 | 5.3 | 5.5 |
| AT 6925-1 SL ROHS | | | 0 | 0.6 | 2.2 | 3.2 | | | |
| AT 6925-3 SL ROHS | | | 3.3 | 7.1 | 5.4 | 6.4 | | | |
| AT 6925-7 SL ROHS | | | 1.1 | 4.9 | 5.4 | 6.4 | | | |
| AT 6925-8 SL ROHS | | | 0.2 | 2.0 | 3.2 | 4.3 | | | |
| AT 6925-9 SL ROHS | | | 0 | 2.3 | 6.5 | 7.5 | | | |
| AT 6926-0 SL ROHS | | | 0 | 2.7 | 4.6 | 5.3 | | | |
| AT 6926-1 SL ROHS | | | 0 | 0.7 | 2.4 | 3.2 | | | |
| AT 6926-4 SL ROHS | | | 2.3 | 8.8 | 5.5 | 9.1 | | | |
| AT 6926-5 SL ROHS | | | .234-64 | 0.6 | 2.7 | 4.0 | | | |
| AT 6926-6 SL ROHS | 2.6 | 11.5 | | 5.4 | 11.5 | | | | |
| AT 6926-7 SL ROHS | 1.9 | 4.6 | | 4.6 | 5.3 | | | | |
| AT 6926-9 SL ROHS | 0 | 2.7 | | 5.5 | 9.1 | | | | |
| AT 6926-10 SL ROHS | 0 | 4.6 | | 5.5 | 9.1 | | | | |
| AT 6927-0 SL ROHS | C and X | .234-64 | 0 | 6.5 | 5.5 | 9.1 | 4.1 | 6.8 | 7.0 |
| AT 6928-0 SL ROHS | C | | 0 | 8.8 | 5.4 | 11.5 | 4.1 | 6.8 | 7.0 |
| AT 6928-2 SL ROHS | C | | 6.1 | 8.8 | 4.6 | 5.3 | 4.1 | 6.8 | 7.0 |
| AT 6929-0 SL ROHS | C | .190-64 | 0 | 11.4 | 13 | 14 | 3.2 | 5.3 | 5.5 |
| AT 6948-0 SL ROHS | C and X | .312-64 | 0 | 5.9 | 8.2 | 9.2 | 5.3 | 9.5 | 10.0 |
| AT 6965-0 SL ROHS | L and S | .469-32 | 0 | 12.7 | 17.3 | 18.3 | 8.8 | 13.5 | 14.3 |

Custom dimensions are available upon request

I.2 Dielectric tuning elements

Dielectric Tuning Elements are used whenever the lowest loss tuning for high frequency applications is required. When dielectric rod is introduced into a cavity, the self resonant frequency is lowered due to the cavity "appearing" larger.

The basic dielectrics used in Temex-Ceramics Microwave Tuning Elements are sapphire, quartz and alumina.

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Electrical properties of each dielectric material are:

| Dielectric Material | Approximate Dielectric Constant @ 10 GHz | Approximate Dissipation Factor @ 10 GHz |
|---------------------|--|---|
| Sapphire | 9.9 | 0.0001 |
| Quartz | 3.8 | 0.0001 |
| Alumina | 9.7 | 0.0002 |

Models and dimensions in mm

| P/N | Rod Material | Frequency Band | Bushing Thread UNS | A | B | C | D | ΦE | ΦF | G |
|-------------------|--------------|----------------|--------------------|-----|-----|-----|-----|-----|-----|-----|
| AT 6933-0 SL ROHS | Sapphire | X and K | .120-80 | 0.6 | 4.3 | 5.1 | 6.0 | 1.6 | 3.4 | 4.0 |
| AT 6933-1 SL ROHS | Sapphire | | | 0 | 3.3 | 5.1 | 6.0 | 0.9 | | |
| AT 6933-2 SL ROHS | Quartz | K | | 0.6 | 4.3 | 5.1 | 6.0 | 1.6 | | |
| AT 6934-0 SL ROHS | Sapphire | C, X and K | | 0.3 | 3.0 | 4.6 | 5.3 | 3.9 | | |
| AT 6935-0 SL ROHS | Sapphire | X and K | .234-64 | 0.3 | 6.8 | 5.5 | 9.1 | 3.9 | 6.8 | 7.0 |

Custom dimensions are available upon request

I.3 Resistive tuning elements

Resistive Tuning Elements provide a consistent and accurate means of attenuating microwave energy. Rod made of magnetically loaded epoxy exhibits broadband lossy properties.

Models and dimensions in mm

| P/N | Frequency Band | Bushing Thread UNS | A | B | C | D | ΦE | ΦF | G |
|-------------------|----------------|--------------------|-----|-----|-----|-----|-----|-----|-----|
| AT 6950-0 SL ROHS | Broad Band | .120-80 | 0.6 | 4.3 | 5.1 | 6.0 | 1.6 | 3.4 | 4.0 |
| AT 6950-1 SL ROHS | | | 0 | 3.3 | 5.1 | 6.0 | 2.0 | 3.4 | 4.0 |
| AT 6952-0 SL ROHS | | .234-64 | 0 | 6.4 | 5.5 | 9.1 | 3.9 | 6.8 | 7.0 |

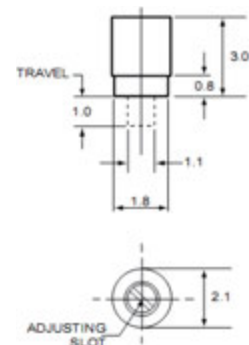
Custom dimensions are available upon request

I.4 mm Wave tuning elements

The millimeter Wave Tuning Elements are higher frequency versions of both Tuning Elements described in this data sheet.

Part number: **AT 6922 ROHS**. Bushing and rotor are made of brass gold plated.

Usage in the frequency bands X to K. Bushing can be mounted with solder, epoxy or press-fit.



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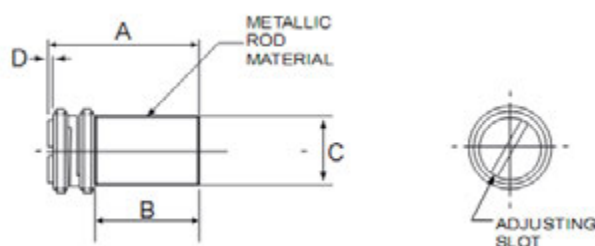
Recommended rotor tuning tool AT 8762

II. Tuning rotors

Extended range metallic and dielectric rotors are used where direct insertion of the tuning element is desired.

Taps designed specifically to insure proper fit are available.

II.1 Metallic tuning rotors



Models made of brass and dimensions in mm

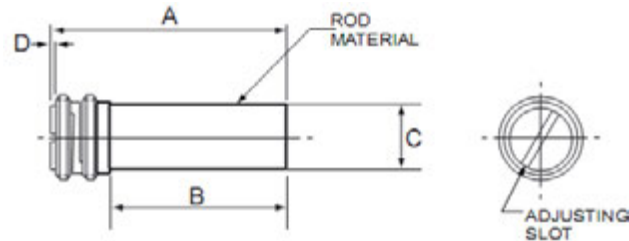
| P/N | Thread | A | B | Φ C | D | Slot W x L |
|----------------|----------------|------|------|-----|------|------------|
| AT 6501-3 ROHS | M 1.5 x 0.25 | 4.4 | 2.3 | 1.1 | | 0.25 x 1.1 |
| AT 6501-0 ROHS | | 5.4 | 3.3 | | | |
| AT 6501-1 ROHS | M 2.5 x 0.25 | 4.4 | 2.3 | 2.1 | 0.4 | 0.4 x 1.9 |
| AT 6501-2 ROHS | | 7.7 | 5.6 | | | |
| AT 6995-0 ROHS | | 3.1 | 0.8 | | | |
| AT 6995-1 ROHS | .094-80 UNS | 4.2 | 1.9 | 1.8 | 0.5 | 0.4 x 1.5 |
| AT 6995-2 ROHS | | 6.1 | 3.8 | | | |
| AT 6996-1 ROHS | | 6.4 | 3.8 | | | |
| AT 6996-2 ROHS | | 9.7 | 7.1 | | | |
| AT 6996-3 ROHS | | 14.0 | 11.4 | | | |
| AT 6996-4 ROHS | .156-64 UNS | 3.2 | 0.6 | 3.2 | 0.25 | 0.5 x 3.0 |
| AT 6996-5 ROHS | | 7.5 | 4.9 | | | |
| AT 6996-6 ROHS | | 4.6 | 2.0 | | | |
| AT 6996-8 ROHS | | 4.9 | 2.3 | | | |
| AT 6997-0 ROHS | | 14.1 | 11.5 | | | |
| AT 6997-1 ROHS | | 5.3 | 2.7 | | | |
| AT 6997-2 ROHS | .190-64 UNS | 9.1 | 6.5 | 4.1 | 0.25 | 0.5 x 3.7 |
| AT 6997-3 ROHS | | 11.4 | 8.8 | | | |
| AT 6997-4 ROHS | | 3.3 | 0.7 | | | |
| AT 6997-5 ROHS | | 7.2 | 4.6 | | | |

Custom dimensions are available upon request

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II.2 Dielectric tuning rotors



Models with dielectric rod and dimensions in mm

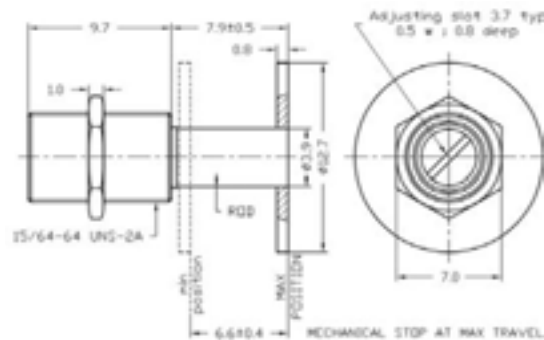
| P/N | Rod material | Thread | A | B | Φ C | D | Slot W x L |
|----------------|--------------|---------|-----|-----|-----|-----|------------|
| AT 6930-4 ROHS | Sapphire | .094-80 | 5.8 | 2.5 | 0.9 | 0.5 | 0.4 x 1.5 |
| AT 6930-8 ROHS | | UNS | 6.6 | 3.5 | 1.6 | 0.5 | |

Custom models and dimensions are available upon request.

III. DRO tuners

DRO tuners are precision components designed exclusively for tuning dielectric resonator devices such as filters and oscillators.

Rod is made of Invar silver plated and disk made of brass silver plated. Different disk diameters are available.



Models and dimensions in mm

| P/N | Nominal Frequency | Disk diameter |
|----------------|-------------------|---------------|
| AT 4010-1 ROHS | 2 GHz | 24.6 |
| AT 4011-1 ROHS | 3 GHz | 19.0 |
| AT 4012-1 ROHS | 4 GHz | 12.7 |
| AT 4012-2 ROHS | | 15.9 |

Custom dimensions are available upon request

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IV. Mechanical and general specifications

| SERIES | Bushing Thread | Tap P/N | Recommended Tap Drill (mm) | Rotational Rotor Torque (cm.N) | Max Mounting Torque (cm.N) | Max Nut Mounting Torque (cm.N) |
|--------------|----------------|---------|----------------------------|--------------------------------|----------------------------|--------------------------------|
| AT 6924 ROHS | .120- 80 UNS | AT 7060 | 2.75 | 0.2 to 2.0 | 7.0 | 10.0 |
| AT 6925 ROHS | .190-64 UNS | AT 7061 | 4.45 | 0.3 to 2.8 | 21.0 | 30.0 |
| AT 6926 ROHS | .234-64 UNS | AT 7062 | 5.50 | 0.7 to 3.5 | 35.0 | 50.0 |
| AT 6927 ROHS | .234-64 UNS | AT 7062 | 5.50 | 0.7 to 3.5 | 35.0 | 50.0 |
| AT 6928 ROHS | .234-64 UNS | AT 7062 | 5.50 | 0.7 to 3.5 | 35.0 | 50.0 |
| AT 6929 ROHS | .190-64 UNS | AT 7061 | 4.45 | 0.3 to 2.8 | 21.0 | 30.0 |
| AT 6933 ROHS | .120- 80 UNS | AT 7060 | 2.75 | 0.2 to 2.0 | 7.0 | 10.0 |
| AT 6934 ROHS | .234-64 UNS | AT 7062 | 5.50 | 0.7 to 3.5 | 35.0 | 50.0 |
| AT 6935 ROHS | .234-64 UNS | AT 7062 | 5.50 | 0.7 to 3.5 | 35.0 | 50.0 |
| AT 6948 ROHS | .312-64 UNS | AT 7065 | 7.55 | 0.7 to 5.0 | 84.0 | 70.0 |
| AT 6950 ROHS | .120- 80 UNS | AT 7060 | 2.75 | 0.2 to 2.0 | 7.0 | 10.0 |
| AT 6952 ROHS | .234-64 UNS | AT 7062 | 5.50 | 0.7 to 3.5 | 35.0 | 50.0 |
| AT 6965 ROHS | .469-32 UNS | AT 7066 | 11.1 | 0.7 to 5.6 | 168.0 | 140.0 |

Recommended rotor tuning tool: AT 8777

| SERIES | Rotor Thread | Tap P/N | Recommended Tap Drill (mm) | Recommended Tuning Tool P/N |
|------------------------|--------------|---------|----------------------------|-----------------------------|
| AT 6501-3 ROHS | M1.5 x 0.25 | AT 7071 | 1.25 | AT 8762 |
| AT 6501-0, -1, -2 ROHS | M2.5 x 0.25 | AT 7070 | 2.25 | AT 8777 |
| AT 6995 ROHS | .094-80 UNS | AT 7064 | 2.05 | |
| AT 6996 ROHS | .156-64 UNS | AT 7059 | 3.55 | |
| AT 6997 ROHS | .190-64 UNS | AT 7061 | 4.45 | |

Precautions to use rotor tunings:

Typical drilling diameter is the tap core diameter + 0.1 mm

Flange of machined threads has to be perfect, very smooth, without metallic burrs.

Use recommended tuning tool.

Before screwing the rotor, find the first thread by turning the anti-clockwise.

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V. Packaging

Parts are delivered in bulk.

VI. How to order

Tuning elements

| | |
|------------------|-------------|
| Reference | ROHS |
|------------------|-------------|

| | | |
|----------|--------------|------|
| Examples | AT 6924-3 SL | ROHS |
| | AT 6922 | ROHS |

Tuning rotors

| | |
|------------------|-------------|
| Reference | ROHS |
|------------------|-------------|

| | | |
|----------|-----------|------|
| Examples | AT 6995-2 | ROHS |
| | AT 6501-3 | ROHS |

DRO tuners

| | |
|------------------|-------------|
| Reference | ROHS |
|------------------|-------------|

| | | |
|---------|-----------|------|
| Example | AT 4011-1 | ROHS |
|---------|-----------|------|

EXXELIA TEMEX reserves the right to modify herein specifications and information at any time when necessary to provide optimum performance and cost.