

HIGH FREQUENCY NARROW BANDWIDTH INVAR SCREW

RoHS COMPLIANT

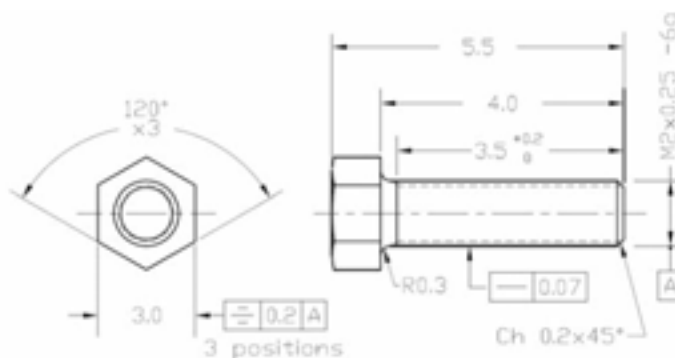
Description

High precision
High resolution tuning
Very low coefficient of thermal expansion
Available with Gold plating
Available with locking nut or “self locking system”
Adjustments in applications from Ka, KU, Q 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
Space applications



I. Invar (alloy 36) Tuning elements

The performance of a microwave filter over temperature is becoming more and more important, especially for narrow bandwidth high frequency filters.

Invar alloy offers very good Coefficient of Thermal Expansion (CTE) and can achieve the desired temperature characteristics.

This alloy can become difficult to machine especially with fine pitch threads. With more than 40 years experience, Temex Ceramics offers a complete range of standard products and is particularly able to work on specific request for custom designs with its prototyping dedicated team and R&D equipment.

EXELIA TEMEX has designed several types of invar screws in order to answer to specific request from customers. These screws are now “space” qualified as flight model for KA and Ku band filters. In some cases, the fine pitch resolution has halved the technician tuning time.

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I.1 Invar 36 tuning screws

Invar tuning elements consist of an Invar screw and its brass nut. Screw can be gold plated. We can offer different size, style and types of head (hex, slotted, pan). The array below is an example of Invar tuning elements already designed and qualified for space applications.

Models and dimensions in mm

metric screws			
Φ diameter	thread	length	tolerances
M1,5	0,25	up to 5mm	6G
M2	0,25	up to 9 mm	6G
M2	0,4	up to 9mm	6G
M2,5	0,25	up to 11mm	6G
M2,3	0,25	up to 11mm	6H
M2,5	0,45	up to 11mm	6H
M3,5	0,35	up to 12mm	6H

Custom dimensions are available upon request

UNS Screws		
thread	length	tolerances
3/32-80	up to 11mm	2A
.120-80	up to 11mm	2A
5/32-80	up to 15mm	2A

II. Packaging

Parts are delivered in bulk.

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

AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

Description

Air dielectric
 Rated voltage 250 VDC (500 VDC for AT 5300's)
 Low temperature coefficient
 Low capacitance drift
 Very stable over time
 Terminations gold plated
 High Q factor
 Multi-turn, high resolution
 Self-locking constant torque drive mechanism
 Compliant to MIL-C-14409 and ESA/SCC 3010
ROHS compliant
High Reliability versions available on special order
Maximum Soldering Temperature 260°C, 3 s Max



Applications

RF amplifiers and oscillators
 Impedance matching
 Crystal trimming
 Filter tuning
 Interstage coupling
 Space applications

Air trimmers series

SERIES	FAMILIES	CAPACITANCE RANGE	MIN Q @ 100 MHz	WORKING VOLTAGE
MINIATURE AIR TRIMMER	AT 5800's ROHS	0.35 to 3.5 pF > 9 turns	> 10000	250 VDC
	AT 5850's ROHS	0.5 to 5 pF > 12 turns	> 7500	
	AT 5700's ROHS	0.8 to 6 pF > 7 turns	> 10000	
	AT 5750's ROHS	0.8 to 10 pF > 6 turns	> 7500	
STANDARD AIR TRIMMER	AT 5200's ROHS	0.8 to 10 pF > 6 turns	> 5000	250 VDC
	AT 5400's ROHS	1 to 14 pF > 6 turns	> 3000	
	AT 5450's ROHS	1 to 16 pF > 6 turns	> 3000	
	AT 5500's ROHS	1 to 20 pF > 12 turns	> 1500	
	AT 5600's ROHS	1 to 30 pF > 20 turns	> 800	
HIGH VOLTAGE AIR TRIMMER	AT 5300's ROHS	1 to 10 pF > 10 turns	> 2000	500 VDC

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AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

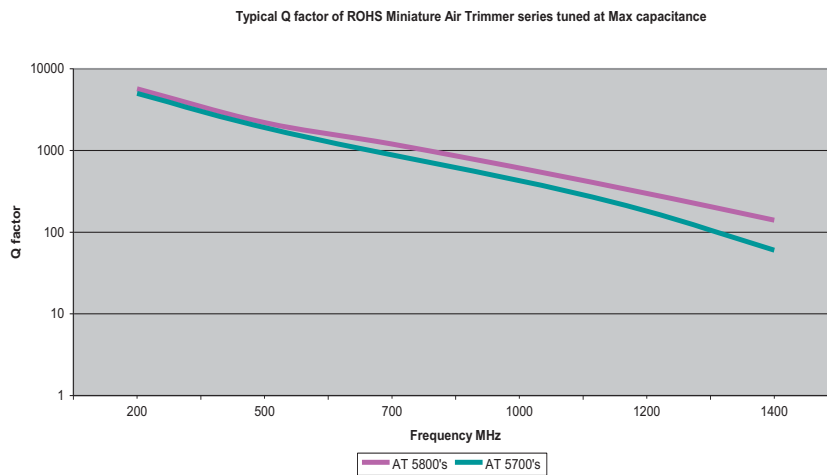
AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

I. Miniature air trimmer series

P/N	AT 5800 ROHS	AT 5850 ROHS	AT 5700 ROHS	AT 5750 ROHS
	AT 5801 ROHS	AT 5851 ROHS	AT 5701 ROHS	AT 5751 ROHS
	AT 5802 ROHS	AT 5852 ROHS	AT 5702 ROHS	AT 5752 ROHS
	AT 8051 ROHS	AT 5853 ROHS	AT 8050 ROHS	AT 5753 ROHS
Capacitance range	0.35 to 3.5 pF >10 turns	0.5 to 5 pF >12 turns	0.8 to 6.0 pF pF >6 turns	0.8 to 10 pF >9 turns
Working voltage	250 VDC			
Test voltage	500 VDC			
Working Temp. range	-55°C to +125°C			
Temp. Coefficient	0+/-50 ppm/°C	0+/-50 ppm/°C	0+/-15 ppm/°C	0+/-50 ppm/°C
Q factor @ Max Capacitance	>10000	>7500	> 10000	> 7500
Insulation Resistance	>10 ⁶ MΩ min			

Capacitance change is linear versus rotation of mobile rotor.

I.1 Miniature air trimmer series: quality factor



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AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

I.2 Miniature air trimmer series: Mechanical and general specifications

P/N	AT 5800 ROHS AT 5801 ROHS AT 5802 ROHS AT 8051 ROHS	AT 5850 ROHS AT 5851 ROHS AT 5852 ROHS AT 5853 ROHS	AT 5700 ROHS AT 5701 ROHS AT 5702 ROHS AT 8050 ROHS	AT 5750 ROHS AT 5751 ROHS AT 5752 ROHS AT 5753 ROHS
Rotating torque	22 to 220 g.cm		30 to 290 g.cm	
Max torque on rotor stop	300 g.cm		400 g.cm	
Nut mounting torque	1000 g.cm		3000 g.cm	
Seal cap assembly torque	300 g.cm		600 g.cm	
Vibrations	60g, 10-2000 Hz			
Shocks	1500g, 0.5 ms			
	Brass and Invar structure			
	Glazed alumina insulation			
	306°C solder used in assembly			
	Silicone rubber seal washer			
	Gold, silver and chromate finish			

I.3 Miniature air trimmer series : models

<p>Figure 1</p>	<p>Figure 2</p>	
<p>Figure 3</p>	<p>Figure 4</p>	
<p>Figure 5</p>	<p>Terminals are gold plated</p> <p>Others models available upon request</p> <p>Custom designs available upon request</p>	<p>Figure 6</p>

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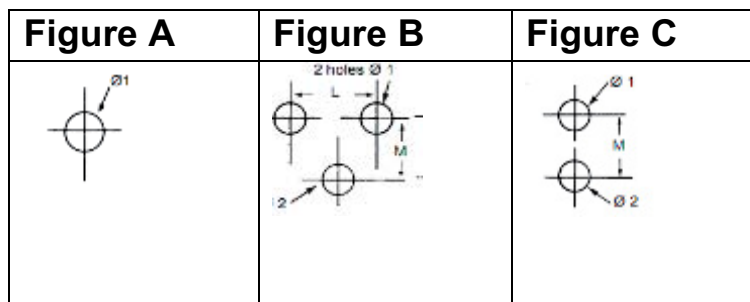
AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

I.4 Miniature air trimmer series: DIMENSIONS IN MM

P/N	Fig	A	B	C	D	E	F	G	H	L	Thread
AT 5800 ROHS	1	6.7	5.9		4.6						
AT 5801 ROHS	2a	7.0	5.7	6.5	4.6	5.4		0.25			.120-80
AT 5802 ROHS	3	6.7	5.9		4.6						UNS
AT 8051 ROHS	6	7.0	5.6	3.2	4.6	0.8	0.25	0.5		2.8	
AT 5850 ROHS	1	6.7	6.8		4.6						
AT 5851 ROHS	2a	7.0	6.6	6.5	4.6	5.4		0.25			.120-80
AT 5852 ROHS	3	6.7	6.8		4.6						UNS
AT 5853 ROHS	6	7.0	6.6	3.2	4.6	0.8	0.25	0.5		2.8	
AT 5700 ROHS	4	7.0	5.6		6.2						
AT 5701 ROHS	2b	7.3	5.1	6.7	6.2	6.3		0.4			.190-64
AT 5702 ROHS	3	6.9	5.6		6.2						UNS
AT 8050 ROHS	6	7.3	5.1	4.0	6.2	1.1	0.4	0.8		3.0	
AT 5750 ROHS	4	7.0	6.3		6.2						
AT 5751 ROHS	2b	7.3	6.0	6.7	6.2	6.3		0.4			.190-64
AT 5752 ROHS	3	6.9	6.3		6.2						UNS
AT 5753 ROHS	5	7.3	5.8	4.0	6.2	1.1	0.4	0.8	4.0	3.0	

I.5 Miniature air trimmer series: Suggested Mounting Holes



P/N	Figure	Φ1	Φ2	L	M
AT 5800 ROHS, AT 5802 ROHS, AT 5850 ROHS, AT 5852 ROHS	A	3.2			
AT 5801 ROHS, AT 5851 ROHS	C	1.3	1.3		6.5
AT 8051 ROHS, AT 5853 ROHS	C	1.3	1.3		3.2
AT 5700 ROHS, AT 5702 ROHS, AT 5750 ROHS, AT 5752 ROHS	A	4.9			
AT 5701 ROHS, AT 5751 ROHS	B	1.3	1.3	4.0	6.7
AT 8050 ROHS	C	1.3	1.3		4.0
AT 5753 ROHS	B	1.3	1.3	4.0	4.0

AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

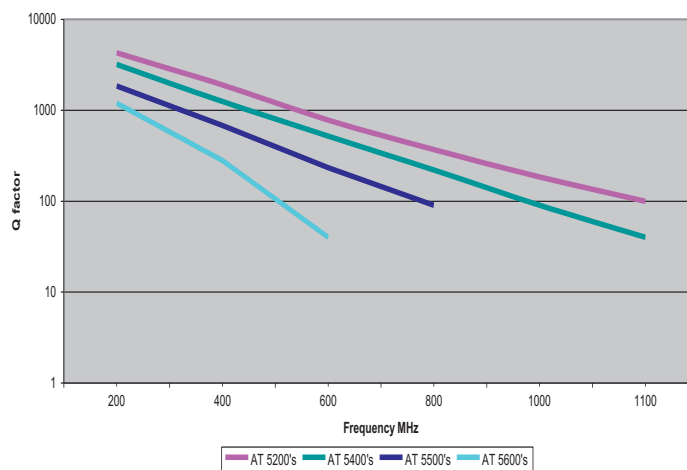
II. Standard air trimmer series

P/N	AT 5200 ROHS AT 5201 ROHS AT 5202 ROHS AT 8052 ROHS	AT 5400 ROHS AT 5401 ROHS AT 5402 ROHS AT 8053 ROHS	AT 5450 ROHS AT 5451 ROHS AT 5452 ROHS AT 5453 ROHS	AT 5500 ROHS AT 5501 ROHS AT 5502 ROHS AT 8054 ROHS	AT 5600 ROHS AT 5601 ROHS AT 5602 ROHS
Capacitance range	0.8 to 10 pF > 6 turns	1 to 14 pF > 6 turns	1 to 16 pF > 6 turns	1 to 20 pF > 14 turns	1 to 30 pF >20 turns
Working voltage	250 VDC				
Test voltage	500 VDC				
Working Temp. range	- 55°C to + 125°C				
Temp. Coefficient	0+/-15 ppm/°C	0+/-25 ppm/°C	0+/-50 ppm/°C	0+/-30 ppm/°C	0+/-30 ppm/°C
Q factor @ Max Cap.	> 5000	> 3000	> 3000	> 1000	> 800
Insulation Resistance	>106 MΩ min				

Capacitance change is linear versus rotation of mobile rotor.

II.1 Standard air trimmer series: quality factor

Typical Q factor of ROHS Standard Air Trimmer series tuned at Max capacitance



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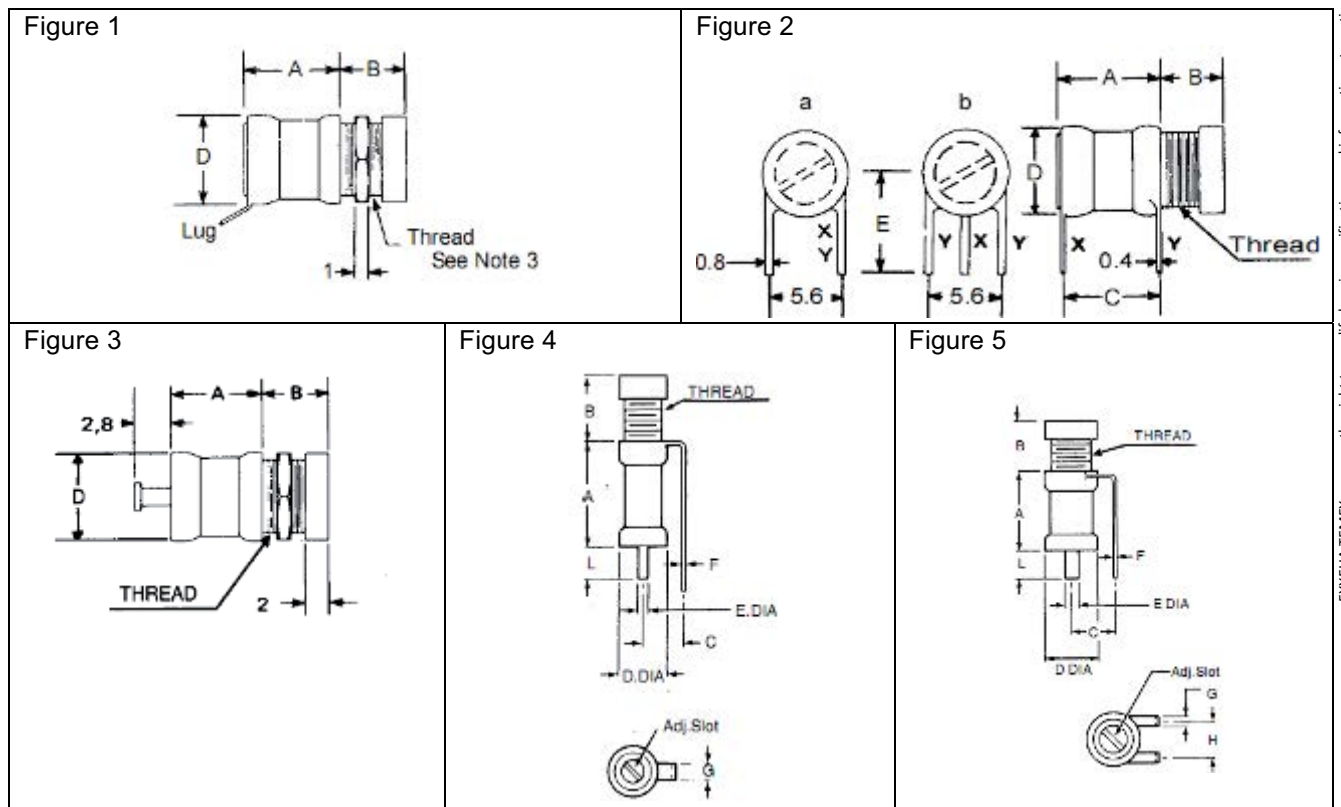
AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

II.2 Standard air trimmer series: Mechanical and general specifications

P/N	AT 5200 ROHS AT 5201 ROHS AT 5202 ROHS AT 8052 ROHS	AT 5400 ROHS AT 5401 ROHS AT 5402 ROHS AT 8053 ROHS	AT 5450 ROHS AT 5451 ROHS AT 5452 ROHS AT 5453 ROHS	AT 5500 ROHS AT 5501 ROHS AT 5502 ROHS AT 8054 ROHS	AT 5600 ROHS AT 5601 ROHS AT 5602 ROHS
Rotating torque	70 to 350 g.cm				
Max torque on rotor stop	500 g.cm				
Nut mounting torque	5000 g.cm				
Seal cap assemb. torque	800 g.cm				
Vibrations	60g, 10-2000 Hz				
Shocks	1500g, 0.5 ms				
Brass and Invar structure					
Glazed alumina insulation					
306°C solder used in assembly					
Silicone rubber seal washer					
Gold, silver and chromate finish					

II.3 Standard air trimmer series : Models



Terminals are gold plated. Others models available upon request. Custom design available upon request

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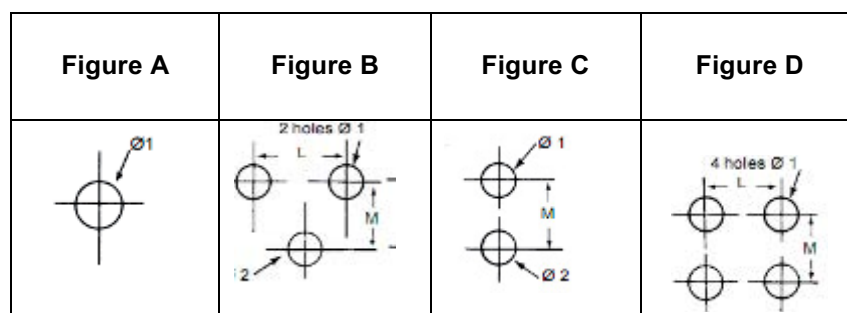
AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

II.4 Standard air trimmer series: Dimensions in mm

P/N	Figure	A	B	C	D	E	F	G	H	L	Thread
AT 5200 ROHS	1	7.7	5.8		7.6						
AT 5201 ROHS	2b	8.0	5.4	7.2	7.6	7.9					
AT 5202 ROHS	3	7.2	5.8		7.6						
AT 8052 ROHS	4	7.5	5.6	5.2	7.6	1.6	0.4	1.0		2.8	
AT 5400 ROHS	1	7.7	5.8		7.6						
AT 5401 ROHS	2b	8.0	5.4	7.2	7.6	12.0					
AT 5402 ROHS	3	7.2	5.8		7.6						
AT 8053 ROHS	4	7.5	5.6	5.2	7.6	1.6	0.4	1.0		2.8	
AT 5450 ROHS	1	7.7	5.8		7.6						.234-64 UNS
AT 5451 ROHS	2b	8.0	5.4	7.2	7.6	12.0					
AT 5452 ROHS	3	7.2	5.8		7.6						
AT 5453 ROHS	5	7.5	5.6	5.2	7.6	1.6	0.4	1.0	5.6	2.8	
AT 5500 ROHS	1	12.5	6.7		8.0						
AT 5501 ROHS	2b	14.7	4.3	14.2	8.0	12.0					
AT 5502 ROHS	3	12.4	6.7		8.0						
AT 8054 ROHS	4	14.7	4.4	5.2	8.0	1.6	0.4	1.0		2.8	
AT 5600 ROHS	1	17.3	6.6		8.0						
AT 5601 ROHS	2a	19.4	4.4	18.8	8.0	12.0					
AT 5602 ROHS	3	17.3	6.6		8.0						

II.5 Standard air trimmer series:



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AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

Models	Fig.	Φ1	Φ2	L	M
AT 5200 ROHS, AT 5202 ROHS, AT 5400 ROHS, AT 5402 ROHS, AT 5450 ROHS, AT 5452 ROHS, AT 5500 ROHS, AT 5502 ROHS, AT 5600ROHS, AT 5602 ROHS	A	6.2			
AT 5201 ROHS, AT 5401 ROHS, AT 5451 ROHS, AT 5501 ROHS,	B	1.3	1.3	5.6	7.2
AT 5601 ROHS	B	1.3	1.3	5.6	14.2
AT 8052 ROHS, AT 8053 ROHS, AT 8054 ROHS	D	1.3	1.3	5.6	18.8
AT 5453 ROHS	C	1.3	1.3		5.2
	B	1.3	1.7	5.6	5.2

III. High voltage air trimmer series

P/N	AT 5301 ROHS AT 5302 ROHS
Capacitance range	0.8 to 10 pF > 10 turns
Working voltage	500 VDC
Test voltage	1000 VDC
Working Temp. range	-55°C to +125°C
Temp. Coefficient	0+/-20 ppm/°C
Q factor @ Max Cap.	> 2000
Insulation Resistance	> 10 ⁶ MΩ

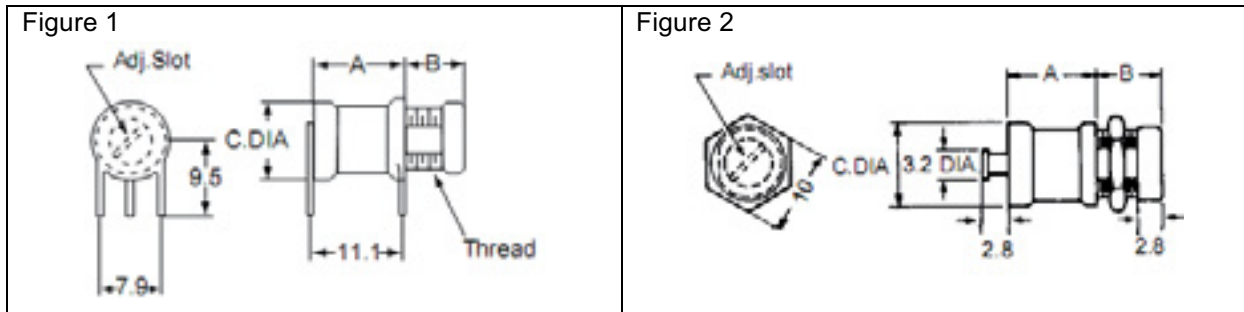
III.1 High voltage air trimmer series: Mechanical and general specifications

P/N	AT 5301 ROHS AT 5302 ROHS
Rotating torque	70 to 420 g.cm
Max torque on rotor stop	600 g.cm
Nut mounting torque	7000 g.cm
Seal cap assembly torque	1000 g.cm
Vibrations	60g, 10-2000 Hz
	Glazed alumina insulation
	306°C solder used in assembly
	Silicone rubber seal washer
	Gold, silver and chromate finish

AIR TRIMMER CAPACITORS MINIATURE, STANDARD & HIGH VOLTAGE

AIR DIELECTRIC TRIMMER CAPACITORS, RoHS COMPLIANT

III.2 High voltage air trimmer series : Models



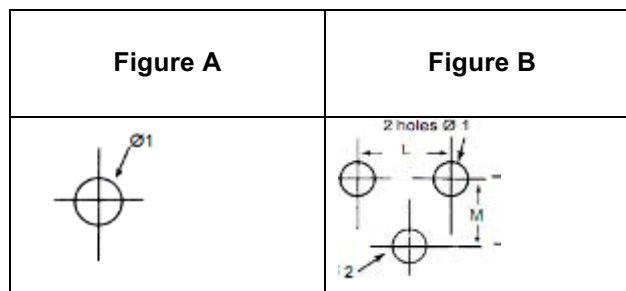
Terminals are gold plated

Others models available upon request

III.3 High voltage air trimmer series: Dimensions in mm

P/N	Figure	A	B	C	Thread
AT 5301 ROHS	1	11.1	8.3	9.8	.312-64 UNS
AT 5302 ROHS	2	10.7	7.8	9.8	

III.4 High voltage air trimmer series: Suggested Mounting Holes



P/N	Figure	Φ1	Φ2	L	M
AT 5301 ROHS	B	1.3	1.3	11.1	7.9
AT 5302 ROHS	A	8.1			

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