



# STILETTO SERIES MAGNETRONS

HV SPUTTERING SOURCES

AJA INTERNATIONAL, INC.

## GENERAL INFORMATION

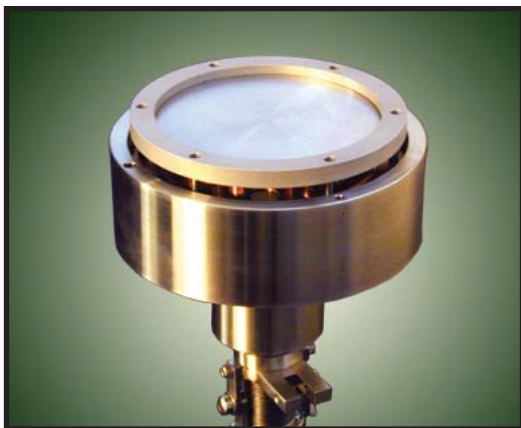
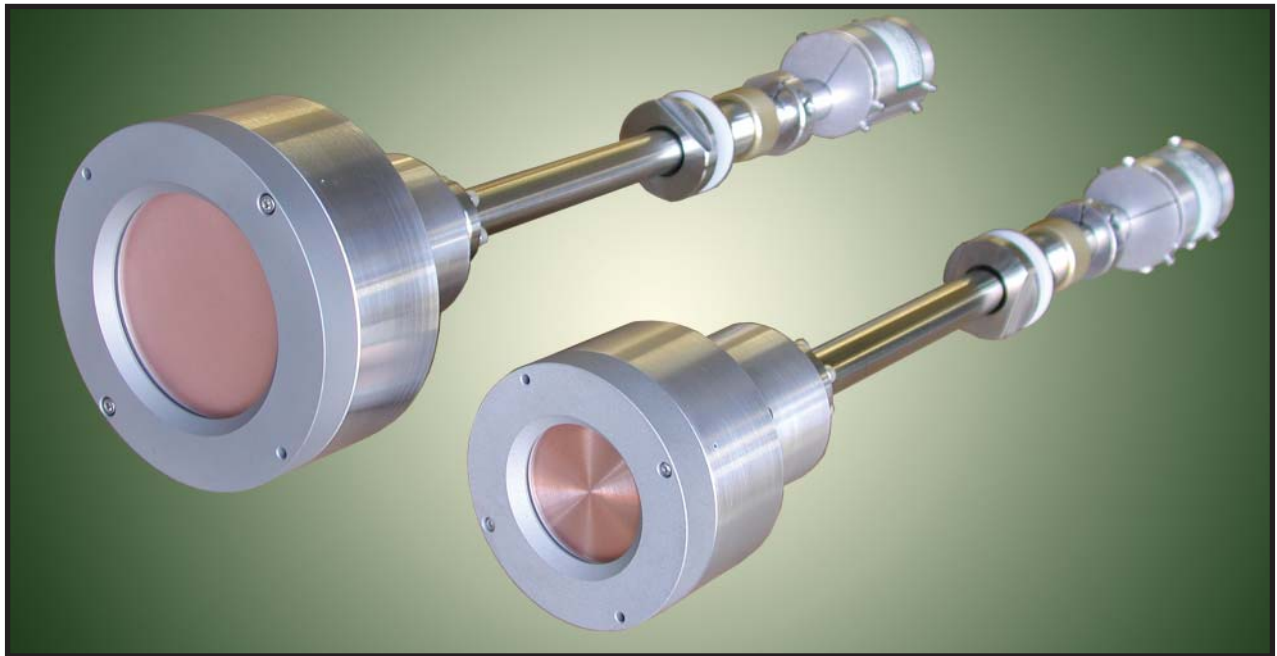
The AJA International, Inc. STILETTO SERIES magnetron sputtering sources have been designed to meet the most challenging needs of the thin film research community for high vacuum applications while maintaining the flexibility and features of the world class A300 SERIES UHV sources. STILETTO SERIES magnetrons are offered in the following target sizes:

### ROUND TARGET SOURCES

- ST10: 1" target diameter
- ST20: 2" target diameter
- ST30: 3" target diameter
- ST40: 4" target diameter

### RECTANGULAR TARGET SOURCES

- ST1550: 1.5" x 5.00" rectangular target
- ST1580: 1.5" x 8.00" rectangular target
- ST2056: 2.0" x 5.63" rectangular target
- ST2080: 2.0" x 5.00" rectangular target



## UBQD: Universal Baseplate Quick Disconnect



AJA International, Inc. has developed the perfect quick disconnect for the mounting of HV magnetron sputtering sources with 0.750" support tubes through baseplate holes ranging in size from 1.00" to 34 mm in diameter. Unlike conventional aluminum BQD's (whose threads are easily stripped) or S/S BQD's (which can easily scratch the support tube resulting in leaks), the AJA UBQD uses a stainless body with a PTFE glide ring to protect the support tube and an atmosphere side brass nut to prevent galling of the threads. It also includes an adapter ring to accommodate 32-34 mm baseplate holes and is available at a cost below that of simple S/S models.

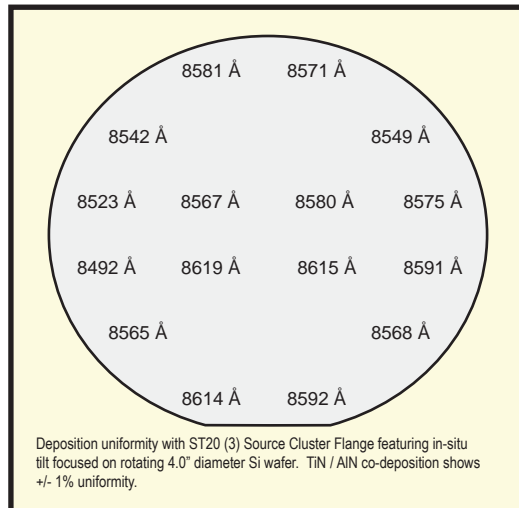
## THE UNIQUE MODULAR MAGNET ARRAY

The *STILETTO SERIES* magnetron sputtering sources feature a unique "modular magnet array" which is completely isolated from the cooling water to eliminate magnet deterioration and subsequent degradation of source performance. This design permits access to the internal magnet arrangement thus allowing the same source to be:

- Operated as a balanced magnetron
- Operated in a variety of unbalanced magnetron configurations
- Configured for maximum target utilization
- Configured for uniform or intentionally non-uniform depositions
- Configured for high or low rate sputtering
- Configured for high or low electron energies as they arrive at the substrate surface
- Operated with thick magnetic material targets, facilitating easy magnetic target removal and replacement

## IN-SITU TILT FOR OPTIMUM UNIFORMITY

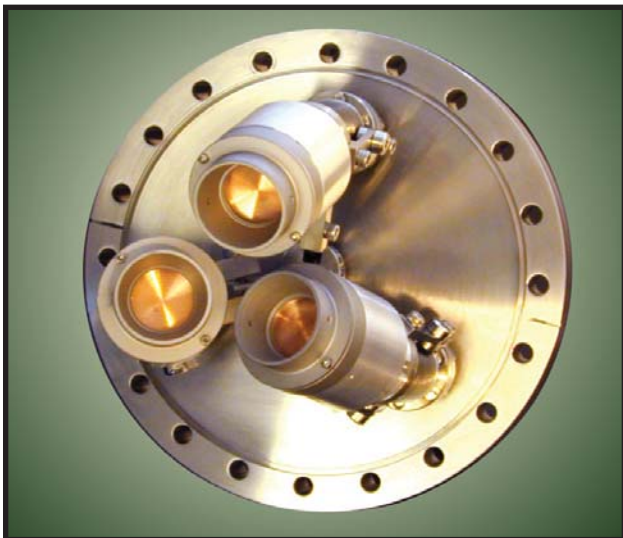
For angled sputtering configurations with rotating substrates, *STILETTO SERIES* sources are offered with the "in-situ tilt" option. This option allows the source angle to be precisely adjusted from outside the vacuum chamber. Fine tuning the incident angle is critical to achieving good deposition uniformity when working distances, operating pressures and materials are changed. While fixed angle arrangements limit and often compromise the capabilities of a system, "in-situ tilt" can deliver better than +/- 1.5% uniformity on substrates which can be up to triple the diameter of the source targets.



## HV MAGNETRON SPUTTERING SOURCE CLUSTER FLANGES

AJA International, Inc. STILETTO SERIES magnetron sputtering sources can be mounted to a wide variety of cluster flange configurations. By incorporating the manual tilt, in-situ tilt or linked in-situ tilt options, the focal point of the sources can be adjusted to optimize uniformity for different working distances and materials. Conventional sputtering wisdom suggests that to achieve good uniformity, the sources must be larger than the substrate. With a variable tilt angle, however, excellent uniformity is achievable with sources which are smaller than the substrate. For example, uniformities better than +/- 1% have been achieved on Ø 4.0" substrates with angled ST20 sources (Ø 2.0" target) and simple substrate rotation. For users building their own system, incorporating an AJA cluster flange with in-situ tilt and an AJA rotating, heated, RF biasable substrate holder, can guarantee proven performance and eliminate design errors which limit system capability and flexibility.

- HV in-situ tilt configurations to vary incident angle
- Compact, fixed angle configurations with flip-top shutters
- ISO, Viton Seal, base plate, top plate and dished head versions available
- Individual source gas rings for reactive sputtering applications
- Integrated source shutter packages with automated controllers
- Individual shielding chimneys to eliminate cross-contamination and reduce operating pressure to less than 0.5m Torr



## FEATURES / TYPICAL APPLICATIONS

- Modular Magnet Array isolated from cooling water
- Magnetic Material sputtering of thicker targets
- Easy removal of larger magnetic targets
- Integral gas injection and chimney system
- Efficient target cooling with no vacuum/water seals
- Clamped target mounting for optimal heat transfer
- RF & DC compatibility
- True UHV construction (CF & ceramic/metal only)
- Bakeable to 200° without disassembly
- Broad operating pressure (0.1 mTorr to 1.0 Torr)
- In-situ tilt or manual tilt for optimum uniformity
- Custom versions available
- Source / Power Supply / Target packages available

- CD/DVD Disk Coatings (e.g. reflective, phase change)
- Semiconductor
- Conductive Metal / Resistive Metal / Insulating Films
- Transparent Electrical Conductors (e.g. ITO)
- Optical Communications Applications (e.g. pump lasers)
- Lens Coatings (reflexive / anti-reflective / hard / color)
- Precious Metals (for maximum target utilization)
- Thin Film Sensors
- Coatings for Surgical / Medical Implants & Implants
- Magnetic Storage Media and Heads (HD, GMR, TMR)
- Photovoltaic Thin Films (solar cells)
- Wear Resistant Films
- Combinatorial Chemistry (special configurations)

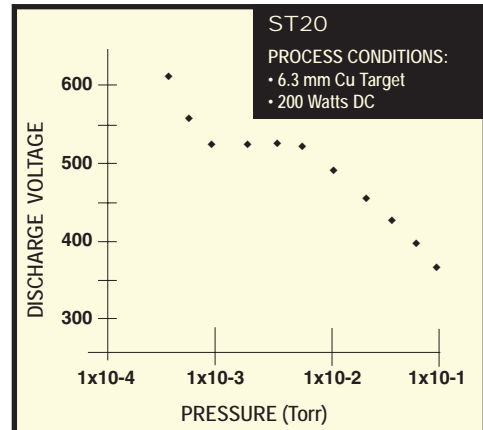
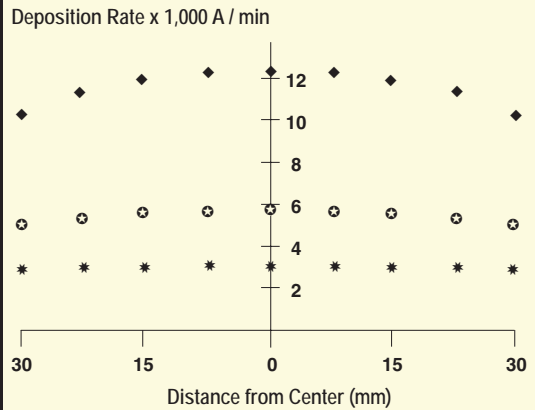
## TYPICAL PERFORMANCE

ST20

PROCESS CONDITIONS:

- 6.3 mm Cu Target
- 4 mT Argon
- 400 Watts DC
- 709 mA
- 564 Volts

- ◆ 50 mm Working Distance
- ⊗ 75 mm Working Distance
- \* 100 mm Working Distance

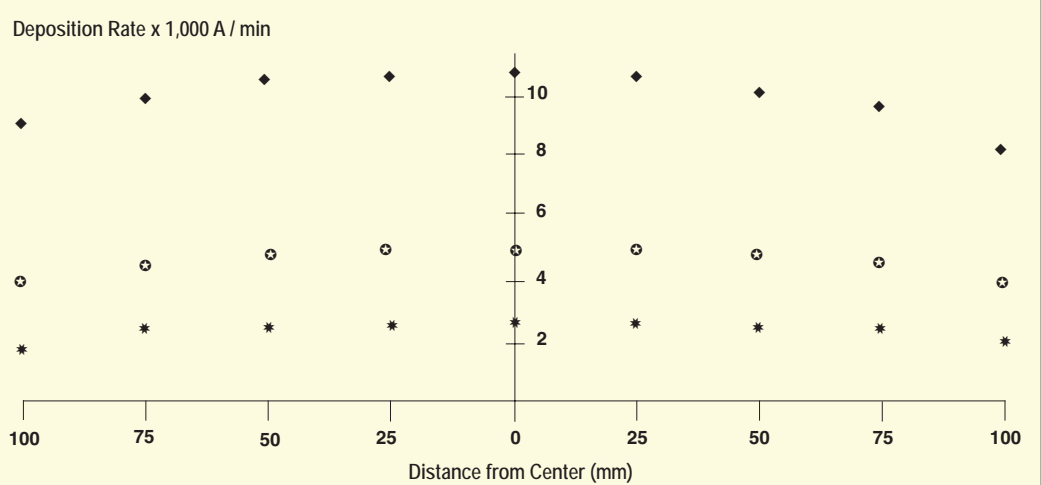


ST2080 - long axis

PROCESS CONDITIONS:

- 6.3 mm Cu Target
- 4 mT Argon
- 1400 Watts DC
- 2505 mA
- 558 Volts

- ◆ 50 mm Working Distance
- ⊗ 75 mm Working Distance
- \* 100 mm Working Distance

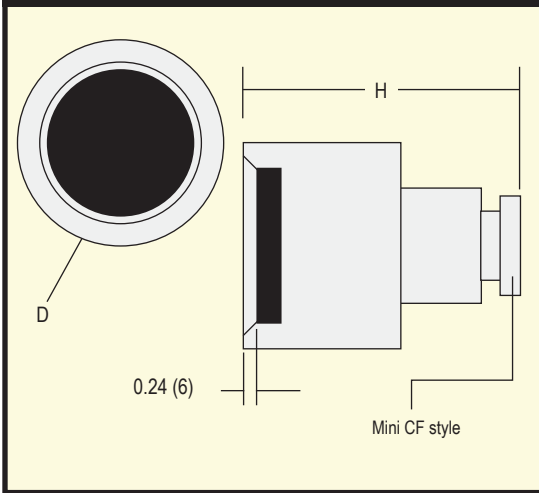


# SPECIFICATIONS & DIMENSIONS

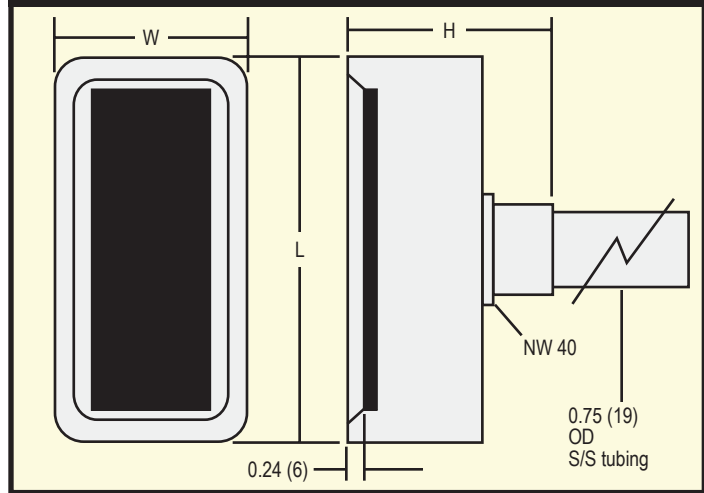
Specifications subject to change without notice.

\* Sources configured for 0.250" (6.3 mm) thick targets unless specified in order.

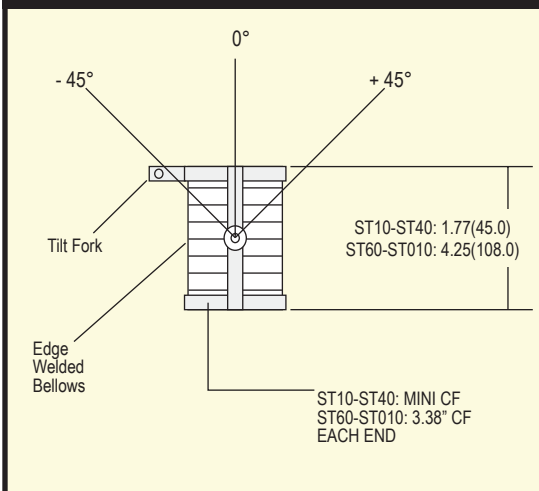
## ST 10/23/30/40 SOURCE HEAD



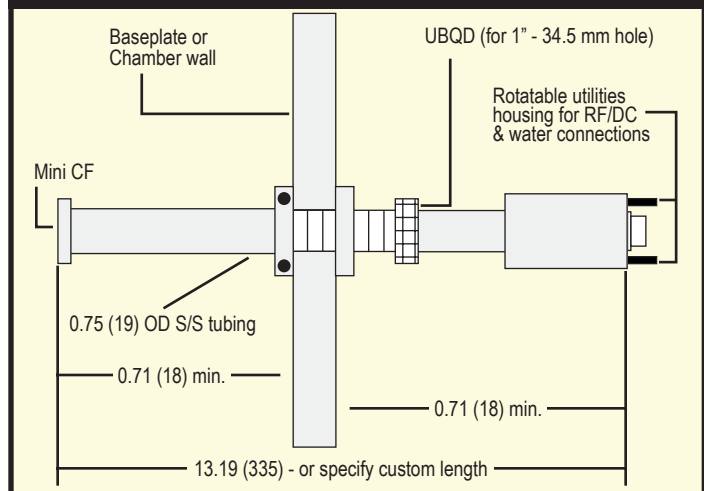
## ST1550 / 1580 / 2056 / 2080 SOURCE HEAD



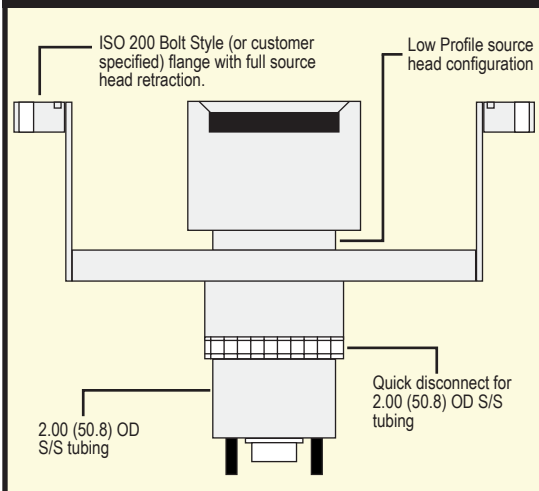
## TILT GIMBALS



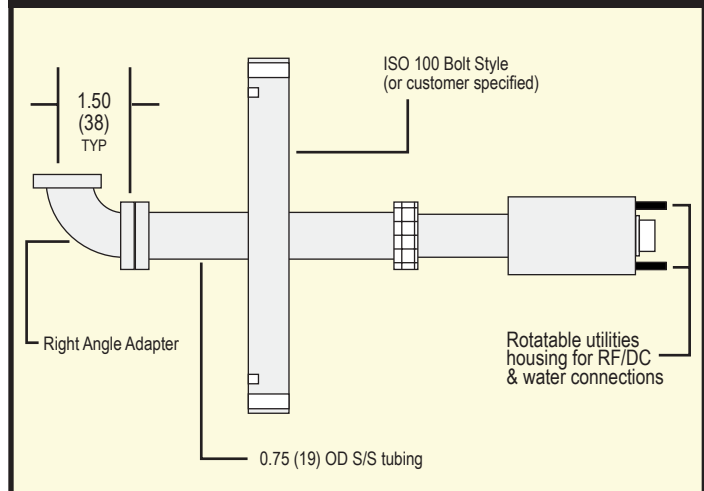
## HV MOUNTING STEM & UBQD FT



## "PANAMA HAT" PORT EXTENSION



## FLANGE WELDED QUICK DISCONNECT (FQD)



# SPECIFICATIONS & DIMENSIONS

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\* Sources configured for 0.250" (6.3 mm) thick targets unless specified in order.

## SOURCE HEAD CONFIGURATIONS

- MM (MAGNETIC MATERIAL)
- R - RIGHT ANGLE
- S - NON-STANDARD SPECIAL
- LP - LOW PROFILE

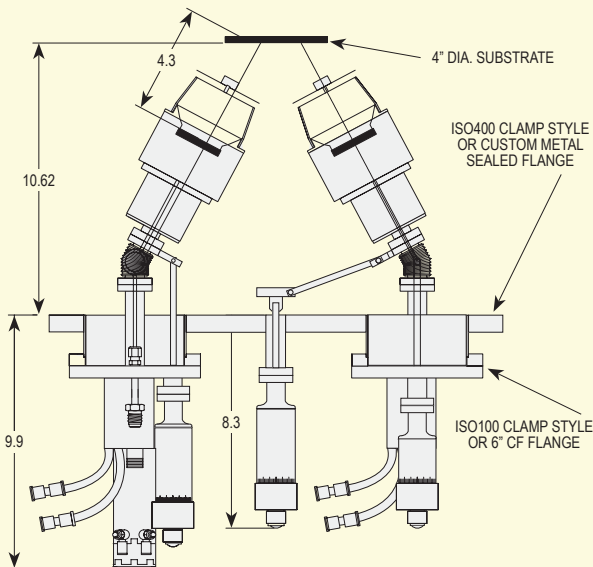
## TYPICAL MOUNTING OPTIONS \*

- UBQD: Universal Baseplate Quick Disconnect for  $\varnothing$  1.00" - 34.5mm hole (304S/S / PFTE / Viton)
- FQD - XXX: Flange Welded Quick Disconnect (for example FQD-6" CF of FQD ISO100)
- PH - XXX: "PANAMA HAT" Port Extension - mounts to flange & allows full retraction of source head (for example, PH-ISO200 is an ISO200 flanged "PANAMA HAT" w/ quick 2.00" quick disconnect)

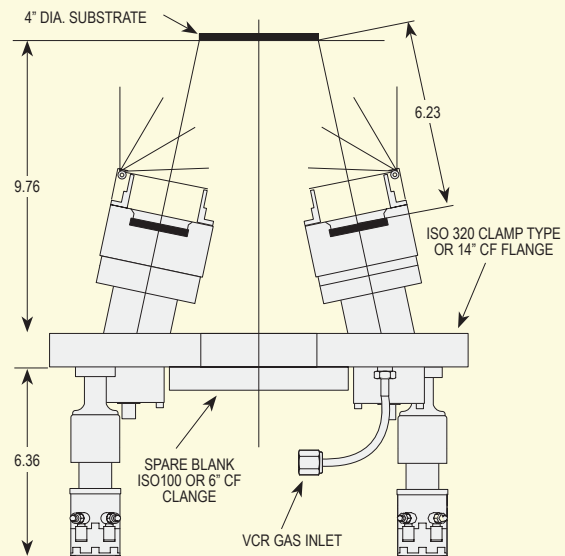
MODEL NUMBER	ST10	ST20	ST30	ST40
TARGET DIAMETER / MAXIMUM THICKNESS [in (mm)]	1.0" / 0.125" (25.4 / 3.2)	2.0" / 0.250" (50.8 / 6.3)	3.0" / 0.375" (76.2 / 9.5*)	4.0" / 0.375"* (101.6 / 9.5)
MAXIMUM POWER - DC/RF (WATTS)	150 / 150	700 / 500	1200 / 800	1500 / 1000
COOLING WATER (liters/minute)	0.5	1.7	2.3	3.0
SOURCE HEAD DIAMETER (D) [in (mm)]	1.80" (45.7)	3.50" (88.9)	4.63" (117.6)	5.63" (143.0)
SOURCE HEAD HEIGHT (H) [(in (mm))]	1.50" (38.1)	4.80" (122.0)	4.80" (122.0)	4.80" (122.0)
MODEL NUMBER	ST1550	ST1580	ST2056	ST2080
TARGET DIAMETER / MAXIMUM THICKNESS [in (mm)]	5.0" x 1.5" / 0.125" (127 x 38.1 / 3.2)	8.0" x 1.5" / 0.125" (203.2 x 38.1 / 3.2)	5.63" x 2.0" / 0.250" (143 x 50.8 / 6.3)	8.0" x 2.0" / 0.250" (203.2 x 50.8 / 6.3)
MAXIMUM POWER - DC/RF (WATTS)	150 / 150	200 / 200	1200 / 800	1500 / 1000
COOLING WATER (liters / minute)	0.4	0.6	2.3	3.0
SOURCE HEAD DIMENSIONS L x W [in (mm)]	6.35"x2.85" (161.3x72.4)	9.35" x 2.85" (237.5 x 72.4)	7.13" x 3.50" (181.1 x 88.9)	9.51" x 3.50" (241.6 x 88.9)
SOURCE HEAD HEIGHT (H) [(in (mm))]	2.85" (72.4)	2.85" (72.4)	3.68" (93.5)	3.68" (93.5)

## HV CLUSTER FLANGES

Tilted or fixed angle HV cluster flanges available with wide range of source configurations and options.



Cluster of (4) ST20 sources with gas ring chimneys. Source on left shown with individual in-situ tilt and pneumatic shutter. Source on right shown with "linked" in-situ-tilt and manual shutter. Recommended for substrates 4" diameter and smaller.



Cluster of (5) ST20-O fixed angle sources with gas ring chimneys, pneumatic "flip top" shutters and spare port in the center for analysis, evaporation or an ion source. Recommended for substrates 4" diameter and smaller.

# RF / DC POWER SUPPLIES



	POWER	MODEL
<b>RF AUTOMATCHING:</b> Networks feature one vacuum and one air capacitor for optimum reliability. Air cooling is standard on smaller units.	300 watt	A300RF / A300MU
	600 watt	A600RF / A300MU
	1000 watt	A1000RF / A1000
<b>LOW POWER RF:</b> Integrated PS / manual match box makes this package ideal for small sources	100 watt	A100 RF / A100MM
	300 watt	A300RF / A300MM
<b>PULSED DC:</b> These modules / power supplies modulate the DC output to prevent arcing, increase rate or ionize the sputtered material.	20 kHz	ASPL-20
	Variable	ASPL-V
	HIPIMS	Sinex 2.0, 4.0, 8.0
<b>DC POWER SUPPLIES:</b> Supplies feature efficient switching technology, power / current / voltage regulation, arc supression, remote connector and interlocks.	500 watt	A500 DC
	1000 watt	A1000 DC
	1500 watt	A1500 DC
<b>DCXS SERIES:</b> Supplies are fully programmable with process storage and power ramping to reduce thermal stress on the targets.	750 watt	DCXS-750-3 / DCXS-750-5
	1500 watt	DCXS-1500-3 / DCXS-1500-5



## SPUTTERING TARGETS & EVAPORATION MATERIALS



AJA International, Inc. offers a variety of sputtering targets to satisfy virtually any requirement. Targets available in a wide range of materials, sizes and purities. If you don't see the material options you are looking for please don't hesitate to call or email your requirements as custom projects are our specialty.

### FABRICATION OPTIONS

- MACHINED
- HOT PRESSED
- VACUUM MELT
- STANDARD & CUSTOM BACKING PLATES
- PURITIES FROM 99.0% - 99.999%
- METALIC & EPOXY BONDING
- HIGH TEMP ELASTOMER BONDING

### TYPES OF MATERIALS AVAILABLE

- OXIDES
- BORIDES
- NITRIDES
- SELENIDES
- FLOURIDES
- SILICIDES
- SULFIDES
- CARBIDES
- ALLOYS
- PURE METALS
- NON-METALS

### PARTIAL LIST OF AVAILABLE MATERIALS & MATERIALS SOLD

Ag	99.99	In(2)O(3)	99.99	Si(3)N(4)	99.9 ex binder
Al	99.999	Ir	99.95	SiO	99.9
Al(2)O(3)	99.99	ITO	99.99	SiO(2)	99.995
Au	99.99	Mg	99.95	Sn	99.995
C	99.999	MgO	99.95 ex Ca	SnO(2)	99.9
Co	99.95	Ni	99.99	Ta	99.99
Co(2)Fe	99.9	Ni/Fe	99.95	Ti	99.999
Cr	99.95	Pd	99.95	TiO(2)	99.5
Cu	99.995	Pt	99.95	V	99.7
Fe	99.95	Re	99.95	W	99.95
Ge	99.999	Ru	99.95	ZnO	99.995
In	99.995	Si	99.999	ZnO/SnO(2)	99.99

[www.ajaint.com](http://www.ajaint.com)



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