ALUMINUM ETCH

Gases	BCl_3	40 sccm
	Cl_2	5-10 sccm
	$CHCl_3$	2-5 sccm
Pressure		30 mT
R. F.		100 watts
Susceptor		Al_2O_3
Endpoint Technique - O.E. @ 410nm or 520nm ($AlCl_3$)		

Passivation	$CF_4/10\%O_2$	50 sccm
Pressure		100 mT
R. F.		50 watts/1 min.

Gas Channels	0-100 BCl_3	(BCl_3)
	0-100 Cl_2	(Cl_2)
	0-20 $CHCl_3$	($CHCl_3$)
	0-200 N_2	(CF_4/O_2)
	or purge	(CF_4/O_2)

Aluminum etch rate	500-2000Å/min.
Uniformity wafer/wafer	$< \pm 5\%$
Uniformity across wafer	$\pm 10\%$
Selectivity to SiO_2	$> 15:1$
" " photo-resist	2-4:1

POWER

During the main etch R.F. power has little influence on etch rate, but lower power (low d.c. bias) will tend towards isotropic etching and higher power (high d.c. bias) towards reduced selectivity. Power can be increased 50-100% for first 30-60 seconds of etch to ensure efficient removal of native Al oxide.

GAS FLOW

Etch rate is linearly dependent on Cl_2 flow rate: at high flows etch tends towards isotropic profile. $CHCl_3$ flow controls amount of sidewall polymer necessary to maintain anisotropic profile (dependent on degree to which photo-resist contributes to process). At high $CHCl_3$ flows excessive polymer formation (dirty process) results. BCl_3 flow is not critical.

PRESSURE

At lower pressures, Al etch rate decreases and selectivity decreases. At higher pressures, etch rate increases but tends towards isotropic profile.

LOADING

Etch rate is load dependent. This can be partially compensated for by increasing Cl_2 flow when full wafer loadings are used, but decreasing Cl_2 flow at end-point (when loading is small).

PASSIVATION

Passivation is necessary to stabilize freshly etched Al surface and prevent corrosion. Step is not critical providing time is long enough for passivation to occur. Longer passivation steps can be used to reduce Si residues, but at expense of SiO_2 loss.