	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	RONCHI RULING FREQUENCY	PERIOD IN MICRONS	LINE OR SPACE WIDTH	ALTA3500 ADDRESS SIZE µ	CUMM ERROR DECISION POINT µ	LINE WIDTH DIVIDED BY ADDRESS SIZE	CL-CL TOTAL WIDTH OF RULING µ	EDGE-EDGE TOTAL WIDTH OF RULING µ	EDGE-EDGE TOTAL WIDTH DIVIDED BY ADDRESS SIZE	TOTAL NUMBER OF EVEN ADDRESS INCREMENTS	CALCULATED ADDRESS SNAP ERROR µ	PERIODIC ADDRESS SNAP ERROR µ	SNAP ERROR OCCURS EVERY NUMBER OF LINE PAIRS	NUMBER OF LINE PAIRS IN RULING	MAXIMUM REPLICATION TOLERANCE µ	OVERALL SNAP PLUS REPLICATION ERROR µ
2	240LP/mm	4.1667	2.08333	0.08333	0.04167	25.001	1,495.833	1,497.916	17975.715	17976	0.02375	0.08333	250.00	359	0.02193	0.04568
3	260LP/mm	3.8462	1.92308	0.08333	0.04167	23.078	1,496.154	1,498.237	17979.567	17980	0.03607	0.08333	3.21	389	0.02194	0.05801
4	280LP/mm	3.5714	1.78571	0.08333	0.04167	21.429	1,496.429	1,498.512	17982.867	17983	0.01106	0.08333	0.58	419	0.02194	0.03300
5	300LP/mm	3.3333	1.66667	0.08333	0.04167	20.001	1,496.667	1,498.750	17985.723	17986	0.02305	0.08333	250	449	0.02195	0.04500
6	310LP/mm	3.2258	1.61290	0.08333	0.04167	19.356	1,496.774	1,498.857	17987.007	17987	0.00062	0.08333	0.70	464	0.02195	0.02257
7	320LP/mm	3.1250	1.56250	0.08333	0.04167	18.751	1,496.875	1,498.958	17988.219	17988	0.01829	0.08333	1.00	479	0.02195	0.04024
8	330LP/mm	3.0303	1.51515	0.08333	0.04167	18.183	1,496.970	1,499.053	17989.360	17989	0.02996	0.08333	1.37	494	0.02195	0.05191
9	340LP/mm	2.9412	1.47059	0.08333	0.04167	17.648	1,497.059	1,499.142	17990.428	17990	0.03563	0.08333	0.71	509	0.02195	0.05758
10	350LP/mm	2.8571	1.42857	0.08333	0.04167	17.144	1,497.143	1,499.226	17991.436	17991	0.0363	0.08333	1.74	524	0.02195	0.05825
11	360LP/mm	2.7778	1.38889	0.08333	0.04167	16.667	1,497.222	1,499.305	17992.384	17992	0.03197	0.08333	0.75	539	0.02195	0.05392
12	370LP/mm	2.7027	1.35135	0.08333	0.04167	16.217	1,497.297	1,499.380	17993.284	17993	0.02364	0.08333	1.15	554	0.02195	0.04559
13	380LP/mm	2.6316	1.31579	0.08333	0.04167	15.790	1,497.368	1,499.451	17994.136	17994	0.01131	0.08333	1.19	569	0.02196	0.03327
14	390LP/mm	2.5641	1.28205	0.08333	0.04167	15.385	1,497.436	1,499.519	17994.952	17995	0.00402	0.08333	0.65	584	0.02196	0.02598
15	400LP/mm	2.5000	1.25000	0.08333	0.04167	15.001	1,497.500	1,499.583	17995.720	17996	0.02335	0.08333	250	599	0.02196	0.04531
16	410LP/mm	2.4390	1.21951	0.08333	0.04167	14.635	1,497.561	1,499.644	17996.452	17996	0.03765	0.08333	0.68	614	0.02196	0.05961
17	420LP/mm	2.3810	1.19048	0.08333	0.04167	14.286	1,497.619	1,499.702	17997.148	17997	0.01232	0.08333	0.87	629	0.02196	0.03428
18	430LP/mm	2.3256	1.16279	0.08333	0.04167	13.954	1,497.674	1,499.757	17997.808	17998	0.01601	0.08333	5.43	644	0.02196	0.03797
19	440LP/mm	2.2727	1.13636	0.08333	0.04167	13.637	1,497.727	1,499.810	17998.444	17998	0.03699	0.08333	0.69	659	0.02196	0.05895
20	450LP/mm	2.2222	1.11111	0.08333	0.04167	13.334	1,497.778	1,499.861	17999.056	17999	0.00466	0.08333	0.75	674	0.02196	0.02662
21	460LP/mm	2.1739	1.08696	0.08333	0.04167	13.044	1,497.826	1,499.909	17999.632	18000	0.03067	0.08333	5.68	689	0.02196	0.05263
22	470LP/mm	2.1277	1.06383	0.08333	0.04167	12.766	1,497.872	1,499.955	18000.184	18000	0.01533	0.08333	1.07	704	0.02196	0.03729
23	480LP/mm	2.0833	1.04167	0.08333	0.04167	12.501	1,497.917	1,500.000	18000.724	18001	0.023	0.08333	0.50	719	0.02196	0.04496
24	490LP/mm	2.0408	1.02041	0.08333	0.04167	12.245	1,497.959	1,500.042	18001.228	18001	0.019	0.08333	1.02	734	0.02196	0.04096
25	500LP/mm	2.0000	1.00000	0.08333	0.04167	12.000	1,498.000	1,500.083	18001.720	18002	0.02333	0	NONE	749	0.02196	0.04529
26	510LP/mm	1.9608	0.98039	0.08333	0.04167	11.765	1,498.039	1,500.122	18002.188	18002	0.01567	0.08333	1.06	764	0.02197	0.03764
27	520LP/mm	1.9231	0.96154	0.08333	0.04167	11.539	1,498.077	1,500.160	18002.644	18003	0.02966	0.08333	0.54	779	0.02197	0.05163
28	530LP/mm	1.8868	0.94340	0.08333	0.04167	11.321	1,498.113	1,500.196	18003.076	18003	0.00634	0.08333	0.78	794	0.02197	0.02831
29	540LP/mm	1.8519	0.92593	0.08333	0.04167	11.112	1,498.148	1,500.231	18003.496	18003	0.04134	0.08333	2.23	809	0.02197	0.06331
30	550LP/mm	1.8182	0.90909	0.08333	0.04167	10.910	1,498.182	1,500.265	18003.904	18004	0.00799	0.08333	2.78	824	0.02197	0.02996
31	560LP/mm	1.7857	0.89286	0.08333	0.04167	10.715	1,498.214	1,500.297	18004.288	18004	0.02401	0.08333	0.88	839	0.02197	0.04598
32	570LP/mm	1.7544	0.87719	0.08333	0.04167	10.527	1,498.246	1,500.329	18004.672	18005	0.02732	0.08333	0.53	854	0.02197	0.04929
33	580LP/mm	1.7241	0.86207	0.08333	0.04167	10.345	1,498.276	1,500.359	18005.032	18005	0.00268	0.08333	0.72	869	0.02197	0.02465
34	590LP/mm	1.6949	0.84746	0.08333	0.04167	10.170	1,498.305	1,500.388	18005.380	18005	0.03168	0.08333	1.47	884	0.02197	0.05365
35	600LP/mm	1.6667	0.83333	0.08333	0.04167	10.000	1,498.333	1,500.416	18005.716	18006	0.02365	0	NONE	899	0.02197	0.04562
36																

37 COLUMN A: RONCHI RULING FREQUENCY IN LINE PAIRS PER MM.

38 COLUMN B: 1000 MICRONS DIVIDED BY THE RONCHI RULING LP/mm. EXAMPLE 1000/240 = 4.1667 MICRONS.

39 COLUMN C: LINE OR SPACE WIDTH = 1000 MICRONS DIVIDED BY THE RONCHI RULING (LP/mm X 2). EXAMPLE 1000/(240x2) = 2.0833 MICRONS.

40 COLUMN D: ALTA 3500 ADDRESS SIZE: THIS IS THE GRID LAYOUT REPRESENTING THE SMALLEST INCREMENTAL DISTANCE BETWEEN TWO SNAP POINTS FOR GENERATION OF THE PHOTOTOOL. ALL DISTANCES BETWEEN

41 TWO POINTS ARE REPRESENTED BY AN UNIQUE NUMBER OF ADDRESS UNITS. THE WIDTH OF FEATURES THAT CANNOT BE REPRESENTED IN INTEGER ADDRESS UNITS ARE SNAPPED TO THE CLOSEST POINT ON THE ADDRESS GRID.

42 COLUMN E: CUMULATIVE ERROR DECISION POINT: THIS IS 1/2 THE ADDRESS SIZE. WHEN THE CUMMULATIVE ERROR EXCEEDS THIS NUMBER THE SNAP IS TO THE NEXT ADDRESS POINT ON THE GRID. WHEN THIS SNAP

43 OCCURS THE ERROR BETWEEN THE LAST POINT AND THE NEXT POINT IS ONE ADDRESS UNIT.

44 COLUMN F: LINE WIDTH DIVIDED BY ADDRESS SIZE: THIS GIVES US THE NUMBER OF THEORETICAL ADDRESS UNITS IN ONE LINE WIDTH OR ONE SPACE WIDTH AT THIS RONCHI RUHLING FREQUENCY.

45 COLUMN G: CENTERLINE TO CENTERLINE OF TOTAL WIDTH OF RULING: THIS IS THE DISTANCE BETWEEN THE CENTER OF THE FIRST OPAQUE LINE IN THE RULING AND THE CENTER OF THE LAST OPAQUE LINE IN THE

46 RULING IN MICRONS FOR THE SPECIFIED RONCHI RULING FREQUENCY.

47 COLUMN H: EDGE-EDGE TOTAL WIDTH OF RULING IN MICRONS: THIS IS THE DISTANCE FROM THE LEFT EDGE OF THE FIRST OPAQUE LINE TO THE RIGHT EDGE OF THE LAST OPAQUE LINE IN MICRONS.

48 COLUMN I: EDGE-EDGE TOTAL WIDTH DIVIDED BY ADDRESS SIZE: THIS GIVES US THE TOTAL NUMBER OF ADDRESS SNAPS FROM THE START OF THE FIRST OPAQUE RULING LINE TO THE END OF THE LAST OPAQUE

49 RULING LINE.

50 COLUMN J: TOTAL NUMBER OF EVEN ADDRESS INCREMENTS: SINCE THE SYSTEM WILL SNAP TO A POINT ON THE ADDRESS GRID TO COMPLETE THE LAST LINE THIS IS THE TOTAL NUMBER OF ADDRESS INCREMENTS.

51 COLUMN K: CALCULATED ADDRESS SNAP ERROR: THIS IS NUMBER OF GRID ADDRESSES (J) TIMES THE ADDRESS INCREMENT (D) MINUS THE THEORETICAL EDGE-EDGE TOTAL WIDTH OF THE RULING (H) NORMALIZED TO

52 A POSITIVE NUMBER.

53 COLUMN L: PERIODIC ADDRESS SNAP ERROR: THIS IS THE ADDRESS SIZE; HOWEVER, WHEN THE RULING LINE WIDTH IS AN EXACT MULTIPLE OF THE ADDRESS THERE IS NO PERIODIC ADDDRESS SNAP ERROR.

54 COLUMN M: SNAP ERROR OCCURS EVERY NUMBER OF LINE PAIRS: THIS NUMBER IS ONE HALF THE ADDRESS (E), DIVIDED BY THE PRODUCT OF THE PARTIAL NUMBER OF ADDRESS INCREMENTS THAT REPRESENT

55 THE LINE WIDTH (DERIVED FROM J) TIMES THE ADDRESS SIZE (D) X 2. IN THE CASE WHERE THE PARTIAL ADDRESS SIZE BECOMES EQUAL TO OR GREATER THAN .5, THE SNAP WOULD BE TO THE NEXT GRID POSITION; OR,

56 A JUMP OF ONE ADDRESS INCREMENT OF .08333 MICRONS.

COLUMN N: NUMBER OF LINE PAIRS IN RULING: THIS EQUALS THE OVERALL RULING WIDTH (G) DIVIDED BY THE PERIOD OF THE RULING (B)

COLUMN O: MAXIMUM REPLICATION TOLERANCE: THIS IS THE WIDTH OF THE RULING (G) DIVIDED BY THE LENGTH OF THE RULE ON THE SCALE (68,200 MICRONS) X 1. (THE TOLERANCE ON THE LINE RULE LENGTH IS +/-1 MICRON.)

COLUMN P: OVERALL SNAP PLUS REPLICATION ERROR: THIS IS THE SUM OF CALCULATED ADDRESS SNAP ERROR (K) AND THE MAXIMUM REPLICATION TOLERANCE (O). THIS RESULT IS IN MICRONS AND WOULD INDICATE THAT THE OVERALL ERROROF ANY OF THE RULINGS IS LESS THAN THE ADDRESS ERROR OF .08333 MICRONS.