ELIONIX

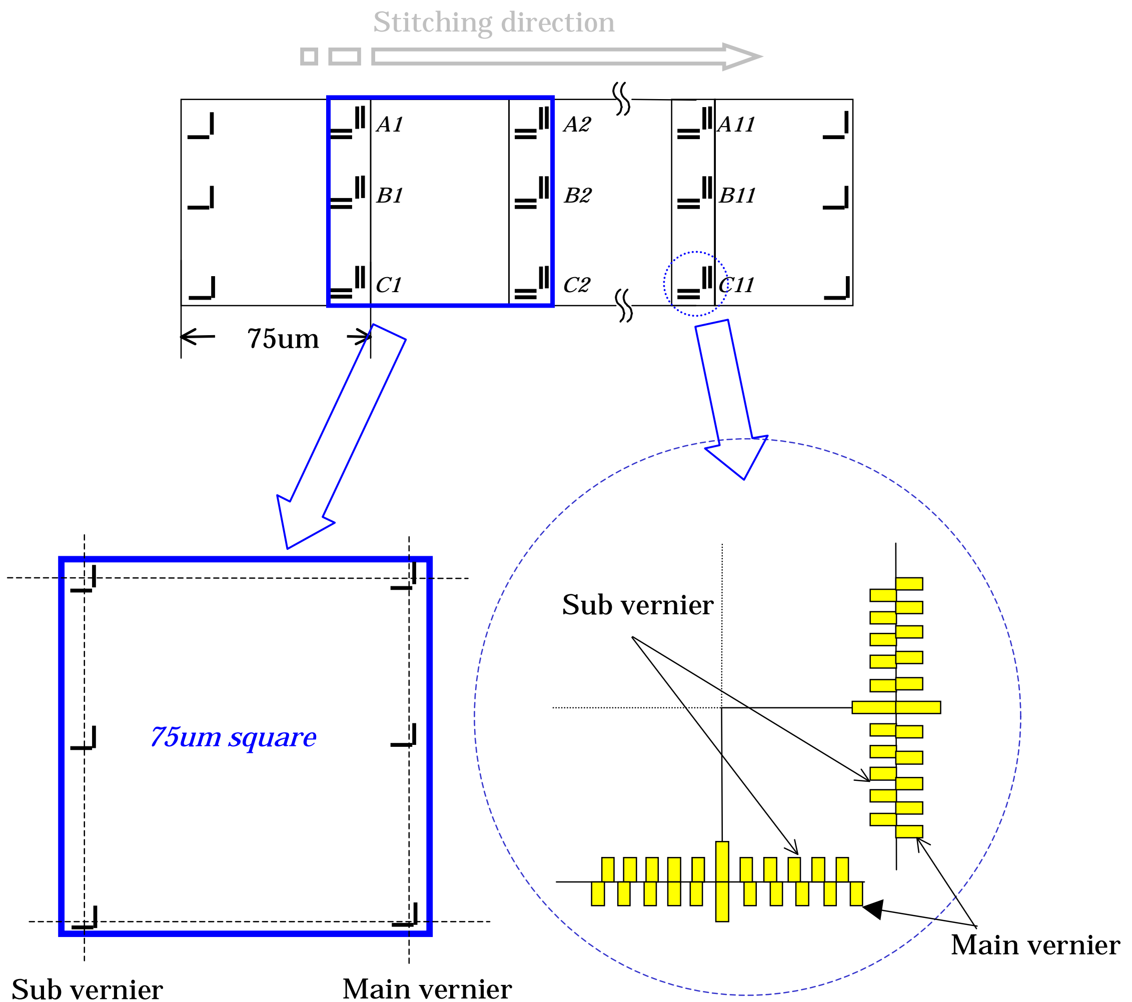
Field stitching - X

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA	CATHODE HEAT.	2.31 A
BEAM CURR.	30p A	OL APERTURE	0.30 mmф
FIELD SIZE	0.075 mm□	Dot Map	60000 dot
DOSE TIME	0.4 usec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.1 um
Development temp	room temp ℃	Development time	80 sec

Measured ：

Position	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
A	≦20nm	12.83	≦20nm	9.47
B	≦20nm	7.49	≦20nm	3.47
C	≦20nm	4.47	≦20nm	7.83

Pattern design：



ELIONIX

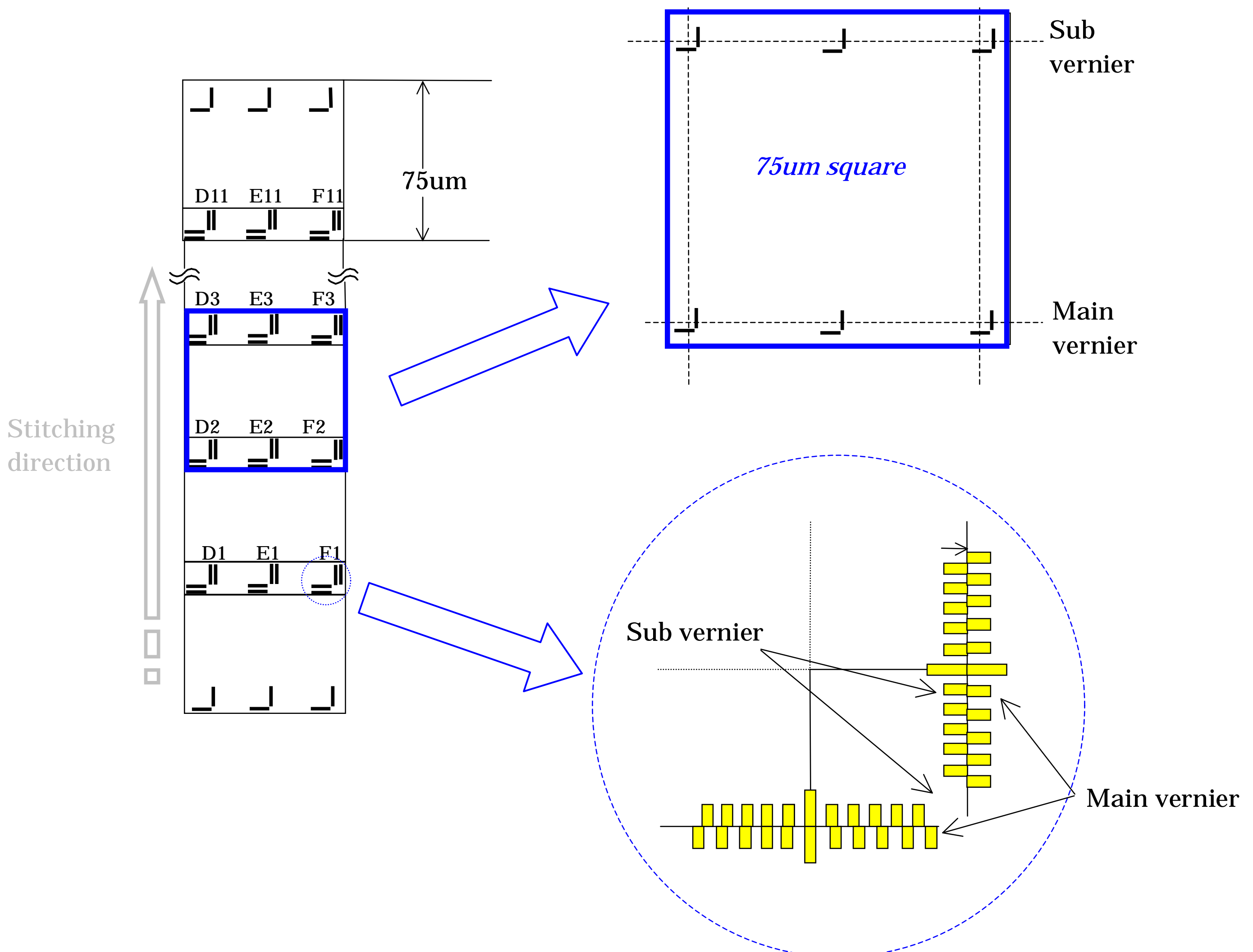
Field stitching - Y

ACCEL. VOLT.	50 kV		EXT.VOLTAGE	3.9 kV	
Emission CURR.	68 uA		CATHODE HEAT.	2.31 A	
BEAM CURR.	30p A		OL APERTURE	0.30 mmφ	
FIELD SIZE	0.075 mm□		Dot Map	60000 dot	
DOSE TIME	0.4 usec/dot		RESIST NAME	ZEP-520A	
SUBSTRATE	Si-wafer		RESIST THIKNESS	0.1 um	
Development temp	room temp ℃		Development time	80 sec	

Measured ：

	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
D	≦20nm	12.49	≦20nm	7.49
E	≦20nm	5.84	≦20nm	11.32
F	≦20nm	11.32	≦20nm	6.87

Pattern design：



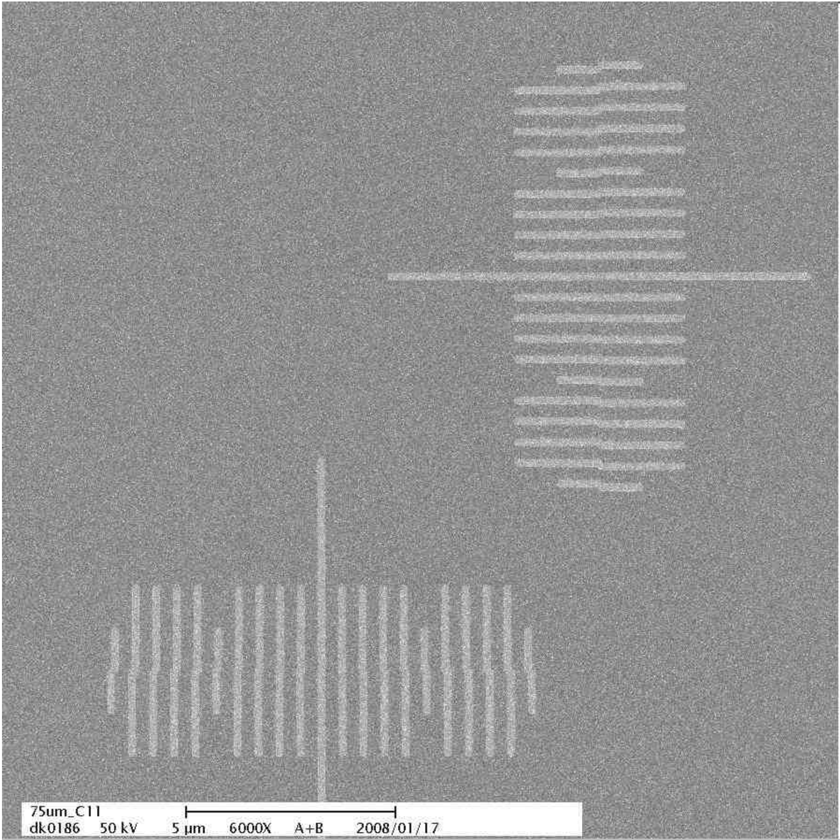
Field stitching data

Stitching - X

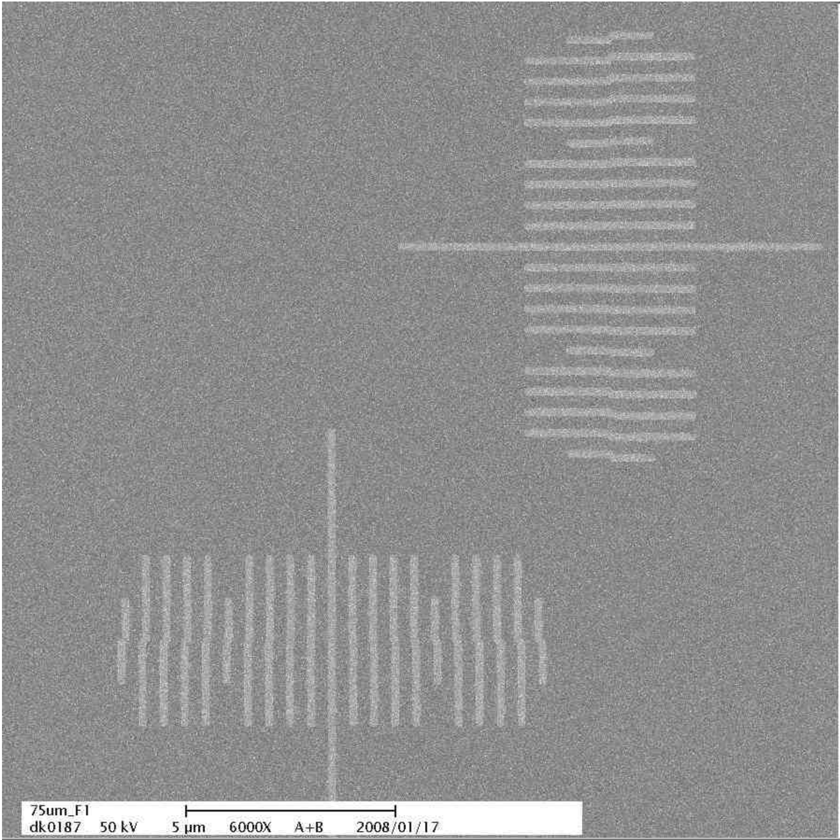
	A		B		C	
	X	Y	X	Y	X	Y
1	-5	0	-5	0	0	-5
2	-5	-5	0	0	5	0
3	-10	-5	-5	-5	0	0
4	-5	-5	0	0	0	5
5	0	-5	-5	0	0	0
6	-5	-5	-5	0	-5	-5
7	-10	-5	0	0	0	0
8	-5	-5	0	0	0	0
9	-10	-5	-5	0	0	-5
10	-5	-5	0	0	0	0
11	-10	-10	0	0	0	-5
AVE	-6.36	-5	-2.27	-0.45	0	-1.36
2σ	6.47	4.47	5.22	3.02	4.47	6.47

Stitching - Y

	D		E		F	
	X	Y	X	Y	X	Y
1	5	5	0	5	0	5
2	5	0	0	10	-5	0
3	10	5	0	0	0	0
4	5	0	0	5	-5	0
5	10	0	5	0	-5	5
6	10	0	5	10	-5	0
7	10	5	0	5	-10	0
8	10	5	0	5	-5	0
9	5	0	0	5	-5	5
10	5	5	-5	5	-10	0
11	5	0	0	5	-5	5
AVE	7.27	2.27	0.45	5	-5	1.82
2σ	5.22	5.22	5.39	6.32	6.32	5.05



Field stitching - X



Field stitching - Y

ELIONIX

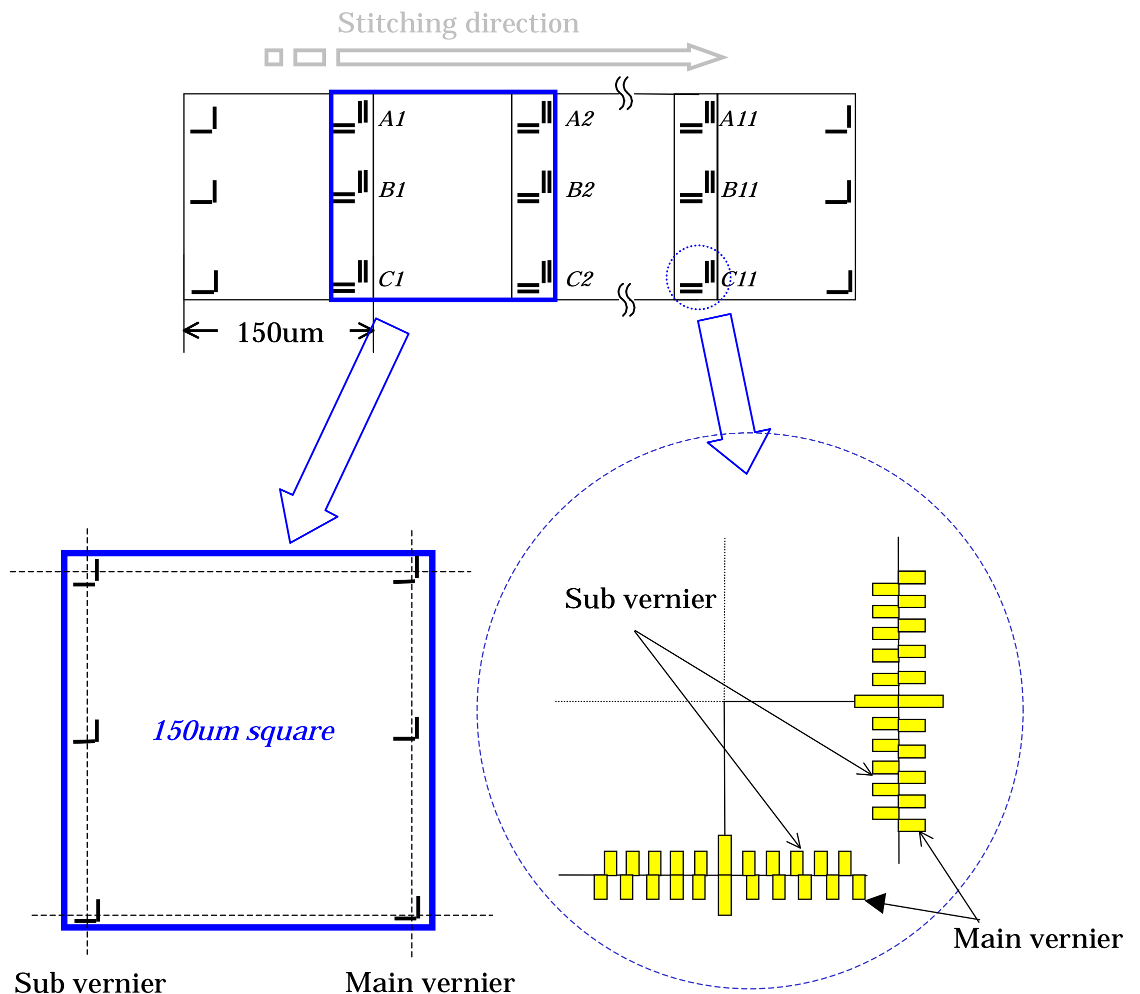
Field stitching - X

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 μA	CATHODE HEAT.	2.31 A
BEAM CURR.	30p A	OL APERTURE	0.30 mmφ
FIELD SIZE	0.150 mm□	Dot Map	60000 dot
DOSE TIME	0.4 usec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.1 um
Development temp	room temp ℃	Development time	80 sec

Measured ：

Position	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
A	≦20nm	7.49	≦20nm	9.94
B	≦20nm	9.94	≦20nm	5.84
C	≦20nm	12.95	≦20nm	0

Pattern design：



ELIONIX

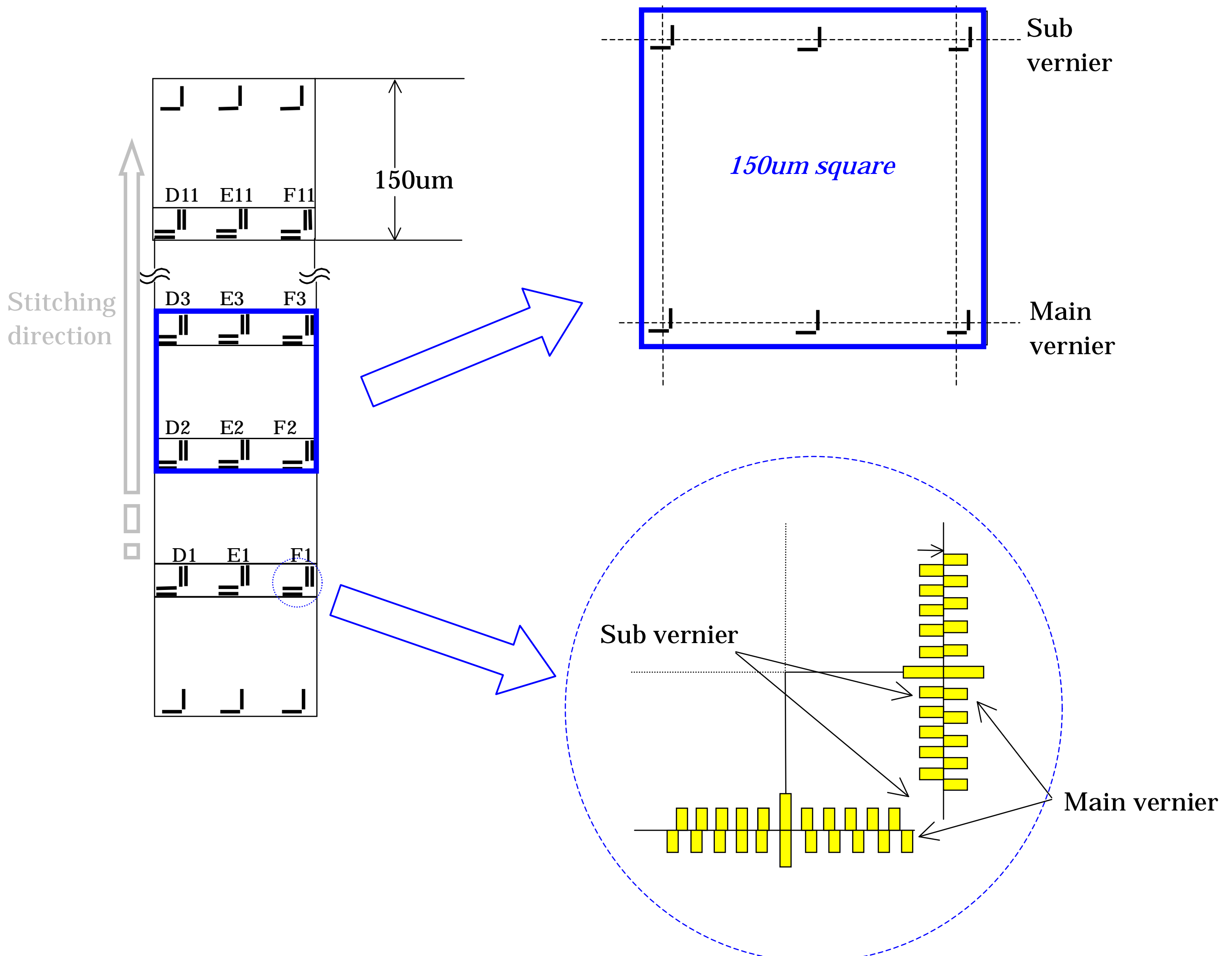
Field stitching - Y

ACCEL. VOLT.	50 kV		EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA		CATHODE HEAT.	2.31 A
BEAM CURR.	30 pA		OL APERTURE	0.30 mmΦ
FIELD SIZE	0.150 mm□		Dot Map	60000 dot
DOSE TIME	0.4 usec/dot		RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer		RESIST THIKNESS	0.1 um
Development temp	room temp ℃		Development time	80 sec

Measured ：

Position	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
D	≦20nm	11.56	≦20nm	13.56
E	≦20nm	9.92	≦20nm	16.87
F	≦20nm	10.93	≦20nm	13.47

Pattern design：



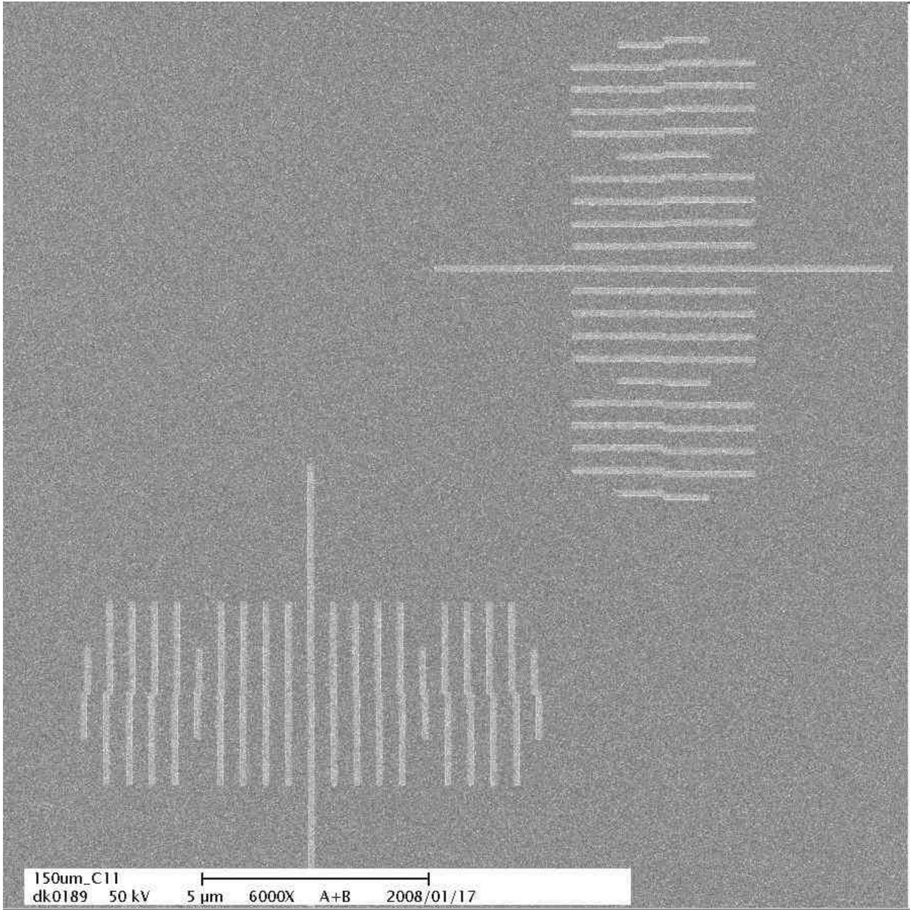
Field stitching data

Stitching - X

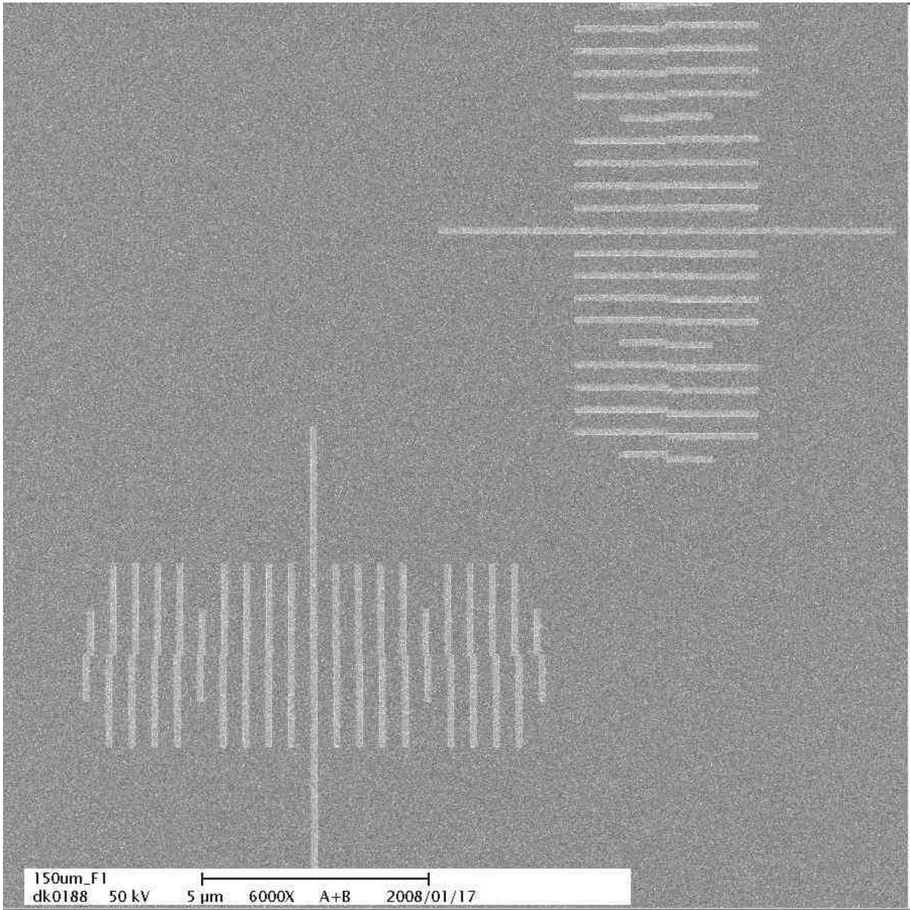
	A		B		C	
	X	Y	X	Y	X	Y
1	-5	0	5	0	-10	0
2	-5	5	0	0	-5	0
3	-5	10	5	5	-10	0
4	0	5	10	-5	-5	0
5	0	5	5	0	-10	0
6	0	0	5	0	-5	0
7	0	5	5	0	-10	0
8	-5	5	5	5	-10	0
9	-5	5	5	0	-10	0
10	0	5	0	0	-5	0
11	0	5	5	0	-5	0
AVE	-2.27	4.55	4.55	0.45	-7.73	0
2σ	5.22	5.39	5.39	5.39	5.22	0

Stitching - Y

	D		E		F	
	X	Y	X	Y	X	Y
1	0	5	-5	10	5	10
2	0	10	-5	15	0	10
3	-10	10	-5	10	0	10
4	-5	5	0	10	5	10
5	-5	5	-5	10	0	10
6	-5	10	0	15	5	15
7	-5	10	0	15	10	10
8	-10	0	0	10	5	10
9	-5	10	-10	10	-5	10
10	-5	5	0	15	0	10
11	0	5	-5	10	5	10
AVE	-4.55	6.82	-3.18	11.82	2.73	10.45
2σ	7.01	6.74	6.74	5.05	8.2	3.02



Field stitching - X



Field stitching - Y

ELIONIX

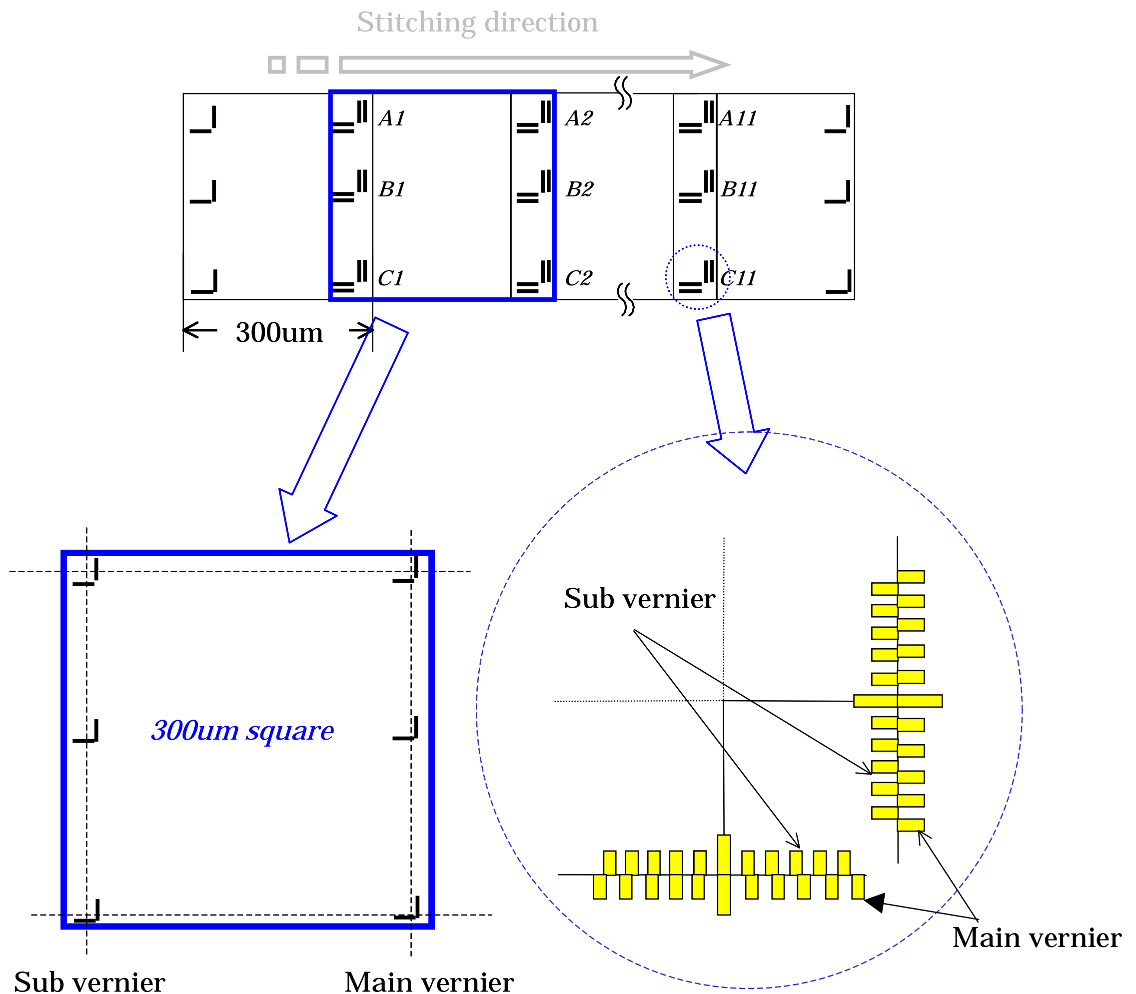
Field stitching - X

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA	CATHODE HEAT.	2.31 A
BEAM CURR.	100 pA	OL APERTURE	0.30 mmϕ
FIELD SIZE	0.30 mm□	Dot Map	60000 dot
DOSE TIME	0.4 usec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.30 um
Development temp	room temp ℃	Development time	360 sec

Measured ：

Position	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
A	≦30nm	19.88	≦30nm	24.99
B	≦30nm	25.49	≦30nm	19.91
C	≦30nm	16.61	≦30nm	19.88

Pattern design：



ELIONIX

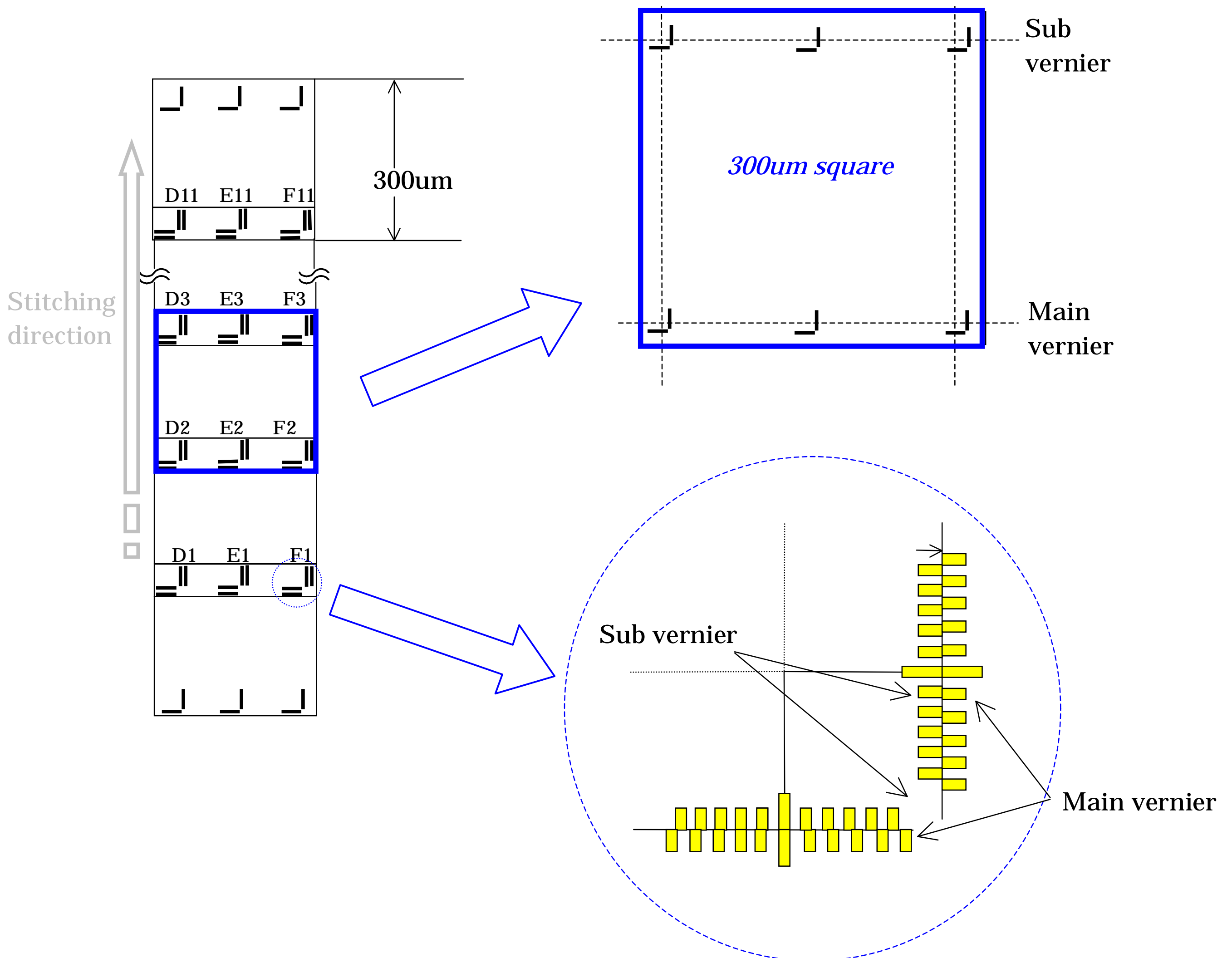
Field stitching - Y

ACCEL. VOLT.	50 kV		EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA		CATHODE HEAT.	2.31 A
BEAM CURR.	100 pA		OL APERTURE	0.30 mmφ
FIELD SIZE	0.30 mm□		Dot Map	60000 dot
DOSE TIME	0.4 usec/dot		RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer		RESIST THIKNESS	0.30 um
Development temp	room temp ℃		Development time	360 sec

Measured ：

	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
D	≦30nm	19.91	≦30nm	14.99
E	≦30nm	13.73	≦30nm	16.27
F	≦30nm	16.45	≦30nm	15.12

Pattern design：



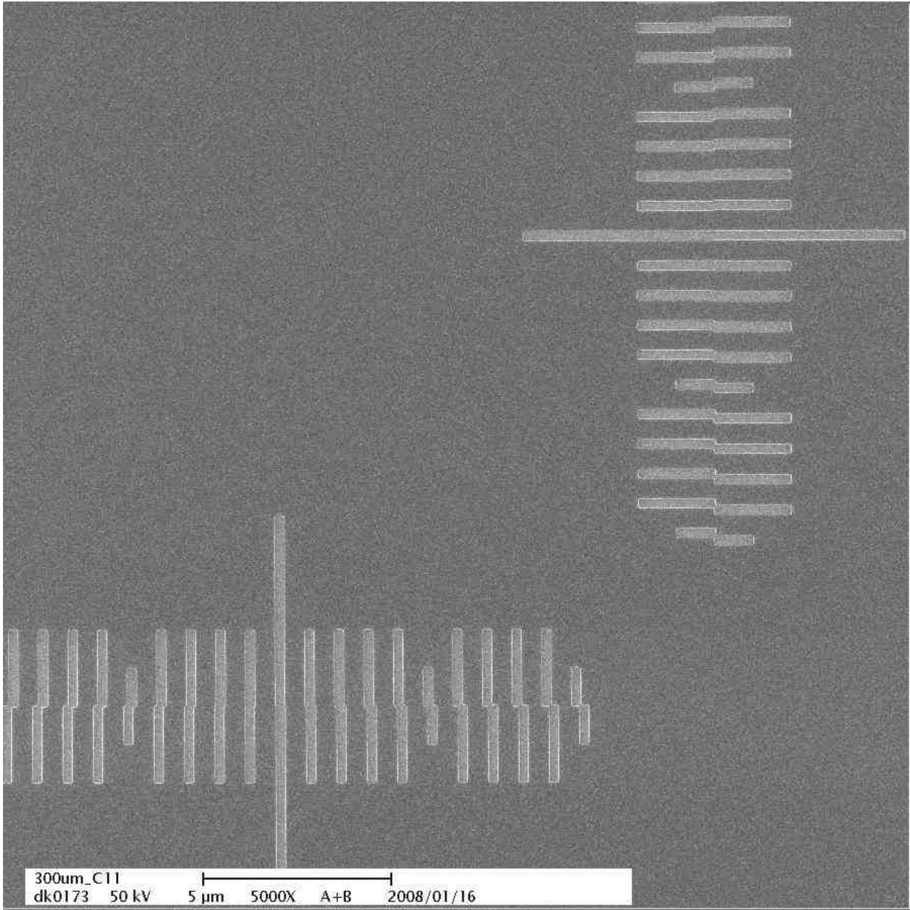
Field stitching data

Stitching - X

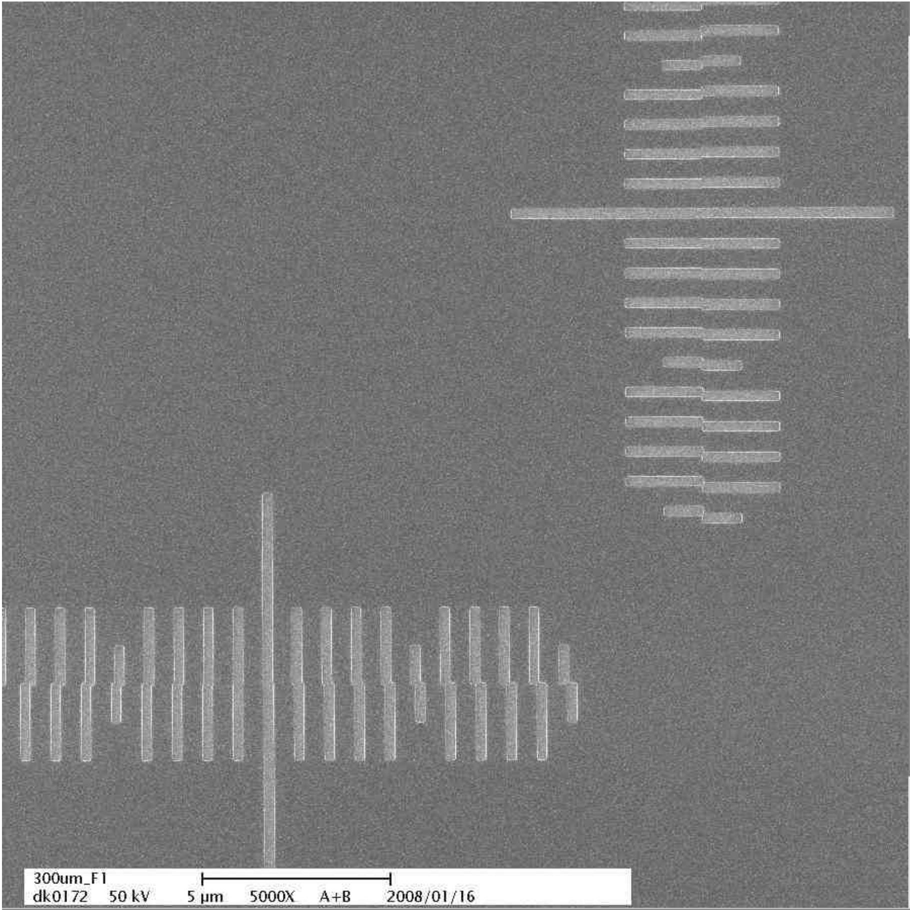
	A		B		C	
	X	Y	X	Y	X	Y
1	-10	-10	0	-20	0	-10
2	-10	-20	0	-10	-10	-10
3	0	-20	-10	-10	0	-10
4	0	-10	0	-10	0	-10
5	-10	-10	-10	-10	-10	-10
6	-10	-20	-20	-10	-10	0
7	-10	-10	-10	-10	-10	-10
8	-10	-10	-10	-10	-10	-10
9	-10	-20	-10	-20	-10	-20
10	-10	-20	-20	-10	-10	0
11	-20	-10	-20	-10	-10	-10
AVE	-9.09	-14.55	-10	-11.82	-7.27	-9.09
2σ	10.79	10.44	15.49	8.09	9.34	10.79

Stitching - Y

	D		E		F	
	X	Y	X	Y	X	Y
1	-20	0	0	-10	-10	-10
2	-10	-10	0	-10	0	-10
3	-10	0	0	-10	0	-10
4	-10	0	-10	0	0	0
5	-10	0	-10	-10	-10	-10
6	-10	0	0	-10	-10	-10
7	-10	-10	-10	-10	-10	-10
8	-20	-10	-10	-10	-10	-10
9	-10	-10	0	-10	-10	-10
10	-10	-10	0	-10	-10	-10
11	-10	0	0	0	0	-10
AVE	-11.82	-4.55	-3.64	-8.18	-6.36	-9.09
2σ	8.09	10.44	10.09	8.09	10.09	6.03



Field stitching – X



Field stitching - Y

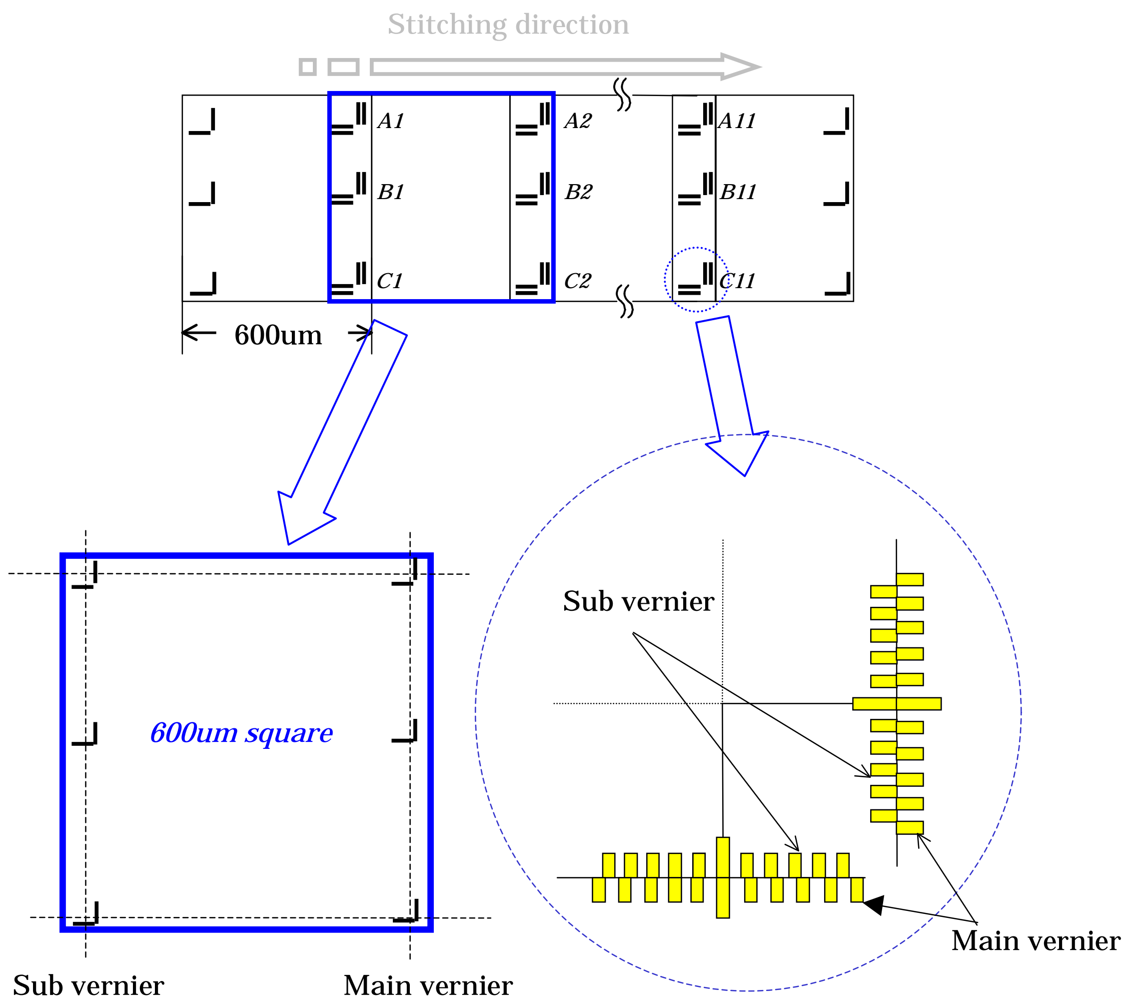
Field stitching - X

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA	CATHODE HEAT.	2.31 A
BEAM CURR.	100 pA	OL APERTURE	0.30 mmφ
FIELD SIZE	0.60 mm□	Dot Map	60000 dot
DOSE TIME	1.50 usec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.30 um
Development temp	room temp ℃	Development time	360 sec

Measured ：

Position	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
A	≦50nm	25.36	≦50nm	40.2
B	≦50nm	24.92	≦50nm	18.3
C	≦50nm	19.84	≦50nm	25.71

Pattern design：



ELIONIX

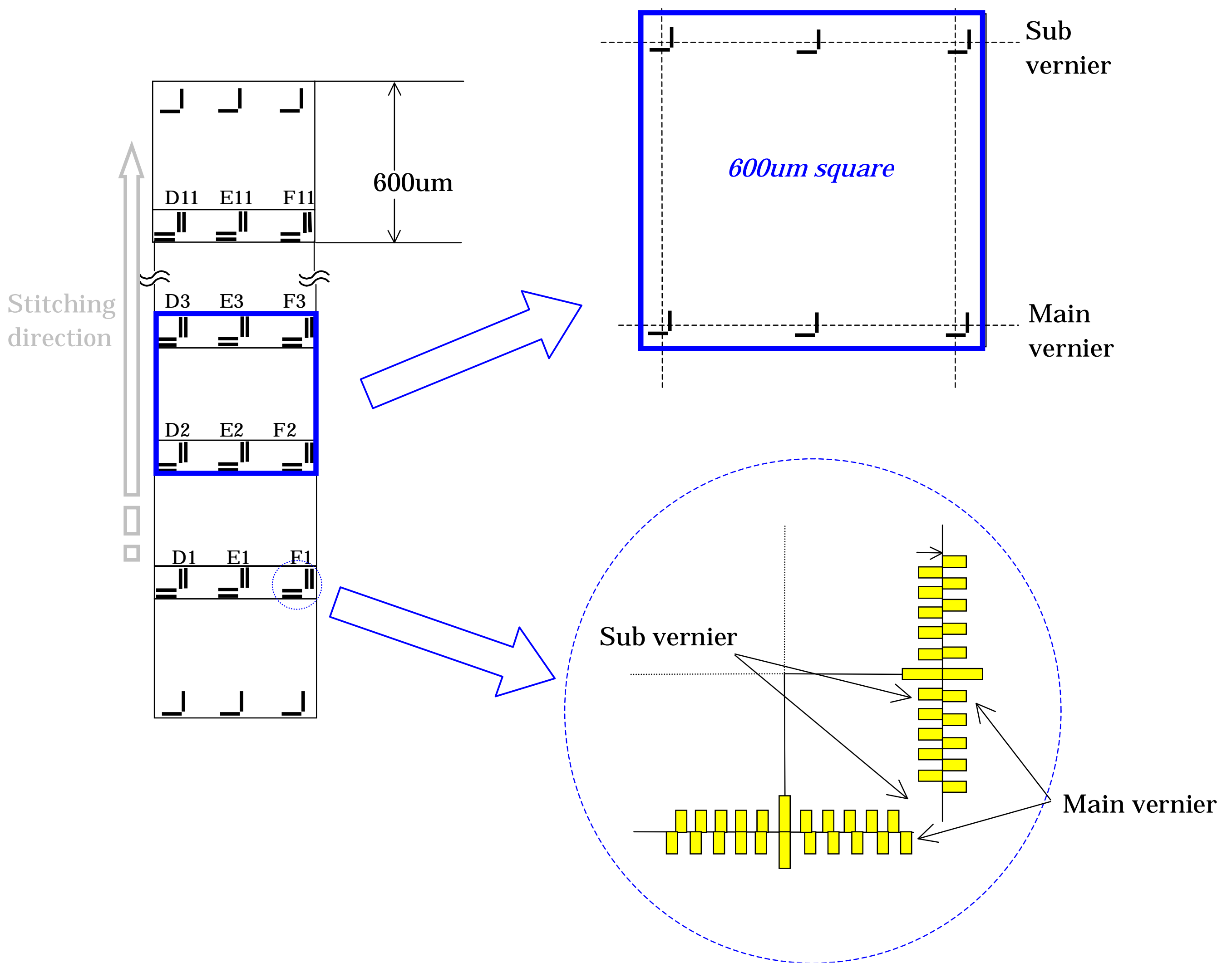
Field stitching - Y

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA	CATHODE HEAT.	2.31 A
BEAM CURR.	100 pA	OL APERTURE	0.30 mmφ
FIELD SIZE	0.6 mm□	Dot Map	60000 dot
DOSE TIME	1.50 usec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.30 um
Development temp	room temp ℃	Development time	360 sec

Measured ：

	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
D	≦50nm	35.71	≦50nm	49.3
E	≦50nm	38.94	≦50nm	45.71
F	≦50nm	35.49	≦50nm	34.8

Pattern design：



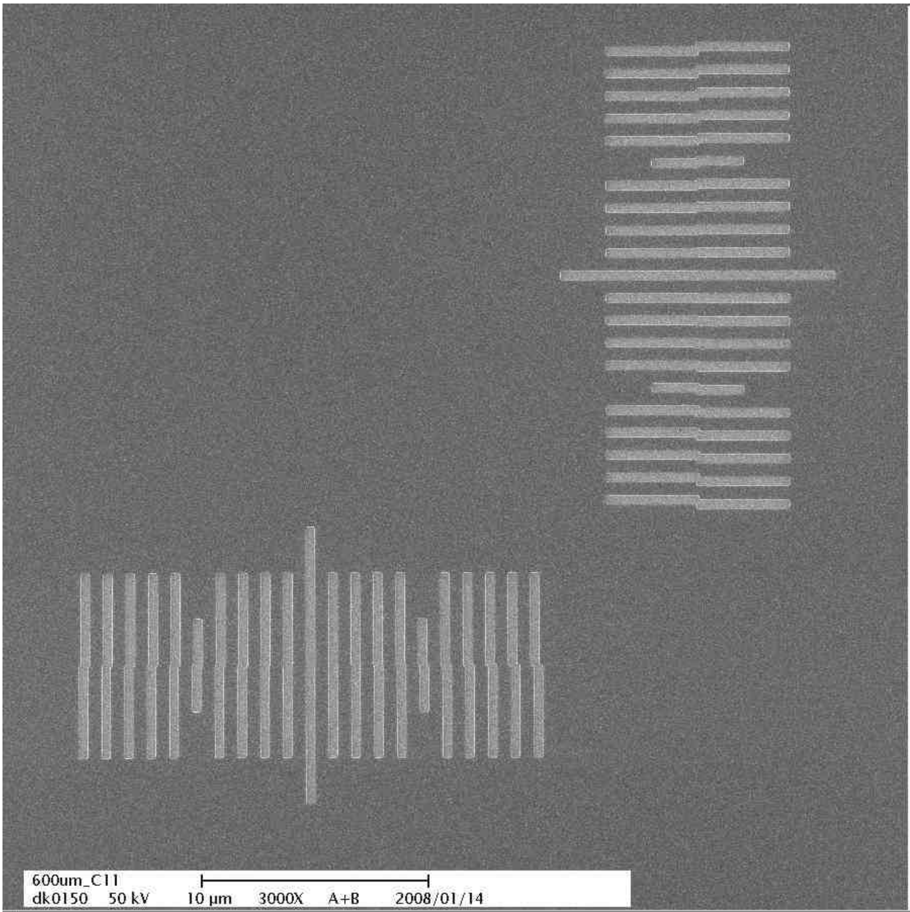
Field stitching data

Stitching - X

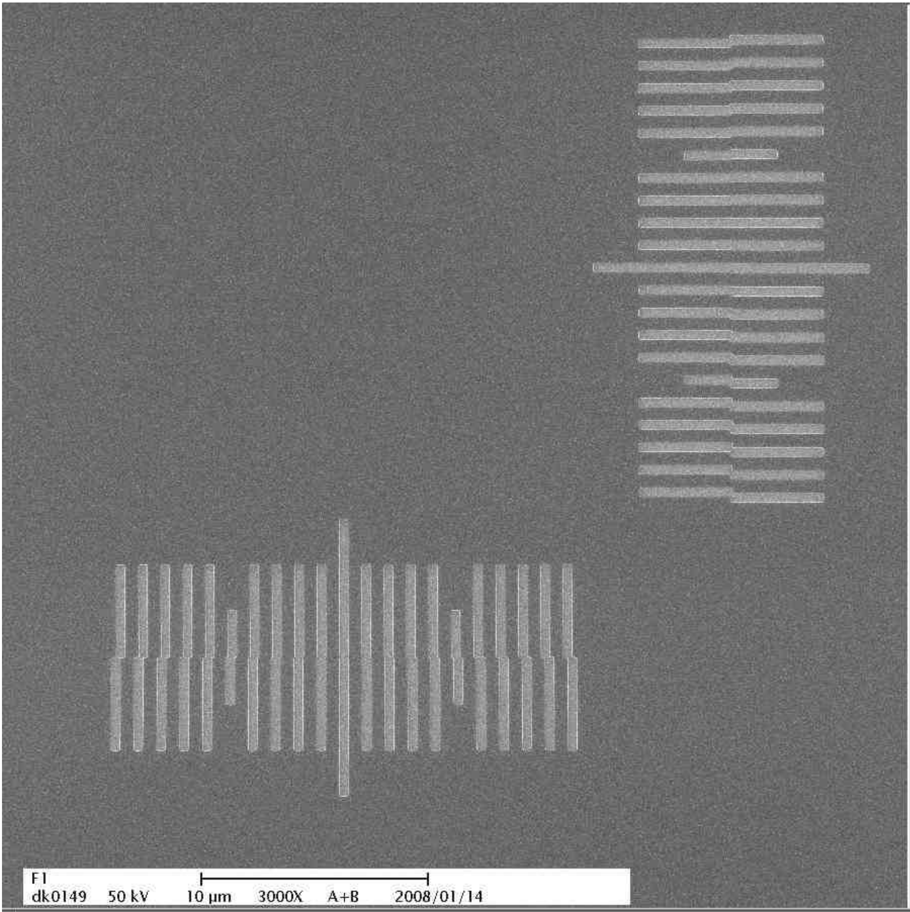
	A		B		C	
	X	Y	X	Y	X	Y
1	0	-20	-10	-20	0	-30
2	-10	-30	-20	-10	0	-10
3	-10	-30	-10	0	0	0
4	0	-30	0	-10	10	-10
5	-20	-30	-20	0	0	-10
6	0	-20	-10	0	10	0
7	0	-30	-10	0	10	-10
8	0	-40	0	0	20	-10
9	-20	-20	-10	0	10	-10
10	-20	-30	-20	-10	0	-10
11	0	-20	-10	0	10	0
AVE	-7.27	-27.27	-10.91	-4.55	6.36	-9.09
2σ	18.09	12.93	14.01	13.75	13.48	16.62

Stitching - Y

	D		E		F	
	X	Y	X	Y	X	Y
1	0	40	30	30	0	30
2	20	20	30	20	-20	0
3	10	40	30	20	-20	20
4	20	30	30	40	-20	20
5	30	20	30	30	-20	0
6	20	30	30	20	-30	10
7	20	40	30	30	-20	20
8	20	40	40	40	-20	20
9	20	20	30	40	-20	0
10	20	40	30	20	-30	20
11	30	30	20	30	-20	0
AVE	19.09	31.82	30	29.09	-20	12.73
2σ	16.62	17.48	8.94	16.62	15.49	22.07



Field stitching – X



Field stitching - Y

ELIONIX

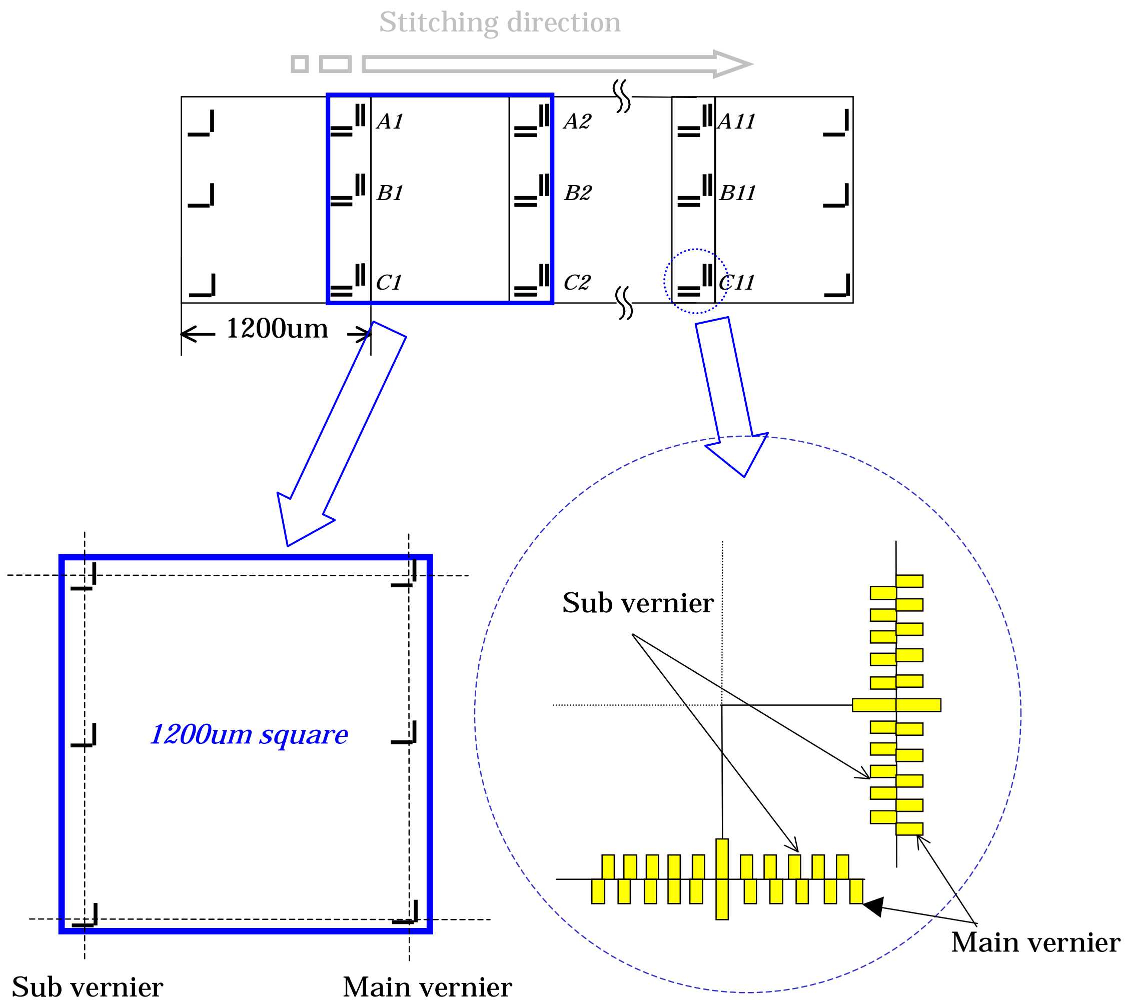
Field stitching - X

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA	CATHODE HEAT.	2.31 A
BEAM CURR.	100 pA	OL APERTURE	0.30 mmφ
FIELD SIZE	1.20 mm□	Dot Map	60000 dot
DOSE TIME	5.00u sec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.30 um
Development temp	room temp ℃	Development time	360 sec

Measured ：

Position	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
A	≦150nm	110	≦150nm	41.14
B	≦150nm	45.09	≦150nm	79.2
C	≦150nm	109.34	≦150nm	120.95

Pattern design：



ELIONIX

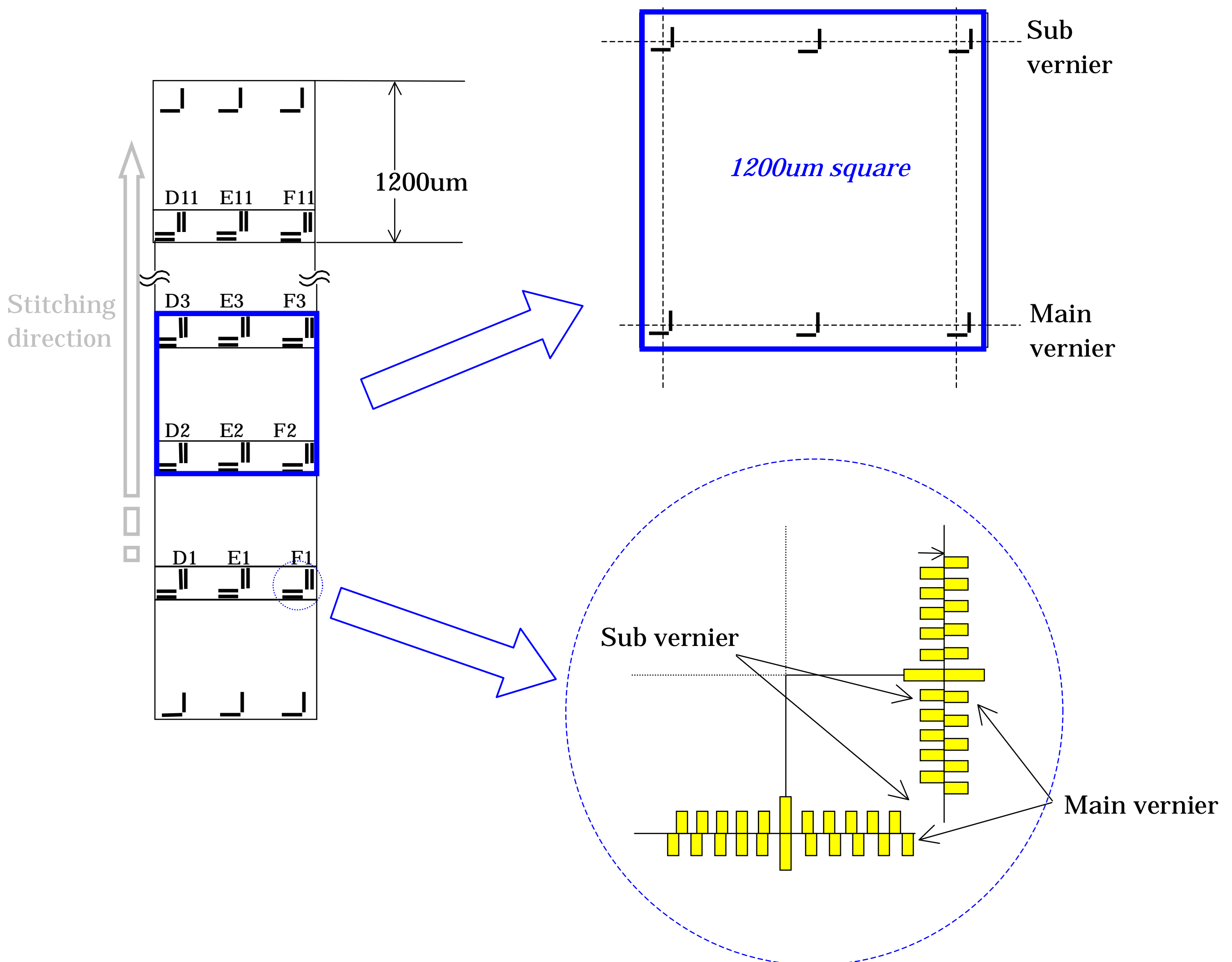
Field stitching - Y

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA	CATHODE HEAT.	2.31 A
BEAM CURR.	100 pA	OL APERTURE	0.30 mmφ
FIELD SIZE	1.20 mm□	Dot Map	60000 dot
DOSE TIME	5.00u sec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.30 um
Development temp	room temp ℃	Development time	360 sec

Measured ：

	Mean + 2σ			
	X		Y	
	Standard	Measured	Standard	Measured
D	≦150nm	25.49	≦150nm	77.45
E	≦150nm	69.84	≦150nm	84.13
F	≦150nm	82.54	≦150nm	30.24

Pattern design：



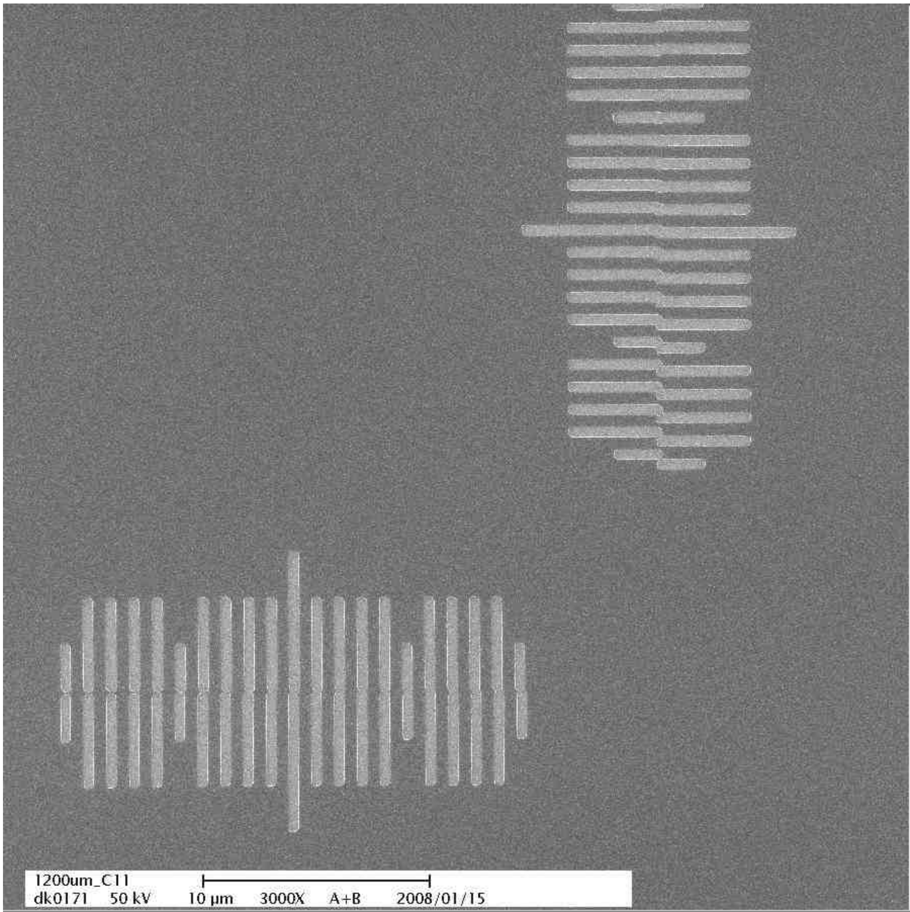
Field stitching data

Stitching - X

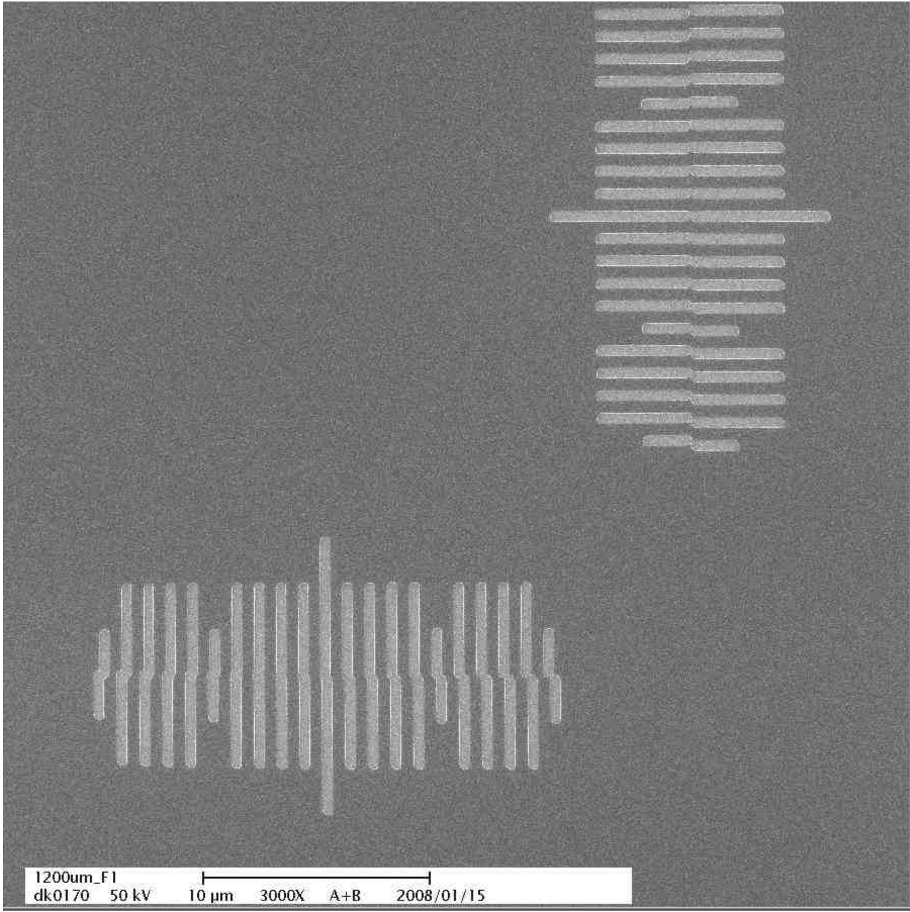
	A		B		C	
	X	Y	X	Y	X	Y
1	-40	-60	70	-30	110	10
2	-80	-60	60	-40	100	0
3	-70	-60	40	-50	90	-20
4	-70	-80	50	-50	100	-20
5	-80	-50	50	-40	90	-10
6	-70	-70	40	-50	70	-30
7	-60	-90	60	-50	90	0
8	-50	-80	60	-60	90	-40
9	-50	-80	80	-40	100	-10
10	-70	-100	60	-70	90	-40
11	-60	-90	60	-60	100	-30
AVE	-63.64	-74.55	57.27	-49.09	93.64	-17.27
2σ	25.73	31.45	23.82	22.72	20.54	33.57

Stitching - Y

	D		E		F	
	X	Y	X	Y	X	Y
1	70	10	10	50	-20	40
2	80	40	10	60	-10	50
3	80	20	10	60	-10	60
4	80	20	20	50	0	40
5	70	20	10	40	-30	40
6	110	40	30	60	0	60
7	90	20	20	50	-10	30
8	90	40	20	70	-20	60
9	100	20	40	40	10	20
10	100	20	30	40	0	40
11	80	20	20	50	-10	30
AVE	86.36	24.55	20	51.82	-9.09	42.73
2σ	25.73	20.71	20	19.63	22.72	26.97



Field stitching - X



Field stitching - Y

ELIONIX

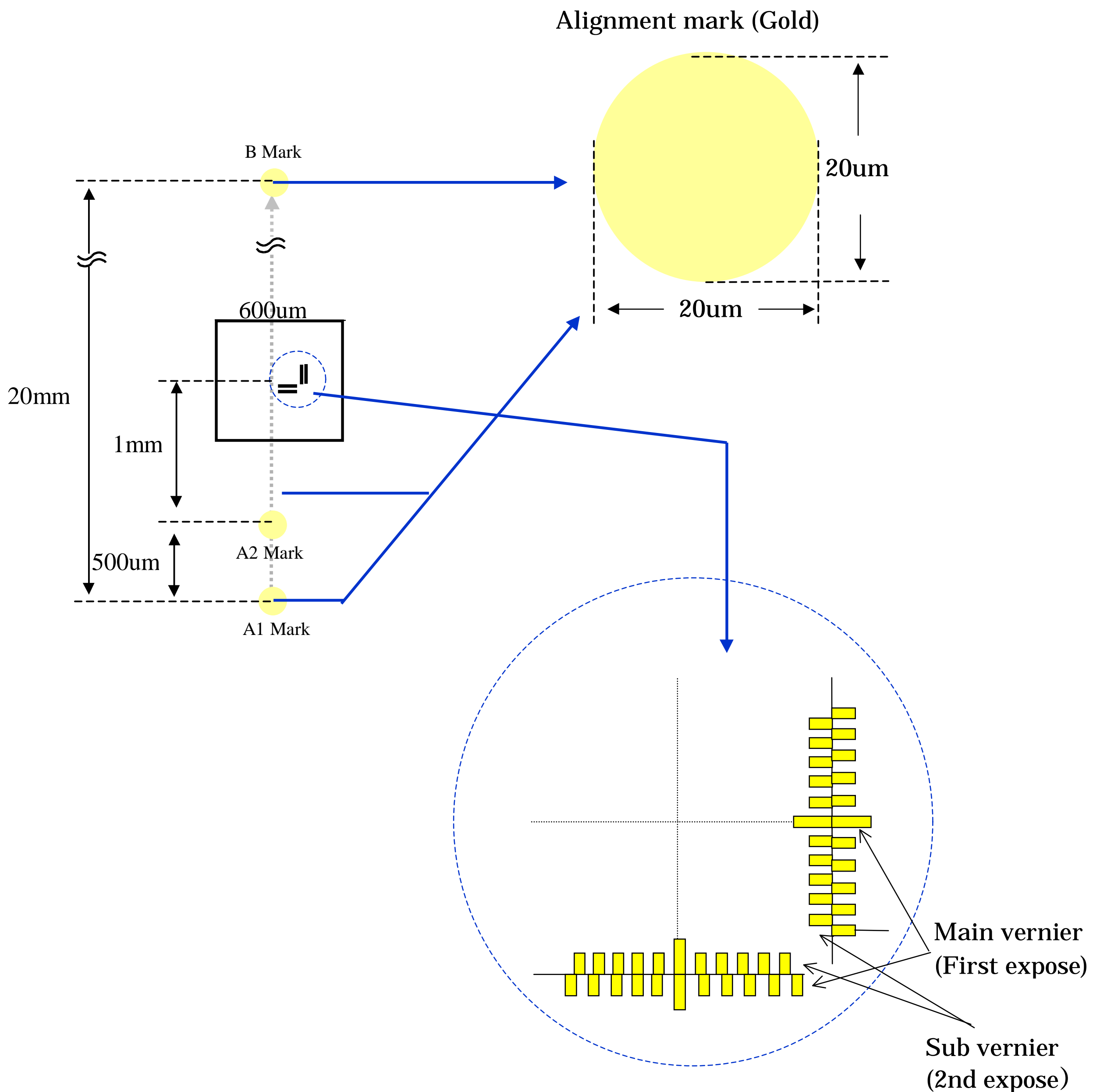
Overlay (Auto registration)

ACCEL. VOLT.	50	kV	EXT.VOLTAGE	3.9	kV
Emission CURR.	68	uA	CATHODE HEAT.	2.31	A
BEAM CURR.	100	pA	OL APERTURE	0.30	mmφ
FIELD SIZE	0.6	mm□	Dot Map	60000	dot
DOSE TIME	1.5	usec/dot	RESIST NAME	ZEP-520A	
SUBSTRATE	Si-wafer		RESIST THIKNESS	0.30	um
Development temp	room temp	℃	Development time	360	sec

Measured ：

	Standard	Measured
X	≦±30nm	10nm
Y	≦±30nm	- 20nm

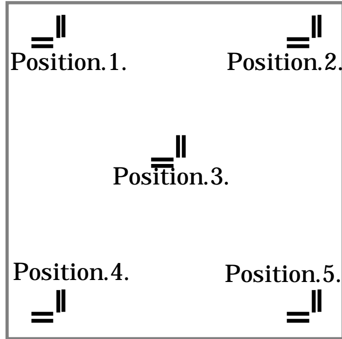
Pattern design：



ELIONIX

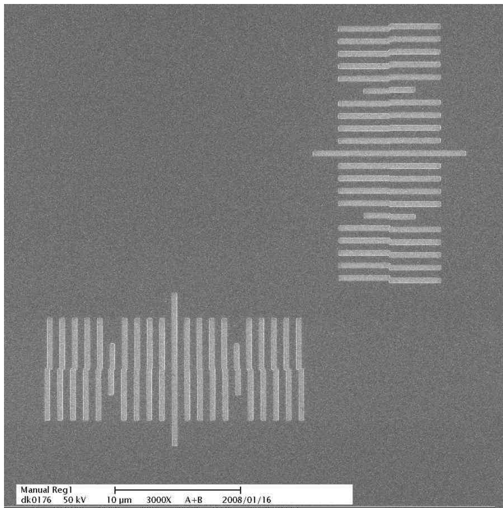
Overlay data (Auto registration)

Vernier position

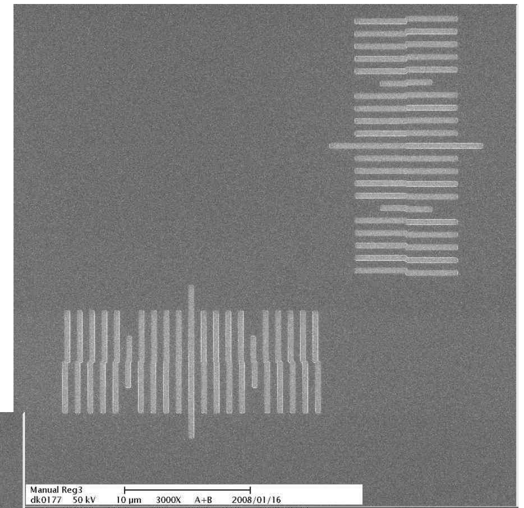


600um scan field

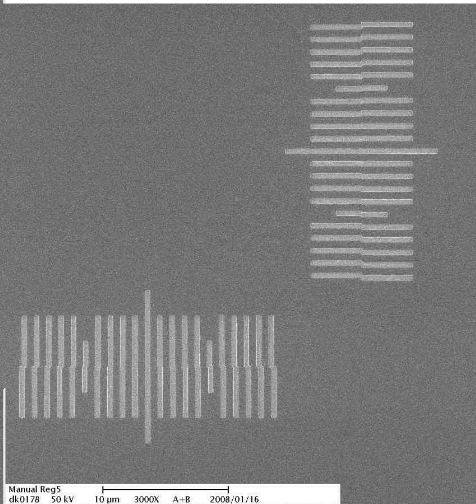
	X	Y
Position.1	0	-20
Position.2	10	-10
Position.3	0	-10
Position.4	0	0
Positioin.5	0	-10



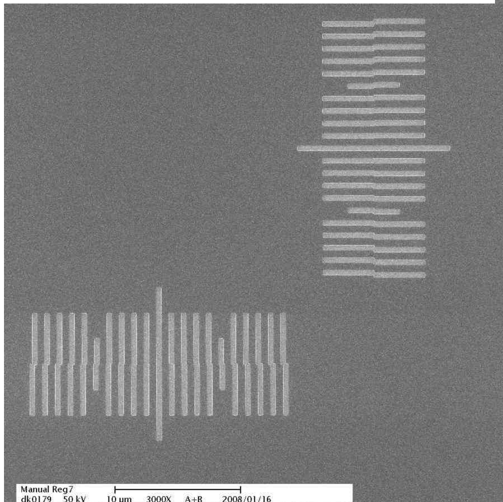
Position.1.



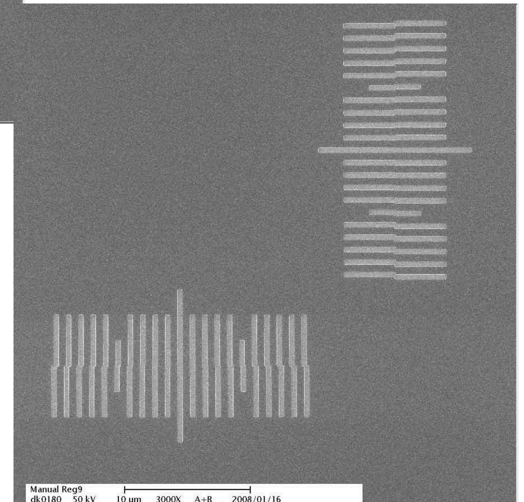
Position.2.



Position.3.



Position.4.



Position.5.

ELIONIX

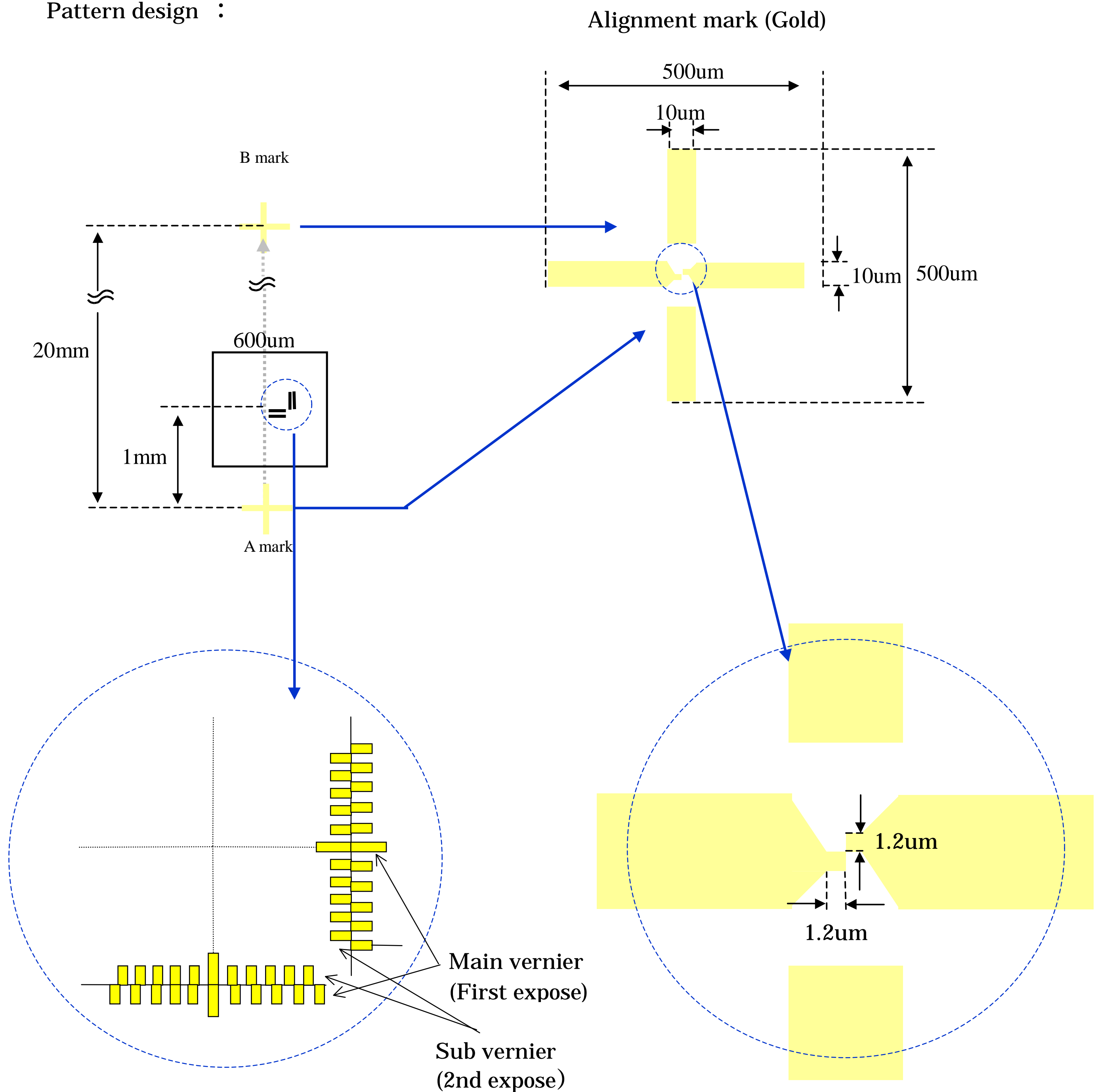
Overlay (Manual registration)

ACCEL. VOLT.	50 kV	EXT.VOLTAGE	3.9 kV
Emission CURR.	68 uA	CATHODE HEAT.	2.31 A
BEAM CURR.	100 pA	OL APERTURE	0.30 mmφ
FIELD SIZE	0.6 mm□	Dot Map	60000 dot
DOSE TIME	1.5 usec/dot	RESIST NAME	ZEP-520A
SUBSTRATE	Si-wafer	RESIST THIKNESS	0.30 um
Development temp	room temp ℃	Development time	360 sec

Measured ：

	Standard	Measured
X	≦±30nm	0nm
Y	≦±30nm	-10nm

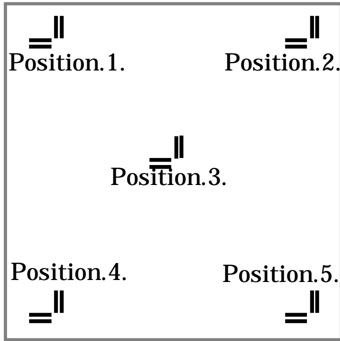
Pattern design ：



ELIONIX

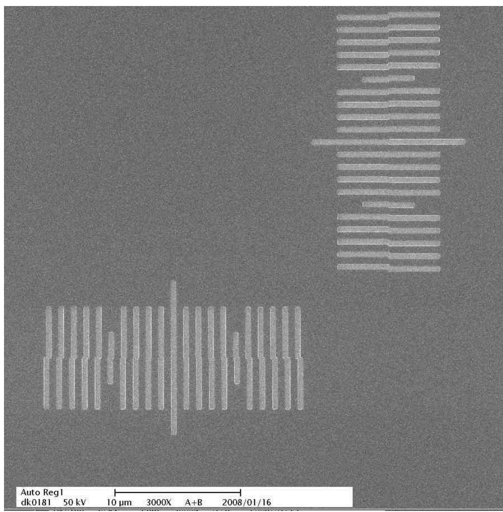
Overlay data (Manual registration)

Vernier position

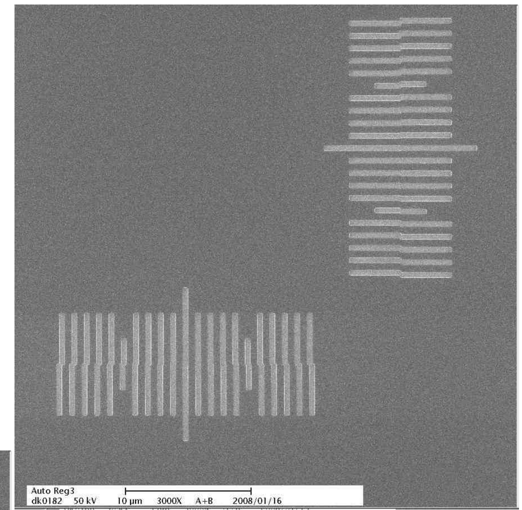


600um scan field

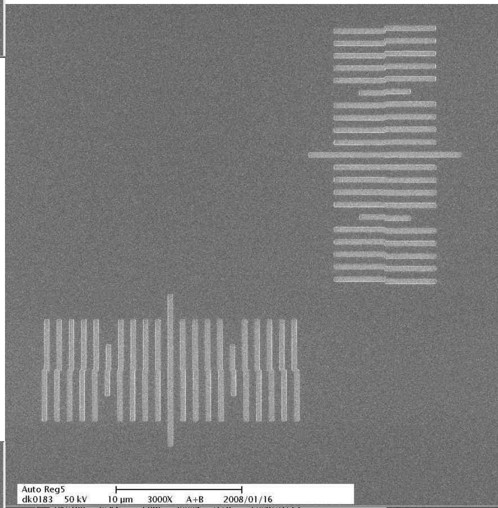
	X	Y
Position.1	0	0
Position.2	0	-10
Position.3	0	0
Position.4	0	0
Positioin.5	0	0



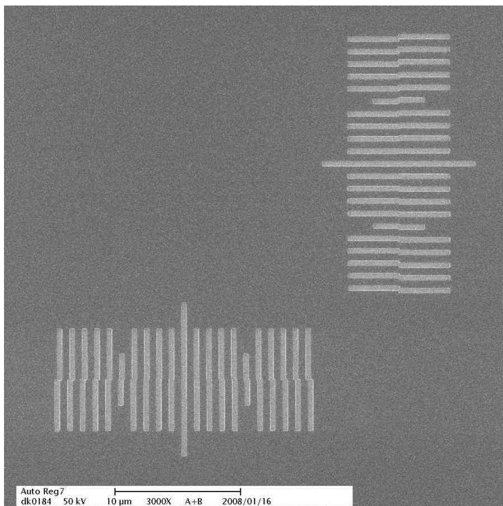
Position.1.



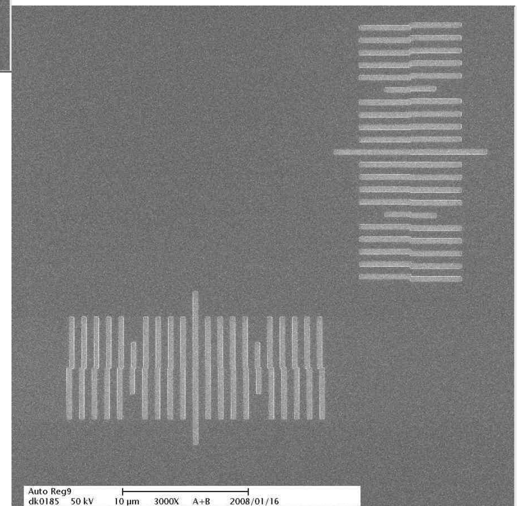
Position.2.



Position.3.



Position.4.



Position.5.