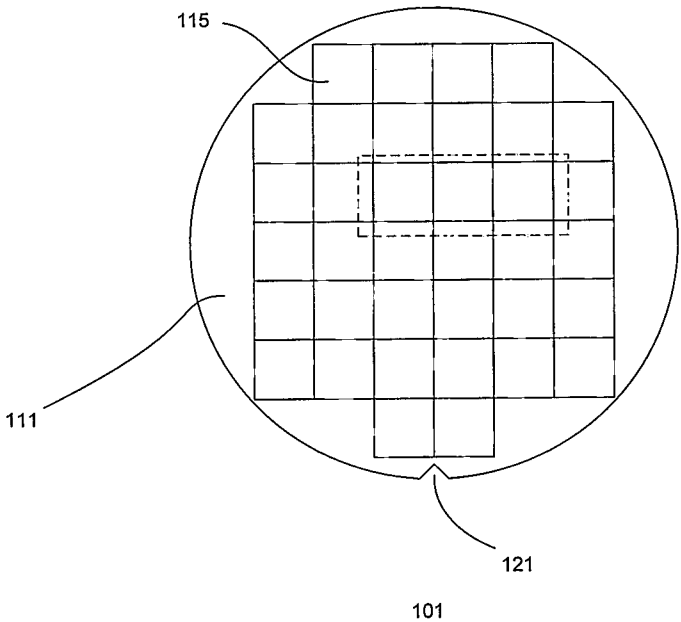



Fig. 1a

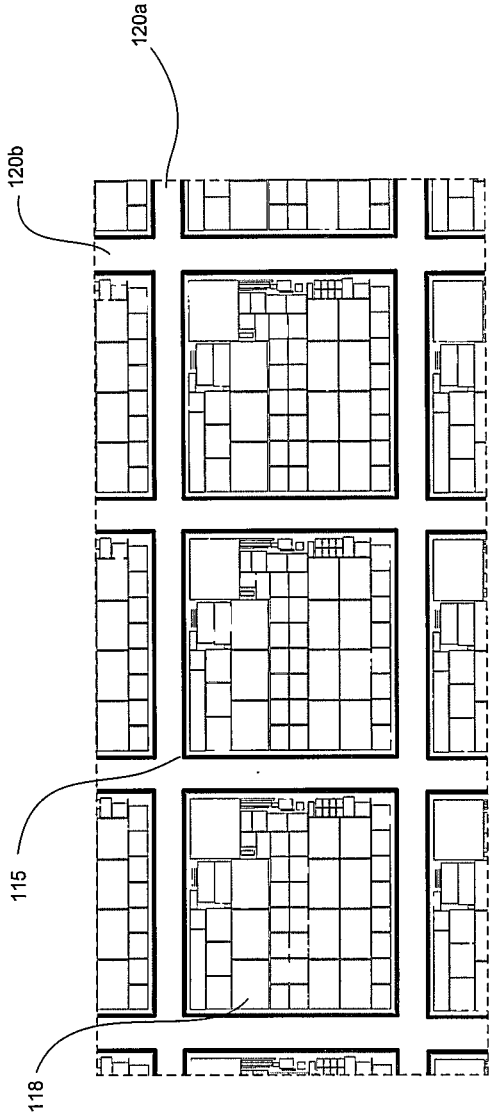



Fig. 1b

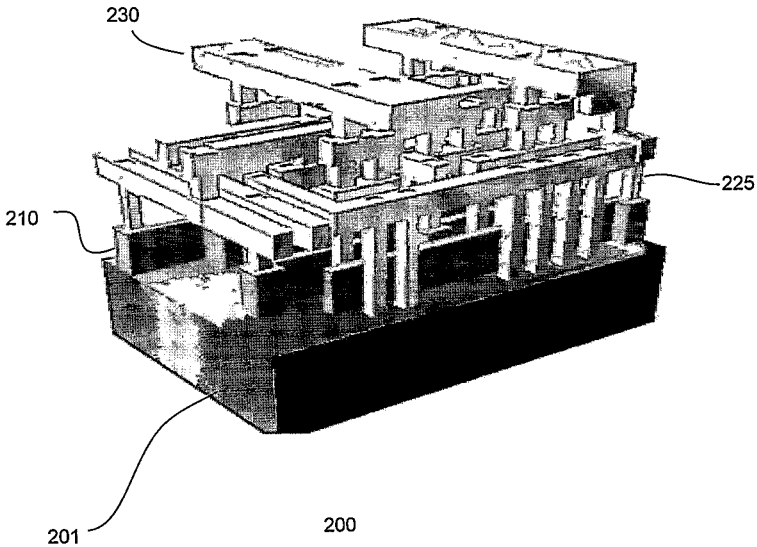



Fig. 2

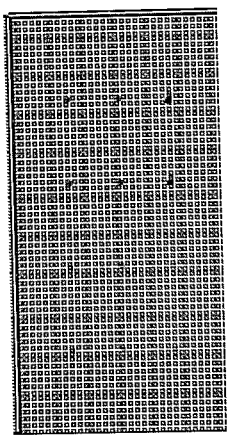



Fig. 3a

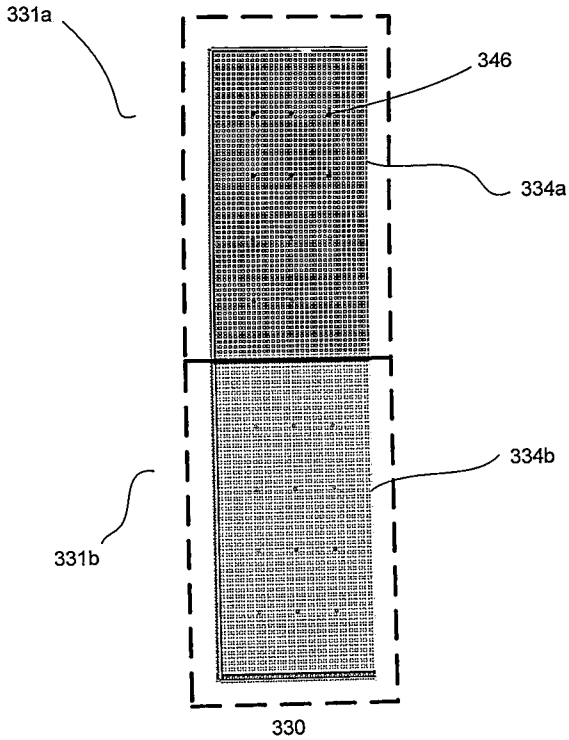



Fig. 3b

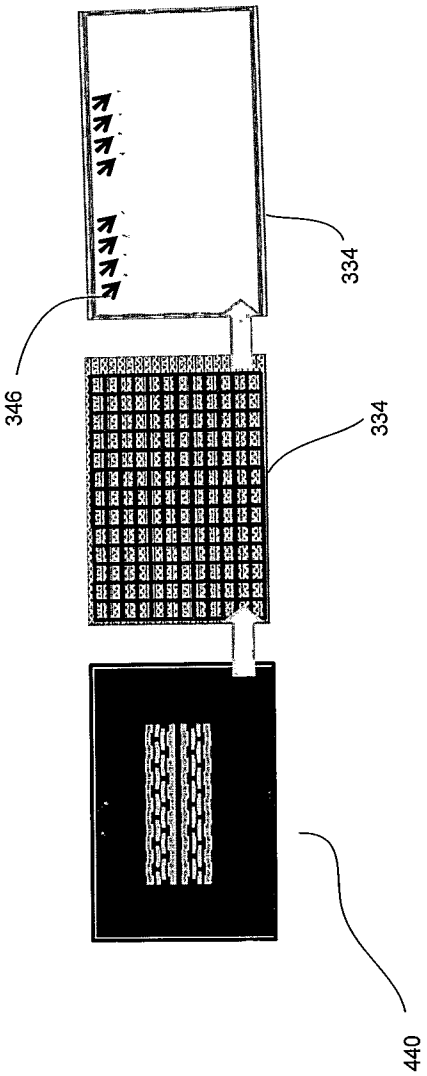



Fig. 4a

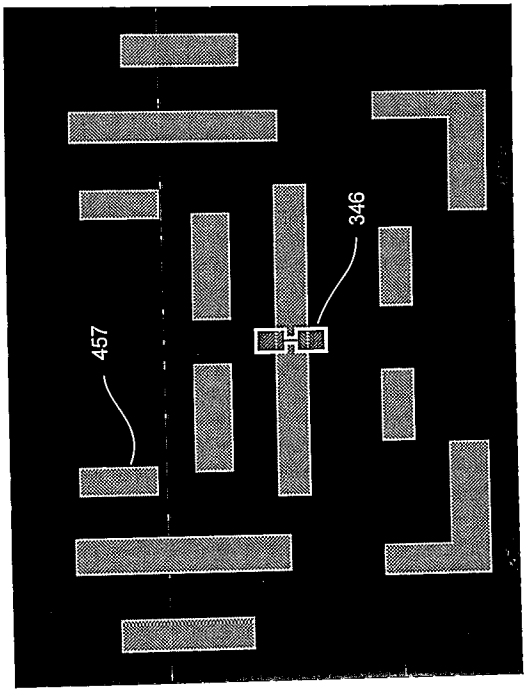



Fig. 4b

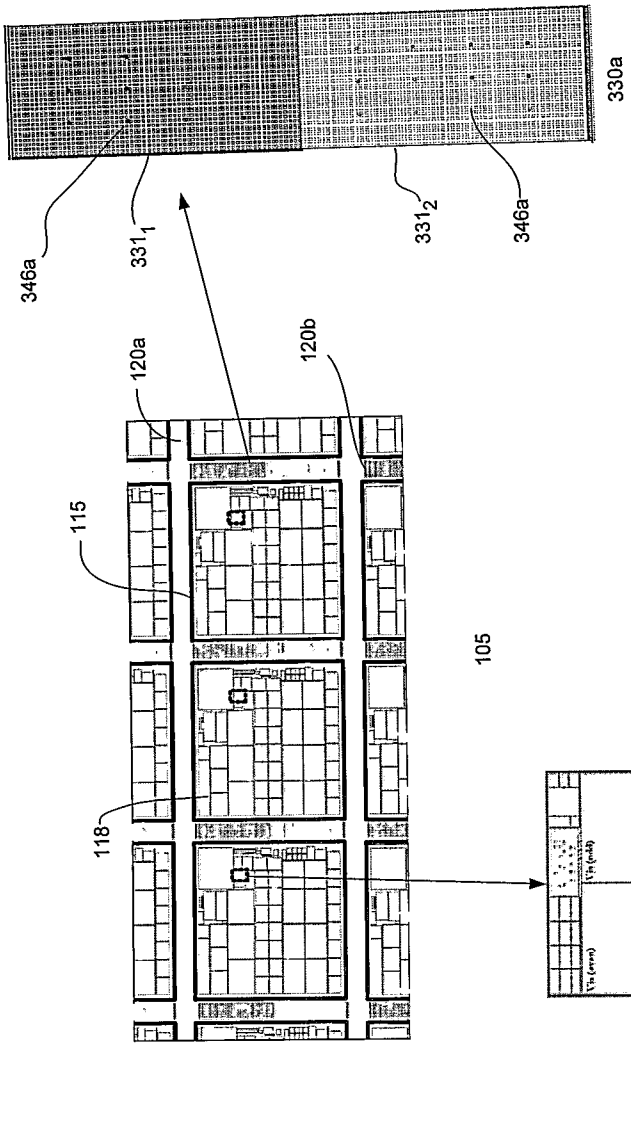

346a
331$_1$
331$_2$
346a
330a
120a
120b
115
118
105
332$_2$
346b
330b
332$_1$
346b

Fig. 5

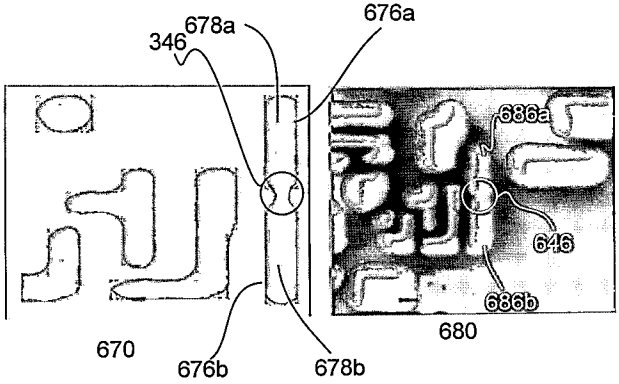

678a
346
676a
686a
646
686b
680
670
676b
678b

Fig. 6a

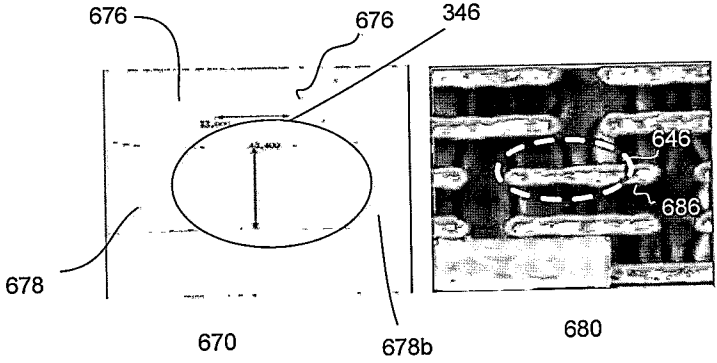

676
676
346
646
686
678
670
678b
680

Fig. 6b

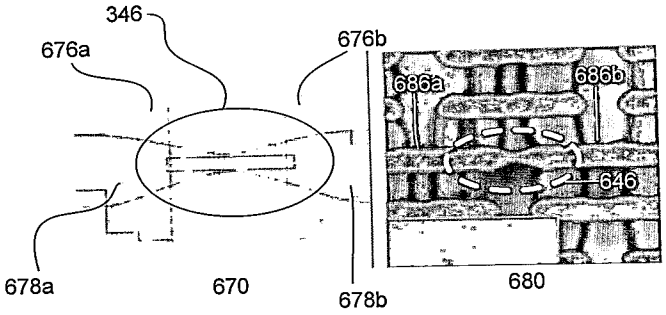

346
676a
676b
686a
686b
646
678a
670
678b
680

Fig. 6c

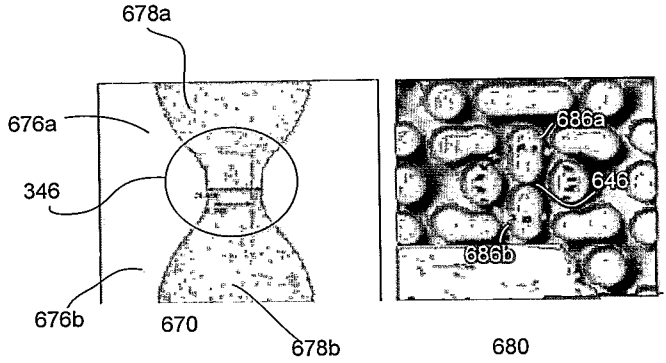

678a
676a
346
686a
646
686b
676b
670
678b
680

Fig. 6d

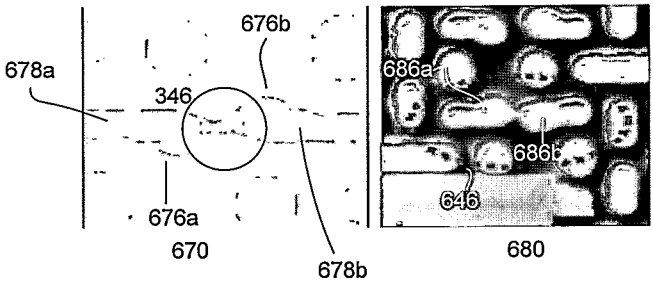

678a
676b
346
676a
670
678b
686a
686b
646
680

Fig. 6e

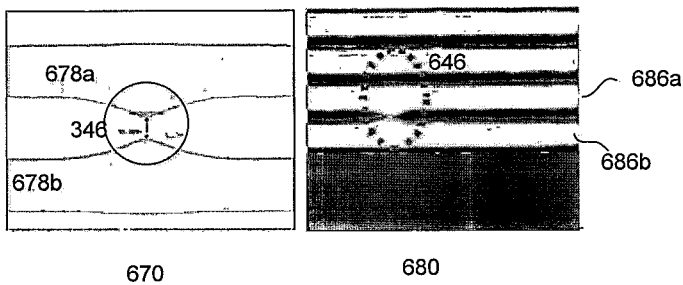

678a
346
678b
670
646
686a
686b
680

Fig. 6f

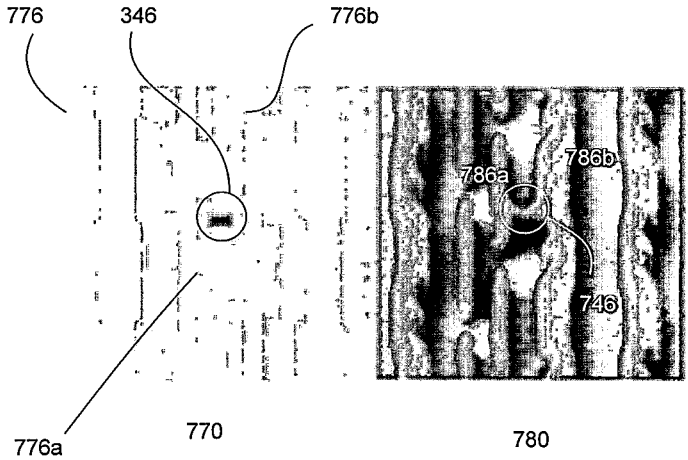



Fig. 7a

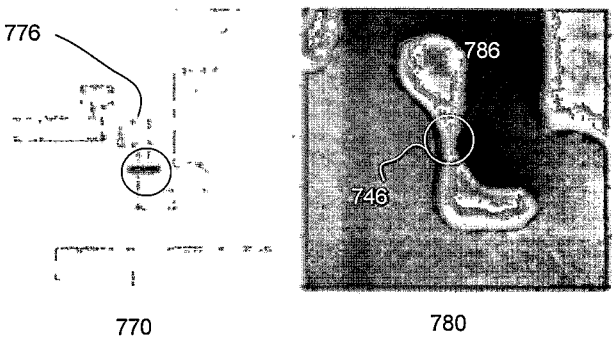



Fig. 7b

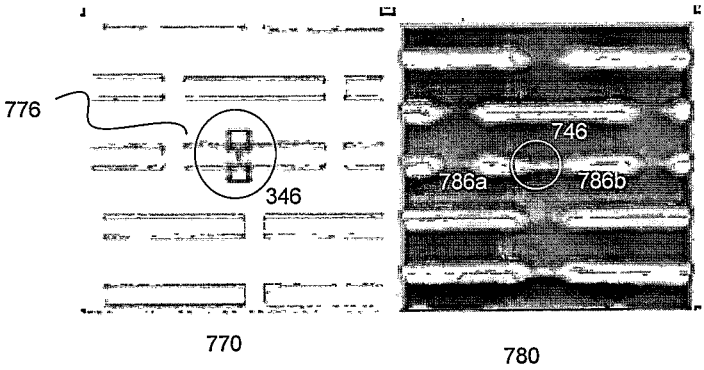



Fig. 7c

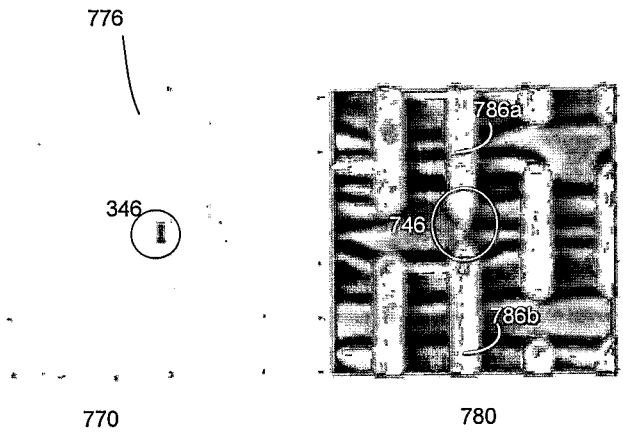



Fig. 7d

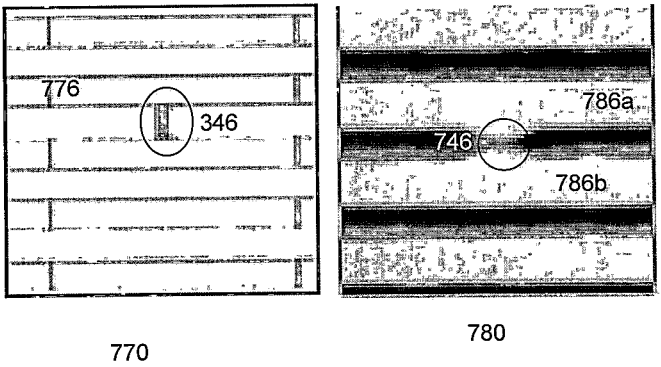



Fig. 7e

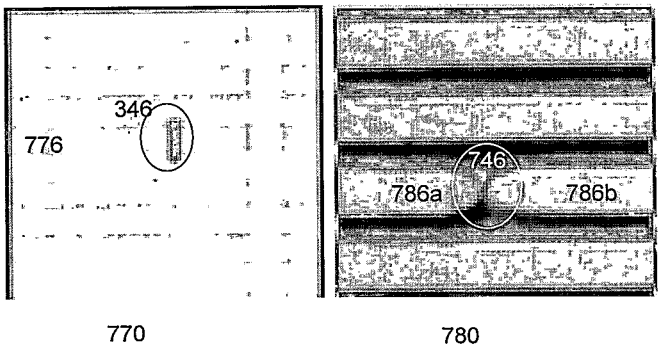



Fig. 7f

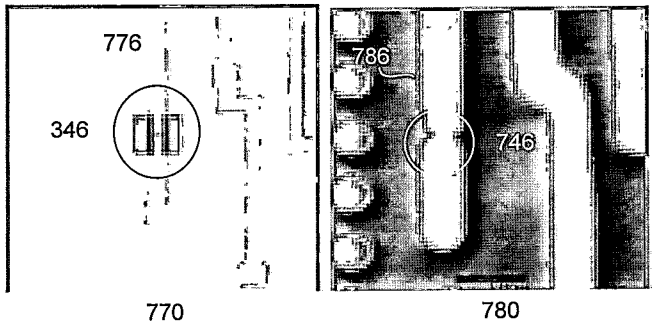



Fig. 7g

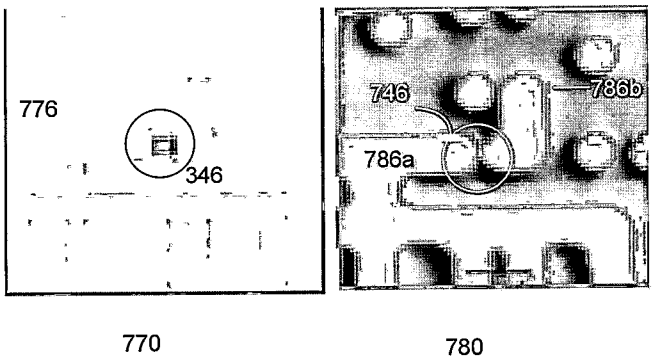



Fig. 7h

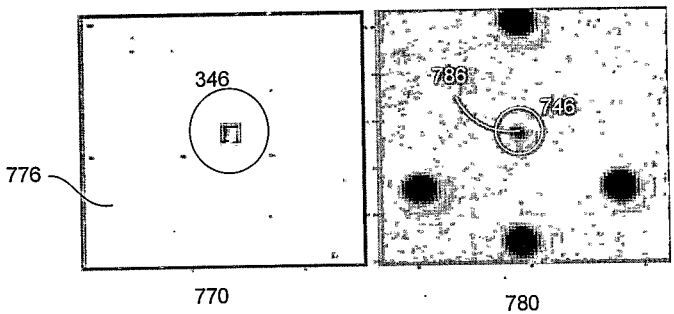



Fig. 7i

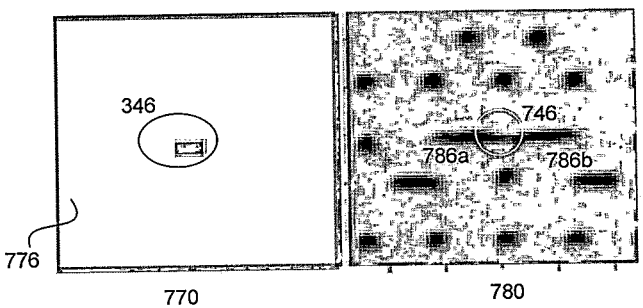



Fig. 7j

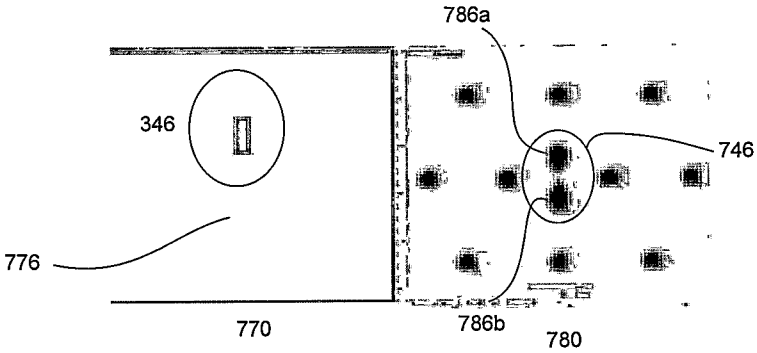



Fig. 7k

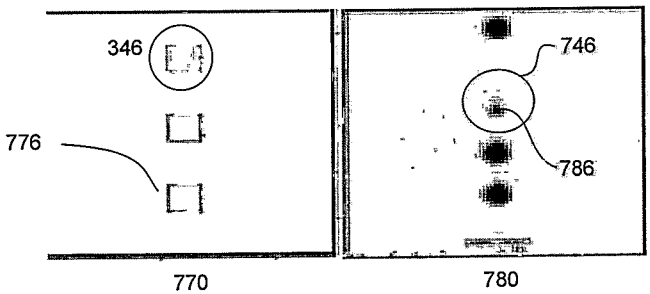



Fig. 7l

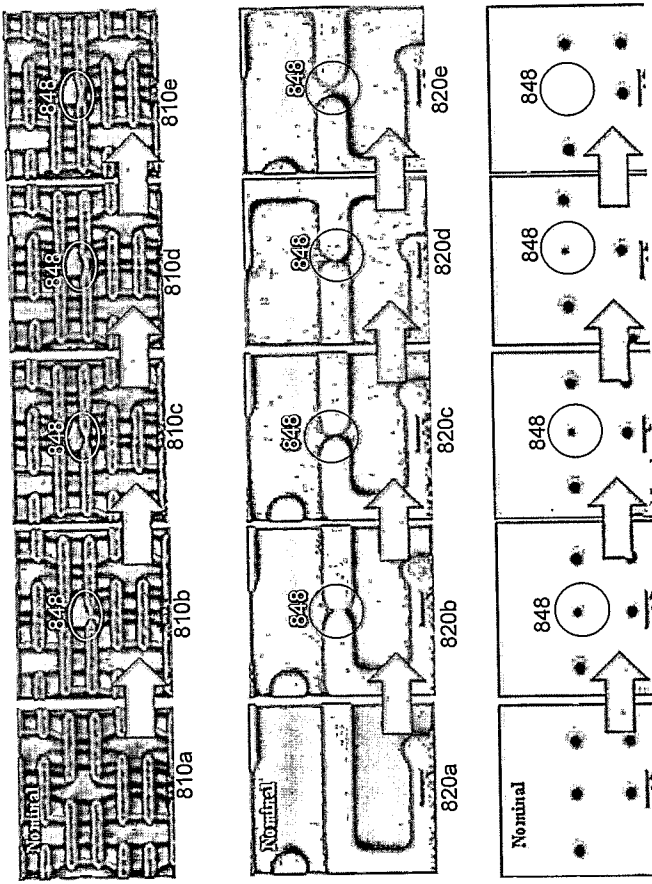

Nominal
848
810
810a
810b
810c
810d
810e
820
820a
820b
820c
820d
820e
830
830a
830b
830c
840d
840e

Fig. 8

| Scan Mode | Spectrum Mode | Imaging Mode | Pixel Size | Focus | Segmentation | Threshold | Merge (um) | Cell Size | IDo | Signal |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 Mix<br>2 Array<br>3 Random | 1.Broadband<br>2.Midband<br>3.Deepband<br>4.Blueband<br>5.I line<br>6.G line<br>7.G-I line | 1.Brightfield<br>2.Edge Contrast +<br>3.High Performance Edge<br>4.VIB<br>5.VPS<br>6.HFS<br>7.VPS-F<br>8.HFS-F<br>9.VPS-M<br>10.HPS-M<br>11.VPS-C<br>12.HPS-C | 1 200nm<br>2 160nm<br>3 120nm<br>4 90nm<br>5 80nm<br>6 50nm | Inspection eye dependent | 0 - 255<br>Defect of Interest (DOI) dependent | > 0 | 5 ~ 15 | Depends on products | Depends on products/Eye | Different defect carries different signal |
| 910a | 910b | 910c | 910d | 910e | 910f | 910g | 910h | 910i | 910j | 910k |

900

Fig. 9a

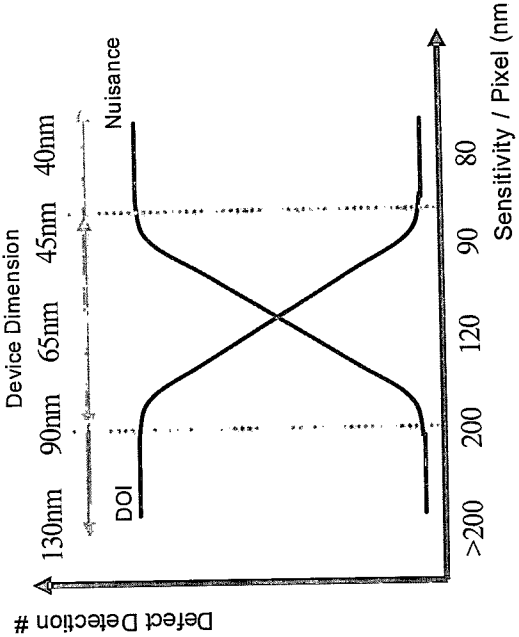

Defect Detection #
Device Dimension
130nm
90nm
65nm
45nm
40nm
DOI
Nuisance
>200
200
120
90
80
Sensitivity / Pixel (nm
905

Fig. 9b

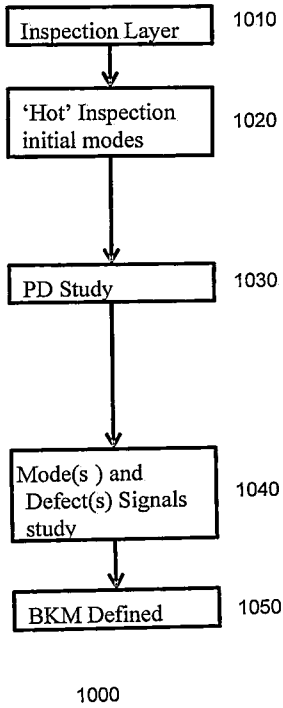

Inspection Layer
1010
'Hot' Inspection initial modes
1020
PD Study
1030
Mode(s ) and Defect(s) Signals study
1040
BKM Defined
1050
1000

Fig. 10a

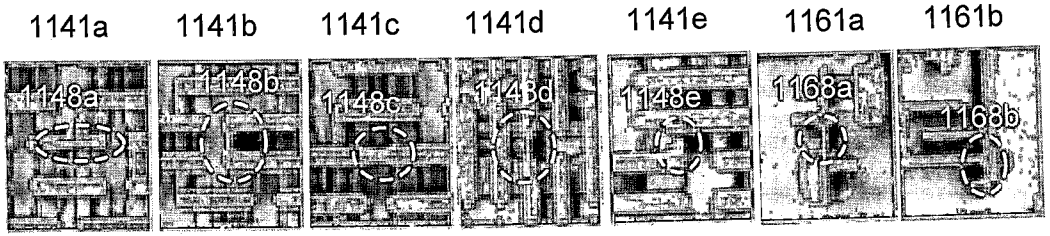
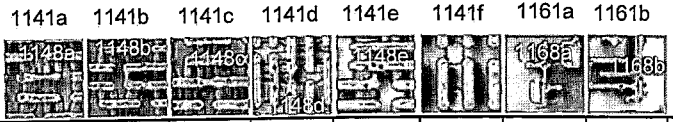

1141a
1141b
1141c
1141d
1141e
1161a
1161b
1148a
1148b
1148c
1148d
1148e
1168a
1168b



Fig. 10b




| Spectral Mode | | Focus (um) | Pixel Size (um) | SRAM BK I | SRAM BG I | SRAM BG M | SRAM BG Subtle T2T | SRAM BG Lateral MM | SRAM Nuisance | LOG BG II | LOG BG VI | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G Line | BF | 0.00 | 0.09 | 1.1 | 1.11 | 2.6 | 2.17 | 0.9 | 1.00 | 1.33 | 1.45 | 1.40 |
| GHI-Line | ECP | -0.15 | 0.09 | 4.02 | 3.07 | 2.55 | 2.41 | 2.5 | 1.71 | 3.11 | 2.75 | 2.92 |
| GHI-Line | VIB | -0.20 | 0.09 | 1.82 | 2.61 | 2.11 | 2.1 | 1.33 | 1.4 | 1.63 | 2 | 1.94 |
| GHI-Line | BF | -0.10 | 0.09 | 3.14 | 3.09 | 2.5 | 2.33 | 1.83 | 1.17 | 3 | 3.1 | 2.71 |
| I-Line | BF | -0.10 | 0.09 | 3.05 | 2.76 | 1.81 | 1.6 | 2.33 | 1.4 | 2 | 1.67 | 2.17 |
| Middleband_DUV | BF | -0.10 | 0.09 | 1.51 | 1.74 | 1.88 | 1.38 | 2.5 | 2.33 | 2.33 | 2.11 | 1.92 |
| Deepband_DUV | VIB | -0.20 | 0.09 | 0.89 | 1.19 | 2 | 1.86 | 1.7 | 1.75 | 1.17 | 1.5 | 1.49 |
| Deepband_DUV | BF | -0.10 | 0.09 | 1 | 1.15 | 2.19 | 2 | 1.86 | 1.6 | 2 | 2.16 | 1.77 |
| Blueband_DUV | ECP | -0.15 | 0.09 | 1.06 | 1.93 | 2.1 | 1.63 | 1.91 | 1.43 | 2.5 | 3 | 2.02 |
| Blueband_DUV | VIB | -0.20 | 0.09 | 1.12 | 1.26 | 2.23 | 1.43 | 2.11 | 2.29 | 1.78 | 2.7 | 1.80 |
| Blueband_DUV | BF | -0.10 | 0.09 | 1.49 | 1.56 | 2.3 | 2.13 | 2.25 | 2 | 2.5 | 2.25 | 2.07 |
| Broadband_DUV | ECP | -0.15 | 0.09 | 3.9 | 3.8 | 2.82 | 2.7 | 2.67 | 1.33 | 3.37 | 3.5 | 3.25 |
| Broadband_DUV | VIB | -0.20 | 0.09 | 1.75 | 2.05 | 2.13 | 1.5 | 1.86 | 1.86 | 2.43 | 2.2 | 1.99 |
| Broadband_DUV | BF | -0.10 | 0.09 | 2.16 | 2.77 | 2.2 | 2.17 | 2.67 | 2.2 | 2.67 | 3 | 2.52 |

1120$_1$

1120$_N$

1120$_2$

1120$_4$

1120$_{12}$

1140a ---------- 1140f 1160a 1160b

1120 1140 1160 1180

1100

Fig. 11

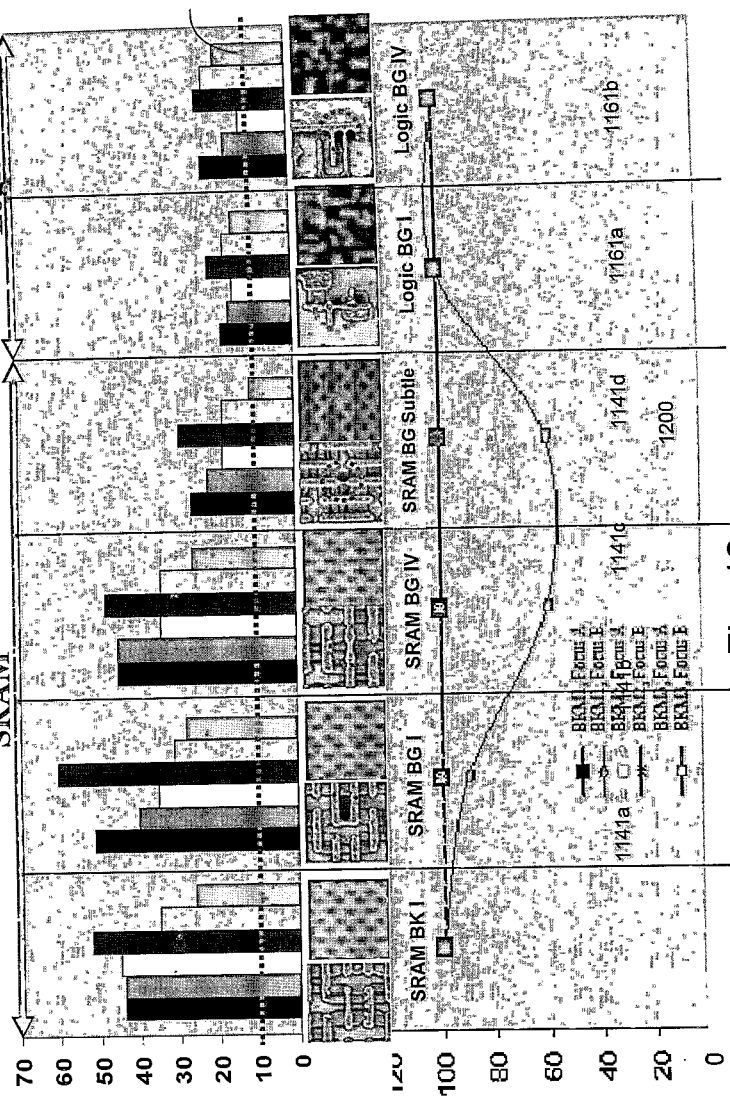
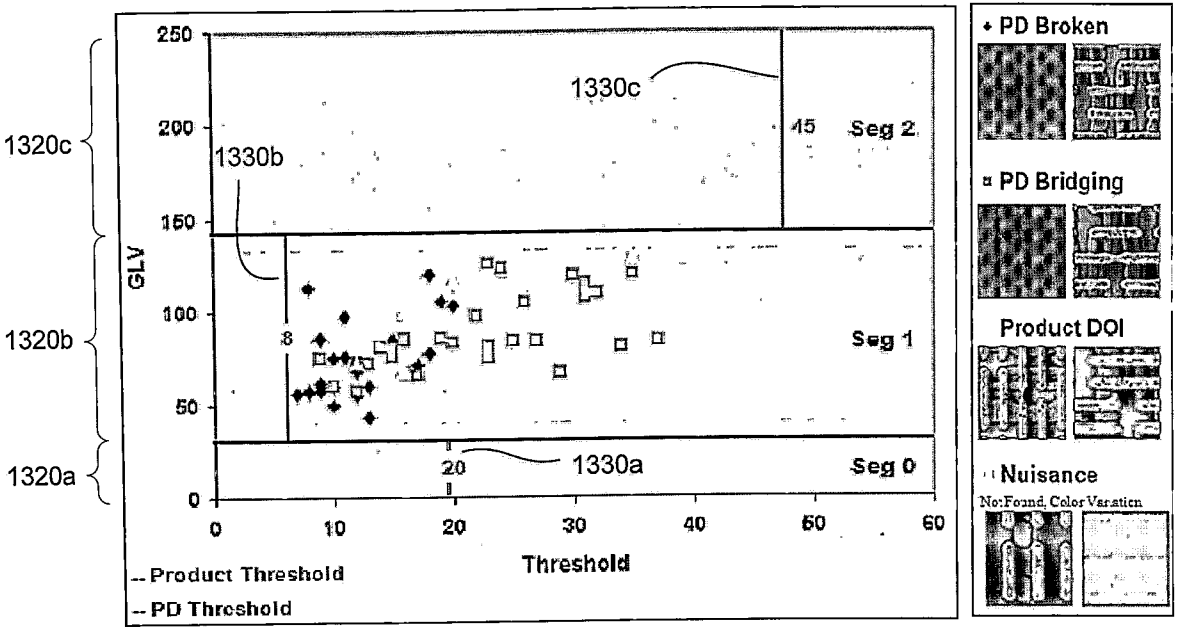
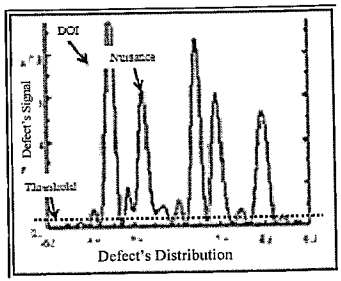

SRAM
Logic
1260
Signal
70
60
50
40
30
20
10
0
Capacitance (%)
120
100
80
60
40
20
0
SRAM BK I
SRAM BG I
SRAM BG IV
SRAM BG Subtle
Logic BG I
Logic BG IV
1141a
1141b
1141c
1141d
1161a
1161b
1200
BK#1 Focus A
BK#1 Focus B
BK#4 Focus A
BK#4 Focus B

Fig. 12


1320c
1320b
1320a
250
200
150
100
50
0
GLV
1330c
1330b
45
Seg 2
8
Seg 1
20
1330a
Seg 0
0
10
20
30
40
50
60
Threshold
-- Product Threshold
-- PD Threshold
PD Broken
PD Bridging
Product DOI
Nuisance
No:Found, Color Variation

1300

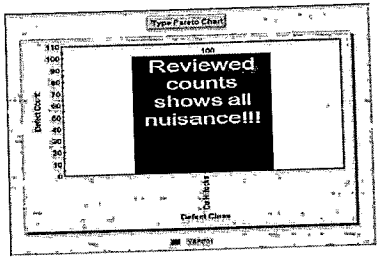
Fig. 13




1410

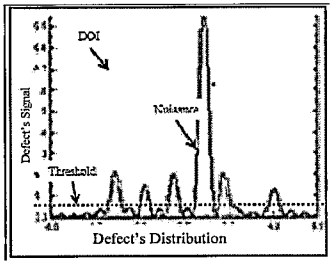


1430

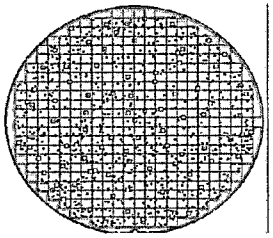



1440

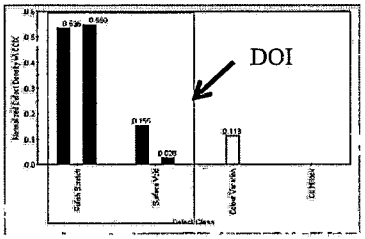
Fig. 14a




1415



1435




1445

1405



Fig. 14b

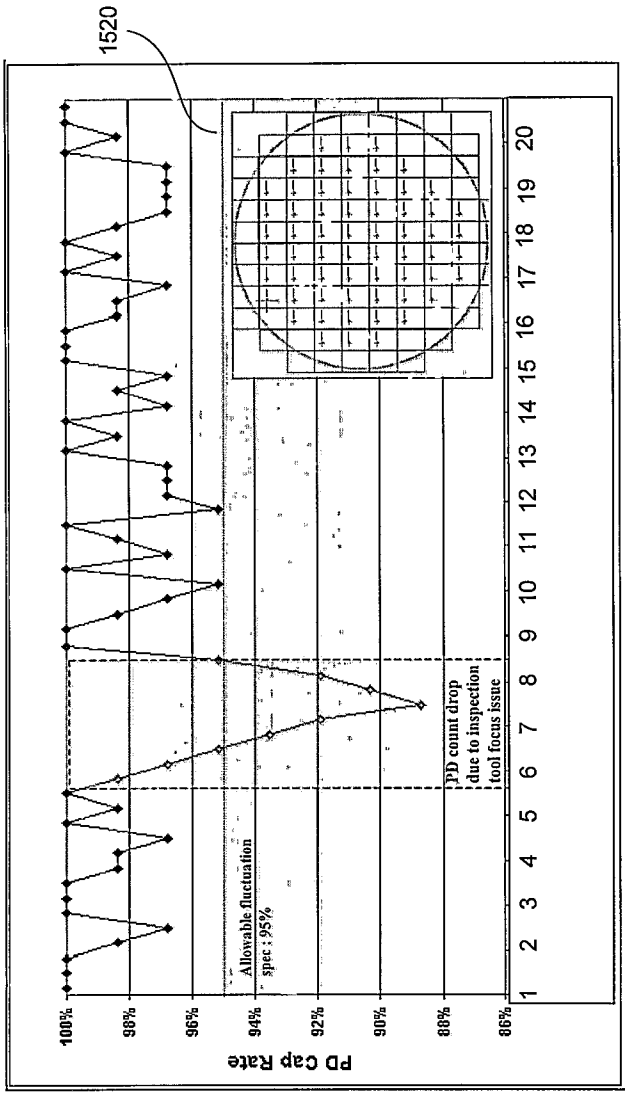

1520
PD Cap Rate
100%
98%
96%
94%
92%
90%
88%
86%
Allowable fluctuation
spec : 95%
PD count drop
due to inspection
tool focus issue
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
1500

Fig. 15

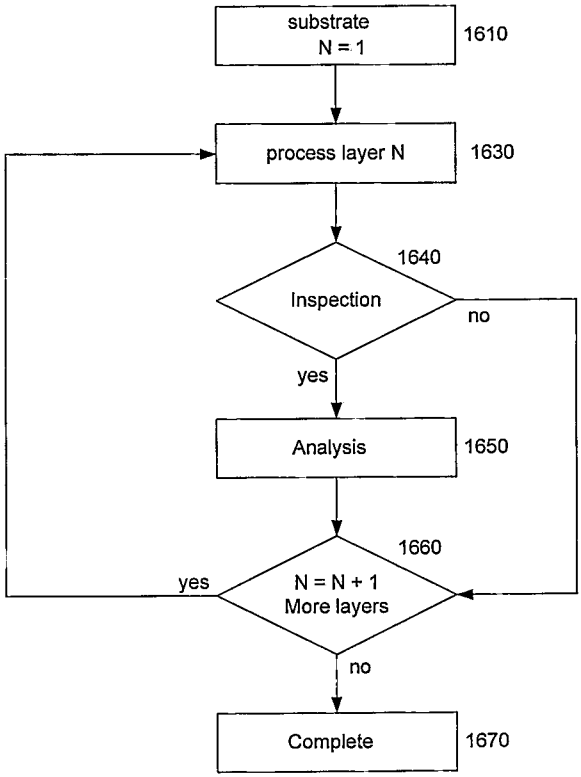

substrate
N = 1
1610
process layer N
1630
1640
Inspection
no
yes
Analysis
1650
1660
yes
N = N + 1
More layers
no
Complete
1670
1600

Fig. 16