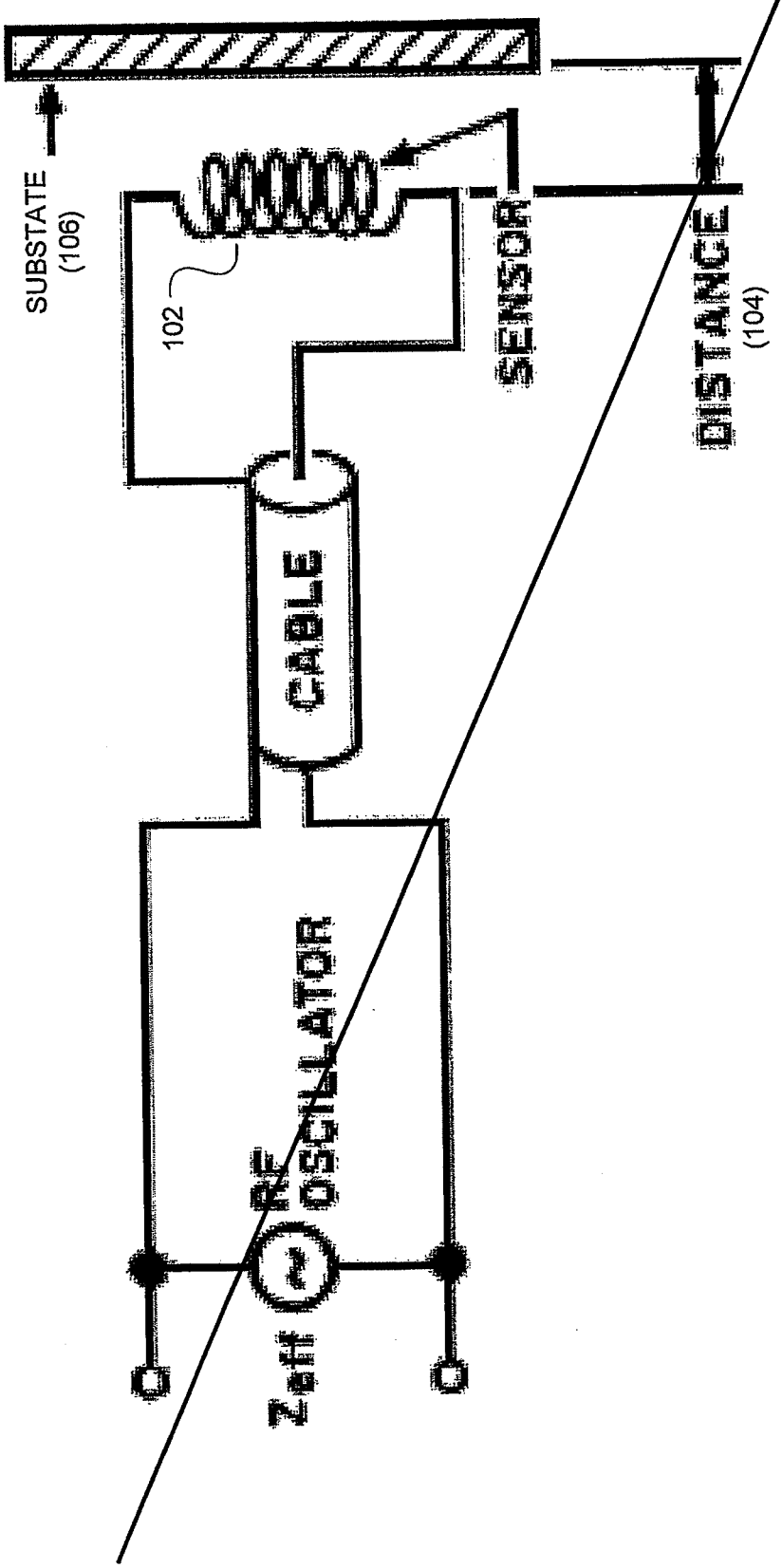

SUBSTATE
(106)
102
SENSOR
DISTANCE
(104)
CABLE
RF OSCILLATOR
Zeff

FIG. 1

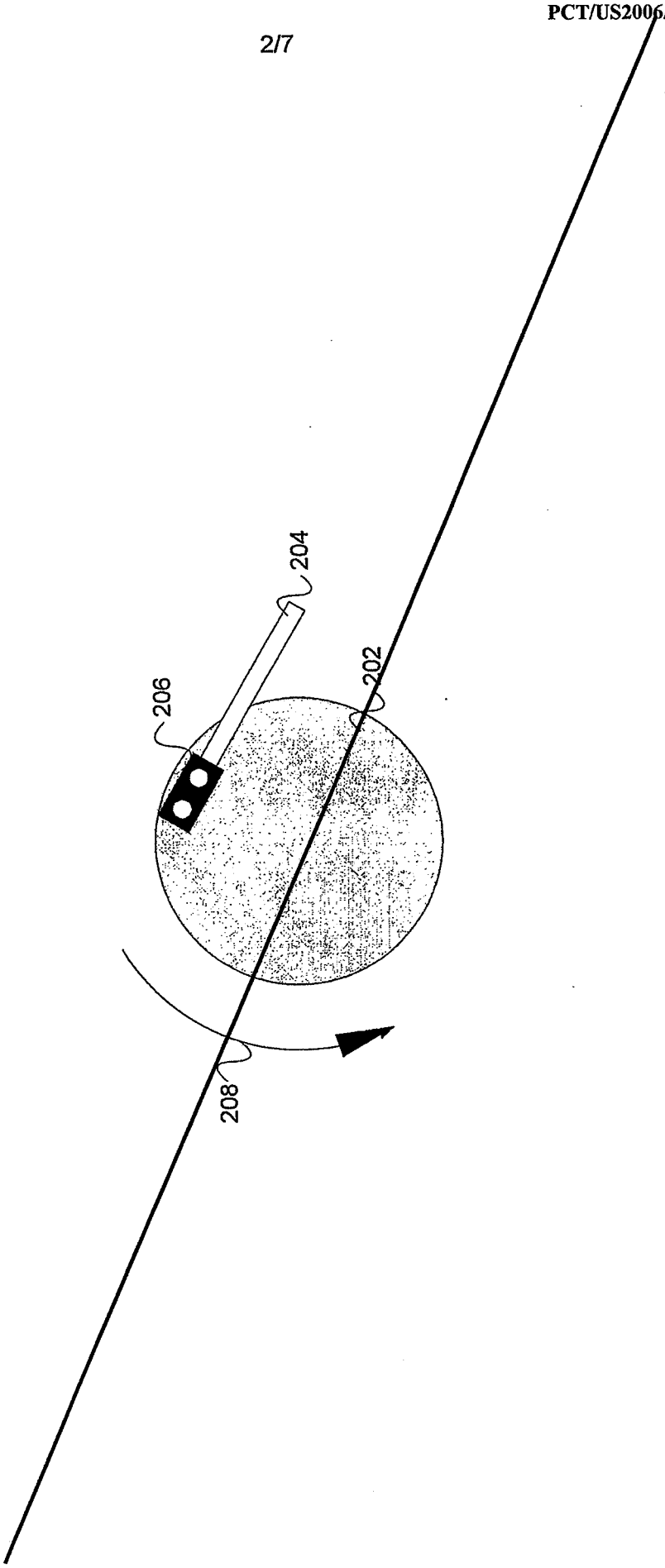


FIG. 2

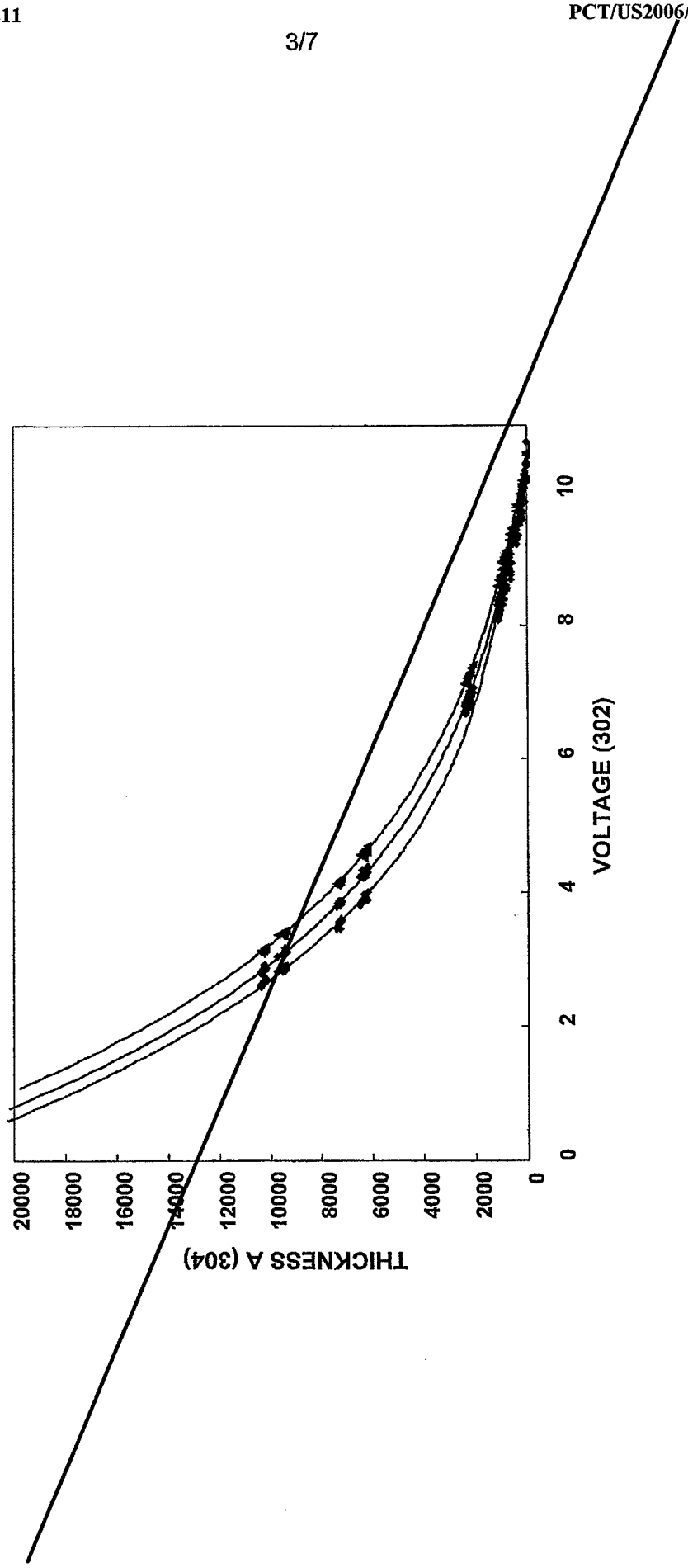

THICKNESS A (304)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
VOLTAGE (302)
0
2
4
6
8
10

FIG. 3

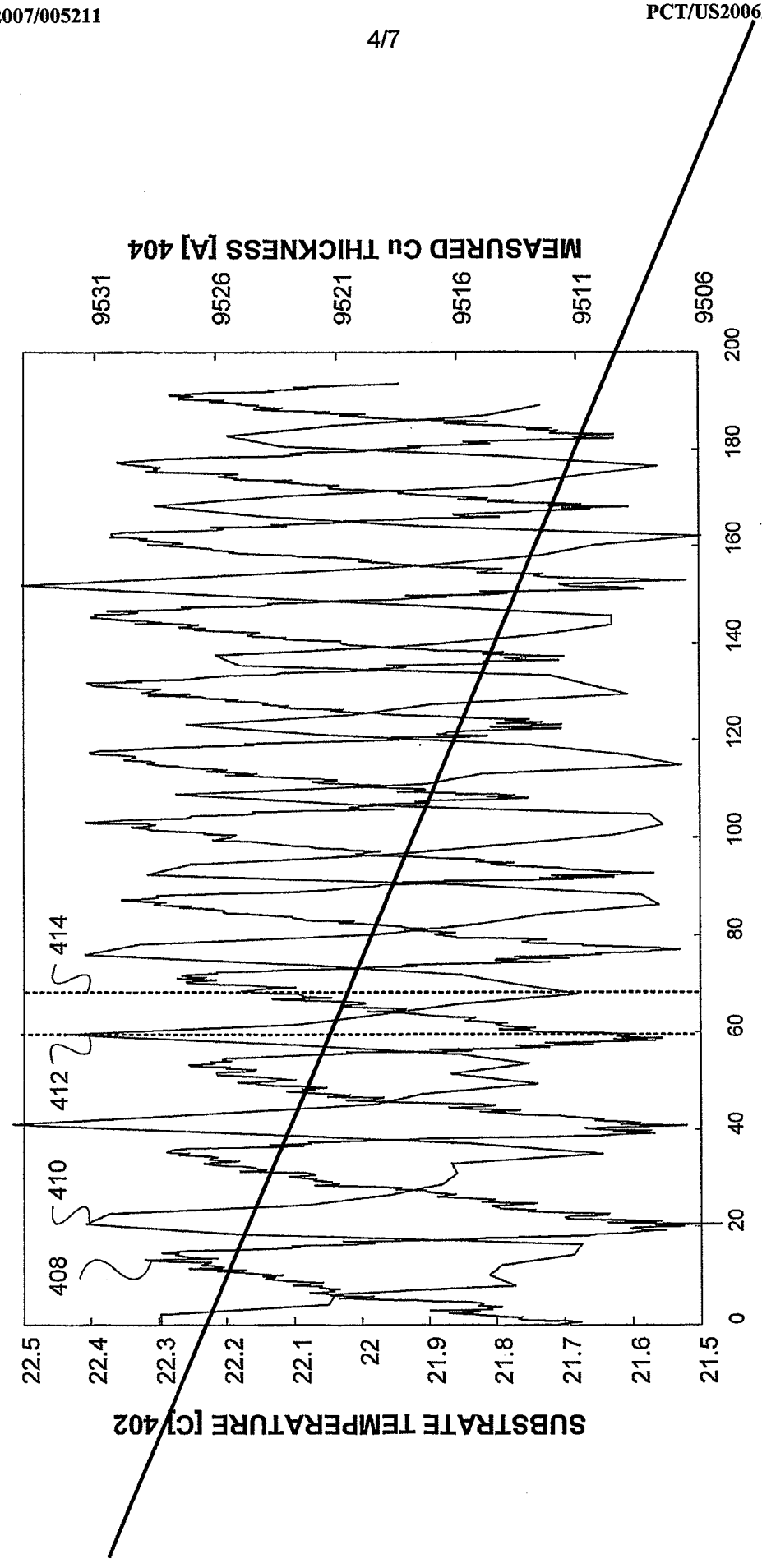

SUBSTRATE TEMPERATURE [C] 402
MEASURED Cu THICKNESS [A] 404
TIME [MIN] 406
408
410
412
414
22.5
22.4
22.3
22.2
22.1
22
21.9
21.8
21.7
21.6
21.5
9531
9526
9521
9516
9511
9506
0
20
40
60
80
100
120
140
160
180
200

FIG. 4

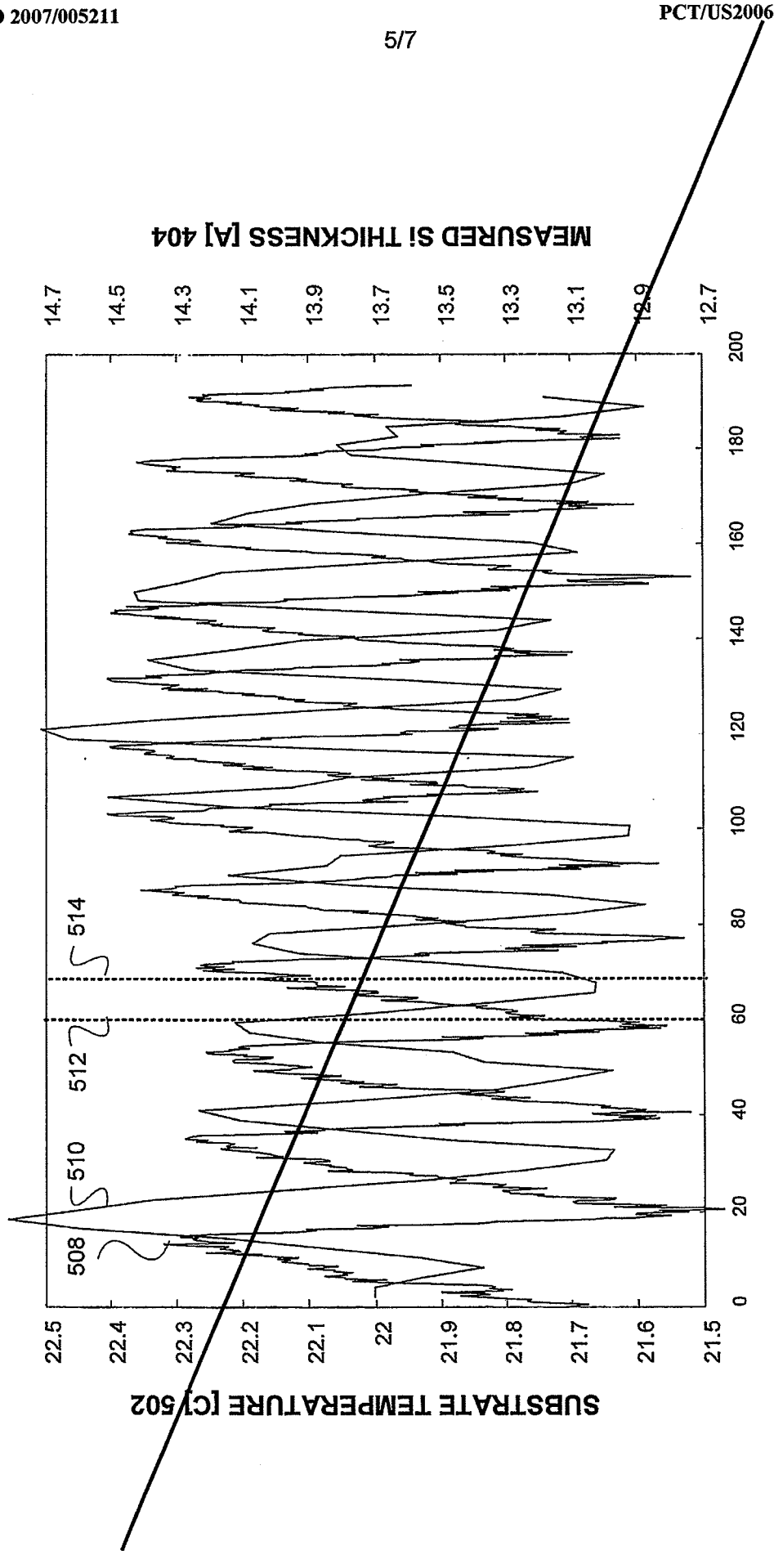

SUBSTRATE TEMPERATURE [C] 502
MEASURED Si THICKNESS [A] 404
TIME [MIN] 506
508
510
512
514
22.5
22.4
22.3
22.2
22.1
22
21.9
21.8
21.7
21.6
21.5
14.7
14.5
14.3
14.1
13.9
13.7
13.5
13.3
13.1
12.9
12.7
0
20
40
60
80
100
120
140
160
180
200

FIG. 5

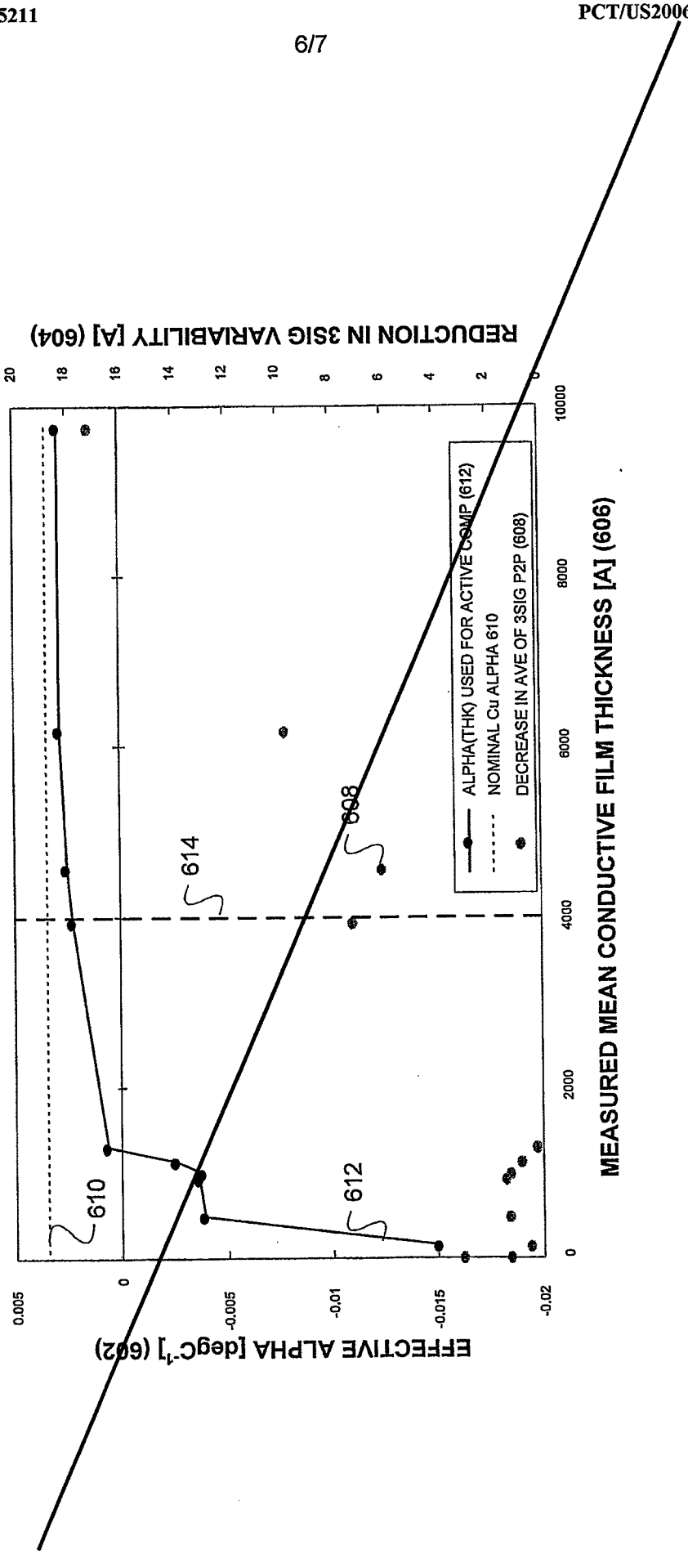

EFFECTIVE ALPHA [degC-1] (602)
0.005
0
-0.005
-0.01
-0.015
-0.02
REDUCTION IN 3SIG VARIABILITY [A] (604)
20
18
16
14
12
10
8
6
4
2
0
MEASURED MEAN CONDUCTIVE FILM THICKNESS [A] (606)
0
2000
4000
6000
8000
10000
ALPHA(THK) USED FOR ACTIVE COMP (612)
NOMINAL Cu ALPHA 610
DECREASE IN AVE OF 3SIG P2P (608)
610
612
614
608

FIG. 6

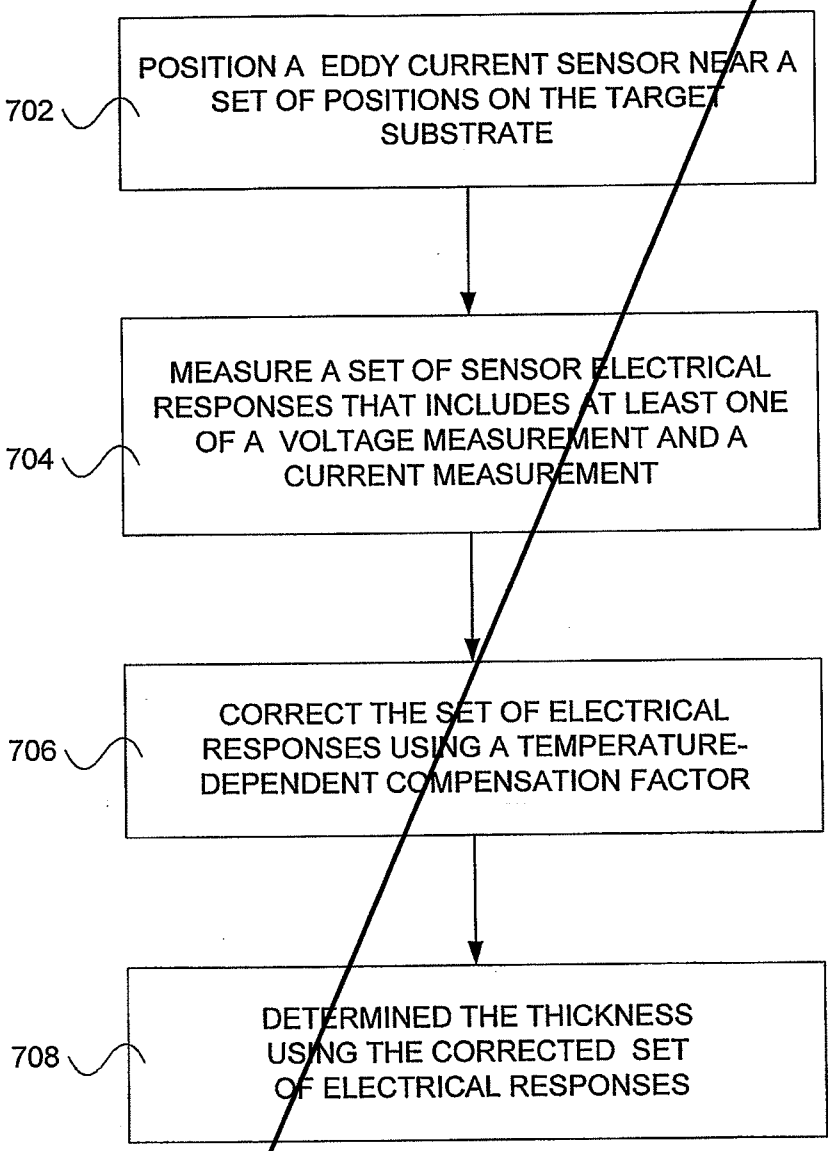

POSITION A EDDY CURRENT SENSOR NEAR A SET OF POSITIONS ON THE TARGET SUBSTRATE
702
MEASURE A SET OF SENSOR ELECTRICAL RESPONSES THAT INCLUDES AT LEAST ONE OF A VOLTAGE MEASUREMENT AND A CURRENT MEASUREMENT
704
CORRECT THE SET OF ELECTRICAL RESPONSES USING A TEMPERATURE-DEPENDENT COMPENSATION FACTOR
706
DETERMINED THE THICKNESS USING THE CORRECTED SET OF ELECTRICAL RESPONSES
708

FIG. 7

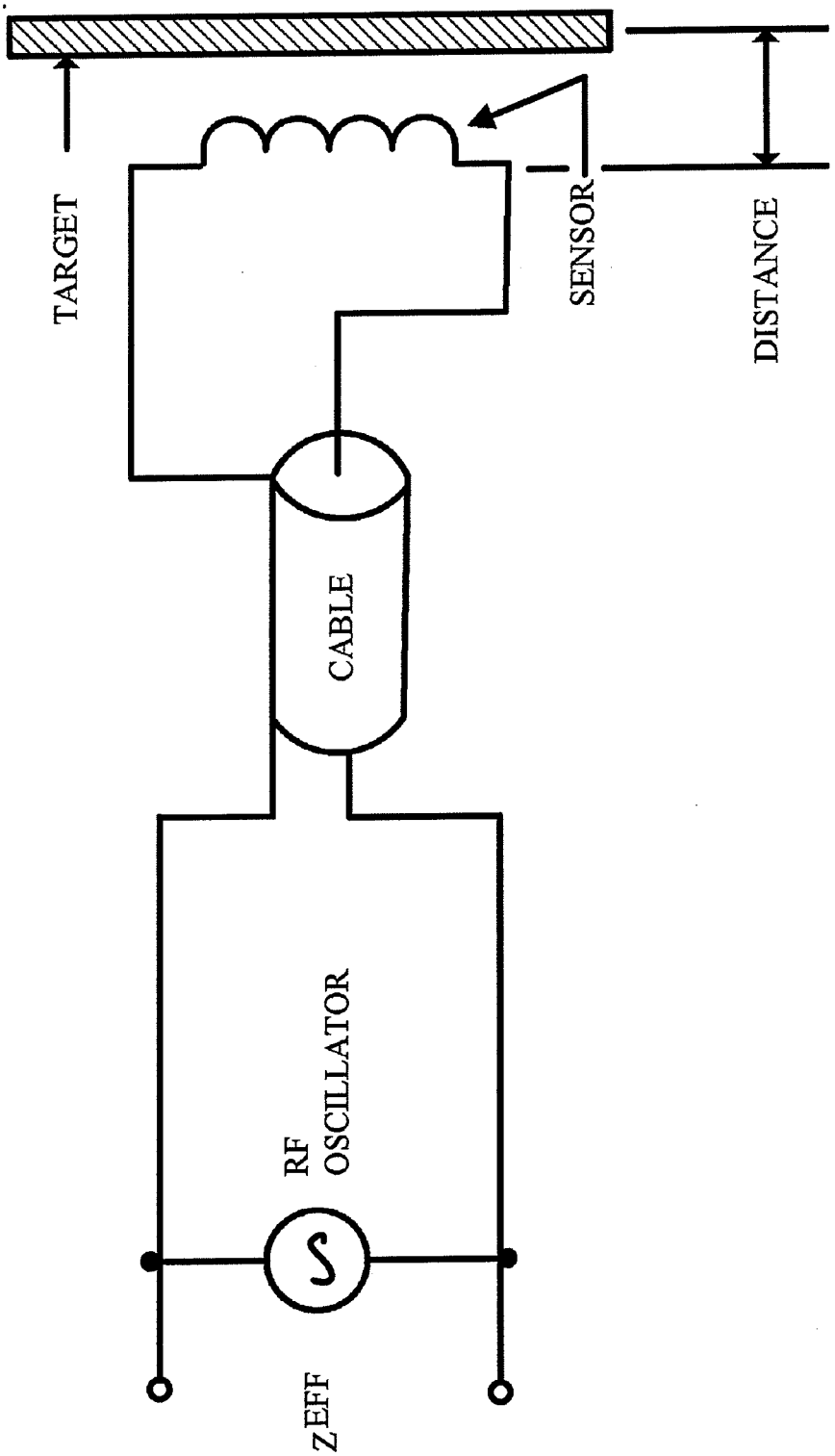


FIG. 1
(PRIOR ART)

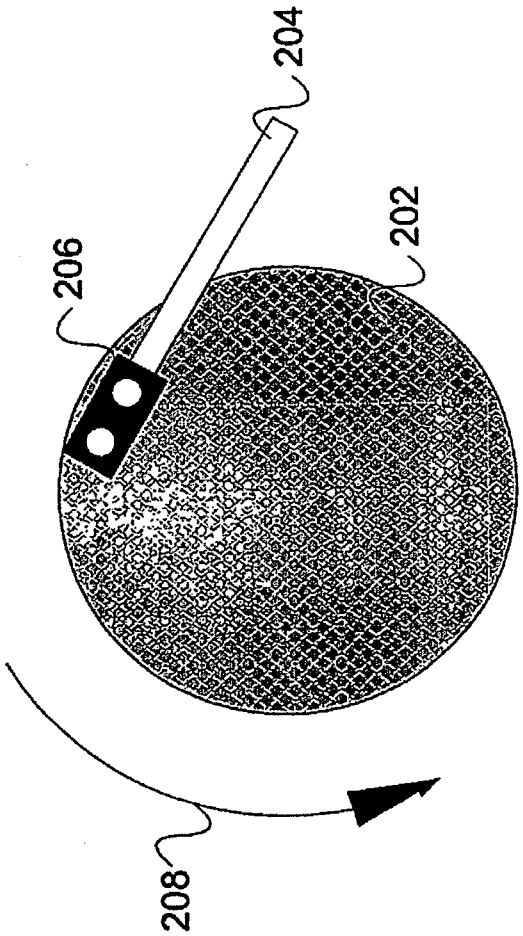


FIG. 2

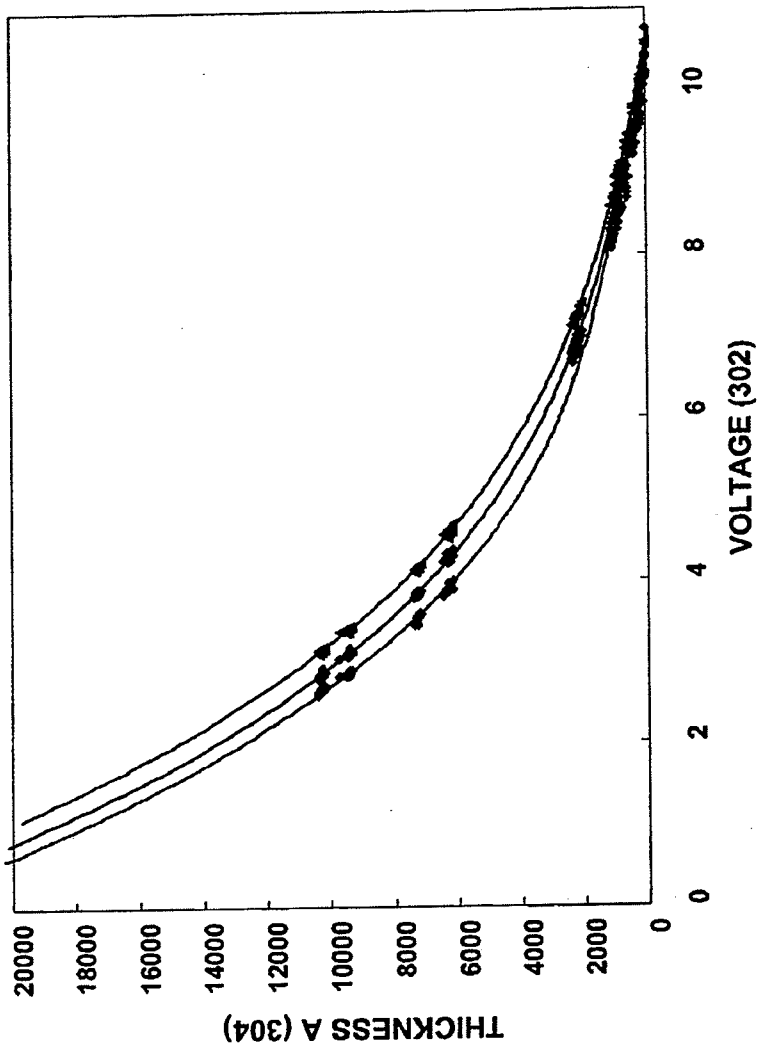

THICKNESS A (304)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
2
4
6
8
10
VOLTAGE (302)

FIG. 3

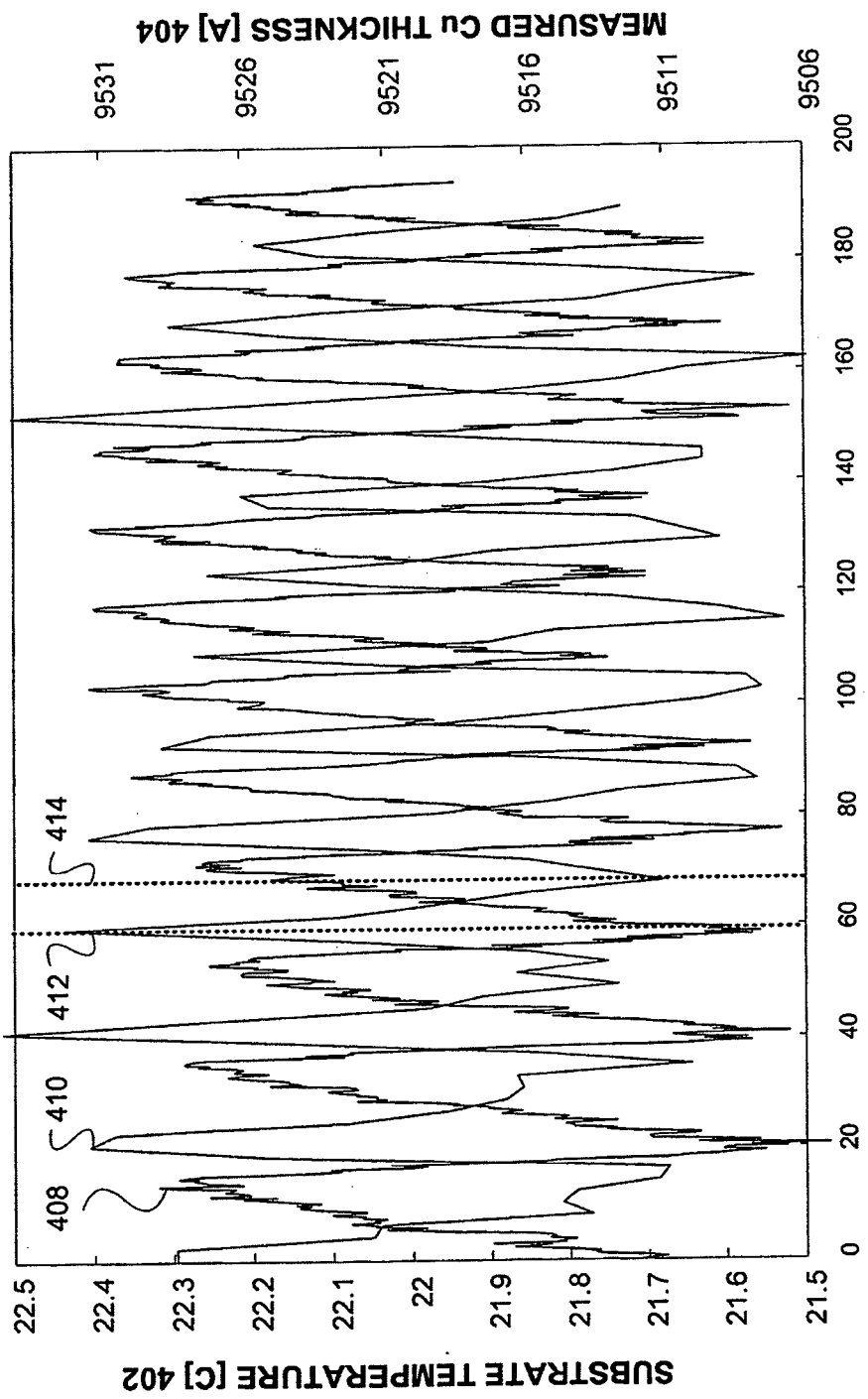

MEASURED Cu THICKNESS [A] 404
9531
9526
9521
9516
9511
9506
SUBSTRATE TEMPERATURE [C] 402
22.5
22.4
22.3
22.2
22.1
22
21.9
21.8
21.7
21.6
21.5
408
410
412
414
0
20
40
60
80
100
120
140
160
180
200
TIME [MIN] 406

FIG. 4

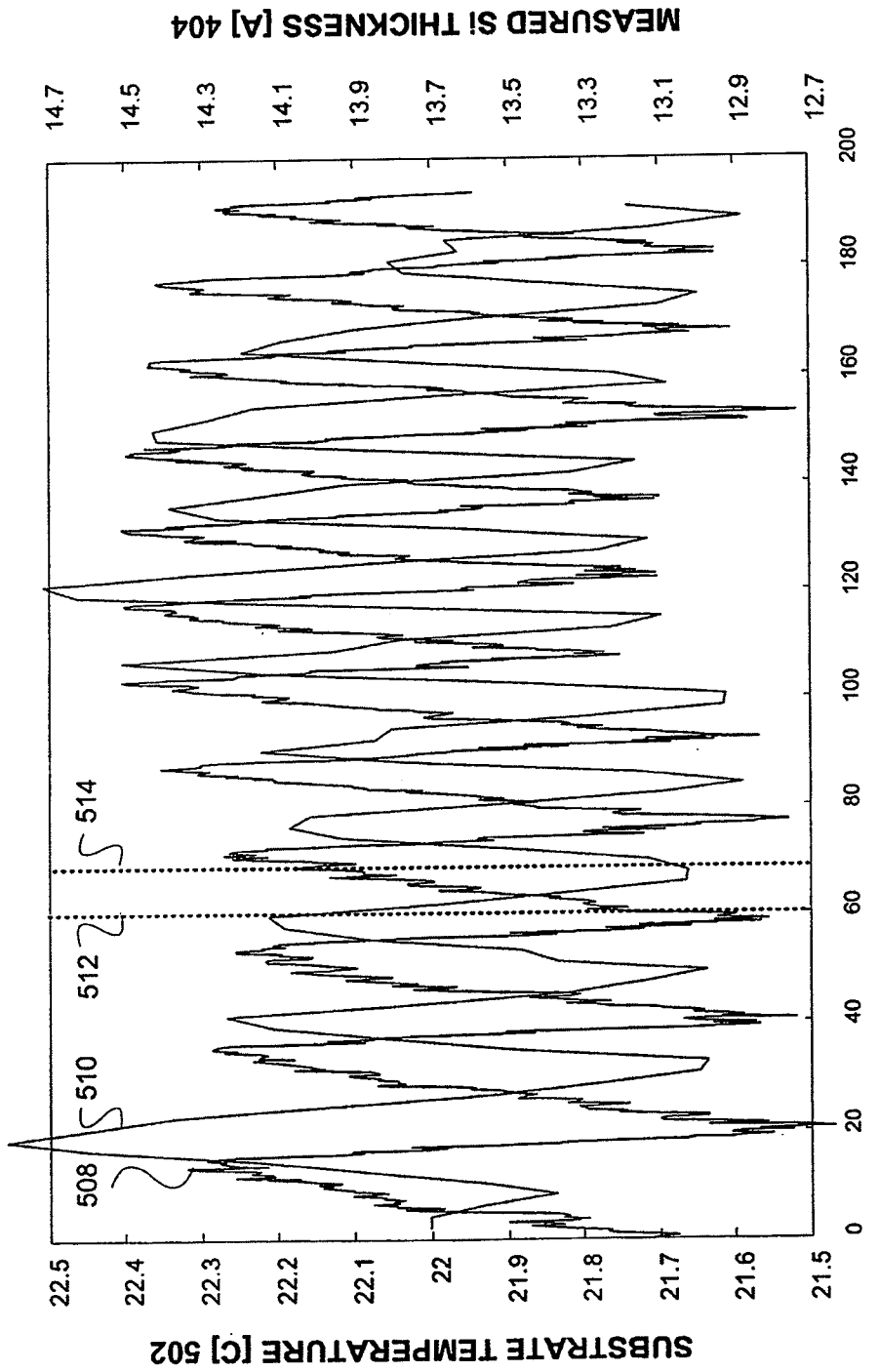

MEASURED Si THICKNESS [A] 404
14.7
14.5
14.3
14.1
13.9
13.7
13.5
13.3
13.1
12.9
12.7
SUBSTRATE TEMPERATURE [C] 502
22.5
22.4
22.3
22.2
22.1
22
21.9
21.8
21.7
21.6
21.5
508
510
512
514
0
20
40
60
80
100
120
140
160
180
200
TIME [MIN] 506

FIG. 5

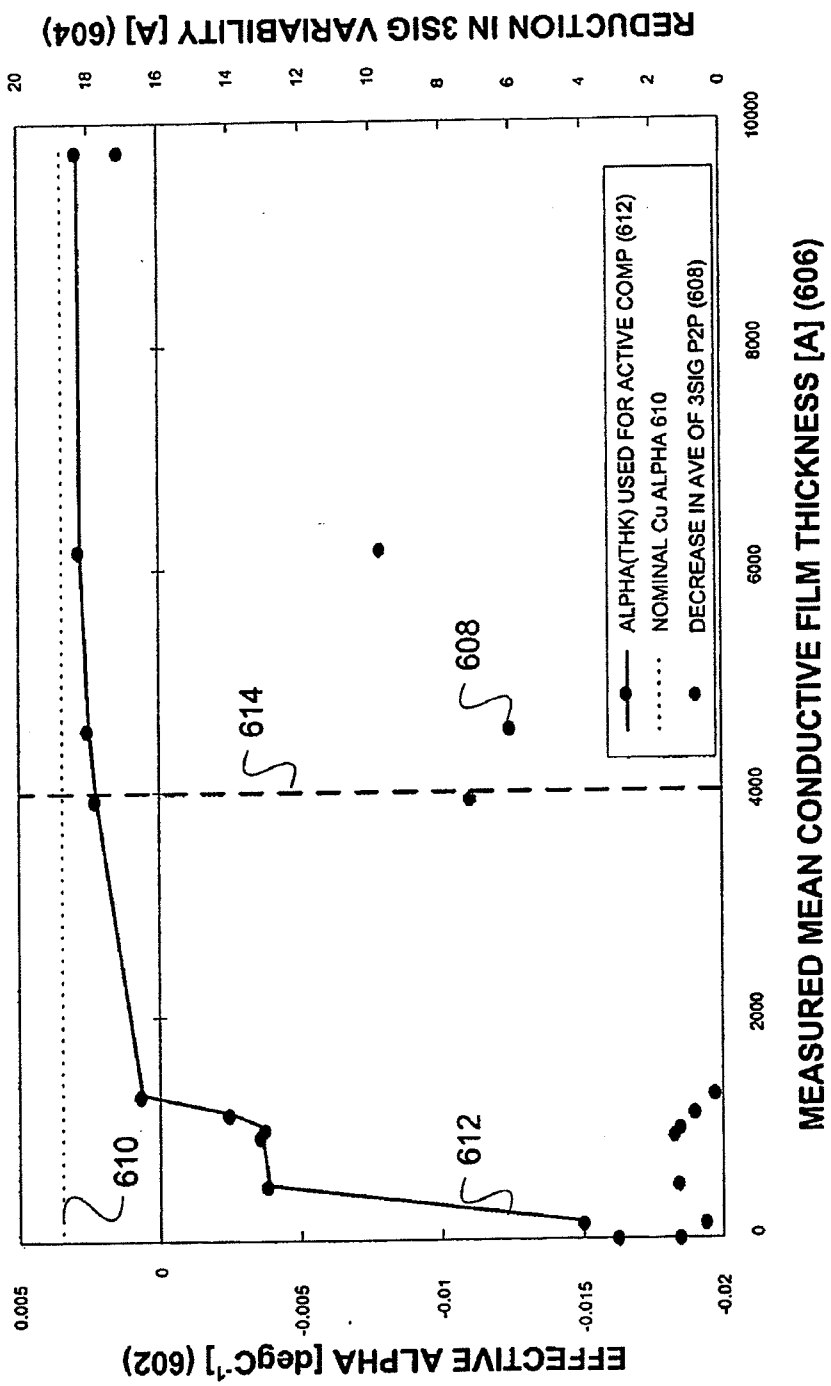

REDUCTION IN 3SIG VARIABILITY [A] (604)
EFFECTIVE ALPHA [degC-1] (602)
MEASURED MEAN CONDUCTIVE FILM THICKNESS [A] (606)
ALPHA(THK) USED FOR ACTIVE COMP (612)
NOMINAL Cu ALPHA 610
DECREASE IN AVE OF 3SIG P2P (608)
610
612
614
608
0.005
0
-0.005
-0.01
-0.015
-0.02
20
18
16
14
12
10
8
6
4
2
0
0
2000
4000
6000
8000
10000

FIG. 6

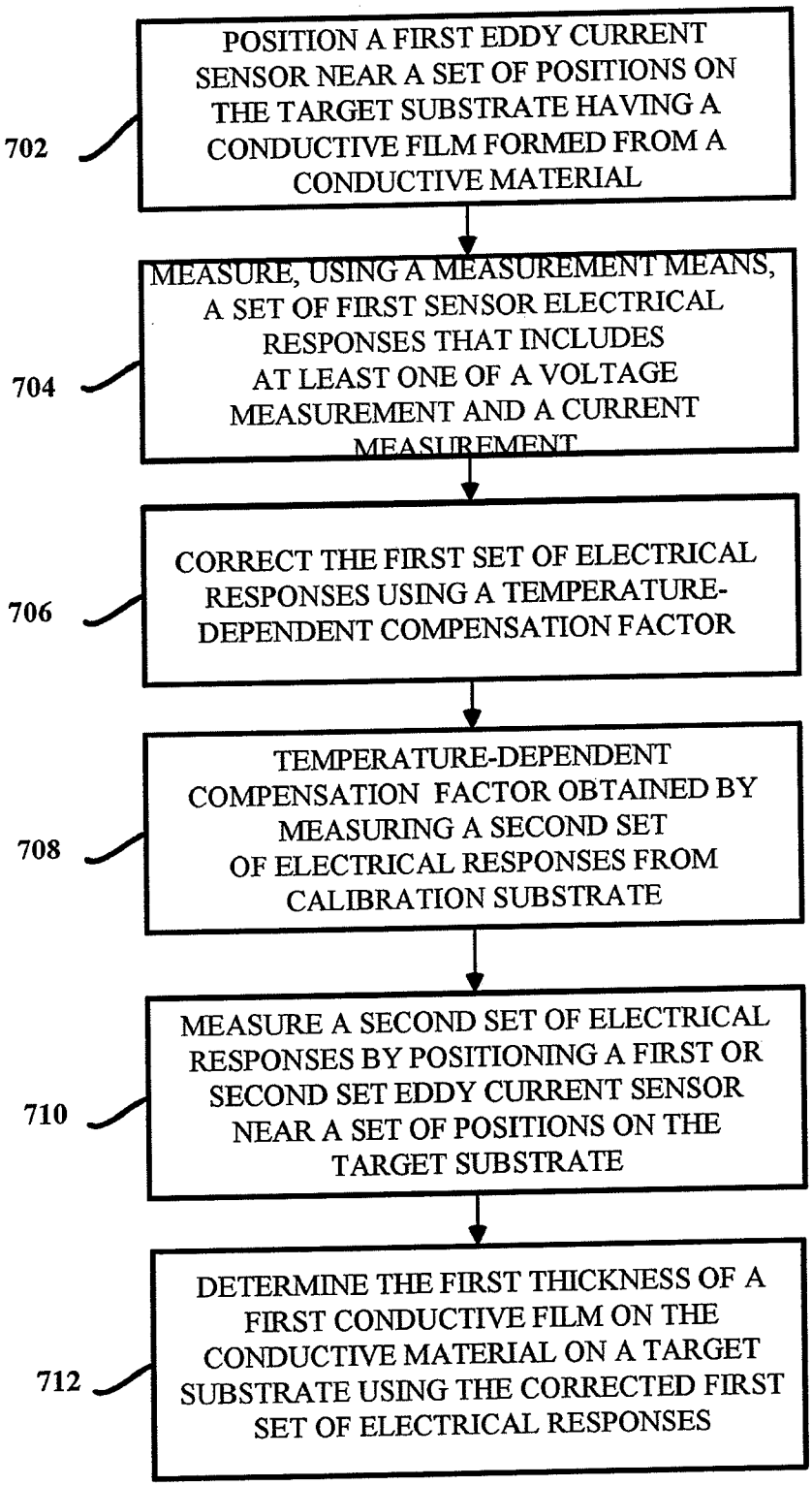

POSITION A FIRST EDDY CURRENT SENSOR NEAR A SET OF POSITIONS ON THE TARGET SUBSTRATE HAVING A CONDUCTIVE FILM FORMED FROM A CONDUCTIVE MATERIAL
702
MEASURE, USING A MEASUREMENT MEANS, A SET OF FIRST SENSOR ELECTRICAL RESPONSES THAT INCLUDES AT LEAST ONE OF A VOLTAGE MEASUREMENT AND A CURRENT MEASUREMENT
704
CORRECT THE FIRST SET OF ELECTRICAL RESPONSES USING A TEMPERATURE-DEPENDENT COMPENSATION FACTOR
706
TEMPERATURE-DEPENDENT COMPENSATION FACTOR OBTAINED BY MEASURING A SECOND SET OF ELECTRICAL RESPONSES FROM CALIBRATION SUBSTRATE
708
MEASURE A SECOND SET OF ELECTRICAL RESPONSES BY POSITIONING A FIRST OR SECOND SET EDDY CURRENT SENSOR NEAR A SET OF POSITIONS ON THE TARGET SUBSTRATE
710
DETERMINE THE FIRST THICKNESS OF A FIRST CONDUCTIVE FILM ON THE CONDUCTIVE MATERIAL ON A TARGET SUBSTRATE USING THE CORRECTED FIRST SET OF ELECTRICAL RESPONSES
712

FIG. 7