

PRE-ACCEPTANCE REPORT SUMMARY

EQUIPMENT	Prometrix RS35c resistivity tester
VENDOR	ITS (Agent for Prometrix)
MIETEC PO NO.	N1036
CONTRACT REF	FAB-2/920017

1) Mechanical tests : passed YES

Remarks : initial problems with the probe arm jamming. A bearing has now been replaced with no subsequent problems.

2) Process tests : passed YES

Remarks : See attached report.

3) Spare parts : delivered.

Remarks :

4) Documentation : sufficient YES

5) Training : given YES

7) Other remarks :

a) The machine ordered in the purchase contract used a touch screen in addition to the keyboard. The machine delivered did not have the touch screen option. Apparently, this is no longer produced. The absence of the touch screen is no impediment to the operation of the machine.

b) SECS - tested in part by D. De Smijter, there are some still problems outstanding.

c) Safety - no official certificate issued, but see attached safety statement.

8) Addenda : total number4
items : 2

Conclusion : based on the results of items 1 to 8, it is agreed that the equipment passed the pre-acceptance tests :YES

The warranty period (as per contract) starts on ..2/12/92.. and ends on .1/12/93.....

For Mietec
Signature and date

For Vendor
Signature and date

Engineering

Manufacturing

Procurement

PROMETRIX RS35c 4PP ACCEPTANCE REPORT

INTRODUCTION

This machine is used to measure the resistivity of materials such as doped poly, implanted silicon, deposited metal etc. Loading the wafers onto the chuck is done manually. Since the method of measurement mechanical contact with the surface of the wafer, only test wafers are used for measurement. In addition, particle measurements are not required to be done on the machine. Two probe heads have been delivered, one for measuring silicon layers and one for measuring metal layers.

MECHANICAL TESTS

A defective roller bearing on the probe arm mechanism caused problems and delayed the completion of the acceptance tests. The bearing has now been replaced and no problems have subsequently been encountered.

PROCESS TESTS

These relate to the accuracy and reproducibility of the measuring system and have been split into three sections;

- 1) Electronics
- 2) Prometrix's own repeatability specifications
- 3) Mietec's MSA test requirements

1) ELECTRONICS - in this test, fixed high accuracy resistors are plugged into the system to check the calibration of the measuring circuits. They act as a dummy load and bypass any error from probe contact resistance. Three separate values were measured over a period of several days (3 Nov - 20 Nov). The results are shown below in Table 1.

TABLE 1 ELECTRONIC CALIBRATION

Actual resistance (ohms)	2.79	279	27.9k
Measured resistance (ohms)	2.791	279.5	27.92
Standard deviation	0.055%	0.000%	0.15%

The above values are highly stable and accurate and the machine passes this test.

2) PROMETRIX SPECIFICATIONS

Probe repeatability - this is a test to check the quality of the probing. The accuracy and repeatability of the measurements is very sensitive to the condition of the probe head. Damaged or old probes will give a unreliable results. The test takes five measurements at very short spacings from each other and is repeated on four different sites on the wafer. A standard deviation of the five points on all four sites should be <0.2%. A high resistance implant wafer was used to check the silicon probe, and a TiN layer used for the metal probe. The test was repeated over several days.

The worst case for any of these measurements was a 0.08% variation. This means that the probes during the test gave repeatable results and therefore the machine passes the test.

Measurement repeatability - an implanted wafer was measured using an 81 pt contour recipe. The test was repeated over 11 days and the average results are shown in Plot 1. Although the max/min variation was 0.42% (spec limit 0.7%), a definite trend is observed. This will have to be monitored in the future since it may represent a deterioration of the probe head.

3) MSA TESTS - these tests demonstrate the repeatability and reproducibility that would be expected in normal use. They take into account measurement variation due to machine non reproducibility, sample positioning, non uniformities within a sample etc. The results are shown below in table 2 for a wafers with a range of resistivities that would normally be encountered in a fab.

TABLE 2 MSA TEST RESULTS

	LOW RES 20 mohms/„	MEDIUM RES 20 ohms/„	HIGH RES 1450 ohms/„
REPEATABILITY	5.8%	2.4%	2.6%
REPRODUCIBILITY	2.3%	0%	1.8%
R & R	6.2%	2.4%	3.2%

The higher R&R result from the metal (low resistivity) layer may be due partly to the fact that the soft metal becomes embedded in the probe tips and reduces the accuracy of the readings. There is a standard probe cleaning procedure which will minimise this variation.

All the MSA results are within the specification of the contract, as attached to the report. Note that the exact resistivity values required by the report were not available, but this is of no consequence.

The machine passes the MSA test.

PLOT 1 Daily measurement results on an implanted wafer

PROMETRIX OmniMap RS35c

Mon Dec 14, 1992

11:05

Folder ID: 61 Disk ID :

GROUPED BY: INDIVIDUALS

FULL SCALE

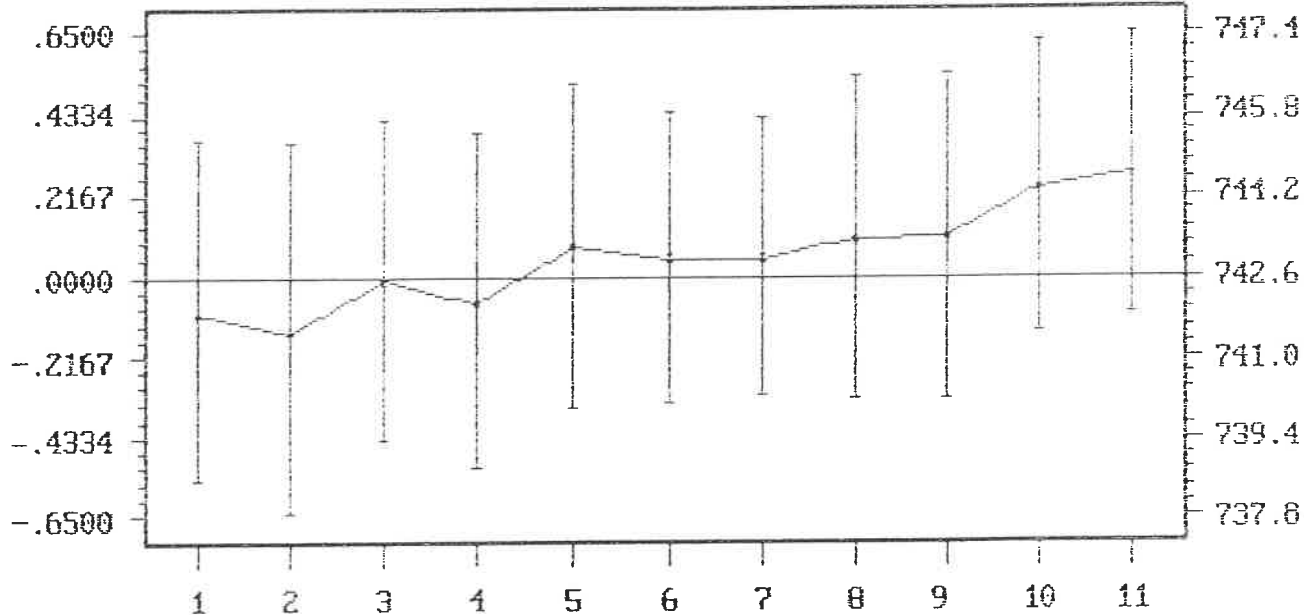
SORTED BY : PROCESS DATES

OHMS/SQ

12/08/92

SIGMA BRACKET: 3.0 STDVS

12/14/92



: DAILY CHECK

: IMPLANT

MEAN of MEANS: 742.96

STDV of MEANS: 0.131 %

MEAN of STDVS: 0.142 %

STDV of STDVS: 9.345 %

MIN of MEANS: 741.49

MAX of MEANS: 744.61

SAMPLES: 11

CHART SCALE: AUTO LIMITS

TARGET: 742.59

WARNING: 3.218 0.433

SPEC: 3.218 0.433

ACCEPTANCE SPECIFICATIONS PROMETRIX 4PP RS35c

By Measurement System Analysis (M.S.A.) as per procedure enclosed and according to the caveats as per fax of March 26th (also enclosed), the following results should be obtained and are subject to pre- and final acceptance :

Accuracy : 1 % on resistors (2.79 / 27.9 / 279 ohm)

Repeatability : 0.2 % on resistors and layers.

to be tested (M.S.A., on site) :

epi : 2850 ohm/square (spec tol. : 400; 6 sigma = 5 % = 20)
metal : 28 mohm/square (spec tol. : 4; 6 sigma = 12.5 % = 0.5)
poly : 1375 ohm/square (spec tol. : 200; 6 sigma = 5 % = 10)
impl. : 670 ohm/square (spec tol. : 70; 6 sigma = 7 % = 5).

If one of these values is not achieved, ITS and Prometrix will commit to work with MIETEC to solve the problems.

FACSIMILE TRANSMISSION**ITS** Intertrade Scientific
Limited

FAX TO: MIETEC ALCATEL
ATTENTION: AUSTIN DONLEAVY
FROM: JOHN GAILEY
DATE: 9TH NOVEMBER 1992
SUBJECT: PROMETRIX RS35 SAFETY REQUIREMENTS

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Dear Mr. Donleavy,

I should like to confirm that whilst the PROMETRIX RS35 has not been designed to meet any specific European Safety norms, it will meet your general safety requirements in all respects.

Our confidence in supporting this statement is based upon the successful installation of this product at multiple sites within Europe.

In particular, it has met the stringent safety requirements of companies such as IBM in France.

Yours Sincerely



John Gailey
European Customer Support Manager