CORRECTION FACTOR TABLES FOR FOUR-POINT PROBE RESISTIVITY MEASUREMENTS ON THIN, CIRCULAR SEMICONDUCTOR SAMPLES

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Extensive tables of the geometrical correction factors for four-point probe resistivity measurements on thin, circular semiconductor samples with all surfaces insulating are given, (1) for an in-line probe array displaced radially with points along a diameter, (2) for an in-line probe array displaced radially with the line of points perpendicular to a diameter, and (3) for a displaced square probe array.

1. INTRODUCTION

When measuring the resistivity of a thin, circular sample of semiconductor material, a four-point probe is often used. This probe may be either the in-line array as described by Valdes[1]* or the square array as described by Uhlir[2]. By moving the probe over the semiconductor sample an idea of the sample resistivity variations can be obtained[3]. However a geometrical correction factor, which is a function of the position of the probe on the sample, must be applied for correct results. The tables below give this correction factor for the cases illustrated in figures 1, 2 and 3. These tables apply to circularly shaped samples having a uniform thickness which is less than about one-half the probe spacing, and having all surfaces of the sample in contact with an insulating medium. For greater sample thicknesses an additional correction factor, as given by Smits,[4] is necessary. If the sample thickness is less than 0.5 of the probe spacing, the thickness correction is less than 0.3%. If the sample thickness is less than 0.4 of the probe spacing, the thickness correction factor will be less than 0.05%. The tables are given to six significant figures, all of which would seldom be required, and only those necessary to achieve the desired accuracy need be used.

TABLE I

This table applies to the case shown in figure 1. The sample resistivity is given by

$$\rho = \frac{V}{I} \, t \, F_1 \qquad (1)$$

* Figures in brackets indicate the literature references at the end of this paper.