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ESSENTIAL RATINGS AND CHARACTERISTICS OF SEMICONDUCTOR DEVICES AND GENERAL PRINCIPLES OF MEASURING METHODS

Part 2J—GENERAL PRINCIPLES OF MEASURING METHODS—ANALOGUE INTEGRATED CIRCUITS

STANDARDS ASSOCIATION OF AUSTRALIA
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Confederation of Australian Industry

Department of Defence

Department of Science and Technology

Department of Transport

Institution of Radio and Electronics Engineers, Australia

Telecom Australia

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PREFACE

This standard is one of a series being prepared by the Association's Committee on Semiconductor Devices.

This standard is technically identical with and has been substantially reproduced from Chapter VII of IEC 147-2 (issued as IEC 147-2J). Acknowledgement is accordingly made to the International Electrotechnical Commission for this assistance.

The purpose of the standard is to describe methods of measurement applicable to analogue integrated circuits, in particular to integrated linear amplifiers, including operational amplifiers, audio amplifiers and RF/IF amplifiers, and voltage regulators and modulator/demodulators. A list of test methods and their application is given in Appendix A; the methods are numbered according to a 'key' given in Appendix B, and the relevant method number is given in a 'box' after the title of each method.

This standard forms part of the series originally issued under the reference 'AS C366'. Some of these standards are endorsements of parts of IEC 147 and others have been prepared and published as Australian standards. The intention is to review those standards and progressively re-issue them under the reference 'AS 2547', retaining wherever practicable the IEC text and format. A related standard is AS 1967, Essential Ratings and Characteristics for Integrated Circuits.

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PART 2J—GENERAL PRINCIPLES OF MEASURING METHODS—ANALOGUE INTEGRATED CIRCUITS

SECTION ONE — INTEGRATED LINEAR AMPLIFIERS (INCLUDING OPERATIONAL AMPLIFIERS)

1. Introduction

1.1 *General*

The following methods of measurement are intended as general methods applicable to most types of integrated linear amplifiers, including operational amplifiers.

For many characteristics, two different methods of measurement are given. It should be noted that these methods may not be directly equivalent, in that either:

a) they may be applicable to different types of amplifiers (e.g. single-ended or differential input types); or:

b) they may not measure a characteristic under the same conditions (e.g. a.c. method only or d.c. method only).

Furthermore, some methods (usually labelled as "method a") are suitable as laboratory methods, whilst others (usually labelled as "method b") are those particularly suited to be used in automatic test equipment. In the latter context, it should be noted that the following methods can be grouped together as forming a sequence of tests using basically a fixed measurement set-up:

— differential input resistance (method 3.2*b*);
— input offset voltage of a differential input amplifier (method 5.2*b*);
— input offset current of a differential input amplifier (method 6.2*b*);
— input bias current of a differential input amplifier (method 7.2*b*);
— d.c. voltage amplification of a differential input amplifier (method 10.2*b*);
— d.c. value of common-mode rejection ratio of a differential input amplifier (method 12.2*b*);
— supply-voltage rejection ratio (for one or more supplies) (method 13.2*b*);
— output voltage range (for a differential input amplifier) (method 14).

This group of methods requires the use of an additional amplifier (labelled A in this standard), the requirements of which are given in Sub-clause 1.3.

Furthermore, this group of methods usually requires the characteristics being measured to be obtained by calculation.

The list of measurement methods is not intended to be complete, and may be extended in the future.

In certain measurements (e.g. "offset voltage" and "offset current"), the specified characteristics imply measurement at the input of the amplifier. The methods actually use measurements made at the output in order to use the gain of the amplifier to reduce the effect of impedance on the measurement point.