

# IEEE Standard on Video Techniques: Measurement of Resolution of Camera Systems, 1993 Techniques

Sponsor

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of the  
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**Abstract:** The methods for measuring the resolution of camera systems are described. The primary application is for users and manufacturers to quantify the limit where fine detail contained in the original image is no longer reproduced by the camera system. The techniques described may also be used for laboratory measurements and for proof-of-performance specifications for a camera.

**Keywords:** camera systems, video.

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## Introduction

(This introduction is not a part of IEEE Std 208-1995, IEEE Standard on Video Techniques: Measurement of Resolution of Camera Systems, 1993 Techniques.)

IEEE Std 208-1995 replaces IEEE Std 208-1960, which was reaffirmed in 1972, and again in 1978.

The principal purpose of IEEE Std 208-1995 is to define a method of measurement of the image resolving capability of a television camera. The standard defines a method that yields consistent and repeatable quantitative resolution values, and reliably determines the resolution limit at which fine detail contained in the original image is no longer reproduced by the television camera.

The standard has been changed to include new information that permits measurement of greater technical performance and unique picture characteristics resulting from the use of solid state imaging devices in television cameras.

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## 1. Overview

One of the major characteristics of a television system affecting overall picture quality is the ability of the system to reproduce fine detail found in the original image. This ability to resolve detail is determined by a number of factors such as number of scanning lines employed, the scanning method, and the overall response of the electrical circuits, which is usually specified in terms of the frequency response characteristics. Performance of the lens, optical imaging device (camera), and the reproducing device (picture monitor) will also have considerable influence on the ability of the system to resolve detail.

### 1.1 Scope

The fundamental basis for making a measurement of resolution of a camera system is to reproduce a suitable test chart with the equipment under test. This test chart shall include a pattern that has a sufficient amount of fine detail so that a quantitative observation can be made of the amount of this detail in the reproduced picture. This is usually done by incorporating in the chart a series of lines having graduated widths. The reproduced image of this test chart is then observed on a picture tube or other suitable reproducing device. The point in the picture where the lines are no longer visible as separately defined images gives a measure of the system performance with respect to resolution. A quantitative method of measuring the horizontal resolution response of a camera system is based upon the oscilloscope display of the camera output voltage obtained from any single scan line across the vertical wedges of the resolution chart image. By choosing lines that occur at suitable times, the amplitude of the resulting signal can be plotted as a function of the line number of the chart.

NOTE—The horizontal resolution response characteristic described above is also referred to as the depth of modulation. The term *modulation transfer function* (MTF), or *optical transfer function* (OTF), is strictly defined as sine wave frequency response, and should not be used when referring to the response of the television camera to optical square wave patterns.