

SMPTE STANDARD

D-Cinema Distribution Master — Image Characteristics



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Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in the SMPTE Standards Operations Manual.

SMPTE Standard ST428-1:2019 was prepared by SMPTE Technology Committee 21DC.

Introduction

This section is entirely informative and does not form an integral part of this Engineering Document.

This standard describes the image characteristics of the Digital Cinema Distribution Master (DCDM). The image characteristics and parameters are not subject to any further image processing prior to the compression process described elsewhere.

In order for content creators to convert a Digital Source Master (DSM) into a Digital Cinema Distribution Master (DCDM), this standard will define all of the metrics required for the image structure of the DCDM. This DCDM image structure may then be transported by being mapped into either real time interfaces or into file formats.

In the process of creating theatrical releases, a Digital Source Master, or DSM, is produced from which many distribution elements are created, (e.g., Film Distribution Masters, Digital Cinema Distribution Masters (DCDM), Home Video Masters, Airline Version Masters and Broadcast Masters). It is not the goal of this specification to define the DSM. It is recognized that the DSM may consist of any color space, pixel matrix (spatial), frame rate (temporal), bit depth and many other metrics.

This standard defines sets of operational levels, in terms of the maximum number of pixels, H pixel count and V pixel count. In combination with the frame rate this determines the operational level, 1-9 as defined in Table 1.

1 Scope

This standard defines the uncompressed image characteristics for DCDM by specifying a pixel array, frame rate, pixel bit depth, and colorimetry. The DCDM image operational levels are defined by the maximum number of pixels and frame rate.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

CIE Publication 15:2004, Colorimetry

SMPTE ST 431-1:2006, D-Cinema Quality — Screen Luminance Level, Chromaticity and Uniformity

3 Image structures

The pixel array shall use equally sampled tristimulus code values to represent each pixel.¹ The maximum number of horizontal and vertical pixels shall be no greater than the limits of one of the operational levels as defined in Table 1². The number of pixels shall extend to the maximum in either one or both of the horizontal and vertical directions of the defined operational level.

Table 1 – DCDM operational levels

Operational Level	Maximum Horizontal Pixels	Maximum Vertical Pixels	Frames per Second
1	4096	2160	24
2	2048	1080	48
3	2048	1080	24
4	4096	2160	25
5	4096	2160	30
6	2048	1080	25
7	2048	1080	30
8	2048	1080	50
9	2048	1080	60

The pixel shall have an aspect ratio of 1:1. No anamorphic or other geometric distortions of the image data shall be permitted

For operational level 1, 4 and 5 the number of horizontal and vertical pixels shall be evenly divisible by four.

¹ The pixel array is the set of pixels that are intended to be displayed on the cinema screen.

² Common film aspect ratios, unlike the native aspect ratio of the image boundaries shown in Table 1, shall be accommodated. Some examples of these are provided in the informative Annex A.