

# ISO/IEC 14496-22:2019-01 (E)

## Information technology - Coding of audio-visual objects - Part 22: Open Font Format

---

<b>Contents</b>		<b>Page</b>
Foreword .....		vii
Introduction.....		viii
<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Normative references.....</b>	<b>1</b>
<b>3</b>	<b>Terms, definitions and abbreviated terms .....</b>	<b>1</b>
<b>3.1</b>	<b>Terms and definitions .....</b>	<b>1</b>
<b>3.2</b>	<b>Abbreviated terms .....</b>	<b>2</b>
<b>4</b>	<b>The Open Font file format.....</b>	<b>3</b>
<b>4.1</b>	<b>Description.....</b>	<b>3</b>
<b>4.2</b>	<b>Filenames .....</b>	<b>3</b>
<b>4.3</b>	<b>Data types .....</b>	<b>3</b>
<b>4.4</b>	<b>Table version numbers .....</b>	<b>4</b>
<b>4.5</b>	<b>Top-level OFF organization .....</b>	<b>5</b>
<b>4.5.1</b>	<b>Offset table.....</b>	<b>5</b>
<b>4.5.2</b>	<b>Table directory.....</b>	<b>5</b>
<b>4.5.3</b>	<b>Calculating checksums .....</b>	<b>6</b>
<b>4.6</b>	<b>Font collections .....</b>	<b>6</b>
<b>4.6.1</b>	<b>The Font Collection overview .....</b>	<b>6</b>
<b>4.6.2</b>	<b>The Font Collection file structure .....</b>	<b>7</b>
<b>4.6.3</b>	<b>TTC header.....</b>	<b>7</b>
<b>5</b>	<b>Open font tables .....</b>	<b>8</b>
<b>5.1</b>	<b>General .....</b>	<b>8</b>
<b>5.2</b>	<b>Required common tables .....</b>	<b>8</b>
<b>5.2.1</b>	<b>List of required tables .....</b>	<b>8</b>
<b>5.2.2</b>	<b>cmap – Character to glyph index mapping table .....</b>	<b>9</b>
<b>5.2.3</b>	<b>head – Font header.....</b>	<b>21</b>
<b>5.2.4</b>	<b>hhea – Horizontal header.....</b>	<b>23</b>
<b>5.2.5</b>	<b>hmtx – Horizontal metrics .....</b>	<b>24</b>
<b>5.2.6</b>	<b>maxp – Maximum profile .....</b>	<b>25</b>
<b>5.2.7</b>	<b>name – Naming table.....</b>	<b>26</b>
<b>5.2.8</b>	<b>OS/2 – Global font information table .....</b>	<b>45</b>
<b>5.2.9</b>	<b>Font class parameters .....</b>	<b>67</b>
<b>5.2.10</b>	<b>post – PostScript.....</b>	<b>67</b>
<b>5.3</b>	<b>Tables related to TrueType outlines.....</b>	<b>69</b>
<b>5.3.1</b>	<b>List of TrueType outlines tables .....</b>	<b>69</b>
<b>5.3.2</b>	<b>cvt – Control value table.....</b>	<b>69</b>
<b>5.3.3</b>	<b>fpgm – Font program .....</b>	<b>69</b>
<b>5.3.4</b>	<b>glyf – Glyf data.....</b>	<b>70</b>
<b>5.3.5</b>	<b>loca – Index to location.....</b>	<b>75</b>
<b>5.3.6</b>	<b>prep – Control value program .....</b>	<b>75</b>
<b>5.3.7</b>	<b>gasp – Grid-fitting and scan-conversion procedure table .....</b>	<b>76</b>
<b>5.4</b>	<b>Tables related to CFF outlines .....</b>	<b>78</b>
<b>5.4.1</b>	<b>List of CFF outline tables.....</b>	<b>78</b>
<b>5.4.2</b>	<b>CFF – Compact Font Format (version 1) table .....</b>	<b>78</b>
<b>5.4.3</b>	<b>CFF2 – Compact Font Format (version 2) table .....</b>	<b>78</b>
<b>5.4.4</b>	<b>VORG – Vertical origin table .....</b>	<b>88</b>
<b>5.5</b>	<b>Table for SVG glyph outlines .....</b>	<b>89</b>
<b>5.5.1</b>	<b>SVG – The SVG (Scalable Vector Graphics) table .....</b>	<b>89</b>
<b>5.5.2</b>	<b>Color Palettes .....</b>	<b>90</b>

5.5.3	Glyph Identifiers .....	91
5.5.4	Glyph Semantics and Metrics .....	91
5.5.5	Glyph Rendering.....	91
5.5.6	SVG glyph examples .....	93
5.6	Tables related to bitmap glyphs.....	98
5.6.1	List of bitmap glyph tables .....	98
5.6.2	EBDT – Embedded bitmap data table .....	98
5.6.3	EBLC – Embedded bitmap location table .....	101
5.6.4	EBSC – Embedded bitmap scaling table.....	108
5.6.5	CBDT – Color bitmap data table.....	109
5.6.6	CBLC – Color bitmap location table .....	111
5.6.7	sbix – Standard bitmap graphics table.....	112
5.7	Optional tables .....	114
5.7.1	DSIG – Digital signature table .....	115
5.7.2	hdmx – Horizontal device metrics.....	117
5.7.3	kern – Kerning.....	118
5.7.4	LTSH – Linear threshold .....	120
5.7.5	MERG – Merge table .....	121
5.7.6	meta – Metadata table .....	125
5.7.7	PCLT – PCL 5 table.....	128
5.7.8	VDMX – Vertical device metrics .....	135
5.7.9	vhea – Vertical header table .....	137
5.7.10	vmtx – Vertical metric table .....	141
5.7.11	COLR – Color Table.....	143
5.7.12	CPAL – Palette Table.....	144
6	Advanced Open Font layout tables.....	147
6.1	Advanced Open Font layout extensions .....	147
6.1.1	Overview of advanced typographic layout extensions.....	147
6.1.2	TrueType versus OFF layout .....	149
6.1.3	OFF layout terminology .....	149
6.1.4	Text processing with OFF layout .....	151
6.1.5	OFF layout and Font variations.....	153
6.2	OFF layout common table formats .....	153
6.2.1	Overview .....	153
6.2.2	OFF layout and Font variations.....	154
6.2.3	Table organization .....	155
6.2.4	Scripts and languages .....	156
6.2.5	Features and lookups.....	159
6.2.6	Coverage table .....	162
6.2.7	Class definition table.....	164
6.2.8	Device and VariationIndex tables.....	165
6.2.9	Feature variations .....	167
6.2.10	Common table examples .....	170
6.3	Advanced typographic tables.....	178
6.3.1	BASE Baseline table.....	178
6.3.2	GDEF – The glyph definition table .....	199
6.3.3	GPOS – The glyph positioning table.....	211
6.3.4	GSUB – The glyph substitution table .....	263
6.3.5	JSTF – The justification table .....	296
6.3.6	MATH – The mathematical typesetting table .....	306
6.4	Layout tag registry.....	322
6.4.1	Scripts tags .....	323
6.4.2	Language tags.....	327
6.4.3	Feature tags.....	344
6.4.4	Baseline tags.....	406
7	OFF font variations .....	410
7.1	Font variations overview.....	410
7.1.1	General.....	410
7.1.2	Terminology .....	412
7.1.3	Variation space, default instances and adjustment deltas .....	414
7.1.4	Coordinate scales and normalization.....	417

7.1.5	Variation data .....	419
7.1.6	Variation data tables and miscellaneous requirements .....	428
7.1.7	Algorithm for interpolation of instance values.....	429
7.1.8	Interpolation example .....	432
7.1.9	Dynamic generation of static instance fonts.....	437
7.2	Font variations common table formats .....	438
7.2.1	Overview.....	438
7.2.2	Tuple variation store .....	439
7.2.3	Item variation stores .....	446
7.2.4	Design-variation axis tag registry.....	450
7.3	Font variations tables .....	455
7.3.1	avar – Axis variations table .....	455
7.3.2	cvar – CVT variations table .....	459
7.3.3	fvar – Font variations table.....	461
7.3.4	gvar – Glyph variations table .....	468
7.3.5	HVAR – Horizontal metrics variations table .....	478
7.3.6	MVAR – Metrics variations table.....	481
7.3.7	STAT – Style attributes table.....	485
7.3.8	VVAR – Vertical metrics variations table .....	497
8	Recommendations for OFF fonts .....	499
8.1	Byte ordering .....	499
8.2	'sfnt' version.....	499
8.3	Mixing outline formats .....	499
8.4	Filenames .....	499
8.5	Table alignment and length.....	500
8.6	Glyph 0: the .notdef glyph .....	500
8.7	'BASE' table.....	500
8.8	'cmap' table .....	500
8.9	'cvt' table .....	501
8.10	'fpgm' table.....	501
8.11	'glyf' table .....	501
8.12	'hdmx' table.....	501
8.13	'head' table .....	501
8.14	'hhea' table .....	501
8.15	'hmtx' table.....	502
8.16	'kern' table.....	502
8.17	'loca' table .....	502
8.18	'LTSH' table .....	502
8.19	'maxp' table .....	502
8.20	'name' table .....	502
8.21	'OS/2' table .....	504
8.22	'post' table .....	505
8.23	'prep' table.....	505
8.24	'VDMX' table .....	505
8.25	TrueType Collections.....	505
9	General recommendations .....	506
9.1	Optimized table ordering .....	506
9.2	Non-standard (Symbol) fonts.....	506
9.3	Baseline to baseline distances .....	506
9.4	Style bits.....	507
9.5	Drop-out control .....	507
9.6	Embedded bitmaps .....	507
9.7	OFF CJK font guidelines.....	508
9.8	Stroke reduction in variable fonts .....	508
9.9	Families with optical size variants.....	508

<b>Annex A (informative) Font Class and Font Subclass parameters .....</b>	<b>510</b>
<b>Annex B (informative) Earlier versions of OS/2 – OS/2 and Windows metrics.....</b>	<b>521</b>
<b>Annex C (informative) OFF Mirroring Pairs List.....</b>	<b>596</b>
<b>Annex D (informative) The CFF2 CharString Format.....</b>	<b>603</b>
<b>Annex E (informative) CFF2 DICT Encoding .....</b>	<b>622</b>
<b>Annex F (informative) Registration of Media Type: application/font-sfnt.....</b>	<b>624</b>
<b>Bibliography .....</b>	<b>627</b>