**OSD Engine Spec**

|  |  |  |  |
| --- | --- | --- | --- |
| 版本 | 修改人 | 日期 | 修改内容 |
| 0.1 | 陈长虹 | 2018/4/23 | 初始版本 |

1. Full Diagram



1. User cases

## Monitor

For monitor mode without OSD frame buffer, OSD engine is enabled.



## TV with OSD Engine

ATV with OSD engine use same diagram with monitor mode



## ATV without OSD Engine

For some cases, if OSD cannot meet the requirement of OSD drawing, CPU can draw OSD frame to frame buffer directly. In this mode, OSD Engine is disabled. CPU can utilize DMA to improve OSD performance.



1. Features

## RAM management



Resource RAM: font glyph + bitmap

Index RAM: Font or bitmap index in the place, each column take 3 bytes(index + color+width\_dec)

Rectangle RAM: Save rectangle position and properties(Each rectangle take 4 Bytes)

|  |  |  |
| --- | --- | --- |
|  | Monitor | ATV with OSD Engine |
| Resource RAM | 16K  For 16x16 font  16\*1024/(16\*16/8) = 512 glyphs | 32K  For 16x16 font  32\*1024/(16\*16/8) = 1024 glyphs |
| Index RAM | 16K  For 16x16 font, 1920x1080 OSD  16\*1024/(1920/16\*3) =45 rows | 32K  For 16x16 font, 960x540 OSD  32\*1024/(960/16\*3) =182 rows |
| Rectangle RAM | 1K  1024/4 = 256 rectangle | 2K  2048/4 = 512 rectangles |
| ATV without OSD Engine | only DDR used, 960x540x4=2M | |

## Width\_dec field of glyph/bitmap

Width\_dec field is to indicate this column is not full size, but shrink width.



## OSD Engine Supported

|  |  |  |
| --- | --- | --- |
| Object | Max Count | Description |
| Window | 8 | Support z-order  Support alpha blending  Support any overlap between windows  All RAM Range(Index/Resource/Rectangle) are configurable between windows. (1K unit?) |
| Row | Limit by Index RAM | Each window has several rows  Height of row can be different  Width of column in one row is same  Height unit: 4, total row should not larger than index RAM count |
| Column | Limit by Index RAM | Width unit: 4  One column is for a character or a bitmap  One column contains 3 fields.  Index: font or bitmap index of resource RAM  Color: color of character, unused for bitmap  Width\_dec: see 3.2 description |
| Palette | 2 | Each window support 2 palettes  one for font and rectangle  another for bitmap |
| Bitmap | Limit by Resource RAM | Animation support: multiple bitmaps data combined to one buffer, only one of them can show at one time  Maximum 256 colors for a bitmap? |
| Glyph | Limit by Resource RAM | Pixel information of font  1 bytes for 8 pixels |
| Rectangle | Limit by Rectangle RAM | One window should support 4 group rectangle  Rectangle in one group should not overlay  Rectangle in difference group can overlay  Support 4 colors for 4 border, border weight  Gradient color fill, left to right, top to bottom, corner to center |

## Others

Output format: ARGB8888

Configuration Double Buffer: no extra hardware needed, we just change window’ RAM range in runtime