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RK3566 ebook 显示模式说明

第二系统产品部

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V1.0.0	刘益星	2021/04/15	初始版本	

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1 波形文件模式定义（来自第三方文档，如有侵权，请联系删除）

Mode	Supported pixel state transitions	Ghosting	Usage	Typical update time at 25 C 85 Hz (ms)
INIT	[0 1 2 3 … 31]→ 30	N/A	Display initialization	2000
DU	[0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31]→ [0 30]	Low	Monochrome menu, text input, and touch screen/pen input	260
GC16	[0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31]→ [0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30]	Very Low	High quality images	450
GL16	[0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31]→ [0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30]	Medium	Text with white background	450
GLR16	[0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31]→ [0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31]	Low	Text with white background	450
GLD16	[0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31]→ [0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31]	Low	Text and graphics with white background	450
A2	[0 29 30 31]→ [0 30]	Medium	Fast page flipping at reduced contrast	120
DU4	[0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29 30 31] → [0 10 20 30]	Medium	Anti-aliased text in menus / touch and screen/pen input	290

1.1 Introduction

The controller generates display waveforms using an internal or external flash file. The waveform flash file contains multiple temperatures look-up-tables (LUTs). Each temperature LUT contains the waveform sequence information to allow the controller to properly construct a waveform used to generate images on the display. Several update modes are encoded in the AF waveform within each temperature LUT.

1.2 Pixel State Usage

For the AF waveform, the LUTs are defined for a 5-bit (32-level) pixel state representation. Gray tones 1-16 are assigned to the even pixel states (0, 2, 4, … 30), respectively. The odd pixel states (1, 3, 5, … 27) are not used. Odd pixel states 29 and 31 (along with state 30) are used to denote gray tone 16; states 29 and 31 are used to invoke special transitions to gray tone 16.

1.3 Pixel State Usage

1.3.1 INIT

The initialization (INIT) mode is used to completely erase the display and leave it in the white state. It is

useful for situations where the display information in memory is not a faithful representation of the optical state of the display, for example, after the device receives power after it has been fully powered down. This waveform switches the display several times and leaves it in the white state.

1.3.2   DU

The direct update (DU) is a very fast, non-flashy update. This mode supports transitions from any gray tone to black or white only. It cannot be used to update to any gray tone other than black or white. The fast update time for this mode makes it useful for response to touch sensor or pen input or menu selection indictors.

1.3.3   GC16

The grayscale clearing (GC16) mode is used to update the full display and provide a high image quality. When GC16 is used with Full Display Update the entire display will update as the new image is written. If a Partial Update command is used the only pixels with changing gray tone values will update. The GC16 mode has 16 unique gray levels.

1.3.4   GL16

The GL16 waveform is primarily used to update sparse content on a white background, such as a page of anti-aliased text, with reduced flash. The GL16 waveform has 16 unique gray levels.

1.3.5   GLR16

The GLR16 mode is used in conjunction with an image preprocessing algorithm to update sparse content on a white background with reduced flash and reduced image artifacts. The GLR16 mode supports 16 gray tones. If only the even pixel states are used (0, 2, 4, … 30), the mode will behave exactly as a traditional GL16 waveform mode. If a separately-supplied image preprocessing algorithm is used, the transitions invoked by the pixel states 29 and 31 are used to improve display quality. For the AF waveform, it is assured that the GLR16 waveform data will point to the same voltage lists as the GL16 data and does not need to be stored in a separate memory.

1.3.6   GLD16

The GLD16 mode is used in conjunction with an image preprocessing algorithm to update sparse content on a white background with reduced flash and reduced image artifacts. It is recommended to be used only with the full display update. The GLD16 mode supports 16 gray tones. If only the even pixel states are used (0, 2, 4, … 30), the mode will behave exactly as a traditional GL16 waveform mode. If a separately supplied image preprocessing algorithm is used, the transitions invoked by the pixel states 29 and 31 are used to refresh the background with a lighter flash compared to GC16 mode following a predetermined pixel map as encoded in the waveform file, and reduce image artifacts even more compared to the GLR16

mode. For the AF waveform, it is assured that the GLD16 waveform data will point to the same voltage lists as the GL16 data and does not need to be stored in a separate memory.

1.3.7 DU4

The DU4 is a fast update time (similar to DU), non-flashy waveform. This mode supports transitions from any gray tone to gray tones 1,6,11,16 represented by pixel states [0 10 20 30]. The combination of fast update time and four gray tones make it useful for anti-aliased text in menus. There is a moderate increase in ghosting compared with GC16.

1.3.8 A2

The A2 mode is a fast, non-flash update mode designed for fast paging turning or simple black/white animation. This mode supports transitions from and to black or white only. It cannot be used to update to any gray tone other than black or white. The recommended update sequence to transition into repeated A2 updates is shown in Figure 1. The use of a white image in the transition from 4-bit to 1-bit images will reduce ghosting and improve image quality for A2 updates.

2 RK EBC 驱动各显示模式详解

模式名称	值	模式类型	效果	说明
EPD_AUTO	0	RK 自定义刷屏模式	连续刷新过程内容显示会有多帧不同步呈现的效果，残影重	实现类似 LCD 屏的连续刷新，多帧连续刷新情况下速度更快
EPD_OVERLAY	1	RK 自定义刷屏模式	手写笔迹刷新速度快，延时小	在 EPD_AUTO 模式的基础上，增加 OSD 层，背景层概念，仅用于手写场景，系统层不建议使用
EPD_FULL_GC16	2	波形模式	刷新过程会闪烁，残影少，一般用来消除残影	使用波形文件中的 GC16 模式做全屏刷新
EPD_FULL_GL16	3	波形模式	参考波形模式说明	使用波形文件中的 GL16 模式做全屏刷新
EPD_FULL_GLR16	4	波形模式	参考波形模式说明	使用波形文件中的 GLR16 模式做全屏刷新
EPD_FULL_GLD16	5	波形模式	参考波形模式说明	使用波形文件中的 GLD16 模式做全屏刷新
EPD_FULL_GCC16	6	波形模式	参考波形模式说明	使用波形文件中的 GCC16 模式做全屏刷新

EPD_PART_GC16	7	波形模式	刷新过程不会闪烁，多次使用 part 模式后，会带来一定残影	使用波形文件中的 GC16 模式做差异刷新
EPD_PART_GL16	8	波形模式	同上	使用波形文件中的 GL16 模式做差异刷新
EPD_PART_GLR16	9	波形模式	同上	使用波形文件中的 GLR16 模式做差异刷新
EPD_PART_GLD16	10	波形模式	同上	使用波形文件中的 GLD16 模式做差异刷新
EPD_PART_GCC16	11	波形模式	同上	使用波形文件中的 GCC16 模式做差异刷新
EPD_A2	12	波形模式	刷新速度快，残影重	对图像做 dither，并使用波形文件中的 A2 模式做全屏刷新
EPD_DU	13	波形模式	刷新速度较快，残影重	使用波形文件中的 DU 模式做全屏刷新
EPD_RESET	14	波形模式	黑白闪烁，用于屏幕初始化	使用波形文件中的 INIT 模式做全屏刷新
EPD_SUSPEND	15	RK 自定义功能模式	同 EPD_FULL_GC16	用于待机图片的显示
EPD_RESUME	16	RK 自定义功能模式	同 EPD_FULL_GC16	用于系统唤醒
EPD_POWER_OFF	17	RK 自定义功能模式	同 EPD_FULL_GC16	用于关机图片的显示