

**EPSON**<sup>®</sup>



**S1D13506 Color LCD/CRT/TV Controller**

## **Power Consumption**

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# 1 S1D13506 Power Consumption

S1D13506 power consumption is affected by many system design variables.

- Input clock frequency (CLKI/CLKI2): the CLKI/CLKI2 frequency determines the LCD/CRT frame-rate, CPU performance to memory, and other functions – the higher the input clock frequency, the higher the frame-rate, performance and power consumption.
- CPU interface: the S1D13506 current consumption depends on the BUSCLK frequency, data width, number of toggling pins, and other factors – the higher the BUSCLK, the higher the CPU performance and power consumption.
- $V_{DD}$  voltage level: the voltage level affects power consumption – the higher the voltage, the higher the consumption.
- Display mode: the resolution and color depth affect power consumption – the higher the resolution/color depth, the higher the consumption.
- Internal CLK divide: internal registers allow the input clock to be divided before going to the internal logic blocks – the higher the divide, the lower the power consumption.

There is a power save mode in the S1D13506. The power consumption is affected by various system design variables.

- DRAM refresh mode (CBR or self-refresh): self-refresh capable DRAM allows the S1D13506 to disable the internal memory clock thereby saving power.
- Clock states during the power save mode: disabling the clocks during power save mode has substantial power savings.



## 1.1 Conditions

Table 1-1: “S1D13506 Power Consumption” gives an example of a specific environment and its effects on power consumption.

Table 1-1: S1D13506 Power Consumption

Test Condition $V_{DD} = 3.3V, BUSCLK = 8MHz$		Color Depth	S1D13506 Active (mW)	Power Save Mode	
				Clocks Active (mW) <sup>1</sup>	Clocks Removed (mW) <sup>2</sup>
1	CLKI = 6MHz LCD Panel = 60Hz 320x240 4-bit Single Monochrome	4 bpp	21.22	3.14	.13
2	CLKI = 6 MHz LCD Panel = 60Hz 320x240 8-bit Single Color	4 bpp	23.30	3.14	.13
		8 bpp	24.98		
		16 bpp	26.73		
3	CLKI = 25MHz LCD Panel = 60Hz 640x480 8-bit Dual Monochrome	4 bpp	70.75	10.36	.13
4	CLKI = 25MHz LCD Panel = 60Hz 640x480 16-bit Dual Color	4 bpp	91.74	10.40	.13
		8 bpp	96.89		
		16 bpp	99.03		
5	CLKI = 33.333MHz, CLKI2 = 25.175MHz CRT = 60Hz 640x480 Color	4 bpp	224.86	11.72	.13
		8 bpp	233.44		
		16 bpp	242.68		
6	CLKI = 33.333MHz, CLKI2 = 14.31818MHz NTSC TV = 640x480 Color, S-Video output, no filter	4 bpp	359.83	10.00	.13
		8 bpp	365.11		
		16 bpp	372.04		
7	CLKI = 33.333MHz, CLKI2 = 17.734475MHz PAL TV = 640x480 Color, S-Video output, no filter	4 bpp	364.78	10.53	.13
		8 bpp	369.07		
		16 bpp	374.02		

### Note

1. Conditions for software suspend with Clocks active:
  - CPU interface inactive
  - CLKI, CLKI2, BUSCLK active
  - Self-Refresh DRAM
2. Conditions for software suspend with Clocks inactive:
  - CPU interface inactive
  - CLKI, CLKI2, BUSCLK stopped
  - Self-Refresh DRAM



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## Summary

The system design variables in Section 1, “S1D13506 Power Consumption” and in Table 1-1: “S1D13506 Power Consumption” show that S1D13506 power consumption depends on the specific implementation. Active Mode power consumption depends on the desired CPU performance and LCD/CRT frame-rate, whereas power save mode consumption depends on the CPU Interface and Input Clock state.

In a typical design environment, the S1D13506 can be configured to be an extremely power-efficient LCD/CRT/TV Controller with high performance and flexibility.



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