

字符叠加芯片 EA400

技术说明书

一、产品特性

- 1、集字符叠加、汉字库、同步头、同步发生器于一体。
- 2、同时显示 12 行，每行最多可显示 32 字符，显示位置可灵活控制。
- 3、256 个字符库，8*16 点阵。
- 4、无外部视频时自动转换为内同步，并有指示口线。
- 5、白字，有口线指示，可叠加于彩色视频图像中。
- 6、SPI 通讯控制。

二、 IIC 通讯控制：

波特率 3K

指令可连续发送，两字符发送间隔超过 20ms 时，须重新发送指令字符串。两指令间间隔时间 0.4mS

详见附录：字符叠加器芯片 EA400 演示版 C 程序

1,设置指令：

[0X55][设置字节][校验]，共 3 字节。

设置字节：

| | | | | | | | |
|----|----|------|------|---|----|----|----|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 保留 | 保留 | TOP1 | TOP0 | H | L2 | L1 | L0 |

TOP1、TOP0:设置顶部留空 0~3，单位：半个字符高度。

H:行间距。为 0，0.25 字符高度；为 1，0.5 字符高度。

L2、L1、L0：左边留空 0~7，单位：约半个字符宽度。

校验：前两个字节的与或

2,字符更新：

[字符区号][字符编码，8 字节][校验]

字符区号：将每行分为 4 区，每区 8 字符，全屏共 48 区，依次为 0~47。

字符编码：按给出的编码表查出需要显示字符编码。

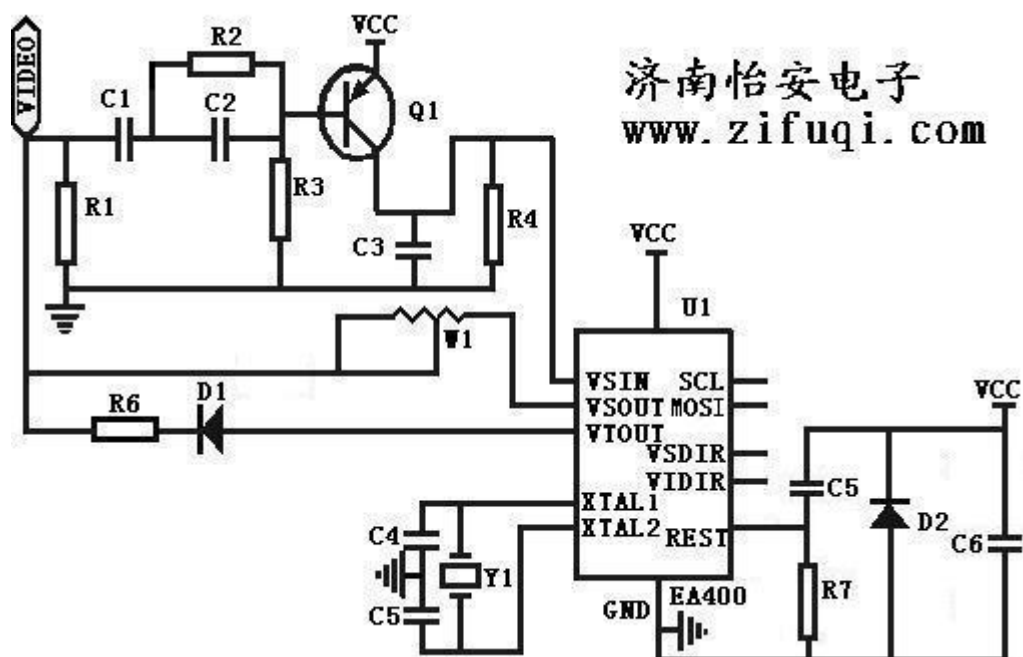
校验：前 9 个字节的与或

三、演示版字符编码表

| 字符 | 编码 | 字符 | 编码 | 字符 | 编码 | 字符 | 编码 | 字符 | 编码 | 字符 | 编码 | 字符 | 编码 | 字符 | 编码 | 字符 | 编码 | 字符 | 编码 |
|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|
| 空格 | 0 | ! | 1 | " | 2 | # | 3 | \$ | 4 | % | 5 | & | 6 | ' | 7 | (| 8 |) | 9 |
| * | 10 | + | 11 | , | 12 | - | 13 | . | 14 | / | 15 | 0 | 16 | 1 | 17 | 2 | 18 | 3 | 19 |
| 4 | 20 | 5 | 21 | 6 | 22 | 7 | 23 | 8 | 24 | 9 | 25 | : | 26 | ; | 27 | < | 28 | = | 29 |
| > | 30 | ? | 31 | @ | 32 | A | 33 | B | 34 | C | 35 | D | 36 | E | 37 | F | 38 | G | 39 |
| H | 40 | I | 41 | J | 42 | K | 43 | L | 44 | M | 45 | N | 46 | O | 47 | P | 48 | Q | 49 |
| R | 50 | S | 51 | T | 52 | U | 53 | V | 54 | W | 55 | X | 56 | Y | 57 | Z | 58 | [| 59 |
| \ | 60 |] | 61 | ^ | 62 | _ | 63 | ` | 64 | a | 65 | b | 66 | c | 67 | d | 68 | e | 69 |
| f | 70 | g | 71 | h | 72 | i | 73 | j | 74 | k | 75 | l | 76 | m | 77 | n | 78 | o | 79 |
| p | 80 | q | 81 | r | 82 | s | 83 | t | 84 | u | 85 | v | 86 | w | 87 | x | 88 | y | 89 |
| z | 90 | { | 91 | | 92 | } | 93 | ~ | 94 | 白格 | 95 | 安 | 96 | | 97 | 白 | 98 | | 99 |
| 并 | 100 | | 101 | 步 | 102 | | 103 | 部 | 104 | | 105 | 彩 | 106 | | 107 | 出 | 108 | | 109 |
| 电 | 110 | | 111 | 点 | 112 | | 113 | 叠 | 114 | | 115 | 动 | 116 | | 117 | 多 | 118 | | 119 |
| 发 | 120 | | 121 | 符 | 122 | | 123 | 个 | 124 | | 125 | 公 | 126 | | 127 | 行 | 128 | | 129 |
| 汉 | 130 | | 131 | 话 | 132 | | 133 | 换 | 134 | | 135 | 活 | 136 | | 137 | 集 | 138 | | 139 |
| 济 | 140 | | 141 | 加 | 142 | | 143 | 可 | 144 | | 145 | 控 | 146 | | 147 | 口 | 148 | | 149 |
| 库 | 150 | | 151 | 灵 | 152 | | 153 | 每 | 154 | | 155 | 南 | 156 | | 157 | 内 | 158 | | 159 |
| 片 | 160 | | 161 | 频 | 162 | | 163 | 品 | 164 | | 165 | 器 | 166 | | 167 | 色 | 168 | | 169 |
| 生 | 170 | | 171 | 视 | 172 | | 173 | 时 | 174 | | 175 | 示 | 176 | | 177 | 司 | 178 | | 179 |
| 特 | 180 | | 181 | 体 | 182 | | 183 | 通 | 184 | | 185 | 同 | 186 | | 187 | 头 | 188 | | 189 |
| 图 | 190 | | 19 | 外 | 192 | | 193 | 网 | 194 | | 195 | 为 | 196 | | 197 | 位 | 198 | | 199 |
| 无 | 200 | | 201 | 显 | 202 | | 203 | 限 | 204 | | 205 | 线 | 206 | | 207 | 像 | 208 | | 209 |
| 芯 | 210 | | 211 | 性 | 212 | | 213 | 讯 | 214 | | 215 | 一 | 216 | | 217 | 怡 | 218 | | 219 |
| 有 | 220 | | 221 | 于 | 222 | | 223 | 阵 | 224 | | 225 | 制 | 226 | | 227 | 址 | 228 | | 229 |
| 置 | 230 | | 231 | 指 | 232 | | 233 | 中 | 234 | | 235 | 转 | 236 | | 237 | 字 | 238 | | 239 |
| 子 | 240 | | 241 | 自 | 242 | | 243 | 最 | 244 | | 245 | 的 | 246 | | 247 | 年 | 248 | | 249 |
| 月 | 250 | | 251 | 日 | 252 | | 253 | 人 | 254 | | 255 | | | | | | | | |

注：每个汉字占用两个字符，因此每个汉字也占用两个编码。

四、电路图



说明：

| | |
|--------|---------|
| Video | 视频信号 |
| VSIN | 同步脉冲 |
| VSOUT | 字符叠加信号 |
| VTOUIT | 自生同步信号 |
| XTAL1 | 晶振接入端 1 |
| XTAL2 | 晶振接入端 2 |
| REST | 复位引脚 |
| VSDIR | 视频指示信号 |
| VIDIR | 叠加指示信号 |

五、封装形式

直插 20 脚 , PDIP, 7.62mm 宽 (0.300")

贴片 32 脚 , TQFP, 7mmX7mm

六、电器特性

工作电压 : 5V

芯片内耗电流 : 小于 30mA

工作温度 : -40°C 到 +85°C

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附录一：字符叠加器芯片 EA400 演示版 C 程序

```
/******EA400 芯片演示程序*****

    控制芯片型号:89s52
    指令速度：2MHz
    晶振速度:24MHz
    通讯速度：3K
    版本：ea400    （在 wave keil c 编译通过）
    日期：20100702
    研制者：济南怡安电子有限公司
***** WWW.ZIFUQI.COM *****/

#include "C:\Keil\C51\INC\Atmel\at89X51.h"

void SpiDelay(void);//延时子程序，在 SPI 内部操作中使用，以调整波特率
void SpiDelayLED(unsigned char);//延时子程序，同时控制指示灯闪烁
void SPI_write_1byte(unsigned char a);//SPI 发送一个字节

#define baudus 107 //控制波特率    约 3K
#define P_osd_cs P0_6
#define P_osd_clk P2_6
#define P_osd_dat P2_7
#define PinLED P2_0
#define SpiDelayZu for(k=0;k<255;k++); //延时约 380uS
unsigned char j,n,k,verify;

void SPI_write_1byte(unsigned char a) //写一个字节并计算校验
{
    unsigned char i,j;
    verify=verify^a;

    P_osd_cs=0;
    for(i=0;i<8;i++)
    {
        P_osd_clk =0;
        if(a&0x80)
            P_osd_dat=1;
        else
            P_osd_dat=0;
        SpiDelay();
        P_osd_clk=1;
    }
}
```

```

        SpiDelay();
        a<=1;
    }
    P_osd_clk =0;
    P_osd_cs=1;
}

/*****
延时子程序，在 SPI 内部操作中使用，以调整波特率
*****/
void SpiDelay(void)
{
    unsigned char n;
    for(n=0;n<baudus;n++);
}

/*****
延时子程序，同时控制指示灯闪烁
*****/
void SpiDelayLED(unsigned char DelayLED)
{
    unsigned int m;
    for(;DelayLED!=0;DelayLED--)
    {
        for(m=0;m<0xfff0;m++);
        PinLED=(DelayLED/4)&0001;//
    }
}

void main (void)
{
    verify=0;
    P2=0xff;

    while(1)
    {
        SpiDelayLED(20);
//显示：字符叠加芯片 EA400
        SPI_write_1byte(4);
        SPI_write_1byte(0);//1
        SPI_write_1byte(0);//2
        SPI_write_1byte(0);//3
        SPI_write_1byte(0);//4
        SPI_write_1byte(0);//5
    }
}

```

```
SPI_write_1byte(0);//6
SPI_write_1byte(0);//7
SPI_write_1byte(238);//8 字
SPI_write_1byte(verify);
```

SpiDelayZu

```
SPI_write_1byte(5);
SPI_write_1byte(239);//1
SPI_write_1byte(122);//2 符
SPI_write_1byte(123);//3
SPI_write_1byte(114);//4 叠
SPI_write_1byte(115);//5
SPI_write_1byte(142);//6 加
SPI_write_1byte(143);//7
SPI_write_1byte(210);//8 芯
SPI_write_1byte(verify);
```

SpiDelayZu

```
SPI_write_1byte(6);
SPI_write_1byte(211);//1
SPI_write_1byte(160);//2 片
SPI_write_1byte(161);//3
SPI_write_1byte(37);//4 E
SPI_write_1byte(33);//5 A
SPI_write_1byte(20);//6 4
SPI_write_1byte(16);//7 0
SPI_write_1byte(16);//8 0
SPI_write_1byte(verify);
```

SpiDelayZu

```
SPI_write_1byte(7);
SPI_write_1byte(0);//1
SPI_write_1byte(0);//2
SPI_write_1byte(0);//3
SPI_write_1byte(0);//4
SPI_write_1byte(0);//5
SPI_write_1byte(0);//6
SPI_write_1byte(0);//7
SPI_write_1byte(0);//8
```

```
SPI_write_1byte(verify);
```

SpiDelayZu

//显示：济南怡安电子有限公司出品

SPI_write_1byte(12);
 SPI_write_1byte(0);//3
 SPI_write_1byte(0);//4
 SPI_write_1byte(0);//5
 SPI_write_1byte(0);//6
 SPI_write_1byte(140);//7 济
 SPI_write_1byte(141);//8
 SPI_write_1byte(156);//7 南
 SPI_write_1byte(157);//8

SPI_write_1byte(verify);
 SpiDelayZu

SPI_write_1byte(13);
 SPI_write_1byte(218);//1 怡
 SPI_write_1byte(219);//2
 SPI_write_1byte(96);//3 安
 SPI_write_1byte(97);//4
 SPI_write_1byte(110);//5 电
 SPI_write_1byte(111);//6
 SPI_write_1byte(240);//7 子
 SPI_write_1byte(241);//8

SPI_write_1byte(verify);
 SpiDelayZu

SPI_write_1byte(14);
 SPI_write_1byte(220);//1 有
 SPI_write_1byte(221);//2
 SPI_write_1byte(204);//3 限
 SPI_write_1byte(205);//4
 SPI_write_1byte(126);//5 公
 SPI_write_1byte(127);//6
 SPI_write_1byte(178);//7 司
 SPI_write_1byte(179);//8
 SPI_write_1byte(verify);
 SpiDelayZu

SPI_write_1byte(15);
 SPI_write_1byte(108);//1 出


```
SPI_write_1byte(109);//2
SPI_write_1byte(164);//3 品
SPI_write_1byte(165);//4
SPI_write_1byte(0);//5
SPI_write_1byte(0);//6
SPI_write_1byte(0);//7
SPI_write_1byte(0);//8
SPI_write_1byte(verify);
```

SpiDelayZu

```
//显示：电话：0531 89227531
SPI_write_1byte(24);
SPI_write_1byte(0);//1
SPI_write_1byte(0);//2
SPI_write_1byte(0);//3
SPI_write_1byte(0);//4
SPI_write_1byte(0);//5
SPI_write_1byte(0);//6
SPI_write_1byte(110);//7 电
SPI_write_1byte(111);//8
```

```
SPI_write_1byte(verify);
```

SpiDelayZu

```
SPI_write_1byte(25);
SPI_write_1byte(132);//1 话
SPI_write_1byte(133);//2
SPI_write_1byte(26);//3
SPI_write_1byte(16);//4
SPI_write_1byte(21);//5
SPI_write_1byte(19);//6
SPI_write_1byte(17);//7
SPI_write_1byte(j);//8
```

```
SPI_write_1byte(verify);
SpiDelayZu
```

```
SPI_write_1byte(26);
SPI_write_1byte(24);//1
SPI_write_1byte(22);//2
SPI_write_1byte(18);//3
SPI_write_1byte(18);//4
SPI_write_1byte(23);//5
```

```
SPI_write_1byte(21);//6
SPI_write_1byte(19);//7
SPI_write_1byte(17);//8
SPI_write_1byte(verify);
```

SpiDelayZu

```
SPI_write_1byte(27);
SPI_write_1byte(0);//1
SPI_write_1byte(0);//2
SPI_write_1byte(0);//3
SPI_write_1byte(0);//4
SPI_write_1byte(0);//5
SPI_write_1byte(0);//6
SPI_write_1byte(0);//7
SPI_write_1byte(0);//8
SPI_write_1byte(verify);
```

SpiDelayZu

//显示：网址：WWW.ZIFUQI.COM

```
SPI_write_1byte(32);
SPI_write_1byte(0);//1
SPI_write_1byte(0);//2
SPI_write_1byte(0);//3
SPI_write_1byte(0);//4
SPI_write_1byte(0);//5
SPI_write_1byte(0);//6
SPI_write_1byte(194);//7 网
SPI_write_1byte(195);//8
```

```
SPI_write_1byte(verify);
SpiDelayZu
```

```
SPI_write_1byte(33);
SPI_write_1byte(228);//1 址
SPI_write_1byte(229);//2
SPI_write_1byte(26);//3
SPI_write_1byte(55);//4
SPI_write_1byte(55);//5
SPI_write_1byte(55);//6
SPI_write_1byte(14);//7
SPI_write_1byte(58);//8
```

```
SPI_write_1byte(verify);
```



```
        j++;
        SPI_write_1byte(j);//1
        j++;
        SPI_write_1byte(j);//1
        j++;
        SPI_write_1byte(j);//1
        j++;
        SPI_write_1byte(verify);
        SpiDelayZu
    }

    SpiDelayLED(20);

//改变字库显示次序 j 没有清零
for(n=0;n<48;n++)
{
    SPI_write_1byte(n);
    SPI_write_1byte(j);//1
    j++;
    SPI_write_1byte(j);//1
    j++;
    SPI_write_1byte(j);//1
    j++;
    SPI_write_1byte(j);//1
    j++;
    SPI_write_1byte(j);//1
    j++;
    SPI_write_1byte(j);//1
    j++;
    SPI_write_1byte(j);//1
    j++;
    SPI_write_1byte(verify);
    SpiDelayZu
}

    SpiDelayLED(20);
//左右移动
    SPI_write_1byte(0x55);
    SPI_write_1byte(0x30);//
```

```
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x31);//  
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x32);//  
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x33);//  
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x34);//  
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x35);//  
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x36);//  
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x37);//  
SPI_write_1byte(verify);
```

```
//上下移动
```

```
SpiDelayLED(5);  
SPI_write_1byte(0x55);  
SPI_write_1byte(0x34);//  
SPI_write_1byte(verify);
```

```
SpiDelayLED(5);
SPI_write_1byte(0x55);
SPI_write_1byte(0x24);//
SPI_write_1byte(verify);

SpiDelayLED(5);
SPI_write_1byte(0x55);
SPI_write_1byte(0x14);//
SPI_write_1byte(verify);

SpiDelayLED(5);
SPI_write_1byte(0x55);
SPI_write_1byte(0x04);//
SPI_write_1byte(verify);

SpiDelayLED(20);

//改变行间距
SPI_write_1byte(55);
SPI_write_1byte(0x39);//
SPI_write_1byte(verify);//

SpiDelayLED(5);

//清屏
for(n=0;n<48;n++)
{
    SPI_write_1byte(n);
    SPI_write_1byte(0);//1
    SPI_write_1byte(0);//2
    SPI_write_1byte(0);//3
    SPI_write_1byte(0);//4
    SPI_write_1byte(0);//5
    SPI_write_1byte(0);//6
    SPI_write_1byte(0);//7
    SPI_write_1byte(0);//8
    SPI_write_1byte(verify);
}

SpiDelayZu
```

```
SPI_write_1byte(0x55);  
SPI_write_1byte(0x55);//  
SPI_write_1byte(verify);  
  
    }//while(1)  
}
```