

## 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。

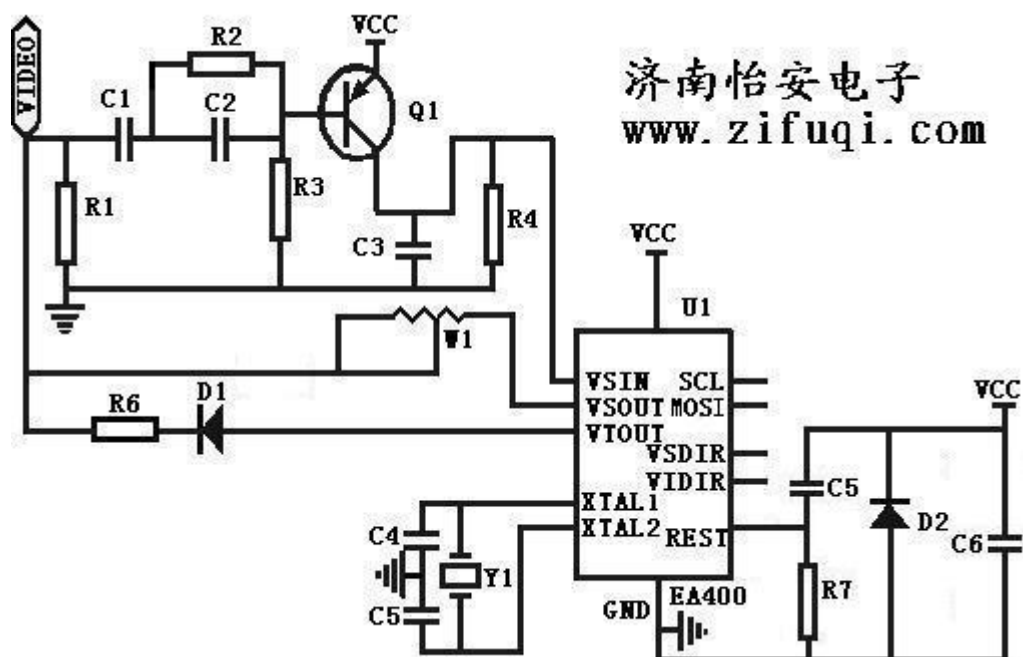
校验：前 9 个字节的与或

### 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
VTOUT	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

济南怡安电子有限公司

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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)  
}
```