TEF6686 MCU 程序制作

1. TEF6686 上电初始化。

(1) TEF6686 软件复位 1E 5A 01 5A 5A。

64	Write Trans...	1E 5A 01 5A 5A

(2) 延时 100ms。

(3) TEF6686 Patch 初始化

64	Write Trans...	1C 00 00
64	Write Trans...	1C 00 74
64	Write Trans...	1B F0 00 38 2F D0 80 F0 00 38 37 D0 80 43 B2 38 3A D0 80 F0 00 70 00 C2
64	Write Trans...	1B F0 00 38 6B D0 80 80 FC 39 0E D0 80 F0 00 39 13 D0 80 F0 00 39 16 D0
64	Write Trans...	1B F0 00 39 BC D0 80 F0 00 39 32 D0 80 F0 00 39 BE D0 80 C4 A2 02 11 60
64	Write Trans...	1B F0 00 39 9A D0 80 90 01 39 34 D0 80 F0 00 38 F0 D0 80 F0 00 39 3B D2
64	Write Trans...	1B F0 00 39 3F D0 80 F0 00 39 49 D0 80 F0 00 39 4C D0 80 9E 30 18 F9 D2
64	Write Trans...	1B F0 00 39 51 D0 80 F0 00 39 54 D0 80 F0 00 39 57 D0 80 32 00 39 59 D0
64	Write Trans...	1B F0 00 39 5B D0 80 A8 01 39 AA D0 80 F0 00 39 C3 D0 80 F0 00 39 C5 D0
64	Write Trans...	1B F0 00 39 C7 D0 80 F0 00 39 DA D0 80 F0 00 39 DD D0 80 F0 00 39 E0 D0
64	Write Trans...	1B F0 00 39 E3 D0 80 F0 00 70 00 F0 00 F0 00 39 E8 D0 80 F0 00 39 B5 D2
64	Write Trans...	1B F0 00 39 F6 D0 80 00 43 3A 05 D9 80 F0 00 3A 0F D0 80 F0 00 3A 45 D0
64	Write Trans...	1B F0 00 3A 48 D0 80 F0 00 3A 59 D0 80 2E 40 3A F8 D0 80 F0 00 3B 02 D0
64	Write Trans...	1B F0 00 0E 3F 60 00 50 10 28 D8 D2 80 91 01 01 36 60 00 F0 00 70 00 A0
64	Write Trans...	1B F0 00 70 00 A0 D8 F0 00 70 00 A0 E8 F0 00 70 00 A1 6F F0 00 70 00 A1
64	Write Trans...	1B F0 00 70 00 A1 C4 F0 00 70 00 A1 DC F0 00 20 31 D0 80 F0 00 04 C1 60
64	Write Trans...	1B F0 00 01 01 D2 80 F0 00 00 30 D0 80 00 7F 60 02 E2 00 F0 00 0E 22 60
64	Write Trans...	1B F0 00 00 FF 60 03 F0 00 01 42 D2 80 90 03 40 02 F0 00 90 43 01 70 D1

64	Write Trans...	1B 10 00 00 8C 60 00 10 00 FE 7D 60 00 10 00 02 54 60 00 10 00 03 89 60
64	Write Trans...	1B 10 00 FD A1 60 00 10 00 FD 23 60 00 10 00 01 2F 60 00 10 00 01 28 60
64	Write Trans...	1B 10 00 00 01 60 00 10 00 FF DF 60 00 10 00 FF A6 60 00 10 00 FF A8 60
64	Write Trans...	1B 10 00 00 64 60 00 F0 00 10 00 F0 00 F0 00 10 00 F0 00 F0 00 17 0B 60
64	Write Trans...	1B F0 00 00 03 60 00 F0 00 54 C0 60 00 10 00 00 05 60 00 10 00 00 05 60
64	Write Trans...	1B 10 00 00 0F 60 00 10 00 00 0F 60 00 10 00 09 C0 60 00 10 00 0A 20 60
64	Write Trans...	1B 10 00 1D 40 60 00 10 00 1E 60 60 00 F0 00 10 00 F0 00 F0 00 10 00 F0
64	Write Trans...	1B F0 00 70 00 D0 08
64	Write Trans...	1C 00 00

（3）LutByteValues[]数组写入 25*3+23(一次性写入 94 字节)字节 Byte.

64	Write Trans...	1C 00 75
64	Write Trans...	1B 40 13 40 2F 41 68 41 C1 42 14 44 DE 47 C5 47 FC 4E 56 4E 58 4E 5B 4D
64	Write Trans...	1B 4E 0A 4E 49 4E 53 4F 92 4F EA 50 74 50 80 56 60 56 D4 56 D9 59 B4 5A
64	Write Trans...	1B 5B 79 5D DC 60 67 60 88 60 A8 61 9F 61 B6 61 DF 62 14 62 59 62 9B 62
64	Write Trans...	1B 63 69 64 3B 66 09 66 E7 67 0B 67 1A 67 29 68 87 68 99 68 A7 68 B2
64	Write Trans...	1C 00 00

（4）命令开始命令

64	Write Transaction	14 00 01

（5）延时 50ms。

（6）状态检测模式检测 0X01。

module	64	APPL	
cmd	**128**	**Get_Operation_Status**	| status
index	1	status	Device operation status
			0 = boot state; no command support
			1 = idle state
			2 = active state; radio standby
			3 = active state; FM
			4 = active state; AM

64	Write Transaction	40 80 01
64	Read Transaction	00 00*
64	Write Transaction	40 80 01
64	Read Transaction	00 01*

（7）IC 型号与版本检测

64	Write Trans...	40 82 01
64	Read Trans...	09 0E 01 00 02 00 02 11*

（8）设定模组内晶体频率 9.216MHz.

64	Write Transaction	40 04 01 00 8C A0 00 00 00

（9）devTEF665x_APPL_Activate(0x0001)

64	Write Transaction	40 05 01 00 01

（10））延时 100ms。

（11）状态检测模式检测 0X02。

64	Write Trans...	40 80 01
64	Read Trans...	00 02*

（12） TEF6686 FM band 收音设置命令

```
void devTEF6686_FM_para_command_boot(void)
{
    int i,j,k=1;
    unsigned char num;
    unsigned char buf[50];

    for(i=0;i<sizeof(TEF6686_set_FM_command);i+=(TEF6686_set_FM_command[i]+1))
    {
     num=TEF6686_set_FM_command[i];   k=i+1;
     for(j=0;j<num;j++,k++)  buf[j]=TEF6686_set_FM_command[k];
     devTEF665x_Write(buf, num);
    }
}
```

```
static const unsigned char TEF6686_set_FM_command[]=
{
 0x07,0x20,0x01,0x01,0x00,0x01,0x26,0x52,          // FM_Tune_To
 0x06,0x20,0x16,0x01,0x00,0x01,                 // FM_Set_ChannelEqualizer
 0x06,0x20,0x14,0x01,0x00,0x01,                 // FM_Set_MphSuppression
 0x0B,0x20,0x28,0x01,0x00,0x78,0x01,0xF4,0x00,0x0A,0x00,0x14,   // FM_Set_SoftMute_Time
 0x09,0x20,0x2C,0x01,0x00,0x00,0x00,0xC8,0x03,0xE8,        // FM_Set_SoftMute_Mph
 0x09,0x20,0x2B,0x01,0x00,0x00,0x00,0xC8,0x03,0xE8,        // FM_Set_SoftMute_Noise
 0x0B,0x20,0x32,0x01,0x00,0xC8,0x07,0xD0,0x00,0x0A,0x00,0x50,   // FM_Set_HighCut_Time
 0x09,0x20,0x36,0x01,0x00,0x03,0x00,0x78,0x00,0xA0,        // FM_Set_HighCut_Mph
 0x09,0x20,0x35,0x01,0x00,0x03,0x00,0x96,0x00,0xC8,        // FM_Set_HighCut_Noise
 0x07,0x20,0x37,0x01,0x00,0x01,0x09,0x60,           // FM_Set_HighCut_Max
 0x07,0x20,0x39,0x01,0x00,0x01,0x00,0x64,           // FM_Set_LowCut_Max
 0x0B,0x20,0x3C,0x01,0x00,0xC8,0x0F,0xA0,0x00,0x14,0x00,0x50,   // FM_Set_Stereo_Time
 0x09,0x20,0x40,0x01,0x00,0x03,0x00,0x64,0x00,0x96,        // FM_Set_Stereo_Mph
 0x09,0x20,0x3F,0x01,0x00,0x03,0x00,0x78,0x00,0xA0,        // FM_Set_Stereo_Noise
 0x09,0x20,0x4A,0x01,0x00,0x03,0x00,0x50,0x00,0x8C,        // FM_Set_StHiBlend_Mph
 0x09,0x20,0x49,0x01,0x00,0x03,0x00,0x50,0x00,0x8C,        // FM_Set_StHiBlend_Noise
 0x09,0x40,0x03,0x01,0x00,0x00,0x00,0x21,0x00,0x03,        // APPL_Set_GPIO
 0x09,0x40,0x03,0x01,0x00,0x01,0x00,0x21,0x00,0x00,        // APPL_Set_GPIO
 0x09,0x40,0x03,0x01,0x00,0x02,0x00,0x21,0x00,0x00,        // APPL_Set_GPIO
 0x09,0x40,0x03,0x01,0x00,0x00,0x00,0x20,0x00,0x03,        // APPL_Set_GPIO
 0x09,0x40,0x03,0x01,0x00,0x01,0x00,0x20,0x00,0x00,        // APPL_Set_GPIO
 0x09,0x40,0x03,0x01,0x00,0x02,0x00,0x20,0x00,0x00,        // APPL_Set_GPIO
 0x0D,0x30,0x16,0x01,0x00,0x20,0x00,0x00,0x00,0x20,0x00,0x00,0x11,0x3A,  // AUDIO_Set_Dig_IO
 0x0D,0x30,0x16,0x01,0x00,0x21,0x00,0x00,0x00,0x20,0x00,0x00,0x11,0x3A,  // AUDIO_Set_Dig_IO
 0x06,0x30,0x0B,0x01,0x00,0x00,                 // AUDIO_Set_Mute
 0X06,0x30,0x0A,0x01,0x00,0x32,          // AUDIO_Set_Volume
 0x07,0x30,0x0D,0x01,0x00,0x80,0x00,0xE0         // AUDIO_Set_Output_Source

};
```

64	Write Trans...	20 01 01 00 01 26 52
64	Write Trans...	20 16 01 00 01
64	Write Trans...	20 14 01 00 01
64	Write Trans...	20 28 01 00 78 01 F4 00 0A 00 14
64	Write Trans...	20 2C 01 00 00 00 C8 03 E8
64	Write Trans...	20 2B 01 00 00 00 C8 03 E8
64	Write Trans...	20 32 01 00 C8 07 D0 00 0A 00 50
64	Write Trans...	20 36 01 00 03 00 78 00 A0
64	Write Trans...	20 35 01 00 03 00 96 00 C8
64	Write Trans...	20 37 01 00 01 09 60
64	Write Trans...	20 39 01 00 01 00 64
64	Write Trans...	20 3C 01 00 C8 0F A0 00 14 00 50
64	Write Trans...	20 40 01 00 03 00 64 00 96
64	Write Trans...	20 3F 01 00 03 00 78 00 A0
64	Write Trans...	20 4A 01 00 03 00 50 00 8C
64	Write Trans...	20 49 01 00 03 00 50 00 8C
64	Write Trans...	40 03 01 00 00 00 21 00 03
64	Write Trans...	40 03 01 00 01 00 21 00 00
64	Write Trans...	40 03 01 00 02 00 21 00 00

64	Write Trans...	40 03 01 00 00 00 20 00 03
64	Write Trans...	40 03 01 00 01 00 20 00 00
64	Write Trans...	40 03 01 00 02 00 20 00 00
64	Write Trans...	30 16 01 00 20 00 00 00 20 00 00 11 3A
64	Write Trans...	30 16 01 00 21 00 00 00 20 00 00 11 3A
64	Write Trans...	30 0B 01 00 00
64	Write Trans...	30 0A 01 00 32
64	Write Trans...	30 0D 01 00 80 00 E0

（13）状态检测模式检测 0X03。

64	Write Trans...	40 80 01
64	Read Trans...	00 03*

(14) FM 频率设置。

64	Write Trans...	20 01 01 00 01 22 2E

软件纠错处理：收音高频头 9pin:SDA 或者 10pin:SCL 对地 GND 接一个按键开关（50～100ms），开机时，按一下按键开关，相当于干扰严重一样，模拟通讯数据出错，MCU 无纠错处理，此时收音无声 不能收台，收音完全不能工作。如果 MCU 软件有纠错处理，接一个按键开关，收音可以正常工作。

```
void TEF6686_Reset(void) /*TEF6686软件复位*/
{
    unsigned char devTEF665x_Patch_CmdTab0[6]={5,  0x1E,0x5A,0x01,0x5A,0x5A};
    devTEF665x_WriteTab(devTEF665x_Patch_CmdTab0);
}
```

```
unsigned char devTEF6686_startup(void)
{
   unsigned char err=0,i=0;

    TEF6686_Reset(); /*软件复位1E 5A 01 5A 5A*/
    delay_ms(100); /*延时100ms*/
    devTEF6686_Patch_Init(); /*boot patch*/
    devTEF665x_StartCmd();/*命令开始命令14 00 01*/
    delay_ms(50); /*延时50ms*/
    do{
       devTEF665x_APPL_Get_Operation_Status(&status1);/*状态检测命令40 80 01*/
       i++;
       delay_ms(5);
       if(i>20) return(err=1) ; /*有错误存在，就返回*/
       }while(status1!=0x01); /*只有patch数据写入不出错，状态才会为0x01*/
     devTEF665x_APPL_Get_Identification(&device, &hw_version, &sw_version);/*IC ID读取*/
     delay_ms(10);/*延时10ms*/
     devTEF665x_APPL_Activate(0x0001);/*激活命令40 05 01 00 01*/
     delay_ms(100); /*延时100ms*/
     i=0;
     do{
         devTEF665x_APPL_Get_Operation_Status(&status1);/*状态检测命令40 80 01*/
         i++;
         delay_ms(5);
         if(i>20) return(err=1);  /*有错误存在，就返回*/
        }while(status1!=0x02); /*激活后，状态检测因为0x02*/
     devTEF6686_FM_para_command_boot();/*FM band收音波段参数命令设置*/
     i=0;
     do{
         devTEF665x_APPL_Get_Operation_Status(&status1);/*状态检测命令40 80 01*/
         i++;
         delay_ms(5);
         if(i>20) return(err=1); /*有错误存在，就返回*/
       }while(status1!=0x03); /*FM band收音波段参数命令设置完成无误，状态检测才为0X03*/
       return err;/*无错误，返回值为0*/
}
```

```
void main(void) /*TEF6686纠错机处理*/
{
  unsigned char i=0;
  while(devTEF6686_startup()){i++; if(i>5) break;} /*连续6次出错，就跳出循环*/
}
```

2. TEF6686 波段切换

```
void devTEF6686_AM_para_command_boot(void)
{
    int i,j,k=1;
    unsigned char num;
    unsigned char buf[50];

    for(i=0;i<sizeof(TEF6686_set_AM_command);i+=(TEF6686_set_AM_command[i]+1))
    {
     num=TEF6686_set_AM_command[i];   k=i+1;
     for(j=0;j<num;j++,k++)  buf[j]=TEF6686_set_AM_command[k];
     devTEF665x_Write(buf, num);
    }
}
```

```
static const unsigned char TEF6686_set_AM_command[]=
{
0x07,0x21,0x01,0x01,0x00,0x01,0x03,0xE7,        // AM_Tune_To
0x07,0x21,0x52,0x01,0x00,0xC8,0x00,0x00,     // AM_Set_QualityStatus
0x07,0x21,0x52,0x01,0x00,0x00,0x00,0x00,    // AM_Set_QualityStatus
0X05,0X30,0X0A,0X01,0X00,0X32       // AUDIO_Set_Volume
};
```

64	Write Trans...	21 01 01 00 01 03 E7
64	Write Trans...	21 52 01 00 C8 00 00
64	Write Trans...	21 52 01 00 00 00 00
64	Write Trans...	30 0A 01 00 32
64	Write Trans...	21 01 01 00 02 02 0A
64	Write Trans...	21 01 01 00 07

FM_Tune_To (1, 1, 8930)	Preset tuning to FM 89.3 MHz
AM_Tune_To (1, 2, 990)	Search tuning (from FM) to AM 990 kHz
AM_Tune_To (1, 7)	End (release mute of AM Search action)
[w 20 01 01 0001 22E2]	Preset tuning to FM 89.3 MHz
[w 21 01 01 0002 03DE]	Search tuning (from FM) to AM 990 kHz
[w 21 01 01 0007]	End (release mute of Search action)

3. TEF6686 频率切换

（1）FM 频率设定

```
0x20,0x01,0x01,0x00,0x01,0x22,0xE2,        // FM_Tune_To
```

（2）AM 频率设定

```
0X21,0X01,0X01,0X00,0X01,0X03,0XDE,     // AM_Tune_To
```

4. FM AM SEEK 通过读取 LEVEL USN WAM　OFFSET 停台。

64	Write Trans...	20 80 01
64	Read Trans...	00 41*
64	Write Trans...	20 80 01
64	Read Trans...	00 7D*
64	Write Trans...	20 81 01
64	Read Trans...	03 E8 00 8A 00 14 00 56 FE DB 02 D0 00 6E*

64	Write Trans...	20 01 01 00 02 22 7E
64	Write Trans...	20 80 01
64	Read Trans...	00 41*
64	Write Trans...	20 80 01
64	Read Trans...	00 7D*
64	Write Trans...	20 81 01
64	Read Trans...	03 E8 01 E1 00 1E 00 1D FF DA 09 38 00 2D*
64	Write Trans...	20 01 01 00 01 22 7E
64	Write Trans...	20 85 01 立体声检测pilot
64	Read Trans...	80 00*

```
void devTEF665x_Radio_Get_Signal_Status(bool fm,unsigned char *stereo) /*立体声检测20 85 01命令*/
{
    unsigned char buf[2];

    devTEF665x_Get_Cmd(fm ? TEF665X_MODULE_FM : TEF665X_MODULE_AM,
            TEF665X_Cmd_Get_Signal_Status,
            buf,sizeof(buf));

        *stereo = (Convert8bto16b(buf)&0x8000)/0x8000; /*是立体声返回值为1*/
}
```

```
void FM_seek(void) /*TEF6686 FM SEEK*/
{  unsigned char station=0, t1,t2, fm;  /*定义局部变量*/
   unsigned int  status, level,usn,wam,offset,bandwidth,IFC; /*定义局部变量*/
    if(Band==FM||Band==FM1||Band==FM2) /*FM SEEK停台*/
            {
                LCDDisplayFreq(); /*LCD屏显示锁台信息*/
                devTEF665x_SeekMode_freq (RF_Freq);/*写入一个FM频率*/
                fm=1;  /*局部变量赋值*/
                delay_ms(8); /*先延时8ms，再状态读取*/
                devTEF665x_Radio_Get_Quality_Status (fm,&status);/*0X20 0X80 0X01命令读取状态非零，数据有效*/
                t1=status; /*数值暂时保存*/
                delay_ms(5); /*延时5ms,再保存*/
                devTEF665x_Radio_Get_Quality_Status (fm,&status); /*0X20 0X80 0X01命令读取状态非零，数据有效*/
                t2=status;   /*数据暂时保存*/
                if((t1==0)||(t2==0))  continue; /*非零数据有效*/
            }
    if(Band==FM||Band==FM1||Band==FM2)
        {
        fm=1;  /*FM波段*/
        delay_ms(30); /*写入一个频率，第一次延时30ms,再读取锁台数据*/
        for(i=0;i<5;i++) /*5次连续读取，防止漏台*/
        {
        devTEF665x_Radio_Get_Signal_Status( fm, &stereo); /*20 85 01立体声检测函数*/
        devTEF665x_Radio_Get_Quality_Data (fm,&level,&usn,&wam,&offset,&bandwidth); /*0X20 0X81 0X01锁台状态数据读取函数*/
        if(offset<0x8000) IFC=offset; /*正频偏*/
        else  IFC=0x10000-offset; /*负频偏取绝对值*/
        if((stereo==1)&&(level>=0X90)&&(IFC<0x4a)) station=1; /*自然界95%电台属于立体声，立体声停台条件*/
        if((bandwidth>0x07D5)&&((level>=FMSM_TH)&&(usn<0x70)&&(wam<0x70)&&(IFC<0x4a)) ) station=1; /*一般电台，停台条件*/
        else if((RF_Freq==99100)&&(bandwidth>0x0500)&&((level>=FMSM_TH)&&(usn<0x9a)&&(wam<0x9A)&&(IFC<0x6a)) ) station=1;
         /*99.1MHz特殊电台停台条件*/
        else if(((level>=FMSM_TH)&&(usn<0x80)&&(wam<0x80)&&(IFC<0x6a))&&(RF_Freq==94200))  /*94.2MHz特殊电台，停台条件*/
               station=1; /*好台，标志性变量赋值*/

        if(station==1) break; /*有一次检测是好台，跳出循环检测20次*/
        delay_us(100); /*循环连续检测，每次延时100us*/
        }
        if(station==1) /*是好台，跳出锁台大循环*/
        {
            devTEF665x_Radio_freq (RF_Freq);/*锁台静音，锁台后输出声音*/
            LitLED(TUNING,On);   /*LED指示灯亮*/

            Seek_Off(); /*立体声检测函数*/

            break; /*跳出锁台大循环*/
        }
}
```

```
//AM auto SEEK
            if((Band==MW)||(Band==LW)||(Band==SW))
            {
                LCDDisplayFreq();
                devTEF665x_SeekMode_freq (RF_Freq);
                delay_ms(20);
                fm=0;
                devTEF665x_Radio_Get_Quality_Status (fm,&status);
                     t1=status;
                delay_ms(2);
                devTEF665x_Radio_Get_Quality_Status (fm,&status);
                t2=status;
                if((t1==0)||(t2==0) )   continue;
            }

            if((Band==MW)||(Band==LW)||(Band==SW))
            {
                delay_ms(30);
                devTEF665x_Radio_Get_Quality_Data (fm,&level,&usn,&wam,&offset,&bandwidth);
                if(offset<0x8000) IFC=offset;
                else  IFC=0x10000-offset;
                if((level>=0xff00)||(IFC>=0x10))    continue;
                else if(((level>AMSM_TH))&&(level<0xff00)&&(IFC<0x08))
                { LitLED(TUNING,On);;
                  devTEF665x_Radio_freq (RF_Freq);
                  break;
                }
            }
        }while(1);
```