

```
-----
' Name : WS2811_V1.bas
' Datum: 28.11.2012
'
' Autor : Stefan Kaldewey
' Email : stefan.kaldewey@kt-elektronik.de
-----
```

```
$regfile = "m16def.dat"           ' specify the used micro
$crystal = 10000000              ' used crystal frequency
$hwstack = 64                    ' default use 32 for the hardware stack
$swstack = 32                    ' default use 10 for the SW stack
$framesize = 32                  ' default use 40 for the frame space
```

```
Declare Sub Send_frame_800(byval Number_of_ic As Byte)
Declare Sub Send_frame_400(byval Number_of_ic As Byte)
```

```
' enthält die PWM Werte für jeden Kanal
' die Größe des Arrays errechnet sich aus der Anzahl der WS2811 Controller * 3
' im Beispielprogramm 3 * 3 = 9
Dim Led_buffer(9) As Byte
```

```
' Hilfsvariablen zum Testen
Dim Rnd_value As Byte
Dim Loop_counter As Byte
```

```
' Konfiguration der Datenleitung
```

```
Sdi Alias Portd.6
```

```
Config Portd.6 = Output
```

```
' ----- Hauptprogramm -----
Do
```

```
    For Loop_counter = 1 To 9
```

```
        Led_buffer(loop_counter) = Rnd(30)
```

```
        'Call Send_frame_400(3)
        Call Send_frame_800(3)
```

```
    Next Loop_counter
```

```
    'Test mit einem Controller
```

```
    'Led_buffer(1) = 30   ' rot
    'Led_buffer(2) = 0   ' grün
    'Led_buffer(3) = 0   ' blau
    'Call Send_frame(1)
```

```
    Waitms 300
```

```
Loop
' ----- Ende Hauptprogramm -----
```

```
Sub Send_frame_800(byval Number_of_ic As Byte)
```

```
    Local I As Byte
    Local J As Byte
    Local Last_channel As Byte
    Local Temp As Byte
    Local Mask As Byte
```

```
    Last_channel = Number_of_ic * 3
    Mask = 128
```

```
    Sdi = 0
    Waitms 1
```

```
    ' Bit Zeiten
    ' für eine 1, T1H 0.6 µs T1L 0.65 µs
    ' für eine 0, T0H 0.25 µs T0L 1.0 µs
```

```
    push r0           ' enthält das aktuelle Byte des Kanals
    push r16          ' Bitzähler
    push r17          ' Kanalzähler
```

```
    Loadadr Last_channel, X
    ld r17,x
    Loadadr Led_buffer(1), X
```

Channel_loop_800:

```
ld r0,x+
ldi r16,8
```

Bit_loop_800:

```
lsl r0
brcc BIT_0_800
```

Bit_1_800:

```
Sbi $12 , 6
nop
nop
nop
nop
cbi $12 , 6
rjmp Next_bit_800
```

Bit_0_800:

```
Sbi $12 , 6
nop
cbi $12 , 6
```

Next_bit_800:

```
dec r16
cpi r16,0
brne BIT_LOOP_800
dec r17
cpi r17,0
brne CHANNEL_LOOP_800
```

```
pop r17
pop r16
pop r0
```

Waitus 60

End Sub

```
*****
,
,
*****
```

Sub Send_frame_400(byval Number_of_ic As Byte)

```
Local I As Byte
Local J As Byte
Local Last_channel As Byte
Local Temp As Byte
Local Mask As Byte
```

```
Last_channel = Number_of_ic * 3
Mask = 128
```

```
Sdi = 0
Waitms 1
```

```
' Bit Zeiten
' für eine 1, T1H 1.2 µs T1L 1.3 µs
' für eine 0, T0H 0.5 µs T0L 2.0 µs
```

```
push r0           ' enthält das aktuelle Byte des Kanals
push r16          ' Bitzähler
push r17          ' Kanalzähler
```

```
Loadadr Last_channel , X
ld r17,x
Loadadr Led_buffer(1) , X
```

Channel_loop_400:

```
ld r0,x+
ldi r16,8
```

Bit_loop_400:

```
lsl r0
brcc BIT_0_400
```

Bit_1_400:

```
Sbi $12 , 6  
nop  
nop  
nop  
nop
```

```
nop  
nop  
nop  
nop  
nop  
nop
```

```
cbi $12 , 6  
nop  
nop
```

```
rjmp Next_bit_400
```

```
Bit_0_400:
```

```
Sbi $12 , 6  
nop  
nop  
nop
```

```
cbi $12 , 6  
nop  
nop  
nop
```

```
nop  
nop  
nop  
nop  
nop  
nop
```

```
Next_bit_400:
```

```
dec r16  
cpi r16,0  
brne BIT_LOOP_400  
dec r17  
cpi r17,0  
brne CHANNEL_LOOP_400
```

```
pop r17  
pop r16  
pop r0
```

```
Waitus 60
```

```
End Sub
```