RF Monolithics, Inc.

Using the TR8100 in ISSS Mode

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The Following code snipped is from TR8100ISSS.asm which shows the code that is required to program the TR8100 Transceiver for ISSS mode which will operate under the FCC Part 15.247 rule.

The micro used is a SiLabs F330.

Development environment is the SiLabs IDE.

The TR8100 uses up to 3, 8 bit registers. These 8 bit registers have an additional 3 bits added to the 8 bit register, read/write control along with 2 bits for addressing totaling 11 bits. The SPI interface is an eight bit register, of which we need to send 11 bits. To accommodate this, we will send two 8 bit commands padding each with 5 zero bits for each 8 bit register.

Example:

R/W A1 A0 D7 D6 D5 D4 D3 D2 D1 D0 P P P P P

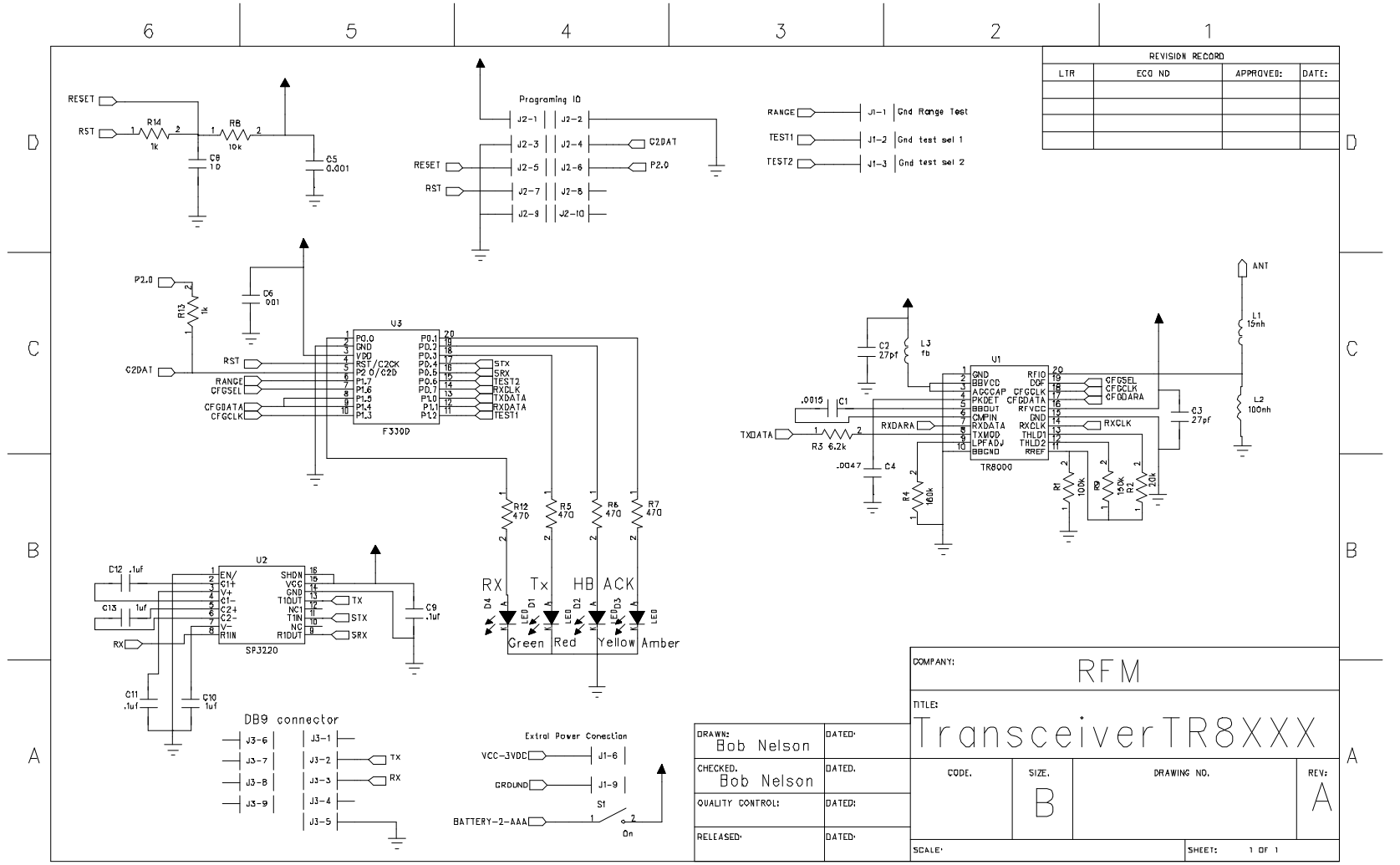
R/W = Read = 1, Write = 0
P = pad (0)

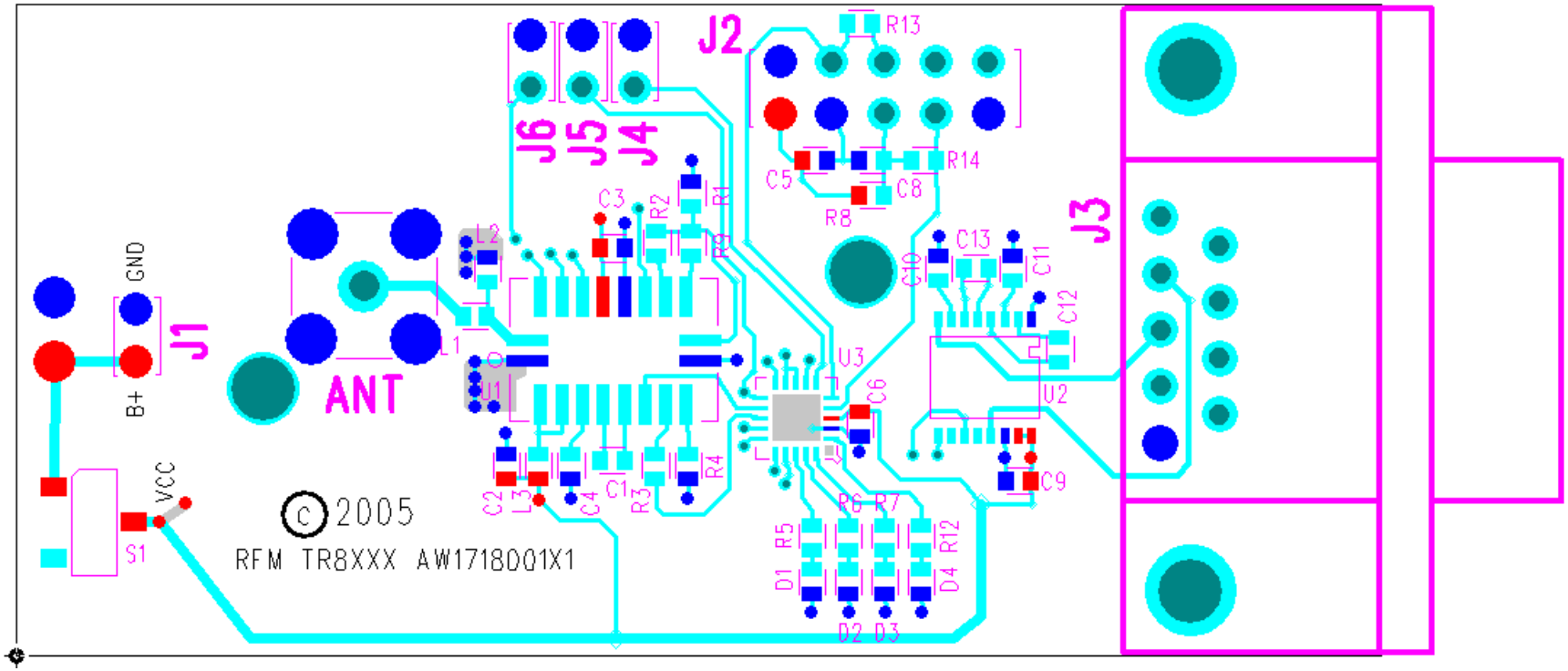
```
;*******************************************************************************************
;                                          TR8100ISSS.ASM
;*******************************************************************************************
;                                  Range Test Enabled when Jumper is installed
;                                   Unit with jumper installed is the Transmitter!
;                                  Unit without jumper installed is the Receiver!
;*******************************************************************************************
;                                  This code sets the TR8100 up in ISSS mode  for TX
;                                          And High Sen. mode for RX..
;*******************************************************************************************
;                                      Control = R(read) = 1, W(write) = 0
;                                  CFG = 1(high) to Write Configuration to TR8100
;*******************************************************************************************
;Address Name  Bit 7    Bit 6      Bit 5          Bit 4       Bit 3      Bit 2     Bit 1       Bit 0
;0          CFG0  Sleep  TX/RX   ASK/OOK 2.4 GHz Mode 1  Mode 0 RX HDR SV En
;1          CFG1  RX Blk VCO Lk  ISSMod    -           BR3      BR2     BR1         BR0
;2          LoSyn Test   LOSyn6  LOSyn5  LOSyn4  LOSyn3  LOSyn2 LOSyn1 LOSyn0
;*******************************************************************************************
;Need to send an even 8 or 16 bits, control, address + data = 11, fill last 5 bits with zero
;R/W A1 A0 D7 D6 D5 D4 D3 D2 D1 D0  Fill Fill Fill Fill Fill
; 0       0   0   0   0   0   0   0   1   0   0  0   0    0    0   0    = 0080h High sen mode
; 0       0   1   0   0   0   0   0   0   0   0  0   0    0    0   0    = 2000h
;*******************************************************************************************
; Added the following to set the TR8100 up RX mode
;Set_RX:
;                                          setb  P1.6                      ; config high
;                                          mov SPIODAT,        #00h        ; send write and address
;                                          ACALL spio_wait                 ; wait for the 8 bits to send
;                                          mov SPIODAT,        #080h       ; RX Hi Sen Mode
;                                          ACALL spio_wait                 ; wait for the 8 bits to send
;                                          clr   P1.6                      ; bring config low
;                                          acall led                       ; delay
;                                          setb  P1.6                      ; bring config high
;                                          mov SPIODAT,        #20h        ; set high sen. mode
;                                          ACALL spio_wait                 ; wait for spio
;                                          mov SPIODAT,        #00h        ; next 8 bits
;                                          ACALL spio_wait                 ; wait for spio
;                                          clr   P1.6                      ; config low
;                                          RET                             ; TR8100 in high rx mode
;*******************************************************************************************
; Added the following to put the TR8100 in ISSS TX mode
;*******************************************************************************************
;Address Name  Bit 7   Bit 6       Bit 5          Bit 4      Bit 3      Bit 2      Bit 1      Bit 0
;0          CFG0  Sleep  TX/RX   ASK/OOK 2.4 GHz Mode 1  Mode 0 RX HDR SV En
;1          CFG1  RX Blk VCO Lk  ISSMod    -          BR3       BR2      BR1         BR0
;2          LoSyn Test   LOSyn6  LOSyn5  LOSyn4  LOSyn3  LOSyn2 LOSyn1 LOSyn0
```

```
;*************************************************************************************************
;Need to send an even 8 or 16 bits, control, address + data = 11, fill last 5 bits with zero
;R/W A1 A0 D7 D6 D5 D4 D3 D2 D1 D0 Fill Fill Fill Fill Fill
; 0       0   0   0   1   0  0   1   0    0   0  0  0   0   0   0    = 0900h TX & DSSS mode
; 0       0  1   0   0   1   0  0   0    0   0   0  0   0   0   0    = 2400h ISSS mode
;*************************************************************************************************
;Set_TX:
;                                          setb  P1.6                    ; config high
;                                          mov SPIODAT,        #09h      ; ISSS mode
;                                          ACALL spio_wait               ; wait for the 8 bits to send
;                                          mov SPIODAT,        #00h
;                                          ACALL spio_wait               ; wait for the 8 bits to send
;                                          clr   P1.6                    ; config low
;                                          acall led                     ; delay a bit
;                                          setb  P1.6                    ; config high
;                                          mov SPIODAT,        #24h
;                                          ACALL spio_wait               ; wait for the 8 bits to send
;                                          mov SPIODAT,        #00h
;                                          ACALL spio_wait               ; wait for the 8 bits to send
;                                          clr   P1.6                    ; config low
;                                          RET                           ; TR8100 in ISSS TX mode
;
;spio_wait:
      mov   A,SPIOCN          ; Get SPIO status bit
;     ANL   A,#02h            ; Done sending the bits
;     cjne  a,#02h,spio_wait  ; wait till it is
      RET                     ; Done
;
;*************************************************************************************************
```

The complete Range Test using the TR8100 in ISSS mode file name is TR1800ISSS.asm. This firmware will put the TR8100 in ISSS mode for transmit and High sensitivity mode is receive. Also the RF power out is set for max power of 10mw.

The following is the Range test PCB Schematic following by the PCB layout. Power to the range test demo board is 2 AAA batteries. Antenna is 3.06” ¼ wave, provisions have been made for a SMA connector.


REVISION RECORD
LTR
ECO NO
APPROVED:
DATE:
RESET
RST
R14 1k
R8 10k
C8 1D
C5 0.001
Programing IO
J2-1
J2-2
J2-3
J2-4
J2-5
J2-6
J2-7
J2-8
J2-9
J2-10
C2DAT
P2.0
RESET
RST
RANGE
TEST1
TEST2
J1-1
J1-2
J1-3
Gnd Range Test
Gnd test sel 1
Gnd test sel 2
P2.0
R13 1k
C6 001
C2DAT
RST
RANGE
CFGSEL
CFGDATA
CFGCLK
U3
F330D
STX
SRX
TEST2
RXCLK
TXDATA
RXDATA
TEST1
R12 470
R5 470
R6 470
R7 470
RX
Tx
HB
ACK
Green
Red
Yellow
Amber
D4
D1
D2
D3
LED
C2 27pf
L3 fb
.0015
C1
TXDATA
R3 6.2k
.0047
C4
U1
TR8000
RXDARA
RXCLK
CFGSEL
CFGCLK
CFGDARA
R4 160k
R1 100k
R2 20k
C3 27pf
ANT
L1 15nh
L2 100nh
C12 .1uf
C13 1uf
C11 .1uf
C10 1uf
U2
SP3220
TX
STX
SRX
RX
C9 .1uf
DB9 connector
J3-1
J3-2
J3-3
J3-4
J3-5
J3-6
J3-7
J3-8
J3-9
TX
RX
Extral Power Conection
VCC-3VDC
GROUND
BATTERY-2-AAA
J1-6
J1-9
S1
On
DRAWN: Bob Nelson
CHECKED: Bob Nelson
QUALITY CONTROL:
RELEASED:
DATED:
COMPANY: RFM
TITLE: TransceiverTR8XXX
CODE.
SIZE. B
DRAWING NO.
REV: A
SCALE:
SHEET: 1 OF 1


J1
GND
B+
VCC
S1
ANT
J2
J6
J5
J4
J3
R13
R14
C5
C8
R8
C3
R2
R1
L2
L1
U1
C2
L3
C4
C1
R3
R4
U3
C6
C13
C10
C11
C12
U2
C9
R6
R7
R5
R12
D1
D4
D2
D3
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RFM TR8XXX AW1718001X1