RTC6705/RTC6715
SPI Programming Guide
(For Modules Only)

RTC6705 Module Control Procedure

- Hardware setting
  - Richwave ships RTC6705 TX module configured as DIP switch. To use SPI on MCU to control RTC6705 module, the adjustment of components on PCB is must. As described on page 4, remove capacitor C39 and resistor R10 in advance can force SPI slave activation when power-on.
  - Also, the exact location of C39 and R10 are shown on page 5.

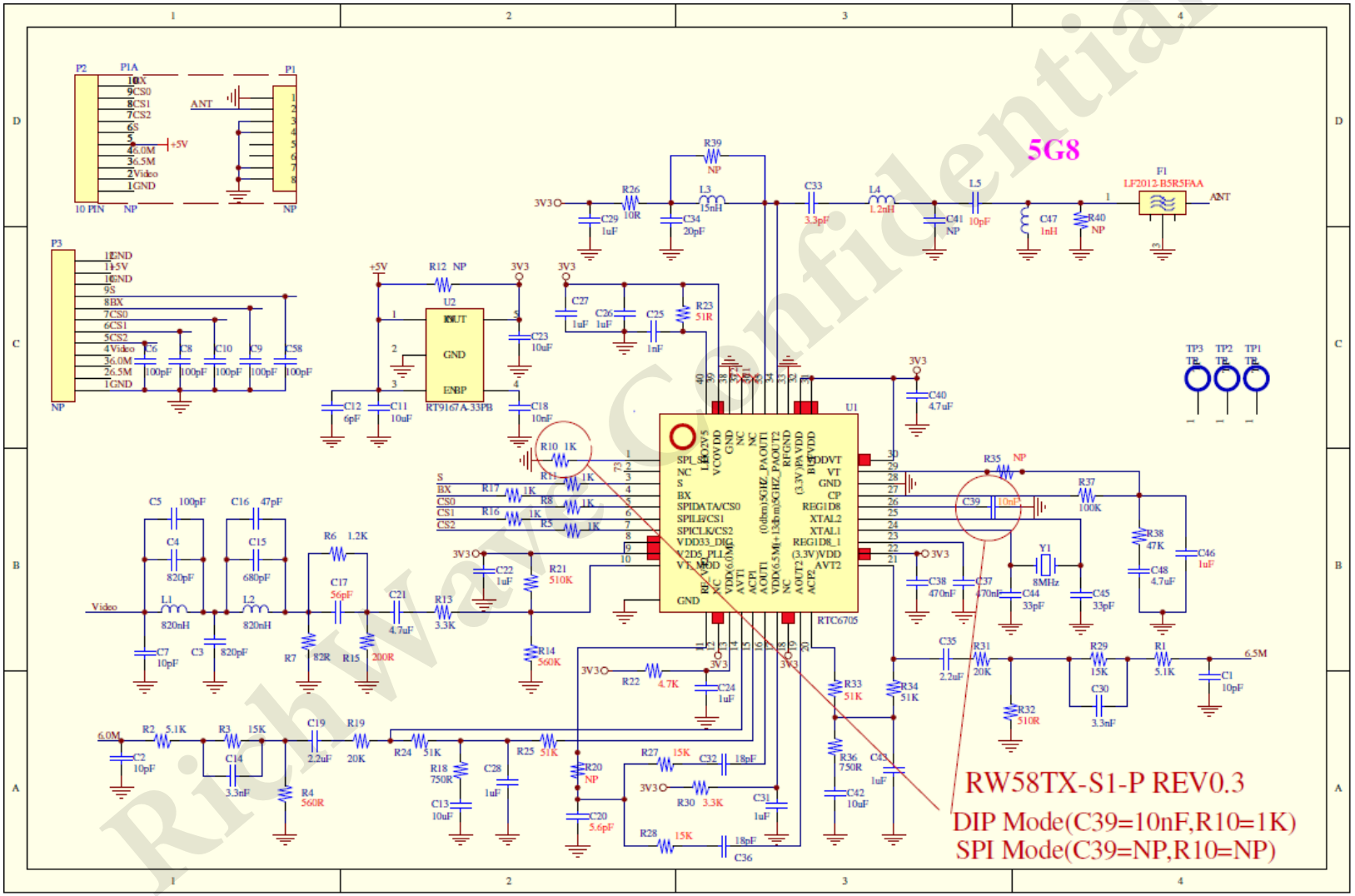
- Formula of tuning frequency
  - To convert from tuning frequency to actual 20-bits register value on address 0x1, here is the example for reference
  - Synthesizer counter default setting to 5865 MHz for 5.8GHz band. Relationship of RF frequency (FRF) to N (SYN_RF_N_REG) and A (SYN_RF_A_REG) counters is:
  - FRF = 2*(N*64+A)*(Fosc/R)
  - For example: for default FRF = 5865MHz, Fosc = 8MHz, R=400 for 20KHz PLL reference clock.
  - 5865MHz = 2*(N*64+A)*(8MHz/400) → N = 2291, A = 1 → register 0x01 = 0x47981

RTC6705 Module Control Procedure

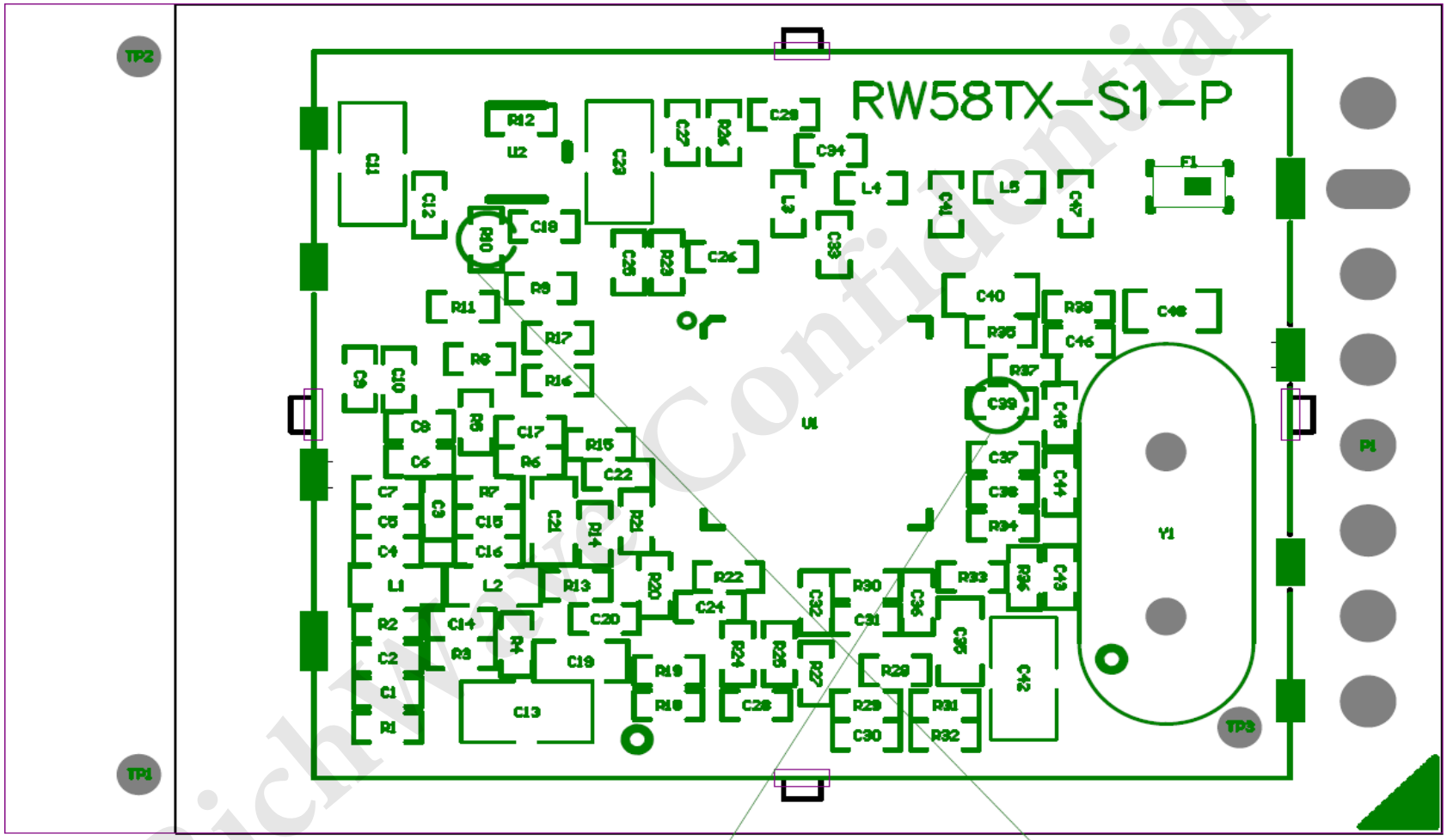
- Programming sequence
  - When tunging a frequency on RTC6705 module, there are 3 registers need to be adjusted step by step for each tuning.
  - To tune 5865MHz for example, first step is programming 0xF register as 0x00000 for reset then delay for 300ms for calibration. Second step is programming 0x1 register as 0x47981 for tuning frequency then delay for 30ms. Last step is programming 0x3 register as 0x0FFD7 for adjusting tuning-curve

- The limitation of tuning frequency
  - The reliable range of tuning frequency is from 5325MHz to 5945MHz.

RTC6705 TX Circuit



RTC6705 TX PCB Location



RTC6715 Module Control Procedure

- Hardware setting
  - Richwave ships RTC6715 RX module configured as DIP switch. To use SPI on MCU to control RTC6715 module, the adjustment of components on PCB is must. As described on page 8, remove resistor R05 in advance can force SPI slave activation when power-on.
  - Also, the exact location of R05 are shown on page 9.

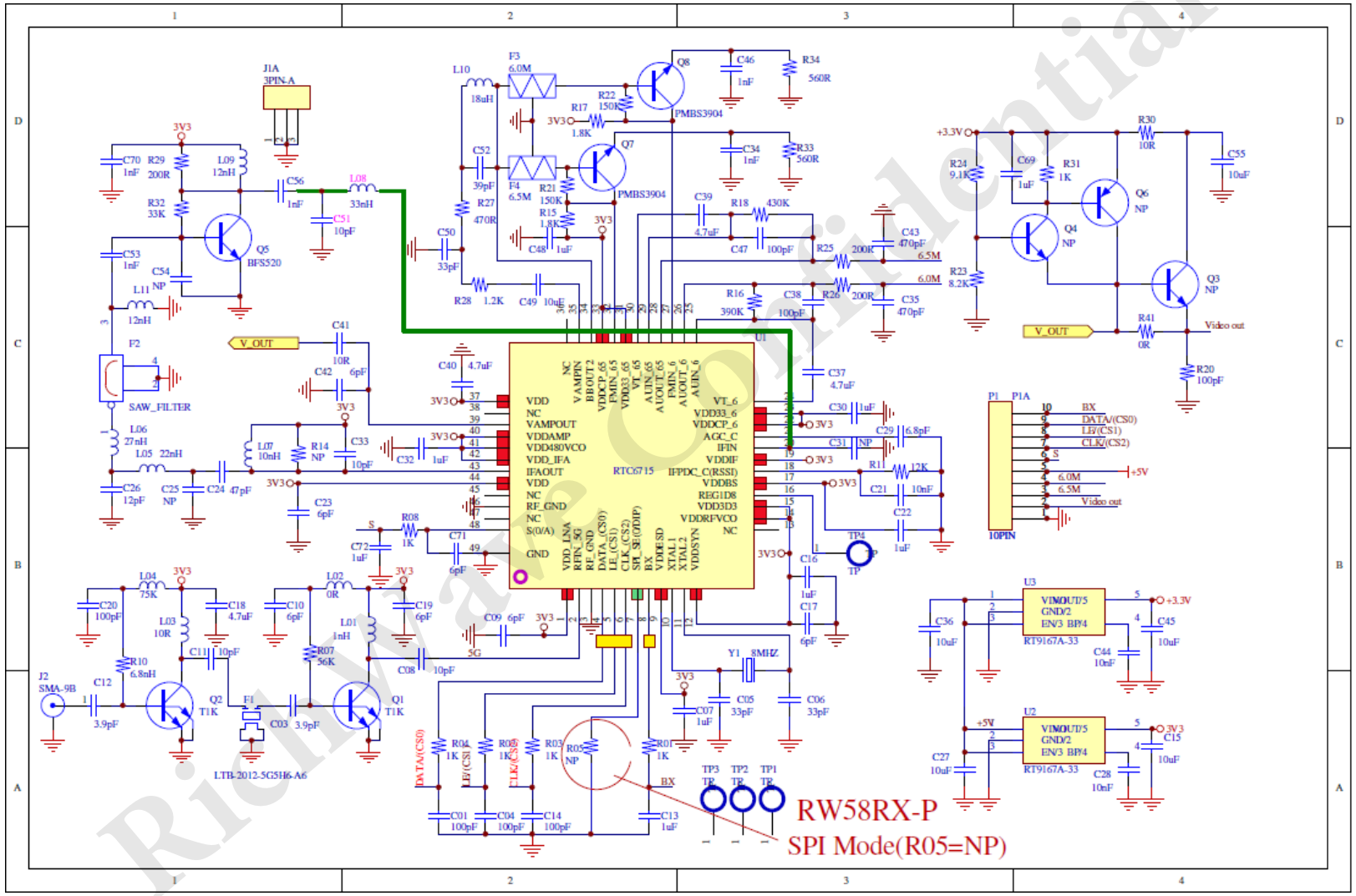
- Formula of tuning frequency
  - To convert from tuning frequency to actual 20-bits register value on address 0x1, here is the example for reference
  - Synthesizer counter default setting to receive 5865 MHz for 5.8GHz band. Relationship of RF frequency (FRF) and LO frequency (FLO) to N (SYN_RF_N_REG) and A (SYN_RF_A_REG) counters is:
  - FLO = (FRF – FIF) = 2*(N*32+A)*(Fosc/R)
  - For example: for default FRF = 5865MHz, FLO = 5865 – 479 = 5386MHz, Fosc = 8MHz, R=8 for 1MHz PLL reference clock.
  - 5386MHz = 2*(N*32+A)*(8MHz/8) → N = 84, A = 5 → register 0x01 = 0x02A05

RTC6705 Module Control Procedure

- Programming sequence
  - When tunging a frequency on RTC6705 module, there is only one register need to be adjusted for each tuning.
  - To tune 5865MHz for example, just programming 0x1 register as 0x02A05 for tuning frequency then delay for 100ms

- The limitation of tuning frequency
  - The reliable range of tuning frequency is from 5325MHz to 5945MHz.

RTC6715 RX Circuit



RTC6705/6715 Reference Table of Tuning Frequencies

- Reference Table of Tuning Frequencies
  - Appendix on page 10 shows the programming sequence and related value for each dedicated frequency workable on RTC6705/RTC6715 module.

- Automatic conversion from dedicated frequency to register value
  - Excel file with named “RTC670515 Frequency Conversion.xls” provide the quick converter from dedicated frequency to register value on 0x1. Key-in the frequcny number, i.e. 5865 for 5.865MHz on column I, then the following columns will show the register value automatically.
  - Conversion for TX modules, please refer sheet named with “AVTX 5.8G”, and refer sheet named with “AVRX 5.8G” for RX modules.

Appendix

		RTC6705 Programming Sequence						RTC6715 Programming Sequence
		TX Step 1		TX Step 2		TX Step 3		RX Step
Channel	frequency	TX(REG_0F)		TX(REG_01)		TX(REG_03)		RX(REG_01)
CH4	5885	00000	Delay time 300 - 500 ms	47D35	Delay time 30 - 50 ms	0FFD7		02A0F
CH5	5865	00000		47981		0FFD7		02A05
CH6	5845	00000		4758D		0FFD7		0299B
CH7	5825	00000		47199		0FFD7		02991
CH8	5805	00000		46DA5		0FFD7		02987
CH9	5785	00000		469B1		0FFDC		0291D
CH10	5765	00000		465BD		0FFDC		02913
CH11	5745	00000		46209		0FFDC		02909
CH12	5725	00000		45E15		0FFDC		0289F
CH13	5705	00000		45A21		0FFDC		02895
CH14	5685	00000		4562D		0FFE1		0288B
CH15	5665	00000		45239		0FFE1		02881
CH16	5645	00000		44E85		0FFE1		02817
CH17	5625	00000		44A91		0FFE1		0280D
CH18	5605	00000		4469D		0FFE1		02803
CH19	5585	00000		442A9		0FFE6		02799
CH20	5565	00000		43EB5		0FFE6		0278F
CH21	5545	00000		43B01		0FFE6		02785
CH22	5525	00000		4370D		0FFE6		0271B
CH23	5505	00000		43319		0FFE6		02711
CH24	5485	00000		42F25		0FFED		02707
CH25	5465	00000		42B31		0FFED		0269D
CH26	5445	00000		4273D		0FFED		02693
CH27	5425	00000		42389		0FFED		02689
CH28	5405	00000		41F95		0FFED		0261F
CH29	5385	00000		41BA1		0FFF3		02615
CH30	5365	00000		417AD		0FFF3		0260B
CH31	5345	00000		413B9		0FFF3		02601
CH32	5325	00000		41005		0FFF3		02597
	5668	00000		45304		0FFE1		02882
	5732	00000		45F84		0FFDC		02902
	5806	00000		46DBE		0FFD7		02987
	RTC6705&RTC6715 : frequency 5325-5945mhz is the reliable range on SPI Mode							