

B.A Microwaves

Project name (code): 1526

Project description (goals):

1. The system will output 2 frequencies (hard-coded) using by PIC16LF1823 mcu and ADF4351 synthesizer this output RF signals will have fixed value (hard - coded) at values: a. 13.75GHz- 14.5GHz, b. 13.75GHz- 14.5GHz.
3. The MCU will check if the output frequency signal is latched at ADF4351 by discrete input (PIN: SYNTH_LD)
4. The MCU will have indication LEDs: LED_ON1: Will show frequency state (state that cleared by FREQ_SEL). LED_ON2: Will show if frequency is latched at ADF4351. if not it will be at toggling state.
5. The MCU will output the negative values of output digital frequency pins to ADF4351 (VCTRL_FHI = not (VCTRL_FLO), SYNTH_DATA = not (SYNTH_LE) .

Project software tasks:

1. HW / SW board ramp up, configure programming and reset pins.
2. External switch button: a. Develop switch driver for this PIC16LF1823 MCU. B. Implement software logic at the mcu to select desired frequency between 2 frequencies.
3. ADF4351 (synthesizer unit): a. Develop / porting sw driver for ADF4351 that controlled by PIC16LF1823 MCU. B. Implement logic to configure the Synth controller buffer at desired hard coded frequencies.
4. Create sw square wave that output from PIC16LF1823 MCU to Synth unit at hard-coded frequency and at hard-coded duty-cycle.
5. Leds (output): a. create Leds APIs to be controlled at PIC16LF1823 MCU. B. Implement software logic on the mcu to blink leds according to frequencies state at the Synth unit.

MCU connected pins description:

Task ID	HW component	PIN name	Description
1	PIC16LF1823	PGDM, PGCM	MCU program pins
2	PIC16LF1823	MCLR	Reset pin (WDT not needed).
3	PIC16LF1823	FREQ_SEL	Switch input to select frequency signal to be transferred to ADF4351.
4	PIC16LF1823	SYNTH_CLK	1. Input clock from MCU to synthesizer unit.
5	PIC16LF1823	VCTRL_FLO, SYNTH_LE	Output configuration pins from MCU to ADF4351
6	PIC16LF1823	VCTRL_FHI, SYNTH_DATA	Output opposite pins relate to (VCTRL_FLO, SYNTH_LE)

7 PIC16LF1823

LED_ON1, LED_ON2 Indication leds

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Project name (code): 1531

Project description (goals):

- a. To control syntiszer units (ADF5355) by calibrated clock (colleration made by DAC and VCO circuit manage by CPLD unit).
- b. generate 2 programmable frequancies configuration words and transfer them to 2 ADF5355 (might be change) units. Their parameters will be set via UART (422) Rx channel and set by PC SW application.
- c. To measure by internal MCU ADC units 6 analog data inputs such as: TEMP, FWD, REV, Voltage, current).
- d. Save ADC values that gether by PIC mcu in ERPOM (or other memory section) and to transfet this paramaters to PC via UART (422) Tx channel when requested.

Project software tasks:

1. HW / SW board ramp up, configure programing and reset pins.
2. UART-422: Develop internal PIC18F45K22 UART-422 SPI driver. (both Tx / Rx channels).
3. develop PC sw communication tool between PIC18F45K22 and PC based on serial communication (UART-422) with the PIC18F45K22 mcu unit. This tool need to: Configure the Synth paramters. Read data from memory section at the mcu unit.
4. FW VCO clock calibration: a. Implement VCO sw interface on the CPLD unit. B. Sw data interface between CPLD and MCU to transfer calibrated clock (output from CPLD).
5. ADC: a. develop sw driver for internal MCU ADC units to measure 6 analog inputs. B. Store this parametrs at mcu flash memory section.
6. DAC: a. develop DAC-AD5312 driver. Develop SPI interface (using GPIOs) at the mcu unit to control the external DAC unit.
7. Memory section: a. develop sw driver for the internal mcu flash unit. B. Develop sw interface to transfer data from the internal flash to external PC using by UART-422 communication.
3. ADF5355 (synthesizer unit): a. Develop / porting sw driver for ADF5355 that controlled by PIC16LF1823 MCU. B. Implement logic to configure the Synth controller buffer at desire hard coded frequencies (parametrs that transfer by serial communication (UART-422)).
7. Leds (output): a. create Leds APIs to be controlled at PIC18F45K22 MCU. B. Implement software logic on

MCU connected pins description:

Task ID	HW component	PIN name	Description
1	PIC18F45K22	PGD, PGC	MCU program pins
2	PIC18F45K22	MCLR	Reset pin (WDT not needed).
3	PIC18F45K22	RS422_RXP, RS422_RXN,	Receive synthesizer control word by UART Rx channel

4 PIC18F45K22	RS422_TXN, RS422_TXP	Transmit internal ADC parametes that readed by internal MCU ADC unit and transfer them to PC station.
5 CPLD		CPLD will calibrate external clock by internal ADC and DAC units. This clock will be readed by PIC16 MCU unit.
6 PIC18F45K22, CPLD	CPLD_RX, CPLD_TX	Pins to transfer data between CPLD and PIC16 units.
7 PIC18F45K22	LED_S1, LED_S2	Indication leds related to system state.
8 PIC18F45K22	FFWR1, FFWR2, RF_INDET, RREV, PA_TEMP,	Analog data readed by PIC16 ADC internal units.