

COMPUTER ORGANIZATION (ELE408) LAB 5

Wireless communication of Tower system

1. Pre-lab Report

- Read all documents in directory C:\Freescale\beekit\Documentation\MC12311 Documents.
- Read this lab handout carefully. Take notes and prepare the programs required in this handout.

2. Objectives of this Lab

This lab is intended to familiarize you with the Freescale TWR-12311 sub-1 GHz Wireless board in your tower system. You will learn:

How to create a Demonstration solution for TWR-12311 wireless board

How to run a MC12311 Radio Utility FCC Compliance

How to download the Demonstration solution you create to a TWR-12311 board

How to run the demonstration and transfer data between two boards

3. Basics

The TWR-RF is a Tower Controller Module compatible with the Freescale Tower System. It can function as a stand-alone, low-cost platform for the evaluation of the MC12311 or MC1323x devices with their development board and the appropriate Modular Reference Board (MRB) (12311-MRB or 1323x-MRB) plugged in.

The TWR-RF module works with the Tower Elevator Modules (TWR-ELEV) and can also be combined with other Freescale Tower peripheral modules to create development platforms for a wide variety of applications. Figure 1 provides an overview of the Freescale Tower System.

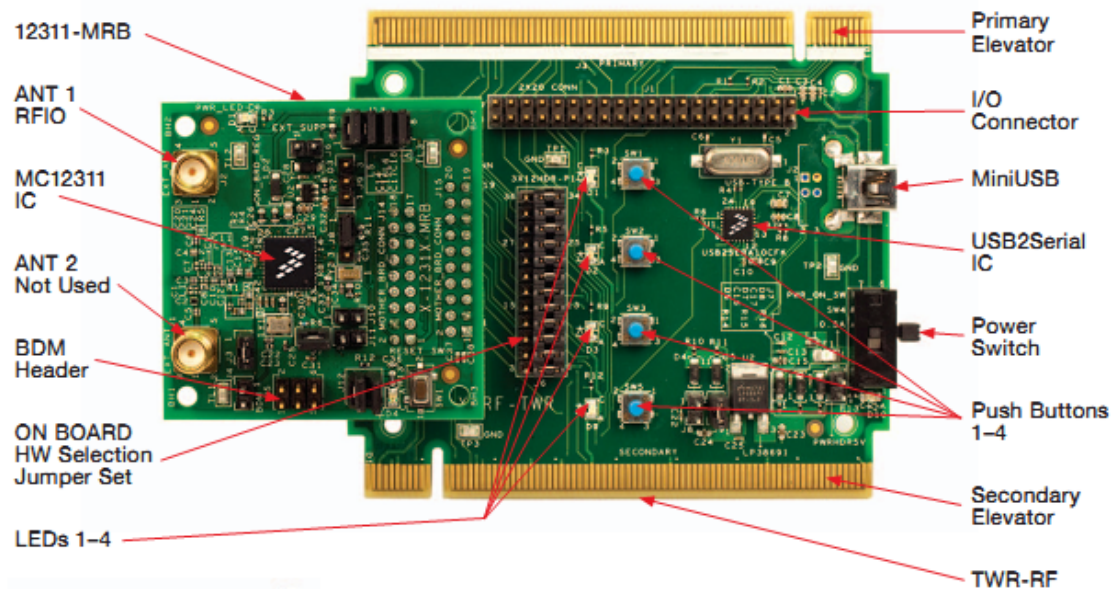


Figure 1: Overview of TWR-12311 Module

TWR-RF Module features:

- Standard sockets 100 mils J5 and J4 (2x9 and 2x10) to connect either an MC1323x Modular Reference Board (MRB) or an MC12311 Modular Reference Board (MRB)
- Standard header 100 mils J1 (2x20) to enable signaling path to TWR primary and secondary connectors.
- Standard header 100 mils J6 (3x12) to enable signaling to onboard HW and USB interface or to TWR system Hardware
- On-board regulator to provide external supply
- Four (4) user-controllable LEDs
- Four (4) user pushbutton switches
- USB Mini-B connector

4. Experiment Requirements and Procedures

In this lab, you are required to run a MC12311 Radio Utility FCC Compliance first. And then, create an 802.15.4 MAC solutions, download your solutions to your TWR-12311 board and run the demonstration.

In the Lab:

- ◆ Read document C:\Freescale\beekit\Documentation\MC12311 Documents\TWR-MC12311_QSG.pdf carefully. Follow the Step-by-Step installation instructions on page 4. Use one of your TWR-12311 boards as transmitter and the other as receiver. Transfer data between the two boards and get screen-print of your experiment.

- ◆ Read document C:\Freescale\beekit\Documentation\MC12311 Documents\BKWCTKQSG.pdf carefully:

1. Follow instructions from Page 10, create a project "MyStarNetwork Demo(coordinator)" with codebase "MC12311 MAC Codebase 3.0.0"
2. Follow the same instruction, add another project "MystarNetwork Demo(End Device)" to your solution.(hint: solution->add project in Freescale BeeKit)
3. Export two projects to Codewarrior 10.2 and build them

- ◆ Read document C:\Freescale\beekit\Documentation\MC12311 Documents\802154MSNAUG.pdf chapter 2 and Appendix B.4.3 Run created demonstration, transfer data between the two boards

4. Use USB-BDM debugger to download "Coordinator" image to one board and "End device" image to another board. Unplug the debugger after the download is finished.
5. Open two HyperTerminal windows, set baud rate to 57600, connect one window to "Coordinator" and the other to "End Device"
6. On-off power switch of two boards, read the output, transfer data between two boards.
7. Get a screenshot and print your transmission experiment.

5. Lab Report Requirements

In your lab report, you should discuss your designs, trade-offs between performance/cost and power. Explanation and interpretation of your results are very important. The lab report will be graded based on your report and discussions. Total mark for the report is 100 points.

- Prelab report: 20 points
- Successful experiment: 50 points

- Results analysis, interpretation, and discussions on your design and engineering constraints: 30 points

In the following items, numbers inside each bracket indicates the points you will earn on a satisfactory report and discussions.

In your discussion and explanations of your results, you should consider the following constraints:

- What knowledge of mathematics, science and engineering have you applied in this lab and what tools have you used in this lab?[5]
- Economic Constraint (performance/cost ratios) [5]
- Manufacturability, Modularity and Expandability Constraints, Environmental Constraint (power consumption) [5]
- Sustainability: Is your design and implementation sustainable? [5]
- What is the potential impact of your design on real time applications? [5]
- How would you utilize the memory hierarchy available to you to design real time applications? [5]

For each of the above programs hand in the debugged source code with comments; the machine code is not necessary. Be very specific with your comments that explain what you are doing and why you are doing it.