Quick Start Guide

Wireless Mesh Networking Module
featuring SNAP® Technology (TWR-RF-SNAP)

freescale
semiconductor

Get to Know the TWR-RF-SNAP

Elevator Connection Jumpers

Battery Connector

3-position Power Switch (Battery > Off > USB/Elevator)

MicroUSB

Red LED

Power LED

Reset Button

Secondary Elevator Connector

Primary Elevator Connector

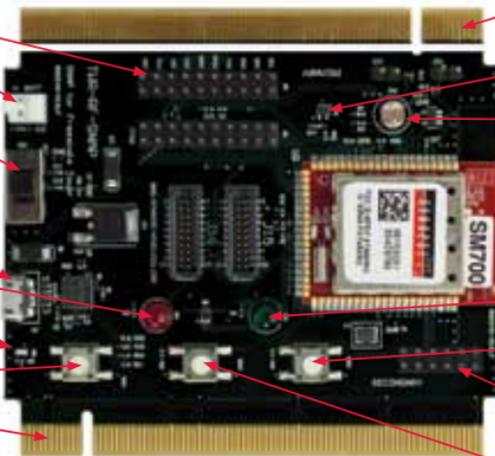Temperature Sensor

Light Sensor

SM700 802.15.4 RF Engine (based on the Freescale MC13224)

Green LED

Push Button Switch 2

GPIO Expansion Header

Push Button Switch 3

TWR-RF-SNAP
Freescale Tower System

The TWR-RF-SNAP module is part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Take your design to the next level and begin constructing your Tower System today.

TWR-RF-SNAP Features

- Features the SM700 802.15.4 RF Engine from Synapse Wireless, based on the Freescale MC13224 module

- Pre-loaded with SNAP Network Operating System

- Push button inputs and user controlled LEDs

- On-board low-power linear active thermistor and light sensor

- On-board TWRPI connector for the addition of standard Freescale TWRPI modules

- Configurable access to Tower Elevator connector allows for interaction with other Freescale Tower modules (UART, SPI and I^{2}C)

- MicroUSB connector provides power and serial connectivity

- Multiple powering options

- Access to additional GPIOs on SM700 via header block

Step-by-Step Installation Instructions

STEP 1 — Powering the TWR-RF-SNAP

Attach the included microUSB cable to the USB interface on the TWR-RF-SNAP Tower System module. Insert the opposite end of the microUSB cable in either a USB port or USB wall adapter. Slide the power switch to the right (towards the microUSB receptacle). A small green LED (D5), located next to the USB port, should illuminate indicating that the Tower System module is correctly powered. With the power switch in the far-right position, the TWR-RF-SNAP can also be powered by inserting the module into the Tower System and providing power via the TWR-ELEV or MCU module. Optionally, with the power switch in the far-left position, the TWR-RF-SNAP can be powered via the battery connector in a stand-alone configuration only.

STEP 2 — Using the Default Application

The TWR-RF-SNAP Tower System module comes pre-loaded with a simple application to demonstrate user interaction with the module. Once power is supplied to the Tower System module, the program will blink the red LED. The green LED has been configured to react to user input. Use the push-button labeled "Switch 2" to turn the green LED on and "Switch 3" to turn the green LED off.

STEP 3
Download/Install Synapse Wireless' Portal

Visit **freescale.com/Tower** and select the TWR-RF-SNAP from the list of available Tower System modules. Download and install Synapse Wireless' Portal Software. Portal is a networking commissioning tool and integrated development environment (IDE) for SNAP network software. It allows the user to interact with SNAP nodes and upload custom programs in the form of SNAPpy scripts (based on the Python programming language). Refer to the lab documents associated with the TWR-RF-SNAP module for instructions.

STEP 4
Learn more about the included USB SNAP Stick

A USB Dongle (the SN132 SNAP Stick from Synapse) was included with this kit to demonstrate the wireless capability. It is not only its own free standing node in the SNAP network, but also provides the PC and Portal software a bridge into the SNAP network. Refer to the Lab Tutorials associated with the TWR-RF-SNAP Tower System module for more about the USB dongle.

STEP 5
Learn more about the TWR-RF-SNAP Tower System Module

Visit **freescale.com/Tower** and select the TWR-RF-SNAP from the list of available Tower System modules. Explore the available Lab Tutorials and supporting documents related to the TWR-RF-SNAP. The Lab Tutorials will guide the user through using Synapse Portal IDE, modifying and uploading SNAPpy scripts, and integrating input from the onboard sensors.

Configuration Instructions

In this Quick Start Guide, you will learn how to configure the various settings on the TWR-RF-SNAP module for use in the Tower System.

Tower System Communication Modes

Refer to these settings for interaction options between the TWR-RF-SNAP and the Tower System MCU module.

- **I²C Connectivity: jumper the following pins to enable I²C access from the Tower MCU module**
  - J5 Pin 1-2 (SCL)
  - J5 Pin 3-4 (SDA)
- **UART Connectivity: jumper the following pins to enable serial access from the Tower MCU module**
  - J5 Pin 5-6 (TX)
  - J5 Pin 7-8 (RX)

- **SPI Connectivity: jumper the following pins to enable SPI access from the Tower MCU module**
  - J5 Pin 9-10 (MISO)
  - J5 Pin 11-12 (MOSI)
  - J5 Pin 13-14 (CS0) or J5 Pin 15-16 (CS1)
  - J5 Pin 17-18 (CLK)
- **MCU Reset Control: jumper the following pins to enable reset control via the Tower System**
  - J5 Pin 19-20 (RESET)

Freescale TWRPI Socket

The TWR-RF-SNAP can be expanded using I²C and analog-based TWRPIs. General purpose TWRPIs can be inserted into the J14/J15 set of connects.

TWR-RF-SNAP Jumper Options

The following is a list of all jumper options.

Jumper	Option	Setting	Description
J5	TWR-ELEV Connection Jumper	1-2	I²C SCL : Connects I²C_SCL to TWR-ELEV (ELEV_SCL0)
		3-4	I²C SDA : Connects I²C_SDA to TWR-ELEV (ELEV_SDA0)
		5-6	UART RX : Connects UART1_RXD to TWR-ELEV (ELEV_RXD0)
		7-8	UART TX : Connects UART1_TXD to TWR-ELEV (ELEV_TXD0)
		9-10	SPI MISO : Connects SPI_MISO to TWR-ELEV (ELEV_SPI0_MISO)
		11-12	SPI MOSI : Connects SPI_MOSI to TWR-ELEV (ELEV_SPI0_MOSI)
		13-14	SPI CS : Connects SPI_SS to TWR-ELEV (ELEV_SPI0_CS0)
		15-16	SPI CS : Connects SPI_SS to TWR-ELEV (ELEV_SPI0_CS1)
		17-18	SPI CLK : Connects SPI_SCLK to TWR-ELEV (ELEV_SPI0_CLK)
		19-20	RESET : Connects RESET to TWR-ELEV (ELEV_RSTOUT_B)
Switch 1	3-Position Power Switch	Left	Powered via Battery Terminal: Switched towards battery connection
		Center	OFF
		Right	Powered via USB / Tower System : Switched towards USB receptacle
Switch 2	User Push Button	Pressed	Switch connects SM700 GPIO 22 to GND when pressed. Pin can be used as an interrupt pin to wake the SM700 from sleep.
Switch 3	User Push Button	Pressed	Switch connects SM700 GPIO 23 to GND when pressed. Pin can be used as an interrupt pin to wake the SM700 from sleep.
Switch 4	Reset Button	Pressed	Resets the SM700

Go to **freescale.com/Tower** to find pertinent information for the TWR-RF-SNAP module, including:

- TWR-RF-SNAP User's Manual
- TWR-RF-SNAP Schematics
- TWR-RF-SNAP Lab Tutorials

  And more

To learn more about the TWR-RF-SNAP and other modules within the Tower System, go to **freescale.com/Tower**. To become a member of the online Tower Geeks community, go to **towergeeks.org**.

freescale™
semiconductor