## Theory of Operation

### Circuit Description

The PowerView Remote is a device that is powered from two 3VDC CR2032 lithium cells in parallel. On-chip VBUS 3.3 V regulator supplies the DC-DC boost converter to create an operational voltage of 3.5VDC for the LEDs. The converter output also powers the Nordic Radio and the ST accelerometer in both bypass (non-boost) and boost mode. User input consists of 14 pushbuttons. 13 LEDs provide feedback and illumination of the buttons.

The radio circuit is centered around the Nordic NRF52840 System on Chip. It houses a 2.4GHz radio and an ARM Cortex M4 CPU. A 32kHz crystal is employed for general purpose timing functions. A 16MHz crystal serves as the system clock source and is used to synthesize the 2.4GHz radio frequency. A discrete passive matching circuit connects the Nordic chip to a PCB trace antenna.

### RF Specifications

The RF protocol used is Bluetooth 4.0 (LE) and is implemented with Nordic NRF52840 system on chips.

Radio Specifications:
Frequency: 2400-2483.5 MHz
300ms Multi Packet Burst Output Power: +8dBm as specified by Nordic
384us Single Packet Output Power: 0dBm as specified by Nordic
Modulation: GFSK

### Operational Description

The user first pairs the remote to a PowerView App via a handshaking transaction. This stores the remote network, address, and group settings data in the App and the shade. The user can then operate the shade by pressing the appropriate group button and pressing one of the action buttons. Pressing any button or triggering the accelerometer will activate the remote feedback LEDs. The remote will turn off feedback LEDs and go into low power mode after a few seconds of non-activity.