BQ Settings Convert and Transfer Utilities

November 29, 2021

Table of Contents

1 Introduction

The BMS (Battery Management System) needs the ability to store and transfer settings to the BQ chip (battery management IC on the BMS). Those settings are stored in the BMS's onboard EEPROM and are loaded onto the BQ chip at system start up. The BMS itself however, needs a way to get the settings in the first place. Therefore, included in this code base are utilities for converting BQ settings into a format that can then be transfered to the BMS as well as a utility for sending those settings over to the BMS. The intention is to provide a replicatable process for taking in new settings and updating the BMS.

2 Background

The BQ chip is a TI product with the ability to operate under a wide range of applications. As such, the BQ chip is highly configurable. The majority of the settings are stored in the BQ chip "RAM" or "Data Memory", however the BMS software was designed to also support configuration through commands and subcommands. Each time the system starts up, the BQ chip must have all of its settings sent over. The BMS handles the logic of transfering the settings to the BQ chip, however, it still needs to be sent of the settings at least once to be stored in non-volitile memory (EEPROM). In order to acomplish this, the settings for the BQ chip must be converted into a form that can then be sent over CANopen to the BMS as well as be saved into EEPROM. The format of the data is described in BQ Setting Representation.

The settings originally are stored in a file generated by bqStudio, a TI software. This document goes over the utilities that exist for converting those settings into the format recognized by the BMS, and how to transfer those settings to the BMS.

3 Human Process Description

Users of these utilities will be converting the TI settings file into the BMS recognized format. From there, additional instruction will be provided on how the user can transfer those settings to the BMS itself. The TI settings file contains the settings that will be applied to the RAM of the BQ chip. Additionally, the settings file itself contains information on each setting including the type of data, the units, the size in bytes, and how to convert from a human readable format into the BQ expected format.

The user of the utility does not have to know the intricacies of the TI settings file, but should be aware of its function. Further information on how to generate the TI settings file can be found in Section 3 of the Easy Configuration of BQ76942, BQ76952 Battery Monitors document. Additionally, documentation on the settings themselves and how they apply can be found in Section 13.1 of the BQ76952 Technical Reference Manual. The selection of the settings values themselves is beyond the scope of this document, but again, understanding the original of the data can prove useful.

The utilities themselves are Python3 scripts with a command line interface. Users will interact directly with the scripts in order to execute the conversion logic as well as the transfer logic. The remainder of this document will go over the specifics of interacting with these scripts.