Simple Guide to Chemical ID Selection Tool (GPC)

This user's guide is provided as a simple guide for the GPC Chemical ID Selection tool. This document includes a summary of the tool, requirements, how to submit data, and examples.

Contents

1   Tool Summary

The Gauging Parameter Calculator (GPC) Golden GG Maker is a math calculation tool that helps the battery designer to select the best chemical ID for a given battery to use with Impedance Track gauges..

The battery pack must use one of TI's Impedance Track algorithm-based fuel gauges. It requires a log file of a charge / relaxation / discharge /relaxation test that can be created with various test equipment such as Maccor or Arbin battery testers or by using TI's Battery Management Studio (bqStudio) software with an evaluation board connected through USB.

This guide describes how to obtain the required log file without the use of a TI EVM or TI bqStudio software.

2   Required Data

The GPC tool requires a single .zip file containing one configuration file, one data file, as input. The name of the .zip file is not important. The .zip file should contain the following files:

*   config.txt
*   roomtemp_rel_dis_rel.csv

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2.1 Configuration File (1 Each)

The configuration file is a text file named config.txt and is an ASCII text dictionary containing the following information:

- ProcessingType = 2 <Determines the type of tool used. Value should be 2 for chemistry ID selection tool>
- NumCellSeries = <Number series cells>
- VoltageColumn = <Zero-based column number for the voltage data in your data logs>
- CurrentColumn = <Zero-based column number for the current data in your data logs>
- TemperatureColumn = <Zero-based column number for the temperature data in your data logs>
- ElapsedTimeColumn = <Zero-based column number for the elapsed time data in your data logs>

Typical settings are:

```
ProcessingType=2
NumCellSeries=1
ElapsedTimeColumn=0
VoltageColumn=1
CurrentColumn=2
TemperatureColumn=3
```

2.2 Data Log File

The required test consists of the following steps:

1. Test is performed at room temperature. Optional: If the cell was at a different temperature before, let it relax for 2 hr at room temperature prior to the test.
2. Charge using CC/CV charging to full, using taper current, for example C/100. Use nominal CC charge rate and CV voltage. If another charging method is specified by the cell maker, use that method.
3. Let the battery relax for 2 hrs to reach full equilibrium open circuit voltage (OCV).
4. Discharge the battery at C/10 rate until the minimal voltage, as specified by the cell manufacturer, is reached.
5. Let the battery relax for 5 hrs to reach full equilibrium OCV.

The result is exemplified in Figure 1:
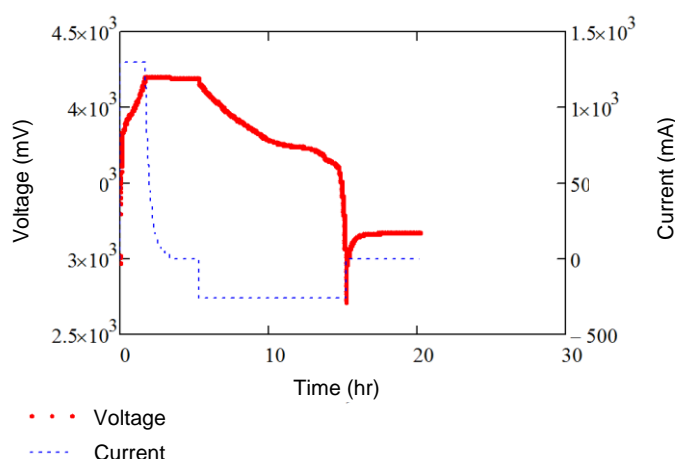
Figure 1. Voltage and Current Profiles of the Test Required for Chemical ID Selection

Data logging should store data into a file containing the following columns, in a coma-separated (CSV), tab separated, or space separated format:

- Time (in seconds elapsed)
- Voltage (in millivolts)
- Current (in milliamps where discharge current is negative)
- Cell temperature (measured by a thermistor attached to the surface of the cell, in degrees Celsius). One decimal place is acceptable.

If the original data format is not one of the supported formats (for example Microsoft® Excel®), the data file must be saved as .csv. Any text that is not part of the data-columns, such as the log file header generated by bqStudio or EV Software, as well as empty lines should be removed from the file prior to submission. One row of column names can remain, (the tool will skip it), as long as it has just one name per column.

An easy recording method utilizes TI's bqStudio software utility called GPC Packager that reads data directly from a TI fuel-gauge.

The columns can be in any order since the column positions are defined in the config.txt file. The log file can have some other data columns that are not used in this tool (no need to remove them), as long as the size of the zip file prepared for submission does not exceed 2MB. Note that since it is a compressed file, you can sometimes squeeze it some more by utilizing different compression settings in your archiver program.

The sampling interval can be from 5 to 100 s.

The initial charging portion is not required; however, the charging should be performed shortly before the relaxation period. Relaxation data is required both before and after the discharge.

The precision of the measurements is important. In particular, current measurement should be better than 0.1% of range accuracy, and for voltage measurement, 1 mV, at room temperature. 16-bit ADC is recommended.

The data log should be renamed as: **roomtemp_rel_dis_rel.csv** prior to submission of the file, regardless of actual text format.

2.2.1   Example Config.txt File

```
ProcessingType=2
NumCellSeries=2
ElapsedTimeColumn=0
VoltageColumn=1
CurrentColumn=2
TemperatureColumn=3
```

2.2.2   Excerpted Example Data Log

In the following excerpt, the columns are:

```
elapsed time (sec), voltage (mV), current (mA), temperature (C)
```

```
20.02833  2975.308      0        28.95893
30.04369  2974.984      0        28.88429
40.05915  2975.308      0        28.91459
50.09006  2974.984      0        28.73499
60.13664  2975.308      0        28.74904
70.20198  3008.069    99.9098    28.89834
80.20158  3023.314    99.9098    28.77718
90.23994  3300.643   1300.396    28.79125
100.2554  3360.975   1300.396    28.79125
110.2708  3404.115   1300.221    28.58133
120.2859  3439.146   1300.572    28.59754
```

3   Data Submission

The zip file created as previously described needs to be submitted to the GPC tool through the web-interface here:

https://www.ti.com/powercalculator/docs/gpc/gpcUpload.tsp

After processing, an E-mail with a report that indicates the selectedd chemical ID is sent to the E-mail address you will provide when logging in.

The report contains the selected chemical ID, as well as a list of chemical IDs which satisfy "less than 3%" error criteria. This could be useful, for example, to verify that the ID you used earlier is still suitable.

If any format or other errors are present, they will be reflected in the report.

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