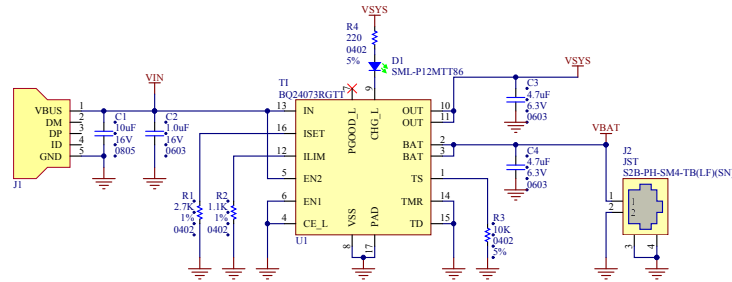


Battery and Charge Controller



ISET sets maximum battery fast-charge current, which should not exceed C/3, where C is battery capacity in mAh.

ILIM sets maximum system input current, which is the sum of system load and charge current. This allows system load to exceed the maximum fast charge current without a battery installed.

This example shows a system with Ilim set to max, and Iset configured for a 1000 mAh battery.

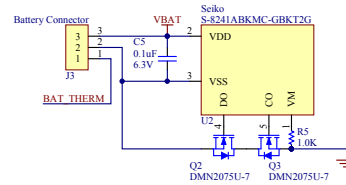
$$I_{LIM} = K_{ILIM} / R_{ILIM}$$

$$I_{LIM} = 1610 \text{ A}\Omega\text{ms} / 1.1 \text{ k}\Omega\text{ms} = 1.46 \text{ A}$$

$$I_{SET} = K_{ISET} / R_{ISET}$$

$$I_{SET} = 890 \text{ A}\Omega\text{ms} / 2.7 \text{ k}\Omega\text{ms} = 329 \text{ mA}$$

Over-Discharge Protection



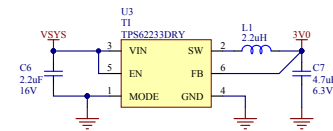
Over-discharge of a lithium-ion or lithium-polymer battery will result in decreased capacity and service life, and can cause serious damage to the battery.

The system rail is "locked out" if the battery drops below the threshold voltage (2.5V). The rail remains locked out until the battery voltage exceeds 2.9V.

While lock-out threshold is well below minimum operating voltage of the battery, this condition will occur on transients near the end of battery life. Hysteresis on the system lock-out prevents boot-looping at the end of battery life.

If your battery pack includes on-board overdischarge protection, this block can be excluded.

3.0V Buck Power Supply



By running the system below the minimum battery voltage (3.2), this solution leaves enough headroom to run the system with just a buck converter, instead of requiring an expensive buck-boost converter.

Further headroom can be acquired by running the system voltage even lower (The TPS622316 can be used for a system rail of 2.7V).

If your system absolutely requires a 3.3V rail, please see Solution B for an example using the LM3668 buck-boost converter.

Copyright © 2013, Electric Imp Inc.

Permission is hereby granted, free of charge, to any person obtaining a copy of this work and associated documentation files (the "Work"), to deal in the Work without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Work, and to permit persons to whom the Work is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Work.

THE WORK IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE WORK OR THE USE OR OTHER DEALINGS IN THE WORK.

Design: **Solution A** Rev: **1.0** Electric Imp
5050 El Camino Real, #221
Los Altos, CA 94022

Sheet: 1 of 1 Date: 11/6/2014 Time: 3:30:15 PM
File: Z:\ei-hardware\lithium-imp\solution_A_SchDoc

