Disto - Project Ironman

TI BQ25730 USB OTG Not Working

METZLER Reto

- when it has to be right

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In the Ironman project, the TI BQ25730 is going to be used to either generate the system voltage of 18V from a 24V DC connector. This supplies the instrument and also charges a 18650 Li-Ion 4s2p pack, supervised by the TI fuel gauge BQ40Z50. In another mode, it needs to supply USB OTG from the 4s2p pack. While the first mode is working fine, the second mode is not. The CHROK signal is not set by the BQ25730 after the OTG setup procedure.

Observations:

VBUS without load	PCB1: 6.0V PCB2: 5.6V
Behaviour if load is applied	PCB1: Already oscillating when 1mA is drawn PCB2: Oscillation starts at 30mA load current

PCB2 unfortunately got broken during the investigations. Only PCB1 is left for further investigations.

Test Setup

The 4s2p pack is simulated by a Battery Simulator (Keithley 2281S-20-6). Charging from 24V DC supply to that battery simulator and supplying the system from the battery pack in case no DC supply is present is working.

The VBUS voltage in case of USB OTG is loaded using a source meter (Keithley 2460).

Configuration:

To enter USB OTG mode, the steps described in Section 9.3.9 of the datasheet of BQ25730 were followed:

1. VBUS is 0V
2. OTG current limit is set to 100mA
3. OTG pin is pulled high by the MCU.
4. OTG_ON_CHRGOK bit remains 0

The battery current prior to activating the USB OTG function is 8mA, afterwards 11.2mA (w/o load on VBUS).

Schematics:

The schematic showing the BQ25730 and its circuitry is shown in Figure 1. The connection to the DC plus has been removed (L1), such that only the VBUS for the USB OTG is attached. This is where the source meter is attached to load the BQ25730.

VSYS is not supplying any other components than a 3.3V regulator that supplies the MCU in the system. It draws around 20mA at 3.3V.

The battery pack is actually a Battery Simulator. The fuel gauge is present and active. If not otherwise noted, the 75% state of charge is set in the Battery Simulator (Voc=15.9V, ESR=93mOhm, Current Limit=5A).

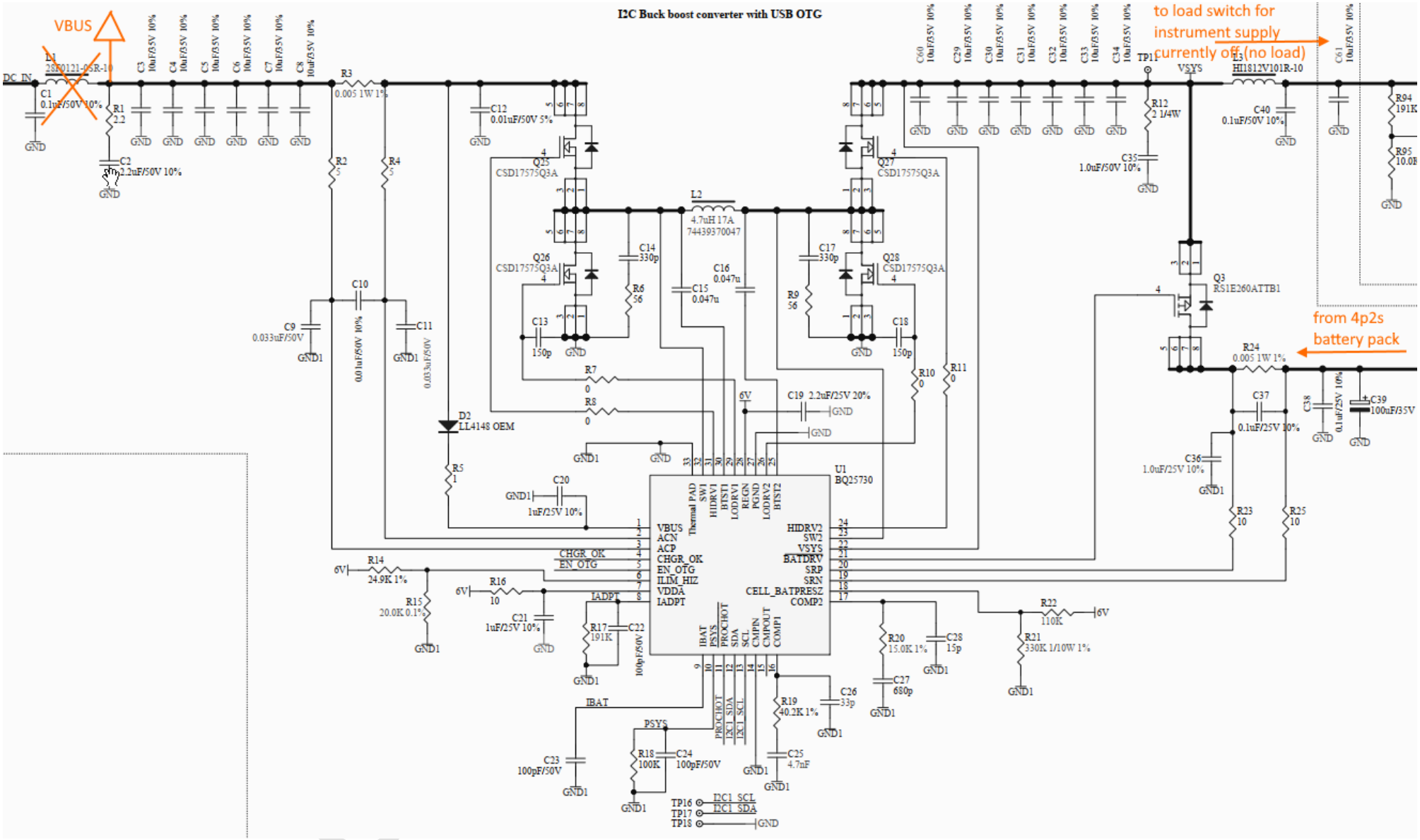

Figure 1 - Schematic Extract