FSEB Rev.1 to Rev.2 Changes

0. Introduction

The new design allows the usage of a two-wire main power connection now. The mid level connection (GND_48) is not required anymore, but is not harming either.

1. Page 1_P12V

DC/DC converters U1, U2 (TEP 100-7212UIR) used to generate the FH-12V, have a switchable input voltage now, to avoid high inrush current, caused by the input filters, when applying the string voltage of 120V to the crate.

When enabled by jumper J1, the DC/DC converters can be powered using the front panel switch SW1, for more robustness a through hole type now. Else like before ESP_GPIO33 = H has to be used.

As fall back solution (no input voltage switching) L6 (usually=DNL) can be installed.

2. Page 1_P3V3

The P3V3 are generated by the DC/DC converters U22 (LTM4623EV#PBF) or by the SBC ESP32, using the ideal diodes U28, U29. The DC/DC converter U21 (NTE0303MC) generates the P3V3_ISO. Monitoring LEDS (only 6 now) are available for ESP_+3V3, P12V, 50..150V in (P48_IN), 50..150V out (P48_OUT), P12V-over current and 50..150V-over current.

3. Page 2_psw

The power Mosfets V11..14 got new, isolating gate-control circuits, based on TPSI3050DWZR. The power-on through U37 in absence of a FSEB takes place atutomatically, else by ESP_GPIO33=H. The reset timer U36 is being used to keep the main power off, until the isolating Mosfet-driver have their output capacitors fully charged. It can also be used to enforce a recovery period after an overcurrent related shut down.

The design is optimized for a fast shut down, caused by an overcurrent. Depending on the state of the signal STRG_OVER_CUR_RESET, the power switches are staying OFF (latch mode) or getting ON, as soon as the overcurrent condition is gone. Presently the STRG_OVER_CUR_RESET signal is under control of ESP_GPIO5_SPI_CS. This signal is used for the SPI bus control (FCON-CPLD) either, because there was no unused ESP port available. The string power overcurrent status is monitored by ESP_GPI35.

4. Page 4_mon

Due to the usage of isolating amplifiers U10…U12, there is a little change concerning the ADC resolution for the string current (0.384mA/bit) and the string voltage (5.086mV/bit) now. Four sensors (U19, U20, U23, U24) were added to monitor the DC/DC converters (U1, U2, TEP 100-7212UIR) and the power mosfet (V11...V14) temperatures.

5. Page 5_ESP

J5, the connector for a TTL-232RGVSW3V3-WE adpter cable is removed now. To access the serial ports of the ESP32 the USB connector J6 must be used. To allow the ESP32 flash programming some circutry was added, basically copied from the ESP32 modules schematic. When USB is in use, the signal FCON_PWRBTNn cannot be controlled by the ESP due to the multiple usage of ESP_GPIO0.