

Hardware Manager Design Review

(Luca Solero 06-26-2002)

- **MAX6338 (U1003):** this component requires (in noisy applications) a $0.1\mu\text{F}$ capacitor close to the Vcc pin. The resistor R1021 maybe should be a little bit lower than 65Ω .
- **PM300DVA120 (U1012):** the power supply for the top switch (pins Vp1 and Vpc) must be different and isolated from the power supply for the botton switch (pins Vn1 and Vnc); otherwise we cause a short circuit across the bottom switch. The dc-dc converter UST-15/200-D5 (U2001) seems to be oversized, the power supply for each switch control section should be rated +15V, 68mA (or higher). Maybe (it seems that Datel has minimum 3W components), products from “Volger America”, “TRACO”, C&D Technologies”, “XPiQ Inc” or other companies can be used. Capacitor of $68\mu\text{F}$ instead of $22\mu\text{F}$ is required by the IPM in correlation to each control stage power supply (C2009).
- **HCPL-4504 (U1010 and U1011):** the capacitors C1009 and C1010 must be connected to pins 5 and 8 of respectively U1010 and U1011. The resistors R1029 and R1030 must have the value of $6.8\text{k}\Omega$. I’m not sure that the component HCPL-4504 has SMD case, it seems that the component HCPL-0454 is the SMD version (SOIC-8).
- **SN74AC244 (U1009):** the logic between the SN74AC244 and each of the HCPL-4504 should be changed. Pin 2 of each HCPL-4504 should be connected to respectively pin 16 and pin 18 of the SN74AC244, whereas pin 3 of each HCPL-4504 should be ground connected. This is because the PM300DVA120 has an inverting logic command, when pins Cn1 and Cp1 are high each switch is off otherwise each power switch is in on state (control sector at page 451 of PM300DVA120 datasheet).
- **PC817 (U1013):** R1031 and R1032 are not necessary, there is an internal resistance (R_{F0}) inside the PM300DVA120 for each control stage. The pin 1 can be directly connected to pin 1 of U1012 (Vp1), the pin 3 can be directly connected to pin 6 of U1012 (Vn1); Vp1 and Vn1 must have separated voltage supply. The value of 237Ω for resistors R1033 and R1034 seems to be too low ($1.8\text{k}\Omega$ should be better). PC817 does not have internal shielding, thus some

switching noise could be coupled through the opto. An RC filter with a time constant of about 5-10 μ s can be added to the opto's output to remove this noise.

- **MAX6315 (U1008)**: the connections of the pins seem to be wrong (pin 4 is switched with pin 2 and pin 3 is switched with pin 1).
- **BWR-15/275-D5A (U2000)**: a 5-6W (instead of 8W) dc-dc converter is sufficient to supply the sensors (+15V/167mA; -15V/167mA).
- **ZUS150505 (U2002)**, **UNR-1.8/2-D5SM (U2003)**, **UWR-3.3/4250-D5A (U2004)**: they all seem to be oversized with respect the supposed power consumption.
- Common choke filters should be used in each power supply section.
- A switch fuse could be used in the power supply main input.
- **LA200-P (U4000)**: the charge resistance R4001 must be rated at least 1W, a value of 82 Ω (instead of 50 Ω and improving the measure accuracy) can be used if AD762-10 is used as A/D converter.
- **LV25-P/SP2 (U4002)**: the resistor R4006 (80k Ω) must be rated 8W!
- **AD597 (U4001)**: pay attention to the case in purchasing this component (SOIC and not TO-100).
- *We don't consider the using of any hardware filter (e.g. Butterworth filter of the second or higher order) in the acquisition of measures (current and voltage); do we use any software filter? If not, I think we should consider the opportunity of using some hardware filters.*