FTOF POWER BOARD POWER DISTRIBUTION BLOCK LpGBT based Service Hybrid **Power board conversion** ppRDO Board Power **ASIC POWER 1 6X ASIC + LGAD bPOL48V DC|DC** L_p GBT 1.2V sensor module 1.2V 15V: 1.2V **SERDES** ~7.5W 10W out 1.2V @ < 1.0W ~ 70% power efficiency => 36W input power (2.5A / hybrid) **ASIC POWER 2 6X ASIC + LGAD** bPOL48V DC DC MUX64 1.2V 15V power + sense voltage 1.2V sensor module 1.2V @ 20mW 15V: 1.2V ~7.5W 10W out Need to power ~132 [RDO + ASIC] service hybrids **LT3033 LDO** 2.5V: 1.2V 1.5A Recommend: 3x 12 channel PL512s **RDO POWER** Each channel power 4x hybrids **bPOL48V DC|DC** 2.5V 15V: 2.5V VTRx+ This provides ~ 3.0% segmentation 1.2V 1.2V @ 60mW 5W out 2.5V @ **Power consumption of detector** 200mW electronics: 5.0KW (330A) 2.5V **NOTE: 70% power conversation**

efficiency

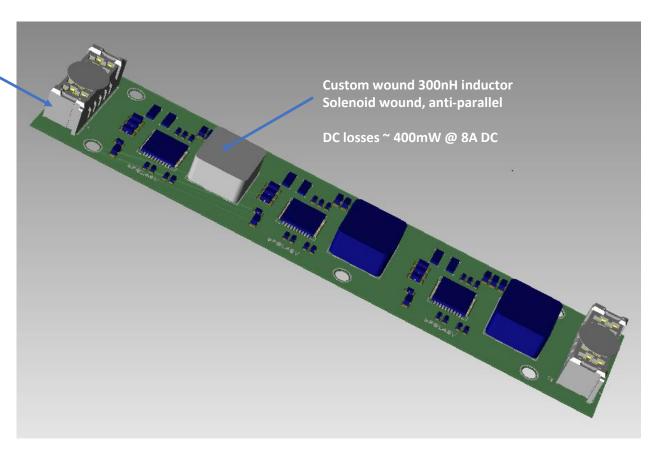
October 2024, T. Camarda BNL



Connector Samtec: UMPS-06-05.5-G-V-S-W-TR

6 pin blade type connector on each side: plenty for power + signals



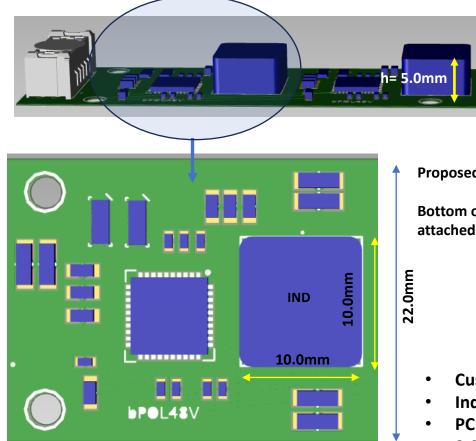


100mm x 22mm service hybrid power board

bPOL48V power regulator board: 30W total (10W/ch)

1.2V_{OUT} @ 8A





Proposed fTOF Power Board shown as example

Bottom of PCB will have thermal copper plane attached to liquid cooling plate

CERN bPOL48V evaluation board Modified for 1.2V_{OUT} 8A, ~10W Heat-sink attached w/ thermal pad at bottom

- Custom switching inductor: 300nH, 8A air-core, solenoid wound in anti-parallel
- Inductor dimensions (mm) lxWxH => 10 x 10 x 5 => allow ~ 8mm clearance height
- PCB board height: 2.0mm to 2.4mm
- 2.0oZ outer copper

6.82cm² circuit footprint size

31.0mm

FEE board to power board stack-up height

UMPX MATED VIEWS REVISION D 10/6/2021 ECN-420354 DESIGNED & DIMENSIONED IN MILLIMETERS[INCHES] "A" -"A" -SECTION "A"-"A" SCALE 4:1 FIG 1 UMPT MATED WITH UMPS TABLE 1 UMPS LEAD STYLE WIPE -03.5 -05.5 -07.5 "A" FULLY "A" FULLY "A" FULLY "A" MAX "A" MAX "A" MAX FULLYMATED MIN @ "A" MAX MATED MATED MATED 7.00 [.276] -01.5 5.00 [.197] 6.09 [.240] 8.09 [.319] 9.00 [.354] 10.09 [.397] 1.47 [.058] 0.38 [.015] -02.5 6.00 [.236] 7.09 [.279] 8.00 [.315] 9.09 [.358] 10.00 [.394] 11.09 [.437] 1.47 [.058] 0.38 [.015] UMPT LEAD -06.5 10.00 [.394] 11.09 [.437] 12.00 [.472] 13.09 [.515] 14.00 [.551] 15.09 [.594] 1.47 [.058] 0.38 [.015] STYLE 11.00 [.433] 12.09 [.476] 13.00 [.512] 14.09 [.555] 15.00 [.591] 16.09 [.633] 1.47 [.058] 0.38 [.015] 18.00 [.709] -12.5 16.00 [.630] 17.09 [.673] 19.09 [.752] 20.00 [.787] 21.09 [.830] 1.47 [.058] 0.38 [.015]

NOTE

- 1. ALL DIMENSIONS BASED ON NOMINAL VALUES FOR SAMTEC RECOMMENDED PCB LAYOUTS.
- 2. ALTHOUGH MAX DIMENSIONS ARE LISTED SAMTEC RECOMMENDS FULLY MATING COMPONENTS.

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