**GE21 GBTx Based OH Board Design Modifications**

**16 October 2019**

1. U35 is updated (“A” is pin 2 and “NC” is pin 1).
2. Increase the diameter of six mounting holes from 3 mm to 4 mm.
3. Replace SN74AUP1G00DBVR (U34) with the SN74AUP1G04DBVR
4. Disconnect U33-13 from U37-2. Disconnect U33-12 from U34-1.
5. Disconnect U37-4 from U31-2. Remove U37.
6. Disconnect U31-2 from U37-4. Connect U31-2 to U32-4 (DIS\_GBT).
7. Add TP18 to U1-U13 (TDO). Add TP21 to U25-E6 (PROM\_TDO).
8. Disconnect U1-F15 from U5-7. Disconnect U1-F21 from U5-6. Disconnect U5-2 from U2-N11. Disconnect U5-3 from U3-N11. Remove U5. Connect U2-N11 to R148. The other side of R148 connect to 1.5V. Connect U3-N11 to R149. Connect the other side of R149 to 1.5V.
9. Add R150. One side is connected to U3-L10 (MODE2) and the other side to +1.5V.
10. Update U10 and U22 (VTRX). Pin 18 is now TD+ and pin 19 is now TD-. Four connections remain unchanged: U22-18 to U3-D1; U22-19 to U3-E1; U10-18 to U2-D1; U10-19 to U2-E1.
11. Disconnect P1-13 from U1-W14 (MSD7P). Disconnect P1-14 from U1-Y14 (MSD7N). Disconnect P1-15 from U1-V13 (MSD8P). Disconnect P1-16 from U1-V14 (MSD8N). Disconnect P1-17 from U1-T14 (MSD9P). Disconnect P1-18 from U1-T15 (MSD9N). Disconnect P1-19 from U1-U15 (MSD10P). Disconnect P1-20 from U1-V15 (MSD10N). Disconnect P1-21 from U1-W15 (MSD11P). Disconnect P1-22 from U1-W16 (MSD11N). Disconnect P1-23 from U1-T16 (MSD12P). Disconnect P1-24 from U1-U16 (MSD12N).
12. Disconnect U1-D14 from U11-7 (GBT1RXDV). Connect U11-7 to U1-F15.
13. Disconnect U1-B16 from U24-7 (GBT2RXDV). Connect U24-7 to U1-F21.
14. Disconnect U1-D15 from U9-6 (GBT1RXRDY). Connect U9-6 to U1-T3.
15. Disconnect U1-B15 from U9-7 (GBT1TXRDY). Connect U9-7 to U1-U7.
16. Disconnect U1-C13 from U23-6 (GBT2RXRDY). Connect U23-6 to U1-F4.
17. Disconnect U1-B13 from U23-7 (GBT2TXRDY). Connect U23-7 to U1-L6.
18. Disconnect U2-R17 from pull-down resistor. Connect U2-R17 to U1-D15 (ELINK5N). Disconnect U2-P17 from pull-up resistor. Connect U2-P17 to U1-D14 (ELINK5P).
19. Disconnect U2-K15 from pull-down resistor. Connect U2-K15 to U1-B16 (ELINK6N). Disconnect U2-L15 from pull-up resistor. Connect U2-P17 to U1-B15 (ELINK6P).
20. Disconnect U2-U16 from pull-down resistor. Connect U2-K15 to U1-B13 (ELINK7N). Disconnect U2-U15 from pull-up resistor. Connect U2-P17 to U1-C13 (ELINK7P).
21. Disconnect U3-R17 from pull-down resistor. Connect U3-R17 to U1-Y14 (ELINK8N). Disconnect U3-P17 from pull-up resistor. Connect U3-P17 to U1-W14 (ELINK8P).
22. Disconnect U3-B15 from U1-E14 (ELINK3N). Disconnect U3-B16 from U1-E13 (ELINK3P). Connect U1-E13 to U3-A7 (ELINK14P). Connect U1-E14 to U3-A8 (ELINK14N).
23. Disconnect U3-K15 from pull-down resistor. Disconnect U3-L15 from pull-up resistor. Connect U1-V13 to U3-L15 (ELINK9P). Connect U1-V14 to U3-K15 (ELINK9N).
24. Disconnect U3-U16 from pull-down resistor. Disconnect U3-U15 from pull-up resistor. Connect U1-U15 to U3-U15 (ELINK10P). Connect U1-V15 to U3-U16 (ELINK10N).
25. Disconnect U3-Y1 from P6-156 (VFAT7GBTOUTN). Connect P6-156 to U3-W16. Disconnect U3-Y2 from P6-154 (VFAT7GBTOUTP). Connect P6-154 to U3-W15.
26. Disconnect U3-Y7 from P6-155 (VFAT8GBTOUTN). Connect P6-155 to U3-N16. Disconnect U3-Y8 from P6-153 (VFAT8GBTOUTP). Connect P6-153 to U3-M16.
27. Disconnect U3-A18 from P6-108 (VFAT9GBTOUTN). Connect P6-108 to U3-T13. Disconnect U3-A17 from P6-106 (VFAT9GBTOUTP). Connect P6-106 to U3-T14.
28. Disconnect U3-A10 from P6-107 (VFAT10GBTOUTN). Connect P6-107 to U3-B15. Disconnect U3-A9 from P6-105 (VFAT10GBTOUTP). Connect P6-105 to U3-B16.
29. Connect U1-T14 to U3-U4 (ELINK11P). Connect U1-V15 to U3-T4 (ELINK11N).
30. Connect U1-W15 to U3-V7 (ELINK12P). Connect U1-W16 to U3-W7 (ELINK12N).
31. Connect U1-T16 to U3-A15 (ELINK13P). Connect U1-U16 to U3-A16 (ELINK13N).
32. Disconnect U4-A11 from U33-5. Disconnect U4-A1 from U33-4 (SCA\_HR). Disconnect U4-A3 from U33-2. Disconnect U4-A2 from U33-3. Disconnect U33-11 from U34-2. Remove R133. Remove U33. Connect U4-A3 to TP23.
33. Connect U4-A1 to U24-3 (SCA\_HR). Connect U24-6 to U34-2 (HR).
34. Disconnect U29-7 from U25-E6 and P4-8. Disconnect U29-2 from U4-M1 (SCA\_TDI). Connect U25-E6 and P4-8 to U30-10 (PROM\_TDO). Connect U30-5 to U4-M1 (SCA\_TDI).
35. Connect U4-A11 to U29-2 (SCA\_DONE). Connect U29-7 to U28-2, R75, U1-G11 and U25-B4 (FPGA\_DONE).
36. Add 4 temperature sensors Heraeus Nexensos PT1000 1206 size (R151 near U2, R152 near U3, R153 near U22, R154 near U8). Connect R151 to U4-M9. Connect R152 to U4-N9. Connect R153 to U4-P9. Connect R154 to U4-M8.
37. Add R135, connect it to U22-8. Add R134, connect it to U10-8. Remove R107 and R110.
38. Disconnect U2-J4 from C184 (MGTCLK1N). Disconnect U2-H4 from C185 (MGTCLK1P). Connect U2-L20 to C184 (MGTCLK2N). Connect U2-M20 to C185 (MGTCLK2P).
39. Remove R37 and R64. Disconnect U10-6 from U1-J16 (VTRX1\_MABS). Disconnect U22-6 from U1-M17 (VTRX2\_MABS). Connect U10-6 to GND. Connect U22-6 to GND. Connect U1-J16 to U2-K10 and TP14 (TESTOUTPUT). Connect U1-M17 to U3-K10 and TP17 (TESTOUTPUT).
40. Add C230 (680uF). Add C231…C238 (4.7uF). Add C239..C245 (0.47uF).
41. Add C246 (47uF) and C247 (47uF).
42. Disconnect U1-V22 from SW3 and R115. Connect U1-V22 to TP22.
43. Disconnect U30-8 from EN\_GBT line. Connect U30-8 to SW3 and R115 (TESTA).
44. Disconnect U3-N6 (I2CADDRESS1) from U3-N7, P5, R42. Connect U3-N6 to R156. Connect the other side of R156 to CONFIGSEL (R43).
45. Disconnect U3-M8 (TRESERB) from R63, U3-N8,P7,P8. Connect U3-M8 to GND.
46. Disconnect U2-M8 (TRESERB) from R36, U2-N8,P7,P8. Connect U2-M8 to GND.
47. Disconnect U4-H14 from U4-G14, U4-L12 and from R89. Disconnect U4-H13 from U4-G13,H12,J12,K12,D14 and from R90. Connect U4-H14 to U3-P6 (SCA\_CLKAP). Connect U4-H13 to U3-R6 (SCA\_CLKAN).
48. Disconnect U4-G14 from U4-L12 and from R89. Disconnect U4-G13 from U4-H12,J12,K12,D14 and from R90. Connect U4-G14 to U3-P4 (SCADATAINAP). Connect U4-G13 to U3-P3 (SCADATAINAN).
49. Remove R59 and R60. Connect U4-F14 to U3-P12 (SCADATAOUTAP). Connect U4-F13 to U3-P13 (SCADATAOUTAN).
50. Add TP24 (EN\_GBT).
51. Connect R89 to GND (instead of +1.5V).
52. Connect R115 to 1.5V (instead of 2.5V)
53. Add R157 (to U30-2) and R158 (to U30-3).