

2 TXB translators in series

Note: TXB0104 characteristics taken from the datasheet and in combination from “a guide to voltage translation with TXB-Type Translators”. VCCA =3.3V and VCCB=5V. Calculations made with Trace simulators utilities.

Measures and calculations:

TXB0104

Propagation delay time: 4ns MAX

T rise and fall time: 2.7ns MAX

Skew time:0.5ns MAX

Total Calculation time for rise or fall ~6ns MAX

Input to output internal capacitance for port B: 14pF MAX (in full range of temp. -40 °C - 85 °C)

OS: Turn on for 10ns with load or 95%High - 5%Low of the output edge, whichever occurs first. During acceleration phase the output resistance decreased to 40Ω(can deliver up ~100mA) to increase the current-drive capability of the device.

Traces from 2 PCBS + connector header

First PCB max trace length:18mm

Second PCB max trace length: 24.5mm

Trace width: 0.3mm

Trace thickness:0.035mm

Trace separation min: 0.2mm

Dielectric thickness:1.57mm

Header length: 11mm

Header width of pin:0.6mm

Header separation between pins:1.9mm

εr: 4 (FR-4)

Total propagation delay time max: ~0.5ns

Total parasitic capacitance MAX: ~11pF

Result:

Capacitance : 11pF(traces + header) + 14pF(port B of TXB) = 25pF < 70pF

Rise or fall need it time: 0.5ns(propagation delay of system) + 6ns(max from TXB) = ~6.5ns < 10ns(Max time of OS)

Tests:

- We left for many hours the system on and it works perfect. The two pcbs exchange packets of data every 4sec in data rate of ~164kbs. No data lost found.
- We check the packets exchange on microcontrollers side with debuggers. All packets are successful without any lost.
- We check the system in different temperatures from -1°C to +65°C (hot-cold air).Results are steady as in normal ambient temperature.

- We give a very poor 24Vdc power supply (1.8V rms) in first pcb which gives the power supply to the second. The system stay steady and the two pcbs continue to communicate without problems.
- We remove the headers and connect wires with approximately length of ~300mm between the 2 pcbs. We confirm in that situation that the system not working (the parasitic capacitance exceed 70pF). We expect this result.
- We check the system in 7 pair of pcbs. The same good results as above.

Result:

The system works perfect without problems with drive current provided by accelerators. The accelerators gives all the current needed to the input stage of TXB without any drifts in voltage levels.