# Evaluation of options for a low latency isolated RS-422 interface

## Requirements

* Sufficient galvanic isolation from equipment side
  + ground loop prevention
  + hindering effects of external electromagnetic events such as ESD, EMP
  + protecting equipment side from fault voltages on the transmission line, e.g. in case of a short to other wiring
* Operation from 3.3V DC or 5V DC
* low signal propagation delay
* low deviance of propagation delay due to change in temperature
* subzero and over 80 °C operation
* symmetric signal propagation delay (line to equipment, equipment to line)

## RS-422 transceiver IC selection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **part #** | **isolated** | **Tpd** | **Tpr** | **ΔTpd** | **ΔTpr** | **asymmetry** | **price** |
| ISO3086T | yes | 25 ns | 103 ns | 5.5 ns | 3.25 ns | 78 ns | 2659 Ft |
| SN65LBC179A | no | 6 ns | 13 ns | 1 ns | 0.53 ns | 7 ns | 897 Ft |
| ADM2582E | yes | 64 ns | 95 ns | 11 ns | NDA | 31 ns | 4495 Ft |
| LTM2881 | yes | 60 ns | 100 ns | 6 ns | 10 ns | 40 ns | 4758 Ft |
| MAX14855 | yes | NDA | NDA | 9 ns | 6 ns | 5 ns | 1685 FT |
| ISO35T | yes | 205 ns | 85 ns | 28 ns | 20 ns | 120 ns | 2461 FT |
| ISO35 | yes | NDA | NDA | NDA | NDA | NDA | 2461 FT |

## Compact solution with ISO3086T

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **part #** | **quantity** | **Tpd** | **Tpr** | **ΔTpd** | **ΔTpr** | **asymmetry** | **price** |
| ISO3086T | 2 pcs | 25 ns | 103 ns | 5.5 ns | 3.25 ns | 78 ns | 2,659 Ft |
| DA2303-AL | 1 pcs |  |  |  |  |  | 809 Ft |
| TPS76350 | 1 pcs |  |  |  |  |  | 260 Ft |
| 10 µF | 2 pcs |  |  |  |  |  | 50 Ft |
| 4.7 µF | 1 pcs |  |  |  |  |  | 26 Ft |
| Schottky diode | 2 pcs |  |  |  |  |  | 17 Ft |
| 0.1 µF | 5 pcs |  |  |  |  |  | 3 Ft |
| **7 types** | **14 pcs** | **25 ns** | **103 ns** | **5.5 ns** | **3.25 ns** | **78 ns** | **6,562 Ft** |

This option requires fewer types of parts and fewer pieces of parts. However, it is more expensive, has a lower performance, and contains no parts which could prove redundant.

## Separate solution with SN65LBC179A and ISO7421E

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **part #** | **quantity** | **Tpd** | **Tpr** | **ΔTpd** | **ΔTpr** | **asymmetry** | **price** |
| SN65LBC179A | 2 pcs | 6 ns | 13 ns | 1 ns | 0.53 ns | 7 ns | 897 Ft |
| ISO7421E | 2 pcs | 7 ns | 7 ns | 0.75 ns | 0.75 ns | 0 ns | 1,310 Ft |
| NXJ1S0505MC | 1 pcs |  |  |  |  |  | 897 Ft |
| LBR2518T100K | 1 pcs |  |  |  |  |  | 62 Ft |
| 2.2 µF | 1 pcs |  |  |  |  |  | 27 Ft |
| CVH252009-4R7M | 1 pcs |  |  |  |  |  | 75 Ft |
| 4.7 µF | 1 pcs |  |  |  |  |  | 26 Ft |
| 0.1 µF | 6 pcs |  |  |  |  |  | 3 Ft |
| **8 types** | **15 pcs** | **13 ns** | **20 ns** | **1.75 ns** | **1.28 ns** | **7 ns** | **5,519 Ft** |

This option requires more types of parts and more pieces of parts. However, it is less expensive, has a much higher performance, and contains 2 parts which might be redundant.