AND8365/D

125 kbps with AMIS-4168x

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APPLICATION NOTE

Introduction

Question

"Is it possible to drive 125kB with the AMIS−41682?" Please consider all possible CAN bit timings (TSEG1, TSEG2, SJW), a capacitive load at each can pin about 300 pF and l = 20m line (5 ns/m) length. Please investigate different communication scenarios (e.g. arbitration).

Conclusion

The maximum propagation delay measured at 125 kB is 1.555 μs. This is for 270 pF capacitive load and a bus length of 20m. When using the AMIS−41682, the user has to program the CAN−controller in such a way that the propagation segment of a bit time accounts for two maximum propagation delays to ensure correct function of the bus during arbitration and acknowledgment. In our example, the propagation segment shall be at least 3.11 μs long.

If for instance the bit time is divided in 16 time quanta (t_q), t_q will be 0.5 μs and the Prop_Seg has to be set to 7 t_q = 3.5 μs. By applying this CAN−controller setting, it's ensured that the bus signal will be sampled correctly in all situations.

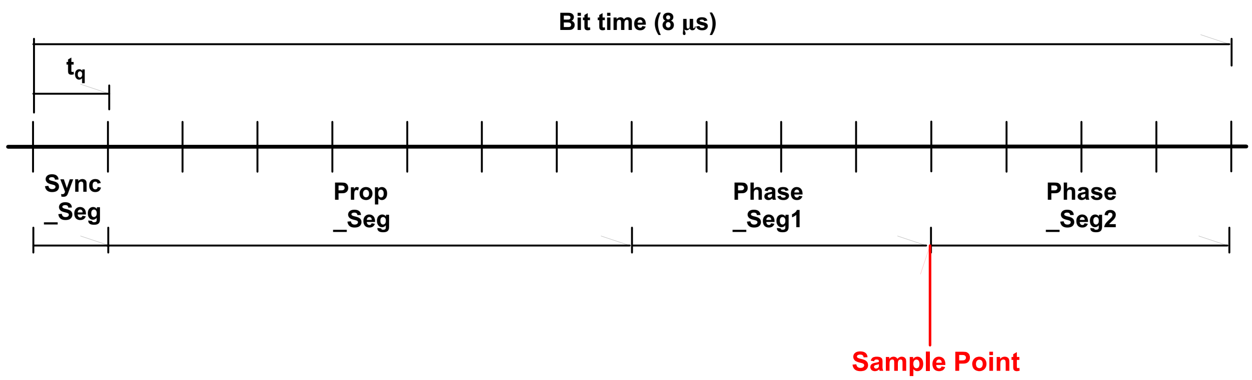

Figure 1. Example of CAN−Controller Setting Suitable for 125kB Operation with AMIS−4168x

Overall, it is not a problem to drive 125 kB with the AMIS−41682.

Performed Measurements

Propagation delay between Tx_1 and Rx_1 (transceiver 1) and Tx_1 and Rx_2 (receive transceiver 2) for different cable length, and CANL/CANH termination of 220 Ω.

Used equipment:

- Oscillator type: Hewlett−Packard 3310A Function Generator; frequency 62.5 kHz (t_{bit} = 8 μs)
- Oscilloscope type: Agillent Infiniium 600 MHz, 4 GSa/s
- Power supply: Thurlby Thandar Instruments PL310QMD
- Cable: Alcatel TIA/EIA 568−B.2 Category 5e; 100 Ω; propagation delay: 570 ns/100m at 1 MHz

The circuit shown in was Figure 2 used for the measurement.

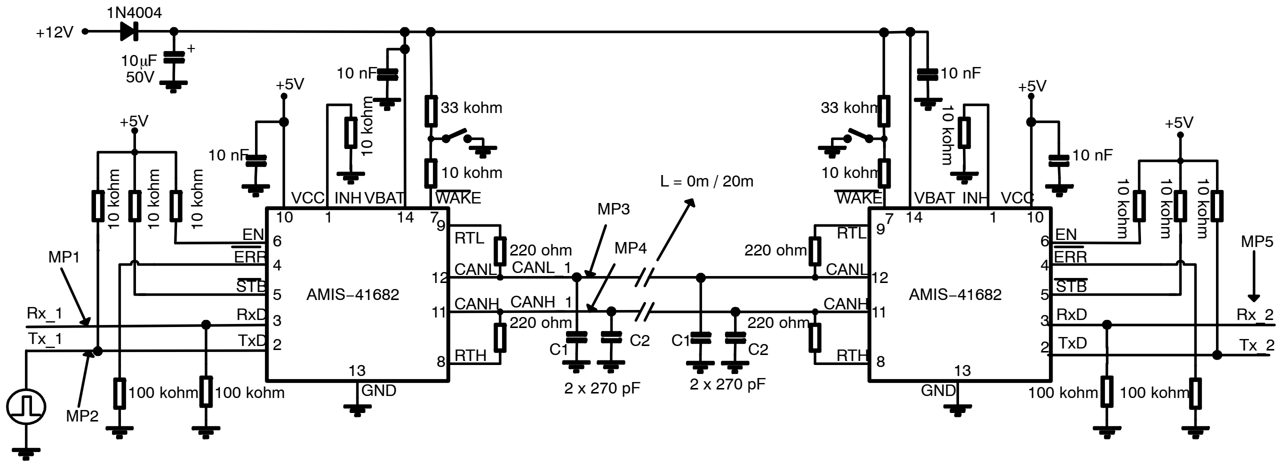

Figure 2. Measurement Set−Up

Measurements Results

Propagation delay (see data sheet) L −> H and H −> L for different bus configurations.

T_{bit} = 8 μs

T_{amb} = 25°C

Table 1. MEASURED PROPAGATION DELAYS

Symbol	Parameter	Condition	Value	Comment
$t_{PD(H)}$	Propagation delay Tx_1 to Rx_1 high	$C_1 = C_2$ = 270 pF L = 0m	1.041 μs	See Figure 3
$t_{PD(L)}$	Propagation delay Tx_1 to Rx_1 low	$C_1 = C_2$ = 270 pF L = 0m	1.107 μs	See Figure 4
$t_{PD(H)}$	Propagation delay Tx_1 to Rx_2 high	$C_1 = C_2$ = 270 pF L = 0m	1.051 μs	See Figure 5
$t_{PD(L)}$	Propagation delay Tx_1 to Rx_2 low	$C_1 = C_2$ = 270 pF L = 0m	1.110 μs	See Figure 6
$t_{PD(H)}$	Propagation delay Tx_1 to Rx_1 high	$C_1 = C_2$ = 270 pF L = 20m	1.536 μs	See Figure 7
$t_{PD(L)}$	Propagation delay Tx_1 to Rx_1 low	$C_1 = C_2$ = 270 pF L = 20m	1.176 μs	See Figure 8
$t_{PD(H)}$	Propagation delay Tx_1 to Rx_2 high	$C_1 = C_2$ = 270 pF L = 20m	1.555 μs	See Figure 9
$t_{PD(L)}$	Propagation delay Tx_1 to Rx_2 low	$C_1 = C_2$ = 270 pF L = 20m	1.244 μs	See Figure 10

Measurements Cable Length 0m

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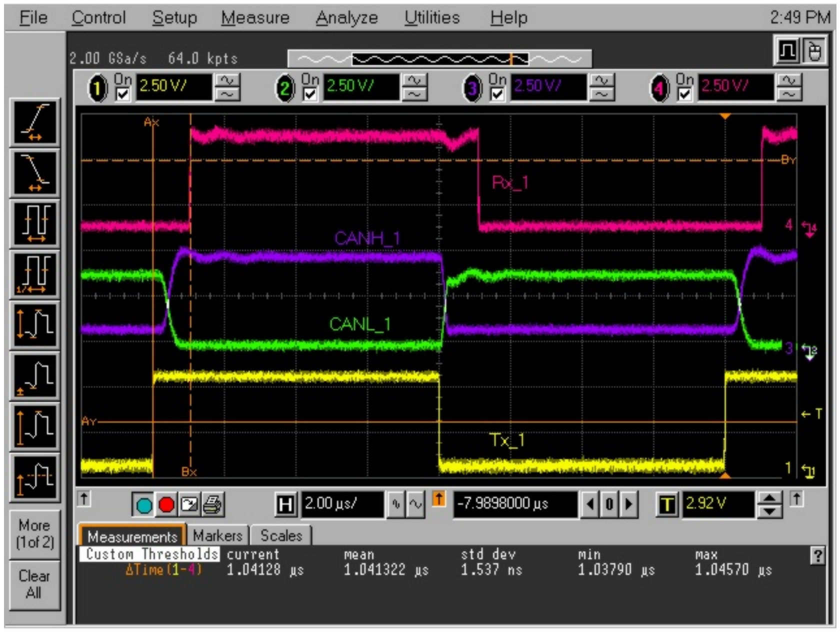

Figure 3. Propagation Delay $t_{PD(H)}$ Between Tx_1 and Rx_1 at 125kB and Cable Length 0m = 1.041 µs

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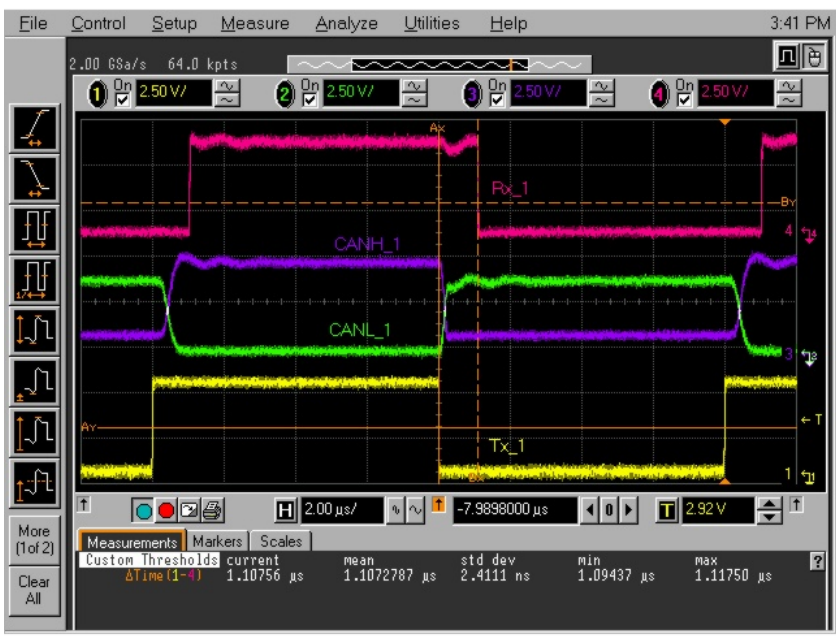

Figure 4. Propagation Delay $t_{PD(L)}$ Between Tx_1 and Rx_1 at 125kB and Cable Length 0m = 1.107 µs

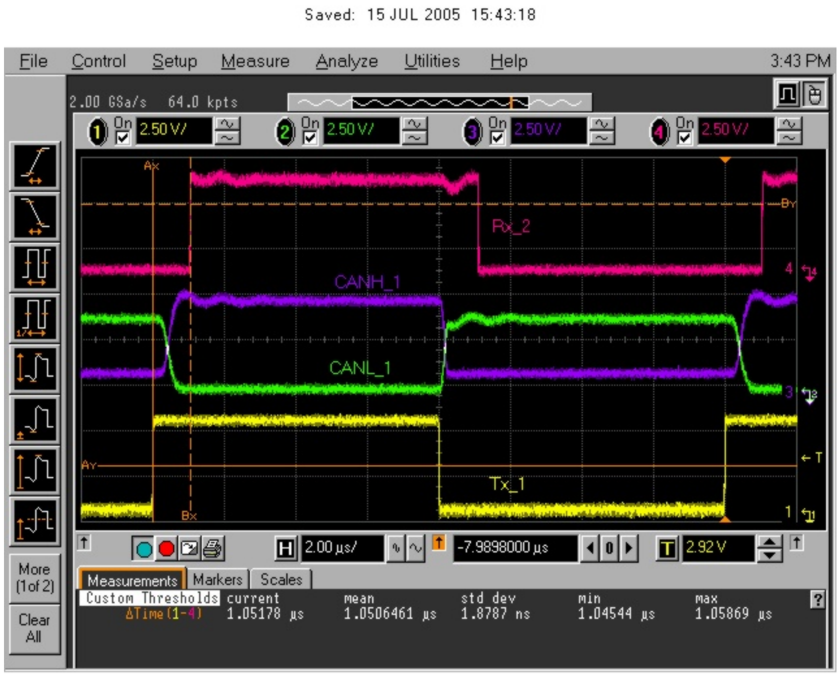

Figure 5. Propagation Delay $t_{PD(H)}$ Between Tx_1 and Rx_2 at 125kB and Cable Length 0m = 1.051 µs

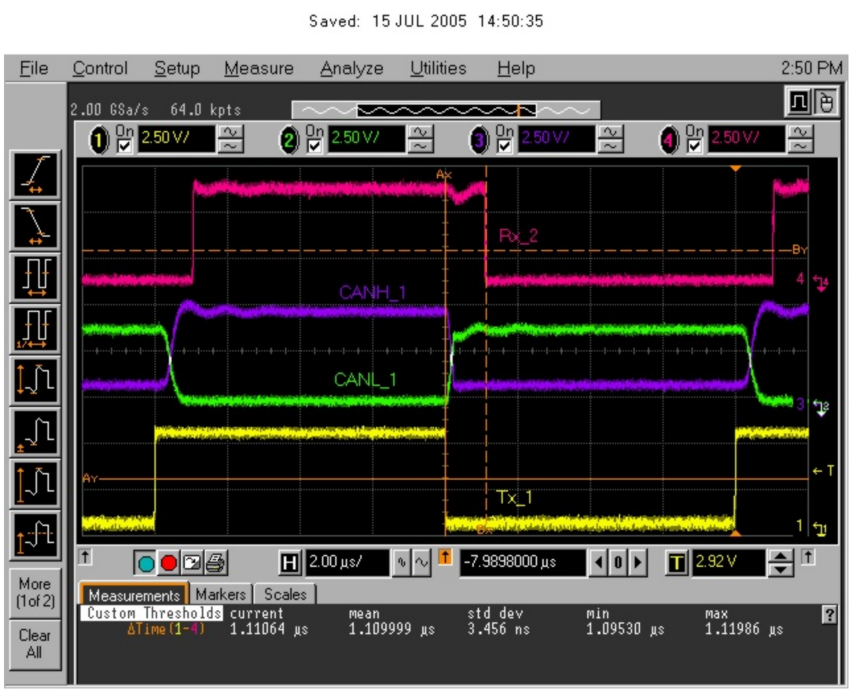

Figure 6. Propagation Delay $t_{PD(L)}$ Between Tx_1 and Rx_2 at 125kB and Cable Length 0m = 1.110 µs

Measurements Cable Length 20m

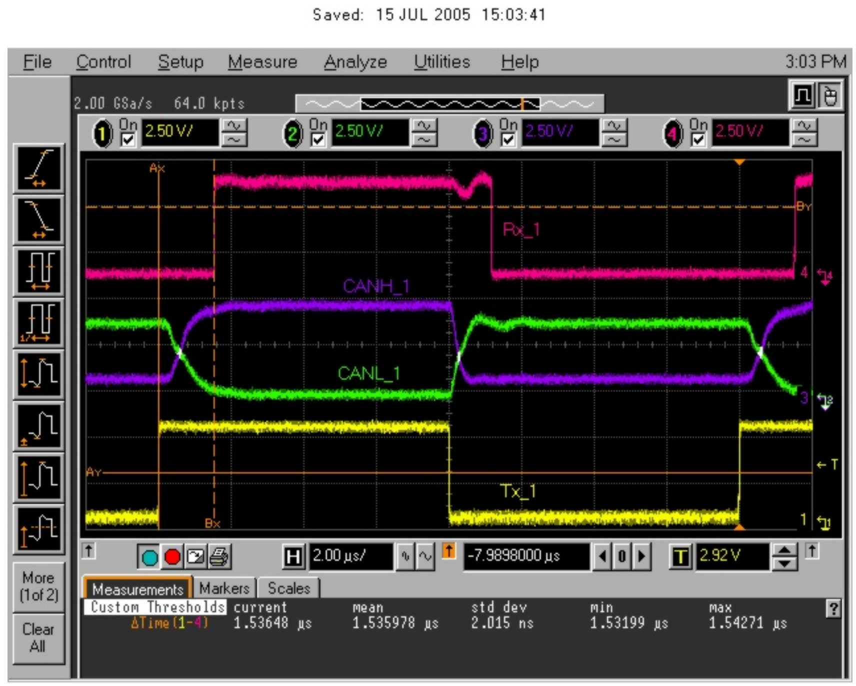

Figure 7. Propagation Delay $t_{PD(H)}$ Between Tx_1 and Rx_1 at 125kB and Cable Length 20m = 1.536 µs

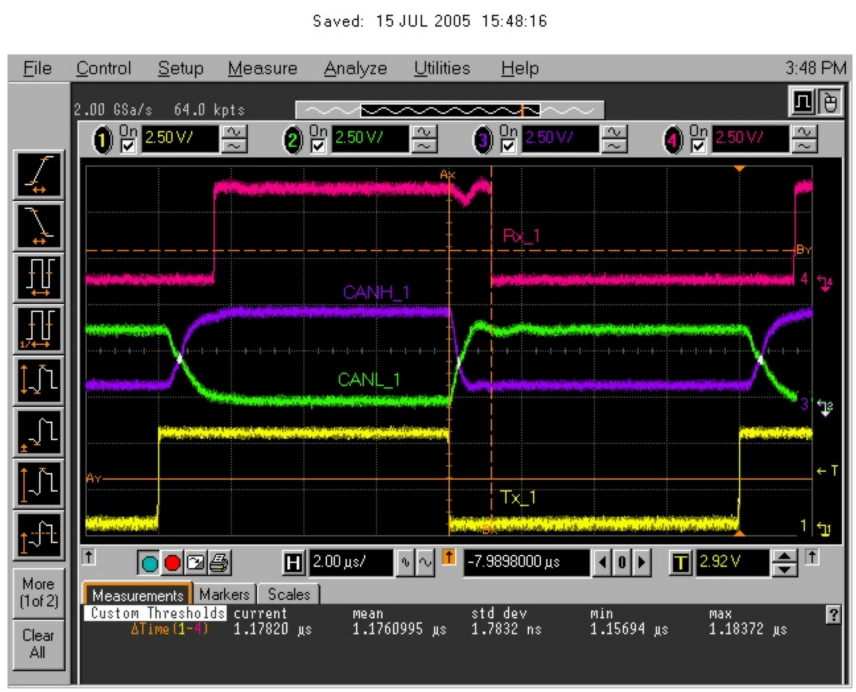

Figure 8. Propagation Delay $t_{PD(L)}$ Between Tx_1 and Rx_1 at 125kB and Cable Length 20m = 1.176 µs

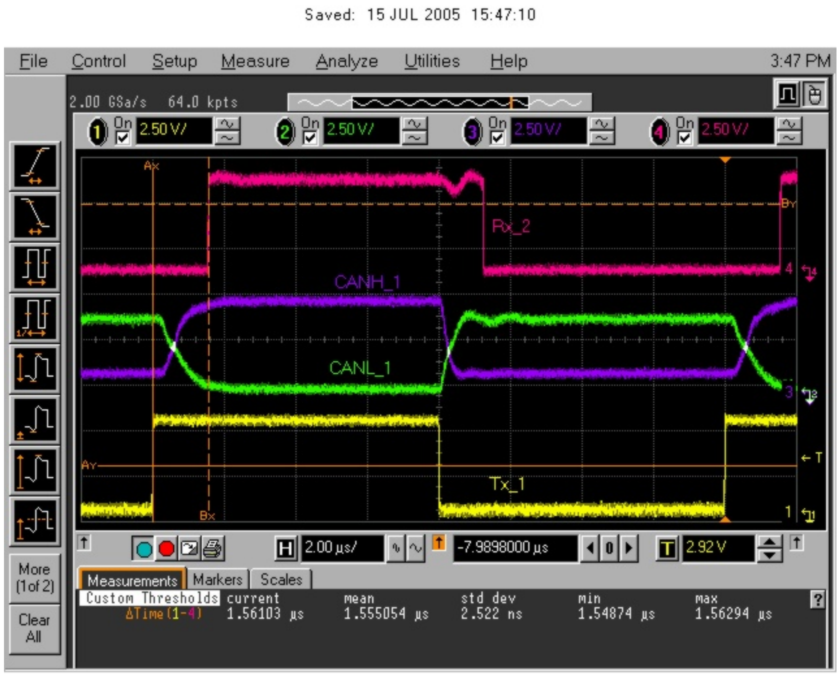

Figure 9. Propagation Delay $t_{PD(H)}$ Between Tx_1 and Rx_2 at 125kB and Cable Length 20m = 1.555 µs

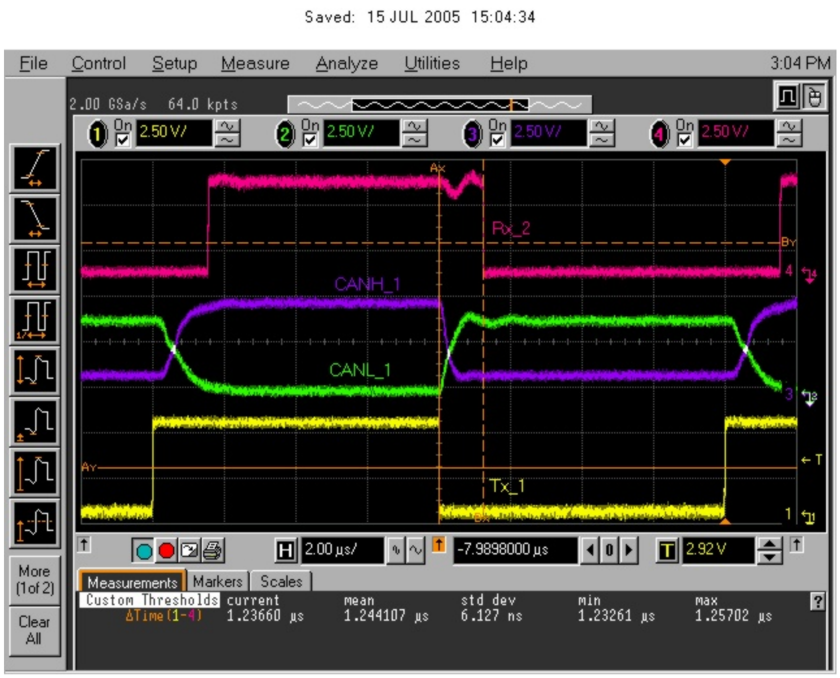

Figure 10. Propagation Delay $t_{PD(L)}$ Between Tx_1 and Rx_2 at 125kB and Cable Length 20m = 1.244 µs

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