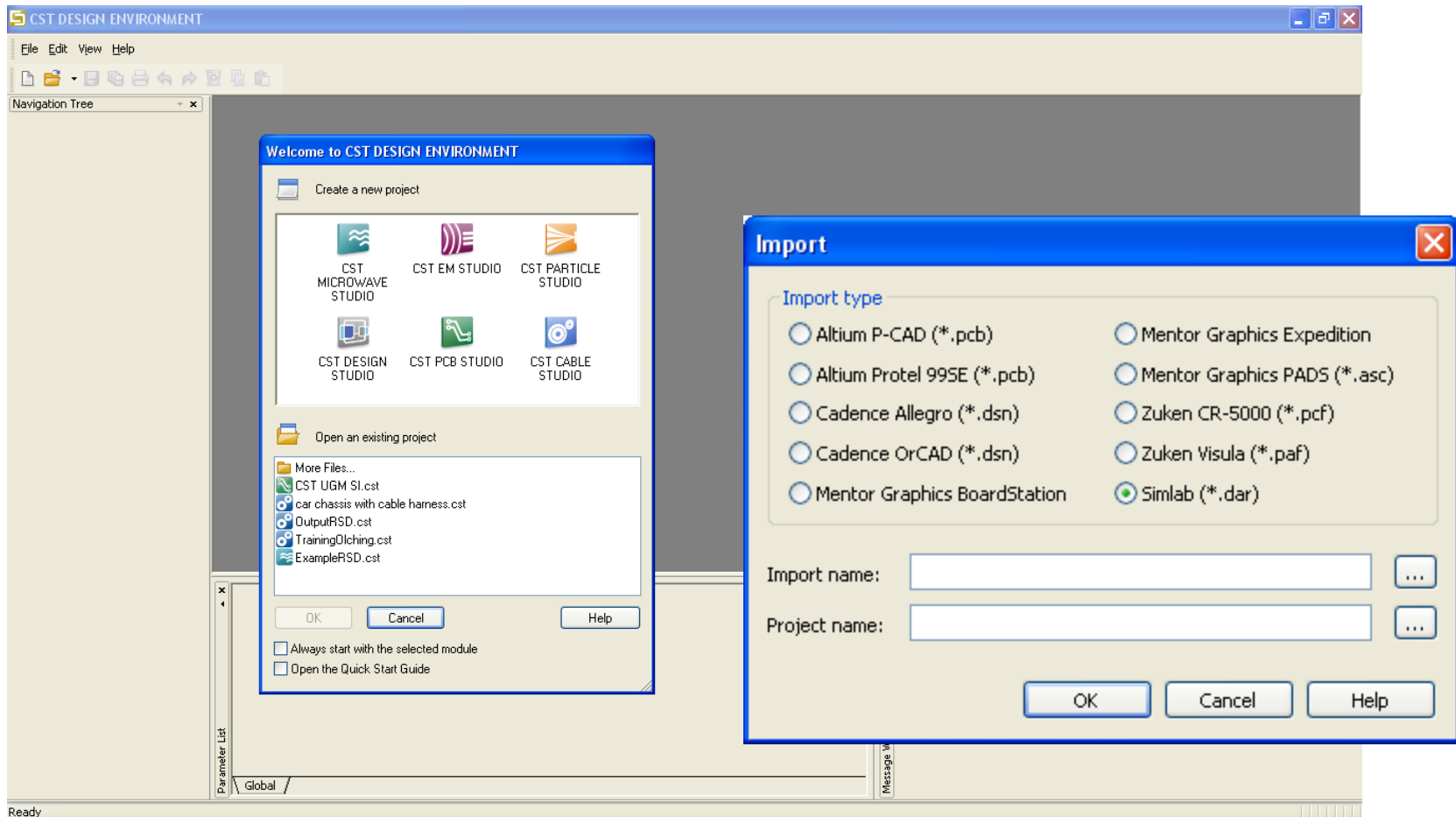


Signal Integrity (SI) analysis with CST PCB STUDIO

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Start the simulation project



PCB design

CST PCB STUDIO - [CST UGM SI*]

File Edit Layout View Solve Window Help

Navigation Tree

- Technology
 - Board
 - Materials
 - Layers
 - Images
 - Pad Stacks
- Network
 - Nets
 - Net Classes
 - Components
 - Terminals
- Wiring
 - Traces
 - Areas
 - Vias

Selection Manager

Selection Engine

All Elements

Only Selected Items Unselect All

- Nets
- Components
- Net Classes
- Traces
- Areas
- Vias

Filter

Select

CST UGM SI* CST UGM SI

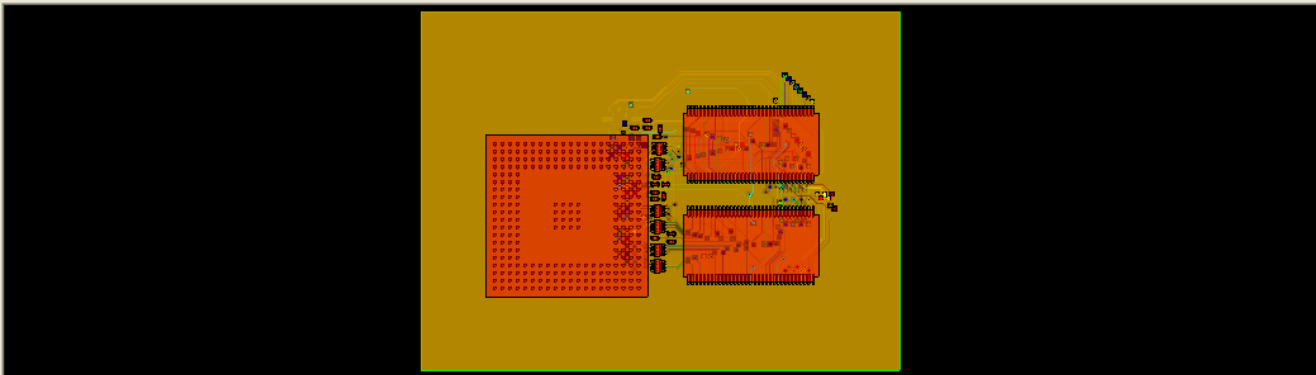
Name	Color	Style	Filled	Transpar...	Visible	Selectable
Top Components			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L2gnd			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L3			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L4gnd			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L5			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L6gnd			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L7			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bottom Components			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
All Layers			<input checked="" type="checkbox"/>	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>

View Options

Filter

Message Window

Ready



Layer stackup definition

Layers Stackup Length Units: mm

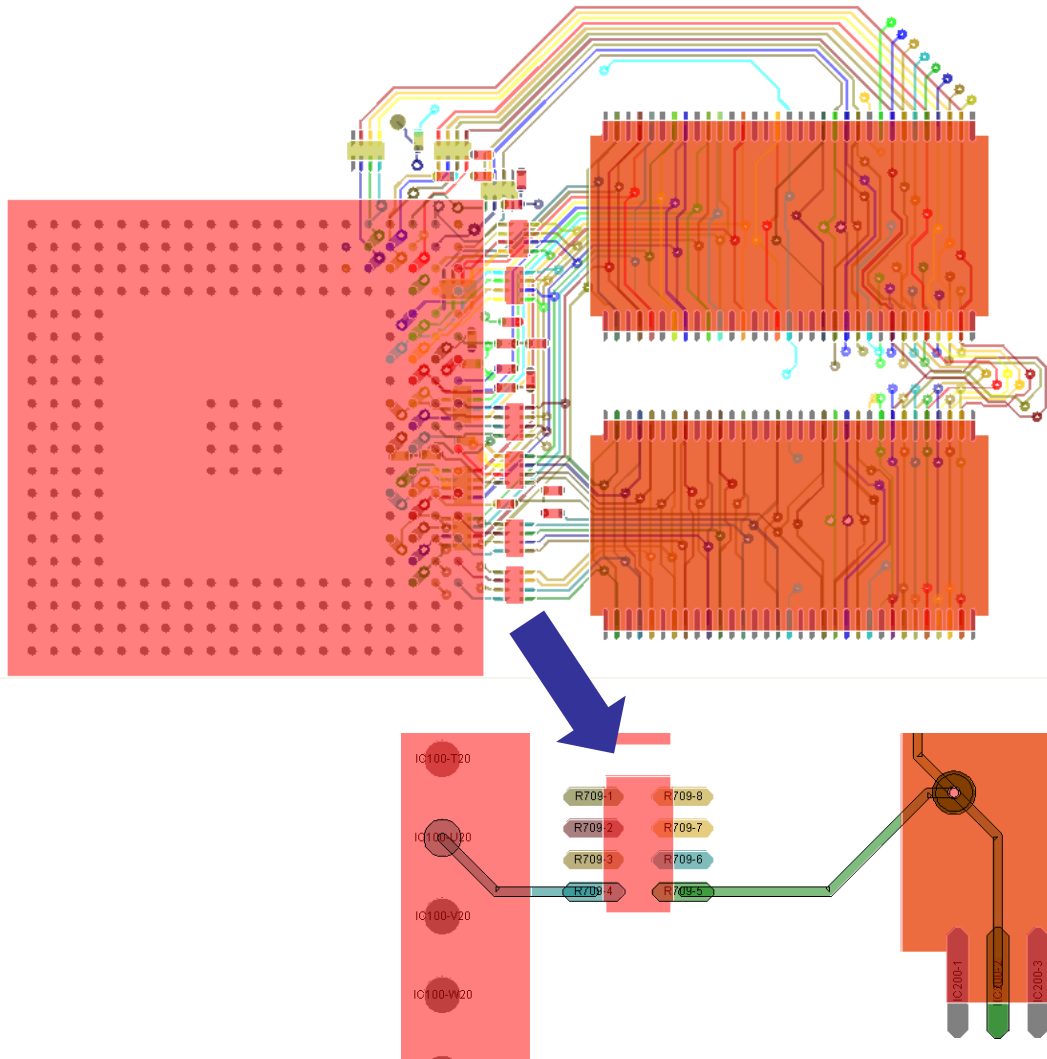
Number of Layers: 7 Board Thickness: 1.084 Total Thickness: 1.084

Layer Name	Type	Number	Material	Thickness	Conductivity	Permittivity	Loss Angl...	Fill	Spacing	Signal Name
mask_top	Dielectric	-	SolderResist	0.055	-	3.0	0.001	-	-	-
L1_top	Signal	1	cu	0.04	5.8E7	-	-	Above	-	-
prepreg1	Dielectric	-	fr4	0.11	-	4.2	0.02	-	-	-
L2	Signal	2	cu	0.018	5.8E7	-	-	Above	-	-
core1	Dielectric	-	fr4	0.25	-	4.2	0.02	-	-	-
L3	Signal	3	cu	0.018	5.8E7	-	-	Below	-	-
prepreg2	Dielectric	-	fr4	0.118	-	4.2	0.02	-	-	-
L4	Signal	4	cu	0.018	5.8E7	-	-	Below	-	-
prepreg3	Dielectric	-	fr4	0.136	-	4.2	0.02	-	-	-
L5	Signal	5	cu	0.018	5.8E7	-	-	Above	-	-
core2	Dielectric	-	fr4	0.25	-	4.2	0.02	-	-	-
L6	Signal	6	cu	0.018	5.8E7	-	-	Below	-	-
prepreg4	Dielectric	-	fr4	0.11	-	4.2	0.02	-	-	-
L7_bot	Signal	7	cu	0.04	5.8E7	-	-	Below	-	-
mask_bot	Dielectric	-	SolderResist	0.055	-	3.0	0.001	-	-	-

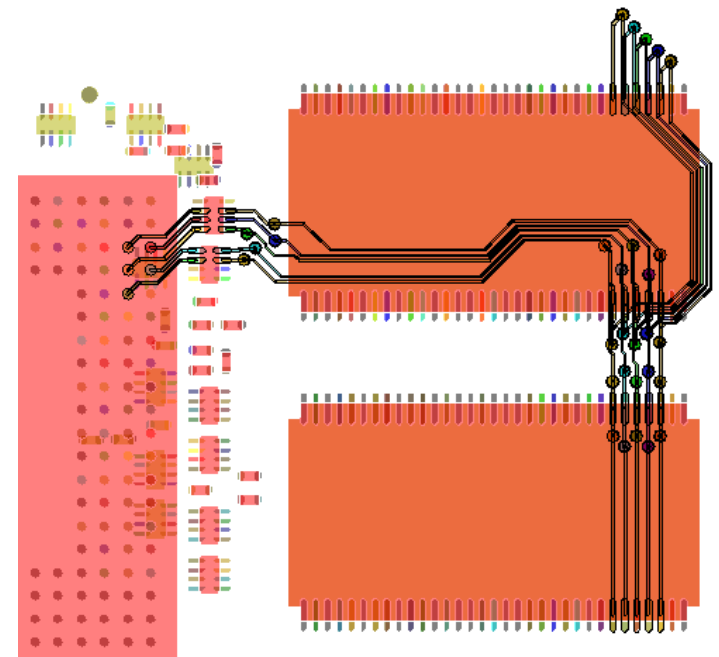
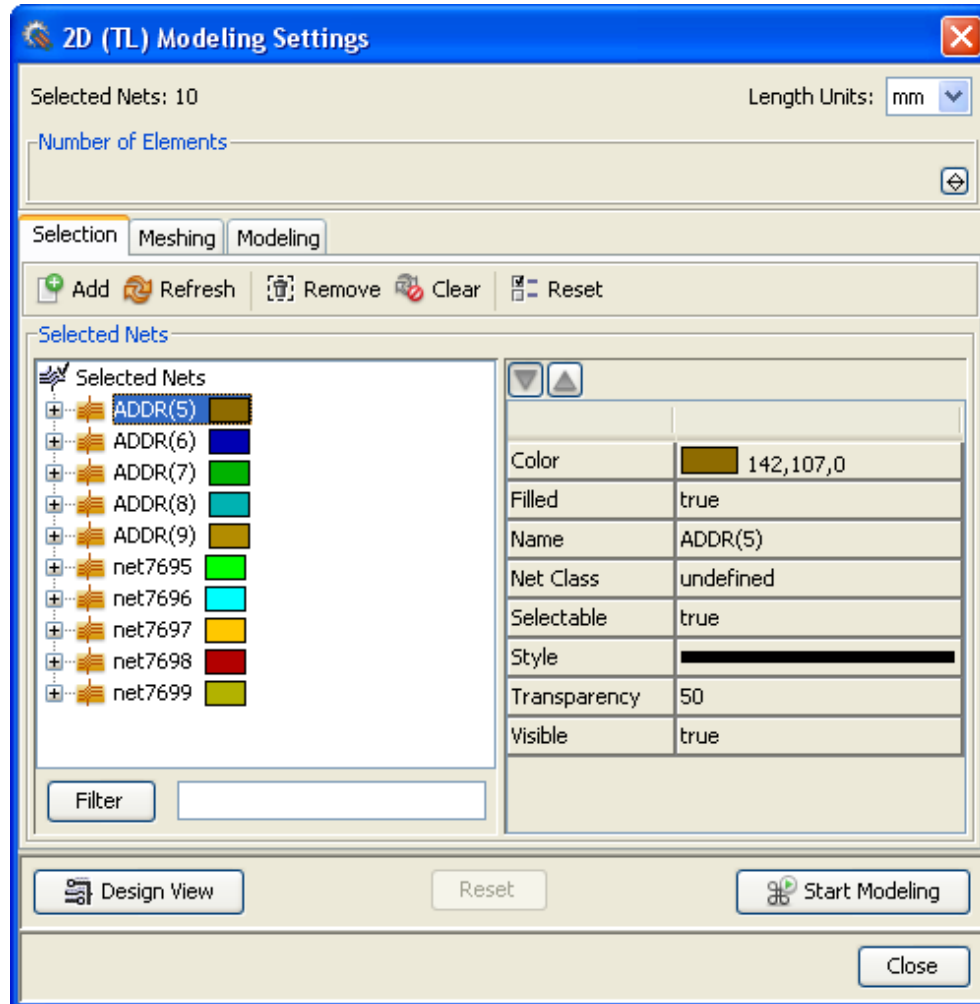
- Before starting any modeling it is demanded to check the layer stackup (technology) of the board because this has significant influence on the results

Board description

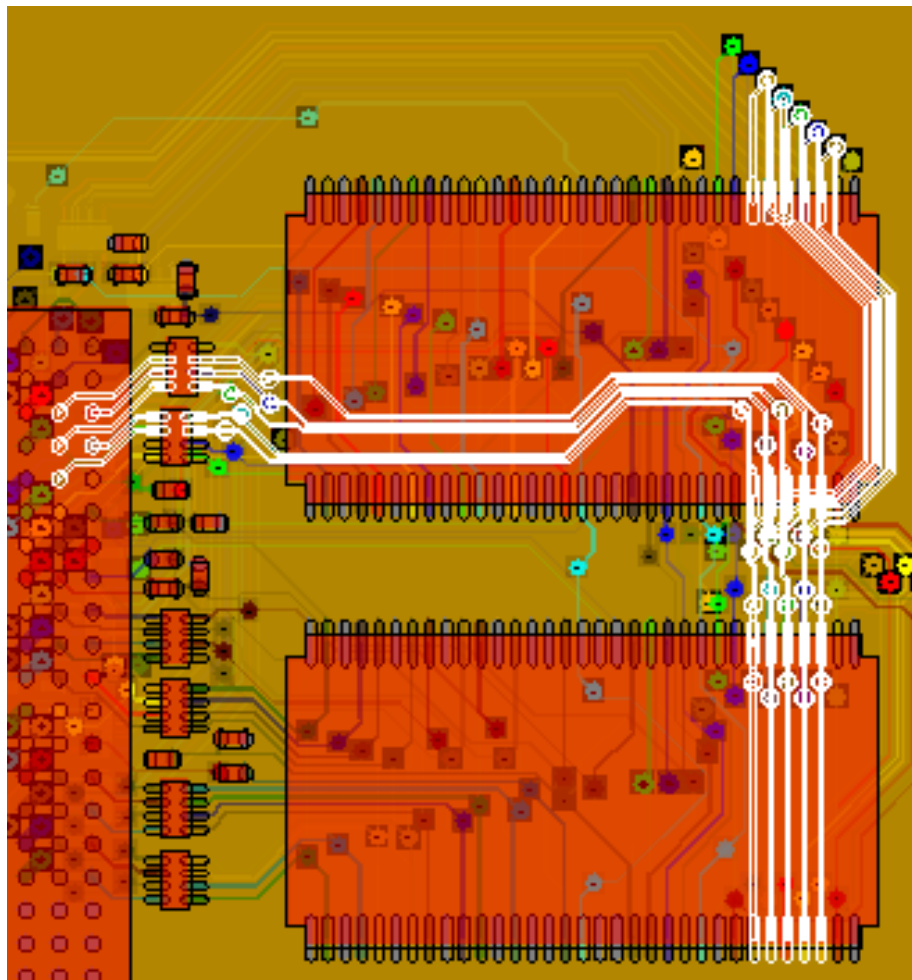
- Subset of a real board
- 8 layers
- μ -Controller IC100
- 4 MM IC200 - IC203
- Net data(0) connects pin 2 of IC200 and pin 2 of IC202 with pin 5 of R709
- Net net3983 connects pin 4 of R709 and pin U20 of microcontroller IC100



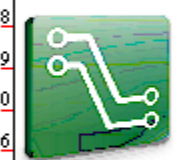
Net selection



From PCB to DESIGN STUDIO



IC100_C19	IC202_39
IC100_C20	IC202_40
IC100_D19	IC203_36
IC100_D20	IC203_37
IC100_E19	IC203_38
IC200_36	IC203_39
IC200_37	IC203_40
IC200_38	R706_2
IC200_39	R706_3
IC200_40	R706_4
IC201_36	R706_5
IC201_37	R706_6
IC201_38	R706_7
IC201_39	R707_1
IC201_40	R707_2
IC202_36	R707_7
IC202_37	R707_8
IC202_38	



IBIS Models

■ MOTOROLA MPC5200

```
[IBIS Ver] 2.1
[File name] mpc52001.ibs
[File Rev] 0.2
[Date] November 06, 2003
[Source] Motorola, SPS, TSPG, DART, DESIGN
[Notes] IBIS model for the MPC5200 embedded microprocessor.
        DDR configuration (2.5V VDD_MEM)
[Disclaimer] This information is for modeling purposes only and
            is not guaranteed.
[Copyright] Copyright, Motorola, Inc., 2003

*****
Component MPC5200
*****

[Component] MPC5200
[Manufacturer] Motorola Inc.
[Package]

variable      typ      min      max
R_pkg         100.0000m  NA      NA
L_pkg         6.0000nH   NA      NA
C_pkg         1.5000pF   NA      NA

[Pin] signal_name  model_name  R_pin  L_pin  C_pin
B02 test_mode_0    mdp12_4m   2.99E-01  1.03E-08  1.35E-12
A01 test_mode_1    mdp12_4m   3.01E-01  1.11E-08  1.56E-12
B01 test_sel_0     mdp12_4m   3.36E-01  1.21E-08  1.37E-12
C03 test_sel_1     mdp12_8m   2.83E-01  8.66E-09  1.37E-12
C02 rtc_xtal_in    NC         3.23E-01  1.03E-08  1.33E-12
```

■ MICRON TECH. MT46V128M4TG-IT

```
[Copyright] Copyright 2005 Micron Technology, Inc. All Rights Reserved.

*****
Component: MT46V128M4TG-IT
*****

[Component] MT46V128M4TG-IT
[Manufacturer] Micron Technology, Inc.

[Package] | TSOP package
           typ      min      max
R_pkg     46.96m    34.54m    59.38m
L_pkg     4.82nH     2.76nH    6.88nH
C_pkg     1.23pF     0.91pF    1.54pF

[Pin] signal_name  model_name  R_pin  L_pin  C_pin
1 VDD      POWER      9.90m  1.38nH  1.18pF
2 NF       NC
3 VDDQ    POWER      58.14m  6.42nH  1.56pF
4 NC      NC
5 DQ0     DQ         58.17m  5.63nH  1.49pF
6 VSSQ    GND        56.76m  5.25nH  1.46pF
7 NC      NC
8 NF      NC
9 VDDQ    POWER      50.81m  4.10nH  1.36pF
10 NC     NC
11 DQ1    DQ         45.07m  3.61nH  1.25pF
12 VSSQ    GND        43.84m  3.45nH  1.21pF
13 NC     NC
```

Signal integrity (poor loadings)

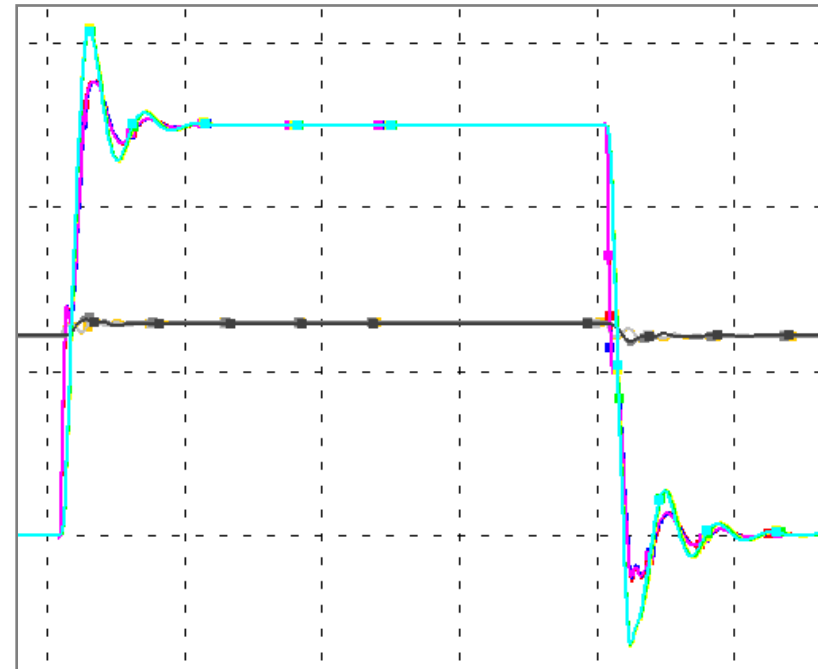
Component Translation Table

Part Name	Reference	Value	IBIS Model
_27673	IC100	MGT5200	-
_27674	IC200	K4H511638D	-
_27674	IC201	K4H511638D	-
_27674	IC202	K4H511638D	-
_27674	IC203	K4H511638D	-
pn-loetpad	P702	X	-
pn-rx4array_33R	R702	100m	-
partno17142	R703	33	-
partno17142	R704	33	-
pn-rx4array_33R	R705	100m	-
pn-rx4array_33R	R706	100m	-
pn-rx4array_33R	R707	100m	-
pn-rx4array_33R	R708	100m	-
pn-rx4array_33R	R709	100m	-
pn-rx4array_33R	R710	100m	-
pn-rx4array_33R	R711	100m	-
pn-rx4array_33R	R712	100m	-
pn-rx4array_33R	R713	100m	-
pn-rx4array_33R	R714	100m	-
pn-rx4array_33R	R715	100m	-
pn-rx4array_33R	R716	100m	-
partno17142	R722	33	-
partno17142	R726	33	-
partno10445	R731	4.7K	-

Filter:

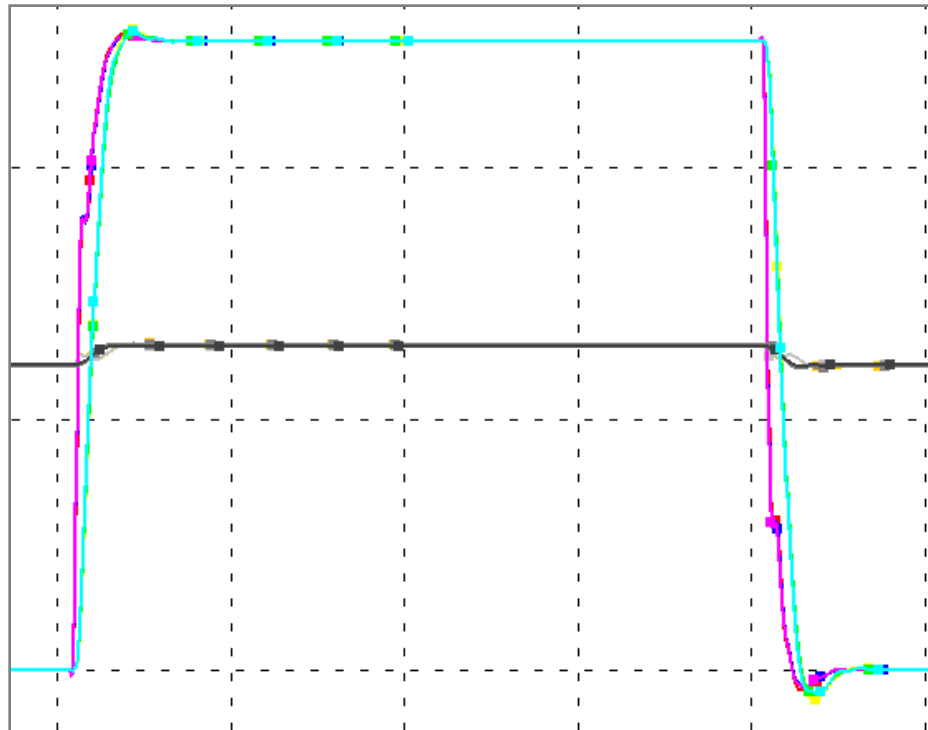
Search in DB...

Close



- The default loadings lead to unwanted over and undershoots
- The resistor values have to be changed for better SI

Signal integrity (better loadings)



- Changing the resistor values from 100m Ohm to 33 Ohm changes the signal behavior considerably
- With simulation tools different variants of PCB designs and different loading and termination conditions can be easily performed