



Printed board for the layout of electronic circuits

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Orcad 16.6 with PSpice

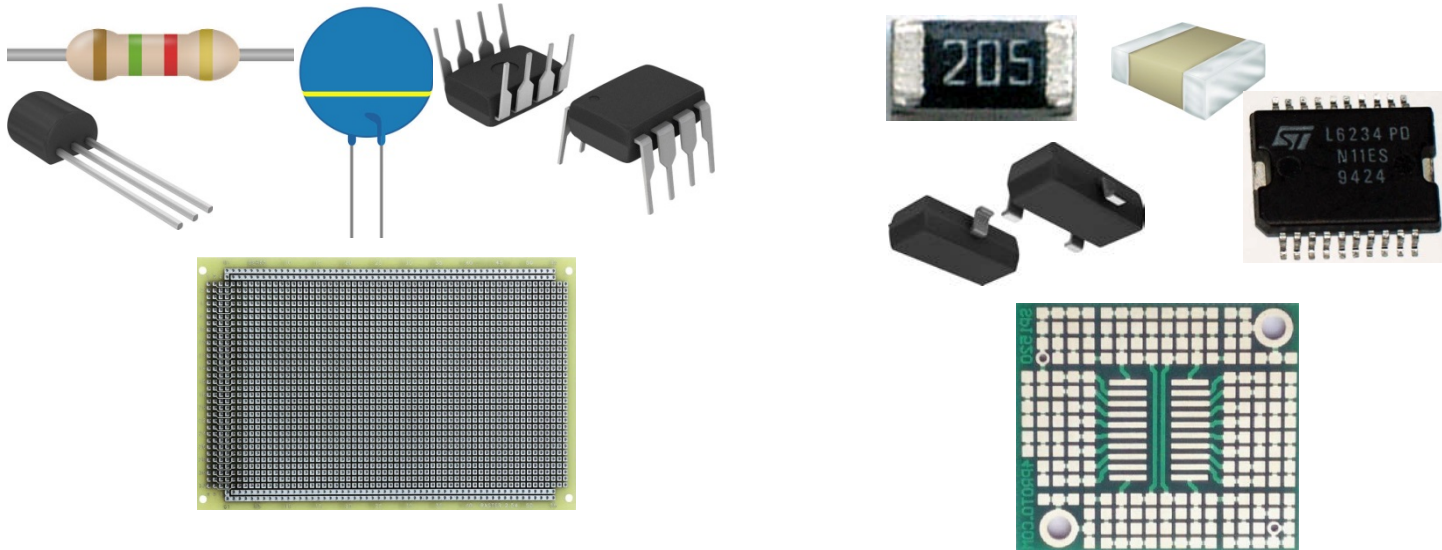
Presentation at Cadence User Conference 2016



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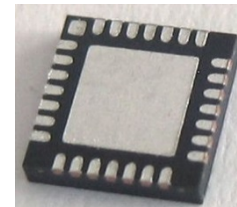
Motivation:

- Available printed boards for prototyping:
 - Wired connection components < - > SMD connection components



Restrictions of these solutions:

- Impossible to fulfill EMC and thermal considerations
- Impossible to use individual component footprints



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6 Layers are the minimum for fulfilling all EMC:

OrCAD PCB Designer Professional w/PSpice: laborkarte_rou16.brd Project: D:/CadUser/Laborkarte/allegro

File Import Setup Display Outline Add Edit Place Route Shape Check Analyze Tools Manufacture E

Layout Cross Section

	Subclass Name	Type	Material	Thickness (MM)	Conductivity (mho/cm)	Dielectric Constant	Loss Tangent	Negative Artwork	Shield
1		SURFACE	AIR			1	0		
2	TOP	CONDUCTOR	COPPER	0.03	595900	4.5	0	<input type="checkbox"/>	
3		DIELECTRIC	FR-4	0.1	0	4.5	0.035		
4	GND	PLANE	COPPER	0.03	595900	4.5	0.035	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5		DIELECTRIC	FR-4	0.1	0	4.5	0.035		
6	VCC	PLANE	COPPER	0.03	595900	4.5	0.035	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7		DIELECTRIC	FR-4	0.42	0	4.5	0.035		
8	VCC2	PLANE	COPPER	0.03	595900	4.5	0.035	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9		DIELECTRIC	FR-4	0.1	0	4.5	0.035		
10	GND2	PLANE	COPPER	0.03	595900	4.5	0.035	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11		DIELECTRIC	FR-4	0.1	0	4.5	0.035		
12	BOTTOM	CONDUCTOR	COPPER	0.03	595900	4.5	0	<input type="checkbox"/>	
13		SURFACE	AIR			1	0		

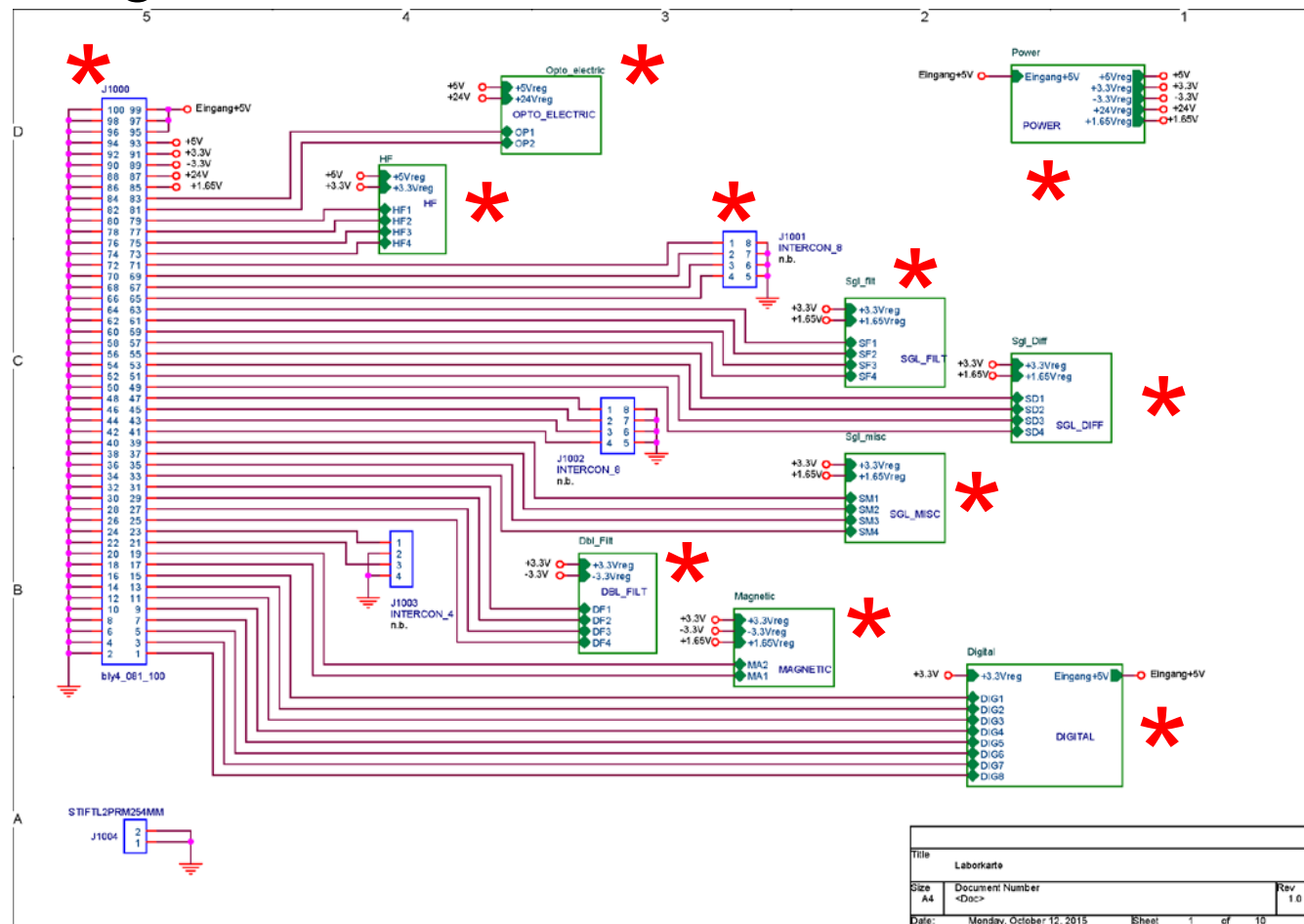
Total Thickness: 1 MM

Layer Type: ALL Material: ALL Field to Set: Thickness Value to Set: Update Fields

OK Apply Cancel Refresh Materials ->

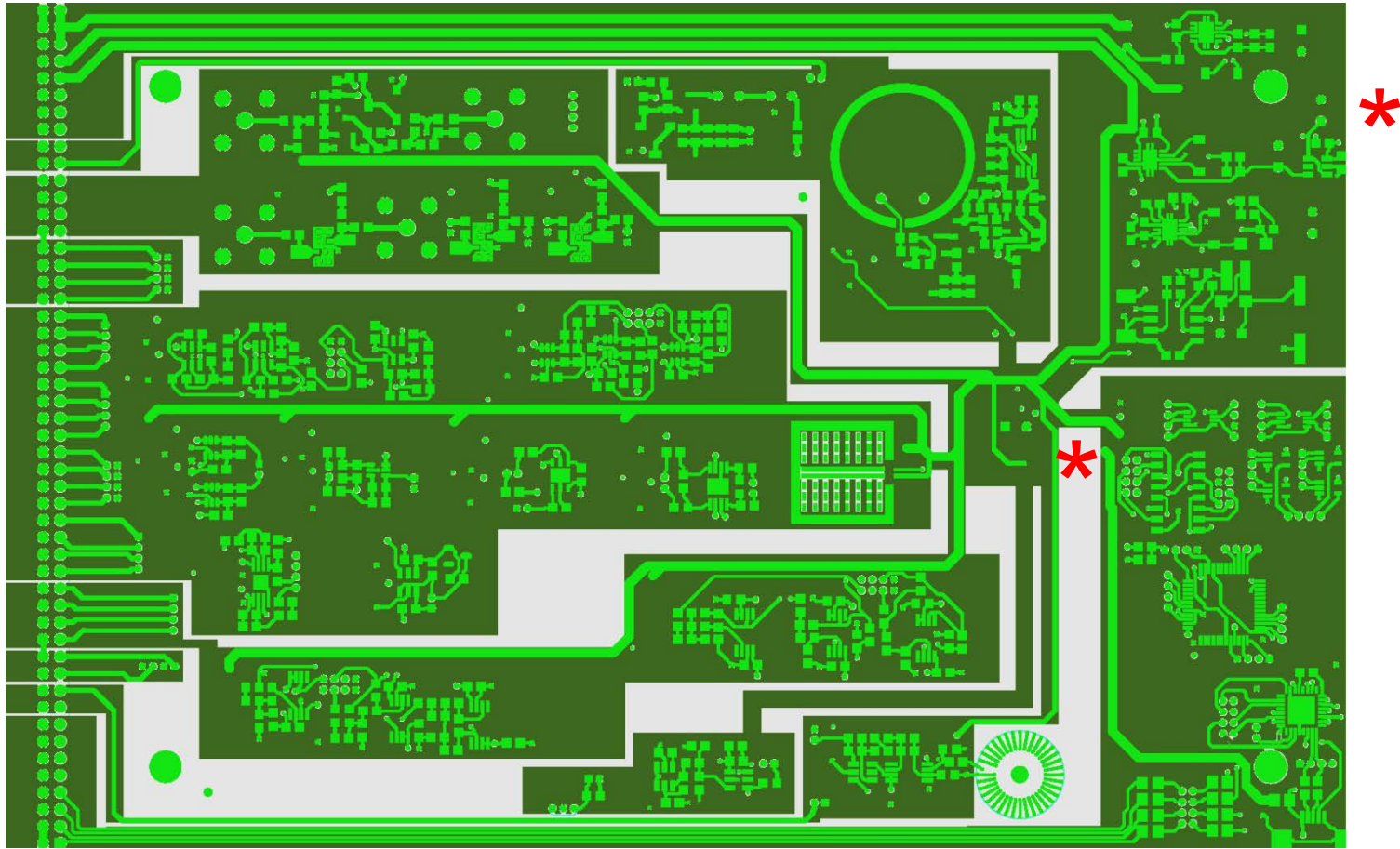
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Blockdiagram:



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Top layer and ground (layer 2 and 5)



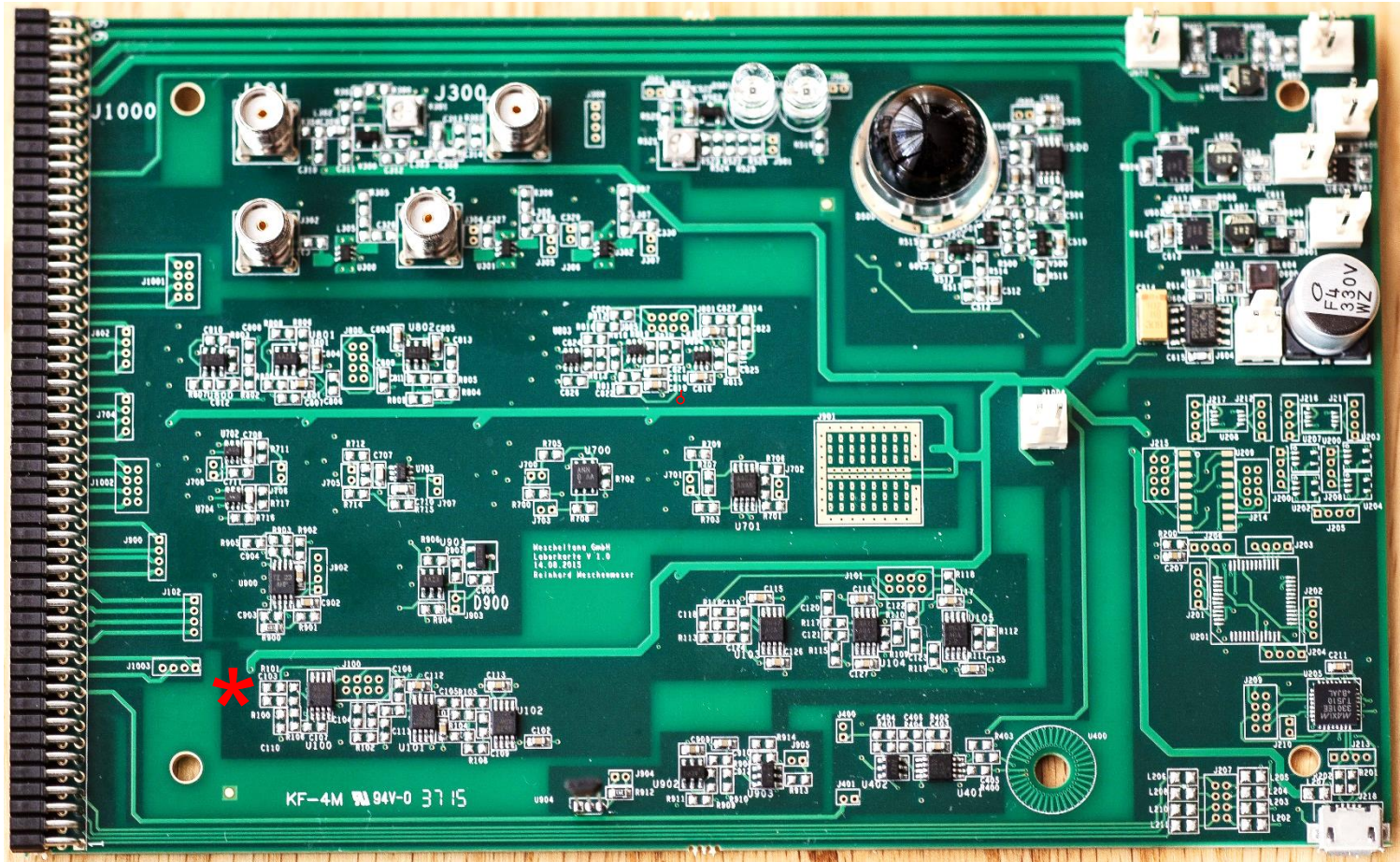
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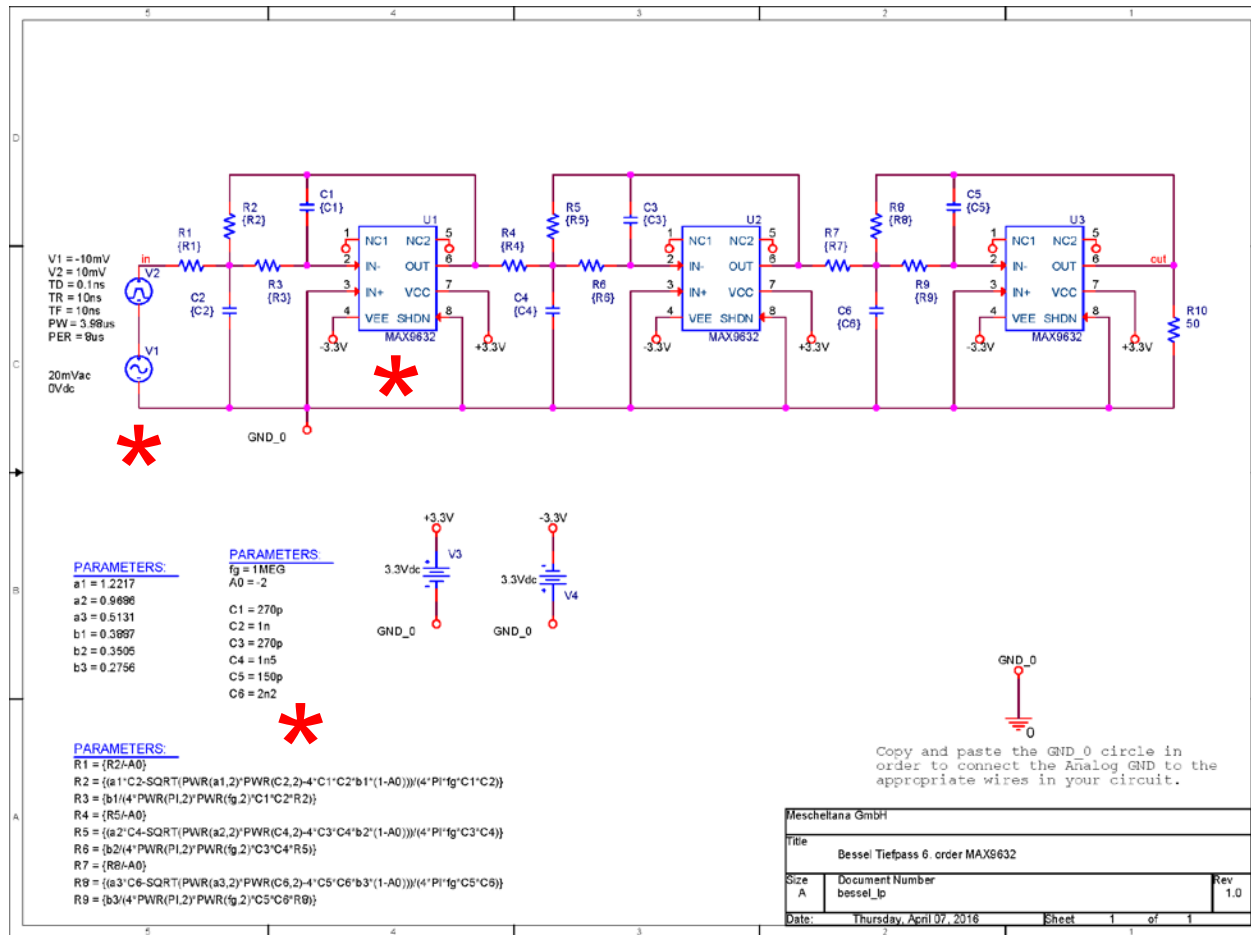
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Photo of the partly mounted board:



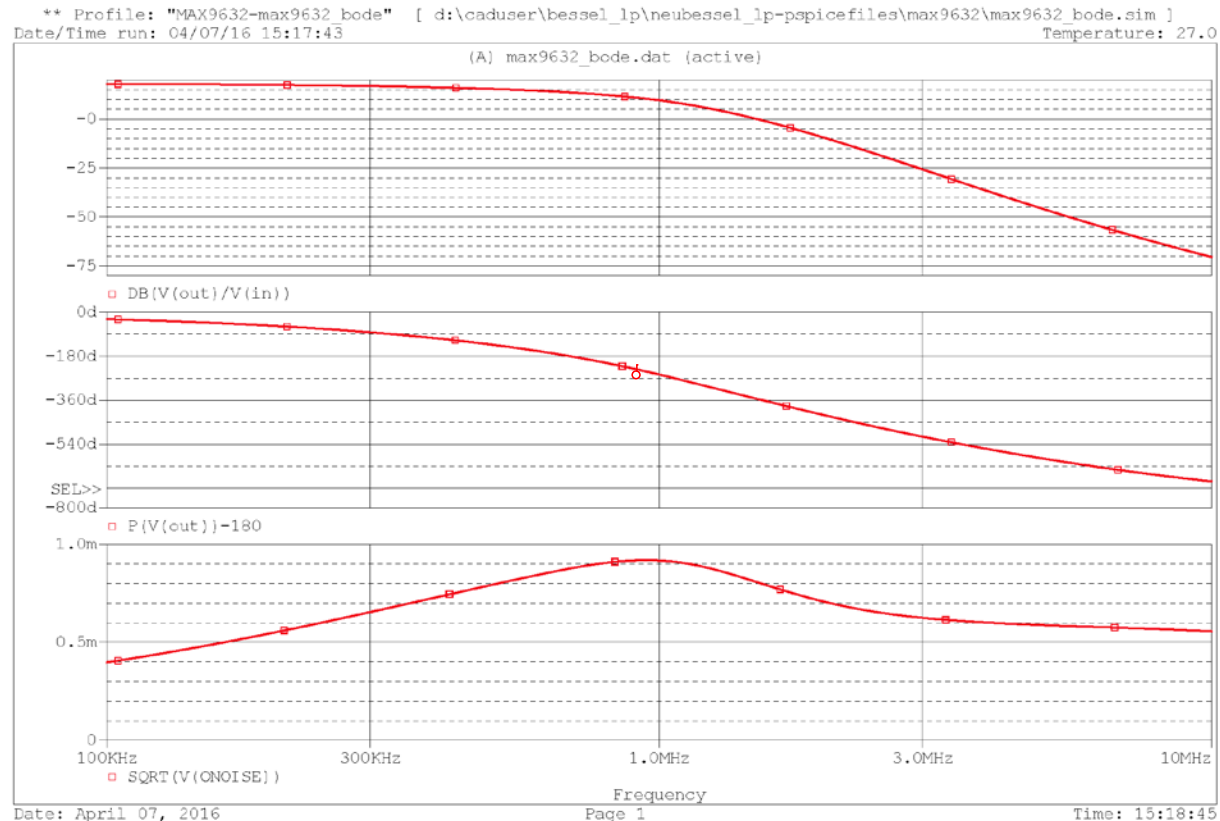
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Circuit of the PSpice simulation:



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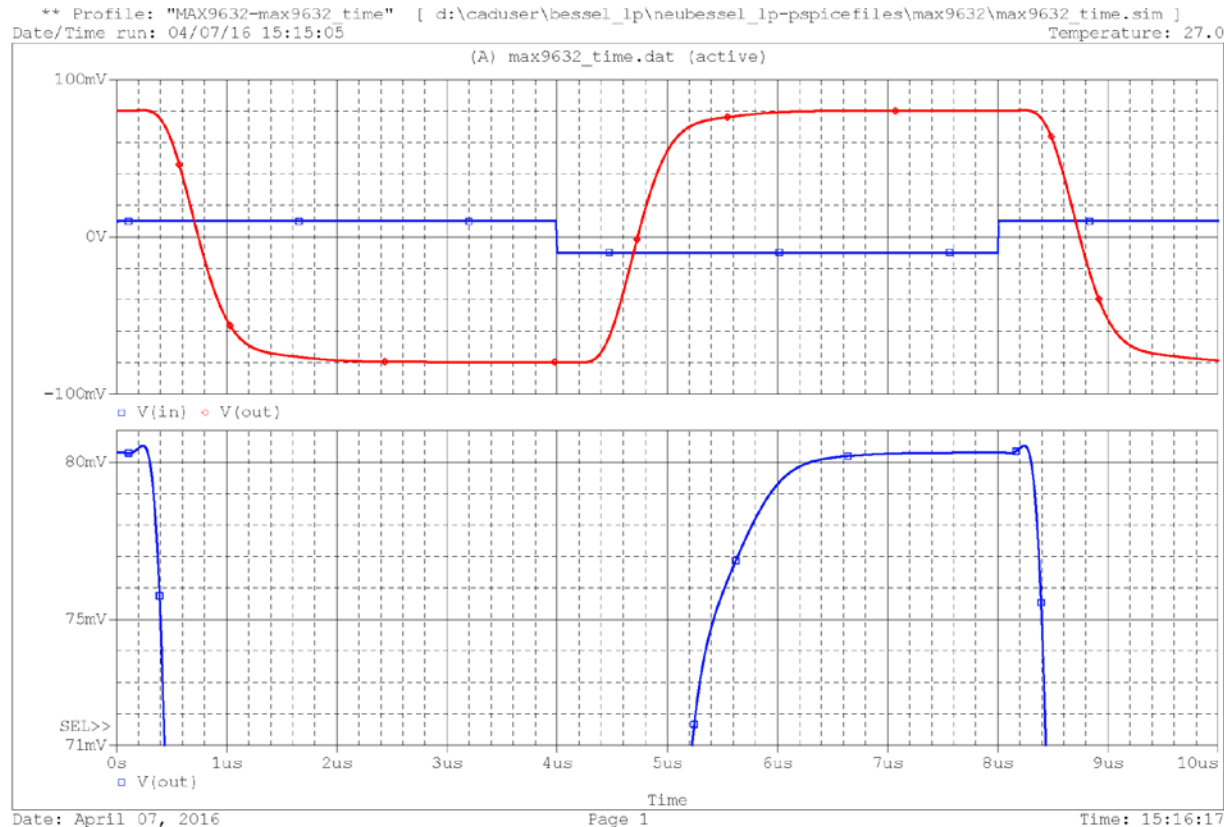
Frequency simulation:





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Time simulation:





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Finally:

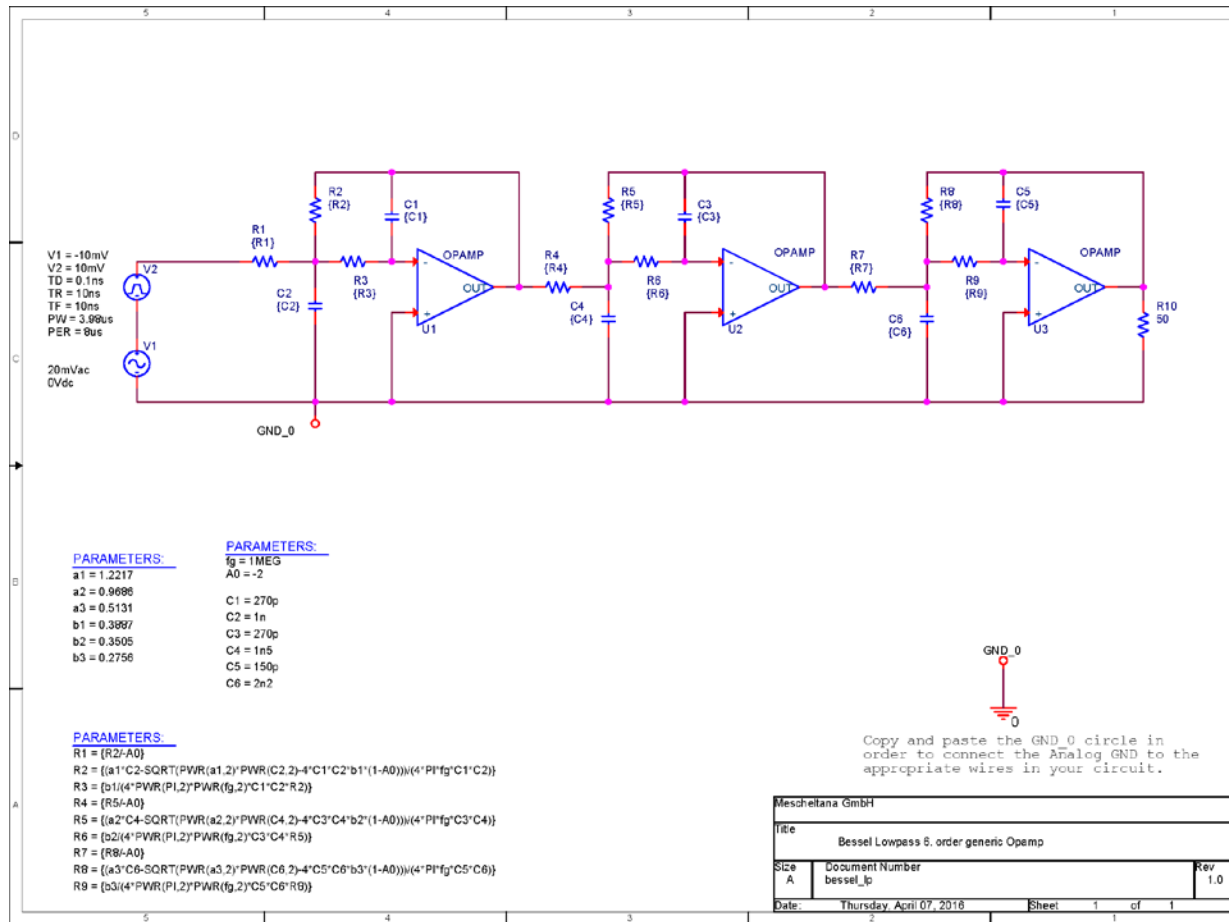
- My offer to customers:
 - Sale of the unmounted board
 - Sale a partly mounted version of the board
 - Individual configuration to customer requirements
 - Use of parts and concepts as a base for individual developments
- Evaluation the whole schematics:
http://www.mescheltana.de/LABORKARTE3_link.pdf
- Reference:
 - [1] Tietze, U., Schenk, C., & Gamm, E. (2009). Halbleiter-Schaltungstechnik. Erlangen und München: Springer.

Questions ?

→ Backup

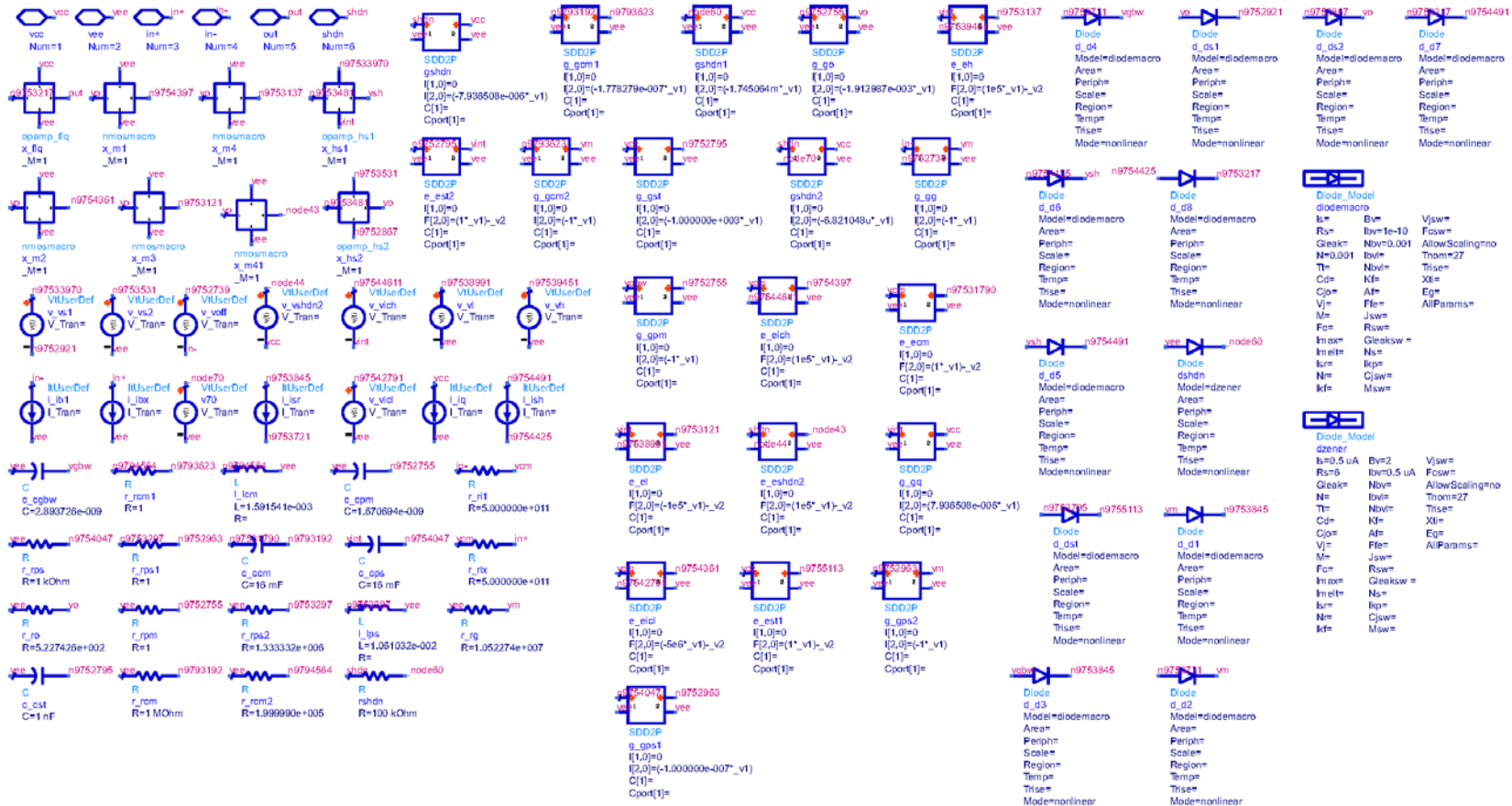
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Simulation with generic operational amplifier:



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Spice model of the max9632:



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Excel calculation of the components:

Bessel Filter 6th Order from Tietze-Schenk:

a1= 1,2217

a2= 0,9686

a3= 0,5131

b1= 0,3887

b2= 0,3505

b3= 0,2756

fg= 1,00E+06

wg= 1,26E+07

A0= -2

C1= 2,70E-10

C2= 1,00E-09

C3= 2,70E-10

C4= 1,50E-09

C5= 1,00E-10

C6= 1,50E-09

C2ref= 8,44E-10

C4ref= 1,21E-09

C6ref= 1,26E-09

zC1= 294,73

zC2= 79,58

zC3= 294,73

zC4= 53,05

zC5= 795,77

zC6= 53,05

R1= 108,88

R2= 217,76

R3= 56,45

R4= 112,89

R5= 121,85

R6= 243,70

