Load Instability Problems with TPA3255 used in PBTL Modus

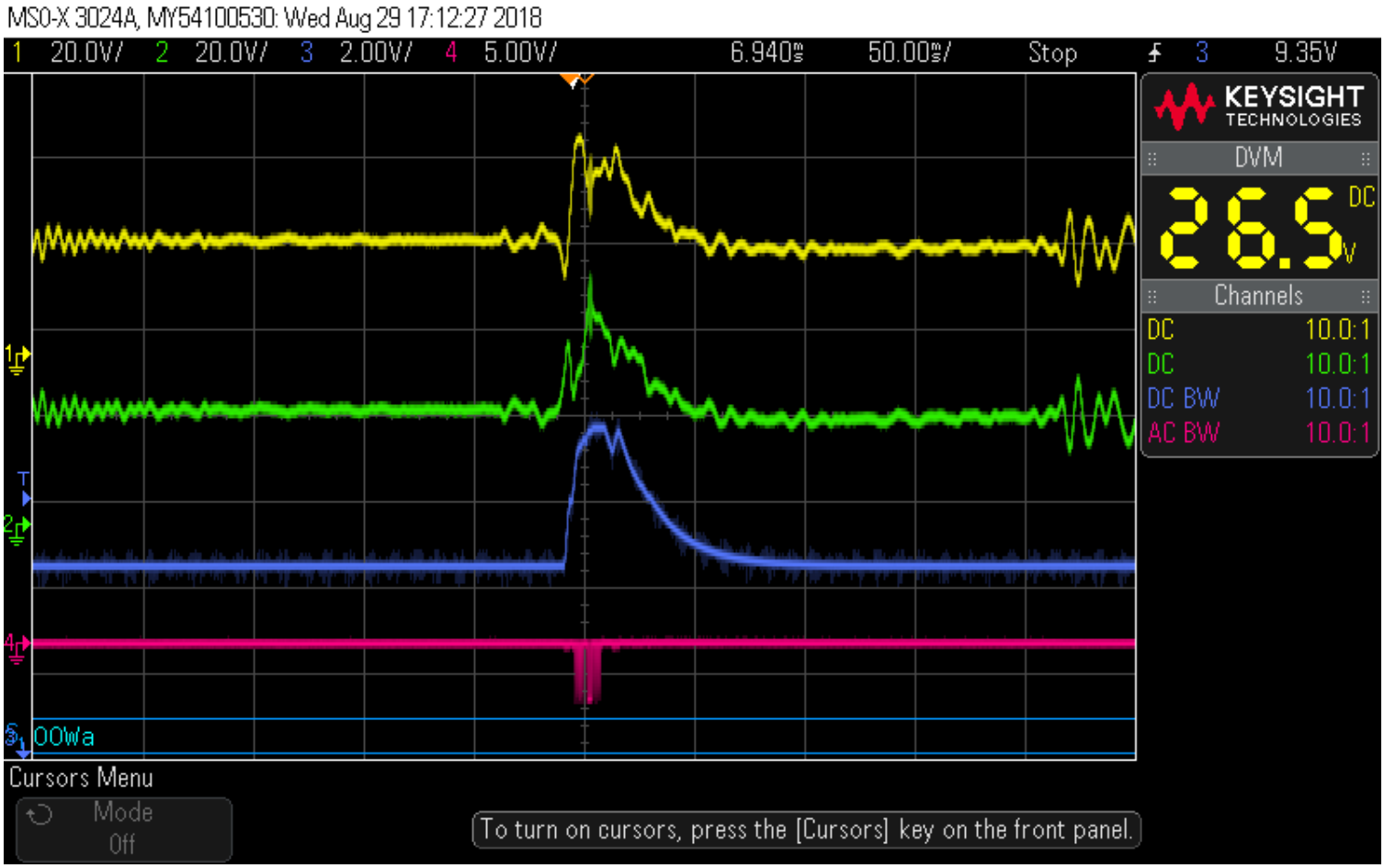
Hello,

The PCB is developed in our Company and is similar to the EMV-PCB (see Pictures). TPA3255 works in PBTL mode.

- +VB = 52V
- VDD = 12V
- AVDD = 6V (with no Load connected to the Outputs, see Picture).
- Inputs of TPA3255 connected to OpAmp Outputs with ceramic Capacitors to get rid of polarity Problems.
- Peak Voltage of the Outputs: +-10V
- Load resistance: 8 Ohm (Power Resistor, no complex Load)
- The Amp is used as Bassamp, max. F = 100Hz
- The second TPA3255 used in Stereo Mode does not suffer from this Problems! (Frequencies > 100Hz)

Oscilloscope Picture 1:

Yellow/Green = Outputs after Filter
Blue = AVDD = Pin 14 of TPA 3255
Red = Clip Output = Pin 21 of TPA3255

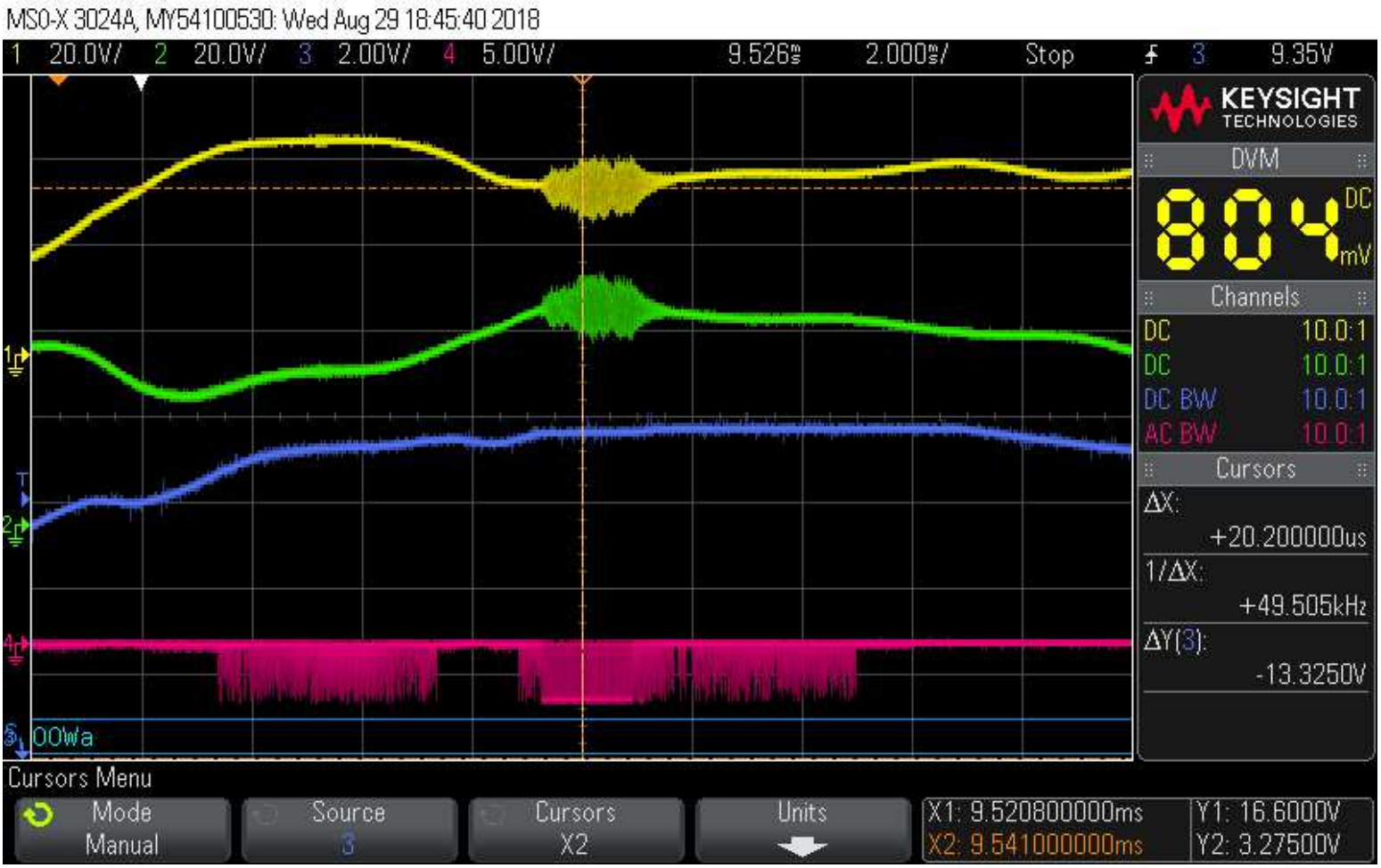


Picture 1

The normal Modulation (in this case Blues Music) can be seen on the right and left Side of the Screenshot.
The Problem is to be seen in the Center. The huge Modulation is not the Signal, this is the strange Behavier of the IC.
As to be seen AVDD follows the Envelope of the Music.
We tested two very different Coils in the Output Filters: 1D17A-150M (15uH) from ICE Components and a Coil made for our bigger D-Amps 20uH/50A saturation Current (Iron Powder). So the Coils can't be the reason.
Without Load the Amp works properly.

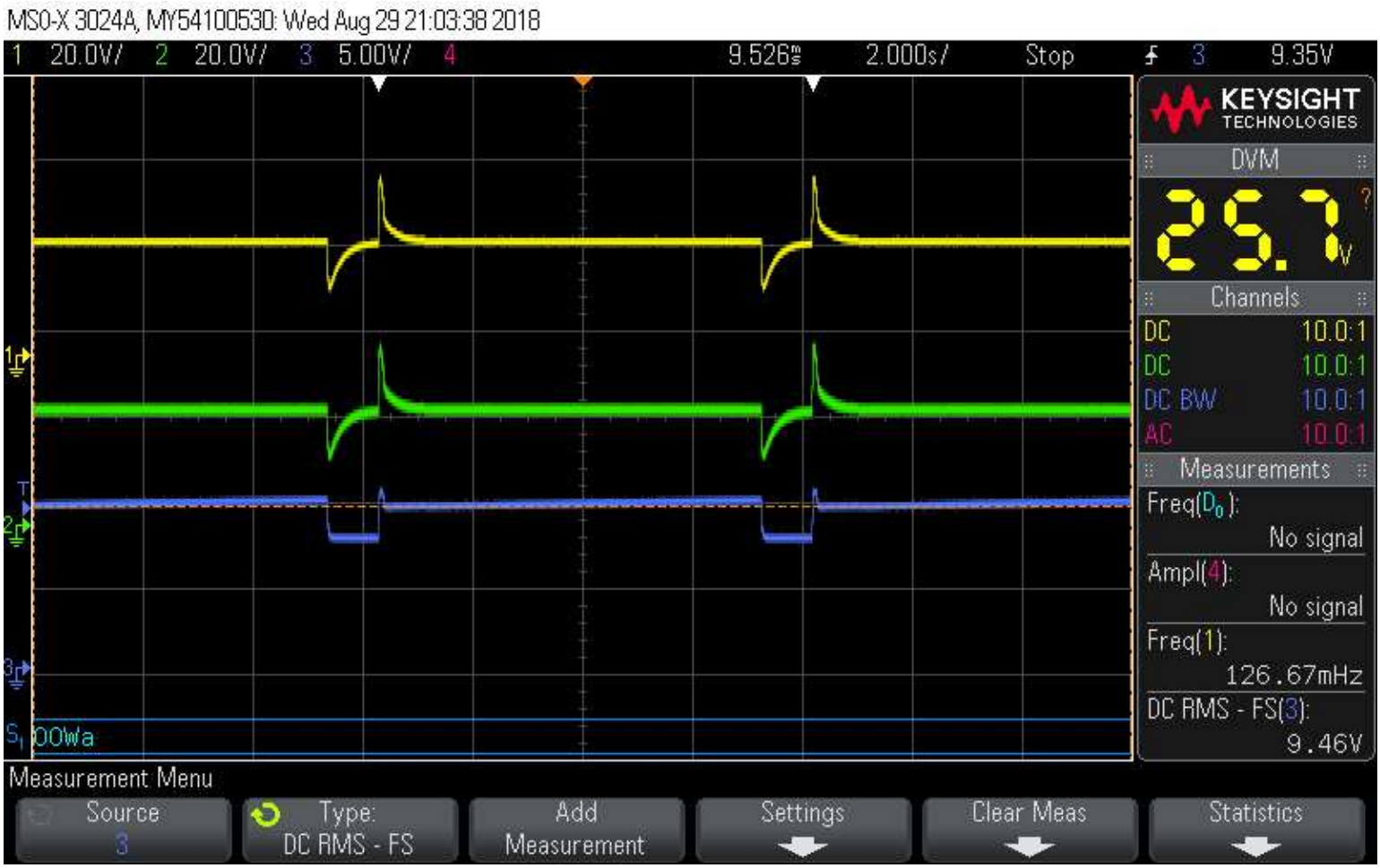
The Valleys of the Clip Output are real. (Lower than GND caused by AC Coupling Input Oscilloscope)

The Picture below is a enlarged area of Picture 1.
The Outputs show a ~50kHz Oscillation (= Pole Frequency of the output Filters) when the Power Mosfets are switched of due to (why? 8 Ohm Load) current limiting. The positiv Output (yellow) seems to clip 4 – 7 mSecs.



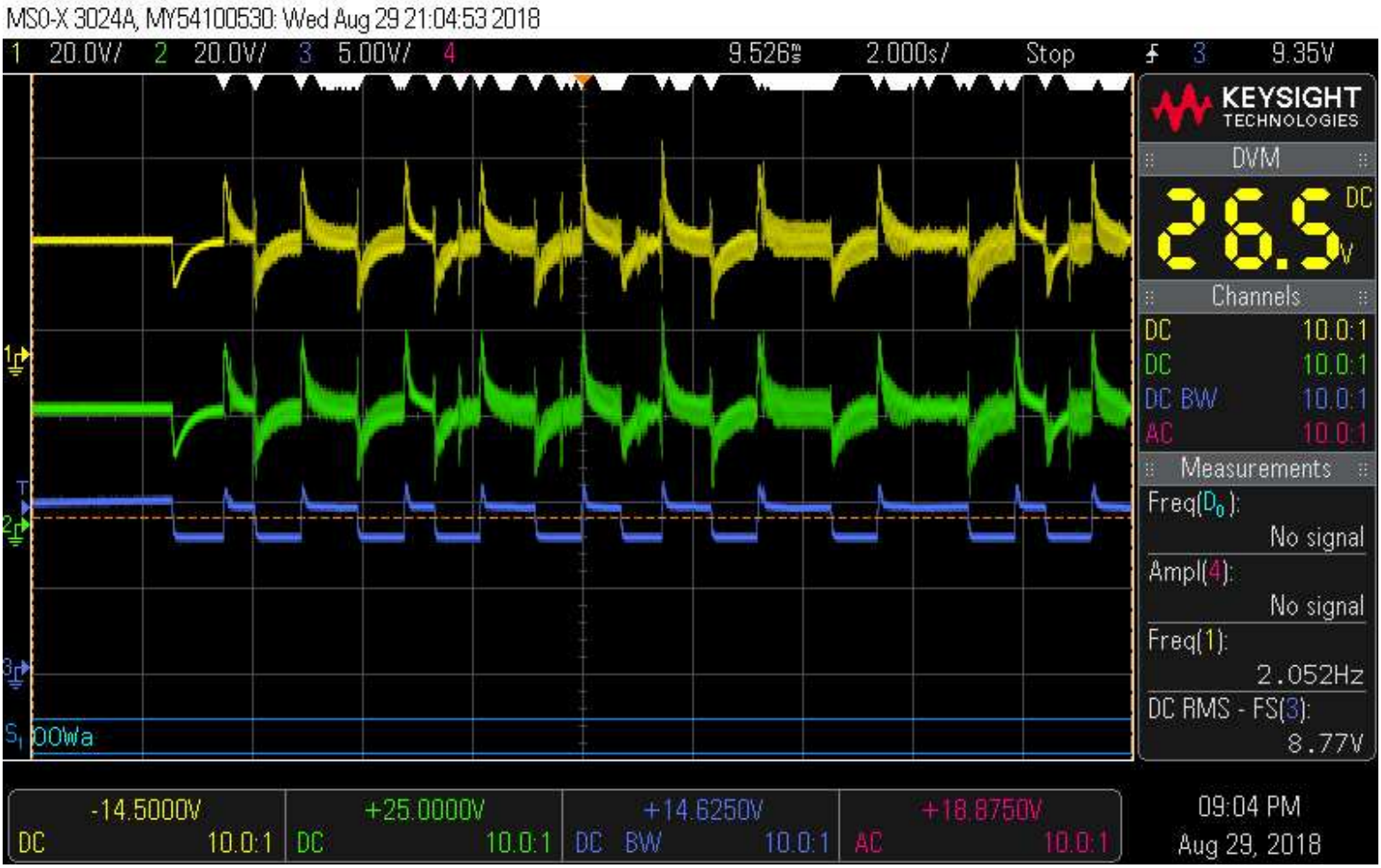
Picture 2

Special situations call for special measures...
So we enlarged the Bootstrap Capacitors to 100nF each. Something changed, but the changes have not yet produced the desired results....



Picture 3

The Amp after switched on – no Audio Signal. With C_Bootstrap = 100nF the Amp oscillates.



Picture 4

Same as Picture 3 but with Audio signal applied.

We tested and checked anything on the PCB - the placement and soldering seem to be o.k.

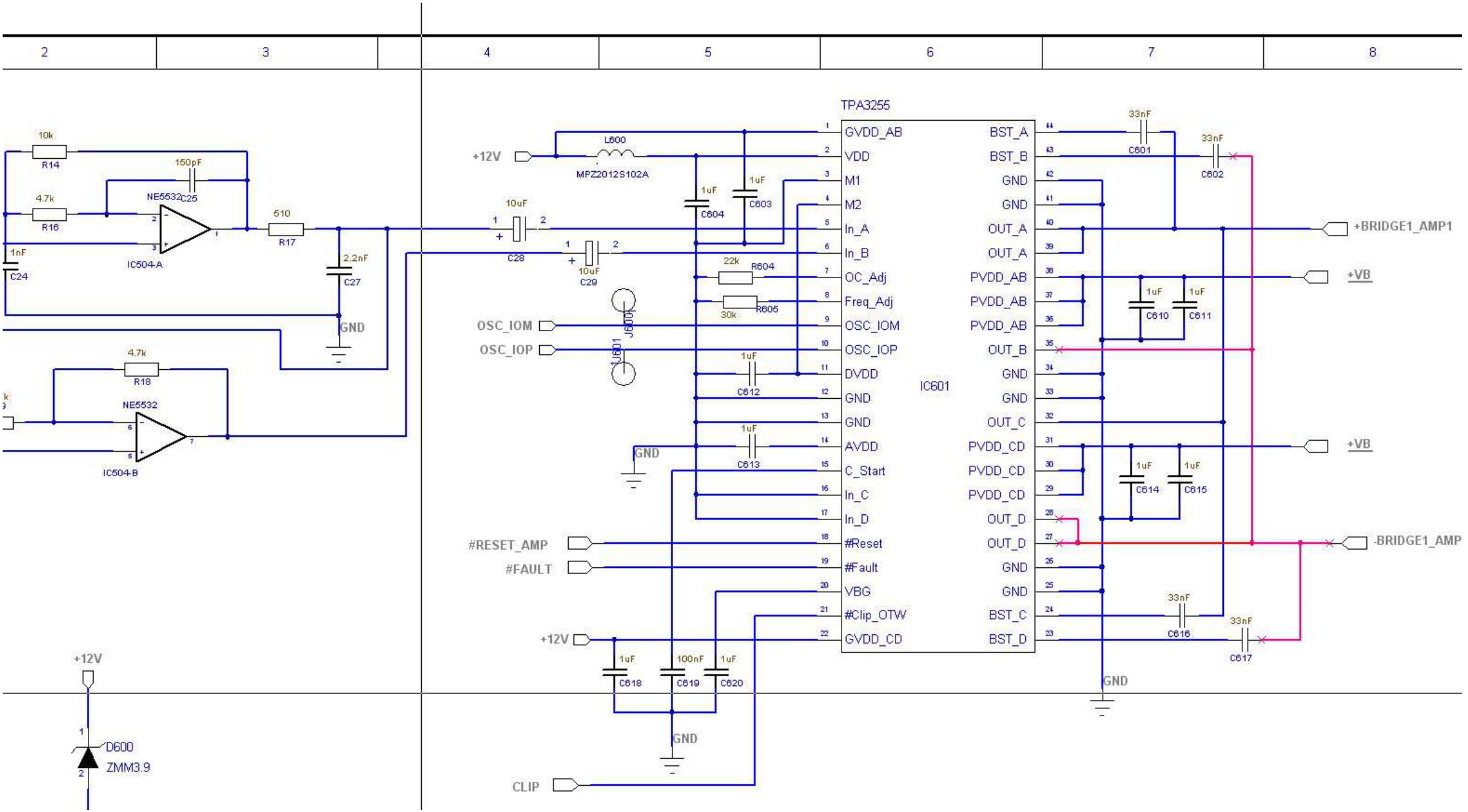
Did we make a big mistake we couldn't discover?

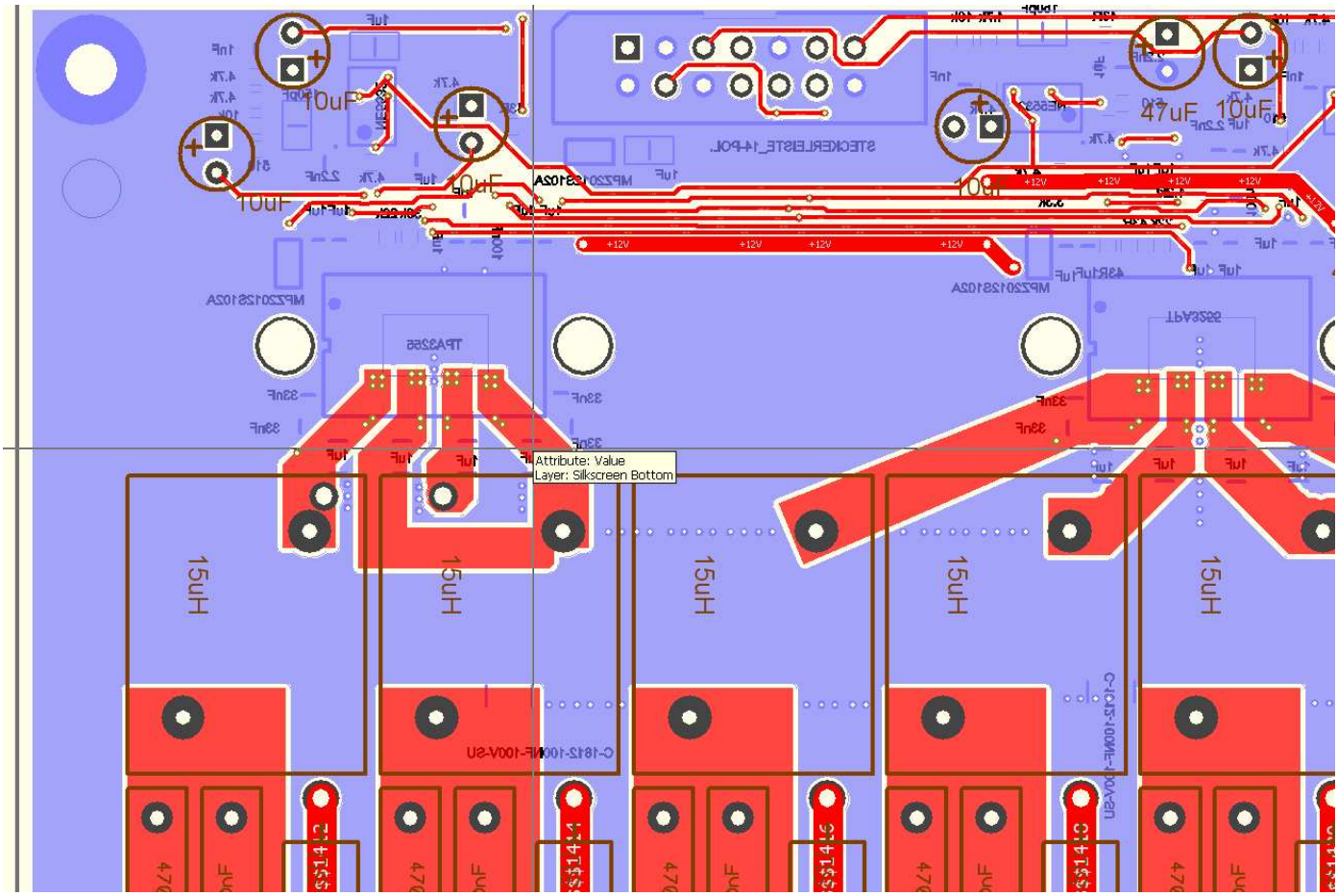
So we need Help.

With regards

Marc Iegen

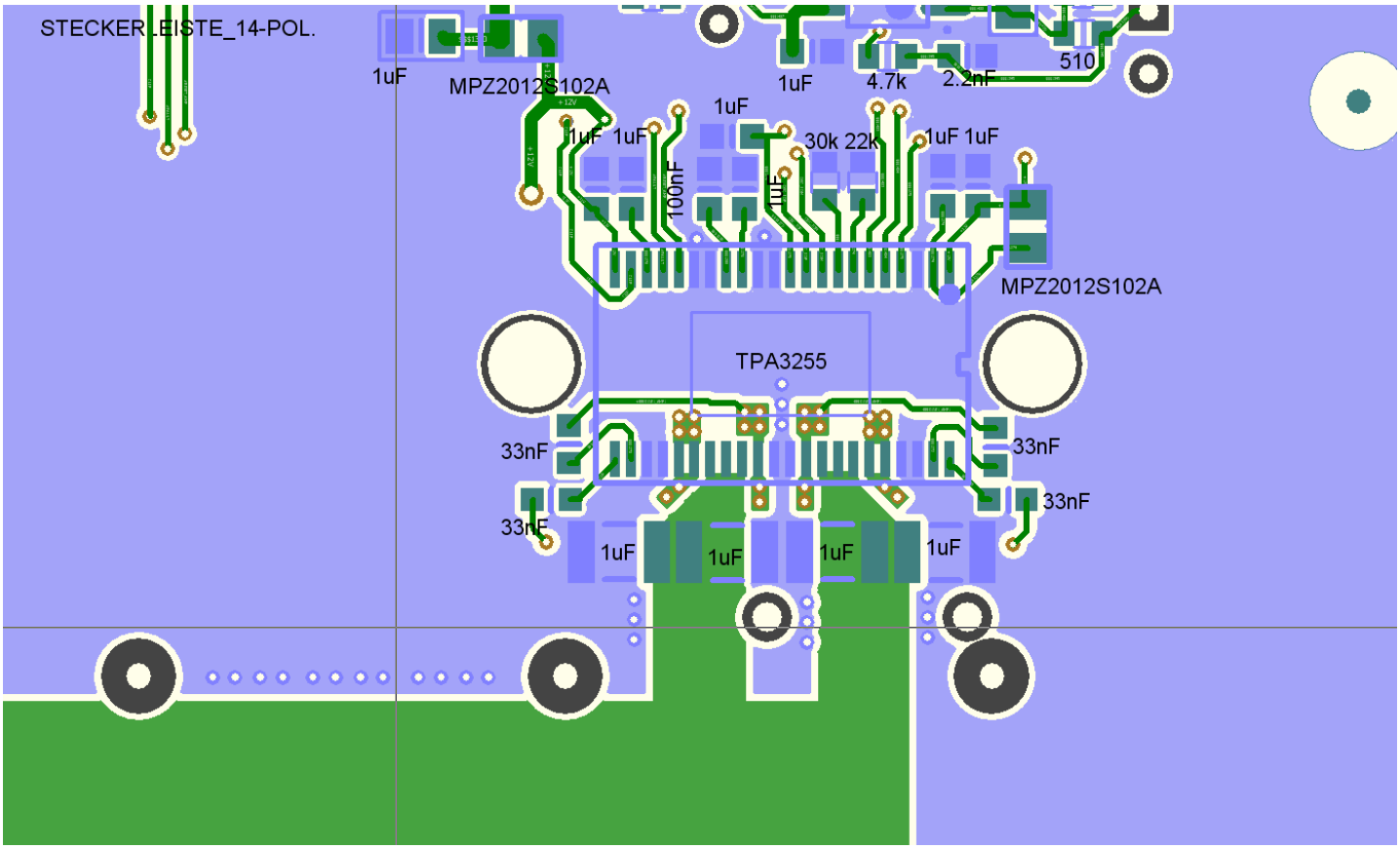
What is the mechanism that forces the AVDD voltage to follow V-Out from a certain power delivered by the TPA3255?


2
3
4
5
6
7
8
10k
R14
150pF
C25
NE5532
4.7k
R16
510
R17
IC504-A
1nF
C24
2.2nF
C27
GND
4.7k
R18
NE5532
IC504-B
+12V
D600
ZMM3.9
TPA3255
L600
MPZ2012S102A
10uF
C28
10uF
C29
1uF
C604
1uF
C603
22k
R604
30k
R605
OSC_IOM
OSC_IOP
J600
J601
1uF
C612
1uF
C613
GND
#RESET_AMP
#FAULT
CLIP
+12V
1uF
C618
100nF
C619
1uF
C620
GND
GVDD_AB
VDD
M1
M2
In_A
In_B
OC_Adj
Freq_Adj
OSC_IOM
OSC_IOP
DVDD
GND
GND
AVDD
C_Start
In_C
In_D
#Reset
#Fault
VBG
#Clip_OTW
GVDD_CD
IC601
BST_A
BST_B
GND
GND
OUT_A
OUT_A
PVDD_AB
PVDD_AB
PVDD_AB
OUT_B
GND
GND
OUT_C
PVDD_CD
PVDD_CD
PVDD_CD
OUT_D
OUT_D
GND
GND
BST_C
BST_D
33nF
C601
33nF
C602
+BRIDGE1_AMP1
+VB
1uF
C610
1uF
C611
1uF
C614
1uF
C615
+VB
-BRIDGE1_AMP
33nF
C616
33nF
C617
GND



PCB Top Blue Copper = GND Bottom Silkscreen is shown as well

The TPA with problems is the one on the left side. Out A and C are connected by wire (not shown, only the Pads can be seen).



PCB Bottom Blue Copper = GND