Group Buy for Jan's high voltage regulator

jan.didden · 2019-10-19 1:22 pm

jan.didden

AX tech editor

Joined 2002

2019-10-19 1:22 pm #1

Group Buy for Jan's high voltage regulator - update for higher voltage

As suggested in my thread about my high voltage regulator for tube amps, this is the Group Buy thread for it.

I am offering the following half-kit:

- PCB;
- Current source LT3092 SMD soldered to the board;
- overload reset switch SMD soldered to the board;
- Pass device FDP12N60NZ;
- low current high brightness LED;
- depletion mode HV MOSFET IXTP08N100D2.

Everything else is easy to find and/or already in your parts box.

All info for building can be found here: **T-reg HV regulator | Linear Audio NL** *(URL: https://linearaudio.nl/t-reg-hv-regulator)*

Update Feb. 2021: **T-reg is now available in the diyaudio store!** *(URL: https://diyaudiostore.com/collections/power-supplies-accessories/products/copy-of-linear-audio-high-voltage-delay-for-tube-amplifiers)*

Jan

Last edited: 2021-02-03 7:20 am

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

E

euro21

Member

Joined 2004

2019-10-19 1:43 pm #2

euro21 2pcs

jan.didden

AX tech editor

Joined 2002

2019-10-19 2:07 pm #3

Info posted: **T-reg HV regulator | Linear Audio NL** *(URL: https://linearaudio.nl/t-reg-hv-regulator)*

Jan

EUVL

Member

Joined 2003

2019-10-19 2:29 pm #4

How about a negative version ?

Patrick

jan.didden

AX tech editor

Joined 2002

2019-10-19 3:08 pm #5

> **EUVL said:** *(URL: /community/goto/post?id=5949334)*
>
> How about a negative version ?
>
> Patrick

For your ESHP?

Jan

EUVL

Member

Joined 2003

2019-10-19 3:15 pm #6

For example.

Patrick

jan.didden
AX tech editor
Joined 2002

2019-10-19 3:30 pm #7

Working on it ...

Edit: OK done

Jan

Attachments

(URL: /community/attachments/3d-view-400v-bias-6v-png.788827/)

3D view +-400V +bias +-6V.PNG

171.5 KB · Views: 3,424

Last edited: 2019-10-19 3:56 pm

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-10-19 3:33 pm #8

> **euro21 said:** *(URL: /community/goto/post?id=5949310)*
>
> euro21 2pcs

Bela please send me your address and phone # with PM.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

EUVL
Member
Joined 2003

2019-10-19 3:37 pm #9

I thought you already had it working ??

Patrick

jan.didden
AX tech editor
Joined 2002

2019-10-19 3:58 pm #10

> **EUVL said:** *(URL: /community/goto/post?id=5949394)*
>
> I thought you already had it working ??
>
> Patrick

Yes. Not pub ready, but close. +/-400V adjustable, separate adjustable bias, plus as bonus 2x6V for any opamps in the amp.
Uses a specific Antek xformer, hence the PCB size, which sits on top of the Antek

I wonder whether it would need a current limiter?

Jan

Attachments

(URL: /community/attachments/20191019_181257-jpg.788833/)

20191019_181257.jpg

728.2 KB · Views: 3,336

Last edited: 2019-10-19 4:18 pm

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

S

shattered_dream
Member
Joined 2009

2019-10-19 4:36 pm #11

What was the maximum current? Have to check on my tube amp

EUVL
Member
Joined 2003

2019-10-19 4:41 pm #12

> I wonder whether it would need a current limiter?

I have one. Can send schematics to you.
Voltage limited by P-device rating (500V).

Patrick

merlin el mago
Member
Joined 2009

2019-10-19 8:30 pm #13

> **jan.didden said:** *(URL: /community/goto/post?id=5949422)*
>
> Yes. Not pub ready, but close. +/-400V adjustable, separate adjustable bias, plus as bonus 2x6V for any opamps in the amp.
> Uses a specific Antek xformer, hence the PCB size, which sits on top of the Antek
>
> I wonder whether it would need a current limiter?
>
> Jan

Hey Jan,

How much voltage drop to operate so what's the Vin = Vout difference?

How much current can deliver?

TIA
Felipe

jan.didden
AX tech editor
Joined 2002

2019-10-19 8:46 pm #14

> **merlin el mago said:** *(URL: /community/goto/post?id=5949680)*
>
> Hey Jan,
>
> How much voltage drop to operate so what's the Vin = Vout difference?
>
> How much current can deliver?
>
> **Click to expand...** *(URL:)*

It can run with 7V difference or so. But you must account for the input ripple. The max output is 7V below the ripple lower peak, under max load.
Current with the shown pass device is about 400mA. Actually it could deliver (much) more but 400mA is about the limit if you want short circuit protection. With lower input voltage, like 300V, probably 600mA, I would need to check the SOA graph.

Edit: This is for the HV regulator. Are you asking about the +/- regulator I showed above?

Jan

merlin el mago
Member
Joined 2009

2019-10-20 11:34 am #15

Thanks for answer Jan, no, the question was for the single HV regulator.

Felipe

jan.didden
AX tech editor
Joined 2002

2019-10-20 2:36 pm #16

Friends,

The 8 PCBs I had left are spoken for, and I should order more if there is interest.

Please reply with your diyaudio name, and copy the list in your own post as we go along.

Interest for **Treg high-voltage PCB** *(URL: https://linearaudio.nl/t-reg-hv-regulator)* + some parts as described:

jan.didden 2 x

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

S

SigFire
Member
Joined 2005

2019-10-20 3:04 pm #17

jan.didden 2 x
SigFire 2 x

Greez & Thanks

SigFire

S

shattered_dream
Member
Joined 2009

2019-10-20 3:29 pm #18

I first have to check how big the voltage and how much current I need...

---

jan.didden
AX tech editor
Joined 2002

2019-10-20 5:03 pm #19

Anything up to 550V and up to 400mA ...

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

J

jhicks
Member
Joined 2009

2019-10-20 7:52 pm #20

jan.didden 2 x
SigFire 2 x
jhicks 2 x

I've got all the Linear Audio issues, maybe this will help me get started building and testing some of the designs?

~ Jeffrey

S

skunark

Member

Joined 2011

2019-10-21 1:55 am #21

jan.didden 2 x
SigFire 2 x
jhicks 2 x
skunark 2 x

Francois G

Member

Joined 2004

2019-10-21 2:55 am #22

jan.didden 2 x
SigFire 2 x
jhicks 2 x
skunark 2 x
Francois G 2 x

S

siddv

Member

Joined 2009

2019-10-21 4:09 am #23

hvps

Jan.didden 2x

Stixx

Member

Joined 2003

2019-10-21 5:54 am #24

jan.didden 2 x
SigFire 2 x
jhicks 2 x
skunark 2 x
Francois G 2 x
siddv 2x?

Please be careful during copy & paste!!

V

Valtus

Member

Joined 2010

2019-10-21 6:36 am #25

jan.didden 2 x

---

jan.didden

AX tech editor

Joined 2002

2019-10-21 6:41 am #26

Please *copy the whole list and add your own at the bottom*. I can't keep track of everything separately.

SigFire 2 x
jhicks 2 x
skunark 2 x
Francois G 2 x
siddv 2x?
valtus 2x

Jan

L

larslang
Member
Joined 2004

2019-10-21 6:52 am #27

SigFire 2 x
jhicks 2 x
skunark 2 x
Francois G 2 x
siddv 2x?
valtus 2x
larslang 2x

T

tassosk
Member
Joined 2008

2019-10-21 9:18 am #28

SigFire 2 x
jhicks 2 x
skunark 2 x
Francois G 2 x
siddv 2x?
valtus 2x
larslang 2x
tassosk 2x

F

fbjohn
Member
Joined 2010

2019-10-21 10:28 am #29

SigFire 2 x
jhicks 2 x
skunark 2 x
Francois G 2 x
siddv 2x?
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x

---

jan.didden
AX tech editor
Joined 2002

2019-10-21 11:24 am #30

Updated the build info with
settings TregTS.docx - Google Drive *(URL: https://drive.google.com/file/d/1zchwxt-7R9iPRd_Tm1k2YKZCXf2xSkf3/view)*

Jan

Stixx
Member
Joined 2003

2019-10-21 1:21 pm #31

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x

R

randytsuch
Member
Joined 2003

2019-10-21 4:38 pm #32

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x

B

bhkbhk
Member
Joined 2018

2019-10-21 6:57 pm #33

I am new to this Group Buy thing. How do I buy one of these HV regulators?

Thanks,
BHK

jan.didden
AX tech editor
Joined 2002

2019-10-21 7:58 pm #34

Copy the above list into your post, add yourself at the end.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

O

obh
Member
Joined 2016

2019-10-21 8:20 pm #35

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x

E

exeric
Member
Joined 2008

2019-10-21 8:34 pm #36

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x

M

misterno
Member
Joined 2010

2019-10-22 6:02 pm #37

misterno 1X

M

mravinsky
Member
Joined 2006

2019-10-22 6:57 pm #38

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x

S

ste
Member
Joined 2001

2019-10-22 8:04 pm #39

> **mravinsky said:** *(URL: /community/goto/post?id=5952510)*
>
> SigFire 2x
> jhicks 2x
> skunark 2x
> Francois G 2x
> siddy 2x
>
> **Click to expand...** *(URL:)*

B

boar206
Member
Joined 2013

2019-10-23 5:54 am #40

> **mravinsky said:** *(URL: /community/goto/post?id=5952510)*
>
> SigFire 2x
> jhicks 2x
> skunark 2x
> Francois G 2x
> ciddy 2x
>
> **Click to expand...** *(URL:)*

jan.didden
AX tech editor
Joined 2002

2019-10-23 12:53 pm #41

Getting ready to mail the few I have now, awaiting more PCBs to arrive.

I decided to solder a DIP08 socket on the board to hold the opamp, best way to make sure the pins are not bend during shipping.

Jan

Attachments

(URL: /community/attachments/20191023_144316-jpg.789678/)

20191023_144316.jpg

803 KB · Views: 606

R

randytsuch
Member
Joined 2003

2019-10-23 8:43 pm #42

I'm probably confused, but the pics above don't seem to match the description of the 1/2 kit in the first post

- PCB;
- Current source LT3092 SMD soldered to the board;
- overload reset switch SMD soldered to the board;
- Pass device FDP12N60NZ;
- low current high brightness LED;
- depletion mode HV MOSFET IXTP08N100D2.

I don't see the mosfet, but I see an opamp I wasn't expecting.

Just wondering what I need to order to complete.
And since I'm asking questions, can you confirm the value of R6 and R8
Are they 10 and 3.3 ohms per the schematic markup?

Thanks
Randy

S

shattered_dream
Member
Joined 2009

2019-10-23 9:48 pm #43

Is the +/- supply available?

A

arthur

Member

Joined 2001

2019-10-24 4:02 am #44

> **boar206 said:** *(URL: /community/goto/post?id=5952901)*
>
> > **mravinsky said:** *(URL: /community/goto/post?id=5952510)*
> >
> > SigFire 2x
> > jhicks 2x
>
> **Click to expand...** *(URL:)*

Stixx

Member

Joined 2003

2019-10-24 5:34 am #45

> I don't see the mosfet, but I see an opamp I wasn't expecting.

As I take it the Mosfet will be included in the kit but of course not soldered. Why should Jan solder the Mosfet? Also, the schematic clearly shows the opamp...

Stixx

Member

Joined 2003

2019-10-24 5:35 am #46

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x

jan.didden
AX tech editor
Joined 2002

2019-10-24 6:54 am #47

> **randytsuch said:** *(URL: /community/goto/post?id=5953593)*
>
> I'm probably confused, but the pics above don't seem to match the description of the 1/2 kit in the first post
>
> - PCB;
> - Current source LT3092 SMD soldered to the board;
> - overload reset switch SMD soldered to the board;
>
> **Click to expand...** *(URL:)*

Randy, my bad, good catch. I didn't show the two MOSFETs in the picture but they will be included, as will be the high brightness LED.
I did show the opamp since a few people asked me to include is as well, for an additional € 5. I will post a new pic later today with the complete contents.

In the meantime, those of you who put themselves on the list, please send your name, email address, shipping address and a phone number to jandidden01 at gmail dot com as I will start to set up a spreadsheet for the shipping. In case you also want the opamp, say so as well.

Jan

jan.didden
AX tech editor
Joined 2002

2019-10-24 6:56 am #48

> **randytsuch said:** *(URL: /community/goto/post?id=5953593)*
>
> And since I'm asking questions, can you confirm the value of R6 and R8
> Are they 10 and 3.3 ohms per the schematic markup?
>
> Thanks
> Randy

Those resistor values determine the current limiting. I put **a write up here** *(URL: https://linearaudio.nl/t-reg-hv-regulator)* how to calculate the values.

Jan

jan.didden
AX tech editor
Joined 2002

2019-10-24 8:11 am #49

I also put up a revised schematic mentioning thew dimensioning of R6, R8 and R11, (Vout & I-lim) referring to **the links on the website** *(URL: https://linearaudio.nl/t-reg-hv-regulator)*.

I went back to the prototype and D3 is not a 1N4148 but a UF4007, just like D1 and D2. I also updated the online BOM for this.

Jan

R

randytsuch
Member
Joined 2003

2019-10-24 3:12 pm #50

> **jan.didden said:** *(URL: /community/goto/post?id=5953975)*
>
> I also put up a revised schematic mentioning thew dimensioning of R6, R8 and R11, (Vout & I-lim) referring to **the links on the website** *(URL: https://linearaudio.nl/t-reg-hv-regulator)*.
>
> I went back to the prototype and D3 is not a 1N4148 but a UF4007, just like D1 and D2. I also updated the online BOM for this.
>
> Jan

A suggestion, for people like me who miss things I should have figured out,
change name of link
from "How to set Vout and Ilim"
to "How to set Vout (R11) and Ilim (R6, R8)"

Thanks for the answers. I currently have a CLCLC unregulated HV supply for my 45 based amp, looking forward to trying this instead.

Randy

S

shattered_dream
Member
Joined 2009

2019-10-24 8:13 pm #51

SigFire 2x

jhicks 2x

skunark 2x

Francois G 2x

siddv 2x

valtus 2x

larslang 2x

tassosk 2x

fbjohn 1x

Stixx 2x

randytsuch 1x

obh 2x

exeric 2x

misterno 1X

mravinsky 2x

ste 1x

Arthur 2X

Boar206 2x
shattered_dream 2x

T

timgrindell
Member
Joined 2004

2019-10-24 9:57 pm #52

SigFire 2x

jhicks 2x

skunark 2x

Francois G 2x

siddv 2x

valtus 2x

larslang 2x

tassosk 2x

fbjohn 1x

Stixx 2x

randytsuch 1x

obh 2x

exeric 2x

misterno 1X

mravinsky 2x

ste 1x

Arthur 2X

Boar206 2x

shattered_dream 2x

dhsettim 2x with opamp

J

jmlow
Member
Joined 2011

2019-10-25 4:45 am #53

jmlow 2X with opamp

K

kartk
Member
Joined 2014

2019-10-25 8:00 am #54

SigFire 2x

jhicks 2x

skunark 2x

Francois G 2x

siddv 2x

valtus 2x

larslang 2x

tassosk 2x

fbjohn 1x

Stixx 2x

randytsuch 1x

obh 2x

exeric 2x

misterno 1X

mravinsky 2x

ste 1x

Arthur 2X

Boar206 2x

shattered_dream 2x

dhsettim 2x with opamp

jmlow 2X with opamp

kartk 2x with opamp

---

jan.didden
AX tech editor
Joined 2002

2019-10-25 11:12 am #55

Guys, when you send name, address, phone number to jandidden01 at gmail dot com, please include your diyaudio name! Otherwise I have no idea who you are in the list!

Jan

A

Adams_Leo
Member
Joined 2003

2019-10-25 11:34 am #56

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
adams_leo 2x

B

benGeesink
Member
Joined 2005

2019-10-26 10:38 am #57

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
adams_leo 2x
benGeesink 2x

Stixx
Member
Joined 2003

2019-10-26 11:39 am #58

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x

Last edited: 2019-10-26 11:40 am

torrence
Member
Joined 2008

2019-10-27 7:18 pm #59

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x

jan.didden
AX tech editor
Joined 2002

2019-10-28 7:45 am #60

Friends, please when you email jandidden01 at gmail dot com with your address, phone number, diyaudio handle, also tell me how many you want and whether you want the opamp with them. € 30 without, + € 5 for the opamp.

Makes my live a lot easier!

Thanks,

Jan

jan.didden
AX tech editor
Joined 2002

2019-10-28 8:18 am #61

Shipped: exeric, jhicks, torrence .

Jan

B

Billc
Member
Joined 2002

2019-10-28 12:14 pm #62

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x
Billc 4x with opamp

chede
Member
Joined 2016

2019-10-28 2:40 pm #63

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x
Billc 4x with opamp
chede 2x

---

jan.didden
AX tech editor
Joined 2002

2019-10-30 7:31 am #64

I have a transfer from Pecenkovic. Please send me an email to jandidden01 at gmail dot com as I don't know who you are in the list.

BTW The boards are under way so with a bit of luck I will ship next week.

Jan

Last edited: 2019-10-30 7:36 am

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Francois G
Member
Joined 2004

2019-10-30 9:29 pm #65

> **jan.didden said:** *(URL: /community/goto/post?id=5959765)*
>
> BTW The boards are under way so with a bit of luck I will ship next week.
>
> Jan

Hi Jan,
Will you let us know when and how to pay? Thanks much.
F.

Y

ymwong

Member

Joined 2003

2019-11-01 2:42 am #66

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x
Billc 4x with opamp
chede 2x
ymwong 3x with opamp

jan.didden

AX tech editor

Joined 2002

2019-11-01 9:31 am #67

> **Francois G said:** *(URL: /community/goto/post?id=5960380)*
>
> Hi Jan,
> Will you let us know when and how to pay? Thanks much.
> F.

Yes, contact me at jandidden01 at gmail dot com with address, phone #, how many with/without opamp and I'll do the sums.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-01 9:59 am #68

SigFire 2x
jhicks 2x - shipped
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp
chede 2x
ymwong 3x with opamp

I will ship another 20 units coming week.

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

J

jmlow
Member
Joined 2011

2019-11-02 4:06 am #69

input voltage

What should the input voltage be for a desired output voltage?

jan.didden
AX tech editor
Joined 2002

2019-11-02 9:24 am #70

> **jmlow said:** *(URL: /community/goto/post?id=5962544)*
>
> What should the input voltage be for a desired output voltage?

The regulator itself needs just a few volts headroom, but you must be aware of the input ripple.

Let us say you have an input voltage with ripple that has at the peak 280V, at the bottom 265V, so ripple is 15V peak-peak.
Give the regulator 5V and your max Vout is 260V.

But there's also the mains variation. On a bad day the mains can easily drop 5V AC on a 220V circuit, say 2.5%, which is say 6 or 7V on the rectified 280V peak. To take care of that set Vout 7V lower, to 253V.

You could also play it safe and set Vout to 250V. Be aware though that large Vin-Vout differences increase dissipation on the pass MOSFER as it has to absorb the voltage difference x current drawn.

How to measure the Vin and ripple: Measure Vin with a DC voltmeter. That will give you close to the average. Then measure Vin with an AC voltmeter. That gives you close to the RMS ripple. To convert the RMS ripple to peak-to-peak take the value measured x 3.
You Vin will be ~ measured average +/- 1.5 x the calculated ripple peak-to-peak.

Disclaimer: this is all rule of thumb, but good enough to get an idea what max Vout you can set and still keep regulation. Take a safety factor of 5V.
If you have a scope you can look at the Vin and see the min-max values, of course.

Jan

J

jmlow
Member
Joined 2011

2019-11-02 11:31 am #71

input voltage

Thank you for the clear reply.

jan.didden
AX tech editor
Joined 2002

2019-11-04 12:26 pm #72

Earlier in the thread someone wondered what would happen if you connected the output to a fully charged capacitor while the input was off.
It's not clear to me how that could happen; where you'd get a fully charged cap unless you have the regulator on. But this is easy to simulate so I did that.

What happens is that the fully charged output cap discharges via the pass device parallel diode, which is normally off. Then I see a current of some 8uA flowing through the opamp inputs into the reference cap. In that scenario the max allowed voltage difference between the opamp inputs is exceeded. Why there is only 8uA is probably because the opamp model doesn't fully model the input stage over-voltage.

I made a quick fix to replace D3 with a 2.7V zener diode. That keeps the opamp input stage voltage below some 2.5V, no problem.
I just tried it out on my prototype and I see no difference in performance.

So, if you are worried about that extremely unlikely scenario, put in a 2.7V zener at D3 and relax. Mouser 625-BZX85C2V7-TAP is a good one.

I will update the online BOM as well as the online schematic.

Jan

Last edited: 2019-11-04 12:36 pm

A
Andreas B
Member
Joined 2008

2019-11-04 2:20 pm #73

SigFire 2x
jhicks 2x - shipped
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp
chede 2x
ymwong 3x with opamp
Andreas B 1X

A

Andreas B
Member
Joined 2008

2019-11-04 2:23 pm #74

SigFire 2x
jhicks 2x - shipped
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp
chede 2x
ymwong 3x with opamp
Andreas B 2X

correct
Regards

---

torrence
Member
Joined 2008

2019-11-06 3:24 am #75

Just received mine in the mail today!

Thanks Jan

---

jan.didden
AX tech editor
Joined 2002

2019-11-06 7:30 am #76

> **torrence said:** *(URL: /community/goto/post?id=5966349)*
>
> Just received mine in the mail today!
>
> Thanks Jan

Now go build something!

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-09 4:07 pm #77

Guys, I was hoping to get the boards this week, but they haven't arrived yet ...
So I plan for shipping early next week, because end of next week we'll be in Normandie for the **European Triode Festival** *(URL: https://www.facebook.com/groups/164921830213087/)*!

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Z

Zung
Member
Joined 2005

2019-11-09 5:54 pm #78

> **jan.didden said:** *(URL: /community/goto/post?id=5969933)*
>
> ... because end of next week we'll be in Normandie for the **European Triode Festival** *(URL: https://www.facebook.com/groups/164921830213087/)*!
>
> Jan

Hello Jan, there's surprisingly little to no info as to where, when, how much, etc.... Do you have any pointers?

G

gillougillou
Member
Joined 2009

2019-11-09 6:20 pm #79

SigFire 2x
jhicks 2x - shipped
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp
chede 2x
ymwong 3x with opamp
Andreas B 2X
gillougillou 1x with opamp

jan.didden
AX tech editor
Joined 2002

2019-11-09 8:01 pm #80

> **Zung said:** *(URL: /community/goto/post?id=5970064)*
>
> Hello Jan, there's surprisingly little to no info as to where, when, how much, etc.... Do you have any pointers?

You should read my sig

T-reg HV regulator | Linear Audio NL *(URL: https://linearaudio.nl/t-reg-hv-regulator)*

Jan

Z

Zung
Member
Joined 2005

2019-11-09 9:46 pm #81

> **jan.didden said:** *(URL: /community/goto/post?id=5970241)*
>
> You should read my sig
>
> **T-reg HV regulator | Linear Audio NL** *(URL: https://linearaudio.nl/t-reg-hv-regulator)*
>
> Jan

Sorry, I meant the ETF.
Just found out it's an invitation only event. Oh well...

jan.didden
AX tech editor
Joined 2002

2019-11-09 9:57 pm #82

If you let them know you are interested you might be invited next year ;-)

Jan

Z

Zung
Member
Joined 2005

2019-11-09 9:59 pm #83

> **jan.didden said:** *(URL: /community/goto/post?id=5970365)*
>
> If you let them know you are interested you might be invited next year ;-)
>
> Jan

Thanks. If I'm in Europe, I'd definitely consider this.

chede
Member
Joined 2016

2019-11-10 5:09 am #84

No rush, currently in the Bay Area for Burning Amp tomorrow... have business here next week, so not waiting impatiently right now
Have a great Triode Festival !

Regards, Claas

jan.didden
AX tech editor
Joined 2002

2019-11-10 8:16 am #85

Ahh! I attended the first 10 or so Burning Amps, even did a presentation or two, but let it slide last few years. Should make an effort next year.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-17 2:15 pm #86

Just got home from the European Triode Festival and found a stack of boards in my mailbox.

So I'll start soldering and shipping tomorrow. I will amend the list to show when your stuff is shipped.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-18 9:00 am #87

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x
Francois G 2x - shipped
siddv 2x
valtus 2x
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X
mravinsky 2x - shipped
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp - shipped
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x
ymwong 3x with opamp
Andreas B 2X
gillougillou 1x with opamp
hifilars 2+2 - shipped

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

P

PGDO

Member

Joined 2010

2019-11-20 10:08 pm #88

SigFire 2x
jhicks 2x
skunark 2x
Francois G 2x
siddv 2x
valtus 2x
larslang 2x
tassosk 2x
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x
exeric 2x
misterno 1X
mravinsky 2x
ste 1x
Arthur 2X
Boar206 2x

PGDO 2x

---

jan.didden

AX tech editor

Joined 2002

2019-11-21 6:05 pm #89

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X
mravinsky 2x - shipped
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp - shipped
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x
ymwong 3x with opamp
Andreas B 2X
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

---

jan.didden
AX tech editor
Joined 2002

2019-11-21 6:07 pm #90

PGDO 2x do you want with/without opamp?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

T

touchdown
Member
Joined 2006

2019-11-21 7:56 pm #91

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X
mravinsky 2x - shipped
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp - shipped
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x
ymwong 3x with opamp
Andreas B 2X
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp

Thx

P

PGDO

Member

Joined 2010

2019-11-21 8:04 pm #92

> **jan.didden said:** *(URL: /community/goto/post?id=5983360)*
>
> PGDO 2x do you want with/without opamp?
>
> Jan

With opamp please.

Peter (PGDO)

2019-11-21 10:08 pm #93

Got it Peter.

Jan

jan.didden

AX tech editor

Joined 2002

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-22 8:28 am #94

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x
randytsuch 1x
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp - shipped
kartk 2x with opamp
adams_leo 2x
benGeesink 2x
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x
ymwong 3x with opamp
Andreas B 2X
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-22 9:53 am #95

@ Touchdown, did you already send me your address and phone number?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-22 3:40 pm #96

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp - shipped
kartk 2x with opamp
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp
resets - shipped

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2019-11-22 6:09 pm #97

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp - shipped
kartk 2x with opamp
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp
resets - shipped
_____

jan.didden
AX tech editor
Joined 2002

2019-11-22 7:38 pm #98

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x - shipped
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp
jmlow 2X with opamp - shipped
kartk 2x with opamp - shipped
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp
resets - shipped

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

T

touchdown
Member
Joined 2006

2019-11-22 8:06 pm #99

Jan,

yes, I did send you an email yesterday evening at 20:57 with all my data.
It comes from touchdown at libero dot it.

Please verify, otherwise I can send it again.

Thanks
Nicola/Touchdown

2019-11-22 8:13 pm #100

jan.didden
AX tech editor
Joined 2002

> **touchdown said:** *(URL: /community/goto/post?id=5984618)*
>
> Jan,
>
> yes, I did send you an email yesterday evening at 20:57 with all my data.
> It comes from touchdown at libero dot it.
>
> **Click to expand...** *(URL:)*

Thanks, got it!

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

2019-11-24 12:17 pm #101

jan.didden
AX tech editor
Joined 2002

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x - shipped
larslang 2x
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp - shipped
jmlow 2X with opamp - shipped
kartk 2x with opamp - shipped
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp
resets - shipped

Waiting for new batch of boards, expect to ship remainder end of coming week.

Jan

Last edited: 2019-11-24 12:25 pm

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

2019-11-26 1:35 pm #102

jan.didden
AX tech editor
Joined 2002

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x - shipped
larslang 2x - shipped
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 2X
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp - shipped
jmlow 2X with opamp - shipped
kartk 2x with opamp - shipped
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp
resets - shipped

Waiting for last batch of boards, expect to ship remainder this weekend or early coming week.

Last edited: 2019-11-26 1:46 pm

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

2019-11-26 2:07 pm #103

Adams_Leo
Member
Joined 2003

> **jan.didden said:** *(URL: /community/goto/post?id=5979497)*
>
> Shipping update
>
> SigFire 2x - shipped
> jhicks 2x - shipped
> skunark 2x
>
> **Click to expand...** *(URL:)*

can you tell me how to the payment

jan.didden
AX tech editor
Joined 2002

2019-11-26 2:36 pm #104

YGM

Jan

jan.didden
AX tech editor
Joined 2002

2019-11-28 12:55 pm #105

Shipping update

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x - shipped
larslang 2x - shipped
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 3X - shipped
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp - shipped
jmlow 2X with opamp - shipped
kartk 2x with opamp - shipped
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp - shipped
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp
resets 4x - shipped
boar206 2+2 - shipped

Shipment for ymwong will go out next week as requested.

I believe all others that have send payment are now shipped. If you have send payment and your order is not shown as shipped, please let me know, I may have missed something.
Thanks for your participation, it's been a great project, hope your amps will thank you for it! ;-)

And, there's still a few left if you decide you need some after all!

Jan

Last edited: 2019-11-28 1:02 pm

T

touchdown
Member
Joined 2006

2019-11-28 6:16 pm #106

Jan,

I've not got your payment details. Could you please send them to me via email?

Thanks
Nicola/Touchdown

S

shattered_dream
Member
Joined 2009

2019-11-28 9:38 pm #107

F**k now I know what I forgot... Will send payment the next days

---

Stixx
Member
Joined 2003

2019-11-29 8:12 am #108

Received mine.
Thank you Jan.

2019-11-29 2:57 pm #109

Deke609
Member
Joined 2018

I'll take 2 (two) boards without opamp if still available. PM sent.

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x - shipped
larslang 2x - shipped
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 3X - shipped
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp - shipped
jmlow 2X with opamp - shipped
kartk 2x with opamp - shipped
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp - shipped
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x
Touchdown 2x - without opamp
resets 4x - shipped
boar206 2+2 - shipped
Deke609 2x without opamp

2019-12-02 9:49 pm #110

jan.didden
AX tech editor
Joined 2002

Shipping update:

I'll take 2 (two) boards without opamp if still available. PM sent.

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x - shipped
larslang 2x - shipped
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 3X - shipped
Boar206 2x
shattered_dream 2x
dhsettim 2x with opamp - shipped
jmlow 2X with opamp - shipped
kartk 2x with opamp - shipped
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp
Andreas B 2X - shipped
gillougillou 1x with opamp - shipped
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x - shipped
Touchdown 2x - without opamp - shipped
resets 4x - shipped
boar206 2+2 - shipped
Deke609 2x without opamp - shipped

2019-12-03 7:12 pm #111

B

boar206
Member
Joined 2013

Jan THX! received my board

S

skunark

Member

Joined 2011

2019-12-05 4:19 am #112

Boards received

Thank you,

Jim

G

gillougillou

Member

Joined 2009

2019-12-05 6:17 am #113

Idem.

Thank you

---

jan.didden

AX tech editor

Joined 2002

2019-12-05 10:30 am #114

Have fun guys!

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

S

ste

Member

Joined 2001

2019-12-06 1:29 pm #115

Another happy customer. Thanks Jan.😋

jan.didden
AX tech editor
Joined 2002

2019-12-09 10:56 am #116

Shipping update:

SigFire 2x - shipped
jhicks 2x - shipped
skunark 2x - shipped
Francois G 2x - shipped
siddv 2x
valtus 2x - shipped
larslang 2x - shipped
tassosk 2x - shipped
fbjohn 1x
Stixx 2x - shipped
randytsuch 1x - shipped
obh 2x - shipped
exeric 2x - shipped
misterno 1X - shipped
mravinsky 2x - shipped
ste 1x - shipped
Arthur 3X - shipped
Boar206 2x - shipped
shattered_dream 2x
dhsettim 2x with opamp - shipped
jmlow 2X with opamp - shipped
kartk 2x with opamp - shipped
adams_leo 2x
benGeesink 2x - shipped
torrence 1x - shipped
Billc 4x with opamp - shipped
chede 2x - shipped
ymwong 3x with opamp - shipped
Andreas B 2X - shipped
gillougillou 1x with opamp - shipped
hifilars 2+2 - shipped
friston 1 - shipped
PGDO 2x - shipped
Touchdown 2x - without opamp - shipped
resets 4x - shipped
boar206 2+2 - shipped
Deke609 2x without opamp - shipped

Jan

jan.didden
AX tech editor
Joined 2002

2019-12-09 11:00 am #117

Waiting list:

siddv 2x
fbjohn 1x
shattered_dream 2x
adams_leo 2x

Let me know if you want to be taken off the waiting list - no problem, but would help me.

Jan

S

Staticx
Member
Joined 2015

2019-12-10 10:10 am #118

Hi Jan,

Please what source i can connect to the input. Is there enough rectified voltage across the bridge or need to be smoothed with the capacitor?

Thank you

jan.didden
AX tech editor
Joined 2002

2019-12-10 11:11 am #119

> **Staticx said:** *(URL: /community/goto/post?id=6003500)*
>
> Hi Jan,
>
> Please what source i can connect to the input. Is there enough rectified voltage across the bridge or need to be smoothed with the capacitor?
>
> Thank you

You need to connect DC, so you need a cap after your rectifier. What output voltage do you want, what current?

Jan

R

Rinman77
Member
Joined 2019

2019-12-12 7:21 am #120

Are there any boards left? Can I add myself to a list?
Thanks,
Ron

jan.didden
AX tech editor
Joined 2002

2019-12-12 10:00 am #121

> **Rinman77 said:** *(URL: /community/goto/post?id=6006102)*
>
> Are there any boards left? Can I add myself to a list?
> Thanks,
> Ron

Yes, I have new boards coming. You can send me a PM, include address and phone number please.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Y

ymwong
Member
Joined 2003

2019-12-16 11:01 am #122

Boards received. Thanks Jan.

ym

Francois G
Member
Joined 2004

2019-12-16 3:46 pm #123

Boards received a week ago. Sorry, forgot to inform you. Thanks.

Deke609
Member
Joined 2018

2019-12-16 6:38 pm #124

My 2 boards arrived today. They look great. Many thanks Jan.

jan.didden
AX tech editor
Joined 2002

2019-12-17 10:32 am #125

I have received several questions for a version of the regulator that can handle more than 600V max. The issue here is the voltage handling capacity of the pass device Q1 MOSFET, and the capacitors C3, C4 and C6. Q8 is rated for 1kV so there's some leeway there.

The problem with finding a higher-voltage Q1 is the SOA (Safe Operating Area). In case of short circuit, the full input voltage is across Q1 with the current at maximum. The used device can handle 600V at 400mA.

The FCP850N80Z can handle 800V and has a reasonale SOA, max. 200mA. So if you set the current limit to 200mA max, this setup would be good up to 800V.

You can replace C3 and C4 with 0.03uF/800V, mouser part number 667-ECW-H8303JV. They should fit the PCB.
Unfortunately I could not find a drop-in replacement for C6 that could handle 800V. Mouser part # 871-B32774P8105K000 is an 840V box film cap with a pin pitch of 27.5mm. This will not fit the PCB directly but you may be able to jury-rig something up, for instance mounting it on the bottom side.

Hope this is useful but note I have not tested this! If you do go this route, I'd like to hear from you, how it worked out.

Jan

Last edited: 2019-12-17 10:38 am

jan.didden
AX tech editor
Joined 2002

2019-12-22 8:48 am #126

To add to the above, here is the safe operating area for that 800V FCP850N80Z MOSFET. Remember that at short circuited output, all the input voltage is across the MOSFET, and to be safe we want to make sure that it can withstand that dissipation indefinitely* .

So if your input voltage is 800V (max allowed), you see that the max current limit is about 200mA.

You also see that if you want to set the limit to 300mA, the max input voltage is about 400V. IF you work at 400V, it is better to use the original 600V FDP12N60, which can handle 400mA at up to 600V (see its data sheet SOA graph).

* In my circuit, the regulator will be shut off in a few 100ms but unless you have an infinite heatsink, it should be treated as DC.

Jan

Attachments

(URL: /community/attachments/soa-800v-mosfet-png.803996/)

soa 800V mosfet.PNG

307.5 KB · Views: 353

R

resets
Member
Joined 2016

2019-12-30 9:01 am #127

Heat sinks

Hi Jan,
one question:

Q1+ Q8 are on the same heatsink. Right?

What about Q7 does it need a second heatsink? If so is a small one sufficient?

My current f.e. is about 40 mA, the voltage drop between raw input and Vout is less than 50 V.

All the best for the new year by the way

---

jan.didden
AX tech editor
Joined 2002

2019-12-30 10:30 am #128

Q8 is the current source and should be on the 'inside' of the heatsink.
For the pass device you use *either* Q1 *or* Q7.
For pass device dissipations up to say 5 or 6W you can use the Q1 position on the outside of the heatsink.

For higher dissipations, use the Q7 position on an external heasink or bracket.

In either case, Q1/Q7 is only one device, the same device. All documented online here:
T-reg HV regulator | Linear Audio NL *(URL: https://linearaudio.nl/t-reg-hv-regulator)*

Jan

Attachments

(URL: /community/attachments/heatsink-png.805492/)

heatsink.PNG

24.1 KB · Views: 318

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

R

resets
Member
Joined 2016

2020-01-02 8:37 am #129

Jan,

got it on the heatsink issue. Do you mean that you need onlyQ1 or Q7 not both?

By the way are there 2 more PCBs available?

Best

jan.didden
AX tech editor
Joined 2002

2020-01-02 9:11 am #130

> **resets said:** *(URL: /community/goto/post?id=6029189)*
>
> Jan,
>
> got it on the heatsink issue. Do you mean that you need only Q1 or Q7 not both?
>
> **Click to expand...** *(URL:)*

See post 128.

I have more PCBs on the way, they are in-country so should be delivered coming week.

Jan

A

Avellano
Member
Joined 2014

2020-01-10 6:15 pm #131

Hi Jan,
I'm interested in two PCBs.

R

resets
Member
Joined 2016

2020-01-16 12:27 pm #132

2 more boards

Dropped you a PM Jan

---

jan.didden
AX tech editor
Joined 2002

2020-01-16 3:33 pm #133

Dear Friends,

I ordered high-voltage regulator boards some time ago planning to send them out last week. Unfortunately, the Belgian Customs decided that this time they would select my shipment to turn upside down. I received lots of forms to fill out and they will process that hopefully this week.

The problem is that I am not home for at least another 6-8 weeks, so earliest shipping would be mid-March. I know that several of you have already paid their boards. If you don't want to wait, let me know and i will reimburse you. If you can wait, no action required, I have you logged.

Apologies for this delay, I regret it but can't change it now.

Jan

YouAgain
Member
Joined 2008

2020-01-23 9:41 pm #134

I'd like two boards and have added myself to the list below.
Waiting list:

siddv 2x
fbjohn 1x
shattered_dream 2x
adams_leo 2x
YouAgain 2x

---

hallcon83
Member
Joined 2008

2020-01-24 1:05 pm #135

- is there a way i can ask this anonymously .... here's the give away silly newbie question , do you need 1 board or 2 per amp?

YouAgain
Member
Joined 2008

2020-01-24 10:50 pm #136

My question is if I order two boards will I get both Positive and Negative (which is what I'd like).

---

jan.didden
AX tech editor
Joined 2002

2020-01-24 10:54 pm #137

The high voltage regulator only exists as a pos output board. But you can ground the output and use the neg side as neg output. No change in performance. Just make sure the transformer winding is correctly connected or floating.

Jan

---

jan.didden
AX tech editor
Joined 2002

2020-01-24 10:54 pm #138

> **hallcon83 said:** *(URL: /community/goto/post?id=6056800)*
>
> - is there a way i can ask this anonymously .... here's the give away silly newbie question , do you need 1 board or 2 per amp?

Does your amp need two different voltages?

Jan

YouAgain
Member
Joined 2008

2020-01-25 12:28 am #139

> **jan.didden said:** *(URL: /community/goto/post?id=6057547)*
>
> The high voltage regulator only exists as a pos output board. But you can ground the output and use the neg side as neg output. No change in performance. Just make sure the transformer winding is correctly connected or floating.
>
> Jan

Perfect! Thanks again for all the great things that you have provided to the DIY community.

J

JanDH
Member
Joined 2003

2020-01-26 1:20 pm #140

Hello Jan. I would like to apply your power supply in a push pull amplifier. So i need a positive and a negative supply. For two mono blocks this means fout boards, correct???

---

jan.didden
AX tech editor
Joined 2002

2020-01-31 6:28 pm #141

Yes it would be four, and you can do that with my regulators for a neg bias if you have a floating winding available for the neg regs.
What negative supply do you need, what voltage?

Other Jan

Last edited: 2020-01-31 6:39 pm

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---

jan.didden
AX tech editor
Joined 2002

2020-01-31 6:35 pm #142

Guys, Per-Anders has pointed out that the HV MOSFET symbol in the published schematics might be incorrect.

So to be clear: the IXTP08N100D2 is an N-channel depletion mode MOSFET.
The data sheet uses the attached symbol.

At any rate, the PCB is correct for the given device, of course.

Edit: attachment doesn't work for some reason. But here's the data sheet:

https://www.littelfuse.com/~/media/...l_depletion_mode_ixt_08n100_datasheet.pdf.pdf *(URL: https://www.littelfuse.com/~/media/electronics/datasheets/discrete_mosfets/littelfuse_discrete_mosfets_n-channel_depletion_mode_ixt_08n100_datasheet.pdf.pdf)*

Jan

Last edited: 2020-01-31 6:37 pm

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jan.didden
AX tech editor
Joined 2002

2020-02-13 5:14 pm #143

Update: I have been informed that the PCB production with my PCB manufacturer in China has been resumed on 13 Feb. Approx. 40% of their employees are still not able to work due to safety measures for the Corona virus.

They restart production of small orders (< 50) on a first-come first-serve basis.
My last order is from end of January so I hope I am at or close to the top of the pile.

Jan

W

wct
Member
Joined 2006

2020-03-07 3:45 pm #144

Hello

Wondering if boards are available and if the group buy is proceeding.

If yes, I would like to add my name (wct) to the list for 1 board.

I bet in looking through the thread I missed the formal way to join the group

buy, my apologies if that is so. No doubt there must be ship fees and perhaps

paypal fees.

Thanks for doing the group buy.

curt

(central coast California)

---

jan.didden
AX tech editor
Joined 2002

2020-03-07 5:02 pm #145

Noted Curt. I just received 10 boards, and I leave for home next Tuesday. I'll then restart the project and post progress here.

Jan

J

jmlow
Member
Joined 2011

2020-03-19 4:50 am #146

Dissipation of Pass Device

How do I calculate the dissipation for the pass device Q1/Q7?
Thank you.

---

jan.didden
AX tech editor
Joined 2002

2020-03-19 7:28 am #147

Power is voltage across the pass device x current through the device.

I have several boards with parts ready to ship. I am not sure I have correctly kept track of who wanted what over the last few months (Alberto I've got you covered, Curt you got PM).

I know some of you have already paid. So please remind me.

Jan

Eva
Member
Joined 2003

2020-03-26 11:48 pm #148

Does the startup of the regulator depend completely on the fight between leakage currents of various components?

EDIT: Oh, I see a depletion MOSFET is ued. But then what is the purpose of the momentary switch?

Last edited: 2020-03-27 12:05 am

Eva
Member
Joined 2003

2020-03-27 12:28 am #149

Oh, I see, a minimum load is required, and the pushbutton is an alternate way to reset the regulator, apart from removing the load. But the regulator without load always starts at full output, so the load has to be connected before the input is powered. What an interesting approach to avoid the usage of a couple bias resistors or current sources and a normal enhancement MOSFET.

Oh, another thing I do not understand is why one would use a 80Mhz op-amp to end up with 1uF output capacitor.

Last edited: 2020-03-27 12:50 am

jan.didden
AX tech editor
Joined 2002

2020-03-27 7:13 am #150

Yes there is a minimum load of about 3 mA. If you worry about that a single load resistor that draws 3mA will do.

The opamp is not selected because of its bandwidth, but because of its ability to work at low supply voltage and low supply current. Other such opamps might also work.

That 1uF output cap comes from the fact that 600V electrolytics that are reasonable in size are not that common.

There are many design choices that are not obvious from a schematic diagram.
One goal of this was to provide a supply where the output can be set with a single resistor. My experience with the SuperRegulator was that even with the very simple way to set Vout by the ratio of two resistors, many users find that complicated and I get many, many emails on how to calculate those resistors. That gets boring very fast ...

Sometimes your design ego must take second place after ease of use by the user. ;-)

Jan

Last edited: 2020-03-27 7:16 am

Eva
Member
Joined 2003

2020-03-27 8:02 pm #151

Oh, voltage adjustment, fine signal circuitry.

I mean that with an op-amp that is good to 80Mhz and a pair of MOSFET that are also good to 80Mhz the bandwidth of the circuit could surely be improved. A simple calculation reveals an output zero (from 1uF, 2.2r) of 1/(2*3.1415*1e-6*2.2)~=72Khz. That could be 100nF and 720Khz, or even 7Mhz, with a current source for minimum load and control of stability/bounce. Olympic design.

EDIT: Obviously the PCB is not good up to 80Mhz.

Last edited: 2020-03-27 8:04 pm

---

jan.didden
AX tech editor
Joined 2002

2020-04-07 4:34 pm #152

I have updated the circuitry for the last batch of boards, so that you need to select only one resistor value to set the current limit, instead of two values.

The schematic is here: **https://linearaudio.nl/sites/linearaudio.net/files/TS-4-b schematic.pdf** *(URL: https://linearaudio.nl/sites/linearaudio.net/files/TS-4-b%20schematic.pdf)* .

The writeup is here: **Access denied | Linear Audio** *(URL: https://linearaudio.net/t-reg-hv-regulator)* .

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

---

grufti
Member
Joined 2004

2020-04-07 6:46 pm #153

I am logged in at Linear Audio, but Access denied remains Access denied for the writeup.

---

jan.didden
AX tech editor
Joined 2002

2020-04-14 7:59 am #154

Shipping update:

Belgium Post send out the following message:

Shipping of letters and small packages: shipping within Europe as normal but with possible delays, especially France, Italy, Malta and Russia.

Shipping outside Europe/oversees at this point halted due to lack of flights. Shipments will remain in Belgium until such time that flights become available again.

I recently send out several packages outside Europe, so if you are waiting for it, it may be (much) longer than expected. I apologize but cannot change it at this time.

From now on I will not accept orders for delivery outside Europe unless you specifically agree to wait for delivery whatever the delay.

Sorry about all this, it is just something we need to get through.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

R

resets
Member
Joined 2016

2020-04-14 8:23 am #155

Jan,
I have some trouble with the Voltage Regs.
Version T-Reg TS-3

I have a row supply with about DC 275 V
Reg is configured to deliver 170 V
R 11 is 330 K I tested 270 K as well
R6 is 6,8R and R8 is 2,2 R

LED is on, but the voltage doesn't drop to 170 V.
Vin and Vout are mostly similar.

Debugging I have done so far:
checked the position of all parts
Measured all Rs and Cs, as well Diodes.
Exchanged all transistors (4xBC and FDP as well as IXTP)

Any idea what could be the reason? Or any hint whatelse I can try?

chede
Member
Joined 2016

2020-04-14 10:35 am #156

Hi resets,

two pointers come to mind:

- The regulator needs a minimum load to work, maybe even a minimum load is necessary that it doesn't break. I think Jan mentioned at least 3 mA. I did my tests with a load of about 10 mA - just put a 22k power resistor or similar across the outputs.

- if you operated without load and had some other things coming together, maybe the AD8031 is broken. Try changing that as well. No voltage difference (or a very small one) points to the AD8031 as a possible culprit, as a shorted AD8031 provides a path from input to output.

I built two regulators, and actually managed to break the first one in the beginning. In my case, I had two things going on:
- a spurious short of the FDP to the heatsink. I actually measured for shorts, but with the meter set for 200 ohms range. When I later discovered the connection between FDP and heatsink, it measured something like 350R .
- when I first tried the regulator, with a 22k resistor load, all worked fine. But when I connected the ground to the chassis, and at the same time didn't have a load connected on that test, but 80 uF PP capacitance on the output, the regulator failed when I turned the variac to more than about a hundred volts.

I deduced that when the FDP shorted to the heatsink / ground, the input voltage dropped to below the output voltage, and the capacitors at the output reverse discharged through the circuit, taking the AD8031 with it. This was actually with the 2.7V Zener mod installed ...
It took me a while of head-scratching - I first suspected a broken FDP because of no voltage differential between drain and source in circuit ... but it tested fine out-of-circuit. After testing various segments of the circuit in isolation, it showed that really only the AD8031 was broken ... a new AD8031 fixed the regulator. I actually changed C2 as well, to be on the safe side, because it likely had gotten reverse voltage, but that tested and looked fine in the end (I had a higher voltage rated cap there in the beginning).

Otherwise, the two regulators are working great now - one supplies my EL84 PP amp, the other my Aikido preamp.

Thanks Jan, for the design and the boards !

Best regards,
Claas

R

resets
Member
Joined 2016

2020-04-14 10:49 am #157

Claas,
Jan,

I tested it with a load at the output. It is a complete preamp behind the T-Reg which works with a "Langsregler IRF 840" pretty well.

The diference voltage between in and out of the T-Reg is around 6 V. Can't adjust it to more.

The crazy thing is, after I had changed all 4 BC Transistors it worked at the first startup. and I could adjust it to 170 V. Later I tried it again, but it failed.

Last edited: 2020-04-14 10:52 am

jan.didden
AX tech editor
Joined 2002

2020-04-14 11:28 am #158

That is indeed strange. The first note of the minimum 3mA or so laod is correct, with no load at all the output voltage will drift up.

The 6V difference I need to see if I can replicate that. Question: what is the G-S voltage on the pass device in this situation?

Jan

R

resets
Member
Joined 2016

2020-04-14 11:32 am #159

what do you mean by this?
"what is the G-S voltage on the pass device in this situation?"

chede
Member
Joined 2016

2020-04-14 12:18 pm #160

Voltage between Gate and Source of the FDP.
That's the two outer pins of that MOSFET.

Best regards, Claas

R

resets
Member
Joined 2016

2020-04-14 12:33 pm #161

Voltage between Gate and Source of the FDP.
That's the two outer pins of that MOSFET.

Voltage difference is 4,8 to 5 V

Last edited: 2020-04-14 12:41 pm

jan.didden
AX tech editor
Joined 2002

2020-04-14 1:23 pm #162

So its wide open.

Now, what is the voltage between the output and the reference voltage on pin 3 of the opamp? Be careful not to short anything!

Can you also verify that the voltage between the output and pin 2 of the opamp is zero? Again, be careful!

Jan

R

resets
Member
Joined 2016

2020-04-14 2:03 pm #163

Now, what is the voltage between the output and the reference voltage on pin 3 of the opamp?

>>>>> It is 0,9V

Can you also verify that the voltage between the output and pin 2 of the opamp is zero?

>>>> It is 0 V

---

jan.didden
AX tech editor
Joined 2002

2020-04-14 2:55 pm #164

> **resets said:** *(URL: /community/goto/post?id=6161512)*
>
> Now, what is the voltage between the output and the reference voltage on pin 3 of the opamp?
>
> >>>>> It is 0,9V

Just to be sure, which one is higher?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

R

resets
Member
Joined 2016

2020-04-14 3:05 pm #165

output is higher

R

resets
Member
Joined 2016

2020-04-15 8:02 am #166

Jan, are there any other measuring point that I can check to encircle the reason for that curious behavoir. By the way, I have another T-Reg perfektly working in my phonostage. Works great.

Could the reason be that I put the FDP at Q 7 position only and there are only 30 mA running through?

jan.didden
AX tech editor
Joined 2002

2020-04-15 8:42 am #167

> **resets said:** *(URL: /community/goto/post?id=6162604)*
>
> Could the reason be that I put the FDP at Q 7 position only and there are only 30 mA running through?

No that should be OK. If the output is higher than the ref voltage, the opamp output should draw the Vgs of the FDP down, which isn't the case in this unit.

Just to exclude everything, can you verify that the opamp is installed in the correct orientation? And the FDP in Q7, should have the metal tab facing outward (which is the opposite for when it is mounted on the PCB heatsink).

Jan

R

resets
Member
Joined 2016

2020-04-15 9:02 am #168

yes
Opamp is correct orientation

FDP is with metal tab and small heatsink outwards

R

resets
Member
Joined 2016

2020-04-15 10:18 am #169

Jan,

the T-Reg feeds in this case directly into a interstage transformer only. Could this be the issue, because it sees only a small resistance and a inductance?

Many thanks

René

jan.didden
AX tech editor
Joined 2002

2020-04-15 2:10 pm #170

Could be, what is the DC current taken from the T-reg then?
You can check with 30k to 50k load resistor temporarily added, at 170V?

Jan

R

resets
Member
Joined 2016

2020-04-15 2:30 pm #171

Jan I have put a 1K8 Resistor between the T-Reg and the Interstage transformer, now it is running. DC Current is 30 mA.

1 is stable running, the second may be has shot the IC, but I will figure out

---

R

resets
Member
Joined 2016

2020-04-15 2:31 pm #172

JAN thank you very much for the PCB and all your support

---

jan.didden
AX tech editor
Joined 2002

2020-04-15 2:41 pm #173

Well done!
But I hope you are not pulling 30mA through the interstage? Can you show that part of the circuit?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

R

resets
Member
Joined 2016

2020-04-15 2:48 pm #174

the Interstage Lundahl 1671 is set up as line out. It is fine with 30 mA.

I have no drawn circuit. It is a circuit similar to the MIR Preamp of Kevin at K+K audio the MIR, but with a 12P17L instead of the 4P1L tube

---

R

resets
Member
Joined 2016

2020-04-17 7:46 am #175

Jan

it runs.

Audible improvement.

Thank you very much for your design, PCB and kindly support!

---

dady
Member
Joined 2002

2020-05-22 12:22 pm #176

Hi, is possible to make a new GB? I need four boards.
Best Regards
Esteban

2020-06-01 8:44 am #177

jan.didden
AX tech editor
Joined 2002

I have a new set of boards coming in this week, expected to be delivered Wednesday.

In the mean time, our friend EUVL has discovered that when the regulator is switched on without load, there is a chance that the opamp non-inverting input is driven outside its limits. The way to prevent that is to replace zener diode D7 (see attached) by two reverse-parallel small signal diodes, preferable Schottky. A good part would be Mouser 511-BAT43 or 511-BAT42.

There should be no problem with the current PCB but I will adapt the next version of the board. I will also post this on the Linear audio website and note it in the BOM.

Jan

Attachments

__(URL: /community/attachments/ts-4-b-schematic-pdf.849166/)

TS-4-b schematic.pdf

86 KB · Views: 162

__(URL: /community/attachments/ts-4-b-d7-alt-pdf.849167/)

TS-4-b d7 alt.pdf

46.1 KB · Views: 111

Last edited: 2020-06-01 8:52 am

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

2020-06-01 9:24 am #178

EUVL
Member
Joined 2003

Patrick

2020-06-02 6:37 am #179

dady
Member
Joined 2002

Hi Mr Didden, Can you reserve three pcb?
Best Regards
Esteban

jan.didden
AX tech editor
Joined 2002

2020-06-02 7:14 am #180

Send me your address through PM please.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

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dady
Member
Joined 2002

2020-06-02 7:40 am #181

estebanbikic@comodoro.com *(URL: mailto:estebanbikic@comodoro.com)*
Your mail is full dear member.

---

jan.didden
AX tech editor
Joined 2002

2020-06-02 8:20 am #182

OK, I got a diyaudio msg, inbox cleared. Sorry ...

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

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jan.didden
AX tech editor
Joined 2002

2020-06-02 11:28 am #183

PCBs just came in! Yay!

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

M

merlinxwiz
Member
Joined 2020

2020-07-05 2:46 am #184

I want to buy one of these regulators

Please tell me how I can purchase the regulator designed for tube amp.
Mark Kiziuk

M

merlinxwiz
Member
Joined 2020

2020-07-05 2:50 am #185

How can I buy one of these regulators

> **jan.didden said:** *(URL: /community/goto/post?id=6227670)*
>
> PCBs just came in! Yay!
>
> Jan

How can I buy one of these regulators for my tube amp?
Mark Kiziuk

jan.didden
AX tech editor
Joined 2002

2020-07-05 7:24 am #186

Getting in touch with me?

Jan

M

merlinxwiz
Member
Joined 2020

2020-07-05 1:22 pm #187

How do I get in touch with you?

Sorry for being not familiar with things on this website. I was searching for a voltage regulator for my HH Scott tube amplifier and through a few links got here. The secondary side of the power supply transformer puts out 400 volts AC. Would your regulator board be able to put out a constant 400 volts AC? Again I am new to this forum site and I do not know how to get in contact with you.
Mark

Last edited: 2020-07-05 1:33 pm

jan.didden
AX tech editor
Joined 2002

2020-07-05 1:28 pm #188

Hi Mark, most people come through my website, see my sig line. Or send a PM through the forum if you want to keep your email address private; you can do that through the user command post, see top menu line: userCP

You probably want 400VDC rather than 400VAC from your regulated supply?
How much current do you need?

Jan

M

merlinxwiz
Member
Joined 2020

2020-07-05 1:45 pm #189

current limit

DC would mean I connect the input of the regulator to the output of the rectifier tube. Ok, I get that. Sorry, where was my brain? For the current the schematic shows 400V at 150mA out of the 5U4GA rectifier tube.
Mark

jan.didden
AX tech editor
Joined 2002

2020-07-05 3:07 pm #190

So 400VDC out of the rectifier, with ripple on it, means that the output of the regulator to your amp will need to be less. Does the schematic show what the voltage is on the amp? Generally shown as 'B+' or something like that.

Jan

M

merlinxwiz
Member
Joined 2020

2020-07-05 3:13 pm #191

B plus voltage

Hi, don't hate me for being a little green for not knowing what B plus means. If at all possible, the amplifier in question is an HH Scott 99D audio amplifier. Is it possible that you can do a quick google search for the schematic to help me out?
Tnx!
Mark

M

merlinxwiz
Member
Joined 2020

2020-07-05 4:51 pm #192

HH Scott 99D Schematic

View attachment HH-Scott-99-D-Schematic.pdf *(URL: https://www.diyaudio.com/community/attachments/hh-scott-99-d-schematic-pdf.858274/)*

---

jan.didden
AX tech editor
Joined 2002

2020-07-05 7:12 pm #193

Don't be silly, nobody hates you! We all started with a blank mind, so to say ;-)

Jan

M

merlinxwiz
Member
Joined 2020

2020-07-06 11:00 am #194

Sad that we couldn't have done business

Hi Jan, I have supplied you with the schematic and answered all of your questions regarding your regulator circuit so I take your no response as a NO-GO.
Regards
Mark

---

jan.didden
AX tech editor
Joined 2002

2020-07-06 11:38 am #195

I was waiting for it to come alive here, as requested.

I looked at your schematic, there are several different B+ voltages. For me, the most critical one is the one supplying the pre-stages, the 240V. I'd be happy to provide you with a T-reg regulator for that. But as you mentioned you are starting in diyaudio (at least that is what I understood), maybe you want to cut your teeth first on something less drastic? Are you comfortable to assemble a regulator, understanding its operation, testing it, fault-finding if you make a mistake?

Maybe a less drastic undertaking like replacing some suspect, old electrolytics to get the hang of it?

Jan

M

merlinxwiz
Member
Joined 2020

2020-07-06 10:43 pm #196

Hi Jan

Hi Jan I misunderstood the earlier no response. As far as electronics go I am pretty familiar with some but not all. I just did some work on 2 dead HH Scott 99D audio amplifiers about 2 weeks ago. I love the sound of tubes, especially the 300B tube. In the 2 amps that I just repaired, I replaced all the bumblebee caps. Just about every one was way out of tolerance on my capacitor tester. I also installed brand new custom built filter cans. I replaced all of the high wattage resistors. I installed thermistors going to the on/off switches. Just about every tube in both amps tested weak, all except the rectifier tubes. I installed all brand new tubes and diodes in place of the rectifier tube (one less tube to worry about!) I just got brand new tube sockets that this weekend I will be changing out all tube sockets in both amps. I will also be changing out both line cords with 3 wire line cords. By trade I am a senior RF Electronic Technician for 27 years. Do to the economy I currently am employed as a technician working on switch mode power supplies (the BIG switching supplies with crazy power) I am also a Ham radio operator with 40 years. I do have experience with electronics and troubleshooting and very proficient in soldering. I also just updated an old NRI model 70 tube tester with a diode and changed out 2 of the resistors in the diodes path due to the diodes greater efficiency. Also recalibrated the tube tester according to the correct procedure

M

merlinxwiz
Member
Joined 2020

2020-07-06 11:29 pm #197

Regulator

I came across your regulator device on EBay. There are two of them for sale. Question is, how old are they since I see on your Website that you have made revisions. I did some research on the internet and came across your Website then wound up here. I want to try an experiment where I keep the 400 volts out of the rectifier tube (well now they are two diodes because that's what I replaced the rectifier tube with) regulated. All of my B+ voltages are done so by dropping resistors. Not concerned with that part of the circuit. I am concerned with the 400 volts FEEDING that circuit. I understand on regulators usually you need a higher voltage IN. I can use 400 volts into your regulator and come out with 375 volts which is the first B+ voltage. Then I need to derive at the other B+ voltages by changing the dropping resistors that are on the schematic with resistors that would produce the correct voltages for the other B+ voltages.

M

merlinxwiz
Member
Joined 2020

2020-07-08 6:06 am #198

Lost a customer

Jan, I have given you plenty of time to respond to me. Keep your regulator thing. I don't want it!
Have a great day!

jan.didden
AX tech editor
Joined 2002

2020-07-08 8:02 am #199

Man, you're in a hurry! This is a hobby project/ Group Buy, and I generally respond within a day. I'm not generally looking at people building my stuff as 'customers'. Sorry to disappoint you.

As to the experience, I just wanted to make sure you knew what you would be getting into, as you obviously are. It is often hard to gauge people's experience from a post, and it is also very hard and extremely time consuming to remotely debug projects with people just starting out at diyaudio. I always do, but I also try to avoid such situations as they are hard both on me as well as on the diy-er.

Jan

M

merlinxwiz
Member
Joined 2020

2020-07-10 2:17 am #200

I thought you supplied your product to customers

Sorry for mis-understanding things. And I haven't a clue to what a group buy is? I saw a person on EBay selling basically the same thing that you designed. It's a bit different though. They have a product where you can put in 100-500 volts and get a regulated voltage out of up to 400 volts which is adjustable with a potentiometer. It has a 40 volt drop. I guess that's the drop through the circuit. I spoke actually to the owner of the company. They said they have sold thousands of these boards since I think 2003. Sorry to start things off a bit aggressive. I thought you made a product and sold it to customers. Again Ibhave no idea what this group buy thing is all about.
Mark

---

jan.didden
AX tech editor
Joined 2002

2020-07-10 6:51 am #201

A Group Buy is just what it says. Someone has developed something of use for others. Interest is pooled so prices can be lower, and at a certain point stuff is ordered and shipped.

If you look into the Group Buy section (see menu 'Commercial sector' at the bottom on left side of your diyaudio Home screen: **https://www.diyaudio.com/forums/group-buys/** *(URL: https://www.diyaudio.com/forums/group-buys/)*) you will see lots of varied Group Buys, some finished, some still active, some even restart several times.

As happens a lot, also in the case of my high-voltage regulator, after the Group Buy it sort of peters out but now and then people want one or two and I always have stuff for a dozen or so in stock.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

M

merlinxwiz
Member
Joined 2020

2020-07-16 1:17 pm #202

Sorry for the delay. I have CoronaVirus and I have been in ill since last week. I plan to use this regulator in the pre-amp section of one of my amps. How can I purchase your regulator from you?
Mark

---

jan.didden
AX tech editor
Joined 2002

2020-07-16 1:32 pm #203

Hope you are getting better soon! I just replied to your PM.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

---

jan.didden
AX tech editor
Joined 2002

2020-07-17 10:36 am #204

Update July 2020: All good things will come to and end!
I have decided that I will stop providing T-reg 'half kits' when my current stock is depleted. It was a nice ride but it takes too much of my time, I have other ideas I want to pursue. As of this date (17 July) I have 10 units left. Thanks for all your interest and comments!

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Deke609
Member
Joined 2018

2020-07-18 7:41 pm #205

Will bare boards still be available in the future? I still have a couple of the kits that will soon find homes in my amps, but it would be great to have boards available for future projects.

cheers and thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-07-18 8:11 pm #206

They may be, don't know yet.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

---

poseidonsvoice
Member
Joined 2004

2020-07-18 9:29 pm #207

Jan,

Do consider offering it through the DIYAUDIO store as you have done with your HV delay board and Silent Switcher.

My very best,

Anand.

NPXP | Modulus 686 | Starkrimson GaN | MOFO | FH9HVX | It's the journey not the destination!

---

jan.didden
AX tech editor
Joined 2002

2020-07-19 6:38 am #208

That's an idea. I'll check with Jason if he is interested.
I don't need to make any money from it.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

---

jan.didden
AX tech editor
Joined 2002

2020-07-22 4:18 pm #209

All are gone. I will look at providing boards separately.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Deke609
Member
Joined 2018

2020-07-25 2:12 am #210

Reducing output noise

I have a few questions about the output noise of the reg. The plot on Jan's Linear Audio website **http://linearaudio.nl/sites/linearaudio.net/files/Noise%20small.jpg** *(URL: http://linearaudio.nl/sites/linearaudio.net/files/Noise%20small.jpg)* appears to show strong harmonic structure to the largest magnitude noise, with a 100Hz fundamental. Is this just residual ripple passed through by the reg? In which case, very low ripple at the input should result in decreased noise at the output?

If that's not the case, and the output noise profile is intrinsic to the reg itself, is there a simple way of reducing it after the output? I appreciate that 300 uV is quite low, but I'm interested in playing around with the PSU to get as close to a pure DC supply as possible - just to see/hear for myself. I'm still quite new to the hobby, and have no EE education, so I'm hoping for some guidance. My thought was to add an additional LC filter stage after the reg. Does anyone see a problem with this? Are there other suggestions?

I realize that if I add an LC filter after the reg, I'll need to adjust the Vout setting to account for the additional voltage drop. I can manage that ok.

cheers and thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-07-25 6:35 am #211

Derek, good points. But I must point out that these graphs are from a very early version of T-reg, with a much different topology than the current version which has seen lots of small improvements over several years. Unfortunately I do not have a comparable graph for the latest version.

To your question: if there is too much mains noise at the output (that's what these 100Hz spurs are, rectified 50Hz mains in Europe), they should be attacked at the input side of the regulator. Sometimes people use extra LC-filters between the rectifier and regulator input, or even a pre-regulator in that position.
Trying to fix it at the regulator output is likely to worsen the overall performance.

Jan

Deke609
Member
Joined 2018

2020-07-25 11:34 am #212

Excellent! Many thanks Jan. Minimizing ripple at the input is not a problem.

much appreciated, Derek

---

jackinnj
Member
Joined 2002

2020-07-25 2:01 pm #213

> **Deke609 said:** *(URL: /community/goto/post?id=6287364)*
>
> I realize that if I add an LC filter after the reg, I'll need to adjust the Vout setting to account for the additional voltage drop. I can manage that ok.

If you add an LC filter "After the Reg" you will increase its output impedance. Suggest placing it before the T-Reg.

Deke609
Member
Joined 2018

2020-07-25 7:43 pm #214

Thanks jackinnj - Hadn't even considered that. I was only thinking of adding an LC after the reg if the reg was generating the bulk of the harmonic noise. But since Jan has advised the higher amplitude harmonic noise is post-rectifier ripple, I don;t think I'll need to worry about post-reg filtering. My PSUD modeled CLCLC filter should knock down ripple before the reg to well under 50 uV. I'll be more than happy with that.

cheers, Derek

Deke609
Member
Joined 2018

2020-08-02 2:05 am #215

Need current limit instructions for TS-3 version

Can someone please post or PM me a copy of Jan's instructions for setting the current limit on the TS-3 version of the board?

As best as I can see, the instructions posted on Linear Audio are only for the revised V4 board that has uses a single resistor R16 to set the current limit. There's no R16 on my version of the board.

many thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-08-02 8:00 am #216

On the V3 board, you set the current limit with the value of R6. Example: current limit 200mA, R6 = 0.6V/0.2A = 3ohms.

Then you set R8 to about 1/3rd or 1/4th of that value. In this example, R6 = 3 ohm, R8 = 1 ohms or 0.75 ohm.

This is not critical, you can select nearest practical values.

To make it a bit easier, these two resistors are fixed on the V4 board with a single resistor in parallel to set the current limit.

Jan

Last edited: 2020-08-02 8:02 am

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Deke609
Member
Joined 2018

2020-08-02 1:04 pm #217

Perfect. Many thanks Jan. That's easy enough.

Deke609
Member
Joined 2018

2020-08-02 4:34 pm #218

Replacement for BC560 PNP?

Sorry to be a pest, but Mouser lists the BC560C as obsolete.

Is the ON Semi BC327 a suitable replacement? I attach datasheets for both.

It looks equivalent to my newbie eyes. However, the BC560C is described as "low noise" and includes noise data. The BC327 datasheet does not mention noise.

Many thanks, Derek

Attachments

(URL: /community/attachments/bc560c-pdf.865285/)

BC560C.pdf

97.1 KB · Views: 53

(URL: /community/attachments/bc327-pdf.865286/)

BC327.pdf

248.5 KB · Views: 40

jan.didden
AX tech editor
Joined 2002

2020-08-02 4:59 pm #219

Yeah that's fine. Those transistor are used as switches, either in the current limiting or as a discrete triac for shut-down. Any reasonable high Hfe (>100) small-signal transistor will work here.
The BC556B or C series are also good.

Jan

Deke609
Member
Joined 2018

2020-08-02 5:15 pm #220

Thanks again Jan.

jan.didden
AX tech editor
Joined 2002

2020-08-03 8:44 am #221

I have 4 more half-kits available, after that they are all gone!

Jan

Deke609
Member
Joined 2018

2020-08-03 12:19 pm #222

PM sent. I'll take 2 if still available.

Many thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-08-03 12:39 pm #223

You have PM.

Now all 4 spoken for.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Deke609
Member
Joined 2018

2020-08-08 5:50 pm #224

Another newbie question: any problem using the T-reg in a parallel feed amp?

I ask b/c I've read that some regulators do not get along with capacitive loads.

In my case, the output tubes are choke-loaded, with a 10 uF parafeed cap from anode to the primary of the output transformer. I'm not sure if the parafeed cap qualifies as a capacitive load on turn on, and if it does, whether it is a problem.

MTIA, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-08-09 11:04 am #225

Derek, all regulators have capacitors at their output, so they are intrinsically capacitively loaded. That cap has an important function for stability.

At any rate, capacitive loads on circuits are only of interest if there is an actual AC signal that is capacitively loaded. The cap load then causes a phase shift between the AC signal voltage, for instance the output of an amp, and the load current. It is that phase shift that can sometimes cause problems.

With a regulator, there is no AC signal that can be phase shifted with the load current; the reg output is DC. So the term cap load in the context of phase shift has no meaning for a regulator.*

I would be very interested where you have read that is ws an issue.

Jan

*As noted, a minimum cap load, with a non-zero ESR, is needed for stability. There is internally in the reg a phase shift but beyond the min capacity, further cap load has no effect.

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Deke609
Member
Joined 2018

2020-08-09 3:04 pm #226

Many thanks again, Jan.

My concern about capacitive loads was piqued after reading a brief exchange between forum members tomchr and tubelab about short-circuit/fault testing a high voltage regulator (posts 21 and 24): **21st Century Maida Regulator - Page 3 - diyAudio** *(URL: http://www.diyaudio.com/forums/vendor-s-bazaar/209067-21st-century-maida-regulator-3.html#post2952744)*

That sent me down a rabbit hole of interweb reading, from which I gleaned that a specific capacitive load is deliberately built into the output of a voltage regulator for stability. Which got me wondering whether an additional external capacitive load might destabilize a regulator that was designed to perform only into its built-in capacitance. And at that point I was well over my head and figured that I just better ask.

cheers and thanks, Derek

R

resets
Member
Joined 2016

2020-08-10 8:15 am #227

T-Reg feeding 2 tube stages

I want to feed 2 or 3 tubestages via the T-Reg. As each stage needs a different voltage, what would be the best way to do this?

Drop the voltage by a RC combo or does this have negative impact on the T-Reg performance?

Best

René

---

jan.didden
AX tech editor
Joined 2002

2020-08-10 8:26 am #228

Yes, whatever you do after the T-reg will compromise its performance.

In your case, I would use the T-reg for the most sensitive stage, probably the first stage which probably needs the lowest voltage, and feed the less critical stages with a (higher) voltage taken from before the T-reg.

Jan

T

thuanth43
Member
Joined 2016

2020-08-17 2:32 am #229

Jan,

Any chance you will offer the +/- boards soon?

Cheers

jan.didden
AX tech editor
Joined 2002

2020-08-17 6:09 am #230

I have no plans for a negative high voltage regulator. But of course you can use the T-reg high voltage regulator to provide a negative high voltage, by using a separate transformer winding. You can then ground the T-reg output and use the T-reg 'ground' as the negative output. That gives you exactly the same performance in a negative voltage.

I'll put an example up on the website today or tomorrow.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

B

bravi
Member
Joined 2004

2020-08-23 8:06 pm #231

Regulator boards

Can you pl advise when your next batch of boards will be available?

Ravi

---

jan.didden
AX tech editor
Joined 2002

2020-08-24 7:49 am #232

I have still 4 sets available.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

---

jan.didden
AX tech editor
Joined 2002

2020-08-24 12:40 pm #233

3 left

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

---

jan.didden
AX tech editor
Joined 2002

2020-08-25 8:40 am #234

1 left but more coming.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Deke609
Member
Joined 2018

2020-09-10 11:09 pm #235

Looking for some help troubleshooting my installation of the T-Reg in a parallel feed 300B SET amp. The driver tubes already have their own plate voltage regulators, so I want to use the T-reg to regulate the B+ feeding the 300B output tubes to eliminate line voltage variation. Block diagram of my installation is attached.

With 470 very well filtered VDC feeding the T-reg, I trimmed the output voltage of the reg to 450 VDC using the on-board trimmer pot. But the 450 VDC wasn't stable. It continuously bounced around +/- 0,5 V (approx. 1V pk-pk) - I assume in keeping with my mains voltage variations.

Maximum current draw of both output stages (left and right channels) is 160 mA, and I have the T-reg max current set to 200 mA using 3R and 1R resistors.

Based on the above and attached info, does anyone see an obvious cause of my problem? Happy to provide any other info required.

Many thanks in advance, Derek

Attachments

(URL: /community/attachments/treg-install-block-diagram-png.875036/)

Treg Install - Block Diagram.png

35.7 KB · Views: 226

Last edited: 2020-09-10 11:10 pm

jan.didden
AX tech editor
Joined 2002

2020-09-11 7:34 am #236

Deke, that output should definitely NOT bounce around, it should be rock stable, whatever the mains voltage (assuming the mains doesn't drop so far that the input to the T-reg gets below the set output value).

I think your current limit is a bit tight, there is some tolerance there depending on the transistors used. Try to set it higher like to 250 or 300mA, it is only meant to get activated in case of a problem, not to exactly limit the circuit.
Don't forget that the 160mA is a DC value (I assume) and in use the anode current will vary and get above (and below) 160mA.

Normally there is a power supply capacitor at the load, which is not in your diagram. Is it there?
I am not familiar with such a circuit, the plate choke is the load I guess, and in that case you definitely should have a largish cap at the T-reg output.

Jan

Last edited: 2020-09-11 7:37 am

Deke609
Member
Joined 2018

2020-09-11 1:13 pm #237

Many thanks Jan for the quick response.

> **jan.didden said:** *(URL: /community/goto/post?id=6337541)*
>
> I think your current limit is a bit tight, there is some tolerance there depending on the transistors used. Try to set it higher like to 250 or 300mA ...

Great. I will increase the current limit as you suggest.

> Normally there is a power supply capacitor at the load, which is not in your diagram. Is it there?

The T-reg is fed by a CLCLC filter, but there is no additional load capacitor after the T-reg. The T-reg directly feeds the plate choke.

> I am not familiar with such a circuit, the plate choke is the load I guess, and in that case you definitely should have a largish cap at the T-reg output.

So a 600+ VDC rated capacitor across +ve and -ve outputs of the T-reg? Do you have a guesstimate of the range of appropriate capacitance values? I expect I may have to play around with different values, but a ballpark starting point would be most helpful.

Alternatively, do you think I could insert the T-reg between the L and the C of the final LC stage of the CLCLC filter? The last cap of the power supply is pretty big: a 1500 uF film capacitor.

cheers and many thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-09-11 1:56 pm #238

It is just that I don't know how a voltage regulator reacts to a high L load.

Leave all the C-L stuff (except the anode load) at the input side.
Try 10uF at the T-reg output, but first check how it goes with higher current limit please. I am curious ;-)

jan

Deke609
Member
Joined 2018

2020-09-11 2:05 pm #239

Thanks Jan. Will do. I will first try current shut off set to 300 mA. If that doesn't do it, I will add a 10 uF film cap across the output. i will try this this evening and report back.

cheers and many thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-09-11 2:46 pm #240

Preferably an electrolytic, no film cap. You want something lossy there.

Jan

Deke609
Member
Joined 2018

2020-09-11 3:50 pm #241

Ah, ok. Something with high-ish ESR. In that case, i suppose a small resistor in series with a film cap across the output would work? I don't think I have any electrolytic caps in that capacitance range on hand (lots of large capacitance ones, though -- 100 to 220 uF). But I have lots of small value resistors and a bunch of 1 to 20 uF film caps.

cheers and thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-09-11 3:53 pm #242

100uF electrolytic is OK.

Deke609
Member
Joined 2018

2020-09-12 2:06 pm #243

Improvement achieved - but still not rock steady.

I increased the current limit to 300 mA, but saw no difference in performance. Output voltage bounced around as much as 2V pk-pk. But this needed to be done in any event b/c I mistakenly used the quiescent current when calculating my max current needs.

I then tried a 10 uF film cap in series with a 2 ohm resistor across the T-reg output. I noticed no difference, but only let the amp run for 5 minutes.

Lastly, I put two 220 uF 400V caps in series (for effective 110 uF 800V) across the output. For the first 5+ minutes there was no difference. But thereafter the voltage settled down. And at 10+ minutes after power on, the voltage stabilized to within 100mV of 450V.

An observation that I find curious: when the output voltage of the T-reg is most unstable, the output seems insensitive to changes to the 5K trimmer resistor. When it is more stable it is more senstive to changes to the trimmer. I wonder whether this points to a fried trimmer - perhaps I used too much heat when soldering it to the board. I have extras an will test what happens if I replace it.

Things I don't know but plan to test:

(1) whether the stabilization of voltage with the effective 110 uF cap is a function of the cap or of time - as this was only test setup that I ran for more than 10 minutes. I will test the stock board for 10+ minutes to see.

(2) Whether the board is functionlng properly (i.e., whether I screwed up the stuffing). I've ordered some high value high power-rated resistors to test how the regulator behaves when it has a purely resistive load.

(3) as mentioned above, whether the 5K got overheated and is misbehaving.

cheers, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-09-12 2:11 pm #244

(2) Whether the board is functioning properly (i.e., whether I screwed up the stuffing). I've ordered some high value high power-rated resistors to test how the regulator behaves when it has a purely resistive load.

Yes please, you should do that. Then we know whether it is the reg or something else.

Jan

Deke609
Member
Joined 2018

2020-09-16 1:49 am #245

Mouser delivery finally arrived. With a purely resistive load the T-reg works perfectly. With a 50K resistor load, output voltage was instantly stable: approx. 470VDC input to regulated 450VDC output.

So the issue is with the parallel feed (parafeed) load. I have verified that the amp, including the 300B output stage that wish to regulate, is operating properly.

Lundahl's specs for the plate choke: 53H with a 160 ohm DCR. Edit: The T-reg feeds two of them, one per 300B output stage.

Any ideas as to what to try?

My only idea is to add to the DCR of the choke by putting a 75R resistor in series with it. I have enough raw DC voltage to make this work. It would still leave me with approx. 8 VDC of compliance for the reg.

many thanks, Derek

Last edited: 2020-09-16 1:54 am

Deke609
Member
Joined 2018

2020-09-16 1:58 am #246

And I should add that I have additional T-regs -- so if use of one reg per channel might help, I can give that a try too.

cheers and thanks, Derek

jan.didden
AX tech editor
Joined 2002

2020-09-16 6:06 am #247

Derek, have you tried to place a largish electrolytic like 47uF at the T-reg output?
I believe that the problem with the large inductive load is the fact that an inductor tends to create a large varying voltage with varying current. If that voltage gets above the T-reg output, it can't 'go' anywhere - a regulator is designed to source current, not to sink it.

Jan

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Deke609
Member
Joined 2018

2020-09-16 12:21 pm #248

Thanks Jan.

I did try the equivalent of a 110 uF cap across the output of the reg, and that seemed to help, but did not give me a steady output -- see post #243 above.

> **jan.didden said:** *(URL: /community/goto/post?id=6342966)*
>
> I believe that the problem with the large inductive load is the fact that an inductor tends to create a large varying voltage with varying current. If that voltage gets above the T-reg output, it can't 'go' anywhere - a regulator is designed to source current, not to sink it.

So I take it that the reg and the choke are fighting each other - the reg varying current to hold voltage constant while the choke is varying voltage to maintain constant current. This makes sense to me, but I am a bit surprised that this tug-of-war occurs even when the output stage is operating at its quiescent point.

Conceptually, I can't see a way around this problem. But then how is the T-reg able to function properly when feeding a "normal" output stage -- i.e., the primary of a gapped output transformer -- doesn't the gapped OT behave like a choke?

cheers and many thanks, Derek

---

jan.didden
AX tech editor
Joined 2002

2020-09-16 12:30 pm #249

These are good thoughts, and I don't have an immediate answer. The problem can only arise if at any point on the signal the current reversed, i.e. flows back into the regulator, or at least trying to.

In your case, you have both a choke load and an output transformer, right?
Is it possible to run your amp with the output transformer disconnected?

Your #243 seems to point to something akin to motorboating in a tube amp, which is caused by a particular combination of time constants in the power supply and amp circuits. Hmmm.
Maybe you can send me the amp schematic, confidential of course.

Another thing to try is to add say a 10mA DC load to the regulator, by connecting a 40k or 50k resistor across its output.
That gives the reg a 10mA reverse current capability.

Jan

Last edited: 2020-09-16 12:36 pm

Deke609
Member
Joined 2018

2020-09-16 12:47 pm #250

Many thanks Jan.

Edit: yes, I have both a plate choke and a zero-gapped (parafeed) output transformer.

I can definitely try a 50K resistor across the output in parallel with the parafeed output stage. And I suspect I can also test with the output transformer disconnected -- but I want to check with some parafeed experts for confirmation that it is ok to do this.

I will post back when I have done one or both of the above tests.

cheers and thanks, Derek

Last edited: 2020-09-16 12:49 pm

Deke609
Member
Joined 2018

2020-09-17 12:00 am #251

No luck with the tests. All of the following failed: (1) parafeed load (amp as designed) with 50K resistor across T-reg output; (2) same as (1) but with addition of 110 uF cap in parallel with 50K resistor; (3) same as (2) but with output transformers disconnected. In all cases, the T-reg output was unstable - randomly bouncing around +/- 1V rms or so.

I will look into the motorboating issue. I think I will need to scope the amp to explore this. Without the reg, with the output stage fed directly from the CLCLC filter, I don't hear any motorboating, or hum/noise of any kind. But I suppose there could be inaudible oscillation. I need to read up more about this and do some scoping. This will have to wait a week or more -- but I will report back on what I find.

cheers and thanks, Derek

jackinnj
Member
Joined 2002

2020-10-14 6:17 pm #252

Question -- at startup (and for a few microseconds), won't the output and input voltages be equal?

NJ, OH and Llanddewi Brefi

jan.didden
AX tech editor
Joined 2002

2020-10-14 6:36 pm #253

I think that will only be the case when the DC input voltage rises slower than the ref voltage which is normally not the case. I believe that at startup, the output voltage will always be lower than the input voltage. What are you getting at?

@Derek: can you try to set the T-reg to a much lower voltage, so that is it much lower than its DC input? Like 50V lower than the input? Does that make a difference?

Jan

Last edited: 2020-10-14 6:39 pm

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jackinnj
Member
Joined 2002

2020-10-14 7:23 pm #254

> What are you getting at?

In simulation it looked as if it took a brief period of time for the LT3092 to get to the steady state current. Might not be the case in real life with some nanoHenries of connections between B+ and the T-reg.

Datasheet also states that quieting the current source with a small capacitor across Rset adds to startup time.

NJ, OH and Llanddewi Brefi

jan.didden
AX tech editor
Joined 2002

2020-10-15 7:10 am #255

Yes, the latest version of T-reg uses that also for even lower noise.

Jan

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S

Sesmarias
Member
Joined 2020

2020-10-20 6:37 pm #256

Hi Jan.

Any news about the PCB boards for the TReg still being available?

Thanks a lot

Jorge

jan.didden
AX tech editor
Joined 2002

2020-10-20 7:07 pm #257

They were expected in the diyaudio store but will take some time.

I have a number of sets available as described on my website, so first come first served.
Complete with AD8031 in socket, pass device, low current LED and high voltage current source device; LT3092 and reset pushbutton pre-soldered (SMD).
€ 35 + shipping.

Jan

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S

Sesmarias
Member
Joined 2020

2020-10-20 8:28 pm #258

PCB for TReg

Thanks a lot for your reply, Jan. Please put aside one set for and send me payment details.

All the best

Jorge

---

jan.didden
AX tech editor
Joined 2002

2020-10-21 7:50 am #259

YGM

Jan

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---

jan.didden
AX tech editor
Joined 2002

2020-10-21 7:51 am #260

Pinging Kwai Luen CHU - please contact me.

Jan

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Z

zne2001
Member
Joined 2007

2020-10-26 7:30 pm #261

Hi Jan, are the boards of HV regulator still available ? Can I paid over PayPal ?

---

jan.didden
AX tech editor
Joined 2002

2020-10-26 8:09 pm #262

Yes. Yes. ;-)

YGM.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

C

consol
Member
Joined 2014

2020-11-07 9:52 pm #263

I want to ask you Mr.Jan if the T-Reg can be used as Bench regulated power supply 0-400V with current adj. 0-400mA
I appreciate if you give some modifications for this application

J

johan283
Member
Joined 2010

2020-12-24 9:58 pm #264

Hello Jan, do you have still have boards available?

N

Nikon1975
Member
Joined 2009

2021-01-22 3:41 pm #265

Hi,

Is there a way to implement a HV delay using this circuit? I see that this is default in the DN2450 version, but I am not sure if it is the case in the latest version. Also what is the switch for ?

Regards,

Davide

Last edited: 2021-01-22 3:53 pm

---

jan.didden
AX tech editor
Joined 2002

2021-01-22 4:04 pm #266

> **consol said:** *(URL: /community/goto/post?id=6403810)*
>
> I want to ask you Mr.Jan if the T-Reg can be used as Bench regulated power supply 0-400V with current adj. 0-400mA
> I appreciate if you give some modifications for this application

Sorry for the late reaction, I've been in hospital to get a new shoulder mounted and lost track of this thread. I'm back and 2-handed again ;-)

In theory this is possible but you need a lot of heatsink. In the situation where your input voltage is 450V, output is 50V @ 400mA the regulator has to get rid of 0.4A X 400V =160W, and that's A Lot.

But if you want to limit max output to say 100mA it is doable.

Jan

---

jan.didden
AX tech editor
Joined 2002

2021-01-22 4:06 pm #267

> **johan283 said:** *(URL: /community/goto/post?id=6461167)*
>
> Hello Jan, do you have still have boards available?

I have a bunch of partial kits as described on the website on the way to the diyaudio store, but in the meantime I also have some available myself. Contact me via PM if you need some.

Jan

jan.didden
AX tech editor
Joined 2002

2021-01-22 4:13 pm #268

> **Nikon1975 said:** *(URL: /community/goto/post?id=6499243)*
>
> Hi,
>
> Is there a way to implement a HV delay using this circuit? I see that this is default in the DN2450 version, but I am not sure if it is the case in the latest version. Also what is the switch for ?
>
> **Click to expand...** *(URL:)*

The switch is to reset the regulator after an overload. Normally you would have to physically disconnect the load to reset it, but you can also use the on-board switch. Of course it will only work if the overload is no longer present.

That version of the regulator with delay was the very old version that had much less performance. The new version is much better. **There is a separate high voltage delay that is much more flexible, lets you set the delay between 20 and 254 seconds and also needs minimum wiring in existing equipment.** *(URL: https://audioxpress.com/article/you-can-diy-a-high-voltage-delay-for-tube-amplifiers-the-sequel)*

The high voltage delay diyaudio semi-kit is currently sold out but I have some available I think, and also a box on its way to the diyaudio store.

Jan version

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jan.didden
AX tech editor
Joined 2002

2021-02-02 2:09 pm #269

Friends, I have no more boards available but Jason is kindly offering the same half-kit that I provided from the diyaudio store. So, supply of this high voltage regulator is ensured!

Linear Audio T-reg V5 – diyAudio Store *(URL: https://diyaudiostore.com/collections/power-supply-kits/products/copy-of-linear-audio-high-voltage-delay-for-tube-amplifiers)*

Jan

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erhardaudio
Member
Joined 2014

2021-02-11 2:37 am #270

a question re current limiting. What if one wants to set the current limit to say 50mA, for a preamp, not power amp, the value for R16 is impractical.....unless I missed something?, thanks.

www.erhard-audio.com; PAS upgrade kit forum
Dynaco PAS upgrade kits; North American Lundahl Transformers Distributor
Audio Amp Auto Bias Modules Distributor

jan.didden
AX tech editor
Joined 2002

2021-02-11 7:52 am #271

There is nothing impractical to set the current limit to 50mA that I know of.

But there is no need to set the current limit to exactly the max current you believe your equipment is needing. In fact, it might not be a good idea to set it that tight, you should also cater for the occasional transient.

If you have a preamp that takes 50mA, you can just set the current limit to say 100mA or 200mA. It still protects the supply as well the preamp in case of a short.

Jan

---

erhardaudio
Member
Joined 2014

2021-02-11 1:55 pm #272

thanks for that Jan. I was referring to the value of R16 to be somewhat impractical if one were to try and set the limit to say 50mA, it would be so low, close enough to be a short?But yes, it makes sense to set it between 100 and 200mA.

---

jan.didden
AX tech editor
Joined 2002

2021-02-11 3:26 pm #273

The lower the current the larger the limit resistor value.

From the build guide:

How to set the current limit
A single resistor, R16, needs to be selected to set the current limit. Current limiting occurs when the voltage across R16 gets to about 0.8V. So, for example, if you want a current limit of 180mA, your R6 will be 0.8/0.180 = 3.3Ω.

Jan

Last edited: 2021-02-11 3:38 pm

---

erhardaudio
Member
Joined 2014

2021-02-11 3:43 pm #274

D'OH!!!...of course, thank you Jan....must be old age setting in for sure!! LOL

---

jan.didden
AX tech editor
Joined 2002

2021-02-12 7:57 am #275

Don't start me about my own senior moments ... !

Jan

dot
Member
Joined 2005

2021-03-07 5:47 pm #276

Linear Audio T-Reg vs the Vacuum State Super Regulator.

I originally purchased two of these boards for another protect when I ran into trouble with one of my VS super regulators in my RTP3D. After a series of tubes going bad and finally a rectifier tube turned into a flash bulb there was trouble bringing one of the regulators back up to spec. The RTP3D is the jewel in my system and I can't live with out it. So it was natural to put the T-Reg in for as a temp.
At first the sound was disappointing, but I could live with it for a while. After about an hour the T-Reg really brought things to life with all the sound Allen Wrights design is famous for. I must say, at least to these old ears, this regulator is equal to that of Vacuum State's. I will eventual put the originals back in, but for now... no rush.

Jan, thanks for offering the boards. Good design.

Cheers; Glenn

jan.didden
AX tech editor
Joined 2002

2021-03-07 7:45 pm #277

Thanks Glen, glad it all worked out!

Jan

itsikhefez
Member
Joined 2015

2021-04-14 9:05 pm #278

Just noticed these are in the store, that's great!

A few quick questions --
1) What is the regulator dropout voltage? Trying to determine if I should use a SS rectifier with high capacitance on the input for low ripple and high margin into the reg, or if a tube rectifier is adequate.

2) Which point is preferred to tie to the star ground -- the neg of the main filter capacitor, or the output of the regulator?

3) The PCB I plan on using the reg with has room for bypass capacitors on the B+ input, something electrolytic up to 22uF. Is there any value in populating that when using the reg or leave empty?

Thanks!!

chede
Member
Joined 2016

2021-04-15 6:00 am #279

Hi,

I think Jan should answer that for a more competent answer, but for what's it worth:

- Voltage margin between input and output should always be more than the D-S voltage of the pass FET, so more than, say, 4.5V. That is, input voltage always needs to be higher than that - the lowest Vp of the input waveform, taking the remaining ripple into account, and also wall voltage fluctuations causing lower Vraw.

- I would instinctively choose the regulator's output as the most quiet point in the circuit. No ripple currents there anymore.

- I have in my preamp about 20 uF MKP as local decoupling. In my EL 84 PP I use about 250 uF MKP as local capacitors - I first built that one without the regulator. I can see no adverse effects .

You might ask where to get these capacitances in MKP and how much space the need ... look at "DC-Link" capacitors (solar energy use, I believe)

Best regards, Claas

jan.didden
AX tech editor
Joined 2002

2021-04-15 6:36 am #280

I'll try to reply to both in one go. The drop out is determined by the 'flying supply' for the control circuit which is about 6V. If you count in variations in mains and ripple voltage, set the output at least 10V below the lowest ripple point.

Agree with chede on the ground point. The reservoir cap has it's own ground, and that is wired to the T-Reg *input*. The T-Reg delivers an output voltage between the two output pins. Take these to your amplifier for cleanest power.

If you have space for an additional decoupling, a 22uF sounds fine. There is no advantage going higher, the additional cap does provide some extra stability. MKPs or other very low ESR caps are actually detrimental for stability and that money is better used elsewhere.

MKPs are great for signal coupling, but for supply decoupling you need something with a bit of loss.

Jan

Last edited: 2021-04-15 6:56 am

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chede
Member
Joined 2016

2021-04-15 7:52 am #281

Thanks, Jan - that is very good info to know !
The big film caps with my EL84 amp stem from my previous version where I wanted to build an (unregulated) tube amp PSU without electrolytics

I see that after the regulator you want caps with some losses to improve stability. That reminds of the threads around the VRDN supply and Mark Johnson's SMPS filters. Does it hold for unregulated supplies, and for solid-state PSUs as well that filter and decoupling caps with some losses are preferred ?

Best regards, Claas

T

therling
Member
Joined 2009

2021-04-20 8:58 pm #282

Hi, I'm putting together a parts order while I wait for my T-Reg V5 kit to arrive and I'm puzzled by the BOM listing of D7 and D8. In your May 2020 blog post you stated

> Previously I suggested BAT42 diodes here, but I now recommend SB140-T Schottky diodes, Mouser 621-SB140-T. There should be no problem to put them both on the current PCB but I will adapt the next version of the board for proper layout.

However, the BOM for V5 has D7 and D8 as BAT42s. I imagine this is just an oversight. If you think about it, these days the term 2020 hindsight has an entirely different meaning.

Also, I find that Mouser may not carry as wide a selection of high voltage metal foil resistors as Digi-Key. For my 1963 HH Scott 222C, which puts 445V out of the 5AR4 rectifier, I figure the correct value for R11 to be approximately 767kOhms. Digi-Key has a larger range of Vishay's HVR25 series which tolerate up to 1600VDC. I've found they have one at 768kOhm, which is surprisingly close. (Part # PPCQF768KCT-ND). At 43 cents it's a bargain compared at what I found trudging through Mouser for various combinations that would get me there, although it will incur an additional shipping cost.

---

jan.didden
AX tech editor
Joined 2002

2021-04-21 7:42 am #283

Both the BAT42 or the SB140-T diodes will work fine. They are limiting the voltage between the opamp pins and normally are not conducting.
I recommended the SB2140-T because they allow slightly higher currents, but if you mounted the BAT's, just leave them be.

I'll check the BOM.

Jan

T

therling
Member
Joined 2009

2021-04-22 4:41 am #284

That was quick. I appreciate your taking the time to respond. Thanks.

T

therling
Member
Joined 2009

2021-04-23 2:15 am #285

Oh, and just one more thing..... (I've been watching a lot of Columbo episodes during this pandemic.)

There's a discrepancy between the V5 BOM and the schematic. The BOM calls for Q2, Q3 to be BC550C and Q5 as BC560C. On the schematic, you have designated BC546B for Q2 and Q3, and BC556B for Q5.

The BC550C and BC560C are now becoming obsolete as are BC546B and BC556B, and may not be stocked, depending on which supply outfit you use. I compared the BC546C and the BC556C data sheets and those look like they're acceptable substitutions.

---

jan.didden
AX tech editor
Joined 2002

2021-04-23 6:21 am #286

Yeah it's hard to keep track of what comes and goes.

Basically, any small signal TO-92 transistor of the right polarity will work. 100mA, 30V, Hfe > 150, which practically a zillion types fill.

Jan

T

therling
Member
Joined 2009

2021-04-24 8:28 pm #287

Just think of this as a loosely organized peer review system. In academe, research assistants would do the donkey work on such things to leave more time for the eggheads to nap.

I

itsikhefez
Member
Joined 2015

2021-04-26 6:45 am #288

Is there any advantage to having a choke before the T-reg, such as
CLC(reg)C, or go straight to the T-Reg from the main filter cap? (assuming the input voltage/ripple is sufficient to keep the regulator happy)

jan.didden
AX tech editor
Joined 2002

2021-04-26 8:55 am #289

The exact scientific answer: anything that you do before the regulator changes the output by some number of electrons;

My answer: the performance of the T-reg is such that you will not hear any difference from filters or pre-regulators before it. In fact, additional stuff may worsen the sound due to additional ground loops and EMI ingress points;

The audiophile answer: I inserted a coil from Acme Audio Research before the T-reg and the sound really opened up, night and day!

Your call ;-)

Jan

I

itsikhefez
Member
Joined 2015

2021-04-26 4:15 pm #290

Where can I buy that coil from Acme Audio?? (just kidding)

Thanks Jan!

I

itsikhefez

Member

Joined 2015

2021-05-28 9:13 am #291

> **jan.didden said:** *(URL: /community/goto/post?id=6528012)*
>
> The lower the current the larger the limit resistor value.
>
> From the build guide:
>
> ***How to set the current limit***
>
> **Click to expand...** *(URL:)*

Is this example correct? 0.8/0.180 = 4.4ohm.
Sorry for nitpicking but this confused me a bit.

---

jan.didden

AX tech editor

Joined 2002

2021-05-28 9:19 am #292

You are absolutely correct, it is 4.4 ohms nominal, I goofed.
Thanks for the heads-up! I will correct the writeup.

Jan

S

schiirrn

Member

Joined 2018

2021-06-09 11:49 am #293

I'm a bit confused about the intended use of this regulator. It makes sense that everything following after the regulator compromises it's performance so it should be connected close to it's load. It seems that different users had problems connecting it to interstage or output transformers directly and that the regulator is unstable with an inductive load?

That leaves a use in single stage buffers ("line stages") with anode resistors as loads.

Is that correct?

---

jan.didden

AX tech editor

Joined 2002

2021-06-09 11:52 am #294

That's news to me. Any reference?

Jan

S

schiirrn
Member
Joined 2018

2021-06-09 12:23 pm #295

Yes, post #241 ff for example, the issues Derek is/was (?) having.

In post #247 you wrote:

"I believe that the problem with the large inductive load is the fact that an inductor tends to create a large varying voltage with varying current. If that voltage gets above the T-reg output, it can't 'go' anywhere - a regulator is designed to source current, not to sink it."

That would leave shunt regulators as the only option to directly connect them to transformer primaries or anode chokes.
When you refered to 53H (post #245) as "large inductive load", what would be a "safe inductive load" for your regulator?

(my apologies if this sounds like I was looking for an argument)

chede
Member
Joined 2016

2021-06-09 2:06 pm #296

Hallo schiirn,

for what it's worth, with one sample of this regulator I'm powering an Aikido line stage (can be configured both as a buffer and as an Aikido with gain, the regulator works well with both).
With the other sample I'm powering the B+ of a complete EL84 push-pull amplifier. Yes, that one is capacitor-coupled, so no interstage transformers, but it has big output transformers nevertheless, and burns more than 45W in the high-voltage section. The regulator works very well here also.

Regards, Claas

jan.didden
AX tech editor
Joined 2002

2021-06-09 2:24 pm #297

> **schiirrn said:** *(URL: /community/goto/post?id=6685471)*
>
> Yes, post #241 ff for example, the issues Derek is/was (?) having.
>
> In post #247 you wrote:
>
> "I believe that the problem with the large inductive load is the fact that an inductor tends to create a large varying
>
> **Click to expand...** *(URL:)*

Ahh yes, but you have to discern between a series choke after the T-reg, or the load presented by an (interstage) transformer.

A series choke may be troublesome, but it should be noted that using a series choke after a regulator doesn't make any sense anyway. It's a waste of money and space. If you are religious about chokes, put it before the regulator, that can make sense.

An (interstage) transformer should be no problem as it isn't an inductor but reflects the secondary load to the primary and the regulator and that load is normally not inductive.

In the previous pages there are some reports with successful use of T-reg and a transformer.

Jan

S

schiirrn
Member
Joined 2018

2021-06-10 8:38 am #298

"A series choke may be troublesome, but it should be noted that using a series choke after a regulator doesn't make any sense anyway. It's a waste of money and space. If you are religious about chokes, put it before the regulator, that can make sense."
How does it make sense to take the high Z anode load and replace it with a low Z regulator and then put that high Z inductor before the regulator???
This all remains very confusing.

Attachments

(URL: /community/attachments/img_9647-jpg.958647/)

IMG_9647.jpg

782.7 KB · Views: 164

S

schiirrn
Member
Joined 2018

2021-06-10 8:44 am #299

> **jan.didden said:** *(URL: /community/goto/post?id=6685586)*
>
> An (interstage) transformer should be no problem as it isn't an inductor but reflects the secondary load to the primary and the regulator and that load is normally not inductive.
>
> In the previous pages there are some reports with successful use of T-reg and a transformer.
>
> Jan

"**Should** be no problem" and "**some** reports with successsful use" still make it sound as if something like the attached schematic **might** or **might not** work...

Attachments

(URL: /community/attachments/img_9648-jpg.958649/)

IMG_9648.jpg

777.1 KB · Views: 174

jan.didden
AX tech editor
Joined 2002

2021-06-10 3:01 pm #300

I only say that because I have not tested it myself. But your schematic will work well.

Jan

Last edited: 2021-06-10 3:11 pm

jan.didden
AX tech editor
Joined 2002

2021-06-10 3:09 pm #301

> **schiirrn said:** *(URL: /community/goto/post?id=6686408)*
>
> "A series choke may be troublesome, but it should be noted that using a series choke after a regulator doesn't make any sense anyway. It's a waste of money and space. If you are religious about chokes, put it before the regulator, that can make sense."
> How does it make sense to take the high Z anode load and replace it with a low Z regulator and then put that high Z inductor before the regulator???
> This all remains very confusing.

Ahh, I misunderstood, you use the choke as the anode load - I thought you wanted to use it to further smooth the regulator output.

The regulator does only need a small output cap, for stability, but not to smooth the output, that is already much smoother than a cap could be.
On the T-reg board it is 1uF in series with a small resistor to provide some losses needed for stability.

But if you feed a choke loaded amplifier, you DO need an extra cap at the regulator output to absorb the swings from the choke. That is no different from a non-regulated supply where you need capacitors on the B+ for the same purpose, in addition to smoothing the ripple on the high voltage.
I have not tried that but looking at the usual amp circuit it appears that 47uF will do. But you can use more.

Jan

Last edited: 2021-06-10 3:12 pm

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2021-06-11 8:54 am #302

@schiirrn - can you post a schematic of your choke loaded amp stage?
Maybe I can do a sim.

Jan

Last edited: 2021-06-11 9:07 am

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2021-06-13 3:24 pm #303

I have done some simulations, but I can't reproduce the situation of the output of T-reg to rise above it's setting. The only way the regulator output voltage can rise is when the load current reverses, that the current tries to flow back into the regulator.*

Even with the inductive load of a choke loaded tube stage, that does not happen. So unless anyone comes up with a circuit that would show it, I assume that the report was incorrect.

Jan

* Note that T-reg needs at least 3mA minimum load. So if you run it without any load, the output will be too high.

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

mirlo
Member
Joined 2002

2021-06-13 4:09 pm #304

Most likely the plate and presumably the following stage present enough real impedance effectively in series with the choke from the point of view of the regulator, to keep the regulator happy.

In other words the regulator sees the inductor in series with a big resistor.

No?

Last edited: 2021-06-13 4:13 pm

---

jan.didden
AX tech editor
Joined 2002

2021-06-13 6:37 pm #305

I tested with L only, and all stayed well.

Jan

S

schiirrn
Member
Joined 2018

2021-06-14 8:08 am #306

> **jan.didden said:** *(URL: /community/goto/post?id=6687366)*
>
> @schiirrn - can you post a schematic of your choke loaded amp stage?
> Maybe I can do a sim.
>
> Jan

I currently don't use a choke loaded stage that I plan on feeding with a T-Reg. What I do have in the works is a 2 stage mono amplifier as in the the simplified diagram attached earlier where I thought about using the regulators for setting anode voltages and decoupling of stages which for me usually takes priority (when thinking about regulators) before smoothing and providing a supply with even source impedance.
It will take a few weeks but I can get back with measurements when a breadboard is built.

Last edited: 2021-06-14 8:09 am

---

jan.didden
AX tech editor
Joined 2002

2021-06-14 9:14 am #307

OK, yes, if you mean the simplified circuit in post # 298, that'll work without problems.
As long as the load is minimum 3mA.

Jan

NickKUK
Member
Joined 2019

2021-07-11 11:42 am #308

I'm currently looking at power for a cascode front stage and a push pull back end.

How much voltage drop headroom is required for the board?

I see you've essentially made a negative by re-referencing the board - would there be an issue running -320V -> +320V, across two regulators referenced to the same ground voltage?

The output stage is running up to 240mA each channel at 200V B+. I see you have current limiting - if the negative board is running re-referenced is it providing current limiting on the B- rail in a B- to B+ scenario? (if the regulator is regulating the return if it's shifted?)

Lastly I'd be using something like a CLC on each rail. How would at affect the board running with B+ and B- (as a B+ running with GND as B+)?

Last edited: 2021-07-11 11:46 am

jan.didden
AX tech editor
Joined 2002

2021-07-11 11:51 am #309

The thing to be aware of when you use one as a neg reg, then connect the outputs for +300 - GND - -300 is that the inputs to the two boards must be separate. That means two transformer secondaries and rectifiers, so you can't use a center tapped secondary (unless you open up the center tap so you have two separate windings and full wave rectifiers).

Other than that, you should have no issues and the current limiting will work fine on each board.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

NickKUK
Member
Joined 2019

2021-07-11 12:50 pm #310

> **jan.didden said:** *(URL: /community/goto/post?id=6717258)*
>
> The thing to be aware of when you use one as a neg reg, then connect the outputs for +300 - GND - -300 is that the inputs to the two boards must be separate. That means two transformer secondaries and rectifiers, so you can't use a center tapped secondary (unless you open up the center tap so you have two separate windings and full wave rectifiers).
>
> Other than that, you should have no issues and the current limiting will work fine on each board.
>
> Jan

Thank you, it confirmed my concern with the rail-to-rail requirement.

2021-07-15 6:00 pm #311

More tests with parafeed output stage to come

Deke609
Member
Joined 2018

> **schiirrn said:** *(URL: /community/goto/post?id=6685471)*
>
> Yes, post #241 ff for example, the issues Derek is/was (?) having.
>
> In post #247 you wrote:
>
> "I believe that the problem with the large inductive load is the fact that an inductor tends to create a large varying voltage with varying current. If that voltage gets above the T-reg output, it can't 'go' anywhere - a regulator is designed to source current, not to sink it."
> ...

Just seeing this b/c I had notifications turned off.

I've been meaning to return to this. I never managed to get the reg working when feeding a parafeed output stage (choke-loaded power tube, with parafeed cap after choke feeding the OPT). I tried it in two different parafeed amps without success. But it worked flawlessly in tests into a purely resistive load.

My guess is that my problem is the one identified by Jan in the quote: I need the plate choke to swing voltage higher than the output of the reg. Want I want to try is moving the reg before the huge reservoir film cap (1500 uf) I have in the PS filter, with the hope that the huge capacitance will shield the reg output from the anode voltage swings.

I'll report back after trying that. But it may be some weeks before I get to it.

cheers, Derek

Last edited: 2021-07-15 6:10 pm

T

therling
Member
Joined 2009

2021-09-18 8:41 pm #312

Help with diagnostics?

I have two T-Reg V5s that I'm using for plate voltage on my HHScottt 222C. I'm having trouble with one of them.

That amp has four 7189 pentode output tubes at 420V, datasheet says a maximum 105mA plate current in push-pull operation. I have one T-Reg per pair, maximum signal current for each pair is 210mA.

I carefully looked over both units before testing. When I tested them under actual operating conditions, temporarily connected with alligator clips, they worked fine in bringing the raw voltage from about 440V to 420V and held steady for a good amount of time.

However, after I installed them in a more permanent fashion, I discovered a hidden cold solder joint on the output from one of the units meaning it was not connected to the load for a few minutes. That one now doesn't regulate properly. The other unit is fine.

Here's some basic data based on what I've found in previous troubleshooting comments on this thread:

R16 = 2.2 Ohm, 1W (should limit current to 400mA, yes?)
R11 = 750 kOhm (provides about 420V with 117VAC)

Raw V in: 443
V out: 431 (adjusting trimpot makes no difference)

I/O difference = 12V

The Gate to Source voltage for FDP, Q1 = 4.5V.

U2 pin 2 to output = 0
U2 pin 3 to output = 0

U1 pin 1 to ground = 431
U1 pin 2 to ground = 443
U1 pin 3 to ground = 443
U1 pin 1 to pin 3 = 11.4

The LED is illuminated.

I'm not sure if it's safe to take U2 out of the working unit and put it into the non-working unit in case the fault takes that one out too.

Is my guess that the FDP got zapped when the T-Reg was not connected to the load? Or is the AD8031 toast? Or both? My inclination is to replace both ICs and both MOSFETs even though that's throwing parts at the problem.

Any further hints would be appreciated. I'll provide any further measurements as requested.

jan.didden
AX tech editor
Joined 2002

2021-09-19 6:40 am #313

What is te voltage between the opamp pin 7 and pin 4?
Also check the voltage *across* R13 and D4 please.

Jan

Last edited: 2021-09-19 6:44 am

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

T

therling
Member
Joined 2009

2021-09-19 10:55 pm #314

Thanks for getting back to me so quickly.

I found the problem. I had mistakenly installed the D4 5.6V Zener in the D5 12V Zener position and vice versa. Some of this newfangled solid state stuff is where I lack a bit of knowledge and experience. Had I not checked those zener voltages I'd have never found that problem. From now on I use my 5X magnification optivisor when handling those tiny zeners.

Both units are now functioning perfectly and my stereo sounds great.

For the record, for anyone running across the above comments while troubleshooting, the voltages you requested (after having corrected the Zener diode error) are as follows:

U2 Pin 7 to Pin 4 = 7.52V
Voltage across R13 = 2.1V
Voltage across D4 =5.4V
Voltage across R13 and D4 = 7.5V

The left unit is taking in 432V, output 418V
Right unit is 434V in, 421V out.

Thanks for pointing me in the right direction.

T

therling
Member
Joined 2009

2021-09-19 11:32 pm #315

One thing that's been bugging me, I can't find my trimpot tool with the recessed blade for those Bourns trimpots with the tiny slotted adjusting screw. I took a piece of 3mm hollow plastic tubing, reamed out the inner diameter to fit over the screw snugly and fastened it with CA glue (aka crazy glue), being careful to not let the glue run onto the screw and trimpot body. I can now more easily adjust those 25-turn trimpots by turning the plastic rod instead of a flat blade adjustment tool that keeps slipping off, a bit hazardous if you use metal screwdriver (which I do not recommend) that could cause a short circuit. That's particularly helpful with that heat sink at 434V so nearby.

Attachments

(URL: /community/attachments/bf84de2e-86e6-4936-92f8-2decd729956d-jpeg.984647/)

BF84DE2E-86E6-4936-92F8-2DECD729956D.jpeg

330.5 KB · Views: 195

jan.didden
AX tech editor
Joined 2002

2021-09-20 7:14 am #316

> **therling said:** *(URL: /community/goto/post?id=6790926)*
>
> Thanks for getting back to me so quickly.
>
> I found the problem. I had mistakenly installed the D4 5.6V Zener in the D5 12V Zener position and vice versa. Some of this newfangled solid state stuff is where I lack a bit of knowledge and experience. Had I not checked
>
> **Click to expand...** *(URL:)*

Well done! Those voltages look OK.

Jan

jan.didden
AX tech editor
Joined 2002

2021-09-20 7:16 am #317

> **therling said:** *(URL: /community/goto/post?id=6790954)*
>
> One thing that's been bugging me, I can't find my trimpot tool with the recessed blade for those Bourns trimpots with the tiny slotted adjusting screw. I took a piece of 3mm hollow plastic tubing, reamed out the inner diameter to fit over the screw snugly and fastened it with CA glue (aka crazy glue), being careful to not let the glue run onto the screw and trimpot body. I can now more easily adjust those 25-turn trimpots by turning the plastic rod instead of a flat blade adjustment tool that keeps slipping off, a bit hazardous if you use metal screwdriver (which I do not recommend) that could cause a short circuit. That's particularly helpful with that heat sink at 434V so nearby.

That is a good solution. My solution is a bit different: I kept on buying (and losing) cheap insulated trim screwdrivers until I started to find them again because there are so many floating around. It's a small amount that can be used to pad a Mouser order to get over $50 for free delivery. Probably half a dozen ;-)

Jan

Last edited: 2021-09-20 7:20 am

S

schiirrn
Member
Joined 2018

2021-10-16 2:43 pm #318

> **schiirrn said:** *(URL: /community/goto/post?id=6686412)*
>
> "**Should** be no problem" and "**some** reports with successful use" still make it sound as if something like the attached schematic **might** or **might not** work...

The amplifier is built and works. Both regulators have a load resistor at the output to draw necessary minimum current. No oscillations. Stable output voltage.

jan.didden
AX tech editor
Joined 2002

2021-10-16 2:50 pm #319

Thanks for the feedback!

Jan

Flavious Maximus
Member
Joined 2016

2021-12-19 11:00 pm #320

I'm trying to figure out how to use *PSU designer II* to design a PSU that would set the correct voltage coming into the Voltage Regulator. The last component (R2) is meant to represent the T-Reg voltage regulator. I have a couple of questions about that.

- Should the load representing the T-Reg be resistive or a constant current load?
- And what would be the appropriate values (either resistive or constant current) to most accurately represent the T-Reg?

Thanks,
Glenn

---

jan.didden
AX tech editor
Joined 2002

2021-12-19 11:04 pm #321

T-Reg on itself is a very light load, just a few mA. Sizing for that isn't a good way.
You need to determine the load on the T-Reg, the circuit you want to power, and use it's resistor equivalent as the R2 load to your supply.

Jan

Flavious Maximus
Member
Joined 2016

2021-12-19 11:20 pm #322

Not as easy as I thought it was? lol, of course not!!

I'm looking to use the T-Reg to power a Tubelab SSE. Would the load on the T-Reg ultimately be the pair of 5K OPTs at the end of the circuit?
R2 = 5K ohm?

Glenn

Attachments

(URL: /community/attachments/simple_se_amp_sch_11-08-jpg.1006714/)

Simple_SE_Amp_Sch_11-08.jpg

153.9 KB · Views: 137

Flavious Maximus
Member
Joined 2016

2021-12-20 12:16 am #323

Actually, now that I've thought about it, the load would be all the power the circuit uses. That would be a lot of power, it runs hot!!

if P = I x V
and I want to run 2 kt88s at 450V then (0.14A) x (450V) = 63W
I have 2 kt88s so 126W
and then 4.5W for the 12AT7
About 130W total.
Is that closer to what I'm looking for? Everything in audio is way more complicated than it appears at first glance! Whenever I think I understand something about circuits I soon realize how much the Dunning Kruger effect applies to me!!

---

jan.didden
AX tech editor
Joined 2002

2021-12-20 8:09 am #324

You said it: 2 x KT88 at 140mA each is 280mA, say 300mA to be on the safe side. That's what the T-Reg has to deliver, at 450V. Equivalent load on PSUD2 is thus 450V/300mA = 1.5k

Jan

Flavious Maximus
Member
Joined 2016

2021-12-21 2:23 am #325

> **jan.didden said:** *(URL: /community/goto/post?id=6884265)*
>
> You said it: 2 x KT88 at 140mA each is 280mA, say 300mA to be on the safe side. That's what the T-Reg has to deliver, at 450V. Equivalent load on PSUD2 is thus 450V/300mA = 1.5k
>
> Jan

Thanks for the explanation. That changes the circuit. Looks like I need to lower C1 to about 47uF or the line on the graph looks like a guitar string that's been plucked!
Cool, thanks for the help Jan

T

therling
Member
Joined 2009

2022-01-31 7:18 am #326

I recently received word from Mouser that the FDP12N60NZ is obsolete, discontinued by the manufacturer.

https://www.mouser.com/ProductDetail/512-FDP12N60NZ *(URL: https://www.mouser.com/ProductDetail/512-FDP12N60NZ)*
They still have a good number in stock (1200) but it may at some point become a problem. I'm wondering if I should stock up on a spare or two in case I need to replace that component some years from now unless there is a suitable substitute.

jan.didden
AX tech editor
Joined 2002

2022-01-31 7:22 am #327

I don't have a part number handy right now but I am pretty sure there will be an alternative.

Give me day or so to find one.

Edit: Onsemi recommends a replacement FDP**F**12N60NZ which is the isolated fullpak version.
The problem lies in the very much reduced SOA as shown in the attachment.
At 600V across the device (shorted output T-reg) the FDP60 can handle 400mA, the FDP**F**60 only 70mA ...

Jan

Attachments

(URL: /community/attachments/fdp60-png.1020506/)

FDP60.PNG

134.4 KB · Views: 61

Last edited: 2022-01-31 7:36 am

jan.didden
AX tech editor
Joined 2002

2022-01-31 7:57 am #328

A good replacement would be the NTP110N65S3HF. But there is an error in the datasheet. There is also a fullpak version, the NTP**F**110N65S3HF which has a much smaller SOA (due to the extra isolation of course). Unfortunately, if you look at the data sheets it's clear that they messed up the SOA curves for the two types. I need to straighten them out again

But to answer the original question: the NTP110N65S3HF is a good replacement. I will add it to the BOM.

Jan

S

schiirrn
Member
Joined 2018

2022-01-31 9:46 am #329

> **jan.didden said:** *(URL: /community/goto/post?id=6529125)*
>
> Don't start me about my own senior moments ... !
>
> Jan

About senior moments: Over the weekend I built 4 more T-Regs. Bench testing the first one I noticed output followed the input without any regulation. Reason was I mixed up Input and Output. The regulator survived without damage and hooked up the right way around works perfectly fine.

jan.didden
AX tech editor
Joined 2002

2022-01-31 10:06 am #330

OK yes I can see why that didn't damage anything, the diode in parallel with the FET shorted out any bad polarity voltages.
Good to know!

Jan

R

Raj1
Member
Joined 2003

2022-01-31 7:52 pm #331

Hi Jan,

im thinking of building a few of these. I've looked through the documentation, but other than the temperature rise table in the article and mention of "see text" in the bom, I can't find explicit instructions on how to work out the dissipation in Q1/Q7. Any advice appreciated.

Raja

---

jan.didden
AX tech editor
Joined 2002

2022-01-31 8:46 pm #332

The dissipation is simply the voltage across the device times the current through the device.
P = V x I (watts, volts, amps).

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

R

Raj1
Member
Joined 2003

2022-01-31 10:23 pm #333

Ahh ok. I'm looking at circa 30W.

---

jan.didden
AX tech editor
Joined 2002

2022-02-01 8:03 am #334

That's relatively high. What is the input and output voltage and output current?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

R

Raj1
Member
Joined 2003

2022-02-01 10:55 am #335

360V @ 60 ma for a 300B (sophia electric princess)

D3A at 150v @ 15mv

Input voltage 400V or so.

it'll need a tasty heatsink...

---

jan.didden
AX tech editor
Joined 2002

2022-02-01 11:02 am #336

So what is then the voltage across Q1/Q7?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

R

Raj1
Member
Joined 2003

2022-02-01 12:47 pm #337

It'll be the 400v input being regulated to 360V, Jan. the driver voltage is dropped via a choke and resistor.

---

jan.didden
AX tech editor
Joined 2002

2022-02-01 1:13 pm #338

So 40V. At 60mA +15mA. How much power is that ;-)

Jan

R

Raj1
Member
Joined 2003

2022-02-01 2:21 pm #339

> **jan.didden said:** *(URL: /community/goto/post?id=6927668)*
>
> So 40V. At 60mA +15mA. How much power is that ;-)
>
> Jan

ah, I thought you meant the total draw needed to be taken into account.

---

jan.didden
AX tech editor
Joined 2002

2022-02-01 2:32 pm #340

Yes. Isn't that 60mA + 15mA?
Or is that for one channel?
Are you able to calculate the dissipation? I gave the simple equation earlier.
How did you arrive at 30W?

Not trying to play games - I think if you apply this stuff you should know what you are doing.

Jan

R

Raj1
Member
Joined 2003

2022-02-01 2:40 pm #341

> **jan.didden said:** *(URL: /community/goto/post?id=6927717)*
>
> Yes. Isn't that 60mA + 15mA?
> Or is that for one channel?
> Are you able to calculate the dissipation? I gave the simple equation earlier.
> How did you arrive at 30W?
>
> **Click to expand...** *(URL:)*

The amps are monoblocks, so it would be 75ma dissipated across the transistor for each amp.

30W is the approx total power consumption of each amp, Jan.

---

jan.didden
AX tech editor
Joined 2002

2022-02-01 2:57 pm #342

OK, you won't come clean. Your choice.
75mA per channel, with 400-360V=40V across the regulator, is 40 x 75 mW = 3W per channel in Q1/Q7.

Jan

R

Raj1
Member
Joined 2003

2022-02-01 3:02 pm #343

> **jan.didden said:** *(URL: /community/goto/post?id=6927744)*
>
> OK, you won't come clean. Your choice.
> 75mA per channel, with 400-360V=40V across the regulator, is 40 x 75 mW = 3W per channel in Q1/Q7.
>
> Jan

i thought you understood my mistake, which was summing the amp power consumption with p=va. This wasnt about coming clean. I didn't think I'd need to tell you how I arrived at the figure. Assumption got the better of both of us.

---

jan.didden
AX tech editor
Joined 2002

2022-02-01 3:28 pm #344

I asked clear question, you tap-danced. I'm not spending my time on such games.
Off to my ignore list.

Jan

R

Raj1
Member
Joined 2003

2022-02-01 3:36 pm #345

i wasnt even being facetious. You're reading into it far too deeply. But, whatever.

T

tanker135
Member
Joined 2011

2022-02-26 3:18 am #346

Hello Jan,
Are C3, C4 , C6 and Q1 voltage rating are limited factor why the board is limited to 500V in? If changing these components to higher voltage rating, would it be safe for input higher than 500V? My supply has about 640 V raw output after choke/capacitor input filter. I could reduce the supply further with some power resistor to bring it about 600V or less as required. However, I wanted the flexibility to adjust it between 400-550V regulated output with load current of 250mA for testing different amps. Will plan to use chassis heatsink for Q1. With these in mind, would it safe to use your board or I need to do something else? Please let me know. Thanks.

---

jan.didden
AX tech editor
Joined 2002

2022-02-26 8:01 am #347

Actually you can use it up to 600V with one change. Q8 is shown as a IXTP08N100D2, which were not available at the time I assembled the kits.
So replacing the IXTP08N50D2 with a IXTP08N100D2 gives you 600V limit.
C3, C4 and C6 should be 630V rating.

Jan

T

tanker135
Member
Joined 2011

2022-02-26 4:24 pm #348

Jan,

Yes, I am aware of the Q8 and will use IXTP08N100D2. I probably will use higher voltage rating for C3 too to give it more safety margin and peace of mind. Also do you have any concerns if I replace Q1 with IXTP08N100P? I have both Q1 and Q8 in my hand. Yes, I am aware it does not have Vgs protection built in as FDP12N60NZ. However, I will find the way to add them in.

Again, thanks for a quick response.

jan.didden
AX tech editor
Joined 2002

2022-02-26 4:50 pm #349

It all depends on the current draw. The 12N60 can source 400mA and still be short-circuit proof with its large SOA.
The IXTP08N100P will be limited to 100mA at 25C heatsink, and only half that at 75C. (see fig 15 and 16 of the data sheet).
Is that within the intended envelope?

Jan

T

tanker135
Member
Joined 2011

2022-02-26 5:33 pm #350

Jan,

I can't find the SOA figures 15 & 16 of IXTP08N100P in datasheet that you just mentioned. Attached is the datasheet.

Attachments

(URL: /community/attachments/ixty08n100p-ixys-pdf.1029489/)

IXTY08N100P-IXYS.pdf

257.6 KB · Views: 74

jan.didden
AX tech editor
Joined 2002

2022-02-26 5:54 pm #351

> **tanker135 said:** *(URL: /community/goto/post?id=6953938)*
>
> Jan,
>
> I can't find the SOA figures 15 & 16 of IXTP08N100P in datasheet that you just mentioned. Attached is the datasheet.

That's funny, I found it in the attached.

Edit: it's gone now that I attach it! Weird. I added a screenshot.
There's also a one-line spec in the datasheet, attached.

Jan

Attachments

(URL: /community/attachments/ixty08n100p-ixys-pdf.1029495/)

IXTY08N100P-IXYS.pdf

257.6 KB · Views: 65

(URL: /community/attachments/soa-png.1029496/)

soa.PNG

66.1 KB · Views: 73

(URL: /community/attachments/soa2-png.1029498/)

soa2.PNG

9.9 KB · Views: 77

T

tanker135
Member
Joined 2011

2022-02-26 6:30 pm #352

Jan,
There are two different datasheet for IXTP08N100P (Enhancement) and IXTP08N100D2 (Depletion). IXTP08N100P does not have figures for SOA. However, I assumed that we can use the same SOA from IXTP08N100D2. Now I can see your point. In my situation for normal operation with 50-60V across Vds I think it will be OK but not look good for 200Vds. It's definitely not short proof.

Again thanks.

jan.didden
AX tech editor
Joined 2002

2022-02-26 6:42 pm #353

OK, yes I missed that difference. But you get it.
I have spend countless hours searching datasheets for a good HV FET with a wide SOA, they are rarer than hen's teeth.
Nobody is using FETs in linear mode except those funny audio guys .
The 12N60 is being obsoleted as well.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

tanker135
Member
Joined 2011

2022-02-26 10:02 pm #354

Jan,
How do figure out what's SOA if SOA figures do not include DC curve? Thanks.

jan.didden
AX tech editor
Joined 2002

2022-02-27 7:58 am #355

Very good question! What I did in the T-reg is to make sure that the current at the current limit does not stay there more than a few 100mS.
In case of short, the current is limited to the set value but a fraction of a second later the supply is shut down.
The idea is that short-term load pulses at the current limit are supported but only for very short periods.
It's a bit of guesstimate work, but in practice it seems to work.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

tanker135
Member
Joined 2011

2022-02-27 4:04 pm #356

Jan,

I noted on your website you recommended that NTP110N65S3HF would be a good substitution for FDP12N60NZ. During my research I found a few that would probably be good candidates for substitution that you want to take a look (e.g., STP36N60M6, STP33N60M6, STP34N65M5, STP35N60M2-EP).

On another subject I plan to connect your regulator to the B+ of my KT88 pushpull amp with an Ultralinear output transformer, do you see any issue with this or what other recommendation you would recommend to do before connect it to the B+ (H.T)?

Thank you.

Attachments

(URL: /community/attachments/ultraliner-output-tranny-jpg.1029757/)

Ultraliner output tranny.jpg

28.3 KB · Views: 67

jan.didden
AX tech editor
Joined 2002

2022-02-27 4:23 pm #357

Yes these look like good candidates. Too bad the SOA graphs stop at 10mS, but they are quite robust at 1A and 600V or more.
They would probably be totally safe in the T-reg up to say 200mA.
One issue to be aware of is that nowadays many power FETs are offered in a fullpak case which is a totally isolated tab, so you don't need an isolation between the tab and a heatsink.
But fullpak devices have a very bad SOA and are pretty much unusable in a T-reg.

I don't see any problems in your use case. I have been in a discussion with someone who had problems with a choke loaded single ended amp.
But that didn't get resolved whether it was a supply issue or whether there was another issue with the amp.

Jan

T

tanker135
Member
Joined 2011

2022-02-28 6:33 pm #358

Jan,

For Q1 mounting to chassis is it possible to run the wires from PCB to the chassis location where Q is mounted? What precautions or practices I would take into consideration if doing this? Thanks.

jan.didden
AX tech editor
Joined 2002

2022-02-28 6:49 pm #359

Nothing special, except keeping it as short as possible. Use thick wires for S and D.

Jan

D

Dipolejapan
Member
Joined 2020

2022-03-17 11:46 am #360

Hi I'm new to the group, this is my first intervention. i am building a phono preamp
purchased two reg ht shunt boards for use in the first voltage gain stage of my phono stage. The stage works in a voltage point of 105V and 8 mA of anode current. What current should I adjust the output shunt to get the best sound result? I have read that other models of shunt (Salas SSHV2) work in an optimum of double or 3x the current necessary for the amplifier stage, in my case with 8mA I should set the shunt to 16-24mA. correct? I await suggestions.
thank you

jan.didden
AX tech editor
Joined 2002

2022-03-17 12:48 pm #361

Did you get the T-reg? That is a series reg, and as such doesn't need to set a shunt current.
What you should do is set the current limit to something like 5 x the expected load current.
That is enough leewing while still having protetion for failures.

Jan

jan.didden
AX tech editor
Joined 2002

2022-03-17 6:23 pm #362

Apologies for the writing error - I wrote it on a phone in a hurry on a hospital bed.
It should be 'That is enough leeway while still having protection for failures.'

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

D

Dipolejapan
Member
Joined 2020

2022-03-18 2:36 am #363

> **jan.didden said:** *(URL: /community/goto/post?id=6971829)*
>
> Apologies for the writing error - I wrote it on a phone in a hurry on a hospital bed.
> It should be 'That is enough leeway while still having protection for failures.'
>
> Jan

> **jan.didden said:** *(URL: /community/goto/post?id=6971574)*
>
> Did you get the T-reg? That is a series reg, and as such doesn't need to set a shunt current.
> What you should do is set the current limit to something like 5 x the expected load current.
> That is enough leewing while still having protetion for failures.
>
> Jan

ho comprato il T-reg V5 nel negozio del link qui sotto

https://diyaudiostore.com/products/linear-audio-t-reg *(URL: https://diyaudiostore.com/products/linear-audio-t-reg)*

I bought it after reading a comparison article made on a group of different controllers. the article is visible at the following link:

https://www.google.com/url?sa=t&sou...sQFnoECBIQAQ&usg=AOvVaw2CcSrnjXFsU10eGOggAgas *(URL: https://www.google.com/url?sa=t&source=web&rct=j&url=https://linearaudio.nl/sites/linearaudio.net/files/v4%2520jdw.pdf&ved=2ahUKEwjEyZD9ys72AhVRIMUKHTXCCosQFnoECBIQAQ&usg=AOvVaw2CcSrnjXFsU10eGOggAgas)*
in the comparison the Jung / Diedder regulator obtains excellent evaluations and, after several researches on the net, I came to the T-reg v5 that I bought. Also, in the reviews of the t-reg v5 there is a positive review of a user who replaced his failed superregs with the t-reg v5 in his preamplifier RTP3D. based on this I have considered buying them in the hope that they will give excellent sound results. I will use them in a high gain phono stage, I have no experience with regulated power supplies neither series nor shunt. I hope for your help as for the sound results it is impossible to know before having edited and listened to. I am consoled by the fact that a card like the t-reg v5 would seem a good basis for having clean voltage supplies and useful variables to be able to experiment with different working points. Basically like having a variable voltage power supply for the workbench.

E

Eric W
Member
Joined 2011

2022-03-24 7:52 pm #364

hi there. I was wondering if anyone had suggestions on where to start troubleshooting my failed attempt at building this board.

My problem is that there isn't any regulation of the voltage. Whatever comes in Vi is the same as what goes out Vo, and it's not stable. The trim pot also doesn't seem to affect things much if at all. I have R11 set to trim down to around 290 volts (500k ohms). But that doesn't seem to matter. maybe it's U2? So if anyone can think of a part that may have failed that would cause this, and how to test it, that would be great.

D

Dipolejapan
Member
Joined 2020

2022-03-25 3:55 pm #365

Ho appena ricevuto le carte t-reg. chiedo in V in posso entrare con dc, quindi dopo il trasformatore di alimentazione, i diodi raddrizzatori e il filtro CLC? dopo il regolatore, cioè a valle della V out, può essere conveniente inserire un filtro RC aggiuntivo? o il filtro RC in uscita degraderebbe le prestazioni. grazie.

D

Dipolejapan
Member
Joined 2020

2022-03-25 3:56 pm #366

I just got the t-reg cards. i ask in V in can i enter with dc, then after the power transformer, rectifier diodes and CLC filter? after the regulator, ie downstream of V out, can it be convenient to put an additional RC filter? or the outgoing RC filter would degrade performance. thank you.

jan.didden
AX tech editor
Joined 2002

2022-03-25 7:05 pm #367

> **Dipolejapan said:** *(URL: /community/goto/post?id=6979308)*
>
> I just got the t-reg cards. i ask in V in can i enter with dc, then after the power transformer, rectifier diodes and CLC filter? after the regulator, ie downstream of V out, can it be convenient to put an additional RC filter? or the outgoing RC filter would degrade performance. thank you.

You can put RLC anything between rectifier and T-reg input, but the effect will be very limited.
Do *not* put any R-C at the T-reg output, you will destroy the low output impedance (and maybe the low noise).

Jan

jan.didden
AX tech editor
Joined 2002

2022-03-28 8:32 am #368

> **Eric W said:** *(URL: /community/goto/post?id=6978675)*
>
> hi there. I was wondering if anyone had suggestions on where to start troubleshooting my failed attempt at building this board.
>
> My problem is that there isn't any regulation of the voltage. Whatever comes in Vi is the same as what goes out Vo, and it's not stable. The trim pot also doesn't seem to affect things much if at all. I have R11 set to trim down to around 290 volts (500k ohms). But that doesn't seem to matter. maybe it's U2? So if anyone can think of a part that may have failed that would cause this, and how to test it, that would be great.

Hi Eric, did this get resolved yet? If not, can you give us some info?
What is the input voltage you use, how much is the output voltage?
Can you measure the voltage between gate and source of Q1 ?

Jan

E

Eric W
Member
Joined 2011

2022-03-29 5:38 am #369

> **jan.didden said:** *(URL: /community/goto/post?id=6981570)*
>
> Hi Eric, did this get resolved yet? If not, can you give us some info?
> What is the input voltage you use, how much is the output voltage?
> Can you measure the voltage between gate and source of Q1 ?
>
> Jan

hi Jan

thanks for the support. I measured source and gate of Q1 and got 5.8 volts. Vi and the desired Vo is a pretty big difference currently. When the regulator is loaded with a resistor I get 370v in and a desired Vo of 290v. I'm waiting on some resistors to drop the Vi down (and eventually a new transformer). This is my first attempt at designing my own power supply (minus your regulator) and my calculations weren't correct. I wasn't planning on running the regulator with that large of a drop. I was only doing it for testing.

After further reading and learning, and I'm probably wrong, but I was wondering if the voltage differential between Vi and Vo is causing an issue with Q8. When I measure the voltage difference between pin 7 of U2 and the point between R13 and D4, I get less than a volt. like 0.1 volts.

thanks again

Eric

jan.didden
AX tech editor
Joined 2002

2022-03-29 6:05 am #370

I'll look into it later today, but be aware that the T-reg needs at least 3 or 4mA load to function.
It will not regulate if there is no load at all.
And don't change Vi or transformer at this time, that a waste, we first have to get the regulator working.
Actually your measurement shows it IS working but possibly too low load.
Does it work correctly with a small load like 20mA?

Edit: I think you are saying it works OK, 390Vin and desired 290Vo under load. So what is the problem actually?

Jan

Last edited: 2022-03-29 6:22 am

E

Eric W
Member
Joined 2011

2022-03-29 11:31 pm #371

> **jan.didden said:** *(URL: /community/goto/post?id=6982487)*
>
> I'll look into it later today, but be aware that the T-reg needs at least 3 or 4mA load to function.
> It will not regulate if there is no load at all.
> And don't change Vi or transformer at this time, that a waste, we first have to get the regulator working.
> Actually your measurement shows it IS working but possibly too low load.
> Does it work correctly with a small load like 20mA?
>
> **Click to expand...** *(URL:)*

oh, sorry, that was confusing. I was trying to say that I want Vo to be 290 but was getting 370.

But you were right in that my test load resister was too large. I put a smaller resister in to get more current and now the regulator is showing 300V. A good thing! Thanks!

jan.didden
AX tech editor
Joined 2002

2022-03-30 6:39 am #372

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

D

Dipolejapan
Member
Joined 2020

2022-04-04 3:58 am #373

can I use a single power transformer followed by a single filter like this to power two t reg cards for the left and right channels?
Thanks

> ujju3doc

---

jan.didden
AX tech editor
Joined 2002

2022-04-04 6:37 am #374

I would at the least like to see the power transformer winding arrangement, but as shown it provides a pos and a neg voltage.
It looks like a bipolar supply for a high power transistor amplifier.
To use a T-reg for the L and R channels you would need a pos voltage for each T-reg, no?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Brinkman
Member
Joined 2007

2022-04-20 2:08 am #375

So on an amplifier such as this...
... the regulator would replace R20 in the power supply and C17+C18//R18+R19 would be omitted, correct?

---

jan.didden
AX tech editor
Joined 2002

2022-04-20 6:47 am #376

Yes, for the two B++ supplies, that is correct.
I see that the B+ is taken off at what would be the T-reg input.
What is the difference in voltage between B+ and B++?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

> Brinkman

Brinkman
Member
Joined 2007

2022-04-20 11:56 am #377

B+ is 500V; R20 [in my slightly reworked mono block version of this schematic] is a 10K 1W resistor.

---

jan.didden
AX tech editor
Joined 2002

2022-04-20 2:40 pm #378

If you would use a T-reg for the B++, you don't need R20, R19, R18, C17, C18.
But you need to know the B++ value to set the T-reg accordingly.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

Brinkman

T

therling
Member
Joined 2009

2022-04-22 4:27 am #379

Update. I've been running two T-reg 5s on my dual-mono modified HH Scott tube amp since early last December and they have stayed within a volt or two of the 420V plate voltage ever since I'd set them back then.

The meters in measuring those voltages are generic Ebay Chinese 0-500V DC ones that I've included in a meter bridge behind the amp. It also monitors line voltage, bias supply and individual bias settings for the 7189 output tubes. Makes a nifty light show in the dark.

jan.didden
AX tech editor
Joined 2002

2022-04-22 6:06 am #380

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

D

Dipolejapan
Member
Joined 2020

2022-05-26 1:19 pm #381

excuse mine which may seem trivial to some. I am building the t-reg for the first time and I am still in the component purchasing phase. I ordered them on mouser and found that many components of the excell list were already in kit form. never mind it will mean that in case of failure I will have them in reserve.
adello my damanda on the excell sheets the last line of the resistors is written; R16 2.2 res50 1 W film resistor current limit set; see text for actual value!

my stage should run at 45V and 9mA approximately. the suggestion that I was given is to supply a current x5 compared to what the stage will work teally, so I would like 50 mA. how do i get 50 mA from my boards? ie what is the value you want for r16 in order to get 50 mA? thank you
Salvatore Aragona

2022-05-26 2:54 pm #382

jan.didden
AX tech editor
Joined 2002

It's all in the article....

Jan

Attachments

(URL: /community/attachments/treg1-png.1058110/)
treg1.PNG
11.4 KB · Views: 127

(URL: /community/attachments/treg2-png.1058111/)
treg2.PNG
32 KB · Views: 122

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

2022-06-26 11:37 am #383

B

beardman
Member
Joined 2005

Update om my T-Reg regulator use to my 4p1l preamp

going from Cornell Dubilier caps on C3 and C6 ,, i use now Intertechnik Audyn Cap Reference 0.33uf on C3

and fostex cs copper-tin foil 3uf on C6 ,,, and C4 is Duelund CU 0.47 uf

this give me a very nice sound,, better from buttom to top ,,, buttom is more full and deep

so for me is good caps a must

best Bjarne

2022-07-18 10:14 am #384

S

sepe421
Member
Joined 2020

this might be a stupid question but is there any simple way to configure a voltage source to simulate the output from this circuit without having to draw it all in ltspice?

2022-07-18 10:55 am #385

jan.didden
AX tech editor
Joined 2002

That depends on how realistic you want it to be. You can simulate the voltage output with just a voltage source. You can add a small R to simulate the Rout, but it is freq dependent so you need a more complex output network, etc, etc.
The most realistic (but stlill not exact) is the actual circuit.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

sepe421

DontHertzMe
Member
Joined 2013

2022-08-10 5:44 pm #386

Would a SET amplifier benefit from 2 of these? One feeding the driver tube and another feeding the output tube (2A3)? Or is just one reg feeding the driver tube sufficient?

No Morse

S

schiirrn
Member
Joined 2018

2022-08-12 9:07 pm #387

I have built a 2stage SET amp with a regulator on each tube. The amp is dead silent (Coleman regulators on the filaments, small as possible loop areas, etc...). To me there is a subjective sound difference when using either a T-Reg or an LC for decoupling of the output stage.
According to some just one regulator on the driver tube is enough and preferable.

V

viltsone
Member
Joined 2022

2023-02-20 10:02 pm #388

@**jan.didden** *(URL: https://www.diyaudio.com/community/members/1603/)* What about this T-Reg regulator PSRR? Will I hear any difference in sound using this T-Reg regulator or 21 century regulator or LM317 maida regulator? What are the most key aspects to look at tube HV regulator?

M

MarcelvdG
Member
Joined 2003

2023-02-20 10:29 pm #389

Jan got fed up with diyaudio and left, hence the "Account disabled at user request".

leadbelly

T

therling
Member
Joined 2009

2023-04-12 8:35 am #390

That's a shame that Jan has left. He had always been quick to respond with help with questions about and problems with his kits.

But understandable. Here we have the internet, the most powerful information tool ever invented and people use it just to bicker.

Bonsai, schiirrn, bucks bunny and 2 others

krivium
Member
Joined 2009

2023-04-12 9:33 am #391

Such a loss. Stalkers are a pity. 😯

M

MarcelvdG
Member
Joined 2003

2023-04-12 9:44 am #392

If you need to contact him, see his website: **https://linearaudio.net/contact** *(URL: https://linearaudio.net/contact)*

krivium

Bonsai
www.hifisonix.com
Joined 2003

2023-04-12 9:52 am #393

Wow. That's a pity. Another great contributor gone.

http://hifisonix.com/x-altra-phono-eq-preamp/ For the Ground Loops presentation and the rest of the Hifisonix projects, visit https://hifisonix.com/

T

therling
Member
Joined 2009

2023-05-11 2:20 am #394

Update. Doing some routine maintenance on my amplifier, I decided that I wasn't all that thrilled with the heat sink being at 420 volts so I harvested some silicon heat sink insulation from an old computer power supply and installed it behind Q1 and Q7. Now there's less chance of getting zapped if my hand slips while poking around in there.

M

mdpaudio
Member
Joined 2014

2023-05-11 2:36 am #395

Were the fun in that? Getting bitten by 300+ volts lets you know you're alive! Getting bitten by 500+ volts let's you know you're dead!

> therling

Z

Zung
Member
Joined 2005

2023-05-11 10:57 am #396

Not quite.
Right after graduation, my very first job was a current regulator for an electron microscope. I took 675V between the right and the left hand.
It wasn't pleasant, but I still breathe.

---

chede
Member
Joined 2016

2023-05-11 8:52 pm #397

That's why the first thing we learned in the lab was: "always keep your left hand in your pocket if you start poking around in the equipment". I still do that reflexively.
Also, after a high-voltage shock - always a trip to the hospital because of the risk of internal blod clotting from the current running through you, which might lead to problems a short time afterwards ...

Z

Zung
Member
Joined 2005

2023-05-11 11:17 pm #398

It was 1975, RCA was getting ready to close down its tube factories, Laurence Nagel was doing his PhD at UCB on a thing called SPICE, The C Programming Language was yet to be published... Things were not as organized as they are today. It was quite a shock, but I got away without any consequence that I know of.

D

dch53
Member
Joined 2015

2023-07-09 3:37 am #399

Sadly, I managed to destroy every bit of silicon in my T-Reg in a pyrotechnic display! Every bit I can test anyway.

I'd previously tested the regulator separately and it worked fine.

Despite double-checking the wiring I suspect an error incorporating it into my 300B SE amp causing it to try to drive a short-circuit. The regulator was set for 400V and preceded by a SMPS HT supply producing 420V, also checked and working fine.

A chunk of Q8 was a metre away, R2 and R5 were obviously destroyed which was puzzling. Q7 was a short. The 3 small-signal transistors all dead as was D4 the 5.6V zener. I assume the op amp has had it.

Q8, the IXTP08N100D2, is unobtanium at the moment so there was no option but to order a new kit from the diyAudio store.

> therling

T

therling
Member
Joined 2009

2023-07-09 4:25 am #400

Oh, heck, I know the feeling. I misplaced a nut only to find that it had lodged itself under the circuit board of Jan's high voltage delay device and turned some high wattage resistors into light bulbs. Had to order up a new HV delay device and a T-Reg, bought a spare because I know some of the FETs are at "end of life," as the mail order houses announce.

I figure that trial and error and error is always part of the fun of learning as long as you don't turn any vital organs into resistors.

T

therling
Member
Joined 2009

2023-07-09 4:32 am #401

Zoof! A vaporized BJT transistor makes an interesting splatter of carbon on a pricy piece of silicon. But hey, the upside is another recyclable bunch of resources for the junk box.

jan.didden
AX tech editor
Joined 2002

2023-07-09 6:42 am #402

What happened here?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

T

therling
Member
Joined 2009

2023-07-09 7:19 am #403

A fastener that I'd thought had rolled off the bench and onto the floor and gotten lost had instead lodged itself under the HV delay PCB, causing a short to the chassis.

D

dch53
Member
Joined 2015

2023-07-28 5:03 am #404

My T-reg TS-5 is setup for 400V and a current limit of 300mA (R16 = 2R7). It regulates just fine.

However, it's current limiting at around 120mA. I measured the voltage across R16 and it's limiting with ~0.3V across R16 rather than at 0.8V.

I wasn't able to get either a BC556B or BC560C for Q5 and used a BC557 available locally. The only significant difference I can see is in hfe. BC557 is only rated as >110. BC556B is 180 and BC560C is 380. Could the BC557 be the problem?

If not, any other suggestions please?

I see that BAT42s are no longer recommended for D7A and D7B and will order some SB140Ts.

---

jan.didden
AX tech editor
Joined 2002

2023-07-28 8:02 am #405

Lower Hfe would increase the limiting value, not lower it.
Since you measured the actual limiting value (0.3V) the resistor values are not the cause.
Can you verify the Q2 orientation?
I've seen some with different pinout from different manufacturers but with the same typenumber.
Can you verify, if you short R16, can you get up to 300mA?

Another test is to disconnect R7 from R6 and connect that end of R7 to Vout.
That disables the shutdown.
BTW Do you see just limiting or shutdown?

Jan

D

dch53
Member
Joined 2015

2023-07-29 8:08 am #406

Hi Jan. Thanks for the reply.

I see limiting (400V down to around 200V) followed by shutdown after 2 or 3 seconds which is as-designed I think.

Q2, Q3 and Q5 are oriented as per the silk-screening on the PCB. Q2 and Q3 are onsemi BC550Cs so they should be standard pinout. Q5 is a BC557 of unknown brand. My metre reckons it's a standard pinout with an hfe of around 400.

I shorted R16 and the regulator doesn't limit at 200mA which is all my test setup (400V across 22 47k 5W resistors in parallel) can do. I'll add another 14 47k resistors to try it at 300mA and let you know how it goes.

BTW, thanks very much for the regulator. I'm using it to clean up the HT from a cheap (relatively) LLC resonant supply in a 300B stereo amp I'm building.

Dave.

Attachments

(URL: /community/attachments/img_4191-jpeg.1197434/)

IMG_4191.jpeg

791.8 KB · Views: 62

jan.didden
AX tech editor
Joined 2002

2023-07-29 8:55 am #407

Dave, it looks that you supply T-reg from a switching supply.
Any chance that it's that supply that limits Iout?
Have you tested it on itself?

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

D

dch53
Member
Joined 2015

2023-07-29 10:16 am #408

Thanks Jan. The switching supply is supposed to be good for 300W. I've been using it @ 200mA in the test bed and ~180mA in the 300B amp I'm building for a few weeks without a problem. Definitely the T-Reg that's limiting.

I'll increase the current to 300mA tomorrow.

Dave.

> jan.didden

D

dch53

Member

Joined 2015

2023-07-30 9:30 am #409

Hi Jan.

I'm very puzzled! My T-Reg doesn't limit on the bench. I don't think it's current limiting is the problem.

I'm investigating lots of possibilities. The problem may well be in the amp itself. It runs OK straight from the SMPS but there's a lot of 100Hz, 200Hz, 300Hz etc noise in the output coming from somewhere. There's a problem there that I'm yet to track down. Maybe there is sudden current spike over 300mA that my metre isn't fast enough to pick up that's causing the current limit to trigger.

Can you answer some questions for me please?

Could MHz region switching noise or residual ~100kHz ripple from the SMPS cause problems for T-Reg? I've attached a screenshot from my oscilloscope.

What would you expect T-Reg to do if the input voltage drops below the set output voltage? One theory I'm investigating is the regulation of the SMPS. Mains here can go from 222VAC up to 247VAC depending on whether the sun is shining; day night but also whether a cloud blocks the sun for a few seconds. Maybe as the mains voltage drops if the SMPS regulation isn't very good, it's output voltage drops as well.

How long would you expect T-Reg to take to settle down to steady output voltage? When I turn it on the output voltage slowly increases by 2 to 3 volts over a few minutes before settling down.

Have you experienced any hysteresis around the trimpot set-point? As I adjust the trimpot approaching my desired voltage of 400V, I get to about 395V and a fraction of a turn later the voltage jumps up to 412V. Then when I wind the trimpot back nothing happens for 2 or 3 turns before it suddenly decreases to 370V-380V. I thought there might be something wrong with the trimpot and took it out and tested it but it was fine. Maybe it's C4 charging and discharging.

When I find out what the problem actually is, I'll let you know.

Thanks and regards, Dave.

Attachments

(URL: /community/attachments/ht-km-pl600-running-2-jpg.1197785/)

HT KM-PL600 running 2.jpg

52.1 KB · Views: 40

jan.didden
AX tech editor
Joined 2002

2023-07-30 9:47 am #410

There's a lot of interacting stuff here. My suggesting would be to attack it one at the time.
Get T-reg working on the bench (linear supply?).
Put an elcap at the input and load the output with a minimum of 5mA to assure regulation.
Maybe just repace the output volt setting resistor and trimpot with a resistor value that sets it to a value 10 or 20V below the output of the bench supply.
Then see if it regulates OK. Increase load and check that the output remains stable up to current limit. Verify that all all loads the bench remains well above Vout, if not then repeat the whole thing with a lower Vout to make sure bench supply is always, any load, well above Vout.

If regulation works, increase load to see if limiting works, do that intermittently, to check the load curent at which Vout will start to drop, that should be the intended current limit.
If that works, increase the time that you put it in limiting and see if it shuts down.
To be safe, do all of that limit stuff at a low current say 50 or 100mA.
The object is not to check max currents but to check the functionality.

Jan

D

dch53
Member
Joined 2015

2023-07-30 10:19 am #411

Thanks Jan. Good advice.

I'm going to attack the amp the same way.

T

tanker135
Member
Joined 2011

2023-08-16 11:25 pm #412

Can anyone explain the purpose/function of D5 (zener diode Z12) in T-regulator circuit? I thought Q1 (FDP12N60NZ) has built in back to back protection zener diodes, therefore making D5 not necessary, right? I read the T_Reg Article document but did not find any info about the this Zener. Thanks.

jan.didden
AX tech editor
Joined 2002

2023-08-17 7:57 am #413

That was a point of discussion.
Some said that the build-in zener is only rated for high voltage/low current from static from handling and such, but not as protection in a circuit.
I couldn't win that discussion so I added the zener ;-)

Jan

T

tanker135
Member
Joined 2011

2023-09-14 2:48 am #414

Jan,
Can Q1 (FDP12N60NZ) be replaced with IGBT transistor? What's pro & con? Thanks

jan.didden
AX tech editor
Joined 2002

2023-09-14 6:56 am #415

In principle any power device can be used, but there's a few things to look out for.
You need to make sure that the safe operating area of the device can handle 400mA at the maximum input voltage.
That should be in the data sheet, and is a serious limitation in a lot of high power devices that are meant for switching applications rather than linear.
Some switching device datasheets even don't specify the SOA at all!

The other thing is that the bandwidth and inter-electrode capacitances may make the control loop unstable.
There's no hard and fast way to check that other than just trying it with several loads; possibly a spice sim can shine some light on it too but it's not always 1:1 transposable to a real unit.
So your a bit on your own here.

Jan

T

tanker135
Member
Joined 2011

2023-09-14 1:10 pm #416

Jan,
How do you check for if the control loop is stable/unstable in LTspice with your circuit? Thanks

jan.didden
AX tech editor
Joined 2002

2023-09-14 2:13 pm #417

If it oscillates then the largest signal is usually at the opamp output or at the gate of the pass device.
You probably want to check with light loads as well as larger loads, and with and without extra capacitor at the output.
But also check in real life, not all spice models do accurately model open loop response and capacitances of devices.

Jan

D

dch53
Member
Joined 2015

2023-09-15 10:09 am #418

Can anyone give me a strategy for debugging one of my regulators please? One doesn't regulate properly. I'm running them side by side at 25V and ~50mA. 45V in.

When I double the load on one the voltage pops up to 29V. I've tried comparing voltages but all I can tell you is that when I halve the load on that one the voltage across R11 increases by 2.5V.

Thanks!

jan.didden
AX tech editor
Joined 2002

2023-09-15 10:31 am #419

What are the opamp input and output voltages when it drops out?
Is D7 the right way around?

Are you aware that R11 is in the neg reg? So that 45V in should probably be -45V in.

Jan

Last edited: 2023-09-15 10:48 am

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

jan.didden
AX tech editor
Joined 2002

2023-09-15 3:44 pm #420

Sorry for the above post, I was looking at the superreg not the T-reg, so forget it.
I'll take a fresh look.

Jan

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jan.didden
AX tech editor
Joined 2002

2023-09-15 4:55 pm #421

Can you check the opamp output voltage referred to Vout?
What happens when you increase the load?

Jan

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D

dch53

Member

Joined 2015

2023-09-16 6:16 am #422

I made more measurements today. Unlike yesterday when the output voltage increased when I decreased the load, today the voltage was dropping. No idea why. Here are the measurements:

Initial setup: 45V in. Both setup for 25V out into 560R (44.6mA)		
Measurements with load reduced to 220R (113.6mA)		
	Good unit	**Bad unit**
Vout	25V	22.7V
AD8031 output	30.2V	25.4V and going down -> 24.6V etc
Q3 Vbe	0.274V	0.274V
Q2 Vbe	0.2V	0.2V
Voltage across R4	0.56V	0.56V
Voltage across R11	24.9V	22.8V and going down
Voltage across R1	0.56V	0.56V
Q5 Vbe	0V	0V
Voltage at junction of R1, VR1, R4 etc	22.7V	23.7V and going down -> 23V etc

All I get from this is that the constant current sources in both units appear to be producing the same current. All current limiting transistors are off.

In the bad unit the input to the op amp is lower as is the output. This turns the pass MOSFET off more thereby reducing the output voltage.

None of this is helping me diagnose the problem though.

jan.didden

AX tech editor

Joined 2002

2023-09-16 1:27 pm #423

Next if you want to post measurements please measure against Vout, not against Gnd.
The whole regulator floats on Vout so that's the reference.
It appears that the opamp is off.
Assuming it is not broken, it thinks that Vout is too high so it tries to shut down the pass device.
Check the inputs of the opamp (against Vout).
Check the polarity of the diodes around the opamp circuit, are they the correct way around?

Jan

D

dch53
Member
Joined 2015

2023-09-17 9:06 am #424

Thanks for your patience Jan. I've re-done the measurements, referenced to Vo.

D7A and D7B are the right way round.

Referenced to Vo, there's very little difference between the measurements so I swapped meters to one with 4 decimal places.

I think the opamp is working. 3rd and 4th decimal places, but the problem unit has double the Δ across the input pins of the op amp. There's a 2nd decimal place difference in the voltages on the pass device gate.

Sadly the measurements still aren't identifying the problem for me. I thought maybe I had a different value of R11 in the problem unit but it's exactly the same.

Initial setup: 45V in. Both setup for 25V out into 560R (44.6mA)		
Measurements with load reduced to 220R (113.6mA) with reference to Vout		
Good unit Vo 25.018V. Bad unit Vo 23.329V and heading down.		
	Good unit	Bad unit
Vin	22.5	24.3
Junction of R1, VR1, R4 etc	0.0010	0.0033
Junction of D6, C11, Q8 source etc	7.918	8.210
AD8031 input pin 3	0.0011	0.0026
AD8031 output pin 6	5.0470	5.0243
Gate of Q7	5.0470	5.0243
Source of Q7	0.2760	0.2805
Q3 Vbe	0.274	0.274
Q2 Vbe	0.2	0.2
Q5 Vbe	0	0
Voltage across R4	0.56	0.56
Voltage across R11	24.9	22.9
Voltage across R1	0.55	0.55

Does anything jump out at you?

jan.didden
AX tech editor
Joined 2002

2023-09-17 10:22 am #425

No nothing does, it's weird, the opamp seems to working OK.
The Vin value you noted, is that the Vin referenced to Vout? Seems OK to.
If it was a premature limiting of the current, you'd see in it the opamp node voltages.
One question: if you increase the current further say to 150mA, does the 'good' unit also start to drop?
Try this with the current limiting disabled (shorted limit set resistor).
I am at an industry convention today and tomorrow (IBC in Amsterdam) so I can't really work on it now, but will as soon as I get home.

Jan

D

dch53
Member
Joined 2015

2023-09-17 11:08 am #426

Thanks Jan. No hurry at all. I'll keep you posted.

S

Staticx
Member
Joined 2015

2024-01-14 1:10 pm #427

Hi all and Jan,

I look for TO220 transistors:
NTP110N65S3HF
IXTP3N100D2
which are replacement for the original transistors for T-reg. It looks like it is a problem to get them.
Can anyone give me a tip on suitable replacements from the new production?

Thanks

stv

---

jan.didden
AX tech editor
Joined 2002

2024-01-14 6:11 pm #428

Really. Type the 1st part number in Google, and the first hit is:

https://eu.mouser.com/ProductDetail...T*MTcwNTI1NTcxOC4yLjEuMTcwNTI1NTcyMS41Ny4wLjA *(URL: https://eu.mouser.com/ProductDetail/onsemi/NTPF110N65S3HF?qs=I7cgNqFNU1htFZ1H1SQWvw%3D%3D&gad_source=1&gclid=CjwKCAiAqY6tBhAtEiwAHeRopVWcjQyHnMyPUzfvSXcGuj1uWOAw5NhUcCRlBxXjvjRDjJZvhB2E7hoCmAoQAvD_BwE&_gl=1*1sy21ml*_ga*MTIxMTMxNzY3OS4xNzA0MTkzMTI2*_ga_15W4STQT4T*MTcwNTI1NTcxOC4yLjEuMTcwNTI1NTcyMS41Ny4wLjA)*.

82 in stock.

Jan

S

Staticx
Member
Joined 2015

2024-01-15 8:34 am #429

Jan,

You send me a link for the NTPF version of transistor. You dont recommanded the NTPF version on your website. Only NTP version is suitable. NTP is now not available on mouser.

---

jan.didden
AX tech editor
Joined 2002

2024-01-15 9:00 am #430

Ahh yes, good catch! I'll look.

Jan

Last edited: 2024-01-15 9:05 am

T

tanker135
Member
Joined 2011

2024-01-15 8:24 pm #431

I noted the SOA on NTPF version is much better than NTP version. Not really sure if this is a misprinted.

T

tanker135
Member
Joined 2011

2024-01-15 8:41 pm #432

If current is less than 350mA then I would suggest **FCP190N60E** *(URL: https://www.mouser.com/ProductDetail/onsemi-Fairchild/FCP190N60E?qs=5vZCdhuZeNMwwNXeZ0yOLQ%3D%3D)* or **FCP190N6** *(URL: https://www.mouser.com/ProductDetail/onsemi-Fairchild/FCP190N60E?qs=5vZCdhuZeNMwwNXeZ0yOLQ%3D%3D)*5F. Mouser has plenty in stock and it's cheap.

jan.didden

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jan.didden
AX tech editor
Joined 2002

2024-01-15 9:24 pm #433

> **tanker135 said:** *(URL: /community/goto/post?id=7569125)*
>
> I noted the SOA on NTPF version is much better than NTP version. Not really sure if this is a misprinted.

I think it is an error. The fullpak should have the worst SOA.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

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jan.didden
AX tech editor
Joined 2002

2024-01-15 9:26 pm #434

> **tanker135 said:** *(URL: /community/goto/post?id=7569149)*
>
> If current is less than 350mA then I would suggest **FCP190N60E** *(URL: https://www.mouser.com/ProductDetail/onsemi-Fairchild/FCP190N60E?qs=5vZCdhuZeNMwwNXeZ0yOLQ%3D%3D)* or **FCP190N6** *(URL: https://www.mouser.com/ProductDetail/onsemi-Fairchild/FCP190N60E?qs=5vZCdhuZeNMwwNXeZ0yOLQ%3D%3D)*5F. Mouser has plenty in stock and it's cheap.

Yes, they have adequate SOA for up to 300mA or so.
Nice find.

Jan

High-Voltage regulator - SuperRegulator - High-Voltage Delay - Linear Audio PDFs on USB

S

Staticx
Member
Joined 2015

2024-01-16 8:12 am #435

Thanks guys for answers. Help me a lot. And the repleacement for IXTP3N100D2? On mouser are only 4 pcs available.

ljdamore
Member
Joined 2011

Tuesday at 4:48 PM #436

Hello one and all. I come to this site from the audio vs engineering side of things. I have bought a couple of T-Reg boards for an amplifier project I am working on.

I have a question that I would like a little help on from those of you that are more knowledgeable than myself (Most of you).

Acknowledging that there are very few original thoughts - I got the bright idea to try to put together a modular, 3 enclose amp - one box for DC heater supplies, one box for B+ supplies and a 3rd for the tube circuits and output transformers.

I am attempting this with the goal of being able to use an adjustable power supply when switching between the 45 tube, 6a3 and 300b tubes. I am also using a Tent Labs fixed bias supply. I plan to mount remote potentiometers so that voltages can be changed without opening up the amp.

My question has to do with using the T-Reg to adjust the B+ voltage when changing tubes. The 45 tubes wants a B+ of potentially as low as 200 volts and the 300b could use up to around 400 volts.

Besides being wasteful of energy (I don't feel bad about this because i have solar power) - will the T-reg be suitable for this application and is there a performance penalty of any kind by using this board vs separate B+ supplies?

Thanks very much for any thoughts on the matter.

Best,
Lou

jan.didden
AX tech editor
Joined 2002

Tuesday at 5:52 PM #437

Hi Lou, the T-reg performance does not change with output voltage due to its design.

But be mindful of dissipation, assuming you are not changing the raw input voltage.
For 400V out you probably will have something like 420V input, leaving 20V across the series device.

If you change the output to 200V, you now have 220V across the output device. That's a dissipation of 22W per 100mA output current, which gets hot quickly.
Ideally you'd use a dual switch or something to switch both the input and the output.
Or use two T-regs, one set up for 200V with 220V in and one for 400V with 420V in.
With a bit of creativity you can use a center tapped transformer to set up 220V and 440V from a single transformer.

Jan

ljdamore
Member
Joined 2011

Tuesday at 6:06 PM #438

Thanks for your response Jan. I had thought of placing a switchable drop resistor before the T-reg to take a good amount of voltage drop (and heat) outside of your device - but I was just guessing.

I have 2 T-Regs with the idea of dual mono B+ and a separate power supply for the driver tube. I am an old audio guy with time on his hands (not enough) and am trying to make a dream amplifier. Usually I prefer simple vs complicated, but I am hoping that with care and a pre-flight checklist it will turn out well!

Thanks for your suggestion.

Lou

> jan.didden

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