MIRAND Audio TSSA V1.7 User Manual.

Content

General description

The TSSA V1.7 is an spinoff from an very simple design posted by Andrej (Lazycat) on the DIY forum. It was to show how few active components an amplifier actually consist of. Indeed, it was down to four active components but it has some flaws. It runs in heavy class A to perform above average and the output impedance was to the high side.

The TSSA V1.7 is a third generation design, which is far from being simple. The board has 96 components mainly SMT on the backside of the board. It has now become a fine swan.

The benefits from this is a highly stable design without the use of servo, wide bandwidth, huge soundstage, with lot of details without getting harsh. In other words, an amplifier we could listen to for hours without listen fatigue.

One should note before building this amp, that it has no protection circuit at all. We have not seen defects on the V1.7 because of overload.

Beware: The mosfet is static sensitive, so take care when taking the out of the antistatic bag.

Key specifications

- Supply voltage : +/-24VDC <-> +/-35VDC
- Bandwidth : 1,4Hz <-> 1.5MHz
- Slewrate : 53V/us
- Zin : 10KOhm.
- Zout : 71mOhm@1KHz.
- Peakcurrent continous out : 12.3Apeak
- Stable into 7R + 2.2uF
- Softclipping
- Size (WxLxH): 94x64x41mm

Connection diagram.
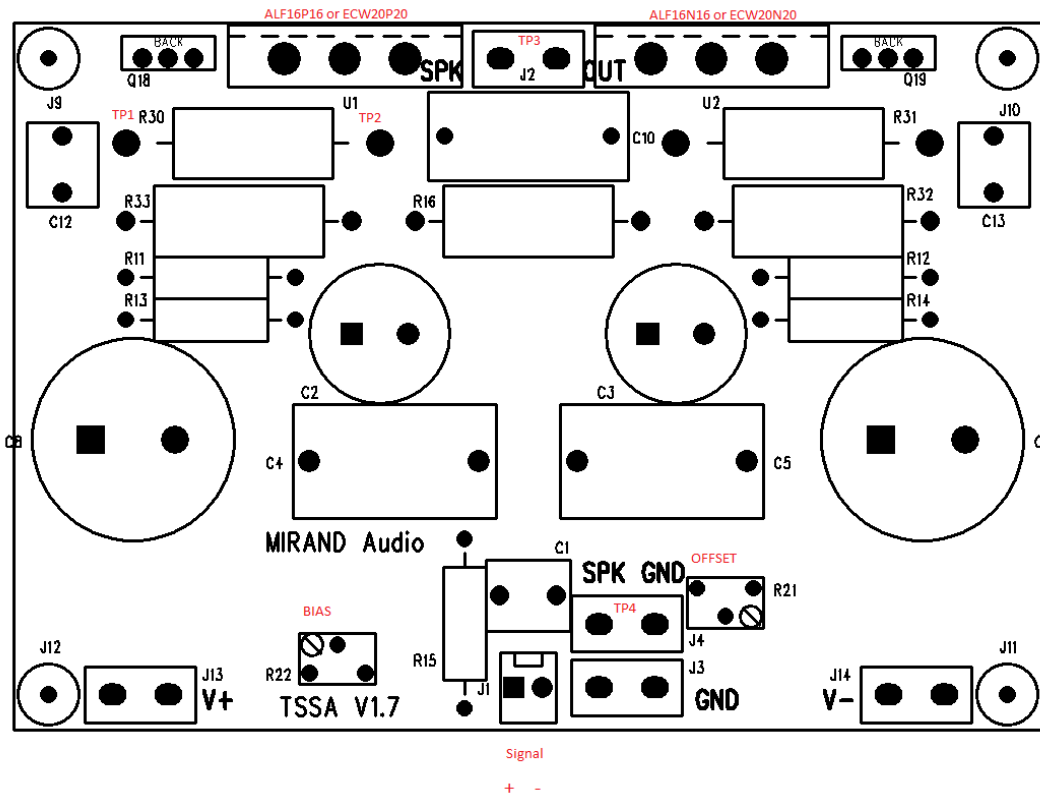
POWER input

Type: Blade Faston 6.3mmx0.8mm			
PIN	Function	Description	Type
J13	V+ (+24VDC - +35VDC)	V+ Terminal from Power Supply	Input
J3	GND	GND Terminal from Power Supply	Input
J14	V- (-24VDC - -35VDC)	V- Terminal from Power Supply	Input

Table 1: Power input connector Specification

POWER output

Type: Blade Faston 6.3mmx0.8mm			
PIN	Function	Description	Type
J2	SPK OUT	Output Terminal to Speaker	Output
J4	GND	GND Terminal to Speaker	Output

Table 2: Speaker output connector Specification

Signal input

Type: Molex KK grid 2.54mm header mates with Molex 0022012025 Crimp housing			
PIN	Function	Description	Type
J1-1	Signal in	Signal input for amp.	Input
J1-2	Signal GND	Signal GND input for amp.	Input

Table 3: Signal input connector Specification

Trimmers

Type: 3266W from bourns or similar. 12Turn			
Trimmer	Function	Description	Type
R21	Offset trim	Offset trimming	Input
R22	Bias Trim	Bias Trim	Input

Table 4: Trimmer Specification

Test points

Type: 3266W from bourns or similar. 12Turn			
Test points	Function	Description	Type
TP1,TP2	Bias adjust	Adjustment of bias with trimmer R22, 20mA/mV	Input
TP3,TP4	Offset adjust	Adjustment of offset with trimmer R21.	Input

Table 5: Test point Specification

Absolute Maximum Ratings.

Power Input (Table 1)

Symbol	Parameter	Value	Units
DC In min	Minimum input working voltage	+/-24	V DC
DC In max	Maximum input working voltage	+/-36	V DC
Bias Current	Bias Current (Max 70Watt per device, and 0.4K/W heatsink per device)	2A	A DC

Table 6: Absolute Maximum ratings

Signal Input (Table 3)

Symbol	Parameter	Value	Units
AC in max	Maximum Signal input	2	Vrms

Table 7: Absolute Maximum ratings

Speaker (Table 3)

Symbol	Parameter	Value	Units
Rload	Minimum Load	2	Ohm
CL	Maximum Capacitive load in Parallel with 8R	2.2	uF

Table 8: Absolute Maximum ratings

General Specifications

Unless otherwise specified f=1KHz, Po=1W, Ta=25°C, +/-35VDC, Bias=0.25A

Symbol	Parameter	Typ	Units
Po	Output power into 8R @1%THD+N	40	W
THD+N	8R, 27W	0.065	%
THD+N	8R, 1W	0.016	%
Hum level	50Hz, input shorted, 120.000uF, 0.5A total current draw	91	dBu
Zin	Input resistance	10K	Ohm
Zout	Output impedance into 8R, 1KHz	71m	Ohm
fl	Lower bandwidth limit	1.4	Hz
fu	Upper bandwidth limit	1.5M	Hz
ZLmin	Minimum load impedance	2	Ohm

Table 9: General Specification

General assembly notes.

The power mosfet supplied can be either Semelab ALF16N/P16 or Exicon EZW20N/P20. Different name same mosfet. The dashed line on U1 and U2 represent the backside on the mosfet (Metal part). To allow maximum heat transfer to the heatsink a firm pressure on as much of the mosfet surface is necessary especially when operated into class A. This can be done in two ways. Either by mounting the mosfet by using an aluminium bar as pressure on the top side of the mosfet or by using extra large Metric Fender washers. They are available in 9mm outside diameter. It is always good to use thermal grease with the isolation pad.

But for good reading I would suggest visiting Elliot Sound Products for an good guide:

http://sound.westhost.com/heatsinks.htm

Heatsink size notes.

When running at an bias of 0.2 – 0.35A two modules gets enough cooling from one 0.4K/W heatsink. In general, there should be a good airflow around the heatsink.

In general, it is not a good advice to go higher than 60 degrees. With a room temperature of 30 degrees Celsius, it will leave 30 degrees Celsius for the heatsink. With 0.4 K/W, it will give us 75Watt or 1 Ampere bias current with only one module per heatsink. 0.4K/W matches Fischer Elektronik SK56 100mm SA.

Cabling notes.

Always use shielded or at least twist the cables to reduce coupling as much as possible between the wires.

Trim procedure.

Before powering up Trimmer R22 and R21 should be turned 12 turns CCW. Afterwards R21 should be turned 6 turns CW,

1. Turn on the amp.
2. Wait 10 second.
3. Measure across TP1 and TP2 (R30)
4. Turn R22 CW until TP1 and TP2 are 10mVDC
5. Measure between TP3 and TP4
6. Adjust R21 until offset voltage is within +/-5mV
7. Measure across TP1 and TP2 (R30)
8. Turn R22 CW until TP1 and TP2 are at the desired voltage (10mVDC = 200mA bias)
9. Measure between TP3 and TP4
10. Check the offset is still within +/-5mV and adjust R21 if necessary.

Meaurements

TSSA V1.7 Class AB/A current feedback amplifier
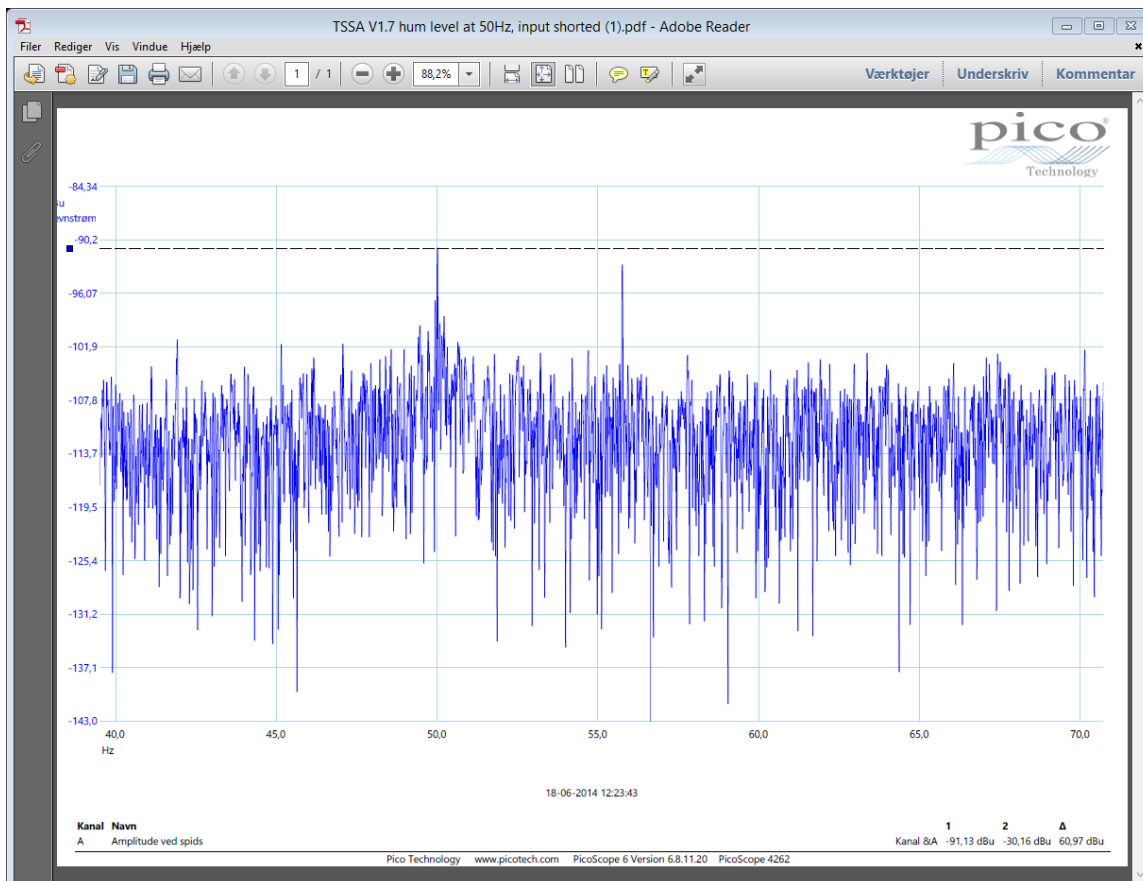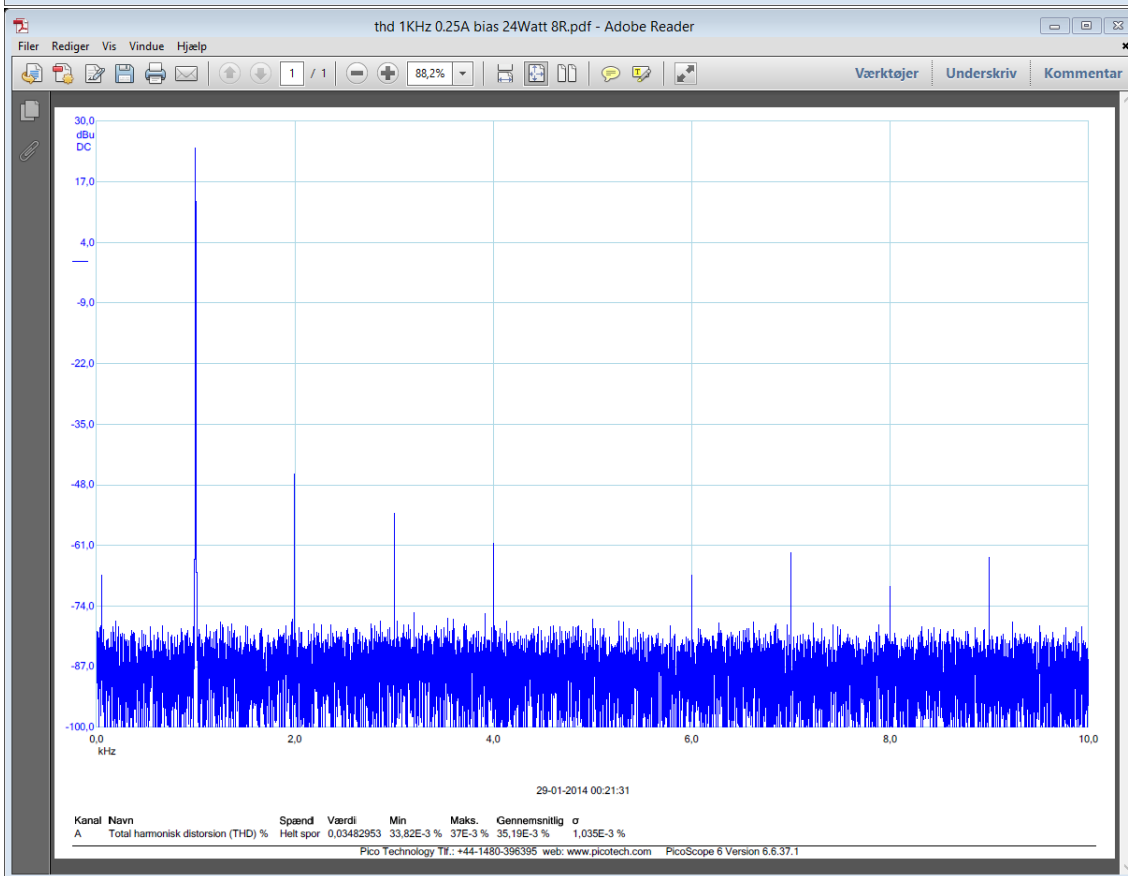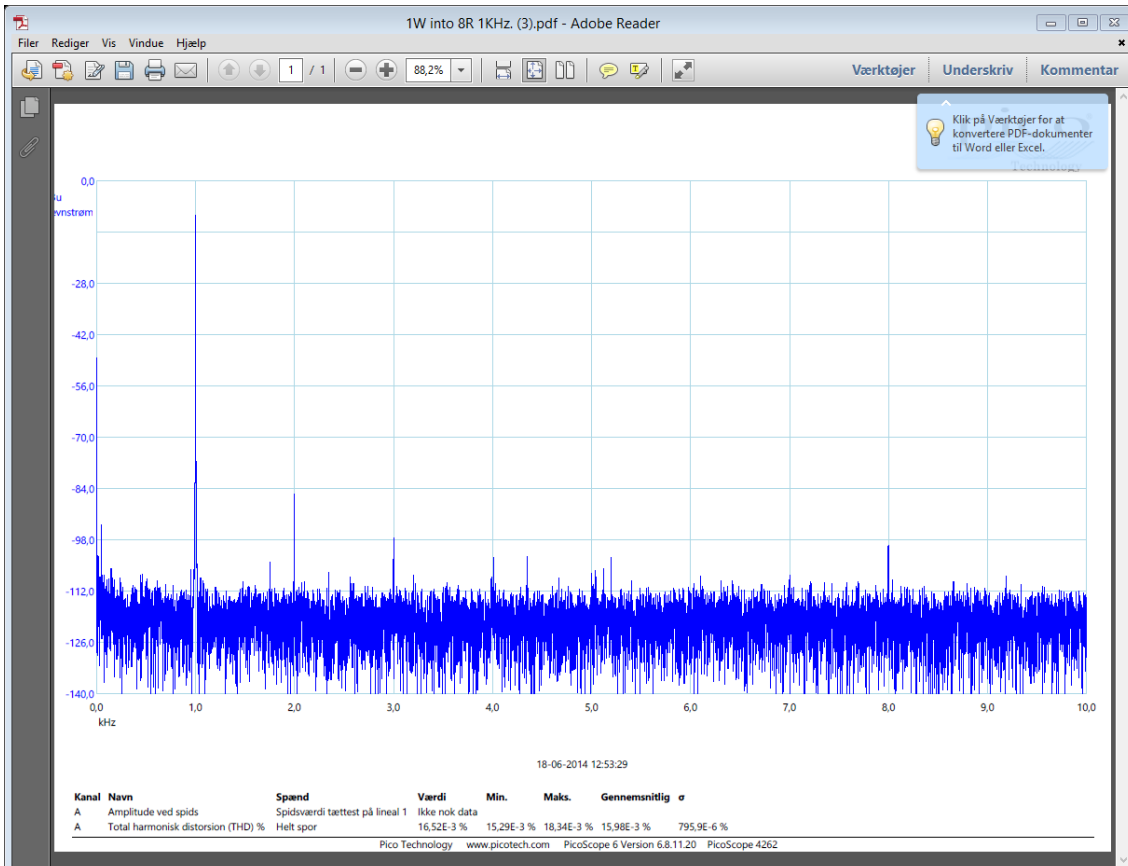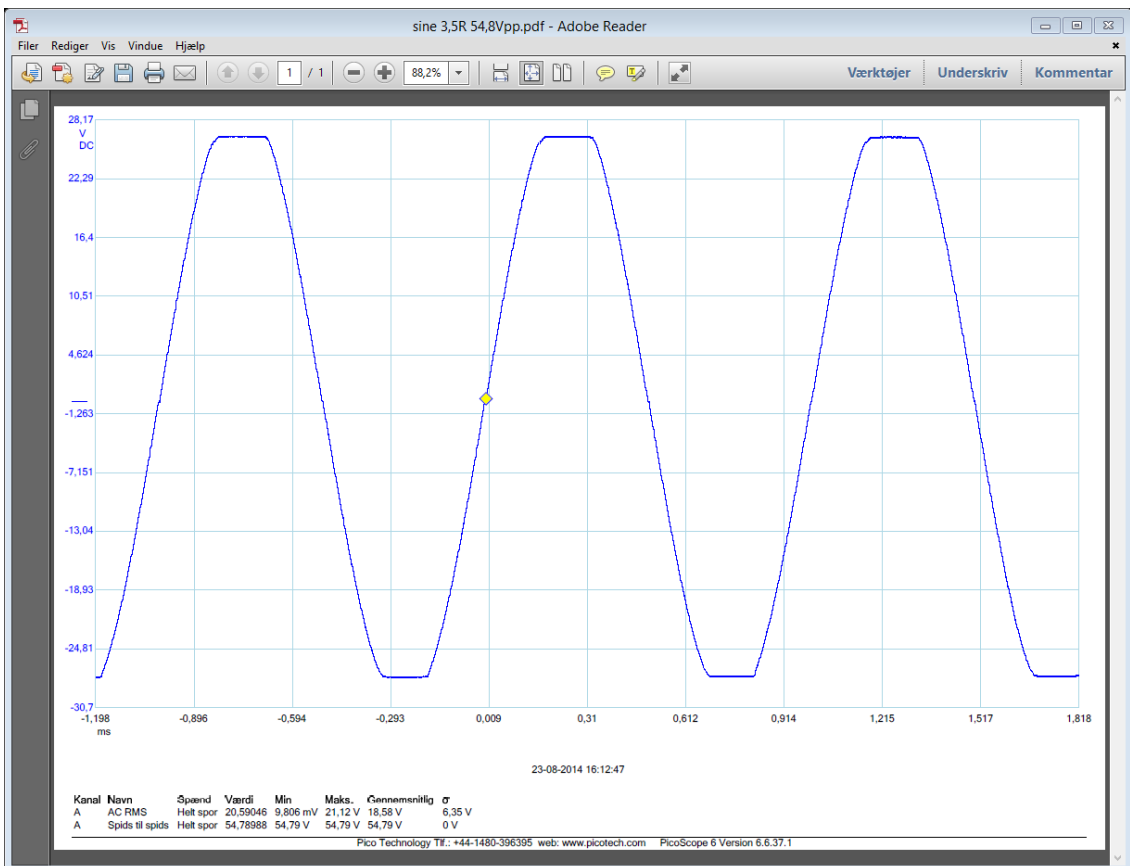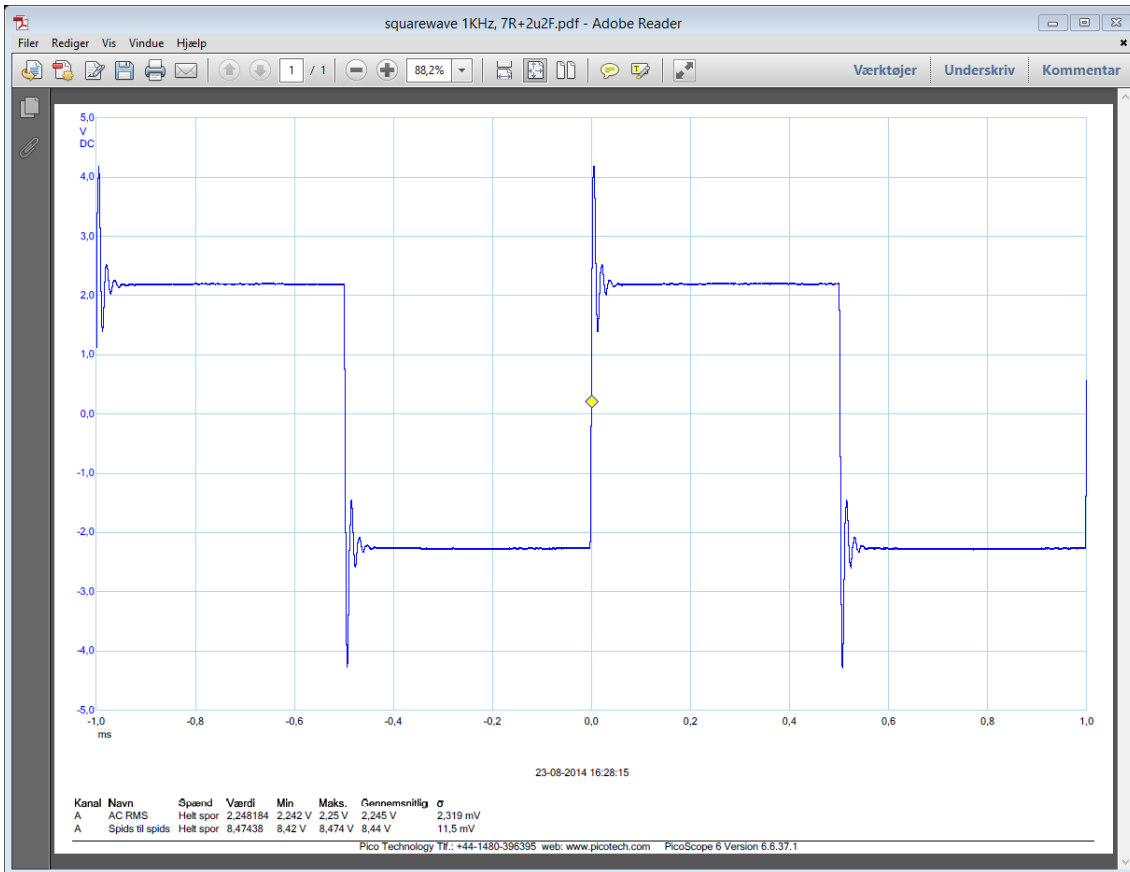
Ordering information

Part number: TSSA V1.7

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