

Single ended OPTs, do's and don't's

This document is part of the tech-support of Ask Jan First GmbH&CoKG, Germany, www.askjanfirst.com. It may be distributed and copied but only in whole, unabridged. This document will discuss typical problems and questions about the frequency response of single ended output transformers for tube amplifiers.

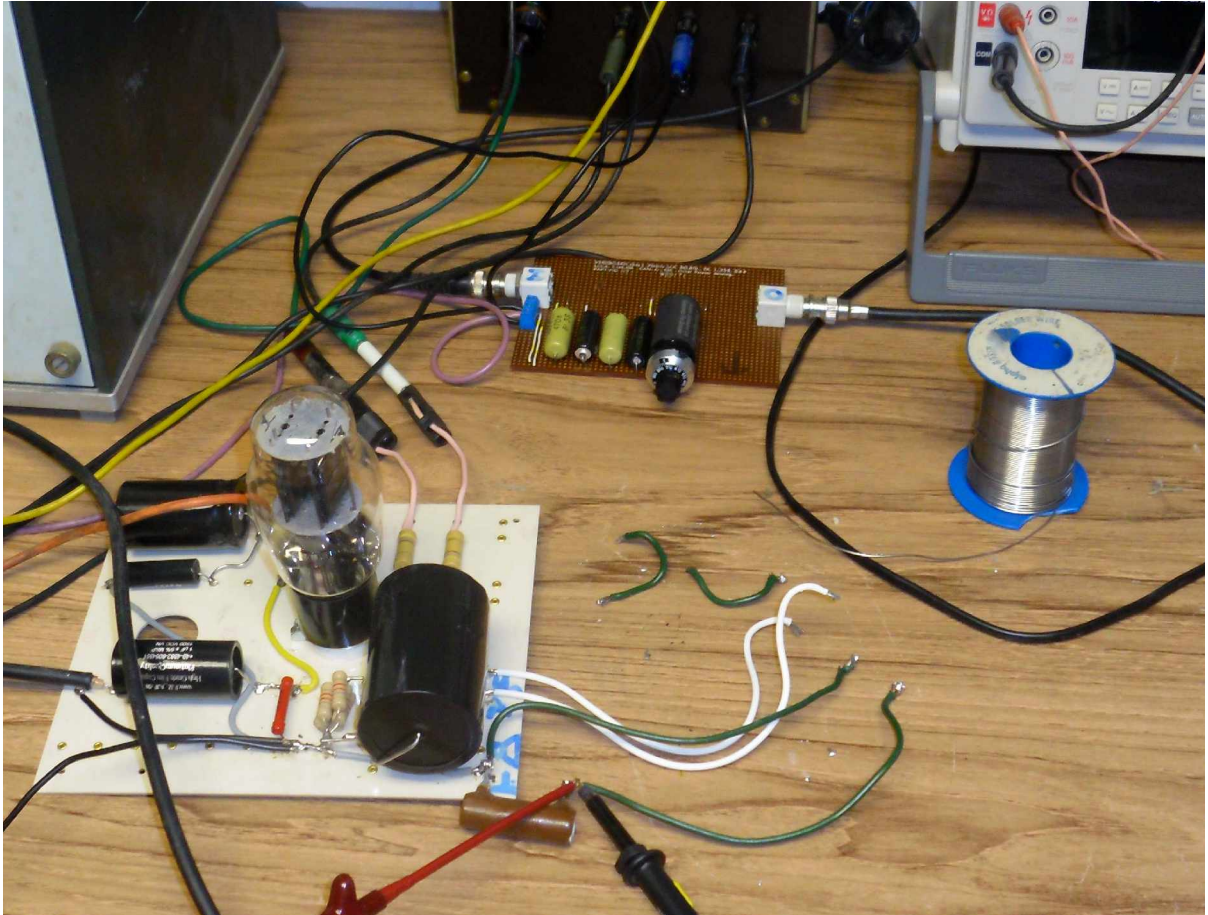
As example we discuss our SE-OPT, order code ATRA0238 intended for triodes such as the 2A3, 6B4G etc.

You will find this transformer on our website: www.askjanfirst.com/catalogue.htm

From time to time we receive questions from customers asking for the „sonic quality“ or the „frequency behaviour“ or the frequency response of our transformers. Very unfortunately there are four obstacles in the way to provide an easy and quick answer here:

- 1.) Not necessarily a nice flat frequency response warrants good sound. Looking at many of the not-really perfect old „classic“ and now sought-after transformers confirms this. Regarding this question we stop exactly here answering it: This is a question of personal taste to be decided by each and everybody him or herself. :-)
- 2.) To measure does not automatically mean to know. Especially SE transformers which are biased with DC are not easily to interpret. The relation between magnetisation and electric properties is non-linear and not trivial. Looking around one sees curves given in idle, at 1W, at not specified output power, on a not specified circuit... This makes it almost impossible to compare.
We decided to build a complete amp around the transformer and measure this whole assembly. The frequency limitations of the tube amp are far higher and lower than those of the transformer so we get good data of the transformer determining the whole circuit's performance.
- 3.) Speakers are complex loads. R, L and C. So we should let this amp work on a RLC load.
Problem 1: Does this represent your speaker ? Problem 2: Does it represent other user's speakers ? We can't solve this so we let this amp work on a purely ohmic load of 8 ohms which can be reproduced easily.
- 4.) Price ? Beg you pardon? Yes, the price is not a solid criteria to evaluate a transformer's performance. Industrially made carefully designed transformers made in large quantities like our ATRA0238 can have an excellent performance at a real good price.
Whenever a customer needs something „special“ or „unique“ price will be a totally different thing because the whole calculation will be based on very small quantities then...
But this does not have necessarily have anything to do with quality...

Enough of theory. Let's measure:



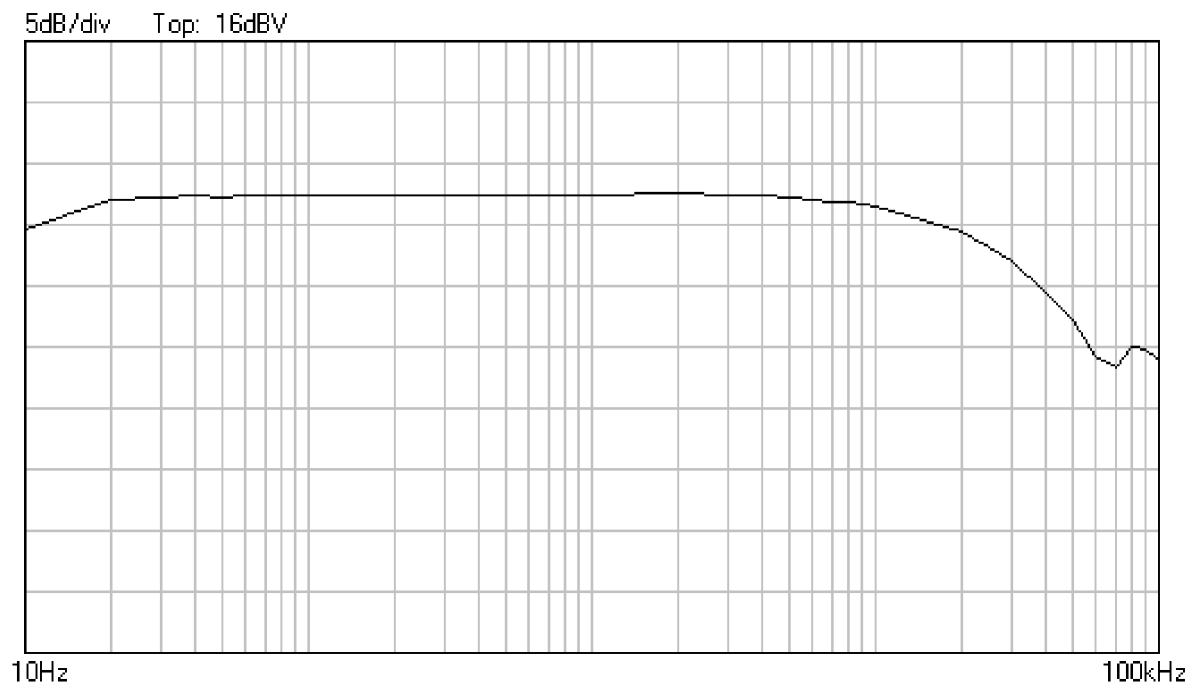
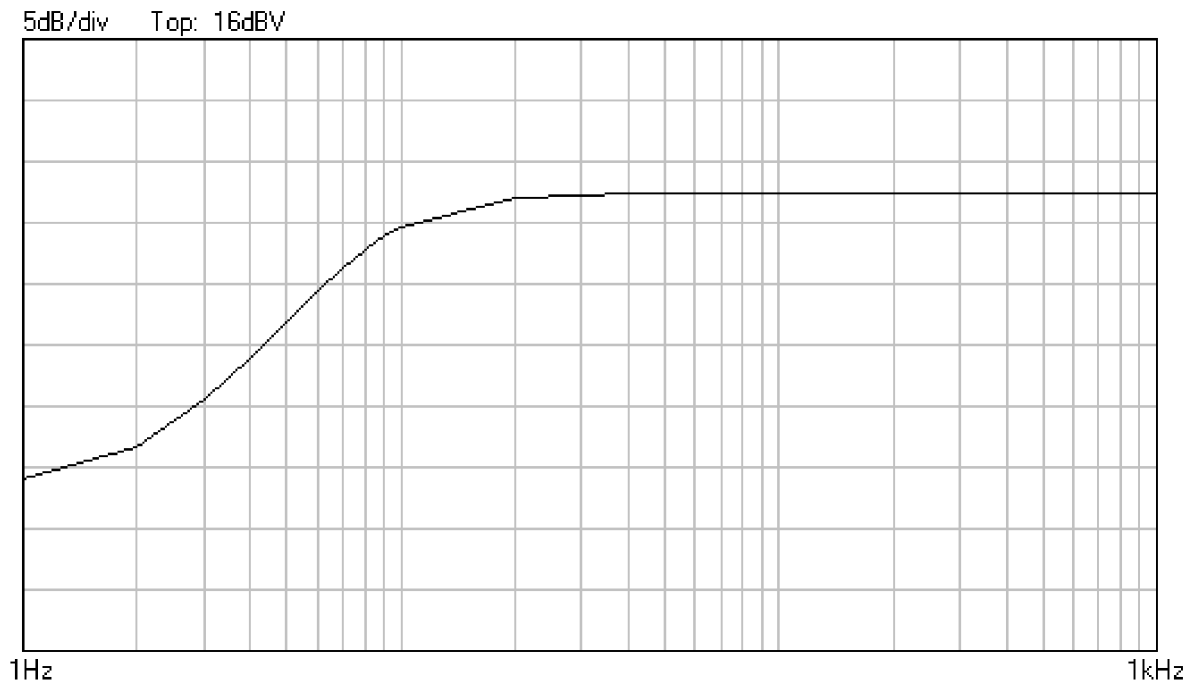
This is the test-amp: NOS 6B4G Sylvania, supplies are stabilised Sorensen lab supplies, no tube driver, a high voltage OP-amp will provide enough voltage swing to drive the 6B4G.

Coupling and cathode caps are High Grade polypropylene caps, 1uF and 100uF. Tube is being operated at 250V, 60mA, datasheet ratings.

On this photo you see no OPT, we took the picture between testing of two different designs...

Let's see some results:

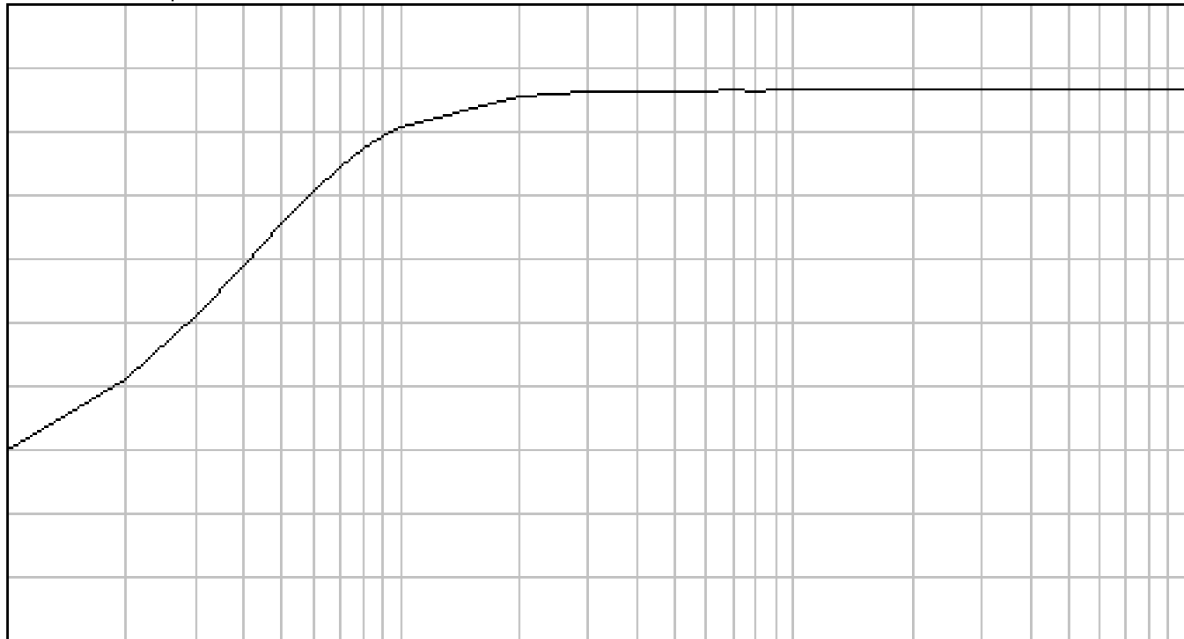
1 W of output power, lower end of the response curve has been spreaded for better details. You see a -3dB-point of about 9Hz which is quite remarkable for the relative small EI84-core.



Now the upper end: -3dB at 20kHz is not bad at all.

This is the truth at 4W nominal power:

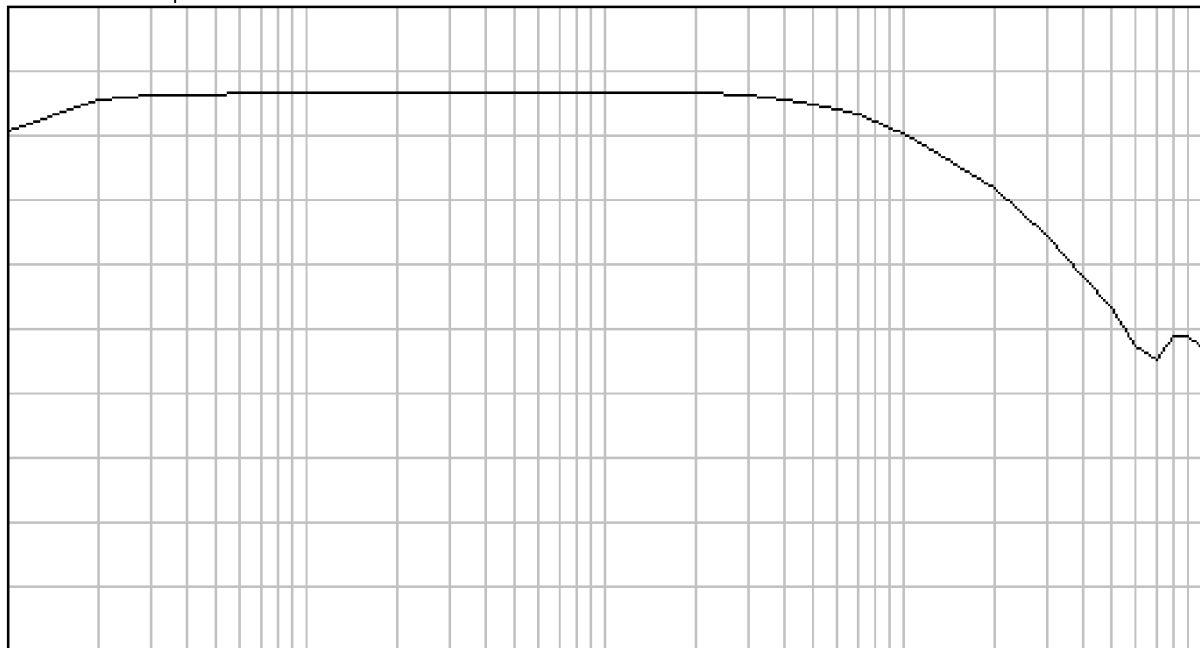
5dB/div Top: 16dBV



1Hz

1kHz

5dB/div Top: 16dBV



10Hz

100kHz

Lower -3dB is at 15Hz now, upper 3dB at around 10kHz. This is not bad at all for a transformer of this size.

How to interpret this data:

The curves you see here give a small insight into the characteristics of our ATRA0238 in a standart-application. You see the frequency responses and with those you know far more than you know about the toptrque of a car engine when looking into a car dealer´s leaflet...

This data may help you to decide if the ATRA0238 suits your needs and is worth the money.

What this information does **not** provide:

- Comparability with other transformers. As told earlier this may be tricky due to differing ways of measuring.
- Sonical well-being. This is far more complicated. Same with a car, any written info about a car will be totally insufficient to decide if a certain car suits you - you will have to sit in it and drive it to know.

Whatever questions you may have - contact us:

Dipl.-Ing. Jan Philipp Wuesten (Phone: +49-4882-6054551)

Frag'Jan zuerst - Ask Jan First GmbH & Co. KG

Preiler Ring 10 ; D- 25774 Lehe, Germany

Telefon: 04882-6054551 Fax : 04882-6054552

<<http://www.die-wuestens.de>>

mail: <FJZ@die-wuestens.de>

HR A4788 PI, Vertretung: Wüsten Verw.GmbH, HR B 6295 PI

Registergericht Pinneberg. GF: Jan Wüsten; UStID: DE814610403