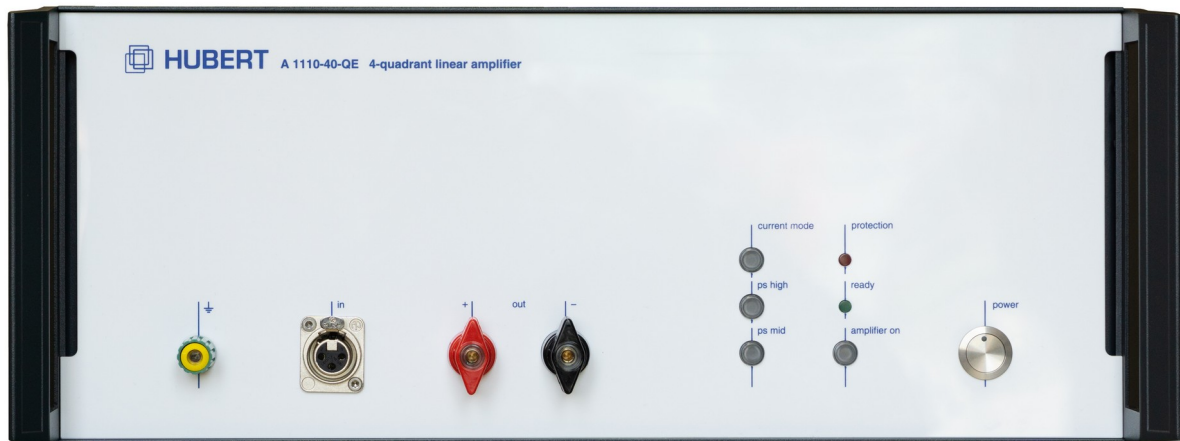




HUBERT

amp up your process

Whitepaper No. 11



HUBERT Power Amplifiers and Driving Pulsed Currents



1 Introduction

ISO 11452-8 is a widely used automotive standard for immunity testing against magnetic fields. In the frequency range from 15 Hz to 150 kHz, a sinusoidal current is applied to a coil with a power amplifier.

Recently, however, **magnetic field tests with pulsed waveforms** up to e.g. 500 Hz and 30 A_p have been required. This task can be solved conveniently and reliably with a **HUBERT A1110-40-QE-100V** power amplifier in current amplifier mode.

2 Current Mode

Figure 1 shows the time course of the current (blue) of an A1110-40-QE-100V in current mode with optimized compensation network for an inductive load (see also WP-7 "Drive vibration exciter"). The maximum output voltage (red) of the power amplifier is required for a short period of time for the rapid increase of the load current. This maximum voltage then drops to a small value in the steady state of the current, depending on the resistive component of the inductance. In this example from approx. 100 V to $U_{out_min} = 32 \text{ A} * 80 \text{ m}\Omega = 2.56 \text{ V}$.

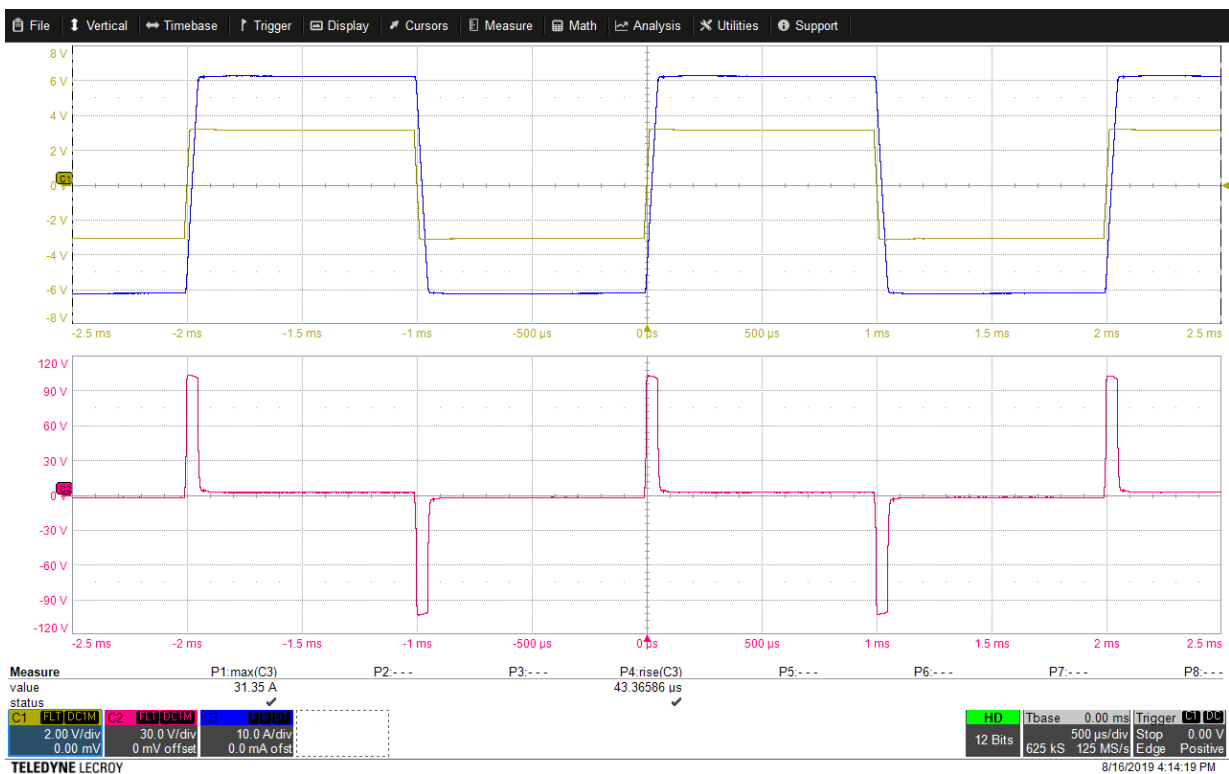


Figure 1: C1:U_{in}, pulse 6,2 V_{pp}/500 Hz; C2:U_{mon}; C3:I_{mon}; current mode; Load= 80 mΩ+90 μH



During this time of steady state (here approx. 1 ms), a high power dissipation occurs in the power amplifier due to the difference between high operating voltage and low output voltage. The amplifier must be dimensioned accordingly for a safe and longer operating time.

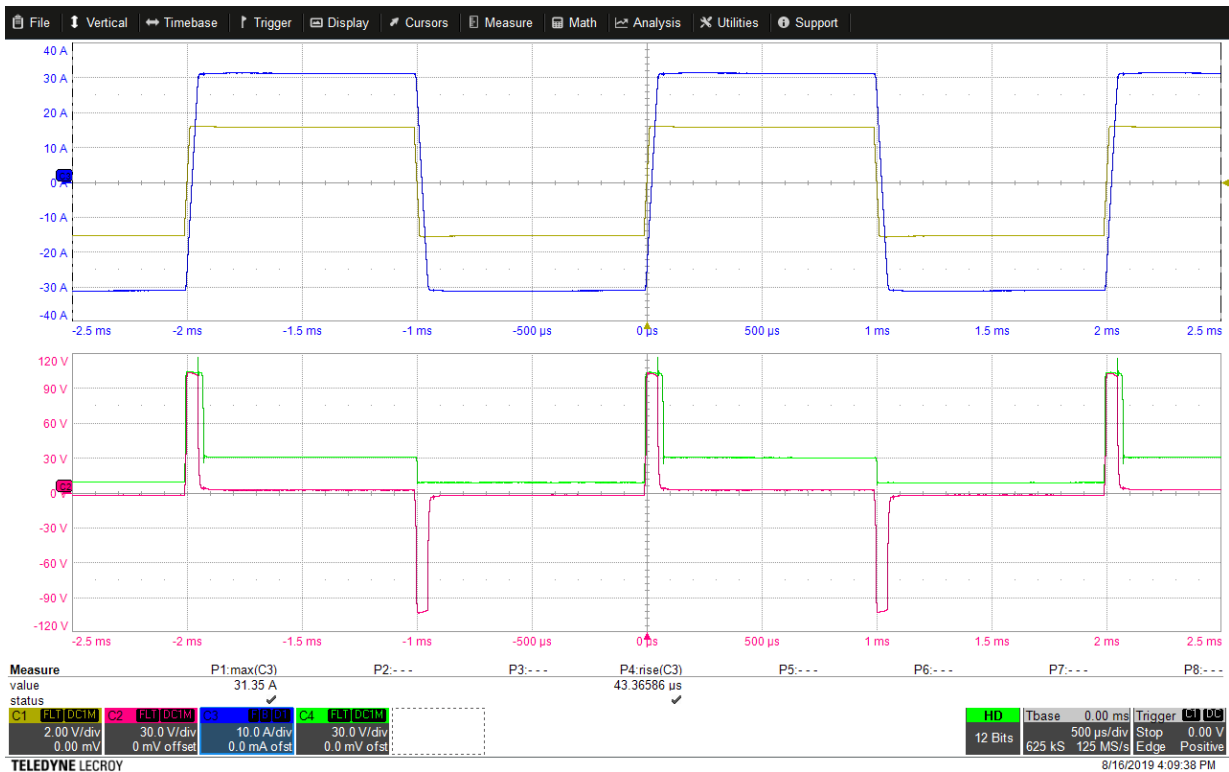


Figure 2: C1:Uin, pulse, 6,2 Vpp/500 Hz; C2:Umon; C3:Imon; C4:+Ub, current mode

With the A1110-40-QE-100V power amplifier, this problem is minimized because the operating voltage is automatically adapted to the required output voltage (see also WP-1 "HUBERT 4-quadrant amplifier").

Figure 2 illustrates the connections: During the period in which a high output voltage is required, the operating voltage (green, only the positive operating voltage +Ub is shown) is switched to the highest level. In the further course of time, +Ub is lowered to a minimum value.

This technology reduces the losses in the A1110-40-QE-100V during operation at reactive loads to a minimum and thus achieves a significantly higher degree of efficiency compared to power amplifiers with a fixed, static operating voltage.



For comparison, Figure 3 shows the current transfer curve of the A1110-40-QE-100V in voltage mode. As expected, this does not meet the requirement for pulse current.

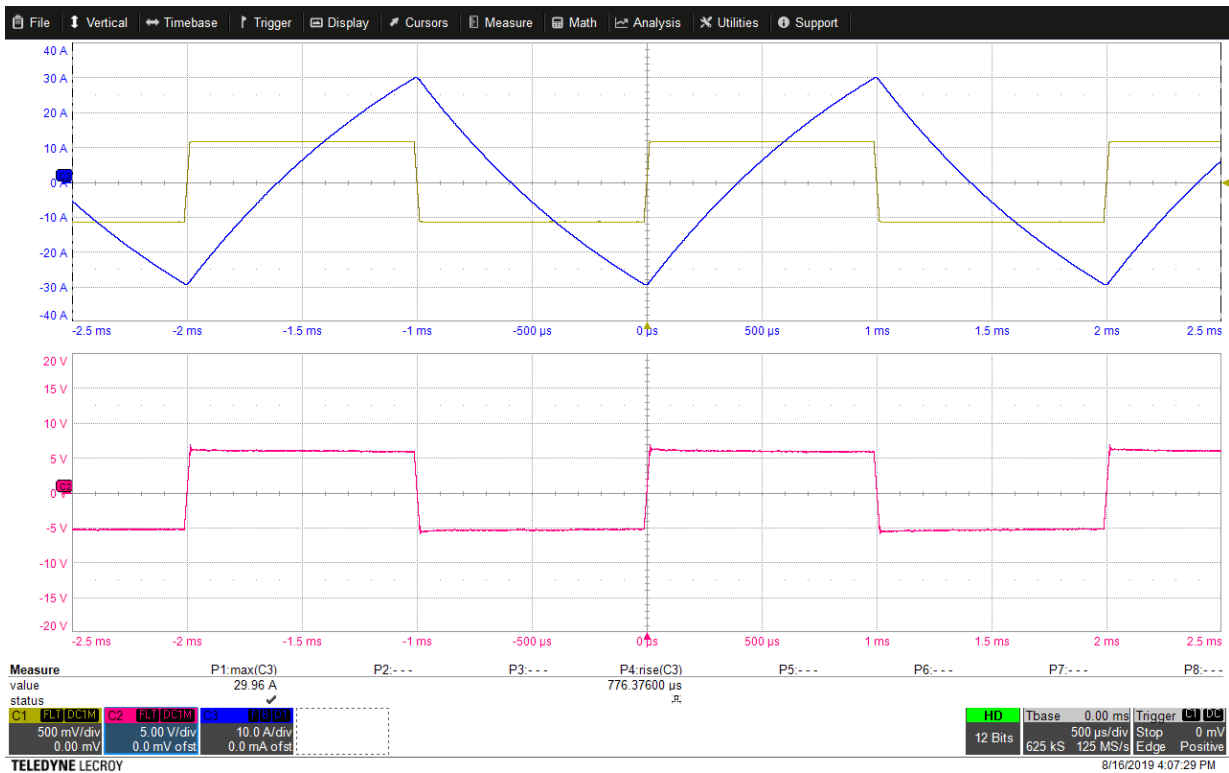


Figure 3: C1:Uin, 1,2 Vpp/500 Hz; C2:Umon; C3:Imon; voltage mode

Do you have any questions about this or other applications?
We are happy to support you by telephone or e-mail.



3 Contact Information

Dr. Hubert GmbH

Dietrich-Benking-Str. 41
44805 Bochum
Germany

Tel. +49 234 970569-0
Fax. +49 234 970569-29
sales@drhubert.de

For more information on our products and services please visit our website www.drhubert.de.

4 Document History

Revision	Date	Changelog
1.0	November 2019	Initial publication