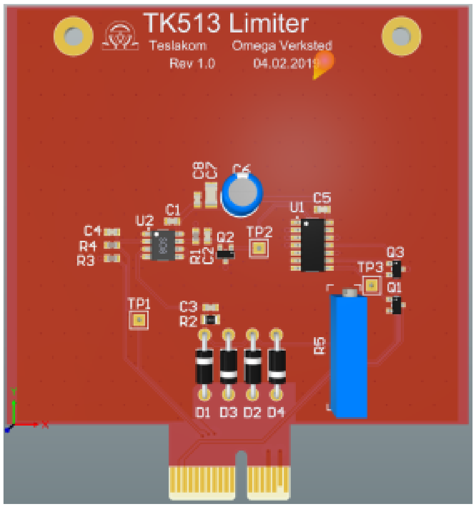
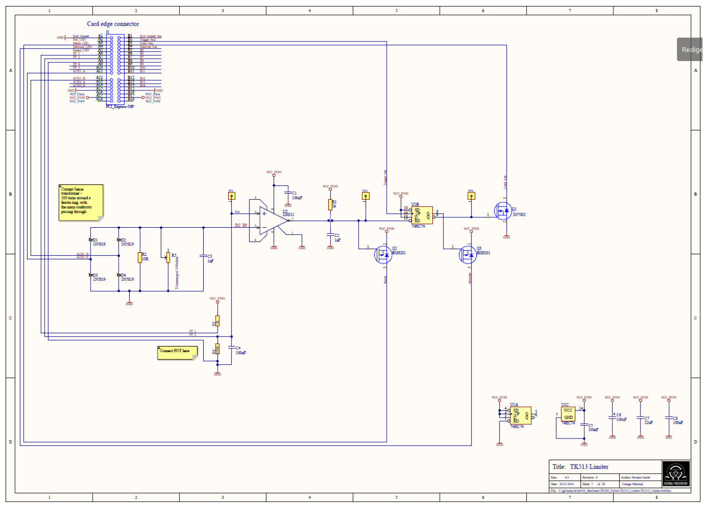
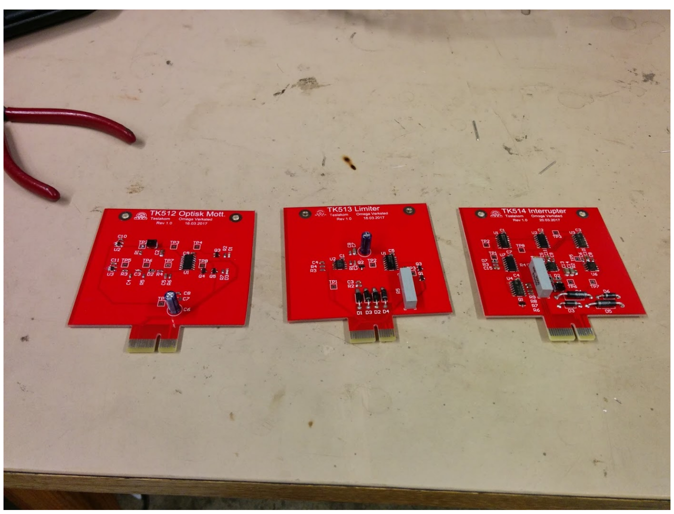
TK513 Limiter







Teori

Bakgrunn

TBD

Virkemåte

The limiter prevents overcurrent in the coil rig by disabling the interrupter when the peak current rises above a preset level. The limiter is shown in fig. 2.7

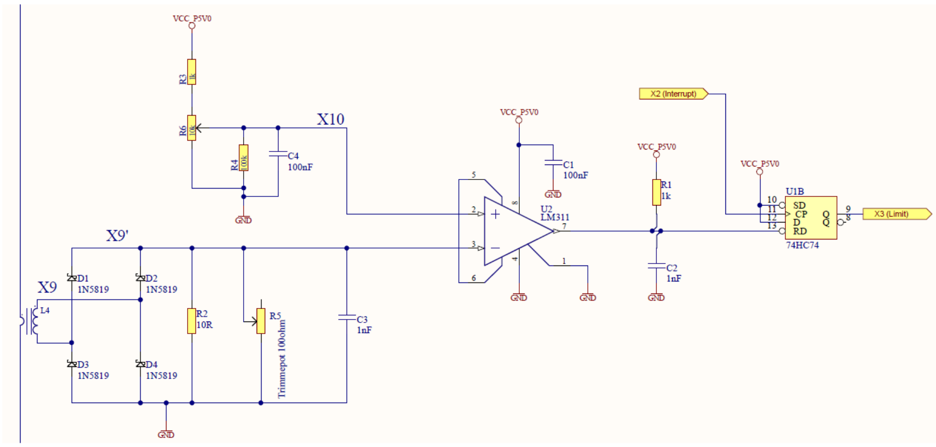


Figure 2.7: Limiter

The feedback signal is retrieved from the primary resonant circuit via the feedback transformer L4. The diodes D1-D4 is a full bridge rectifier, schottky diodes are used for low propagation delay. The rectifier is loaded with R2 and C3, R2 and C3 also functions as a noise filter with a cut off frequency fc given by eq. (2.8).

$$f_c = \frac{1}{2\pi R_2 C_3} \tag{2.8}$$

The cut off frequency fc decides how much noise is allowed through to the comparator and thus how often the spark is shut down early unintentionally due to noise. The spark being shut down unintentionally generates noise on the acoustic signal. The rectified signal is fed into a comparator, the other input of the comparator is connected to a variable voltage controlled by a potentiometer. R3 is to set the highest level the variable voltage can be set to. R4 is to pull the input of the comparator low in the case that the potentiometer is disconnected. The relation between the (peak) current in the primary resonance circuit and the (peak) voltage on the input of the comparator is given by eq. (2.9).

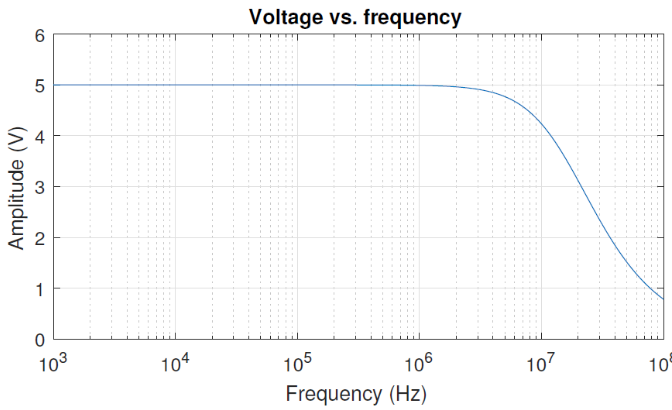


Figure 2.8: I_1=50A

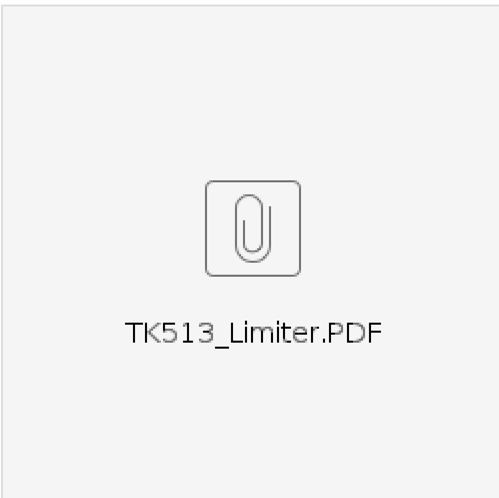
$$\frac{U_{X9'}}{I_{X6}} = \frac{n_1}{n_2} \cdot \frac{R_2}{\sqrt{1 + (2\pi 2 f R_2 C_3)^2}} \tag{2.9}$$

Where n1/n2 is the winding ratio of the feedback transformer, IX6 is the current running in the primary resonance circuit, f is the fundamental frequency of IX6 (half the frequency of the signal on the input of the comparator because of the full bridge rectifier). Given n1 = 1, n2 = 100, R2 = 10 , C3 = 1nF, f = 110kHz, we get UX90 IX6 = 0; 1 Volts per Ampere.

If the voltage of X90 is higher than the voltage set by the potentiometer X10 the output of the comparator goes low and resets the latch. The data input of the latch is connected to VCC, on the next positive flank of the interrupt signal X2 the data will be clocked to the output and the output will go high. R5 is to give the possibility to tune the resistance of R2 by removing R2 from the PCB and mounting R5 instead, R5 then replaces R2 in the calculations above. R2 decides the range of current that can be sensed and compared to the preset level. This is critical to the maximum amplitude attainable on the output and the range of amplitudes attainable. And thus affects the volume and dynamic range of the acoustic signal. The output of the latch X3 is connected to the interrupter, as explained in section 2.2. A low signal stops the output of the interrupter. A high signal allows the interrupt signal X2 to control the output.

Spec

Beskytte transistorene



Versjoner

V0.0 (2009)

Changelog

1. Laget av Dewald De Bruyn

Errata

1. Virkemåte stemmer ikke overens med skjematikk

V0.1 (2014)

Changelog

1. Kokt fra 2009 skjema
2. Splittet ut på eget kretskort

Errata

1. Fungerer ikke likt som V0.0

V1.0

Release: 2017-03-16
Antall: 10

Changelog

1. Bakplanifisert
2. Lagt til potmeter som last til feedbackspolen for ekstra tuning

Errata

1. Kretskortet er for bredt til å passe i kortholderne på bakplanet
2. Fungerer ikke likt som V0.0

Produserte kort

SN	V	Montert	Fungerer								Plassering	Kommentar
?	0.0	✅	✅								2009 Driver	Trimmepot flyttet til frontpanel. Var justert feil, IGBTene gikk over en lav sko, loddet inn potmeter på fremsiden og justerte til rett over normal bruk. Siden da har ikke IGBTene gått.
?	0.1	✅	✅								2014 Driver	Koblet ut, feil antall viklinger på feedbackspole (mangler feedbackspole?)
?	1.0	✅	✅								Marintesla	Solgt
01	1.0	✅	❓								Atmel-boksen som ikke inneholder ugagnstrinn	Moddet til at komparatoren går på 18V-railen. Har glemt hva som er galt med det, må testes.
02	1.0	✅	❌								Atmel-boksen som ikke inneholder ugagnstrinn	Moddet til at komparatoren går på 18V-railen, men Trigger Bus-inputen har blitt lavimpedant (Ohmer 60ohm mot jord).
03	1.0	✅	✅								Driver SN:01 (Er Øystein sin?)	Testet, R5 justert til 1 ohm
04	1.0	✅	✅								Driver SN:02	Testet, R5 justert til 1 ohm. Den med den røde kondisen. 4.7uF loddet i serie med 100nF C4
05	1.0											
06	1.0											
07	1.0											
08	1.0											
09	1.0											
10	1.0											