R&D Electronics Newsletter (2014 Issue 5)

Welcome to our 5th issue of newsletter!

Overcurrent and **overvoltage** could easily destroy power semiconductors. It is therefore important in the real applications to use protection circuits. In this issue we will introduce some of such protection circuits for **overcurrent protection**.

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R&D Electronics Team

Overcurrent Protection For Thyristors

The root causes for overcurrent in thyristors can be divided into two categories:

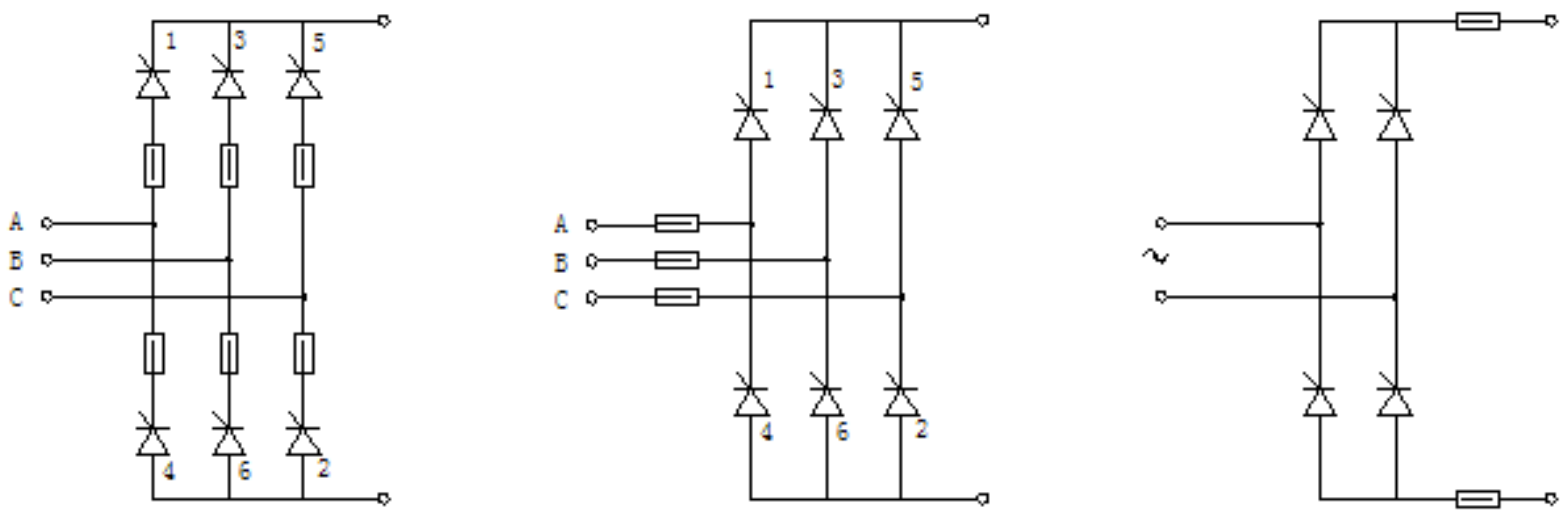
1. Because of the failures in the rectifier circuit itself, e.g. damage of the rectifier thyristor, failure of the trigger circuit or the control system.
2. The other cause for the overcurrent could be short-circuits of the external load of the rectifier bridge.

The protective circuits for thyristor can be roughly divided into two types:

1. One is to install a protective device such as a RC snubber circuit, current limiting inductors, fuses or fast varistors at the suitable location.
2. Another possibility would be to measure the output voltage and the input current by using electronic protection circuit. When the output voltage or the input current exceeds the allowable value, let the rectifier bridge by means of a triggering system operate in a state of the active inverter, whereby an excessive voltage or current levels can be suppressed.

1. Using the Protection devices:

This is an effective method of protection against the failure in the internal rectifier circuit. The most common solution is to add the fast fuses. There are generally three types of circuits. The circuit-diagrams and descriptions are shown in Figure 1 and Table 1.



Protection Circuit A　　Protection Circuit B　　Protection Circuit C

Fig.1 : Protective circuits with fuses

Circuit	Description	Rated Current I_{SN}	Remark
A	One fuse connected in series with each element enabling all the semiconductor components in the circuit can be effectively protected.	$I_{SN} < 1.57 I_T$	I_T: Average Forward Current
B	This can function as protective role in case of AC-, DC- and component short-circuits. The reliability is somewhat lower.	$I_{SN} < K_C I_D$	I_D: Output Current K_C: Ratio of AC side current and I_D
C	This protects the failure on the DC load side; this however provides no protections in case of component short-circuit.	$I_{SN} < I_D$	I_D: Output Current

Table 1 : Description of the protection circuits with fuses

2. Electronic protection circuit:

For the second category of over-current, that is, the overcurrent caused by an external load short-circuit, the electronic protection circuit should be applied. A common circuit diagram is shown in Figure 2.

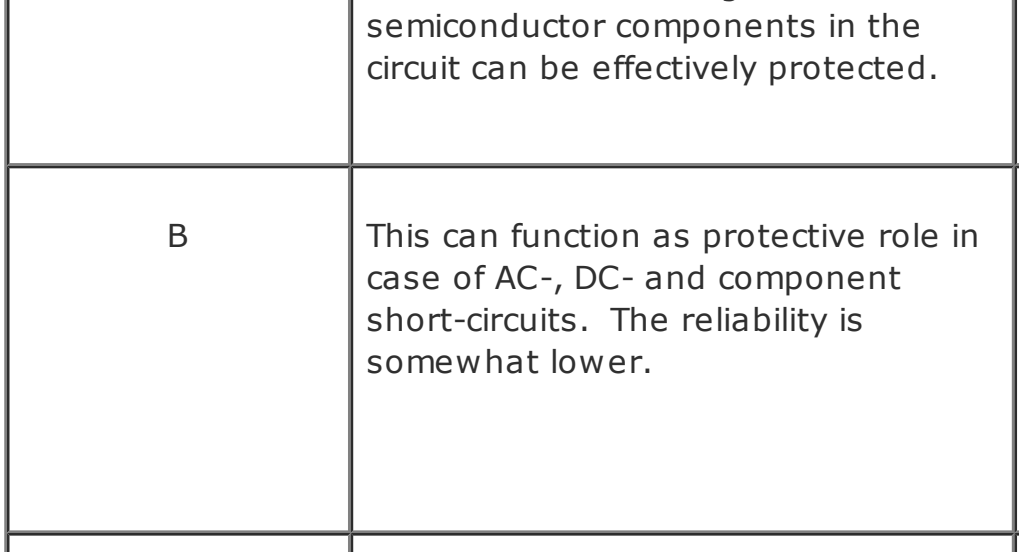


Fig.2 : Over-current protection circuit diagram

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- When: from 20th - 22nd May 2014
- Where: at booth 9-548 in hall 9

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