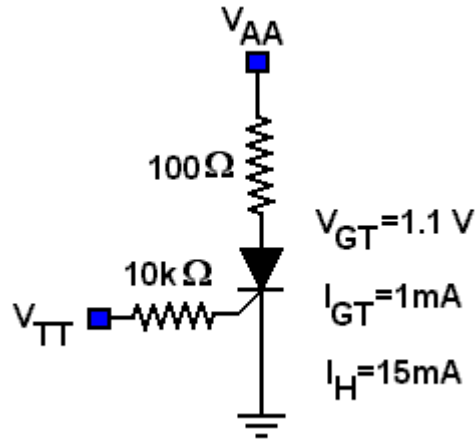


Electronics

Silicon controlled rectifiers

Problem 1.- Find the minimum voltage V_{TT} to trigger the thyristor when it is biased with $V_{AA}=30V$. After triggering, the voltage V_{TT} is reduced to zero. Find how low can V_{AA} drop before the thyristor opens again.



Solution: To trigger the SCR we need at least:

$$V_{TT} = V_{GT} + R_T I_{GT} = 1.1\text{V} + 10\text{k}\Omega(1\text{mA}) = 11.1\text{V}$$

Once the SCR is triggered it will stay conducting even without gate current, but the anode current has to stay above the holding current. So the SCR will open when the anode voltage drops below:

$$V_{AA} = 0.7\text{V} + R_A I_H = 0.7\text{V} + 100\Omega(15\text{mA}) = 2.2\text{V}$$

Problem 2.- What is the advantage of using SCRs instead of diodes to rectify AC voltages?

Solution: The C in SCR stands for “controlled” and it is the main advantage over regular diodes. The output of an SCR-based rectifier can be varied between zero and a maximum value by controlling the trigger angle.