

UNIVERSITY OF KUFA		CODE : EE 401
ENGINEERING FACULTY		SUBJECT : power Electronics
ELECTRICAL ENGINEERING DEP.		LECTURE'S TITLE: SCR Triggering 2
Dr. AMEL AHMED RIDHA		DATE : (4-8) /Nov.11 /2018

Characteristics of UJT

Initially, in the cut-off region, as V_E increases from zero, slight leakage current flows from terminal B_2 to the emitter. This current is due to the minority carriers in the reverse biased diode. Above a certain value of V_E , forward I_E begins to flow, increasing until the peak voltage V_P and current I_P are reached at point P. After the peak point P, an attempt to increase V_E is followed by a sudden increase in emitter current I_E with a corresponding decrease in V_E . This is a negative resistance portion. The negative portion of the curve lasts until the valley point V_V is reached. After the valley point, the device is driven to saturation.

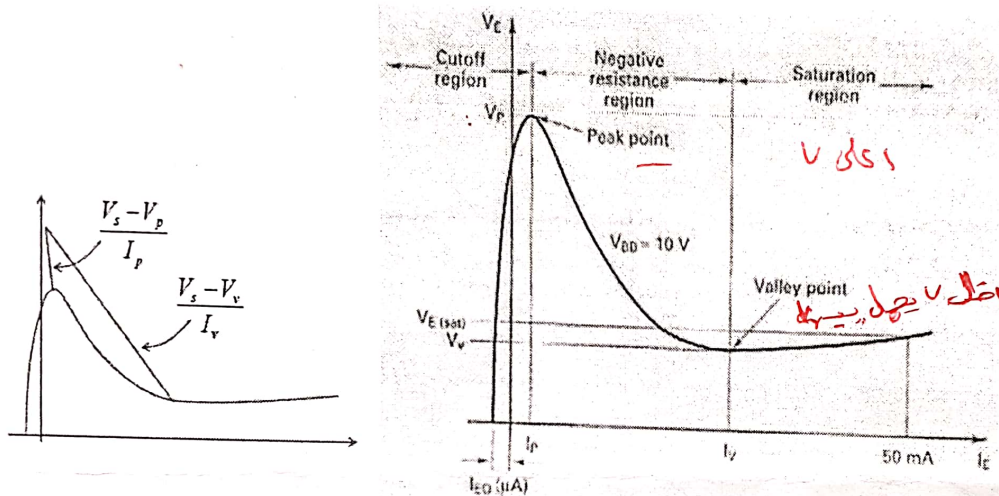


Fig. 1 Characteristics of UJT

Design of UJT

The load line formed by R and V_S should intersect the device characteristics to the right of peak point but to the left of valley point, otherwise UJT will not turn on.

Therefore min&max values for R

$$\frac{V_S - V_V}{I_V} < R < \frac{V_S - V_P}{I_P}$$

Where V_P can be calculated as

$$V_E \approx V_P = V_R + V_D = \eta V_{BB} + V_D$$

assume $V_S \approx V_{BB}$

V_D : One diode fwd voltage drop, $\approx 0.5V$

$$V_P = \eta V_S + V_D$$

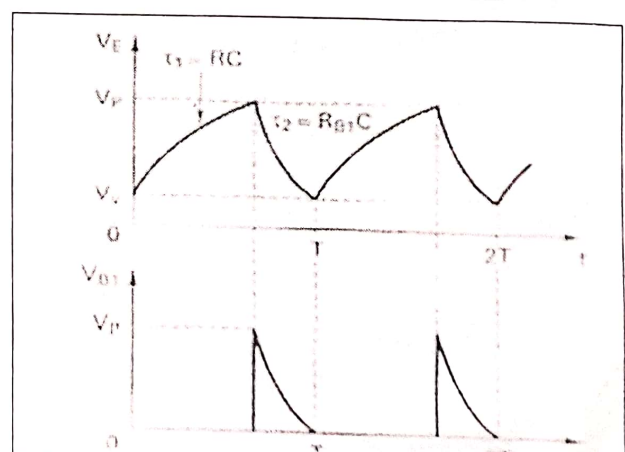
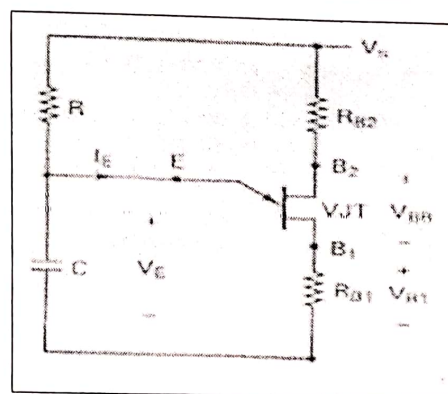
The pulse width of triggering pulse t_g is

$$t_g = R_{B1} C$$

Oscillation frequency is

$$T = \frac{1}{f} \approx RC \ln \frac{1}{1-\eta}$$

A resistor R_{B2} is generally connected in series



with B_2 to compensate for the decrease in V_p due to temperature rise and to protect the UJT from thermal runaway.

$$R_{B2} = \frac{10^4}{\eta V_s}$$

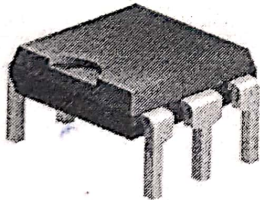
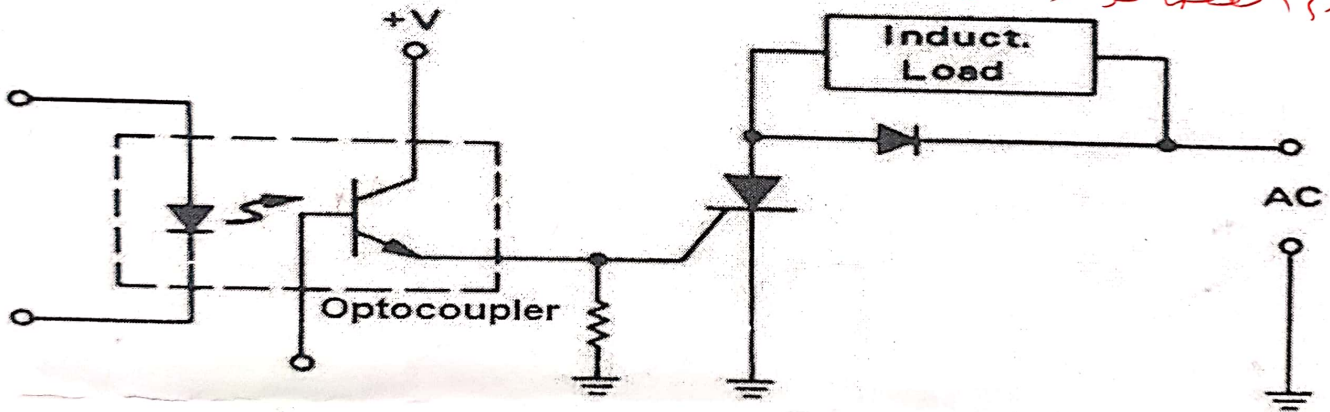
صا كروج البنية ما ندرى تبرد من د خلیج و تا خن Power

مقدوم نظیة للاحات ۲۵۳

The following points should be considered in designing the gate control circuit;

- ① The gate signal should be removed after the thyristor is turned on. A continues gate signal increases the power loss in the gate junction. هنا یقلی د صوره یقلی
- ② While thyristor is reversed biased, there should be not gate signal; otherwise, the thyristor may fail due to increased leakage current. لان صیفة تا خن Power
- ③ The width of gate pulse t_G must be longer than the time required for the anode current reach to the holding current. لان یو یو ۱ ر ۲

بصا ط لازم ا دفعها عذر ۲۵۴



Opto isolated gate drive

