

第一章

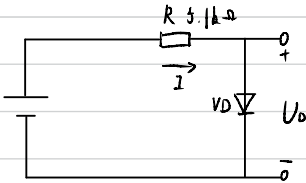
1-3. ① P型和N型半导体交界处出现自由电子和空穴浓度差, 载流子将从浓度较高的区域向浓度较低的区域运动, P区多子空穴向N区扩散.

PN结具有单向导电性关键在于内电场. 在外加正向电压作用下, 削弱了内电场, PN结变窄, 有利于多子扩散, 有利于少子漂移. 因少子数量少, 反向电流小, 在正向电压作用下电流较大, 反向电压作用下电流较小, 即PN结具有单向导电性.

② 在温度过高, 击穿状态, 外电压频率超过特征频率情况下单向导电性丧失.

③ 温度升高, 正向反向电阻降低, 正向导通电压和反向击穿电压降低.

1-6. 1.

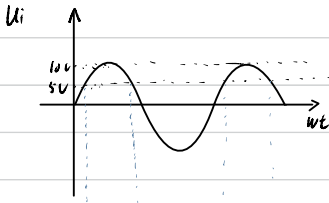


$$I = \frac{10 - 0.7}{5100 \Omega} = 1.82 \text{ mA}$$

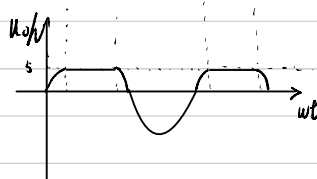
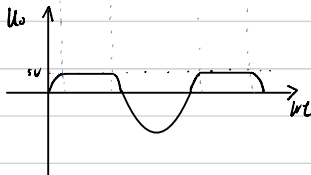
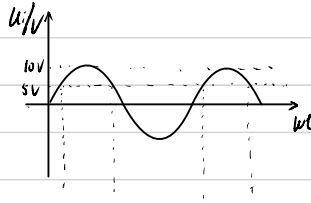
2. 温度升高, 电阻率降低, I 增大, U_D 减小.

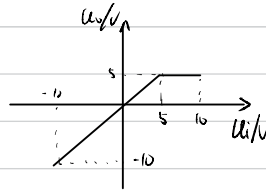
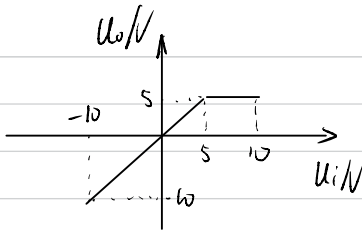
1-8. $u_i = 10 \sin 100\pi t$

a)

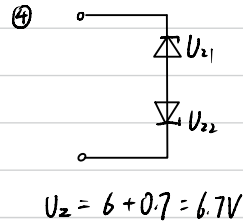
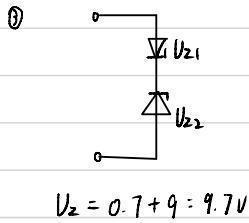
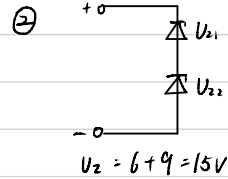
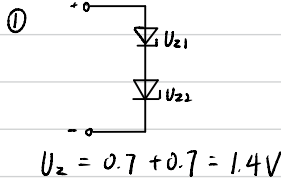


b)

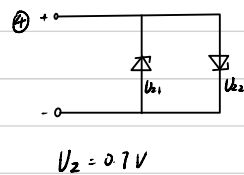
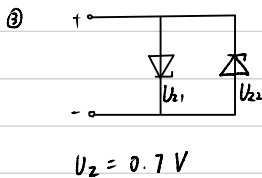
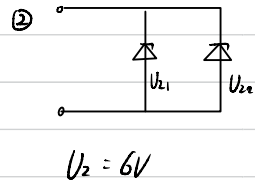
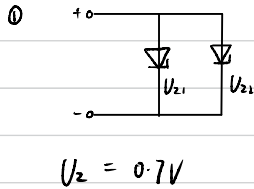




1-9 1)



2)



1-10. 1. 设 $U_0 = U_2 = 6V$

$$I_0 = \frac{U_2}{R_L} = \frac{6}{1000} = 0.006A$$

$$I = \frac{U_1 - U_2}{R} = \frac{14}{500} = 0.028A$$

$$I_2 = I - I_0 = 22mA$$

$$I_{2max} = \frac{P}{U_2} = \frac{200}{6} = 33.3mA$$

$$\therefore I_{2min} < I_2 < I_{2max}$$

\therefore 电路正常运行

$$\therefore U_0 = 6V$$

2. 设 $U_0 = U_2 = 6V$

$$I_0 = \frac{U_2}{R_L} = 60A$$

$$I = \frac{U_1 - U_2}{R} = 28mA$$

$$I_0 > I$$

\therefore 假设不成立

稳压管不能正常工作

$$I = \frac{U_1}{R + R_L} = \frac{20}{600} = 33.3mA$$

$$U_0 = R_L I = 3.3V$$

$$3. \quad I_2 = \frac{U_1 - U_2}{R} = 28mA$$

$$I_{2min} < I_2 < I_{2max}$$

\therefore 稳压管正常工作

$$4. \quad I_{2max} = \frac{U_1 - U_2}{R} = 2mA$$

$$I_{2max} < 10V$$

\therefore 稳压管仍能正常工作