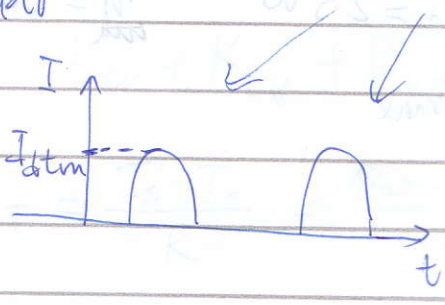
(8.) MOS tranz. PTF10136 radi u sklopu granično pobuđenog VF pojačala snage u klasi C na radnoj frekv.
$f = 1$ MHz uz uvjete:

$U_{DD} = 28\,V$ - napon napajanja
$U_{GG} = -1\,V$ - predmapon gatea
$P_d = 39\,W$ - najviša dopuštena disipacija na dotoku
$U_D = 1\,V$ - napon dodira tranz.
$I_{dtm} = 1{,}1\,A$ - tjemena vrijednost dotočne struje
$U_{gm} = 5{,}85\,V$ - amplituda pobudnog napona na gatu
$U_{Dmin} = 4\,V$ - minimalna razina dotočnog napona
$Q = 12$ - faktor dobrote dotočnoga titrajnog kruga

- manji kut protjecanja $\Rightarrow$ manja snaga $\Rightarrow$ veća korisnost
- struju ispuštati u impulsima $\rightarrow$ na izlazu titrajni krug i filtar



$$\cos\Theta = \frac{U_D - U_{GG}}{U_{gm}} = \frac{1-(-1)}{5{,}85} = 0{,}342 \Rightarrow \Theta = 70° \rightarrow \text{kut protjecanja}$$

$$k_u = \frac{U_{dm}}{U_{DD}} = \frac{U_{DD} - U_{Dmin}}{U_{DD}} = \frac{28-4}{28} = 0{,}857$$

$\alpha_0(70°) = 0{,}252 \quad \alpha_1(70°) = 0{,}436$ (iz tablica)

$$P_{DD} = U_{DD} \cdot I_{DS} = U_{DD} \cdot I_{dtm} \cdot f_0(\Theta) = 7{,}76\ W$$

$$P_k = \frac{U_{dm} \cdot I_{dm}}{2} = \frac{(U_{DD} - U_{dmin}) \cdot I_{dtm} \cdot f_1(\Theta)}{2} = 5{,}75\ W$$

$$R_D = \frac{U_{dm}}{I_{dm}} = \frac{U_{DD} - U_{dmin}}{U_{dtm} \cdot f_1(\Theta)} = 50\ \Omega$$

$$Q = \frac{R_D}{2\pi f L_D} \Rightarrow L_d = \frac{R_D}{2\pi f Q} = 0{,}663\ \mu H$$

$$C_d = \frac{1}{(2\pi f)^2 \cdot L_d} = 38{,}2\ nF$$

(9.) VF pojačalo snage radi u režimu klase B uz uvjete: $U_{DSS} = 28\ V$ (→ max) $P_d = 25\ W$ (→ max) $\eta = 60\%$

$\Theta = 90°$ (kod klase B)

$$U_{DDmax} = \frac{U_{DSS}}{2} = 14\ V$$

$$U_{DD} = 0{,}8 \cdot U_{DDmax} = 11{,}2\ V$$

$$P_{DD} = P_k + P_d = P_{DD} \cdot \eta + P_d$$

$$P_{DD} = \frac{P_d}{1-\eta} = \frac{0{,}8 \cdot P_d}{1-\eta} = 50\ W$$

$P_K = P_{DD} \cdot \eta = 30\ W$

$f_0(90°) = 0{,}318 \qquad f_1(90°) = 0{,}5$

$$I_{dtm} = \frac{P_{DD}}{U_{DD} \cdot f_0(\alpha)} = \frac{50}{11{,}2 \cdot 0{,}318} = 14{,}03\ A$$

$$P_K = \frac{U_{dm} \cdot I_{d1m}}{2} = \frac{U_{dm} \cdot I_{dtm} f_1(\alpha)}{2} \Rightarrow U_{dm} = \frac{2 P_K}{I_{dtm} f_1(\alpha)}$$

$U_{dm} = 8{,}55\ V$

$U_{dmin} = U_{DD} - U_{dm} = 2{,}65\ V$

(10.) Pojačalo snage treba projektirati za rad na temp. okoline do 50°C. $T_{S(max)} = 130°C$

$K = K_{SK} + K_{KH} + K_{HO} = 1{,}5\ °C/W$

$$P_{dT} = \frac{T_S - T_o}{K} = \frac{130 - 50}{1{,}5} = 53{,}33\ W$$

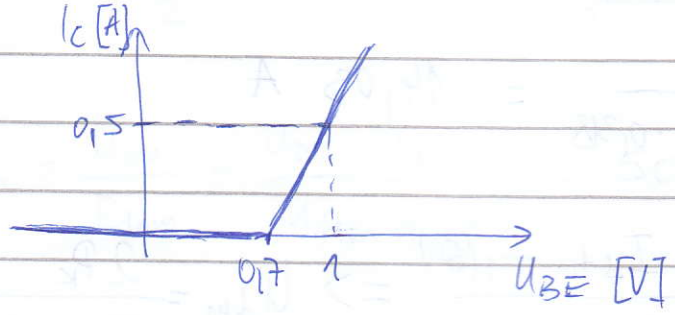
$P_{DD} = P_K + P_d \qquad P_K = P_{dT} \cdot \frac{\eta}{1-\eta} = 53{,}33 \cdot \frac{0{,}75}{0{,}25} = 160\ W$

$\frac{P_K}{\eta} = P_K + P_{dT} \qquad P_{dT} = P_d + P_{uz}$

↓

ako se ne navede, onda = 0

(11.) VF pojačalo snage s bipolarnim tranz. radi u režimu klase C u odušljaču gdje je temp. okoline 60°C.



$k = \frac{0,5}{1-0,7} = \frac{5}{3}$ A/V → koef. smjera

$I_C = \frac{5}{3}(U_{BE} - 0,7)$, za $U_{BE} > 0,7$ V

$I_{Ctm} = \frac{5}{3}(U_{BEmax} - 0,7)$ $U_{BEmax} = U_{BB} + U_{bem}$

$= 1,3$ V

$I_{Ctm} = \frac{5}{3}(1,3 - 0,7) = 1$ A

$\cos\Theta_c = \frac{U_{BEZ} - U_{BB}}{U_{BEmax} - U_{BB}} = 0,5 \Rightarrow \underline{\Theta_c = 60°}$

($U_\gamma = 0,7$ V)

$I_{C1} = I_{Ctm} \cdot t_1(\Theta) = 1 \cdot 0,218 = 218$ mA

$\eta = \frac{P_K}{P_{CC}}$ $P_{CC} = U_{CC} \cdot I_{C1} = \underline{6,104\ W}$

$P_K = \frac{U_{cm} \cdot I_{cm}}{2}$ $U_{cm} = U_{CC} - U_S = 27$ V

$I_{cm} = I_{Ctm} \cdot t_1(\Theta)$

$I_{cm} = 1 \cdot 0{,}391 = 391\ mA$

$\Rightarrow P_K = 5{,}2785\ W \longrightarrow \eta = \frac{5{,}28}{6{,}1} = 86{,}47\ \%$

- pojačanje snage $= G = 10 \log \frac{P_K}{P_{dz}} = 10 \log \frac{5{,}28}{0{,}5}$

$G = 10{,}23\ dB$

$R_c = \frac{U_{cm}}{I_{cm}} = \frac{27}{0{,}391} = 69\ \Omega$

$P_d = P_{cc} - P_K = 6{,}1 - 5{,}28 = 0{,}825\ W$

$P_{dT} = P_d + P_{dz} = 0{,}825 + 0{,}5 = 1{,}325\ W$

$K = \frac{T_S - T_o}{P_{dT}} = \frac{180° - 60°}{1{,}325} = 90{,}53\ °C/W$

$K_{Ho} = K - K_{SK} - K_{KH} = 90{,}53 - 15 - 6 = 69{,}53\ °C/W$

(12.) Sklop za utrostručivanje frekvencije izveden je pomoću pojačala klase C s bip. tranz.

$$f_3(\Theta)_{max} = 0{,}185 \Rightarrow \Theta = 40°$$

$$P_{K3} = \frac{U_{cm} \cdot I_{C3m}}{2} = \frac{(U_{CC} - U_S) \cdot I_{Ctm} \cdot f_3(\Theta)}{2}$$

$$I_{Ctm} = \frac{2 P_{K3}}{(U_{CC} - U_S) f_3(\Theta)} = 1{,}081 \text{ A}$$

$$\eta = \frac{P_{K3}}{P_{CC}} \qquad P_{CC} = U_{CC} \cdot I_{CS} = U_{CC} \cdot I_{Ctm} \cdot f_0(\Theta)$$

$$P_{CC} = 12 \cdot 1{,}081 \cdot 0{,}147$$

$$\eta = \frac{1}{1{,}9} = 52{,}43\% \leftarrow P_{CC} = 1{,}9 \text{ W}$$