UNIDAD 2: EJERCICIO DE CÁLCULO TÉRMICO

DESARROLLO

$$I = \frac{400W}{60V} = 6,67A$$

$T_{max\ adm} = 175°C \qquad R_{DS(on)} = 17,5\ m\Omega$

$T = 175°C - 50°C = 125°C$

$$R\theta_{JA} = 62\ \frac{°C}{W}$$

$R_{DS(on)}(125°C) \cong 1,8\ R_{DS(on)} = 31,5\ m\Omega$

$$T_J = I^2 R_{DS(on)} \cdot 62\frac{°C}{W} + T_{amb\_max}$$

$\Rightarrow T_J' = 137°C$ (1ra iteración)

$\hookrightarrow R_{DS(on)}(137°C) \cong 2 \cdot R_{DS(on)} = 35\ m\Omega$

$\Rightarrow T_J'' = 146,5°C$ (2da iteración)

$\hookrightarrow R_{DS(on)}(146,5°C) \cong 2,1 \cdot R_{DS(on)} = 36,75\ m\Omega$

$\Rightarrow \boxed{T_J''' \cong 151,37°C}$ (Sin disipador)

Margen de 40°C $\Rightarrow T = 175°C - 40°C - 50°C$

$T = 85°C$

$$R\theta_{CS} = 0,5\ \frac{°C}{W}, \quad R_{\theta JC} = 1,5\ \frac{°C}{W}$$

$R_{DS(on)}(85°C) \cong 1,4 \cdot R_{DS(on)} = 24,5\ m\Omega$

$$I^2 . R_{DS(on)}(85°C) . (R_{\theta JC} + R_{\theta CS} + R_{\theta D}) = 85°C$$

$$\Rightarrow \boxed{R_{\theta D} = 76 \frac{°C}{W}}$$

Selección de disipador: HS227-ND
(Natural) $\boxed{R_{\theta D} = 68 °C/W}$

$t_f = 45ns \quad t_r = 60ns \Rightarrow t = 105ns$

$f = 100kHz \quad f_p = 100.10^3 . 105.10^{-9}$

$f_p = 0,0105$

$$P_{commutacion} = \frac{V . I}{4} . f_p = 1,05W$$

$$\Rightarrow P_{TOTAL} = I^2 R_{DS(on)}(85°C) + 1,05W$$

$$P_{TOTAL} = 2,14W$$

$$R_{\theta D} = \frac{85°C}{P_{TOTAL}} - R_{\theta JC} - R_{\theta CS}$$

$$\Rightarrow \boxed{R_{\theta D} = 37,72 \frac{°C}{W}}$$

Selección de disipador: HS273-ND
(Natural) $\boxed{R_{\theta D} = 34 °C/W}$