

LLC mosfet switching loss

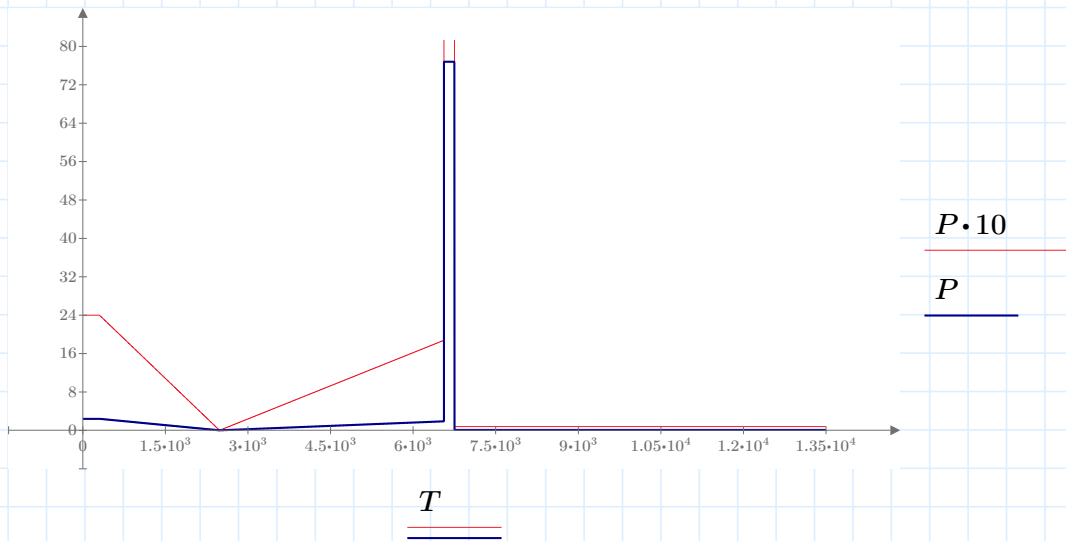
The mosfet body diode conducts for the first 300ns

From 300n to 2400n current reduce from -2a to 0a linearly

From 2400n to 6500n current rises from 0a to 2.5a linearly

```
Data := READCSV("cycle loss.csv")
```

```
T := Data(0)      P := Data(1)
min(T) = 1
max(T) = 1.35 · 104
Start := match(1, T)ORIGIN      Start = 0
End := match(1.35 · 104, T)ORIGIN      End = 1.35 · 104
```



$$Int := \sum_{i=Start}^{End} P_i \quad Int = 2.236 \cdot 10^4$$

$$End - Start = 1.35 \cdot 10^4$$

$$P_{avg} := \frac{\sum_{i=Start}^{End} P_i}{End - Start}$$

$P_{avg} := \text{mean}(P) = 1.656$

$P_{avg} = 1.656 \text{ Watt}$

$$\frac{300 \cdot -2 \cdot (-1.2) + \frac{(-2 \cdot -1.2 - 0) \cdot 2200}{2} + \frac{4000 \cdot 2.5^2 \cdot 0.3}{2} + 250 \cdot 16^2 \cdot 0.3 + 6750 \cdot 10^{-4}}{13500} = 1.949$$

$$\frac{300 \cdot -2 \cdot (-1.2) + \frac{(-2 \cdot -1.2 - 0) \cdot 2200}{2} + \frac{4000 \cdot 2.5^2 \cdot 0.3}{2} + 250 \cdot 16^2 \cdot 0.3}{13500} = 1.949$$

```

stepPTavg(t) :=
  PT ← 0
  for i ∈ 0 .. last (P(0)) - 1
    PT ← PT + ((P(i))i+1) · ((P(0))i+1 - ((P(0))i))
  Pavg ←  $\frac{PT}{(P^{(0)})_{\text{last}(P^{(0)})}}$ 
  return Pavg
= 2.031

```

```

lenerPTavg(t) :=
  PT ← 0
  for i ∈ 0 .. last (P(0)) - 1
    if (P(i))i = (P(i))i+1
      PT ← PT + ((P(i))i+1) · ((P(0))i+1 - ((P(0))i))
    else
      PT ← PT +  $\frac{((P^{(i)})_i + (P^{(i)})_{i+1})}{2} \cdot ((P^{(0)})_{i+1} - ((P^{(0)})_i))$ 
  Pavg ←  $\frac{PT}{(P^{(0)})_{\text{last}(P^{(0)})}}$ 
  return Pavg
= 1.949

```