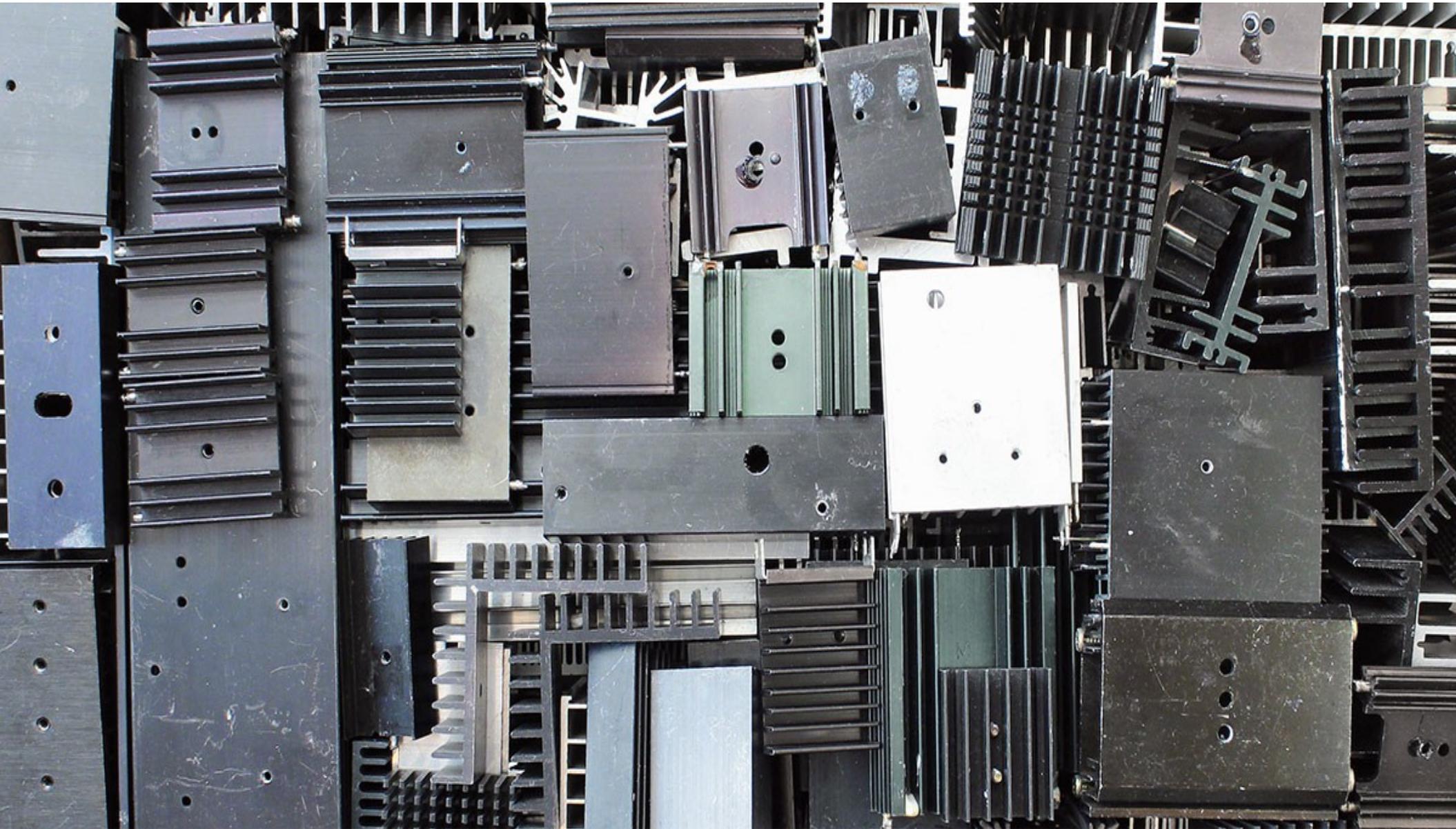


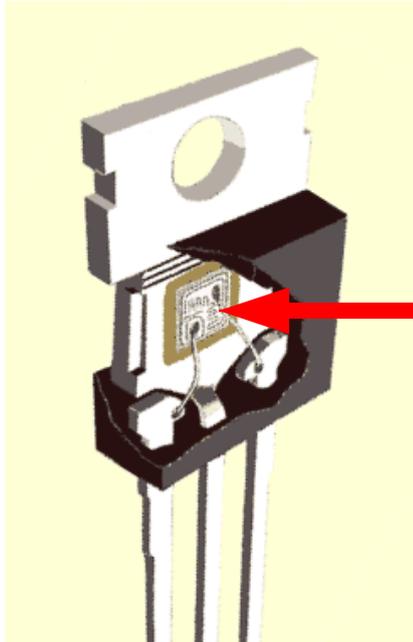
OZ9AU
17.1.20

Kølepladeberegning



Kølepladeberegning

LM7805



$T_j \text{ max } 150 \text{ } ^\circ\text{C}$

Her afsættes effekten

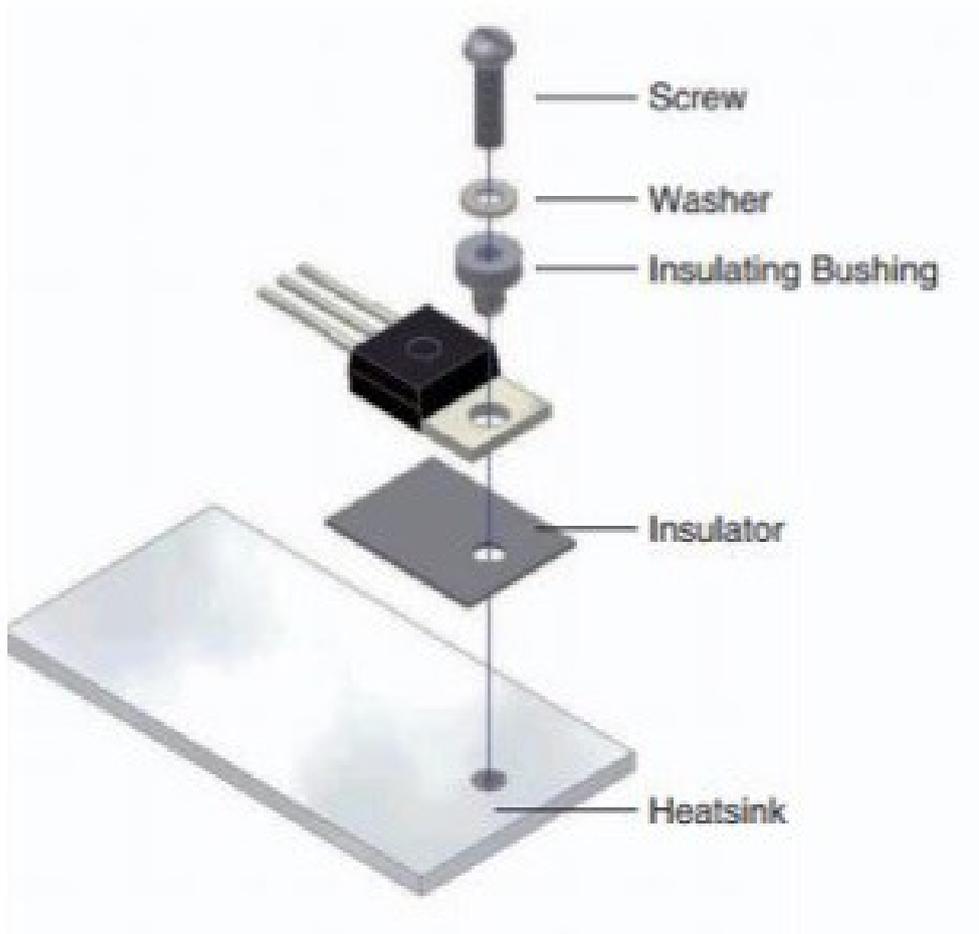
$T_j \text{ max } 150 \text{ } ^\circ\text{C}$

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾⁽²⁾

		MIN	MAX	UNIT
DC input voltage			35	V
Internal power dissipation ⁽³⁾		Internally Limited		
Maximum junction temperature			150	$^\circ\text{C}$
Lead temperature (soldering, 10 sec.)	TO-3 package (NDS)		300	$^\circ\text{C}$
	Lead temperature 1,6 mm (1/16 in) from case for 10 s		230	$^\circ\text{C}$
Storage temperature		-65	150	$^\circ\text{C}$

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings



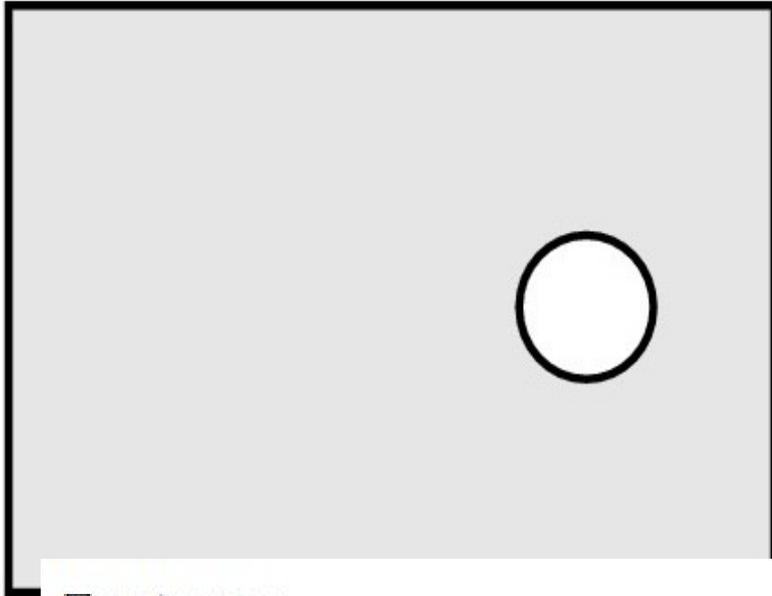
Termiske modstande

THERMAL METRIC ⁽¹⁾

<http://www.ti.com/lit/ds/symlink/lm340.pdf>

$R_{\theta JA}$	Junction-to-ambient thermal resistance
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance
$R_{\theta JB}$	Junction-to-board thermal resistance
ψ_{JT}	Junction-to-top characterization parameter
ψ_{JB}	Junction-to-board characterization parameter
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance

Isolering (Glimmer)



Mica wafers

GS 220 4

TO 220, 18 x 12 mm, customer specific versions on request



Features

for transistor:	TO 220
material:	muskovit
material thickness:	0.05 mm
thermal resistance (GS 3):	0.4 K/W
dielectric strength:	5 kV
insulation resistance:	$3 \cdot 10^{17} \Omega \cdot \text{cm}$

LM7805

Aflæste værdier

R_{th J-case(bottom)} , 1.7 °C/W

Isolation Mica, 0.4 °C/W

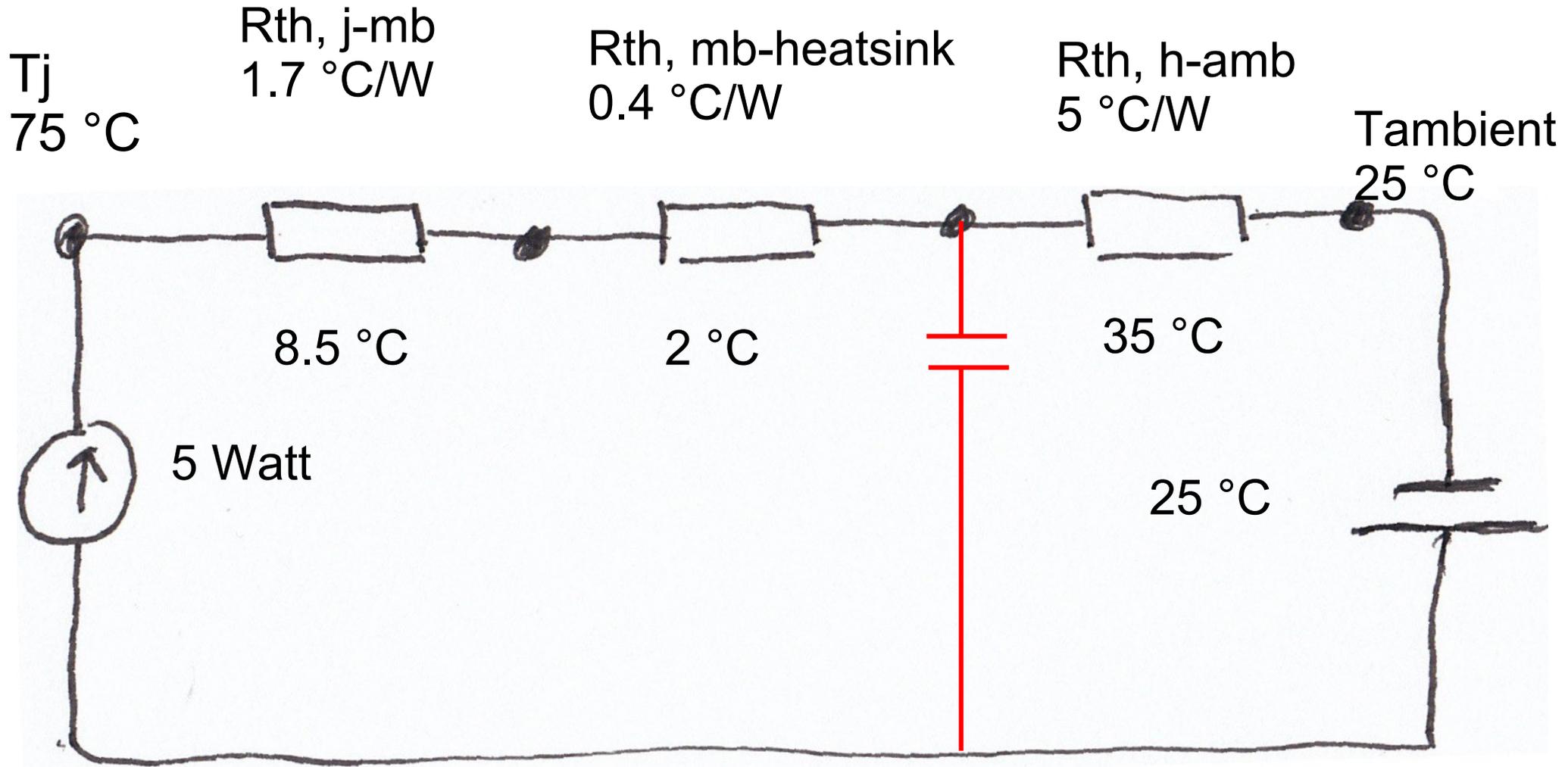
Modstand i alt fra junction til heatsink
2.1 °C/W

6.4 Thermal Information

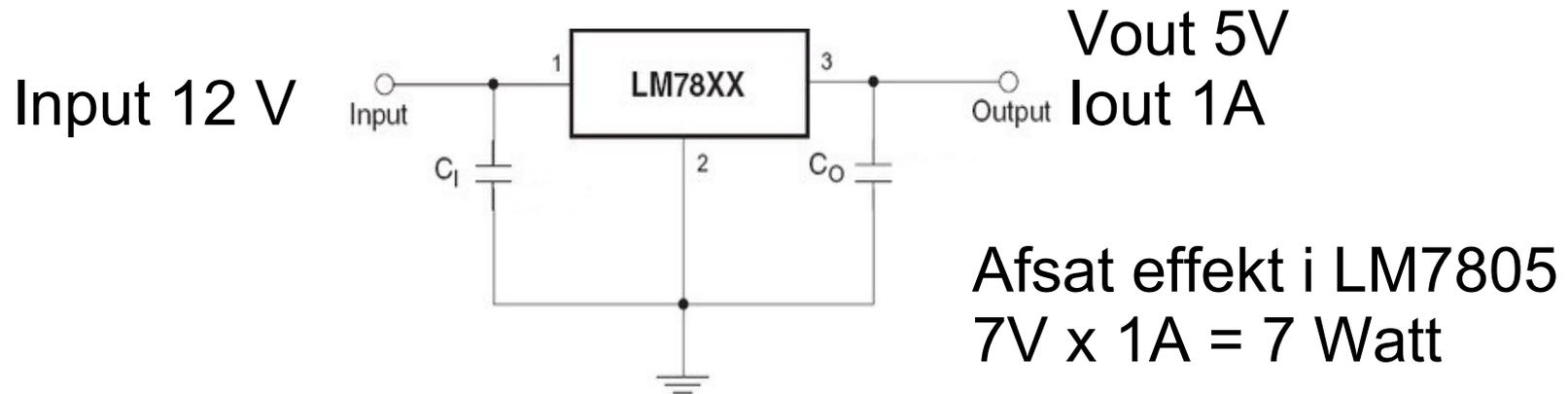
THERMAL METRIC ⁽¹⁾	LM340, LM7805 Family				UNIT
	NDE (TO-220)	KTT (DPAK/TO-263)	DCY (SOT-223)	NDS (TO-3)	
	3 PINS	3 PINS	4 PINS	2 PINS	
R _{θJA} Junction-to-ambient thermal resistance	23.9	44.8	62.1	39	°C/W
R _{θJC(top)} Junction-to-case (top) thermal resistance	16.7	45.6	44	2	°C/W
R _{θJB} Junction-to-board thermal resistance	5.3	24.4	10.7	—	°C/W
ψ _{JT} Junction-to-top characterization parameter	3.2	11.2	2.7	—	°C/W
ψ _{JB} Junction-to-board characterization parameter	5.3	23.4	10.6	—	°C/W
R _{θJC(bot)} Junction-to-case (bottom) thermal resistance	1.7	1.5	—	—	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

Vi bruger Ohm's lov



Eksempel med LM7805



Ønsket $T_j = 75^\circ\text{C}$

Omgivelsestemperatur, $T_{amb} = 25 - 40^\circ\text{C}$

Samlet max termisk modstand $(75 - 25)/7 = 50/7 = 7,14 \text{ }^\circ\text{C/W}$

Modstand i alt fra junction til heatsink $2.1 \text{ }^\circ\text{C/W}, (1.7 + 0.4)$

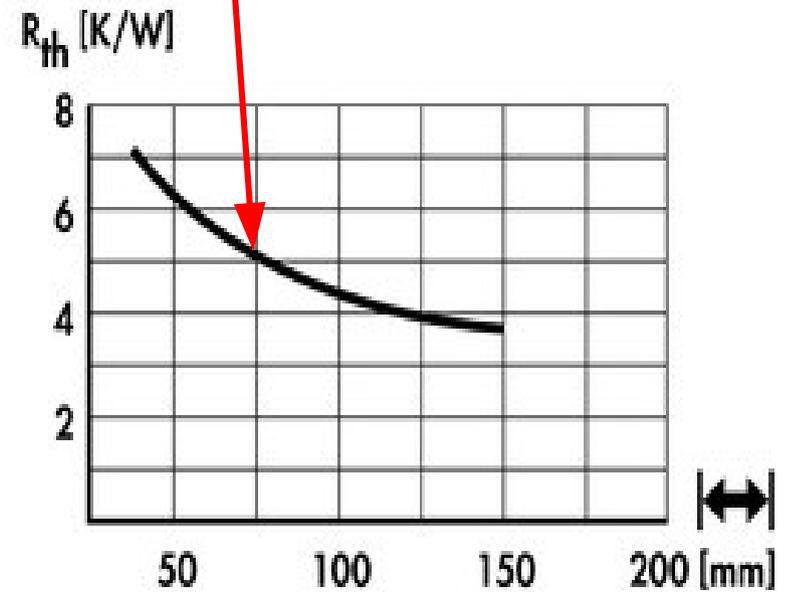
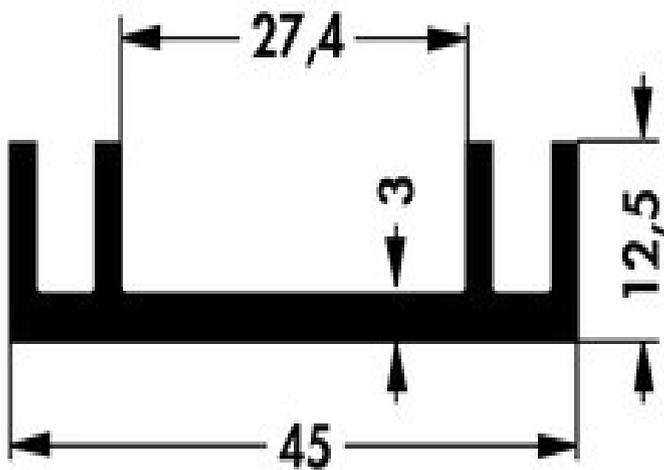
Heatsink = $5 \text{ }^\circ\text{C/W}$

<https://www.heatsinkcalculator.com/heat-sink-size-calculator.html>

Køleplade Fischer SK122

<https://www.fischerelektronik.de/en/>

Ved 5 °C/W aflæses 75mm

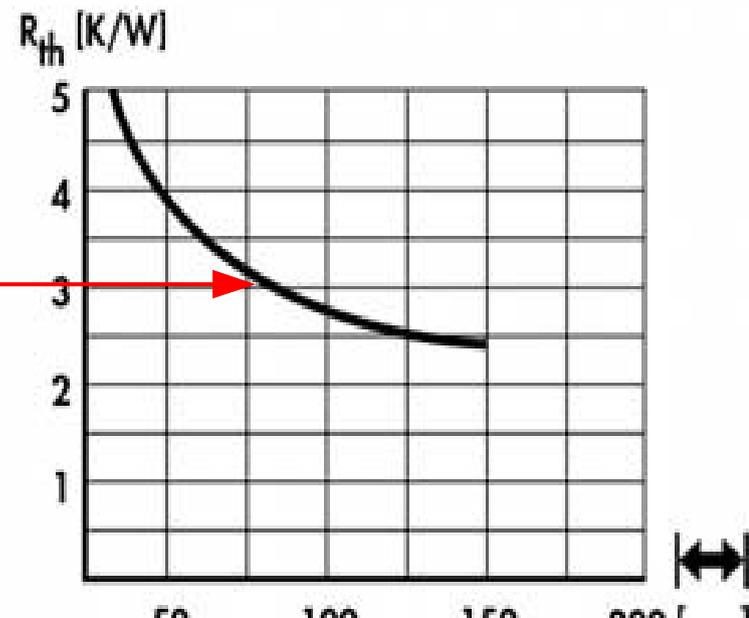
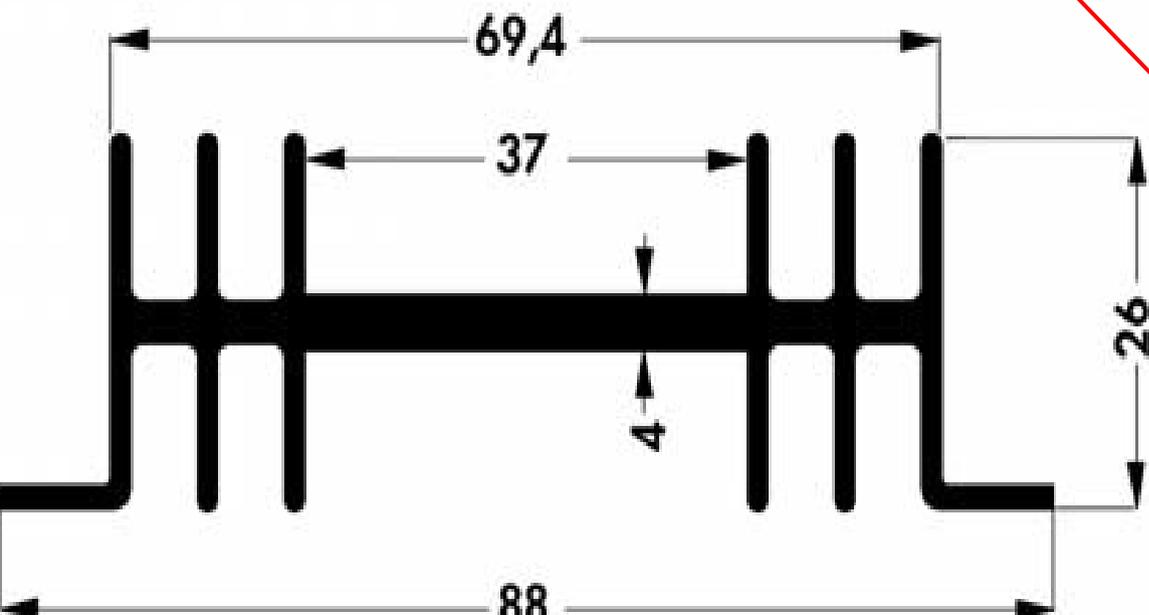


Hvis Tamb er 40 °C/W

Skal kølepladen være 2.9 °C/W

Vi finder en større køleplade, **Fischer SK36**

Ca 80 mm's længde

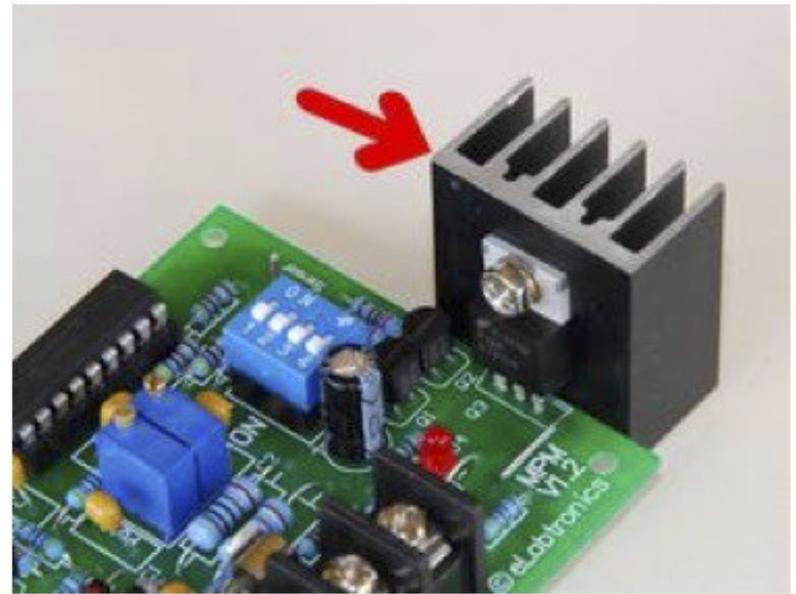
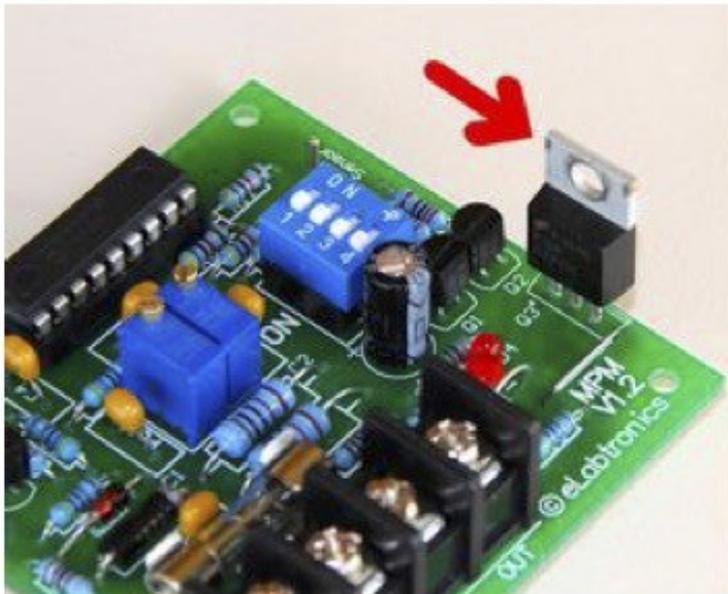


Med eller uden køleplade?

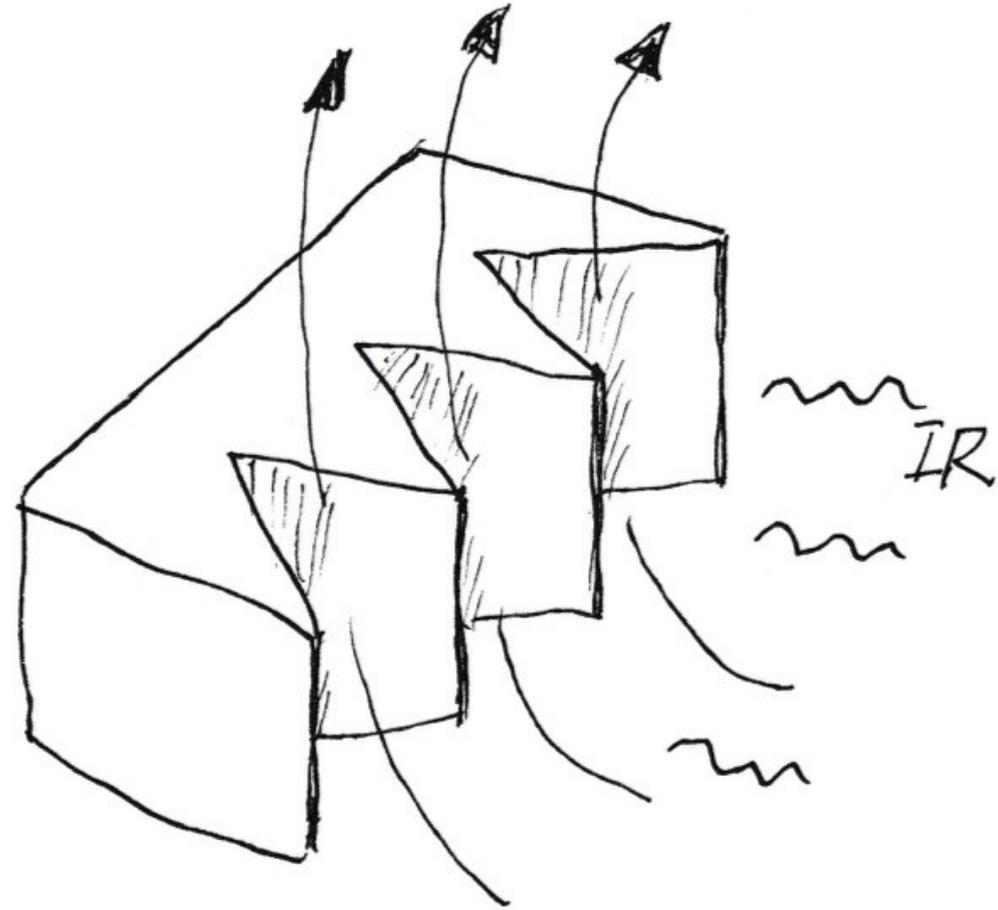
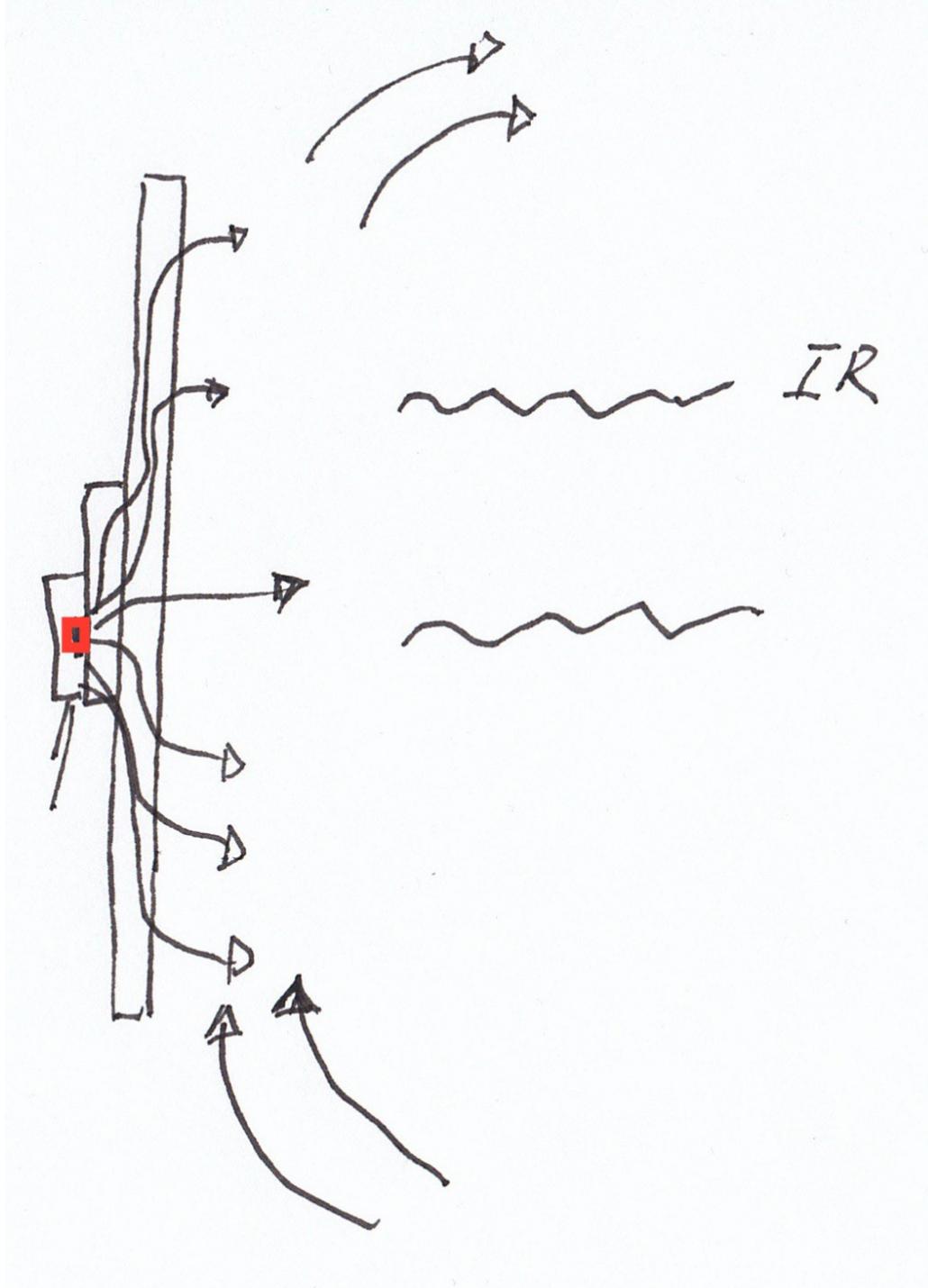
Termisk modstand fra junction til ambient, LM7805
 $23,9 \text{ } ^\circ\text{C/W}$

$T_j \text{ max } 75 \text{ } ^\circ\text{C}$, $T_{\text{amb}} 25 \text{ } ^\circ\text{C}$. $50 \text{ } ^\circ\text{C} / 23.9 \text{ } ^\circ\text{C} = 2.1 \text{ Watt}$

Men der også den termiske modstand til printbanerne
 $R_{\text{th,jb}} = 5.3 \text{ } ^\circ\text{C/W}$. Kræver dog at der er kobber nok til at lede varmen bort

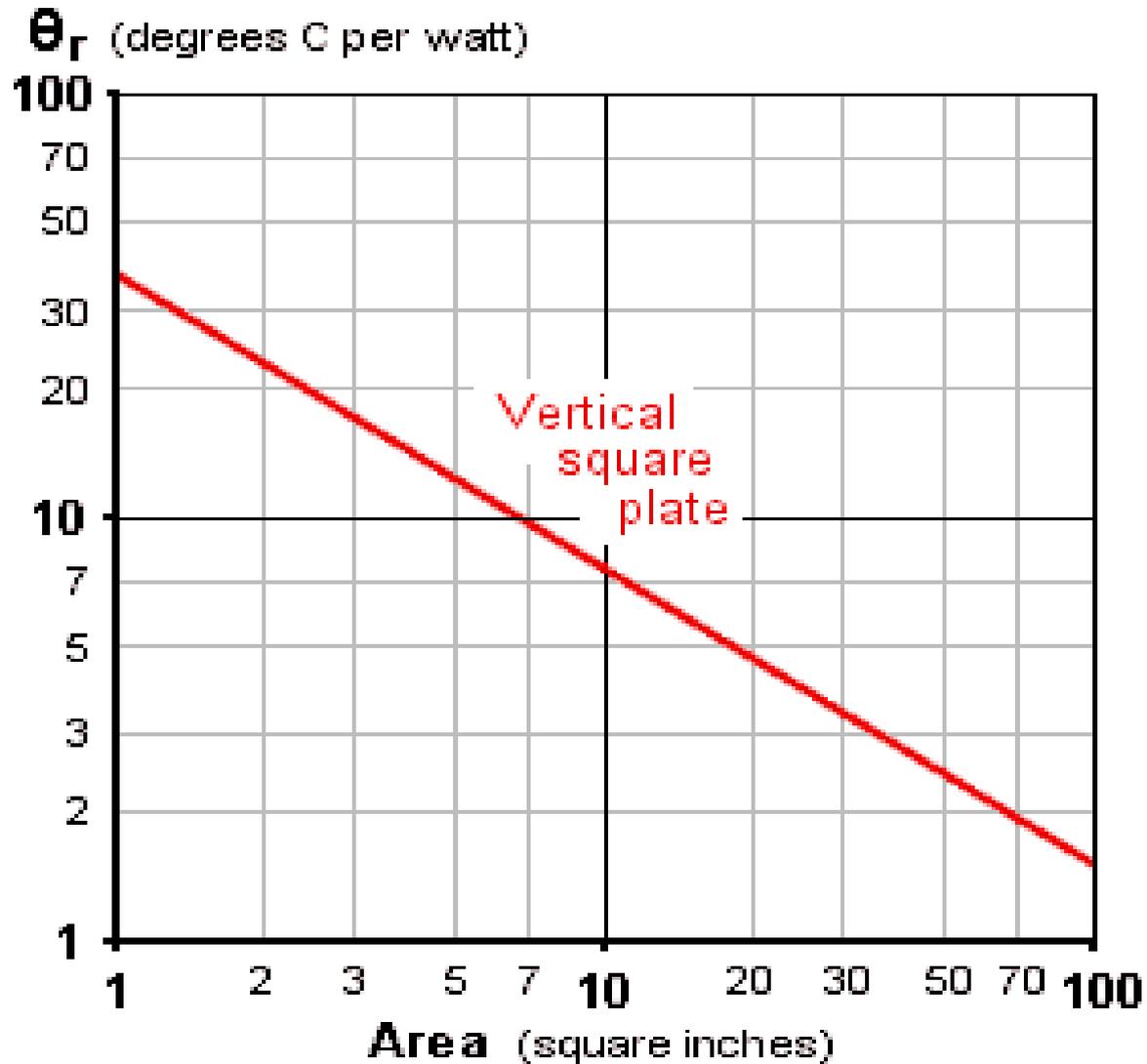


Konvektion og strålevarme



1.5mm Aluplade

<https://www.heatsinkcalculator.com/free-resources/flat-plate-heat-sink-calculator.html>



<https://www.heatsinkcalculator.com/free-resources/heat-sink-thermal-resistance-calculator.html>