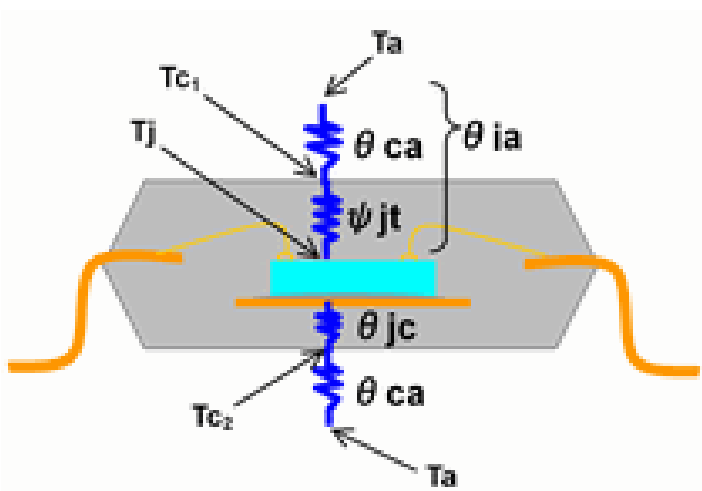


IC 溫度計算

Reported: 台北工程部

Date: Feb 8th 2022

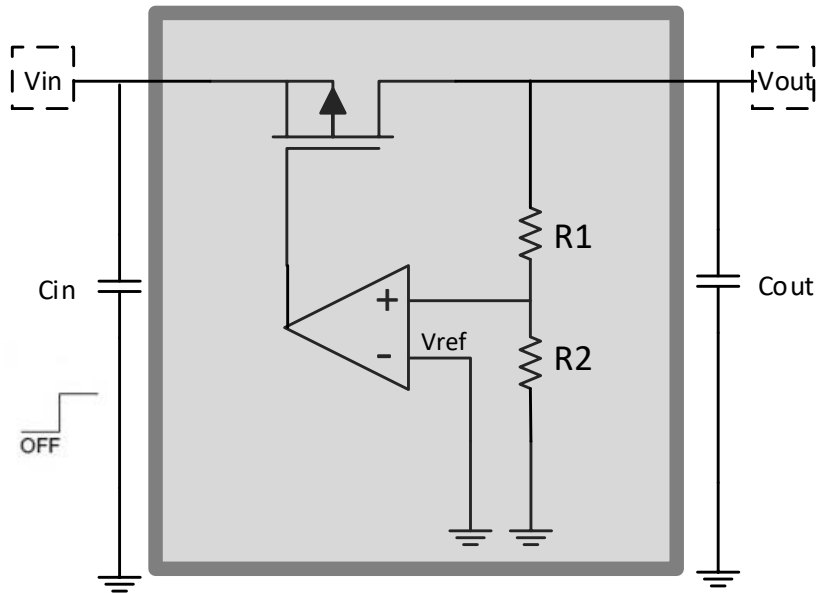
- 名詞解釋
- LDO & Power Dissipation
- 名詞解釋
- 基本公式
- Package
- Layout 重點



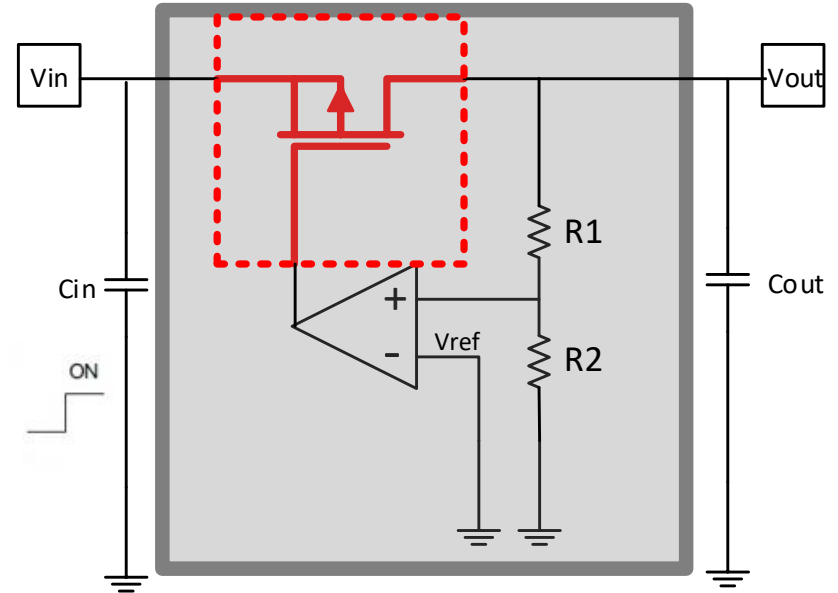
1. T_J ($^{\circ}\text{C}$) = Junction Temp(= Die 溫度)
2. T_c ($^{\circ}\text{C}$) = Case Temp(IC 表面溫度)
3. T_A ($^{\circ}\text{C}$) = Ambient Temp(環境溫度)
4. θ_{JC} ($^{\circ}\text{C}/\text{W}$) = Die表面到IC表面的熱阻系數
5. θ_{JA} ($^{\circ}\text{C}/\text{W}$) = Die表面到環境的熱阻系數
6. θ_{CA} ($^{\circ}\text{C}/\text{W}$) = IC表面到環境的熱阻系數
7. P_D (W) = 耗散功率

熱阻係數越低越好

Not Working



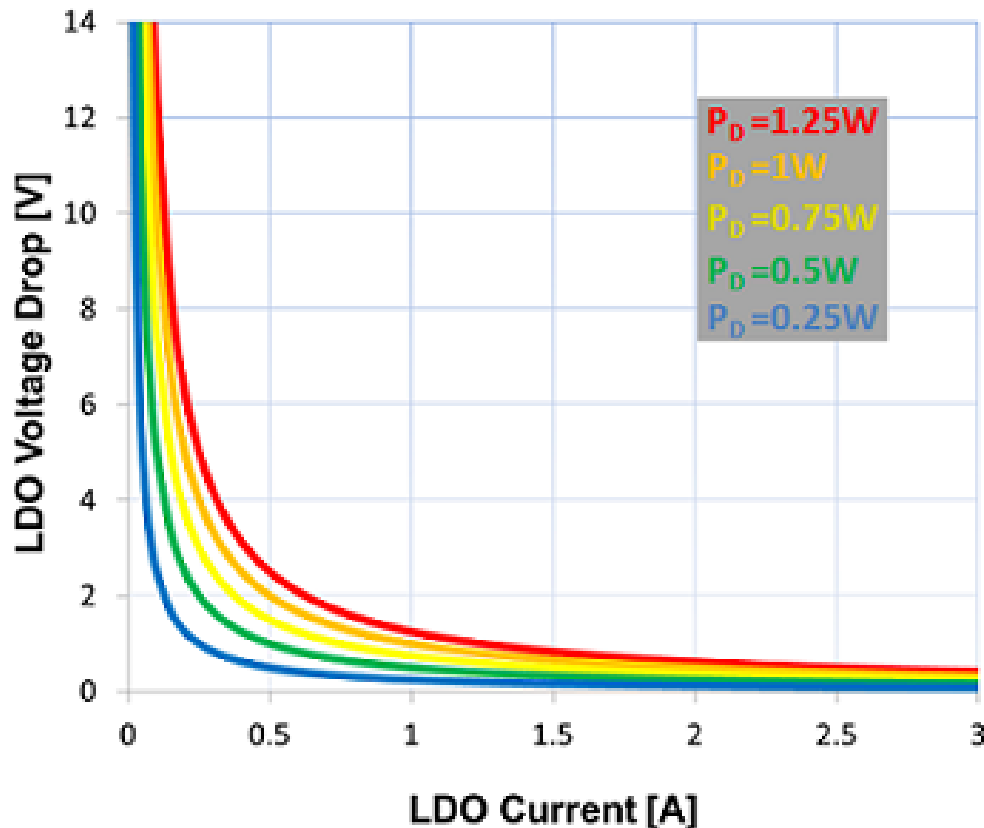
Working



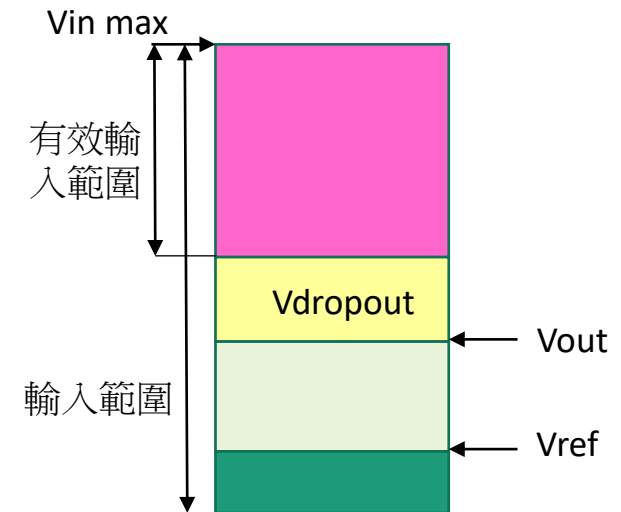


Power Dissipation

AENEAS



$$P_D = (V_{IN} - V_{OUT}) \times I_{LOAD}$$

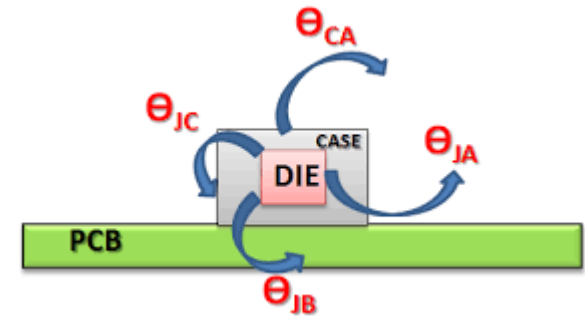


Ex :

$$(5V - 1.8V) \times 200mA = 0.64mW$$

$$(3.3V - 1.8V) \times 200mA = 0.3mW$$

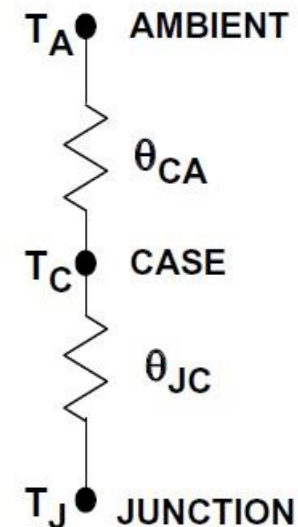
1. $\theta_{JA} = \theta_{JC} + \theta_{CA}$
2. $T_J = T_A + (\theta_{JA} \times P_D)$
3. $T_J = T_C + (\theta_{JC} \times P_D)$

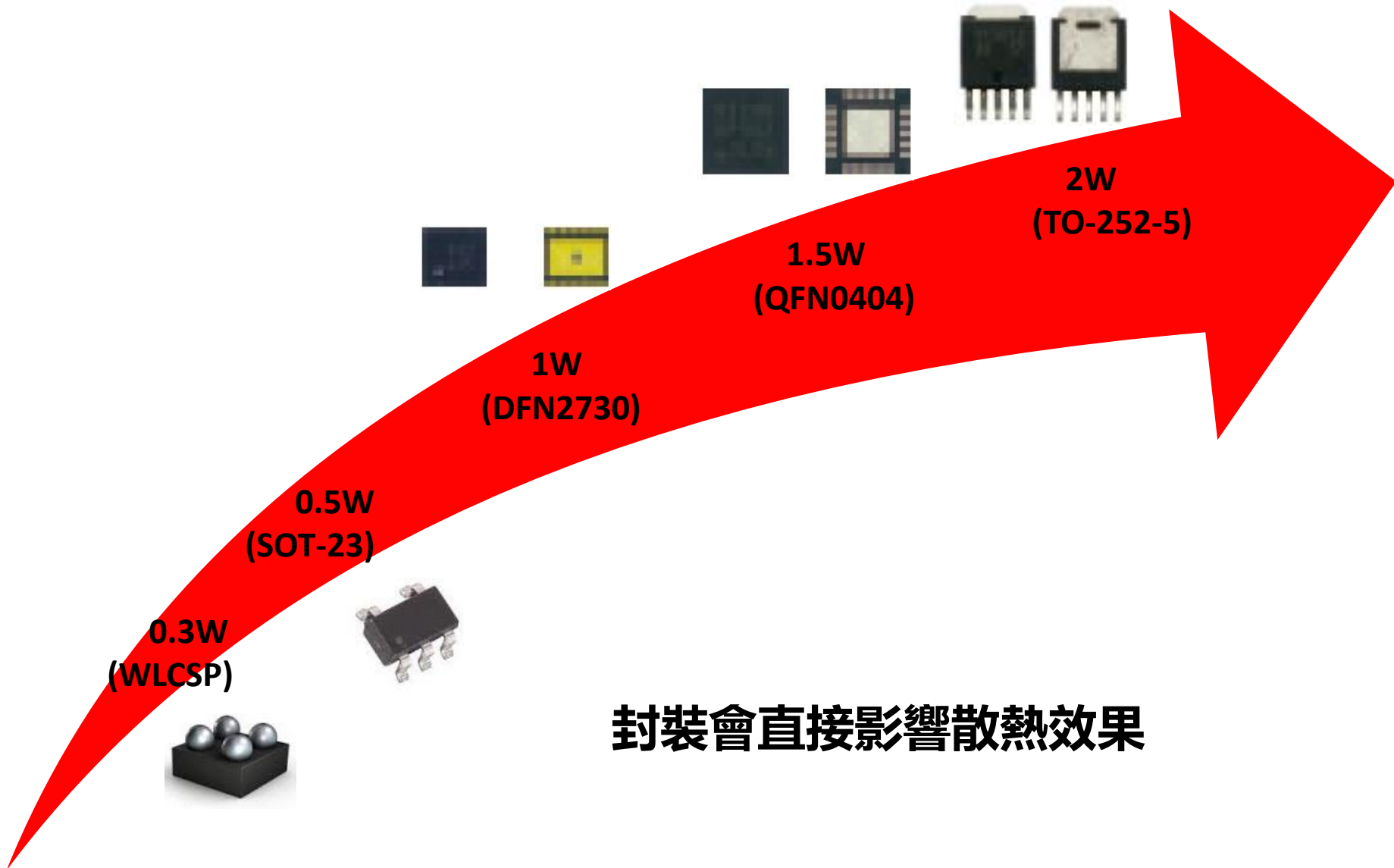


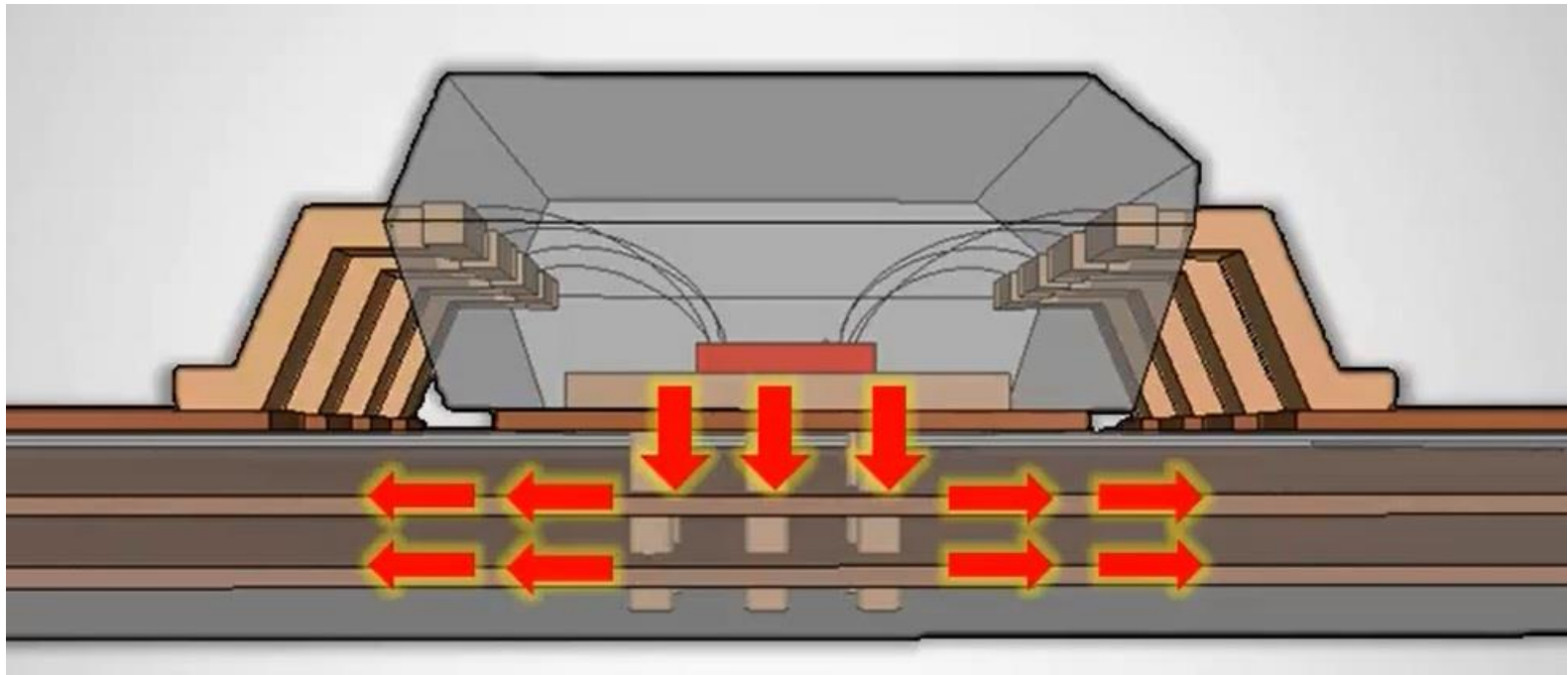
範例參考：NISD RN5T618

$P_{D(MAX)} = 4500 \text{ mW}$, $\theta_{JA} = 22.2 \text{ }^{\circ}\text{C/W}$, θ_{JC}

1. $T_J = 25 \text{ }^{\circ}\text{C} + (22.2 \times 4.5) = 125 \text{ }^{\circ}\text{C}$
2. $T_C = 125 \text{ }^{\circ}\text{C} - 45^{\circ}\text{C} = 80 \text{ }^{\circ}\text{C}$







良好的PCB 設計也可加強
散熱效果

Package	Dimensions	Power Dissipation Standard Con High Watt Con
K(DFN2527)	2.7 x 2.5 (mm)	910(mW) 1400(mW)

Measurement Conditions

	High Wattage Land Pattern	Standard Land Pattern
Environment	Mounting on Board (Wind velocity=0m/s)	Mounting on Board (Wind velocity=0m/s)
Board Material	Glass cloth epoxy plastic (4-Layers)	Glass cloth epoxy plastic (Double sided)
Board Dimensions	35mm × 90mm × 0.8mm	40mm × 40mm × 1.6mm
Copper Ratio	Each layers : Approx. 15%	Top side : Approx. 50% , Back side : Approx. 50%
Through-holes	φ0.3mm × 9pcs, φ0.5mm × 10pcs	φ0.54mm × 30pcs

Measurement Results

(T_{opt}=25°C, T_{jmax}=125°C)

	High Wattage Land Pattern	Standard Land Pattern
Power Dissipation	1400mW	910mW
Thermal Resistance	$\theta_{ja} = (125 - 25^{\circ}\text{C}) / 1.4\text{W} = 71^{\circ}\text{C/W}$	$\theta_{ja} = (125 - 25^{\circ}\text{C}) / 0.91\text{W} = 110^{\circ}\text{C/W}$
	$\theta_{jc} = 14^{\circ}\text{C/W}$	$\theta_{jc} = 20^{\circ}\text{C/W}$

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Thank You

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