

阻抗控制計算

目的: 學會使用Polar si9000對特殊信號線的阻抗計算

舉例:

1. 差分信號線的阻抗計算

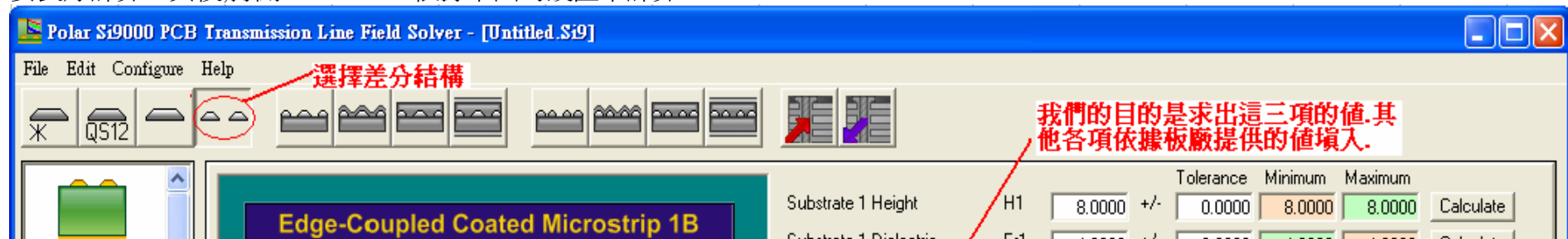
以 E03 為例, E03 USB2.0 D+, D- 要求有90歐姆的阻抗匹配, 依照此要求, 計算出這兩條差分信號線在走線時的線寬和線間距.

計算需準備的數據: 板層的迭構方式, 各個板層之間的介質厚度, 介質常數, 銅箔厚度, 阻抗控制的設計阻值.

板層的迭構方式	thickness	Er	UNIT:MIL
SOLDER	0.844	4.2	
TOP	1.00Z	1.4	
PP	8	4.2	
VCC	1.00Z	1.4	
CORE	6	4.2	
GND	1.00Z	1.4	
PP	8	4.2	
BOT	1.00Z	1.4	
SOLDER	0.844	4.2	

此差分信號走線是在BOT層, 與他相鄰的一層就是GND層, 所以我們在計算時用到數據是BOT與GND之間的數據.

安裝好計算工具後, 打開Polar si9000. 依據下圖的設置來計算:



Edge-Coupled Coated Microstrip 1B

Diagram labels: CEr, C1, C2, S1, W2, T1, H1, Er1, C3, W1, GND 層

Substrate 1 Height	h1	8.0000	+/-	0.0000	8.0000	8.0000	Calculate
Substrate 1 Dielectric	Er1	4.2000	+/-	0.0000	4.2000	4.2000	Calculate
Lower Trace Width	W1	12.4447	+/-	0.0000	12.4447	12.4447	Calculate
Upper Trace Width	W2	11.4447	+/-	0.0000	11.4447	11.4447	
Trace Separation	S1	9.0000	+/-	0.0000	9.0000	9.0000	Calculate
Trace Thickness	T1	1.4000	+/-	0.0000	1.4000	1.4000	Calculate
Coating Above Substrate	C1	0.8440	+/-	0.0000	0.8440	0.8440	Calculate
Coating Above Trace	C2	0.8440	+/-	0.0000	0.8440	0.8440	
Coating Between Traces	C3	0.8440	+/-	0.0000	0.8440	0.8440	
Coating Dielectric	CEr	4.2000	+/-	0.0000	4.2000	4.2000	Calculate

Differential Impedance: Zdiff

Units: Mils Inches Microns Millimetres

Interface Style: Standard Extended

G.S. Convergence: Fine (Slower) Coarse (Faster)

Notes: Add your comments here

Lossless Calculation | Frequency Dependent Calculation

Differential Structures

信號線與GND層相鄰，並且信號線上覆蓋有塗層，因此依據製板的實際情況，選擇此方式。

單位選擇

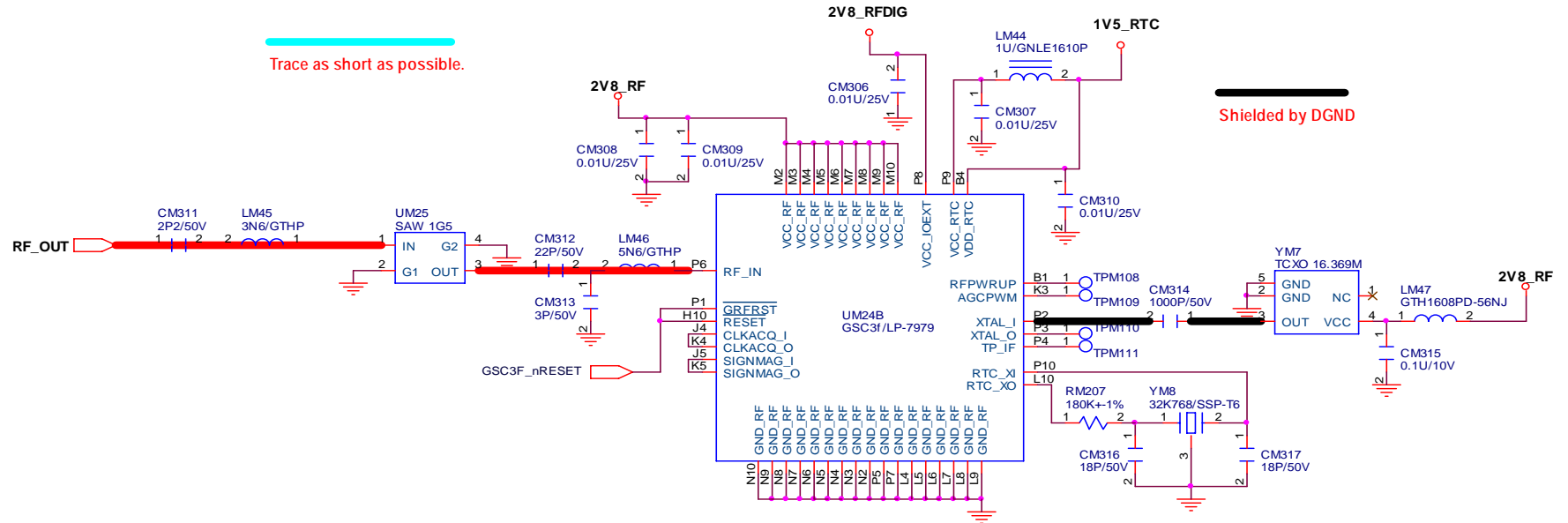
輸入匹配阻抗的數值。

保持默認值

各項填好之後，點擊此按鈕，我們所求的W1, W2, S1的值就會顯示上面的紅色方框內。










2. G06 的GPS 傳輸線阻抗計算

紅色走線部分需要做50 OHM 阻抗匹配



板層結構

		thickness	Er	UNIT:MIL
SOLDER		0.8	3.8	
L1 (TOP)	1.00Z	1.4		
PP	2116	6	4.6	
L2 (IN2)	1.00Z	1.4		
CORE		6	4.2	
L3 (IN3)	1.00Z	1.4		
PP	2116	4	4	
L4 (IN4 GND)	1.00Z	1.4		

CORE			4	4
L5 (IN5 VCC)		1.00Z	1.4	
PP		2116	4	4
L6 (IN6)		1.00Z	1.4	
CORE			6	4.2
L7 (IN7)		1.00Z	1.4	
PP		2116	6	4.6
L8 (BOT)		1.00Z	1.4	
SOLDER			0.8	3.8
TOL:			48.8	

在LAYOUT 中實際走線為L1(TOP) 層,其下對應的7層為GND
 即以 L2 層作為參考平面實際計算此傳輸線的線寬
 在計算工具中輸入參數

選擇帶有塗層的單微帶線方式

這兩項是所求項,其他各項依據已有數據填入.

點擊這兩個按鈕得到計算結果.

Parameter	Symbol	Value	Tolerance	Minimum	Maximum	Action
Substrate 1 Height	H1	6.0000	+/-	0.0000	6.0000	Calculate
Substrate 1 Dielectric	Er1	4.6000	+/-	0.0000	4.6000	Calculate
Lower Trace Width	W1	9.4001	+/-	0.0000	9.4001	
Upper Trace Width	W2	8.4001	+/-	0.0000	8.4001	Calculate
Trace Thickness	T1	1.4000	+/-	0.0000	1.4000	Calculate
Coating Above Substrate	C1	0.8000	+/-	0.0000	0.8000	
Coating Above Trace	C2	0.8000	+/-	0.0000	0.8000	
Coating Dielectric	CEr	3.8000	+/-	0.0000	3.8000	

GND層 www.polarinstruments.com

Impedance Zo 50.38 50.38 50.38 Calculate More...

Notes
Add your comments here

Units
 Mils
 Inches
 Microns
 Millimetres

Interface Style
 Standard
 Extended

G.S. Convergence
 Fine (Slower)
 Coarse (Faster)

Lossless Calculation Frequency Dependent Calculation

Single-Ended Structures

Coated Microstrip 1B
Coated Microstrip 2B
Embedded Microstrip 1B1A
Embedded Microstrip 1B2A

昇和

選擇單位

輸入阻抗值

保持默認值