

Vorschlag

02.08.2024

FCON-9508-02 Lagenaufbau:

```
1 -----      Cu-Foil  9+35  :End-Cu 44
                  Imp/Diff.Pair
xxxxxxxxxxxxxxxxx Prepreg  106 R1755 58 :55
xxxxxxxxxxxxxxxxx Prepreg  1080R1755LR 74 :70
2 -----      #PWR/GND
##### Core  200 35/35 :270  FR4
3 -----      Imp/Diff.Pair
xxxxxxxxxxxxxxxxx Prepreg  2116R1755HR 122 :115
xxxxxxxxxxxxxxxxx Prepreg  2116R1755HR 122 :115
4 -----      #PWR/GND
##### Core  200 35/35 :270  FR4
5 -----      #PWR/Power
xxxxxxxxxxxxxxxxx Prepreg  2116R1755HR 122 :115
xxxxxxxxxxxxxxxxx Prepreg  2116R1755HR 122 :115
6 -----      Signale
##### Core  200 35/35 :270  FR4
7 -----      #PWR/GND
xxxxxxxxxxxxxxxxx Prepreg  1080R1755LR 74 :70
xxxxxxxxxxxxxxxxx Prepreg  106 R1755 58 :55
                  Imp/Diff.Pair
8 -----      Cu-Foil  9+35  :End-Cu 44
```

Lagen: 8 Dicke: 1,57 +/- 0,13

Conductor Spacing Conductor Impedance Conversion Data Planar Inductors Plane Calculator Thermal Fusing Current
 Embedded Resistors PPM Calculator Crosstalk Calculator Wavelength Calculator Er Effective Ohm's Law Reactance
 Via Properties Conductor Properties Bandwidth & Max Conductor Length Differential Pairs Padstack Calculator Mechanical Information

Differential Pairs

Conductor Width (W)

0,17 mm

Target Zdiff

85 Ohms

Formula Restrictions:

$0.1 < W/H < 3.0$
 $0.1 < S/H < 3.0$

Conductor Spacing (S)

0,1 mm

Conductor Height (H)

0,130 mm

W/H = 1.308

S/H = 0.769

Zdifferential

84.342 Ohms

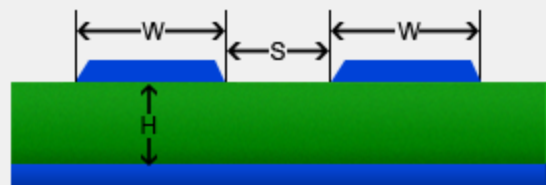
Zo

54.722 Ohms

+/- Tolerance = 10%

92.776 Ohms

75.907 Ohms



Options

Base Copper Weight

- ☒ 9um
- ☐ 18um
- ☐ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Units

- ☐ Imperial
- ☒ Metric

Substrate Options

Material Selection

Custom

Er Tg (°C)

4,0 **140**

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Temp Rise (°C)

20

Temp in (°F) = 36.0

Differential Layer

- ☒ Edge Cpld Ext
- ☐ Edge Cpld Int Sym
- ☐ Edge Cpld Int Asym
- ☐ Edge Cpld Embed
- ☐ Broad Cpld Shld
- ☐ Broad Cpld NShld

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Print

Solve!

Information

Total Copper Thickness
44 um

Via Thermal Resistance
N/A

Via Count: **10**

Conductor Temperature
Temp in (°C) = N/A
Temp in (°F) = N/A

N/A
Via Voltage Drop
N/A

Differential Pairs

Conductor Width (W)

0,15 mm

Target Zdiff

85 Ohms

Formula Restrictions:

0.1 < W/H < 3.0
0.1 < S/H < 3.0

Conductor Spacing (S)

0,11 mm

Conductor Height (H1)

0,230 mm

Conductor Height (H2)

0,200 mm

W/H = 0.323

S/H = 0.237

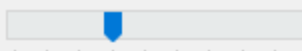
Zdifferential

84.665 Ohms

Zo

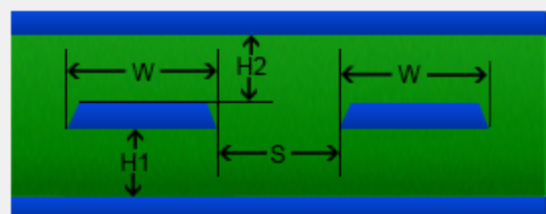
52.155 Ohms

+/- Tolerance = 10%



93.131 Ohms

76.198 Ohms



Options

Base Copper Weight

- ☐ 9um
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Units

- ☐ Imperial
- ☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

140

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Differential Layer

- ☐ Edge Cpld Ext
- ☐ Edge Cpld Int Sym
- ☒ Edge Cpld Int Asym
- ☐ Edge Cpld Embed
- ☐ Broad Cpld Shld
- ☐ Broad Cpld NShld

Print

Solve!

Information

Total Copper Thickness
35 um

Via Thermal Resistance
N/A

Via Count: **10**

Conductor Temperature
Temp in (°C) = N/A
Temp in (°F) = N/A

N/A
Via Voltage Drop
N/A

Differential Pairs

Conductor Width (W)

0,16 mm

Target Zdiff

90 Ohms

Formula Restrictions:

$0.1 < W/H < 3.0$
 $0.1 < S/H < 3.0$

Conductor Spacing (S)

0,12 mm

Conductor Height (H)

0,130 mm

W/H = 1.231

S/H = 0.923

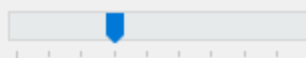
Zdifferential

90.516 Ohms

Zo

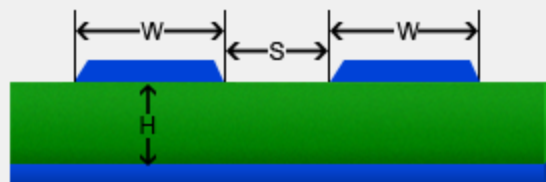
56.423 Ohms

+/- Tolerance = 10%



99.568 Ohms

81.465 Ohms



Options

Base Copper Weight

- ☒ 9um
- ☐ 18um
- ☐ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Units

- ☐ Imperial
- ☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

14

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Differential Layer

- ☒ Edge Cpld Ext
- ☐ Edge Cpld Int Sym
- ☐ Edge Cpld Int Asym
- ☐ Edge Cpld Embed
- ☐ Broad Cpld Shld
- ☐ Broad Cpld NShld

Print

Solve!

Information

Total Copper Thickness
44 um

Via Thermal Resistance
N/A

Via Count: **10**

Conductor Temperature
Temp in (°C) = N/A
Temp in (°F) = N/A

N/A
Via Voltage Drop
N/A

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Differential Pairs

Conductor Width (W)

0,14 mm

Target Zdiff

90 OhmsFormula Restrictions:
 $0.1 < W/H < 3.0$
 $0.1 < S/H < 3.0$

Conductor Spacing (S)

0,14 mm

Conductor Height (H1)

0,230 mm

Conductor Height (H2)

0,200 mm**W/H = 0.301****S/H = 0.301**

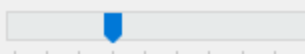
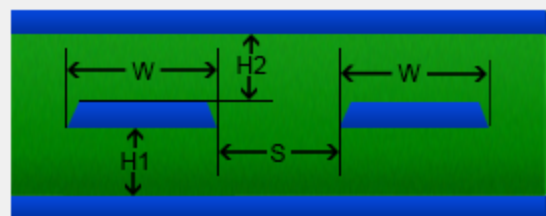
Zdifferential

90.614 Ohms

Zo

53.694 Ohms

+/- Tolerance = 10%

**99.675 Ohms****81.553 Ohms**

Options

Base Copper Weight

- ☐ 9um
☐ 18um
☒ 35um
☐ 53um
☐ 70um
☐ 88um
☐ 106um
☐ 142um
☐ 178um

Plating Thickness

- ☐ Bare PCB
☐ 18um
☒ 35um
☐ 53um
☐ 70um
☐ 88um
☐ 106um

Differential Layer

- ☐ Edge Cpld Ext
☐ Edge Cpld Int Sym
☒ Edge Cpld Int Asym
☐ Edge Cpld Embed
☐ Broad Cpld Shld
☐ Broad Cpld NShld

Information

Total Copper Thickness
35 um

Conductor Temperature

Temp in (°C) = N/A

Temp in (°F) = N/A

Units

- ☐ Imperial
☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

140

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Print

Solve!

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Conductor Spacing	Conductor Impedance	Conversion Data	Planar Inductors	Plane Calculator	Thermal	Fusing Current
Embedded Resistors	PPM Calculator	Crosstalk Calculator	Wavelength Calculator	Er Effective	Ohm's Law	Reactance
Via Properties	Conductor Properties	Bandwidth & Max Conductor Length	Differential Pairs	Padstack Calculator	Mechanical Information	

Differential Pairs

Conductor Width (W)

0,145 mm

Target Zdiff

95 Ohms

Formula Restrictions:

 $0.1 < W/H < 3.0$ $0.1 < S/H < 3.0$

Conductor Spacing (S)

0,12 mm

Conductor Height (H)

0,130 mm**W/H = 1.115****S/H = 0.923**

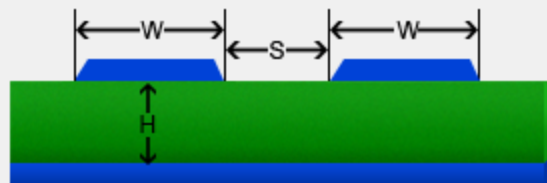
Zdifferential

94.856 Ohms

Zo

59.128 Ohms

+/- Tolerance = 10%

104.342 Ohms**85.370 Ohms**

Options

Base Copper Weight

- ☒ 9um
- ☐ 18um
- ☐ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Differential Layer

- ☒ Edge Cpld Ext
- ☐ Edge Cpld Int Sym
- ☐ Edge Cpld Int Asym
- ☐ Edge Cpld Embed
- ☐ Broad Cpld Shld
- ☐ Broad Cpld NShld

Information

Total Copper Thickness
44 um

Conductor Temperature

Temp in (°C) = N/A

Temp in (°F) = N/A

Units

- ☐ Imperial
- ☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

140

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

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Differential Pairs

Conductor Width (W)

0,125 mm

Target Zdiff

95 Ohms

Formula Restrictions:

 $0.1 < W/H < 3.0$
 $0.1 < S/H < 3.0$

Conductor Spacing (S)

0,14 mm

Conductor Height (H1)

0,230 mm

Conductor Height (H2)

0,200 mm**W/H = 0.269****S/H = 0.301**

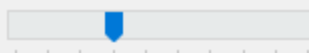
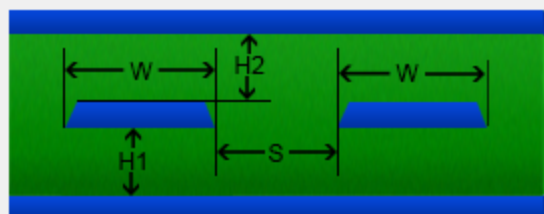
Zdifferential

94.824 Ohms

Zo

56.189 Ohms

+/- Tolerance = 10%

**104.307 Ohms****85.342 Ohms**

Options

Base Copper Weight

- ☐ 9um
☐ 18um
☒ 35um
☐ 53um
☐ 70um
☐ 88um
☐ 106um
☐ 142um
☐ 178um

Plating Thickness

- ☐ Bare PCB
☐ 18um
☒ 35um
☐ 53um
☐ 70um
☐ 88um
☐ 106um

Differential Layer

- ☐ Edge Cpld Ext
☐ Edge Cpld Int Sym
☒ Edge Cpld Int Asym
☐ Edge Cpld Embed
☐ Broad Cpld Shld
☐ Broad Cpld NShld

Information

Total Copper Thickness
35 um

Conductor Temperature

Temp in (°C) = N/A

Temp in (°F) = N/A

Units

- ☐ Imperial
☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

140

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Print

Solve!

Conductor Spacing	Conductor Impedance	Conversion Data	Planar Inductors	Plane Calculator	Thermal	Fusing Current
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Via Properties	Conductor Properties	Bandwidth & Max Conductor Length	Differential Pairs	Padstack Calculator	Mechanical Information	

Differential Pairs

Conductor Width (W)

0,13 mm

Target Zdiff

100 OhmsFormula Restrictions: $0.1 < W/H < 3.0$
 $0.1 < S/H < 3.0$

Conductor Spacing (S)

0,12 mm

Conductor Height (H)

0,130 mm**W/H = 1.000****S/H = 0.923**

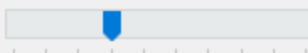
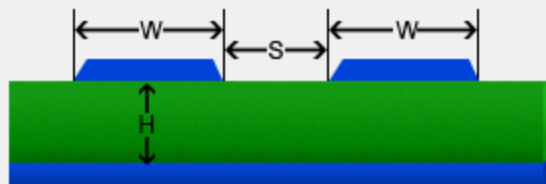
Zdifferential

99.534 Ohms

Zo

62.044 Ohms

+/- Tolerance = 10%

**109.488 Ohms****89.581 Ohms**

Options

Base Copper Weight

- ☒ 9um
- ☐ 18um
- ☐ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Differential Layer

- ☒ Edge Cpld Ext
- ☐ Edge Cpld Int Sym
- ☐ Edge Cpld Int Asym
- ☐ Edge Cpld Embed
- ☐ Broad Cpld Shld
- ☐ Broad Cpld NShld

Information

Total Copper Thickness
44 um

Conductor Temperature

Temp in (°C) = N/A

Temp in (°F) = N/A

Units

- ☐ Imperial
- ☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

140

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Print

Solve!

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Differential Pairs

Conductor Width (W) mm

Target Zdiff Ohms

Formula Restrictions:
 $0.1 < W/H < 3.0$
 $0.1 < S/H < 3.0$

Conductor Spacing (S) mm

Conductor Height (H1) mm

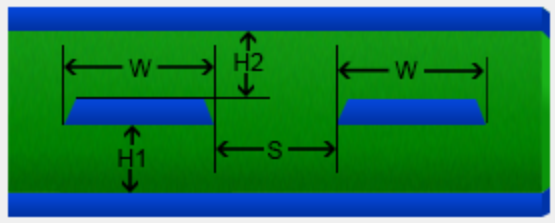
Conductor Height (H2) mm

$W/H = 0.215$
 $S/H = 0.387$

Zdifferential

Zo

+/- Tolerance = 10%



Options

Base Copper Weight

- ☐ 9um
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Units

- ☐ Imperial
- ☒ Metric

Substrate Options

Material Selection

Er Tg (°C)

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Temp Rise (°C)

Temp in (°F) = 36.0

Differential Layer

- ☐ Edge Cpld Ext
- ☐ Edge Cpld Int Sym
- ☒ Edge Cpld Int Asym
- ☐ Edge Cpld Embed
- ☐ Broad Cpld Shld
- ☐ Broad Cpld NShld

Ambient Temp (°C)

Temp in (°F) = 71.6

Information

Total Copper Thickness 35 um

Conductor Temperature

Temp in (°C) = N/A

Temp in (°F) = N/A

Via Thermal Resistance N/A

Via Count:

Via Voltage Drop N/A



Conductor Impedance

Conductor Width (W)

0,24 mm

Conductor Height (H)

0,130 mm

Frequency (MHz)

500

Note:

This calculator uses a complex formula, not the simplified formula. Results track the Sonnet 3D solver.

Er Effective = 2.8877

Zo

50.4355 Ohms

Lo

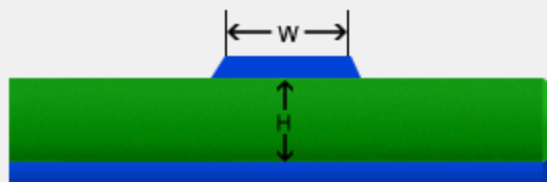
2.8595 nH/cm

Co

1.1241 pF/cm

Tpd

56.6969 ps/cm



Options

Base Copper Weight

- ☒ 9um
- ☐ 18um
- ☐ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☒ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Passive Circuits

- ☒ Microstrip
- ☐ Microstrip Embed
- ☐ Stripline
- ☐ Stripline Asym
- ☐ Dual Stripline
- ☐ Coplanar Wave

Units

- ☐ Imperial
- ☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

140

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Print

Solve!

Information

Total Copper Thickness
44 um

Via Thermal Resistance
N/A

Via Count: 10

Conductor Temperature

Temp in (°C) = N/A

Temp in (°F) = N/A

N/A

Via Voltage Drop

N/A

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Conductor Impedance

Conductor Width (W)

0,2 mm

Conductor Height (H1)

0,230 mm

Conductor Height (H2)

0,200 mm

Wide calculation mode

Zo

50.702 Ohms

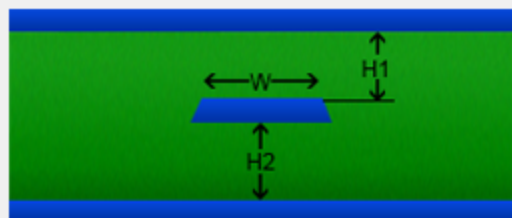
Lo

3.3834 nH/cm

Co

1.3162 pF/cm

Tpd

66.7323 ps/cm

Options

Base Copper Weight

- ☐ 9um
☐ 18um
☒ 35um
☐ 53um
☐ 70um
☐ 88um
☐ 106um
☐ 142um
☐ 178um

Plating Thickness

- ☐ Bare PCB
☐ 18um
☒ 35um
☐ 53um
☐ 70um
☐ 88um
☐ 106um

Passive Circuits

- ☐ Microstrip
☐ Microstrip Embed
☐ Stripline
☒ Stripline Asym
☐ Dual Stripline
☐ Coplanar Wave

Information

Total Copper Thickness
35 um

Conductor Temperature

Temp in (°C) = N/A

Temp in (°F) = N/A

Units

- ☐ Imperial
☒ Metric

Substrate Options

Material Selection

Custom

Er

4,0

Tg (°C)

130

Temp Rise (°C)

20

Temp in (°F) = 36.0

Ambient Temp (°C)

22

Temp in (°F) = 71.6

Print

Solve!

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