



# Flatsat Platform Documentation

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*Flatsat Platform Documentation*

*SpaceLab, Universidade Federal de Santa Catarina, Florianópolis - Brazil*



# Flatsat Platform Documentation

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# CHAPTER 1

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## Introduction

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[1], [2]  
LEO



## CHAPTER 2

## Hardware

### 2.1 Antenna Interfaces

#### 2.1.1 Impedance Control of the RF Tracks

PCB Calculator

Regulators Track Width Electrical Spacing **TransLine** RF Attenuators Color Code Board Classes

Transmission Line Type:

- ☐ Microstrip Line
- ☐ Coplanar wave guide
- ☒ Coplanar wave guide with ground plane
- ☐ Rectangular Waveguide
- ☐ Coaxial Line
- ☐ Coupled Microstrip Line
- ☐ Stripline
- ☐ Twisted Pair

Substrate Parameters:

Er: 4.29

TanD: 0.02

Rho: 1.72e-08

H: 0.175 mm

T: 0.035 mm

mu Rel C: 0.999994

Physical Parameters:

W: 0.384095 mm

S: 3 mm

L: 12 mm

Analyze Synthesize

Electrical Parameters:

Z0: 50  $\Omega$

Ang\_L: 0.0693472 Radian

Results:

ErEff: 3.61611

Conductor Losses: 0.00255698 dB

Dielectric Losses: 0.00568223 dB

Skin Depth: 5.48153  $\mu\text{m}$

Component Parameters:

Frequency: 145 MHz

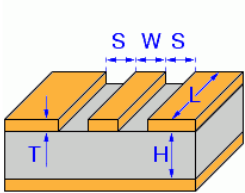


Figure 2.1: Calculation of the width of the RF tracks.

**PCB Calculator**

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Regulators   **Track Width**   Electrical Spacing   TransLine   RF Attenuators   Color Code   Board Classes

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Parameters:

Current:  A

Temperature rise:  deg C

Conductor length:  mm

Resistivity:  Ohm-meter

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If you specify the maximum current, then the trace widths will be calculated to suit.  
 If you specify one of the trace widths, the maximum current it can handle will be calculated. The width for the other trace to also handle this current will then be calculated.  
 The controlling value is shown in bold.

The calculations are valid for currents up to 35A (external) or 17.5A (internal), temperature rises up to 100 deg C, and widths of up to 400mil (10mm).  
 The formula, from IPC 2221, is

$$I = K * dT^{0.44} * (W * H)^{0.725}$$

where:  
**I** = maximum current in amps  
**dT** = temperature rise above ambient in deg C  
**W, H** = width and thickness in mils  
**K** = 0.024 for internal traces or 0.048 for external traces

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External layer traces:

**Trace**  mm

Trace thickness:  mm

Cross-section area: 0.0133 mm x mm  
 Resistance: 0.0155188 Ω  
 Voltage drop: 0.0184028 Volt  
 Power loss: 0.0218227 Watt

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Internal layer traces:

Trace width:  mm

Trace thickness:  mm

Cross-section area: 0.0345991 mm x mm  
 Resistance: 0.00596546 Ω  
 Voltage drop: 0.00707407 Volt  
 Power loss: 0.00838868 Watt

Figure 2.2: Power dissipation of the RF tracks.

## CHAPTER 3

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**Software**

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## Bibliography

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- [1] SpaceLab. *Test*, July 2020. Note.
- [2] Space Technology Research Laboratory (SpaceLab). *OBDH 2.0 Documentation*, 2020. Available at <<https://github.com/spacelab-ufsc/obdh2>>.