

Reference Design Guide

Sterling-LWB+ SiP

Version 1.1

REVISION HISTORY

Version	Date	Notes	Contributors	Approver
1.0	28 Apr 2022	Initial Release	Andrew Chen	Andy Ross
1.1	4 Dec 2023	Added 2.2.1 SiP Design with External Antenna	Erik Lins	Andy Ross

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1 SCOPE

This document provides information on the recommended reference design requirements for the Sterling-LWB+ SiP (453-00083). The guidelines are provided to allow integration of the Sterling-LWB+ SiP and allow customers to leverage existing regulatory certification available from Laird Connectivity for the Sterling-LWB+ modules and SiP.

Following the schematic and layout guidelines will allow the use of existing modular approvals provided by Laird Connectivity, however a design review, by Laird Connectivity, of the final implementation is recommended to assure conformance has been maintained.

2 SCHEMATIC

2.1 Reference SiP Schematic

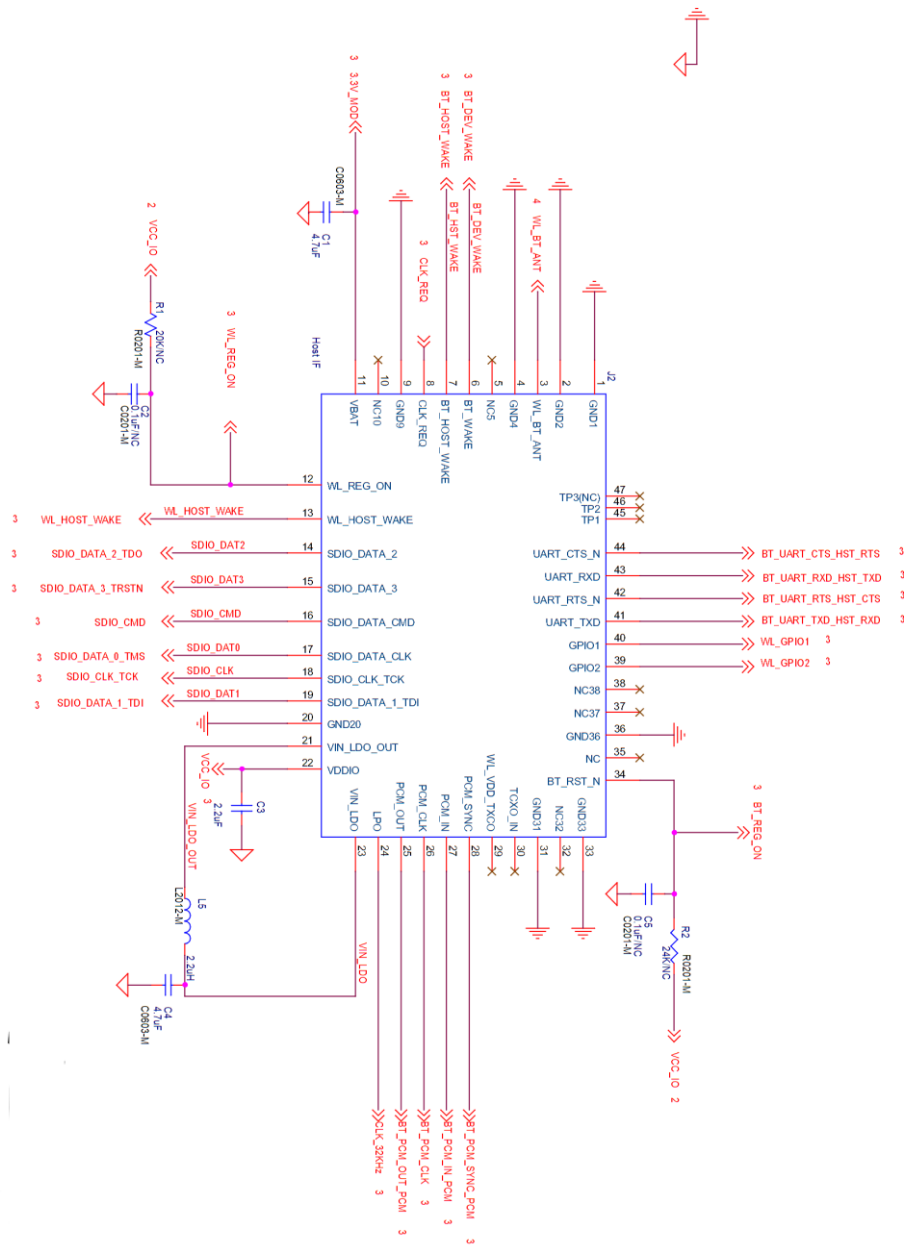


Figure 1: Reference SiP Schematic

2.2 RF Network Schematic

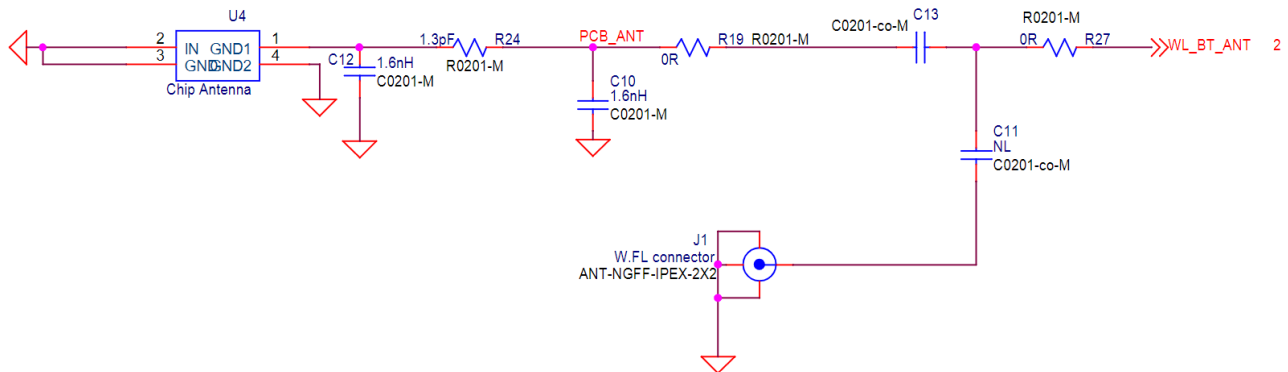


Figure 2: RF Network Schematic

2.2.1 SiP Design with External Antenna

When using the LWB+ SiP variant (453-00083) with an external antenna the following components in the above RF network schematic need to be populated:

- R27: 0 Ohms (0201 size)
- C11: 6.8 pF (0201 size)
- J1: I-PEX 20449-001E (MHF4 connector)

The other components (C13, R19, C10, R24, C12 and U4) must be left unpopulated.

3 PCB STACK-UP

The following is guidance on necessary PCB stack. Compliance is necessary to ensure and maintain trace characteristics in the RF network.

Table 1: General Stack-up Information

Dielectric Constant	4.04
Trace Characteristics	50Ω trace width is 9.5mil and 10mil gap to the ground copper.

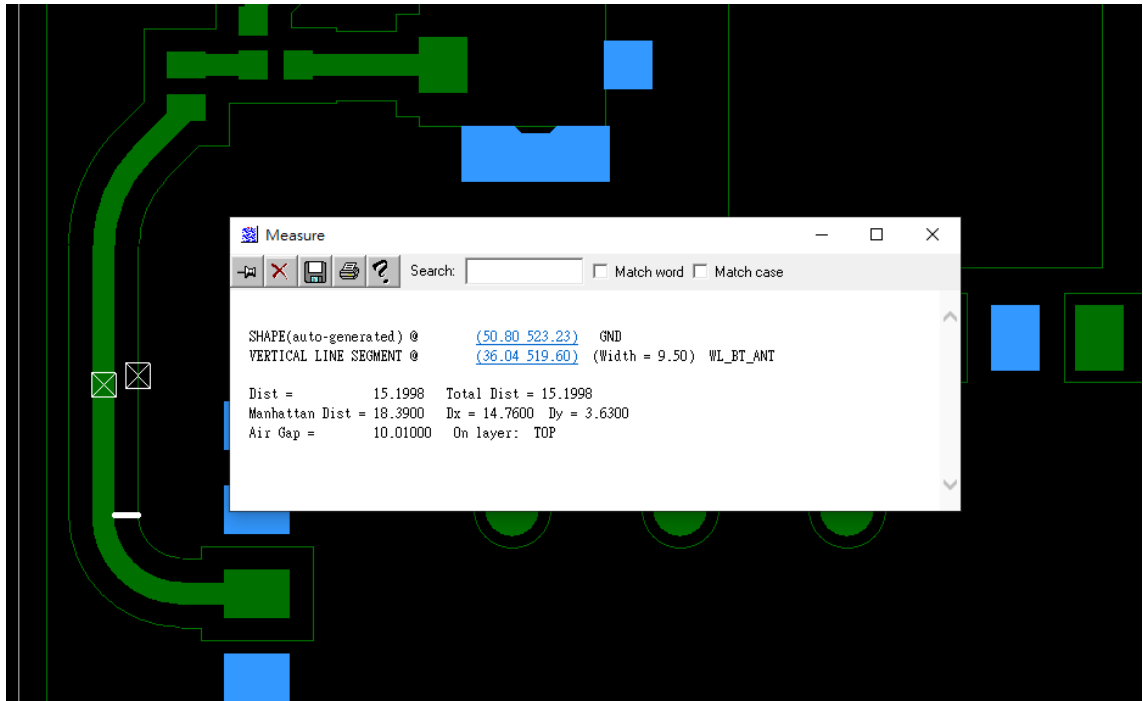


Figure 3: Stack Up Trace Data

Table 2: PCB Stack-up Details

Layer	Layer Type	Layer Structure	Thickness(mil)	DK
	Solder mask		0.9	
L1	Top	0.5oz+Plating	1.69	
		Prepreg	5.85	4.04
L2	Plane	0.5oz	0.55	
		Core	13.78	
L3	Plane	0.5oz	0.55	
		Prepreg	5.88	4.04
L4	Bottom	0.5oz+Plating	1.69	
	Solder mask		0.9	
Total Thickness			31.79	

4 RF NETWORK TRACE PATTERN

The drawing below is provided for guidance. .DXF files are available for detailed trace dimensions and placement:

<https://www.lairdconnect.com/documentation/reference-design-sterling-lwb-dxf-format>

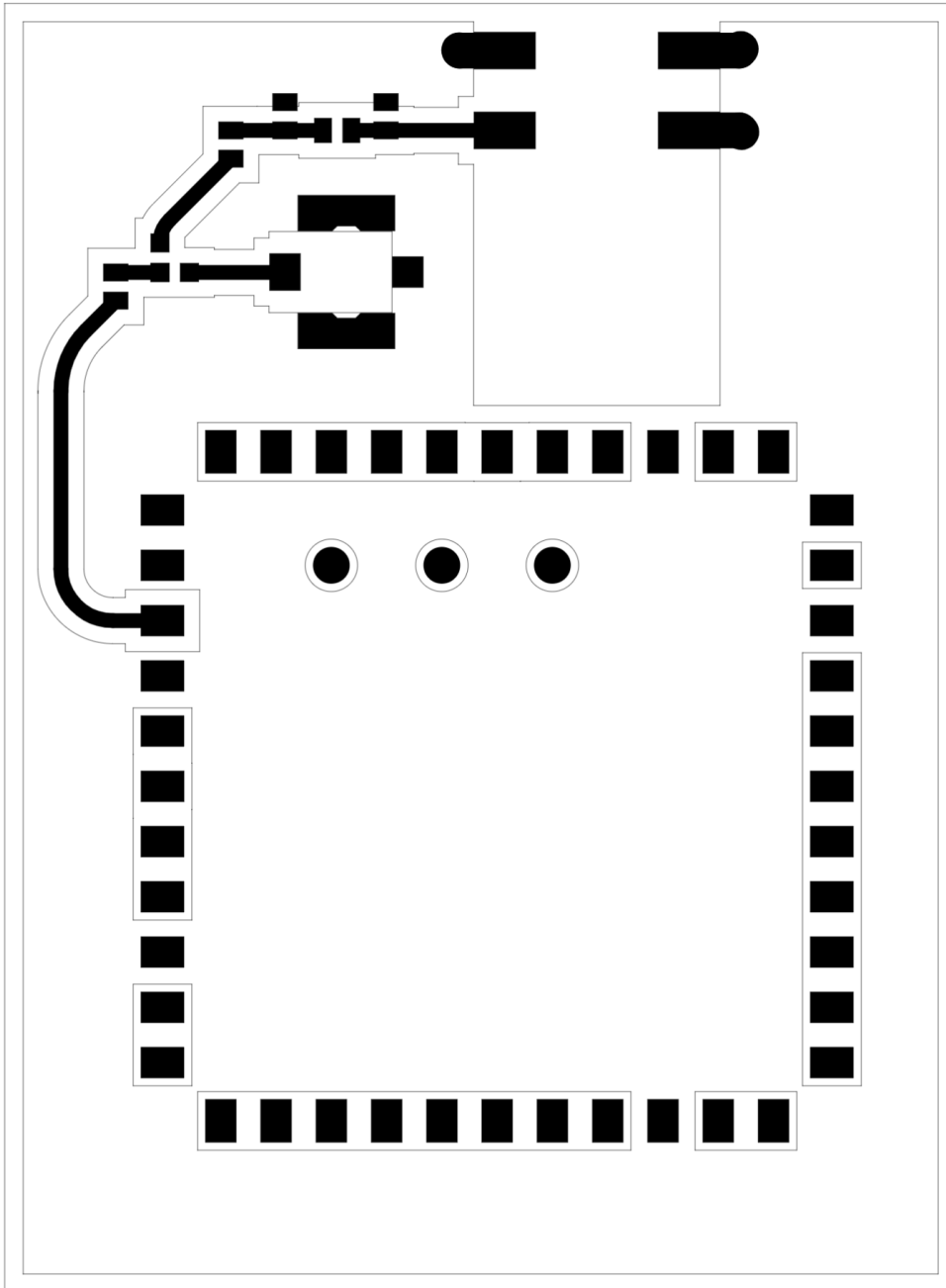


Figure 4: RF Network Trace Diagram

5 ADDITIONAL INFORMATION

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