APH006 APPLICATION NOTE

DW1000 PCB LAYOUT USING .dxf FILES

Version 2.3

This document is subject to change without notice

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1 INTRODUCTION

To assist customers with PCB layout of a DW1000 based product, three files in DXF format are available from Decawave. These DXF files can be imported in most PCB layout EDA tools and used as an overlay to replicate the DW1000 section of Decawave's EVB1000 evaluation boards.

Note: In order to maintain the correct impedances of the RF tracks, the PCB stack up shown in Appendix 1 should be used, however, customers should consult their PCB manufacturer to fine tune impedances. During PCB manufacture, *Impedance Control Techniques* should be employed to ensure that the RF tracks have the correct impedance. This is required because of the variability of laminate parameters with standard FR4 material.

2 FILES SUPPLIED

In total 4 files are supplied. One is an image file for reference and the other three are DXF files.

2.1 DW1000 section of EVB1000 image

File name: EVB1000_DW1000_section.png

Description: This file is an image of the DW1000 section of Decawave's EVB1000 board for reference.

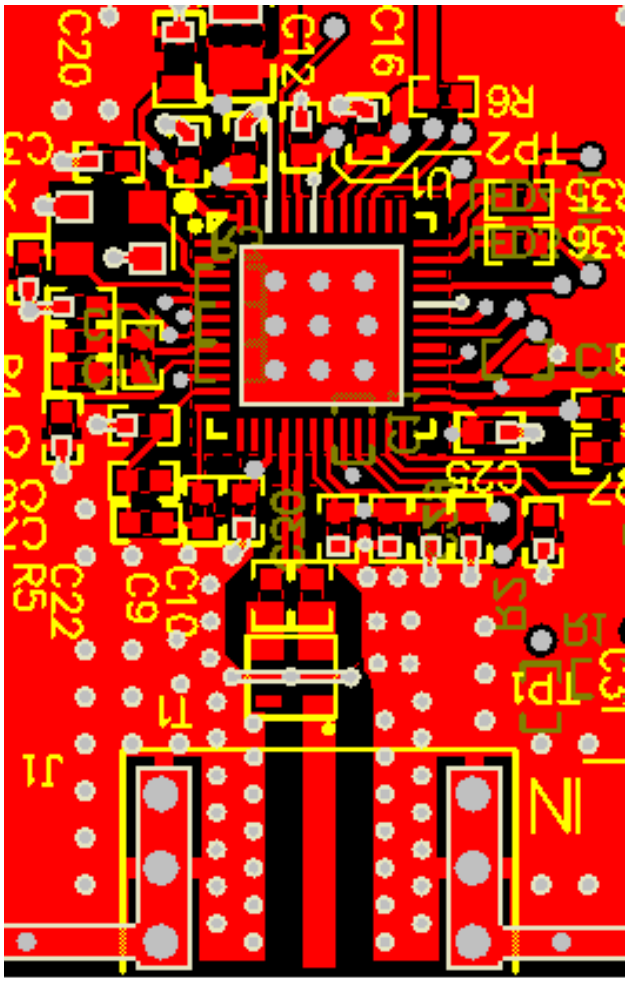

Figure 1: Image of DW1000 section of EVB1000 for reference

2.2 Top side copper

Filename: DW1000_IC_PCB_TopCopperOnly.dxf

Description: This file shows how the topside tracks and ground plane are constructed on the DW1000 section of the EVB1000 PCB. This is the main file of interest.

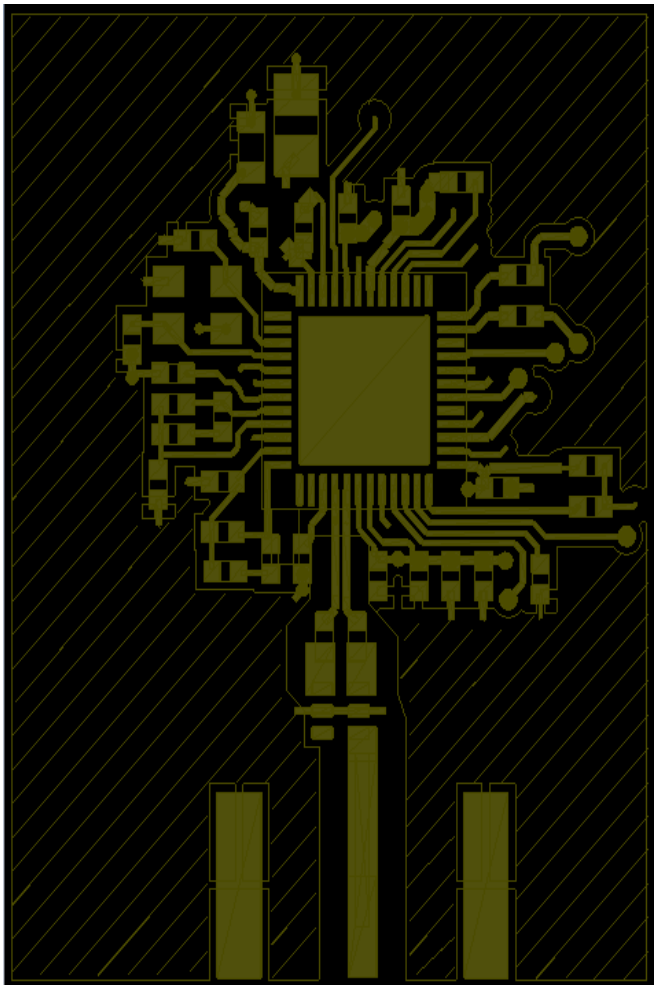

Figure 2: Top Side Copper of DW1000 section of EVB1000

2.3 Top side Resist

Filename: DW1000_IC_PCB_TopResistOnly.dxf

Description: This file shows how the top side solder resist (mask) is applied to the DW1000 section of the EVB1000 PCB. Note: we do not recommend applying solder resist on the RF traces. This helps ensure that the correct RF impedance is maintained. In order to stop solder flowing onto these tracks during the solder reflow process, slivers of resist as shown are used.

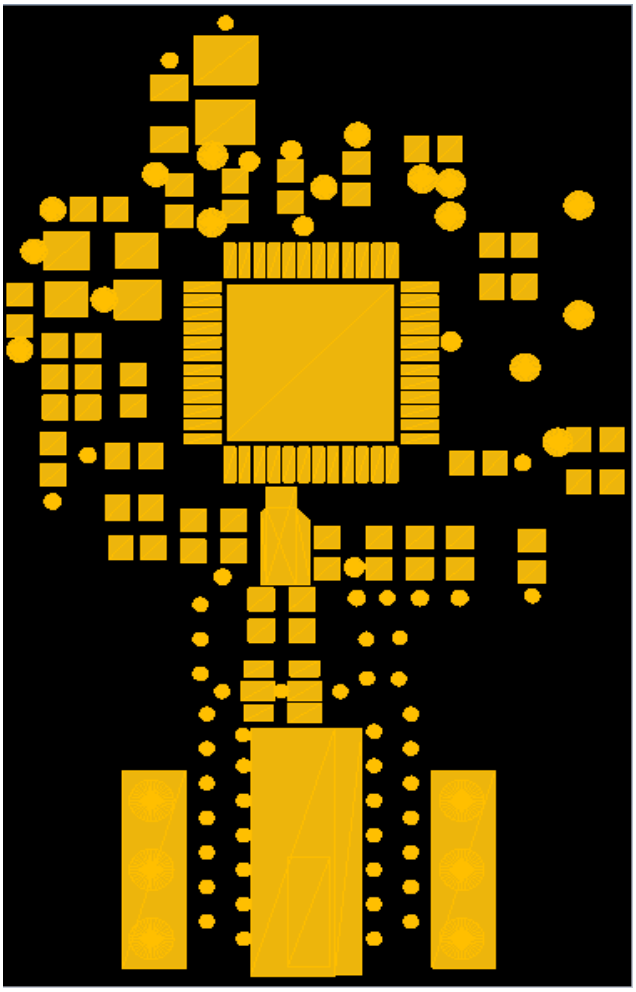

Figure 3: Top side Resist of DW1000 section of EVB1000

2.4 Top side Silk Screen

Filename: DW1000_IC_PCB_TopSilkscreenOnly.dxf

Description: This file shows the top side silk screen of the DW1000 section of EVB1000 for reference.

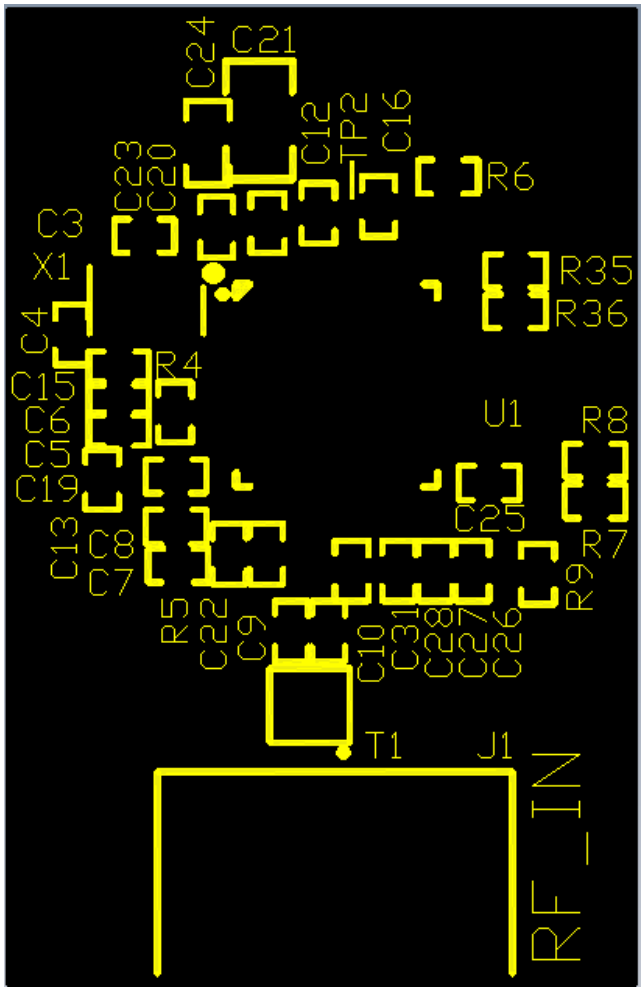

Figure 4: Top Side Silk Screen of DW1000 section of EVB1000

3 APPENDIX 1: PCB STACK UP

The four layer FR4 PCB stack up shown below shows how the EVB1000 PCB is constructed.

For the RF traces shown in the .dxf files only the top layer and the layer immediately below it (ground) are relevant i.e. the substrate thickness between these layers needs to be maintained for the RF impedance.

MANUFACTURING STACKUP
4-LAYER IMPEDANCE CONTROLLED PCB WITH TH VIAS

File Ext	Description	Board Stackup		
GTP	Top Paste			
GTO	Top Silkscreen			
GTS	Top Solder			
GTL	Top Layer			Copper 38 µm (finished)
G1	Inner Layer 1	FR4 Core	510 µm	Copper 18 µm
		1 x 7628 50% FR4 Pre Preg	207 µm	
		1 x 106 76% FR4 Pre Preg	58 µm	
		1 x 7628 50% FR4 Pre Preg	207 µm	
G2	Inner Layer 2			Copper 18 µm
GBL	Bottom Layer	FR4 Core	510 µm	Copper 38 µm (finished)
GBS	Bottom Solder			
GBO	Bottom Silkscreen			
GBP	Bottom Paste			

TOTAL THICKNESS 1.600 mm +/- 10%

Controlled Impedance Traces are as follows: -

a) Tolerance on all lines, unless other wise specified +/- 10%
b) 50 Ω Single Ended CPW Traces on Top Layer (50 Ω with reference to Inner Layer 1, no solder resist) = 0.95 mm (1.00 mm GND gap)
c) 100 Ω Differential Microstrip Traces on Top Layer (100 Ω with reference to Inner Layer 1, no solder resist) = 0.235 mm Track / 0.127 mm Gap

Figure 5: EVB1000 PCB stack up

4 REVISION HISTORY

Table 1: Document History

Revision	Date	Description
1.0	30th June 2014	Initial release
2.0	30th September 2015	Scheduled update
2.1	31st December 2015	Scheduled update
2.2	31st March 2016	Scheduled update
2.3	17th May 2024	Scheduled update

5 MAJOR CHANGES

Revision 1.0

Page	Change Description
All	Initial release

Revision 2.0

Page	Change Description
All	Update of version number to 2.0
All	Various typographical changes

Revision 2.1

Page	Change Description
All	Update of version number to 2.1 / Copyright notice to 2015
All	Various typographical changes
8	Update to Figure 5 for clarity
9	Addition of document history in section 4
9	Addition of major changes in section 5
9	Update of About Decawave section number from 4 to 6

Revision 2.2

Page	Change Description
All	Update of version number to 2.2 / Copyright notice to 2016
All	Various typographical changes
8	Modification to Figure 5 to correct impedance reference layer from 2 to 1
9	Addition of document history in section 4
9	Addition of major changes in section 5

Revision 2.3

Page	Change Description
All	Modification to footer.

6 ABOUT DECAWAVE

Decawave is a pioneering fabless semiconductor company whose flagship product, the DW1000, is a complete, single chip CMOS Ultra-Wideband IC based on the IEEE802.15.4-2011 UWB standard. This device is the first in a family of parts that will operate at data rates of 110 kbps, 850 kbps and 6.8 Mbps.

The resulting silicon has a wide range of standards-based applications for both Real Time Location Systems (RTLS) and Ultra Low Power Wireless Transceivers in areas as diverse as manufacturing, healthcare, lighting, security, transport, inventory & supply chain management.

Further Information

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