

Datasheet

DCU040

Version 1.1

Revision History

Revision	Date	Change Description
1.0	Apr-2021	Preliminary version
1.1	Jul-2023	Updated pin-16 description & Module picture


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1. Introduction

The DCU040 is fully interoperable with IEEE® 802.15.4 HRP UWB standard. It is designed to operate worldwide with support of 500MHz UWB channels 5 (6489.6MHz) to 9 (7987.2MHz). It enables high-precision positioning applications with a non-Line-of-Sight precision of 5±10cm. It is a (SMD) Surface Mount Device designed to be easily mounted over custom Printed Circuit Boards (PCB) to deploy.

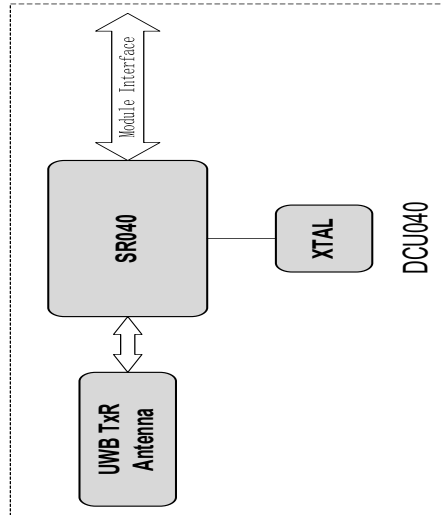
1.1. Key Features

	
Name	DCU040
Antenna Type	PCB patch
Size	Size 15.7 x 16.75 x 2mm
Communication Interface	SPI
Main Chip	SR040
Channel	5, 9
Frequency range	6.24GHz~8.24GHz
Supply Voltage	1.8 ~ 3.6V
Max Output Power (EIRP)	14.7 dBm

1.2. Applications

The perfect TAG for High Precision RTLS & Industrial application. Ideally suited as TAG&TRACKER for IoT Consumer & Smart Home application.

1.3. Block Diagram



2. Electrical characteristics

2.1. Recommended operating conditions

When the input voltage of the module is lower than the rated operating voltage, the operation will be unstable. Input voltage higher than the maximum rating will cause permanent damage to the module. At the same time, working under the maximum rating for a long time also affects the stability of the module.

Parameter	Min	Type	Max	Unit	Conditions/Notes
Operating Temperature	-30		+85	°C	
Supply Voltage (Vdd)	2.4	3.3	3.6	V	All specification parameters fulfilled
	1.8		2.4	V	<ul style="list-style-type: none"> Device fully functional TX PA peak power shall not be set higher than +9dBm
HIGH level input voltage (V _{IH})	1.26		Vdd+0.5	V	
LOW level input voltage (V _{IL})	-0.6	-	0.54	V	
HIGH level output voltage (V _{OH})	Vdd-0.5	-	Vdd	V	
LOW level output voltage (V _{OL})	-	-	0.2	V	

2.2. RF characteristics

Parameter	Min	Type	Max	Unit	Conditions/Notes
Frequency range	6240		8240	MHz	Channel 5 and 9
Channel bandwidth		500		MHz	
Power level range		32		dB	
Power level step		0.25		dB	
Rx Sensitivity (± 10 ppm carrier Offset)	Channel 5		-92	dBm	64 preamble, 6.8Mbps data rate
	Channel 9		-92	dBm	64 preamble, 6.8Mbps data rate

2.3. Antenna specifications

Antenna Type	PCB Embedded
Antenna Polarization	Linear
Peak directivity	4.5dBi @CH5 3.8dBi @CH9
Radiation efficiency	60% @ CH5 77% @ CH9
Frequency range	6.0 ~ 8.5GHz

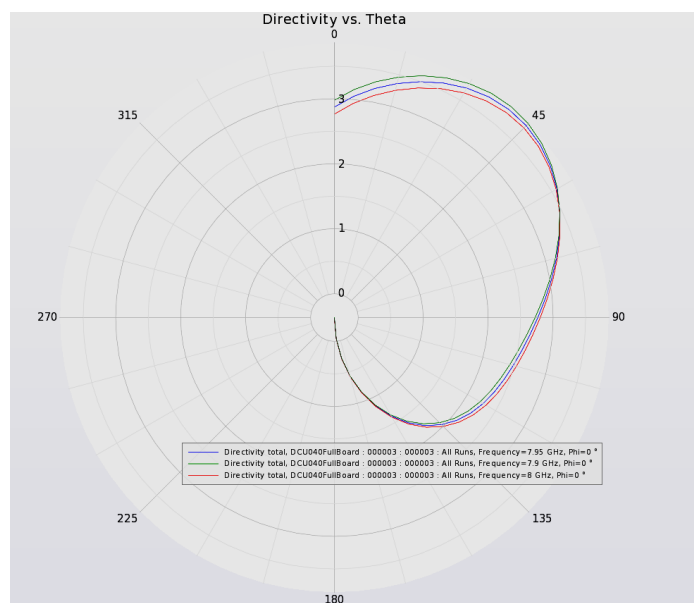
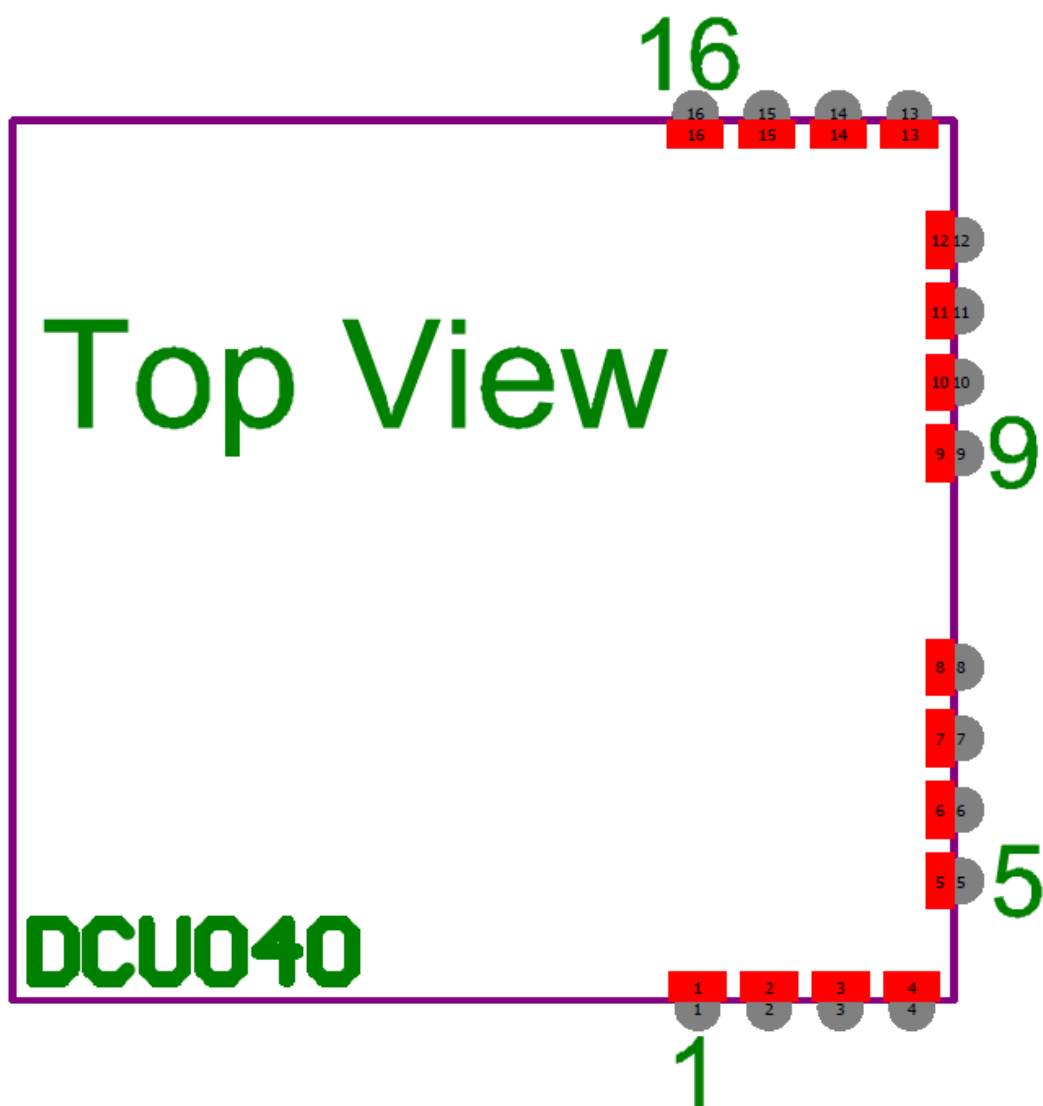


Fig. 1 Directivity at channel 9 center frequency and ch9 center frequency ± 500 MHz

3. Module Package

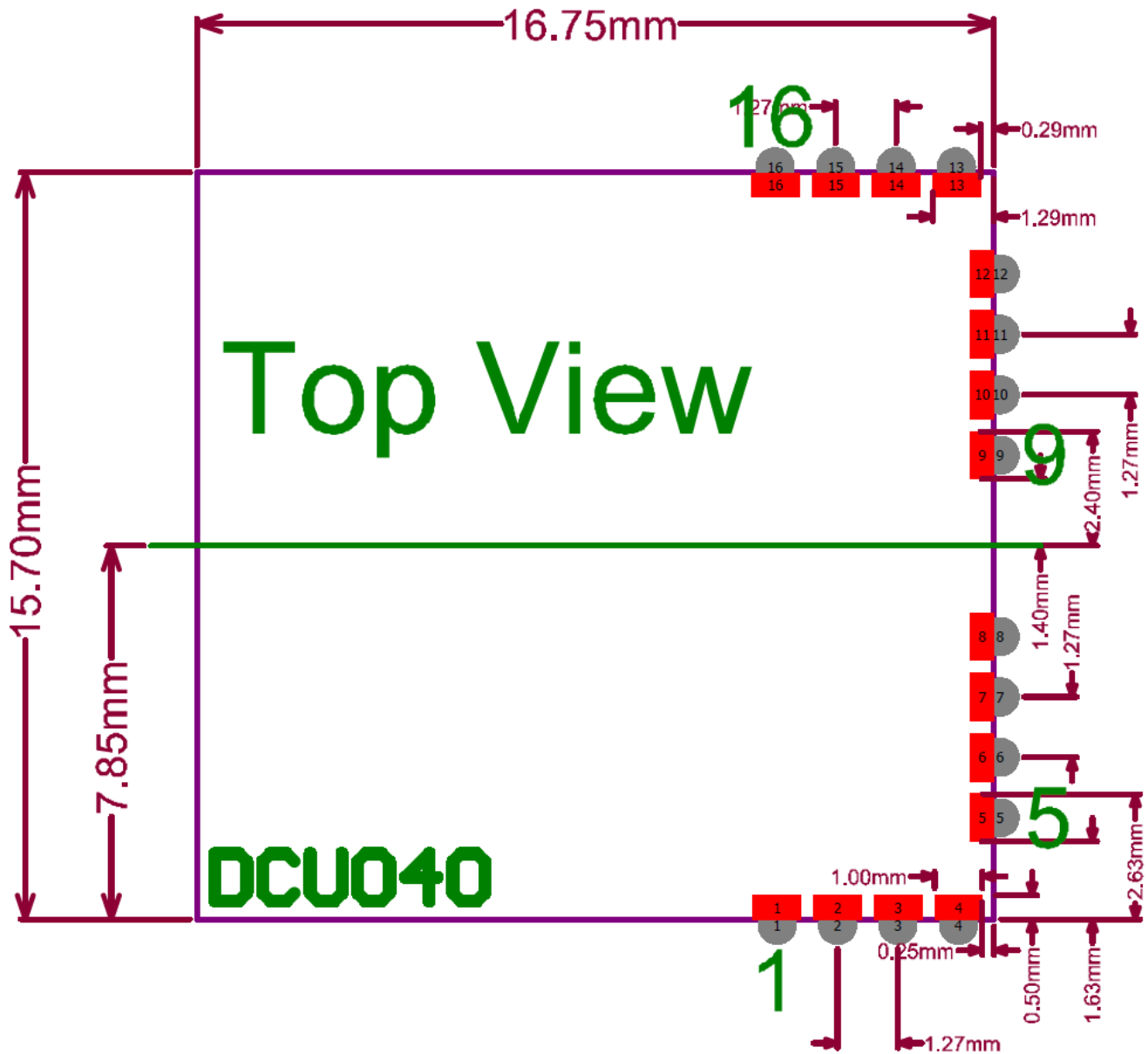
3.1. Pinout Description



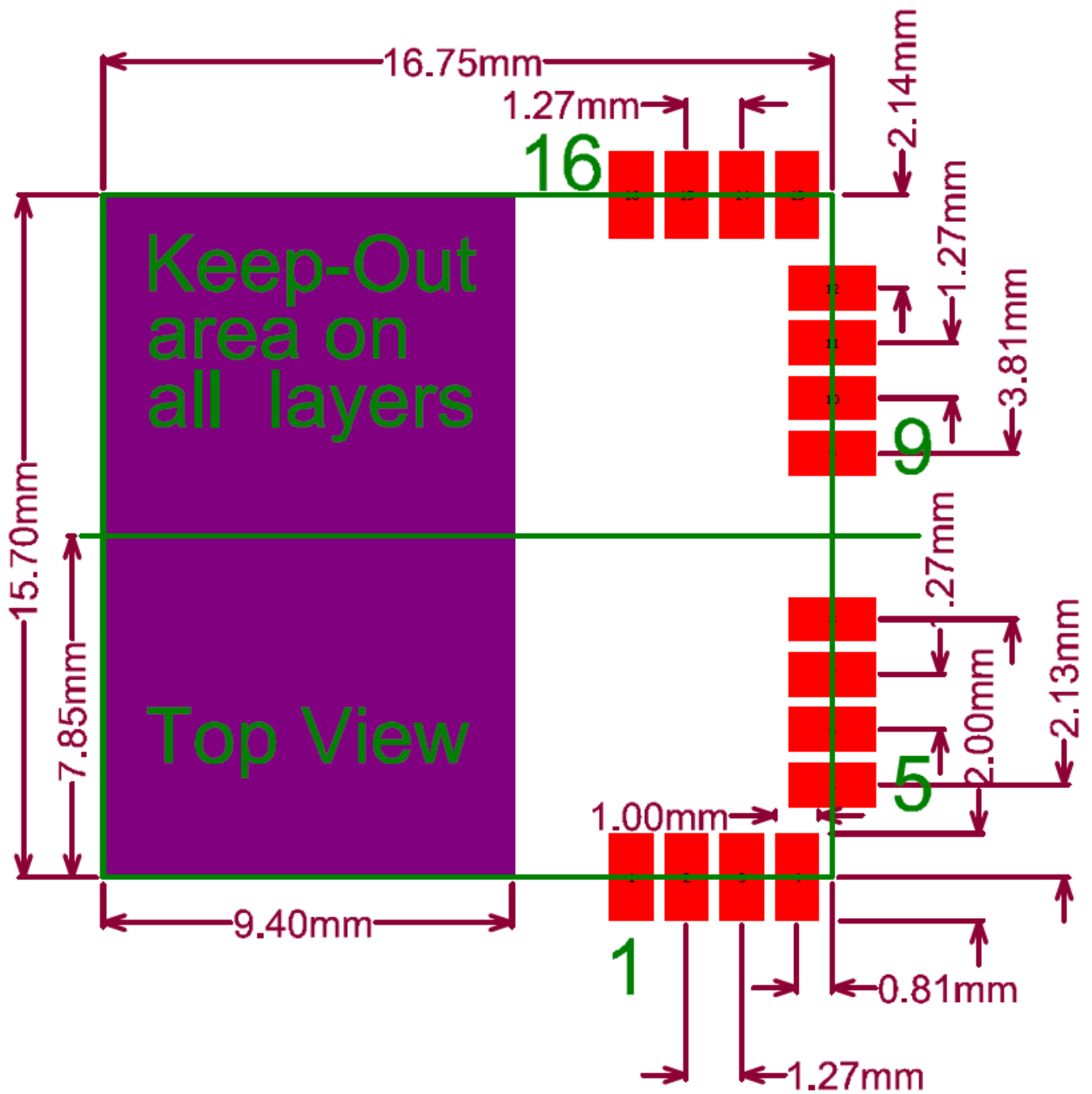
3.2. Pin Description Box

Pin	Pin Name	Pin Type	Description
1	P12/TX	O	GPIO TX - Data output in UART operation
2	SWCLK	I/O	Serial Wire Debug (SWD) clock, internal pull-up resistor
3	SWDIO	I/O	Serial Wire Debug (SWD) data, internal pull-up resistor
4	P13	I/O	GPIO CS2_N - Second Chip Select (active low) output in SPI Master operation RTS - "Request To Send" in UART operation
5	P14/CS_N	I/O	GPIO CS_N - Chip Select (active low); output in SPI Master operation; input in SPI Slave operation
6	P21/SDI	I	GPIO SDI - Data input for SPI full duplex operation
7	P17/SCLK	I/O	GPIO SCLK - Data clock for SPI operation; output in SPI Master operation; input in SPI Slave operation
8	P20/SDIO	I/O	GPIO SDIO - Data I/O for SPI operation; output in full duplex operation; input/output in half-duplex operation
9	GND	G	Ground
10	P15/INT_N	O	GPIO INT_N - Interrupt output (active low) in 6-wire SPI operation
11	P16/RDY_N	O	GPIO RDY_N - Ready output (active low) in 6-wire SPI operation
12	RST_N	I	Reset input (active low), internal pull-up resistor
13	P11/RX	I	GPIO RX - Data input in UART operation
14	P10	I/O	GPIO CTS - "Clear To Send" in UART operation PA_ENBL - Gating signal for an optional external PA
15	VBAT	P	Power supply for digital I/Os and power supply for the chip via current limiter
16	VLIM	P	Power supply for digital domain and XTAL

3.3.Package outline

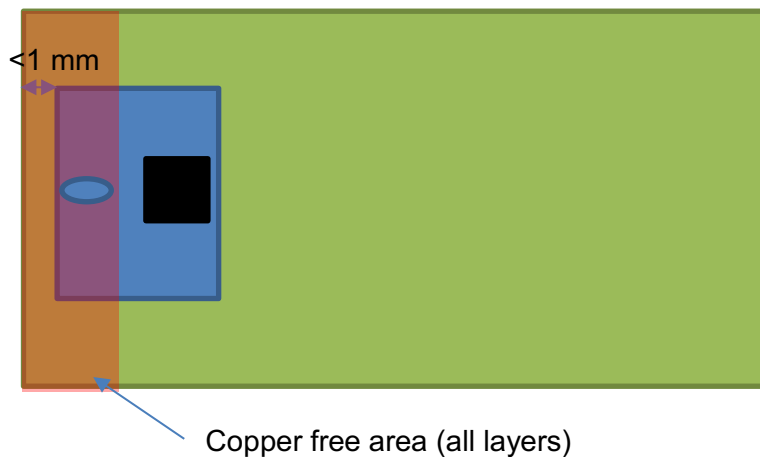


3.4. Recommended PCB Footprint



3.5 Host board mounting

DCU040 is designed to be mounted onto a host board. Suggested host-board thickness is 0.8mm and it should be greater than 0.5mm. The DCU040 is preferably mounted close to the host board edge, as shown next. Maximum distance to the edge should be up to 1mm.

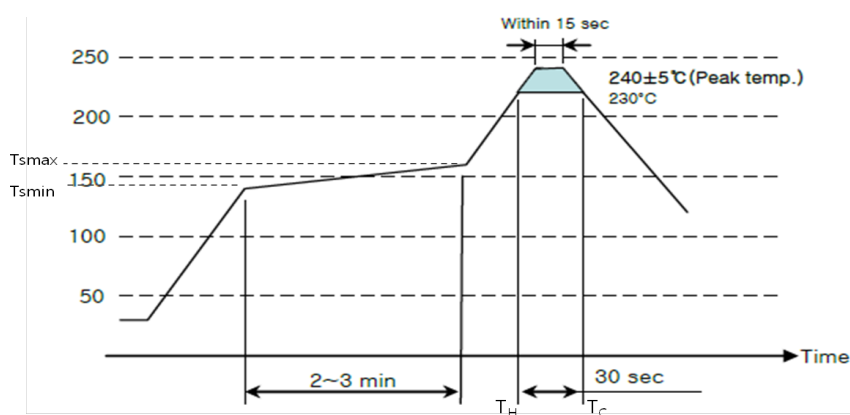


4. Soldering Condition

4.1. Manual Soldering – Pb Free

Soldering Temperature: 360°C ± 5°C, 5sec max.

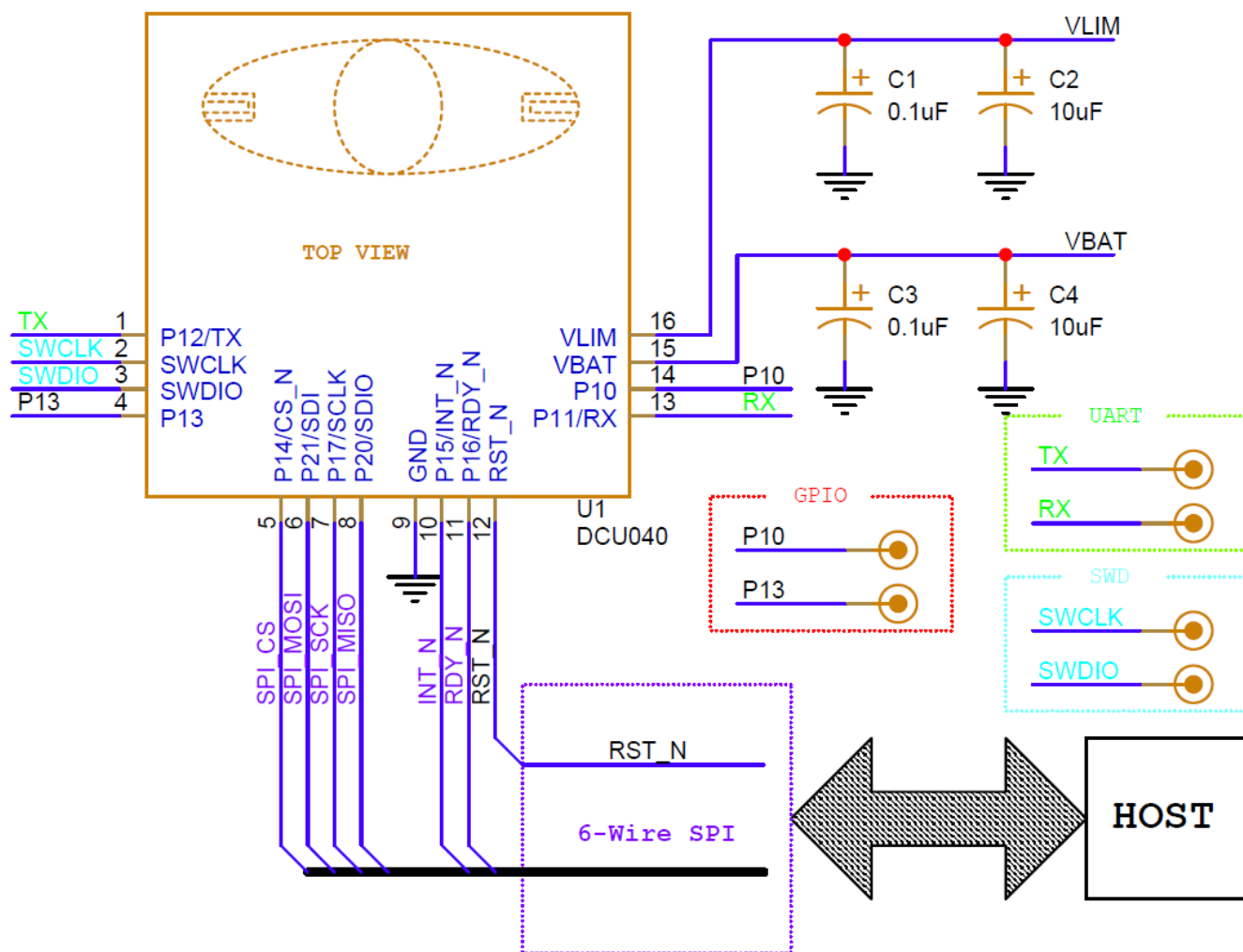
4.2. Recommended Reflow Condition – Pb Free



Profile Feature	Pb-Free Assembly
Preheat	
-Temperature Min (T _{smmin})	140°C
-Temperature Typical (T _{stypical})	150°C
-Temperature Max (T _{smmax})	160°C
-Time T _{smmin} to T _{smmax}	2 ~ 3 min
Peak Temperature	240±5°C
Time of actual peak temperature	Max. 15 seconds
Heating to Cool	
-Temperature Heating (T _H)	230°C
-Temperature Cool (T _C)	230°C
-Time T _H to T _C	30 seconds

5. Application design-in information

5.1 Reference schematics for DCU040



The key component values for the schematic are shown in

Part code	Description	Value	Notes
C1,C3	Multilayer Ceramic Capacitor, 0402, X7R	100nF ±10% / 16V	
C2,C4	Multilayer Ceramic Capacitor, 0402, X5R	10µF ±10% / 16V	

6. Regulatory approval

CE and FCC certified.