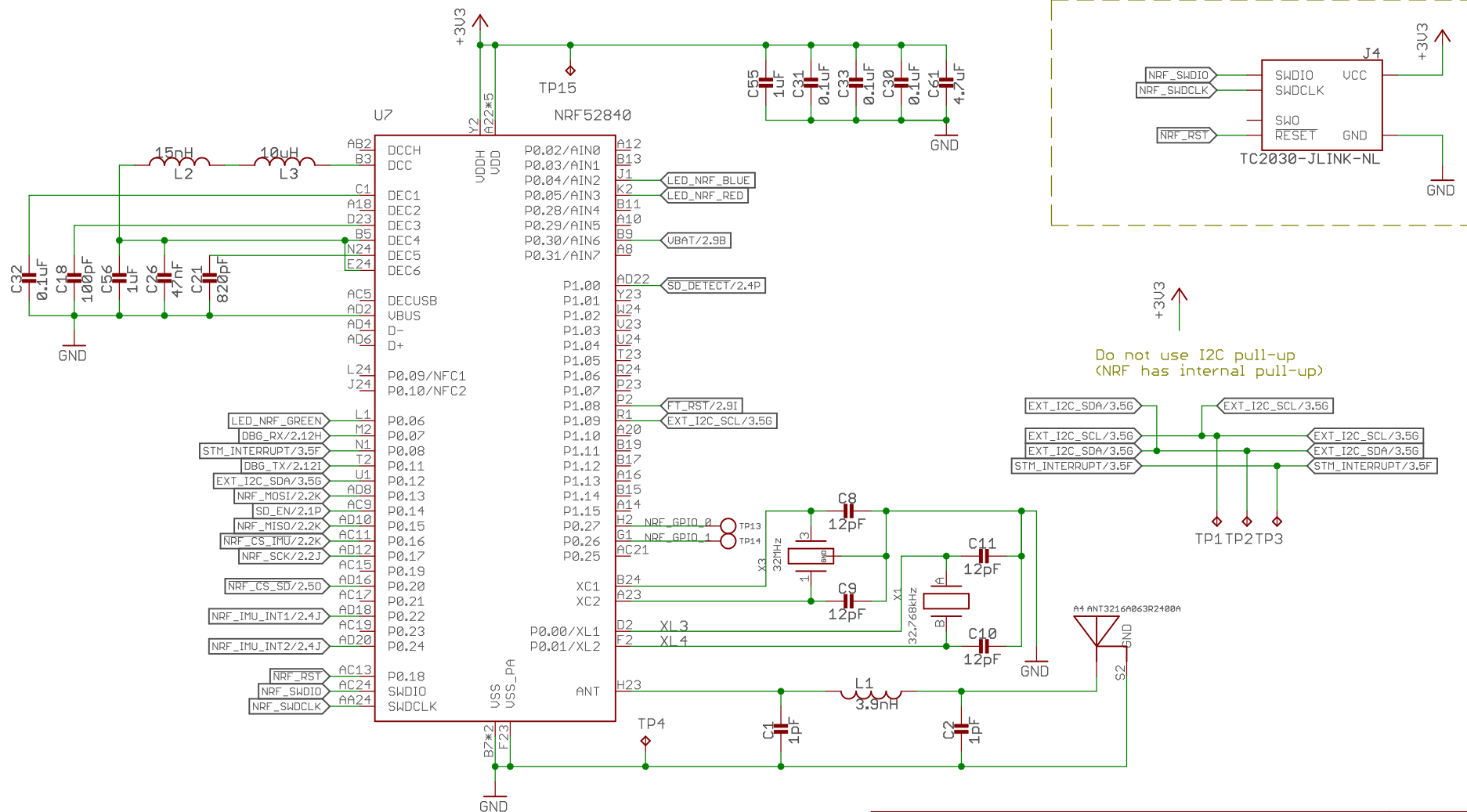


# nRF52840 BLE



Do not use I2C pull-up  
(NRF has internal pull-up)

TriTag

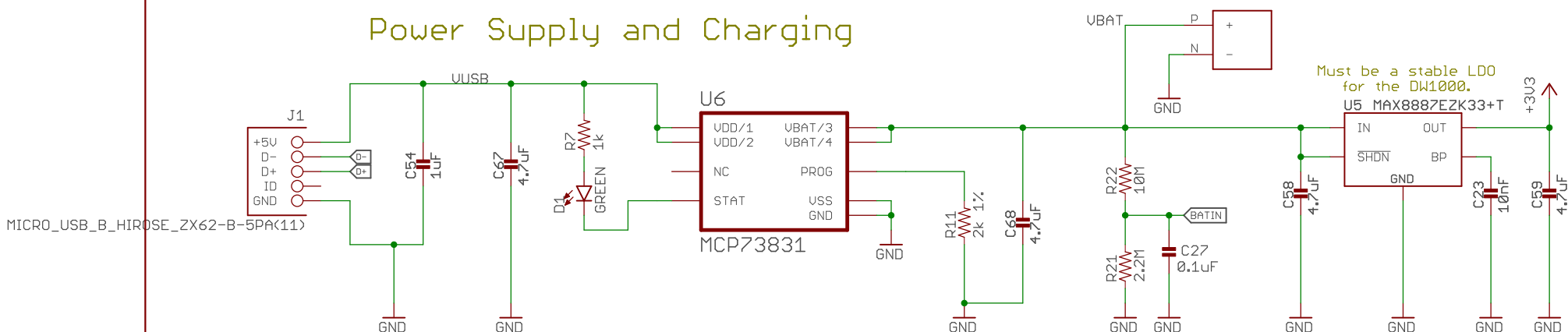
Author: Andreas Biri

Date: 08.10.18 21:12

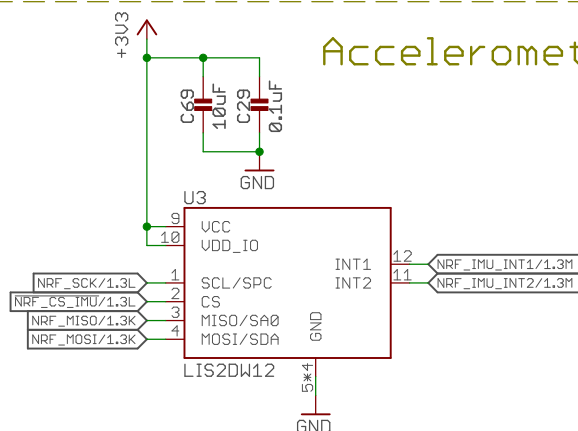
REV:  
E

Sheet: 1/4

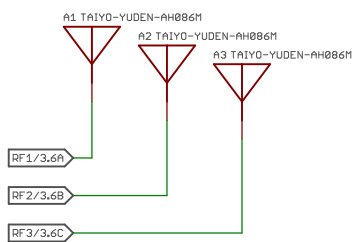
## Power Supply and Charging



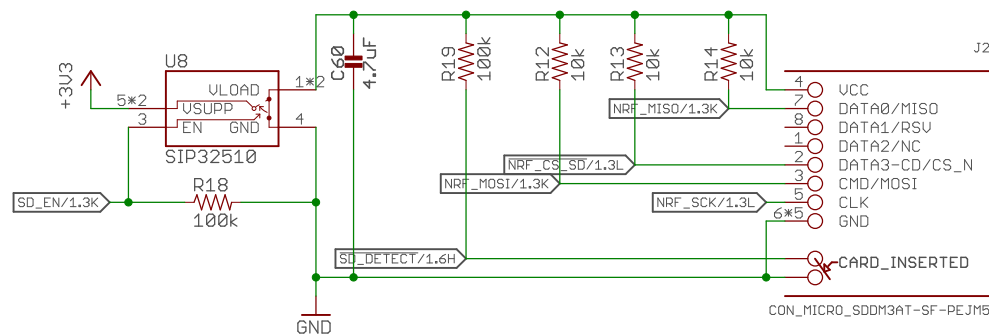
## Accelerometer



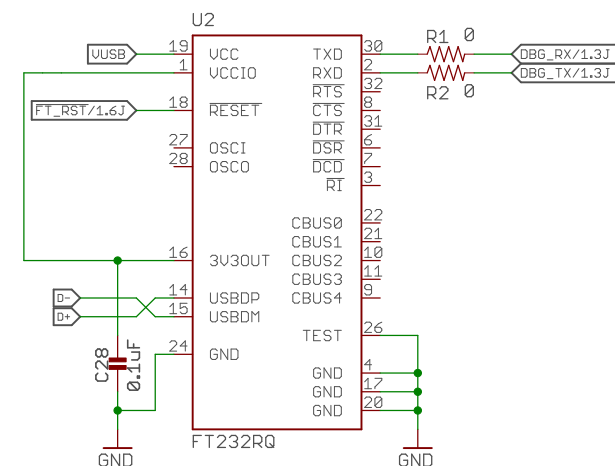
## Antennas



## SD Card Adapter



## USB-Serial



Mount 0-0hm resistors only if you intend to use the FTDI; this prevents unintentional power draws

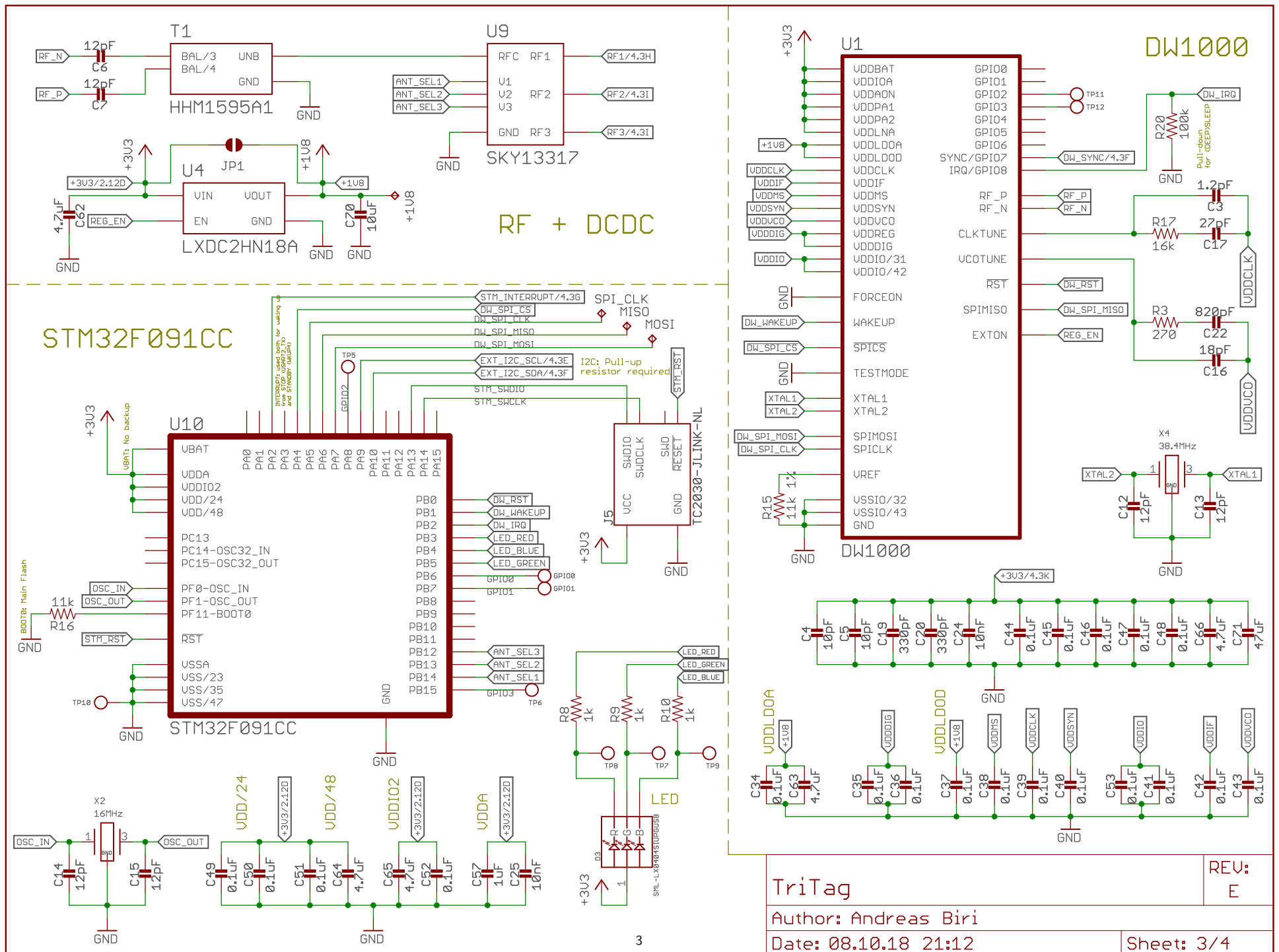
TriTag

Author: Andreas Biri

Date: 08.10.18 21:12

REV:  
E

Sheet: 2/4



## EXTERNAL SIGNALS

The following signals must be integrated into all designs using the design block:

### Signals



Note: Additional I2C pull-up resistors required to +3V3

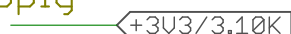
### Antennas



Guarantee 120° offset in-between antennas to maximize polarization difference and antenna diversity

RF traces should respect the keepout zones and be surrounded by a via shield. Furthermore, try to keep them as short and straight as possible

### Power Supply



Be aware that the DecaWave is very sensitive regarding its power supply.

We suggest using the "MAX8887EZK33+T" from Maxim Integrated.  
You can find a reference layout at [github.com/lab11/polypoint/pcb/tritag](https://github.com/lab11/polypoint/pcb/tritag).

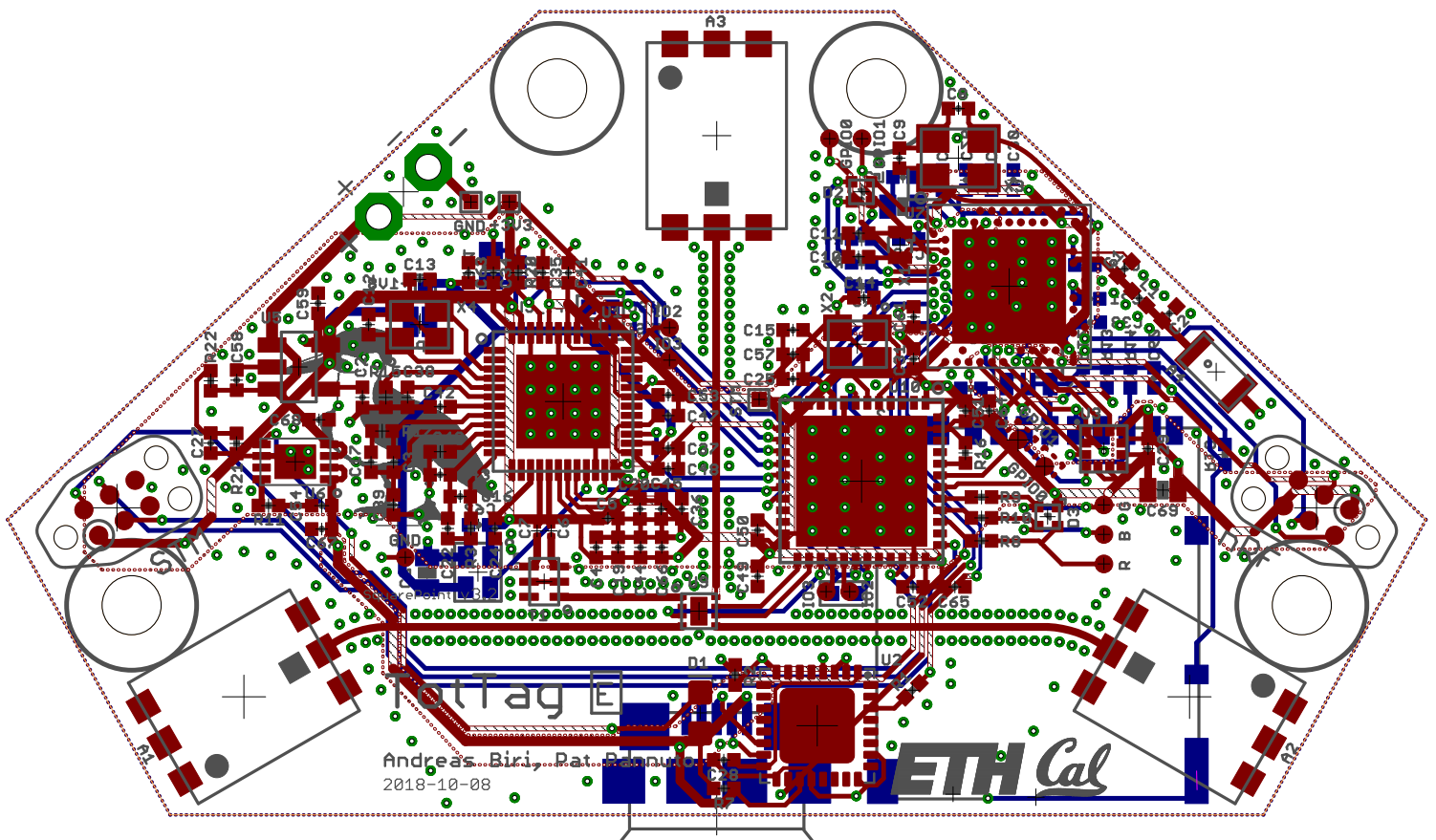
TriTag

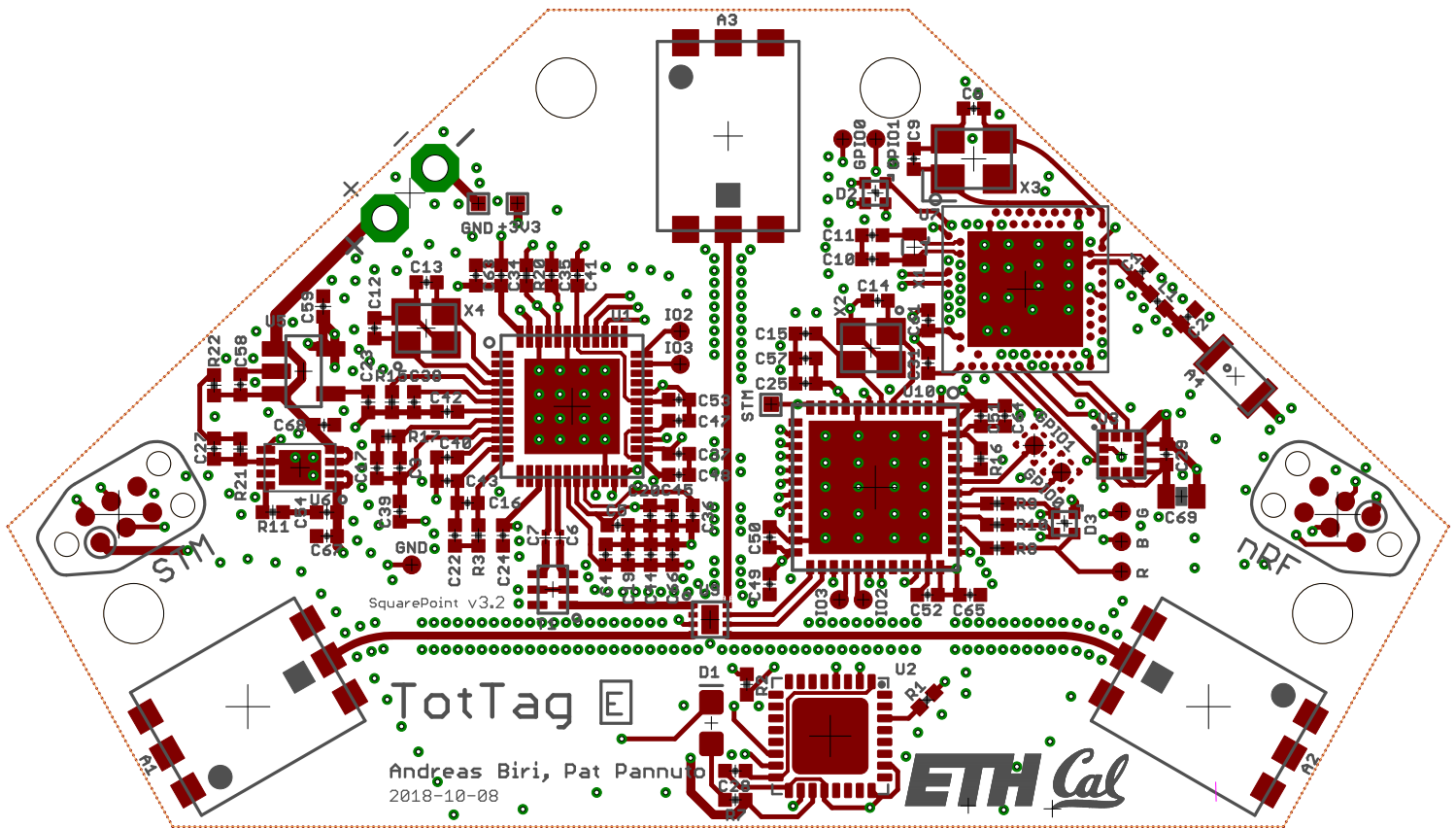
REV:  
E

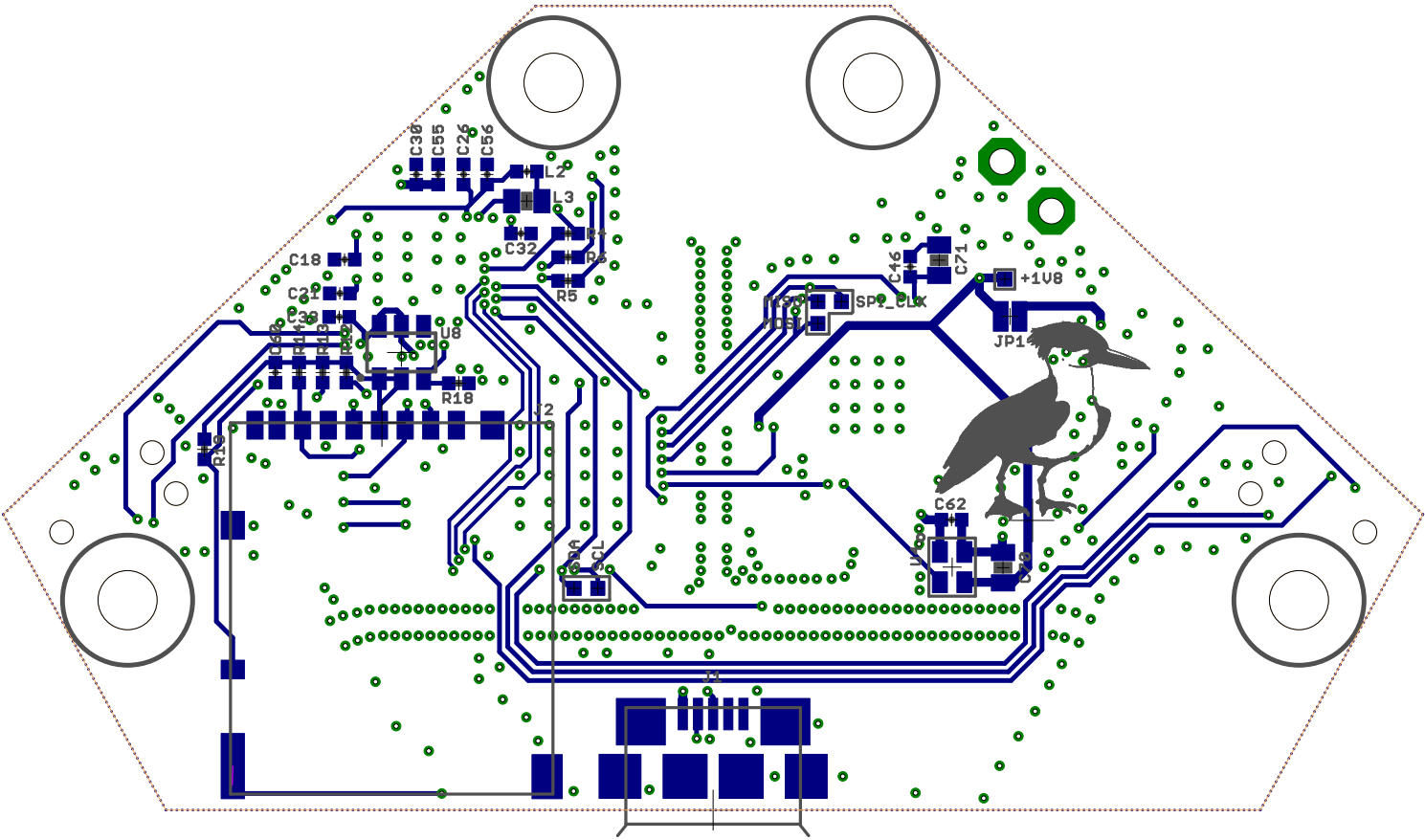
Author: Andreas Biri

Date: 08.10.18 21:12

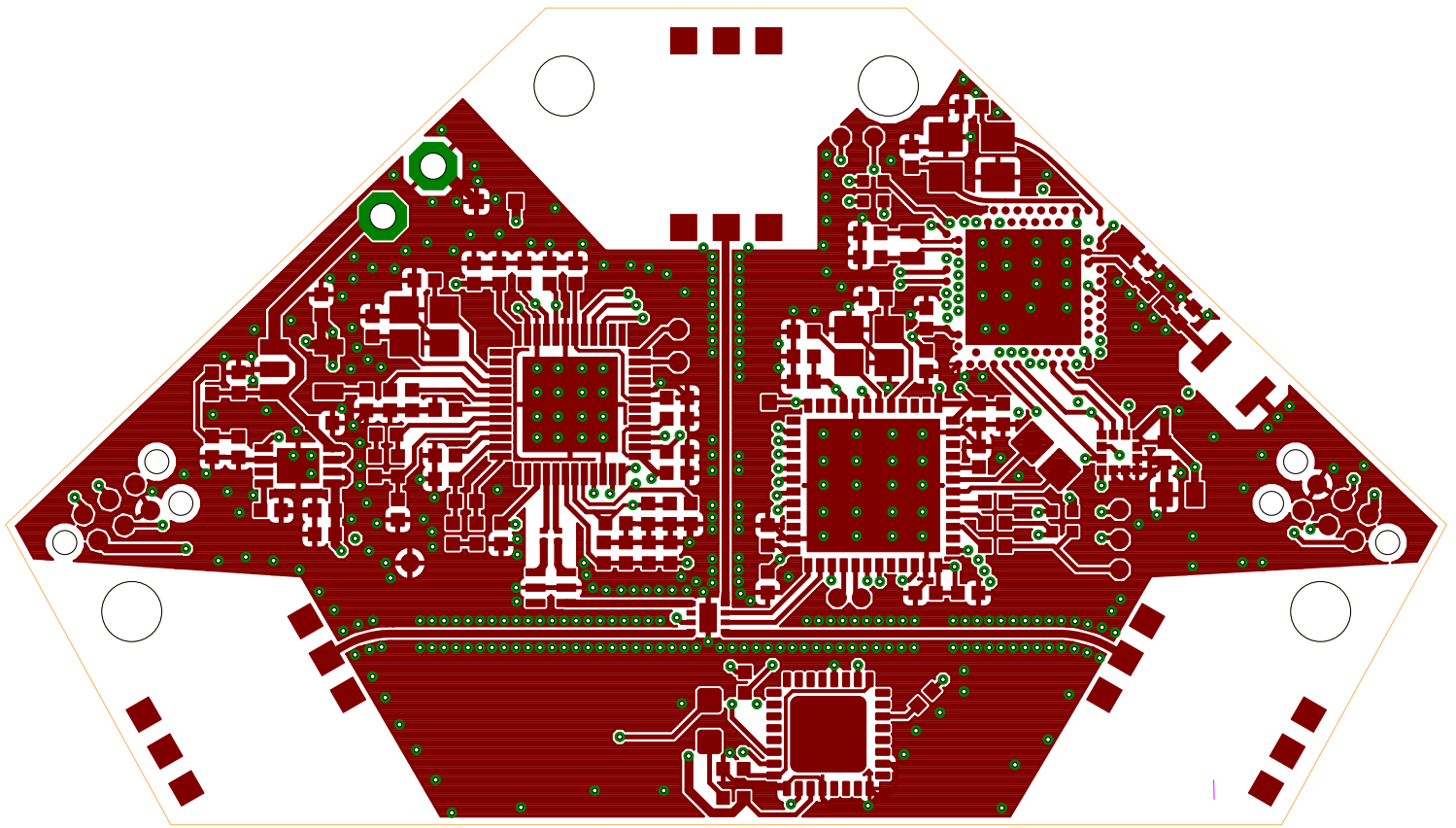
Sheet: 4/4



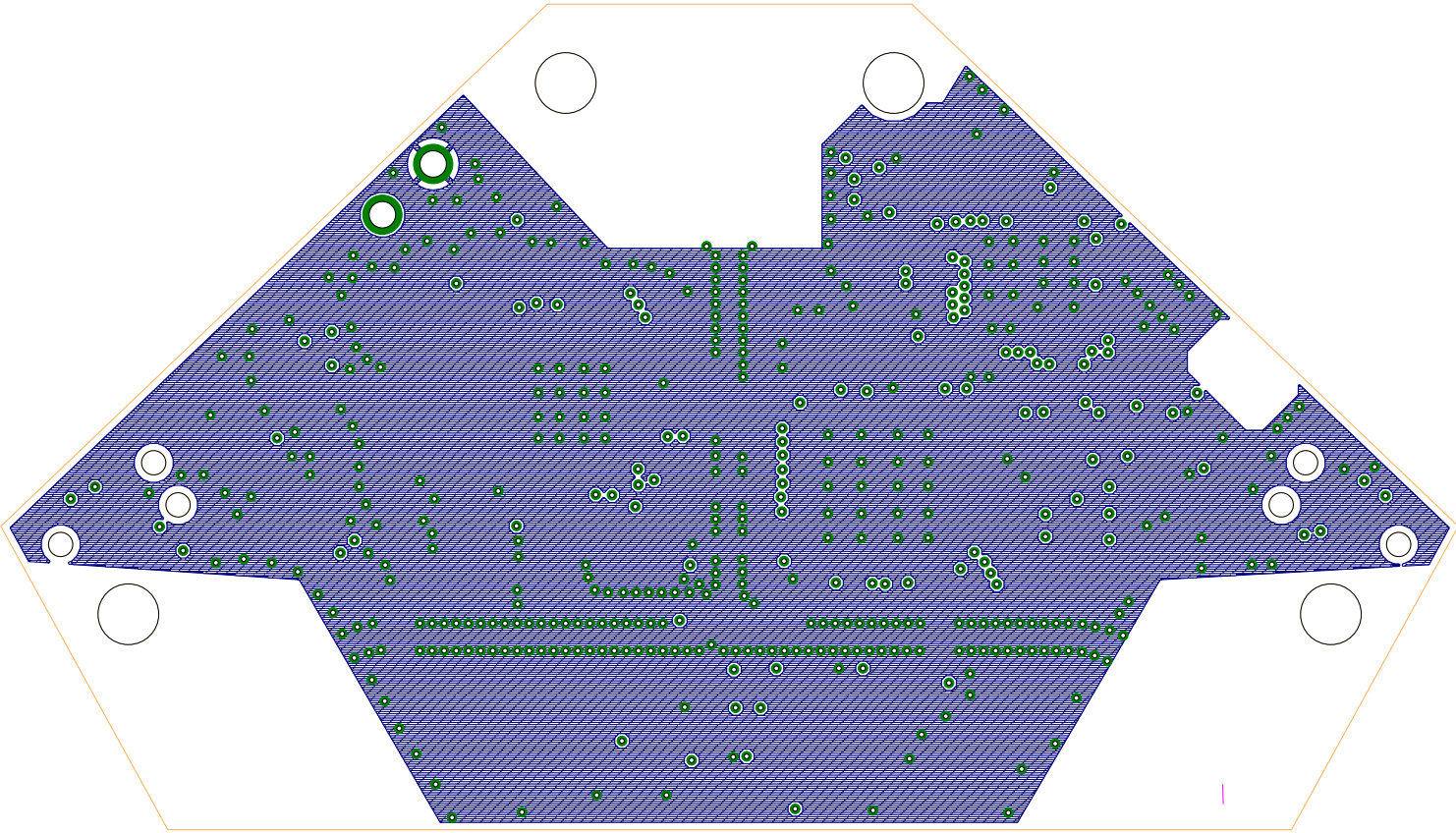


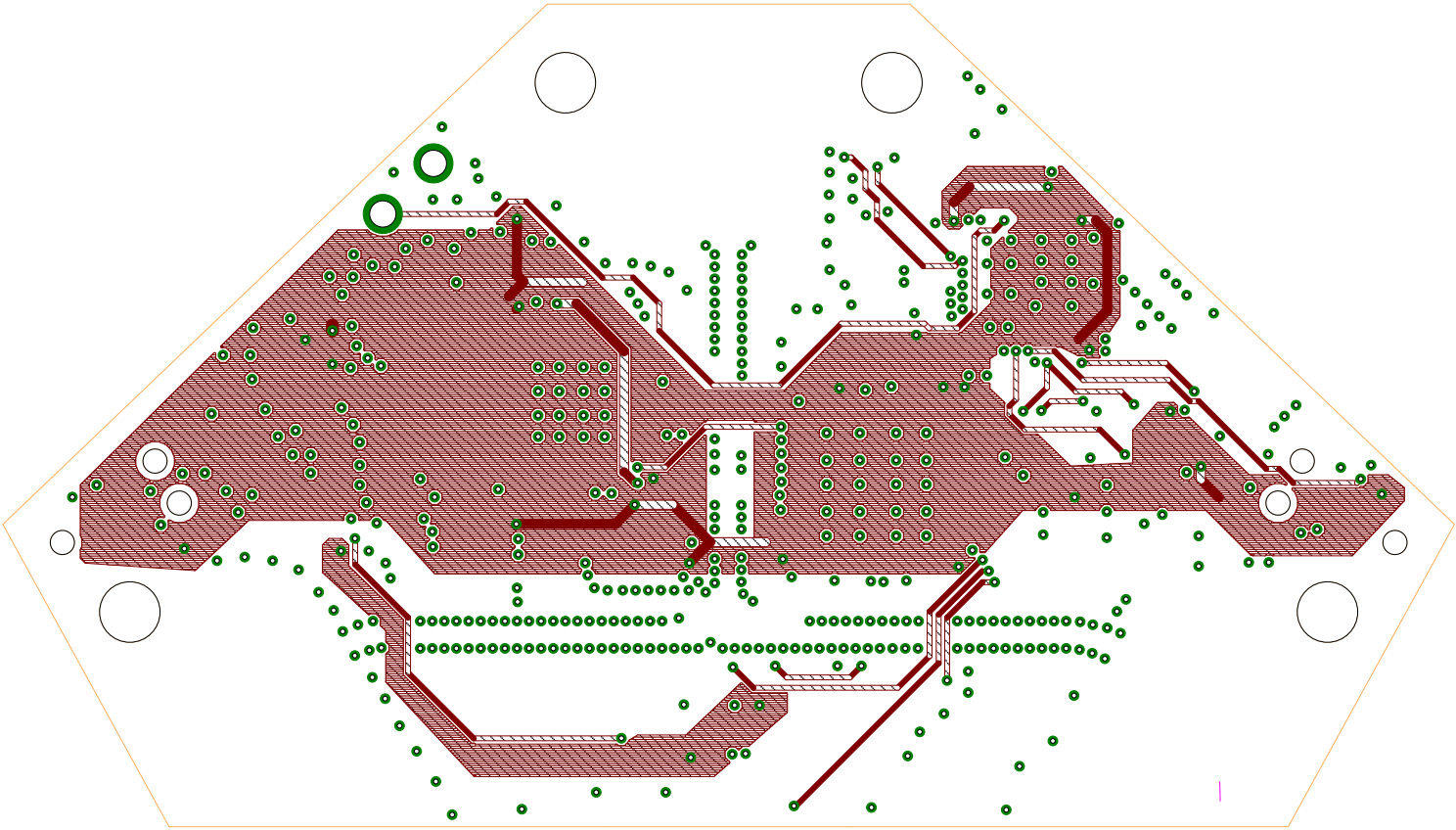


# Top Copper Layer

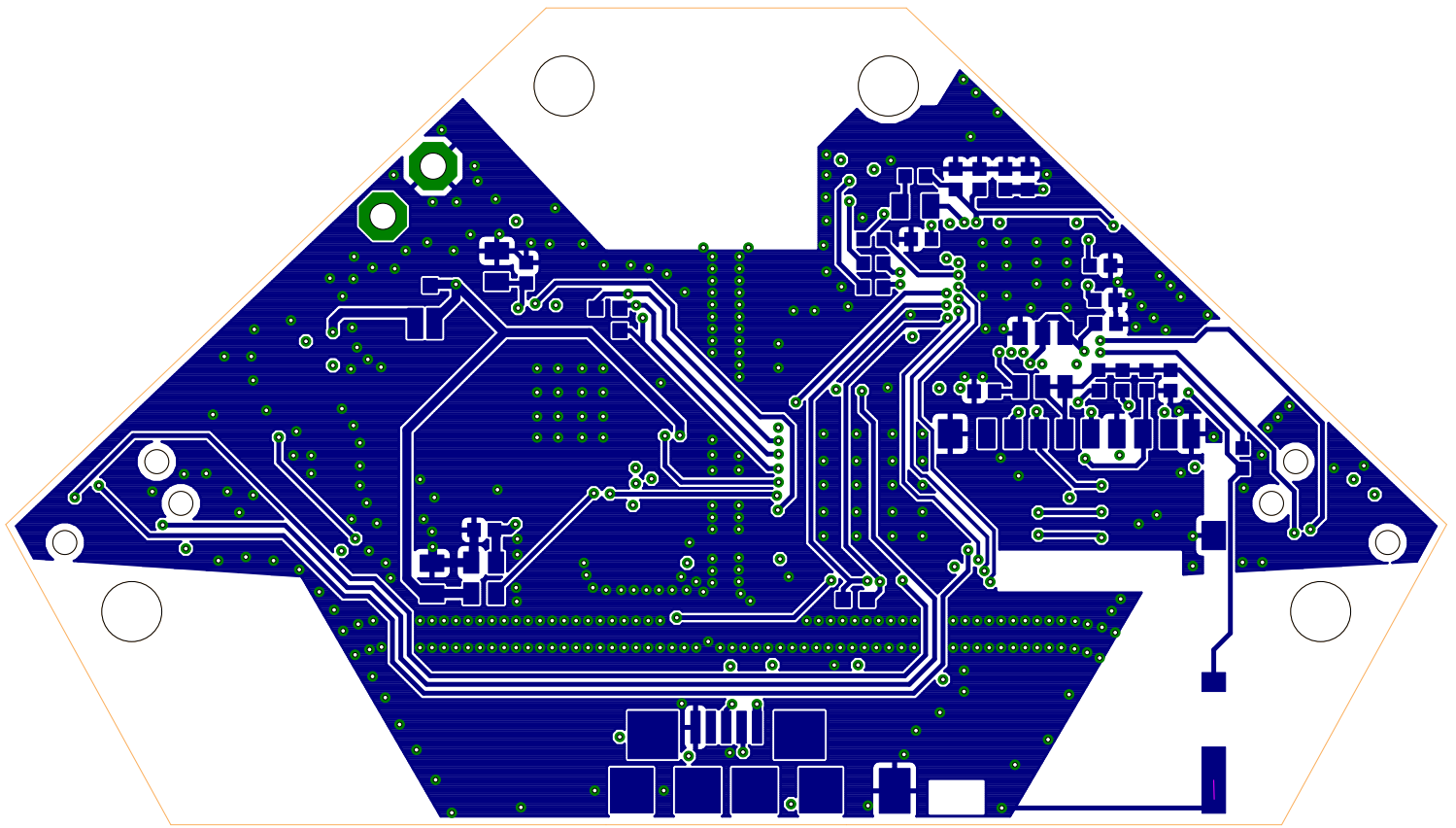


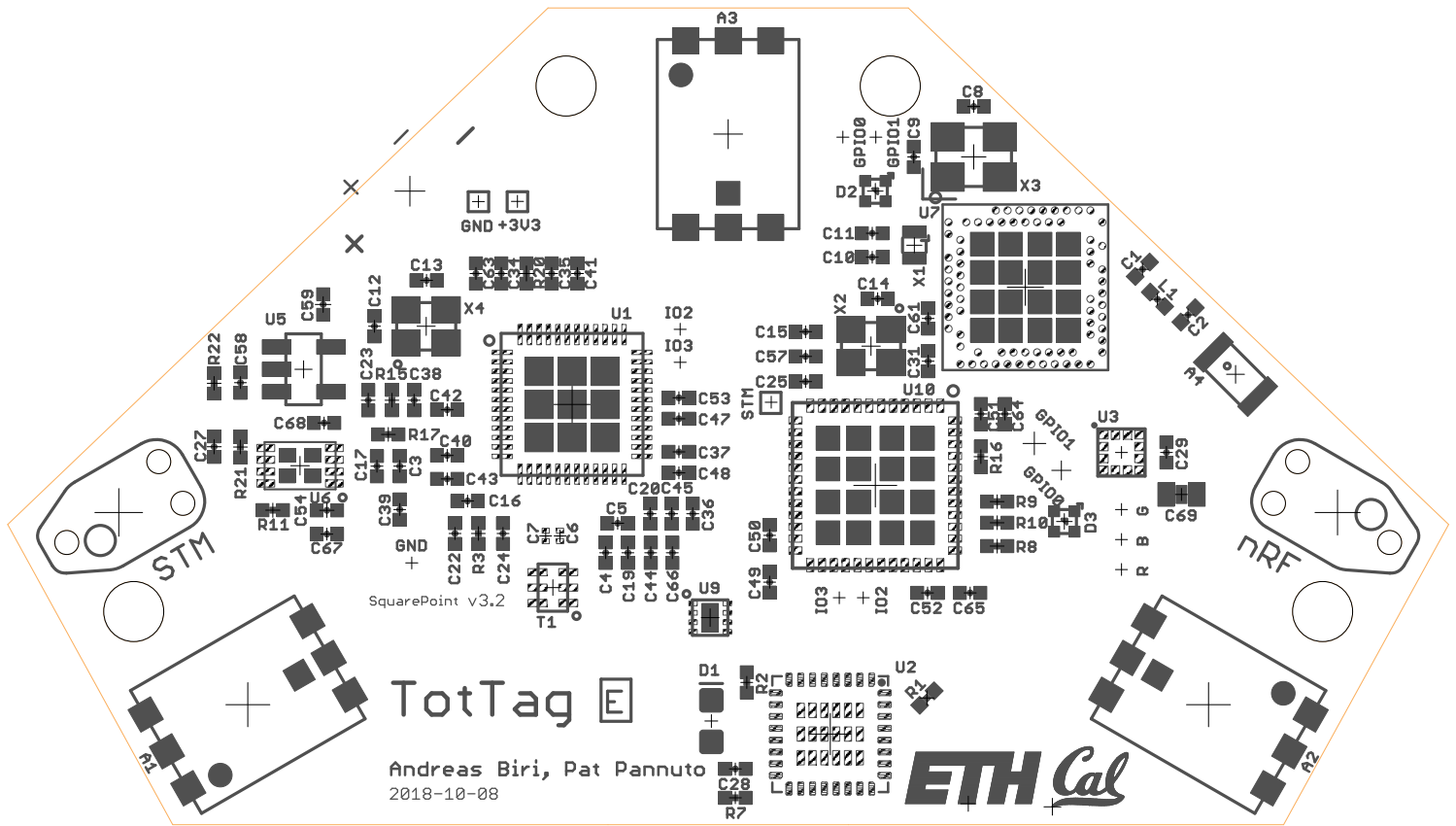




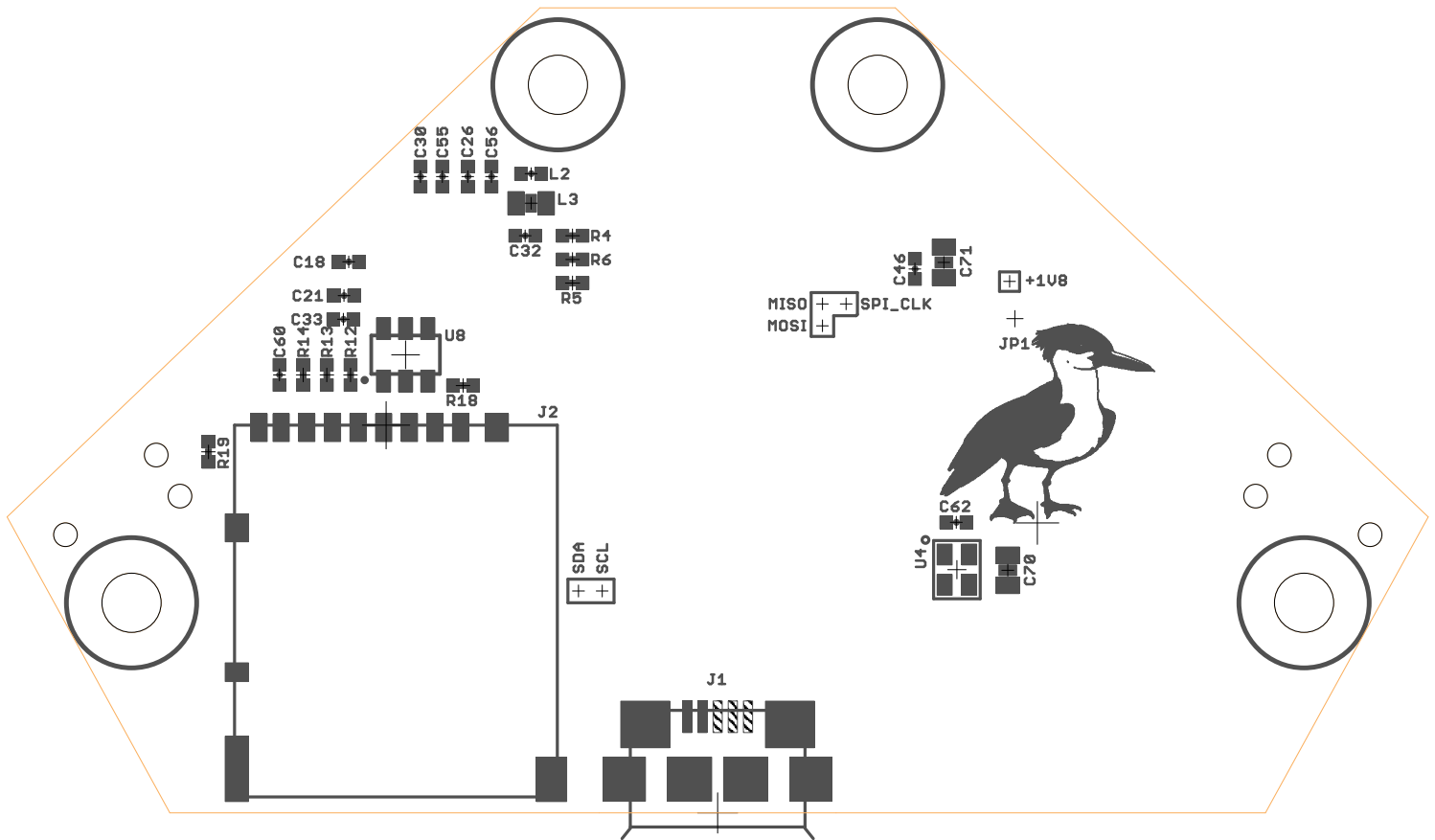


# Bottom Copper Layer

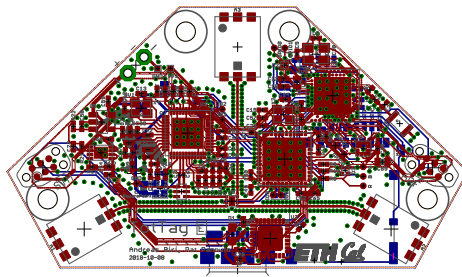




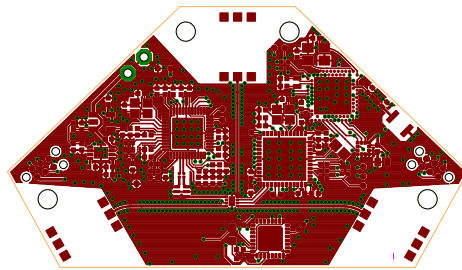
# Bottom Paste Layer with Silkscreen

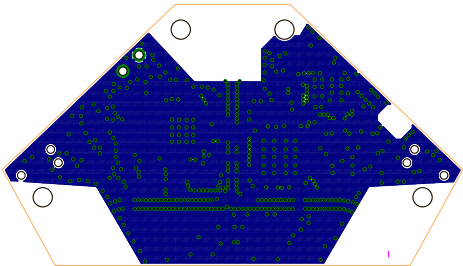


Top and Bottom Layers 1:1 Scale



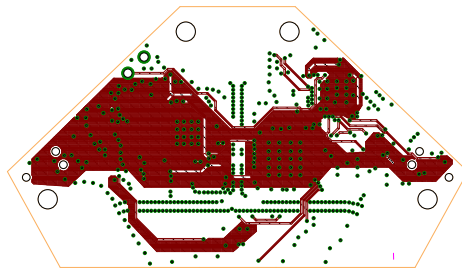
Top Layer 1:1 Scale



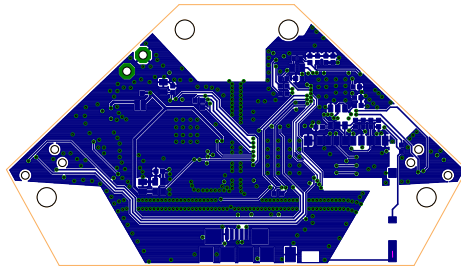




### Layer 3 Copper 1:1 Scale



Bottom Copper Layer 1:1 Scale



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Qty	Parts	Value	Can Substitute	Do not populate (DNP)
3	TAIYO-YUDEN-AH0TAIYO-YUDEN-AH086M		N	
1	ANT3216A063R240ANT3216A063R2400A		N	
2	1pF	CAPACITOR0402_CAP	Y	
1	1.2pF	CAPACITOR0402_CAP	Y	
2	10pF	CAPACITOR0402_CAP	Y	
2	12pF	CAPACITOR0201_CAP	N	
8	12pF	CAPACITOR0402_CAP	Y	
1	18pF	CAPACITOR0402_CAP	Y	
1	27pF	CAPACITOR0402_CAP	Y	
1	100pF	CAPACITOR0402_CAP	Y	
2	330pF	CAPACITOR0402_CAP	Y	
2	820pF	CAPACITOR0402_CAP	Y	
3	10nF	CAPACITOR0402_CAP	Y	
1	47nF	CAPACITOR0402_CAP	Y	
27	0.1uF	CAPACITOR0402_CAP	Y	
4	1uF	CAPACITOR0402_CAP	Y	
11	4.7uF	CAPACITOR0402_CAP	Y	
2	10uF	CAPACITOR0603_CAP	Y	
1	47uF	CAPACITOR0603_CAP	Y	
1	GREEN	LED0603	Y	
2	SML-LX0404SIUPGSML-LX0404SIUPGUSB		Y	
1	MICRO_USB_B_HIIMICRO_USB_B_HIROS		N	
1	CON_MICRO_SDDICON_MICRO_SDDM3A		N	
1	3.9nH	INDUCTOR0402	Y	
1	15nH	INDUCTOR0402	Y	
1	10uH	INDUCTOR0603	Y	
2	0	RESISTOR0402_RES	Y	
1	270	RESISTOR0402_RES	Y	
3	470	RESISTOR0402_RES	Y	
4	1k	RESISTOR0402_RES	Y	
1	2k 1%	RESISTOR0402_RES	Y	
3	10k	RESISTOR0402_RES	Y	
2	11k 1%	RESISTOR0402_RES	Y	
1	16k	RESISTOR0402_RES	Y	
3	100k	RESISTOR0402_RES	Y	
1	2.2M	RESISTOR0402_RES	Y	
1	10M	RESISTOR0402_RES	Y	
1	HHM1595A1	HHM1595A1	N	
1	DW1000	DW1000	N	
1	STM32F091CC	STM32F091CC	N	
1	FT232RQ	FT232RQ	N	
1	LIS2DW12	LIS2DW12	N	
1	LXDC2HN18A	LXDC2HN18A	N	
1	MAX8887EZK33+T	MAX8887EZK33+T	N	
1	MCP73831	MCP73831	N	
1	NRF52840	NRF52840	N	
1	SIP32510	SIP32510	N	
1	SKY13317	SKY13317	N	
1	32.768kHz	ABS05-32.768KHZ-9-T	N	
1	16MHz	FA-20H	N	
1	32MHz	7V-32.000MAHV-T	N	
1	38.4MHz	FA-20H	N	

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9 TPTP06SQ           TPTP06SQ  
12 TEST-POINT       TEST-POINT  
1 BAT\_HOLE           BAT\_HOLE  
2 TC2030-JLINK-NL   TC2030-JLINK-NL  
1 JUMPER-SMT\_2\_NJUMPER-SMT\_2\_NO\_NO-SILK

DNP  
DNP  
DNP  
DNP  
DNP

Device	Package
TAIYO-YUDENA1,A2,A3	
ANT3216A063 A4	
0402_CAP	C1,C2
0402_CAP	C3
0402_CAP	C4,C5
0201_CAP	C6,C7
0402_CAP	C8,C9,C10,C11,C12,C13,
0402_CAP	C16
0402_CAP	C17
0402_CAP	C18
0402_CAP	C19,C20
0402_CAP	C21,C22
0402_CAP	C23,C24,C25
0402_CAP	C26
0402_CAP	C27,C28,C29,C30,C31,C3
0402_CAP	C54,C55,C56,C57
0402_CAP	C58,C59,C60,C61,C62,C6
0603_CAP	C69,C70
0603_CAP	C71
LED-0603	D1
1MM_SQ_4PA D2,D3	
USB_MICRO_IJ1	
DM3AT-SF-PE J2	
0402_CAP	L1
0402_CAP	L2
0603_CAP	L3
0402_RES	R1,R2
0402_RES	R3
0402_RES	R4,R5,R6
0402_RES	R7,R8,R9,R10
0402_RES	R11
0402_RES	R12,R13,R14
0402_RES	R15,R16
0402_RES	R17
0402_RES	R18,R19,R20
0402_RES	R21
0402_RES	R22
EIA-0805	T1
QFN-48-DW10 U1	
UFQFPN-48	U10
QFN32	U2
LGA-12	U3
LXDC2HN	U4
SOT-23-5	U5
DFN-8-MCP	U6
AQFN73	U7
TSOT23-6	U8
MLPQ-UT-8	U9
ABS05	X1
FA-20H	X2
TXC-7V	X3
FA-20H	X4

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TP06SQ +1V8,MISO,MOSI,SPI\_CL  
PAD.03X.03 GPIO0,GPIO1,TP5,TP6,T  
BATTERY\_HOIJ3  
TC2030-IDC-N J4,J5  
SMT-JUMPER\_JP1

## Description

---

UWB Antenna - 3.1-8GHz

Yageo 2.4GHz

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

SMD Capacitor

LED (Generic)

1mm^2 RGB LED

Connector Receptacle USB - micro B 2.0 5 Position Surface Mount, Right Angle, Horizontal

CONN MICRO SD R/A PUSH-PUSH SMD

A very specific inductor

A very specific inductor

A very specific inductor

Resistor

Resistor

Resistor

Resistor

Resistor

Resistor

Resistor

Resistor

Resistor

Resistor

Resistor

Description: Symbol for HHM1595A1, a multilayer Balun from TDK.

Description: The DecaWave DW1000 chip, used for UWB two-way ranging.

Description: STM32F091CC from STMicroelectronics, an ARM-based 32-bit MCU with 256 kB Flash, 32kB of SRAM and

Source: [http://www.ftdichip.com/Documents/DataSheets/DS\\_FT232R\\_v104.pdf](http://www.ftdichip.com/Documents/DataSheets/DS_FT232R_v104.pdf)

ultra low power 3 axis accelerometer

Description: Symbol for LXDC2HN18A-097, a DC-DC converter by Murata Electronics.

IC REG LDO 3.3V 0.3A TSOT23-5

Description: Device for MCP73831, a battery charge controller from Microchip.

ultra-low power 2.4 GHz wireless system on chip (SoC) integrating a multiprotocol 2.4 GHz transceiver, an ARM® Cor

Load switch, slew rate controlled. By Vishay

Description: Device for SKY13317-373LF, an RF switch from Skyworks Inc.

32.768kHz Crystal

Description: Oscillator by EPSON from 12MHz to 54 MHz

TXC CRYSTAL SMD

Description: Oscillator by EPSON from 12MHz to 54 MHz

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Test pad

P7,TP8,TP9,TP10,TP11,TP12,TP13,TP14

Normally open jumper



**DESCRIPTION**


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RF ANT 3.5GHZ/5.6GHZ CHIP SLD  
 RF ANT 2.4GHZ CHIP SOLDER SMD  
 CAP CER 1PF 50V C0G/NP0 0402  
 CAP CER 1.2PF 50V C0G/NP0 0402  
 CAP CER 10PF 100V C0G/NP0 0402  
 CAP CER 12PF 25V C0G/NP0 0201  
 CAP CER 12PF 50V C0G/NP0 0402  
 CAP CER 18PF 50V C0G/NP0 0402  
 CAP CER 27PF 50V C0G/NP0 0402  
 CAP CER SMD 0402 100PF 5% X7R 50  
 CAP CER 330PF 50V X7R 0402  
 MLCC 1005(0402) C0G 820PF 5% 50V  
 CAP CER 10000PF 25V X7R 0402  
 CAP CER 0.047UF 16V X7R 0402  
 CAP CER 0.1UF 16V X5R 0402  
 CAP CER 1UF 10V X6S 0402  
 CAP CER 4.7UF 10V X5R 0402  
 CAP CER 10UF 10V X5R 0603  
 CAP CER 47UF 6.3V X5R 0603  
 LED GREEN CLEAR SMD  
 LED RGB CLEAR SMD  
 CONN MICRO SD CARD PUSH-PUSH R/A  
 CONN RCPT USB MICRO B SMD R/A  
 FIXED IND 3.9NH 840MA 66 MOHM  
 FIXED IND 15NH 320MA 460 MOHM  
 FIXED IND 10UH 300MA 600 MOHM  
 RES SMD 0 OHM JUMPER 1/10W 0402  
 RES SMD 270 OHM 1% 1/16W 0402  
 RES SMD 470 OHM 1% 1/16W 0402  
 RES SMD 1K OHM 1% 1/5W 0402  
 RES SMD 2K OHM 1% 1/10W 0402  
 RES SMD 10K OHM 5% 1/10W 0402  
 RES SMD 11K OHM 1% 1/10W 0402  
 RES SMD 16K OHM 1% 1/16W 0402  
 RES SMD 100K OHM 1% 1/16W 0402  
 RES SMD 2.2M OHM 1% 1/16W 0402  
 RES SMD 10M OHM 5% 1/10W 0402  
 XFMR BALUN RF 3.0-8.0GHZ UWB SMD  
 IC RF TXRX 802.15.4 48-QFN  
 IC MCU 32BIT 256KB FLASH 48QFPN  
 IC USB FS SERIAL UART 32-QFN  
 MEMS DIGITAL OUTPUT MOTION SENSOR  
 DC/DC CONVERTER SMD  
 IC REG LIN 3.3V 300MA TSOT23-5  
 IC CONTROLLER LI-ION 4.2V 8DFN  
 NRF52840-QIAA QFN 73L  
 IC LOAD SWITCH SOT23-6  
 IC SWITCH RF SP3T 8-MLP  
 32.768kHz  $\pm$ 20ppm Crystal 9pF 90 kOhms 2-SMD, No Lead  
 16MHz  $\pm$ 10ppm Crystal 8pF 80 Ohms 4-SMD, No Lead  
 32MHz  $\pm$ 30ppm Crystal 8pF 60 Ohms 4-SMD, No Lead  
 38.4MHz  $\pm$ 10ppm Crystal 8.5pF 40 Ohms 4-SMD, No Lead

<b>DIGIKEY</b>	<b>MANUFACTURER</b>
587-2204-1-ND	Taiyo Yuden
311-1542-1-ND	Yageo
712-1266-1-ND	Johanson Technology Inc.
490-3085-1-ND	Murata Electronics North America
732-12054-1-ND	Würth Electronics Inc.
712-1208-1-ND	Johanson Technology Inc.
490-11190-1-ND	Murata Electronics North America
490-14582-1-ND	Murata Electronics North America
1276-1153-1-ND	Samsung Electro-Mechanics
399-17545-1-ND	KEMET
311-3768-1-ND	Yageo
1276-6989-1-ND	Samsung Electro-Mechanics
399-1279-1-ND	KEMET
445-1264-1-ND	TDK Corporation
1276-1234-1-ND	Samsung Electro-Mechanics
1276-6805-1-ND	Samsung Electro-Mechanics
490-14306-1-ND	Murata Electronics North America
490-10474-1-ND	Murata Electronics North America
490-13247-1-ND	Murata Electronics North America
160-1446-1-ND	Lite-On Inc.
67-2125-1-ND	Lumex Opto/Components Inc.
HR1964CT-ND	Hirose Electric Co Ltd
H125270CT-ND	Hirose Electric Co Ltd
AISC-0402-3N9G-TCT-ND	Abracon LLC
587-1521-1-ND	Taiyo Yuden
445-6755-1-ND	TDK Corporation
P0.0JCT-ND	Panasonic Electronic Components
1276-3970-1-ND	Samsung Electro-Mechanics
541-4072-1-ND	Vishay Dale
541-3240-1-ND	Vishay Dale
P2.00KLCT-ND	Panasonic Electronic Components
P10KJCT-ND	Panasonic Electronic Components
P11.0KLCT-ND	Panasonic Electronic Components
YAG5263CT-ND	Yageo
541-3960-1-ND	Vishay Dale
541-4083-1-ND	Vishay Dale
P10MJCT-ND	Panasonic Electronic Components
445-3387-1-ND	TDK Corporation
1479-1001-1-ND	Decawave Limited
497-15813-ND	STMicroelectronics
768-1008-1-ND	FTDI, Future Technology Devices In
497-17718-6-ND	STMicroelectronics
490-12092-1-ND	Murata Electronics North America
MAX8887EZK33+TCT-ND	Maxim Integrated
MCP73831T-2ACI/MCCT-ND	Microchip Technology
1490-1071-1-ND	Nordic Semiconductor ASA
SIP32510DT-T1-GE3CT-ND	Vishay Siliconix
863-1056-1-ND	Skyworks Solutions Inc.
535-11897-1-ND	Abracon LLC
SER4201CT-ND	EPSON
887-2568-1-ND	TXC CORPORATION
SER3631CT-ND	EPSON

**MPN**

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AH086M555003-T  
ANT3216A063R2400A  
500R07S1R0BV4T  
GJM1555C1H1R2CB01D  
885012005074  
250R05L120GV4T  
GJM1555C1H120FB01D  
GRM1555C1H180JA01J  
CL05C270JB5NNNC  
C0402C101J5RACAUTO  
CC0402JRX7R9BB331  
CL05C821JB5NFNC  
C0402C103J3RACTU  
C1005X7R1C473K050BC  
CL05A104KO5NNNC  
CL05X105KP5NNNC  
GRM155R61A475MEAAD  
GRM188R61A106KE69D  
GRM188R60J476ME15D  
LTST-C191KGKT  
SML-LX0404SIUPGUSB  
DM3AT-SF-PEJM5  
ZX62-B-5PA(33)  
AISC-0402-3N9G-T  
HK100515NJ-T  
MLZ1608N100LT000  
ERJ-2GE0R00X  
RC1005F271CS  
CRCW0402470RFKEDC  
RCA04021K00FKEDHP  
ERJ-2RKF2001X  
ERJ-2GEJ103X  
ERJ-2RKF1102X  
AC0402FR-0716KL  
CRCW0402100KFKEDC  
CRCW04022M20FKEDC  
ERJ-2GEJ106X  
HHM1595A1  
DW1000-I-TR13  
STM32F091CCU6  
FT232RQ  
LIS2DW12TR  
LXDC2HN18A-097  
MAX8887EZK33+T  
MCP73831T-2ACI/MC  
NRF52840  
SIP32510DT-T1-GE3  
SKY13317-373LF  
ABS05-32.768KHZ-9-T  
FA-20H 16.0000MF10Z-AJ5  
7M-32.000MAHV-T  
FA-20H 38.4000MF10Z-AS3

81-GRM188R60J476ME5D