

User's Manual

78K0 UZ Stick

ZigBee™-ready

Wireless Network Evaluation Module

Using the 78K0/KE2 Microcontroller

Hardware Manual

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[NOTES]

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[CAUTION]

This equipment should be handled like a CMOS semiconductor device. The user must take all precautions to avoid build-up of static electricity while working with this equipment. All test and measurement tool including the workbench must be grounded. The user/operator must be grounded using the wrist strap. The connectors and/or device pins should not be touched with bare hands.

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1 Introduction

78K0 UZ Stick is an evaluation kit for wireless personal area network using 78K0/KE2 8-bit MCU and UZ2400 RF chip by Uniband Electronic Corporation.

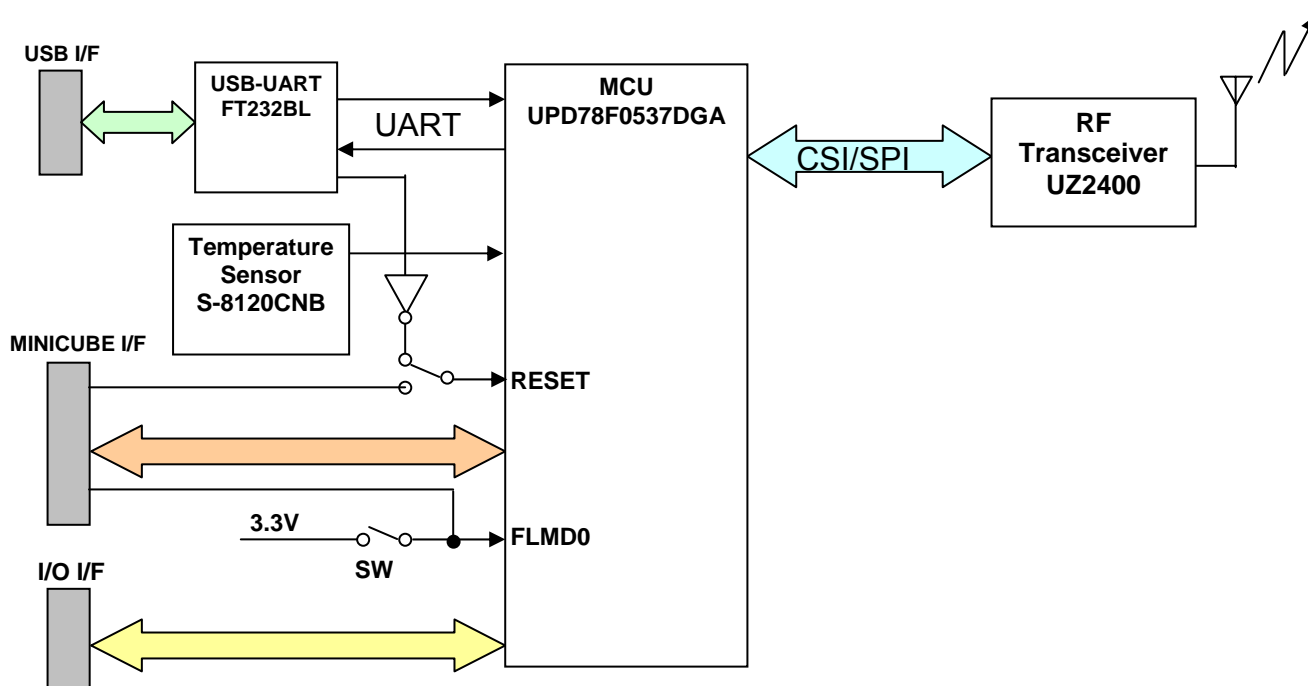
1.1 Features

- Hardware is ready to accommodate IEEE 802.15.4/ZigBee compliant wireless personal area network with 8 bit single chip MCU 78K0/KE2, μ PD78F0537DGA, and 2.4GHz transceiver UZ2400
- Object code of IEEE 802.15.4 PHY/MAC is included in the kit and possible to utilize as a library.
- 128 Kbytes of Flash EEPROM, available on chip in the 78K0/KE2 MCU, is programmable from PC via USB connection without any additional Flash programming hardware. Flash programming utility, PG-FPL3, which works on MS Windows in your PC, is included in the kit.
- Debugging of the program requires an optional connector, SICA2P20S, an additional adaptor, SICA10I2P, and a MINICUBE emulator, QB-78K0MINI or QB-MINI2.
- USB connection can be utilized not only for Flash programming, but also for user applications and power supply.
- Real time clock is available on the board.
- In addition to the USB connector, one serial I/O port, UART or CSI, one interrupt input port, and three analog input ports are available in the expansion connector.
- The expansion connector also provides with a connection to a 006P battery. Power source can be selectable between USB or a battery by a switch.
- Three orange LEDs are available on board for applications, in addition to one green LED for power indication.
- The size of the module is, 82mm x 23mm.

1.2 Hardware Overview

MCU	UD78F0537DGA with 128 KB Flash EEPROM and 7 KB RAM
Clock	16MHz main, and 32.768KHz sub
RF transceiver	UZ2400
Interfaces	USB connector (Type A) Expansion interface Option: MINICUBE connector (CN1)
Power supply	5.0V by USB, or 4.75 - 10.0V by a battery

1.3 Block Diagram



2 Interface Connection

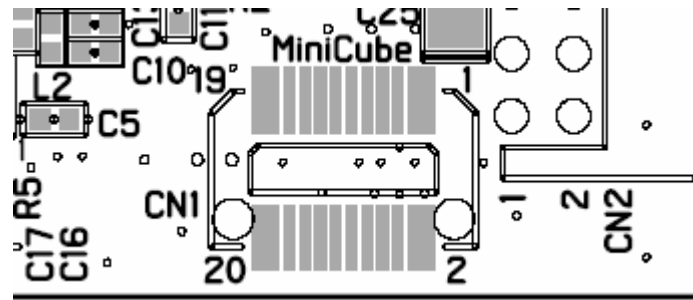
2.1 CN1

MINICUBE interface: CN1

This is available as an option.

CN1: Tokyo Eletech SICA2P20S

CN1	Name	Connection to MCU	Notes
1	RESET_IN	Pull-up with 10 K Ohm	
2	REST_OUT	RESET	
3	FLMD0	FLMD0	Programming Mode
4	VDD_IN	VDD (3.3V)	Regulated
5	X2	P32/INTP3/OCD1B	OCDX2
6	GND	GND	
7	X1	P31/INTP2/OCD1A	OCDX1
8	GND	GND	
9	-	N.C.	
10	5V_CHK	N.C.	
11	-	N.C.	
12	-	N.C.	
13	-	N.C.	
14	-	N.C.	
15	-	N.C.	
16	-	N.C.	
17	-	N.C.	
18	-	N.C.	
19	-	N.C.	
20	-	N.C.	



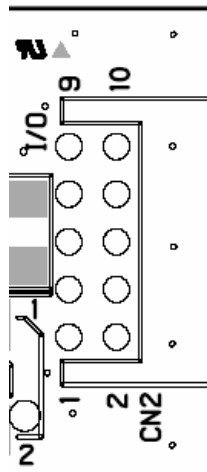
Location of CN1 : TOP VIEW

2.2 CN2

Expansion Interface: CN2

CN2: Hirose DF11-10DP-2DS

CN2	Name	Connection to MCU	Notes
1	GND	GND	Battery GND
2	VBAT	4.75V - 10.0V	From battery
3	P10	P10/SCK10/TXD0	
4	P11	P11/SI10/RXD0	
5	P140	P140/PCL/INTP6	
6	P12	P12/SO10	
7	P24	P24/ANI4	
8	P25	P25/ANI5	
9	P26	P26/ANI6	
10	GND	GND	



Location of CN2: TOP VIEW

3 Switches and LEDs

3.1 SW1: FLMD0

Programming mode selection for Flash EEPROM on the MCU

Setting of SW1: FLMD0

Normal Mode	L
Flash Programming Mode	H



SW1: TOP VIEW

3.2 SW2: POWER

Selection of power source: USB power or battery at CN2

Setting of SW2

USB Power	USB
CN2: Expansion I/F	BAT



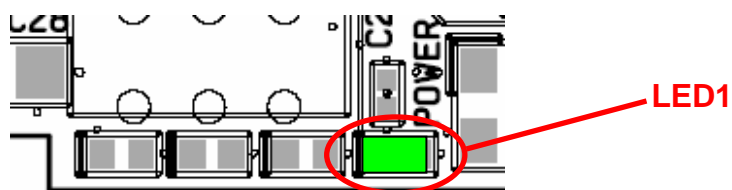
SW2: TOP VIEW

3.3 LED1: Power Indication

LED1 is a green LED to indicate the availability of power.

LED1 status

Status	LED
Power ON	Green
Power OFF	Off



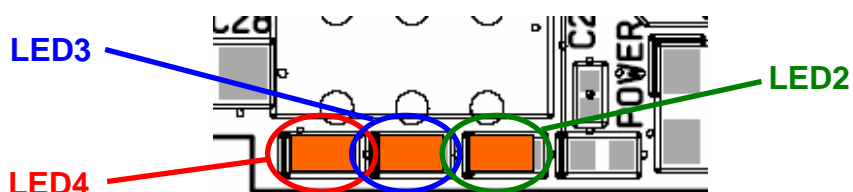
LED1: TOP VIEW

3.4 LED2, LED3, and LED4

LED2, LED3, and LED4 are for application. They emit orange by setting the port output of P40, P41, or P42 of the MCU low, respectively.

LED2, LED3, and LED4

	Name	MCU PIN	Port Level
LED2	P40	P40/AD0	LOW for orange HIGH for off
LED3	P41	P41/AD1	LOW for orange HIGH for off
LED4	P42	P42/AD2	LOW for orange HIGH for off



LED2, LED3, and LED4: TOP VIEW

4 Power Source

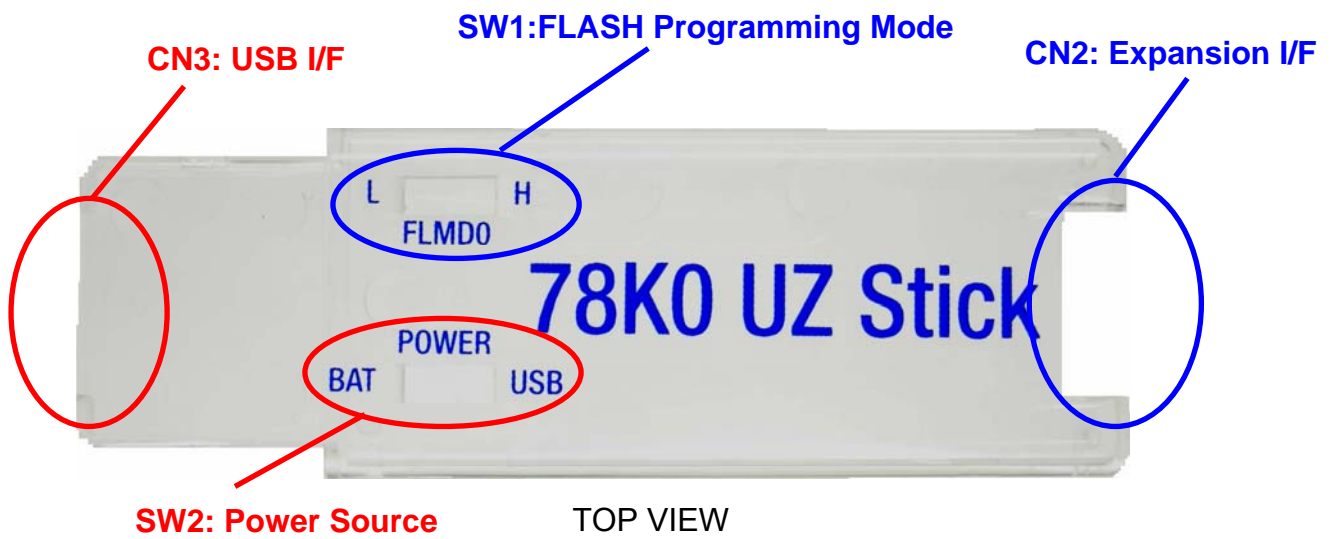
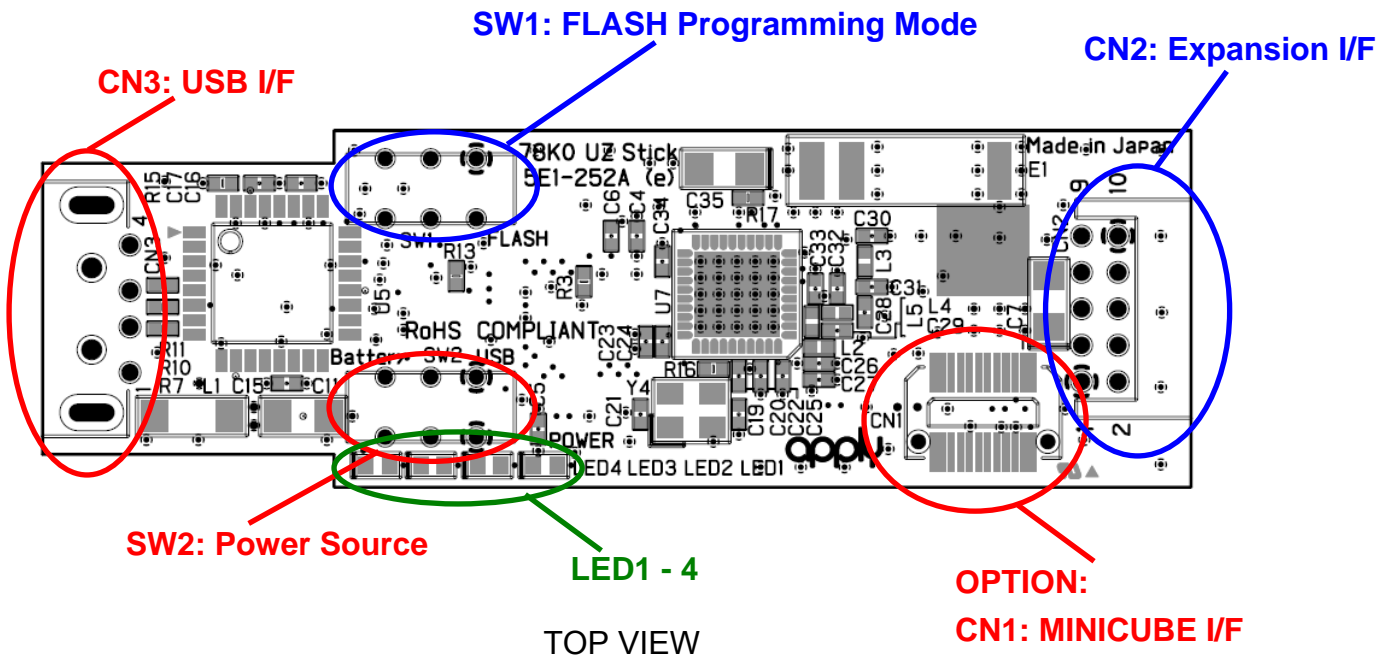
This module is equipped with a voltage regulator, which regulates the source of 4.75 -10.0 V to 3.3V. The power source can be selected by SW2 between USB power or a battery power through CN2.

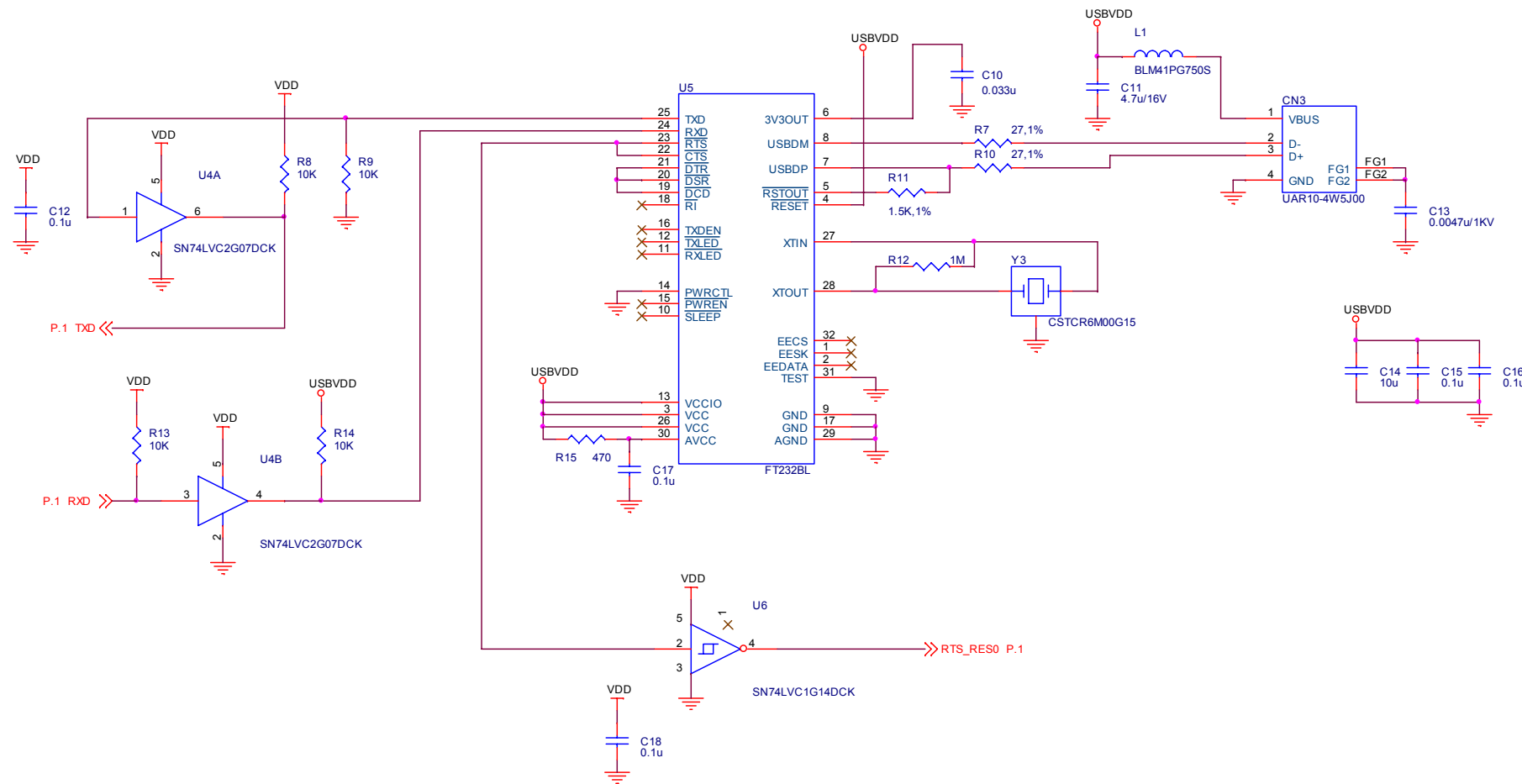
5 Power Consumption

The power consumption of the module largely depends on the status of the PHY driver of the USB I/F. One example of measured consumed current is, 14.3 mA in case USB is not connected, while 33.5 mA while USB is connected.

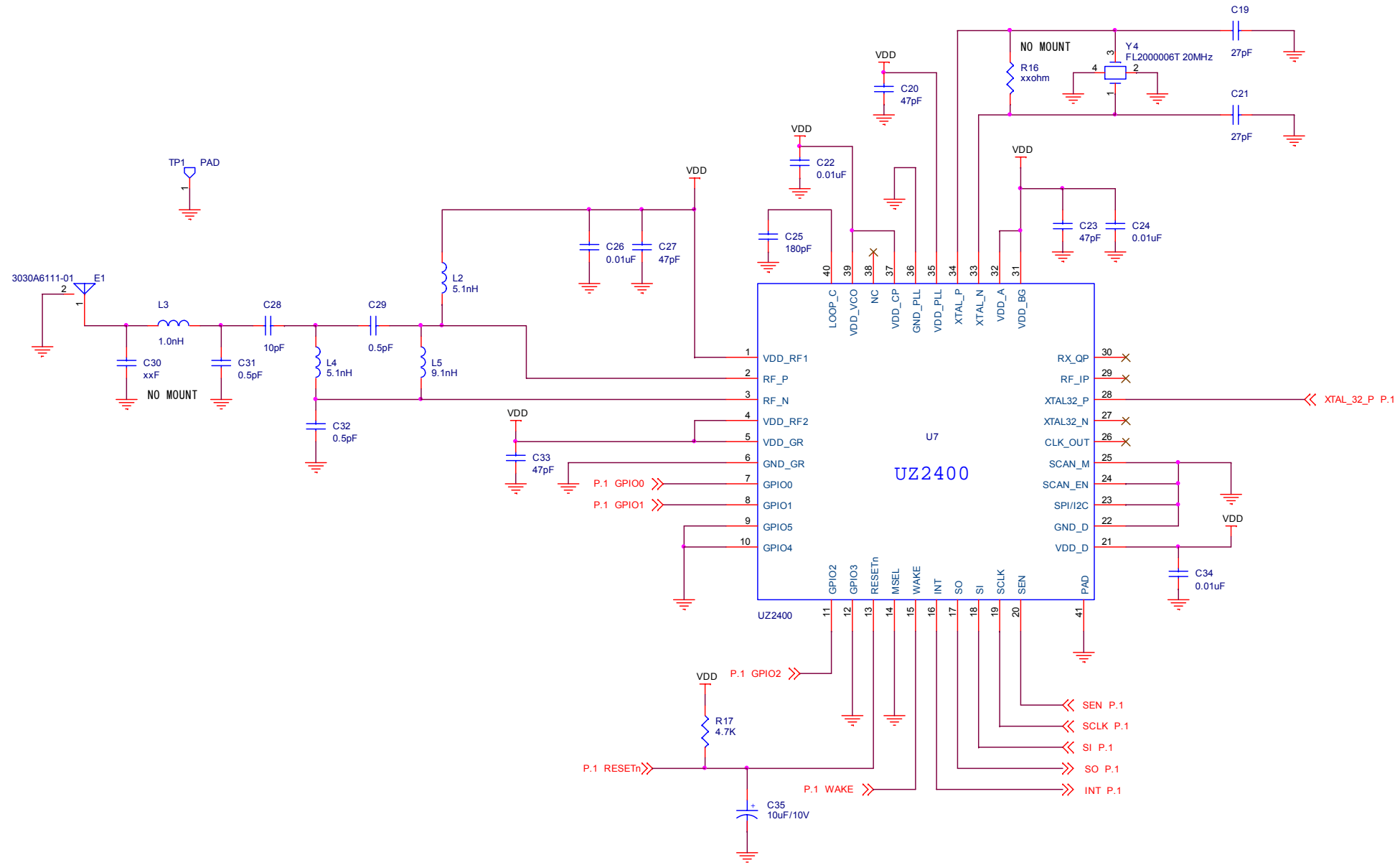
6 Design Data

6.1 Parts Layout



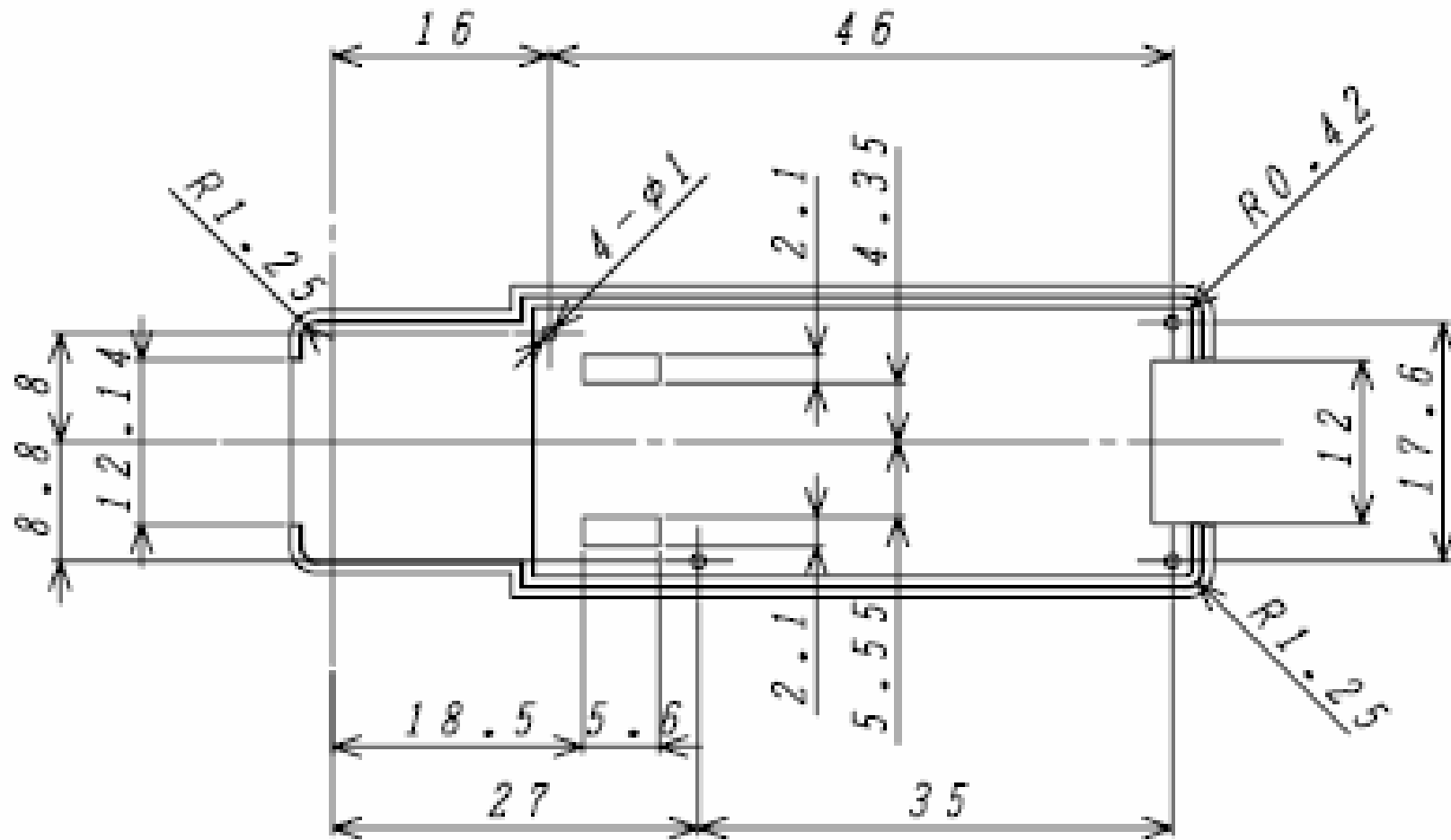


Title		
78K0 UZ Stick		
Size	Document Number	Rev
A3	5E1-252A	1.0
Date:	Thursday, October 05, 2006	Sheet 2 of 3

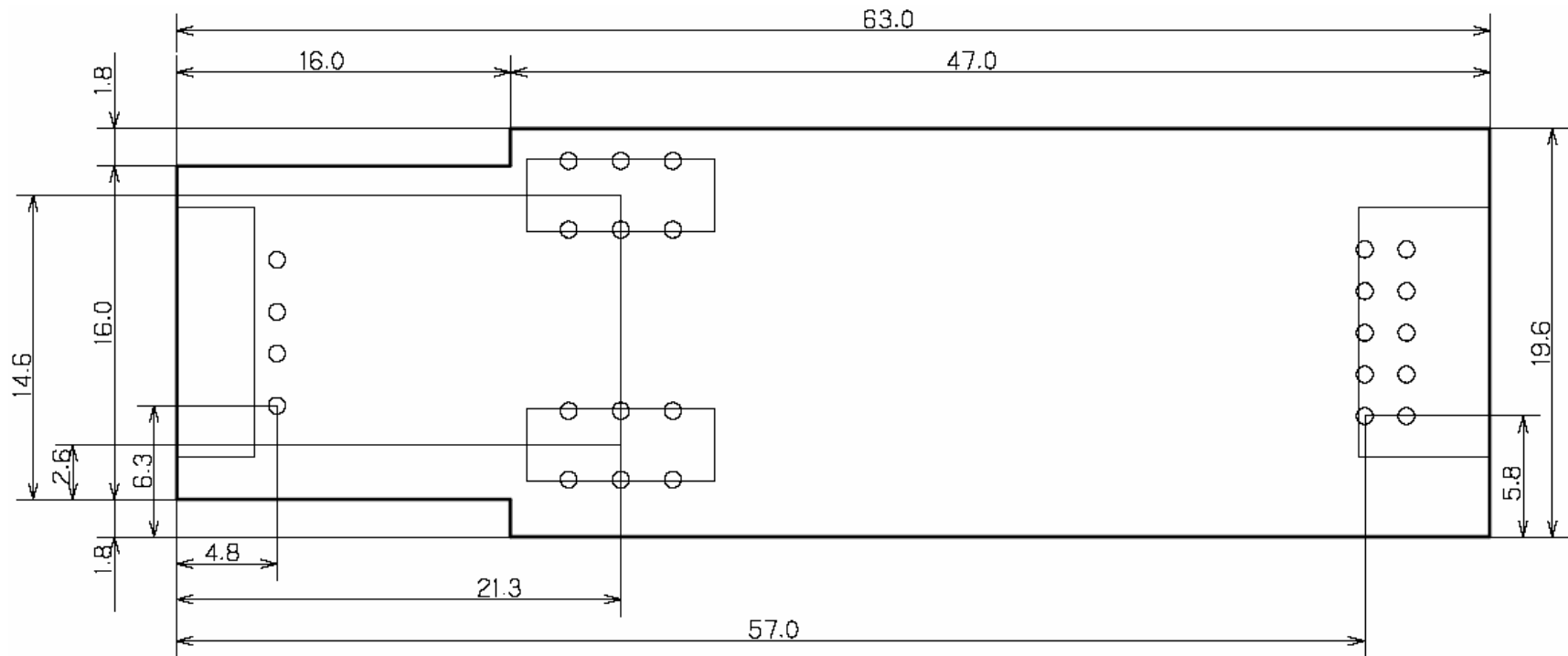


Title		
78K0 UZ Stick		
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A3	5E1-252A	1.0
Date:	Thursday, October 05, 2006	Sheet 3 of 3

6.3 Body Dimensions

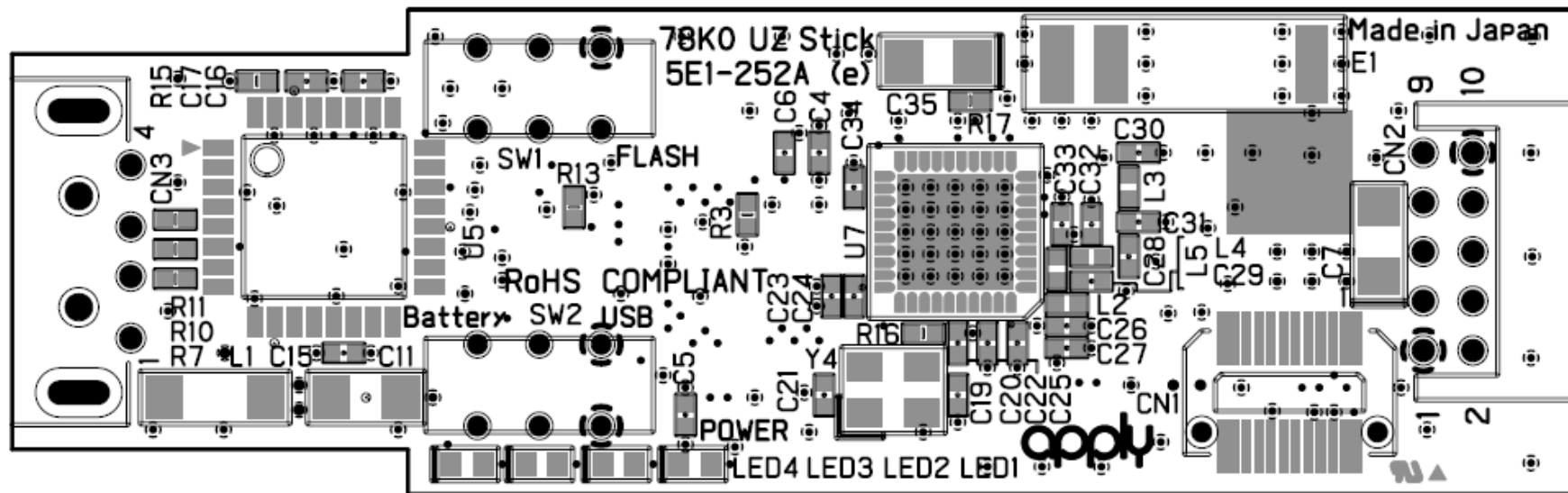


6.4 Board Dimensions

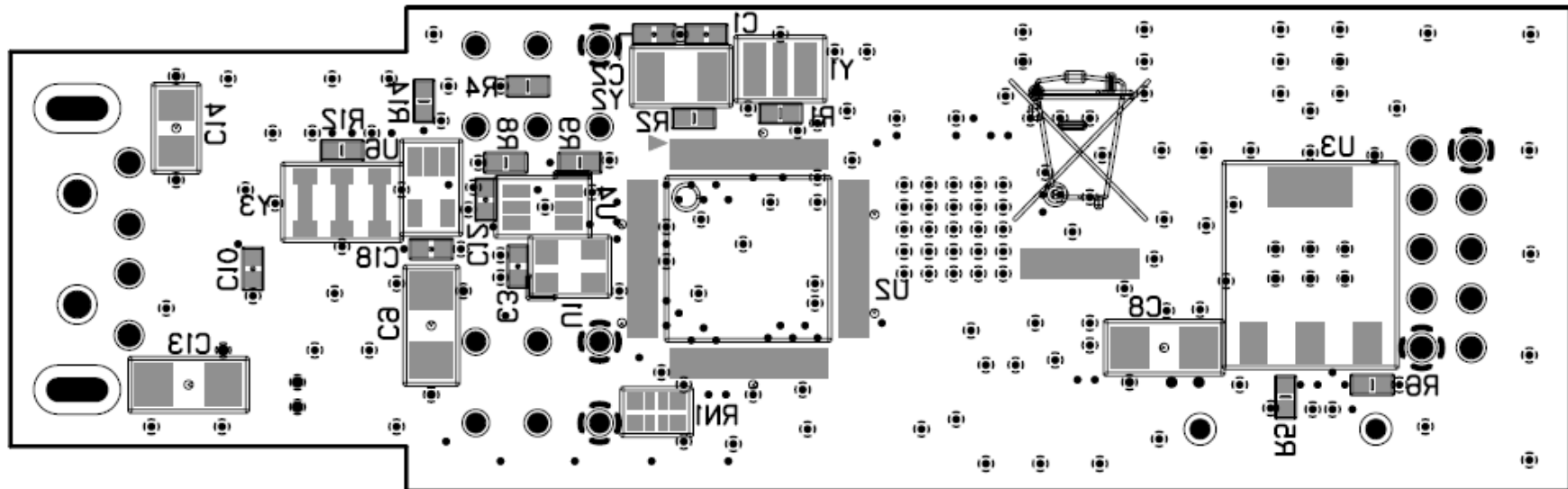


6.5 PCB Layout

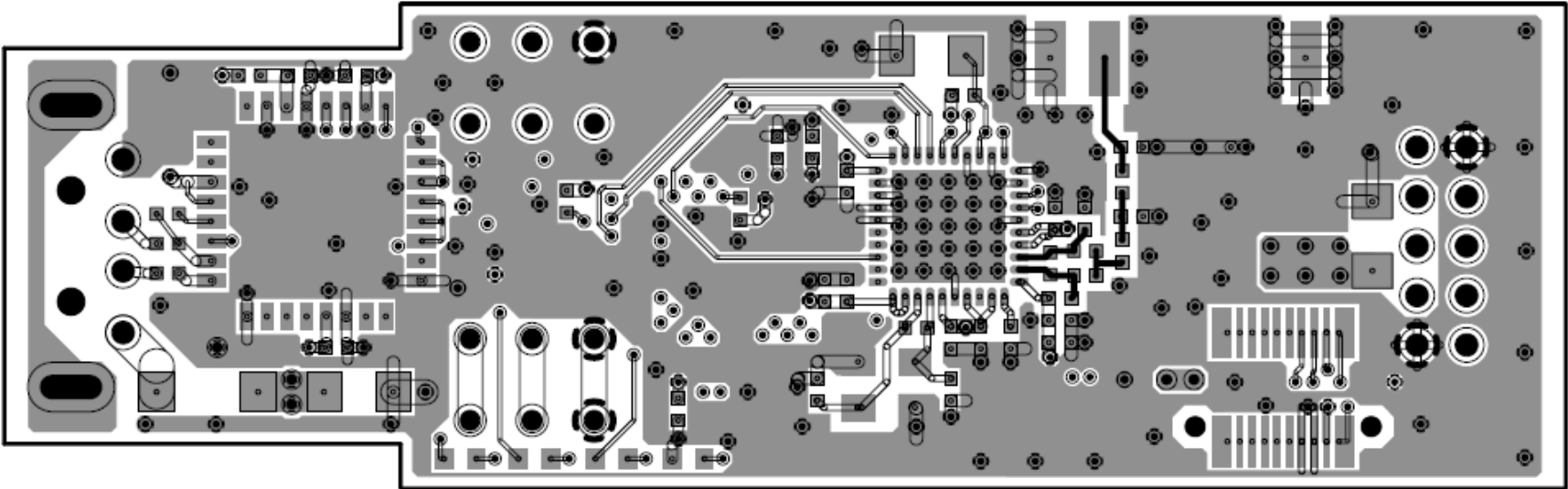
6.5.1 Silk of the top side



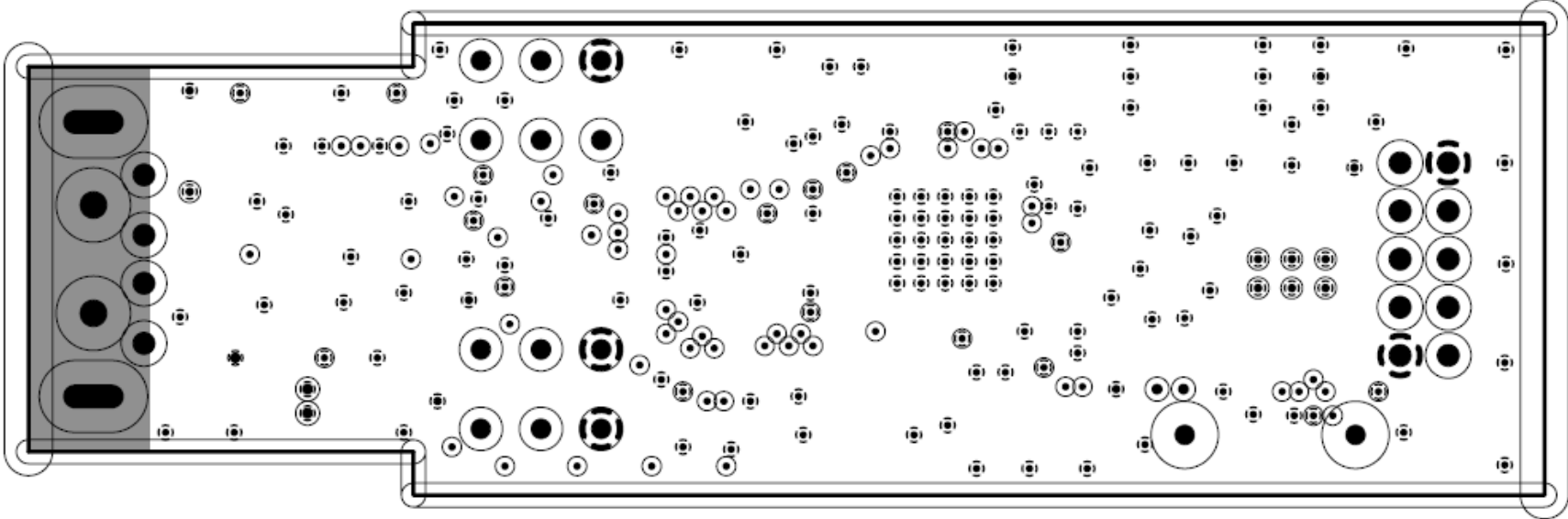
6.5.2 Silk of the bottom side



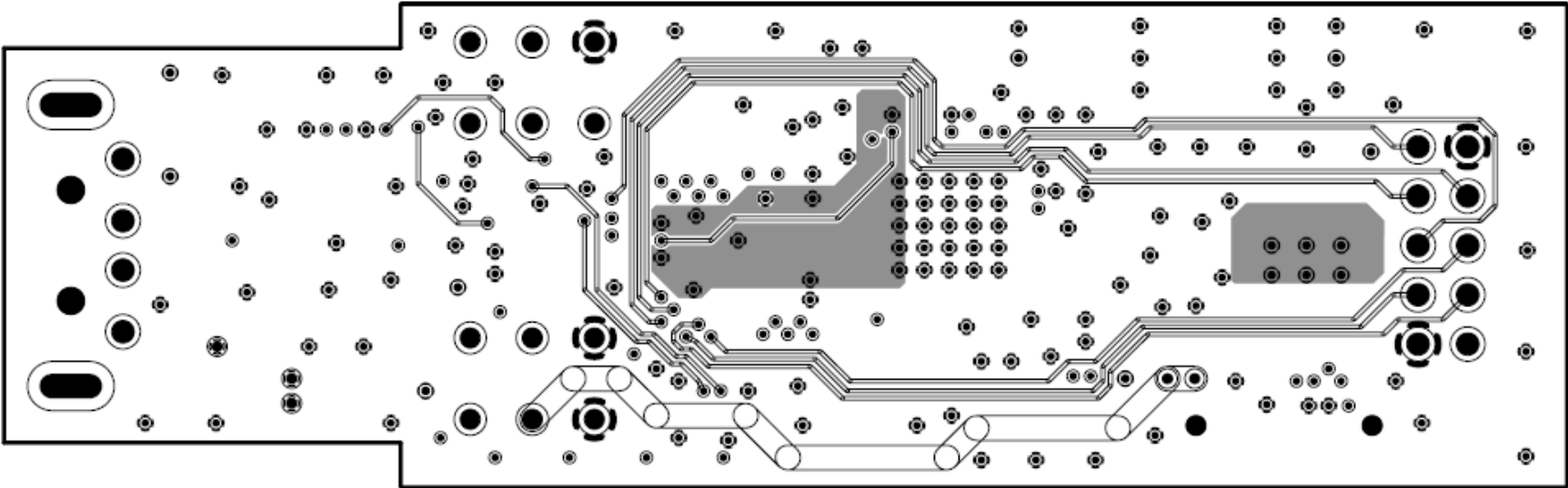
6.5.3 PCB Layout: The first layer



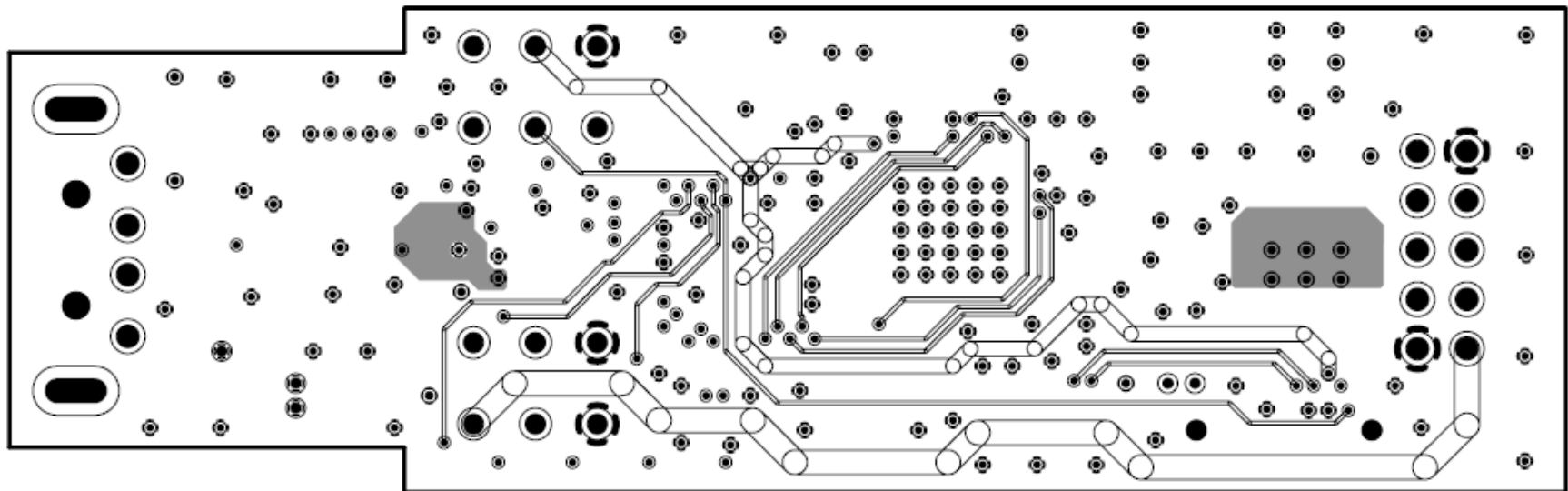
6.5.4 PCB Layout: The second layer



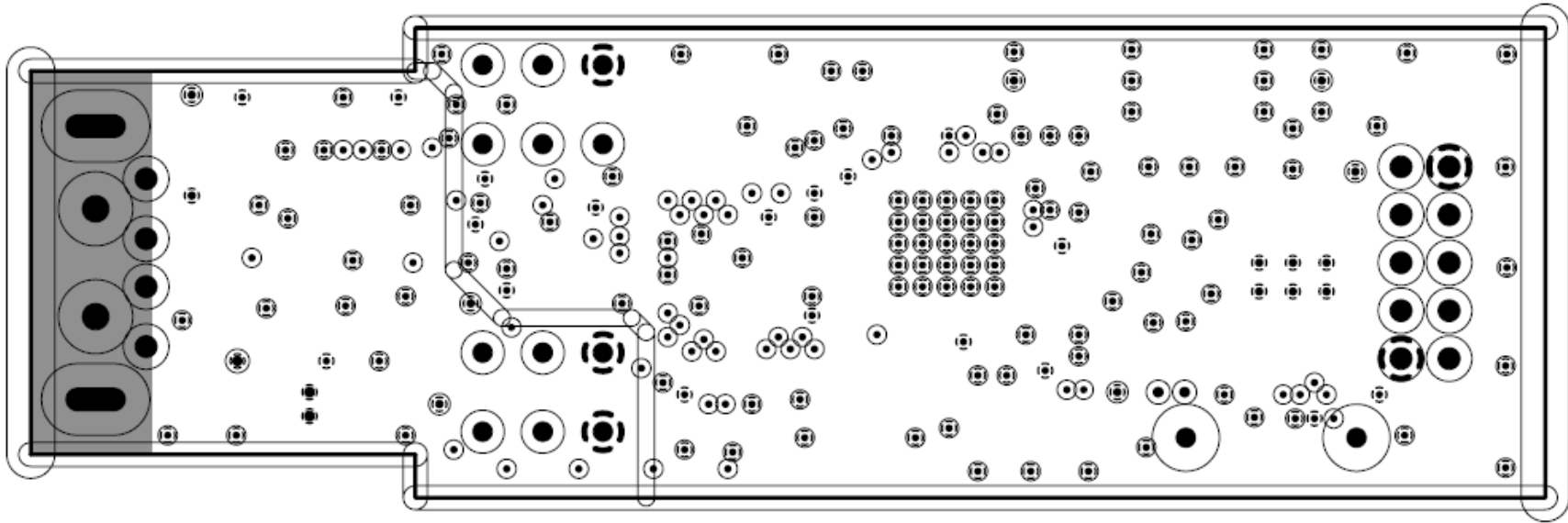
6.5.5 PCB Layout: The third layer



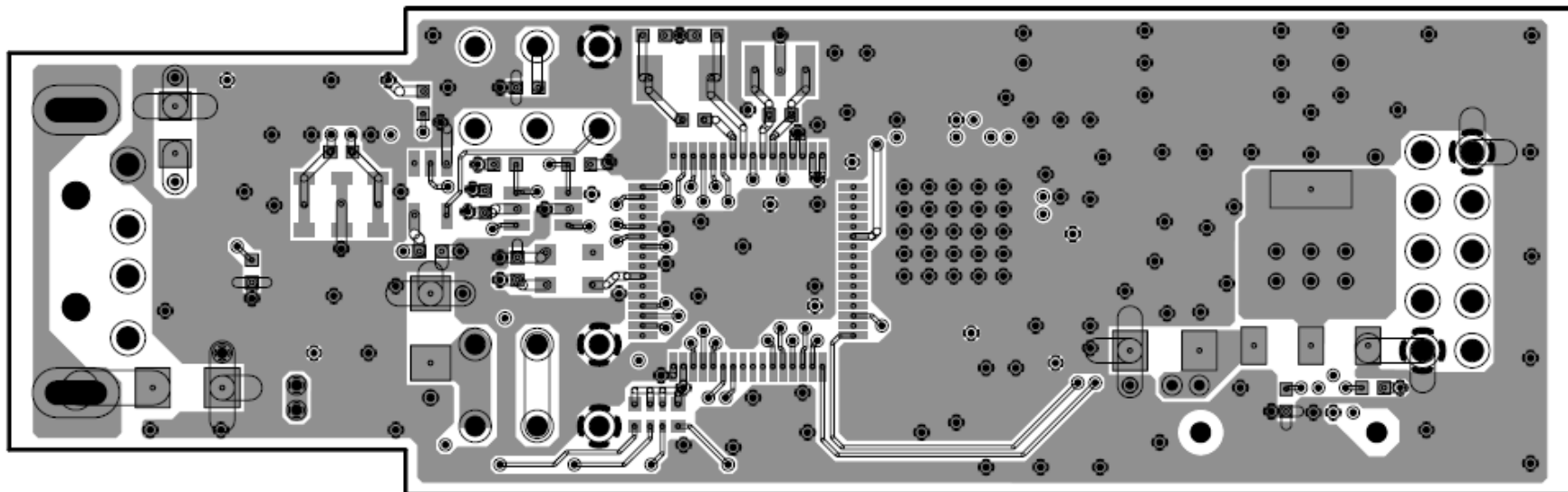
6.5.6 PCB Layout: The fourth layer



6.5.7 PCB Layout: The fifth layer



6.5.8 PCB Layout: The sixth layer



6.6 BOM List

No	Function	Name	Supplier	Quantity	Location	Note
1	Connector	SICA2P20S	TECT	0	CN1	No mount
2	Connector	DF11-10DP-2DS(24)	Hirose	1	CN2	
3	Connector	UAR10-4W5J00	Chuou Musen	1	CN3	
4	Capacitor	18pF	Size:1005	2	C1,C2	
5	Capacitor	0.1uF	Size:1005	8	C3,C4,C5,C12,C15 ,C16,C17,C18	
6	Capacitor	0.47uF	Size:1005	1	C6	
7	Capacitor	10uF Tantalum	Size:3216	2	C35,C7	
8	Capacitor	EMK316BJ106KL	Taiyoyuden	1	C8	
9	Capacitor	GRM319B31C475K	Murata	2	C11,C9	
10	Capacitor	0.033uF	Murata	1	C10	
11	Capacitor	GRM31BR73A472KW01L	Size:3216	1	C13	
12	Capacitor	27pF	Size:1005	2	C19,C21	
13	Capacitor	47pF	Size:1005	4	C20,C23,C27,C33	
14	Capacitor	0.01uF	Size:1005	4	C22,C24,C26,C34	
15	Capacitor	180pF	Size:1005	1	C25	
16	Capacitor	10pF	Size:1005	1	C28	
17	Capacitor	0.5pF	Size:1005	3	C29,C31,C32	
18	Capacitor	None	Size:1005	0	C30	No mount
19	Antenna	3030A6111-01	gigaAnt	1	E1	
20	LED	PG1111C	STANLY	1	LED1	
21	LED	AA1111C	STANLY	3	LED2,LED3,LED4	
22	Inductor	BLM41PG750S	Murata	1	L1	
23	Inductor	LQW15AN5N1D00D	Murata	2	L2,L4	
24	Inductor	MLK1005S1N0S	TDK	1	L3	
25	Inductor	LQW15AN9N1J00D	Murata	1	L5	
26	Resistor	CN1E4KT 331J	KOA	1	RN1	
27	Resistor	1M Ω	Size:1005	3	R1,R5,R12	
28	Resistor	100 Ω	Size:1005	1	R2	

29	Resistor	10K Ω	Size:1005	7	R3,R4,R6,R8,R9,R13,R14	
30	Resistor	27 Ω ,1%	Size:1005	2	R7,R10	
31	Resistor	1.5K Ω ,1%	Size:1005	1	R11	
32	Resistor	470 Ω	Size:1005	1	R15	
33	Resistor	None	:1005	0	R16	No mount
34	Resistor	4.7K Ω	Size:1005	1	R17	
35	Switch	SSSS222700	ALPS	2	SW2,SW1	
36	IC	S-8120CNB	SII	1	U1	
37	IC	UPD78F0537DGA	NEC	1	U2	
38	IC	LM1117MPX-3.3	NS	1	U3	
39	IC	SN74LVC2G07DCK	TI	1	U4	
40	IC	FT232BL	FTDI	1	U5	
41	IC	SN74LVC1G14DCK	TI	1	U6	
42	IC	UZ2400	UBEC	1	U7	
43	Crystal	CSTCE16M0V53	Murata	1	Y1	
44	Crystal	FC-135(32.768KHz)	Seiko Epson	1	Y2	
45	Crystal	CSTCR6M00G15	Murata	1	Y3	
46	Crystal	FL2000006T 20MHz	ECERA	1	Y4	+/-10ppm
47	Capacitor	GRM21BB31A106K	Murata	1	C14	

7 Revision History

Revision	Contents	Date
Rev. 1.0	Initial Version	December 1, 2006
Rev. 2.0	maker name change	June 13, 2008