User's Manual

78K0R UZ Stick

ZigBee™-ready

Wireless Network Evaluation Module

Using the 78K0R/KE3 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.

Contents

1 Introduction

78K0R UZ Stick is an evaluation kit for wireless personal area network using 78K0R/KE3 8-bit MCU and UZ2400 RF chip by Uniband Electronic Corporation.

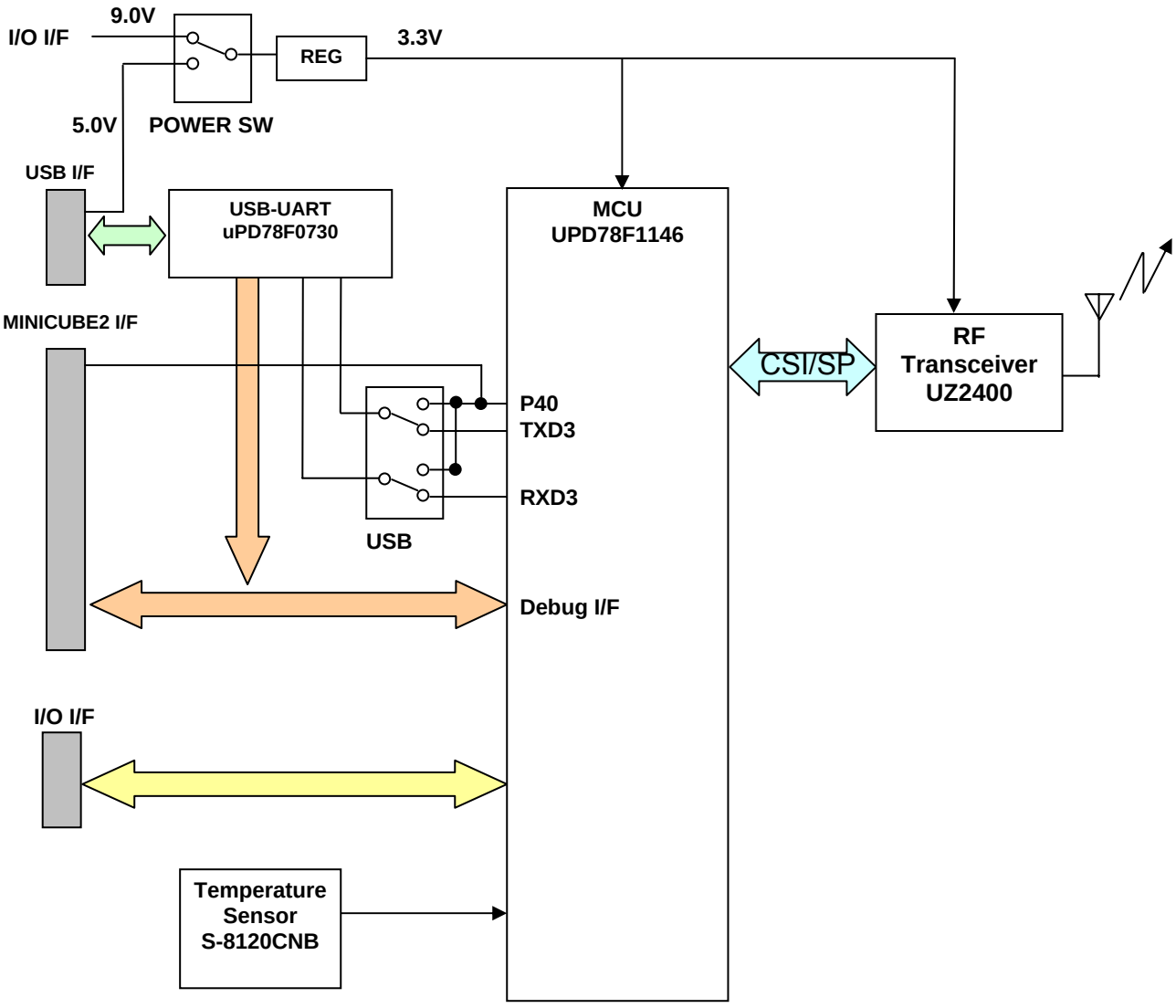
1.1 Features

- Hardware is ready to accommodate IEEE 802.15.4/ZigBee compliant wireless personal area network with 16bit single chip MCU 78K0R/KE3, μPD78F1146, 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.
- 256Kbytes of Flash EEPROM, available on chip in the 78K0R/KE3 MCU, is programmable from PC via USB connection without any additional Flash programming hardware.
- Enable to connect On-Chip Debug Emulator MINICUBE2 (you need the conversion connector "SICA16I2P"）
- 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	μPD78F1146
Clock	20MHz main, and 32.768KHz sub
RF transceiver	UZ2400
Interfaces	USB connector (Type A) Expansion interface(CN2) MINICUBE2 connector (CN1)
Power supply	5.0V by USB, or 4.75 - 10.0V by a battery

1.3 Block Diagram



2 Interface Connection

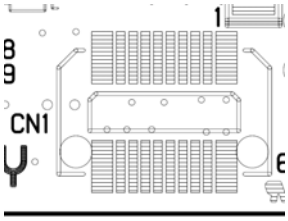
2.1 CN1

This is the pin list for MINICUBE2 connector (CN1).

You need to use the conversion connector "SICA16I2P" when you use "MINICUBE2".

CN1: Tokyo Eletech SICA2P20S

CN1	Name	Connection to MCU	Notes
1	GND	GND	
2	RESET_OUT	RESET	
3	RXD	P40/TOOL0	
4	VDD	VDD	
5	TXD	P40/TOOL0	
6	N.C.	N.C.	
7	N.C.	N.C.	
8	N.C.	N.C.	
9	N.C.	N.C.	
10	N.C.	N.C.	
11	N.C.	N.C.	
12	N.C.	N.C.	
13	N.C.	N.C.	
14	FLMD0	FLMD0	
15	RESET_IN	N.C.	Reset trigger signal
16	CLK_IN	P41/TOOL1	
17	N.C.	N.C.	
18	N.C.	N.C.	
19	N.C.	N.C.	
20	N.C.	N.C.	



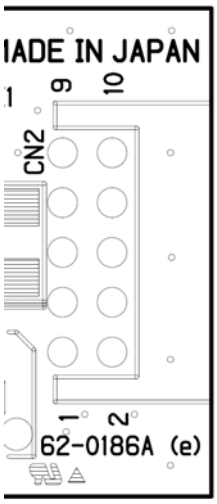
Location of CN1 : TOP VIEW

2.2 CN2

Expansion Interface: CN2

CN2: Hirose DF11-10DP-2DS

CN2	Name	Connection to MCU	Notes
1	GND	GND	
2	VBAT	N.C.	From battery
3	P12	P12/SO00/TxD0	
4	P11	P11/SI00/RxD0	
5	P141	P141/PCLBUZ1/INTP7	
6	P10	P10/SCK00	
7	P25	P25/ANI5	
8	P23	P23/ANI3	
9	P24	P24/ANI4	
10	GND	GND	



Location of CN2: TOP VIEW

3 Switches and LEDs

3.1 SW1: POWER

Selection of power source: USB power or battery (CN2)

Setting of SW1 (Power supply select)

USB Power	USB
CN2: Expansion I/F	BAT

SW1: TOP VIEW

3.2 SW2: USB

The switch for selecting the USB I/F use. : Debug or General Serial Communication

When it is set to "SER", it enables serial communication using UART3.

Connect 78K0R UZ Stick to the USB I/F after switch setting.

Setting of SW2 (USB I/F setting)

Normal mode (MINICUBE2 use)	SER
Debug mode (USB use)	DBG

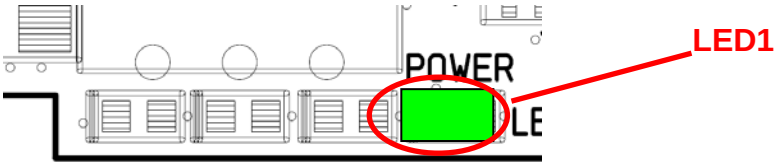
SW2: TOP VIEW

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



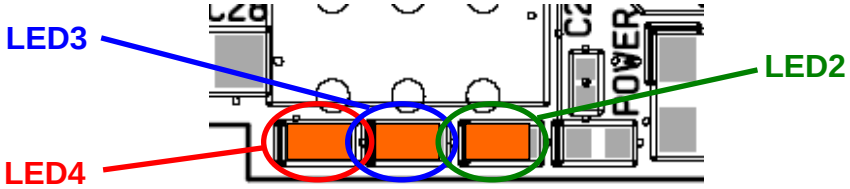
LED1 layout(TOP VIEW)

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 P40 of the MCU low, respectively.

LED2, LED3, and LED4

	Name	MCU PIN	Port Level
LED2	P62	P62	LOW for orange HIGH for off
LED3	P61	P61/SDA0	LOW for orange HIGH for off
LED4	P60	P60/SCL0	LOW for orange HIGH for off



LED2, LED3, and LED4: TOP VIEW

4 Power Source

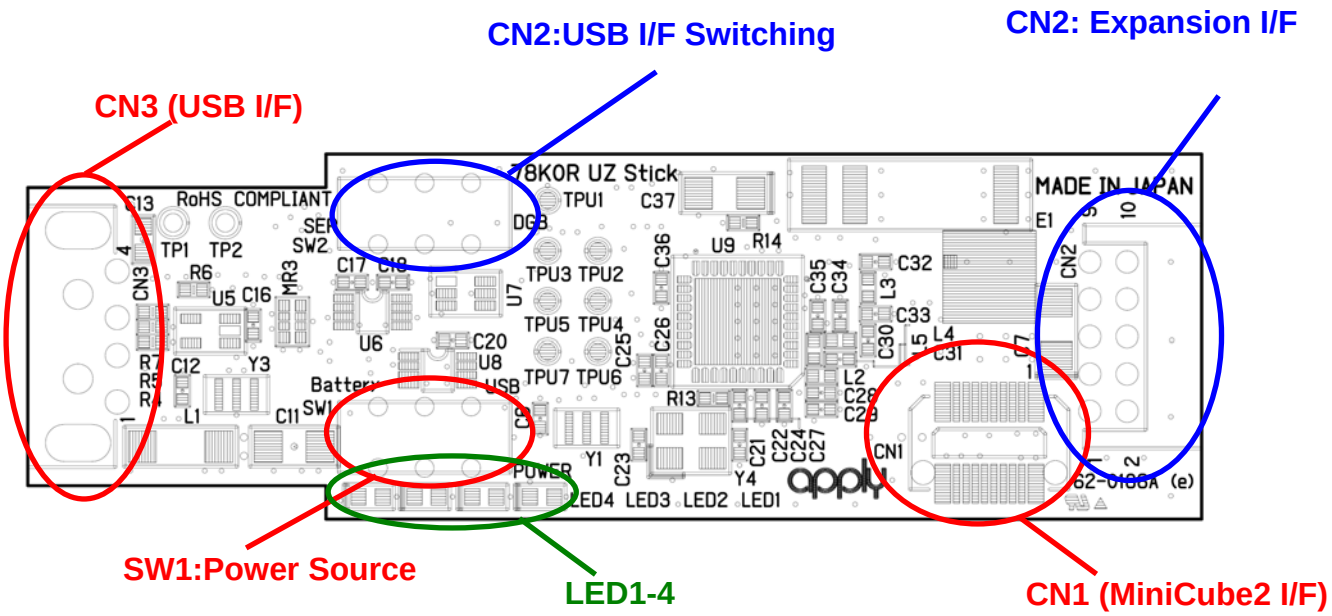
This module is equipped with a voltage regulator, which regulates the source of 4.75 -10.0 V to 3.3V. The power source can be selected by SW1 between USB power or a battery power through CN2.

5 Power Consumption

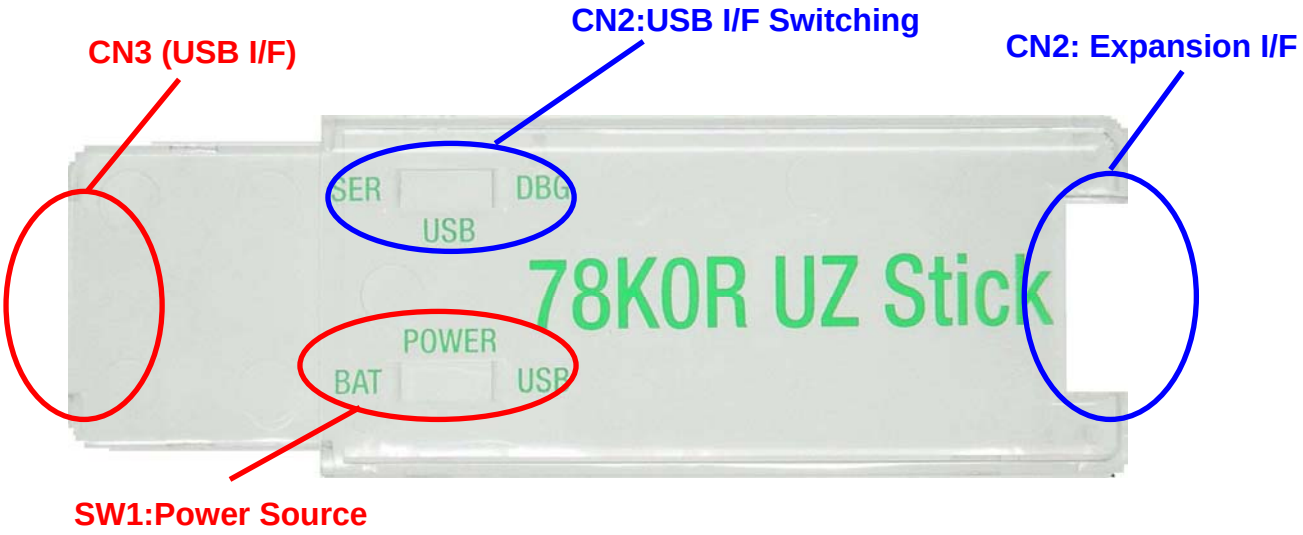
The power consumption of the module largely depends on the status of the PHY driver of the USB I/F. One example of measured consumed current is, 40 mA in case USB I/F is not connected

6 Design Data

6.1 Parts Layout

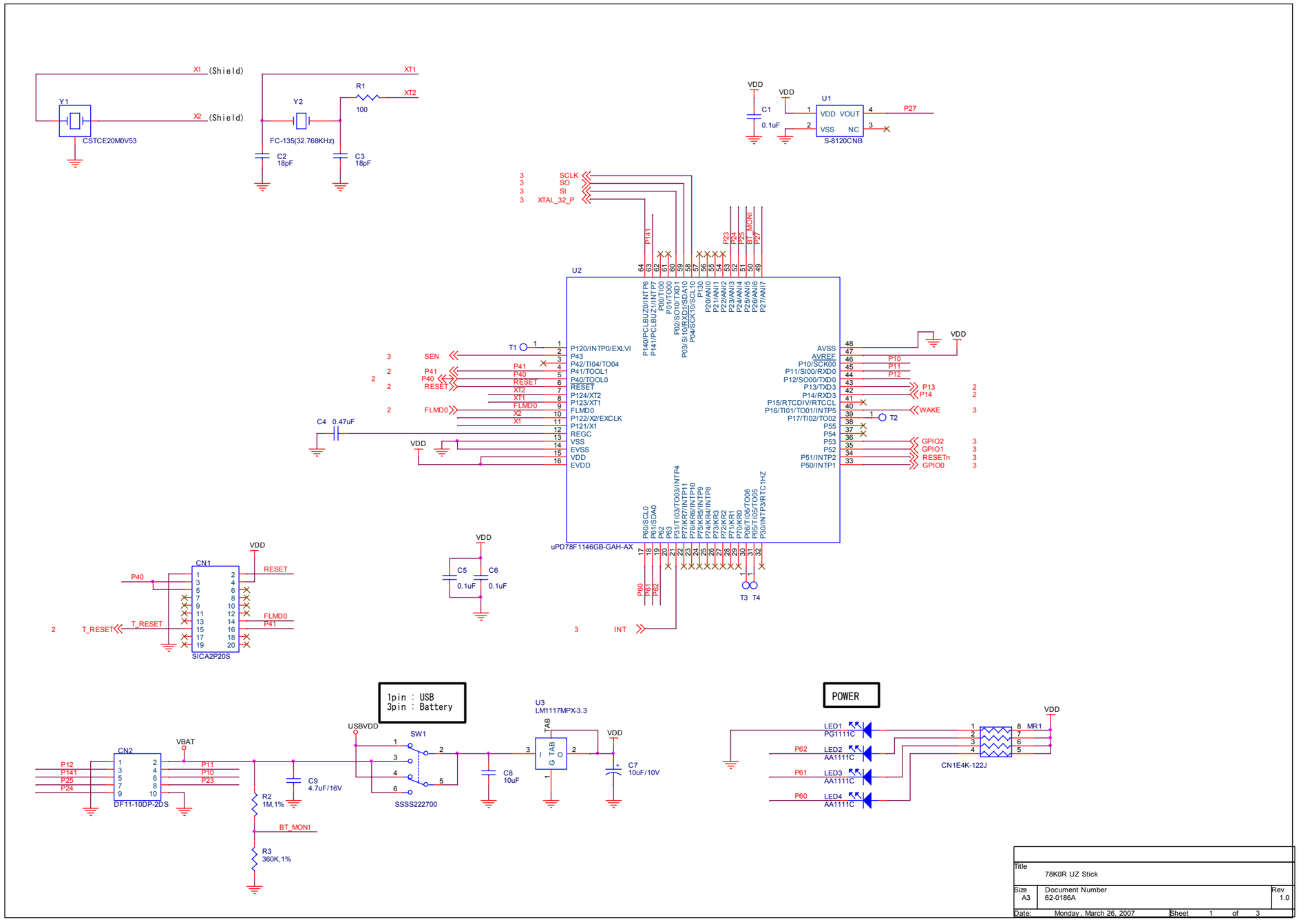


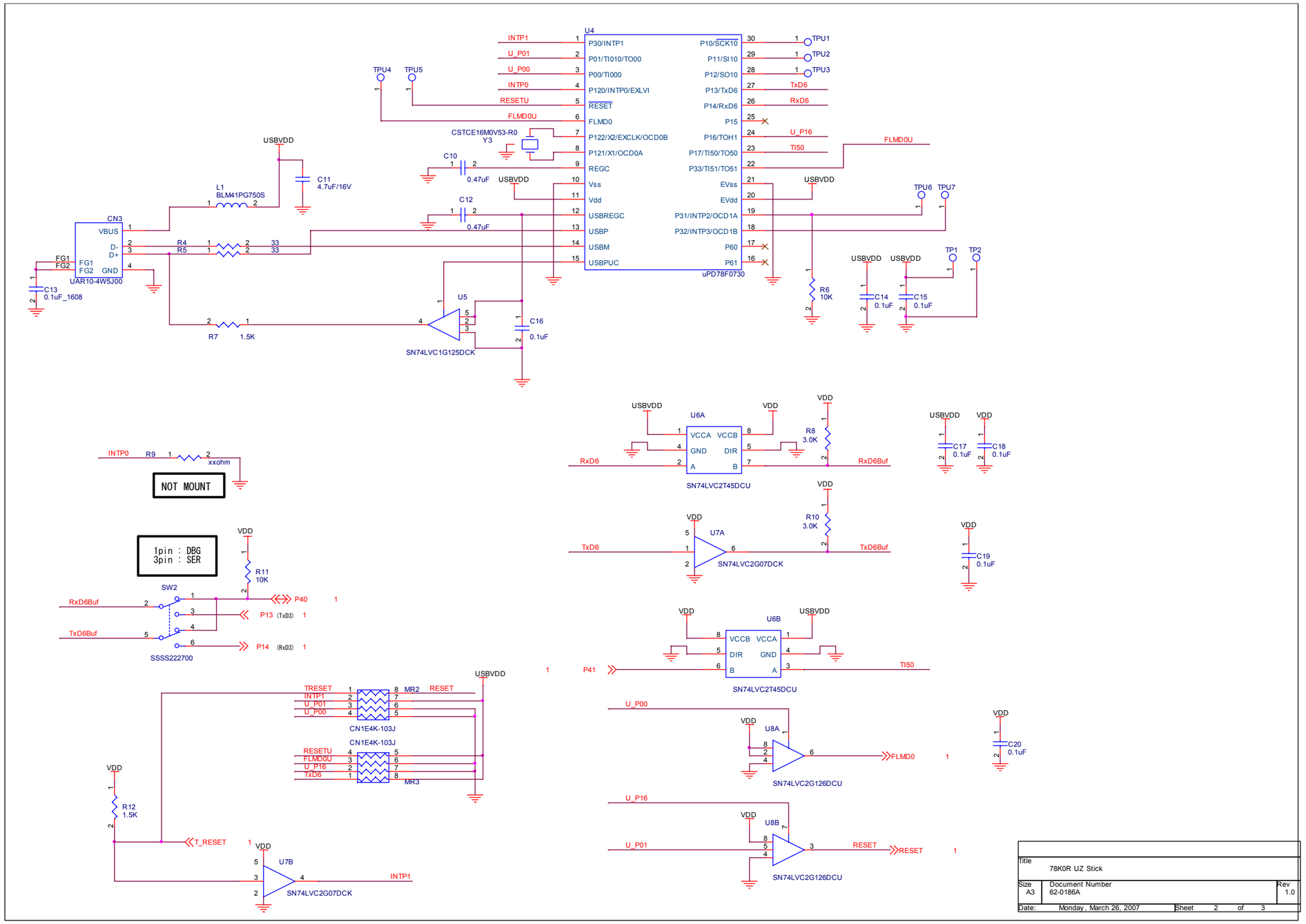
TOP VIEW



TOP VIEW

6.2 Circuit Schematics




U4
INTP1
U_P01
U_P00
INTP0
RESETU
FLMD0U
P30/INTP1
P01/TI010/TO00
P00/TI000
P120/INTP0/EXLVI
RESET
FLMD0
P122/X2/EXCLK/OCD0B
P121/X1/OCD0A
REGC
Vss
Vdd
USBREGC
USBP
USBM
USBPUC
P10/SCK10
P11/SI10
P12/SO10
P13/TxD6
P14/RxD6
P15
P16/TOH1
P17/TI50/TO50
P33/TI51/TO51
EVss
EVdd
P31/INTP2/OCD1A
P32/INTP3/OCD1B
P60
P61
uPD78F0730
TPU1
TPU2
TPU3
TxD6
RxD6
U_P16
TI50
FLMD0U
TPU4
TPU5
TPU6
TPU7
TP1
TP2
CSTCE16M0V53-R0
Y3
C10
0.47uF
C11
4.7uF/16V
C12
0.47uF
C13
0.1uF_1608
C14
0.1uF
C15
0.1uF
C16
0.1uF
L1
BLM41PG750S
USBVDD
CN3
VBUS
D-
D+
FG1
FG2
GND
UAR10-4W5J00
R4
R5
33
R6
10K
R7
1.5K
U5
SN74LVC1G125DCK
INTP0
R9
xxohm
NOT MOUNT
1pin : DBG
3pin : SER
R11
10K
SW2
P40
P13 (TxD3)
P14 (RxD3)
SSSS222700
TRESET
INTP1
U_P01
U_P00
RESETU
FLMD0U
U_P16
TxD6
MR2
MR3
RESET
CN1E4K-103J
R12
1.5K
T_RESET
U7B
SN74LVC2G07DCK
VDD
U6A
VCCA
VCCB
GND
DIR
A
B
SN74LVC2T45DCU
R8
3.0K
RxD6Buf
C17
0.1uF
C18
0.1uF
U7A
R10
3.0K
TxD6Buf
C19
0.1uF
U6B
P41
U8A
FLMD0
SN74LVC2G126DCU
C20
0.1uF
U8B
RESET
Title
78K0R UZ Stick
Size
A3
Document Number
62-0186A
Rev
1.0
Date:
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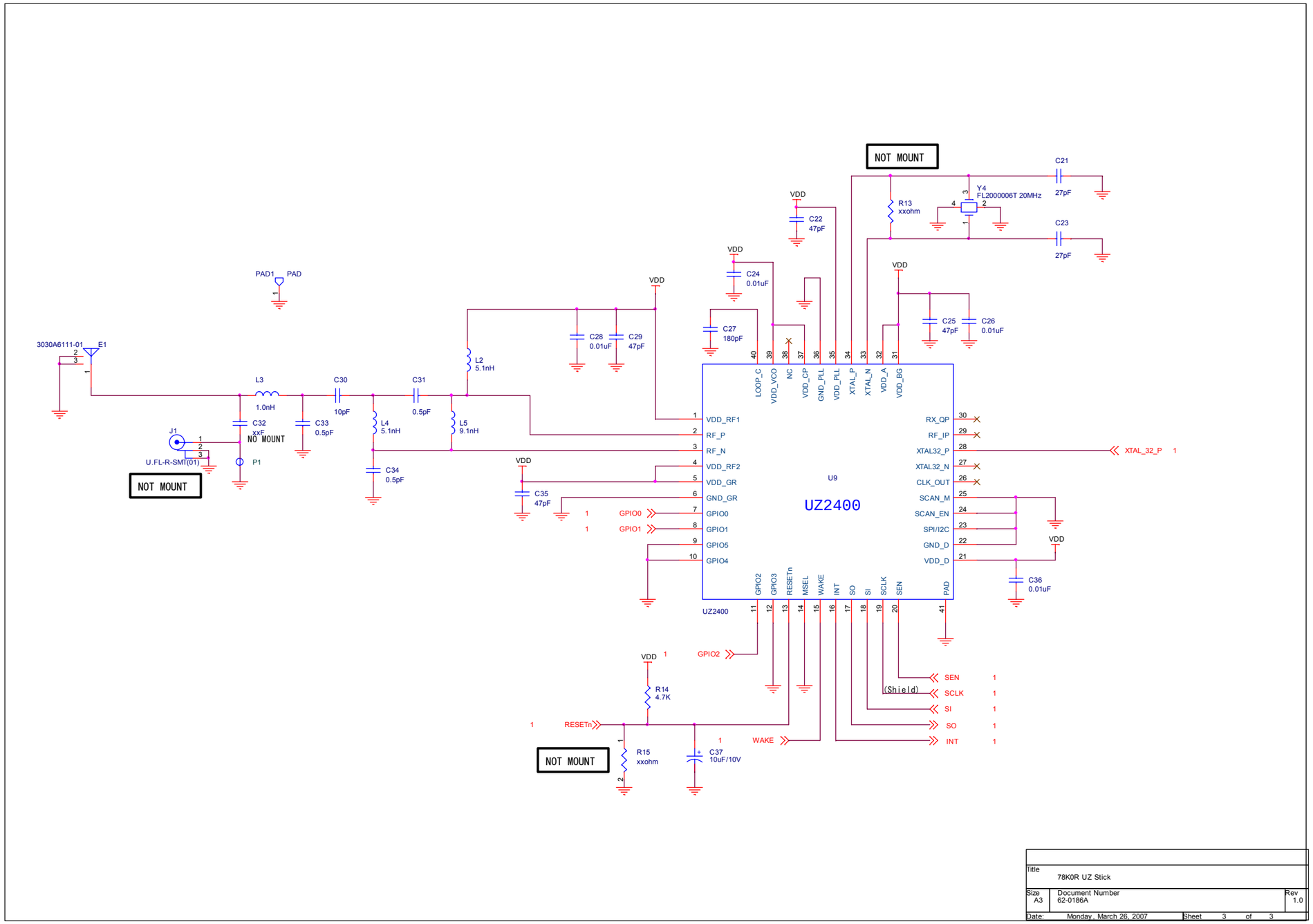
3



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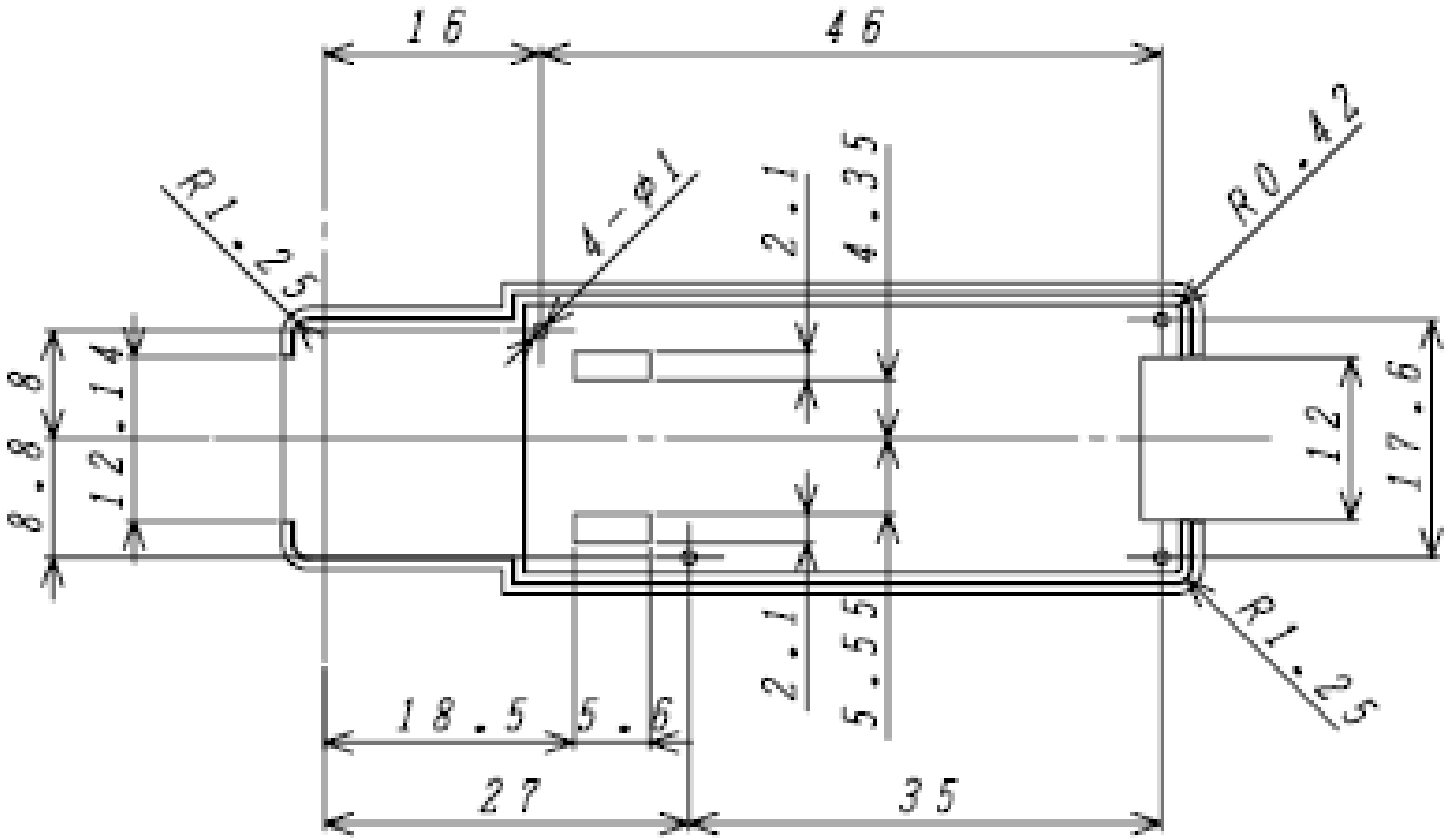
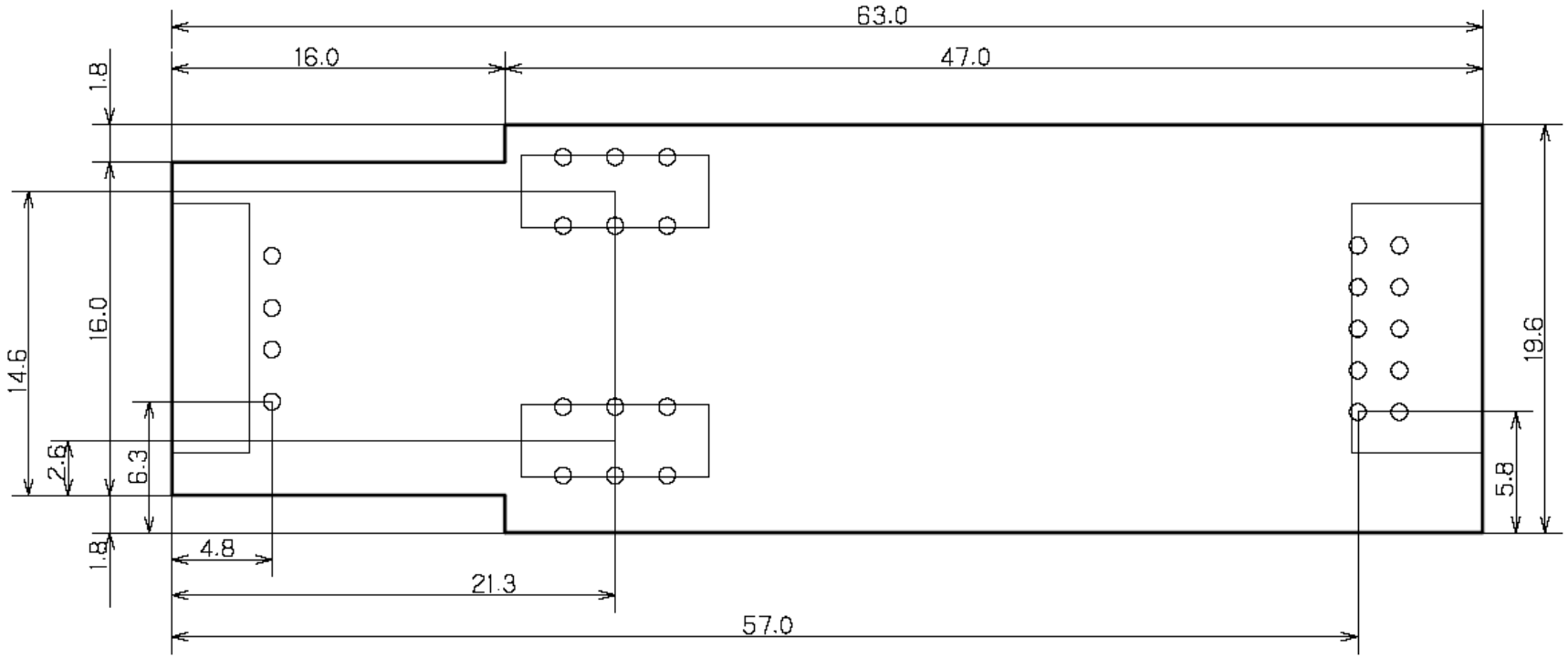
Date: Monday, March 26, 2007		Sheet 3 of 3	

6.3 Body Dimensions

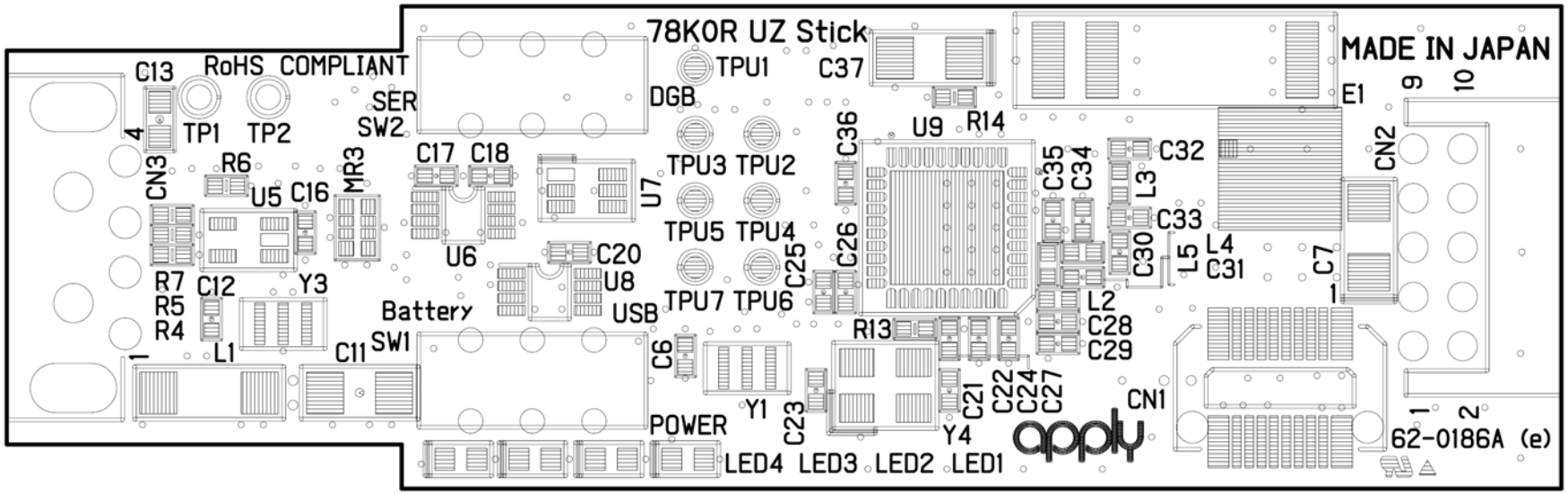


6.4 Board Dimensions

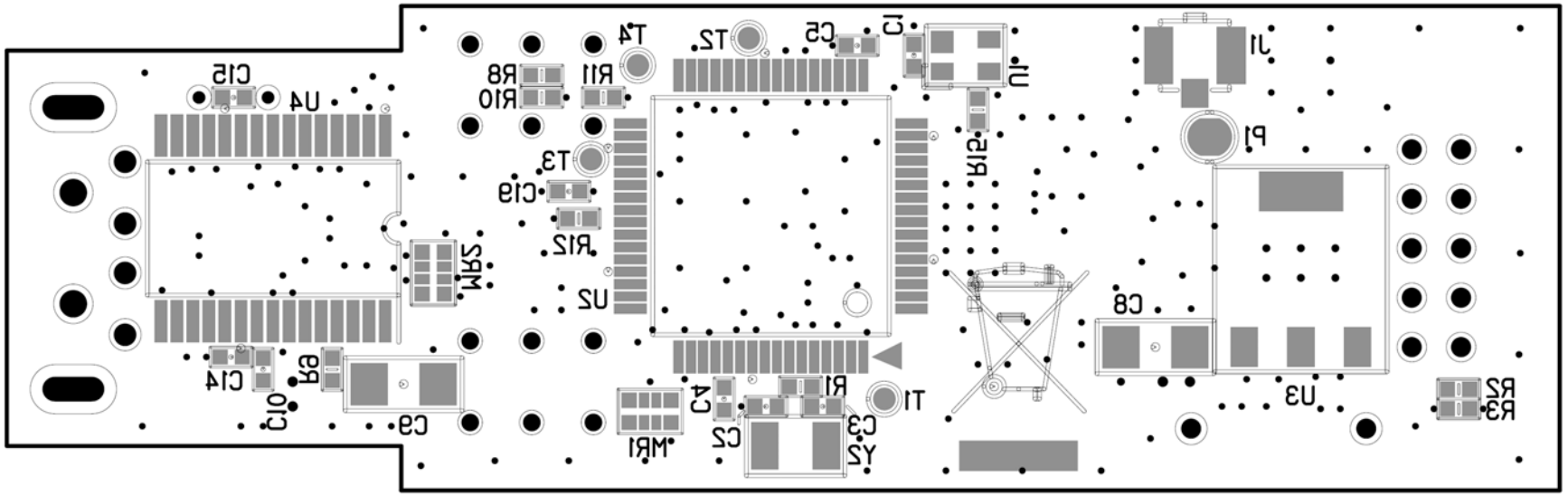


6.5 PCB Layout

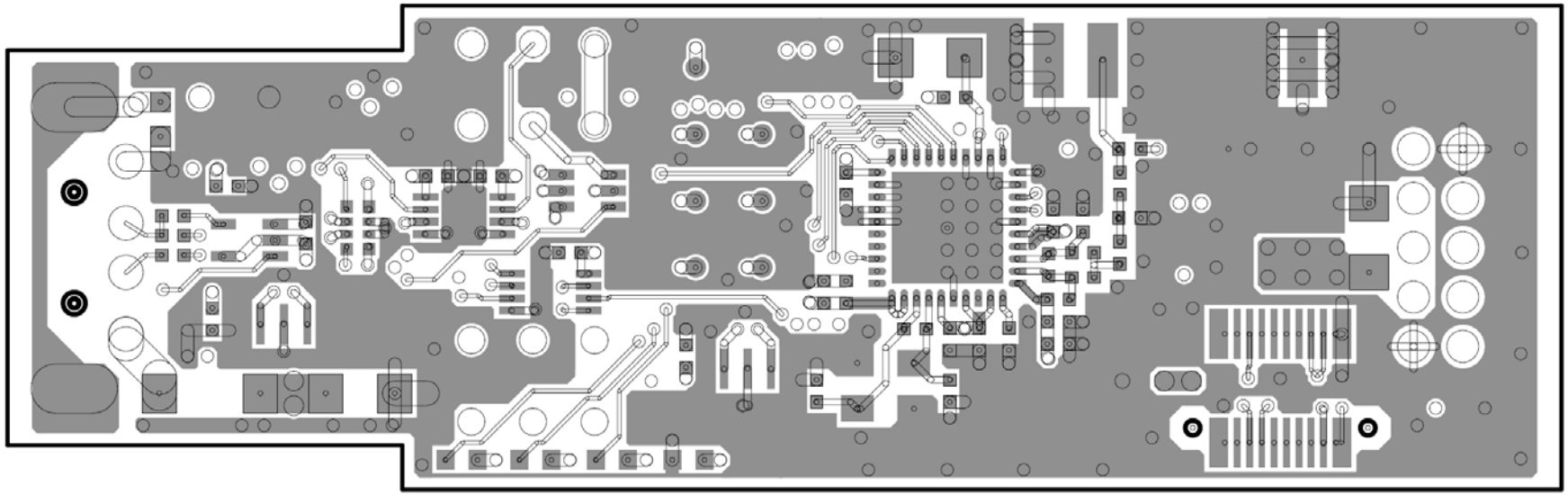
6.5.1 Silk of the top side



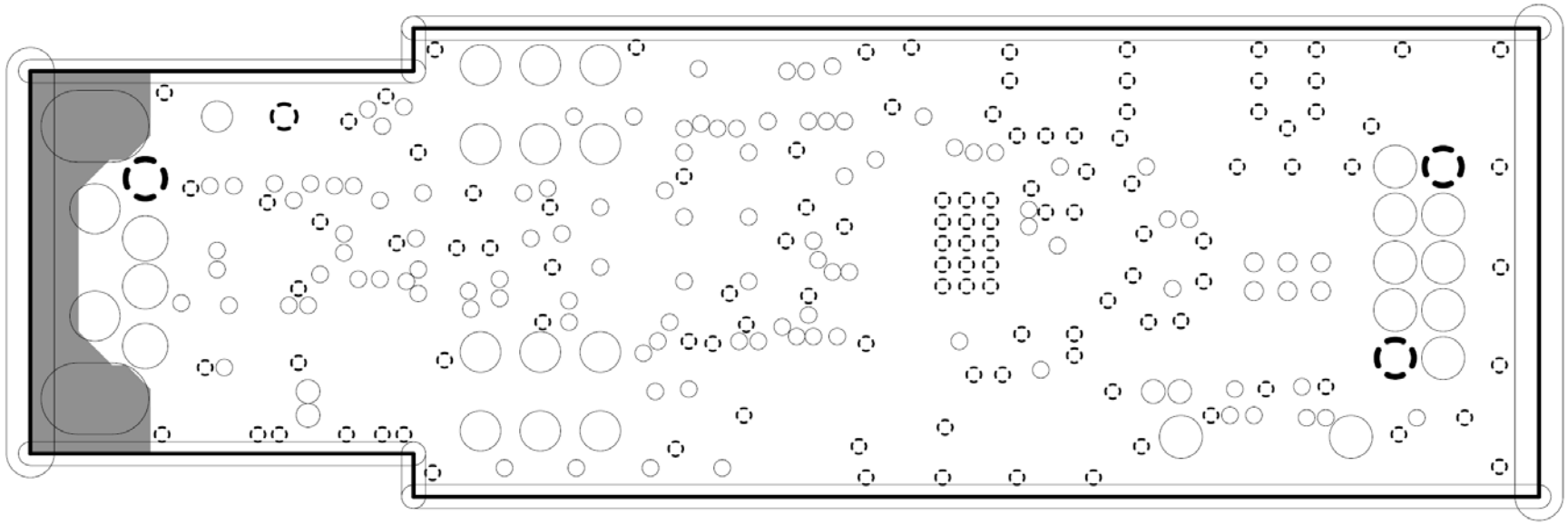
6.5.2 Silk of the bottom side



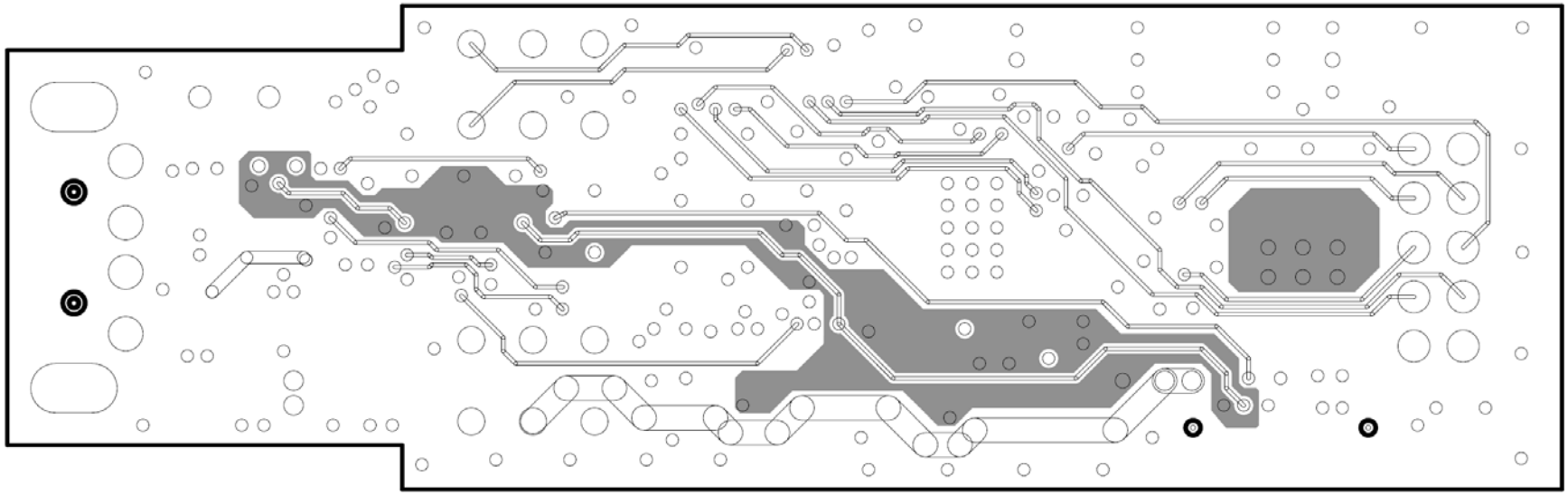
6.5.3 PCB Layout: The first layer



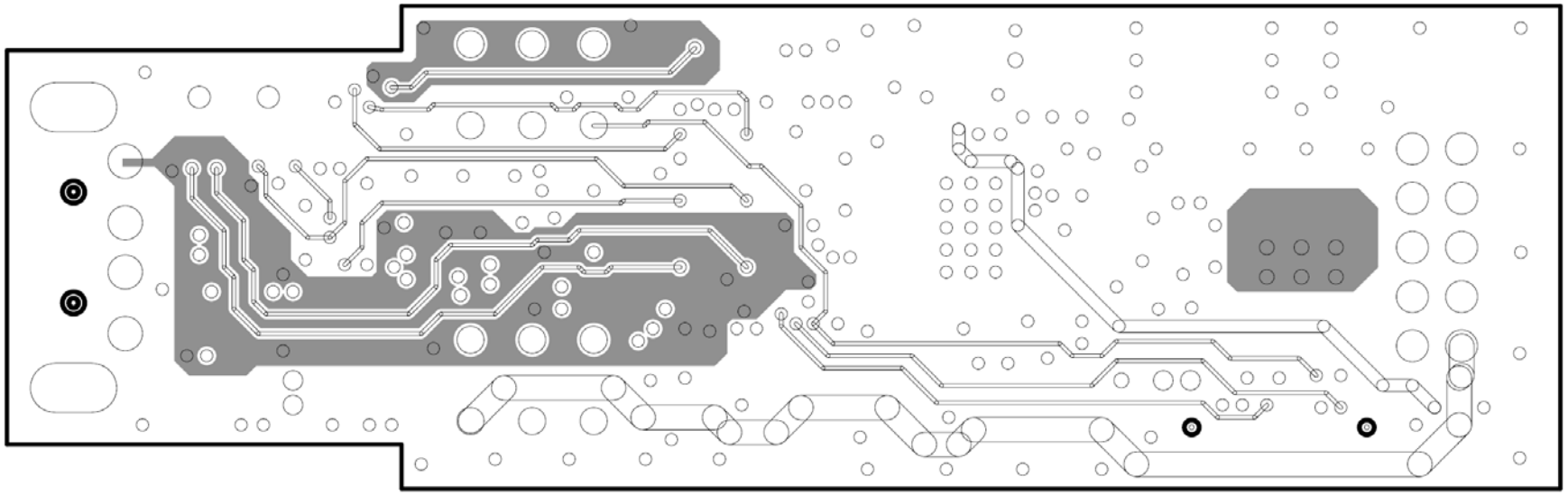
6.5.4 PCB Layout: The second layer



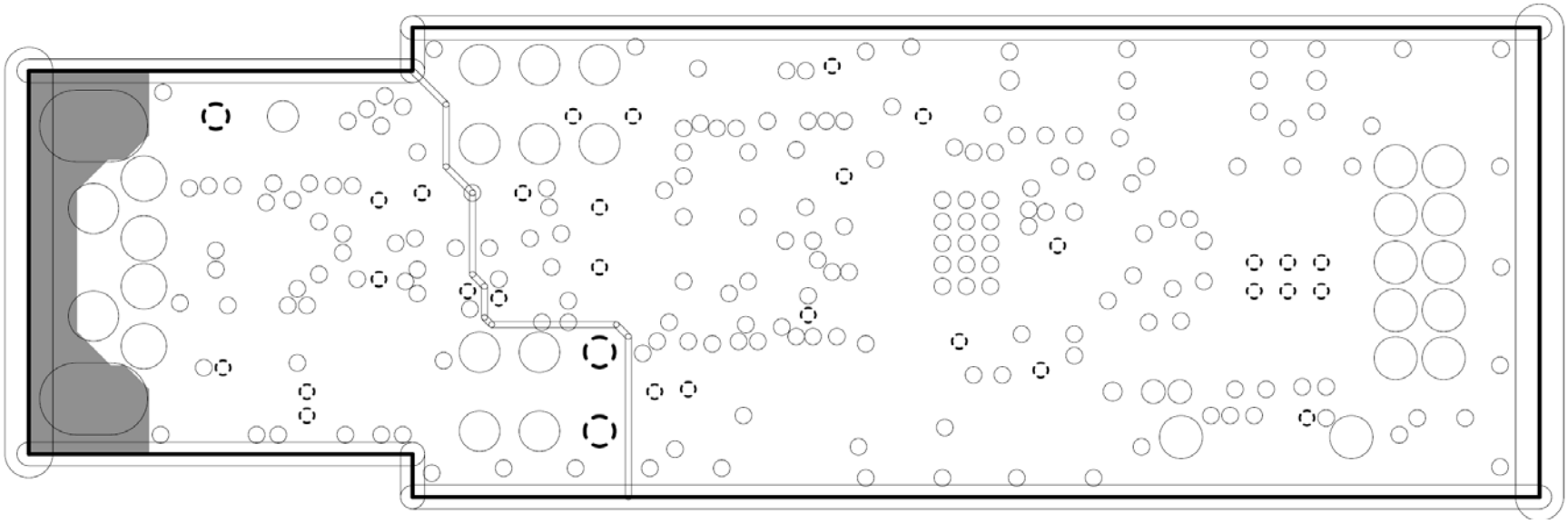
6.5.5 PCB Layout: The third layer



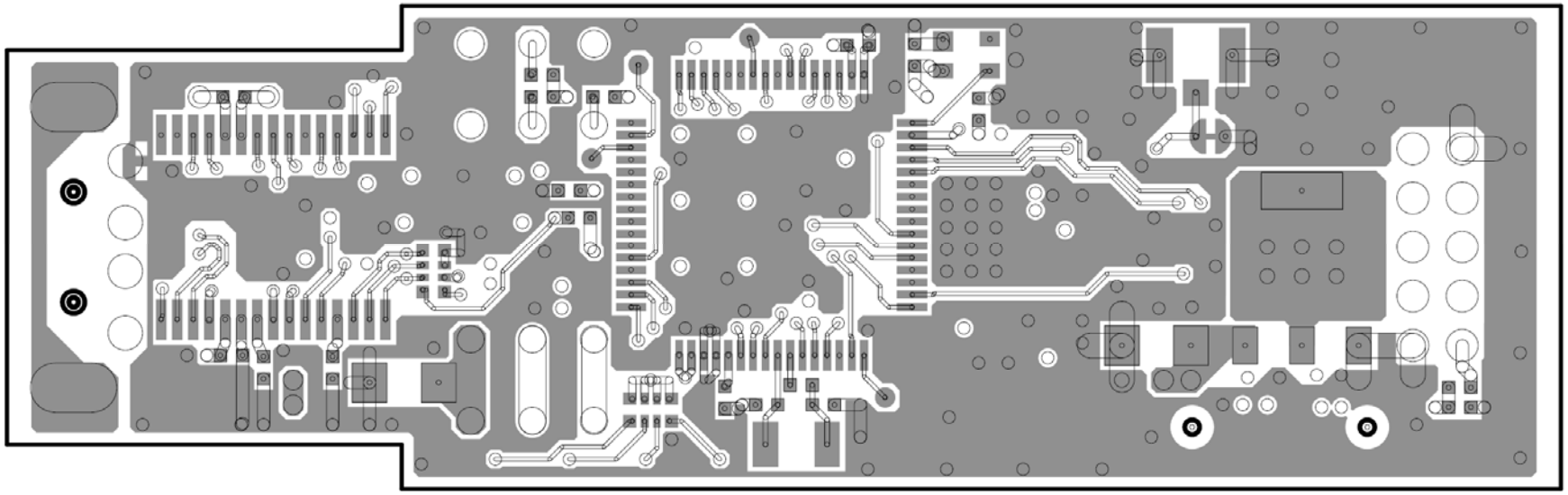
6.5.6 PCB Layout: The fourth layer



6.5.7 PCB Layout: The fifth layer



6.5.8 PCB Layout: The sixth layer



6.6 BOM List

No	Quantity	Location	Function	Name	Supplier	Note
1	1	CN1	Connecter	SICA2P20S	TET	
2	1	CN2	Connecter	DF11-10DP-2DS(24)	Hirose	
3	1	CN3	Connecter	UAR10-4W5J00	TECHNICAL ELECTRON	
4	10	C1,C5,C6,C14,C15,C16, C17, C18,C19,C20	Size:1005	0.1uF		
5	2	C2,C3	Size:1005	18pF		
6	3	C4,C10,C12	Size:1005	0.47uF		
7	2	C37,C7	Size:3216	10uF/10V		Tantalum
8	1	C8	Size:3216	10uF		
9	2	C11,C9	Size:3216	4.7uF/16V		
10	1	C13	Size:1608	0.1uF_1608		
11	2	C21,C23	Size:1005	27pF		
12	4	C22,C25,C29,C35	Size:1005	47pF		
13	4	C24,C26,C28,C36	Size:1005	0.01uF		
14	1	C27	Size:1005	180pF		
15	1	C30	Size:1005	10pF		
16	3	C31,C33,C34	Size:1005	0.5pF		
17	0	C32	Size:1005	xxF		**Not Mount**
18	1	E1	Antenna	3030A6111-01	gigaAnt	
19	0	J1	Connecter	U.FL-R-SMT(01)	Hirose	**Not Mount**
20	1	LED1	LED	PG1111C	Stanley	
21	3	LED2,LED3,LED4	LED	AA1111C	Stanley	
22	1	L1	L	BLM41PG750S	Murata	
23	2	L4,L2	Inductor	LQW15AN5N1D00D	Murata	

24	1	L3	Inductor	MLK1005S1N0S	TDK	
25	1	L5	Inductor	LQW15AN9N1J00D	Murata	
26	1	MR1	Module resister	CN1E4K-471J	KOA	
27	2	MR2,MR3	Module resister	CN1E4K-103J	KOA	
28	0	P1	Short Pad	SS		**Not Mount**
29	1	R1	Size:1005	100		
30	1	R2	Size:1005	1M,1%		
31	1	R3	Size:1005	360K,1%		
32	2	R5,R4	Size:1005	33		
33	2	R6,R11	Size:1005	10K		
34	2	R7,R12	Size:1005	1.5K		
35	2	R10,R8	Size:1005	3.0K		
36	0	R9,R13,R15	Size:1005	xxohm		**Not Mount**
37	1	R14	Size:1005	4.7K		
38	2	SW2,SW1	Switch	SSSS222700	ALPS	
39	0	TPU1,T1,TPU2,T2,TPU3,T3,TPU4,T4,TPU5,TPU6,TPU7TP1,TP2	Test Pad	TPU		**Not Mount**
40	0	PAD1	Test Pad	PAD		**Not Mount**
41	1	U1	Temp Sensor	S-8120CNB	Seiko	
42	1	U2	CPU	uPD78F1146GB-GAH-AX	NECEL	
43	1	U3	Regulator	LM1117MPX-3.3	NS	
44	1	U4	CPU	uPD78F0730	NECEL	
45	1	U5	IC	SN74LVC1G125DCK	TI	
46	1	U6	IC	SN74LVC2T45DCU	TI	
47	1	U7	IC	SN74LVC2G07DCK	TI	
48	1	U8	IC	SN74LVC2G126DCU	TI	
49	1	U9	IC	UZ2400	UBEC	

50	1	Y1	Ceramic	CSTCE20M0V53	Murata	
51	1	Y2	Resonator	FC-135(32.768KHz)	Epson	
52	1	Y3	Ceramic	CSTCE16M0V53-R0	Murata	
53	1	Y4	Resonator	FL2000006T 20MHz	ECERA	

7 Revision History

Revision	Contents	Date
Rev. 1.0	Initial Version	April 7, 2007
Rev. 2.0		March 31, 2008
Rev. 3.0	Maker change	June 20, 2008