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User's Manual

adStar-L STK

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Revision History

Date	Description
15. 6.14.	– Ver 1.0 Initial Release
15.11.17	– Ver 1.1 Board Revision

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4. Component Summary

5. Schematic

This document is...

This document is a manual about the development kit usage guidance that is using, 32 bits Microcontroller of ADChips Corp., adStar (AE32000C-Lucida) chip. The adStar-L STK(Starter Kit) is a development kit for a LCD Display.

The manual provides various applications to user to develop and test hardware through detail descriptions about each hardware block of the adStar-L STK.

It is better to have thorough knowledge of contents of this manual for newly user and experts even they already have used similar application system with adStar-L.

01. BOARD

1-1 Introduction

The adStar-L STK is a graphic interface development kit for an embedded system that is using ADChips Corp.'s 32bits Microcontroller, adStar-L.
The adStar-L STK minimizes hardware supplement to user, since it provides various application blocks for the graphic user interface development. Moreover, it provides 2.54mm Pitch board hole that enables direct test about a user's hardware on a board without additional universal board. As a result, adStar-L STK provides convenience for hardware development and test.

1-2 Board Specifications

- **CPU : adStar-L**
  - High-performance, Low-power 32-bit EISC Microprocessor
  - AE32000C-Lucida
    - ✓ 8KB 2-way Instruction Cache
    - ✓ 8KB 2-way Data Cache
    - ✓ Serial Wire Debugger
  - Embedded Memory
    - ✓ 2Kbytes Internal SRAM for Instruction
    - ✓ 1Kbytes Internal SRAM for Data
    - ✓ 8/16Mbytes SDRAM
    - ✓ Optional 512Kbytes Flash
  - External Memory Interface
    - ✓ 8-bit NAND Flash Interface supports SLC and MLC (4/24-bit ECC) type
  - Boot Modes
    - ✓ NAND Flash Booting
    - ✓ Serial Flash Booting
  - SD-Card Interface

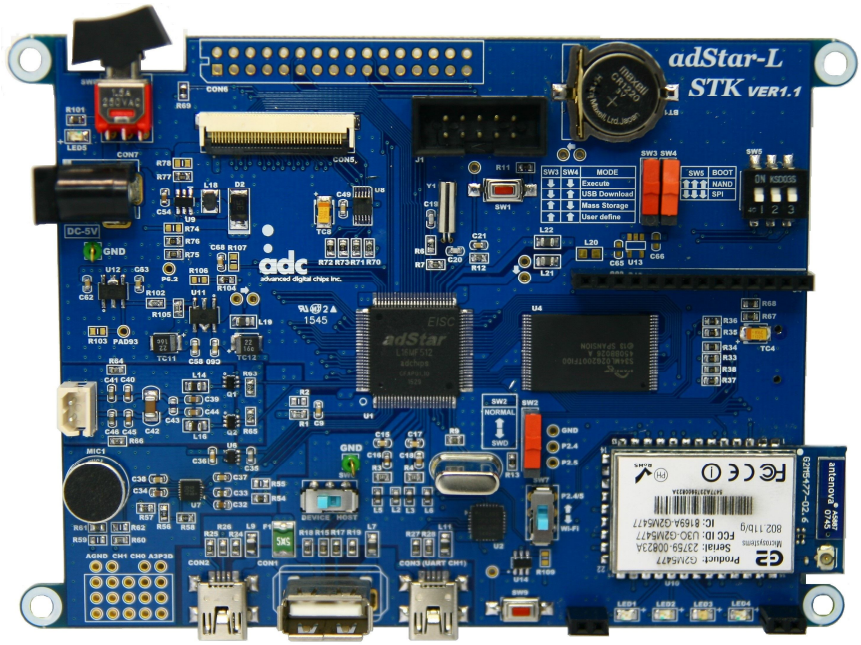
- SWD Interface
  - ✓ Extensive On-chip Debug Support
  - ✓ Programming of Serial Flash, other Ram
- LCD Controller
  - ✓ RGB 888 or 565 output
- USB 1.1 Full-Speed Device/Host Compatible
- Sound Mixer
  - ✓ 2ch Digital Modulator
- RTC
  - ✓ Support RTC counter, Support Alarm counter, Support wake-up function

■ Peripherals

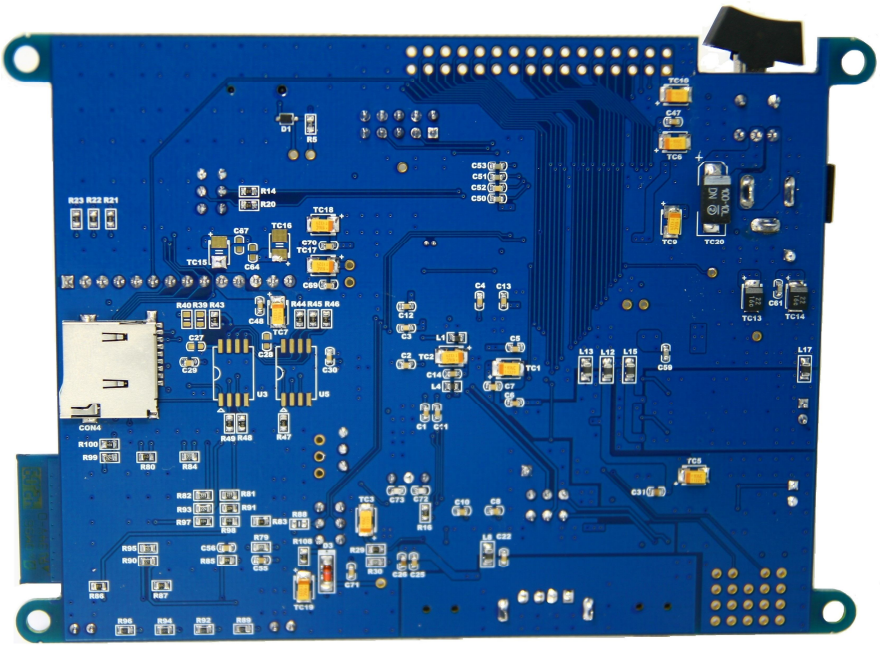
- TFT-LCD
  - ✓ RGB interface 4.3" TFT-LCD KDG043C1-TP(with Touch)
  - ✓ SPI interface 1.8" TFT-LCD JD-T18003-T01
  - ✓ Extension TFT-LCD Connector
- NAND FLASH
  - ✓ 1Gbit
- Micro SD-CARD Socket
- ADC Input
  - ✓ Microphone Input
  - ✓ Thermistor IC
  - ✓ Extension ADC input
- Audio output
- Debugging UART CH1
  - ✓ CP2102 (USB to UART Bridge)
- Wi-Fi Module
  - ✓ RN-131G
- Real-Time Clock & Back-up Battery
- PCB through hole for component test

1-3 Board Picture

1-3.1 adStar-L STK Board TOP VIEW



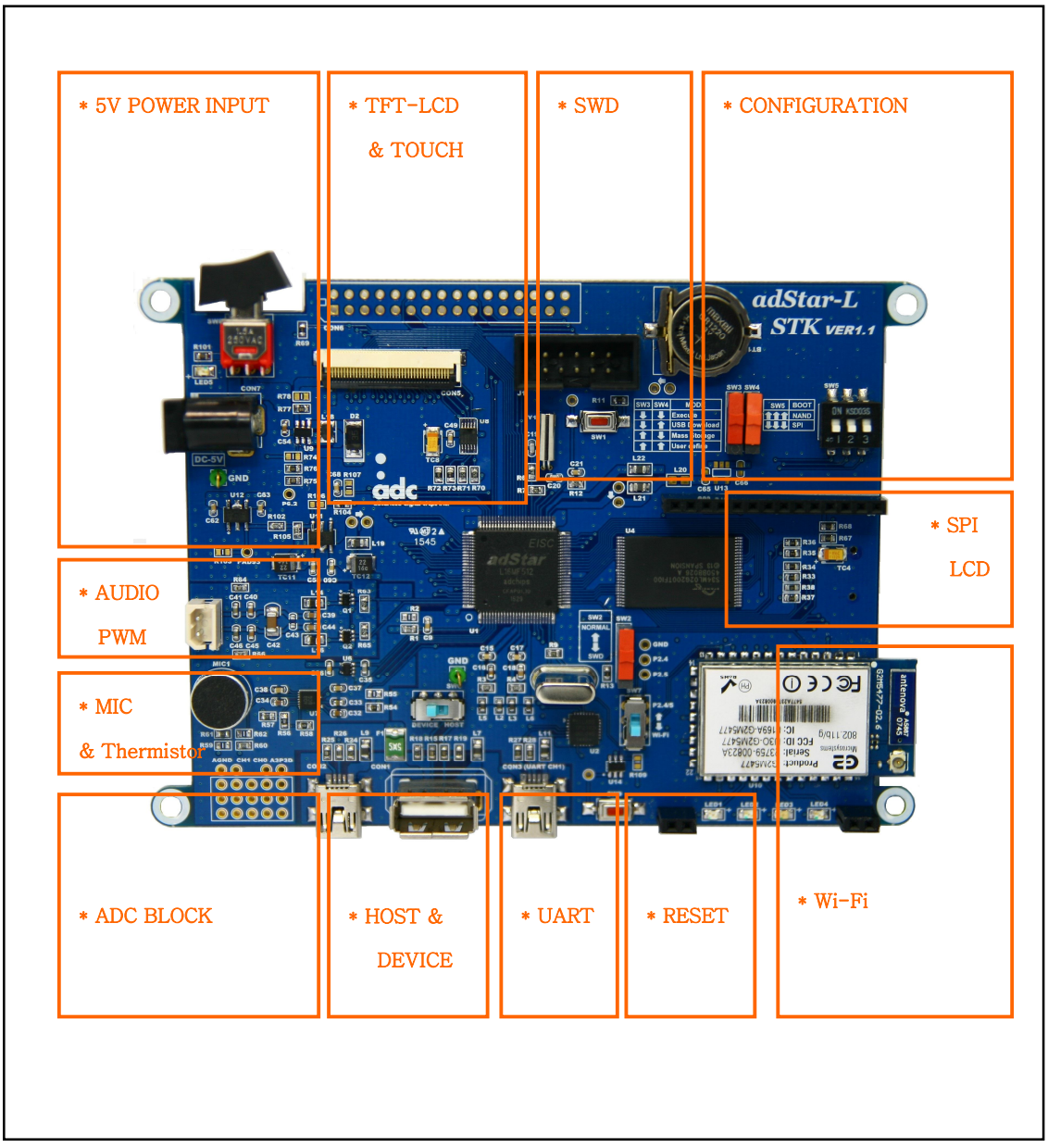
1-3.2 adStar-L STK Board BOTTOM VIEW



1-3.3 adStar-L STK with LCD

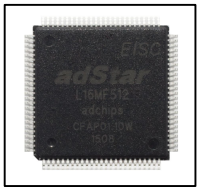
02. Organizations

2-1 Organizations



03. Block Feature

3-1 adStar-L



ADChips Corp.'s 32bits Microcontroller, adStar-L has 2KB SRAM for instructions and 1KB SRAM for data. Moreover, LCD Controller is an appropriate General MCU for graphic user interface development.

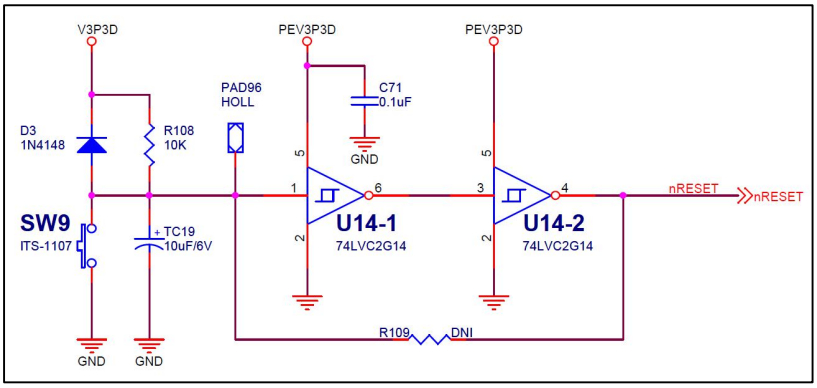
adStar-L is provided with 4 different versions according to internal SDRAM(8/16M), Flash(512K) options, and user can choose among them by application types.

For now, adStar-L STK is loaded with D16MF512 (16MB SDRAM, 512KB Flash).

Refer to Data Book about details of adStar-L.

3-2 Reset Block

There are two ways to send reset signal to the adStar-L STK system as described in the below figure. One is switch (SW9) based reset and the other is through external reset signal.



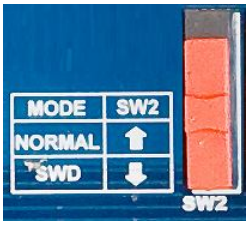
3-3 Boot Mode Block

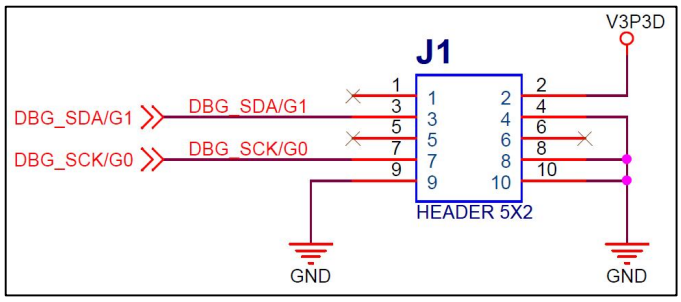
adStar-L has the Debugger Boot Mode for debugging and the Normal Boot Mode through 2 different memory types. For now, adStar-L STK is implemented as internal SPI Flash Boot Mode

User can choose between the Debugger Boot Mode and the Normal Boot Mode (SPI Flash Boot Mode, NAND Flash Auto Boot Mode) with SW3.

3-3-1 Serial Wide Debugger Boot Block

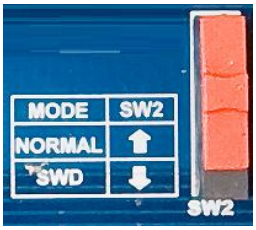
The SWD mode of adStar-L entry is done by SW2. J1 is a connector to connect with SWD Download device, E-CON.

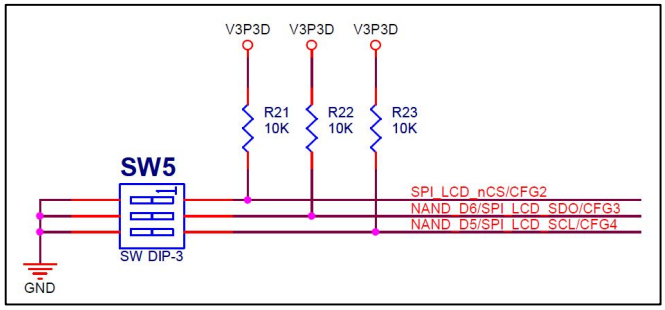




3-3-2 Normal Boot Block

Users can choose the Normal Boot Mode (SPI Flash Boot Mode, NAND Flash Auto Boot Mode). adStar-L STK is implemented as internal SPI Flash Boot Mode, and it is possible to implement the STK to NAND Flash Auto Boot Mode by changing a SW5.

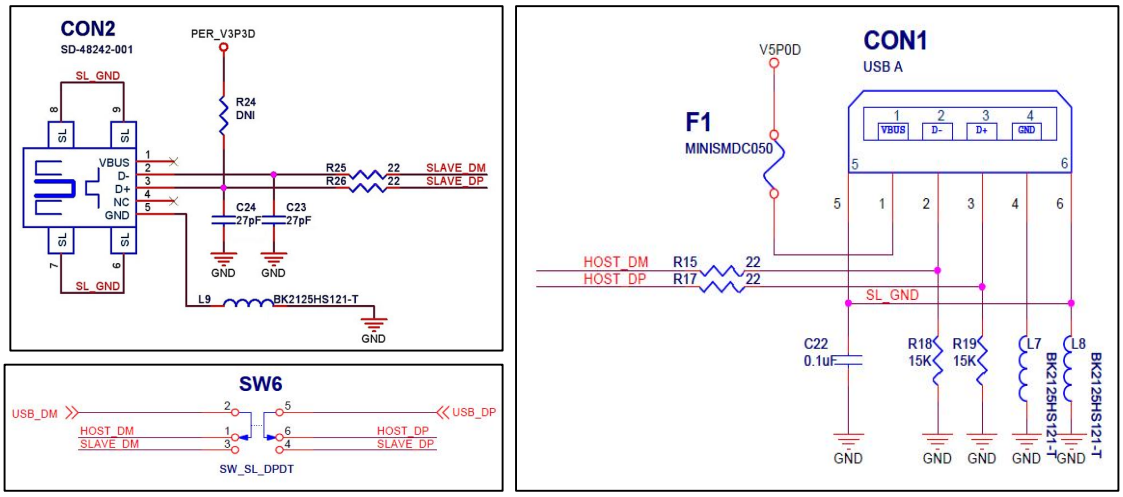




adStar-L STK Boot Mode				
SW2	**SW5**			**adStar-L STK Component**
CFG0	**CFG2**	**CFG3**	**CFG4**	**Configuration**
DOWN	X	X	X	SWD Boot Mode
UP	DOWN	DOWN	DOWN	Internal SPI Flash Boot Mode
UP	UP	DOWN	UP	Large type address 4 Cycles

3-4 USB Block

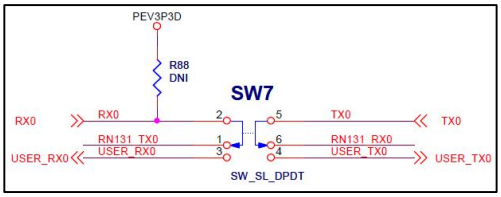
adStar-L STK has a connector for a USB HOST and a DEVICE. HOST or DEVICE is chosen by SW6 configurations.



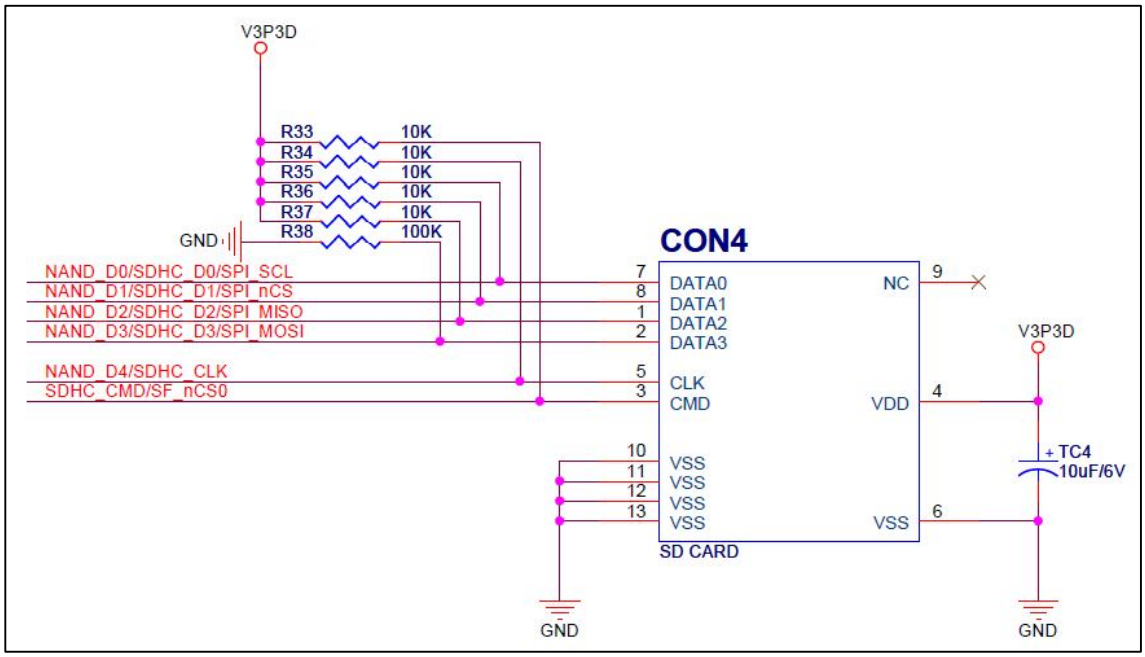
3-5 UART Block

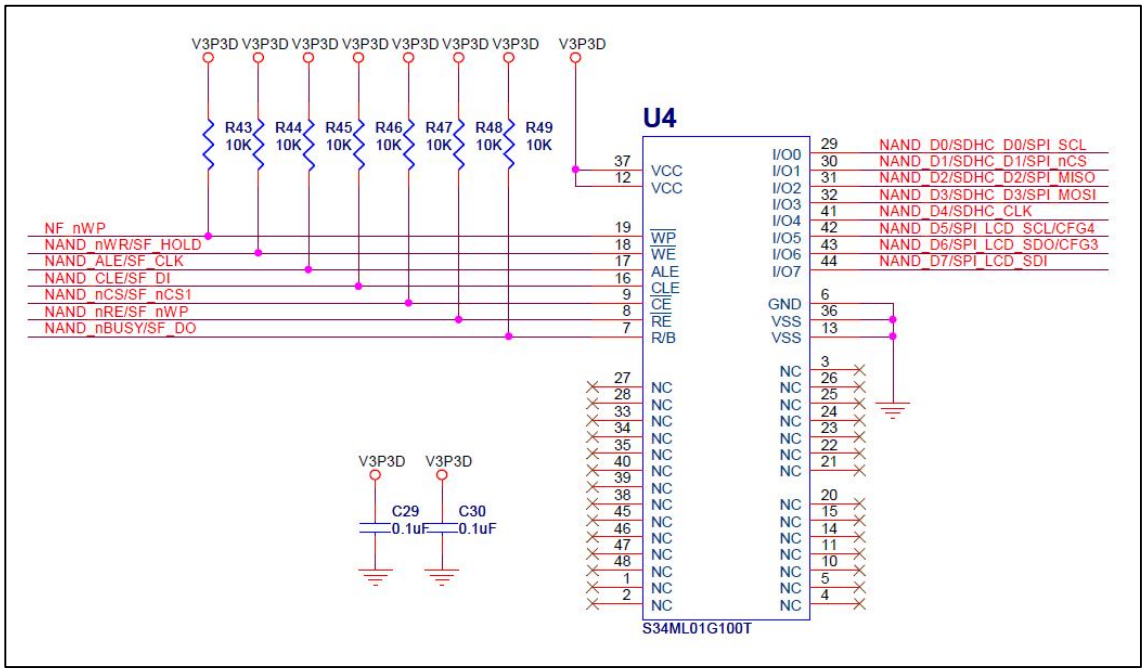
adStar-L STK board contains UART CH1 for debugging and UART CH0 for Wi-Fi module or user applications.

UART CH0 could be U10(RN-131) for wireless communication and extensions hall of TTL level that is interfaced directly at adStar-L. User can choose one of the SW7.

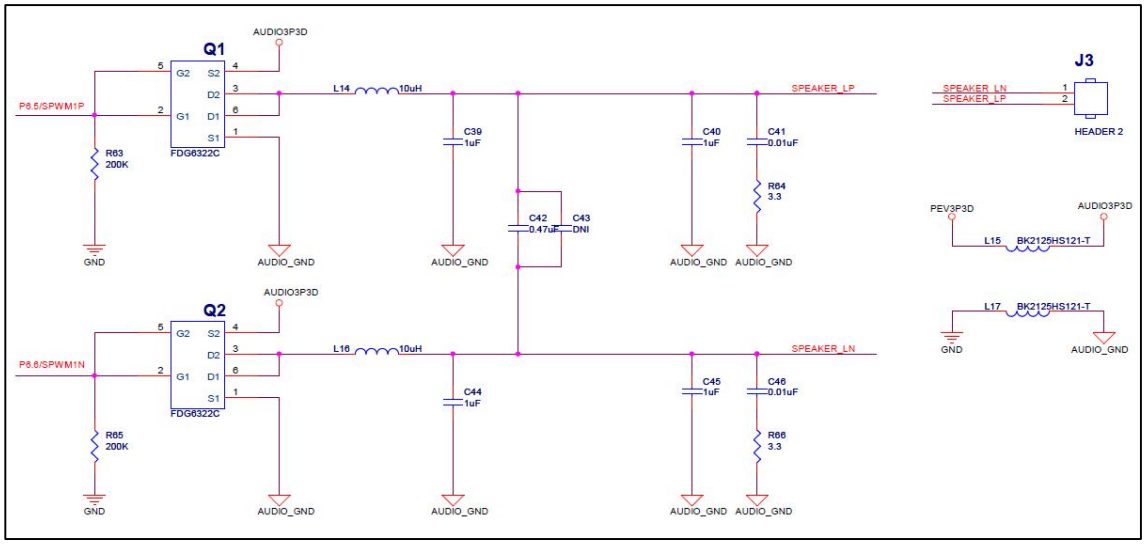


3-6 MEMORY Block



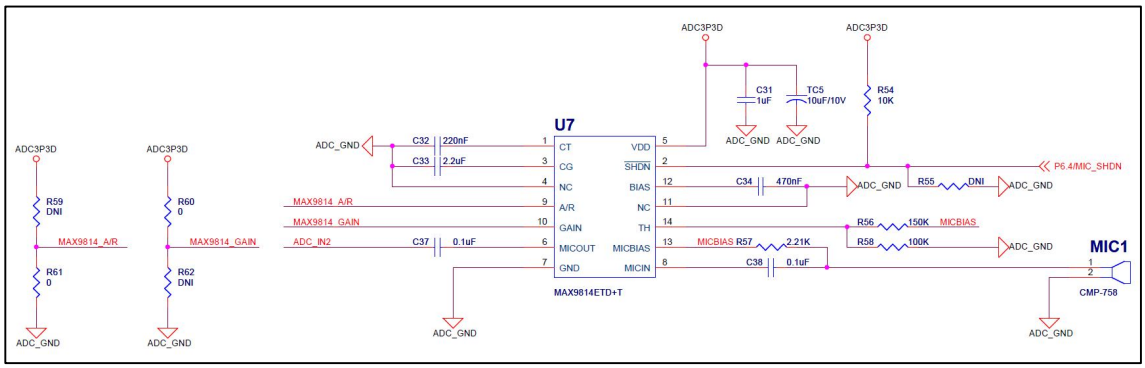


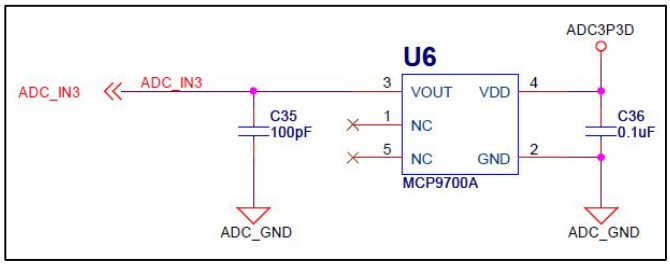
3-7 AUDIO PWM Block

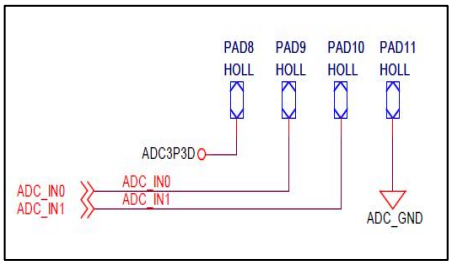


3-8 ADC Block

ADChips Corp.'s 32bits Microcontroller adStar contains 4 channel 12-bit ADC가. The adStar-L STK contains thermistor IC and microphone to test ADC ch2 and ch3. Moreover, ch0 and ch1 can be used by extending to additional 2.54mm pitch PCB hole as described in the above figure.





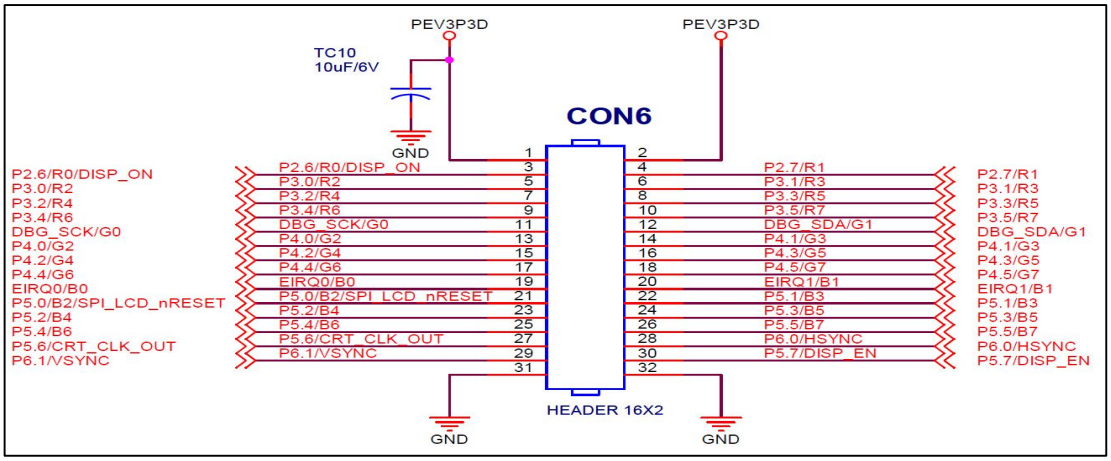


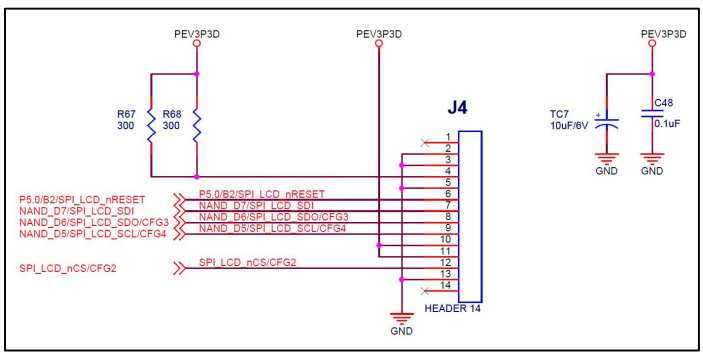
3-9 TFT-LCD Block

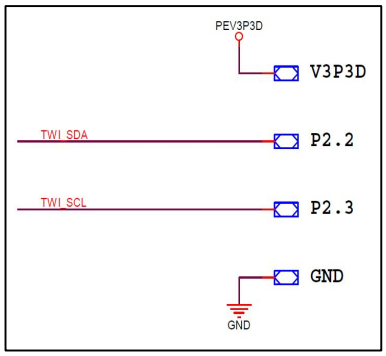
There are PCB holes that have no real parts, CON6 on the adStar-L STK. They are for expand board to use other LCD, AT043TN24 that is already loaded on the adStar-L STK.

These holes are compatible with typical 2.54mm pitch pin header, so user can make an additional LCD board according to their purpose and test.

LCD related signal line is expanded to CON6 and TW1 signal line is expanded to HALL. Therefore, they support other TWI types of touch devices.

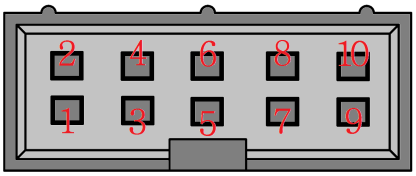






04. Component Summary

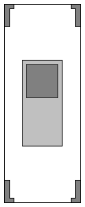
4-1 SWD CONNECTOR



< J1 >

SWD CONNECTOR (J1)			
PIN	Description	PIN	Description
1	NC	2	V3P3D
3	DBG_SDA / G1	4	GND
5	NC	6	NC
7	DBG_SCK / G0	8	GND
9	GND	10	GND

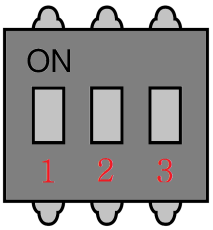
4-2 SWD MODE SELECT SWITCH



< SW2 >

SWD MODE SELECT (SW2)	
UP	NORMAL MODE
DOWN	SWD MODE

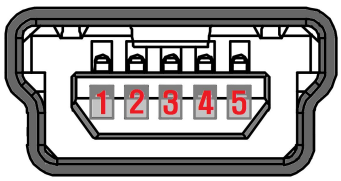
4-3 BOOT CONFIGURATION SWITCH



< SW5 >

BOOT CONFIGURATION (SW5)			
1	2	3	Description
UP	UP	UP	NAND FLASH BOOT (Small 3Cycle)
DOWN	UP	UP	NAND FLASH BOOT (Small 4Cycle)
UP	DOWN	UP	NAND FLASH BOOT (Large 4Cycle)
DOWN	DOWN	UP	NAND FLASH BOOT (Large 5Cycle)
UP	UP	DOWN	NAND FLASH BOOT (MLC 4bit ECC)
DOWN	UP	DOWN	NAND FLASH BOOT (MLC 24bit ECC)
DOWN	DOWN	DOWN	SPI FLASH BOOT

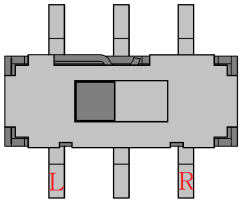
4-4 DEBUGGING UART CH1



< CON3 >

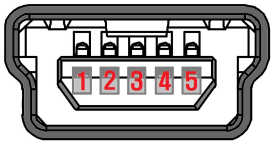
DEBUGGING UART CH1 CONNECTOR (CON3)	
PIN	Description
1	USB VCC+ 5V
2	USB DM (CP2102 PIN_5)
3	USB DP (CP2102 PIN_4)
4	NC
5	GND

4-5 USB MODE SELECT SWITCH

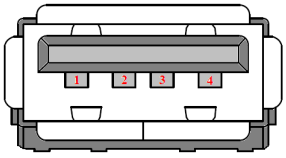


< SW6 >

USB MODE SELECT (SW6)	
LEFT	DEVICE (CON2)
RIGHT	HOST (CON1)



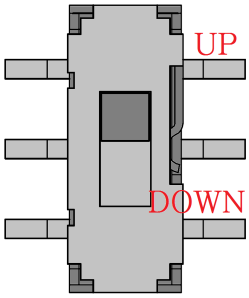
< CON2 >



< CON1 >

DEVICE (CON2)		HOST (CON1)	
PIN	Description	PIN	Description
1	NC	1	V5P0D
2	DM	2	DM
3	DP	3	DP
4	NC	4	GND
5	GND		

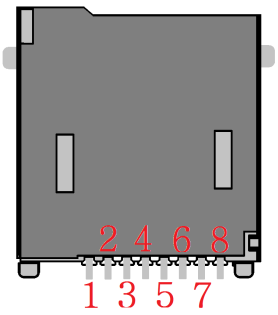
4-6 UART CH0 SELECT SWITCH



< SW7 >

UART CH0 SELECT (SW7)	
UP	USER UART TX0 : P2.4(HALL) RX0 : P2.5(HALL)
DOWN	Wi-Fi MODULE RN-131

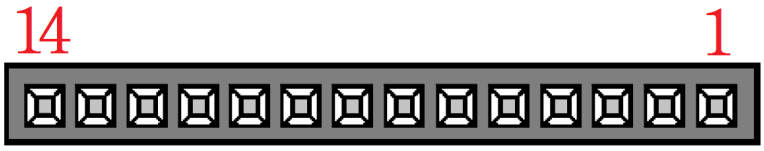
4-7 Micro SD CARD SOCKET



< CON4 >

Micro SD CARD (CON4)	
PIN	Description
1	SDHC DATA2
2	SDHC DATA3
3	SDHC CMD
4	VDD
5	SDHC CLK
6	GND
7	SDHC DATA0
8	SDHC DATA1

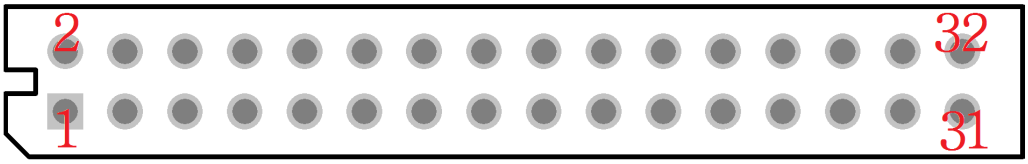
4-8 SPI TFT-LCD CONNECTOR



< J4 >

SPI TFT-LCD (J4)			
PIN	Description	PIN	Description
1	NC	2	GND
3	GND	4	Back Light
5	GND	6	RESET
7	SPI_SDI	8	SPI_SDO
9	SPI_SCL	10	V3P3D
11	V3P3D	12	SPI_nCS
13	GND	14	NC

4-9 EXTENSION LCD CONNECTOR

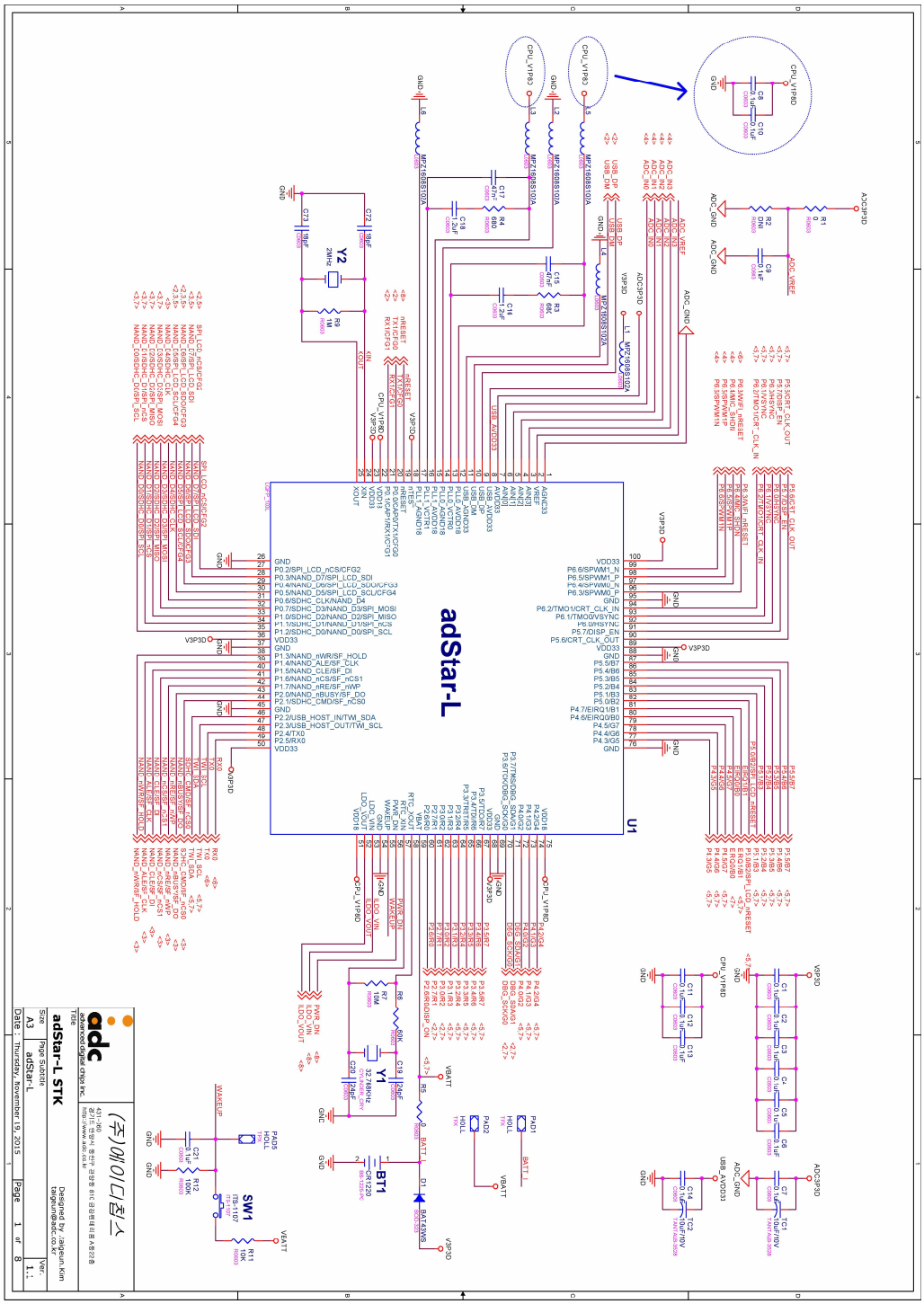


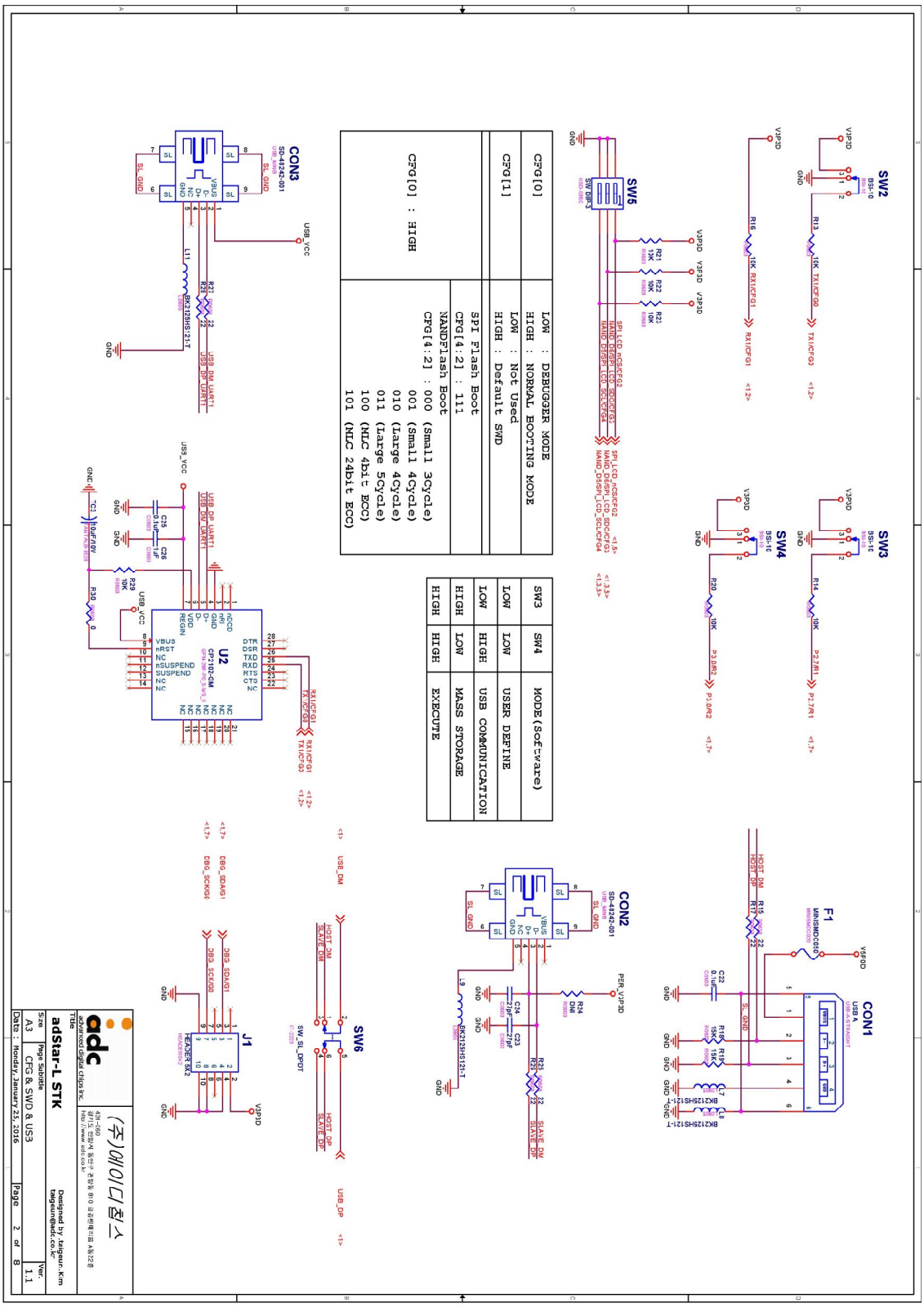
< CON6 >

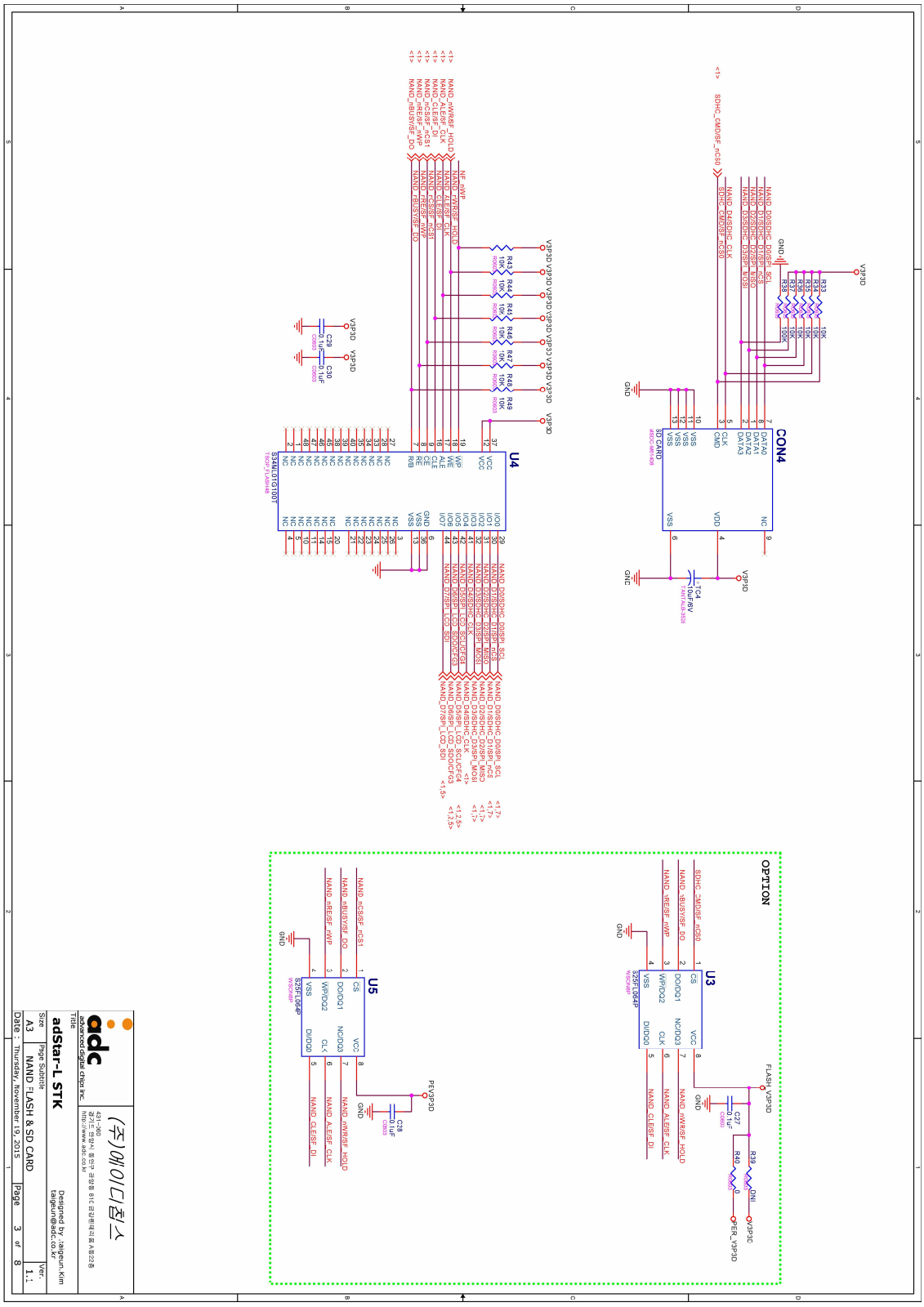
EXTENSION CONNECTOR (CON6)			
PIN	Description	PIN	Description
1	V3P3D	2	V3P3D
3	P2.6/R0	4	P2.7/R1
5	P3.0/R2	6	P3.1/R3
7	P3.2/R4	8	P3.3/R5
9	P3.4/R6	10	P3.5/R7
11	DBG_SCK/G0	12	DBG_SDA/G1
13	P4.0/G2	14	P4.1/G3
15	P4.2/G4	16	P4.3/G5
17	P4.4/G6	18	P4.5/G7
19	EIRQ0/B0	20	EIRQ1/B1
21	P5.0/B2	22	P5.1/B3
23	P5.2/B4	24	P5.3/B5
25	P5.4/B6	26	P5.5/B7
27	P5.6/CRT_CLK_OUT	28	P6.0/HSYNC
29	P6.1/VSYNC	30	P5.7/DISP_EN
31	GND	32	GND

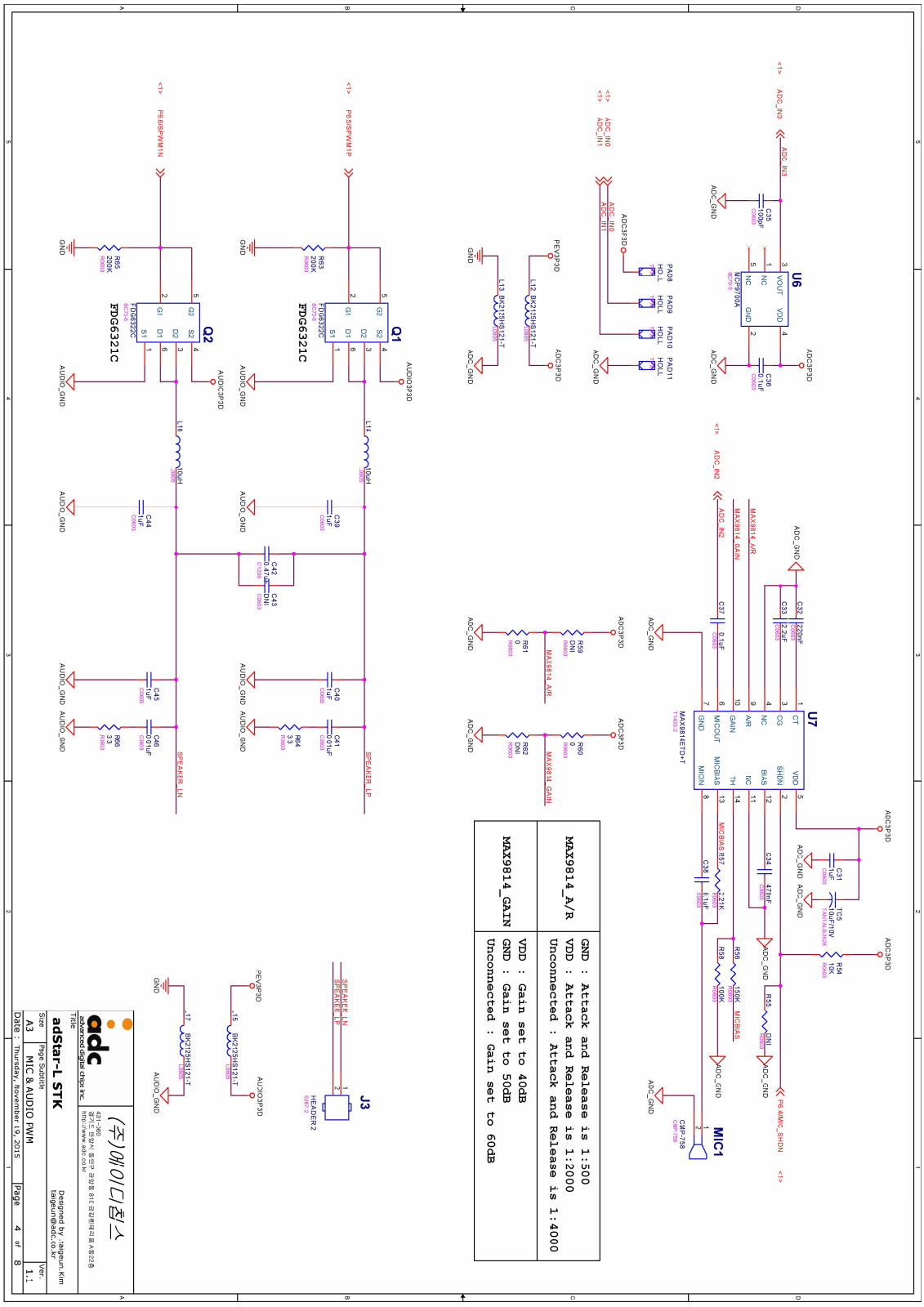
05. SCHEMATIC

5-1 adStar-L Main




CFG[0] LOW : DEBUGGER MODE
HIGH : NORMAL BOOTING MODE
CFG[1] LOW : Not Used
HIGH : Default SWD
CFG[4:2] : 111 SPI Flash Boot
CFG[0] : HIGH NANDFlash Boot
CFG[4:2] : 000 (Small 3Cycle)
001 (Small 4Cycle)
010 (Large 4Cycle)
011 (Large 5Cycle)
100 (NLC 4bit ECC)
101 (NLC 24bit ECC)
SW3 SW4 MODE(Software)
LOW LOW USER DEFINE
LOW HIGH USB COMMUNICATION
HIGH LOW MASS STORAGE
HIGH HIGH EXECUTE
SW2
SW3
SW4
SW5
SW6
CON1
CON2
CON3
F1
U2
J1
adStar-L STK
CFG & SWD & US3
Designed by :taegeun.Kim
taegeun@adc.co.kr
Ver: 1.1
Page 2 of 8
Date : Monday, January 25, 2016
Size A3


adStar-L STK
NAND FLASH & SD CARD
Thursday, November 19, 2015
(주)에이디칩스
advanced digital chips inc
Designed by : taigeun.Kim
taigeun@adc.co.kr
CON4
U4
U5
U3
OPTION
FLASH_V3P3D
PER_V3P3D


MAX9814_A/R
GND : Attack and Release is 1:500
VDD : Attack and Release is 1:2000
Unconnected : Attack and Release is 1:4000
MAX9814_GAIN
VDD : Gain set to 40dB
GND : Gain set to 50dB
Unconnected : Gain set to 60dB
U6
U7
Q1
Q2
FDG6321C
MIC1
J3
adStar-L STK
MIC & AUDIO PWM
(주)에이디칩스
advanced digital chips inc
Designed by : taigeun.kim
taigeun@adc.co.kr
Date : Thursday, November 19, 2015
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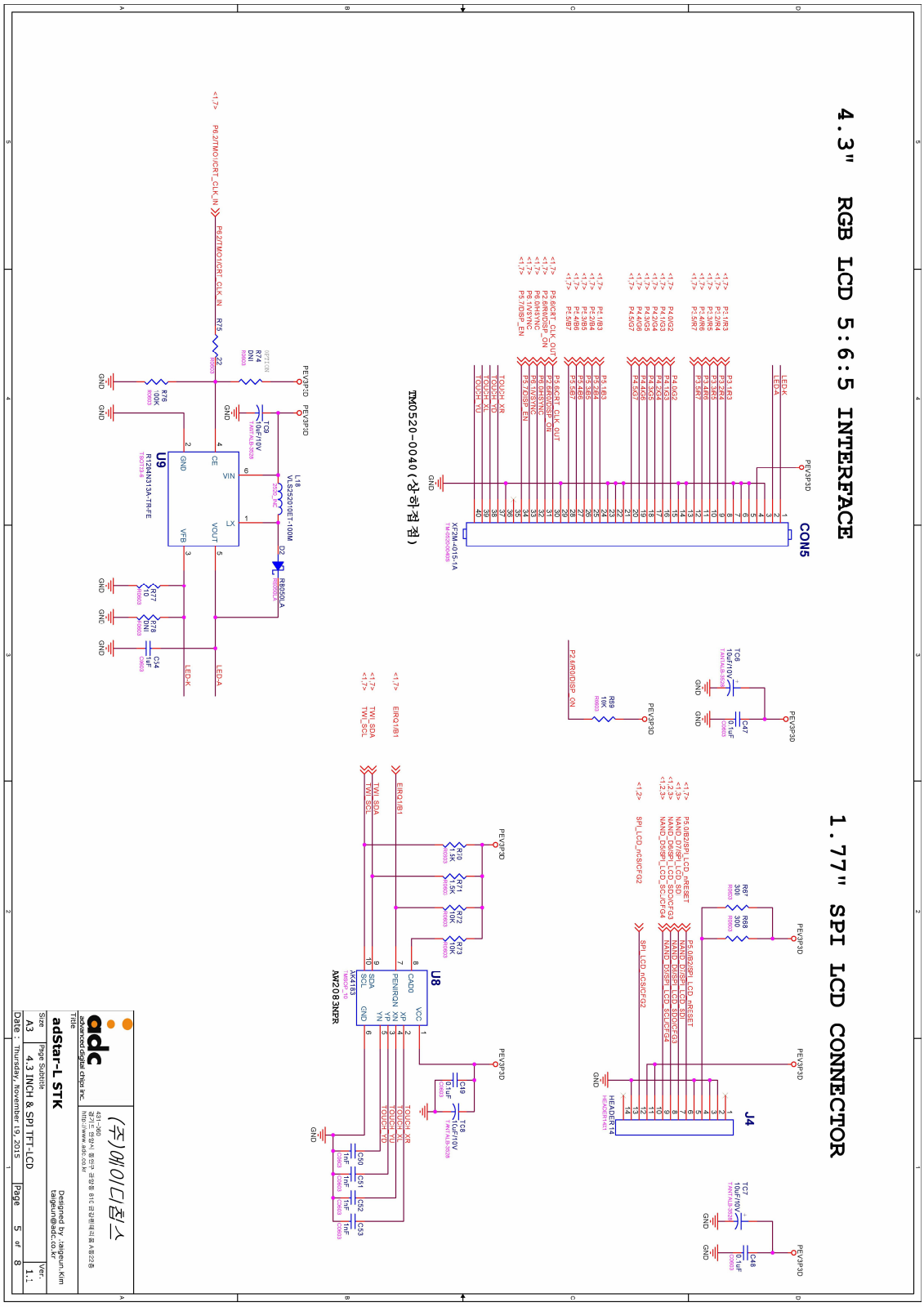
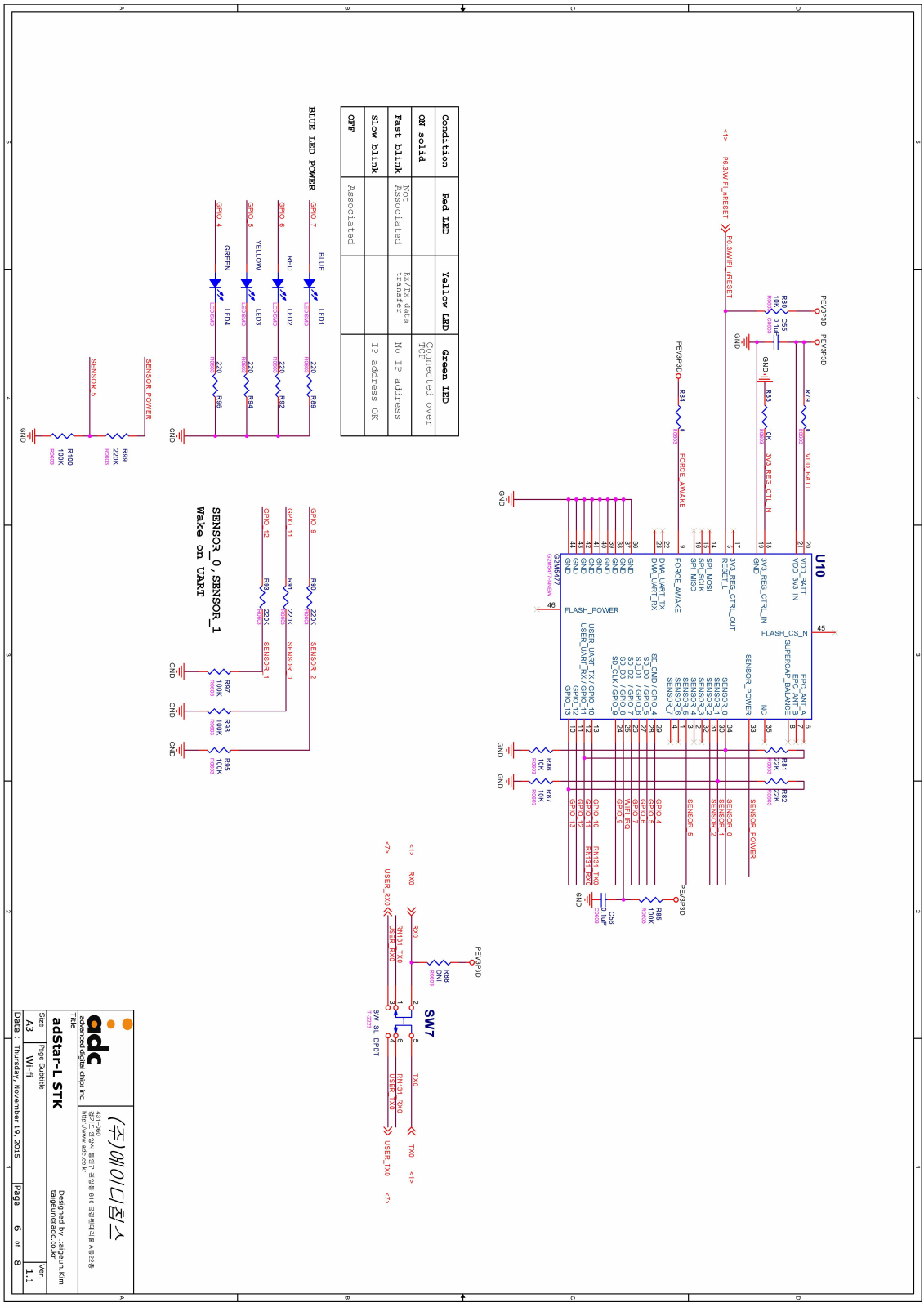
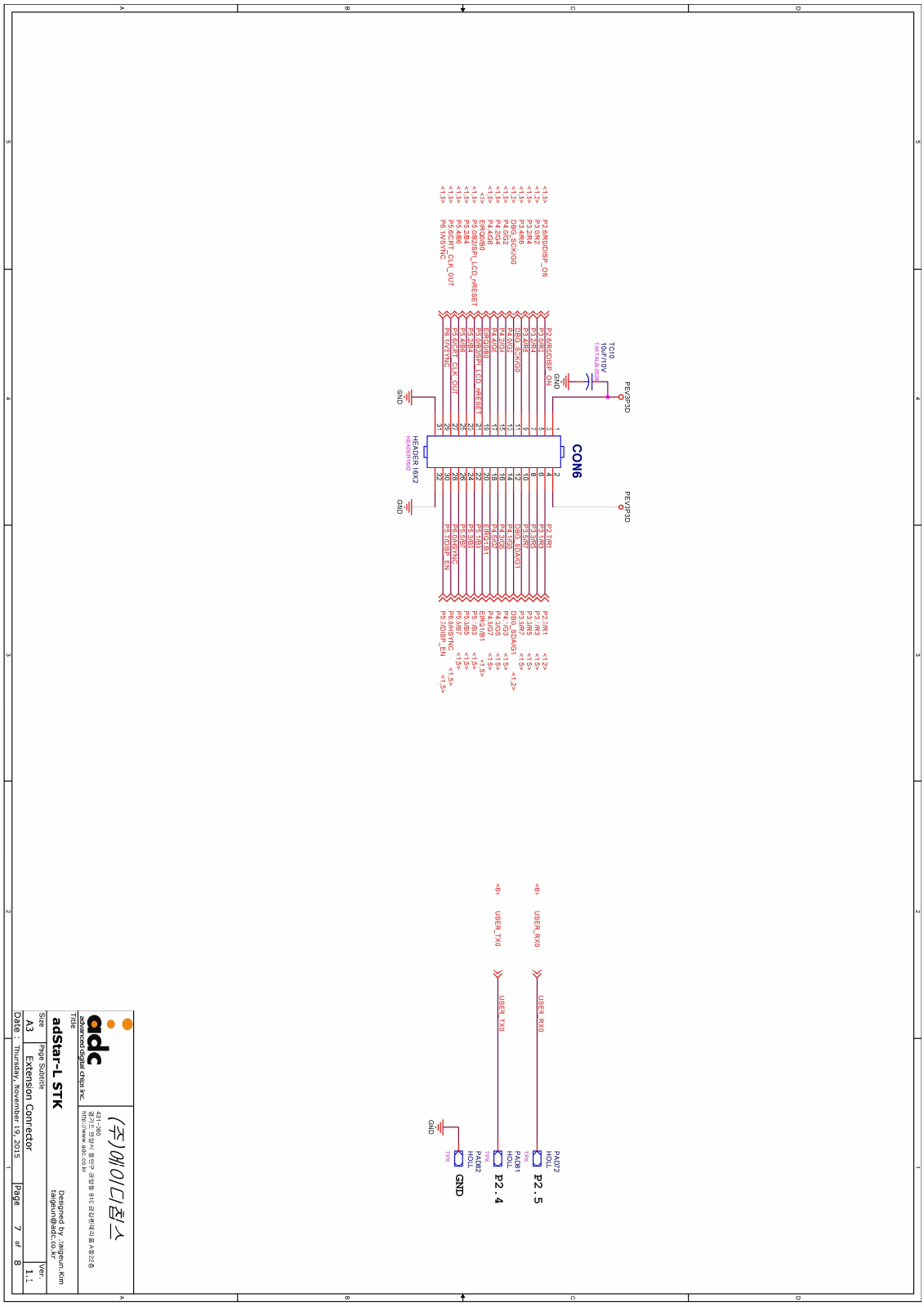

4.3" RGB LCD 5:6:5 INTERFACE
1.77" SPI LCD CONNECTOR
TM0520-0040(상하좌우)
CON5
J4
U8
U9
adStar-L STK
4.3 INCH & SPI TFT-LCD
(주)에이디칩스


U10
FLASH_POWER
FLASH_CS_N
SENSOR_POWER
FORCE_AWAKE
3V3_REG_CTRL_IN
VDD_BATT
SW7
SW_SL_DPDT
BLUE LED POWER
SENSOR_0, SENSOR_1
Wake on UART
Condition
Red LED
Yellow LED
Green LED
ON solid
Fast blink
Slow blink
OFF
Associated
Not Associated
Tx/Rx data transfer
Connected over TCP
No IP address
Ip address OK
(주)에이디칩스
adStar-L STK
Designed by : taigeun.kim
taigeun@adc.co.kr
Thursday, November 19, 2015


CON6
HEADER 6X2
HEADER6X2
TC10
10uF/16V
TANTALUM_3216
GND
P2.4
P2.5
USER_RX0
USER_TX0
(주)에이디칩스
adStar-L STK
advanced digital chips inc
Designed by : taigeun.kim
taigeun@adc.co.kr
Thursday, November 19, 2015
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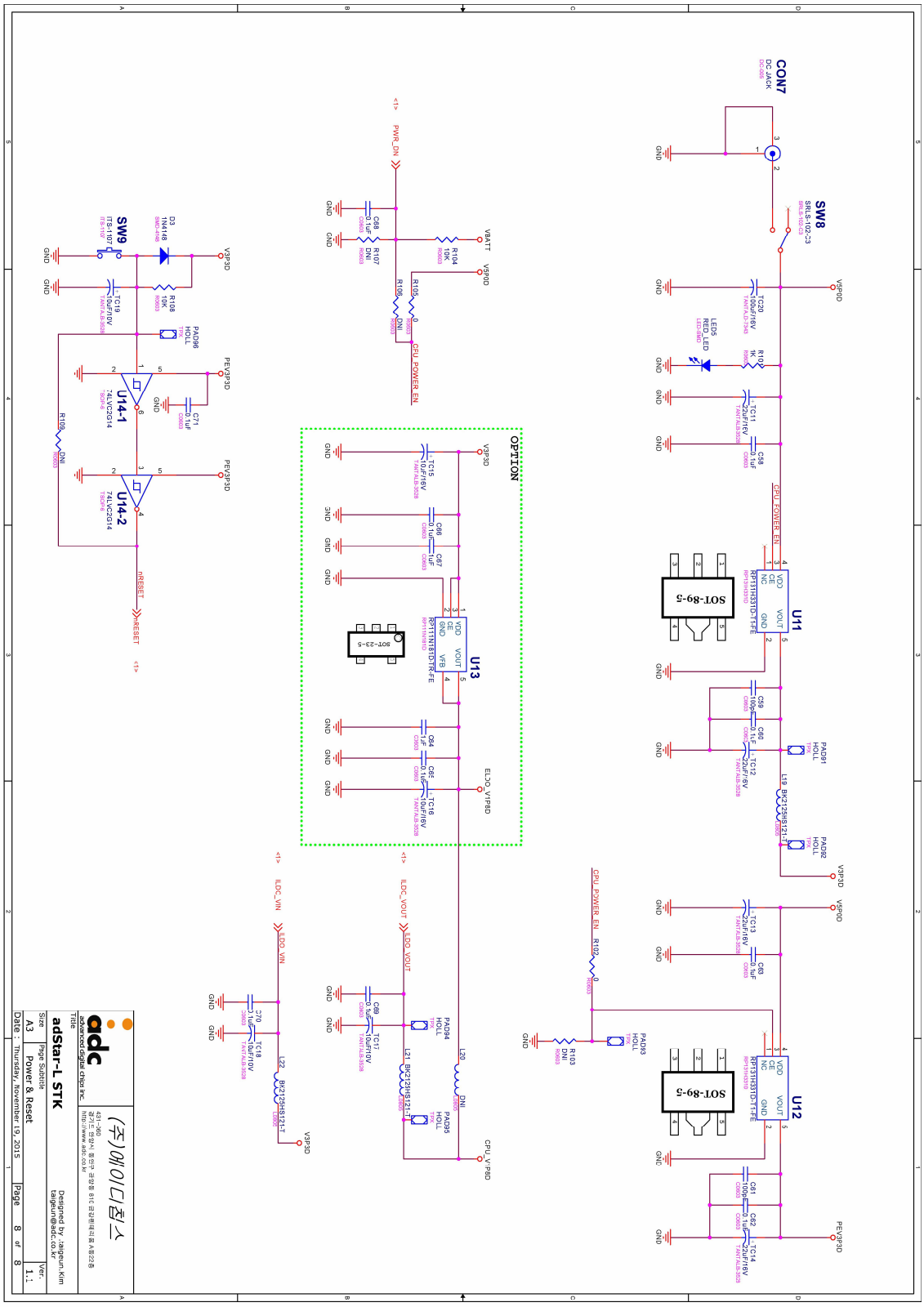
Ver: 1.1


CON7
DC_JACK
SW8
SRLS-102-23
SW9
ITS-107
U11
U12
U13
U14-1
U14-2
74LVC2G14
OPTION
V6P0D
V3P3D
PEV3P3D
VBATT
CPU_POWER_EN
PWR_DN
nRESET
ILDO_VIN
ILDO_VOUT
ELDO_VFBD
CPU_VFBD
adStar-L STK
Power & Reset
(주)에이디칩스
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Thursday, November 19, 2015