



Evaluation Board Manual

S3F401F

**16/32-BIT RISC
MICROPROCESSOR**

Dec, 2007

REV 1.00

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EVALUATION BOARD MANUAL

1. OVERVIEW

S3F401F EVB (Evaluation Board) is a compact platform that is suitable for code development of SAMSUNG's S3F401F 16-/32-bit RISC microcontroller for an inverter motor and general purpose application.

EVB is consists of several blocks, which can make operate the function of S3F401F. Those functions are from the followings:

- A 16-/32-bit RISC CPU Core, ARM7TDMI-S
- A built-in 256Kbyte NOR-Flash memory
- An internal 20KB SRAM for stack, data, or code
- An interrupt controller, supporting vectored interrupt
- 6xch 16-bit timers with capture and PWM function
- 1xch 8-bit basic timer & 3-bit watch-dog timer
- Three programmable I/O port groups
- 2xch Inverter motor controller
- 2xch 16-bit Encoder counter
- 15xch 12-bit ADC
- 2xch UART
- 2xch SSP

If you need more detail information about S3F401F, meet the samsung web site.

http://www.samsung.com/global/business/semiconductor/productList.do?fmly_id=223

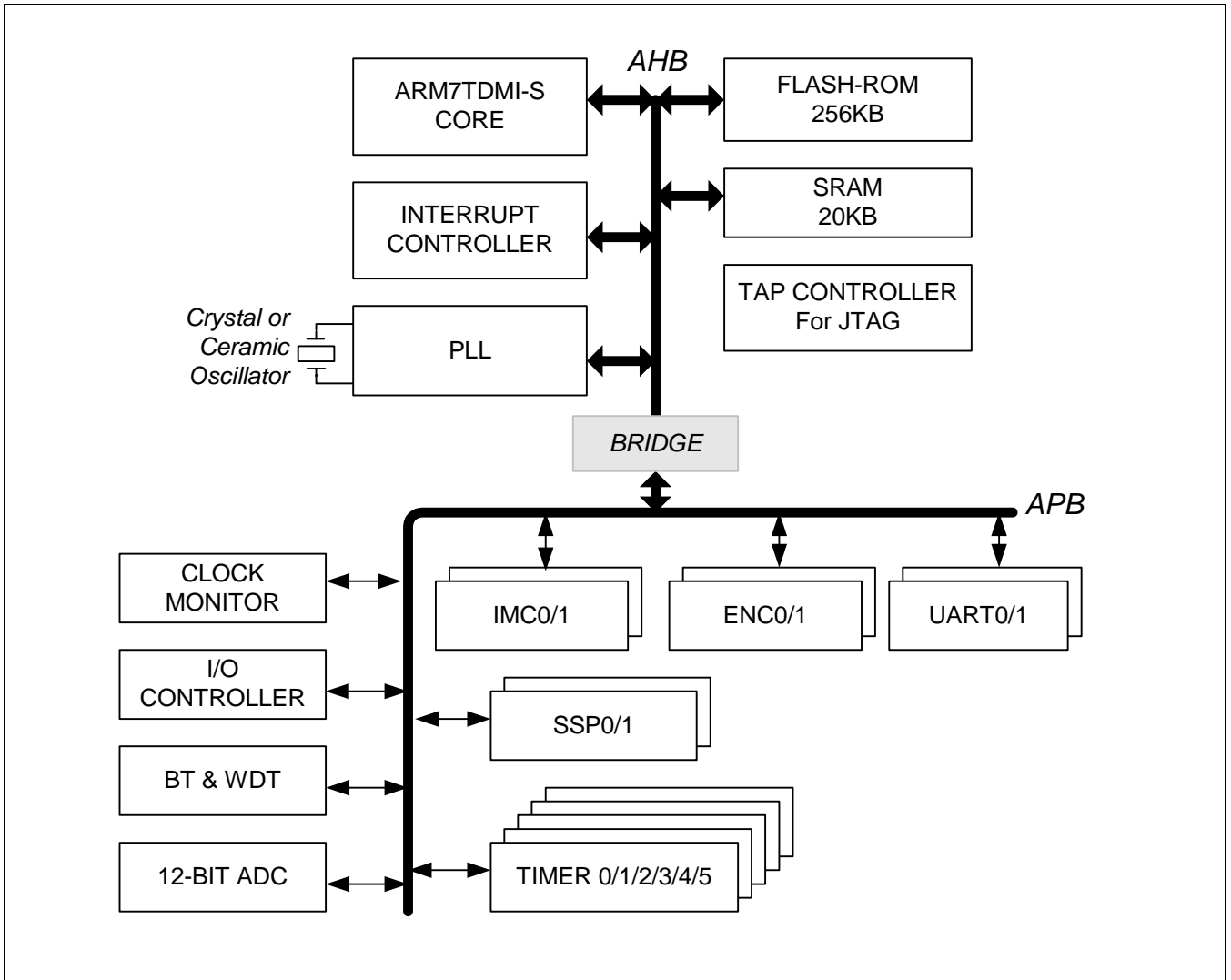


Figure 1. S3F401F Block Diagram

1.1 FEATURES

Micro-Controller	S3F401F, ARM7TDMIS, 16/32-bit RISC Microcontroller
Board Power Source	External DC 7~12V
	Adjustable voltage regulator out is 3.2V
Board Master Power Switch	SW6
UART	Support to protocol for RS-232
	Physical interface circuit connected to standard PC through DB9(female)
	Interface driver IC MAX3221
Synchronous Serial Port	Provide SSP, SPI serial communication with external devices (master or slave)
	SSP serial EEPROM (8K * 8bit): X25650
	SSP serial EEPROM (4K * 16bit): 64LC40S
LED	IO Port output control display
JTAG Connection	20Way JTAG connector (Multi-ICE Interface, Trace 32 etc.)

1.2 SYSTEM REQUIREMENTS

This section describes the hardware and software system requirements.

Software Requirements	ARM Compiler SW
	ARM Debugger SW
Hardware Requirements	S3F401F EVB Board Set
	Power Supply DC 7~12V (Recommend Default 12V)
	Debugger (Multi-ICE or Trace 32 etc.)
	PC(Pentium, 32MB RAM for Windows 95, or 64MB RAM for Windows NT)
	COM Port for serial communication
	Parallel Port (If using Multi-ICE)

1.3 BOARD COMPONENTS

The board consists of the followings.

- S3F401F Micro-controller
- 64LC40S and X25650 as a serial EEPROM for SSP
- 2 x DSUB Connector for RS-232
- 2 x Header groups for IMC function
- 1 x Buzzer
- 6 x Switches: IRQ x 2, Power, Reset
- 4 x LED: Power x1, IO Port output x 3
- A regulator to generate 3.3V
- 4MHz Crystal as a master system clock source
- Switches for ADC input capacitor selection
- 7-segment (4-digit) display circuit
- A standard 20-pin JTAG interface connector
- Dual-line header pins for a port level or signal
- 53 x Jumpers for function setting control
- 15 x TP (Test Pole) to check specific pins relating to the digital, analog, PLL power and clock

2. CONFIGURATION

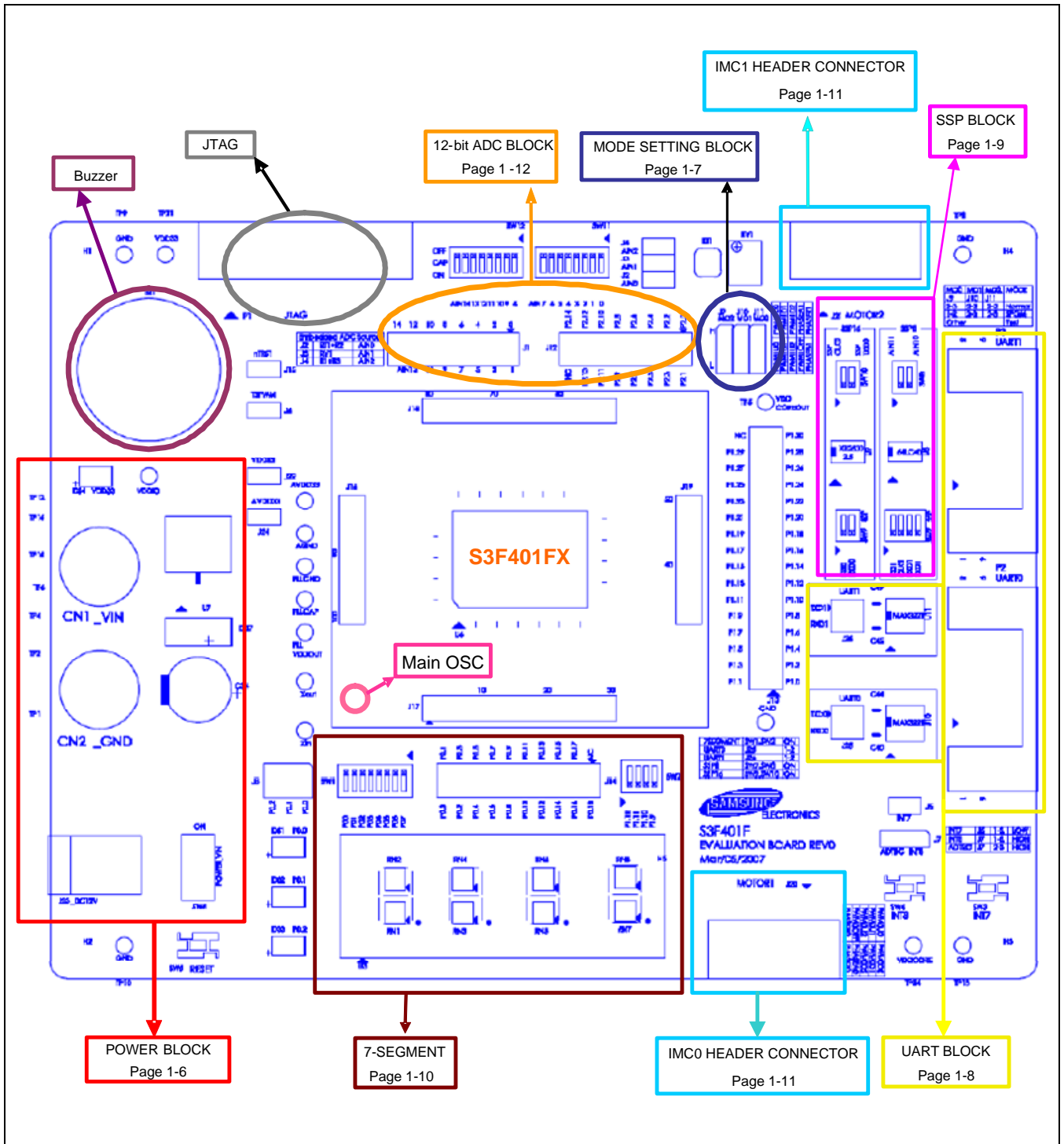
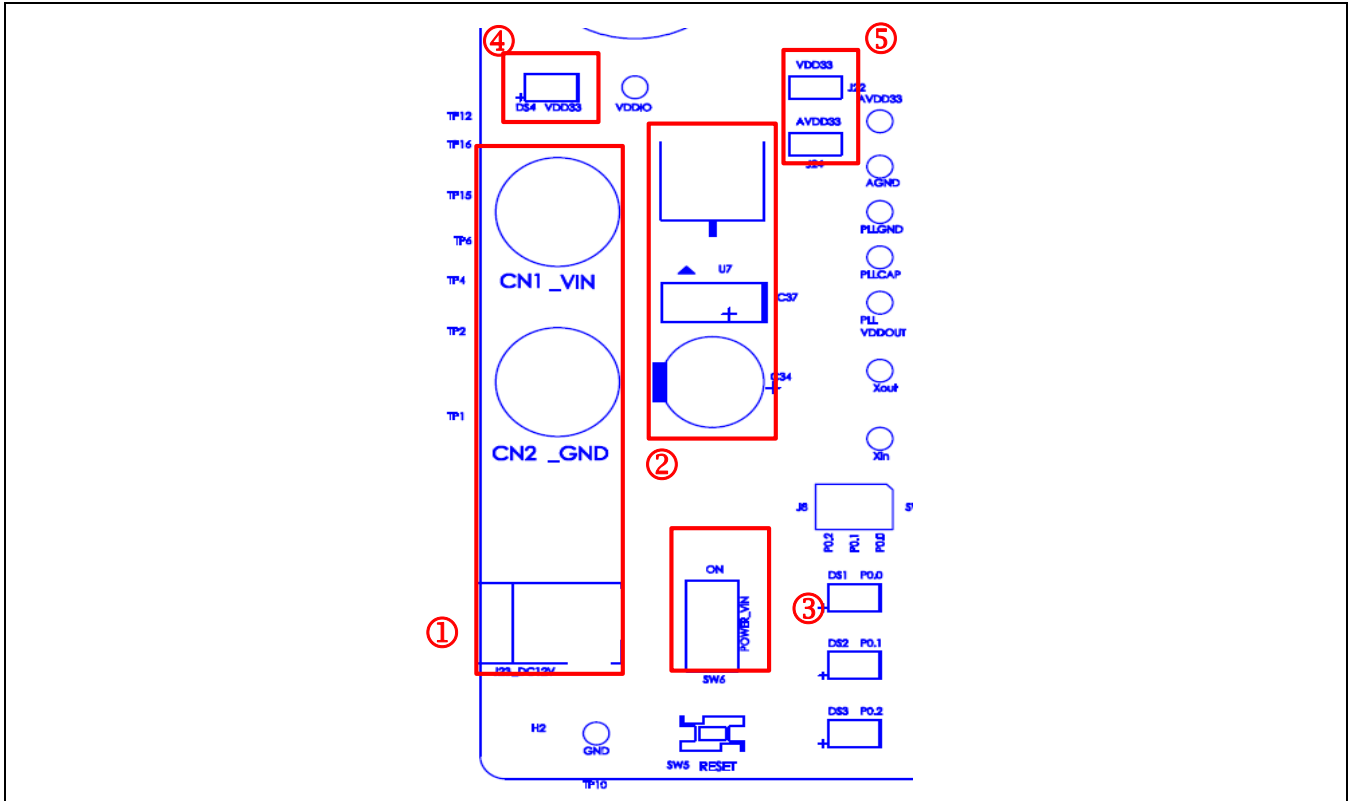


Figure 2. S3F401F Evaluation Board Top-view

2.1 DETAILED BLOCK CONFIGURATIONS

2.1.1 Power Block

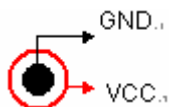


CN1, CN2, J23: Power Supply Connector

CN1 : VIN

CN2 : GND

J23 : DC adapter connector



U7: Adjustable Voltage Regulator

3.3V generator → VDD33, VDDCORE, VDDIO

SW6: Power Switch

DS4: Power Display LED

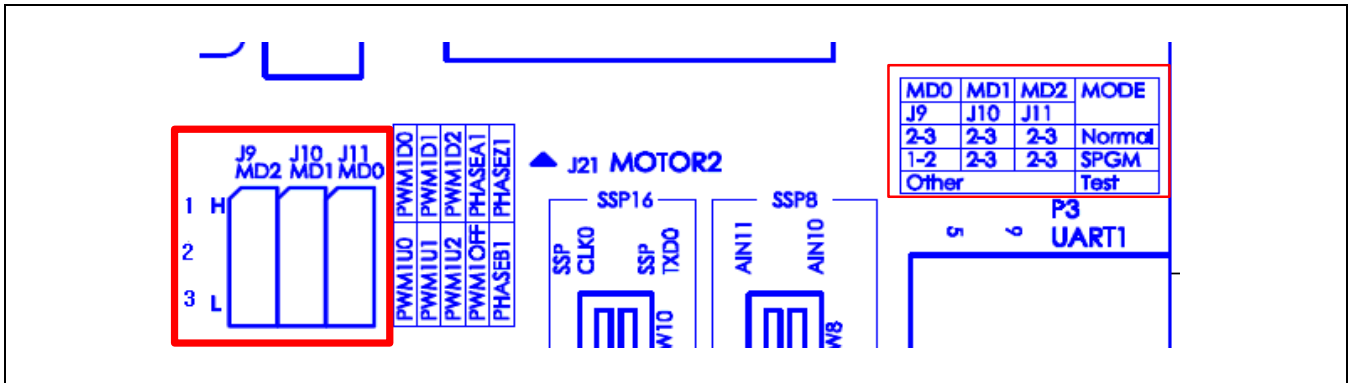
VDD33 Power-on status display

J22: Jumper Setting

Selection VDDCORE / VDDIO

1-2 connection: The VDD of each block is connected to VDD33.

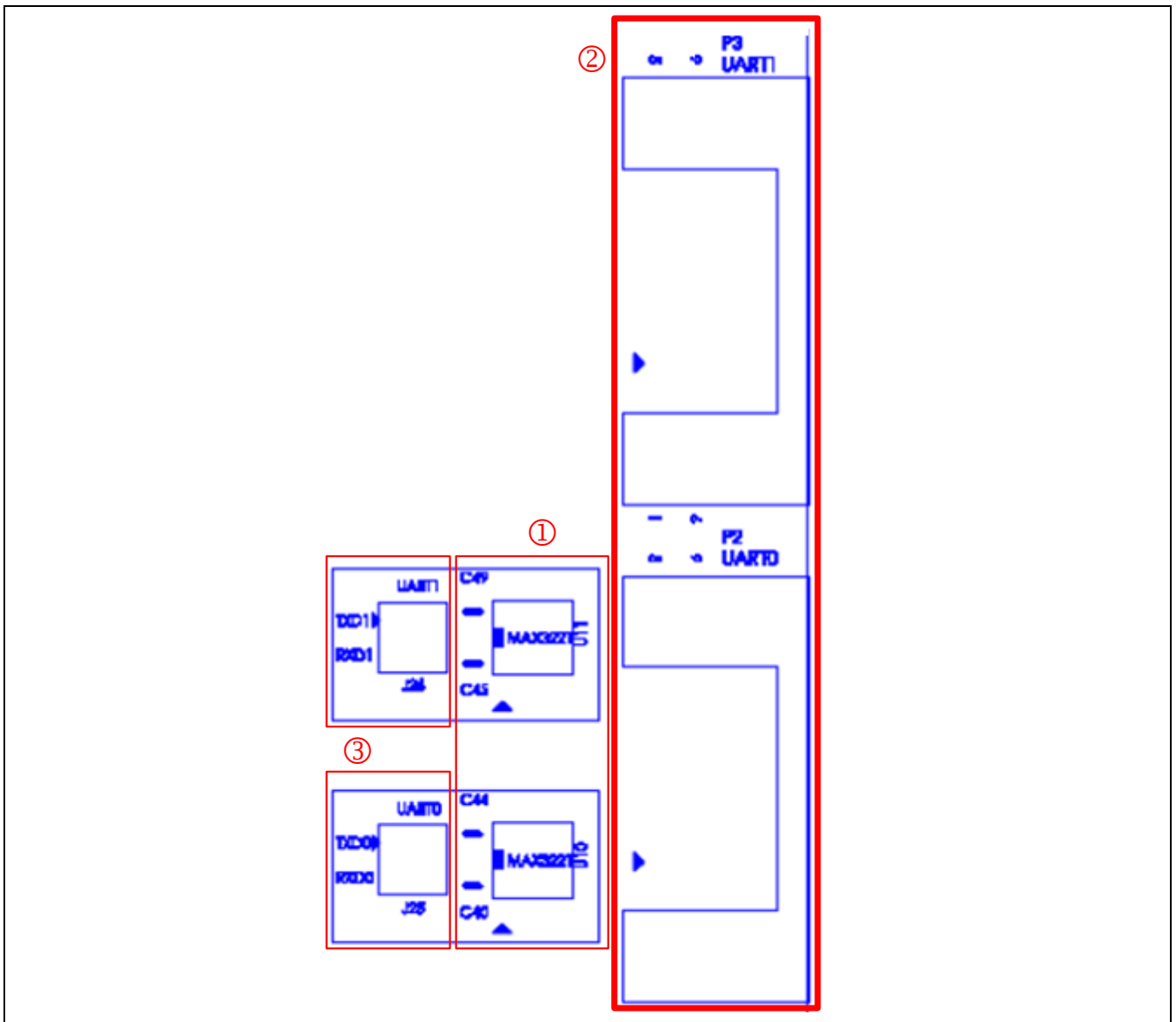
2.1.2 Mode Setting Block



J9 & J10 & J11: Jumper Setting

J9	J10	J11	MD[2:0]
2-3 Connection	2-3 Connection	2-3 Connection	NORMAL
1-2 Connection	2-3 Connection	2-3 Connection	SPGM
Others			Only TEST Mode

2.1.3 UART Block



U10, U11: UART Driver IC

P2, P3: UART Connector

J25 Jumper Setting

TXD0 UARTTXD0 is connected to T1IN of MAX3221.

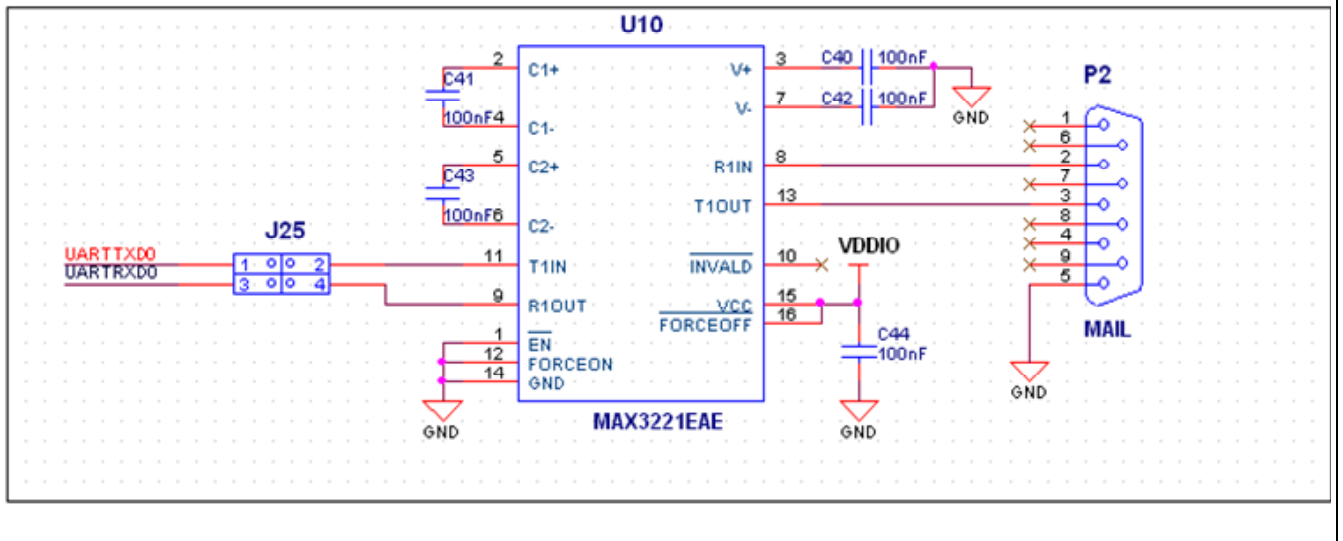
RXD0 UARTRXD0 is connected to R1OUT of MAX3221.

J26 Jumper Setting

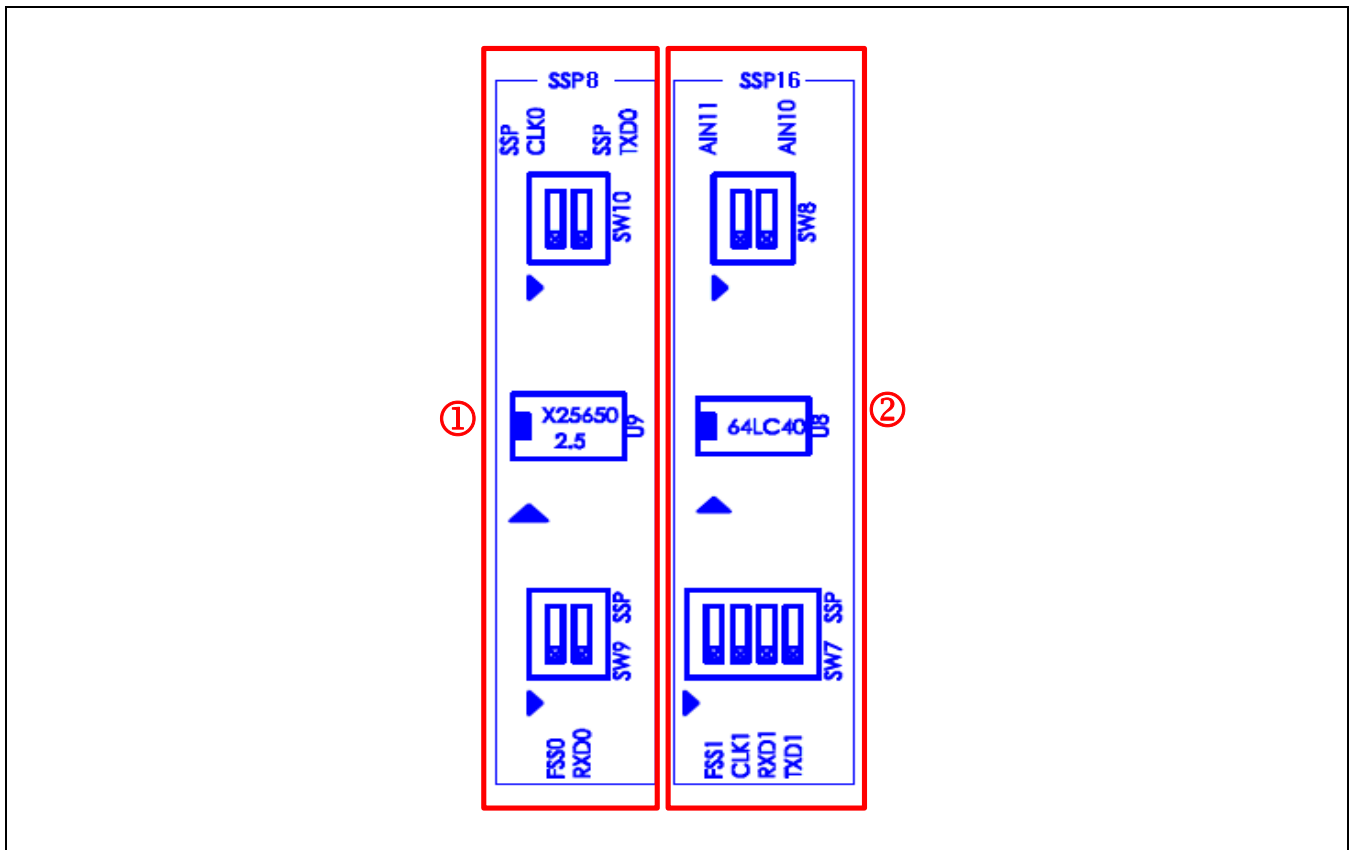
TXD1 UARTTXD1 is connected to T1IN of MAX3221

RXD1 UARTRXD1 is connected to R1OUT of MAX3221.

SERIAL COMMUNICATION INTERFACE (UART)



2.1.4 SSP Block



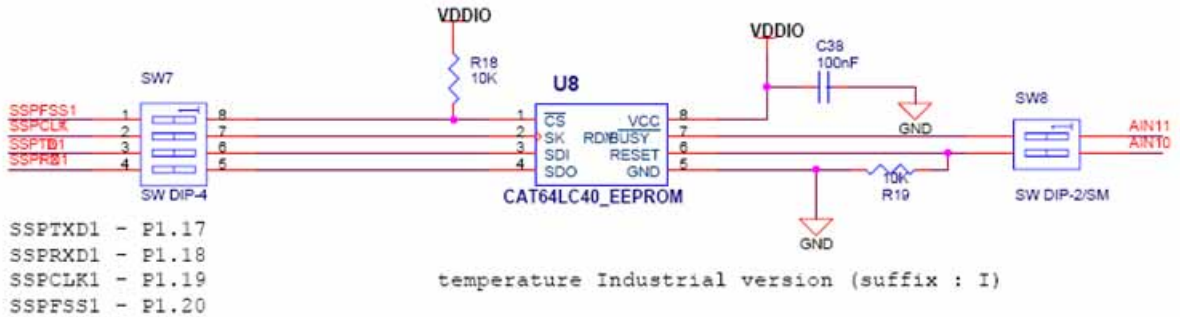
U9: SSP8 serial EEPROM (8K × 8bit)

- SW9 ON** FSS0 is connected to P1.16.
RXD0 is connected to P1.14.
- SW10 ON** CLK0 is connected to P1.15.
TXD0 is connected to P1.13.

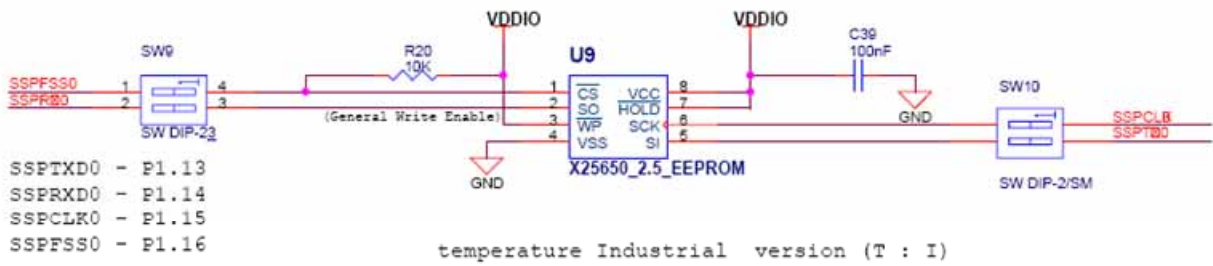
U8: SSP16 serial EEPROM (4K × 16bit)

- SW7 ON** FSS1 is connected to P1.20.
CLK1 is connected to P1.19.
RXD1 is connected to P1.18.
TXD1 is connected to P1.17.
- SW8 ON** The RDY/nBUSY pin is connected to P2.11.
The RESET pin is connected to P2.10.

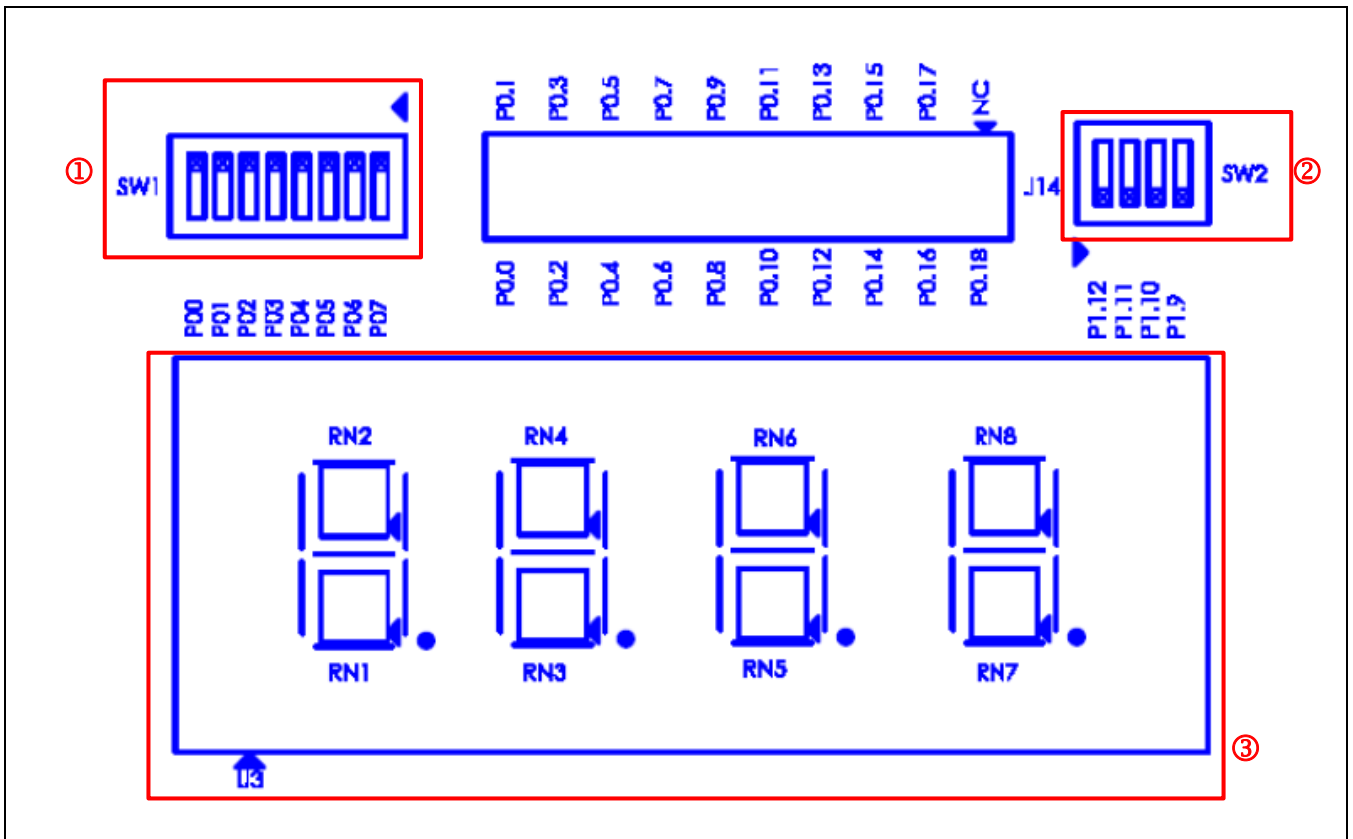
SSP16 INTERFACE



SSP8 INTERFACE



2.1.5 7-SEGMENT BLOCK



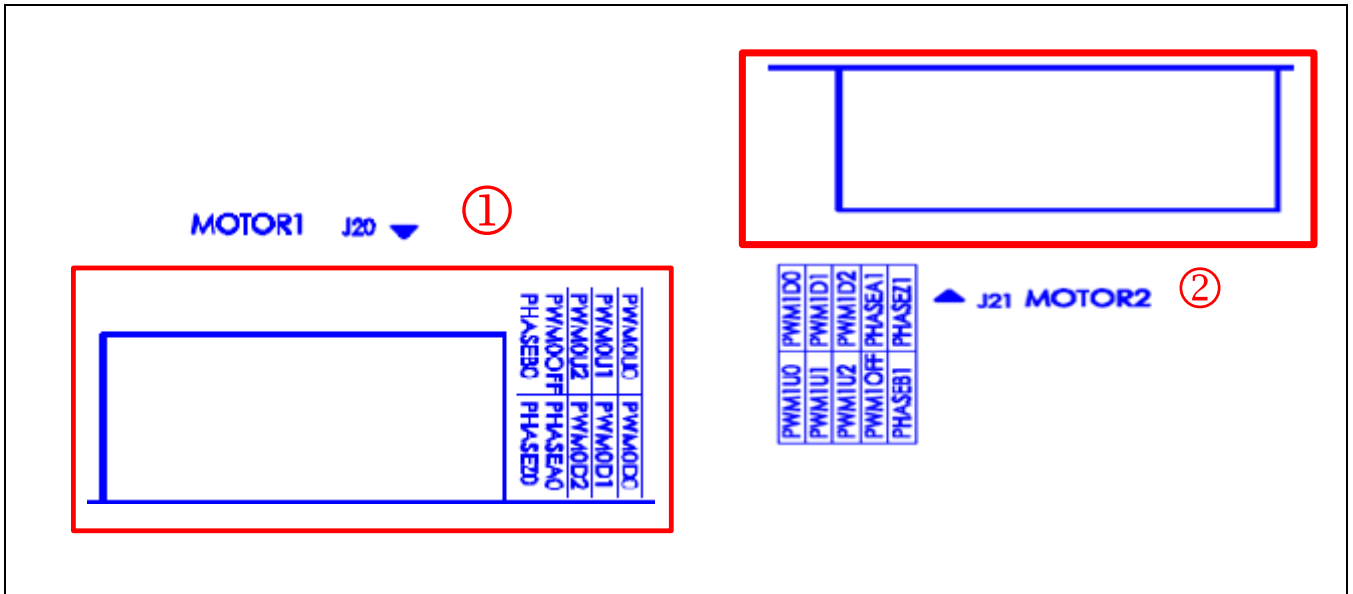
The assignment of 7-segment control pins on the S3F401F-EVB is the same like this.

SW1 ON: This Port (P0.0~P0.7) is connected to each segment of 7-segment.

SW2 ON: This Port (P1.9~P1.12) is connected to latch.

U3: 7-segment display

2.1.6 IMC BLOCK

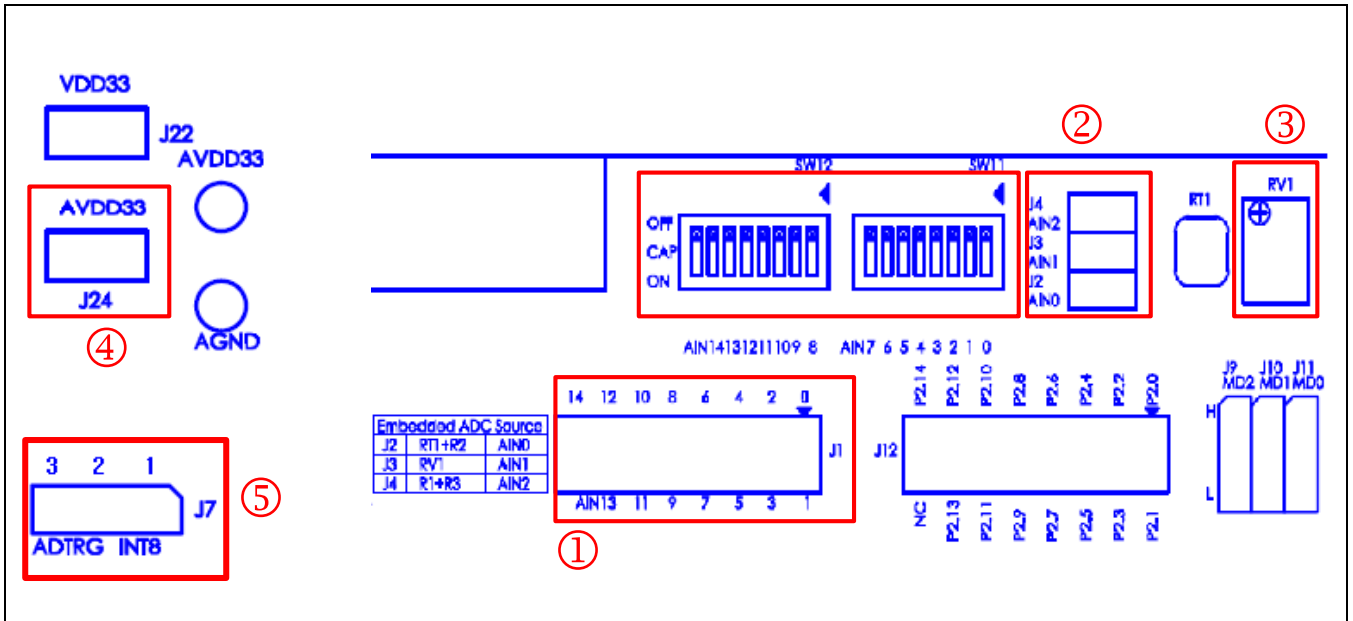


The assignment of IMC pins on the S3F401F-EVB is the same like this.

J20: A header pin group for MOTOR1

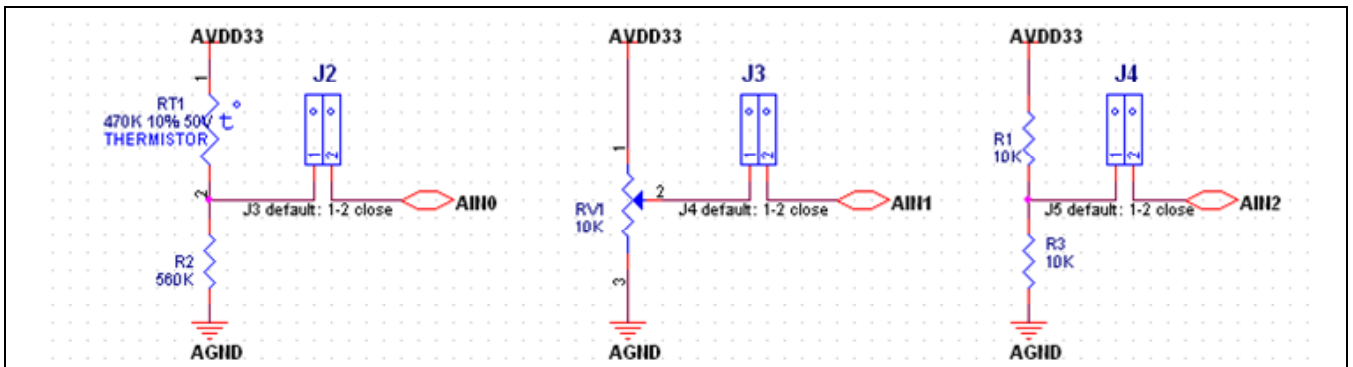
J21: A header pin group for MOTOR2

2.1.7 ADC BLOCK



J1: ADC input connector

J2, J3, J4: J2, J3 and J4 are selected to sample test with AIN0, AIN1 and AIN2



RV1: Variable Resistor

J24: ADC Power Source

Close: When connecting (short), AVDD is same to VDD33.

Open: AVDD is a second (right) pin of J24. So, AVDD should be connected to another power.

J7: 2,3 connection - ADTRG signal is generated by SW4

SW11, SW12: Control cap for each ADC input port.

3. TOTAL BLOCKS' UNIT & JUMPER SUMMARY

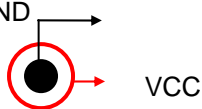
3.1 FUNCTION BLOCKS

Block	Symbols	Description
7-SEGMENT	U3	4Digit Segment
IMC	J20	MOTOR 1
	J21	MOTOR 2
UART	U14	RS-232 transceiver
	P41	RS-232 connector
SSP	U7	SPI8 interface EEPROM (8K × 8bit)
	U8	SPI16 interface EEPROM (4K × 16bit)
	J28	SPI block pin assignment
POWER	U11	3.3V generator regulator
LED	DS1	Red LED
	DS2	Green LED
	DS3	Yellow LED
BUZZER	BZ1	Buzzer

3.2 JUMPER CONNECTION

JP#	Description		Default Setting
J1	ADC block pin assignment	AIN0~AIN14	–
J2	AIN0 input voltage connector		Connect (Short)
J3	AIN1 input voltage connector		Connect (Short)
J4	AIN2 input voltage connector		Connect (Short)
J5	SW3_INPUT	VDDIO connects to INT7	Open
J6	Buzzer connector	T3PWM connects to Buzzer	Connect (Short)
J7	SW4_INPUT	VDDIO connects to INT8	Connect ADTRG
J8	LED signal connector	Port 0.0/0.1/0.2 connect to DS1, DS2, DS3	Connect (Short)

3.2 JUMPER CONNECTION (Continued)

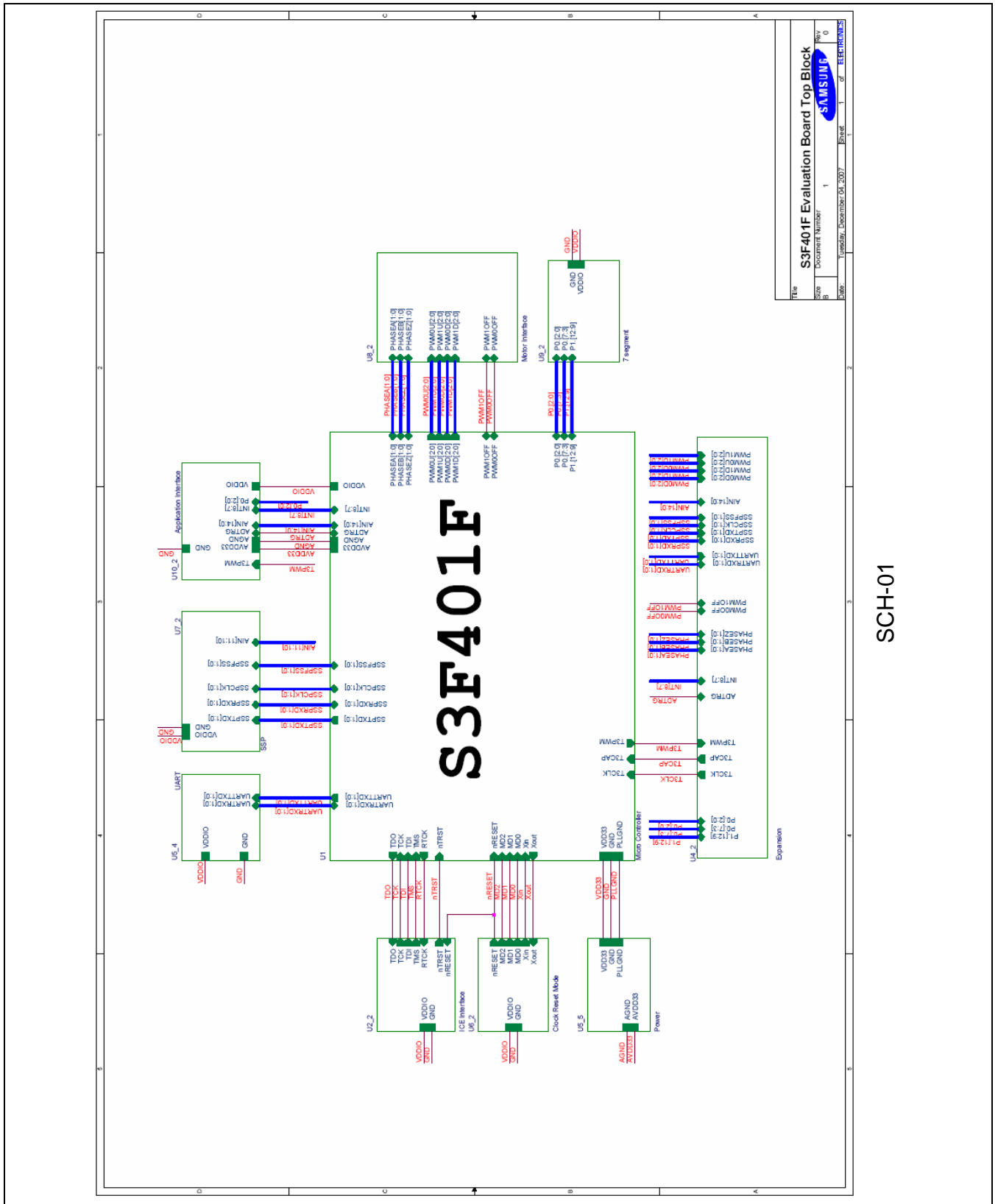
JP#	Description					Default Setting
J9	MODE selection	J9	J10	J11	MD[1:0]	All 2-3 connect :Normal Mode
J10		2-3	2-3	2-3	NORMAL	
J11		1-2	2-3	2-3	SPGM	
J12	Port assignment pin	Port 2				Open
J13	Port assignment pin	Port 1				Open
J14	Port assignment pin	Port 0				Open
J15	nTRST	The JTAG connects to nTRST				Open
J16	Chip socket connection	Chip socket board is connected with S3F401F-EVB.				Use the chip socket board
J17						
J18						
J19						
J20	MOTOR1	IMC0 and ENC0 signal connector				-
J21	MOTOR2	IMC1 and ENC1 signal connector				-
J22	Generated VDD33 voltage from U11_regulator (3.3V)	3.3V connects to VDD33				Join 1-2
J23	DC Power jack (9~18V)	 <p>The diagram shows a DC power jack with two terminals. The left terminal is labeled 'GND' and has a black dot with an arrow pointing to it. The right terminal is labeled 'VCC' and has a red dot with an arrow pointing to it.</p>				-
J24	AVDD	-				Open
J25	UART	-				Open
J26						

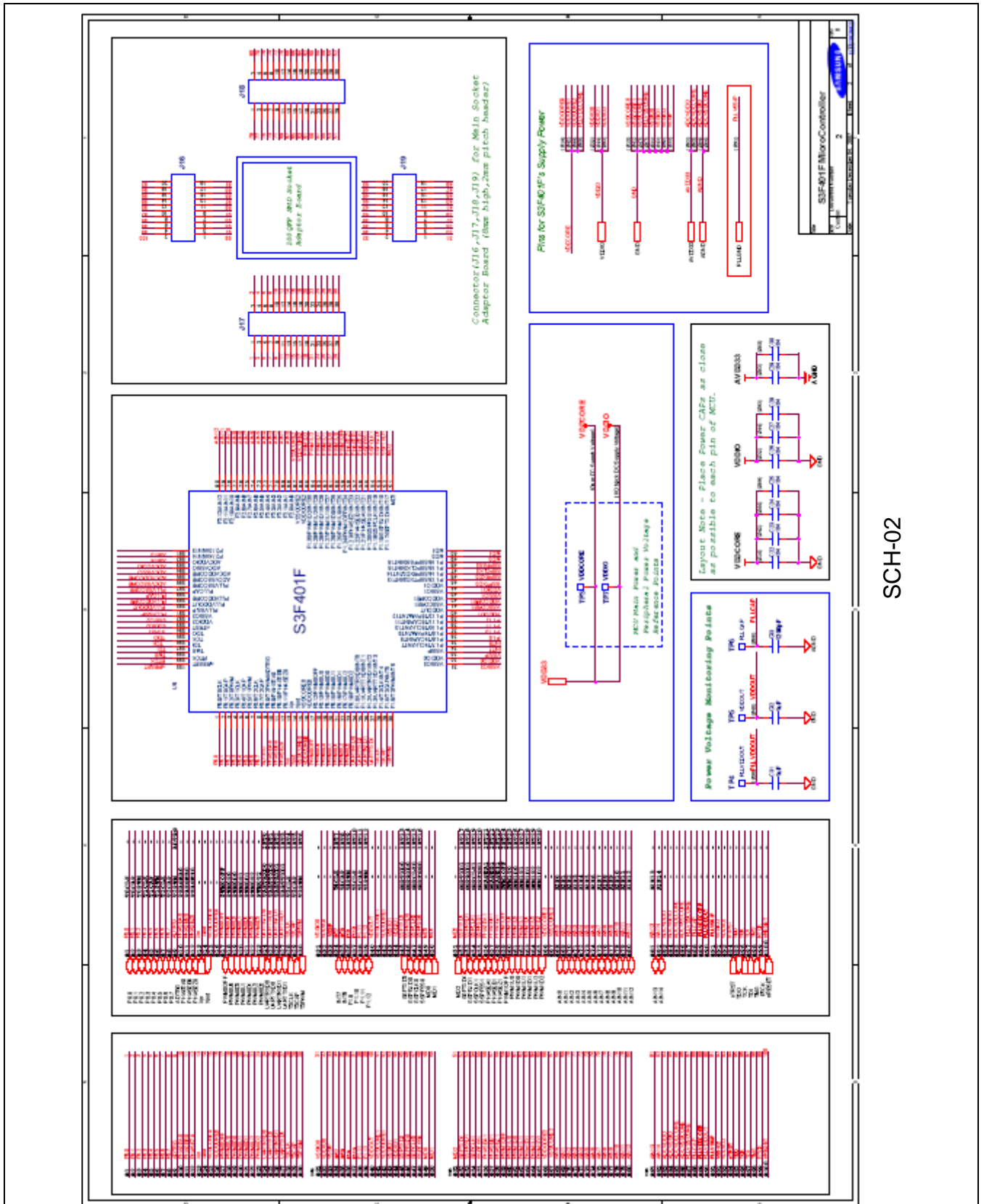
3.3 SWITCHES

SW#	Description	
SW1	7-Segment	ON: Port 0.0~0.7 connects to 7segment
SW2	Latch	ON: Port 1.9~1.12 connects to latch
SW3	INT7	LOW signal is generated by SW3
SW4	INT8	HIGH signal is generated by SW4
SW5	RESET	Reset signal is generated by SW6
SW6	Power_VIN	Power on switch
SW7	SSP16	Port connects to EEPROM
SW8	SSP16	Port connects to EEPROM
SW9	SSP8	Port connects to EEPROM
SW10	SSP8	Port connects to EEPROM
SW11	AIN	Port connects to ADC
SW12	AIN	Port connects to ADC

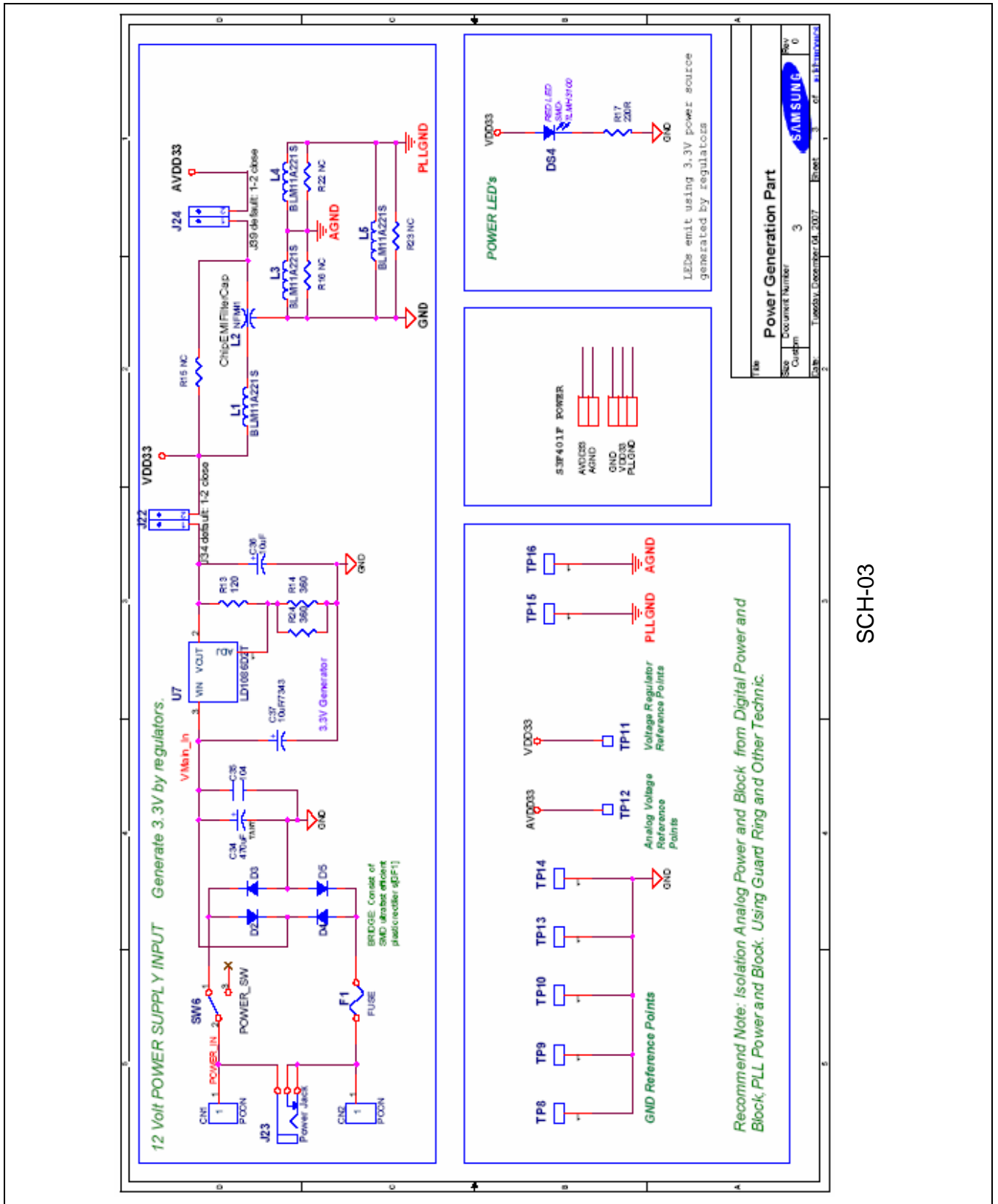
4. S3F401F-EVB REV 1.0 BOARD SCHEMATICS

SCH-01	EVB TOP Block Diagram	REV 1.0
SCH-02	S3F401F Micro-Controller	REV 1.0
SCH-03	System Power Generation	REV 1.0
SCH-04	Clock & Mode	REV 1.0
SCH-05	ADC, Interrupt & BUZZER	REV 1.0
SCH-06	JTAG Connector	REV 1.0
SCH-07	UART Communication	REV 1.0
SCH-08	SSP Communication	REV 1.0
SCH-09	IMC & ENC Signal	REV 1.0
SCH-10	7-Segment Display	REV 1.0
SCH-11	Expansion Connector	REV 1.0



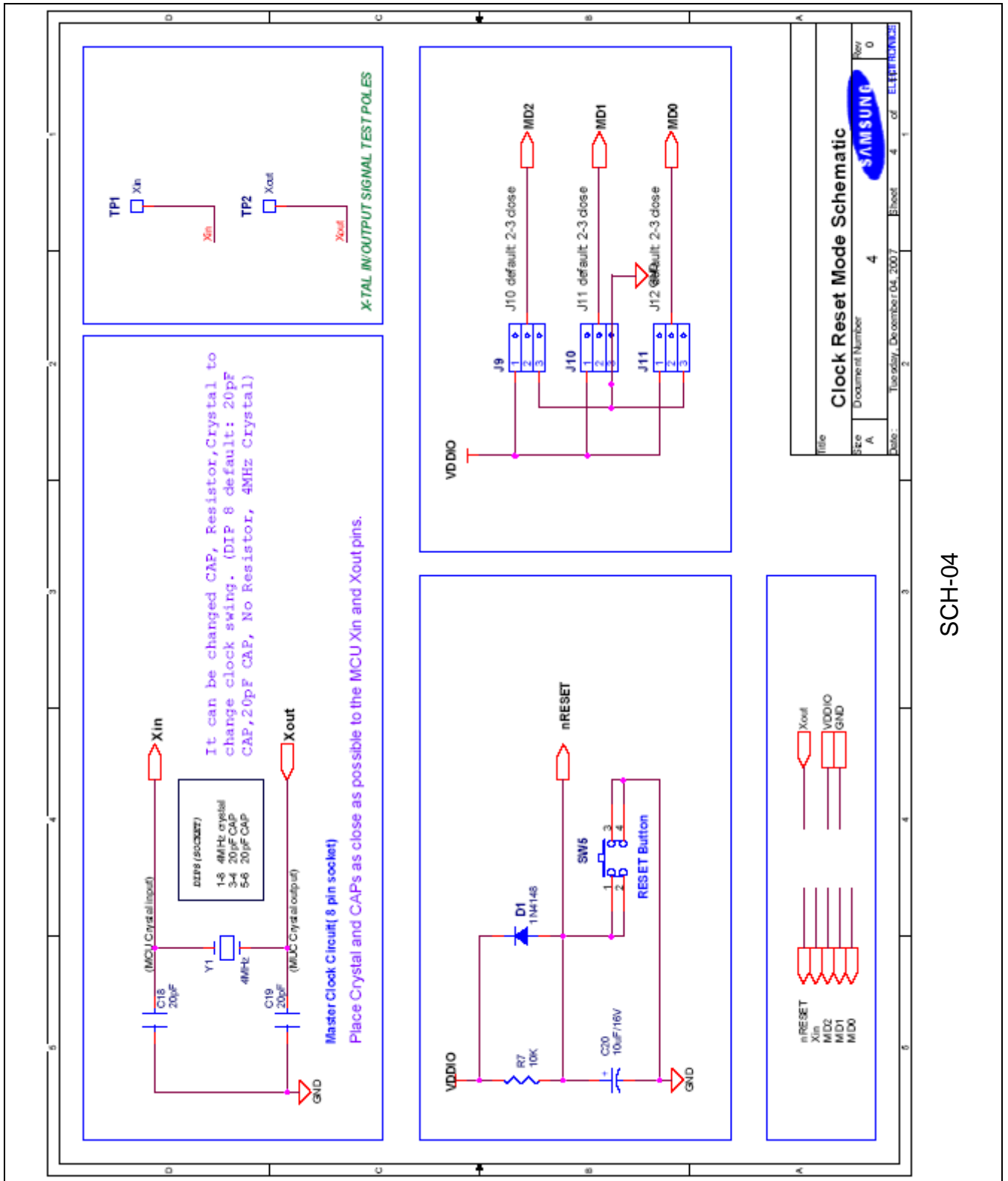


SCH-02



SCH-03





Clock Reset Mode Schematic

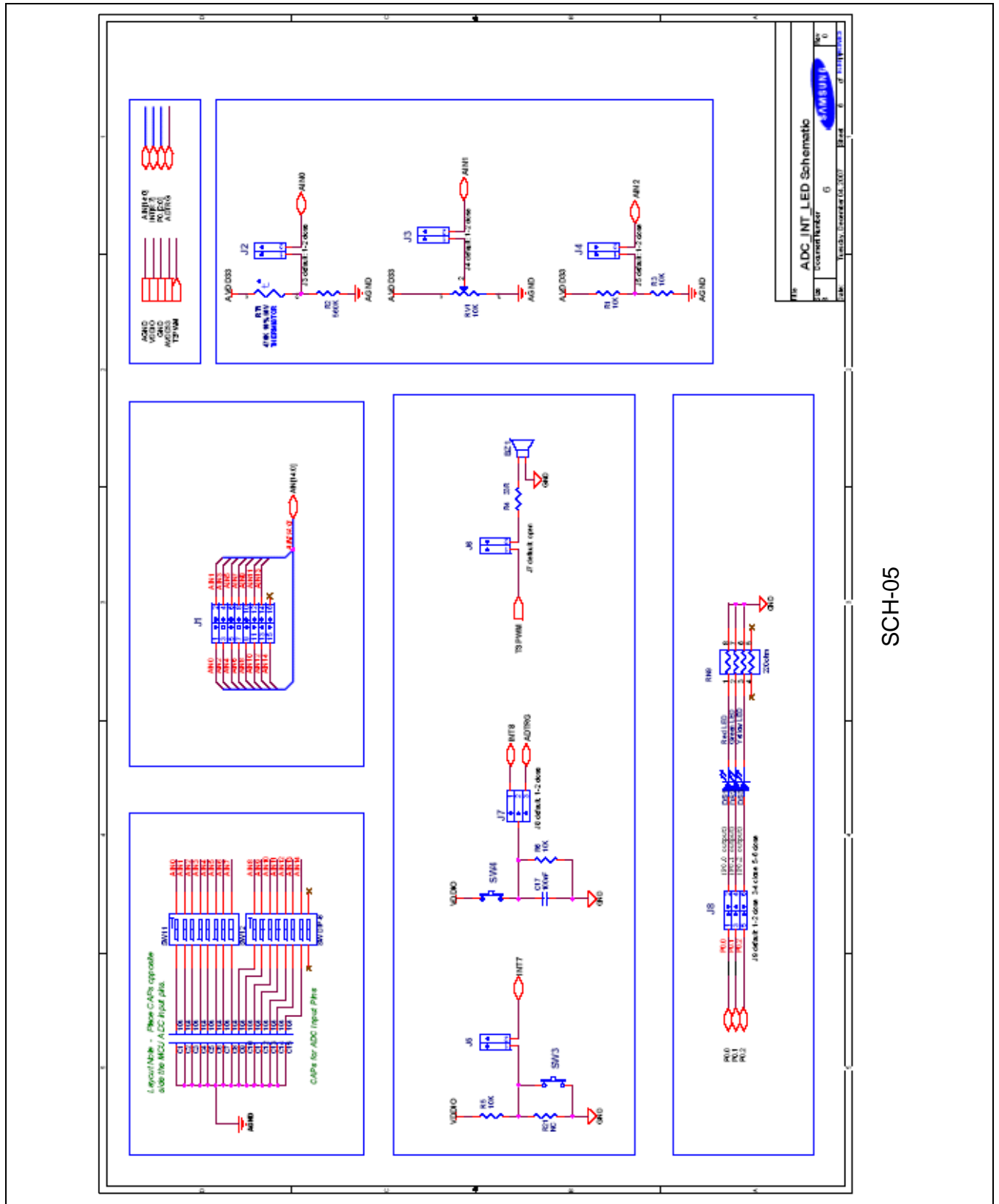
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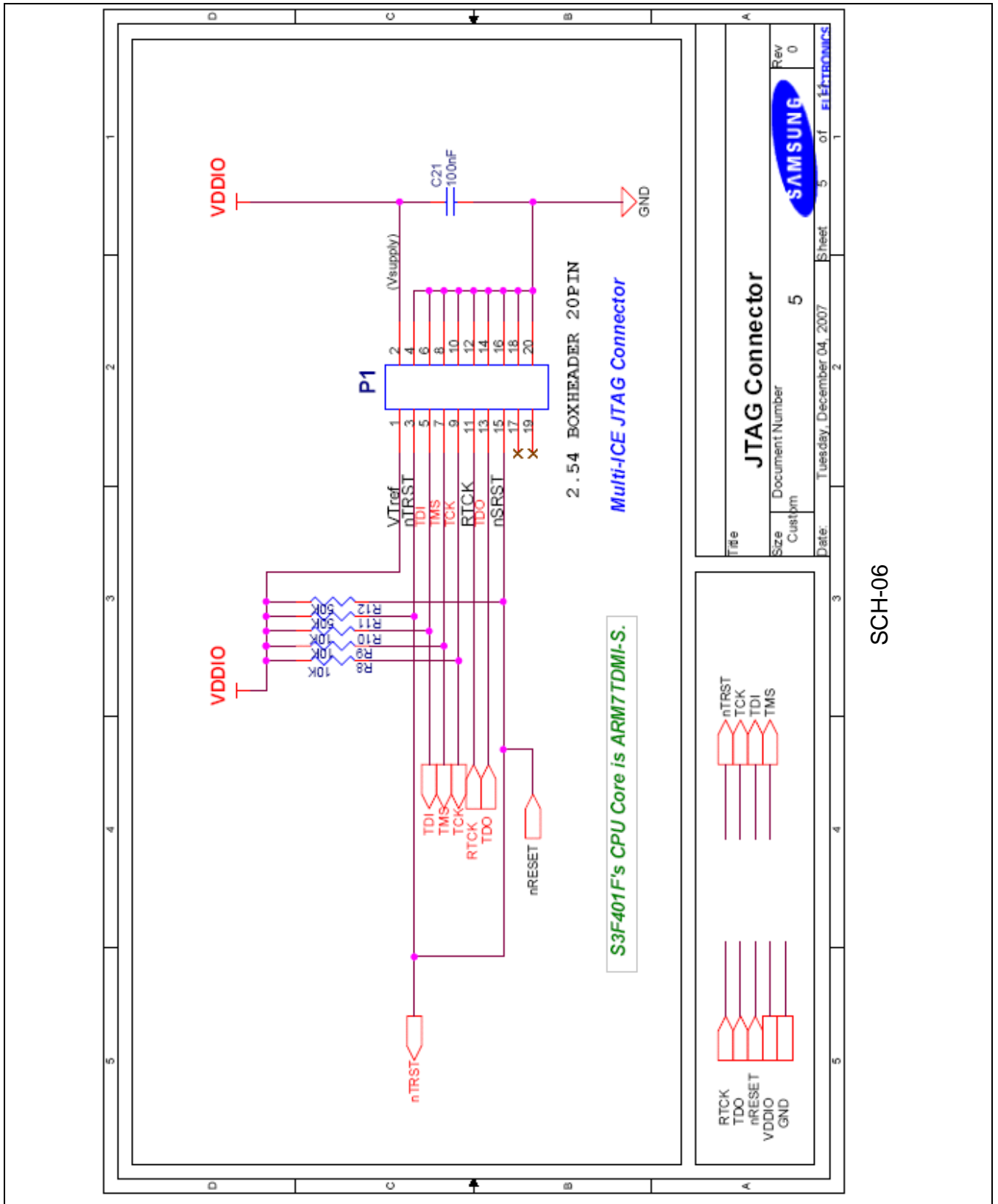
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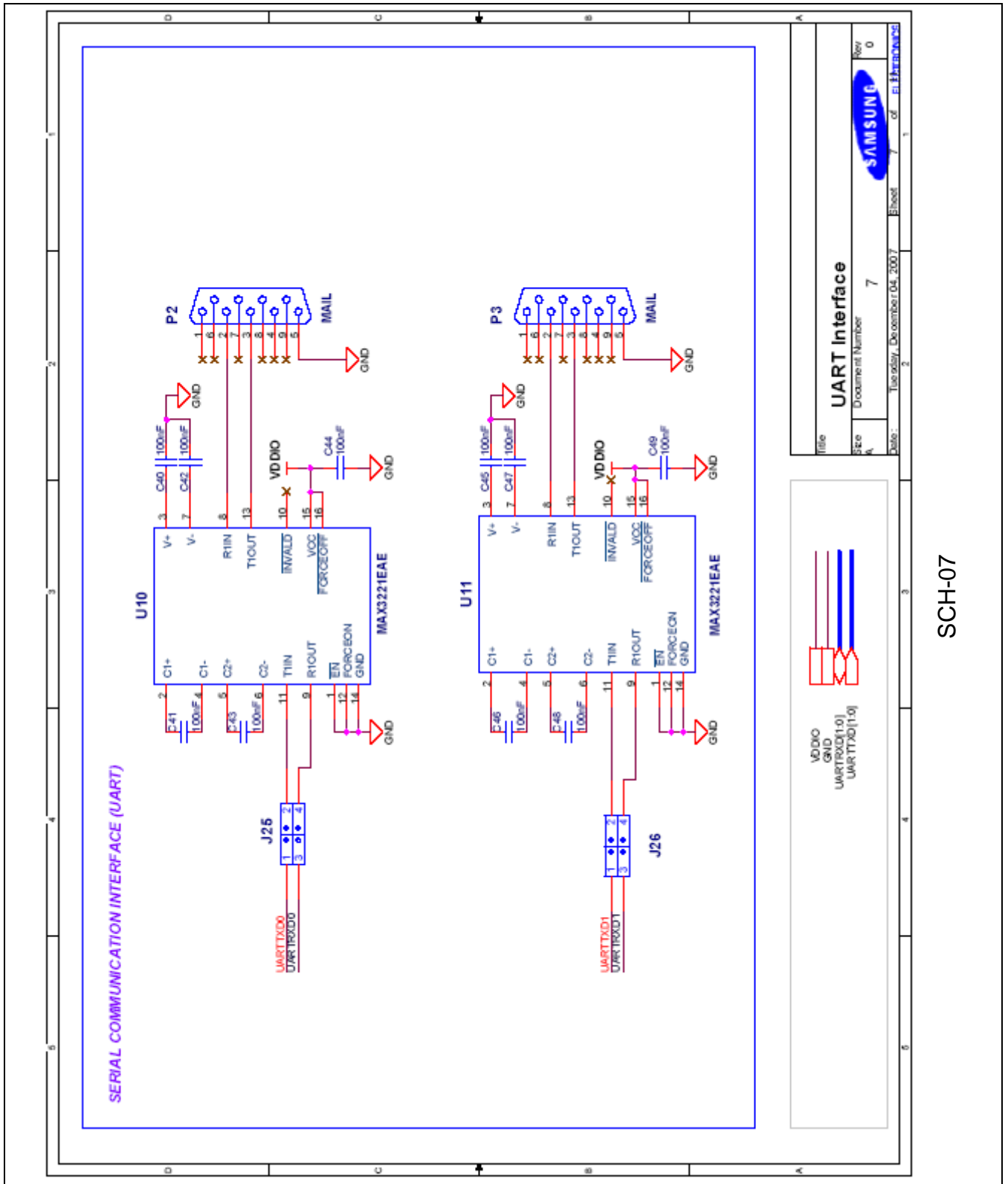


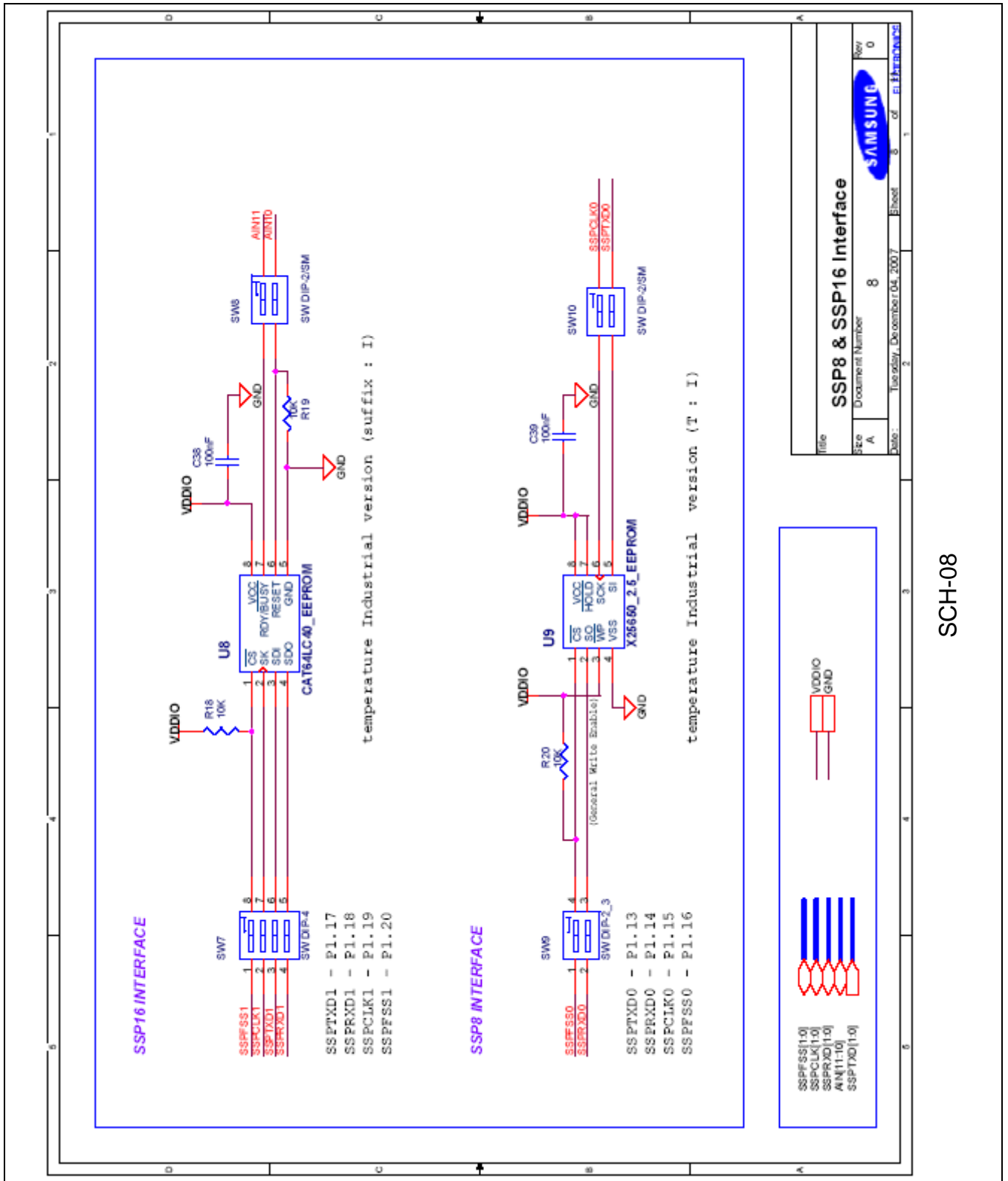


SCH-05

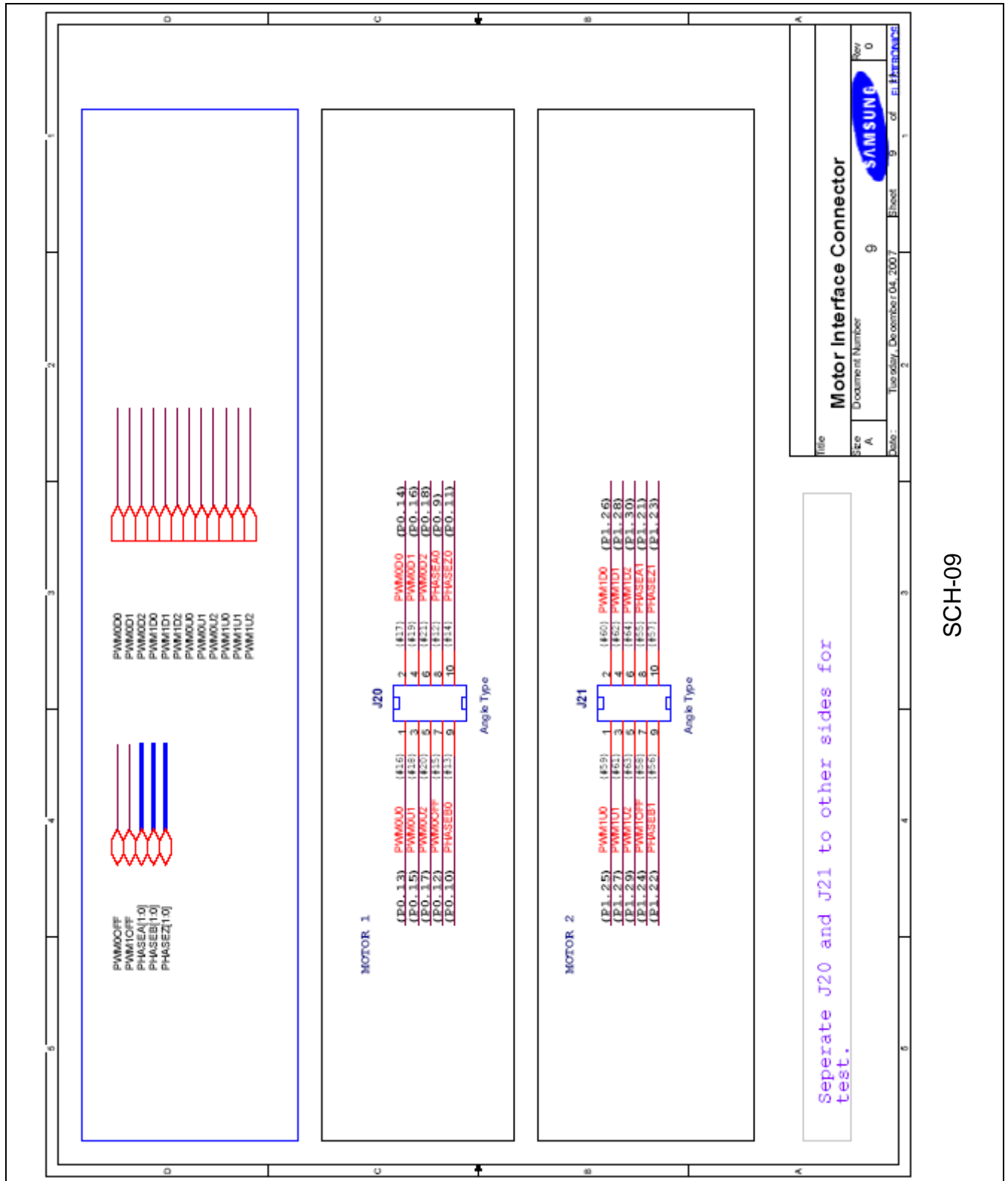


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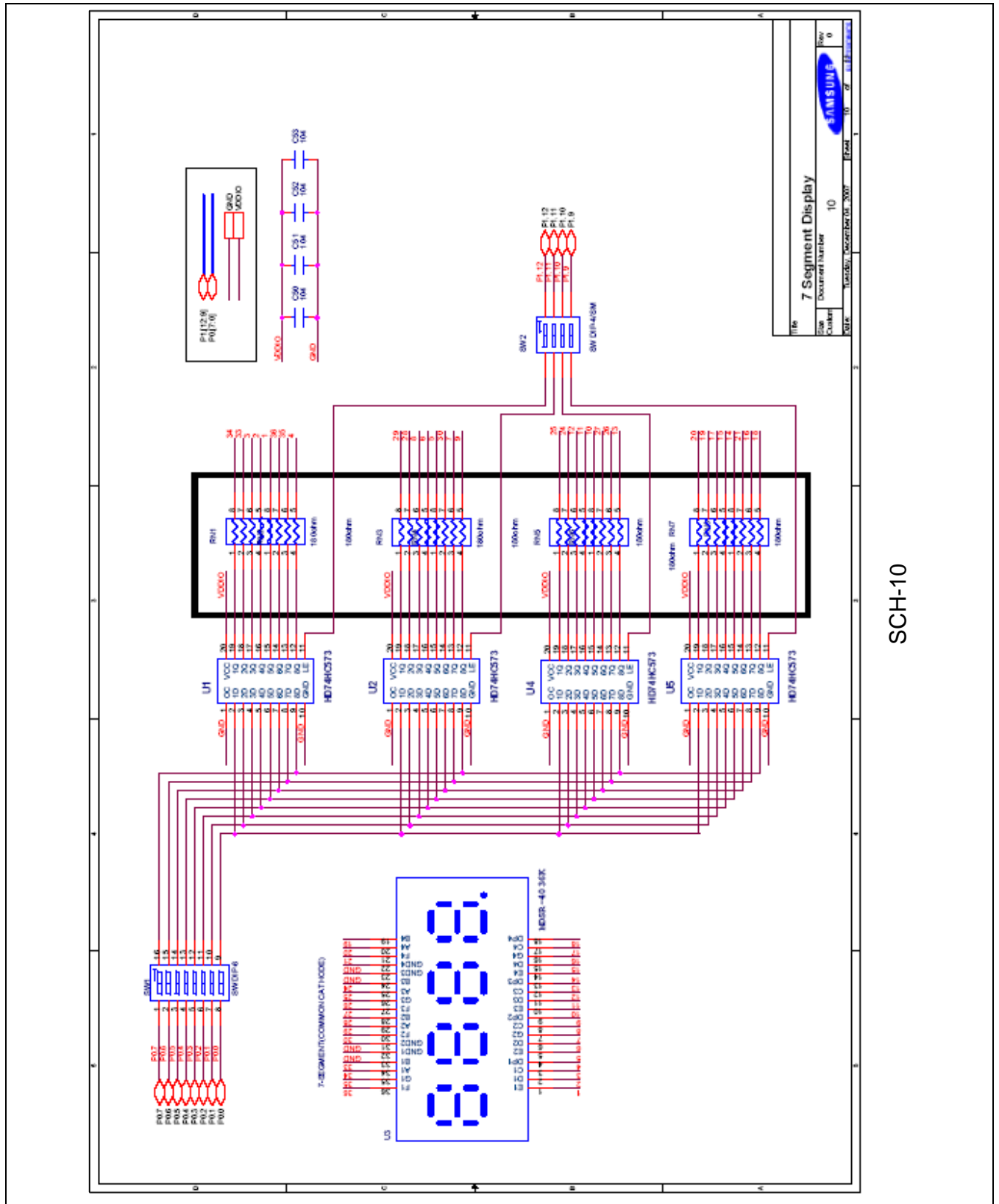


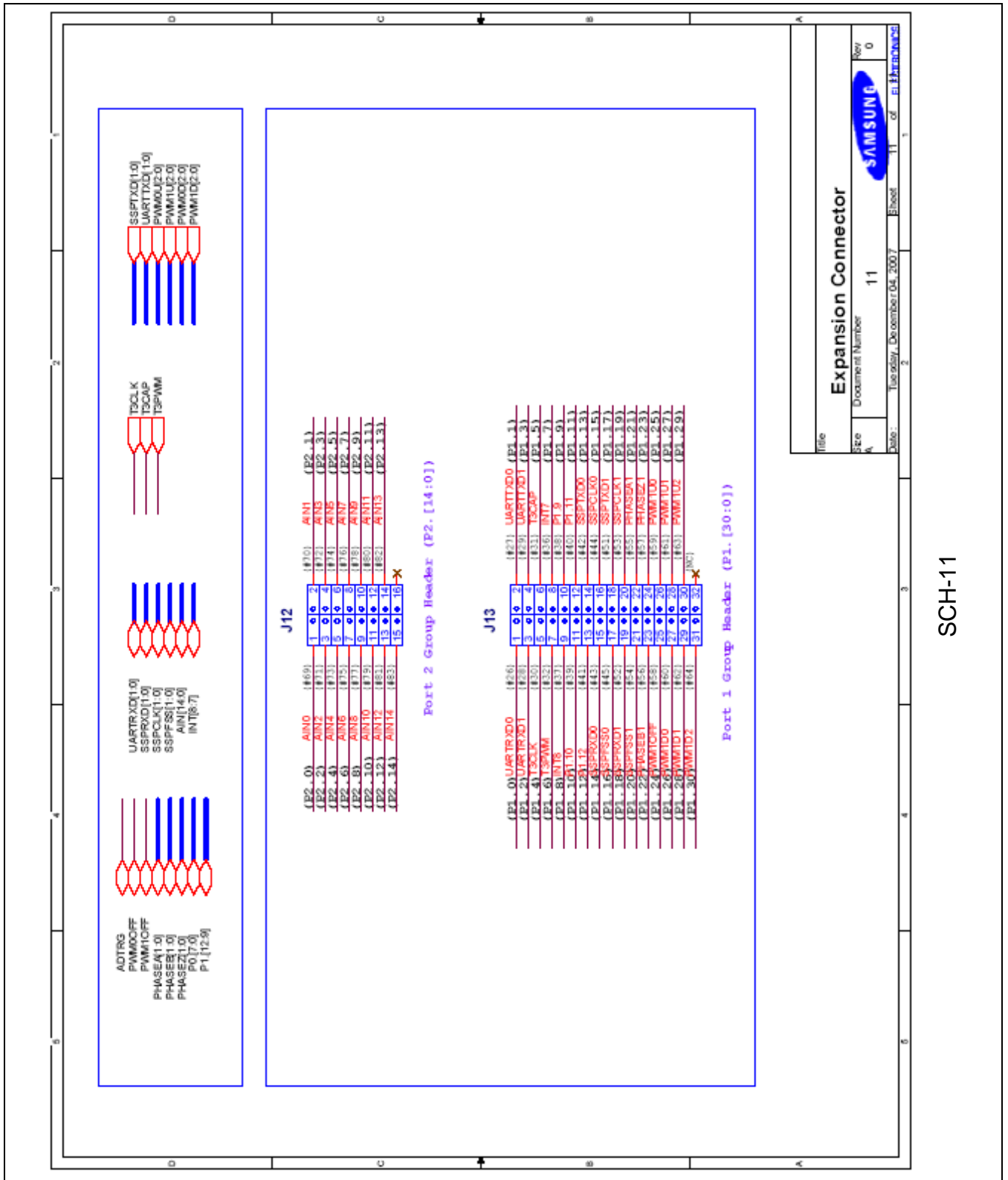


SCH-08



SCH-09





SCH-11



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