

**WT51F108S/104S  
Starter Kit Board  
Operation Manual  
REV. 1.0  
May 26, 2016**

Ver.	Date	Applicant	Description
1.0	2016/05/26	Louis	1 <sup>st</sup> version

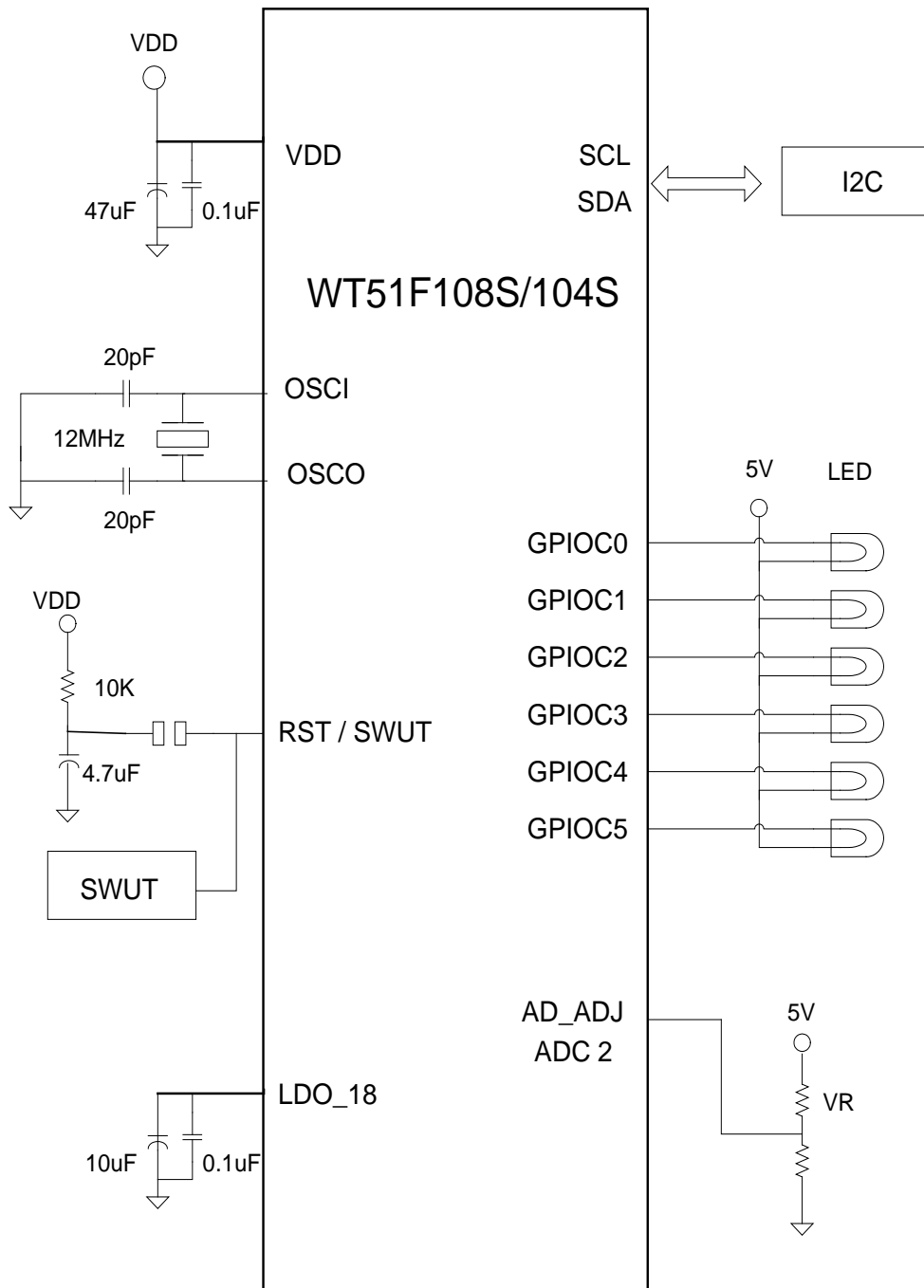
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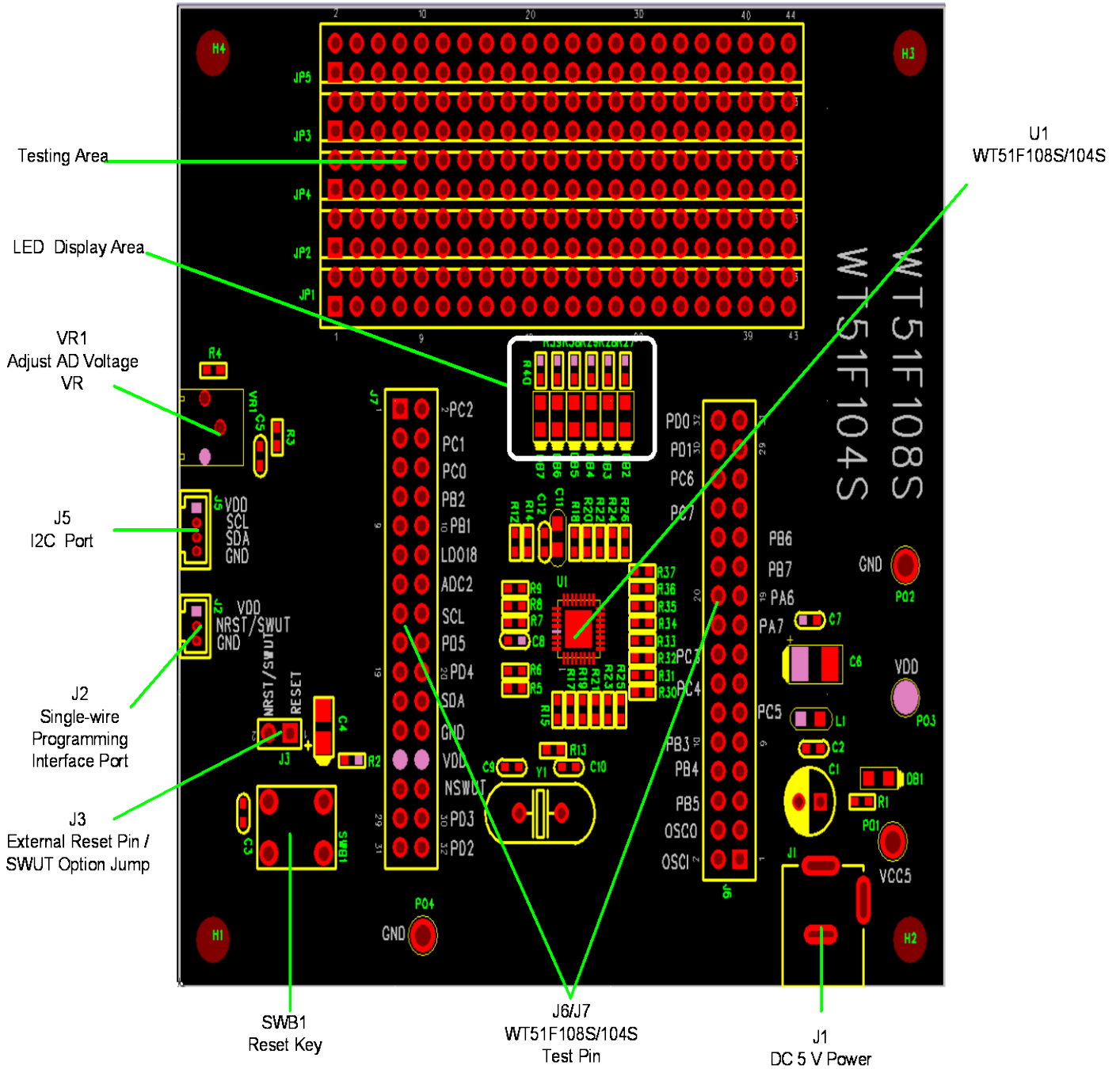
**Chapter 1 WT51F108S/104S Starter Kit Board Hardware Description**

**1.1 System Block Diagram**

WT51F108S/104S is an enhanced 8052 Micro Controller with a variety of peripheral functions, and the Starter Kit Board is designed for 32-pin QFN type IC to demonstrate its functions. System structure is as the figure below.



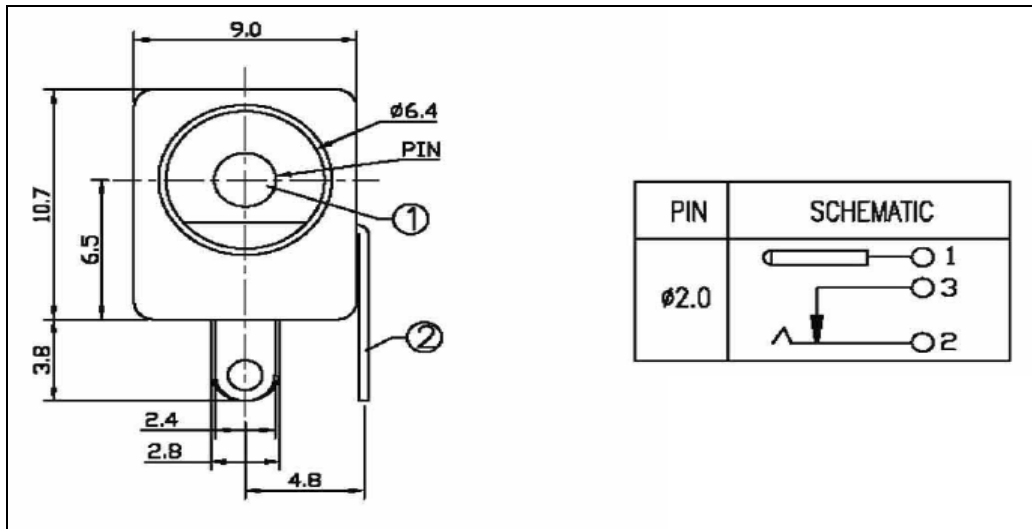
**1.2 Starter Kit Board Components Location**



**Chapter 2 WT51F108S/104S Starter Kit Board I/O Port Description**

**2.1 DC Input Connector (J1)**

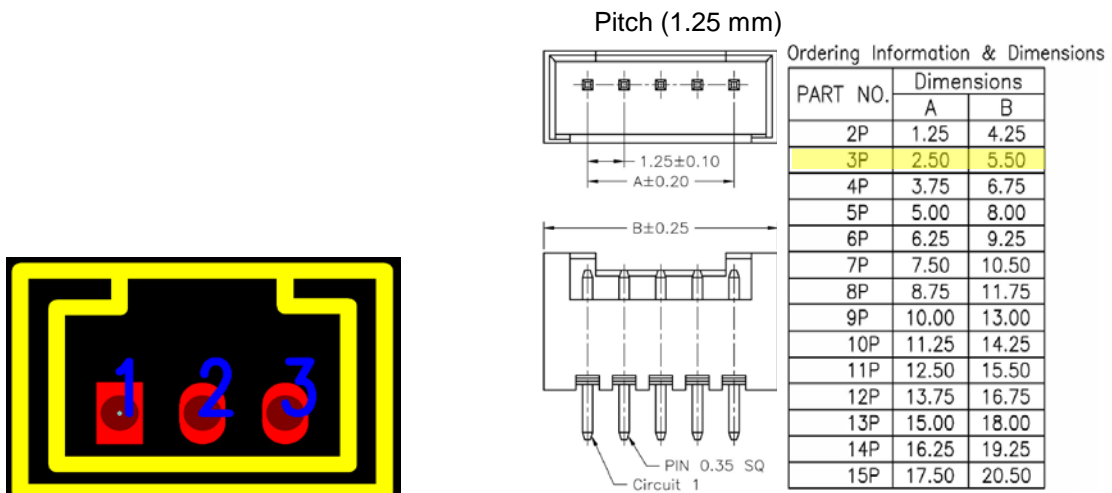
This is DC input connector for Starter Kit Board (supporting voltage: DC 5V).



Pad Number	Description
1	Positive Input Pin
2	--
3	Negative Input Pin

**2.2 SWUT (Single-wire UART) Programming Interface Port (J2)**

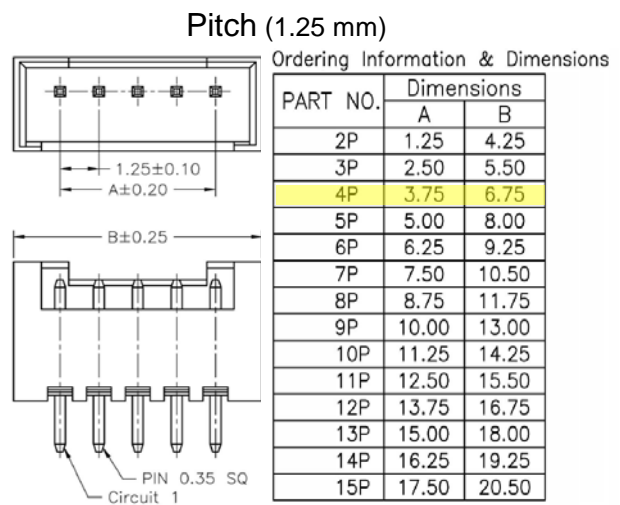
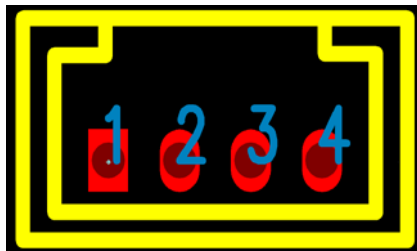
WT51F108S/104S Single-wire programming port as below:



Pad Number	Description
1	VDD
2	SWUT
3	GND

### 2.3 WT51F108S/104S I<sup>2</sup>C Interface Port

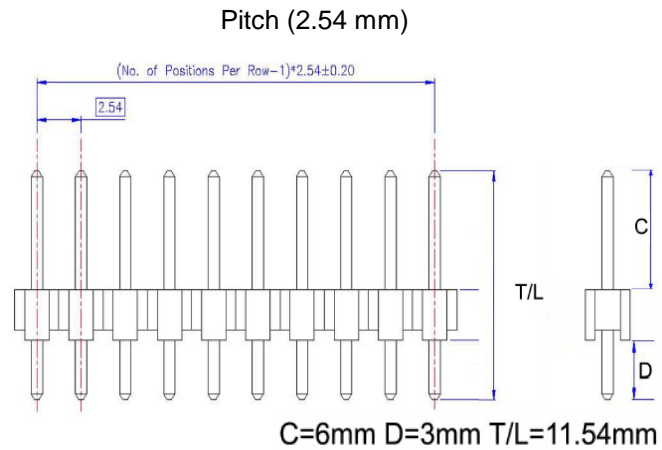
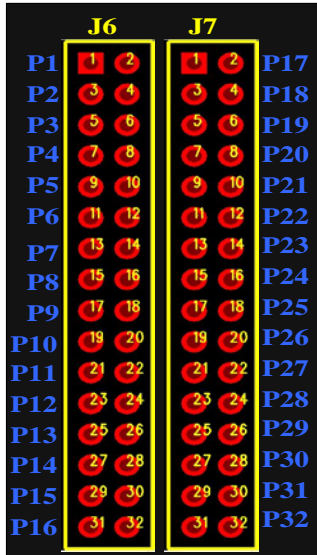
Components Location (J5): Slave I<sup>2</sup>C Interface Port.



Pad Number	Description
1	VDD
2	Slave_SCL
3	Slave_SDA
4	GND

## 2.4 Test Pins (J6/J7)

These are testing signal pins.



J6		J7	
Pad Number	Description	Pad Number	Description
1-2	GPIOA5DH/IRQ15/ADC15/OSCI/PWM1B/P00	1-2	GPIOC2D/ PWM2C/P06
3-4	GPIOA4DH/IRQ14/ADC14/OSCO/PWM0B/P01	3-4	GPIOC1D/IRQ7/ADC7/P05
5-6	GPIOB5D/IRQ12/ADC12/RXA/PWM1A/P02	5-6	GPIOC0D/IRQ6/ADC6/PWM3B/P04
7-8	GPIOB4D/IRQ11/ADC11/TXA/PWM1D/P03	7-8	GPIOB2D/IRQ5/ADC5/STB/PWM0D
9-10	GPIOB3D/IRQ10/ADC10/PWM0A	9-10	GPIOB1D/IRQ4/ADC4/MOSI/PWM3A
11-12	GPIOC5D/IRQ9/ADC9	11-12	LDO18
13-14	GPIOC4D/IRQ8/ADC8	13-14	GPIOA2DH/IRQ2/ADC2/CMPO/PWM1C
15-16	GPIOC3D/PWM3C/P07	15-16	GPIOA1DHIRQ1/ADC1/VREF/ CMPN/SCKA/MISOB/RXA/SCL/PWM2B
17-18	GPIOA7DH	17-18	GPIOD5
19-20	GPIOA6DH	19-20	GPIOD4
21-22	GPIOB7D	21-22	GPIOA0DH//IRQ0/ADC0/CMPP/MISOA/ SCKB/TXA/SDA/PWM0D
23-24	GPIOB6D	23-24	VSS
25-26	GPIOC7D	25-26	VDD
27-28	GPIOC6D	27-28	GPIA3D/IRQ13/ADC13/NRST/SWUT
29-30	GPIOD1	29-30	GPIOD3
31-32	GPIOD0	31-32	GPIOD2



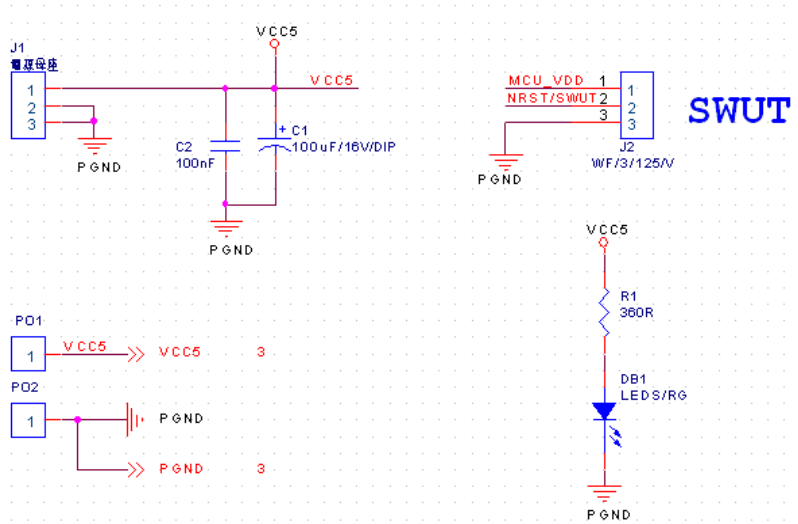
**Chapter 3 WT51F108S/104S Starter Kit Board Circuit Description**

**3.1 VDD Power Selection**

There are three main power options for WT51F108S/104S Starter Kit Board.  
(External power input cannot exceed Max. 5.5V as spec. definition).

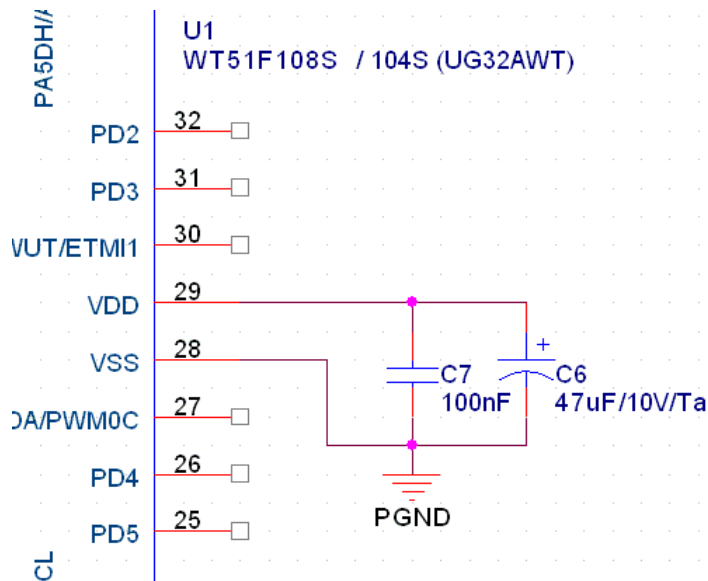
1. 5V adapter (Select input is 5V by J1), J1 DC Jack (VDD)
2. External VDD: PO1 positive input, PO2 negative power, external VDD cannot exceed Max 5.5V as spec. definition.
3. WLINK-SWUT VDD: Using WLINK-SWUT MCU\_VDD as WT51F108S/104S VDD power.

If power works normally, DB1 LED will light up.



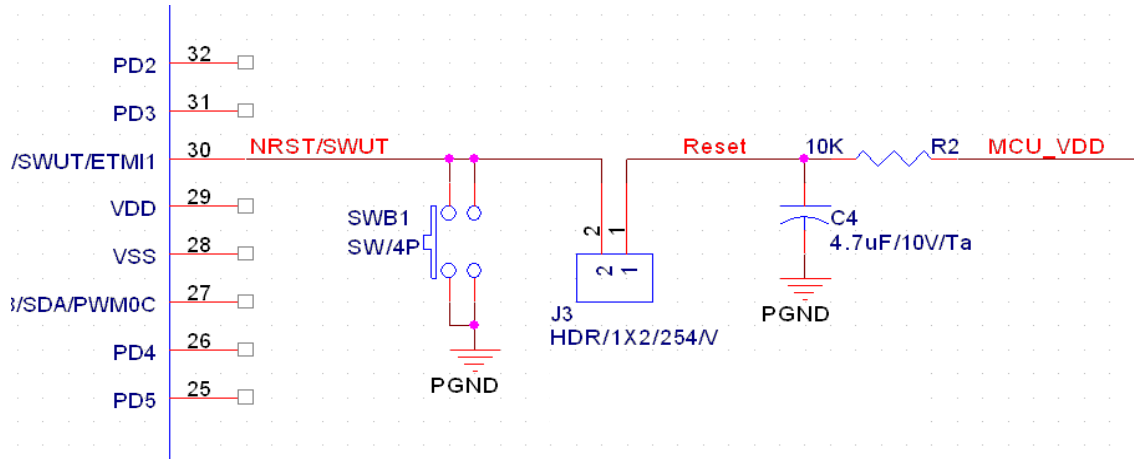
**3.2 Power circuit**

VDD power input should be with filter capacitance, this is best that the layout is close to the pin.



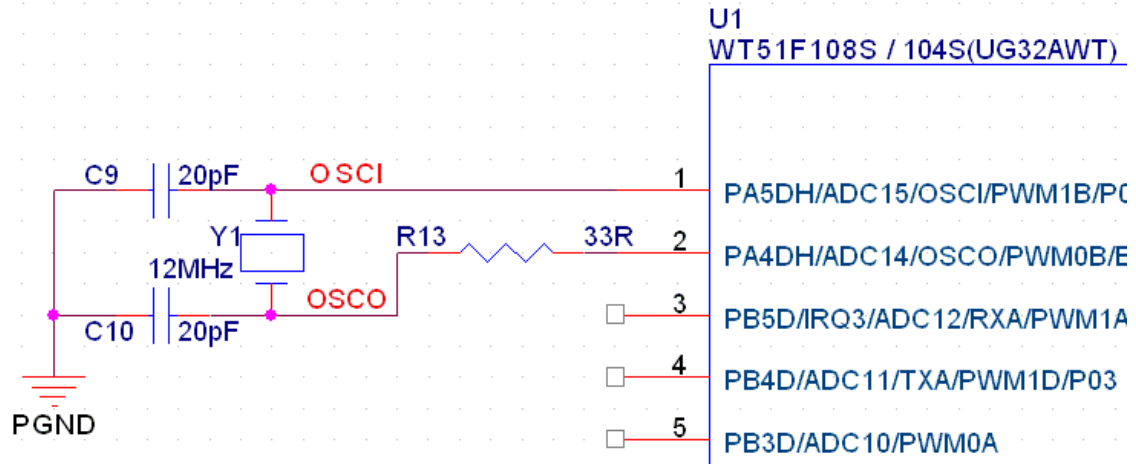
### 3.3 RESET Circuit

WT51F108S/104S RESET circuit and SWUT (Single-wire programming) use the same pin, the related circuit description as below. When SWUT on programming, J3 JUMP should be removed, and disconnect from the external RC RESET. After programming finished, J3 JUMP should be plugged in again, if the REST function had been used.



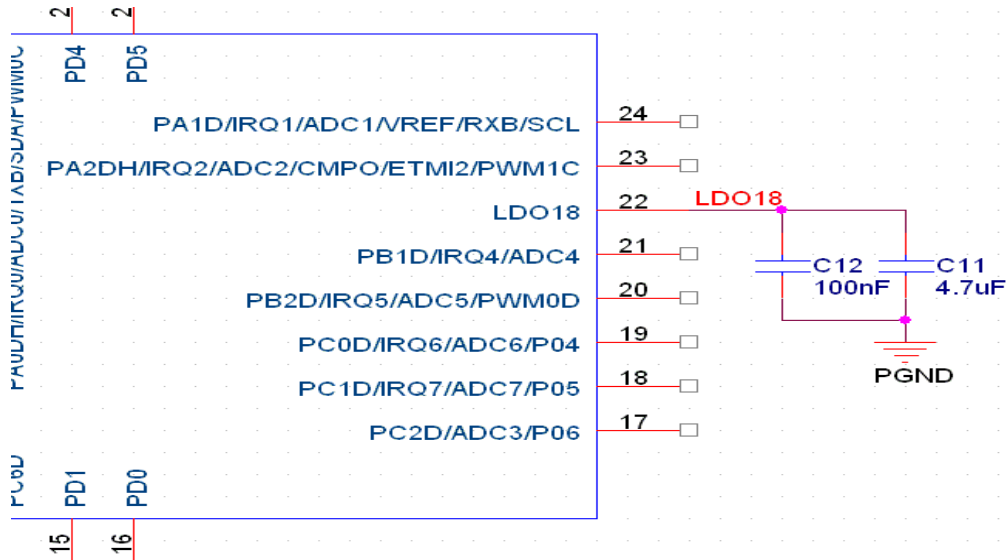
### 3.4 Oscillate Circuit

WT51F108S/104S oscillates circuit as bellow:



### 3.5 LDO 18 Filter Circuit

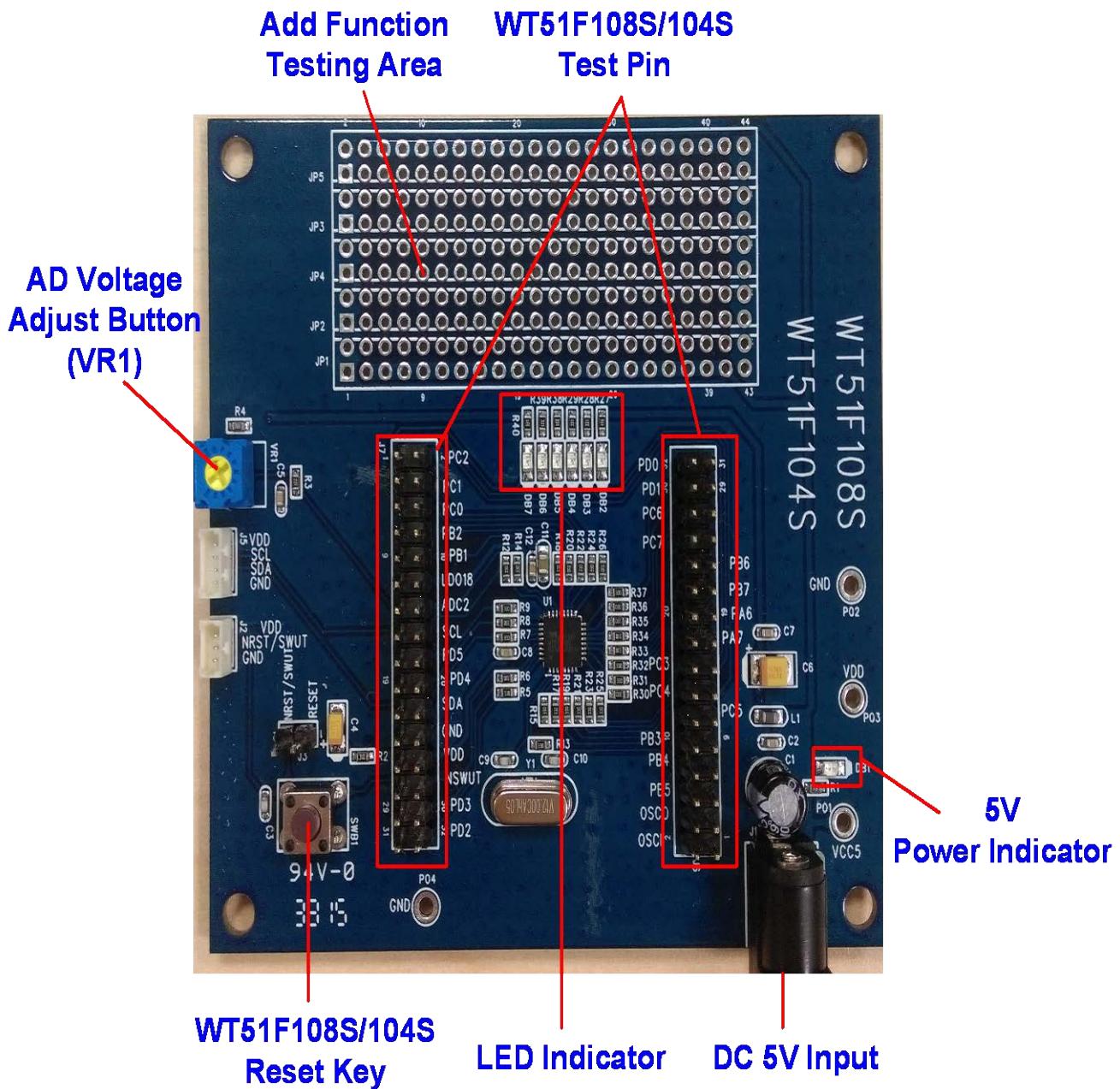
WT51F108S/104S LDO18 filter circuit as below illustrated:



**Chapter 4 WT51F108S/104S Starter Kit Board Operation Manual**

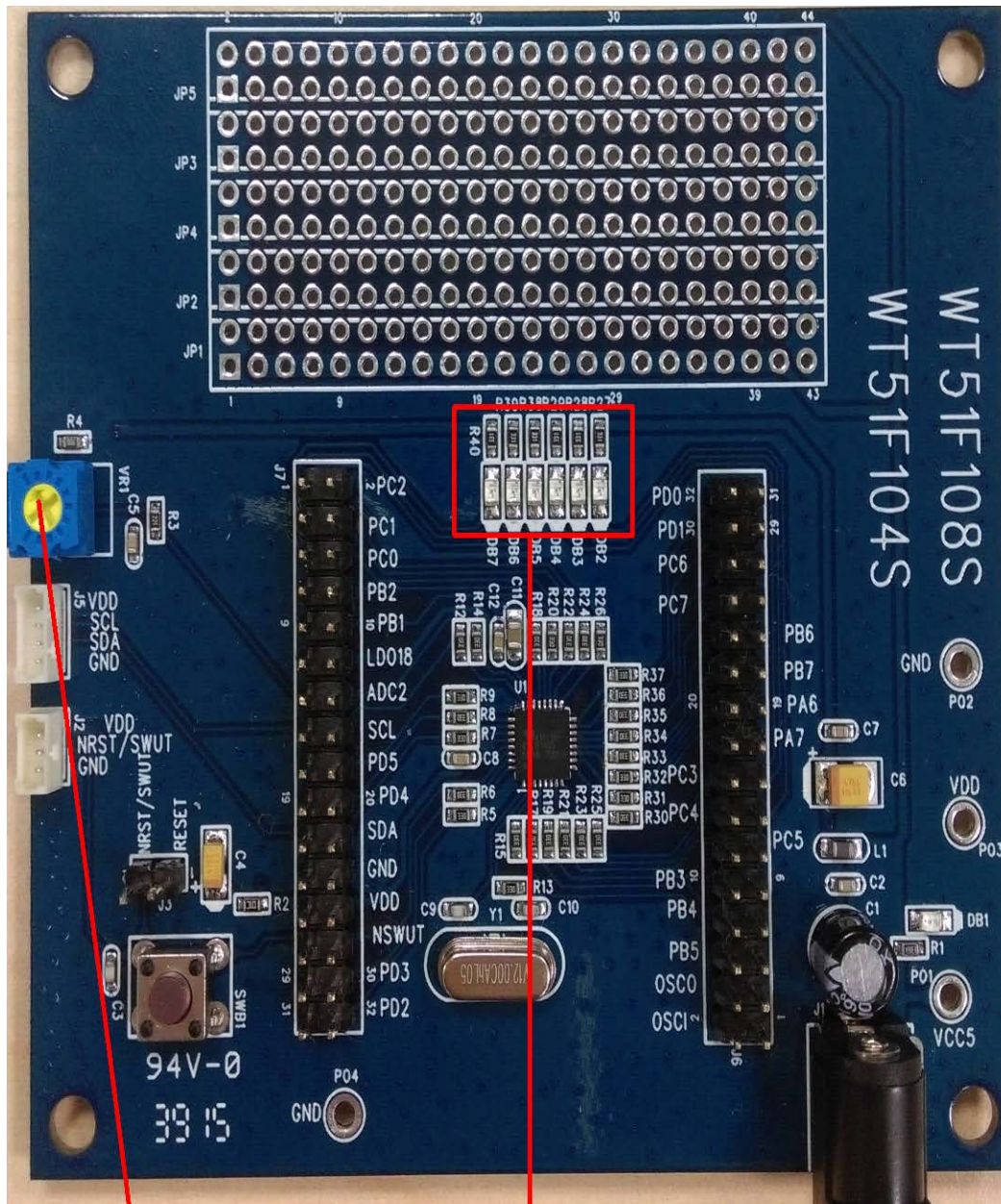
**4.1 WT51F108S/104S testing and demo platform**

WT51F108S/104S Starter Kit Board built-in a single and easy LED flash to display functions, and reserved some pins for testing usage.



## 4.2 LED display

After Power on, LED will alternately blink on the Starter Kit Board. Meanwhile, adjusting VR1 can change LED blinking speed.



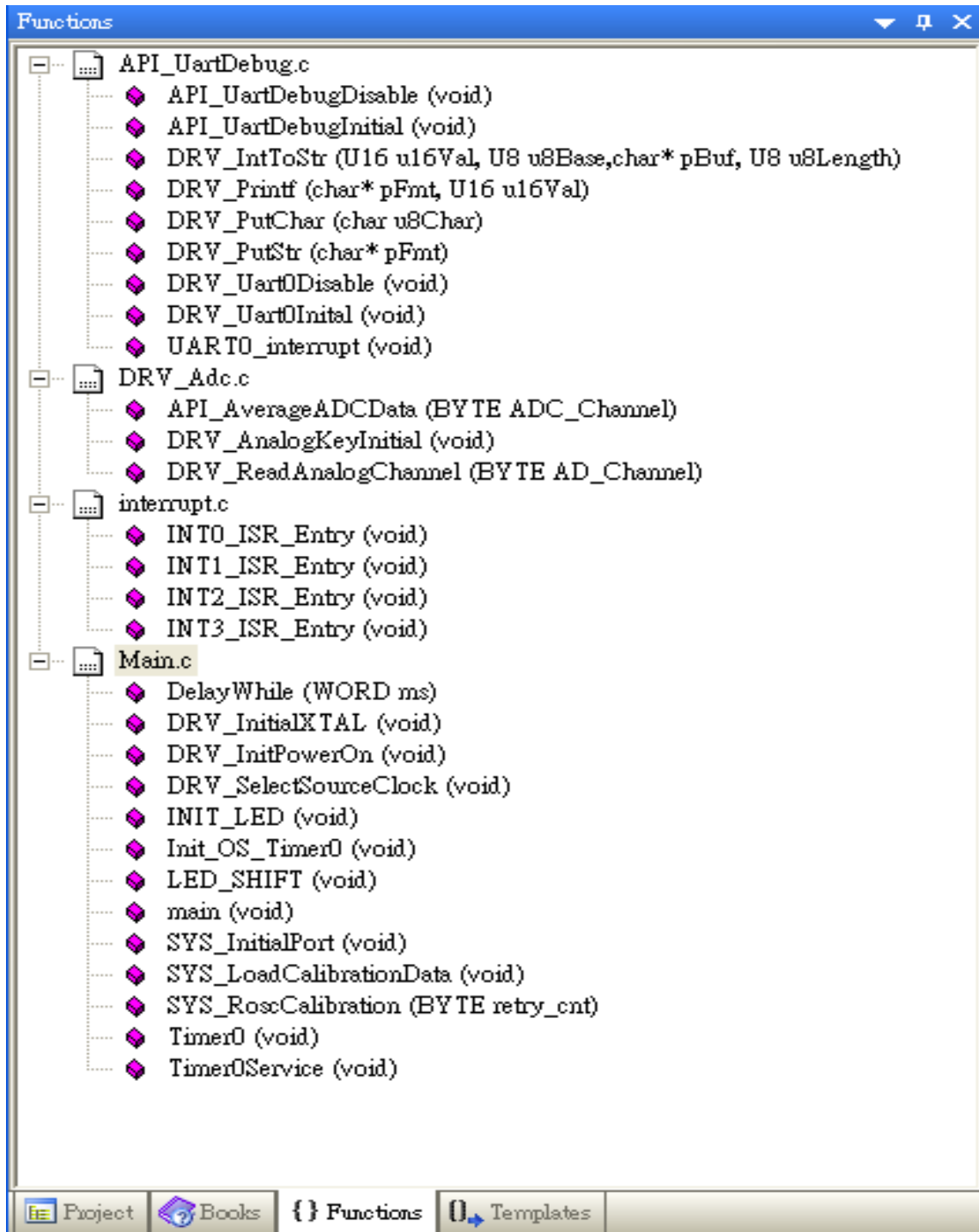
**AD Voltage  
Adjust Button  
(VR1)**

**LED Indicator**

## Chapter 5 Driver Module

### 5.1 Driver Module Summary

Please refer to the Driver module display, as below:



## 5.2 LED Driver Module <LED.C>

Function	Description
void DelayWhile(WORD ms)	NOP Delay Sub-Program
Void DRV_InitialXTAL(void)	Initialize oscillator parameters
void DRV_InitPowerOn(void)	Call Timer 0 and ADC to initialize the functions
void SelectSourceClock(void)	MCU Source clock select internal IRC 12 MHZ and enable external oscillator 32.768 kHz
void INIT_LED (void)	Initialize LED counter and initialize LED pins as output ports
void Init_OS_Timer0(void)	Initialize Timer 0 count 10ms generate an interrupt
void LED_SHIFT (void)	Led shift light program
void SYS_InitialPort(void)	Initialize all GPIO as input ports and enable internal pull-up resistors
void SYS_LoadCalibrationData(void)	Load Default IRC 12 MHZ correction value to register
void SYS_RoscCalibration(BYTE retry_cnt)	Auto calibration internal IRC 12 MHZ $\pm 2\%$
void Timer0 (void) interrupt 1	Timer 0 interrupts sub-Program
void Timer0Service(void)	Timer 0 service program

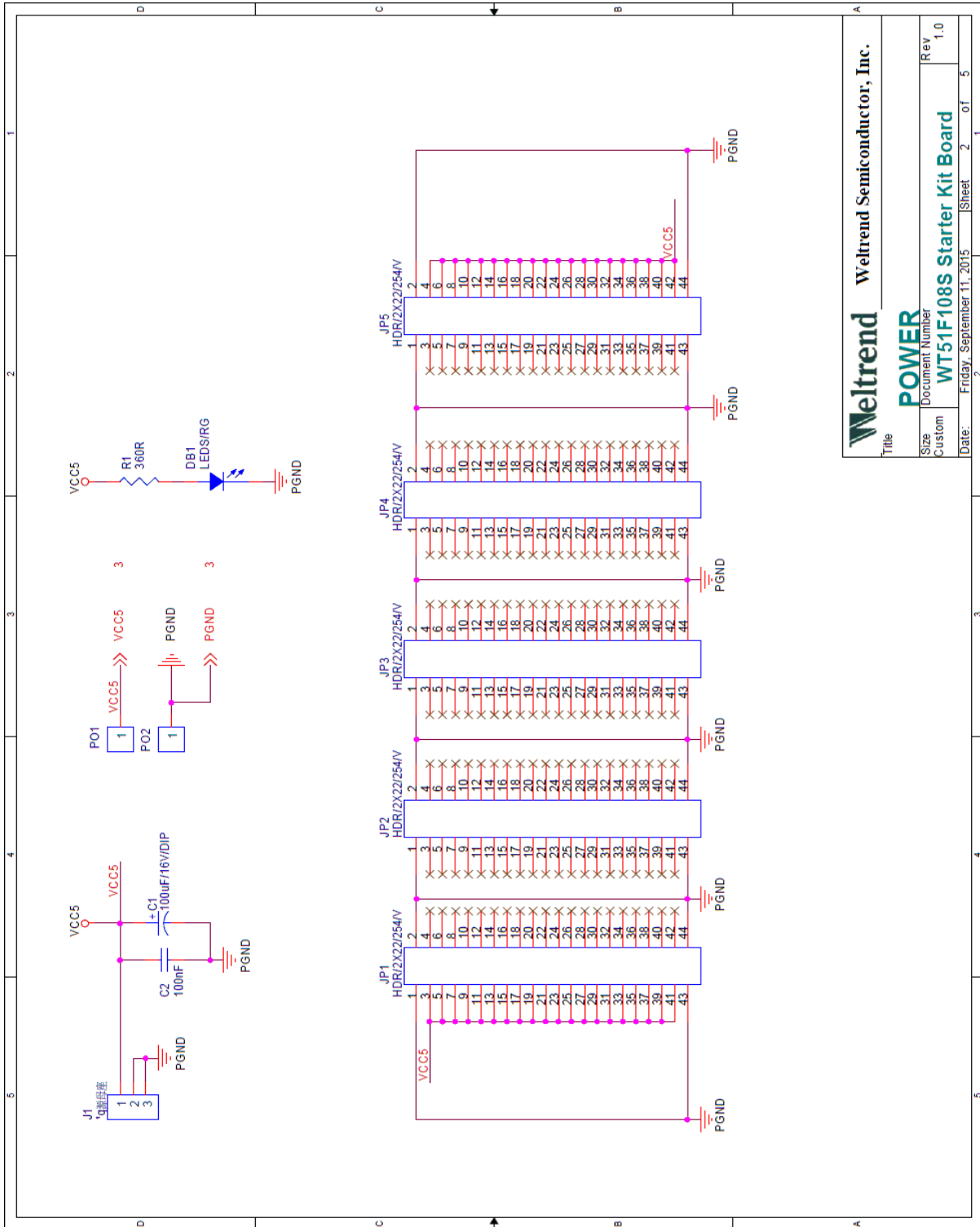
## 5.3 ADC Driver <DRV\_Adc.c>

Function	Description
WORD API_AverageADCDData(BYTE ADC_Channel)	Sampling analog to digital average (16 times)
void DRV_AnalogKeyInitial(void)	Initialized Analog to Digital convert
WORD DRV_ReadAnalogChannel(BYTE AD_Channel)	Assigned channel executing Analog to Digital

**Chapter 6 Appendix**

**6.1 Circuit**

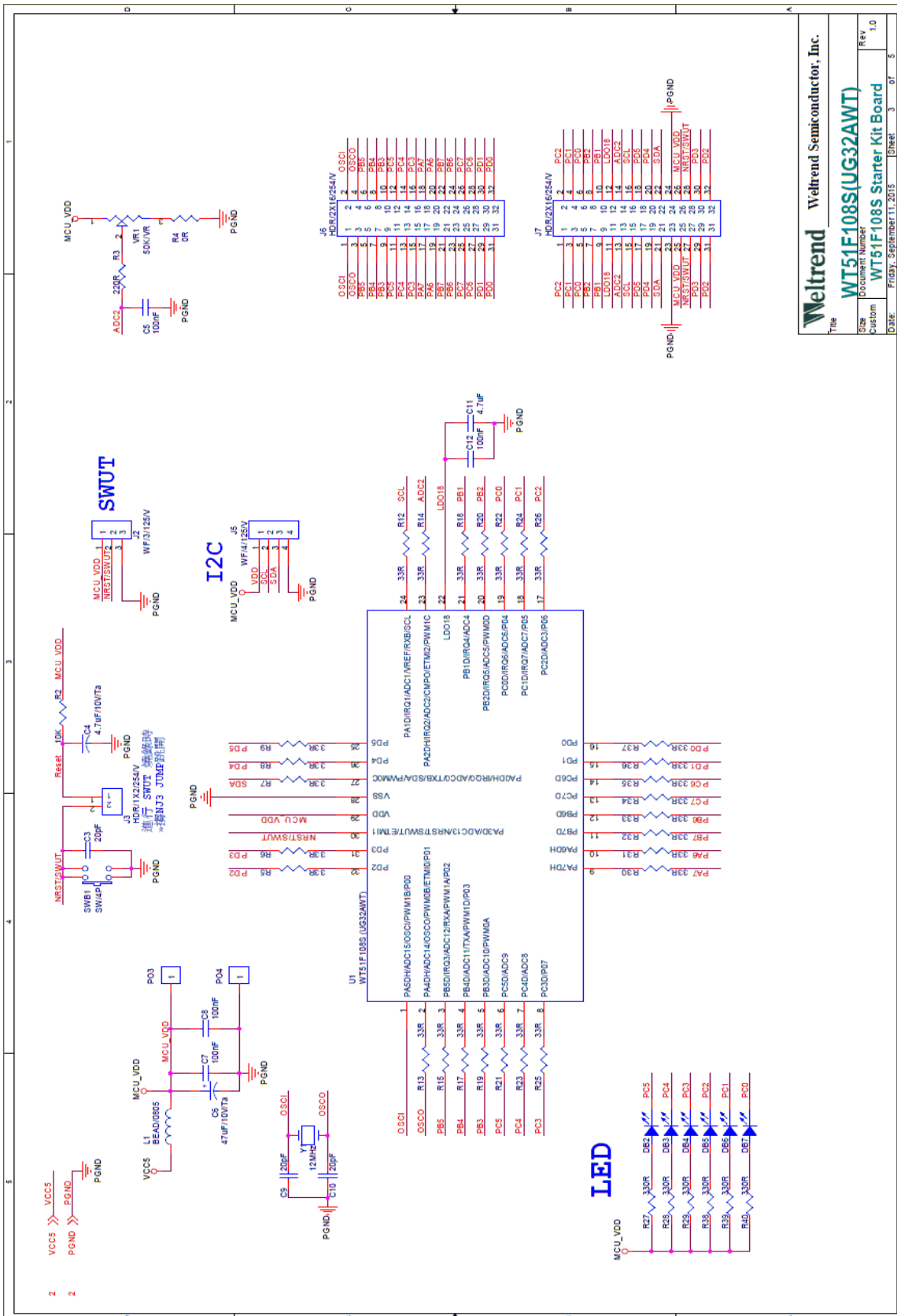
1. Power



Title		Weltrend Semiconductor, Inc.		
Size	Document Number	Rev		
Custom	WT51F108S Starter Kit Board	1.0		
Date:	Friday, September 11, 2015	Sheet	2	of 5



## 2. WT51F108S/104S (MCU)



**Weltrend** Weltrend Semiconductor, Inc.

Title: WT51F108S(U32AWT)

Size: Custom

Document Number: WT51F108S Starter Kit Board

Rev: 1.0

Date: Friday, September 11, 2015

Sheet: 3 of 5

6.2 BOM

WT51F108S/104S BOM				
DIP				
Item	Quantity	Reference	Part	PCB Footprint
1	1	C1	100uF/16V/DIP	DCE030
2	1	J1	電源母座	DCJACK-3P
3	1	J2	WF/3/125/V	WAFTER3P-1.25-V
4	1	J3	HDR/1X2/254/V	HEADER1X2-2.54-V
5	1	J5	WF/4/125/V	WAFTER4P-1.25-V
6	2	J7, J6	HDR/2X16/254/V	HEADER2X16-2.54-V
7	1	SWB1	SW/4P	KEY
8	1	VR1	50K/VR	VR3-DIP
9	1	Y1	12MHz	HC49US
SMD				
Item	Quantity	Reference	Part	PCB Footprint
10	5	C2, C5, C7, C8, C12	100nF	SC0603
11	3	C3, C9, C10	20pF	SC0603
12	1	C4	4.7uF/16V/Ta	SCE3216
13	1	C6	47uF/10V/Ta	SCE-B
14	1	C11	4.7uF	SC0805
15	7	DB1, DB2, DB3, DB4, DB5, DB6, DB7	LEDS/G	SLED0805
16	1	L1	BEAD/0805	SL0805
17	1	R4	0R	SR0603
18	27	R5, R6, R7, R8, R9, R12, R13, R14, R15, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R30, R31, R32, R33, R34, R35, R36, R37	33R	SR0603
19	1	R3	220R	SR0603
20	6	R27, R28, R29, R38, R39, R40	330R	SR0603
21	1	R1	360R	SR0603
22	1	R2	10K	SR0603
23	1	U1	WT51F108S (UG32AWT)	QFN32PIN

## 6.3 Ordering Information

### 1. WT51F108S/104S Starter Kit

Kit	Product Name	Number
WT51F108S/104S Starter Kit	Single-wire Programming Board PL-2303 (WLINK-SWUT) x 1	WA001
	Simple Version (WT51F108S/104S Starter Kit Board) x 1	WB012
	SWUT Programming Wire x 1	

### 2. WT51F108S/104S Starter Kit Board

Kit	Product Name	Number
WT51F108S/104S	WT51F108S/104S Starter Kit Board	WB012
	EVB Operation Manual	DOC35

### 3. Single-wire Programming Board (WLINK-SWUT)

Kit	Product Name	Number
Single-wire Programming Board WLINK-SWUT	Single-wire Programming Board PL-2303 (WLINK-SWUT)	WA001
	WLINK-SWUT Operation Manual	DOC2