

**WT51F516**  
**Evaluation Board**  
**Operation Manual**  
REV. 1.0  
June 7, 2012

Ver.	Date	Applicant	Description
1.0	2012/06/07	Carter	1 <sup>st</sup> version

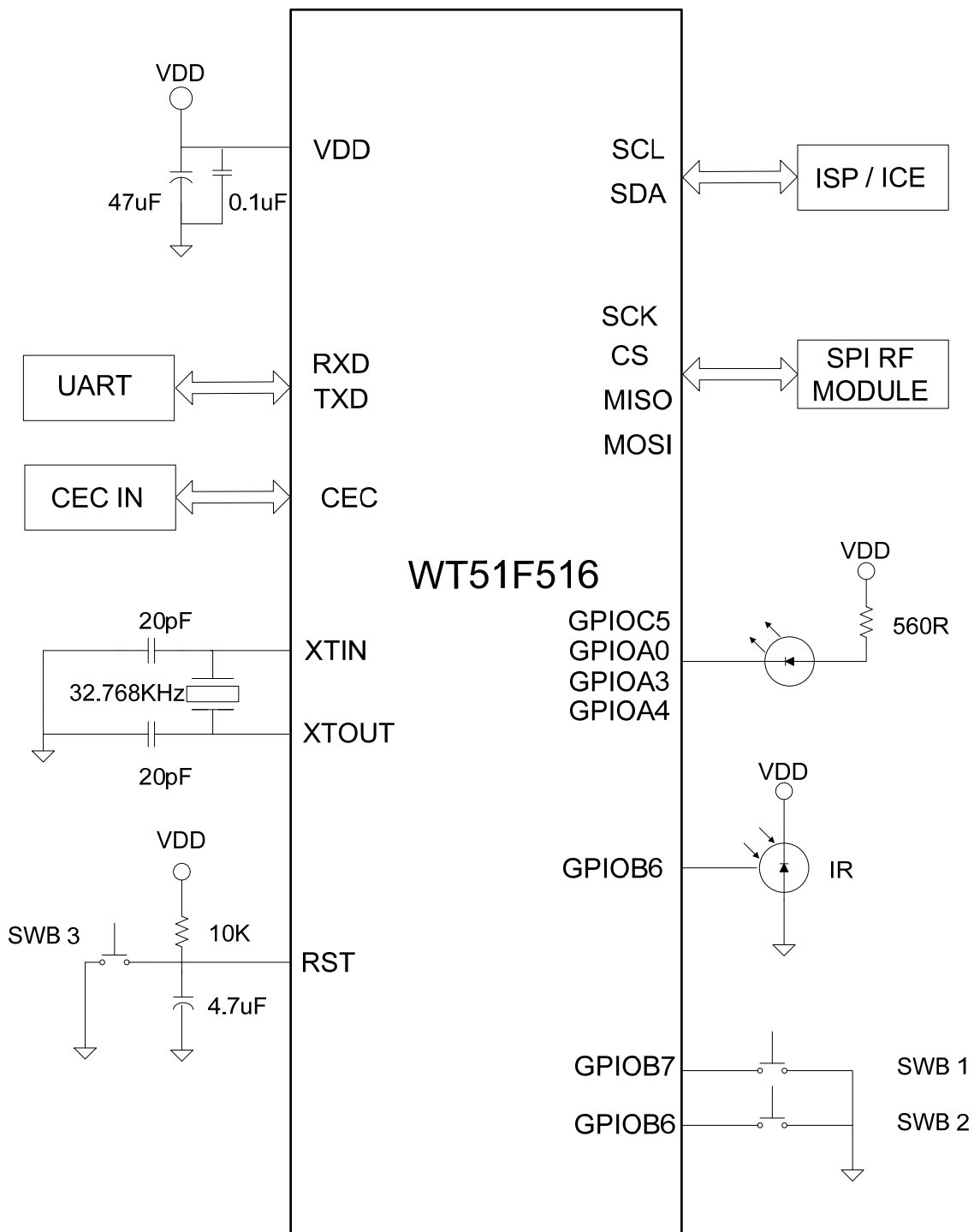
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**Chapter 1 WT51F516 EVB H/W Description**

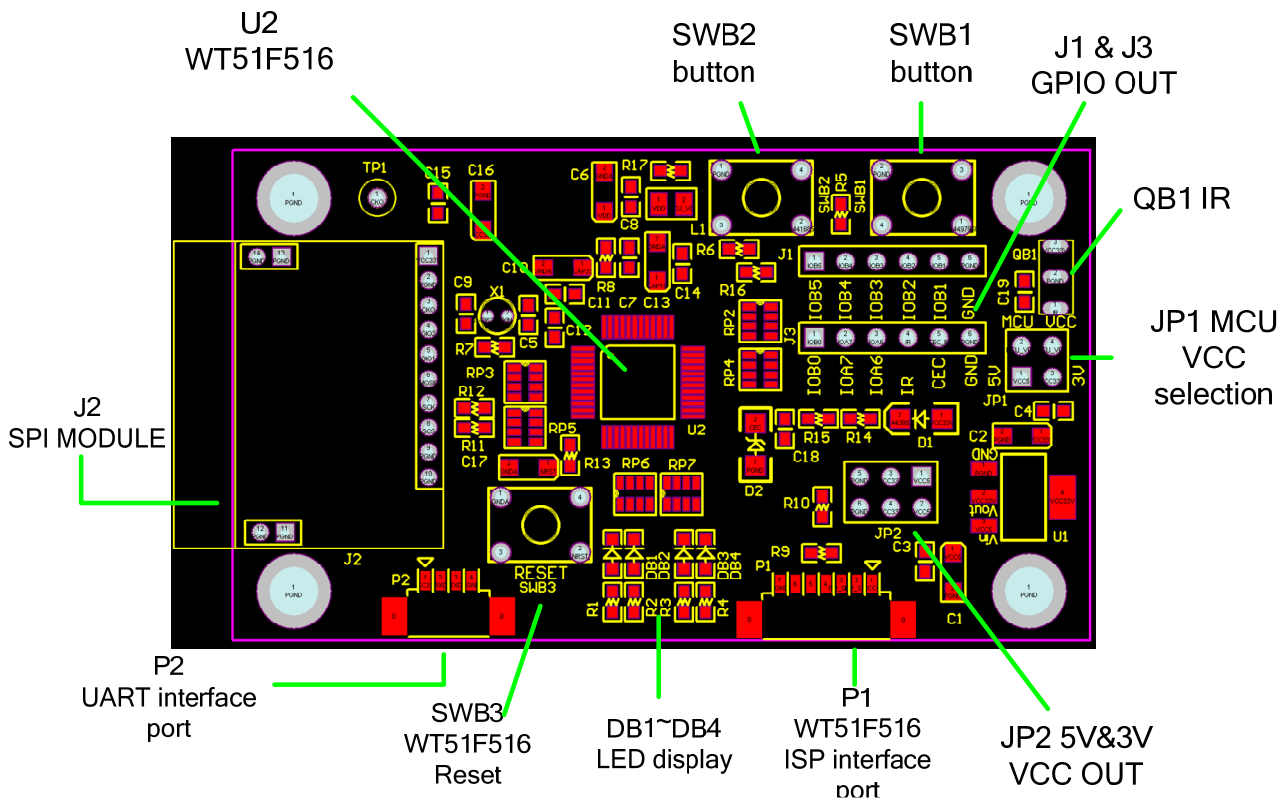
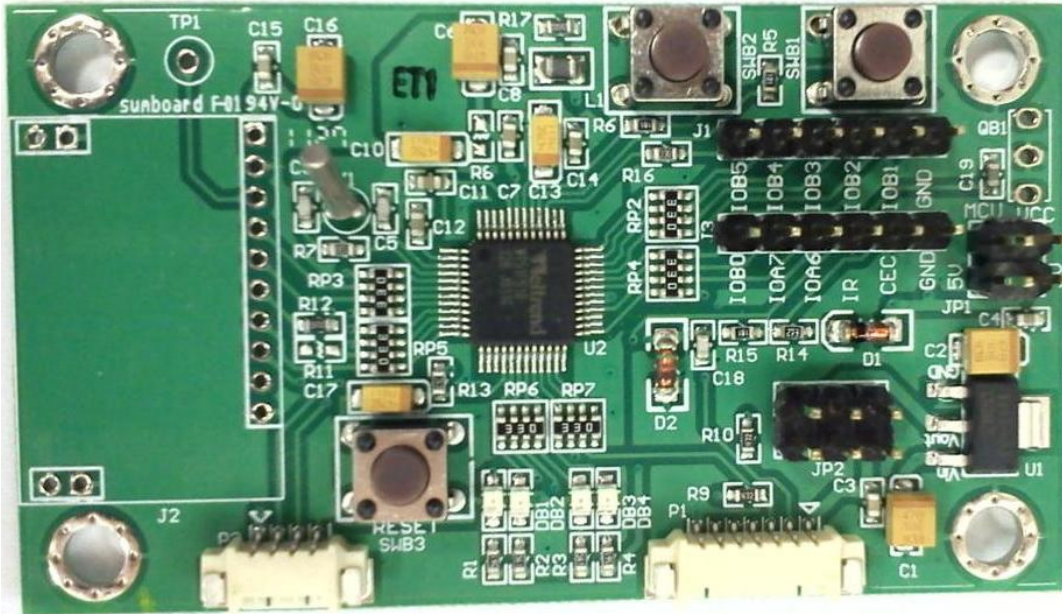
**1.1 System Block Diagram**

WT51F516 is an 8052 Microcontroller with a variety of peripheral functions enhanced; the EVB is designed for LQFP 48-pin PKG type. The system structure as the figure below is demonstrating its functions.



**1.2 EVB Component Location**

WT51F516-RG480WT PKG type

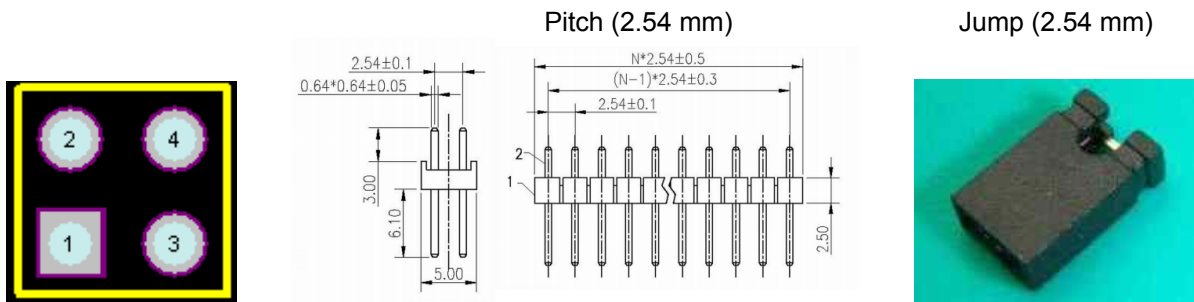


## Chapter 2 WT51F516 EVB Connecting Port Description

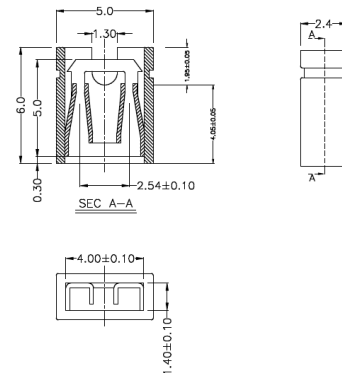
### 2.1 MCU VDD Voltage Selector

Component location JP1

This is MCU VDD voltage selector, WT51F516 can support 2V ~ 5.5V input voltage, and the pad can select 3.3V or 5V as MCU input voltage.



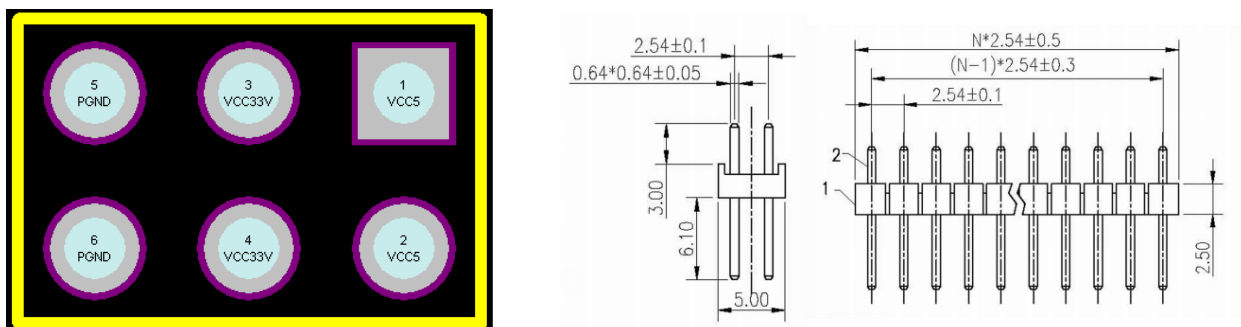
Pad Number	Description
1	5V (Jump 1-2 short, R8 NC.)
2	MCU VDD (MCU power input)
3	3.3V (Jump 3-4 short, R8 needs connecting with 0R)
4	MCU VDD (MCU power input pad)



### 2.2 External VDD Voltage Input Port

Component Location JP2

This is external VDD voltage input port.

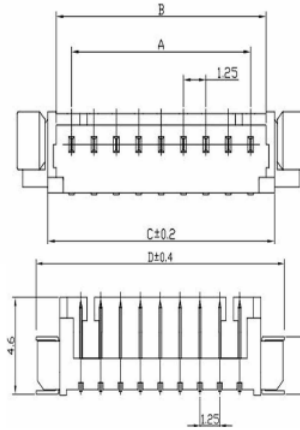
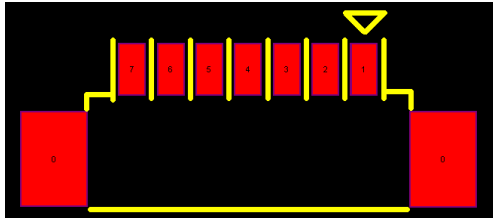


Pad Number	Description
1、2	VCC5V (power input)
3、4	VCC3.3V (power input)
5、6	GND

## 2.3 ISP Programming Port

Component location P1

This WT51F516 programming port, pitch (1.25 mm).



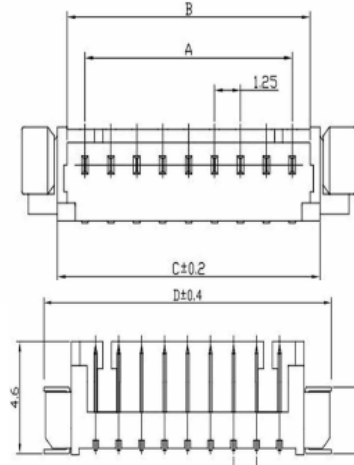
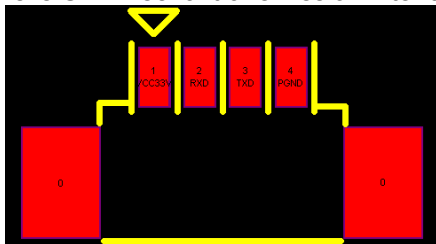
CKT	A	B	C	D
2	1.25	3.05	4.25	7.65
3	2.50	4.30	5.50	8.90
4	3.75	5.55	6.75	10.15
5	5.00	6.80	8.00	11.40
6	6.25	8.05	9.25	12.65
7	7.50	9.30	10.50	13.90
8	8.75	10.56	11.75	15.15
9	10.00	11.80	13.00	16.40
10	11.25	13.05	14.25	17.65
11	12.50	14.30	15.50	18.90
12	13.75	15.55	16.75	20.15
13	15.00	16.80	18.00	21.40
14	16.25	18.05	19.25	22.65
15	17.50	19.30	20.50	23.90

Pad Number	Description	Pad number	Description
1	5V	5	NC
2	SCL	6	NC
3	SDA	7	GND
4	NC		

## 2.4 UART Port

Component Location P2

This is UART serial transmission interface port (1.25 mm).



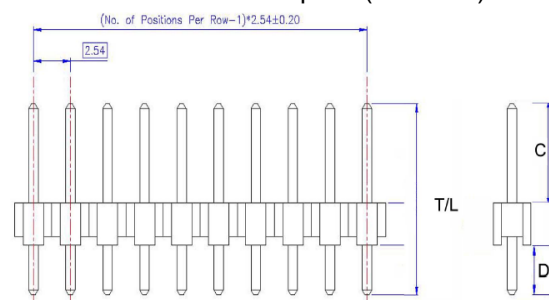
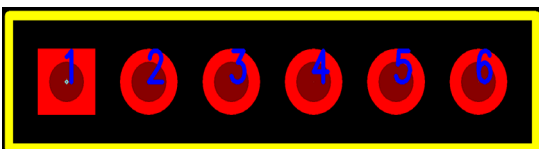
CKT	A	B	C	D
2	1.25	3.05	4.25	7.65
3	2.50	4.30	5.50	8.90
4	3.75	5.55	6.75	10.15
5	5.00	6.80	8.00	11.40
6	6.25	8.05	9.25	12.65
7	7.50	9.30	10.50	13.90
8	8.75	10.56	11.75	15.15
9	10.00	11.80	13.00	16.40
10	11.25	13.05	14.25	17.65
11	12.50	14.30	15.50	18.90
12	13.75	15.55	16.75	20.15
13	15.00	16.80	18.00	21.40
14	16.25	18.05	19.25	22.65
15	17.50	19.30	20.50	23.90

Pad number	Description
1	VDD 3.3V
2	RXD
3	TXD
4	GND

## 2.5 GPIO Input Port

Component Location (J1 & J3)

pitch (2.54 mm)



C=6mm D=3mm T/L=11.54mm

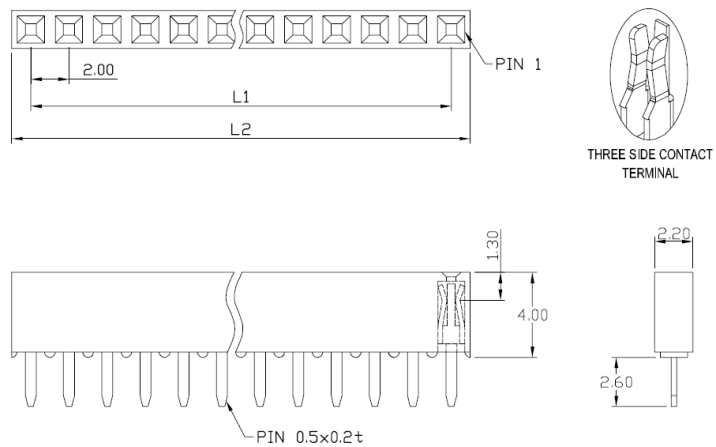
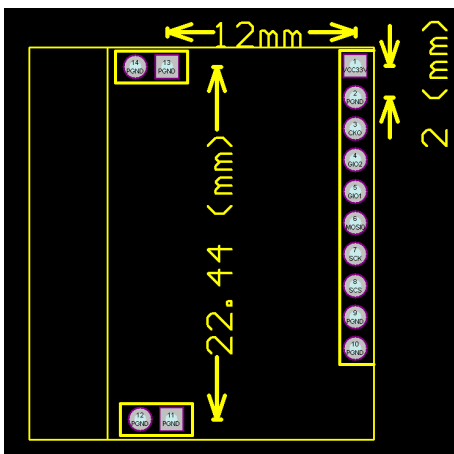
J1 Pad Number	Description	J1 Pad Number	Description
1	GPIOB5	4	GPIOB2
2	GPIOB4	5	GPIOB1
3	GPIOB3	6	GND

J3 Pad Number	Description	J3 Pad Number	Description
1	GPIOB0	4	IR
2	GPIOA7	5	CEC IN
3	GPIOA6	6	GND

## 2.6 SPI Module Port

Component Location (J2)

Cir- cuits	Dimension mm	
	L1	L2
10	18.00	20.50



Pad Number	Description	Pad Number	Description
1	VCC33V	8	SCS
2	GND	9	GND
3	CKO	10	GND
4	GIO2	11	GND
5	GIO1	12	GND
6	MOSI or MISO	13	GND
7	SCK	14	GND



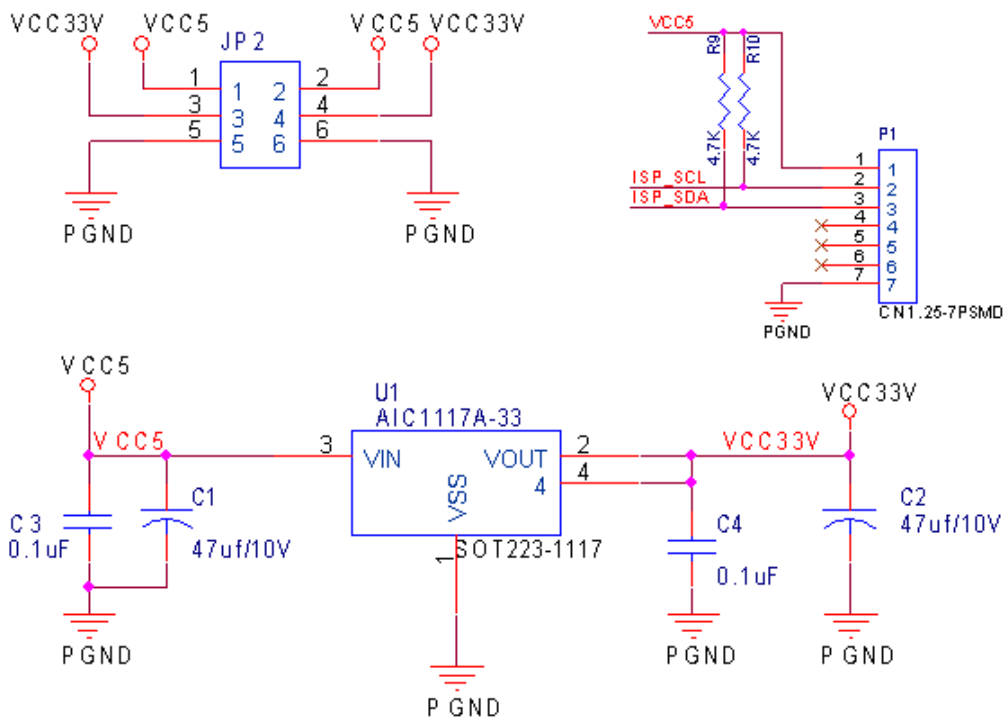
**Chapter 3 WT51F516 EVB Circuit Description**

**3.1 Main Power System**

There are two options for WT51F516 EVB main power to choose:

1. WLINK-I<sup>2</sup>C Adapter 5V input: Through regulator and produce DC power 3.3V.
2. JP2 input VCC 5V directly

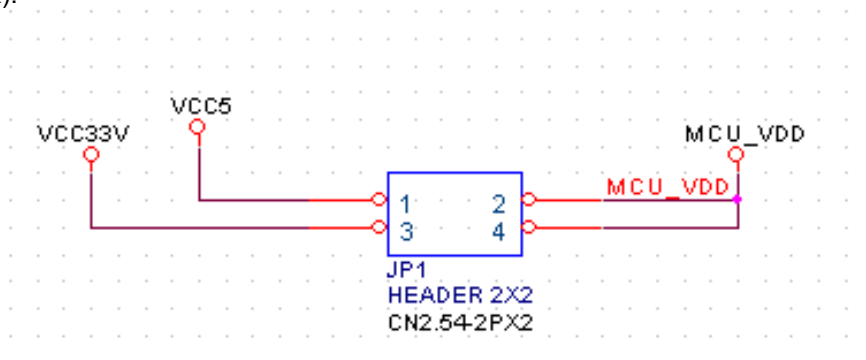
WT51F516 EVB main power system circuit:



**3.2 VDD Power Option**

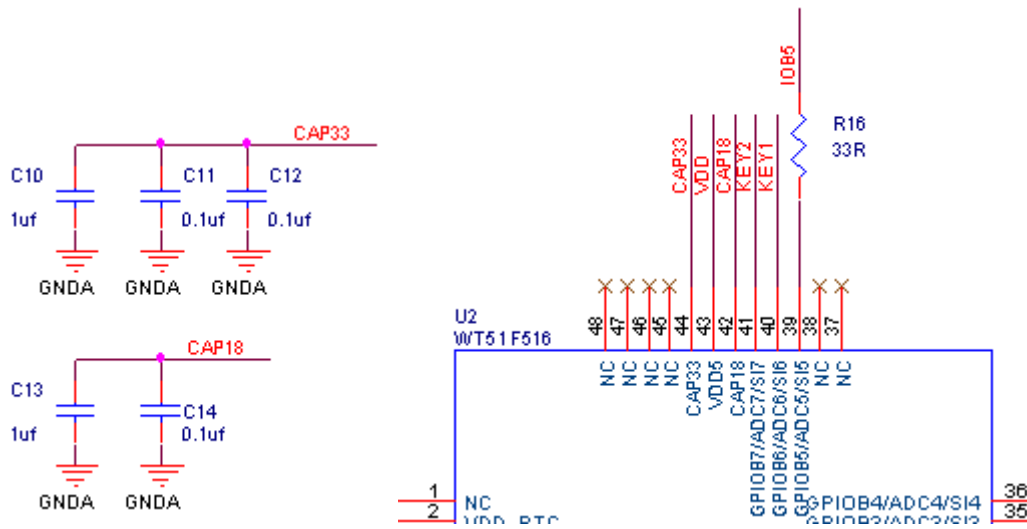
There are two options for WT51F516, VDD power, the operation voltage is 5V、3.3V

1. JP1 1-2 short: means that WT51F516 VDD operation voltage is 5 V (Resistor R8 No Connect).
2. JP1 3-4 short: means that WT51F516 VDD operation voltage is 3.3V (Resistor R8 Needs connecting with 0R).



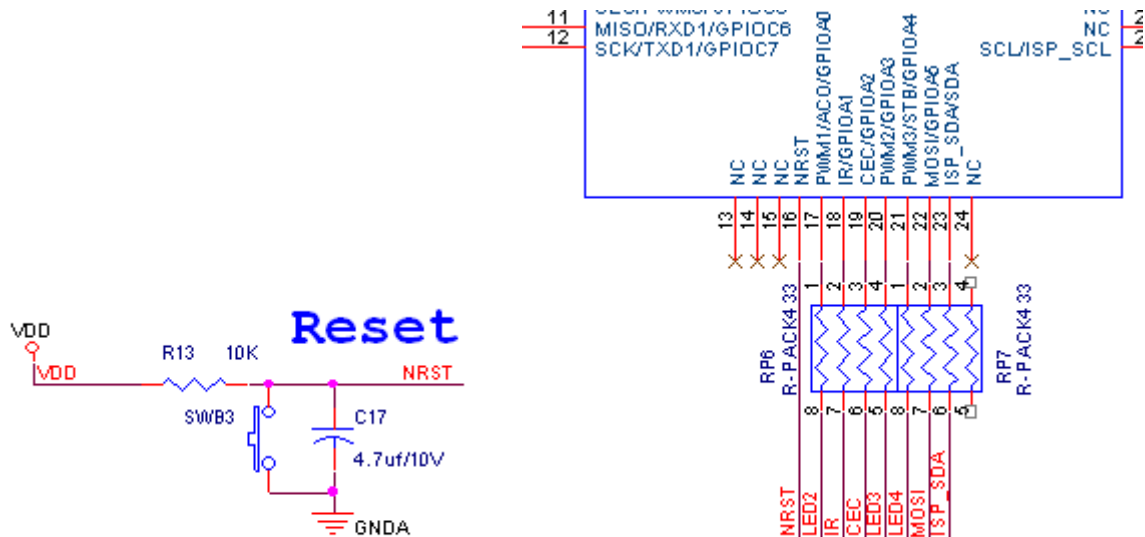
### 3.3 Power Circuit

VDD power input need filter capacitance, its placement close the pin is better.



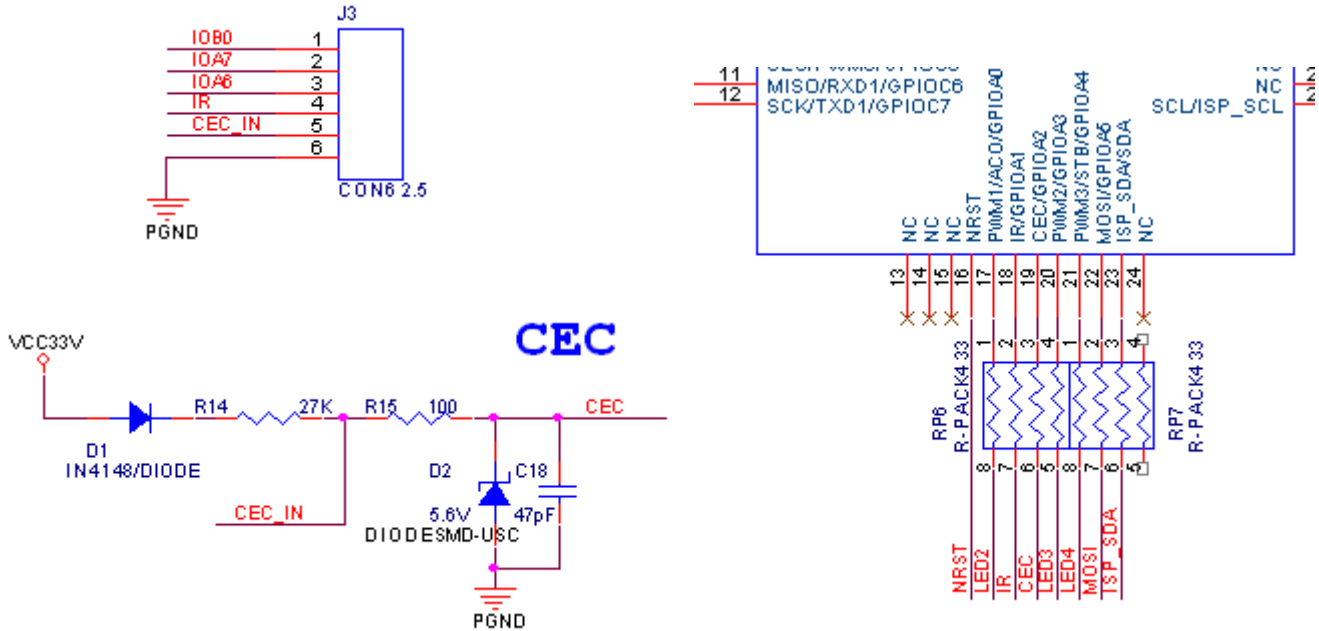
### 3.4 RESET Circuit

WT51F516 RESET circuit, the related circuit as the figure below:



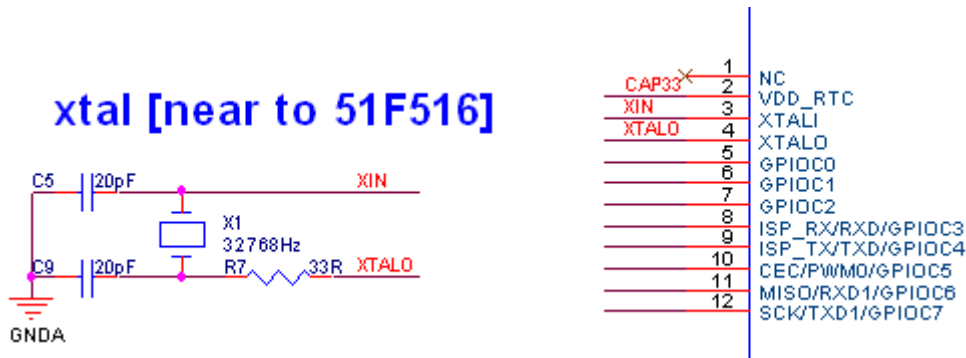
### 3.5 Consumer Electronics Control CEC Circuit

Consumer electronics control CEC circuit as the figure below:



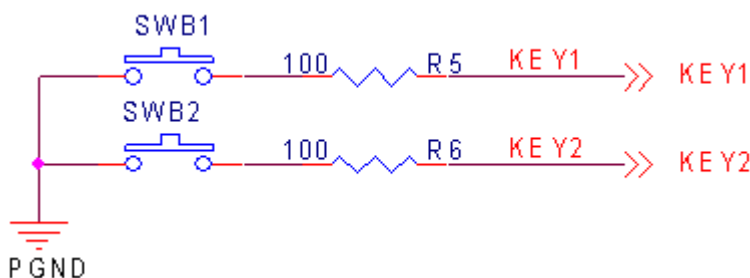
### 3.6 Oscillate Circuit

WT51F516 32.768 kHz oscillator circuit as the figure below:



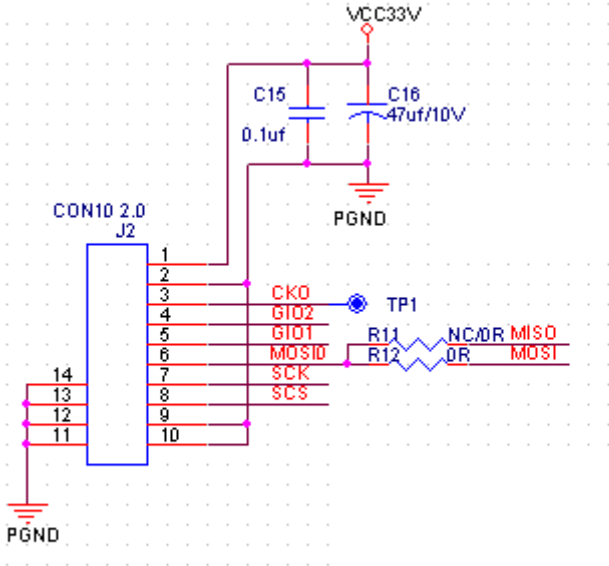
### 3.7 Key Functions

WT51F516 EVB reserves two function keys.



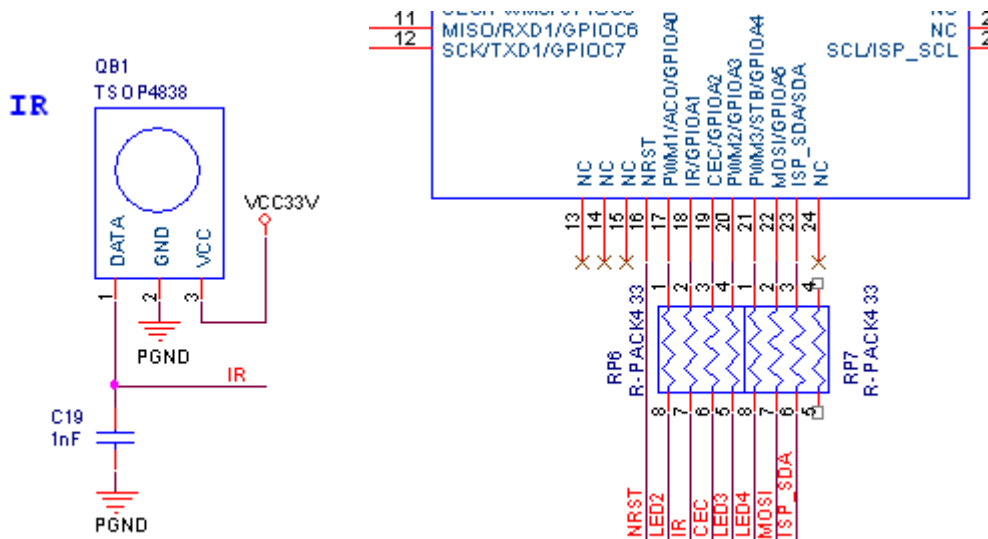
### 3.8 SPI Module Port

RF port definition as the figure below:



### 3.9 Infrared Receiver Circuit

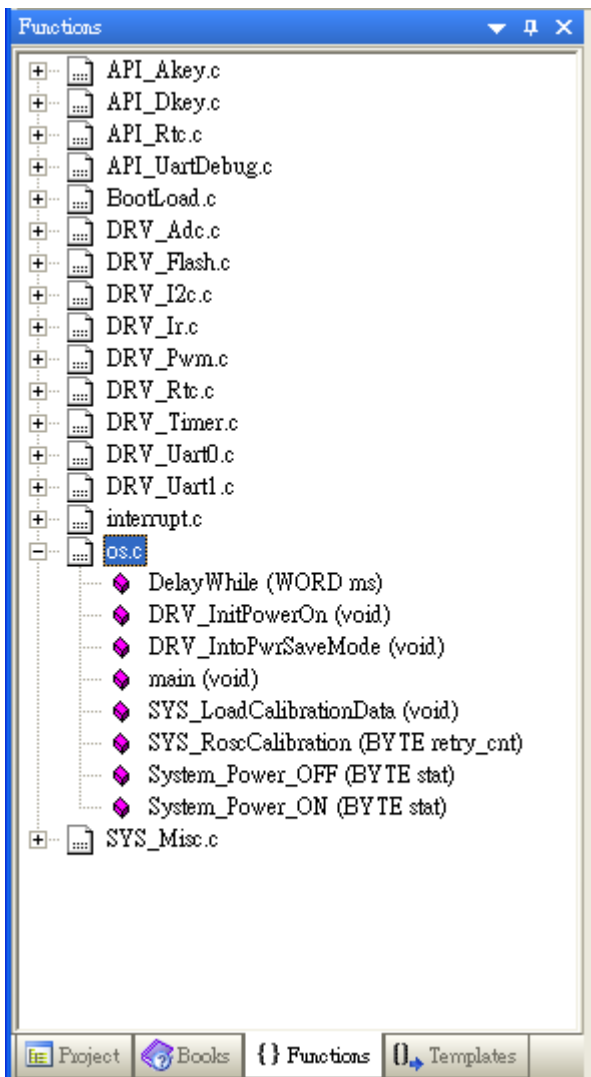
Infrared circuit as the figure below description:



**Chapter 4 Driver Module**

**4.1 Program Module Description**

Please refer to the following program module.



## 4.2 OS Operation Procedure <OS.c>

Function	Description
void main(void) using 0	Main program
void DRV_InitPowerOn(void)	Initialize the status of the various functional
void SYS_LoadCalibrationData(void)	Correction LDO
void SYS_RoscCalibration(BYTE retry_cnt)	Internal oscillator calibration
void DRV_IntoPwrSaveMode(void)	Power saving mode function
void System_Power_ON(BYTE stat)	Power on
void System_Power_OFF(BYTE stat)	Power off
void DelayWhile(WORD ms)	Delay

## 4.3 TIMER Driver Program <DRV\_Timer.c>

Function	Description
void OS_TimerInitial(void)	Timer 0 initialize setting function
void Timer0_Interrupt(void) interrupt 1 //using 1	Timer 0 interrupt function
void Timer0Service(void)	Every 10ms cumulative function
void OS_Timer1Initial(void)	Timer 1 initialize setting function
void Timer1_Interrupt (void) interrupt 3	Timer 1 interrupt function
void OS_Timer2Initial(void)	Timer 2 initialize setting function
void Timer2 (void) interrupt 5	Timer 2 interrupt

## 4.4 INTERRUPT Deriver <interrupt.c>

Function	Description
void INT0_ISR_Entry(void) interrupt 0	interrupt 0
void INT1_ISR_Entry(void) interrupt 2	interrupt 1
void INT2_ISR_Entry(void) interrupt 7	interrupt 2
void INT3_ISR_Entry(void) interrupt 8	interrupt 3

## 4.5 PWM Driver <DRV\_Pwm.c>

Function	Description
void DRV_PwmInitial(void)	Initialize PWM duty and frequency

## 4.6 UART0 Driver <DRV\_Uart0.c>

Function	Description
void DRV_Uart0Initial(void)	Initialize UART0 as 115200,n,8,1
void UART0_interrupt (void) interrupt 4	Interrupt UART0 to receive sub program

## 4.7 UART1 Driver <DRV\_Uart1.c>

Function	Description
void DRV_Uart1Initial(void)	Initialize UART1 as 115200, n, 8, 1
void UART_interrupt (void) interrupt 6	Interrupt UART1 and receiving the sub program

## 4.8 UART Application Program <API\_UartDebug.c>

Function	Description
void API_UartDebugInitial(void)	Initialize debugging port and according to UART_DEBUG_PORT to choose UART0 or UART1
void DRV_PutChar(char u8Char)	Data output from UART port
void DRV_PutStr(char *pFmt)	String output from UART port
void DRV_IntToStr(U16 u16Val, U8 u8Base, char *pBuf, U8 u8Length)	Value transfer to word and string output from UART port
void DRV_Printf(char *pFmt, U16 u16Val)	State change: 0xAAFFor 1234

## 4.9 ADC Driver Program <DRV\_Akey.c>

Function	Description
void DRV_AnalogKeyInitial(void)	Initialize ADC( turn on ADC function)
WORD API_AverageADCCData(BYTE ADC_Channel)	An average of N times analog to digital conversion value function
WORD DRV_ReadAnalogChannel(BYTE AD_Channel)	Analog to digital conversion on the specified channel

## 4.10 ADC Application Program <API\_Akey.c>

Function	Description
void API_AnalogKeyInitial(void)	Initialize ADC application key
void DRV_CheckAnalogKeyRoutine(void)	ADC key detection handler
void DRV_AnalogKeyRelease10mS(void)	Elimination of the ADC keys bounce timing function

## 4.11 KEY Function Application Program <API\_Dkey.c>

Function	Description
void DRV_DigitalKeyInitial(void)	Initialize GPIO setting as input
void DRV_DigitalKeyPadRoutine(void)	Button 1 execute detection every 10ms
void DRV_DigitalKey2Routine(void)	Button 2 execute detection every 10ms
void DRV_DigitalKey10mS(void)	Eliminate of the ADC keys timing

## 4.12 I<sup>2</sup>C Driver Program <DRV\_I2c.c>

Function	Description
void DRV_I2cInitial(void)	Initialize I <sup>2</sup> C (turn on I <sup>2</sup> C function)
void ISR_Hwl2c(void)	I <sup>2</sup> C interrupt receive/transmission

## 4.13 RTC Driver <DRV\_Rtc.c>

Function	Description
void DRV_RtcInitial(void)	Turn on RTC function
void DRV_Rtc1SecInitial(void)	Turn on RTC one second function

## 4.14 RTC Application Program <API\_Rtc.c>

Function	Description
void API_UpdateRtc(void)	Update RTC Time
void API_ReadRtcTime(void)	Read RTC Time
void API_BackupRtcTime(void)	Backup RTC Time
void API_WakeUpAlarmRoutine(void)	Setting alarm clock wake up
void API_PowerDownAlarmRoutine(void)	Setting clock as sleeping model



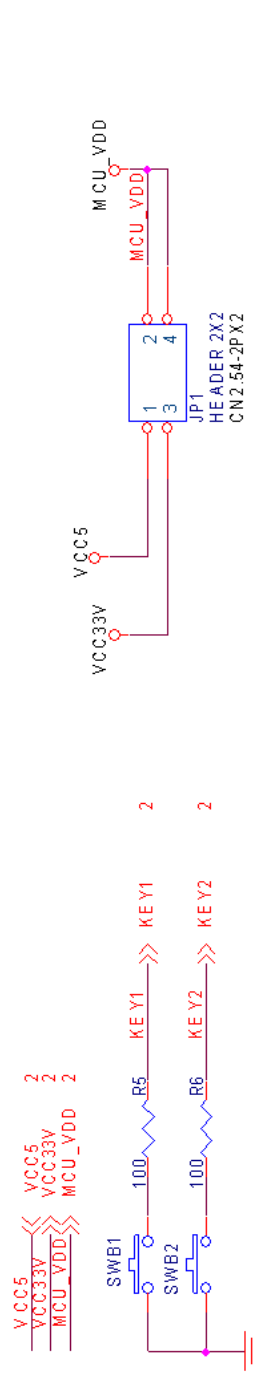
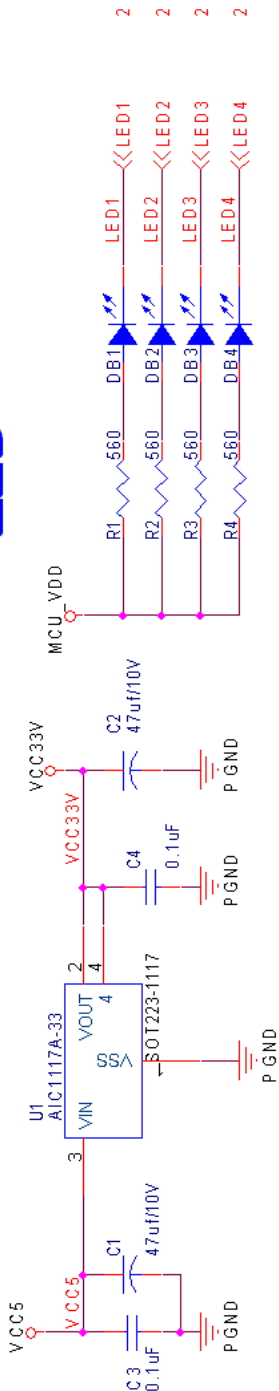
**Chapter 5 Appendix**

**5.1 Circuit**

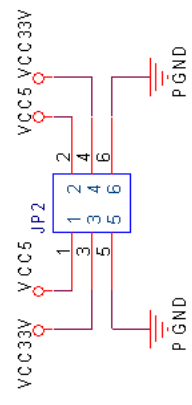
EVB Circuit (WT51F516-RG480WT PKG type)

**1. Power**

**LED**



1->2 :MCU\_VDD = 3V3 (Default)  
3->4 :MCU\_VDD = 5V





## 5.2 BOM

<b>WT51F516 BOM</b>					
<b>DIP</b>					
Item	Quantity	Reference	Part	Footprint	Note
1	2	J1,J3	CON6_ 2.54	Pin header/2.54mm180°/1*6P	
2	1	JP1	HEADER 2X2	Pin header/2.54mm180°/2*2P	
3	1	JP2	HEADER 2X3	Pin header/2.54mm180°/2*3P	
4	3	SWB1,SWB2,SWB3	KEY	DIP/KEY 6X6X5	
5	1	X201	32.768MHz	DIP/XTAL/32.768MHz/5PPM	
<b>SMD</b>					
Item	Quantity	Reference	Part	Footprint	Note
1	1	C10,C13,C17	4.7uf/10V	SMD Tantalum Capacitors	
2	4	C1,C2,C6,C16	47uf/10V	SMD Tantalum Capacitors	
3	2	C5,C9	20pF	SMD 0603 capacitance	
4	1	C18	47pF	SMD 0603 capacitance	
5	1	C19	1nF	SMD 0603 capacitance	
6	8	C3,C4,C7,C8,C11,C12,C14,C15	0.1uf	SMD 0603 capacitance	
7	4	DB1,DB2,DB3,DB4	LED/Green	SMD 0805 LED light	
8	1	D1	IN4148	SMD Diodes	
9	1	D2	5.6V	SMD Zenner Diodes	
10	1	L1	BEAD	SMD 0805 BEAD	
11	2	R12,R17	0Ω	SMD 0603 resistor	
12	2	R16,R7	33Ω	SMD 0603 resistor	
13	3	R5,R6,R15	100Ω	SMD 0603 resistor	
14	4	R1,R2,R3,R4	560	SMD 0603 resistor	
15	2	R10,R9	4.7K	SMD 0603 resistor	
16	1	R13	10K	SMD 0603 resistor	
17	1	R14	27K	SMD 0603 resistor	
18	6	RP2,RP3,RP4,RP5,RP6,RP7	R-PACK4 33Ω	SMD 0603 resistors array	
19	1	P1	CN1.25-4P	SMD housing/1.25mm 90/4P	
20	1	P2	CN1.25-7P	SMD housing/1.25mm 90/7P	
21	1	U1	GL1117A_ 3.3V	SMD SOT-223	
22	1	U2	WT51F516	LQFP-48	
<b>NC</b>					
Item	Quantity	Reference	Part	Footprint	Note
1	1	TP1	TEST PIN	TEST PIN	
2	1	J2	CON14 2.0	Pin header/2.54mm180°/1*14P	
3	1	QB1	TSOP4838	DIP/IR	
<b>NC</b>					
Item	Quantity	Reference	Part	Footprint	Note
1	2	R8, R11	NC/OR	SMD 0603 resistor	

## 5.3 Ordering Information

### 1. WT51F516 Starter Kit

Kit	Product Name	Number
WT51F516 Starter Kit	WLINK-I <sup>2</sup> C (or WLINK) Adapter x 1	
	WT51F516 Evaluation Board x 1	
	USB Cable x 1	

### 2. WT51F516 Development and Demonstration Board

Kit	Product Name	Number
WT51F516 Development and Demonstration Board	Development and Demonstration Board (WT51F516 –RG480WT)	
	EVB Operation Manual	

### 3. WLINK-I<sup>2</sup>C Adapter

Kit	Product Name	Number
Signal Wire Programming Board WLINK-I <sup>2</sup> C	USB to I <sup>2</sup> C serial interface convert	
	WLINK-I <sup>2</sup> C Operation Manual	