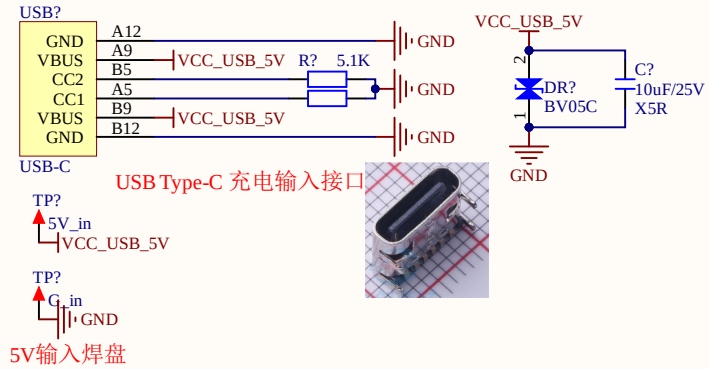

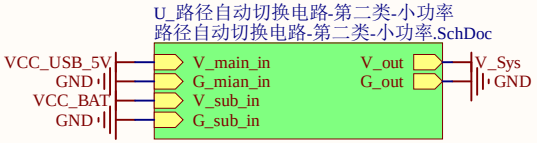

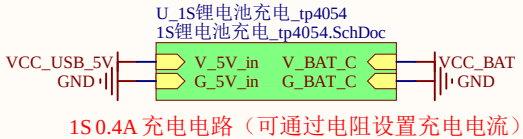

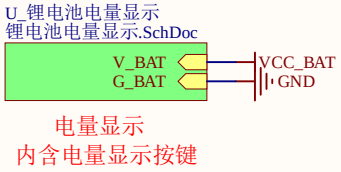

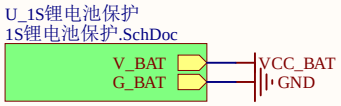

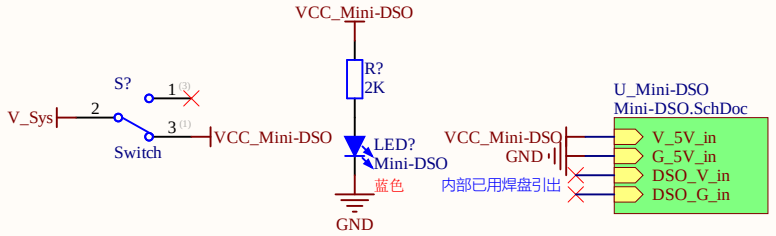

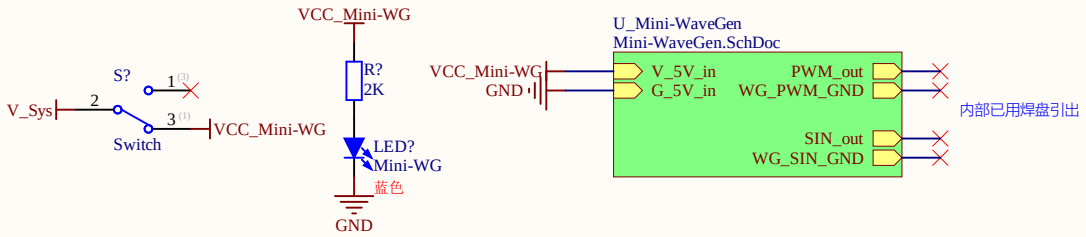

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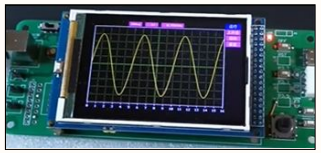
Mini-DSO

仿自 STC官方开源STC32示波器
https://www.stcai.com/newsinfo/4315738.html
https://www.stcai.com/newsinfo/4315765.html



探头接口

这个还需要加个探头接口

TFT LCD模组左边两个螺丝定位孔

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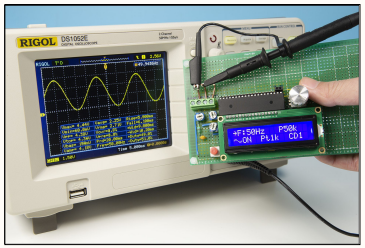
Mini-WaveGen

仿自“老刘爱捣鼓STC15波形发生器”
https://www.bilibili.com/video/BV12k4y197Qu
https://github.com/CreativeLau/Function_Generator_STC



改变的地方：
1、LCD的D0D7改接在P2.0P2.7，程序需要相应改；
2、焊接晶振，使用外接晶振，频率更准，程序修改成使用外接晶振。

U?
STC15W4K32S4-30I-LQFP48

P5.3/TXT4_2
P0.5/AD5/T4
P0.6/AD6/T3CLKO
P0.7/AD7/T3
P1.0/ADC0/CCP1/RXD2
P1.1/ADC1/CCP0/TXD2
P4.7/TXD2_2
P1.2/ADC2/SS/ECI/CMPO
P1.3/ADC3/MOSI
P1.4/ADC4/MISO
P1.5/ADC5/SCLK
P1.6/ADC6/RXD_3/XTAL2/MCLKO_2

P2.3/A11/MOSI_2
P2.2/A10/MISO_2
P2.1/A9/SCLK_2
P2.0/A8/RSTOUT_LOW
P4.4/RD/CCP4
P4.3/SCLK_3
P4.2/WR/CCP3
P4.1/MISO_3
P3.7/INT3/TXD_2/CCP2/CCP2_2
P3.6/INT2/RXD_2/CCP1_2
P3.5/T1/T0CLKO/CCP0_2
P5.1/TXD3_2

剩余IO引出

P5.2/RXD4_2
P0.4/AD4/T4CLKO
P0.3/AD3/TXD4
P0.2/AD2/RXD4
P0.1/AD1/TXD3
P0.0/AD0/RXD3
P4.6/RXD2_2
P4.5/ALE/CCP5
P2.7/A15/CCP2_3
P2.6/A14/CCP1_3
P2.5/A13/CCP0_3
P2.4/A12/ECI_3/SS_2

P1.7/ADC7/TXD_3/XTAL1
P5.4/RST/MCLKO/SS_3/CMP-
VCC
P5.5/CMP+
GND
P4.0/MOSI_3
P3.0/RXD/INT4/T2CLKO
P3.1/TXD/T2
P3.2/INT0
P3.3/INT1
P3.4/T0/T1CLKO/ECI_2
P5.0/RXD3_2

LB?
FBMA-11-160808-601A10T
V_5V_in
G_5V_in
VCC_5V_Mini-WG
GND_Mini-WG
C? 47uF/10V X5R
C? 47uF/10V X5R
C? 22uF/25V X5R

RP? 10K 调LCD1602对比度
R? 10R 背光
C? 10uF/25V X5R
C? 0.1uF/50V X7R

LCD?
LCD 1602
VSS VDD V0 RS R/W E D0 D1 D2 D3 D4 D5 D6 D7 LED-A LED-K
Mini-WG_LCD_RS Mini-WG_LCD_RW Mini-WG_LCD_E Mini-WG_LCD_D0 Mini-WG_LCD_D1 Mini-WG_LCD_D2 Mini-WG_LCD_D3 Mini-WG_LCD_D4 Mini-WG_LCD_D5 Mini-WG_LCD_D6 Mini-WG_LCD_D7

SP? M3铜柱
SP? M3铜柱
LCD1602模组下方两个螺丝定位孔

SW? EC11
Mini-WG_EC11_P34
Mini-WG_EC11_P35
Mini-WG_EC11_P33
GND_Mini-WG

PWM
RP? 500 Mini-WG_P45
PWM_out
WG_PWM_GND

L? 1mH SMNR6045-102M
RP? 200K Mini-WG_P44
SIN
SIN_out
S? isLowFreq
C? 0.22uF/50V X7R
WG_SIN_GND
C? 1uF/50V X7R

在输出低频Sin时，连接1uF；在输出高频Sin时，断开1uF

C? 47pF/50V NP0
X? 24M
C? 47pF/50V NP0
差分等长走线

Mini-WG_EC11_P32
Mini-WG_EC11_P33
Mini-WG_EC11_P34

R? 300R
D? 1N4148WS
JP? STC15_down
TX RX GND

C? 10uF/25V X5R
C? 0.1uF/50V X7R
C? 0.1uF/50V X7R
C? 0.01uF/50V X7R

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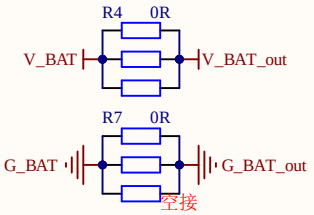
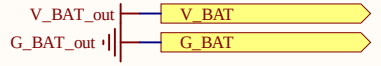
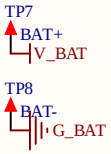
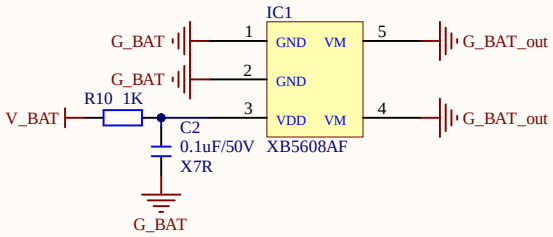




若锂电池芯带保护，则不焊接这个保护IC，短接（或加0R电阻）这个debug pad



接往 1S ＜1000mAh 锂电池



Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Detection Voltage						
Overcharge Detection Voltage	V_{CU}		4.25	4.30	4.35	V
Overcharge Release Voltage	V_{CL}		4.05	4.10	4.15	V
Overdischarge Detection Voltage	V_{DL}		2.3	2.4	2.5	V
Overdischarge Release Voltage	V_{DR}		2.9	3.0	3.1	V
Detection Current						
Overdischarge Current1 Detection	$*I_{IOV1}$	V_{DD}=3.6V	6	9	12	A
Overdischarge Current Recovery	$*I_{ROV1}$	V_{DD}=3.6V	15	25	40	uA
Overcharge Current Detection	$*I_{CHOC}$	V_{DD}=3.6V	5	7	9	A
Load Short-Circuiting Detection	$*I_{SHORT}$	V_{DD}=3.6V	20	40	60	A
Current Consumption						
Current Consumption in Normal Operation	I_{OPE}	V_{DD}=3.6V VM =0V		3.9	6	μA
Current Consumption in power Down	I_{PDN}	V_{DD}=2.0V VM pin floating		2.2	4	μA

1S 锂电池 保护 IC（7A过流保护） 要保证对电池的静态电流在0.1mA以下！！！

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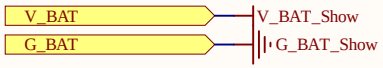
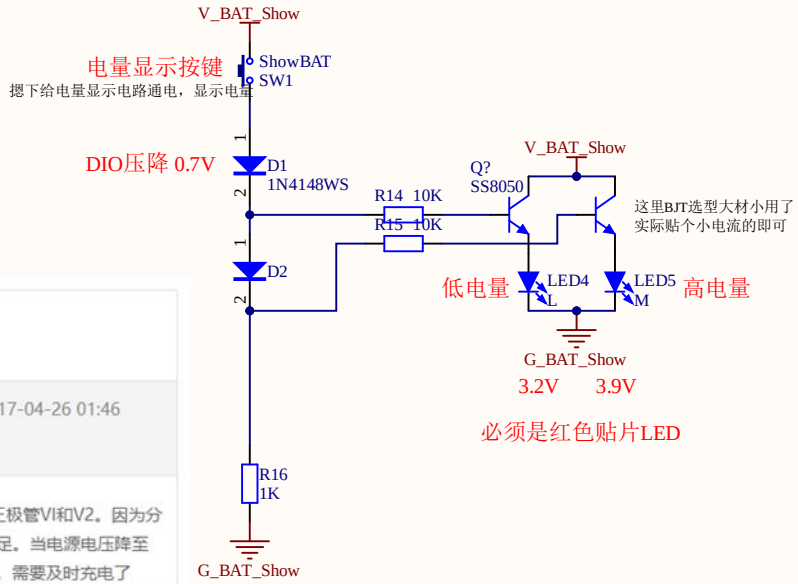




2、贴片LED压降

红:1.82-1.88V，电流5-8mA

绿:1.75-1.82V，3-5mA

橙:1.7-1.8V，3-5mA

兰:3.1-3.3V，8-10mA

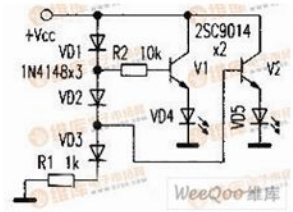
白:3-3.2V，10-15mA。

简易的锂电池电量显示器电路图-检测电路

来源：华强电子网　作者：华仔　浏览：4114　时间：2017-04-26 01:46

标签：

摘要： 简易的锂电池电量显示器电路锂电池充电完成后的端电压约为4.2V，经VDI、VD2和VD3分压后逐点送入两只三极管VI和V2。因为分压值不同，两只LED的驱动电压也不同，随着电源电压的降低而降低。当电源电压为4.2V时，两只IED均发光，指示电量充足。当电源电压降至3.6V时，VD5因达不到8V压降而熄灭，指示电量变弱。当电源电压再降至3.1V时，VD4也会逐渐熄灭，指示电量已经耗尽，需要及时充电了



简易的锂电池电量显示器电路

锂电池充电完成后的端电压约为4.2V，经VDI、VD2和VD3分压后逐点送入两只三极管VI和V2。因为分压值不同，两只LED的驱动电压也不同，随着电源电压的降低而降低。当电源电压为4.2V时，两只IED均发光，指示电量充足。当电源电压降至3.6V时，VD5因达不到8V压降而熄灭，指示电量变弱。当电源电压再降至3.1V时，VD4也会逐渐熄灭，指示电量已经耗尽，需要及时充电了。实际应用中，锂电池电压下降到3.3V就应及时充电，所以在VD4完全熄灭后就停用，并及时充电。使用了这款电路后，发现TDA2822功放并不那么耗电，因VD4完全熄灭需要很长的时间，也不用担心损坏锂电池。

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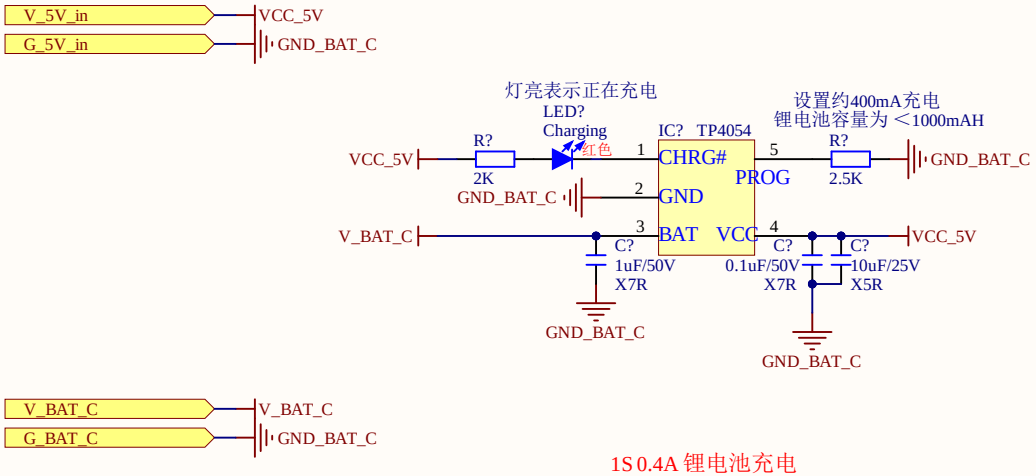
电量显示



1S 0.4A 锂电池充电

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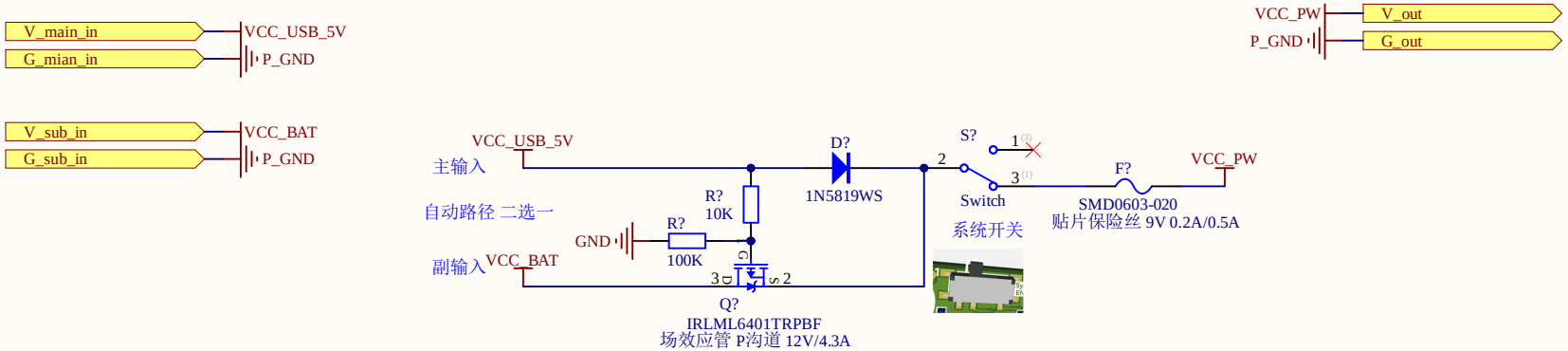

自动路径切换模块，第二类，主输入要大于等于副输入

USB供电时候断开电池供电，USB断开时电池供电

路径自动切换模块\二选一\合路-第二类-小功率

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