

USB Current Monitor

20131223

Reference;

USB_Current_Monitor_0.3.2.f

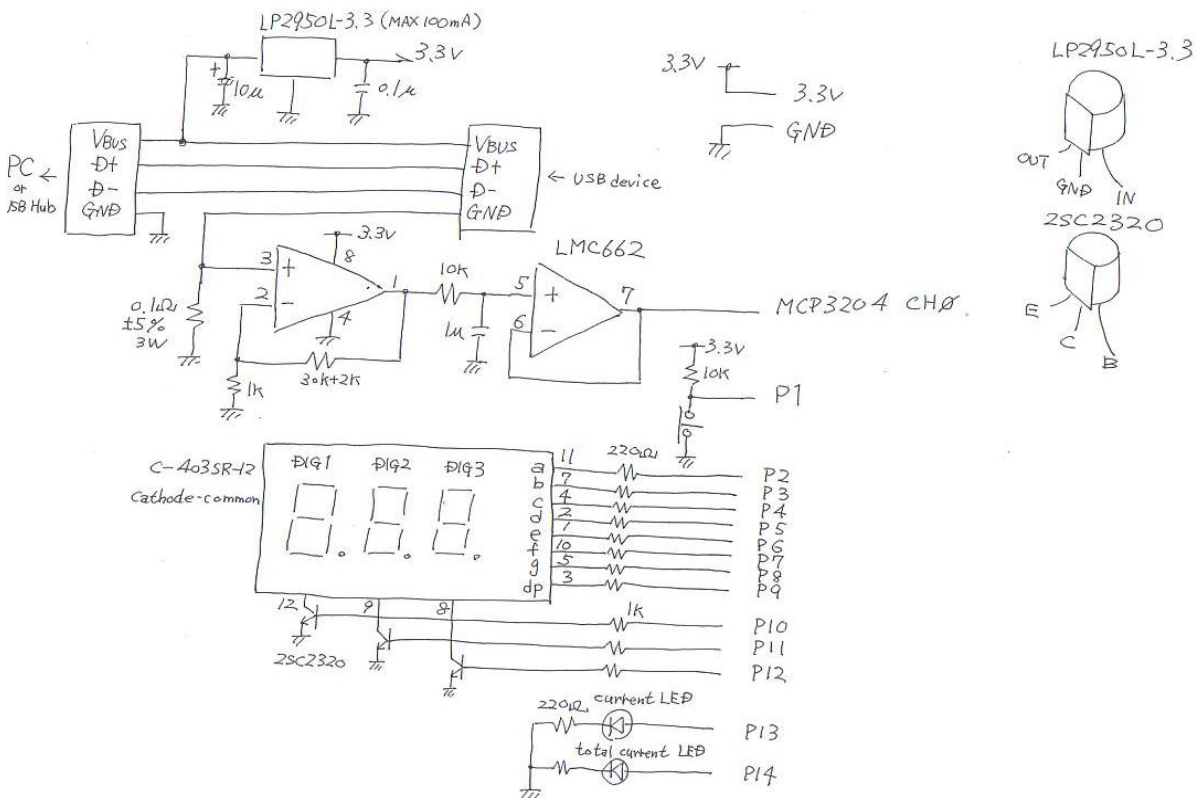
USB Current Monitor display USB-devices-current(mA) and total-current(Ahour).
 Displayment is 1second by 1second.

USB-devices-current(mA): 0mA – 999mA [– –]at more than 999mA

USB-total-current(Ahour): 0.00Ahour – 999Ahour [– –]at more than 999Ahour

Current is an approximate value.

I/F Curcuit



Power(3.3V) is generated by USB-Vbus.

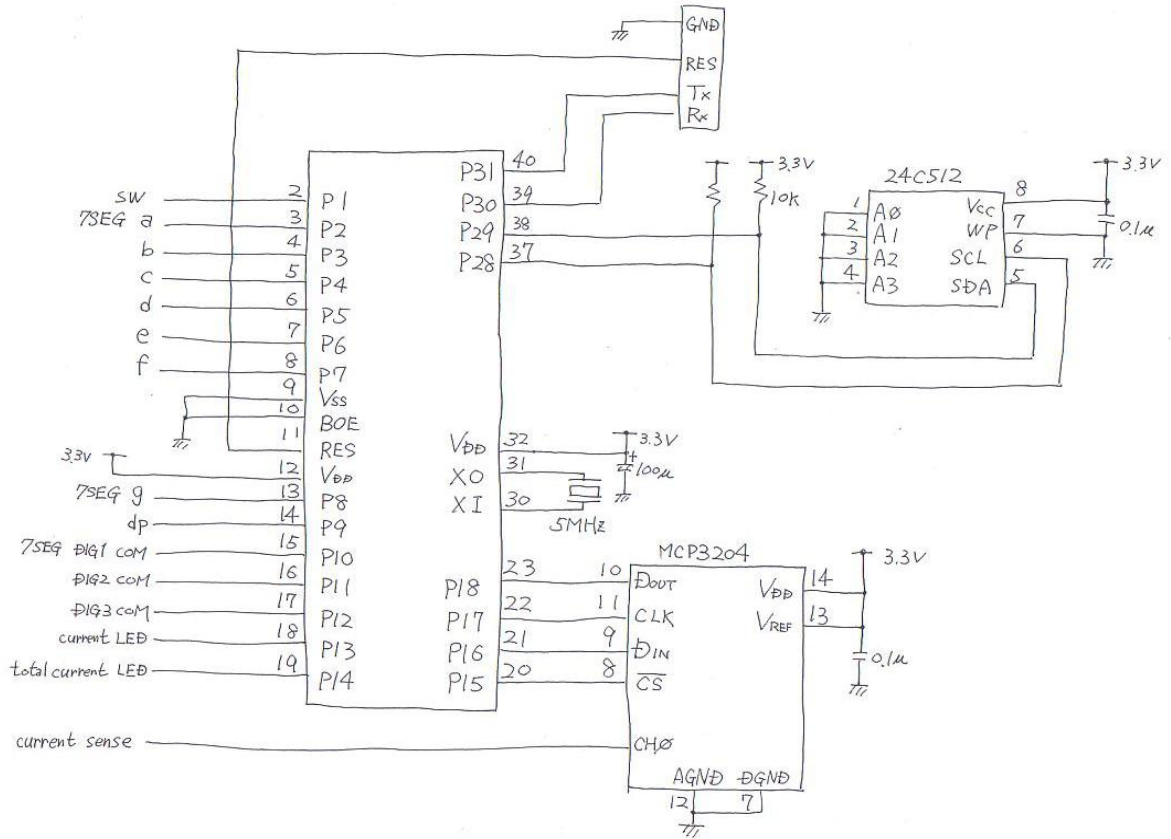
3-digit-7SEG-LED display by Dynamic-drive(400Hz).

USB-device's current is sensed by resistor(0.1ohm).

This resistor has error (max+5%). Resistor for op-amp is +5%.

Current-sense-error is max+5.25%.

CPU Curcuit



	Parts	Description	Quantity	
I/F	LMC662	Op-Amp	1	
	LP2950L-3.3	3.3V Regurator(max current 100mA)	1	
	2SC2320	NPN Tr	3	
	0.1ohm	(+ -5% 3W)	1	
	220ohm	(+ -5% 1/4W)	10	
	1kohm	(+ -5% 1/4W)	4	
	30kohm	(+ -5% 1/4W)	1	
	2kohm	(+ -5% 1/4W)	1	
	10kohm	(+ -5% 1/4W)	2	
	C-403SR-12	3-digit Cathode-common 7SEG	1	
	1uF	Ceramic Capacitor	1	
	10uF	electrolytic Capacitor	1	
	0.1uF	Ceramic Capacitor	1	
	Push-Switch	Normal-Close type	1	
	LED	3mm yellow	2	
	USB connector	Receptacle	1	
	USB connector	Plug	1	
	CPU	P8X32A	40pin DIP	1
		24C512	eeeprom 64kByte	1
		Xtal	5MHz	1
MCP3204		ADC	1	
100uF		electrolytic Capacitor	1	
0.1uF		Ceramic Capacitor	2	
10kohm		(+ -5% 1/4W)	2	
4-pin		For PropPlug	1	
IC-socket(40pin)		For propeller chip	1	
IC-socket(14pin)		For MCP3204	1	
IC-socket(8pin)	For 24C512	1		

Although using 24C512 as eeprom, using 24C256 is ok.
 I use Push-Switch for NormalClose-type.
 So if using it for NormalOpen-type, modify word'read_sw'.
 ADC(MCP3204) is using because converting current-sense-voltage.
 Vref for MCP3204 use 3.3V(generated by LP2950L-3.3).
 LP2950L-3.3 has error(max+-2%).
 So, digital-value has max+-2%.

Error for current-sense-resistor and digital-value is +-5.355%.
 USB-current's error is max+-5.355%.
 But actually display-value is almost correct.

USB-current	Volt for 0.1ohm	Op-Amp Output	ADC-value
1mA	0.1mV	3.3mV	4
10mA	1mV	33mV	40
100mA	10mV	330mV	409
1000mA	100mV	3.3V	4096

Using

1. Inserting USB Current Monitor to USB-port for PC or USB-Hub.
2. After “---” on 7SEG-LED, “0” is displayed on it. (zero-adjustment for op-amp)
3. Inserting USB-device to USB Current Monitor
4. When pushig switch, 7SEG-LED display total-current(Ahour).

Install

After built-up curcuit, insert USB Current monitor to USB-port.
 Load DevKernel.spin connecting prop-plug to 4-pin-port.
 Connect to TeraTerm.
 Loading USB_Current_Monitor_0.3.2.f.

```
Prop0 Cog6 ok
saveforth
.....
Prop0 Cog6 ok
reboot

CON:Prop0 Cog0 RESET - last status: 0 ok
CON:Prop0 Cog1 RESET - last status: 0 ok
CON:Prop0 Cog2 RESET - last status: 0 ok
CON:Prop0 Cog3 RESET - last status: 0 ok
CON:Prop0 Cog4 RESET - last status: 0 ok
CON:Prop0 Cog5 RESET - last status: 0 ok
CON:Prop0 Cog6 RESET - last status: 0 ok
```

Prop0 Cog6 RESET - last status: 0 ok
Prop0 Cog6 ok

-- USB_Current_Monitor should operate ----

cog?

Cog:0 #io chan:1 RUNNING 7SEG_drive
Cog:1 #io chan:1 RUNNING read_sw
Cog:2 #io chan:1 RUNNING USB-current
Cog:3 #io chan:1 PropForth v5.5 2013Feb20 11:30 3
Cog:4 #io chan:1 PropForth v5.5 2013Feb20 11:30 3
Cog:5 #io chan:1 PropForth v5.5 2013Feb20 11:30 3
Cog:6 #io chan:1 PropForth v5.5 2013Feb20 11:30 3 6(0)->7(0)
Cog:7 #io chan:1 SERIAL 7(0)->6(0)
Prop0 Cog6 ok

-- Connected MP3-player ---

monitor

monitor

A/D	Current[mA]	Total Current[mAsec]	Total Current[d100 X Ahour]
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
10	2	2	0
29	7	9	0
81	19	28	0
68	16	44	0
67	16	60	0
95	23	83	0
99	24	107	0
100	24	131	0
94	22	153	0
93	22	175	0
98	23	198	0
98	23	221	0
98	23	244	0
98	23	267	0
93	22	289	0

A/D	Current[mA]	Total Current[mA*sec]
93	22	311
114	27	338
99	24	362
99	24	386
99	24	410
99	24	434
99	24	458
99	24	482
99	24	506
99	24	530
99	24	554
99	24	578
99	24	602
99	24	626
99	24	650
99	24	674
94	22	696
93	22	718
99	24	742
99	24	766

Current-measure mode



Total-Current-measure mode



