

CONFIDENTIAL B

Gauge Master-Cu Setting Tool SOP_



Gauge Master-Customized Setting Tool SOP_V2.1



Revision History

Revision	Data	Author	Note
V1.0	07/21/2015	Filby Horng	1 st version for customer
V1.1	09/02/2015	Filby Horng	增加流程圖，修改重載測試手法step6/9
V2.0	11/16/2015	Filby Horng	精簡step8之后的步驟
V2.1	01/08/2016	Cherry Chiu	增加DLPT開關機條件實驗步驟

Tool 介面

Gauge Master - Customized Setting

電池0%定義調整

瀏覽 請選擇兩個.h檔案

☐ cust_battery_meter.h
☐ cust_battery_meter_table.h

精準模式 快速模式

溫度(℃)	50℃	25℃	0℃	-10℃
開機電壓(mV)				
最低開機電芯電壓(mV)				

計算

Gauge Master - Customized Setting

系統負載影響調整

請選擇兩個.h檔案

瀏覽

☒ cust_battery_meter.h
☒ cust_battery_meter_table.h

	HOT	WARM	COOL	COLD
溫度(℃)				
電芯電壓(mV)				
平均電流(mA)				
開機電壓(mV)				

Rsense(mΩ)
10

Rpcb(mΩ)
20

Q_MAX_SYS_VOLTAGE(mV)	BATTERY_PSEUDO1(%)	0℃	-10℃				
		低溫開機電壓(mV)			PSEUDO1		

計算

測試文件

■ 以XX電池為例

- 參數測試手法請參考

“GM1.0 and 2.0 Customized Setting Flow”文檔

溫度(°C)	50°C	25°C	0°C	-10°C
開機電流 (mA)	363.3	188.2	183.1	263.5

重載測試結果	HOT	WARM	COOL	COLD
溫度(°C)	40	25	0	-10
關機電壓(mV)	3657	3687	3854	4080
重載平均電流(mA)	1467.2	1148.9	1238.8	1324.9

Step 1

- 打開Tool，選擇精準模式或快速模式

Gauge Master - Customized Setting

電池0%定義調整

瀏覽 請選擇兩個.h檔案

☐ cust_battery_meter.h
☐ cust_battery_meter_table.h

精準模式 快速模式

溫度(°C)	50°C	25°C	0°C	-10°C
開機電壓(mV)				
最低開機電芯電壓(...)				

計算

Gauge Master - Customized Setting

電池0%定義調整

瀏覽 請選擇兩個.h檔案

☐ cust_battery_meter.h
☐ cust_battery_meter_table.h

精準模式 快速模式

開機電壓(mV) 3450 (mV)

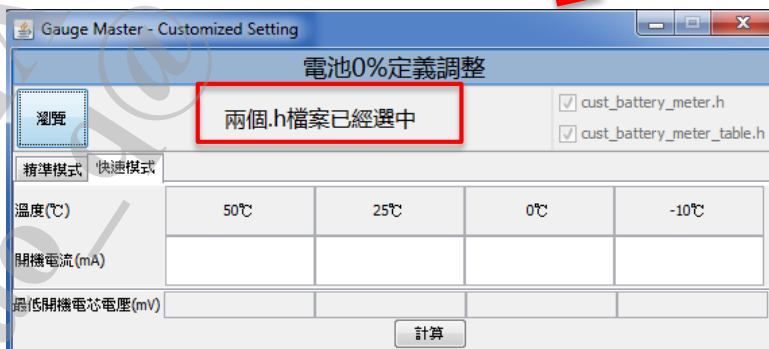
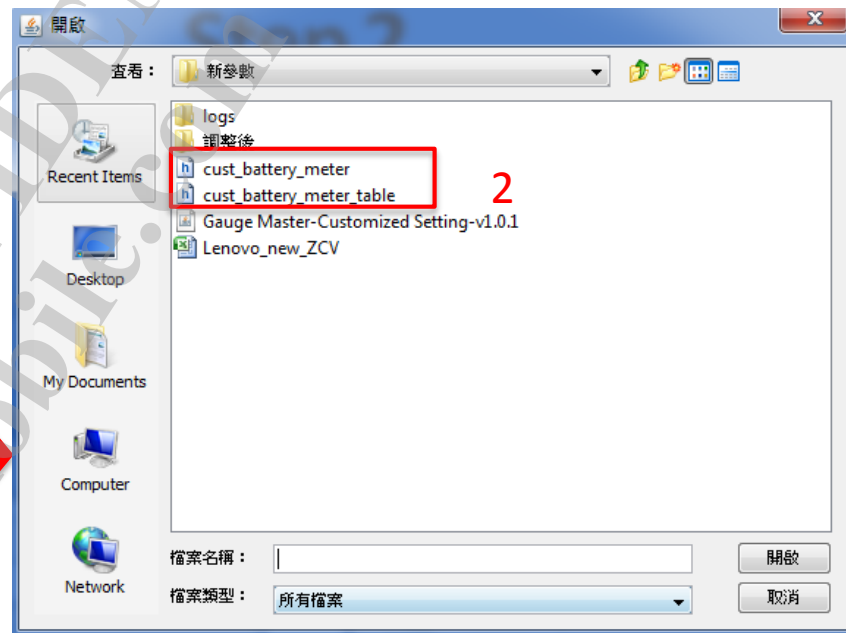
溫度(°C)	50°C	25°C	0°C	-10°C
開機電流(mA)				
最低開機電芯電壓(...)				

計算

Step 2

■ 選擇.h檔來源

1



確定兩個檔案皆已選擇

Step 3-a

- 填入開機電壓資訊
 - MT6797平台填入3200mV
 - 其餘平台為3450mV

The screenshot shows the 'Gauge Master - Customized Setting' window. The title bar is 'Gauge Master - Customized Setting'. The main title is '電池0%定義調整'. Below the title bar, there is a '瀏覽' button and a red text prompt '請選擇兩個.h檔案'. To the right of the prompt are two checkboxes: 'cust_battery_meter.h' and 'cust_battery_meter_table.h'. Below these are two tabs: '精準模式' and '快速模式'. The '精準模式' tab is selected. In this mode, there is a text input field for '開機電壓(mV)' with the value '3450' and a unit '(mV)' dropdown. Below this is a table with columns for temperature: '50°C', '25°C', '0°C', and '-10°C'. The rows are '開機電流(mA)' and '最低開機電芯電壓(...)'. A '計算' button is at the bottom right.

溫度(°C)	50°C	25°C	0°C	-10°C
開機電流(mA)				
最低開機電芯電壓(...)				

Step 3-b

- 填入開機電流資訊

- 其餘平台開機電流依照[FGADC_D0] log報值填入

溫度(°C)	50°C	25°C	0°C	-10°C
開機電流 (mA)	363.3	188.2	183.1	263.5

- MTK release lboot data

- MT6797平台lboot四個溫度下填入1000(mA)

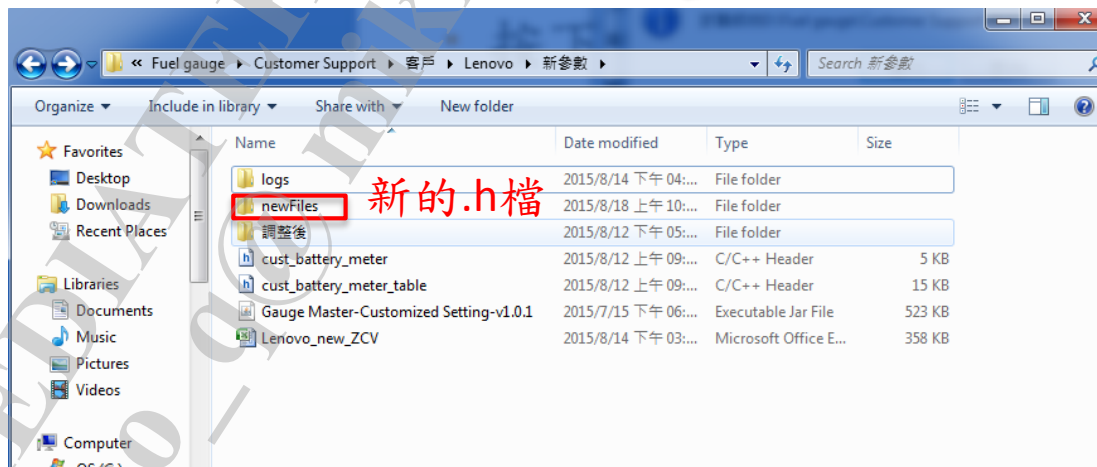
溫度(°C)	50°C	25°C	0°C	-10°C
開機電流 (mA)	1000	1000	1000	1000

Step 4

■ 按下計算

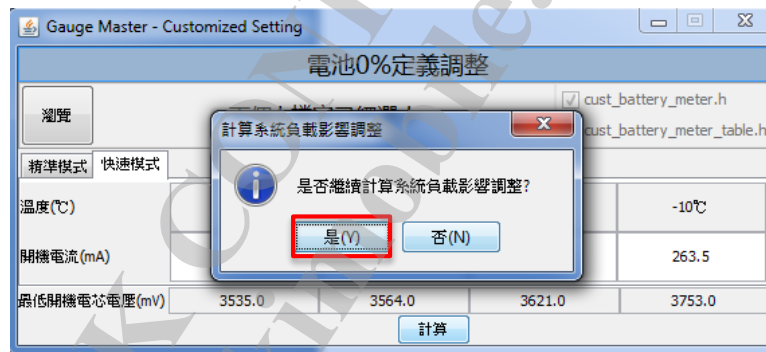


1



Step 5

■ 繼續計算系統負載影響調整



Step 6

- 填入重載相關資訊 HOT溫度若擔心50°C溫度過高造成系統shutdown，可改操作在40°C

溫度填環溫
盡量與ZCV
table的四個
溫度相同

重載測試結果	HOT	WARM	COOL	COLD
溫度(°C)	40	25	0	-10
關機電壓(mV)	3657	3687	3854	4080
重載平均電流(mA)	1467.2	1148.9	1238.8	1324.9

Step 6-1

重載關機電壓取得方式

- 確認剛開機時的HWOCV
 - MT6795需手動量測電池電壓
 - 其他平台可直接查FGADC_D0的log

1. [FGADC_D0] (HW OCV 4239, HW OCV% 93, SW OCV 4223, SW OCV% 92, RIC% 0, VBAT% 90)

- 利用HWOCV去查ZCV table的初始電量

- ex.25 °C
- Note: Hot溫度直接
參考50°C ZCV table即可

25°C	OCV	VC	mAh	R	DOD
	4331		0	130	0
Qmax	4308	4251	47	130	1
3362	4289	4233	93	133	3
	4271	4216	140	130	4
	4255	4200	186	133	6
	4239	4185	233	133	7
	4223	4168	279	133	8
	4207	4153	326	133	10
	4192	4137	372	133	11
	4178	4122	419	138	12

初始電量=233mAh

Step 6-2-a

重載關機電壓取得方式

- 確認當電池電壓小於系統關機電壓時的消耗電量

```
[Tue Aug 11 15:10:58.033 2015] [ 8279.756920]<1>. (1) [173:bat_routine_thr][kernel]AvgVbat 3419,bat_vol 3445, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 3600
[Tue Aug 11 15:11:08.251 2015] [ 8289.961926]<1>. (3) [173:bat_routine_thr][kernel]AvgVbat 3415,bat_vol 3359, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 3487
[Tue Aug 11 15:11:28.265 2015] [ 8309.960288]<2>. (2) [173:bat_routine_thr][kernel]AvgVbat 3411,bat_vol 3413, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 347
[Tue Aug 11 15:11:38.139 2015] [ 8319.878554]<4>. (4) [173:bat_routine_thr][kernel]AvgVbat 3410,bat_vol 3389, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 3600
[Tue Aug 11 15:11:58.137 2015] [ 8339.845580]<4>. (4) [173:bat_routine_thr][kernel]AvgVbat 3406,bat_vol 3355, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 3600
[Tue Aug 11 15:12:08.137 2015] [ 8349.874910]<4>. (4) [173:bat_routine_thr][kernel]AvgVbat 3405,bat_vol 3408, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 3487
[Tue Aug 11 15:12:28.182 2015] [ 8369.894785]<4>. (4) [173:bat_routine_thr][kernel]AvgVbat 3400,bat_vol 3366, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 3600
[Tue Aug 11 15:12:48.149 2015] [ 8389.901531]<3>. (2) [173:bat_routine_thr][kernel]AvgVbat 3391,bat_vol 3325, AvgI 0, I 0, VChr 0, AvgT 43, T 44, ZCV 3600
[Tue Aug 11 15:12:58.102 2015] [ 8399.791394]<1>. (2) [173:bat_routine_thr][kernel]AvgVbat 3389,bat_vol 3345, AvgI 0, I 0, VChr 0, AvgT 43, T 45, ZCV 3600

[Tue Aug 11 15:11:28.062 2015] [ 8309.744935]<0>. (4) [360:fuelgauged]MTK_FG: [fgauge_update_dod] fg_dod_1=94, fg_coulomb_act=-28246, fg_dod0=8, C_0mA=3356, C_400mA=3356
[Tue Aug 11 15:11:38.014 2015] [ 8319.683890]<4>. (1) [360:fuelgauged]MTK_FG: fg_coulomb_act_pre=-28205 fg_coulomb_act=-28290 duration_time=10 fg_coulomb_act_time=20
[Tue Aug 11 15:11:48.123 2015] [ 8329.797044]<3>. (4) [360:fuelgauged]MTK_FG fg_coulomb_act_pre=-28205 fg_coulomb_act=-28333 duration_time=10 fg_coulomb_act_time=30
[Tue Aug 11 15:12:38.088 2015] [ 8379.793276]<2>. (1) [360:fuelgauged]MTK_FG: fg_coulomb_act_pre=-28460 fg_coulomb_act=-28545 duration_time=10 fg_coulomb_act_time=20
[Tue Aug 11 15:12:38.166 2015] [ 8379.873544]<1>. (3) [360:fuelgauged]MTK_FG: [fgauge_update_dod] fg_dod_1=95, fg_coulomb_act=-28545, fg_dod0=8, C_0mA=3356, C_400mA=3356
[Tue Aug 11 15:12:48.196 2015] [ 8389.916194]<1>. (1) [360:fuelgauged]MTK_FG: fg_coulomb_act_pre=-28460 fg_coulomb_act=-28591 duration_time=10 fg_coulomb_act_time=30
[Tue Aug 11 15:12:48.212 2015] [ 8389.922836]<1>. (2) [360:fuelgauged]MTK_FG: [fgauge_update_dod] fg_dod_1=95, fg_coulomb_act=-28591, fg_dod=8, C_0mA=3356, C_400mA=3356
[Tue Aug 11 15:13:18.054 2015] [ 8419.745761]<2>. (7) [360:fuelgauged]MTK_FG: fg_coulomb_act_pre=-28719 fg_coulomb_act=-28719 duration_time=10 fg_coulomb_act_time=0
```

fg_coulomb_act的單位為0.1mAh
→消耗電量=2859.1mAh

Step 6-2-b

重載關機電壓取得方式

- 確認當電池電壓小於系統關機電壓時的消耗電量(for MT6797)
- Key word:
 - [DLPT_POWER_OFF_EN] SOC=0 to power off , cnt=

```
[Mon Oct 26 18:37:07.246 2015] [ 1898.891519] <2>.(1)[176.bat_update_thre][DLPT_POWER_OFF_EN] run
[Mon Oct 26 18:37:17.258 2015] [ 1908.889372] <3>.(5)[176.bat_update_thre][DLPT_POWER_OFF_EN] run
[Mon Oct 26 18:37:27.248 2015] [ 1918.898388] <4>.(5)[176.bat_update_thre][DLPT_POWER_OFF_EN] run
[Mon Oct 26 18:37:37.262 2015] [ 1928.902060] <2>.(4)[176.bat_update_thre][DLPT_POWER_OFF_EN] run
[Mon Oct 26 18:37:47.257 2015] [ 1938.889476] <3>.(5)[176.bat_update_thre][DLPT_POWER_OFF_EN] run
[Mon Oct 26 18:37:47.257 2015] [ 1938.889483] <3>.(5)[176.bat_update_thre][DLPT_POWER_OFF_EN] SOC=0 to power off , cnt=1
[Mon Oct 26 18:37:57.525 2015] [ 1948.908132] <4>.(5)[176.bat_update_thre][DLPT_POWER_OFF_EN] run
[Mon Oct 26 18:37:57.525 2015] [ 1948.908139] <4>.(5)[176.bat_update_thre][DLPT_POWER_OFF_EN] SOC=0 to power off , cnt=2
```

```
[Mon Oct 26 18:36:17.207 2015] [ 1848.892076] <4>.(2)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=81, fg_coulomb_act=6518, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2640, fg_current_avg=12859, qmax_t
[Mon Oct 26 18:36:27.199 2015] [ 1858.894151] <4>.(2)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=81, fg_coulomb_act=6556, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2642, fg_current_avg=12726, qmax_t
[Mon Oct 26 18:36:37.203 2015] [ 1868.885914] <2>.(4)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=81, fg_coulomb_act=6589, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2640, fg_current_avg=12909, qmax_t
[Mon Oct 26 18:36:47.219 2015] [ 1878.903359] <0>.(2)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=81, fg_coulomb_act=6626, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2641, fg_current_avg=12798, qmax_t
[Mon Oct 26 18:36:57.221 2015] [ 1888.888413] <0>.(2)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=82, fg_coulomb_act=6664, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2643, fg_current_avg=12694, qmax_t
[Mon Oct 26 18:37:07.205 2015] [ 1898.888678] <2>.(5)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=82, fg_coulomb_act=6702, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2645, fg_current_avg=12545, qmax_t
[Mon Oct 26 18:37:17.219 2015] [ 1908.886613] <3>.(4)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=82, fg_coulomb_act=6737, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2645, fg_current_avg=12545, qmax_t
[Mon Oct 26 18:37:27.210 2015] [ 1918.893279] <4>.(0)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=82, fg_coulomb_act=6775, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2645, fg_current_avg=12540, qmax_t
[Mon Oct 26 18:37:37.219 2015] [ 1928.893584] <2>.(0)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=82, fg_coulomb_act=6813, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2643, fg_current_avg=12676, qmax_t
[Mon Oct 26 18:37:47.215 2015] [ 1938.886759] <3>.(4)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=82, fg_coulomb_act=6844, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2642, fg_current_avg=12727, qmax_t
[Mon Oct 26 18:37:57.489 2015] [ 1948.894851] <2>.(0)[447.fuelgauged]MTK_FG: [fgauge_update_dod]fg_dod_1=82, fg_coulomb_act=6865, fg_dod0=58, C_0mA=2820, C_400mA=2764, C_FGCurrent=2644, fg_current_avg=12631, qmax_t
```

fg_coulomb_act的單位為0.1mAh
→消耗電量=686.5mAh

Step 6-3 重載關機電壓取得方式

- 將初始電量與消耗電量相加得總電量
 - $233 \text{ mAh} + 2859.1 \text{ mAh} = 3092.1 \text{ mAh}$
- 利用總電量去查ZCV table的OCV

25°C	OCV	VC	mAh	R	DOD
	3730	3657	2791	128	83
	3722	3649	2837	128	84
	3714	3640	2884	128	86
	3706	3629	2930	128	87
	3695	3625	2977	128	89
	3688	3622	3023	125	90
	3687	3618	3070	130	91
	3685	3612	3116	133	93
	3683	3596	3163	140	94

OCV約為3687mV

重載測試結果	HOT	WARM	COOL	COLD
溫度(°C)	40	25	0	-10
關機電壓(mV)	3657	3687	3854	4080
重載平均電流(mA)	1467.2	1148.9	1238.8	1324.9

Step 7

- 依照不同平台填入關機電壓
 - MT6797關機電壓填入3100mV

Gauge Master - Customized Setting

系統負載影響調整

請選擇兩個.h檔案

☒ cust_battery_meter.h

☒ cust_battery_meter_table.h

	HOT	WARM	COOL	COLD
溫度(℃)	40	25	0	-10
電芯電壓(mV)	3657	3687	3854	4080
平均電流(mA)	1467.2	1148.9	1238.8	1324.9
關機電壓(mV)	3400			

Rsence(mΩ)

10

Rpcb(mΩ)

5

Q_MAX_SYS_VOLTAGE(mV)	BATTERY_PSEUDO1(%)	0℃	-10℃	PSEUDO1	HOT	WARM	COOL	COLD
		低溫開机电壓(mV)						

Step 8

■ 按下計算

Gauge Master - Customized Setting

系統負載影響調整

請選擇兩個.h檔案

☒ cust_battery_meter.h

☒ cust_battery_meter_table.h

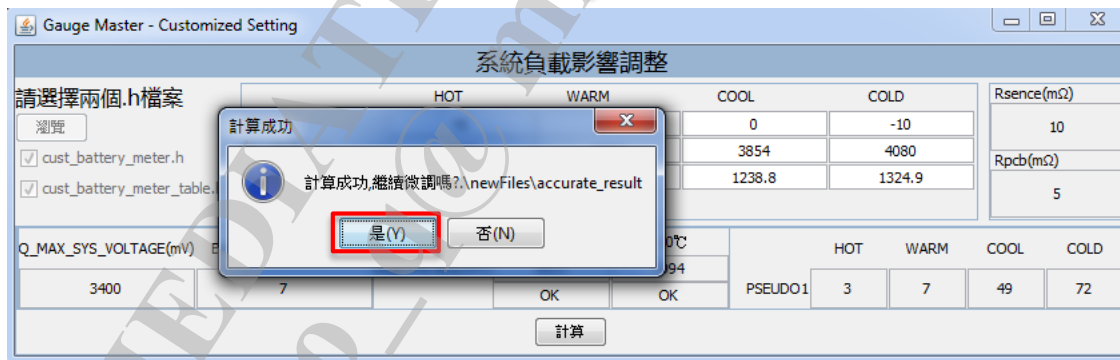
	HOT	WARM	COOL	COLD
溫度(°C)	40	25	0	-10
電芯電壓(mV)	3657	3687	3854	4080
平均電流(mA)	1467.2	1148.9	1238.8	1324.9
開機電壓(mV)	3400			

Rsense(mΩ)	10
Rpcb(mΩ)	5

Q_MAX_SYS_VOLTAGE(mV)	BATTERYPUEDO1(%)	0°C	-10°C	HOT	WARM	COOL	COLD
		低溫開机电壓(mV)					
				PSEUDO1			

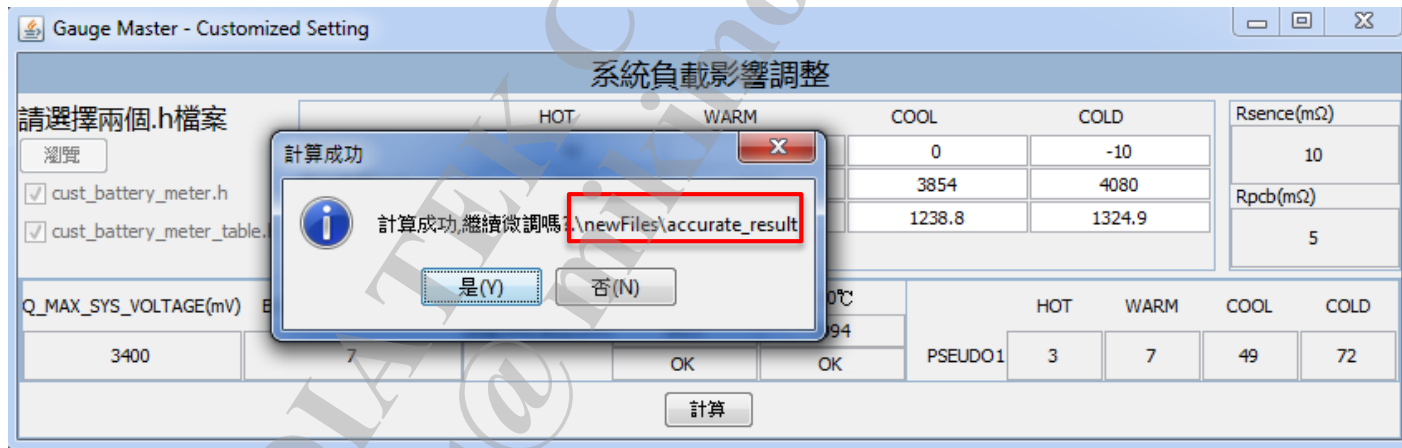
Step 9

- 若要微調低溫0%參數，請選擇是



Step 10

- 最終.H位置在與tool同個資料夾下的“newFiles”裡頭



Note

- 建議將各參數調整完後可實際用手機在各個溫度進行一次完整的充放電實驗微調 BATTERY PSEUDO1

Gauge Master - Customized Setting

系統負載影響調整

請選擇兩個.h檔案

☒ cust_battery_meter.h

☒ cust_battery_meter_table.h

	HOT	WARM	COOL	COLD	Rsense(mΩ)
溫度(°C)	40	25	0	-10	10
電芯電壓(mV)	3657	3687	3854	4080	Rpcb(mΩ)
平均電流(mA)	1467.2	1148.9	1238.8	1324.9	5
開機電壓(mV)	3400				

Q_MAX_SYS_VOLTAGE(mV)	BATTERY PSEUDO1(%)	0°C	-10°C	HOT	WARM	COOL	COLD	
3400	7	3854	4080	PSEUDO1	3	7	49	72
		OK	OK					

計算

若 BATTERY PSEUDO1(%) > 5, 注意導入流程, 請聯絡 ACS 協助分析

MEDIATEK

everyday genius