



**WELL DONE COMPANY**

統振股份有限公司

No.181 Anmei St, NeiHu District, Taipei City, Taiwan, R.O.C.

TEL : 886-2-2769-5959

FAX : 886-2-2769-5970

HTTP : //www.welldone.com.tw

## APPROVAL SHEET

### Delivery Specification

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### Delivery Specification

CUSTOMER : XXXXXX  
Welldone P/N : E2MS083K2002  
MODEL : |  
CUSTOMER P/N :  
SPEC : 3S1P SDI 2200mAh Cell  
ISSUED DATES : 2008/07/11  
REVISED DATE :  
VER : 1.0

Prepared by	Checked by	Approved by

TO

Customer Approved

- APPROVAL FOR SPECIFICATIONS ONLY  
 APPROVAL FOR SPECIFICATIONS AND SAMPLE

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# Product Specification

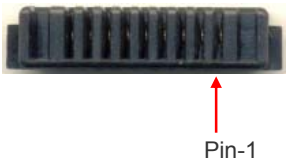
## 1. Revision history

Revision code	Revision date	Change Detail
V1.0	2008/5/11	New Release

## 2. Scope

This specification is applied to Li-Ion rechargeable battery pack ( 3 series 1 parallel ) with gas gauge (SMBus V1.1 interface) delivered to Computer Corp. as power supply for notebook PC.

## 3. Product configuration

Structure	Battery Pack	3 Cell of SAMSUNG 2200 mAh
	PCBA	Protection and Gas gauge circuit
	Protector	
Pin Assignment	Pin 1 : P- Pin 2 : P- Pin 3 : TH 390Ω Pin 4 : SMB Data Pin 5 : SMB Clock Pin 6 : NC Pin 7 : NC Pin 8 : P+ Pin 9 : P+	
	Refer to attached Pin Assignment drawing	

## 4. Norminal specification

No	Item	Rating performance	Remark
1	Typical capacity	2200 mAh 2000	In standard charging (Note 1)
2	Nominal voltage	11.10 V	Within 1 hour after quick charging (Note 1)
3	Maximum charge voltage	12.65 V	The charging voltage of CV mode
4	The end of discharging voltage	9.00 V	Stop discharge when one of cells reach to 3.0V
5	Suggestive charging current (Max.)	1.54 A	
6	System continuous discharging current(Max)	28.0 W	
7	The end of charge condition	150 mA	1 min
8	Operating condition	Charge 0~45°C Discharge 0~45°C	
9	Storage temperature	-20~60°C	

\* Note 1

Rating discharge : The constant current discharge (0.2C) till the end of discharge voltage at 25±2°C.

Rating charge : 12.6 ± 0.05V, the constant voltage and 0.5C, the constant current charge and stop when the current reach to 150mA ( 25±2°C & humidity of 65%).

## Product Specification

### 5. Performance and test condition

No	Item	Standard	Test condition
1	Outside appearance		Visual check
2	Outside dimension and weight	According to the attached drawings. Less than 250 g	Use caliper ( 0.5mm a division )
3	internal resistance	Below $\leq 250$ m $\Omega$	Measure with 1Khz sine wave AC within one hour after the rating charge at 25 $\pm$ 2 $^{\circ}$ C .
4	Open circuit voltage	Approx 11.7 V	Measure it within 24 hours after the rating charge.(25 $\pm$ 2 $^{\circ}$ C)
5	Cycle life	Above 70% compare to the initial capacity	Carry out 300 cycle charges and discharges at 21 $\pm$ 2 $^{\circ}$ C. Charge: 0.5C(Imin=220mA), Discharge: 1.1A(EDV=9V) Rest time: 10min Then measure rated discharge time after charge.(at 301'th cycle)
6	Leakage performance		Leave rated charged test sample at 60 $\pm$ 2 $^{\circ}$ C and 85% RH for 20 days, then leave for 1 week at 25 $\pm$ 2 $^{\circ}$ C .
7	Drop resistance		Drop 50% charge battery pack form 107cm height to concrete block covered with P-tile for X, Y, Z
8	Short between terminal (Safety test)	No rupture, fire, smoke nor leakage.	Leave pack shorted between terminals(+&-) for 6 hour after rated charge at 25 $\pm$ 2 $^{\circ}$ C .
9	Reverse charge (Safety test)	No rupture, fire, smoke nor leakage.	Leave 24 hours connecting 2.2A/12.6V constant current/Constant voltage power supply reverse polarity at 25 $\pm$ 2 $^{\circ}$ C after rated charge.
10	Over charge prohibitor	Shut down the circuitry and stop charge if one cells' voltage>4.28 $\pm$ 0.03 V / cell	In case of the cell voltage which has detected charge prohibition mode. If all cells are less than <4.15 $\pm$ 0.03 V / cell
11	Over discharge prohibitor	Shut down the circuitry and stop discharge if one cells' voltage<2.80 $\pm$ 0.03 V / cell	Recover when the voltage of cells reach above. >3.00 $\pm$ 0.03 V / cell
12	Over current Protection for discharge (Software)	discharge current >3.5 $\pm$ 0.1A Detection Delay Time $\leq$ 4Sec	Eliminate discharge load and charge is considered in normal status.
13	Over current Protection for discharge (Hardware)	discharge current >6.5 $\pm$ 0.5A Detection Delay Time $\leq$ 24mSec	Eliminate discharge load and charge is considered in normal status.
14	Over current prohibition Protector for charge (Software)	charge current >2.25A $\pm$ 0.1A Detection Delay Time $\leq$ 4Sec	
15	Over Temperature Protection for charge	Detection over temperature 60 $^{\circ}$ C $\pm$ 3	Release temperature 50 $^{\circ}$ C $\pm$ 3
16	Over Temperature Protection for discharge	Detection over temperature 70 $^{\circ}$ C $\pm$ 3	Release temperature 60 $^{\circ}$ C $\pm$ 3
17	Over Charge Second Protection for charge (BQ29412)	Shut down the circuitry and stop charge if one cells' voltage(>4.45 $\pm$ 0.025 V / cell)	SCP-protector Blow
18	Safety voltage Protection for charge (Software)	Shut down the circuitry and stop charge if Cell Stack voltage >13.20 V	SCP-protector Blow
19	Safety Temperature Protection for discharge and charge	Detection over temperature 80 $^{\circ}$ C $\pm$ 3	SCP-protector Blow

# Product Specification

## 6. EEPROM data description (For BQ20Z70 )

Item	Value	Unit	Name	Value	Unit
<b>Voltage(1st Level Safety)</b>			TCA Clear %	95	%
COV Threshold	4280	mV	FC Clear%	95	%
COV Recovery	4150	mV	<b>Cell Balancing Cfg(Charge Control)</b>		
CUV Threshold	2800	mV	Min Cell Deviation	2333	mAh
CUV Recovery	3000	mV	<b>Charging Faults(Charge Control)</b>		
<b>Current (1st Level Safety)</b>			Over Charge Capacity	880	mAh
OC(1st Tier ) Chg	2250	mA	<b>Date(SBS Configuration)</b>		
OC(1st Tier ) Dsg	3500	mA	Rem Cap Alarm	220	mAh
Current Recovery Time	30	Sec	Rem Energy Alarm	2440	mWh
AFE OC Dsg	03	Hex	Rem Time Alam	10	min
AFE OC Dsg Time	0A	Hex	Init Battery Mode	0081	Hex
AFE SC Chg Cfg	F0	Hex	Design Voltage	11100	mV
AFE SC Dsg Cfg	F8	Hex	Spec Info	0031	Hex
<b>Temperature(1St Level Safety)</b>			Manuf Date	07-Jun-2008	num
Over Temp Chg	60.0	Deg	Ser.Num.	0001	num
OT Chg Recovery	50.0	Deg	Cycle Count	0	num
Over Temp Dsg	70.0	Deg	CC Threshold	1760	mAh
OT Dsg Recovery	60.0	Deg	CF MaxError Limit	100	%
<b>Voltage(2nd Level Safety)</b>			Design Capacity	2200	mAh
SOV Threshold	13200	mV	Design Energe	24420	mWh
SOV Time	10	Sec	Manuf Name	welldone	name
Cell Imbalance Current	120	mA	Device Name	N011	name
Cell Imbalance Fail Voltage	500	mV	Device Chemistry	LION	name
Cell Imbalanvce Time	20	Sec	<b>Configuration(SBS Configuration)</b>		
Battery Rest Time	30	Sec	TDA Set %	10	%
Min CIM-check voltage	3300	mV	TDA Clear %	19	%
PFIN Detect Time	0	Sec	FD Set %	7	%
<b>Current(2nd Level Safety)</b>			FD Clear %	19	%
SOC Chg	2750	mA	TDA Set Volt Threshold	9300	mV
SOC Chg Time	6	Sec	TDA Set Volt Time	1	Sec
SOC Dag	4500	mA	TDA Clear Volt	9500	mV
SOC Dsg Time	6	Sec	<b>Manufacturer Info(System Data)</b>		
<b>Temperature(2nd Level Safety)</b>			Manuf. Info	SDI22-3S1P	
SOT Chg	85	Deg	<b>Lifetime Data(System Data)</b>		
SOT Chg Time	3	Sec	Lifetime Max Temp	35.0	Deg
SOT Dag	85	Deg	Lifetime Min Temp	19.3	Deg
SOT Dsg Time	3	Sec	<b>Lifetime Temp Samples(System Data)</b>		
<b>FET Verification(2nd Level Safety)</b>			<b>Registers(Configuration)</b>		
FET Fail Time	20	Sec	Operation Cfg A	0229	flg
<b>AFE Verification(2nd Level Safety)</b>			Operation Cfg B	24F8	flg
AFE Check Time	20	Sec	Operation Cfg C	0000	flg
AFE Fail Time	20	num	Permanent Fail Cfg	0C7D	flg
<b>Charge Inhibit Cfg(Charge Control)</b>			Non-Removable Cfg	0000	Hex
Chg Inhibit Temp Low	0.0	Deg	<b>Power(Power)</b>		
Chg Inhibit Temp High	50.0	Deg	Flash Update OK Voltage	7500	mV
<b>Pre-Charge Cfg(Charge Control)</b>			Shutdown Voltage	6900	mV
Pre-Charge Current	220	mA	Cell Shutdown Voltage	2300	mV
Pre-Charge Temp	5.0	Deg	Charger Present	3000	mV
Pre-Charge Voltage	2800	mV	Sleep Current	10	mA
Recovery Voltage	3000	mV	Wake Current Reg	03	Hex
<b>Fsat Charge Cfg(Charge Control)</b>			<b>IT Cfg(Gas Gauging)</b>		
Fast Charge Current	1540	mA	Load Select	3	num
Charging Voltage	12600	mV	Load Mode	0	num
Suspend Low Temp	0.0	Deg	Term Voltage	9000	mV
Suspend High Temp	60.0	Deg	User Rate-mA	0	mA
<b>Termination Cfg.(Charge Control)</b>			User Rate-mW	0	mW
Taper Current	120	mA	Reserve Cap-mAh	50	mAh
Taper Voltage	300	mV	Reserve Cap-mWh	0	mWh

# Product Specification

Item	Value	Unit	Name	Value	Unit
<b>Current Thresholds(Gas Gauging)</b>			<b>Config(Calibration)</b>		
Dsg Current Threshold	50	mA	CC Current	2000	mA
Chg Current Threshold	25	mA	Voltage Signal	11100	mV
Quit Current	2	mA	Temp Signal	298.0	袁
<b>State(Gas Gauging)</b>			CC Offset Time		
Qmax Cell 0	2141	mAh	ADC Offset Time	32	ms
Qmax Cell 1	2147	mAh	CC Gain Time	250	ms
Qmax Cell 2	2152	mAh	Voltage Time	1984	ms
Qmax Cell 3	2200	mAh	Temperature Time	32	ms
Qmax Pack	2141	mAh	Cal Mode Timeout	300	Sec
Update Status	02	num	<b>Temp Model(Calibration)</b>		
Delta Voltage	8	mV	Ext Coef 1	-28285	num
<b>Device Status Data(PF Status)</b>			Ext Coef 2	20848	num
PF Flags 1	0000	flg	Ext Coef 3	-7537	num
PF Flags 2	0000	flg	Ext Coef 4	401.2	袁
<b>Data(Calibration)</b>			Ext Min AD	0	cnt
CC Gain	10.102	mohm	Ext Max Temp	401.2	袁
CC Delta	10.102	mohm	Int Coef 1	0	num
Ref Voltage	1227.25	mV	Int Coef 2	0	num
AFE Pack Gain	993.07	cnt	Int Coef 3	-11136	num
CC Offset	-0.264	mV	Int Coef 4	575.4	袁
Board Offset	0	猩	Int Min AD	0	cnt
Int Temp Offset	0.0	蚓	Int Max Temp	575.4	袁
Ext1 Temp Offset	0.7	蚓	<b>Current(Calibration)</b>		
Ext2 Temp Offset	0.0	蚓	Filter	239	num
			Deadband	3	mA
			CC Deadband	10.0	猩

## 7. Gas gauge Accuracy

Voltage ± 1%  
 Current ± 1%  
 Temperature ± 3 °C

## 8. Agency Approvals

UL:  
 CE:

## 9. Remaining capacity indication

1210mA~1430mA

## 10 Shipment

The battery shall be shipped in 55~65 %charged.