



SPEC SHEET

CUSTOMER :


CUSTOMER PART NUMBER : MedXP-300v3

DESCRIPTION : 300Wh, 12-16-19-24V Selectable & USB OUTPUT

DOCUMENT NUMBER : APP-B0124

REVISION : A01

SUPPLIER APPROVAL

Made by	Checked by	Approved by
Clara Lee		
2013.06.18		2013.06.18

CUSTOMER APPROVAL

Checked by	Checked by	Approved by

Revision Descriptions

Rev	ECN	Description	Approved by	Date
A01		Initial draft	HS Park	2013.06.18

Contents

1. Product Specification

2. Accessory Mechanical Drawings


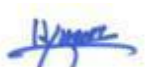
2.1. Label Drawing

1. Product Specification

Product Specification: MedXP-300 External Battery Pack

Model Name : MedXP-300v3
Document Number : PRO-B0008
Revision : A201

Supplier Approval

Made by	Checked by	Approved by
		
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Customer Approval

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Revision Descriptions

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A101		Initial draft		2010.08.03
A102		2.2.3.1. Fuel Gauge Display Add 'Reset method of error state' Two method: 1. Power switch ON/OFF. 2. Charging input by Adapter.		2012.03.07
A103		2.3.2.3. MedXP-300 Block Diagram (modify) 2.4.8. Case Maximum Normal Operation Temperature Add 'Environmental conditions' 2.4.14. FAN Operation (Temperature value correction) 2.5.4. Thermal Protection (Temperature value correction) 5. Safety Approvals (VCCI Items remove)		2012.05.09
A104		4.1. Temperature Operation: 0 to 35°C Storage(for shipping state) : -20 to 60°C (1month) -20 to 45°C (3month) -20 to 20°C (1year) 3.2.4. Charging indicator Charging LED color changing (RED => ORANGE)		2013.05.31
A201		Documents modified form.		2013.06.10

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1. Scope

1.1. Introduction

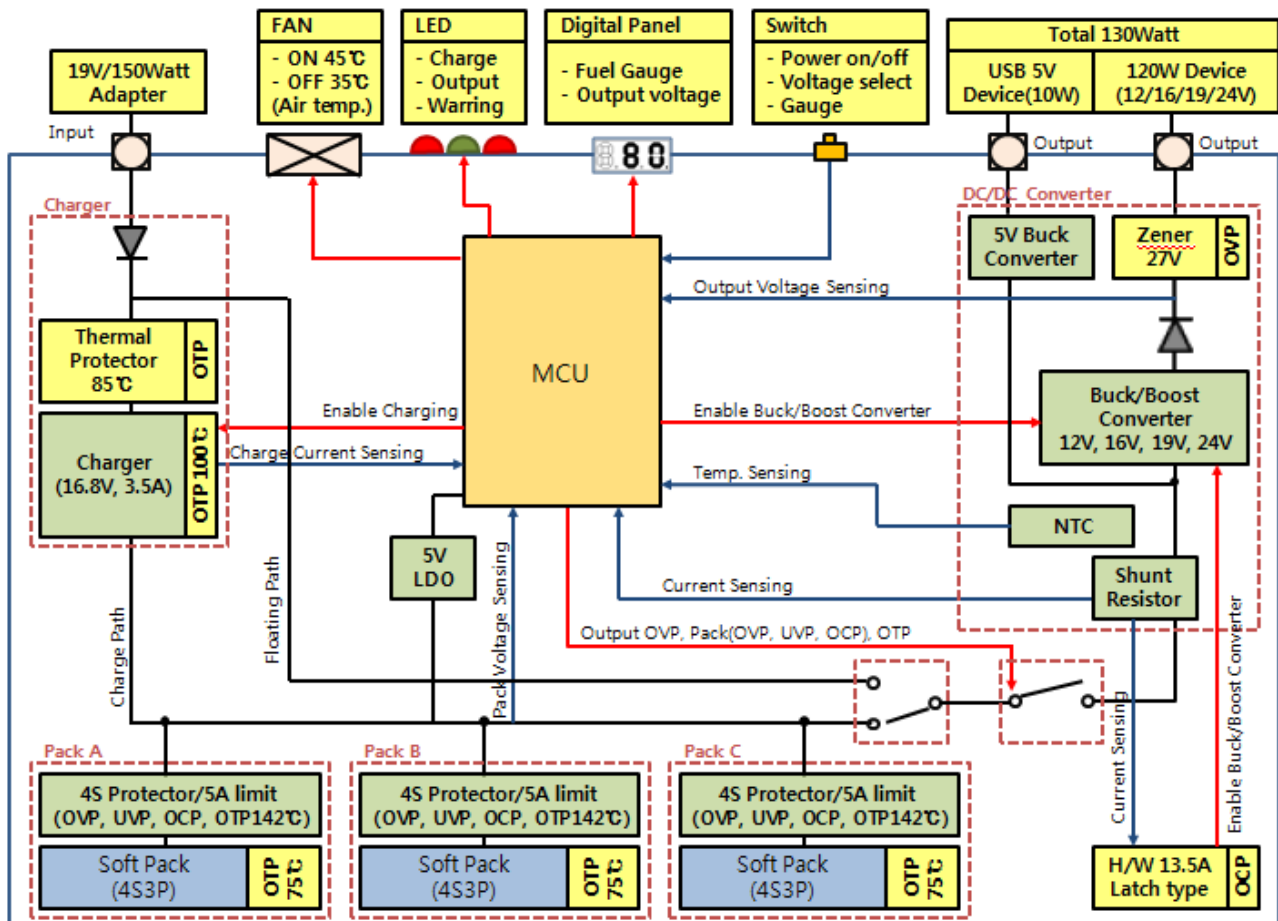
This battery pack makes 24V, 19V, 16V, and 12V output voltage with digital switch, and 5V USB output. It is used for under 120Watt Laptop computer. It's used 4S9P Lithium-ion Cylindrical Cells and can drive up to max. 130Watt.

It can charge with over 18V universal adapter. It can do the synchronous operation (simultaneous charging/discharging), MedXP-300 battery charging and Laptop computer operation.

1.2. Product Views



2. Block Diagram



Note1. A, B, and C are replaceable packs and by replacement, they must be replaced all at once for full performance.

Note2. H/W OCP operates to latch type.

Note3. Floating charging. Usable device range is max 130Watt at floating charge.

Note4. OVP (Over Voltage Protection), OTP (Over Temp Protection), UVP (Under Voltage Protection), OCP (Over Current Protection)

This level depends on charging rating and input adapter rating.

3. Performance Specifications

3.1. Performance of Pack

3.1.1. Used Cell (LG ICR18650 2200mAh)

- Cylindrical rechargeable lithium ion battery
- Diameter: 18.24 ± 0.11 mm, Height: ≤ 65.05 mm
- Nominal Voltage: 3.7 Volt
- Rated capacity (Typical): 2200mAh
- Operating Voltage: 3.0 ~ 4.2V

3.1.2. Pack Configuration

- Cell configuration: (4S * 3P) * 3Pack
- Rated voltage: 14.8 Volt
- Capacity: 19.8Ah (300Wh)

3.2. DC Input Specification

3.2.1. Input Voltage Rating

Input voltage: 18Vdc ~ 20Vdc
Adapter must use over 120watt.

3.2.2. Charging Voltage

Battery fully charged voltage: $16.8V \pm 1\%$
Battery charging current: $0.2 \sim 3.5A \pm 1\%$
Charging method: CCCV (constant current constant voltage)

3.2.3. Charging time

About 6 ~ 7 hours (Under Nominal Load <90Watts)

3.2.4. Charging indicator

- Dual color LED display
- Charging: Orange color LED blinking (step 1Hz)
 - Fully charged: Green LED on

3.3. DC Output Specification

3.3.1. Output Voltage

12V/16V/19V/24V, selectable with digital switch

USB 5V (A type port)

3.3.2. Output Voltage Range

- 24V: 24.1~23.5 Volt @0A / 5.0A Max
- 19V: 19.5~18.5 “ / 6.5A Max
- 16V: 15.8~15.1 “ / 8.0A Max for Toshiba laptop
- 12V: 12.5~11.5 “ / 10.0A Max
- USB 5V: 5.2V ~ 4.7V @0A / 2A Max

3.3.3. Output Power

12V / 16V / 19V / 24V Mode: 120W (max)

USB 5V: 10W (max)

The output is shutdown if output load exceeds 130Watt.

For recovery from shutdown, battery pack should be turned off and turned on after 30 seconds or connected with AC charger.

3.3.4. Efficiency

Efficiency shall be adequate to allow for the continuous operation at 120Watt output, at any battery voltage within range. Efficiency is typical 90% over at standard input (14.8V) at max load, with output cable.

3.3.5. Discharging time

The discharge time is more than 120min under 120Watt discharge.

3.3.6. Output Ripple

± 500mV at any input voltage.

3.3.7. Dynamic Load Regulation

± 5% excursion for 50% ~ 100% or 100% ~ 50% load change of DC output at any frequency up to 1KHz (Duty 50%)

3.4. Protection function of main circuit

3.4.1. Battery under voltage shutdown (by MCU)

Shutdown voltage: $12V \pm 0.5V$

3.4.2. Output Over Voltage Shutdown (by MCU)

Each output voltage $\pm 10\%$, Output will shut down and the output will decrease toward 0V.

3.4.3. Over current protection (by MCU)

Output is shut downed at input current exceed $13.5A \pm 1A$.

3.4.4. Output Short Circuit

The unit will go into current limit without damage to unit.

3.5. Protection function of PCM circuit

3.5.1. Over Voltage Protection (OVP)

When the unit cell voltage becomes higher than $4.25V \pm 0.025V$ during charging, charging is prohibited. Over voltage condition is released all cell voltage drop below $4.05V \pm 0.06V$.

3.5.2. Under voltage Protection (UVP)

When the unit cell voltage becomes lower than $2.30V \pm 0.1V$ during discharging, discharging is prohibited. Under voltage condition is released all cell voltage rise over $3.0V \pm 0.15V$.

3.5.3. Over Current Protection (OCP)

The unit Pack(A, B, C) is shut downed if output current exceeds $5A \pm 0.5A$. When the power switch is off and starts charging, unit pack over load condition is removed.

3.5.4. Over Temp Protection (OTP)

At charge condition, if unit pack temperature is exceed $75^{\circ}C \pm 5^{\circ}C$, charge and discharge are prohibited. And if unit pack temperature is exceed $142^{\circ}C \pm 5^{\circ}C$, charge and discharged are prohibited (fusing type)

3.6. Front display

3.6.1. Fuel Gauge

Digital panel is indicated when user push the gauge switch.

- 100% ~ 91%: 100(%)
- 90% ~ 71%: 80(%)
- 70% ~ 51%: 60(%)
- 50% ~ 31%: 40(%)
- 30% ~ 11%: 20(%)
- 10% ~ 6%: 10(%)
- 5% ~ 1%: 5(%)

3.6.2. Digital Panel Control Method

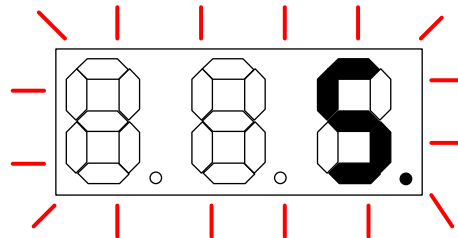
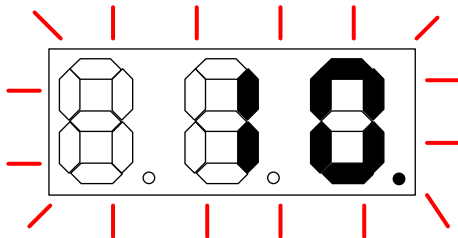
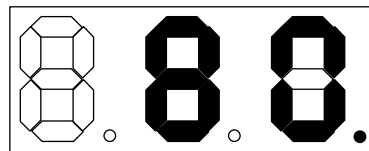
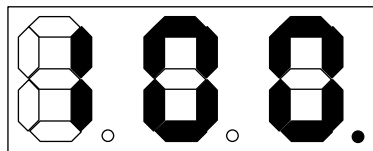
3.6.2.1. Fuel Gauge Display

Push the “gauge switch”

Display method: 0% ~100% (20% step)

Warning alarm function:

- Blinking warning alarm red LED (step 0.5Hz) during 10(%)
- Blinking warning alarm red LED (step 1Hz) during 5(%)



If you want to reset of error state, you can do method of two kinds.

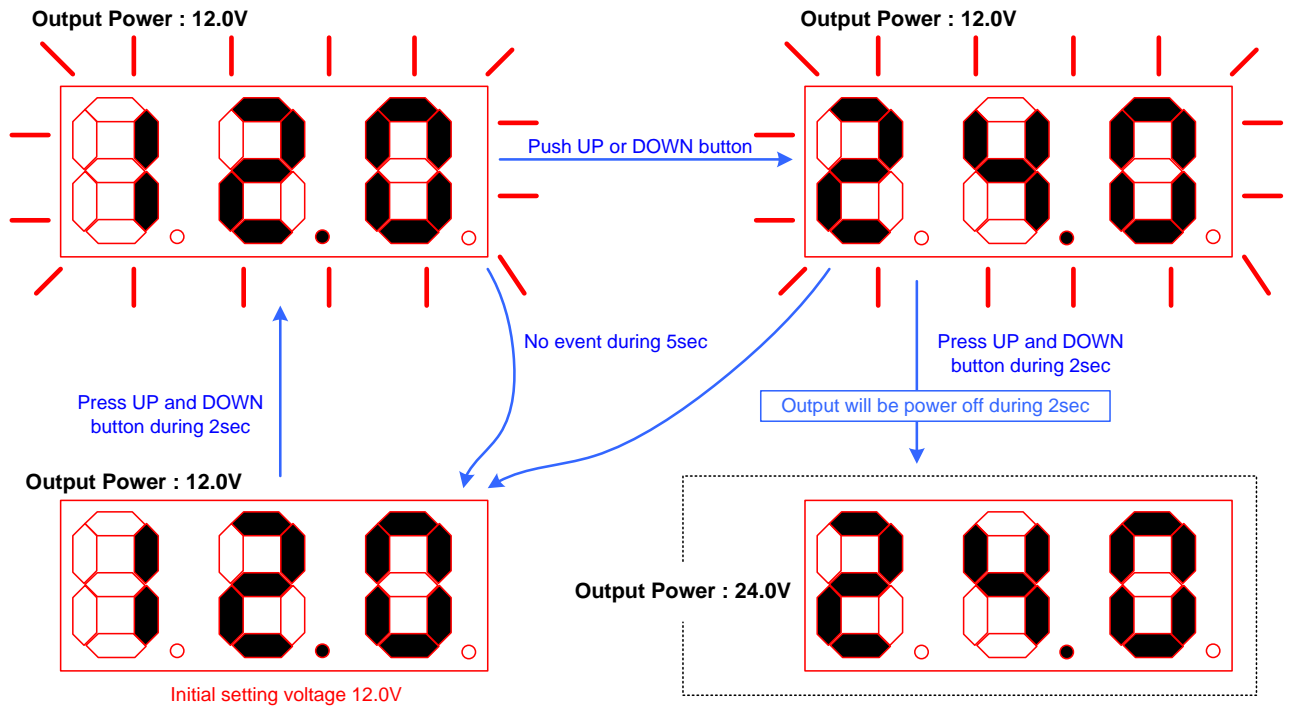
Power switches ON/Off. Or charging input by Adapter

But, if root cause of error is not solved, battery pack will be return state of error.

3.6.2.2. Voltage Setting Method

Voltage setting (can control with voltage setting button)

Digital panel display the setting voltage all time.

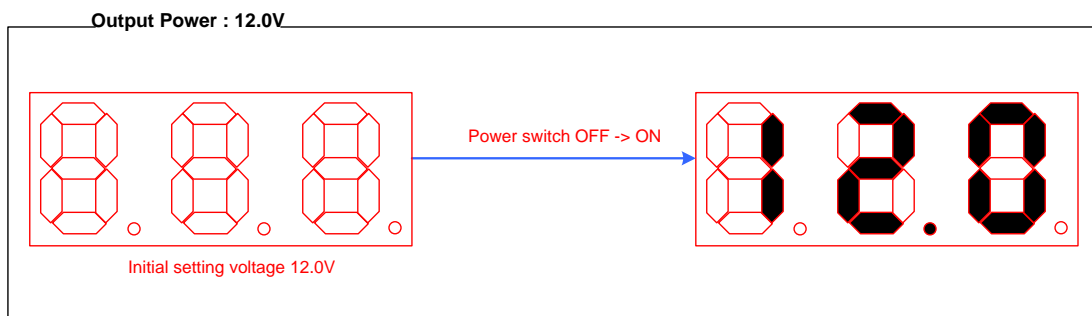


Voltage setting value is memorized into EEPROM after fully empty.

If MedXP-300 is shut down on abnormal condition, digital panel voltage goes to turn-off and output voltage goes to 0V.

3.6.2.3. Power switch on/off

Power switch is controlled from MCU. If user presses button during 2sec, power on/off status is changed.



3.7. The others

3.7.1. Case Maximum Normal Operation Temperature

The case single hotspot temperature does not exceed 45°C at room temperature (20°C) under maximum output.

If internal device exceeds 90°C ± 5°C under load, output is prohibited.

3.7.2. Sleep Current

Sleep current consumption (main power switch off) : less than 500uA

Power down current consumption (under voltage cutoff) : less than 70uA

3.7.3. FAN Operation

Fan operates if internal air temperature reaches to 45°C and the fan stops if the temperature reduced to 35°C.

4. Environmental Requirements

4.1. Temperature

Operation: 0 to 35°C

Storage (for shipping state): -20 to 60°C (1 month)

-20 to 45°C (3 month)

-20 to 20°C (1 year)

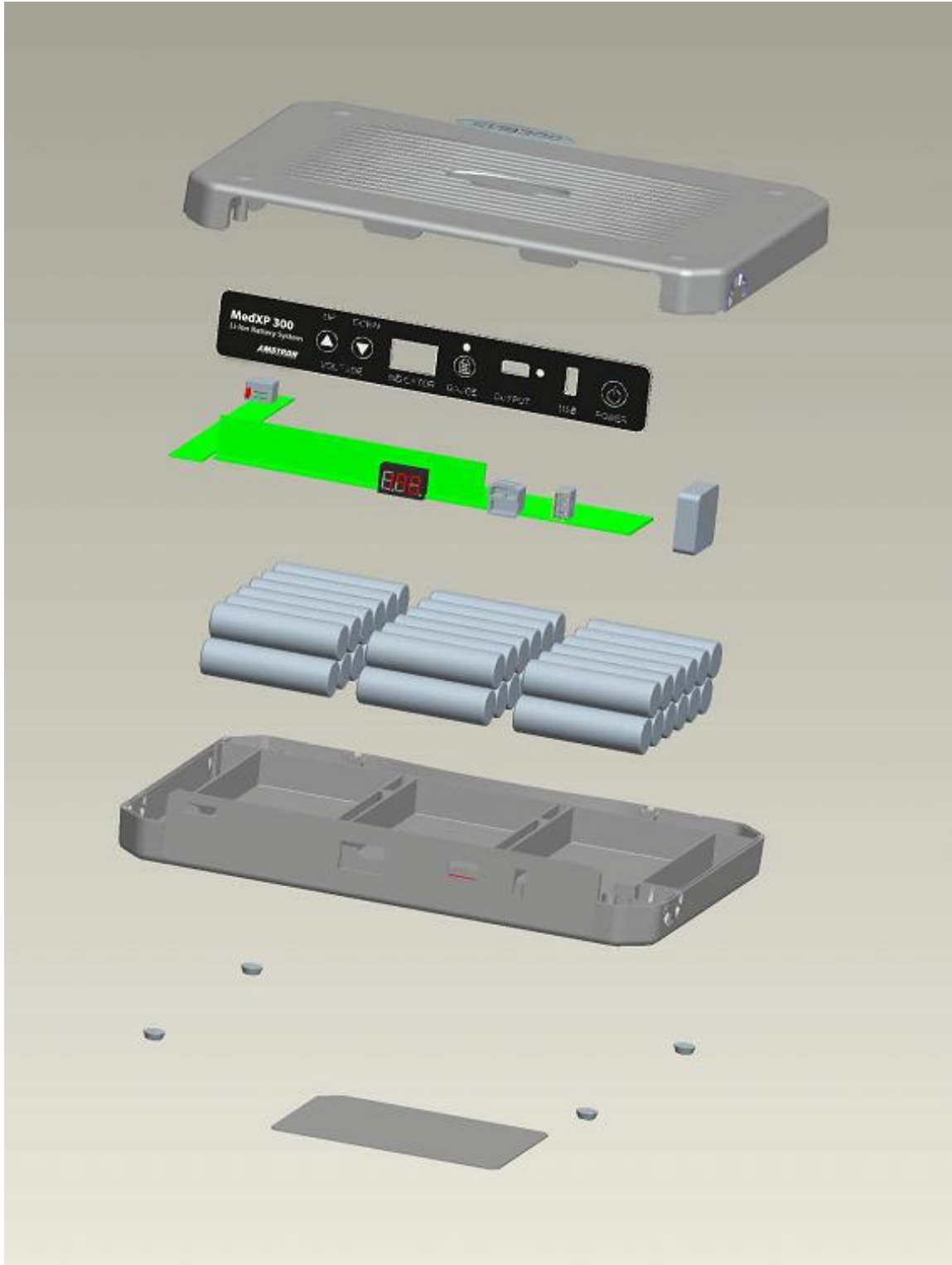
4.2. Humidity

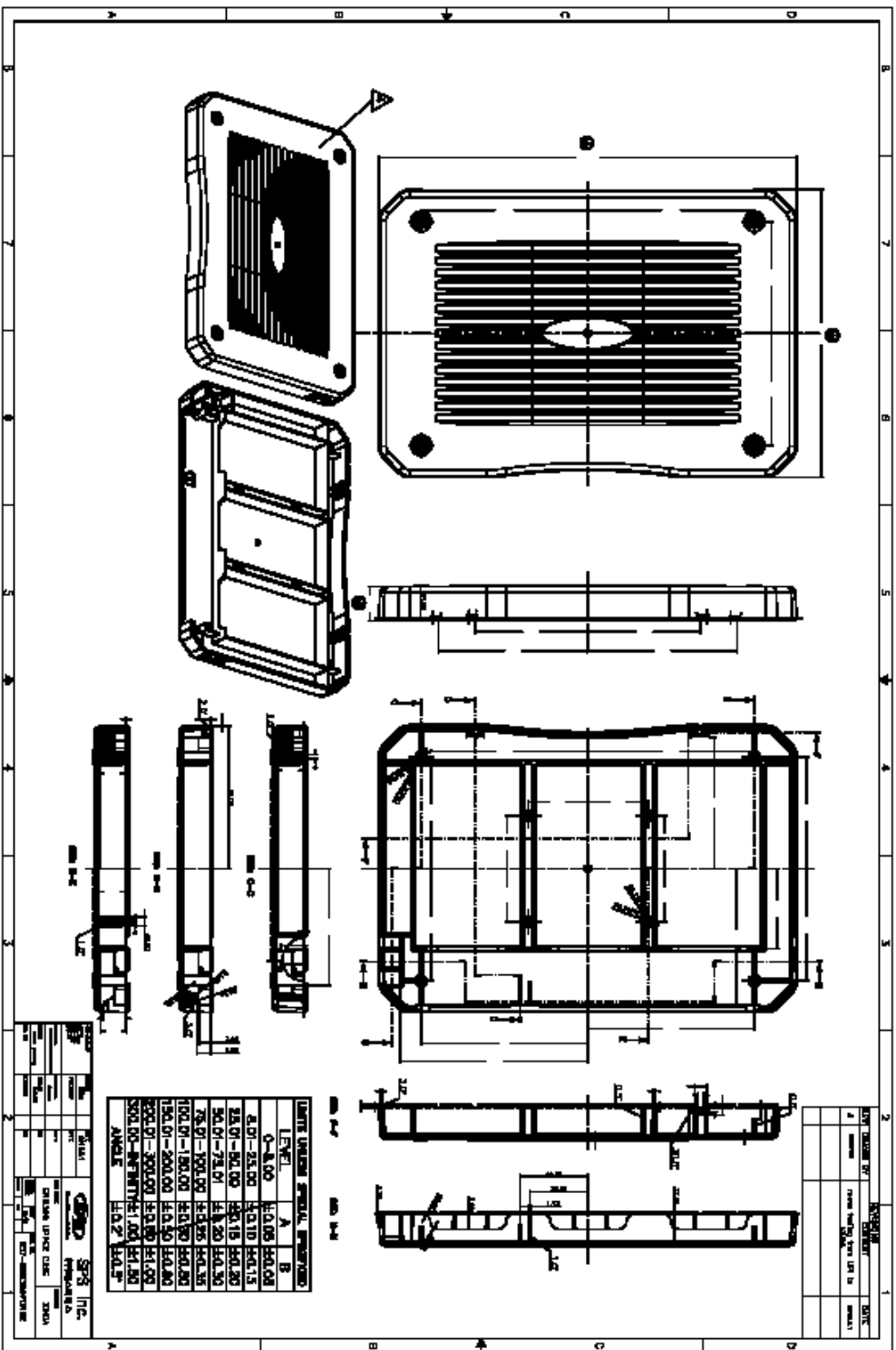
Operation: 5~95% RH non-condensing

Storage: 5~95% RH non-condensing

5. Mechanical Specifications

5.1. Dimensions (mm)





5.2. Weight

2.42Kg (Max)

5.3. Cooling Fan

Fan information: 30mm x 30mm x 10mm, 7000RPM,. 3.11 CFM airflow, 23.50dBA noise

Fan power consumption: 5V/0.16A or 15V/0.06A

6. Regulatory Environmental Requirements

6.1. Lead-free/RoHS

Materials and process compliant with 2002/95/EC RoHS Directive

7. Mechanical characteristics

7.1. Vibration

The pack charged per 3.2.3 are vibrated for 90 minutes per each of the three mutually perpendicular axis (x, y, z) with an amplitude of 0.8mm , frequency of 10Hz to 55Hz and sweep of 1Hz charge per minute

Pass criteria: No mechanical/electrical defects OCV drop < 15mV/cell

7.2. Drop

Packs charged per 3.2.3 are dropped onto wooden floor from 1meter height per each axis(total 3 drops).

Pass criteria: No electrical defects. No cells or safety devices shall be exposed, OCV drop < 15mV/cell

8. Pin Assignment

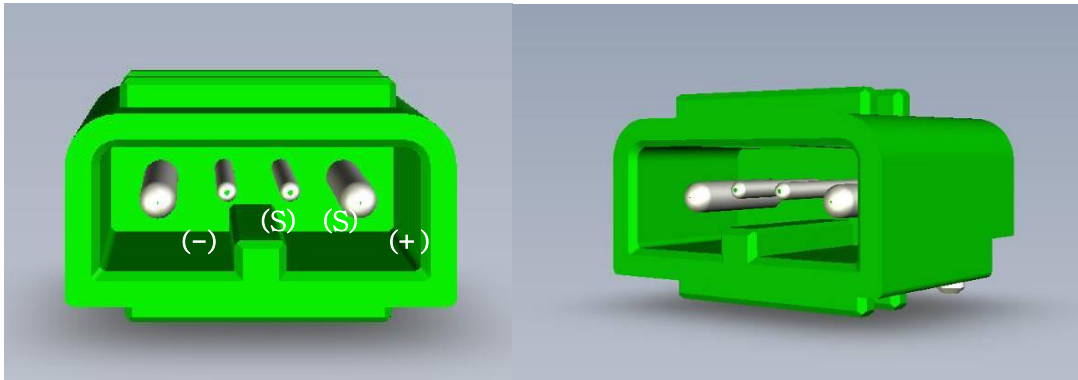
8.1. DC/DC OUTPUT

(+) = Positive supply

(S) = NC

(S) = NC

(-) = Negative supply



DC Jack: 4pin connector

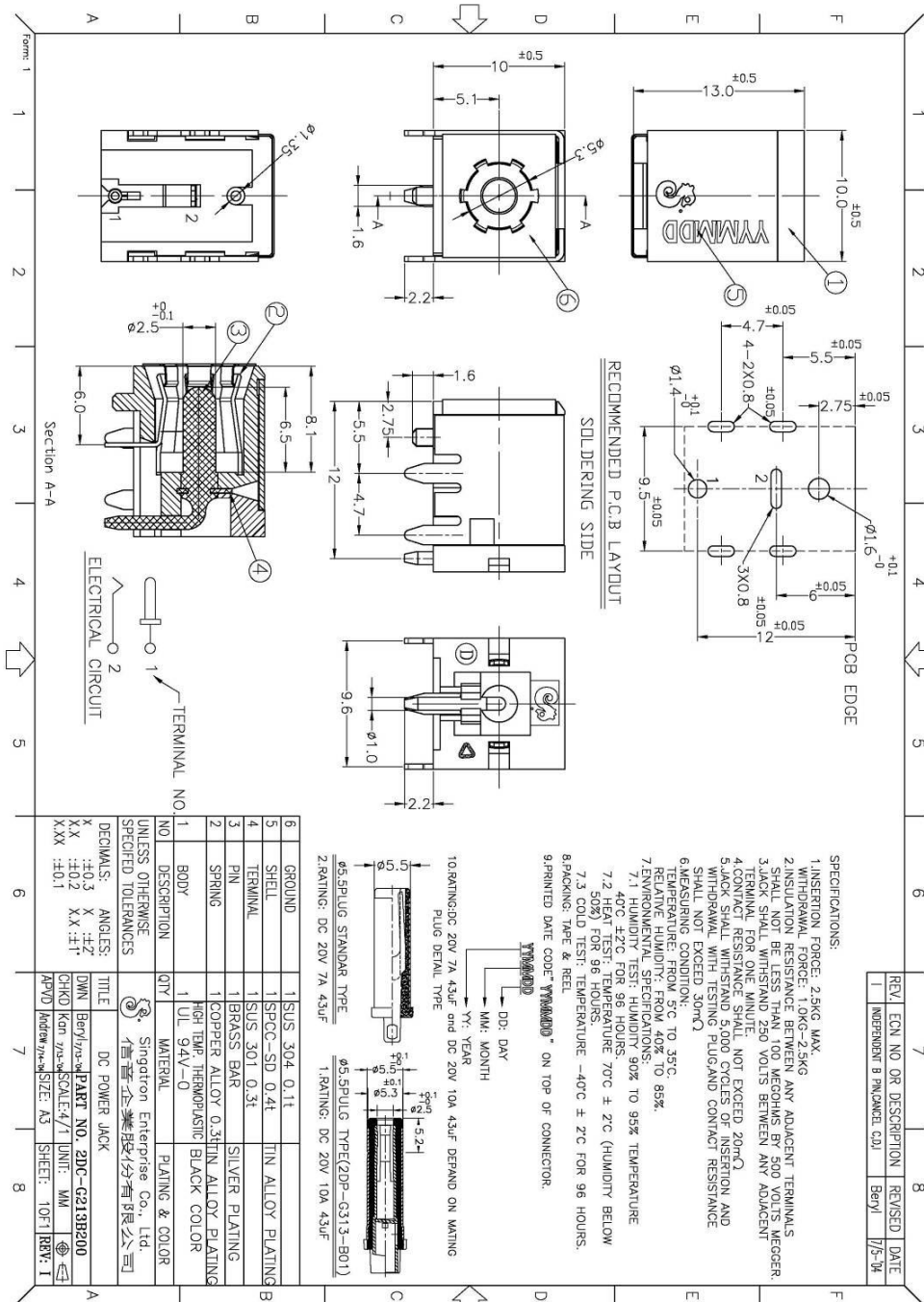
Rating: 20V/10A

Gold coated

8.2. DC INPUT (SINGATRON P/N 2DC-G213B200)

(+) = Positive input (innermost connection)

(-) = Negative input (outermost connection)



DC Jack (5.3 x 2.5)

Rating: 20V/10A, 20V/7A

9. Critical Component List

Components	Description	Manufacture	Remark
MAX1873TEEE	Switch-Mode Charger	MAXIM	Appendix A
LTC3780	PWM Buck-Boost IC	LINEAR	Appendix B
MM1414DV	Protection for Lithium-Ion Batteries	MITSUMI	Appendix C

10. Cell Spec

Appendix D

11. Gas Gauge Program

MedXP300_A201_130306(UL).a90

12. SAFETY Caution

When battery pack is abused, battery pack or device would be damaged.

Battery pack must be charged by specific charger.

Keep battery pack dry and be ventilated.

Battery pack contains organic flammables in battery cells. If it is abused, it may leak electrolytes or be exploded.

Do not short circuit battery.

Do not use battery near the fire, stove or place in a temperature higher than 80°C

The battery safe protection circuit would be damaged if battery pack is in water. Then, the battery pack cannot work normally. Finally battery pack might be too hot, get fire or exploded.

Do not extrude battery pack with heavy object. It may catch a fire or be exploded.

If battery pack is connected in reverse terminal, battery pack would be too hot, get fire or be damaged.

13. Appendix

Appendix A



MAX1873TEEE

Appendix B



LTC3780

Appendix C



MM1414DV

Appendix D



[LG] ICR 18650
S3 PS

2. Accessory Mechanical Drawings

2.1. Label Drawing

MedXP 300 Li-Ion Battery System

Part Number: MEDXP-300v3

Input: 19V \approx 6.2A

Output: 5V \approx 2.0A(USB) Max.

12V \approx 10.0A Max. 16V \approx 8.0A Max.

19V \approx 6.5A Max. 24V \approx 5.0A Max.

Maximum Output Power: 130W

Capacity: 300Wh



- Use specified charger only
- May explode if damaged or disposed of in fire
- Do not disassemble
- Do not short circuit

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