

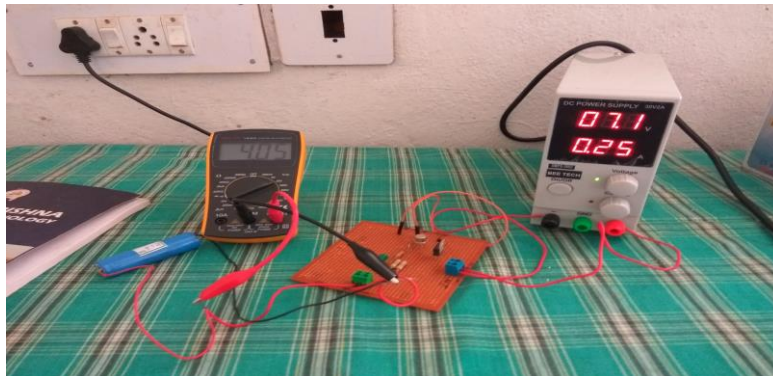
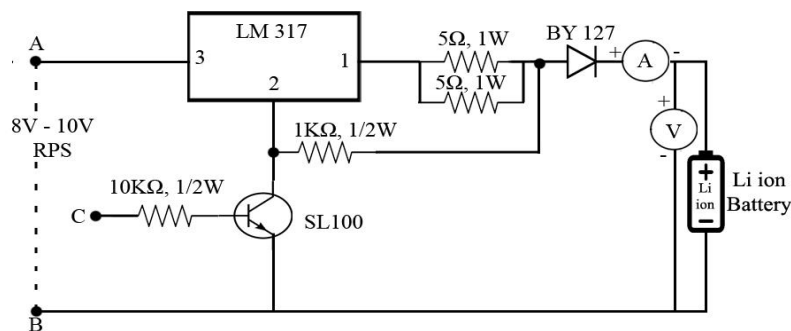
Report 4

Date : 13-8-2016

Battery Charging Test:

The battery charging characteristics was studied for Li ion battery (3.7V & 823mAh). Two batteries were taken of the same series type LGAAS31865 L291J178A4 (good) and LGAAS31865 L116D256A6 (bad). Initially both the batteries are discharged using LiPro Balance Charger under 3V & 0.8mA discharge condition. Tests were conducted on 10/8/2016 and 12/9/2016.

Circuit diagram



Test cases

Before testing : The batteries are discharged using LiPro Balance Charger under 3V & 0.8mA discharge condition.

Test condition : Constant Current Charging at 450mA with input voltage of 7.1V DC.

To be tested :

- Charging time
- Charging current
- Battery voltage
- CC and CV characteristics

TEST 1: Charging test on good battery (LGAAS31865 L291J178A4)

| | | |
|----------------------------------|---|----------------|
| Battery voltage before discharge | = | 4.04V |
| Battery voltage after discharge | = | 3.45V |
| Charging process stop condition | = | 0.2CmA (220mA) |

Case1: Constant current charging (CC)

| S.No | Time (min) | Input voltage (V) | Charging current (mA) | Battery voltage (V) |
|------|------------|-------------------|-----------------------|---------------------|
| 1. | 0 | 0 | 0 | 3.45 |
| 2. | 1 | 7.1 | 450 | 3.58 |
| 3. | 5 | 7.1 | 450 | 3.59 |
| 4. | 15 | 7.1 | 440 | 3.64 |
| 5. | 30 | 7.1 | 420 | 3.69 |
| 6. | 45 | 7.1 | 400 | 3.71 |
| 7. | 60 | 7.1 | 380 | 3.71 |
| 8. | 75 | 7.1 | 380 | 3.73 |
| 9. | 90 | 7.1 | 370 | 3.75 |
| 10. | 105 | 7.1 | 360 | 3.77 |
| 11. | 120 | 7.1 | 360 | 3.79 |
| 12. | 135 | 7.1 | 340 | 3.84 |
| 13. | 150 | 7.1 | 330 | 3.85 |
| 14. | 165 | 7.1 | 320 | 3.87 |
| 15. | 180 | 7.1 | 310 | 3.90 |
| 16. | 195 | 7.1 | 300 | 3.92 |
| 17. | 210 | 7.1 | 280 | 3.95 |
| 18. | 225 | 7.1 | 270 | 3.98 |
| 19. | 240 | 7.1 | 260 | 4.02 |
| 20. | 255 | 7.1 | 250 | 4.04 |
| 21. | 270 | 7.1 | 240 | 4.07 |
| 22. | 285 | 7.1 | 230 | 4.10 |
| 23. | 300 | 7.1 | 220 | 4.12 |

Case2: Constant voltage charging (CV)

| S.No | Time (min) | Input voltage (V) | Charging current (mA) | Battery voltage (V) |
|------|------------|-------------------|-----------------------|---------------------|
| 1. | 0 | 0 | 0 | 4.07 |
| 2. | 1 | 7.1 | 0 | 4.07 |
| 3. | 5 | 7.1 | 0 | 4.06 |
| 4. | 15 | 7.1 | 0 | 4.05 |
| 5. | 30 | 7.1 | 0 | 4.05 |
| 6. | 45 | 7.1 | 0 | 4.05 |
| 7. | 60 | 7.1 | 0 | 4.05 |
| 8. | 75 | 7.1 | 0 | 4.05 |
| 9. | 90 | 7.1 | 0 | 4.05 |

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TEST 2: Charging test on bad battery (LGAAS31865 L116D256A6)

- Battery voltage before discharge = 3.49V
- Battery voltage after discharge = 3.50V
- Charging process stop condition = 0.2CmA (220mA)

Case1: Constant current charging (CC)

| S.No | Time (min) | Input voltage (V) | Charging current (mA) | Battery voltage (V) |
|------|------------|-------------------|-----------------------|---------------------|
| 1. | 0 | 0 | 0 | 3.49 |
| 2. | 1 | 7.1 | 450 | 3.65 |
| 3. | 5 | 7.1 | 450 | 3.72 |
| 4. | 10 | 7.1 | 410 | 3.84 |
| 5. | 15 | 7.1 | 370 | 3.80 |
| 6. | 25 | 7.1 | 340 | 3.78 |
| 7. | 35 | 7.1 | 220 | 3.76 |

Case2: Constant voltage charging (CV)

| S.No | Time (min) | Input voltage (V) | Charging current (mA) | Battery voltage (V) |
|------|------------|-------------------|-----------------------|---------------------|
| 1. | 0 | 0 | 0 | 3.67 |
| 2. | 1 | 7.1 | 0 | 3.66 |
| 3. | 5 | 7.1 | 0 | 3.65 |
| 4. | 10 | 7.1 | 0 | 3.62 |
| 5. | 15 | 7.1 | 0 | 3.62 |
| 6. | 25 | 7.1 | 0 | 3.62 |
| 7. | 35 | 7.1 | 0 | 3.62 |

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Inference:

TEST 1: Charging test on good battery (LGAAS31865 L291J178A4)

1. Constant current charging (CC)

- 1.1. Before test voltage = 3.45 V
- 1.2. After test voltage = 4.12 V
- 1.3. Test run time = 300 min
- 1.4. End charging current = 0.2C mA

2. Constant voltage charging (CV)

- 2.1. Before test voltage = 4.07 V
- 2.2. After test voltage = 4.05 V
- 2.3. Test run time = 90 min

TEST 2: Charging test on bad battery (LGAAS31865 L116D256A6)

3. Constant current charging (CC)

- 3.1. Before test voltage = 3.49 V
- 3.2. After test voltage = 3.76 V
- 3.3. Test run time = 35 min
- 3.4. End charging current = 0.2C mA

4. Constant voltage charging (CV)

- 4.1. Before test voltage = 3.67 V
- 4.2. After test voltage = 3.62 V
- 4.3. Test run time = 35 min