

FAULT INVESTIGATIONS

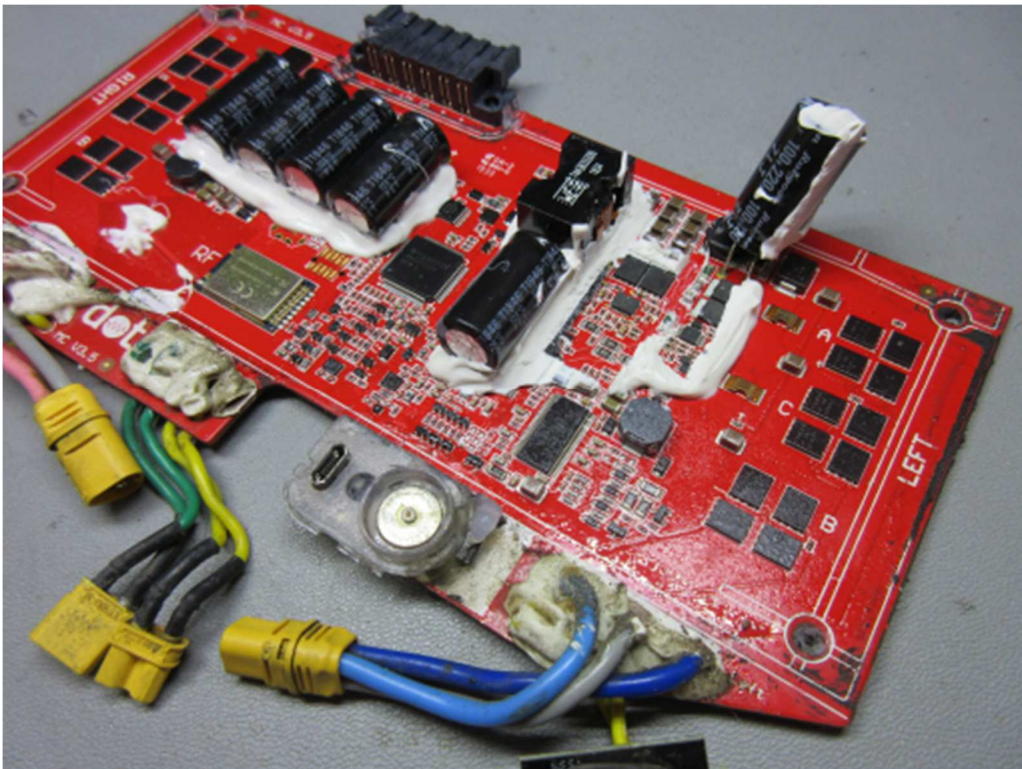
Date: 30-8-2020
Revision: 1.0
Author: Tony Little
Product: Electric Skateboard
Company: Globe Brand

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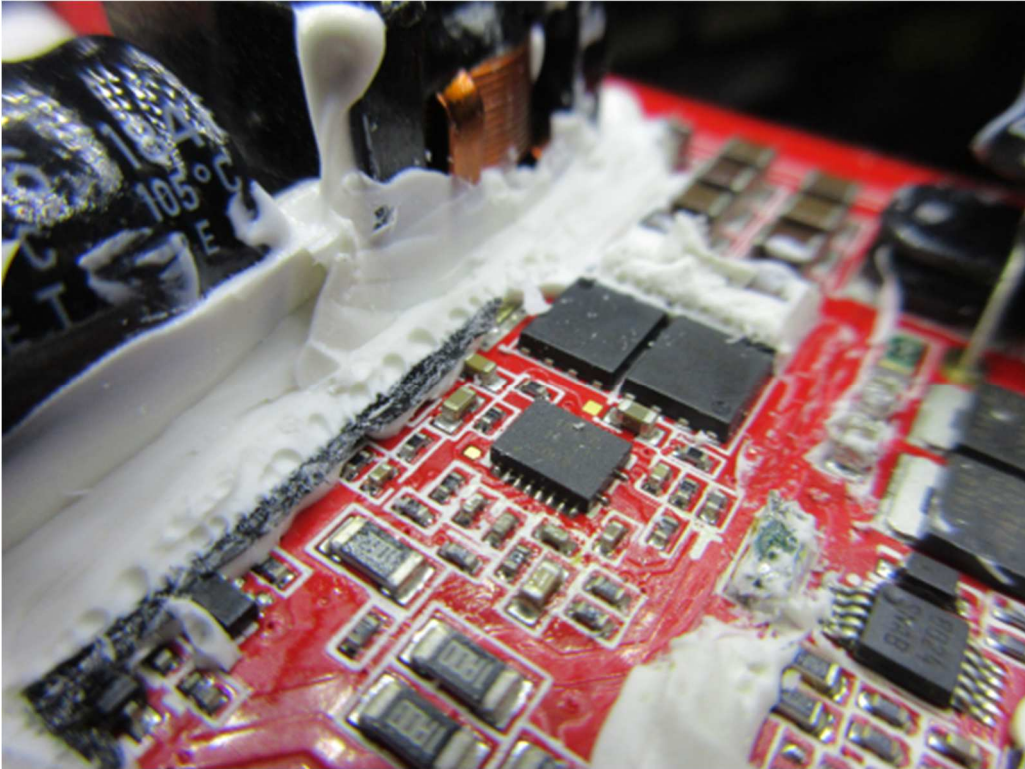
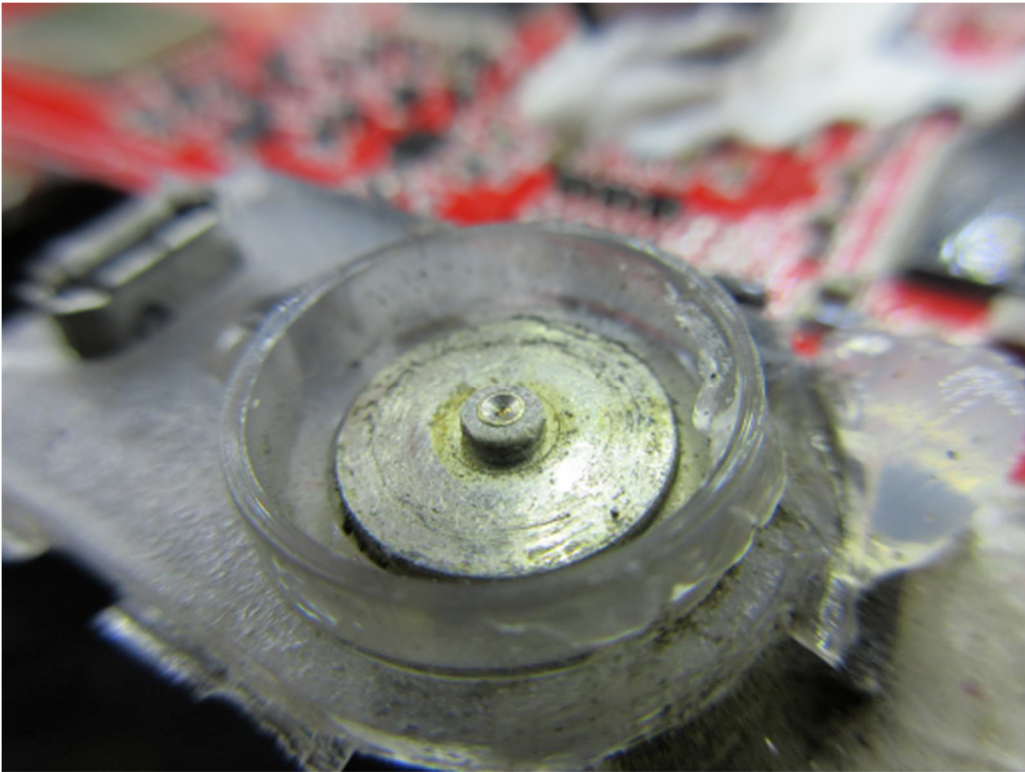
2 MAIN CONTROLLER

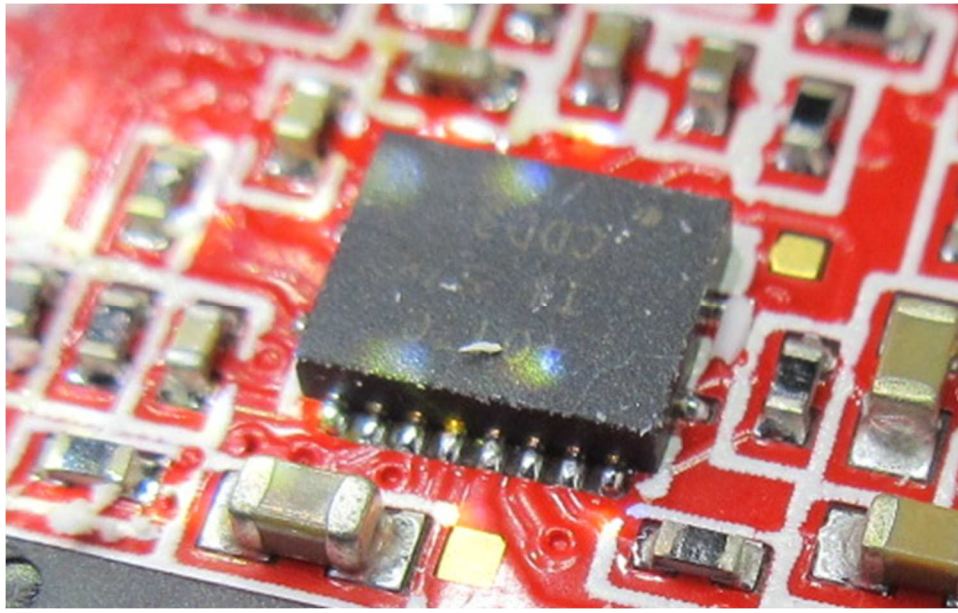
2.1 AAAA000A

Paul's test unit. Charger not working.

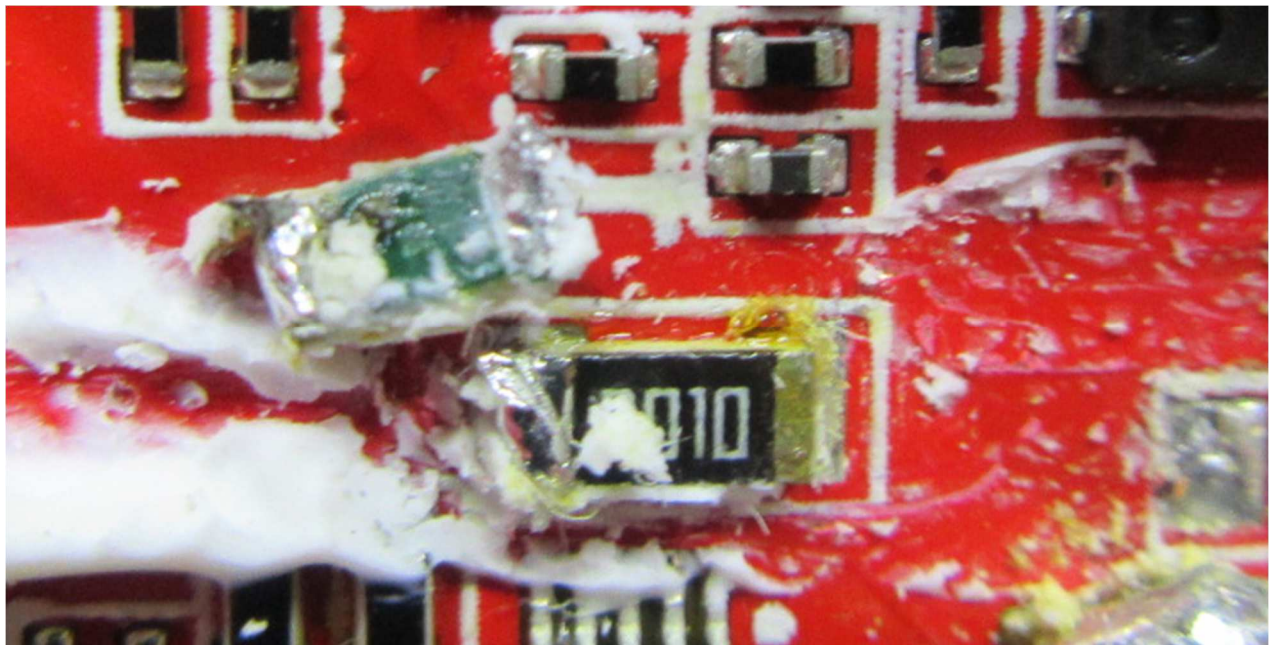


The magnetic receptacle contact has a lot of contamination.

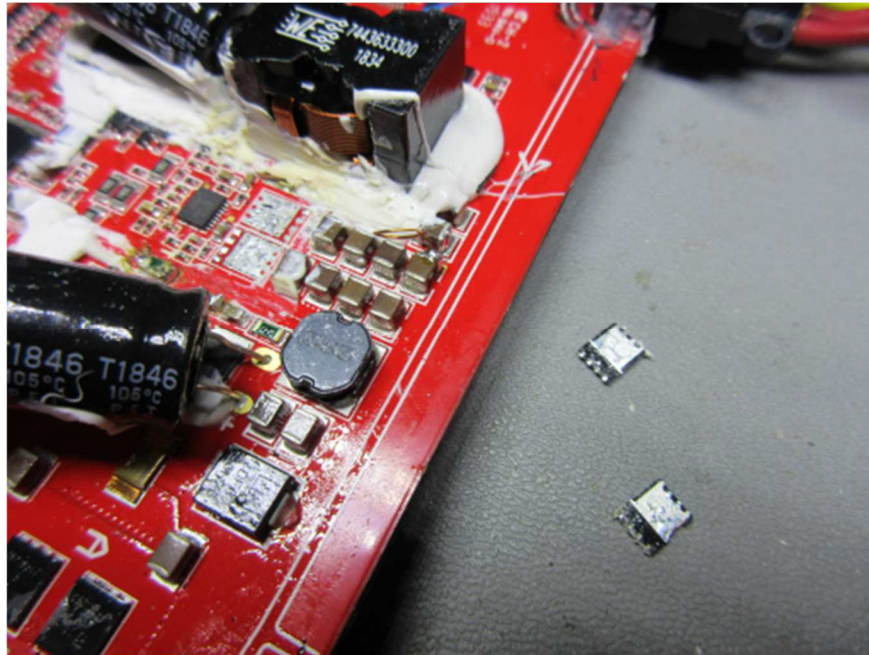




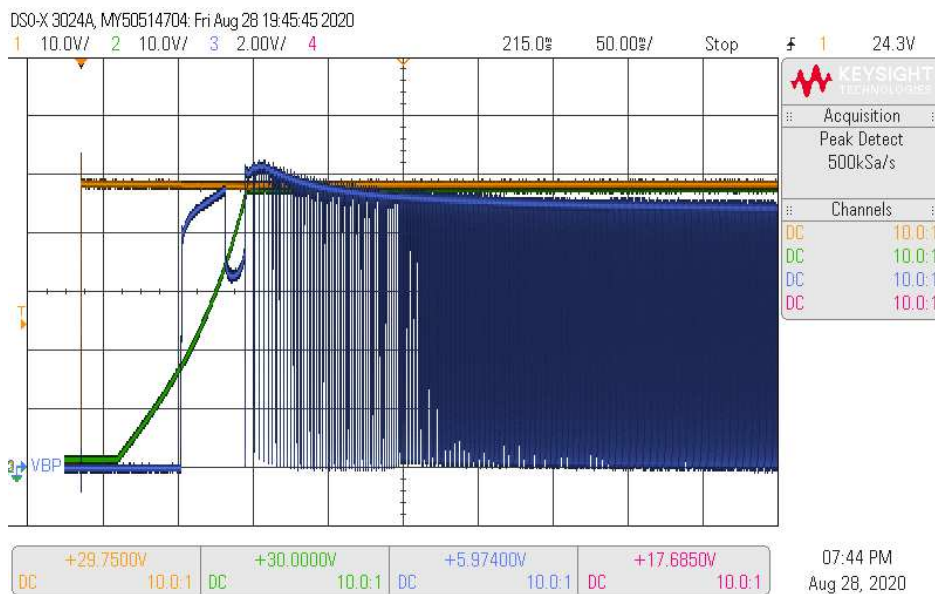
Input over current sense resistor soldered on one side. Right side had no solder bond.



MOSFETs checked.



High side MOSFET driver going into current limit. High side driver damaged.

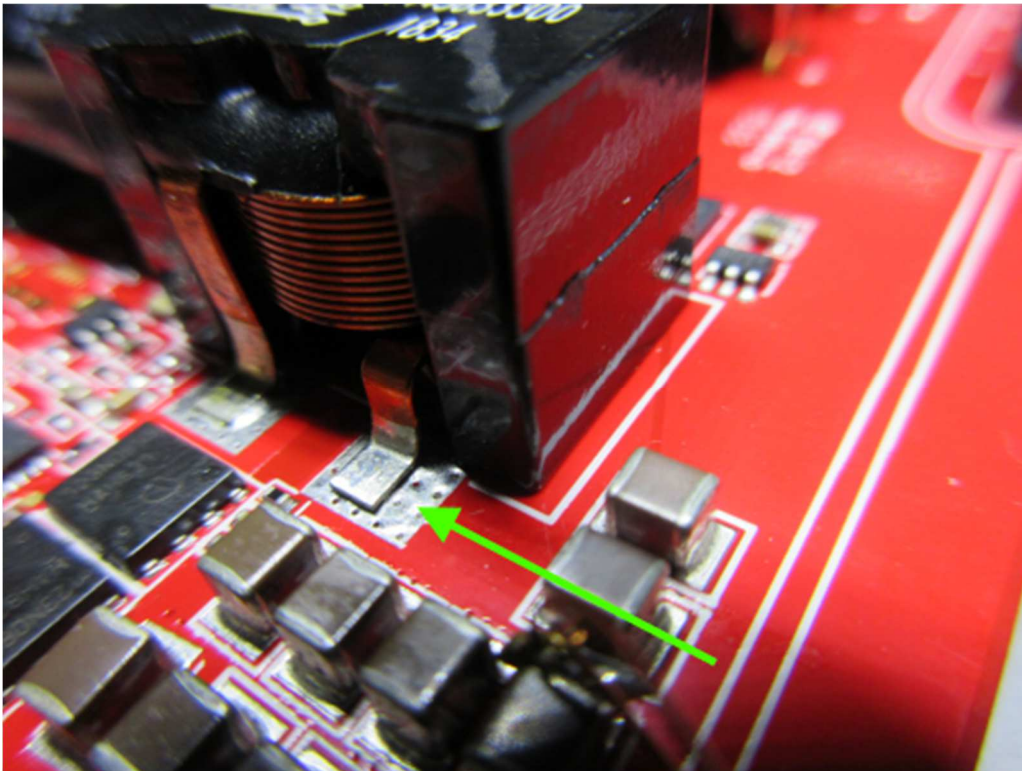


Not repaired. Left as reference for possible further analysis.

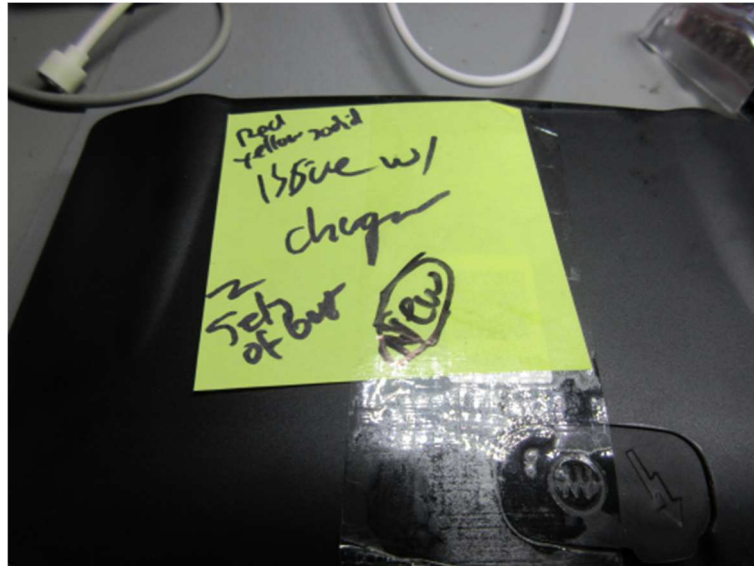
Manufacturer contacted for specific support.



Inductor contact not soldered. Repaired.



FT Passed.

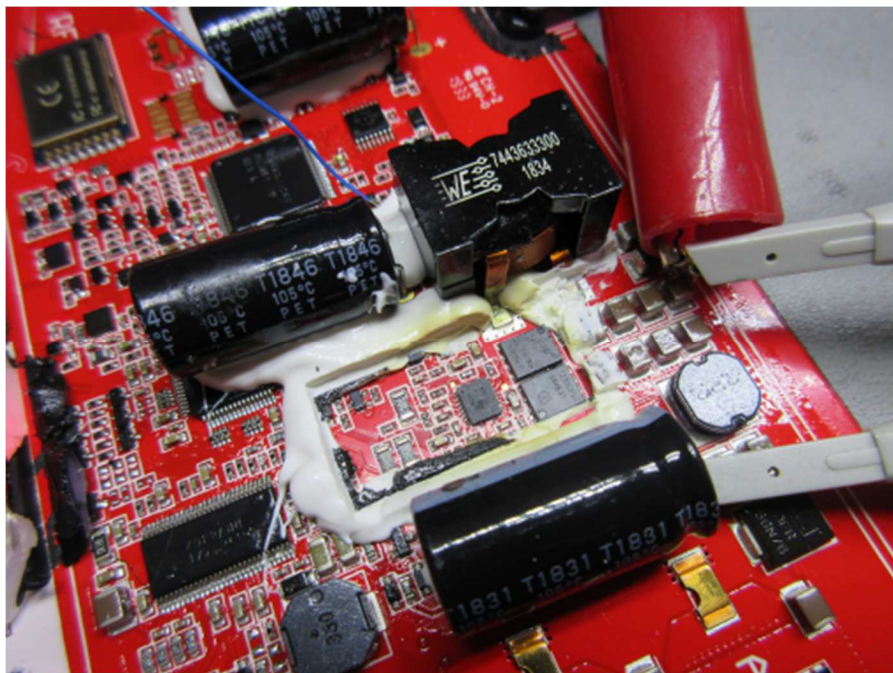


Charging output only reaching ~4V.

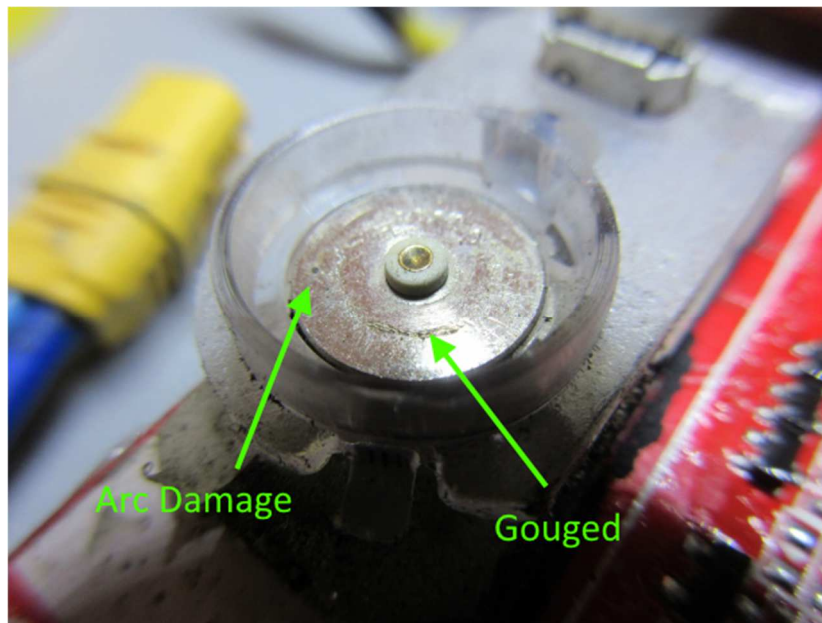
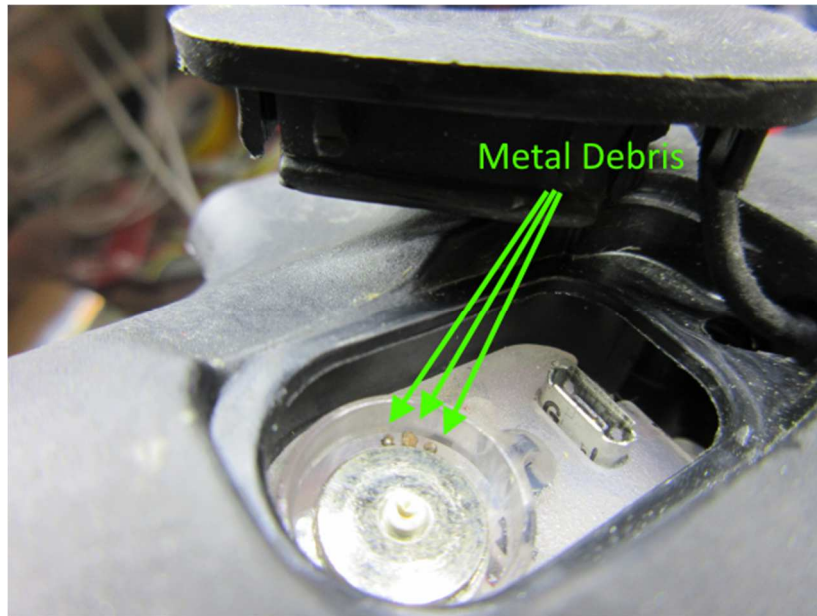
High side gate driver failing.

Replaced regulator. Repaired.

FT Passed.



Water damaged MC from Mike McHugh testing.



Low side gate drive failed.

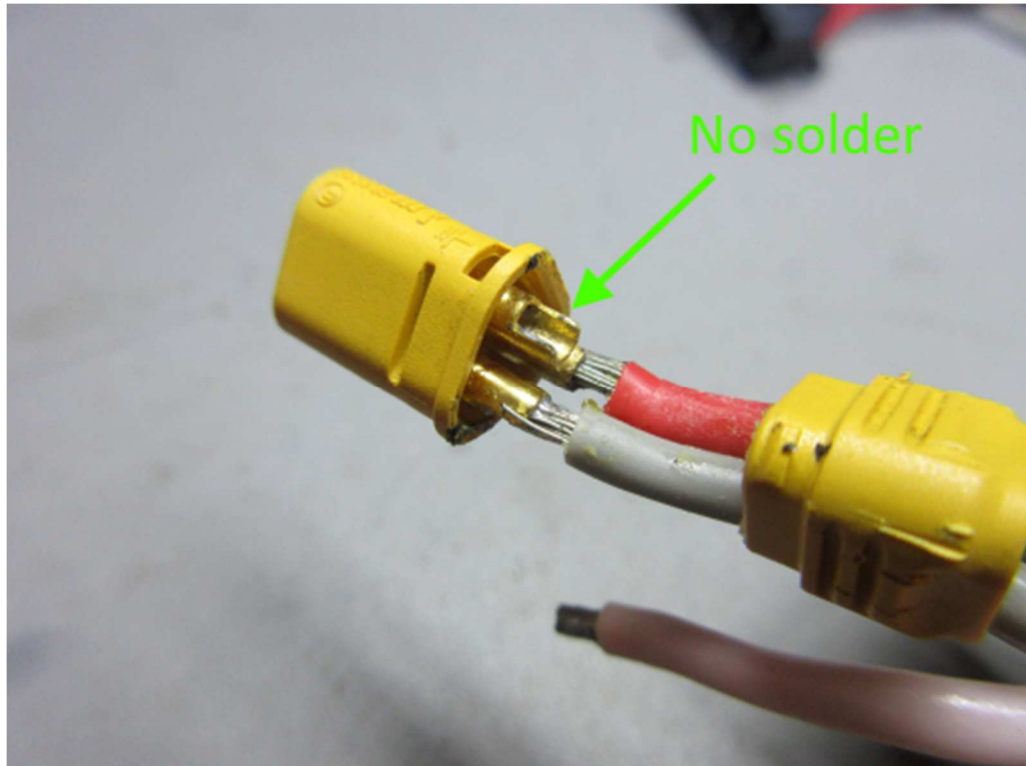
Replaced charger IC.

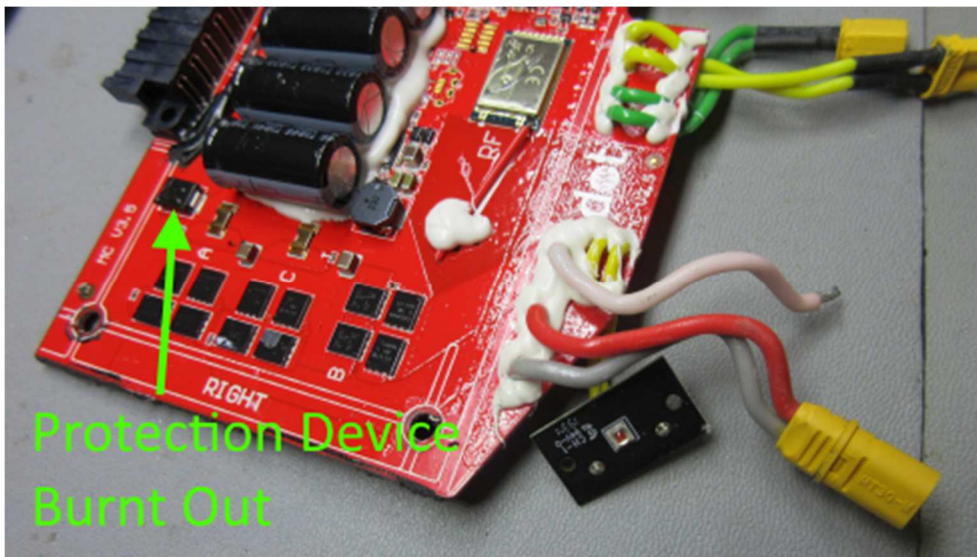
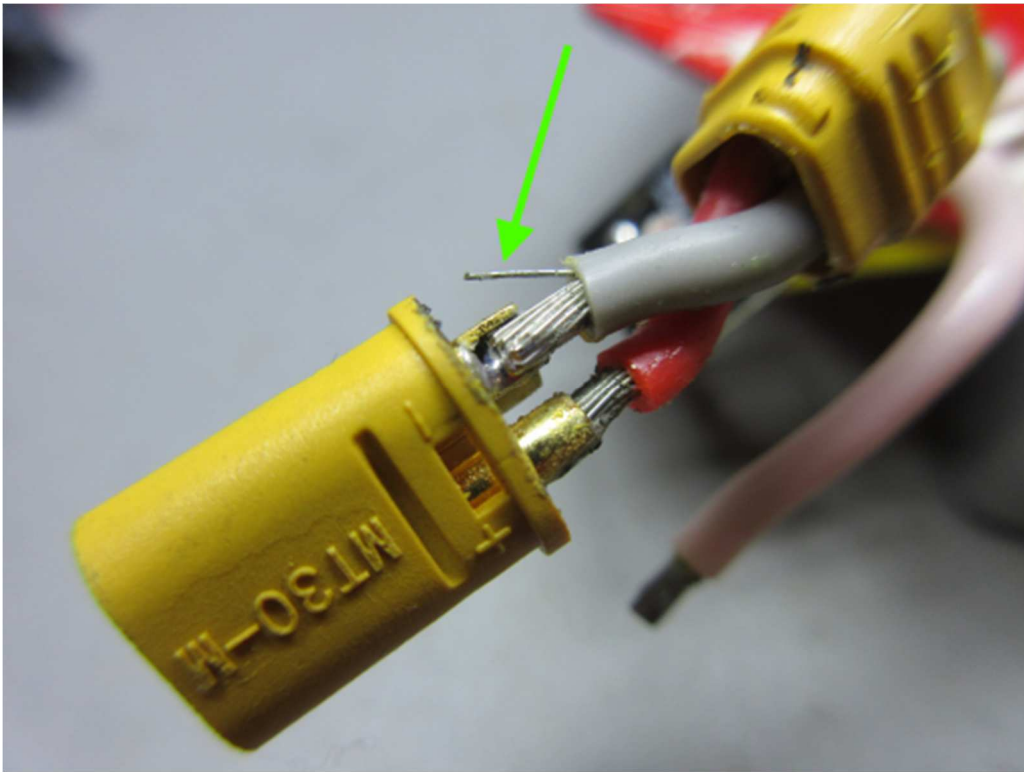
Repaired

FT Passed.

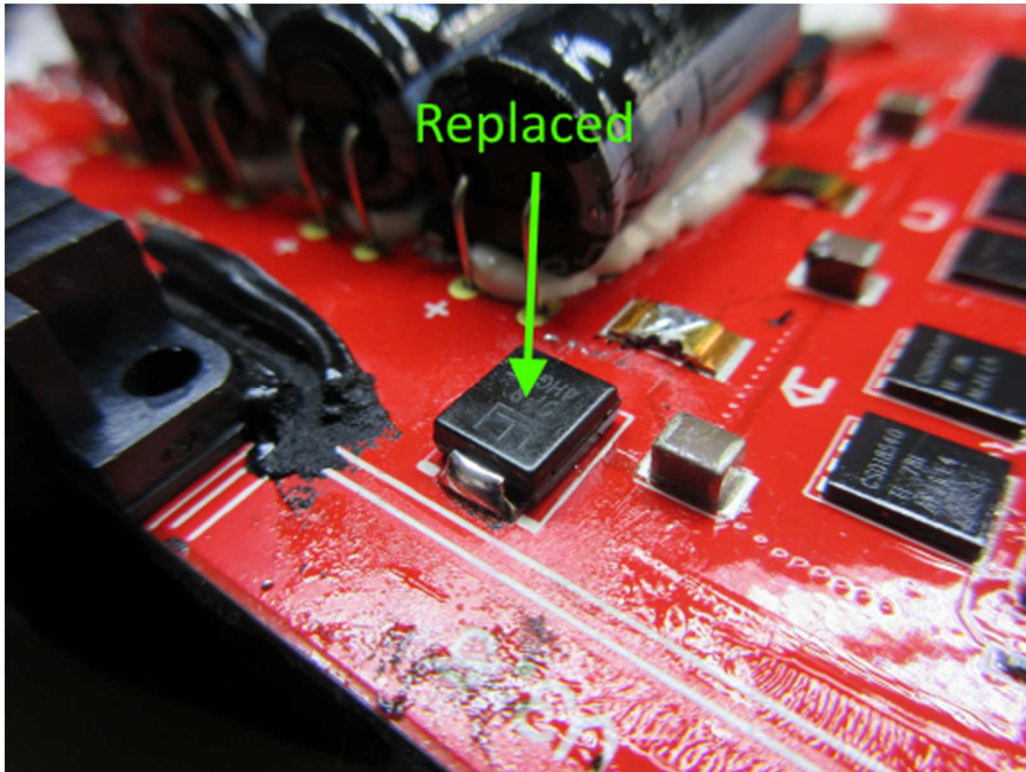
2.5 AAAA0100

Feedback : *“issue with old mc 2863268108, would not reset with usb no led light drag on motors even with no batteries fitted”*





TVS replaced.



Wiring repaired.

FT Passed.

3 BATTERY MODULES

3.1 BBBB0139

The battery is labeled with 3149594937

No history

Remote reports Battery Fault. Current sense showing bad data.

```
Battery Position: 0
Model              : BM100
Hardware Version   : 22
Software Version   : 19
Serial Number      : BBBB0139
Batch Number       : 4
Production Date    : 6-11-2019
Factory Tested     : Yes

Battery Metrics
- State of Charge   : 0.0%
- Current Capacity  : 0.00Wh      * FAIL *
- Full Capacity     : 72.00Wh      --
- #Charge Cycles x32 : 109          --
- Cell Resistance 25C : 234mohm      --

Temperature Sensors
- PCB               : 20.0'C      --
- Cells 0-4         : 19.2'C      --
- Cells 5-9         : 19.3'C      --

Measurements
- V_Bus             : 36016mV      --
- Battery           : 25159mV      --
- V_Switch          : 56mV        * FAIL *
- V_Switch_Off      : 56mV        --
- VCC               : 3304mV      --
- V_Offset          : 3870mV      * FAIL *
- V_Current_Sense   : 1915mV      * FAIL *
- I_Current_Sense   : 4290mA      * FAIL *

Cell Voltages
- Cell 0            : 1397mV      * FAIL *
- Cell 1            : 1904mV      * FAIL *
- Cell 2            : 2046mV      * FAIL *
- Cell 3            : 2341mV      * FAIL *
- Cell 4            : 2522mV      --
- Cell 5            : 2908mV      --
- Cell 6            : 2957mV      --
- Cell 7            : 3087mV      --
- Cell 8            : 3100mV      --
- Cell 9            : 2895mV      --
```

Cell Voltages using known good battery module....

```
- Cell 0            : 1229mV      * FAIL *      1.316V (measured with meter)
- Cell 1            : 1799mV      * FAIL *      1.843V
- Cell 2            : 1927mV      * FAIL *      1.974V
- Cell 3            : 2300mV      * FAIL *      2.320V
- Cell 4            : 2506mV      --          2.506V
- Cell 5            : 2903mV      --          2.902V
- Cell 6            : 2947mV      --          2.947V
```

```
- Cell 7          : 3083mV    --
- Cell 8          : 3084mV    --
- Cell 9          : 2878mV    --
```

Battery voltage calibration.

```
-----
Battery Accepted      : BBBB0139

Reference Connected   :          --
- Cell 0              : 4216mV
- Cell 9              : 41887mV

Calibration in Range :          --
- Voltage Offset      : -24      --
- Voltage Gain        : 13167    --

Calibration Verified  :          --
- Cell 0              : 4206mV
- Cell 9              : 41997mV

Power Switch          :          --
- V_Switch_Off        : 323mV

TEST SUMMARY
- Voltage Calibration :          PASS
- Power Switch        :          PASS
```

Battery Current Calibration

Circuit is drawing 26mA from the 42V reference.

```
-----
Battery Accepted      : BBBB0139

- Calibration at 0V   : 10      --
- V_Switch            : 1mV
- I_Current_Sense    : 0mA      --

FT Output Fault      :          * FAIL *
- Target              : 8000mV
- Measured            : 8055mV
- V_Switch            : 6372mV   * FAIL *
- Battery Status      : On      --

TEST SUMMARY
- Testing              :          * FAIL *
- Calibration          :          * FAIL *
```

LTC4368 is not driving FET switch.

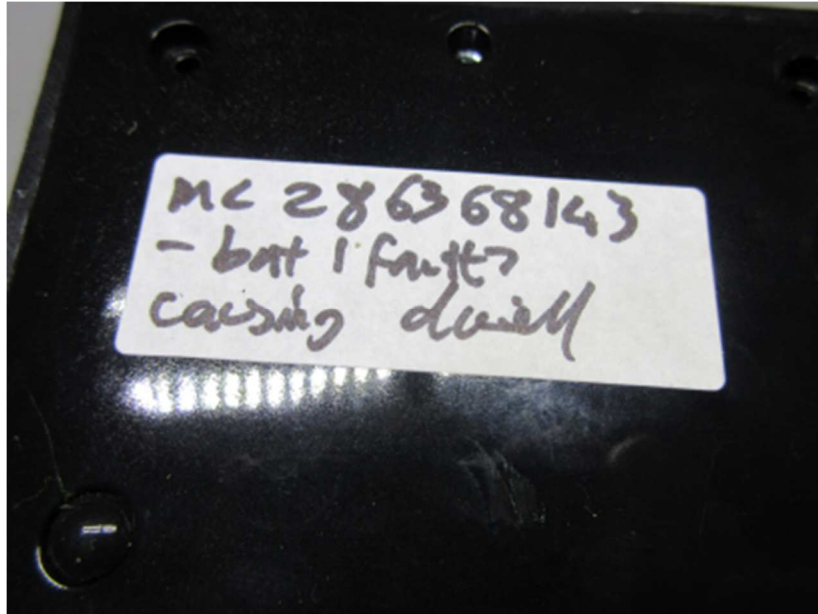
LTC4368 is getting quite hot.

LTC4368 is blown. Trickle current is recirculated back through blown device.

3.2 BBBB035A

Used with MC286368143

Battery fault. Causing dwell.



Generates battery switch off fault.

```
Battery Position: 0
Model : BM100
Hardware Version : 22
Software Version : 19
Serial Number : BBBB035A
Batch Number : 18
Production Date : 4-6-2020
Factory Tested : Yes

Battery Metrics
- State of Charge : 0.0%
- Current Capacity : 0.00Wh * FAIL *
- Full Capacity : 72.00Wh --
- #Charge Cycles x32 : 0 --
- Cell Resistance 25C : 0mohm * FAIL *

Temperature Sensors
- PCB : 21.0'C --
- Cells 0-4 : 19.0'C --
- Cells 5-9 : 19.3'C --

Measurements
- V_Bus : 32406mV --
- Battery : 33389mV --
- V_Switch : 30588mV --
- V_Switch_Off : 30815mV * FAIL *
- VCC : 3300mV --
- V_Offset : 2984mV --
- V_Current_Sense : 1473mV --
- I_Current_Sense : 0mA --

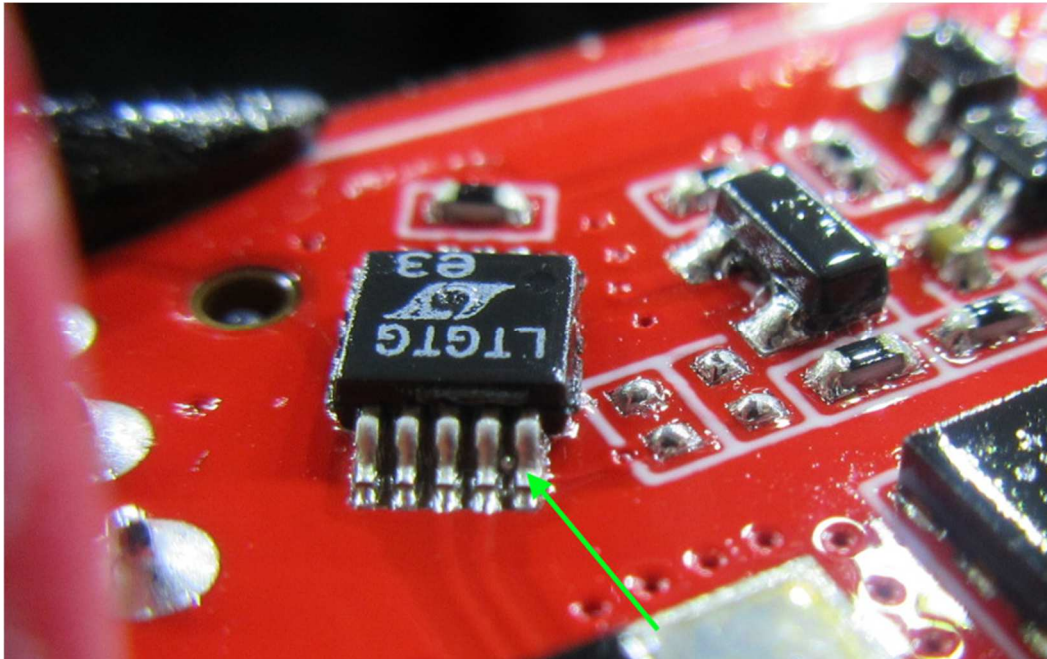
Cell Voltages
- Cell 0 : 3322mV --
```

```

- Cell 1           : 3333mV    ---
- Cell 2           : 3333mV    ---
- Cell 3           : 3334mV    ---
- Cell 4           : 3334mV    ---
- Cell 5           : 3331mV    ---
- Cell 6           : 3359mV    ---
- Cell 7           : 3359mV    ---
- Cell 8           : 3320mV    ---
- Cell 9           : 3346mV    ---

```

Solder ball bridging gate drive found. Chipset damaged.



Replaced LTC4368. Working

```

Battery Position: 0
Model           : BM100
Hardware Version : 22
Software Version : 19
Serial Number   : BBBB035A
Batch Number    : 18
Production Date : 4-6-2020
Factory Tested  : Yes

Battery Metrics
- State of Charge      : 0.0%
- Current Capacity    : 0.00Wh    * FAIL *
- Full Capacity       : 72.00Wh
- #Charge Cycles x32  : 0
- Cell Resistance 25C : 0mohm    * FAIL *

Temperature Sensors
- PCB                 : 26.2'C    ---
- Cells 0-4           : 21.3'C    ---
- Cells 5-9           : 21.7'C    ---

Measurements

```

```
- V_Bus           : 33299mV    --
- Battery        : 33299mV    --
- V_Switch       : 33309mV    --
- V_Switch_Off   : 71mV      --
- VCC            : 3300mV    --
- V_Offset       : 2983mV    --
- V_Current_Sense : 1475mV    --
- I_Current_Sense : 10mA      --
```

Cell Voltages

```
- Cell 0         : 3318mV    --
- Cell 1         : 3324mV    --
- Cell 2         : 3321mV    --
- Cell 3         : 3321mV    --
- Cell 4         : 3323mV    --
- Cell 5         : 3317mV    --
- Cell 6         : 3349mV    --
- Cell 7         : 3356mV    --
- Cell 8         : 3297mV    --
- Cell 9         : 3341mV    --
```

Repaired.

Battery pack wiring is damaged (long screws). Both positive and negative leads. Kapton tape found on wire.





<end of report>