Eight Discipline Report (8D Report)

To:	8D report No.: **20230306**
From:：**Chicony Power Technology**	RMA claim No.: **N/A**
CC：	Chicony Power P/N: **W023R001Q-GS01-0A**
	Customer P/N: **G710-03620-01**
Submit date: **2023/3/6**	Product description: **22.5W wall mount**
Receive date: **2023/3/15**	
Subject：CPT has be informed total 2x failure units caused by capacitance drop issue.	
Keywords/關鍵字：電容	

D1.) 問題解決成員:Use Team Approach

主持者 (Team Leader)：**Tony_Hsu**

內部成員 (Internal Team Members):

CQS: Maria Chen

QE: Nono Cheng

MFG: Xiaohui Du

PE: Yong Liu

Sales: Amy Tsai

RD: Vincent Yang

外部成員 (External Team Member):

D2.)問題說明:Problem Description:

(**Note**: Use **who**, **what**, **when**, **where**, **why**, **how**, **how many** to specify the Customer's problem.)

On 3/6/2023 customer feedback that there are 6x failure units reported from field on A05,

by 3/15/2023 CPT has be informed total 14x failure units caused by capacitance drop issue.

The detail of these failure units as below:

No found damaged on PCBA and components.

SN: 08R0A27BF601B65DC

SN: 08R0A27LF603E79DC

D3.)內部或客戶的暫時解決辦法及實施日期:Implement and Verify Containment Action:

(Note: Internal / external containment action effectiveness and date.**)**

1. **CPT checked the failure samples date code, and then sent those samples to Samxon for analysis.**
2. **Track and hold the finished products using the date code of the failure units, and control the shipment.**
3. **Check the samples of the same date code in stock.**

Date:2023/3/17

D4.)不良原因確認: Define and Verify Root Causes:

(Note: Identify and verify all suspect causes, which needs explain why the problem occurred.**)**

1. **Manufacturing history of the failure unit:**

   After received the customer feedback information, the SFCS records of these 2 units are normal.

08R0A27BF601B65DC	08R0A27LF603E79DC
	

2. This model quality history record from process

It can be seen from the weekly report that no special defects occurred in this model.

2x field returns produced in this week

Mfg week	Feb						Week28	Week29	Week30	Jul
Shipment	0	0	0	0	0	30032	0	30303	44778	105113
WTY (Line)	0	0	0	0	0	7	0	10	9	26
FWR (Field)	0	0	0	0	0	0	0	0	0	0
Total Returned	0	0	0	0	0	7	0	10	9	26
MTHLY kPPM	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.33	0.20	0.25
WTY kPPM	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.33	0.20	0.25
FWR kPPM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Defect Issue	Feb	Mar	April	May	Jun	Week27	Week28	Week29	Week30	Jul
Case black dot	0	0	0	0	0	7	0	10	9	26
Case contamination	0	0	0	0	0	0	0	0	0	0
Cable contamination	0	0	0	0	0	0	0	0	0	0
Case dent	0	0	0	0	0	0	0	0	0	0
Case shinny mark	0	0	0	0	0	0	0	0	0	0
Cable dent	0	0	0	0	0	0	0	0	0	0
Case scratch	0	0	0	0	0	0	0	0	0	0
Case gap	0	0	0	0	0	0	0	0	0	0
Cable discolor	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	7	0	10	9	26

3. **Schematic Analysis**

   a. **Measuring C53 capacitance, ESR were fail ,the measurements are as follows**

SN	CP(UF) Spec(820±20%)	ESR（Ω） (Spec:<0.012）
08R0A27BF601B65DC	188.87(Fail)	3.45(Fail)
08R0A27LF603E79DC	544.43(Fail)	0.714(Fail)

Samxon C53 data sheet:link

   b. **After swap validation done (A→B, B→A), fail symptom follows C53.**

   1. **When tested NG unit, the waveform is measured and found abnormal failure.**
   2. **Replaced OK C53 for returned NG unit, waveform is measured and result OK.**
   3. **Put the Failure C53 into OK adapters, waveform abnormal again.**
   4. **Failure symptom follows the NG capacitor C53 (SAMXON).**

4. **All failures are focused on the MU date code, other date codes are OK.**

   So the CPT process has no risk to cause the C53 issue.

   All work orders are produced on AI line #1, no recipe changed from PVT to MP.

AI (Line 1) Parameter list								
Work order	W/O Q'ty	CPT Manufacturing date	C53 date code marking	Remark	Insert width	Time(s)	Max. Height	Propulsion height
MT2227DB01A	11,000	2022/6/21	MC	No return	1	3	23.7	13.3
MT2228DB03A	19,496	2022/7/2	MC	No return	1	3	23.7	13.3
MT2229DB05A	30,000	2022/7/6	MU	2*Cap issue return	1	3	23.7	13.3
MT2229DB06A	30,000	2022/7/11	MU	7*Cap issue return	1	3	23.7	13.3
MT2230DB07A	40,000	2022/7/15	MU	5*Cap issue return	1	3	23.7	13.3
MT2235DB08A	30,000	2022/8/17	MX	No return	1	3	23.7	13.3
MT2235DB09A	30,000	2022/8/22	MX	No return	1	3	23.7	13.3

5. Sent failure C53 to vendor for further analysis.

Location	Vendor	Material SN	Picture	CPT FA result	Vendor FA result	Report	Due date
C53	Samxon	2C3M5ULR 78252LHF		C53 NG D/C 5/19/2022-6/13/2022	Sent failure samples 2x to vendor for analysis on 3/7.	FA report	3/17

a. Confirm the positive foil length, dielectric withstand voltage, and specific capacitance.

项目	正箔长度/mm		正箔耐压/V		正箔比容uF/cm2	
	设计	实测	设计	实测	设计	实测
1#	≥75	79	>25	25.2	≥110.2	111.0
6#		79		25.5		111.6

b. Confirm the rivet quality of the positive and negative terminal leads.

项目	1#				6#			
	正铆接		负铆接		正铆接		负铆接	
	打扁厚度（mm）	接触电阻（mΩ）	打扁厚度（mm）	接触电阻（mΩ）	打扁厚度（mm）	接触电阻（mΩ）	打扁厚度（mm）	接触电阻（mΩ）
标准	0.36~0.40	≤0.55	0.29~0.33	≤0.55	0.36~0.40	≤0.55	0.29~0.33	≤0.55
实测值	0.381	0.504	0.310	0.527	0.373	0.52	0.31	0.55
判定	OK	OK	OK	OK	OK	OK	OK	OK

c. Test the moisture content using the coulometric method.

样品序号	样品内容	无水乙醇重量 g	萃取液水份	萃取前无水乙醇水份总重 mg	萃取后无水乙醇水份总重 mg	无水乙醇水份增量 mg
样品1	空白样	5.0582	1.0607%	53.65233	53.65233	0.0000
样品2	试验样(NG产品2#样)	5.0135	1.1107%	53.17819	55.68494	2.5068
样品3	对照样（正常产品）	5.0178	0.9232%	53.22380	46.32433	-6.8995

Anhydrous ethanol would extract 2.5068mg of moisture from Sample 2, compared to Sample 1 and Sample 3, indicating Sample 2 has a moisture issue.

d. To investigate the cause of low capacitance values in the products using the process of elimination method

It examined the winding, impregnation, curing, and sealing processes.

- **Winding → No foil breakage was observed.**
- **Impregnation and curing → The production time for the impregnation process and the curing time both complied with the process parameters**
- **Sealing processes → The sealing time exceeded 11 hours.**

NO.	批号	周期	封口机台号	封口数量	封口生产日期	封口开始时间	封口结束时间	实际用时 标准：<4H	封口时间判定	备注
1	QM05-0799-00-012	MU	88	6588	5月25日	0:20	3:30	3:10	合格	
2	QM05-0799-00-005	MU	88	6364	5月25日	21:50	0:20	2:30	合格	
3	QM05-0799-00-009	MU	83	6572	5月25日	23:10	2:35	3:25	合格	
4	QM05-0799-00-019	MU	88	6564	5月26日	10:50	13:30	2:40	合格	
5	QM05-0799-00-017	MU	88	6563	5月26日	13:30	16:00	2:30	合格	
6	QM05-0799-00-002	MU	83	6562	5月26日	16:00	18:30	2:30	合格	
7	QM05-0799-00-006	MU	88	6588	5月26日	17:00	19:25	2:25	合格	
8	QM05-0799-00-011	MU	88	6562	5月26日	20:00	22:30	2:30	合格	
9	QM05-0799-00-013	MU	88	6578	5月26日	22:30	9:55	11:25	不合格	
10	QM05-0799-00-003	MU	83	2978	5月27日	8:00	10:00	2:00	合格	
11	QM05-0799-00-004	MU	88	6548	5月27日	11:10	14:00	2:50	合格	
12	QM05-0799-00-018	MU	83	6306	5月27日	11:20	13:50	2:30	合格	
13	QM05-0799-00-015	MU	83	6572	5月27日	13:50	16:30	2:40	合格	
14	QM05-0799-00-008	MU	88	6573	5月27日	14:00	16:30	2:30	合格	
15	QM05-0799-00-016	MU	88	6571	5月27日	16:30	19:10	2:40	合格	
16	QM05-0799-00-021	MU	88	6556	5月28日	15:40	18:10	2:30	合格	
17	QM05-0799-00-014	MU	83	6549	5月28日	18:00	20:40	2:40	合格	
18	QM05-0799-00-020	MU	88	6566	5月28日	22:30	1:30	3:00	合格	
19	QM05-0799-00-022	MU	88	6608	5月31日	21:00	23:40	2:40	合格	
20	QM05-0799-00-010	MU	88	3148	5月31日	23:40	2:00	2:20	合格	

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During the repair of the sealing machine, the capacitor elements were exposed to air for an extended period, causing moisture absorption.

6. Root cause summary

SAMXON:

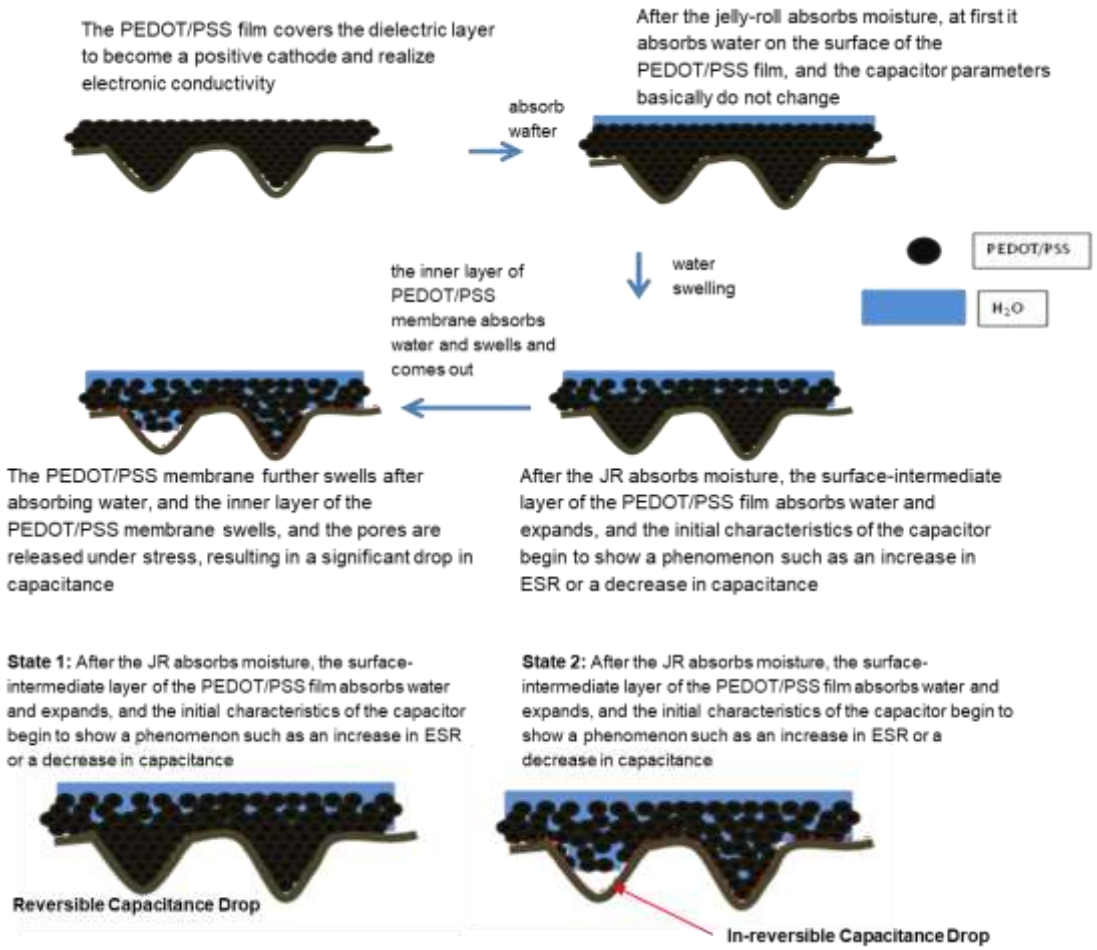
After investigated with vendor for root cause from production line tour and manufacturing record checking:

a. Sealing station:

Manufacturing records with abnormality found at Sealing stage on working order# QM05-0799-00-013, idle for 11 hrs (<4hrs) due to equipment issue, impact range is 225~1,096x per the manufacturing records. (based on the manufacturing speed of 25 mins/wheel, 45pcs/min, total manufacturing time needs to be controlled within 30 mins for each working batch)

b. Capacitance drop is caused by moisture gets inside the E-cap can which induced Reversible & In-reversible Capacitance Drop. Refer next page for explanation.

Moisture inside E-cap



3. Root cause verification plan: Need to do DOE plan to verify the Risks of at the market.

7. Risk assessment

The date code shown on C53 from field is MU which means the week 21st in 2022, and transform to 6 digital code is 220516 (Monday of 21st week).

But actually the Samxon capacitor production period of this date code was from 2022/5/19 to 2022/6/13 around 4 weeks, when loading and unloading batches in each process, if the machine is not clear during operation, there is a possibility that products

from the previous batch will be mixed in.

序号	工序	生产日期	班次	机台号	批号	系列	规格	壳号	D/C	数量	备注
1	捺印	5月27日	白班	X10-021	QM05-0799-00-013	ULR	16V820	6.3*14	MU	6,280	风险批
2	捺印	5月27日	白班	X10-021	QM05-0799-00-011	ULR	16V820	6.3*14	MU	5,226	污染批次
3	老化	5月27日	白班	27	QM09-0799-00-013	ULR	16V820	6.3*14	MU	5,722	风险批
4	老化	5月27日	白班	27	QM05-0799-00-009	ULR	16V820	6.3*14	MU	5,585	污染批次
5	老化	5月27日	夜班	27	QM05-0799-00-011	ULR	16V820	6.3*14	MU	4,953	污染批次
6	老化	5月31日	夜班	27	QM05-0799-00-011	ULR	16V820	6.3*14	MU	5,000	污染批次
7	老化	6月1日	白班	27	QM05-0799-00-004	ULR	16V820	6.3*14	MU	5,396	污染批次
8	老化	6月7日	白班	63	QM05-0799-00-013	ULR	16V820	6.3*14	MU	5,706	风险批
9	老化	6月7日	白班	63	QM05-0799-00-009	ULR	16V820	6.3*14	MU	5,479	污染批次
10	编带	6月7日	夜班	7#	QM05-0799-00-013	ULR	16V820	6.3*14	MU	4,500	风险批
11	编带	6月7日	夜班	7#	QM05-0799-00-018	ULR	16V820	6.3*14	MU	4,500	污染批次
12	编带	6月7日	夜班	7#	QM05-0799-00-011	ULR	16V820	6.3*14	MU	4,500	污染批次
13	编带	6月8日	夜班	7#	QM05-0799-00-004	ULR	16V820	6.3*14	MU	7,500	污染批次
14	编带	6月8日	夜班	7#	QM05-0799-00-015	ULR	16V820	6.3*14	MU	7,500	污染批次
15	编带	6月10日	/	7#	QM05-0799-00-009	ULR	16V820	6.3*14	MU	4,500	污染批次

Unsealed samples are available in 225pcs,and MU (2221) shipment quantity is 105kpcs.

There is 0.2% risk.

D5.)改善措施:Corrective Action Verification:

(Note: Be make sure the corrective actions is effective in process as well as able to fix the customer complaint problem**)**

CPT finished products:

1. **Risk assessment by SAMXON shipment**

   After investigation, all the return adapters use the same D/C capacitor. All failure capacitors are the same D/C MU 5/19/2022-6/13/2022. SAMXON risk q'ty 1,096x be used in CPT 4 W/Os. The risk shipment quantity 104,136x of these capacitors is as follows.

C53(SAMXON) D/C	QTY	Work order
5/19/2022~6/13/2022	104,136	MT2236DB01A* 4,421x MT2230DB07A* 39,871x MT2229DB06A* 29,918x MT2229DB05A* 29,926x

2. **Risk assessment by FGs stock: total 2,842x.**

A05 US*540x on hold in CPT on 3/17/2023

A05 UK*2,302x on hold in CPT on 3/17/2023

Factory process:

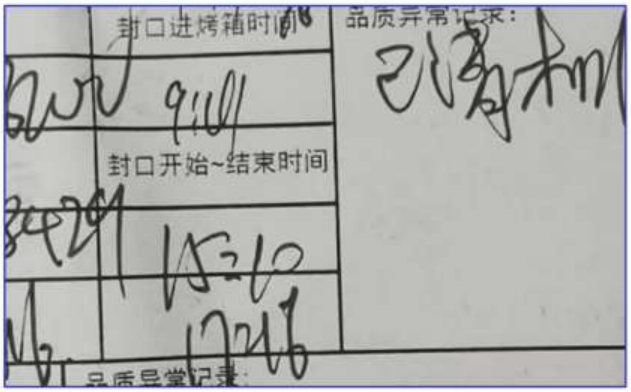
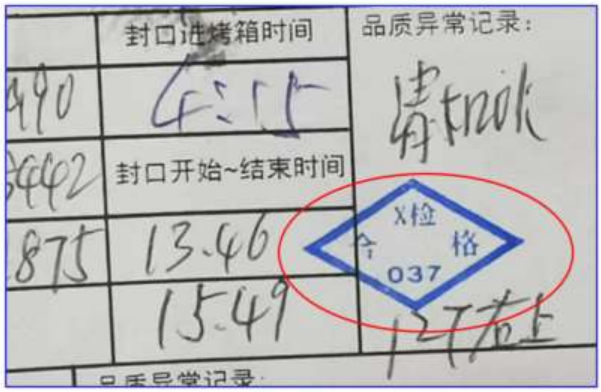
1. **Risk assessment by raw material stock**

   C53: 56,741x, D/C: MU-, on hold in CPT on 3/17/2023
2. **Add IQC moisture level test in SOP**

Manufacturer process:

1. **Action plan for adding test moisture level with PEDOT/PSS only(<16V rated voltage). Procedure link.**
2. **Before IQC moisture level test equipment ready, it can be done on 3/31/2023 as below:**
   - **a. CPT SQE go to SAMXON fo test or test recording by video provided from vendor.**
   - **b. Test n=1(1x) by lot.**
3. **When moisture level test equipment ready, should follow below process;**
   - **a. Moisture test at CPT IQC**
   - **b. Test n=1 (10x avg. value)**
   - **c. Pass spec: ≦ 1.5%(SAMXON);**
4. **Action plan summary for capacitance drop from Samxon:**
   - **a. Add sealing time QC confirmation requirements in SOP document.**

Topic	Seal time confirmation SOP 《SZ-WI-QA-101》

Before Improvement	After Improvement
	
Problem Point	**Improvement Comments**
There is no QC confirming the sealing time before	Add QC check for sealing time (Requirement:<=4H) 3/12/2023

QC confirmation items

I. Machine stopping products disposal

Topic	Machine Stopping Products Disposal SOP 《SZ-WI-RD-008》

Before Improvement	After Improvement
	
Problem Point	**Improvement Comments**
When the machine stopping abnormally, the product is placed on the machine without protection control.	Put the unsealed products back in the oven when the machine is under stopping abnormally. 3/12/2023

II. Add moisture content test

Topic	Add moisture content test 《SZ-WI-QA-087》

Before Improvement	After Improvement
N/A	
Problem Point	**Improvement Comments**
No moisture content test before.	Add moisture testing equipment. 4/30/2023

III. Add samples keeping

Topic	Add samples keeping SOP《SZ-WI-QA-100》

Before Improvement	After Improvement
N/A	
Problem Point	**Improvement Comments**
No samples keeping before	Should keep 5x samples after FQC aging test by each lot.

D6.)改善措施實施日期:Implement Permanent Corrective Actions: **(Note**: Be provide the phase-in date or lot# of corrective actions **implementation** in process**)**
immediately
D7.)預防再發生措施:Prevent Recurrence: **(Note:** Modified the management, operating systems, practices, and procedures to prevent recurrence for the problems as well as lessons learned cases**.)**
Prevent moisture inside E-cap **1. Add QC confirmation requirements for sealing time in the SOP, especially for product disposal and moisture content testing when the machine stops.** **2. Request the capacitor manufacturer to investigate all possibilities of moisture penetration.** **3. 2nd source capacitor manufacturers should also conduct moisture detection tests and investigate all possibilities of moisture penetration at the same time.**
D8.)確認並感謝問題解決成員:Check and Congratulate the Team: **(Note:** Recognize the collective efforts of the team.**)**
Thanks to you all！！！ **CQS: Maria Chen SQE: Nono Cheng MFG: Xiaohui Du PE: Yong Liu Sales: Amy Tsai** **RD: Vincent Yang**

Signature **Team Leader**:	**Maria_chen**
	Name – Title
Signature by Approver:	**Tony_Hsu**
	Name-Title