	Document Name		Rev.	1.0
DPC	Model No.	NP120		

1. Scope

This specification shall be applied to Sonata Lithium Ion battery pack (1 series 1 parallel)

∗ **R**echarge battery after long time storage before use.

2. Composition

The Single cell consists of 2350 mAh capacity also Battery Pack 2350 mAh combines with protection circuit and thermal protection.

3. Product specification

No	Item		Rating performance	Remark
1	Typical Capacity		2350 mAh	0.2C discharging to 3.0V
2	Nominal voltage		3.6V	
3	Maximum charge voltage		4.28V	
4	The end of discharging voltage		2.8V	
5	Suggestive charging current (standard)		470mA / 0.2C	0℃to 40℃
6	Suggestive charging current (Max)		2350mA / 1C	0℃ to 40℃
7	Suggestive continuous discharging current		470mA / 0.2C	-20℃ to 60℃
8	Suggestive continuous discharging current (Max)		2350mA / 1C	0℃ to 40℃
9	Internal resistance		<200 mΩ	Measured by the alternate current method (1Khz)
10	Outer Dimension(mm)(L*W*T)		53*34.5*11 mm	Max
11	Weight		50	g
12	Storage temperature (At the shipment state)	Less than 1 months	-20℃to 60℃ , 90%RH	Percentage of recoverable capacity 80% ※
		Less than 3 months	-20℃to 40℃ , 90%RH	
		Less than 1 years	-20℃to 20℃ , 90%RH	

※ Percentage of recoverable capacity
=(discharge time after storage/Initial discharge time) × 100
Discharge time is measured by the discharge at 0.2CA to 3.0V end voltage after fully charged
according to specification at approximately 25℃

	Document Name		Rev.	1.0
	Model No.	NP120		

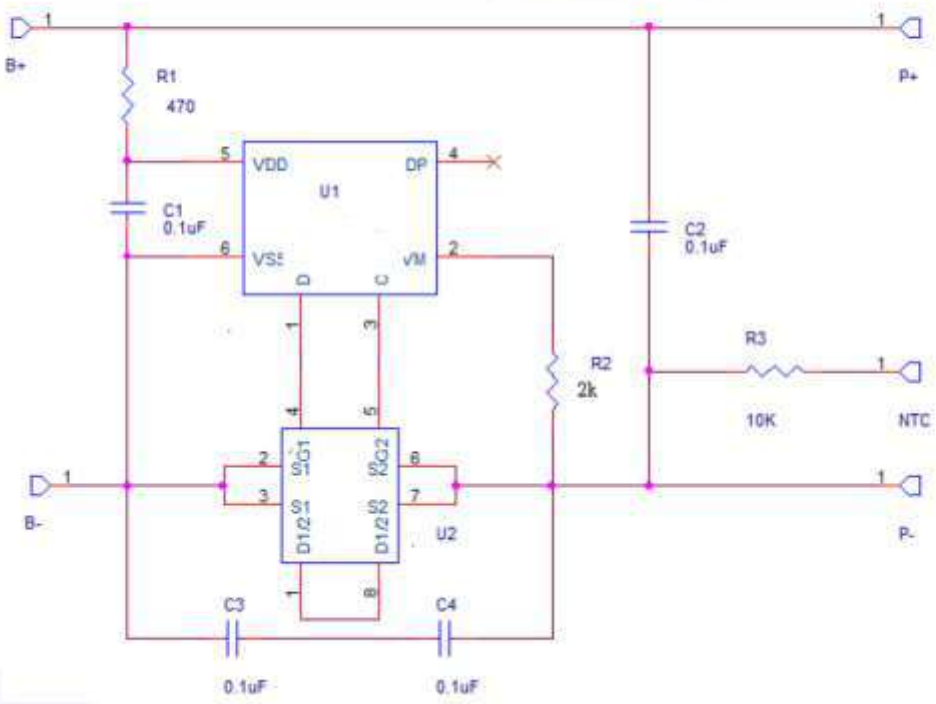
1. Introduction :

This specification provides engineering information and electrical specifications for the protection circuit module of Li-ion cells.

2. Description :

The JI-NP120 PCM provides protection functions for t one-cell Li-ion battery.
The semiconductor devices with ESD protections are utilized on JI-NP120 PCM.

3. Circuit diagram :



Document :	JI-NP120	Date	Mar 20, 2018
DWG No.	JI-NP120	Check	joan
Sheet	1 of 1	Approval	leo

4. Major components :

ITEM	P/N	Maker
Li-ion Protection IC	*Seiko 8261ACKMD*	*Seiko*
MOSFET	*STG8209/SG2422KW/FK*	*Samhop*
TH	*Thermistor 10K Ω ±1%*	*Joinset*

5. Bill of materials :

Document : *JI-NP120*

Revision : A

Date : Mar 20, 2018

No.	Bill of materials for NP120			Q'ty	Maker	REMARK
	Ref.	Part Name	DESCRIPTION			
1	C1	Capacitor	0.1μF / Y5V	1	Yageo, or equivalent	
2	C2	Capacitor	0.1μF / Y5V	1	Yageo, or equivalent	
3	C3	Capacitor	0.1μF / Y5V	NC	Yageo, or equivalent	
4	C4	Capacitor	0.1μF / Y5V	NC	Yageo, or equivalent	
5	R1	Resistor	470 Ω ±5%	1	Yageo, or equivalent	
6	R2	Resistor	2K Ω ±5%	1	Yageo, or equivalent	
7	R3	Thermistor	10K Ω ±1%	1	Joinset, or equivalent	
8	U1	Protection IC	S8261ACKMD	1	Seiko, or equivalent	
9	U2	MOSFET	STG8209	1	Ablic, or equivalent	
10	-	PCB	NP120	1	SJ or equivalent	

6. Absolute maximum rating :

Parameter	Rating	Unit
Operating temperature range	-30 ~ 75	°C
Operating humidity range	Less than 85% RH	%RH
Storage temperature range	-45~ 85	°C
Storage humidity range	Less than 85% RH	%RH
Voltage between terminals of V+ and V-	12.0	V
Voltage Between terminals of B+ and B-	10.0	V

Remarks :

(1) The negative voltage is not allowed to be applied between the charge / discharge terminals (+ and -) or between the cell connection terminals (B+ and B-)

7. Basic functions :

(1) Over-charge protection

Over-charge occurs whenever the voltage applied to battery is over 4.28V.

Protection circuit on JI-NP120 should stop charging the battery when over-charge condition occurs and any deformation in the outer appearance of the Lithium cell connected to NP120 should not occur.

(2) Over-discharge protection

Over-discharge occurs whenever the battery is discharged with voltage below 2.8V.

Protection Circuit on JI-NP120 should stop discharging the cells when over-discharge condition occurs.

(3) Over-current protection

Over-current condition occurs when excessive discharge current occurs (The excessive current threshold is higher than 0.13V when S8261ACK is used.)

Protection circuit on JI-NP120 should stop discharging the cell when over-current condition occurs.

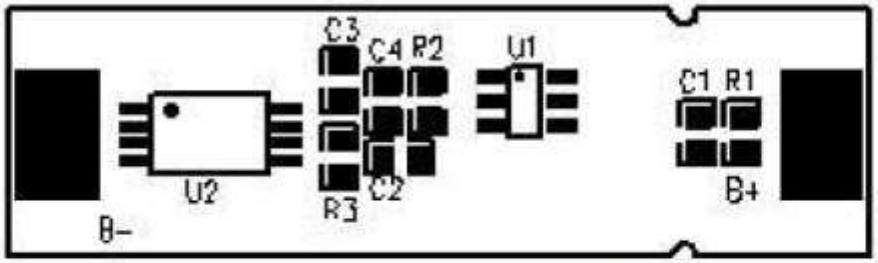
(4) Short-circuit protection

Short-circuit condition occurs when the terminals between + and - is shortened.

Protection circuit on JI-NP120 should stop discharging the cell when short-circuit condition occurs and temperature of MOSFET should not be overheated.

8. Pin Layout Diagram：

Component side：



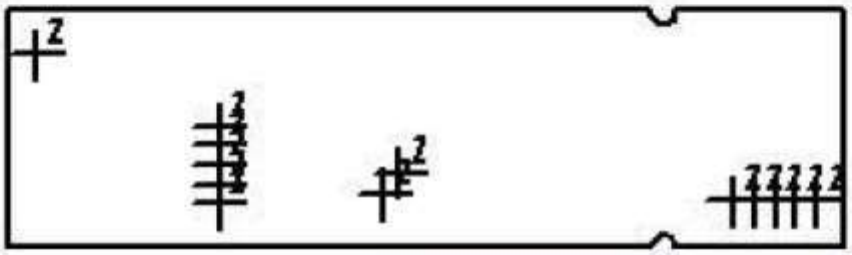
Solder side：

PIN	Description
B+	Battery+
B-	Battery—
TH	Thermistor(TH=10Kohm±1%)
P+	Phone+/ Charger+
P-	Phone— / Charger—

9.Artwork drawing：

TSIDE

BSIDE



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10.Electrical characteristics：

10.1 Parameters of protection circuit (@25°C)：

No	Item	Specification	Unit
1	Over-charge detection voltage	4.28±0.025	V
2	Over-charge release voltage	4.08±0.050	V
3	Over-discharge detection voltage	2.800±0.050	V
4	Over-discharge release voltage	2.8±0.050	V
5	Over-current detection voltage	0.130±0.015	V
6	Over-charge detection delay time	1200±25%	msec
7	Over-discharge detection delay time	144±30%	msec
8	Over current detection delay time	9±30%	msec
9	Short circuit detection delay time	1 ~ 6	msec
10	Supply current (Normal mode)	< 7	μA
11	Supply current (Protection mode)	< 1	μA

10.2 Requirement of protection functions (@25°C)：

No.	Item	*Criteria*
1	Over-charge inhibition	4.28±0.025 (from cell terminal)
2	Over-charge protection recovery method	When the battery is connected to the cellular phone, the protective condition is released.
3	Over-discharge inhibition	2.800±0.050 (from cell terminal)
4	Over-discharge protection recovery method	When the battery is charged, the protective condition is released.
5	Over-current protection	2.5~4.6A
6	Over-current release	Reset by load release

11.Specification of PCB：

Material	FR-4
Dimension	32.0X9.5 (+/- 0.2)mm
Thickness	0.6 (+0/ - 0.15) mm
UL	94V-0

1. Material 1 oz copper double sided bonded to FR-4 base material.
2. 2 layers with through hole.
3. All through hole connections to have solder resis applied.
4. Gold Plating 3u inch.

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12.Battery Specification

Panasonic Lithium Ion

NCA103450

Features & Benefits

- High energy density
- Long, stable power and long run time
- Ideal for portable communications, portable computing, DSC and Camcorder.

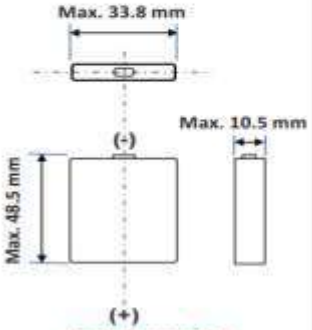
* At temperatures below 10°C, charge at a 0.35C rate.

Specifications

Rated capacity(1)	Min. 2200mAh
Capacity(2)	Min. 2270mAh Typ. 2350mAh
Nominal voltage	3.6V
Charging	CC-CV, Std. 1589mA, 4.20V, 4.0 hrs
Weight (max.)	38.3 g
Temperature	Charge*: 0 to +45°C Discharge: -20 to +60°C Storage: -20 to +50°C
Energy density	Volumetric: 460 Wh/l Gravimetric: 207 Wh/kg

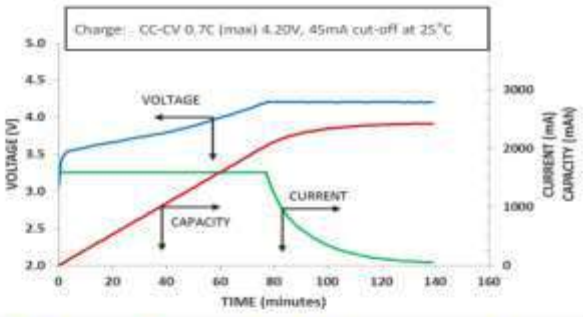
(1) At 20°C (2) At 25°C

Dimensions

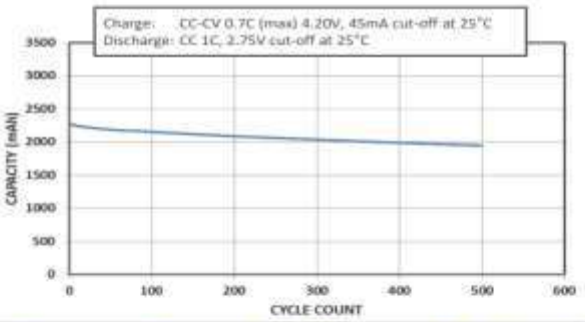


For Reference Only

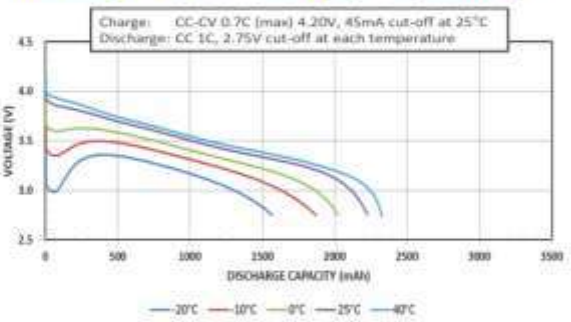
Charge Characteristics



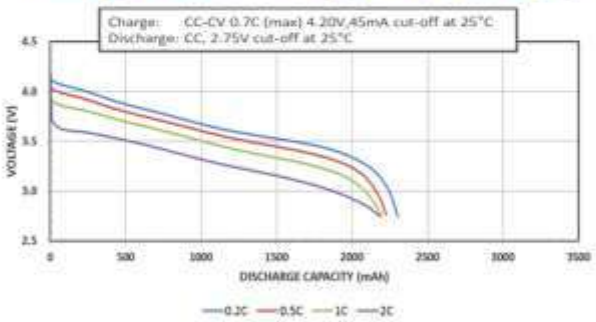
Cycle Life Characteristics



Discharge Characteristics (by temperature)



Discharge Characteristics (by rate of discharge)



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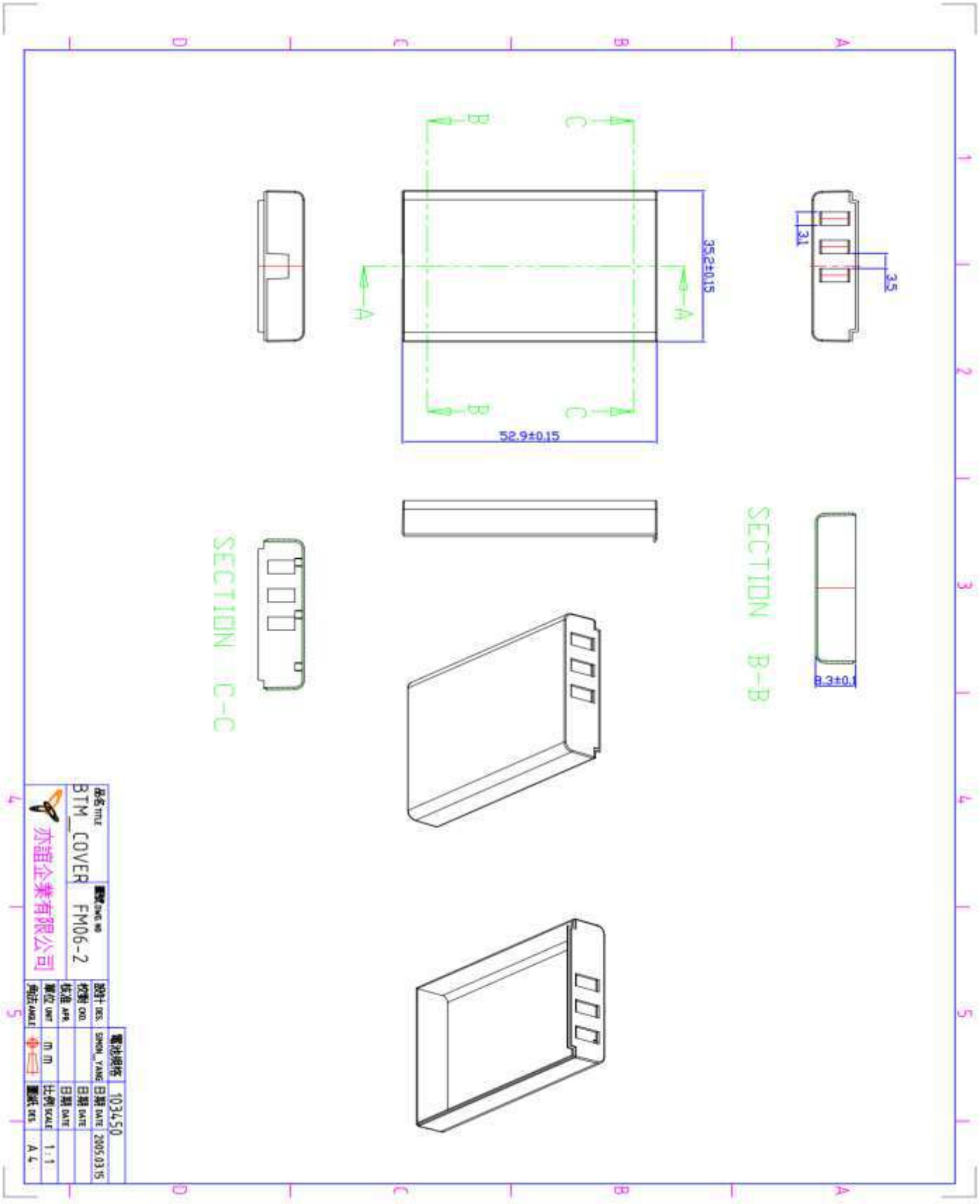

13. Test Report

MO Numb 171002
Process 鳳翰NCA103450-11 Test Date ALL RECORDS
Test Numt 100 Pass Numl 100 Pass % : 100.00%

	Item of O.C.V	Ther.R.	Sh.R.	Int.R.	OCCP	ODCP	Short	Chg V	Dchg V	I D最大	I D比對	I C最大	I C比對	
	High L 4.2			150				4.2	4.2					
	Low L 3.5			50				3	3					
Battery	Bar Cc (Volt)	(kOhm)	(kOhm)	(mOhm)				(Volt)	(Volt)					Result
1	H9U0081	3.615		110.7				3.687	3.544					Pass
2	H9U0099	3.615		112.6				3.688	3.542					Pass
3	H9U0098	3.614		112.8				3.687	3.541					Pass
4	H9U0100	3.614		111.4				3.687	3.542					Pass
5	H9U0095	3.614		113.2				3.688	3.54					Pass
6	H9U0094	3.615		110.9				3.688	3.544					Pass
7	H9U0097	3.612		111.4				3.685	3.539					Pass
8	H9U0096	3.613		111.4				3.686	3.542					Pass
9	H9U0092	3.615		111.5				3.689	3.542					Pass
10	H9U0091	3.614		112.9				3.687	3.541					Pass
11	H9U0093	3.614		112.5				3.687	3.54					Pass
12	H9U0088	3.614		112.6				3.688	3.542					Pass
13	H9U0087	3.615		111.7				3.688	3.541					Pass
14	H9U0090	3.614		112.9				3.687	3.541					Pass
15	H9U0089	3.614		112.5				3.687	3.541					Pass
16	H9U0085	3.614		112.1				3.686	3.541					Pass
17	H9U0086	3.614		109.8				3.686	3.541					Pass
18	H9U0083	3.616		112.2				3.688	3.543					Pass
19	H9U0082	3.614		111.6				3.687	3.541					Pass
20	H9U0084	3.613		112.7				3.686	3.54					Pass
21	H9U0063	3.615		112.9				3.688	3.541					Pass
22	H9U0066	3.616		110.6				3.688	3.545					Pass
23	H9U0061	3.613		110.6				3.686	3.541					Pass
24	H9U0064	3.615		111.2				3.688	3.543					Pass
25	H9U0062	3.614		111.9				3.687	3.541					Pass
26	H9U0069	3.616		110				3.687	3.544					Pass
27	H9U0070	3.612		115				3.687	3.537					Pass
28	H9U0068	3.614		112.3				3.687	3.541					Pass
29	H9U0065	3.613		110.8				3.686	3.542					Pass
30	H9U0067	3.615		111.5				3.687	3.543					Pass
31	H9U0072	3.614		112.1				3.688	3.541					Pass
32	H9U0071	3.614		110.8				3.686	3.542					Pass
33	H9U0074	3.613		110.6				3.687	3.541					Pass
34	H9U0073	3.615		112.9				3.686	3.54					Pass
35	H9U0075	3.613		112.4				3.687	3.54					Pass
36	H9U0076	3.615		112.8				3.687	3.542					Pass
37	H9U0077	3.614		112.4				3.687	3.541					Pass
38	H9U0080	3.615		113.7				3.688	3.541					Pass
39	H9U0079	3.613		111.6				3.686	3.54					Pass
40	H9U0078	3.615		112.6				3.688	3.542					Pass
41	H9U0043	3.614		113.7				3.689	3.541					Pass
42	H9U0044	3.617		112.3				3.69	3.544					Pass
43	H9U0045	3.616		110.9				3.688	3.543					Pass
44	H9U0042	3.614		114.1				3.687	3.541					Pass
45	H9U0040	3.615		113.8				3.69	3.542					Pass
46	H9U0050	3.613		113.3				3.687	3.54					Pass
47	H9U0048	3.615		113.3				3.689	3.541					Pass
48	H9U0046	3.614		109.7				3.685	3.542					Pass
49	H9U0047	3.615		111.7				3.687	3.541					Pass
50	H9U0049	3.614		112.2				3.687	3.542					Pass
51	H9U0060	3.615		112.7				3.689	3.542					Pass
52	H9U0057	3.613		110				3.685	3.542					Pass
53	H9U0058	3.614		111.3				3.686	3.541					Pass
54	H9U0055	3.614		112.7				3.687	3.541					Pass
55	H9U0059	3.614		112.9				3.688	3.541					Pass
56	H9U0056	3.614		112.6				3.687	3.542					Pass
57	H9U0053	3.614		111.5				3.688	3.542					Pass
58	H9U0054	3.612		111.6				3.685	3.541					Pass
59	H9U0051	3.614		111.1				3.687	3.541					Pass
60	H9U0052	3.614		112.9				3.687	3.541					Pass
61	H9U0029	3.614		113				3.689	3.541					Pass
62	H9U0028	3.614		111.5				3.687	3.543					Pass
63	H9U0026	3.613		112.4				3.686	3.54					Pass
64	H9U0027	3.615		111.4				3.688	3.543					Pass
65	H9U0024	3.613		114.1				3.688	3.539					Pass
66	H9U0022	3.616		114.8				3.689	3.541					Pass
67	H9U0021	3.615		112.2				3.689	3.542					Pass
68	H9U0023	3.615		113.4				3.688	3.542					Pass
69	H9U0020	3.614		110.9				3.687	3.542					Pass
70	H9U0038	3.616		112.5				3.689	3.543					Pass
71	H9U0039	3.614		112				3.688	3.541					Pass
72	H9U0036	3.616		113.5				3.689	3.542					Pass
73	H9U0037	3.614		112.6				3.688	3.541					Pass
74	H9U0030	3.616		113.6				3.689	3.542					Pass
75	H9U0032	3.613		113.1				3.686	3.539					Pass
76	H9U0034	3.615		116.1				3.689	3.541					Pass
77	H9U0035	3.615		112				3.688	3.542					Pass
78	H9U0033	3.614		115.5				3.688	3.54					Pass
79	H9U0031	3.614		112.9				3.688	3.54					Pass
80	H9U0041	3.613		113.6				3.686	3.54					Pass
81	H9U0001	3.612		114.5				3.687	3.538					Pass
82	H9U0005	3.611		111.9				3.684	3.539					Pass
83	H9U0004	3.612		111.7				3.685	3.539					Pass
84	H9U0002	3.615		110.4				3.687	3.543					Pass
85	H9U0003	3.614		115.2				3.689	3.539					Pass
86	H9U0009	3.615		112.7				3.687	3.542					Pass
87	H9U0008	3.615		111.5				3.688	3.543					Pass
88	H9U0006	3.615		112.5				3.688	3.542					Pass
89	H9U0007	3.614		111.3				3.687	3.542					Pass
90	H9U0015	3.612		112.1				3.686	3.54					Pass
91	H9U0012	3.612		111.6				3.686	3.539					Pass

92	H9U0013	3.613	113.2	3.686	3.54	Pass
93	H9U0010	3.614	111.6	3.687	3.541	Pass
94	H9U0011	3.613	111.4	3.685	3.54	Pass
95	H9U0019	3.613	113.3	3.687	3.538	Pass
96	H9U0016	3.614	113.9	3.688	3.541	Pass
97	H9U0017	3.613	111.5	3.687	3.541	Pass
98	H9U0014	3.615	114	3.689	3.542	Pass
99	H9U0018	3.614	114.6	3.689	3.54	Pass
100	H9U0025	3.614	115	3.688	3.54	Pass
	Max.Value	3.617	116.1	3.69	3.545	
	Min.Value	3.611	109.7	3.684	3.537	
	Avg.Value	3.614	112.4	3.687	3.541	
	Std.Dev.	0.001	1.3	0.001	0.001	
	Ca	-0.674	0.247			
	Cp	118.626	12.982			
	Cpk	38.67	9.754			