

# ***Battery Pack Test Report*** ***(UN38.3)***

Customer:SRAM

Pack Model:M/N25401

Nominal voltage:7.4V dc

Nominal capacity:300mAh

Configuration: 2S1P

Celxpert P/N: 923300006

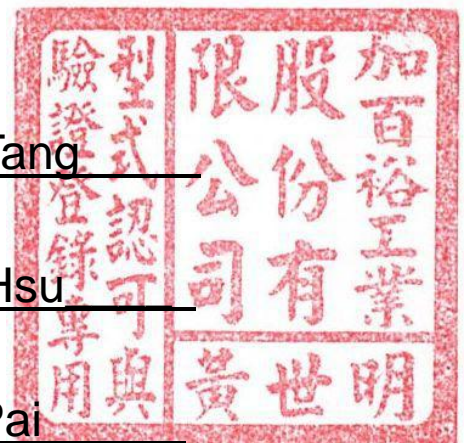
Cell Type: AHB601929T 300mAh

MAY 28, 2018

Approved by Frank Tang

Reviewed by Sylvia Hsu

Prepared by Yufan Pai



# 1. UN38.3 Test Report

Test Period	2018/05/11~2018/05/26		Test Spec.	ST/SG/AC.10/11/Rev.6 Amend.1	
Parts Name	Battery Pack	Application	Bike	Quantity	8PCS

## 1.1 Test Summary

Item	Test Item	Test Result	Details
T1	Altitude simulation test (UN38.3-1)	Pass	Page 03
T2	Thermal test (UN38.3-2)	Pass	Page 04
T3	Vibration test (UN38.3-3)	Pass	Page 05
T4	Shock test (UN38.3-4)	Pass	Page 06
T5	Short Circuit test (UN38.3-5)	Pass	Page 07
T7	Overcharge test (UN38.3-7)	Pass	Page 08

The battery pack pass UN38.3 test.

## 2.2 Test sample list

No.	Pack S/N	Test item
1	Sample No:1/8	38.3.T1~T5,T7
2	Sample No:2/8	38.3.T1~T5,T7
3	Sample No:3/8	38.3.T1~T5,T7
4	Sample No:4/8	38.3.T1~T5,T7
5	Sample No:5/8	38.3.T1~T5,T7
6	Sample No:6/8	38.3.T1~T5,T7
7	Sample No:7/8	38.3.T1~T5,T7
8	Sample No:8/8	38.3.T1~T5,T7

2.3 Test result

Item	Test Item	Test specification	Judge criteria	Sample(s)				
T1	Altitude Simulation (UN38.3-1)	1-1. 4 batteries are standard charged. 4 batteries are 1C cycled 25 times, ending in fully charged state. All batteries weight is measured. The charged batteries voltage are measured and recorded. 1-2. Batteries shall be stored at a pressure of 11.6Kpa or less for at least six hours at ambient temperature 20+/-5 °C. 1-3. Vacuum is released. All cells weight is measured. The charged cell voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 25 cycled ending in fully charged states (Pack#5~8)				
Test Period		Start:2018/05/11 End:2018/05/11						
Test Equipment		Multi-meter Q022, Oven Q103, Scale M396						
Major Problem		-						
Warning Point		-						
Recommendation		The battery packs pass the test.						
Raw Data	<b>Altitude Simulation Test on Charged Packs</b>							
	No.	Before		After		voltage residue Volt (%)	mass loss Weight (%)	other event
		OCV (V)	Weight (kg)	OCV (V)	Weight (kg)			
	1	8.340	24.92	8.331	24.90	99.89%	0.08%	O
	2	8.341	24.64	8.334	24.64	99.92%	0.00%	O
	3	8.341	24.56	8.335	24.56	99.93%	0.00%	O
	4	8.343	24.54	8.337	24.54	99.93%	0.00%	O
	5	8.335	24.54	8.311	24.54	99.71%	0.00%	O
	6	8.335	24.92	8.313	24.92	99.74%	0.00%	O
	7	8.338	24.29	8.318	24.29	99.76%	0.00%	O
8	8.325	24.17	8.303	24.17	99.74%	0.00%	O	
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire								
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire								

Item	Test Item	Test specification	Judge criteria	Sample(s)					
T2	Thermal test (UN38.3-2)	2-1. Packs are stored for 6 hours at $72\pm 2^{\circ}\text{C}$ , followed by storage for 6 hours at $-40\pm 2^{\circ}\text{C}$ . The maximum time interval between test temperature extremes is 30 minutes. 2-2.Repeat 2-1 for 10 times. Then store the packs at ambient for 24 hours. All packs weight are measured. The charged battery voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 25 cycled ending in fully charged states (Pack#5~8)					
Test Period		Start:2018/05/15 End: 2018/05/22							
Test Equipment		Multi-meter Q022, Thermal shock Machine Q164, Scale M396							
Major Problem		-							
Warning Point		-							
Recommendation		The packs pass the test.							
Raw Data		<b>Thermal Test on Charged Packs</b>							
		No.	Before		After		voltage residue	mass loss	other event
			OCV (V)	Weight (kg)	OCV (V)	Weight (kg)	Volt (%)	Weight (%)	
		1	8.297	24.90	8.187	24.90	98.67%	0.00%	O
		2	8.302	24.64	8.193	24.63	98.69%	0.04%	O
		3	8.302	24.56	8.192	24.55	98.68%	0.04%	O
		4	8.304	24.54	8.193	24.53	98.66%	0.04%	O
		5	8.276	24.54	8.167	24.52	98.68%	0.08%	O
		6	8.278	24.92	8.166	24.92	98.65%	0.00%	O
		7	8.283	24.29	8.168	24.29	98.61%	0.00%	O
8	8.269	24.17	8.157	24.17	98.65%	0.00%	O		
		Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire							
		O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire							

Item	Test Item	Test specification	Judge criteria	Sample(s)					
T3	Vibration test (UN38.3-3)	3-1. Packs are firmly secured to the platform of the vibration machine without distorting the packs in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of 3 mutually perpendicular to the terminal face. 3-2. The logarithmic frequency sweep is as follows: 7-18 Hz → 1gn 18-50 Hz → 0.8mm amplitude 50-200 Hz → 2gn 3-3. All packs weight are measured. The charged packs voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 25 cycled ending in fully charged states (Pack#5~8)					
Test Period		Start: 2018/5/22                      End: 2018/5/23							
Test Equipment		Multi-meter Q022, Vibration Machine Q112, Scale M396							
Major Problem		-							
Warning Point		-							
Recommendation		The packs pass the test.							
Raw Data		<b>Vibration Test on Charged Packs</b>							
		No.	Before		After		voltage residue	mass loss	other event
			OCV (V)	Weight (kg)	OCV (V)	Weight (kg)	Volt (%)	Weight (%)	
		1	8.187	24.90	8.181	24.89	99.93%	0.04%	O
		2	8.193	24.63	8.187	24.61	99.93%	0.08%	O
		3	8.191	24.55	8.186	24.55	99.94%	0.00%	O
		4	8.193	24.53	8.187	24.53	99.93%	0.00%	O
		5	8.167	24.52	8.161	24.51	99.93%	0.04%	O
		6	8.166	24.92	8.161	24.91	99.94%	0.04%	O
		7	8.167	24.29	8.162	24.28	99.94%	0.04%	O
8	8.157	24.17	8.152	24.17	99.94%	0.00%	O		
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire									
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire									

Item	Test Item	Test specification	Judge criteria	Sample(s)					
T4	Shock test (UN38.3-4)	4-1. Packs shall be secured to the testing machine by means of a rigid mount, which will support all mounting surfaces. 4-2. Packs shall be subjected to a half-sine shock of peak acceleration 150gn and pulse duration of 6 milliseconds. Each pack shall be subjected to 3 shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicularly mounting positions of the pack for a total of 18 shocks. 4-3. All batteries weight are measured. The charged cell voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 25 cycled ending in fully charged states (Pack#5~8)					
Test Period		Start: 2018/5/23 End: 2018/5/24							
Test Equipment		Multi-meter Q022, Shock Machine Q113, Scale M396							
Major Problem		-							
Warning Point		-							
Recommendation		The packs pass the test.							
Raw Data		<b>Shock Test on Charged Packs</b>							
		No.	Before		After		voltage residue	mass loss	other event
			OCV (V)	Weight (kg)	OCV (V)	Weight (kg)	Volt (%)	Weight (%)	
		1	8.181	24.89	8.181	24.88	100.00%	0.04%	O
		2	8.187	24.61	8.186	24.61	99.99%	0.00%	O
		3	8.186	24.55	8.185	24.55	99.99%	0.00%	O
		4	8.187	24.53	8.184	24.53	99.96%	0.00%	O
		5	8.161	24.51	8.161	24.50	100.00%	0.04%	O
		6	8.161	24.91	8.160	24.89	99.99%	0.08%	O
		7	8.162	24.28	8.162	24.28	100.00%	0.00%	O
8	8.152	24.17	8.150	24.16	99.98%	0.04%	O		
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire									
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire									

Item	Test Item	Test specification	Judge criteria	Sample(s)																														
T5	Short Circuit Test (UN38.3-5)	5-1.Packs are placed in to a 55±2°C oven, and exterior packs temperature are monitored 5-2.When packs exterior reach 55±2°C, they are shorted by connecting terminals with a copper wire of resistance less than 100m Ohm. 5-4. The short was continued for more than 1hour or the cell temperature return to 55°C. The packs are observed for a further 6 hours.	No rupture, no disassembly, no explosion, no fire, no smoke. Packs exterior peak temperature <170°C.	4 packs are standard charged (Pack#1~4) 4 packs 25 cycled ending in fully charged states (Pack#5~8)																														
Test Period		Start: 2018/5/24                      End: 2018/5/25																																
Test Equipment		Environmental Oven Q105, Data acquisition Q187, Battery Hi-Tester																																
Major Problem		-																																
Warning Point		-																																
Recommendation		The packs pass the test.																																
Raw Data		<table border="1"> <thead> <tr> <th colspan="3">Short Circuit Test on Charged Packs</th> </tr> <tr> <th>No.</th> <th>Max. Temp.(°C)</th> <th>Other event</th> </tr> </thead> <tbody> <tr><td>1</td><td>56.64</td><td>O</td></tr> <tr><td>2</td><td>56.62</td><td>O</td></tr> <tr><td>3</td><td>56.35</td><td>O</td></tr> <tr><td>4</td><td>56.02</td><td>O</td></tr> <tr><td>5</td><td>56.45</td><td>O</td></tr> <tr><td>6</td><td>57.82</td><td>O</td></tr> <tr><td>7</td><td>56.91</td><td>O</td></tr> <tr><td>8</td><td>56.89</td><td>O</td></tr> </tbody> </table> <p>Note: D-Disassembly ; R-Rupture ; F-Fire O- No Disassembly , No Rupture , No Fire</p>			Short Circuit Test on Charged Packs			No.	Max. Temp.(°C)	Other event	1	56.64	O	2	56.62	O	3	56.35	O	4	56.02	O	5	56.45	O	6	57.82	O	7	56.91	O	8	56.89	O
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Item	Test Item	Test specification	Judge criteria	Sample(s)		
T7	Overcharge test (UN38.3-7)	7-1. The charge current shall be twice the Spec's recommended maximum continuous charge current. 7-2. The minimum voltage of the test shall be as follows: (a) When the Spec's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (b) When the Spec's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. 7-3. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.	No disassembly, no fire within seven days after the test.	4 packs are fully charged (Pack#1~4) 4 packs are 25 times cycled ending in fully charged state (Pack #5~8)		
Test Period		Start: 2018/5/25 End:2018/5/26				
Test Equipment		Multi-meter Q153, Data acquisition Q078, Power supply				
Major Problem		-				
Warning Point		-				
Recommendation		The packs pass the test.				
Raw Data		<b>Overcharge Test on Charged Packs</b>				
		No.	Charge Voltage(V)	Charge Current(A)	Max. Temp.(°C)	Other event
		1	16.80	0.6	21.44	O
		2			21.40	O
		3			20.91	O
		4			20.89	O
		5			21.06	O
		6			21.01	O
		7			20.89	O
		8			20.94	O
Note: D-Disassembly ; F-Fire / O-No Disassembly ,No Fire						