



新普科技股份有限公司
 新世電子(常熟)有限公司
 新普科技(重慶)有限公司
 華普電子(常熟)有限公司

Control Number: SLEU-1907002

Lithium-ion Battery UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

(Manual of Tests and Criteria, Sixth revised edition, Amend 1)

Customer: Lenovo

Model: L18M3PF1

**Rating/ Mass: 11.4V , Typical Capacity 4000mAh/ 45Wh
 Rated Capacity 3900mAh/ 44Wh /227 (g)**

Issue date: 2019/07/09

Approved By	Checked By	Prepared By
Assistant Manager	Authorized Signatory	Test Engineer
<i>Sung Sin</i>	<i>Zemah Huang</i>	<i>Mia Deng</i>

SIMPLO TECHNOLOGY CO., LTD.

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Form No. : W11-002-B05

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1. Purpose of the Test :

To test each cell/battery is of the type proved to meet the requirements in United Nations Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3.

2. Test Result :

Test results of the UN Recommendations on the Transport of Dangerous Goods

No.	Test Item	Test results
T.1	Altitude simulation	PASS
T.2	Thermal test	PASS
T.3	Vibration test	PASS
T.4	Shock test	PASS
T.5	External short circuit	PASS
T.6	Impact, Crush test	PASS
T.7	Overcharge	PASS
T.8	Forced discharge	PASS

3. Test Lab: Email : Test_Lab@simplo.com.tw Website : <http://www.simplo.com.tw/>

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Control Number: SLEU-1907002

4. Product manufacturer : Email : Test_Lab@simplo.com.tw Website : <http://www.simplo.com.tw/>

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5. Test Quantity :

- 5.1 Four batteries, at first cycle, in fully charged states. (For T.1~T.5)
- 5.2 Four batteries, after 25 cycles ending in fully charged states. (For T.1~T.5)
- 5.3 Five component cells, at first cycle at 50% of the design rated capacity. (For T.6)
- 5.4 Five component cells, after 25 cycles at 50% of the design rated capacity. (For T.6)
- 5.5 Four batteries, at first cycle, in fully charged states. (For T.7)
- 5.6 Four batteries, after 25 cycles ending in fully charged states. (For T.7)
- 5.7 Ten component cells, at first cycle in fully discharge states. (For T.8)
- 5.8 Ten component cells, after 25 cycles ending in fully discharged states. (For T.8)

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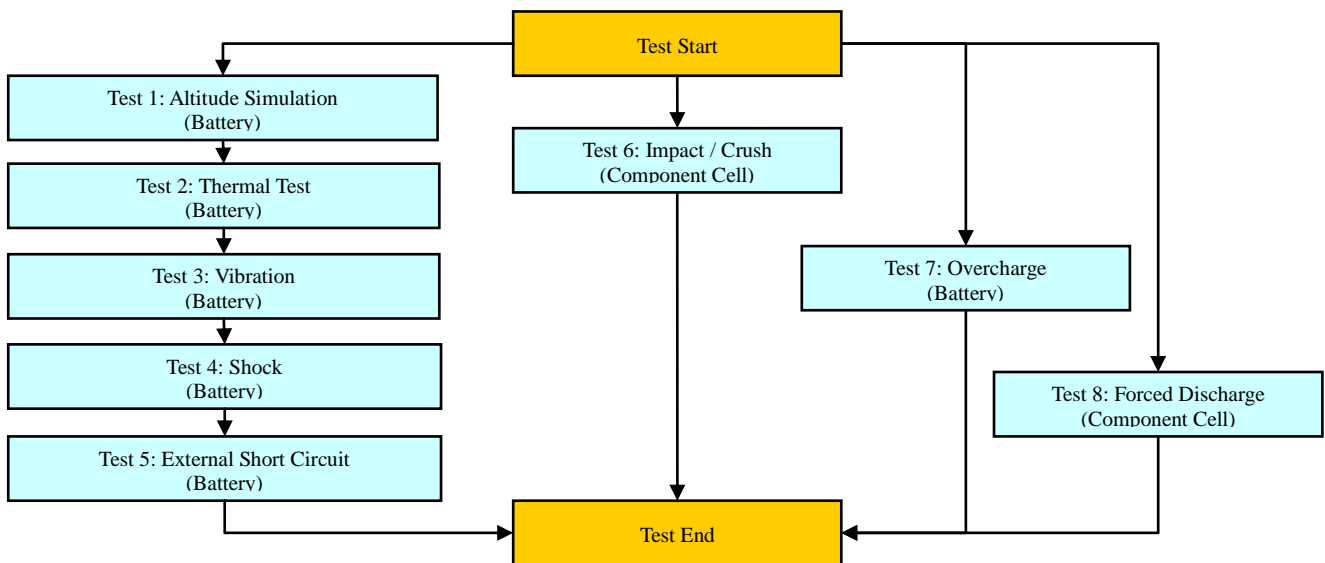
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6. Test Procedure :

6.1 All detailed test procedures must be based on United Nations Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3.

6.2 Test flow shall be followed as below.



Conclusion: The samples had passed the test items of UN38.3.

7. Comment :

Follow the requirement of “TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3”, this report was updated. (The control number of old report: SLEU-1811004)



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8. Test Equipment :

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Revised Date: 2018-11-27

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
Pretest								
V	ML-761	Learning	715C	0~18V 0~8A	SMP	2018/2/26	2019/2/26	
V	ML-762	Learning	715C	0~18V 0~8A	SMP	2018/1/3	2019/1/3	
V	ML-763	Learning	715C	0~18V 0~8A	SMP	2018/2/26	2019/2/26	
V	ML-764	Learning	715C	0~18V 0~8A	SMP	2018/1/3	2019/1/3	
	ML-925	Learning	750C8	0~60V 0~30A	SMP	2018/1/3	2019/1/3	
T.1 Altitude Simulation								
V	ML-522	Altitude	SVT-120	Kpa:30~90	HSIN JIANG	2018/7/18	2019/7/18	
V	ML-257	Multimeter	HP 34401A	Note 1	Agilent	2018/3/1	2019/3/1	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-550	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.2 Thermal Test								
V	ML-789	Thermal Shock	GTST-080-65-AW	T: -40 to 120°C	GF	2018/1/3	2019/1/3	
V	ML-257	Multimeter	HP 34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.3 Vibration								
V	ML-233	Vibration	KD-9636-EM-300F2K-30N80	F:5~2000Hz G:0.2~20G	King Design	2018/8/24	2019/8/24	
V	ML-257	Multimeter	HP 34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-552	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.4 Shock								
V	ML-056	Shock	DP-1200-25	G:10~600G	King Design	2018/8/24	2019/8/24	
V	ML-257	Multimeter	HP 34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.5 External Short Circuit								
V	ML-534	mΩ Hitester	3540	1mΩ ~ 30kΩ	HIOKI	2018/9/18	2019/9/18	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-521	Oven	9031	30~80 °C	YEOW LONG	2018/9/12	2019/9/12	
V	ML-549	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.6 Impact / Crush								
V	ML-339	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/5/17	2019/5/17	
	ML-076	Impact Tester			JYI SHENG	2018/1/3	2019/1/3	
	ML-553	Crush Tester	BCT-01		Simplo	2018/5/16	2019/5/16	
V	ML-866	Crush Tester	M0654		JYI SHENG	2018/4/9	2019/4/9	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	

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Revised Date: 2018-11-27

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
T.7 Overcharge								
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2018/5/17	2019/5/17	
V	ML-549	Data Logger	313	15-35 °C; 30-80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-918	Overcharge & Forced discharge tester	T901	3-30 Vdc, Charge: 0.05-20A Discharge: 0.02-10A	SMP	2018/5/17	2019/5/17	
T.8 Forced Discharge								
	ML-132	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-133	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-136	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-192	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-269	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-532	DC Electronic Load	33511-01	120V, 240A, 3600W	Prodigit	2018/7/18	2019/7/18	
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2018/5/17	2019/5/17	
V	ML-549	Data Logger	313	15-35 °C; 30-80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-918	Overcharge & Forced discharge tester	T901	3-30 Vdc, Charge: 0.05-20A Discharge: 0.02-10A	SMP	2018/5/17	2019/5/17	
Note 1: DC Voltage: 0.1-1000V; AC Voltage: 0.5-700V at 60Hz, 1kHz; Resistance: 10Ω-10MΩ; DC Current: 0.1mA-3A; AC Current: 0.01-3A at 60Hz, 0.01-1A, at 1kHz.								

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V	ML-763	Learning	715C	0~18V 0~8A	SMP	2019/2/26	2020/2/26	
V	ML-764	Learning	715C	0~18V 0~8A	SMP	2019/1/3	2020/1/3	
	ML-925	Learning	750C8	0~60V 0~30A	SMP	2019/1/3	2020/1/3	
T.6 Impact / Crush								
V	ML-339	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2019/5/10	2020/5/10	
	ML-076	Impact Tester			JYI SHENG	2019/1/3	2020/1/3	
	ML-553	Crush Tester	BCT-01		Simplo	2019/5/10	2020/5/10	
V	ML-866	Crush Tester	M0654		JYI SHENG	2019/4/8	2020/4/8	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	

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Control Number: SLEU-1907002

9. T.1~T.8 Detail Reports:

UN 38.3 Test Datasheet
 UN38.3/ST/SG/AC.10/11/Rev.6/Amend.1

Control Number: SLEU-1907002	Customer: Lenovo	Model Name: L18M3PF1	SMP Project Name: L340 ICH
Pack P/N: 928QA253H (A)(B)	Configuration: 3S1P	Test Duration: 2018/10/29-2018/11/26 2019/07/01-2019/07/09	Reviewer: Esmond

Test Sample Identification: Large Battery Small Battery Single-cell Battery

Battery Pack						Component Cell			
Used	Sample No.	Sample State	Used	Sample No.	Sample State	Used	Sample No.	Sample State	
V	01-04	1 Cycle, Fully charged	V	05-08	25 Cycles, Fully charged	V	01C-05C	1 Cycle, 50% SOC	
V	09-12	1 Cycle, Fully charged	V	13-16	25 Cycles, Fully charged	V	06C-10C	25 Cycles, 50% SOC	
						V	11C-20C	1 Cycle, Fully discharged (0% SOC)	
						V	21C-30C	25 Cycles, Fully discharged (0% SOC)	

T.1 Altitude Simulation

Start time: 2018/11/12 09:00	Ambient temp.: 22.8 °C								Operator: Kenny
Finish time: 2018/11/12 16:40	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.640	12.645	12.639	12.642	12.648	12.641	12.636	12.644
	After	12.636	12.639	12.630	12.633	12.636	12.634	12.631	12.635
	Residual OCV %	99.97%	99.95%	99.93%	99.93%	99.91%	99.94%	99.96%	99.92%
Mass (g)	Before	226.206	226.832	227.145	226.680	226.408	227.276	226.548	226.746
	After	226.204	226.827	227.142	226.680	226.406	227.276	226.545	226.744
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Results	P	P	P	P	P	P	P	P	

T.2 Thermal Test

Start time: 2018/11/12 17:00	Ambient temp.: 22.3 °C								Operator: Kenny
Finish time: 2018/11/19 09:00	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.636	12.639	12.630	12.633	12.636	12.634	12.631	12.635
	After	12.494	12.508	12.494	12.499	12.496	12.498	12.498	12.502
	Residual OCV %	98.88%	98.96%	98.92%	98.94%	98.89%	98.92%	98.95%	98.95%
Mass (g)	Before	226.204	226.827	227.142	226.680	226.406	227.276	226.545	226.744
	After	226.186	226.811	227.124	226.664	226.392	227.256	226.528	226.726
	Mass loss %	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Results	P	P	P	P	P	P	P	P	

T.3 Vibration

Start time: 2018/11/19 09:20	Ambient temp.: 22.5 °C								Operator: Kenny
Finish time: 2018/11/20 09:00	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.494	12.508	12.494	12.499	12.496	12.498	12.498	12.502
	After	12.479	12.495	12.486	12.492	12.485	12.492	12.489	12.489
	Residual OCV %	99.88%	99.90%	99.94%	99.94%	99.91%	99.95%	99.93%	99.90%
Mass (g)	Before	226.186	226.811	227.124	226.664	226.392	227.256	226.528	226.726
	After	226.184	226.807	227.122	226.661	226.390	227.256	226.527	226.723
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Results	P	P	P	P	P	P	P	P	

T.4 Shock

Start time: 2018/11/20 09:20	Ambient temp.: 23.1 °C								Operator: Kenny
Finish time: 2018/11/20 13:00	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.479	12.495	12.486	12.492	12.485	12.492	12.489	12.489
	After	12.471	12.489	12.474	12.477	12.477	12.483	12.483	12.479
	Residual OCV %	99.94%	99.95%	99.90%	99.88%	99.94%	99.93%	99.95%	99.92%
Mass (g)	Before	226.184	226.807	227.122	226.661	226.390	227.256	226.527	226.723
	After	226.181	226.805	227.121	226.661	226.386	227.253	226.522	226.721
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Results	P	P	P	P	P	P	P	P	

Form No. : W11-002-B05

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Control Number: SLEU-1907002

T.5 External Short Circuit

Start time: 2018/11/20 13:20		Ambient temp.: 22.7 °C						Operator: Kenny	
Finish time: 2018/11/21 09:00		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.471	12.489	12.474	12.477	12.477	12.483	12.483	12.479
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		56.8	57.3	56.6	59.1	58.4	60.7	58.8	57.6
Max Temp. (< 170°C)		57.3	57.3	57.7	57.5	57.6	57.4	57.8	57.5
Results		P	P	P	P	P	P	P	P

T.6 Impact / Crush (Component Cell)

UN38.3/ST/SG/AC.10/11/Rev.6/Amend.1

Impact - Cylindrical cells not less than 18.0 mm in diameter

Crush - Prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter

Start time: 2019/07/09 08:50		Ambient temp.: 24.1 °C				Operator: Mia			
Finish time: 2019/07/09 12:50		Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C	Sample 06C	Sample 07C	Sample 08C
Initial OCV (V)		3.758	3.762	3.766	3.751	3.754			
Max Temp. (< 170°C)		24.7	23.5	23.2	24.3	24.0			
Results		P	P	P	P	P			
Sample No.		Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C			
Initial OCV (V)		3.757	3.768	3.761	3.769	3.753			
Max Temp. (< 170°C)		23.9	24.6	24.1	23.7	23.8			
Results		P	P	P	P	P			

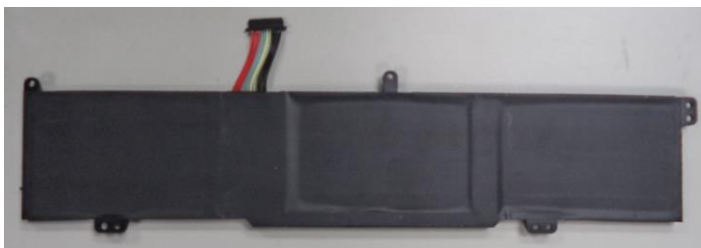
T.7 Overcharge

Start time: 2018/11/15 09:20		Ambient temp.: 22.3 °C						Operator: Kenny	
Finish time: 2018/11/23 10:30		Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)		226.207	226.822	227.145	226.682	226.402	227.271	226.547	226.747
Results		P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2018/11/16 09:00		Ambient temp.: 22.5 °C						Operator: Kenny	
Finish time: 2018/11/26 10:30		Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)		3.436	3.457	3.432	3.443	3.464	3.450	3.447	3.461
Results		P	P	P	P	P	P	P	P
Sample No.		Sample 19C	Sample 20C	Sample 21C	Sample 22C	Sample 23C	Sample 24C	Sample 25C	Sample 26C
Initial OCV (V)		3.475	3.445	3.438	3.467	3.472	3.459	3.466	3.430
Results		P	P	P	P	P	P	P	P
Sample No.		Sample 27C	Sample 28C	Sample 29C	Sample 30C				
Initial OCV (V)		3.441	3.433	3.477	3.453				
Results		P	P	P	P				

9. Test Sample:



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