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JSF-Urban Cruiser2 – battery powered transport device

Limited electrical safety investigation

Report No. 102407157MKS-002

Commercial-in-confidence

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Date: 21 January 2016

TESTED BY INTERTEK

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1 INTRODUCTION	
Specifications considered: IEC 60950-1 IEC 60320-1 BS 1363-1	Testing Station: Milton Keynes Safety Laboratory Davy Avenue, Knowlhill, Milton Keynes MK5 8NL United Kingdom. Tested by: Justin Morgan Date: 21 January 2016 Approved by: Michael Dyer Date: 22 January 2016
Commission received from: Contract Supervision:	Wilton Bradley Ltd 8 Wentworth Road Heathfield, Newton Abbot Devon, UK TQ12 6TL Mr Dan Asker
Type of appliance: Model:	Battery powered transport device JSF-Urban Cruiser2
Type of submission: Manufacturer: Submitter: Classification: Rated on/off times: Ratings (direct plug-in charger):	New contained within retail packaging Wilton Bradley Ltd (Mains Charger only) JSF (Urban Cuiser2 only) Mr Dan Asker Class II (mains charger unit) N/A Mains charger unit: Model: QY029-42 Input: 90-240V 50/60Hz, 1.5A Max Output: 42Vdc, 2A

1. INTRODUCTION

The client submitted two complete new units within retail packaging for a limited electrical safety evaluation.

There are no published safety standards specific to the type of product evaluated. The limited clauses from those standards used were chosen as a basis for the evaluation and considered representative. Other standards could have been applied, but as the tests conducted are the basic safety tests required by most electrical safety standards, the outcome of the report would likely be the same regardless what standards have been used.

Each unit consisted of a battery powered transport device and mains charger with detachable power cord.

2. OBSERVATIONS/TESTS/RESULTS

2.1 Electrical Testing

The mains charger was energised at 240V and plugged into the transport device; initially the charger LED was illuminated red (indicating that the battery is being charged), then turned green (indicating that the charge is complete). With the charger disconnected from the transport device, the LED was also illuminated green.

The covers were removed from the transport device and the battery pack terminal voltage (under charge) was measured at 42.53Vdc (nominal 42Vdc charge).

The charger unit was subject to a dielectric strength test by applying 3kVac for 1 minute between the primary input and secondary DC output. The unit passed this test with no voltage breakdown.

The charger DC output voltage was then subject to a load/overload test, see table 1 for results.

Table 1: Load/Overload Testing

Output condition	Maximum Power Output	Typical Charging	Overload	No Load	Short Circuit	No Load
Output Load (Ω)	34.1	29.2	19.8	N/A	0	N/A
Output Voltage (Vdc)	42.81	36.28	Pulsing	43.13	0	43.12
Output Current (A)	1.27	1.27	-	0.00	-	0.00
Charger Indicator Light	Red	Red	Pulsing Red	Green	None	Green

The maximum output power was reached at 1.27A loading, with an output voltage of 42.81Vdc (54.4W). The charger was operated under this condition for 30 minutes with no issues seen. Following this test, the charger unit was again subject to a dielectric strength test by applying 3kVac for 1 minute between the primary input and secondary DC output. The unit passed this test with no voltage breakdown.

The charger hit its current limit at 1.27A, attempting to increase the current loading further results in the output voltage reducing to approx. 26Vdc before entering a pulsing mode.

No fault tests (abnormal charge/discharge) were conducted on the battery pack due to the possibility of a battery pack explosion/fire due to the applied fault.

2.2 Observations

It was noted during external visual examination of the battery powered transport device that the power button and charging port are not labelled, however there locations are shown within the user manual along with instructions on how to turn it on and off as well as charging it.

Internal visual inspection of the transport device revealed that the battery pack appeared to be mounted securely with minimal room for movement, however it was also noted that the battery pack output connection was made to the control board with no clear evidence of any fusing/over current protection (to prevent excessive fault current that could occur in either charge or discharge mode). The battery pack was removed from the transport device and its insulation wrapping cut away. Examination of the battery pack showed that it included some form of charge/discharge control within the negative output lead, the PCB having connections/monitoring to the voltage at cells within the pack – see photographs 8 and 9. The individual battery cells were labelled as Samsung.

Inspection of the PCBs within the transport device showed solder joints appeared well formed with no indication of dry joints; the PCBs also appeared to be securely mounted. The inside of the transport device was generally clean and free from contaminants/debris.

External visual examination of the charger showed the presence of relevant markings such as the Class II symbol, Manufacturer, Model number, electrical ratings and RoHS compliance.

Visual examination of the internal components of the charger revealed nothing of concern, the isolation barrier was clear and solder joints appeared to be well formed with no indication of dry joints.

2.3 Construction Review

A number of Creepage and Clearance measurements were made on the charger units as detailed in table 2 and 3. Limits are based on IEC 60950-1 and assume a working voltage of 240Vrms, Overvoltage category II, pollution degree 2 and materials group IIIb.

Table 2: Clearance Measurements

Measurement	Measured Value (mm)	Minimum Acceptable Creepage
Across PCB isolation barrier	6.78	4
Across Fuse (internal to charger)	2.57	2
Between Live and Neutral on PCB (before fuse)	4.63	1.5

Table 3: Creepage Measurements

Measurement	Measured Value (mm)	Minimum Acceptable Creepage
Across PCB isolation barrier	6.78	4.8
Across Fuse (internal to charger)	2.57	2.4
Between Live and Neutral on PCB (before fuse)	4.63	2.4

The capacitor across the PCB isolation barrier was marked with a suitable rating, marked as a Y1 capacitor rated at 250V

The recess on the female pins of the IEC 60320-1 Type C7 mains connector (see photograph 6) was measured at 3.68mm which is within the specified range of 3.0-3.8mm.

The BS1363-1 mains plug was marked with the BSI Kitemark and displayed the BSI reference number KM/28235, the plug was fitted with a 3A BS1632 marked fuse.

The cable connecting the mains plug and the IEC 60320-1 Type C7 connector was marked with VDE and CCC logos.

The cable connecting the charger to the transport device connector was marked as a UL recognised component.

No circuit diagram was submitted to allow circuit analysis of the transport device which contains drive motors, control circuitry and the rechargeable battery pack.

3. CONCLUSION

The limited investigation conducted on the supplied samples did not highlight any non-conformities.

Due to the lack of applicable standards to products of this type, only a limited assessment/ investigation was made of the transport device in this submission.

4. PHOTOGRAPHS

1. Top view of transport device

2. Bottom view of transport device

4. PHOTOGRAPHS

3. Manufacturer and Model

4. Mains power charger rating plate

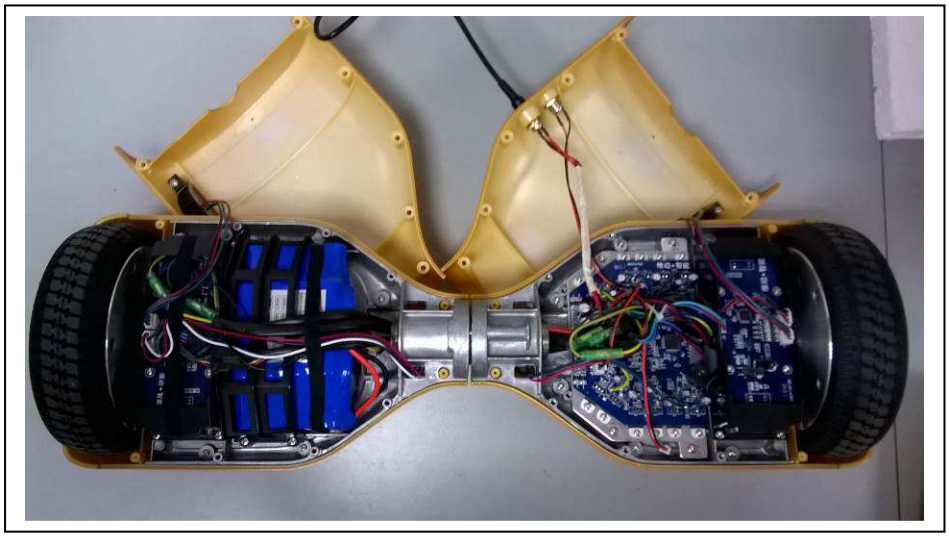
4. PHOTOGRAPHS

5. Mains plug with insulated earth pin

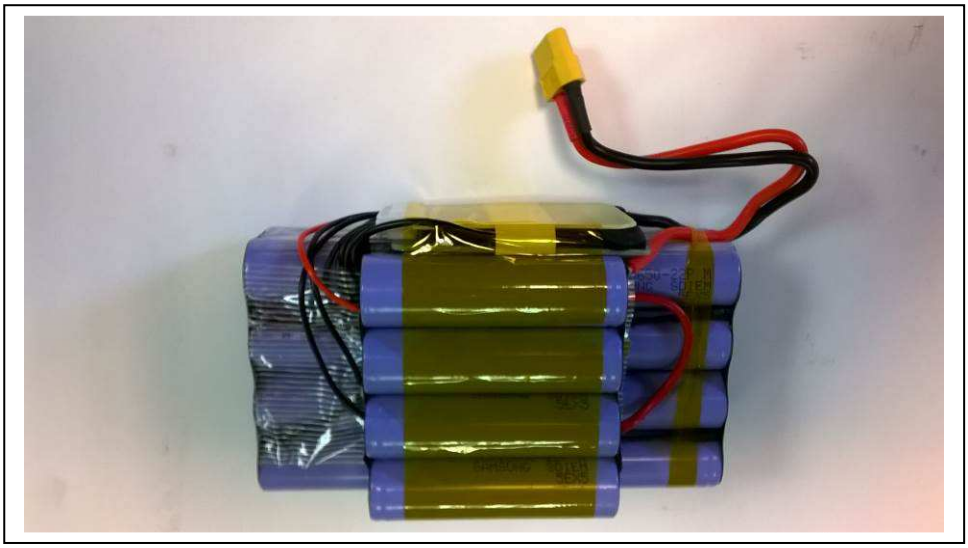
6. IEC 60320 mains connector

4. PHOTOGRAPHS

7. Internal view of transport device

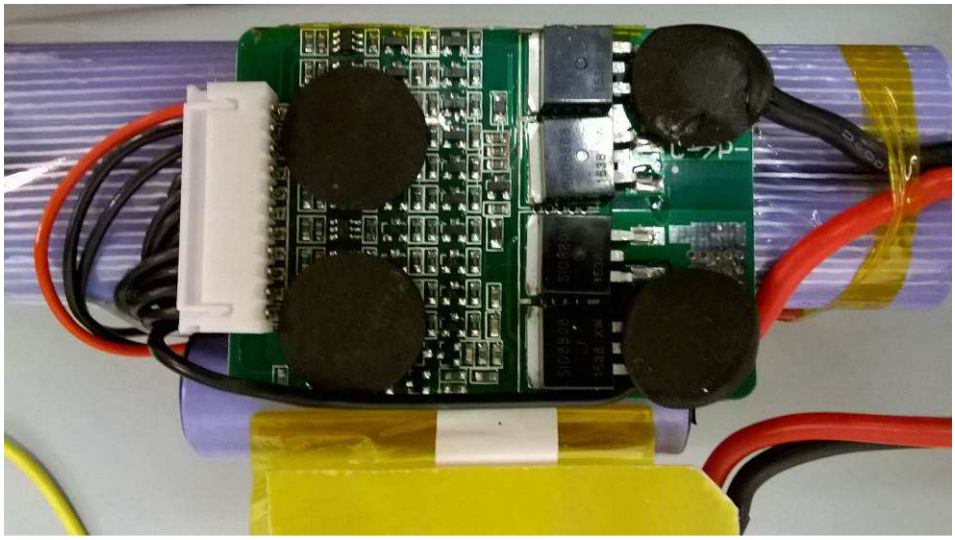


8. Internal view of battery pack

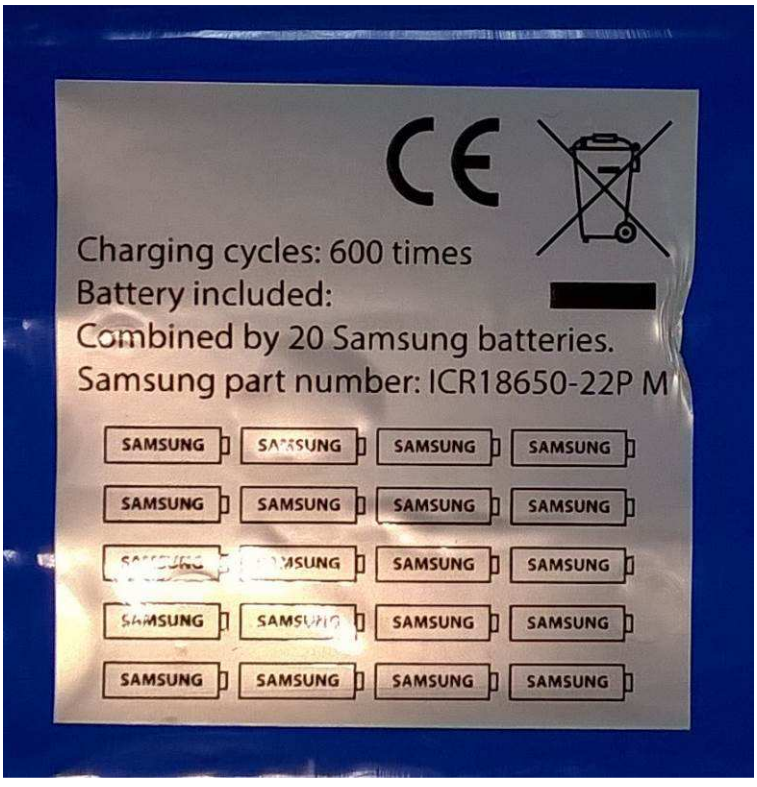


4. PHOTOGRAPHS

9. Battery pack protection circuit PCB



10. Battery pack label



4. PHOTOGRAPHS

11. Mains charger Y capacitor bridging reinforced insulation

End of Report