TEST REPORT

For Battery Management System (BMS)

according to IEC 62841-1 Annex K

Report Reference No. ..... :	SHES201102402303
Date of issue..... :	2021-12-24
Total number of pages	85 pages
Applicant's name..... :	Zhejiang YAT Electrical Appliance Co., Ltd
Address ..... :	No.150 Wenlong Road, Yuxin Town, Nanhu District, Jiaxing City, Zhejiang Province, China
Test specification:	
Standard..... :	IEC 62841-1:2014, COR1:2014 / Annex K
Test procedure ..... :	SGS–CSTC
Non-standard test method……:	N/A
Test Report Form No. ..... :	EEC_IEC 62841_1_Annex K B
Test Report Form(s) Originator ..... :	SGS-CSTC
Master TRF ..... :	2018-05
Test item description..... :	Rechargeable detachable Lithium-ion battery pack and chargers
Trade Mark ..... :	--
Manufacturer..... :	Same as applicant.
Model/Type reference ..... :	Battery pack 1: Z011060, Z011064, UB18VBP25, B25X2 Battery pack 2: Z011061, Z011065, UB18VBP50, B50X2 Battery pack 3: Z011069, B20X2 Battery pack 4: Z011070, B40X2 Charger 1: Z021046, CHX2 Charger 2: Z021045 **Charger 3: Z021060, CHQX2**

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Rating of Battery pack……..…..:	Battery Pack 1: Z011060, Z011064, UB18VBP25, B25X2 18 V ⎓ 2,5 Ah, 45 Wh. Battery Pack 2: Z011061, Z011065, UB18VBP50, B50X2 18 V ⎓ 5,0 Ah, 90 Wh. Battery pack 3: Z011069, B20X2 18 V ⎓ 2,0 Ah, 36 Wh. Battery pack 4: Z011070, B40X2 18 V ⎓ 4,0 Ah, 72 Wh.
Rating of charger…….…..:	Charger 1: Z021046, CHX2 Input: 100-240 V ~; 50/60 Hz; 50 W Output: 21 V d.c; 2 A; Charger 2: Z021045 Input: 100-240 V ~; 50/60 Hz; 100 W Output: 21 V d.c; 4 A; **Charger 3: Z021060, CHQX2** **Input: 100-240 V ~; 50/60 Hz; 100 W** **Output: 21 V d.c; 4 A;**

Testing procedure and testing location:			
☒	**Testing Laboratory:**	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.	
Testing location/ address ..... :		588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China	
☐	**Associated CB Testing Laboratory:**	N/A	
Testing location/ address ..... :			
Tested by (name + signature)..... :		Evan Hu	
Approved by (name + signature)..... :		Canna Bao	
☐	**Testing procedure: TMP/CTF Stage 1:**	N/A	
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Approved by (name + signature)..... :			
☐	**Testing procedure: WMT/CTF Stage 2:**	N/A	
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Witnessed by (name + signature)..... :			
Approved by (name + signature)..... :			
☐	**Testing procedure: SMT/CTF Stage 3 or 4:**	N/A	
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Witnessed by (name + signature)..... :			
Approved by (name + signature)..... :			
Supervised by (name + signature) ..... :			

List of Attachments (including a total number of pages in each attachment):

Attachment 1: Photo documentation……..…….28 pages

Summary of testing:

Tests performed (name of test and test clause):

IEC 62841-1:2014, COR1:2014 / Annex K

All the following partial tests are performed on the battery pack Z011060, Z011061 with charger Z021046 and Z021045.

1. K.8.3 Label check;
2. K.12.201 Normal charging of lithium-ion systems;
3. K.13.1, K.13.2 &K.13.2.201 Resistance to heat and fire;
4. K.18.1 a) electronic circuit-abnormal test;
5. K.18.201 Lithium-ion charging systems − abnormal conditions;
6. K.18.202 Lithium-ion battery short circuit
7. K.19.202 Lithium-ion enclosure pressure test
8. K.20.1, 20.2 and K.20.3.1 Mechanical strength
9. K.21.202, K21.203
10. K.23.201, K23.202
11. K.28.1 Creepage distance and clearance

Amendment 1 report (SHES201002402302):
All the following partial tests were performed on the battery pack Z011069, B20X2 and Z011070, B40X2 with Charger Z021045 and Z021046.

1. K.8.3 Label check;
2. K.12.201 Normal charging of lithium-ion systems;
3. K.18.1 a) electronic circuit-abnormal test;
4. K.18.201 Lithium-ion charging systems − abnormal conditions;
5. K.18.202 Lithium-ion battery short circuit
6. K.21.202, K21.203
7. K.23.201, K23.202

Amendment 2 report (SHES201002402303):
All the following partial tests were performed on the battery packs B20X2 and B40X2 with Charger Z021060.

1. K.12.201 Normal charging of lithium-ion systems;
2. K.18.1 a) electronic circuit-abnormal test;
3. K.18.201 Lithium-ion charging systems − abnormal conditions;
4. K.18.202 Lithium-ion battery short circuit
5. K.21.202, K21.203
6. K.23.201, K23.202

Testing location:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai China

Summary of compliance with National Differences:

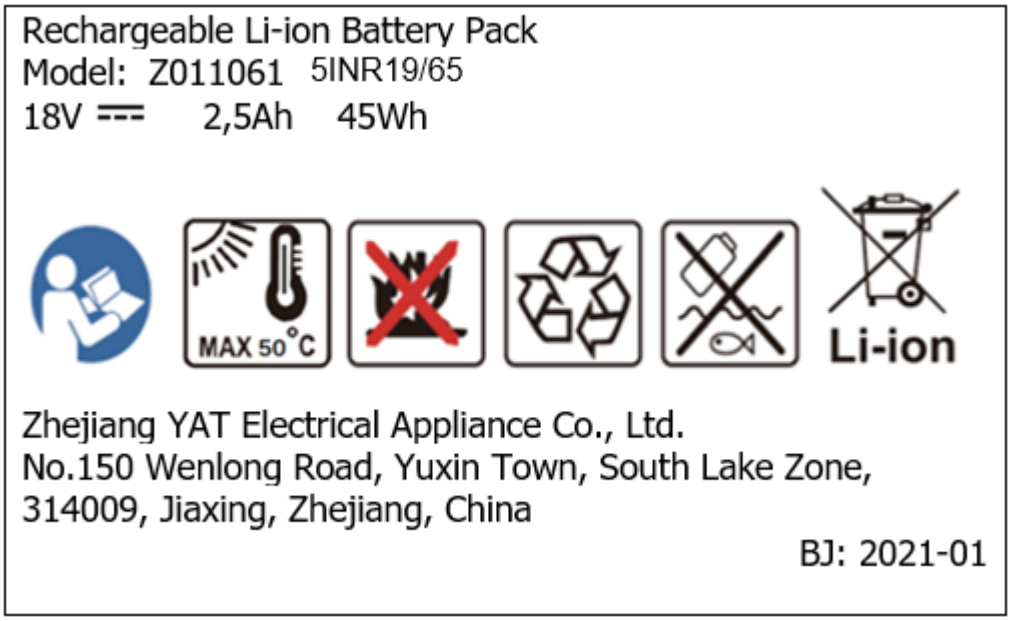
- EU Group differences

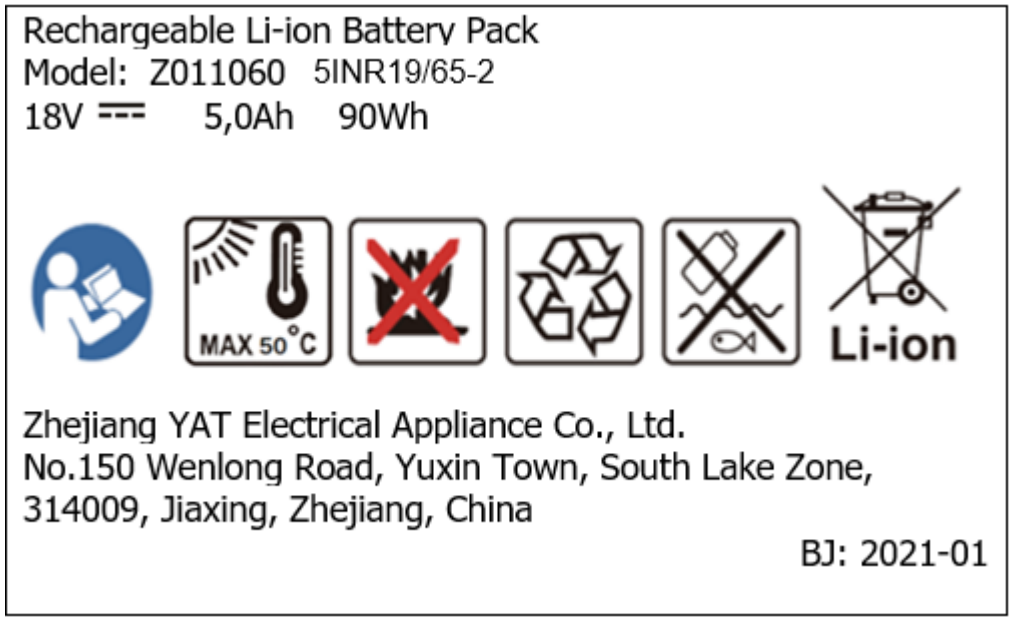
☒ **The product fulfills the requirements of EN 62841-1: 2015 +CRGD: 2015 / Annex K**

Copy of marking plate:

The artwork below may be only a draft.

For battery pack:





Rechargeable Li-ion Battery Pack

Model:Z011069

18V ⎓ 2.0Ah 36Wh 5INR19/66

Zhejiang YAT Electrical Appliance Co.,Ltd.

No. 150 Wenlong Road, Yuxin Town, Nanhu District, Jiaxing City, Zhejiang Province, China

BJ:2021-05-**

Rechargeable Li-ion Battery Pack

Model:Z011070

18V ⎓ 4.0Ah 72Wh 5INR19/66-2

Zhejiang YAT Electrical Appliance Co.,Ltd.

No. 150 Wenlong Road, Yuxin Town, Nanhu District, Jiaxing City, Zhejiang Province, China

BJ:2021-05-**

Note 1: The marking label of other models are in the same format except the model name or capacity.

Note 2 : As declared by the applicant, the importer (and manufacturer, if it is different)'s name, registered trade name or registered trademark and the postal address will be marked on the products before being place on the EU markets. The contact details shall be in a language easily understood by end-users and market surveillance authorities.

Test item particulars..... :	
Category of equipment..... :	**Battery pack / Charger combinations**
Protection Class of tool..... :	N/A
Method of supply cord attachment ..... :	N/A
Degree of protection..... :	IPX0
Accessories and detachable parts included..... :	N/A
Other options included..... :	N/A
Possible test case verdicts:	
- test case does not apply to the test object .....:	N/A or N (Not Applicable)
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2021-11-16
Date (s) of performance of tests.....:	2021-12-06 to 2021-12-14

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

This report is partial test report, which is only evaluated on battery pack and charger, not evaluated with end-product. This report is only intended used with safety report of end-product issued by SGS.

Manufacturer's Declaration:

The application for obtaining a Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:	☐ **Yes** ☒ **Not applicable**

When differences exist, they shall be identified in the General product information section.

Name and address of factory (ies) ..... :	**Battery charger:** Z021046, CHX2; Z021045; **Z021060, CHQX2** Zhejiang YAT Electrical Appliance Co., Ltd. No.150 Wenlong Road, Yuxin Town, Nanhu District, Jiaxing Zhejiang, China **Battery pack:** Z011060, Z011064, UB18VBP25, B25X2 Z011061, Z011065, UB18VBP50, B50X2 Z021069, B20X2 Z021070, B40X2 Zhejiang YAT Electrical Appliance Co., Ltd. No.150 Wenlong Road, Yuxin Town, Nanhu District, Jiaxing Zhejiang, China

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General product information:

This report is only for partial tests according to IEC/EN 62841-1 / Annex K to evaluate the compliance of BMS (battery management system), includes battery pack and charger.
Those are intended to use with electric motor-operated handheld tools, transportable tools and lawn garden machinery

Battery packs information:

Object/part No.	manufacturer/ trademark	type/model	technical data	Cell model	Manufacturer of cell
Battery pack 1	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011060, Z011064, UB18VBP25, B25X2	18V ⎓ 2,5Ah, 45Wh with 5 Li-ion cells (1P5S)	INR18650-25R++	SAMSUNG SDI CO LTD
				L1865-2.5	Union Lithplus Energy (Liaoning) Corp
Battery pack 2	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011061, Z011065, UB18VBP50, B50X2	18V ⎓ 5,0Ah, 90Wh with 10 Li-ion cells (2P5S)	INR18650-25R++	SAMSUNG SDI CO LTD
				L1865-2.5	Union Lithplus Energy (Liaoning) Corp
Battery pack 3	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011069, B20X2	18V ⎓ 2,0Ah, 36Wh with 5 Li-ion cells (1P5S)	INR18650-2000	JIANGSU SUNPOWER CO., LTD
Battery pack 4	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011070, B40X2	18V ⎓ 4,0Ah, 72Wh with 10 Li-ion cells (2P5S)	INR18650-2000	JIANGSU SUNPOWER CO., LTD

Battery pack:
All cells used in battery pack are in series as one group.
The manufacturer recommends the charging ambient temperature of battery pack shall be 0-50 °C in user manual.
The Battery packs B20X2 and Z011069 are identical with each other except the model name.
The Battery packs B40X2 and Z011070 are identical with each other except the model name.
The Battery pack Z021069 and B20X2 are electric identical with Z011060 except the capacity, cell or model name.
The Battery pack Z021070 and B40X2 are electric identical with Z011061 except the capacity, cell or model name.

Specification of the Cell 1

SAMSUNG SDI CO LTD	Cell 1
electrode system	Li Ni Co MnO2
Designation	INR18650-25R++
Rated capacity (mAh)	2500
Max. charge current (A)	4,0

Standard discharge current (A)	0,5
Nominal voltage (V)	3,7
Max. charge voltage (V)	4,2
Final discharge voltage (V)	2,5
Charging temperature upper limit (°C)	60
Charging temperature lower limit (°C)	0
Discharge temperature (°C)	-20~80

Specification of the Cell 2

Lithplus	Cell 2
electrode system	Li Ni Co MnO2
Designation	L1865-2.5
Rated capacity (mAh)	2500
Max. charge current (A)	4,0
Standard discharge current (A)	0,5
Nominal voltage (V)	3,6
Max. charge voltage (V)	4,25
Final discharge voltage (V)	2,5
Charging temperature upper limit (°C)	60
Charging temperature lower limit (°C)	0
Discharge temperature (°C)	-20~75

Specification of the Cell 3

SUNPOWER	Cell 3
electrode system	Li Ni Co MnO2
Designation	INR18650-2000
Rated capacity (mAh)	2000
Max. charge current (A)	**4,3**
Standard discharge current (A)	0,4
Nominal voltage (V)	3,7
Max. charge voltage (V)	4,25
Final discharge voltage (V)	2,75
Charging temperature upper limit (°C)	50

Charging temperature lower limit (°C)	0
Discharge temperature (°C)	-20~80

Charger information:

Object/part No.	manufacturer/ trademark	type/model	technical data	Standard	mark(s) of conformity
Battery Charger1	Zhejiang YAT Electrical Appliance Co., Ltd.	Z021046, CHX2	Input: 100-240 V ~; 50/60 Hz; 50W Output:21V d.c; 2 A;	EN 60335-1 EN 60335-2-29	SGS LVD SHES20120 2546601TLC
Battery Charger2	Zhejiang YAT Electrical Appliance Co., Ltd.	Z021045	Input: 100-240 V ~; 50/60 Hz; 100W Output:21V d.c; 4 A;	EN 60335-1 EN 60335-2-29	SGS LVD SHES19120 2813801TLC
Battery Charger 3	**Zhejiang YAT Electrical Appliance Co., Ltd.**	**Z021060, CHQX2**	**Input: 100-240 V ~; 50/60 Hz; 100 W Output: 21 Vd.c; 4 A;**	**EN 60335-1** **EN 60335-2-29**	**SGS LVD SHES21080 1559101TLC**

Note:

1. Chargers Z021046, CHX2 are identical with each other except with different model name.

2. Chargers Z021060, CHQX2 are identical with each other except with different model name.

List of charger system (battery pack and battery charger)

Battery pack / Charger	Z011060, Z011064, UB18VBP25, B25X2	Z011061, Z011065, UB18VBP50, B50X2	Z011069, B20X2	Z011070, B40X2
Z021046, CHX2	☒	☒	☒	☒
Z021045	☒	☒	☒	☒
Z021060, CHQX2	--	--	☒	☒
Remark:	☒ means in test report the above set of battery pack and charger are tested.			

Amendment 1 report (SHES201102402302):

This report was based on original report No. SHES201102402301: 2021-03-29 with additional modified on 2021-05-26 to include the following changes and/or additions:

1. Added new battery pack Z021069, B20X2 and Z021070, B40X2 which identical with each other except the capacity or model name.

2. Added new cell INR18650-2000 manufactured by JIANGSU SUNPOWER CO., LTD used for battery pack Z021069, B20X2 and Z021070, B40X2.

3. Added new Charger model CHX2 which is identical to Z021046 except the model name and with the same certificate.

4. Corrected the model number from INR18650-25++ to INR18650-25R++ and certificate number from DK-73004-UL to JPTUV-109241 of SAMSUNG Cell.

5. Updated the applicant address from “No.150 Wenlong Road, Yuxin Town, South Lake Zone, 314009, Jiaxing, Zhejiang, China” to “No.150 Wenlong Road, Yuxin Town, Nanhu District, Jiaxing City, Zhejiang Province, China”.

This report replaces the original report SHES201102402301.

Amendment 2 report (SHES201102402303):

This report was based on original report No. SHES201102402302: 2021-05-26 with additional modified on 2021-12-24 to include the following changes and/or additions:

1. Added new chargers Z021060, CHQX2 which identical with each other except the model name and tested only with battery packs Z011069, B20X2 and Z011070, B40X2.

2. Updated the component list table and photo attachment.

3. Modified the SUNPOWER cell maximum charge current from 4A to 4,3A according to the new cell specification provided by the customer.

This report replaces the original report SHES201102402302.

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX K	BATTERY TOOLS AND BATTERY PACKS		
K.1	Rated voltage for tools and battery packs ≤75 V d.c.	18V d.c Max	P

K.5.7	Tests to be done at rated voltage were done with a fully charged battery		P
K.5.201	Peak voltage of any superimposed ripple exceeding 10 % of the average value was included		P
K.5.202	Measurements of lithium-ion cell voltages were made using a filter as specified		P
K.5.203	Test area protected against fire and explosion, and well ventilated		P
K.5.204	Discharging and charging as specified		P
K.5.205	Thermocouples for lithium-ion cell temperature measurement located as specified		P
K.5.206	Currents measured during battery charging are average currents		P
K.5.207	Fully charged batteries used, after resting for ≥ 2 h but ≤ 6 h at an ambient temperature of (20 ± 5) °C	2h, 23°C	P
K.5.208	Battery consisting of a single cell not subject to special preparations of a cell in a series configuration		N/A
K.5.209	For series arrangement of parallel clusters of cells, the cluster is treated as single cell for specified tests		N/A
K.5.210	End-of-discharge voltages for common cell chemistries observed..... :	2,5V for SAMSUNG, Lithplus cell; 2,75V for SUNPOWER cell	P

K.8.3	Battery tools and detachable or separable battery packs marked with additional information	Detachable battery pack only	P
	- Business name and address of the manufacturer and, where applicable, its authorised representative ..... :	See copy of marking label	P
	- Designation of series or type..... :	See copy of marking label	P
	Battery tools also marked with additional information		
	- Year of manufacture ..... :	See copy of marking label	P

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- Designation of the tool..... :		N/A
	- identification for parts shipped separately for assembly by the end user		--
	Detachable or separable battery packs marked with additional information		P
	- capacity in Ah or mAh..... :	See copy of marking label	P
	- type of battery ..... :	See copy of marking label	P
	No misunderstanding by additional markings	See copy of marking label	P
	A detachable battery pack, a separable battery pack, or a battery-operated appliance provided with an integral battery shall be marked For use only with ____ charger, or the equivalent where the underlined space is completed with the manufacturer's name or trademark, catalog number, series identification, or the equivalent of the charger.		N/A
	Alternatively, the statement "See Instruction Manual for Additional Chargers," or the equivalent may be employed in addition to at least one charger referenced by catalog number.		N/A
K.12.1	Tool operated at no-load until maximum temperature reached or battery discharged..... :		N/A
	No operation of protective devices during heating test		N/A
	Temperature rises met values in Table 2		N/A
K.12.201	Charging of lithium-ion battery under normal conditions did not exceed specified operating region for charging of the cell	See appended Table K.12.201A	P
	Charging procedure as specified		P
	Voltage, temperature and charging current monitored for all individual cells		P
	Test repeated with imbalanced battery	See appended Table K.12.201B	P
K.13.1	Thermoplastic materials of relevant enclosure parts sufficiently resistant to heat		P
	Ball-pressure test of IEC 60695-10-2:2003	See appended Table 13.1	P
K.13.2	Glow-wire test applicable only to external enclosure enclosing the current-carrying parts		P

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Non-metallic parts in of detachable or separable battery pack supporting connections that carry ≥0,2 A during charging and those within a distance of 3 mm, subjected to the glow-wire test at 850 °C	See appended Table 13.2	P
K.13.2.201	Polymeric battery enclosure material around current-carrying parts at least classified V according to IEC 60695-11-10:2013, unless …		N/A
	… battery pack was tested to K.18.1 a).		P
K.18.1	Risk of fire or electric shock as a result of abnormal operation obviated as far as is practical		P
	No charring or burning of gauze or tissue paper resulted when battery tool and battery pack were subjected to any abnormal operations, tests a) to f)	Only test a) considered	P
	No explosion during or after the test		P
	Adequate protection against electric shock		N/A
	Component(s) or conductors(s) that interrupt or limit the discharge current that operated operate during the above tests a) to f) ..... :	When short the “+” and “-“ terminal of battery pack, the Intentionally weakness part (nickel sheet) operates to interrupt the discharge current.	P
	Test repeated two more times for devices relied upon to pass the test; devices opened the circuit in the same manner	Repeated two times	P
	Test repeated with the open-circuited device bridged		N/A
	Protective electronic circuits whose function is relied on to pass a test regarded as providing a SCF and comply with 18.8 with a PL = a		N/A
K.18.8	Li-ion charging systems are covered by K.18.201	Li-ion charging systems	N/A
K.18.201	Risk of fire and explosion as a result of abnormal operation during charging of a lithium-ion battery is obviated as far as is practical		P
	No charring or burning of gauze or tissue paper, no explosion resulted when battery tool and battery pack were subjected to any abnormal conditions a) to d)	See appended Table K.18.201	P
	The cells did not exceed the upper limit charging voltage by more than 150 mV unless…		P

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict
	…charging system permanently was disabled from recharging the battery		N/A
	No evident damage to the cell vent to impair compliance with Subclause K.21.202.		N/A
K.18.202	No risk of fire or explosion when main discharge connections of a series configured, integral Li-ion battery, detachable or separable Li-ion battery pack were shorted under extreme imbalance	See appended Table K.18.202	P
	All cells fully charged, one cell fully discharged		P
	Main discharge connections of the battery were shorted, resistance ≤10 mΩ		P
	No explosion during or after the test		P
	No charring or burning of the gauze or tissue paper		P
	Component(s) or conductors(s) that interrupt or limit the discharge current that operated operate during the above tests ..... :	When short the “+” and “-“ terminal of battery pack, the Intentionally weakness part (nickel sheet) operates to interrupt the discharge current.	P
	Test repeated two more times for devices relied upon to pass the test; devices opened the circuit in the same manner	Test repeated two more times	P
	Test repeated with the open-circuited device bridged		N/A
	Protective electronic circuits whose function is relied on to pass a test regarded as providing a SCF and comply with 18.8 with a PL = a		N/A
K.18.203	No risk of fire or explosion during abusive overcharging of batteries comprised of cells other than the Li-ion type	Li-ion type	N/A
	Battery was charged during 1,25 h at a rate of 10 times the C5 rate for the battery		N/A
	No explosion during or after the test		N/A
	No charring or burning of the gauze or tissue paper		N/A
K.19.202	Li-ion battery enclosure designed to safely release gases generated as a result of venting		N/A
	Total area of the openings in the enclosure allowing gases to pass without obstruction is ≥ 20 mm²; or…	80 mm²	P

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict
	… pressure drop within enclosure was tested, no rupture occurred		N/A
K.20.1	Battery tools and battery packs have adequate mechanical strength and withstand tests of 20.2 and K.20.3.1 or K.20.2 and	Only considered battery pack	P
	- did not catch fire or explode		P
	- met requirements of clauses K.9, K.19 and either K.18.1 (f) or K.28.1 after tests of 20.2 and 28.1		P
	Li-ion battery tools and battery packs, after the test of K.20.3.1 or K.20.3.2, - did not have an open circuit voltage below 90 % of the voltage measured immediately prior to the test		P
	- demonstrated normal discharging and recharging after the test		P
	- showed no damage to the cell vent impairing compliance with K.21.202		P
20.2	Three blows applied to every weak point of enclosure by spring-operated impact test apparatus in Clause 5 of IEC 60068-2-75:1997		P
	Brush cap impact energy (Nm)..... :	No Brush cap	
	Other part impact energy (Nm)..... :	1,0 Nm	
	Blows applied each point of the enclosure likely to be weak..... :	Enclosure of battery pack	P
	Blows applied to guards, covers, handles, levers, knobs and the like as necessary ..... :	Top cover of battery pack	P
K.20.3.1	Adequate mechanical strength after drop tests on a concrete surface from a height of 1 m	Tested on battery pack only	N/A
	Test repeated with the battery pack removed from the tool		N/A
	Test repeated on the battery pack by itself		P
	The test was repeated with each attachment or combination of attachments		N/A
K.21.202	Venting of lithium-ion cells, if relied on for safety, not adversely obstructed		P
K.21.203	Unsuitable connector types not used for user accessible interfaces between elements of a Li-ion battery system		P

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict
K.23.201	Battery cells comply with IEC 62133		P
K.23.202	Rechargeable battery cells not of lithium-metal type		N/A
K.28.1	Creepage distances and clearances not less than the values in millimetres shown in Table K.1..... :	See Table 28.1 Only battery pack considered	P
	Smaller clearance and creepage distances for parts of different polarity accepted, shorting of the two parts did not result in the tool starting		P
	For parts with a hazardous voltage between them, the sum total of the measured distances between each of these parts and their nearest accessible surface is not less than 1,5 mm clearance and 2,0 mm creepage (Fig. K.1) ..... :	No hazardous voltage	N/A
	Creepage distances and clearances measured as indicated in Annex A		P
	Distances through slots or openings in external parts of insulating material measured to metal foil in contact with the accessible surface		P
	Foil pushed into corners and the like by means of test probe B of IEC 61032:1997, except not pressed into openings		P
	The sum total of distances measured between parts operating at hazardous voltage and accessible surfaces determined by measuring the distance from each part to the accessible surface		N/A
	Distances added together to determine the sum total (see Figure K.1)		N/A
	One of the distances was 1,0 mm or greater (see Annex A, cases 1 to 10)		N/A
	Force applied by means of test probe B of IEC 61032:1997 at the following values:		P
	– 2 N for bare conductors		P
	– 30 N for enclosures		P
	Means provided for securing the tool to a support considered to be accessible		N/A

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: List of Critical Components					P
Object/ Part No.	Manufacturer/ Trademark	Type/Model	Technical data	Standard	Mark(s) of conformity
Enclosure	KINGFA SCI & TECH CO LTD	PA6-GF15/TPE	2,0mm thickness min	IEC/EN 62841-1 Annex K	Tested with appliance
Alternative	Nanjing Lihua Engineering Plastics Co., Ltd.	B9706UL/TPE	2,0mm thickness min	IEC/EN 62841-1 Annex K	Tested with appliance
Battery pack 1	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011060, Z011064, UB18VBP25, B25X2	18V ⎓ 2,5Ah, 45Wh with 5 Li-ion cells (1P5S)	IEC/EN 62841-1 Annex K	Tested with appliance
Battery pack 2	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011061, Z011065, UB18VBP50, B50X2	18V ⎓ 5,0Ah, 90Wh with 10 Li-ion cells (2P5S)	IEC/EN 62841-1 Annex K	Tested with appliance
Battery pack 3	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011069, B20X2	18V ⎓ 2,0Ah, 36Wh With 5 Li-ion cells (1P5S)	IEC/EN 62841-1 Annex K	Tested with appliance
Battery pack 4	Zhejiang YAT Electrical Appliance Co., Ltd.	Z011070, B40X2	18V ⎓ 4,0Ah, 72Wh with 10 Li-ion cells (2P5S)	IEC/EN 62841-1 Annex K	Tested with appliance
Cell 1	SAMSUNG SDI Co., Ltd.	INR18650-25R++	3,7 V dc 2500mAh	IEC 62133-2-2017	CB/ JPTUV-109241
Cell 2	Union Lithplus Energy (Liaoning) Corp	L1865-2.5	3,6V DC, 2,5Ah	IEC 62133-2-2017	DK-98226-UL
Cell 3	JIANGSU SUNPOWER CO., LTD	INR18650-2000	3,7V DC, 2Ah	IEC 62133-2: 2017	JPTUV-093800-M1
PCB material in battery pack	Wujiang Dongfeng Electronics Co., Ltd.	DF-2H	V-0,130°C, Thickness min: 1,6mm	IEC/EN 62841-1 Annex K	Tested with appliance (E199900)

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

Alternative	Zhejiang Junhao Technology Co., Ltd.	XMZ-1	V-0,130°C, Thickness min: 1.6mm	IEC/EN 62841-1 Annex K	Tested with appliance (E250425)
Alternative	Suzhou Circuit Electronic Co., Ltd.	HLH-2	V-0,130°C, Thickness min: 1.6mm	IEC/EN 62841-1 Annex K	Tested with appliance (E214229)
Alternative	Anhui Wende Electronic Technology Co., Ltd.	WB-200000 WD100000	V-0,130°C, Thickness min: 1.6mm	IEC/EN 62841-1 Annex K	Tested with appliance (E473802)
Alternative	Zhejiang Zapon Electronic Technology Co., Ltd.	Z-M	V-0,130°C, Thickness min: 1.6mm	IEC/EN 62841-1 Annex K	Tested with appliance (E253641)
Alternative	Guangde Tongling Electronic Co., Ltd.	TL-02/TL-03/TL-05	V-0,130°C, Thickness min: 1.6mm	IEC/EN 62841-1 Annex K	Tested with appliance (E306350)
Alternative	**NANJING GUOYANG ELECTRONIC CO LTD**	**GY-D GY-M**	**V-0,130°C, Thickness min: 1.6mm**	**IEC/EN 62841-1 Annex K**	**Tested with appliance (E473760)**
NTC	Nanjing Shagon Electronics Co.,Ltd.	MF59B 103F3 950FB	10K±1% ohm at 25°C ambient, β=3950	IEC/EN 62841-1 Annex K	Tested with appliance
Alternative	Nanjing Shiheng Electronics Co.,Ltd.	MF52B 103F3 950	10K±1% ohm at 25°C ambient, β=3950	IEC/EN 62841-1 Annex K	Tested with appliance
Alternative	JUNGLE TECHNO LGY GROUP(HK)LIMITED	MF52B103F3 950	10K±1% ohm at 25°C ambient, β=3950	IEC/EN 62841-1 Annex K	Tested with appliance
PCB (Design circuit)	Zhejiang YAT Electrical Appliance Co., Ltd.	--	--	IEC/EN 62841-1 Annex K	Tested with appliance
Battery Charger 1	Zhejiang YAT Electrical Appliance Co., Ltd.	Z021046, CHX2	Input: 100-240 V ~; 50/60 Hz; 50W Output:21V d.c; 2 A;	EN 60335-1 EN 60335-2-29	SGS LVD SHES20120 2546601TLC
Battery	Zhejiang YAT Electrical Appliance	Z021045	Input: 100-240 V ~;	EN 60335-1	SGS LVD

IEC 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

Charger 2	Co., Ltd.		50/60 Hz; 100W Output:21V d.c; 4 A;	EN 60335-2-29	SHES19120 2813801TLC
Battery Charger 3	**Zhejiang YAT Electrical Appliance Co., Ltd.**	**Z021060, CHQX2**	**Input: 100-240 V ~; 50/60 Hz; 100 W Output: 21 Vd.c; 4 A;**	**EN 60335-1** **EN 60335-2-29**	**SGS LVD SHES21080 1559101TLC**

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,18	4,18	4,17	4,18	4,18	4,2
Maximum charging Current (A)	1,99	1,99	1,99	1,99	1,99	4,0
Maximum charging Temperature (°C)	26,7	26,5	26,4	26,6	26,4	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 1,99 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,24	3,79	3,80	3,80	3,80	4,2
Maximum charging Current (A)	1,99	1,99	1,99	1,99	1,99	4,0
Maximum charging Temperature (°C)	25,1	24,7	24,6	24,8	24,7	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

Note: current of each cell is 1,99 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,19	4,18	4,18	4,18	4,18	4,25
Maximum charging Current (A)	1,95	1,95	1,95	1,95	1,95	4,0
Maximum charging Temperature (°C)	26,9	26,4	26,6	26,2	26,7	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 1,95 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,22	3,80	3,81	3,81	3,82	4,25
Maximum charging Current (A)	1,94	1,94	1,94	1,94	1,94	4,0
Maximum charging Temperature (°C)	25,4	24,9	25,1	25,0	25,1	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 1,94 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,18	4,18	4,17	4,18	4,17	4,2
Maximum charging Current (A)	1,95	1,95	1,95	1,95	1,95	4,0*2
Maximum charging Temperature (°C)	23,5	23,4	23,2	23,2	24,2	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 0,975 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,21	3,79	3,79	3,79	3,79	4,2
Maximum charging Current (A)	1,96	1,96	1,96	1,96	1,96	4,0*2
Maximum charging Temperature (°C)	22,4	21,8	21,9	22,8	22,0	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

Note: current of each cell is 0,975 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,18	4,18	4,18	4,18	4,18	4,25
Maximum charging Current (A)	1,94	1,94	1,94	1,94	1,94	4,0*2
Maximum charging Temperature (°C)	23,2	23,1	23,0	23,4	23,2	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 0,97 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,22	3,80	3,79	3,81	3,81	4,25
Maximum charging Current (A)	1,95	1,95	1,95	1,95	1,95	4,0*2
Maximum charging Temperature (°C)	22,6	22,2	22,1	22,3	22,2	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 0,975 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,18	4,18	4,17	4,18	4,17	4,2
Maximum charging Current (A)	3,99	3,99	3,99	3,99	3,99	4,0
Maximum charging Temperature (°C)	40,4	40,8	41,0	40,9	41,1	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 3,99 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,19	3,84	3,84	3,83	3,84	4,2
Maximum charging Current (A)	3,99	3,99	3,99	3,99	3,99	4,0
Maximum charging Temperature (°C)	38,2	37,8	37,6	37,7	37,8	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 3,99 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,19	4,19	4,19	4,19	4,19	4,25
Maximum charging Current (A)	3,99	3,99	3,99	3,99	3,99	4,0
Maximum charging Temperature (°C)	41,1	40,8	40,9	41,2	41,1	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 3,99 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,19	3,79	3,79	3,79	3,79	4,25
Maximum charging Current (A)	3,99	3,99	3,99	3,99	3,99	4,0
Maximum charging Temperature (°C)	37,4	36,7	36,8	36,9	36,6	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 3,99 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011060 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged Battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,19	4,17	4,17	4,17	4,18	4,2
Maximum charging Current (A)	4,0	4,0	4,0	4,0	4,0	4,0*2
Maximum charging Temperature (°C)	30,6	30,5	30,2	30,4	30,5	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 2,0 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,21	3,83	3,83	3,84	3,83	4,2
Maximum charging Current (A)	4,0	4,0	4,0	4,0	4,0	4,0*2
Maximum charging Temperature (°C)	34,6	34,2	34,4	34,5	34,7	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

Note: current of each cell is 2,0 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With SAMSUNG 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,2
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,17	4,17	4,17	4,17	4,17	4,25
Maximum charging Current (A)	4,0	4,0	4,0	4,0	4,0	4,0*2
Maximum charging Temperature (°C)	30,8	30,8	30,8	30,8	30,8	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 2,0 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,23	3,82	3,82	3,82	3,82	4,25
Maximum charging Current (A)	4,0	4,0	4,0	4,0	4,0	4,0*2
Maximum charging Temperature (°C)	34,9	35,1	34,8	35,0	35,2	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 2,0 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011061 (With Lithplus 2,5Ah Cell)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	4,0*2
Maximum charging Temperature (°C)	--	--	--	--	--	60

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,18	4,18	4,18	4,17	4,18	4,25
Maximum charging Current (A)	1,899	1,899	1,899	1,899	1,899	**4,3**
Maximum charging Temperature (°C)	26,3	25,6	25,4	25,6	25,5	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 1,899 A

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,23	3,79	3,79	3,80	3,80	4,25
Maximum charging Current (A)	1,901	1,901	1,901	1,901	1,901	**4,3**
Maximum charging Temperature (°C)	22,8	22,2	22,1	22,3	22,0	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the

full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 1,901 A

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)			20 °C			—
Temperature of tool operated (°C)			--			
Battery charger with battery pack			Battery charger: Z021045 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)			
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,18	4,19	4,17	4,19	4,19	4,25
Maximum charging Current (A)	3,779	3,779	3,779	3,779	3,779	**4,3**
Maximum charging Temperature (°C)	39,7	39,5	39,4	39,6	39,8	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 3,779 A

K12.201B	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)			20 °C			—
Temperature of tool operated (°C)			--			
Battery charger with battery pack			Battery charger: Z021045 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)			
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,19	3,80	3,80	3,80	3,80	4,25

Maximum charging Current (A)	3,802	3,802	3,802	3,802	3,802	**4,3**
Maximum charging Temperature (°C)	37,2	36,4	36,2	36,5	36,3	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

Note: current of each cell is 3,802 A

K12.201A	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)	-5 °C					—
Temperature of tool operated (°C)	--					
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)					

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)	-5 °C					—
Temperature of tool operated (°C)	--					
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)					

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell

Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)	55 °C					—
Temperature of tool operated (°C)	--					
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)					
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)	55 °C					—
Temperature of tool operated (°C)	--					
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011069, B20X2 (with SUNPOWER 2,0 Ah battery)					
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating

						region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)			20 °C			—
Temperature of tool operated (°C)			--			
Battery charger with battery pack			Battery charger: Z021046 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)			
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,22	4,21	4,21	4,22	4,22	4,25
Maximum charging Current (A)	1,895	1,895	1,895	1,895	1,895	**4,3**
Maximum charging Temperature (°C)	23,3	23,5	23,4	23,2	23,4	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

Note: current of each cell is 0,948 A

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	

Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,21	3,79	3,79	3,79	3,79	4,25
Maximum charging Current (A)	1,908	1,908	1,908	1,908	1,908	**4,3*2**
Maximum charging Temperature (°C)	22,7	22,0	21,8	22,1	21,9	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.

Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

Note: current of each cell is 0,954 A

K12.201A	**TABLE: Normal charging of Lithium-ion systems**		P
Ambient temperature (°C)	-5 °C		—
Temperature of tool operated (°C)	--		
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)		

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P

Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021046 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.

Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A

*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	TABLE: Normal charging of Lithium-ion systems	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,16	4,16	4,16	4,16	4,16	4,25
Maximum charging Current (A)	3,772	3,772	3,772	3,772	3,772	**4,3*2**
Maximum charging Temperature (°C)	24,4	24,2	24,1	24,5	24,3	50

Supplementary Information: (until returns to within 5K of the ambient temperature) Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A Note: current of each cell is 1,886 A

K12.201B	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)		20 °C				—
Temperature of tool operated (°C)		--				
Battery charger with battery pack		Battery charger: Z021045 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)				
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,24	3,87	3,87	3,87	3,87	4,25
Maximum charging Current (A)	3,781	3,781	3,781	3,781	3,781	**4,3*2**
Maximum charging Temperature (°C)	34,2	33,2	33,1	33,4	33,3	50

Supplementary Information: (until returns to within 5K of the ambient temperature) Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge. Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A Note: current of each cell is 1,891 A

K12.201A	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)		-5 °C				—
Temperature of tool operated (°C)		--				
Battery charger with battery pack		Battery charger: Z021045 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)				
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**

Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25

Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021045 Battery pack: Z011070, B40X2 (with SUNPOWER 4,0 Ah battery)	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B20X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell

Maximum charging voltage (V)	4,17	4,16	4,18	4,17	4,16	4,25
Maximum charging Current (A)	4,131	4,131	4,131	4,131	4,131	**4,3**
Maximum charging Temperature (°C)	32,0	32,5	32,8	32,6	31,9	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 4,131 A

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B20X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,20	3,79	3,79	3,78	3,78	4,25
Maximum charging Current (A)	4,135	4,135	4,135	4,135	4,135	**4,3**
Maximum charging Temperature (°C)	34,2	32,8	32,9	33,4	32,1	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 4,135 A

K12.201A	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B20X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging

						of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)	-5 °C					—
Temperature of tool operated (°C)	--					
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B20X2					
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	**TABLE: Normal charging of Lithium-ion systems**					P
Ambient temperature (°C)	55 °C					—
Temperature of tool operated (°C)	--					
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B20X2					
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging

						of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B20X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201A	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B40X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging

						of cell
Maximum charging voltage (V)	4,17	4,16	4,16	4,18	4,18	4,25
Maximum charging Current (A)	4,145	4,145	4,145	4,145	4,145	**4,3*2**
Maximum charging Temperature (°C)	33,1	33,8	33,6	33,7	33,0	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 2,073 A

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	20 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B40X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	4,21	3,85	3,86	3,87	3,86	4,25
Maximum charging Current (A)	4,152	4,152	4,152	4,152	4,152	**4,3*2**
Maximum charging Temperature (°C)	35,6	33,3	33,6	33,9	33,0	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
Note: current of each cell is 2,076 A

K12.201A	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B40X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	-5 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B40X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At low temperature -5°C, the battery can't charge, no measured value.

K12.201A	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B40X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K12.201B	**TABLE: Normal charging of Lithium-ion systems**	P
Ambient temperature (°C)	55 °C	—
Temperature of tool operated (°C)	--	
Battery charger with battery pack	Battery charger: Z021060 Battery pack: B40X2	

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Specified operating region for charging of cell
Maximum charging voltage (V)	--	--	--	--	--	4,25
Maximum charging Current (A)	--	--	--	--	--	**4,3*2**
Maximum charging Temperature (°C)	--	--	--	--	--	50

Supplementary Information: (until returns to within 5K of the ambient temperature)

Set cell 1 imbalance (50%) was introduced into the fully discharged battery by charging cell 1 to 50% of the full charge.
Status of overload protector at end of test [x] No change [ ] Opened during the Test [ ] N/A
*: At high temperature 55°C, the battery can't charge, no measured value

K13.1	TABLE: Ball pressure test of thermoplastics			P
Ambient temperature (°C)	20			—
Allowed impression diameter (mm)	2,0			
Object/part No.	**Material**	**Manufacturer/ trademark**	**Test temperature (°C)**	**impression diameter (mm)**
Battery pack (terminal port)	--	--	75	1,2
Battery pack (enclosure)	PA6-GF15	KINGFA SCI & TECH CO LTD	75	1,3
Supplementary Information: None				

K13.2	TABLE: Glow wire test					P
Object/part No.	**Material**	**Manufacturer/ trademark**	**Test temperature (°C)**	**Material ignited, Yes/No**	**Layer under test sample ignited, Yes/No**	**Verdict**
Battery pack (terminal port)	--	--	850	No	No	P
Battery pack (enclosure)	PA6-GF15	KINGFA SCI & TECH CO LTD	850	No	No	P
Supplementary Information: None						

K.18.1	TABLE: Battery Tool Abnormal Operation			P
Abnormal conditions	Explosion occurred?	Charring or burning of test materials?	Protector Operated?	Test repeated 3 more times?
a) Terminals of detachable battery pack with exposed terminals shorted	No	No	When short the "+" and "-" terminal of battery pack, the Intentionally weakness part operation to interrupt the discharge current.	Yes
b) Motor terminals shorted	-	-	-	-
c) Motor rotor locked	-	-	-	-
d) Cord between battery tool and separable battery pack shorted	-	-	-	-
e) Cord provided the tool and the charger shorted	-	-	-	-
f) Any two uninsulated parts of opposite polarity in battery tools shorted	-	-	-	-
Supplementary Information: only considering the detachable battery pack exposed terminals shorted				

18.8.1 R	TABLE: Performance levels of Safety Critical Functions			N/A
Type and purpose of SCF	Min. PL determined based on:[1,2]	Min. PL	Actual PL	
Supplementary Information: [1] Relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 or; if no such part existent, ISO 13849-1 using Annex E as a guide [2] For safety critical functions not listed in Table 4 of IEC 62841-1 and provided by electronic circuits, PL values were determined using the methods of ISO 13849-1. --For above SCF, MTTFd more than 5 years after evaluation.				

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021046 Batter pack: Z011060 (SAMSUNG 2,5Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q8 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger; Remark 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021045 Batter pack: Z011060 (SAMSUNG 2,5Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger; Remark 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021046 Batter pack: Z011060 (Lithplus 2,5Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q8 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger; Remark 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021045 Batter pack: Z011060 (Lithplus 2,5Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger; Remark 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation	P
Ambient temperature (°C) ..... :	20,0	—
Battery charger with battery pack	Battery charger: Z021046 Batter pack: Z011061 (SAMSUNG 2,5Ah)	
Components in the charging system faulted as in 18.6.1 b) to f)	See below	

Component	Fault condition	Test duration	Explosion occurred?	Charring or burning of test materials ?	Upper limit charging voltage not exceeded by > 150 mV?[1)]	Charging system permanently disabled? [2)]	Cell vent damaged?
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q8 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No

Supplementary Information: This table is only considered the abnormal of electronic components in the charger;

Remark 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021045 Batter pack: Z011061 (SAMSUNG 2,5Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger; Remark 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021046 Batter pack: Z011061 (Lithplus 2,5Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q8 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger; Remark 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation	P
Ambient temperature (°C) ..... :	20,0	—
Battery charger with battery pack	Battery charger: Z021045 Batter pack: Z011061 (Lithplus 2,5Ah)	
Components in the charging system faulted as in 18.6.1 b) to f)	See below	

Component	Fault condition	Test duration	Explosion occurred?	Charring or burning of test materials ?	Upper limit charging voltage not exceeded by > 150 mV?[1)]	Charging system permanently disabled? [2)]	Cell vent damaged?
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No

Supplementary Information: This table is only considered the abnormal of electronic components in the charger;

Remark 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation	P
Ambient temperature (°C) ..... :	20,0	—
Battery charger with battery pack	Battery charger: Z021045 Batter pack: Z011069, B20X2 (SUNPOWER 2,0Ah)	
Components in the charging system faulted as in 18.6.1 b) to f)	See below	

Component	Fault condition	Test duration	Explosion occurred?	Charring or burning of test materials ?	Upper limit charging voltage not exceeded by > 150 mV?[1)]	Charging system permanently disabled? [2)]	Cell vent damaged?
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No

Supplementary Information: This table is only considered the abnormal of electronic components in the charger;

Remark 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021045 Batter pack: Z011070, B40X2 (SUNPOWER 4,0Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger;							

Remark 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			Battery charger: Z021046 Batter pack: Z011069, B20X2 (SUNPOWER 2,0Ah)				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q8 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the							

charger;
Remark 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation	P
Ambient temperature (°C) ..... :	20,0	—
Battery charger with battery pack	Battery charger: Z021046 Batter pack: Z011070, B40X2 (SUNPOWER 4,0Ah)	
Components in the charging system faulted as in 18.6.1 b) to f)	See below	

Component	Fault condition	Test duration	Explosion occurred?	Charring or burning of test materials ?	Upper limit charging voltage not exceeded by > 150 mV?[1)]	Charging system permanently disabled? [2)]	Cell vent damaged?
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q6 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q8 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No

Supplementary Information: This table is only considered the abnormal of electronic components in the charger;

Remark 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201a	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			**Battery charger: Z021060** Battery pack: B20X2				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No
U2 (In battery)	SC Pin 10/11		No	No	Yes	N/A	No
	OC Pin 11		No	No	Yes	N/A	No
Q3 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q2 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No

Q1 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q4 (In Charger)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U3 (In Charger)	SC Pin7/8		No	No	Yes	N/A	No
	OC Pin7		No	No	Yes	N/A	No
Supplementary Information: This table is only considered the abnormal of electronic components in the charger; Remark 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201a	**TABLE: Lithium-ion charging systems – Abnormal Operation**						P
Ambient temperature (°C) ..... :			20,0				—
Battery charger with battery pack			**Battery charger: Z021060** Battery pack: B40X2				
Components in the charging system faulted as in 18.6.1 b) to f)			See below				
Component	**Fault condition**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials ?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Q10 (In battery)	SC	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q12 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q11 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q13 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q7 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
Q9 (In battery)	SC		No	No	Yes	N/A	No
	OC		No	No	Yes	N/A	No
U1 (In battery)	SC Pin 7/8		No	No	Yes	N/A	No
	OC Pin 8		No	No	Yes	N/A	No

U2 (In battery)	SC Pin 10/11	No	No	Yes	N/A	No	
	OC Pin 11	No	No	Yes	N/A	No	
Q3 (In Charger)	SC	No	No	Yes	N/A	No	
	OC	No	No	Yes	N/A	No	
Q2 (In Charger)	SC	No	No	Yes	N/A	No	
	OC	No	No	Yes	N/A	No	
Q1 (In Charger)	SC	No	No	Yes	N/A	No	
	OC	No	No	Yes	N/A	No	
Q4 (In Charger)	SC	No	No	Yes	N/A	No	
	OC	No	No	Yes	N/A	No	
U3 (In Charger)	SC Pin7/8	No	No	Yes	N/A	No	
	OC Pin7	No	No	Yes	N/A	No	

Supplementary Information: This table is only considered the abnormal of electronic components in the charger;

Remark 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201b	**TABLE: Lithium-ion charging systems – Abnormal Operation**						N/A
Ambient temperature (°C) ..... :							—
Charge a fully discharge battery pack with one cell 50% charged				K.12.201 had performed the imbalance with a fully discharged battery by charging one cell to approximately 50% of full charge			
Battery charger	**Battery pack**	**Test duration**	**Explosion occurred ?**	**Charring or burning of test materials?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**

Supplementary Information: K.12.201 had performed the imbalance with a fully discharged battery by charging one cell to approximately 50% of full charge

One of conditions 1) or 2) is sufficient to achieve compliance with this subclause.

K18.201c	TABLE: Lithium-ion charging systems – Abnormal Operation						P
Ambient temperature (°C) ..... :			20				—
Charge a battery pack with all cells 50% charged, one cell shorted			Short circuit cell no. 1				
Battery charger	**Batter pack**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Z021046	Z011060 (SAMSUNG 2,5Ah Cell)	Until returns to within 5K of the ambient temperature	No	No	Yes	N/A	No
Z021046	Z011061 (SAMSUNG 2,5Ah Cell)		No	No	Yes	N/A	No
Z021046	Z011060 (Lithplus 2,5Ah Cell)		No	No	Yes	N/A	No
Z021046	Z011061 (Lithplus 2,5Ah Cell)		No	No	Yes	N/A	No
Z021045	Z011060 (SAMSUNG 2,5Ah Cell)		No	No	Yes	N/A	No
Z021045	Z011061 (SAMSUNG 2,5Ah Cell)		No	No	Yes	N/A	No
Z021045	Z011060 (Lithplus 2,5Ah Cell)		No	No	Yes	N/A	No
Z021045	Z011061 (Lithplus 2,5Ah Cell)		No	No	Yes	N/A	No
Z021045	Z011069, B20X2 (SUNPOWER 2,0Ah)		No	No	Yes	N/A	No
Z021045	Z011070, B40X2 (SUNPOWER 4,0Ah)		No	No	Yes	N/A	No
Z021046	Z011069, B20X2 (SUNPOWER 2,0Ah)		No	No	Yes	N/A	No
Z021046	Z011070, B40X2 (SUNPOWER 4,0Ah)		No	No	Yes	N/A	No
Z021060	Z011069, B20X2 (SUNPOWER 2,0Ah)		No	No	Yes	N/A	No
Z021060	Z011070, B40X2 (SUNPOWER 4,0Ah)		No	No	Yes	N/A	No
Supplementary Information: One of conditions 1) or 2) is sufficient to achieve compliance with this subclause.							

K18.201d	TABLE: Lithium-ion charging systems – Abnormal Operation							P
Ambient temperature (°C) ..... :			20					—
Short across a component or between adjacent PCB tracks								
Battery charger	**Fully charged battery pack**	**Component or position shorted**	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials?**	**Upper limit charging voltage not exceeded by > 150 mV?[1)]**	**Charging system permanently disabled? [2)]**	**Cell vent damaged?**
Z021046	Z011060 (SAMSUNG 2,5Ah Cell)	D3 (battery)	Temperature of the samples return to 5K of the ambient temperature	No	No	Yes	N/A	No
Z021046	Z011061 (SAMSUNG 2,5Ah Cell)	D3 (battery)		No	No	Yes	N/A	No
Z021046	Z011060 (Lithplus 2,5Ah Cell)	D3 (battery)		No	No	Yes	N/A	No
Z021046	Z011061 (Lithplus 2,5Ah Cell)	D3 (battery)		No	No	Yes	N/A	No
Z021045	Z011060 (SAMSUNG 2,5Ah Cell)	D3 (battery)		No	No	Yes	N/A	No
Z021045	Z011061 (SAMSUNG 2,5Ah Cell)	D3 (battery)		No	No	Yes	N/A	No
Z021045	Z011060 (Lithplus 2,5Ah Cell)	D3 (battery)		No	No	Yes	N/A	No
Z021045	Z011061 (Lithplus 2,5Ah Cell)	D3 (battery)		No	No	Yes	N/A	No
Z021045	Z011069, B20X2 (SUNPOWER 2,0Ah)	D3 (battery)		No	No	Yes	N/A	No
Z021045	Z011070, B40X2 (SUNPOWER 4,0Ah)	D3 (battery)		No	No	Yes	N/A	No
Z021046	Z011069, B20X2 (SUNPOWER 2,0Ah)	D3 (battery)		No	No	Yes	N/A	No
Z021046	Z011070, B40X2 (SUNPOWER 4,0Ah)	D3 (battery)		No	No	Yes	N/A	No
Z021060	Z011069, B20X2 (SUNPOWER 2,0Ah)	D3 (battery)		No	No	Yes	N/A	No
Z021060	Z011070, B40X2 (SUNPOWER 4,0Ah)	D3 (battery)		No	No	Yes	N/A	No

Supplementary Information:
One of conditions 1) or 2) is sufficient to achieve compliance with this subclause.

K18.202	TABLE: Lithium-ion battery short circuit					P
Ambient temperature (°C) ..... :		20				—
Fully charged batter pack with one cell full discharged						
Batter pack	**Test duration**	**Explosion occurred?**	**Charring or burning of test materials?**	**Any component interrupts the discharge current?**	**Protective electronic circuit operated and PL= a?**	**Cell vent damaged?**
Z011060 (SAMSUNG 2,5Ah Cell)	Temperature of the samples returns to within 5K of the ambient temperature	No	No	Y	N/A	No
Z011061 (SAMSUNG 2,5Ah Cell)		No	No	Y	N/A	No
Z011060 (Lithplus 2,5Ah Cell)		No	No	Y	N/A	No
Z011061 (Lithplus 2,5Ah Cell)		No	No	Y	N/A	No
Z011069, B20X2 (SUNPOWER 2,0Ah)		No	No	Y	N/A	No
Z011070, B40X2 (SUNPOWER 4,0Ah)		No	No	Y	N/A	No
Supplementary Information: Note: all tests were repeated two times						

***** End of the Main Report *****

Details of: Charger Z021046

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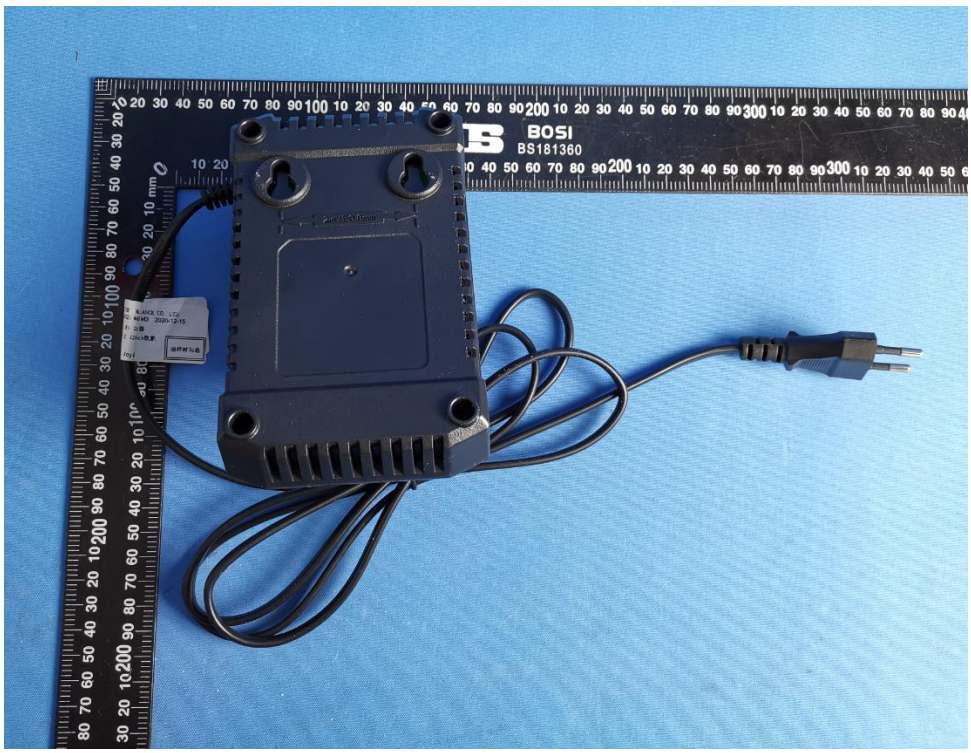
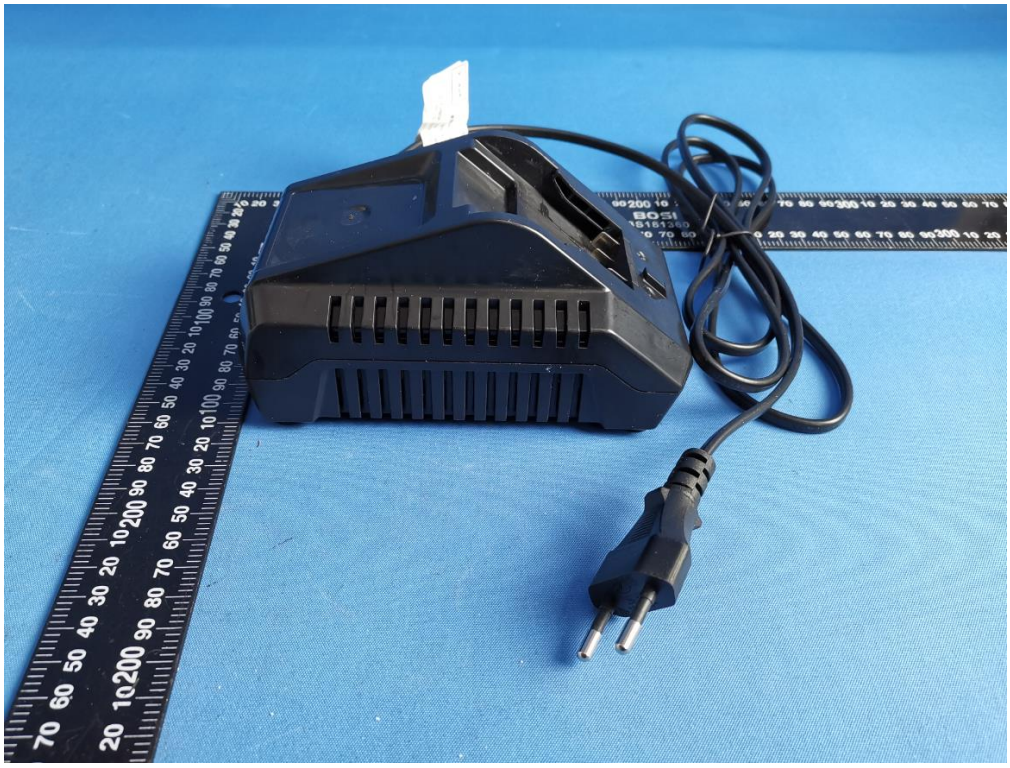
Details of: Charger Z021046

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [x] top [ ] bottom	

Details of: Charger Z021046

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [x] bottom	

Details of: Charger Z021046

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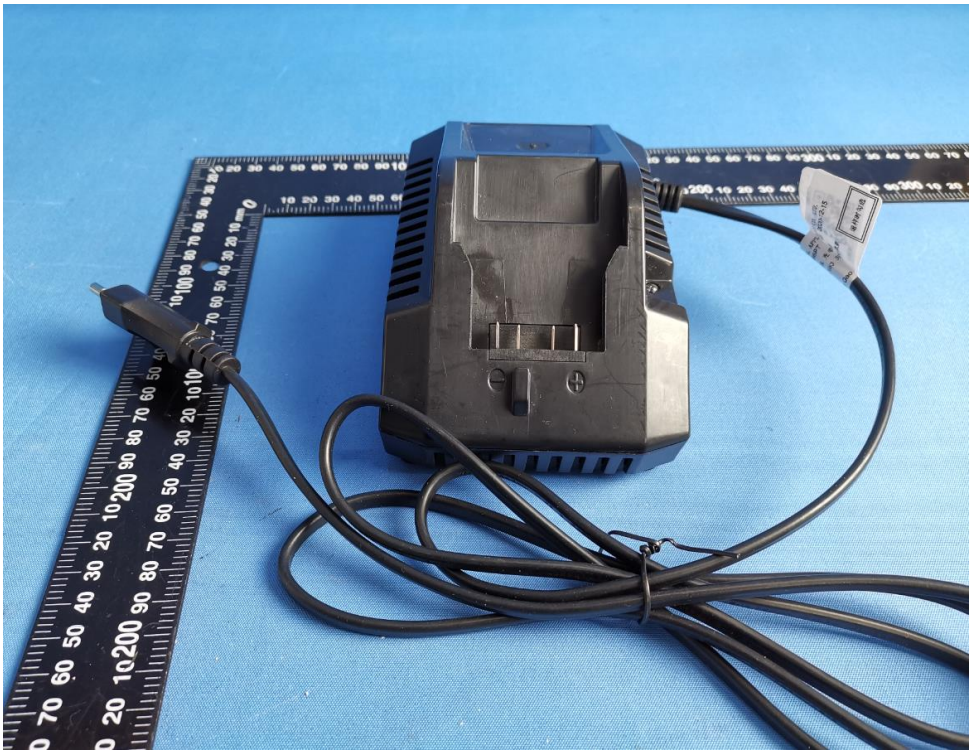
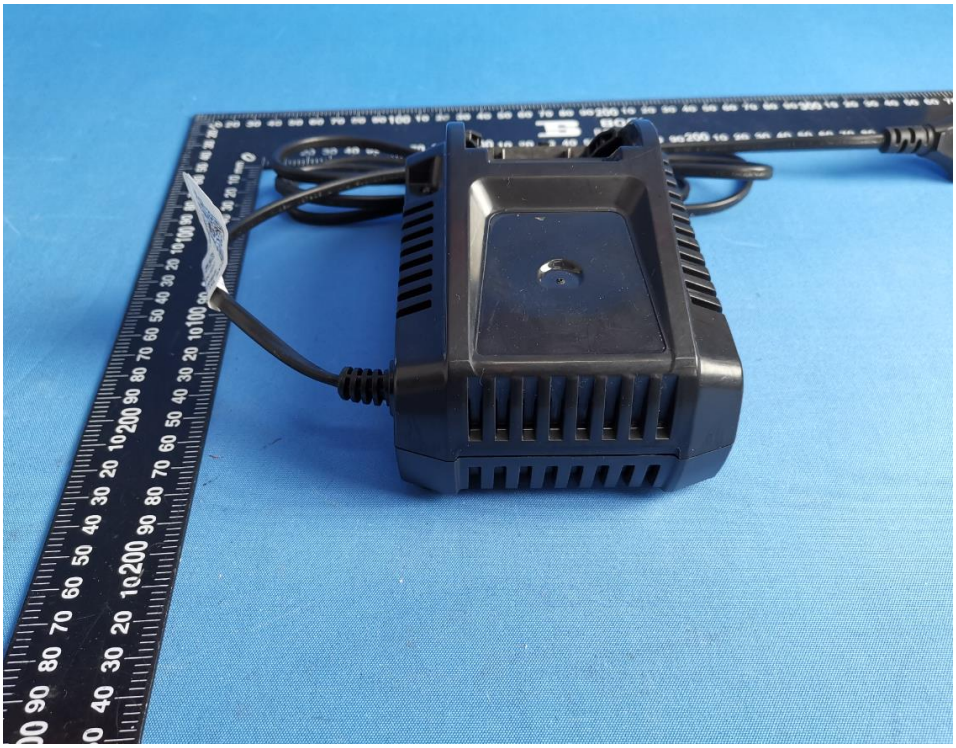
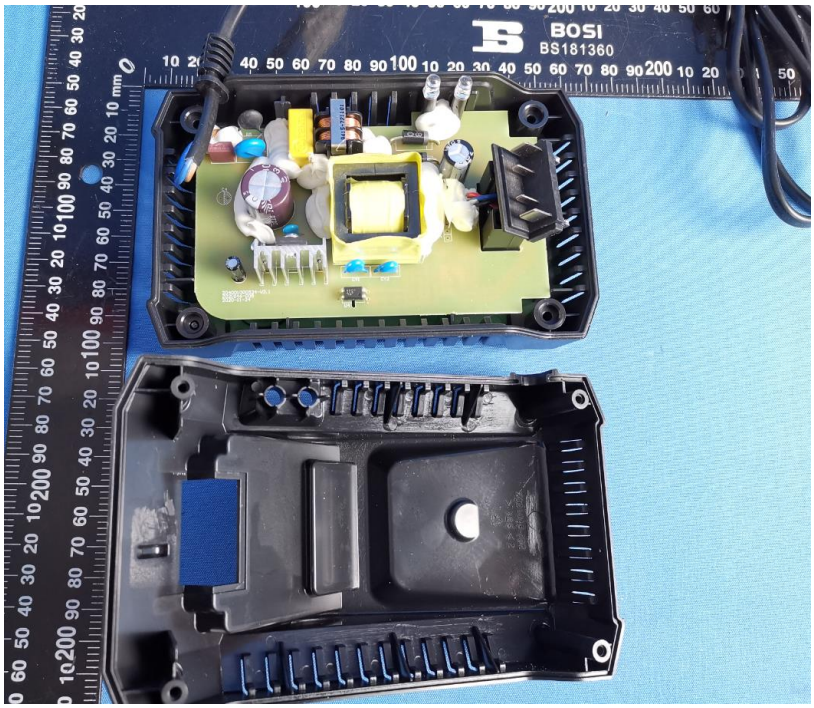
Details of: Charger Z021046

View: [ ] general [ ] front [x] rear [ ] right [ ] left [ ] top [ ] bottom	

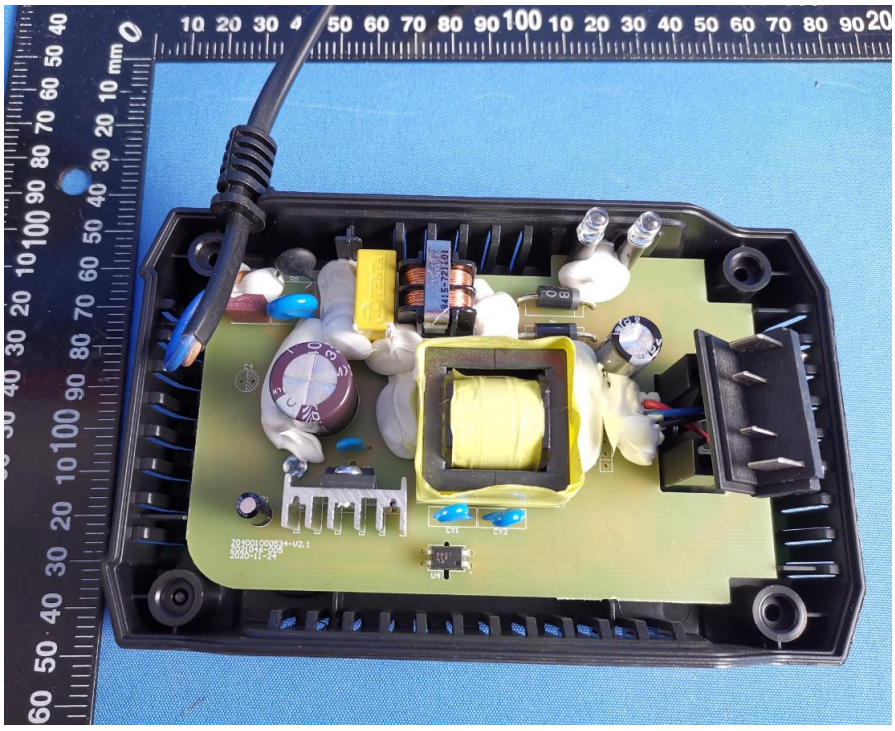
Details of: Charger Z021046

View: [ ] general [ ] front [x] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: Open view of Charger Z021046

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: Open view of Charger Z021046

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: PCB of Charger Z021046

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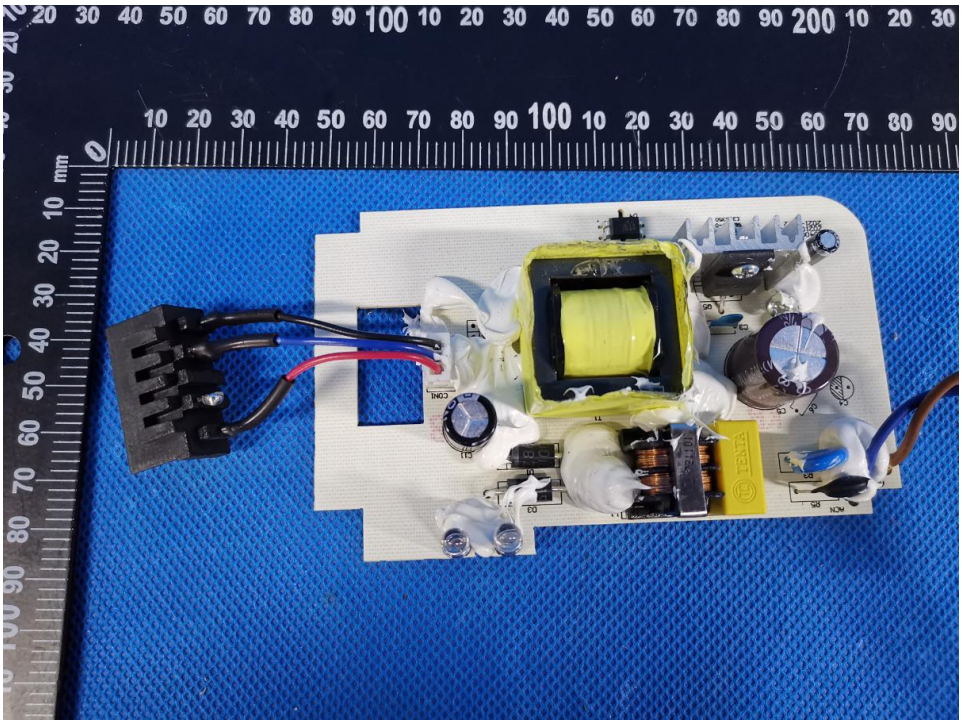

Details of: PCB of Charger Z021046

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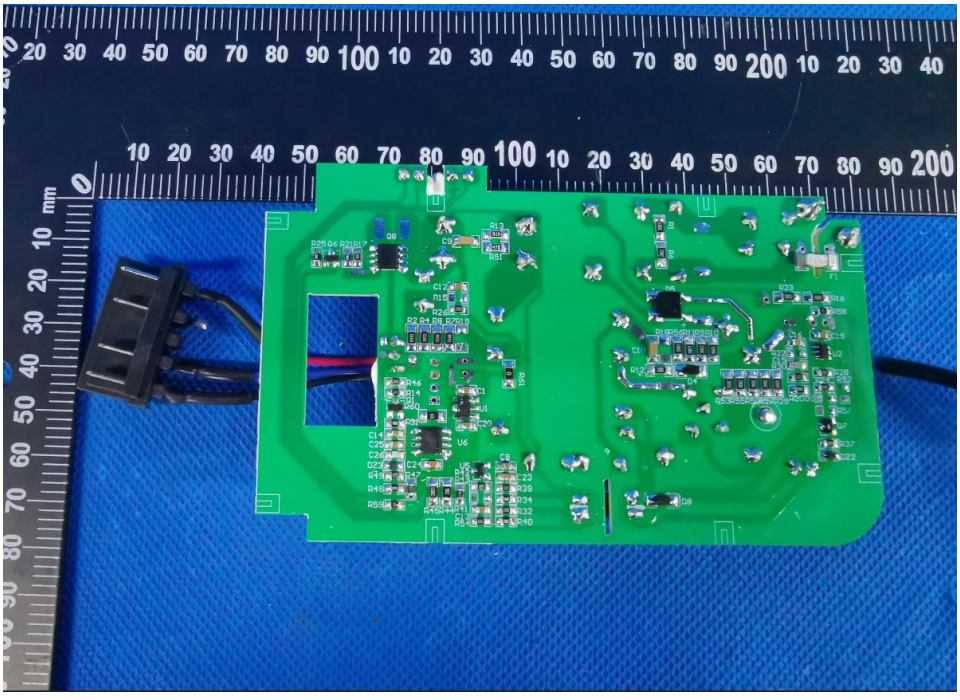

Details of: Charger Z021045

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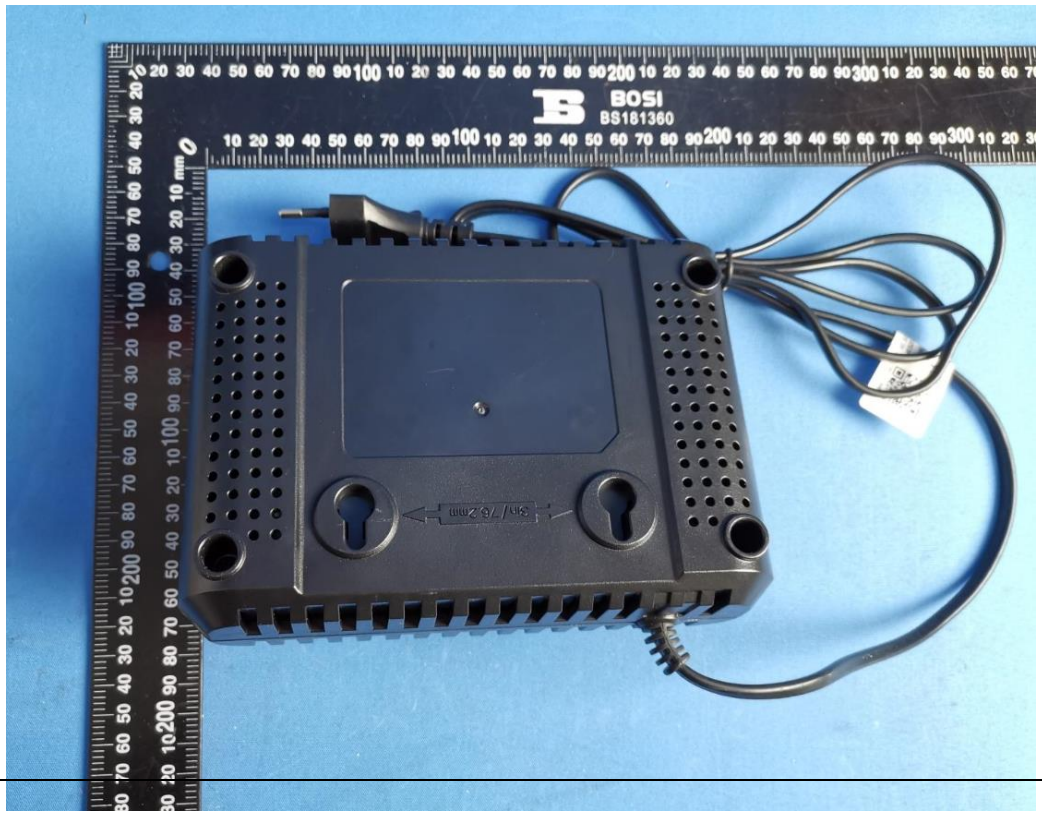
Details of: Charger Z021045

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [x] top [ ] bottom	

Details of: Charger Z021045

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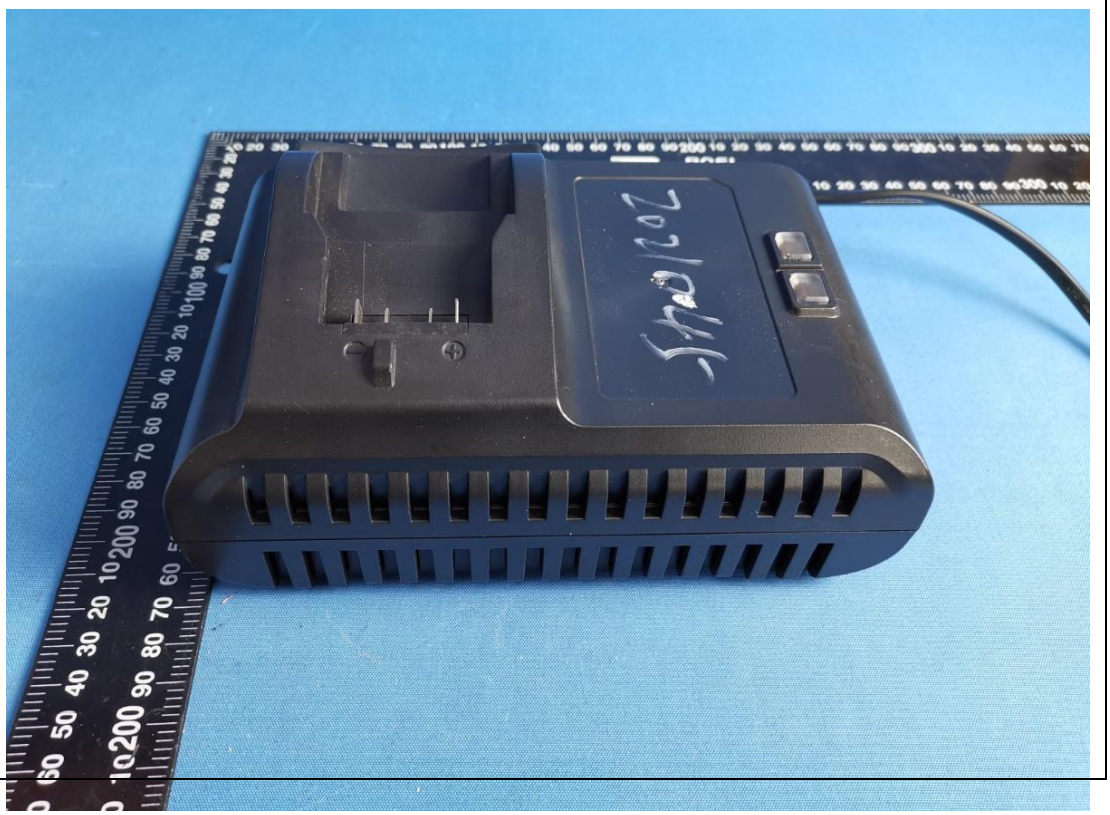

Details of: Charger Z021045

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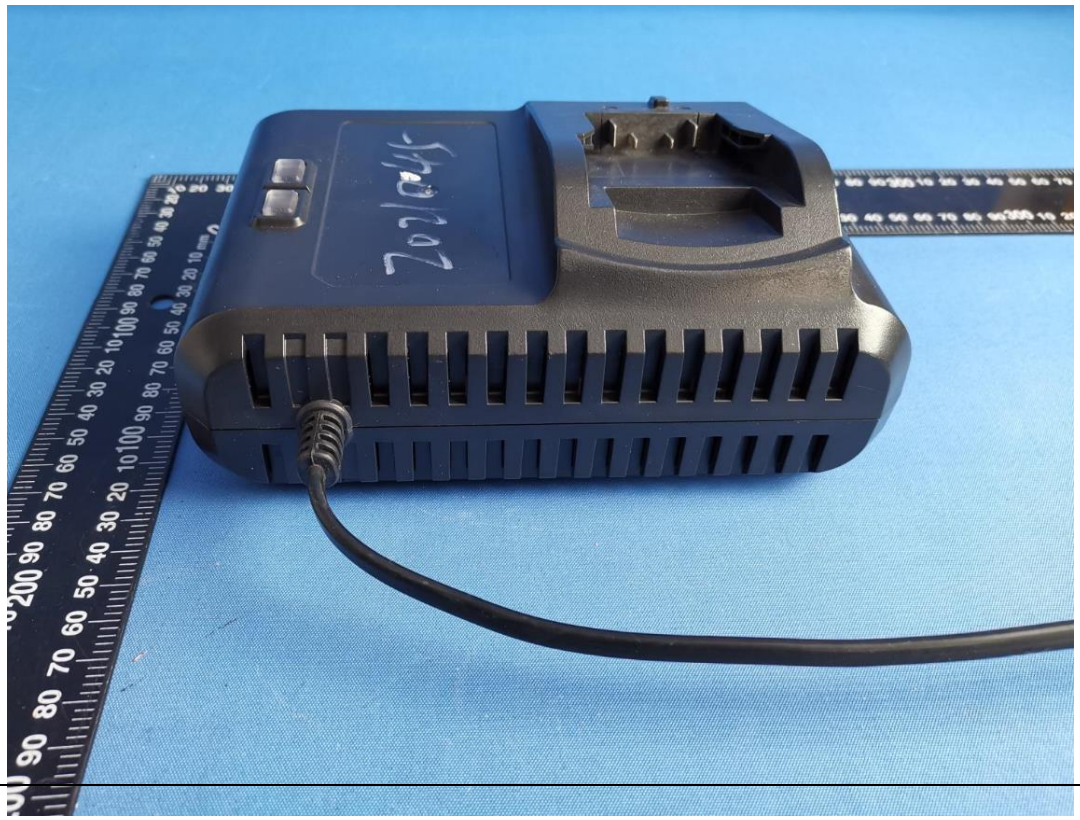

Details of: Charger Z021045

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Details of: Charger Z021045

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Details of: Open view of Charger Z021045

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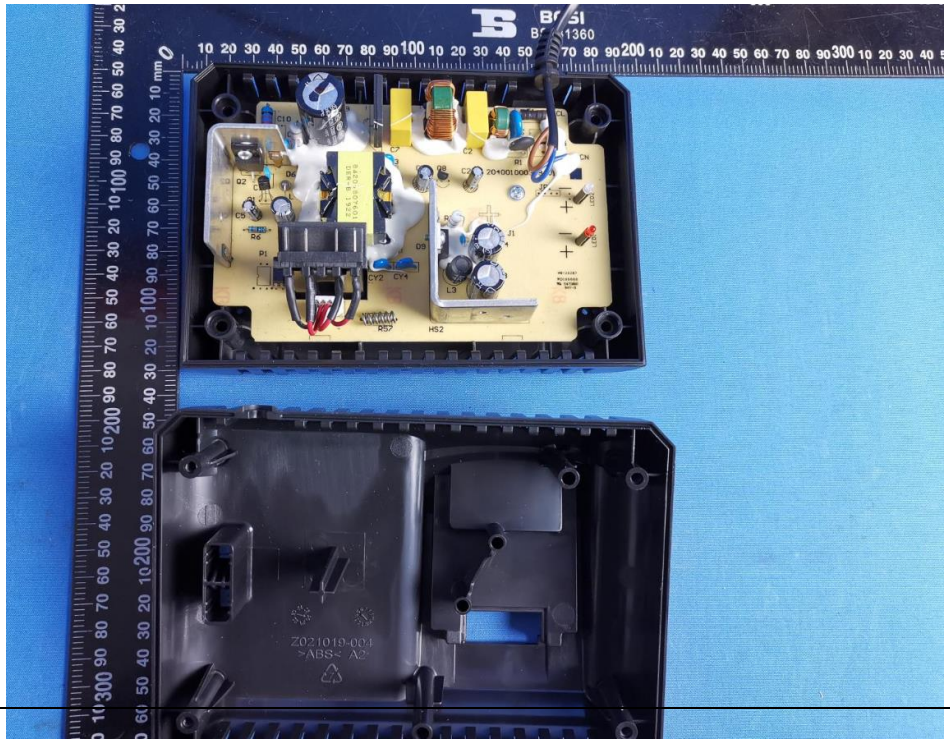

Details of: Open view of Charger Z021045

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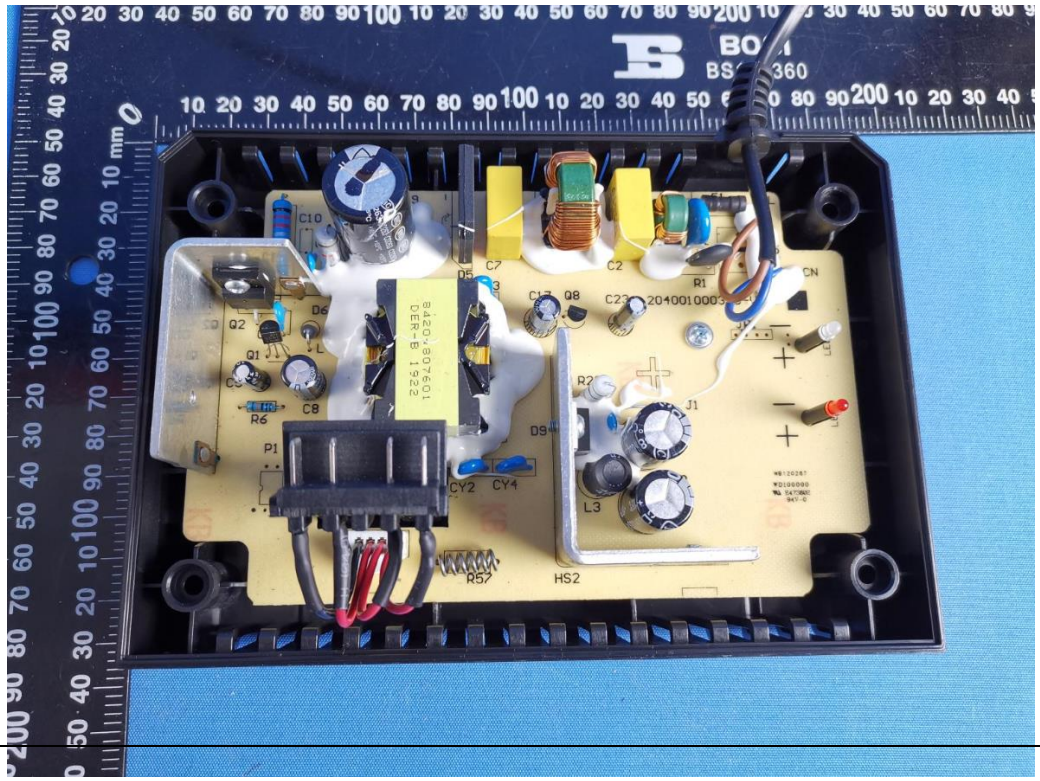

Details of: PCB of Charger Z021045

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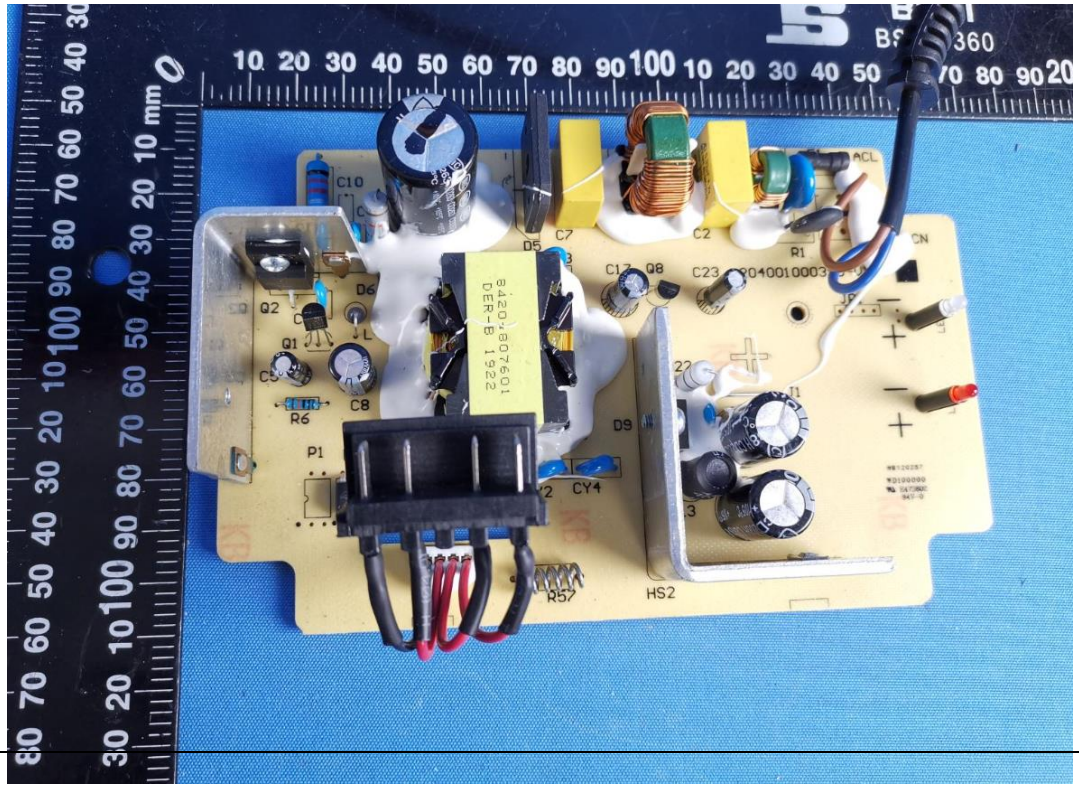

Details of: PCB of Charger Z021045

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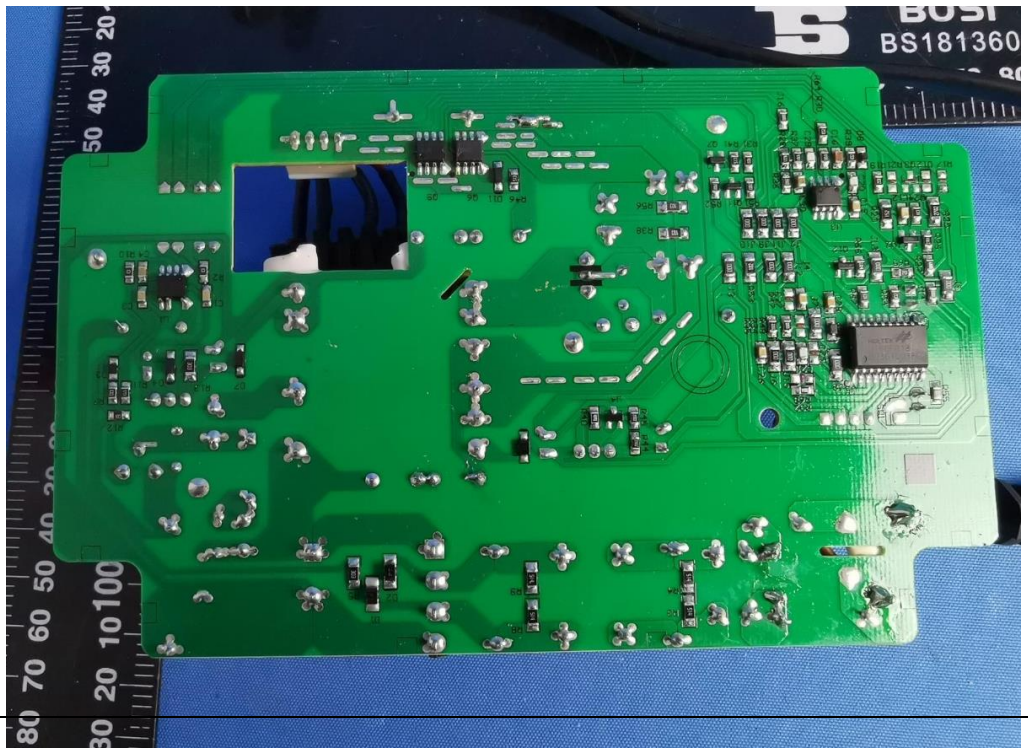

Details of: **Charger Z021060**

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Details of: **Charger Z021060**

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Details of: **Charger Z021060**

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Details of: **Charger Z021060**

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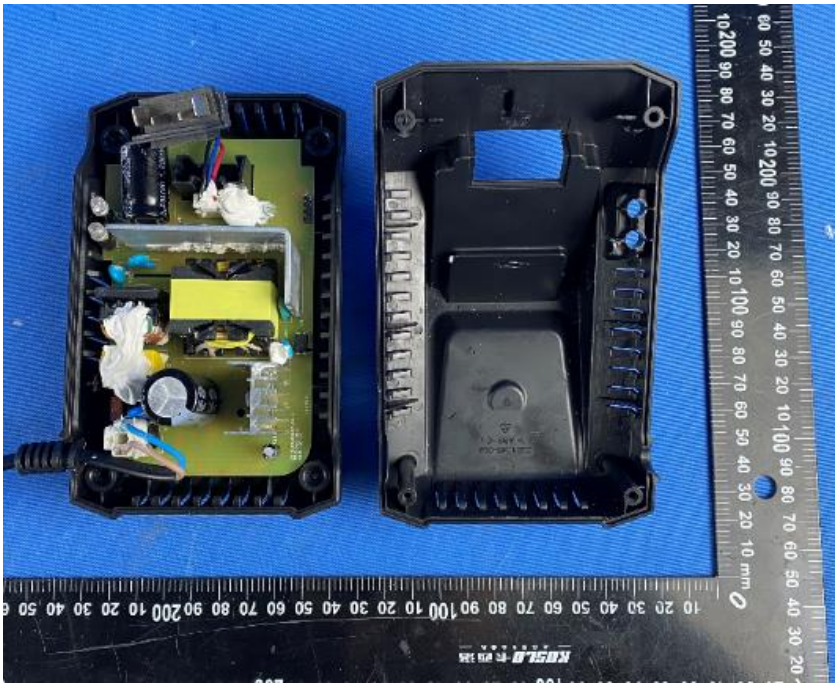
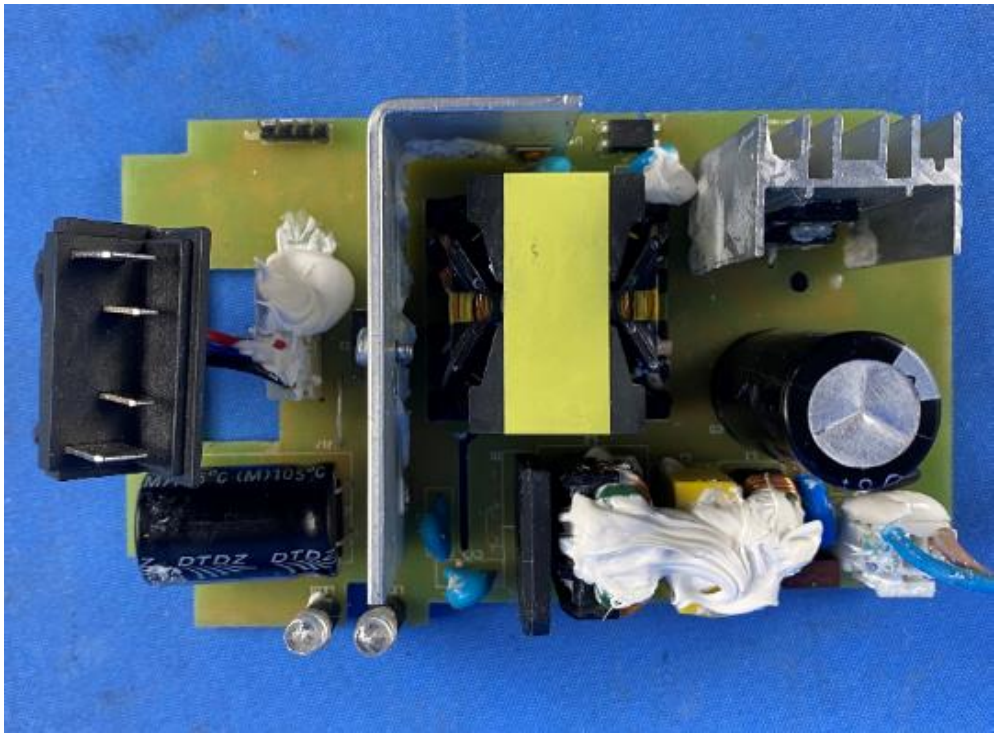
Details of: **Open view of Charger Z021060**

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

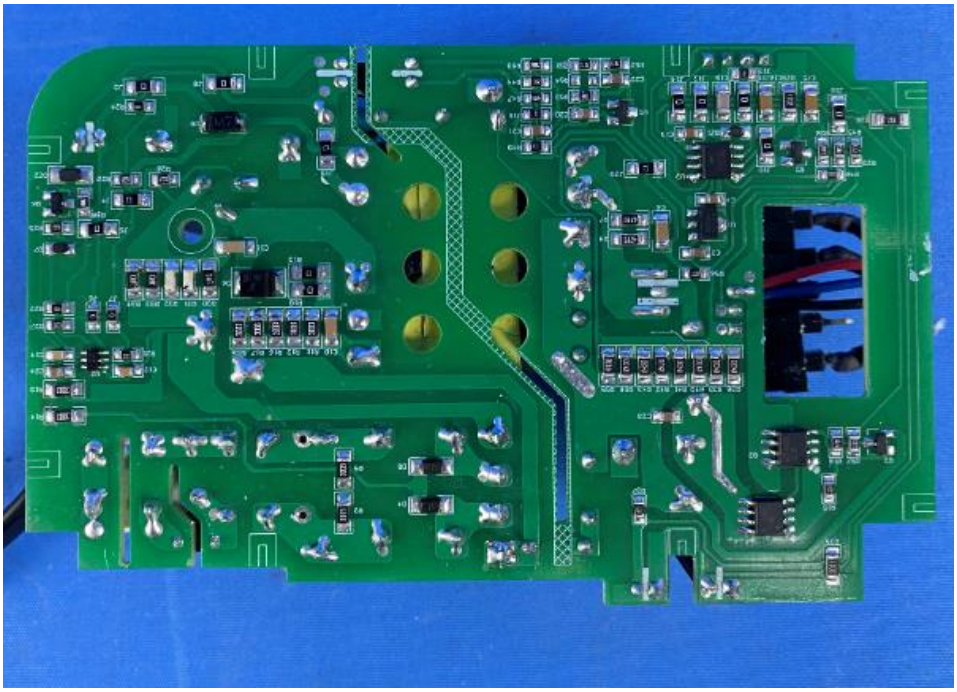
Details of: **Open view of Charger Z021060**

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

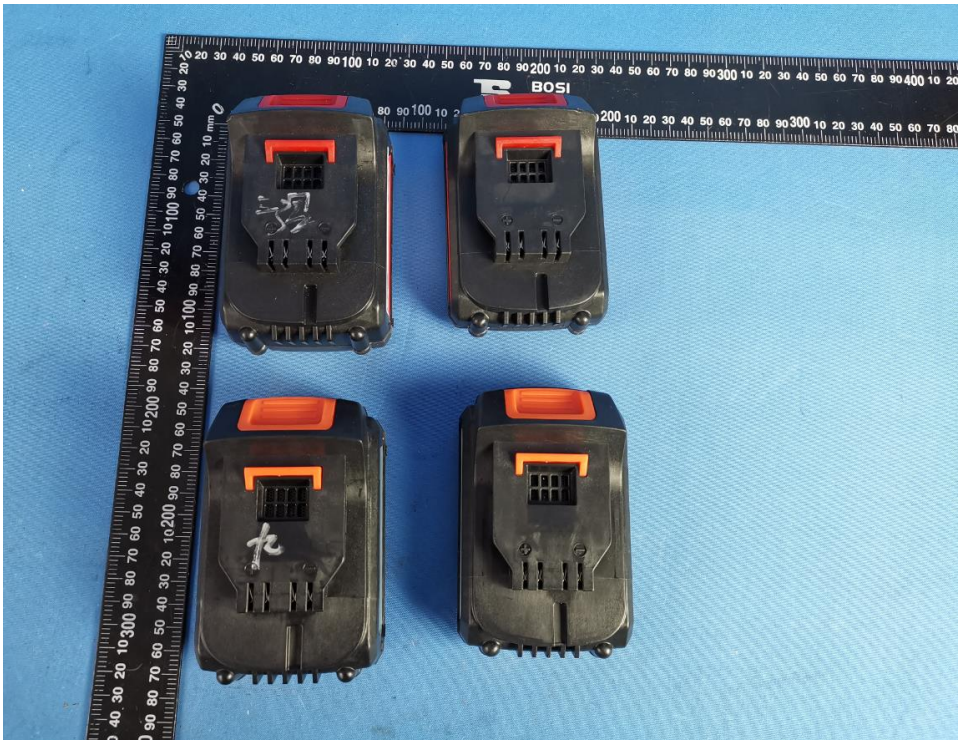
Details of: **PCB of Charger Z021060**

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

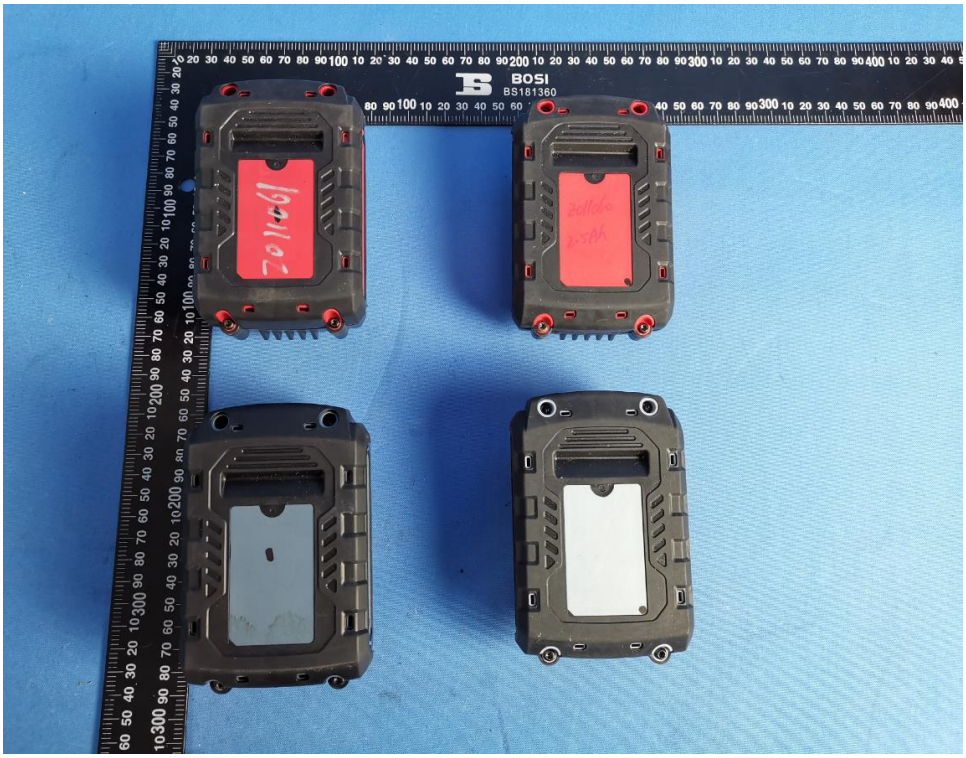
Details of: **PCB of Charger Z021060**

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: battery pack:

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [x] top [ ] bottom	

Details of: battery pack

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [x] bottom	

Details of: battery pack

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Details of: battery pack

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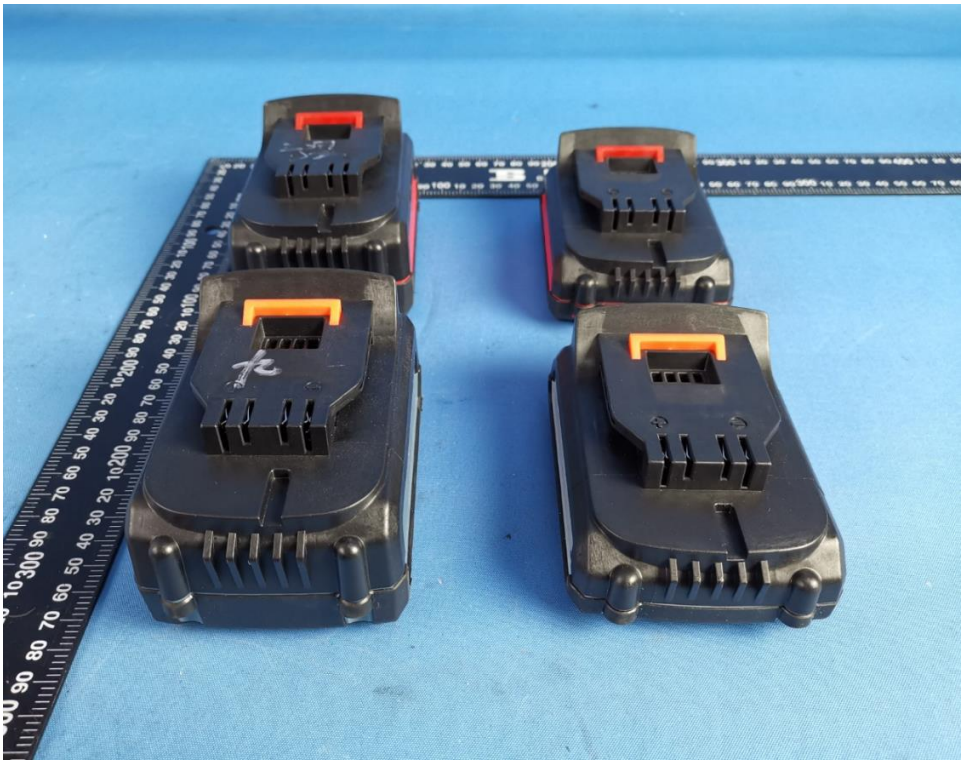
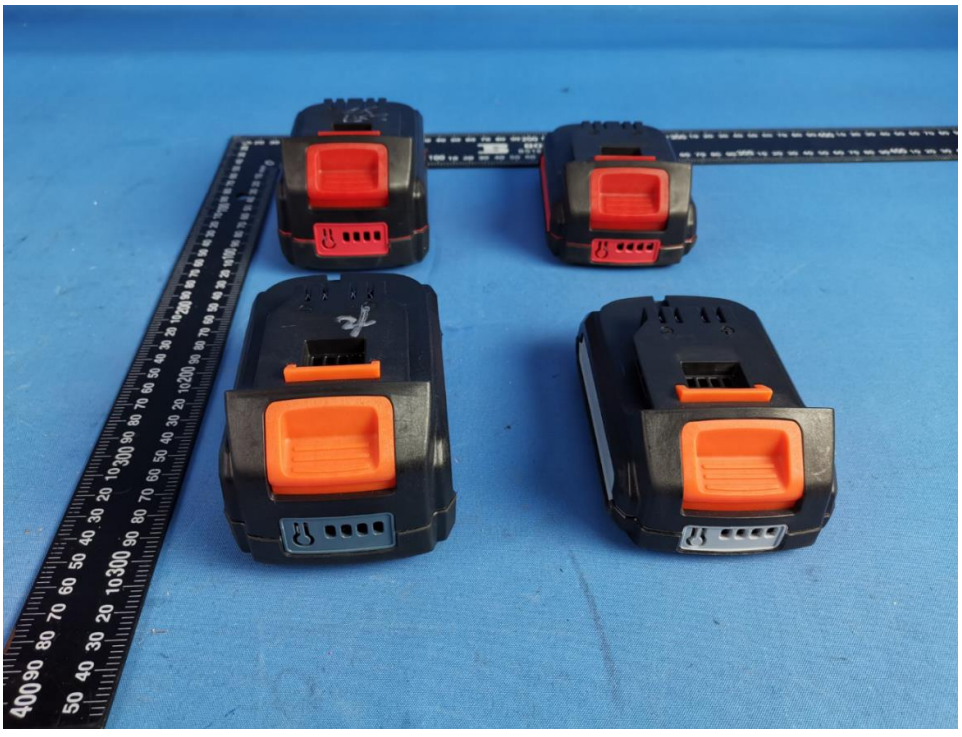
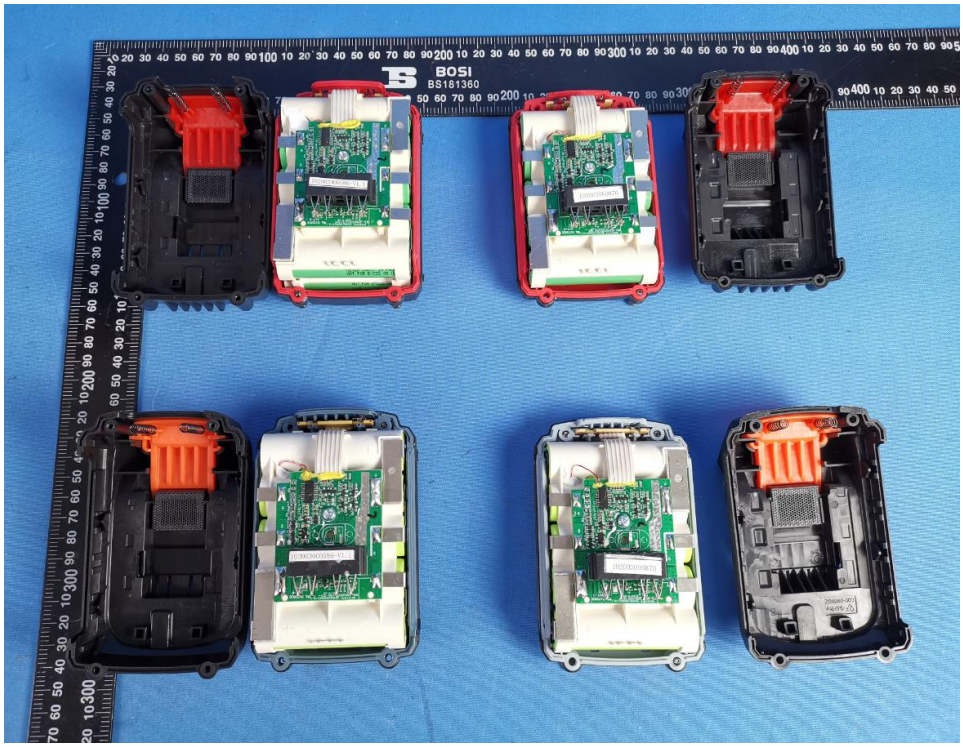
Details of: battery pack

View: [ ] general [ ] front [ ] rear [ ] right [x] left [ ] top [ ] bottom	

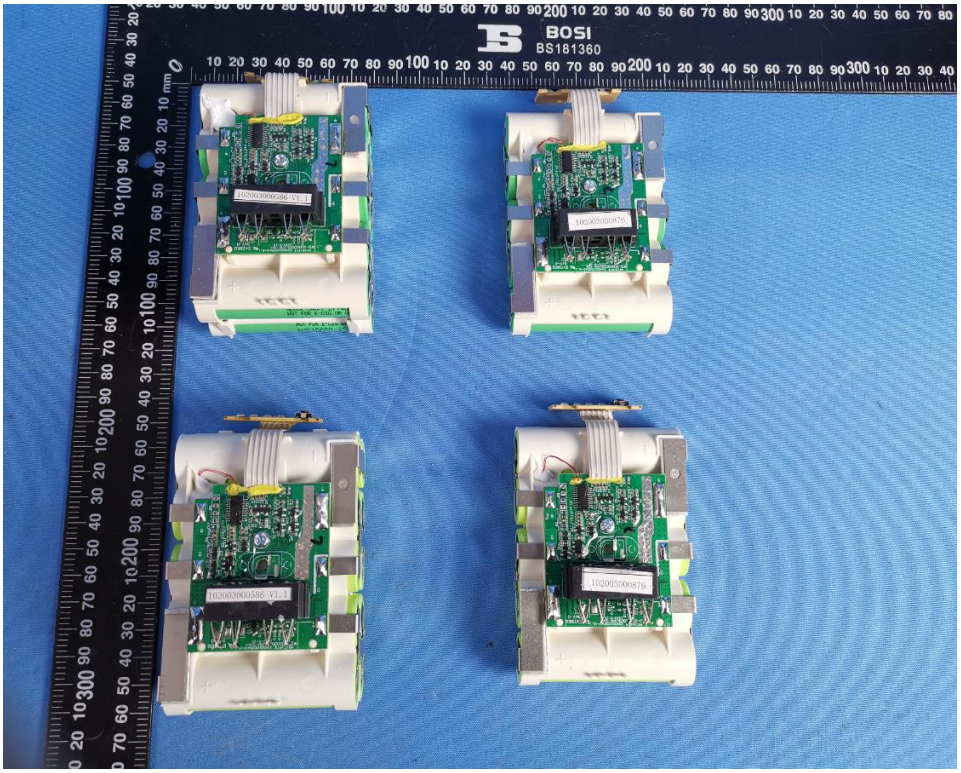
Details of: battery pack

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

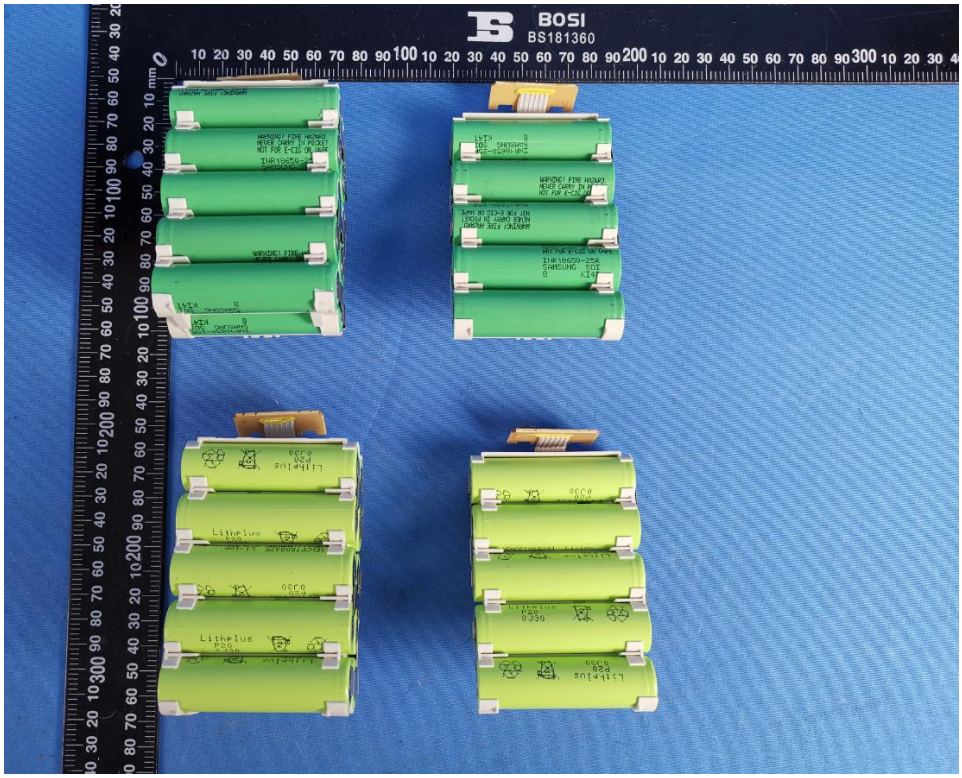
Details of: Internal view battery pack

View:	
[ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

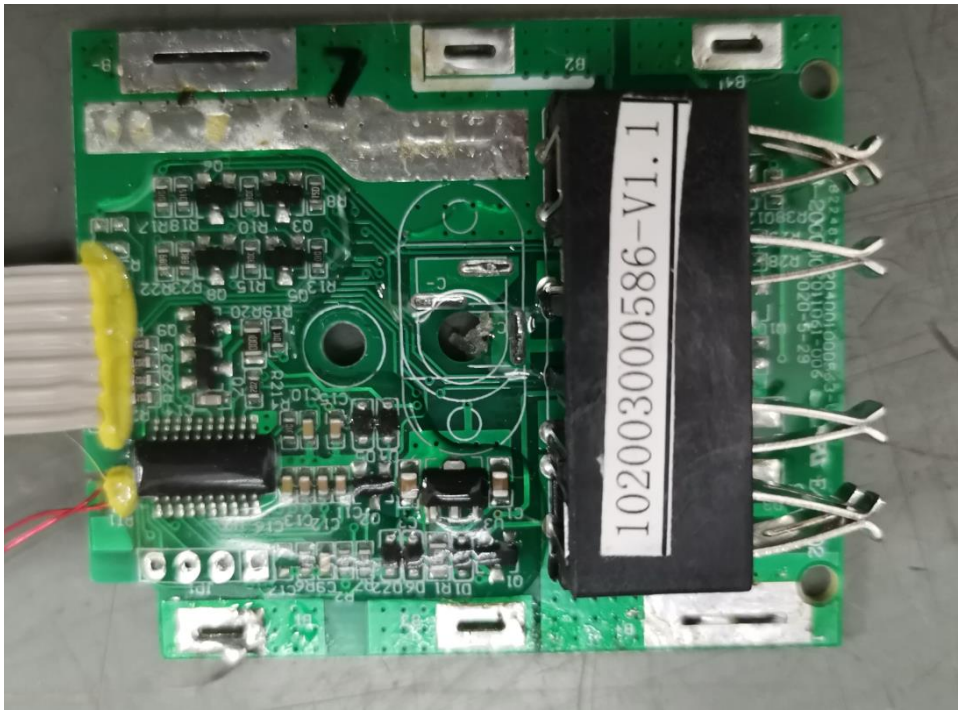
Details of: Internal view battery pack

View:	
[ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

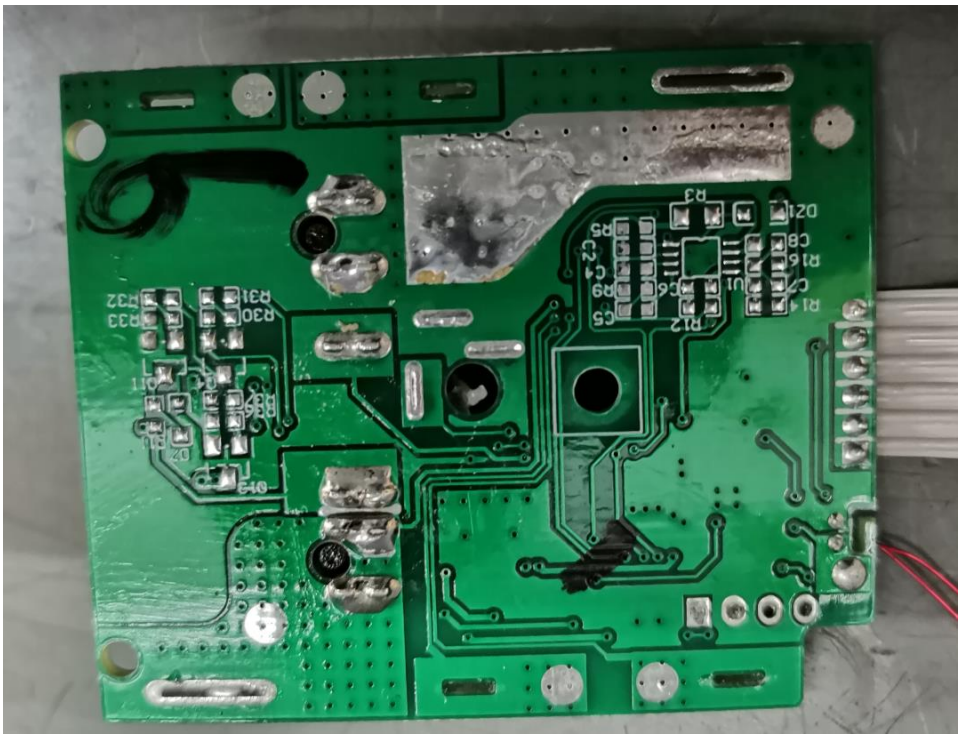
Details of: Internal view battery pack

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: The PCB in the battery pack

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: The PCB in the battery pack

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: Cell in battery pack

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

Details of: Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

Details of: Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

Details of: Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

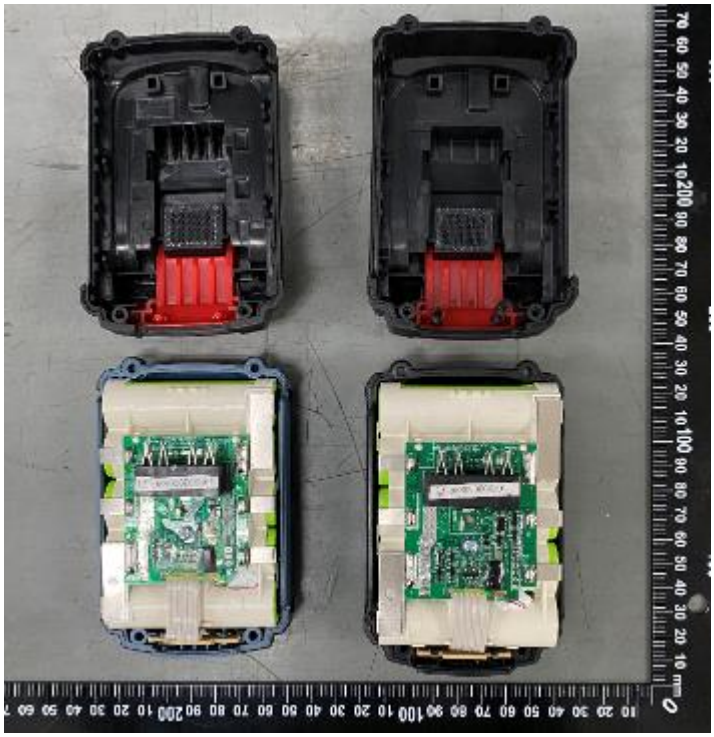
Details of: Battery pack (Z011069, Z011070)

View:	
[ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

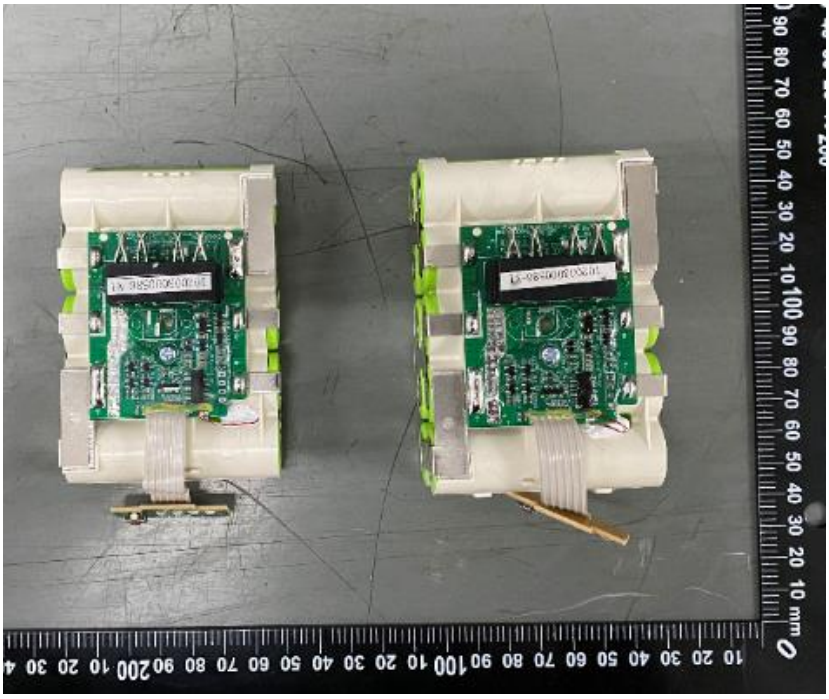
Details of: Battery pack (Z011069, Z011070)

View:	
[ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

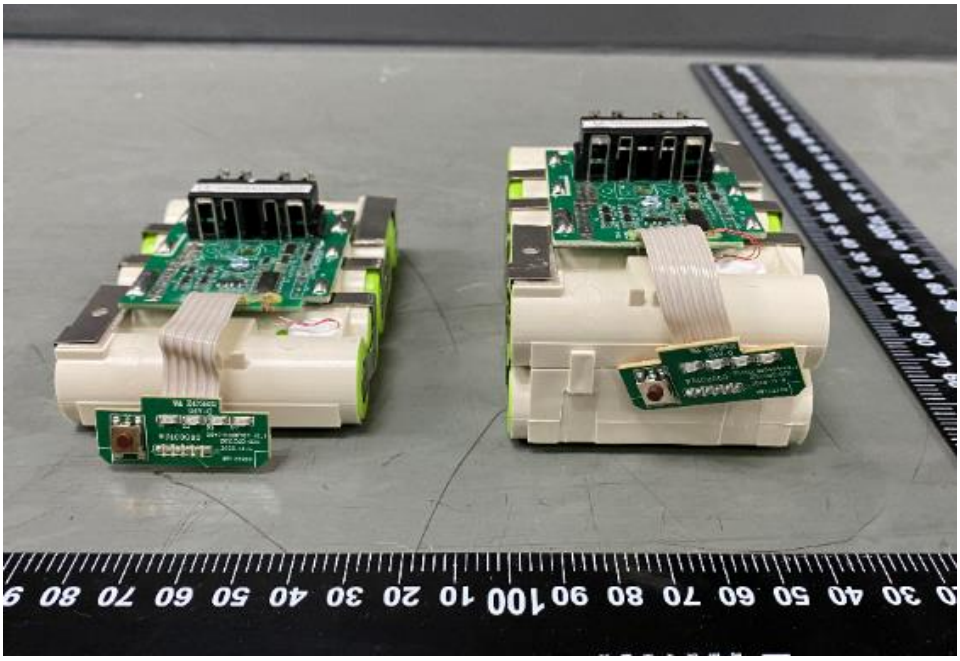
Details of: Battery pack (Z011069, Z011070)

View:	
[ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

Details of: Internal view of Battery pack (Z011069, Z011070)

View:	
[ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

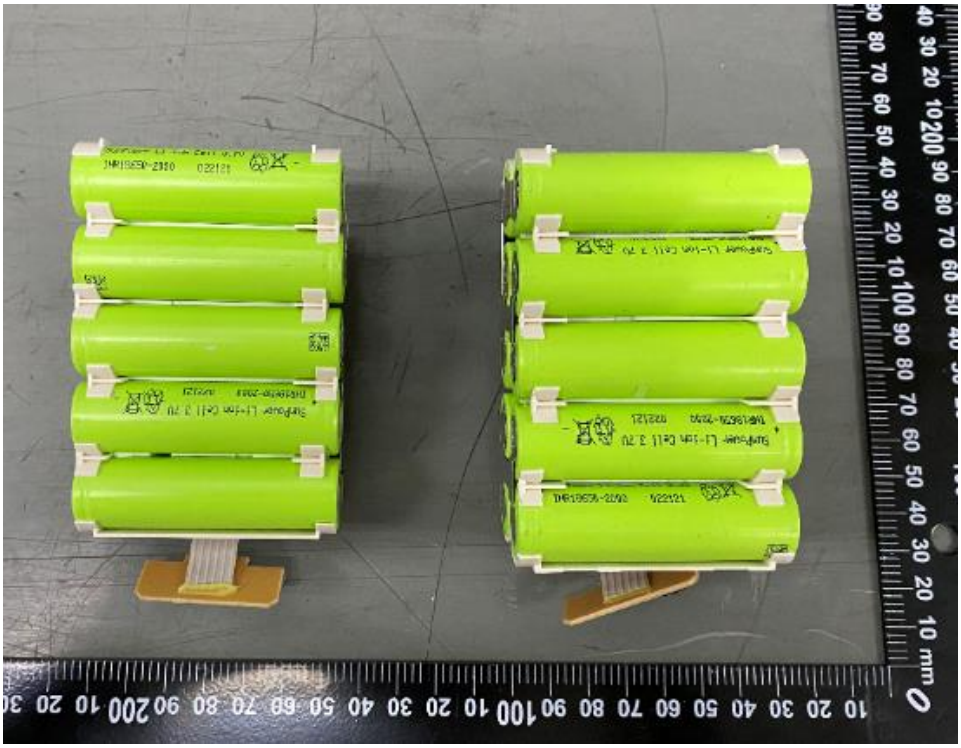
Details of: Internal view of Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

Details of: Internal view of Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

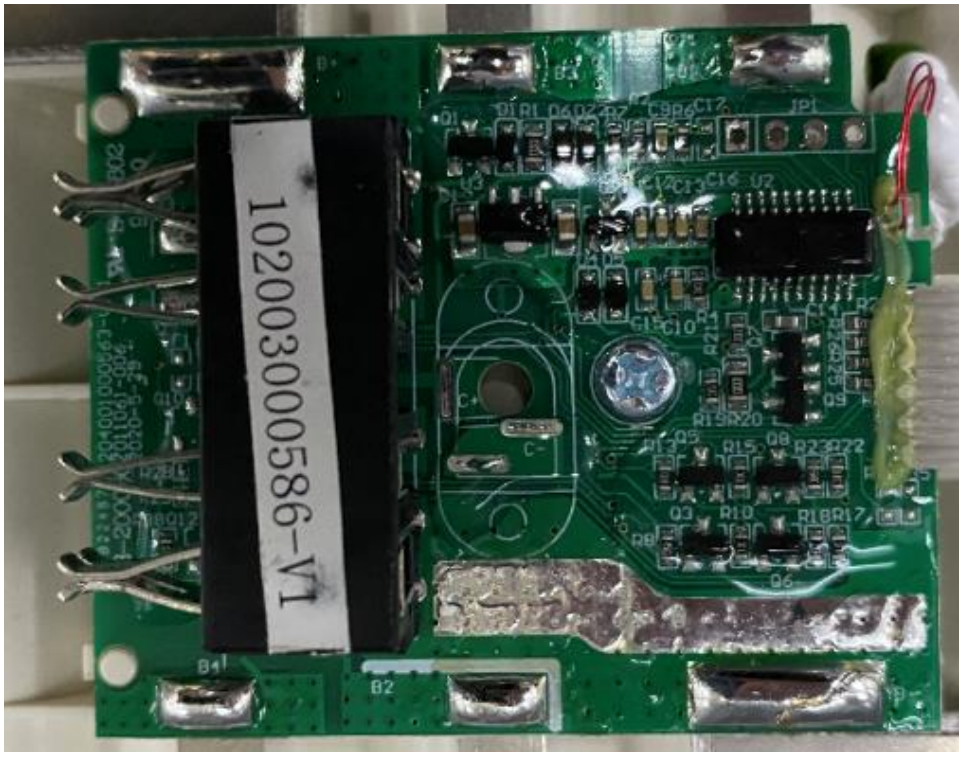
Details of: Internal view of Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	 Z011069 Z011070

Details of: The Cell of Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

Details of: The PCB of Battery pack (Z011069, Z011070)

View: [ ] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

***** End of Attachment 1 *****