



SAFETY TEST REPORT

SANS / IEC 60950-1

Safety of information technology equipment

Part 1: General requirements

Report Number.....: TRS00393-1/19

Date of issue.....: 20/03/2019

Name of testing laboratory.....: iSERT (Pty) Ltd.

Address.....: 129 Khai-Apple street, Montana, Pretoria, South Africa, 0182

Applicant's name.....: Digital Matter SA (Pty) Ltd

Address.....: Ground Floor, Buffalo building, The Oval Cnr. Meadowbrook Lane and Sloane Street, Bryanston, 2021

Test specification

Standard(s).....: IEC 60950-1: 2005 + A1:2009 + A2:2013
SANS 60950-1:2014

Test Result: The Bolt 2G Cat-M1/NB-IoT and Bolt 4G Cat-M1/NB-IoT complied with the applicable requirements of SANS / IEC 60950-1

General disclaimer:

ISERT (Pty) Ltd. Test reports apply only to the specific sample(s) tested under stated conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to ensure that additional production units of this model are manufactured with identical electrical and mechanical components. ISERT (Pty) Ltd. Shall have no liability for any deductions, inference or generalizations drawn by the client or others from our Issued test reports. This report shall not be used to claim, constitute or imply a product endorsement from ISERT (Pty) Ltd.



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DOCUMENT CONTROL

Revision	Date	Author	Pages affected	Change proposal
1.0	20/03/2019	L de Vries-Venter	All	N/A

TEST LABORATORY INFORMATION

Established in 2017, iSERT (Pty) Ltd. Provides EMC, RF & Safety testing services by our skilled Engineers. Our services employ a wide variety of advanced cutting-edge test equipment with one of the widest ranges of accredited standards in the country.

The site and apparatus are constructed in conformance with the requirements of CISPR 16-1-4, EN 50147-1 and other equivalent standards. The laboratory is compliant with the requirements of ISO/IEC 17025



It is our definite objective to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with the best EMC, RF & Safety services by knowledgeable and accommodating staff.


Our test site is located at 129 Khai-Apple street, Montana, Pretoria, South Africa 0186.

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Tested by:	L de Vries-Venter (Product Safety Engineer)	
Approved by:	CJ Deysel (Technical Signatory)	

Test item description:	The Bolt is a GPS/GLONASS tracking device. It plugs into the vehicle's OBDII port. This report covers two variants: 2G and 4G Cat-M1/NB-IoT
Trade Mark.....:	
Manufacturer.....:	Digital Matter
Model number.....:	Bolt 2G Cat-M1/NB-IoT Bolt 4G Cat-M1/NB-IoT
Serial number.....:	Samples: 168430, 174403
Ratings.....:	24Vdc, 200mA -20°C to +60°C

Test conditions:	Maximum	Minimum	Limits
Ambient temperature	24.4°C	22.5°C	25°C ±10°C
Relative humidity	50.4%	48.9%	< 75%

Copy of marking plate:



Figure 1: Bolt marking label (example)

Test item particulars:			
Equipment mobility.....:	<input type="checkbox"/> movable	<input type="checkbox"/> hand-held	<input type="checkbox"/> transportable
	<input type="checkbox"/> stationary	<input type="checkbox"/> for building-in	<input type="checkbox"/> direct plug-in
Connection to mains.....:	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input type="checkbox"/> type B		
	<input type="checkbox"/> detachable power supply cord		
	<input type="checkbox"/> non-detachable power supply cord		
	<input type="checkbox"/> not directly connected to mains		
Operating condition.....:	<input type="checkbox"/> continuous		
	<input type="checkbox"/> rated operating / resting time:		
Access location.....:	<input type="checkbox"/> operator accessible		
	<input type="checkbox"/> restricted access location		
	<input type="checkbox"/> service accessible		
Over voltage category.....:	<input type="checkbox"/> OVC I <input type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV		
	<input type="checkbox"/> DC mains supply		
Mains supply tolerance (%)......:	N/A		
Tested for IT power systems.....:	<input type="checkbox"/> Yes <input type="checkbox"/> No		
IT testing, phase-phase voltage (V).....:	N/A		
Class of equipment.....:	<input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III		
	<input type="checkbox"/> Not classified		
Considered current rating of protective device as Part of the building installation (A).....:	N/A		
Pollution degree (PD).....:	<input type="checkbox"/> PD 1 <input type="checkbox"/> PD 2 <input type="checkbox"/> PD 3		
Max. Specified ambient temperature (°C).....:	60°C		
Mass of equipment (kg).....:	approx. 45g		
Possible test case verdicts:			
- test case does not apply to the test object.....:	N (Not applicable)		
- test object does meet the requirement.....:	P (Pass)		
- test object does not meet the requirement.....:	F (Fail)		
Testing:			
Date (s) of performance of tests.....:	08/03/2019 - 20/03/2019		
	The results obtained in this test report are only valid for the item(s) tested. iSERT (Pty) Ltd. does not make any claims of compliance for samples or variants which were not tested.		

SANS / IEC 60950-1			
Clause	Requirement + Test		Result - Remark
1	GENERAL		P
1.5	Components		P
1.5.1	General		P
	Comply with IEC60950-1 or relevant component standard	(see appended table 1.5.1)	P
1.5.2	Evaluation and testing of components	Components that were found to affect safety aspects comply with the requirements of this standard or within the safety aspects of the relevant IEC component standards.	P
1.5.3	Thermal controls		N
1.5.4	Transformers		N
1.5.5	Interconnecting cables		N
1.5.6	Capacitors bridging insulation	No capacitors bridging insulation	N
1.5.7	Resistors bridging insulation		N
1.5.7.1	Resistors bridging functional, basic or supplementary insulation		N
1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits		N
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable	No resistors bridging insulation in the RF circuit	N
1.5.8	Components in equipment for IT power systems	Not intend for IT power distribution systems.	N
1.5.9	Surge suppressors		N
1.5.9.1	General	Suppression diodes	P
1.5.9.2	Protection of VDRs		N
1.5.9.3	Bridging of functional insulation by a VDR		P
1.5.9.4	Bridging of basic insulation by a VDR		N
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR		N
1.6	Power interface		P
1.6.1	AC power distribution systems	Class III equipment	N
1.6.2	Input current	See appended table 1.6.2	P
1.6.3	Voltage limit of hand-held equipment	Not handheld equipment	N
1.6.4	Neutral conductor		N
1.7	Marking and Instructions		P
1.7.1	Power rating and identification markings		-
1.7.1.1	Power rating marking		P

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Clause	Requirement + Test	Result - Remark	
	Multiple mains supply connections.....:	Single connection	P
	Rated voltage(s) or voltage range(s) (V).....:	24V	P
	Symbol for nature of supply, for d.c. only.....:	dc	P
	Rated frequency or rated frequency range (Hz).....:	dc supply	N
	Rated current (mA or A).....:	200mA	P
1.7.1.2	Identification markings	See below	P
	Manufacturer's name or trade-mark or identification mark.....:	See page 3 of this report	P
	Model identification or type reference.....:		P
	Symbol for Class II equipment only.....:		N
	Other markings and symbols.....:		P
1.7.1.3	Use of graphical symbols		N
1.7.2	Safety instructions and marking		P
1.7.2.1	General	The user's manual contains information for operation, installation, servicing, transport, storage and technical data.	P
1.7.2.2	Disconnect devices		N
	-for permanently connected equipment, a readily accessible disconnect device shall be incorporated in the building installation wiring		N
	-for pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible	Plug used as disconnect device, no hazard	N
1.7.2.3	Overcurrent protective device		N
1.7.2.4	IT power distribution systems		N
1.7.2.5	Operator access with a tool	No operator access	N
1.7.2.6	Ozone	No ozone produced	N
1.7.3	Short duty cycles	Continuous operation	N
1.7.4	Supply voltage adjustment.....:	Fixed	N
1.7.5	Power outlets on the equipment.....:		N
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference).....:	No fuse present	N
1.7.7	Wiring terminals	No terminals	N
1.7.7.1	Protective earthing and bonding terminals.....:		N
1.7.7.2	Terminals for a.c. mains supply conductors		N
1.7.7.3	Terminals for d.c. mains supply conductors		N
1.7.8	Controls and indicators		N

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Clause	Requirement + Test		Result - Remark
1.7.8.1	Identification, location and marking.....:		N
1.7.8.2	Colours.....:		N
1.7.8.3	Symbols according to IEC 60417.....:		N
1.7.8.4	Markings using figures.....:		N
1.7.9	Isolation of multiple power sources.....:		N
1.7.10	Thermostats and other regulating devices.....:	PTC used	P
1.7.11	Durability	Rubbed with a cloth soaked with water for 15s then again for 15s with cloth soaked with petroleum spirits, after this test, the marking on the label did not fade there are no curling nor lifting of the label edge.	P
1.7.12	Removable parts		N
1.7.13	Replaceable batteries.....:		N
	Language(s).....:		-
1.7.14	Equipment for restricted access locations.....:		N
2	Protection from hazards		N
2.1	Protection from electric shock and energy hazards		N
2.1.1	Protection in operator access areas	Class III device	N
2.1.1.1	Access to energized parts	SELV, no hazard	N
	Test by inspection.....:		N
	Test with test finger (Figure 2A).....:		N
	Test with test pin (Figure 2B).....:		N
	Test with test probe (Figure 2C).....:		N
2.1.1.2	Battery compartments		N
2.1.1.3	Access to ELV wiring	No operator access	N
	Working voltage (V_{peak} or V_{rms}); minimum distance through insulation (mm)		N
2.1.1.4	Access to hazardous voltage circuit wiring	No hazards	N
2.1.1.5	Energy hazards:	No hazardous energies	N
2.1.1.6	Manual controls	No such device	N
2.1.1.7	Discharge of capacitors in equipment	No hazard	N
	Measured voltage (V); time-constant (s).....:		N
2.1.1.8	Energy hazards – d.c. mains supply		N
	a) Capacitor connected to the d.c. mains supply ...:		N
	b) Internal battery connected to the d.c. mains supply		N

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Clause	Requirement + Test		Result - Remark
2.1.1.9	Audio amplifiers.....:	No such component	N
2.1.2	Protection in service access areas		N
2.1.3	Protection in restricted access locations		N
2.2	SELV circuits		P
2.2.1	General requirements	(see appended table 2.2)	N
2.2.2	Voltages under normal conditions (V).....:	24V	P
2.2.3	Voltages under fault conditions (V).....:	24V	P
2.2.4	Connection of SELV circuits to other circuits.....:		P
2.3	TNV circuits		N
2.3.1	Limits	No TNV circuit.	N
	Type of TNV circuits.....:		-
2.3.2	Separation from other circuits and from accessible parts		N
2.3.2.1	General requirements		N
2.3.2.2	Protection by basic insulation		N
2.3.2.3	Protection by earthing		N
2.3.2.4	Protection by other constructions.....:		N
2.3.3	Separation from hazardous voltages		N
	Insulation employed.....:		-
2.3.4	Connection of TNV circuits to other circuits		N
	Insulation employed.....:		-
2.3.5	Test for operating voltages generated externally		N
2.4	Limited current circuits		N
2.4.1	General requirements		N
2.4.2	Limit values		N
	Frequency (Hz).....:		-
	Measured current (mA).....:		-
	Measured voltage (V).....:		-
	Measured circuit capacitance (nF or μ F).....:		-
2.4.3	Connection of limited current circuits to other circuits		N
2.5	Limited power sources		N
	a) Inherently limited output		N
	b) Impedance limited output		N
	c) Regulating network limited output under normal operating and single fault condition		N

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Clause	Requirement + Test		Result - Remark
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA).....:		N
	Current rating of overcurrent protective device (A)		N
	Use of integrated circuit (IC) current limiters		N
2.6	Provisions for earthing and bonding		P
2.6.1	Protective earthing	Class III equipment	N
2.6.2	Functional earthing		P
2.6.3	Protective earthing and protective bonding conductors		N
2.6.3.1	General		N
2.6.3.2	Size of protective earthing conductors		N
	Rated current (A), cross-sectional area (mm ²), AWG.....:		N
2.6.3.3	Size of protective bonding conductors		N
	Rated current (A), cross-sectional area (mm ²), AWG.....:		-
2.6.3.4	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min).....:		N
2.6.3.5	Colour of insulation.....:		N
2.6.4	Terminals		N
2.6.4.1	General		N
2.6.4.2	Protective earthing and bonding terminals		N
	Rated current (A), type, nominal thread diameter (mm).....:		-
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N
2.6.5	Integrity of protective earthing		N
2.6.5.1	Interconnection of equipment		N
2.6.5.2	Components in protective earthing conductors and protective bonding conductors		N
2.6.5.3	Disconnection of protective earth		N
2.6.5.4	Parts that can be removed by an operator		N
2.6.5.5	Parts removed during servicing		N
2.6.5.6	Corrosion resistance		N
2.6.5.7	Screws for protective bonding		N
2.6.5.8	Reliance on telecommunication network or cable distribution system		N

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Clause	Requirement + Test	Result - Remark

2.7	Overcurrent and earth fault protection in primary circuits		N
2.7.1	Basic requirements		N
	Instructions when protection relies on building installation		N
2.7.2	Faults not simulated in 5.3.7		N
2.7.3	Short-circuit backup protection		N
2.7.4	Number and location of protective devices		N
2.7.5	Protection by several devices		N
2.7.6	Warning to service personnel		N
2.8	Safety interlocks		N
2.8.1	General principles	No safety interlocks present	N
2.8.2	Protection requirements		N
2.8.3	Inadvertent reactivation		N
2.8.4	Fail-safe operation		N
	Protection against extreme hazard		N
2.8.5	Moving parts		N
2.8.6	Overriding		N
2.8.7	Switches, relays and their related circuits		N
2.8.7.1	Separation distances for contact gaps and their related circuits (mm)		N
2.8.7.2	Overload test		N
2.8.7.3	Endurance test		N
2.8.7.4	Electric strength test		N
2.8.8	Mechanical actuators		N
2.9	Electrical insulation		N
2.9.1	Properties of insulating materials	Natural rubber, asbestos or hygroscopic materials are not used.	N

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Clause	Requirement + Test	Result - Remark

2.9.2	Humidity conditioning	Not required	N
	Relative humidity (%), temperature (°C)	(93 ± 3 %), (20 – 30 ± 2) °C	-
2.9.3	Grade of insulation	Functional	N
2.9.4	Separation from hazardous voltages		N
	Method(s) used	Method 1 a) and b)	N

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Clause	Requirement + Test	Result - Remark
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2.10	Clearances, creepage distances and distances through insulation	N
2.10.1	General	-
2.10.1.1	Frequency	N
2.10.1.2	Pollution degrees	Pollution Degree II N
2.10.1.3	Reduced values for functional insulation	N
2.10.1.4	Intervening unconnected conductive parts	N
2.10.1.5	Insulation with varying dimensions	N
2.10.1.6	Special separation requirements	N
2.10.1.7	Insulation in circuits generating starting pulses	N
2.10.2	Determination of working voltage	-
2.10.2.1	General	N
2.10.2.2	RMS working voltage	dc supply N
2.10.2.3	Peak working voltage	N
2.10.3	Clearances	N
2.10.3.1	General	N
2.10.3.2	Mains transient voltages	N
	a) AC mains supply	N
	b) Earthed d.c. mains supplies	N
	c) Unearthed d.c. mains supplies	N
	d) Battery operation	N
2.10.3.3	Clearances in primary circuits	N
2.10.3.4	Clearances in secondary circuits	N
2.10.3.5	Clearances in circuits having starting pulses	N
2.10.3.6	Transients from a.c. mains supply	N
2.10.3.7	Transients from d.c. mains supply	N
2.10.3.8	Transients from telecommunication networks and cable distribution systems	N
2.10.3.9	Measurement of transient voltage levels	N
	a) Transients from a mains supply	N
	For an a.c. mains supply	N
	For a d.c. mains supply	N
	b) Transients from a telecommunication network....	N
2.10.4	Creepage distances	Refer to appended table 2.10.3 and 2.10.4 N
2.10.4.1	General	N
2.10.4.2	Material group and comparative track index	IIIb assumed N

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Clause	Requirement + Test	Result - Remark
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	CTI tests		-
2.10.4.3	Minimum creepage distances	Refer to table 2.10.3 and 2.10.4	N
2.10.5	Solid insulation		N
2.10.5.1	General		N
2.10.5.2	Distances through insulation	Enclosure	N
2.10.5.3	Insulating compound as solid insulation		N
2.10.5.4	Semiconductor devices		N
2.10.5.5	Cemented joints		N
2.10.5.6	Thin sheet material General		N
2.10.5.7	Separable thin sheet material		N
	Number of layers (pcs)		-
2.10.5.8	Non-separable thin sheet material		N
2.10.5.9	Thin sheet material – standard test procedure		N
	Electric strength test		-
2.10.5.10	Thin sheet material – alternative test procedure		N
	Electric strength test		-
2.10.5.11	Insulation in wound components		N
2.10.5.12	Wire in wound components		N
	Working voltage		N
	a) Basic insulation not under stress		N
	b) Basic, supplementary, reinforced insulation	Functional	N
	c) Compliance with Annex U		N
	Two wires in contact inside wound component; angle between 45° and 90°		N
2.10.5.13	Wire with solvent-based enamel in wound components		N
	Electric strength test		-
	Routine test		-
2.10.5.14	Additional insulation in wound components		N
	Working voltage		N
	- Basic insulation not under stress		N
	- Supplementary, reinforced insulation		N
2.10.6	Construction of printed boards		N
2.10.6.1	Uncoated printed boards		N
2.10.6.2	Coated printed boards		N
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		N

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Clause	Requirement + Test		Result - Remark
2.10.6.4	Insulation between conductors on different layers of a printed board		N
	Distance through insulation		N
	Number of insulation layers (pcs):		N
2.10.7	Component external terminations		N
2.10.8	Tests on coated printed boards and coated components		N
2.10.8.1	Sample preparation and preliminary inspection		N
2.10.8.2	Thermal conditioning		N
2.10.8.3	Electric strength test		N
2.10.8.4	Abrasion resistance test		N
2.10.9	Thermal cycling		N
2.10.10	Test for Pollution Degree 1 environment and insulating compound		N
2.10.11	Tests for semiconductor devices and cemented joints		N
2.10.12	Enclosed and sealed parts		N
3	Wiring, connections and supply		N
3.1	General		-
3.1.1	Current rating and overcurrent protection		N
3.1.2	Protection against mechanical damage		N
3.1.3	Securing of internal wiring		N
3.1.4	Insulation of conductors		N
3.1.5	Beads and ceramic insulators		N
3.1.6	Screws for electrical contact pressure		P
3.1.7	Insulating materials in electrical connections		N
3.1.8	Self-tapping and spaced thread screws		N
3.1.9	Termination of conductors		P
	10 N pull test	No electrical hazard	N
3.1.10	Sleeving on wiring		N
3.2	Connection to a mains supply		P
3.2.1	Means of connection		-
3.2.1.1	Connection to an a.c. mains supply		N
3.2.1.2	Connection to a d.c. mains supply		P
3.2.2	Multiple supply connections		N
3.2.3	Permanently connected equipment		N
	Number of conductors, diameter of cable and conduits (mm):	Not permanently connected equipment	N

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Clause	Requirement + Test		Result - Remark
3.2.4	Appliance inlets		N
3.2.5	Power supply cords		N
3.2.5.1	AC power supply cords		N
	Type		N
	Rated current (A), cross-sectional area (mm ²), AWG		N
3.2.5.2	DC power supply cords		N
3.2.6	Cord anchorages and strain relief		N
	Mass of equipment (kg), pull (N)		-
	Longitudinal displacement (mm)		-
3.2.7	Protection against mechanical damage		N
3.2.8	Cord guards		N
	Diameter or minor dimension D (mm); test mass (g)		-
	Radius of curvature of cord (mm).....		-
3.2.9	Supply wiring space		N
3.3	Wiring terminals for connection of external conductors		P
3.3.1	Wiring terminals		P
3.3.2	Connection of non-detachable power supply cords		N
3.3.3	Screw terminals		P
3.3.4	Conductor sizes to be connected	0.75 mm ²	P
	Rated current (A), cord/cable type, cross-sectional area (mm ²)	0.1A, 0.75 mm ²	P
3.3.5	Wiring terminal sizes	Screw type	P
	Rated current (A), type, nominal thread diameter (mm)	12A, 320V	P
3.3.6	Wiring terminal design		P
3.3.7	Grouping of wiring terminals		P
3.3.8	Stranded wire		P
3.4	Disconnection from the mains supply		N
3.4.1	General requirement		N
3.4.2	Disconnect devices		N
3.4.3	Permanently connected equipment		N
3.4.4	Parts which remain energized		N
3.4.5	Switches in flexible cords		N
3.4.6	Number of poles - single-phase and d.c. equipment		N
3.4.7	Number of poles - three-phase equipment		N

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Clause	Requirement + Test	Result - Remark

3.4.8	Switches as disconnect devices		N
3.4.9	Plugs as disconnect devices		N
3.4.10	Interconnected equipment		N
3.4.11	Multiple power sources		N
3.5	Interconnection of equipment		N
3.5.1	General requirements		N
3.5.2	Types of interconnection circuits		N
3.5.3	ELV circuits as interconnection circuits		N
3.5.4	Data ports for additional equipment		N
4	Physical Requirements		N
4.1	Stability		N
	Angle of 10°		N
	Test force (N)	Not floor standing unit	N
4.2	Mechanical strength		N
4.2.1	General	No hazards	N
	Rack-mounted equipment.		N
4.2.2	Steady force test, 10 N		N
4.2.3	Steady force test, 30 N		N
4.2.4	Steady force test, 250 N		N
4.2.5	Impact test		N
	Fall test		N
	Swing test		N
4.2.6	Drop test; height (mm)		N
4.2.7	Stress relief test	7 hours at 70°C	N
4.2.8	Cathode ray tubes	No such tubes	N
	Picture tube separately certified		N
4.2.9	High pressure lamps	No such lamps	N
4.2.10	Wall or ceiling mounted equipment; force (N)		N
4.3	Design and construction		P
4.3.1	Edges and corners	Edges and corners of the enclosure are rounded and smooth.	P
4.3.2	Handles and manual controls; force (N).....	No handles or controls	N
4.3.3	Adjustable controls	No adjustable controls	N
4.3.4	Securing of parts	No hazard, but cable entry secure for environmental conditions	P

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Clause	Requirement + Test		Result - Remark
4.3.5	Connection by plugs and sockets		N
4.3.6	Direct plug-in equipment		P
	Torque		N
	Compliance with the relevant mains plug standard		N
4.3.7	Heating elements in earthed equipment		N
4.3.8	Batteries		N
	- Overcharging of a rechargeable battery		N
	- Unintentional charging of a non-rechargeable battery		N
	- Reverse charging of a rechargeable battery		N
	- Excessive discharging rate for any battery		N
4.3.9	Oil and grease	No such substances	N
4.3.10	Dust, powders, liquids and gases		N
4.3.11	Containers for liquids or gases		N
4.3.12	Flammable liquids	Flammable liquids not used	N
	Quantity of liquid (l)		N
	Flash point (°C)		N
4.3.13	Radiation		N
4.3.13.1	General		N
4.3.13.2	Ionizing radiation		N
	Measured radiation (pA/kg)		-
	Measured high-voltage (kV)		-
	Measured focus voltage (kV)		-
	CRT markings		-
4.3.13.3	Effect of ultraviolet (UV) radiation on materials		N
	Part, property, retention after test, flammability classification		N
4.3.13.4	Human exposure to ultraviolet (UV) radiation		N
4.3.13.5	Lasers (including laser diodes) and LEDs		N
4.3.13.5.1	Lasers (including laser diodes)		N
	Laser class		-
4.3.13.5.2	Light emitting diodes (LEDs)		N
4.3.13.6	Other types		N
4.4	Protection against hazardous moving parts		N
4.4.1	General	No moving parts	N
4.4.2	Protection in operator access areas		N

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Clause	Requirement + Test		Result - Remark
	Household and home/office document/media shredders		N
4.4.3	Protection in restricted access locations		N
4.4.4	Protection in service access areas		N
4.4.5	Protection against moving fan blades		N
4.4.5.1	General		N
	Not considered to cause pain or injury. a)		N
	Is considered to cause pain, not injury. b)		N
	Considered to cause injury. c)		N
4.4.5.2	Protection for users		N
	Use of symbol or warning		N
4.4.5.3	Protection for service persons		N
	Use of symbol or warning		N
4.5	Thermal requirements		P
4.5.1	General		P
4.5.2	Temperature tests		P
	Normal load condition per Annex L	(see appended table 4.5)	P
4.5.3	Temperature limits for materials	(see appended table 4.5)	P
4.5.4	Touch temperature limits	(see appended table 4.5)	P
4.5.5	Resistance to abnormal heat		N
4.6	Openings in enclosures		N
4.6.1	Top and side openings	No openings	N
	Dimensions (mm)		N
4.6.2	Bottoms of fire enclosures		N
	Construction of the bottom, dimensions (mm)		N
4.6.3	Doors or covers in fire enclosures		N
4.6.4	Openings in transportable equipment		N
4.6.4.1	Constructional design measures		N
	Dimensions (mm)		-
4.6.4.2	Evaluation measures for larger openings		N
4.6.4.3	Use of metallized parts		N
4.6.5	Adhesives for constructional purposes		N
	Conditioning temperature (°! ! , time (weeks)		N
4.7	Resistance to fire		P
4.7.1	Reducing the risk of ignition and spread of flame		P

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Clause	Requirement + Test	Result - Remark

	Method 1, selection and application of components wiring and materials	(see appended table 4.7)	P
	Method 2, application of all of simulated fault condition tests		P
4.7.2	Conditions for a fire enclosure		N
4.7.2.1	Parts requiring a fire enclosure		N
4.7.2.2	Parts not requiring a fire enclosure		P
4.7.3	Materials	Plastic	P
4.7.3.1	General	Refer to appended table 1.5.1	P
4.7.3.2	Materials for fire enclosures		N
4.7.3.3	Materials for components and other parts outside fire enclosures		N
4.7.3.4	Materials for components and other parts inside fire enclosures		N
4.7.3.5	Materials for air filter assemblies	No air filter assemblies	N
4.7.3.6	Materials used in high-voltage components	No high voltage components	N
5	Electrical requirements and simulated abnormal conditions		N
5.1	Touch current and protective conductor current	Class III	N
5.1.1	General		N
5.1.2	Configuration of equipment under test (EUT)		N
5.1.2.1	Single connection to an a.c. mains supply		N
5.1.2.2	Redundant multiple connections to an a.c. mains supply		N
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply		N
5.1.3	Test circuit		N
5.1.4	Application of measuring instrument		N
5.1.5	Test procedure		N
5.1.6	Test measurements		N
	Supply voltage (V)		N
	Measured touch current (mA)		N
	Max. allowed touch current (mA)		N
	Measured protective conductor current (mA)		N
	Max. allowed protective conductor current (mA)		N
5.1.7	Equipment with touch current exceeding 3,5 mA		N
5.1.7.1	General		N
5.1.7.2	Simultaneous multiple connections to the supply		N
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks	No TNV circuits	N

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Clause	Requirement + Test		Result - Remark
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system		-
	Supply voltage (V)		-
	Measured touch current (mA)		-
	Max. allowed touch current (mA)		-
5.1.8.2	Summation of touch currents from telecommunication networks	No telecomms circuit connections	N
	a) EUT with earthed telecommunication ports		-
	b) EUT whose telecommunication ports have no reference to protective earth		-
5.2	Electric strength		N
5.2.1	General		N
5.2.2	Test procedure		N
5.3	Abnormal operating and fault conditions		P
5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	P
5.3.2	Motors	No such component	N
5.3.3	Transformers		N
5.3.4	Functional insulation.....		P
5.3.5	Electromechanical components	No such component	N
5.3.6	Audio amplifiers in ITE	No such component	N
5.3.7	Simulation of faults	(see appended table 5.3)	P
5.3.8	Unattended equipment		P
5.3.9	Compliance criteria for abnormal operating and fault conditions	(see appended table 5.3)	P
5.3.9.1	During the tests		P
5.3.9.2	After the tests		P
6	Connection to telecommunication networks		N
6.1	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment	No connection intended for TNV circuits	N
6.1.1	Protection from hazardous voltages		N
6.1.2	Separation of the telecommunication network from earth		N
6.1.2.1	Requirements		N
	Supply voltage (V)		-
	Current in the test circuit (mA)		-
6.1.2.2	Exclusions		N

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Clause	Requirement + Test		Result - Remark
6.2	Protection of equipment users from over voltages on telecommunication networks		N
6.2.1	Separation requirements	No TNV circuits	N
6.2.2	Electric strength test procedure		N
6.2.2.1	Impulse test		N
6.2.2.2	Steady-state test		N
6.2.2.3	Compliance criteria		N
6.3	Protection of the telecommunication wiring system from overheating		N
	Max. output current (A)	No TNV circuits	-
	Current limiting method		-
7	Connection to cable distribution systems		N
7.1	General		N
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N
7.3	Protection of equipment users from overvoltage on the cable distribution system		N
7.4	Insulation between primary circuits and cable distribution systems		N
7.4.1	General		N
7.4.2	Voltage surge test		N
7.4.3	Impulse test		N
Annex A	Tests for resistance to heat and fire		N
A.1	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)		N
A.1.1	Samples.....		-
	Wall thickness (mm)		-
A.1.2	Conditioning of samples; temperature (°C)		N
A.1.3	Mounting of samples		N
A.1.4	Test flame (see IEC 60695-11-3)		N
A.1.5	Test procedure		N
A.1.6	Compliance criteria		N
	Sample 1 burning time (s)		-
	Sample 2 burning time (s)		-
	Sample 3 burning time (s)		-

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Clause	Requirement + Test	Result - Remark
A.2	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)	N
A.2.1	Samples, material.....:	-
	Wall thickness (mm)	-
A.2.2	Conditioning of samples; temperature (°C)	N
A.2.3	Mounting of samples	N
A.2.4	Test flame (see IEC 60695-11-4)	N
	Flame A, B or C	N
A.2.5	Test procedure	N
A.2.6	Compliance criteria	N
	Sample 1 burning time (s)	-
	Sample 2 burning time (s)	-
	Sample 3 burning time (s)	-
A.2.7	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9	N
	Sample 1 burning time (s)	-
	Sample 2 burning time (s)	-
	Sample 3 burning time (s)	-
A.3	Hot flaming oil test (see 4.6.2)	N
A.3.1	Mounting of samples	N
A.3.2	Test procedure	N
A.3.3	Compliance criterion	N
Annex B	Motor tests under abnormal conditions (see 4.7.2.2 and 5.3.2)	N
B.1	General requirements	N
	Position	-
	Manufacturer	-
	Type	-
	Rated values	-
B.2	Test conditions	N
B.3	Maximum temperatures	N
B.4	Running overload test	N
B.5	Locked-rotor overload test	N
	Test duration (days)	-
	Electric strength test: test voltage (V)	-
B.6	Running overload test for d.c. motors in secondary circuits	N

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Clause	Requirement + Test		Result - Remark
B.6.1	General		N
B.6.2	Test procedure		N
B.6.3	Alternative test procedure		N
B.6.4	Electric strength test; test voltage (V)		N
B.7	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1	General		N
B.7.2	Test procedure		N
B.7.3	Alternative test procedure		N
B.7.4	Electric strength test; test voltage (V)		N
B.8	Test for motors with capacitors		N
B.9	Test for three-phase motors		N
B.10	Test for series motors		N
	Operating voltage (V)		-
Annex C	Transformers (see 1.5.4 and 5.3.3)		N
	Position		-
	Manufacturer		-
	Type		-
	Rated values		-
	Method of protection.....		-
C.1	Overload test		N
C.2	Insulation		N
	Protection from displacement of windings.....		N
Annex D	Measuring instruments for touch-current tests (see 5.1.4)		N
D.1	Measuring instrument		N
D.2	Alternative measuring instrument		N
Annex E	Temperature rise of a winding (see 1.4.13)		N
Annex F	Measurement of clearances and creepage distances (see 2.10 and Annex G)		N
Annex G	Alternative method for determining minimum clearances		N
G.1	Clearances		N
G.1.1	General		N

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Clause	Requirement + Test	Result - Remark
G.1.2	Summary of the procedure for determining minimum clearances	N
G.2	Determination of mains transient voltage (V)	N
G.2.1	AC mains supply	N
G.2.2	Earthed d.c. mains supplies	N
G.2.3	Unearthed d.c. mains supplies	N
G.2.4	Battery operation	N
G.3	Determination of telecommunication network transient voltage (V)	N
G.4	Determination of required withstand voltage (V)	N
G.4.1	Mains transients and internal repetitive peaks	N
G.4.2	Transients from telecommunication networks	N
G.4.3	Combination of transients	N
G.4.4	Transients from cable distribution stems	N
G.5	Measurement of transient voltages (V)	N
	a) Transients from a main supply	N
	For an a.c. mains supply	N
	For a d.c. mains supply	N
	b) Transients from a telecommunication network	N
G.6	Determination of minimum clearances	N
Annex H	Ionizing radiation (see 4.3.13)	N
Annex J	Table of electrochemical potentials (see 2.6.5.6)	N
	Metal(s) used	
Annex K	Thermal controls (see 1.5.3 and 5.3.8)	N
K.1	Making and breaking capacity	N
K.2	Thermostat reliability; operating voltage (V)	N
K.3	Thermostat endurance test; operating voltage (V)	N
K.4	Temperature limiter endurance; operating voltage (V)	N
K.5	Thermal cut-out reliability	N
K.6	Stability of operation	N
Annex L	Normal load conditions for same types of electrical business equipment (see 1.2.2.1 and 4.5.2)	N

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Clause	Requirement + Test	Result - Remark
L.1	Typewriters	N
L.2	Adding machines and cash registers	N
L.3	Erasers	N
L.4	Pencil sharpeners	N
L.5	Duplicators and copy machines	N
L.6	Motor-operated files	N
L.7	Other business equipment	N
Annex M Criteria for telephone ringing signals (see 2.3.1)		
M.1	Introduction	N
M.2	Method A	N
M.3	Method B	N
M.3.1	Ringing signal	N
M.3.1.1	Frequency (Hz)	-
M.3.1.2	Voltage (V)	-
M.3.1.3	Cadence; time (s), voltage (V)	-
M.3.1.4	Single fault current (mA)	-
M.3.2	Tripping device and monitoring voltage	N
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage	N
M.3.2.2	Tripping device	N
M.3.2.3	Monitoring voltage (V)	N
Annex N Impulse test generators (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)		
N.1	ITU-T impulse test generators	N
N.2	IEC 60065 impulse test generator	N
Annex P Normative references		
Annex Q Voltage dependent resistors (VDRs) (see 1.5.9.1)		
	a) Preferred climatic categories	N
	b) Maximum continuous voltage	N
	c) Pulse current	N
Annex R Examples of requirements for quality control programmes		
		N

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Clause	Requirement + Test	Result - Remark
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6.2)	N
R.2	Reduced clearances (see 2.10.3)	N
Annex S	Procedure for impulse testing (see 6.2.2.3)	N
S.1	Test equipment	N
S.2	Test procedure	N
S.3	Examples of waveforms during impulse testing	N
Annex T	Guidance on protection against ingress of water (see 1.1.2)	N
Annex U	Insulated winding wires for use without interleaved insulation (see 2.10.5.4)	N
Annex V	AC power distribution systems (see 1.6.1)	N
V.1	Introduction	N
V.2	TN power distribution systems	N
Annex W	Summation of touch currents	N
W.1	Touch current from electronic circuits	N
W.1.1	Floating circuits	N
W.1.2	Earthed circuits	N
W.2	Interconnection of several equipment's	N
W.2.1	Isolation	N
W.2.2	Common return, isolated from earth	N
W.2.3	Common return, connected to protective earth	N
Annex X	Maximum heating effect in transformer tests (see clause C.1)	N
X.1	Determination of maximum input current	N
X.2	Overload test procedure	N
Annex Y	Ultraviolet light conditioning test (see 4.3.13.3)	N
Y.1	Test apparatus	N
Y.2	Mounting of test samples	N
Y.3	Carbon-arc light-exposure apparatus	N
Y.4	Xenon-arc light exposure apparatus	N

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Clause	Requirement + Test	Result - Remark
Annex Z	Overvoltage categories (see 2.10.3.2 and Clause G.2)	N
Annex AA	Mandrel test (see 2.10.5.8)	N
Annex BB	Changes in the second edition	N
Annex CC	Evaluation of integrated circuit (IC) current limiters	N
CC.1	General	N
CC.2	Test program 1	N
CC.3	Test program 2	N
Annex DD	Requirements for the mounting means of rack-mounted equipment	N
DD.1	General	N
DD.2	Mechanical strength test, variable N	N
DD.3	Mechanical strength test, 250N, including end stops	N
DD.4	Compliance.....	N
Annex EE	Household and home/office document/media shredders	N
EE.1	General	N
EE.2	Markings and instructions	N
	Use of markings or symbols	N
	Information of user instructions, maintenance and/or servicing instructions	N
EE.3	Inadvertent reactivation test	N
EE.4	Disconnection of power to hazardous moving parts	N
	Use of markings or symbols	N
EE.5	Protection against hazardous moving parts	N
	Test with test finger (Figure 2A)	N
	Test with wedge probe (Figure EE1 and EE2)	N

1.5.1	TABLE: List of critical components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity	
PTC1	Littelfuse	TRF250-183US	183mA 100Vdc, 10A _{rms}	ITU-T K.20, K.21	None	
D2, D3	Diodes Incorporated	SM15TY	36V	ISO10605 ISO7637-2 UL94	None	
D1, D7	ST Microelectronics	DFLS160-7	1A, 60V V-0	UL94	None	
U9	Monolithic Power Systems	MP4560	55V, 2A	None	None	
¹⁾ An asterisk indicates a mark which assures the agreed level of surveillance						
Supplementary information:						

1.6.2	TABLE: Electrical Data (in normal conditions)					P
I rated (A)	U (V)	P (W)	I (mA)	I fuse (mA)	condition/status	
200mA	24V	-	-	-	Normal	
Supplementary information:						

2.2	TABLE: evaluation of voltage limiting components in SELV circuits				N
Component (measured between)	max. voltage (V) (normal operation)		Voltage Limiting Components		
	V peak	V d.c.			
--	--	--		--	
--	--	--		--	
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)				
--	--				
Supplementary information:					

2.4.2	TABLE: limited current circuit measurement				N
Location	Voltage (V)	Current (mA)	Freq. (KHz)	Limit (mA)	
--	--	--	--	--	
--	--	--	--	--	
Supplementary information:					

2.5	TABLE: limited power sources				N
Circuit output tested:					
Measured Uoc (V) with all load circuits disconnected					
Components	I _{sc} (A)		VA		
	Meas.	Limit	Meas.	Limit	
--	--	--	--	--	
--	--	--	--	--	
Supplementary information:					

2.10.2	Table: working voltage measurement			P
Location	Peak voltage (V)	RMS voltage (V)	Comments	
Power input	24V	--	Normal operation	
Supplementary information:				
--				

2.10.3 and 2.10.4	TABLE: Clearance and creepage distance measurements						N
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)	
--	--	--	--	--	--	--	
--	--	--	--	--	--	--	
Supplementary information:							

2.10.5	TABLE: Distance through insulation measurements					N
Distance through insulation (DTI) at/of:	U peak (V)	U rms (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)	
--	-	-	-	-	-	
--	-	-	-	-	-	
Supplementary information:						

4.3.8	TABLE: Batteries								N
The tests of 4.3.8 are applicable only when appropriate battery data is not available									N
Is it possible to install the battery in a reverse polarity position?									N
	Non-rechargeable batteries			Rechargeable batteries					
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging	
	Meas. current (mA)	Manuf Specs (mA)		Meas. Current (mA)	Manuf. Spec (mA)	Meas. current (mA)	Manuf Specs (mA)	Meas. current (mA)	Manuf Specs (mA)
Max. current during normal condition	--	--	--	--	--	--	--	--	--
Max. current during fault condition	--	--	--	--	--	--	--	--	--
Test results:									Verdict
- Chemical leaks									N
- Explosion of the battery									N
- Emission of flame or expulsion of molten metal									N
- Electric strength tests of equipment after completion of tests									N
Supplementary information:									
Battery category									
Manufacturer									
Type / model									
Voltage									
Capacity									
Tested and Certified									

4.5	TABLE: Thermal requirements							P
	Supply voltage (V)							
	Ambient T _{min} (°C)							
	Ambient T _{max} (°C)							
Maximum measured temperature T of part/at:				T (°C)			Allowed T _{max} (°C)	
--				--			--	
Temperature T of winding:		t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class

--	--	--	--	--	--	--	--
Supplementary information:							
Evaluation done by simulation							

4.5.5	TABLE: Ball pressure test of thermoplastic parts						N
	Allowed impression diameter (mm)	2 mm					
Part		Test temperature (°C)	Impression diameter (mm)				
--		--	--				
Supplementary information:							

4.7	TABLE: Resistance to fire					N
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class		
--	--	--	--	--		
Supplementary information:						

5.1	TABLE: touch current measurement				N
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions		
--	--	--	--		
--	--	--	--		
Supplementary information:					

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests				N
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No		
--	--	--	--		
--	--	--	--		
Supplementary information:					

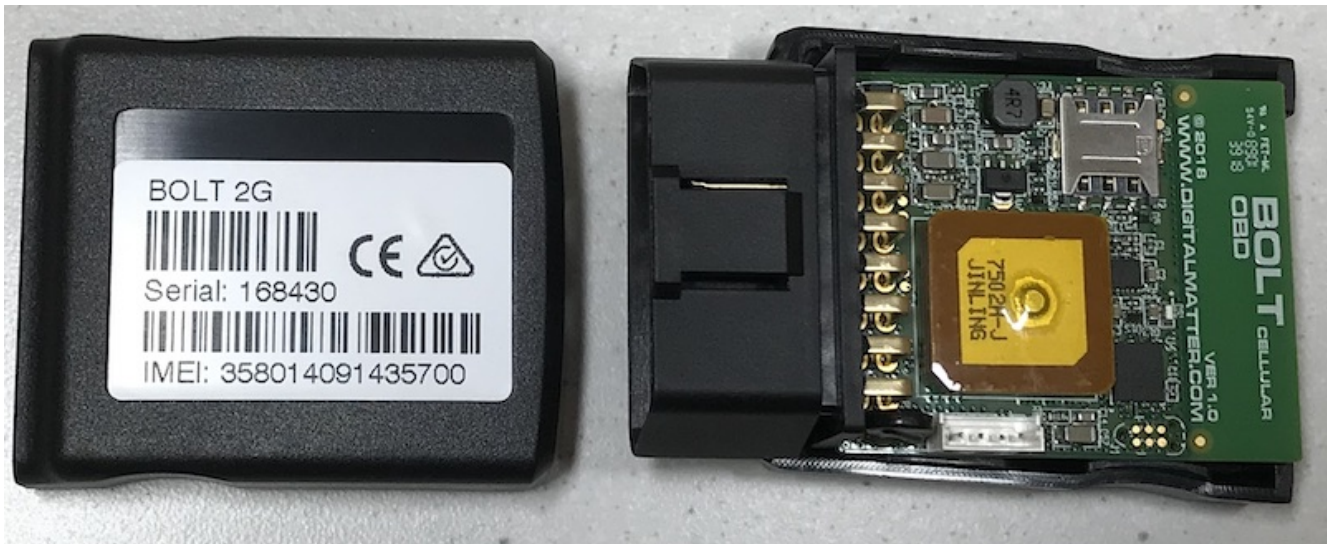
5.3	TABLE: Fault condition tests			P
	Ambient temperature (°C)			
	Power source for EUT: Manufacturer, model/type, output rating :	-		

Component No.	Fault	Supply voltage (V)	Test time (min)	Fuse #	Fuse current (A)	Observation
				--	--	
				--	--	
				--	--	
				--	--	
Supplementary information:						
Evaluation done by simulation. All critical components are rated for high power/current than the maximum rated input current. PTC rated lower than rated input current.						

APPENDIX 1: Device images



Top View: Bolt 2G PCB



Bottom View: Bolt 2G PCB



Top View: Bolt CAT-M1 PCB



BottomView: Bolt CAT-M1 PCB

*** END OF REPORT ***