添付資料

～製品安全における電気試験の考え方と進め方～

(1) Product Summary of Sample Product -201408

This product is a LED Illuminator with adjusting LED intensity, and has an inverter (Input: DC12V to Output: AC100V) in additional function.

(2)Specifications

Power Source	Input Rating: AC100-240V, 50/60Hz, 10-20VA Electrical Protection: Class Ⅰ
Power Supply Cords	- For AC100-120V area UL Listed, detachable power cord set, 3-conductor grounding Type SVT, No. 18 AWG, 3 m long maximum, rated at AC125V minimum. - For AC220-240V area Approved according to EU/EN standards, 3-conductor grounding Type H05VV-F, 3 m long maximum, rated at AC250V minimum.
Function	1)LED Controller with Illuminator Controller(DIMMER): DC12-24V, 8A Illuminator: DC24V 2)AC100V Inverter Input: DC12V *External Battery Output: AC100V, 150VA (150W)
Operating Environment	Temperature: 0 - 40℃, Humidity: 85%RH Max (Non-condensing) Altitude: 2000m Max Pollution: Degree 2 Installation: Category Ⅱ
Dimensions	Approx. 320(W) x 240(D) x 80(H) mm
Weight	Approx. 3kg
Conforming Standards	CE Marking Low Voltage Directive: 2014/35/EU EN 61010-1:2010 EMC Directive: 2014/30/EU EN 61326-1:2013 RoHS Directive: 2011/65/EU EN 50581:2012

(3) Technical Construction

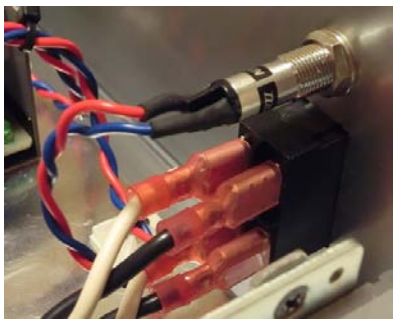
All enclosures are made of metal, and electrical parts are installed in the lower enclosure covered with screws. Main electrical parts of the primary circuit are approved and wirings are segregated between primary and secondary.

The instrument is designed as an apparatus consisted of electrical parts, sub-assemblies and mechanical parts to meet safety and EMC requirements according to the EU Directives with CE Marking. Major electrical parts including sub-assembled units were chosen in consideration of EU/UL approved or CE marking parts.

The Sample Product -201408 employs a detachable power supply cord (EU approved) depending on supply voltage such as AC230V. And all critical parts such as AC inlet, power SW, and switching power supply unit are approved. Regarding the electrical parts for safety, please refer to the attached CDF (Construction Data Form).

(4) Configurations

The following photos are internal constructions of the Sample Product-201408.



(5) Power Supply Cord

The attached detachable power supply cord set should be used. The approved power cord described in the CDF (Construction Data Form) will be shipped from the manufacturer with the apparatus. Regarding connection of power source and specification, they are instructed in the instruction manual.

Power Supply Cable

Plug

Connector

(6) Electrical Block Diagram

The electric block diagram of the instrument shows entire system of the control including the power supply. *See P6.

(7) Electrical Components (CDF)

Electric components relating to safety and specifications of parts are described in the CDF (Construction Data Form). *See P7-8.

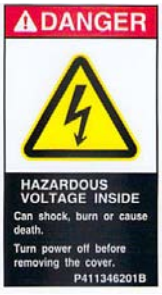
(8) Constructions (Safety Protection)

Regarding risk analysis under consideration of hazards about the product, there are risks of electric shock and fire. In order to prevent hazardous events, the following matters were taken into consideration in the design stage.

1. Employing approved parts and power supply cord in primary circuit.
   Refer to the CDF.
   *Remark: The approved switching power supply unit has a fuse to protect circuits from electrical malfunctions.
2. Enclosing electrical parts with metal enclosure not to spread of fire and not to allow aggression of a foreign matter except ventilation openings.
3. When current exceeds the specified limit, the device shuts off output immediately and automatically.

(9) Labels (CAUTION/WARNING/DANGER)

The following DANGER label is affixed on the specified location of the instrument.
*Please see Instruction Manual.



(10) Safety Test plan

Test plan for the safety test was made in advance. Practical testing was performed according to the following table and reported to meet requirements of standard.

安全試験 Safety Test

安全評価(電気･機械) Electrical･Mechanical Safety Evaluation

■ **IEC/EN 61010-1** ☐ IEC/EN 60204-1 ☐IEC/EN 60335-1

	試験項目 Test Items	内容 Contents	類似実績ﾃﾞｰﾀ	規格項目 Standards Items *61010-1	*60204-1	
電気	■ｲﾝﾌﾟｯﾄ試験 Power Input Test	AC90V to AC264V 50/60Hz	☐	5.1.3-c)	*A.3	
	■漏れ電流試験 Earth Leakage Test	Leakage (Disconnecting PE line)	☐	6.3.2	*A.6/..8	
	■温度上昇試験 Heating Test	Power Supply Unit, Main body (inside)	☐	10.	*A.21A/B	
	☐残留電圧試験 Residual Voltage Test	AC inlet	☐		*A14	19.5
	■保護ｱｰｽ導通試験 Earth Continuity Test	25A Test	☐	6.5.3	*A12	19.2
	☐保護ﾎﾞﾝﾃﾞｨﾝｸﾞｲﾝﾋﾟｰﾀﾞﾝｽ試験 Continuity of Protective Bonding Circuit		☐	6.5.1.3 6.5.1.5	*A.10 *A.11	19.2
	■耐電圧試験 Electric Strength Test	Electrical parts/wirings	☐	6.8	*A.5/.14	19.4
	☐温度試験 Temperature Test	(Manufacturer's data)	☐	10.4	-	
	☐絶縁抵抗試験 Insulation Resistance Test		☐	-	-	19.3
メカ	☐ｴﾝｸﾛｰｼﾞｬｰ剛性試験 Enclosure rigidity	Construction check	☐	8..1	*A.23	
	☐高圧危険試験 High Pressure Leakage		☐	11.7.2	*A.24	
	☐電源ｺｰﾄﾞ物理試験 Cord Physical Test		☐	6.10.2	*A15	
	☐騒音試験 Sound Pressure Test		☐	12.5.1	*A.26	
	☐安定性試験 Stability Test	Construction check ±10°	☐	7.3	-	
	☐落下試験 Drop Test		☐	8.2	-	
	☐吊上げ及び横持ち試験 lifting & Carrying		☐	7.4	-	
	☐壁取付け試験 Wall Mounting		☐	7.5		
	■表示耐久性試験 Marking Durability	Material of label	☐	5.3	*A.4	
放射線	☐Laserﾊﾟﾜｰ測定 Laser Power Test		☐	12.6	-	
	☐紫外線ﾊﾟﾜｰ測定 UV Power Test		☐	12.3	-	
	☐電離放射線測定 Ionizing Radiation Test		☐	12.2.1	*A25	
その他	☐保護機能試験 Interlock Function Test		☐	15.	-	19.6
	■単一故障条件試験 Single Fault Test		☐	4.4	*A.1/.2	
	☐ﾊﾞｯﾃﾘｰ Battery Test		☐	13.2.2	*A.27	

※備考 Remarks:規格要求とテスト Requirements + Test (IEC/EN 61010-1:2010) ※上記の類似実績ﾃﾞｰﾀ有りは下記Form非該当とする。
(実績ﾃﾞｰﾀで適合性評価→技術文書TD)

4.4.2	*■A.1: Summary of single fault conditions	9.3.2	☐A.18: Construction requirements
4.4	*■A.2: Testing in single fault condition – Results	9.4	☐A.19: Limited-energy circuit
5.1.3c)	*■A.3: Mains supply	9.5	☐A20:Requirements for equip. of flammable liquids
5.3	*■A.4: Durability of markings	10.	*■A.21A: Temperature Measurements
6.	*■A.5: Protection against electric shock - Block diagram of system	10.2	*☐A.21B: Temperature of windings Resistance method Temperature Measurements
6.2	*■A.6: List of accessible parts	10.5.2	☐A.22: Resistance to heat of non-metallic enclosure ☐A.
6.	■A.7: Values in normal condition	10.5.3	23: Insulating Materials
6.3.2	*■A.8: Values in single fault condition	8.	*☐A.24: Mechanical resistance to shock and impact
6.5.2.2	■A.9: Cross-sectional area of bonding conductors	11.7.2	*☐A.25: Leakage and rupture at high pressure
6.5.2.4	*■A.10:Bonding impedance of plug connected equipment	12.2.1	*☐A.26: Ionizing radiation
6.5.2.6	*☐A.11:Indirect bonding for measuring & test equipment	12.5.1	*☐A.27: Sound level
6.5.4	*☐A.12: Protective impedance	13.2.2	*☐A.28: Batteries
6.7	■A.13: Clearances and creepage distances	14.3	☐A.29: Over-temperature protection devices
6.8	*■A.14: Dielectric strength tests	4.4.2.7	☐A.30: Mains transformer (Short circuit)
6.10.2	*☐A.15: Cord anchorage	4.4.2.7	☐A.31: Mains transformer (Overload tests)
7.	☐A.16: Protection against mechanical hazards	14.8	☐A.32: Transient overvoltage limiting devices
9.	☐A.17: Protection against the spread of fire	-	☐A.xx: Addition to Form

備考 Remarks

(11) Summary of Safety Evaluation

Safety evaluation for the model was carried out according to the standard IEC/EN 61010-1: 2010. As a result, the product had satisfied all safety requirements of the applicable standard.

*IEC/EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements

The followings are summary of product safety evaluation for CE Marking.

1. AC power cables are wired with using approved cable for the power lines.
2. Electrical system in primary circuits employs approved parts such as TUV/UL/CSA or CE declaration parts and all parts were reviewed and reported in the CDF.
3. Protective Earth is mounted on the main primary circuit with protective bonding earth. (PE is wired to AC inlet with an approved appliance.)
4. The enclosures of the power units and control circuits are made of metal and securely covered with screws so that only service person is allowed to access to the inside of enclosure.
5. Regarding transformers employed in switching power supply, they were evaluated in the approved parts.

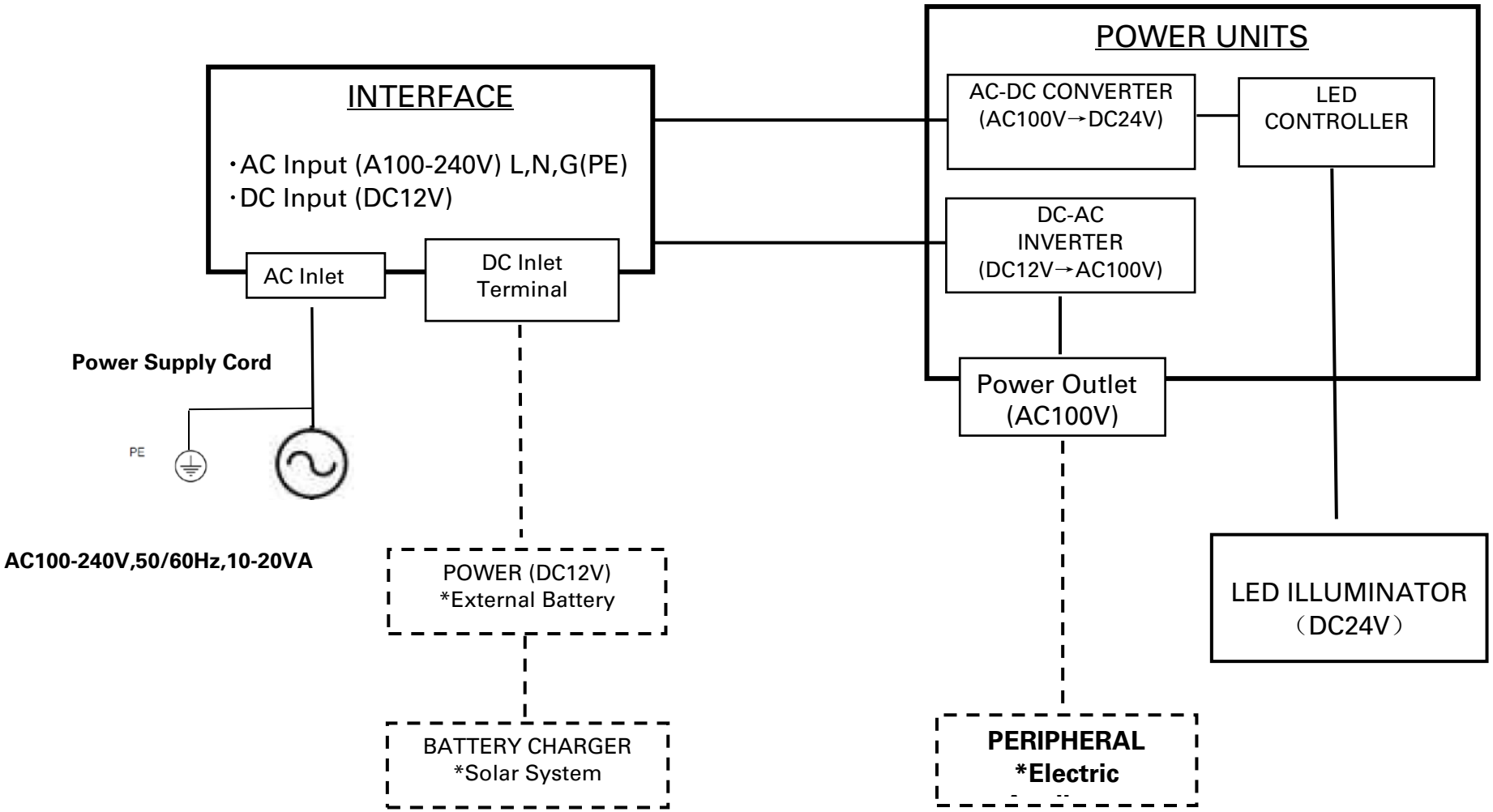
■Summary of testing: *Test Report No. FS14006

The test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the standard.

Clause No.	Test Item	Results
4.4	**Single fault condition tests**	**Pass**
5.1.3c)	**Mains supply (Input test)**	**Pass**
5.3	**Durability of markings**	**Pass**
6.2	**Determination of accessible parts**	**Pass**
6.3.1	**Values in normal condition**	**Pass**
6.3.2	**Values in single fault condition**	**Pass**
6.5.1.1	**Cross-sectional area of bonding conductor**	**Pass**
6.5.1.2	**Tightening torque test**	**Pass**
6.5.1.3	**Bonding impedance of plug connected equipment**	**Pass**
6.7	**Clearances and creepage distances**	**Pass**
6.8	**Dielectric strength tests**	**Pass**
6.8.2	**Humidity preconditioning**	**Pass**
8	**Mechanical resistance to shock and impact**	**Pass**
9	**Protection against the spread of fire**	**Pass**
10.1-10.4.1	**Temperature measurements**	**Pass**

■Electrical Block Diagram

PRODUCT: Sample Product -201408



■CDF (Construction Data Form)

IEC 61010-1			
Product	Sample Product-201408	Result –Remark	Rev.0

	TABLE: 3 - List of components and circuits relied on for safety				
Unique component reference or location	Application/Function	Manufacturer (NOTE 1)	Type / model	Technical data (NOTE 2)	Evidence of acceptance (NOTE 3)
Detachable Power Supply Cord Set for Europe area	AC Input	Various	3 conductor grounding type H05VV-F	3m long max., 250Vac min.	Approved according to EU/EN standards
Detachble Power Supply Cord Set for North America and Canada	AC Input	Various	3 conductor grounding Type SVT, No. 18 AWG	3m long max., 125Vac min.	UL Listed detachable power cord
Detachble Power Supply Cord Set for Japan-domestic	AC Input	Various	Cord: F Plug: C33 Connector: YC-13	Cord: 300V, Plug: 125Vac, 7A, Connector: 125Vac, 7A <PS>E	JET
Appliance Inlet	AC Input	Various	Various	250Vac, 15A EN 60320-1, +A1, UL 498, CSA C22.2 No. 182.3	VDE: Nr. ****** UL: E ***** CSA: LR*****
Protective Earth Wire	PE	Various	Various	Green/Yellow insulated wire, 600V, 0.75mm^2 (AWG18), VW-1, 105°C UL 758, CSA *****	UL, CSA
Screw of Protective Earth Conductor	PE	Various	Various	M4 Screw with spring washer	--

IEC 61010-1			
Product	SAFETY PRODUCT-201408	Result - Remark	Rev.0

Unique component reference or location	Application/Function	Manufacturer (NOTE 1)	Type / model	Technical data (NOTE 2)	Evidence of acceptance (NOTE 3)
Primary Internal Wires (between Appliance Inlet and SWPS)	AC Input	Various	Various	600V, 0.75mm^2 (AWG18), VW-1, 105°C UL 758, CSA *****	UL, CSA
Power Switch	AC Input	Various	Various	250Vac, 10A EN 61058-1, UL 1054	VDE: Nr. ***** UL/cUL: E *****
Fuse	AC Input	Various	Various	250Vac, T8A EN 60127-2, UL 248-1, UL 248-14, CSA C22.2 No.248.1, 248.14	VDE: Nr. ***** UL: E ***** CSA No.: *****
Switching Power Supply	AC Input	COSEL	PLA15F-24	Input: AC100-240V,50-60Hz,0.4A Output: DC24V, 0.7A	TUV：R50285891
Inverter	DC Input	Various	Various	Input: DC12V Output: AC100V	-
AC Outlet	AC Input	Various	Various	AC100V, 10A	-
Top/Front Enclosure	Enclosure	Various	Various	Metal, min. 1.0mm thick	Tested with equipment.
Bottom/Rear Enclosure	Enclosure	Various	Various	Metal, min. 1.0mm thick	Tested with equipment.
Left-side, Right-side Enclosure	Enclosure	Various	Various	Metal, min. 1.0mm thick	Tested with equipment.

NOTE 1 - List all manufacturers concerned.
NOTE 2 - Electrical, mechanical, flammability, etc.
NOTE 3 – Licence number, file number or other documentary evidence of acceptance

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.4.2	**TABLE: Summary of SINGLE FAULT CONDITIONS**			**Form A.1**	P
Subclause	Title	Does not apply	Carried out	Comments	
4.4.2.1	SINGLE FAULT CONDITIONS not covered by 4.4.2.2 to 4.4.2.14	X		see Form A.2	
4.4.2.2	PROTECTIVE IMPEDANCE	X			
4.4.2.3	PROTECTIVE CONDUCTOR		X	see Form A.8	
4.4.2.4	Equipment or parts for short-term or intermittent operation	X			
4.4.2.5	Motors	X		Not employed.	
	– stopped while fully energized	X			
	– prevented from starting	X			
	– one phase interrupted (multi-phase)	X			
4.4.2.6	Capacitors	X			
4.4.2.7	MAINS transformers Attach drawing of MAINS transformers showing all protective devices (see Forms A.30 and A.31)	X		Not employed. (Approve SWPS is used.)	
4.4.2.8	Outputs		X	AC100V (AC outlet)	
4.4.2.9	Equipment for more than one supply	X			
4.4.2.10	Cooling		X	Performed heating test.	
	– air holes closed		X		
	– fans stopped	X			
	– coolant stopped	X			
	– loss of cooling liquid	X			
4.4.2.11	Heating devices	X		Not employed.	
	– timer overridden	X			
	– temperature controller overridden	X			
4.4.2.12	Insulation between circuits and parts	X			
4.4.2.13	Interlocks	X		Not employed.	
4.4.2.14	Voltage selectors	X		Not employed.	
List below all SINGLE FAULT CONDITIONS not covered by 4.4.2.2 to 4.4.2.14:					
Supplementary information: (see Form A.2 for details of tests) EUT: Sample Product-201408					

TESTED BY: S.Fujinoki DATE: 21 Aug., 2014 TEST EQUIPMENT LIST ITEM:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

4.4	**TABLE: Testing in SINGLE FAULT CONDITION – Results**			**Form A.2**	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4
4.4.2.1	1	Protective conductor interrupted	1 min.	Unit operated normally	P
4.4.2.10	2	Continuous AC power	35 min	Temperature stabilized. No hazard, no damaged.	P

NOTE Td = Test duration in hh:mm:ss
Record dielectric strength test on Form A.14 and temperature tests on Form A.21.
Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.

Supplementary information:

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

5.1.3c)	**TABLE: MAINS supply**	**Form A.3**	F
	Marked rating ..... :	AC100-240 V	—
	Phase ..... :	Single	—
	Frequency ..... :	50/60 Hz	—
	Current ..... :	- A	—
	Power ..... :	- W	—
	Power ..... :	200 VA *Mfr's Spec.	—

Test No.	Voltage V	Frequency Hz	Current A	Power in W	Power in VA	Comments
1	90	50	0.84	3.8	7.5	Reference only
	100		0.79	3.8	7.9	
	240		0.53	3.9	12.7	
	264		0.51	4.1	13.5	Reference only
2	90	60	0.86	3.9	7.7	Reference only
	100		0.81	3.9	8.1	
	240		0.55	4.1	13.0	
	264		0.53	4.1	13.8	Reference only

Note – Measurements are only required for marked ratings.

Supplementary information:

・LED Illuminator: Maximum intensity

・VA averages are 10.3VA on 50Hz, 10.55VA on 60Hz *Not including the above reference data.

The VA rating has to be within ±20% to the average on each frequency. *Cl. 5.1.3 c) of IEC 61010-1

12.36≦VA(10.3)≦8.24 (50Hz)

12.66≦VA(10.55)≦ 8.44 (60Hz)

Therefore, the above tested results are not within ±20% to the average.

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

5.3	TABLE: Durability of markings	Form A.4	P

Marking method (see NOTE)	Agent
1) Adhesive label	A Water
2) Ink printed	B Isopropyl alcohol 70%
3) Laser marked	C (specify agent)
4) Filmcoated (plastic foil control panel)	D (specify agent)
5) Imprinted on plastic (moulded in)	E (specify agent)

NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location	Marking method (see above)
Identification (5.1.2)	1
MAINS supply (5.1.3)	1
Fuses (5.1.4)	1
terminals and operating devices (5.1.5.2)	1
Switches and circuit breakers (5.1.6)	N/A
Double/reinforced equipment (5.1.7)	N/A
Field wiring Terminal boxes (5.1.8)	N/A
Warning marking (5.2)	1
Battery charging (13.2.2)	N/A

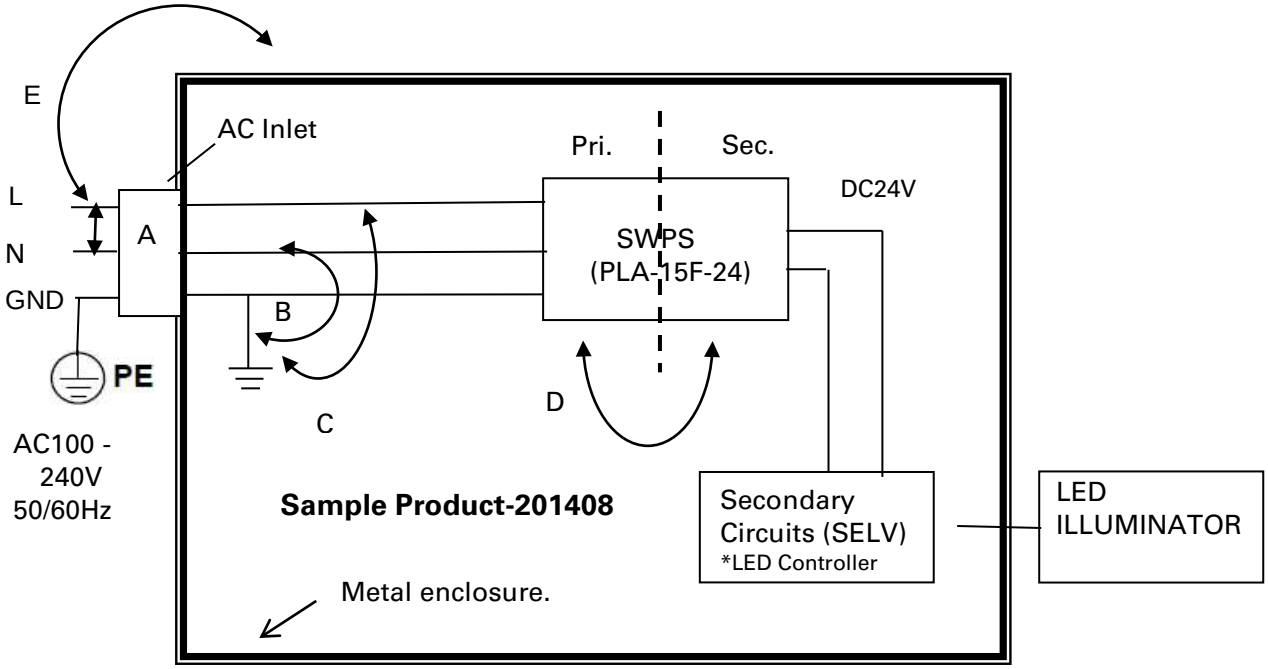
Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
A	1	P	P	P	Suitable printings and materials for labelling.
A,	1	P	P	P	

Supplementary information:

TESTED BY: S.Fujinoki DATE: 24 Aug., 2014 TEST EQUIPMENT LIST ITEM:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6	**TABLE: Protection against electric shock - Block diagram of system**	**Form A.5**	P



Pollution degree ..... : 2

Overvoltage category ..... : Ⅱ

Location or description	Insulation type (NOTE 1)	Maximum working voltage (NOTE 2)	CREEPAGE Distance (NOTE 3) PWB mm	CTI	Other mm	CTI	CLEARANCE (NOTE 3) mm	Test voltage (NOTE 2) V	Comments
A	BI	240Vrms	1.5	≧100	3.0	>100	1.5	1620Vac	Pass
B and C	BI	240Vrms	1.5	≧100	3.0	>100	1.5	1620Vac	Pass
D	RI or DI	240Vrms	3.0	≧100	6.0	>100	3.0	3330Vac	Not conducted

NOTE 1 – Type of insulation:
BI = BASIC INSULATION
DI = DOUBLE INSULATION
PI = PROTECTIVE IMPEDANCE
RI = Reinforced INSULATION
SI = Supplementary INSULATION

NOTE 2 - Types of voltage
Peak impulse test voltage (pulse)
r.m.s.
d.c.
peak

NOTE 3 - INSTALLATION CATEGORIES (OVERVOLTAGE CATEGORIES) or POLLUTION DEGREES which differ from these should be shown under "Comments".

Supplementary Information: *SWPS: Switching Power Supply

1) Withstanding test was not conducted on location “D” due to employing approved SWPS.
2) Values for test voltage includes correction factor.
3) Altitude: **approx. 1000m** at the test Laboratory △1: Revised 2019/1/26

*Considered correction factor of test site. (**Not applied in case of routine test.**)

B.I. =1.5mm AC1500V (Table 5) **1500V×1.08= AC1620V**

D.I. =3.0mm AC3000V (Table 5) **3000V×1.11= AC3330V**

4) Regarding the test data of SWPS (approved), see the manufacturer’s technical data.

Remarks;

・Correction factors of test site altitude → See Cl.6.8.1 Table 10 (Protection for voltage tests: General).
・Overvoltage category → See Annex K(.Insulation requirements no covered by 6.7)
・Test voltage → See Cl.6.7.2.1 (Solid insulation: General)
・CTI : Comparative Tracking Index (Cl.6.7.1.3)

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.2	**TABLE: List of ACCESSIBLE parts**	**Form A.6**	P
6.1.2	Exceptions		—
6.2	Determination of ACCESSIBLE parts		—

Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)
1	AC Inlet / Fuse	V	Employed approved parts
2	AC Outlet	V	Marked DANGER(High Voltage)
3	Enclosure	V	Enclosed metal material
4	DC Input Terminal	V	SELV

NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2)
NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)
NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see 6.4).
NOTE 4 – Capacitor test may be required (see Form A.7).
NOTE 5 – The determination methods are:
V = visual; R = rigid test finger; J = jointed test finger; P3 = pin 3 mm diameter; P4 = pin 4 mm diameter.

Supplementary information:

Remarks;
・SELV: Safety Extra Low Voltage *See IEC 60950-1 Cl.1.2.8.8.
See Cl.6.3.1 a) Levels in NORMAL CONDITION of Cl. Limit values for accessible parts.
*Reference: See IEC 60950-1 Cl.1.2.8.6 (HAZARDOUS VOLTAGE: voltage exceeding 42.4V peak or DC60V).

TESTED BY: _____ DATE: TEST EQUIPMENT LIST ITEM: _____

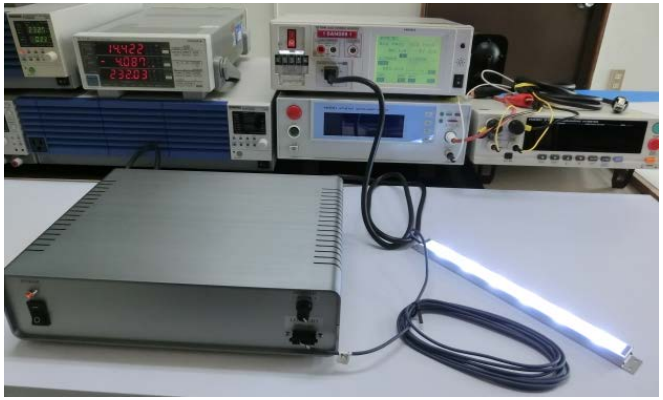
IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6	**TABLE: Values in NORMAL CONDITION**	**Form A.7**	P
6.1.2	Exceptions	11.2 Cleaning and decontamination	—
6.3.1	Values in NORMAL CONDITION (see NOTE 1)	11.3 Spillage	—
6.6.2	Terminals for external circuit	11.4 Overflow	—
6.10.3	Plugs and connections		—

Item	Voltage			Current				Capacitance		10 s / 5 s test (NOTE)			Comments
(see Form A.6)	V r.m.s.	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	μC	mJ	V	μC	mJ	
3	230	--	--	A2	0.066	--	--	--	--	--	--	--	Accessible enclosure (Normal)
3	230	--	--	A2	0.067	--	--	--	--	--	--	--	Accessible enclosure (Revers)

NOTE – A 10 s test is specified in 6.1.2 a) b). A 5 s test is specified in 6.10.3. The capacitance level versus voltage below the limits given from figure 3 of IEC 61010-1.

Supplementary information:



TESTED BY: S.Fujinoki DATE: 22 Aug.,2014 TEST EQUIPMENT LIST ITEM

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.3.2	TABLE: Values in SINGLE FAULT CONDITION										Form A.8	P
Item	Subclause and	Voltage			Transient (see NOTE)		Current				Capacitance	
(see Form A.6)	fault No. (see Form A.2)	V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	µF (see NOTE)	Comments
3	1	230	--	--	--	--	A2	0.227	--	--	--	Accessible enclosure (Normal)
3	1	230	--	--	--	--	A2	0.227	--	--	--	Accessible enclosure (Revers)

NOTE – Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.

Supplementary information:

TESTED BY: S.Fujinoki DATE: 22 Aug. 2014 TEST EQUIPMENT LIST ITEM

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

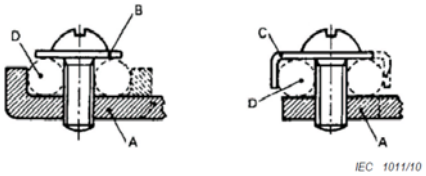
6.5.2.2	TABLE: Cross-sectional area of bonding conductors	Form A.9	P
CONDUCTOR LOCATION	CROSS-SECTIONAL AREA mm²		VERDICT
Protective bonding conductor (Green/Yellow)	0.75mm² (AWG18)		P

6.5.2.3	TABLE: Tighting torque test		
Conductor location	Size of screw	Tighting torque Nm	Verdict
Protective bonding conductor terminal screw on metal chassis	M4	Specified	P

Supplementary information:

Remarks;

・Integrity of protective bonding: See a) to k) of Cl. 6.5.2.2.



Key

A fixed part
B washer or clamping plate
C anti-spread device
D conductor space

・Tightening torque for binding screw assemblies

Thread size mm	4,0	5,0	6,0	8,0	10,0
Tightening torque N·m	1,2	2,0	3,0	6,0	10,0

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.5.2.4	TABLE: Bonding impedance of plug connected equipment Form A.10			P
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min V (NOTE 2)	Calculated resistance (Maximum 0,1 or 0,2 Ω) Ω (NOTE 1)	Verdict
PE Terminal to AC Inlet (GND)	25	-	0.025	P
PE Terminal to GND(Case) on SWPS	25	-	0.020	P
GND(PE) on Power Cord to SWPS(Case)	25	-	0.070	Ref.

NOTE 1 – For none-detachable power cord the impedance between protective conductor plug pin of MAINS cord and each ACCESSIBLE part shall not exceed 0,2 Ohm.

Supplementary information:

Remarks;
·Impedance of PROTECTIVE BONDING of plug-connected equipment: See Cl. 6.5.2.4.

6.5.2.5	TABLE: Bonding impedance of permanently connected equipment		N/A
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict

Supplementary information:

Remarks;
·Impedance of PROTECTIVE BONDING of PERMANENTLY CONNECTED EQUIPMENT: See Cl. 6.5.2.5.

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM:

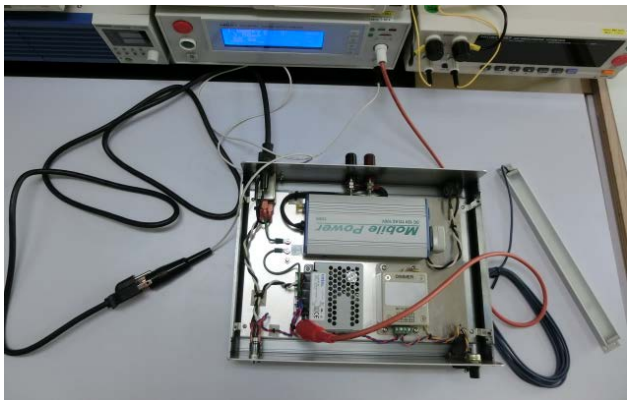
6.8	**TABLE: Dielectric strength tests** **Form A.14**	P
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS[1]	N/A
6.4	Primary means of protection[2]	P
6.6	Connections to external circuits	N/A
6.7.	Insulation requirements[2] (see Annex K)	P
6.10.2	Fitting of non-detachable MAINS supply cords[1]	N/A
9.2 a) 2)	Eliminating or reducing the sources of ignition within the equipment	N/A
9.4 c)	Limited-energy circuit	N/A
9.6.1	Overcurrent protection basic insulation between MAINS - parts	P

[1] Record the fault, test or treatment applied before the dielectric strength test. [2] Humidity preconditioning required.

	Test site altitude ..... :	630m	—
	Test voltage correction factor (see Table 10) ..... :	1.064	—

Location or references from Forms A.2 and A.5	Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s./peak/d.cV	Comments	Verdict
A	--	No	240Vrms	1620Vrms	Not required	N/A
B	--	No	240Vrms	1620Vrms	No breakdown	P
C	--	No	240Vrms	1620Vrms	No breakdown	P

Supplementary information:



Remarks;

・Primary means of protection: See Cl.6.4.

・Insulation requirements(CLEARANCES/ CREEPAGE DISTANCES) : See Cl.6.7.

・Overcurrent protection: See Cl.9.6.1.

*Equipment intended to be energized from a MAINS supply shall be protected by fuses, circuit breakers, thermal cut-outs, impedance limiting circuits or similar means, to provide protection against excessive current being drawn from the MAINS in case of a fault in the equipment.

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.	**TABLE : Temperature Measurements** **Form A.21A**	P
10.1	Surface temperature limits - NORMAL CONDITION and / or SINGLE FAULT CONDITION	P
10.2	Temperature of windings- NORMAL CONDITION and / or SINGLE FAULT CONDITION	N/A
10.3	Other temperature measurements	N/A

Operating conditions:	Normal operation (Connected with LED Illuminator)		
Frequency..... :	50 Hz	Test room ambient temperature (ta) ..... :	27 °C
Voltage ..... :	264 V	Test duration..... :	- h 30 min

Part / Location	t_m °C	t_c °C	t_{max} °C	Verdict	Comments
1. AC Inlet	27.8	40.8	70	P	Metal surface
2. Power Switch	28.7	41.7	80	P	Plastic
3. Fuse Holder	28.0	41.0	80	P	Plastic
4. SWPS	31.7	44.7	105	P	COCEL(PLA15F-24)
5. LED Controller	29.3	42.3	80	-	Around SWPS
6. LED Illuminator	31.6	44.6	80	P	Plastic
7. Rear Panel	27.7	40.7	70	P	Metal
8. Top Enclosure	27.9	40.9	70	P	Metal
9. Bottom Enclosure	27.8	40.8	70	P	Metal
10. Front Enclosure	28.2	41.2	70	P	Metal
11. Ambient (inside)	28.4	41.4	-	-	Around SWPS

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.21B for details of winding temperature measurements

Supplementary information:
Heating test was performed without AC Inverter.
Maximum loading with LED maximum intensity during heating test

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM:

10.	**TABLE : Temperature Measurements**	**Form A.21A**	P
10.1	Surface temperature limits - NORMAL CONDITION and / or SINGLE FAULT CONDITION		P
10.2	Temperature of windings- NORMAL CONDITION and / or SINGLE FAULT CONDITION		N/A
10.3	Other temperature measurements		N/A

Operating conditions:	Normal operation (Connected with LED Illuminator)		
Frequency..... :	60 Hz	Test room ambient temperature (ta) ..... :	27 °C
Voltage ..... :	90 V	Test duration..... :	- h 30 min

Part / Location	t_m °C	t_c °C	t_{max} °C	Verdict	Comments
1. AC Inlet	28.0	41.0	70	P	Metal surface
2. Power Switch	29.0	42.0	80	P	Plastic
3. Fuse Holder	28.1	41.1	80	P	Plastic
4. SWPS	31.1	44.1	105	P	COCEL(PLA15F-24)
5. LED Controller	29.8	42.8	80	-	Around SWPS
6. LED Illuminator	31.9	44.9	80	P	Plastic
7. Rear Panel	27.8	40.8	70	P	Metal
8. Top Enclosure	27.9	40.9	70	P	Metal
9. Bottom Enclosure	28.0	41.0	70	P	Metal
10. Front Enclosure	28.2	41.2	70	P	Metal
11. Ambient (inside)	28.4	41.4	-	-	Around SWPS

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.21B for details of winding temperature measurements

Supplementary information:
Heating test was performed without AC Inverter.
Maximum loading with LED maximum intensity during heating test.

Remarks;
・Equipment temperature limits and resistance to heat;
See Cl.10.

Table 20 – Maximum temperatures for insulation material of windings

Class of insulation (see IEC 60085)	NORMAL CONDITION °C	SINGLE FAULT CONDITION °C
Class A	105	150
Class B	130	175
Class E	120	165
Class F	155	190
Class H	180	210

Table 19 – Surface temperature limits in NORMAL CONDITION

Part	Limit °C
1 Outer surface of ENCLOSURE (unintentional contact)	
a) metal, uncoated or anodized	65
b) metal, coated (paint, non metallic)	80
c) plastics	85
d) glass and ceramics	80
e) small areas (<2 cm^2) that are not likely to be touched in NORMAL USE	100
2 Knobs and handles (NORMAL USE contact)	
a) metal	55
b) plastics	70
c) glass and ceramics	65
d) non-metallic parts that in NORMAL USE are held only for short periods (1 s – 4 s)	70
NOTE EN 563 gives information about the effect of the duration of contact.	

TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM:

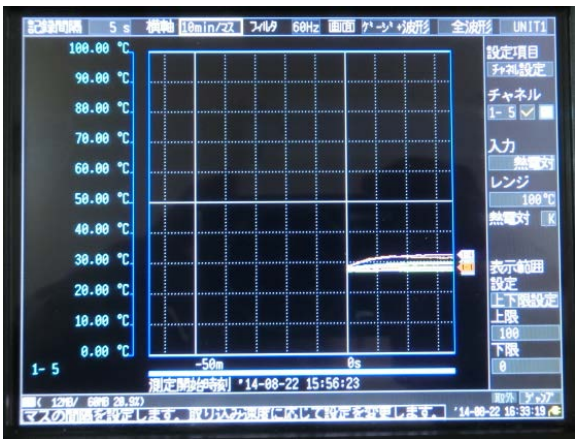
10.	**TABLE : Temperature Measurements**	**Form A.21A**	P
10.1	Surface temperature limits - NORMAL CONDITION and / or SINGLE FAULT CONDITION		P
10.2	Temperature of windings- NORMAL CONDITION and / or SINGLE FAULT CONDITION		N/A
10.3	Other temperature measurements		N/A

Operating conditions:	Abnormal operation *Closed air holes. (Connected with LED Illuminator)		
Frequency..... :	50 Hz	Test room ambient temperature (ta) ..... :	27 °C
Voltage ..... :	264 V	Test duration..... :	- h 35 min

Part / Location	t_m °C	t_c °C	t_{max} °C	Verdict	Comments
1. AC Inlet	27.8	40.8	70	P	Metal surface
2. Power Switch	28.9	41.9	80	P	Plastic
3. Fuse Holder	28.0	41.0	80	P	Plastic
4. SWPS	32.1	45.1	105	P	COCEL(PLA15F-24)
5. LED Controller	29.6	42.6	80	-	Around SWPS
6. LED Illuminator	31.1	44.1	80	P	Plastic
7. Rear Panel	27.6	40.6	70	P	Metal
8. Top Enclosure	27.7	40.7	70	P	Metal
9. Bottom Enclosure	27.9	40.9	70	P	Metal
10. Front Enclosure	28.1	41.1	70	P	Metal
11. Ambient (inside)	29.2	42.2	-	-	Around SWPS

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.21B for details of winding temperature measurements

Supplementary information:
Heating test was performed without AC Inverter.
Maximum loading with LED maximum intensity during heating test.



TESTED BY: S.Fujinoki DATE: 22 Aug., 2014 TEST EQUIPMENT LIST ITEM: