TESTING
No. L3110

TEST REPORT
IEC 60598-2-2
Luminaires
Part 2: Particular requirements
Section Two – Recessed luminaires

Reference No. ..... :	WT11116647-Z-F-O
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Applicant's name ..... :	NEWORB INTERNATIONAL CORPORATION LIMITED
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Manufacturer's Name ..... :	NEWORB INTERNATIONAL CORPORATION LIMITED
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Test specification	
Standard ..... :	IEC 60598-2-2: 1997 used in conjunction with IEC 60598-1: 2008
Non-standard test method ..... :	N/A
Test Report Form	60598-2-2/09-10
TRF originator. ..... :	---
Master TRF (date) ..... :	Dated 2009-09

Test item description ..... :	LED LIGHT
Trade Mark ..... :	N/A
Model/Type reference ..... :	See attached model list
Ratings ..... :	See attached model list

Copy of marking plate:

LED LIGHT

MODEL NO.:DL-LED-A
ITEM NO.: 2006LED
SELV 12V ⎓
LED 5 X 1 W
Must be connected to SELV output LED driver
Made in China
NEWORB INTERNATIONAL CORPORATION LIMITED
Suitable for covering with thermally insulating material

LED LIGHT

MODEL NO.:DL-LED-G
ITEM NO.:2447LED
SELV 12V ⎓
LED 7 X 1 W
Must be connected to SELV output LED driver
Made in China
NEWORB INTERNATIONAL CORPORATION LIMTIED
Suitable for covering with thermally insulating material

LED LIGHT

MODEL NO.:DL-LED-Z
ITEM NO.: 1650LED
SELV 12V ⎓
LED 4 X 1 W
Must be connected to SELV output LED driver
Made in China
NEWORB INTERNATIONAL CORPORATION LIMITED
Suitable for covering with thermally insulating material

On the luminaries surface outside the ceiling

Note: only the marking for model " 2006LED " & " 2447LED " & " 1650LED" are shown here, the marking plate for other models are similar except model No., the item No. and rated wattage.

Summary of testing:

All tests are performed on the representative models and deviation tests & construction check for the other models had been done according to the requirements of the standard(s) for recessed luminaires (IEC 60598-2-2).
The differences between standard of Saudi Arabia and IEC standard have been considered (no deviation).

Test item particulars ..... :	See below
Classification of installation and use ..... :	Recessed into ceiling
Supply Connection ..... :	Connector
..... :	
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 of receipt of test item ..... :	2011-11-28
Date (s) of performance of tests ..... :	2011-11-29 to 2011-12-11

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.
The report would be invalid without specific stamp for test institute or the authority.
The report would be invalid without the signatures of reporter and reviewer.
"(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 point is used as the decimal separator.
Clause numbers between brackets refer to clauses in IEC 60598-1

General product information:

LED LIGHT

These products are Class III recessed luminaires for indoor use only.

They are only suitable for connecting to the SELV or SELV-equivalent output LED driver.

They are suitable for covering with thermally insulating material in normal use (not including the LED driver, the LED driver should be assessed separately).

For other detail see model list in next page.

Model List

Model No.	Item No.	Input voltage (V)	Input power	IP classification	Protection against electric shock
DL-LED-A	2202LED	DC 12	3 x 1W	IP20	Class III
DL-LED-A	1194LED	DC 12	6 x 1W	IP20	Class III
DL-LED-A	2006LED	DC 12	5 x 1W	IP20	Class III
DL-LED-A	2591LED	DC 12	1 x 3W	IP20	Class III
DL-LED-A	2205LED	DC 12	6 x 1W	IP20	Class III
DL-LED-A	2085LED	DC 12	5 x 1W	IP20	Class III
DL-LED-Z	2080LED	DC 12	3 x 1W	IP20	Class III
DL-LED-Z	1642LED	DC 12	5 x 1W	IP20	Class III
DL-LED-Z	1650LED	DC 12	4 x 1W	IP20	Class III
DL-LED-A	1411LED	DC 12	3 x 1W	IP20	Class III
DL-LED-Z	1649LED	DC 12	6 x 1W	IP20	Class III
DL-LED-Z	2198LED	DC 12	4 x 1W	IP20	Class III
DL-LED-A	2203LED	DC 12	3 x 1W	IP20	Class III
DL-LED-Z	2199LED	DC 12	5 x 1W	IP20	Class III
DL-LED-A	2550LED	DC 12	3 x 1W	IP20	Class III
DL-LED-Z	1921LED	DC 12	1 x 1W	IP20	Class III
DL-LED-Z	1614LED	DC 12	3 x 1W	IP20	Class III
DL-LED-Z	2444LED	DC 12	4 x 1W	IP20	Class III
DL-LED-A	25078LED	DC 12	5 x 1W	IP20	Class III
DL-LED-A	1192LED	DC 12	1 x 1W	IP20	Class III
DL-LED-G	2447LED	DC 12	7 x 1W	IP20	Class III
DL-LED-G	2326LED	DC 12	5 x 1W	IP20	Class III
DL-LED-G	1984LED	DC 12	3 x 1W	IP20	Class III
DL-LED-G	2524LED	DC 12	5 x 1W	IP20	Class III
DL-LED-G	2528LED	DC 12	5 x 1W	IP20	Class III
DL-LED-G	2532LED	DC 12	5 x 1W	IP20	Class III
DL-LED-G	2584LED	DC 12	5 x 1W	IP20	Class III

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict

2.2 (0)	**GENERAL TEST REQUIREMENTS**		
2.2 (0.1)	Information for luminaire design considered	Standard IEC 60598-2-2 Yes☒No☐	—
2.2 (0.3)	More sections applicable .....:	Yes☐No☒	—

2.4 (2)	**CLASSIFICATION**		
2.4 (2.2)	Type of protection .....:	Class III	—
2.4 (2.3)	Degree of protection (Requirement: Ordinary) .....:	IP20	—
2.4 (2.4)	Luminaire only suitable for non-combustible surfaces .....:	Yes☐No☒	—
	Luminaire suitable for normally flammable surfaces:	Yes☒No☐	—
2.4 (2.5)	Luminaire for normal use .....:	Yes☒No☐	—
	Luminaire for rough service .....:	Yes☐No☒	—

2.5 (3)	**MARKING**		
2.5 (3.2)	Mandatory markings	See “copy of marking plate”	P
	Position of the marking		P
	Format of symbols/text		P
2.5 (3.3)	Additional information		P
	Language of instructions	In English	P
2.5 (3.3.1)	Combination luminaires		N
2.5 (3.3.2)	Nominal frequency in Hz	Direct current	N
2.5 (3.3.3)	Operating temperature		N
2.5 (3.3.4)	Symbol or warning notice		N
2.5 (3.3.5)	Wiring diagram	See user manual	P
2.5 (3.3.6)	Special conditions		N
2.5 (3.3.7)	Metal halide lamp luminaire – warning		N
2.5 (3.3.8)	Limitation for semi-luminaires		N
2.5 (3.3.9)	Power factor and supply current		N
2.5 (3.3.10)	Suitability for use indoors	Only for indoor used	N
20.5 (3.3.11)	Luminaires with remote control		N
2.5 (3.3.12)	Clip-mounted luminaire – warning		N
2.5 (3.3.13)	Specifications of protective shields		N
2.5 (3.3.14)	Symbol for nature of supply	⎓	P

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
2.5 (3.3.15)	Rated current of socket outlet		N
2.5 (3.3.16)	Rough service luminaire		N
2.5 (3.3.17)	Mounting instruction for type Y, type Z and some type X attachments		N
2.5 (3.3.18)	Non-ordinary luminaires with PVC cable		N
2.5 (3.3.19)	Protective conductor current in instruction if applicable		N
2.5 (3.3.20)	Provided with information if not intended to be mounted within arm's reach		N
2.5 (3.4)	Test with water	15s	P
	Test with hexane	15s	P
	Legible after test		P
	Label attached		P
2.5.1 (-)	Warning notice, if not suitable for insulating ceiling	See "copy of marking plate"	P
2.6 (4)	**CONSTRUCTION**		
2.6 (4.2)	Components replaceable without difficulty		N
2.6 (4.3)	Wireways smooth and free from sharp edges		P
2.6 (4.4)	Lampholders		
2.6 (4.4.1)	Integral lampholder		N
2.6 (4.4.2)	Wiring connection		N
2.6 (4.4.3)	Lampholder for end-to-end mounting		N
2.6 (4.4.4)	Positioning		N
	- pressure test (N) .....:	---	N
	- bending test (N) .....:	---	N
2.6 (4.4.5)	Peak pulse voltage		N
2.6 (4.4.6)	Centre contact		N
2.6 (4.4.7)	Parts in rough service luminaires resistant to tracking		N
2.6 (4.4.8)	Lamp connectors		N
2.6 (4.4.9)	Caps and bases correctly used		N
2.6 (4.5)	Starter holders		
	Starter holder in luminaires other than class II		N
	Starter holder class II construction		N
2.6 (4.6)	Terminal blocks		
	Tails		N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	Unsecured blocks		N
2.6 (4.7)	Terminals and supply connections		
2.6 (4.7.1)	Contact to metal parts		N
2.6 (4.7.2)	Test 8 mm live conductor		N
	Test 8 mm earth conductor		N
2.6 (4.7.3)	Terminals for supply conductors		N
2.6 (4.7.3.1)	Welded connections:		
	- stranded or solid conductor		N
	- spot welding		N
	- welding between wires		N
	- Type Z attachment		N
	- mechanical test according to 15.8.2		N
	- electrical test according to 15.9		N
	- heat test according to 15.9.2.3 and 15.9.2.4		N
2.6 (4.7.4)	Terminals other than supply connection		P
2.6 (4.7.5)	Heat-resistant wiring/sleeves		N
2.6 (4.7.6)	Multi-pole plug		N
	- test at 30 N		N
2.6 (4.8)	Switches:		
	- adequate rating		N
	- adequate fixing		N
	- polarized supply		N
	- compliance with 61058-1 for electronic switches		N
2.6 (4.9)	Insulating lining and sleeves		
2.6 (4.9.1)	Retainment		N
	Method of fixing .....:	---	N
2.6 (4.9.2)	Insulated linings and sleeves		
	a) & c) Insulation resistance and electric strength		N
	b) Ageing test. Temperature (°C) .....:	---	N
2.6 (4.10)	Insulation of Class II luminaires		
2.6 (4.10.1)	No contact, mounting surface – accessible metal parts – wiring of basic insulation	Class III	N
	Safe installation fixed luminaires		N
	Capacitors and switches		N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	Interference suppression capacitors according to IEC 60384-14		N
2.6 (4.10.2)	Assembly gaps:		
	- not coincidental		N
	- no straight access with test probe		N
2.6 (4.10.3)	Retainment of insulation:		
	- fixed		N
	- unable to be replaced; luminaire inoperative		N
	- sleeves retained in position		N
	- lining in lampholder		N
2.6 (4.11)	Electrical connections		
2.6 (4.11.1)	Contact pressure		P
2.6 (4.11.2)	Screws:		
	- self-tapping screws		N
	- thread-cutting screws		N
	- at least two self-tapping screws		N
2.6 (4.11.3)	Screw locking:		
	- spring washer		N
	- rivets		N
2.6 (4.11.4)	Material of current-carrying parts	> 50% Cu	P
2.6 (4.11.5)	No contact to wood		P
2.6 (4.11.6)	Electro-mechanical contact systems		N
2.6 (4.12)	Mechanical connections and glands		
2.6 (4.12.1)	Screws not made of soft metal		N
	Screws of insulating material		N
	Torque test: torque (Nm); part .....:	---	N
	Torque test: torque (Nm); part .....:	---	N
	Torque test: torque (Nm); part .....:	---	N
2.6 (4.12.2)	Screws with diameter < 3 mm screwed into metal		N
2.6 (4.12.4)	Locked connections:		
	- fixed arms; torque (Nm) .....:	---	N
	- lampholder; torque (Nm).....:	---	N
	- push-button switches; torque 0,8 Nm.....:	---	N
2.6 (4.12.5)	Screwed glands; force (N) .....:	---	N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
2.6 (4.13)	Mechanical strength		
2.6 (4.13.1)	Impact tests:		
	- fragile parts; energy (Nm).....:	---	N
	- other parts; energy (Nm).....:	---	N
	1) live parts		N
	2) linings		N
	3) protection		N
	4) covers		N
2.6 (4.13.3)	Straight test finger		N
2.6 (4.13.4)	Rough service luminaires		
	- IP54 or higher		N
	a) fixed		N
	b) hand-held		N
	c) delivered with a stand		N
	d) for temporary installations and suitable for mounting on a stand		N
2.6 (4.13.6)	Tumbling barrel		N
2.6 (4.14)	Suspensions and adjusting devices		
2.6 (4.14.1)	Mechanical load:		P
	A) four times the weight	Max.: 4 x 0.5kg=2.0kg, 1h	P
	B) torque 2,5 Nm		N
	C) bracket arm; bending moment (Nm).....:	---	N
	D) load track-mounted luminaires		N
	E) clip-mounted luminaires, glass-shelve. Thickness (mm) .....:	---	N
	metal rod. diameter (mm) .....:	---	N
	Fixed luminaire or independent control gear without fixing devices		N
2.6 (4.14.2)	Load to flexible cables		
	Mass (kg) .....:	---	N
	Stress in conductors (N/mm²) .....:	---	N
	Mass (kg) of semi-luminaire .....:	---	N
	Bending moment (Nm) of semi-luminaire .....:	---	N
2.6 (4.14.3)	Adjusting devices:		
	- flexing test; number of cycles .....:	150 cycles	P

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	- strands broken		P
	- electric strength test afterwards		P
2.6 (4.14.4)	Telescopic tubes: cords not fixed to tube; no strain on conductors		N
2.6 (4.14.5)	Guide pulleys		N
2.6 (4.14.6)	Strain on socket-outlets		N
2.6 (4.15)	Flammable materials:		
	- glow-wire test 650 °C		P
	- spacing ≥ 30 mm		N
	- screen withstanding test of 13.3.1		N
	- screen dimensions		N
	- no fiercely burning material		P
	- thermal protection		N
	- electronic circuits exempted		N
2.6 (4.15.2)	Luminaires made of thermoplastic material with lamp control gear		
	a) construction		N
	b) temperature sensing control		N
	c) surface temperature		N
2.6 (4.16)	Luminaires for mounting on normally flammable surfaces		
	No lamp control gear	(compliance with Section 12)	N
2.6 (4.16.1)	Lamp control gear spacing:		
	- spacing 35 mm		N
	- spacing 10 mm		N
2.6 (4.16.2)	Thermal protection:		
	- in lamp control gear		N
	- external		N
	- fixed position		N
	- temperature marked lamp control gear		N
2.6 (4.16.3)	Design to satisfy the test of 12.6	(see 12.6)	N
2.6 (4.17)	Drain holes		N
	Clearance at least 5 mm		N
2.6 (4.18)	Resistance to corrosion:		
2.6 (4.18.1)	- rust-resistance		N
2.6 (4.18.2)	- season cracking in copper		P

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
2.6 (4.18.3)	- corrosion of aluminium		N
2.6 (4.19)	Ignitors compatible with ballast		N
2.6 (4.20)	Rough service vibration		N
2.6 (4.21)	Protective shield:		
2.6 (4.21.1)	Shield fitted		N
2.6 (4.21.2)	Particles from a shattering lamp not impair safety		N
2.6 (4.21.3)	No direct path		N
2.6 (4.21.4)	Impact test on shield		N
	Glow-wire test on lamp compartment		N
2.6 (4.22)	Attachments to lamps		N
2.6 (4.23)	Semi-luminaires comply Class II		N
2.6 (4.24)	UV radiation for tungsten halogen lamps and metal halide lamps (Annex P)		N
2.6 (4.25)	No sharp point or edges		P
2.6 (4.26)	Short-circuit protection:		
2.6 (4.26.1)	Uninsulated accessible SELV parts		N
2.6 (4.26.2)	Short-circuit test		N
2.6 (4.26.3)	Test chain according to Figure 29		N
2.7 (11)	**CREEPAGE DISTANCES AND CLEARANCES**		
	Working voltage (V).....:	12 Vd.c.	—
	Voltage form	Sinusoidal ☐ Non-sinusoidal ☐	—
	PTI	< 600 ☒ > 600 ☐	—
	Rated pulse voltage (kV).....:	---	—
	(1) Current-carrying parts of different polarity: cr (mm); cl (mm).....:	---	N
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm).....:	---	N
	(3) Parts becoming live due to breakdown of basic insulation and metal parts: cr (mm); cl (mm).....:	---	N
	(4) Outer surface of cable where it is clamped and metal parts: cr (mm); cl (mm).....:	---	N
	(5) Not used		—

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	(6) Current-carrying parts and supporting surface: cr (mm); cl (mm).....:	---	N
2.8 (7)	**PROVISION FOR EARTHING**		
2.8 (7.2.1 + 7.2.3)	Accessible metal parts	Class III	N
	Metal parts in contact with supporting surface		N
	Resistance < 0,5 Ω		N
	Two self-tapping screws used		N
	Thread-forming screws		N
	Thread-forming screw used in a grove		N
	Earth makes contact first		N
2.8 (7.2.2 + 7.2.3)	Earth continuity in joints etc.		N
2.8 (7.2.4)	Locking of clamping means		N
	Compliance with 4.7.3		N
2.8 (7.2.5)	Earth terminal integral part of connector socket		N
2.8 (7.2.6)	Earth terminal adjacent to mains terminals		N
2.8 (7.2.7)	Electrolytic corrosion of the earth terminal		N
2.8 (7.2.8)	Material of earth terminal		N
	Contact surface bare metal		N
2.8 (7.2.10)	Class II luminaire for looping-in		N
	Double or reinforced insulation to functional earth		N
2.8 (7.2.11)	Earthing core coloured green-yellow		N
	Length of earth conductor		N
2.9 (14)	**SCREW TERMINALS**		
	Separately approved; component list	(see Annex 1)	N
	Part of the luminaire	(see Annex 3)	N
2.9 (15)	**SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS**		
	Separately approved; component list	(see Annex 1)	N
	Part of the luminaire	(see Annex 4)	N
2.10 (5)	**EXTERNAL AND INTERNAL WIRING**		

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict

2.10 (5.2)	Supply connection and external wiring		
2.10 (5.2.1)	Means of connection.....:	Connector	P
2.10 (5.2.2)	Type of cable.....:	---	N
	Nominal cross-sectional area (mm²) .....:	---	N
	Cables equal to HD21 or HD22	---	N
2.10 (5.2.3)	Type of attachment, X, Y or Z	---	N
2.10 (5.2.5)	Type Z not connected to screws		N
2.10 (5.2.6)	Cable entries:		N
	- suitable for introduction		N
	- adequate degree of protection		N
2.10 (5.2.7)	Cable entries through rigid material have rounded edges		N
2.10 (5.2.8)	Insulating bushings:		
	- suitably fixed		N
	- material in bushings		N
	- material not likely to deteriorate		N
	- tubes or guards made of insulating material		N
2.10 (5.2.9)	Locking of screwed bushings		N
2.10 (5.2.10)	Cord anchorage:		
	- covering protected from abrasion		N
	- clear how to be effective		N
	- no mechanical or thermal stress		N
	- no tying of cables into knots etc.		N
	- insulating material or lining		N
2.10 (5.2.10.1)	Cord anchorage for type X attachment:		
	a) at least one part fixed		N
	b) types of cable		N
	c) no damaging of the cable		N
	d) whole cable can be mounted		N
	e) no touching of clamping screws		N
	f) metal screw not directly on cable		N
	g) replacement without special tool		N
	Glands not used as anchorage		N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	Labyrinth type anchorages		N
2.10 (5.2.10.2)	Adequate cord anchorage for type Y and type Z attachment		N
2.10 (5.2.10.3)	Tests:		
	- impossible to push cable; unsafe		N
	- pull test: 25 times; pull (N) .....:	---	N
	- torque test: torque (Nm).....:	---	N
	- displacement ≤ 2 mm		N
	- no movement of conductors		N
	- no damage of cable or cord		N
2.10 (5.2.11)	External wiring passing into luminaire		N
2.10 (5.2.12)	Looping-in terminals		N
2.10 (5.2.13)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N
2.10 (5.2.14)	Mains plug same protection		N
	Class III luminaire plug		N
2.10 (5.2.16)	Appliance inlets (IEC 60320)		N
	Appliance couplers of class II type		N
2.10 (5.2.17)	No standardized interconnecting cables properly assembled		N
2.10 (5.2.18)	Used plug in accordance with		
	- IEC 60083		N
	- other standard		N
2.10 (5.3)	Internal wiring		
2.10 (5.3.1)	Internal wiring of suitable size and type	2468, 22AWG	P
	Through wiring		
	- not delivered/ mounting instruction		N
	- factory assembled		N
	- socket outlet loaded (A) .....:	---	N
	- temperatures .....:	(see Annex 2)	N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	Green-yellow for earth only		N
2.10 (5.3.1.1)	Internal wiring connected directly to fixed wiring		
	Cross-sectional area (mm²).....:	---	N
	Insulation thickness		N
	Extra insulation added where necessary		N
2.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal current-limiting device		
	Adequate cross-sectional area and insulation thickness		P
2.10 (5.3.1.3)	Double or reinforced insulation for class II		N
2.10 (5.3.1.4)	Conductors without insulation		N
2.10 (5.3.1.5)	SELV current-carrying parts		P
2.10 (5.3.1.6)	Insulation thickness other than PVC or rubber	PVC	N
2.10 (5.3.2)	Sharp edges etc.		P
	No moving parts of switches etc.		N
	Joints, raising/lowering devices		N
	Telescopic tubes etc.		N
	No twisting over 360°		P
2.10 (5.3.3)	Insulating bushings:		
	- suitable fixed		N
	- material in bushings		N
	- material not likely to deteriorate		N
	- cables with protective sheath		N
2.10 (5.3.4)	Joints and junctions effectively insulated		N
2.10 (5.3.5)	Strain on internal wiring		N
2.10 (5.3.6)	Wire carriers		N
2.10 (5.3.7)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		P
2.11 (8)	**PROTECTION AGAINST ELECTRIC SHOCK**		
2.11 (8.2.1)	Live parts not accessible		P

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	Basic insulated parts not used on the outer surface without appropriate protection		P
	Basic insulated parts not accessible with standard test finger on portable and adjustable luminaires		N
	Basic insulated parts not accessible with Ø 50 mm probe from outside, within arm's reach, on wall-mounted luminaires		N
	Lamp and starterholders in portable and adjustable luminaires comply with double or reinforced insulation requirements		N
	Basic insulation only accessible under lamp or starter replacement		N
	Protection in any position		P
	Double-ended tungsten filament lamp		N
	Insulation lacquer not reliable		N
	Double-ended high pressure discharge lamp		N
	Relevant warning according to 3.2.18 fitted to the luminaire		N
2.11 (8.2.2)	Portable luminaire adjusted in most unfavourable position		N
2.11 (8.2.3a)	Class II luminaire:		
	- basic insulated metal parts not accessible during starter or lamp replacement		N
	- basic insulation not accessible other than during starter or lamp replacement		N
	- glass protective shields not used as supplementary insulation		N
2.11 (8.2.3b)	Class I luminaire with BC lampholder		N
20.11 (8.2.3.c)	Class III luminaires with exposed SELV parts:		N
	Ordinary luminaire:		N
	- touch current .....:	---	N
	- no-load voltage .....:	---	N
	Other than ordinary luminaire:		N
	- nominal voltage .....:	---	N
2.11 (8.2.4)	Portable luminaire:		
	- protection independent of supporting surface		N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	- terminal block completely covered		N
2.11 (8.2.5)	Compliance with the standard test finger or relevant probe		P
2.11 (8.2.6)	Covers reliably secured		P
2.11 (8.2.7)	Discharging of capacitors ≥ 0,5 μF		N
	Portable plug connected luminaire with capacitor		N
	Other plug connected luminaire with capacitor		N
	Discharge device on or within capacitor		N
	Discharge device mounted separately		N
2.12 (12)	**ENDURANCE TEST AND THERMAL TEST**		
2.12 (12.3)	Endurance test:		
	- mounting-position.....:	On the black recessed box	—
	- test temperature (°C) .....:	35°C	—
	- total duration (h).....:	240 h	—
	- supply voltage: Un factor; calculated voltage (V)..:	2447LED : 1.1U_R=264.0V → I=0.05A → P=7.6 W (tested with reference LED driver)	—
	- lamp used.....:	Integral LED module	—
2.12 (12.3.2)	After endurance test:		
	- no part unserviceable		P
	- luminaire not unsafe		P
	- no damage to track system		N
	- marking legible		P
	- no cracks, deformation etc.		P
2.12 (12.4)	Thermal test (normal operation)	(see Annex 2)	P
2.12 (12.5)	Thermal test (abnormal operation)		N
2.12 (12.6)	Thermal test (failed lamp control gear condition):		
2.12 (12.6.1)	Through wiring or looping-in wiring loaded by a current of (A) .....:	---	—
	- case of abnormal conditions.....:	---	—
	- electronic lamp control gear		N
	- measured winding temperature (°C): at 1,1 Un ...:	---	—

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	- measured mounting surface temperature (°C) at 1,1 Un .....:	---	N
	- calculated mounting surface temperature (°C) ....:	---	N
	- track-mounted luminaires		N
2.12 (12.6.2)	Temperature sensing control		
	- case of abnormal conditions.....:	---	—
	- thermal link		N
	- manual reset cut-out		N
	- auto reset cut-out		N
	- measured mounting surface temperature (°C) .....:		N
	- track-mounted luminaires		N
2.12 (12.7)	Thermal test (failed lamp control gear in plastic luminaires):		
2.12 (12.7.1)	Luminaire without temperature sensing control		
2.12 (12.7.1.1)	Luminaire with fluorescent lamp ≤ 70W		
	Test method 12.7.1.1 or Annex V.....:	---	—
	Test according to 12.7.1.1:		
	- case of abnormal conditions		—
	- Ballast failure at supply voltage (V) .....:	---	—
	- Components retained in place after the test		N
	- Test with standard test finger after the test		N
	Test according to Annex V:		
	- case of abnormal conditions		—
	- measured winding temperature (°C): at 1,1 Un ....:	---	—
	- measured temperature of fixing point/exposed part (°C): at 1,1 Un .....:	---	—
	- calculated temperature of fixing point/exposed part (°C) .....:	---	—
	Ball-pressure test:		
	- part tested; temperature (°C).....:	---	N
	- part tested; temperature (°C).....:	---	N
2.12 (12.7.1.2)	Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA		
	- case of abnormal conditions		—

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	- measured winding temperature (°C): at 1,1 Un ....:	---	—
	- measured temperature of fixing point/exposed part (°C): at 1,1 Un .....:	---	—
	- calculated temperature of fixing point/exposed part (°C) .....:	---	—
	Ball-pressure test:		
	- part tested; temperature (°C).....:	---	N
	- part tested; temperature (°C).....:	---	N
2.12 (12.7.1.3)	Luminaire with short circuit proof transformers ≤ 10 VA		N
	- case of abnormal conditions		—
	- Components retained in place after the test		N
	- Test with standard test finger after the test		N
2.12 (12.7.2)	Luminaire with temperature sensing control		
	- thermal link	Yes☐No☐	—
	- manual reset cut-out	Yes☐No☐	—
	- auto reset cut-out	Yes☐No☐	—
	- case of abnormal conditions		—
	- highest measured temperature of fixing point/exposed part (°C):.....:	---	—
	Ball-pressure test:		N
	- part tested; temperature (°C).....:	---	N
	- part tested; temperature (°C).....:	---	N

2.13 (9)	**RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE**		
2.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP .....:	IP20	—
	- mounting position during test.....:	Acc. to user manual mounting on the black ceiling	—
	- fixing screws tightened; torque (Nm).....:	---	—
	- tests according to clauses .....:	9.2.0 (test finger)	—
	- electric strength test afterwards	See section 10	P
	a) no deposit in dust-proof luminaire		N
	b) no talcum in dust-tight luminaire		N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	c) no trace of water on current-carrying parts or where it could become a hazard		N
	d) i) For luminaires without drain holes – no water entry		N
	d) ii) For luminaires with drain holes – no hazardous water entry		N
	e) no water in watertight luminaire		N
	f) no contact with live parts (IP 2X)	IP20	P
	f) no entry into enclosure (IP 3X and IP 4X)		N
	f) no contact with live parts (IP3X and IP4X)		N
2.13 (9.3)	Humidity test 48 h	R.H.: 93%, 25°C	P
2.14 (10)	**INSULATION RESISTANCE AND ELECTRIC STRENGTH**		
2.14 (10.2.1)	Insulation resistance test		
	Cable or cord covered by metal foil or replaced by a metal rod of mm Ø .....:	---	—
	Insulation resistance (MΩ)		—
	SELV:		
	- between current-carrying parts of different polarity:	$R_{insulation}$ > 100 MΩ	P
	- between current-carrying parts and mounting surface.....:	$R_{insulation}$ > 100 MΩ	P
	- between current-carrying parts and metal parts of the luminaire.....:	$R_{insulation}$ > 100 MΩ	P
	Other than SELV:		
	- between live parts of different polarity.....:	---	N
	- between live parts and mounting surface .....:	---	N
	- between live parts and metal parts.....:	---	N
	- between live parts of different polarity through action of a switch.....:	---	N
2.14 (10.2.2)	Electric strength test		
	Dummy lamp		N
	Luminaires with ignitors after 24 h test		N
	Luminaires with manual ignitors		N
	Test voltage (V):		P
	SELV:		

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	- between current-carrying parts of different polarity:	500V	P
	- between current-carrying parts and mounting surface.....:	500V	P
	- between current-carrying parts and metal parts of the luminaire.....:	500V	P
	Other than SELV:		
	- between live parts of different polarity.....:	---	N
	- between live parts and mounting surface .....:	---	N
	- between live parts and metal parts.....:	---	N
	- between live parts of different polarity through action of a switch.....:	---	N
2.14 (10.3)	Touch current (mA).....:	Class III	N
2.15 (13)	**RESISTANCE TO HEAT, FIRE AND TRACKING**		
2.15 (13.2.1)	Ball-pressure test:		
	- part tested; temperature (°C).....:	Connector:125°C, 1h, 1.16mm	P
	- part tested; temperature (°C).....:	LED board: 125°C, 1h, 1.03mm	P
2.15 (13.3.1)	Needle flame test (10 s):		
	- part tested; temperature (°C).....:	---	N
	- part tested .....:	---	N
2.15 (13.3.2)	Glow-wire test (650°C):		
	- part tested .....:	Connector	P
	- part tested .....:	LED board	P
2.15 (13.4.1)	Tracking test: part tested .....:	---	N

IEC 60 598-2-2

ANNEX 1: components

object/part No.	code	manufacturer/ trademark	type/model	technical data	Standard	mark(s) of conformity
LED board	B	SHENZHEN DAZHENG TECHNOLOGY CO LTD	DZ2SH#; DZ2SG#; DZ2SN#	V-0; T110	---	UL E323040
Lead wire	B	Feiyang Lighting Electric Factory	FEP	0.5 mm^2; 300/500V; T180	--	VDE 40023163
LED	B	Edison Opto Corporation	Edixeon White	0.35A; 1W	EN 62471	Tested with appliance

The codes above have the following meaning:

A - The component is replaceable with another one, also certified, with equivalent characteristics

B - The component is replaceable if authorized by the test house

C - Integrated component tested together with the appliance

D - Alternative component

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict

	ANNEX 2: temperature measurements, thermal tests of Section 12	

	Type reference ..... :	2447LED	—
	Lamp used..... :	Integral LED module	—
	Lamp control gear used ..... :	Reference transformer	—
	Mounting position of luminaire ..... :	Acc. to user manual	—
	Supply wattage (W)..... :	7.2	—
	Supply current (A) ..... :	0.05	—
	Calculated power factor ..... :	0.53PF	—
	Table: measured temperatures corrected for ta = 25 °C:		P
	- abnormal operating mode..... :	---	—
	- test 1: rated voltage ..... :	---	—
	- test 2: 1.06 times rated voltage or 1.05 times rated wattage ..... :	1.06 times rated voltage	—
	- test 3: Load on wiring to socket-outlet, 1.06 times voltage or 1.05 times wattage ..... :	---	—
	- test 4: 1.1 times rated voltage or 1.05 times rated wattage ..... :	---	—
	Through wiring or looping-in wiring loaded by a current of A during the test ..... :	---	—

temperature (°C) of part	Clause 12.4 – normal				Clause 12.5 – abnormal	
	test 1	test 2	test 3	limit	test 4	limit
LED module (nearest to LED)	---	58.9	---	Ref.cl.13	---	---
Internal wires (nearest to LED)	---	57.0	---	80	---	---
Internal wires (nearest to heat sink)	---	45.9	---	80	---	---
Connector	---	31.7	---	Ref.cl.13	---	---
Mounting surface (flammable surface)	---	45.3	---	90	---	---
Surface illuminated by lamp(0.1m)	---	27.8	---	90	---	---

	ANNEX 2: temperature measurements, thermal tests of Section 12	

	Type reference ..... :	2528LED	—

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict

	Lamp used.....:	Integral LED module	—
	Lamp control gear used .....:	Reference transformer	—
	Mounting position of luminaire .....:	Acc. to user manual	—
	Supply wattage (W).....:	5.7	—
	Supply current (A) .....:	0.04	—
	Calculated power factor .....:	0.5PF	—
	Table: measured temperatures corrected for ta = 25 °C:		P
	- abnormal operating mode.....:	---	—
	- test 1: rated voltage .....:	---	—
	- test 2: 1.06 times rated voltage or 1.05 times rated wattage .....:	1.06 times rated voltage	—
	- test 3: Load on wiring to socket-outlet, 1.06 times voltage or 1.05 times wattage .....:	---	—
	- test 4: 1.1 times rated voltage or 1.05 times rated wattage .....:	---	—
	Through wiring or looping-in wiring loaded by a current of A during the test .....:	---	—

temperature (°C) of part	Clause 12.4 – normal				Clause 12.5 – abnormal	
	test 1	test 2	test 3	limit	test 4	limit
LED module (nearest to LED)	---	52.4	---	Ref.cl.13	---	---
Internal wires (nearest to LED)	---	51.4	---	80	---	---
Internal wires (nearest to heat sink)	---	50.2	---	80	---	---
Connector	---	27.2	---	Ref.cl.13	---	---
Mounting surface (flammable surface)	---	46.3	---	90	---	---
Surface illuminated by lamp(0.1m)	---	28.9	---	90	---	---

	ANNEX 3: screw terminals (part of the luminaire)	N

(14)	**SCREW TERMINALS**		—
(14.2)	Type of terminal .....:	-----	—
	Rated current (A).....:	-----	—
(14.3.2.1)	One or more conductors		N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
(14.3.2.2)	Special preparation		N
(14.3.2.3)	Terminal size		N
	Cross-sectional area (mm²) .....:	-----	N
(14.3.3)	Conductor space (mm).....:	-----	N
(14.4)	Mechanical tests		
(14.4.1)	Minimum distance		N
(14.4.2)	Cannot slip out		N
(14.4.3)	Special preparation		N
(14.4.4)	Nominal diameter of thread (metric ISO thread)..:	-----	N
	External wiring		N
	No soft metal		N
(14.4.5)	Corrosion		N
(14.4.6)	Nominal diameter of thread (mm) .....:	-----	N
	Torque (Nm).....:	-----	N
(14.4.7)	Between metal surfaces		N
	Lug terminal		N
	Mantle terminal		N
	Pull test; pull (N).....:	-----	N
(14.4.8)	Without undue damage		N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	ANNEX 4: screwless terminals (part of the luminaire)		N
(15)	**SCREWLESS TERMINALS**		—
(15.2)	Type of terminal .....:	-----	—
	Rated current (A).....:	-----	—
(15.3.1)	Material		N
(15.3.2)	Clamping		N
(15.3.3)	Stop		N
(15.3.4)	Unprepared conductors		N
(15.3.5)	Pressure on insulating material		N
(15.3.6)	Clear connection method		N
(15.3.7)	Clamping independently		N
(15.3.8)	Fixed in position		N
(15.3.10)	Conductor size		N
	Type of conductor		N
(15.5.1)	Terminals internal wiring		N
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples)….:		N
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples)……:		N
	Insertion force not exceeding 50 N		N
(15.5.2)	Permanent connections: pull-off test (20 N)		N
(15.6)	Electrical tests		
	Voltage drop (mV) after 1 h (4 samples).....:	-----	N
	Voltage drop of two inseparable joints		N
	Number of cycles .....:	-----	—
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples) .....:	-----	N
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples) .....:	-----	N
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) .....:	-----	N
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) .....:	-----	N
(15.7)	Terminals external wiring		N
	Terminal size and rating		N
(15.8.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N) .....:	-----	N

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict

	Pull test pin or tab terminals (4 samples); pull (N) .....:					-----					N
(15.9)	Contact resistance test										N
	Voltage drop (mV) after 1 h										N
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)	---	---	---	---	---	---	---	---	---	---	
	Voltage drop of two inseparable joints					-----					N
	Voltage drop after 10th alt. 25th cycle										N
	Max. allowed voltage drop (mV).....:					-----					—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)	---	---	---	---	---	---	---	---	---	---	
	Voltage drop after 50th alt. 100th cycle										N
	Max. allowed voltage drop (mV).....:					-----					—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)	---	---	---	---	---	---	---	---	---	---	
	Continued ageing: voltage drop after 10th alt. 25th cycle										N
	Max. allowed voltage drop (mV).....:					-----					—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)	---	---	---	---	---	---	---	---	---	---	
	Continued ageing: voltage drop after 50th alt. 100th cycle										N
	Max. allowed voltage drop (mV).....:					-----					—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)	---	---	---	---	---	---	---	---	---	---	

ANNEX 5	**LED modules for general lighting – Safety specifications IEC 62031: 2008**		
4	**GENERAL REQUIREMENTS**		
4.4	Integral modules treated as part of luminaires defined in clause 0.5 of EN 60598-1		P
4.5	Independent modules complies with requirements in EN 60598-1		N

6	**CLASSIFICATION**		
	Built-in module .....:	Yes ☐ No ☒	—
	Independent module.....:	Yes ☐ No ☒	—
	Integral module .....:	Yes ☒ No ☐	—
	For Integral module; Note to 1.2.1 in EN 60598-1		

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
	applies.		
13	**FAULT CONDITIONS**		P
13.1	In compliance with IEC 61347-1 (clause numbers between parentheses refer to IEC 61347-1)		P
	When operated under fault conditions the LED-module:		P
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		N
	Thermally protected controlgear does not exceed the marked temperature value		N
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected		N
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)		N
	Distances on printed boards provided with coating according to EN 60664-3		N
- (14.2)	Short-circuit or interruption of semiconductor devices	LED	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile		N
- (14.4)	Short-circuit across electrolytic capacitors		N
- (14.5)	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		P
	After the tests the insulation resistance with d.c. 500 V (MΩ) are ≥ 1 MΩ ..... :	> 10 MΩ	P
	Temperature declared thermally protected LED-modules fulfil the requirements in Annex C of EN 61437-1		N
13.2	Module withstands overpower condition >15 min.	1.5 times of 12Vd.c.	P
	Module with automatic protective device or power limiter, test performed 15 min. at limit.		N
	During the tests, tissue paper, spread below module, does not ignite		P
15	**CONSTRUCTION**		P
	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P

IEC 60 598-2-2			
Cl.	Requirement – Test	Result	Verdict
A	**ANNEX A - TESTS**		P
	All tests performed in accordance with the advice given in Annex H of EN 61347-1, if applicable		P

========= End of Test Report =========

ITEM: 2447LED

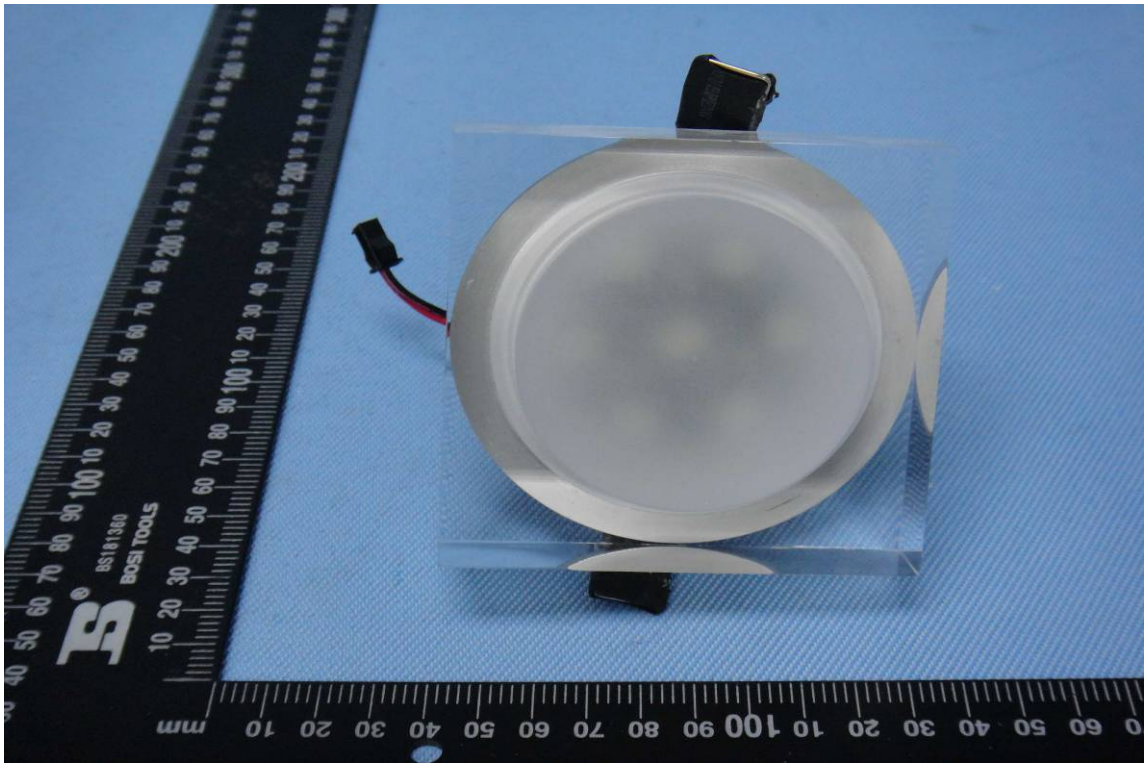

Photo 1

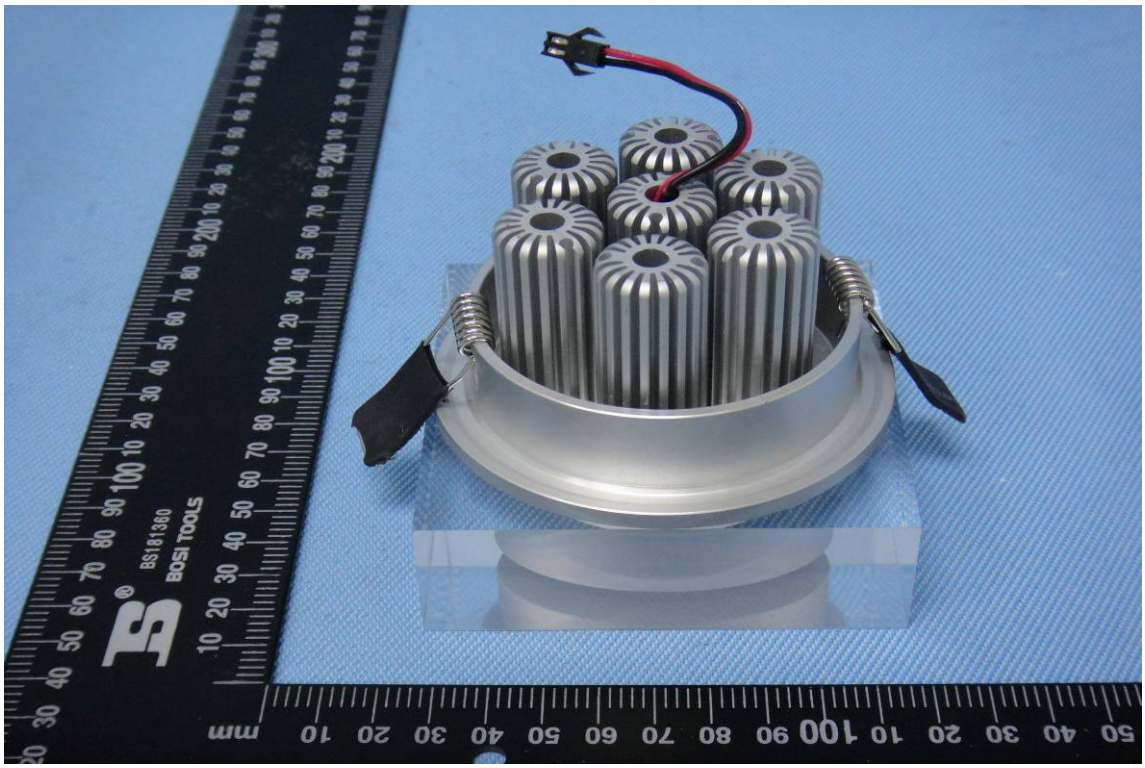

Photo 2

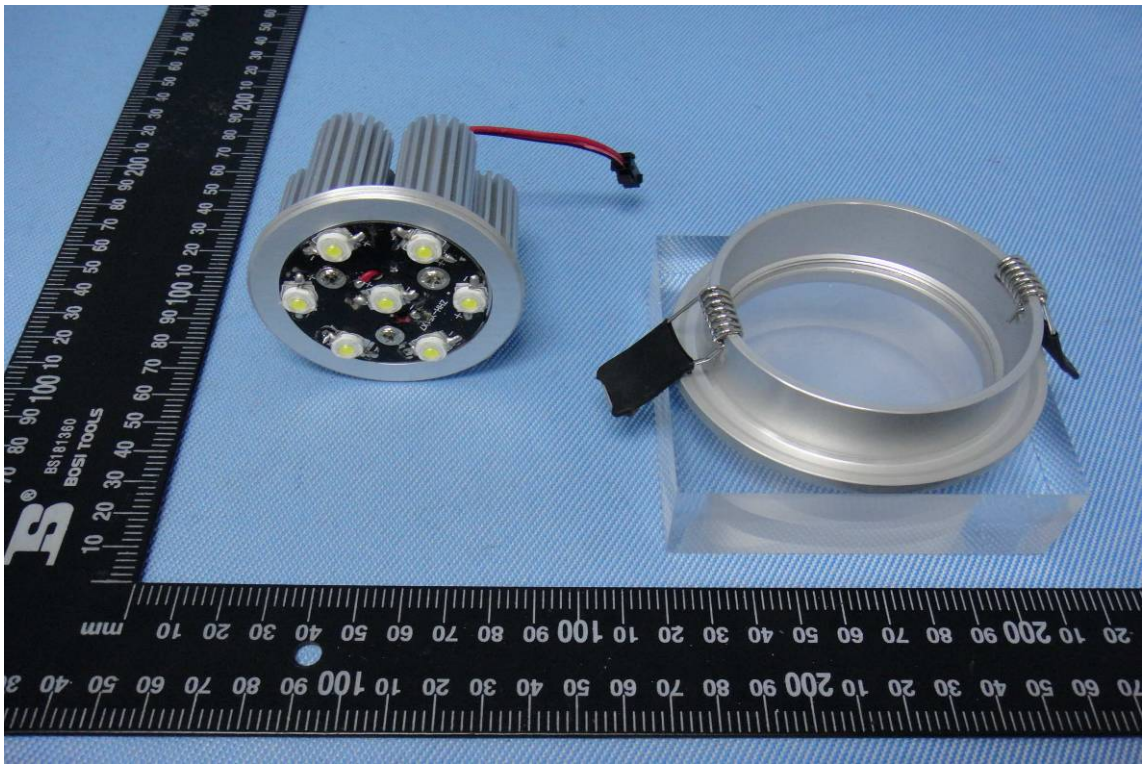

Photo 3

Photo 4

ITEM: 2528LED

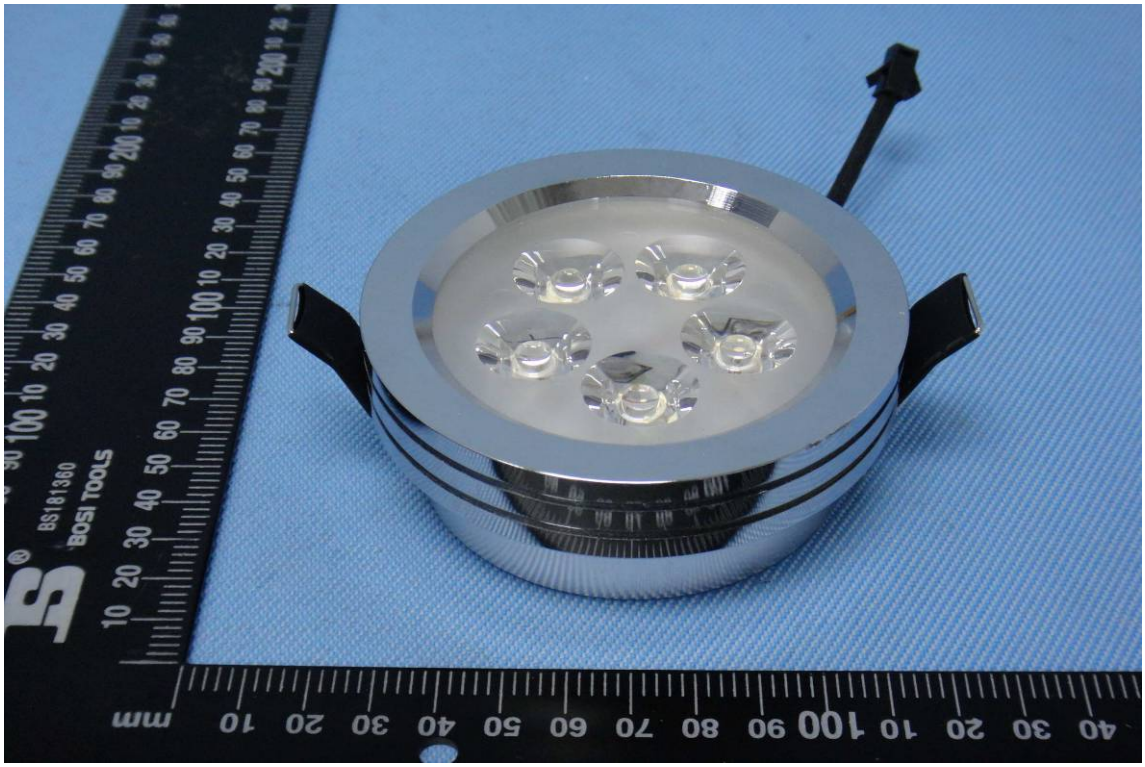

Photo 5

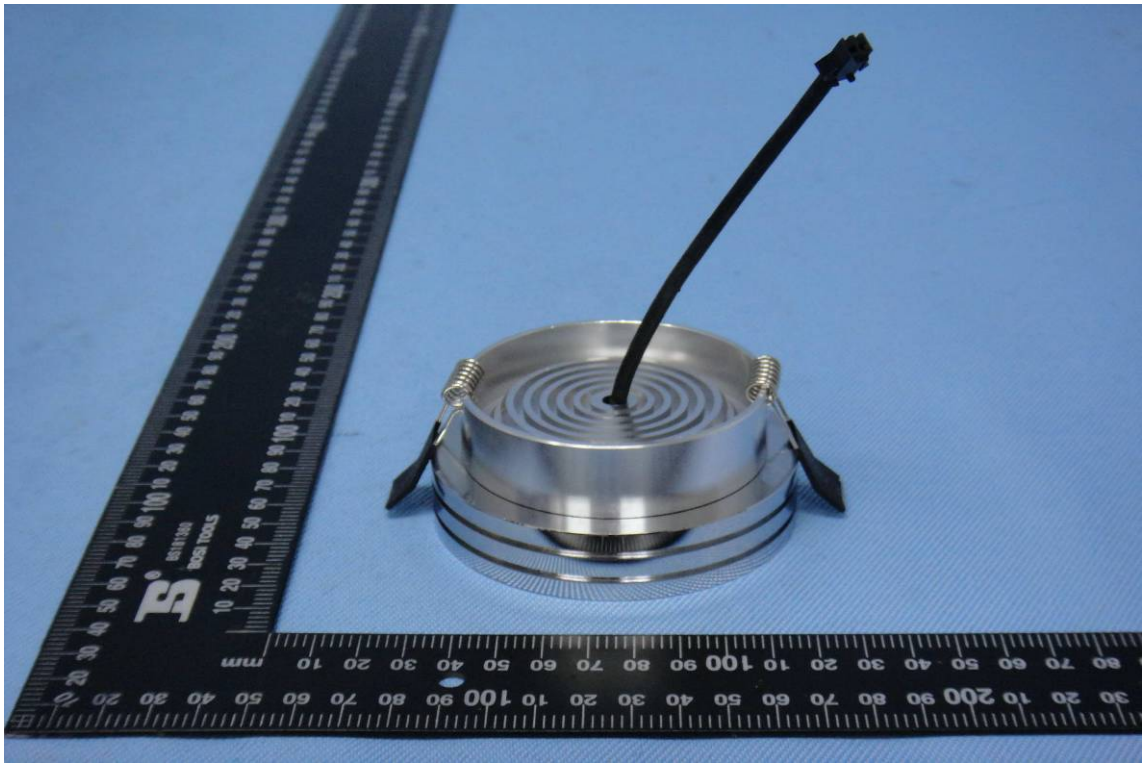

Photo 6

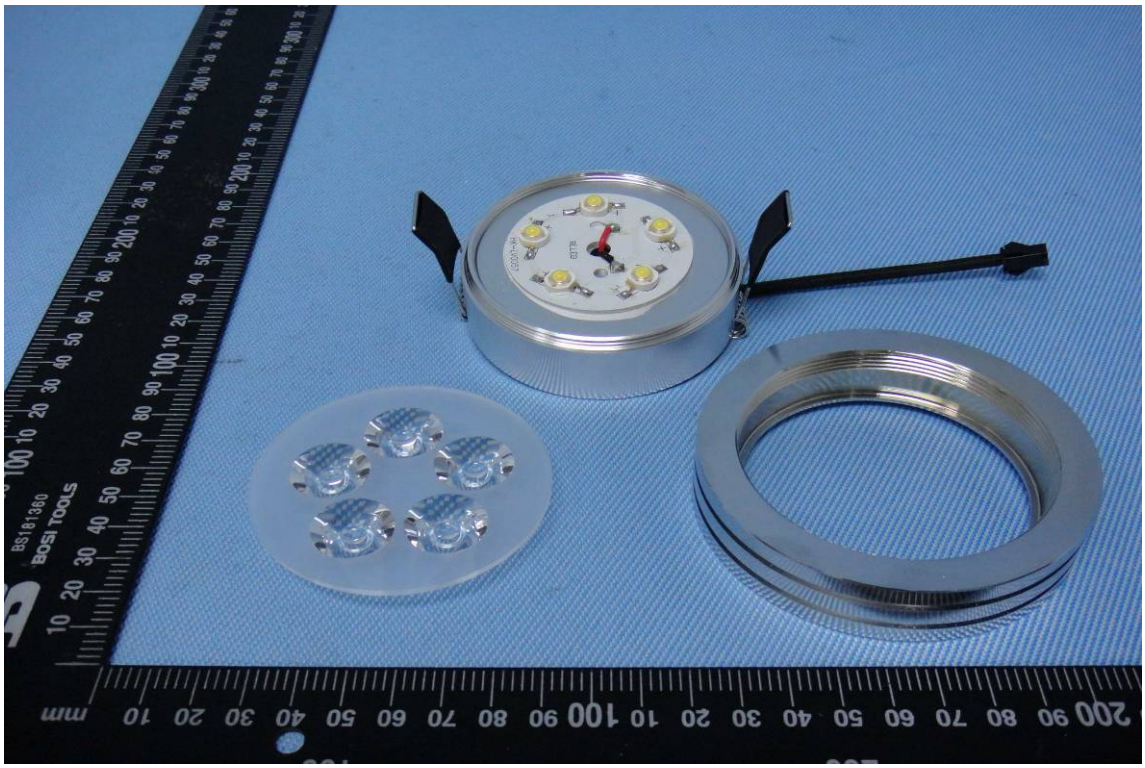

Photo 7

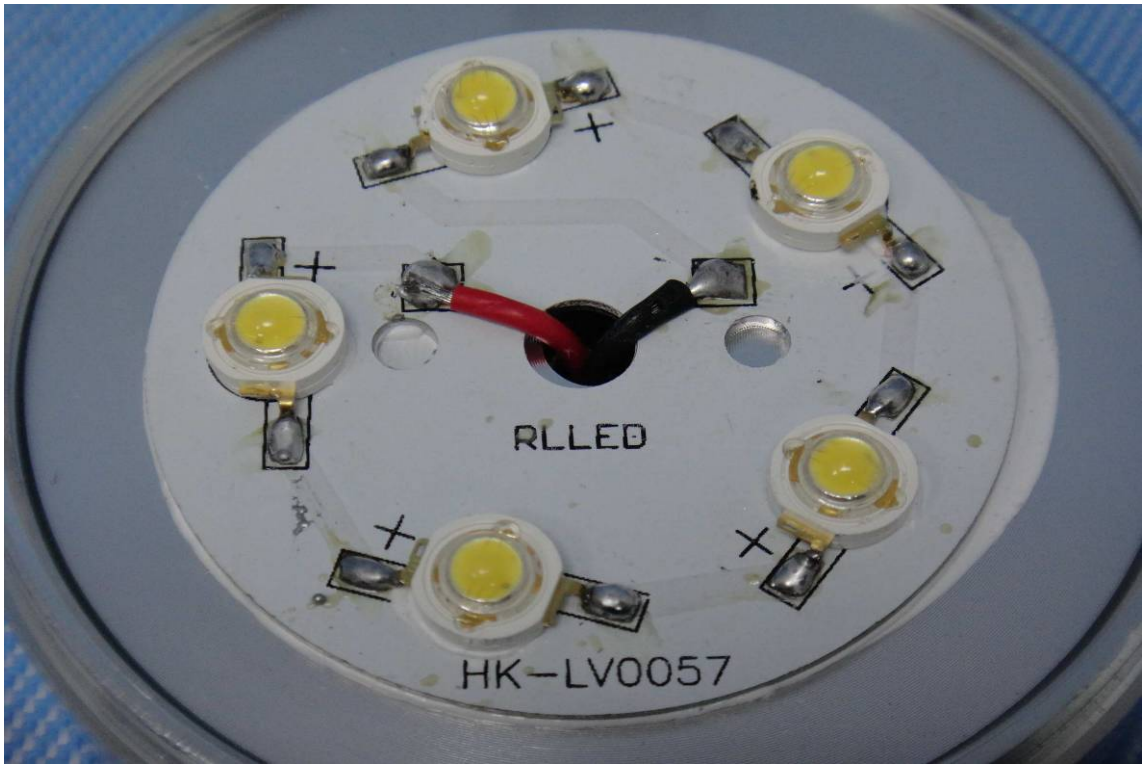

Photo 8

ITEM: 1194LED

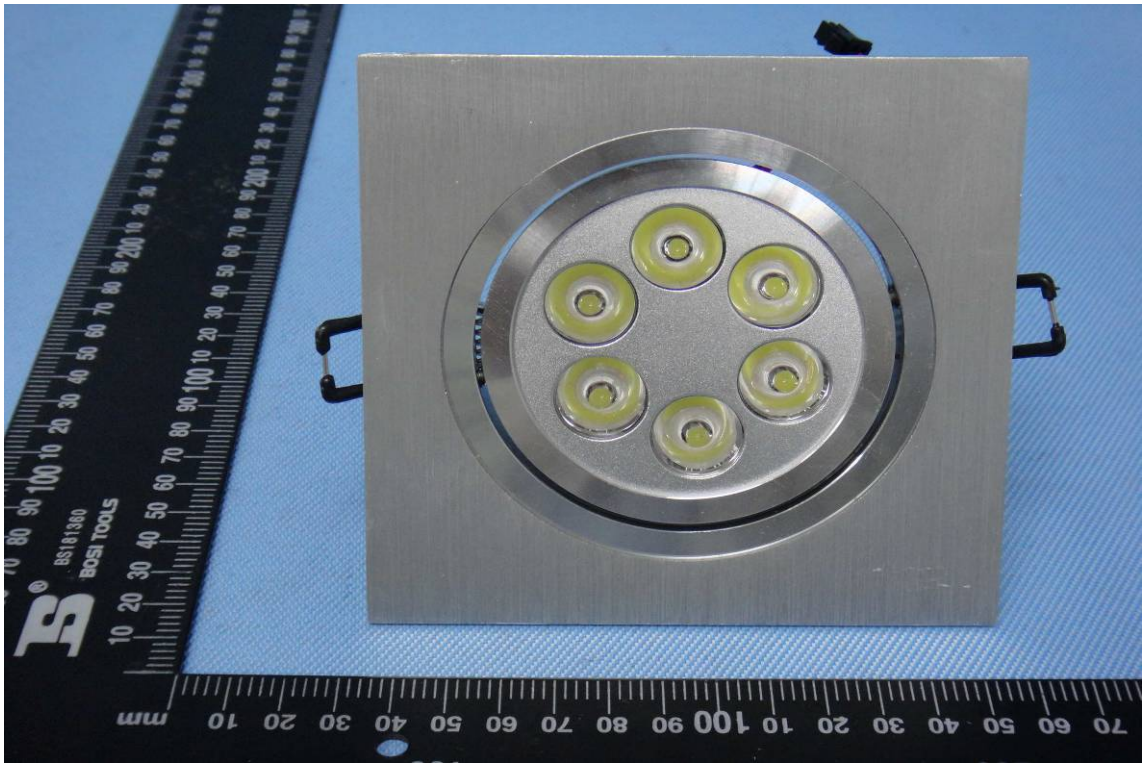

Photo 9

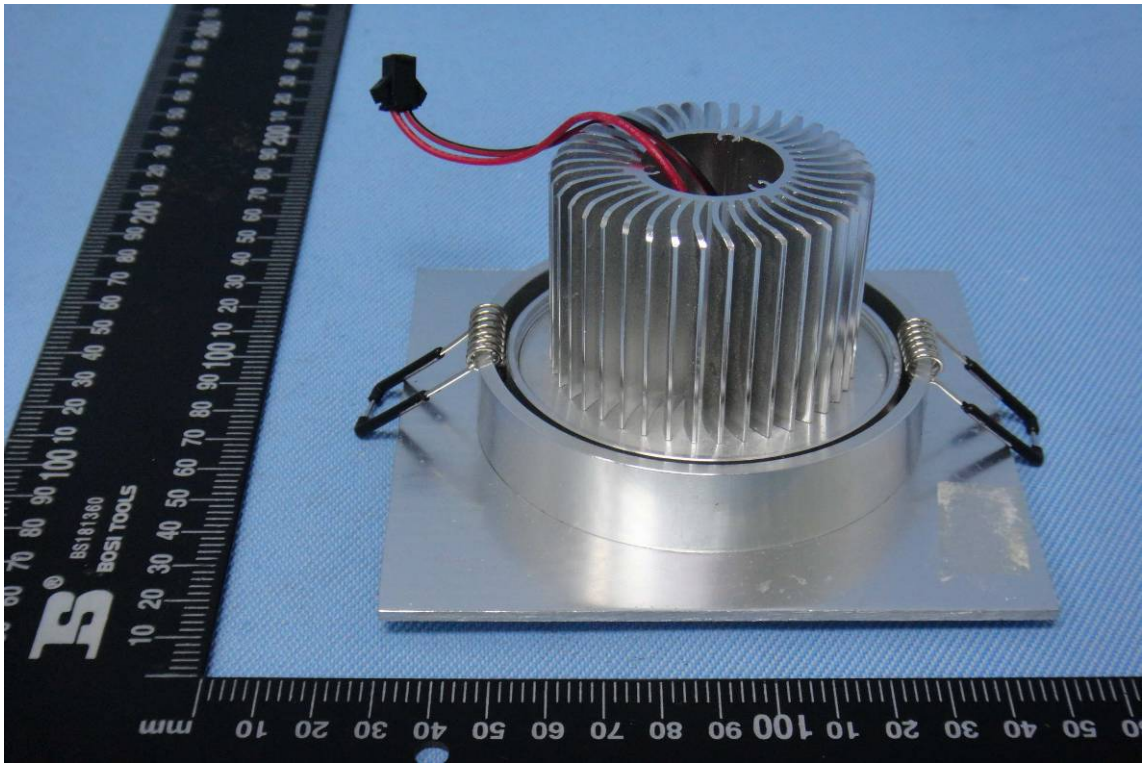

Photo 10

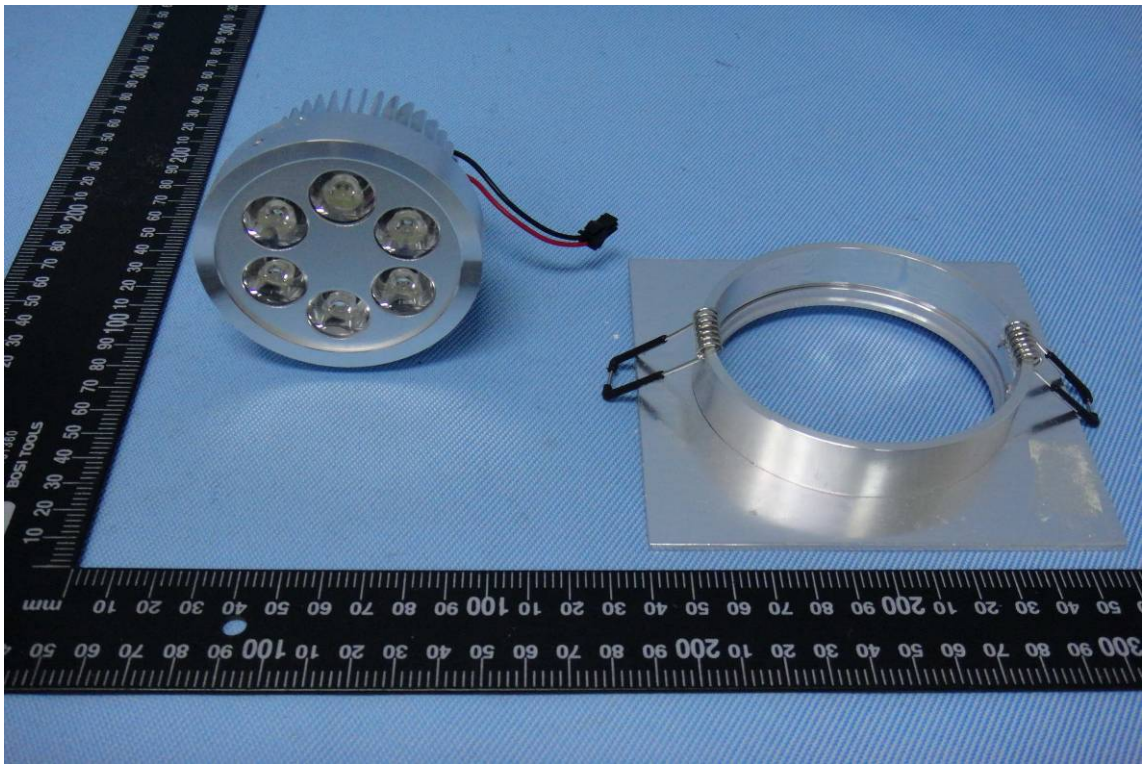

Photo 11

ITEM: 1642LED

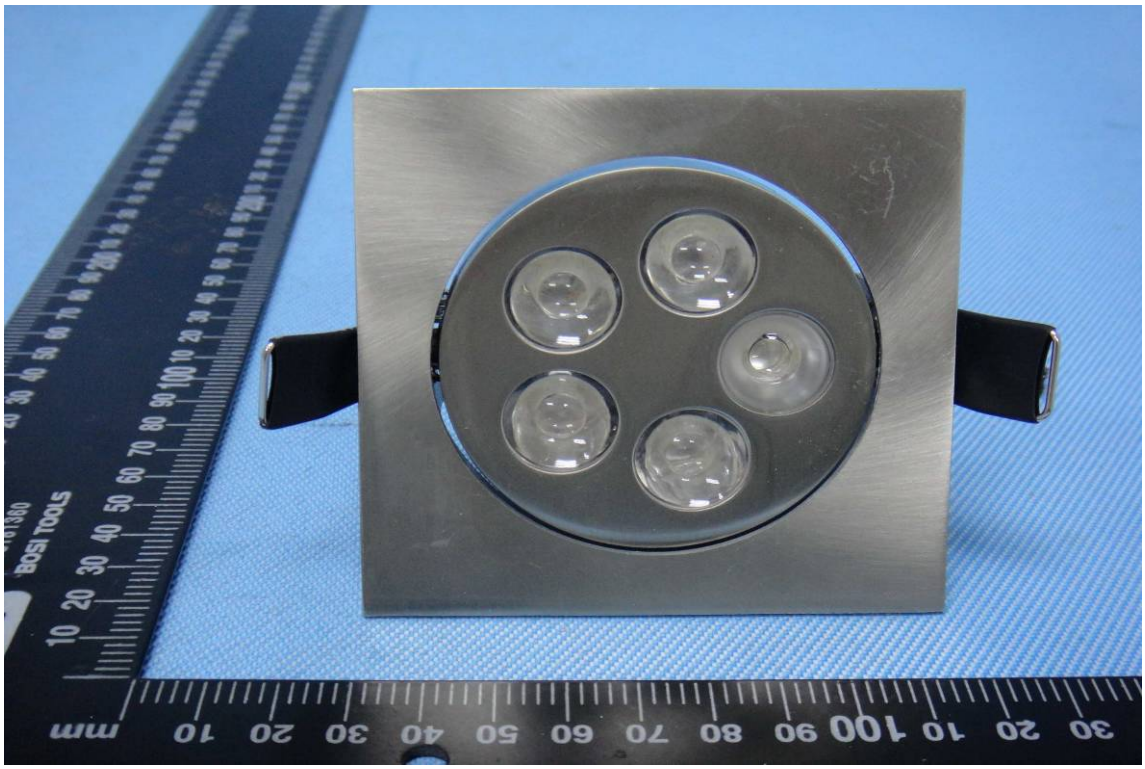

Photo 12

ITEM: 1650LED

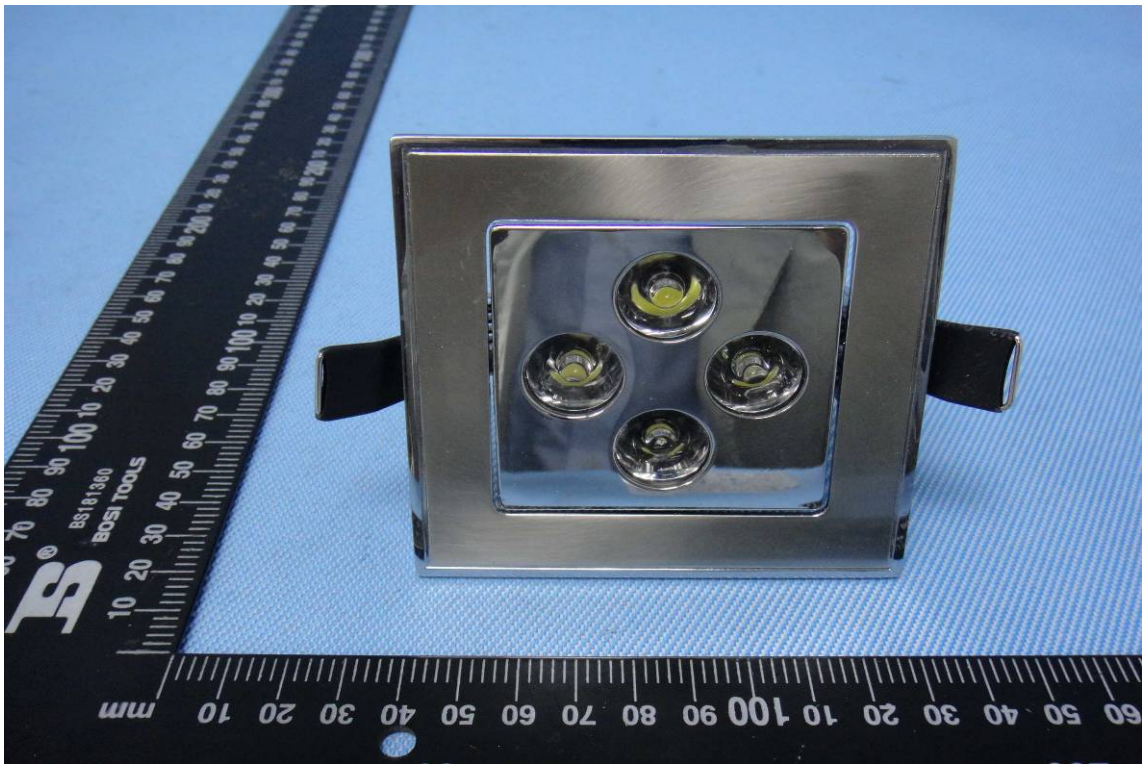

Photo 13

ITEM: 2006LED

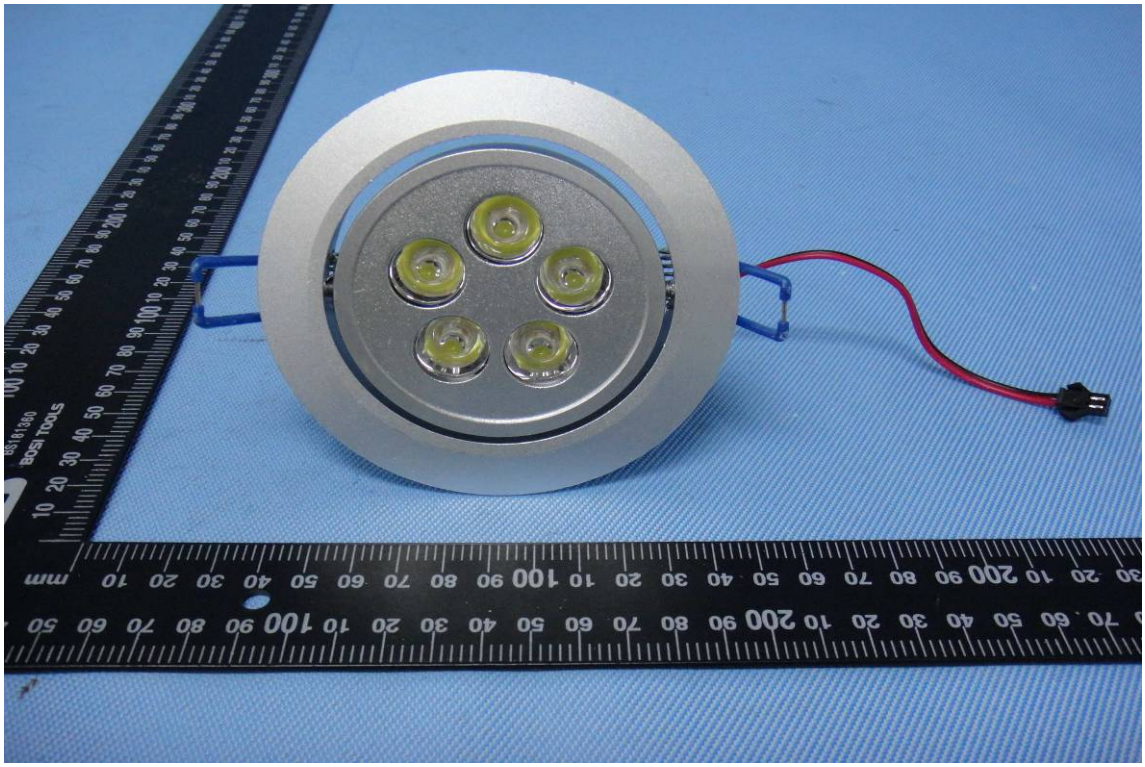

Photo 14

ITEM: 2205LED

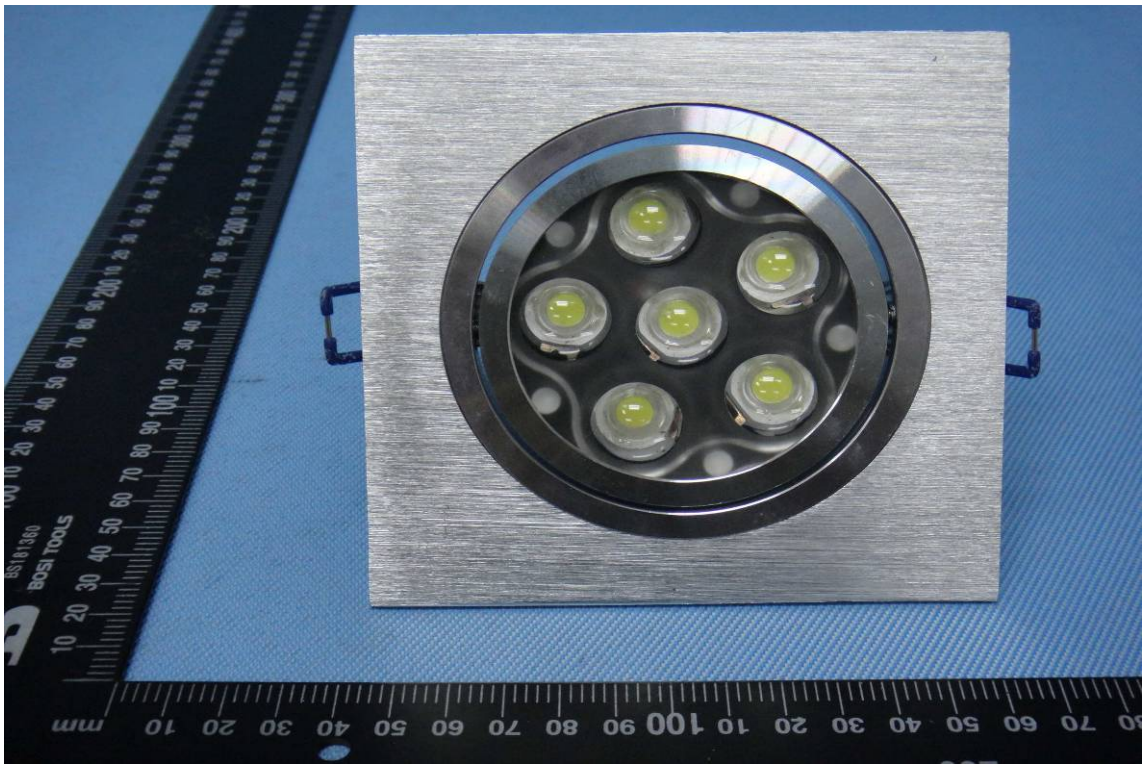

Photo 15

ITEM: 2524LED

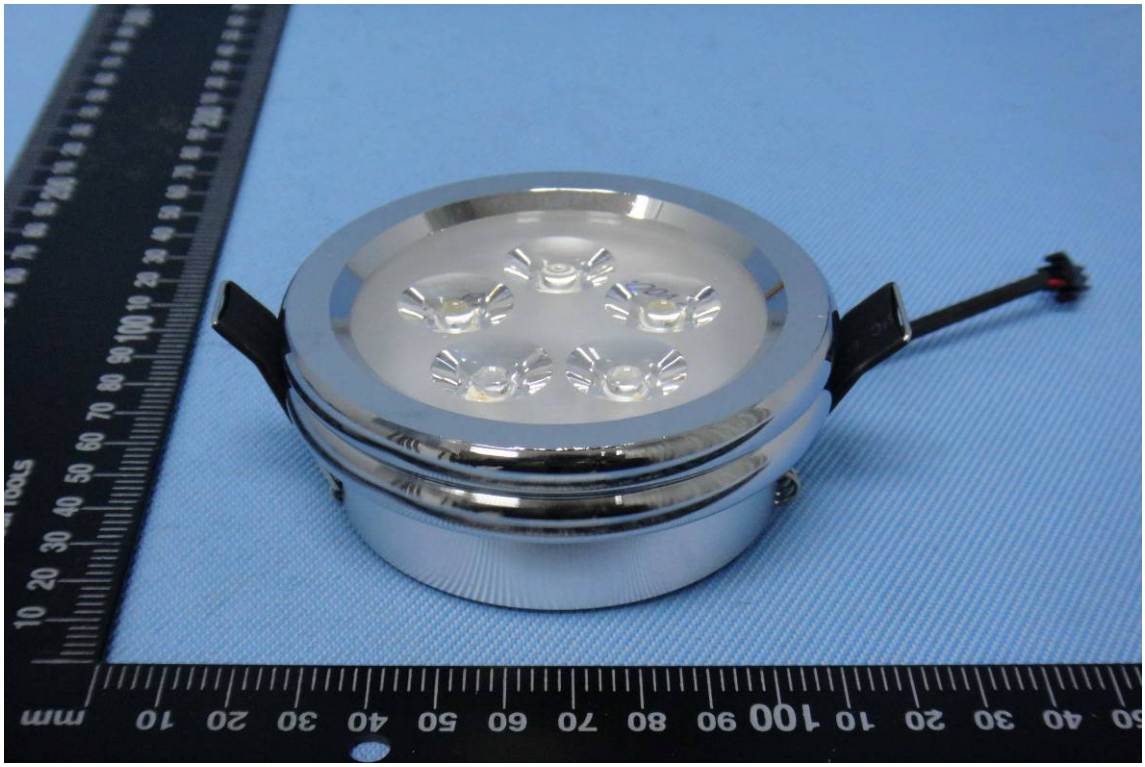

Photo 16

End