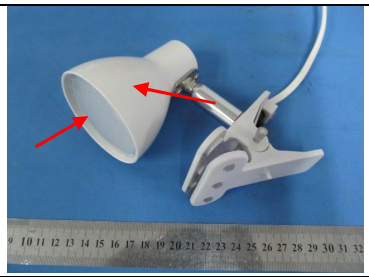
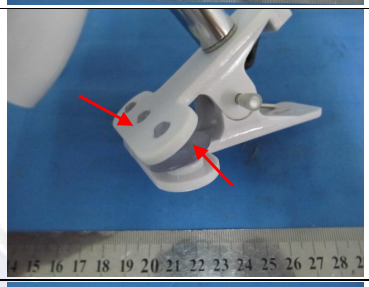
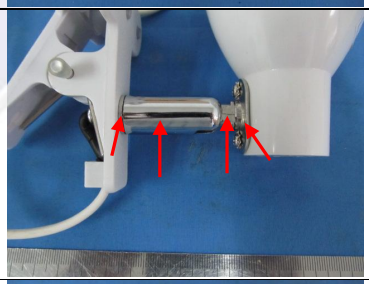
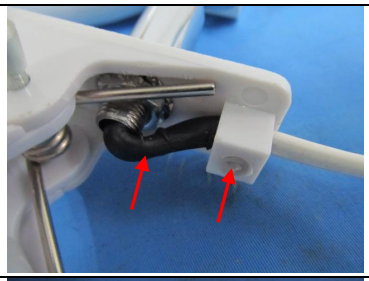
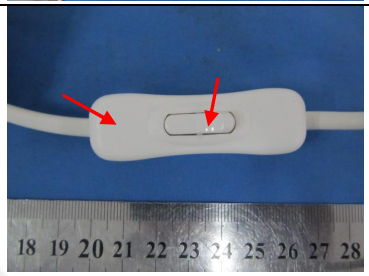
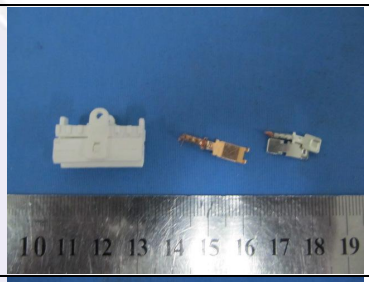
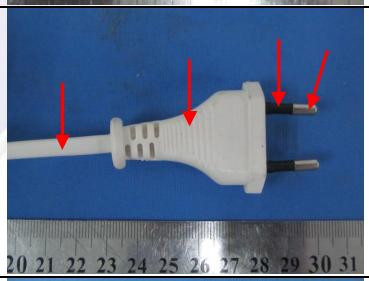
Technical Report No. 64.164.14.01453.01
Rev. 00
Dated 2014-05-28

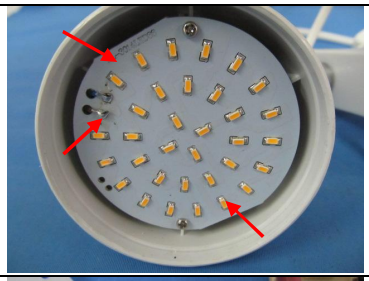
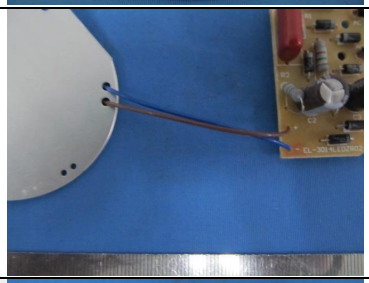
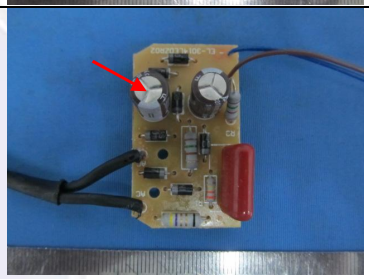
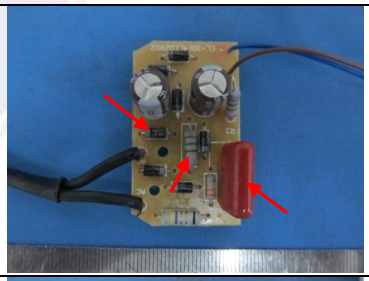
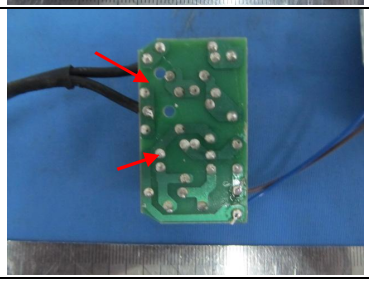
Client:	ZhongShan LiangYi Lighting CO.,LTD BeiHai Industrial Zone,GuZhen Town,ZhongShan,GuangDong,P.R.China
Test Subject:	The submitted sample was identified and described by client as: Clip Lamp, Spot Lamp Model: LED12036-1C, LED12036-3SP,LED12036-4TU
Test Method:	Tests were performed for the samples with test methods reference to EN 62321:2009: Procedures for the Determination of Level of Six Regulated Substances in Electrotechnical Products
Test Result:	Refer to the following page(s)
Test Requested and Conclusion:	Test according to RoHS (Restriction of Hazardous Substances) directive 2011/65/EU Annex II on submitted samples

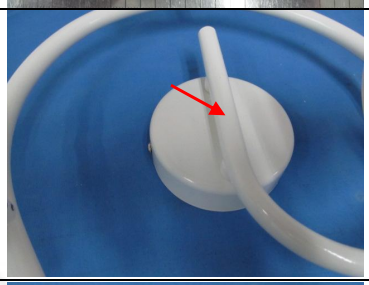
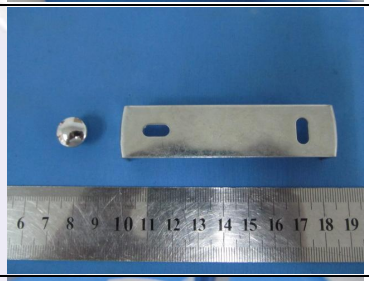
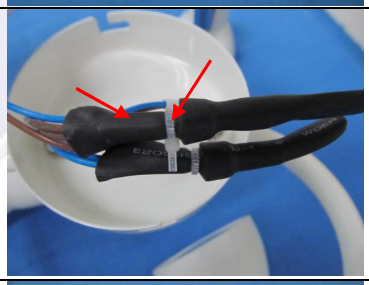
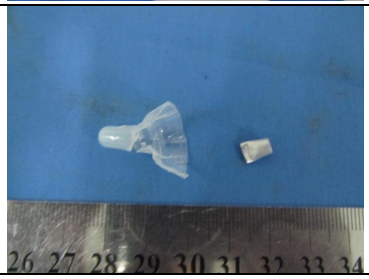
- Heavy Metal (Pb, Cd, Hg and CrVI) Content — PASS
- Polybrominated Biphenyls (PBBs) and Polybrominated Diphenyl Ethers (PBDEs) Content — PASS

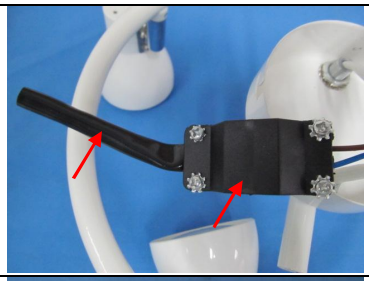
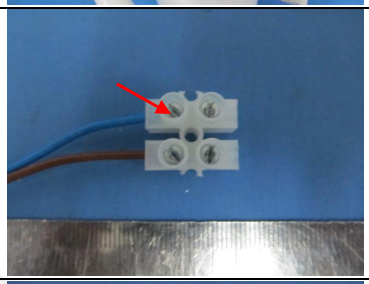
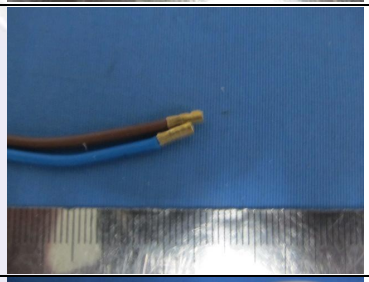
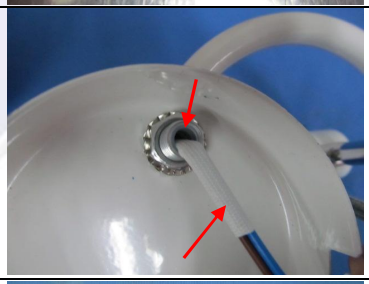
1. Description of the test subject

Sample No.	Model No.	Description	Photograph
001	LED12036-1C	Transparent plastic cover	
002		White plastic shell	
003		White plastic part	
004		Transparent soft plastic part	
005		Silvery metal clip	
006		Silvery metal rivet	
007		Transparent soft plastic part	
008		Silvery metal part	
009		Silvery metal axle	
010		Silvery metal joint	
011		Silvery metal part	
012		Silvery metal ring	
013		Silvery metal spring	

Sample No.	Model No.	Description	Photograph
014	LED12036-1C	Black plastic heat shrink tubing	
015		Transparent plastic screw	
016		White plastic shell	
017		White plastic switch	
018		White plastic part	
019		Copper-colored metal sheet	
020		Silvery metal sheet	
021		White plastic cable jacket	
022		White plastic plug	
023		Black plastic holder	
024		Silvery metal pin	
025		Brown plastic wire jacket	
026		Blue plastic wire jacket	
027		Copper-colored metal wire	

Sample No.	Model No.	Description	Photograph
028	LED12036-1C	Silvery metal sheet with white printing	
029		Silvery metal solder	
030		Yellow/white LED	
031		Blue plastic wire jacket	
032		Brown plastic wire jacket	
033		Silvery metal wire	
034		Brown plastic shell with white printing(C3)	
035		Silvery metal shell	
036		Black plastic cap	
037		Silvery metal pin	
038		Brown paper foil	
039		Silvery foil	
040		Black body with silvery spring(D3)	
041		Grey body with multicolor printing(R2)	
042		Brown body(C1)	
043		Green/beige CPB	
044		Silvery metal	

Sample No.	Model No.	Description	Photograph
045	LED12036-1C	Silvery metal screw	
046		Silvery metal washer	
047		Silvery metal ring	
048		Silvery metal nut	
049	LED12036-3SP	White coating on tube	
050		Silvery metal tube	
051		Silvery plated plastic edge	
052		Silvery metal sheet	
053		Black plastic heat shrink tubing	
054		Translucent plastic tie	
055		Translucent plastic cover	
056		Silvery metal joint	

Sample No.	Model No.	Description	Photograph
057	LED12036-3SP	Black plastic tube	
058		Black plastic box	
059		White plastic part	
060		Blue surfaced metal screw	
061		Blue surfaced metal block	
062		Blue plastic cable jacket	
063		Brown plastic cable jacket	
064		White plastic wire jacket	
065		Silvery metal wire	
066		Golden metal terminal	
067		Transparent plastic tube	
068		White fiber glass tube	
069		Silvery metal screw	

2. Order

2.1 Date of Purchase Order

2014-05-20

2.2 Receipt of Test Sample, Location

2014-05-20, Guangzhou

2.3 Date of Testing

2014-05-20 to 2014-05-30

2.4 Location of Testing

The chemical testing was performed in TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Chemical lab and the XRF testing was performed at TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch. The test results were reviewed at TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch.

3. Test Results

3.1 Screening test for the specified hazardous substances of RoHS for the selected materials of the submitted sample:

- Heavy Metal (Cadmium, Chromium, Mercury, Lead) Content Test
- Bromine Content Test

According to EN 62321: 2009, and Quantification analyzed with Energy Dispersive X-ray Fluorescence Spectrometers.

Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 001	BL	BL	BL	BL	BL
Sample 002	BL	BL	BL	BL	Inconclusive ^
Sample 003	BL	BL	BL	BL	BL
Sample 004	BL	BL	BL	BL	BL
Sample 005	BL	BL	BL	Inconclusive ^	N.A.
Sample 006	BL	BL	BL	BL	N.A.
Sample 007	BL	BL	BL	BL	BL
Sample 008	BL	BL	BL	BL	N.A.
Sample 009	BL	BL	BL	Inconclusive ^	N.A.
Sample 010	BL	BL	BL	BL	N.A.
Sample 011	BL	BL	BL	BL	N.A.
Sample 012	BL	Inconclusive ^	BL	BL	N.A.
Sample 013	BL	BL	BL	Inconclusive ^	N.A.
Sample 014	BL	BL	BL	BL	BL
Sample 015	BL	BL	BL	BL	BL
Sample 016	BL	BL	BL	BL	Inconclusive ^
Sample 017	BL	BL	BL	BL	BL
Sample 018	BL	BL	BL	BL	BL
Sample 019	BL	BL	BL	BL	N.A.
Sample 020	BL	BL	BL	BL	N.A.
Sample 021	BL	BL	BL	BL	BL
Sample 022	BL	BL	BL	BL	BL
Sample 023	BL	BL	BL	BL	Inconclusive ^
Sample 024	BL	OL^	BL	BL	N.A.
Sample 025	BL	BL	BL	BL	BL
Sample 026	BL	BL	BL	BL	BL
Sample 027	BL	BL	BL	BL	N.A.
Sample 028	BL	BL	BL	BL	N.A.

Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 029	BL	BL	BL	BL	N.A.
Sample 030	BL	BL	BL	BL	BL
Sample 031	BL	BL	BL	BL	BL
Sample 032	BL	BL	BL	BL	BL
Sample 033	BL	BL	BL	BL	N.A.
Sample 034	BL	BL	BL	BL	BL
Sample 035	BL	BL	BL	BL	N.A.
Sample 036	BL	BL	BL	BL	BL
Sample 037	BL	BL	BL	BL	N.A.
Sample 038	BL	BL	BL	BL	BL
Sample 039	BL	BL	BL	BL	BL
Sample 040	BL	BL	BL	BL	Inconclusive ^
Sample 041	BL	BL	BL	BL	Inconclusive ^
Sample 042	BL	BL	BL	BL	BL
Sample 043	BL	BL	BL	BL	Inconclusive ^
Sample 044	BL	BL	BL	BL	N.A.
Sample 045	BL	BL	BL	BL	N.A.
Sample 046	BL	BL	BL	BL	N.A.
Sample 047	BL	BL	BL	BL	N.A.
Sample 048	BL	BL	BL	BL	N.A.
Sample 049	BL	BL	BL	BL	BL
Sample 050	BL	BL	BL	BL	N.A.
Sample 051	BL	BL	BL	Inconclusive ^	BL
Sample 052	BL	BL	BL	BL	N.A.
Sample 053	BL	BL	BL	BL	BL
Sample 054	BL	BL	BL	BL	BL
Sample 055	BL	BL	BL	BL	BL
Sample 056	BL	BL	BL	BL	N.A.
Sample 057	BL	BL	BL	BL	BL
Sample 058	BL	BL	BL	BL	Inconclusive ^
Sample 059	BL	BL	BL	BL	BL
Sample 060	BL	BL	BL	BL	N.A.
Sample 061	BL	BL	BL	Inconclusive ^	N.A.
Sample 062	BL	BL	BL	BL	BL
Sample 063	BL	BL	BL	BL	BL
Sample 064	BL	BL	BL	BL	BL
Sample 065	BL	BL	BL	BL	N.A.
Sample 066	BL	BL	BL	BL	N.A.

Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 067	BL	BL	BL	BL	BL
Sample 068	BL	BL	BL	BL	BL
Sample 069	BL	BL	BL	BL	N.A.

Note:
1. All Concentrations express in “mg/kg” (milligram per kilogram), mg/kg ~ ppm
2. “OL” denotes “over limit”
3. “BL” denotes “below limit”
4. “N.A.” denotes “Not Applicable”
5. “Inconclusive” denotes result is intermediate between “OL” and “BL”
6. “^”denotes the screening result was inconclusive(X) or over limit (OL), thus further confirmation test was conducted, results are listed in 3.2 and 3.3.

XRF screening limits for different materials:

Materials	Concentration (mg/kg)				
	Cd	Cr	Pb	Hg	Br
Metal	BL≤(70-3σ)<X<(130+3σ)≤OL	BL≤(700-3σ)<X	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	N.A.
Polymers	BL≤(70-3σ)<X<(130+3σ)≤OL	BL≤(700-3σ)<X	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(300-3σ)<X
Composite material	BL≤(50-3σ)<X<(150+3σ)≤OL	BL≤(500-3σ)<X	BL≤(500-3σ)<X<(1500+3σ)≤OL	BL≤(500-3σ)<X<(1500+3σ)≤OL	BL≤(250-3σ)<X

3. 2 Test for Heavy Metals

– Lead, Cadmium, Hexavalent Chromium and Mercury Tests according to EN 62321: 2009.

Element	Total Cadmium [mg/kg]	Total Lead [mg/kg]	Total Mercury [mg/kg]	Hexavalent Chromium [-]	Hexavalent Chromium [mg/kg]
Detection Limit	**5**	**5**	**5**	**Δ**	**5**
RoHS Requirements	**100**	**1000**	**1000**	#	**1000**
Sample 005	/	/	/	Negative	/
Sample 009	/	/	/	Negative	/
Sample 012	/	N.D.	/	/	/
Sample 013	/	/	/	Negative	/
Sample 024	/	**16800 Φ**	/	/	/
Sample 051	/	/	/	Negative	/
Sample 061	/	/	/	Negative	/

Note:

1. All Concentrations express in “mg/kg”(milligram per kilogram), mg/kg ~ ppm.
2. “N.D.” = “Not Detected”.
3. Δ =Spot-Test:
   Negative = Absence of CrVI coating, Positive = Presence of CrVI coating;
   (The tested sample should be further verified by boiling-water-extraction method if the spot test result is negative or cannot be confirmed.)
   Boiling-water-extraction:
   Negative = Absence of CrVI coating
   Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02mg/kg with 50 cm^2 sample surface area.
   Storage conditions and production date of the tested sample are unavailable and thus results of Cr(VI) represent status of the sample at the time of testing
4. # = Positive indicates the presence of CrVI on the tested areas.
   Negative indicates the absence of CrVI on the tested areas.
5. “-” = Not regulated
6. Φ means as the information (the main source of lead could be copper alloy base) provided by the client, when Lead as an alloying element in copper alloy containing up to 4% Lead by weight is exempted from RoHS Directive 2011/65/EU Annex III.

3. 3 Test for Flame retardants

Test Method: With reference to EN 62321:2009, extracted by toluene and analyzed by Gas Chromatography and Mass Spectrometry (GC-MS). [Reporting Limit: 5mg/kg]

Test Item		Result [mg/kg]		RoHS Requirement [mg/kg]
		Sample 002	Sample 016	
PBBs	Monobromobiphenyl	< 5	< 5	Sum of PBBs < 1000
	Dibromobiphenyl	< 5	< 5	
	Tribromobiphenyl	< 5	< 5	
	Tetrabromobiphenyl	< 5	< 5	
	Pentabromobiphenyl	< 5	< 5	
	Hexabromobiphenyl	< 5	< 5	
	Heptabromobiphenyl	< 5	< 5	
	Octabromobiphenyl	< 5	< 5	
	Nonabromobiphenyl	< 5	< 5	
	Decabromobiphenyl	< 5	< 5	
	Sum of PBBs	< 5	< 5	
PBDEs	Monobromodiphenyl Ether	< 5	< 5	Sum of PBDEs < 1000
	Dibromodiphenyl Ether	< 5	< 5	
	Tribromodiphenyl Ether	< 5	< 5	
	Tetrabromodiphenyl Ether	< 5	< 5	
	Pentabromodiphenyl Ether	< 5	< 5	
	Hexabromodiphenyl Ether	< 5	< 5	
	Heptabromodiphenyl Ether	< 5	< 5	
	Octabromodiphenyl Ether	< 5	< 5	
	Nonabromodiphenyl Ether	< 5	< 5	
	Decabromodiphenyl Ether	< 5	< 5	
	Sum of PBDEs	< 5	< 5	

Note:

1. All Concentrations express in “mg/kg” (milligram per kilogram), mg/kg ~ ppm.
2. “<” denotes less than

Test Item		Result [mg/kg]		RoHS Requirement [mg/kg]
		Sample 023	Sample 040	
PBBs	Monobromobiphenyl	< 5	< 5	Sum of PBBs < 1000
	Dibromobiphenyl	< 5	< 5	
	Tribromobiphenyl	< 5	< 5	
	Tetrabromobiphenyl	< 5	< 5	
	Pentabromobiphenyl	< 5	< 5	
	Hexabromobiphenyl	< 5	< 5	
	Heptabromobiphenyl	< 5	< 5	
	Octabromobiphenyl	< 5	< 5	
	Nonabromobiphenyl	< 5	< 5	
	Decabromobiphenyl	< 5	< 5	
	Sum of PBBs	< 5	< 5	
PBDEs	Monobromodiphenyl Ether	< 5	< 5	Sum of PBDEs < 1000
	Dibromodiphenyl Ether	< 5	< 5	
	Tribromodiphenyl Ether	< 5	< 5	
	Tetrabromodiphenyl Ether	< 5	< 5	
	Pentabromodiphenyl Ether	< 5	< 5	
	Hexabromodiphenyl Ether	< 5	< 5	
	Heptabromodiphenyl Ether	< 5	< 5	
	Octabromodiphenyl Ether	< 5	< 5	
	Nonabromodiphenyl Ether	< 5	< 5	
	Decabromodiphenyl Ether	< 5	< 5	
	Sum of PBDEs	< 5	< 5	

Note:

1. All Concentrations express in “mg/kg” (milligram per kilogram), mg/kg ~ ppm.
2. “<” denotes less than

Test Item		Result [mg/kg]		RoHS Requirement [mg/kg]
		Sample 041	Sample 043	
PBBs	Monobromobiphenyl	< 5	< 5	Sum of PBBs < 1000
	Dibromobiphenyl	< 5	< 5	
	Tribromobiphenyl	< 5	< 5	
	Tetrabromobiphenyl	< 5	< 5	
	Pentabromobiphenyl	< 5	< 5	
	Hexabromobiphenyl	< 5	< 5	
	Heptabromobiphenyl	< 5	< 5	
	Octabromobiphenyl	< 5	< 5	
	Nonabromobiphenyl	< 5	< 5	
	Decabromobiphenyl	< 5	< 5	
	Sum of PBBs	< 5	< 5	
PBDEs	Monobromodiphenyl Ether	< 5	< 5	Sum of PBDEs < 1000
	Dibromodiphenyl Ether	< 5	< 5	
	Tribromodiphenyl Ether	< 5	< 5	
	Tetrabromodiphenyl Ether	< 5	< 5	
	Pentabromodiphenyl Ether	< 5	< 5	
	Hexabromodiphenyl Ether	< 5	< 5	
	Heptabromodiphenyl Ether	< 5	< 5	
	Octabromodiphenyl Ether	< 5	< 5	
	Nonabromodiphenyl Ether	< 5	< 5	
	Decabromodiphenyl Ether	< 5	< 5	
	Sum of PBDEs	< 5	< 5	

Note:

1. All Concentrations express in “mg/kg” (milligram per kilogram), mg/kg ~ ppm.
2. “<” denotes less than

Test Item		Result [mg/kg]	RoHS Requirement [mg/kg]
		Sample 058	
PBBs	Monobromobiphenyl	< 5	Sum of PBBs < 1000
	Dibromobiphenyl	< 5	
	Tribromobiphenyl	< 5	
	Tetrabromobiphenyl	< 5	
	Pentabromobiphenyl	< 5	
	Hexabromobiphenyl	< 5	
	Heptabromobiphenyl	< 5	
	Octabromobiphenyl	< 5	
	Nonabromobiphenyl	< 5	
	Decabromobiphenyl	< 5	
	Sum of PBBs	< 5	
PBDEs	Monobromodiphenyl Ether	< 5	Sum of PBDEs < 1000
	Dibromodiphenyl Ether	< 5	
	Tribromodiphenyl Ether	< 5	
	Tetrabromodiphenyl Ether	< 5	
	Pentabromodiphenyl Ether	< 5	
	Hexabromodiphenyl Ether	< 5	
	Heptabromodiphenyl Ether	< 5	
	Octabromodiphenyl Ether	< 5	
	Nonabromodiphenyl Ether	< 5	
	Decabromodiphenyl Ether	< 5	
	Sum of PBDEs	< 5	

Note:

1. All Concentrations express in “mg/kg” (milligram per kilogram), mg/kg ~ ppm.
2. “<” denotes less than

4. Documentation

APPENDIX 01: Photos of submitted products

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch
TÜV SÜD Group

Engineer: _____ **Technical Report checked:** _____

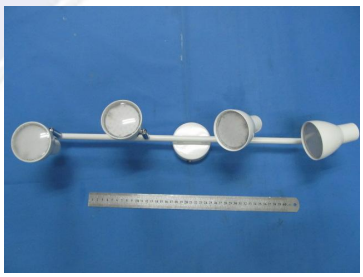
Judy Tan **Ben Shao**

APPENDIX 01:

Photos of submitted products**:**

LED12036-1C

LED12036-3SP



LED12036-4TU