
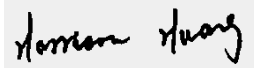




Report No.: RSZ181026552-03

Report reference No: RSZ181026552-03	
Compiled by (+ signature): Engineer: Herry He	
Approved by (+ signature): Project Engineer:Harrison Huang	
Date of issue: 2018-11-1	
Testing laboratory: Bay Area Compliance Laboratories Corp. (Dongguan)	
Address: No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China	
Testing location: Same as above	
Applicant: Hongli Zhihui Group Co.,Ltd.	
Address: No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China	
Standard: EN 62471:2008	
Test sample(s) received.....: 2018-10-30	
Test in period.....: 2018-10-30	
Procedure deviation: N.A.	
Non-standard test method: N.A.	
<p>The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the specific product described herein. It must not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).</p>	
Type of test object: LEDCOB	
Trademark: NA	
Model/type reference: HL-LM002H384W-7B3C12(Ra2)	
Manufacturer.....: Hongli Zhihui Group Co.,Ltd. No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China	
Rating: Input: 34-40Vdc, 0.25A	
Copy of marking plate: None	



Tested lamp:LED COB
 Tested lamp system:N.A

Lamp cap: N.A
 Bulb.....: N.A
 Rated of the lamp:See rating
 Furthermore marking on the lamp.....: N.A.
 Seasoning of lamps accordingEN standard: No seasoning
 Used measurement instrument.....: See appendix B for details
 Temperature by measurement.....: 25.3°C
 Information for safety use.....: N.A

:

-test case does not apply to the test object.....:N(.A.)
 -test object does meet the requirement.....:P(ass)
 -test object does not meet the requirement.....:F(ail)

The test results presented in this report relate only to the object tested.
 This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
 "(See Enclosure #)" refers to additional information appended to the report.
 "(See appended table)" refers to a table appended to the report.
 Throughout this report a point is used as the decimal separator.
 List of test equipment must be kept on file and available for review.

"EUT" as referred in this report is LED COB, test model is HL-LM002H384W-7B3C12(Ra2), Input: 34-40Vdc, 0.25A

4	EXPOSURE LIMITS		P
	Contents of the whole Clause 4 of IEC 62471: 2006 moved into a new informative Annex ZB		P
	Clause 4 replaced by the following:		P
	Limits of the Artificial Optical Radiation have been applied instead of those fixed in IEC 62471: 2006	See Table 6.1	P

FINAL

	$L_B \cdot t = \int_t L(\lambda, t) \cdot B(\lambda) \cdot d\lambda \cdot t \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}$		N
	$L_B = \int L(\lambda) \cdot B(\lambda) \cdot d\lambda \leq 100 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	See Table 6.1	P
4.3.4	Retinal blue light hazard exposure limit - small source	= 0.0425	N
	Thus the spectral irradiance at the eye E_λ , weighted against the blue-light hazard function $B(\lambda)$ shall not exceed the levels defined by: see table 4.2		N
	$E \cdot t = \int E_\lambda(\lambda, t) \cdot B(\lambda) \cdot d\lambda \cdot t \leq 100 \text{ J} \cdot \text{m}^{-2}$		N
	$E_B = \int E_\lambda \cdot B(\lambda) \cdot d\lambda \leq 1 \text{ W} \cdot \text{m}^{-2}$		N
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_λ , weighted by the burn hazard weighting function $R(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		P
	$L_{IR} = \int_{1400}^{5000} L_\lambda \cdot R(\lambda) \cdot d\lambda \leq \frac{50000}{\alpha} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	See Table 6.1	P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		P
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, LIR, as viewed by the eye for exposure times greater than 10 s shall be limited to:		P
	$L_{IR} = \int_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot d\lambda \leq \frac{6000}{\alpha} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	See Table 6.1	P
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, EIR, over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		N
	$E_{IR} = \int_{780}^{3000} E_\lambda \cdot d\lambda \leq 18000 \cdot t^{-0,75} \text{ W} \cdot \text{m}^{-2}$		N
	For times greater than 1000 s the limit becomes:		P

$$E_{\text{IR}} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100$$

W·m⁻²

See Table 6.1

P

FEMVAL

5.2.2.1	Standard method		P
	The measurements made with an optical system.		P
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		P
5.2.2.2	Alternative method		N
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		N
5.2.3	Measurement of source size		P
	The determination of θ , the angle subtended by a source, requires the determination of the 50% emission points of the source.	$\theta = 0.0425$	P
5.2.4	Pulse width measurement for pulsed sources		N
	The determination of t_p , the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		N
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.		N
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.		P
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as follows:		P
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		N
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		P
6.1	Continuous wave lamps		P
6.1.1	Exempt Group		N
	In the exempt group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		N
	– an actinic ultraviolet hazard (ES) within 8-hours exposure (30000 s), nor		N
	– a near-UV hazard (EUVA) within 1000 s, (about 16 min), nor		N

	– a retinal blue-light hazard (LB) within 10000 s (about 2,8 h), nor		N
	– a retinal thermal hazard (LR) within 10 s, nor		N
	– an infrared radiation hazard for the eye (EIR) within 1000 s		N
6.1.2	Risk Group 1 (Low-Risk)		P
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		P
	– an actinic ultraviolet hazard (ES) within 10000 s, nor		P
	– a near ultraviolet hazard (EUVA) within 300 s, nor		P
	– a retinal blue-light hazard (LB) within 100 s, nor		P
	– a retinal thermal hazard (LR) within 10 s, nor		P
	– an infrared radiation hazard for the eye (EIR) within 100 s		P
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 100 s are in Risk Group 1.		P
6.1.3	Risk Group 2 (Moderate-Risk)		N
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N
	– an actinic ultraviolet hazard (ES) within 1000 s exposure, nor		N
	– a near ultraviolet hazard (EUVA) within 100 s, nor		N
	– a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	– a retinal thermal hazard (LR) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (EIR) within 10 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 10 s are in Risk Group 2.		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N
6.2	Pulsed lamps		N
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N
	The risk group determination of the lamp being tested shall be made as follows:		N
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N

	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N
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F E M T A L

Spectral weighting function for assessing ultraviolet hazards for skin and eye				-
λ	λ	λ	λ	
200	0,030	313*	0,006	
205	0,051	315	0,003	
210	0,075	316	0,0024	
215	0,095	317	0,0020	
220	0,120	318	0,0016	
225	0,150	319	0,0012	
230	0,190	320	0,0010	
235	0,240	322	0,00067	
240	0,300	323	0,00054	
245	0,360	325	0,00050	
250	0,430	328	0,00044	
254*	0,500	330	0,00041	
255	0,520	333*	0,00037	
260	0,650	335	0,00034	
265	0,810	340	0,00028	
270	1,000	345	0,00024	
275	0,960	350	0,00020	
280*	0,880	355	0,00016	
285	0,770	360	0,00013	
290	0,640	365*	0,00011	
295	0,540	370	0,000093	
297*	0,460	375	0,000077	

Spectral weighting functions for assessing retinal hazards from broadband optical sources		-
300	0,01	-
305	0,01	-
310	0,01	-
315	0,01	-
320	0,01	-
325	0,01	-
330	0,01	-
335	0,01	-
340	0,01	-
345	0,01	-
350	0,01	-
355	0,01	-
360	0,01	-
365	0,01	-
370	0,01	-
375	0,01	-
380	0,01	0,1
385	0,013	0,13
390	0,025	0,25
395	0,05	0,5
400	0,10	1,0
405	0,20	2,0
410	0,40	4,0
415	0,80	8,0
420	0,90	9,0
425	0,95	9,5
430	0,98	9,8
435	1,00	10,0
440	1,00	10,0
445	0,97	9,7
450	0,94	9,4
455	0,90	9,0
460	0,80	8,0
465	0,70	7,0
470	0,62	6,2
475	0,55	5,5
480	0,45	4,5
485	0,40	4,0
490	0,22	2,2
495	0,16	1,6
500-600	$10^{[(450-\lambda)/50]}$	1,0
600-700	0,001	1,0
700-1050	0,013	$10^{[(700-\lambda)/500]}$
1050-1150	0,025	0,2
1150-1200	0,05	$0,2 \cdot 100.02^{(1150-\lambda)}$
1200-1400	0,10	0,02
* 1 Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.		
* Emission lines of a mercury discharge spectrum.		

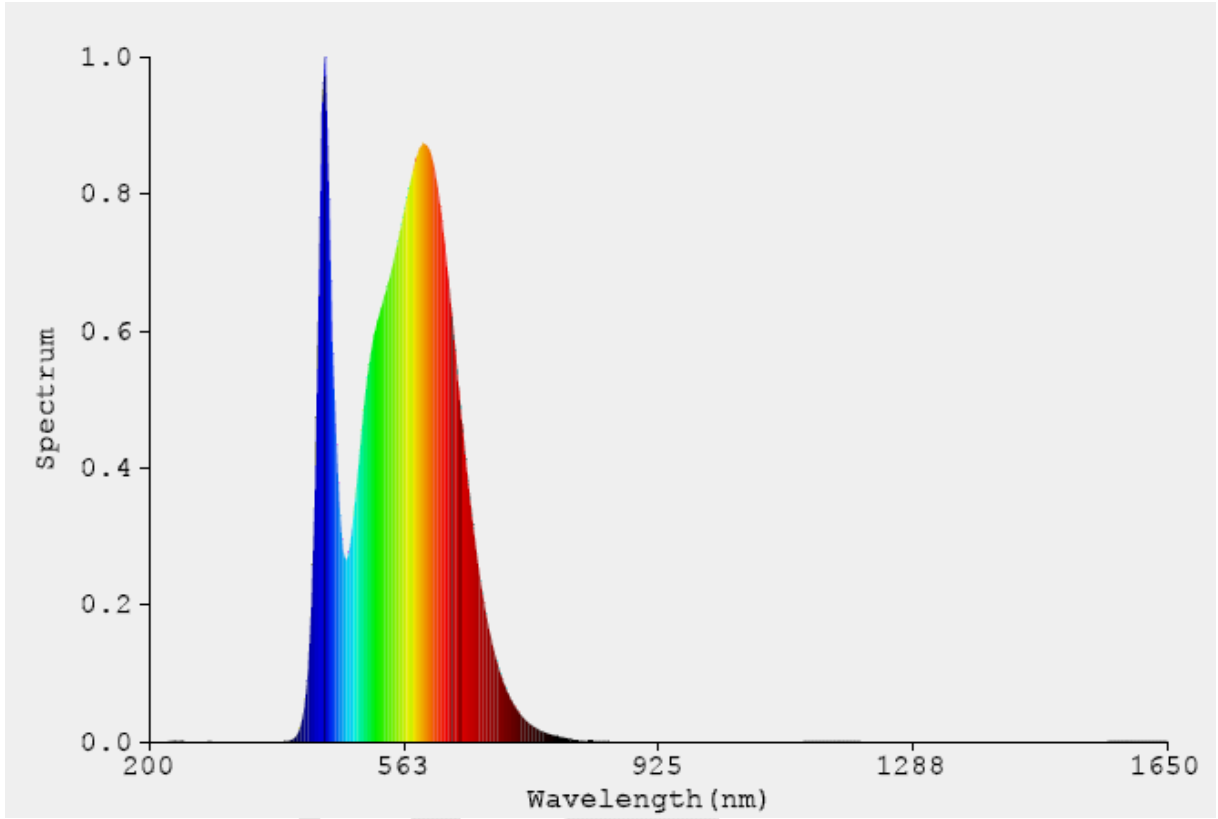
Summary of the ELs for the surface of the skin or cornea (irradiance based values)					
Actinic UV skin & eye	$E_s = E \cdot S(\lambda)$	200 – 400	< 30000	1,4 (80)	30/t
Eye UV-A	$E_{UVA} = E \cdot$	315 – 400	1000 >1000	1,4 (80)	10000/t 10
Blue-light small source	$E_B = E \cdot B(\lambda)$	300 – 700	100 >100	< 0,011	100/t 1,0
Eye IR	$E_{IR} = E \cdot$	780 – 3000	1000 >1000	1,4 (80)	18000/t ^{0,75} 100
Skin thermal	$E_H = E \cdot$	380 – 3000	< 10	2 sr	20000/t ^{0,75}

Summary of the ELs for the retina (radiance based values)					
Blue light	$L_B = L \cdot B(\lambda) \cdot$	300 – 700	0,25 – 10 10-100 100-10000 10000	0,011 • (t/10) 0,011 0,0011 • t 0,1	10 ⁶ /t 10 ⁶ /t 10 ⁶ /t 100
Retinal thermal	$L_R = L \cdot R(\lambda) \cdot$	380 – 1400	< 0,25 0,25 – 10	0,0017 0,011 • (t/10)	50000/(• t ^{0,25}) 50000/(• t ^{0,25})
Retinal thermal (weak visual stimulus)	$L_{IR} = L \cdot R(\lambda) \cdot$	780 – 1400	> 10	0,011	6000/

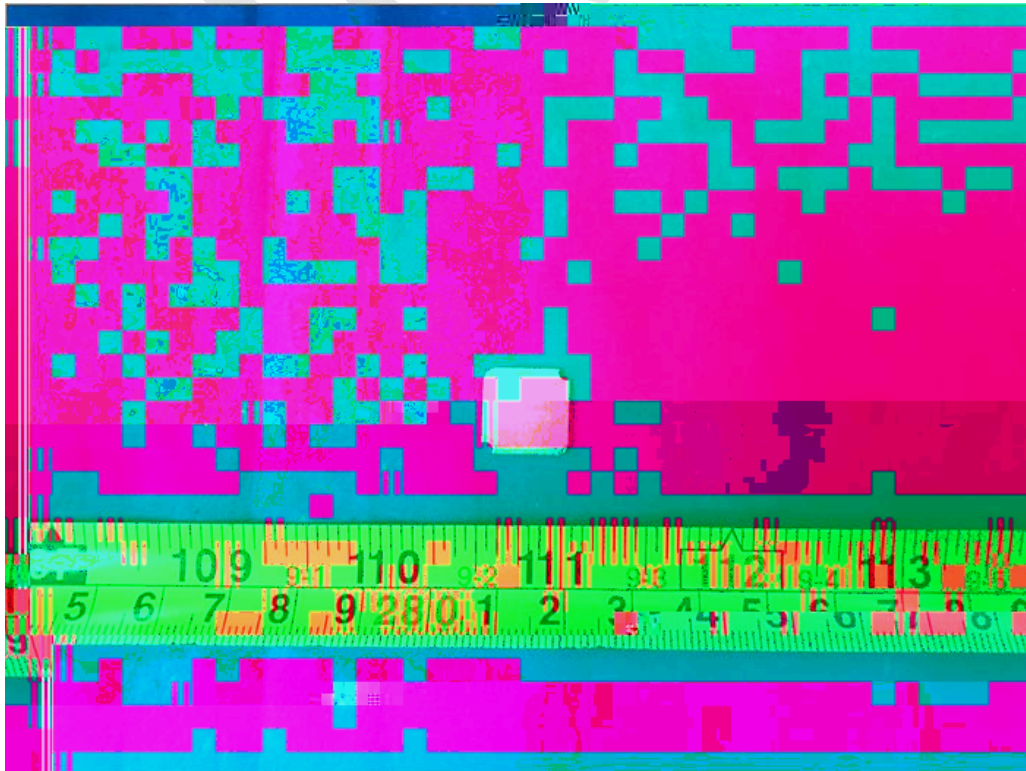
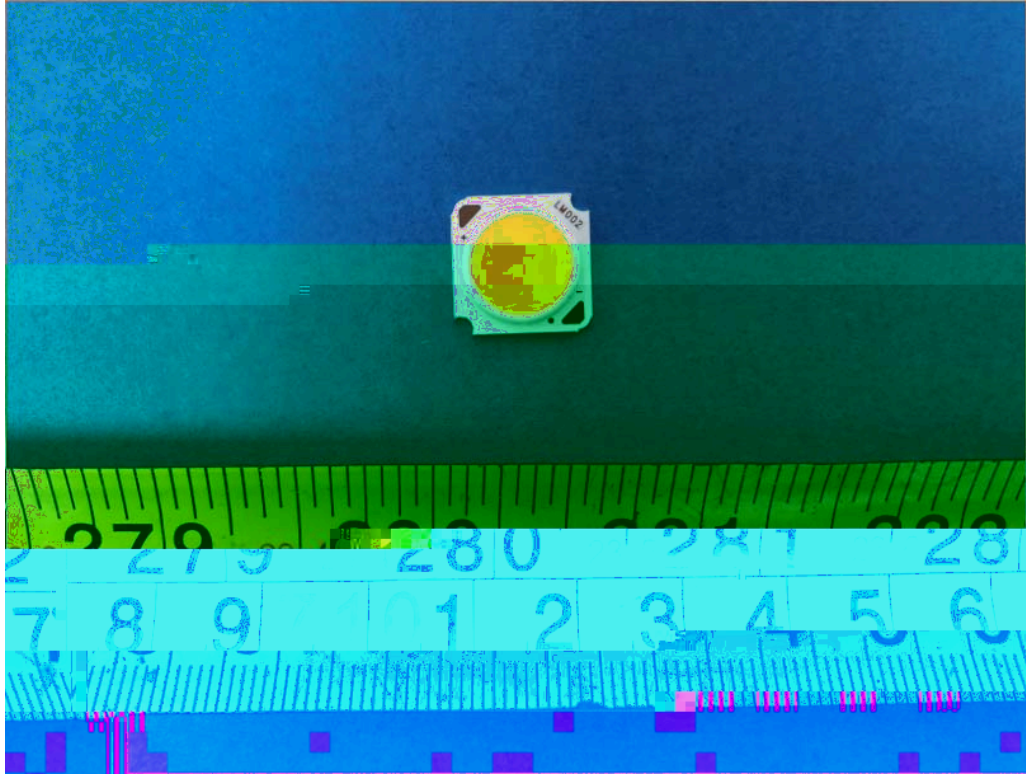
Table 6.1		Emission limits for risk groups of continuous wave lamps based on Directive(2006/25/EC)							P	
Risk	Action spectrum	Units	Symbol	Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	Suv()	W.m ⁻²	E _S	0.001	-	0.003	1.4×10 ⁻³	0.03	-	
Near UV		W.m ⁻²	E _{UVA}	0.33	-	33	1.8×10 ⁻³	100	-	
Blue light	B()	W.m ⁻² .sr ⁻¹	L _B	100	-	10000	2.28×10 ³	4000000	-	
Blue light,small source	B()	W.m ⁻²	E _B	0.01	-	1.0	-	400	-	
Retinal thermal	R()	W.m ⁻² .sr ⁻¹	L _R	28000/ (= 0.0425)	-	28000/ (= 0.0425)	3.1×10 ⁴	71000/ (= 0.0425)	-	
Retinal thermal, Weak visual stimulus**	R()	W.m ⁻² .sr ⁻¹	L _{IR}	6000/ (= 0.0425)	-	6000/ (= 0.0425)	1.3×10 ¹	6000/ (= 0.0425)	-	
IR radiation Eye		W.m ⁻²	E _{IR}	100	-	570	5.0	3200	-	

* Small source defined as one with < 0,011 radian. Averaging field of view at 10000 s is 0,1 radian.
 ** Involves evaluation of non-GLS source
 NOTE The action functions: see Table 4.1 and Table 4.2
 The appliance apertuer diameters: see 4.2.1
 The limitations for the angular subtenses: see 4.2.2
 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5

Figure of Spectral distribution



Appendix A - EUT Photos





Appendix B - Test equipment list

UV-VIS-near IR Spectrophotometer	PMS-2000	T-08-SF213	EVERFINE	2018-09-03	2019-09-03
Imaging luminance meter	CX-2K	T-08-SF213-1	EVERFINE	2018-09-03	2019-09-03
Radiation illuminance meter	RD-2000	T-08-SF213-2	EVERFINE	2018-09-03	2019-09-03
Radiation illuminance meter	RD-2000	T-08-SF213-3	EVERFINE	2018-09-03	2019-09-03
High Accuracy Array	HAAS-2000	T-08-SF213-4	EVERFINE	2018-09-03	2019-09-03
80mm sample integrating sphere	SMS-300	T-08-SF213-5	EVERFINE	2018-09-03	2019-09-03
Hygrothermograph	VC230	T-08-QA015	VICTOR	2018-03-17	2019-03-17
Steel tape	5mx19mm	T-08-SF197	B&Q	2016-02-25	2021-02-23
High power LED aging dc power supply	B12005	T-08-SF205	BACL	2018-03-26	2019-03-26
AC power supply	HPA-1103	F-08-SF129	EVERFINE	2018-07-23	2019-07-23