



<b>TEST REPORT</b> <b>PPP 11106B:2016 Rev.01</b> <b>TÜV SÜD Test program for ErP</b> <b>Ecodesign requirement for LED module</b> <b>Implementation measure EU 1194/2012 and EC 244/2009</b>	
Report reference No.....	70.402.16.057.01
Date of issue.....	2016-04-29
Project handler .....	Mr. Arsis XIN
Testing laboratory.....	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
Address.....	No. 151, Hengtong Road, 200070, Shanghai, P.R.China.
Testing location .....	as above
Applicant .....	Paragon Semiconductor Lighting Technology Co., Ltd.
Client number .....	90164
Address.....	3F, No.369, Sec2, Wenhua 2nd Rd., Linkou Dist, 24458 New Taipei City, TAIWAN
Contact person .....	N/A
Standard .....	This TÜV SÜD test program is based on the following standards: (EU) 1194/2012:2012-12-12 (EC) 244/2009:2009-03-18 Amended by (EC) 859/2009:2009-09-18 and (EU) 2015/1428:2015-08-25
TRF originated by.....	TÜV SÜD Product Service GmbH, Mr. Richard Xu
Copyright blank test report.....	This test report is based on the content of the internal test program. The test program considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TÜV SÜD Product Service GmbH.  TÜV SÜD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
Test procedure .....	<input type="checkbox"/> TÜV Mark, <input checked="" type="checkbox"/> EU-Directive, <input type="checkbox"/> without certification
Non-standard test method .....	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes, see details under Summary
National deviations .....	None
Number of pages (Report) .....	19
Number of pages (Attachments).....	9
Compiled by..... (+ signature)	 Mr. Arsis XIN
Approved by .....	 Ms. Lucy LU



Product Service

Test sample .....	LED module	
Type of test object .....	Portable	
Trademark .....	N/A	
Model and/or type reference .....	CBAC-83-36185-230V-40 22W	
Rating(s) .....	230VAC, 50Hz, 22W, 4000K	
Manufacturer .....	Paragon Semiconductor Lighting Technology Co., Ltd.	
Client number .....	90164	
Address .....	3F, No.369, Sec2, Wenhua 2nd Rd., Linkou Dist, 24458 New Taipei City, TAIWAN	
Sub-contractors/ tests (clause) .....	N/A	
Address .....	N/A	
Order description .....	<input checked="" type="checkbox"/>	Complete test according to TRF
	<input type="checkbox"/>	Partial test according to manufacturer's specifications
	<input type="checkbox"/>	Preliminary test
	<input type="checkbox"/>	Spot check
Date of order .....	2016-01-06	
Date of receipt of test item .....	2016-01-20	
Date(s) of performance of test .....	2016-01-20 to 2016-04-15	
Test item particulars:		
Module type:		
- Non - directional LED module	<input checked="" type="checkbox"/>	
- Directional LED module	<input type="checkbox"/>	
- Special purpose module	<input type="checkbox"/>	
Construction:		
- User replaceable	<input type="checkbox"/>	
- Non-user replaceable	<input checked="" type="checkbox"/>	Note: separately tested
- Luminaire with non-user replaceable module	<input type="checkbox"/>	
Control gear:		
- Integrated	<input checked="" type="checkbox"/>	
- External	<input type="checkbox"/>	
Use of module		
- Indoor	<input checked="" type="checkbox"/>	
- Outdoor	<input type="checkbox"/>	
- Industry	<input type="checkbox"/>	



Product Service

Envelope transparency:	
- Clear	<input checked="" type="checkbox"/>
- Non-clear	<input type="checkbox"/>
Dimmable module:	
	<input type="checkbox"/>
Module with anti-glare shield:	
	<input type="checkbox"/>
Cap installed.....	
	N/A
Declared data:	
Rated voltage .....	(V): 230
Rated lamp power .....	(W): 22
Rated useful luminous flux.....	(lm): 1900
Rated beam angel .....	(°): N/A
Rated CCT .....	(K): 4000
Rated life time .....	(h): 25000
Declared $t_{p\ max}$ .....	(°C): N/A
Attachments:	
<ol style="list-style-type: none"> <li>1. Test equipment list</li> <li>2. Photometric test record of one lamp at initial measurement</li> <li>3. Light intensity distribution record of one module at initial measurement</li> <li>4.</li> </ol>	
General remarks:	
<p>“(see remark #)” refers to a remark appended to the report.  “(see appended table)” refers to a table appended to the report.  Throughout this report the term ‘lamp’ is used instead of ‘module’.  Throughout this report a <b>comma</b> is used as the decimal separator.  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 testing laboratory.  In this report the term lamp includes also LED modules.</p> <p>The data of lumen maintenance @6000h and lifetime @6000h in this report was calculated according to IES TM-21-11 and its calculator.  Based on the lumen maintenance projection data. The lumen maintenance at 6000h hours is 96.64%.  The real data should be checked after 6000h.</p>	



Product Service

**Summary of testing:**

The product meets the stage 6 efficiency requirements of EC 244/2009 and stage 1 functionality and information requirements of EC 1194/2012.

Remark:

**Efficiency & Information requirement:**

<b>Non-directional</b>	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Start Date	1.Sep.2009	1.Sep.2010	1.Sep.2011	1.Sep.2012	1.Sep.2013	1.Sep.2018

<b>Directional</b>	Stage 1	Stage 2	Stage 3
Start Date	1.Sep.2013	1.Sep.2014	1.Sep.2016

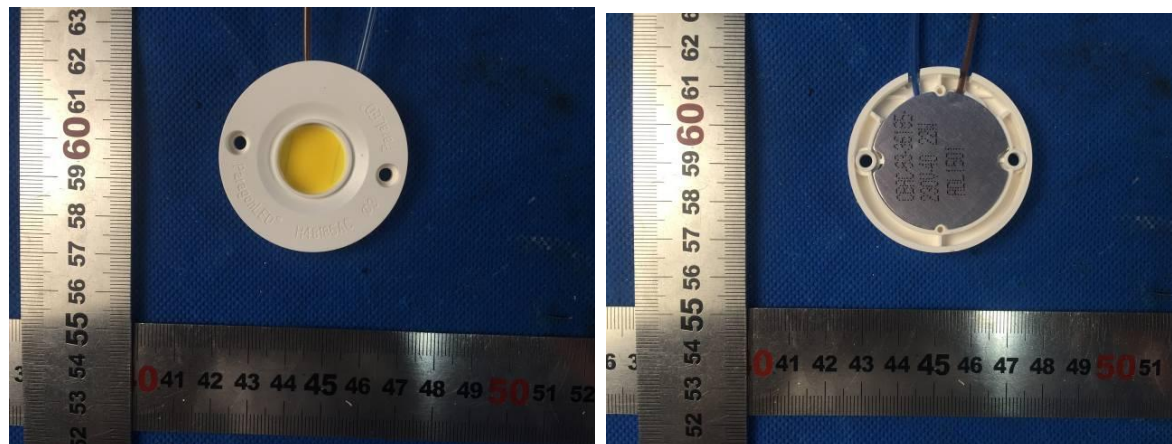
**Functionality requirement**

<b>All</b>	Stage 1	Stage 1a	Stage 2	Stage 3
Start Date	1.Sep.2013	1. Mar. 2014	1.Sep.2014	1.Sep.2016

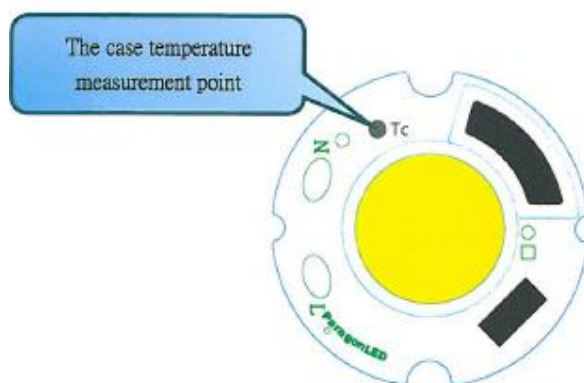
Copy of marking plate:

Not provided

Picture of the product



Picture of the location of the  $t_p$  – point



Characteristic data  
Not provided



Product Service

Purpose of the product

LED module for general lighting service.

The appliance does not incorporate with the standby/off mode.

Possible test case verdicts:

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

Possible suffixes to the verdicts:

- suffix for detailed information for the client.....: - C(omment)
- suffix for important information for factory inspection...: - M(anufacturing)

Clause	Requirement – Test	Measuring result – Remark	Verdict
<b>0</b>	Measurement methods		
	Recognised state of art measurement methods incl. the one published in the Official Journal taking into account the measurement methods of (EC) 244/2009, (EU) 1194/2012	Transitional test method acc. to OJ 2010/C 92/04)	P
1.	Sample		
	Number of sample used for test .....	20	P
2.	Energy efficiency requirements		
2.1	<b>Non-directional</b> LED lamp (Annex II, cl.1 of EC 244/2009)		
a	Lamp efficacy ( $\eta_{\text{lamp}}$ )		
	Evaluation : $P \leq P_{\text{max}}$	P: 22.0W	P
b	Limit definition:		
	Clear lamps – Stage 1~5: $P_{\text{max}} = 0,8 * (0,88\sqrt{\Phi+0,049\Phi})$	$P_{\text{max}}$ : 105.17W (incl. corrections) $\Phi$ :1900lm	P
	Clear lamps – Stage 6: $P_{\text{max}} = 0,6 * (0,88\sqrt{\Phi+0,049\Phi})$	$P_{\text{max}}$ : 78.87W (incl. corrections) $\Phi$ :1900lm	P
	Non-clear lamps – Stage 1~6: $P_{\text{max}} = 0,24\sqrt{\Phi+0,0103\Phi}$	$P_{\text{max}}$ : (incl. corrections) $\Phi$ :	N/A
c	<b>Exceptions:</b>		
	Clear lamps $60 \text{ lm} \leq \Phi \leq 950 \text{ lm}$ in Stage 1 $P_{\text{max}} = 1,1 * (0,88\sqrt{\Phi+0,049\Phi})$		N/A
	Clear lamps $60 \text{ lm} \leq \Phi \leq 725 \text{ lm}$ in Stage 2 $P_{\text{max}} = 1,1 * (0,88\sqrt{\Phi+0,049\Phi})$		N/A
	Clear lamps $60 \text{ lm} \leq \Phi \leq 450 \text{ lm}$ in Stage 3 $P_{\text{max}} = 1,1 * (0,88\sqrt{\Phi+0,049\Phi})$	$P_{\text{max}}$ : (incl. corrections) $\Phi$ :	N/A
	Clear lamps with G9 or R7s cap in Stage 6 $P_{\text{max}} = 0,8 * (0,88\sqrt{\Phi+0,049\Phi})$	$P_{\text{max}}$ : (incl. corrections) $\Phi$ :	N/A
	<b>Correction</b> factors, which are cumulative where appropriate and also applicable to the products covered by the <b>Exceptions</b> :		
	non-clear lamp with colour rendering index $\geq 90$ and $P \leq 0,5 * (0,88\sqrt{\Phi+0,049\Phi})$	$P_{\text{max}}/0,85$	N/A
	non-clear lamp with second envelope and $P \leq 0,5 * (0,88\sqrt{\Phi+0,049\Phi})$	$P_{\text{max}}/0,95$	N/A
	LED lamp requiring external power supply	$P_{\text{max}}/1,1$	N/A





Clause	Requirement – Test	Measuring result – Remark	Verdict
2.2	<b>Directional</b> LED lamp (Annex III, cl.1.1 of EU 1194/2012)		
a	Energy efficiency (EEI )		
	The energy efficiency index is calculated as follows and rounded to 2 decimal places: $EEI = P_{cor} / P_{ref}$	EEI:	N/A
	Stage 1~2: $EEI_{max} \leq 0.5$		N/A
	Stage 3: $EEI_{max} \leq 0.2$		N/A
b	Correction factors, which are cumulative where appropriate		
	No correction appropriate : $P_{cor} = P_{rated}$	$P_{rated}$ : $P_{cor}$ :	N/A
	Lamps operating on external LED lamp control gear : $P_{cor} = P_{rated} \times 1,10$	$P_{rated}$ : $P_{cor}$ :	N/A
	Lamps with anti-glare shield: $P_{cor} = P_{rated} \times 0,80$	$P_{rated}$ : $P_{cor}$ :	N/A
c	$P_{ref}$ is the reference power obtained from the useful luminous flux of the lamp ( $\Phi_{use}$ ) by the following formula:		
	For models with $\Phi_{use} < 1\,300$ lumen: $P_{ref} = 0,88\sqrt{\Phi_{use}} + 0,049\Phi_{use}$	$\Phi_{use}$ : $P_{ref}$ :	N/A
	For models with $\Phi_{use} \geq 1\,300$ lumen: $P_{ref} = 0,07341 \Phi_{use}$	$\Phi_{use}$ : $P_{ref}$ :	N/A
3	Lamp functionality requirements for <b>non-directional</b> and <b>directional</b> LED lamp (Annex III, cl.2.2, table 5 of EU 1194/2012)		
3.1	Lamp survival factor (LSF) at 6000h		
	From March 1, 2014: $LSF \geq 0.90$	LSF:	N/A
3.2	Lumen maintenance (LLMF) at 6000h		
	From March 1, 2014: $LLMF \geq 0.80$	LLMF:	N/A
3.3	Number of switching cycles (n) before failure		
	$n \geq 15\,000$ if rated lamp life $\geq 30\,000$ h	n:	N/A
	otherwise: $n \geq$ half the rated lamp life expressed in hours	n: see appendix table	P
3.4	Starting time ( $t_{start}$ )		
	$t_{start} < 0.5$ s	$t_{start}$ : see appendix table	P
3.5	Lamp warm-up time ( $t_{warm}$ ) to 95 % $\Phi$		
	$t_{warm} < 2$ s	$t_{warm}$ : see appendix table	P
3.6	Premature failure rate (PFR)		
	$PFR \leq 5,0$ % at 1000 h	PFR: see appendix table	P





Clause	Requirement – Test	Measuring result – Remark	Verdict
3.7	Colour rendering (Ra)		
	Ra $\geq$ 80	Ra: see appendix table	P
	Ra $\geq$ 65 if the lamp is intended for outdoor or industrial applications	Ra:	
3.8	Colour consistency		
	Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.		P
3.9	Lamp power factor (PF)		
	P $\leq$ 2 W: no requirement		
	2 W < P $\leq$ 5 W: PF > 0,4	PF:	N/A
	5 W < P $\leq$ 25 W: PF > 0,5	PF: see appendix table	P
	P > 25 W: PF > 0,9	PF:	N/A
3.10	Compatibility requirement for lamps using lamp caps also used with filament lamps		
	Lamps shall comply from <b>stage 2</b> with state of art requirements for compatibility with equipment designed for installation between the mains and filament lamps (e.g. dimmer, ...)		N/A
4	Product Information Requirements		
4.1	Product information requirements for <b>directional lamps</b> (Annex III, cl.3.1 of EU 1194/2012)		
	These information requirements do not apply to: LED modules when marketed as part of a luminaire from which they are not intended to be removed by the end-user.		N/A
	The following information shall be provided as from stage 1, except where otherwise stipulated.		
	In all forms of product information, the term ' <b>energy-saving lamp</b> ' or any similar product related promotional statement about lamp efficacy may be used only if the energy efficiency index of the lamp (calculated in accordance with the method set out in point 1.1 of this Annex) is 0,40 or below.		N/A
4.1.1	Information to be displayed on the lamp itself		
	For lamps other than high-intensity discharge lamps, the value and unit ('lm', 'K' and '° ') of the nominal useful luminous flux, of the colour temperature and of the nominal beam angle shall be displayed in a legible font on the surface of the lamp if, after the inclusion of safety-related information such as power and voltage, there is sufficient space available for it on the lamp without unduly obstructing the light coming from the lamp.		N/A
	If there is room for only one of the three values, the nominal useful luminous flux shall be		N/A



Clause	Requirement – Test	Measuring result – Remark	Verdict
	provided. If there is room for two values, the nominal useful luminous flux and the colour temperature shall be provided.		
4.1.2	Information to be visibly displayed to end-users, prior to their purchase, on the packaging and on free access websites		
	The information below shall be displayed on free access websites and in any other form the manufacturer deems appropriate.		N/A
	If the product is placed on the market in a packaging containing information to be visibly displayed to the end- users, prior to their purchase, the information shall also be clearly and prominently indicated on the packaging.		N/A
	The information does not need to use the exact wording on the list below. It may be displayed in the form of graphs, drawings or symbols rather than text.		N/A
(a)	Nominal useful luminous flux displayed in a font at least twice as large as any display of the nominal lamp power;		N/A
(b)	Nominal life time of the lamp in hours (not longer than the rated life time);		N/A
(c)	Colour temperature, as a value in Kelvins and also expressed graphically or in words;		N/A
(d)	Number of switching cycles before premature failure;		N/A
(e)	Warm-up time up to 60 % of the full light output (may be indicated as 'instant full light' if less than 1 second);		N/A
(f)	A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers; in the latter case a list of compatible dimmers shall be also provided on the manufacturer's website;		N/A
(g)	If designed for optimum use in non-standard conditions (such as ambient temperature $T_a \neq 25^\circ\text{C}$ or specific thermal management is necessary), information on those conditions;		N/A
(h)	Lamp dimensions in millimeters (length and largest diameter);		N/A
(i)	Nominal beam angle in degrees;		N/A
(j)	If the lamp's beam angle is $\geq 90^\circ$ and its useful luminous flux as defined in point 1.1 of this Annex is to be measured in a $120^\circ$ cone, a warning that the lamp is not suitable for accent lighting;		N/A
(k)	If the lamp cap is a standardized type also used with filament lamps, but the lamp's dimensions are different from the dimensions of the filament lamp(s) that the lamp is meant to replace, a drawing comparing the lamp's dimensions to the dimensions of the filament lamp(s) it replaces;		N/A

Clause	Requirement – Test	Measuring result – Remark	Verdict
(l)	An indication that the lamp is of a type listed in the first column of Table 6 may be displayed only if the luminous flux of the lamp in a 90° cone ( $\Phi_{90^\circ}$ ) is not lower than the reference luminous flux indicated in Table 6 for the smallest wattage among the lamps of the type concerned. The reference luminous flux shall be multiplied by the correction factor in Table 7. For LED lamps, it shall be in addition multiplied by the correction factor in Table 8;	Claimed equivalent:  Reference $\Phi_{90^\circ}$ (lm): (incl. correction factor)	N/A
(m)	An equivalence claim involving the power of a replaced lamp type may be displayed only if the lamp type is listed in Table 6 and if the luminous flux of the lamp in a 90° cone ( $\Phi_{90^\circ}$ ) is not lower than the corresponding reference luminous flux in Table 6. The reference luminous flux shall be multiplied by the correction factor in Table 7. For LED lamps, it shall be in addition multiplied by the correction factor in Table 8. The intermediate values of both the luminous flux and the claimed equivalent lamp power (rounded to the nearest 1 W) shall be calculated by linear interpolation between the two adjacent values.	Claimed equivalent:  Claimed P:  Reference $\Phi_{90^\circ}$ (lm): (incl. correction factor)	N/A
4.1.3	Information to be made publicly available on free-access websites and in any other form the manufacturer deems appropriate		
(a)	The information specified in above point 4.1.2;		N/A
(b)	Rated power (0,1 W precision)		N/A
l	Rated useful luminous flux		N/A
(d)	Rated lamp life time		N/A
(e)	Lamp power factor		N/A
(f)	Lumen maintenance factor at the end of the nominal life (except for filament lamps)		N/A
(g)	Starting time (as X,X seconds)		N/A
(h)	Colour rendering		N/A
(i)	Colour consistency (only for LEDs)		N/A
(j)	Rated peak intensity in candela (cd)		N/A
(k)	Rated beam angle		N/A
(l)	If intended for use in outdoor or industrial applications, an indication to this effect;		N/A
(m)	Spectral power distribution in the range 180-800 nm		N/A
4.2	Product information requirements for <b>non-directional lamps</b> (Annex II, cl.3 of EC 244/2009)		
4.2.1	Information to be visibly displayed prior to purchase to end-users on the packaging and on free access websites. (It may be displayed using graphs, figures or symbols rather than text.)		P



Clause	Requirement – Test	Measuring result – Remark	Verdict
(a)	When the nominal lamp power is displayed outside the energy label in accordance with Directive 98/11/EC, the nominal luminous flux of the lamp shall also be separately displayed in a font at least twice as large as the nominal lamp power display outside the label	Label acc. to (EU) 874/2012	P
(b)	Nominal life time of the lamp in hours (not higher than the rated life time)	25000h	P
I	Number of switching cycles before premature lamp failure;	12500 cycles	P
(d)	Colour temperature (also expressed as a value in Kelvins);	4000K	P
(e)	Warm-up time up to 60 % of the full light output (may be indicated as 'instant full light' if less than 1 second);		P
(f)	A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers;		P
(g)	If designed for optimal use in non-standard conditions (such as ambient temperature $T_a \neq 25^\circ \text{C}$ ), information on those conditions;		N/A
(h)	Lamp dimensions in millimeters (length and diameter);		N/A
(i)	If equivalence with an incandescent lamp is claimed on the packaging, the claimed equivalent incandescent lamp power (rounded to 1 W) shall be that corresponding in Table 6 to the luminous flux of the lamp contained in the packaging. The intermediate values of both the luminous flux and the claimed incandescent lamp power (rounded to 1W) shall be calculated by linear interpolation between the two adjacent values.	Claimed equivalent:	N/A

Clause	Requirement – Test	Measuring result – Remark	Verdict
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Table 6

Rated lamp luminous flux $\Phi$ [lm]			Claimed equivalent incandescent lamp power
CFL	Halogen	LED and other lamps	[W]
125	119	136	15
229	217	249	25
432	410	470	40
741	702	806	60
970	920	1055	75
1398	1326	1521	100
2253	2137	2452	150
3172	3009	3452	200

j	The term ' <b>energy saving lamp</b> ' or any similar product related promotional statement about lamp efficacy may only be used if the lamp complies with the efficacy requirements applicable to non-clear lamps in Stage 1 according to Tables 1, 2 and 3.		
4.2.2	Information to be made publicly available on free-access websites. (information shall be expressed at least as values.)		
(a)	The information specified in above point 4.2.1		P
(b)	Rated wattage (0,1 W precision);	22.0W	P
l	Rated luminous flux;	1900lm	P
(d)	Rated lamp life time;	25000h	P
(e)	Lamp power factor;	>0.50	P
(f)	Lumen maintenance factor at the end of the nominal life;	≥0.70	P
(g)	Starting time (as X,X seconds);	<0.5s	P
(h)	Colour rendering.	≥80	P
5	Temperature reference point (IEC/PAS 62717:2011 clause 4.1)		
	Measured temperature @ reference point $t_p$	101.7	P



Table 1a		Test data : LED lamps															
Model:				CBAC-83-36185-230V-40 22W				Frequency (Hz):				50					
Φ <sub>use</sub> measured at:				total luminous flux				Ambient (T/rh) (°C / %)				25/55					
Test item		Measured Value										Average		Limit		Remark	
Rated lifetime(h)		25000										-		-		-	
Rated power (W)		22.0										-		≤P <sub>max</sub> = 78.87W		-	
Rated luminous flux (lm)		1900										-		-		-	
Rated EEI		0.158										-		-		F	
Rated EEI Class		A+										-		-		G	
Measured lifetime (h)		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	≥1000	-			
		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000						
Switching cycle		12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	≥12500	-			
		12500	12500	12500	12500	12500	12500	12500	12500	12500	12500						
Voltage (V)		230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	-	C			
		230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0						
Current (mA)		109	109	108	109	108	109	109	108	107	108	108	-	-			
		108	108	108	108	108	108	109	108	109	107						
Luminous flux Φ <sub>use</sub>		1841	1852	1863	1869	1858	1881	1876	1850	1840	1844	1856	≥ 1710	E			
		1859	1855	1842	1851	1855	1855	1870	1862	1849	1856						
Lumen maintenance at 6000h (%)		96.64%										≥ 80.00		I			
Starting time (s)		0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	<0.5	-			
		0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06						



95% warm-up time (s)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	<2.0	-
	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04			
Input power (W)	22.69	22.70	22.55	22.73	22.65	22.69	22.71	22.66	22.51	22.48	22.61	≤24.20	D
	22.64	22.54	22.60	22.48	22.51	22.64	22.69	22.58	22.73	22.47			
Power factor	0.909	0.909	0.910	0.908	0.908	0.909	0.908	0.910	0.911	0.909	0.909	>0.50	-
	0.909	0.910	0.908	0.908	0.910	0.910	0.909	0.909	0.909	0.910			
CCT (K)	3963	3968	3966	3952	3974	3959	3963	3938	3947	3950	3958	-	-
	3961	3960	3955	3971	3962	3968	3959	3950	3952	3944			
Color rending (Ra)	84.1	84.2	84.2	84.1	84.0	84.4	84.3	84.3	84.1	84.1	84.2	≥80	-
	84.3	83.9	84.0	84.1	84.1	84.2	84.1	84.2	84.1	84.2			
LED Color consistency	2.1	2.1	1.9	2.2	2.2	2.0	2.1	2.0	2.0	2.2	2.2	<6.0	-
	2.2	1.9	1.8	2.5	2.1	2.0	2.3	2.5	2.8	2.1			
Premature failure rate at 1000h	0.0%											≤5.0%	-
P <sub>ref</sub> (W)	136.28											-	-
P <sub>cor</sub> (W)	22.61											-	-
EEI	0.166											≤0.174	F
EEI class	A+											-	G
Supplementary information: Chromaticity coordinates (x,y) : 0.3822, 0.3782( Sample #1)													

Remark:





- A. All measured values are the average values of 20 pcs test samples.
- B. Initial values were measured after 1 h aging test.
- C. All tests were carried out under 230V~, 50Hz, and the other test conditions are according to the relative standards.
- D. Initial power should  $\leq 110\%$  rated power.
- E. Initial luminous flux should  $\geq 90\%$  rated luminous flux.
- F.  $EEl = P_{cor} / P_{ref}$ ,  $P_{ref} = 0,07341 \Phi_{use}$
- G. The Energy efficiency class is determined according to EC 874/2012, Annex VI, Table 1.
- H. The data of lumen maintenance @6000h was calculated according to IES TM-21-11 and its calculator
- I. For all values with 20 measured results, the model number of the table is as below:

1	.....	10
11	.....	20

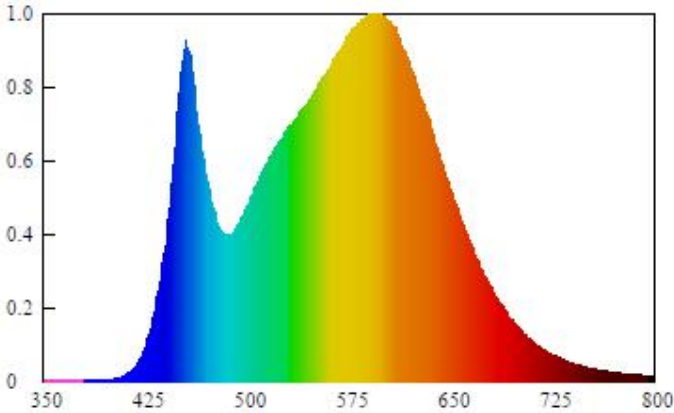
Table 3	Spectroradiometric Parameters
Model:	CBAC-83-36185-230V-40 22W
 <p>色品坐标 Chromaticity Coordinates: <math>x=0.3822</math> <math>y=0.3782</math> <math>u'=0.2257</math> <math>v'=0.5025</math>              相关色温 Correlated Color Temperature: 3963 K      主波长 Dominant Wavelength: 578.0 nm(E)              显色指数 Rendering Index: <math>R_a=84.1</math>      峰值波长 Peak Wavelength: 597.8 nm              色纯度 Purity: 0.2822      谱线带宽 Bandwidth: 149.8nm              光通量 Luminous Flux: 1841.035 lm      辐射通量 Radiant Flux: 5.503 W              色比 Color Ratio: <math>K_r=38.5\%</math> <math>K_g=51.7\%</math> <math>K_b=9.8\%</math>              色容差 Color Tolerance(SDCM): 2.1112      色偏差 Chromaticity Difference: <math>+0.00017Duv</math>              R1=83   R2=92   R3=96   R4=81   R5=82   R6=89   R7=85   R8=65              R9=14   R10=81   R11=79   R12=66   R13=86   R14=98   R15=77              电压 Voltage: 230.07 V      电流 Current: 0.1085 A              功率因数 Power Factor: 0.909      功率 Power: 22.69 W              发光效率 Luminous Efficacy: 81.139 lm/W</p>	

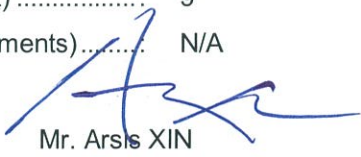
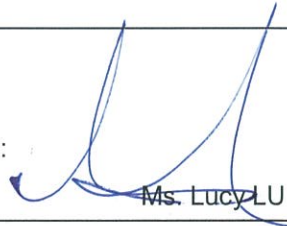
Table 4	Lumen maintenance projection according to TM-21				
Model:	CBAC-83-36185-230V-40 22W				
LM-80 Testing Details					
Total number of units tested per case temperature:		25			
Number of failures:		0			
Number of units measured:		25			
Test duration (hours):		6000			
Tested drive current (mA):		1000			
Tested case temperature 1 (T <sub>c</sub> , °C):		55			
Tested case temperature 2 (T <sub>c</sub> , °C):		85			
Tested case temperature 3 (T <sub>c</sub> , °C):		105			
Test Data for 55°C Case Temperature		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature	
Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
1000	99.31%	1000	99.00%	1000	99.08%
2000	98.87%	2000	98.50%	2000	98.46%
3000	98.44%	3000	98.21%	3000	98.24%
4000	98.05%	4000	97.82%	4000	97.75%
5000	97.46%	5000	97.11%	5000	97.13%
6000	97.18%	6000	96.51%	6000	96.54%
In-Situ Inputs					
Drive current for each LED package/array/module (mA):		95			
In-situ case temperature (T <sub>c</sub> , °C):		101.7			
Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70):		70			
Results					
Time (t) at which to estimate lumen maintenance (hours):		6,000			
Lumen maintenance at time (t) (%):		96.64%			
Reported L70 (hours):		>36000			
Remark: Test data was according to LM-80 report no. PS-110314-001 issued by Paragon Semiconductor Lighting Technology Co.,Ltd dated on 2014.03.11					
Measured temperature @ reference point t <sub>p</sub> :101.7°C					

**Attachment 1: Equipment List**

Equipment	ID No.	Model	Brand/Manufacturer	Calibration due date
Power source	S0712411-YQ	6640	EXTECH (Taiwan)	May-18-2017
Power Analyser	S1004526-YQ	WT210	YOKOGAWA	May-18-2017
Full-field Speed Goniophotometer	S1207714-YQ	GO-R5000	Everfine	May-18-2017
Integrating sphere	S1004508-YQ	Sensing	PR-110B	May-18-2017
Calibration lamp	S1108625-YQ	D204BH	Everfine	May-18-2017

**-- End of report --**



<b>TEST REPORT</b> <b>PPP 18014B:2014 Rev. 00</b> <b>TÜV SÜD Test report for Energy labelling for electrical lamps and luminaires</b> <b>Delegated regulation EU 874/2012</b> <b>Lamps and LED modules</b>	
Report reference No.....	70.402.16.057.01
Date of issue.....	2016-04-29
Project handler .....	Mr. Arsis XIN
Testing laboratory.....	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
Address.....	No. 151, Hengtong Road, 200070, Shanghai, P.R.China.
Testing location .....	as above
Applicant .....	Paragon Semiconductor Lighting Technology Co., Ltd.
Client number .....	90164
Address.....	3F, No.369, Sec2, Wenhua 2nd Rd., Linkou Dist, 24458 New Taipei City, TAIWAN
Contact person .....	N/A
Standard .....	This TUV SUD test report form is based on the following requirements: (EU) 874/2012:2012-07-12 Test method: OJ (2014/C 22/02)
TRF originated by.....	TUV SUD Product Service GmbH, Mr. Richard Xu
Copyright blank test report.....	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TUV SUD Product Service GmbH.  TUV SUD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
Test procedure .....	<input type="checkbox"/> TÜV Mark, <input checked="" type="checkbox"/> EU-Directive, <input type="checkbox"/> without certification
Non-standard test method .....	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes, see details under Summary
National deviations .....	None
Number of pages (Report) .....	9
Number of pages (Attachments).....	N/A
Compiled by..... (+ signature)	 Mr. Arsis XIN
Approved by .... (+ signature)	 Ms. Lucy LU



Test sample .....	LED module
Type of test object .....	Portable
Trademark .....	N/A
Model and/or type reference .....	CBAC-83-36185-230V-40 22W
Rating(s) .....	230VAC, 50Hz, 22W, 4000K
Manufacturer .....	Paragon Semiconductor Lighting Technology Co., Ltd.
Manufacturer number .....	90164
Address .....	3F, No.369, Sec2, Wenhua 2nd Rd., Linkou Dist, 24458 New Taipei City, TAIWAN
Sub-contractors/ tests (clause) .....	N/A
Name .....	N/A
Order description... ..	<input type="checkbox"/> Complete test according to TRF <input type="checkbox"/> Partial test according to manufacturer's specifications <input type="checkbox"/> Preliminary test <input type="checkbox"/> Spot check <input type="checkbox"/>
Date of order .....	2016-01-06
Date of receipt of test item .....	2016-01-20
Date(s) of performance of test .....	2016-01-20 to 2016-04-15
Test item particulars:	
Product .....	<input type="checkbox"/> Luminaire <input type="checkbox"/> Lamp <input checked="" type="checkbox"/> Module
Lamp / Modul type .....	<input checked="" type="checkbox"/> non - directional <input type="checkbox"/> directional
Beam angle (°) .....	N/A
Cap / Socket type .....	N/A
Technology .....	<input type="checkbox"/> mains-voltage filament lamps <input type="checkbox"/> other filament lamps : .. <input type="checkbox"/> fluorescent lamps <input type="checkbox"/> compact fluorescent lamps <input type="checkbox"/> high-intensity discharge lamps <input type="checkbox"/> LED lamp <input type="checkbox"/> LED module, user replacable <input type="checkbox"/> LED module, non user replacable <input type="checkbox"/> other: ...



To be used with .....	<input type="checkbox"/> external halogen lamp control gear <input type="checkbox"/> external fluorescent lamp control gear <input type="checkbox"/> Fluorescent lamps of 16 mm diameter (T5 lamps) and 4-pin single capped fluorescent lamps operating on external fluorescent lamp control gear <input type="checkbox"/> external HID lamp control gear <input type="checkbox"/> external low over sodium lamp control gear <input type="checkbox"/> external LED lamp control gear <input type="checkbox"/> other: ...
Luminaire construction:	<input type="checkbox"/> lamp included <input type="checkbox"/> lamp not included <input type="checkbox"/> non user replacable LED modules <input type="checkbox"/> user replacable module included <input type="checkbox"/> user replacable module not included <input type="checkbox"/> other:
Declared data: Rated voltage .....(V): 230 Rated lamp power .....(W): 22 Rated usefull luminous flux.....(lm): 1900 Rated beam angel .....(°): N/A	
Attachments: 1. Test report No.: 70.402.16.057.01	
General remarks: "(see remark #)" refers to a remark appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report a comma is used as the decimal separator. 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 testing laboratory.	





Summary of testing:

- ☐ Deviation(s) found  
☒ No deviations found

Requirement	Declared	Measured
EEI	0.158	0.166
EE class	A+	A+
E <sub>c</sub> (kWh/1000h)	22.00	22.61

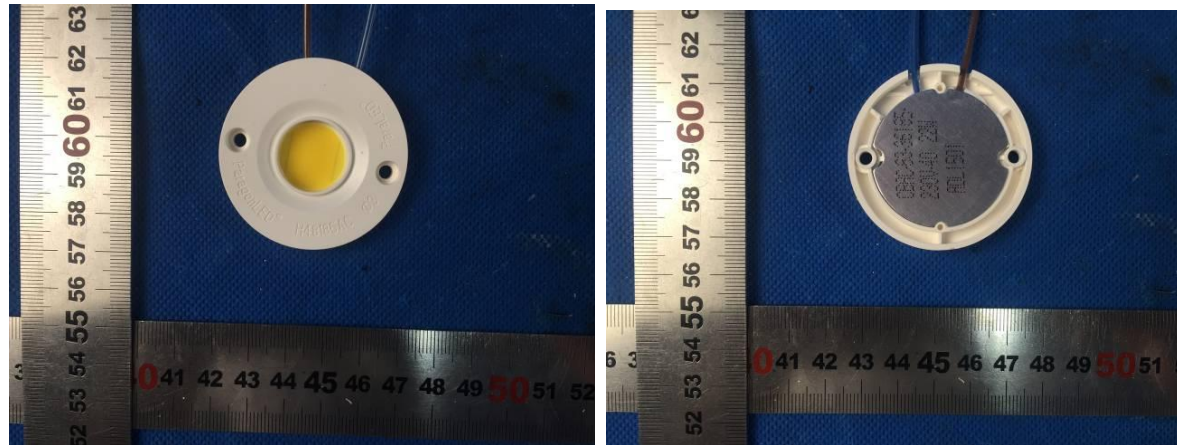
If additional information is necessary, please provide

Copy of marking plate:

Marking plate:

Not provided

Picture of the product



Characteristic data Factory

Not provided

Purpose of the product

LED module for general lighting service.

The appliance does not incorporate with the standby/off mode.

Possible test case verdicts:

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

Possible suffixes to the verdicts:

- suffix for detailed information for the client.....: - C(omment)
- suffix for important information for factory inspection....: - M(anufacturing)

<b>0</b>	<b>Measurment methods</b>			
	Recognised state of art measurement methods incl. the one published in the Official Journal taking into account the measurement methods of (EC) 244/2009, (EC) 245/2009, (EU) 1194/2012			P
<b>1</b>	<b>Method for calculating the energy efficiency index and energy consumption (Annex VII)</b>			
<b>1.1</b>	<b>CALCULATION OF THE ENERGY EFFICIENCY INDEX</b>			
	The EEI is calculated as follows and rounded to two decimal places: $EEI = P_{cor} / P_{ref}$	See attached table 2		P
	$P_{cor}$ is the rated power ( $P_{rated}$ ) for models without external control gear and the rated power ( $P_{rated}$ ) corrected in accordance with below table for models with external control gear.	See attached table 2		P
	The rated power of the lamps is measured at their nominal input voltage	See attached table 2		P
	Power correction if the model requires external control gear (Table2)			
	Scope of the correction	Power corrected for control gear losses ( $P_{cor}$ )		N/A
	Lamps operating on external halogen lamp control gear	$P_{rated} \times 1,06$		N/A
	Lamps operating on external LED lamp control gear	$P_{rated} \times 1,10$		N/A
	Fluorescent lamps of 16 mm diameter (T5 lamps) and 4-pin single capped fluorescent lamps operating on external fluorescent lamp control gear	$P_{rated} \times 1,10$		N/A
	Other lamps operating on external fluorescent lamp control gear	$P_{rated} \times \frac{0,24\sqrt{\Phi_{use}} + 0,0103\Phi_{use}}{0,15\sqrt{\Phi_{use}} + 0,0097\Phi_{use}}$		N/A
	Lamps operating on external high-intensity discharge lamp control gear	$P_{rated} \times 1,10$		N/A
	Lamps operating on external low pressure sodium lamp control gear	$P_{rated} \times 1,15$		N/A
	$P_{ref}$ is the reference power obtained from the useful luminous flux of the model ( $\Phi_{use}$ ) by the following formular:			
	For models with $\Phi_{use} < 1300$ lumen: $P_{ref} = 0,88\sqrt{\Phi_{use}} + 0,049\Phi_{use}$	See attached table 2		N/A
	For models with $\Phi_{use} \geq 1300$ lumen: $P_{ref} = 0,07341\Phi_{use}$	See attached table 2		P
	The useful luminous flux ( $\Phi_{use}$ ) is defined in accordance with below table.(Table 3)			
	Definition of the useful luminous flux			
	Model	Useful luminous flux ( $\Phi_{use}$ )		
	Non-directional lamps	Total rated luminous flux ( $\Phi$ )		P

	Directional lamps with a beam angle $\geq 90^\circ$ other than filament lamps and carrying a textual or graphical warning on their packaging that they are not suitable for accent lighting	Rated luminous flux in a $120^\circ$ cone ( $\Phi_{120^\circ}$ )		N/A
	Other directional lamps	Rated luminous flux in a $90^\circ$ cone ( $\Phi_{90^\circ}$ )		N/A
1.2	CALCULATION OF THE ENERGY CONSUMPTION			
	The weighted energy consumption ( $E_c$ ) is calculated in kWh/1000 h as follows and is rounded to <b>two</b> decimal places: $E_c = \frac{P_{cor} \times 1\,000\,h}{1\,000}$			P
2	Evaluation			
	Declared values are not more favorable than value based on measured data		See attached table 2	P

For reference:

<b>Annex VI</b>	<b>Energy Efficiency Class</b>			P
	The energy efficiency class of lamps shall be determined on the basis of their energy efficiency index (EEI) as set out in below table.			P
	Energy efficiency class	Energy efficiency index (EEI) for non-directional lamps	Energy efficiency index (EEI) for directional lamps	
	A++ (most efficient)	$EEI \leq 0,11$	$EEI \leq 0,13$	
	A+	$0,11 < EEI \leq 0,17$	$0,13 < EEI \leq 0,18$	
	A	$0,17 < EEI \leq 0,24$	$0,18 < EEI \leq 0,40$	
	B	$0,24 < EEI \leq 0,60$	$0,40 < EEI \leq 0,95$	
	C	$0,60 < EEI \leq 0,80$	$0,95 < EEI \leq 1,20$	
	D	$0,80 < EEI \leq 0,95$	$1,20 < EEI \leq 1,75$	
	E (least efficient)	$EEI > 0,95$	$EEI > 1,75$	

Table 1		Measured Values				P
Model		G1L115064-230V22WC50				
Frequency (Hz):		-		Ambient temperature (°C):	25	
$\Phi_{use}$ measured at:		Total luminous flux		Ambient humidity (%):	55	
Sample no.	U (V)	I (mA)	Power (W)	$\Phi_{use}$ (lm)	Color temperature (K)	
1	230.0	109	22.69	1841	3963	
2	230.0	109	22.70	1852	3968	
3	230.0	108	22.55	1863	3966	
4	230.0	109	22.73	1869	3952	
5	230.0	108	22.65	1858	3974	
6	230.0	109	22.69	1881	3959	
7	230.0	109	22.71	1876	3963	
8	230.0	108	22.66	1850	3938	
9	230.0	107	22.51	1840	3947	
10	230.0	108	22.48	1844	3950	
11	230.0	108	22.64	1859	3961	
12	230.0	108	22.54	1855	3960	
13	230.0	108	22.60	1842	3955	
14	230.0	108	22.48	1851	3971	
15	230.0	108	22.51	1855	3962	
16	230.0	108	22.64	1855	3968	
17	230.0	109	22.69	1870	3959	
18	230.0	108	22.58	1862	3950	
19	230.0	109	22.73	1849	3952	
20	230.0	107	22.47	1856	3944	
<b>Average</b>		--	--	22.61	1856	--
Remarks:						
Other test data refer to test report PPP11106A:2013: 70.402.16.057.01						

Table 2	Data calculation & comparision				
Item	Rated value	Measured value	Deviation	Remark	
Beam angel (°)	N/A	N/A	N/A	N/A	
$\Phi_{use}$ (lm)	1900	1856	-2.3%	P	
$P_{ref}$ (W)	139.48	136.28	-2.3%	P	
Power (W)	22.00	22.61	+2.8%	P	
Power corrected factor for control gear losses	N/A	N/A	N/A	N/A	
$P_{cor}$ (W)	22.00	22.61	+2.8%	P	
EEI	0.16	0.17	+5.2%	P	
Energy efficiency class	A+	A+	-	P	
$E_c$ (kWh/1000h)	22.00	22.61	+2.8%	P	
Remarks:					
N/A					