Ref. Certif. No.

DK-47381-P8-UL

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product	Built-in LED Module
Name and address of the applicant	Signify Netherlands B.V. High Tech Campus 48 Eindhoven 5656 AE Netherlands
Name and address of the manufacturer	Signify Netherlands B.V. High Tech Campus 48 Eindhoven 5656 AE Netherlands
Name and address of the factory Note: *When more than one factory, please report on page 2*	☒ Additional Information on page 2
Ratings and principal characteristics	Imax 3680 mA ⎓ Vmax 44 V ☒ Additional Information on page 2 to page 6
Trademark / Brand (if any)	PHILIPS
Customer's Testing Facility (CTF) Stage used	
Model / Type Ref.	Main series: Fortimo SLM C zcc d m Lee s Gia ☒ Additional Information on page 2 to page 7
Additional information (if necessary may also be reported on page 2)	**Additionally evaluated to:** EN IEC 62031:2020, EN IEC 62031:2020/A11:2021; National Differences specified in the CB Test Report. ☒ Additional Information on page 7 and page 8
A sample of the product was tested and found to be in conformity with	IEC 62031:2018
As shown in the Test Report Ref. No. which forms part of this Certificate	4790611363-2 issued on 2023-03-29

This CB Test Certificate is issued by the National Certification Body

UL Solutions

☐ UL Solutions (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL Solutions (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL Solutions (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL Solutions (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

For full legal entity names see www.ul.com/ncbnames

Date: 2023-04-12

Signature: Jan-Erik Storgaard

Factory(ies):

Additional Model Detail(s):

Product Key:

Main series: **Fortimo SLM C *zcc d m* Lee *s* G*ia***

Where:

z	=	CRI of LED divided by 10 (one digit, may be “7” or “8” or “9”);
cc	=	Color temperature of LED divided by 100 (two digits, may be a value between 25 and 57);
d	=	Flavor of light (two or three characters, may be “CW” or “FP” or “FPR” or “FW” or “FWW” or “PW” or blank;
m	=	Die matrix (4 digits, example 1216: Chip configuration = 12 chips in series per string & 16 strings in parallel);
ee	=	Diameter of Light Emitting Surface (LES) in mm (one or two digits, example 19: LES dimensions = 19 mm);
s	=	CoB size in mm (four digits, example 2828: CoB dimensions = 28 mm x 28 mm);
i	=	Number of generation of CoB (one digit, may be “4” or “5”);
a	=	Suffix for commercial purposes (optional)

The naming key of this main series can be also written as:

Fortimo SLM C (z)(cc) (d) (m) L(ee) (s) G(i)(a)

The (one or more) substitute characters between each pair of brackets are a short form of some product feasibility (may be mechanical, electrical, thermal, or commercial purpose), each of them (including the pair of brackets) can be replaced with the expanded words as shown in the detailed descriptions as above.

Maximum ratings of the series:

CoB Type (Die matrix)	Diameter of LES of CoB [mm]	CCT [K]	DC Current [mA]	Power [W]	Power Density of CoB [W/mm^2]	t_c [°C]
1211	19	≤ 4000	2400 ($V_{f\ tot}$ 37,5 V)	90	0,32	105
		> 4000	1500 ($V_{f\ tot}$ 36 V) *	54	0,19	
1208	15	≤ 4000	1690 ($V_{f\ tot}$ 36 V)	60,8	0,34	105
		> 4000	935 ($V_{f\ tot}$ 36 V) *	33,7	0,19	
1205	13	≤ 4000	1200 ($V_{f\ tot}$ 36 V)	43,2	0,33	105
		> 4000	700 ($V_{f\ tot}$ 36 V) *	25,2	0,19	
1204	13	≤ 4000	960 ($V_{f\ tot}$ 36 V)	34,6	0,26	105
		> 4000	700 ($V_{f\ tot}$ 36 V) *	25,2	0,19	
1203	9	≤ 4000	600 ($V_{f\ tot}$ 36 V)	21,6	0,34	105
		> 4000	340 ($V_{f\ tot}$ 36 V) *	12,2	0,19	
1202	9	≤ 4000	480 ($V_{f\ tot}$ 36 V)	17,3	0,27	105
		> 4000	340 ($V_{f\ tot}$ 36 V) *	12,2	0,19	
* : See additional information						

Additional information (if necessary)

☐ UL Solutions (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL Solutions (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL Solutions (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL Solutions (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

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Date: 2023-04-12

Signature:

Jan-Erik Storgaard

Additional Model Detail(s): (Cont'd)

Higher numeric generations of CoB is suitable replacement for lower numeric generations without additional normal temperature test on final product if:

- The final product thermal management construction is not reduced, and
- The CoB size is identical, and
- The rated power of CoB is lower or equal.

Product Key:
Variant series 1: **Fortimo SLM *zcc* L*ee hh s* G*ija***
Where:

z	=	CRI of LED divided by 10 (one digit, may be "7" or "8" or "9");
cc	=	Color temperature of LED divided by 100 (two digits, may be a value between 25 and 57);
ee	=	Diameter of Light Emitting Surface (LES) in mm (one or two digits, example 19: LES dimensions = 19 mm);
hh	=	Holder type (two characters or none, may be "DL" or "PI" or "ZP" or "ZPw" or blank);
s	=	CoB size in mm (four digits, example 2828: CoB dimensions = 28 mm x 28 mm));
i	=	Number of generation of CoB (one digit, may be "4" or "5");
j	=	Number of generation of Holder (one digit, may be "1" or "2");
a	=	Suffix for commercial purposes (optional)

The naming key of this variant series 1 can be also written as:
Fortimo SLM (z)(cc) L(ee) (hh) (s) G(i)(j)(a)
The (one or more) substitute characters between each pair of brackets are a short form of some product feasibility (may be mechanical, electrical, thermal, or commercial purpose), each of them (including the pair of brackets) can be replaced with the expanded words as shown in the detailed descriptions as above.

The variant series 1 differs from the main series for different product key and for the presence of LED CoB + LED Holder.

Maximum ratings of the series:

CoB Type	Diameter of LES of CoB [mm]	CCT [K]	DC Current [mA]	Power [W]	Power Density of CoB [W/mm²]	t_c [°C]	T Holder [°C]
1211	19	≤ 4000	2400 ($V_{f\ tot}$ 37,5 V)	90	0,32	105	100
		> 4000	1500 ($V_{f\ tot}$ 36 V) *	54	0,19		
1208	15	≤ 4000	1690 ($V_{f\ tot}$ 36 V)	60,8	0,34	105	100
		> 4000	935 ($V_{f\ tot}$ 36 V) *	33,7	0,19		
1205	13	≤ 4000	1200 ($V_{f\ tot}$ 36 V)	43,2	0,33	105	100
		> 4000	700 ($V_{f\ tot}$ 36 V) *	25,2	0,19		
1204	13	≤ 4000	960 ($V_{f\ tot}$ 36 V)	34,6	0,26	105	100
		> 4000	700 ($V_{f\ tot}$ 36 V) *	25,2	0,19		

Additional information (if necessary)

UL Solutions

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☐ UL Solutions (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

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Date: 2023-04-12

Signature:

Jan-Erik Storgaard

Additional Model Detail(s): (Cont'd)

Maximum ratings of the series:

CoB Type	Diameter of LES of CoB [mm]	CCT [K]	DC Current [mA]	Power [W]	Power Density of CoB [W/mm²]	t_c [°C]	T Holder [°C]
1203	9	≤ 4000	600 ($V_{f\ tot}$ 36 V)	21,6	0,34	105	100
		> 4000	340 ($V_{f\ tot}$ 36 V) *	12,2	0,19		
1202	9	≤ 4000	480 ($V_{f\ tot}$ 36 V)	17,3	0,27	105	100
		> 4000	340 ($V_{f\ tot}$ 36 V) *	12,2	0,19		
* : See additional information							

Product Key:
Variant series 2: **Fortimo SLM C *zcc d m* Lee *s* G*ia***
Where:

z	=	CRI divided by 10 (may be blank when d= "CED", or one digit, may be "7" or "8" or "9");
cc:	=	CCT divided by 100 (may be blank when d= "CED", or two digits, may be a value maximum to 65);
d	=	Flavour of light (two or three characters, may be "CW" or "FP" or "FPR" or "FW" or "FWW" or "PW" or "PC" or "FLS", or "FVF", or "FIS" or "CED" or blank);
m	=	Die matrix (4 digits, example 1216: Chip configuration = 12 chips in series per string & 16 strings in parallel; or blank when d= "CED");
ee	=	Diameter of Light Emitting Surface (LES) in mm (one or two digits, example 23: LES dimensions = 23 mm);
s	=	PCB size in mm (four digits, example 2828: CoB dimensions = 28 mm x 28 mm);
i	=	Number of generation of CoB (one digit, may be "6" or "7");
a	=	Suffix for commercial purposes (optional)

The naming key of this variant series 2 can be also written as:
Fortimo SLM C (z)(cc) (d) (m) L(ee) (s) G(i)(a)
The (one or more) substitute characters between each pair of brackets are a short form of some product feasibility (may be mechanical, electrical, thermal, or commercial purpose), each of them (including the pair of brackets) can be replaced with the expanded words as shown in the detailed descriptions as above.

Additional information (if necessary)

☐ UL Solutions (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL Solutions (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL Solutions (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL Solutions (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

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Date: 2023-04-12

Signature:

Jan-Erik Storgaard

Additional Model Detail(s): (Cont'd)

Maximum ratings of the series:

CoB Type (Die matrix)	Diameter of LES of CoB [mm]	DC Current [mA]	Power [W]	Power Density of CoB [W/mm²]	t_c [°C]
1216	23 *	3680 (Vf_{tot} 41V)	151	0,36	105
	22 *	3680 (Vf_{tot} 41V)	151	0,40	105
1212	22 *	2760 (Vf_{tot} 41V)	113	0,30	105
1211	18,5 *	2530 (Vf_{tot} 41V)	104	0,39	105
	22 *	2530 (Vf_{tot} 41V)	104	0,27	105
1210	14,5 *	2300 (Vf_{tot} 41V)	94	0,57	105
1208	15 *	1840 (Vf_{tot} 41V)	75	0,43	105
	14,5 *	1840 (Vf_{tot} 41V)	75	0,46	105
1206	13 *	1380 (Vf_{tot} 41V)	57	0,43	105
	14,5 *	1380 (Vf_{tot} 41V)	57	0,34	105
1205	13 *	1150 (Vf_{tot} 41V)	47	0,36	105
	14,5 *	1150 (Vf_{tot} 41V)	47	0,29	105
1204	9,8 *	920 (Vf_{tot} 41V)	38	0,50	105
	13 ^	850 ($V_{f\ tot}$ 41 V)	35	0,26	105
	9 **	1350 ($V_{f\ tot}$ 44 V)	59	0,93	105
	9 ^	740 ($V_{f\ tot}$ 41 V)	30	0,48	105
1203	9 *	690 (Vf_{tot} 41V)	28	0,44	105
	9,8 *	690 (Vf_{tot} 41V)	28	0,38	105
1202	9,8 *	460 (Vf_{tot} 41V)	19	0,25	105
	6,5 ^	380 ($V_{f\ tot}$ 41 V)	16	0,47	105
	6,5 **	675 ($V_{f\ tot}$ 44 V)	30	0,90	105
1201	9,8 *	230 (Vf_{tot} 41V)	9	0,13	105
CED	22	1440 (Vf_{tot} 41V)	59	0,16	105
	13	720 (Vf_{tot} 41V)	30	0,22	105

^: Concerning CoB's Generation 6
*: Concerning CoB's Generation 6 and 7
**: Concerning CoB's Generation 7

Additional information (if necessary)

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☒ UL Solutions (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
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Date: 2023-04-12

Signature:

Jan-Erik Storgaard

Additional Model Detail(s): (Cont'd)

Product Key:

Variant series 3: **Fortimo SLM *zcc* L*ee hh s* G*ija***

Where:

z	=	CRI of LED divided by 10 (one digit, may be "7" or "8" or "9");
cc	=	Color temperature of LED divided by 100 (two digits, may be a value between 22 and 65);
ee	=	Diameter of Light Emitting Surface (LES) in mm (one or two digits, example 23: LES dimensions = 23 mm);
hh	=	Holder type (two or three characters or none, may be "DL" or "PI" or "ZP" or "ZPw" or blank);
s	=	CoB size in mm (four digits, example 2828: CoB dimensions = 28 mm x 28 mm));
i	=	Number of generation of CoB (one digit, may be "6", "7");
j	=	Number of generation of Holder (one digit, may be "1" or "2");
a	=	Suffix for commercial purposes (optional)

The naming key of this variant series 3 can be also written as:

Fortimo SLM (z)(cc) L(ee) (hh) (s) G(i)(j)(a)

The (one or more) substitute characters between each pair of brackets are a short form of some product feasibility (may be mechanical, electrical, thermal, or commercial purpose), each of them (including the pair of brackets) can be replaced with the expanded words as shown in the detailed descriptions as above.

The variant series 3 differs from the variant series 2 for different product key, for the presence of LED CoB + LED Holder and for different maximum ratings for CoB Type 1216.

Maximum ratings of the series:

CoB Type	Diameter of LES of CoB [mm]	DC Current [mA]	Power [W]	Power Density of CoB [W/mm^2]	t_c [°C]	T Holder [°C]
1216	23 *	2750 ($V_{f\ tot}$ 41 V)	98	0,27	105	100
1211	18.5*	2400 ($V_{f\ tot}$ 41 V)	98	0,37	105	100
1208	15 *	1710 ($V_{f\ tot}$ 41 V)	70	0,40	105	100
1206	13 *	1200 ($V_{f\ tot}$ 41 V)	49	0,37	105	100
1205	13 *	1050 ($V_{f\ tot}$ 41 V)	43	0,32	105	100
1204	13 ^	850 ($V_{f\ tot}$ 41 V)	35	0,26	105	100
	9 **	1350 ($V_{f\ tot}$ 44 V)	59	0,93	105	100
	9 ^	740 ($V_{f\ tot}$ 41 V)	30	0,48	105	100
1203	9 *	570 ($V_{f\ tot}$ 41 V)	23	0,37	105	100
1202	6,5 ^	380 ($V_{f\ tot}$ 41 V)	16	0,47	105	100
	6,5 **	675 ($V_{f\ tot}$ 44 V)	30	0,90	105	100

^: Concerning CoB's Generation 6
*: Concerning CoB's Generation 6 and 7
**: Concerning CoB's Generation 7

Additional information (if necessary)

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Date: 2023-04-12

Signature:

Jan-Erik Storgaard

Additional Model Detail(s): (Cont'd)

Higher numeric generations of CoB is suitable replacement for lower numeric generations without additional normal temperature test on final product if:

- The final product thermal management construction is not reduced, and
- The CoB size is identical, and
- The rated power of CoB is lower or equal.

Additional information:

- The modules have been evaluated according to IEC/TR 62778 and the Lamp classification Group for Blue Light Hazard is Risk Group 1 Unlimited for modules having generation of CoB "4" or "5", Risk Group 2 for modules having generation of CoB "6", "7" when are used at maximum rated currents. These Generation 6, 7 modules are classified as Risk Group 1 if they are used according to the maximum currents listed below:

-	CoB Type							
	1216	1211	1208	1205	1204	1204s	1203	1202s
Maximum Currents for RG1 Classif. [mA]	1824 (Gen 6)	1254 (Gen 6)	912 (Gen 6)	570 (Gen 6)	456 (Gen 6)	456	342 (Gen 6)	228

-		CoB Type							
		1216	1211	1208	1206	1205	1204	1203	1202
Maximum Currents for RG1 Classif. [mA]	zcc = 765	1797 (Gen 7)	1248 (Gen 7)	548 (Gen 7)	/	468 (Gen 7)	/	258 (Gen 7)	/
	zcc = 857	2298 (Gen 7)	1349 (Gen 7)	1040 (Gen 7)	1000 (Gen7)	820 (Gen 7)	480 (Gen 7)	330 (Gen 7)	157 (Gen7)
	zcc = 940	2750 (Gen 7)	2400 (Gen 7)	1710 (Gen 7)	1200 (Gen 7)	1050 (Gen 7)	650 (Gen 7)	570 (Gen 7)	300 (Gen 7)

- For 940 series, the results of risk group 1 for CoB types except 1204 are based on following technical judgement – power density over LES of each CoB type is equal to or less than that of 1204 under specified current in above table, while only the difference between all COBs is LED chip arrangement. According to IEC62778-2014, Luminance L is in principle determined from the same spectral radiance measurement that produced the LB value, but in the case of L the spectrum is multiplied with the CIE 1924 photopic eye sensitivity curve V(λ). For any given spectrum, LB will be proportional to L. Besides, the only difference between all COBs is the LED chip arrangement, so if the L is the same, the LB will be the same, so does the Risk Group.

- For modules having generation of CoB "4" or "5" with CCT > 4000 K the customer can increase the rated currents (for example 1500 mA for Type 1211) up to the rated currents of modules having CCT ≤ 4000 K (2400 mA for Type 1211). In this case the photobiological hazard shall be additionally evaluated in the final product.

Additional information (if necessary)

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Additional information: (Cont'd)

- The insulation between active parts of LED CoB and accessible conductive parts (metal mounting surface) is tested for basic insulation related to 50 Vdc for CoB Types 1202, 1202s, 1203, 1204s, 1204 Gen 7 and all CoBs provided with holders having Field *hh* in the product key of variant series = "PI", 150 Vdc for CoB Types 1204, 1205, 1206, 1208, 1211, 1216 provided with holders having Field *hh* in the product key of variant series = "DL" or blank and 200 Vdc for CoB Types 1204 Gen 6, 1205, 1206, 1208, 1211, 1216 provided with holder having Field *hh* in the product key of variant series = "ZP" or "ZPw".

- Maximum 3 CoBs can be placed in series configuration for CoB Types 1204 Gen 6, 1205, 1208, 1211, 1216 provided with holders having Field *hh* in the product key of variant series = "DL" or blank.
Maximum 4 CoBs can be placed in series configuration for CoB Types 1204 Gen 6, 1205, 1208, 1211, 1216 provided with holder having Field *hh* in the product key of variant series = "ZP" or "ZPw". No series configuration can be used for CoB Types 1202, 1202s, 1203, 1204s, 1204 Gen 7 and all CoBs provided with holders having Field *hh* in the product key of variant series = "PI".

- Creepage and clearance distances on the overall LED module (LED CoB + LED Holder) shall be evaluated on the final product.

- LED Holders have been evaluated as integral component according to IEC/EN 60838-1and IEC/EN 60838-2-2.

- M3 fixing screws for LED Holders shall be used. The fasters used to secure the module to the mounting surface must be tightened with a torque between 0,4 and 0,6 Nm.

- The modules can be supplied only by electronic LED controlgears separately approved according to IEC/EN 61347-2-13 and protected against output short-circuit and overload.

- The customer is obligated to add an appropriated cooling system to the LED module in order to not exceed t_c value. Temperature test shall be performed on the final product to verify the effectiveness of this cooling system.

Additional information (if necessary)

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