






Test Report issued under the responsibility of:



Korea Testing Laboratory

<b>TEST REPORT IEC TR 62778 Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires</b>	
<b>Report Number</b> ..... :	19-076618-01-3(A1)
<b>Application Number</b> ..... :	19-081852-01-3
<b>Date of issue</b> .....	2019-12-16
<b>Total number of pages</b> .....	11 pages
<b>Name of Testing Laboratory preparing the Report</b> .....	KTL (Korea Testing Laboratory)
<b>Applicant's name</b> .....	SAMSUNG ELECTRONICS Co., Ltd.
<b>Address</b> ..... :	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
<b>Test specification:</b>	
<b>Standard</b> .....	IEC TR 62778:2014 (Second Edition)
<b>Test procedure</b> ..... :	CB Scheme
<b>Non-standard test method</b> ..... :	N/A
<b>Test Report Form No.</b> .....	IEC62778A
<b>Test Report Form(s) Originator</b> .... :	TÜV SÜD Product Service GmbH
<b>Master TRF</b> .....	Dated 2016-02
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<b>This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.</b>	
<b>General disclaimer:</b>	
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<b>Test item description</b> ..... :	Middle Power LED (Product name : LM301H ONE)	
<b>Trade Mark</b> ..... :	<b>SAMSUNG</b>	
<b>Manufacturer</b> .....	SAMSUNG ELECTRONICS Co., Ltd.	
<b>Model/Type reference</b> .....	SPMWH\$32#####	
<b>Ratings</b> .....	200 mA, Max. 2,9 V	
<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>		
<input type="checkbox"/>	<b>CB Testing Laboratory:</b>	
<b>Testing location/ address</b> ..... :		
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address</b> ..... :		
<b>Tested by (name, function, signature)</b> .....		
<b>Approved by (name, function, signature)</b> ... :		
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 1:</b>	
<b>Testing location/ address</b> ..... :		
<b>Tested by (name, function, signature)</b> .....		
<b>Approved by (name, function, signature)</b> ... :		
<input checked="" type="checkbox"/>	<b>Testing procedure: CTF Stage 2:</b>	SAMSUNG ELECTRONICS Co., Ltd.
<b>Testing location/ address</b> ..... :		1, Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do, 17113, Korea
<b>Tested by (name + signature)</b> .....		Doosung Park Technical Engineer 
<b>Witnessed by (name, function, signature) :</b>		Daeil Seok, Technical Engineer 
<b>Approved by (name, function, signature)</b> ... :		Jinwook Kwon, Technical Manager 
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 3:</b>	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 4:</b>	
<b>Testing location/ address</b> ..... :		
<b>Tested by (name, function, signature)</b> .....		
<b>Witnessed by (name, function, signature) :</b>		
<b>Approved by (name, function, signature)</b> ... :		
<b>Supervised by (name, function, signature) :</b>		

<p><b>List of Attachments (including a total number of pages in each attachment):</b></p> <ul style="list-style-type: none"> <li>- Attachment 1 : Photographs(1 page)</li> </ul>	
<p><b>Summary of testing:</b></p> <ul style="list-style-type: none"> <li>- All clauses.</li> <li>- Performed by supplying DC 2,9 V, 200 mA to the representative model SPMWHD32AMH1XAH0S0.</li> </ul>	
<p><b>Tests performed (name of test and test clause):</b></p> <p>7. MEASUREMENT INFORMATION FLOW 8. RISK GROUP CLASSIFICATION</p> <p>*) Only photobiological hazards have been addressed.</p>	<p><b>Testing location:</b></p> <p>SAMSUNG ELETRONICS Co., Ltd 1, Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do, 17113, Korea</p>
<p><b>Summary of compliance with National Differences (List of countries addressed):</b></p> <p style="text-align: center;">N/A</p>	
<p><b>Copy of marking plate:</b></p> <p>The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.</p> <p style="text-align: center;">N/A</p>	

<b>Test item particulars.....:</b>	
<b>Product evaluated.....:</b>	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire
<b>Rated voltage (V) .....</b>	Max. 2,9 V
<b>Rated current (mA) .....</b>	Const. 200 mA
<b>Rated CCT (K).....</b>	-
<b>Rated Luminance (Mcd/m<sup>2</sup>) .....</b>	-
<b>Component report data used .....</b>	<input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp Report number: N/A
<b>Possible test case verdicts:</b>	
- test case does not apply to the test object.....: N/A	
- test object does meet the requirement.....: P (Pass)	
- test object does not meet the requirement.....: F (Fail)	
<b>Testing.....:</b>	
<b>Date of receipt of test item .....</b>	2019-11-21
<b>Date (s) of performance of tests .....</b>	2019-11-21 ~ 2019-12-16
<b>General remarks:</b>	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.  <b>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</b>	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC62778A:</b>	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided .....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
<b>When differences exist; they shall be identified in the General product information section.</b>	
<b>Name and address of factory (ies) .....</b>	Tianjin Samsung LED Co., Ltd. 300385 No.6,Weisi Rd, Micro-Electronic Industrial Park, Xiqing Dist.,Tianjin,, China

**General product information:**

**[Absolute Maximum Rating]**

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	$T_a$	-40 ~ +85	°C	-
Storage Temperature	$T_{stg}$	-40 ~ +120	°C	-
LED Junction Temperature	$T_j$	110	°C	-
Forward Current	$I_F$	200	mA	-
Pulse Forward Current	$I_{FP}$	300	mA	Duty 1/10, pulse width 10ms
Assembly Process Temperature	-	260 <10	°C s	-
ESD (HBM)	-	5	kV	-

**[Electro-optical Characteristics ( $I_F = 65 \text{ mA}$ ,  $T_s = 25 \text{ °C}$ )]**

Item	Unit	Rank	Bin	Min.	Typ.	Max.
Forward Voltage ( $V_F$ )	V	XA	AY	2.6	-	2.7
			AZ	2.7	-	2.8
			A1	2.8	-	2.9
Reverse Voltage (@ 5 mA)	V			0.7	-	1.2
Color Rendering Index ( $R_a$ )	-			-	-	-
Thermal Resistance (junction to solder point)	°C/W			-	7.5	-
Beam Angle	°			-	120	-

**Note:**

Samsung maintains measurement tolerance of: forward voltage =  $\pm 0.1 \text{ V}$ , luminous flux =  $\pm 5 \%$ , CRI =  $\pm 3$

Item	Nominal CCT	SU		SV	
		Min.	Max.	Min.	Max.
Luminous Flux ( $\Phi_v$ )	ONE	35	38	38	43

**Note:**

Samsung maintains measurement tolerance of: forward voltage =  $\pm 0.1 \text{ V}$ , luminous flux =  $\pm 5 \%$ , CRI =  $\pm 3$

[Product Code Information]

- SPMWH\$32#####

Digit	PKG Information	Code	Specification
1 2 3	Samsung Package Middle Power	SPM	
4 5	Color	WH	White
6	Product Version	D	Dispensing
7 8 9	Form Factor	32A	3.0 x 3.0 x 0.7 mm; 2 pads;
10	Sorting Current (mA)	M	65 mA
11	Chromaticity Coordinates	H	Horticulture
12	CRI	1	Free
13 14	Forward Voltage (V)	XA	2.6~2.9 Bin Code: AY 2.6~2.7 AZ 2.7~2.8 A1 2.8~2.9
15 16	Color bin	H0	Bin Code HE, HF, HG, HH, HJ, HK, HL, HM
17 18	Luminous Flux	S0	Bin Code: SU, SV

**History of amendments and modification:**

- (1) Ref. No. 19-076618-01-3, dated 2019-12-02 (original test report)
- (2) Ref. No. 19-076618-01-3(A1), dated 2019-12-16 (amendment : 19-081852-01-3)

Description of Change(s); for Ref. No. 19-076618-01-3(A1)

- (1) Factory name and address were corrected.

	Before	After
Name	SHENZHEN MTC LIGHTING CO., Ltd	Tianjin Samsung LED Co., Ltd.
Address	MTC Industry Park, Xialilang community, Nanwan street, Longgang district, Shenzhen, China	300385 No.6,Weisi Rd, Micro-Electronic Industrial Park, Xiqing Dist.,Tianjin,, China

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict
<b>7</b>	<b>MEASUREMENT INFORMATION FLOW</b>		<b>P</b>
<b>7.1</b>	<b>Basic flow</b>		<b>P</b>
	'Law of conservation of luminance' applied		N/A
	Use of only true luminance/radiance values		P
	In case of luminaire: The light source is operated in the luminaire under similar conditions as when tested as a component		N/A
	In case $E_{thr}$ value for RG2 was established the peak value was derived from angular light distribution		N/A
<b>7.2</b>	<b>Conditions for the radiance measurement</b>		<b>P</b>
	Standard condition applied (200mm distance, 0,011rad field of view)		N/A
	Non-standard condition applied		P
<b>7.3</b>	<b>Special cases (I): Replacement by a lamp or LED module of another type</b>		N/A
	Light source is a white light source		N/A
	Evaluation done based on highest luminance		N/A
	Evaluation done based on CCT value		N/A
<b>7.4</b>	<b>Special cases (II): Arrays and clusters of primary light sources</b>		N/A
	LED package is evaluated as ..... : <input type="checkbox"/> RG0 unlimited <input type="checkbox"/> RG1 unlimited		N/A
	$E_{thr}$ of LED package applies to array		N/A
<b>8</b>	<b>RISK GROUP CLASSIFICATION</b>		<b>P</b>
	Risk group achieved:		P
	- ..Risk Group 0 unlimited		N/A
	- ..Risk Group 1 unlimited		N/A
	- $E_{thr}$ ..... (lx) : Distance to reach RG1 ..... (m) :	3,94E+03 -	P

TABLE: Spectroradiometric measurement				
Measurement performed on:		<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire		
Model number .....		SPMWHD32AMH1XAH0S0		
Test voltage (V) .....		DC 2,9 V		
Test current (mA) .....		200 mA		
Test frequency (Hz) .....		-		
Ambient, t (°C) .....		25,0		
Measurement distance .....		<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm		
Source size .....		<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1,7 x 1,68 mm (8,4 mrad)		
Field of view .....		<input checked="" type="checkbox"/> 100 mrad <input type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)		
Item	Symbol	Units	Result	Remark
Correlated colour temperature	CCT	K	3 205	
x/y colour coordinates			0,4359 / 0,4284	
Blue light hazard radiance	L <sub>B</sub>	W/(m <sup>2</sup> •sr <sup>1</sup> )	-	
Blue light hazard irradiance	E <sub>B</sub>	W/m <sup>2</sup>	0,4	
Luminance	L	cd/m <sup>2</sup>	-	
Illuminance	E	lx	1,58E+03	
Supplementary information: -				



	<b>TABLE: Angular light distribution</b>	<b>N/A</b>
N/A		

**List of test equipment used:**

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.

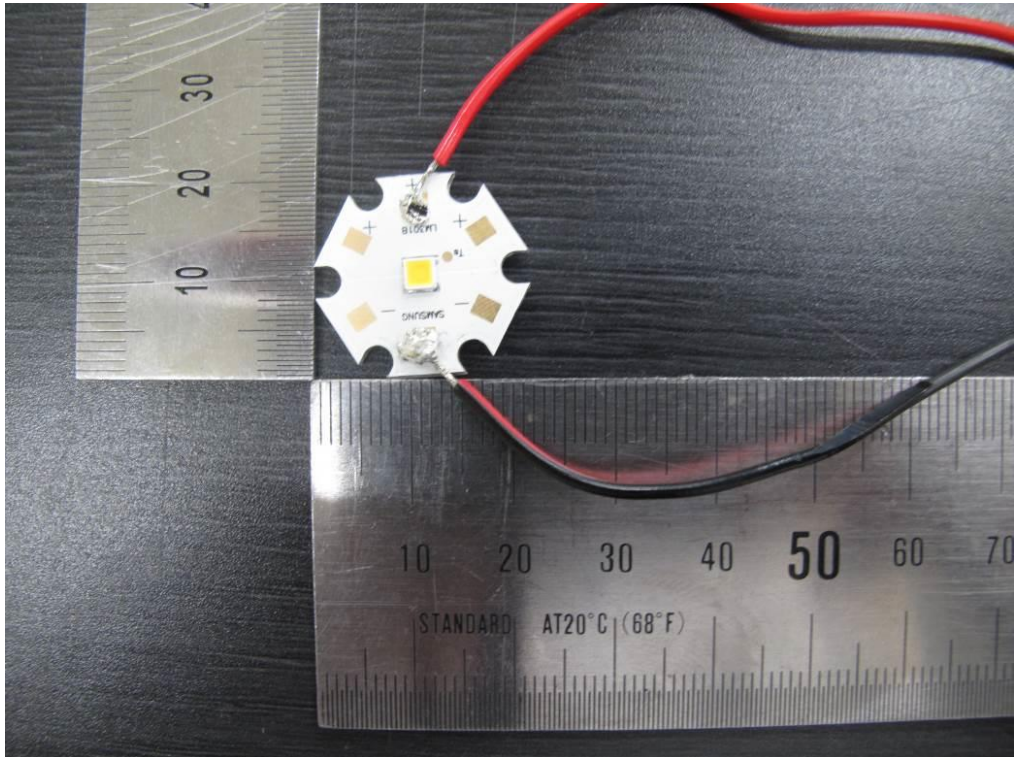
Note: This page may be removed when CTF stage 1 CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
7	Irradiance measurements Radiance measurements	IDR 300 Monochromator (15702)	200-1400nm	- / -	- / -
7	Radiance measurement	TEL309 Telescope (15334/3)	300-1400nm	- / -	- / -
7	Radiance measurements	SRS 12 Radiance Standard (15474/3)	300-1400nm	2019/07/15	2021/07/15
7	Irradiance measurements	CL6 Spectral irradiance standard (15265/5)	300-3000nm	2019/07/11	2021/07/11
7	Irradiance measurements	CL7 Spectral irradiance standard (15472/3)	200-400nm	2019/07/11	2021/07/11

**End of Test Report**

**Attachment 1: Photographs**

< Fig. 1 >



< Fig. 2 >

