Internal LM-80 TEST REPORT

Report No.: EL-2014-0810

The following tested product(s) submitted and identified by the vendor as:

Company	: Everlight Electronics Co., LTD.
Address of Applicant	: No. 6-8, Zhonghua Rd., Shulin Dist., New Taipei City, Taiwan 23860
Testing Laboratory	: Everlight Internal Lab
Product Name	: LOW Power LED Component
Model/ Serial Number	: 67-21S Series
Manufacturer	: Everlight Electronics Co., LTD.
Rating	: DC 60mA 0.2 W
Date of Issue	: August. 10th 2014

The submitted products have been tested as requested and the following results were obtained, and the report , not applicable for lawsuit, refers only to the unit(s) submitted for test.

Test Results: PLEASE SEE ATTACHED SHEETS

Tester

Approver

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1 . DATE OF RECEIPT OF SAMPLES

Nov. 14th 2013

2 . DATE(S) OF PERFORMANCE OF THE TEST

Dec. 05th, 2013~ Aug. 06th, 2014

3. IDENTITY OF SAMPLES

Quantity	Model	Serial Number
25	67-21S	A01-A25 (55℃)
25	67-21S	B01-B25 (75℃)
25	67-21S	C01-C25 (85℃)

4. TEST ITEMS

4.1 Data Summary of Lumen and Color Maintenance

Test results were concluded by different Case Temperatures (Ts)

4.2 Lumen Maintenance and Color Maintenance Test

Testing specifications by different case temperature according to IES LM 80-08 Approved

Method: Measuring Lumen Maintenance of LED Light Sources and clients requirements were implemented per the following items.

4.2.1 Total Luminous Flux (φ_V)

The test results of total luminous flux were implemented referring to Clause 2 PROPERTIES OF LEDS & Clause 6 MEASUREMENT OF LUMINOUS FLUX of CIE 127: 2007 2nd edition MEASUREMENT OF LEDS and IES LM 80-08 Approved

Method: Measuring Lumen Maintenance of LED Light Sources, when the UUTs were powered with constant current of I_F

4.2.2 Correlated Color Temperature (CCT) CIE Color Coordinate (CIEx, CIE y) & Chromaticity Shift

The test results of correlated color temperature were implemented referring to CIE 127:2007 2nd edition MEASUREMENT OF LEDS, CIE 15: 2004 COLORIMETRY

The test results of color coordinate were implemented referring to CIE 127: 2007 2nd edition ME ASUREMENT OF LEDS, CIE 15:2004 COLORIMETRY

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5. TEST CONDITIONS

Main Test Equipment:

Chamber with temperature control for LED package/array.

-Water cooling system is equipped in this chamber for each device temperature control.

-Power supply is certified by LM-80 requirement and connected to device.

Photometric measurement system for LED package/array.

-The integral sphere equipped temperature control plate and DC power supply.

Environmental Conditions:

Temperature:	(25± 1) ℃
Relative Humidity:	< 65 % RH

UTT Conditions:

Drive Current:	DC 60 mA (Typical)
Forward Voltage:	DC 3.2 V (Typical)
Power Consumption:	0.2W
CCT:	3500K
Package Dimension:	L 3.5 x W 2.8 x H 0.7mm
Prior operation:	0 hr
Total Operation Duration:	6000 hours

Measurement Conditions:

Interval Time:	1000, 2000, 3000, 4000, 5000, 6000 hours
Warm up Time:	× 1 minute (initial)
Relative measurement uncertainty:	2.8 % (95 % Confidence Level)

6. TEST RESULTS

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6.1 Data Summary of Lumen and Color Maintenance

	Initial(0hrs)		Luminous Maintenance(%)					
Temp.	TLF(lm)	V_F(V)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
55℃ Avg.	21.59	3.15	100.22%	99.94%	99.82%	99.59%	99.29%	98.98%
75℃ Avg.	21.78	3.18	100.19%	99.74%	99.35%	98.96%	98.32%	97.52%
85℃ Avg.	21.25	3.14	99.92%	99.78%	99.13%	98.64%	97.78%	96.89%

	Initial(0hrs)			Chromaticity Shift (△u'v')					
Temp.	CIEx	CIEy	CCT	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
55℃ Avg.	0.4382	0.4095	3020	0.0006	0.0010	0.0011	0.0013	0.0017	0.0020
75℃ Avg.	0.4385	0.4099	3018	0.0006	0.0008	0.0009	0.0015	0.0014	0.0016
85℃ Avg.	0.4385	0.4102	3020	0.0007	0.0009	0.0009	0.0013	0.0011	0.0014

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6.2 Lumen Maintenance and Color Maintenance Test

Test Condition: Ts = 55℃

Requirement	
Case Temperature [Ts]: ≧53℃	Average [Ts]: ≧55.1℃
Ambient Temperature [Ta]: ≧50℃	Average [Ts]: ≧54.5℃
Driver Current: 60 mA	Air Flow: Minimized
Measurement Current: 60 mA	Relative humidity: ＜65%RH

Item		Luminous Maintenance (%)						
Aging Hrs		0 hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
55 ℃	A01	100.00%	100.71%	100.63%	99.91%	100.28%	99.96%	99.67%
	A02	100.00%	101.36%	101.31%	100.93%	100.48%	100.15%	100.32%
	A03	100.00%	100.06%	99.50%	99.84%	99.42%	99.72%	98.94%
	A04	100.00%	100.37%	100.10%	100.02%	99.43%	99.03%	99.40%
	A05	100.00%	100.80%	100.72%	100.66%	100.26%	99.01%	99.10%
	A06	100.00%	101.00%	100.69%	100.36%	99.92%	99.92%	99.25%
	A07	100.00%	100.88%	100.46%	100.75%	100.42%	99.93%	99.44%
	A08	100.00%	100.43%	100.61%	99.01%	99.36%	99.27%	98.93%
	A09	100.00%	100.48%	100.30%	100.20%	99.93%	99.16%	98.98%
	A10	100.00%	101.26%	101.30%	100.86%	99.88%	99.87%	99.47%
	A11	100.00%	100.48%	98.83%	99.44%	98.57%	99.00%	98.99%
	A12	100.00%	100.39%	100.37%	99.81%	99.05%	98.83%	99.00%
	A13	100.00%	100.19%	99.95%	100.06%	99.79%	99.59%	99.21%
	A14	100.00%	99.72%	99.73%	99.40%	99.24%	99.36%	99.30%
	A15	100.00%	99.67%	99.58%	100.42%	100.17%	99.40%	99.20%
	A16	100.00%	100.06%	100.04%	100.33%	100.34%	99.36%	99.05%
	A17	100.00%	99.62%	99.54%	99.27%	98.93%	98.31%	98.34%
	A18	100.00%	99.61%	98.58%	98.79%	99.58%	99.18%	99.12%
	A19	100.00%	100.17%	99.73%	99.76%	100.30%	99.49%	98.57%
	A20	100.00%	99.59%	99.33%	99.52%	99.08%	98.98%	98.69%
	A21	100.00%	100.14%	99.69%	99.68%	99.06%	99.39%	98.78%
	A22	100.00%	99.21%	98.77%	98.80%	98.42%	99.10%	98.15%
	A23	100.00%	100.36%	100.22%	100.14%	99.75%	99.81%	98.30%
	A24	100.00%	99.39%	99.33%	98.40%	99.12%	98.26%	98.32%
	A25	100.00%	99.63%	99.15%	99.10%	98.94%	98.07%	98.06%
55 ℃	MAX.	100.00%	101.36%	101.31%	100.93%	100.48%	100.15%	100.32%
	MIN.	100.00%	99.21%	98.58%	98.40%	98.42%	98.07%	98.06%
	AVG.	100.00%	100.22%	99.94%	99.82%	99.59%	99.29%	98.98%

6.2.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIE y) & Chromaticity Shift (△u'v')

Item		Chromaticity Shift (Δu'v')						
Aging Hrs		0 hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
55 ℃	A01	0.0000	0.0007	0.0009	0.0013	0.0014	0.0018	0.0019
	A02	0.0000	0.0008	0.0011	0.0008	0.0006	0.0010	0.0018
	A03	0.0000	0.0005	0.0009	0.0012	0.0017	0.0021	0.0020
	A04	0.0000	0.0004	0.0010	0.0011	0.0009	0.0013	0.0025
	A05	0.0000	0.0004	0.0010	0.0011	0.0011	0.0015	0.0024
	A06	0.0000	0.0006	0.0010	0.0013	0.0020	0.0024	0.0015
	A07	0.0000	0.0007	0.0011	0.0016	0.0016	0.0020	0.0024
	A08	0.0000	0.0006	0.0010	0.0013	0.0014	0.0018	0.0022
	A09	0.0000	0.0007	0.0008	0.0006	0.0006	0.0010	0.0016
	A10	0.0000	0.0006	0.0011	0.0011	0.0005	0.0009	0.0015
	A11	0.0000	0.0005	0.0010	0.0006	0.0009	0.0013	0.0012
	A12	0.0000	0.0006	0.0011	0.0008	0.0007	0.0011	0.0014
	A13	0.0000	0.0007	0.0012	0.0008	0.0010	0.0014	0.0025
	A14	0.0000	0.0008	0.0012	0.0017	0.0022	0.0026	0.0018
	A15	0.0000	0.0004	0.0008	0.0015	0.0018	0.0022	0.0017
	A16	0.0000	0.0005	0.0010	0.0010	0.0010	0.0014	0.0027
	A17	0.0000	0.0004	0.0008	0.0010	0.0019	0.0023	0.0021
	A18	0.0000	0.0005	0.0010	0.0012	0.0019	0.0023	0.0017
	A19	0.0000	0.0007	0.0010	0.0012	0.0010	0.0014	0.0013
	A20	0.0000	0.0006	0.0010	0.0010	0.0009	0.0013	0.0013
	A21	0.0000	0.0004	0.0011	0.0008	0.0017	0.0021	0.0028
	A22	0.0000	0.0005	0.0009	0.0009	0.0013	0.0017	0.0030
	A23	0.0000	0.0010	0.0015	0.0009	0.0015	0.0019	0.0028
	A24	0.0000	0.0005	0.0010	0.0009	0.0017	0.0021	0.0019
	A25	0.0000	0.0006	0.0008	0.0007	0.0016	0.0020	0.0030
55 ℃	MAX.	0.0000	0.0010	0.0015	0.0017	0.0022	0.0026	0.0030
	MIN.	0.0000	0.0004	0.0008	0.0006	0.0005	0.0009	0.0012
	AVG.	0.0000	0.0006	0.0010	0.0011	0.0013	0.0017	0.0020

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6.3 Lumen Maintenance and Color Maintenance Test

Test Condition: Ts = 75℃

Requirement	
Case Temperature [Ts]: ≧73℃	Average [Ts]: ≧75.1℃
Ambient Temperature [Ta]: ≧70℃	Average [Ts]: ≧75.1℃
Driver Current:60 mA	Air Flow: Minimized
Measurement Current: 60 mA	Relative humidity:＜65%RH

6.3.1 Total Luminous Flux (φ v)

Item		Luminous Maintenance (%)						
Aging Hrs		0 hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
75 ℃	B01	100.00%	100.49%	100.10%	100.19%	99.64%	98.76%	97.89%
	B02	100.00%	101.23%	100.85%	100.54%	100.16%	98.72%	98.06%
	B03	100.00%	100.52%	100.42%	100.96%	100.20%	99.47%	99.16%
	B04	100.00%	98.47%	98.52%	98.32%	97.46%	96.78%	95.26%
	B05	100.00%	99.75%	99.61%	100.00%	99.18%	98.65%	99.33%
	B06	100.00%	99.83%	99.68%	99.75%	99.04%	98.48%	97.61%
	B07	100.00%	100.16%	99.18%	99.81%	102.00%	101.02%	99.09%
	B08	100.00%	100.40%	100.28%	99.82%	99.01%	97.37%	95.58%
	B09	100.00%	100.71%	99.62%	100.83%	98.44%	97.94%	97.39%
	B10	100.00%	100.19%	100.14%	100.21%	98.69%	97.89%	97.44%
	B11	100.00%	100.32%	99.87%	100.00%	98.39%	98.00%	97.27%
	B12	100.00%	99.79%	99.12%	99.44%	98.43%	97.11%	97.41%
	B13	100.00%	100.47%	100.12%	98.87%	99.34%	98.09%	96.24%
	B14	100.00%	100.35%	100.03%	100.26%	99.73%	98.77%	98.55%
	B15	100.00%	100.51%	99.68%	98.95%	99.16%	98.35%	97.82%
	B16	100.00%	100.27%	100.24%	99.56%	99.46%	98.88%	98.90%
	B17	100.00%	99.36%	98.56%	97.52%	96.70%	96.13%	94.71%
	B18	100.00%	99.96%	99.61%	98.41%	97.91%	97.99%	97.77%
	B19	100.00%	99.86%	98.98%	97.32%	97.29%	98.18%	96.65%
	B20	100.00%	99.87%	99.66%	98.92%	98.88%	98.19%	97.12%
	B21	100.00%	99.39%	98.78%	98.25%	98.45%	97.61%	95.92%
	B22	100.00%	101.26%	100.45%	99.64%	100.17%	99.84%	98.41%
	B23	100.00%	100.24%	99.80%	98.32%	98.41%	97.96%	97.32%
	B24	100.00%	100.20%	99.54%	98.96%	98.82%	98.34%	98.00%
	B25	100.00%	101.09%	100.59%	98.90%	98.94%	99.43%	99.03%
75 ℃	MAX.	100.00%	101.26%	100.85%	100.96%	102.00%	101.02%	99.33%
	MIN.	100.00%	98.47%	98.52%	97.32%	96.70%	96.13%	94.71%
	AVG.	100.00%	100.19%	99.74%	99.35%	98.96%	98.32%	97.52%

6.3.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIE y) & Chromaticity Shift (△u'v')

Item		Chromaticity Shift (Δu'v')						
Aging Hrs		0 hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
75 ℃	B01	0.0000	0.0005	0.0012	0.0014	0.0019	0.0013	0.0016
	B02	0.0000	0.0005	0.0009	0.0012	0.0016	0.0016	0.0015
	B03	0.0000	0.0007	0.0010	0.0011	0.0018	0.0017	0.0017
	B04	0.0000	0.0007	0.0011	0.0011	0.0011	0.0009	0.0011
	B05	0.0000	0.0004	0.0004	0.0010	0.0014	0.0014	0.0019
	B06	0.0000	0.0007	0.0006	0.0005	0.0009	0.0008	0.0013
	B07	0.0000	0.0007	0.0007	0.0008	0.0029	0.0013	0.0013
	B08	0.0000	0.0005	0.0007	0.0007	0.0011	0.0010	0.0014
	B09	0.0000	0.0005	0.0007	0.0007	0.0010	0.0010	0.0014
	B10	0.0000	0.0005	0.0007	0.0007	0.0010	0.0010	0.0014
	B11	0.0000	0.0006	0.0009	0.0011	0.0016	0.0016	0.0019
	B12	0.0000	0.0005	0.0007	0.0007	0.0011	0.0010	0.0018
	B13	0.0000	0.0006	0.0009	0.0010	0.0016	0.0015	0.0015
	B14	0.0000	0.0004	0.0006	0.0007	0.0016	0.0018	0.0016
	B15	0.0000	0.0005	0.0007	0.0010	0.0015	0.0015	0.0016
	B16	0.0000	0.0005	0.0006	0.0008	0.0013	0.0014	0.0013
	B17	0.0000	0.0004	0.0006	0.0008	0.0013	0.0014	0.0013
	B18	0.0000	0.0006	0.0008	0.0009	0.0013	0.0015	0.0019
	B19	0.0000	0.0005	0.0007	0.0008	0.0016	0.0017	0.0018
	B20	0.0000	0.0006	0.0009	0.0010	0.0018	0.0018	0.0016
	B21	0.0000	0.0005	0.0005	0.0006	0.0011	0.0014	0.0015
	B22	0.0000	0.0006	0.0008	0.0011	0.0017	0.0016	0.0016
	B23	0.0000	0.0005	0.0007	0.0011	0.0017	0.0017	0.0018
	B24	0.0000	0.0005	0.0006	0.0008	0.0017	0.0018	0.0018
	B25	0.0000	0.0006	0.0009	0.0010	0.0014	0.0017	0.0014
75 ℃	MAX.	0.0000	0.0007	0.0012	0.0014	0.0029	0.0018	0.0019
	MIN.	0.0000	0.0004	0.0004	0.0005	0.0009	0.0008	0.0011
	AVG.	0.0000	0.0006	0.0008	0.0009	0.0015	0.0014	0.0016

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6.4 Lumen Maintenance and Color Maintenance Test

Test Condition: Ts = 85℃

Requirement	
Case Temperature [Ts]: ≧83℃	Average [Ts]: ≧85.5℃
Ambient Temperature [Ta]: ≧80℃	Average [Ts]: ≧84.7℃
Driver Current: 60 mA	Air Flow: Minimized
Measurement Current: 60 mA	Relative humidity: ＜65%RH

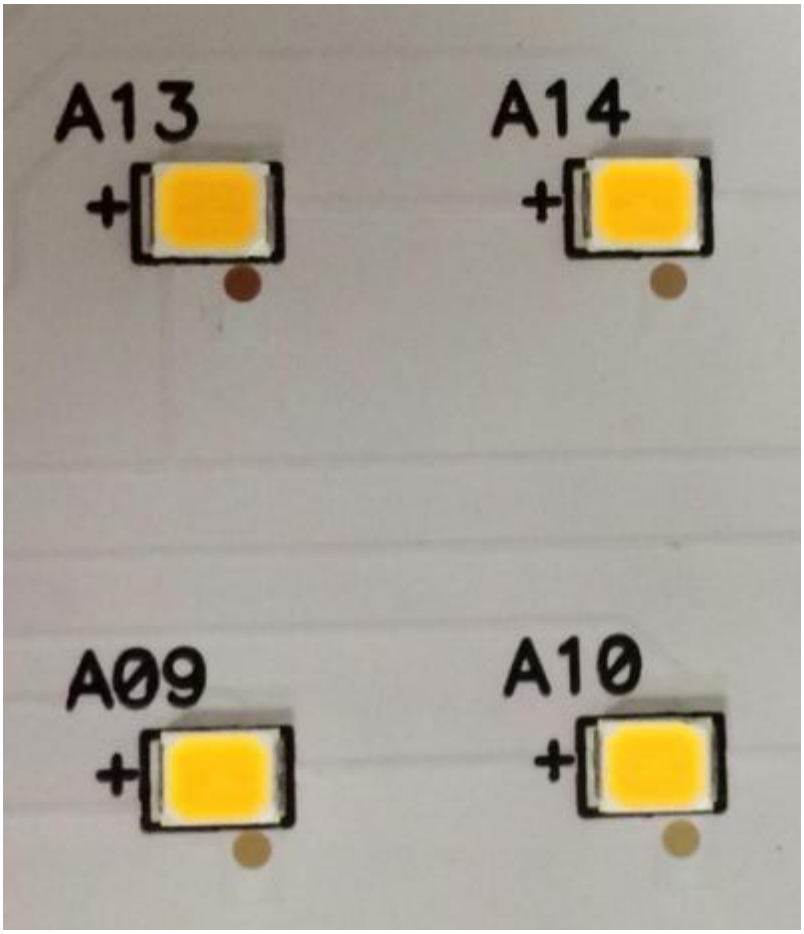
6.3.1 Total Luminous Flux (φ_v)

Item		Luminous Maintenance (%)						
Aging Hrs		0 hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
85 ℃	C01	100.00%	99.76%	99.29%	98.58%	97.93%	96.86%	96.63%
	C02	100.00%	99.42%	99.78%	99.25%	98.40%	97.33%	96.67%
	C03	100.00%	99.87%	99.90%	99.12%	98.60%	97.79%	96.88%
	C04	100.00%	99.06%	99.03%	99.11%	98.28%	97.18%	96.17%
	C05	100.00%	100.30%	100.39%	100.31%	99.70%	99.22%	98.50%
	C06	100.00%	99.49%	99.83%	99.97%	97.27%	96.88%	95.57%
	C07	100.00%	99.79%	100.19%	99.43%	99.30%	98.75%	97.34%
	C08	100.00%	99.80%	99.66%	98.60%	98.64%	97.90%	96.63%
	C09	100.00%	100.92%	99.96%	99.15%	98.89%	98.14%	96.99%
	C10	100.00%	99.76%	99.01%	98.09%	97.43%	96.92%	96.77%
	C11	100.00%	100.22%	99.86%	99.70%	96.56%	96.68%	96.38%
	C12	100.00%	100.07%	99.90%	99.42%	99.56%	98.47%	97.04%
	C13	100.00%	99.10%	98.86%	98.56%	98.83%	97.58%	96.77%
	C14	100.00%	100.82%	99.94%	98.91%	98.13%	96.74%	95.77%
	C15	100.00%	101.15%	101.34%	99.93%	99.48%	98.83%	97.45%
	C16	100.00%	99.41%	99.89%	99.00%	98.83%	97.99%	96.90%
	C17	100.00%	99.36%	99.69%	98.74%	98.69%	97.87%	96.38%
	C18	100.00%	100.74%	100.95%	102.13%	101.85%	100.57%	99.95%
	C19	100.00%	100.04%	100.54%	100.45%	100.31%	99.60%	98.95%
	C20	100.00%	99.39%	99.79%	98.86%	98.36%	97.69%	96.94%
	C21	100.00%	100.71%	99.90%	98.70%	98.78%	98.27%	97.73%
	C22	100.00%	100.08%	99.60%	98.54%	98.65%	97.86%	96.86%
	C23	100.00%	99.91%	99.80%	98.31%	98.27%	97.15%	95.74%
	C24	100.00%	99.62%	98.84%	98.16%	98.51%	97.61%	96.38%
	C25	100.00%	99.28%	98.70%	97.16%	96.68%	94.74%	94.86%
85 ℃	MAX.	100.00%	101.15%	101.34%	102.13%	101.85%	100.57%	99.95%
	MIN.	100.00%	99.06%	98.70%	97.16%	96.56%	94.74%	94.86%
	AVG.	100.00%	99.92%	99.78%	99.13%	98.64%	97.78%	96.89%

6.4.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIE y) & Chromaticity Shift (△u'v')

Item		Chromaticity Shift (Δu'v')						
Aging Hrs		0 hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
85 ℃	C01	0.0000	0.0006	0.0013	0.0013	0.0017	0.0010	0.0014
	C02	0.0000	0.0006	0.0010	0.0012	0.0014	0.0013	0.0013
	C03	0.0000	0.0008	0.0011	0.0011	0.0016	0.0014	0.0015
	C04	0.0000	0.0008	0.0012	0.0011	0.0009	0.0006	0.0009
	C05	0.0000	0.0005	0.0005	0.0010	0.0012	0.0011	0.0017
	C06	0.0000	0.0008	0.0007	0.0005	0.0007	0.0005	0.0011
	C07	0.0000	0.0008	0.0008	0.0008	0.0027	0.0010	0.0011
	C08	0.0000	0.0006	0.0008	0.0007	0.0009	0.0007	0.0012
	C09	0.0000	0.0006	0.0008	0.0007	0.0008	0.0007	0.0012
	C10	0.0000	0.0006	0.0008	0.0007	0.0008	0.0007	0.0012
	C11	0.0000	0.0007	0.0010	0.0011	0.0014	0.0013	0.0017
	C12	0.0000	0.0006	0.0008	0.0007	0.0009	0.0007	0.0016
	C13	0.0000	0.0007	0.0010	0.0010	0.0014	0.0012	0.0013
	C14	0.0000	0.0005	0.0007	0.0007	0.0014	0.0015	0.0014
	C15	0.0000	0.0006	0.0008	0.0010	0.0013	0.0012	0.0014
	C16	0.0000	0.0006	0.0007	0.0008	0.0011	0.0011	0.0011
	C17	0.0000	0.0005	0.0007	0.0008	0.0011	0.0011	0.0011
	C18	0.0000	0.0007	0.0009	0.0009	0.0011	0.0012	0.0017
	C19	0.0000	0.0006	0.0008	0.0008	0.0014	0.0014	0.0016
	C20	0.0000	0.0007	0.0010	0.0010	0.0016	0.0015	0.0014
	C21	0.0000	0.0006	0.0006	0.0006	0.0009	0.0011	0.0013
	C22	0.0000	0.0007	0.0009	0.0011	0.0015	0.0013	0.0014
	C23	0.0000	0.0006	0.0008	0.0011	0.0015	0.0014	0.0016
	C24	0.0000	0.0006	0.0007	0.0008	0.0015	0.0015	0.0016
	C25	0.0000	0.0007	0.0010	0.0010	0.0012	0.0014	0.0012
85 ℃	MAX.	0.0000	0.0008	0.0013	0.0013	0.0027	0.0015	0.0017
	MIN.	0.0000	0.0005	0.0005	0.0005	0.0007	0.0005	0.0009
	AVG.	0.0000	0.0007	0.0009	0.0009	0.0013	0.0011	0.0014

7 TEMPERATURE MEASUREMENT POINT (TMP) DEFINITION



Test Sample

8 OBESERVATION of FAILURES

No LED failure or damage observation during life test.