

Cree® LED Lamp Reliability Test Standard

criteria for performing LED Reliability Tests

This application note applies to the following High-brightness-LED products:

- Oval and round LEDs
- P4 LEDs
- Surface-mount PLCC LEDs

For XLamp LED reliability information, refer to the XLamp LED Reliability Application Note(CLD-AP06).

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1. P2 RGB LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	1000 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	1000 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	1000 hrs	0/50
	Solder ability	JEITA ED-4701 300 303	Tsol=245(±5)°C, 3sec (using flux)	1time (over95%)	0/50
	Resistance to Soldering Heat	JEITA ED-4701 300 302	Tsol=260(±5)°C,10sec (3mm from the base of the epoxy bulb)	1time	0/50
Operation sequence	Life Test	-	T _A =25°C Oval: I _F =35mA(G/B), I _F =50mA(R/A) Round: I _F =30mA(G/B), I _F =50mA(R/A)	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C RH=90%, I _F =20mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C I _F =20mA	1000hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	100μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

2. P2 White LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	1000 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	1000 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	1000 hrs	0/50
	Solder ability	JEITA ED-4701 300 303	Tsol=245(±5)°C, 3sec (using flux)	1time (over95%)	0/50
	Resistance to Soldering Heat	JEITA ED-4701 300 302	Tsol=260(±5)°C,10sec (3mm from the base of the epoxy bulb)	1time	0/50
Operation sequence	Life Test	-	T _A =25°C, I _F =30mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C RH=90%, I _F =20mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F =20mA	1000hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	100μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

3. P4 RGB LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	1000 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	1000 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	1000 hrs	0/50
	Solder ability	JEITA ED-4701 300 303	Tsol=245(±5)°C, 3sec (using flux)	1time (over95%)	0/50
	Resistance to Soldering Heat	JEITA ED-4701 300 302	Tsol=260(±5)°C,10sec (3mm from the base of the epoxy bulb)	1time	0/50
Operation sequence	Life Test	-	T _A =25°C I _F =30mA(G/B), I _F =70mA(R/A)	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C RH=90%, I _F =20mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F =30mA	1000hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 30 mA	-	Initial Data x 1.2
Reverse Current	I _R	V _R = 5 V	-	100μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

4. P4 White LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	1000 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	1000 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	1000 hrs	0/50
	Solder ability	JEITA ED-4701 300 303	Tsol=245(±5)°C, 3sec (using flux)	1time (over95%)	0/50
	Resistance to Soldering Heat	JEITA ED-4701 300 302	Tsol=260(±5)°C,10sec (3mm from the base of the epoxy bulb)	1time	0/50
Operation sequence	Life Test	-	T _A =25°C, I _F =35mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C RH=90%, I _F =20mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F =30mA	1000hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 30 mA	-	Initial Data x 1.2
Reverse Current	I _R	V _R = 5 V	-	100μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

5. SMD CLV1A-FKB & CLM1 series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=50mA, G=25mA, B=25mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F (single chip):R=30mA,G=15mA, B=15mA I _F (RGB): R=15mA, G=15mA, B=15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F (single chip):R=30mA,G=15mA, B=15mA I _F (RGB): R=15mA, G=15mA, B=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=50mA, G=25mA . B=25mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

6. SMD CLA1A,CLA1B,CLA2A and SP301 series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F =35mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F =15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F =35mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

7. SMD CLM2(except for CLM2C/CLM2D/CLM2T series) and CLM4 series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=70mA, G=30mA, B=30mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R=50mA, G=15mA, B=15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R=50mA, G=15mA, B=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=70mA, G=30mA, B=30mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

8. SMD CLM2C-ACA/RCA LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F =50mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F =15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F =50mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

9. SMD CLM2C-GCA/BCA LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : G=35mA, B=20mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : G=10mA, B=10mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : G=15mA, B=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : G=35mA, B=20mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

10. SMD CLM2D/T-RPC/RCC/APC/ACC LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F =50mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F =15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F =50mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

11. SMD CLM2D/T-GPC/GCC/BPC/BCC/CPC/CCC LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : G=35mA, B=20mA, C=35mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : G=10mA, B=10mA, C=10mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : G=15mA, B=15mA, C=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : G=35mA, B=20mA, C=35mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

12. SMD CLM3 series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=50mA, G=25mA, B=25mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R=30mA, G=15mA, B=15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R=30mA, G=15mA, B=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=50mA, G=25mA, B=25mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

13. SMD CLM3 white LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F =25mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F =15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F =25mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

14. SMD CLMXB series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=20mA, G=25mA, B=15mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F =10mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =10mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=20mA, G=25mA, B=15mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

15. SMD CLVBA-FKA LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=18mA, G=16mA, B=10mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R=12mA, G=10mA, B=6mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R=12mA, G=10mA, B=6mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=18mA, G=16mA, B=10mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

16. SMD CLMV & CLMU series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=12mA, G=6mA, B=3mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R=5mA, G=3mA, B=3mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R=5mA, G=3mA, B=3mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=12mA, G=6mA, B=3mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

17. SMD CLX6 series (CLX6A/B/C/D/F) LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=30mA, G=35mA, B=20mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F =15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=30mA, G=35mA, B=20mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

18. SMD CLX6E series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=30mA, G=30mA, B=20mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F =15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=30mA, G=30mA, B=20mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

19. SMD CLX6F-RKB/AKB LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R1=R2=R3=30mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R1=R2=R3=15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R1=R2=R3=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R1=R2=R3=30mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

20. SMD CLX6F-GKB LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : G1=G2=G3=35mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : G1=G2=G3=15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : G1=G2=G3=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : G1=G2=G3=35mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

21. SMD CLX6F-BKB LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : B1=B2=B3=20mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : B1=B2=B3=15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : B1=B2=B3=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : B1=B2=B3=20mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

22. SMD CLX6F-PKW LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : B1=B2=B3=30mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : B1=B2=B3=15mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : B1=B2=B3=15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C I _F : B1=B2=B3=30mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

23. SMD CLV1S and CLV1L LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=25mA, G=20mA, B=20mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R=10mA, G=8mA, B=8mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R=10mA, G=8mA, B=8mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=25mA, G=20mA, B=20mA	500hrs	0/50

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

24. SMD CLY6 series(CLY6C/D/L, CLYBA/CLYBB) LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=30mA G=35mA B=20mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R=15mA G=15mA B=10mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F =15mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=30mA G=35mA B=20mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

25. SMD LS6 series LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
	Water Proof Test*	IEC 60529:2011	IPX8 Immersing in 1m water	24 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=14mA G=12mA B=16mA	1000 hrs	0/50
	High Temperature Life Test	-	T _A =85°C I _F : R=7mA G=7mA B=5mA	1000 hrs	0/50
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R=7mA G=7mA B=5mA	500 hrs	0/50
	Low Temperature Life Test	-	T _A =-40°C, I _F : R=14mA G=12mA B=16mA	500hrs	0/50

*Water proof test: The test is conducted on component level. It is strongly recommended customer test the product for their application

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-

26. SMD LQ6 LED Lamps

Test Items and Results

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T _A =100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T _A =60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T _A =-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T _A =25°C I _F : R=G=B=W=150mA	1000 hrs	0/30
	High Temperature Life Test	-	T _A =85°C I _F : R=G=B=W=80mA	1000 hrs	0/30
	High Humidity Heat Life Test	-	T _A =60°C, RH=90% I _F : R=G=B=W=80mA	500 hrs	0/30
	Low Temperature Life Test	-	T _A =-40°C I _F : R=G=B=W=150mA	500hrs	0/30

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V _F	I _F = 20 mA	-	Initial Data x 1.1
Reverse Current	I _R	V _R = 5 V	-	10μA
Luminous Flux/Intensity	Φ _V	I _F = 20 mA	Initial Data x 0.7	-