

# Product /Process Change Notification

**PCN Number: ND-2021-061**

**Create Date: 29<sup>th</sup> Step. 2021**

**Issue By PD: William Lin**

**1. Description of Change:**

For more flexible and smooth production support and reduce shipment impact from current supplier, LITEON would add ChangeLight dice as 2nd source, keep the same performance, quality, and RA requirements. The action will implement at the end of November 2021.

**2. Products Affected:**

Product number	Product number	Product number
LSHD-5503	LSHD-A101	LTC-4624JS
LSHD-A103	LTC-2721JD	LTC-4627JF
LSHD-F101	LTC-4624JD-11	LTC-4627JG
LTC-2623JD	LTC-4624JR	LTC-4627JR
LTC-4624JR	LTC-4624JS	LTC-4627JS
LTC-4627JR	LTC-4724JR	LTC-4724JF
LTC-4724JR	LTC-4727JR	LTC-4724JR
LTC-4724KR-15	LTD-2701JD	LTC-4724KR-15
LTC-4727KR-01	LTD-4608JR	LTC-4727JR
LTD-2701JD	LTS-4301JR	LTC-4727JS
LTD-4608JF	LTS-4801JD	LTC-4727KR-01
LTD-4608JR	LTS-4802BJR-H1	LTD-2701JD
LTP-2057AKR	LTS-4817CKR-PR	LTD-4608JF
LTP-3786JD-03	LSHD-5503	LTD-4608JR
LTP-747KR	LSHD-7501	LTD-4708JF
LTP-757KR	LSHD-7503	LTD-4708JR
LTS-2806CKR-P	LSHD-A101	LTD-5021AJD
LTS-3861JD	LSHD-A103	LTP-1457AKR
LTS-4301JR	LSHD-F101	LTP-4323JD
LTS-4801JD	LTC-2623JD	LTP-747KR
LTS-4802BJR-H1	LTC-2687CKS-P	LTP-757KR
LTS-4802BJS-H1	LTC-4624JR	LTS-3403LJG

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Product number	Product number	Product number
LTS-4301JF	LTS-5001AJD	LTC-4727JS
LTS-4301JR	LTS-5825CKG-PST1	LTD-2701JD
LTS-4301JS	LSHD-5503	LTD-4608JF
LTS-4801JD	LSHD-7501	LTD-4608JR
LTS-4801JR	LSHD-7503	LTD-4608JS
LTS-4801JS	LSHD-A101	LTD-4708JR
LTS-4802BJR-H1	LSHD-A103	LTP-1457AKR
LTS-4802BJS-H1	LSHD-F101	LTP-3862JD
LSHD-5503	LTC-2623JD	LTP-4323JD
LSHD-7501	LTC-2721JD	LTP-747KR
LSHD-A101	LTC-4624JD	LTP-757KR
LTC-2723JD	LTC-4624JR	LTS-4301JR
LTC-4624JR	LTC-4624JS	LTS-4301JS
LTC-4627JR	LTC-4627JD	LTS-4801JD
LTC-5623JD-20	LTC-4627JF	LTS-4801JR
LTD-2701JD	LTC-4627JR	LTS-4801JS
LTD-4608JR	LTC-4627JS	LTS-4801KF
LTP-3862JD	LTC-4724JF	LTS-4802BJR-H1
LTS-4301JR	LTC-4724JG	LTS-4802BJS-H1
LTS-4801JR	LTC-4724JR	LTS-4817CKR-P
LTS-4802BJR-H1	LTC-4727JR	LTS-546AJD

### 3. Before:

Products with Epistar dice.

### 4. After:

Adding ChangeLight dice as 2<sup>nd</sup> source.

### 5. Effected date :

The action will implement at the end of November 2021, if there is no feedback.

### 6. Available of sample:

6~8 weeks after receiving sample request.

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**Customer Approval Portion:**

\* Approved (\_\_\_\_), Remark: \_\_\_\_\_

\* Rejected (\_\_\_\_), Reason (\_\_\_\_\_)

CUSTOMER REPRESENTATIVE NAME/TITLE:

SIGNATURE:

DATE:

E-MAIL:

PHONE:



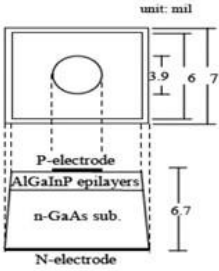
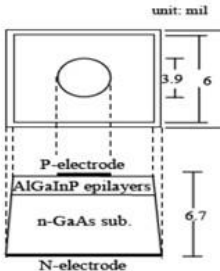
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## Dice comparison - Appearance

### ➤ Comparison Result

- EPI structure are the same
- Electrode polar and structure : P side up type , structure are different
- Pad material are the same
- Outline dimension of dice are the same ( 7 mil dice )

Vendor Name	Change Light	Epistar
EPI Structure	AlInGaP	AlInGaP
Electrode Polar and structure	P side up  polygon	P side up  circular
Pad Material	Aluminum Pad	Aluminum Pad
Dice Figure		

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## Reliability Report – Change Light Summary

- Test result summary of Change Light dice by different colors
- Approved by Liteon QA

RA Test Items	Liteon PN Series					
	02-KG-SSB (Change Light)	02-KE-SS7 (Change Light)	02-KD-SS3 (Change Light)	02-KR-SS4A (Change Light)	02-KF-SS3C (Change Light)	02-KS-SS4D (Change Light)
Life Test	pass	pass	pass	pass	pass	-
High Temperature High Humidity Storage Test	pass	pass	pass	pass	pass	-
Temperature Cycling Test	pass	pass	pass	pass	pass	pass
Thermal Shock Test	pass	pass	pass	pass	pass	pass
High temp. storage	pass	pass	-	-	-	-
Low temp. storage	pass	pass	-	-	-	-
reference	Appendix 1	Appendix 2	Appendix 3	Appendix 4	Appendix 5	Appendix 6

□ RA test condition :

Test item	Test Conditions
Life Test	Ta = under room temperature IF = 10mA Test time=1000hrs
High Temperature High Humidity Storage Test	Ta= 65±5°C RH=90~95% Test time = 1000hrs
Temperature Cycling Test	105°C~25°C~ -35°C~25°C 30m~5m~30m~5mins 30 cycles
Thermal Shock Test	105°C±5°C~ -35°C±5°C 15m ~ 15mins 30 cycles
High temp. storage	Test temp. = 105±5°C Test time = 1000hrs
Low temp. storage	Test temp. = -35±5°C Test time = 1000hrs

□ RA test criteria :

Item	Criteria for RA after and before
Forward Voltage (VF) decay ratio	0% < shift ratio < 20%
Luminous Intensity (IV) decay ratio	0% < decay ratio < 50%

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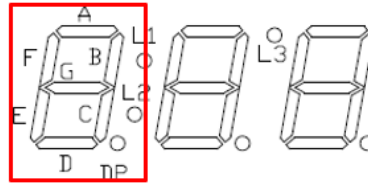
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## 02-KG-SS Series - Compare Epistar with ChangeLight

Appendix 1

- Liteon PN : 02-KG-SSB
- Test with ND Display device : LTC-4724JG
- Dice color : Yellow Green
- RA test meet QA spec.
  - Test result meet QA spec.
  - Dice performance are the same

Measured segment



IV & VF compared of life test

Luminous Intensity measurement			
IF=20mA Unit: mcd			
check point	Initial(0hr)	1000hrs	decay rate(%)
Vendor			
Change Light	11.4	11.0	4%
Epistar	11.6	11.0	5%

Forward Voltage measurement			
IF=20mA Unit: volt			
check point	Initial(0hr)	1000hrs	shift rate(%)
Vendor			
Change Light	2.08	2.08	0%
Epistar	2.03	2.04	0%

# Product /Process Change Notification

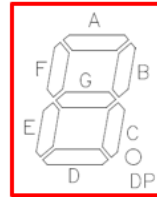
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## 02-KE-SS Series - Compare Epistar with ChangeLight

Appendix 2

- Liteon PN : 02-KE-SS7
- Test with ND Display device : LTS-4812CKE-PMDL
- Dice color : Super Red
- RA test meet QA spec.
  - Test result meet QA spec.
  - Dice performance are the same

Measured segment



IV & VF compared of life test

Luminous Intensity measurement			
IF=10mA Unit: mcd			
check point	Initial(0hr)	1000hrs	decay rate(%)
Vendor			
Change Light	19.2	18.7	3%
Epistar	20.1	19.1	5%

Forward Voltage measurement			
IF=20mA Unit: volt			
check point	Initial(0hr)	1000hrs	shift rate(%)
Vendor			
Change Light	2.04	2.04	0%
Epistar	2.04	2.04	0%

# Product /Process Change Notification

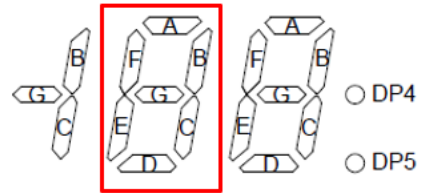
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## 02-KD-SS Series - Compare Epistar with ChangeLight

Appendix 3

- Liteon PN : 02-KD-SS3
- Test with ND Display device : LTC-5689KD-01
- Dice color : Super Red
- RA test meet QA spec.
  - Test result meet QA spec.
  - Dice performance are the same

Measured segment



IV & VF compared of life test

Luminous Intensity measurement			
IF=20mA Unit: mcd			
check point	Initial(0hr)	1000hrs	decay rate(%)
Vendor			
Change Light	15.5	15.0	3%
Epistar	16.1	15.5	4%

Forward Voltage measurement			
IF=20mA Unit: volt			
check point	Initial(0hr)	1000hrs	shift rate(%)
Vendor			
Change Light	1.98	2.01	2%
Epistar	2.00	2.01	0%



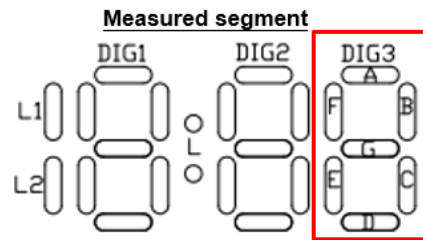
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## 02-KF-SS Series - Compare Epistar with ChangeLight

Appendix 5

- Liteon PN : 02-KF-SS3C
- Test with ND Display device : LTC-3698KF
- Dice color : Orange
- RA test meet QA spec.
  - Test result meet QA spec.
  - Dice performance are the same



### IV & VF compared of life test

Luminous Intensity measurement			
IF=20mA Unit:mcd			
check point	Initial(0hr)	1000hrs	decay rate(%)
Vendor			
Change Light	27	25.8	4%
Epistar	28.5	28.4	0%

Forward Voltage measurement			
IF=20mA Unit:volt			
check point	Initial(0hr)	1000hrs	decay rate(%)
Vendor			
Change Light	2.11	2.11	0%
Epistar	2.01	2.02	1%

# Product /Process Change Notification

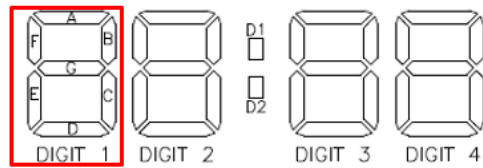
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## 02-KS-SS Series - Compare Epistar with ChangeLight

Appendix 6

- Liteon PN : 02-KS-SS3A
- Test with ND Display device : LTC-36D4KS
- Dice color : Yellow
- RA test meet QA spec.
  - Test result meet QA spec.
  - Dice performance are the same

Measured segment



IV & VF compared of life test

Luminous Intensity measurement			
IF=1mA Unit: $\mu$ cd			
check point	Initial(0hr)	1000hrs	decay rate(%)
Vendor			
Change Light	683.2	681.0	0%
Epistar	683.6	681.6	0%

Forward Voltage measurement			
IF=20mA Unit: volt			
check point	Initial(0hr)	1000hrs	shift rate(%)
Vendor			
Change Light	2.10	2.11	0%
Epistar	2.10	2.13	1%

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### Summary for the EVA report

#### Conclusion :

- ① Electrode Polar structure of Change Light dice is different from Epistar .
- ② ChangeLight dice RA test was approved by LITEON criteria .
- ③ ChangeLight and Epistar dice have same optical performance according to the test result

# Product /Process Change Notification



<b>LITE-ON TECHNOLOGY CORP. QRA Department</b>		<b>RELIABILITY TEST REPORT</b>			Report No.: F30TPO18003			
		From : 06/20/2018		To: 08/02/2018				
Test Purpose :		N/D Product Reliability Test						
Part No. :		LTC-3710KR						
Measure Equipment :		CAS-140CT/LED-638HC						
Reference Document :		SWR-RA-30-20180017						
Description :								
		<u>Dice</u>	<u>Source Color</u>	<u>Leadframe/PCB</u>	<u>Encapsulant</u>			
		02-KRSS4A	AllGaP Super Red	01-C3710	12E312/12E313			
Pre-Condition :								
LEVEL	Test Conditions	Criteria	Duration		S/S (PCs)	Result		
			Initial	Final				
	Pre-Heat Temperature : 115°C Wave Solder : 260±5°C Pre-Heat Time : 30 sec Conveyer Speed : 12 Wave Speed : 90 Wave solder:2 Times (Interval: 10 mins ~ 15mins) ( 3mm from the base of the epoxy )	IV > 50%, VF < ±20%, IR < 50uA	06/20/18	06/20/18	12	Accept		
Test Condition :								
Test Item	Test Conditions	Test Equipment	CAL. No.	Criteria	Duration	Unit	S/S (PCs)	Result
LT	Life Test	Ta = under room temperature IF = 10mA	Power (LITEON Tester)	-	1000	Hrs	3	Accept
TH	High Temperature High Humidity Storage Test	Ta= 65± 5°C RH=90~95%	GF GTH-800-40-CP-AR	EL1-32	1000	Hrs	3	Accept
TC	Temperature Cycling Test	105°C~25°C~ -35°C~25°C 30m~5m~30m~5mins	GF GTST-108-55-AW	EL1-34	30	Cycles	3	Accept
TS	Thermal Shock Test	105°C±5°C~ -35°C±5°C 15m ~ 15mins	GF GTST-056-65-AW-2	EL1-31	30	Cycles	3	Accept
Test Result:		● Accept    ○ Reject						
S/S: {	Reading :	12	PCs,	Failure :	0	PC		
	Function :	0	PCs,	Percentage :	0.00	%		
Failure Analysis :								
Tested By:			Approved By:					
<i>Joyce Huang</i>			<i>Cung</i>					
08/02/18'			08/02/18'					

QLS-OD-C035/A4

Note: Please refer to LTC-3710KR RA report for detail measured data.

# Product /Process Change Notification



<b>LITE-ON TECHNOLOGY CORP. QRA Department</b>		<b>RELIABILITY TEST REPORT</b>		Report No.: F30TP018009				
				From : 06/08/2018	To: 09/03/2018			
Test Purpose :		N/D Product Reliability Test						
Part No. :		LTC-4724JG						
Measure Equipment :		CAS-140CT/LED-638HC						
Reference Document :		SWR-RA-30-20180018						
Description :								
<u>Dice</u> 乾照 CL-CAYG208L		<u>Source Color</u> AllnGaP Green	<u>Leadframe/PCB</u> 01-C4724	<u>Encapsulant</u> 12E226/12E227				
Pre-Condition :								
<b>LEVEL</b>	<b>Test Conditions</b>		<b>Criteria</b>	<b>Duration</b>		<b>S/S (PCs)</b>	<b>Result</b>	
				<b>Initial</b>	<b>Final</b>			
	Pre-Heat Temperature : 115°C Wave Solder : 260±5°C Pre-Heat Time : 30 sec Conveyer Speed : 12 Wave Speed : 90 Wave solder:2 Times (Interval: 10 mins - 15mins) ( 3mm from the base of the epoxy )		IV > 50%, VF < ± 20%, IR < 50uA	06/08/18	06/08/18	66	Accept	
Test Condition :								
<b>Test Item</b>	<b>Test Conditions</b>	<b>Test Equipment</b>	<b>CAL. No.</b>	<b>Criteria</b>	<b>Duration</b>	<b>Unit</b>	<b>S/S (PCs)</b>	<b>Result</b>
LT	Life Test	Ta = under room temperature IF = 10mA	Power (LITEON Tester)	-	2000	Hrs	11	Accept
TH	High Temperature High Humidity Storage Test	Ta= 65± 5°C RH=90~95%	GF GTH-800-40-CP-AR	EL1-32	1000	Hrs	11	Accept
HTS	High Temperature Storage Test	Ta= 105± 5°C	GF GCT-125-(+25)-TR-SP	EL2-22	1000	Hrs	11	Accept
LTS	Low Temperature Storage Test	Ta= -35± 5°C	JUI HUNG SR6-190-60	EL1-08	1000	Hrs	11	Accept
TC	Temperature Cycling Test	105°C ~ 25°C ~ -35°C ~ 25°C 30m~5m~30m~5mins	WEISS WKS 3-270/70/25	EL1-33	30	Cycles	11	Accept
TS	Thermal Shock Test	105°C±5°C ~ -35°C±5°C 15m ~ 15mins	GF GTST-056-65-AW-2	EL1-31	30	Cycles	11	Accept
Test Result:						● Accept    ○ Reject		
S/S:	{	Reading :	18	PCs,	{	Failure :	0	PC
		Function :	48	PCs,		Percentage :	0.00	%
Failure Analysis :								
Tested By:			Approved By:					
<i>Joyce Huang</i>			<i>Cung</i>					
09/03/18			09/03/18					

QLS-OD-C035/A4

Note: Please refer to LTC-4727JG RA report for detail measured data.