Product /Process Change Notification

PCN Number: ND-2021-061

Create Date: 29th 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 2nd 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:

Product /Process Change Notification

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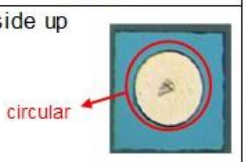
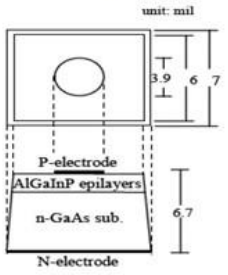
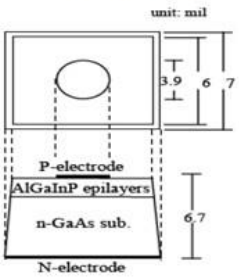
Dice comparison - Appearance

➢ **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 	P side up 
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

Liteon P/N Series / RA Test Items	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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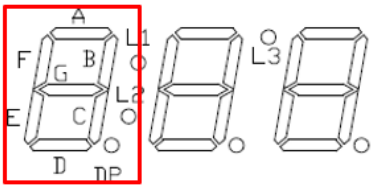
02-KG-SS Series - Compare Epistar with ChangeLight

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 / Vendor	Initial(0hr)	1000hrs	decay rate(%)
Change Light	11.4	11.0	4%
Epistar	11.6	11.0	5%

Forward Voltage measurement
IF=20mA
Unit: volt

check point / Vendor	Initial(0hr)	1000hrs	shift rate(%)
Change Light	2.08	2.08	0%
Epistar	2.03	2.04	0%

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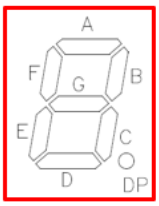
LITEON

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 / Vendor	Initial(0hr)	1000hrs	decay rate(%)
Change Light	19.2	18.7	3%
Epistar	20.1	19.1	5%

Forward Voltage measurement
IF=20mA
Unit: volt

check point / Vendor	Initial(0hr)	1000hrs	shift rate(%)
Change Light	2.04	2.04	0%
Epistar	2.04	2.04	0%

Product /Process Change Notification

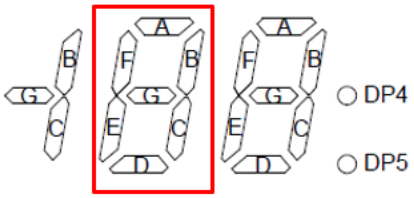
LITEON

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 / Vendor	Initial(0hr)	1000hrs	decay rate(%)
Change Light	15.5	15.0	3%
Epistar	16.1	15.5	4%

Forward Voltage measurement
IF=20mA
Unit: volt

check point / Vendor	Initial(0hr)	1000hrs	shift rate(%)
Change Light	1.98	2.01	2%
Epistar	2.00	2.01	0%

Product /Process Change Notification

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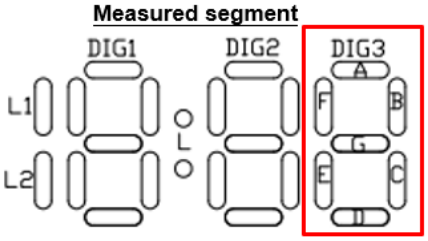
02-KF-SS Series - Compare Epistar with ChangeLight

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

Measured segment



IV & VF compared of life test

Luminous Intensity measurement

IF=20mA
Unit:mcd

check point / Vendor	Initial(0hr)	1000hrs	decay rate(%)
Change Light	27	25.8	4%
Epistar	28.5	28.4	0%

Forward Voltage measurement

IF=20mA
Unit:volt

check point / Vendor	Initial(0hr)	1000hrs	decay rate(%)
Change Light	2.11	2.11	0%
Epistar	2.01	2.02	1%

Product /Process Change Notification

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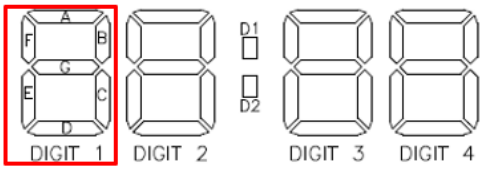
02-KS-SS Series - Compare Epistar with ChangeLight

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

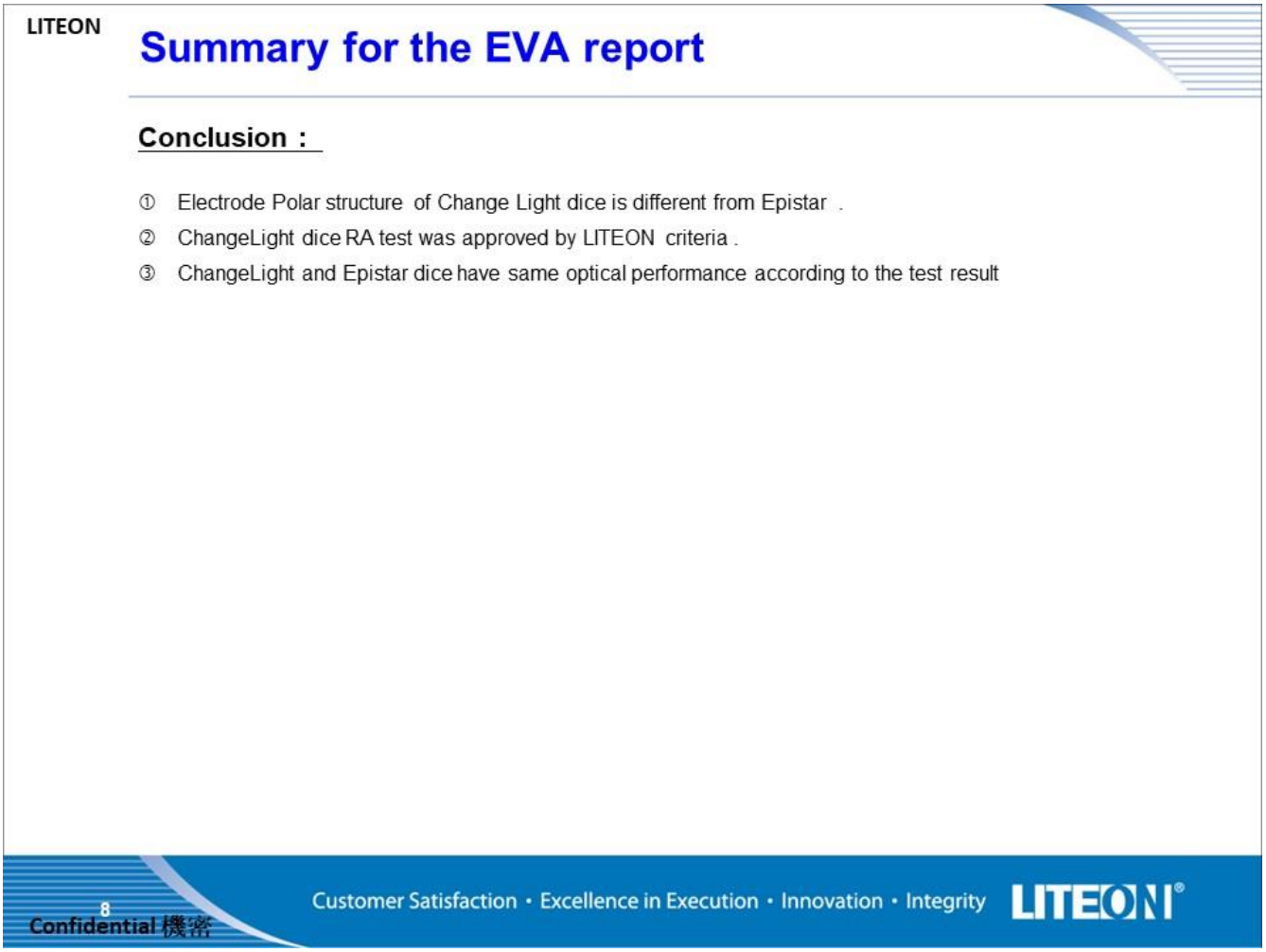
Luminous Intensity measurement
IF=1mA
Unit: μcd

check point / Vendor	Initial(0hr)	1000hrs	decay rate(%)
Change Light	683.2	681.0	0%
Epistar	683.6	681.6	0%

Forward Voltage measurement
IF=20mA
Unit: volt

check point / Vendor	Initial(0hr)	1000hrs	shift rate(%)
Change Light	2.10	2.11	0%
Epistar	2.10	2.13	1%

Product /Process Change Notification



Product /Process Change Notification

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LITE-ON TECHNOLOGY CORP. QRA Department	RELIABILITY TEST REPORT	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 :	

Dice	Source Color	Leadframe/PCB	Encapsulant
02-KRSS4A	AlIGaP Super Red	01-C3710	12E312/12E313

Pre-Condition :

LEVEL	Test Conditions	Criteria	Duration		S/S (PCs)	Result
			Initial	Final		
	Pre-Heat Temperature : 115℃ Wave Solder : 260±5℃ 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)	-	IV > 50%, VF<±20%, IR<50uA	1000	Hrs	3	Accept
TH	High Temperature High Humidity Storage Test	Ta= 65± 5℃ RH=90~95%	GF GTH-800-40-CP-AR	EL1-32		1000	Hrs	3	Accept
TC	Temperature Cycling Test	105℃~25℃~ -35℃~25℃ 30m~5m~30m~5mins	GF GTST-108-55-AW	EL1-34		30	Cycles	3	Accept
TS	Thermal Shock Test	105℃±5℃~ -35℃±5℃ 15m ~ 15mins	GF GTST-056-65-AW-2	EL1-31		30	Cycles	3	Accept

Test Result: ● Accept ○ Reject

S/S: { Reading : 12 PCs, Function : 0 PCs, } { Failure : 0 PC, Percentage : 0.00 % }

Failure Analysis :

Tested By :	Approved By :
Joyce Huang 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

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LITE-ON TECHNOLOGY CORP. QRA Department	RELIABILITY TEST REPORT	Report No.: F30TPO18009	
		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 :	

Dice	Source Color	Leadframe/PCB	Encapsulant
乾照 CL-CAYG208L	AlInGaP Green	01-C4724	12E226/12E227

Pre-Condition :

LEVEL	Test Conditions	Criteria	Duration		S/S (PCs)	Result
			Initial	Final		
	Pre-Heat Temperature : 115℃ Wave Solder : 260±5℃ 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 :

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)	-	IV > 50%, VF<±20%, IR<50uA	2000	Hrs	11	Accept
TH	High Temperature High Humidity Storage Test	Ta= 65± 5℃ RH=90~95%	GF GTH-800-40-CP-AR	EL1-32		1000	Hrs	11	Accept
HTS	High Temperature Storage Test	Ta= 105± 5℃	GF GCT-125-(+25)-TR-SP	EL2-22		1000	Hrs	11	Accept
LTS	Low Temperature Storage Test	Ta= -35± 5℃	JUI HUNG SR6-190-60	EL1-08		1000	Hrs	11	Accept
TC	Temperature Cycling Test	105℃~25℃~ -35℃~25℃ 30m~5m~30m~5mins	WEISS WKS 3-270/70/25	EL1-33		30	Cycles	11	Accept
TS	Thermal Shock Test	105℃±5℃~ -35℃±5℃ 15m ~ 15mins	GF GTST-056-65-AW-2	EL1-31		30	Cycles	11	Accept

Test Result: ● Accept ○ Reject

S/S: { Reading : 18 PCs, Function : 48 PCs, } { Failure : 0 PC, Percentage : 0.00 % }

Failure Analysis :

Tested By :	Approved By :
Joyce Huang 09/03/18'	09/03/18'

QLS-OD-C035/A4

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