

Doc. No: LUMI 3528-1.0T 2P- 10 02 26- SPEC

3528-2PIN-SMD LED

WHITE COLOR LED

Preliminary Specification

Customer Approval		Model	LMTPWH10A2Z					
<table><tr><td>Checked By</td><td>Approved By</td></tr><tr><td></td><td></td></tr></table>		Checked By	Approved By			Issued Date	2010 – 02 - 26	
		Checked By	Approved By					
		Description	SMD Type LED					
		Written By	Checked By	Approved by				

Contact Point

Tel: 82-31-213-9200

Fax: 82-31-213-9210

Homepage: www.lumimicro.com



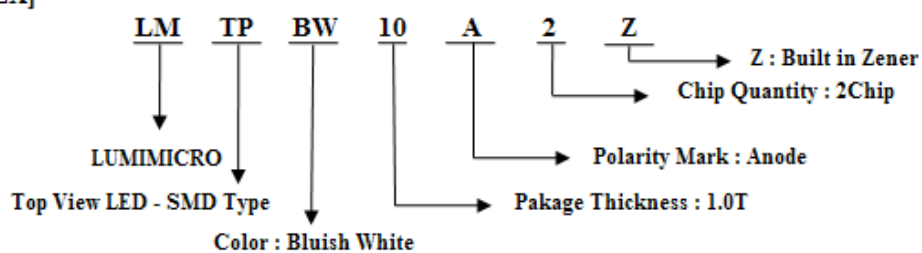
LUMIMICRO 3528 – Two Chip Specification

◆ LUMIMICRO Top View LED P/N

LUMIMICRO 5050 Top View LED Part No. Explanation

LM	: LUMIMICRO. Ltd					
TP	: Top View LED - SMD Type					
WH	: White Color					
	BW	PW	YW	RW	AW	WW
	Bluish White	Pure White	Yellow White	Reddish White	Amber white	Warm White
10	: Pakage Thickness(1.0T)					
A	: Polarity(A : Anode / C : Cathode)					
2	: Chip Quantity(One chip[1], Two chip[2], Three[3]					
Z	: Built in Zener(X : No zener , Z : zener)					

[EX]

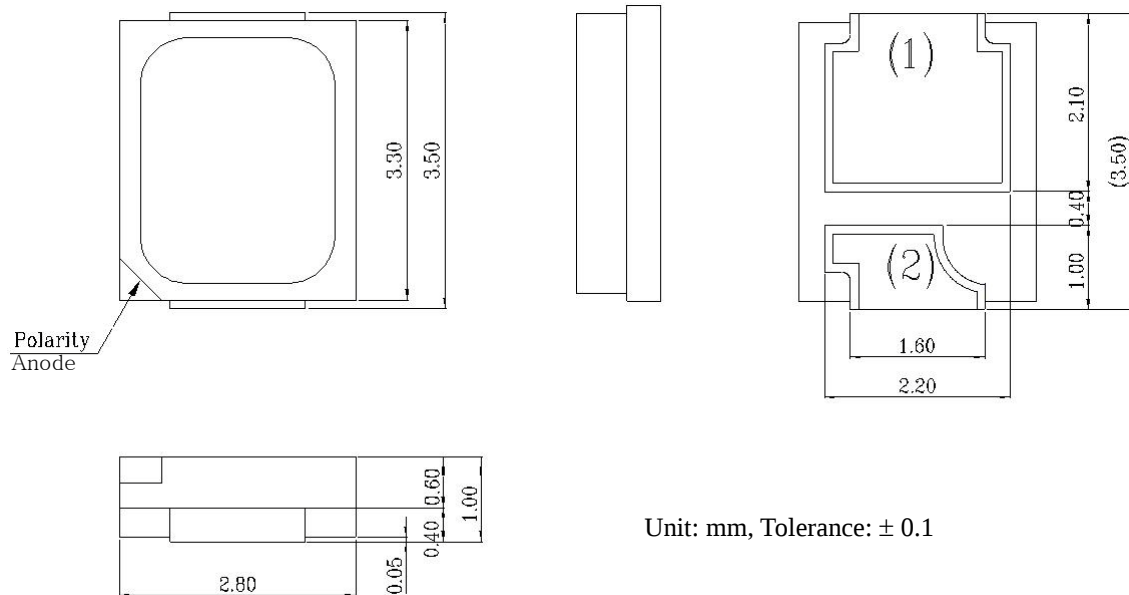


LUMIMICRO 3528 – Two Chip Specification

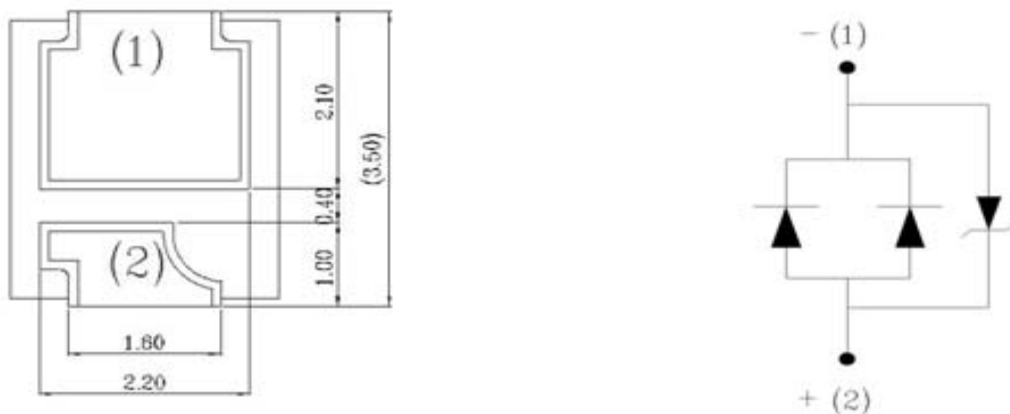
◆ Features

- [1] Built-in 2 chip Super-luminosity Chip LED
- [2] Super-luminosity chip LED
- [3] Wide viewing angle
- [4] External dimensions: 3.5 x 2.8 x 1.0 mm
- [5] Lead frame package with individual 2 pin

◆ Outline Dimensions



◆ LED Circuit Diagram



LUMIMICRO 3528 – Two Chip Specification

◆ Absolute Maximum Rating

Parameter	Color	Symbol	Rating Value	Unit
Forward DC Current	White	IF-1	60	m A
Power Dissipation	White	PD	200	mW
Forward Pulse Current ^{*1}	White	IPF-1	120	m A
Reverse Voltage	White	VR-1	5	V
ESD Voltage	White	ESD-1	HBM 12,000	V
Operating Temperature	White	TO	-30 to + 85	°C
Storage Temperature	White	TST	-40 to + 120	°C
Soldering Temperature	White	TSD	260C for 10 Seconds	°C

^{*1} : Forward Pulse Current : Pulse Width < 10msec / Duty Ratio < 1/10

◆ Forward Voltage Characteristics [Condition : 40mA – Ta = 25°C]

Color	Item	Rank	Forward Voltage			Unit
			MIN.	TYP.	Max.	
White	Forward Voltage	3V0	2.9	2.95	3.0	V
	Forward Voltage	3V1	3.0	3.05	3.1	V
	Forward Voltage	3V2	3.1	3.15	3.2	V
	Forward Voltage	3V3	3.2	3.25	3.3	V
	Forward Voltage	3V4	3.3	3.35	3.4	V
	Forward Voltage	3V5	3.4	3.45	3.5	V

Measurement Tolerance: ± 0.05V

LUMIMICRO 3528 – Two Chip Specification

◆ Peak Luminous Intensity Characteristics [Condition : 40mA – Ta = 25°C]

Color	Part No.	Item	Rank	Luminous Intensity			Unit
				MIN.	TYP.	Max.	
Bluish White	LMTPBW10A2X	Luminous Intensity	2L1	2	—	3	cd
			2L2	3	—	4	cd
			2L3	4	—	5	cd
			2L4	5	—	6	cd
			2L5	6	—	7	cd
			2L6	7	—	8	cd
Pure White	LMTPPW10A2X	Luminous Intensity	2L2	3	—	4	cd
			2L3	4	—	5	cd
			2L4	5	—	6	cd
			2L5	6	—	7	cd
			2L6	7	—	8	cd
Yellowish Reddish	LMTPYW10A2X	Luminous Intensity	2L2	3	—	4	cd
			2L3	4	—	5	cd
	LMTPRW10A2X		2L4	5	—	6	cd
			2L5	6	—	7	cd
			2L6	7	—	8	cd
Amber White Warm White	LMTPAW10A2X	Luminous Intensity	2L1	2	—	3	cd
			2L2	3	—	4	cd
	LMTPWW10A2X		2L3	4	—	5	cd
			2L4	5	—	6	cd
			2L5	6	—	7	cd

Measurement Tolerance: ± 10%

LUMIMICRO 3528 – Two Chip Specification

◆ Peak Luminous Flux Characteristics [Condition : 40mA – Ta = 25°C]

Color	Part No.	Item	Rank	Luminous Intensity			Unit
				MIN.	TYP.	Max.	
Bluish White	LMTPBW10A2X	Luminous Flux	2L1	4	—	6	lm
			2L2	6	—	8	lm
			2L3	8	—	10	lm
			2L4	10	—	12	lm
			2L5	12	—	14	lm
			2L6	14	—	16	lm
Pure White	LMTPPW10A2X	Luminous Flux	2L2	6	—	8	lm
			2L3	8	—	10	lm
			2L4	10	—	12	lm
			2L5	12	—	14	lm
			2L6	14	—	16	lm
			Yellowish Reddish	LMTPYW10A2X	Luminous Flux	2L2	6
2L3	8	—				10	lm
LMTPRW10A2X	2L4	10		—		12	lm
	2L5	12		—		14	lm
	2L6	14		—		16	lm
	Warm White Amber White	LMTPAW10A2X		Luminous Flux		2L1	4
2L2			6		—	8	lm
LMTPWW10A2X		2L3	8		—	10	lm
		2L4	10		—	12	lm
		2L5	12		—	14	lm

Measurement Tolerance: ± 10%

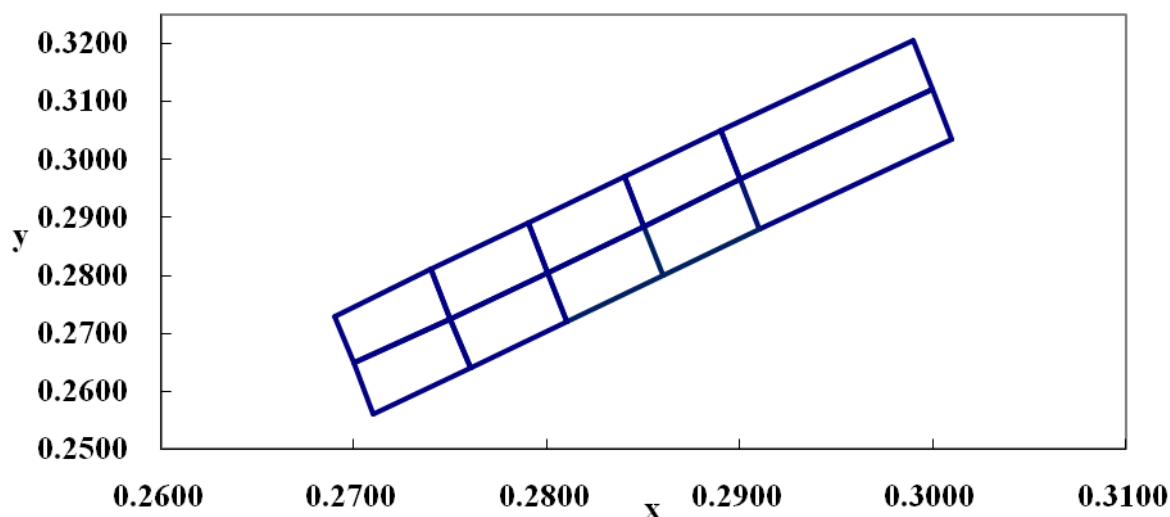
LUMIMICRO 3528 – Two Chip Specification

◆ White Color C.I.E Characteristics [Condition : 40mA – Ta = 25°C]

👁️ Bluish White Color C.I.E

14K0H		12K0H		11K0H		9K5H		8K3H	
X	Y	X	Y	X	Y	X	Y	X	Y
0.2700	0.2650	0.2750	0.2725	0.2800	0.2805	0.2850	0.2885	0.2900	0.2965
0.2690	0.2730	0.2740	0.2810	0.2790	0.2890	0.2840	0.2970	0.2890	0.3050
0.2740	0.2810	0.2790	0.2890	0.2840	0.2970	0.2890	0.3050	0.2990	0.3205
0.2750	0.2725	0.2800	0.2805	0.2850	0.2885	0.2900	0.2965	0.3000	0.3120
14K0L		12K0L		11K0L		9K5L		8K3L	
x	y	x	y	x	y	x	y	x	y
0.2710	0.2560	0.2760	0.2640	0.2810	0.2720	0.2860	0.2800	0.2910	0.2880
0.2700	0.2650	0.2750	0.2725	0.2800	0.2805	0.2850	0.2885	0.2900	0.2965
0.2750	0.2725	0.2800	0.2805	0.2850	0.2885	0.2900	0.2965	0.3000	0.3120
0.2760	0.2640	0.2810	0.2720	0.2860	0.2800	0.2910	0.2880	0.3010	0.3035

Lumimicro Ltd. Bluish White C.I.E Graph



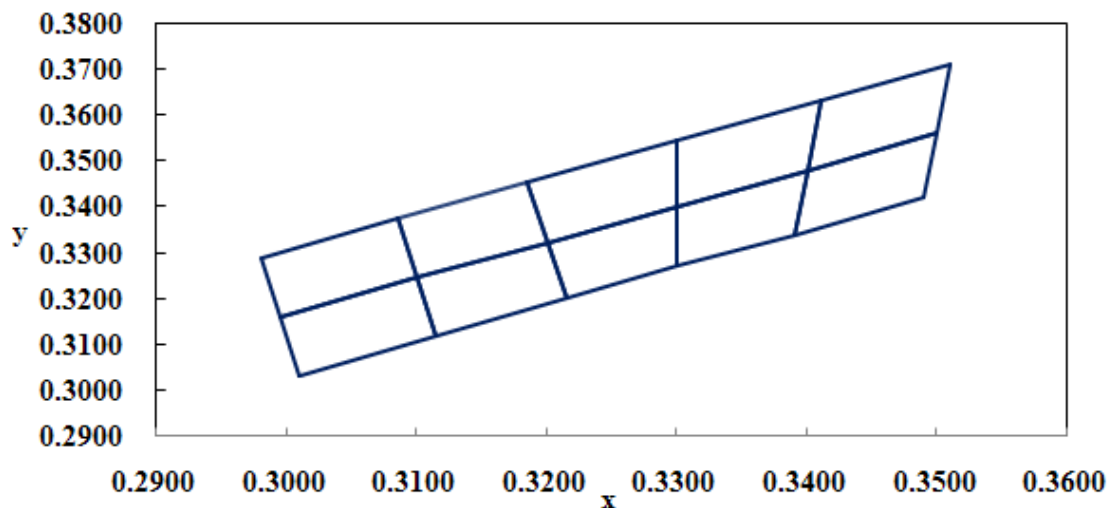
LUMIMICRO 5050 – Two Chip Specification

◆ White Color C.I.E Characteristics [Condition : 40mA – Ta = 25°C]

☞ Pure White Color C.I.E

7K0H		6K3H		5K7H		5K3H		5K0H	
x	y	x	y	x	y	x	y	x	y
0.2980	0.3290	0.3085	0.3375	0.3185	0.3455	0.3300	0.3545	0.3410	0.3630
0.3085	0.3375	0.3185	0.3455	0.3300	0.3545	0.3410	0.3630	0.3510	0.3710
0.3100	0.3245	0.3200	0.3320	0.3300	0.3400	0.3400	0.3480	0.3500	0.3560
0.2995	0.3160	0.3100	0.3245	0.3200	0.3320	0.3300	0.3400	0.3400	0.3480
7K0L		6K3L		5K7L		5K3L		5K0L	
x	y	x	y	x	y	x	y	x	y
0.2995	0.3160	0.3100	0.3245	0.3200	0.3320	0.3300	0.3400	0.3400	0.3480
0.3100	0.3245	0.3200	0.3320	0.3300	0.3400	0.3400	0.3480	0.3500	0.3560
0.3115	0.3120	0.3215	0.3200	0.3300	0.3270	0.3390	0.3340	0.3490	0.3420
0.3010	0.3030	0.3115	0.3120	0.3215	0.3200	0.3300	0.3270	0.3390	0.3340

Lumimicro Ltd. Pure White C.I.E Graph

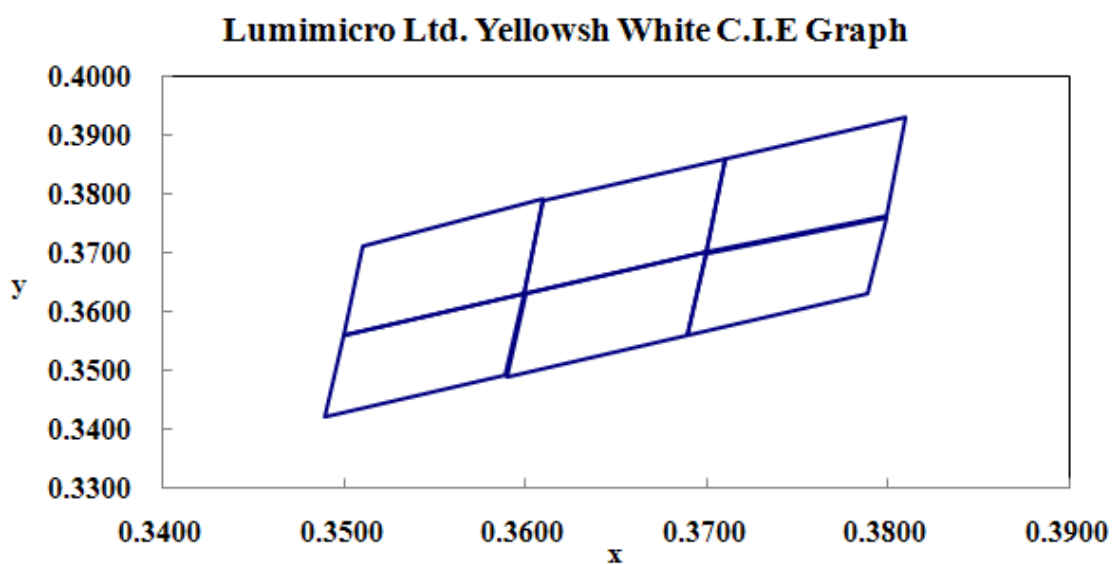


LUMIMICRO 5050 – Two Chip Specification

◆ White Color C.I.E Characteristics [Condition : 40mA – Ta = 25°C]

☞ Yellowish White Color C.I.E

4K7H		4K5H		4K0H	
x	y	x	y	x	y
0.3500	0.3560	0.3600	0.3630	0.3700	0.3700
0.3510	0.3710	0.3610	0.3790	0.3710	0.3860
0.3610	0.3790	0.3710	0.3860	0.3810	0.3930
0.3600	0.3630	0.3700	0.3700	0.3800	0.3760
4K7L		4K5L		4K0L	
x	y	x	y	x	y
0.3490	0.3420	0.3590	0.3490	0.3690	0.3560
0.3500	0.3560	0.3600	0.3630	0.3700	0.3700
0.3600	0.3630	0.3700	0.3700	0.3800	0.3760
0.3590	0.3490	0.3690	0.3560	0.3790	0.3630

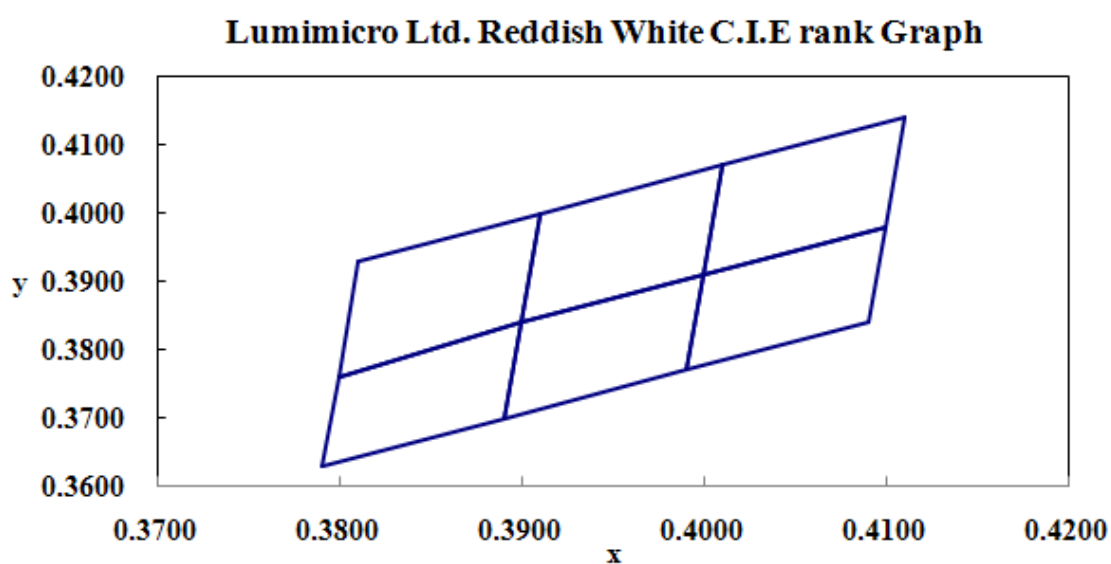


LUMIMICRO 5050 – Two Chip Specification

◆ White Color C.I.E Characteristics [Condition : 40mA – Ta = 25°C]

☞ Reddish White Color C.I.E

3K8H		3K6H		3K4H	
x	y	x	y	x	y
0.3800	0.3760	0.3900	0.3840	0.4000	0.3910
0.3810	0.3930	0.3910	0.4000	0.4010	0.4070
0.3910	0.4000	0.4010	0.4070	0.4110	0.4140
0.3900	0.3840	0.4000	0.3910	0.4100	0.3980
3K8L		3K6L		3K4L	
x	y	x	y	x	y
0.3790	0.3630	0.3890	0.3700	0.3990	0.3770
0.3800	0.3760	0.3900	0.3840	0.4000	0.3910
0.3900	0.3840	0.4000	0.3910	0.4100	0.3980
0.3890	0.3700	0.3990	0.3770	0.4090	0.3840

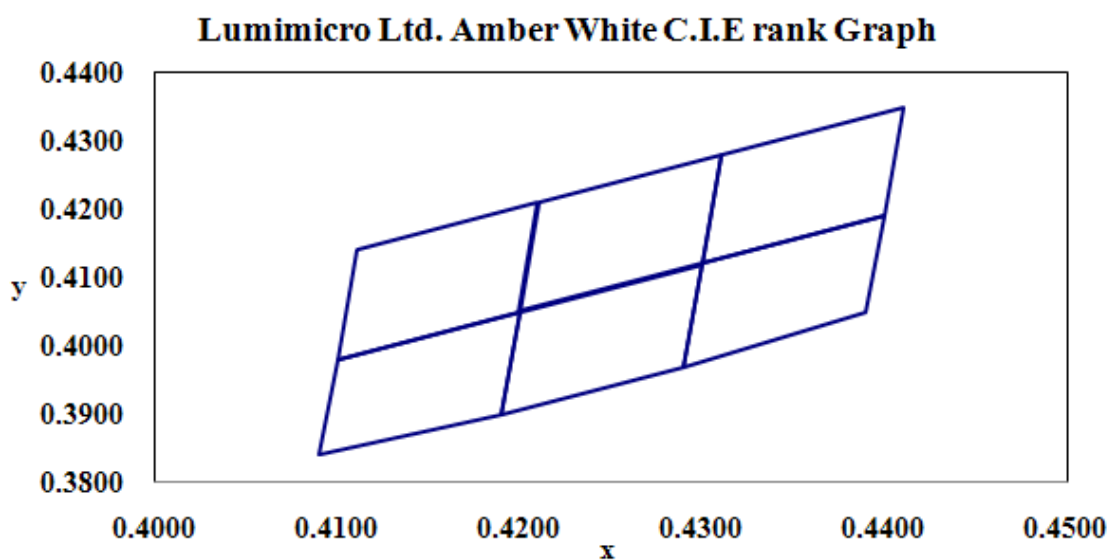


LUMIMICRO 5050 – Two Chip Specification

◆ White Color C.I.E Characteristics [Condition : 40mA – Ta = 25°C]

☞ Amber White Color C.I.E

3K2H		3K0H		2K9H	
x	y	x	y	x	y
0.4100	0.3980	0.4200	0.4050	0.4300	0.4120
0.4110	0.4140	0.4210	0.4210	0.4310	0.4280
0.4210	0.4210	0.4310	0.4280	0.4410	0.4350
0.4200	0.4050	0.4300	0.4120	0.4400	0.4190
3K2L		3K0L		2K9L	
x	y	x	y	x	y
0.4090	0.3840	0.4190	0.3900	0.4290	0.3970
0.4100	0.3980	0.4200	0.4050	0.4300	0.4120
0.4200	0.4050	0.4300	0.4120	0.4400	0.4190
0.4190	0.3900	0.4290	0.3970	0.4390	0.4050

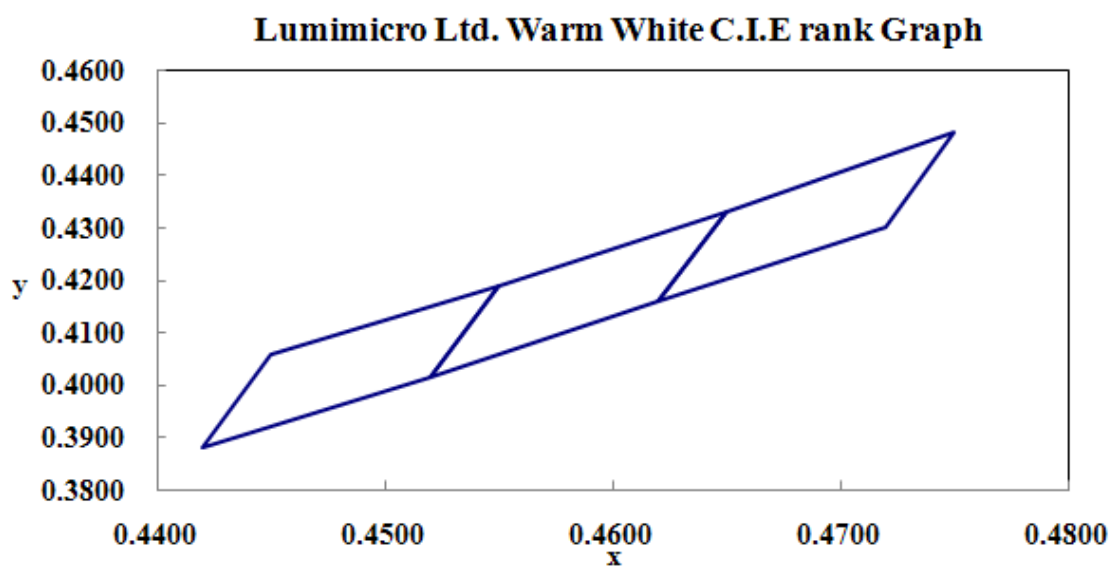


LUMIMICRO 5050 – Two Chip Specification

◆ White Color C.I.E Characteristics [Condition : 40mA – Ta = 25°C]

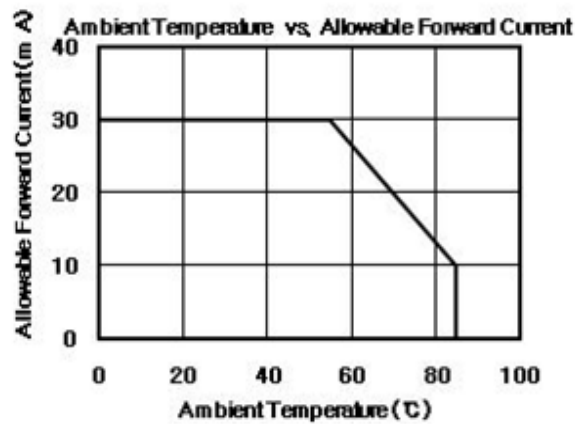
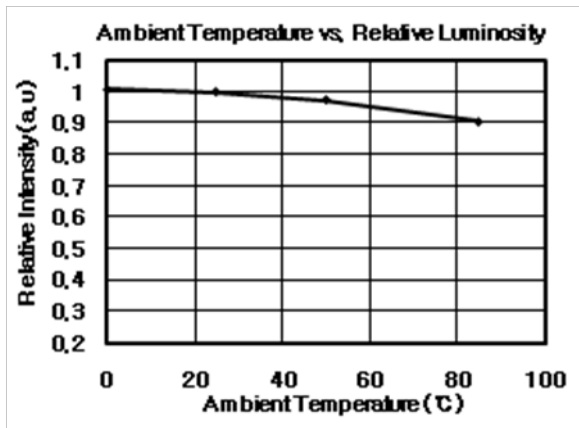
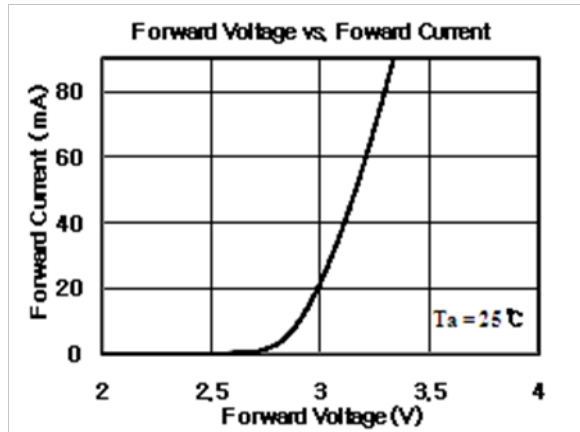
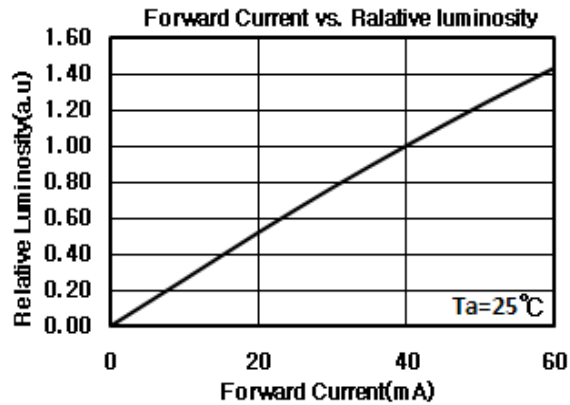
☞ Warm White Color C.I.E

2K8		2K7		2K6	
X	Y	X	Y	X	Y
0.4420	0.3880	0.4520	0.4015	0.4620	0.4160
0.4450	0.4060	0.4550	0.4190	0.4650	0.4330
0.4550	0.4190	0.4650	0.4330	0.4750	0.4480
0.4520	0.4015	0.4620	0.4160	0.4720	0.4300



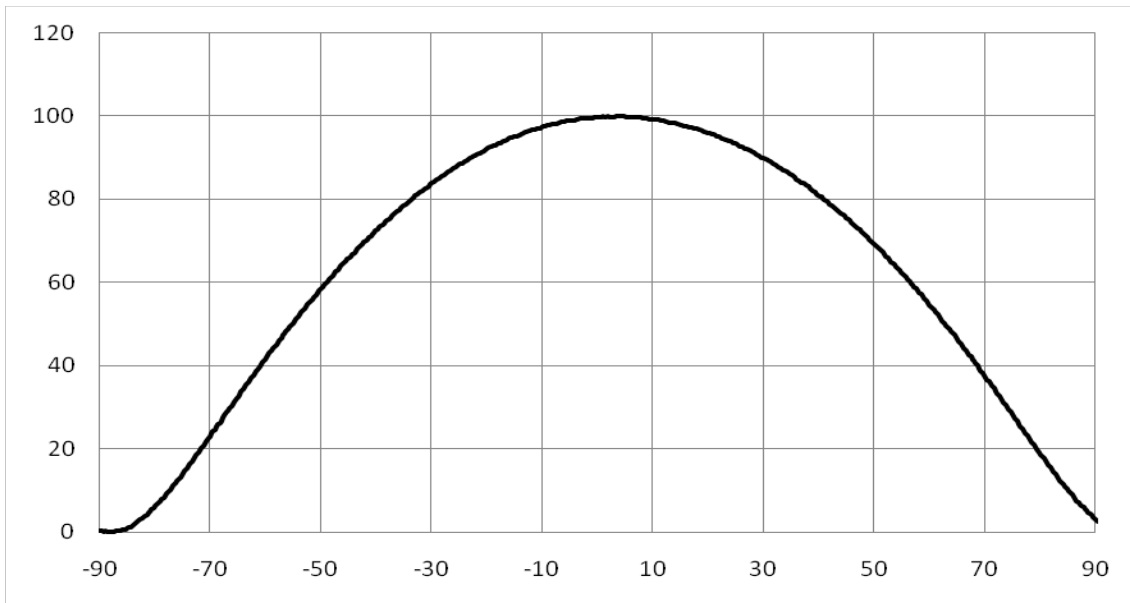
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◆ Electrical & Optical Characteristics

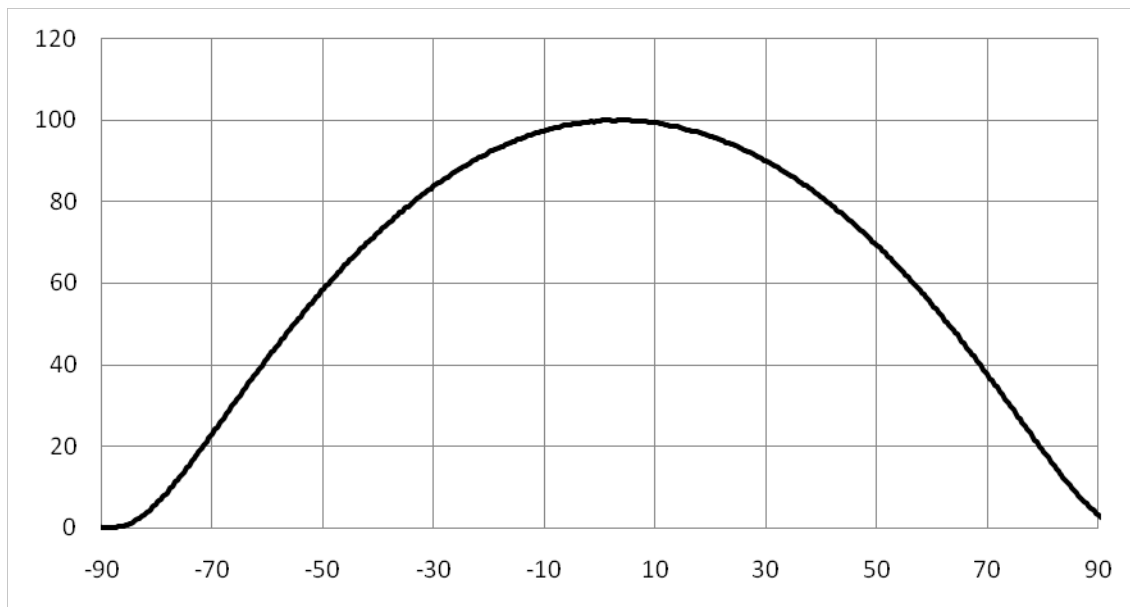


◆ Directivity

X-Direction



Y-Direction



LUMIMICRO 3528 – Two Chip Specification

◆ Reliability Results

	ITEMS	CONDITION	NOTE	Fail /Sample
1	RESISTANCE TO SOLDERING HEAT (REFLOW SOLDERING)	TSID=260℃, 10sec (PRE TREATMENT 30℃, 70%, 168hr)	2TIMES	0/30
2	THERMAL SHOCK	-20℃ ~ 100℃, 15min AT EACH TEMP.	100CYCLES	0/30
3	MOISTURE RESISTANCE CYCLE	25℃ ~ 65℃ ~ -10℃, 90%RH 24hr/ 1cycle	500HRS	0/30
4	HIGH TEMPERATURE STORAGE	Ta = 100℃	500HRS	0/30
5	TEMPERATURE HUMIDITY STORAGE	Ta = 60℃ , RH = 90%	1,000HRS	0/30
6	LOW TEMPERATURE STORAGE	Ta = -40℃	1,000HRS	0/30
7	ROOM TEMPERATURE LIFE TEST	Ta = 25℃, IF=20mA/chip each*	1,000HRS	0/30
8	HIGH TEMPERATURE HUMIDITY LIFE TEST	60℃, RH=90%, IF=15mA/chip each*	500HRS	0/30
9	LOW TEMPERATURE LIFE TEST	Ta = -40℃, IF=20mA/chip each*	1,000HRS	0/30
10	HIGH TEMPERATURE LIFE TEST	Ta = 85℃, IF=20mA/chip each*	500HRS	0/30

*) ; Tested with LUMIMICRO standard circuit board

◆ Failure Criteria

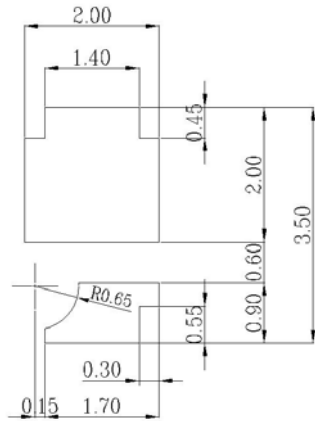
ITEM	SYMBOL	Failure Criteria	
		MIN	MAX
Forward Voltage	VF	-	U.S.L*)×1.1
C.I.E. x, y	x, y	L.S.L*)×0.8	U.S.L*)×1.2
Luminous Intensity	IV	L.S.L*)×0.7	-

U.S.L*) ; Upper Standard Level

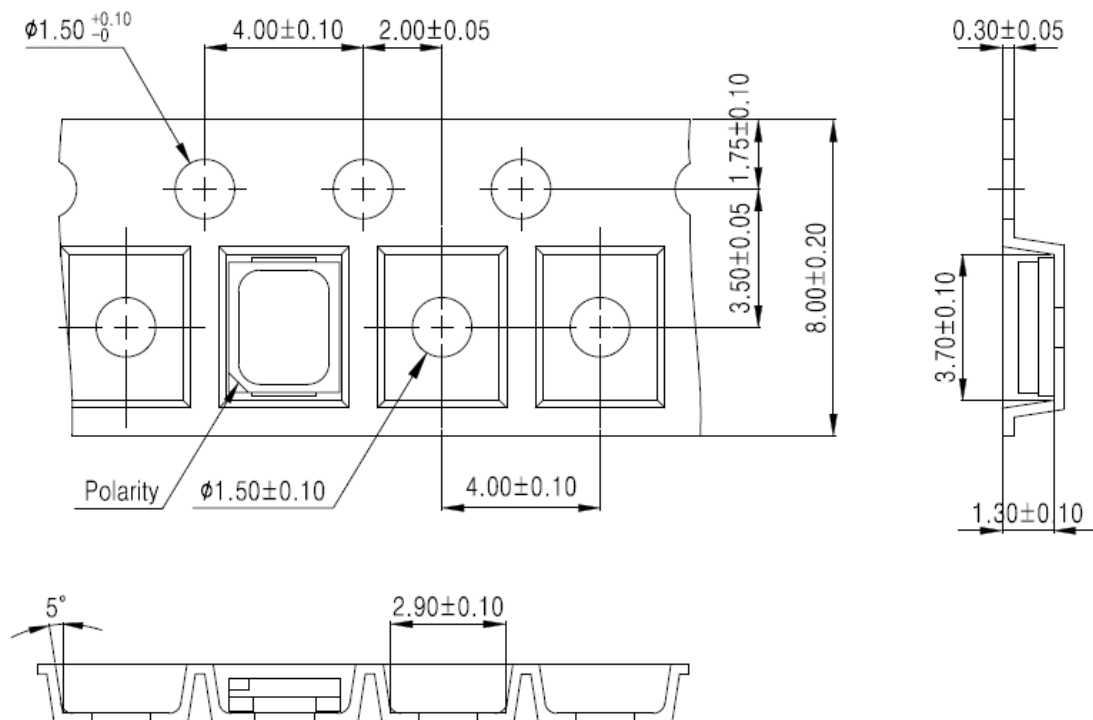
L.S.L*) ; Lower Standard Level

LUMIMICRO 3528 – Two Chip Specification

◆ Recommended Pad Pattern



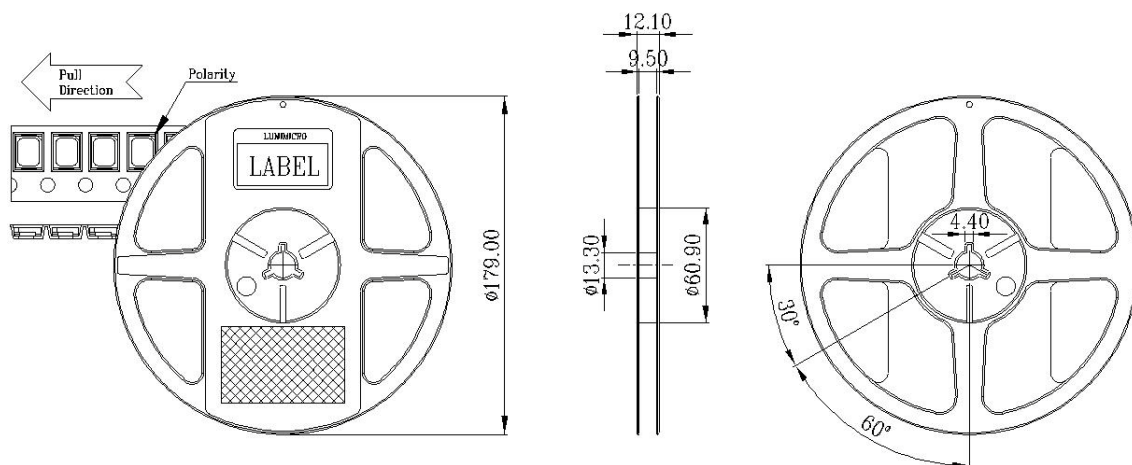
◆ Taping pocket Dimension



*Unit: mm

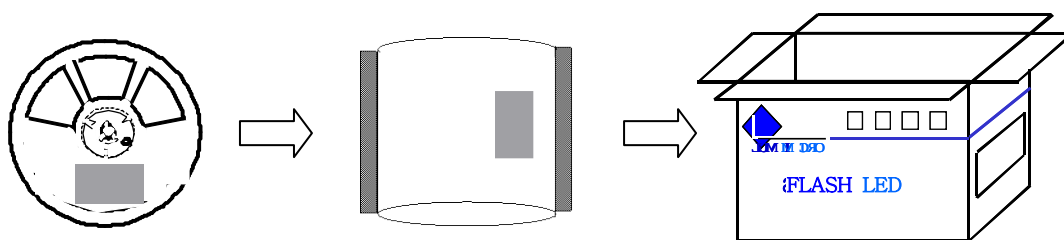
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◆ Reel Dimensions



One Reel	Unit	Tolerance
Max 1,500EA	mm	0.1

◆ Packing Spec



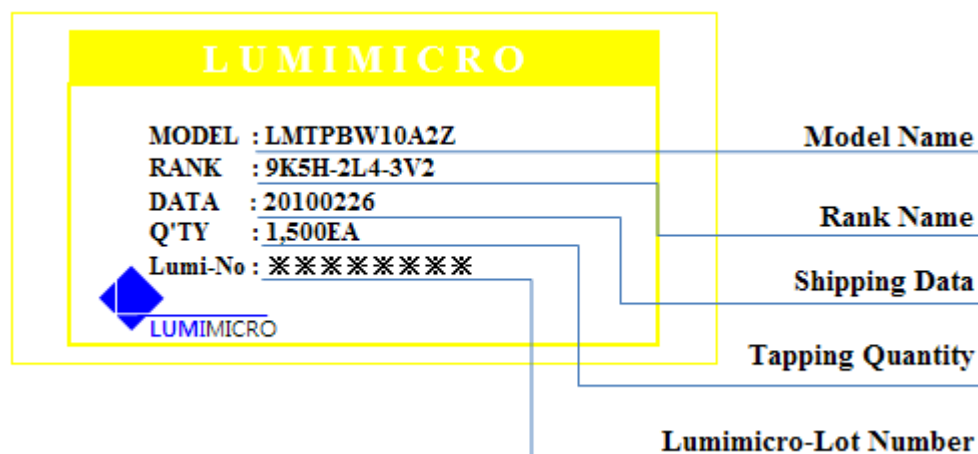
- Aluminum Bag

	Reel in a Bag	Silica in a Bag	Goods QNT in a Bag
Aluminum Bag	1 Reel	1 Silica, 1 Indicator	Max : 1,500ea

- Box Spec.

	Dimensions(Width/Thickness) Unit : mm	Reels in Box	Goods in QNT in Box
In Box	270/ 270/ 190	10	Max : 15,000ea
	Dimensions(Width/Thickness) Unit : mm	InBox in OutBox	Goods in QNT in Box
Out Box	562/ 285/ 402	4	Max : 60,000ea

◆ Label Spec



◆ Precautions For Use

This device should not be used in any type of fluid such as water, oil, organic solvent, etc.

When washing is required, IPA should be used.

When the LEDs are illuminating, operating current should be decided after considering the ambient maximum temperature.

LEDs must be stored to maintain a clean atmosphere. If the LEDs are stored for 3 months or more after being shipped from LUMIMICRO, sealed container with a nitrogen atmosphere should be used for storage.

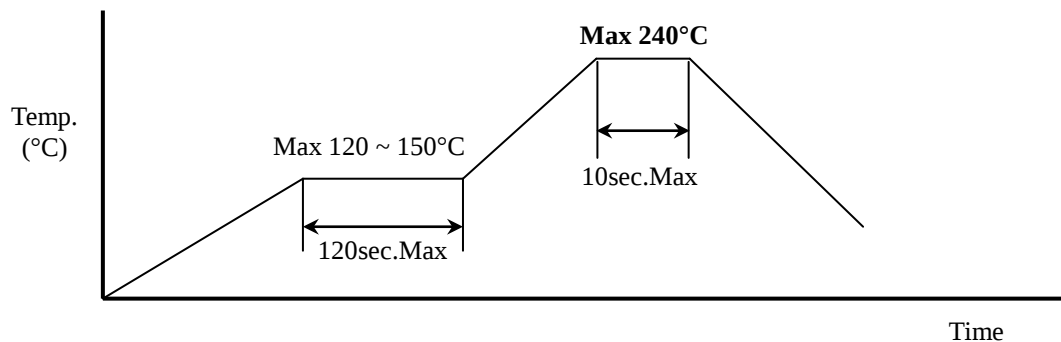
The LEDs must be dip soldered within seven days after opening the moisture-proof packing. Repack unused Products with anti-moisture packing, fold to close any opening and then store in dry place. The appearance and specifications of the product may be modified for improvement without notice. These LEDs are sensitive to the static electricity and surge. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs. If Over voltage which exceeds the absolute maximum rating is applied to LEDs, it will cause damage in LEDs and result in destruction. Damaged LEDs will show some unusual characteristics such as remarkably increased leak current, turn-on voltage becomes lower and the LEDs get unlighted at low current.

◆ Soldering Condition

1. Reflow Conditions (With Pb)

Preliminary heating to be at 150°C max. for 2 minutes max.

Soldering heat to be at 240°C max. for 10 seconds max.

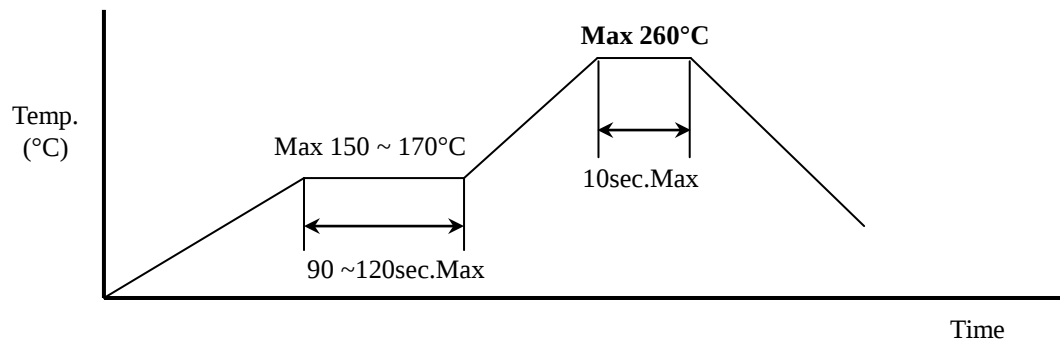


Recommended Solder Paste : Alloy- 63Sn/37Pb Model: OL107B,

2. Pb free Reflow Conditions

Preliminary heating to be at 150°C max. for 2 minutes max.

Soldering heat to be at 260°C max. for 10 seconds max.



Recommended Pb free Paste Alloy: 96.5Sn/3Ag/0.5Cu. - Model: OL204

3. For Manual Soldering

Not more than 5seconds @MAX340°C, under soldering iron.

◆ Test Certification



CTK Co., Ltd.

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Tel: +82-31-339-9970 Fax: +82-31-339-9855
www.e-ctk.com

Test Report

Applicant Name: LUMIMICRO
Address: 2F 685, Buk-ri, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea

Test Report No.: CTK0911-RS-000406
Date of Issue: Nov. 17, 2009

Sample Name: LED (3228, 3528 SIZE)

Receipt Date: Nov. 04, 2009
Test Performing Date: Nov. 17, 2009

Test Performed: CTK Co., Ltd. tested the sample and item(s) which were selected by applicant with following result

Test Results: Refer to following page.

Tested by Jae Won Park, Assistant Manager
Dae Soon Kim

CTK Co., Ltd.

A handwritten signature in black ink, appearing to read 'Yongjun Jo'.

Yongjun Jo / Lab. Manager

Test Report No : CTK0911-RS-000406
Date : 11. 17. 2009

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Report Form No : CTK-RF-RS-002 (Rev. 04)

LUMIMICRO 3528 - Two Chip Specification

◆ Test Certification

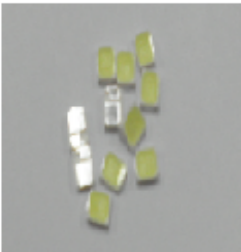


CTK Co., Ltd.

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Tel: +82-31-339-9970 Fax: +82-31-339-9855
www.e-ctk.com

1. TEST RESULTS

1) LED (3228, 3528 SIZE)

SVHC					
Test Items	Unit	Test Results	MDL	Test Methods	
Cobalt dichloride (Co) ¹⁾ (CAS No.: 007646-79-9)	mg/kg	N.D	5.0	US EPA 3052_ ICP-OES	
Diarsenic pentaoxide (As) ²⁾ (CAS No.: 001303-28-2)		N.D	10.0	US EPA 3052_ ICP-OES	
Diarsenic trioxide (As) ²⁾ (CAS No.: 001327-53-3)		N.D			
Triethyl arsenate (As) ²⁾ (CAS No.: 015606-95-8)		N.D			
lead hydrogen arsenate (Pb) ²⁾ (CAS No.: 007784-40-9)		N.D	5.0	US EPA 3052_ ICP-OES	
Sodium dichromate, dihydrate ²⁾ (CAS No.: 007789-12-0)		N.D	0.5	ISO 3813_ UV-Vis	
Anthracene (CAS No.: 000120-12-7)	mg/kg	N.D	0.2	ZEK01.2-08_GC/MS	
4,4'-Diaminodiphenylmethane (CAS No.:000101-77-9)	mg/kg	N.D	5.0	KS K 0147 : 1999_GC/MS	
Dibutyl phthalate (DBP) (CAS No.:000084-74-2)	mg/kg	N.D	5.0	KS M 1991_GC/MS	
Bis (2-ethyl(hexyl)phthalate) (DEHP) (CAS No.:000117-81-7)	mg/kg	N.D			
Benzyl butyl phthalate (BBP) (CAS No.:000085-88-7)	mg/kg	N.D			
5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene) (CAS No.:000081-15-2)	mg/kg	N.D	10.0	US EPA 3550C_GC/MS	
Hexabromocyclododecane (HBCDD) (CAS No.:025637-99-4)	mg/kg	N.D	5.0	US EPA 3540C_GC/MS	
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.:085535-84-8)	mg/kg	N.D	50	US EPA 3540C _GC/MS	
Bis (tributyltin)oxide ³⁾ (CAS No.:000056-35-9)	mg/kg	N.D	50	US EPA 3052_ICP-OES	

* MDL : Method Detection Limit , N.D : Not Detected

¹⁾ Calculated concentration of cobalt dichloride is based on the identified heavy metal and anion result.

²⁾ Calculated concentration of diarsenic pentaoxide, diarsenic trioxide, triethyl arsenate, lead hydrogen arsenate and sodium dichromate are based on the identified heavy metal result.

³⁾ Calculated concentration of Bis (tributyltin)oxide ³⁾ are based on the identified heavy metal result.

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◆ Test Certification



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- LED (3228, 3528 SIZE)

Halogen Contents				
Test Items	Unit	Test Results	MDL	Test Methods
Fluorine (F)	mg/kg	N.A	50	EN 14582_IC
Chlorine (Cl)		N.D	50	EN 14582_IC
Bromine (Br)		N.D	50	EN 14582_IC
Iodine (I)		N.A	50	EN 14582_IC

Test Items	Unit	Test Results	MDL	Test Methods
Perfluorooctyl acid (PFOA) [CAS No.: 335-87-1]	mg/kg	N.A	-	-
Perfluorooctanesulfonate (PFOS) [CAS No.: 1763-23-1]		N.D	1.0	In-House method _LC/MS/MS

* MDL : Method Detection Limit , N.D : Not Detected, N.A : Not Applicable