

2PIN-SMD LED

WHITE COLOR LED

PRELIMINARY

Customer Approval		Model	LMFLC4500ZWH					
<table border="1"><tr><td>Checked By</td><td>Approved By</td></tr><tr><td> </td><td> </td></tr></table>		Checked By	Approved By	 	 	Issued Date		
		Checked By	Approved By					
		Description	SMD Type LED					
Written By	Checked By	Approved by						

Contact Point

Tel: 82-31-213-9200

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Homepage: www.lumimicro.com

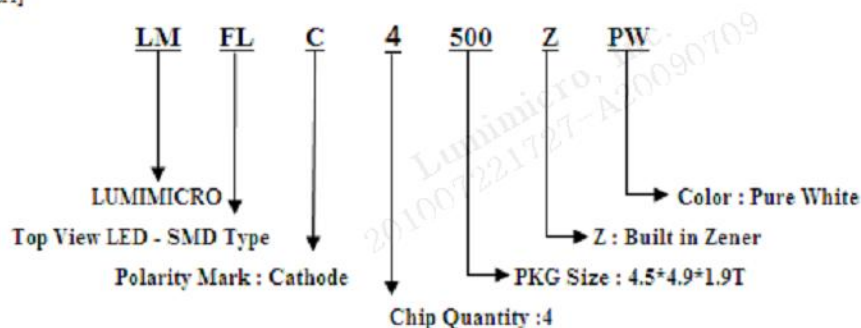


◆ LUMIMICRO Top View LED P/N

LUMIMICRO Top View LED Part No. Explanation

LM	: LUMIMICRO. Ltd					
FL	: Top View LED - SMD Type					
C	: Polarity Mark (C : Cathode / A : Anode)					
4	: Chip Quantity(One chip[1], Two chip[2], Three Chip[3], Four chip[4])					
500	: Package Size (4.5*4.9*1.9T)					
Z	: Built in Zener (X : NO ZENER / Z : ZENER)					
WH	: White Color					
	BW	PW	YW	RW	AW	WW
	Bluish White	Pure White	Yellow White	Reddish White	Amber white	Warm White

[EX]

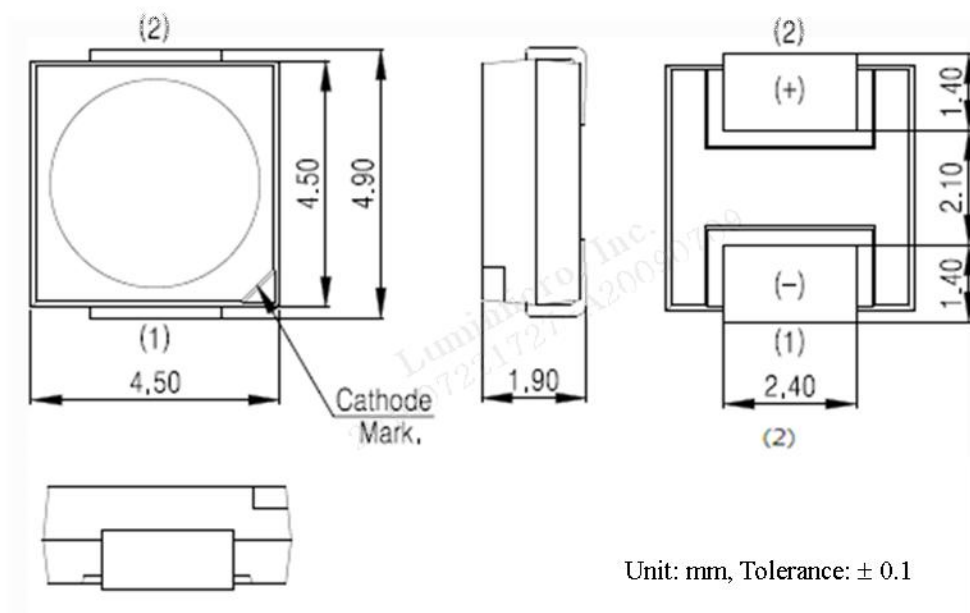


LUMIMICRO 4549 – Four Chip Specification

◆ Features

- [1] Built-in 4 chip Super-luminosity Chip LED
- [2] Super-luminosity chip LED
- [3] Wide viewing angle
- [4] External dimensions: 4.5 x 4.9 x 1.9t mm
- [5] Lead frame package with individual 2 pin

◆ Outline Dimensions



◆ LED Circuit Diagram



LUMIMICRO 4549 – Four Chip Specification

◆ Absolute Maximum Rating

Parameter	Color	Symbol	Rating Value	Unit
Forward DC Current	White	IF-1	120	mA
Power Dissipation	White	PD	400	mW
Forward Pulse Current ^{*1}	White	IPF-1	240	mA
Reverse Voltage	White	VF	5	V
ESD Voltage	White	ESD-1	HBM 12,000	V
Storage Temperature	White	TST	-40 to + 120	°C
Operating Temperature	White	TOT	-30 to + 85	°C
Soldering Temperature	White	TSD	260°C for 10 Seconds	°C

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

◆ Forward Voltage Characteristics [Condition : 80mA – Ta = 25°C]

Color	Item	Rank	Luminous Intensity			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 4549 – Four Chip Specification

◆ Peak Luminous Intensity Characteristics [Condition : 80mA – Ta = 25°C]

Color	Part No.	Item	Rank	Luminous Intensity			Unit
				MIN.	TYP.	MAX.	
Bluish White	LMFLC4500ZBW	Luminous Intensity	4L3	6	—	7	cd
			4L4	7	—	8	cd
			4L5	8	—	9	cd
			4L6	9	—	10	cd
			4L7	10	—	11	cd
			4L8	11	—	12	cd
			4L9	12	—	13	cd
Pure White	LMFLC4500ZPW	Luminous Intensity	4L4	7	—	8	cd
			4L5	8	—	9	cd
			4L6	9	—	10	cd
			4L7	10	—	11	cd
			4L8	11	—	12	cd
			4L9	12	—	13	cd
			4LA	13	—	14	cd
Yellowish White Reddish White	LMFLC4500ZYW	Luminous Intensity	4L4	7	—	8	cd
			4L5	8	—	9	cd
			4L6	9	—	10	cd
	LMFLC4500ZRW		4L7	10	—	11	cd
			4L8	11	—	12	cd
			4L9	12	—	13	cd
			4LA	13	—	14	cd
Amber White Warm White	LMFLC4500ZAW	Luminous Intensity	4L3	6	—	7	cd
			4L4	7	—	8	cd
			4L5	8	—	9	cd
	LMFLC4500ZWW		4L6	9	—	10	cd
			4L7	10	—	11	cd
			4L8	11	—	12	cd
			4L9	12	—	13	cd

Measurement Tolerance: ± 10%

LUMIMICRO 4549 – Four Chip Specification

◆ Peak Luminous Intensity Characteristics [Condition : 80mA – Ta = 25°C]

Color	Part No.	Item	Rank	Luminous Intensity			Unit
				MIN.	TYP.	MAX.	
Bluish White	LMFLC4500ZBW	Luminous Flux	4L3	12			lm
			4L4	14			lm
			4L5	16			lm
			4L6	18			lm
			4L7	20			lm
			4L8	22			lm
			4L9	24			lm
Pure White	LMFLC4500ZPW	Luminous Flux	4L4	14			lm
			4L5	16			lm
			4L6	18			lm
			4L7	20			lm
			4L8	22			lm
			4L9	24			lm
			4LA	26			lm
Yellowish White Reddish White	LMFLC4500ZYW LMFLC4500ZRW	Luminous Flux	4L4	14			lm
			4L5	16			lm
			4L6	18			lm
			4L7	20			lm
			4L8	22			lm
			4L9	24			lm
			4LA	26			lm
Amber White Warm White	LMFLC4500ZAW LMFLC4500ZWW	Luminous Flux	4L3	12			lm
			4L4	14			lm
			4L5	16			lm
			4L6	18			lm
			4L7	20			lm
			4L8	22			lm
			4L9	24			lm

Measurement Tolerance: ± 10%

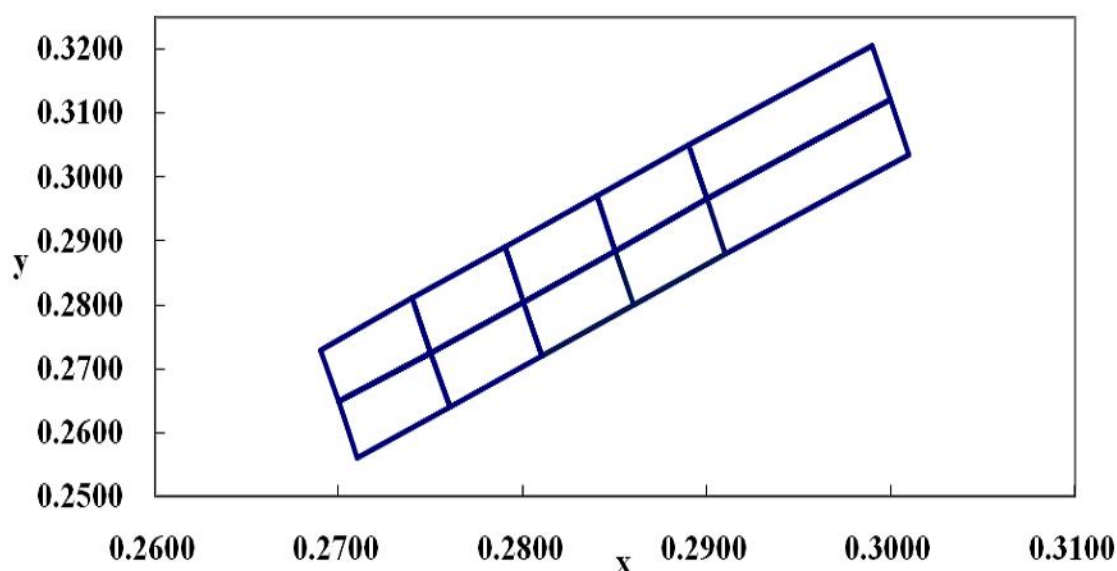
LUMIMICRO 4549 – Four Chip Specification

◆ White Color C.I.E. Characteristics [Condition : 80mA – 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

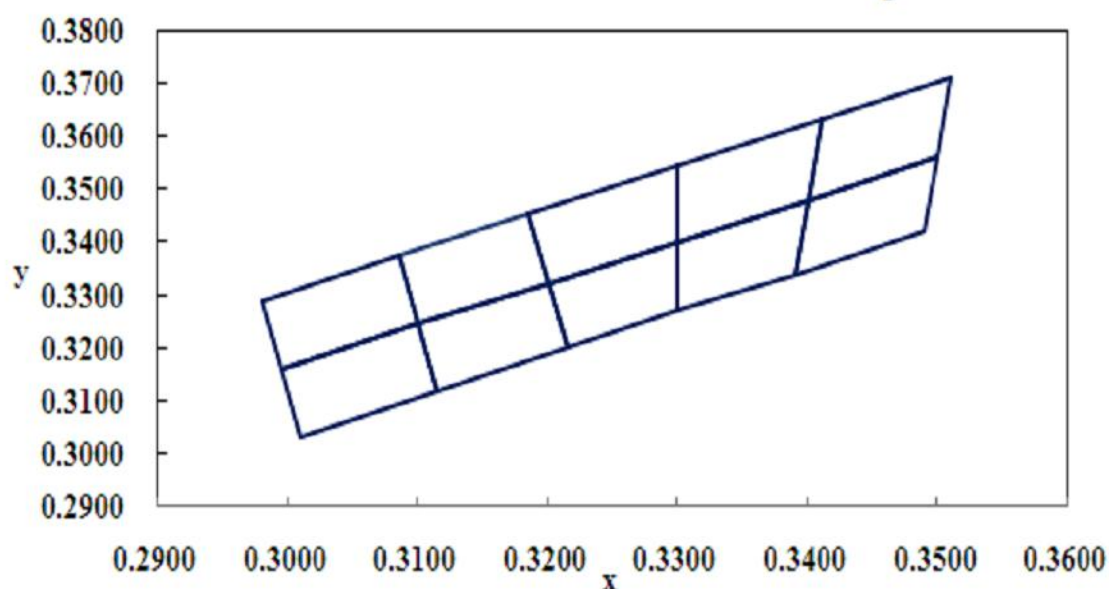


◆ White Color C.I.E. Characteristics [Condition : 80mA – Ta = 25°C]

☞ 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



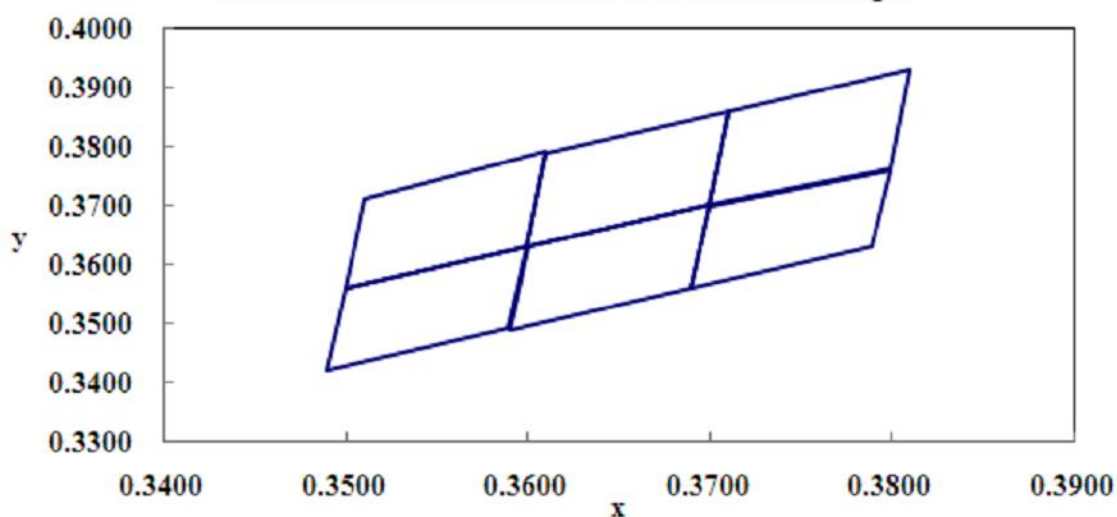
LUMIMICRO 4549 – Four Chip Specification

◆ White Color C.I.E. Characteristics [Condition : 80mA – 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 Ltd. Yellowsh White C.I.E Graph



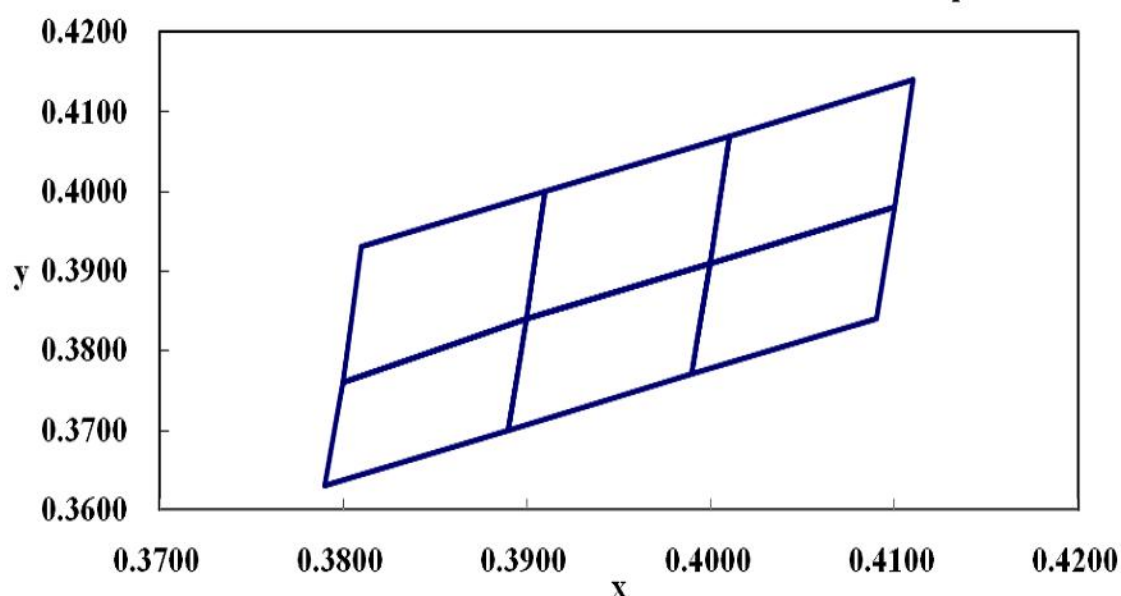
LUMIMICRO 4549 – Four Chip Specification

◆ White Color C.I.E. Characteristics [Condition : 80mA – 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	0.41110	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 Ltd. Reddish White C.I.E rank Graph



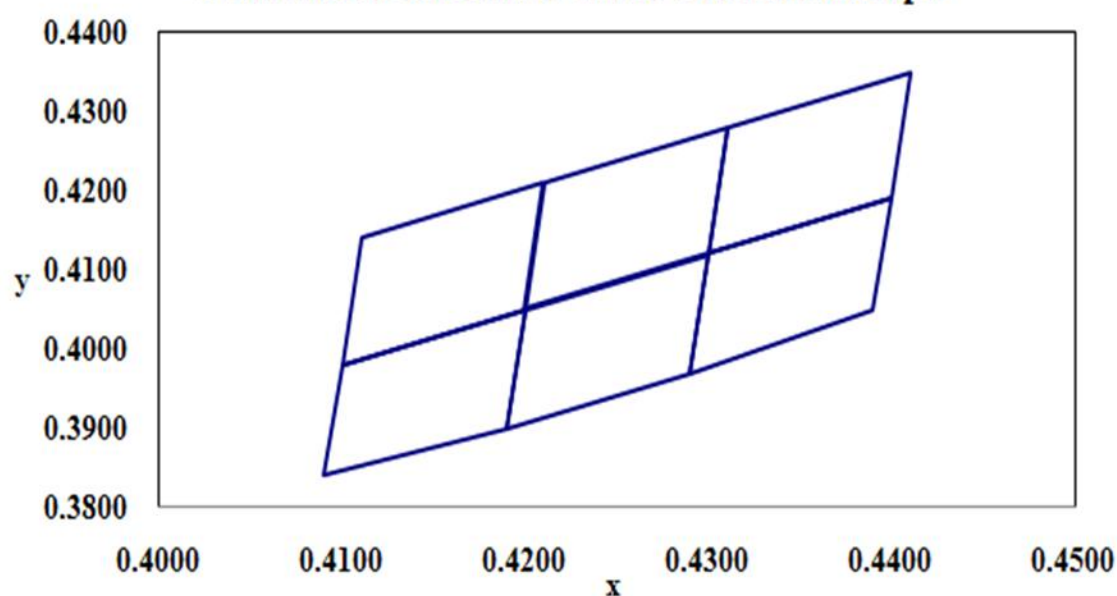
LUMIMICRO 4549 – Four Chip Specification

◆ White Color C.I.E. Characteristics [Condition : 80mA – 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 Ltd. Amber White C.I.E rank Graph

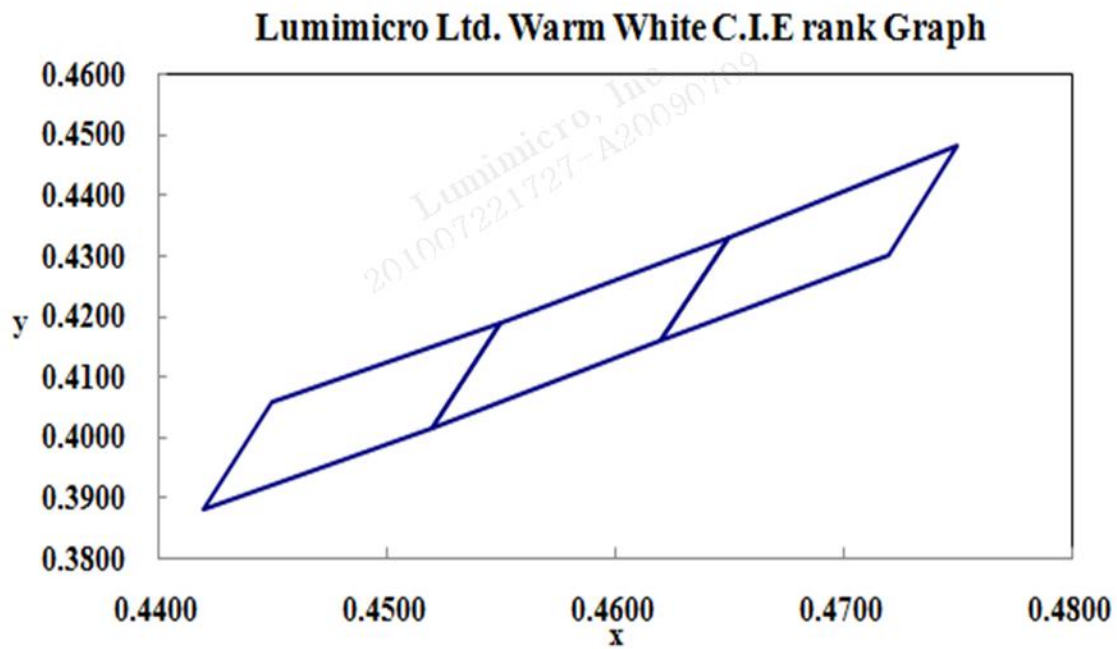


LUMIMICRO 4549 – Four Chip Specification

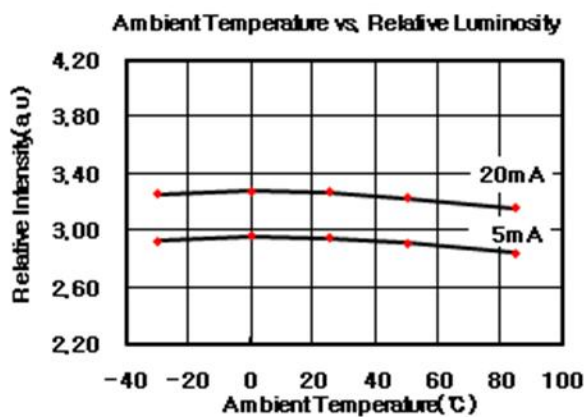
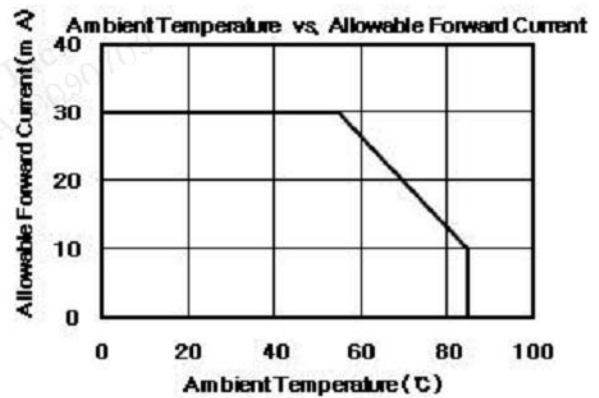
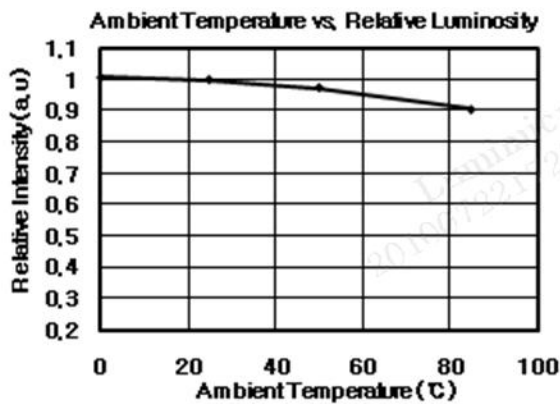
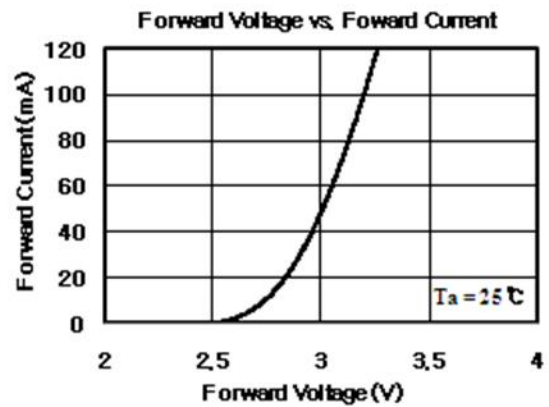
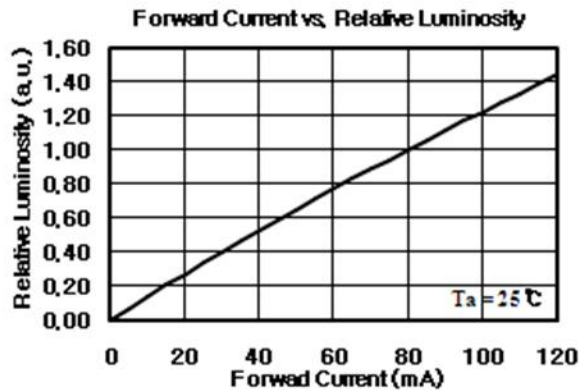
◆ White Color C.I.E. Characteristics [Condition : 80mA – Ta = 25°C]

☞ Warm White Color C.I.E.

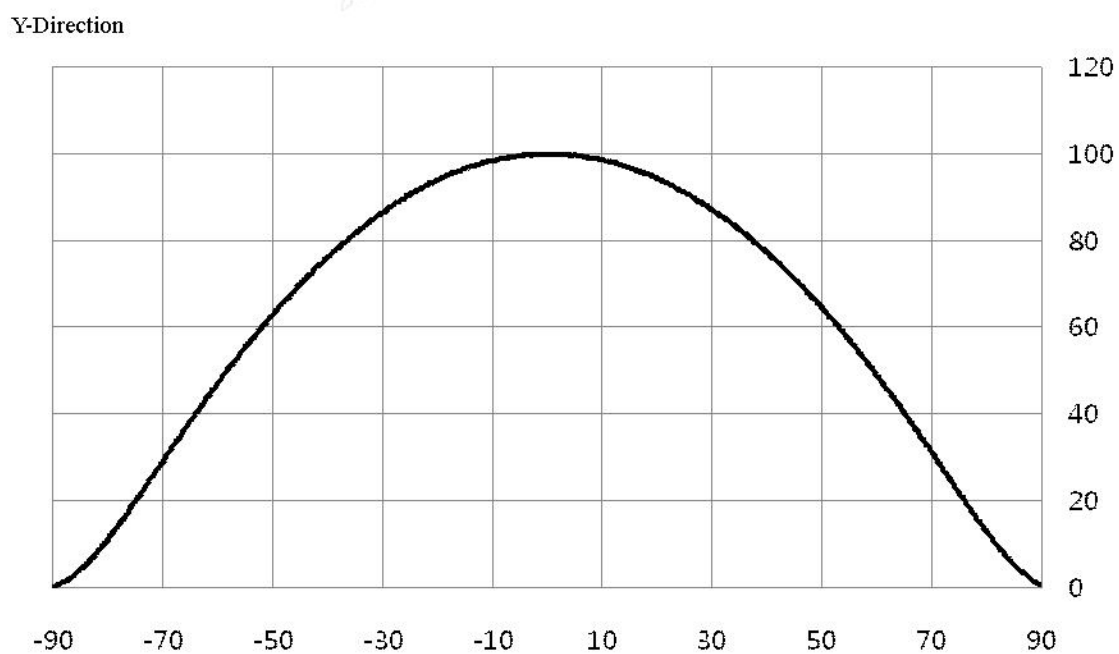
2K8H		2K7H		2K6H	
x	y	x	y	x	y
0.4420	0.3880	0.4520	0.4015	0.4620	0.4160
0.4450	0.4060	0.4550	0.4190	0.4650	0.4330
0.4550	0.4190	0.4650	0.4330	0.4750	0.4480
0.4520	0.4015	0.4620	0.4160	0.4720	0.4300



◆ Electrical & Optical Characteristics



◆ Directivity



Lumimicro 5050 – Three 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

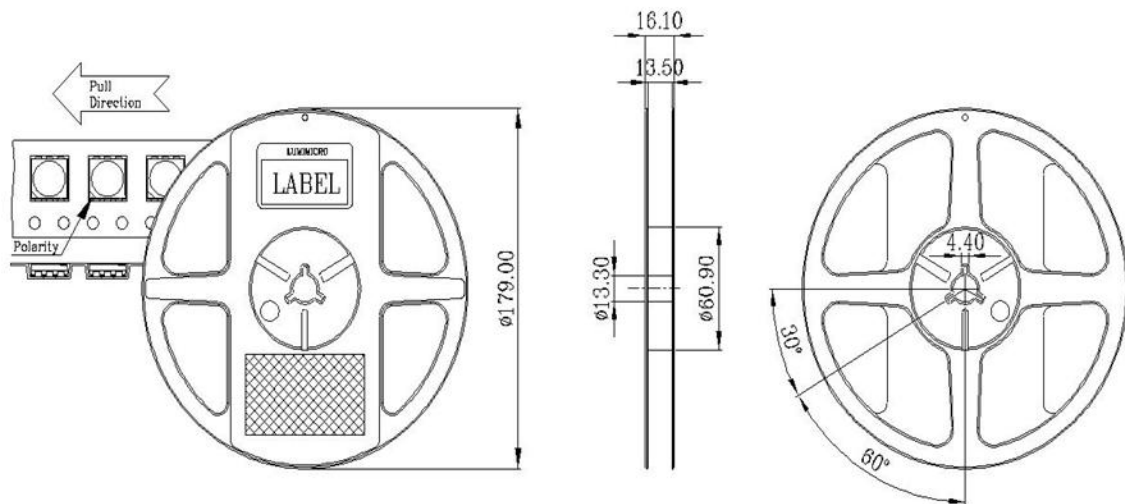
ITEM	SYMBOL	Failure Criteria	
		MIN	MAX
Forward Voltage	VF	-	U.S.L*)×1.1
C.I.E. x, y	x, y	L.S.L*)×0.8	U.S.L*)×1.2
Luminous Intensity	IV	L.S.L*)×0.7	-

U.S.L*) ; Upper Standard Level

L.S.L*) ; Lower Standard Level

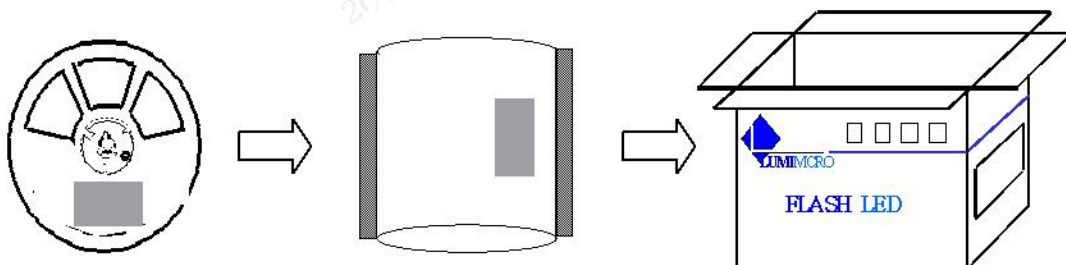
LUMIMICRO 4549 – Four Chip Specification

◆ Reel Dimensions



One Reel	Unit	Tolerance
Max 750EA	mm	0.1

◆ Packing Spec



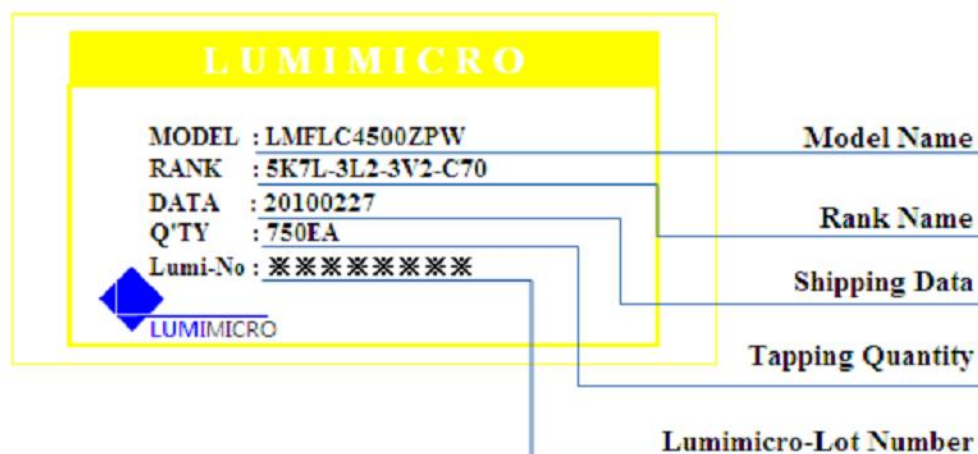
- Aluminum Bag

	Reel in a Bag	Silica in a Bag	Goods QNT in a Bag
Aluminum Bag	1 Reel	1 Silica, 1 Indicator	Max : 750ea

- Box Spec.

	Dimensions(Width/Thickness) Unit : mm	Reels in Box	Goods in QNT in Box
Box	275/ 285/ 200	10	Max : 7,500ea

◆ 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.

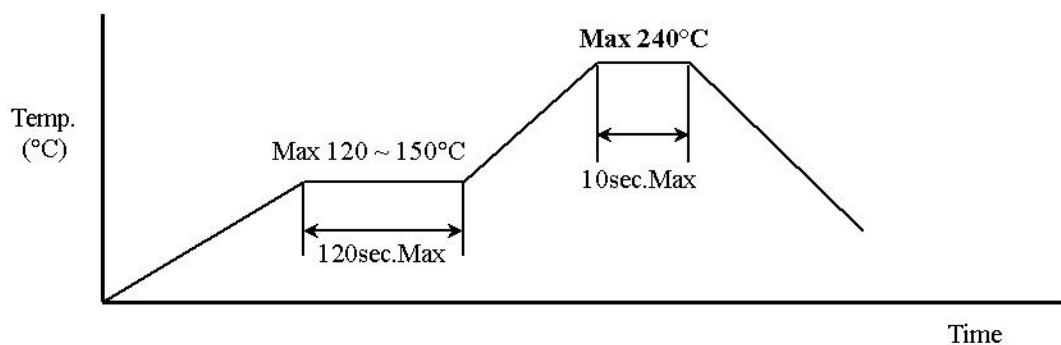
The LEDs must be dip soldered within seven days after opening the moisture-proof packing. Repack unused Products with anti-moisture packing, fold to close any opening and then store in dry place. The appearance and specifications of the product may be modified for improvement without notice. These LEDs 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.

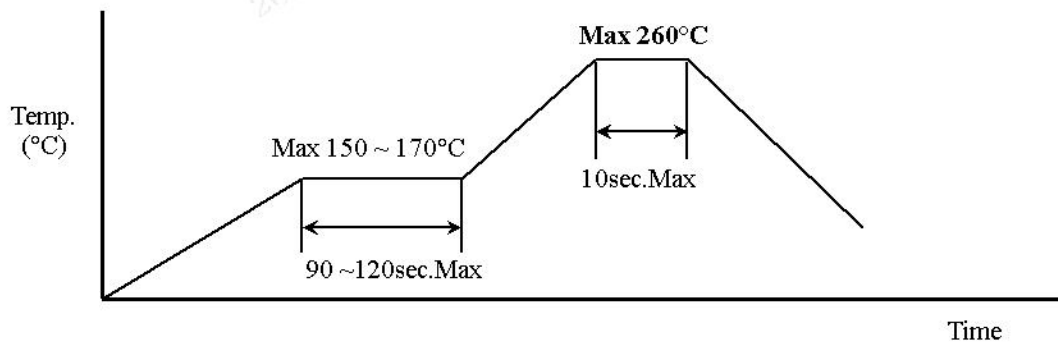


Recommended Solder Paste : Alloy- 63Sn/37Pb Model: OL107B,

2. Pb free Reflow Conditions

Preliminary heating to be at 170°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 @MAX300°C, under soldering iron.

◆ Test Certification



CTK Co., Ltd.
386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-100
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-000407
Date of Issue: Nov. 17, 2009

Sample Name: FRESH TYPE LED (4549 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.


Yongjun Jo / Lab. Manager

Test Report No : CTK0911-RS-000407
Date : 11. 17. 2009

page 1 of 3

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

◆ Test Certification



CTK Co., Ltd.
 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-100
 Tel: +82-31-339-9970 Fax: +82-31-339-9855
 www.e-ctk.com

1. TEST RESULTS

1) FRESH TYPE LED (4549 SIZE)

Heavy Metals					
Test Items	Unit	Test Results	MDL	Test Methods	
Pb	mg/kg	N.D	5.0	IEC 62321_ AAS	
Cd		N.D	0.5	IEC 62321_ ICP-OES	
Hg		N.D	1.0		
Cr ⁶⁺		N.D	0.2	IEC 62321_ UV/Vis Spectrometer	
Flame Retardants					
Test Items		Unit	Test Results	MDL	Test Methods
PBB _s	Bromobiphenyl	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromobiphenyl		N.D	20.0	
	Tribromobiphenyl		N.D	20.0	
	Tetrabromobiphenyl		N.D	20.0	
	Pentabromobiphenyl		N.D	20.0	
	Hexabromobiphenyl		N.D	20.0	
	Heptabromobiphenyl		N.D	20.0	
	Octabromobiphenyl		N.D	20.0	
	Nonabromobiphenyl		N.D	20.0	
	Decabromobiphenyl		N.D	50.0	
PBDE _s	Bromodiphenyl ether	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromodiphenyl ether		N.D	20.0	
	Tribromodiphenyl ether		N.D	20.0	
	Tetrabromodiphenyl ether		N.D	20.0	
	Pentabromodiphenyl ether		N.D	20.0	
	Hexabromodiphenyl ether		N.D	20.0	
	Heptabromodiphenyl ether		N.D	20.0	
	Octabromodiphenyl ether		N.D	20.0	
	Nonabromodiphenyl ether		N.D	20.0	
	Decabromodiphenyl ether		N.D	50.0	

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◆ Test Certification

**CTK Co., Ltd.**

388-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-100
Tel: +82-31-339-9970 Fax: +82-31-339-9855
www.e-ctk.com

- FRESH TYPE LED (4549 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.: 335-67-1]	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

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Test Report

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

Test Report No.: CTK0911-RS-000402
Date of Issue: Nov. 17, 2009

Sample Name: FRESH TYPE LED (4549 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 Seung Hyup Baek 
Dae Soon Kim 

CTK Co., Ltd.



Yongjun Jo / Lab. Manager

Test Report No : CTK0911-RS-000402
Date : 11. 17. 2009

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1. TEST RESULTS

1) FRESH TYPE LED (4549 SIZE)

SVHC (Cobalt Chloride) (Cobalt Chloride)

SVHC						
Test Items	Unit	Test Results	MDL	Test Methods		
Cobalt dichloride (Co) ¹⁾ (CAS No.: 007846-79-9)	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 3613_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-ethylhexyl)phthalate (DEHP) (CAS No.: 000117-81-7)	mg/kg	N.D				
Benzyl butyl phthalate (BBP) (CAS No.: 000085-68-7)	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)oxide³⁾ are based on the identified heavy metal result.

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