PRODUCT FAMILY DATA SHEET

3528A0 (0.2W)

MODEL NAME : LEMWS28Q80 Series

RoHS Compliant

Halogen Compliant

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CONTENTS
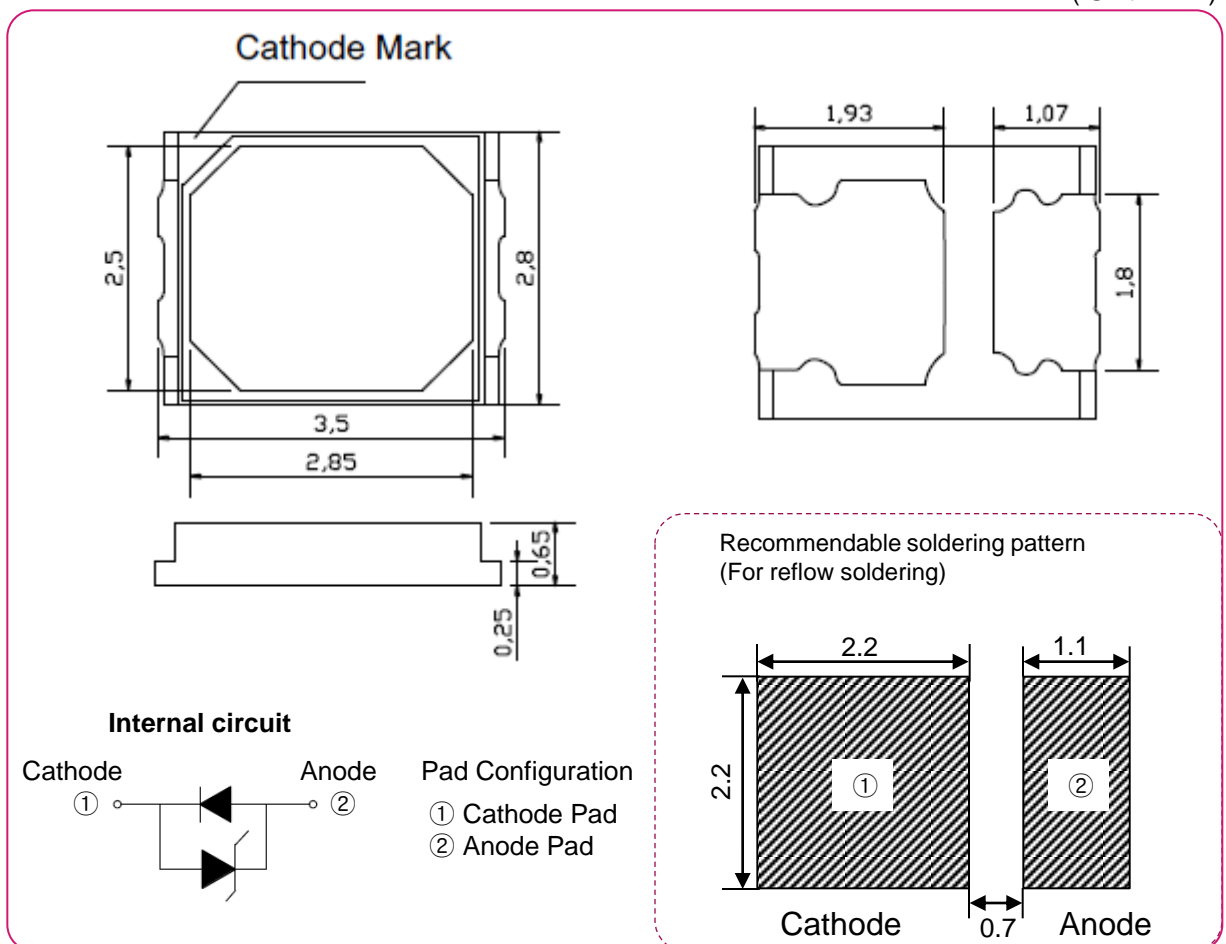
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1. Features

- Lighting Color : White

- Lead Frame Type LED Package : 2.8 x 3.5 x 0.65 (L x W x H) [Unit : mm]

- Viewing Angle : 120˚

- Chip Material : InGaN

- Soldering Methods : Reflow soldering

- Taping : 8 mm conductive black carrier tape and antistatic clear cover tape

       3,500 pcs/reel, Φ178 mm reel

2. Applications

- Interior Illumination

3. Outline Dimensions

(Unit : mm)

Internal circuit

Cathode ①   Anode ②

Pad Configuration
① Cathode Pad
② Anode Pad

Recommendable soldering pattern
(For reflow soldering)

Cathode   0.7   Anode

Tolerances unless otherwise mentioned are ± 0.10 mm

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4. Absolute Maximum Ratings

(Ta = 25℃)

Item	Symbol	Rating	Unit
Forward Current	If	90	mA
Peak Pulse Forward Current[*1]	Ifp	150	mA
Operating Temperature	Topr	-40 ~ +85	℃
Storage Temperature	Tstg	-40 ~ +100	℃
Junction Temperature	Tj	110	℃
Soldering Temperature		JEDEC-J-STD-020D	

*1) Pulse width ≤ 10ms and duty cycle ≤ 10%

※ Operating the LED beyond the listed maximum ratings may affect device reliability and cause permanent damage. These or any other conditions beyond those indicated under recommended operating conditions are not implied.

The exposure to the absolute maximum rated conditions may affect device reliability.

※ The LEDs are not designed to be driven in reverse bias.

5. Electro - Optical Characteristics

(Ta = 25℃, If = 60mA)

Item	Symbol	CCT	Min.	Typ.	Max.	Unit
Luminous Flux	Φv	6500 (F)	23.3	25.1	26.8	lm
		5700 (G)	23.3	25.5	26.8	
		5000 (H)	23.3	25.1	26.8	
		4000 (J)	23.3	25.2	26.8	
		3500 (K)	22.4	25.2	25.8	
		3000 (L)	21.4	23.8	24.7	
		2700 (M)	20.5	22.8	23.6	
Forward Voltage	Vf	All	2.9	3.05	3.2	V
Color	Cx / Cy	All	Refer to 'Chromaticity Bins'			-
Viewing Angle	2Θ1/2	All	-	120	-	deg
Color Rendering Index (Ra)	-	All	80	-	-	-
Thermal Resistance, Junction to Solder Point	Rth j-s	All	-	30	-	℃/W
Typical Temperature Coefficient of Forward Voltage[*1]	ΔVf / ΔTj	All	-1.0	-	-3.0	mV/℃

*1) Measured at Ta between 25℃ and 85℃.

※ These values are measured by the LG Innotek optical spectrum analyzer within the following tolerances.
Luminous Flux (Φv) : ±7%, Forward Voltage (Vf) : ±0.1V, Color Value : ±0.005, CRI Value : ±2,

※ Although all LEDs are tested by LG Innotek equipment, some values may vary slightly depending on the conditions of the test equipment.

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5. Electro - Optical Characteristics

| CCT	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
6500K (F)	50	2.99	0.150	21.5	143
	60 (Typ.)	3.05	0.183	25.1	137
	70	3.10	0.217	28.5	132
	80	3.14	0.251	31.7	126
	90	3.19	0.287	35.0	122
5700K (G)	50	2.99	0.150	21.8	146
	60 (Typ.)	3.05	0.183	25.5	140
	70	3.10	0.217	29.2	135
	80	3.14	0.251	32.6	130
	90	3.19	0.287	35.9	125
5000K (H)	50	2.99	0.150	21.5	143
	60 (Typ.)	3.05	0.183	25.1	137
	70	3.10	0.217	28.6	132
	80	3.14	0.251	32.0	127
	90	3.19	0.287	35.2	123
4000K (J)	50	2.99	0.150	21.6	144
	60 (Typ.)	3.05	0.183	25.2	138
	70	3.10	0.217	28.8	133
	80	3.14	0.251	32.1	128
	90	3.19	0.287	35.3	123
3500K (K)	50	2.99	0.150	21.5	144
	60 (Typ.)	3.05	0.183	25.2	138
	70	3.10	0.217	28.6	132
	80	3.14	0.251	31.8	127
	90	3.19	0.287	35.1	122
3000K (L)	50	2.99	0.150	20.4	136
	60 (Typ.)	3.05	0.183	23.8	130
	70	3.10	0.217	27.1	125
	80	3.14	0.251	30.3	120
	90	3.19	0.287	33.2	116
2700K (M)	50	2.99	0.150	19.6	131
	60 (Typ.)	3.05	0.183	22.8	125
	70	3.10	0.217	25.9	120
	80	3.14	0.251	28.9	115
	90	3.19	0.287	31.8	111

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6. Flux Characteristics and Order Code

Color	CRI	CCT	Vf @ 60mA [V]	Luminous Flux [lm] @ 60mA			Order Code
				Bin Code	Min.	Max.	
Cool	80	6500 (F)	2.90 ~ 3.00 (0) 3.00 ~ 3.10 (1) 3.10 ~ 3.20 (2)	Q	23.3	26.8	LEMWS28Q80FSZ2xx
Cool	80	5700 (G)	2.90 ~ 3.00 (0) 3.00 ~ 3.10 (1) 3.10 ~ 3.20 (2)	Q	23.3	26.8	LEMWS28Q80GSZ2xx
Cool	80	5000 (H)	2.90 ~ 3.00 (0) 3.00 ~ 3.10 (1) 3.10 ~ 3.20 (2)	Q	23.3	26.8	LEMWS28Q80HSZ2xx
Neutral	80	4000 (J)	2.90 ~ 3.00 (0) 3.00 ~ 3.10 (1) 3.10 ~ 3.20 (2)	Q	23.3	26.8	LEMWS28Q80JSZ2xx
Warm	80	3500 (K)	2.90 ~ 3.00 (0) 3.00 ~ 3.10 (1) 3.10 ~ 3.20 (2)	Q	22.4	25.8	LEMWS28Q80KSZ2xx
Warm	80	3000 (L)	2.90 ~ 3.00 (0) 3.00 ~ 3.10 (1) 3.10 ~ 3.20 (2)	Q	21.4	24.7	LEMWS28Q80LSZ2xx
Warm	80	2700 (M)	2.90 ~ 3.00 (0) 3.00 ~ 3.10 (1) 3.10 ~ 3.20 (2)	Q	20.5	23.6	LEMWS28Q80MSZ2xx

※ Φv values are for representative references only.

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7. Chromaticity Bins

LG Innotek complies with the ANSI C78.377A standard for its chromaticity bin structure. For each ANSI quadrangle for the CCT range of 2700K to 6500K, LG Innotek provides 6 micro bins.
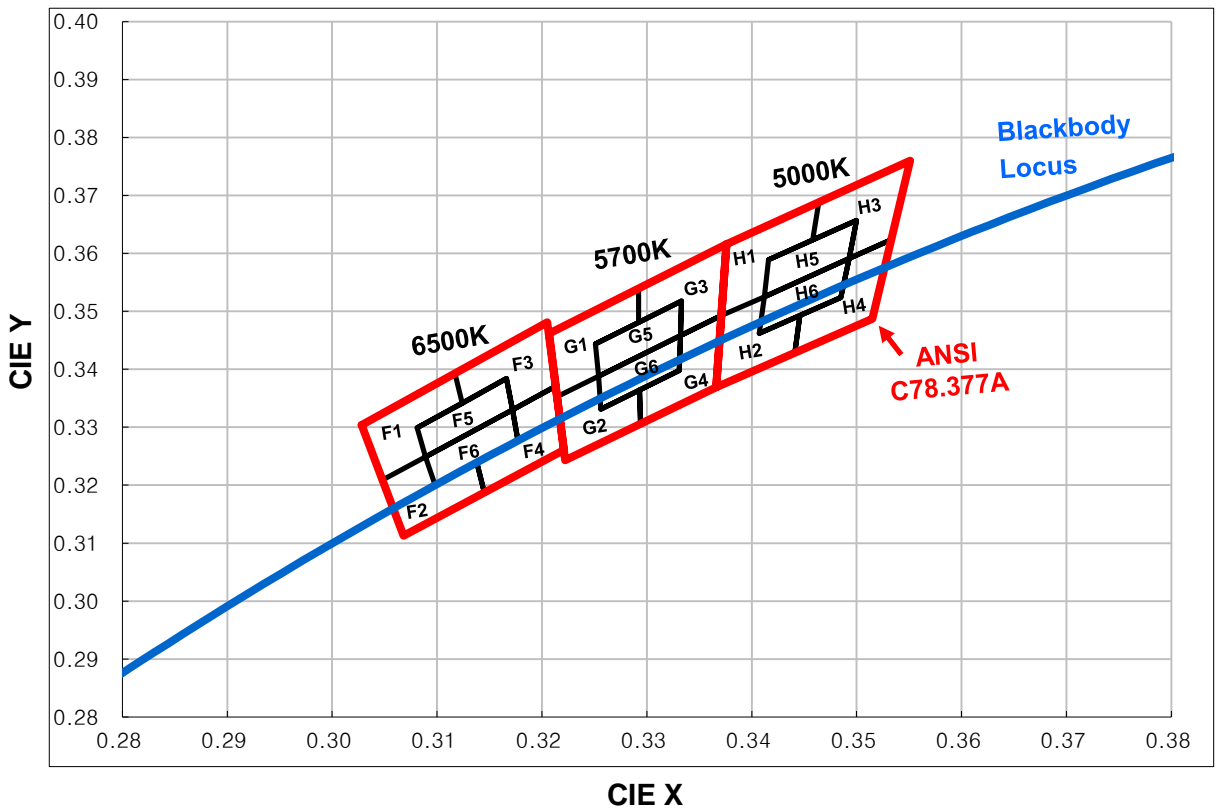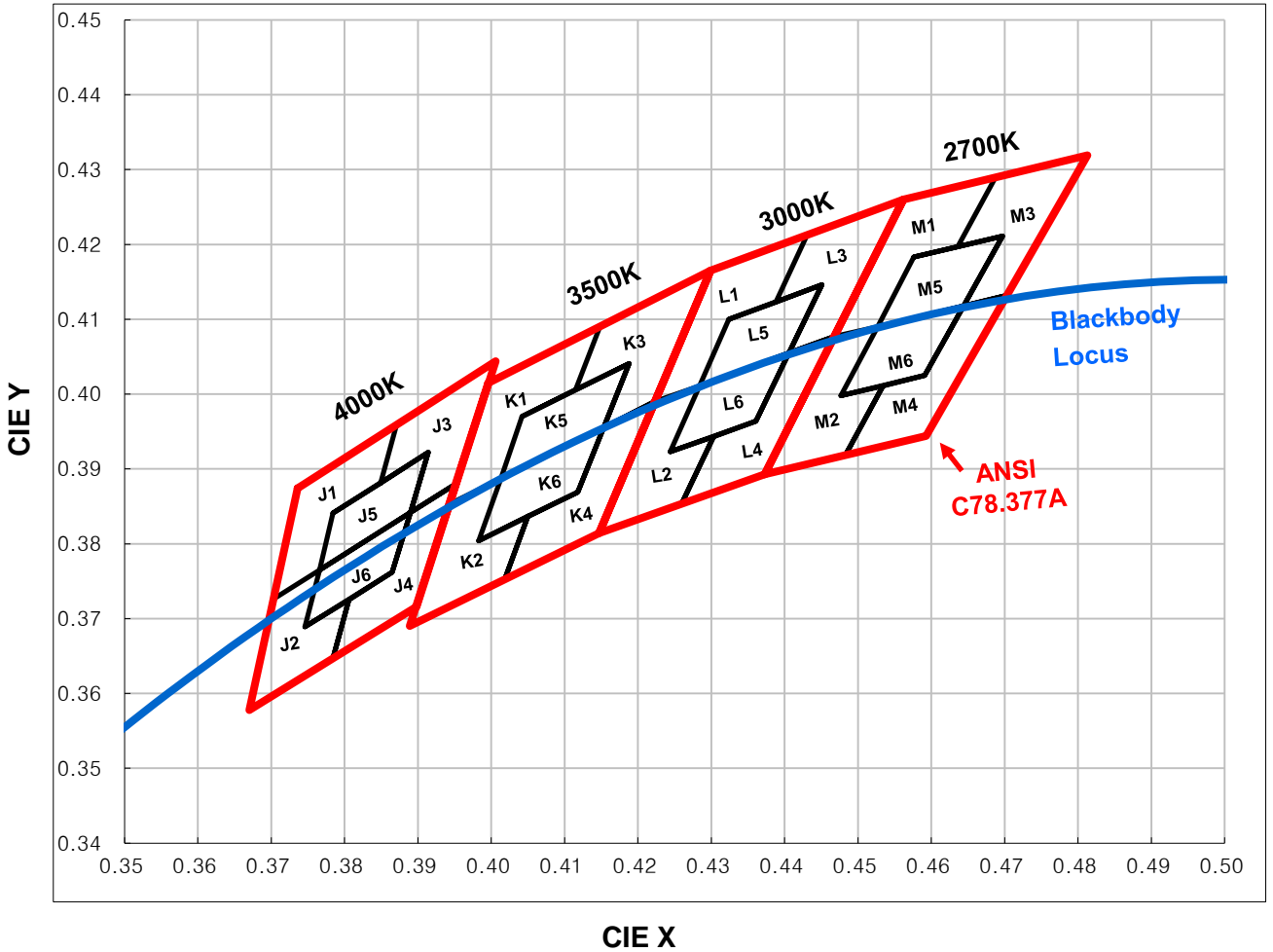

Bin	CIE X	CIE Y	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y
F1	0.3048	0.3209	**G1**	0.3215	0.3353	**H1**	0.3371	0.3493
	0.3028	0.3304		0.3207	0.3462		0.3376	0.3616
	0.3117	0.3393		0.3292	0.3539		0.3464	0.3688
	0.3124	0.3341		0.3292	0.3481		0.3458	0.3623
	0.3081	0.3299		0.3251	0.3444		0.3416	0.3589
	0.3089	0.3249		0.3254	0.3388		0.3412	0.3525
F2	0.3068	0.3113	**G2**	0.3222	0.3243	**H2**	0.3366	0.3369
	0.3048	0.3209		0.3215	0.3353		0.3371	0.3493
	0.3089	0.3249		0.3254	0.3388		0.3412	0.3525
	0.3098	0.3200		0.3256	0.3331		0.3407	0.3462
	0.3138	0.3238		0.3293	0.3364		0.3446	0.3493
	0.3145	0.3187		0.3294	0.3306		0.3441	0.3428

7. Chromaticity Bins (Continued)

| Bin	CIE X	CIE Y	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y
F3	0.3117	0.3393	G3	0.3292	0.3539	H3	0.3464	0.3688
	0.3205	0.3481		0.3376	0.3616		0.3551	0.3760
	0.3213	0.3371		0.3371	0.3493		0.3533	0.3624
	0.3172	0.3330		0.3332	0.3458		0.3493	0.3591
	0.3166	0.3384		0.3333	0.3518		0.3500	0.3657
	0.3124	0.3341		0.3292	0.3481		0.3458	0.3623
F4	0.3145	0.3187	G4	0.3294	0.3306	H4	0.3441	0.3428
	0.3138	0.3238		0.3293	0.3364		0.3446	0.3493
	0.3177	0.3277		0.3331	0.3398		0.3485	0.3524
	0.3172	0.3330		0.3332	0.3458		0.3493	0.3591
	0.3213	0.3371		0.3371	0.3493		0.3533	0.3624
	0.3221	0.3261		0.3366	0.3369		0.3515	0.3487
F5	0.3081	0.3299	G5	0.3251	0.3444	H5	0.3416	0.3589
	0.3166	0.3384		0.3333	0.3518		0.3500	0.3657
	0.3172	0.3330		0.3332	0.3458		0.3493	0.3591
	0.3089	0.3249		0.3254	0.3388		0.3412	0.3525
F6	0.3089	0.3249	G6	0.3254	0.3388	H6	0.3412	0.3525
	0.3172	0.3330		0.3332	0.3458		0.3493	0.3591
	0.3177	0.3277		0.3331	0.3398		0.3485	0.3524
	0.3098	0.3200		0.3256	0.3331		0.3407	0.3462

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7. Chromaticity Bins (Continued)

Bin	CIE X	CIE Y	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y
J1	0.3703	0.3726	K1	0.3943	0.3853	L1	0.4223	0.3990	M1	0.4468	0.4077
	0.3736	0.3874		0.3996	0.4015		0.4299	0.4165		0.4562	0.4260
	0.3871	0.3959		0.4148	0.4090		0.4431	0.4213		0.4688	0.4290
	0.3849	0.3881		0.4115	0.4006		0.4388	0.4123		0.4636	0.4197
	0.3784	0.3841		0.4042	0.3970		0.4324	0.410		0.4576	0.4183
	0.3766	0.3765		0.4013	0.3887		0.4284	0.4011		0.4527	0.4090
J2	0.3670	0.3578	K2	0.3889	0.369	L2	0.4147	0.3814	M2	0.4373	0.3893
	0.3703	0.3726		0.3943	0.3853		0.4223	0.3990		0.4468	0.4077
	0.3766	0.3765		0.4013	0.3887		0.4284	0.4011		0.4527	0.4090
	0.3746	0.3689		0.3983	0.3804		0.4244	0.3923		0.4477	0.3998
	0.3806	0.3725		0.4050	0.3837		0.4303	0.3943		0.4534	0.4011
	0.3784	0.3647		0.4018	0.3752		0.4260	0.3854		0.4483	0.3919

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7. Chromaticity Bins (Continued)

Bin	CIE X	CIE Y	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y
J3	0.3871	0.3959	K3	0.4148	0.409	L3	0.4431	0.4213	M3	0.4688	0.4290
	0.4006	0.4044		0.4299	0.4165		0.4562	0.4260		0.4813	0.4319
	0.3952	0.3880		0.4223	0.3990		0.4468	0.4077		0.4703	0.4132
	0.3890	0.3842		0.4153	0.3955		0.4406	0.4055		0.4644	0.4118
	0.3914	0.3922		0.4188	0.4041		0.4451	0.4146		0.4697	0.4211
	0.3849	0.3881		0.4115	0.4006		0.4388	0.4123		0.4636	0.4197
J4	0.3784	0.3647	K4	0.4018	0.3752	L4	0.4260	0.3854	M4	0.4483	0.3919
	0.3806	0.3725		0.4050	0.3837		0.4303	0.3943		0.4534	0.4011
	0.3865	0.3762		0.4118	0.3869		0.4361	0.3964		0.4591	0.4025
	0.3890	0.3842		0.4153	0.3955		0.4406	0.4055		0.4644	0.4118
	0.3952	0.3880		0.4223	0.3990		0.4468	0.4077		0.4703	0.4132
	0.3898	0.3716		0.4147	0.3814		0.4373	0.3893		0.4593	0.3944
J5	0.3784	0.3841	K5	0.4042	0.3970	L5	0.4324	0.4100	M5	0.4576	0.4183
	0.3914	0.3922		0.4188	0.4041		0.4451	0.4146		0.4697	0.4211
	0.3890	0.3842		0.4153	0.3955		0.4406	0.4055		0.4644	0.4118
	0.3766	0.3765		0.4013	0.3887		0.4284	0.4011		0.4527	0.4090
J6	0.3766	0.3765	K6	0.4013	0.3887	L6	0.4284	0.4011	M6	0.4527	0.4090
	0.3890	0.3842		0.4153	0.3955		0.4406	0.4055		0.4644	0.4118
	0.3865	0.3762		0.4118	0.3869		0.4361	0.3964		0.4591	0.4025
	0.3746	0.3689		0.3983	0.3804		0.4244	0.3923		0.4477	0.3998

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8. Typical Characteristic Curves

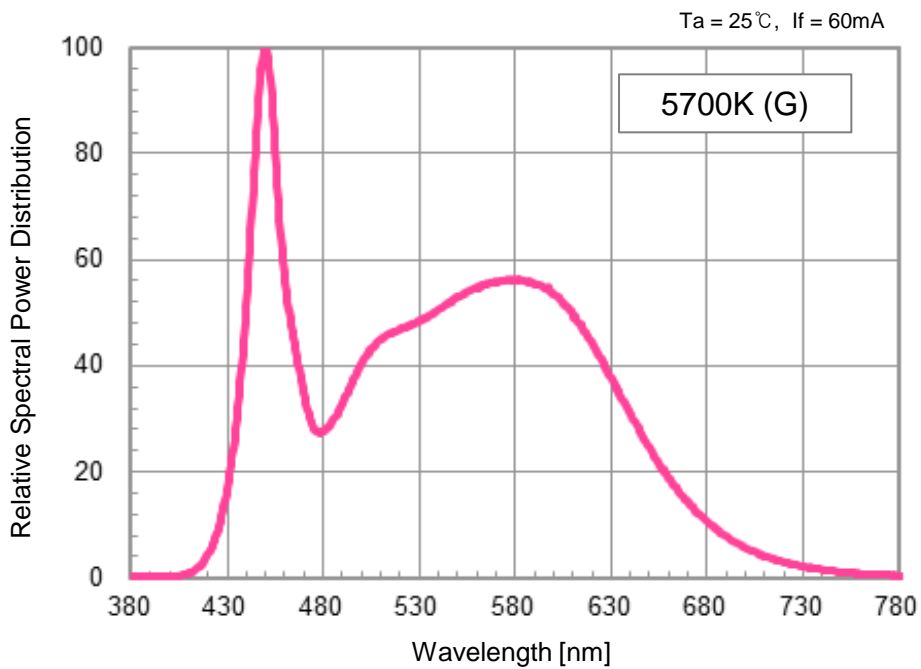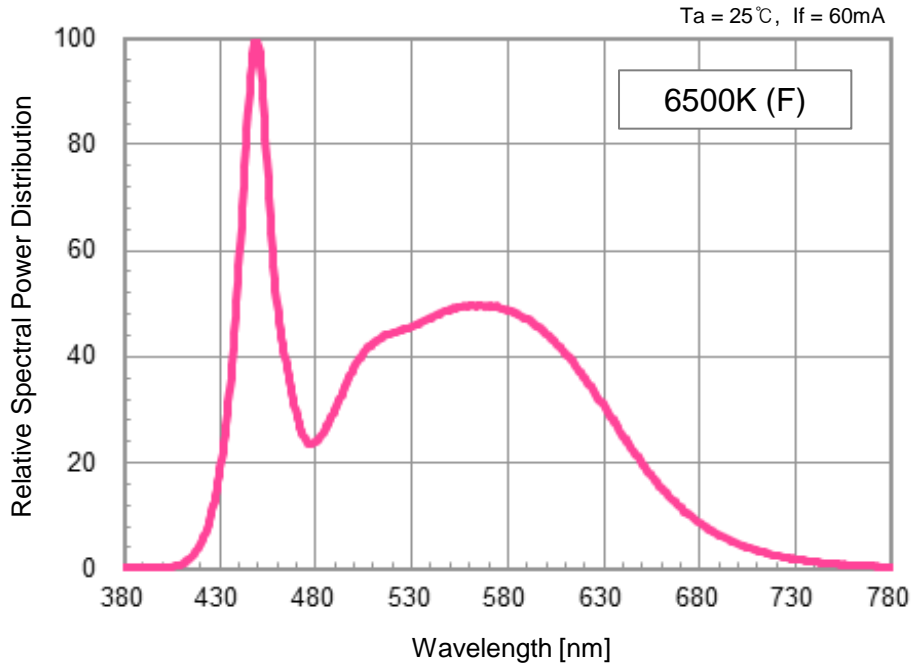■ Forward Current vs. Forward Voltage

Ta = 25℃
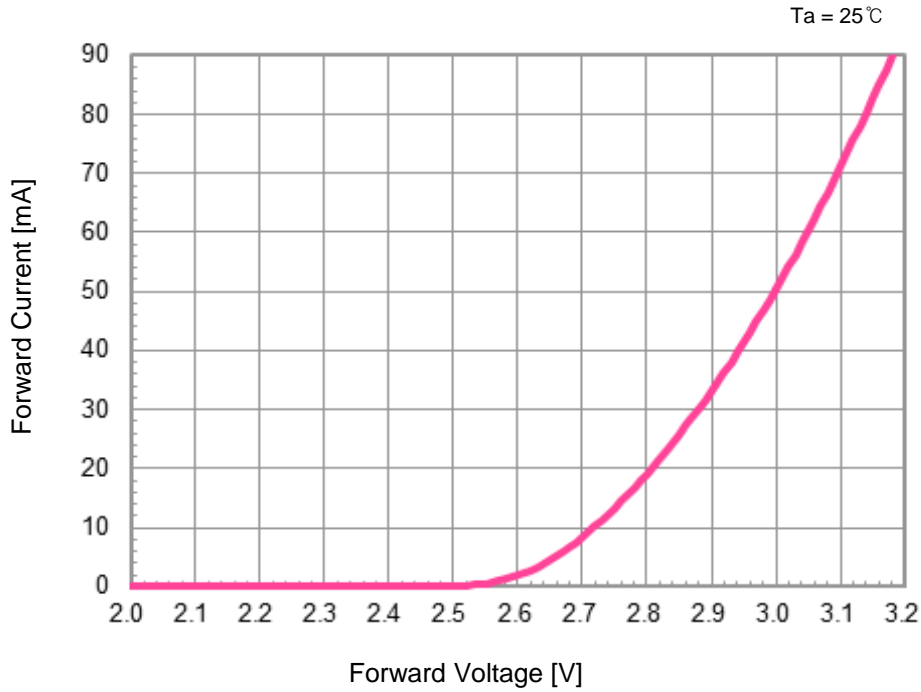
■ Relative Luminous Flux vs. Forward Current
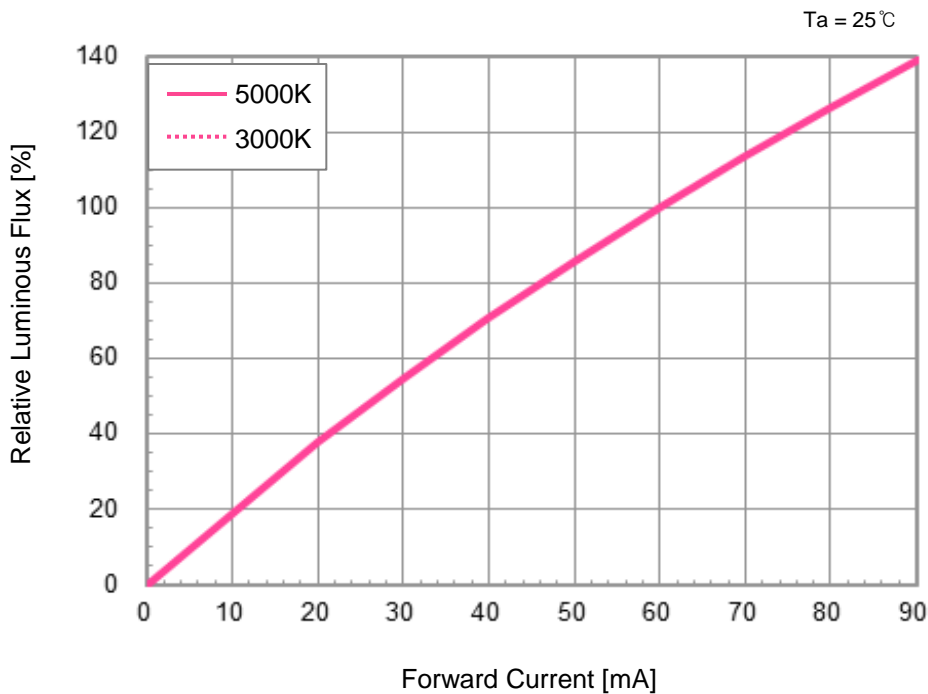
Ta = 25℃

※ 5000K CCT data also applies to 5700K and 6500K CCTs and 3000K data also applies to 2700K, 3500K and 4000K CCTs.

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8. Typical Characteristic Curves

▪ Spectrum

Ta = 25℃, If = 60mA

6500K (F)

Ta = 25℃, If = 60mA

5700K (G)

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8. Typical Characteristic Curves

▪ Spectrum

Ta = 25℃, If = 60mA

5000K (H)

Relative Spectral Power Distribution vs Wavelength [nm]

Ta = 25℃, If = 60mA

4000K (J)

Relative Spectral Power Distribution vs Wavelength [nm]

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8. Typical Characteristic Curves

- Spectrum

Ta = 25℃, If = 60mA

3500K (K)

Ta = 25℃, If = 60mA

3000K (L)

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8. Typical Characteristic Curves

▪ Spectrum

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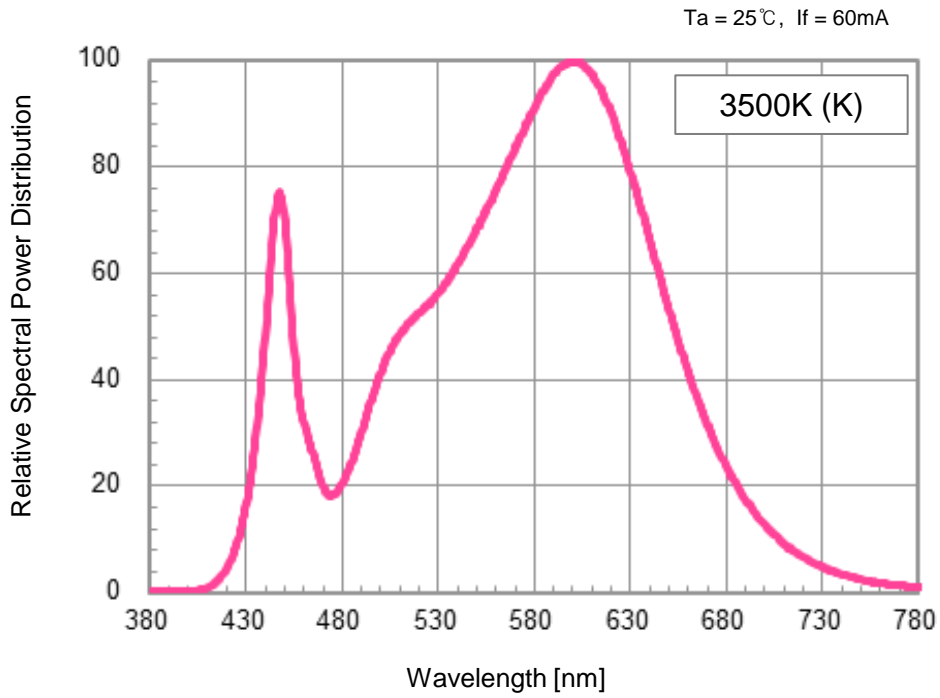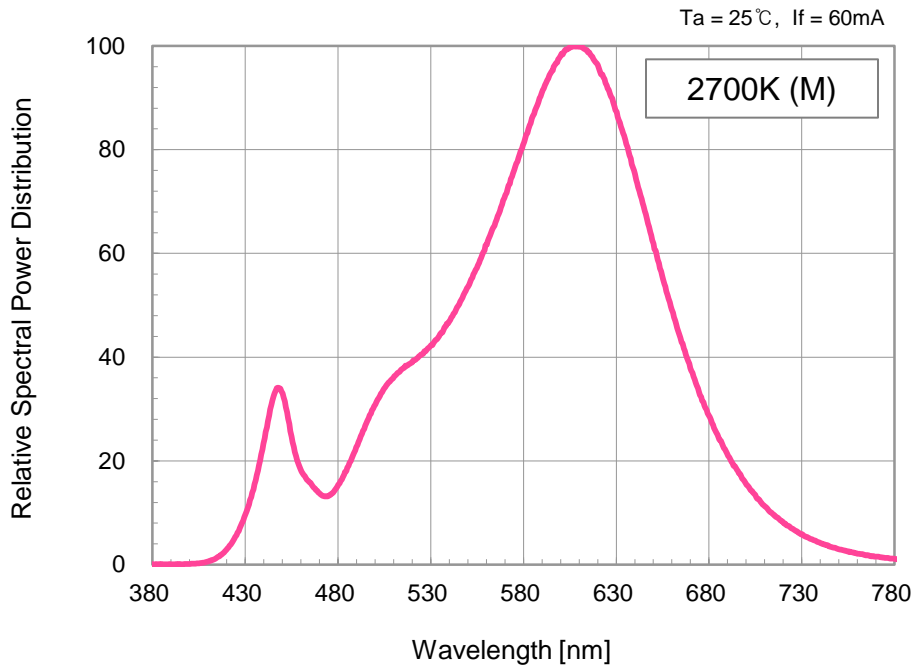
8. Typical Characteristic Curves

▪ Chromaticity Coordinate vs. Forward Current
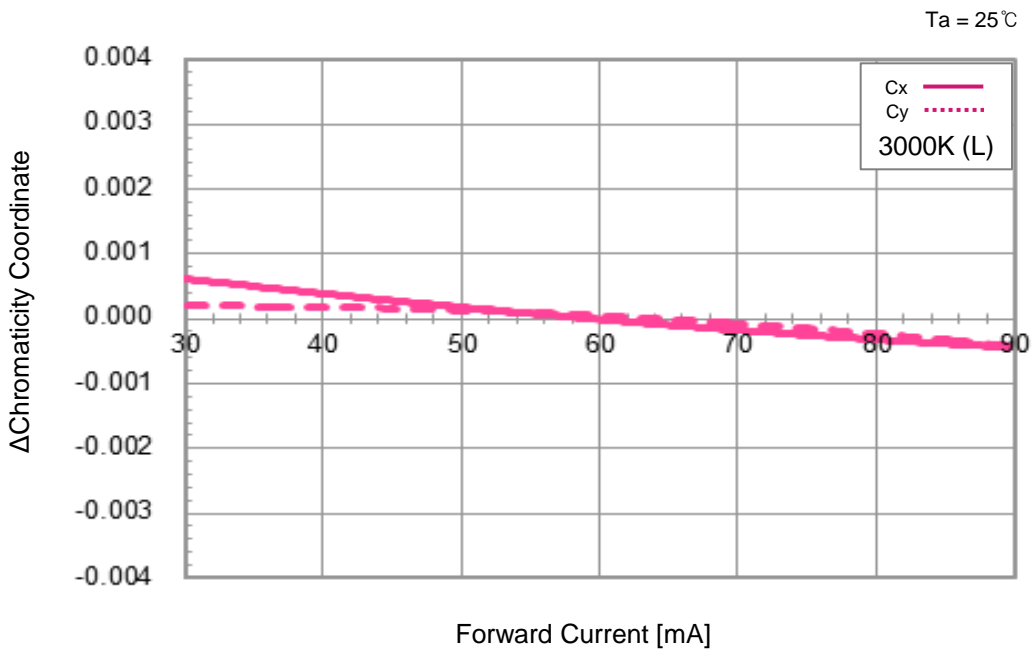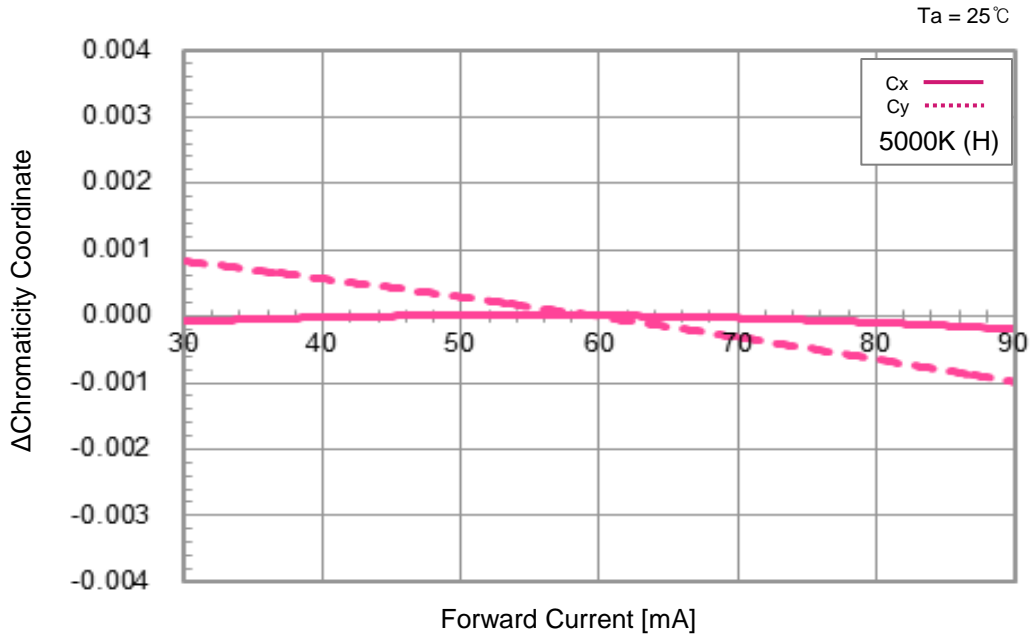
Ta = 25℃

Forward Current [mA]

Ta = 25℃

Forward Current [mA]

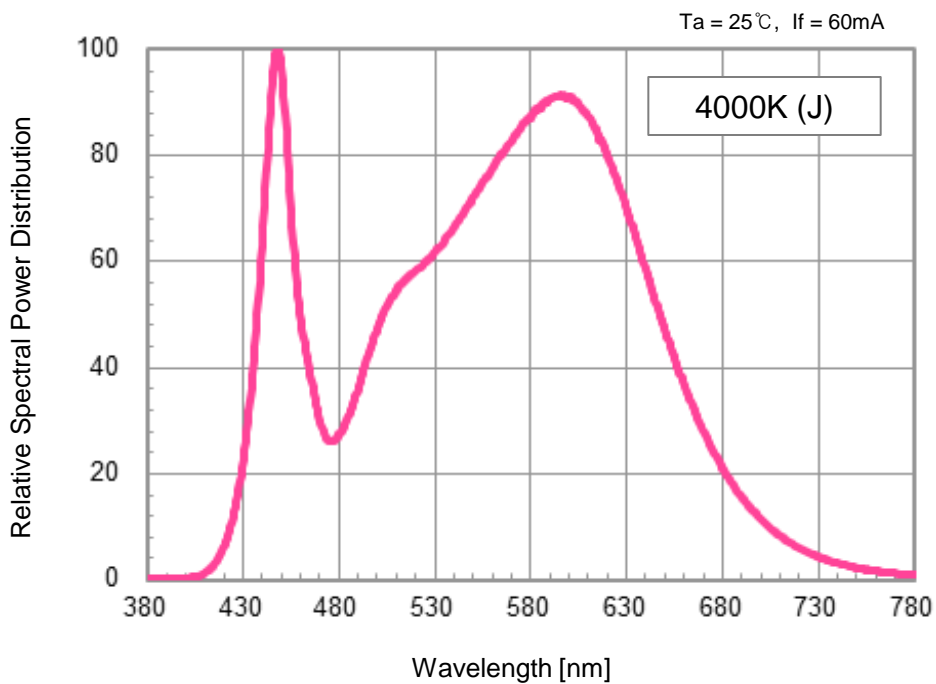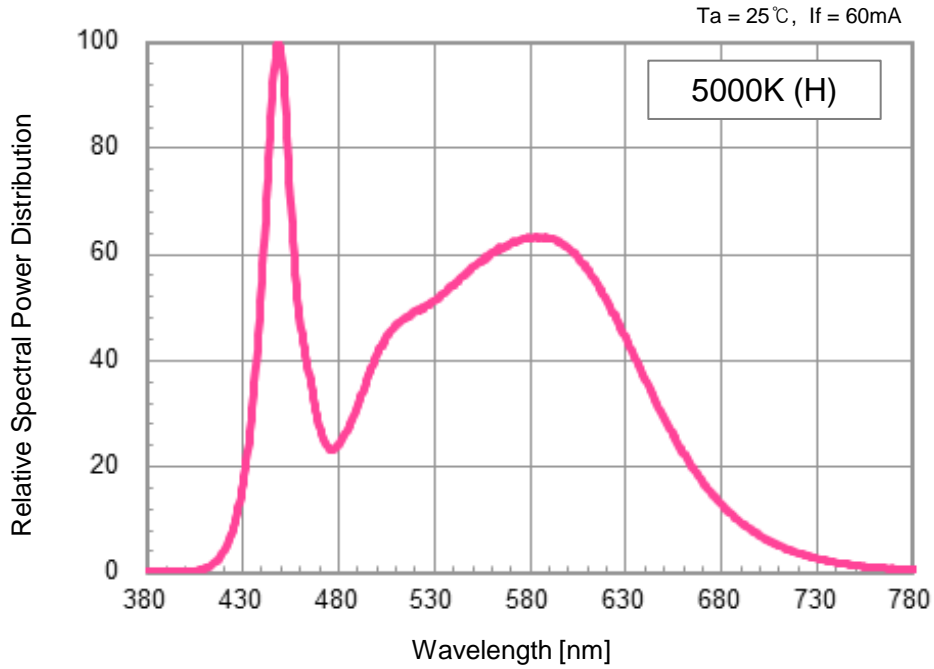※ 5000K CCT data also applies to 5700K and 6500K CCTs and 3000K data also applies to 2700K, 3500K and 4000K CCTs.

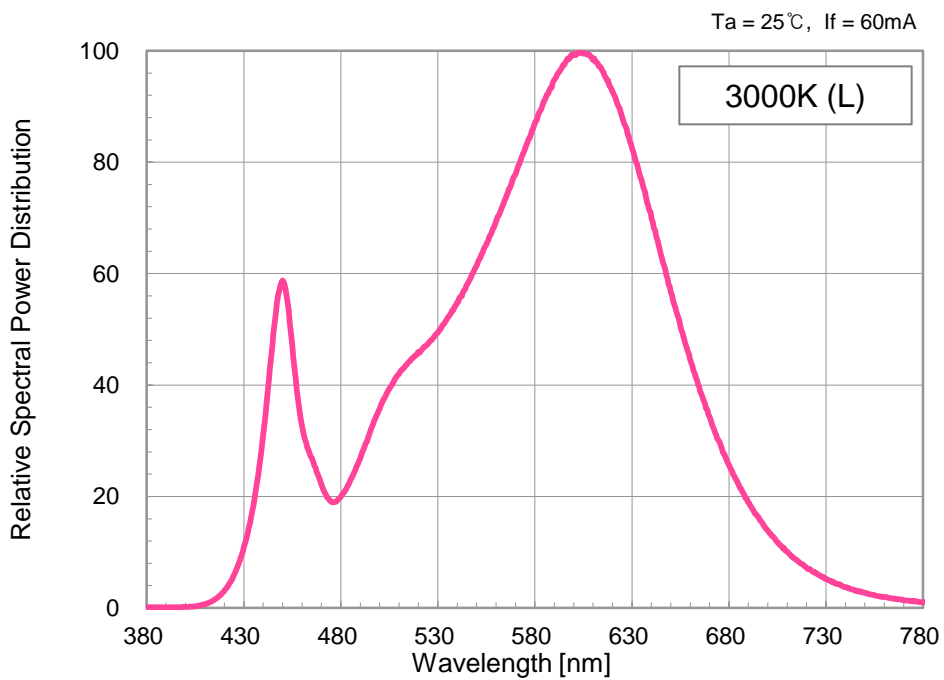LG Innotek

8. Typical Characteristic Curves

▪ Radiation Characteristics

Ta=25℃, If = 60mA

Ta=25℃, If = 60mA

X-X

Y-Y

▪ Luminous Flux vs. Temperature

If = 60mA

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8. Typical Characteristic Curves

▪ Chromaticity Coordinate vs. Temperature

If = 60mA

Cx / Cy — 5000K (H)

ΔChromaticity Coordinate vs. Ambient Temperature [℃]

If = 60mA

Cx / Cy — 3000K (L)

ΔChromaticity Coordinate vs. Ambient Temperature [℃]

※ 5000K CCT data also applies to 5700K and 6500K CCTs and 3000K data also applies to 2700K, 3500K and 4000K CCTs.

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8. Typical Characteristic Curves

▪ Forward Voltage vs. Temperature

If = 60mA

▪ Derating Curve

If = 60mA

※ The ambient temperature values for each graph are obtained with LG Innotek equipment.

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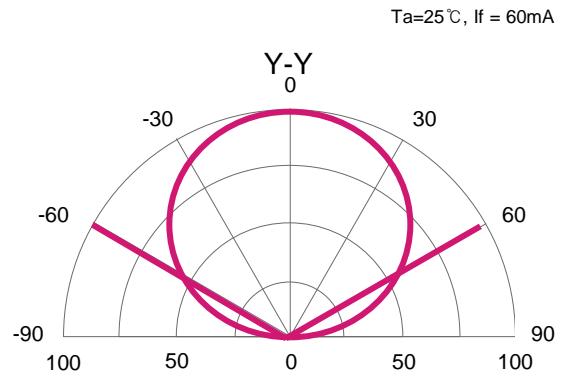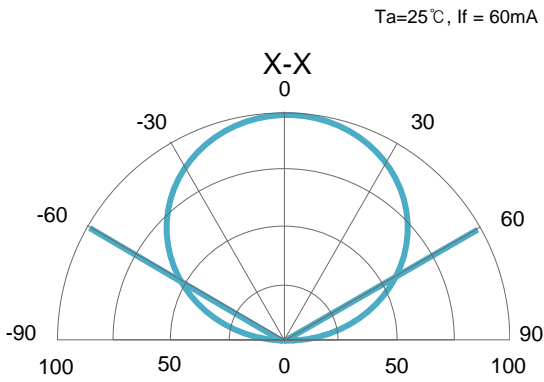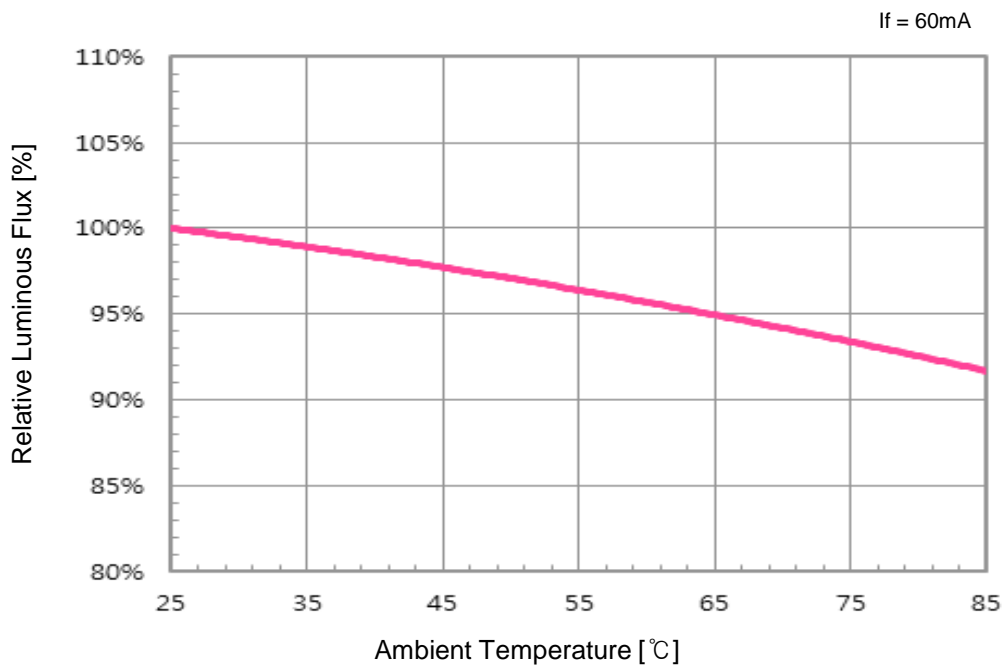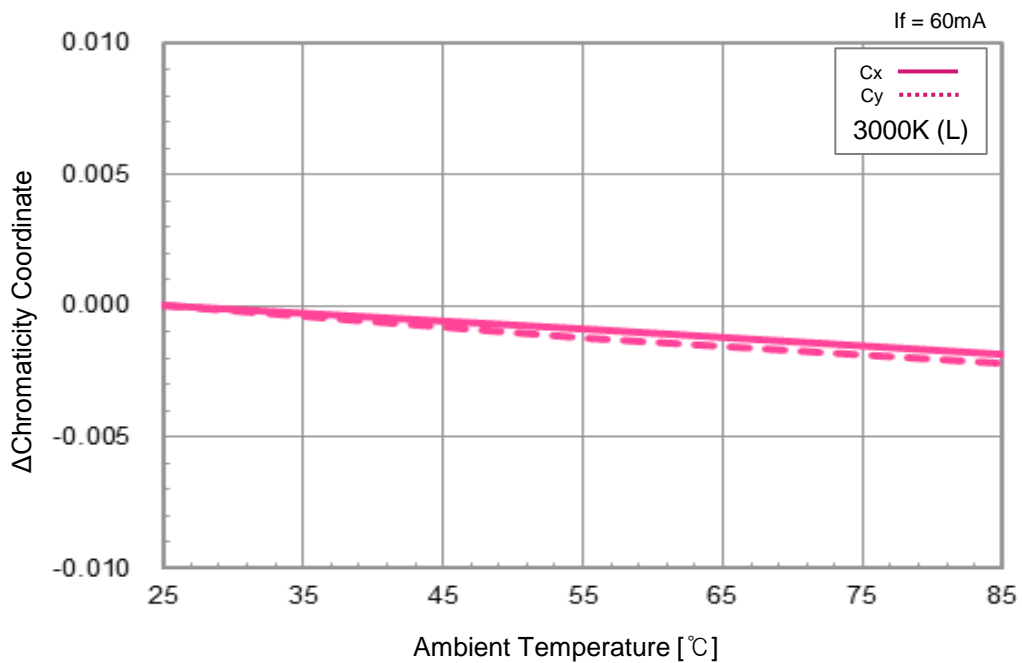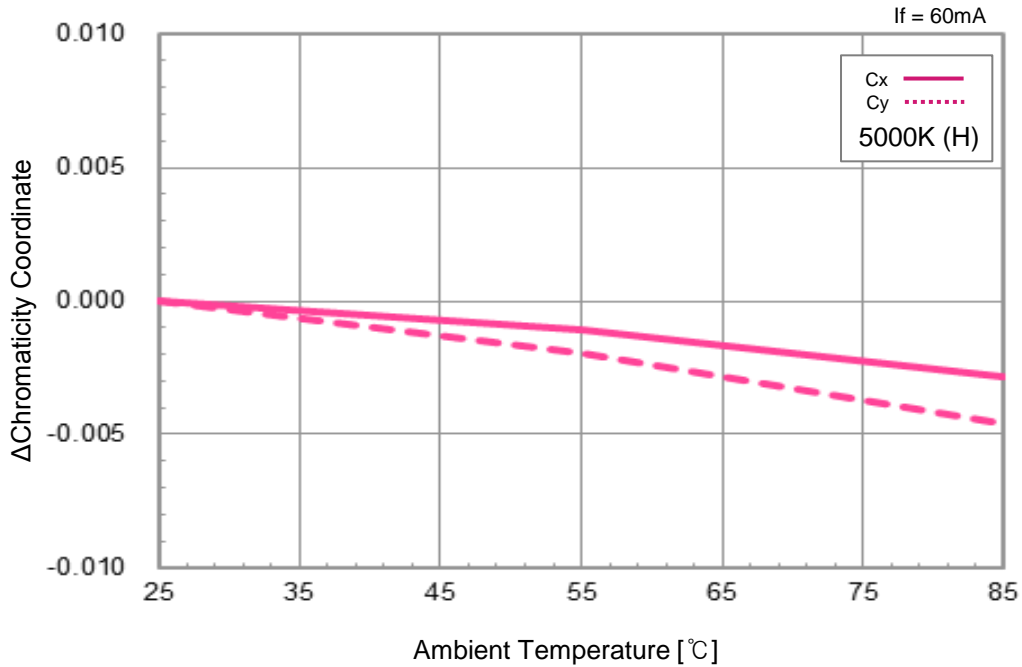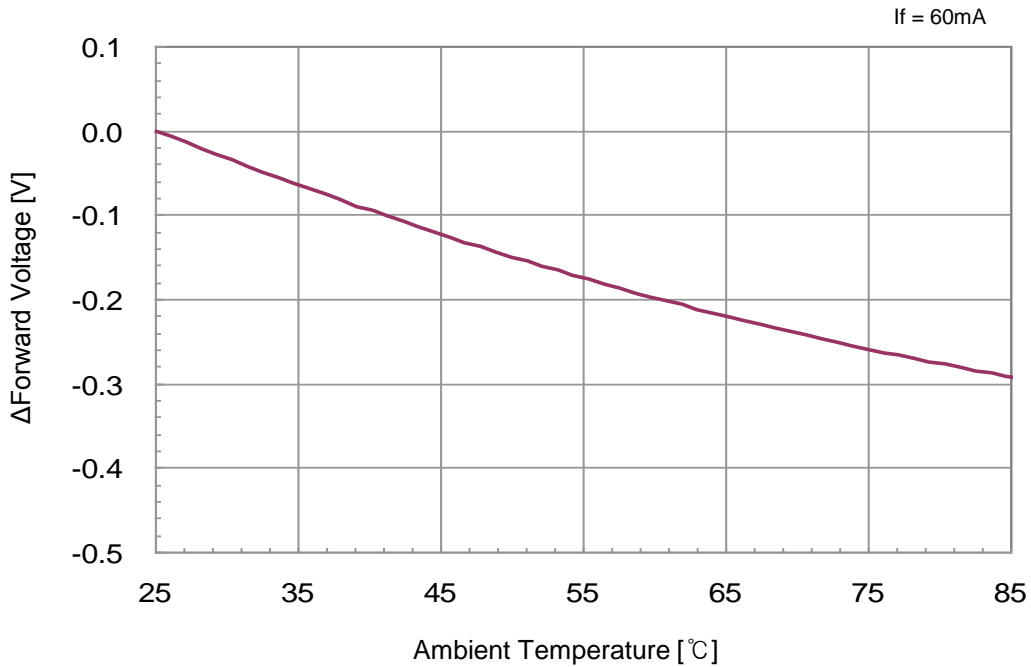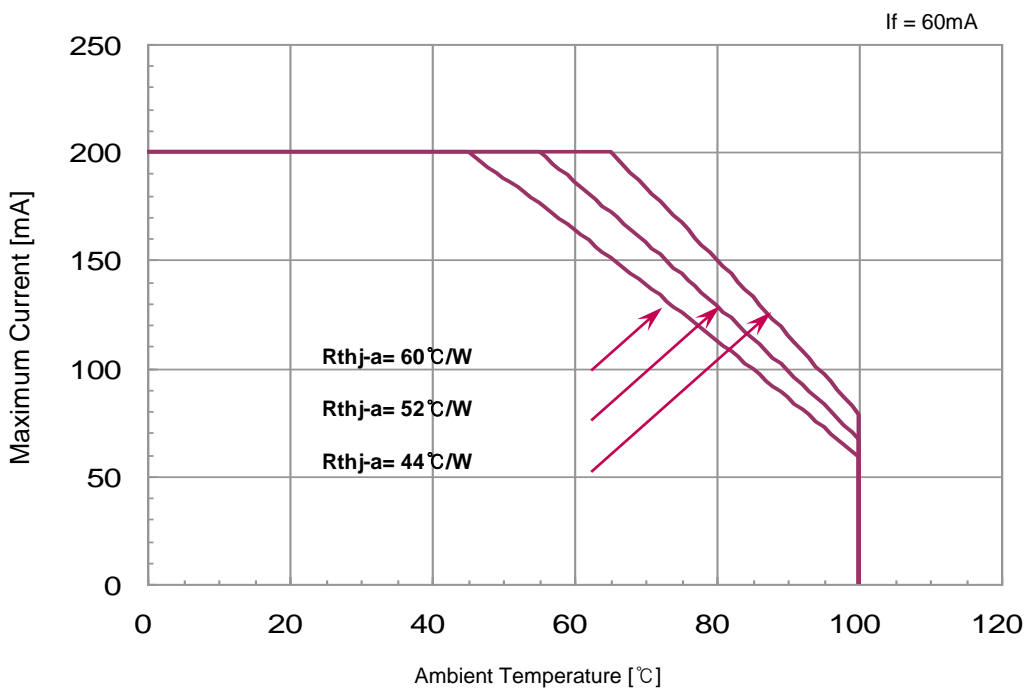# 9. Reliability Test Items and Conditions

9-1. Failure Criteria

Items	Symbols	Test Conditions	Criteria	
			Min.	Max.
Forward Voltage	Vf	If = 90mA	-	Initial Value × 1.1
Luminous Flux	Φ_V	If = 90mA	Initial Value × 0.7	-

9-2. Reliability Tests

No	Items	Test Conditions	Test Hours /Cycles	Sample Size	Ac/Re
1	Room Temperature Operating Life (RTOL)	Ta = 25℃, If = 90mA	1,000 Hours	20 pcs	0/1
2	Wet High Temperature Operating Life (WHTOL)	Ta = 60℃, RH = 90% If = 90mA	1,000 Hours	20 pcs	0/1
3	High Temperature Operating Life (HTOL)	Ta = 85℃, If = 90mA	1,000 Hours	20 pcs	0/1
4	Low Temperature Operating Life (LTOL)	Ta = -40℃, If = 90mA	1,000 Hours	20 pcs	0/1
5	High Temperature Storage Life (HTSL)	Ta = 100℃	1,000 Hours	20 pcs	0/1
6	Low Temperature Storage Life (LTSL)	Ta = -40℃	1,000 Hours	20 pcs	0/1
7	Wet High Temperature Storage Life (WHTSL)	Ta = 85℃, RH = 85%	1,000 Hours	20 pcs	0/1
8	Temperature Cycle (TC)	-40℃(30min) ~ 100℃(30min)	100 Cycles	20 pcs	0/1
9	Moisture Sensitivity Level (MSL)	Tsld = 260℃ (Pre treatment 60℃,60% 168 hours)	3 Times	20 pcs	0/1
10	Vibration	100~2000~100Hz Sweep 4min. 200m/s², 3 directions	48 Minutes	20 pcs	0/1

※ All samples are tested using LG Innotek Standard Metal PCB (25x25x1.6 mm³ (L×W×H)) except MSL test .
※ All samples must pass each test item and all test items must be satisfied.

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10. Packing and Labeling of Product

10-1. Taping Outline Dimensions

(Unit : mm)

- Packing Materials :
- Reel : Conductive PS (Black)
- Embossed Carrier Tape : Conductive PS (Black)
- Cover Tape : Conductive PET Base

Polarity
Direction

Cathode

Anode

Cathode Mark

Taping Arrangement

Feed Direction

Embossed Carrier Tape

(End)   Cover Tape   (Start)

Trailer	Loaded Pocket	Leader with
(Empty Pockets)	(4,000 pcs)	Cover Tape
(Min. 400mm)	(1,600mm)	(Min.500mm)

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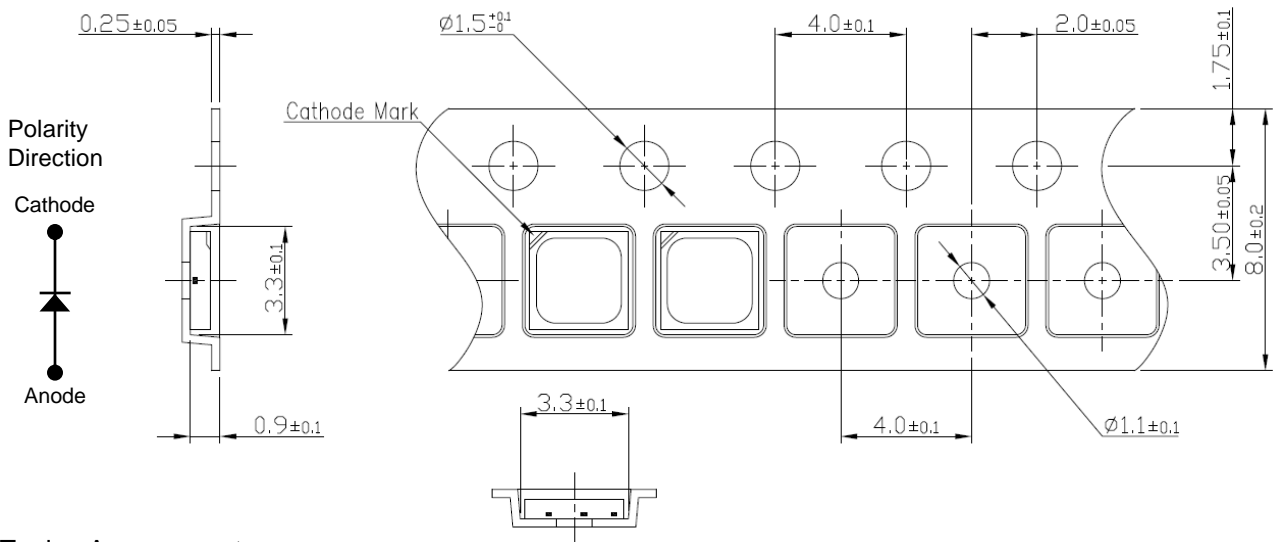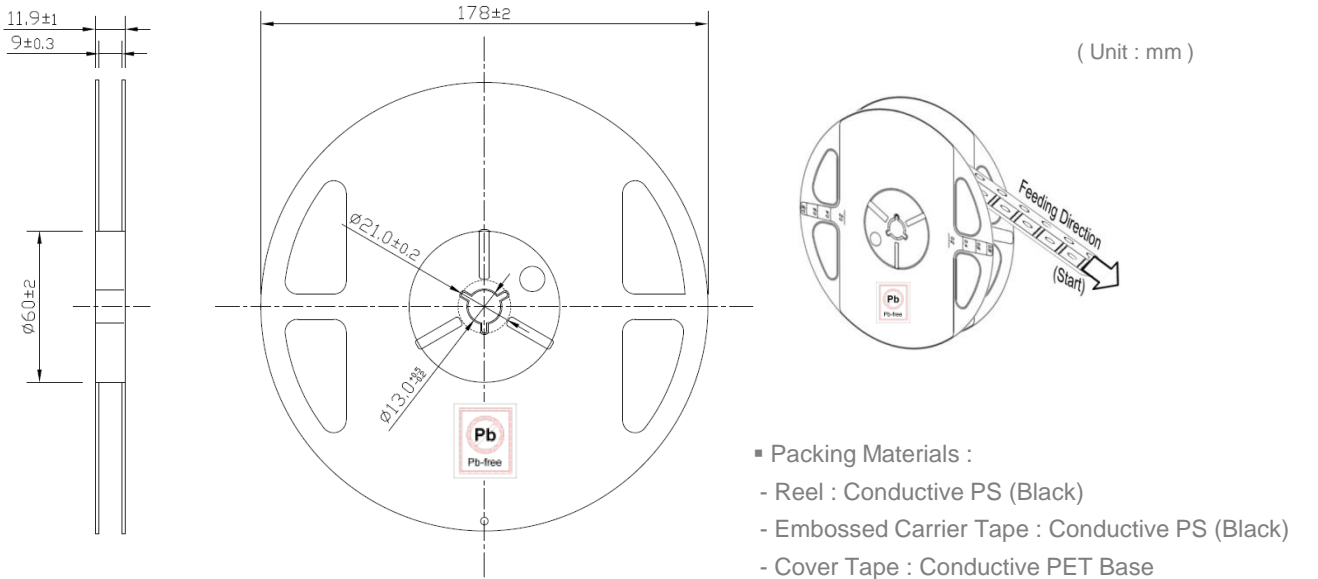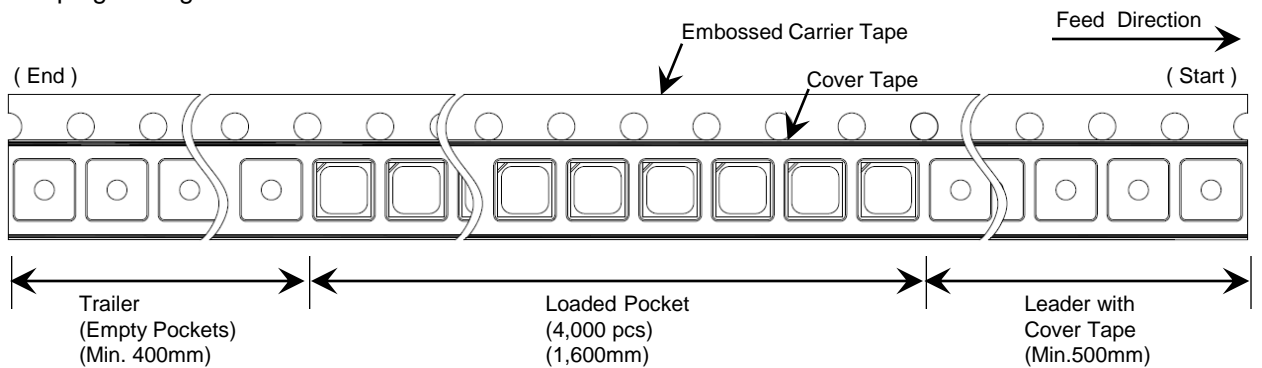
10. Packing and Labeling of Product

10-2. Packing Structures

Reeled products are packed in a sealed-off and moisture-proof aluminum bag with desiccants (silica gel). 24 Reels are packed in an outer box.

Label A

Vacuum Packing   Label A

Silica gel

Types	Sizes (mm)		
	ⓐ	ⓑ	ⓒ
Outer Box	530	240	280

Tolerance : ±10mm

Label C

ⓒ

ⓐ   ⓑ

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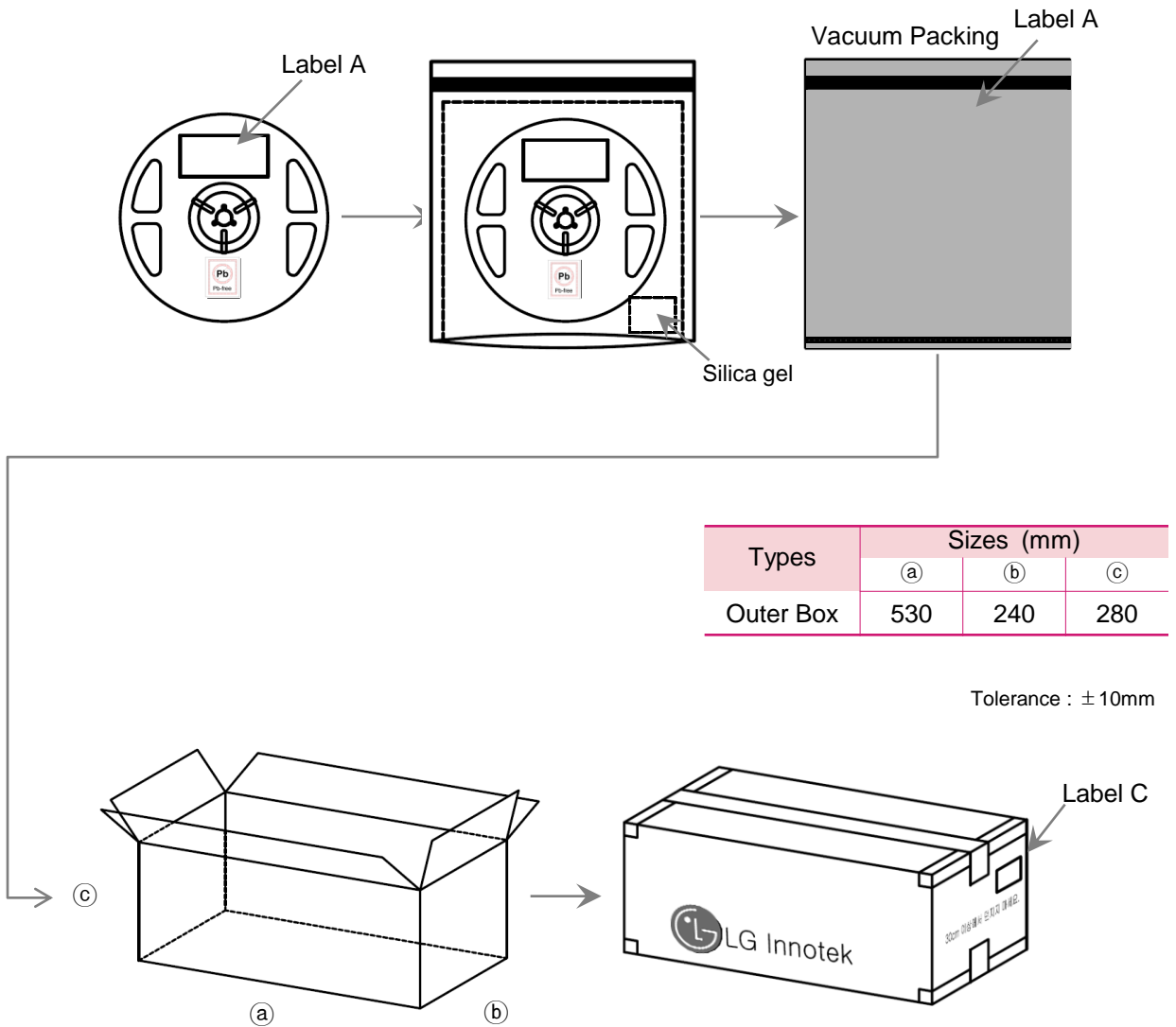
10. Packing and Labeling of Product

10-3. MES Label Structure

※ Label A

Specifying Lot ID, 'Model Name', 'MES ID', 'RANK', 'Q'ty', 'Run No.', 'Rack No.'

```
Lot ID : PPWS03R063M000101                    2C11001-A003
                                              Ver : 1.00

Model : lEMWS28Q80GSZ20      Q'ty : 4000[pcs]
MES ID :                     Run No : F00401-4517
RAN: Q-G5-0                  Rack No : C-107
 3X80F =Q-G1-1=4000=F00401-4517=C-107

 Q-G1-1                              LG Innotek Co., Ltd.
```

40mm / 80mm

▪ Run No. indication

1	2	3	4	5	6	—	7	8	9	10
Code	Manufactured Site	Manufactured Year	Manufactured Month	Manufactured Date			TH #		Serial No	
Paju : 1 Huizhou : 9		2013 : 3 2014 : 4 ... 2020 : 0 2021 : 1	1~9 : 1~9 10 : A 11 : B 12 : C	(01~31)			(00 ~ 99)		(00 ~ ZZ)	
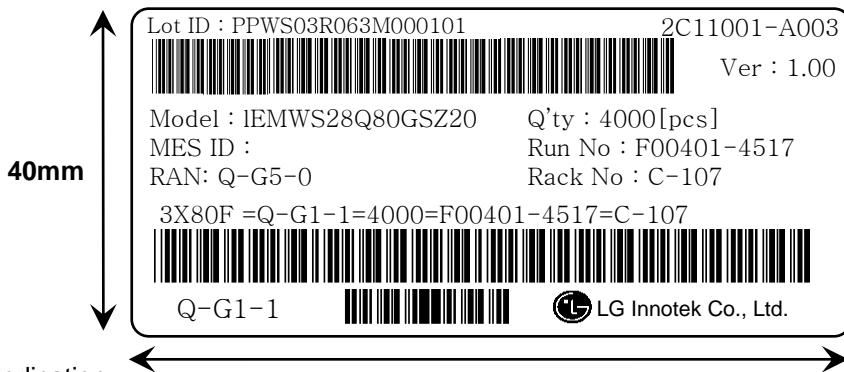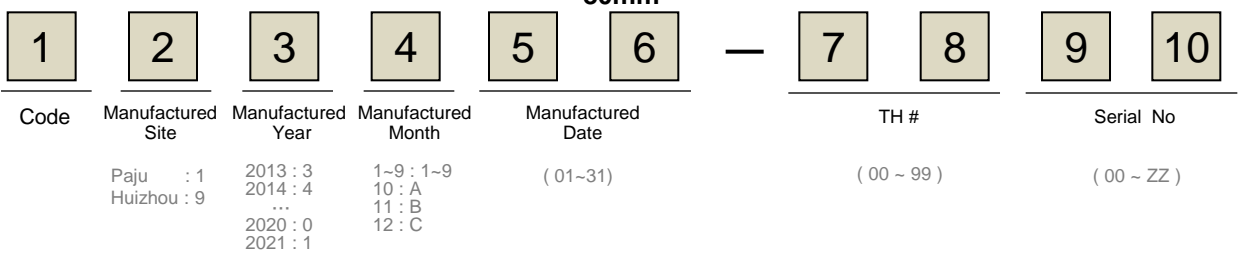
※ Label C

Specifying 'Customer', 'Date', 'Model Name', 'Quantity', 'Customer Part no.', 'Outbox ID', 'LGIT internal Model name'
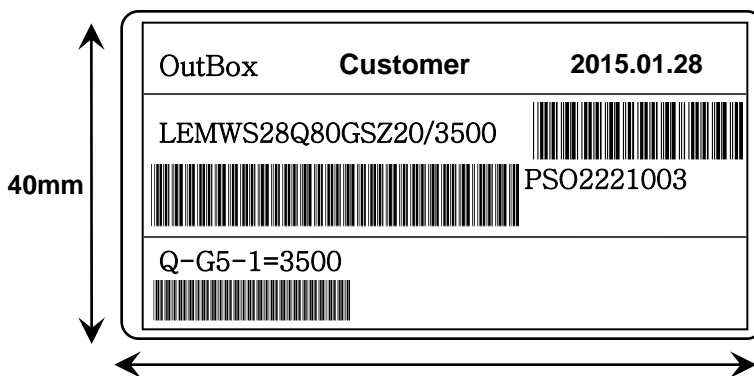
```
OutBox        Customer         2015.01.28

LEMWS28Q80GSZ20/3500

                              PSO2221003

Q-G5-1=3500
```

40mm / 80mm

▪ Box ID. indication

1	2	3	4	5	6	7	8	9	10
Manufactured Site	PKG Site	Box	Year	Month	Date		Serial No		
Paju : P Huizhou : H	PKG : S, P	Inner Box : I Outer Box : O	2013 : 3 2014 : 4 ... 2020 : 0 2021 : 1	1~9 : 1~9 10 : A 11 : B 12 : C	(01 ~ 31)		(001 ~ 999)		
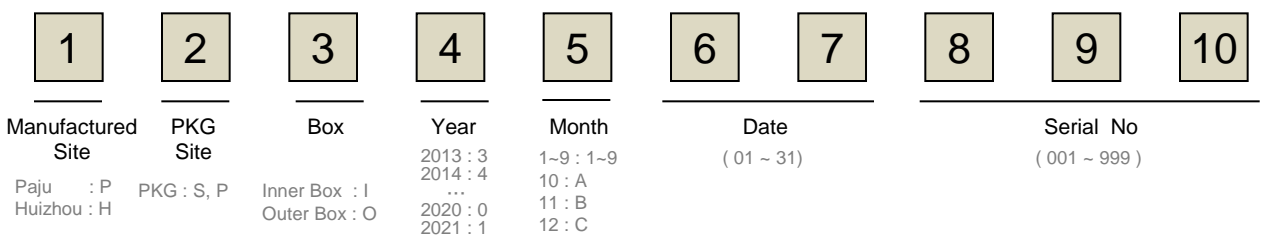
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10. Packing and Labeling of Product

10-4. NEDA Label Structure

※ Label A

Specifying 'Manufacturing Part Number', 'Quantity', 'Bin Code', 'Lot', 'Date Code'
and 'Country of Origin'

- Date Code(9D)

1	2	3	4

Year   Week
01~99   01~52
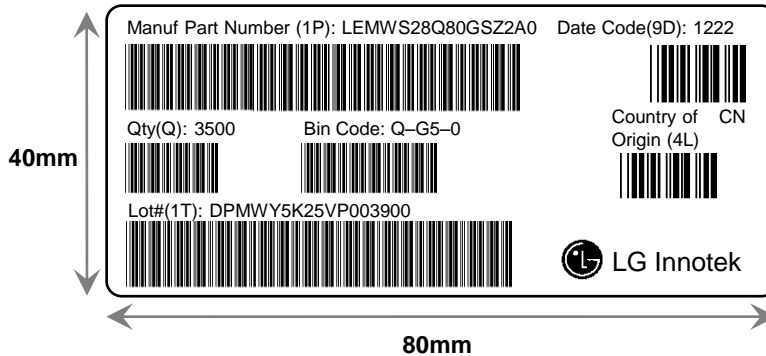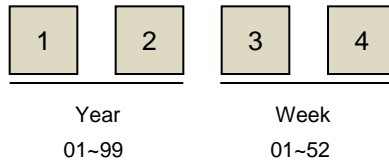
- Lot#(1T)

  LG Innotek Trace Code

- Bin Code

1	2		1	2	3		1	2

Flux   Color Coordinates   Forward Voltage

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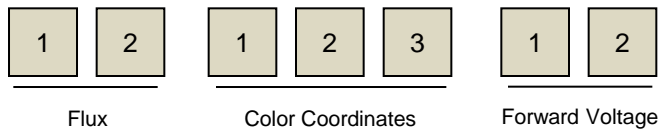
10. Packing and Labeling of Product

10-4. NEDA Label Structure

※ Label C

Specifying 'Manufacturing Site', 'Customer Address', 'Manufacturing Part Number', 'Bin Code', 'Box ID', 'Trans ID' and 'Quantity'

```
FROM: LG Innotek ( HuiZhou ) Co., Ltd          TO:
District 18,ZhongKai Hi-Tech Industry
Development Zone, Huizhou ,Guangdong, China
Manuf Part Number (1P): LEMWS28Q80FSZ2A0
                                               Trans ID (K): IAP5X8
40mm   |||||||||||||||||||||||||||||||         ||||||||||||||||||

       Bin Code: Q-G5-0
                                               Qty(Q): 84000
       |||||||||||||||||||||||                 ||||||||||||||||||

       BOX ID:  HSO2531048
       |||||||||||||||||||||||
```

80mm
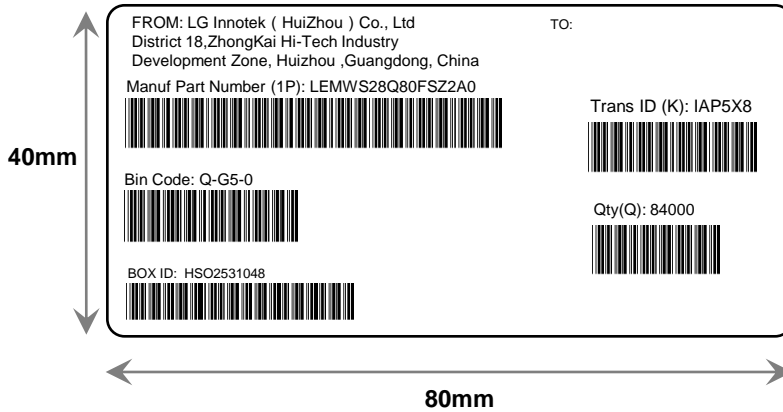
▪ Box ID indication

1	2	3	4	5	6	7	8	9	10
Site	Code	Outbox	Year	Month	Date		Serial No		

Site	Code	Outbox	Year	Month	Date	Serial No
Paju: P	S, P	Outbox: O	13 : 3	1~9 : 1~9	(01 ~ 31)	(001 ~ 999)
Huizhou: H		Inbox: I	14 : 4	10 : A		
			15 : 5	11 : B		
				12 : C		

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11. Cautions on Use

11-1. Moisture-Proof Package
　-. The moisture in the SMD package may vaporize and expand during soldering.
　-. The moisture can damage the optical characteristics of the LEDs due to the encapsulation.

11-2. During Storage

Conditions		Temperature	Humidity	Time
Storage	Before Opening Aluminum Bag	5℃ ~ 30℃	< 50% RH	Within 1 Year from the Delivery Date
	After Opening Aluminum Bag	5℃ ~ 30℃	< 60% RH	≤ 672 Hours
Baking		65 ± 5℃	< 10% RH	10 ~ 24 Hours

11-3. During Usage
　-. The LED should avoid the direct contact with hazardous materials such as sulfur, chlorine, phthalate,
　　 etc..
　-. The metal parts on the LED can rust when exposed to corrosive gases. Therefore, exposure to
　　 corrosive gases must be avoided during operation and storage.
　-. The silver-plated metal parts also can be affected not only by the corrosive gases emitted inside of
　　 the end-products but by the gases penetrated from outside environment.
　-. Extreme environments such as sudden ambient temperature changes or high humidity that can
　　 cause condensation must be avoided.

11-4. Cleaning
　-. Do not use brushes for cleaning or organic solvents (i.e. Acetone, TCE, etc..) for washing as
　　 they may damage the resin of the LEDs.
　-. Isopropyl Alcohol (IPA) is the recommended solvent for cleaning the LEDs under the following
　　 conditions.
　　 Clearing Condition : IPA, 25℃ max. × 60 sec max.
　-. Ultrasonic cleaning is not recommended.
　-. Pretests should be conducted with the actual cleaning process to validate that the process will not
　　 damage the LEDs.

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11. Cautions on Use

11-5. Thermal Management
-. The thermal design of the end product must be seriously considered, particularly at the beginning of the system design process.
-. The generation of heat is greatly impacted by the input power, the thermal resistance of the circuit boards and the density of the LED array combined with other components.

11-6. Static Electricity
-. Wristbands and anti-electrostatic gloves are strongly recommended and all devices, equipment and machinery must be properly grounded when handling the LEDs, which are sensitive against static electricity and surge.
-. Precautions are to be taken against surge voltage to the equipment that mounts the LEDs.
-. Unusual characteristics such as significant increase of current leakage, decrease of turn-on voltage, or non-operation at a low current can occur when the LED is damaged.

11-7. Recommended Circuit
-. The current through each LED must not exceed the absolute maximum rating when designing the circuits.
-. In general, the LED forward voltages can vary. LEDs in parallel that have different forward voltages in combination with a single resistor can result in different forward currents to each LED, which can also output different luminous flux values. In the worst case, the currents can exceed the absolute maximum ratings which can stress the LEDs. Matrix circuit with a single resistor for each LED is recommended to avoid luminous flux fluctuations.
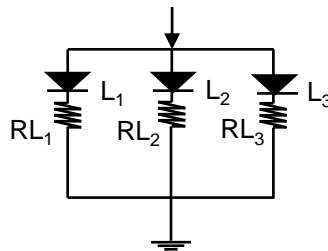

Fig.1 Recommended Circuit in Parallel Mode
: Separate resistors must be used for each LED.

-. The driving circuits must be designed to operate the LEDs by forward bias only.
-. Reverse voltages can damage the zener diode, which can cause the LED to fail.
-. A constant current LED driver is recommended to power the LEDs.

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11. Cautions on Use

11-8. Soldering Conditions

-. Reflow soldering is the recommended method for assembling LEDs on a circuit board.

-. LG Innotek does not guarantee the performance of the LEDs assembled by the dip soldering method.

-. Recommended Soldering Profile (according to JEDEC J-STD-020D)
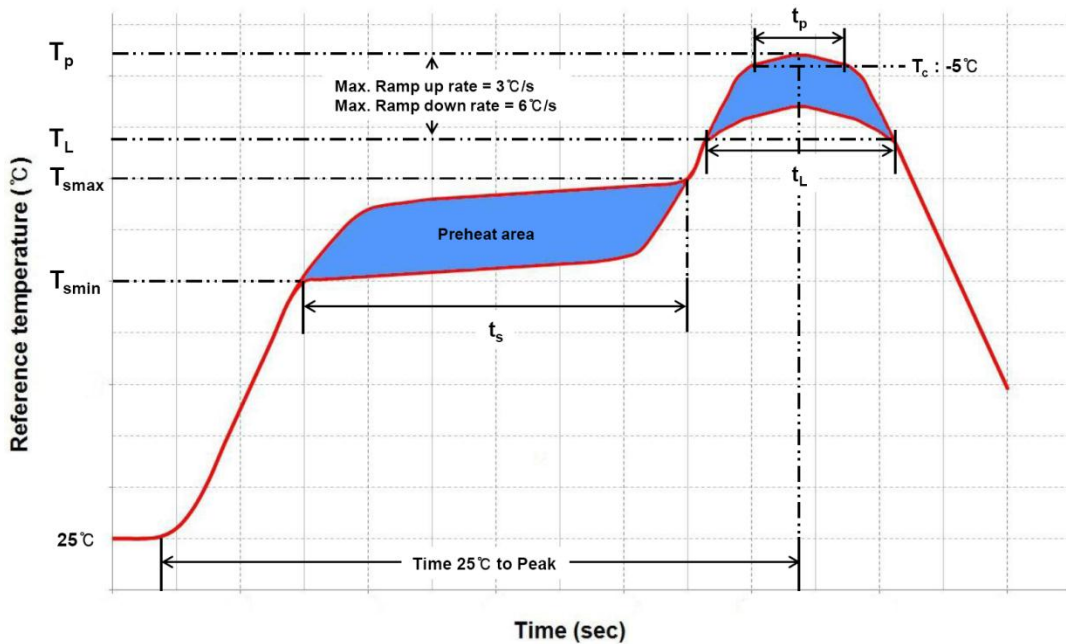
Profile Feature	Pb-Free Assembly	Pb-Based Assembly
Preheat/Soak Temperature Min(T_{smin}) Temperature Max(T_{smax}) Maximum time(t_s) from T_{smin} to T_{smax}	150℃ 200℃ 60~120 seconds	100℃ 150℃ 60~120 seconds
Ramp-up rate (T_L to T_p)	3℃/ second max.	3℃/ second max.
Liquidous temperature (T_L)	217℃	183℃
Time (t_L) maintained above T_L	60~150 seconds	60~150 seconds
Maximum peak package body temperature (T_p)	260℃	235℃
Time(t_p) within 5℃ of the specified temperature (T_c)	30 seconds	20 seconds
Ramp-down rate (T_p to T_L)	6℃/second max.	6℃/second max.
Maximum Time 25℃ to peak temperature	8 minutes max.	6 minutes max.

-. Reflow or hand soldering at the lowest possible temperature is desirable for the LEDs
  although the recommended soldering conditions are specified in the above diagrams.

-. A rapid cooling process is not recommended for the LEDs from the peak temperature.

-. The silicone encapsulant at the top of the LED package is a soft surface, which can easily be
  damaged by pressure. Precautions should be taken to avoid strong pressure on the silicone
  resin when leveraging the pick and place machines.

-. Reflow soldering should not be done more than two times.

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11. Cautions on Use

11-9. Soldering Iron

-. The recommended condition is less than 5 seconds at 260℃.

-. The time must be shorter for higher temperatures. (+10℃ → -1sec).

-. The power dissipation of the soldering iron should be lower than 15W and the surface temperature of the device should be controlled at or under 230℃.

11-10. Eye Safety Guidelines

-. Do not directly look at the light when the LEDs are on.

-. Proceed with caution to avoid the risk of damage to the eyes when examining the LEDs with optical instruments.

11-11. Manual Handling

-. Use Teflon-type tweezers to grab the base of LED and do not apply mechanical pressure on the surface of the encapsulant.

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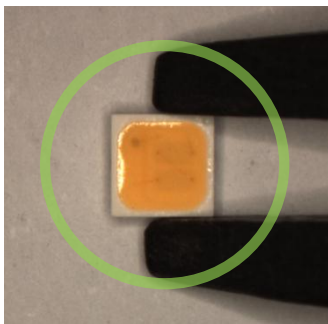
Appendix. Nomenclature of Package

All LEDs are tested and sorted by color, luminous flux and forward voltage where every LED in a tube has only a single color bin, luminous flux bin and forward voltage bin. However, the forward voltage bin information is not captured in the part number nomenclature.

A 16-digit part number is required when orders are placed. LG Innotek leverages the following part number nomenclature.

Type
  LE = Light Emitting Diode

Color
  RR = Red
  BB = Blue
  MW = Multi Mixing White
  MC = Multi Color

PKG Type
  S = SMD Type
  M = Module Type
  A = Ceramic Type
  H = High Power SMD Type

Label Code
  0 = MES
  A = NEDA

PKG Dimension

Revision

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

Flux Bin Code
  0 = Full Bins
  1 = 15% Micro-Bins
  2 = 7.5% Micro-Bins

CIE Bin Code
  1 = 4 Bins
  2 = 9 Bins
  3 = 16 Bins

Special Code

CIE Bin

Optical Bin (CRI)

Optical Bin (Flux)

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MODEL	LEMWS28Q80 Series	DOCUMENT No.	-
REG.DATE	2015.01.28	REV. No.	3.0
REV.DATE	2015.10.19	PAGE	-

History of Revision

Revision	Date	Contents Revision	Remark
Rev.0.0	15.01.28	New Establishment	
Rev.1.0	15.04.03	Change the Part Number	P6
Rev.2.0	15.10.09	Add the NEDA Label format	
Rev.3.0	15.10.19	Adjust the typical value	P4

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