

CUSTOMER : _____.

DATE : _____.

REV : _____.

SPECIFICATIONS FOR APPROVAL



Top View Type White SMD LED

MODEL NAME : LEMWS59R80 Series



APPROVAL	REMARK	APPENDIX

DESIGNED	CHECKED	APPROVED

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1. Features

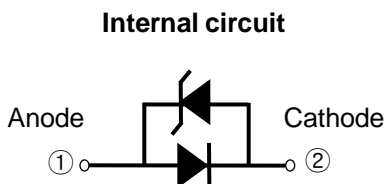
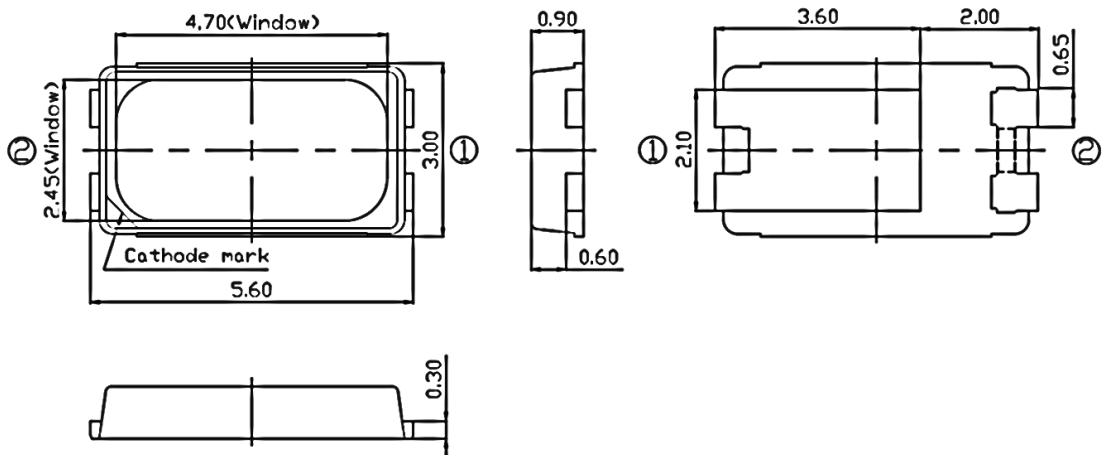
- Lighting Color : White
- Lead Frame Type LED Package : 5.6 x 3.0 x 0.9 mm (L x W x H) [Unit : mm]
- Viewing Angle : 120°
- Chip Material : InGaN
- Soldering Methods : Reflow soldering
- Taping : 12mm conductive black carrier tape and antistatic clear cover tape
3,000 pcs/reel, Φ 178 mm reel

2. Application

- Interior and Exterior Illumination

3. Outline Dimensions

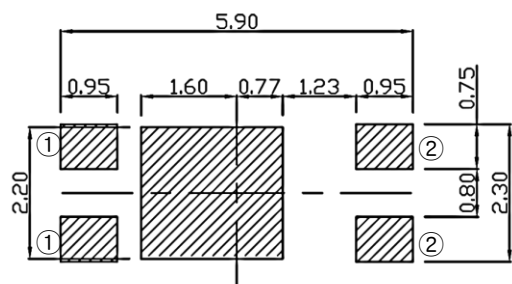
(Unit : mm)



Pad Configuration

- ① Anode Pad
- ② Cathode Pad

Recommendable soldering pattern
(For reflow soldering)



▪ Tolerances unless otherwise mentioned are ± 0.10 mm

4. Absolute Maximum Ratings

(Ta=25°C)

Item	Symbol	Rating	Unit
Forward Current	If	200	mA
Pulse Forward Current*1)	Ifp	260	mA
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +100	°C
Junction Temperature	Tj	110	°C
Soldering Temperature	JEDEC-J-STD-020D		
ESD Classification	Class 2 (ANSI/ESDA/JEDEC JS-001)		

*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°C)

Item	Symbol	Condition	CCT	Min.	Typ.	Max.	Unit
Luminous Flux I ^{*1)}	Φv	If =65mA	6500 (F)	31.9	-	38.3	lm
			5700 (G)	32.2	-	38.6	
			5000 (H)	32.5	-	39.0	
			4000 (J)	31.2	-	37.5	
			3500 (K)	30.6	-	36.9	
			3000 (L)	30.2	-	36.5	
			2700 (M)	28.6	-	34.7	
Forward Voltage	Vf	If =65mA	All	2.70	-	3.00	V
Color Coordinate	Cx / Cy	If =65mA	All	Refer to "Chromaticity Bins"			-
Color Rendering Index (CRI)	Ra	If =65mA	All	80.0	-	-	-
Viewing Angle	2Θ1/2	If =65mA	All	-	120	-	deg
Typical Temperature Coefficient of Forward Voltage*2)	ΔVf / ΔTj	If =65mA	All	-1.0	-	-3.0	mV/°C
Thermal Resistance, Junction to Solder Point	Rth j-s	If =65mA	All	-	15	-	°C/W

*1) These values are measured by a standard of LED component level
(Refer to appendix pages for assembly level values)

*2) Measured at Ta between 25°C and 85°C

- ※ 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.

5. Electro - Optical Characteristics

▪ By a standard of component level

(Ta=25℃)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
6500K (F)	R3	30	2.69	0.081	14.3	178
		65	2.85	0.185	32.6	177
		100	2.98	0.298	45.3	152
		150	3.15	0.473	65.5	139
		200	3.29	0.658	84.2	128
	R4	30	2.67	0.080	16.3	203
		65	2.80	0.182	34.3	188
		100	2.90	0.290	51.2	177
		150	3.04	0.455	73.6	162
		200	3.14	0.629	94.0	149
	R5	30	2.67	0.080	16.7	208
		65	2.76	0.179	35.6	198
		100	2.84	0.284	53.7	189
		150	2.94	0.441	79.0	179
		200	3.03	0.606	101.6	167
	R6	30	2.67	0.080	17.4	217
		65	2.76	0.179	37.1	207
		100	2.84	0.284	56.0	197
150		2.94	0.441	82.3	187	
200		3.03	0.606	105.9	175	
5700K (G)	R3	30	2.69	0.081	15.6	194
		65	2.85	0.185	33.0	178
		100	2.98	0.298	49.4	166
		150	3.15	0.473	71.3	151
		200	3.29	0.658	91.8	139
	R4	30	2.67	0.080	16.5	205
		65	2.80	0.182	34.6	190
		100	2.90	0.290	51.6	178
		150	3.04	0.455	74.1	163
		200	3.14	0.629	94.7	151
	R5	30	2.67	0.080	16.8	210
		65	2.76	0.179	35.9	200
		100	2.84	0.284	54.2	190
		150	2.94	0.441	79.7	180
		200	3.03	0.606	102.5	169
	R6	30	2.67	0.080	17.5	218
		65	2.76	0.179	37.4	208
		100	2.84	0.284	56.5	199
150		2.94	0.441	83.0	188	
200		3.03	0.606	106.8	176	

5. Electro - Optical Characteristics

▪ By a standard of component level

(Ta=25℃)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
5000K (H)	R3	30	2.69	0.081	15.7	195
		65	2.85	0.185	33.3	180
		100	2.98	0.298	49.7	167
		150	3.15	0.473	71.8	152
		200	3.29	0.658	92.3	140
	R4	30	2.67	0.080	16.7	208
		65	2.80	0.182	34.9	192
		100	2.90	0.290	52.0	179
		150	3.04	0.455	74.6	164
		200	3.14	0.629	95.4	152
	R5	30	2.67	0.080	16.9	211
		65	2.76	0.179	36.2	202
		100	2.84	0.284	54.6	192
		150	2.94	0.441	80.4	182
		200	3.03	0.606	103.3	170
	R6	30	2.67	0.080	17.6	220
		65	2.76	0.179	37.7	210
		100	2.84	0.284	56.9	200
		150	2.94	0.441	83.7	190
		200	3.03	0.606	107.6	178
4000K (J)	R3	30	2.69	0.081	15.2	188
		65	2.85	0.185	32.0	173
		100	2.98	0.298	47.9	161
		150	3.15	0.473	69.2	146
		200	3.29	0.658	88.9	135
	R4	30	2.67	0.080	16.0	199
		65	2.80	0.182	33.6	185
		100	2.90	0.290	50.1	173
		150	3.04	0.455	71.9	158
		200	3.14	0.629	91.7	146
	R5	30	2.67	0.080	16.4	205
		65	2.76	0.179	34.9	195
		100	2.84	0.284	52.3	184
		150	2.94	0.441	75.8	171
		200	3.03	0.606	97.7	161
	R6	30	2.67	0.080	17.1	213
		65	2.76	0.179	36.3	202
		100	2.84	0.284	54.4	192
		150	2.94	0.441	78.8	179
		200	3.03	0.606	101.6	168

5. Electro - Optical Characteristics

▪ By a standard of component level

(Ta=25℃)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
3500K (K)	R3	30	2.69	0.081	15.1	187
		65	2.85	0.185	31.4	170
		100	2.98	0.298	47.5	160
		150	3.15	0.473	68.8	146
		200	3.29	0.658	99.1	151
	R4	30	2.67	0.080	15.5	193
		65	2.80	0.182	32.6	179
		100	2.90	0.290	48.6	168
		150	3.04	0.455	69.8	153
		200	3.14	0.629	89.2	142
	R5	30	2.67	0.080	16.2	202
		65	2.76	0.179	34.3	191
		100	2.84	0.284	51.5	181
		150	2.94	0.441	74.6	169
		200	3.03	0.606	96.2	158
	R6	30	2.67	0.080	16.9	211
		65	2.76	0.179	35.7	199
		100	2.84	0.284	53.6	189
		150	2.94	0.441	77.6	176
		200	3.03	0.606	100.1	165
3000K (L)	R3	30	2.69	0.081	14.7	182
		65	2.85	0.185	31.0	167
		100	2.98	0.298	46.3	156
		150	3.15	0.473	67.0	142
		200	3.29	0.658	96.6	147
	R4	30	2.67	0.080	15.5	193
		65	2.80	0.182	32.6	179
		100	2.90	0.290	48.6	168
		150	3.04	0.455	69.8	153
		200	3.14	0.629	89.2	142
	R5	30	2.67	0.080	16.0	200
		65	2.76	0.179	33.9	189
		100	2.84	0.284	50.9	179
		150	2.94	0.441	73.7	167
		200	3.03	0.606	95.1	156
	R6	30	2.67	0.080	16.7	208
		65	2.76	0.179	35.3	197
		100	2.84	0.284	53.0	187
		150	2.94	0.441	76.7	174
		200	3.03	0.606	99.0	163

5. Electro - Optical Characteristics

▪ By a standard of component level

(Ta=25℃)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
2700K (M)	R3	30	2.69	0.081	14.0	173
		65	2.85	0.185	29.4	159
		100	2.98	0.298	44.1	148
		150	3.15	0.473	63.6	135
		200	3.29	0.658	81.6	124
	R4	30	2.67	0.080	15.1	188
		65	2.80	0.182	31.0	170
		100	2.90	0.290	48.1	166
		150	3.04	0.455	69.4	152
		200	3.14	0.629	89.3	142
	R5	30	2.67	0.080	15.2	190
		65	2.76	0.179	32.3	180
		100	2.84	0.284	48.5	170
		150	2.94	0.441	70.2	159
		200	3.03	0.606	90.6	149
	R6	30	2.67	0.080	15.8	197
		65	2.76	0.179	33.6	187
		100	2.84	0.284	50.5	178
		150	2.94	0.441	73.0	166
		200	3.03	0.606	94.2	156

6. Bins Structure and Order Code

(Ta=25°C, @65mA)

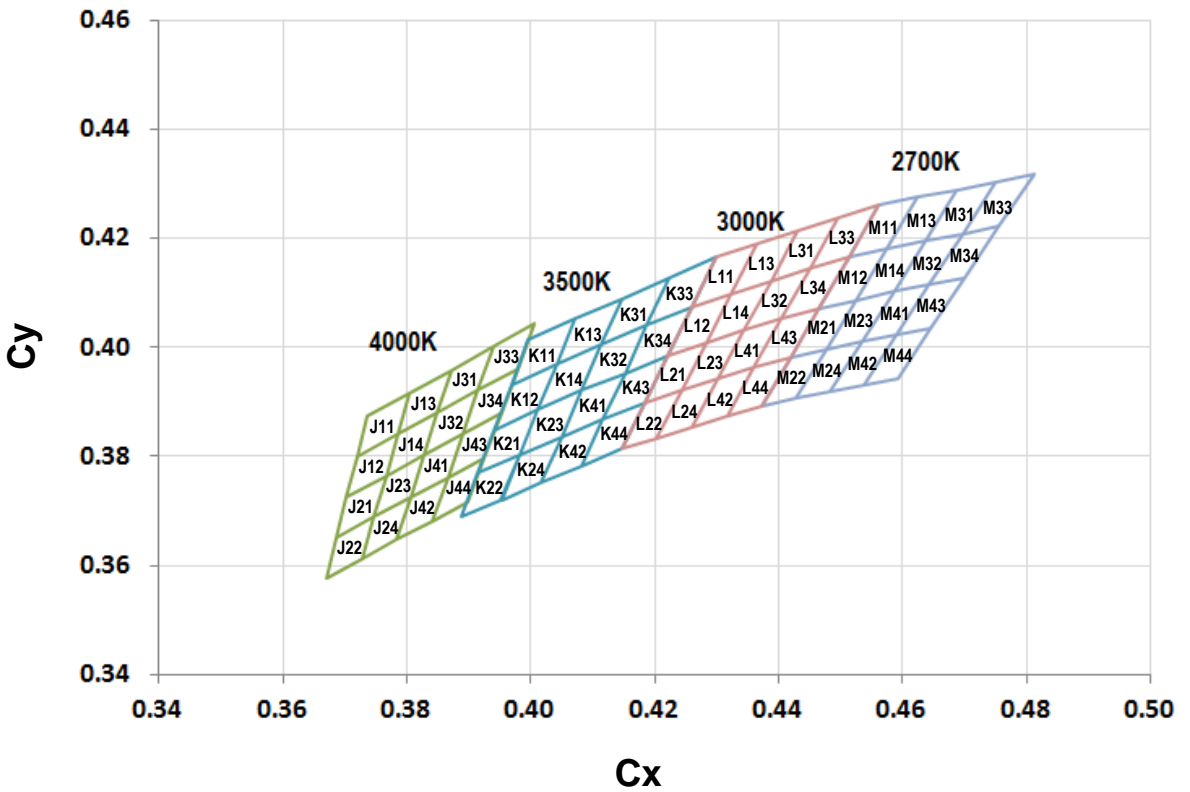
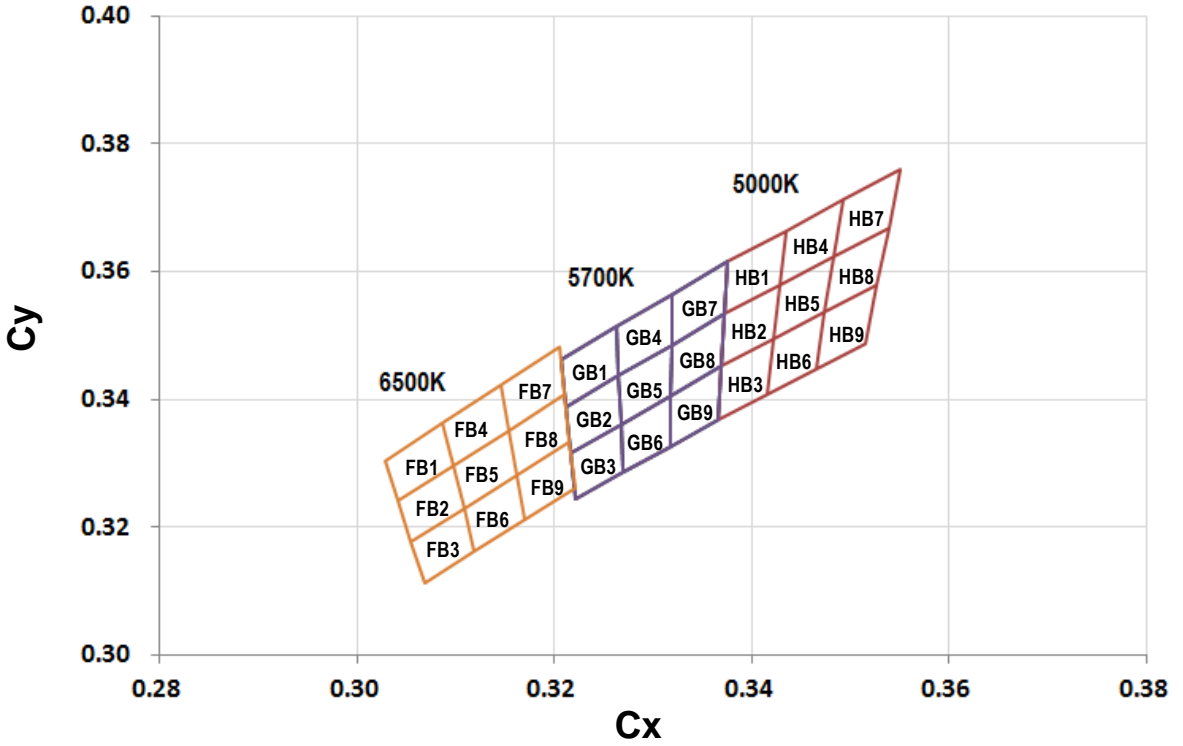
Color	CRI	CCT [K]	Vf [V]			Luminous Flux*1) [lm]			Order Code				
			Bin Code	Min	Max	Bin Code	Min	Max					
Cool	80	6500 (F)	8A	2.70	2.75	R3	31.9	33.5	LEMWS59R80FZ2B**				
			8B	2.75	2.80								
			9A	2.80	2.85					R4	33.5	35.1	LEMWS59R80FZ2D**
			9B	2.85	2.90					R5	34.7	36.5	LEMWS59R80FZ2E**
			0A	2.90	2.95					R6	36.5	38.3	LEMWS59R80FZ2F**
			0B	2.95	3.00								
	80	5700 (G)	8A	2.70	2.75	R3	32.2	33.8	LEMWS59R80GZ2B**				
			8B	2.75	2.80								
			9A	2.80	2.85					R4	33.8	35.4	LEMWS59R80GZ2D**
9B			2.85	2.90	R5					35.0	36.8	LEMWS59R80GZ2E**	
0A			2.90	2.95	R6					36.8	38.6	LEMWS59R80GZ2F**	
0B			2.95	3.00									
80	5000 (H)	8A	2.70	2.75	R3	32.5	34.1	LEMWS59R80HZ2B**					
		8B	2.75	2.80									
		9A	2.80	2.85					R4	34.1	35.7	LEMWS59R80HZ2D**	
		9B	2.85	2.90					R5	35.3	37.1	LEMWS59R80HZ2E**	
		0A	2.90	2.95					R6	37.1	39.0	LEMWS59R80HZ2F**	
		0B	2.95	3.00									
Neutral	80	4000 (J)	8A	2.70	2.75	R3	31.2	32.8	LEMWS59R80JZ3B**				
			8B	2.75	2.80								
			9A	2.80	2.85					R4	32.8	34.4	LEMWS59R80JZ3D**
			9B	2.85	2.90					R5	34.1	35.8	LEMWS59R80JZ3E**
			0A	2.90	2.95					R6	35.8	37.5	LEMWS59R80JZ3F**
			0B	2.95	3.00								
Warm	80	3500 (K)	8A	2.70	2.75	R3	30.6	32.2	LEMWS59R80KZ3B**				
			8B	2.75	2.80								
			9A	2.80	2.85					R4	32.2	33.8	LEMWS59R80KZ3D**
			9B	2.85	2.90					R5	33.5	35.1	LEMWS59R80KZ3E**
			0A	2.90	2.95					R6	35.1	36.9	LEMWS59R80KZ3F**
			0B	2.95	3.00								
	80	3000 (L)	8A	2.70	2.75	R3	30.2	31.8	LEMWS59R80LZ3B**				
			8B	2.75	2.80								
			9A	2.80	2.85					R4	31.8	33.4	LEMWS59R80LZ3D**
			9B	2.85	2.90					R5	33.1	34.7	LEMWS59R80LZ3E**
			0A	2.90	2.95					R6	34.7	36.5	LEMWS59R80LZ3F**
			0B	2.95	3.00								
	80	2700 (M)	8A	2.70	2.75	R3	28.6	30.2	LEMWS59R80MZ3B**				
			8B	2.75	2.80								
			9A	2.80	2.85					R4	30.2	31.8	LEMWS59R80MZ3D**
			9B	2.85	2.90					R5	31.5	33.1	LEMWS59R80MZ3E**
			0A	2.90	2.95					R6	33.1	34.7	LEMWS59R80MZ3F**
			0B	2.95	3.00								

*1) These values are measured by a standard of LED component level
(Refer to appendix pages for assembly level values)

※ Φv values are for representative references only.

6. Bins Structure and Order Code

- Color Bins (@65mA)



6. Bins Structure and Order Code

- Color Bins (@65mA)

※ Ansi Bin

5000K			5700K			6500K		
Bin	Cx	Cy	Bin	Cx	Cy	Bin	Cx	Cy
HB1	0.3376	0.3616	GB1	0.3207	0.3462	FB1	0.3028	0.3304
	0.3434	0.3664		0.3263	0.3513		0.3087	0.3363
	0.3428	0.3579		0.3266	0.3437		0.3098	0.3296
	0.3373	0.3534		0.3212	0.3389		0.3041	0.3240
HB2	0.3373	0.3534	GB2	0.3212	0.3389	FB2	0.3041	0.3240
	0.3428	0.3579		0.3266	0.3437		0.3098	0.3296
	0.3422	0.3494		0.3268	0.3361		0.3108	0.3229
	0.3369	0.3451		0.3217	0.3316		0.3055	0.3177
HB3	0.3369	0.3451	GB3	0.3217	0.3316	FB3	0.3055	0.3177
	0.3422	0.3494		0.3268	0.3361		0.3108	0.3229
	0.3416	0.3408		0.3270	0.3285		0.3119	0.3162
	0.3366	0.3369		0.3222	0.3243		0.3068	0.3113
HB4	0.3434	0.3664	GB4	0.3263	0.3513	FB4	0.3087	0.3363
	0.3493	0.3712		0.3320	0.3565		0.3146	0.3422
	0.3484	0.3624		0.3319	0.3485		0.3154	0.3352
	0.3428	0.3579		0.3266	0.3437		0.3098	0.3296
HB5	0.3428	0.3579	GB5	0.3266	0.3437	FB5	0.3098	0.3296
	0.3484	0.3624		0.3319	0.3485		0.3154	0.3352
	0.3474	0.3536		0.3319	0.3406		0.3162	0.3282
	0.3422	0.3494		0.3268	0.3361		0.3108	0.3229
HB6	0.3422	0.3494	GB6	0.3268	0.3361	FB6	0.3108	0.3229
	0.3474	0.3536		0.3319	0.3406		0.3162	0.3282
	0.3465	0.3448		0.3318	0.3327		0.3170	0.3212
	0.3416	0.3408		0.3270	0.3285		0.3119	0.3162
HB7	0.3493	0.3712	GB7	0.3320	0.3565	FB7	0.3146	0.3422
	0.3551	0.3760		0.3376	0.3616		0.3205	0.3481
	0.3539	0.3669		0.3373	0.3534		0.3210	0.3408
	0.3484	0.3624		0.3319	0.3485		0.3154	0.3352
HB8	0.3484	0.3624	GB8	0.3319	0.3485	FB8	0.3154	0.3352
	0.3539	0.3669		0.3373	0.3534		0.3210	0.3408
	0.3527	0.3578		0.3369	0.3451		0.3216	0.3334
	0.3474	0.3536		0.3319	0.3406		0.3162	0.3282
HB9	0.3474	0.3536	GB9	0.3319	0.3406	FB9	0.3162	0.3282
	0.3527	0.3578		0.3369	0.3451		0.3216	0.3334
	0.3515	0.3487		0.3366	0.3369		0.3221	0.3261
	0.3465	0.3448		0.3318	0.3327		0.3170	0.3212

6. Bins Structure and Order Code

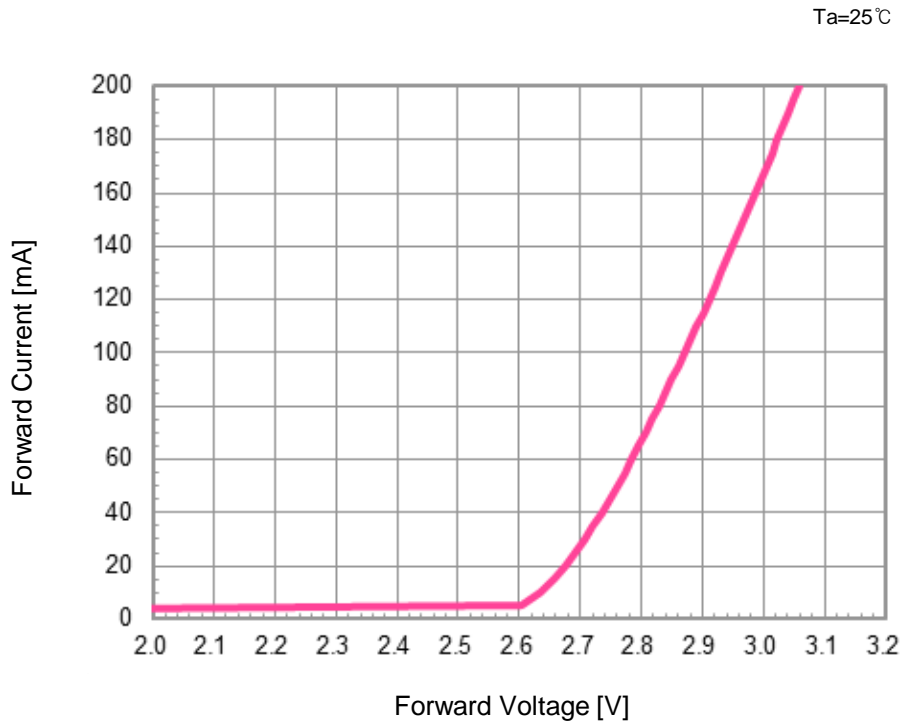
▪ Color Bins (@65mA)

※ Ansi Bin

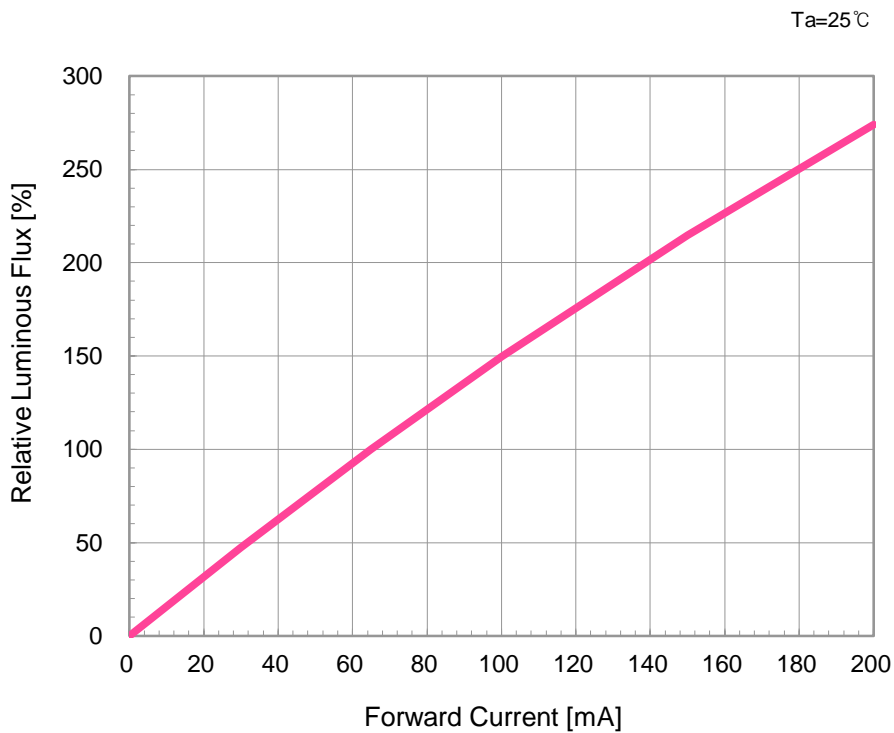
2700K			3000K			3500K			400K		
Rank	CIE X	CIE Y	Rank	CIE X	CIE Y	Rank	CIE X	CIE Y	Rank	CIE X	CIE Y
M11	0.4562	0.4260	L11	0.4299	0.4165	K11	0.3996	0.4015	J11	0.3736	0.3874
	0.4625	0.4275		0.4364	0.4189		0.4071	0.4052		0.3804	0.3917
	0.4575	0.4181		0.4323	0.4098		0.4041	0.3969		0.3785	0.3841
	0.4513	0.4166		0.4260	0.4075		0.3969	0.3932		0.3720	0.3800
M12	0.4513	0.4166	L12	0.4260	0.4075	K12	0.3969	0.3932	J12	0.3720	0.3800
	0.4575	0.4181		0.4323	0.4098		0.4041	0.3969		0.3785	0.3841
	0.4525	0.4087		0.4282	0.4008		0.4012	0.3885		0.3766	0.3765
	0.4465	0.4071		0.4221	0.3984		0.3941	0.3848		0.3703	0.3726
M13	0.4625	0.4275	L13	0.4364	0.4189	K13	0.4071	0.4052	J13	0.3804	0.3917
	0.4687	0.4289		0.4430	0.4212		0.4146	0.4089		0.3871	0.3959
	0.4637	0.4196		0.4387	0.4122		0.4114	0.4005		0.3849	0.3881
	0.4575	0.4181		0.4323	0.4098		0.4041	0.3969		0.3785	0.3841
M14	0.4575	0.4181	L14	0.4323	0.4098	K14	0.4041	0.3969	J14	0.3785	0.3841
	0.4637	0.4196		0.4387	0.4122		0.4114	0.4005		0.3849	0.3881
	0.4586	0.4103		0.4344	0.4032		0.4082	0.3922		0.3828	0.3803
	0.4525	0.4087		0.4282	0.4008		0.4012	0.3885		0.3766	0.3765
M21	0.4465	0.4071	L21	0.4221	0.3984	K21	0.3941	0.3848	J21	0.3703	0.3726
	0.4525	0.4087		0.4282	0.4008		0.4012	0.3885		0.3766	0.3765
	0.4477	0.3996		0.4243	0.3921		0.3982	0.3803		0.3746	0.3689
	0.4419	0.3982		0.4184	0.3899		0.3915	0.3769		0.3687	0.3652
M22	0.4419	0.3982	L22	0.4184	0.3899	K22	0.3915	0.3769	J22	0.3687	0.3652
	0.4477	0.3996		0.4243	0.3921		0.3982	0.3803		0.3746	0.3689
	0.4428	0.3906		0.4203	0.3834		0.3950	0.3721		0.3727	0.3613
	0.4373	0.3893		0.4147	0.3814		0.3889	0.3690		0.3670	0.3578
M23	0.4525	0.4087	L23	0.4282	0.4008	K23	0.4012	0.3885	J23	0.3766	0.3765
	0.4586	0.4103		0.4344	0.4032		0.4082	0.3922		0.3828	0.3803
	0.4535	0.4011		0.4302	0.3943		0.4050	0.3837		0.3806	0.3725
	0.4477	0.3996		0.4243	0.3921		0.3982	0.3803		0.3746	0.3689
M24	0.4477	0.3996	L24	0.4243	0.3921	K24	0.3982	0.3803	J24	0.3746	0.3689
	0.4535	0.4011		0.4302	0.3943		0.4050	0.3837		0.3806	0.3725
	0.4483	0.3918		0.4260	0.3853		0.4017	0.3752		0.3784	0.3647
	0.4428	0.3906		0.4203	0.3834		0.3953	0.3721		0.3727	0.3613
M31	0.4687	0.4289	L31	0.4430	0.4212	K31	0.4146	0.4089	J31	0.3871	0.3959
	0.4750	0.4304		0.4496	0.4236		0.4223	0.4127		0.3939	0.4002
	0.4697	0.4209		0.4450	0.4144		0.4187	0.4040		0.3915	0.3922
	0.4637	0.4196		0.4387	0.4122		0.4114	0.4005		0.3849	0.3881
M32	0.4637	0.4196	L32	0.4387	0.4122	K32	0.4114	0.4005	J32	0.3849	0.3881
	0.4697	0.4209		0.4450	0.4144		0.4187	0.4040		0.3915	0.3922
	0.4643	0.4115		0.4404	0.4052		0.4151	0.3953		0.3890	0.3842
	0.4586	0.4103		0.4344	0.4032		0.4082	0.3922		0.3828	0.3803
M33	0.4750	0.4304	L33	0.4496	0.4236	K33	0.4223	0.4127	J33	0.3939	0.4002
	0.4813	0.4319		0.4562	0.4260		0.4299	0.4165		0.4006	0.4044
	0.4756	0.4223		0.4513	0.4166		0.4260	0.4075		0.3979	0.3962
	0.4697	0.4209		0.4450	0.4144		0.4187	0.4040		0.3915	0.3922
M34	0.4697	0.4209	L34	0.4450	0.4144	K34	0.4187	0.4040	J34	0.3915	0.3922
	0.4756	0.4223		0.4513	0.4166		0.4260	0.4075		0.3979	0.3962
	0.4700	0.4126		0.4465	0.4071		0.4221	0.3984		0.3952	0.3880
	0.4643	0.4115		0.4404	0.4052		0.4151	0.3953		0.3890	0.3842
M41	0.4586	0.4103	L41	0.4344	0.4032	K41	0.4082	0.3922	J41	0.3828	0.3803
	0.4643	0.4115		0.4404	0.4052		0.4151	0.3953		0.3890	0.3842
	0.4590	0.4023		0.4360	0.3962		0.4117	0.3868		0.3866	0.3762
	0.4535	0.4011		0.4302	0.3943		0.4050	0.3837		0.3806	0.3725
M42	0.4535	0.4011	L42	0.4302	0.3943	K42	0.4050	0.3837	J42	0.3806	0.3725
	0.4590	0.4023		0.4360	0.3962		0.4117	0.3868		0.3866	0.3762
	0.4538	0.3931		0.4316	0.3873		0.4082	0.3783		0.3841	0.3682
	0.4483	0.3918		0.4260	0.3853		0.4017	0.3752		0.3784	0.3647
M43	0.4643	0.4115	L43	0.4404	0.4052	K43	0.4151	0.3953	J43	0.3890	0.3842
	0.4700	0.4126		0.4465	0.4071		0.4221	0.3984		0.3952	0.3880
	0.4646	0.4035		0.4419	0.3982		0.4184	0.3899		0.3925	0.3798
	0.4590	0.4023		0.4360	0.3962		0.4117	0.3868		0.3866	0.3762
M44	0.4590	0.4023	L44	0.4360	0.3962	K44	0.4117	0.3868	J44	0.3866	0.3762
	0.4646	0.4035		0.4419	0.3982		0.4184	0.3899		0.3925	0.3798
	0.4593	0.3944		0.4373	0.3893		0.4147	0.3814		0.3898	0.3716
	0.4538	0.3931		0.4316	0.3873		0.4082	0.3783		0.3841	0.3682

7. Typical Characteristic Curves

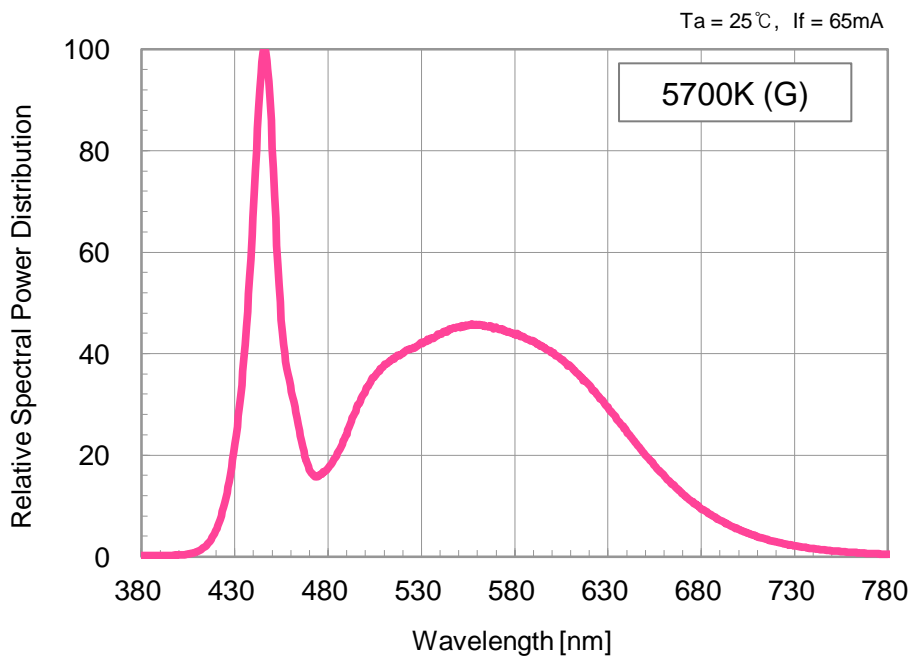
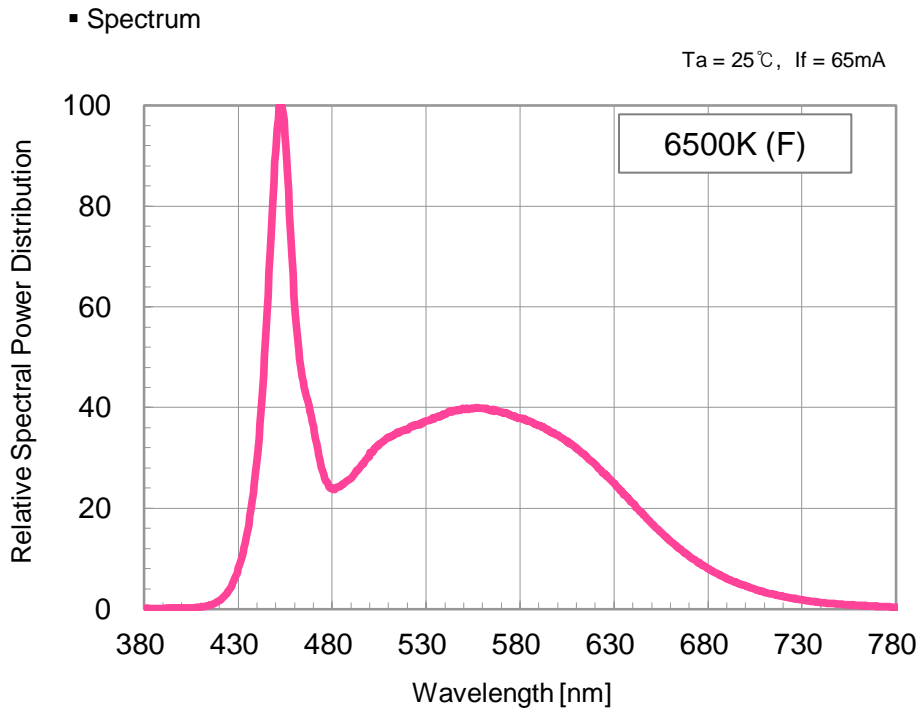
- Forward Current vs. Forward Voltage



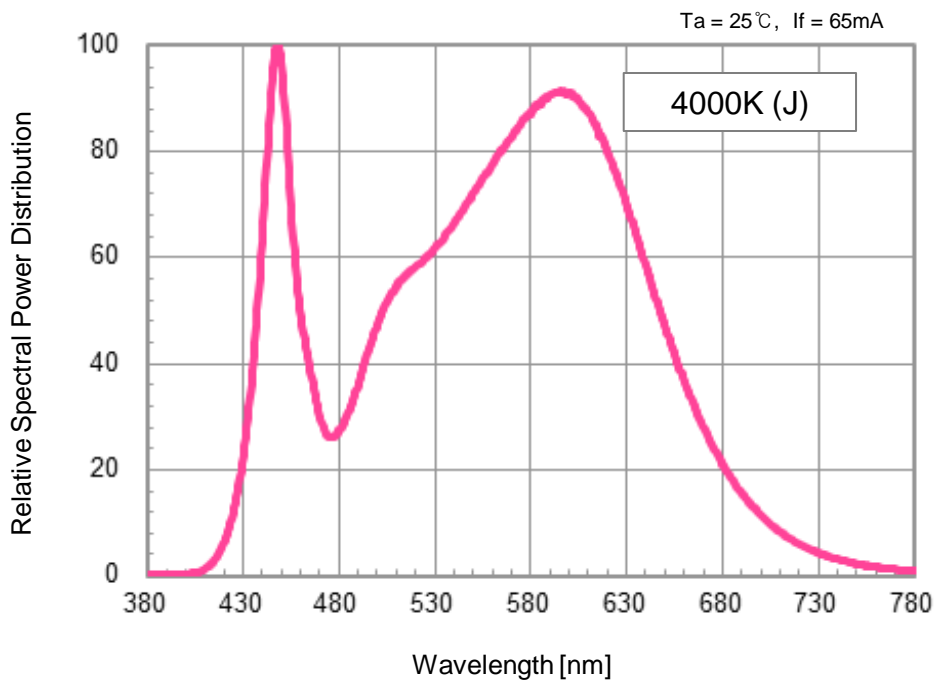
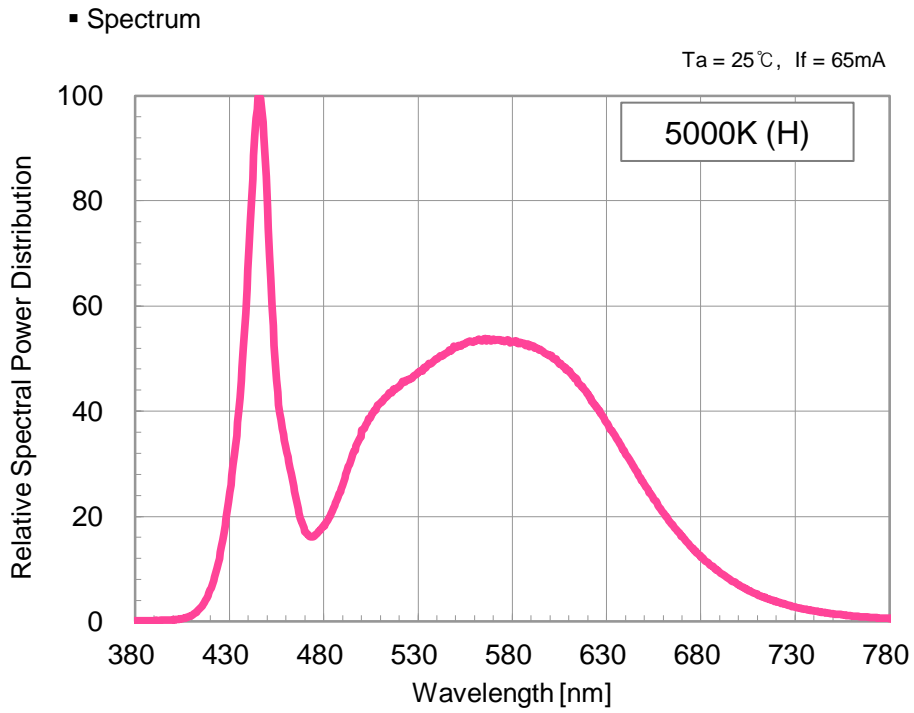
- Relative Luminous Flux vs. Forward Current



7. Typical Characteristic Curves

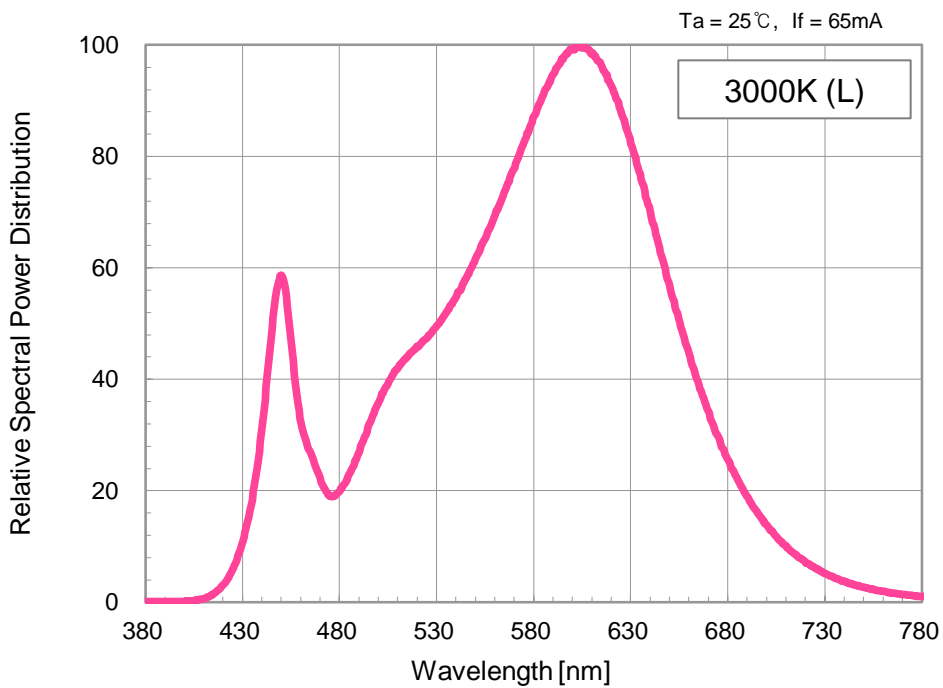
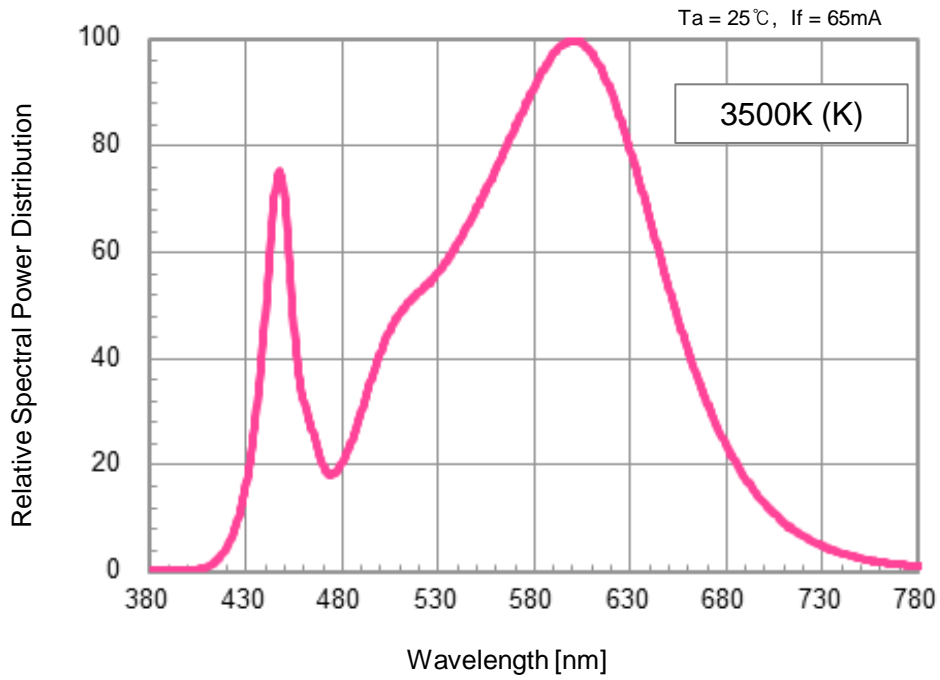


7. Typical Characteristic Curves

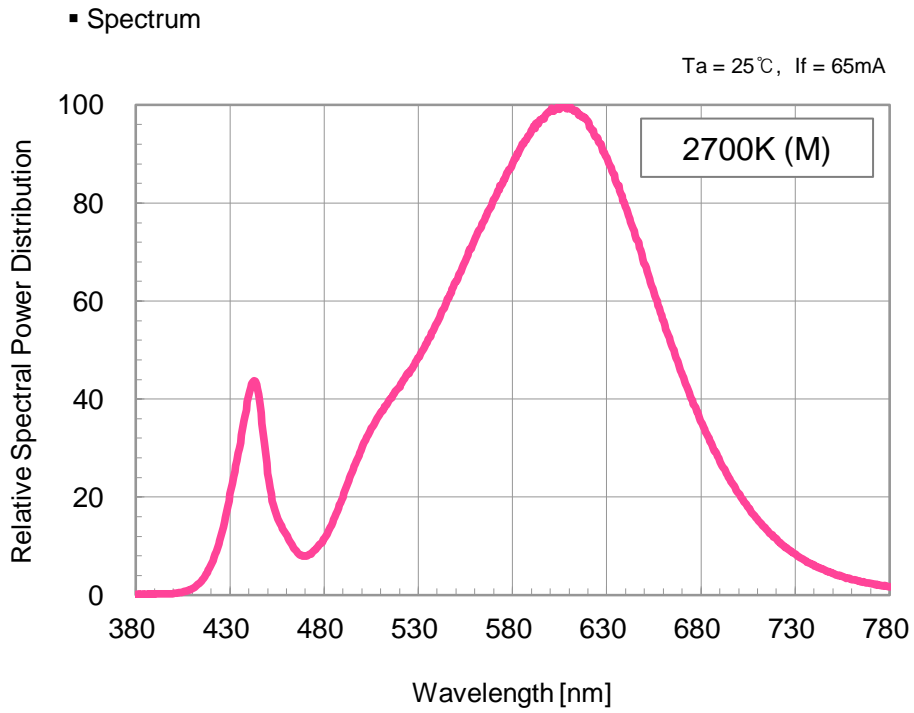


7. Typical Characteristic Curves

▪ Spectrum

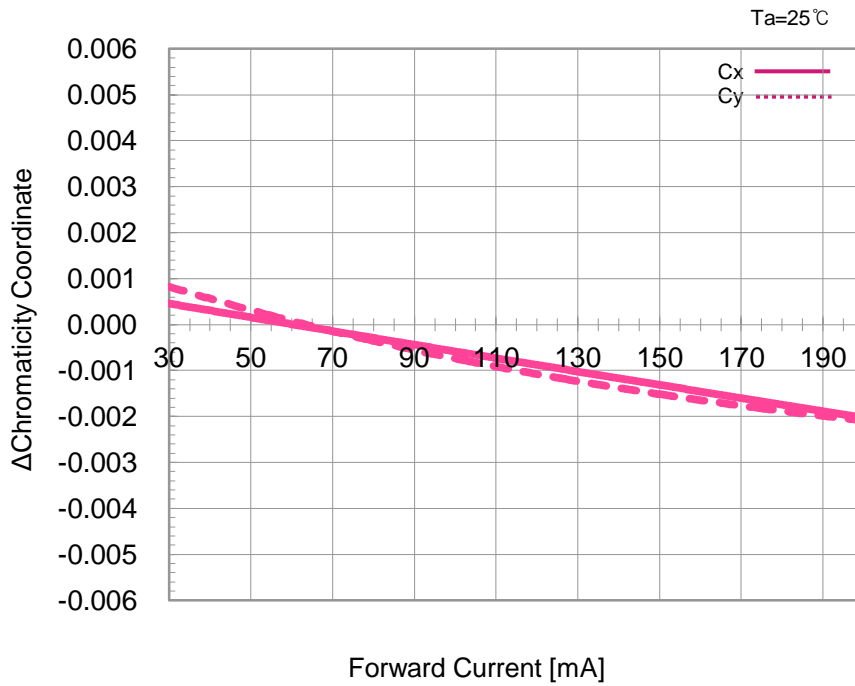


7. Typical Characteristic Curves



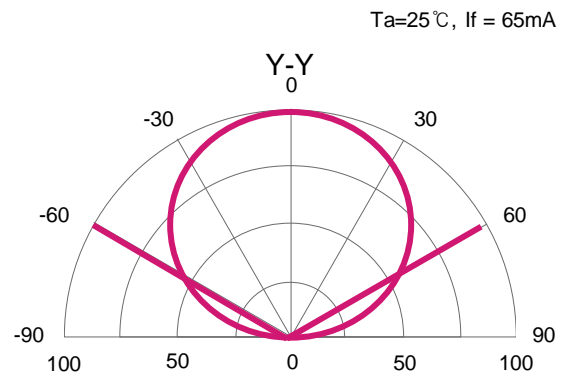
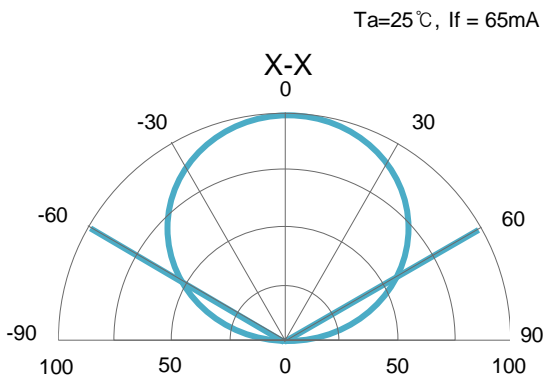
7. Typical Characteristic Curves

- Chromaticity Coordinate vs. Forward Current

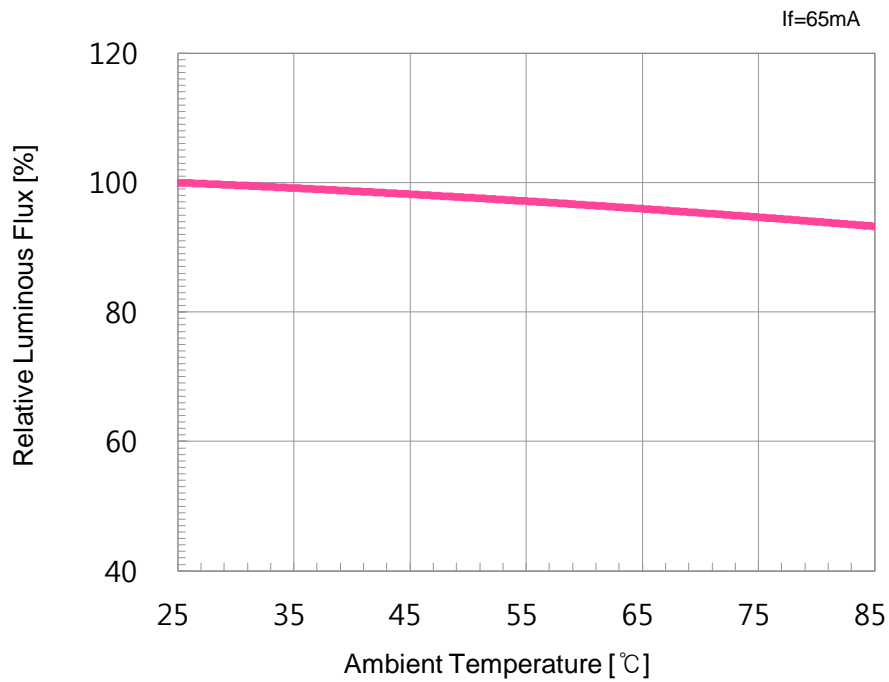


7. Typical Characteristic Curves

- Radiation Characteristics

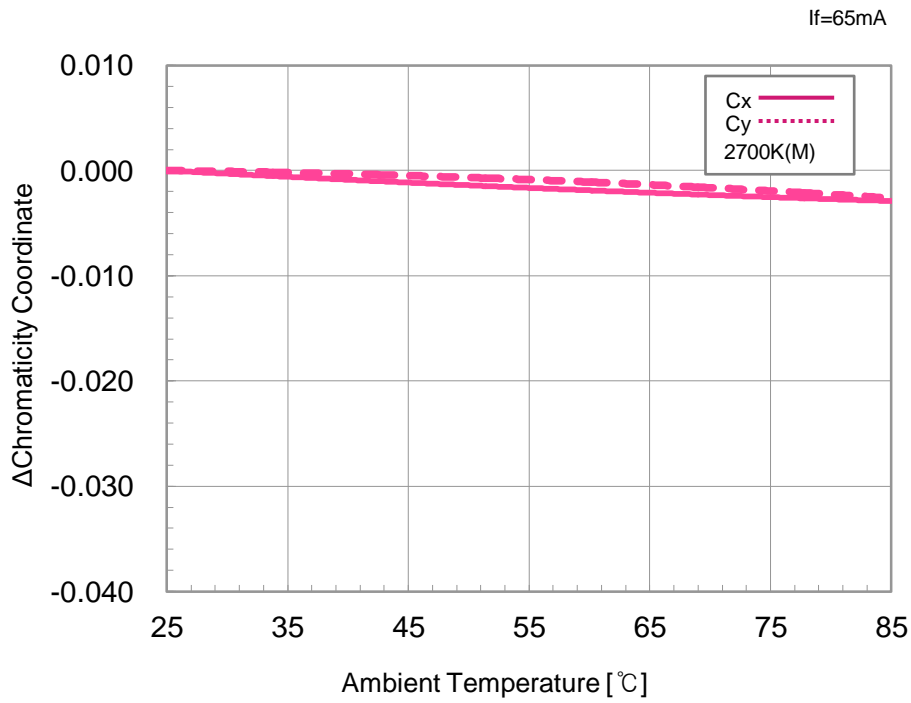


- Luminous Flux vs. Temperature



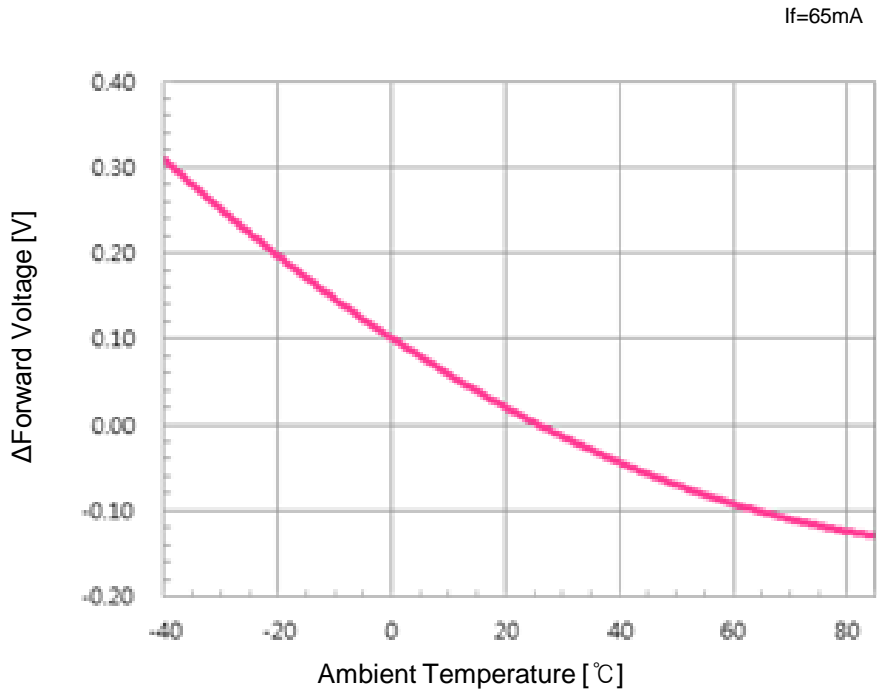
7. Typical Characteristic Curves

- Chromaticity Coordinate vs. Temperature

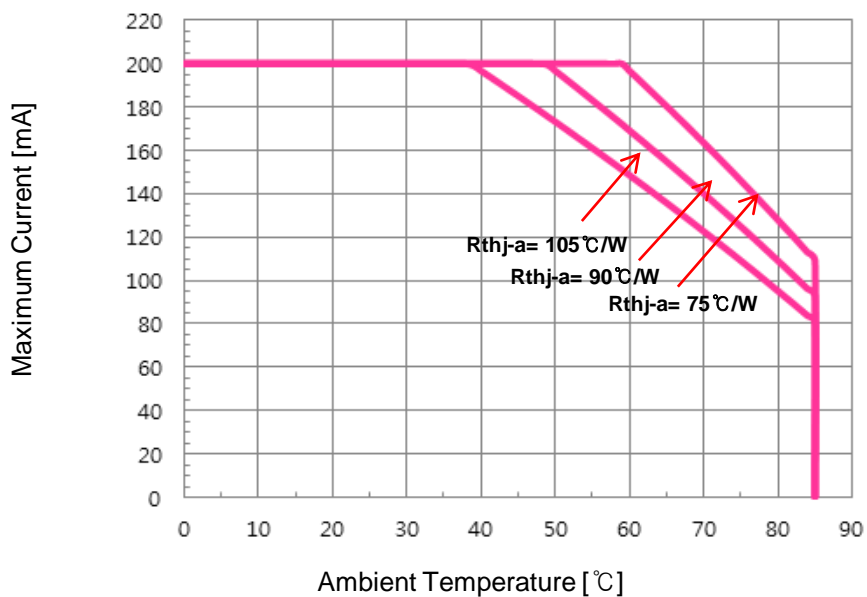


7. Typical Characteristic Curves

- Forward Voltage vs. Temperature



- Derating Curve



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

8. Reliability Test Items and Conditions

8-1. Failure Criteria

Items	Symbol	Test Conditions	Criteria	
			Min.	Max.
Forward Voltage	V _f	I _f = 65mA	-	Initial Value × 1.1
Luminous Flux	Φ _v	I _f = 65mA	Initial Value × 0.7	-

8-2. Reliability Tests

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

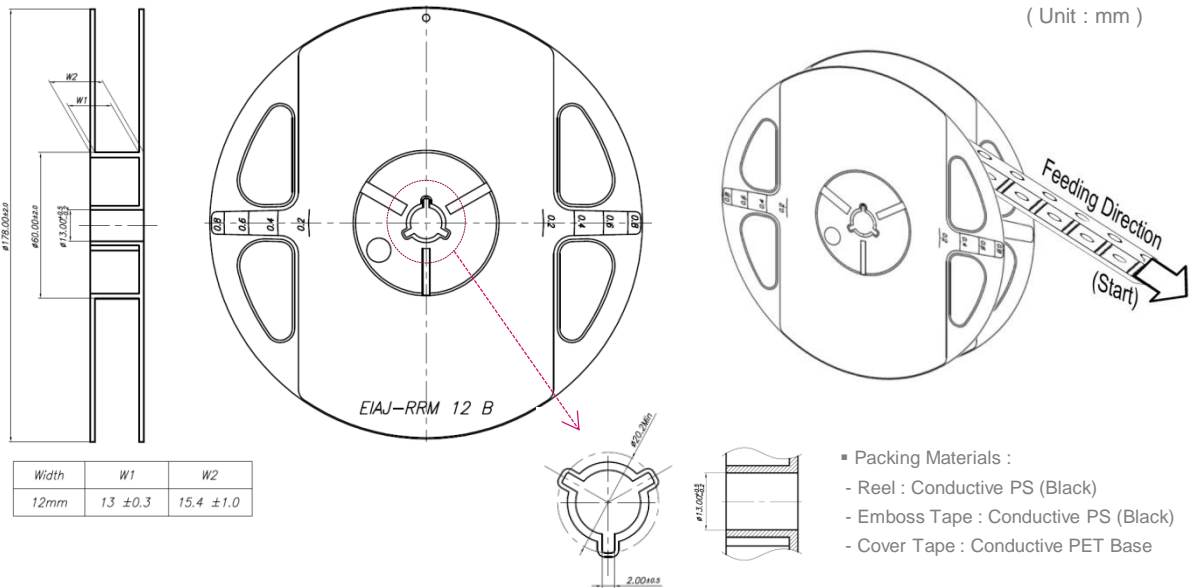
※ All samples are tested using LG Innotek Standard Metal PCB (25x25x1.6 mm³(L×W×H)) except MSL test .

※ All samples must pass each test item and all test items must be satisfied.

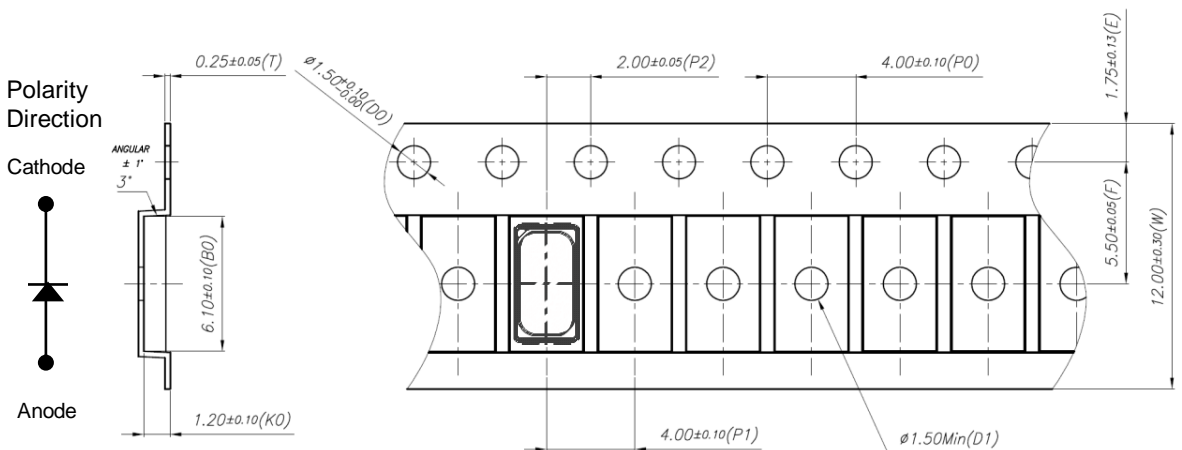
9. Packing and Labeling of Products

9-1. Taping Outline Dimension

Reel



Tape



Taping Arrangement

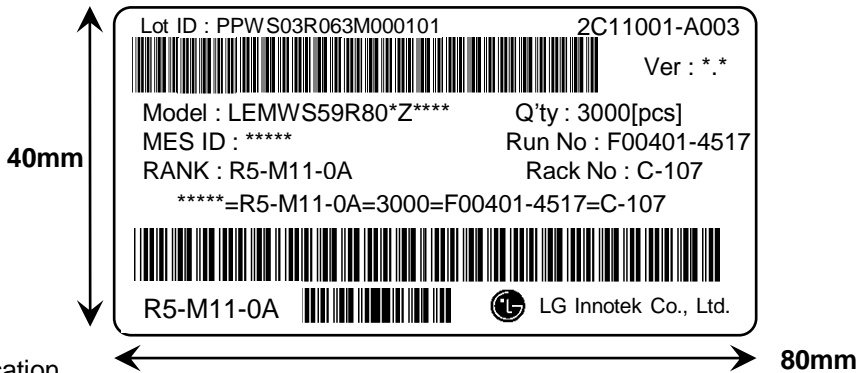


9. Packing and Labeling of Product

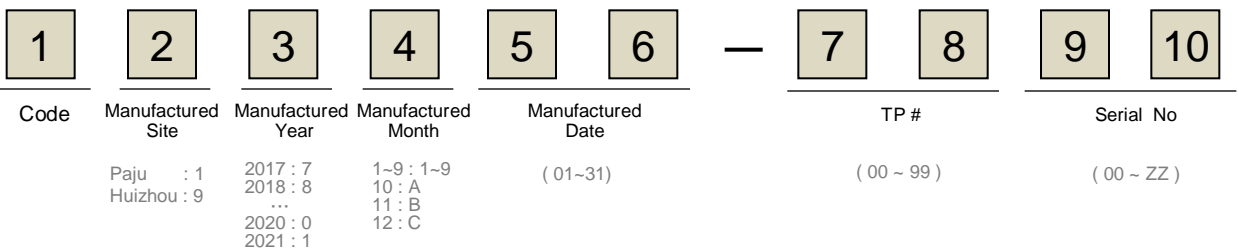
9-2. Label Structure

※ Label A

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

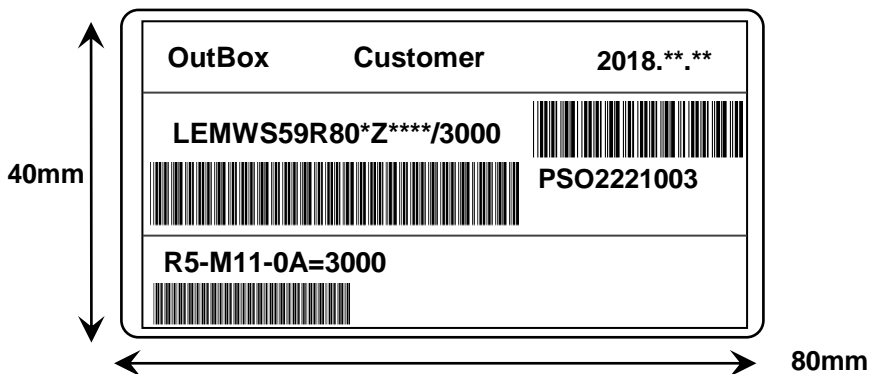


▪ Run No. indication

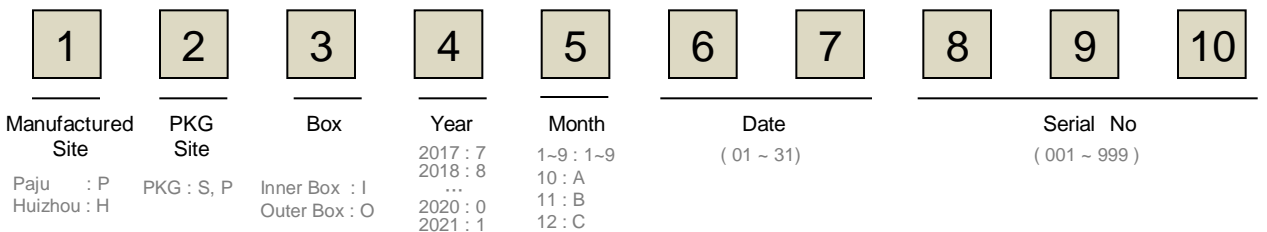


※ Label C

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



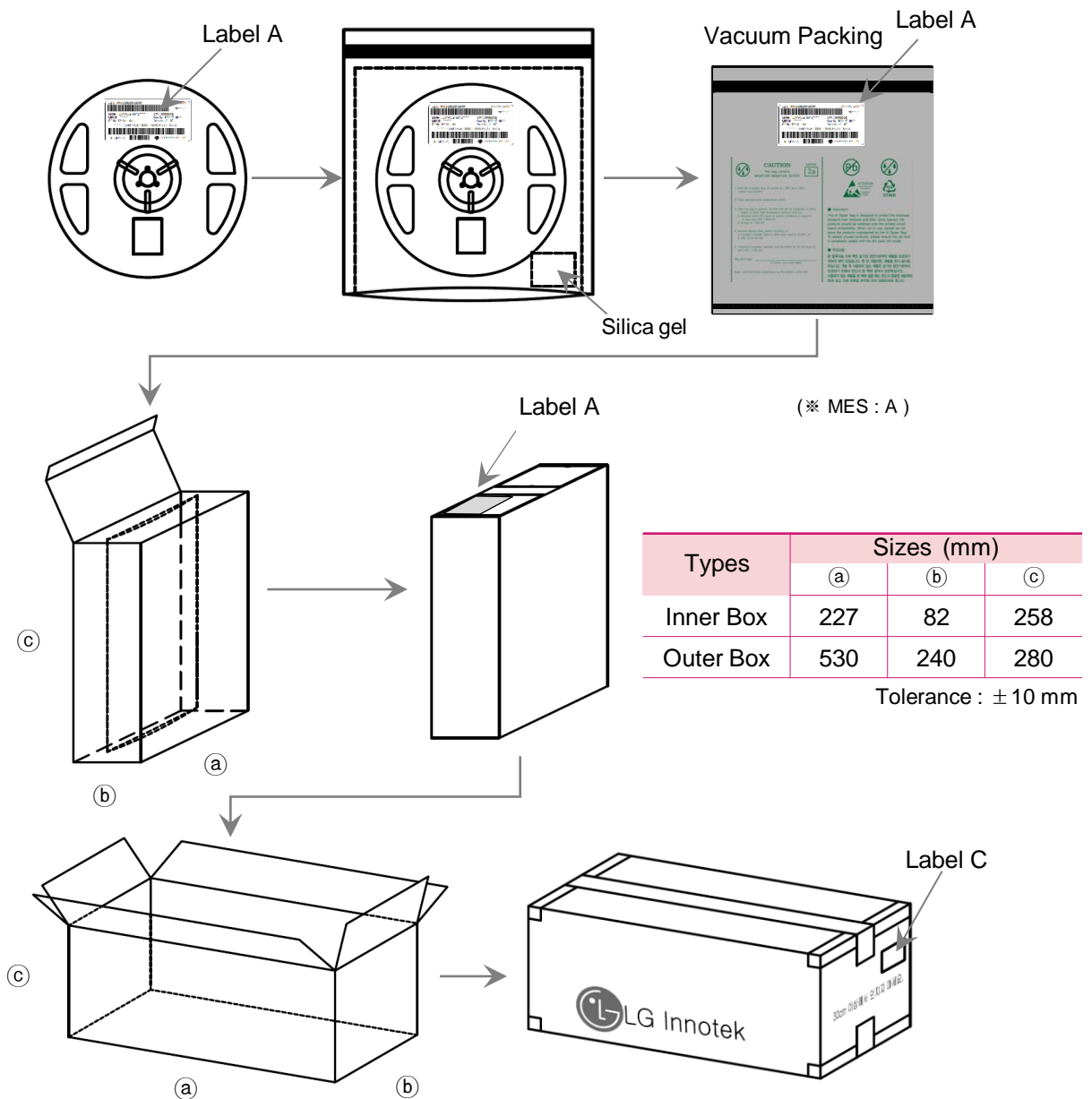
▪ Box ID. indication



9. Packing and Labeling of Products

9-3. Packing Structures

Reeled products are packed in a sealed-off and moisture-proof aluminum bag with desiccants (silica gel). Max four aluminum bags are packed in an inner box and six inner boxes are packed in an outer box.



10. Cautions on Use

10-1. 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.

10-2. During Storage

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

- The LEDs should be stored in a clean environment. If the LEDs are stored for 3 months or more after being shipped from LGIT, a sealed container with a nitrogen gas should be used for storage.
- When storing the LEDs after opening aluminum bag, reseal with a moisture absorbent material inside

10-3. During Usage

- The LED should be avoided direct contact with hazardous materials such as sulfur, chlorine, phthalate, acid, solvent, etc. These materials(S, Cl, VOCs, etc.) may cause sulfurization of silver lead-frame or encapsulant silicone discoloration in LED.
VOCs(Volatile Organic Compounds) can be generated from adhesives glue, cleaning flux, molding hardener or organic additive which used in luminaires fixtures and they(VOCs) may cause a significant lumen degradation of LED in luminaires when they exposed to heat or light.
To prevent this phenomenon, materials used in luminaires must be carefully selected by users.
- The metal parts(Including silver plated metal) on the LED can rust when exposed to corrosive gases. Therefore, exposure to corrosive gases must be avoided during operation and storage.
- The metal parts(Including silver plated metal) 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.

10-4. 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.
Cleaning Condition : IPA, 25°C max. × 60sec 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.

10. Cautions on Use

10-5. 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.

10-6. 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.

10-7. Recommended Circuit

- The current through each LED must not exceed the absolute maximum rating when designing the circuits.
- In general, there can be various forward voltages for LEDs. Different forward voltages in parallel via a single resistor can result in different forward currents to each LED, which also can 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 the luminous flux fluctuations.

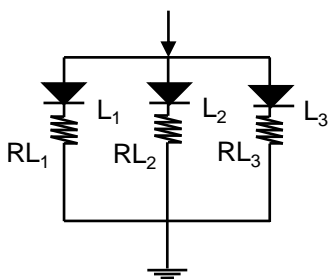


Fig.1 Recommended Circuit in Parallel Mode
: Separate resistors must be used for each LED.

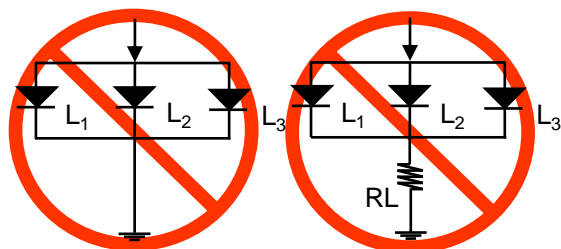


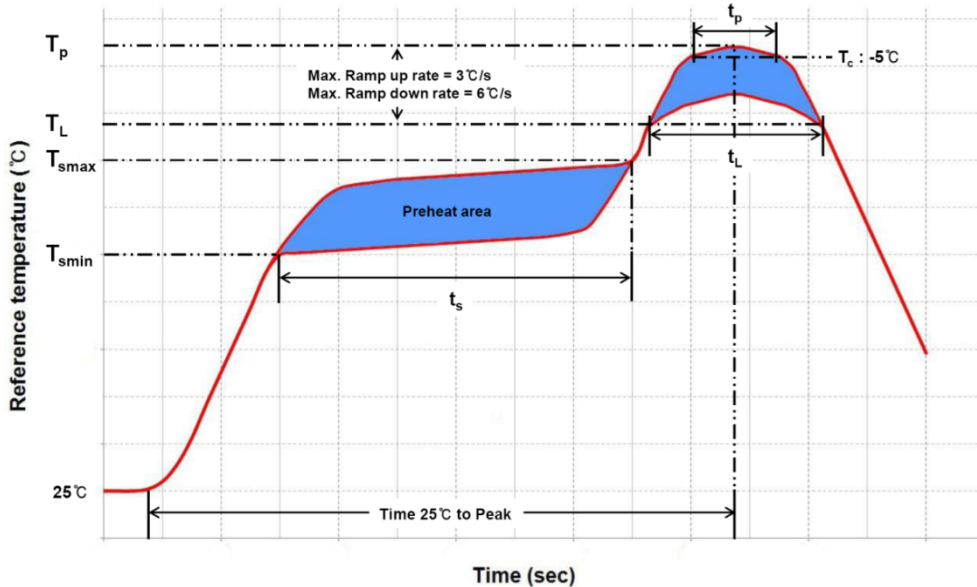
Fig.2 Abnormal Circuit
Circuits to Avoid : The current through the LEDs may vary due to the variation in LED forward voltage.

- 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.

10. Cautions on Use

10-8. 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})	150°C	100°C
Temperature Max (T_{smax})	200°C	150°C
Maximum time(t_s) from T_{smin} to T_{smax}	60~120 seconds	60~120 seconds
Ramp-up rate (T_L to T_p)	3°C/ second max.	3°C/ second max.
Liquidus temperature (T_L)	217°C	183°C
Time (t_L) maintained above T_L	60~150 seconds	60~150 seconds
Maximum peak package body temperature (T_p)	260°C	235°C
Time(t_p) within 5°C of the specified temperature (T_c)	30 seconds	20 seconds
Ramp-down rate (T_p to T_L)	6°C/second max.	6°C/second max.
Maximum Time 25°C 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.

10. Cautions on Use

10-9. Soldering Iron

- The recommended condition is less than 5 seconds at 260°C.
- The time must be shorter for higher temperatures. (+10°C → -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°C.

10-10. 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.

10-11. Manual Handling

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



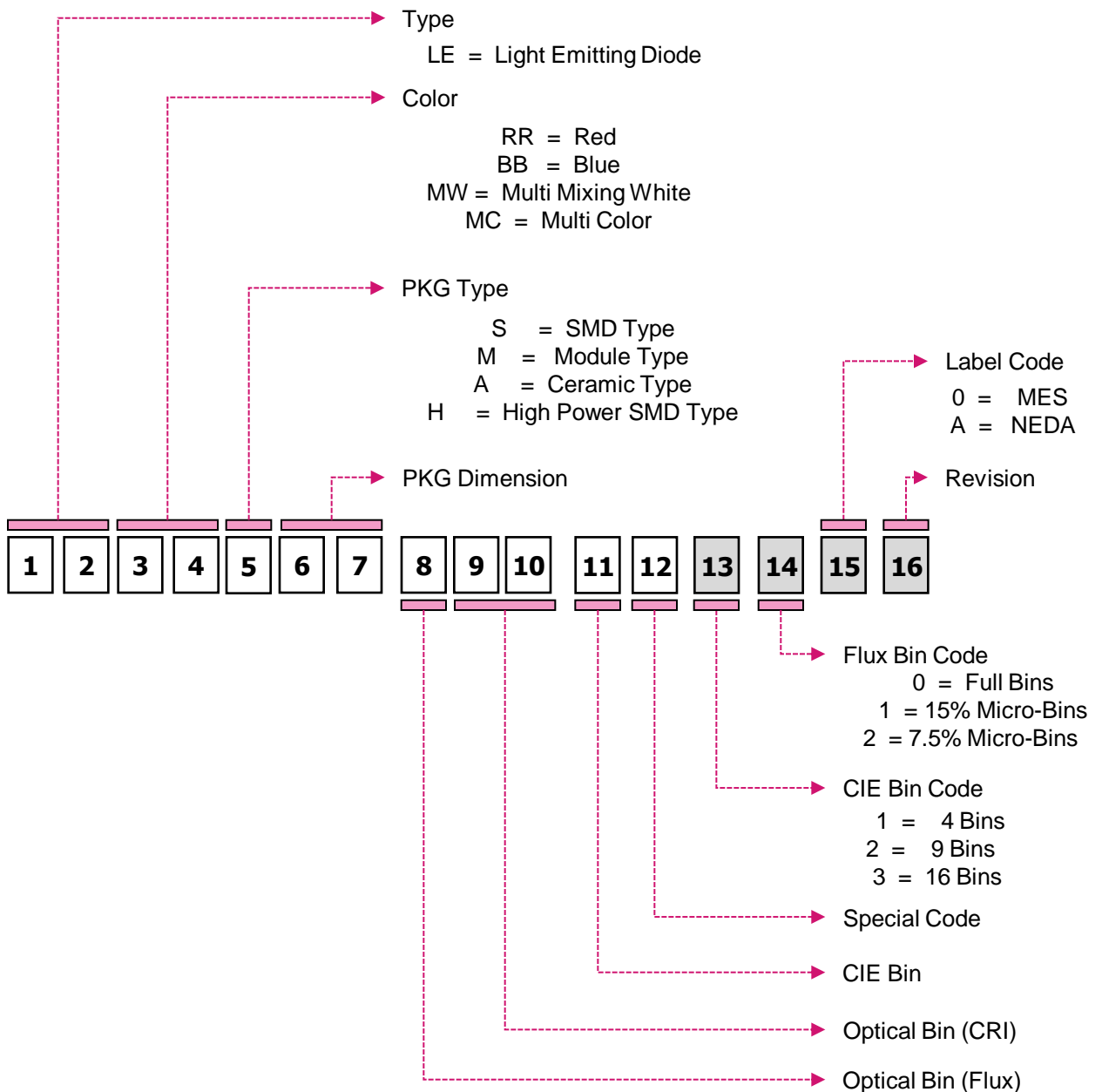
11. Disclaimers

- LG Innotek is not responsible for any damages or accidents caused if the operating or storage conditions exceed the absolute maximum ratings recommended in this document.
- The LEDs described in this document are intended to be operated by ordinary electronic equipment.
- It is recommended to consult with LG Innotek when the environment or the LED operation is non-standard in order to avoid any possible malfunctions or damage to product or risk of life or health.
- Disassembly of the LED products for the purpose of reverse engineering is prohibited without prior written consent from LG Innotek. All defected LEDs must be reported to LG Innotek and are not to be disassembled or analyzed.
- The product information can be modified and upgraded without prior notice.

Appendix A. 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.



Appendix B. Assembly level values

5. Electro - Optical Characteristics

(Ta=25°C)

Item	Symbol	Condition	CCT	Min.	Typ.	Max.	Unit
Luminous Flux I ^{*1)}	Φv	If =65mA	6500 (F)	30.4	-	36.5	lm
			5700 (G)	30.7	-	36.8	
			5000 (H)	31.0	-	37.1	
			4000 (J)	29.7	-	35.8	
			3500 (K)	29.1	-	35.1	
			3000 (L)	28.8	-	34.7	
			2700 (M)	27.2	-	33.1	
Forward Voltage	Vf	If =65mA	All	2.70	-	3.00	V
Color Coordinate	Cx / Cy	If =65mA	All	Refer to "Chromaticity Bins"			-
Color Rendering Index (CRI)	Ra	If =65mA	All	80.0	-	-	-
Viewing Angle	2Θ1/2	If =65mA	All	-	120	-	deg
Typical Temperature Coefficient of Forward Voltage ^{*2)}	ΔVf / ΔTj	If =65mA	All	-1.0	-	-3.0	mV/°C
Thermal Resistance, Junction to Solder Point	Rth j-s	If =65mA	All	-	15	-	°C/W

*1) These values are measured by a standard of assembly level

*2) Measured at Ta between 25°C and 85°C

※ 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.

Appendix B. Assembly level values

5. Electro - Optical Characteristics

▪ By a standard of assembly level

(Ta=25°C)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
6500K (F)	R3	30	2.69	0.081	13.6	169
		65	2.85	0.185	31.0	168
		100	2.98	0.298	43.1	145
		150	3.15	0.473	62.4	132
		200	3.29	0.658	80.2	122
	R4	30	2.67	0.080	15.5	193
		65	2.76	0.179	32.7	179
		100	2.84	0.284	48.8	168
		150	2.94	0.441	70.1	154
		200	3.03	0.606	89.5	142
	R5	30	2.67	0.080	15.9	199
		65	2.76	0.179	33.9	189
		100	2.84	0.284	51.1	180
		150	2.94	0.441	75.2	171
		200	3.03	0.606	96.8	160
	R6	30	2.67	0.080	16.6	207
		65	2.76	0.179	35.3	197
		100	2.84	0.284	53.2	187
		150	2.94	0.441	78.3	178
		200	3.03	0.606	100.8	166
5700K (G)	R3	30	2.69	0.081	14.9	183
		65	2.85	0.185	31.4	170
		100	2.98	0.298	47.0	158
		150	3.15	0.473	67.9	144
		200	3.29	0.658	87.4	133
	R4	30	2.67	0.080	15.7	196
		65	2.76	0.179	33.0	181
		100	2.84	0.284	49.1	169
		150	2.94	0.441	70.6	155
		200	3.03	0.606	90.2	143
	R5	30	2.67	0.080	16.0	200
		65	2.76	0.179	34.2	191
		100	2.84	0.284	51.6	182
		150	2.94	0.441	75.9	172
		200	3.03	0.606	97.6	161
	R6	30	2.67	0.080	16.7	208
		65	2.76	0.179	35.6	198
		100	2.84	0.284	53.7	189
		150	2.94	0.441	79.0	179
		200	3.03	0.606	101.6	168

Appendix B. Assembly level values

5. Electro - Optical Characteristics

▪ By a standard of assembly level

(Ta=25℃)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
5000K (H)	R3	30	2.69	0.081	15.0	185
		65	2.85	0.185	31.7	171
		100	2.98	0.298	47.3	159
		150	3.15	0.473	68.4	145
		200	3.29	0.658	87.9	134
	R4	30	2.67	0.080	15.9	199
		65	2.80	0.182	33.2	183
		100	2.90	0.290	49.5	171
		150	3.04	0.455	71.0	156
		200	3.14	0.629	90.9	144
	R5	30	2.67	0.080	16.1	201
		65	2.76	0.179	34.5	192
		100	2.84	0.284	52.0	183
		150	2.94	0.441	76.6	174
		200	3.03	0.606	98.4	162
	R6	30	2.67	0.080	16.8	209
		65	2.76	0.179	35.9	200
		100	2.84	0.284	54.1	191
		150	2.94	0.441	79.7	181
		200	3.03	0.606	102.4	169
4000K (J)	R3	30	2.69	0.081	14.5	179
		65	2.85	0.185	30.5	165
		100	2.98	0.298	45.6	153
		150	3.15	0.473	65.9	139
		200	3.29	0.658	84.7	129
	R4	30	2.67	0.080	14.8	190
		65	2.80	0.182	31.0	176
		100	2.90	0.290	46.3	165
		150	3.04	0.455	66.5	150
		200	3.14	0.629	85.0	139
	R5	30	2.67	0.080	15.6	195
		65	2.76	0.179	33.2	186
		100	2.84	0.284	49.8	175
		150	2.94	0.441	72.2	164
		200	3.03	0.606	93.0	154
	R6	30	2.67	0.080	16.3	203
		65	2.76	0.179	34.6	193
		100	2.84	0.284	51.9	183
		150	2.94	0.441	75.2	171
		200	3.03	0.606	96.9	160

Appendix B. Assembly level values

5. Electro - Optical Characteristics

▪ By a standard of assembly level

(Ta=25°C)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
3500K (K)	R3	30	2.69	0.081	14.4	178
		65	2.85	0.185	29.9	170
		100	2.98	0.298	45.2	152
		150	3.15	0.473	65.5	139
		200	3.29	0.658	94.4	143
	R4	30	2.67	0.080	14.8	185
		65	2.80	0.182	31.0	171
		100	2.90	0.290	46.3	160
		150	3.04	0.455	66.5	146
		200	3.14	0.629	85.0	135
	R5	30	2.67	0.080	15.4	193
		65	2.76	0.179	32.7	182
		100	2.84	0.284	49.0	173
		150	2.94	0.441	71.0	161
		200	3.03	0.606	91.6	151
	R6	30	2.67	0.080	16.0	200
		65	2.76	0.179	34.0	190
		100	2.84	0.284	50.9	179
150		2.94	0.441	73.8	167	
200		3.03	0.606	95.2	157	
3000K (L)	R3	30	2.69	0.081	14.0	173
		65	2.85	0.185	29.5	160
		100	2.98	0.298	44.1	148
		150	3.15	0.473	63.8	135
		200	3.29	0.658	92.0	140
	R4	30	2.67	0.080	14.8	185
		65	2.80	0.182	31.0	171
		100	2.90	0.290	46.3	160
		150	3.04	0.455	66.5	146
		200	3.14	0.629	85.0	135
	R5	30	2.67	0.080	15.2	190
		65	2.76	0.179	32.3	180
		100	2.84	0.284	48.5	171
		150	2.94	0.441	70.2	159
		200	3.03	0.606	90.6	149
	R6	30	2.67	0.080	15.8	197
		65	2.76	0.179	33.6	187
		100	2.84	0.284	50.5	178
150		2.94	0.441	73.0	166	
200		3.03	0.606	94.2	156	

Appendix B. Assembly level values

5. Electro - Optical Characteristics

▪ By a standard of assembly level

(Ta=25°C)

CCT	Rank	If (mA)	Vf (V)	Power (W)	Φv (lm)	lm/W
2700K (M)	R3	30	2.69	0.081	13.3	165
		65	2.85	0.185	28.0	151
		100	2.98	0.298	42.0	141
		150	3.15	0.473	60.6	128
		200	3.29	0.658	77.7	118
	R4	30	2.67	0.080	14.4	180
		65	2.80	0.182	29.5	162
		100	2.90	0.290	45.8	158
		150	3.04	0.455	66.1	145
		200	3.14	0.629	85.0	135
	R5	30	2.67	0.080	14.5	181
		65	2.76	0.179	30.8	172
		100	2.84	0.284	46.2	163
		150	2.94	0.441	66.9	152
		200	3.03	0.606	86.3	142
	R6	30	2.67	0.080	15.1	188
		65	2.76	0.179	32.0	178
		100	2.84	0.284	48.0	169
		150	2.94	0.441	69.5	158
		200	3.03	0.606	89.7	148

Appendix B. Assembly level values

6. Bins Structure and Order Code

(Ta=25°C, @65mA)

Color	CRI	CCT [K]	Vf [V]			Luminous Flux*1) [lm]			Order Code				
			Bin Code	Min	Max	Bin Code	Min	Max					
Cool	80	6500 (F)	8A	2.70	2.75	R3	30.4	31.9	LEMWS59R80FZ2B**				
			8B	2.75	2.80					R4	31.9	33.4	LEMWS59R80FZ2D**
			9A	2.80	2.85					R5	33.1	34.7	LEMWS59R80FZ2E**
			0A	2.90	2.95					R6	34.7	36.5	LEMWS59R80FZ2F**
			0B	2.95	3.00								
	80	5700 (G)	8A	2.70	2.75	R3	30.7	32.2	LEMWS59R80GZ2B**				
			8B	2.75	2.80					R4	32.2	33.7	LEMWS59R80GZ2D**
			9A	2.80	2.85					R5	33.4	35.0	LEMWS59R80GZ2E**
			0A	2.90	2.95					R6	35.0	36.8	LEMWS59R80GZ2F**
			0B	2.95	3.00								
	80	5000 (H)	8A	2.70	2.75	R3	31.0	32.5	LEMWS59R80HZ2B**				
			8B	2.75	2.80					R4	32.5	34.0	LEMWS59R80HZ2D**
			9A	2.80	2.85					R5	33.7	35.3	LEMWS59R80HZ2E**
			0A	2.90	2.95					R6	35.3	37.1	LEMWS59R80HZ2F**
			0B	2.95	3.00								
Neutral	80	4000 (J)	8A	2.70	2.75	R3	29.7	31.2	LEMWS59R80JZ3B**				
			8B	2.75	2.80					R4	31.2	32.8	LEMWS59R80JZ3D**
			9A	2.80	2.85					R5	32.4	34.1	LEMWS59R80JZ3E**
			0A	2.90	2.95					R6	34.1	35.8	LEMWS59R80JZ3F**
			0B	2.95	3.00								
Warm	80	3500 (K)	8A	2.70	2.75	R3	29.1	30.7	LEMWS59R80KZ3B**				
			8B	2.75	2.80					R4	30.7	32.2	LEMWS59R80KZ3D**
			9A	2.80	2.85					R5	31.9	33.5	LEMWS59R80KZ3E**
			0A	2.90	2.95					R6	33.5	35.1	LEMWS59R80KZ3F**
			0B	2.95	3.00								
	80	3000 (L)	8A	2.70	2.75	R3	28.8	30.3	LEMWS59R80LZ3B**				
			8B	2.75	2.80					R4	30.3	31.8	LEMWS59R80LZ3D**
			9A	2.80	2.85					R5	31.5	33.1	LEMWS59R80LZ3E**
			0A	2.90	2.95					R6	33.1	34.7	LEMWS59R80LZ3F**
			0B	2.95	3.00								
	80	2700 (M)	8A	2.70	2.75	R3	27.2	28.8	LEMWS59R80MZ3B**				
			8B	2.75	2.80					R4	28.8	30.3	LEMWS59R80MZ3D**
			9A	2.80	2.85					R5	30.0	31.5	LEMWS59R80MZ3E**
			0A	2.90	2.95					R6	31.5	33.1	LEMWS59R80MZ3F**
			0B	2.95	3.00								

*1) These values are measured by a standard of assembly level

※ Φv values are for representative references only.

单击下面可查看定价，库存，交付和生命周期等信息

[>>LG INNOTEK\(乐金伊诺特\)](#)