LUMILEDS

ILLUMINATION



LUXEON 7070
LUXEON 7070 HE

High light output and efficacy in a robust multi-die package, enabling cost-effective system designs for demanding applications



LUXEON 7070 and 7070 HE are multi-die, high power package that provides high luminance from a super robust package to enable cost effective, single optic and directional fixture designs. LUXEON 7070 and 7070 HE use an industry standard 7070 surface mount package with a small Light Emitting Surface (LES). LUXEON 7070 and 7070 HE are offered in 70, 80, 90 CRI with a wide range of CCTs, and offers hot-color targeting to ensure that the LEDs are within color target at application conditions of 85°C.

FEATURES AND BENEFITS

- Superior lm/W enables outstanding efficacy in end application
- Extremely reliable package design affirms long lifetime in harsh environments
- Low Rth enables effective thermal dissipation design for higher efficiency
- Hot-color targeting ensures color is within ANSI bin at 85°C
- 3-step and 5-step MacAdam ellipse binning structure ensures excellent color uniformity
- Offered in different voltage options for customer design flexibility

PRIMARY APPLICATIONS

- High Bay
- Low Bay
- Floodlights
- Wall Pack
- Outdoor
- Spotlights

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c UL us No. E352519 RoHS COMPLIANT

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General Product Information

Product Test Conditions

LUXEON 7070 and 7070 HE LEDs are tested and binned at a junction temperature, T_j of 25°C.

Part Number Nomenclature

Part numbers for LUXEON 7070 follow the convention below:

L 1 7 0 – **A A B B** 7 0 **C C Z Z Z Z Z**

Where:

- **A A** – alphanumeric option codes that designates nominal ANSI CCT (Example: 22=2200K, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K, 65=6500K)
- **B B** – alphanumeric option codes that designates minimum CRI (Example: 70=70CRI, 80=80CRI, 90=90CRI)
- **C C** – alphanumeric option codes designates performance options (Example: forward voltage 12=12V, 36=36V)
- **Z Z Z Z Z** – alphanumeric option codes that is used for product options

Therefore, the following part number is used for a LUXEON 7070, 4000K 70CRI, 12V:

L 1 7 0 – **4 0 7 0** 7 0 **1 2** 0 0 0 0 0

Lumen Maintenance

Please contact your local Sales Representative or Lumileds Technical Solutions Manager for more information about the long-term performance of this product.

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON 7070 and LUXEON 7070 HE is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS Directive 2011/65/EU and REACH Regulation (EC) 1907/2006. Lumileds LLC will not intentionally add the following restricted materials to its products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Performance Characteristics

Product Selection Guide

Table 1. Product performance of LUXEON 7070 at test current, T_j=25°C Flux and T_j=85°C for R9 and CRI

VOLTAGE	NOMINAL CCT [1]	MINIMUM R9 [4]	MINIMUM CRI [2, 3]	LUMINOUS FLUX [2, 3] (lm)		TYPICAL LUMINOUS EFFICACY (lm/W)	TEST CURRENT (mA)	PART NUMBER
				MINIMUM	TYPICAL			
12V	2200K	-40	70	1172	1260	153	700	L170-2270701200000
	2700K	-40	70	1295	1392	169	700	L170-2770701200000
	3000K	-40	70	1344	1445	175	700	L170-3070701200000
	3500K	-40	70	1376	1480	179	700	L170-3570701200000
	4000K	-40	70	1414	1520	184	700	L170-4070701200000
	5000K	-40	70	1404	1510	183	700	L170-5070701200000
	5700K	-40	70	1395	1500	182	700	L170-5770701200000
	6500K	-40	70	1386	1490	180	700	L170-6570701200000
	2200K	0	80	1059	1139	138	700	L170-2280701200000
	2700K	0	80	1176	1265	153	700	L170-2780701200000
	3000K	0	80	1232	1325	160	700	L170-3080701200000
	3500K	0	80	1257	1352	164	700	L170-3580701200000
	4000K	0	80	1293	1390	168	700	L170-4080701200000
	5000K	0	80	1288	1385	168	700	L170-5080701200000
	5700K	0	80	1288	1385	168	700	L170-5780701200000
	6500K	0	80	1283	1380	167	700	L170-6580701200000
	2200K	50	90	911	980	119	700	L170-2290701200000
	2700K	50	90	1018	1095	133	700	L170-2790701200000
	3000K	50	90	1049	1128	137	700	L170-3090701200000
	3500K	50	90	1075	1156	140	700	L170-3590701200000
	4000K	50	90	1102	1185	143	700	L170-4090701200000
	5000K	50	90	1097	1180	143	700	L170-5090701200000
	5700K	50	90	1086	1168	141	700	L170-5790701200000
	6500K	50	90	1075	1156	140	700	L170-6590701200000
36V	2200K	-40	70	1172	1260	154	233	L170-2270703600000
	2700K	-40	70	1295	1392	170	233	L170-2770703600000
	3000K	-40	70	1344	1445	176	233	L170-3070703600000
	3500K	-40	70	1376	1480	180	233	L170-3570703600000
	4000K	-40	70	1414	1520	185	233	L170-4070703600000
	5000K	-40	70	1404	1510	184	233	L170-5070703600000
	5700K	-40	70	1395	1500	183	233	L170-5770703600000
	6500K	-40	70	1386	1490	182	233	L170-6570703600000
	2200K	0	80	1059	1139	138	233	L170-2280703600000
	2700K	0	80	1176	1265	153	233	L170-2780703600000
	3000K	0	80	1232	1325	160	233	L170-3080703600000
	3500K	0	80	1257	1352	164	233	L170-3580703600000
	4000K	0	80	1293	1390	168	233	L170-4080703600000
	5000K	0	80	1288	1385	168	233	L170-5080703600000
	5700K	0	80	1288	1385	168	233	L170-5780703600000
	6500K	0	80	1283	1380	167	233	L170-6580703600000
	2200K	50	90	911	980	119	233	L170-2290703600000
	2700K	50	90	1018	1095	133	233	L170-2790703600000
	3000K	50	90	1049	1128	137	233	L170-3090703600000
	3500K	50	90	1075	1156	140	233	L170-3590703600000
	4000K	50	90	1102	1185	143	233	L170-4090703600000
	5000K	50	90	1097	1180	143	233	L170-5090703600000
	5700K	50	90	1086	1168	141	233	L170-5790703600000
	6500K	50	90	1075	1156	140	233	L170-6590703600000

Notes for Table 1:
1. Correlated color temperature is hot targeted at T_j=85°C.
2. Luminous flux is based upon mounted package on highly reflective surface at T_j=25°C. There is a tolerance of ±7% on luminous flux measurements.
3. Lumileds maintains a tolerance of ±2 on CRI (tested to 85°C) .Typical CRI is approximately 2 points higher than the minimum CRI specified, but this is not guaranteed.
4. Lumileds maintains a tolerance of ±6.5 on R9 (tested to 85°C).

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Table 2. Product performance of LUXEON 7070 HE at test current, T_j=25°C Flux and T_j=85°C for R9 and CRI

VOLTAGE	NOMINAL CCT [1]	MINIMUM R9 [4]	MINIMUM CRI [2, 3]	LUMINOUS FLUX [2, 3] (lm)		TYPICAL LUMINOUS EFFICACY (lm/W)	TEST CURRENT (mA)	PART NUMBER
				MINIMUM	TYPICAL			
12V	2200K	-40	70	1220	1311	160	700	L170-22707012000A1
	2700K	-40	70	1350	1448	177	700	L170-27707012000A1
	3000K	-40	70	1390	1492	182	700	L170-30707012000A1
	3500K	-40	70	1420	1529	187	700	L170-35707012000A1
	4000K	-40	70	1450	1565	191	700	L170-40707012000A1
	5000K	-40	70	1450	1565	191	700	L170-50707012000A1
	5700K	-40	70	1440	1550	189	700	L170-57707012000A1
	6500K	-40	70	1430	1539	188	700	L170-65707012000A1
	2200K	0	80	1100	1180	144	700	L170-22807012000A1
	2700K	0	80	1220	1310	160	700	L170-27807012000A1
	3000K	0	80	1280	1375	168	700	L170-30807012000A1
	3500K	0	80	1300	1400	171	700	L170-35807012000A1
	4000K	0	80	1335	1435	175	700	L170-40807012000A1
	5000K	0	80	1335	1433	175	700	L170-50807012000A1
	5700K	0	80	1335	1433	175	700	L170-57807012000A1
	6500K	0	80	1330	1428	174	700	L170-65807012000A1
	2200K	50	90	945	1015	124	700	L170-22907012000A1
	2700K	50	90	1070	1150	140	700	L170-27907012000A1
	3000K	50	90	1085	1167	142	700	L170-30907012000A1
	3500K	50	90	1110	1196	146	700	L170-35907012000A1
	4000K	50	90	1140	1225	150	700	L170-40907012000A1
	5000K	50	90	1140	1225	150	700	L170-50907012000A1
	5700K	50	90	1145	1230	150	700	L170-57907012000A1
	6500K	50	90	1110	1196	146	700	L170-65907012000A1
36V	2200K	-40	70	1220	1311	159	233	L170-22707036000A1
	2700K	-40	70	1350	1448	176	233	L170-27707036000A1
	3000K	-40	70	1390	1492	181	233	L170-30707036000A1
	3500K	-40	70	1420	1529	186	233	L170-35707036000A1
	4000K	-40	70	1450	1565	190	233	L170-40707036000A1
	5000K	-40	70	1450	1565	190	233	L170-50707036000A1
	5700K	-40	70	1440	1550	188	233	L170-57707036000A1
	6500K	-40	70	1430	1539	187	233	L170-65707036000A1
	2200K	0	80	1100	1180	143	233	L170-22807036000A1
	2700K	0	80	1220	1310	159	233	L170-27807036000A1
	3000K	0	80	1280	1375	167	233	L170-30807036000A1
	3500K	0	80	1300	1400	170	233	L170-35807036000A1
	4000K	0	80	1335	1435	174	233	L170-40807036000A1
	5000K	0	80	1335	1433	174	233	L170-50807036000A1
	5700K	0	80	1335	1433	174	233	L170-57807036000A1
	6500K	0	80	1330	1428	174	233	L170-65807036000A1
	2200K	50	90	945	1015	123	233	L170-22907036000A1
	2700K	50	90	1070	1150	140	233	L170-27907036000A1
	3000K	50	90	1085	1167	142	233	L170-30907036000A1
	3500K	50	90	1110	1196	145	233	L170-35907036000A1
	4000K	50	90	1140	1225	149	233	L170-40907036000A1
	5000K	50	90	1140	1225	149	233	L170-50907036000A1
	5700K	50	90	1145	1230	150	233	L170-57907036000A1
	6500K	50	90	1110	1196	145	233	L170-65907036000A1

Notes for Table 2:
1. Correlated color temperature is hot targeted at T_j=85°C.
2. Luminous flux is based upon mounted package on highly reflective surface at T_j=25°C. There is a tolerance of ±7% on luminous flux measurements.
3. Lumileds maintains a tolerance of ±2 on CRI (tested to 85°C) .Typical CRI is approximately 2 points higher than the minimum CRI specified, but this is not guaranteed.
4. Lumileds maintains a tolerance of ±6.5 on R9 (tested to 85°C).

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Optical Characteristics

Table 3. Optical characteristics for LUXEON 7070 at test current, T_j=25°C

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE [1]	TYPICAL VIEWING ANGLE [2]
L170-xxxx70xx00000	140°	120°
L170-xxxx70xx000A1	140°	120°

Notes for Table 3:
1. Total angle at which 90% of total luminous flux is captured.
2. Viewing angle is the off axis angle from the LED centerline where the luminous intensity is ½ of the peak value.

Electrical and Thermal Characteristics

Table 4. Electrical and thermal characteristics for LUXEON 7070 at test current, T_j=25°C

PART NUMBER	FORWARD VOLTAGE [1] (V_f)			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE [2] (mV/°C)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W)
	MINIMUM	TYPICAL	MAXIMUM		
L170-xxxx701200000	10.5	11.8	12.5	4.5	1.2
L170-xxxx703600000	34.0	35.2	36.0	14.5	1.2
L170-xxxx7012000A1	10.5	11.7	12.5	3.8	0.42
L170-xxxx7036000A1	33.4	35.3	36.6	10.9	0.42

Notes for Table 4:
1. Lumileds maintains a tolerance of ±1% on forward voltage measurements.
2. Measured between 25°C and 85°C.

Absolute Maximum Ratings

Table 5. Absolute maximum ratings for LUXEON 7070 and LUXEON 7070 HE

PARAMETER	MAXIMUM PERFORMANCE	
DC Forward Current [1, 2]	1200mA (12V)	400mA (36V)
Peak Pulsed Forward Current [1, 3]	1440mA (12V)	480mA (36V)
LED Junction Temperature [1] (DC & Pulse)	125°C	
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	2000V	
Operating Case Temperature [1]	105°C	
LED Storage Temperature	-40°C to 105°C	
Reverse Voltage ($V_{reverse}$)	LUXEON LEDs are not designed to be driven in reverse bias	

Notes for Table 5:
1. Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple," are acceptable if the following conditions are met:
   – The frequency of the ripple current is 100Hz or higher
   – The average current for each cycle does not exceed the maximum allowable DC forward current
   – The maximum amplitude of the ripple does not exceed the maximum peak pulsed forward current
3. At 10% duty cycle with pulse width of 10ms.

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Characteristic Curves

Spectral Power Distribution Characteristics

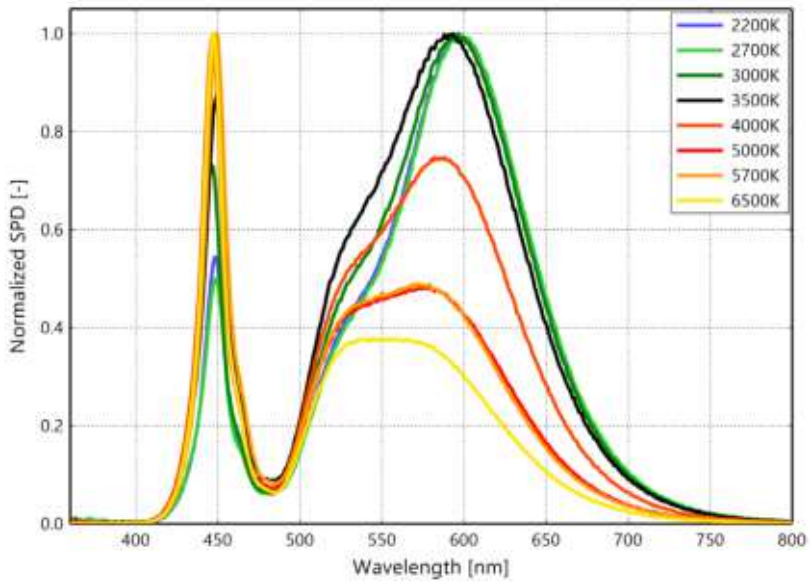


Figure 1a. Typical normalized power vs. wavelength for L170-xx707012000xx at test current, T_j=25°C

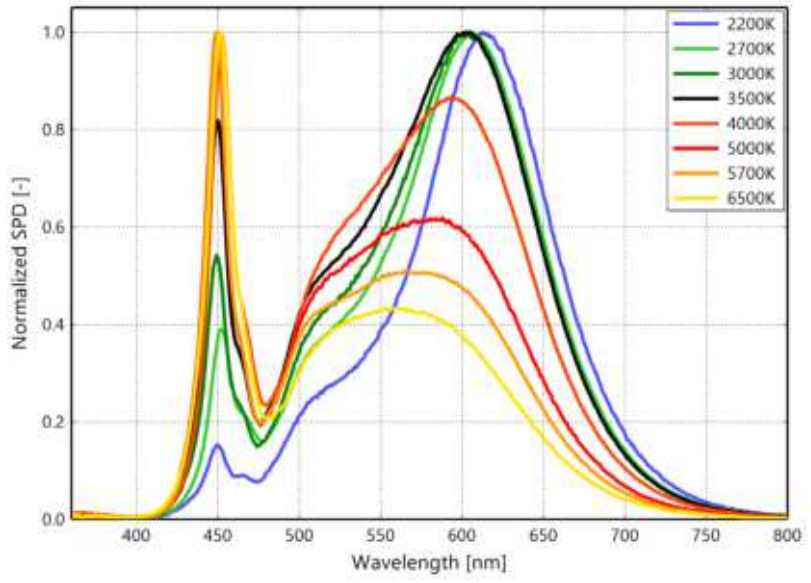


Figure 1b. Typical normalized power vs. wavelength for L170-xx807012000xx at test current, T_j=25°C

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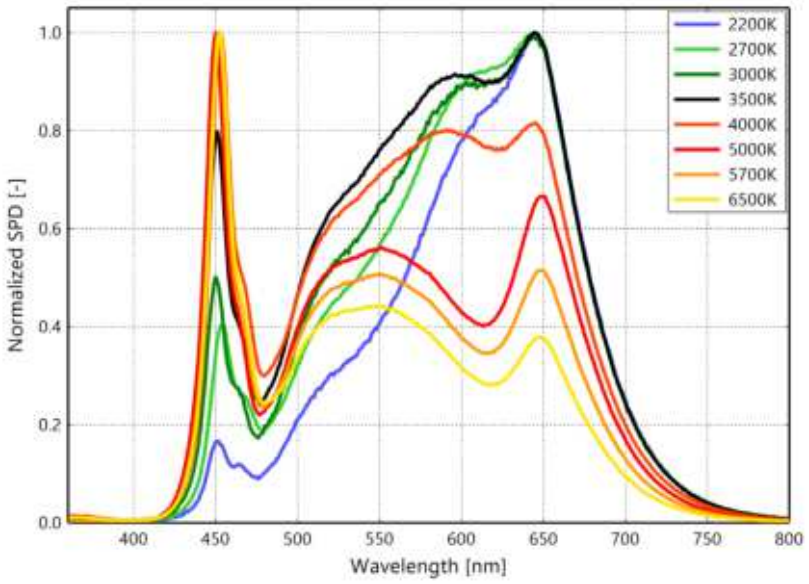


Figure 1c. Typical normalized power vs. wavelength for L170-xx907012000xx at test current, T_j=25°C

Light Output Characteristics

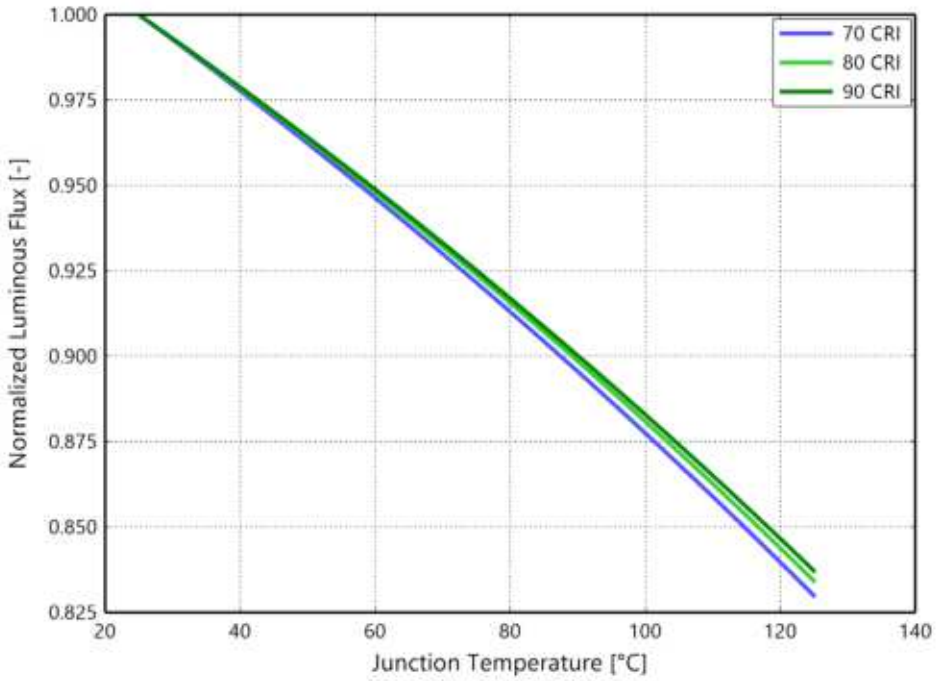


Figure 2a. Typical normalized light output vs. junction temperature for L170-xxxx70xx00000 at test current

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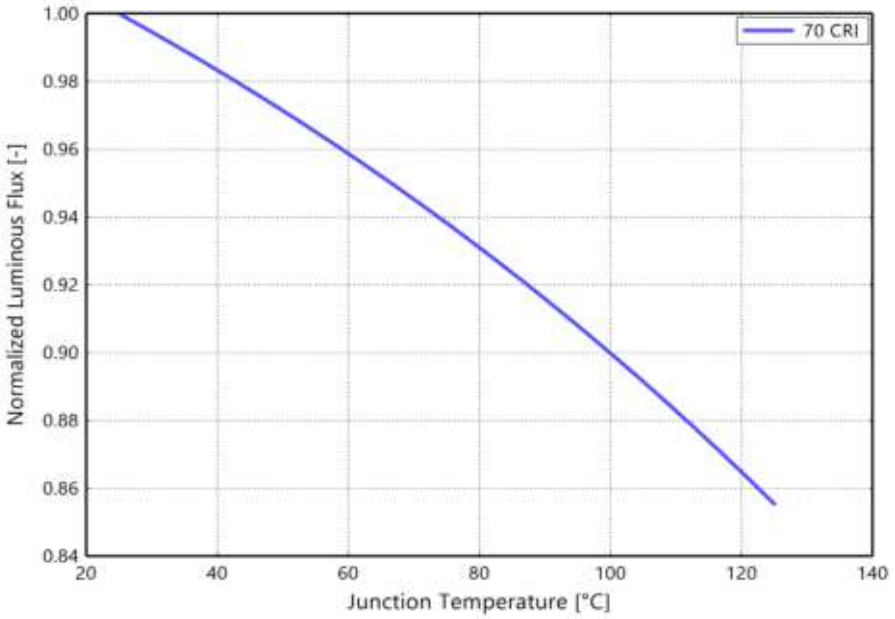


Figure 2b. Typical normalized light output vs. junction temperature for L170-xxxx70xx000A1 at test current

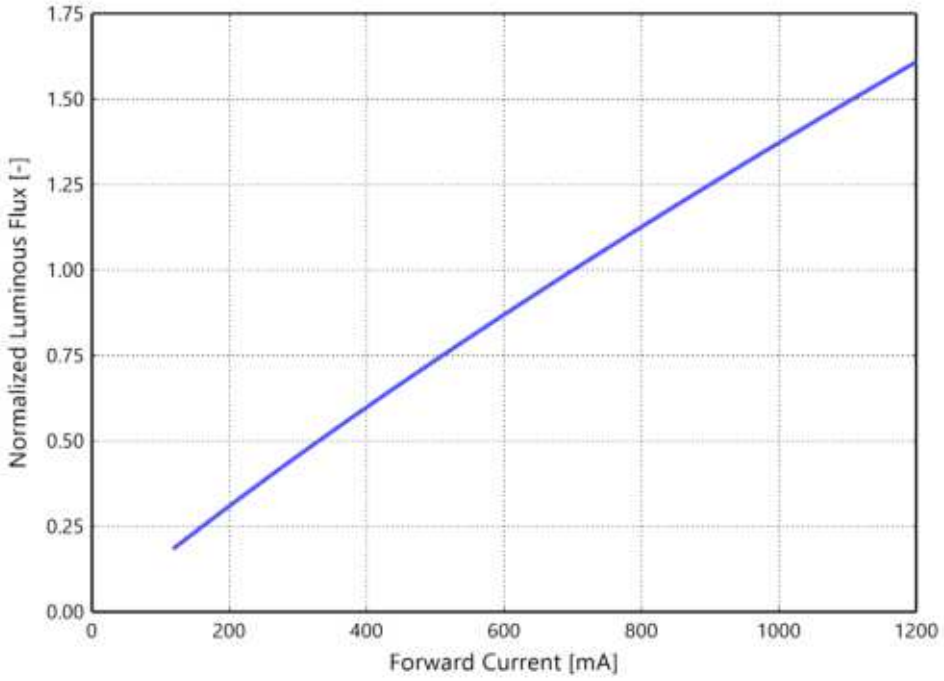


Figure 3a. Typical normalized light output vs. forward current for L170-xx70701200000, T_j=25°C

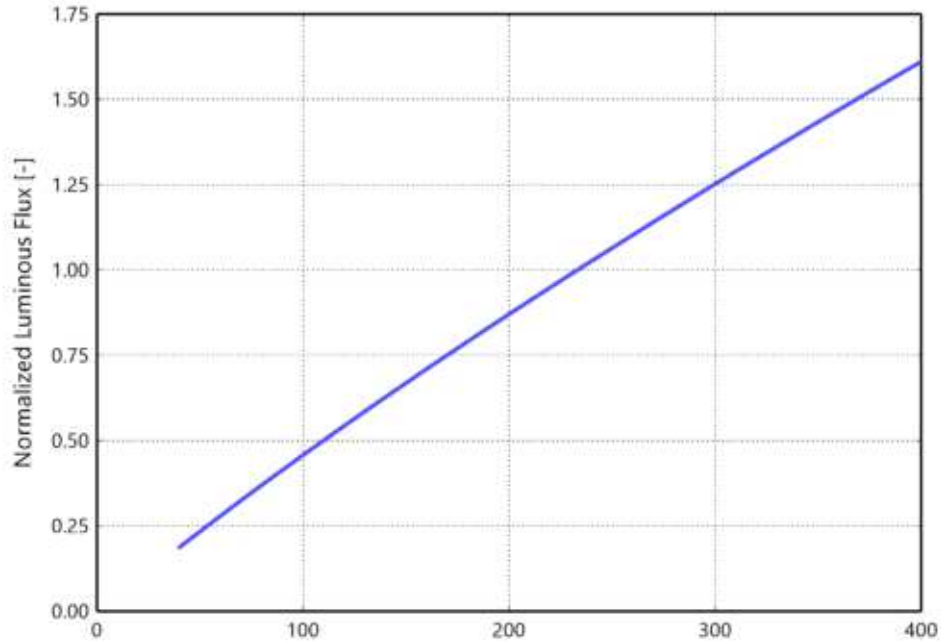


Figure 3b. Typical normalized light output vs. forward current for L170-xxxx703600000, T_j=25°C

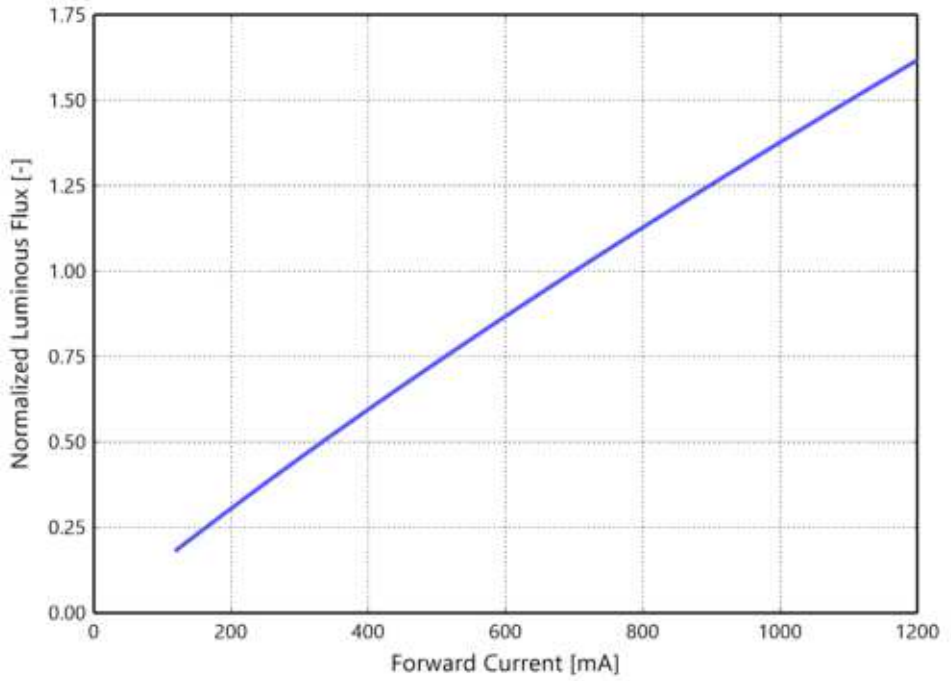


Figure 3c. Typical normalized light output vs. forward current for L170-xxxx7012000A1, T_j=25°C

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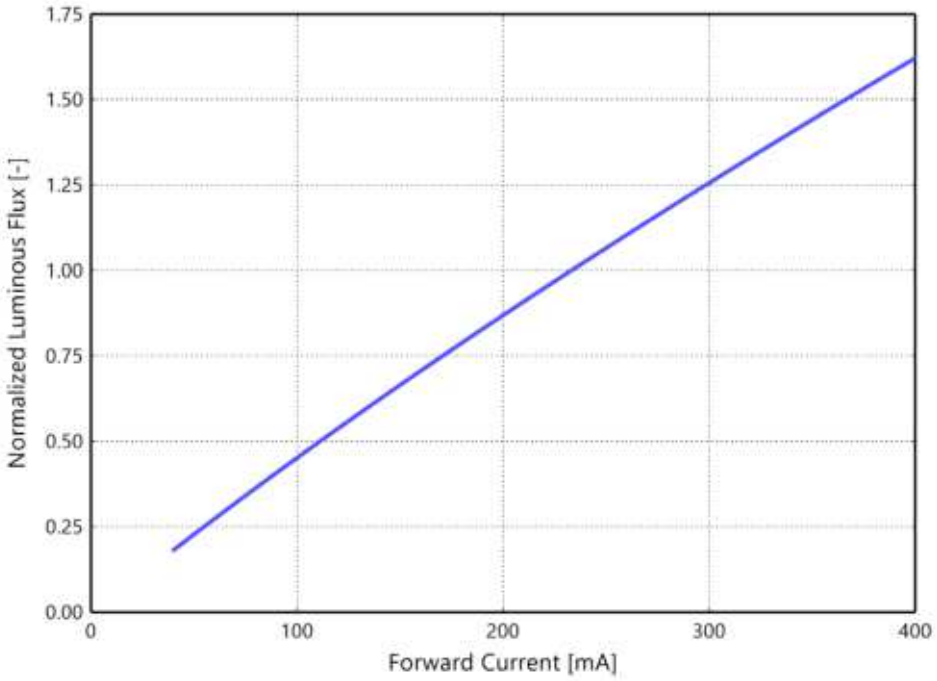


Figure 3d. Typical normalized light output vs. forward current for L170-xxxx7036000A1, T_j=25°C

Forward Current Characteristics

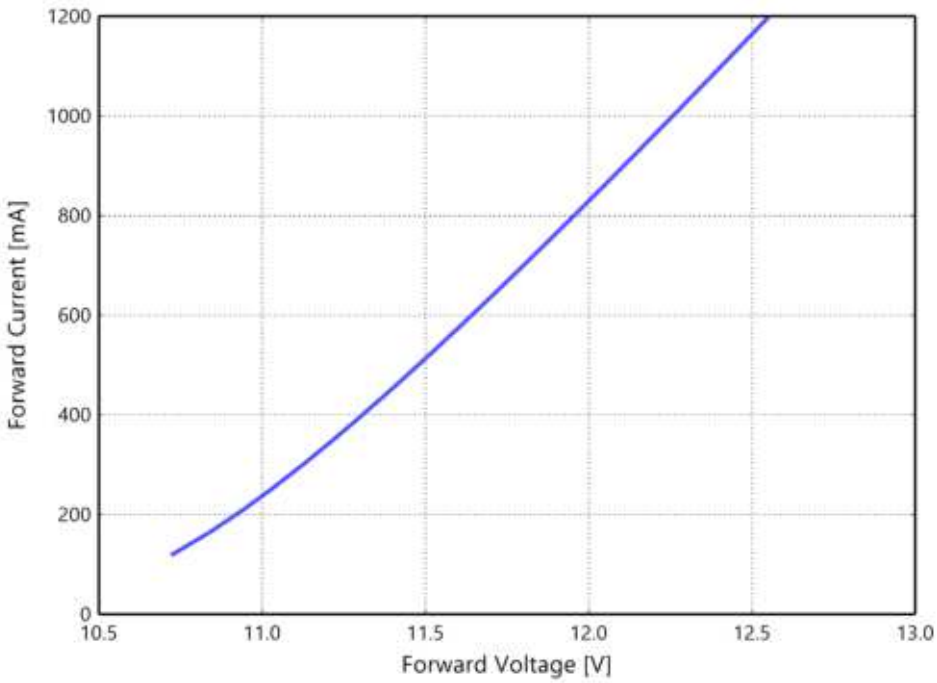


Figure 4a. Typical forward current vs. forward voltage for L170-xxxx701200000, T_j=25°C

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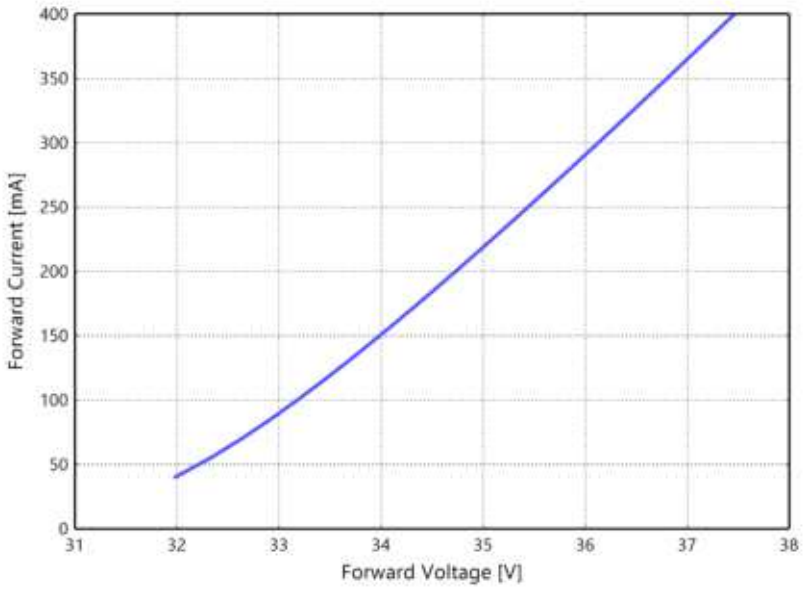


Figure 4b. Typical forward current vs forward voltage for L170-xxxx703600000, T_j=25°C

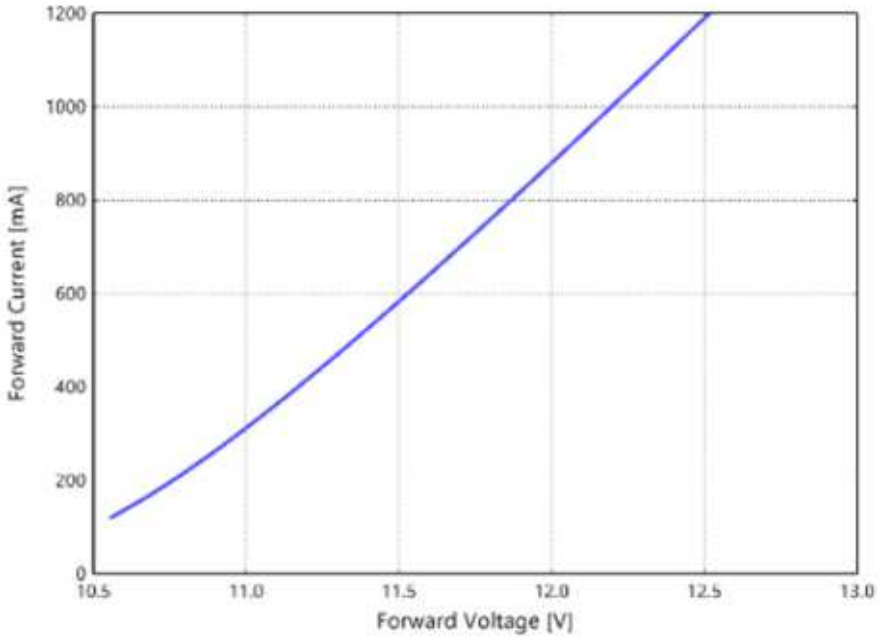


Figure 4c. Typical forward current vs forward voltage for L170-xxxx7012000A1, T_j=25°C

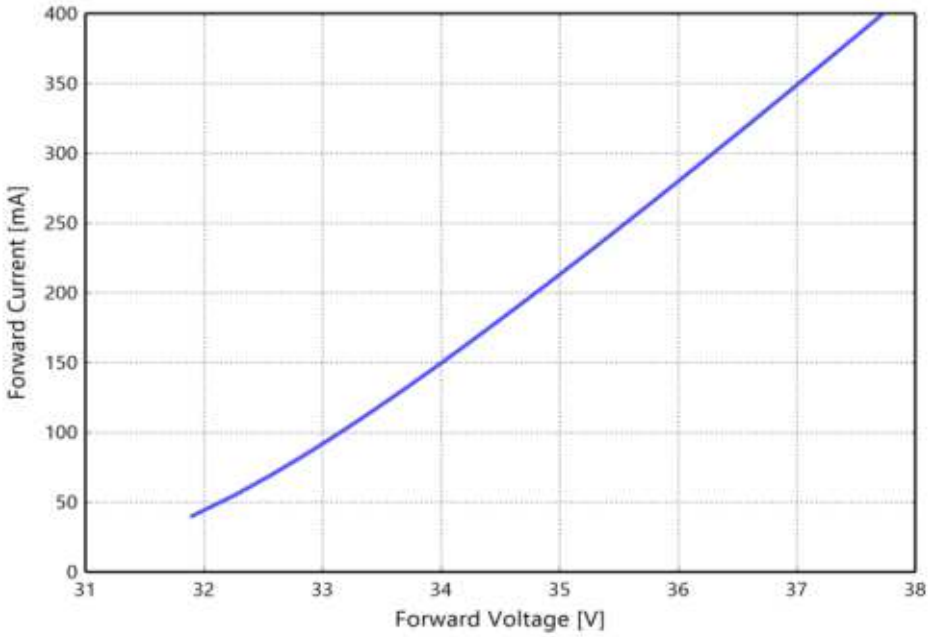


Figure 4d. Typical forward current vs forward voltage for L170-xxxx7036000A1, T_j=25°C

Radiation Pattern Characteristics

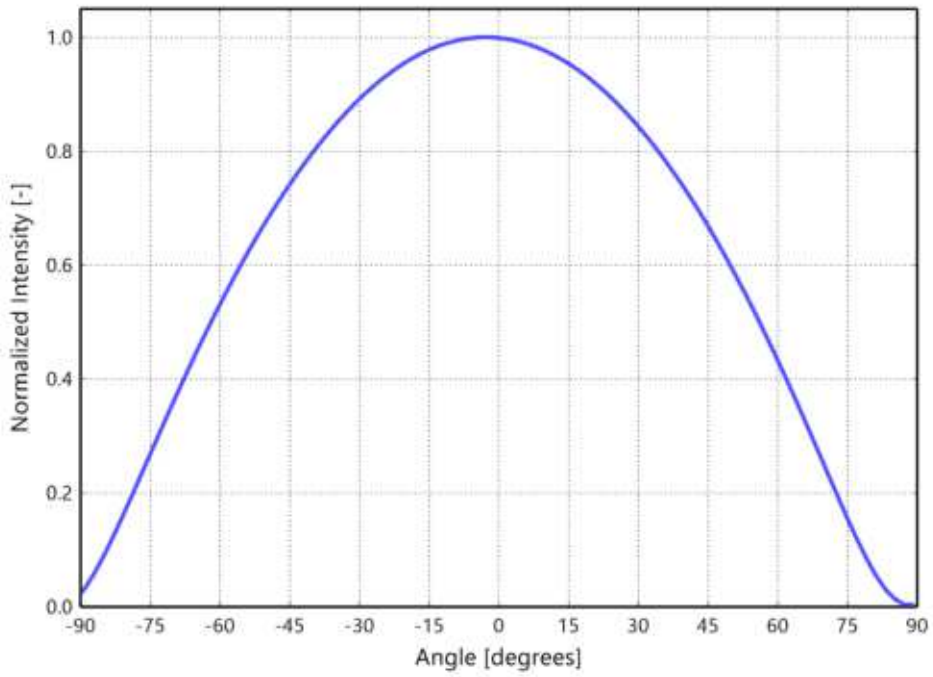


Figure 5a. Typical radiation pattern for L170-xxxx70xxx0000 at test current, T_j=25°C

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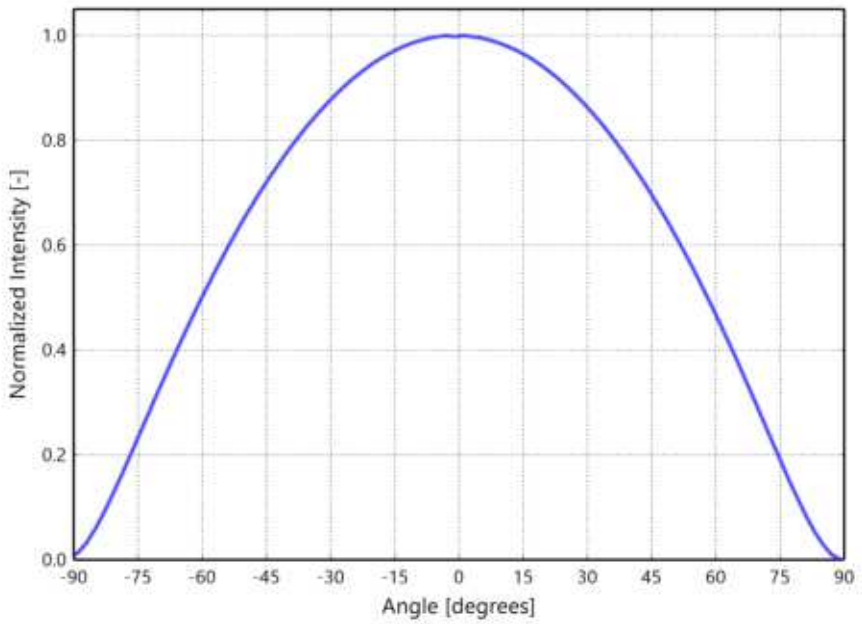


Figure 5b. Typical radiation pattern for L170-xxxx70xxx00A1 at test current, T_j=25°C

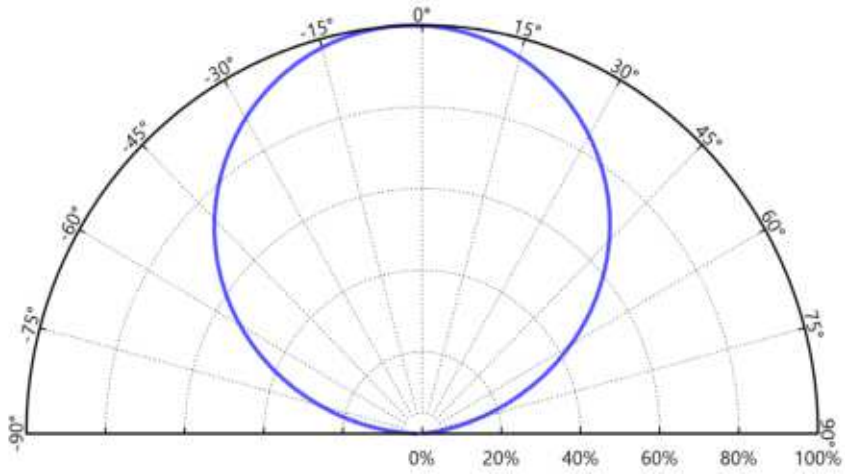


Figure 6a. Typical polar radiation pattern for L170-xxxx70xxx0000 at test current, T_j=25°C

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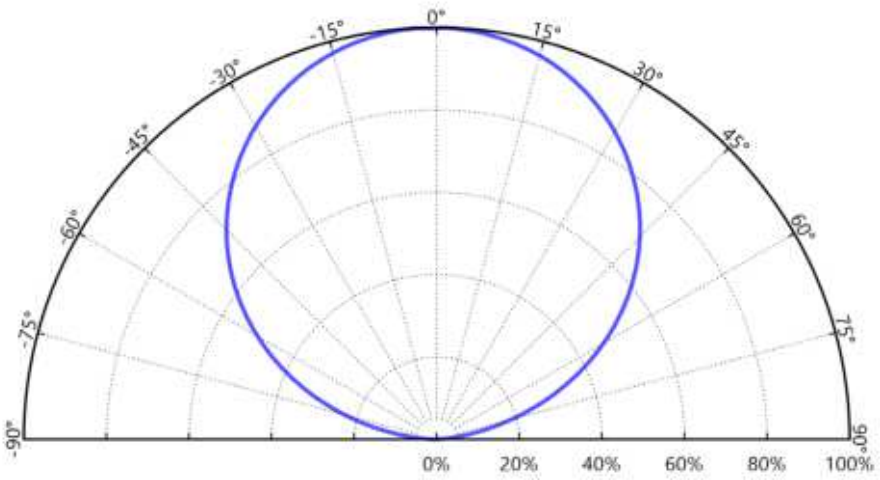


Figure 6b. Typical polar radiation pattern for L170-xxxx70xxx00A1 at test current, T_j=25°C

Product Bin and Labeling Definitions

Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheet. For this reason, Lumileds bins LED components for luminous flux or radiometric power, color point, peak or dominant wavelength and forward voltage.

LUXEON 7070 and LUXEON 7070 HE LEDs are labeled using a 3-digit alphanumeric CAT code following the format below:

A B C D

Where:

- **A** – designates luminous flux bin (example: S=1400 to 1450 lumens, T=1450 to 1500 lumens)
- **B** – designates color bin (example: 1=6500K, 2=5700K, 3=5000K, 5=4000K, 6=3500K, 7=3000K, 8=2700K, A=2200K)
- **C** – designates color space (example: 5=5-step MacAdam ellipse, 3=3-step MacAdam ellipse)
- **D** – designates forward voltage bin (example: 12V: B=11.0-11.5V, C=11.5 to 12.0V; 36V: B=35.0-35.5V, C=35.5 to 36.0V)

Therefore, a LUXEON 7070 with a lumen range of 1400 to 1450, color bin of 3000K, Color space of 3-SDCM and forward voltage range of 11.5 to 12.0V has the following CAT code:

S 7 3 C

Luminous Flux Bins

Table 5 lists the standard luminous flux bins for LUXEON 7070 LEDs. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are available in all CCTs.

Table 6. Luminous flux bin definitions for LUXEON 7070, T_j=25°C

BIN	LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM
G	900	950
H	950	1000
J	1000	1050
K	1050	1100
L	1100	1150
M	1150	1200
N	1200	1250
P	1250	1300
Q	1300	1350
R	1350	1400
S	1400	1450
T	1450	1500
U	1500	1550
V	1550	1600
W	1600	1650
X	1650	1700
Y	1700	1750

Notes for Table 6:
1. Lumileds maintains a tolerance of ±7% on luminous flux measurements.

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Color Bin Definitions

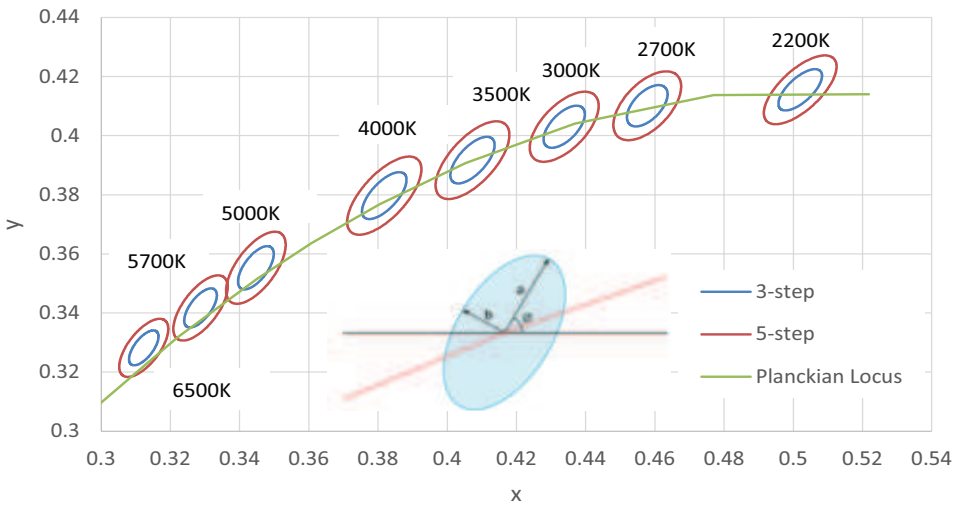


Figure 7. 3- and 5-step MacAdam ellipse illustration for hot-color targeting expected at 85°C

Table 7. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 7070 at test current, hot-color targeted at T_j=85°C

NOMINAL CCT	COLOR SPACE	"CENTER POINT [1] (CX, CY)"	"MAJOR AXIS, A"		"MAJOR AXIS, B"		ELLIPSE ROTATION ANGLE, Θ
			3-step	5-step	3-step	5-step	
2200K	Single 3-step, 5-step MacAdam ellipse	(0.5018, 0.4153)	0.00863	0.01438	0.00398	0.00663	49.27°
2700K	Single 3-step, 5-step MacAdam ellipse	(0.4578, 0.4101)	0.00810	0.01350	0.00420	0.00700	53.70°
3000K	Single 3-step, 5-step MacAdam ellipse	(0.4338, 0.4030)	0.00834	0.01390	0.00408	0.00680	53.22°
3500K	Single 3-step, 5-step MacAdam ellipse	(0.4073, 0.3917)	0.00927	0.01545	0.00414	0.00690	54.00°
4000K	Single 3-step, 5-step MacAdam ellipse	(0.3818, 0.3797)	0.00939	0.01565	0.00402	0.00670	53.72°
5000K	Single 3-step, 5-step MacAdam ellipse	(0.3447, 0.3553)	0.00822	0.01370	0.00354	0.00590	59.62°
5700K	Single 3-step, 5-step MacAdam ellipse	(0.3287, 0.3417)	0.00745	0.01243	0.00320	0.00533	59.09°
6500K	Single 3-step, 5-step MacAdam ellipse	(0.3123, 0.3282)	0.06690	0.01115	0.00285	0.00475	58.57°

Notes for Table 7:
1. Lumileds maintains a tolerance of ±0.01 on x and y coordinates in the CIE 1931 color space.

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Table 8. Correlated color temperature bin definitions for LUXEON 7070 and LUXEON 7070 HE

BIN	CCT
1	6500K
2	5700K
3	5000K
5	4000K
6	3500K
7	3000K
8	2700K
A	2200K

Table 9. MacAdam ellipse color space definitions for LUXEON 7070 and LUXEON 7070 HE

BIN	SDCM
3	3-step MacAdam ellipse
5	5-step MacAdam ellipse

Forward Voltage Bins

Table 10. Forward voltage bin definitions for LUXEON 7070 and 7070 HE, T_j=25°C

VOLTAGE	BIN	FORWARD VOLTAGE [1] (V_f)	
		MINIMUM	MAXIMUM
12V	A	10.5	11.0
	B	11.0	11.5
	C	11.5	12.0
	D	12.0	12.5
36V	A	34.0	34.5
	B	34.5	35.0
	C	35.0	35.5
	D	35.5	36.0

Notes for Table 10:
1. Lumileds maintains a tolerance of ±0.1V on forward voltage measurements.

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Mechanical Dimensions

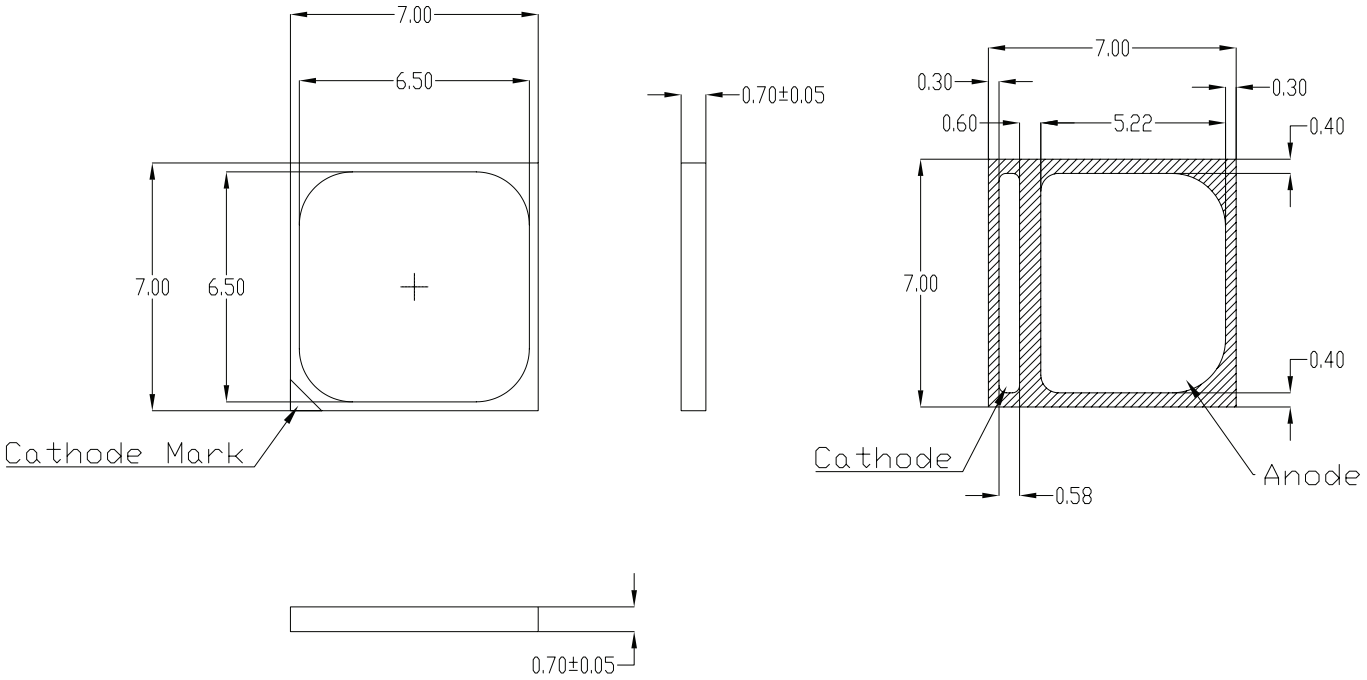


Figure 8. Mechanical dimensions for LUXEON 7070 and LUXEON 7070 HE

Notes for Figure 8:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reflow Soldering Guidelines

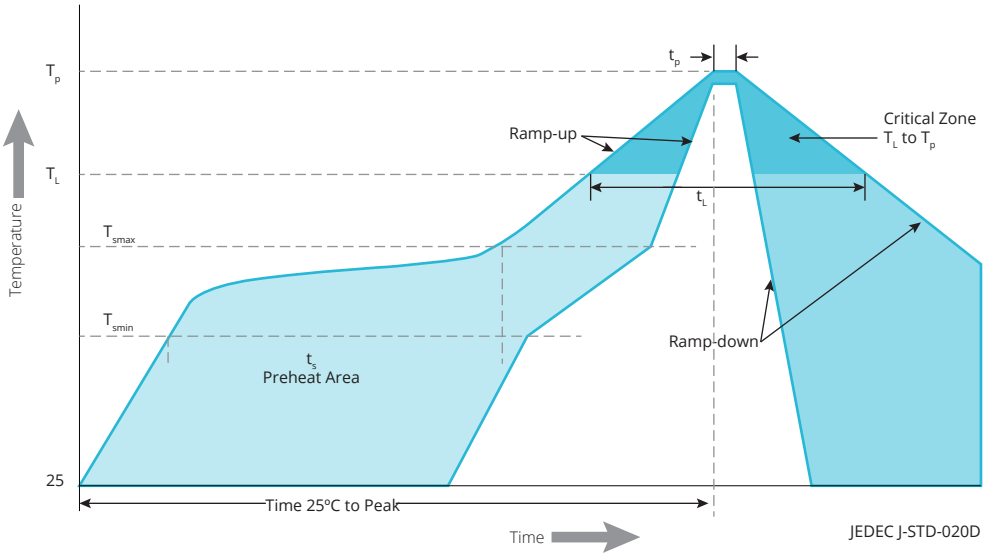


Figure 9. Visualization of the acceptable reflow temperature profile as specified in Table 10

Table 11. Reflow profile characteristics for LUXEON 7070 and LUXEON 7070 HE

PROFILE FEATURE	LEAD-FREE ASSEMBLY
Preheat Minimum Temperature (T_{smin})	150°C
Preheat Maximum Temperature (T_{smax})	200°C
Preheat Time (t_{smin} to t_{smax})	60 to 180 seconds
Ramp-Up Rate (T_L to T_p)	3°C / second maximum
Liquidus Temperature (T_L)	217°C
Time Maintained Above Temperature T_L (t_L)	60 to 150 seconds
Peak / Classification Temperature (T_p)	260°C
Time Within 5°C of Actual Temperature (t_p)	20 to 40 seconds
Ramp-Down Rate (T_p to T_L)	6°C / second maximum
Time 25°C to Peak Temperature	8 minutes maximum

JEDEC Moisture Sensitivity

Table 12. Moisture sensitivity levels for LUXEON 7070 and LUXEON 7070 HE

LEVEL	FLOOR LIFE		SOAK REQUIREMENTS STANDARD	
	TIME	CONDITIONS	TIME	CONDITIONS
3	168 Hours	≤30°C / 60% RH	192 Hours +5 / -0	30°C / 60% RH

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Solder Pad Design

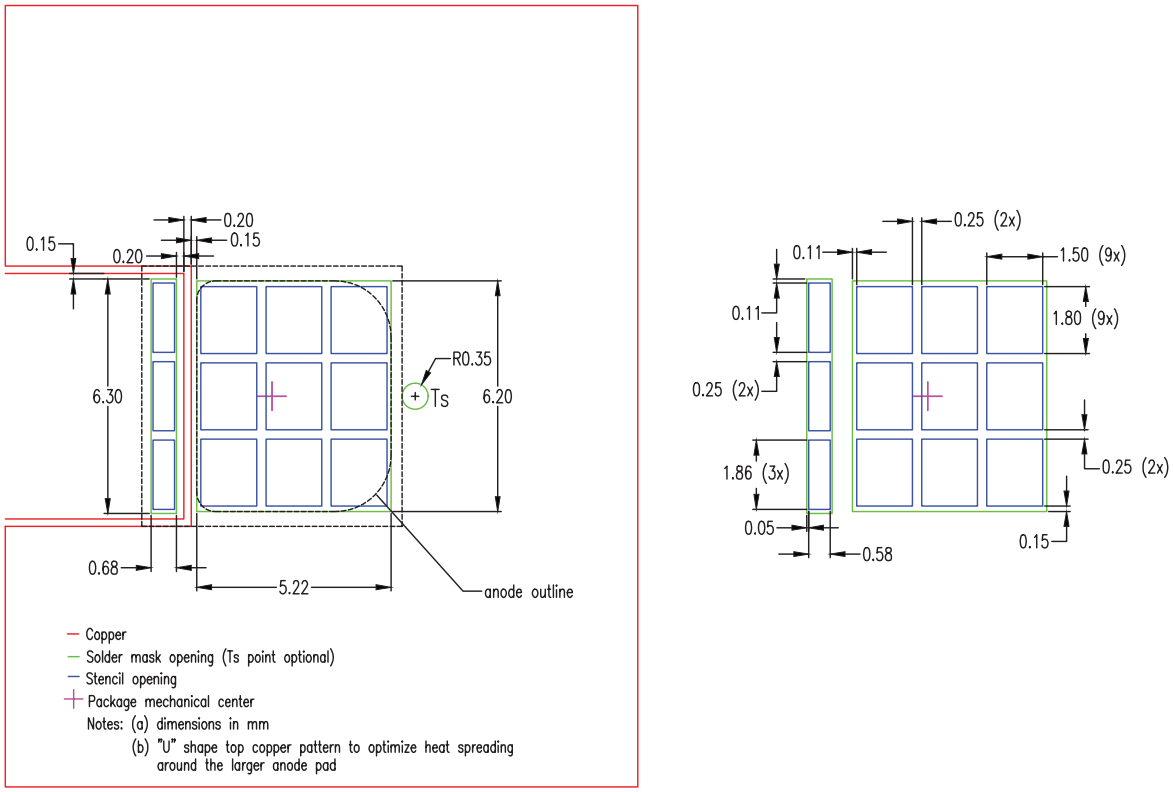


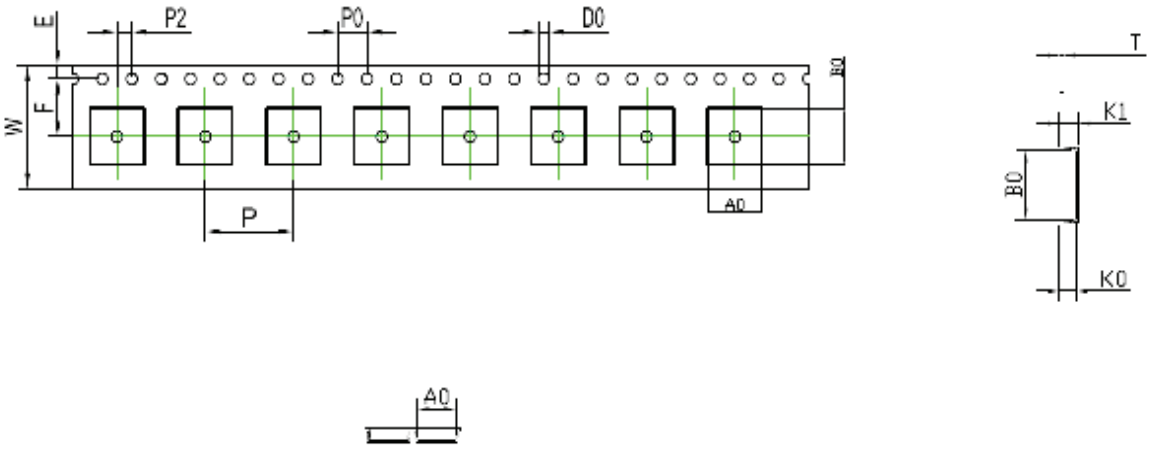
Figure 10. Recommended PCB solder pad layout for LUXEON 7070 and LUXEON 7070 HE

Notes for Figure 10:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

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Packaging Information

Pocket Tape Dimensions



symbol	AO	BO	KO	PO	P	P2	长度/盘
Spec	7.30±0.1	7.30±0.1	1.00±0.1	4.00±0.10	12.0±0.1	2.00±0.10	200M/R
symbol	W	T	E	F	DO	D1	K1
Spec	16.0±0.3	0.30±0.05	1.75±0.10	7.5±0.1	$1.50^{+0.1}_{-0}$	1.50±0.10	1.20±0.1

Figure 11. Pocket tape dimensions for LUXEON 7070 and LUXEON 7070 HE

Notes for Figure 11:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

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Reel Dimensions

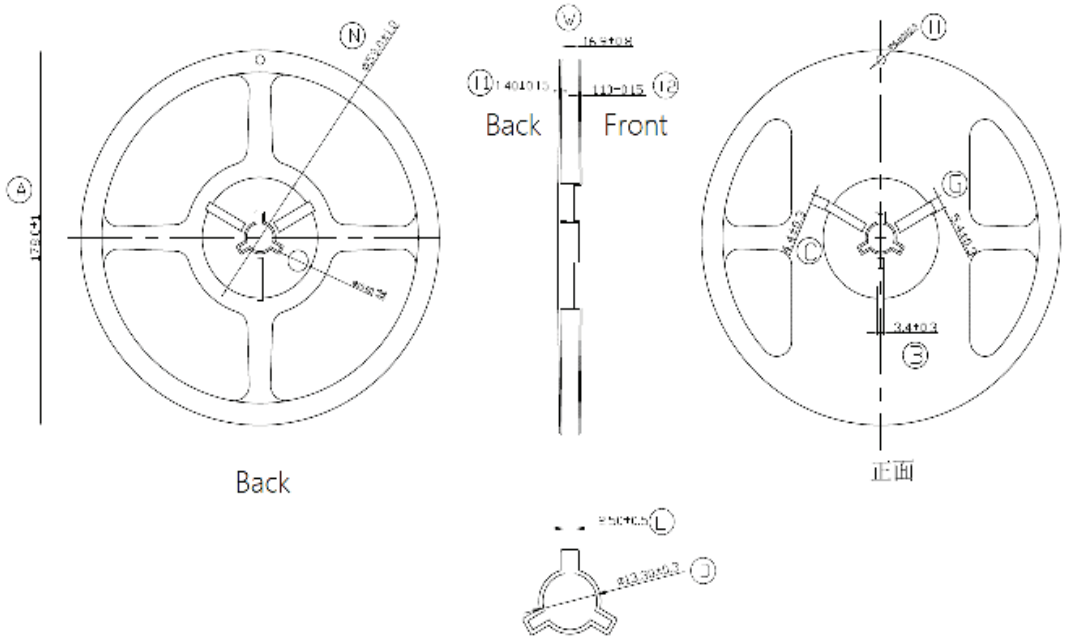


Figure 12. Reel dimensions for LUXEON 7070 and LUXEON 7070 HE

Notes for Figure 12:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

About Lumileds

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To learn more about our lighting solutions, visit lumileds.com.

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