15 up Sony boards

Max	Δ(u'v')	0.008

3. Emitter configuration

	Red	Green	Blue
Number of emitters	6	6	3
Emitter sequence	2, 4, 7, 9, 12, 14	1, 5, 6, 10, 11, 15	3, 8, 13
Emitter type	Luxeon side emitting		

4. Electrical specification

Electrical specifications defined at 350mA for red and 700mA for green and blue and at 25°C junction temperature

		Red	Green	Blue
Forward voltage				
Min	V	14.3	17.8	8.5
Max	V	19.3	23.3	13

		Red	Green	Blue
Dynamic resistance				
Min	Ohm	N/A	3.3	N/A

5. Thermal specification

		Red	Green	Blue
Thermal resistance, junction to board				
Max	C°/W	3.9	3.2	6.3

6. Packaging

Refer to Packaging Specification sheet
Standard Packing Increment (SPI) 40
One packaging increment will contain not more than one grade

7. Max Ratings

		Red	Green	Blue
DC Forward current	mA	385	1000	1000
Peak Pulsed Forward current	mA	550	1000	1000
Aluminum core PWB temperature	°C		-40 to 80	
Storage Temperature	°C		-40 to 120	

Using max forward current of 700mA for Green and Blue

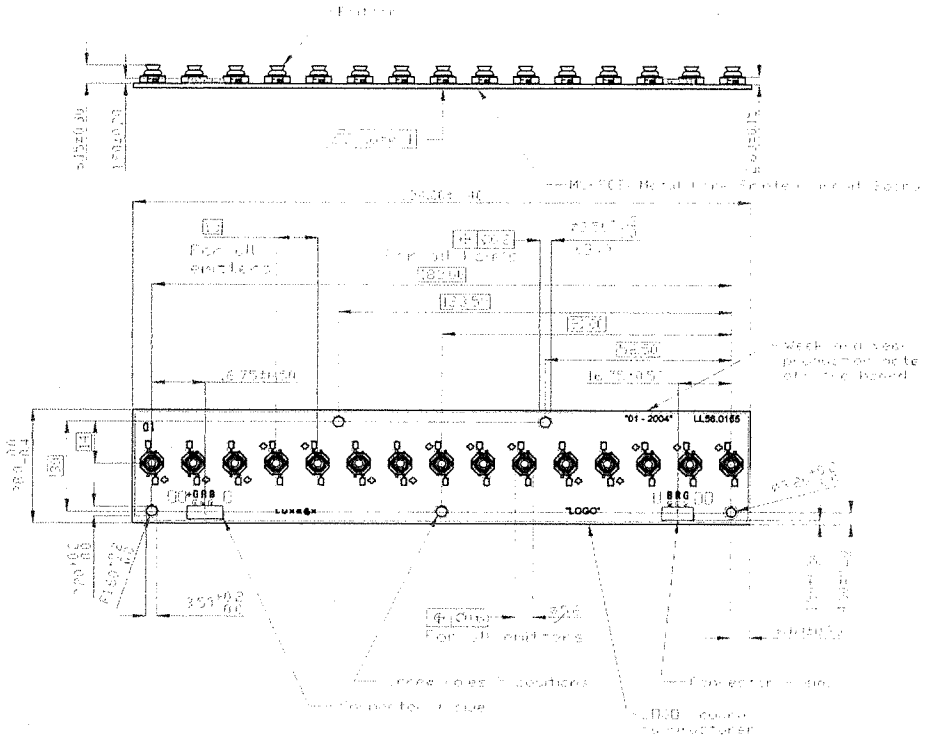
LXQL-FGBB PRELIMINARY specification sheet

Date 1/30/2005

All values are given at junction temperature 25°C

ENGINEERING RESPONSIBILITY	USING DIVISIONS	DOCUMENT NUMBER

SYM	REVISIONS	REVISED BY	APPROVED BY	DATE



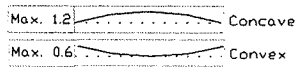
Critical Dimension (To include in COC)
a. MCPWB Length tolerance
b. MCPWB Width tolerance
c. MCPWB Hole to Hole tolerance
d. MCPWB Warpage = Max 0.5% to length (Refer Note 1)

PCB Specifications
a. Copper Trace = 1oz
b. Silver print thickness = N.A.
c. Solder mask color = Black and Dull
d. Aluminium grade = AL1050(BREE) OR AL1100(GAINBASE)
e. Aluminum Thickness = 1.5mm
f. Dielectric + Pre-Preg (Thickness 0.11mm)
g. Conductive surface Finishing = OSP
h. Perform Electrical Test (Continuity)

Components Assembly accuracy
a. Connector = +/-0.2mm

Design Rule of Custom made Light Source
a. Distance between the copper pattern and the edge of Board ; 1.5mm
b. Distance between the different color copper patterns ; 1.4mm
c. Distance between the copper pattern and the sink of same color ; 0.5mm
d. Width of the copper patern ; 1.0 mm (0.7mm minimum)
e. Distance from the screw hole edge to any copper patterns ; 3.25mm

Note 1.
MCPWB Warp Control



DO NOT SCALE THIS DRAWING	GD&T SYMBOLOGY PER ASME Y14.5M-1994
STANDARD	

UNLESS OTHERWISE SPECIFIED
* DIMENSIONS ARE IN MM
* THIRD ANGLE PROJECTION
* ADHERENCE TO DWG A-5951-(541-)
ED,STD SECTION) WAS REQUIRED

TOLERANCES
(UNLESS OTHERWISE SPECIFIED)

ITEM	QTY	PART/MATERIAL-DESCRIPTION	MATL-PART NO	MATL-DWG NO	MATL-SPEC

DRAWN BY: DATE:
ENGINEER/CHECKER: DATE:

LUXEON DIRECT LIGHTSOURCE (LXQL-FGBA)

LUMILEDS
LIGHT FROM SILICON VALLEY

FILE NAME: LXQL-FGBA-01

-	-	-
3D PART/ASSY NAME(S)	REV	DATE

<CD.STD SECTION 600> REQUIRED

TOLERANCES
(UNLESS OTHERWISE SPECIFIED)

X.X.X ± 0.5
X.X.XX ± 0.1
X.X° ± 0.5°

ENGINEER/CHECKER	DATE
Tan Tien Wei	26-07-2004
RELEASE TO PRODUCTION	DATE
SUPERSEDES DOC	DATE

(LXQL-FGBA)

TITLE

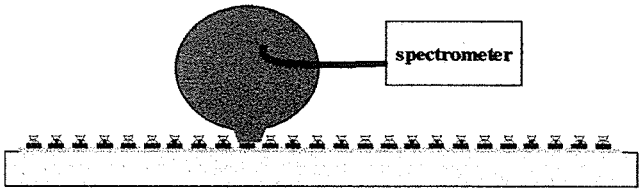
FILE NAME	LXQL-FGBA-01
PART NUMBER	LXQL-FGBA

SIZE	SCALE	SHEET	OF	DOCUMENT NUMBER
	1:1			Rev A

LXQL-FGBB PRELIMINARY specification sheet

Date 1/30/2005 *All values are given at junction temperature 25°C*

8. Testing specifications Photometric characteristics



8.1 Test conditions

		Red	Green	Blue
Junction temperature	°C	25	25	25
Forward current	mA	350	700	700
Pulse length	ms	20	20	20

8.2 Test setup

Integrating sphere	Labsphere Coated	
sphere diameter	in	6
Aperture	mm	15
Spectrometer		
Model	Instrument Systems CAS140B-151	
Spectral Resolution	nm	2.5
range	nm	380-780

0.4nm/25mum pixel data interval

8.3 Measurement procedure

Light source characteristics are determined by measuring optical properties of individual emitters
Liight output of each LED is collected by inserting the lens into the integrating sphere.

8.3.1. Light source fluxes per colour

Flux values per color are determined as a sum of fluxes of the individual emitters for this color

8.3.2 Chromaticity Coordinates and Dominant wavelength per colour

Tristimulus values per color are determined as a sum of respective tristimulus values X, Y and Z of the individual emitters for this color

Red	XR = Σ X(Red LEDs)	YR = Σ Y(Red LEDs)	ZR = Σ Z(Red LEDs)
Green	XG = Σ X(Green LEDs)	YG = Σ Y(Green LEDs)	ZG = Σ Z(Green LEDs)
Blue	XB = Σ X(Blue LEDs)	YB = Σ Y(Blue LEDs)	ZB = Σ Z(Blue LEDs)

CIE1931 color space

8.3.2.a Chromaticity Coordinates per color

Red	Cx	XR / (XR + YR + ZR)
Green	Cx	XG / (XG + YG + ZG)
Blue	Cx	XB / (XB + YB + ZB)
Red	Cy	YR / (XR + YR + ZR)
Green	Cy	YG / (XG + YG + ZG)
Blue	Cy	YB / (XB + YB + ZB)

8.3.2.b Dominant wavelength per color

Dominant wavelength for each color is calculated from Cx and Cy values for this color
Equal energy (E) color point (x,y)=(0.333, 0.333) is used as a reference white point for this calculation

8.3.3 Light source White Point

The light source white point is calculated from the tristimulus values of each colour.

LS tristimulus values	X = XR + XG + XB	Y = YR + YG + YB	Z = ZB + ZG + ZB
LS_Cx	X / (X + Y + Z)		
LS_Cy	Y / (X + Y + Z)		

Color grade and sub-grade is determined from this white point.

8.3.4 Light source Color Uniformity

The light source color uniformity is calculated from the tristimulus values X, Y, and Z of the individual emitters

X(I) = Σ T(I,J) X(J) Y(I) = Σ T(I,J) Y(J) Z(I) = Σ T(I,J) Z(J) J=1..N I = 1..M N=15 M = 15
u'(I) = 4 X(I)/(X(I) + 15 Y(I) + 3 Z(I)) v'(I) = 9 Y(I)/(X(I) + 15 Y(I) + 3 Z(I)
XS = Σ X(I) YS = Σ Y(I) ZS = Σ Z(I)
u'S = 4 XS/(XS+15 YS+ 3 ZS) v'S = 9 YS/(XS+15YS + 3 ZS)
Δ(u'v') = Max[((u'(I)-u'S)^2+(v'(I)-v'S)^2)^(1/2)]

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Date 1/30/2005

Transfer matrix T(I,J)

I \ J	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0.842200	0.811055	0.755698	0.687081	0.615854	0.549665	0.492561	0.445751	0.408741	0.380273	0.358917	0.343373	0.332592	0.325806	0.322520
2	0.811055	0.786991	0.742567	0.684582	0.620989	0.558835	0.502929	0.455616	0.417341	0.387436	0.364774	0.348177	0.336624	0.329338	0.325806
3	0.755698	0.742567	0.715875	0.676474	0.627563	0.574253	0.521891	0.474520	0.434312	0.401842	0.376696	0.358025	0.344923	0.336624	0.332592
4	0.687081	0.684582	0.676474	0.658856	0.629739	0.590619	0.545843	0.500586	0.459021	0.423571	0.395093	0.373442	0.358025	0.348177	0.343373
5	0.615854	0.620989	0.627563	0.629739	0.621912	0.601329	0.569315	0.530345	0.489845	0.452272	0.420318	0.395093	0.376696	0.364774	0.358917
6	0.549665	0.558835	0.574253	0.590619	0.601329	0.600607	0.585830	0.558574	0.523595	0.486592	0.452272	0.423571	0.401842	0.387436	0.380273
7	0.492561	0.502929	0.521891	0.545843	0.569315	0.585830	0.589867	0.579081	0.555320	0.523595	0.489845	0.459021	0.434312	0.417341	0.408741
8	0.445751	0.455616	0.474520	0.500586	0.530345	0.558574	0.579081	0.586613	0.579081	0.558574	0.530345	0.500586	0.474520	0.455616	0.445751
9	0.408741	0.417341	0.434312	0.459021	0.489845	0.523595	0.555320	0.579081	0.589867	0.585830	0.569315	0.545843	0.521891	0.502929	0.492561
10	0.380273	0.387436	0.401842	0.423571	0.452272	0.486592	0.523595	0.558574	0.585830	0.600607	0.601329	0.590619	0.574253	0.558835	0.549665
11	0.358917	0.364774	0.376696	0.395093	0.420318	0.452272	0.489845	0.530345	0.569315	0.601329	0.621912	0.629739	0.627563	0.620989	0.615854
12	0.343373	0.348177	0.358025	0.373442	0.395093	0.423571	0.459021	0.500586	0.545843	0.590619	0.629739	0.658856	0.676474	0.684582	0.687081
13	0.332592	0.336624	0.344923	0.358025	0.376696	0.401842	0.434312	0.474520	0.521891	0.574253	0.627563	0.676474	0.715875	0.742567	0.755698
14	0.325806	0.329338	0.336624	0.348177	0.364774	0.387436	0.417341	0.455616	0.502929	0.558835	0.620989	0.684582	0.742567	0.786991	0.811055
15	0.322520	0.325806	0.332592	0.343373	0.358917	0.380273	0.408741	0.445751	0.492561	0.549665	0.615854	0.687081	0.755698	0.811055	0.842200

LXQL-FGBB PRELIMINARY specification sheet

Date 1/30/2005

Revision history

Who	Rev #	Date	Comments
Y. Martynov	1	3/14/2004	Created based on Trial00 design freeze
Y. Martynov	2	3/19/2004	Corrected x-y for Green
Y. Martynov	3	4/16/2004	Replaced Photometric by radiometric flux spec on Blue; added color uniformity spec
T.-W. Tan	4	4/19/2004	Changed format
Y. Martynov	5	4/20/2004	Added mW for Blue, tentative Min/Max x-y for primaries
Y. Martynov	6	4/23/2004	Spec review with the customer
Y. Martynov	7	5/13/2005	Increased min Blue radiometric flux; Spec for Trial 2B
Y. Martynov	8	5/18/2005	Blue wavelength to dominant, added WP grade definition
Y. Martynov	9	5/25/2005	Thermal resistance, Grade names
Y. Martynov	10	5/27/2004	7 grades, connector part #, drawing, removed typical Ldom, Maximum thermal resistance
Y. Martynov	11	5/28/2004	Corrected x-y for all colors based on Tr002A, added test spec
Y. Martynov	12	6/7/2006	Typ->Nom, coordinates for grade corners corrected x-y for red again
Y. Martynov	13	6/7/2006	Drawing update
Y. Martynov	14	6/21/2004	Corrected error Blue x-y, update after customer feedback, FWHM for Green, drawing update
Y. Martynov	15	6/23/2004	Grade split + packaging explanation, final mechanical drawing, corrected flux to agree with 25up
Y. Martynov	16	7/7/2004	Higher Max Vf on Green, Min dyn. resistance spec, Green flux grades, testing spec with camera
Y. Martynov	17	7/8/2004	Updated Red flux and corrected the grade structure to reflect possible effects of burn-in
Y. Martynov	18	7/27/2004	Updated mechanical drawing to reflect agreement on warp & placement
Y. Martynov	19	1/12/2005	Modified Blue flux Min and Max and Grade structure
Y. Martynov	20		Skipped
Y. Martynov	21	1/30/2005	Abandoned L3 test and added new color uniformity specification, LXQL-FGBB part number

LXQL-FGBB PRELIMINARY specification sheet

Date 1/30/2005

All values are given at junction temperature 25°C

1. Dimensions

1.1 Drawing

See Mechanical Drawing sheet

1.2 Connector

I JAE FI-S5-3P-HFE
II JAE FI-S6-3P-HFE

2. Photometric specification

All photometric specifications defined at 350mA for red and 700mA for green and blue
Junction temperature 25°C
As per Lumileds' tester measurement tolerance.
Lumileds and Sony will establish a Joint Calibration Program to maintain tester accuracy

		Red	Green	Blue
2.1 Total Flux				
Driving condition	mA	350	700	700
min	lm mW	175	325	900
max	lm mW	310	500	1300

Photometric for Red and Green, Radiometric for blue
As actual effect of production burn-in are unclear the flux numbers for Red may be updated based on the actual results.

Light sources will be marked according to their Green luminous flux grade measured at 700 mA Green

		S	M	L	X
2.1.a Green Flux Grade Limits					
min	lm	325	365	405	450
max	lm	365	405	450	500

2.2 Wavelength				
Min	nm	620	523	445
Max	nm	631	537	465

Dominant wavelength (CIE 1931) for R, G and B
Equal energy (E) color point (x,y)=(0.333, 0.333) is used as a reference white point to determine dominant wavelength

2.3 Spectral Width (Full Width at Half Maximum)				
Nom	nm	25	40	30
Max	nm	40	50	40

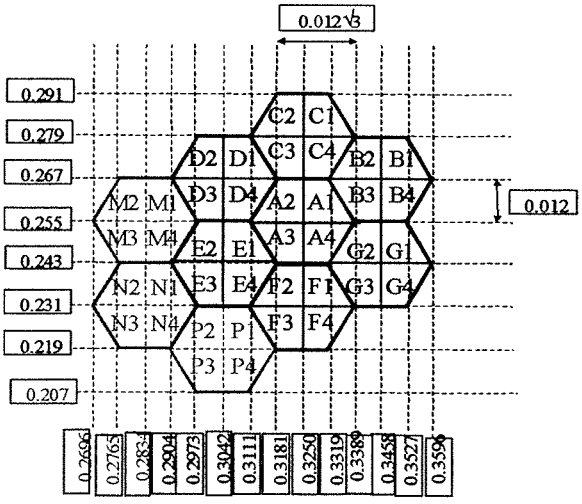
Full spectral width at half peak

2.4 Temperature coefficient of dominant wavelength				
Nom	nm/C°	0.05	0.06	0.04

2.5 Chromaticity coordinates				
Min	x	0.685	0.14	0.13
Max	x	0.715	0.24	0.17
Min	y	0.285	0.685	0.005
Max	y	0.31	0.75	0.055

2.6 White color point characteristics

Light sources will be marked according to their white point grade and sub-grade measured at 350 mA Red and at 700 mA Green and Blue



Grades may be added and become inactive every 6 months
Such change will be agreed upon in advance

2.7 Color Uniformity according to 8.3.4