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(54) **Apparatus and methods for tuning of emitter with multiple leds to a single color bin**

(57) Apparatus and methods are provided for tuning the color of an LED-based lamp (100) to a desired color or color temperature. The lamp (100) can include two or more independently addressable groups of LEDs associated with different colors or color temperatures. The color (or color temperature) of the output light is tuned by controllably dividing an input current among the groups of LEDs. An optimal division of the input current is determined based on a linear interpolation between measured values of color or color temperature produced by at least two different divisions of the input current. Tuning can be performed once, e.g., during manufacture, and the lamp (100) does not require active feedback components for maintaining color temperature.

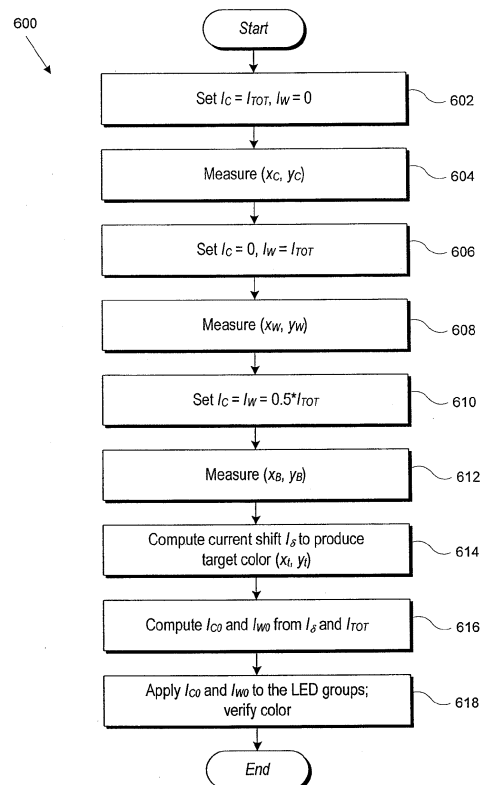


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 12 16 6091

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 734 009 A2 (SIEMENS AG [DE]) 25 September 1996 (1996-09-25) * abstract; figure 1 *	12,13	INV. H05B33/08
X	WO 2009/073394 A2 (CREE LED LIGHTING SOLUTIONS [US]; NEGLEY GERALD H [US]; VAN DE VEN ANT) 11 June 2009 (2009-06-11) * abstract; figures * * page 11 - page 14 *	1-15	
X	WO 2008/152922 A1 (SHARP KK [JP]; ROSHAN RAKESH; HADWEN BENJAMIN JAMES; MONTGOMERY DAVID) 18 December 2008 (2008-12-18) * abstract; figures *	1-15	
X	WO 2008/061560 A1 (PATRA PATENT TREUHAND [DE]; SCHNEIDER MATTHIAS [DE]) 29 May 2008 (2008-05-29) * abstract; figure *	1-15	
X	WO 2005/009085 A1 (TIR SYSTEMS LTD [CA]; ASHDOWN IAN [CA]) 27 January 2005 (2005-01-27) * page 6 - page 8 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) H05B
X	US 2008/088244 A1 (MORISHITA MASAZUMI [JP]) 17 April 2008 (2008-04-17) * abstract; figures *	1-15	
A	WO 2006/071628 A2 (COLOR KINETICS INC [US]; DOWLING KEVIN J [US]) 6 July 2006 (2006-07-06) * the whole document *	1-15	
X	US 2007/235639 A1 (RAINS JACK C JR [US]) 11 October 2007 (2007-10-11) * the whole document *	1-15	
		-/--	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 July 2013	Examiner Maicas, Jesús
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EUROPEAN SEARCH REPORT

Application Number
EP 12 16 6091

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 152 642 A2 (AGILENT TECHNOLOGIES INC [US] AVAGO TECH ECBU IP SG PTE LTD [SG]) 7 November 2001 (2001-11-07) * the whole document *	1-15	
X	US 2002/047624 A1 (STAM JOSEPH S [US] ET AL) 25 April 2002 (2002-04-25) * abstract; figures *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 July 2013	Examiner Maicas, Jesús
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 16 6091

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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11-07-2013

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0734009	A2	25-09-1996	DE 19510049 A1	02-10-1996
			EP 0734009 A2	25-09-1996
WO 2009073394	A2	11-06-2009	CN 101889475 A	17-11-2010
			EP 2225914 A2	08-09-2010
			JP 2011508939 A	17-03-2011
			KR 20100093576 A	25-08-2010
			US 2009160363 A1	25-06-2009
			WO 2009073394 A2	11-06-2009
WO 2008152922	A1	18-12-2008	GB 2458095 A	09-09-2009
			JP 4959815 B2	27-06-2012
			JP 2010529590 A	26-08-2010
			US 2010182294 A1	22-07-2010
			WO 2008152922 A1	18-12-2008
WO 2008061560	A1	29-05-2008	NONE	
WO 2005009085	A1	27-01-2005	CA 2533209 A1	27-01-2005
			CN 1857034 A	01-11-2006
			EP 1649730 A1	26-04-2006
			JP 5197957 B2	15-05-2013
			JP 2006528419 A	14-12-2006
			US 2005062446 A1	24-03-2005
			US 2008224024 A1	18-09-2008
			WO 2005009085 A1	27-01-2005
US 2008088244	A1	17-04-2008	JP 2006202602 A	03-08-2006
			US 2008088244 A1	17-04-2008
			WO 2006077955 A1	27-07-2006
WO 2006071628	A2	06-07-2006	CA 2591205 A1	06-07-2006
			EP 1849152 A2	31-10-2007
			US 2006158881 A1	20-07-2006
			WO 2006071628 A2	06-07-2006
US 2007235639	A1	11-10-2007	NONE	
EP 1152642	A2	07-11-2001	EP 1152642 A2	07-11-2001
			JP 4185255 B2	26-11-2008
			JP 2001332764 A	30-11-2001
			US 6448550 B1	10-09-2002
US 2002047624	A1	25-04-2002	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82