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**United States Patent**

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(12) **United States Patent**  
**Chung et al.**

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(54) **MULTICHIP PACKAGE STRUCTURE**

(56) **References Cited**

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U.S. PATENT DOCUMENTS

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6,410,940	B1 *	6/2002	Jiang et al.	257/82
6,498,355	B1 *	12/2002	Harrah et al.	257/99
6,661,030	B2 *	12/2003	Komoto et al.	257/98
8,217,404	B2 *	7/2012	Wu et al.	257/88
8,791,471	B2 *	7/2014	Leung	257/88
2011/0193109	A1 *	8/2011	Loh	257/89
2012/0132938	A1 *	5/2012	Komatsu et al.	257/89

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\* cited by examiner

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(57) **ABSTRACT**

(65) **Prior Publication Data**

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A multichip package structure includes a metal substrate, a circuit substrate and a light-emitting module. The metal substrate has a first mirror plane area and a second mirror plane area. The circuit substrate is disposed on the metal substrate. The circuit substrate includes a plurality of first conductive pads, a plurality of second conductive pads, a first passing opening for exposing the first mirror plane area, and a second passing opening for exposing the second mirror plane area. The light-emitting module includes a plurality of light-emitting units disposed on the first mirror plane area. Each light-emitting unit includes a plurality of LED chips disposed on the first mirror plane area. The LED chips of each light-emitting unit are electrically connected between the first conductive pad and the second conductive pad in series. Thus, the heat-dissipating efficiency and the light-emitting effect of the multichip package structure can be increased.

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See application file for complete search history.

**13 Claims, 8 Drawing Sheets**

