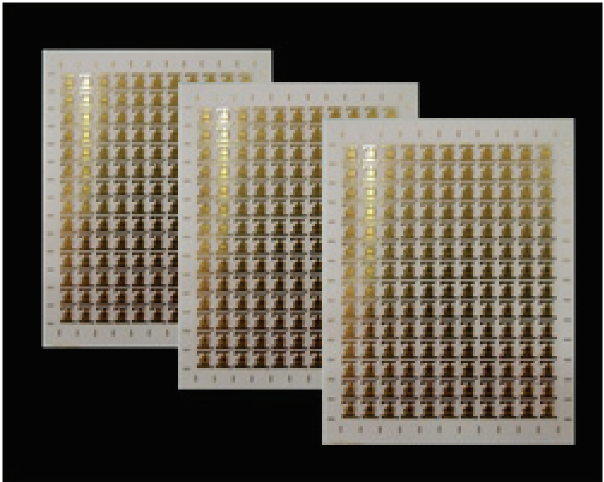
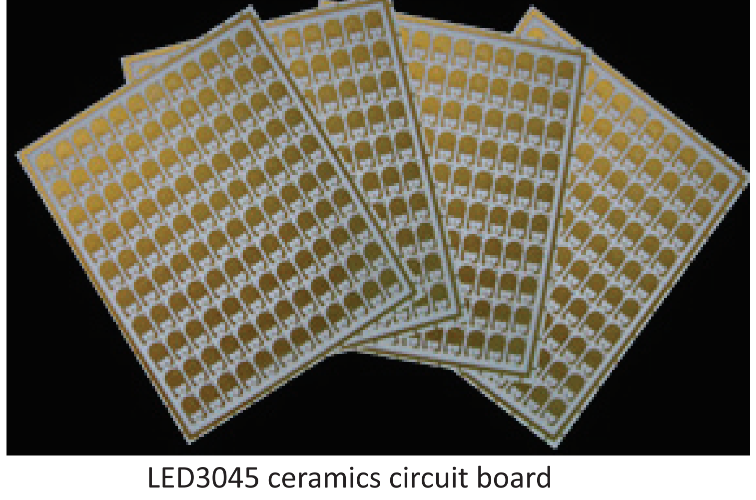
CERAMIC SUBSTRATES

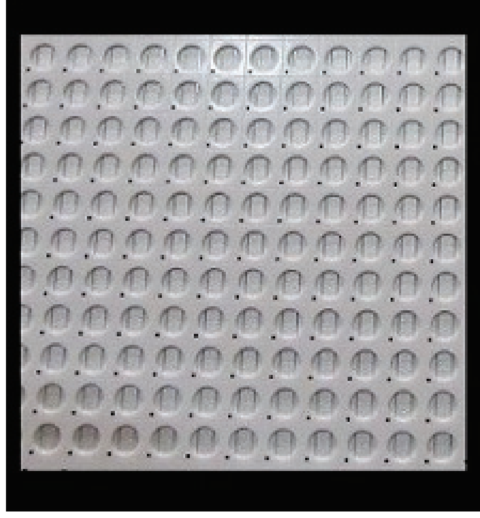
Ceramic Substrates

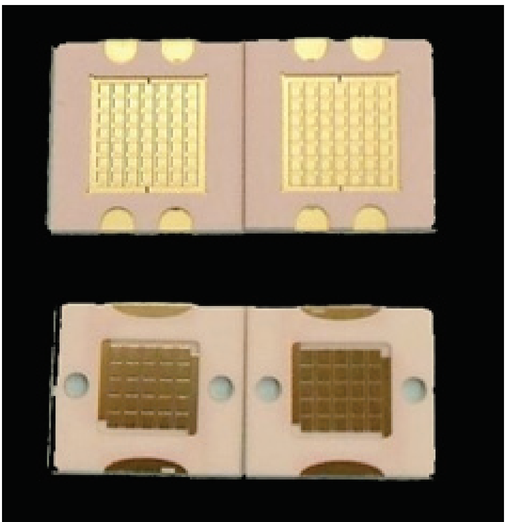
Aluminum Oxide (Al_2O_3) and Aluminum Nitride (AlN) are non-electrical conductive. They act as electrical insulators and they reduce the thermal effect which affecting the performance and quality of the traditional Aluminium plate (MCPCB). Thermal effect could easily cause short circuit. With Ceramic Substrates, it improves the performance and greatly extends the life span of the product. This is particularly obvious in the high power application as ceramic has a high thermal conductivity. We produce customized, smaller in size, high performance with high accuracy and surface finish ceramic substrates for our customers.

We possess the following ceramic substrate manufacturing technologies, namely Thin-film deposition, Photolithography, Electrode/Electrodeless plating, Micro-pattern design and integrated manufacturing.


LED3535 ceramics circuit board


LED3045 ceramics circuit board


Ceramics Cavity Substrate


Integrated Ceramic Substrate

Xellatech Pte Ltd
7, Kallang Place, #06-10, Singapore 339153
Tel: +65-66815739 Ext 18
Email: sales@xellatech.com Website: http://www.xellatech.com

CERAMIC SUBSTRATES - Design Rules

Wafer

Material	Pattern construction	Laser drill for via-holes	Laser scribing	Line width for dicing saw	Clearance distance from edge to metalized pattern
Al2O3 Wafer	Single Face Double face With Via-holes Customized	80~200 um, 150 um typically	1/4~1/2 substrate thickness , 1/3 substrate thickness typically	150~300 um, 200 um typically	6mm (as the thickness of the metalized layer less than 30 um)； 8 mm (as the thickness of the metalized layer higher than 30 um)
AlN Wafer					
Al2O3 Chip					
ALN Chip					

Substrate Materials

Material	Typical thickness (mm)	Typical dimension	Thermal conductivity
Al2O3 Wafer	0.38/ 0.5 /0.635/0.8/1mm	4.5" /5”	20~27 W/mK
Al2O3 Chip	0.38/ 0.5 /0.635/0.8/1mm	Customized	
AlN Wafer	0.38/ 0.5 /0.635	4.5“/5”	170~200 W/mK
AlN Chip	0.38/ 0.5 /0.635	Customized	

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CERAMIC SUBSTRATES - APPLICATIONS

Thermal Shock Test

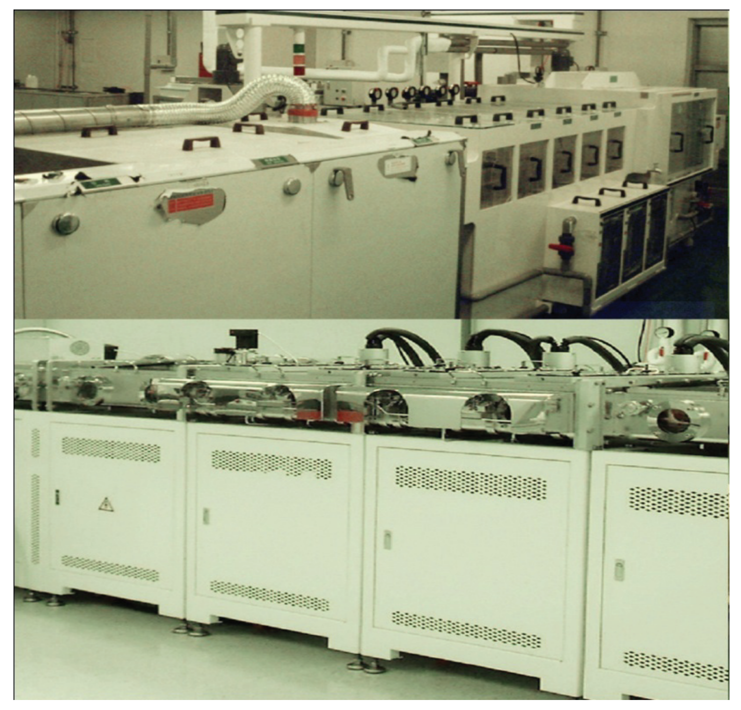
- Condition：-40℃(30 min)~125℃(30min), 500 cycle - (MIL-STD-202.107G)
- Manner：The pulling machine to test adhesion
- Standard： Pulling ≧3Kgf。
- Test result：

Item	Pulling (Kgf)	Result	Item	Pulling (Kgf)	Result
1	3.84	OK	6	3.94	OK
2	3.93	OK	7	3.58	OK
3	3.42	OK	8	3.67	OK
4	4.04	OK	9	3.66	OK
5	3.56	OK	10	3.83	OK
				Average	3.75

Testing position

Applications

- High power LED ceramic substrate
- Flip chip /eutectic substrate manufacturing
- HCPV heat-sink of solar cell
- Sensor ceramic substrate
- ESD/EMI protect design
- Thin film passive/protect devices



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CERAMIC SUBSTRATES - Design Rules (Cont'd)

Metalized Materials

Material	Matalized Material/Thickness			Conducting material of the via-holes	Line width* tolerance
	Cu	Ni	Au		
Al2O3 Wafer AlN Wafer Al2O3 Chip AlN Chip	1 µm 10 µm 20 µm 30µm 60µm 70um 100um Customized	3~5 um, typically	0.075~1 um, 0.1um typically	Sliver Cooper Sliver/Copper	50 µm typically

Note*：The limit of the line width of the metalized pattern depends on the thickness of the metalized material. The ratio of the line width limit and metalized metal thickness is 3:1 (For example, when the metalized metal thickness is 33 um, the line width limit will be 99 um).

Thick and Thin Film Comparison

Item	Thick film	Thin film /DPC
Accuracy	+/- 10%	+/- 1%
Adhesion	Low (especially on AlN substrate)	High
Surface roughness	Low (1~3 µm)	High (<0.3 µm)
Real image		

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