


최신 PCB 기술동향


이 성 규
(LG전자(주))




최신 PCB 기술 동향

BUM기술을 중심으로 한 기술의 전개 방향 공유
[NEPCON Korea, 2004. 02. 25]

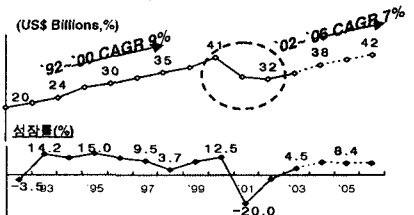
1. PCB Trends
2. BUM 기술 시장
3. Bum 공법 비교
4. NMBI-I vs NMBI-II
5. Applications
6. NMBI Road Map

 LG Electronics / DMC Division

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1. PCB Trend

Market



(US\$ Billions, %)

1992-2000 CAGR 9%

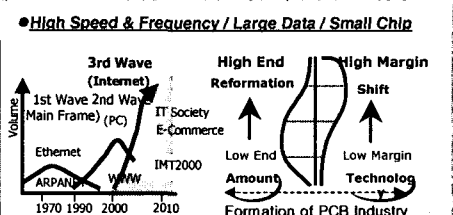
2002-2006 CAGR 7%

성장률(%)

14.2, 15.0, 9.5, 3.7, 12.5, -20.0, 4.5, 8.4

Technology

● High Speed & Frequency / Large Data / Small Chip



3rd Wave (Internet)
1st Wave (Main Frame) (PC)
2nd Wave (E-Commerce)
IT Society
E-Commerce
Ethernet
ARPANET
WWW
IMT2000

High End Reformation
High Margin Shift
Low End Amount
Low Margin Technology

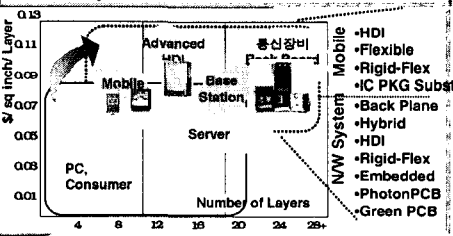
Formation of PCB Industry

PCB Market Segmentation

Package	9%	Flexible	11%
Military	6%	HDI/PKG	13%
Industrial	7%	일반18L	4%
Automotive	4%	일반8-16L	15%
Consumer	14%	일반4-8L	31%
통신단말기 & N/W Sys.	24%	단면/양면	26%
Computer & 주변기기	36%		

Industry Products

PCB value position



Advanced Mobile, Base Station, Server

통신장비


Mobile, N/W System

PC, Consumer

Number of Layers

inch/Layer

High Value Added PCB

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2. PCB Market & Technology

Mobile PCB			
<p>Mobile</p>	FPCB	*Headphone Camera Movie	
	Rigid-Flex	*PDA Wireless Paperless e-Mail	
	MMC	*Smart phone Multi Function	
	NMBI		
High Layer PCB			
	ZBC		
	Teflon		
	Rigid-Flex		
	Back-Plane		
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3. BUM 기술 비교

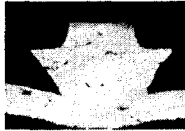
공법 개요						
어 법 특 징	절연재료	All	All	Thermo-plastic Resin(LCP)	Thermal Curable Resin, RCC	Aramid 부직포
	VIA 형성	Etched, Plated Bump	Laser Drill(CO ₂) + Cu Plating	Laser Drill(CO ₂) + Silver Paste Filling	Plating + Etched Bump	Laser Drill(CO ₂) + Cu Paste Filling
	층간접속	Metallurgical Interconnection	Cu Plating Interconnection	Metallurgical Interconnection	Cu Plating Interconnection	Conductive paste
	장단점	<ul style="list-style-type: none"> Pad on Via/Landless → High mounting density Stack Via/All IVH → High Design Flexibility Thermal Via → High Frequency 	<ul style="list-style-type: none"> Pad on Via/Landless → High density Stack Via/All IVH → High Flexibility Thermal Via → High Frequency High Reliability 	<ul style="list-style-type: none"> High Performance (내열, 자유전, 저항습) Simple Process (일괄적층가능) → 전층 IVH 가능 Landless 풀가 	<ul style="list-style-type: none"> Pad on Via/Landless → High density Stack Via/All IVH → High Flexibility Thermal Via → High Frequency 	<ul style="list-style-type: none"> Stack Via/All IVH → Design Flexibility 열 충격성 약함
참여 업체 현황	Mektron, Fujikura, Sony Chem., NMBG Unimicron, SLMi	SS, DD, IBIDEN, IBM, CMK, etc.	Denso, Airex, Noda Screen, Sowa, OK print, Kyousha	Daiwa, Clover, Motoya, etc.	Matsushita, CMK, etc.	
현재 단계	Mass Prod.	개발중(Pilot)	개발중(E/S)	개발중(E/S)	Mass Prod.	
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4. NMBI

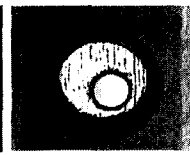
NMBI 란 ?

Copper Bump를 이용한 층간 접속 공법

NMBI



Laser 공법



NMBI Merit



Stacked Via

• 기판 면적 축소



Pad on Via

• 미세 실장 용이



All IVH

• 설계 자유도 확보



Land-less

• 고 밀도 설계 가능



• 낮은 전기 저항

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NMBI™ Process

Bump



pre-preg



Hot press

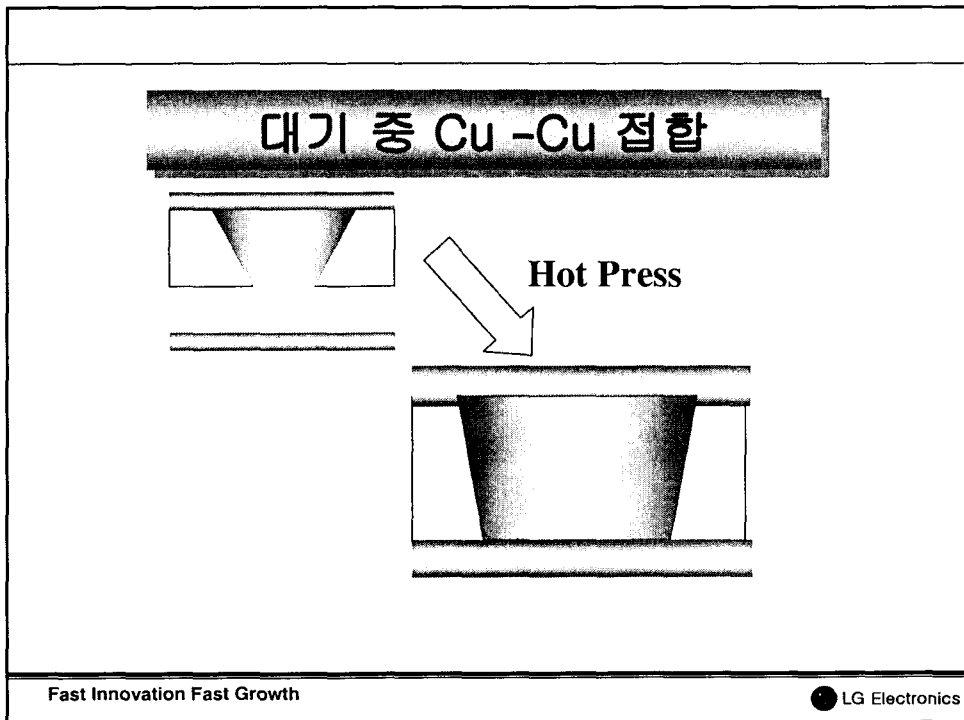
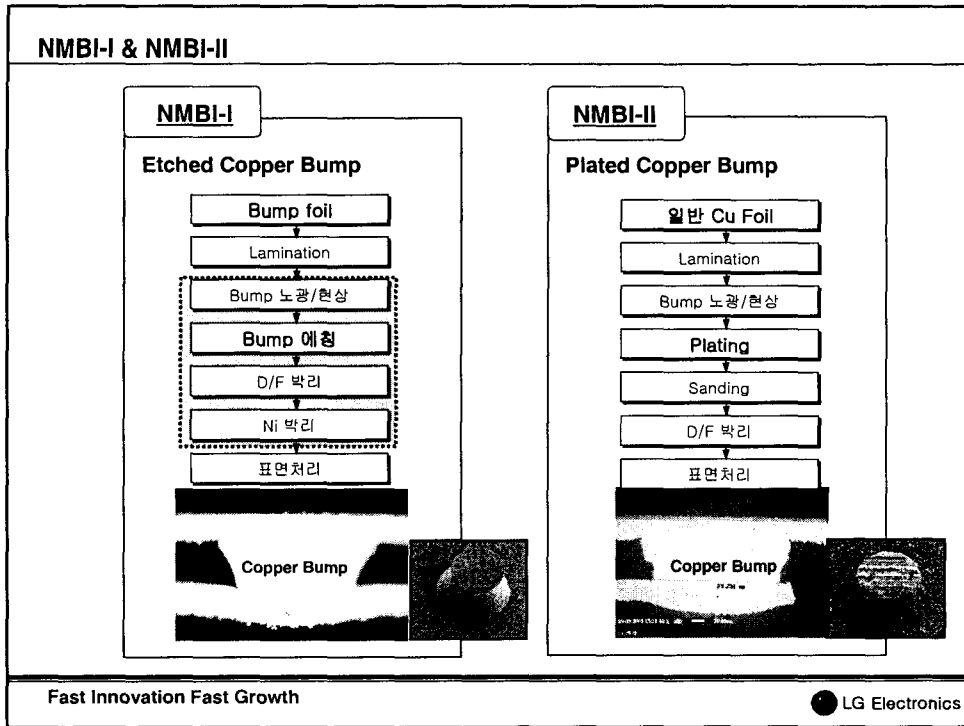


Pattern Formation



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Bump 접속 신뢰성

Reliability test result for Cu-Cu bonding

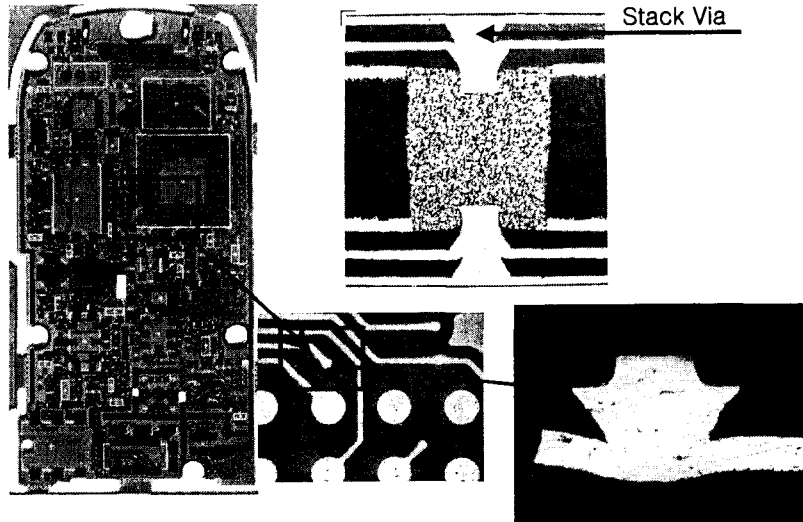
Item	Condition	Specification	Result
.	125℃X700 h	Resistance change : +10% >	0/20
.	85%85℃ DC12V 500 h	Resistance change : +10% >	0/20
.	-65℃/30min/125℃ /30min 700cycle	Resistance change : +10% >	0/20
Thermal shock	288℃X10sec 9cycle	Resistance change : +10% >	0/20
IST	+25℃X2min/+125℃X3 min 500cycle	Resistance change : +10% >	0/20
Hot OIL test	+260℃X20sec/+20℃ X20sec 100cycle	Resistance change : +10% >	0/20
Resistance	4electrode method	0.15φ V i a	0.1 mΩ

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5. Application

BUM NMBI Cellular Phone

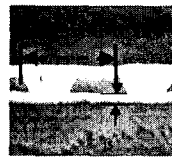
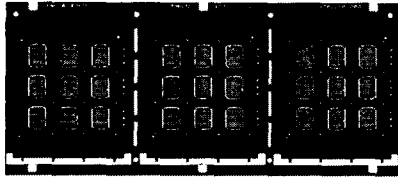


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5. Application

Rigid / Rigid-Flex NMBI PKG



Rigid NMBI PKG Substrate
(Thin core 0.06t)

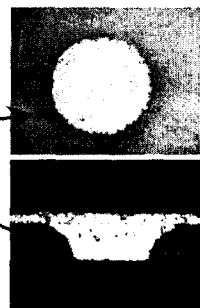
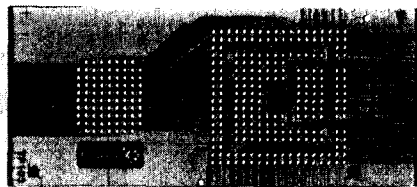
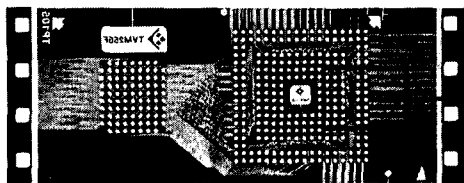
Rigid-Flex NMBI PKG Substrate
(Image Sensor)

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5. Application

Flexible NMBI PKG



Folded Stack PKG Substrate
(1-, 2-metal Tape)

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