SEMICON Taiwan2011

Semiconductor Process Technologies & Solutions

Best performance for next generation applications

Brand-new Flip-Chip Package

- High thermal conductivity
- High frequency performance
- High Mountability
- High reliability

Sept.7, 2011

CONNECTEC JAPAN Corporation

What's CONNECTEC JAPAN

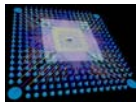
Company Name : CONNECTEC JAPAN Corp.

Establishment : November 02, 2009

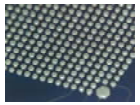
Capital : US$ 2.5 million

Business Activities

Packaging Foundry Service



Contract of Package Development



Technical Consulting & Support

Company Location

CONNECTEC KOREA

- Sales Office in Seoul

CONNECTEC JAPAN

- HQ, R&D & Factory in Niigata

- Sales Office & DH in Kyoto

CONNECTEC CHINA

- Sales Office in Suzhou

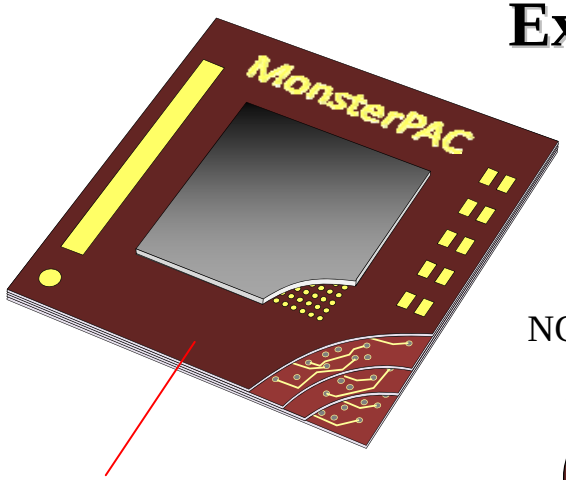
CONNECTEC TAIWAN

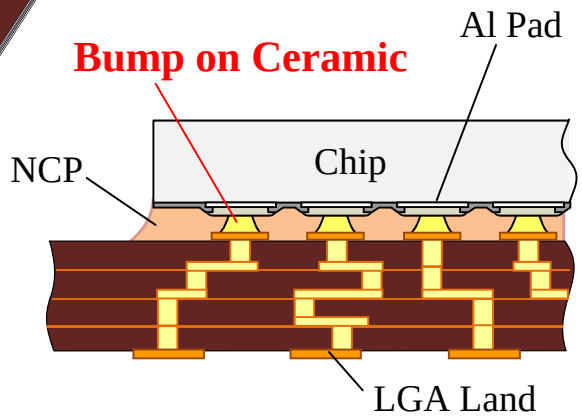
Coming soon !

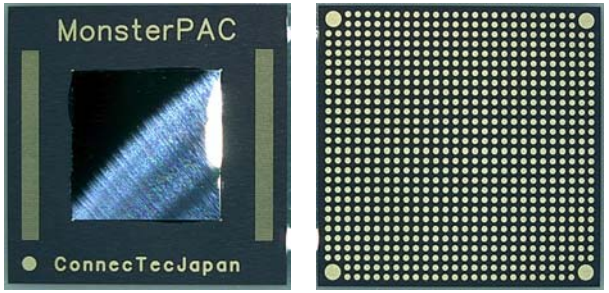
MONSTER PAC – type C

What's MONSTER PAC

Exceed the performance of conventional BGA!!

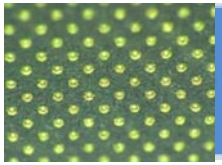




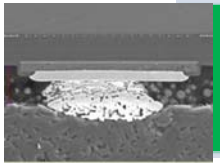


- Non-Molded
- Land Grid Array [LGA]

KEY Technologies



Bump on Ceramic → **Wafer Bump not needed**, **Fine pitch Bumping**



Soft Flip-chip Bonding → **Low Pressure & Temp.**, **Less Damage Bonding**

Why Ceramic Substrate

Primary Drivers for Substrate Material

- **Electrical & Thermal Enhancement**
- **Denser Package Outline** [Smaller, Thinner, Less Weight]
- **Improved Reliability**
- **Cost Compatible**

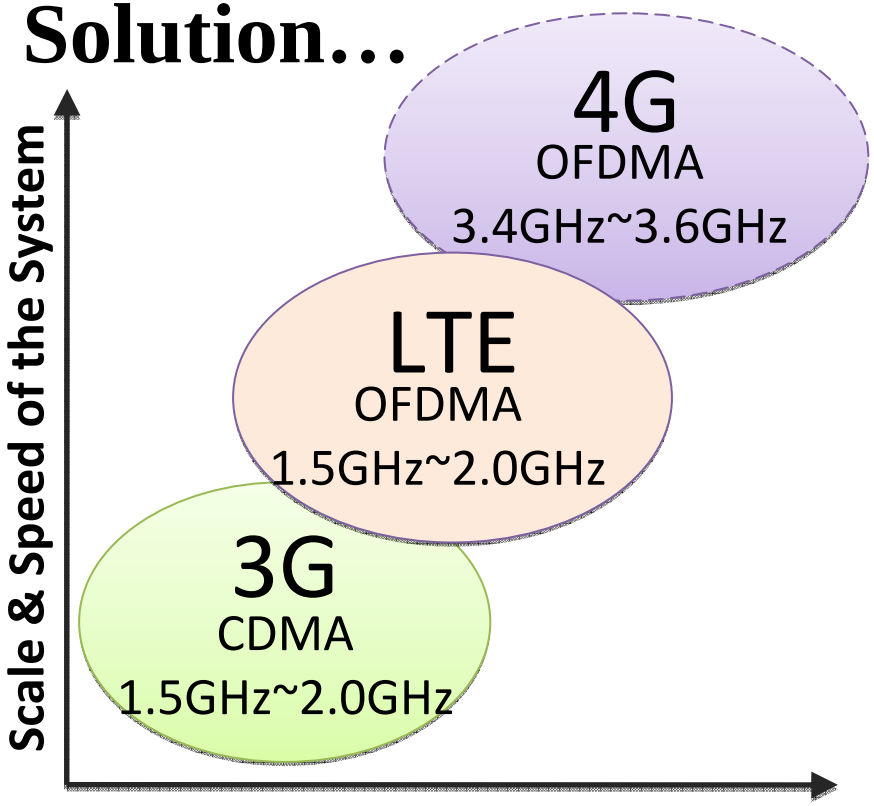
Organic substrate is nearly over capacity

Ceramic Substrate should be highlighted

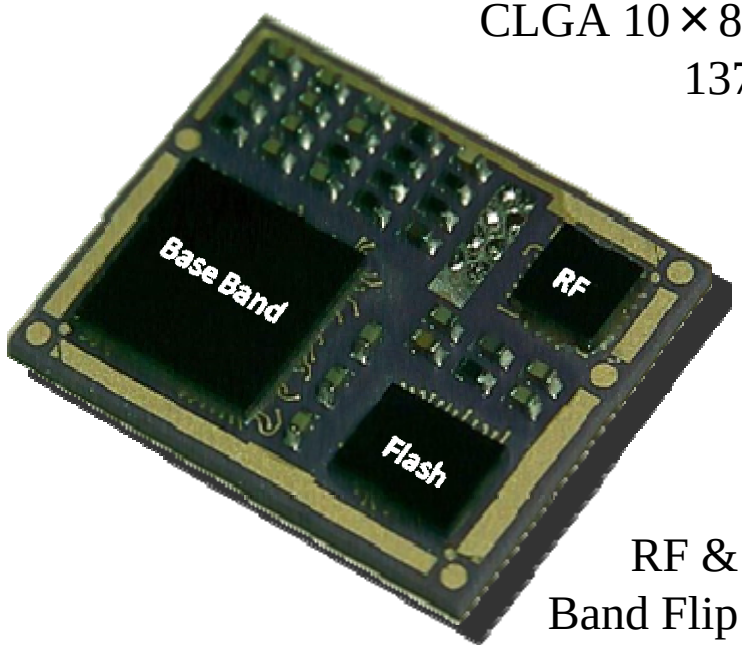
For Maximize Performance of 3G , LTE & 4G

If you are looking for the Multi Chip Module Solution…

MONSTER PAC – type C
Can offer All !



CLGA 10×8mm
137pin



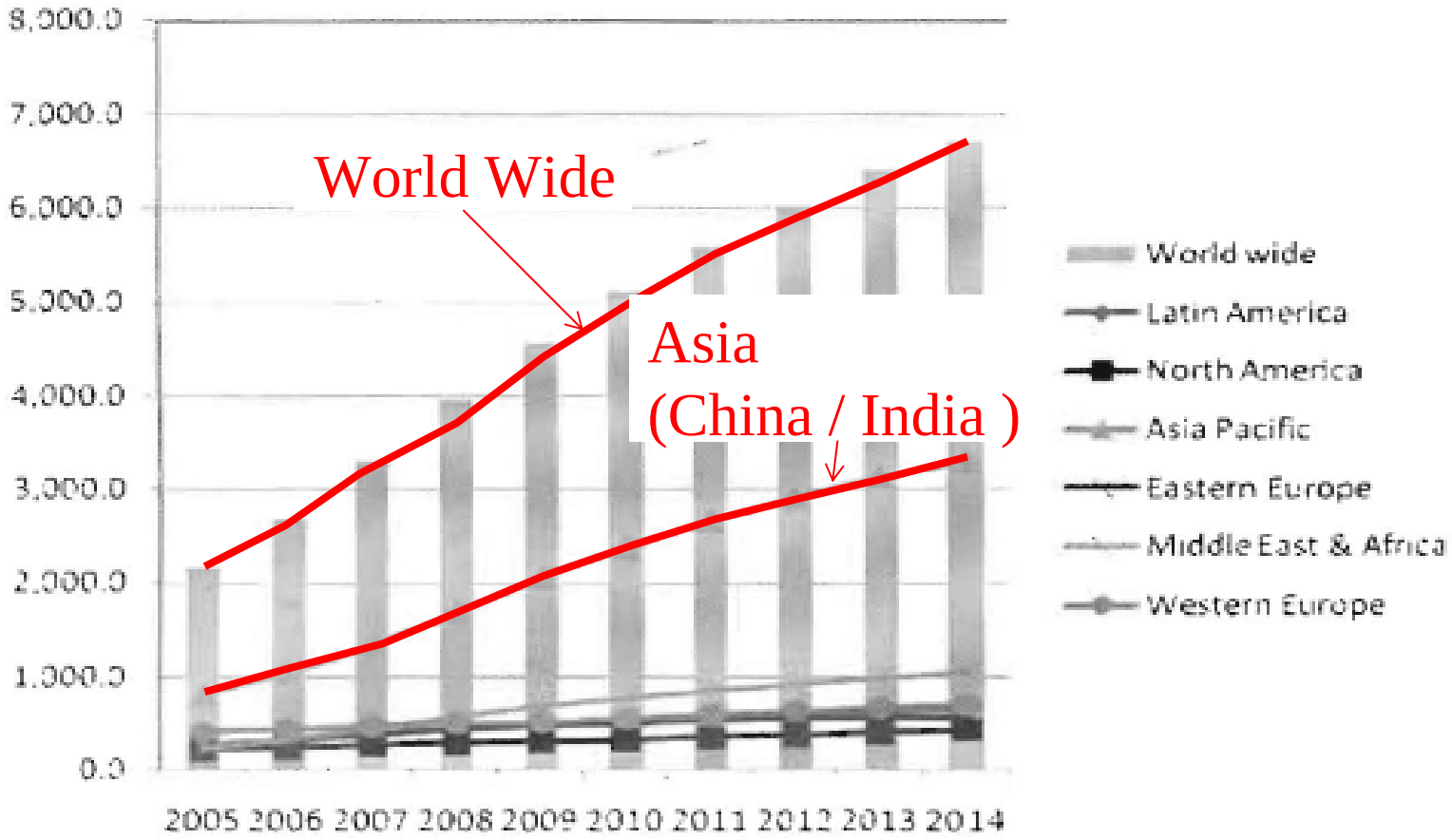
RF & Base
Band Flip Chip
Multi chip Module

MONSTER PAC – type C
Can offer All !

- ✓ **Lower Loss over GHz Application**
- ✓ **Higher Thermal Conductivity**
- ✓ **Unique Low Pressure Flip Chip Bonding for Low-k**
- ✓ **High Density Multi Chip Module for RF & Base Band**

Forecast of Mobile Phone Market

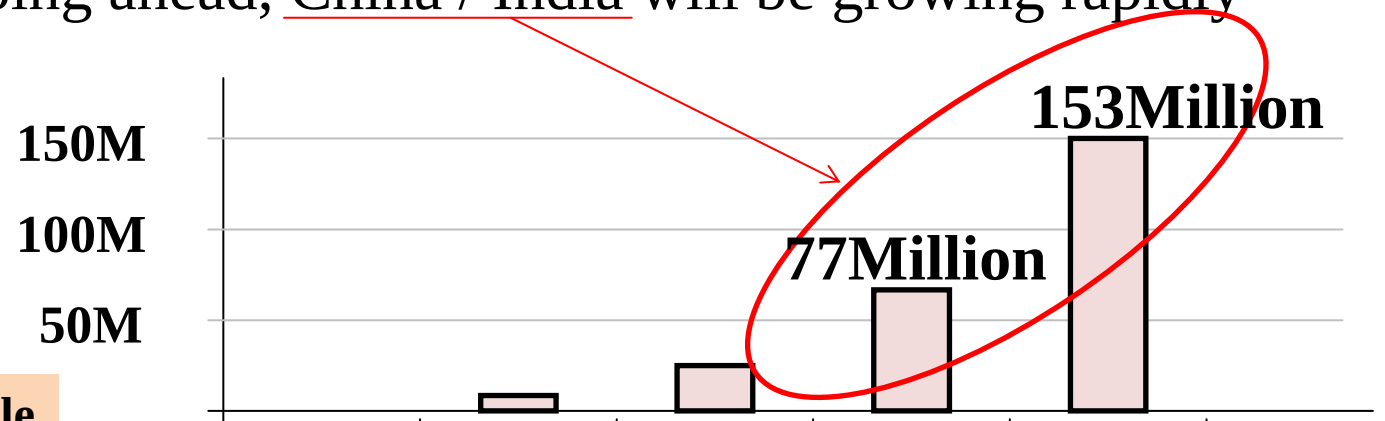
- In 2014, it is estimated to be over 6.7Billion subscribers world wide.



LTE Service-in Schedule

USA/Japan : going ahead, China / India will be growing rapidly

Mobile phones with LTE

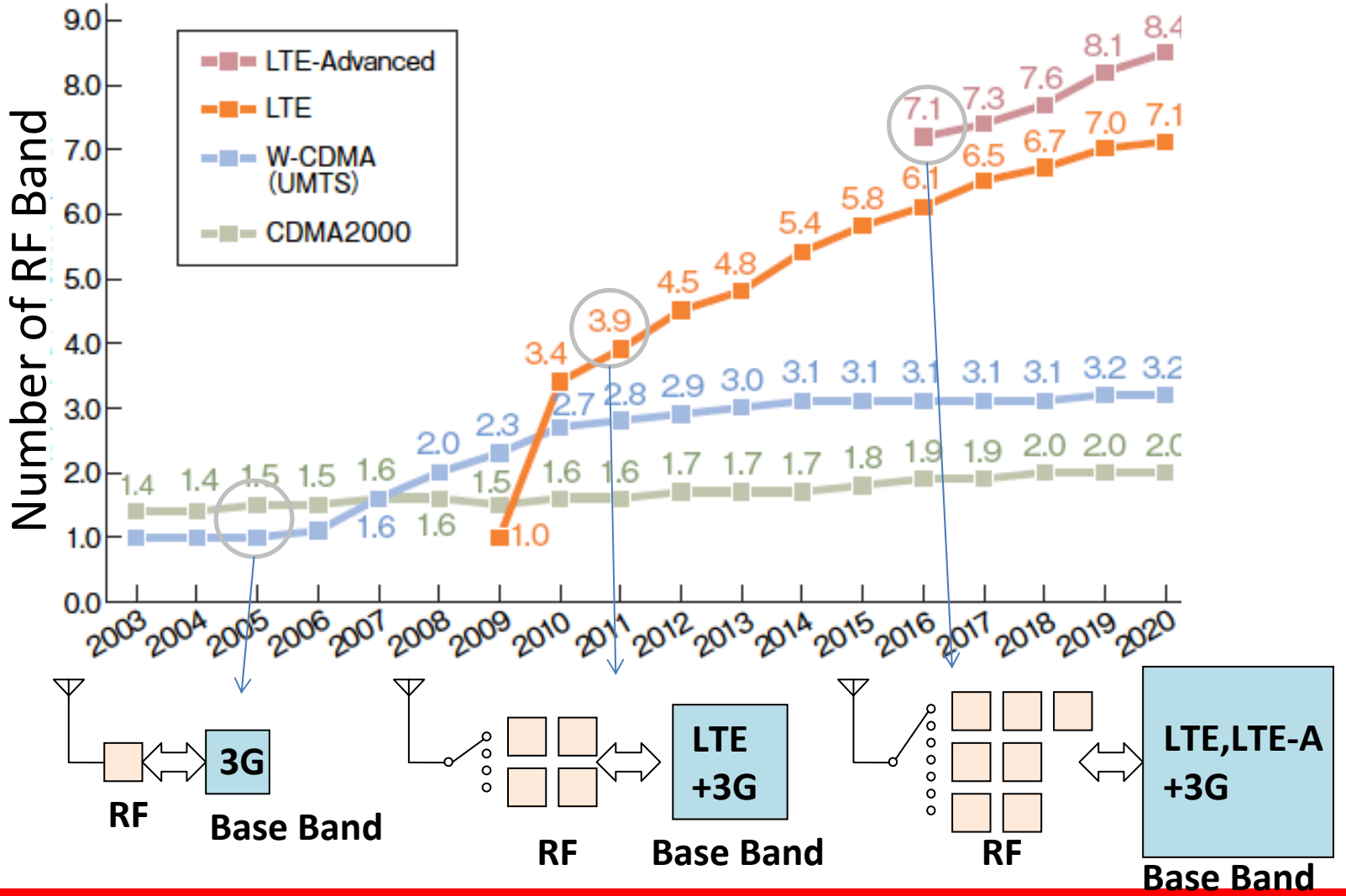


Service in Schedule

Japan	NTT
	SB
	KDDI
USA	Metro PCS
	Verison
	ATT
China	China Mobile
Korea	KT , SK Telecom , LGU+
Hong Kong	CSL
Singapore	Singtel
Sweden	Telia Sonera
India	Reliance Ind.

Increasing System Scale of Mobile Phone

Increasing RF Band Number & Base Band System are Key Issues for LTE & 4G



Technical demand for RF Circuit

1) Multi Band RF module

- 800Mz, 1.5GHz, 1.7GHz, 1.8GHz, 2.1GHz, 2.6GHz other.
  Many frequency is used. But space is limited.
  ⇨ **High frequency performance is required.**
  ⇨ **Module for multi band RF is required.**

2) High thermal conductive package

- High power is required for LTE PA.
- LTE PA circuit is bigger than GSM, WCDMA
- So heat problem occurs
  ⇨ **High thermal conductive package is required.**

Technical demand for Base Band LSI

1) High Thermal conductive package

- Data speed is high (100Mbps)
- Serious Heat Problem by FCBGA
- Using by spec down to reduce heat

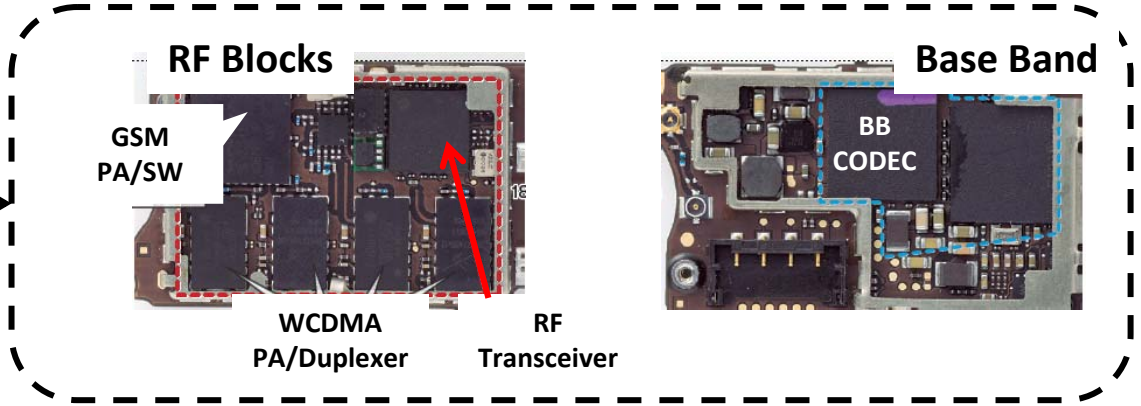
➡ **High Thermal conductive package is required.**

2) Package for Low-K wafer

- Multi Mode (GSM, WCDMA,LTE)
- Circuit scale increase but not allowed for mobile.
- So using fine process (under 65nm : Low-K)

➡ **Low pressure bonding is required.**

Requirement of Set, RF & Base Band



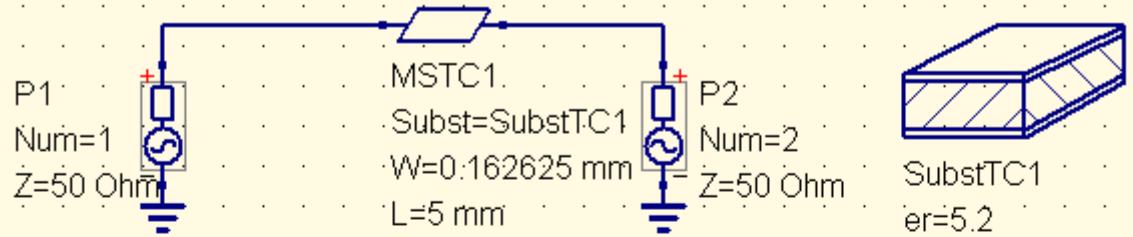
	Mobile Set	RF Blocks		Base Band	
System Require -ment	All in One	Multi Band RF Transceiver		Multi Mode CODEC	
	High Density	Low Loss Over GHz	Higher Power Consumption		32nm/22nm Low - k
PKG Require -ment	Module	Low Loss	High Thermal Conductivity		Low Pressure Bonding

【Technical Data】 High Performance(Frequency)

Model (Micro Strip Line : Z=50ohm , L = 5mm)

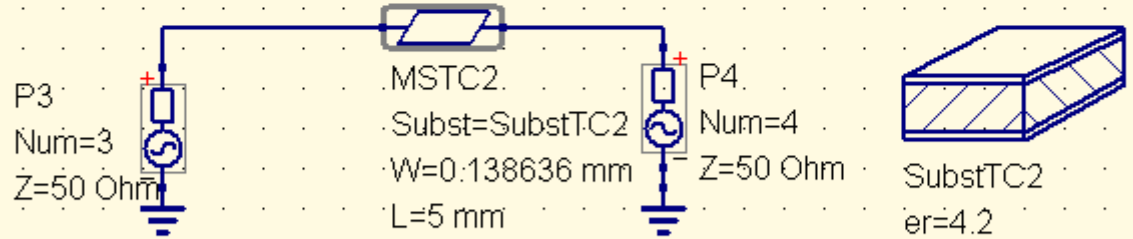
S-Parameter Simulation

Glass Ceramic substrate (tan δ =0.0038)

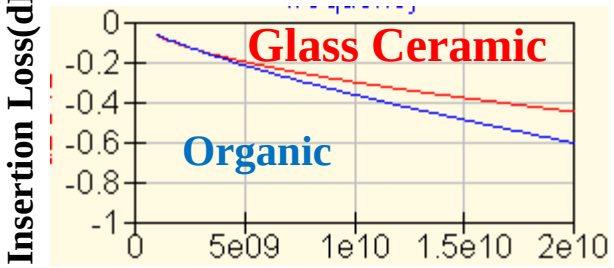


SubstTC1
er=5.2
h=0.1 mm
t=8 um
tand=0.0038
rho=3.0e-08
D=2e-06

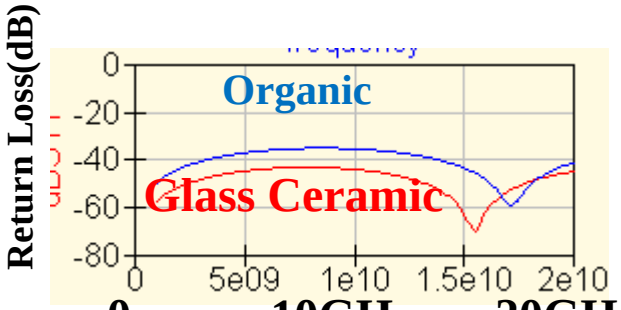
Organic Substrate (tan δ =0.019)



SubstTC2
er=4.2
h=0.075 mm
t=18 um
tand=0.019
rho=1.7e-08
D=1e-06



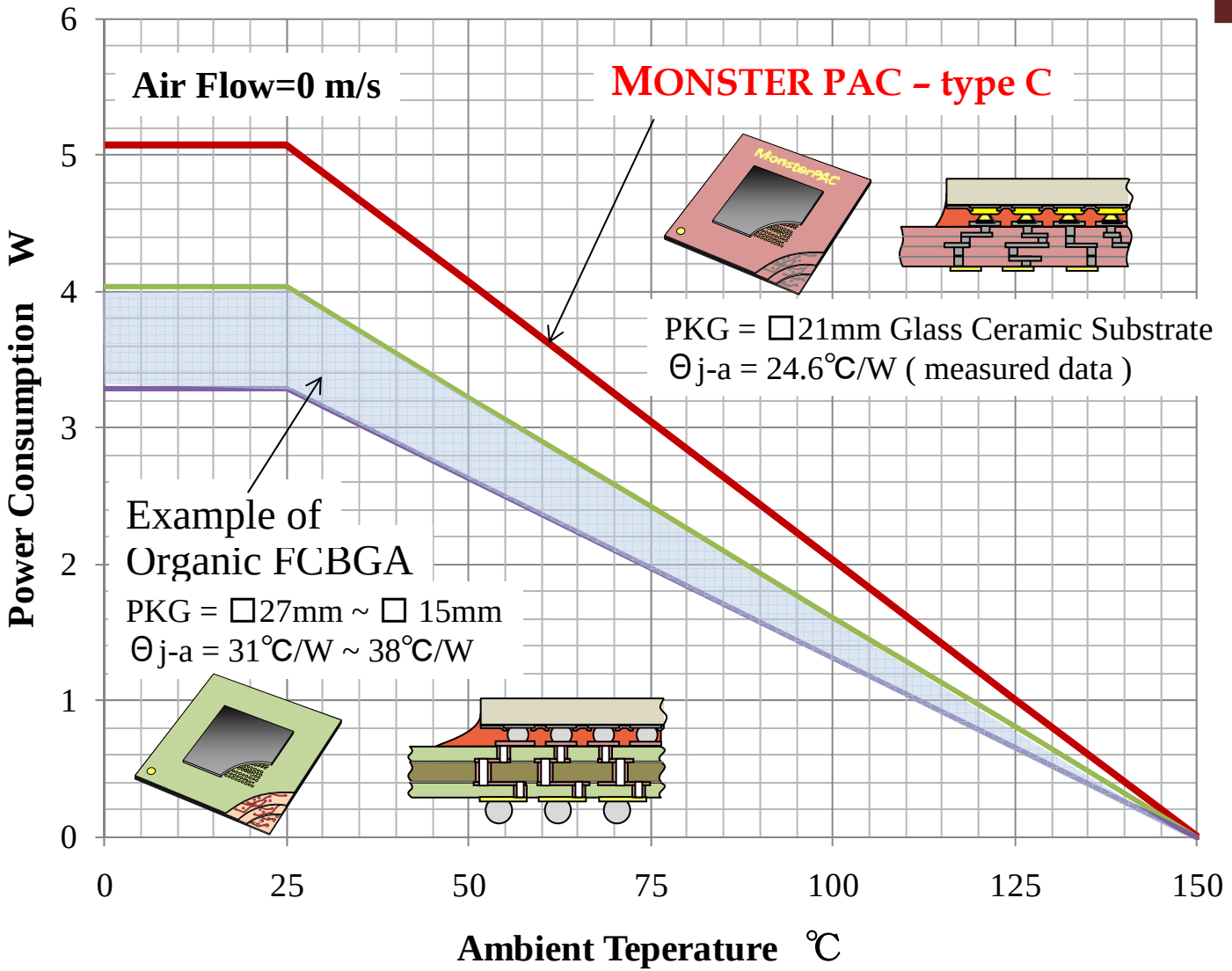
0 10GHz 20GHz



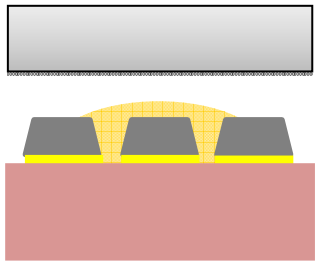
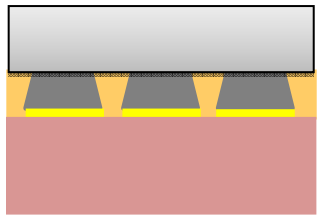
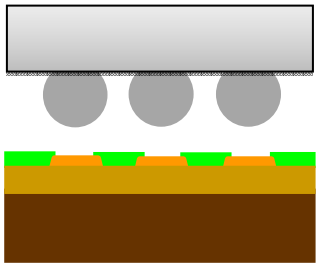
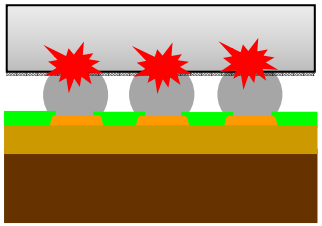
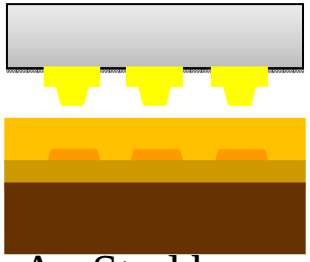
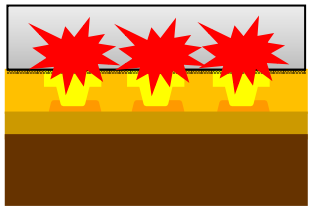
0 10GHz 20GHz

Ceramic's loss is small →over 5GHz available

Power Consumption data



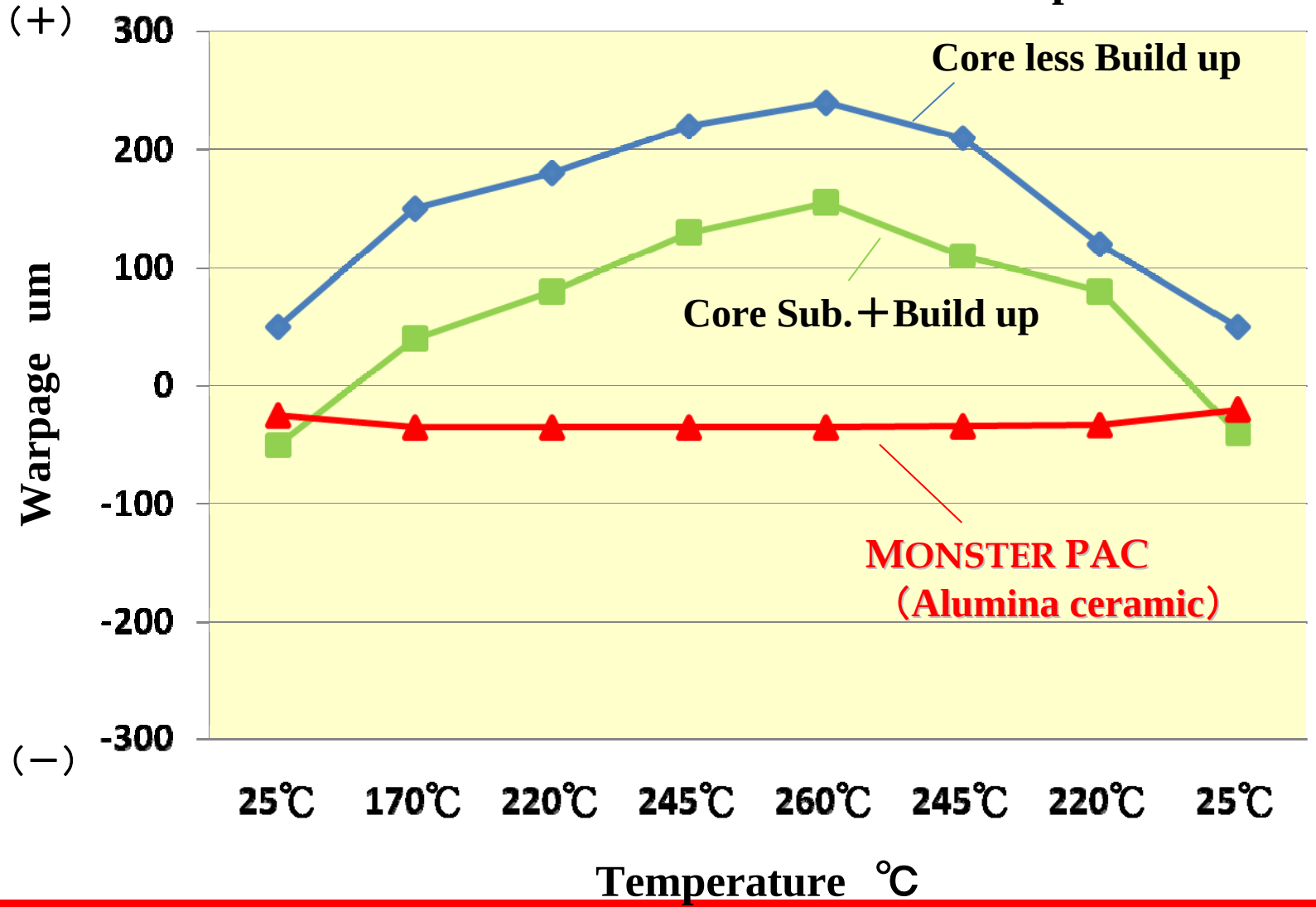
Low pressure bonding

	Bump material	Chip damage	Bonding force
MONSTER PAC - type C	 Soft bump	 No damage	0.12g/bump
C4	 Solder ball (Hard bump)	 damaged	2.4g/bump
SBB	 Au Stud bump (Hard bump)	 damaged	50g/bump

【Technical Data】

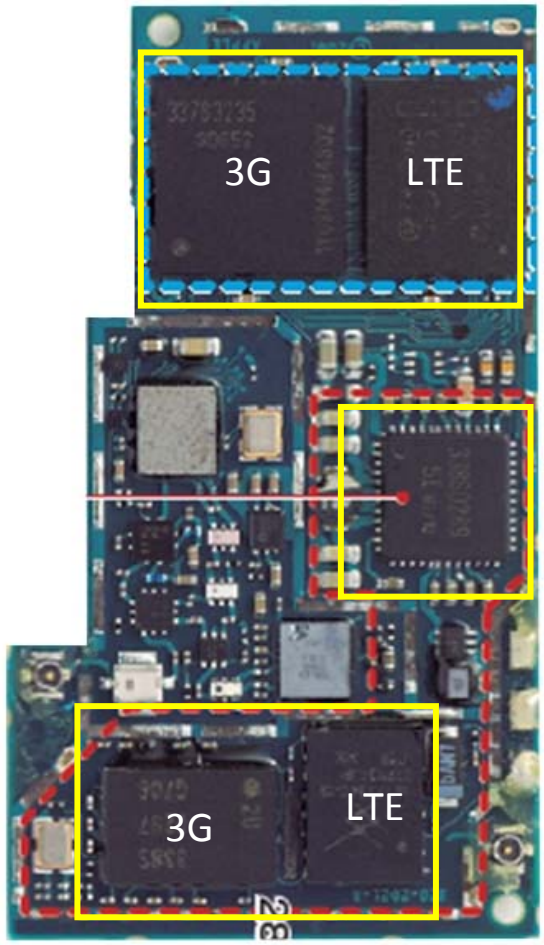
Warpage data at Reflow

MONSTER PAC19mm□ vs. Core Sub.+ Build up15mm□
Core less Build up 15mm□



Issues of Module Assembly

Example of Conventional Package



Issues on current organic substrate products

- **Poor high frequency performance**
- **Poor thermal conductivity**
- **Poor mountability (warpage)**

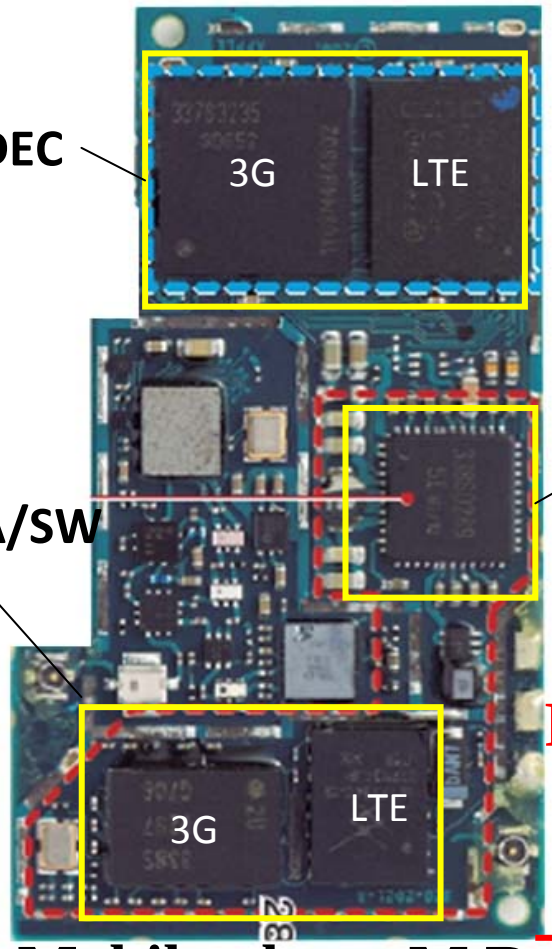
Need to divide all chips for individual PKG.

MONSTER PAC –type C can produce Multi-chip module w/o issues.

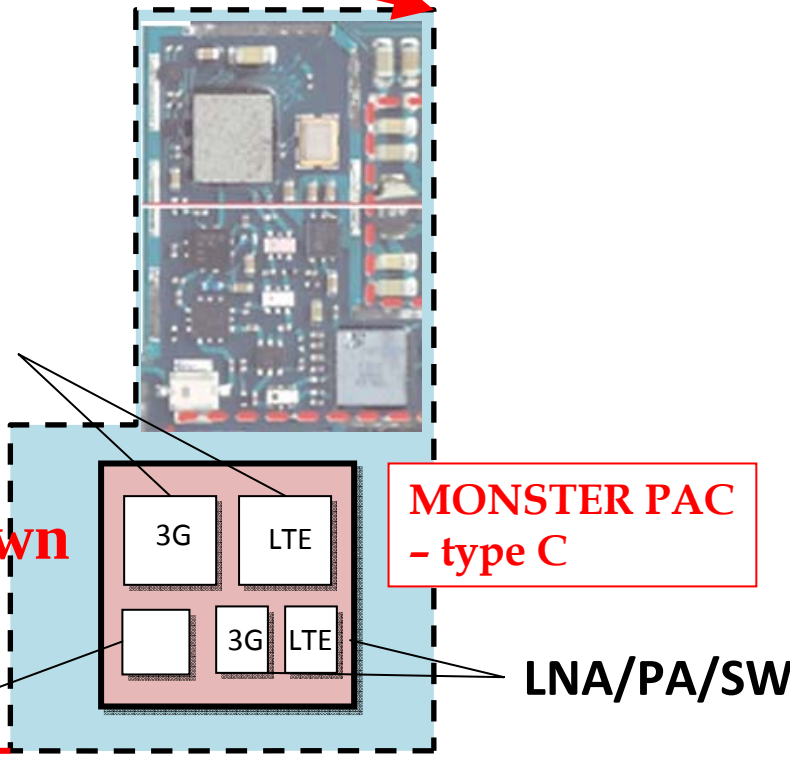
Replacement Efficiency of MONSTER PAC – type C

Conventional Package ⇨ **MONSTER PAC – type C**

PWB: 35% Down Sizing !



PKG: 70% Down Sizing !



Mobile phone M.B

S=744mm2 ⟶ S=480mm2

MONSTER PAC ver. M.B

MONSTER PAC -type C is the Best Packaging Solution for 3G , LTE & 4G

	Conventional Flip Chip Package with Organic Substrate		MONSTER PAC - type C
Substrate	**Core Sub. + Build up**	**Core Less Build up**	**Ceramic**
Transmission Loss @5GHz	**Poor** (>0.30dB/5mm)	**Fair** (0.20dB/5mm)	**Good** (0.15dB/5mm)
Substrate Thermal Conductivity	**Poor** (0.5 W/K･m)	←	**Good** (2.0 W/K･m)
Bonding Pressure	**Fair** C4 2.4g/bump SBB 50g/bump	←	**Good** (0.12g/bump)
Warpage in Reflow	**Fair** (150um@260℃)	**Poor** (>200um@260℃)	**Good** (<50um@260℃)
Preferable Application	**3G**	**3G , LTE**	**3G , LTE , 4G**

Summary

Demand and status of next generation's Mobile phone

- LTE subscribers will be increase rapidly in shortly.
- Many kind of RF and Baseband placed in a mobile phone
- High frequency performance and High Thermal conductivity is must be key.

MONSTER PAC –type C can solve technical issues for next generation's mobile phone.

MONSTER PAC –type C will be strong product for mobile business market

CONNECTEC JAPAN booth at Semicon Taiwan

Seminar place
#3052

CONNECTEC JAPAN
#487