

松下 先进半导体材料

Panasonic Materials for Advanced Semiconductors

半导体封装材料 / 实装加固材料

Semiconductor Encapsulation Materials/Mounting Reinforcement Materials

Low-temperature curing
Secondary mounting Underfill materials

低温固化二次实装底部填充材料

▶ CV5350AS

Cures at a low temp of 80°C.
After curing, Tg is 140°C or greater
仅需低温 80°C即可固化。固化后, Tg 不小于 140°C

High heat resistance
Secondary mounting Reinforcement materials

高耐热性二次实装加固材料

▶ CV5797U

▶ CV5794L

XV7803 (*)

Industry's highest Tg 160°C
行业内最高的玻璃转变温度 160°C

for the PKG (> 25 mm square sized)
可适用于边长 25mm 以上的 PKG

BGA

CSP

FC CSP

PoP

FC BGA

Image sensor

WLP/PLP

Encapsulation Materials for FOWLP/PLP

FOWLP/PLP 封装材料

▶ CV8511

▶ CV5788

Low stress
低应力

Low shrinkage
低收缩率

Low temp. curability
低温固化

Power Device

For Intelligent Power Module (IPM)
High heat resistance semiconductor encapsulation materials

IPM 用 高耐热半导体封装材料

For Automotive IC package Delamination free
surface mounting semiconductor encapsulation materials

用于车载半导体封装的 无分层表面贴装型封装材料

▶ CV8540series

Low warpage, Low stress
低翘曲、低应力

High heat resistance
高耐热性

High volume resistivity
高体积电阻率

Capillary Underfill(CUF)
Semiconductor encapsulation materials

CUF 毛细管底部填充半导体形式封装材料

▶ CV5300 ▶ CV5350

High fluidity
高流动性

for Narrow gap/pitch
适用于狭缝间隙 / 狭窄间距

Reduced void/bleed
少气孔 / 溢出

Molded Underfill(MUF)
Semiconductor encapsulation Molding compounds

MUF 模塑底部填充半导体形式封装材料

▶ CV8710 ▶ CV8713 ▶ CV8580

Saving process time
缩短工艺时间

for Narrow gap/pitch
适用于狭缝间隙 / 狭窄间距

Low warpage
低翘曲性

半导体基板材料

IC Substrate Materials

MEGTRON

GX

系列 series

Halogen-free

CSP

Single-Chip
Stacked-Chip
NAND-Flash
etc.

FC CSP

PoP-Bottom
Flip-Chip
etc.

Module

AiP , PAM
FEM , etc.

FC BGA

Flip-Chip , etc.

▶ R-G545L/R-G545E

Low Df/Dk
低 Df/Dk

▶ R-G515S/R-G515E

Ultra thin material (*0.04 ~ 0.1mm)
超薄材料 (*0.04 ~ 0.1mm)

▶ R-1515E

Thin material
薄材料

▶ R-1515V/R-1515K

Ultra-low CTE (*0.2 ~ 1.8mm)
超低热膨胀系数 (*0.2 ~ 1.8mm)

▶ R-G535S/R-G535E

Low CTE (*0.2 ~ 1.8mm)
低热膨胀系数 (*0.2 ~ 1.8mm)

▶ R-1515W

▶ R-1515A

本公司的无卤素材料基于的是
JPCA-ES-01-2003 等的定义。

Our Halogen-free materials are based on
JPCA-ES-01-2003 standard and others.

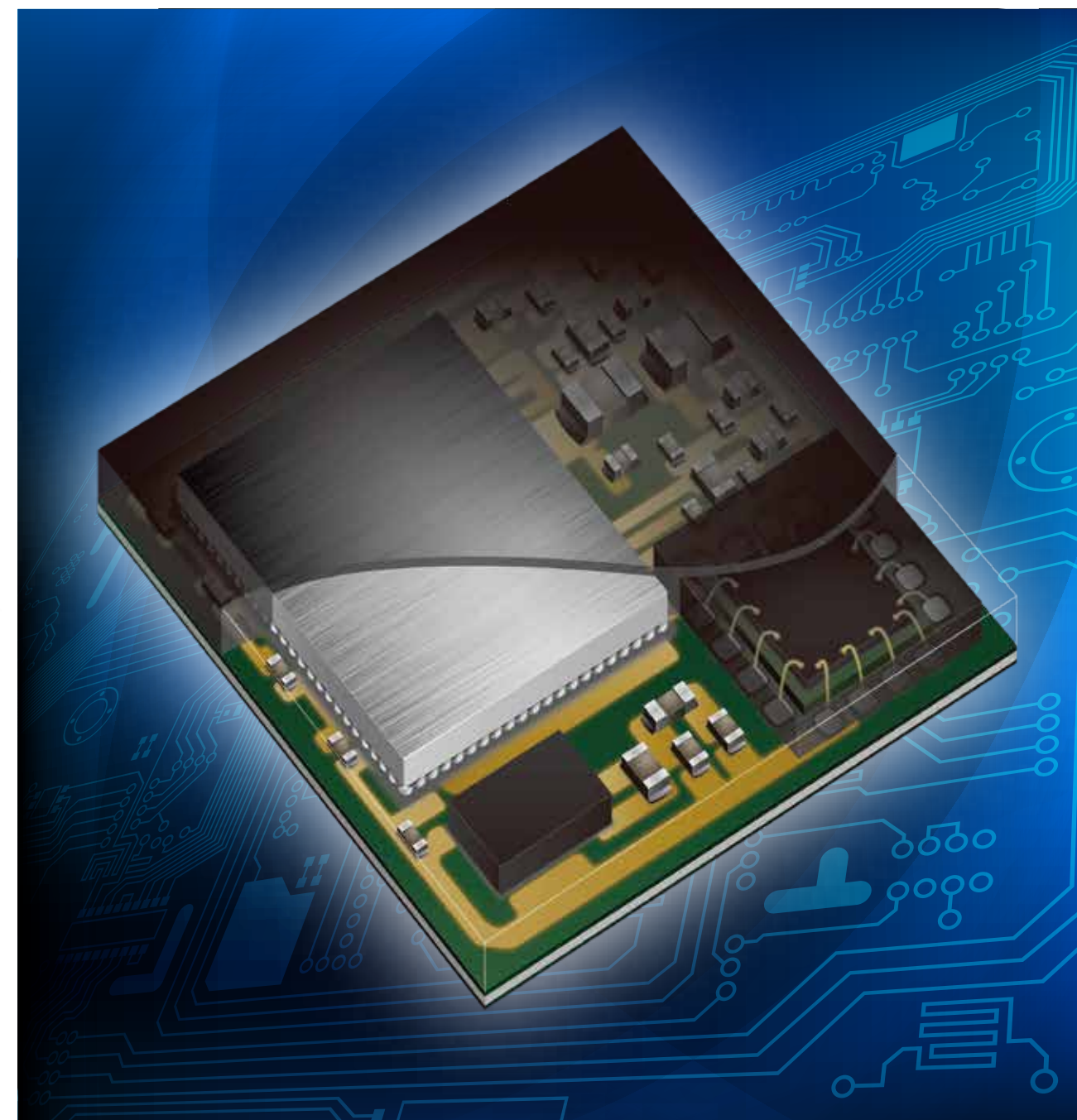
* 品厚度

SiP/倒装芯片封装材料(MUF, CUF)

Materials for SiP/Flip Chip Packaging (MUF, CUF)

适用模塑底部填充·毛细管底部填充 半导体封装材料 CV8710, CV8713, CV5300

Mold Underfill / Capillary Underfill for Semiconductor encapsulation materials. CV8710, CV8713, CV5300



应用 Applications

- 移动 / 通信设备用
半导体 PKG
IC PKGs for mobile /
communication devices

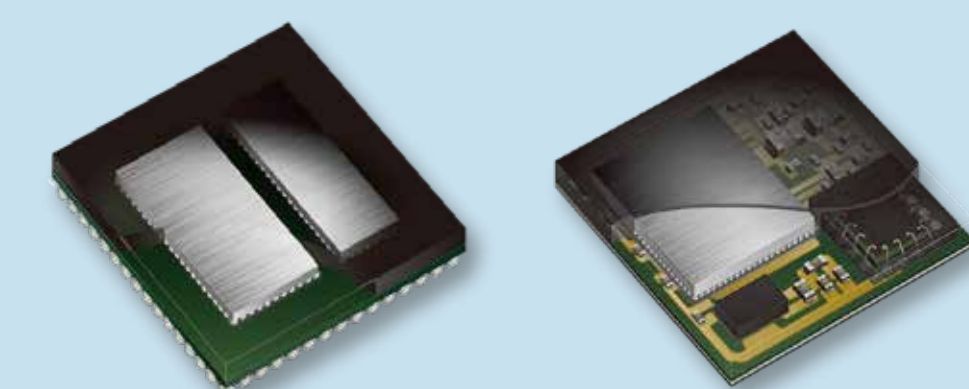
要点 Point

适用于狭缝间隙 / 窄间距的出色的填充能力
Excellent fillability for Narrow gap / pitch

低翘曲
Low warpage

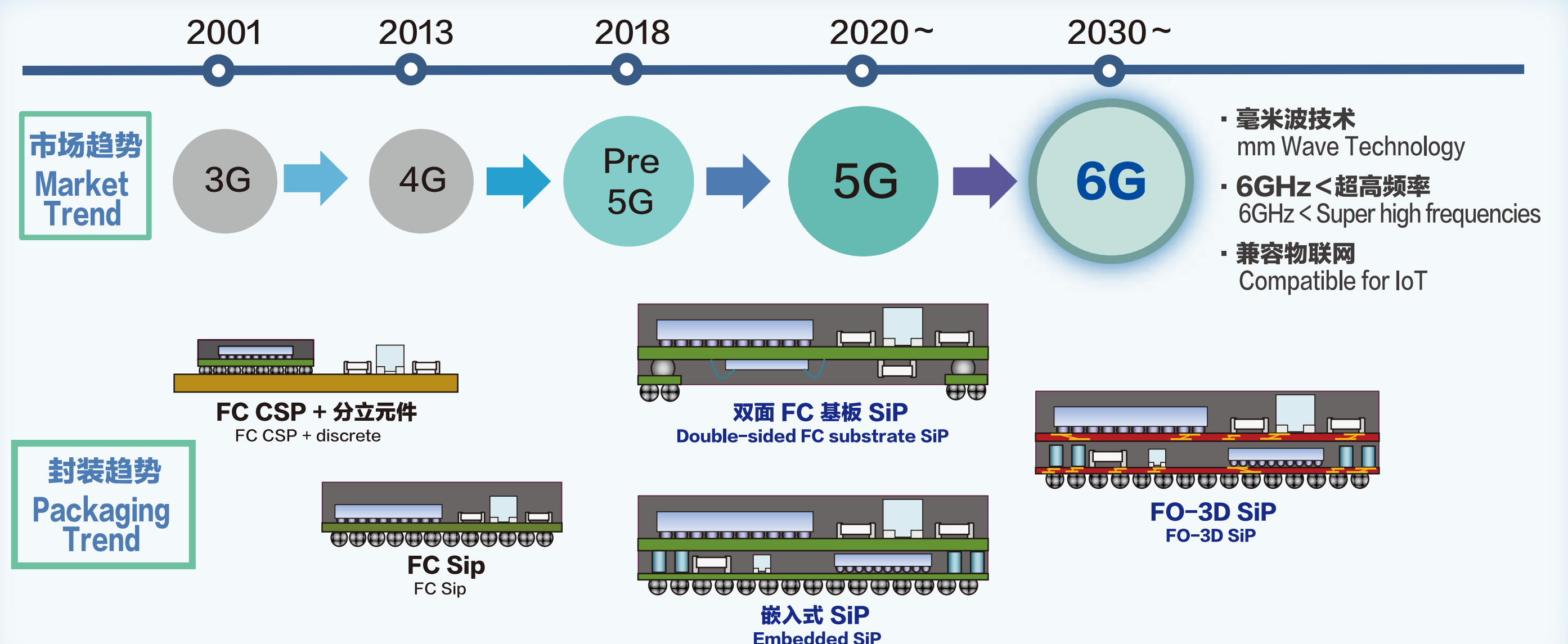
对应SiP/ 缩短工艺
Correspond to SiP / Saving process time

SiP 技术趋势 SiP Technology Trend

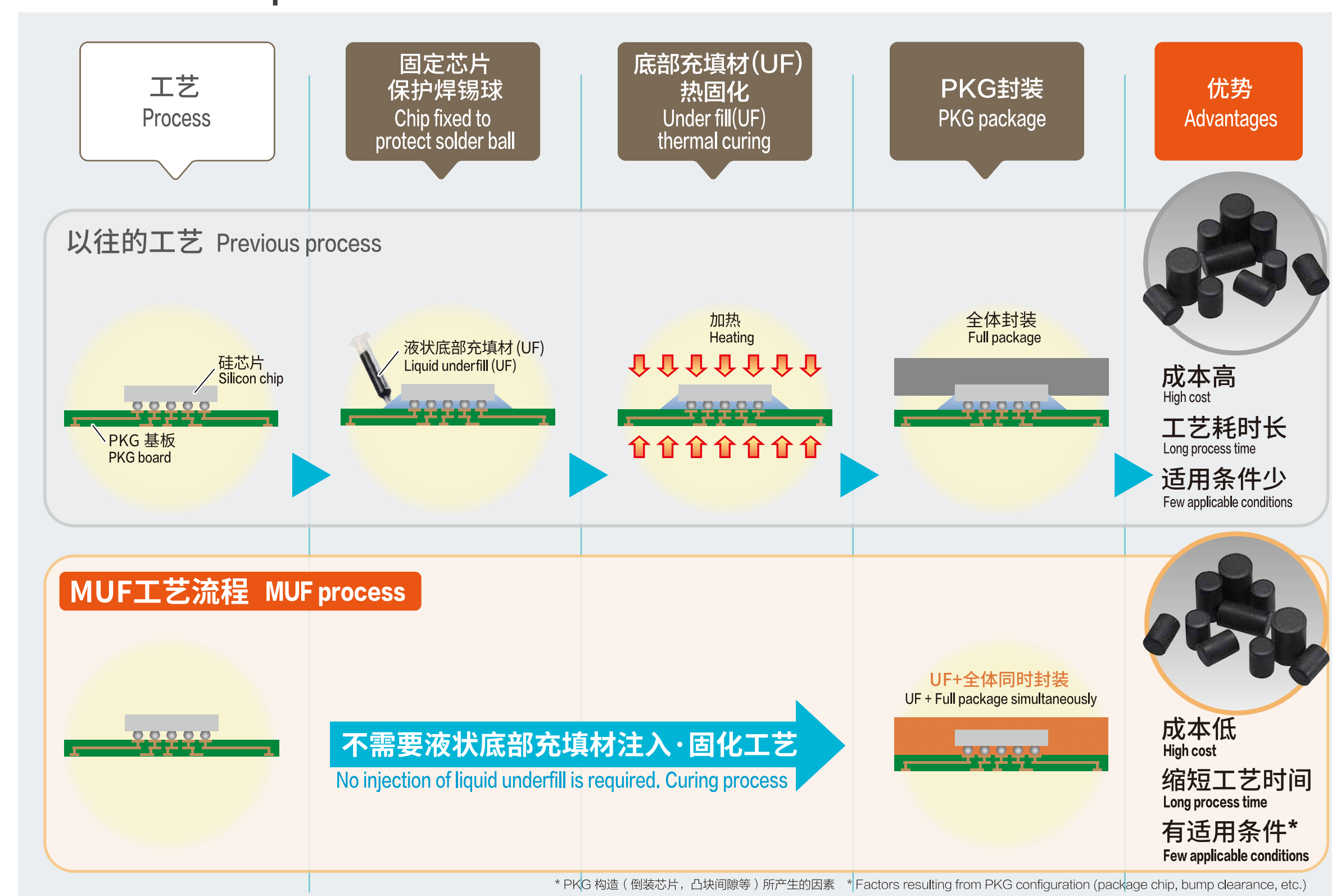


对 EMC的要求 Requirement to EMC for SiP;

- ✓ 适用于狭缝间隙 / 窄间距的出色的填充能力
Filling ability under FC, component.
- ✓ 翘曲控制
Warpage control
- ✓ 耐分层 / 耐焊料挤出
Delamination / Solder extrusion resistance



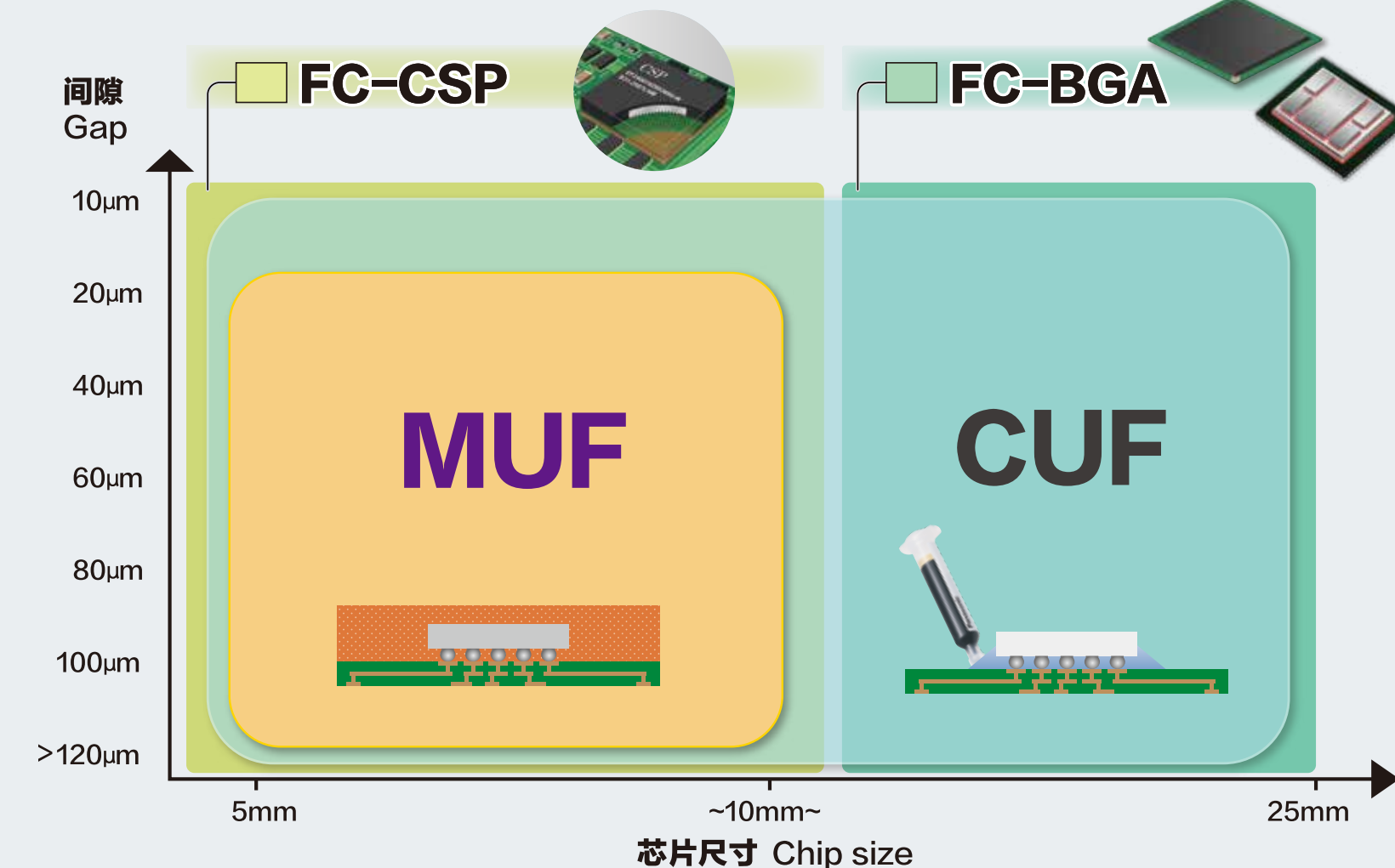
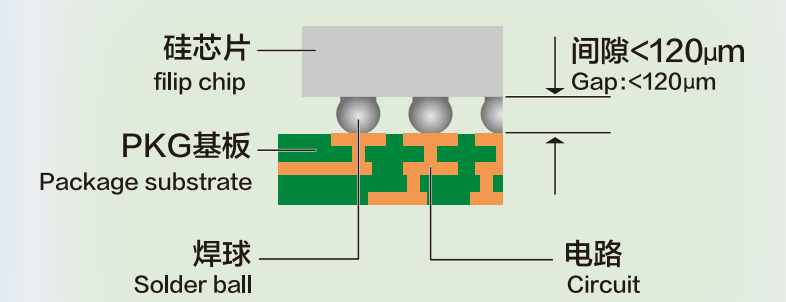
工艺对比 Process comparison



各封装方法的比较 (FC-PKG) Each material and corresponding package

对 EMC的要求 Requirement to EMC for FC-PKG;

- ✓ 适用于狭缝间隙 / 窄间距的出色的填充能力
Filling ability to narrow gap / fine pitch
- ✓ 翘曲控制
Warpage control
- ✓ 高可靠性
High reliability (MRT, TC, HAST, etc)



功率元件封装材料

Materials for Power Module / Power Device

IPM用 高耐热半导体封装材料 CV8540 series

High heat resistance semiconductor encapsulation materials for IPM CV8540 series

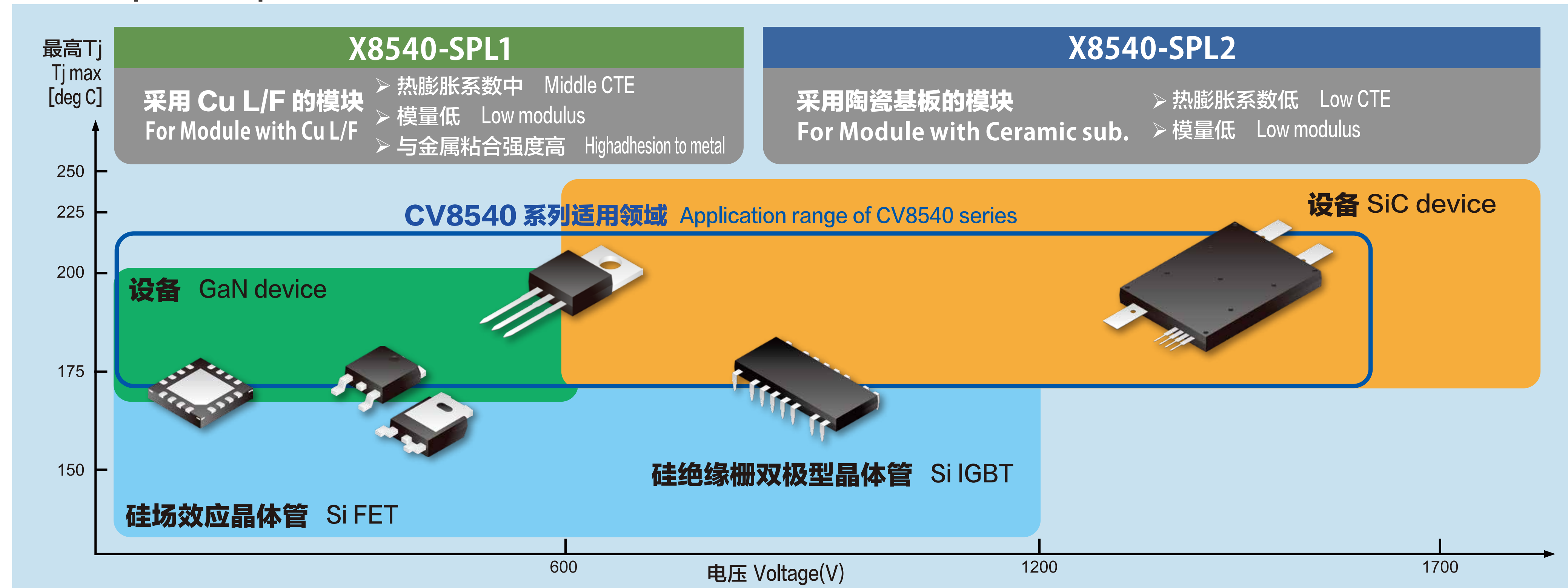


应用 Applications

- 用于车载半导体 PKG
Automotive IC PKGs

概念、阵容

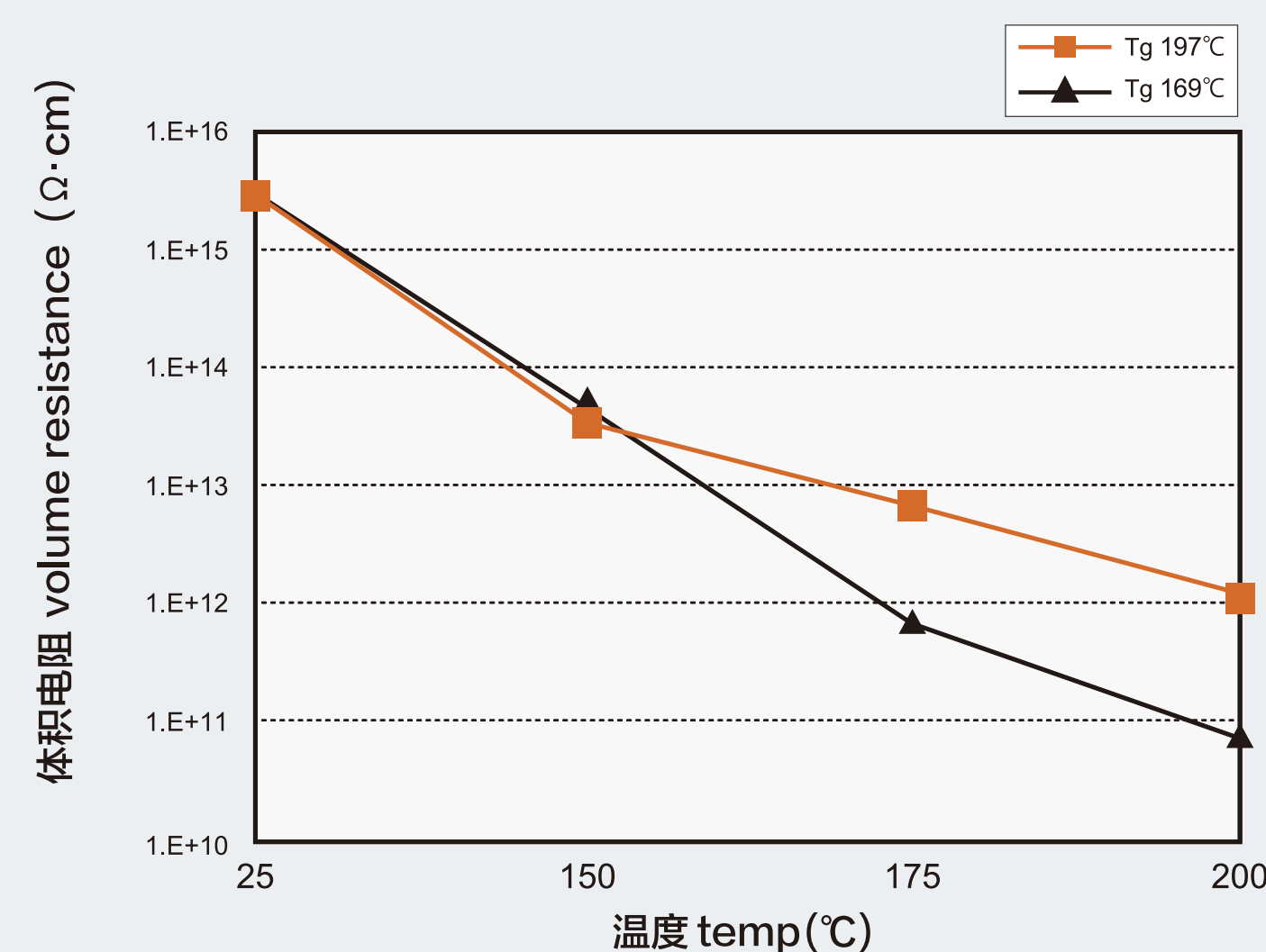
Concept / Line-up



体积电阻评估(T_g 依赖性)

Evaluation of volume resistance (T_g dependence)

- 对高温环境下的体积电阻有效
Effective for high-temperature volume resistance

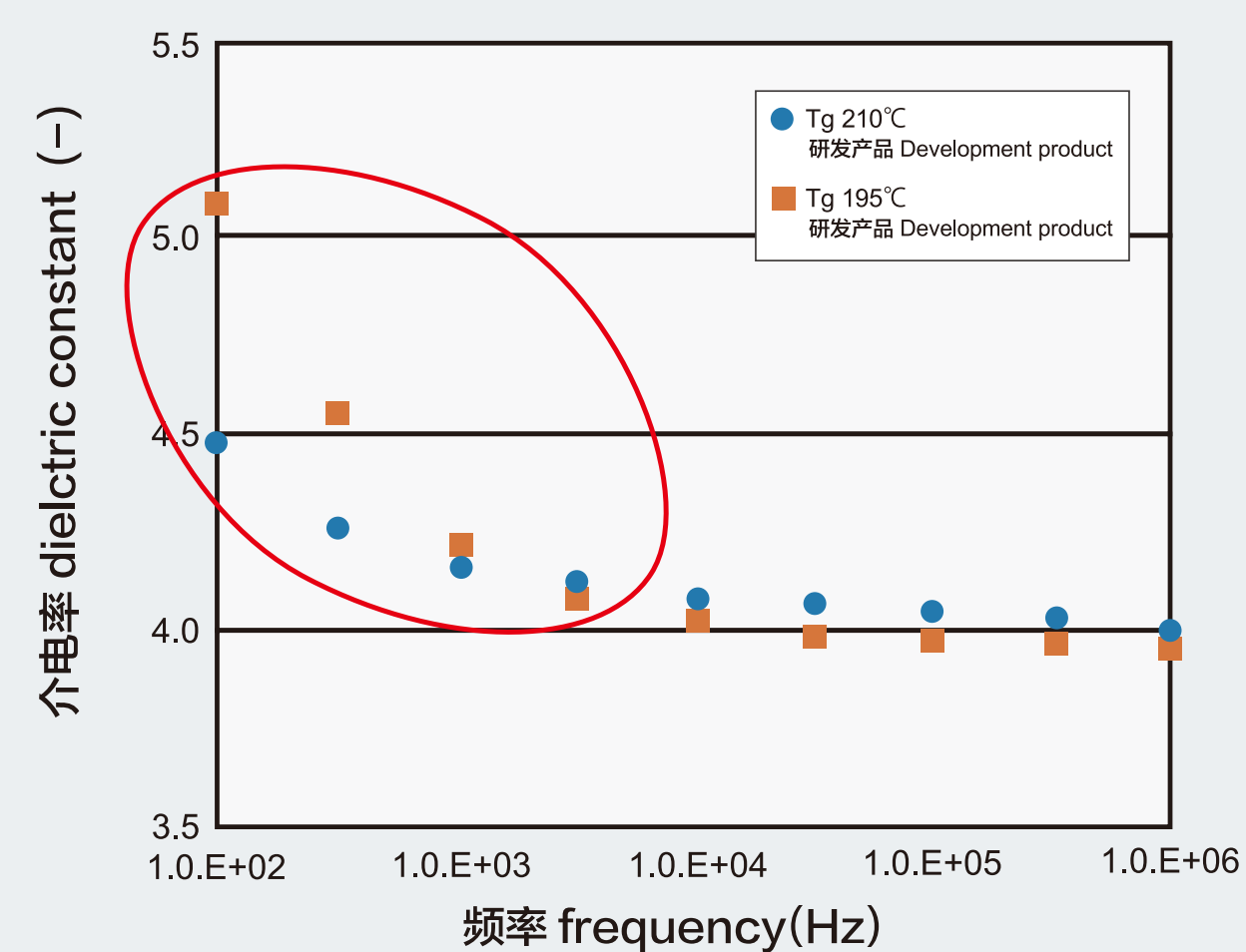


介电特性(T_g 依赖性)

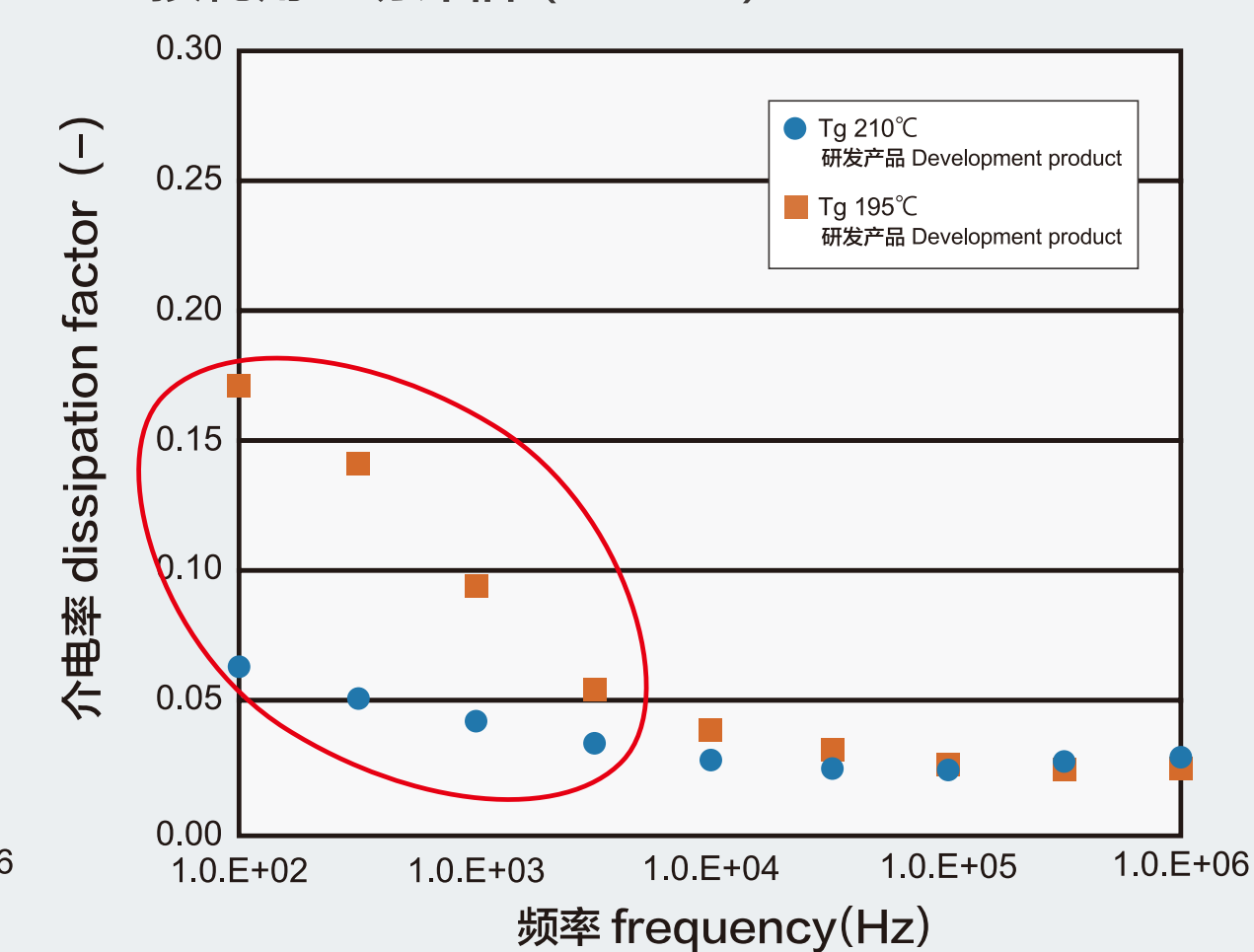
Dielectric property (T_g dependence)

- 对高温环境下的低介电率、低损耗角正切有效
Effective for high-temperature low dielectric constant low dissipation factor

Evaluation of dielectric constant (200degC)
介电率评估 (200°C)



Evaluation of dissipation factor (200degC)
损耗角正切评估 (200°C)

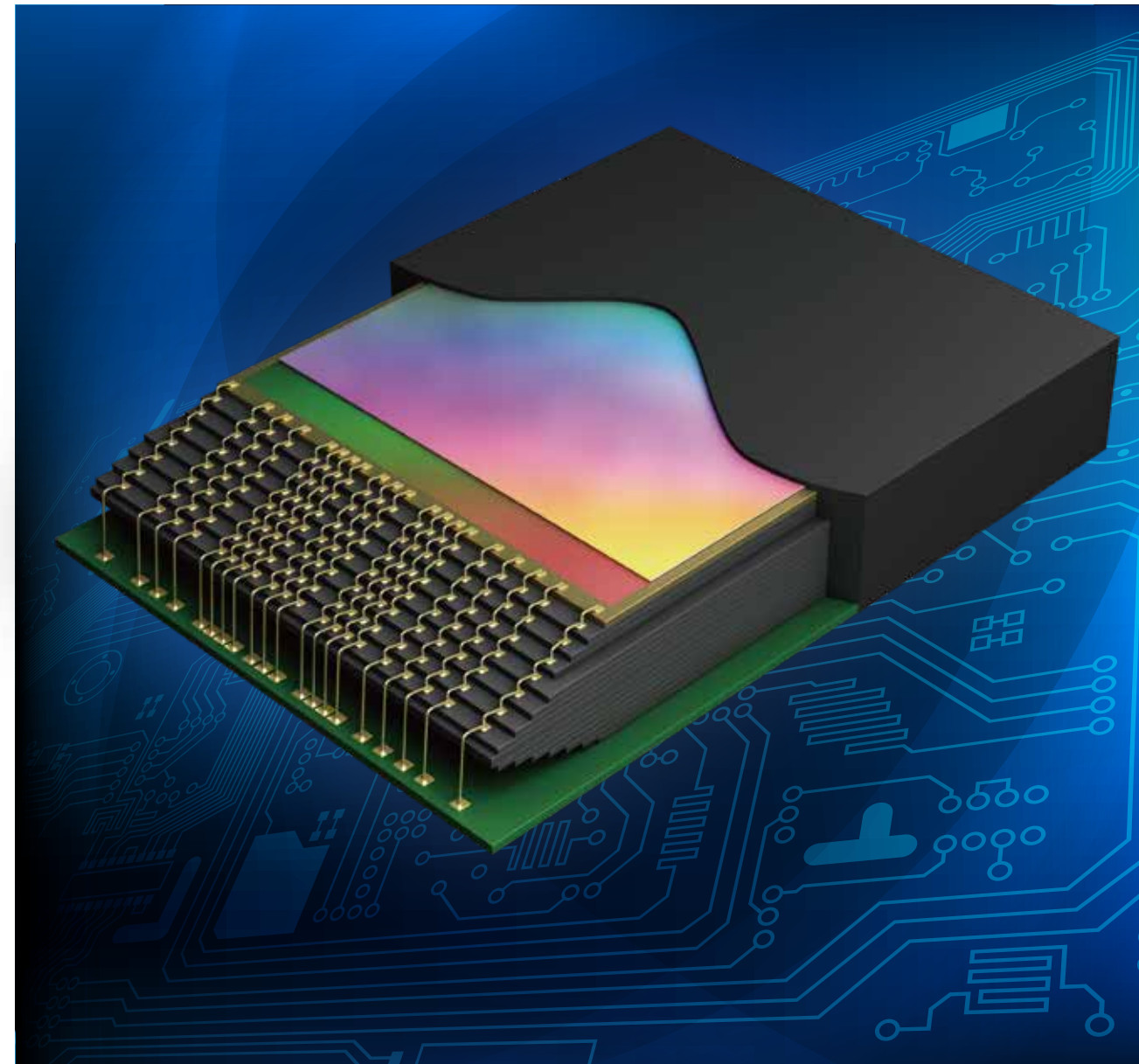


面向半导体Memory的表面贴装塑封材料

Surface mounting semiconductor encapsulation materials for Memory

适用模塑底部填充 半导体密封材料 CV8710, CV8580 / 适用压缩成型 半导体密封材料 CV8710

Mold Underfill for Semiconductor encapsulation materials CV8710 & CV8580 / Compression Molding for Semiconductor encapsulation materials CV8710



应用 Applications

- 移动设备用
半导体存储器 (DRAM, NAND)
Semiconductor memories (DRAM & NAND)
for mobile devices

特点 Feature 1

翘曲控制 Warpage control

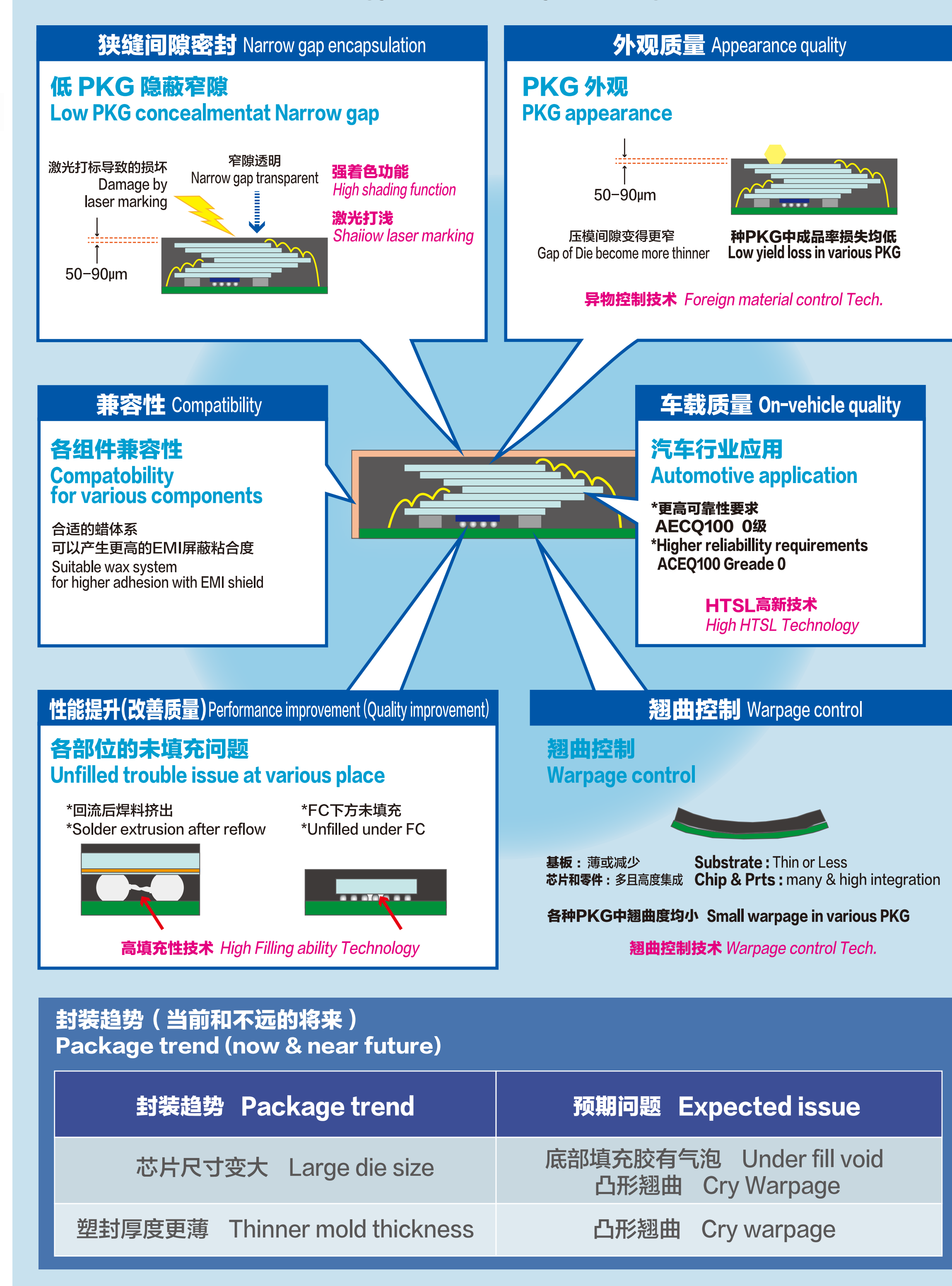
特点 Feature 2

适用狭缝间隙 Excellent fillability for Narrow gap

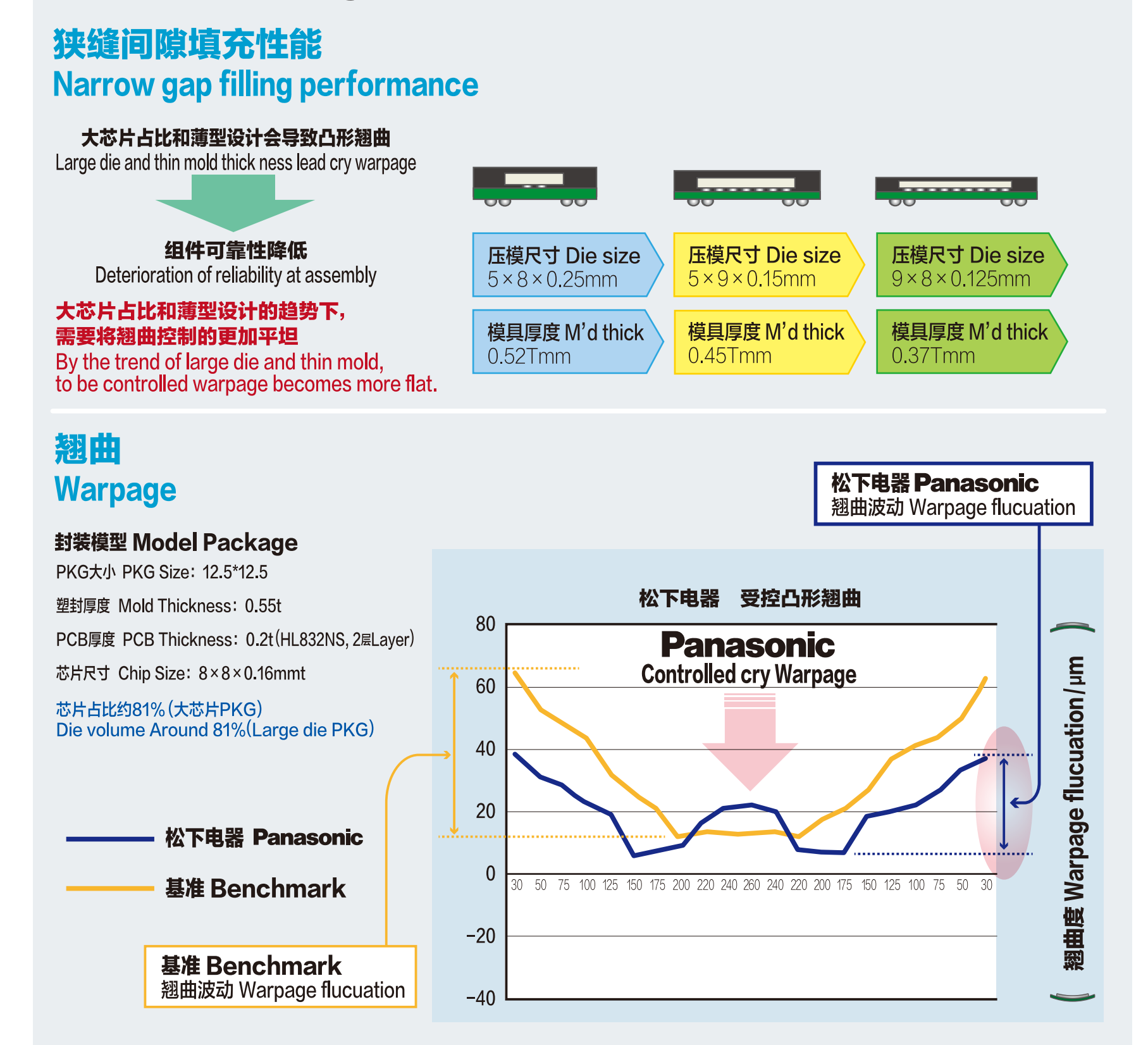
特点 Feature 3

产品种类丰富 适用于各类 PKG A wide range of variation Compatible with various types of PKGs

■ 半导体 Memory 的条件 Requirement Technology for memory package



■ PKG的翘曲控制性优异 Best warpage control



■ 最适于填充性的精细填料系统 Best fine filler system for Filling ability



晶圆级封装, 面板级扇出封装材料

Materials for WLP, PLP

FOWLP/PLP用 半导体封装材料 CV8511C, CV5788

Semiconductor encapsulation materials for FOWLP/PLP CV8511C, CV5788



应用 Applications

- 先端移动设备用半导体 PKG
IC PKGs for advanced mobile devices

要点 Point

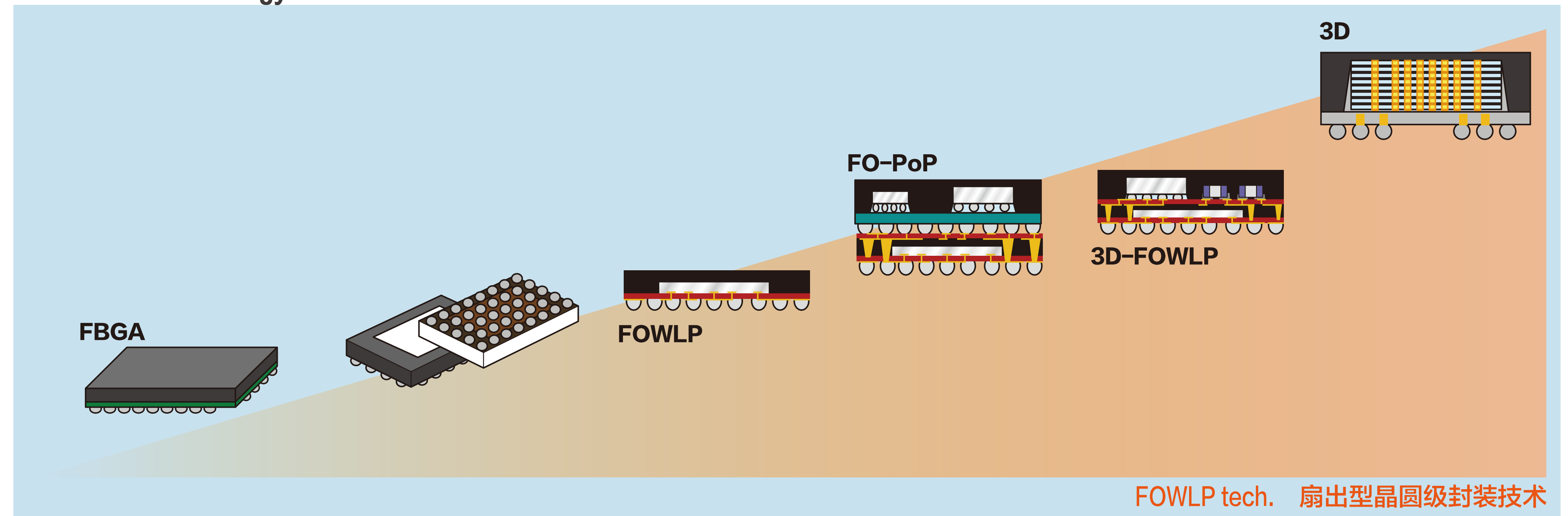
低翘曲性
Low Warpage

对应12英寸或更多封装尺寸
Encapsulation of ≥ 12 inch size

对应各种工艺
Correspond Various Process

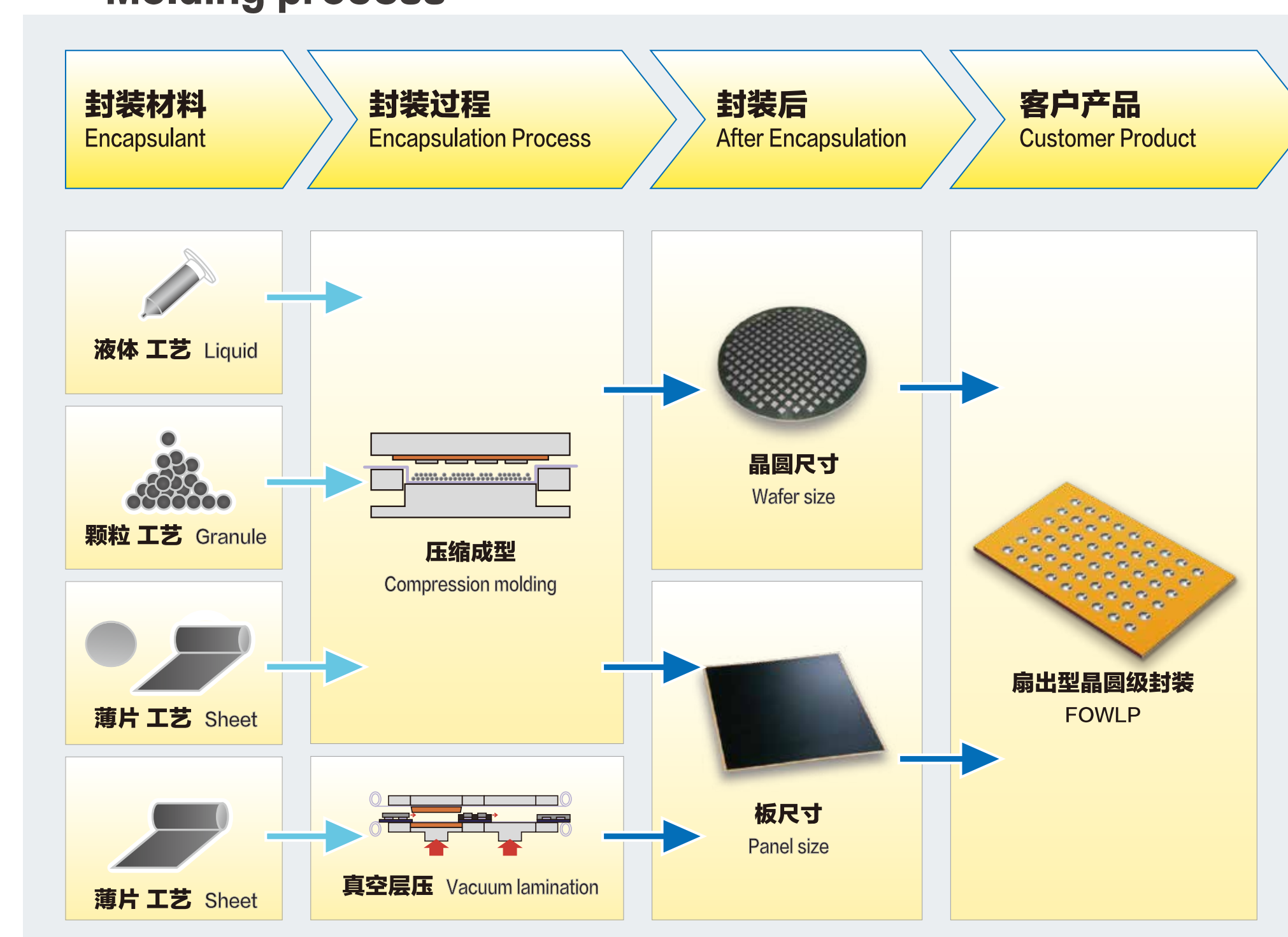
■ FOWLP 技术趋势

FOWLP Technology Trend



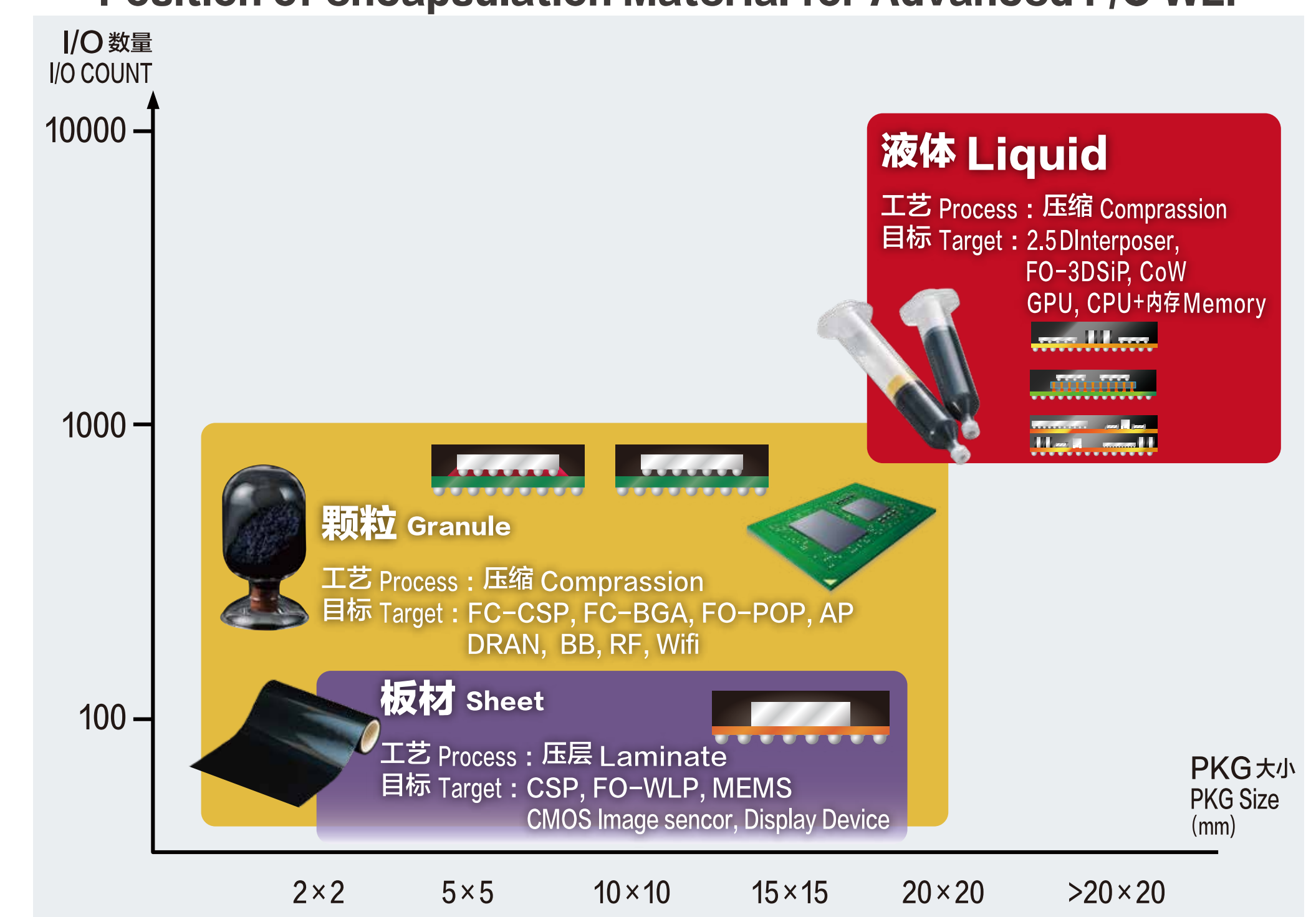
■ 各材料的封装过程

Molding process



■ 先端 F/O WLP 封装材料的位置

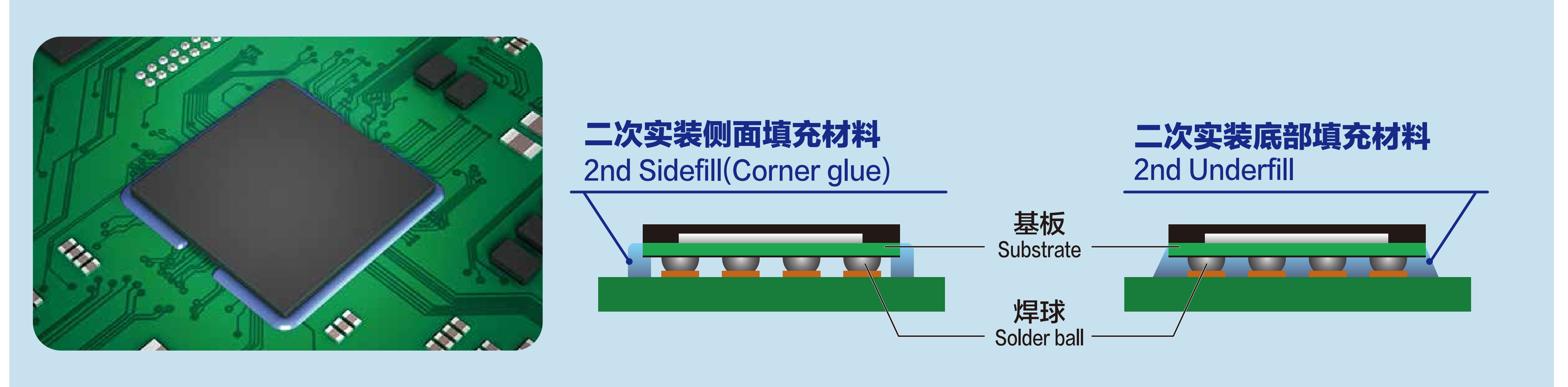
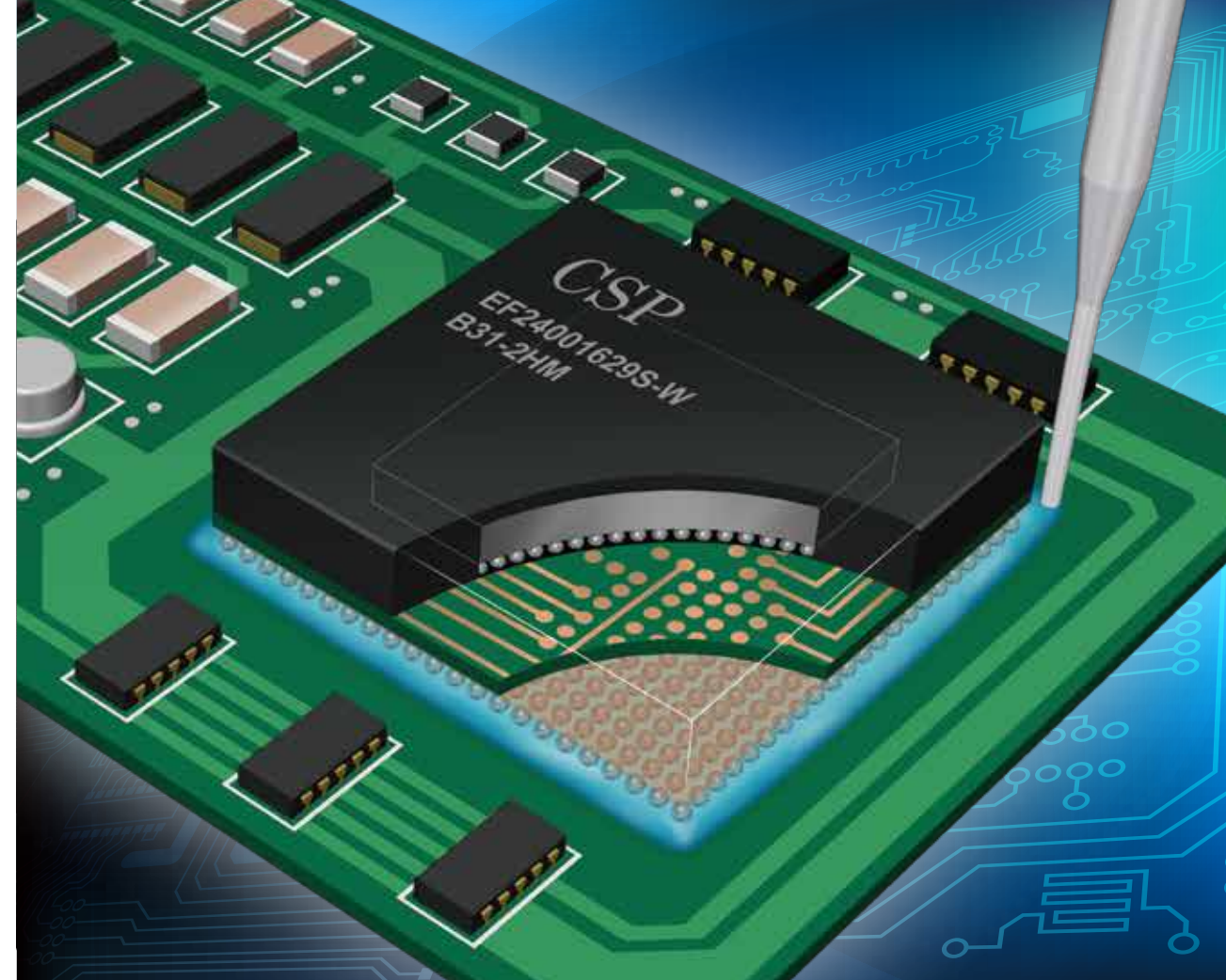
Position of encapsulation Material for Advanced F/O WLP



贴装加固材料

Materials for Mounting, Reinforcement

高耐热性二次实装侧面填充、底部填充 CV5797, CV5794, CV5350, CV7803*开发中
Highly heat-resistant Secondary mount Sidefill / Underfill CV5797, CV5794, CV5350, CV7803*Under Development



应用 Applications

- 车载用半导体 PKG 实装加固材料
Mount reinforcing materials for automotive IC PKGs
- Automotive camera modules
- Millimeter-wave radar modules
- Automotive ECU

提高实装可靠性
Improved mount reliability
TCT: -55 ⇄ 125°C 6000cycle

适用狭缝间隙
Excellent fillability for Narrow gap

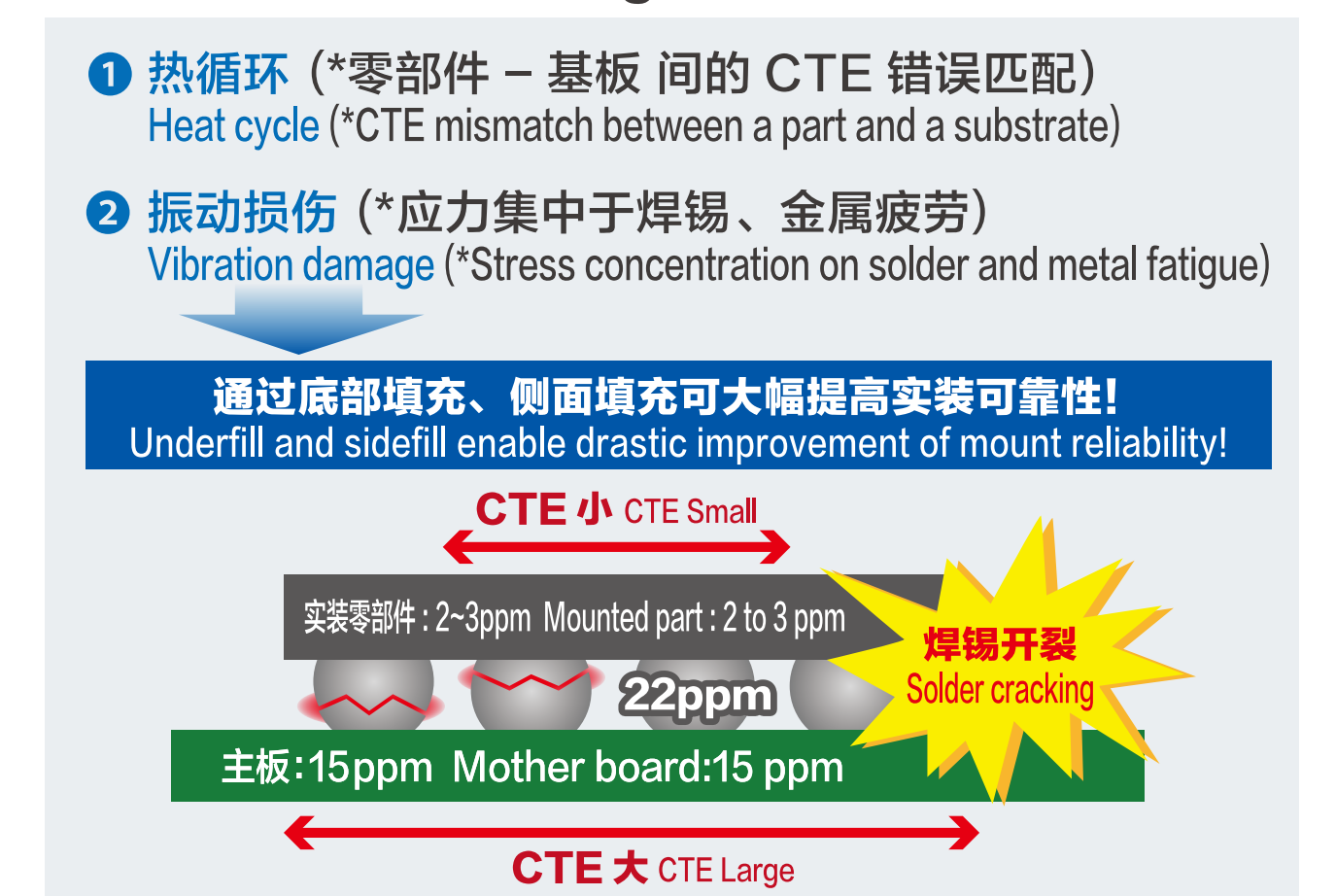
适用于各类尺寸的 PKG
Compatible with PKGs of various sizes

高Tg 150-160°C
High Tg 150-160°C

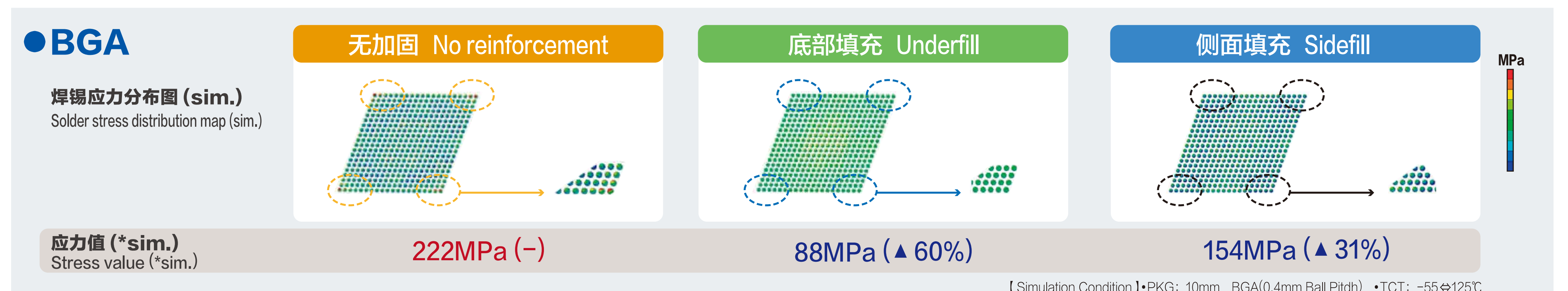
■ 加固型 - 适应 PKG Reinforcement type - Applicable PKGs



■ 焊锡开裂机制 Solder cracking mechanism



■ 应力模拟 Stress simulation



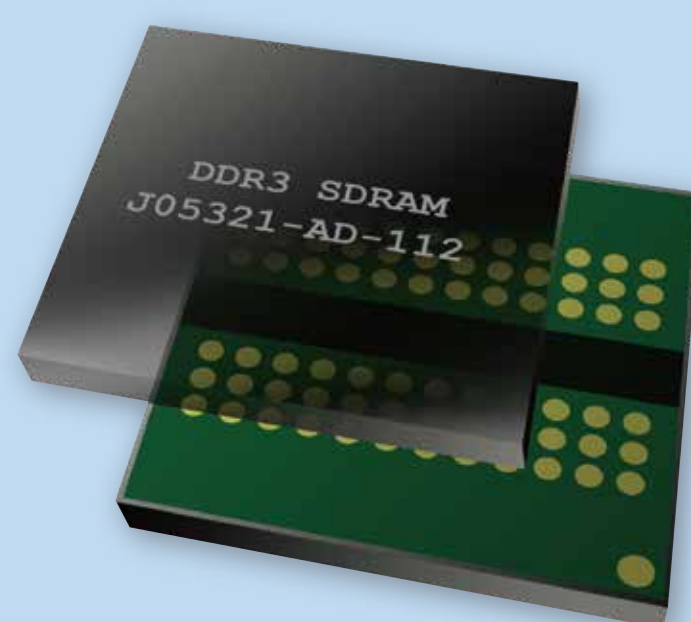
基板材料

Substrate Materials



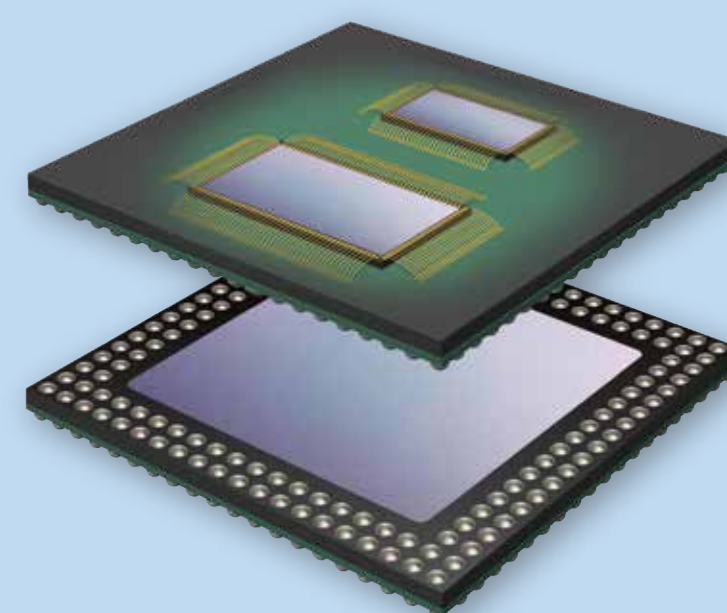
封装类型 Package Type

CSP



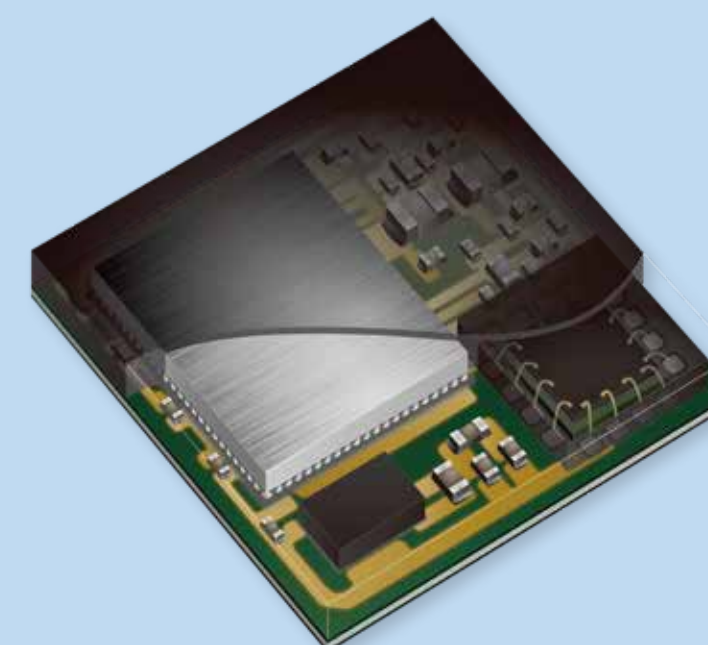
- Single-Chip
- Stacked-Chip
- NAND-Flash etc.

FC-CSP



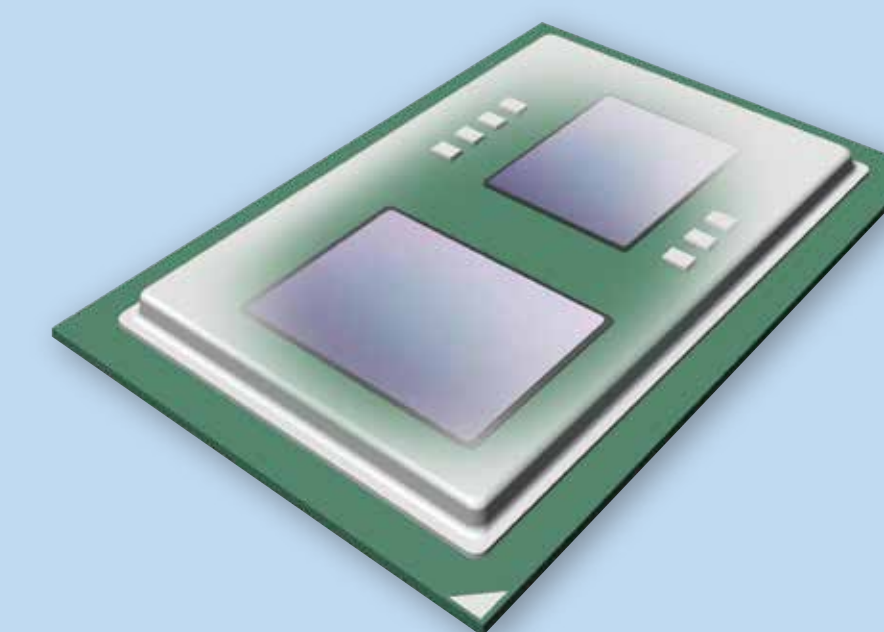
- PoP-Bottom
- Flip-Chip etc.

MODULE



- AiP
- PAM
- FEM etc.

FC-BGA



- Flip-Chip etc.

产品 Product

MEGTRON GX R-G545L / R-G545E
Low Df / Dk

MEGTRON GX R-G515S / R-G515E
Ultra thin material *0.02~0.2mm

MEGTRON GX R-1515E
Thin material

**MEGTRON GX R-1515V
R-1515K**
Ultra-low CTE *0.2~1.8mm

**MEGTRON GX R-G535S
R-G535E**
Low CTE *0.2~1.8mm

MEGTRON GX R-1515W

MEGTRON GX R-1515A

* 产品厚度

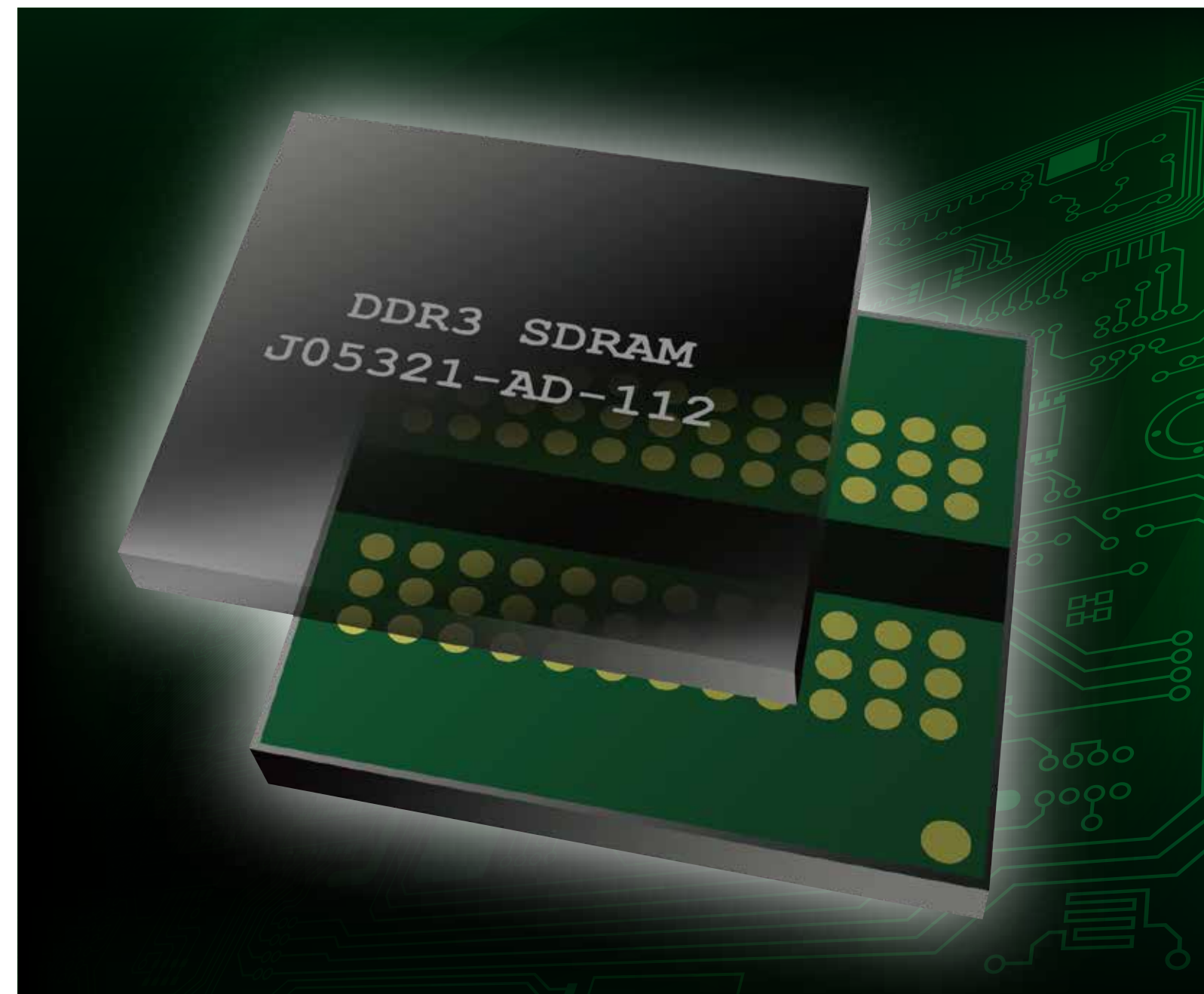
适用高弹性模量、超薄 半导体封装基板材料

High modulus IC Thin substrate materials



基板 R-1515E 半固化片 R-1410E

Laminate R-1515E Prepreg R-1410E



应用 Applications

- 半导体封装基板 IC PKG substrates

CSP

Single-Chip, Stacked-Chip, NAND-Flash etc.

特点 Feature 1

T_g(DMA) 270°C

特点 Feature 2

弯曲模量 25°C 33GPa
Flexural modulus 25°C 33GPa

特点 Feature 3

热膨胀系数 x,y-轴方向 8-10ppm/°C
CTE x, y-axis 8-10ppm/°C

苏州工厂可进行生产、出货 (已量产)

Now working on production and shipment at Suzhou Plant (Already mass stage)

CSP “新准材料” 在世界范围内有众多客户使用

New Standard material” for CSP Many customers have been adopting the materials all over the world.

以合理价格供应高质量封装材料

High quality PKG materials are supplied at reasonable costs.

以更短时间交付给中国大陆各个地区

Delivered all over the Chinese mainland in short lead time.



松下电子材料(苏州)有限公司
Panasonic Industrial Device Materials (Suzhou) Co., Ltd.

适用于半导体封装薄型化

Compatible with thinner semiconductor PKGs.

面向半导体封装、模块基板的超低损耗材料

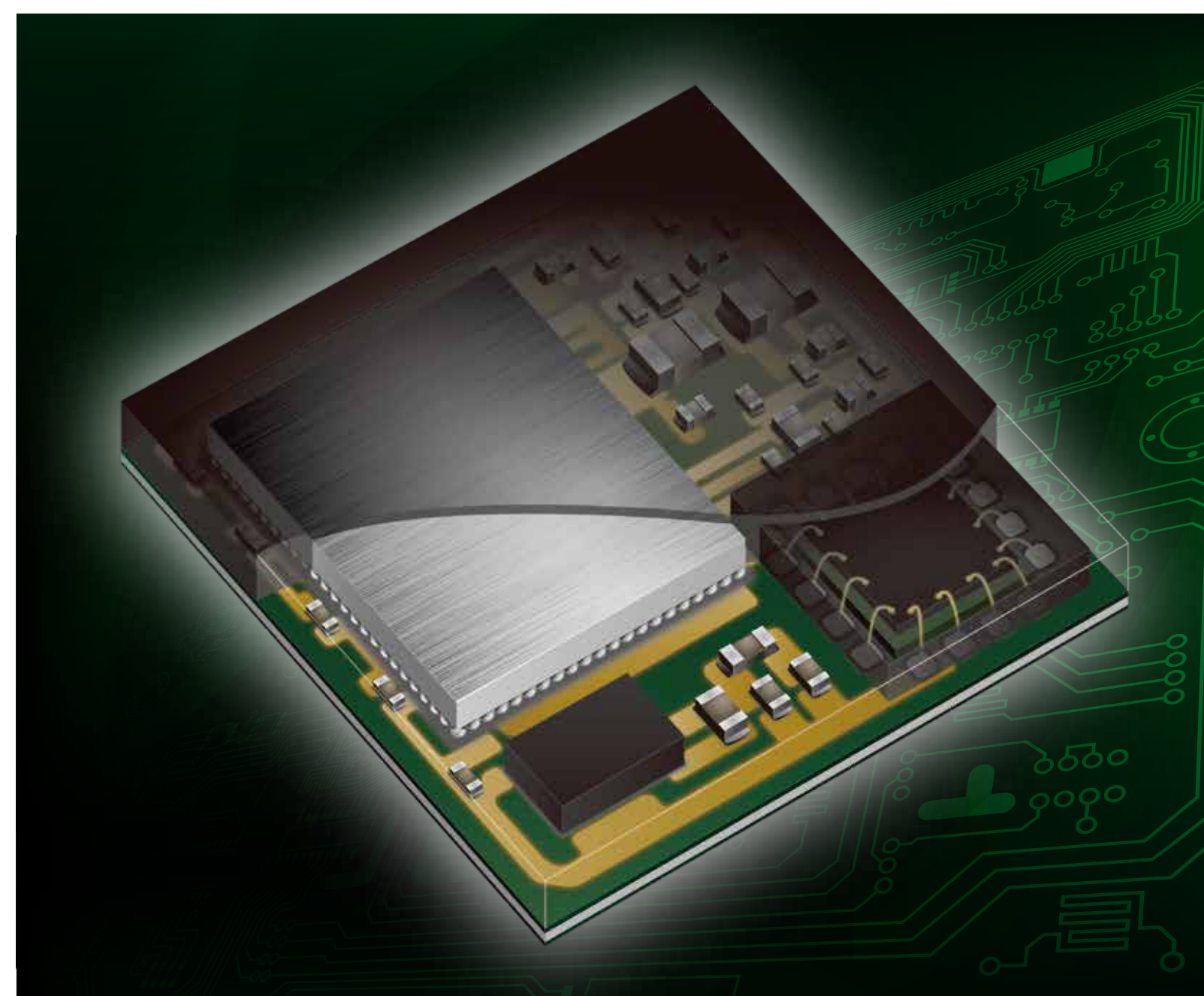
Ultra-low transmission loss materials for IC substrate/ Module



基板 R-G545L* / R-G545E 半固化片 R-G540L* / R-G540E

Laminate R-G515L* / R-G545E Prepreg R-G540L* / R-G540E

* 低 Dk 玻璃布类型
* Low DK glass cloth type



应用 Applications

- 半导体封装基板 IC PKG substrates

模块 Module
AiP, PAM, FEM etc.

特点 Feature 1

Df 0.003 Dk 3.5 @12GHz

特点 Feature 2

热膨胀系数 x,y-轴方向 10ppm/°C

热膨胀系数 z-轴方向 22ppm/°C

CTE x, y-axis 10ppm/°C

CTE z-axis 22ppm/°C

特点 Feature 3

Tg(DMA) 230°C

实现高水准的低 DK/Df 封装用材料

Achieving a high level of low Dk/Df as package materials

高频带、高温高湿环境下也可保证特性稳定

Stable properties in a high frequency band and in a high temperature and high humidity environment

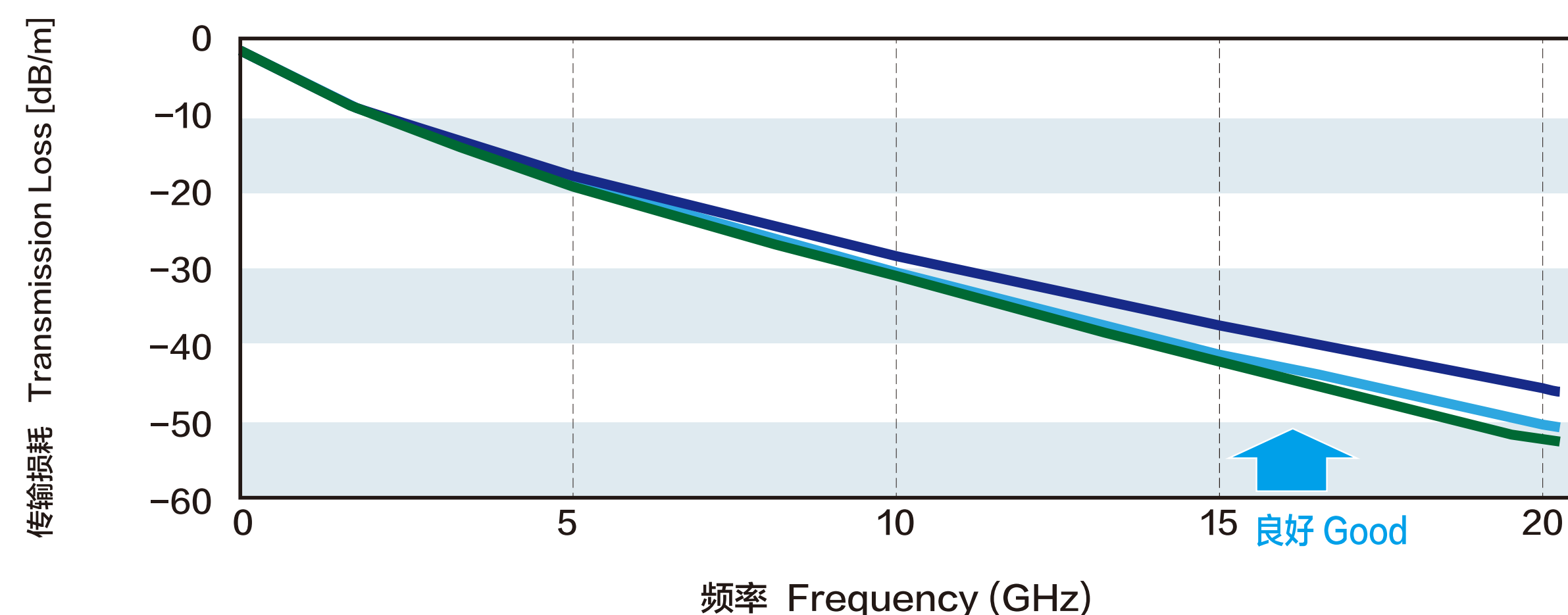
还可运用于 mSAP 工艺

Capable of dealing with mSAP method.

传输损耗比较

Comparison of transmission loss

即使在 E 玻璃规格中，R-G545 相比其他公司的 Low Dk 玻璃规格产品实现了更低的传输损耗（本公司试验数据）

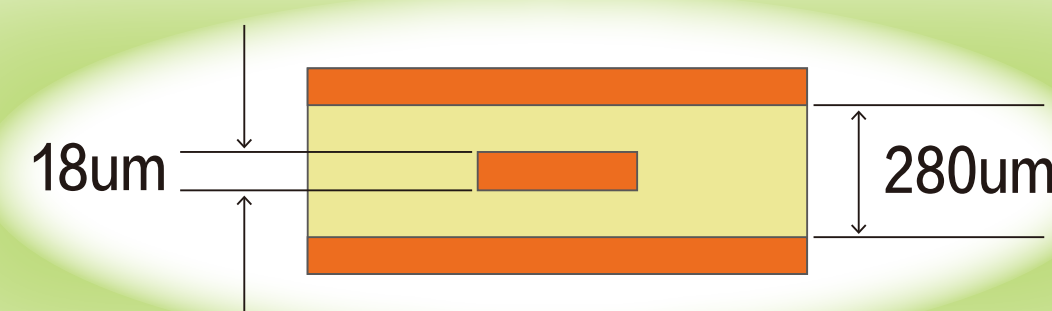


R-G545L
低 Dk 玻璃布
Low Dk glass cloth

R-G545E
E 玻璃布
E glass cloth

参考材料
Reference material
低 Dk 玻璃布
Low Dk glass cloth

结构 Construction



| | |
|---------------------------|----------------------------|
| 线 长 Line length | 1,000mm |
| 线 宽 Line width | 130 μm |
| 阻 抗 Impedance | 50 Ω |
| 铜材类型 Copper type | STD |
| 内层铜材处理 Inner Cu treatment | 无表面处理 No-surface treatment |
| 芯 板 Core | 0.14mm |
| 半固化片 Prepreg | #1067 74% × 2ply |

面向半导体封装基板的热膨胀、高可靠性材料

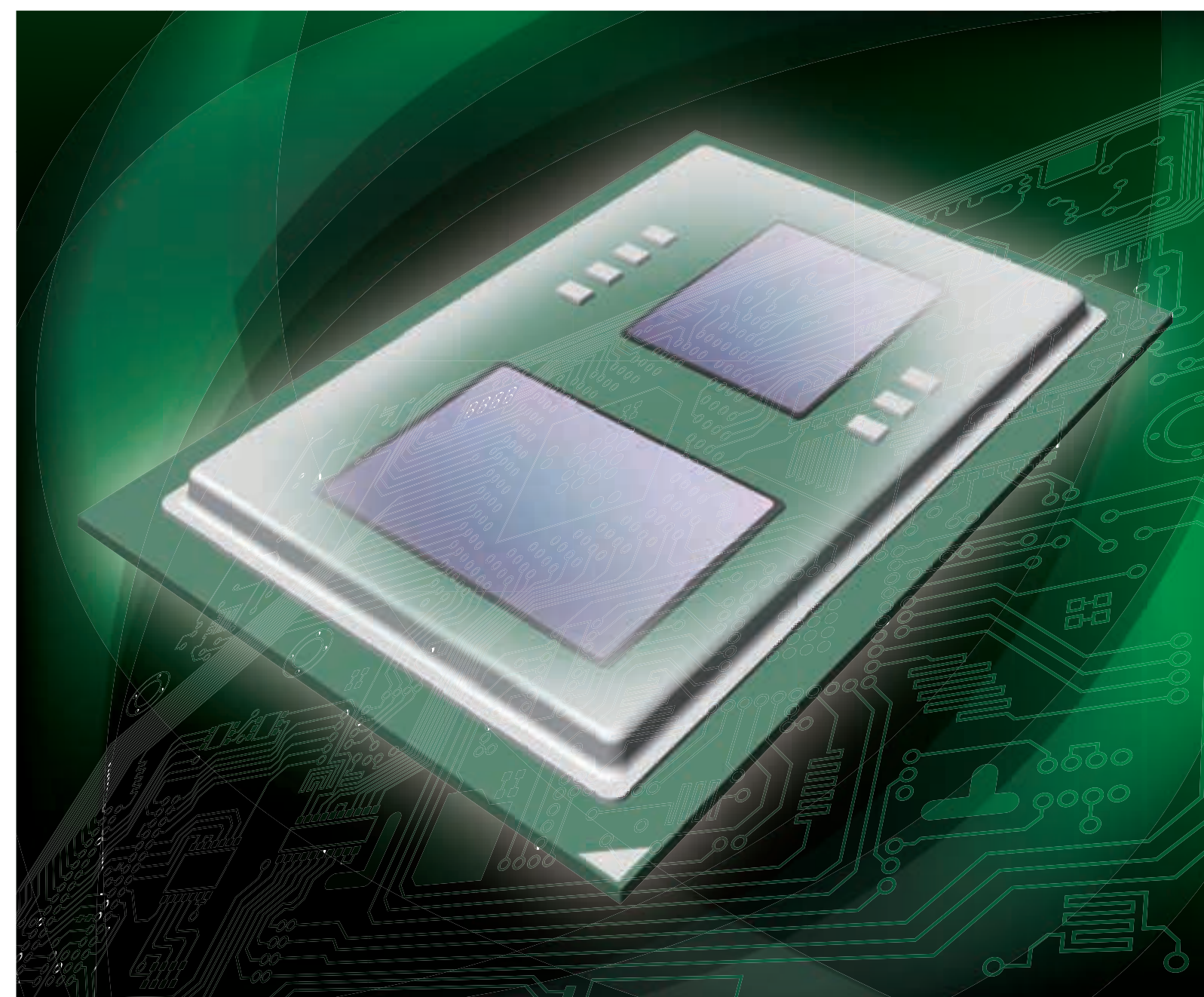
Low CTE Higher Elongation materials for IC substrate



基板 R-1515V(S-玻璃*) R-1515K(E-玻璃)

Laminate R-1515V(S-glass*) R-1515K(E-glass)

* 低热膨胀系数玻璃布类型
* Low CTE glass cloth type



应用 Applications

- 半导体封装基板 IC PKG substrates

FC-BGA
FC-BGA etc.

特点 Feature 1

热膨胀系数 x, y-轴方向
3-5ppm/°C(低热膨胀系数玻璃)
CTE x, y-axis
3-5ppm/°C (Low CTE glass)

特点 Feature 2

翘曲度更好
Better Warpage

特点 Feature 3

厚度偏差良好
Good Thickness Variation

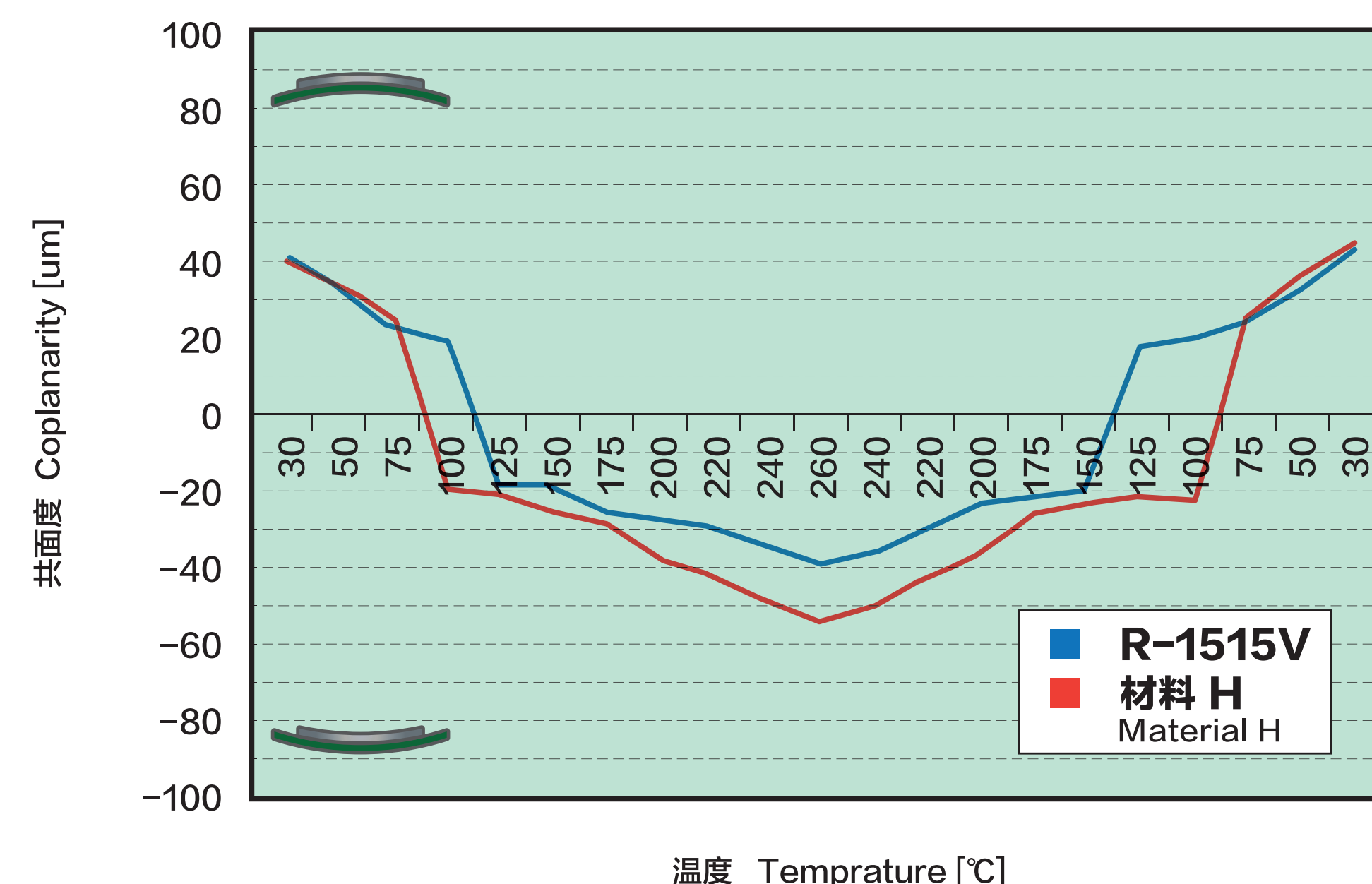
实现高等级的 Low CTE、低翘曲同时还可适用于
Achieving a high level of low CTE and low warpage.

2.xD 等大型 FCBGA 封装中
Compatible with large-size FCBGA PKGs such as 2.xD.

低热膨胀

Low thermal expansion

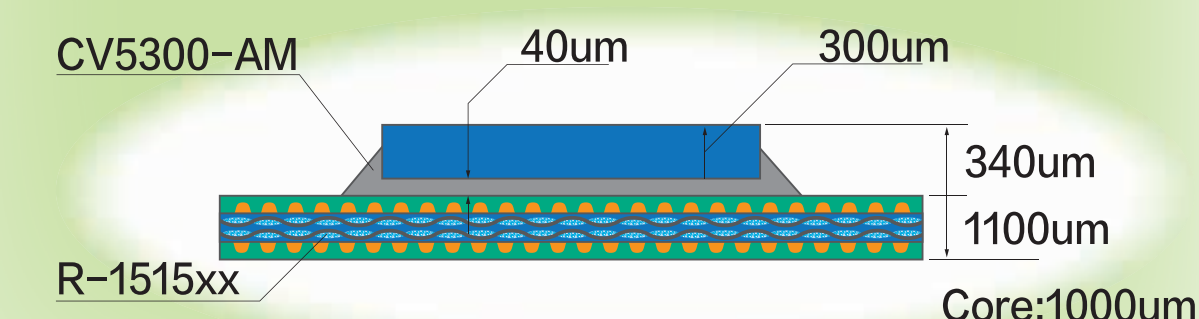
R-1515V 翘曲度 R-1515V Warpage Performance



● 试验片 Sample

材料 / Material : R-1515V, 材料 H / Material H
芯厚度 / Core Thickness : 1000um (12-12um)
PKG 尺寸 / PKG Size : 35 × 35mm
(Die 尺寸 / Die Size : 15 × 15mm)

● PKG 结构 / PKG Construction



产品线拥有丰富厚度

A wide range of thickness lineup

R-1515V(S-玻璃) / R-1515V(S-glass) : 0.2mm ~ 1.8mm

R-1515K(E-玻璃) / R-1515V(E-glass) : 0.2mm ~ 1.8mm

适用低热膨胀、超薄 半导体封装基板材料

Low CTE Ultra-thin IC substrate materials



基板 R-G515E / R-G515S* 半固化片 R-G510E / R-G510S*

Laminate R-G515E / R-G515S* Prepreg R-G510E / R-G510S*

* 低热膨胀系数玻璃布类型
* Low CTE glass cloth type

由于是超薄材料，因此可帮助实现封装薄型化
The ultra-thin materials contribute to the realization of thinner PKGs.

超薄材料(绝缘层厚度在 20 μ m 以下)实现量产

Now in mass production of ultra-thin materials (insulation layer of 20 μ m or less in thickness)

低热膨胀

Low thermal expansion

低翘曲

Low warpage

成型性

Moldability

应用 Applications

- 半导体封装基板 IC PKG substrates

CSP

PoP-Bottom, Flip-Chip etc.

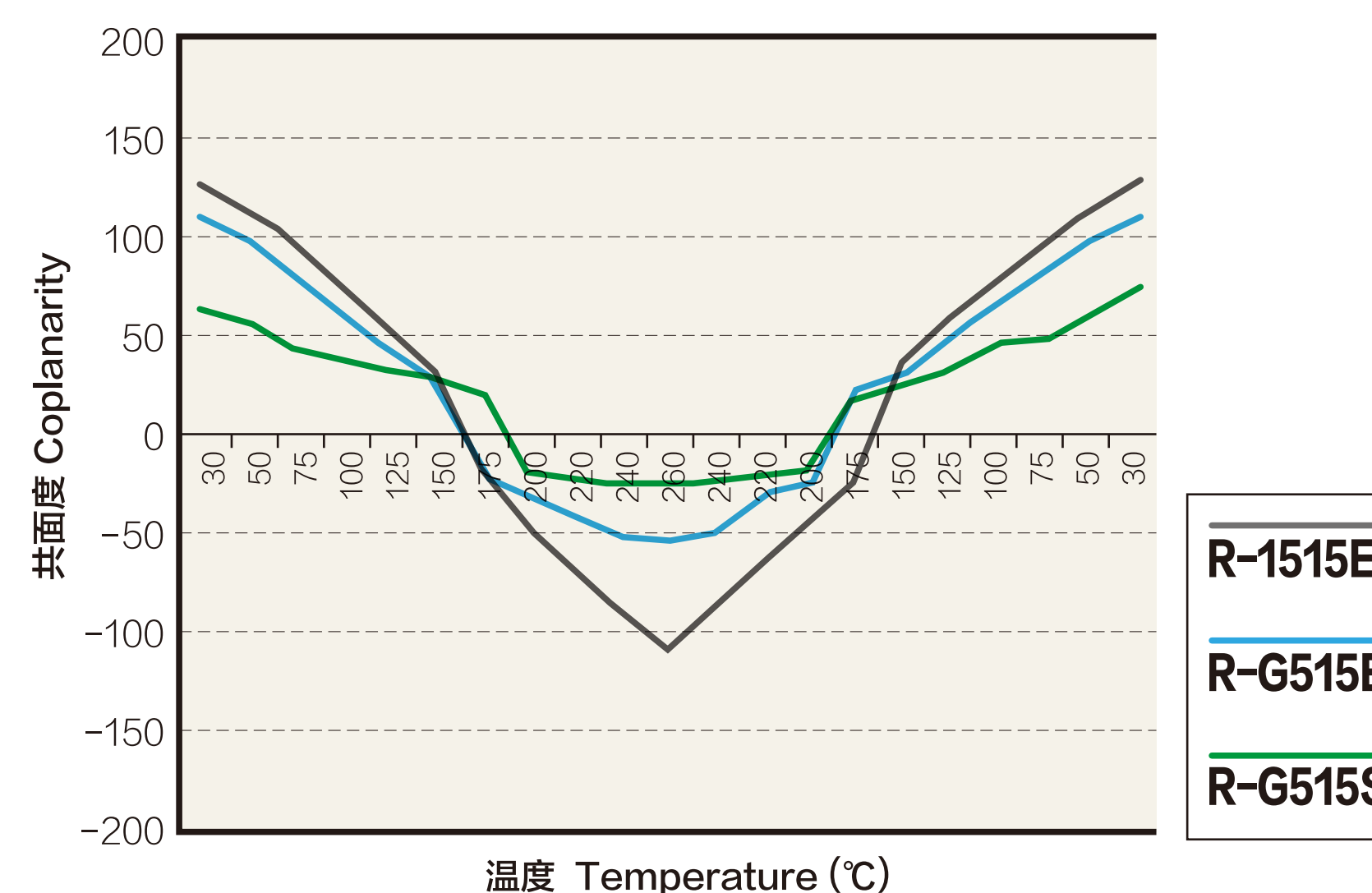
特点 Feature 1

超薄超薄 20 μ m~
Ultra-thin 20 μ m~

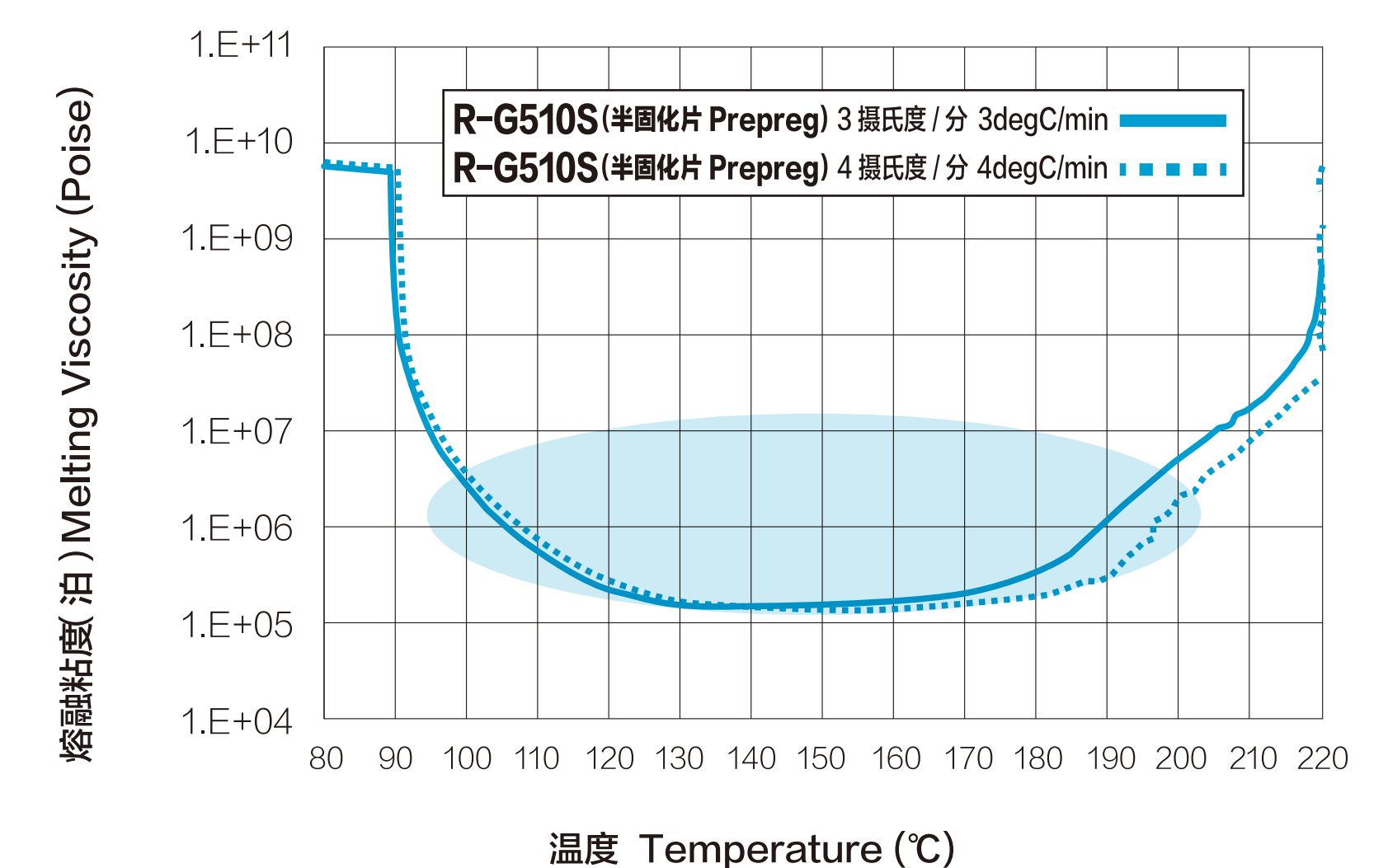
特点 Feature 2

热膨胀系数 x, y-轴方向
4-6ppm/ $^{\circ}$ C(低热膨胀系数玻璃)
CTE x, y-axis
4-6ppm/ $^{\circ}$ C (Low CTE glass)

相比半导体封装翘曲 (IC package warpage)
Comparison of IC package warpage



Coreless/ETS 等 超薄基板中成型性良好
Good moldability of ultra-thin substrates such as Coreless/ETS



R-G510 树脂体系专用于最薄的介电层，
有很大的空间 (working window?) 可供树脂流入。

R-G510 resin system is designed for thinnest dielectric layer.
Resin has a wide room to flow-in.

全球生产据点

Our Global Operation

松下电子材料（上海）有限公司

Panasonic Industrial Devices Materials (Shanghai) Co., Ltd.



制造

Manufacturing

- 成型材料 Molding compounds
- 封装材料 Encapsulation materials

松下电子材料（苏州）有限公司

Panasonic Industrial Devices Materials (Suzhou) Co., Ltd.



制造

Manufacturing

- 印刷电路板 Circuit board
- 多层材 Multi-layer materials
- 玻璃复合基板材料 Glass composite materials

松下电子材料（广州）有限公司

Panasonic Industrial Devices Materials (Guangzhou) Co., Ltd.



制造

Manufacturing

开发

R&D

营业

Marketing

电子材料中国研究开发中心 Electronic Materials China R&D Center
电子材料中国R&M组 Electronic Materials China R&M Group

- 多层材 Multi-layer materials

台湾松下多层材料股份有限公司

Panasonic Industrial Devices Materials Taiwan Co., Ltd.



制造

Manufacturing

开发

R&D

销售·营业

Sales/Marketing

台湾半导体材料研究开发中心
Taiwan Semiconductor Materials R&D Center

- 多层材 Multi-layer materials

松下制造大城株式会社

Panasonic Manufacturing Ayuthaya Co., Ltd.



制造

Manufacturing

销售·营业

Sales/Marketing

- 纸基材 Paper phenolic materials
- 成型材料 Molding compounds
- 封装材料 Encapsulation materials

新加坡 Singapore



开发

R&D

电子材料南亚研究开发中心

Electronic Materials South Asia R&D Center

- 封装材料 Encapsulation materials

松下电器产业株式会社 电子材料事业部

Panasonic Corporation/Electronic Materials Business Division



本公司

Headquarter

开发

R&D

销售·营业

Sales/Marketing

郡山事业所

Koriyama Plant



制造

Manufacturing

LAB

LAB

开发

R&D

- 多层材 Multi-layer materials
- 内层线路多层板材料 Mass laminations
- 功能膜 Advanced films

郡山事业所 西工厂

Koriyama Plant/West Factory



制造

Manufacturing

- 多层材 Multi-layer materials

四日市事业所

Yokkaichi Plant



制造

Manufacturing

开发

R&D

- 成型材料 Molding compounds

四日市事业所 南工厂

Yokkaichi Plant/South Factory



制造

Manufacturing

LAB

LAB

开发

R&D

- 玻璃复合基板材料 Glass composite materials
- 柔性基板材料 Flexible materials
- 封装材料 Encapsulation materials

松下电子材料欧洲有限公司

Panasonic Industrial Devices Materials Europe GmbH



奥地利 Austria

制造

Manufacturing

销售·营业

Sales/Marketing

电子材料欧洲R&M组

Electronic Materials European R&M Group

- 多层材 Multi-layer materials

松下电器机电（美国）有限公司

Panasonic Industrial Devices Sales Company of America



北美 North America

销售·营业

Sales/Marketing

电子材料部门

Electronic Materials Division

※ R&M: Research & Marketing