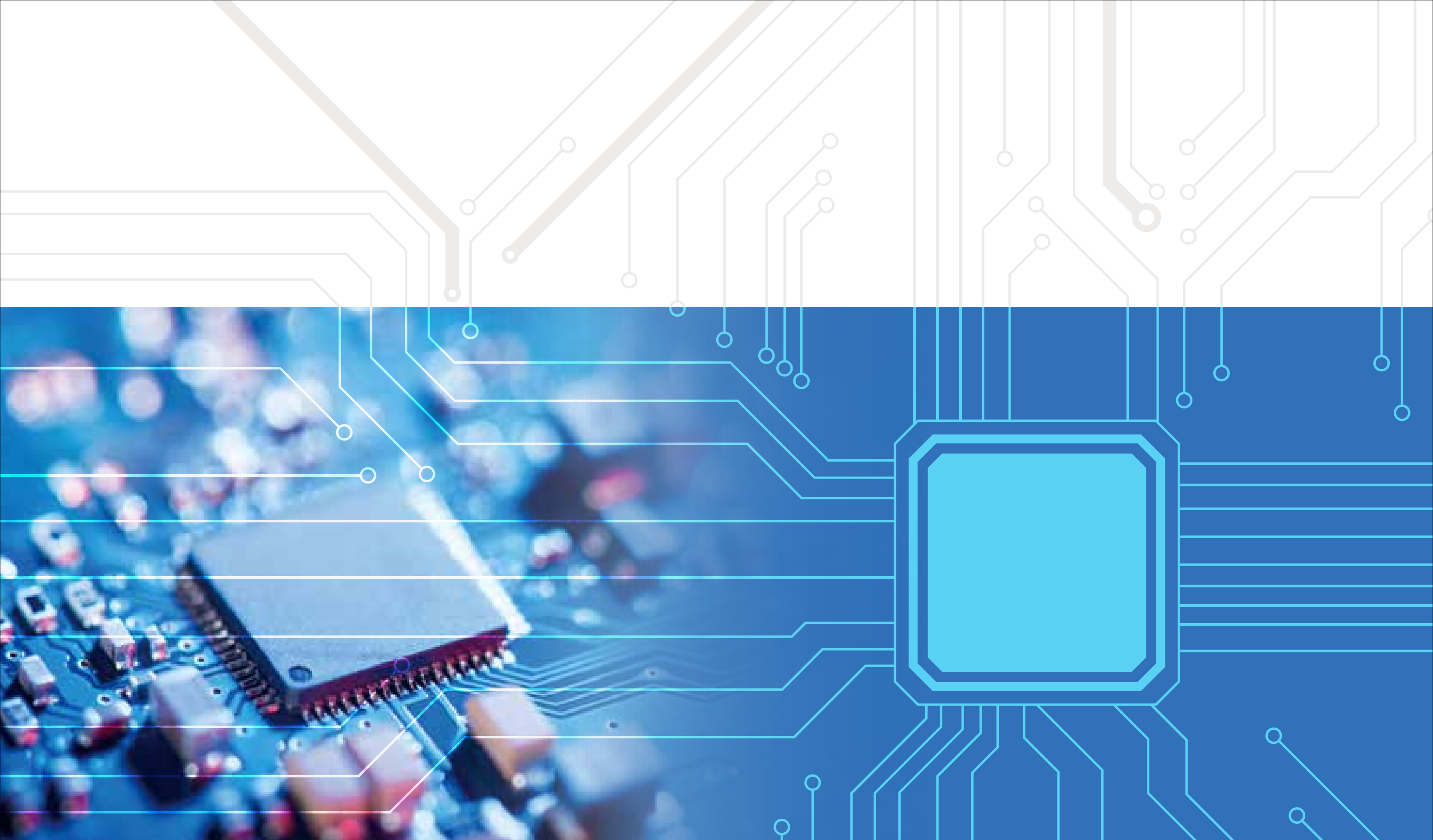
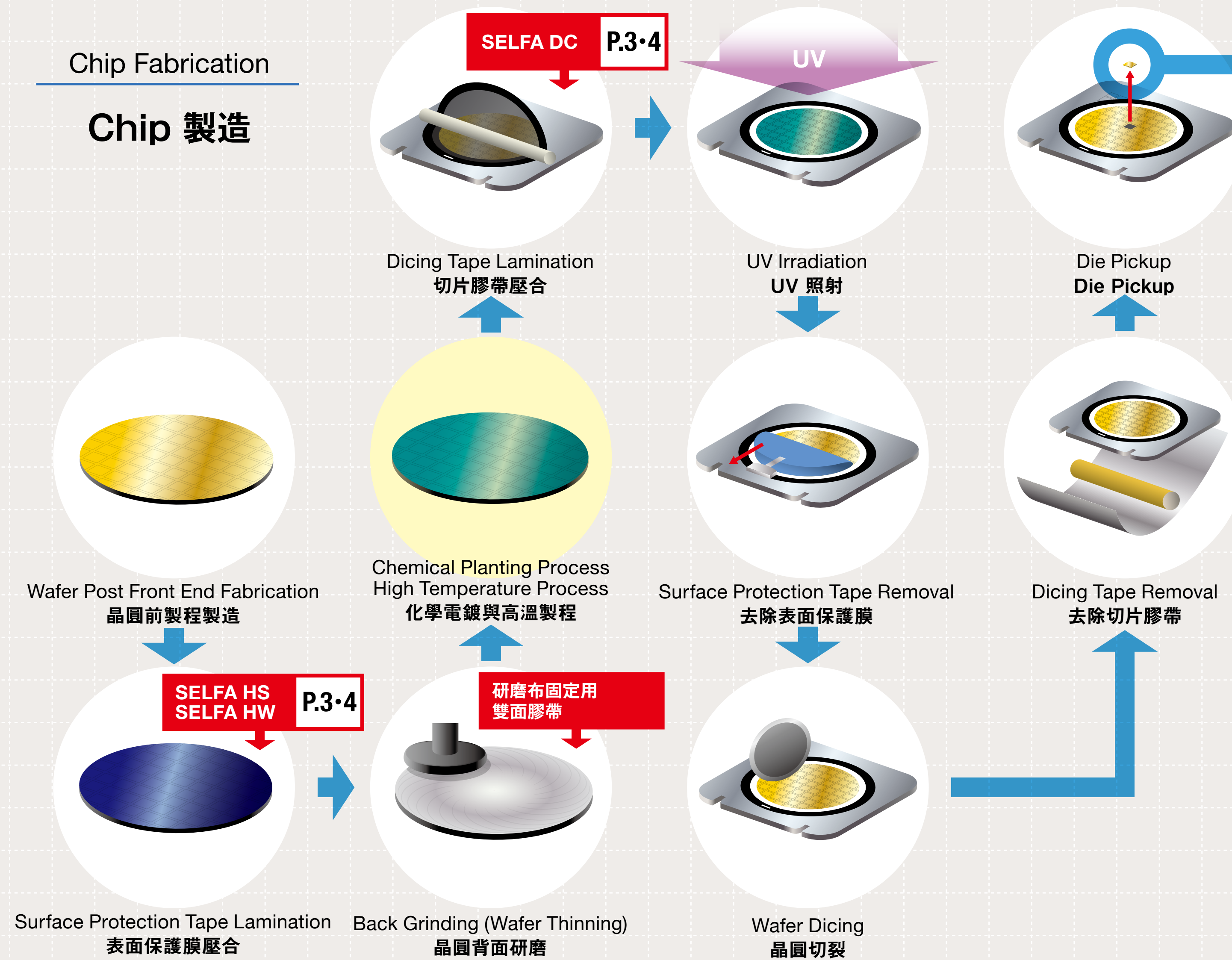


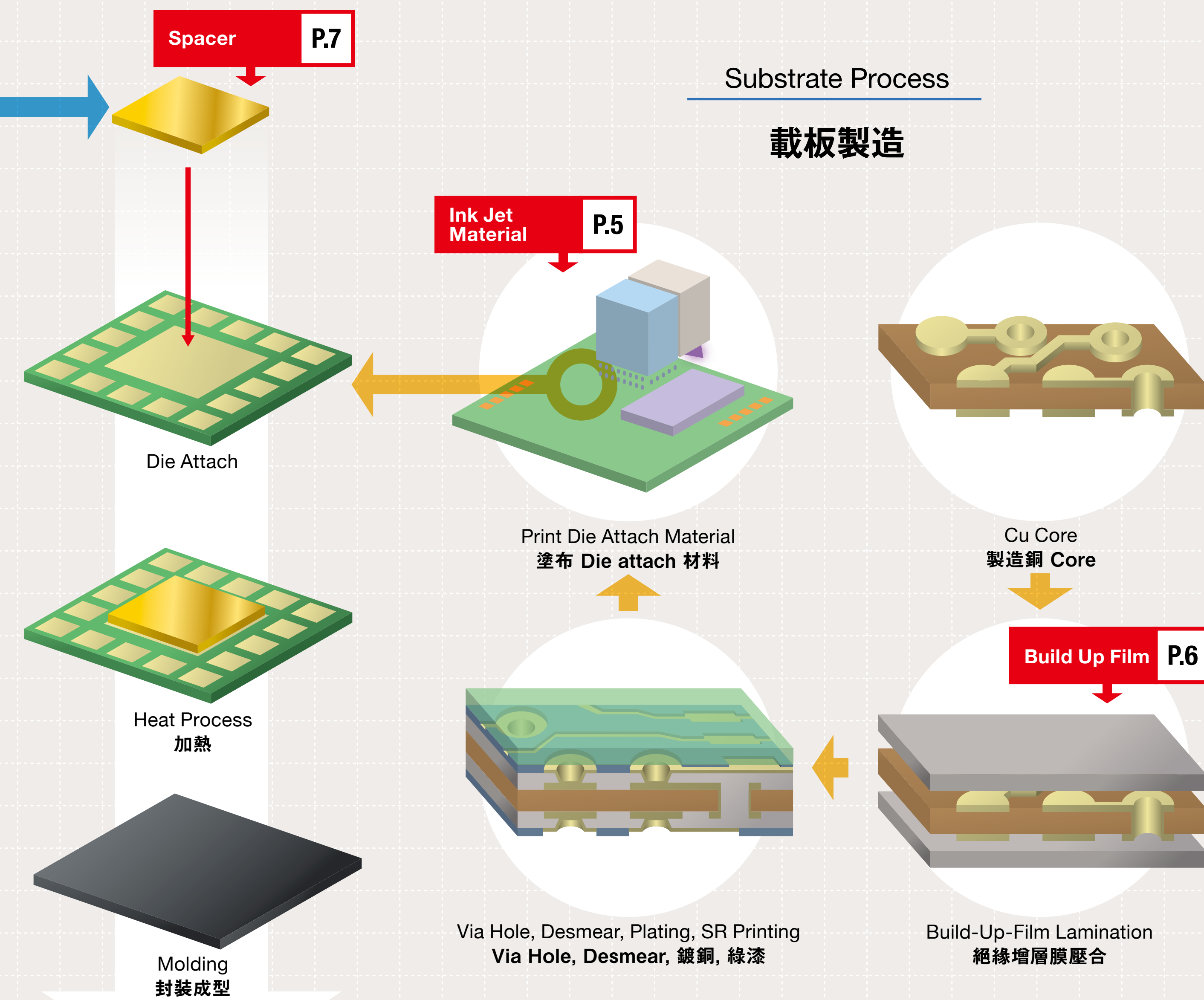
SEMICONDUCTOR RELATED MATERIAL CATALOG

# 半導體關連材料目錄

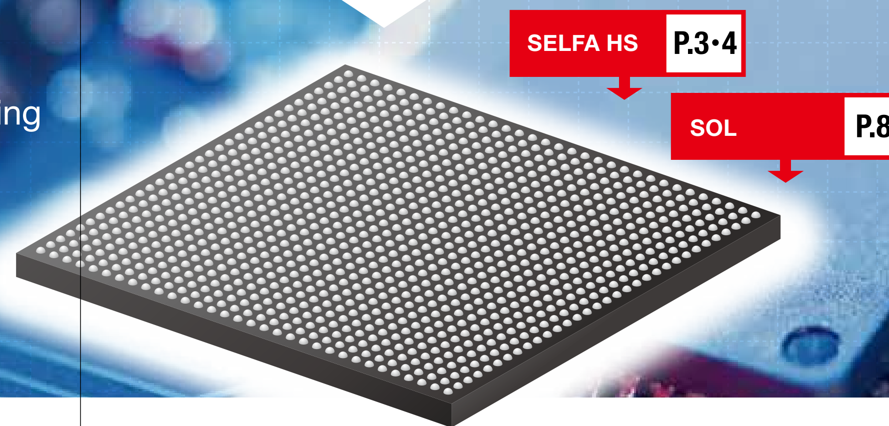
SEKISUI

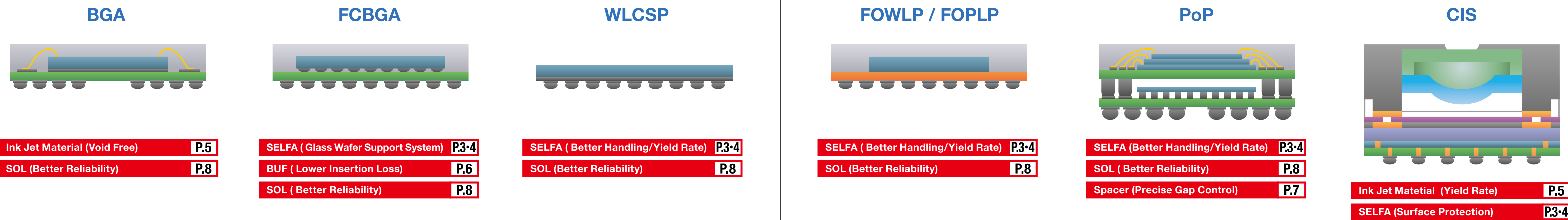
積水化学工業株式会社




# Sekisui's Material for Back End Process
# 半導體後製程用積水材料一覽



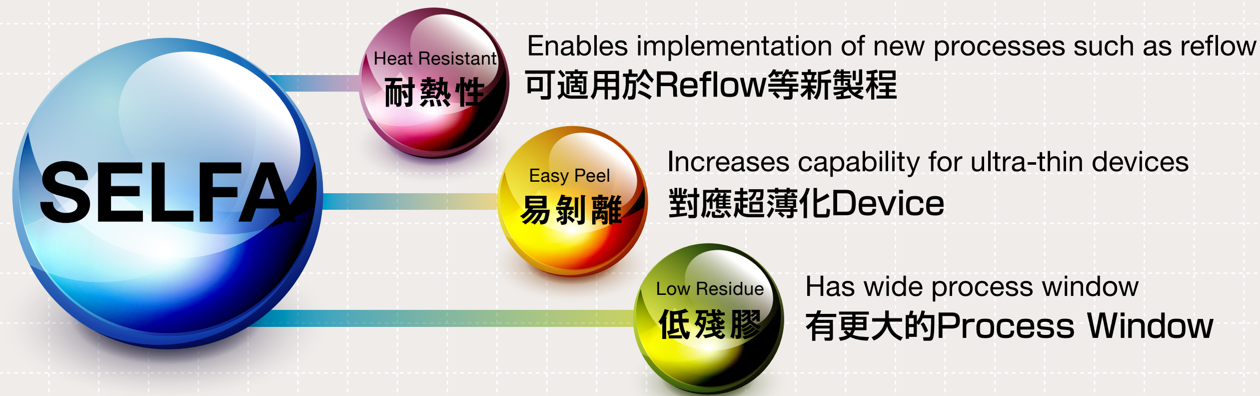



UV Releasing Tape : SELFA Series

# 高黏着性易剝離UV膠帶 SELFA系列

## Enabling new semiconductor process by incorporating proprietary heat resistance and debonding technology

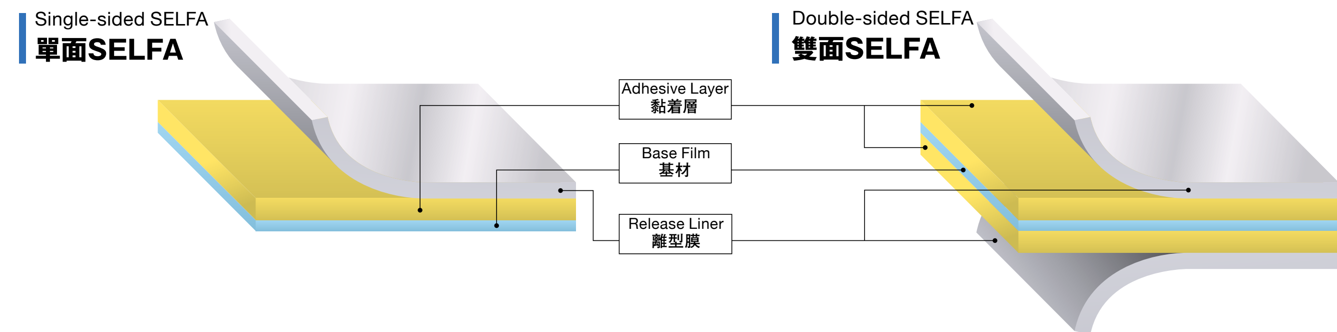
## 以耐熱性及剝離技術實現半導體的新製程開發




Enables implementation of new processes such as reflow
可適用於Reflow等新製程

Increases capability for ultra-thin devices
對應超薄化Device

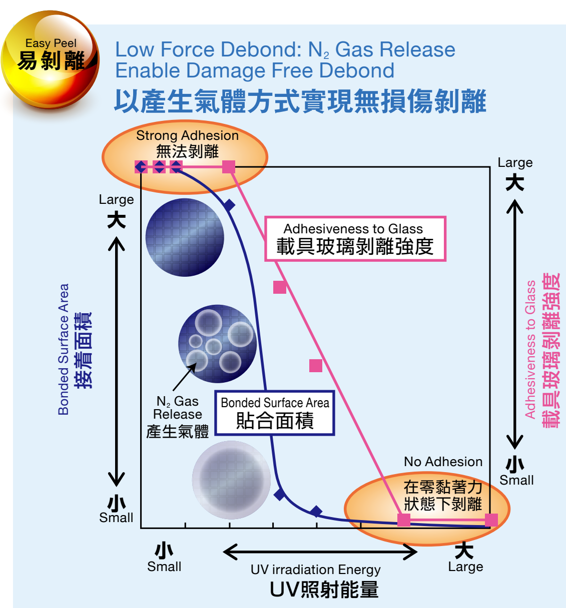
Has wide process window
有更大的Process Window




| Grade 名稱 | Type 類型 | Heat Resistance 高耐熱 | Debonding Method 剝離方法 | Base Film 基材種類 | Adhesive for Device-side Device端 黏膠種類 | Adhesive for Support-side 承載玻璃端黏膠種類 | UV Wavelength UV波長(nm) | UV Intensity UV照射量(mJ/cm2) | Application 用途範例 |
|---|---|---|---|---|---|---|---|---|---|
| HS | Single 片面 | ✓ | Peeling 撕除 | Heat Resistant Film 耐熱膜 | UV Curing UV硬化黏膠 | – | 405 | 3000 | Reflow 回焊 |
| MP | Single 片面 | | Gas Debond 氣體剝離 | PET PET | Gas Release 產生氣體 | – | 365 | 5000 | Shield from Chemicals 藥水保護 |
| HW | Double 両面 | ✓ | Peeling 撕除 Gas Debond 氣體剝離 | Heat Resistant Film 耐熱膜 | UV Curing UV硬化黏膠 | Gas Release 產生氣體 | 405 254 | 3000 12000 | Glass Carrier Support 玻璃承載 |

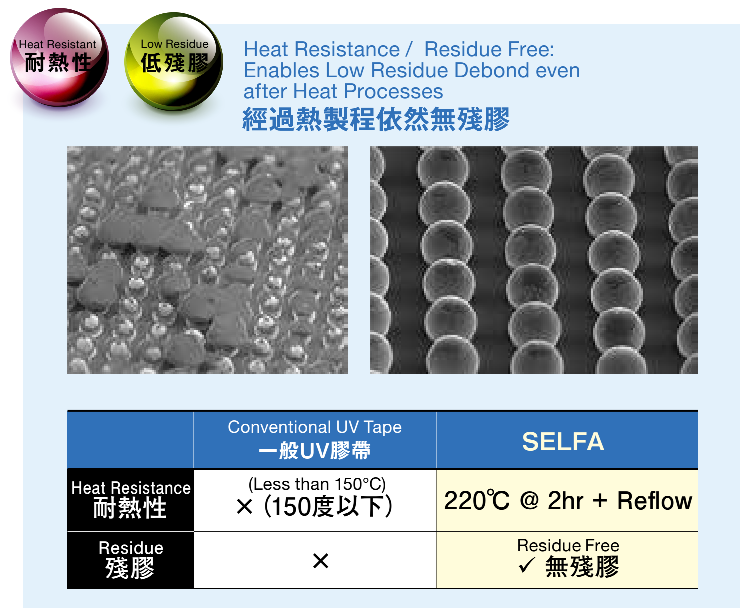
Easy Peel 易剝離

Low Force Debond: $N_2$ Gas Release
Enable Damage Free Debond
以產生氣體方式實現無損傷剝離




Heat Resistant 耐熱性 Low Residue 低殘膠

Heat Resistance / Residue Free:
Enables Low Residue Debond even after Heat Processes
經過熱製程依然無殘膠



| | Conventional UV Tape 一般UV膠帶 | SELFA |
|---|---|---|
| Heat Resistance 耐熱性 | (Less than 150℃) ✕ (150度以下) | 220℃ @ 2hr + Reflow |
| Residue 殘膠 | ✕ | Residue Free ✓ 無殘膠 |



Application 使用範例1

## Double Sided SELFA: HW Series (for Glass Carrier Support System)

## 雙面耐熱SELFA HW系列

(玻璃載具的方式)

**Enable improved productivity by utilizing tape type glass carrier support system**
使用膠帶搭配玻璃載具的方式可大幅改善作業性

Features 特徵

Tape type adhesive supported glass carrier enable better handling capabilities
- 使用膠帶搭配玻璃載具的方式可大幅改善作業性

$N_2$ gas release debonding mechanism results in damage free debonding
- 產生氣體方式可實現無損傷剝離

High resistance to heat and chemicals
- 優越的耐熱性、抗化性

### 使用範例 Application

1. Laminate Tape 膠帶貼附 (SELFA, Wafer 晶圓)
2. Bond Glass Carrier 貼合玻璃載具 (Glass Carrier 玻璃載具)
3. 1st UV Irradiation UV照射 (UV)
4. Wafer Grinding 研磨
5. Standard Heat and Chemical Process 各種熱製程、藥水處理
6. Mount Dicing Tape 轉貼附切割膠帶 (Dicing Tape 切割膠帶)
7. 2nd UV Irradiation UV照射 (UV, $N_2$ Gas Release Debond 氣體剝離)
8. Tape Debond 撕除膠帶

Application 使用範例2

## Singled Sided Heat Resistance SELFA : HS Series (For Protecting Devices)

## 單面耐熱SELFA HS系列

(Device保護用途)

**For protecting devices from heat process during assembly and packaging**
在封裝熱製程(例如回焊)中保護Device

Features 特徵

High resistance to heat and chemicals
- 優越的耐熱性、抗化性

Achieves both high adhesion and low residue
- 兼具高黏着性+低殘膠二者優點

### 使用範例 Application

1. PKG & Wafer Mount 貼附晶片或晶圓 (SELFA)
2. UV Irradiation UV照射 (UV)
3. Standard Heat and Chemical Process 各種熱製程、藥水處理
4. Dicing and Pickup 切割&撿晶

## Ink Jet Material
# 噴墨材料

**Print with UV irradiation → Controllable structures and thicknesses**
**噴墨+UV照射 → 可以自由控制材料形狀和厚度**

### Features 特 徵

Ability to Draw Structures
●形狀自由度
Thickness Uniformity
●厚度均一性
Roughness Conformance
●凹凸追隨性

Comparison with film and dispense
**與Film・Dispense材料比較表**

| | Film Type | Dispenser Type | SEKISUI Ink Jet 積水噴墨 |
|---|---|---|---|
| Ability to Draw Structures 形狀自由度 | × | ✓ | ✓ |
| Thickness Uniformity 厚度均一性 | ✓ | × | ✓ |
| Roughness Conformance 凹凸追隨性 | × | ✓ | ✓ |

UV cure
IJ head IJ噴頭

厚み Thickness (um): 100, 200, 300, 400, 500
解像度 Resolution (um): 50, 100, 150, 200, 250
SEKISUI Ink Jet
Dispenser

### Drop on Demand
Controllable printing size
→ 噴印體積可控制性

### High-Aspect Ration
Controllable printing thickness
→ 厚度可控制性

200um
200um
72.8um

### 使用範例 Application

**Adhesive Material 黏晶材料**

For Die attach 黏晶用途

Embedded die 埋設Die
Printing Ink 噴印膠材

Embedded die (Wire bonded die) 封裝Die(Wire Bonded Die)
Printing Ink
Thickness : ca. 120um
厚み : ca. 120um

ADVANTAGES 優 勢
- Adjustable shapes and thicknesses
- ・形狀,厚度都可以自由調整
- Conforms with large roughness
- ・不論凹凸,段差都可以對應
- Applicable to FOD, FOW structures
- →結構FOD和FOW都適用

**Coating Material Coating 材料**

For Solder Resist 防焊用途
For Dam 擋牆用途

200um
Line Width : ca. 140um
Thickness : ca. 440um

ADVANTAGES 優 勢
- Printing mask unnecessary
- ・無需印刷模具
- Follows substrate pattern
- ・追隨基板圖案
- Achieves higher accuracy than dispenser type
- ・印刷精度 比Dispense還要高



## Interlayer Dielectric Film
# 絕緣增層膜

**Achieves Low Insertion Loss, High Dielectric Reliability and Finer Line and Space Manufactureability**
**具備低訊號低傳送損失, 高絕緣信賴性, 微細線路製造能力**

### Features 特 徵

Low CTE for low package warpage
●低線膨可降低packege翹曲
Low Roughness for finer line and space
●維持低粗糙度, 具微細線路製造能力
Low Df for lower transmission loss
●低訊號低傳送損失

**何謂 絕緣增層膜 What is BU FIlm**
**Interlayer Dielectric Film used for IC Package Substrates**

FCBGA
IC Chip
BU Layer 絕緣增層
Cu Interconnects 銅連接面
Core Material Core 材
BU Layer 絕緣增層

Schematic X-Sectional View of IC Package Substrates

Low Ra
Bird's-Eye View of BU Films after Desmear
Sekisui BU Reference
Surface Roughness Comparison after Desmear

Low CTE
NX04H Reference
Substrtae Warpage @ 260°C

### 物性目錄表 Lineup

| | | NX04H | NQ07 series | NR series (Development item) |
|---|---|---|---|---|
| | | Product of reference | Low Df | Low CTE |
| CTE(25-150°C) | ppm/°C | 24.5 | 27 | 17 |
| Dk | 5.8GHz | 3.3 | 3.3 | 3.4 |
| Df | 5.8GHz | 0.009 | 0.0037 | 0.008 |
| Young's Modulus | GPa | 8 | 10.4 | 12.5 |
| Tg(DMA) | °C | 205 | 183 | 195 |
| Ra(WYKO) | nm | <100 | 30-150 | 30-50 |
| Performance on PKG Substrate | | High Insulation Reliability/ Fine Line/Low Loss | + Super Low Loss | + Low Warpage |
| Application | | Networking/Servers | | + Mobiles |

Df@5.8GHz: 0.000, 0.002, 0.004, 0.006, 0.008, 0.010, 0.012, 0.014
CTE@(25-150°C)ppm/°C: 10, 20, 30, 40
NR series
NX04H
NQ07 series
High Performance
Next Target

### 使用用途 Application

Cover Film
BU Film 絕緣增層膜 (t=25-100um)
PET Film

BU Layer BU 層
BU Layer BU 層
X-Section

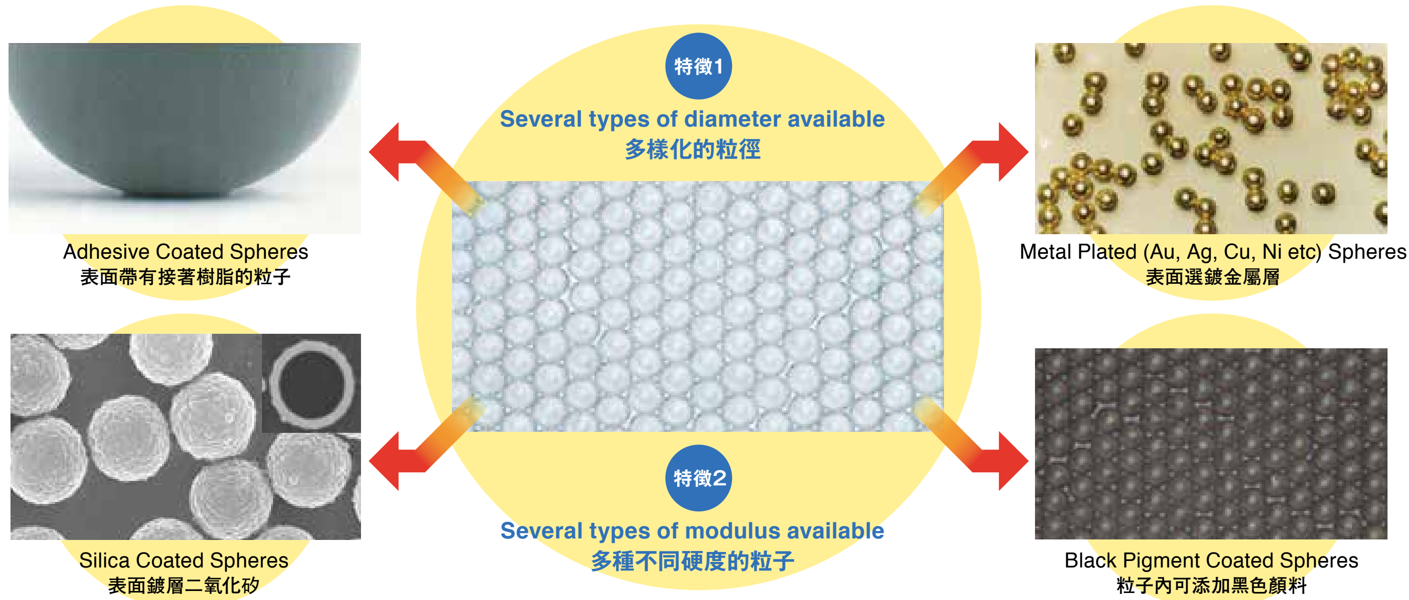
1. Laminate 絕緣增層膜壓合與 + Remove PET Film +去除PET FILM
2. Cure 烘烤與 + Via Formation (Laser) +Via 形成
3. Etch Surface using Chemical Etching 化學藥液表面處理
4. Interconnect Fabrication 線路成型 Litho + Develop + Plating 曝光+顯影+鍍銅
5. Top Layer Fabrication 表面層形成 (Solder Resist) (綠漆)

Microsphere Polymer Material Sets
微粒子相關產品

# Micropearl Series
# Micropearl 系列

## Microsphere Polymer Engineering Design with Surface Treatment Technology
## 提供多樣化的粒子與粒子表面處理設計

### Possible to add various functions to microsphere polymers
### 可針對圓球狀塑膠粒子進行機能加工




Adhesive Coated Spheres
表面帶有接著樹脂的粒子

Metal Plated (Au, Ag, Cu, Ni etc) Spheres
表面選鍍金屬層

Silica Coated Spheres
表面鍍層二氧化矽

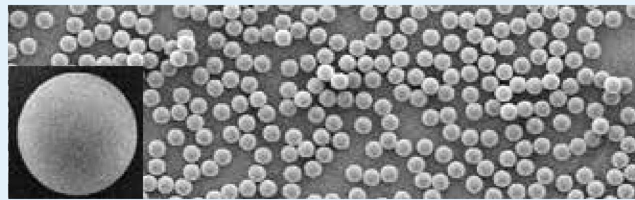
Black Pigment Coated Spheres
粒子內可添加黑色顏料

## 1 Low Modulus Microspheres 柔軟粒子

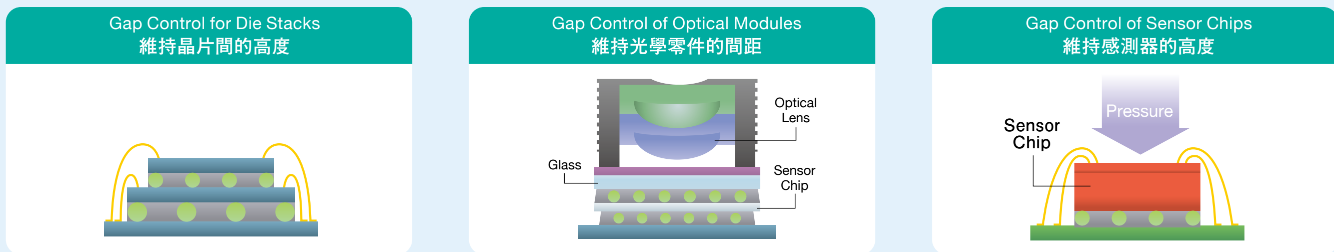
**Microspheres for Gap Control without Damaging Contact Surfaces**
不造成接觸面損傷的間隔材料

Features 特 徵

- Uniform Size Distribution
- ●粒徑均一
- Low Modulus and Resilient
- ●低彈性低反發
- Various Diameters Available (15um-110um)
- ●豐富的粒徑選擇 (15~110um)

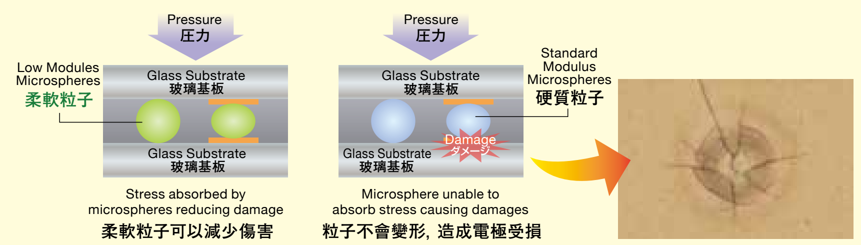


### 使用用途 Application




### Micropearl EZ

| | |
|---|---|
| Characteristic 特長 | Low modulus and low resilient<br>●低彈性與低反發 |
| Function 機能 | Reduces damages to electrodes and substrates<br>●減少對電極與基板的傷害<br>Reduces vibration noise due to low modulus<br>●低彈性所以減少震動與雜訊 |
| Line Up 產品線 | 15~110μm |



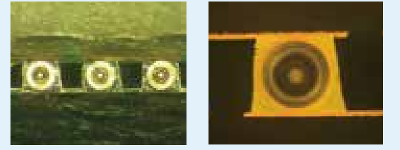

## 2 Polymer Core Solder Ball SOL 塑膠核錫球SOL

**Achieve High Reliability + Stand Off Height Control**
高信賴性+維持間距

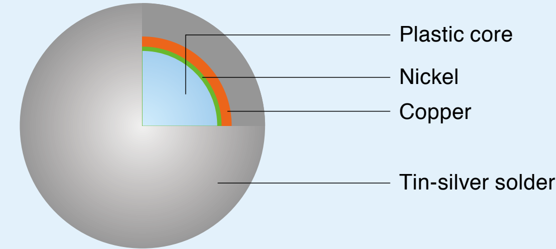
Features 特 徵

- Polymer Core enables Various Physical Stresses to be Absorbed
- ●塑膠核心部可吸收應力
- Uniform Stand Off Height after Several Times of Reflow
- ●多次reflow後間距仍保持固定
- Enables Underfill-less Designs
- ●不需underfill補強

Assembly Image
封裝斷面圖



Basic Structure
基本構造




| | Internal Stress of Solder Bump during TCT<br>TCT中的錫球應力圖 | Stand Off Height after 3 times Reflow<br>3次reflow後的間距維持 |
|---|---|---|
| SAC305 | 259~641 kgf/mm² PKG PCB Large stress! | Solder bridge |
| SOL | 125~187 kgf/mm² Small stress! | No bridge, No deformation |

## 3 Anisotropic Solder Paste SAP 異方性導電膠水SAP

New Product 新製品

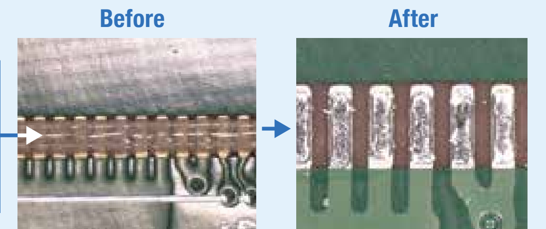
**Low Temperature / Fine Pitch Metal Connection Possible**
實現低溫與Fine Pitch組裝

Features 特 徵

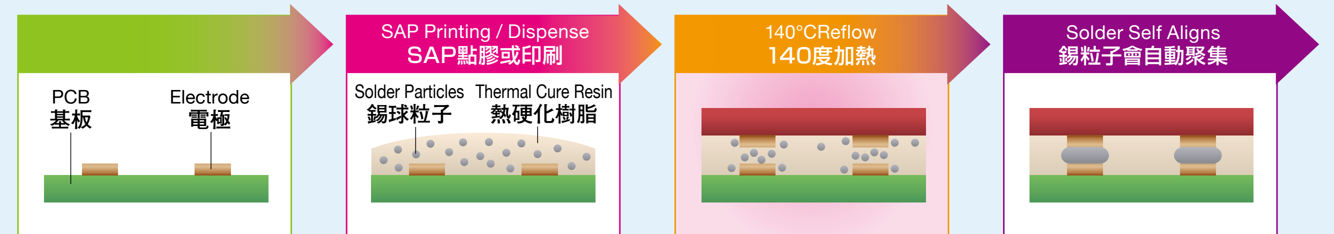
- Low Temperature Assembly
- ●低溫組裝
- Achieve High Reliable Metal Connections
- ●有良好的金屬黏合性
- Achieve Fine Pitch Connection
- ●可對應細小線距 Fine Pitch

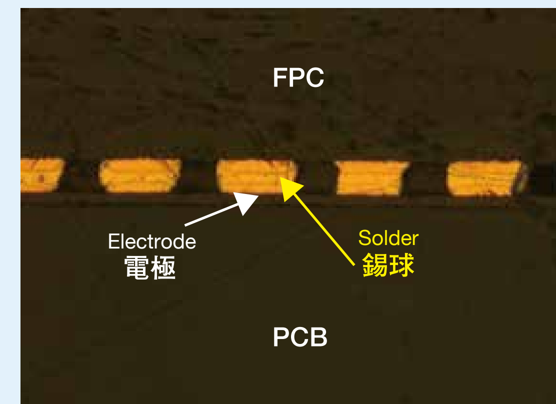
Special Solder Particles
特殊處理的錫球粒子
✚
Thermal Cure Resin
熱硬化樹脂

Before / After



### 使用範例 Application




| | Conditions 条件 | Results 結果 |
|---|---|---|
| Peel Strength 拉拔力測試 | 90° peel | 24N/cm |
| Thermal Shock 熱衝擊測試 | -40/85℃/1000 Cycle | Pass |
| High Temp. + Moisture Resistance 高溫高濕測試 | 85℃85%/1000h | Pass |
| Electrical Insulation 絕緣測試 | 85℃85%15V/500h | Pass |

# Heat Release Related Materials
# 導熱相關產品群

## Enabled High Heat Release Material utilizing Sekisui's Proprietary Resin Design and Filler Composite Technology
## 獨特的樹脂設計與Filler分散性實現了高熱傳導效果

### Various Types of Heat Release Materials Avaliable
### 可提供不同形態的導熱材料

| | Siloxane Free 無矽氧樹脂材料 | Siloxane Containing 矽氧樹脂材料 |
|---|---|---|
| Substrate 基板 | Epoxy Based Materials: Resin Substrate 樹脂基板 | |
| Grease 膏 | Heat Release Paste 放熱接著膠 | Thermal Interface Materials (TIM): Grease 散熱膏 |
| Sheet 薄膜 | Sheet 放熱薄膜 | Sheet (soft～hard) 放熱薄膜（軟～硬） |

## 1 Resin Substrate 樹脂基板

**Resin substrate to achieve both low thermal resistance and high reliability**
低熱阻且具有高信賴性的基板

| | Siloxane Free | Siloxane Containing |
|---|---|---|
| Substrate | ■ | |
| Grease | | |
| Sheet | | |

**Features 特　徵**

To achieve both high insulation with thin film and high thermal conductivity.
●薄化絕緣且具有高熱傳導率

Sable adhesive B-stage insulation layer (N-Fin)
●具有穩定接著性的絕緣層 (N-Fin)

**信賴性 Reliability**

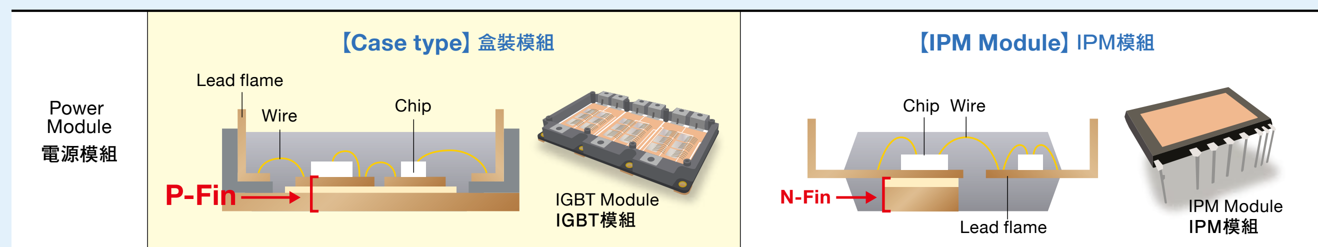
| Item 製品 | Test condition 實驗條件 | | | Breakdown # |
|---|---|---|---|---|
| P-Fin (10W type) N=10 | 150°C | 2.0 kV | 2,000h | None |
| | 85°C85%RH | 2.0 kV | 2,000h | None |

**物性 Properties**

| Item 製品 | P-Fin | N-Fin |
|---|---|---|
| Structure 構造 | Insulation layer (C-stage) 放熱絕緣層; Cu foil Cu箔; Base metal 金屬基材 | Insulation layer (B-stage) 放熱絕緣層; Base metal 金屬基材 |
| Thermal conductivity 熱傳導率 | ～15W/m･K | ～10W/m･K |
| Breakdown Voltage 絕緣性 | 6kV@100um | 4kV@100um |

**用途 Application**

Power Module 電源模組






## 2 Heat Release Paste 放熱接著膠

**Prevents thermal destruction of electronics devices**
可延長電子產品的壽命

| | Siloxane Free | Siloxane Containing |
|---|---|---|
| Substrate | | |
| Grease | ■ | |
| Sheet | | |

**Features 特　徵**

To achieve both flexibility and adhesiveness
●兼具柔軟性與接著性

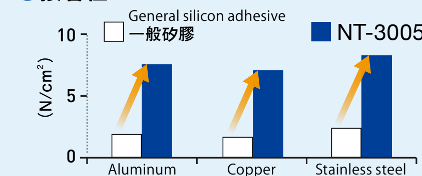
Siloxane free material
●無矽氧樹脂材料

**物性 Properties**

| Item 製品 | Thermal conductivity 熱傳導率 | Curing condition 硬化條件 |
|---|---|---|
| NT-3005 | 2.5 W/m･K | 150°C x 2hrs |
| YK-001 | 4.5 W/m･K | 150°C x 2hrs |
| LL-003 | 2.5 W/m･K | 85°C x 0.5hrs |

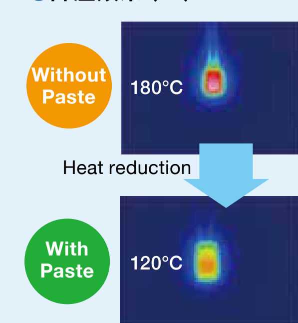
**特性 Characteristic**

Adhesiveness
●接着性



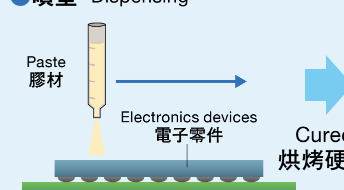

Flexibility
●柔軟性

Heat reduction effect on IC
●降溫效果 (IC)

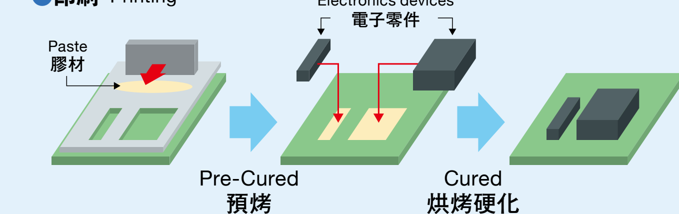



**用途 Application**

●噴塗 Dispensing




●印刷 Printing




## 3 Thermal Interface Materials (TIM) 介面放熱材料

**Broad line of TIM products to meet your requirements**
種類豐富的TIM製品Line Up

| | Siloxane Free | Siloxane Containing |
|---|---|---|
| Substrate | | |
| Grease | | ■ |
| Sheet | | ■ |

**Features 特　徵**

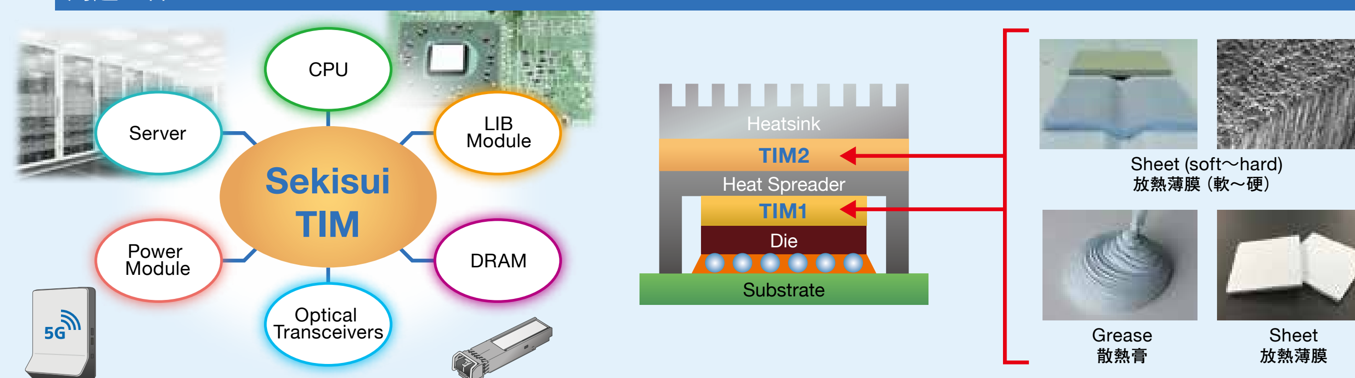
Various kinds of products to satisfy customer's requirements
●TIM的最佳提案

Thermal conductivity
[With insulation] ～ 10 W/m･K
[Without insulation] ～ 35 W/m･K
●熱傳導率
10 W/m･K (絕緣)、
35 W/m･K (非絕緣)

**物性 Properties**

| Item 製品 | Type 形狀 | Insulation 絕緣性 | Thermal conductivity W/m･K | Overview 概要 |
|---|---|---|---|---|
| Feather、Ramiel | Sheet 薄膜 | ○ | 1.4～6 | Broad lineup 產品線多 |
| SF ALMO | | | 1.0 | Siloxane free material 無矽氧樹脂材料 |
| XLIM-HL | | | 10.0 | Low reaction force 低反作用力 |
| PT、Manion | | × | 6～35 | High thermal conductivity 高熱傳導性 |
| CGW | Grease 膏 | ○ | 4.3 | Room temp. curing two-liquid grease 二液型室溫硬化膏 |
| GA | | | 4.5 | One-liquid grease 一液型散熱膏 |
| MK | | | 4.5 | Phase change material 相變材料 |

**用途 Application**



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