

Low stress

Low shrinkage

Low temp. curability

Applications

IC Package/Mobile

Over-molding and wafer back-coating of advanced semiconductor packages, such as WLPs (FOWLPs and FIWLPs) and PLPs, for sophisticated mobile and wearable devices.

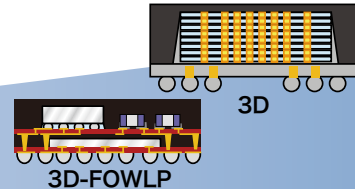
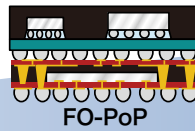
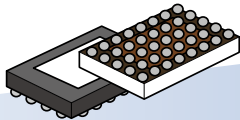
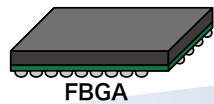
CV8511CUB

Encapsulation materials for FOWLP/PLP

Available in forms of granule according to the required encapsulation thickness and size, enabling compression molding and lamination molding. Respond to growing size and low warpage of thin packages and contribute to the increased productivity of advanced semiconductor packages.

FOWLP Technology Trend

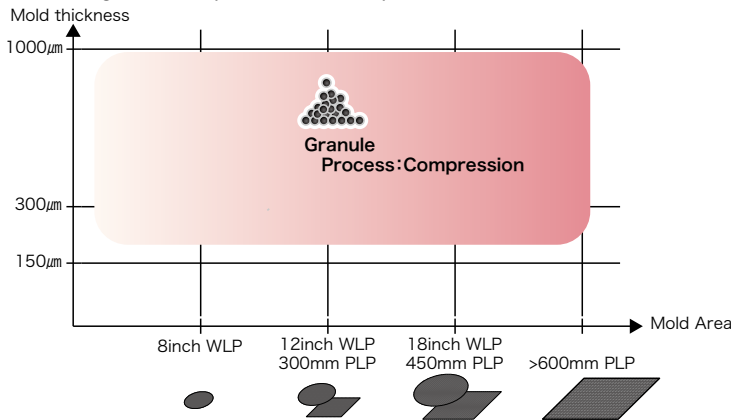
Contribute to low warpage and thinner product



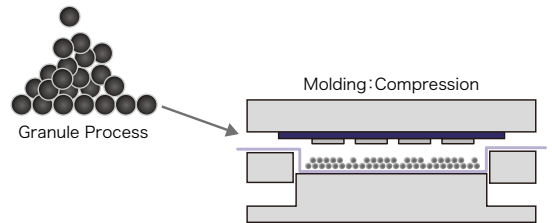
FOWLP tech.

Line-up and corresponding package

We have wide range of Encapsulation Line-up for WLP/PLP



Encapsulation method



General properties

Item	Unit	LEXCM ^{CF} CV8511CUB	LEXCM ^{CF} X85U-PT1-AP
Mold size	—	Wafer Level / Panel Level	
Process	—	Chip First / Chip Last	
Form	—	Granule	Granule
Mold shrinkage	%	0.15	0.07
Tg	°C	210	174
C.T.E.1	ppm/°C	8	7
C.T.E.2	ppm/°C	56	25
Flexural modulus (25°C)	GPa	8	30

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Saves process time

Excellent fillability for narrow gap/pitch

Low warpage

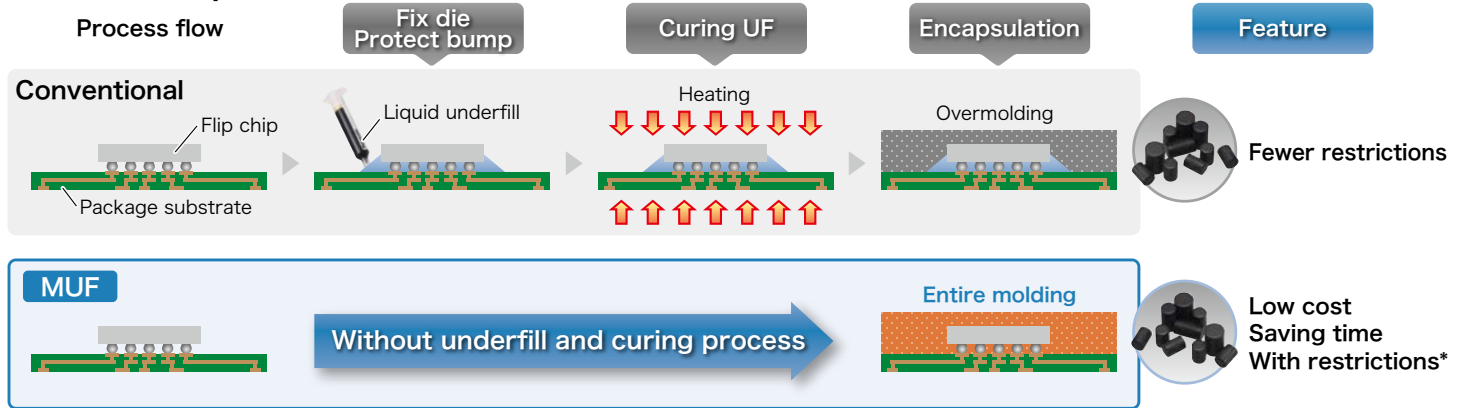
Applications
IC Package/Mobile
 Advanced IC Packages (Flip-chip package such as FC-CSP, FC-SiP module)

CV8581 CV8713

Molded underfill (MUF) semiconductor encapsulation molding compounds

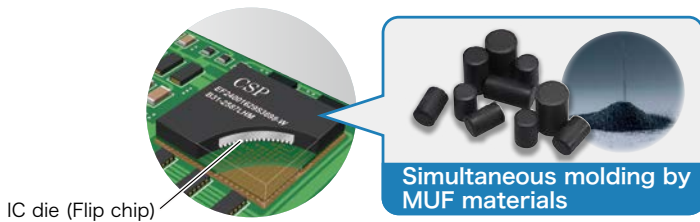
MUF technology is a process that can fill the narrow gap under the flip-chip without voids and overmold the die in one-step. Panasonic Industry proprietary high filler loading and resin design technologies are the features of this material.

Process comparison



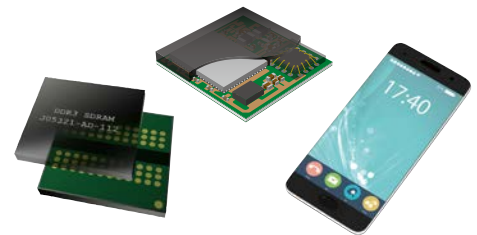
* Depends on package structure (Die size, gap size, bump pitch, etc.)

Excellent fillability for narrow gap and narrow pitch



Application

- Flip-chip package
- FC-CSP
- FC-SiP module
- Other



We have various options of MUF materials proven for many packages. Please contact us.

General properties

Item	Unit	LEXCM _{CF}			
		CV8581MUW	CV8713UB	CV8714AHSL	X8770UY
Tg (TMA)	°C	170	145	153	150
CTE 1	ppm/°C	20	9	12	9
CTE 2		64	38	47	40
Flexural modulus (25°C)	GPa	16	24	23	26
Filler size (Max)	μm	20	20	10	20
Mold shrinkage	%	0.32	0.20	0.21	0.20

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Panasonic Industry CV8581

High fluidity
Excellent fillability for narrow gap/pitch
Reduced void/bleed

Applications
IC Package/Mobile
 High-density advanced IC packages (BGA, CSP)

CV5300 series

Capillary underfill (CUF) semiconductor encapsulation materials

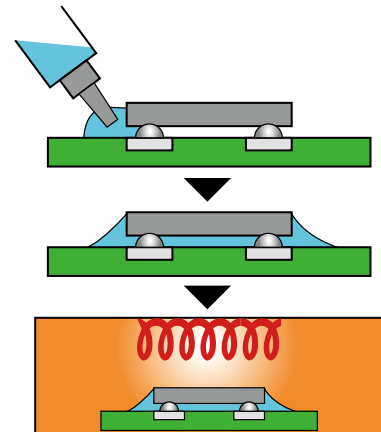
High capillary flow rate fills narrow gaps without voiding.

Line-up

Features

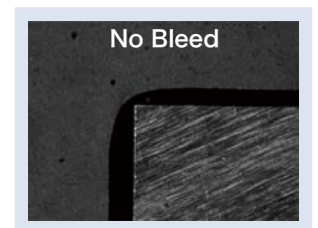
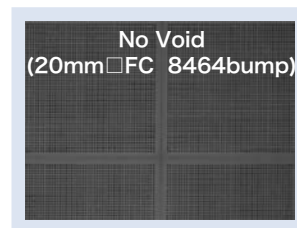
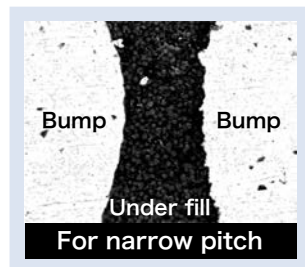
- 1 Compatible with narrow gap
- 2 Uniform penetration
- 3 High-speed fillability
- 4 Compatible with low-k film
- 5 High moisture reflow resistance

Part Number	Features
CV5300 series	High fluidity, Short-time curing



Excellent fillability for narrow gap/pitch

Reduced void/bleed



General properties

Item	Unit	CV5300 series
Filler size Max	μm	1
C.T.E.	ppm/°C	33
Tg (TMA)	°C	110
Flexural modulus (25°C)	GPa	7

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Thinner
High-density wiring
Warpage control

Applications
IC Package/Mobile
 High-density, advanced package for mobile devices (PoP, MCP, Mold underfill package, etc.)

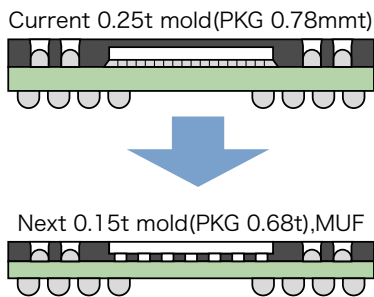
CV8710 CV8760

Thin surface mounting semiconductor encapsulation materials

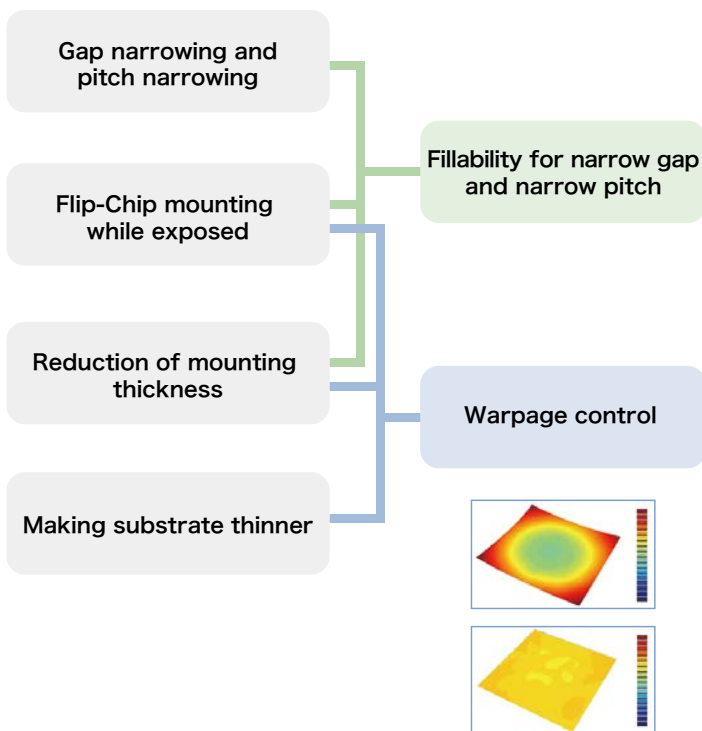
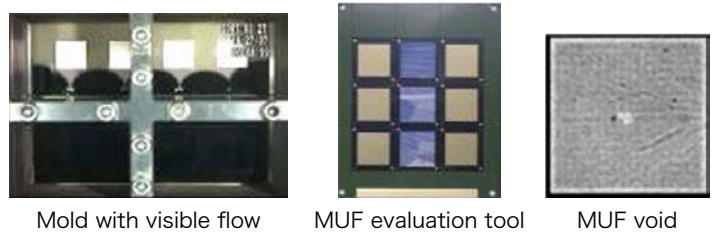
Corresponding to the high-density wiring and thinner (Fillability for narrow gap and narrow pitch)
 Corresponding to the flip-chip mounting. Making the substrate thinner (Package warpage control)

Trends and required performance

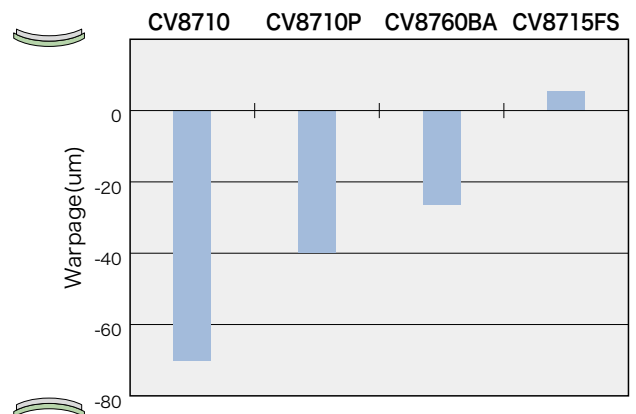
ex) MUF(Mold underfill) of PoP-b



Use of high moldability-evaluation technology has achieved excellent fillability



Line-up of materials selectable according to warpage



0.3t mold FBGA

PKG size : 12x12mm
 Substrate : BT 0.3mmt
 Die : 8x8x0.15mmt
 Mold thickness : 0.3mmt

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Panasonic Industry CV8710



Warpage control
High adhesion
Reduced solder flash

CV5386 CV5401

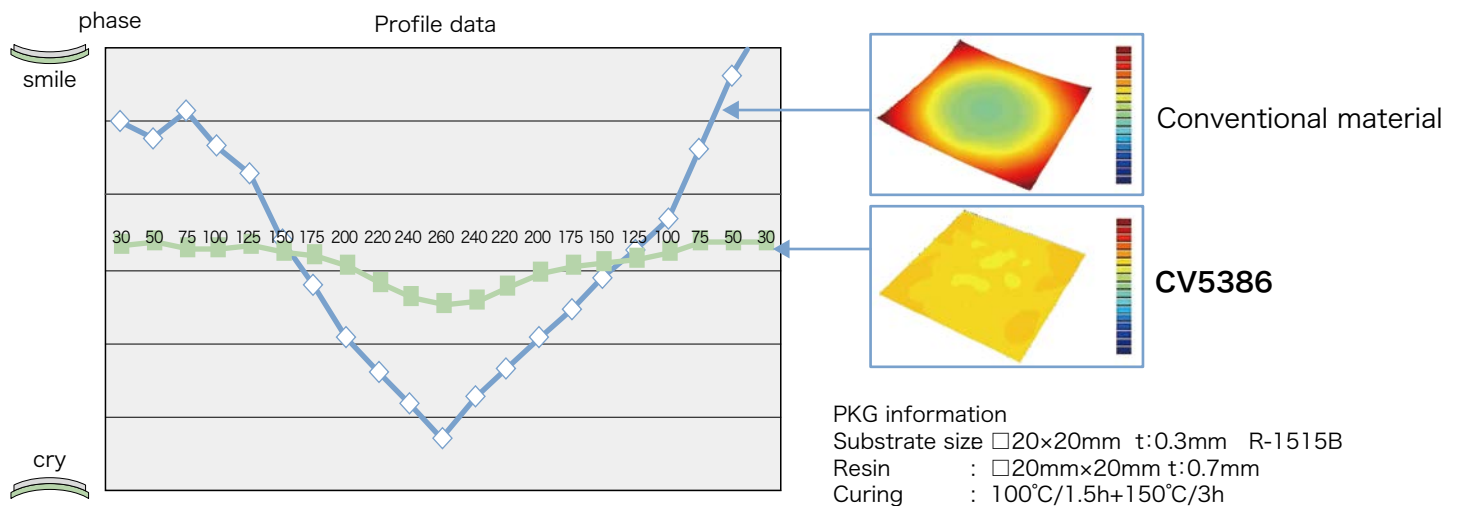
For SMD module
low warpage liquid encapsulant

Enhances process reliability by warpage control and high adhesion (Low warpage of ultrathin module is achieved). Solder flash during mounting reflow has been reduced, resulting in greatly decreasing the defect ratio. Large encapsulation area.

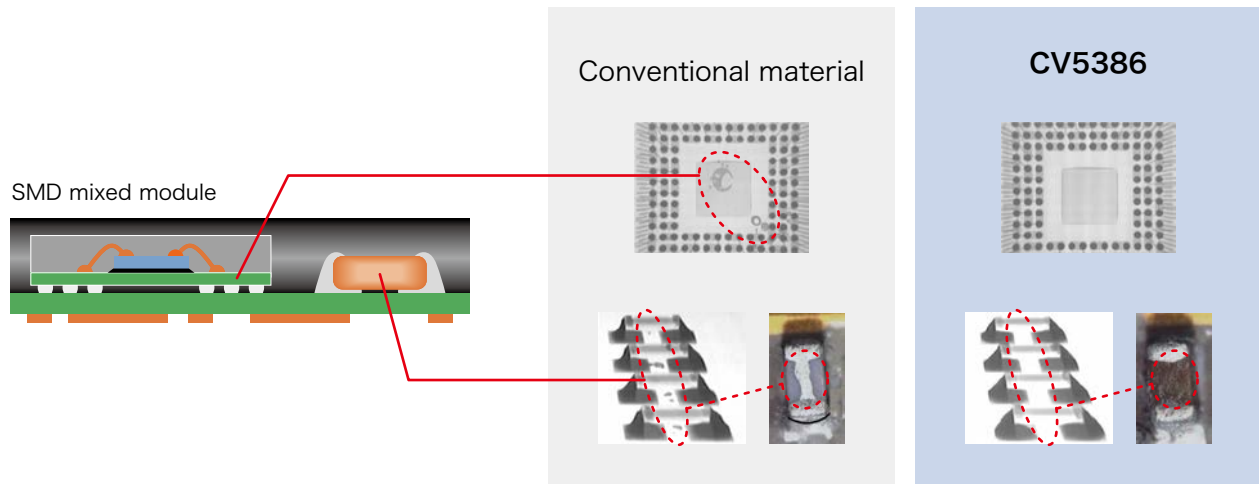
Applications IC Package/Mobile

Communication module (MAP, COB) for mobile devices such as notebook PC, digital camera, mobile phone, smartphone, tablet PC

Warpage behavior : Shadow moire analysis



Solder flash after mounting reflow has been reduced (X-ray observation)



Delamination free* with high adhesion and low stress

Automotive quality
AEC-Q100/grade 0

Also used for Clip-Bond Package of automotive application

Applications
IC Package/Automotive

Surface mounting PKG: SOP, QFP, LQFP, DPAK, LFPK, TOLL

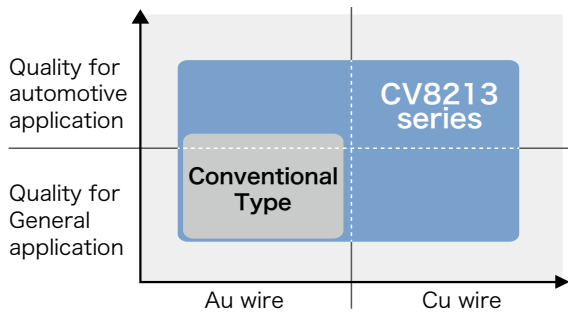
LEXCM^{CF}

CV8213 series

Delamination free* surface mounting semiconductor encapsulation materials

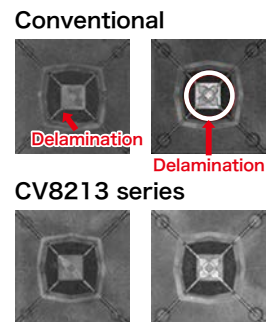
Achieved delamination free* with high adhesion strength and low stress property.
High heat resistance for automotive application (AEC-Q100/grade 0)

Concept



Delamination free* achieved by MRT (Moisture reflow test)

		Conventional	CV8213 series
MRT Delamination	Lead finger	3/6	0/6
	Die paddle	0/6	0/6
	Chip(front)	0/6	0/6
	Chip(back)	5/6	0/6
Condition	Level 2aa (85°C/65%RH/120h+IR(260)×3)		
PKG	28□LQFP 256pin CuL/F die size 6×6×0.35mmt (SiN)		
Molding condition	180°C/60scure, Injection pressure 9.8MPa, Injection time 7.5s (Out of cure time)		



Delamination free* achieved at 1000 cycles of TCT (Thermal Cycle Test)

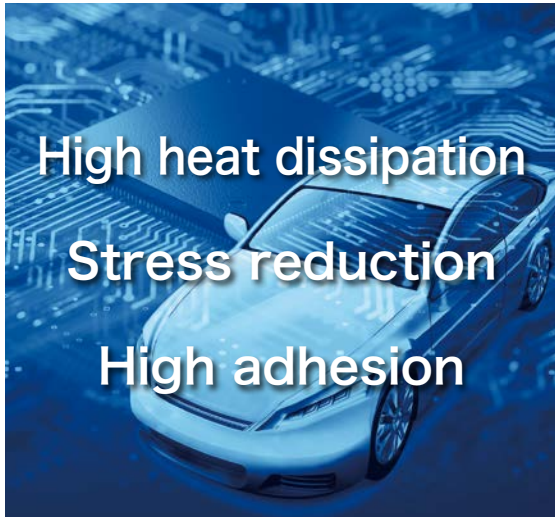
LF surface : Copper paddle, T post: Ni
MLS1 : Moisture Sensitivity Level Tesiting Level1
Die Attach : Solder paste
TCT : -65°C⇄175°C

	After MSL 1	500 cycles	1000 cycles
Conventional			
CV8213 series			

General properties

Item	Unit	CV8213 series
Tg	°C	125
C.T.E. ($\alpha 1 / \alpha 2$)	ppm/°C	10 / 46
Flexural modulus (260°C)	GPa	0.4
Moisture Absorption	%	0.13
pH	—	7.0

* 1. Based on Panasonic's internal evaluation samples. No separation observed between the lead frame and the semiconductor encapsulation material were detected using on measurements made using SAT (Scanning Acoustic Tomography) Equipment.
2. Panasonic does not guarantee that no delaminated parts will be detected under any evaluation conditions.
3. With respect to delamination, the company recommends that all users evaluate the stability of parts and make a decision with respect to adoption.
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High heat dissipation
Stress reduction
High adhesion

Applications IC Package/Automotive

Automotive module, Inverter module for major appliances and industrial motors

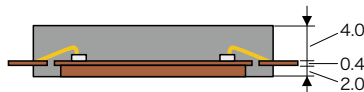
LEXCM^{CF}

CV4180 CV4380

For power modules high thermal conductive semiconductor encapsulation materials

Achieving high mountability and high heat dissipation (Package warpage control). Suitable for large packages with heat spreaders exposed (T/C resistance improvement due to stress reduction). Compatible with nickel plating (Achieved high adhesion).

Stress reduction: Thermal cycle (T/C) resistance

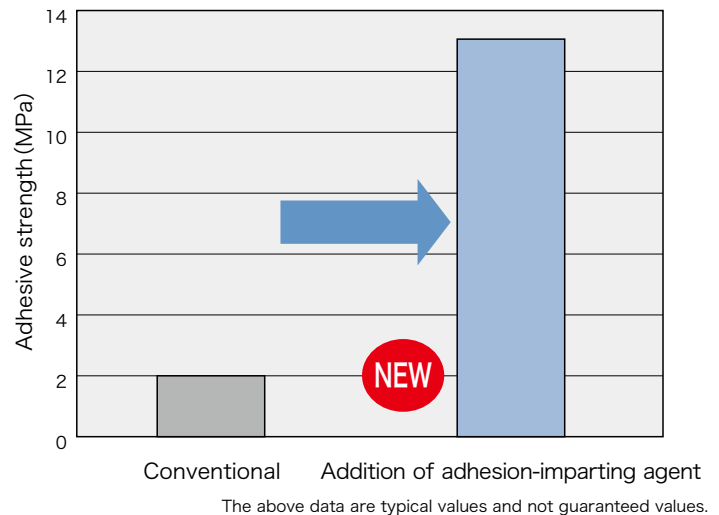
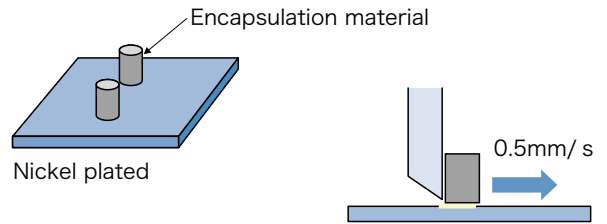


Mold size : 44x65x6.4mmt
Die size : 40x50x0.4mmt
Cu plate size : 36x46x2.0mmt

SAT image after TC -50°C (30 min) ↔ +150°C (30min)

	After cure	100 cycles	300 cycles	500 cycles
Ref E=20GPa				
New E=14GPa				

Nickel plating adhesion: Shear adhesive strength



Line-up

Part Number	Applications	Features
CV3300 / CV4380	Encapsulation of fully-molded module	High thermal conductive grade (1.7-2.3 W/mK)
CV4500 / CV4580		Super high thermal conductive grade (3.0-3.5 W/mK)
CV4100A / CV4180A	Encapsulation of module with heat spreader exposed	Low stress type for metallic substrates
CV4100B / CV4180B		Low stress type for ceramic substrates

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Panasonic Industry CV4180



High heat resistance
Low warpage,
Low stress
High insulation

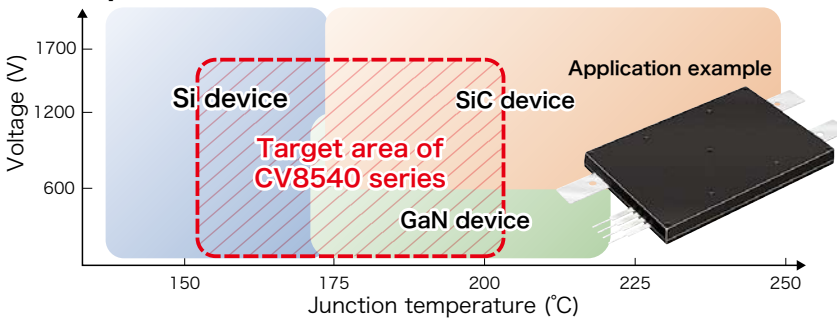
Applications
IC Package/Automotive
 Power devices used in industry/
 Automotive inverters

CV8540 series

For high heat resistance power devices semiconductor encapsulation materials

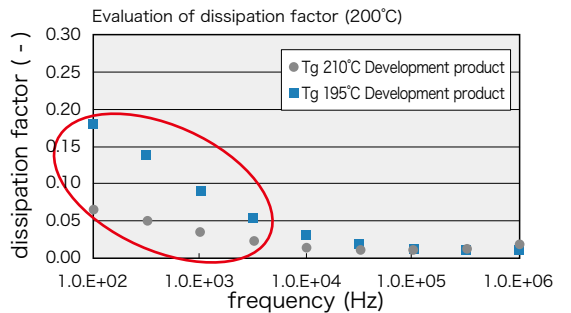
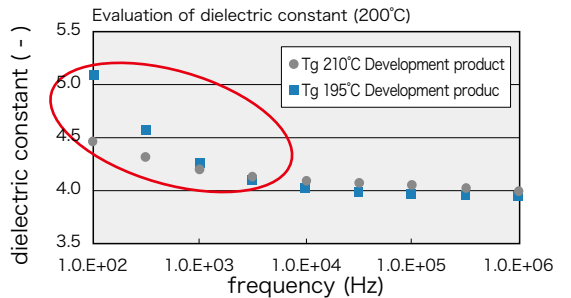
By adopting a new epoxy system, this material has excellent heat resistance and can be applied to the next generation power devices (SiC, GaN).
 Contribute to improving power module performance and reliability under high temperature environment.

Concept



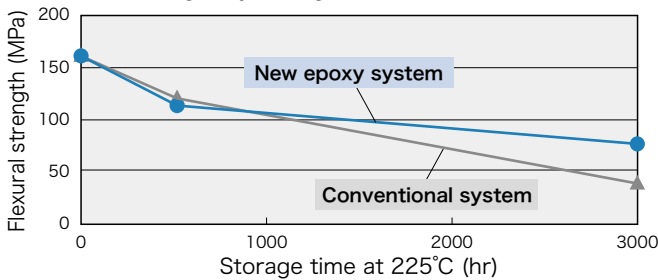
Dielectric property (Tg dependence)

Effective for high-temperature low dielectric constant and low dissipation factor.



High heat resistance

Change in flexural strength by storage time at 225°C.



General properties

Item	Unit	LEXCM _{CF} CV8540 series
Tg (TMA)	°C	185-205
CTE 1	ppm/°C	11-13
CTE 2		48
Flexural strength (25°C)	MPa	130-160
Flexural modulus (25°C)	GPa	15-19
Flammability (UL-94)	-	V-0
Mold shrinkage	%	0.25-0.4
Gelation time	sec	30-40

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Panasonic Industry CV8540

**Industry's highest
Tg 160°C**

**Compatible with the package
size of 25 mm square or more**

Pot life is long 3 days

**Applications
IC Package/Automotive**

Mount reinforcement of semiconductor packages and electronic parts for automotive camera modules, millimeter-wave radar modules, ECU.

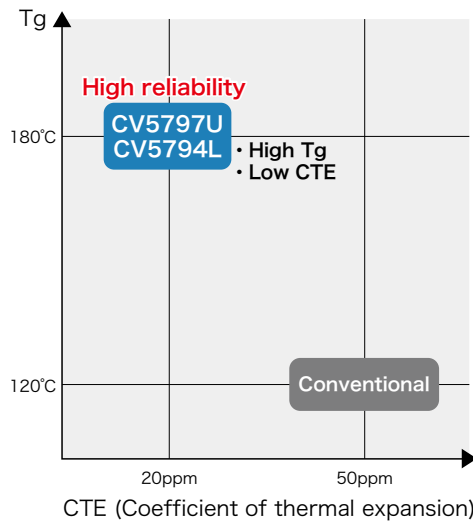
LEXCM^{DF}

CV5797 series CV5794 series

High heat resistance secondary mounting sidefill/underfill materials

Achieves automotive grade assembly-level reliability requirements with the industry's highest heat resistance and low CTE. Package periphery (edge and corner) reinforcement materials available. RoHS compliant.

Concept



Reinforcement type (Applicable IC package)

Sidefill

For large-size package
(e.g. 25 mm square or more)



BGA
Motherboard



QFN
Motherboard

Underfill

For small and medium size package
(e.g. 20 mm square or less)

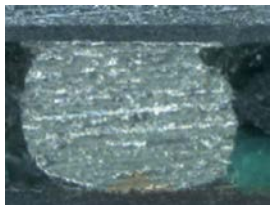


BGA
Motherboard

Correspond to temperature cycle test under automotive environment

CV5797U/ CV5794L

Conventional



Item	CV5797U	Conventional
Temperature cycling test (TCT) -55°C⇔125°C 30min	6000 cycles Pass	3000 cycles Pass

General properties

Item	Unit	CV5797U Sidefill (Corner glue)	CV5794L Underfill
Glass transition temp. (Tg)	°C	160	160
C.T.E.1	ppm/°C	13	21
Flexural modulus (25°C)	GPa	20	15
Storage condition	—	-20°C/ 6months	

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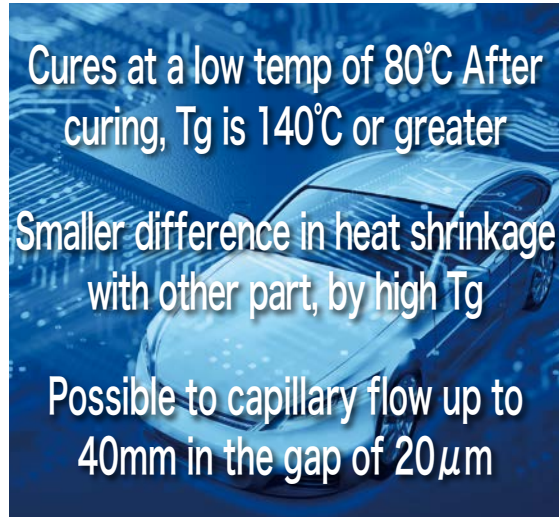
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CV5350AS

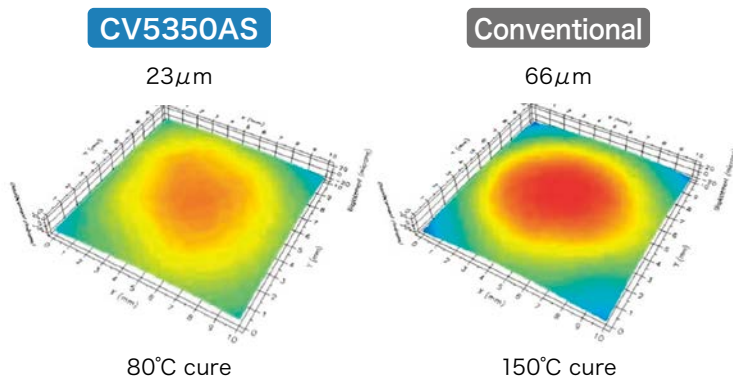
Low-temperature curing secondary mounting Underfill materials

Cures at low temperatures and can be applied for mount-reinforcement of precision parts that need to be protected from high temperatures. Improves the mounting reliability of automotive parts, for which high bonding strength is required.

Applications IC Package/Automotive

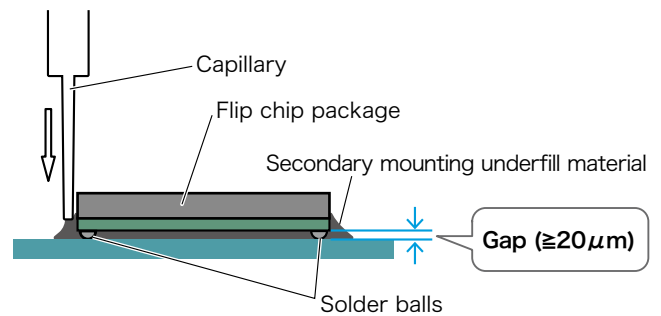
Mount reinforcement of semiconductor packages and electronic parts for Automotive camera modules, Millimeter-wave radar modules, ECU, etc.

Moire data at Room temperature

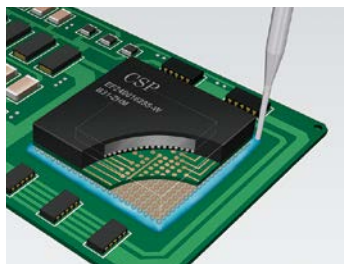


Suitable for mounting in areas with small gaps

Cross Section of a Circuited Board Being Mounted



Correspond to temperature cycle test under Automotive environment



Item	CV5350AS	Conventional
Temperature cycling test (TCT) -55°C⇔125°C"	1000 cycles Pass	300 cycles Pass

We also have "Corner reinforce type" suitable for partial reinforcement

General properties

Item	Unit	LEXCM ^{DF} CV5350AS
Minimum flow gap	μm	20
Viscosity (25°C)	mPa·s	4000
Glass transition temperature (Tg)	°C	150
C.T.E.1	ppm/°C	30
Elastic modulus (25°C)	GPa	10
Potential for reworking	—	Not possible

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Panasonic Industry CV5350AS

Drop impact resistance
Underfill reinforcement
Sidefill reinforcement

CV5313 CV5314

For secondary mounting reinforcement
drop impact resistance liquid encapsulant

Applications

IC Package/Mobile

LSI package and SSD for mobile devices such as notebook PC, digital camera, mobile phones, smartphone and tablet PC.

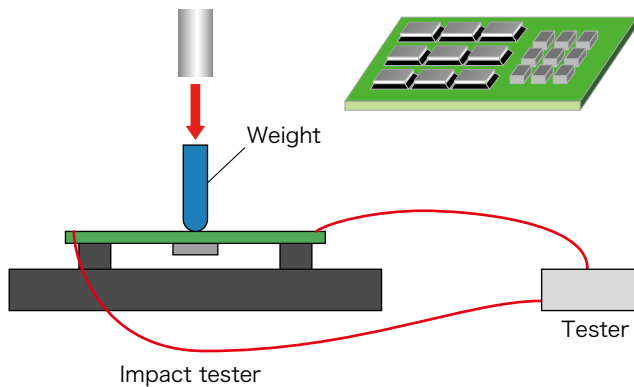
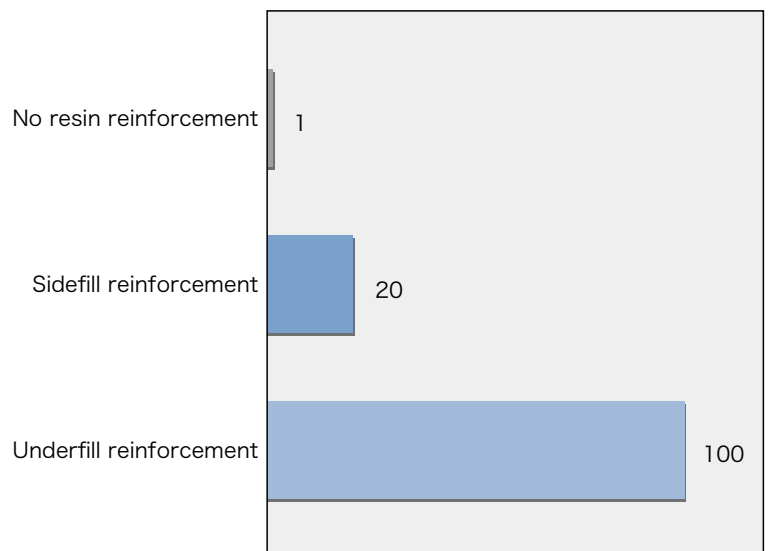
Protection of "brain" of mobile terminal from drop impact. Underfill/Sidefill reinforcement material when BGA/CSP is mounted.

Comparison of impact test evaluations

Test conditions

Strain amount	3000 μ ST (Weight 50g 30cm drop)
BGA	W14mmxD14mmxH1.2mm
Board	W35mmxD70mmxH0.6mm

Number of times of dropping before cracking occurs



General properties

Item	Unit	LEXCM ^{DF} CV5313 (Underfill)	LEXCM ^{DF} CV5314 (Underfill)
Viscosity (25°C)	Pa·s	2	130
Thixotropic index	—	1.2	3.5
Gelation time (150°C)	sec	50	70
Curing condition	—	120°C 5min	120°C 5min
T _g	°C	105	80
C.T.E. (α 1)	ppm/°C	70	35
Flexural modulus	GPa	3	7

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