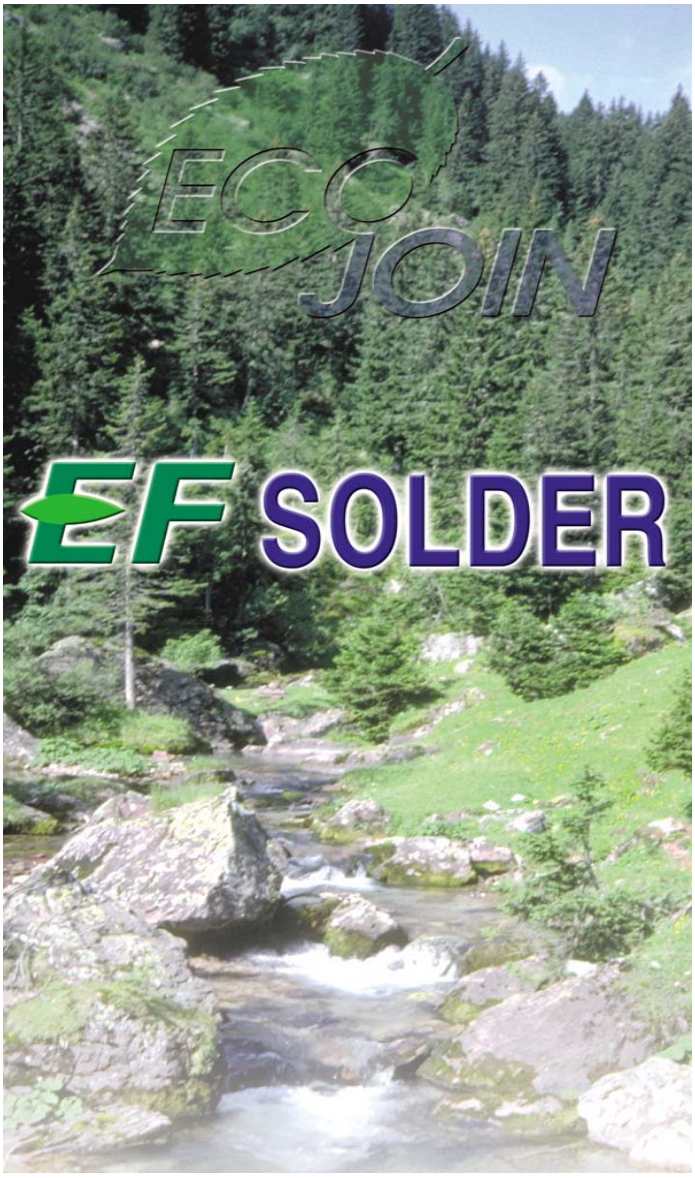
PRODUCT INFORMATION

EF Solder Cream (V)

(EFC-3C05)



Ecojoin.co.,Ltd

EF Solder Cream Series

EFC-3C05
(Sn3.0Ag0.5Cu)

Ecojoin.co.,Ltd
723-3, KorimDong, YongInSi, KyungKiDo,(449-010), KOREA
Http://www.ecojoin.co.kr
Tel : 031-339-0683, Fax : 031-339-0684

Features of EF Solder Cream

- ▣ Pb Free Solder of high temperature
- ▣ Excellent Continuous Workability in Fine pitch
- ▣ Excellent Soldering property in 180℃ of Preheat Temperature
- ▣ Flux have Excellent insulation property and no cleaning
- ▣ Excellent Joint Strength and Thermal properties
- ▣ Minimal generation of void and crack at soldering joint.

Classification of Product

1. Product Name

E F C – 3 C 0 5

Alloy Composition

2. Classification of Powder

Symbol	Granularity	Use
15	5~20㎛	μ-BGA, CSP, Micro Bumping
30	20~38㎛	0.3~0.4mmPitch QFP, CSP
35	20~45㎛	0.4~0.5mmPitch QFP
40	20~53㎛	0.65mmPitch QFP

3. Classification of Flux

Symbol	Active rate	
Printing Type	A	RA Type
	M	RMA Type
	R	R Type
Dispenser	D	RA, RMA Type

4. Content of Flux

11.6wt% ± 0.5

5. Viscosity of Solder Cream

200 ± 50Pa•S

6. Packing Unit of Product

500g

7. Valid

Three months after manufacturing in 5~10℃

One month after manufacturing in normal temperature

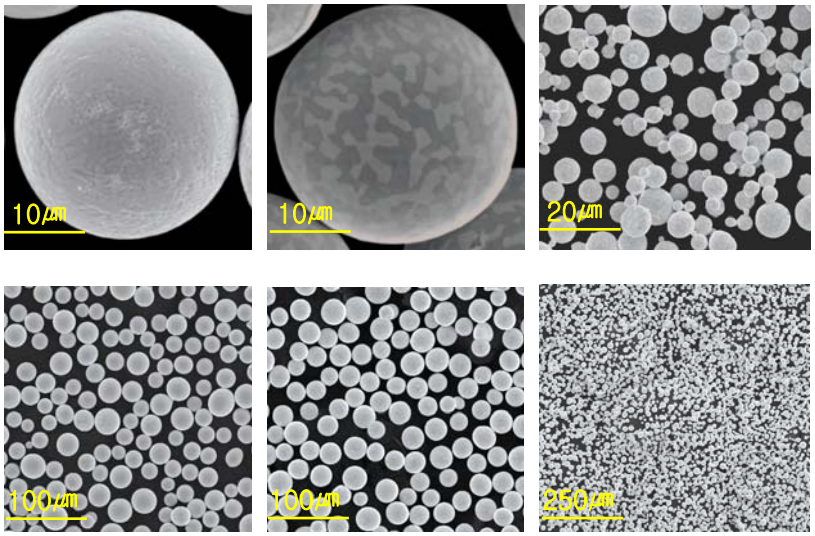
Composition of Solder Alloy

Sn	Ag	Cu	Pb	Sb	Bi	Zn	Fe	Ge	Al	Ni	As	Cd
96.4	3.0	0.5	0.019	0.005	0.006	0.001	0.002	0.005	0.001	0.005	0.004	0.001

Feature of Solder Powder

- ▶ Homogenized component
- ▶ Extremely low oxygen content
- ▶ Homogenous Powder shape & Granularity

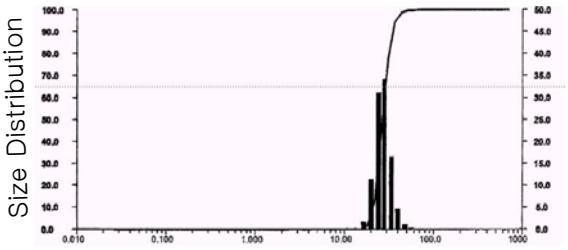
1. Granularity and Shape



(a) EF Solder (b) Micro Solder (c) Ultra Micro Solder

2. Oxygen Concentration

Classification	Size(㎛)	Oxygen Concentration (PPM)
EF Solder	20~38	69
	20~45	62
Micro Solder	20~38	65
	20~45	57
Ultra Micro Solder	5~20	190



Feature of Flux

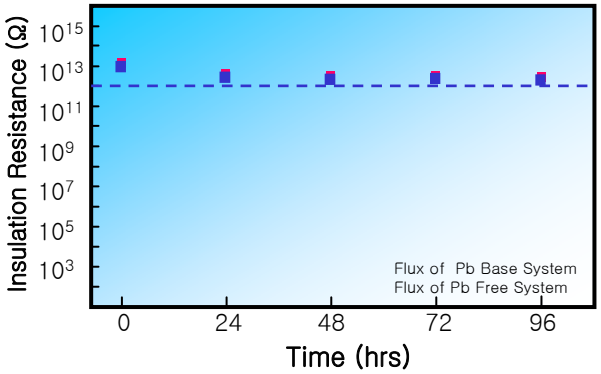
Pb Free Solder Flux of Ecojoin don't generated Erosion of Copper plate, and hardened alteration.

Also, Insulation Resistance is over $10^{12}\Omega$, and Spread rate is over 80%.

1. Erosion Features of Copper plates

2. Spreadability

3. Features of Insulation Resistance



EFC-3C05

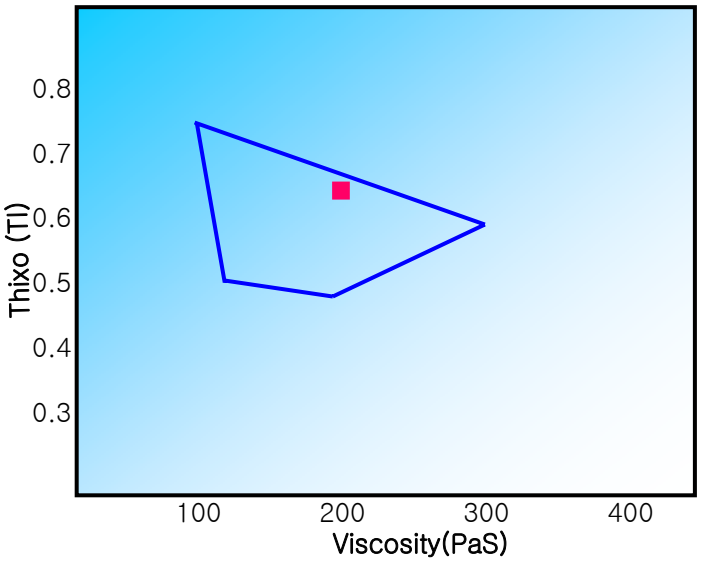
Classification			Spec.	Features	Remark	Ref.
Solder Powder	Alloy composition		Sn3.0Ag0.5Cu	Sn3.0Ag0.5Cu	-	-
	Powder size		S5, 20~38㎛	20~38㎛	Laser	-
	Shape of powder		Sphere ,Within 1.2	Sphere, 1.1	SEM	-
	Melting point(℃)		217~219℃	217~219℃	DSC	-
	Contents of oxide(PPM)		Under 100ppm	77	-	-
Flux	Erosion of Copper plate		Discoloration	Discoloration	JIS Z 3197	-
	Spreadability(%)		Over 80%	82	JIS Z 3197	-
	Solidity content(%)		Under 60%	58	JIS Z 3197	-
	Halide content(%)		Under 0.14%	0	JIS Z 3197	-
	Resistance of water(Ω•Cm)		Over 1 X 10^5	7.351 X 10^6	JIS Z 3197	-
	Resistance of Insulation(Ω)		40℃, 90%R.H Over 1 X 10^{12}	4.6797 X 10^{12}	JIS Z 3197	-
Basic Feature of Solder Cream	Flux content (%)		11.6% ±0.5%	11.60	JIS Z 3284	-
	Rheology	Viscosity(Pa •S)	200 ±50	205	JIS Z 3284	Sheet 1
		Thixotropic	0.65 ±0.05	0.656	JIS Z 3284	Sheet 1
		Restoration(%)	Under 5%	1.44	JIS Z 3284	Sheet 1
	Tackiness (gf)		Over 120gf	138	JIS Z 3284	Sheet 1
	Slump	After printing	No crumbliness of 0.3mm Pitch	No crumbliness of 0.2mm Pitch	JIS Z 3284	Sheet 2
		After heating (150℃)	No crumbliness of 0.3mm Pitch	No crumbliness of 0.2mm Pitch	JIS Z 3284	Sheet 2
	Solder Ball	Initial	Class2 (Under 3 point)	Class2 (Under 3 point)	JIS Z 3284	Sheet 3
		After 72 hours	Class2 (Under 3 point)	Class2 (Under 3 point)	JIS Z 3284	Sheet 3
Workability of Solder Cream	Workability		-	Printing of 50 times In no cleaning	-	Sheet 4
	Viscosity Of Continuous Printing		Viscosity Of Continuous Printing ± 30(8 hours)	Viscosity Of Continuous Printing -11Pa.s(194)	-	Sheet 5
	Tackiness Of Continuous Printing		Tackiness: over 120gf (After Continuous Printing for 8 hours)	Tackiness : 137gf	-	Sheet 6
Reliability Of Solder Cream	Stability of Charge		No Change of Viscosity For 3 months	No Change of Viscosity For 3 months	-	Sheet 7
	Tack Time		Over 4 hours	12 hours (134gf after 48 hours)	JIS Z 3284	Sheet 7
	Resistance of Insulation	40℃, 90%R.H	Over 1.0 X 10^{11}	7.0017 X 10^{12}	JIS Z 3284	Sheet 8
		85℃, 85%R.H	Over 1.0 X 10^9	1.8934 X 10^{11}	JIS Z 3284	Sheet 8
	Migration	40℃, 90%R.H,50V	1.0 X 10^9 No occurring migration	8.1248 X 10^{11}	JIS Z 3284	Sheet 9
		85℃, 85%R.H,50V		3.4739 X 10^{10}	JIS Z 3284	Sheet 9
	Residue of Flux	Tar test	Pass Tar Test	Pass	JIS Z 3284	Sheet 10
		Shape of application	Application of 10ϕ	Shape of application	-	Sheet 10

Features of Basic

Rheology of Solder Cream is evaluated as follows using EFC-3C05 Solder Cream.

1. Rheology

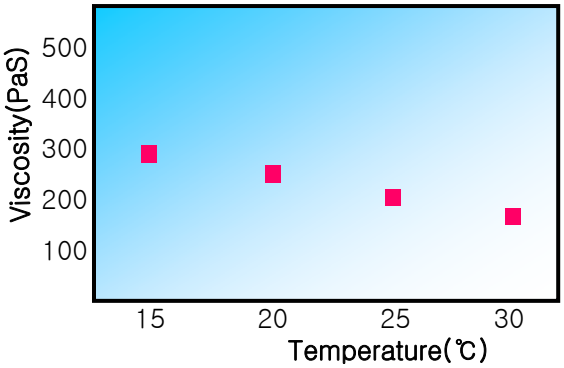
Material		EFC-3C05		Spec.
Equipment		Malcom, VS-3		1.200 ±20PaS
	Temp.	25℃		2.0.65 ±0.05
	Type	Spiral Type		3.5% under
Classification		Viscosity (PaS)	Temp.(℃)	Time(min.)
Viscocity	10RPM	205	25.0	10
	3RPM	494	25.0	5
	4RPM	398	25.0	3
	5RPM	346	25.0	3
	10RPM	208	25.0	3
	20RPM	135	25.0	1
	30RPM	109	25.0	1
	10RPM	205	25.0	1
Thixo		0.656		
Restoration		1.44%		



2. Dependence in Temperature of Viscosity

Viscosity of Solder Cream depend on temperature as result, Solder Cream must raise temperature to normal temperature using negligence or stirrer.

Material		EFC-3C05			
Equipment		Malcom, VS-3			
	Temp.	25℃			
	Type	Spiral Type			
Classification		Temperature(℃)			
		15	20	25	30
Viscosity(PaS)		289	238	205	175



3. Tackiness Test

EFC-3C05 Solder Cream of Ecojoin co.,Ltd produce good result from tackiness test.

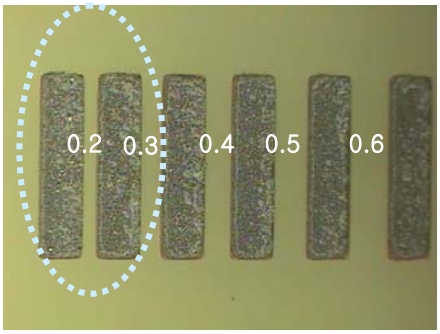
Material		EFC-3C05					Spec.
Equipment		Malcom, TK-1					Over 120gf
condition	Mask	0.20mmt					
	Squeeze	Urethane					
Classification		Time					
		1	2	3	4	5	Average
Tackiness(gf)		138	138.8	138.3	137	150	138.5

4. Slump Test

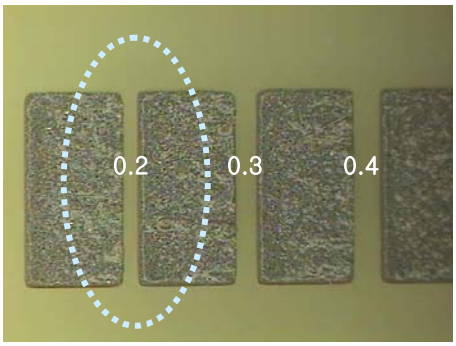
EFC-3C05 Solder Cream is produced good result to slump test. As maintaining 150℃, 5min, EFC-3C05 Solder Cream don't crumble to 0.2mm pitch.

Material		EFC-3C05	Spec.
Condition	Mask	0.15mmt	No Crumbliness of 0.3mm Pitch
	Heat Condition	180℃, 5min.	
Method of Measurement		Observation of Crumble in Printing Observation of Crumble in heat to180℃, 5min	

4-1. After Printing

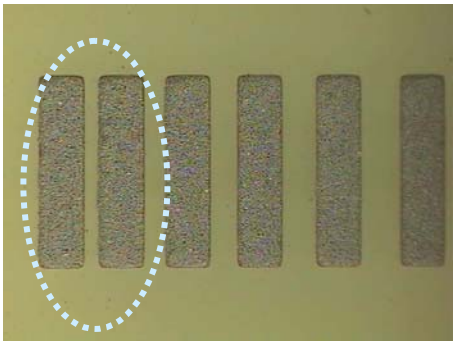


No crumble in 0.3mm pitch

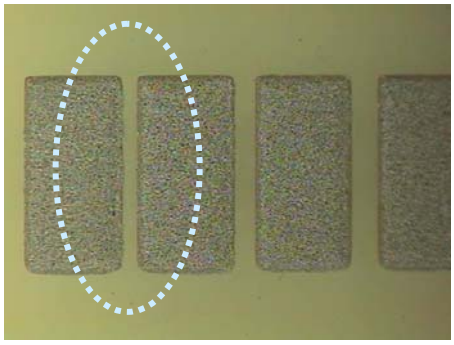


No crumble in 0.3mm pitch

4-2. After heating (150℃, 5min.)



No crumble in 0.3mm pitch



No crumble in 0.3mm pitch

5. Solder Ball Test

EFC-3C05 Solder Cream is produced good result to Solder Ball test as follows.

EFC-3C05 Solder Cream have class 1 after printing and negligence of 72 hours to 25℃,80%R.H.

Material		EFC-3C05	Spec.
Test Condition	Temp.of Bath	250℃	Class 1
	Board	Alumina	
	Mask	0.2mmt	
Method of Measurement		Observation of one hour Observation after printing and negligence in 60%R.H. 25 ℃ for 24 hours Observation after printing and negligence in 90%R.H. 30 ℃, for 8 hours	

5-1. After printing immediately

No detect solder ball

5-2. After 72 hours

No detect solder ball

Workability of Solder Cream

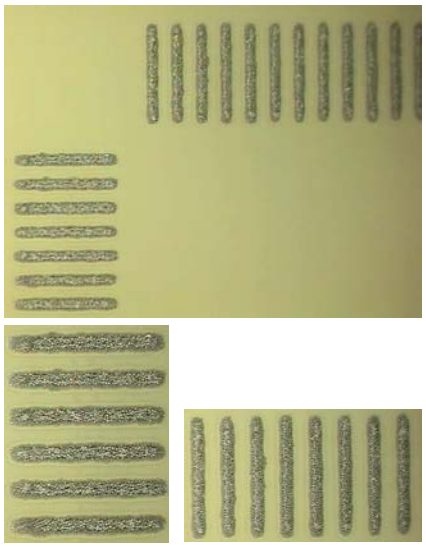
1. Condition of Printing

Material of Test		EFC-3C05	Spec.
Condition Of Test	Squeeze	Urethane	Observation of Workability
	Angle of Squeeze	30 °	
	Speed Of Printing	30mm/sec.	
Equipment	Printer	MK-2805A	
	Mask	SUS304, 0.18mmt	
Environment of test		23~25℃, 50~60%R.H.	
Method of Measurement		Observation of 50 sheets after continuous printing	

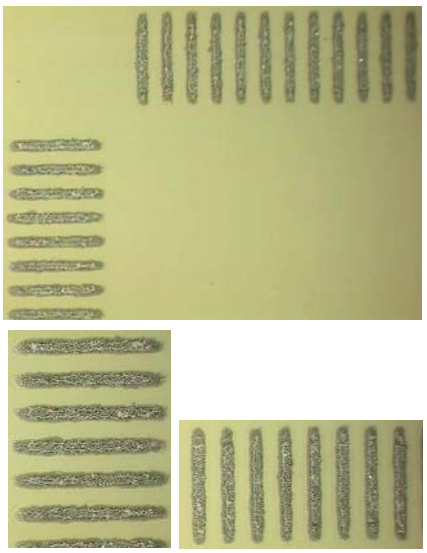
2. Continuous Workability (QFP 0.4mm Pitch)

EFC-3C05 Solder Cream have excellent Workability as continuous printing test of 50 times.

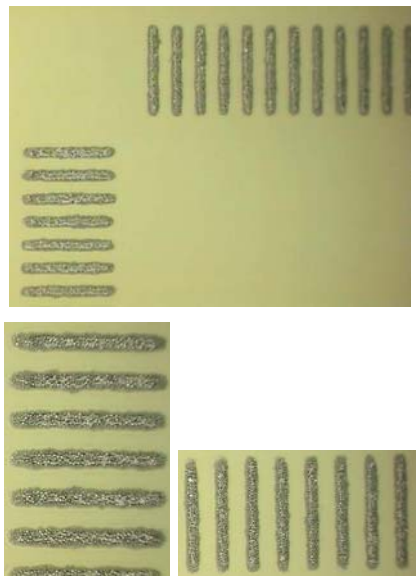
5 Sheets



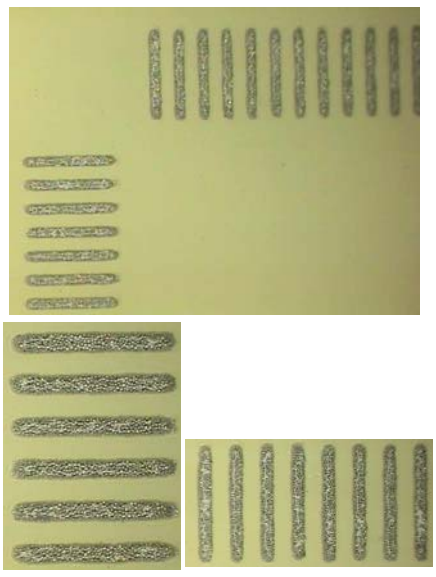
10 Sheets



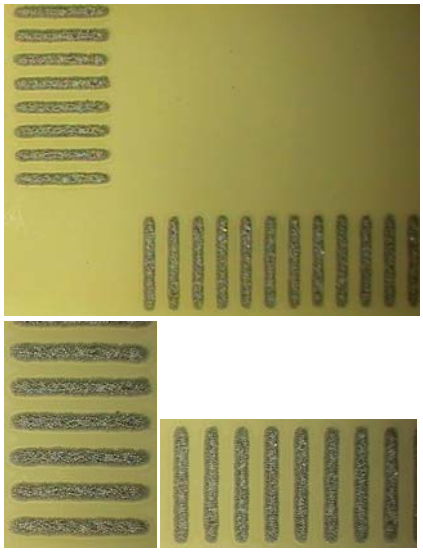
20 Sheets



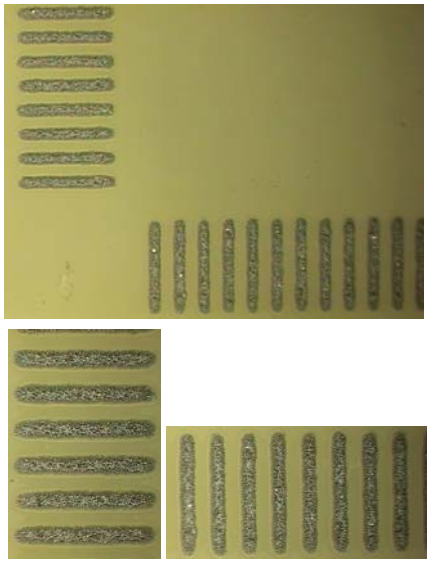
30 Sheets



40 Sheets



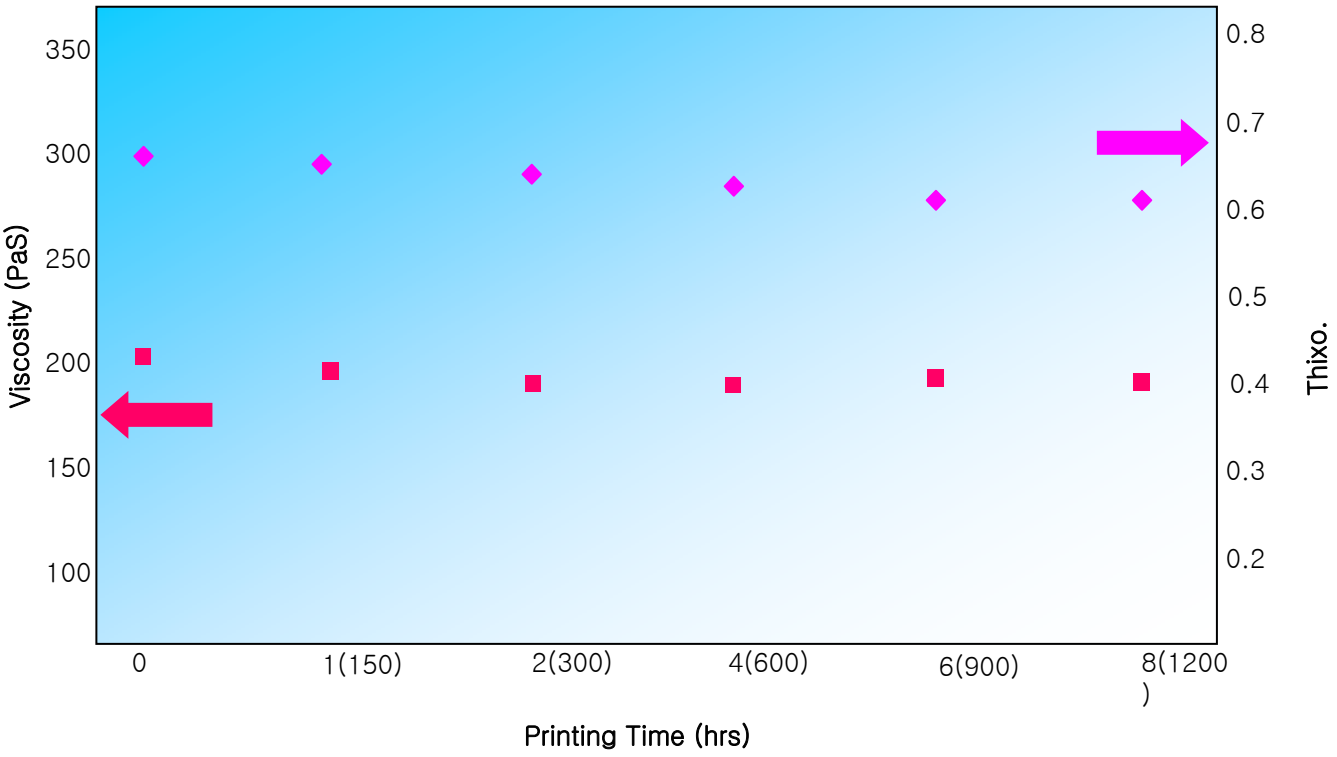
50 Sheets



3. Viscosity of Continuous Printing

EF Solder Cream don't become different viscosity or thixotropic agent by times and condition of printing in continuous printing.

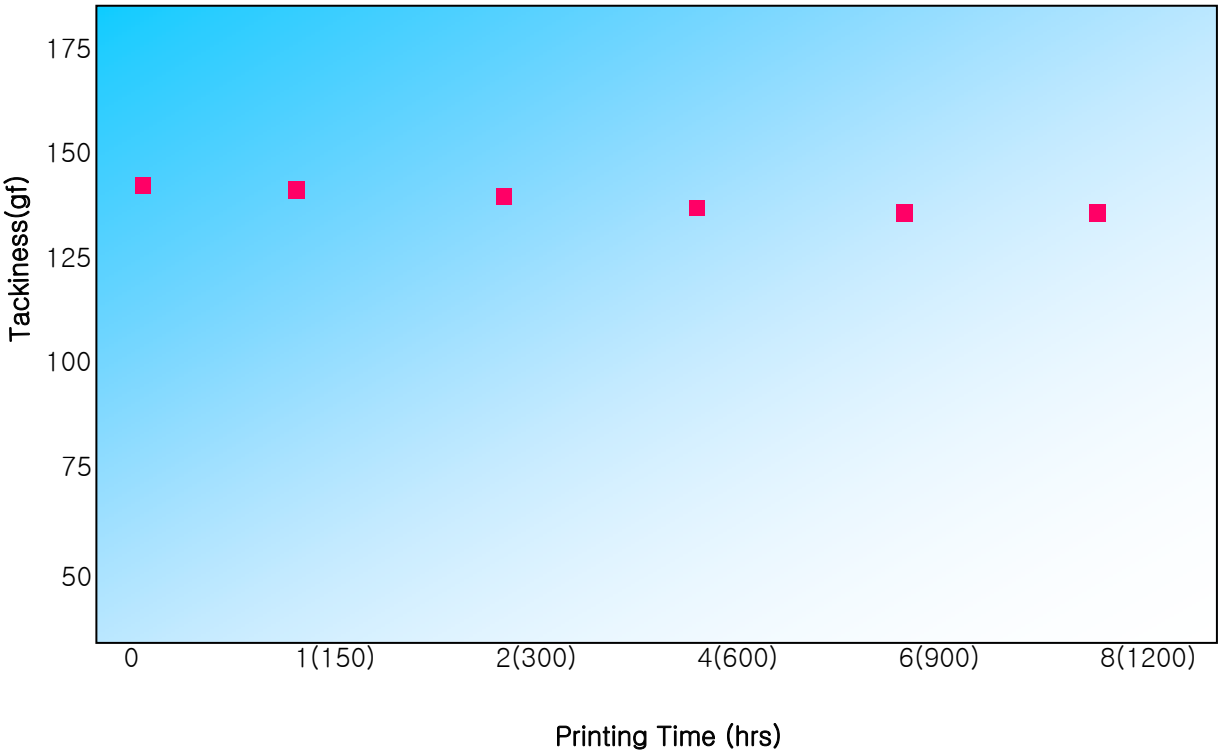
Material of Test		EFC-3C05					
Condition Of Test	Squeeze	Metal(Ti Coating)					
	Angle	30 °					
	Speed Of Printing	30mm/sec.					
	Pressure Of Printing	150KPa					
Equipment Of Test	Printer	MK-2805A					
	Mask	SUS304, 0.15mmt					
	Viscosity Meter	Malcom, VS-3					
Method of Measurement		Measurement per 150 sheets(one hour)					
Classification		Times					
		Early	150	300	600	900	1200
Viscosity		205	201	197	190	198	194
Thixo		0.656	0.65	0.64	0.64	0.63	0.62



4. Tackiness of Continuous Printing

EF Solder Cream don't become different tackiness by increasing sheet of printing, and maintain enough tackiness for sticking of part.

Test of Material		EFC-3C05					
Condition Of Test	Squeeze	Metal (Ti Coating)					
	Angle	30 °					
	Speed of Printing	30mm/sec.					
	Pressure of Printing	150KPa					
Equipment Of Test	Printer	MK-2805A					
	Mask	SUS304, 0.15mmt					
	Tackiness	Malcom, TK-1					
Method of Measurement		Measurement per 150 sheets (one hour)					
Classification		Times					
		Early	150	300	600	900	1200
Tackiness		140	138	140	139	135	137

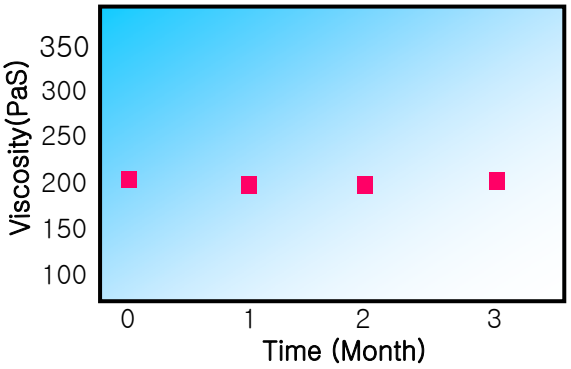


Reliability of Solder Cream

1. Stability of Charge in Viscosity

EF Solder Cream don't become different viscosity after three months in refrigerator.

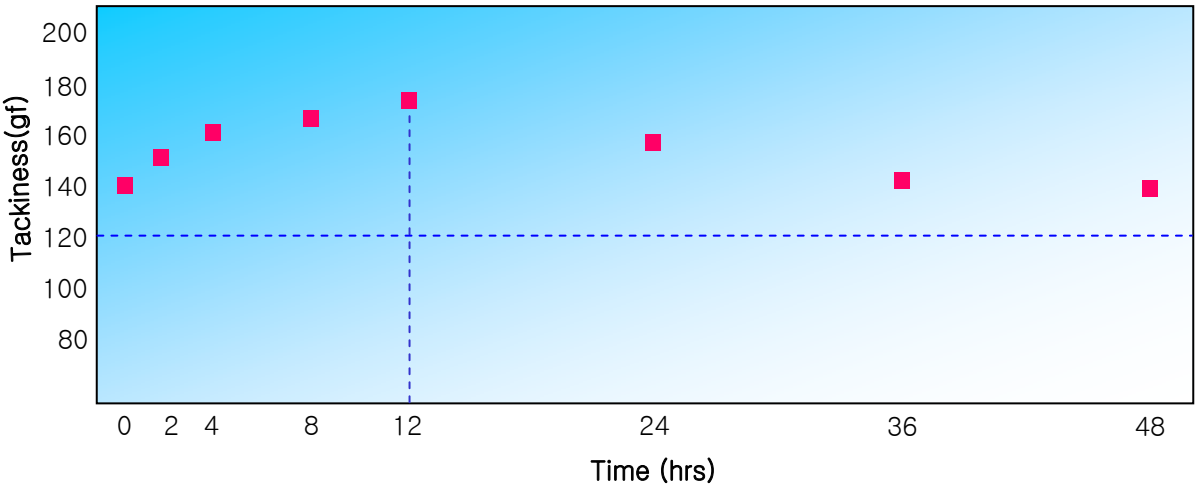
Material		EFC-3C05			
Equipment		Malcom, VS-3			
Condition	Temp.	25℃			
	Type	Spiral Type			
Classification		Period of Storage(month)			
		0	1	2	3
Viscosity(PaS)		205	203	203	204



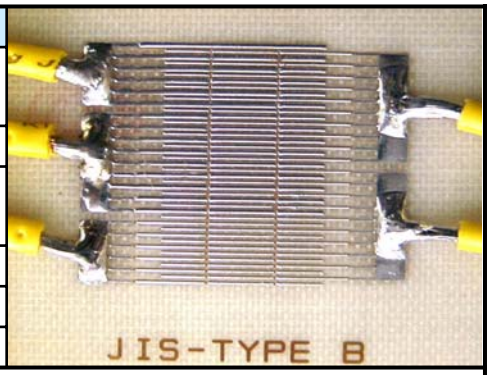
2. Aging Time of Tackiness

Tack time of Solder Cream of EFC-3C05-30-M is 8 hours, and Tackiness is 138 gf after 48 hours.

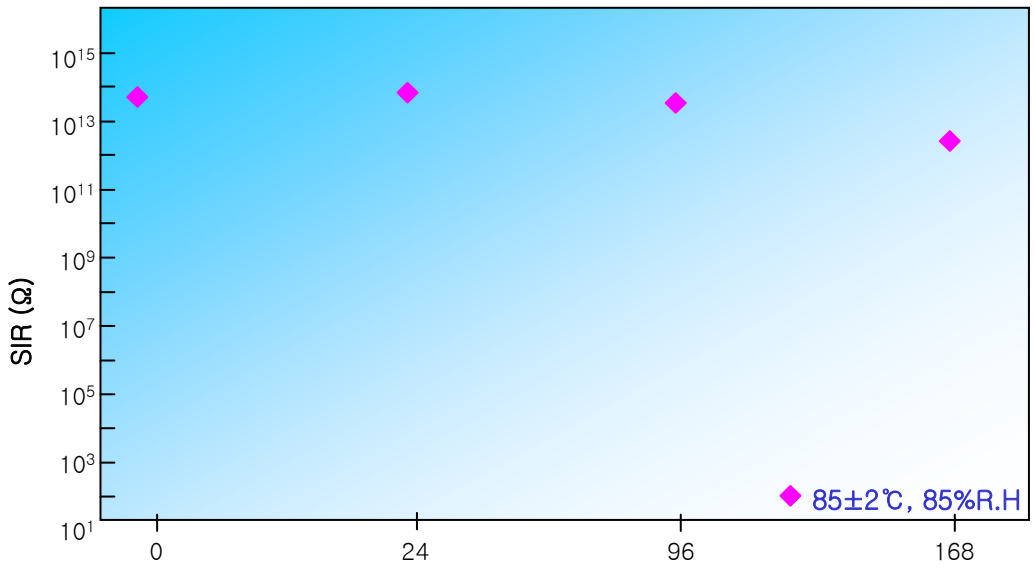
Material		EFC-3C05-30-M							Spec.
Equipment		Malcom, TK-1							Tack Time Over 4 hours
Condition	Mask	0.20 mmt							
	Squeeze	Urethane							
Classification		Time after printing(hrs)							
		0	2	4	8	12	24	36	48
Tackiness (gf)		138.5	150.3	163.7	164.5	172	164.8	142.1	134



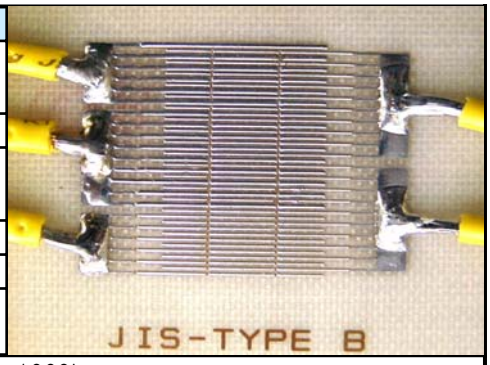
3. Test of Insulation resistance

Material		EFC-3C05	
Equipment		Resistance of Insulation : Agilent 4339B Enex, EN-GLMP-52	
Condition Of Measurement	Voltage	100V	
	Condition	85 ±2℃, 85%R.H, 168hrs	
	Pole	Pole of comb	
Gap of Measurement		24hrs, 96hrs, 168hrs	
Spec.		Over 1 X 10^{10} Ω	

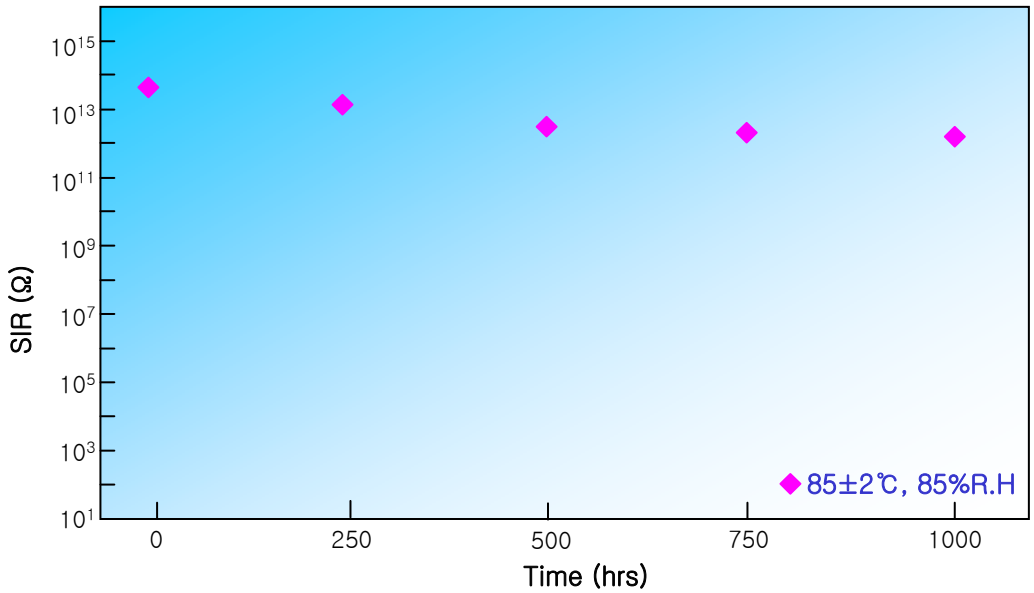
Time (hrs)	85 ±2℃, 85%R.H, 168hrs
0	8.4927×10^{14}
	4.4255×10^{13}
	9.3456×10^{13}
	8.9191×10^{13}
24	1.4791×10^{13}
	3.5810×10^{13}
	4.1093×10^{14}
	9.1385×10^{13}
96	4.0862×10^{13}
	3.0524×10^{12}
	7.9872×10^{13}
	4.1226×10^{13}
168	1.0856×10^{12}
	1.8942×10^{12}
	2.7005×10^{12}
	1.8934×10^{12}



4. Test of Migration

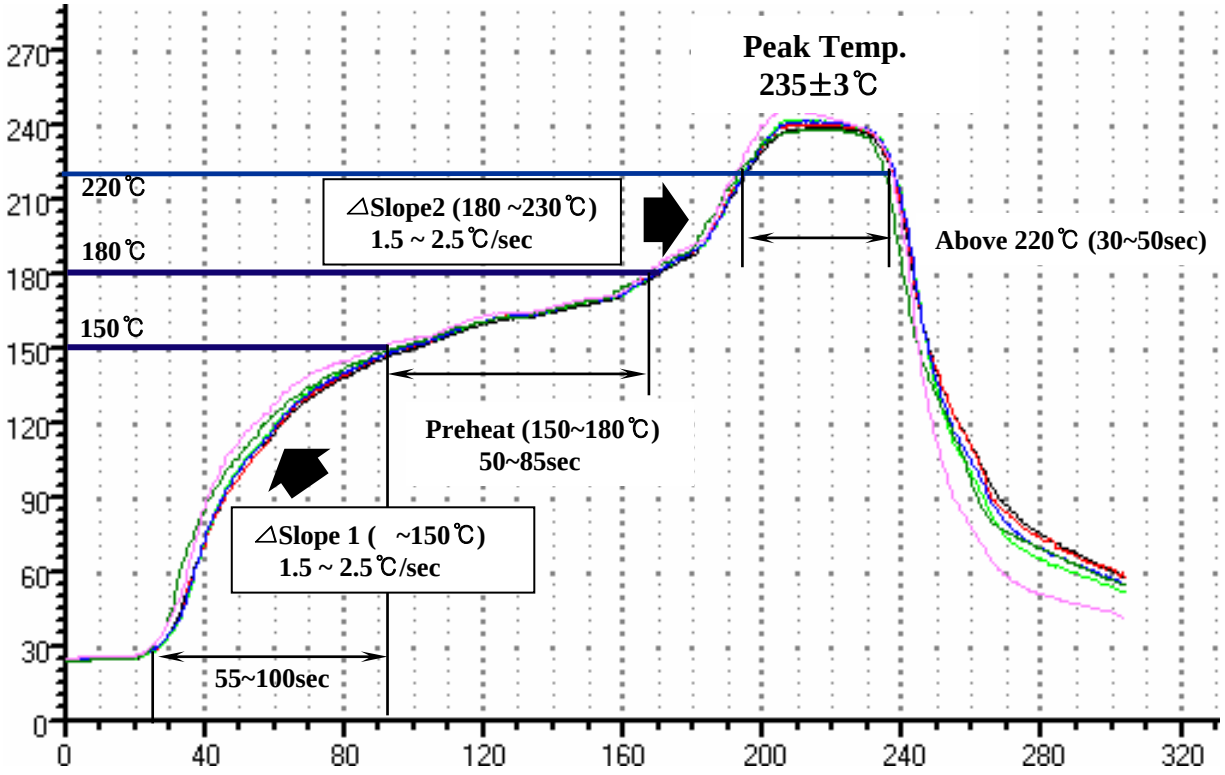
Material		EFC-3C05-30-M	
Equipment		Resistance of Insulation : Agilent 4339B Enex, EN-GLMP-52	
Condition Of Measurement	Voltage	100V	
	Condition	85 ±2℃, 85%R.H, 168hrs	
	Pole	Pole of comb	
Gap of Measurement		24hrs, 96hrs, 168hrs	
Spec.		Over 1 X 10^{9} Ω , No occurring migration	

Time (hrs)	85 ±2℃, 85%R.H, 1000hrs
0	1.3743×10^{14}
	1.9945×10^{13}
	1.0496×10^{14}
	9.1473×10^{13}
250	3.7934×10^{13}
	8.7894×10^{12}
	1.4541×10^{13}
	2.0421×10^{13}
500	4.4854×10^{12}
	7.4571×10^{12}
	3.1435×10^{12}
	5.0286×10^{12}
750	2.5374×10^{12}
	3.4561×10^{12}
	6.2973×10^{12}
	4.0969×10^{12}
1000	2.7565×10^{12}
	2.6592×10^{12}
	5.0062×10^{12}
	3.4739×10^{12}



Features of Solderability

■ Initial heat(RT~150℃) : 55~100 sec
■ Preheat (150~180℃) : 50~85sec
■ Slope 1 (RT ~150℃) : 1.5~2.5℃/sec
■ Slope 2 (180~230℃) : 1.5~2.5℃/sec
■ Peak Temp. : 235±3℃
■ Above 220℃ : 30~50sec



Caution

1. Speed of preheating zone set up 1.5~2.5℃/sec. Very Rapid Heating bring about obstruction of Spread-ability.
2. Temperature of preheating zone set up 50~85 sec to 150~180℃. Very long or short zone bring about solder ball.

3. Slope of preheating zone set up 1.5~2.5℃/sec to 180~230℃.

4. Temperature of Reflow Zone set up 235±3℃. Very Rapid heating of reflow zone bring about obstruction of Spread-ability.

4. Very slow speed of cooling bring about falling-off of strength and movement of parts.