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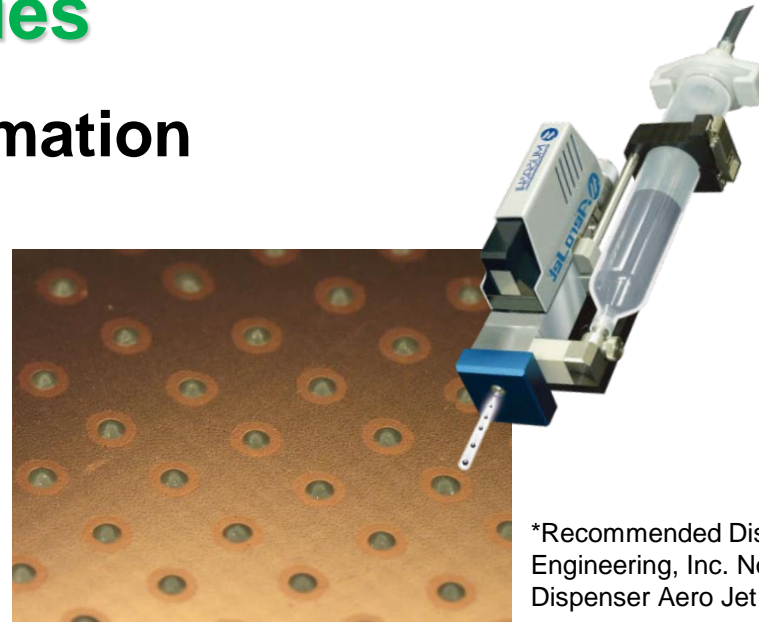
User Guide

KOKI no-clean **LEAD FREE** solder paste

Halogen Free Solder Paste for Jet Dispensing E150DN Series



Product Information



*Recommended Dispenser: Musashi Engineering, Inc. Non-contacting Jet Dispenser Aero Jet

Disclaimer

Product performance in this technical information is assessed strictly according to KOKI's test condition and may not be compatible to the end-user experience. Please conduct thorough investigation to determine the optimal process condition before mass production.



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Characteristics

- Alloy composition: Sn3.0Ag0.5Cu
- Solder paste specifically designed for jet dispensing
- Available in various powder types for versatile solder applications
- Compatible for multiple shots per spot with precise control over deposit volume
- Complies with Halogen Free standard (Br+Cl: <1500ppm) BS EN14582



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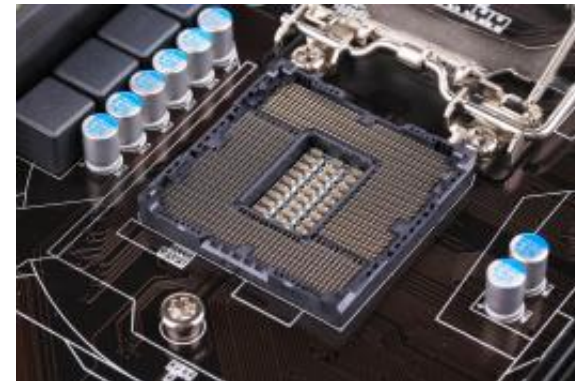
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Concept of the Product

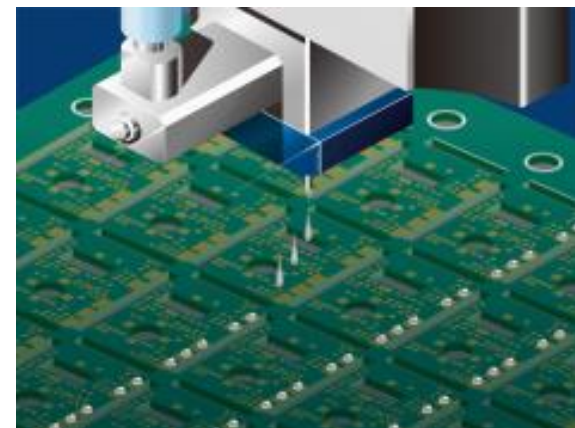
Background

Rapid miniaturization and versatile new applications like complex PCB, 3D packaging in SMT requires equal demand in soldering process. Printing is the most popular method for solder pastes; however, the need for flat surface and equal deposit height over various size chips are drawbacks for 3D packaging. Additionally printing could not be used for rework after reflow, such as adding solder deposit or filling solder into the cavities. Manual and robot soldering using solder wire and solder paste by pneumatic dispenser can solve these issues. Still these process functions in contact with PCB, where again some clearance area is required in the target. In-contact with PCB is also associated with failures and need for extra space.

To eliminate these constraints, jet dispensing has been introduced. Jet dispensing is a non-contact, consistent application method which deposits at a desired height and enables volume adjustment through multiple shots per spot.



In Cavity Mounting



Non-Contact Application



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Concept of the Product

Development Concept

- E150DN series, designed specifically for jet dispensing equipment.
- To accommodate high speed dispensing, E150DN series are produced with low viscosity.
- High thixotropic index improves dispensing performance by fast paste separation.
- E150DN series are intended to meet versatile demands by complying with halogen free standard and available in broad solder powder types.



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Application		Jet Dispensing			
Product Name		S3X58-E150DN	S3X70-E150DN	S3X811-E150DN	S3X012-E150DN
Alloy Property	Alloy Composition (%)	Sn3.0Ag0.5Cu			
	Melting Point (°C)	217-219			
	Powder Size (µm)	20-38	10-25	5-20	2-10
Flux Property	Halide Content (%)	0			
	Flux Classification* ¹	ROLO			
Product Property	Flux Content (%)	15.0 ± 1.0			
	Viscosity* ² (Pa.s)	40 ± 20			
	Copper Plate Corrosion* ³	Pass			
	Shelf Life (below 10 °C)	Syringe: 3 months			

*1.Flux Classification test : IPC J-STD-004A

*2.Viscosity: Measurement at 5°C, 10 rpm by PCU-205(Malcom)

*3.Copper Plate Corrosion: IPC-TM-650-2.6.15



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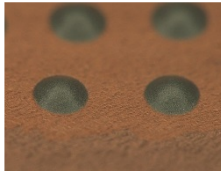
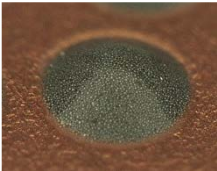
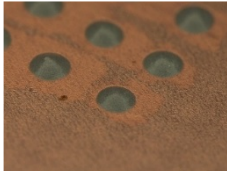

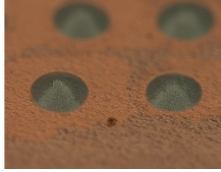

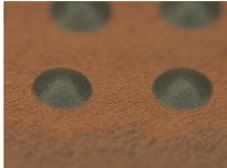
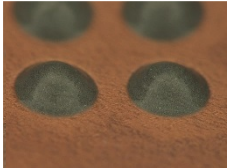
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Continuous Dispense Performance

Test Condition

- Equipment: Aero Jet (Musashi Engineering, Inc.)
- Dispense Duration: 0.2 ms
- Dispensing Height: 2 mm
- Temperature: 40 °C
- Tested Solder Paste: S3X012-E150DN · S3X811-E150DN

	S3X012-E150DN	S3X811-E150DN	S3X012-E150DN		
Dia.	φ0.45mm	φ0.6mm	Shot(s)	1 per spot	3 per spot
1 st			x30		
5,000 th			x100		

There is no spattering occurring after 5000 shots. Stable continuous dispensing has been obtained.
 At multiple shots per spot dispense, stable solder shape can be observed.



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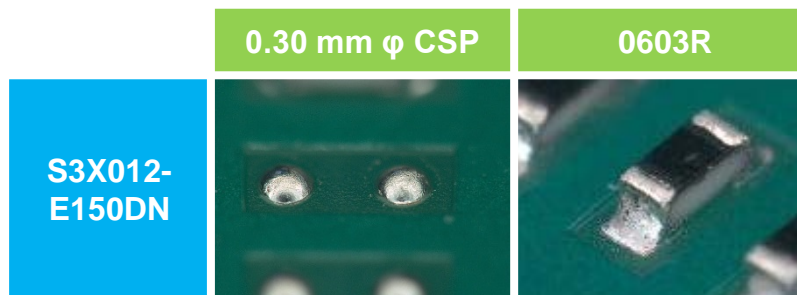
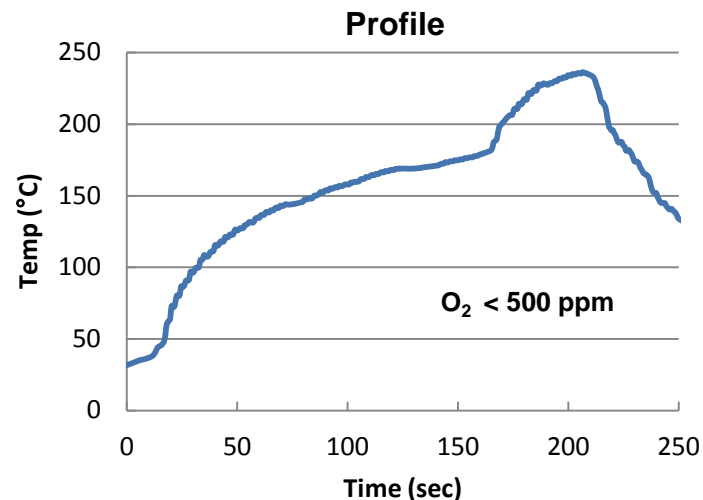
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Test Condition

- PCB: Glass Epoxy FR-4
- Surface Finish: OSP
- Evaluation (Dispense): 0.3 mm ϕ CSP · 0603R
- Reflow Method: Hot Air Oven
- Reflow Atmosphere: N₂
- Reflow Profile: See the diagram to right
- Tested Solder Paste: S3X012-E150DN



Good wetting toward chip components and pads can be observed



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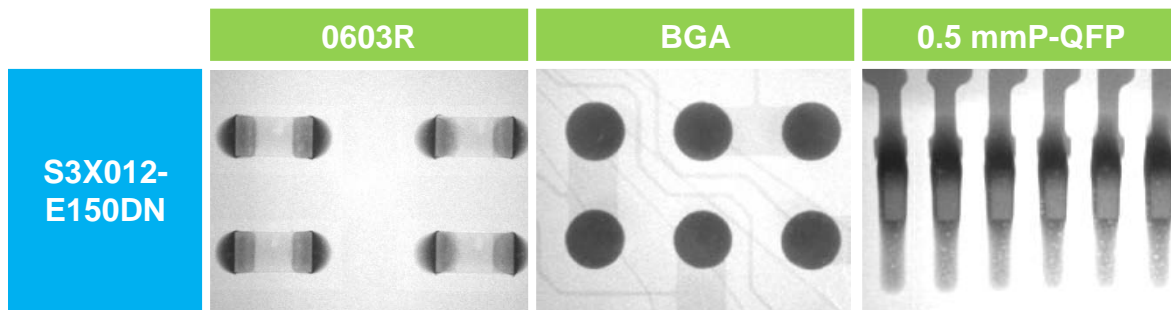
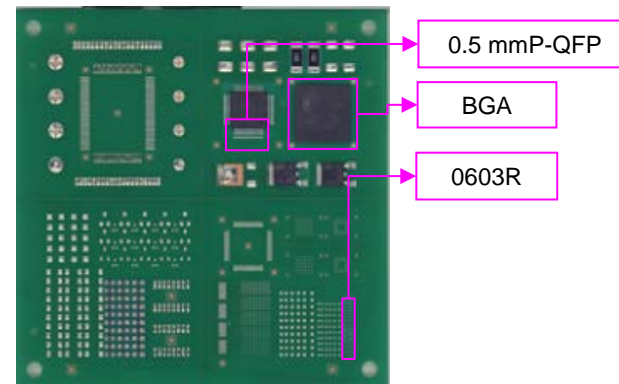
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Voiding Property

Test Condition

- PCB: Glass Epoxy FR-4
- Surface Finish: OSP
- Stencil Thickness: 0.12 mm (Laser)
- Evaluation Location: 0603R (Sn plating)
BGA-196DC (ball: SAC)
0.5 mmP-QFP (Sn plating)
- Reflow Oven: Hot Air
- Reflow Atmosphere: N₂
- Reflow Profile: Same as meltability test
- Evaluated Solder Paste: S3X012-E150DN



Low void occurrence from smaller chip components to a larger package component such as BGA.



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Halogen Content

Test Method

Quartz tube combustion: Content in the flux



Halogen	Results
F	Not detected
Cl	Not detected
Br	238.0

Halogen Content (ppm)

E150DN series complies with Halogen Free (Br+Cl: < 1500 ppm) according to BS EN14582



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Item	Result	Method
Tack Time	> 72 hours	JIS Z 3284-3
Copper Mirror Corrosion	Type L	IPC-TM-650-2.3.32
Copper Plate Corrosion	Pass	IPC-TM-650-2.6.15 JIS Z 3197
Surface Insulation Resistance	>1E+9 Ω	IPC-TM650-2.6.14.1
Electromigration	No evidence of migration	IPC-TM650-2.6.3.7



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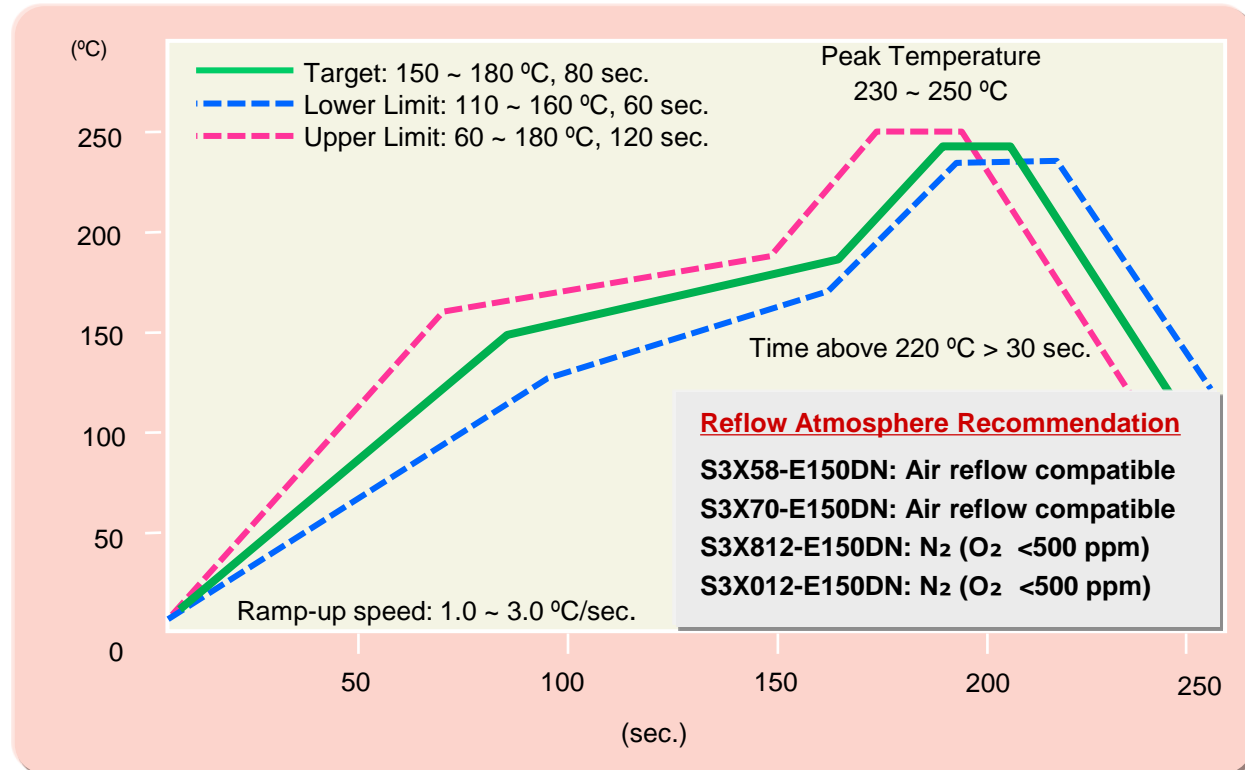
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User Guide (Recommended Reflow Profile)



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1. Dispensing

1) Dispensing Condition

(1) Needle

1. Proper Needle Size: **S3X58-E150DN > 400 μm**
S3X70-E150DN > 250 μm
S3X811-E150DN > 200 μm
S3X012-E150DN > 100 μm

2. Syringe Pressure: 10 ~ 150 kPa

3. Needle Shape: Needle for jet dispensing

4. Needle Temperature: 25 ~ 40 °C

* Optimal dispensing condition depends on the dispenser and the needle diameter

Please investigate best setting and combination on

(2) Usage Environment

1. Temperature: 23 ~ 25 °C

2. Humidity: 40 ~ 60 % RH

(3) Syringe: PSY 10E (net wt. 30g) or PSY 30E (net wt. 90g)

(4) Recommended Dispenser: Aero Jet (non-contacting dispenser by Musashi Engineering)

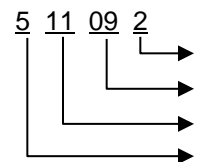
* Please conduct thorough investigation to determine optimal process condition for the equipment at your facility.

2. Shelf Life

0 ~ 10 °C: 3 months from the date of production

- How to interpret the product lot number

e.g. Lot No. 5 11 09 2



Batch #: 2nd batch
 Production Date: 9th
 Production Month: November
 Production Year: 2015



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Recommendation Chart

	Product Name	Solder Powder Type	Minimum Needle Diameter	Dispensing Diameter	Reflow Atmosphere
Solder Paste	S3X58-E150DN	20 ~ 38 μm	0.40 mm	ϕ 1.0 mm	Compatible with Air
	S3X70-E150DN	10~25 μm	0.25 mm	ϕ 0.8 mm	Compatible with Air
	S3X811-E150DN	5~20 μm	0.20 mm	ϕ 0.6 mm	N ₂ Only O ₂ Concentration : <500ppm
	S3X012-E150DN	2~10 μm	0.10 mm	ϕ 0.4 mm	N ₂ Only O ₂ Concentration : <500ppm



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Available Syringe and Volume

Syringe Name / Maker	Volume (ml)	Weight (g)	Sample Image
PSY 10E Musashi Engineering Inc.	10	30	A
PSY 30E Musashi Engineering Inc.	30	90	B

* Please contact Koki for other syringe selection

