

2020 Susumu QA communication
July , 17th , 2020

To: Future Electronics Inc

From: Isao Yasusaka, Senior Manager, Quality Assurance, Susumu, Co.Ltd.

On: Request for pre-approval for process changes: Transferring fabrication process to new Itoigawa Minamiterajima factory

Thanks for being a loyal customer. As informed before, we are currently building a new **Itoigawa Minamiterajima factory to which the KRL series fabrication line will be transferred from current Itoigawa Suzawa factory**(2020 Susumu Engineering communication 006.) Regarding this change, we will submit comparison data of before and after the fabrication process transfer for your approval of this process change. Please read the following details and let us know if you approve the procedure. Thank you.

Details

1. Applicable products

Foil low resistance chip resistor, the KRL series

Your part number:

Our part number: KRL series

2. Change: Process flow before and after the transfer.

Essential process flow will change as follows:

Current flow: Metal foil lamination → Resist application → Exposure → Developing → Etching → Stripping → Protective coating application → Oxygen bombarding → Substrate Plating

New flow: Metal foil lamination → Resist application → Exposure → **Developing → Etching → Stripping(note 1)** → Protective coating application → **Oxygen bombarding(note 2)** → **Substrate Plating (note 3)**

Note 1: All fabrication equipment will be newly purchased and installed. Currently, the processes from developing to stripping are all batch processes but in new factory, these processes will be continuous in line process.

Note 2: Oxygen bombarding is currently a part of Protective coating process and not in the control plan as separate process. In new fabrication line, this will be an independent process and it will be added as an independent process in the control plan.

Note 3: The substrate plating process will not be transferred. As currently, we will continue to plate at two locations, 1) in house (Itoigawa Suzawa factory) 2) Outsourcing to Tateyama Denka Kogyo

3. Process change points and their effect and evaluation

Based on FMEA of the fabrication processes, we have identified which change might influence which product characteristics. As shown in the table below, each change point and its influence to the product characteristics will be compared before and after the change and data will be submitted for your approval.

	Change point	Product characteristics that need evaluation	Evaluation items	
Material	No change	—	—	—
People	No change	—	—	—
Procedure	Change from liquid (positive) resist to film (negative) resist	•Dimensions of the patterns	•Dimensions of the patterns	1)Dimensions of the patterns
Equipment	Developing/etching/stripping: change batch process to in line process	•Pre-trimming resistance distribution •Pattern defects (visually identifiable)	•Pre-trimming resistance distribution •Pattern defects (visually identifiable)	①Pattern location (position) on the substrate 2 Pre-trimming resistance distribution 3) Pattern defects ①Etching residue ②Pattern defects (pin poles, missing patterns) ③Foreign material (contamination) ④Incomplete developing, contamination

4. Products to be evaluated

Above evaluation will be done on:

- Constantan foil and Manganin foil
- Product sizes: 0816, 2012, 3216, 6432, and 50110

5. Plan for submitting data

The new factory is scheduled to be completed in July or August 2020. We plan to start producing in the new factory in September 2020. We plan to submit above mentioned data in early October 2020. Therefore, we appreciate if you can communicate us if you approve the procedure described in this document by the end of September 2020. We will identify the substrates fabricated in the current factory and the new factory (refer to the attached separate document) and execute "first in, first out" control. Until all inventory made from the substrates from the current factory are completed and used up, assembly line will process substrates from both factories.

6. Customer approval

We would like you to inform us if you approve or do not approve the above-mentioned procedure for process change regarding the new factory. Please check one.

Approve Not approve

Your Name _____ Title _____

Your signature _____ Date _____

Sincerely

Isao Yasusaka

MPN's Affected

KRL2012D-M-R003-F-T5
KRL2012E-M-R020-F-T5
KRL6432E-M-R100-F-T5
KRL1632E-M-R100-F-T5
KRL3264-C-R068-F-T1
KRL2012E-M-R220-F-T5
KRL1632E-M-R008-G-T5
KRL11050D-C-R004-F-T1
KRL6432E-M-R004-F-T1
KRL2012E-M-R005-F-T5
KRL3264-C-R015-F-T1
KRL2012E-M-R010-F-T5
KRL1220E-M-R180-F-T5
KRL6432E-M-R005-F-T1
KRL1632E-M-R009-G-T5
KRL1632E-M-R470-F-T5
KRL3216T4A-M-R010-F-T1
KRL3264D-C-R100-F-T1
KRL2012E-C-R003-F-T5
KRL2012E-C-R300-F-T5
KRL1220E-M-R005-F-T5
KRL1632E-M-R150-F-T5
KRL1220D-M-R010-F-T1
KRL1220E-M-R010-F-T5
KRL1220E-M-R022-F-T1
KRL1220E-M-R033-F-T5
KRL3264-C-R022-F-T1
KRL1632E-M-R005-G-T5
KRL1632E-M-R022-F-T5
KRL3264D-C-R043-F-T1
KRL3264-C-R010-F-T1
KRL6432E-M-R007-F-T1
KRL2012E-M-R100-F-T5
KRL1632E-M-R180-F-T5
KRL1632E-M-R082-F-T5
KRL3216E-C-R008-F-T5
KRL3216E-C-R012-F-T5
KRL1632E-M-R010-F-T5
KRL1632E-M-R027-F-T5
KRL2012E-M-R006-F-T5
KRL3216-M-R003-F-T1
KRL1220E-M-R039-F-T5
KRL3264E-C-R500-F-T1
KRL7638D-C-R008-F-T1
KRL0816D-C-R047-F-T5
KRL3216E-C-R020-F-T5

KRL2012E-M-R003-F-T5
KRL2012E-M-R470-F-T5
KRL1220-C-R030-F-T1
KRL3264-C-R008-G-T1