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Littelfuse, Inc.
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(773) 628-1000

Jun 21st, 2021

RE: LFPCN 41393 – TVS STD SMF3.3 and SMF4.0 approval of wafer foundry location & wafer size change for productivity improvement

To: Our Valued Customers

Littelfuse would like to notify you of changing wafer foundry location and corresponding wafer size from 5-inch to 6-inch of TVS STD products listed below for productivity improvement. There will be no change to the fit, form, function, quality or reliability of the products.

All affected products have been fully qualified in accordance with established performance and reliability criteria. Please see the attached documentation for qualification results, change details and affected part numbers. Full qualification data and samples will be available upon request.

Affected Part Numbers		
SMF3.3	SMF3.3-A	SMF4.0

Form, fit, function changes: None
Part number changes: None
Effective date: Jan 1st, 2022 and rolling change
Replacement products: N/A
Last time buy: N/A

This notification is for your information and acknowledgement. If you have any other questions or concerns, please contact your local sales team or product team below for further assistance.

We highly value your business and look forward to assisting you whenever possible.

Sincerely,

Jenny Chen
Assistant Product Marketing Manager
Commercial TVS Products
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800 E. Northwest Highway Des Plaines, IL 60016

Product/Process Change Notice (PCN)

<p>PCN#: LFPCN #41393 Date: June 21st, 2021</p> <p>Product Identification: TVS STD Diode SMF3.3, SMF3.3-A, SMF4.0</p> <p>Implementation Date for Change: Jan 1st, 2022 or rolling change</p>	<p>Contact Information</p> <p>Name: Jenny Chen Title: Assistant Product Manager Phone #: +86 510 85277710 Ext. 7965 Fax#: N/A E-mail: jchen7@littelfuse.com</p>
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<p>Category of Change:</p> <p><input type="checkbox"/> Assembly Process</p> <p><input type="checkbox"/> Data Sheet</p> <p><input type="checkbox"/> Technology</p> <p><input type="checkbox"/> Discontinuance/Obsolescence</p> <p><input type="checkbox"/> Equipment</p> <p><input checked="" type="checkbox"/> Manufacturing Site</p> <p><input type="checkbox"/> Raw Material</p> <p><input type="checkbox"/> Testing</p> <p><input type="checkbox"/> Fabrication Process</p> <p><input checked="" type="checkbox"/> Other: _____</p>	<p>Description of Change:</p> <p>Littelfuse would like to notify you of changing wafer foundry location and corresponding wafer size from 5-inch to 6-inch of TVS STD products listed for productivity improvement.</p> <p>There will be no change to the fit, form, function, quality or reliability of the products.</p> <p>The electrical performance and datasheet specifications of the affected products will remain unchanged.</p>
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Important Dates:	
<input checked="" type="checkbox"/> Qualification Samples Available: Available upon the request	<input type="checkbox"/> Last Time Buy:
<input checked="" type="checkbox"/> Final Qualification Data Available: Jun 17 th 2021, included on the following pages	
<input type="checkbox"/> Date of Final Product Shipment:	

Method of Distinguishing Changed Product
<input type="checkbox"/> Product Mark, <input checked="" type="checkbox"/> Date Code, <input type="checkbox"/> Other,

Demonstrated or Anticipated Impact on Form, Fit, Function or Reliability:
N/A

LF Qualification Plan/Results:
Littelfuse Qualification Report is included on the following pages.

Customer Acknowledgement of Receipt: Littelfuse requests you acknowledge receipt of this PCN. In your acknowledgement, you can grant approval or request additional information. Littelfuse will assume the change is acceptable if no acknowledgement is received within 30 days of this notice. Lack of any additional response within 90 days of PCN issuance further constitutes acceptance of the change.



PCN Report

Prepared By : Shirley Zhao-Foundry Operation Manager
Wilson Wu-Outsourced Product Engineer
Date : 6/17/2021
Device : SOD123-FL Package SMF3.3 SMF4.0
Revision : A

1.0 Objective:

The purpose of this project is to qualify an alternate foundry location and corresponding wafer size change from 5-inch to 6-inch for TVS STD products listed below. Succeeding pages summarize the physical, electrical and reliability test performed in qualification lots.

2.0 Applicable Devices:

Affected Part Numbers		
SMF3.3	SMF3.3-A	SMF4.0

3.0 Assembly, Process & Material Differences/Changes:

3.1 Assembly and Process Changes

	Current	Alternate
Foundry Location	150 Kinoko-cho, Ibara-shi, Okayama, Japan	6833 Kinoko-cho, Ibara-shi, Okayama, Japan
Wafer Size	5-inch	6-inch
Top Metallization	TiNiAg/TiAg	TiAg

There are no other significant changes in the assembly and process method.

3.2 Material Changes

No change of BOM

4.0 Packing Method

There will be no changes in the packing method.

5.0 Physical Differences/Changes:

There is no change in mechanical specification or package outline dimension (POD).



6.0 Reliability Test Results Summary:

Test Items	Condition	S/S	Results	ETR #
Pre-conditioning	JESD22-A113	240	0/240	ETR152832
DC Blocking(HTRB)	Bias = rated VR, Ta = 150°C or 125°C Duration = 1008 Hours	154	0/154	
Temperature Cycle	Ta = -55°C to +150°C Duration = 1000 Cycles	80	0/80	
Temperature/Humidity	Ta = 85°C, 85% RH Duration = 1008 Hours	80	0/80	
Unbiased Highly Accelerated Stress Test	Ta = 130°C, 85%RH, 2ATM Duration = 96 Hours	80	0/80	
Resistance to Solder Heat	260°C, 10 sec M-2031	60	0/60	
Moisture Sensitivity Level(MSL)	Per Jedec J-STD-020D Level 1	44	0/44	

Remark:

1. Tests are conducted without a bias condition unless otherwise stated.
2. Reliability data from product tests that is representative of similar products having structural similarity, commonality of production processes and product technology will be generically applied to those products.
3. Tests are conducted on **SMF3.3 and SMF4.0**.

Estimate of Failure Rate, MTBF, FITS for a Given Operation Temperature

Temp °C	% FR/khrs	MTBF (K)	FITS
30	0.00002279	4387687.18	0.23
60	0.00071569	139725.04	7.16
80	0.00514527	19435.34	51.45
100	0.02994058	3339.95	299.41
125	0.21099443	473.95	2109.94
150	1.18054361	84.71	11805.44

4. The Mean-Time-Between-Failure (MTBF) in hours and the percent failure rate per 1000 hours (%FR/khr) are computed at a 60% confidence level using the chi square method and the Arrhenius derating model for various junction operating temperatures. For the calculations, a value of 1 eV was used for the activation energy.

7.0 Electrical Characteristic Summary:

There is no change in electrical characteristics.

Test Items	Condition	S/S	Results	ETR #
Parametric	V_{BR} , I_R	20	0/20	ETR152837
VF	Datasheet condition	20	0/20	
Surge Out test	1 hit, at 25°C from rated IPP, 0.1 IPP step	20	0/20	
Surge Life test	1 hit, 30 hits, 1.0IPP	20	0/20	



8.0 Changed Part Identification:

There is no Part used in affected products.

9.0 Recommendations & Conclusions:

Based on the test results, it is determined that the alternative foundry location is qualified and certified for production of all Littelfuse SMF3.3 and SMF4.0 products.

10.0 Approvals:

Shirley Zhao
Foundry Operation Manager
Littelfuse, Shanghai

Peter Liu
Asia OSAT Product Engineering Manager
Littelfuse, Wuxi