

Suite 500 Chicago, Illinois USA 60631

March 4th, 2016

RE: PCN # ESU270-37 - SP402x series new wafer foundry and alternative backend manufacturing location approval

To our valued customers.

Littelfuse would like to notify you of a newly approved wafer foundry location and two alternative backend locations for the SP402x series TVS Diode Array (SPA® Diodes) products. The new wafer foundry is located in China, and the two new alternative backend factories both in China are all fully approved. There are no changes to form or function of the finished product.

Qualification efforts are complete and the new factories are online for immediate shipments. Please see the attached documentation for change detail and affected part numbers.

All affected products have been fully qualified in accordance with established performance and reliability criteria. The attached pages summarize the qualification results. Full qualification data and/or samples will be available upon request.

Form, fit, function changes: None Part number changes: None

Effective date: June 4th, 2016 or sooner

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 Tim Micun, Product Manager.

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

Best Regards,

Tim Micun 8755 W. Higgins Road, Suite 500 Chicago, Illinois USA 60631 +1 408 409 3657 tmicun@littelfuse.com



800 E. Northwest Highway Des Plaines, IL 60016

Product/Process Change Notice (PCN)

PCN#: ESU270-37 Date: March 4, 20	Contact Information			
Product Identification:	Name: Tim Micun			
SP402x series of TVS Diode Array Produ	cts Title: Product Marketing Manager			
Implementation Date for Change:	Phone #: +1 408 409 3657			
June 4, 2016 or sooner	Fax#: N/A			
	E-mail: tmicun@littelfuse.com			
Category of Change:	Description of Change:			
☐ Assembly Process	Approve a new wafer foundry location and two alternate backend			
□ Data Sheet	assembly, test, and packing locations for SP402x series products.			
☐ Technology	There are no changes to fit, form & function of the finished product. The			
☐ Discontinuance/Obsolescence	affected products have been fully qualified in accordance with all established			
☐ Equipment				
	criteria for performance and reliability			
☐ Raw Material	All relevant detail is included in the supplemental pages			
☐ Testing				
☐ Fabrication Process				
Other:				
Important Dates:				
Qualification Samples Available: Mar	rch 2, 2016			
	arch 2, 2016			
☐ Date of Final Product Shipment:				
Method of Distinguishing Changed Pro	oduct			
Method of Distinguishing Changed Pro	oduct			
Method of Distinguishing Changed Pro Product Mark, Date Code,	oduct			
Product Mark,				
☐ Product Mark, ☐ Date Code,	CN report for details			
□ Product Mark,□ Date Code,☑ Other, See (8.0) in the succeeding PC	CN report for details			
 □ Product Mark, □ Date Code, ☑ Other, See (8.0) in the succeeding PC □ Demonstrated or Anticipated Impact of 	CN report for details			
☐ Product Mark, ☐ Date Code, ☐ Other, See (8.0) in the succeeding PC Demonstrated or Anticipated Impact of N/A	CN report for details			
☐ Product Mark, ☐ Date Code, ☐ Other, See (8.0) in the succeeding PC Demonstrated or Anticipated Impact of N/A LF Qualification Plan/Results: N/A	CN report for details			
☐ Product Mark, ☐ Date Code, ☐ Other, See (8.0) in the succeeding PC Demonstrated or Anticipated Impact of N/A LF Qualification Plan/Results: N/A Customer Acknowledgement of Receiption	CN report for details n Form, Fit, Function or Reliability:			



PCN Report ETR # 76816, 80610

Prepared By: Jordan Hsieh-SPA Product Engineering Manager,

: Ming-Huan Ko-SPA Product Engineer

Date : Mar/02/2016

Device : SP402x Series Product

Revision : A

1.0 Objective:

The purpose of this project is to change to a new wafer foundry and qualify two alternative assembly locations for SP402x series product. Succeeding pages summarize the physical, electrical and reliability test performed in qualification lot.

2.0 Applicable Devices:

Part Numbers	Part Numbers	
SP4020-01FTG	SP4020-01FTG-C	
SP4021-01FTG	SP4021-01FTG-C	

3.0 Assembly, Process & Material Differences/Changes:

3.1 Assembly and Process Changes

Change wafer supplier of steering die as below table.

P/N	SP4021-01FTG, SP4021-01FTG-C, SP4020-01FTG and SP4020-01FTG-C			
Material	Original New		Changed?	
Steering Die	Taiwan	China	Yes	

3.2 Material Changes

Add two alternative backend locations for SP4020-01FTG, SP4020-01FTG-C, SP4021-01FTG and SP4021-01FTG-C as below table.

	Original Backend Location		New Backend Location 1		New Backend Location 2 Located in China		Changed
Material	Located in China		Located in China				
	Material Name	Supplier	Material Name Supplier		Material Name	Supplier	1
Leadframe	N42	Shuen Der Industry	N42	Shuen Der Industry	A42	ASM	Yes
Die Attach Material	84-1LMISR4	Henkel	Eutetic		Eutetic		Yes
Au Wire	Gold Wire	Heraeus	Gold Wire	MK Electron	Gold Wire	MK Electron	Yes
Molding Compound	ELER-8-100HFE	E'Dale	ELER-8-100HFE	E'Dale	EME-G600	ННСК	Yes
Lead Finish	Tin	Yunnan	Tin	ShangHai SinYang	Tin	Suzhou Nuonengda	Yes

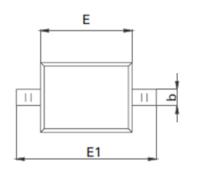


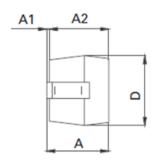
4.0 Packing Method

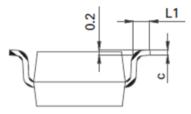
There will be no changes in the packing method.

5.0 Physical Differences/Changes:

Lead dimension of new backend locations differ from the original backend location.







	Original Su	ıpplier	Alternative Supplier-1		Alternative Supplier-2	
	Min	Max	Min	Min Max		Max
Α	0.80	1.00		1.00		1.00
A1	0.00	0.10	0.02	0.10	0.00	0.10
A2	0.80	0.90	0.90		0.80	0.90
b	0.25	0.35	0.30		0.25	0.35
С	0.08	0.15	0.10 Typical		0.08	0.15
D	1.15	1.45	1.20	1.40	1.20	1.40
E	1.60	1.80	1.60	1.80	1.60	1.80
E1	2.50	2.70	2.55	2.75	2.50	2.70
L1	0.25	0.40	0.22	0.42	2.50	4.00

Unit: mm



6.0 Reliability Test Results Summary:

Test Items	Condition	S/S	Results	ETR#
Bake 24hr @ 150°C/ 168hrs 85%rh, 85°C sock/3 times 260°C peak temperature reflow		308	0/308	
DC Blocking(HTRB)	Bias = 3.3V Ta = 150°C Duration = 1008 Hours	77	0/77	FTD 76946
Temperature Cycle	Ta = -55°C to +150°C Duration = 1000 Cycles	77	0/77	ETR 76816 Qualification for new wafer
Temperature/Humidity (H³TRB)	Bias=3.3V Ta = 85°C, 85% RH Duration = 1008 Hours	77	0/77	supplier and alternative assembly
Autoclave	Ta = 121°C, 100%RH, 2atm Duration = 96 Hours	77	0/77	supplier-1
Moisture Sensitivity Level(MSL) Refer to Precondition Test		308	0/308	
ESD Test	HBM>8kV, MM>400V	30	0/30	

Test Items	Condition	S/S	Results	ETR#
Precondition	Bake 24hr @ 150°C/ 168hrs 85%rh, 85°C sock/3 times 260°C peak temperature reflow	308	0/308	
DC Blocking(HTRB)	Bias = 3.3V Ta = 150°C Duration = 504 Hours	77	0/77	ETR 80610
Temperature Cycle Ta = -55°C to +150°C Duration = 1000 Cycles		77	0/77	Qualification for new wafer supplier and
Temperature/Humidity (H ³ TRB) Bias=3.3V Ta = 85°C, 85% RH Duration = 504 Hours		77	0/77	alternative assembly supplier-2
Autoclave Ta = 121°C, 100%RH, 2atm Duration = 96 Hours		77	0/77	
Moisture Sensitivity Level(MSL) Refer to Precondition Test		308	0/308	

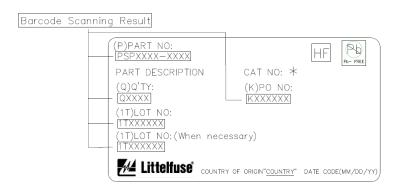


7.0 Electrical Characteristic Summary:

There is no change in electrical characteristics. Characterization data is available upon request.

8.0 Changed Part Identification:

To distinguish different manufacturing locations please refer to labeling information as CAT NO:



Original Backend Location		New Backend Location 1	New Backend Location 2
	CAT No : S	CAT No : Y	CAT No : F

9.0 Recommendations & Conclusions:

Based on the test results, it is determined that the new wafer foundry and alternative assembly locations are qualified and certified for production of Littelfuse® SP402x series products.

10.0 Approvals:

Jordan Hsieh SPA Product Engineering Manager Littelfuse, Hsinchu