

8755 W. Higgins Road Suite 500 Chicago, Illinois USA 60631

June 17th, 2020

PCN # ESW490-34 - TO-220AB non-isolated On Portfolio Thyristor Wafer Manufacture Site Transfer

To our valued customers,

Littelfuse would like to notify you that we will change the wafer location of TO-220AB non-isolated On Portfolio Thyristor products from external foundry to internal Littelfuse Wuxi Fab. The purpose of this change is to better utilize Wuxi Fab existing capability and provide better performance and quality product to all our valued customer.

The affected part numbers listed in attached and we appreciate your approval to continue work with us to enjoy the benefit of Littelfuse best support from internal manufacture excellence.

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: No Fit/Form change. Turn-on/Turn-off time slightly changed due to larger die size utilized, which benefit ITSM performance.

Part number changes: None Effective date: Sep 17th, 2020 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 Zhiwei Wang, Thyristor Product Marketing Manager.

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

Thank you very much!

Best Regards,

Zhiwei Wang Product Marketing Manager of Power Thyristor/Diode Discrete Semiconductor Business Unit, Wuxi, China +86 510 85277701 - 7927 zwang@littelfuse.com



800 E. Northwest Highway Des Plaines, IL 60016

Product	t/Pro	cess Change Notice (PCN)			
PCN#: ESW490-34 Date: June 17th, 2	2020	Contact Information			
Product Identification:		Name: Zhiwei Wang			
TO-220AB non-isolated On Portfolio Thyris	stor	Title: Product Marketing Manager			
Implementation Date for Change:		Phone #: +86 510 85277701 - 7927			
Sep-17 th ,2020		Fax#: N/A			
		E-mail: zwang@littelfuse.com			
Category of Change:	Descrip	otion of Change:			
		e would like to notify you that we will change the wafer location of TO-			
		non-isolated On Portfolio Thyristor products from external foundry to			
		Littelfuse Wuxi Fab. The purpose of this change is to better utilize Wux sting capability and provide better performance and quality product to al			
		ied customer.			
Equipment					
Manufacturing Site	Affected	part number list refer to attached excel table.			
Raw Material					
☐ Testing					
Fabrication Process					
Other:					
Important Dates:					
Qualification Samples Available: June	17 th ,20	D20 🗌 Last Time Buy:			
Final Qualification Data Available: June 17th ,2020					
Date of Final Product Shipment:					
Method of Distinguishing Changed Proc	duct				
Product Mark,					
Date Code, Various depends on wafer	stock o	of external foundry			
Other,					
Demonstrated or Anticipated Impact on Form, Fit, Function or Reliability:					
Slightly change on Turn-on/off time. But better ITSM and Reliablity obtained.					
LF Qualification Plan/Results:					
Pass.					
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	: Lei Wu, Product Engineer
Date	: May 27th, 2020
Device	: Littelfuse WUXI TO-220AB non-isolated On Portfolio Thyristor Products
Revision	: B

1.0 Objective:

The purpose of this file is to report qualification result of wafer manufacture site change of Littelfuse WUXI TO-220AB non-isolated On Portfolio Thyristor Products.

2.0 Applicable Devices:

Littelfuse WUXI TO-220AB non-isolated On Portfolio Thyristor Products Please refer to Appendix I for a full list of affected part numbers.

3.0 Packing Method:

There will be no changes in the packing method.

4.0 Physical Differences/Changes:

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

Internal assembly structure of new site wafers is slightly different with structure of existing wafers. Details please refer to below list.

Existing	After	Affected Product Family
Existing		MCR8Sxx/MCR72-xG/MCR310-xG/ C122F1G/MCR218-xG/2N639x/ MCR12xx/MCR68-xG series
		2N640x/MCR16xx/2N650x/MCR25xx/ MCR69-x/MAC8xx/MAC12xx/ BTB08-x00/BTB12-x00/BTB12H-x00/ MAC9xx/T2500/T2800/MAC228Ax/ MAC210Ax/2N634x/MAC3030-xG/ MAC15Ax/MAC16xx/BTB16-x00/ BTB16H-x00 Series



5.0 Reliability Test Results Summary:

5.1 Parameter test result summary

Test Category	Sample P/N	Sample Qty	Littelfuse test Ref#	Contents/Conditions	Result Summary
	MCR8SNG	5	135736		
	MCR8NG	5	135061		
	MAC12SNG	5	135959		
	BTB12-800CW3G	5	135733		
	BTB12-800BW3G	5	135064		
	MAC12NG	5	135102		
	MAC12HCNG	5	135726		
	T2800DG	5	135731	Electrical Parameters,	Within
Parametric Test	MAC212A10G	5	135066	V _{GD} /di/dt/dv/dt/(dv/dt)c	datasheet
	SAC847-8LFBJG	5	135067	/Tgt/Tq/I⊤SM/V⊤ VS.I⊤ /Rth(j-c)	spec
	MAC228A10G	5	135068	/T th(j-c)	
	SAC319MTG	5	136663		
	MAC15A10G	5	135935		
	MAC16NG	5	137965		
	BTB16-800BW3G	5	137963]	
	MAC16CNG	5	136666		
	2N6509G	5	136634		

5.2 Reliability test result summary

Test Category	Description	Sample P/N	Sample Qty	Littelfuse test Ref#	Contents/Conditions	Result Summary
		MAC15A10G	77	136093		no failure at 1,008hr read
		MCR25NG	77	136630	TJ, 1,008hr, Reverse	
	AC Blocking (HTRB)	MAC16CNG	77	136630	biased at peak AC	
		T2800DG	77	140422	800Vpeak	point
		MAC15A10G	77	140541		
	High	MAC15A10G	77	136093		
	Humidity	MCR25NG	77	136630	Ta: 85°C, RH: 85%,	no failure at
	High Temp.	MAC16CNG	77	136630	1,008hr, Reverse biased at 160V _{DC}	1,008 hr read point
	Reverse Bias (H ³ TRB)	T2800DG	77	140422		
		MAC15A10G	77	140541		
Reliability	Temperature Cycling (TC)	MAC15A10G	77	136093	-55°C&150°C (air to air), Dwell time 15mins,1000 cycles	no failure at 1,000 cycle read point
		MCR25NG	77	136630		
		MAC16CNG	77	136630		
		T2800DG	77	140422		
		MAC15A10G	77	140541		
	Unbiased Highly Accelerated Stress Test (UHAST)	MAC15A10G	77	136093	- 130°C/85%RH,96hrs	no failure at 96hr read point
		MCR25NG	77	136630		
		MAC16CNG	77	136630		
		T2800DG	77	140422		
		MAC15A10G	77	140541		



		1				
	MAC15A10G	77	136093	TA:05%0 TI:405%0		
	Intermittent	MCR25NG	77	136630	TA:25°C, TJ:125°C (ΔTJ=100°C), TON/OFF: 2 minutes, 15,000cycles	no failure at 15,000cycles read point
	Operational Life Test	MAC16CNG	77	136630		
	(IOL)	T2800DG	77	140422		
		MAC15A10G	77	140541	10,000090103	
	Resistance	MAC15A10G	10	136093	260°C, 10 seconds	no failure after RSH
	to Solder	MCR25NG	10	136630		
	Heat (RSH)	MAC16CNG	10	136630		
		MAC15A10G	10	136093		Maat
Solderability	MCR25NG	10	136630	245°C, 5 seconds	Meet	
	Soluerability	MAC16CNG	10	136630		standard requirement
		MAC16CNG	10	136630		requirement

Note: Reliability performance of products using wafers from new wafer site is better than existing ones on leakage drifting result.

6.0 Electrical Characteristic Summary:

- 1. Turn-on time of new site wafers is typically longer 2.6µS than existing wafers and Turn-off time of new site wafers is typically longer 18.21µS than existing wafers, these results are caused by the new wafer chip size are larger than existing ones.
- 2. ITSM performance of new site wafers is typically higher 20A than existing wafers.

7.0 Changed Part Identification:

NA

8.0 <u>Recommendations & Conclusions:</u>

Based on above qualification test results, Littelfuse conclude that new wafer manufacture site transfer activities are qualified and certified for Littelfuse WUXI TO-220AB non-isolated On Portfolio Thyristor Products

Littelfuse released new wafer manufacture site to production for Littelfuse WUXI TO-220AB nonisolated On Portfolio Thyristor Products

9.0 Approvals:

<u>Lei Wu</u> Thyristor Product Engineer Littelfuse, Inc.

Peter Liu Sr. Product Engineer Manager Littelfuse, Inc.



10.0 Appendix I – Thyristor Affected part number list

Affected Part Numbers						
MCR8SDG	2N6400G	MAC8SDG	2N6344AG	MCR12MG		
MCR8SMG	2N6401G	MAC8SMG	2N6348AG	MCR12NG		
MCR8SNG	2N6402G	MAC8SNG	2N6349AG	MCR68-2G		
MCR72-3G	2N6403G	MAC12SMG	MAC15A6G	MAC210A10G		
MCR72-6G	2N6403TG	MAC12SNG	MAC15A8G	MAC212A8G		
MCR72-6TG	2N6404G	BTB12-600TW3G	MAC15-8G	MAC212A10G		
MCR72-8G	2N6405G	BTB08-600CW3G	MAC15-10G	2N6344G		
MCR72-8TG	MCR16NG	BTB08-800CW3G	MAC15A10G	TPA0233G		
MCR310-10G	2N6504G	BTB12-600CW3G	MAC15MG	T2500DG		
MAC9DG	2N6505G	BTB12H-600CW3G	MAC15NG	T2800DG		
C122F1G	2N6505TG	BTB12-800CW3G	MAC16CMG	MAC228A4G		
MCR218-2G	2N6507G	BTB08-600BW3G	MAC16CNG	MAC228A6G		
MCR218-4G	2N6507TG	BTB08-800BW3G	MAC16DG	MAC228A6TG		
MCR218-6G	2N6508G	BTB12-600BW3G	MAC16MG	MAC228A8G		
MCR8NG	2N6508TG	BTB12-800BW3G	MAC16NG	MAC9NG		
2N6394G	2N6509G	MAC8DG	MAC16HCDG	MAC12HCDG		
2N6394TG	2N6509TG	MAC8MG	MAC16HCMG	MAC12HCMG		
2N6395G	MCR25DG	MAC8NG	MAC16HCNG	MAC12HCNG		
2N6397G	MCR25MG	MAC12DG	BTB16-600CW3G	MAC3030-8G		
2N6397TG	MCR25NG	MAC12MG	BTB16-800CW3G	SAC396-7G		
2N6399G	MCR69-2G	MAC12NG	BTB16-600BW3G	SAC847-8LFBJG		
2N6399TG	MCR69-3G	MAC228A8TG	BTB16H-600BW3G	SAC187G		
MCR12DG	MAC9MG	SYC17143LFBPG	BTB16-800BW3G	SAC319MTG		
SAC320MTG	MAC210A8G	SCR888LFDZG	MAC228A10G			