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June 17<sup>th</sup>, 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 17<sup>th</sup>, 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  
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# 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.

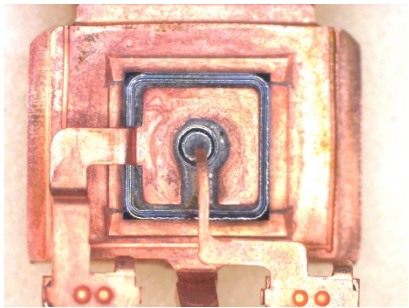

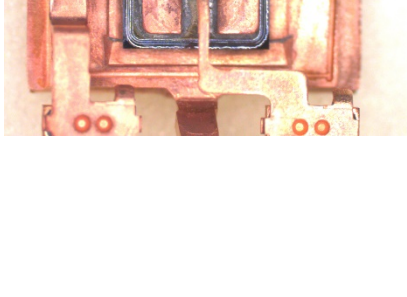
## 3.0 Packing Method:

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
		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
Parametric Test	MCR8SNG	5	135736	Electrical Parameters, $V_{GD}/di/dt/dv/dt/(dv/dt)_c$ $/T_{g}/T_q/I_{TSM}/V_T$ vs. $I_T$ $/R_{th(j-c)}$	Within datasheet spec
	MCR8NG	5	135061		
	MAC12SNG	5	135959		
	BTB12-800CW3G	5	135733		
	BTB12-800BW3G	5	135064		
	MAC12NG	5	135102		
	MAC12HCNG	5	135726		
	T2800DG	5	135731		
	MAC212A10G	5	135066		
	SAC847-8LFBJG	5	135067		
	MAC228A10G	5	135068		
	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
Reliability	AC Blocking (HTRB)	MAC15A10G	77	136093	$T_J$ , 1,008hr, Reverse biased at peak AC 800V <sub>peak</sub>	no failure at 1,008hr read point
		MCR25NG	77	136630		
		MAC16CNG	77	136630		
		T2800DG	77	140422		
		MAC15A10G	77	140541		
	High Humidity High Temp. Reverse Bias (H <sup>3</sup> TRB)	MAC15A10G	77	136093	$T_a$ : 85°C, RH: 85%, 1,008hr, Reverse biased at 160V <sub>DC</sub>	no failure at 1,008 hr read point
		MCR25NG	77	136630		
		MAC16CNG	77	136630		
		T2800DG	77	140422		
		MAC15A10G	77	140541		
	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			



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

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 Recommendations & Conclusions:

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 non-isolated On Portfolio Thyristor Products

#### 9.0 Approvals:

Lei Wu  
Thyristor Product Engineer  
Littelfuse, Inc.

Peter Liu  
Sr. Product Engineer Manager  
Littelfuse, Inc.



**10.0 Appendix I – Thyristor Affected part number list**

<b>Affected Part Numbers</b>				
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	