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June 30th 2017

To: Our Valued Customers.

From: **Littelfuse Product Management Team**

**Littelfuse SBU DO-214AA package Backend Automation Notification Letter.**

In order to support growing demand, Littelfuse SBU ( Semiconductor Business Unit) has completed DO-214AA package automation qualification , with this automation line release We will have more capacity to support customer growing demand for Package DO-214AA TVS and SIDACTor® .

The DO-214AA package backend automation line for capacity expansion is installed in Littelfuse Semiconductor Wuxi China , Please refer to below page for the picture of automation line .

This automation line plan to have pilot productions on Aug 1<sup>st</sup> 2017 . The affected part numbers as attached excel file , this is rolling change, You will be expected to have either old line products or new automation line products.

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

There are no changes on FIT, form or function of the finished product

**Form, fit, function changes:** None  
**Part number changes:** None  
**Effective date:** Aug 1<sup>st</sup>, 2017 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 Meng Wang, Product Manager. We highly value your business and look forward to assisting you whenever possible.

Best Regards

Meng Wang ( Rex Wang)

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## Product Qualification Report

To: Those who may concern  
 From: Zhihui Chen ,Product Engineering, Littelfuse,  
 Date: May 24<sup>th</sup>, 2017 -  
 Subject: **Qualification Report for Littelfuse TVS/SIDACtor DO-214AA full Automation expanding**

Backend Assembly Automation Line Picture

### Automation Assembly Process Flow



#### Purpose:

This report is to inform the successful TVS/SIDACtor DO-214AA full automation expanding qualification test results

#### 1. Qualification Types ( Test Vehicle)

Product Package	Product Series	Representative Test Sample Part Numbers	Assembly Location
DO-214AA	TVS	P6SMB6.8CA	Wuxi
		P6SMB220A	
		P6SMB510CA	
		SACB5.0	
	SIDACtor	P4500SCLHLP	
		P0080SCLRP	
		P7002SCLRP	

## 2. Qualification Test Items and Result Summary:

### TVS result:

Test Category	Description	Sample P/N	Sample Qty	Littelfuse test Ref#	Contents/Conditions	Result Summary
Parametric	Electrical Parameters	P6SMB6.8CA	207	95226	VBR, IR	100% meet published spec.
		P6SMB220A	207	95228		
		P6SMB510CA	207	95232		
		SACB5.0	207	95236		
Surge IPP test	8*20us Surge out Test	P6SMB6.8CA	10	95226	+/- 1 hit, at rated IPP	100% passing at Rated IPP
		P6SMB220A	10	95228		
		P6SMB510CA	10	95232		
		SACB5.0	10	95236		
	10*1000us Surge out Test	P6SMB6.8CA	10	95226	+/- 1 hit, at rated IPP	100% passing at Rated IPP
		P6SMB220A	10	95228		
		P6SMB510CA	10	95232		
		SACB5.0	10	95236		
Reliability Test	Pre-condition (PC)	P6SMB6.8CA	80	95224	SMD qualification parts for TC,H3TRB	0 failure
		P6SMB220A	80	95227		
		P6SMB510CA	80	95230		
		SACB5.0	80	95235		
	DC Blocking (HTRB)	P6SMB6.8CA	77	95224	150°C, DC bias=100% of VR spec	0 failure at 1008hrs
		P6SMB220A	77	95227		
		P6SMB510CA	77	95230		
		SACB5.0	77	95235		
	RSH	P6SMB6.8CA	30	95224	260C,10s	0 failure
		P6SMB220A	30	95227		
		P6SMB510CA	30	95230		
		SACB5.0	30	95235		
	Biased Temp & Humidity (H3TRB)	P6SMB6.8CA	40	95224	85°C, 85%,RH DC bias=100% of VR spec	0 failure at 1008hrs
		P6SMB220A	40	95227		
		P6SMB510CA	40	95230		
		SACB5.0	40	95235		
	Temp Cycle	P6SMB6.8CA	40	95224	-55°C&150°C (air to air)	0 failure at 1008hrs
		P6SMB220A	40	95227		
		P6SMB510CA	40	95230		
		SACB5.0	40	95235		

## SIDACTor result:

Test Category	Description	Sample P/N	Sample Qty	Littelfuse test Ref#	Contents/Conditions	Result summary
Parametric	Electrical Parameters	P4500SCLHLP	247	95245	Vdrm,IH,VT	Meet datasheet spec
		P0080SCLRP	247	95247		
		P7002SCLRP	247	95252		
Surge out	Surge out 8*20us	P4500SCLHLP	10	95245	+/- hit,from rated lpp,0.1lpp step	100% passing at Rated IPP
		P0080SCLRP	10	95247		
		P7002SCLRP	10	95252		
	Surge out 10*700us	P4500SCLHLP	10	95245	+/- hit,from rated lpp,0.1lpp step	100% passing at Rated IPP
		P0080SCLRP	10	95247		
		P7002SCLRP	10	95252		
	Surge out 10*1000us	P4500SCLHLP	10	95245	+/- hit,from rated lpp,0.1lpp step	100% passing at Rated IPP
		P0080SCLRP	10	95247		
		P7002SCLRP	10	95252		
VS	VS,100V/S	P4500SCLHLP	10	95245	100V/us	Meet datasheet spec
		P0080SCLRP	10	95247		
		P7002SCLRP	10	95252		
Reliability Test	Pre-condition (PC)	P4500SCLHLP	80	95244	SMD qualification parts for TC,H3TRB	0 failure
		P0080SCLRP	80	95246		
		P7002SCLRP	80	95251		
	DC/AC Blocking (HTRB)	P4500SCLHLP	77	95244	125°C,24h at +/- 80%Vdrm,AC blocking test with AC peak 80% Vdrm 168/504/1008h	0 failure at 1008hrs
		P0080SCLRP	77	95246		
		P7002SCLRP	77	95251		
	Temperature Cycling (TC)	P4500SCLHLP	40	95244	-55°C ~+150°C,1000cycles	0 failure at 1000Cycle
		P0080SCLRP	40	95246		
		P7002SCLRP	40	95251		
	HTSL	P4500SCLHLP	40	95244	168/504/1008h at Tj=150C	0 failure at 1008hrs
		P0080SCLRP	40	95246		
		P7002SCLRP	40	95251		
	H3TRB	P4500SCLHLP	40	95244	168/504/1008h at Tj=85C/85% RH with device reverse biased at 80% VDRM and not exceed 52V	0 failure at 1008hrs
		P0080SCLRP	40	95246		
		P7002SCLRP	40	95251		

### 3. MTBF Calculation

Estimate of Failure Rate, MTBF, FITS for a Given Operation Temperature  
(See note)

#### 1. TVS

Temp °C	% FR/khrs	MTBF (K)	FITS
30	0.0000569776	2003	0.06
60	0.00178923	64	1.79
80	0.01286317	8.87	12.86
100	0.07485144	1.53	74.85
125	0.52748607	0.22	527.49
150	2.95135904	0.04	2951.36

#### 2. SIDACtor

Temp °C	% FR/khrs	MTBF (K)	FITS
30	0.000425064	2352588	0.43
60	0.01334799	74917	13.35
80	0.09596166	10420	95.96
100	0.55840583	1791	558.41
125	3.93514538	254	3935.15

Note: 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.

### 4. Conclusion

**According to the above qualification test results, Littelfuse concluded that TVS/SIDACtor DO-214AA full automation expanding family parts have passed the reliability test at WTC Lab.**

<b>SIDACTor DO-214AA package</b>				
P0640SALRP	P0080SCLRP	P0080SDLRP	P0642SALRP	P0642SCLRP
P659P0640SARP	P763P0080SCLRP	P835P0080SDLRP	P0722SALRP	P0722SCLRP
P712P0640SARP	P763AP0080SCLRP	P0640SDLRP	P0902SALRP	P0902SCLRP
P0641SALRP	P0080SCLRP-	P812P0640SDLRP	P1102SALRP	P1102SCLRP
P0720SALRP	P0080SCMCLRP	P0720SDLRP	P1302SALRP	P1302SCLRP
P0721SALRP	P0080SCMCLRP-N	P813P0720SDLRP	P1502SALRP	P1502SCLRP
P506P0721SALRP	P0080SCLRP-N1	P767P0720SDLRP	P1802SALRP	P1802SCLRP
P0900SALRP	P0080SCLRP-N2	P767AP0720SDLRP	P2302SALRP	P2302SCLRP
P0901SALRP	P825P3500SCMCLRP	P0900SDLRP	P2602SALRP	P2602SCLRP
P1100SALRP	P0220SCLRP	P923CRP	P3002SALRP	P3002SCLRP
P675P1100SARP	P0220SCMCLRP	P1100SDLRP	P3502SALRP	P3502SCLRP
P688P1100SARP	P0300SCLRP	P698CRP	P4202SALRP	P4202SCLRP
P1101SALRP	P761P0300SCLRP	P806P1100SDLRP	P4802SALRP	P772P4202SCLRP
P1200SALRP	P761AP0300SCLRP	P1300SDLRP	P6002SALRP	P797P4202SCLRP
P811P1200SALRP	P931WRP	P810P1300SDLRP	P6002SALRP-HM	P798P4202SCLRP
P1300SALRP	P0300SCMCLRP	P925CRP	P7002SALRP	P4802SCLRP
P697P1300SARP	P691P0300SCMCRP	P1500SDLRP	P0642SBLRP	P6002SCLRP
P1301SALRP	P0300SCLRP-N1	P376P1500SCR	P0722SBLRP	P7002SCLRP
P1500SALRP	P0300SCLRP-N2	P674P1500SCR	P0902SBLRP	P862P7002SCLRP
PLED150S	P0640SCLRP	P768P1500SDLRP	P1102SBLRP	
P1701SALRP	P676P0640SCR	P768AP1500SDLRP	P1302SBLRP	
P1800SALRP	P764P0640SCLRP	P926CRP	P1502SBLRP	
P779P1800SALRP	P764AP0640SCLRP	P927CRP	P1802SBLRP	
P2000SALRP	P832P0640SCLRP	P931CRP	P2302SBLRP	
P776P2000SALRP	P0640SCLRP-	P1800SDLRP	P2602SBLRP	
P2100SALRP	P0640SCMCLRP	P2300SDLRP	P3002SBLRP	
P2300SALRP	P0640SCLRP-N1	P2600SDLRP	P3502SBLRP	
P2500SALRP	P0640SCLRP-N2	P746P2600SDRP	P4202SBLRP	
P2600SALRP	P868P0640SCLRP	P746AP2600SDRP	P4802SBLRP	
P3100SALRP	P872P0720SBLRP	P3100SDLRP	P6002SBLRP	
P651P3100SARP	P0720SCLRP	P3100SCHR	P7002SBLRP	
P707P3100SARP	P755P0720SCLRP	P765P3100SDLRP		
P3500SALRP	P755AP0720SCLRP	P765AP3100SDLRP		
P716P3500SARP	P755BP0720SCLRP	P3500SDLRP		
P4500SBLHLRP	P0720SCMCLRP	P692P3500SDRP		
P0640SBLRP	P0720SCLRP-N	P773P3500SDLRP		
P0720SBLRP	P0900SCLRP	P0641SCLRP		
P0900SBLRP	P626P0900SCLRP	P0721SCLRP		
P858P0900SCLRP	P0900SCMCLRP	P0901SCLRP		
P1100SBLRP	P1100SCLRP	P1100SCLRP		
P1200SBLRP	P689P1100SCR	P1101SCLRP		
P1300SBLRP	P698WRP	P1201SCLRP		
P1500SBLRP	P923WRP	P856P1201SCLRP		
P1500SBLRP-N	P1100SCMCLRP	P1301SCLRP		
P1800SBLRP	P1101SCLRP-N	P1500SCLRP		

P2000SBLRP	P1200SCLRP	P465P1500SCR
P2100SBLRP	P1200SCLRP-N	P1701SCLRP
P2300SBLRP	P1200SCMCLRP	P0641SDLRP
P686P2300SBRP	P1300SCLRP	P0901SDLRP
P708P2300SBRP	P925WRP	P1101SDLRP
P2300SBLRP-N	P1300SCMCLRP	P829P1101SDLRP
P2500SBLRP	P1500SCLRP	P829AP1101SDLRP
P2600SBLRP	P753P1500SCLRP	P1301SDLRP
P591P2600SBLRP	P753AP1500SCLRP	P1701SDLRP
P653P2600SBRP	P753BP1500SCLRP	P2601SDLRP
P831P2600SBLRP	P753CP1500SCLRP	P3101SDLRP
P3100SBLRP	P753DP1500SCLRP	A0609SCLRP
P486P3100SBRP	P926WRP	P760LRP
P640P3100SBRP	P927WRP	P760ALRP
P654P3100SBRP	P465P1500SCR	A0710SCLRP
P654P3100SBRPH	P1500SCLRP-N1	A0709SCLRP
P654P3100SBRPHF	P1500SCLRP-N2	PP0640SC-LF-T
P809P3100SBLRP	P1500SCMCLRP	PP0720SC-LF-T
P842P3100SBLRP	P1500SCMCL-N	PP0900SC-LF-T
P3100SBLRP-	P1800SCLRP	PP1100SC-LF-T
P3100SBLRPH	P677P1800SCR	PP1300SC-LF-T
P3500SBLRP	P1800SCLRP-N	
P496P3500SBLRP	P1800SCLRP-	
P655P3500SBRP	P1800SCMCLRP	
P770P3500SBLRP	P2000SCLRP	
P784P3500SBLRP	P777P2000SCLRP	
P793P3500SBLRP	P2000SCMCLRP	
P838P3500SCLRP	P2100SCLRP	
P4500SBLRP	P2100SCMCLRP	
P839P4500SCLRP	P2300SCLRP	
P844P4500SCLRP	P762P2300SCLRP	
P4500SCLHLRP	P762AP2300SCLRP	
PDT5061-T	P2300SCMCLRP	
SPH0004CRP	P2500SCLRP	
P3100SXLRP	P2500SCMCLRP	
PLED6SW	P469P2600SCLRP	
PLED9SW	P2600SCLRP	
PLED13SW	P820P2600SCLRP	
PLED18SW	P759P2600SCLRP	
PLED6USW	P759AP2600SCLRP	
PL865PLED18USW	P766P2600SCLRP	
P0080SALRP	P766AP2600SCLRP	
P817P0080SALRP	P774P2600SCLRP	
P0080SAMCLRP	P2600SCMCLRP	
P0080SAMCLRP-	P3100SCLRP	
PLED6S	P440P3100SCR	
PLED6US	P618P3100SCR	

P807P0080SAMCLRP	P641P3100SCR
PLED9S	P754P3100SCLRP
P0220SALRP	P754AP3100SCLRP
P818P0220SALRP	P754BP3100SCLRP
P0220SAMCLRP	P754CP3100SCLRP
PLED13S	P754DP3100SCLRP
PLED18S	P3100SCLRP-P841
P0240SBLRP	P3100SCLRPP841
P0300SALRP	P3100SCL-N
P566P0300SALRP	P3100SCLRP-
P658P0300SARP	P3100SCMCLRP
P695P0300SARP	P3100SDLHLP
P0300SAMCLRP	P3500SCLRP
PLED9US	P794P3500SCLRP
P871PLED9US	P681P3500SCR
PLED13US	P3500SCL-N
PLED18US	P3500SCMCLRP
P821P0080SCLRP	P4500SCLRP
P0181SALRP	P4500SCMCLRP
PLED35US	P4500SDLHLP
P0080SBLRP	P827P3100SCLRP
P678P0080SBRP	P1800STLRP
P792P0080SBLRP	P2300STLRP
P857P0080SCLRP	P2600STLRP
P0080SBMCLRP	P3100STLRP
P0220SBLRP	P3500STLRP
P0220SBMCLRP	
P0300SBLRP	
P0300SBMCLRP	
PLED6USW2A	
PLED6USW3A	
PLED9USW3A	