



PCN Report

Prepared By : Yaling Fan- Outsourcing Assembly and Test Manager,
 Wilson Wu-Outsourced Product Engineer,
Date : 3/4/2021
Device : DO-221AC Package TPSMA6L Series Product
Revision : 1

1.0 Objective:

The purpose of this project is to qualify an alternate location for DO-221AC Package TPSMA6L Series Product as 2nd source.
 Succeeding pages summarize the physical, electrical and reliability test performed in qualification lots.

2.0 Applicable Devices:

Package	Part Numbers
DO-221AC	TPSMA6LxxxA

3.0 Assembly, Process & Material Differences/Changes:

3.1 Assembly and Process Changes

Process	1 st Source	2 nd Source
1	Wafer Sawing (None Tape)	Wafer Mounting &Sawing (Blue Tape)
2	Soldering	Soldering (Die&Clip Bond)
3	Molding	Flux Cleaning
4	PMC	Molding
5	Trim/Forming	PMC
6	IR reflow	Trim
7	Barrel Plating	IR reflow
8	Test	Rack Plating
9	OQC	Forming
10		Temperature Cycling (TPSMA6L)
11		Test
12		OQC

3.2 Material Changes

Material	1st Source		2nd Source		Changed?
	Material Name	Supplier	Material Name	Supplier	
Die	Silicon Wafer	Littelfuse	Silicon Wafer	Littelfuse	No
Leadframe & Clip	C194	Jihlong	C19210	ECE	Yes
Die Attach Material	Pb92.5/Sn5/Ag2.5	Zhejiang Huangyan Xingqian	Pb92.5/Sn5/Ag2.5	Alpha/Indium	Yes
Molding Compound	E120G	Changchun Plastics	EK1700GH	Eternal Electronic Materials	Yes
Plating	Matte Tin	Jihlong	Matte Tin	Yunnan Tin	Yes

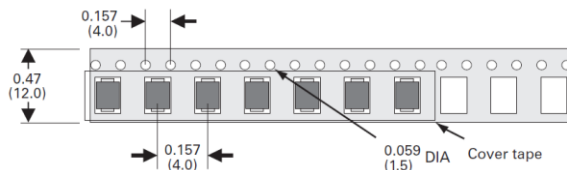
4.0 Packing Method

4.1 Packing Material

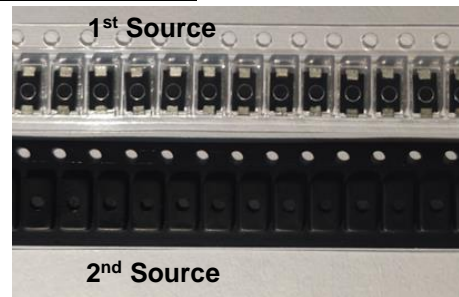
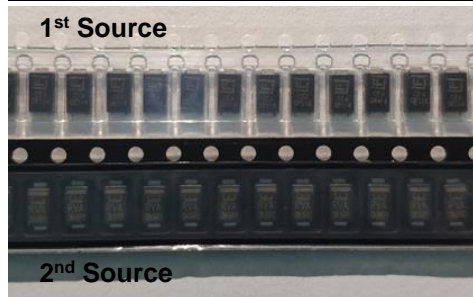
Packing	1st Source	2nd Source
Tape	Hot seal carrier tape Details dimension refer to 4.2	Hold seal carrier tape Details dimension refer to 4.2
Reel	White Plastic Reel, 7 inches Details dimension refer to 4.3	White Plastic Reel, 7 inches Details dimension refer to 4.3
Pizza Box	185mm*185mm*20mm (TPSMA6L 1 Reel/Pizza Box)	200mm*186mm*21mm (1 Reel/Pizza Box)
Label	Size: 100mmx40mm Font is Arial, font size is 7.5 Bar code is code 128, height is 4mm	Size: 70mmx40mm Font is Arial, Font size is 12 Bar code is code 39, height is 4.06mm
Outside Box	405mm*210mm*380mm (TPSMA6L 34 Pizza Box)	350mm*350mm*50mm (1 to 2 Pizza Box) 350mm*350mm*100mm (3 to 4 Pizza Box) 350mm*350mm*195mm (5 to 18 Pizza Box) 350mm*350mm*345mm (19 to 34 Pizza Box)

Remark: There are few minor differences (Bold Parts) between two sources.

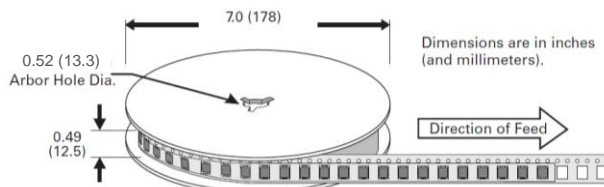
4.2 Tape Dimension



Case Type	Source	Tape Dimension(mm)			
		Hole Pitch	Tape Width	Product Pitch	Hole Dia.
DO-221AC	1st Source	4.0±0.05	12+0.1-0	4.0±0.1	1.5±0.1
DO-221AC	2nd Source	4.0±0.1	12±0.3	4.0±0.1	1.55±0.05



4.3 Reel Dimension



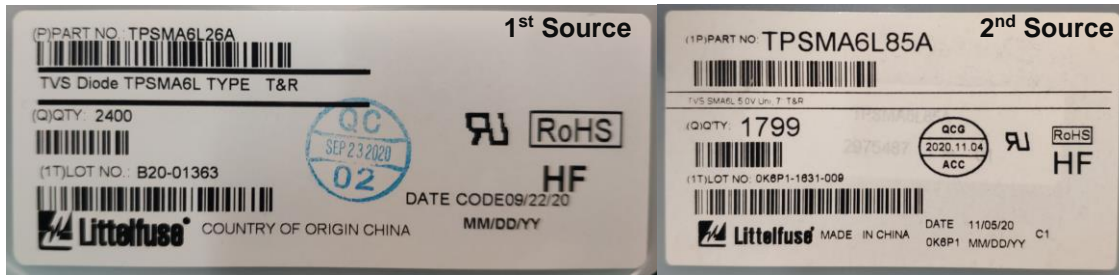
Case Type	Source	Reel Dimension(mm)			
		Reel Dia.	Arbor Hole Dia.	Reel Inner Height	Reel Total Height
DO-221AC	1st Source	178±0.5	13.3±0.5	12.5±0.5	15.5±0.5
DO-221AC	2nd Source	178±1.0	13.3±0.2	12.4+2.0-0.4	15.2±1.0

Remark: Reel dimension has little difference between two sources as above.



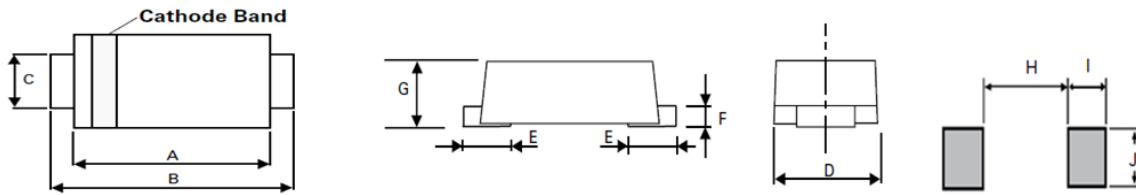
Remark: Reel color is similar between two sources as above.

4.4 Label on Reel and Pizza Box



Remark: Besides differences of label listed in packing material, QC signet is printed on the label at 2nd Source.

5.0 Physical Differences/Changes:



DIM	1 st Source					2 nd Source					Changed?	
	Inches		Millimeters			Inches		Millimeters				
	MIN	MAX	MIN	MAX	Actual AVE	MIN	MAX	MIN	MAX	Actual AVE		
A	0.156	0.181	3.950	4.600	4.32	0.16	0.17	4.100	4.300	4.16	No	
B	0.189	0.220	4.800	5.600	5.34	0.19	0.21	4.800	5.200	5.00	No	
C	0.049	0.069	1.250	1.750	1.37	0.05	0.06	1.250	1.450	1.36	No	
D	0.088	0.116	2.250	2.950	2.65	0.10	0.11	2.600	2.800	2.70	No	
E	0.030	0.059	0.750	1.500	1.06	0.03	0.04	0.750	1.100	0.85	No	
F	0.005	0.010	0.125	0.250	0.15	0.00	0.01	0.125	0.250	0.15	No	
G	0.035	0.043	0.900	1.100	1.05	0.04	0.04	0.920	1.080	1.05	No	
H	0.123 typ.		3.12 typ.				0.123 typ.		3.12 typ.			No
I	0.047 typ.		1.20 typ.				0.047 typ.		1.20 typ.			No
J	0.060 typ.		1.52 typ.				0.060 typ.		1.52 typ.			No

6.0 Reliability Test Results Summary:

Test Items	Condition	S/S	Results	ETR #
Pre-conditioning	JESD22-A113	1089	0/1089	ETR150877 ETR152255 ETR150873
High Temperature, DC Blocking(HTRB)	Bias = VR, Ta = 150°C Duration = 1008 Hours	462	0/462	
Temperature Cycle(TC)	Ta = -55°C to +150°C Duration = 1000 Cycles 15 minutes dwell	363	0/363	
High Temperature & Humidity with Bias(H3TRB)	Ta = 85°C, 85% RH Bias=VR Duration = 1008 Hours	363	0/363	
UHASt Unbiased Highly Accelerated Stress Test (UHASt)	Ta = 130°C, 85%RH, 2ATM Duration = 96 Hours	363	0/363	
Resistance to Solder Heat(RSH)	260°C, 10 seconds	90	0/90	
Moisture Sensitivity Level(MSL)	Per Jedec J-STD-020D Level 1	132	0/132	
Solderability	ANSI-J-STD-002	66	0/66	
DPA	Random sample of devices that have successfully completed H3TRB or HAST, and TC.	4	0/4	

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 **TPSMA6L5.0A**, **TPSMA6L28A** and **TPSMA6L85A** to cover TPSMA6L series products.

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

Temp °C	% FR/khrs	MTBF (K)	FITS
30	0.00000760	13163061.53	0.08
60	0.00023856	419175.11	2.39
80	0.00171509	58306.01	17.15
100	0.00998019	10019.85	99.80
125	0.07033148	1421.84	703.31
150	0.39351454	254.12	3935.15

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. Characterization data is available upon request.

Test Items	Condition	S/S	Results	ETR #
Parametric	V_{BR} , I_R	100	0/100	ETR150886
VF	Datasheet condition	100	0/100	ETR150887
Surge Out test	1 hit, at 25°C from rated IPP, 0.1 IPP step	100	0/100	ETR150971
Surge Life test	1 hit,30 hits, 1.0IPP	100	0/100	ETR150972
				ETR150973
				ETR150975

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 backend location is qualified and certified for production of above listed Littelfuse products.

10.0 Approvals:

Yaling Fan
 Outsourcing Assembly and Test Manager
 Littelfuse, Wuxi

Peter Liu
 Asia OSAT Product Engineering Manager
 Littelfuse, Wuxi