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Wuxi, Jiangsu 214142

Product Qualification Report

To: Those who may concern

From: Haipeng Xu, Senior Product Engineer, Littelfuse, Wuxi

Date: Oct 23rd, 2020 – Rev.A

Subject: **Qualification test result of High Voltage TPSMBxx and TPSMCxx BCP and capacity extension**

Purpose:

This report is to inform the successful qualification test results for high voltage TPSMBxx and TPSMCxx BCP and capacity extension.

Conclusion:

According to the qualification result, Littelfuse concluded that high voltage TPSMBxx and TPSMCxx BCP and capacity extension qualification have been successfully completed and will be released to mass production.

Best Regards,

Haipeng Xu

Senior Product Engineer
Littelfuse Semiconductor

1. Change Description

TPSMB ¹

Change Description		Before	After	Benefits
Fab	Wafer	FZ wafer Vendor: Siltronic	1.FZ wafer Vendor: Siltronic 2.MCZ wafer Vendor: Huan Ou	BCP
BE	Manufacturing Line	Old line	Old line & New lines	Capacity extension
	L/F & Clip Vendor	L/F Vendor: JIH Long Clip vendor: G-Shank	L/F & Clip vendor: 1.JIH Long 2. G-Shank	BCP
	Solder Paste	Heraeus F367SN10-90P4	1.Heraeus FS5116 2.Indium 9.32	BCP
	EMC	EME-G630AY Vendor: Sumitomo	1.EME-G630AY Vendor: Sumitomo 2.EME-E500HME Vendor: Sumikon	BCP
	Plating Source	1.Bandl (Suzhou) 2.Suyang (Wuxi)	1.Bandl (Suzhou) 2.Suyang (Wuxi) 3.Littelfuse inhouse (Wuxi)	BCP

Note 1: PNs with VBR≥600V are released in new lines and only affected by wafer, solder paste and plating source change.

TPSMC

Change Description		Before	After	Benefits
Fab	Wafer	FZ wafer Vendor: Siltronic	1.FZ wafer Vendor: Siltronic 2.MCZ wafer Vendor: Huan Ou	BCP
BE	Manufacturing Line	Old line	Old line & New lines	Capacity extension
	L/F & Clip Vendor	L/F Vendor: Kenly Clip vendor: G-Shank	L/F Vendor: Kenly & SDI Clip vendor: G-Shank & SDI	BCP
	Solder Paste	Heraeus F367SN10-90P4	1.Heraeus FS5116 2.Indium 9.32	BCP
	EMC	EME-G720C Vendor: Sumitomo	1.EME-G720C Vendor: Sumitomo 2.EME-E500HME Vendor: Sumikon	BCP
	Plating Source	1.Bandl (Suzhou) 2.Suyang (Wuxi)	1.Bandl (Suzhou) 2.Suyang (Wuxi) 3.Littelfuse inhouse (Wuxi)	BCP

2. Qualification Test Vehicle

Part Number	Package Type	Lot Size	Internal Reference #
TPSMB200CA	DO214AA(SMB)	2	144695
TPSMB440A-A	DO214AA(SMB)	3	144690 & 144356
TPSMB550CA-A	DO214AA(SMB)	2	144356 & 144357
TPSMB600CA-A	DO214AA(SMB)	2	144357
SMCJ200A ²	DO214AB(SMC)	10	145678 & 145681 146396 & 146394

Note 2: SMCJ200A comes from three different wafer lots.

3. Qualification Test Plan

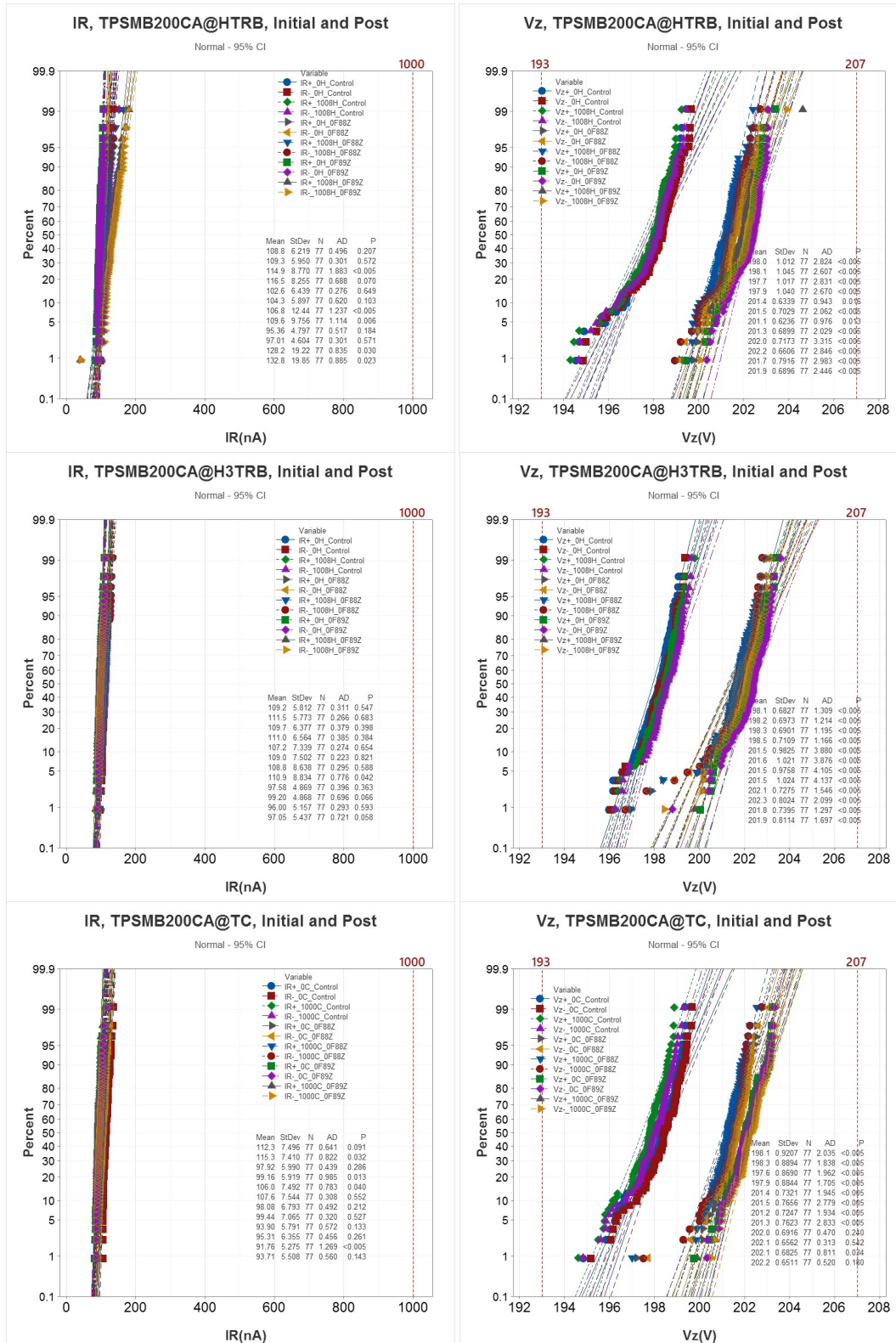
Reliability Test	Part Number	S.S	Test Condition	Ref. Spec	Result Fail/Total
Pre-conditioning	TPSMB200CA	462	24hr 125°C bake, 168hrs 85°C/85% humidity storage, 3 times reflow	JESD22A-113	0/462
	TPSMB440A-A	693			0/693
	TPSMB550CA-A	462			0/462
	TPSMB650CA-A	462			0/462
	SMCJ200A	2310			0/2310
High temperature Reverse Bias (HTRB)	TPSMB200CA	154	Tj specified in datasheet, 1008hrs, biased at VR	MIL-STD-750- 1 M1038 Method A	0/154
	TPSMB440A-A	231			0/231
	TPSMB550CA-A	154			0/154
	TPSMB650CA-A	154			0/154
	SMCJ200A	770			0/770
High Humidity High Temp. Reverse Bias (H3TRB)	TPSMB200CA	154	TA: 85°C, RH: 85%, 1000hrs, Reverse biased at VR or max 100V	JESD22-A101	0/154
	TPSMB440A-A	231			0/231
	TPSMB550CA-A	154			0/154
	TPSMB650CA-A	154			0/154
	SMCJ200A	770			0/770
Unbiased Highly Accelerated Stress Test (UHAST)	TPSMB200CA	154	96 hours at TA=130°C/85%RH.	JESD22-A118	0/154
	TPSMB440A-A	231			0/154
	TPSMB550CA-A	154			0/154
	TPSMB650CA-A	154			0/154
	SMCJ200A	770			0/770
Temperature Cycling(TC)	TPSMB200CA	154	TA: -55°C to +150°C, dwell time >15mins, 1000 cycle	JESD22-A104	0/154
	TPSMB440A-A	231			0/231
	TPSMB550CA-A	154			0/154
	TPSMB650CA-A	154			0/154
	SMCJ200A	770			0/770
High temperature	TPSMB200CA	154	TA: 150°C, 1008hours	JESD22-A103	0/154
	TPSMB440A-A	231			0/231

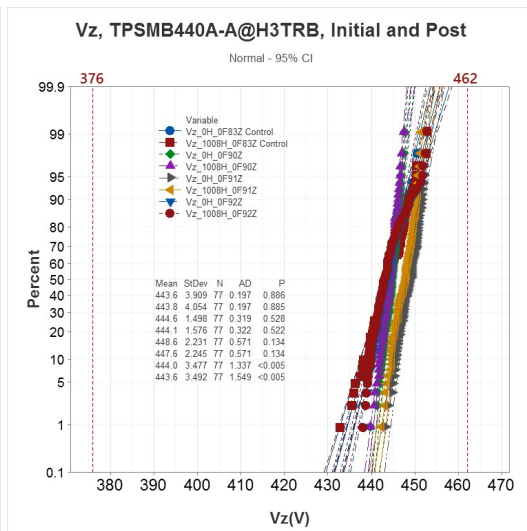
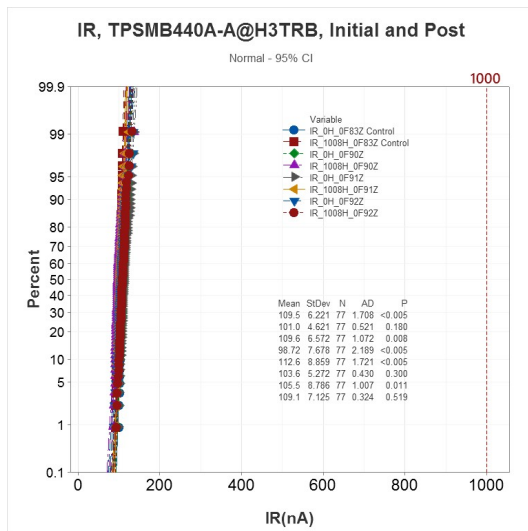
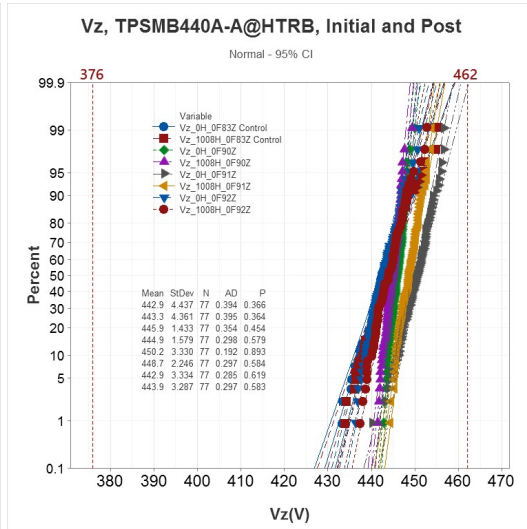
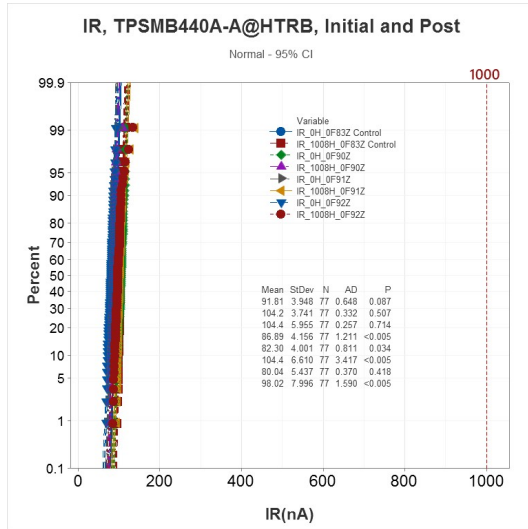
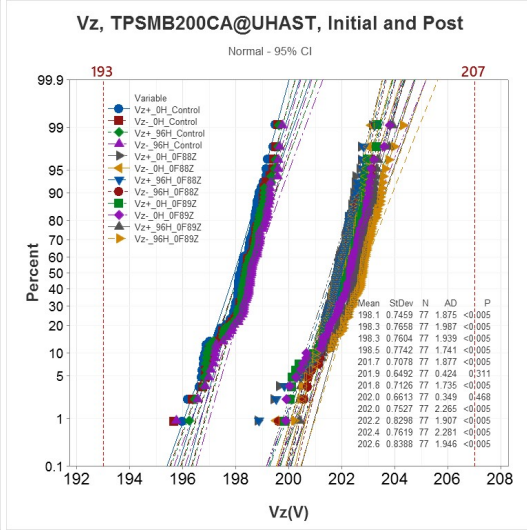
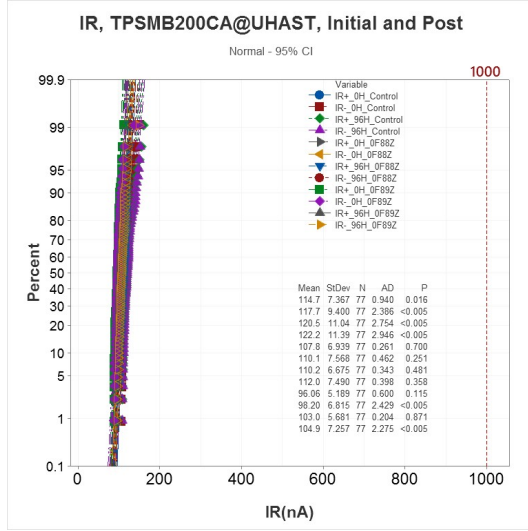
Storage Life (HTSL)	TPSMB550CA-A	154			0/154
	TPSMB650CA-A	154			0/154
	SMCJ200A	770			0/770
Resistance to Solder Heat (RSH)	TPSMB200CA	40	260°C, 10secs	JESD22-A111	0/40
	TPSMB440A-A	60			0/60
	TPSMB550CA-A	40			0/40
	TPSMB650CA-A	40			0/40
	SMCJ200A	200			0/200
Solderability	TPSMB200CA	20	245°C ± 5°C, 5 ± 0.5s	J-STD002	0/20
	TPSMB440A-A	30			0/30
	TPSMB550CA-A	20			0/20
	TPSMB650CA-A	20			0/20
	SMCJ200A	100			0/100

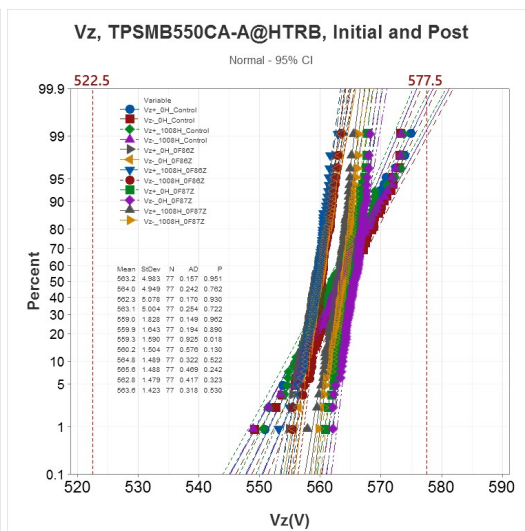
All qual vehicles pass reliability test and meet the drift requirement of AEC-Q101.

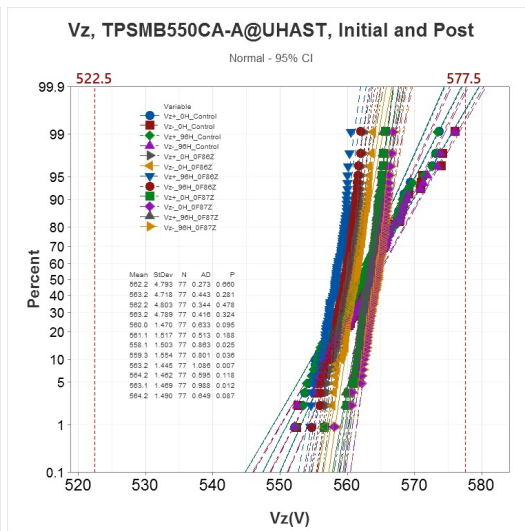
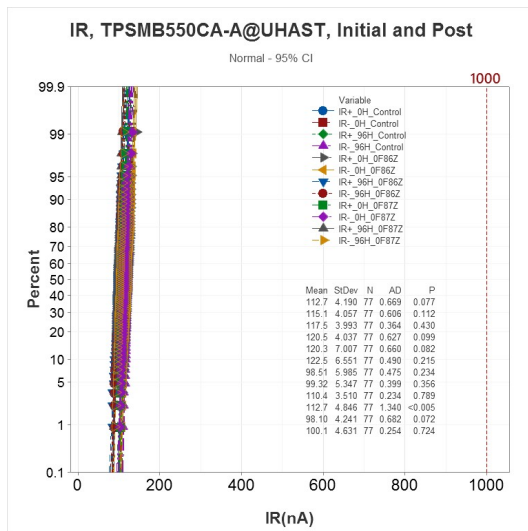
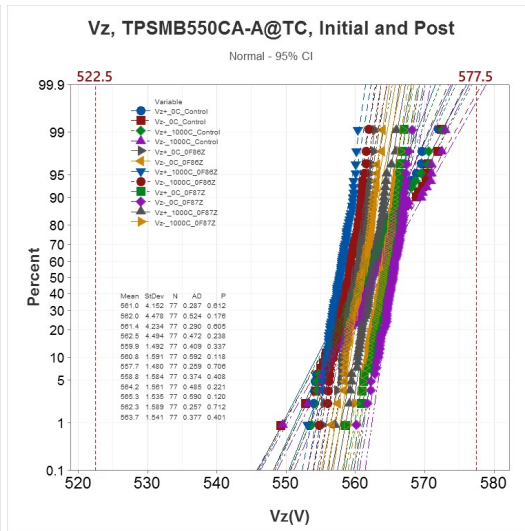
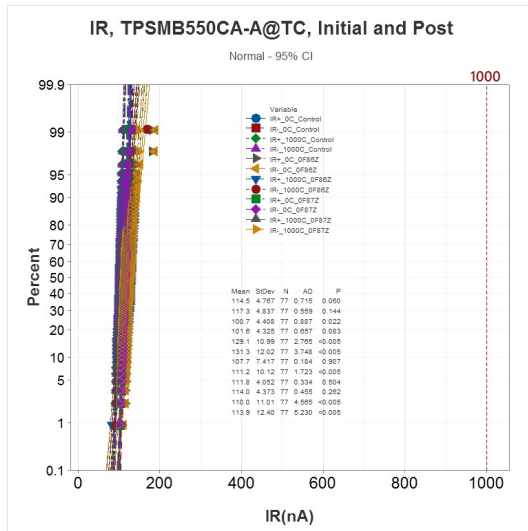
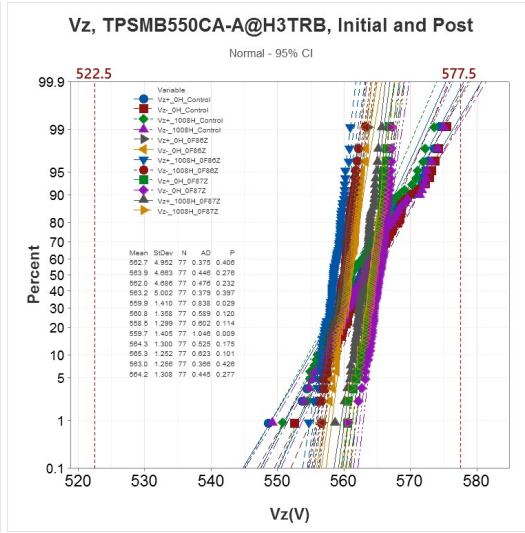
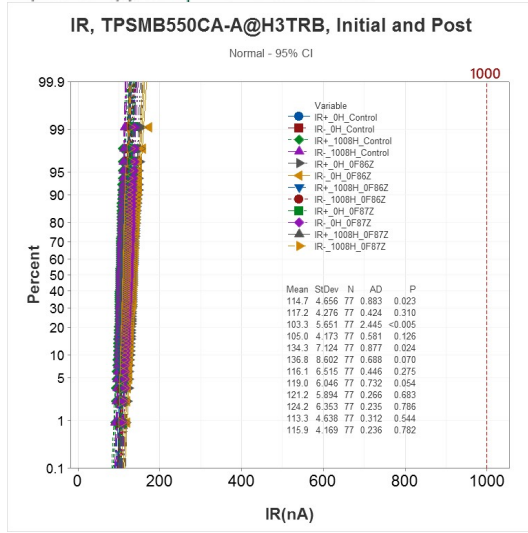
Appendix 1: Parameter drift and distribution in AEC-Q101 stress tests

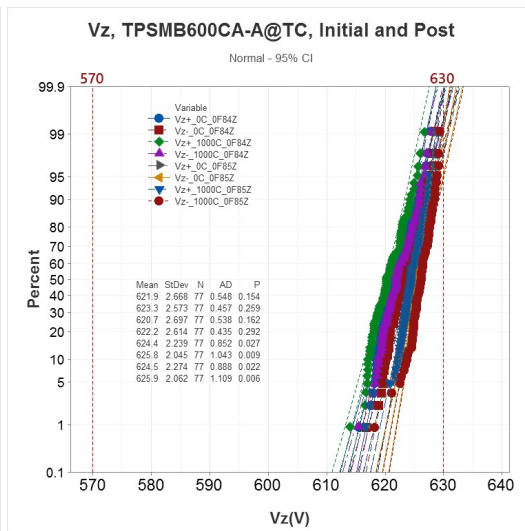
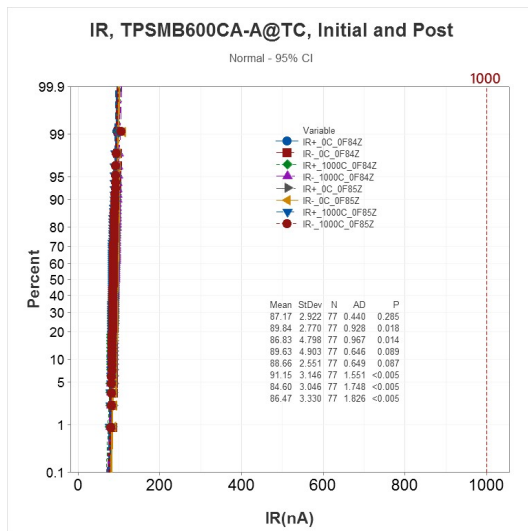
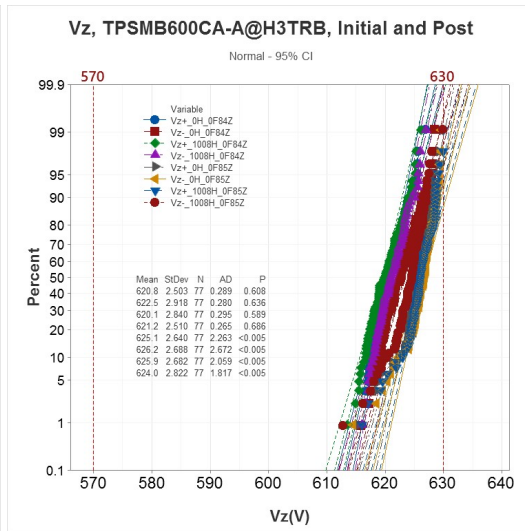
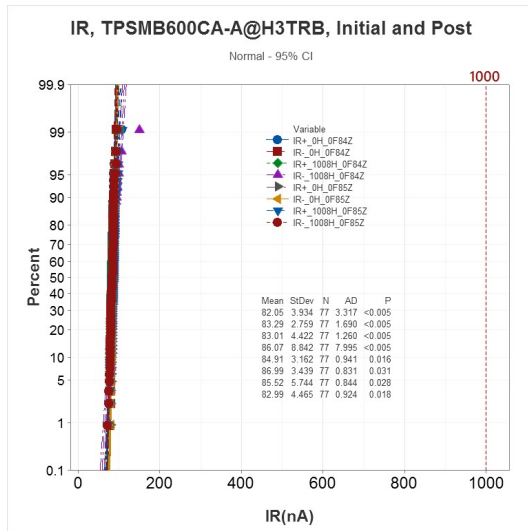
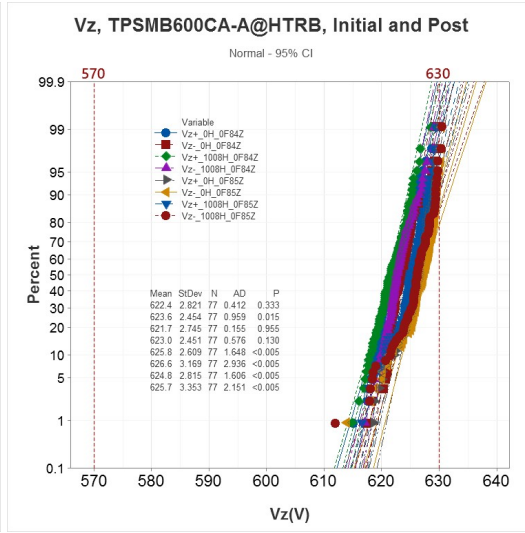
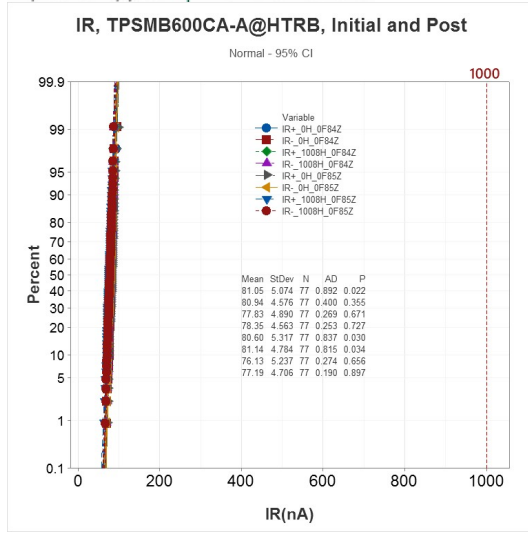
Note: The reference line is equal to or tighter than the specification defined in datasheet.

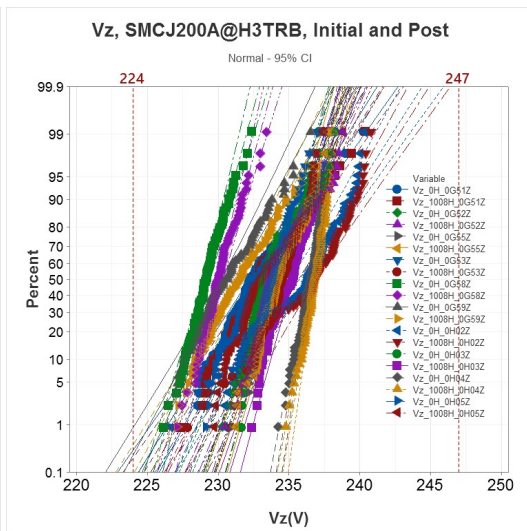
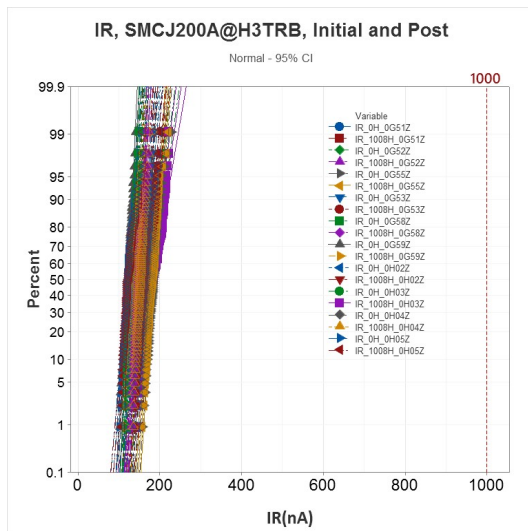
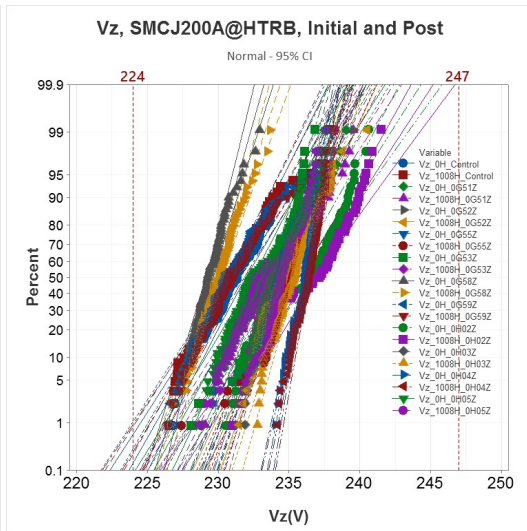
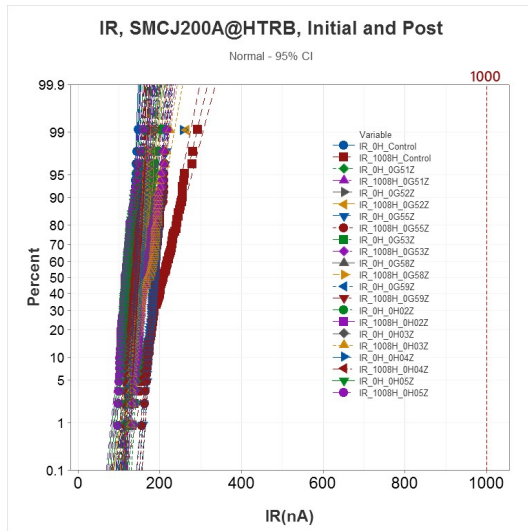
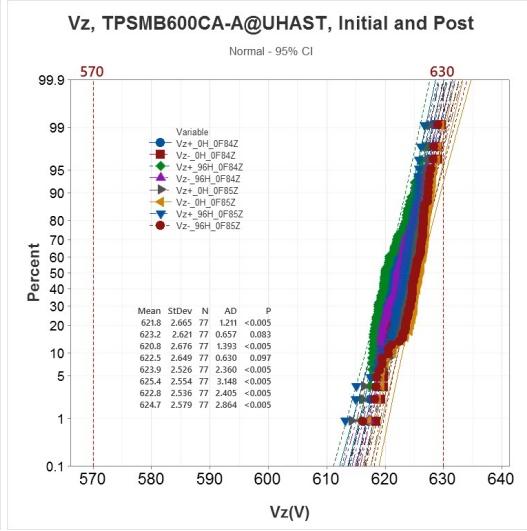
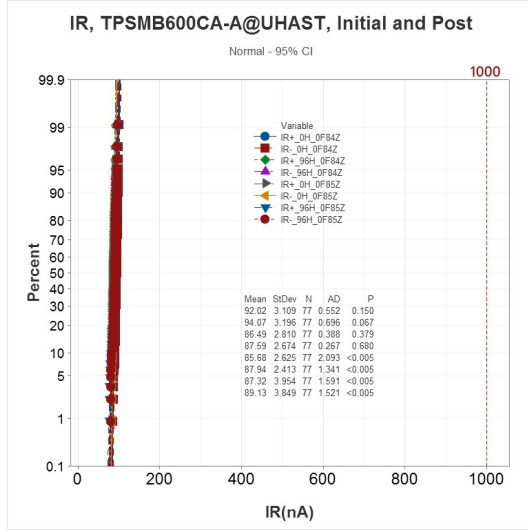


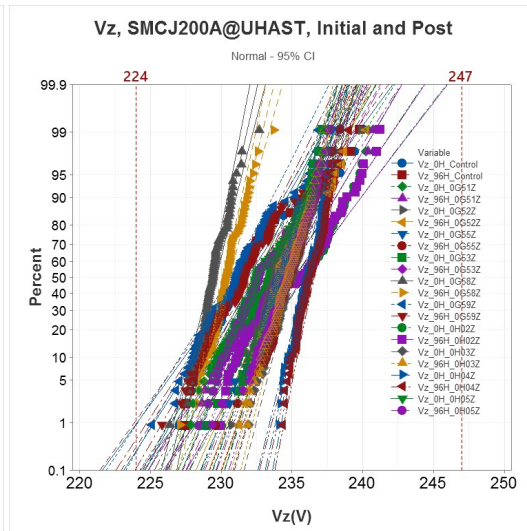
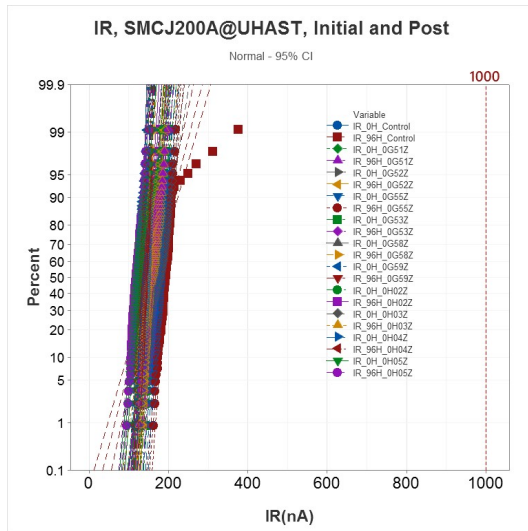
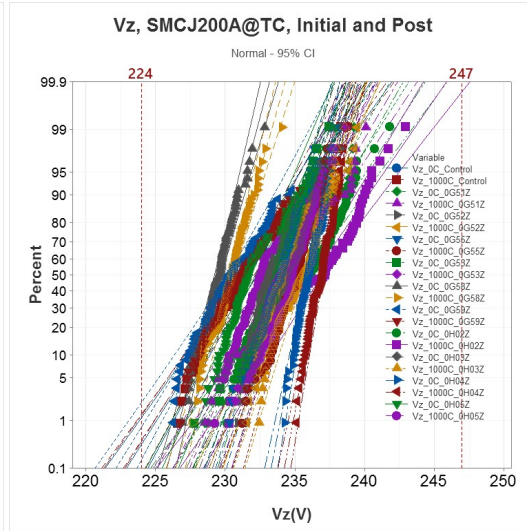
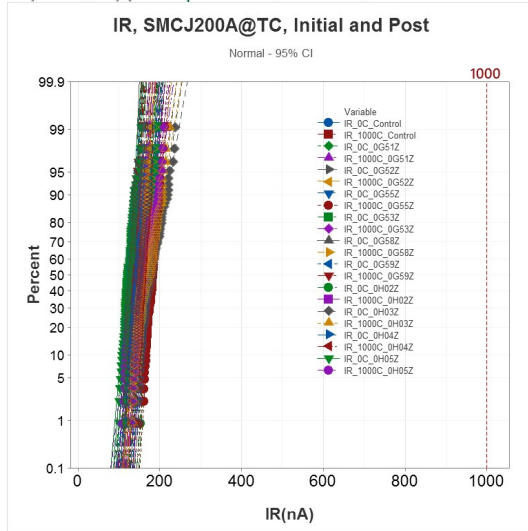












Appendix 2: Affected PN list

TPSMB		TPSMC
TPSMB100A	TPSMB90A-VR	SMCJ180A
TPSMB100CA	TPSMB90CA-VR	SMCJ193A
TPSMB110A	TPSMB100A-VR	SMCJ200A
TPSMB110CA	TPSMB100CA-VR	
TPSMB120A	TPSMB110A-VR	
TPSMB120CA	TPSMB110CA-VR	
TPSMB130A	TPSMB120A-VR	
TPSMB130CA	TPSMB120CA-VR	
TPSMB150A	TPSMB130A-VR	
TPSMB150CA	TPSMB130CA-VR	
TPSMB160A	TPSMB150A-VR	
TPSMB160CA	TPSMB150CA-VR	
TPSMB170A	TPSMB160A-VR	
TPSMB170CA	TPSMB160CA-VR	
TPSMB180A	TPSMB170A-VR	
TPSMB180CA	TPSMB170CA-VR	
TPSMB200A	TPSMB180A-VR	
TPSMB200CA	TPSMB180CA-VR	
TPSMB210A	TPSMB188A-VR	
TPSMB210CA	TPSMB188CA-VR	
TPSMB220A	TPSMB200A-VR	
TPSMB220CA	TPSMB200CA-VR	
TPSMB250A	TPSMB220A-VR	
TPSMB250CA	TPSMB220CA-VR	
TPSMB300A-A	TPSMB250A-VR	
TPSMB300CA-A	TPSMB250CA-VR	
TPSMB350A-A	TPSMB300A-VR	
TPSMB350CA-A	TPSMB300CA-VR	
TPSMB400CA-A	TPSMB350A-VR	
TPSMB440CA-A	TPSMB350CA-VR	
TPSMB400A-A	TPSMB400A-VR	
TPSMB440A-A	TPSMB400CA-VR	
TPSMB480A-A	TPSMB440A-VR	
TPSMB480CA-A	TPSMB440CA-VR	
TPSMB510A-A		
TPSMB510CA-A		
TPSMB520A-A		
TPSMB520CA-A		
TPSMB530A-A		
TPSMB530CA-A		
TPSMB540A-A		
TPSMB540CA-A		
TPSMB550A-A		
TPSMB550CA-A		
TPSMB600CA-A ³		
TPSMB650CA-A ³		

Note 3: PNs are released in new lines and only affected by wafer, solder paste and plating source change.