PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	AMS/19/11832
1.3 Title of PCN	Qualification of TSHT China as second Back-end source for Automotive grade products in TSSOP8 package
1.4 Product Category	See product list
1.5 Issue date	2019-11-15

2. PCN Team	
2.1 Contact supplier	
2.1.1 Name	ROBERTSON HEATHER
2.1.2 Phone	+1 8475853058
2.1.3 Email	heather.robertson@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Lorenzo NASO
2.1.2 Marketing Manager	Marcello SAN BIAGIO
2.1.3 Quality Manager	Jean-Marc BUGNARD

3. Change		
3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Transfer	Line transfer for a full process or process brick (process step, control plan, recipes) from one site to another site: Assembly site (SOP 2617)	Subcontractor TSHT (China)

4. Description of change		
	Old	New
4.1 Description	Assembly and Test & Finishing plant : - ST Bouskoura (Morocco)	Assembly and Test & Finishing plant : - ST Bouskoura (Morocco) - Subcontractor TSHT (China)
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No impact	

5. Reason / motivation for change	
5.1 Motivation	ST is pleased to announce the qualification of our subcontractor TSHT China as second Back-end source for Automotive grade products in TSSOP8 package (for General Purpose Analog products). This change will allow us to ship from either facility (ST Bouskoura or TSHT) in order to shorten lead-time and meet market demand. (Please note that a new PCN will be issued within 2020 to announce the modernization of the production line in Bouskoura.)
5.2 Customer Benefit	SERVICE IMPROVEMENT

6. Marking of parts / traceability of change	
6.1 Description	New Finished good codes

7. Timing / schedule	
7.1 Date of qualification results	2019-10-28
7.2 Intended start of delivery	2020-02-22
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	11832 Qual report TSSOP auto TSHT_WK45.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2019-11-15

9. Attachments (additional documentations)
11832 Public product.pdf 11832 Qual report TSSOP auto TSHT_WK45.pdf

10. Affected parts		
10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
	LM258AWYPT	
	LM258YPT	
	LM2903WYPT	
	LM2903YPT	
	LM2904AWYPT	
	LM2904AYPT	
	LM2904WYPT	
	LM2904YPT	
	LMV358IYPT	
	TS1872IYPT	
	TS9222IYPT	
	TS922AIYPT	
	TS922IYPT	
	TS952IYPT	
	TS972IYPT	
	TSC1021AIYPT	
	TSC1021BIYPT	
	TSC102IYPT	
	TSC1031IYPT	
	TSV358AIYPT	
	TSV358IYPT	

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PRODUCT/PROCESS
CHANGE NOTIFICATION

PCN AMS/19/11832

Analog, MEMS & Sensors Group (AMS)

Qualification of TSHT China as second Back-end source for Automotive grade products in TSSOP8 package (General Purpose Analog products)

WHAT:
ST is pleased to announce the qualification of our subcontractor TSHT China as second Back-end source for Automotive grade products in TSSOP8 package (for General Purpose Analog products).

This change will allow us to ship from either facility (ST Bouskoura or TSHT) in order to shorten lead-time and meet market demand. (*Please note that a new PCN will be issued within 2020 to announce the modernization of the production line in Bouskoura.)*

Material	Process before the PCN	Modified process	Comment
Diffusion location	**No change**		
Assembly location	ST Bouskoura (Morocco)	Subcontractor TSHT (China)	
Molding compound	Sumitomo G630AY	Hitachi CEL-9220HF10	Both halogen free
Die attach	Ablestick 8601-S25	Henkel 8200T	
Lead-frame	Copper	Copper	
Wire	Copper 1 mil	Copper 1 mil Pd Coated	
Plating	NiPdAgAu	Sn	
MSL	1	1	
Final test location	ST Bouskoura (Morocco)	Subcontractor TSHT (China)	
Tester	ASL1K	ASL1K	No change

WHY:

This additional source will allow us to better support our customer's demand and provide a better delivery service.

HOW:

The qualification program consists mainly of comparative electrical characterization and reliability tests.

You will find here after the qualification test plan which summarizes the various test methods and conditions that ST uses for this qualification program.

WHEN:

We will start deliveries from TSHT in January 2020.

Marking and traceability:

Unless otherwise stated by customer's specific requirement, the traceability of the parts assembled with the new material set will be ensured by new internal sales type, date code and lot number.

The changes here reported will not affect the electrical, dimensional and thermal parameters keeping unchanged all the information reported on the relevant datasheets.
There is -as well- no change in the packing process or in the standard delivery quantities.

Shipments may start earlier with the customer's written agreement.

Reliability Report

Automotive grade TSSOP8 in TSHT

General Information	
Product Line	0158, 0922, 3702
Product Description	Low power dual op-amps, Rail-to-rail dual op amp
P/N	LM2904YPT, TS922IYPT, TS3702IYPT
Product Group	*AMS*
Product division	*GPA*
Package	*TSSOP8*
Silicon Process technology	Bipolar, HF2CMOS, HC1PA

Locations	
Wafer fab	*ST Singapore*
Assembly plant	*TSHT (China)*
Reliability Lab	*ST Grenoble France*

Note: This report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the potential reliability risks during the product life using a set of defined test methods.
This report does not imply for STMicroelectronics expressly or implicitly any contractual obligations other than as set forth in STMicroelectronics general terms and conditions of Sale. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics.

TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
AEC-Q100	Stress test qualification for automotive grade integrated circuits
AEC-Q101	Stress test qualification for automotive grade discrete semiconductors
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
AECQ006	Qualification requirements for components using copper (cu) wire interconnections

2 GLOSSARY

DUT	Device Under Test
PCB	Printed Circuit Board
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

To qualify TSSOP8 package for Automotive Grade products for General Purpose Analog products.

3.2 Conclusion

Qualification Plan requirements have been fulfilled without issue. It is stressed that reliability tests have to show that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests have to demonstrate the ruggedness of the products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

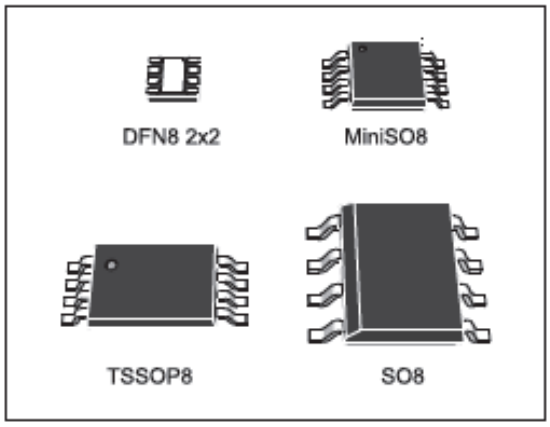
LM2904YPT

life.augmented

LM2904, LM2904A

Low-power dual operational amplifier

Datasheet - production data



Features

- Frequency compensation implemented internally
- Large DC voltage gain: 100 dB
- Wide bandwidth (unity gain): 1.1 MHz (temperature compensated)
- Very low supply current/amplifier, essentially independent of supply voltage
- Low input bias current: 20 nA (temperature compensated)
- Low input offset current: 2 nA
- Input common-mode voltage range includes negative rail
- Differential input voltage range equal to the power supply voltage
- Large output voltage swing 0 V to ((V$_{CC}^{+}$) -1.5 V)

Related products

- See LM2904W for enhanced ESD performances

Description

This circuit consists of two independent, high gain operational amplifiers (op amps) that have frequency compensation implemented internally. They are designed specifically for automotive and industrial control systems. The circuit operates from a single power supply over a wide range of voltages. The low power supply drain is independent of the magnitude of the power supply voltage.

Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits which can now be more easily implemented in single power supply systems. For example, these circuits can be directly supplied from the standard 5 V which is used in logic systems and easily provides the required electronic interfaces without requiring any additional power supply.

In linear mode, the input common-mode voltage range includes ground and the output voltage can also swing to ground, even though operated from a single power supply.

TS922, TS922A

Rail-to-rail, high output current, dual operational amplifier

Datasheet - production data

Flip-chip with backcoating

SO8

TSSOP8

Applications

- Headphone and servo amplifiers
- Sound cards, multimedia systems
- Line drivers, actuator drivers
- Mobile phones and portable equipment
- Instrumentation with low noise as key factor
- Piezoelectric speaker drivers

Description

TS922 and TS922A devices are rail-to-rail dual BiCMOS operational amplifiers optimized and fully specified for 3 V and 5 V operation. These devices have high output currents which allow low-load impedances to be driven.

Very low noise, low distortion, low offset, and a high output current capability make these devices an excellent choice for high quality, low voltage, or battery operated audio systems.

The devices are stable for capacitive loads up to 500 pF.

Features

- Rail-to-rail input and output
- Low noise: 9 nV/√Hz
- Low distortion
- High output current: 80 mA (able to drive 32 Ω loads)
- High-speed: 4 MHz, 1 V/µs
- Operating from 2.7 to 12 V
- Low input offset voltage: 900 µV max. (TS922A)
- ESD internal protection: 2 kV
- Latch-up immunity
- Macromodel included in this specification
- Dual version available in Flip-chip package

TS3702IYPT

TS3702

Micropower dual CMOS voltage comparators

Features

- Push-pull CMOS output (no external pull-up resistor required)
- Extremely low supply current: 9µA typ / comparator
- Wide single supply range: 2.7V to 16V or dual supplies (±1.35V to ±8V)
- Extremely low input bias current: 1pA typ
- Extremely low input offset currents: 1pA typ
- Input common-mode voltage range includes GND
- High input impedance: $10^{12}\Omega$ typ
- Fast response time: 2µs typ for 5mV overdrive
- Pin-to-pin and functionally compatible with bipolar LM393

Description

The TS3702 is a micropower CMOS dual voltage comparator with extremely low consumption of 9µA typ / comparator (20 times less than bipolar LM393). The push-pull CMOS output stage allows power and space saving by eliminating the external pull-up resistor required by usual open-collector output comparators.

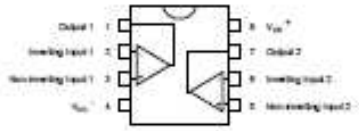
Thus response times remain similar to the LM393.

N
DIP8
(Plastic package)

D
SO8
(Plastic micropackage)

P
TSSOP8
(Thin shrink small outline package)

Pin connections
(Top view)



4.2 Construction note

	New Plant Qualification		
	P/N LM2904YPT	**PN/ TS922IYPT**	**P/N TS3702IPT**
Wafer/Die fab. information			
Wafer fab manufacturing location	ST Singapore		
Technology	Bipolar	HF2CMOS	HC1PA
Process family	Bipolar	BiCMOS2	CMOS
Die finishing back side	Raw Silicon	Raw Silicon	Lapped silicon
Die size	1070 x 1010 µm²	1720x1190µm²	1366x1136µm²
Passivation type	SiN (nitride)	PVAPOX+Nitride	PVAPOX+Nitride
Assembly information			
Assembly site	SC-Tianshui Huatian-China (TSHT)		
Package description	TSSOP8		
Molding compound	Hitachi CEL-9220HF10		
Frame material	Copper		
Die attach process	Glue		
Die attach material	Henkel 8200T-		
Wire bonding process	Wire		
Wires bonding materials/diameters	1.0mil PdCu		
Lead finishing process	Copper		
Lead finishing/bump solder material	Sn		
Final testing information			
Testing location	SC-Tianshui Huatian-China (TSHT) 999L		

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Diffusion Lot	Assy Lot	Process/ Package	Product Line	Comments
1	V68514PV	T3L1913LG0188	Bipolar/TSSOP8	0158	
2	V68514TX	TSS008190425865	HF2CMOS/TSSOP8	0922	
3	V613P3E	TSS008190425864	HC1PA/TSSOP8	3702	

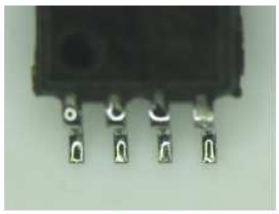
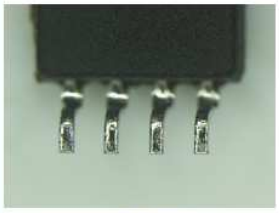
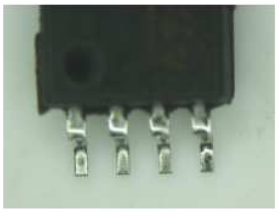
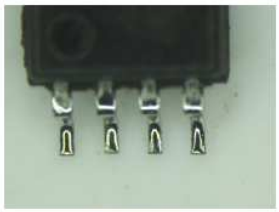
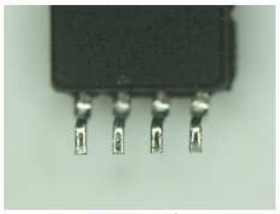
5.2 Test plan and results summary

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS						Note
						0158	0922	3702				
HTOL	N	JESD22 A-108	Ta = 125°C, BIAS		168 H	0/77	0/77	0/77				
					500 H	0/77	0/77	0/77				
					1000 H	0/77	0/77	0/77				
					2000h		0/77					
ELFR	N	JESD22 A-108	Ta = 125°C, BIAS		48h	On going	On going	0/800				
HTSL	N	JESD22 A-103	Ta = 150°C		168 H	0/77	0/77	0/77				
					500 H	0/77	0/77	0/77				
					1000 H	0/77	0/77	0/77				
					2000H							
Package Oriented Tests												
PC		JESD22 A-113	Drying 24 H @ 125°C Store 168 H @ Ta=85°C Rh=85% Over Reflow @ Tpeak=260°C 3 times		Final	PASS	PASS	PASS				
UHAST	Y	JESD22 A-102	Pa=2Atm / Ta=121°C		96 H	0/77	0/77	0/77				
TC	Y	JESD22 A-104	Ta = -65°C to 150°C		100 cy	0/77	0/77	0/77				*DPA after cycles
					200 cy	0/77	0/77	0/77				
					500 cy	0/77	0/77	0/77				
					1000cy	0/77	0/77	0/77				
					2000cy	0/77	0/74*	74*				
THB	Y	JESD22 A-101	Ta = 85°C, RH = 85%, BIAS		168 H	0/77	0/77	0/77				
					500 H	0/77	0/77	0/77				
					1000 H	0/77	0/77	0/77				
			CDM		1500V							

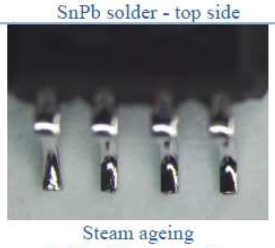
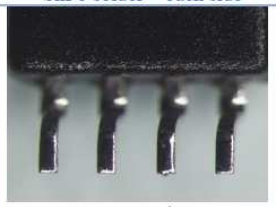
DPA: destructive physical analysis performed after test with positive results (both value and failure mode)

Solderability:

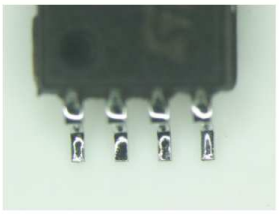
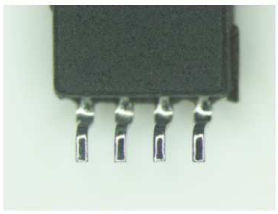
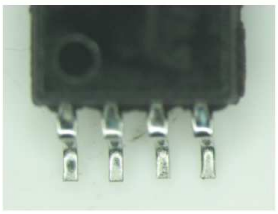
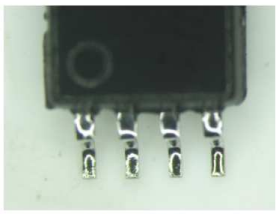
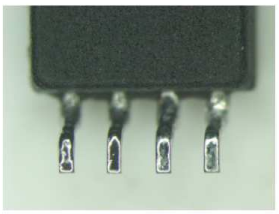
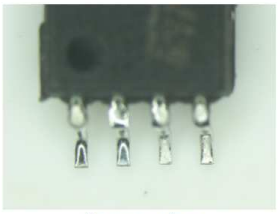
Test vehicle LM2904YPT
REF.: CAD19003
Sample size 40 units
Results: Pass

After solderability test pictures			
 Dry air SnPb solder - top side	 Dry air SnPb solder – back side	 Dry air SnAgCu solder - top side	 Dry air SnAgCu solder – back side
 Steam ageing SnPb solder – top side	 Steam ageing SnPb solder – back side	 Steam ageing SnAgCu solder – top side	 Steam ageing SnAgCu solder – back side

Test vehicle TS922IYPT
REF.: CAD19005
Sample size 40 units
Results: Pass

After solderability test pictures			
 Dry air SnPb solder - top side	 Dry air SnPb solder – back side	 Dry air SnAgCu solder - top side	 Dry air SnAgCu solder – back side
 Steam ageing SnPb solder – top side	 Steam ageing SnPb solder – back side	 Steam ageing SnAgCu solder – top side	 Steam ageing SnAgCu solder – back side

Test vehicle TS3702IPT
REF.: CAD19004
Sample size 40 units
Results pass

After solderability test pictures			
 Dry air SnPb solder - top side	 Dry air SnPb solder – back side	 Dry air SnAgCu solder - top side	 Dry air SnAgCu solder – back side
 Steam ageing SnPb solder – top side	 Steam ageing SnPb solder – back side	 Steam ageing SnAgCu solder – top side	 Steam ageing SnAgCu solder – back side

Pull test (value in gram)

All failure mode acceptable

Unit / TV	0158	0922	3702
1	14.89	12.75	11.84
2	15.22	13.44	12.33
3	16.12	13.48	12.47
4	12.72	13.21	10.12
5	13.74	13.22	11.28
6	13.06	13.42	12.66
7	14.72	14.01	11.86
8	15.12	13.06	11.85
9	12.78	12.89	12.08
10	15.36	13.59	11.81
11	14.08	13.68	13.20
12	16.17	12.83	11.34
13	14.41	11.66	12.73
14	14.73	13.44	11.16
15	15.41	12.17	11.35
16	14.69	12.97	12.11
17	13.53	12.79	11.01
18	14.09	13.26	10.08
19	15.18	12.59	10.73
20	14.98	13.51	11.85
21	16.65	13.85	12.62
22	14.86	12.98	10.85
23	14.42	13.67	11.19
24	15.27	11.67	11.52
25	13.95	13.15	12.09
26	13.06	12.49	12.81
27	13.15	12.87	11.93
28	13.95	13.15	11.77
29	13.06	12.49	10.79
30	13.15	12.87	11.10
mean	**14.4**	**13.0**	**11.7**
stddev	**1.04**	**0.56**	**0.76**
Cpk	**3.34**	**5.40**	**3.36**

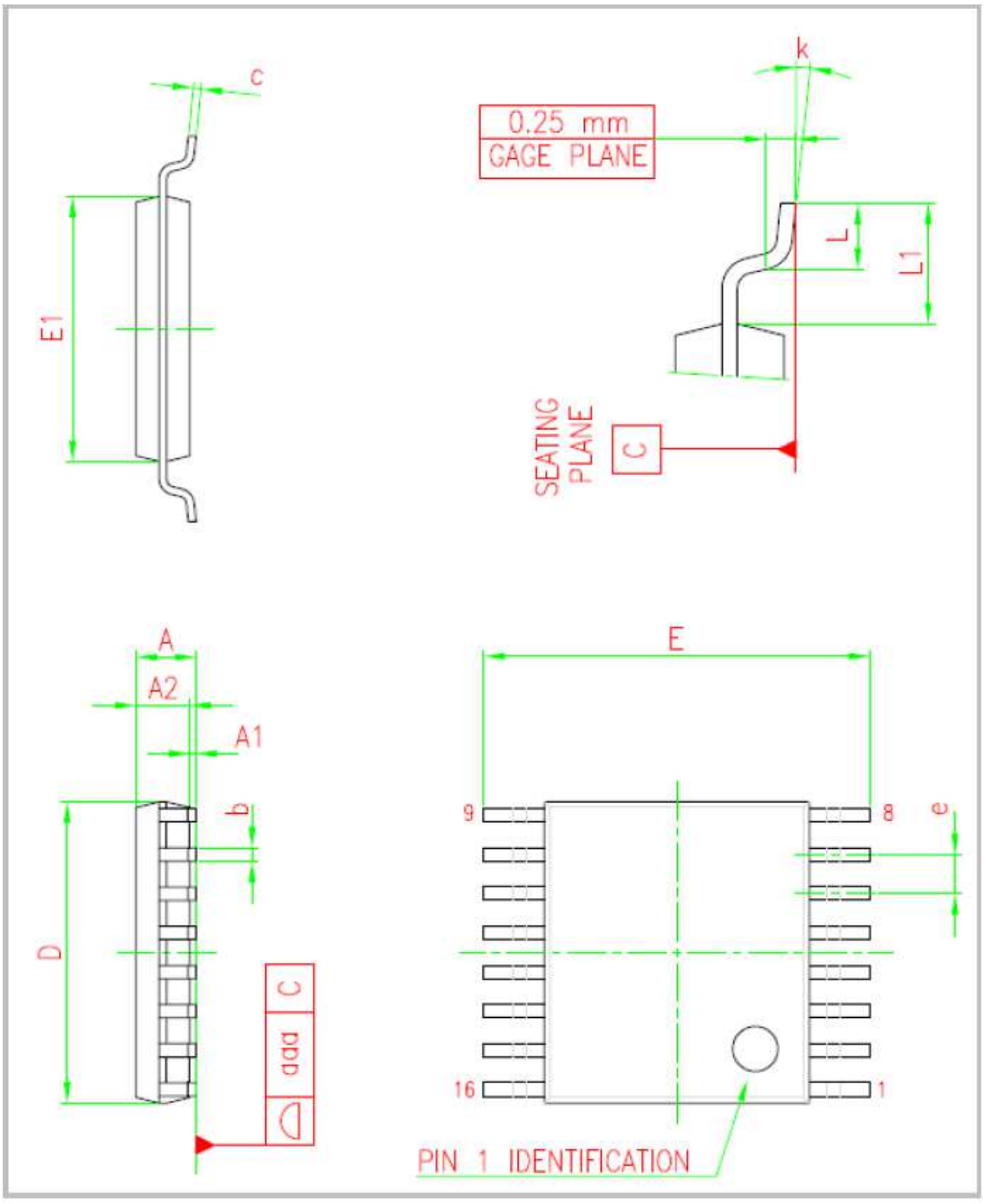
Shear test (value in gram)

All failure mode acceptable

Unit / TV	0158	0922	3702
1	38.037	32.64	48.806
2	41.16	34.86	48.63
3	41.261	32.49	48.39
4	42.452	33.53	47.782
5	39.371	31.27	45.916
6	43.157	34.14	48.046
7	41.504	33.6	48.598
8	42.026	45.42	48.06
9	42.228	35.42	47.22
10	42.772	33.83	48.104
11	38.726	36.25	48.568
12	39.174	33.56	47.987
13	40.567	31.19	47.031
14	43.012	35.02	47.405
15	42.272	33.24	47.533
16	40.324	33.23	46.486
17	41.147	35.14	48.444
18	38.277	35.47	46.142
19	38.521	31.48	47.331
20	36.061	33.92	47.678
21	39.581	33.81	46.456
22	37.444	33.59	47.441
23	38.674	34.18	46.665
24	43.193	34.69	46.245
25	40.465	34.93	45.732
26	40.693	34.45	46.752
27	37.258	34.87	48.735
28	40.465	34.93	45.732
29	40.693	34.45	46.752
30	37.258	34.87	48.735
mean	**40.3**	**34.3**	**47.4**
stddev	**1.95**	**2.39**	**0.96**
Cpk	**2.86**	**1.78**	**3.31**

Physical dimension

CP	Unit / dim	A	A1	A2	b	D	E	E1	L
TSC103IYPT	**1**	1.08	0.118	0.962	0.232	2.996	6.441	4.378	0.628
	2	1.062	0.105	0.957	0.226	3.004	6.452	4.373	0.633
	3	1.071	0.108	0.963	0.227	2.999	6.445	4.367	0.622
	4	1.062	0.097	0.965	0.235	3.003	6.452	4.369	0.634
	5	1.071	0.105	0.965	0.228	2.991	6.448	4.363	0.627
	6	1.083	0.112	0.971	0.228	2.991	6.448	4.363	0.627
LM2904YPT	**7**	1.077	0.114	0.963	0.231	2.988	6.424	4.386	0.619
	8	1.069	0.103	0.966	0.229	2.984	6.419	4.392	0.621
	9	1.071	0.099	0.972	0.223	2.991	6.433	4.388	0.613
	10	1.074	0.107	0.967	0.225	2.988	6.432	4.402	0.628
	11	1.071	0.108	0.963	0.219	2.997	6.431	4.401	0.623
	12	1.071	0.108	0.963	0.219	2.997	6.431	4.401	0.623
LM2903YPT	**13**	1.069	0.117	0.952	0.23	2.998	6.444	4.368	0.628
	14	1.057	0.117	0.954	0.226	2.996	6.45	4.37	0.63
	15	1.072	0.103	0.964	0.227	2.999	6.44	4.367	0.621
	16	1.061	0.108	0.963	0.237	3.001	6.452	4.368	0.634
	17	1.06	0.098	0.955	0.227	2.991	6.448	4.362	0.627
	18	1.06	0.105	0.955	0.227	2.991	6.448	4.362	0.627
TS922IYPT	**19**	1.069	0.107	0.959	0.231	2.995	6.429	4.392	0.611
	20	1.085	0.124	0.963	0.229	2.989	6.442	4.389	0.617
	21	1.083	0.12	0.965	0.23	2.986	6.415	4.391	0.605
	22	1.074	0.111	0.962	0.237	2.987	6.428	4.388	0.609
	23	1.081	0.119	0.963	0.238	2.994	6.445	4.393	0.604
	24	1.081	0.119	0.963	0.238	2.994	6.445	4.393	0.604
TS3702IPT	**25**	1.078	0.103	0.975	0.232	2.993	6.424	4.392	0.623
	26	1.081	0.113	0.968	0.241	2.988	6.432	4.401	0.631
	27	1.078	0.106	0.972	0.228	2.992	6.429	4.398	0.623
	28	1.068	0.104	0.964	0.235	2.997	6.431	4.403	0.63
	29	1.077	0.109	0.968	0.234	2.996	6.427	4.396	0.637
	30	1.077	0.109	0.968	0.234	2.996	6.427	4.396	0.637
	mean	**1.1**	**0.1**	**1.0**	**0.2**	**3.0**	**6.4**	**4.4**	**0.6**
	Cpk	**5.57**	**2.01**	**3.98**	**1.90**	**6.32**	**5.14**	**1.97**	**4.56**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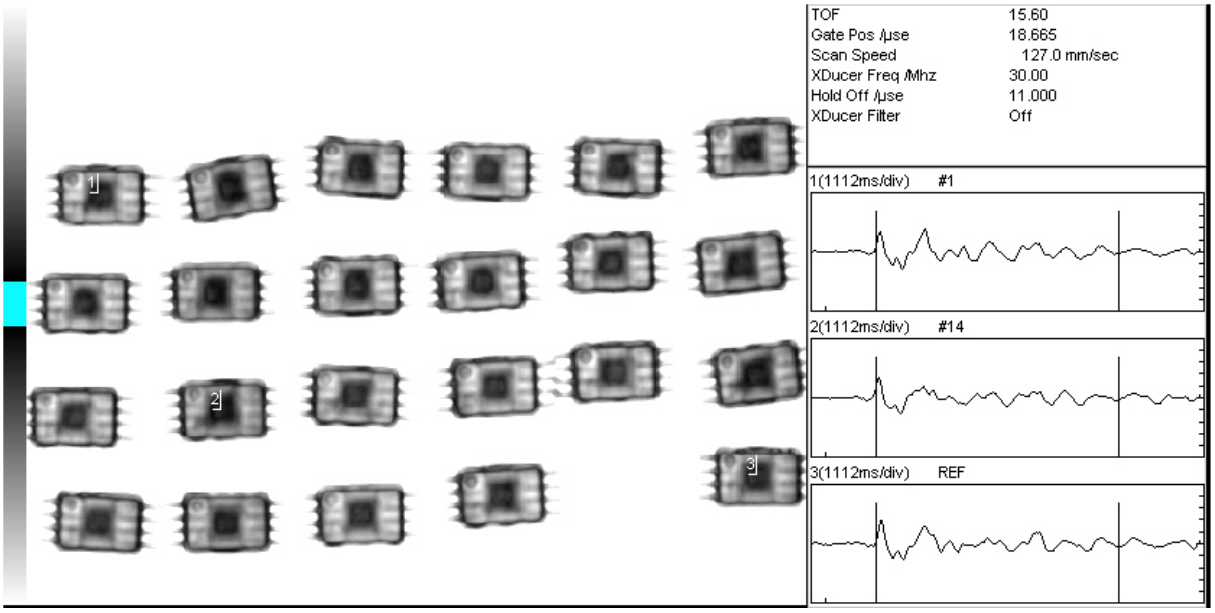
PIN 1 IDENTIFICATION

Scanning acoustic microscopy:

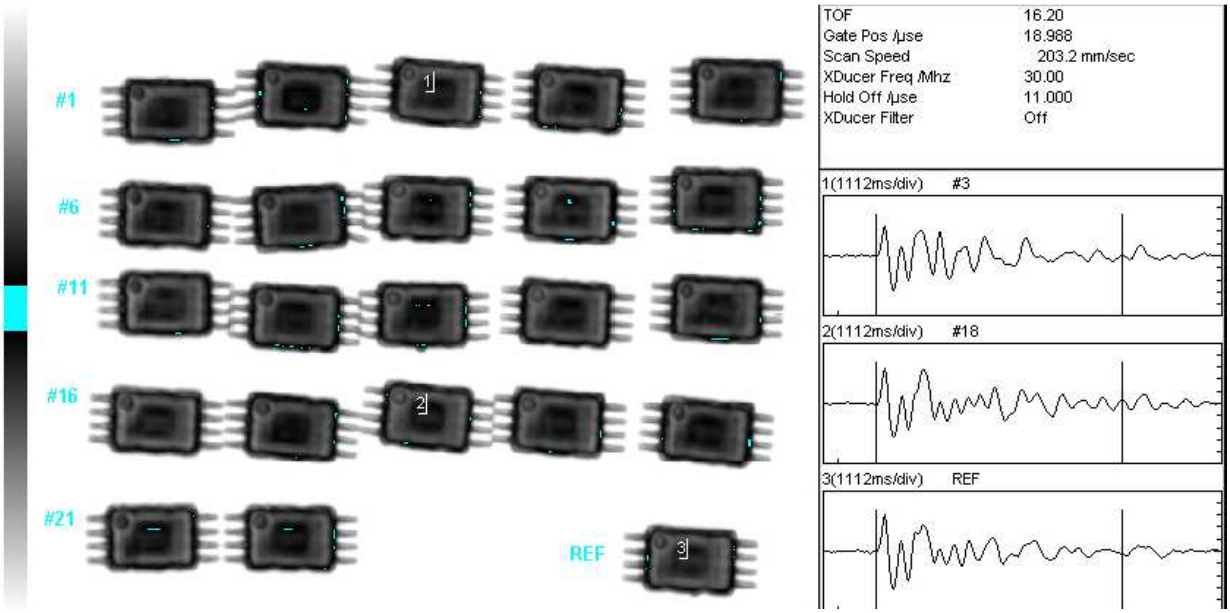
Test vehicle 0158

No delamination on die after MSL1



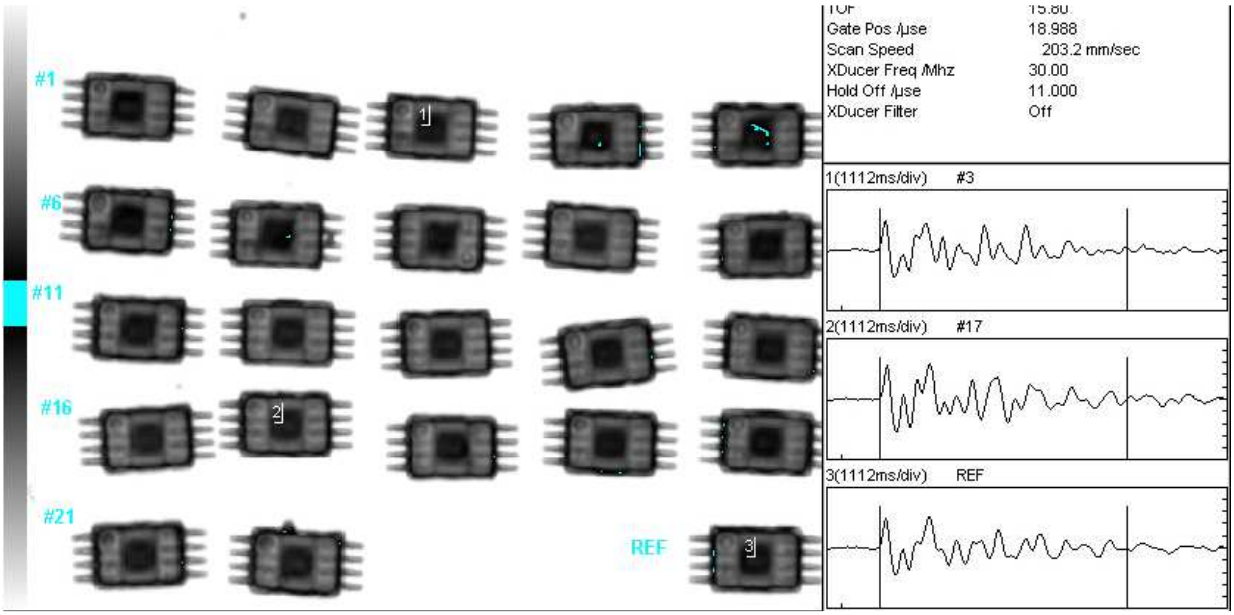
Test vehicle 0922

No delamination on die after MSL1



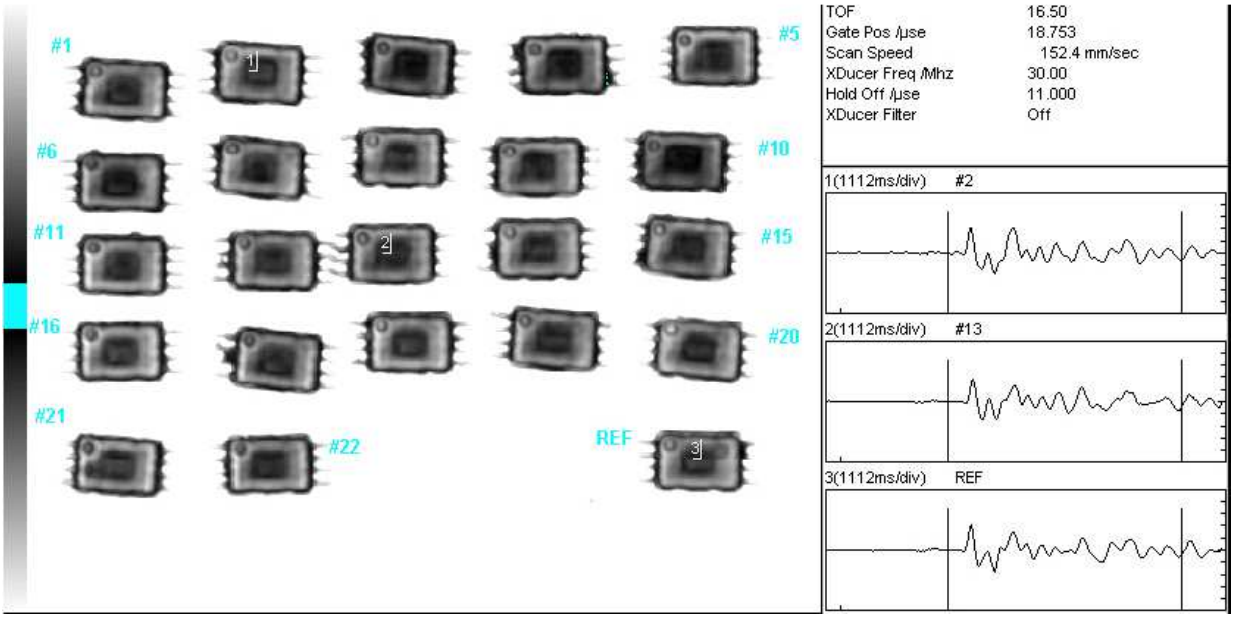
Test vehicle 3702

No delamination on die after MSL1



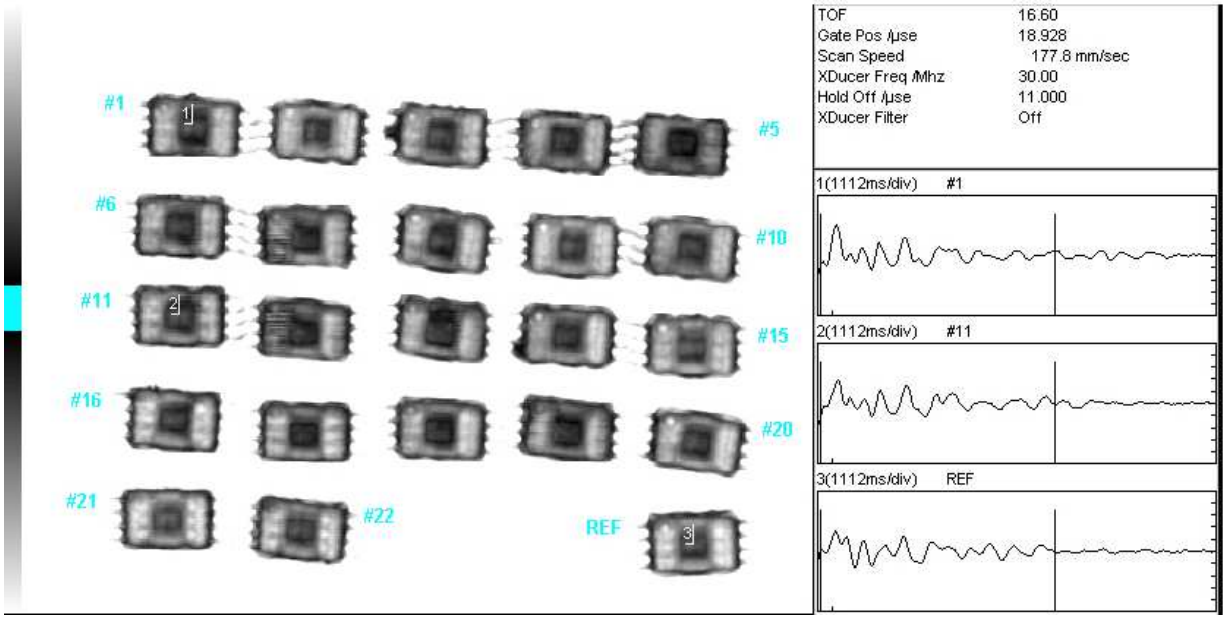
Test vehicle 0922

No delamination on die after 1000 thermal cycles



Test vehicle 3702

No delamination after 1000 thermal cycles



Electrical comparison

LM2904YPT

		Mean Comparison			Cpk comparison	
Name	Units	ST Bouskoura	TSHT	Shift	ST Bouskoura	TSHT
P106_*0, Icc 3V	mA	0.462628	0.476386	-0.013758	26.36	33.56
P101_A0, VioA 3V	mV	0.370816	0.252096	0.11872	2.56	3.38
P101_B0, VioB 3V	mV	1.00119	0.897649	0.103541	2.07	2.59
P117_A0, VohA 30V 10K	V	28.5475	28.5483	-0.0008	38.23	53.87
P117_B0, VohB 30V 10K	V	28.5516	28.5518	-0.0002	39.10	42.47
P117_A0, VolA 30V 10K	V	0.00613851	0.00385429	0.00228422	6.61	3.66
P117_B0, VolB 30V 10K	V	0.00585468	0.00353463	0.00232005	6.87	3.32
P106_*1, Icc 30V	mA	0.603407	0.62423	-0.020823	18.79	23.97
P101_A1 , VioA 30V	mV	0.361966	0.246413	0.115553	2.53	3.32
P101_B1 , VioB 30V	mV	0.977207	0.893358	0.083849	2.07	2.57
P106_*3 , Icc 5V	mA	0.492089	0.506354	-0.014265	6.29	6.92
P101_A3 , VioA 5V/0V	mV	0.350488	0.244929	0.105559	2.57	3.37
P101_B3 , VioB 5V/0V	mV	0.95631	0.879992	0.076318	2.11	2.61
P101_A2, VioA 30V/28.	mV	0.0772191	-0.0388704	0.1160895	2.68	3.54
P101_B2, VioB 30V/28.	mV	0.673441	0.650355	0.023086	2.29	2.87
P105_A1 , SVR A	dB	128.567	134.676	-6.109	not gaussian	not gaussian
P105_B1 , SVR B	dB	122.426	126.663	-4.237	not gaussian	not gaussian
P109_A1 , CMR A	dB	100.731	100.242	0.489	not gaussian	not gaussian
P109_B1 , CMR B	dB	100.523	102.295	-1.772	not gaussian	not gaussian
P104_A1, Avd A	V/mV	370.809	344.276	26.533	not gaussian	not gaussian
P104_B1, Avd B	V/mV	387.888	337.267	50.621	not gaussian	not gaussian
P150_*1, Thp	V	4.99871	4.99824	0.00047	2480.00	2415.48
P101_A31, VioA 5/3.5V	mV	0.243886	0.131616	0.11227	2.65	3.47
P101_B31, VioB 5/3.5V	mV	0.834395	0.766959	0.067436	2.21	2.75
P117_A3, VolA 5V 10Ko	V	0.00596164	0.00297052	0.00299112	12.29	20.89
P117_B3, VolB 5V 10Ko	V	0.00578233	0.00280821	0.00297412	13.60	20.35
P117_A1, VohA 30V 2KO	V	28.2351	28.2271	0.008	55.06	41.25
P117_B1, VohB 30V 2KO	V	28.2342	28.2239	0.0103	55.12	26.89
P117_A5, VohA 10V 2KO	V	8.51726	8.52231	-0.00505	3.66	6.58
P117_B5, VohB 10V 2KO	V	8.51767	8.5215	-0.00383	3.67	4.97
P117_A3, VohA 5V 2KOh	V	3.60412	3.61276	-0.00864	2.23	4.76
P117_B3, VohA 5V 2KOh	V	3.60387	3.61223	-0.00836	2.21	4.30
P102_A1, IioA 30V	nA	-10.2905	-3.67767	-6.61283	5.42	11.46
P102_B1 , IioB 30V	nA	-13.0732	-4.79016	-8.28304	4.08	9.88
P103_A1 , IibnA 30V	nA	-37.1209	-27.1701	-9.9508	4.68	9.37
P103_B1 , IibnB 30V	nA	-39.8151	-29.785	-10.0301	5.01	9.32
P103_A1 , IibpA 30V	nA	-26.8304	-23.4924	-3.338	3.65	8.80

P103_B1 , IibpB 30V	nA	-26.7419	-24.9949	-1.747	3.70	8.72
P137_A2, IskA 15V Vo2	mA	18.1609	18.087	0.0739	8.18	8.87
P137_B2, IskB 15V Vo2	mA	18.4596	18.2219	0.2377	7.99	7.32
P137_A1 , IsrA 15V Vo2	mA	-34.393	-34.2779	-0.1151	10.40	15.65
P137_B1 , IsrB 15V Vo2	mA	-34.7694	-34.2848	-0.4846	10.01	18.31
P137_A21, IskA 15V Vo0	mA	0.0818767	0.0865709	-0.0046942	4.19	6.72
P137_B21, IskB 15V Vo0	mA	0.0848214	0.0866692	-0.0018478	4.97	7.22
P121_A1, GBPA 30V	MHz	1.32511	1.40632	-0.08121	8.23	10.83
P121_B1, GBPB 30V	MHz	1.32548	1.40013	-0.07465	7.55	10.65
P113_A2, SRnA 15V	V/uS	0.838645	0.868635	-0.02999	7.93	16.98
P113_B2, SRnB 15V	V/uS	0.866836	0.90496	-0.038124	11.17	14.40
P113_A2, SRpA 15V	V/uS	0.711404	0.747194	-0.03579	13.39	18.17
P113_B2, SRpB 15V	V/uS	0.747781	0.773584	-0.025803	7.78	9.48

TS922IYPT

Name	Units	ST Bouskoura	TSHT	Shift	ST Bouskoura	TSHT
P106_*0, Icc	mA	0.98	1.00	-0.019833	9.58	9.85
P101_A0, Vio	mV	0.31	0.43	-0.121175	10.28	11.05
P101_B0, Vio	mV	0.23	0.33	-0.106453	10.11	10.42
P106_*5, Icc	mA	1.20	1.27	-0.06683	10.36	10.01
P101_A5, Vio	mV	0.23	0.38	-0.146597	11.89	12.72
P101_B5, Vio	mV	0.18	0.28	-0.101855	11.39	12.09
P106_*2 , Icc	mA	1.04	1.07	-0.02925	4.34	5.05
P101_A2 , Vio	mV	0.27	0.41	-0.139904	4.27	4.42
P101_B2 , Vio	mV	0.21	0.31	-0.101858	4.15	4.33
P106_*1 , Icc	mA	0.99	1.01	-0.021406	3.55	4.27
P101_A1 , Vio	mV	0.30	0.44	-0.140916	4.23	4.38
P101_B1 , Vio	mV	0.24	0.35	-0.108764	4.11	4.28
P109_A1, cmr	dB	89.77	89.91	-0.137	not gaussian	not gaussian
P109_B1, cmr	dB	88.60	89.13	-0.5348	not gaussian	not gaussian
P109_A2, cmr	dB	94.40	95.11	-0.7049	not gaussian	not gaussian
P109_B2, cmr	dB	93.57	94.28	-0.7014	not gaussian	not gaussian
P105_A1, SVR	dB	93.43	93.09	0.341	not gaussian	not gaussian
P105_B1, SVR	dB	92.94	92.52	0.4183	not gaussian	not gaussian
P104_A1, Avd	V/mV	337.44	258.78	78.656	not gaussian	not gaussian
P104_B1, Avd	V/mV	363.18	287.04	76.133	not gaussian	not gaussian
P104_A4, Avd	V/mV	74.93	81.52	-6.5946	not gaussian	not gaussian
P104_B4, Avd	V/mV	146.70	68.44	78.2638	not gaussian	not gaussian
P102_A1, Iio	nA	-0.97	-1.73	0.753241	5.21	8.16
P102_B1, Iio	nA	-2.61	-1.49	-1.1194	2.53	7.88
P103_A1, Iibn	nA	25.78	26.91	-1.1268	11.74	6.71
P103_B1, Iibn	nA	24.71	27.62	-2.9082	11.57	6.23
P103_A1, Iibp	nA	26.75	28.63	-1.88	9.60	6.62
P103_B1, Iibp	nA	27.32	29.10	-1.7888	5.96	6.21
P117_A1, Voh	V	2.99	2.99	-0.00013	23.52	9.00
P117_B1, Voh	V	2.99	2.99	3E-05	21.99	8.78
P117_A1, Vol	V	0.01	0.01	9.36E-05	6.70	14.54
P117_B1, Vol	V	0.01	0.01	0.0001533	6.81	15.19
P117_A2, Voh	V	2.95	2.95	-0.00196	16.88	13.50
P117_B2, Voh	V	2.95	2.95	-0.00095	33.96	14.79
P117_A2, Vol	V	0.04	0.04	0.0014525	10.14	16.93
P117_B2, Vol	V	0.04	0.04	0.0010834	11.16	21.20
P117_A3, Voh	V	4.99	4.99	0.00044	22.69	11.32
P117_B3, Voh	V	4.99	4.99	0.0004	23.05	10.90
P117_A3, Vol	V	0.02	0.01	0.0006913	8.31	16.34
P117_B3, Vol	V	0.02	0.01	0.0008525	8.56	17.65

P117_A4, Voh	V	4.93	4.93	-0.00242	14.07	11.94
P117_B4, Voh	V	4.93	4.93	-0.00099	35.52	13.23
P117_A4, Vol	V	0.05	0.05	0.0026458	9.96	17.56
P117_B4, Vol	V	0.05	0.05	0.0020391	11.23	21.49
P137_A1, Isk	mA	90.27	92.42	-2.1424	6.45	7.94
P137_B1, Isk	mA	90.28	92.08	-1.7994	6.25	8.11
P137_A1, Isr	mA	-96.68	-102.43	5.7568	9.64	12.25
P137_B1, Isr	mA	-96.73	-102.09	5.3564	9.92	12.07
P113_A1, SRn	V/uS	1.12	1.15	-0.03734	4.15	4.68
P113_B1, SRn	V/uS	1.18	1.18	-0.00388	4.95	6.48
P113_A1, SRp	V/uS	1.20	1.27	-0.06959	4.83	5.12
P113_B1, SRp	V/uS	1.27	1.30	-0.03342	5.59	7.40

TS3702IPT

Name	Units	ST Bouskoura	TSHT	Shift	ST Bouskoura	TSHT
ICC 3V, Icc	uA	7.87	7.50	0.36637	3.07	2.90
VIOA 3V, Vio	mV	-0.50	-0.59	0.087696	1.80	1.85
VIOB 3V, Vio	mV	-0.45	-0.52	0.072421	1.81	1.92
ICC 16V Out Low, Icc 16V	uA	12.04	12.66	-0.6181	2.82	5.20
VIOA 5V, P101_A1	mV	-0.01	0.00	-0.00594216	12.95	12.55
VIOB 5V, P101_B1	mV	-0.01	0.00	-0.00612876	12.33	12.03
ICC 5V, Icc	uA	10.15	10.23	-0.0819	6.27	6.77
ICC 2.7V out lo, Icc 2.7V	uA	7.54	7.08	0.45317	5.60	5.49
ICC 5V Out High, Icc	uA	10.55	10.31	0.2414	6.52	6.00
ICC 5V Out LOW, Icc 5V	uA	8.86	8.60	0.26178	1.94	1.88
IIOA 5V, Iio 5V	pA	-3.35	2.46	-5.80775	84.23	8.18
IIOB 5V, Iio 5V	pA	-7.65	5.27	-12.92611	129.70	20.04
IIBNA 5V, Iibn 5V	pA	2.46	-0.91	3.376765	121.00	19.95
IIBNB 5V, Iibn 5V	pA	-7.40	-1.92	-5.47943	123.50	95.91
IIBPA 5V, Iibp 5V	pA	5.81	-3.38	9.18451	146.00	31.10
IIBPB 5V, Iibp 5V	pA	0.25	-7.20	7.446676	141.20	30.43
VIOA 5V 3.8V, P101_A4	mV	0.00	0.00	-0.00140536	12.85	n/a ,
VIOB 5V 3.8V, P101_B4	mV	0.00	0.00	-0.000503441	12.82	n/a ,
VIOA 3V 1.8V, P101_A5	mV	0.00	0.00	-0.00246278	12.80	n/a ,
VIOB 3V 1.8V, P101_B5	mV	0.00	0.00	-0.00203903	12.52	n/a ,
VOHA 5V, Voh	V	4.70	4.71	-0.00427	16.21	15.59
VOHB 5V, Voh	V	4.70	4.71	-0.00476	16.60	19.42
VOLA 5V, Vol	V	0.17	0.17	-0.0043	15.47	6.24
VOLB 5V, Vol	V	0.17	0.17	-0.004691	16.70	8.13
VOHA 3V, Voh	V	2.51	2.52	-0.00998	21.23	28.82
VOHB 3V, Voh	V	2.51	2.52	-0.00909	21.49	31.07
VOLA 3V, Vol	V	0.26	0.27	-0.005882	8.95	5.38
VOLB 3V, Vol	V	0.26	0.27	-0.005786	9.13	6.52
P150_*1, Vd pos min	V	0.67	0.67	0.004721	56.31	67.60
P150_*1, Vd pos max	V	0.67	0.67	0.004987	42.92	33.14
P150_*1, Vd neg min	V	-0.65	-0.64	-0.002352	12.81	25.24
P150_*1, Vd neg max	V	-0.64	-0.64	-0.001098	14.43	30.52

6 ANNEXES

6.1 Tests Description

Test name	Description	Purpose
Die Oriented		
HTOL High Temperature Operating Life **HTB** High Temperature Bias	The device is stressed in static or dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature and bias condition.	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way. The typical failure modes are related to, silicon degradation, wire-bonds degradation, oxide faults.
HTRB High Temperature Reverse Bias **HTFB / HTGB** High Temperature Forward (Gate) Bias	The device is stressed in static configuration, trying to satisfy as much as possible the following conditions: low power dissipation; max. supply voltage compatible with diffusion process and internal circuitry limitations;	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way. To maximize the electrical field across either reverse-biased junctions or dielectric layers, in order to investigate the failure modes linked to mobile contamination, oxide ageing, layout sensitivity to surface effects.
HTSL High Temperature Storage Life	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
ELFR Early Life Failure Rate	The device is stressed in biased conditions at the max junction temperature.	To evaluate the defects inducing failure in early life.
Package Oriented		
PC Preconditioning	The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.	As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.
AC Auto Clave (Pressure Pot)	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.
TC Temperature Cycling	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.

Test name	Description	Purpose
TF / IOL Thermal Fatigue / Intermittent Operating Life	The device is submitted to cycled temperature excursions generated by power cycles (ON/OFF) at T ambient.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.
THB Temperature Humidity Bias	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.
Other		
ESD Electro Static Discharge	The device is submitted to a high voltage peak on all his pins simulating ESD stress according to different simulation models. CBM: Charged Device Model HBM: Human Body Model MM: Machine Model	To classify the device according to his susceptibility to damage or degradation by exposure to electrostatic discharge.
LU Latch-Up	The device is submitted to a direct current forced/sunk into the input/output pins. Removing the direct current no change in the supply current must be observed.	To verify the presence of bulk parasitic effect inducing latch-up.

Public Products List

Publict Products are off the shelf products. They are not dedicated to specific customers, they are available through ST Sales team, or Distributors, and visible on ST.com

PCN Title : Qualification of TSHT China as second Back-end source for Automotive grade products in TSSOP8 package

PCN Reference : AMS/19/11832

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change.

TSC1021AIYPT	LMV358IYPT	LM258YPT
TS9222IYPT	TSC1031IYPT	TS922AIYPT
LM2903YPT	LM258WYPT	LM2904YPT
LM2904WYPT	TS1872IYPT	TSC103IYPT
LM2903WYPT	TS922IYPT	TSV358IYPT
LM2904AYPT	TS972IYPT	TS952IYPT
TSC102IYPT	LM258AWYPT	LM2904AWYPT
TSC1021BIYPT	TSV358AIYPT	

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