PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APG-CRM/08/4077
Notification Date 10/17/2008

BCD5S 80V STANDARD DIFFUSION TRANSFER FROM CARROLLTON 6" TO ANG MO KIO 6"

Table 1. Change Implementation Schedule

Forecasted implementation date for change	15-Dec-2008
Forecasted availabillity date of samples for customer	17-Oct-2008
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	17-Oct-2008
Estimated date of changed product first shipment	05-Jan-2009

Table 2. Change Identification

Related APCN	3222
Product Identification (Product Family/Commercial Product)	ALL PRODUCTS IN THIS PROCESS TECHNOLOGY
Type of change	Waferfab location change
Reason for change	Restructuring plan as per Corporate CIL CRP/07/29/2900
Description of the change	Following Corporate CIL CRP/07/2900 and APCN CRP/07/3222 we are transferring the process BCD5S 80V and related products from Carrollton to AMK.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	"V6" as traceability marking identification for Ang Mo Kio plant
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	

Customer Acknowledgement of Receipt **PCN APG-CRM/08/4077**

Please sign and return to STMicroelectronics Sales Office **Notification Date 10/17/2008**

☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

....

....

....

....

....

....

....

....

DOCUMENT APPROVAL

Name	Function
Pengo, Tullio	Division Marketing Manager
Cassani, Fabrizio	Division Product Manager
Mercandelli, Laura	Division Q.A. Manager
Mervic, Alberto	Division Q.A. Manager

BCD5S 80V STANDARD DIFFUSION TRANSFER FROM CARROLLTON 6" TO ANG MO KIO 6"

WHAT:

Progressing along the Restructuring Plan already communicated by Corporate Information Letter (C.I.L.) CRP/07/2900 dated September 25, 2007 and APCN CRP/07/3222 dated December 28, 2007, please be informed that the products currently manufactured in Carrollton 6" Plant (Texas) by using BCD5 80V STANDARD Baseline Technology, will be moved to our facilities located in Ang Mo Kio 6" Plant (Singapore).

All the products manufactured by ST using BCD5 80V Baseline Technology, even if not expressly included in the above mentioned PIL & APCN, are affected by this change.

WHY:

In order to optimize ST asset utilization and enhance performance for shareholders and customers.

HOW:

By transferring and re-qualifying the mentioned front-end technology in the receiving plant; this technology has been qualified through a full set of evaluations on the selected test vehicle (TV for technology qualification): T84, EWS, electrical characterization, die and package oriented stress tests; others products diffused in the same Technology are qualified mainly by similarity (generic data) if assembled in the same package family. In case of different package families, stress test package oriented are carried on a "package test vehicle" (FE/BE compatibility) as listed in the annexed table.

Techno family	Techno sub family	Product	Package	Product Group	Qualification Plan
BCD5s 80V Standard	**BCD5s 80V Standard**	UK23	Flexiwatt	APG	**APG TV for technology qualification**
		UK43	PSO	APG	TV for FE/BE compatibility

This transfer will not modify the electrical, dimensional and thermal parameters for the affected products, maintaining unchanged current information published on the relevant datasheets.
There is as well neither change in the packing modes nor in the standard delivery quantities either.

ST is focused on customer satisfaction in order to ensure a seamless transition in the supply of products from the new site.

WHEN:

The production start and first shipments will be implemented according to our work in progress and materials availability. Full traceability is guaranteed by dedicated genealogy and traceability on the part.

We are ready to start shipments from AMK from mid December 08 onward.
The transfer of all product lines and the ramp up in the new location will be finalized within Q1 2009.

<u>Qualification program and results availability</u>:

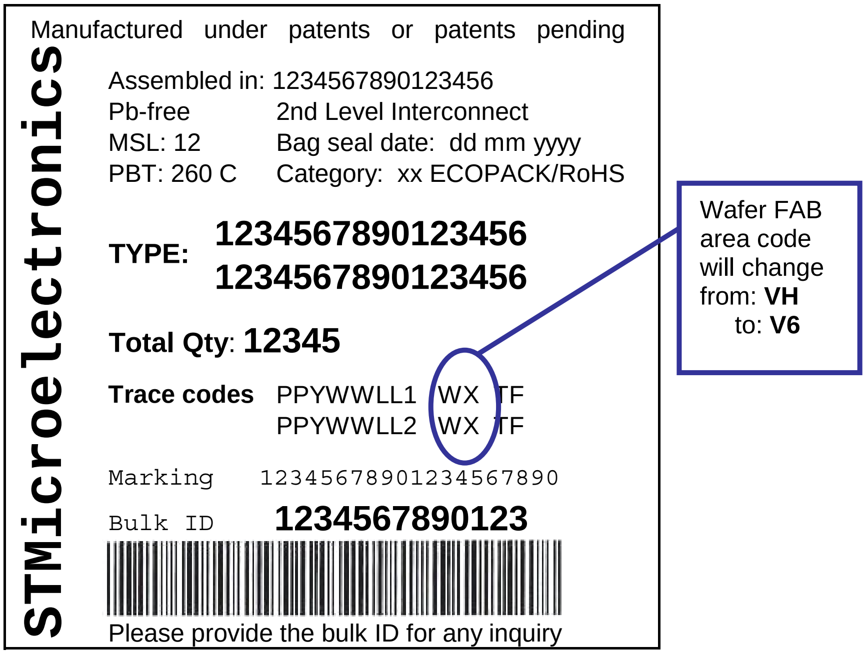
The relevant reliability reports of the test vehicles and process evaluation are provided below.

Product’s traceability:

Unless otherwise stated by customer specific requirement, new parts produced in AMK6 have a different traceability code as below:

Diffusion plant	ID	Country of origin
Carrollton (current)	**VH**	Texas
AMK6 (new)	**V6**	Singapore

Shipments from new Wafer FAB location are tracked on the ST Standard Label as showed below :



Manufactured under patents or patents pending

Assembled in: 1234567890123456
Pb-free 2nd Level Interconnect
MSL: 12 Bag seal date: dd mm yyyy
PBT: 260 C Category: xx ECOPACK/RoHS

TYPE: **1234567890123456**
1234567890123456

Total Qty: **12345**

Trace codes PPYWWLL1 WX TF
PPYWWLL2 WX TF

Marking 12345678901234567890

Bulk ID **1234567890123**

Please provide the bulk ID for any inquiry

Wafer FAB area code will change from: **VH** to: **V6**

Generic ST Standard label

Samples availability:

Samples are available upon request to our local Sales Offices.

BCD5 XFER TO AMK6

BCD5s 80V std family qualification approach

SEPT 18th, 08

XFER TO AMK6
QUALIFICATION APPROACH

- The qualification plan was defined taking in account:
  - Experience, Know how:
    - The failure mode knowledge gained during the BCD past generation qualification.
    - The experience gained during the BCD5 CST, AG, CF6 qualification.
  - Comparison between source and receiving plant in term of:
    - Process flow, Equipment, Data;
  - Procedures
    - Internal ST (OP31).
    - AEC Q100 Automotive qualification guideline.

- The qualification has been obtained through a set of reliability investigation:
  - Construction Analysis,
  - Wafer and Package Level Reliability
  - Stress tests on elementary components
  - Product Test Vehicle qualification for Silicon process qualification
    - The Front End / Back End compatibility is evaluated through Package oriented test performed at Product Level.

XFER TO AMK6
Analysis and Evaluation

	TEST	Stress condition	STRUCTURE	FAILURE MECHANISM
Investigation defined by Risk analysis. Risk analysis based on know how and comparison between sending and receiving plant.	HTS	168hrs 250C	Metal 3	Metal shunt resistance decrease
			Contacts and Vias	Contacts and Vias instability
	HTGS	1000hrs 175C	5V Pch	NBTI
	HTRB		LDMOS PDMOS	Surface effects
	TDDB	-	Capacitors	Low Oxide Quality
	Construction analysis	-	Struct. For CA	key features anomalies
	JL3 + TC + DPA	JL3+1000TC	Product TV	IMD damage, metal displacement
	JL3 + AC + DPA	JL3+AC	Product TV	corrosion
	WBP and WBS	-	Product TV	Bonding weakness
Investigation defined by Q100	Reported on the next slide			

STRESS TEST ON PRODUCT TEST VEHICLES

DEVICE	PACKAGE	THB	AC	TC	PTC	HTSL	HTOL	ELFR	EDR	WBS	WBP	SD	PD	SBS	LI	EM	TDDB	HCI	NBTI	SM	HBM-MM	CDM	LU	ED	CHAR	GL	EMC	SC	SER	MECH	DROP	LT	DS	IWV
UK23 BCD5S 80V std	FW27	●	●	●	●	●	●	●		●	●					●	●	●	●		●	●	●	●	●									
UK43 BCD5S 80V std	PSO36	●	●	●	●	●	●	GD		●	●					●	●	●	●		●	●	●	●	●									

RELIABILITY REPORT

TDA7563B

Quad Power Amplifier

Author: Daniele Bini

Approved: Giacomo Burrone

Date: Castelletto, September 1st, 2008

TABLE OF CONTENTS

1 RELIABILITY EVALUATION OVERVIEW 3
1.1 OBJECTIVES 3
1.2 CONCLUSION 3
2 DEVICE CHARACTERISTICS 4
2.1 DEVICE DESCRIPTION 4
2.2 BLOCK DIAGRAM 5
2.3 CONSTRUCTION NOTE 6
2.3.1 Wafer fabrication information 6
2.3.2 Assembly information 6
3 RELIABILITY TESTS RESULTS 7
3.1 RELIABILITY TEST PLAN AND RESULTS SUMMARY 9

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objectives

The purpose of this document is to describe the reliability qualification trials, the results and the criteria used to evaluate the transfer of TDA7563B product line from CF6 to AMK6 plant.
The product is diffused in BCD5S technology and assembled in both PSO36 slug-up and FW27 packages.

1.2 Conclusion

The reliability tests performed on three lots of TDA7563B device diffused in BCD5S and assembled in FW27 package, gave the following results.

HTOL	No failures and no significant drift on key parameters have been found after 1000h of HTOL test
HTRB	No failures and no significant drift on key parameters have been found after 1000h of HTRB test
HTSL	No failures have been found after 1000h of HTS test.
PTC	No failures and no significant drift on key parameters have been found after 1000c of PTC test
THB	No failures have been found after preconditioning plus 1000h of THB test.
TC	No failures have been found after preconditioning plus 1000 thermal cycles.
AC	No failures have been found after preconditioning plus 96 hours of autoclave test.
ESD	HBM ±2kV, MM ±200V and CDM ±500V were applied without failures.
LU	Injection current and over-voltage models were applied and no failures have been detected.

Moreover, the TDA7563B assembled in PSO36 package has to be considered qualified keeping into account the positive results obtained in the package oriented tests performed on TDA7575BPD product similar for functionality.

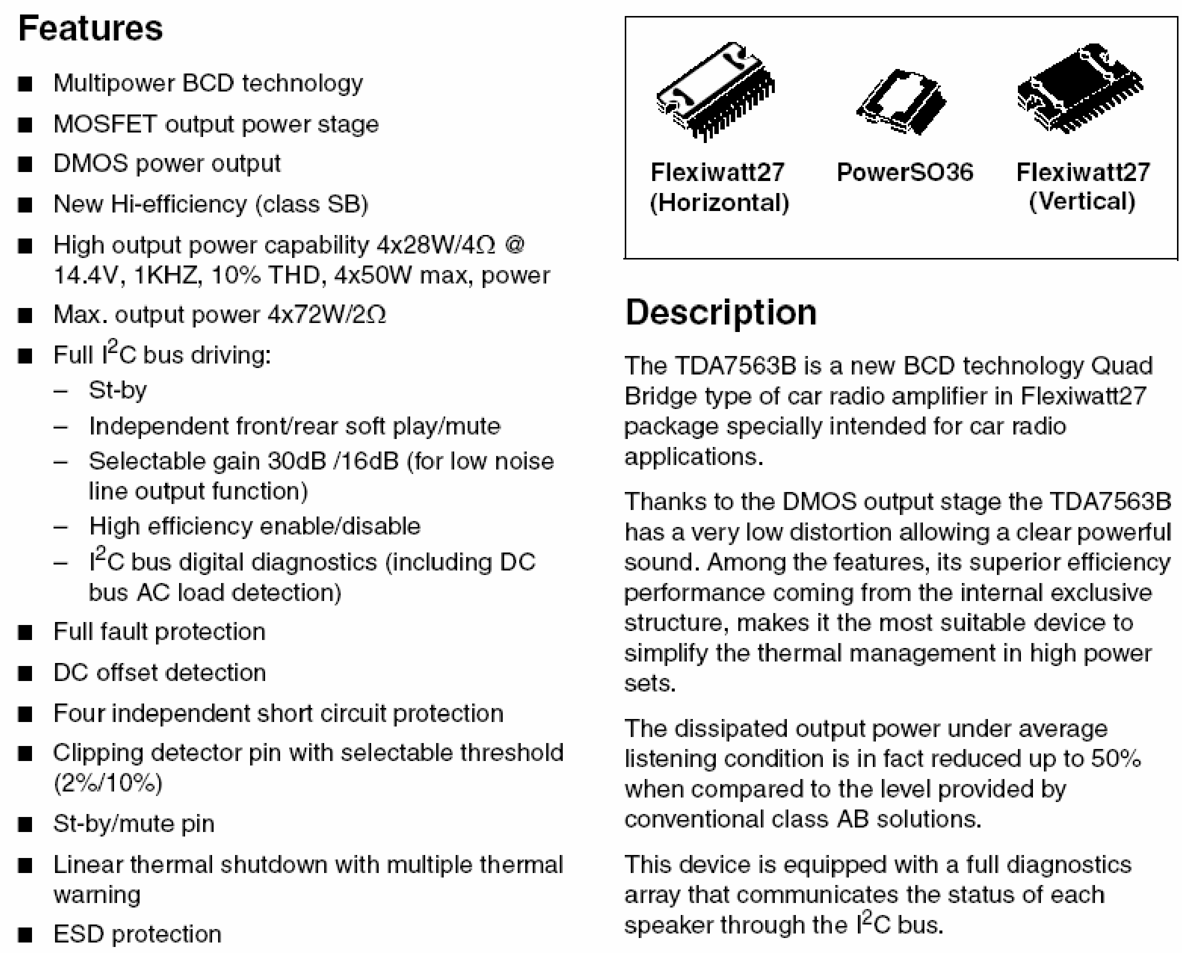
Therefore, considering

- The process is qualified and BCD5S products in AMK6 plant.
- The electrical characterization on TDA7563B device fulfills the product specification.

From the reliability point of view, the evaluation of TDA7563B devices has been positively completed.

2 DEVICE CHARACTERISTICS

2.1 Device description



Features

- Multipower BCD technology
- MOSFET output power stage
- DMOS power output
- New Hi-efficiency (class SB)
- High output power capability 4x28W/4Ω @ 14.4V, 1KHZ, 10% THD, 4x50W max, power
- Max. output power 4x72W/2Ω
- Full I²C bus driving:
  - St-by
  - Independent front/rear soft play/mute
  - Selectable gain 30dB /16dB (for low noise line output function)
  - High efficiency enable/disable
  - I²C bus digital diagnostics (including DC bus AC load detection)
- Full fault protection
- DC offset detection
- Four independent short circuit protection
- Clipping detector pin with selectable threshold (2%/10%)
- St-by/mute pin
- Linear thermal shutdown with multiple thermal warning
- ESD protection

Flexiwatt27 (Horizontal) **PowerSO36** **Flexiwatt27 (Vertical)**

Description

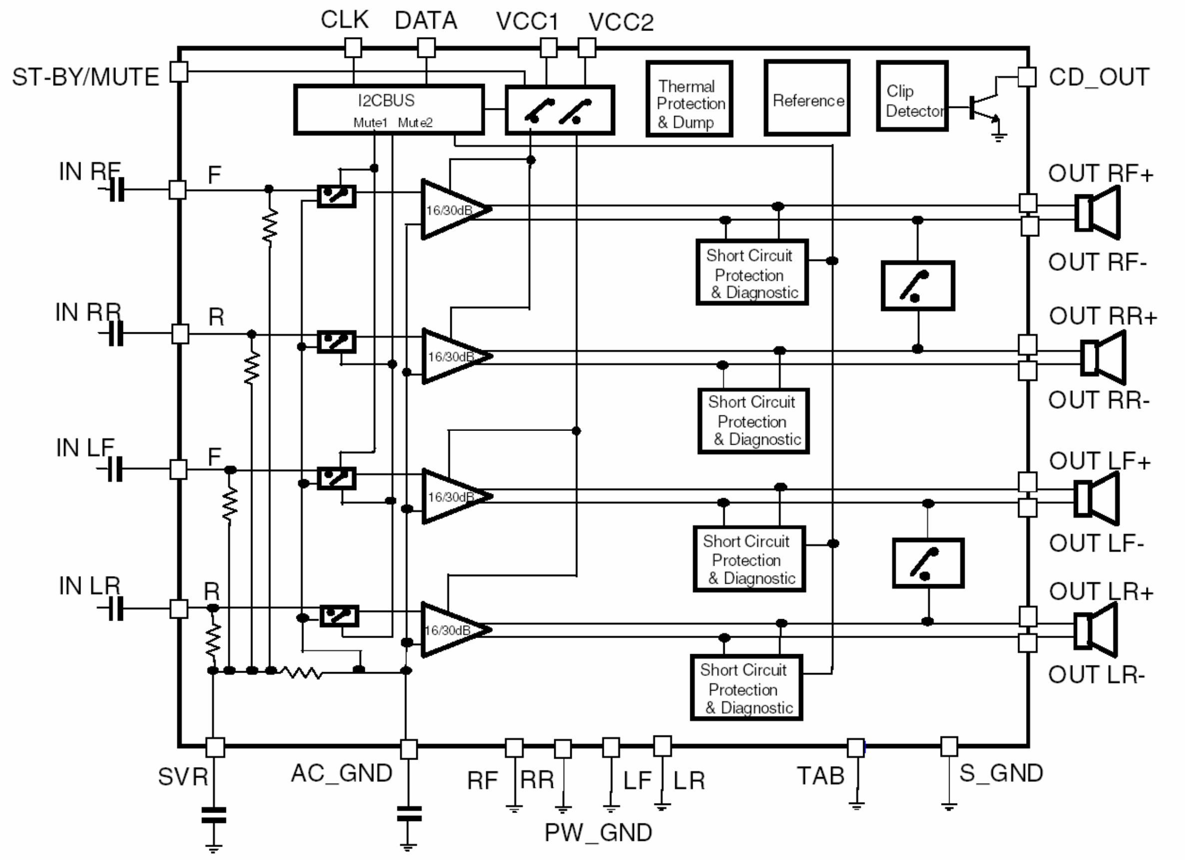
The TDA7563B is a new BCD technology Quad Bridge type of car radio amplifier in Flexiwatt27 package specially intended for car radio applications.

Thanks to the DMOS output stage the TDA7563B has a very low distortion allowing a clear powerful sound. Among the features, its superior efficiency performance coming from the internal exclusive structure, makes it the most suitable device to simplify the thermal management in high power sets.

The dissipated output power under average listening condition is in fact reduced up to 50% when compared to the level provided by conventional class AB solutions.

This device is equipped with a full diagnostics array that communicates the status of each speaker through the I²C bus.

2.2 Block Diagram



2.3 Construction note

2.3.1 Wafer fabrication information

	TDA7563B	TDA7563B	TDA7575B/ TDA7575BPD
Internal name:	UK23DC6 [UK23DD6]	UK23DB6	UK43BC6
Diffusion process:	BCD5S	BCD5S	BCD5S
Diffusion plant:	AMK	AMK	AMK
Wafer size [inches]:	6"	6"	6"
Wafer thickness [µm]:	375	375	375
Die sizes [mm^2]:	6.00 x 4.79	6.00 x 4.79	3.75 x 4.89
Passivation:	PSG+SiON+PIX	PSG+SiON+PIX	PSG+SiON+PIX
Back finishing:	Cr/Ni/Au	Cr/Ni/Au	Cr/Ni/Au
Pad Metallization[µm]:	AlSiCu: 0.4um+0.8um+2.9um	AlSiCu: 0.4um+0.8um+2.9um	AlSiCu: 0.4um+0.8um+2.9um

2.3.2 Assembly information

	TDA7563B	TDA7575B/TDA7575BPD
Package line:	FW27	PSO36
Assembly plant:	Malta	Muar
Wires [mils]:	2 mils, Cu	3 mils, Au
Resin:	SUMITOMO 6300HW	HITACHI CEL 9240HF10
Die Attach:	Pb/Ag/Sn 97.5/1.5/1	Pb/Ag/Sn 97.5/1.5/1
Frame Material	Cu	Cu
Lead Finishing:	Pure tin	Pure tin

3 RELIABILITY TESTS RESULTS

Test Name	Description	Purpose
HTOL	The device is stressed in dynamic configuration, approaching the operative max. ratings in terms of junction temperature, load current, internal power dissipation.	To simulate the worst-case application stress conditions. The typical failure modes are related to electromigration, wire-bonds degradation, oxide faults.
HTRB	The device is stressed in static configuration, approaching the absolute ratings in terms of junction temperature and supply voltage minimizing the power dissipation	To maximize the electrical field across either junctions or dielectric layers, in order to investigate the failure modes linked to mobile contamination, oxide ageing, and lay-out sensitivity to surface effects
ESD	The device is submitted to a high voltage peak on all his pins simulating ESD stress according to different simulation models.	To classify the device according to his susceptibility to damage or degradation by exposure to electrostatic discharge.
LU	The device is submitted to a direct current forced/sinked 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.
PC	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.
TC	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.
AC	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.
THB	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

Test Name	**Description**	**Purpose**
HTSL	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
WBP	The wire is submitted to a pulling force (approximately normal to the surface of the die) able to achieve wire break or interface separation between ball/pad or stitch/lead.	To investigate and measure the integrity and robustness of the interface between wire and die or lead metallization
WBS	The ball bond is submitted to a shear force (parallel to the pad area) able to cause the separation of the bonding surface between ball bond and pad area.	To investigate and measure the integrity and robustness of the bonding surface between ball bond and pad area.
PTC	The device is stressed in dynamic configuration approaching the operative conditions with an alternate exposure at high and low temperature extremes.	To simulate the actual combination of environmental stresses interacting in the field application. The typical failure modes are those reported for HTOL and TC

3.1 Reliability test plan and results summary

Here the tests plan and the results summary.

Test	**TDA7563B**					
		UK23DB	**UK23DC [UK23DD]**			
	Conditions	**Sample Size**	**Sample Size**	**Duration**	**Failure**	**Note**
HTOL	Vs=16V, Tj=150°C, Load = 2 x [2Ω + 300μH] + 2 x [4Ω + 300μH]	77 x 2 lots	77 x 1 lot	1000h	0	-
HTRB	Vs=18V, Tj=150°C, standby	77 x 2 lots	-	1000h	0	-
PTC	Vs=15V, Tj=150°C, Load = 2 x 2Ω Ta=-40°/85°C	45 x 1 lot	-	1000c	0	-
ELFR	Vs=16V, Tj=150°C, Load = 1.1kΩ + 22μH	800 x 3 lots		24h	0	-
ESD	HBM ±2kV [R=1.5kΩ, C=100pF]	6	6	-	passed	-
	MM ±200V [R=0Ω, C=200pF]	6	6	-	passed	
	CDM ±500V	3	3	-	passed	
LU	Injection current (Inom±100mA)	6	6	-	passed	
	Overvoltage (Vs≥24V)	4	4	-	passed	
HTSL	Ta=+150°C, unbiased	45 x 2 lots	45 x 1 lots	1000h	0	-
THB	Vs=18V, Ta=85°C, RH=85%, standby	77 x 2 lots	77 x 1 lot	1000h	0	-
TC	Ta=-50°C/+150°C	77 x 2 lots	77 x 1 lot	1000c	0	1
AC	Ta=121°C, P=2atm	77 x 2 lots	77 x 1 lot	96h	0	-
WBP	MIL STD883 Method 2011	30 bonds from a minimum of 5 devices		-	passed	1
WBS	AEC Q100-001			-	passed	1

1. WBP and WBS have been performed with positive results:

	Mean	Sigma	Min	Max
Pull Test on virgin parts	52.4	4.0	45.0	59.0
Pull Test after TC	33.6	5.4	18.5	43.5
Shear test	167.9	8.6	154	181

Test	TDA7575BPD [UK43BC]				
	Conditions	**Sample Size**	**Duration**	**Failure**	**Note**
HTOL	Vs=16V, Tj=150°C, Load (conf. 1) = (1Ω + 600μH) Load (conf. 2) = 2 x (2Ω + 300μH)	77 x 1 lot	1000h	0	-
HTRB	Vs=18V, Tj=150°C, standby	77 x 1 lot	1000h	0	-
ESD	HBM ±2kV [R=1.5kΩ, C=100pF]	6	-	passed	-
	MM ±200V [R=0Ω, C=200pF]	6	-	passed	
	CDM ±500V	3	-	passed	
LU	Injection current (Inom±100mA)	6	-	passed	
	Overvoltage (Vs≥24V)	4	-	passed	
HTSL	Ta=+150°C, unbiased	45 x 1 lot	1000h	0	3
PC [JL3]	BAKE: 24h @ 125°C SOAK: 192h @ T=30°C, RH=60% REFLOW: 3 @ Tpeak=245°C	250 x 1 lot	-	passed	1
THB	Vs=18V, Ta=85°C, RH=85%, standby	77 x 1 lot	1000h	0	-
TC	Ta=-50°C/+150°C	77 x 1 lot	1000c	0	2, 3
AC	Ta=121°C, P=2atm	77 x 1 lot	96h	0	-
WBP	MIL STD883 Method 2011	30 bonds from a minimum of 5 devices	-	passed	3
WBS	AEC Q100-001		-	passed	3

1. No die delamination has been observed at SAM analysis after PC.
2. No die delamination has been observed after 1000 cycles.
3. WBP and WBS data:

	Mean	Sigma	Min	Max
Pull Test Virgin Parts	60.5	5.6	51.9	68.7
Pull Test after TC	49.2	3.1	32.1	57.2
Pull Test after HTSL	49.2	2.1	43.6	53.8
shear Test	263.4	12.1	247.3	279.2

RELIABILITY REPORT

TDA7575B [NDBA]

PSO36 slug-up and FW27 packages

Author: Daniele Bini

Approved: Giacomo Burrone

Date: Castelletto, August 11, 2008

TABLE OF CONTENTS

1 RELIABILITY EVALUATION OVERVIEW 3
  1.1 OBJECTIVES 3
  1.2 CONCLUSION 3
2 DEVICE CHARACTERISTICS 4
  2.1 DEVICE DESCRIPTION 4
  2.2 BLOCK DIAGRAM 5
  2.3 CONSTRUCTION NOTE 6
    2.3.1 Wafer fabrication information 6
    2.3.2 Assembly information 6
3 RELIABILITY TESTS RESULTS 7
  3.1 RELIABILITY TEST PLAN AND RESULTS SUMMARY 9

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objectives

The purpose of this document is to describe the reliability qualification trials, the results and the criteria used to evaluate the transfer of UK43 product line from CF6 to AMK6 plant.
The product is diffused in BCD5S technology and assembled in both PSO36 slug-up and FW27 packages.

1.2 Conclusion

The reliability tests performed on UK43BC (NDBA) device diffused in BCD5S and assembled in PowerSO36 package, gave the following results.

HTOL	No failures and no significant drift on key parameters have been found after 1000h of HTOL test
HTRB	No failures and no significant drift on key parameters have been found after 1000h of HTRB test
HTSL	No failures have been found after 1000h of HTS test.
PC	No delamination has been observed after preconditioning sequence (JL3).
THB	No failures have been found after preconditioning plus 1000h of THB test.
TC	No failures have been found after preconditioning plus 1000 thermal cycles.
AC	No failures have been found after preconditioning plus 168 hours of autoclave test.
ESD	HBM ±2kV, MM ±200V and CDM ±500V were applied without failures.
LU	Injection current and over-voltage models were applied and no failures have been detected.

Moreover, the UK43BC assembled in FW27 package has to be considered qualified keeping into account the positive results obtained in the package oriented tests performed on TDA7563B product similar for functionality but with a greater die-size (6.00x 4.79 mm) see chapter three for details.

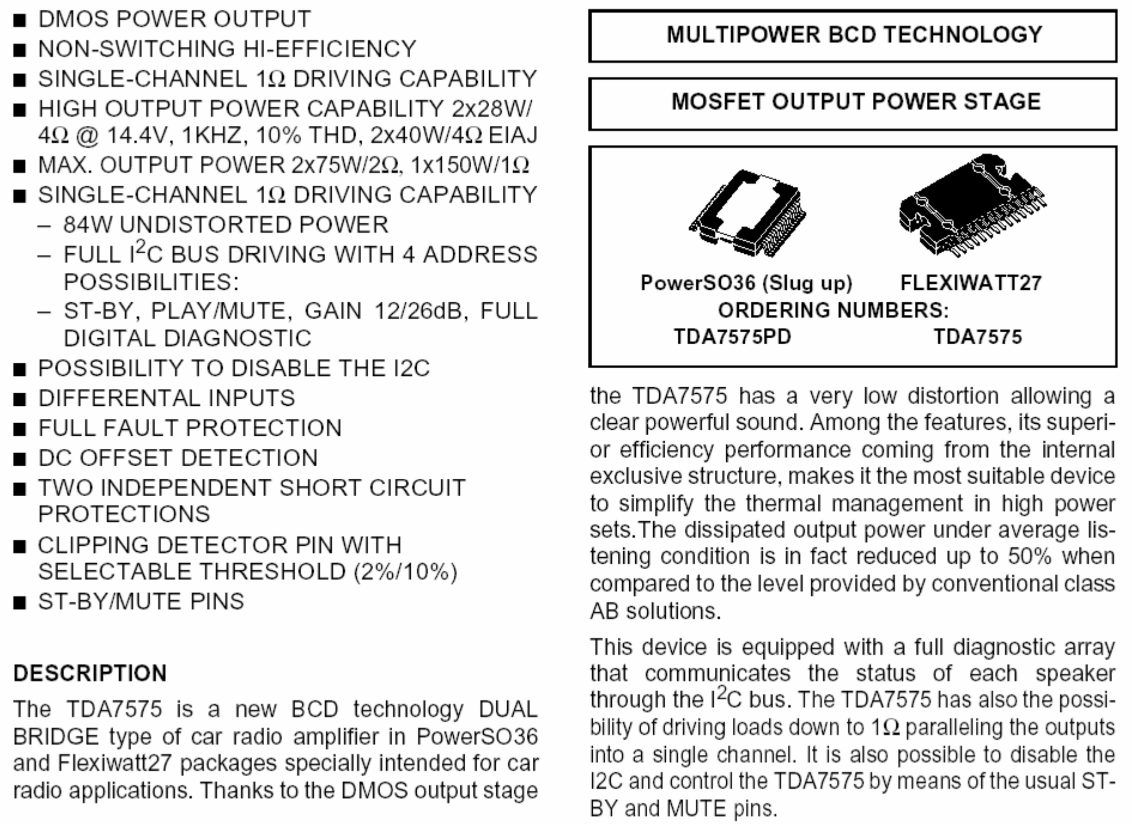
Therefore, considering

- The process is qualified and BCD5S products in AMK6 plant.
- The electrical characterization on UK43BC6 device fulfills the product specification.

From the reliability point of view, the evaluation of UK43BC6 devices has been positively completed.

2 DEVICE CHARACTERISTICS

2.1 Device description



- DMOS POWER OUTPUT
- NON-SWITCHING HI-EFFICIENCY
- SINGLE-CHANNEL 1Ω DRIVING CAPABILITY
- HIGH OUTPUT POWER CAPABILITY 2x28W/4Ω @ 14.4V, 1KHZ, 10% THD, 2x40W/4Ω EIAJ
- MAX. OUTPUT POWER 2x75W/2Ω, 1x150W/1Ω
- SINGLE-CHANNEL 1Ω DRIVING CAPABILITY
  - 84W UNDISTORTED POWER
  - FULL I^2C BUS DRIVING WITH 4 ADDRESS POSSIBILITIES:
  - ST-BY, PLAY/MUTE, GAIN 12/26dB, FULL DIGITAL DIAGNOSTIC
- POSSIBILITY TO DISABLE THE I2C
- DIFFERENTAL INPUTS
- FULL FAULT PROTECTION
- DC OFFSET DETECTION
- TWO INDEPENDENT SHORT CIRCUIT PROTECTIONS
- CLIPPING DETECTOR PIN WITH SELECTABLE THRESHOLD (2%/10%)
- ST-BY/MUTE PINS

MULTIPOWER BCD TECHNOLOGY

MOSFET OUTPUT POWER STAGE

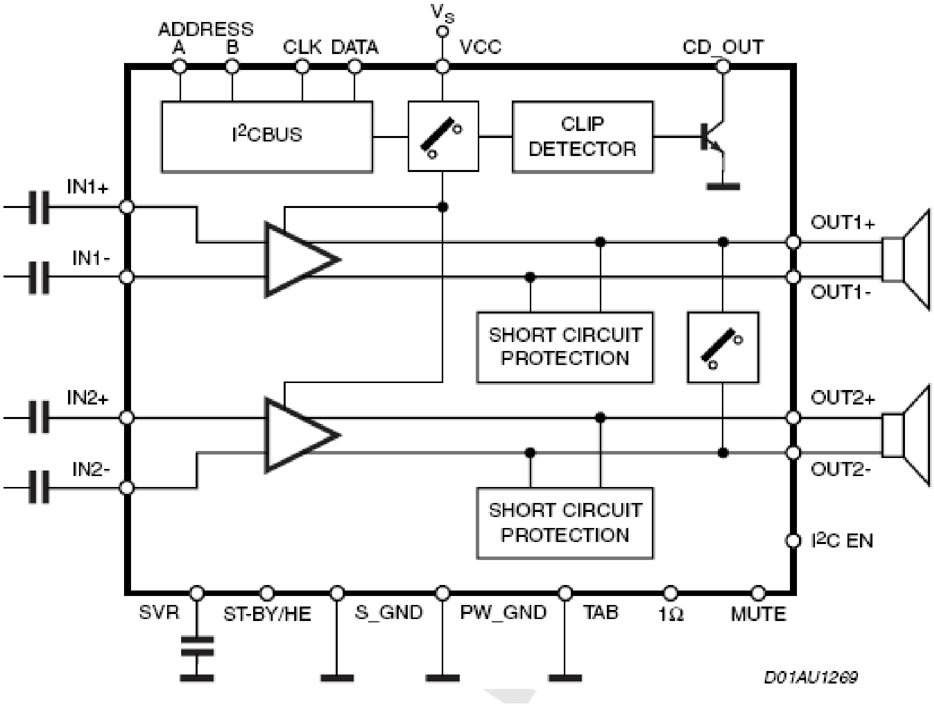
PowerSO36 (Slug up) **FLEXIWATT27**
ORDERING NUMBERS:
TDA7575PD **TDA7575**

DESCRIPTION

The TDA7575 is a new BCD technology DUAL BRIDGE type of car radio amplifier in PowerSO36 and Flexiwatt27 packages specially intended for car radio applications. Thanks to the DMOS output stage the TDA7575 has a very low distortion allowing a clear powerful sound. Among the features, its superior efficiency performance coming from the internal exclusive structure, makes it the most suitable device to simplify the thermal management in high power sets.The dissipated output power under average listening condition is in fact reduced up to 50% when compared to the level provided by conventional class AB solutions.

This device is equipped with a full diagnostic array that communicates the status of each speaker through the I^2C bus. The TDA7575 has also the possibility of driving loads down to 1Ω paralleling the outputs into a single channel. It is also possible to disable the I2C and control the TDA7575 by means of the usual ST-BY and MUTE pins.

2.2 Block Diagram



2.3 Construction note

2.3.1 Wafer fabrication information

	TDA7575B/TDA7575BPD	TDA7563B
Internal name:	UK43BC6	UK23DB6
Diffusion process:	BCD5S	BCD5S
Diffusion plant:	AMK	AMK
Wafer size [inches]:	6"	6"
Wafer thickness [µm]:	375	375
Die sizes [mm^2]:	3.75 x 4.89	6.00 x 4.79
Passivation:	PSG+SiON+PIX	PSG+SiON+PIX
Back finishing:	Cr/Ni/Au	Cr/Ni/Au
Pad Metallization[µm]:	AlSiCu: 0.4um+0.8um+2.9um	AlSiCu: 0.4um+0.8um+2.9um

2.3.2 Assembly information

	TDA7575B/TDA7575BPD	TDA7563B
Package line:	PSO36	FW27
Assembly plant:	Muar	Malta
Wires [mils]:	3 mils, Au	2 mils, Cu
Resin:	HITACHI CEL 9240HF10	SUMITOMO 6300HW
Die Attach:	Pb/Ag/Sn 97.5/1.5/1	Pb/Ag/Sn 97.5/1.5/1
Frame Material	Cu	Cu
Lead Finishing:	Pure tin	Pure tin

3 RELIABILITY TESTS RESULTS

Test Name	Description	Purpose
HTOL	The device is stressed in dynamic configuration, approaching the operative max. ratings in terms of junction temperature, load current, internal power dissipation.	To simulate the worst-case application stress conditions. The typical failure modes are related to electromigration, wire-bonds degradation, oxide faults.
HTRB	The device is stressed in static configuration, approaching the absolute ratings in terms of junction temperature and supply voltage minimizing the power dissipation	To maximize the electrical field across either junctions or dielectric layers, in order to investigate the failure modes linked to mobile contamination, oxide ageing, and lay-out sensitivity to surface effects
ESD	The device is submitted to a high voltage peak on all his pins simulating ESD stress according to different simulation models.	To classify the device according to his susceptibility to damage or degradation by exposure to electrostatic discharge.
LU	The device is submitted to a direct current forced/sinked 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.
PC	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.
TC	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.
AC	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.
THB	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

Test Name	**Description**	**Purpose**
HTSL	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
WBP	The wire is submitted to a pulling force (approximately normal to the surface of the die) able to achieve wire break or interface separation between ball/pad or stitch/lead.	To investigate and measure the integrity and robustness of the interface between wire and die or lead metallization
WBS	The ball bond is submitted to a shear force (parallel to the pad area) able to cause the separation of the bonding surface between ball bond and pad area.	To investigate and measure the integrity and robustness of the bonding surface between ball bond and pad area.
PTC	The device is stressed in dynamic configuration approaching the operative conditions with an alternate exposure at high and low temperature extremes.	To simulate the actual combination of environmental stresses interacting in the field application. The typical failure modes are those reported for HTOL and TC

3.1 Reliability test plan and results summary

Here the tests plan and the results summary.

Test	**TDA7575BPD**				
	Conditions	**Sample Size**	**Duration**	**Failure**	**Note**
HTOL	Vs=16V, Tj=150°C, Load (conf. 1) = (1Ω + 600μH) Load (conf. 2) = 2 x (2Ω + 300μH)	77 x 1 lot	1000h	0	-
HTRB	Vs=18V, Tj=150°C, standby	77 x 1 lot	1000h	0	-
ESD	HBM ±2kV [R=1.5kΩ, C=100pF]	6	-	passed	-
	MM ±200V [R=0Ω, C=200pF]	6	-	passed	
	CDM ±500V	3	-	passed	
LU	Injection current (Inom±100mA)	6	-	passed	
	Overvoltage (Vs≥24V)	4	-	passed	
HTSL	Ta=+150°C, unbiased	45 x 1 lot	1000h	0	3
PC [JL3]	BAKE: 24h @ 125°C SOAK: 192h @ T=30°C, RH=60% REFLOW: 3 @ Tpeak=245°C	250 x 1 lot	-	passed	1
THB	Vs=18V, Ta=85°C, RH=85%, standby	77 x 1 lot	1000h	0	-
TC	Ta=-50°C/+150°C	77 x 1 lot	1000c	0	2, 3
AC	Ta=121°C, P=2atm	77 x 1 lot	96h	0	-
WBP	MIL STD883 Method 2011	30 bonds from a minimum of 5 devices	-	passed	3
WBS	AEC Q100-001		-	passed	3

1. No die delamination has been observed at SAM analysis after PC.
2. No die delamination has been observed after 1000 cy.
3. WBP data

	Mean	Sigma	Min	Max
Pull Test after TC	49.2	3.1	32.1	57.2
Pull Test after HTSL	49.2	2.1	43.6	53.8

Test	**TDA7563B**				
	Conditions	**Sample Size**	**Duration**	**Failure**	**Note**
HTOL	Vs=16V, Tj=150°C, Load = 2 x [2Ω + 300μH] + 2 x [4Ω + 300μH]	77 x 2 lots	1000h	0	-
HTRB	Vs=18V, Tj=150°C, standby	77 x 2 lots	1000h	0	-
PTC	Vs=15V, Tj=150°C, Load = 2 x 2 Ω Ta=-40°/85°C	45 x 1 lot	1000c	0	-
ELFR	Vs=16V, Tj=150°C, Load = 1kΩ + 22μH	800 x 2 lots	24h	0	-
ESD	HBM ±2kV [R=1.5kΩ, C=100pF]	6	-	passed	-
	MM ±200V [R=0Ω, C=200pF]	6	-	passed	
	CDM ±500V	3	-	passed	
LU	Injection current (Inom±100mA)	6	-	passed	
	Overvoltage (Vs≥24V)	4	-	passed	
HTSL	Ta=+150°C, unbiased	77 x 2 lots	1000h	0	-
THB	Vs=18V, Ta=85°C, RH=85%, standby	77 x 2 lots	1000h	0	-
TC	Ta=-50°C/+150°C	77 x 2 lots	1000c	0	1
AC	Ta=121°C, P=2atm	77 x 2 lots	96h	0	-
WBP	MIL STD883 Method 2011	30 bonds from a minimum of 5 devices	-	passed	1
WBS	AEC Q100-001		-	passed	1

1. WBP have been performed with positive results:

	Mean	Sigma	Min	Max
Pull Test on virgin parts	52.4	4.0	45.0	59.0
Pull Test after TC	33.6	5.4	18.5	43.5
Shear test	167.9	8.6	154	181

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries(‘‘ST’’) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND / OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS ‘‘AUTOMOTIVE GRADE’’ MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners

ⓒ2008 STMicroelectronics - All rights reserved.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -
Malaysia - Malta - Morroco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com