PCI
Product/Process Change Information

Frame modification and assembly flow standardization for Triacs and SCRs housed in D²PAK

Notification number:	ADG-DIS/17/10335	**Issue Date**	22/06/2017
Issued by	Aline AUGIS		
Product series affected by the change		T1010H-6G (TR) T1035H-6G (TR) T1050-8G (TR) T1050H-6G (TR) T1205-600G-TR T1210-6G (TR) T1210-800G-TR T1235-600G (TR) T1235-800G-TR T1235H-6G (TR) T1250-600G-TR T1250H-6G (TR) T1610-600G-TR T1610-800G-TR T1635-600G (TR) T1635-700G-TR T1635-800G-TR T1635H-6G (TR) T1650-600G-TR T1650H-6G (TR) T2035H-6G (TR) T2050H-6G (TR) T2535-600G (TR) T2535-800G (TR) T2550-12G (TR) T3035H-6G (TR) T3050H-6G (TR) T810-600G-TR T810H-6G (TR) T835-600G (TR)	

	T835H-6G (TR)
	T850-6G (TR)
	T850H-6G (TR)
	TB16A6D
	TB25A6D
	TN1205H-6G (TR)
	TN1215-600G (TR)
	TN1215-800G-TR
	TN1605H-6G (TR)
	TN1625-1000G-TR
	TN1625-600G-TR
	TN2540-600G-TR
	TN2540-800G-TR
	TN4015H-6G (TR)

Reason for change

Production line modernization and assembly flow standardization.

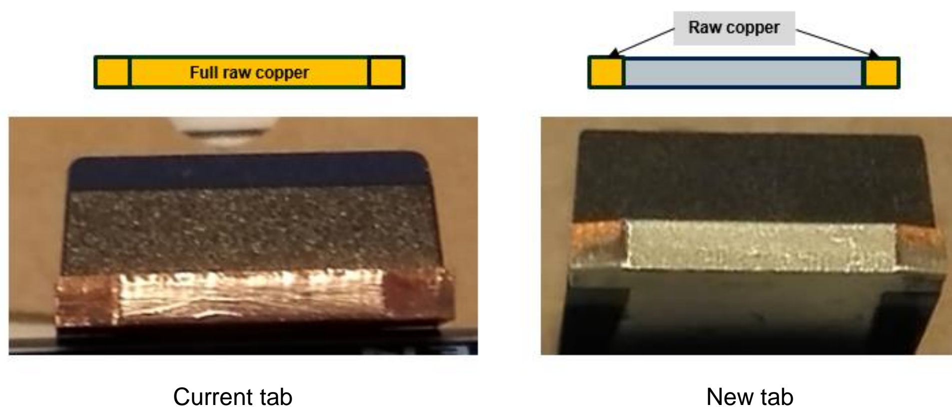
Effects of change

Visual aspect

TOP view: no variation
SIDE view:

- The current tab top edge is raw copper
- The new tab top edge is tinned on most the surface, its corners is are still raw copper

D²PAK tab side view



Current tab New tab

Frame modification

The frame shape has been modified so that a smaller zone of the tab needs to be cut on its top edge leading to less mechanical stress. Once the tab is cut, its shape is the same as before and the soldering of the top edge is improved.

Product identification and traceability

The traceability is ensured by the date code (xxxxx 2017) and the QA number.

Qualification complete date	Week 26-2017

Forecasted sample availability

Product family	Sub-family	Commercial part Number	Availability date
TRIAC	D^2PAK	T2535-800G (TR)	Week 26 2017

Change implementation schedule

Estimated production start	Estimated first shipments
Week 29-2017	Week 30-2017

Qualification:	17073QRP

Comments:

Reliability Evaluation Report

Qualification of D²PAK frame modification and assembly flow standardization

General Information	
Product Lines	*AC Switches*
Products Description	*SCR & TRIACS*
Product Group	*ADG*
Product division	*ASD & IPAD*
Package	*D²PAK*
Maturity level step	*Qualified*

Locations	
Wafer fab	*STMicroelectronics Tours (FRANCE)*
Assembly plant	*STMicroelectronics Shenzhen (CHINA)*
Reliability Lab	*STMicroelectronics Shenzhen (CHINA)*
Reliability assessment	**PASS**

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
Rev. 1	June 20th 2017	10	Mickael ALCANTARA	Julien MICHELON	ADG-DIS/17/10335

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.
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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD 22	Reliability test methods for packaged devices
JESD 47	Stress-Test-Driven Qualification of Integrated Circuits
JESD 94	Application specific qualification using knowledge based test methodology
MIL-STD-750C	Test method for semiconductor devices

2 GLOSSARY

BOM	Bill Of Materials
DUT	Device Under Test
SS	Sample Size
TC	Temperature Cycling
AC	Autoclave
UHAST	Unbiased Highly Accelerated Stress Test
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

The objective is to certify the qualification D²PAK frame modification and assembly flow standardization in STMicroelectronics SHENZHEN.

3.2 Conclusion

Reliability plan has been fulfilled without exception. Reliability tests have shown that those devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the robustness of those products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

See referenced Datasheet document.

BTA24, BTB24, BTA25 BTA26, BTB26, T25

25 A standard and Snubberless™ triacs

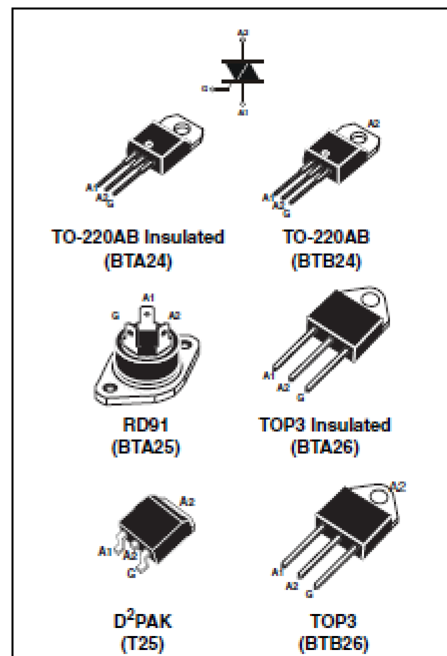
Features

- High current triac
- Low thermal resistance with clip bonding
- High commutation (4 quadrant) or very high commutation (3 quadrant) capability
- BTA series UL1557 certified (File ref: 81734)
- Packages are RoHS (2002/95/EC) compliant

Applications

Applications include the ON/OFF function in applications such as static relays, heating regulation, induction motor starting circuits, etc., or for phase control operation in light dimmers, motor speed controllers, and silmilar.

The snubberless versions (BTA/BTB...W and T25 series) are especially recommended for use on inductive loads, due to their high commutation performances. The BTA series provides an insulated tab (rated at 2500 V_{RMS}).



Description

Available either in through-hole or surface-mount packages, the **BTA24, BTB24, BTA25, BTA26, BTB26** and **T25** triac series is suitable for general purpose mains power AC switching.

Table 1. Device summary

Symbol	Parameter	BTA24(1)	BTB24	BTA25(1)	BTA26(1)	BTB26	T25	Unit
$I_{T(RMS)}$	RMS on-state current	25	25	25	25	25	25	A
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage	600 / 800	600 / 800	600 / 800	600(2) / 800	600	600 / 800	V
I_{GT} (Snubberless)	Triggering gate current	35 / 50	35 / 50	50	35 / 50	-	35	mA
I_{GT} (Standard)	Triggering gate current	-	50	50	50	50	-	mA

1. Insulated packages
2. 600 V version available only with I_{GT} = 50 mA (Snubberless and Standard)

TM: Snubberless is a trademark of STMicroelectronics

5 TESTS RESULTS SUMMARY

5.1 Test vehicles

Lot #	Part number	Package	Comments
Lot 1	T2535-800G-TR	D²PAK	Qualification Lot
Lot 2	T2535-800G-TR	D²PAK	Qualification Lot
Lot 3	T2535-800G-TR	D²PAK	Qualification Lot

5.2 Test plan and results summary

Test	Std ref.	Conditions	SS	Steps	Failure/SS		
					Lot 1	Lot 2	Lot 3
TC	JESD22 A-104	-65 °C/+150 °C 1 cycle/h	231	500 cycles	0/77	0/77	0/77
AC	JESD22 A-102	121°C, 2 bars 100% RH	231	96 h	0/77	0/77	0/77
µHAST	JESD22-A110-B	133°C ; 85% RH	231	96h	0/77	0/77	0/77

6 ANNEXES

6.1 Device details

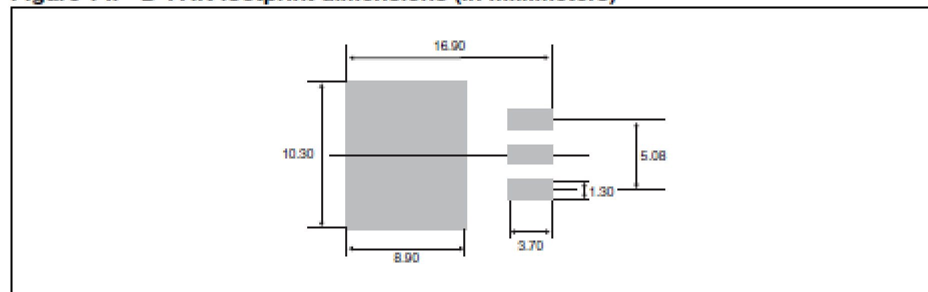
6.1.1 Pin connection

6.1.2 Package outline/Mechanical data

Table 7. D^2PAK dimensions

REF.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.40		1.75	0.055		0.069
R		0.40			0.016	
V2	0°		8°	0°		8°

Figure 14. D^2PAK footprint dimensions (in millimeters)



6.2 Tests Description

Test name	Description	Purpose
Die-oriented test		
Package-oriented test		
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.
uHAST	The device is biased under 130°C 85% RH during 96 hours, or equivalent 110°C 85% RH during 264 hours, minimizing its internal power dissipation.	The Highly-Accelerated Temperature and Humidity Stress Test is performed for the purpose of evaluating the reliability of non-hermetic packaged solid-state devices in humid environments. It employs severe conditions of temperature, humidity, and bias which accelerate the penetration of moisture through the external protective material (encapsulant or seal) or along the interface between the external protective material and the metallic conductors which pass through it. The stress usually activates the same failure mechanisms as the "85/85" Steady-State Humidity Life Test (THB).
AC Autoclave	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.

6.3 List of products involved in this qualification

T1010H-6G (TR)
T1035H-6G (TR)
T1050-8G (TR)
T1050H-6G (TR)
T1205-600G-TR
T1210-6G (TR)
T1210-800G-TR
T1235-600G (TR)
T1235-800G-TR
T1235H-6G (TR)
T1250-600G-TR
T1250H-6G (TR)
T1610-600G-TR
T1610-800G-TR
T1635-600G (TR)
T1635-700G-TR
T1635-800G-TR
T1635H-6G (TR)
T1650-600G-TR
T1650H-6G (TR)
T2035H-6G (TR)
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TN2540-800G-TR
TN4015H-6G (TR)