STMicroelectronics
ADG - ASD & IPAD™ Division[1]
BU Thyristors/Triacs

(1) ADG: Automotive and Discretes Group - ASD: Application Specific Device – IPAD™: Integrated Passive and Active Devices

PCN
Product/Process Change Notification

Wafer diameter production conversion to 150 mm for Triacs and SCRs products

Notification number:	ADG-DIS/16/9872	**Issue Date**	07/07/2016
Issued by	Aline AUGIS		
Product series affected by the change		TNxx, X0xx, Z0xx, T4xx, T8xx, TYNxx, TSxx, BTB04 series This PCN applies also to custom devices.	
Type of change		Front end realization	

Description of the change

ST is completing the conversion of wafers to 150 mm for its Triacs and SCRs, without any change on the die, therefore there is no change in datasheets.

Reason for change

ST has qualified the 6-inch wafer diameter in order to complete the harmonization of ST's production facilities.

Former versus changed product:	The changed products do not present modified electrical, dimensional or thermal parameters, leaving unchanged the current information published in the product datasheet The Moisture Sensitivity Level of the part (according to the IPC/JEDEC JSTD-020D standard) remains unchanged. The footprint recommended by ST remains the same. There is no change in the packing modes and the standard delivery quantities either. The products remain in full compliance with the ST ECOPACK®2 grade ("halogen-free").

Disposition of former products

Delivery of current product versions will continue while stocks last.

Marking and traceability

The traceability of the devices diffused in 150mm wafers will be ensured by an internal codification and by the QA number.

Qualification complete date	Technical Qualification: May 2016. The production completion and first shipments will start according to industrial capacity and material availability (conversion should be completed end of September 2017)

Forecasted sample availability

Product family	Product series	Availability date
Thyristors and AC Switches	X0405MF-TN815-T435-T410-T405-T835-Z0103-Z0107-Z0109-Z0409NF-TN1205-TYN612	From week 33-2016
Thyristors and AC Switches	Z0409MF-T405Q	From week 39-2016
Thyristors and AC Switches	X0202-X0203- X0402-TS420-T810-Z0405-BTB04-600SL	From week 43-2016
Thyristors and AC Switches	X0402-X0403-X0405-TS820-TN815-TN805-TS820-TS1220-TS420-TN1215-TN1515- X00602-X0205-X0202-X0203-X0205-X00619-T410-T405-T835-T810-T435-Z0109MUF-Z0110-Z0402-Z0410-Z0405-Z00607	From week 45-2016

Samples will be available 4 weeks from the demand (starting the dates mentioned above)

Change implementation schedule

Sales types	Estimated production start	Estimated first shipments
ALL	Week 39-2016	Week 52-2016

Comments:	With early PCN acceptance, shipments are possible starting week 52-2016

Customer's feedback

Please contact your local ST sales or quality representative contact for requests concerning this change notification.
Absence of acknowledgement of this PCN within 30 days of receipt will constitute acceptance of the change
Absence of additional response within 90 days of receipt of this PCN will constitute acceptance of the change

Qualification program and results	QRP16014 Attached

External Reliability Evaluation Report

Wafer Diameter Production Conversion to 150mm for Triacs and SCRs products

General Information		Locations	
Product Lines	*SCR – Triac*	**Wafer fab**	*ST Tours*
Products Description	*TNxx* *X0xx* *Z0xx* *T4xx* *T8xx* *TYNxx* *TSxx* *BTB04*	**Assembly plant**	*Subontractor – China (998G)*
		Reliability Lab	*ST Tours*
		Reliability assessment	
Product Group	*ADG*	***Pass***	
Product division	*ASD & IPAD*		

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
Rev. 1	06/15/2016	11	Mickael ALCANTARA	Julien Michelon	First issue

TABLE OF CONTENTS

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
SOP 2614	Reliability requirements for product qualification
SOP 267	Product maturity levels

2 GLOSSARY

BOM	Bill Of Materials
DUT	Device Under Test
F/G	Finished Good
HTRB	High Temperature Reverse Bias
PCT	Pressure Cooker Test
P/N	Part Number
RH	Relative Humidity
SS	Sample Size
TCT	Temperature Cycling Test
THB	Temperature Humidity Bias
HTS	High Temperature Storage

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

This project consists in conversion of wafer production diameter to 150mm for Triacs and SCRs.

3.2 Conclusion

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

Devices Characteristics

3.3 Devices description

Z01

Standard 1A Triacs

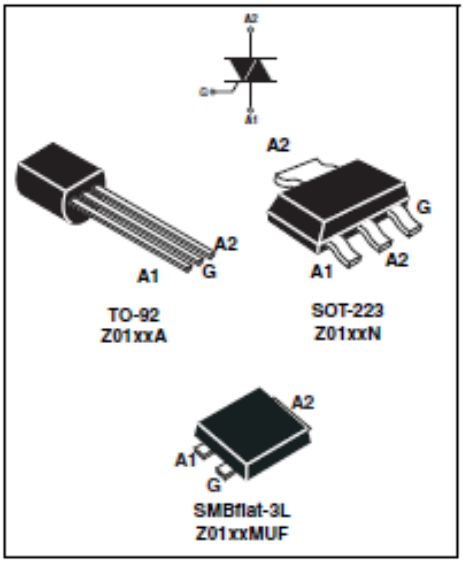
Features

- On-state rms current, $I_{T(RMS)}$ 1 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 or 800 V
- Triggering gate current, $I_{GT\ (Q1)}$ 3 to 25 mA

Description

The Z01 series is suitable for general purpose AC switching applications. These devices are typically used in applications such as home appliances (electrovalve, pump, door lock, small lamp control), fan speed controllers,...

Different gate current sensitivities are available, allowing optimized performance when driven directly through microcontrollers.



December 2010 Doc ID 7474 Rev 10 1/12

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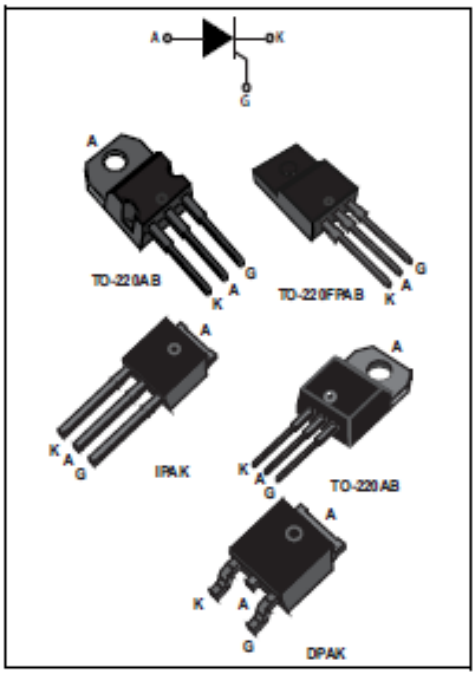
TN805, TN815, TS820, TYN608

Sensitive and standard 8 A SCRs

Datasheet - production data



Features

- On-state rms current, $I_{T(RMS)}$ 8 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 and 800 V
- Triggering gate current, I_{GT} 0.2 to 15 mA

Description

Available either in sensitive (TS8) or standard (TN8 / TYN) gate triggering levels, the 8 A SCR series is suitable to fit all modes of control found in applications such as overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits.

Available in through-hole or surface-mount packages, they provide an optimized performance in a limited space.

Table 1. Device summary

Order code	Voltage (x00) V_{DRM}/V_{RRM}		Sensitivity I_{GT}	Package
	600 V	800 V		
TS820-600B	X		0.2 mA	DPAK
TS820-600H	X		0.2 mA	IPAK
TS820-600T	X		0.2 mA	TO-220AB
TS820-600FP	X		0.2 mA	TO-220FPAB
TN805-600B	X		5 mA	DPAK
TN815-x00B	X	X	15 mA	DPAK
TYN608RG	X		15 mA	TO-220AB

X006

0.8 A sensitive gate SCRs

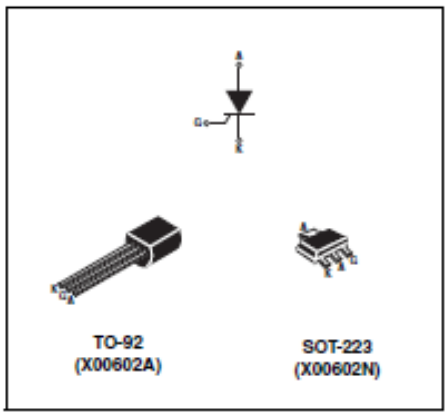
Features

- $I_{T(RMS)}$ = 0.8 A
- V_{DRM}/V_{RRM} = 600 V
- I_{GT} = 200 µA

Description

Thanks to highly sensitive triggering levels, the X006 SCR series is suitable for all applications where the available gate current is limited, such as ground fault circuit interrupters, overvoltage crowbar protection in low power supplies, capacitive ignition circuits, etc.

Available in though-hole or surface-mount packages, these devices are optimized in forward voltage drop and inrush current capabilities, for reduced power losses and high reliability in harsh environments.



4 TESTS RESULTS SUMMARY

4.1 Test vehicles

Three test vehicles were chosen:

- X00602MA5AL2
- Z0103NA1AA2
- TN815-800B-TR

Lot #	Part Number	Process/ Package	Comment
Lot 1	Z0103NA1AA2	TO-92	Qualification lot
Lot 2	X00602MA5AL2	TO-92	Qualification lot
Lot 3	TN815-800B-TR	DPAK	Qualification lot

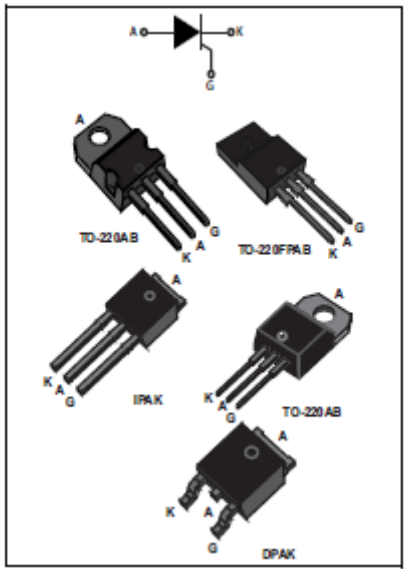
4.2 Test plan and results summary

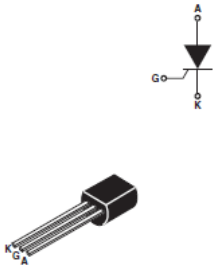
Test	Std ref.	Conditions	SS	Steps	Failure/SS		
					Lot 1	Lot 2	Lot 3
HTRB	JESD22 A-108 MIL-STD-750C method 1040	T_j = 125 °C 600V VAC	231	168 h	**0/77**	**0/77**	**0/77**
				500 h	**0/77**	**0/77**	**0/77**
				1000 h	**0/77**	**0/77**	**0/77**
THB	JESD22 A-101	85 °C 85% RH V_r = 100 V	75	168 h	**0/25**	**0/25**	**0/25**
				500 h	**0/25**	**0/25**	**0/25**
				1000 h	**0/25**	**0/25**	**0/25**
TC	JESD22 A-104	-65 °C/+150 °C 2 cycles/h	231	500 cycles	**0/77**	**0/77**	**0/77**
				1000 cycles	**0/77**	**0/77**	**0/77**

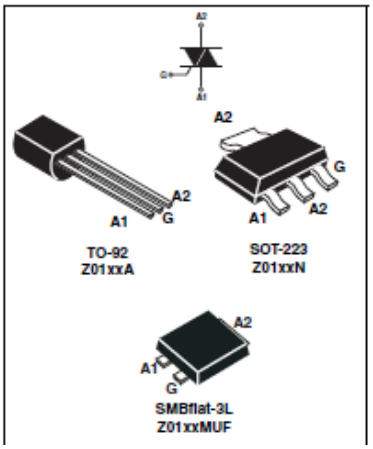
5 ANNEXES

5.1 Device details

5.1.1 Pin connection







5.1.2 Package outline/Mechanical data

Table 7. TO-92 dimensions

REF.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		1.35			0.053	
B			4.70			0.185
C		2.54			0.100	
D	4.40			0.173		
E	12.70			0.500		
F			3.70			0.146
a			0.50			0.019

Figure 15. DPAK dimension definitions

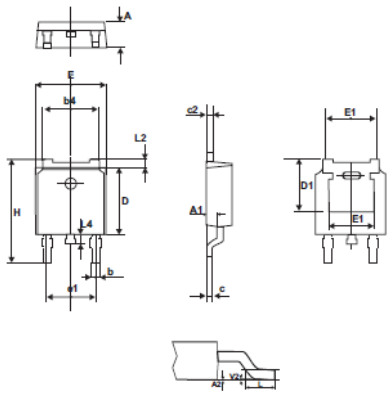


Table 6. DPAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.086		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.195		0.215
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.023
D	5.97		6.22	0.235		0.244
D1	5.10			0.201		
E	6.35		6.73	0.250		0.264
E1		4.32			0.170	
e1	4.40		4.70	0.173		0.185
H	9.35		10.40	0.368		0.409
L	1.00		1.78	0.039		0.070
L2			1.27			0.05
L4	0.60		1.02	0.023		0.040
V2	0°		8°	0°		8°

5.2 Tests Description

Test name	Description	Purpose
Die-oriented test		
HTRB (AC mode) High Temperature Reverse Bias	The device is stressed here in DC mode, trying to satisfy as much as possible the following conditions: - Low power dissipation. - Peak 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 aging, layout sensitivity to surface effects.
Die and Package-oriented test		
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.
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.

Annex: List of involved parts

BTB04-600SL	TS420-600B	Z0103MA 5AL2
T405-600B	TS420-600B-TR	Z0103MN 5AA4
T405-600B-TR	TS420-600BCTR	Z0103MN 6AA4
T405-600H	TS420-600H	Z0103MUF
T405-700B-TR	TS420-600T	Z0103NA 1AA2
T405-800B-TR	TS820-600B	Z0103NA 2AL2
T405-800H	TS820-600B-TR	Z0103NN5AA4
T405Q-600B-TR	TS820-600FP	Z0107DA 2AL2
T405Q-600H	TS820-600H	Z0107MA 1AA2
T410-600B	TS820-600T	Z0107MA 2AL2
T410-600B-TR	TS820-700B-TR	Z0107MA 5AL2
T410-600H	TYN612MFP	Z0107MN 5AA4
T410-800B-TR	TYN612MRG	Z0107MN6AA4
T410-800H	X00602MA 1AA2	Z0107MUF
T435-600B	X00602MA 2AL2	Z0107NA 1AA2
T435-600B-TR	X00602MA 5AL2	Z0107NA 2AL2
T435-600H	X00619MA1AA2	Z0107NA 5AL2
T435-700B-TR	X00619MA2AL2	Z0107NN 5AA4
T435-800B-TR	X00619MA5AL2	Z0107SA1AA2
T435-800H	X00619MN5AL2	Z0107SA2AL2
T435T-600FP	X0202DA 1BA2	Z0107SN 5AA4
T810-600B	X0202MA 1BA2	Z0109MA 1AA2
T810-600B-TR	X0202MA 2BL2	Z0109MA 2AL2
T810-800B-TR	X0202MN 5BA4	Z0109MA 5AL2
T835-600B	X0202NA 1BA2	Z0109MN 5AA4
T835-600B-TR	X0202NA2BL2	Z0109MN 6AA4
T835-600H	X0202NN 5BA4	Z0109MUF
T835-800B	X0202NUF	Z0109NA 2AL2
T835-800B-TR	X0203MA 1BA2	Z0109NN 5AA4
TN1205T-600B	X0203MA2BL2	Z0109SN 5AA4
TN1205T-600B-TR	X0203NA 1BA2	Z0110MA 1AA2
TN1215-600B	X0205MA 1BA2	Z0110MN 5AA4
TN1215-600B-TR	X0205MA 2BL2	Z0110SN 5AA4
TN1215-600H	X0205NA 1BA2	Z0402DF 1AA2
TN1215-800B-TR	X0402MF 0AA2	Z0402MF 1AA2
TN1215-800H	X0402MF 1AA2	Z0402MF0AA2
TN1515-600B-TR	X0402NF 1AA2	Z0405MF 1AA2
TN805-600B-TR	X0403DF 1AA2	Z0405MF0AA2
TN815-600B-TR	X0403MF 1AA2	Z0405NF 1AA2
TN815-800B-TR	X0405MF 1AA2	Z0405NF0AA2
TN815-800H	X0405MF0AA2	Z0409MF 1AA2
TN815-9BAS	X0405NF 1AA2	Z0409MF0AA2
TN815-9BAS-TR	Z00607MA 1BA2	Z0409NF 1AA2
TS1220-600B	Z00607MA 2BL2	Z0409NF0AA2
TS1220-600B-TR	Z00607MA 5BL2	Z0410MF 1AA2
TS1220-600H	Z00607MN 5AA4	Z0410MF0AA2
TS1220-600T	Z0103MA 1AA2	Z0410NF 1AA2
TS1220-6FP	Z0103MA 2AL2	Z0410NF0AA2

Public Products List

PCN Title : Wafer diameter production conversion to 150 mm for Triacs and SCRs products

PCN Reference : ADG/16/9872

PCN Created on : 06-Jul-2016

Subject : Public Products List

Dear Customer,

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

Z0103MN 5AA4	X00619MA5AL2	Z0107NA 2AL2
T835-800B	T435-600B	Z0109MA 2AL2
Z0402MF0AA2	T810-600B-TR	T810-600B
Z0107MA 1AA2	X0202MA 1BA2	X0202MA 2BL2
TN815-800B-TR	T405-600H	T410-600B
TS420-600B	TS420-600B-TR	TS1220-600T
TYN612MRG	Z0410NF 1AA2	X0405MF 1AA2
T405Q-600B-TR	Z0107MN6AA4	Z0405MF 1AA2
X0402NF 1AA2	X0402MF 1AA2	TYN612MFP
T405-800H	X0202NN 5BA4	T410-800H
Z0110SN 5AA4	X0205NA 1BA2	TS820-600H
Z0103MN 6AA4	TS820-600B	Z0110MA 1AA2
T810-800B-TR	Z0103MA 1AA2	Z0402MF 1AA2
TN1215-600B	X00602MA 1AA2	T410-600B-TR
TN1515-600B-TR	Z0107MN 5AA4	T435-700B-TR
TS1220-600H	Z0109MN 6AA4	X0202MN 5BA4
Z0107MA 5AL2	T405-600B-TR	X0202NA 1BA2
Z0405NF0AA2	TS1220-600B	Z0109MA 5AL2
TN1205T-600B	Z0103MA 5AL2	Z0103NA 1AA2
T835-600B-TR	TS1220-600B-TR	T435-800B-TR
TS420-600H	Z0109NA 2AL2	T405-600B
X0205MA 2BL2	Z0107SN 5AA4	X00619MN5AL2
X00619MA2AL2	Z0103NA 2AL2	Z0107NN 5AA4
Z0107MUF	Z0109MA 1AA2	T405-800B-TR
Z0409NF 1AA2	Z0109MN 5AA4	X0205MA 1BA2
T435-600B-TR	T405Q-600H	X0405NF 1AA2
TN815-600B-TR	T410-600H	T835-800B-TR
Z0409MF 1AA2	Z0109MUF	Z00607MA 5BL2
Z0410MF0AA2	BTB04-600SL	T410-800B-TR
Z0405NF 1AA2	Z0103NN5AA4	Z0109SN 5AA4
Z0410MF 1AA2	Z0103MA 2AL2	Z0109NN 5AA4
X0402MF 0AA2	T435-600H	Z0107NA 1AA2
TS820-700B-TR	TS820-600T	TS820-600B-TR
TN1215-600B-TR	X0202NUF	Z0103MUF
X0403MF 1AA2	Z0107MA 2AL2	TN1215-600H
Z0110MN 5AA4	TN805-600B-TR	T435T-600FP
TS420-600T	T435-800H	Z0405MF0AA2

X00602MA 5AL2	T405-700B-TR	X00602MA 2AL2
Z00607MA 1BA2	TN1205T-600B-TR	Z00607MA 2BL2
X00619MA1AA2	T835-600B	Z0107NA 5AL2
Z0409NF0AA2	TS820-600FP	

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