

PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.	ADG/23/14391	
1.3 Title of PCN	Transfer of assembly and test line qualification for TO220 Full Pack package	
1.4 Product Category	TO220FP Rectifiers and Thyristors Triacs products	
1.5 Issue date	2023-11-14	

2. PCN Team

2.1 Contact supplier	
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2.2 Change responsibility	
2.2.1 Product Manager	Stephane CHAMARD
2.1.2 Marketing Manager	Philippe LEGER
2.1.3 Quality Manager	Jean-Paul REBRASSE

3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Transfer	(Not Defined)	subcontractor (China)

4. Description of change

	Old	New
4.1 Description	Assembly and Test & Finishing in ST Shenzhen (China)	Assembly and Test & Finishing in a subcontractor (China)
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No	

5. Reason / motivation for change

5.1 Motivation	ST Shenzhen has decided to phase out TO220FP line to extend production capacity for other packages.
5.2 Customer Benefit	SERVICE CONTINUITY

6. Marking of parts / traceability of change

6.1 Description	Traceability of the change will be ensured by Finished Good/Type print on carton labels.
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7. Timing / schedule

7.1 Date of qualification results	2023-11-10
7.2 Intended start of delivery	2024-03-29
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation

8.1 Description	14391 23028QRP.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2023-11-14

9. Attachments (additional documentations)

14391 Public product.pdf
14391 PCN TO220FP transfer.pdf
14391 23028QRP.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
	ACST1235-8FP	
	ACST1635-8FP	
	ACST210-8FP	
	ACST410-8FP	
	ACST610-8FP	
	ACST830-8FP	
	FERD20H100SFP	
	FERD40H100SFP	
	STPS10150CFP	
	STPS10H100CFP	
STPS10L60CFP	STPS10L60CFP	
	STPS1545FP	
STPS20150CFP	STPS20150CFP	
STPS20170CFP	STPS20170CFP	
	STPS20200CFP	
STPS2045CFP	STPS2045CFP	
STPS20H100CFP	STPS20H100CFP	
STPS20L45CFP	STPS20L45CFP	
	STPS20S100CFP	
STPS30150CFP	STPS30150CFP	
	STPS30H60CFP	
STPS30L45CFP	STPS30L45CFP	
	STPS30M100SFP	
STPS745FP	STPS745FP	
STPS8H100FP	STPS8H100FP	
STTH1002CFP	STTH1002CFP	
	STTH10LCD06CFP	
	STTH10LCD06FP	
STTH12R06FP	STTH12R06FP	
	STTH12S06FP	
	STTH1502FP	
	STTH15AC06FP	
STTH15L06FP	STTH15L06FP	
STTH15R06FP	STTH15R06FP	
STTH1602CFP	STTH1602CFP	
STTH16L06CFP	STTH16L06CFP	
STTH2002CFP	STTH2002CFP	
STTH2003CFP	STTH2003CFP	
	STTH20LCD06CFP	
	STTH25M06FP	
	STTH30AC06FP	
	STTH512FP	
STTH5L06FP	STTH5L06FP	
STTH5R06FP	STTH5R06FP	
	STTH802FP	
	STTH810FP	
	STTH812FP	

STTH8L06FP	STTH8L06FP	
STTH8R06FP	STTH8R06FP	
	STTH8S06FP	
	T405T-6FP	
	T435T-600FP	
	TS1220-6FP	
	TS820-600FP	
TYN612MFP	TYN612MFP	

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Public Products List

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PCN Title : Transfer of assembly and test line qualification for TO220 Full Pack package

PCN Reference : ADG/23/14391

Subject : Public Products List

Dear Customer,

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

STPS10H100CFP	TS820-600FP	STTH5R06FP
STTH10LCD06CFP	STTH15L06FP	STTH15R06FP
STTH1602CFP	STPS30M100SFP	STTH2002CFP
STTH810FP	STTH1002CFP	STTH12R06FP
STTH20LCD06CFP	STTH30AC06FP	STPS20H100CFP
STTH512FP	STTH5L06FP	STPS8H100FP
TYN612MFP	STPS20170CFP	STTH802FP
STPS10L60CFP	STTH8S06FP	ACST1635-8FP
STPS20S100CFP	STTH15AC06FP	STTH8R06FP
STTH1502FP	STTH2003CFP	STPS1545FP
STTH10LCD06FP	STTH12S06FP	FERD40H100SFP
STPS745FP	STPS20L45CFP	ACST830-8FP
STPS30150CFP	STPS2045CFP	STTH16L06CFP
STPS30L45CFP	STPS30H60CFP	STTH8L06FP
ACST1235-8FP	FERD20H100SFP	TS1220-6FP
STPS20150CFP	STTH812FP	STPS15LCD80CFP
T435T-600FP	STPS20200CFP	STTH25M06FP
STPS10150CFP	ACST610-8FP	ACST410-8FP
T405T-6FP	ACST210-8FP	

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Qualification Report

Transfer of Assembly & Test line qualification for TO220 Full Pack Package.

General Information		Locations	
Product Line	<i>Rectifiers - ACS Switch – SCR Triacs</i>	Wafer Fab	<i>ST Singapore – China ST Tours - France</i>
Product Description	<i>Power Schottky Rectifier – Ultrafast Rectifier -Overvoltage protected AC Switch - SCR Triacs</i>		
Product Perimeter	<i>ACSTxx-8FP – STTHxxCFP – STTHxxFP STPSxxCFP – STPSxxFP - STPS30M100SFP - FERDxxH100SFP – T405T-6FP - T435T-600FP - TS820-600FP TS1220-6FP - TYN612MFP</i>	Assembly Plant	<i>Subcontractor 993x - China</i>
Product Group	<i>ADG</i>	Reliability Lab	<i>ST TOURS – FRANCE Whisker's test done at Subcontractor - China</i>
Product Division	<i>Discrete & Filter</i>		
Packages	<i>TO-220FPAB TO-220FPAC</i>	Reliability Assessment	<i>PASS</i>
Maturity level step	<i>QUALIFIED</i>		

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comments
1.0	31 October 2023	29	Elisabeth PREVOST	Digitally signed by Christophe Goin Date: 2023.11.10 09:21:44 +01'00'	Qualification of transfer of assembly & test line qualification for TO-220FP package

Note: This report is a summary of the qualification trials performed in good faith by STMicroelectronics in order to evaluate the potential 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 47	Stress-Test-Driven Qualification of Integrated Circuits
JESD 94	Application specific qualification using knowledge based test methodology
JESD 22	Reliability test methods for packaged devices
MIL-STD-750C	Test method for semiconductor devices

2 GLOSSARY

H3TRB	High Humidity High Temperature Reverse Bias
HTRB	High Temperature Reverse Bias
IOLT	Intermittent Operating Life Test
PD	Physical Dimensions
PV	Parametric Verification
RSH	Resistance to Soldering Heat
SD	Solderability test
SS	Sample Size
TC	Temperature Cycling
TW/WG	Tin Whiskers / Whiskers Growth
SCW	Screwing Test

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

The objective of this report is to qualify Transfer of Assembly & Test manufacturing activity for rectifiers and ACS Switch products housed embedded in TO-220FP package.

Product	Description	Package	Assembly Location
ACST1235-8FP	Overvoltage protected AC Switch	TO-220FPAB	ST Subcontractor (993x) - China
ACST1635-8FP			
ACST210-8FP			
ACST410-8FP			
ACST610-8FP			
ACST830-8FP			
FERD20H100SFP	Field-effect rectifier diode		
FERD40H100SFP			
STPS10150CFP	High Voltage Power Schottky Rectifier		
STPS20150CFP			
STPS20170CFP			
STPS20200CFP			
STPS2045CFP			
STPS30150CFP			
STPS10H100CFP			
STPS10L60CFP			
STPS15LCD80CFP			
STPS20H100CFP			
STPS20L45CFP			
STPS20S100CFP			
STPS30H60CFP			
STPS30L45CFP			
STPS30M100SFP			
STTH1002CFP	High Efficiency Ultrafast Diode		
STTH1602CFP			
STTH2002CFP			
STTH10LCD06CFP	Turbo 2 Ultrafast – High Voltage rectifier for SMPS		
STTH20LCD06CFP			
STTH16L06CFP	Turbo 2 Ultrafast High Voltage Rectifier		
STTH2003CFP	Ultrafast Rectifier		
T405T-6FP	Triac		
T435T-600FP	Snubberless Triac		
TS1220-6FP	Sensitive SCRs		
TS820-600FP	Sensitive SCRs		
TYN612MFP	SCR		
STPS745FP	Power Schottky Rectifier	TO-220FPAC	
STPS8H100FP			
STPS1545FP			
STTH10LCD06FP	Turbo 2 ultrafast - High Voltage Rectifier for Flat Panel Displays		
STTH12R06FP	Turbo 2 Ultrafast High Voltage Rectifier		
STTH12S06FP			
STTH15AC06FP			
STTH15L06FP			
STTH15R06FP			

STTH30AC06FP			
STTH5L06FP			
STTH5R06FP			
STTH8L06FP			
STTH8R06FP			
STTH8S06FP			
STTH25M06FP	Ultrafast High Voltage Diode		
STTH812FP	Ultrafast Recovery - 1200 V Diode		
STTH512FP			
STTH1502FP	Ultrafast Recovery Diode		
STTH802FP			
STTH810FP	Ultrafast Recovery - High Voltage Diode		

The reliability test methodology used follows the JESD47: « Stress Test driven Qualification Methodology ».

The reliability tests ensuing are:

- TC and IOLT to ensure the mechanical robustness of the products.
- HTRB to evaluate the risk of contamination from the resin and the assembly process versus the die layout sensitivity.
- H3TRB to check the robustness to corrosion and the good package hermeticity.
- RSH, Solderability to check compatibility of package with customer assembly.
- TW/WG to check lead-finishing quality.
- Screw test, to verify robustness of device.

For some tests, similarity methodology is used. See 5.1 “comments” for more details about similarities.

3.2 Conclusion

Qualification Plan requirements have been fulfilled without exception. 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.

4 DEVICE CHARACTERISTICS

4.1 Device description

Refer to product datasheet(s).



ACST6

Overvoltage protected AC switch

Datasheet - production data

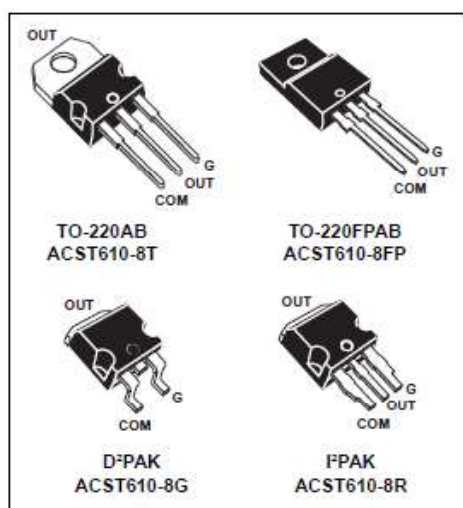
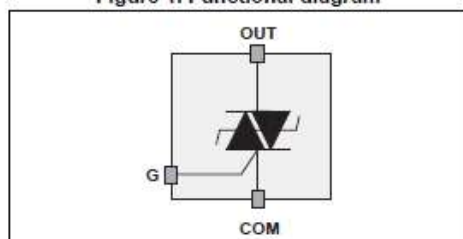


Figure 1. Functional diagram



Features

- Triac with overvoltage protection
- Low I_{GT} (< 10 mA)
- TO-220FPAB insulated package:
 - complies with UL standards (file ref: E81734)
 - insulation voltage: $2000 V_{RMS}$

Benefits

- Enables equipment to meet IEC 61000-4-5
- High off-state reliability with planar technology
- Needs no external overvoltage protection
- Reduces the power passive component count
- High immunity against fast transients described in IEC 61000-4-4 standards

Applications

- AC mains static switching in appliance and industrial control systems
- Drive of medium power AC loads such as:
 - Universal motor of washing machine drum
 - Compressor for fridge or air conditioner

Description

The ACST6 series belongs to the ACS/ACST power switch family built with A.S.D. (application specific discrete) technology. This high performance device is suited to home appliances or industrial systems, and drives loads up to 6 A.

This ACST6 switch embeds a Triac structure and a high voltage clamping device able to absorb the inductive turn-off energy and withstand line transients such as those described in the IEC 61000-4-5 standards. The ACST610 needs only low gate current to be activated ($I_{GT} < 10$ mA) and still shows a high noise immunity complying with IEC standards such as IEC 61000-4-4 (fast transient burst test).

Table 1. Device summary

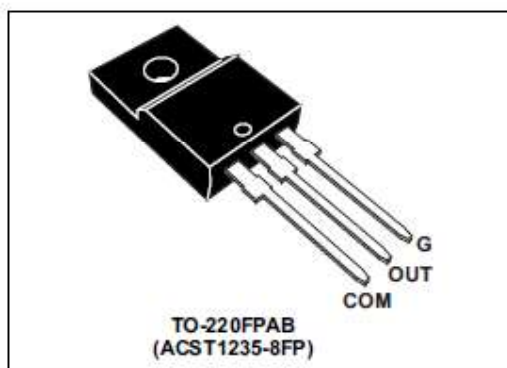
Symbol	Value	Unit
$I_{T(RMS)}$	6	A
V_{DRM}/V_{RRM}	800	V
I_{GT}	10	mA



ACST1235-8FP

Overvoltage protected AC switch

Datasheet – production data



Description

The ACST1235-8FP belongs to the ACS™ / ACST power switch family built with A.S.D.® (application specific discrete) technology. This high performance device is suited to home appliances or industrial systems and drives loads up to 12 A.

This ACST1235-8FP switch embeds a Triac structure and a high voltage clamping device able to absorb the inductive turn-off energy and withstand line transients such as those described in the IEC 61000-4-5 standard. It offers an extremely high static dV/dt immunity of 2 kV/μs minimum at 150 °C junction temperature.

ACST1235-8FP enables applications to be compliant with IEC 61000-4-4 and IEC 61000-4-5.

Features

- 12 A medium current AC Switch
- Triac with self overvoltage protection
- High static immunity and dynamic commutation
- 800 V V_{DRM} / V_{RRM}
- High junction temperature: $T_j = 150$ °C max
- Complies with UL standards (File ref: E81734)
- TO-220FPAB-insulated package 1500V_{RMS}
- ECOPACK®2 and RoHs compliant component

Applications

Motor control for home appliances:

- Washing machine universal drum motors
- Compressor of fridge or air conditioner

Figure 1. Functional diagram

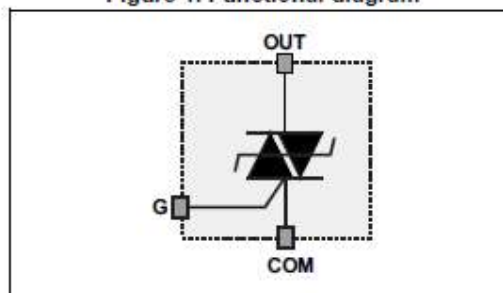
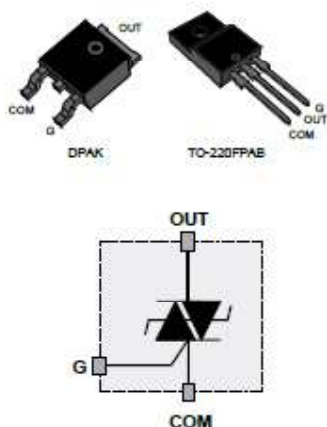


Table 1. Device summary

Symbol	Value	V_{DRM} / V_{RRM}
$I_{T(RMS)}$	12	A
I_{GT}	35	mA
V_{DRM} / V_{RRM}	800	V

2 A - 800 V overvoltage protected AC switch



Features

- Triac with overvoltage crowbar technology
- High noise immunity: static $dV/dt > 500 \text{ V}/\mu\text{s}$
- TO-220FPAB insulated package:
 - complies with UL standards (File ref : E81734)
 - insulation voltage: $2000 \text{ V}_{\text{RMS}}$
- Benefits:
 - Enables equipment to meet IEC 61000-4-5
 - High off-state reliability with planar technology
 - Needs no external overvoltage protection
 - Reduces the power passive component count
 - Interfaces directly with the micro-controller
 - High immunity against fast transients described in IEC 61000-4-4 standards

Applications

- AC mains static switching in appliance and industrial control systems
- Driving low power highly inductive loads like solenoid, pump, fan, and micro-motor

Description

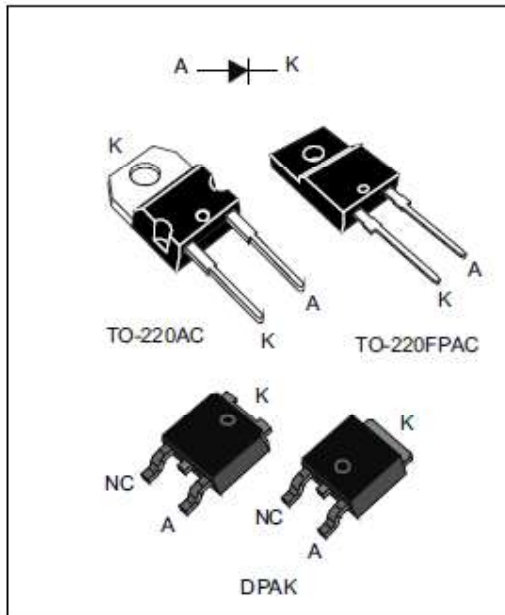
The **ACST2** series belongs to the ACS / ACST power switch family. This high performance device is suited to home appliances or industrial systems and drives loads up to 2 A.

This **ACST2** switch embeds a Triac structure with a high voltage clamping device to absorb the inductive turn-off energy and withstand line transients such as those described in the IEC 61000-4-5 standards. The component needs a low gate current to be activated ($I_{GT} < 10 \text{ mA}$) and still shows a high electrical noise immunity complying with IEC standards such as IEC 61000-4-4 (fast transient burst test).

Product status link	
ACST2	
Product summary	
$I_{T(RMS)}$	2 A
V_{DRM}/V_{RRM}	800 V
I_{GT}	10 mA

Ultrafast recovery - 1200 V diode

Datasheet - production data



Description

The high quality design of this diode has produced a device with low leakage current, regularly reproducible characteristics and intrinsic ruggedness. These characteristics make it ideal for heavy duty applications that demand long term reliability.

Such demanding applications include industrial power supplies, motor control, and similar mission-critical systems that require rectification and freewheeling. These diodes also fit into auxiliary functions such as snubber, bootstrap, and demagnetization applications.

The improved performance in low leakage current, and therefore thermal runaway guard band, is an immediate competitive advantage for this device.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	5 A
V_{RRM}	1200 V
$T_j(max)$	175 °C
$V_F (typ)$	1.25 V
$t_{rr} (typ)$	48 ns

Features

- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature
- ECOPACK®2 compliant component for DPAK on demand
- Insulated package: TO-220FPAC
 - Insulated voltage: 2000 V_{RMS} sine



STPS30H60C

Power Schottky rectifier

Features

- High junction temperature capability
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop
- High frequency operation

Description

Dual centre tab Schottky rectifier suited for high frequency switch mode power supply.

Packaged in TO-220FPAB, TO-220AB, TO-247, I²PAK, and D²PAK, this device is intended to be used in notebook and LCD adaptors and desktop SMPS. In these applications the STPS30H60C provides a good margin between the remaining voltages applied on the diode and the voltage capability of the diode.

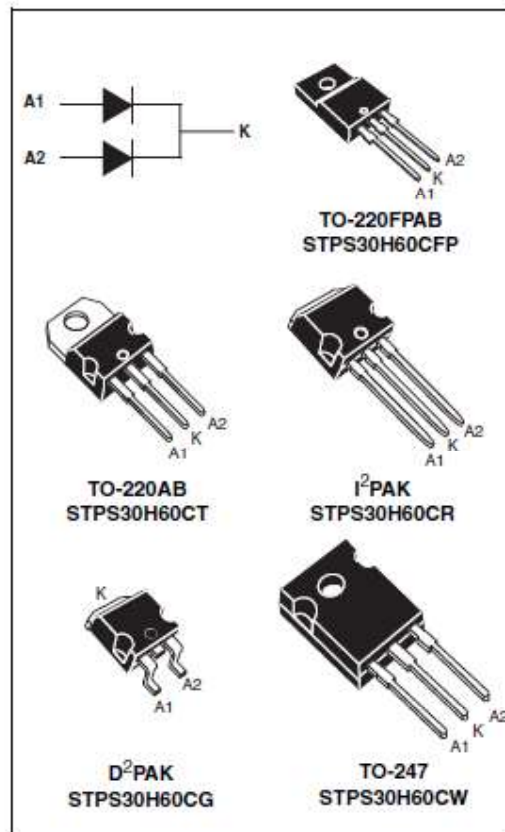


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 X 15 A
V_{RRM}	60 V
T_J	175 °C
V_F (typ)	0.535 V

4.2 Construction Note

	ACSTxx-8FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours – France
Technology / Process family	Overvoltage protected AC switch
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours – France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	FERDxxH100SFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	Field-effect rectifier diode
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STPSxxCFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	High Voltage Power Schottky Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STPSxxCFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	Power Schottky Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTHxxCFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	High Efficiency Ultrafast Diode
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH10LCD06CFP – STTH20LCD06CFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier for SMPS
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH16L06CFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH2003CFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	T405T-6FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Triac
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	T435T-600FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Snubberless Triac
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	TS1220-6FP – TS820-600FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Sensitive SCRs
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	TYN612MFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	SCR
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STPSxxFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	Power Schottky Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH10LCD06FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier for Flat Panel Displays
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTHxxFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier for Flat Panel Displays
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH25M06FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast High Voltage Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH812FP – STTH512FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Recovery – 1200V Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH1502FP – STTH802FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Recovery Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

STTH810FP	
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Recovery – High Voltage Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

5 TESTS PLAN AND RESULTS SUMMARY

5.1 Test vehicles

Lot #	Part Number	Package	Comments
L1	STPS30H60CFP	TO-220FPAB	Qualification lot 1
L2	STTH512FP	TO-220FPAC	Qualification lot 2
L3	ACST1235-8FP	TO-220FPAB	Qualification lot 3
L4	ACST610-8FP	TO-220FPAB	Qualification lot 4
L5	ACST210-8FP	TO-220FPAB	Qualification lot 5

Detailed results in below chapter will refer to these references.

5.2 Test plan

Stress	Abv	Reference	Lot	SS	Comments	Test plan
Pre and Post-Stress Electrical Test	TEST	User specification or supplier's standard Specification	All qualification parts tested per the requirements of the appropriate device specification.			
Pre-conditioning	PC	J-STD-020 JESD22-A113	All qualification parts tested per the requirements of the appropriate device specification.		As per targeted MSL Not applicable for PTH and WLCSP without coating	
MSL research	MSL	J-STD-020			Not applicable for PTH and WLCSP without coating	
External Visual	EV	JESD22B-101	All qualification parts tested per the requirements of the appropriate device specification.		Done during Assembly → Test & Finish inspection	
Parametric Verification	PV	User specification	L3 L4 L5	30 per Test		x
High Temperature Reverse Bias	HTRB	MIL-STD-750-1 M1038 Method A (for diodes, rectifiers and Zeners) M1039 Method A (for transistors)	L2 L3	77 77	WBI after HTRB applicable only for dissimilar metal (wire/meta) in case of no Cu wire	x
AC blocking voltage	ACBV	MIL-STD-750-1 M1040 Test condition A			Required for Thyristor only. Alternative to HTRB	
High Temperature Forward Bias	HTFB	JESD22 A-108			Not required, applicable only to LEDs Alternative to HTRB	
High Temperature Operating Life	HTOL				Covered by HTRB or ACBV	
Steady State Operational	SSOP	MIL-STD-750-1 M1038 Test condition B			Required for Voltage Regulator (Zener) only.	
High Temperature Gate Bias	HTGB	JESD 22A-108			Required for Power MOSFET – IGBT only.	
High Temperature Storage Life	HTSL	JESD22 A-103			Covered by HTRB	
Temperature Humidity Storage	THS	JESD22 A-118			Covered by H3TRB	
Temperature Cycling	TC	JESD22A-104	L1	77		x
Temperature Cycling Hot Test	TCHT	JESD22A-104			Required for Power MOSFET – IGBT only.	
Temperature Cycling Delamination Test	TCDT	JESD22A-104 J-STD-035			Required for Power MOSFET – IGBT only. Alternative to TCHT	
Wire Bond Integrity	WBI	MIL-STD-750 Method 2037			For dissimilar metal bonding systems only	
Unbiased Highly Accelerated Stress Test	UHAST	JESD22A-118 or A101			Required for SCR/TRIAC RECTIFIER and Protection devices	
Autoclave	AC	JESD22A-102			Alternative to UHAST	
Highly Accelerated Stress Test	HAST	JESD22A-110			Covered by H3TRB (same failure mechanisms activation).	
High Humidity High Temperature Reverse Bias	H3TRB	JESD22A-101	L1 L2	77 77	Alternative to HAST	x
High Temperature High Humidity Bias	HTHHB	JED22A-101			Not required, LED only	
Intermittent Operational Life / Thermal Fatigue	IOL	MIL-STD-750 Method 1037	L4	77	For power devices. Not required for Transient Voltage Suppressor (TVS) parts	x

Stress	Abrv	Reference	Lot	SS	Comments	Test plan
Power and Temperature Cycle	PTC	JED22A-105			For power devices. Not required for Transient Voltage Suppressor (TVS) parts Perform PTC if $\Delta T_j > 100^\circ\text{C}$ cannot be achieved with IOL Alternative to IOL	
ESD Characterization	ESD HBM	AEC Q101-001 and 005				
ESD Characterization	ESD CDM	AEC Q101-001 and 005				
Destructive Physical Analysis	DPA	AEC-Q101-004 Section 4			After H3TRB and TC	
Physical Dimension	PD	JESD22B-100	L3 L4 L5	30 30 30		x
Terminal Strength	TS	MIL-STD-750 Method 2036			Required for leaded parts only	
Resistance to Solvents	RTS	JESD22B-107			Not applicable for Laser Marking	
Constant Acceleration	CA	MIL-STD-750 Method 2006			Required for hermetic packaged parts only.	
Vibration Variable Frequency	VVF	JESD22B-103			Required for hermetic packaged parts only.	
Mechanical Shock	MS	JESD22 B-104			Required for hermetic packaged parts only.	
Hermeticity	HER	JESD22A-109			Required for hermetic packaged parts only.	
Resistance to Solder Heat	RSH	JESD22 A-111 (SMD) B-106 (PTH)	L1	30	Not applicable for SMD pitch < 0.5mm, package size > 5.5*12.5mm and die paddle > 2.5*3.5mm	x
Solderability	SD	J-STD-002 JESD22B102	L1	4*15		x
Dead Bug Test	DBT	ST Internal specification			Mandatory for SMD package Data collection for PTH package	
Thermal Resistance	TR	JESD24-3, 24-4, 24-6 as appropriate			Required in case of process change. Not applicable to protection device as no limit specified in the datasheet	
Wire Bond Strength	WBS	MIL-STD-750 Method 2037	L3 L4	10 10	Covered during workability trials	x
Bond Shear	BS	AEC-Q101-003	L3 L4	10 10	Covered during workability trials	x
Die Shear	DS	MIL-STD-750 Method 2017			Not Applicable to parts with solder paste die attach	x
Unclamped Inductive Switching	UIS	AEC-Q101-004 section 2			Required for Power MOS and internally clamped IGBTs only	
Dielectric Integrity	DI	AEC-Q101-004 section 3			Required for Power MOSFET – IGBT only.	
Short Circuit Reliability Characterization	SCR	AEC-Q101-006			Required for smart power parts only	
Whisker Growth Evaluation	WG	AEC-Q005 JESD201	L1	5*6		x
Screwing test	SCW	-	L1 L3	22 22		x
Early Life Failure Rate	ELFR	JESD74			Recommended for new techno development in case of identified failure mechanism	
Functional Test (in rush, di/dt,...)	FT	Internal specification				
Repetitive Surge	RS	Internal specification			Required for protection devices only.	
Low Temperature Storage	LTS	JESD-22 A119: 209			AQG324 test for Modules	
Thermal shock test	TST	JESD22-A104			AQG324 test for Modules	

Power Cycling (seconds)	PC sec	MIL-STD750-1 Method1037			AQG324 test for Modules	
Power Cycling (minutes)	PC min	MIL-STD750-1 Method1037			AQG324 test for Modules	
Mechanical shock	MS	IEC 60068-2- 27			AQG324 test for Modules	
Vibration	V	IEC60068-2-6			AQG324 test for Modules	

5.3 Results summary

Test	PC	Std Ref.	Conditions	Steps / Duration	SS	Failure / SS				
						L1	L2	L3	L4	L5
Parametric Verification	-	ST Datasheet	Over part temperature range (note1)	-		Refer to paragraph 6.2 in Annexes				
PD	-	JESD22 B-100	-	-		Refer to paragraph 6.3 in Annexes				
HTRB	N	MIL-STD-750-1 M1038 Method A	Tj=125°C Voltage=800V	1Khrs	2*77 (154)	-	-	0/77	-	-
			Tj=150°C Voltage=960V			-	0/77	-	-	-
TC	N	JESD22-A104	-65/+150°C 2cy/h	500Cy	77	0/77	-	-	-	-
RSH	N	JESD22 B-106	Dipping 270°C-7s	-	30	0/30	-	-	-	-
H3TRB	N	JESD22 A-101	85°C; 85% RH Voltage=100V	1Khrs	2*77 (154)	-	0/77	-	-	-
			85°C; 85% RH Voltage=48V			0/77	-	-	-	-
IOLT	N	MIL-STD 750 Method 1037	ΔTj=100°C Ton=Toff=210s	8575Cy	77	-	-	-	0/77	-
SD	N	J-STD-002	Wet ageing SnPb bath 245°C	-	15	0/15	-	-	-	-
			Wet ageing SnAgCu bath 245°C	-	15	0/15	-	-	-	-
SCREW	N	ST 0063378	Torque=0.6N.m	-	44	0/22	-	0/22	-	-
WG	N	AEC-Q005 JESD201	No reflow THS 30°C/60%RH	4Krs	6	-	-	-	-	0/6
			Reflow SnPb 220°C TC -40°C/85°C	1.5Kcy	6	-	-	-	-	0/6
			Reflow Pb Free 260°C TC -40°C/85°C	1.5Kcy	6	-	-	-	-	0/6
			Reflow SnPb 220°C THS 55°C/85%RH	4Krs	6	-	-	-	-	0/6
			Reflow Pb Free 260°C THS 55°C/85%RH	4Krs	6	-	-	-	-	0/6

Note 1: These data are indicative values given as information only. Please note that the ST guarantee is the compliance of the products to the ST datasheet. Parameters distributions are not considered as a ST guarantee under any circumstances.

Please note that these electrical parameters are 100% tested at 25°C at Final stage of back-end manufacturing before deliveries to customers.”

6 ANNEXES

6.1 Parametric Verification

ACST210-8FP

TEST	IDRM	IRRM	IDRM	IRRM	IGT I	IGT II	IGT III
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	125°C	25°C	25°C	25°C
Condition 2	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V	VOUT=12V	VOUT=12V	VOUT=12V
Condition 3					RL=33Ω	RL=33Ω	RL=33Ω
Min. Datasheet							
Max. Datasheet	10μA	10μA	0.5mA	0.5mA	10	10	10
UNIT	nA	nA	μA	μA	mA	mA	mA
N	30	30	30	30	30	30	30
Min	3,88	14,82	6,41	65,64	3,01	6,35	4,67
Max	50,86	68,84	9,51	89,28	3,23	8,70	5,84
Avg	11,68	44,25	8,41	74,28	3,13	7,78	4,99

TEST	VGT I	VGT II	VGT III	IL I	IL II	IL III	IH D	IH R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C
Condition 2	VOUT=12V	VOUT=12V	VOUT=12V	IG=12mA	IG=12mA	IG=12mA	IOU=100mA	IOU=100mA
Condition 3	RL=33Ω	RL=33Ω	RL=33Ω					
Min. Datasheet								
Max. Datasheet	1.1	1.1	1.1	25	35	25	10	10
UNIT	V	V	V	mA	mA	mA	mA	mA
N	30	30	30	30	30	30	30	30
Min	0,739	0,695	0,744	11,62	18,06	7,12	6,81	6,28
Max	0,747	0,704	0,768	12,78	19,33	7,49	7,16	6,63
Avg	0,743	0,700	0,751	12,15	18,87	7,31	6,96	6,45

TEST	VTM D	VTM R	VTO D	VTO R	RD D	RD R
EQUIPMENT	TESEC	TESEC	-	-	-	-
Condition 1	25°C	25°C	125°C	125°C	125°C	125°C
Condition 2	IOU=2.8A	IOU=2.8A				
Condition 3	Tp=500μs	Tp=500μs				
Min. Datasheet						
Max. Datasheet	2	2	0.9	0.9	250	250
UNIT	V	V	V	V	mΩ	mΩ
N	30	30	30	30	30	30
Min	1,286	1,327	0,802	0,805	159,20	174,76
Max	1,307	1,349	0,812	0,816	164,33	180,95
Avg	1,298	1,332	0,808	0,809	162,28	176,47

ACST1235-8FP

TEST	IDRM	IRRM	IRRM	IRRM	IDRM	IRRM
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	125°C	150°C	150°C
Condition 2	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V
Condition 3						
Min. Datasheet						
Max. Datasheet	1μA	1μA	500	500	1.2mA	1.2mA
UNIT	nA	nA	μA	μA	μA	μA
N	30	30	30	30	30	30
Min	3,94	8,91	26,30	40,26	175,6	241,7
Max	22,46	29,26	39,98	62,69	244,2	345,1
Avg	14,17	16,20	33,37	50,92	210,6	291,8

TEST	IGT I	IGT II	IGT III	VGT I	VGT II	VGT III	IL I	IL II	IL III
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C
Condition 2	VD=12V	VD=12V	VD=12V	VD=12V	VD=12V	VD=12V	IG=42mA	IG=42mA	IG=42mA
Condition 3	RL=33Ω	RL=33Ω	RL=33Ω	RL=33Ω	RL=33Ω	RL=33Ω			
Min. Datasheet	1.75	1.75	1.75						
Max. Datasheet	35	35	35	1	1	1	30	30	30
UNIT	mA	mA	mA	V	V	V	mA	mA	mA
N	30	30	30	30	30	30	30	30	30
Min	10,70	10,99	16,69	0,770	0,664	0,777	21,28	14,55	13,95
Max	11,09	11,40	17,89	0,784	0,672	0,792	22,94	15,23	14,92
Avg	10,91	11,20	17,10	0,775	0,668	0,783	22,42	14,93	14,51

TEST	IH D	IH R	VTM D	VTM R	VTO D	VTO R	RD D	RD R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC		-	-	-
Condition 1	25°C	25°C	25°C	25°C	150°C	150°C	150°C	150°C
Condition 2	IT=500mA	IT=500mA	ITM=17A	ITM=17A				
Condition 3			Tp=380μs	Tp=380μs				
Min. Datasheet								
Max. Datasheet	30	30	1.5	1.5	0.9	0.9	38	38
UNIT	mA	mA	V	V	V	V	mΩ	mΩ
N	30	30	30	30	30	30	30	30
Min	15,20	12,29	1,340	1,408	0,799	0,812	29,83	33,89
Max	16,69	13,29	1,356	1,422	0,804	0,816	30,18	34,33
Avg	16,26	12,91	1,348	1,415	0,802	0,814	29,96	34,15

ACST610-8FP

TEST	IDRM	IRRM	IDRM	IRRM	IGT I	IGT II	IGT III
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	125°C	25°C	25°C	25°C
Condition 2	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V	VOUT=12V	VOUT=12V	VOUT=12V
Condition 3					RL=33Ω	RL=33Ω	RL=33Ω
Min. Datasheet							
Max. Datasheet	20μA	20μA	500μA	500μA	10	10	10
UNIT	nA	nA	μA	μA	mA	mA	mA
N	30	30	30	30	30	30	30
Min	3,62	62,95	11,38	116,70	3,15	4,73	5,49
Max	26,30	201,20	39,88	286,20	3,29	4,97	5,96
Avg	16,52	114,09	21,67	164,51	3,22	4,84	5,73

TEST	VGT I	VGT II	VGT III	IL I	IL II	IL III	IH D	IH R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C
Condition 2	VOUT=12V	VOUT=12V	VOUT=12V	IG=12mA	IG=12mA	IG=12mA	IOUT=500 mA	IOUT=500 mA
Condition 3	RL=33Ω	RL=33Ω	RL=33Ω					
Min. Datasheet								
Max. Datasheet	1	1	1	30	40	30	25	25
UNIT	V	V	V	mA	mA	mA	mA	mA
N	30	30	30	30	30	30	30	30
Min	0,696	0,663	0,739	11,81	13,66	12,98	9,79	8,40
Max	0,706	0,672	0,748	12,69	14,05	16,00	10,59	10,09
Avg	0,700	0,666	0,742	12,25	13,83	14,80	10,18	9,49

TEST	VTM D	VTM R	VTM D	VTM R	VTO D	VTO R	RD D	RD R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC		-	-	-
Condition 1	25°C	25°C	25°C	25°C	125°C	125°C	125°C	125°C
Condition 2	IOUT=2.1A	IOUT=2.1A	IOUT=8.5A	IOUT=8.5A				
Condition 3	Tp=500μs	Tp=500μs	Tp=500μs	Tp=500μs				
Min. Datasheet								
Max. Datasheet	1.4	1.4	1.7	1.7	0.9V	0.9V	80mΩ	80mΩ
UNIT	V	V	V	V	V	V	mΩ	mΩ
N	30	30	30	30	30	30	30	30
Min	1,048	1,068	1,375	1,449	0,815	0,822	64,82	74,37
Max	1,069	1,075	1,405	1,463	0,830	0,825	66,51	75,78
Avg	1,057	1,070	1,388	1,452	0,822	0,823	65,46	75,06

STPS30H60CFP

TEST	VR	VF	VF	VF	VF
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	125°C
Condition 2	IAK = 1mA	IF=7.5A	IF=15A	IF=30A	IF=7.5A
Min. Datasheet	600V				435mV
Max. Datasheet		550mV	660mV	820mV	470mV
UNIT	V	mV	mV	mV	mV
N	60	60	60	60	60
Min	67.38	0.4957	0.5736	0.695	0.4072
Max	73.32	0.522	0.6128	0.748	0.4386
Avg	71.54	0.511195	0.60061833 3	0.7333	0.42924

TEST	VF	VF	IR	IR
EQUIPMENT	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	125°C	25°C	125°C
Condition 2	IF=15A	IF=30A	VR = 60V	VR = 60V
Min. Datasheet	535mV	635mV	60uA	8mA
Max. Datasheet	570mV	690mV		25mA
UNIT	mV	mV	μA	μA
N	60	60	60	60
Min	0.5118	0.6184	5.369	6.273
Max	0.54	0.64	11.47	10.91
Avg	0.53	0.63	8.11	8.62

STTH512FP

TEST	VR	VF	VF	VF	IR	IR
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	150°C	25°C	125°C
Condition 2	IAK = 1mA	IF=5A	IF=5A	IF=5A	VR = 1200V	VR = 1200V
Min. Datasheet	1200V					
Max. Datasheet		2.2V	2V	1.9V	5 μA	30 μA
UNIT	V	V	V	V	μA	μA
N	40	40	20	20	40	20
Min	145	1.49	1.21	1.15	0	2.89
Max	151	1.78	1.23	1.23	835.10	3.31
Avg	1487.27	1.6	1.25	1.19	29.43	3.07

6.2 Assembly Tests

TO-220FPAB (3L) package

Wire pull Test

	Conditions	Sample size	Failure /SS
ACST1235-8FP	450g Min	10 units	0/10

Ball / Wedge Shear Test

	Conditions	Sample size	Failure /SS
ACST1235-8FP	900g Min	10 units	0/10

TO-220FPAC (2L) package

Wire pull Test

	Conditions	Sample size	Failure /SS
ACST610-8FP	500g Min	10 units	0/10

Ball / Wedge Shear Test

	Conditions	Sample size	Failure /SS
ACST610-8FP	1000g Min	10 units	0/10

6.3 Physical Dimensions

TO-220FPAB package

Figure 18. TO-220FPAB package outline

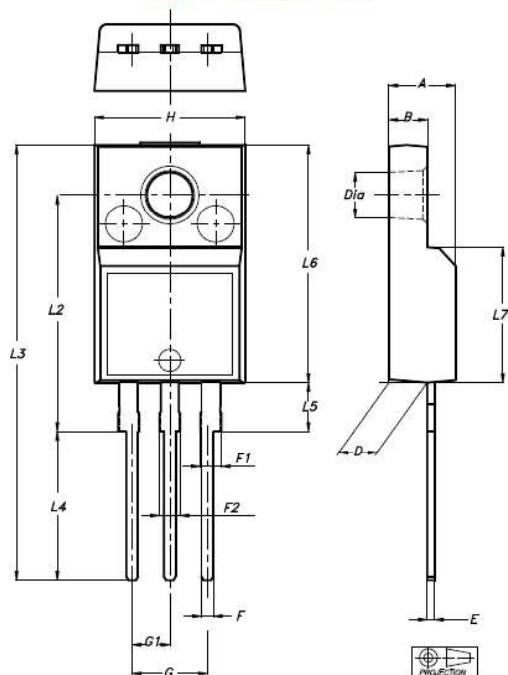


Table 5. TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	2.5	2.7	0.0988	0.1067
D	2.50	2.75	0.0988	0.1087
E	0.45	0.70	0.0178	0.0277
F	0.75	1.0	0.0296	0.0395
F1	1.15	1.70	0.0455	0.0672
F2	1.15	1.70	0.0455	0.0672
G	4.95	5.20	0.1957	0.2055
G1	2.40	2.70	0.0949	0.1067
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 typ.	
L3	28.60	30.60	1.1304	1.2095
L4	9.80	10.6	0.3874	0.4190
L5	2.90	3.60	0.1146	0.1423
L6	15.90	16.40	0.6285	0.6482
L7	9.00	9.30	0.3557	0.3676
Dia	3.0	3.20	0.1188	0.1265

Cote	A	B	D	E	F	F1	F2	G	G1	H	L2	L3	L4	L5	L6	L7	Dia
MIN	4,4	2,5	2,5	0,45	0,75	1,15	1,15	4,95	2,4	10	16	28,6	9,8	2,9	15,9	9	3
TYP																	
MAX	4,6	2,7	2,75	0,7	1	1,7	1,5	5,2	2,7	10,4	16	30,6	10,6	3,6	16,4	9,3	3,2
MIN	4,47	2,55	2,53	0,52	0,80	1,41	1,33	5,07	2,54	10,16	15,92	29,54	10,17	3,24	16,11	9,12	3,05
MAX	4,52	2,66	2,60	0,55	0,85	1,46	1,35	5,11	2,57	10,19	16,08	29,66	10,24	3,33	16,19	9,23	3,12
Avg	4,500	2,587	2,562	0,528	0,820	1,436	1,343	5,086	2,549	10,176	16,003	29,597	10,197	3,278	16,157	9,189	3,089

TO-220FPAC package

Figure 15. TO-220FPAC package outline

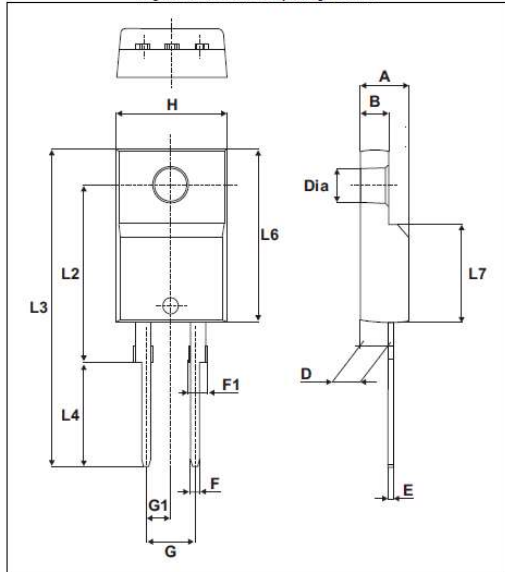


Table 7. TO-220FPAC package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	2.50		2.70	0.098		0.106
D	2.50		2.75	0.098		0.108
E	0.45		0.70	0.018		0.027
F	0.75		1.00	0.030		0.039
F1	1.15		1.70	0.045		0.067
G	4.95		5.20	0.195		0.205
G1	2.40		2.70	0.094		0.106
H	10.00		10.40	0.393		0.409
L2		16.00 Typ.			0.630 Typ.	
L3	28.60		30.60	1.126		1.205
L4	9.80		10.60	0.386		0.417
L6	15.90		16.40	0.626		0.646
L7	9.00		9.30	0.354		0.366
Dia.	3.00		3.20	0.118		0.126

Cote	A	B	D	E	F	F1	G	G1	H	L2	L3	L4	L6	L7	Dia
MIN	4,4	2,5	2,5	0,45	0,75	1,15	4,95	2,4	10	16	28,6	9,8	15,9	9	3
TYP															
MAX	4,6	2,7	2,75	0,7	1	1,7	5,2	2,7	10,4		30,6	10,6	16,4	9,3	3,2
MIN	4,41	2,58	2,54	0,52	0,80	1,37	5,04	2,54	10,14	15,96	29,59	10,16	16,10	9,17	3,10
MAX	4,48	2,60	2,59	0,54	0,82	1,41	5,08	2,57	10,21	16,04	29,66	10,23	16,16	9,20	3,16
Avg	4,442	2,585	2,564	0,530	0,811	1,394	5,064	2,549	10,177	16,003	29,631	10,197	16,141	9,181	3,123

6.4 Thermal Resistance

TEST	RTH (j-c) (ACST210-8FP)	RTH (j-c) (ACST1235-8FP)	RTH (j-c) (ACST610-8FP)
EQUIPMENT	TEST CALCULEES	TEST CALCULEES	TEST CALCULEES
Condition 1	25°C	25°C	25°C
Min. Datasheet			
Typ. Datasheet			
Max. Datasheet	7	3.5	4.25
UNIT	°C/W	°C/W	°C/W
N	10	5	5
Min	2,96	1,93	2,37
Max	3,22	2,05	2,51
Avg	3,10	1,97	2,45

6.5 Tests description

Test name	Description	Purpose
Die Oriented		
HTRB High Temperature Reverse Bias / HTFB High Temperature Forward 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. Forward: device is forward biased with a current fixed and adjusted to reach the targeted junction temperature	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. To assess active area and contacts integrity
Package Oriented		
H3TRB High Humidity High Temperature Reverse 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.
IOLT Intermittent Operating Life Test	All test samples shall be subjected to the specified number of cycles. When stabilized after initial warm-up cycles, a cycle shall consist of an "on" period, when power is applied suddenly, not gradually, to the device for the time necessary to achieve a delta case temperature followed by an "off" period, when the power is suddenly removed, for cooling the case through a similar delta temperature.	The purpose of this test is to determine compliance with the specified numbers of cycles for devices subjected to the specified conditions. It accelerates the stresses on all bonds and interfaces between the chip and mounting face of devices subjected to repeated turn on and off of equipment and is therefore most appropriate for case mount style (e.g., stud, flange, and disc) devices.
RSH Resistance to Solder Heat	Package is dipped by the leads in a solder bath after initial wet ageing (for SMDs only). Assessment by electrical test + no external crack	To simulate wave soldering process and verify that package will not be thermally damaged during this step.
SD Solderability	The purpose of this test method is to provide a referee condition for the evaluation of the solderability of terminations (including leads up to 0.125 inch in diameter) that will be assembled using tin lead eutectic solder.	This evaluation is made on the basis of the ability of these terminations to be wetted and to produce a suitable fillet when coated by tin lead eutectic solder. These procedures will test whether the packaging materials and processes used during the manufacturing operations process produce a component that can be successfully soldered to the next level assembly using tin lead eutectic solder. A preconditioning test is included in this test method, which degrades the termination finish to provide a guard band against marginal finish.
TW/WG Whiskers Growth	Forced growing of Tin Whiskers by various kind of environmental stress: temperature, moisture and temperature cycling.	To ensure no risk of electrical short due to Tin Whisker growth.

(1) ADG: Automotive and Discrete Group

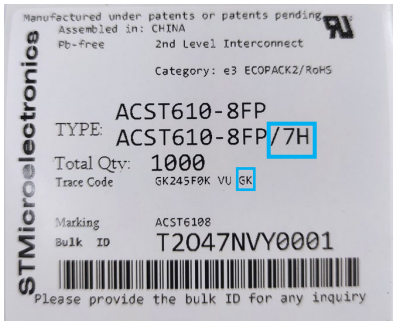
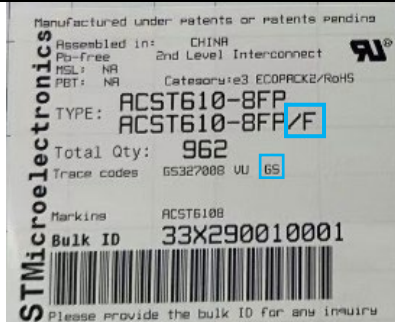
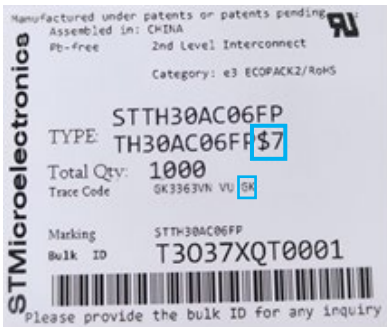
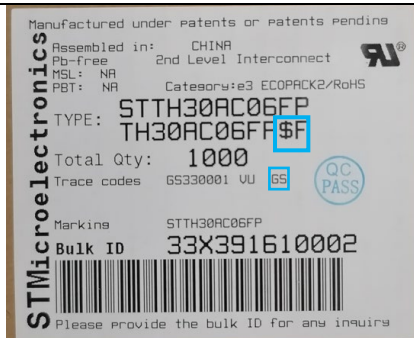
PCN Product/Process Change Notification			
Transfer of assembly and test line qualification for TO220 Full Pack package			
Notification number:	ADG/23/14391	Issue Date	10-Nov-2023
Issued by	Sophie da Silva		
Product series affected by the change		TO220FP Rectifiers and Thyristors Triacs products <i>Refer to attached table for involved Commercial Products.</i>	
Type of change		Transfer	
Description of the change The production of TO220 Full Pack package (Assembly, Test & Finishing) currently located in ST Shenzhen Plant (China) will be transferred to a subcontractor plant located in China.			
Reason for change ST Shenzhen has decided to phase out TO220FP line to extend production capacity for other packages.			
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 (so called "halogen-free").	
Disposition of former products Delivery of current products will be done until stock depletion.			

(1) ADG: Automotive and Discrete Group

Marking and traceability

Traceability of the change will be ensured by Finished Good/Type print on carton labels (New FG ending by **F**).

Commercial part number/Order code (Examples)	Former Finished Good/Type (Examples)	New Finished Good/Type (Examples)
ACST1235-8FP FERD20H100SFP STPS10150CFP STTH1002CFP T435T-600FP	ACST1235-8FP/ 7H FERD20H100SFP/ 7 PS10150CFP% 7 TH1002CFP\$ 7 T435T-600FP/ 7	ACST1235-8FP/ F FERD20H100SFP/ F PS10150CFP% F TH1002CFP\$ F T435T-600FP/ F

Former Label (examples)	New Label (examples)
	
	

Qualification completion date

10-Nov-2023

(1) ADG: Automotive and Discrete Group

Forecasted sample availability

Product family	Sub-family	Commercial part Number	Availability date
THYRISTORS-TRIACS	Triac	ACST1235-8FP	Week 51-2023
THYRISTORS-TRIACS	Triac	ACST1635-8FP	
THYRISTORS-TRIACS	Triac	ACST210-8FP	
THYRISTORS-TRIACS	Triac	ACST410-8FP	
THYRISTORS-TRIACS	Triac	ACST610-8FP	
THYRISTORS-TRIACS	Triac	ACST830-8FP	
RECTIFIERS	AFER	FERD40H100SFP	
RECTIFIERS	Power Schottky	STPS30H60CFP	
RECTIFIERS	Power Schottky	STPS30M100SFP	
RECTIFIERS	Ultrafast	STTH10LCD06FP	
RECTIFIERS	Ultrafast	STTH12S06FP	
RECTIFIERS	Ultrafast	STTH15L06FP	
RECTIFIERS	Ultrafast	STTH30AC06FP	
RECTIFIERS	Ultrafast	STTH812FP	
RECTIFIERS	Ultrafast	STTH8L06FP	
RECTIFIERS	Ultrafast	STTH8R06FP	
RECTIFIERS	Ultrafast	STTH8S06FP	
THYRISTORS-TRIACS	Thyristor	TS820-600FP	
THYRISTORS-TRIACS	Thyristor	TYN612MFP	

For sample(s) request, please inform FSE (Field Sales Engineer) in order to insert corresponding **Non-Standard Samples Order** (a single Commercial Product for each request) with **PCN reference** as additional information.

Change implementation schedule

Sales-types	Estimated production start	Estimated first shipments
All	Feb-2024	Mar-2024

Comments: With early PCN acceptance, possible shipment starting W13-2024.

Customer's feedback

Please contact your local ST sales representative or quality 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 23028QRP Attached

(1) ADG: Automotive and Discrete Group

Involved Commercial part numbers	
ACST1235-8FP	STTH10LCD06FP
ACST1635-8FP	STTH12R06FP
ACST210-8FP	STTH12S06FP
ACST410-8FP	STTH1502FP
ACST610-8FP	STTH15AC06FP
ACST830-8FP	STTH15L06FP
FERD20H100SFP	STTH15R06FP
FERD40H100SFP	STTH1602CFP
STPS10150CFP	STTH16L06CFP
STPS10H100CFP	STTH2002CFP
STPS10L60CFP	STTH2003CFP
STPS1545FP	STTH20LCD06CFP
STPS15LCD80CFP	STTH25M06FP
STPS20150CFP	STTH30AC06FP
STPS20170CFP	STTH512FP
STPS20200CFP	STTH5L06FP
STPS2045CFP	STTH5R06FP
STPS20H100CFP	STTH802FP
STPS20L45CFP	STTH810FP
STPS20S100CFP	STTH812FP
STPS30150CFP	STTH8L06FP
STPS30H60CFP	STTH8R06FP
STPS30L45CFP	STTH8S06FP
STPS30M100SFP	T405T-6FP
STPS745FP	T435T-600FP
STPS8H100FP	TS1220-6FP
STTH1002CFP	TS820-600FP
STTH10LCD06CFP	TYN612MFP

Specific devices not expressly listed above are included in this change.

Qualification Report

Transfer of Assembly & Test line qualification for TO220 Full Pack Package.

General Information		Locations	
Product Line	<i>Rectifiers - ACS Switch – SCR Triacs</i>	Wafer Fab	<i>ST Singapore – China ST Tours - France</i>
Product Description	<i>Power Schottky Rectifier – Ultrafast Rectifier -Overvoltage protected AC Switch - SCR Triacs</i>		
Product Perimeter	<i>ACSTxx-8FP – STTHxxCFP – STTHxxFP STPSxxCFP – STPSxxFP - STPS30M100SFP - FERDxxH100SFP – T405T-6FP - T435T-600FP - TS820-600FP TS1220-6FP - TYN612MFP</i>	Assembly Plant	<i>Subcontractor 993x - China</i>
Product Group	<i>ADG</i>	Reliability Lab	<i>ST TOURS – FRANCE Whisker's test done at Subcontractor - China</i>
Product Division	<i>Discrete & Filter</i>		
Packages	<i>TO-220FPAB TO-220FPAC</i>	Reliability Assessment	<i>PASS</i>
Maturity level step	<i>QUALIFIED</i>		

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comments
1.0	31 October 2023	29	Elisabeth PREVOST	Digitally signed by Christophe Goin Date: 2023.11.10 09:21:44 +01'00'	Qualification of transfer of assembly & test line qualification for TO-220FP package

Note: This report is a summary of the qualification trials performed in good faith by STMicroelectronics in order to evaluate the potential 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.

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1 APPLICABLE AND REFERENCE DOCUMENTS

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

2 GLOSSARY

H3TRB	High Humidity High Temperature Reverse Bias
HTRB	High Temperature Reverse Bias
IOLT	Intermittent Operating Life Test
PD	Physical Dimensions
PV	Parametric Verification
RSH	Resistance to Soldering Heat
SD	Solderability test
SS	Sample Size
TC	Temperature Cycling
TW/WG	Tin Whiskers / Whiskers Growth
SCW	Screwing Test

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

The objective of this report is to qualify Transfer of Assembly & Test manufacturing activity for rectifiers and ACS Switch products housed embedded in TO-220FP package.

Product	Description	Package	Assembly Location
ACST1235-8FP	Overvoltage protected AC Switch	TO-220FPAB	ST Subcontractor (993x) - China
ACST1635-8FP			
ACST210-8FP			
ACST410-8FP			
ACST610-8FP			
ACST830-8FP			
FERD20H100SFP	Field-effect rectifier diode		
FERD40H100SFP			
STPS10150CFP	High Voltage Power Schottky Rectifier		
STPS20150CFP			
STPS20170CFP			
STPS20200CFP			
STPS2045CFP			
STPS30150CFP			
STPS10H100CFP			
STPS10L60CFP			
STPS15LCD80CFP			
STPS20H100CFP			
STPS20L45CFP			
STPS20S100CFP			
STPS30H60CFP			
STPS30L45CFP			
STPS30M100SFP			
STTH1002CFP	High Efficiency Ultrafast Diode		
STTH1602CFP			
STTH2002CFP			
STTH10LCD06CFP	Turbo 2 Ultrafast – High Voltage rectifier for SMPS		
STTH20LCD06CFP			
STTH16L06CFP	Turbo 2 Ultrafast High Voltage Rectifier		
STTH2003CFP	Ultrafast Rectifier		
T405T-6FP	Triac		
T435T-600FP	Snubberless Triac		
TS1220-6FP	Sensitive SCRs		
TS820-600FP	Sensitive SCRs		
TYN612MFP	SCR		
STPS745FP	Power Schottky Rectifier	TO-220FPAC	
STPS8H100FP			
STPS1545FP			
STTH10LCD06FP	Turbo 2 ultrafast - High Voltage Rectifier for Flat Panel Displays		
STTH12R06FP	Turbo 2 Ultrafast High Voltage Rectifier		
STTH12S06FP			
STTH15AC06FP			
STTH15L06FP			
STTH15R06FP			

STTH30AC06FP			
STTH5L06FP			
STTH5R06FP			
STTH8L06FP			
STTH8R06FP			
STTH8S06FP			
STTH25M06FP	Ultrafast High Voltage Diode		
STTH812FP	Ultrafast Recovery - 1200 V Diode		
STTH512FP			
STTH1502FP	Ultrafast Recovery Diode		
STTH802FP			
STTH810FP	Ultrafast Recovery - High Voltage Diode		

The reliability test methodology used follows the JESD47: « Stress Test driven Qualification Methodology ».

The reliability tests ensuing are:

- TC and IOLT to ensure the mechanical robustness of the products.
- HTRB to evaluate the risk of contamination from the resin and the assembly process versus the die layout sensitivity.
- H3TRB to check the robustness to corrosion and the good package hermeticity.
- RSH, Solderability to check compatibility of package with customer assembly.
- TW/WG to check lead-finishing quality.
- Screw test, to verify robustness of device.

For some tests, similarity methodology is used. See 5.1 “comments” for more details about similarities.

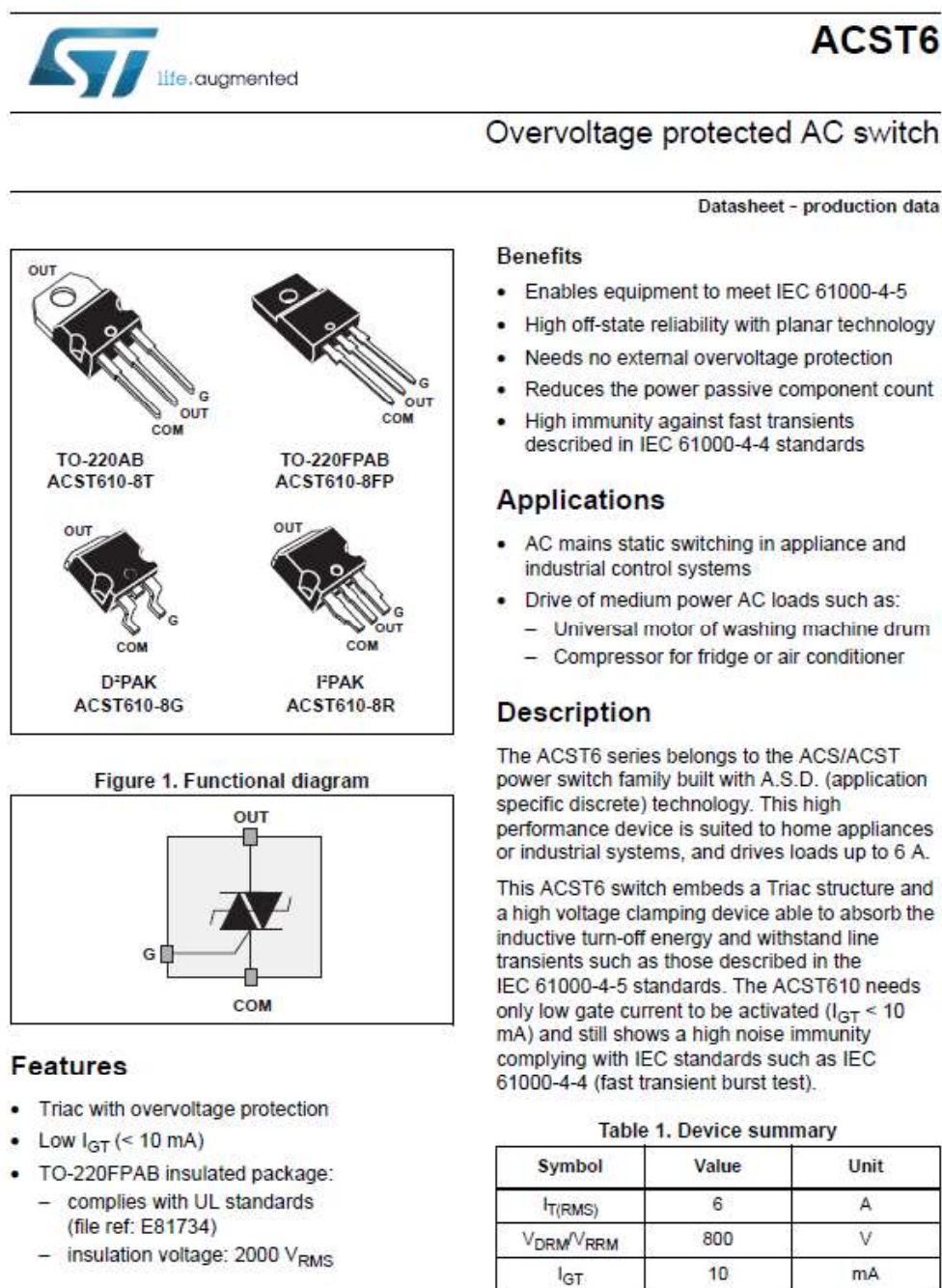
3.2 Conclusion

Qualification Plan requirements have been fulfilled without exception. 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.

4 DEVICE CHARACTERISTICS

4.1 Device description

Refer to product datasheet(s).

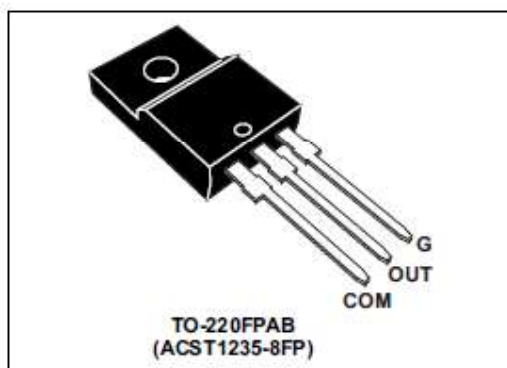




ACST1235-8FP

Overvoltage protected AC switch

Datasheet – production data



Description

The ACST1235-8FP belongs to the ACS™ / ACST power switch family built with A.S.D.® (application specific discrete) technology. This high performance device is suited to home appliances or industrial systems and drives loads up to 12 A.

This ACST1235-8FP switch embeds a Triac structure and a high voltage clamping device able to absorb the inductive turn-off energy and withstand line transients such as those described in the IEC 61000-4-5 standard. It offers an extremely high static dV/dt immunity of 2 kV/μs minimum at 150 °C junction temperature.

ACST1235-8FP enables applications to be compliant with IEC 61000-4-4 and IEC 61000-4-5.

Features

- 12 A medium current AC Switch
- Triac with self overvoltage protection
- High static immunity and dynamic commutation
- 800 V V_{DRM} / V_{RRM}
- High junction temperature: $T_j = 150$ °C max
- Complies with UL standards (File ref: E81734)
- TO-220FPAB-insulated package 1500V_{RMS}
- ECOPACK®2 and RoHs compliant component

Applications

Motor control for home appliances:

- Washing machine universal drum motors
- Compressor of fridge or air conditioner

Figure 1. Functional diagram

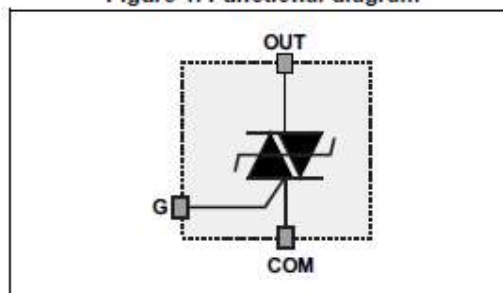
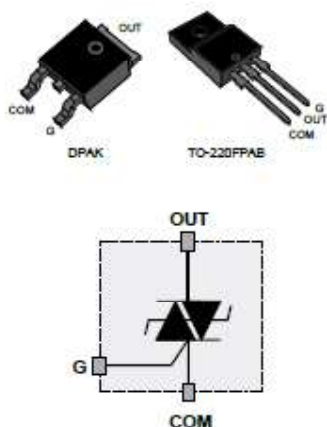


Table 1. Device summary

Symbol	Value	V_{DRM} / V_{RRM}
$I_{T(RMS)}$	12	A
I_{GT}	35	mA
V_{DRM} / V_{RRM}	800	V

2 A - 800 V overvoltage protected AC switch



Features

- Triac with overvoltage crowbar technology
- High noise immunity: static $dV/dt > 500 \text{ V}/\mu\text{s}$
- TO-220FPAB insulated package:
 - complies with UL standards (File ref : E81734)
 - insulation voltage: $2000 \text{ V}_{\text{RMS}}$
- Benefits:
 - Enables equipment to meet IEC 61000-4-5
 - High off-state reliability with planar technology
 - Needs no external overvoltage protection
 - Reduces the power passive component count
 - Interfaces directly with the micro-controller
 - High immunity against fast transients described in IEC 61000-4-4 standards

Applications

- AC mains static switching in appliance and industrial control systems
- Driving low power highly inductive loads like solenoid, pump, fan, and micro-motor

Description

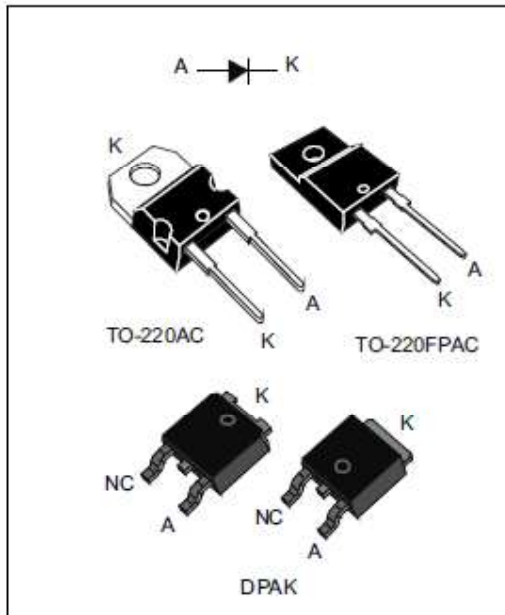
The **ACST2** series belongs to the ACS / ACST power switch family. This high performance device is suited to home appliances or industrial systems and drives loads up to 2 A.

This **ACST2** switch embeds a Triac structure with a high voltage clamping device to absorb the inductive turn-off energy and withstand line transients such as those described in the IEC 61000-4-5 standards. The component needs a low gate current to be activated ($I_{GT} < 10 \text{ mA}$) and still shows a high electrical noise immunity complying with IEC standards such as IEC 61000-4-4 (fast transient burst test).

Product status link	
ACST2	
Product summary	
$I_{T(RMS)}$	2 A
V_{DRM}/V_{RRM}	800 V
I_{GT}	10 mA

Ultrafast recovery - 1200 V diode

Datasheet - production data



Description

The high quality design of this diode has produced a device with low leakage current, regularly reproducible characteristics and intrinsic ruggedness. These characteristics make it ideal for heavy duty applications that demand long term reliability.

Such demanding applications include industrial power supplies, motor control, and similar mission-critical systems that require rectification and freewheeling. These diodes also fit into auxiliary functions such as snubber, bootstrap, and demagnetization applications.

The improved performance in low leakage current, and therefore thermal runaway guard band, is an immediate competitive advantage for this device.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	5 A
V_{RRM}	1200 V
$T_j(max)$	175 °C
$V_F (typ)$	1.25 V
$t_{rr} (typ)$	48 ns

Features

- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature
- ECOPACK®2 compliant component for DPAK on demand
- Insulated package: TO-220FPAC
 - Insulated voltage: 2000 V_{RMS} sine



STPS30H60C

Power Schottky rectifier

Features

- High junction temperature capability
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop
- High frequency operation

Description

Dual centre tab Schottky rectifier suited for high frequency switch mode power supply.

Packaged in TO-220FPAB, TO-220AB, TO-247, I²PAK, and D²PAK, this device is intended to be used in notebook and LCD adaptors and desktop SMPS. In these applications the STPS30H60C provides a good margin between the remaining voltages applied on the diode and the voltage capability of the diode.

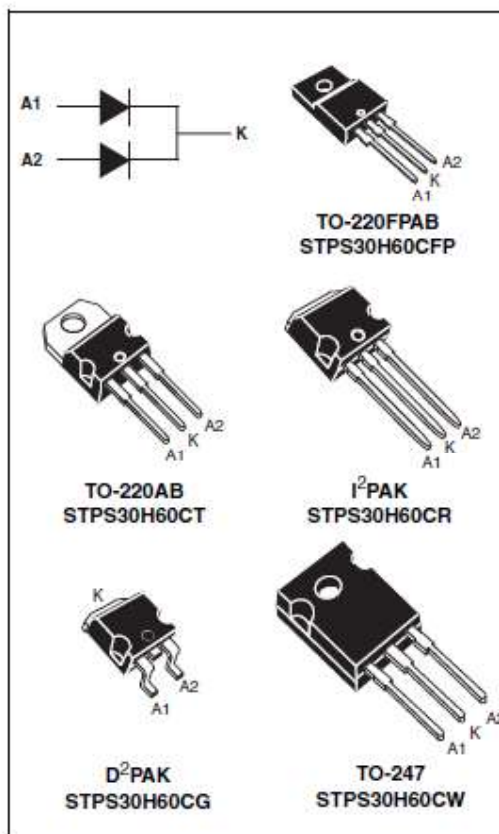


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 X 15 A
V_{RRM}	60 V
T_J	175 °C
V_F (typ)	0.535 V

4.2 Construction Note

	ACSTxx-8FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours – France
Technology / Process family	Overvoltage protected AC switch
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours – France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	FERDxxH100SFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	Field-effect rectifier diode
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STPSxxCFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	High Voltage Power Schottky Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STPSxxCFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	Power Schottky Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTHxxCFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	High Efficiency Ultrafast Diode
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH10LCD06CFP – STTH20LCD06CFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier for SMPS
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH16L06CFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH2003CFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	T405T-6FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Triac
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	T435T-600FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Snubberless Triac
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	TS1220-6FP – TS820-600FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Sensitive SCRs
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	TYN612MFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	SCR
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAB
Final testing information	
Testing location	Subcontractor (993x) - China

	STPSxxFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Singapore - China
Technology / Process family	Power Schottky Rectifier
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ST Singapore - China
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH10LCD06FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier for Flat Panel Displays
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTHxxFP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Turbo 2 Ultrafast – High Voltage Rectifier for Flat Panel Displays
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH25M06FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast High Voltage Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH812FP – STTH512FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Recovery – 1200V Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

	STTH1502FP – STTH802FP
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Recovery Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

STTH810FP	
Wafer/Die fab. information	
Wafer fab manufacturing location	ST Tours - France
Technology / Process family	Ultrafast Recovery – High Voltage Diode
Wafer Testing (EWS) information	
ST Tours - France	ST Tours - France
Assembly information	
Assembly site	Subcontractor (993x) - China
Package description	TO-220FPAC
Final testing information	
Testing location	Subcontractor (993x) - China

5 TESTS PLAN AND RESULTS SUMMARY

5.1 Test vehicles

Lot #	Part Number	Package	Comments
L1	STPS30H60CFP	TO-220FPAB	Qualification lot 1
L2	STTH512FP	TO-220FPAC	Qualification lot 2
L3	ACST1235-8FP	TO-220FPAB	Qualification lot 3
L4	ACST610-8FP	TO-220FPAB	Qualification lot 4
L5	ACST210-8FP	TO-220FPAB	Qualification lot 5

Detailed results in below chapter will refer to these references.

5.2 Test plan

Stress	Abv	Reference	Lot	SS	Comments	Test plan
Pre and Post-Stress Electrical Test	TEST	User specification or supplier's standard Specification	All qualification parts tested per the requirements of the appropriate device specification.			
Pre-conditioning	PC	J-STD-020 JESD22-A113	All qualification parts tested per the requirements of the appropriate device specification.		As per targeted MSL Not applicable for PTH and WLCSP without coating	
MSL research	MSL	J-STD-020			Not applicable for PTH and WLCSP without coating	
External Visual	EV	JESD22B-101	All qualification parts tested per the requirements of the appropriate device specification.		Done during Assembly → Test & Finish inspection	
Parametric Verification	PV	User specification	L3 L4 L5	30 per Test		x
High Temperature Reverse Bias	HTRB	MIL-STD-750-1 M1038 Method A (for diodes, rectifiers and Zeners) M1039 Method A (for transistors)	L2 L3	77 77	WBI after HTRB applicable only for dissimilar metal (wire/meta) in case of no Cu wire	x
AC blocking voltage	ACBV	MIL-STD-750-1 M1040 Test condition A			Required for Thyristor only. Alternative to HTRB	
High Temperature Forward Bias	HTFB	JESD22 A-108			Not required, applicable only to LEDs Alternative to HTRB	
High Temperature Operating Life	HTOL				Covered by HTRB or ACSV	
Steady State Operational	SSOP	MIL-STD-750-1 M1038 Test condition B			Required for Voltage Regulator (Zener) only.	
High Temperature Gate Bias	HTGB	JESD 22A-108			Required for Power MOSFET – IGBT only.	
High Temperature Storage Life	HTSL	JESD22 A-103			Covered by HTRB	
Temperature Humidity Storage	THS	JESD22 A-118			Covered by H3TRB	
Temperature Cycling	TC	JESD22A-104	L1	77		x
Temperature Cycling Hot Test	TCHT	JESD22A-104			Required for Power MOSFET – IGBT only.	
Temperature Cycling Delamination Test	TCDT	JESD22A-104 J-STD-035			Required for Power MOSFET – IGBT only. Alternative to TCHT	
Wire Bond Integrity	WBI	MIL-STD-750 Method 2037			For dissimilar metal bonding systems only	
Unbiased Highly Accelerated Stress Test	UHAST	JESD22A-118 or A101			Required for SCR/TRIAC RECTIFIER and Protection devices	
Autoclave	AC	JESD22A-102			Alternative to UHAST	
Highly Accelerated Stress Test	HAST	JESD22A-110			Covered by H3TRB (same failure mechanisms activation).	
High Humidity High Temperature Reverse Bias	H3TRB	JESD22A-101	L1 L2	77 77	Alternative to HAST	x
High Temperature High Humidity Bias	HTHHB	JED22A-101			Not required, LED only	
Intermittent Operational Life / Thermal Fatigue	IOL	MIL-STD-750 Method 1037	L4	77	For power devices. Not required for Transient Voltage Suppressor (TVS) parts	x

Stress	Abrv	Reference	Lot	SS	Comments	Test plan
Power and Temperature Cycle	PTC	JED22A-105			For power devices. Not required for Transient Voltage Suppressor (TVS) parts Perform PTC if $\Delta T_j > 100^\circ\text{C}$ cannot be achieved with IOL Alternative to IOL	
ESD Characterization	ESD HBM	AEC Q101-001 and 005				
ESD Characterization	ESD CDM	AEC Q101-001 and 005				
Destructive Physical Analysis	DPA	AEC-Q101-004 Section 4			After H3TRB and TC	
Physical Dimension	PD	JESD22B-100	L3 L4 L5	30 30 30		x
Terminal Strength	TS	MIL-STD-750 Method 2036			Required for leaded parts only	
Resistance to Solvents	RTS	JESD22B-107			Not applicable for Laser Marking	
Constant Acceleration	CA	MIL-STD-750 Method 2006			Required for hermetic packaged parts only.	
Vibration Variable Frequency	VVF	JESD22B-103			Required for hermetic packaged parts only.	
Mechanical Shock	MS	JESD22 B-104			Required for hermetic packaged parts only.	
Hermeticity	HER	JESD22A-109			Required for hermetic packaged parts only.	
Resistance to Solder Heat	RSH	JESD22 A-111 (SMD) B-106 (PTH)	L1	30	Not applicable for SMD pitch < 0.5mm, package size > 5.5*12.5mm and die paddle > 2.5*3.5mm	x
Solderability	SD	J-STD-002 JESD22B102	L1	4*15		x
Dead Bug Test	DBT	ST Internal specification			Mandatory for SMD package Data collection for PTH package	
Thermal Resistance	TR	JESD24-3, 24-4, 24-6 as appropriate			Required in case of process change. Not applicable to protection device as no limit specified in the datasheet	
Wire Bond Strength	WBS	MIL-STD-750 Method 2037	L3 L4	10 10	Covered during workability trials	x
Bond Shear	BS	AEC-Q101-003	L3 L4	10 10	Covered during workability trials	x
Die Shear	DS	MIL-STD-750 Method 2017			Not Applicable to parts with solder paste die attach	x
Unclamped Inductive Switching	UIS	AEC-Q101-004 section 2			Required for Power MOS and internally clamped IGBTs only	
Dielectric Integrity	DI	AEC-Q101-004 section 3			Required for Power MOSFET – IGBT only.	
Short Circuit Reliability Characterization	SCR	AEC-Q101-006			Required for smart power parts only	
Whisker Growth Evaluation	WG	AEC-Q005 JESD201	L1	5*6		x
Screwing test	SCW	-	L1 L3	22 22		x
Early Life Failure Rate	ELFR	JESD74			Recommended for new techno development in case of identified failure mechanism	
Functional Test (in rush, di/dt,...)	FT	Internal specification				
Repetitive Surge	RS	Internal specification			Required for protection devices only.	
Low Temperature Storage	LTS	JESD-22 A119: 209			AQG324 test for Modules	
Thermal shock test	TST	JESD22-A104			AQG324 test for Modules	

Power Cycling (seconds)	PC sec	MIL-STD750-1 Method1037			AQG324 test for Modules	
Power Cycling (minutes)	PC min	MIL-STD750-1 Method1037			AQG324 test for Modules	
Mechanical shock	MS	IEC 60068-2- 27			AQG324 test for Modules	
Vibration	V	IEC60068-2-6			AQG324 test for Modules	

5.3 Results summary

Test	PC	Std Ref.	Conditions	Steps / Duration	SS	Failure / SS				
						L1	L2	L3	L4	L5
Parametric Verification	-	ST Datasheet	Over part temperature range (note1)	-		Refer to paragraph 6.2 in Annexes				
PD	-	JESD22 B-100	-	-		Refer to paragraph 6.3 in Annexes				
HTRB	N	MIL-STD-750-1 M1038 Method A	Tj=125°C Voltage=800V	1Khrs	2*77 (154)	-	-	0/77	-	-
			Tj=150°C Voltage=960V			-	0/77	-	-	-
TC	N	JESD22-A104	-65/+150°C 2cy/h	500Cy	77	0/77	-	-	-	-
RSH	N	JESD22 B-106	Dipping 270°C-7s	-	30	0/30	-	-	-	-
H3TRB	N	JESD22 A-101	85°C; 85% RH Voltage=100V	1Khrs	2*77 (154)	-	0/77	-	-	-
			85°C; 85% RH Voltage=48V			0/77	-	-	-	-
IOLT	N	MIL-STD 750 Method 1037	ΔTj=100°C Ton=Toff=210s	8575Cy	77	-	-	-	0/77	-
SD	N	J-STD-002	Wet ageing SnPb bath 245°C	-	15	0/15	-	-	-	-
			Wet ageing SnAgCu bath 245°C	-	15	0/15	-	-	-	-
SCREW	N	ST 0063378	Torque=0.6N.m	-	44	0/22	-	0/22	-	-
WG	N	AEC-Q005 JESD201	No reflow THS 30°C/60%RH	4Krs	6	-	-	-	-	0/6
			Reflow SnPb 220°C TC -40°C/85°C	1.5Kcy	6	-	-	-	-	0/6
			Reflow Pb Free 260°C TC -40°C/85°C	1.5Kcy	6	-	-	-	-	0/6
			Reflow SnPb 220°C THS 55°C/85%RH	4Krs	6	-	-	-	-	0/6
			Reflow Pb Free 260°C THS 55°C/85%RH	4Krs	6	-	-	-	-	0/6

Note 1: These data are indicative values given as information only. Please note that the ST guarantee is the compliance of the products to the ST datasheet. Parameters distributions are not considered as a ST guarantee under any circumstances.

Please note that these electrical parameters are 100% tested at 25°C at Final stage of back-end manufacturing before deliveries to customers.”

6 ANNEXES

6.1 Parametric Verification

ACST210-8FP

TEST	IDRM	IRRM	IDRM	IRRM	IGT I	IGT II	IGT III
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	125°C	25°C	25°C	25°C
Condition 2	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V	VOUT=12V	VOUT=12V	VOUT=12V
Condition 3					RL=33Ω	RL=33Ω	RL=33Ω
Min. Datasheet							
Max. Datasheet	10μA	10μA	0.5mA	0.5mA	10	10	10
UNIT	nA	nA	μA	μA	mA	mA	mA
N	30	30	30	30	30	30	30
Min	3,88	14,82	6,41	65,64	3,01	6,35	4,67
Max	50,86	68,84	9,51	89,28	3,23	8,70	5,84
Avg	11,68	44,25	8,41	74,28	3,13	7,78	4,99

TEST	VGT I	VGT II	VGT III	IL I	IL II	IL III	IH D	IH R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C
Condition 2	VOUT=12V	VOUT=12V	VOUT=12V	IG=12mA	IG=12mA	IG=12mA	IOU=100 mA	IOU=100 mA
Condition 3	RL=33Ω	RL=33Ω	RL=33Ω					
Min. Datasheet								
Max. Datasheet	1.1	1.1	1.1	25	35	25	10	10
UNIT	V	V	V	mA	mA	mA	mA	mA
N	30	30	30	30	30	30	30	30
Min	0,739	0,695	0,744	11,62	18,06	7,12	6,81	6,28
Max	0,747	0,704	0,768	12,78	19,33	7,49	7,16	6,63
Avg	0,743	0,700	0,751	12,15	18,87	7,31	6,96	6,45

TEST	VTM D	VTM R	VTO D	VTO R	RD D	RD R
EQUIPMENT	TESEC	TESEC	-	-	-	-
Condition 1	25°C	25°C	125°C	125°C	125°C	125°C
Condition 2	IOU=2.8A	IOU=2.8A				
Condition 3	Tp=500μs	Tp=500μs				
Min. Datasheet						
Max. Datasheet	2	2	0.9	0.9	250	250
UNIT	V	V	V	V	mΩ	mΩ
N	30	30	30	30	30	30
Min	1,286	1,327	0,802	0,805	159,20	174,76
Max	1,307	1,349	0,812	0,816	164,33	180,95
Avg	1,298	1,332	0,808	0,809	162,28	176,47

ACST1235-8FP

TEST	IDRM	IRRM	IRRM	IRRM	IDRM	IRRM
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	125°C	150°C	150°C
Condition 2	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V
Condition 3						
Min. Datasheet						
Max. Datasheet	1μA	1μA	500	500	1.2mA	1.2mA
UNIT	nA	nA	μA	μA	μA	μA
N	30	30	30	30	30	30
Min	3,94	8,91	26,30	40,26	175,6	241,7
Max	22,46	29,26	39,98	62,69	244,2	345,1
Avg	14,17	16,20	33,37	50,92	210,6	291,8

TEST	IGT I	IGT II	IGT III	VGT I	VGT II	VGT III	IL I	IL II	IL III
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C
Condition 2	VD=12V	VD=12V	VD=12V	VD=12V	VD=12V	VD=12V	IG=42mA	IG=42mA	IG=42mA
Condition 3	RL=33Ω	RL=33Ω	RL=33Ω	RL=33Ω	RL=33Ω	RL=33Ω			
Min. Datasheet	1.75	1.75	1.75						
Max. Datasheet	35	35	35	1	1	1	30	30	30
UNIT	mA	mA	mA	V	V	V	mA	mA	mA
N	30	30	30	30	30	30	30	30	30
Min	10,70	10,99	16,69	0,770	0,664	0,777	21,28	14,55	13,95
Max	11,09	11,40	17,89	0,784	0,672	0,792	22,94	15,23	14,92
Avg	10,91	11,20	17,10	0,775	0,668	0,783	22,42	14,93	14,51

TEST	IH D	IH R	VTM D	VTM R	VTO D	VTO R	RD D	RD R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC		-	-	-
Condition 1	25°C	25°C	25°C	25°C	150°C	150°C	150°C	150°C
Condition 2	IT=500mA	IT=500mA	ITM=17A	ITM=17A				
Condition 3			Tp=380μs	Tp=380μs				
Min. Datasheet								
Max. Datasheet	30	30	1.5	1.5	0.9	0.9	38	38
UNIT	mA	mA	V	V	V	V	mΩ	mΩ
N	30	30	30	30	30	30	30	30
Min	15,20	12,29	1,340	1,408	0,799	0,812	29,83	33,89
Max	16,69	13,29	1,356	1,422	0,804	0,816	30,18	34,33
Avg	16,26	12,91	1,348	1,415	0,802	0,814	29,96	34,15

ACST610-8FP

TEST	IDRM	IRRM	IDRM	IRRM	IGT I	IGT II	IGT III
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	125°C	25°C	25°C	25°C
Condition 2	VDRM=800V	VRRM=800V	VDRM=800V	VRRM=800V	VOUT=12V	VOUT=12V	VOUT=12V
Condition 3					RL=33Ω	RL=33Ω	RL=33Ω
Min. Datasheet							
Max. Datasheet	20μA	20μA	500μA	500μA	10	10	10
UNIT	nA	nA	μA	μA	mA	mA	mA
N	30	30	30	30	30	30	30
Min	3,62	62,95	11,38	116,70	3,15	4,73	5,49
Max	26,30	201,20	39,88	286,20	3,29	4,97	5,96
Avg	16,52	114,09	21,67	164,51	3,22	4,84	5,73

TEST	VGT I	VGT II	VGT III	IL I	IL II	IL III	IH D	IH R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	25°C	25°C	25°C	25°C
Condition 2	VOUT=12V	VOUT=12V	VOUT=12V	IG=12mA	IG=12mA	IG=12mA	IOUT=500 mA	IOUT=500 mA
Condition 3	RL=33Ω	RL=33Ω	RL=33Ω					
Min. Datasheet								
Max. Datasheet	1	1	1	30	40	30	25	25
UNIT	V	V	V	mA	mA	mA	mA	mA
N	30	30	30	30	30	30	30	30
Min	0,696	0,663	0,739	11,81	13,66	12,98	9,79	8,40
Max	0,706	0,672	0,748	12,69	14,05	16,00	10,59	10,09
Avg	0,700	0,666	0,742	12,25	13,83	14,80	10,18	9,49

TEST	VTM D	VTM R	VTM D	VTM R	VTO D	VTO R	RD D	RD R
EQUIPMENT	TESEC	TESEC	TESEC	TESEC		-	-	-
Condition 1	25°C	25°C	25°C	25°C	125°C	125°C	125°C	125°C
Condition 2	IOUT=2.1A	IOUT=2.1A	IOUT=8.5A	IOUT=8.5A				
Condition 3	Tp=500μs	Tp=500μs	Tp=500μs	Tp=500μs				
Min. Datasheet								
Max. Datasheet	1.4	1.4	1.7	1.7	0.9V	0.9V	80mΩ	80mΩ
UNIT	V	V	V	V	V	V	mΩ	mΩ
N	30	30	30	30	30	30	30	30
Min	1,048	1,068	1,375	1,449	0,815	0,822	64,82	74,37
Max	1,069	1,075	1,405	1,463	0,830	0,825	66,51	75,78
Avg	1,057	1,070	1,388	1,452	0,822	0,823	65,46	75,06

STPS30H60CFP

TEST	VR	VF	VF	VF	VF
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	25°C	25°C	125°C
Condition 2	IAK = 1mA	IF=7.5A	IF=15A	IF=30A	IF=7.5A
Min. Datasheet	600V				435mV
Max. Datasheet		550mV	660mV	820mV	470mV
UNIT	V	mV	mV	mV	mV
N	60	60	60	60	60
Min	67.38	0.4957	0.5736	0.695	0.4072
Max	73.32	0.522	0.6128	0.748	0.4386
Avg	71.54	0.511195	0.60061833 3	0.7333	0.42924

TEST	VF	VF	IR	IR
EQUIPMENT	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	125°C	25°C	125°C
Condition 2	IF=15A	IF=30A	VR = 60V	VR = 60V
Min. Datasheet	535mV	635mV	60uA	8mA
Max. Datasheet	570mV	690mV		25mA
UNIT	mV	mV	μA	μA
N	60	60	60	60
Min	0.5118	0.6184	5.369	6.273
Max	0.54	0.64	11.47	10.91
Avg	0.53	0.63	8.11	8.62

STTH512FP

TEST	VR	VF	VF	VF	IR	IR
EQUIPMENT	TESEC	TESEC	TESEC	TESEC	TESEC	TESEC
Condition 1	25°C	25°C	125°C	150°C	25°C	125°C
Condition 2	IAK = 1mA	IF=5A	IF=5A	IF=5A	VR = 1200V	VR = 1200V
Min. Datasheet	1200V					
Max. Datasheet		2.2V	2V	1.9V	5 μA	30 μA
UNIT	V	V	V	V	μA	μA
N	40	40	20	20	40	20
Min	145	1.49	1.21	1.15	0	2.89
Max	151	1.78	1.23	1.23	835.10	3.31
Avg	1487.27	1.6	1.25	1.19	29.43	3.07

6.2 Assembly Tests

TO-220FPAB (3L) package

Wire pull Test

	Conditions	Sample size	Failure /SS
ACST1235-8FP	450g Min	10 units	0/10

Ball / Wedge Shear Test

	Conditions	Sample size	Failure /SS
ACST1235-8FP	900g Min	10 units	0/10

TO-220FPAC (2L) package

Wire pull Test

	Conditions	Sample size	Failure /SS
ACST610-8FP	500g Min	10 units	0/10

Ball / Wedge Shear Test

	Conditions	Sample size	Failure /SS
ACST610-8FP	1000g Min	10 units	0/10

6.3 Physical Dimensions

TO-220FPAB package

Figure 18. TO-220FPAB package outline

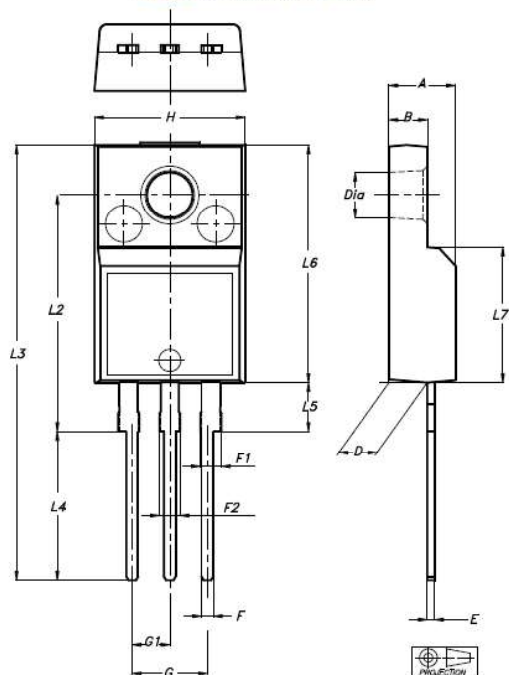


Table 5. TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	2.5	2.7	0.0988	0.1067
D	2.50	2.75	0.0988	0.1087
E	0.45	0.70	0.0178	0.0277
F	0.75	1.0	0.0296	0.0395
F1	1.15	1.70	0.0455	0.0672
F2	1.15	1.70	0.0455	0.0672
G	4.95	5.20	0.1957	0.2055
G1	2.40	2.70	0.0949	0.1067
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 typ.	
L3	28.60	30.60	1.1304	1.2095
L4	9.80	10.6	0.3874	0.4190
L5	2.90	3.60	0.1146	0.1423
L6	15.90	16.40	0.6285	0.6482
L7	9.00	9.30	0.3557	0.3676
Dia	3.0	3.20	0.1188	0.1265

Cote	A	B	D	E	F	F1	F2	G	G1	H	L2	L3	L4	L5	L6	L7	Dia
MIN	4,4	2,5	2,5	0,45	0,75	1,15	1,15	4,95	2,4	10	16	28,6	9,8	2,9	15,9	9	3
TYP																	
MAX	4,6	2,7	2,75	0,7	1	1,7	1,5	5,2	2,7	10,4	16	30,6	10,6	3,6	16,4	9,3	3,2
MIN	4,47	2,55	2,53	0,52	0,80	1,41	1,33	5,07	2,54	10,16	15,92	29,54	10,17	3,24	16,11	9,12	3,05
MAX	4,52	2,66	2,60	0,55	0,85	1,46	1,35	5,11	2,57	10,19	16,08	29,66	10,24	3,33	16,19	9,23	3,12
Avg	4,500	2,587	2,562	0,528	0,820	1,436	1,343	5,086	2,549	10,176	16,003	29,597	10,197	3,278	16,157	9,189	3,089

TO-220FPAC package

Figure 15. TO-220FPAC package outline

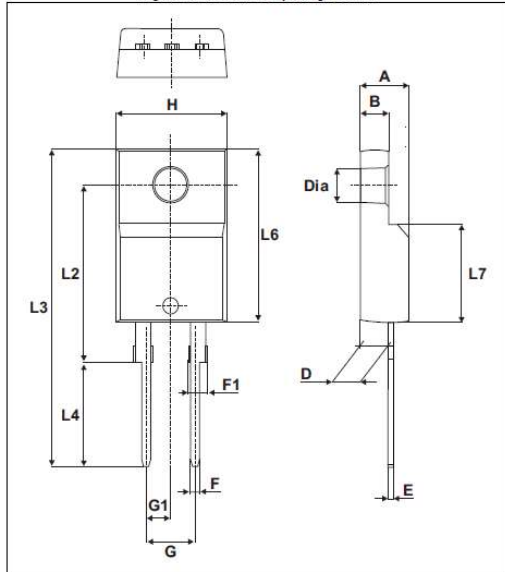


Table 7. TO-220FPAC package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	2.50		2.70	0.098		0.106
D	2.50		2.75	0.098		0.108
E	0.45		0.70	0.018		0.027
F	0.75		1.00	0.030		0.039
F1	1.15		1.70	0.045		0.067
G	4.95		5.20	0.195		0.205
G1	2.40		2.70	0.094		0.106
H	10.00		10.40	0.393		0.409
L2		16.00 Typ.			0.630 Typ.	
L3	28.60		30.60	1.126		1.205
L4	9.80		10.60	0.386		0.417
L6	15.90		16.40	0.626		0.646
L7	9.00		9.30	0.354		0.366
Dia.	3.00		3.20	0.118		0.126

Cote	A	B	D	E	F	F1	G	G1	H	L2	L3	L4	L6	L7	Dia
MIN	4,4	2,5	2,5	0,45	0,75	1,15	4,95	2,4	10	16	28,6	9,8	15,9	9	3
TYP															
MAX	4,6	2,7	2,75	0,7	1	1,7	5,2	2,7	10,4		30,6	10,6	16,4	9,3	3,2
MIN	4,41	2,58	2,54	0,52	0,80	1,37	5,04	2,54	10,14	15,96	29,59	10,16	16,10	9,17	3,10
MAX	4,48	2,60	2,59	0,54	0,82	1,41	5,08	2,57	10,21	16,04	29,66	10,23	16,16	9,20	3,16
Avg	4,442	2,585	2,564	0,530	0,811	1,394	5,064	2,549	10,177	16,003	29,631	10,197	16,141	9,181	3,123

6.4 Thermal Resistance

TEST	RTH (j-c) (ACST210-8FP)	RTH (j-c) (ACST1235-8FP)	RTH (j-c) (ACST610-8FP)
EQUIPMENT	TEST CALCULEES	TEST CALCULEES	TEST CALCULEES
Condition 1	25°C	25°C	25°C
Min. Datasheet			
Typ. Datasheet			
Max. Datasheet	7	3.5	4.25
UNIT	°C/W	°C/W	°C/W
N	10	5	5
Min	2,96	1,93	2,37
Max	3,22	2,05	2,51
Avg	3,10	1,97	2,45

6.5 Tests description

Test name	Description	Purpose
Die Oriented		
HTRB High Temperature Reverse Bias / HTFB High Temperature Forward 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. Forward: device is forward biased with a current fixed and adjusted to reach the targeted junction temperature	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. To assess active area and contacts integrity
Package Oriented		
H3TRB High Humidity High Temperature Reverse 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.
IOLT Intermittent Operating Life Test	All test samples shall be subjected to the specified number of cycles. When stabilized after initial warm-up cycles, a cycle shall consist of an "on" period, when power is applied suddenly, not gradually, to the device for the time necessary to achieve a delta case temperature followed by an "off" period, when the power is suddenly removed, for cooling the case through a similar delta temperature.	The purpose of this test is to determine compliance with the specified numbers of cycles for devices subjected to the specified conditions. It accelerates the stresses on all bonds and interfaces between the chip and mounting face of devices subjected to repeated turn on and off of equipment and is therefore most appropriate for case mount style (e.g., stud, flange, and disc) devices.
RSH Resistance to Solder Heat	Package is dipped by the leads in a solder bath after initial wet ageing (for SMDs only). Assessment by electrical test + no external crack	To simulate wave soldering process and verify that package will not be thermally damaged during this step.
SD Solderability	The purpose of this test method is to provide a referee condition for the evaluation of the solderability of terminations (including leads up to 0.125 inch in diameter) that will be assembled using tin lead eutectic solder.	This evaluation is made on the basis of the ability of these terminations to be wetted and to produce a suitable fillet when coated by tin lead eutectic solder. These procedures will test whether the packaging materials and processes used during the manufacturing operations process produce a component that can be successfully soldered to the next level assembly using tin lead eutectic solder. A preconditioning test is included in this test method, which degrades the termination finish to provide a guard band against marginal finish.
TW/WG Whiskers Growth	Forced growing of Tin Whiskers by various kind of environmental stress: temperature, moisture and temperature cycling.	To ensure no risk of electrical short due to Tin Whisker growth.